The Governments of Malaysia & the State of

Johor tenggara

8 settlements, communications and services

Hunting Technical Services Ltd
Pinnie Carr & Partners
Overseas Development Group
University of East Anglia
Shankland Cox Overseas

1971

THE GOVERNMENT OF MALAYSIA AND THE STATE OF JOHOR

JOHOR TENGAH AND TANJONG PENGGERANG
REGIONAL MASTER PLAN

SUPPORTING VOLUME 8

SETTLEMENT, COMMUNICATIONS & SERVICES

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Hunting Technical Services Ltd.
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FIGURE 1.1.

SOUTH EAST JOHOR STRUCTURE PLAN

PROBABLE FUTURE LAND DEVELOPMENT SCHEMES

SOUTH CHINA SEA

To KUALA LUMPUR & NORTH

To MERSING & PAHANG

KLUANG

G. Blumut

To K. LUMPUR & NORTH

AYER HITAM

To BATU PAHAT MALACCA & WEST COAST

RENGAM

SIMPANG RENGAM

LAYANG LAYANG

F.L.D.A. Kulai

KOMBONG

KOTA TINGGI

S. JOHOR

SEDILI BESAR

JASON BAY

F.L.D.A. Bukit Ayer Tawar

Tg. Kelesa

Tg. Siang

TOURIST RESORT

KULAI

Under Construction

ULU TIRAM

To PONTIAN & WEST COAST

JOHOR BAHARU

PORT

SINGAPORE

CENTRAL CITY AREA

PENGERANG

KG. JAWA

KG. & KAMPAL

S. REMPIT

REFERENCE

- EXISTING MAIN ROADS
- EXTERNAL LINK ROADS
- PRIMARY ROADS
- SECONDARY ROADS
- IMPROVED TERTIARY ROADS & LONG TERM LINKS
- RAILWAY LINE
- EXISTING ALIENATED LAND
- LAND BEING DEVELOPED
- PROJECT LAND DEVELOPMENT
- FOREST & CONSERVATION AREAS
- POSSIBLE MAJOR RESERVOIR
- TOWN CENTRE (PROPOSED & EXISTING)
- EXISTING URBAN AREA
- PROPOSED URBAN AREA
- INDUSTRIAL AREA (PROPOSED)
- COMPREHENSIVE DEVELOPMENT ZONE FOR TOURIST, AGRICULTURE, AND URBAN DEVELOPMENT
- MAJOR BRIDGES
- EXISTING & PROPOSED VILLAGES
- CENTRAL & RESERVED VILLAGES (C) (R)
- TOURIST / RECREATION CENTRE (T)

SUPPORTING VOLUME 8

SETTLEMENTS, COMMUNICATIONS & SERVICES

CHAPTER 1

INTRODUCTION

1.1 Introduction

This volume summarises the work on the physical planning aspects of the Master Plan for the Project regions of Johor Tengah and Tanjong Penggerang.

Its purpose is to assist those responsible for evaluating, amending and implementing the proposals for communications and infrastructure and for urban and industrial development. After a summary (Chapter 2) of the development potential and resources of the project area and of the social and economic context, resulting in a statement of objectives, the remaining chapters are devoted to the methods of survey and analysis, and the proposals for settlements, communications and services. A number of technical appendices and references conclude the report.

1.2 Scope of Work

The relevant parts of the Project Agreement's Scope of Work state:-

"INFRA-STRUCTURAL, URBAN AND INDUSTRIAL DEVELOPMENT

Based on evaluations of the potential for development of the natural resources the consultants will be required to assess the requirement and submit proposals for the overall infrastructural, urban and industrial development as follows:-

(1) Transport and Communications:-

(a) Following an assessment of available data on the existing transport systems, taking into account the existing peripheral road systems and standards and bearing in mind the report on "Transport Development in Malaysia," submitted by the United Nations Survey Group, plan the layout of major and subsidiary roads for the region, including broad specifications for the design of the roads.

(b) Prepare a schedule for the construction of roads including the requirement of staff, equipment and plant, phased according to the pace of natural resource and land development.

(c) Examine additional means of transport and communications that will facilitate the internal development of the area and provide effective external links, and submit proposals for their development including specifications of capacity and layout.

While studying the transportation requirements, the consultants shall at all times take into consideration existing proposals for such development by the Government.

(2) Urban and Industrial Development:

(a) Plan the overall pattern of distribution of urban centres and industrial facilities for processing of agricultural, forest and the other products.

