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**Report No. 179a-MA**

**APPRAISAL OF A SECOND HIGHWAY PROJECT**

**MALAYSIA**

**July 16, 1973**

**Transportation Division  
Asia Region**

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### CURRENCY EQUIVALENTS

Currency Unit	=	Malaysian Dollar (M\$)
US\$1	=	M\$ 2.33 <sup>1/</sup>
M\$ 1	=	US\$0.429
M\$ 1 million	=	US\$429,185

### WEIGHTS AND MEASURES British/US System

<u>British/US</u>		<u>Metric</u>
1 mile (mi)	=	1.6093 kilometers (km)
1 foot (ft)	=	0.3048 meters (m)
1 square mile (mi <sup>2</sup> )	=	2.5898 square kilometers (km <sup>2</sup> )
1 cubic yard (cu yd)	=	0.7646 cubic meters (m <sup>3</sup> )
1 acre (ac)	=	0.4047 hectares (ha)
1 long ton (lg ton)	=	1.0160 metric tons (m ton)
1 long ton (lg ton)	=	1.1200 short tons (sh ton)
1 imperial gallon (IMg)	=	4.545 liters (l)

### ABBREVIATIONS AND ACRONYMS

ADB	-	Asian Development Bank
EPU	-	Economic Planning Unit
ER	-	Economic Return
GNP	-	Gross National Product
HPU	-	Highway Planning Unit
MOC	-	Ministry of Communications
mph	-	Miles per hour
MR	-	Malayan Railway
MWP	-	Ministry of Works and Power
PRD	-	Planning and Research Division
PWD	-	Public Works Department
UNDP	-	United Nations Development Programme
VLD	-	Vallentine, Laurie and Davies
vpd	-	Vehicles per day

### FISCAL YEAR

January 1 to December 31

1/ From June 21, 1973 the Malaysian dollar has floated in relation to the US dollar. It is expected that the rate will be stabilized at M\$ 2.33 = US\$1, the rate that applied during the first two weeks of July. The previous rate was M\$ 2.54 = US\$1.

MALAYSIA

APPRAISAL OF A SECOND HIGHWAY PROJECT

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MAPS

## MALAYSIA

### APPRAISAL OF A SECOND HIGHWAY PROJECT

#### SUMMARY AND CONCLUSIONS

i. The Federation of Malaysia covers the southern part of the Kra or Malay Peninsula (West Malaysia) and the northeastern part of Borneo (East Malaysia). West Malaysia's transport system is generally well-developed; East Malaysia has only limited land transport by road and rail. The highway system totals some 11,000 mi (87% paved) in West Malaysia, and some 3,000 mi (19% paved) in East Malaysia. In an effort to improve road maintenance, the Government will shortly embark on a Road Maintenance Study by consultants (to be Bank-financed under Loan 851-MA). In West Malaysia, the Government-owned Malayan Railways operates a total system of 1,036 mi and is presently carrying out a modernization program to increase its efficiency and regain financial viability; in East Malaysia rail services (by the Sabah State Railways) are being maintained until roads have been improved. The main ports in West Malaysia are Klang and Penang. Port facilities in Penang are adequate; those in Klang are presently being expanded. Long-term investment requirements in both ports are presently being studied. A port improvement program is underway in East Malaysia to bring its six major ports for seagoing traffic up to a satisfactory standard. There are eight airports in West Malaysia and nine in East Malaysia; an airport improvement program is underway.

ii. The Second Malaysia Plan (1971-75) allocates a total of about M\$ 1.2 billion, or 16% of all public development expenditures, to investments in the transport sector. This is more than double the M\$ 545 million spent on transport during the First Malaysia Plan (1966-70), which then represented 13% of total public investments. The transport part of the Second Malaysia Plan is based on the 1968 Malaysia Transport Survey, which was financed by UNDP with the Bank acting as executing agency. The Transport Survey and the Plan emphasize the improvement and extension of West Malaysia's existing transport facilities in all modes. In East Malaysia high priority is assigned to improving road and port facilities and, in view of the region's sparse population and difficult terrain, to providing air service to remote areas. The Government has now started a mid-term review of the Plan and anticipates an increase in the transport allocation. The two main transport planning agencies have been strengthened by two UNDP-financed advisers. Among the transport policy matters which are presently under review are the road user charge system and the road licensing system.

iii. The Bank is financing three transport projects in Malaysia: the first, a port project in Sabah in East Malaysia (Loan 774-MA, May 1971), the second, a railway project (Loan 799-MA, November 1971), and the third, an urban transport project (Loan 851-MA, May 1972) in West Malaysia. All three projects experienced slight initial delays in their execution but they are expected to be completed by their respective closing dates.

iv. The presently proposed fourth transport project includes: (a) construction and improvement of about 90 mi of Malaysia's main highway (Route I) in the vicinity of Kuala Lumpur; (b) construction supervision by consultants; (c) retroactive financing of a supplementary feasibility study and detailed engineering of about 22 mi of Route I; (d) detailed engineering of about 200 mi of road; and (e) two urban development studies. The construction element of the project is based on a highway feasibility study by consultants in 1971, which was UNDP-financed with the Bank acting as executing agency; detailed engineering, also by consultants for most of the works, was financed under Loan 851-MA (urban highway project). A supplementary feasibility study and additional detailed engineering were required to complete the preparation. Retroactive financing for this work, not to exceed US\$100,000, is included in the Project. The project was appraised in December 1972 and January 1973; an updating mission was made in April 1973.

v. The estimated cost of the project is US\$37.2 million, with a proposed Bank participation of US\$19.5 million, or 53%. Cost estimates for road construction are based on detailed quantity estimates and unit prices which were developed by the consultants for each work item and checked against bids received for recent civil works contracts. The costs of construction supervision, detailed engineering and urban studies are based on recent contracts for similar work in Malaysia. During loan negotiations, project cost estimates were reviewed in the light of bids for part of the works, received on June 18, 1973.

vi. Responsibility for project execution, except for one urban study, will be vested in the Public Works Department (PWD) in the Ministry of Works and Power (MWP), assisted by consultants for the construction supervision, one of the urban studies and the detailed engineering. The Economic Planning Unit, which is the Government's central planning agency, will be responsible for the other urban development study. The study will be carried out by consultants. Contracts for the civil works will be awarded after international competitive bidding. Where appropriate, contracts are being tailored to the financing and working capabilities of the local construction industry. The bids opened on June 18, 1973 indicated a good response from local contractors for the smaller contract. The Government had the consultants study the possibility of using labor-intensive construction methods, but because of the higher cost and longer construction period involved, the Government decided to tender the contracts in the conventional way. Even so, the project will provide direct employment for about 2,000 men over the three-year construction period.

vii. The proposed Bank loan of US\$19.5 million will finance the foreign exchange cost of the project. Loan funds will be disbursed on the basis of 55% of the cost of road construction and improvement (the estimated foreign exchange component for this item) and the actual foreign exchange cost of consultants' services (estimated at 35% for construction supervision; 30% for the detailed engineering of Route I; 50% for the detailed engineering of new roads and at 45% for the urban studies). The Government will finance the local cost of the project, estimated at US\$17.7 million.

viii. Construction and improvement of the road sections under this project will benefit major segments of the population both by lowering cost of personal travel and prices of consumer goods. The project will also contribute to a balanced development of the Klang Valley Region and, in the form of reduced transport and travel costs, will offer inducements for industries and other enterprises to settle away from the congested capital. In this way, the project will indirectly support the Government's policy of restrained growth for the capital area. Based on vehicle operating cost and time savings, and reductions in road maintenance cost, the economic rates of return for the individual sections range between 20 and 29%.

ix. The project is suitable for a Bank loan of US\$19.5 million to the Government of Malaysia for a 24-year term, including four years grace, reflecting the estimated economic life of the construction element of the project.



## MALAYSIA

### APPRAISAL OF A SECOND HIGHWAY PROJECT

#### I. INTRODUCTION

##### A. The Project

1.01 The Government of Malaysia has asked the Bank to assist in financing a project consisting of: (a) the construction and improvement of about 90 mi of Route I, West Malaysia's main highway, and construction supervision by consultants; (b) retroactive financing of consulting services for a supplementary feasibility study and detailed engineering of about 22 mi of Route I; (c) consulting services for detailed engineering of about 200 mi of roads; and (d) consulting services for high priority urban development studies (including some detailed engineering) in the Kuala Lumpur area and two secondary growth centers.

##### B. Previous Transport Projects

1.02 This proposed highway project will be the fourth Bank-financed transportation project in Malaysia. The first was a port project in Sabah (Loan 774-MA of May 1971), the second a railway project (Loan 799-MA of November 1971), and the third an urban highway project (Loan 851-MA of May 1972). Both the port project (para 2.13) and the railway project (para 2.10) are slightly behind schedule because of the contractors' mobilization difficulties and the railway's unfamiliarity with the Bank's procurement procedures, respectively. The urban project (para 3.02) had some initial delays because pre-contractual works by the Government took longer than anticipated. However, all three projects are presently expected to be completed by their respective closing dates.

##### C. Bank Group Transport Lending Strategy

1.03 The transport part of the Second Malaysia Plan is based on the 1968 Malaysia Transport Survey which was UNDP-financed with the Bank acting as executing agency, and which was carried out by R. R. Nathan Associates Inc. (US). All previous Bank transport projects, as well as this project, were identified by the Transport Survey, and serve to increase the economic efficiency of transport and to expand the capacity of existing transport facilities in support of the Second Malaysia Plan.

##### D. Project Preparation

1.04 The Transport Survey concluded that the main traffic arteries connecting the economic centers of the west coast of West Malaysia require additional capacity. A Bank mission in August 1969 identified, on the basis of the Transport Survey, four high priority sections of Route I for feasibility study. The feasibility study, financed by the UNDP under Phase II of the Transport Survey, and carried out in 1971 by the Australian firm, Vallentine, Laurie and Davies (VLD), determined the improvements required in these

sections. Detailed engineering is in progress by the same firm, partly financed under Loan 851-MA. Two of the four sections are proposed for construction under this project (para 4.02). The urban aspects of the improvements proposed in the vicinity of Kuala Lumpur were reviewed by the Klang Valley Regional Planning and Development Study, UNDP-financed with the Bank acting as executing agency, and carried out by Shankland, Cox Partnership (UK).

1.05 The urban development studies would be eligible for financing by the United Nations Development Programme (UNDP). However, the UNDP funds for Malaysia are fully committed and there is no provision for new studies. The Government has confirmed its intention not to request changes in the program allocation and, consequently, has requested Bank financing for these high priority studies.

1.06 This report is based on information provided by the Government and consultants and on findings of appraisal missions by Messrs. H. J. Schlechtriem (Economist) in December 1972 and R. J. Mulligan (Engineer) in January 1973. An updating mission consisting of Messrs. H. R. Young and Schlechtriem was made in April 1973, at which time, also, Messrs. R. Venkateswaren (Economist) and S. Hara (Economist) of the Urban Projects Department completed the appraisal of the urban studies included in the project.

## II. THE TRANSPORTATION SECTOR

### A. The Country and its Economy

2.01 The Federation of Malaysia comprises 13 states in two separate geographical areas of Southeast Asia. Eleven states are on the Kra or Malay Peninsula (West Malaysia, 51,000 mi<sup>2</sup>) and two on the northeastern part of Borneo (East Malaysia, 77,000 mi<sup>2</sup>), some 400 mi to the east across the South China Sea. Malaysia has land borders with Thailand to the north on the peninsula, and with Indonesia to the south on Borneo. It is separated by a narrow sea channel from the island state of Singapore at the southern tip of the peninsula which, until 1965, was part of the Federation. Of the total population of 11.3 million, 9.5 million live in West Malaysia and 1.8 million in East Malaysia; average population growth is 2.6% p.a. Topography in both West and East Malaysia is generally rugged, making internal transport often difficult and costly.

2.02 A central mountain chain divides West Malaysia into the west coast region and the east coast region. Protected by the mountains against severe monsoons, and bordering on one of the world's most important shipping routes (the Straits of Malacca), the west coast has developed faster than the rest of the country. Two-thirds of the population live there and work either in the main urban centers where industries have grown or in the important agricultural and mining areas which produce, among other things, rubber and tin

for export. The states on the east coast and in East Malaysia are less advanced and rely mainly on timber and palm oil production, and fishery.

2.03 The objectives of the Second Malaysia Plan (1971-75) are to reduce income disparities between the regions and, since Malays represent the largest group of the society and are mainly employed in low income rural occupations, to increase both their income and ownership of the means of production. Further development of the manufacturing and agricultural sectors is expected to be the main contributor in the Government's strategy to achieve these objectives. Transport has a supporting but essential role in this strategy. The Bank's December 1972 economic mission forecasts GNP to grow at 6.3% p.a. in real terms, if Malaysia's export markets develop as envisaged. This is slightly higher than the 6.0% achieved during 1965 to 1970. Correspondingly, per capita income would rise from M\$ 981 in 1971 to M\$ 1,086 by 1975.

#### B. The Modes

2.04 Reflecting West Malaysia's general pattern of settlement and level of economic activity, the main transport corridor is along the west coast. Of particular importance are the flows of foreign trade. Historically, a large share of exports and imports was channelled through Singapore. Its withdrawal from Malaysia resulted in a major shift of traffic to the ports of Klang, west of Kuala Lumpur, and Penang in the northwest. It also contributed to the growth of the economic centers along the west coast, particularly Kuala Lumpur, Johore Bahru, Ipoh and Penang, which took over trading and production functions previously in Singapore. The industries in these centers increase the needs for intercommunication among them. Outside the west coast corridor, transport flows are relatively small and consist mainly of regional products moving to the west coast and consumer goods in the opposite direction. The development of the east coast, including large land development schemes presently underway or in preparation, will increase the importance of these flows in the future.

2.05 The economies of the two East Malaysian states, Sabah and Sarawak, are made up of a number of rather isolated developments along their coast with little interrelationships. The main demand for internal transport is to bring raw materials to the coast for export. Movement of goods between East and West Malaysia mainly consists of the supply of consumer goods to the East.