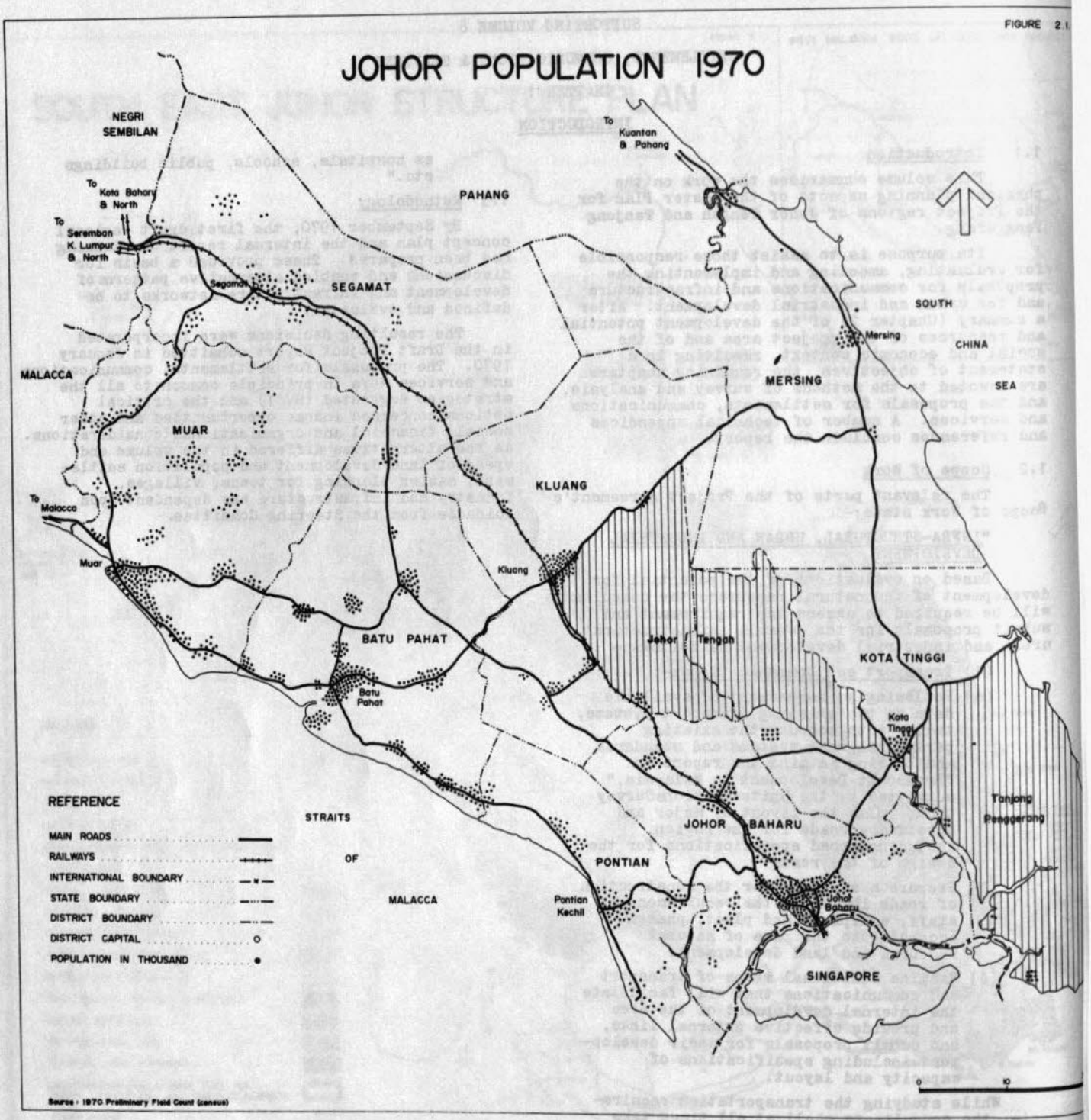
(b) Assess the requirements of these centres for water, power, telecommunications and other physical infra-structures, such as hospitals, schools, public buildings etc."

1.3 Methodology

By September 1970, the first draft regional concept plan and the internal report on planning had been prepared. These provided a basis for discussions and enabled alternative patterns of development and infrastructure networks to be defined and evaluated.

The resulting decisions were incorporated in the Draft Project Report submitted in January 1970. The proposals for settlements, communications and services were in principle common to all the strategies suggested (SV 1) and the critical options concerned income opportunities and other social, financial and organisational considerations. As the alternatives differed in the volume and speed of land development and population settlement, master planning for towns, villages, industry and infrastructure was dependent upon guidance from the Steering Committee.

FIGURE 2.1


JOHOR POPULATION 1970
NEGRI SEMBILAN
To Kuantan & Pahang
To Kota Bahary & North
To Seremban K. Lumpur & North
PAHANG
Segamat
SEGAMAT
SOUTH CHINA SEA
Mersing
MERSING
MALACCA
MUAR
KLUANG
To Malacca
Muar
Kluang
BATU PAHAT
Johor Tengah
KOTA TINGGI
Batu Pahat
Kota Tinggi
Tanjong Penggerang
JOHOR BAHARU
STRAITS OF MALACCA
PONTIAN
Pontian Kechil
Johor Baharu
SINGAPORE
REFERENCE
MAIN ROADS
RAILWAYS
INTERNATIONAL BOUNDARY
STATE BOUNDARY
DISTRICT BOUNDARY
DISTRICT CAPITAL
POPULATION IN THOUSAND
0
10
Source : 1970 Preliminary Field Count (census)

CHAPTER 2

REGIONAL BACKGROUND

2.1 Development Potential of the Project Area

The main opportunities in the project area are in forestry, agriculture and tourism. Though erosion and other conservation constraints limit the extent of developable land, and soil, climate, slope, market and labour constraints limit the range of activities, there is considerable potential for development. However, few variations in the pattern of land use are possible. The recommended extent and location of activities emerged from studies of land capability (climate, soil, slope, drainage, present forest cover) and market potential, and are described in other supporting volumes.

The planned development of these leading sector activities and the resulting creation of employment in services could create 80-90,000 new jobs by 1990, of which about 60,000 might be in the project areas.

A total of 285,000 acres of land are suitable for agricultural development of which 105,000 acres lie in Tanjong Penggerang and 180,000 acres in Johor Tengah. Seventy-five thousand acres are proposed for development by the Federal Land Development Agency (FLDA) in the first five years of the plan. Exploitation of the forest resources in advance of land clearance will provide a basis for the development of a new complex of timber industries in Johor Tengah. Although there are no natural advantages for major manufacturing industry, small local industries should be encouraged, and primary processing plants for agricultural produce will be required.

A tourist resort could be established on the attractive beaches of the central Penggerang coast, starting in 1975. Because of its proximity to the expanding Singapore market, the resort might grow rapidly and create some 10,000 jobs by 1990.

Development must go hand in hand with the careful conservation of forest and soils - to prevent erosion, protect water resources, preserve valuable wild life and plant communities, and provide an attractive environment for residents and visitors.

The area will need to be served by a comprehensive network of settlements, roads and social and physical services.

2.2 The National and State Context

2.2.1 To give a context for planning the Project Area, projections of population trends, economic activity, urban and rural growth to 1990 were made for the State of Johor.

The aims were to expose the major problems and possibilities the State will face in the next twenty years, and to derive guidelines for planning the Project Area.

Tests were made of different assumptions about agricultural output and value added, the agricultural labour force, population growth and migration, occupational distribution and economic activity. The method (of making and testing a series of assumptions and comparing the results) was used because of the severe limitations of existing statistics as a basis for forecasting trends. Certain general results could be derived regardless of the doubtful accuracy of the existing information base.

The results are summarised here and tabulated in detail in Appendix A. This section also draws on the results of the Sociological Studies (SV 4).

2.2.2 Population Trends

The stimuli to the development of the project areas will be population increase and movement in the whole of Johor. Table 2.1 gives pre-census estimates of population for 1970 and two projections for 1990 of the numbers living in different parts of the State. These projections were based upon the 1967 Socio-Economic Survey, and Department of Statistics estimates for rates of natural increase; rates of migration were based upon the findings of the surveys in Johor described in the Working Paper - "Settlements in and around the project regions." The total population is likely to increase from 1.4 million to between 2.4 and 2.8 million; the higher figure assumes migration into the State. The proportion living in towns with more than 10,000 people may grow from 35 percent to about 60 percent.

In the State of Johor, more than two-thirds of the rural population are Malaya, about a third of the urban population and about half the total.