2.06 West Malaysia's transport system is generally well-developed and consists of highways, railways, ports, coastal shipping, and aviation. The system is adequate to meet present demand. Statistics on the relative importance of the individual modes are scarce at present, but will be available in the near future as a result of a comprehensive transport data collection effort by the Planning and Research Division (PRD) of the Ministry of Communications (MOC). The Transport Survey estimated for 1967 the total freight transport output at over 2.0 billion ton-miles, of which 58% was performed by roads, 32% by rail, and 10% by coastal shipping. East Malaysia's transport system is still underdeveloped; it consists mainly of ports, coastal and river shipping, and aviation. Land transport by rail and road is limited. The different modes are described in detail below.

### Highways

2.07 West Malaysia has about 11,000 mi of roads, serving 716,000 motor vehicles; East Malaysia has about 3,000 mi of roads and 80,000 motor vehicles. Details on the highway sector are given in Chapter III.

### Railways

2.08 The Government-owned Malayan Railway (MR) is the largest railway enterprise in Malaysia. In addition, there are some 40 short private railway lines in West Malaysia, serving mining developments and plantations, and the Sabah State Railway in East Malaysia. The Sabah State Railway carries mostly passengers between the coast and the interior; its services are highly uneconomical, but are being maintained until roads have been improved to carry the traffic. These road improvements are presently under study.

2.09 MR operates a system of 1,036 route mi meter gauge and mostly single track lines. The system is roughly Y-shaped, with Singapore at the base and the two arms extending from Gemas (137 mi north of Singapore), one along the west coast and the other through the central part of the peninsula, which link with the Thai railway system at the border. Freight traffic has been increasing at about 6% p.a. during the 1960's, but declined in 1970 and 1971 by 5% p.a. to 674 million ton-mi. Passenger traffic decreased steadily since 1960 to 334 million pass-mi in 1969, but increased in 1970 and 1971 to 402 million pass-mi in the latter year. MR incurred deficits since 1966 and revenues covered only 89% of operating expenses in 1970.

2.10 With Bank assistance (Loan 799-MA), MR has embarked on a modernization program that includes dieselization, replacing obsolete rolling stock, improving planning and traffic costing, and gradually reducing the labor force. The objectives of the program are to increase efficiency and to regain financial viability for MR.

2.11 The country's main highway, Route I, roughly parallels the west coast line of the railway. The consultants investigated the possible impact of the proposed road improvements of Route I on the distribution of traffic between road and rail in the feasibility study. They found that no significant changes are to be expected. Most of the railway's freight traffic consists of long haul bulk traffic, for which it has significant cost advantages over road transport. Since rail passenger transport (third class) is over 50% more expensive than bus (M\$4.7 per mi vs. M\$3.0), and slower, a major portion of rail passengers diverted to road transport in the past. The balance of traffic between road and rail now appears to have stabilized and the proposed road improvements are unlikely to affect the remaining railway passenger traffic. However, the railway will carry a diminishing proportion of total passenger traffic in the future.

## Ports

2.12 Port Klang and Port Penang are West Malaysia's largest ports. Both are administered by autonomous port authorities and handled in 1971, 3.9 million and 3.2 million tons respectively. The facilities in Klang are presently being expanded; those in Penang are generally adequate. Long-term investment requirements in both ports are presently being studied. Additional terminals include Port Dickson, Malaysia's petroleum port, and a number of small ports of regional importance. To accelerate the development of the east coast, the Government plans the construction of a new port in Kuantan on the east coast, and is constructing one in Johore Bahru opposite Singapore.

2.13 East Malaysia has six major ports, handling seagoing traffic: Kota Kinabalu, Labuan, Sandakan and Tawau in Sabah, and Kuching and Sibu in Sarawak. Together they have a throughput of about 1.5 million tons of general cargo. In addition, there are several minor ports and timber loading points. New facilities in Kota Kinabalu and Sandakan are presently being built with Bank assistance (Loan 774-MA); those in Kuching are being improved with assistance from the Asian Development Bank (ADB).

## Coastal Shipping

2.14 Coastal shipping is no longer an important mode of transportation in West Malaysia; it is still used for some shipments of petroleum and palm oil, particularly along the east coast. Coastal shipping is of more significance in East Malaysia, both for internal movements and for the supply of consumer goods from West Malaysia or Singapore.

## Aviation

2.15 Two of West Malaysia's eight airports, Kuala Lumpur and Penang, are served by foreign airlines; East Malaysia has nine airports, three of which are served by regional carriers. Demand for air travel increased at about 18% p.a. between 1962 and 1970 and is higher in East Malaysia because of the lack of adequate land transport. In 1970, West Malaysia's airports handled a total of 818,000 passengers, including 513,000 in Kuala Lumpur; East Malaysian airports handled 932,000. The Government recently had an airport master plan study carried out by consultants and has embarked on an airport improvement program. The ADB is assisting in financing the ongoing extension of Penang airport. The feasibility of feeder airline service in West Malaysia (involving construction of a number of small airfields) is presently being investigated.

2.16 The Malaysia Airline System provides domestic services and flights to neighboring Thailand, Indonesia and Singapore, and also to Hong Kong. The company was set up in December 1971 after the Malaysia-Singapore Airline was dissolved, and operates seven Boeing 737 on international routes (flights between West and East Malaysia are international because of intermediate stops in Singapore), nine Fokker F27-500 on shorter domestic routes and three small Britten Norman Islander aircraft on feeder services in East Malaysia.

### C. Planning and Coordination

2.17 The Transport Survey which reviewed all aspects of transport planning, operational policies and organization, identified investment requirements up to 1975. The Government generally accepted the Survey recommendations, implementation of many of which is well underway, partly financed with UNDP assistance under Phase II of the Survey.

2.18 The MOC has the primary responsibility for transport planning and policy. Through its own departments, or through its supervisory role over Government enterprises, it is concerned with the development of all modes of transport, except highways. Highway planning is done by the Highway Planning Unit (HPU) in the Ministry of Works and Power (MWP).

2.19 The MOC is assisted and advised in carrying out its responsibilities by the PRD. Both the HPU and the PRD have been strengthened by UNDP-financed advisers. The Government intends to continue the advisory services under bilateral financing, when the present contracts expire in July this year. During loan negotiations, these arrangements were discussed and confirmed. The PRD is making good progress towards becoming a leading force in transport planning, but much of its staff is not sufficiently experienced and the continuation of the advisory services is required to consolidate past training efforts. Collaboration between the PRD and the HPU is good and projects involving highways and other modes are being dealt with jointly. The Economic Planning Unit (EPU), which is the Government's central planning agency, supervises the implementation of the Plan (para 2.03) and takes a broad interest in transport planning decisions.

2.20 The distribution of traffic among the different modes of transport is determined by their relative service advantages and prices. There is no evidence of any significant misallocation of traffic between modes. Strict regulations of road transport, however, have led to an expansion of "own account" trucking to the disadvantage of public trucking and, thereby, to some overinvestment in vehicles (para 3.08).

2.21 Public transport investments in the Second Malaysia Plan total about M\$ 1.2 billion (Table 1), or about 16% of all public development expenditures. This is more than double the amount spent during the First Malaysia Plan (1966-1970), when Government deferred major investment decisions until the results of the Transport Survey were available. A substantial portion (about 40%) of the transport investment in the Plan is expected to be financed from external sources (IBRD, ADB, and bilateral aid programs). The Second Malaysia Plan follows the basic investment pattern set by the Survey, which placed emphasis on improving and expanding West Malaysia's existing transport facilities in all modes, and assigned in East Malaysia high priority to improving road and port facilities and, in view of the region's sparse population and difficult terrain, to providing air services to remote areas. Roads (including PWD equipment investments) represent 67% of the total transport investment in West Malaysia and 56% in East Malaysia. The Government has now started a mid-term review of the Plan and anticipates an increase in the transport allocation.

### III. HIGHWAYS

#### A. The Network

3.01 West Malaysia's network comprises about 11,000 mi of roads, of which 87% are paved; East Malaysia's network comprises about 3,000 mi, of which only 19% are paved (Table 2). Roads are classified for administrative purposes into federal, state and local authority categories. A functional classification will be developed under the Road Maintenance Study which will start shortly (para 3.27).

3.02 The Transport Survey concluded that West Malaysia's road network, which is relatively well developed in its western part, is generally adequate for present needs. However, it found that the main traffic arteries connecting the economic centers of the west coast require additional capacity to accommodate traffic growth, and assigned highest priority to these improvements. The Bank accepted the Survey recommendations and is currently assisting the Government in the widening to six lanes of a 6 mi section of Route II, the main connection from Kuala Lumpur westwards to the industrial and residential town of Petaling Jaya and further to the port of Klang (Loan 851-MA). Improvements of Route I, the main north-south artery, will be undertaken under the proposed project. Outside the west coast corridor, the Government is giving emphasis to improving east-west connections, partly within the context of regional development programs. The ADB is assisting the Government in financing the construction of an east-west highway parallel to the Thai border (Grik to Jeli) and improvement of Route II from Kuala Lumpur to the east. Most of the roads in East Malaysia are in the areas served by the ports and the Government's efforts focus on interconnecting these roads.

#### B. Characteristics and Growth of Traffic

3.03 West Malaysia's motor vehicle fleet grew at an average annual rate of 10% between 1966 and 1971 (Table 3). About 716,000 vehicles were registered in 1971; more than half of this number are motorcycles, which also are the fastest growing vehicle category. Some 90% of the fleet is concentrated in the west coast states, with about 30% in the State of Selangor in which Kuala Lumpur is located. Motor vehicles are in ample supply from local assembly plants. Import of motor vehicles into West Malaysia is regulated and subject to protective import duties, amounting roughly to the difference between the prices of locally produced vehicles (including taxes) and the cif prices of imports.

3.04 In East Malaysia, the motor vehicle fleet increased at a slightly faster rate (11% p.a.) and totalled about 80,000 (including 24,000 motorcycles) in 1971. Most of the vehicles are located in the two state capitals.

3.05 The distribution of traffic on West Malaysia's road network reflects the concentration of the vehicle fleet on the west coast. Traffic on most sections of Route I in 1970 was above 4,000 vpd; this compares with 1,500 vpd on the main road along the east coast, and between 1,700 and

4,400 vpd on the main east-west link. Traffic growth rates are lower on the west coast (6 to 8% p.a.) than in the other parts (15 to 18% p.a.). Roads in East Malaysia are lightly trafficked, with volumes generally below 500 vpd.

3.06 Public transport of both passengers and goods is strictly regulated in West Malaysia, but not in East Malaysia. The Road Transport Licensing Board, under the MOC, administers a complicated licensing system. For intercity passenger transport, the most important licenses are those for buses and taxis. Bus licenses cover routes, schedules and maximum fares; taxi licenses cover maximum fares only. Maximum fares are fixed on the basis of M\$10/passenger-mile for buses and M\$40/mi for taxis (4 seats). Services seem generally adequate and actual fares are lower than the maximum rates because of competition.

3.07 Licenses for goods transport are divided among "hire and reward" carriers (A licenses); carriers for own goods (C licenses); and carriers both for "hire and reward" and own goods (B licenses). Issuance of B licenses has now been discontinued and B license holders are being reassigned to either "A" or "C" category. Operations under A licenses are restricted to zones (four in West Malaysia), but permits for interzonal movements are granted freely.

3.08 Changes in the implementation of the licensing system during the 1960's resulted in distortions of the road industry. To achieve the objective of an ownership racial balance in the road transport industry, most applications by non-Malays for A licenses were rejected. Few Malays applied, however, partly because of lack of experience and tradition and partly because of difficulties in gaining access to finance, business contracts, etc. The effect was to produce a slow increase in general trucking capacity and a disproportionate growth in private trucking (C licenses), for which licenses were granted without regard to race. Malay and non-Malay manufacturing firms acquired their own trucks to overcome transport bottlenecks and to illegally engage in general trucking operations. The Government is aware of these problems and has taken some steps to ease the situation. The PRD is presently studying ways of converting the "proof of need" system of road licensing into a market-oriented one. Regulation of entry will probably be maintained to achieve a targeted minimum participation of Malays of 30% in the industry; but quotas will be set more in accordance with demand, and training programs, financial and technical assistance by the Government are likely to be stepped up.

3.09 Over two-thirds of the 3,700 trucking firms in West Malaysia are small, owning one vehicle only; there is also a large number of medium-sized firms (more than 100, with five or more trucks) especially along the west coast. In 1972 the Government set up a National Haulage Corporation with the objective of promoting the Malay participation in the industry. This is now the largest haulage enterprise in the country with a fleet of about 120 trucks, mostly 10-ton capacity. The Corporation caters particularly to port and timber traffic, generally in competition with the private sector firms. It enjoys some privileges such as permission to operate over the

whole country, and exemption permits for heavy trucks. It is still too early to assess the Corporation's ability and the impact it may have on the industry as a whole.

C. Administration

3.10 The Ministry of Works and Power (MWP) is responsible for the planning, design and construction of federal roads, the maintenance of federal roads and the allocation of federal maintenance funds for state roads. Highway planning is done by its Highway Planning Unit (HPU), which was recently placed under the Secretary General of the Ministry. All other responsibilities are with the Public Works Department (PWD) within the MWP. There are 11 state PWDs within the state government in West Malaysia, and one each in Sabah and Sarawak. In addition to its state-financed road commitments, each administers all federal road construction and maintenance work on an agency basis with the exceptions of the city of Kuala Lumpur and the Municipality of Ipoh, for which the Federal PWD retains responsibility.

3.11 The Federal PWD is organized under a Director General who has two deputies, one responsible for development, the other for engineering services (see Chart). The Deputy Director General for Development supervises five operational divisions: Roads, Buildings, Water Supplies, Education, and Armed Forces Works; the Deputy Director General for Engineering Services has five divisions: Mechanical, Quantity Surveying, Electrical, Stores and Accounting. A Design and Research Division reports directly to the Director General.