2.2.3 Land Development and Agricultural Employment

(a) At present about 2 million acres are alienated for agricultural use in Johor and 1.6 million acres are recorded as being under crop.

TABLE 2.1 Assumed population distribution in Johor

Settlement type	Place	1970	1990	
			Low	High
Regional centre	Johor Baharu City Region	175,000	500,000	625,000
Major towns	Kluang	60,000	175,000	
	Batu Pahat	70,000	150,000	625,000
	Muar	70,000	150,000	
	Segamat	30,000	75,000	
		230,000	550,000	625,000
New and expanded towns	Johor Tengah	-		
	Penggerang	-	150,000	175,000
	Kota Tinggi	8,000		
	Jemaluang (say)	-		
		8,000	150,000	175,000
Other towns over 10,000 population		71,000	200,000	225,000
New rural areas		-	350,000	400,000
Existing rural areas		941,000	700,000	800,000
TOTAL		1,425,000	2,450,000	2,850,000
Total urban		484,000	1,400,000	1,650,000
Total rural		941,000	1,050,000	1,200,000

Approximately 1.4 million acres of land suitable for agricultural development remain unalienated. The initial assumption was made that 1 million acres could be developed by 1990.

(b) Given an assumed distribution of this extra acreage among alternative crops, estimates were made of the labour force required to operate the total acreage. This amounted to 377,000 if the present ratio of about 6.5 acres per man is maintained.

(c) Projections of the growth of population and labour force and of migration within the State suggested that the labour force available to agriculture in 1990 would be between 240,000 and 330,000.

(d) Thus the average acreage per man would have to increase to between 8 and 10 acres to achieve the assumed rate of land development. This might be possible if new land is developed at 12 to 14 acres per man.

(e) Agricultural employment on land not alienated at present within the Project Area will play a fairly small but important role in total employment in the State. By 1990 there will perhaps be employment of 22,000 to 23,000 in agricultural and 12,000 or so in associated services in these areas. This will constitute just over 4 percent of employment in the State, or about 9 percent of additional employment created by 1990.

2.2.4 Urban growth

There are continuing dangers of urban unemployment while jobs are available in new agricultural areas. This and other considerations indicate that the rural areas must offer access to employment opportunities, living conditions and services comparable to those in the towns if their economic potential is to be realised.

It seems inevitable that urbanisation will continue on a considerable scale:-

(a) In 1970, approximately 45 percent of the State's population lived in towns.

(b) In 1990, about 60 percent of the State's population will be living in towns.

(c) In 1990, Johor Baharu will be a conurbation of over 500,000.

(d) In 1990, there will be three other towns in the State of over 150,000 - Batu Pahat, Kluang and Muar.

(e) Probable growth in manufacturing, trade, and services will be sufficient not only for the State to need to plan for the large scale expansion of Johor Baharu and the three other major towns, but also to consider New Town and Town Expansion Projects in the period 1975-1990.

(f) The Federal Government is attempting to correct imbalances in incomes and employment between the various ethnic groups, between different parts of the country, and between urban and rural areas. In attempts to solve the unemployment problem by creating a fast-growing industrial and commercial economy by policies designed to encourage private industrial and commercial development, and by the activities of FIDA, Development Corporations, Tourist Development Projects, etc., there is a risk of stimulating an increasing level of migration to towns, resulting in increased urban unemployment in the State.

(g) There are dangers in a massive uncontrolled population drift to the towns, which could swamp the social and physical infrastructure, if measures are not taken to plan both for large scale growth of existing towns and for urban development in land development regions.

By urban (or living in towns) in this context, is meant towns of 10,000 population or more, plus smaller towns in agricultural regions where urban services - schools, markets, etc. are provided. The latter is assumed to be 20 percent of the population of the predominantly rural areas on the basis of the 1957 Census. Also the populations for the towns, in particular Johor Baharu and Kluang also include estimated numbers of those living in adjacent urbanised areas beyond the town council boundaries.

2.2.5 Urban job creation

(a) Large scale urban migration requires the creation of urban job opportunities; these need not be only or even mainly in manufacturing; service activities are likely to play a bigger role than manufacturing in providing extra jobs in urban areas over the next 20 years.

(b) There seems a reasonable prospect of achieving a growth in manufacturing employment of some 4,000 jobs a year in Johor. This, together with expanding service industries, may be sufficient to absorb the influx of urban migrants in worthwhile employment opportunities. However to create a safety margin and make inroads into the present levels of unemployment and underemployment, the State should be encouraging faster development of activities such as manufacturing and tourism which sell their output outside the State and provide a base for further expansion of supporting service industries.