3.12 The Roads Division of the Federal PWD, is controlled by a Director and is divided into five sections: Planning, Design, Project Coordination, Implementation, and Federal Land Development Projects. The Project Coordination Section is responsible for major projects, the Implementation Section for federal road construction and improvements, and for maintenance.

3.13 There are some apparent anomalies in the organizational structure; for example, the Design Section can engineer roads, but not bridges, which are the responsibility of the Director General's Design and Research Division; the Materials Laboratory is similarly remote from the Roads Division, its largest customer. Nevertheless, the present organization functions well and makes good use of the limited staff available.

3.14 In general, the Roads Division functions efficiently; however, its operations are to some extent constrained by staff shortages. Senior staff is generally competent and was in part trained under Phase II of the Transport Survey. Of the 80 established posts for engineers, half are vacant. Government has not been as successful in attracting the few local graduates to its service as the private sector because of its less competitive salaries; some preferential treatment given to indigenous races compared with other ethnic groups also inhibits recruitment. However, as a result of a vigorous recruitment campaign overseas, a number of expatriate engineers have entered Government service on three-year contracts. Additionally, experienced local engineers can now be hired on contract and all junior

engineers are now required by law to serve two years with the Government after graduation. Some from this latter group are expected to remain in Government service after their compulsory service is completed.

3.15 The 13 state PWDs are organized similarly to the Federal PWD. However, in the states a single engineer may have to deal with water supplies, and buildings, as well as roads, as in most cases the volume of work does not require a specialist in each field. The professional staffs are normally paid from the state budgets but are provided on rotating assignments from the Federal PWD. Staff for specific projects are sometimes provided and paid by the Federal PWD. The Directors of the state PWDs have dual responsibilities: to the Federal PWD for the timely execution of federal construction and maintenance, and similarly to the state governments for work approved by the State Works Committees and Legislatures. In general, the state PWDs operate efficiently.

#### D. Highway Planning

3.16 Since in its staff recruitment efforts the Government understandably gave emphasis to project execution, the HPU until recently, was understaffed and as a result not a fully effective instrument of national highway planning. The UNDP-financed adviser to the HPU became involved more in the direct work of the Unit than in the training role for which he was intended. The staffing of the Unit now has improved and the Government intends continuing the advisory assistance (para 2.19) to meet the need for staff training.

3.17 Considering its limited staff, the HPU does a sizeable amount of work. An extensive program of traffic surveys is carried out annually and, in close collaboration with the Roads Division, feasibility studies are made for projects, though not yet on a regular and systematic basis. The Unit also actively participates in the PRD's studies and collection of transport data.

#### E. Financing and Taxation

3.18 Total expenditures on federal and state roads in West Malaysia increased from M\$ 64.4 million in 1967 to M\$ 90.6 million in 1971, and in East Malaysia, from M\$ 36.2 million to M\$ 53.4 million (Table 4). Most of these expenditures are financed through the federal budget, with the states being responsible only for the administrative cost incurred in the state PWDs and a minor part of maintenance and improvement expenditures. Budgets are prepared annually within the framework of the Second Malaysia Plan. The federal highway budget is prepared by the Director of Roads, in consultation with the HPU, for the Director General of the PWD. It is reviewed by the MWP before being approved by the Estimates Sub-Committee of the National Development Planning Council. State highway budgets are prepared by the Directors of the state PWDs and they are subject to approval by the respective State Works Committees and state legislatures.

3.19 Highway expenditures are financed from general budgetary resources, supplemented by domestic and foreign loans (para 2.21). Road user taxes are

not earmarked but form part of the general revenue. In West Malaysia, revenues from these taxes (Table 5) increased faster than road expenditures and in 1971 amounted to nearly five times the expenditures. Revenues in East Malaysia equaled the cost of administration and maintenance plus about half of the road development expenditures. The Transport Survey assessed the structure of existing taxes and their incidence on particular user groups and found that heavy vehicles were undercharged; e.g., the tax on diesel fuel is M\$ 0.20/IMg as compared with M\$ 1.40/IMg on gasoline. The PRD is presently reviewing the road user tax system.

3.20 Although the Government does not have an explicit policy for financing road expenditures by road tolls, it presently collects tolls on a 13 mi section of Route I between Tanjong Malim and Slim River (north of Kuala Lumpur) and at two bridges in the State of Johore. These tolls form an insignificant source of total road user revenue (less than 1%). Toll may considerably reduce the benefits of the facilities to which they are applied. During loan negotiations the question of tolls was discussed and the Government agreed that for the Sections of Route I in the project: it would not take any measures which would adversely affect their economic utilization; and would not impose tolls or similar charges without prior consultation with the Bank.

#### F. Highway Engineering

3.21 Geometric design standards for federal and state roads have recently been revised to reflect modern traffic needs and are satisfactory. However, pavement design is based on the legal maximum loading of eight long tons on a single axle, which appears low. Because vehicle overloading is fairly common, particularly by timber lorries and fuel tankers, the Road Maintenance Study (para 3.27) will recommend, on the basis of an economic analysis, the optimum vehicle weights and axle loading to achieve the minimum overall economic cost of road transport. The pavement of the project roads is designed initially to carry projected traffic (of present axle loadings) over about a 10-year period until subsequent strengthening under maintenance operations, which is acceptable. Should the Government decide to permit heavier vehicles on the roads as a result of the recommendations of the Study, a somewhat earlier strengthening of the pavement would be required.

3.22 The PWD Design Section prepares detailed plans for project execution, and operates satisfactorily. However, in recent years shortage of staff has induced Government to employ the services of consulting firms for feasibility studies and project design. Foreign consulting engineers have been engaged for larger works and several are currently operating in the country. Increasing use is being made of the services of the few local firms, and this trend is expected to continue.

#### G. Highway Construction

3.23 The Roads Division of the Federal PWD is responsible for the construction of all federal roads. It is directly responsible for these projects within Kuala Lumpur and, to the extent that staffing constraints permit, for some others of particular importance, such as the road sections

in this project. State PWDs execute the remainder. About 80% of all roadworks (excluding structures) are built by force account using the Federal and state PWDs' equipment fleets and permanent work force. The Federal and state PWDs hold about 1,600 items of major heavy construction equipment and employ a permanent labor force of about 5,000. With these resources, Government can execute about M\$ 20 million of road construction a year. The quality of work is generally good.

3.24 The Government wishes to foster the growth of a contracting industry able to assume an increasing share of the expanding volume of road construction. Competent local contractors build about 95% of all reinforced concrete structural work, and the few local firms with earth-moving capabilities are being encouraged to better equip themselves for road construction operations. About 40 local contractors are prequalified for highway structures and about 10 are capable of undertaking roadwork. This project will provide opportunities for the local industry to be awarded contracts of a size suited to its technical and financial capabilities.

#### H. Highway Maintenance

3.25 The state PWDs maintain the highway network using funds provided by the Federal Government. The workload is divided among 49 district offices within the 13 states; these employ a total road maintenance labor force of about 8,000. There is no separate maintenance division within the Federal PWD, and maintenance matters are handled by the Implementation Section along with its other activities. Similarly, the state PWDs do not assign engineers specifically to maintenance duties; the work of each engineer is a mix of many different tasks.

3.26 In accordance with Malaysia's Constitution, the National Finance Council determines the maintenance allocations for state roads. These allocations are made on an arbitrary per mile basis which takes no account of actual maintenance needs. In 1970, the approved rate was raised from M\$ 4,500/mi (the rate since 1960) to M\$ 4,600/mi, excluding the cost of administration and equipment depreciation. Although the Federal PWD channels these funds to the states, it has no direct control over their expenditure beyond auditing the annual accounts. On the other hand, funds for federal road maintenance, which are budgeted separately, are not subjected to the same control by the National Finance Council; funds may therefore be allocated where needed. The current expenditures on federal roads average M\$ 5,600/mi, excluding costs of administration and equipment depreciation, but including provision for resurfacing 10% of the network annually. Total expenditures only are recorded; no attempt is made to cost out different maintenance operations.

3.27 Although these allocations are generous by developing country standards, the results of maintenance efforts, while generally satisfactory, are not commensurate with them. There is a regular resurfacing program, but routine or preventive maintenance needs to be systematically organized. A Road Maintenance Study, to be financed under Loan 851-MA, will be started shortly by the consulting firms, Kampsax (Denmark), and Sepakat Setia Perunding (Malaysia). It is designed to provide a detailed maintenance

program and is expected to identify needed organizational and operational improvements, as well as staff training and equipment requirements, and propose methods for systematic planning and execution of maintenance works. During loan negotiations, the Government confirmed its intention to implement the study findings in consultation and agreement with the Bank.

3.28 The PWD's equipment fleet which is used for both maintenance and construction, is old (35% being more than 10 years old), but due to the excellent repair and overhaul facilities, is in relatively good condition. The Maintenance Study will determine whether it is feasible to replace the old vehicles earlier in order to reduce repair expenditures.

#### IV. THE PROJECT

##### A. Description

4.01 The Transport Survey identified the need to improve and expand the capacity of the existing main route on the west coast of Malaysia (Route I), and provided the basis for the selection of four high priority sections (see Map) to be further investigated by the Government's consultants, Vallentine Laurie and Davies (VLD) under a UNDP-financed feasibility study. After the study findings as to the type of improvement required were agreed by both the Government and the Bank, VLD also carried out the detailed engineering (para 4.07).

4.02 Two of the four sections (Sections I and II) are included in the present project; the other two have been deferred. Section III, which provides for the relocation of Route I north of Ipoh to a shorter alignment, was omitted because further technical investigations are required, including the location and design of a long tunnel and the selection of the best bypass route around Ipoh. Section IV, covering the improvement of the approaches and thoroughfare of Butterworth, had to be deleted from the project because of unexpected right-of-way problems in the center of the town.

4.03 The proposed project comprises:

- (a) the construction and improvement of two sections of Federal Route I, totalling about 90 mi in length, and supervision by consultants;
- (b) retroactive financing of consulting services for a supplementary feasibility study and detailed engineering of about 22 mi of Route I and connecting roads in the vicinity of Kuala Lumpur;
- (c) consulting services for the detailed engineering of about 200 mi of roads which may be considered for a future project; and
- (d) consulting services for high priority urban development studies (including some detailed engineering) in metropolitan Kuala Lumpur and two secondary growth centers.

Construction, Improvement and Supervision

4.04 Two separate sections (Annex A) of Federal Route I will be constructed or improved:

- (a) Section I from Kuala Lumpur to Seremban in the south, which involves the widening to four lanes of about 3 mi, a bypass of about 1 mi and the improvement to acceptable geometric standards and adequate pavement strength of about 13 mi of existing two-lane road and, on a parallel alignment, the construction of about 38 mi of four-lane divided expressway, about 3 mi of two-lane expressway, 5 mi of connecting and access roads, and two grade separated interchanges (first stage) at the Seremban end and in Kuala Lumpur; and
- (b) Section II, comprising about 23 mi of selected improvements to both the geometry and pavement strength of the existing two-lane road between Batu Caves on the northern outskirts of Kuala Lumpur and Mi 30 on Route I, about 2 mi of widening to four-lanes, and about 1 mi of connecting road between Kuala Lumpur and Batu Caves.

4.05 The highway sections traverse rolling to hilly terrain. The expressway in Section I will be built on a new alignment while Section II involves mainly improvement to the existing road. No unusual soil conditions have been encountered except in the immediate vicinity of Kuala Lumpur, where tin dredges are still operating. Special care has been taken in selecting the alignment in these areas and in designing the road pavement structure. The consultants' designs conform to the PWD design standards (Table 6), which are acceptable.

4.06 The proposed works will satisfy traffic requirements in the most economical way. Initially the expressway will be tied into an existing four-lane (Sungai Besi) road by a traffic-signalled intersection. During loan negotiations, the Government gave assurances that it will widen the Sungai Besi road to provide additional road capacity from the end of the expressway into the city. The ongoing Transport Study for Metropolitan Kuala Lumpur which is financed under the Bank's Urban Transport Project (Loan 851-MA) and being carried out by Wilbur Smith and Associates (US), will review the integration of the expressway into Metropolitan Kuala Lumpur. During loan negotiations the Government gave assurances that it will, whilst taking into account other demands on its resources, formulate, in agreement with the Bank, a schedule for the implementation of the findings of the study acceptable to the Government and the Bank. The Transport Study will also indicate possibilities of using the urban parts of the project roads for improved public transport. These recommendations, however, will concern the operation of the facility only and are not expected to affect the design, as presently proposed by the engineering consultants.

### Detailed Engineering of Route I

4.07 The project provides for retroactive financing of foreign cost not to exceed US\$100,000 for a supplementary feasibility study and for detailed engineering of about 22 mi of Route I and connecting roads in the vicinity of Kuala Lumpur. These studies were required to complete the preparation of the present project, and were carried out by VLD on terms and conditions approved by the Bank. They relate to works on which recommendations of the recently completed Klang Valley Regional Study had to be awaited. Detailed engineering for the remainder of the improvements of Route I, identified in the UNDP-financed feasibility study, was financed under the Bank's Urban Transport Project (Loan 851-MA).

### Detailed Engineering

4.08 The project includes detailed engineering by consultants for the construction and improvement of about 200 mi of high priority road sections to be considered for a future Bank road project. The sections will be selected jointly by the Government and the Bank on the basis of the current review of the Second Malaysia Plan to be completed by October 1973, and taking into consideration the results of feasibility studies by consultants and the HPU. Timing and procedures for selecting these roads were discussed and agreed during loan negotiations.

### Urban Studies

4.09 The project includes financing of two types of urban development studies: Town Development Studies for Kuantan on the east coast and for the region of North-East Negri Sembilan; and an Urban Road Improvement Study for Kuala Lumpur.

4.10 The Town Development Studies are an outcome of the Bank's continuous and deeper involvement in Malaysia's urban development following the completion of the Klang Valley Study which dealt with the nation's most advanced region. The studies will identify measures for the development of secondary growth centers outside the Klang Valley Region and prepare high priority projects for implementation. Kuantan could be a major development center in the backward east coast of West Malaysia; North-East Negri Sembilan is located closely to Route I, and development of growth centers in its neighborhood could slow down or reverse out-migration flow towards Kuala Lumpur, and thus contribute to the achievement of the national objective of balanced growth. The Urban Road Improvement Study will identify the measures required for improved traffic circulation and distribution in Metropolitan Kuala Lumpur, including road connections between Route II leading into Kuala Lumpur from the west and the city's street system. The detailed engineering of high priority items will also be included.

4.11 The studies, which will be carried out by consultants are expected to result in future urban projects for which Bank financing may be requested. Tentative descriptions of the studies are given in Annex B. Outline terms

of reference for the Town Development Studies were agreed upon with the Government during loan negotiations. Information for the preparation of terms of reference for the Urban Road Improvement Study will be based on the findings of the on-going Transport Study for Metropolitan Kuala Lumpur, which will be available in late 1973.

B. Cost Estimates and Bank Participation

4.12 The project cost, including contingencies, is estimated at US\$37.2 million. The Bank participation is US\$19.5 million, about 53% of total. Costs are detailed in Table 7 and summarized below:

Summary Project Costs

<u>Project Element</u>	<u>M\$ (Million)</u>			<u>US\$ (Million)</u>			<u>% Foreign Exchange Component</u>
	<u>Local</u>	<u>For- eign</u>	<u>Total</u>	<u>Local</u>	<u>For- eign</u>	<u>Total</u>	
I. Construction and Improvement							
(a) Kuala Lumpur-Seremban (Section I)	20.7	25.4	46.1	8.9	10.9	19.8	55
(b) Kuala Lumpur North to M1 30 (Section II)	<u>5.4</u>	<u>6.5</u>	<u>11.9</u>	<u>2.3</u>	<u>2.8</u>	<u>5.1</u>	55
Sub-total	<u>26.1</u>	<u>31.9</u>	<u>58.0</u>	<u>11.2</u>	<u>13.7</u>	<u>24.9</u>	
II. Supervision of I by Consultants	2.8	1.6	4.4	1.2	0.7	1.9	35
III. Feasibility study for expressway extension and detailed engineering of about 22 mi of Route I and connecting roads /a	0.5	0.2	0.7	0.2	0.1	0.3	30
IV. Detailed engineering of about 200 mi of road	2.5	2.5	5.0	1.1	1.1	2.2	50
V. Urban development studies	<u>2.6</u>	<u>2.1</u>	<u>4.7</u>	<u>1.1</u>	<u>0.9</u>	<u>2.0</u>	45
Sub-total II-V	<u>8.4</u>	<u>6.4</u>	<u>14.8</u>	<u>3.6</u>	<u>2.8</u>	<u>6.4</u>	
VI. Contingencies:							
(a) Physical /b	3.4	3.8	7.2	1.5	1.6	3.1	
(b) Price							
(i) Construction/c	2.4	2.9	5.3	1.1	1.2	2.3	
(ii) Consulting services /d	<u>0.6</u>	<u>0.5</u>	<u>1.1</u>	<u>0.3</u>	<u>0.2</u>	<u>0.5</u>	
Sub-total VI	<u>6.4</u>	<u>7.2</u>	<u>13.6</u>	<u>2.9</u>	<u>3.0</u>	<u>5.9</u>	
Total Project Cost	<u>40.9</u>	<u>45.5</u>	<u>86.4</u>	<u>17.7</u>	<u>19.5</u>	<u>37.2</u>	53

/a To be financed retroactively.

/b 10% on all items.

/c 7.5% (5% p.a.) on local and 10.5% (7% p.a.) on foreign cost.

/d 7.5% (5% p.a.) on local and foreign cost.

4.13 Cost estimates for the works in Section I (except for the expressway extension) are based on bids opened on June 18, 1973. For the remaining road construction, the cost estimates are based on unit prices developed by VLD for each of the work items and checked against the Section I bids. The costs of construction supervision, detailed engineering, and urban studies are based on recent contracts for similar work in Malaysia. During loan negotiations, the project cost estimates were confirmed with the Government.

4.14 Contingency allowances of 19% for construction and 17.5% for consulting services are considered adequate. The 19% allowance on construction consists of 10% for possible quantity over-runs, 7.5% for local price increases (about 5% annually) and 10.5% for foreign price increases (about 7% annually) over the period from the close of bids to the completion of construction. The 17.5% allowance on the cost of consulting services provides for a possible 10% increase in the man-months required and 7.5% for price increases.

4.15 The foreign exchange component of construction and improvement works is estimated by VLD at 55% for foreign contractors and at 45% for local contractors; since the Section I bidding indicates about 90% of the civil works are likely to be carried out by foreign contractors, a 55% figure is acceptable. The foreign exchange component is estimated at 35% for construction supervision, 30% for detailed engineering of Route I, 50% for detailed engineering of new roads, and 45% for the urban studies. The reason for the relatively low foreign exchange cost for design and supervision is that a large number of Malays are employed on this work.

### C. Execution

4.16 The PWD will be responsible for the execution of all project elements, except the Town Development Studies which will be the responsibility of the EPU. Consultants will assist the PWD and the EPU by providing construction supervision and carrying out the studies and detailed engineering. The Government has indicated that it intends to engage VLD for the supervision work. During loan negotiations, assurances were obtained that the Government will employ qualified and experienced consultants for these purposes on terms and conditions satisfactory to the Bank, and that contracts for the proposed road construction and improvement will be awarded to prequalified contractors after international competitive bidding in accordance with the Bank's "Guidelines for Procurement".

4.17 Contract documents for the works in Section I (except for the expressway extension) were issued to prequalified contractors in March 1973; bids were opened on June 18, 1973. The first contracts should be awarded in September 1973. Detailed engineering for the remaining works is well advanced and bids will be called in August/September 1973. Contracts would range between about US\$2.3 million and US\$6.8 million in value, which would give local contractors opportunity to participate in the smaller contracts. Suitably prequalified contractors would be permitted to undertake more than one contract section. Construction should be completed towards the end of 1976. During loan negotiations, the Government and the Bank

discussed and agreed on the timing of project execution and progress reporting requirements.

4.18 According to Government records, about 8% of the labor force in West Malaysia is unemployed. In its search for new means of job creation, the Government has been exploring the possibilities of using labor-intensive construction methods whenever possible. Both VLD and the EPU carried out an investigation to determine the likely effect that shadow pricing labor to 50% and 75% of current wage rates would have on a contractor's method of operation, contract construction period, and financial cost of the project. The investigation focussed on the two contracts of Section IV which seemed particularly suited because their compact nature and their proximity to the labor markets in Butterworth and George Town eliminated the need for contractors to house labor on the construction site.

4.19 The Study recommended against the use of labor-intensive construction techniques because of higher cost and longer construction period, and confirmed recent findings of Bank studies elsewhere on the subject that labor-intensive methods are not feasible for construction works which involve haulage of materials over relatively long distances. Also labor costs in Malaysia are comparatively high and contractors, even at a shadow rate for labor of 50%, would find the use of equipment more economical. The Government concurred with the consultants' recommendation and decided to tender the works in the conventional way. With normal construction methods, the contracts financed under this project will provide direct employment for about 2,000 men over the three-year construction period.

4.20 The Government has adequate power to acquire the right-of-way needed for the new road construction; acquisition is already well in hand. During loan negotiations, assurances were obtained from the Government that it will take all action necessary to obtain all the land needed for the roads to be constructed before individual construction contracts are awarded.

4.21 While the ecological effects of the road improvement and construction were not investigated in the feasibility studies, they were considered in the Klang Valley Regional Study. No adverse effects are expected from the proposed road works.

#### D. Financing

4.22 The Bank loan of US\$19.5 million will cover the foreign exchange costs of the project; the Government will meet the local cost of US\$17.7 million.

#### E. Disbursements

4.23 Disbursements from the Loan Account will be on the basis of 55% of the total cost of construction and improvement works and 100% of foreign costs of consultants' services. Based on these percentages, and on the forecast of project completion (para 4.14), a Schedule of Estimated Disbursements (Table 8) has been prepared. Surplus funds remaining in the Loan Account after completion of the project will be cancelled.

## V. ECONOMIC EVALUATION

5.01 The project is to improve and expand Route I, Malaysia's main highway, in the vicinity of Kuala Lumpur. The existing highway has sub-standard geometric and technical characteristics and lacks the capacity to handle traffic at reasonable costs. Kuala Lumpur's population has been growing at 2.8%, a rate only slightly higher than the national average, during the last 15 years and is now 450,000. However, the area around the capital developed rapidly. About 1.2 million people live in the Klang Valley Region, which includes the industrial and residential satellites of Petaling Jaya and Shah Alam, and Port Klang to the west of the capital, and the rural towns of Rawang in the north and Kajang in the south; about 25% of West Malaysia's GDP is generated there.

5.02 The proposed construction of a four-lane expressway and limited improvements to the existing road between Kuala Lumpur and Seremban and the short-term improvements north of Kuala Lumpur will benefit major segments of the population, both by lowering cost of personal travel and prices of consumer goods. The project will also contribute to a balanced development of the Klang Valley Region and, in the form of reduced transport and travel costs, offer inducements for industries and other enterprises to settle away from the congested capital. In this way, the project will indirectly support the Government's policy of restrained growth for the capital area. Detailed descriptions of the road sections are given in Annex A.

5.03 The Government is carefully planning and directing the growth of Kuala Lumpur and the Bank is closely associated with this process. The recently completed Klang Valley Regional Study (para 1.04) reviewed the development potential of the Klang Valley Region and provided the Government with a comprehensive plan for its development up to 1990, corresponding to the Government's social and economic policy objectives. The Transport Study for Metropolitan Kuala Lumpur (para 4.06) will provide the Government with a comprehensive plan of investment and policy recommendations to overcome the city's traffic problem. The urban development studies included in this project (paras 4.09-4.11) will continue this effort, but also will extend to other urban growth centers in West Malaysia.

5.04 The project civil works were identified in the VLD feasibility study as the initial investments needed in an optimum construction program to accommodate traffic in the related sections up to the year 1990. The consultants investigated the possibilities of phased upgrading of the existing roads and construction of new roads and compared alternative courses of action in terms of their discounted overall costs of road use, maintenance and construction. The Klang Valley Regional Study reviewed the results of the VLD feasibility study and proposed a future major road system for the Region, which includes the Seremban expressway as an integral part. A subsequent supplementary feasibility study (also carried out by VLD) identified the parts of the system which warrant immediate implementation and which are proposed in this project to provide access from the expressway into the city.

5.05 The VLD traffic forecasts for the rural road sections (Table 9) are based on a detailed traffic survey carried out in 1970 and, for passenger traffic, on projections of population, vehicle ownership and per capita income in a total of 37 zones of West Malaysia and, for goods traffic, on projections of production and consumption of major commodities. Traffic arising from large development schemes was assessed independently and added to the "normal" traffic. The consultants attempted to relate their traffic forecasts to the 1970 level of travel times and costs. Although 1971 and 1972 traffic counts indicate that the consultants' forecasts are on the low side, they are acceptable. The traffic data developed by VLD for the extension of the expressway into the suburban area of Kuala Lumpur are based on the traffic analysis of the Klang Valley Regional Study and a limited number of supplementary traffic counts. The Klang Valley Regional Study anticipated that the Government, as a result of the ongoing Transport Study for Metropolitan Kuala Lumpur, might adopt a policy of restraining the use of private automobiles in the city and improving public transport, and assessed the impact of such a policy on the road traffic volumes in the suburban area. It found that the most severe measures would reduce forecast traffic by only 3 to 6%. These figures seem low for roads in the immediate vicinity of the city and in order not to over-estimate the benefits of the extension, traffic there has been assumed to grow at the same rates as developed by VLD for the rural section of the expressway. These are about half the rates experienced presently on existing roads in the corridor and lower than those in the Klang Valley Regional Study.

5.06 VLD estimated costs of vehicle operation and passenger time in accordance with road standards and traffic density. Vehicle operating costs were established for nine vehicle types on the basis of estimates of major cost items under different conditions. Typical vehicle operating costs are given in Table 10. Time costs for passengers assessed for different vehicle types on the basis of occupancy rates found in the traffic survey and hourly earning rates of different road user groups are also shown in Table 10. These values were tested against the differences in fares of public transport which users are willing to pay for shorter travel times and increased convenience, and found to be conservative. Since the greater part of the time benefits (more than 70%) accrues to passengers either on business or home-to-work trips, they are acceptable. However, they are not critical for the justification of the road sections proposed.

5.07 Benefits of the proposed improvements were determined as the difference in road user and maintenance costs with and without the project, and are shown in detail in Table 11. Economic returns (ER) for the particular sections (Table 12), calculated over an assumed 20-year service life of the investments, range between 20% and 29%. The sensitivity of the ERs was tested by varying construction cost by  $\pm 15\%$  and benefits by  $\pm 25\%$ . Under the pessimistic assumption of an increase in construction cost concurrent with a decrease in benefits, the ERs range between 14% and 22%. If time benefits are ignored, the ERs are between 10% and 19%.

5.08 Parallel to the appraisal of this project, the Bank carried out an experimental social cost-benefit analysis on the Ipoh road section (Section

III) which is not included in the project (para 4.02), using the Little-Mirrlees appraisal method. 1/ This study valued project inputs and outputs at border prices and arrived at shadow project capital costs 11% lower than developed on the basis of domestic prices, maintenance cost savings 8% lower and vehicle operating cost savings 14% lower. If shadow prices similar to those of the study were used in the evaluation of the road improvements proposed under the project, the ERs would not be significantly different from those given above.