(c) There is a need for a wider dispersal of industry, tourism and urban development to encourage people to move to and remain in developing rural areas, by a wider access to urban facilities.

2.2.6 Guidelines from sociological studies

The Project's Sociological Studies indicate a widespread desire for:

(i) rising real incomes;

(ii) the enjoyment of what may be called the perceived advantages of an urban way of life e.g. choice of how and where those economically active in a family work, and facilities for education, health and welfare, shopping and markets, recreation, economy of travel;

(iii) full involvement in creating a society which will give these advantages;

(iv) strong frustrations over low incomes and underemployment in land development schemes;

(v) a wider range of job opportunities and vocational training.

People wish to be free to pursue any skill they acquire and to be able to set up their own enterprises. This is coupled with desires for independence from employers in activities not connected with employment, and for the security of owning a home.

2.2.7 The proximity of Singapore

Against a national background of high unemployment and underemployment and low wages, the people of southern Johor are well aware of the dramatic rise in real incomes and employment taking place a few miles to the south. They can

read Singapore newspapers, listen to Singapore Radio, and watch Singapore T.V. They receive an impression of rapid progress and solid achievement in which every citizen of the island is involved.

This brings a special factor into the planning of Johor, as compared with the other States of Malaysia. Agricultural land development has to fulfill a major role in the creation of new jobs, and yet stand comparison in terms of employment and incomes with what is taking place in Singapore and the Johor towns, while at the same time the Federal Government cannot favour Johor at the expense of other States.

2.3 Future State Planning

Today Johor is still predominantly a rural and agriculturally based society. But urbanisation appears to be taking place at a rapid rate with a striking growth in employment in manufacturing industries and services. Yet there is no reasonable hope of creating all the employment and incomes people will expect without continued emphasis on the creation of new agricultural jobs.

The project regions have to be planned in the context of the State as a whole. This is a development system which has many parts - an industrial and urban growth centre at Johor Baharu; medium sized towns capable of certain industrial activities - Kluang, Kulai, Kota Tinggi; new towns in the Project Area; small towns and villages based mainly on agricultural production.

Throughout this system investment has to be organised so as to lead to full employment and rising real incomes in those activities which can operate successfully in each part of the region. Enterprises must be set up, or if they exist at present, altered and adapted where necessary, to offer full employment, training and career opportunities. The development of a modern industrial economy has to be as apparent in the villages as in the cities, and the people settled in the villages must be given the advantages they feel an urban way of life offers.

The preparation of a comprehensive development plan for the State and its towns, particularly the Johor Baharu Region, should be given high priority. Such a plan should take into account the likely extent of urban and rural development, national and state communications, the provision of the necessary social and physical infrastructure services, other possible major developments e.g. port, tourism, etc. and be designed as a framework for developments over the next 20 years.

This work should be allied to a strengthening of the capacity to plan economic development, and to introduce changes in organisation for the State as a whole.

The attractions and facilities of urban centres are wanted in land development regions, in order to attract and retain settler population. The urban/village system should have a sufficient range of jobs and commercial and social facilities for settlers and their families to exploit their own skills, aspirations and enterprise in the opportunities that occur in their area through time.

This means not only the expansion of existing towns, but also the development of new towns in the project regions.

This could lead by 1990 to:-

(a) The growth of Kluang to 175,000-200,000 population.

(b) The relocation of Kota Tinggi and its expansion to over to 20,000 population.

(c) A Johor Tengah new town of 12,000 or more based on forest exploitation and primary/secondary agricultural processing and related service activities (distribution, manufacture, services, commerce, construction, research and development etc.)

(d) A Tanjong Penggerang new town of 40,000 or more based on tourism and as (c) above. The growth of this town has been studied in the special context of tourism (SV 7).

2.4 The existing population

Accurate population statistics for the project regions are not available. However, on the basis of the 1957 Census, the Department of Statistics' 1967 projections, and the surveys undertaken as part of this project, some estimates have been made. The 1970 population of the project regions and of the towns and villages directly adjacent to them is estimated to be about 135,000.

The unalienated land in the project regions is virtually unpopulated, except for a few migrant mining and forestry workers. There are less than 400 orang asli in the area, mainly in two small reserves.