5.09 The evaluation of the project in terms of road user savings is conservative and does not fully reflect its development impact. The immediate beneficiaries will be the States of Selangor and Negri Sembilan. The Klang Valley Regional Study predicts that the total population of the Region will increase to 2.7 million in 1990. To accommodate this increase of 1.5 million in population, the Government and the consultants agreed on a settlement pattern for the area which emphasizes development south of Kuala Lumpur. Close to Kajang, an ongoing project for a new university is to be expanded to a major township, in which also light industry would be located, and which would have a total population of 180,000 in 1990. Although the town is planned to be self-contained with a minimum of inter-urban traffic demand, it can be expected to lead to traffic additional to that forecast in the feasibility study. The State of Negri Sembilan (500,000) presently is mostly agriculture-based and the possibilities for expansion of this sector are limited. Prospects for further economic growth of the state mainly lie in further development of manufacturing and tourism, which could take advantage of a large pool of unemployed and underemployed labor. Industrial development which at present is concentrated on two industrial estates near Seremban, has been sluggish in the past but has accelerated recently and will be furthered by the improved connection to Kuala Lumpur to be provided under this project.

5.10 There is a danger that the development which will be induced by the proposed road improvements, particularly the expressway, will not take place in an orderly and properly organized fashion. To provide better coordination between the various Federal, state and local Government agencies involved in the regulation of land development, the Government followed a recommendation of the Klang Valley Regional Study and set up in the State Government of Selangor a State Planning and Coordination Unit. However, land use regulation is not yet strictly enforced and private developers generally get permission for changing designated land use and modifying building restrictions. During loan negotiations, an assurance was obtained from the Government that it will control land use along the project roads, particularly around intersections and interchanges, in order to promote planned urban development and avoid haphazard urban sprawl by private concerns.

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1/ "A Comparison of the IBRD and Little-Mirrlees Appraisal of a Highway Project in Malaysia" by Sudhir Anand, Central Projects Staff.

VI. RECOMMENDATIONS

6.01 During loan negotiations agreement was reached on the following principal points:

- (a) the arrangements to continue the advisory services to the PRD and the HPU under bilateral financing (para 2.19);
- (b) the implementation of the Road Maintenance Study findings, in consultation and agreement with the Bank (para 3.27); and
- (c) the timing and procedures for selecting road sections for detailed engineering (para 4.08).

6.02 The Government gave assurances during loan negotiations that it will:

- (a) not impose tolls on the project road sections without prior consultation with the Bank (para 3.20);
- (b) provide additional road capacity from the end of the expressway into Kuala Lumpur (para 4.06);
- (c) whilst taking into account other demands on its resources, formulate, in agreement with the Bank, a schedule for the implementation of the findings of the Transport Study which relate to the expressway (para 4.06); and
- (d) control land-use along the project roads, particularly around intersections and interchanges, in order to promote planned urban development and avoid haphazard urban sprawl by private concerns (para 5.10).

6.03 In view of the agreements reached and assurances given, the project is suitable for a Bank loan of US\$19.5 million to the Government of Malaysia for a 24-year term, including four years grace, reflecting the economic life of the construction element of the project.

July 16, 1973



MALAYSIA

APPRAISAL OF A SECOND HIGHWAY PROJECT

Description of Project Roads

A. Kuala Lumpur-Seremban (Section I)

1. This section of Route I is the main access from the southern part of West Malaysia to Kuala Lumpur (450,000) and the port of Klang. Regionally, it connects Kuala Lumpur with Seremban (80,000), capital of the state of Negri Sembilan, at the southern end of the section, and further with oil refineries and sea resorts near Port Dickson, west of Seremban. Between Kuala Lumpur and Seremban, there are several smaller towns and villages. The most important ones are Cheras (14,000), just outside Kuala Lumpur, and Kajang (23,000). Most of the land in the Kuala Lumpur-Seremban corridor is used for plantation agriculture (mostly rubber, but also palm oil and coconut). Service activities and normally small-scale industries form the economic basis of the urban centers. There are a number of state roads, particularly close to Kuala Lumpur and Seremban, but no throughgoing alternative route exists.

2. In 1970, traffic on the road ranged between 13,000 and 6,000 vpd, being highest close to Kuala Lumpur and Seremban and lowest in the sparsely populated center section. About 5,700 vpd travel the full length of the road. Over two-thirds of the traffic is passenger traffic, consisting mostly of business and home-to-work travel on weekdays and recreational trips to Port Dickson on weekends. Traffic growth during recent years averaged about 9% p.a., but was higher near Kuala Lumpur because of large housing developments in Cheras and Kajang. The consultants forecast traffic to grow at rates of about 10% p.a. up to 1980 and some 5% thereafter. The Klang Valley Study consultants assessed the impact of policies restraining the use of private motor vehicles in the city of Kuala Lumpur and improving public transport on the road traffic volumes in the suburban area and found that the most severe measures would reduce the traffic by only 3% to 6%.

3. Due to its winding nature, with poor sight distances, varying widths and steep gradients, the existing road is inadequate to carry the forecast traffic and some sections are already at capacity. Three improvement options were investigated:

- (a) to upgrade the existing road over its whole length;
- (b) to upgrade the northern part of the existing road only, and build a new southern section on an alignment which avoids the mountainous terrain; and
- (c) to build a completely new road and carry out limited improvements to the existing road.

The last option, with a four-lane expressway on a new alignment as the initial investment, proved to have the lowest discounted overall cost of road use, maintenance and construction.

#### Expressway

4. The new expressway will attract nearly all through traffic from the present Route I, as well as a considerable volume of suburban traffic from state roads. It will initially have four lanes and at-grade intersections, with the exception of its connection with the Port Dickson road west of Seremban and the junction with a major connecting road in Kuala Lumpur. The overpass of the expressway over the Port Dickson road is necessitated by a railroad branchline which parallels the road. The three-lane bridge for the connecting road is required for traffic capacity reasons. The rural parts of the expressways will provide good traffic flow conditions until about 1985, when further investments would probably be justified to prevent congestion.

5. The urban extension of the expressway is part of a major road system for the greater metropolitan area proposed by the Klang Valley Study. In line with the overall development concept for the region (para 5.09), the study assigned high priority to the road improvements in the access corridor of the expressway. The subsequent supplementary feasibility study by VLD identified the parts of the system which would be required to achieve a satisfactory dispersal of traffic from the expressway into the city. The feasibility study considered the possibility of upgrading an existing road (Sungai Besi Road) which, with four lanes in its northern part and two lanes in its southern part, carries at present between 34,000 vpd and 7,800 vpd (near Sungai Besi). The study found that because of very high land acquisition cost, this alternative is inferior to building the expressway extension further west in mostly tin mining grounds. This extension, together with about 3.0 mi of connecting and access roads (the major one of which is a four-lane link to Route II, currently being improved under Loan 851-MA), will provide good traffic flow for at least five years after opening of the road, and longer, depending on the effectiveness of measures to curb local traffic, particularly by private motor cars, which the ongoing Transport Study for Metropolitan Kuala Lumpur will propose. The critical point in the present design is the tie-in of the expressway into Sungai Besi road by a traffic-signalled intersection. This intersection, and the integration of the expressway into the Metropolitan Kuala Lumpur Area, will be reviewed in the Transport Study for Metropolitan Kuala Lumpur.

6. At Seremban, the four-lane highway terminates at the interchange of the Port Dickson road; a two-lane bypass is carried beyond the town, linking with the existing Route I and an existing industrial estate south of the town. Seremban is connected by a two-lane spur road. These connections are adequate for the forecast traffic.

7. The main benefits of the new four-lane highway are reductions in vehicle operating and time costs due to elimination of congestion, better road characteristics, and increased travel speeds. Traffic between Kuala

Lumpur and Seremban and beyond will also have distance savings of 3 to 6 mi. The average reduction in vehicle operating costs will be 17% in 1976, reduction in time costs will be about 45%. Over an assumed 20-year service life, the rates of return are 25% and 12% for the expressway and 26% and 12% respectively for the expressway extension.

#### Existing Road Improvements

8. The improvements of the existing road are justified by benefits to traffic which will not divert to the new road. The extension of the existing four-lane road from Mi 5.8 south of Kuala Lumpur to the town of Cheras, the construction of a two-lane bypass around the town, and the upgrading of the existing road further to Kajang to acceptable geometric standard width and pavement strength, will reduce vehicle operating costs by about 15% and travel time by about 25%. These savings and reductions in road maintenance cost will result in a rate of return of 29%; the rate of return would be 15% if time savings are not considered. The provision of a climbing lane, improved geometry and strengthening of the pavement in the steep grade section (7%) between Mi 21 and Mi 22 will result in time savings, vehicle operating savings (both 23%), and a reduction in maintenance cost. The investment will yield rates of return of 25%, or 19% if time benefits are ignored. The strengthening of the pavement, provision of standard road width with acceptable geometry and sight distances, climbing lanes, and of hard shoulders for non-motorized traffic in the hilly sections between Mi 34 and Mi 39.5 close to Seremban will result in vehicle operating costs and time savings (22% and 35% respectively) due to a smoother and faster flow of traffic, and reduced road maintenance cost. The rates of return on these improvements will be 20% and 15%, including and excluding time savings.

#### B. Kuala Lumpur North to Mi 30 (Section II)

9. This section is the main access to Kuala Lumpur from the north. However, there is less urban development in this corridor than on the southern access to Kuala Lumpur. The major towns are Batu Caves (2,500), a suburb of Kuala Lumpur, and Rawang (7,000), 18 mi north of Kuala Lumpur. Land use along the road is primarily rubber planting and tin mining. Traffic is presently about 18,000 vpd close to Kuala Lumpur and tapering off to about 5,200 vpd at the northern end. The consultants predict traffic to continue to grow at rates of about 7% to 10% p.a. until 1975 and a slower growth of about 4% to 5% p.a. thereafter.

10. Although the riding surface of the existing two-lane road is generally good, its narrow carriageway, sharp curves and steep grades in many locations cause congestion and slowdowns. The first 1.8 mi from the end of a four-lane urban highway (Jalan Kuching) to the intersection with an access road to Route II in Batu Caves is heavily congested. The consultants compared the options of upgrading the existing road and building a new parallel road between Kuala Lumpur and Rawang and further to Tanjong Malim. The consultants did not come to a clear conclusion as to the best long-term improvement, partly because the feasibility of the new road depends on the construction of a major ring road in the north of Kuala Lumpur which, according to

the Klang Valley Regional Study, has low priority in the urban context. However, limited improvements to the existing road would be the initial investment requirement, regardless of which long-term alternative is chosen, and would be adequate for traffic needs up to 1985.

11. The widening to four lanes of 1.8 mi of existing road, with an intersection south of Batu Caves and a 1 mi relocation of the access road to Route II, and the realigning and upgrading of the existing two-lane road between Batu Caves and Rawang to uniform standards will result in a smoother traffic flow and increased travel speeds; vehicle operating costs will be reduced by about 20%; travel times by about 40%; in addition, maintenance cost savings will be achieved. Assuming constant benefits after 1985, the rates of return on this investment would be 28% with time savings, and 17% without. Similar upgrading between Rawang and Mi 30 will reduce vehicle operating costs by about 13% and travel times by about 25%. The rates of return will be 28% and 17%, including and excluding time savings.

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Description of Urban Studies

Town Development Studies

1. Two studies are included: one will focus on the development of Kuantan, and the other on growth centers in North-East Negri Sembilan. Kuantan is one of the only two major port towns on the east coast and could be an urban growth center for industrial and tourism development, as well as providing a major market for its hinterland. There is currently considerable migration from North-East Negri Sembilan Region because of its economic backwardness. The Region, however, has several potential growth centers which could stimulate economic activities and improve the balance of national growth. The studies will: assess the development potential of each area and propose specific development measures; and identify high priority projects and undertake their feasibility studies for possible financing by the Bank or other international agencies. The precise locations, forms and sizes of the studies are to be further investigated and are subject to agreement between the Government and the Bank.

Kuala Lumpur Urban Road Improvement Study

2. The study will be based on the findings of the Transport Study for Metropolitan Kuala Lumpur and will be designed to identify and undertake the feasibility study of measures to improve traffic circulation in the whole of Kuala Lumpur. It will specifically include suitable links from Route II (which is being improved under the Bank's Urban Transport Project, Loan 851-MA) to the Kuala Lumpur street system. The detailed engineering of high priority items will also be included. The projects prepared under the study are likely to be proposed by the Government for possible Bank financing as a part of a comprehensive approach to the solution of the city's transport problems.



TABLE 1

APPRAISAL OF  
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Federal Government Investments in Transport  
During the First and Second Five Year Plans  
(in M\$ million)

<u>Mode</u>	<u>First Malaysia Plan</u> <u>1966-1970</u>		<u>Second Malaysia Plan</u> <u>1971-1975</u>	
	<u>West Malaysia</u>	<u>East Malaysia</u>	<u>West Malaysia</u>	<u>East Malaysia</u>
Roads	161.3	148.0	505.1	188.5
Railways	47.0	3.9	85.7	8.0
Ports and Shipping	82.9	10.1	122.9	106.9
Airports and Civil Aviation	40.3	20.8	49.8	59.0
PWD Plant and Equipment	<u>24.4</u>	<u>6.2</u>	<u>31.0</u>	<u>31.5</u>
Total	<u>355.9</u>	<u>189.0</u>	<u>794.5</u>	<u>393.9</u>
Transport as % of public development expenditures	<u>10</u>	<u>30</u>	<u>14</u>	<u>28</u>

Source: Prime Minister's Department, December 1972

APPRAISAL OF  
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Annual Change in Length of Road Network,  
by Pavement Type and Responsible Authority  
(mi)

Pavement Type

Year	West Malaysia				East Malaysia				Total All Roads
	Paved	Gravel	Earth	Total	Paved	Gravel	Earth	Total	
1967	8,368	1,355	409	10,132	407	1,381	448	2,236	12,368
1968	8,755	1,356	401	10,512	429	1,652	415	2,496	13,008
1969	9,003	1,294	421	10,718	456	1,798	426	2,680	13,398
1970	9,192	1,237	413	10,842	499	1,913	406	2,818	13,660
1971	9,524	1,031	427	10,982	553	2,007	409	2,969	13,951

Responsible Authority

Year	West Malaysia				East Malaysia				Total All Roads
	Federal	State	Local <sup>1/</sup>	Total	Federal	State	Local	Total	
1967	3,016	6,573	543	10,132	-	2,236	n.a.	2,236	12,368
1968	3,065	6,837	610	10,512	-	2,496	n.a.	2,496	13,008
1969	3,086	7,010	622	10,718	-	2,680	n.a.	2,680	13,398
1970	3,105	7,104	633	10,842	-	2,818	n.a.	2,818	13,660
1971	3,141	7,189	652	10,982	-	2,969	n.a.	2,969	13,951

<sup>1/</sup> Roads in Kuala Lumpur, Penang, Ipoh, and Malacca with Federal Government responsibility.

n.a. = not applicable

Source: Public Works Department, January 1973

APPRAISAL OF  
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Motor Vehicle Registration<sup>1/</sup>

West Malaysia

<u>Year</u>	<u>Motorcycles</u>	<u>Cars</u>	<u>Taxis</u>	<u>Buses</u>	<u>Trucks</u>	<u>Total</u>
1960	49,100	92,200	4,300	2,700	28,900	177,200
1966	214,700	169,000	5,400	4,000	44,400	437,500
1967	251,500	182,400	5,600	4,200	46,500	490,200
1968	278,800	194,700	5,700	4,600	48,300	532,100
1969	312,700	213,200	6,000	5,300	51,400	588,600
1970	350,000	231,500	6,700	5,900	55,800	649,900
1971	389,100	253,500	6,600	6,400	60,500	716,200

Average Annual Growth Rates (% p.a.)

1960-1966:	28	11	4	7	7	16
1966-1971:	12	8	4	10	6	10

East Malaysia

<u>Year</u>	<u>Motorcycles</u>	<u>Cars</u>	<u>Taxis &amp; Buses</u>	<u>Trucks</u>	<u>Total</u>
1960	4,500	6,000	800	(900) <sup>2/</sup>	(12,200)
1966	14,500	17,900	1,100	4,900	38,400
1967	17,100	22,400	1,100	6,200	46,800
1968	18,600	26,800	1,100	6,800	53,300
1969	19,800	32,200	1,100	8,500	61,600
1970	21,600	36,800	1,100	9,900	69,400
1971	24,000	42,600	1,200	11,900	79,700

Average Annual Growth Rates (% p.a.)

1960-1966:	22	20	6	n.a.	n.a.
1966-1971:	11	19	2	19	11

<sup>1/</sup> Excludes Government vehicles.

<sup>2/</sup> Sarawak only.

Source: Public Works Department, January 1973

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Road Expenditures, 1967-71  
(in M\$ million)

	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>
<u>West Malaysia</u>					
<u>Federal Roads</u>					
Administration	0.7	0.6	0.7	0.8	1.2
Maintenance	11.5	12.4	18.1	18.4	17.3
Construction & Improvements	<u>12.8</u>	<u>13.5</u>	<u>14.9</u>	<u>28.5</u>	<u>32.1</u>
Sub-total	<u>25.0</u>	<u>26.5</u>	<u>33.7</u>	<u>47.7</u>	<u>50.6</u>
<u>State Roads</u>					
Administration	6.0	6.4	6.3	6.7	10.1
Maintenance	22.6	25.6	25.8	22.9	21.6
Construction & Improvements	<u>10.8</u>	<u>9.6</u>	<u>9.4</u>	<u>7.4</u>	<u>8.3</u>
Sub-total	<u>39.4</u>	<u>41.6</u>	<u>41.5</u>	<u>37.0</u>	<u>40.0</u>
Sub-total West Malaysia	<u>64.4</u>	<u>68.1</u>	<u>75.2</u>	<u>84.7</u>	<u>90.6</u>
<u>East Malaysia</u>					
<u>Sabah</u>					
Administration	1.0	1.0	1.0	1.1	1.3
Maintenance	6.4	6.9	7.0	6.9	8.4
Construction & Improvements	<u>9.1</u>	<u>24.0</u>	<u>24.8</u>	<u>21.4</u>	<u>21.5</u>
Sub-total	<u>16.5</u>	<u>31.9</u>	<u>32.8</u>	<u>29.4</u>	<u>31.2</u>
<u>Sarawak</u>					
Administration	0.3	0.4	0.5	0.5	0.6
Maintenance	2.6	3.4	3.8	4.4	5.6
Construction & Improvements	<u>16.8</u>	<u>15.8</u>	<u>11.5</u>	<u>12.5</u>	<u>16.0</u>
Sub-total	<u>19.7</u>	<u>19.6</u>	<u>15.8</u>	<u>17.4</u>	<u>22.2</u>
Sub-total East Malaysia	<u>36.2</u>	<u>51.5</u>	<u>48.6</u>	<u>46.8</u>	<u>53.4</u>
Total	<u>100.6</u>	<u>119.6</u>	<u>123.8</u>	<u>131.5</u>	<u>144.0</u>

Source: Bank estimates on basis of data provided by FWD, December 1972

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Revenues from Motor Vehicle Taxation  
(M\$ million)

Item	West Malaysia					East Malaysia				
	1967	1968	1969	1970	1971	1967	1968	1969	1970	1971
Purchase Tax	24.6	16.9	19.8	40.9	39.3 <sup>3/</sup>					
Annual Registration	102.0	111.7	119.7	137.8	147.2					
Other Road Fees	11.1	11.9	13.4	21.8	22.9					
Sub-total	<u>137.7</u>	<u>140.5</u>	<u>152.9</u>	<u>200.5</u>	<u>209.4</u>	<u>4.6<sup>4/</sup></u>	<u>5.5<sup>4/</sup></u>	<u>6.3<sup>4/</sup></u>	<u>7.2<sup>4/</sup></u>	<u>8.5<sup>4/</sup></u>
Import Duty and Excise Tax on:										
Gasoline <sup>1/</sup>	99.9	109.4	112.0	119.3	134.0	9.6	10.4	9.6	10.9	12.8
Diesel fuel <sup>2/</sup>	15.8	19.1	19.7	20.0	21.8	1.1	1.1	1.2	1.5	1.8
Motor vehicles & parts	3.6	11.8	2.4	37.7	49.3	8.3	8.9	12.1	14.1	17.0
Tires	1.3	3.2	2.8	4.0	3.5	0.6	0.5	0.8	0.7	0.7
Sub-total	<u>120.6</u>	<u>143.5</u>	<u>136.9</u>	<u>181.0</u>	<u>208.6</u>	<u>19.6</u>	<u>20.9</u>	<u>23.7</u>	<u>27.2</u>	<u>32.3</u>
Total	<u>258.3</u>	<u>284.0</u>	<u>289.8</u>	<u>381.5</u>	<u>418.0</u>	<u>24.2</u>	<u>26.4</u>	<u>30.0</u>	<u>34.4</u>	<u>40.8</u>

<sup>1/</sup> Road consumption is estimated at 100% of total consumption for both West Malaysia and East Malaysia.

<sup>2/</sup> Road consumption is estimated at 40% of total consumption for West Malaysia and 25% for East Malaysia.

<sup>3/</sup> Treasury estimate.

<sup>4/</sup> Bank estimate.

Sources: Treasury; State Governments of Sabah and Sarawak; and Bank estimates, December 1972

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Highway Design Standards

	Unit	RURAL HIGHWAYS						URBAN HIGHWAYS			
		Two-lane			Four-lane Divided			Two-lane		Four-lane Divided	
		Terrain			Terrain			With Control	Without Control	With Control	Without Control
	Flat	Rolling	Mountainous	Flat	Rolling	Mountainous	of Access	of Access	of Access	of Access	
Design speed	mph	60	50	40	70	60	50	50	40	50	40
Surfaced width	ft	24	24	24	Each carriageway 22			24	24	22 ( each carriageway )	24
Shoulder width <sup>1/</sup>	ft	8	8	4	8	8	5	10	10	8	10
Central reservation	ft	-	-	-	Minimum 10			-	-	Minimum 4	
Maximum gradient	%	3	5	8	3	4	7	Flat & rolling terrain 4 Hilly terrain 6		Flat & rolling terrain 4 Hilly terrain 6	
Stopping sight distance	ft	475	350	275	600	475	350	425	300	425	300
Passing sight distance	ft	2,100	1,800	1,500	-	-	-	1,200	950	-	-
Minimum curve radius	ft	1,040	700	430	1,490	1,040	700	700	430	700	430

Structure Design: British "RA" Loading

<sup>1/</sup> Outside shoulder only for four-lane divided highway

Source: Public Works Department, January and April ,1973

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Detailed Project Cost

Element	M\$ (million)			US\$ (Million)			% Foreign Exchange Component
	Local	Foreign	Total	Local	Foreign	Total	
I. Construction and Improvement							
(a) Kuala Lumpur-Seremban (Section I)							
(i) 32.4 mi of new 4-lane expressway, 2.9 mi of new 2-lane expressway, and 1.9 mi of access roads	13.7	16.8	30.5	5.9	7.2	13.1	55
(ii) 5 mi of 4-lane expressway extension, 2.8 mi of connecting roads (1.4 mi of 4-lane and 1.4 mi of 2-lane roads) and one interchange	4.6	5.6	10.2	2.0	2.4	4.4	55
(iii) 17 mi of Improvement to the existing road (2 lanes, except as noted below)							
- Mi 5.8 to Mi 15 (Mi 5.8 to Mi 8.4 to be widened to 4-lane divided) and new bridge at Mi 16 (with approaches)	1.4	1.7	3.1	0.6	0.7	1.3	55
- Mi 21 to Mi 22	0.1	0.1	0.2	0.04	0.05	0.1	55
- Mi 34 to Mi 39.5	0.9	1.2	2.1	0.4	0.5	0.9	55
(b) Kuala Lumpur North to Mi 30 (Section II)							
25 mi of Improvement to the existing road (2 lanes, except as noted below)							
- Mi 5 to Mi 18 (Mi 5 to Mi 6.8 to be widened to 4-lane divided) and 1 mi of connecting road	3.7	4.5	8.2	1.6	1.9	3.5	55
- Mi 18 to Mi 30	1.7	2.0	3.7	0.7	0.9	1.6	55
Sub-total I	26.1	31.9	58.0	11.2	13.7	24.9	
II. Supervision of I by Consultants	2.8	1.6	4.4	1.2	0.7	1.9	35
III. Feasibility study for expressway extension and detailed engineering of 22 mi of Route I and connecting roads <sup>1/</sup>	0.5	0.2	0.7	0.2	0.1	0.3	30
IV. Detailed engineering of about 200 mi of road	2.5	2.5	5.0	1.1	1.1	2.2	50
V. Urban development studies	2.6	2.1	4.7	1.1	0.9	2.0	45
Sub-total II-V	8.4	6.4	14.8	3.6	2.8	6.4	
VI. Contingencies:							
(a) Physical <sup>2/</sup>	3.4	3.8	7.2	1.5	1.6	3.1	
(b) Price							
(i) Construction <sup>3/</sup>	2.4	2.9	5.3	1.1	1.2	2.3	
(ii) Consulting Services <sup>4/</sup>	0.6	0.5	1.1	0.3	0.2	0.5	
Sub-total VI	6.4	7.2	13.6	2.9	3.0	5.9	
Total Project Cost	40.9	45.5	86.4	17.7	19.5	37.2	53

<sup>1/</sup> To be financed retroactively.

<sup>2/</sup> 10% on all items.

<sup>3/</sup> 7.5% (5% p.a.) on local and 10.5% (7% p.a.) on foreign cost.

<sup>4/</sup> 7.5% (5% p.a.) on local and foreign cost.

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Schedule of Estimated Disbursements

<u>Bank Fiscal Year and Quarter</u>	<u>Cumulative Disbursements at end of Quarter</u> (US\$ '000)
<u>1973/74</u>	
December 31, 1973	100
March 31, 1974	1,500
June 30, 1974	3,900
<u>1974/75</u>	
September 30, 1974	6,400
December 31, 1974	8,700
March 31, 1975	10,600
June 30, 1975	12,200
<u>1975/76</u>	
September 30, 1975	13,600
December 31, 1975	14,800
March 31, 1976	15,900
June 30, 1976	16,600
<u>1976/77</u>	
September 30, 1976	17,200
December 31, 1976	18,000
March 31, 1977	18,500
June 30, 1977	19,000
<u>1977/78</u>	
September 30, 1977	19,500

Source: Government/Bank Estimates, June 1973

APPRAISAL OF  
A SECOND HIGHWAY PROJECT  
MALAYSIA

Average Daily Traffic Volumes on Project Roads

I. Kuala Lumpur-Seremban

Existing Road

<u>Year</u>	<u>Vehicle Type</u>	<u>Mi 5.8 to 9.8</u>	<u>Mi 9.8 to 15.0</u>	<u>Mi 21.0 to 22.0 &amp; Mi 34.0 to 39.5</u>
1970		<u>12,480</u>	<u>10,500</u>	<u>7,000</u>
	Motorcycles	1,400	1,120	710
	Pass. cars, taxis, vans	8,220	6,580	4,170
	Buses	380	320	210
	Trucks	2,480	2,480	1,910
1975		10,620	5,660	3,480
1985		26,370	10,350	5,290
1995		49,240	19,040	7,850

Expressway

		<u>Mi 0.0 to 5.0<sup>1/</sup></u>	<u>Mi 5.0 to 11.0<sup>1/</sup></u>	<u>Mi 11.0 to 37.4<sup>1/</sup></u>
1975		<u>22,070</u>	<u>14,650</u>	<u>10,600</u>
	Motorcycles	4,490	2,040	830
	Pass. cars, taxis, vans	11,470	7,550	6,440
	Buses	670	450	210
	Trucks	5,440	4,610	3,120
1985		37,700	25,164	18,710
1995		58,560	39,620	29,400

II. Kuala Lumpur-Tanjong Malim

<u>Year</u>	<u>Vehicle Type</u>	<u>Mi 5.0 to 6.8</u>	<u>Mi 6.8 to 18.0</u>	<u>Mi 18.0 to 30.0</u>
1970		<u>16,310</u>	<u>7,300</u>	<u>6,000</u>
	Motorcycles	5,260	1,030	780
	Pass. cars, taxis, vans	8,030	4,420	3,240
	Buses	1,010	290	240
	Trucks	2,010	1,560	1,740
1975		26,100	11,700	8,470
1985		43,070	19,280	13,740
1995		(68,910)	(30,460)	(20,470)

<sup>1/</sup> Additional traffic will be generated by the proposed new town, Bandar Langat

Source: Vallentine, Laurie & Davies, December 1972 and April 1973

APPRAISAL OF  
A SECOND HIGHWAY PROJECT  
MALAYSIA

Typical Vehicle Operating Costs (Excluding Taxes)  
(M¢ per mi)

	<u>Motorcycle</u>	<u>Car</u>	<u>Taxi</u>	<u>Small Truck</u>	<u>Large Truck</u>	<u>Bus</u>
Existing 2-lane highway						
Congested	3.6	10.7	16.5	26.6	39.3	29.9
Uncongested	3.4	9.9	13.8	21.7	35.3	25.4
New 2-lane highway	2.9	9.2	10.4	17.4	28.0	20.2
New 4-lane highway	2.9	9.2	10.4	17.3	27.8	20.1

Travel Time Costs of Passengers  
(M\$ per veh-hour)

	<u>Business Trips</u>	<u>Home-to-Work Trips</u>	<u>Social Trips</u>
Motorcycle	-	0.65 <sup>1/</sup>	0.65 <sup>1/</sup>
Passenger car	5.50 <sup>2/</sup>	1.90 <sup>3/</sup>	1.30 <sup>4/</sup>
Bus	-----	2.30 <sup>5/</sup>	-----

- <sup>1/</sup> One-third of earning rates of M\$1.75 per hour of driver and M\$0.60 per hour of 0.4 passenger.
- <sup>2/</sup> Full earning rates of M\$2.65 per hour of driver and M\$2.35 per hour of 1.2 passengers.
- <sup>3/</sup> One-third of earning rates of M\$2.65 per hour of driver and M\$2.35 per hour of 1.3 passengers.
- <sup>4/</sup> One-third of earning rates of M\$2.65 per hour of driver and M\$0.60 per hour of 2.0 passengers.
- <sup>5/</sup> One-third of earning rate of M\$0.25 per hour of 28 passengers; crew wages are included in vehicle operating costs.

Source: Consultants estimates, December 1972

APPRAISAL OF  
A SECOND HIGHWAY PROJECT  
MALAYSIA

Estimated Costs and Benefits  
(M\$ '000)

Project Element	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
<b>I. Kuala Lumpur-Seremban</b>																									
(a) Expressway																									
(i) Miles 5.0 to 40.3																									
<b>Benefits</b>	-	-	-	-	-	11052	11715	12418	13164	13822	14513	15239	16001	16801	17557	18347	19172	20035	21937	21879	22863	23891	24967	26090	27263
Vehicle operating cost savings						4796	5084	5389	5713	5998	6298	6613	6944	7291	7619	7962	8320	8695	9086	9495	9922	10368	10835	11322	11831
Time savings						6256	6631	7029	7451	7824	8215	8626	9057	9510	9938	10385	10852	11340	11851	12384	12941	13523	14132	14768	15432
Avoided highway maintenance cost																									
<b>Costs</b>	1269	7981	14446	11342	1620	334	345	356	366	376	383	393	401	409	421	429	4289	445	410	465	476	489	501	514	527
Engineering	1269																								
Right-of-way		1500	1484																						
Construction		6060	12080	10570	1510																				
Supervision		441	882	772	110																				
Maintenance						334	345	356	366	376	383	393	401	409	421	429	4289	445	410	465	476	489	501	514	527
<b>Net Benefits</b>	-1269	-7981	-14446	-11342	-1620	10718	11370	12062	12798	13446	14130	14846	15600	16392	17136	17918	14883	19390	20527	21414	22387	23402	24466	25576	26736
(ii) Miles 0.0 to 5.0 (urban extension)																									
<b>Benefits</b>	-	-	-	-	-	3002	3182	3373	3575	3754	3942	4129	4346	4563	4768	4983	5207	5442	5687	5943	6210	6489	6781	7086	7405
Vehicle operating cost savings						1313	1392	1476	1564	1642	1725	1811	1901	1996	2086	2180	2278	2381	2488	2600	2717	2839	2967	3100	3260
Time savings						1689	1790	1897	2011	2112	2217	2328	2445	2567	2682	2803	2929	3061	3199	3343	3493	3650	3814	3986	4165
Avoided highway maintenance cost																									
<b>Costs</b>	-	799	3138	5306	4335	85	88	91	93	96	98	100	102	104	107	109	1094	113	116	119	121	125	128	131	134
Engineering																									
Right-of-way		314																							
Construction		485	971	971	4040																				
Supervision			2020	4040	4040																				
Maintenance			147	295	295	85	88	91	93	96	98	100	102	104	107	109	1094	113	116	119	121	125	128	131	134
<b>Net Benefits</b>	-	-799	-3138	-5306	-4335	2917	3094	3282	3482	3658	3844	4039	4244	4459	4661	4874	4113	5329	5571	5824	6089	6364	6653	6955	7271

APPRAISAL OF  
A SECOND HIGHWAY PROJECT

MALAYSIA

Estimated Costs and Benefits  
(MS '000)

Project Element	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
<b>I. Kuala Lumpur-Seremban (cont'd.)</b>																									
<b>(b) Improvement of Existing Road</b>																									
<b>(i) Miles 5.8 to 15.0</b>																									
<b>Benefits</b>	-	-	-	-	-	1457	1577	2044	1949	1969	2114	2269	2436	2616	2772	2934	3108	3378	3486	3673	4260	4117	4361	4623	4899
Vehicle operating cost savings						488	530	575	624	671	721	775	833	896	950	1007	1067	1131	1199	1271	1347	1428	1514	1605	1701
Time savings						869	943	1023	1110	1193	1283	1379	1482	1594	1690	1791	1898	2012	2133	2261	2397	2541	2693	2855	3026
Avoided highway maintenance cost						100	104	446	215	105	110	115	121	126	132	136	143	235	154	141	516	148	154	163	172
<b>Costs</b>	151	784	1611	988	493	59	60	63	64	66	69	76	74	409	406	216	90	93	94	97	99	102	106	109	112
Engineering	151																								
Right-of-way		290	293																						
Construction		460	1228	921	460																				
Supervision		34	90	67	33																				
Maintenance		-	-	-	-	59	60	63	64	66	69	76	74	409	406	216	90	93	94	97	99	102	106	109	112
<b>Net Benefits</b>	<b>-151</b>	<b>-784</b>	<b>-1611</b>	<b>-988</b>	<b>-493</b>	<b>1398</b>	<b>1517</b>	<b>1981</b>	<b>1885</b>	<b>1903</b>	<b>2045</b>	<b>2197</b>	<b>2362</b>	<b>2207</b>	<b>2366</b>	<b>2718</b>	<b>3018</b>	<b>3285</b>	<b>3392</b>	<b>3576</b>	<b>4161</b>	<b>4015</b>	<b>4255</b>	<b>4514</b>	<b>4787</b>
<b>(ii) Miles 21.0 to 22.0</b>																									
<b>Benefits</b>	-	-	-	-	-	132	72	76	80	83	87	90	94	97	101	105	109	174	115	121	125	130	135	141	145
Vehicle operating cost savings						42	44	46	49	51	53	55	57	59	62	64	67	69	72	75	78	81	84	88	91
Time savings						19	20	21	22	23	24	25	26	27	28	29	30	31	32	34	35	36	38	39	40
Avoided highway maintenance cost						71	8	9	9	9	10	10	11	11	11	12	12	12	12	12	12	13	13	14	14
<b>Costs</b>	7	-	57	149	63	5	5	5	5	5	5	5	6	6	92	5	5	5	5	5	5	5	5	6	6
Engineering	7																								
Right-of-way			57																						
Construction				139	59																				
Supervision				10	4																				
Maintenance				-	-	5	5	5	5	5	5	5	6	6	92	5	5	5	5	5	5	5	5	6	6
<b>Net Benefits</b>	<b>-7</b>	<b>-</b>	<b>-57</b>	<b>-149</b>	<b>-63</b>	<b>127</b>	<b>67</b>	<b>71</b>	<b>75</b>	<b>78</b>	<b>82</b>	<b>85</b>	<b>89</b>	<b>91</b>	<b>9</b>	<b>100</b>	<b>104</b>	<b>169</b>	<b>110</b>	<b>116</b>	<b>120</b>	<b>125</b>	<b>130</b>	<b>135</b>	<b>139</b>
<b>(iii) Miles 34.0 to 39.5</b>																									
<b>Benefits</b>	-	-	-	-	-	609	722	668	700	729	756	786	818	850	883	1124	950	989	1027	1068	1195	1153	1198	1245	1294
Vehicle operating cost savings						401	421	442	464	483	502	522	543	565	588	611	635	661	687	715	743	773	804	836	869
Time savings						182	191	200	210	219	227	237	246	256	266	277	288	299	311	324	337	350	364	379	395
Avoided highway maintenance cost						26	110	26	26	27	27	27	29	29	29	236	27	29	29	29	115	30	30	30	30
<b>Costs</b>	110	506	893	669	334	25	26	27	27	27	28	27	29	156	376	27	28	29	29	29	30	31	31	31	31
Engineering	110																								
Right-of-way		171																							
Construction		312	832	624	311																				
Supervision		23	61	45	23																				
Maintenance						25	26	27	27	27	28	27	29	156	376	27	28	29	29	29	30	31	31	31	31
<b>Net Benefits</b>	<b>-110</b>	<b>-506</b>	<b>-893</b>	<b>-669</b>	<b>-334</b>	<b>584</b>	<b>696</b>	<b>641</b>	<b>673</b>	<b>702</b>	<b>728</b>	<b>759</b>	<b>789</b>	<b>694</b>	<b>507</b>	<b>1097</b>	<b>922</b>	<b>960</b>	<b>998</b>	<b>1039</b>	<b>1165</b>	<b>1122</b>	<b>1167</b>	<b>1214</b>	<b>1263</b>

APPRAISAL OF  
A SECOND HIGHWAY PROJECT  
MALAYSIA

Estimated Costs and Benefits  
(M\$ '000)

Project Element	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
II. Kuala Lumpur North to M1 30 (Improvement of Existing Road)																									
(i) Miles 5 to 18																									
<u>Benefits</u>	-	-	-	-	-	3423	3327	3517	3714	3881	4054	4235	4425	4780	4616	4616	4616	4616	4616	4616	4616	4616	4616	4616	4616
Vehicle operating cost savings						1595	1686	1782	1884	1969	2057	2150	2247	2348	2348	2348	2348	2348	2348	2348	2348	2348	2348	2348	2348
Time savings						1454	1537	1625	1718	1795	1876	1960	2049	2141	2141	2141	2141	2141	2141	2141	2141	2141	2141	2141	2141
Avoided highway maintenance cost						374	104	110	112	117	121	125	129	291	127	127	127	127	127	127	127	127	127	127	127
<u>Costs</u>	-	525	3003	3920	2178	89	93	97	101	105	109	112	117	323	115	115	115	115	115	115	115	115	115	115	115
Engineering		360																							
Right-of-way		165	390																						
Construction			2435	3653	2030																				
Supervision			178	267	148																				
Maintenance						89	93	97	101	105	109	112	117	323	115	115	115	115	115	115	115	115	115	115	115
<u>Net Benefits</u>	-	-525	-3003	-3920	-2178	3334	3234	3420	3613	3776	3945	4123	4308	4457	4501	4501	4501	4501	4501	4501	4501	4501	4501	4501	4501
(ii) Miles 18 to 30																									
<u>Benefits</u>	-	-	-	-	-	1787	1523	1593	1671	1752	1836	1922	2016	2349	2395	2125	2125	2125	2125	2125	2125	2125	2125	2125	2125
Vehicle operating cost savings						745	781	819	860	902	946	992	1041	1092	1092	1092	1092	1092	1092	1092	1092	1092	1092	1092	1092
Time savings						613	643	674	707	742	778	816	856	898	898	898	898	898	898	898	898	898	898	898	898
Avoided highway maintenance cost						429	99	100	104	108	112	114	119	359	405	135	135	135	135	135	135	135	135	135	135
<u>Costs</u>	-	264	1361	1718	983	90	94	97	100	104	106	111	113	840	129	129	129	129	129	129	129	129	129	129	129
Engineering		186																							
Right-of-way		78	182																						
Construction			1099	1648	916																				
Supervision			80	120	67																				
Maintenance						90	94	97	100	104	106	111	113	840	129	129	129	129	129	129	129	129	129	129	129
<u>Net Benefits</u>	-	-264	-1361	-1718	-983	1697	1429	1496	1571	1648	1730	1811	1903	1509	2266	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996

Source: Government and Consultants Estimates, April and June 1973



APPRAISAL OF  
A SECOND HIGHWAY PROJECT  
MALAYSIA

Economic Returns and Sensitivity Analysis

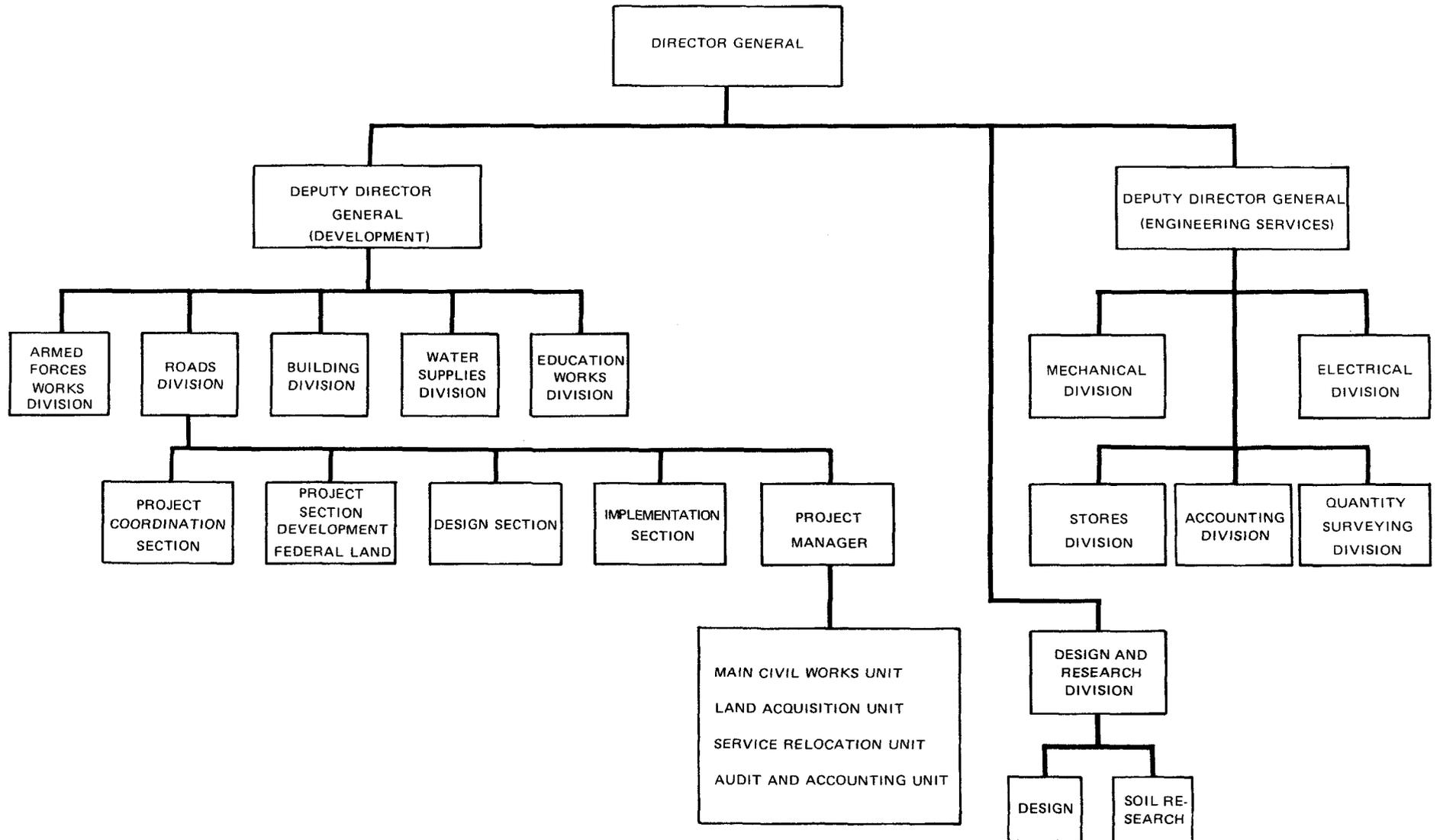
	<u>Best Estimate</u>	<u>High<sup>1/</sup> Estimate</u>	<u>Low<sup>2/</sup> Estimate</u>	<u>Passenger Time Saving Excluded from Benefits</u>
<u>I. Kuala Lumpur-Seremban</u>				
(a) Expressway				
(i) Mi 5.0 to Mi 40.3	24	31	17	12
(ii) Mi 0.0 to Mi 5.0 (urban extension)	22	29	15	10
(b) Existing Road				
(i) Mi 5.8 to Mi 15.0	29	37	22	15
(ii) Mi 21.0 to Mi 22.0	25	35	16	19
(iii) Mi 34.0 to Mi 39.5	20	26	14	15
<u>II. Kuala Lumpur North to Mi 30</u>				
(i) Mi 5.0 to Mi 18.0	28	37	20	17
(ii) Mi 18.0 to Mi 30.0	28	37	19	17

1/ Assumes costs 15% lower and benefits 25% higher than in the best estimate.

2/ Assumes costs 15% higher and benefits 25% lower than in the best estimate.



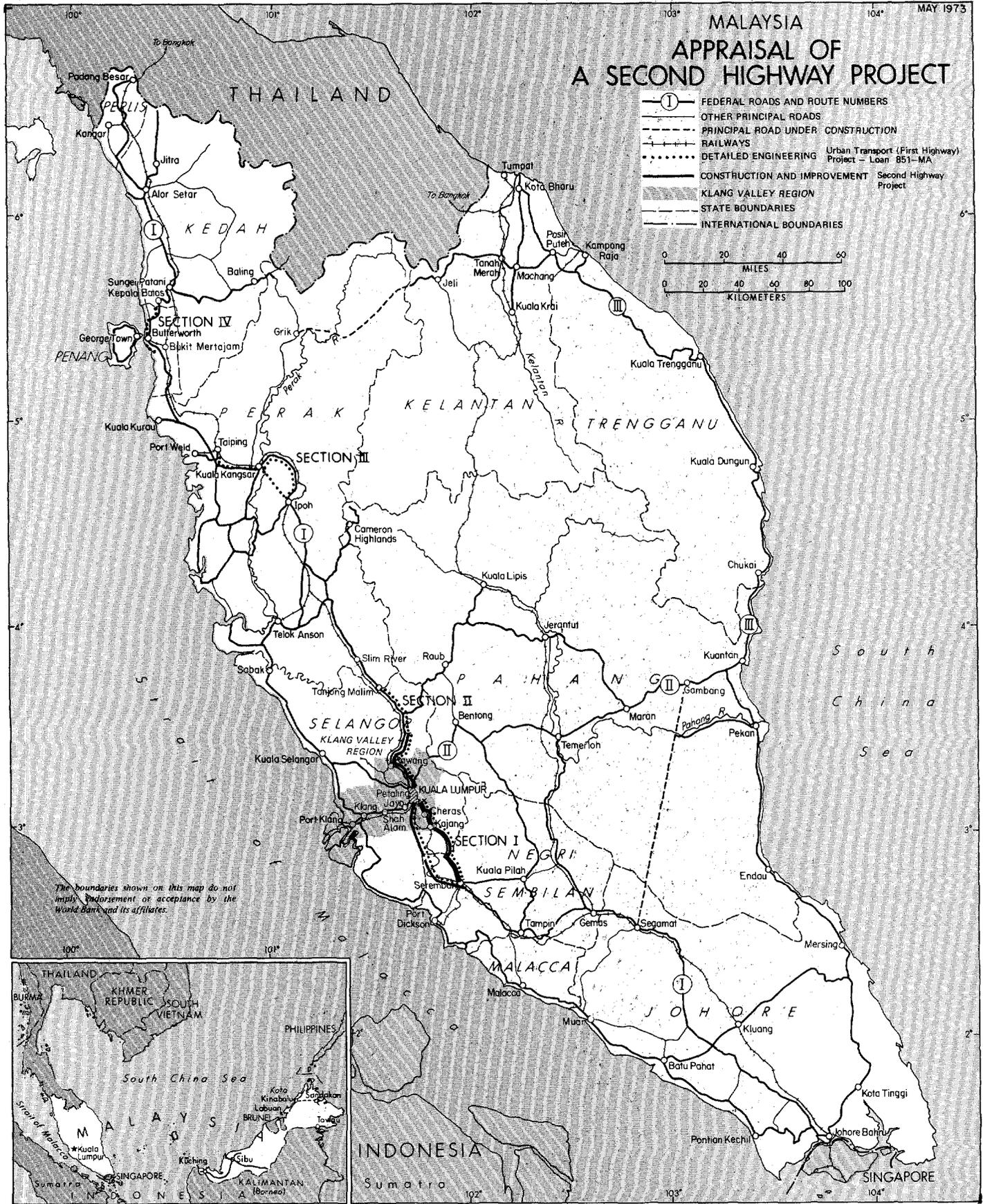
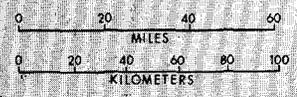
APPRAISAL OF  
A SECOND HIGHWAY PROJECT  
MALAYSIA  
PUBLIC WORKS DEPARTMENT



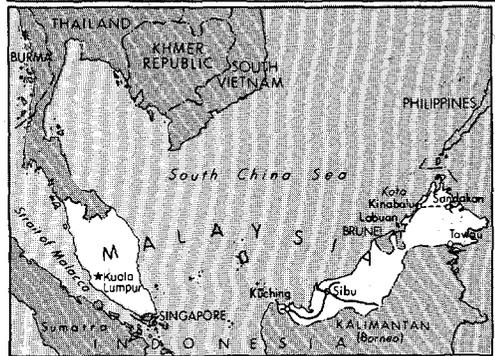


# MALAYSIA APPRAISAL OF A SECOND HIGHWAY PROJECT

- ① FEDERAL ROADS AND ROUTE NUMBERS
- OTHER PRINCIPAL ROADS
- - - PRINCIPAL ROAD UNDER CONSTRUCTION
- RAILWAYS
- DETAILED ENGINEERING
- CONSTRUCTION AND IMPROVEMENT
- Urban Transport (First Highway) Project - Loan 851-MA
- Second Highway Project
- KLANG VALLEY REGION
- STATE BOUNDARIES
- INTERNATIONAL BOUNDARIES

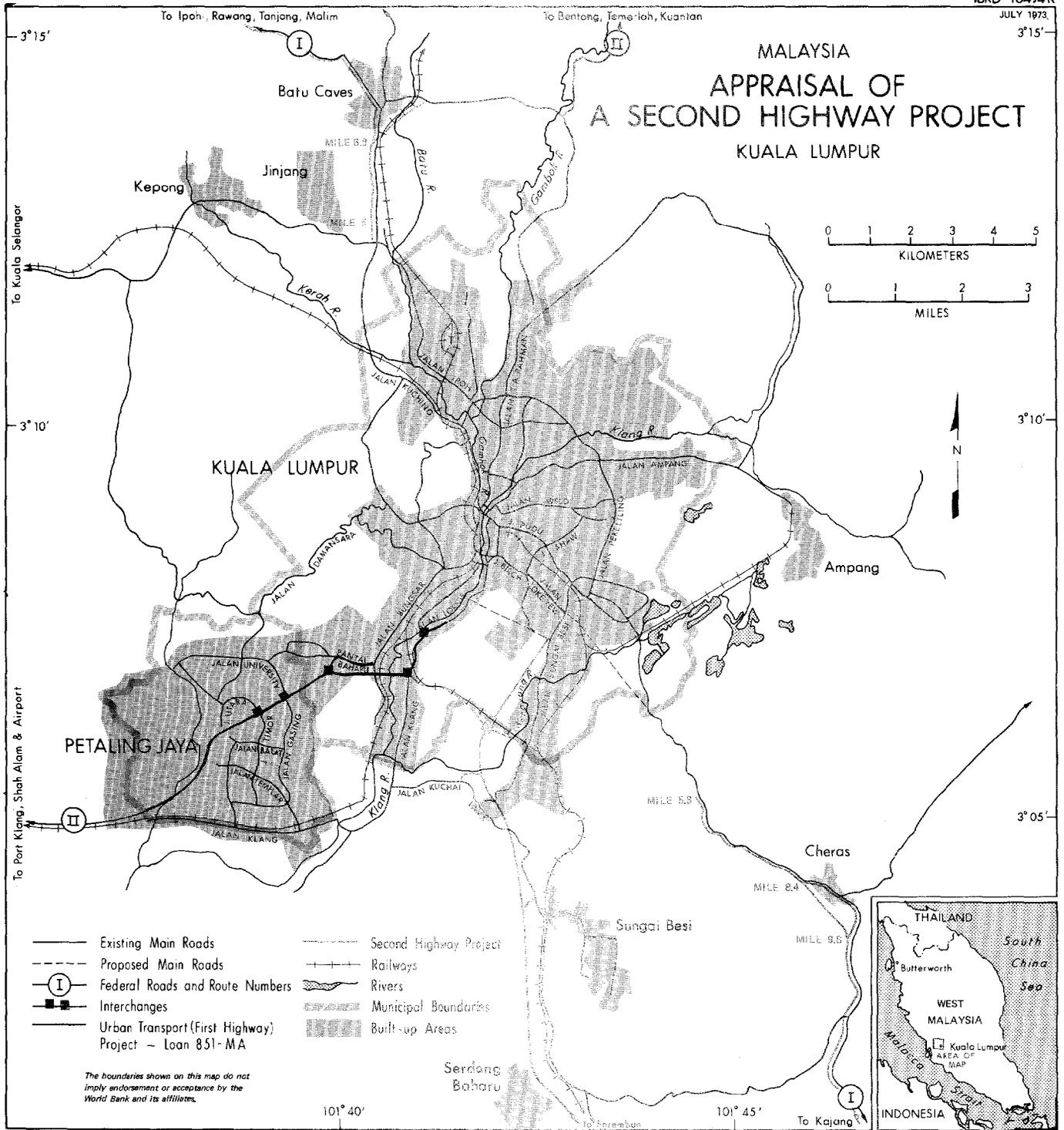


The boundaries shown on this map do not imply endorsement or acceptance by the World Bank and its affiliates.





# MALAYSIA APPRAISAL OF A SECOND HIGHWAY PROJECT KUALA LUMPUR



- Existing Main Roads
- - - Proposed Main Roads
- Ⓢ Federal Roads and Route Numbers
- Interchanges
- Urban Transport (First Highway) Project - Loan 851-MA
- - - Second Highway Project
- Railways
- ~ Rivers
- ▨ Municipal Boundaries
- ▨ Built-up Areas

*The boundaries shown on this map do not imply endorsement or acceptance by the World Bank and its affiliates.*

101° 40'

101° 45'