In the small settlements and scattered dwellings in the alienated areas of Johor Tengah, there are about 33,000 people. The two larger villages in this area - Layang Layang and Rengam - have populations of 2,600 and 2,900 respectively. The only towns around the project regions are Kluang (61,000) and Kota Tinggi (8,300). It should be noted that there are only estimates of the urbanised population, and not the populations within the town council areas. It will be possible to refine the population statistics for the Project Regions on the basis of the 1970 Census, and it is advisable that this should be done as soon as detailed figures are available.

In Tanjong Penggerang, there are approximately 5,000 people living on the estates and FLDA schemes near Kota Tinggi; over 7,000 on the estates bordering the S. Johor and the S. Lebam; about 1,500 living on the east coast around Jason's Bay including Sedili Besar; and about 14,000 people living in the estates and fishing villages along the southern coast.

As far as is ascertainable the size of households is as follows:-

Number of Persons	Percentage
1 - 4	35
5 - 8	45
9 -12	15
13+	5

The population is young; over 60 percent are less than 25 years old, and the live birth rate per annum ranges from 2.5 percent in the towns to 3.2 percent in the east coast fishing areas.

Of the total population, about 50 percent are Chinese, who are concentrated mainly in the towns and large villages and along the southern Penggerang coast. The 32 percent Malay sector accounts for over 80 percent of the east coast fishing population and less than 25 percent of the town populations.

The main concentration of the 15 percent Indian population is in the rubber estates of Johor

Tengah and around Kota Tinggi. The remaining 3 percent of the population are European and other races.

Incomes are highest in the towns, where more than 60 percent of the families have an average monthly income of more than $150, and lowest in the East Coast fishing villages, where only 20 percent earn more than $150. In each settlement surveyed the average incomes of Malays and Indians' families were found to be lower than those of the Chinese.

2.5 Present problems of the Project Area

The development of new physical and social infrastructure systems in the Project Area is likely to result in an increase in development potential of existing alienated areas, particularly on the west and south sides of Tanjong Penggerang.

In contrast to Johor Tengah, where the villages and small towns are in or adjacent to successful estates, the villages of Tanjong Penggerang face severe economic problems. The majority of these villages have a declining economic base, and in most cases are separated by topographical and soil features from the probable new agricultural areas. In Tanjong Penggerang, in the later periods of the plan, employment and incomes in mining will diminish. While agricultural land development, tourism, and other developments, may to some extent improve the economic opportunities of those living in these villages, generally such developments will not in themselves resolve the problems they face. The major existing industries are mining, sea fishing and rubber production.

The level of incomes, extent of underemployment and quality of social services of the existing populations are considerably below the levels to be expected for the incoming population. Social surveys indicate a high level of outward migration from such areas, in both regions. For example in the east coast fishing village of Sedili Besar - over 80 percent of the population have a family income of less than $150 per month and the natural rate of population increase is 2.5-4.0 percent per annum while the actual settlement population growth is around 1 percent per annum. In Tanjong Surat, S. Johor, the average family income is almost $151 per month; including all teachers and government officers.

While these areas were not covered by the soil surveys and therefore the natural resource information base is not as good as for the unalienated land, they are likely to be affected in various ways by planning and development.

There is an enormous range of estate conditions in the Project Area from the dynamic extensive estates with reinvestment continually taking place, to old estates where no reinvestment is taking place, leading to inefficient land use, low productivity, low wages rates and levels of employment, and extremely deprived social circumstances for the resident labour, particularly in parts of Tanjong Penggerang.

If the movement towards a more equitable society offering better opportunities to the underprivileged is to be successful, the sort of opportunities being made available in new land development need to be accessible to the existing population of the Project Area.

The fund of underemployed labour in FLDA schemes, provided with houses, schools, social security arrangements, etc., enables estates nearby to minimise their regular labour requirements and use casual labour, paying only a daily wage for periods of intensive labour requirements. This needs to be recognised and rationalised into the development programmes.

Increased returns in job creation and incomes in the existing estates should be sought by stimulating investment in their redevelopment, when the government will be improving their potential by investment in new roads and other items of social and physical infrastructure. The phased build-up of population to create competition for the labour force, and the creation of opportunities for existing labour on these estates to work on schemes in adjacent new enterprises and move to new villages will be required to achieve these aims.

Traditional fishing is more productive than rubber or oil palm smallholdings or other agriculture and livestock (Snodgrass 1970). Despite being below the national average in productivity, it is a possible source of growth. Productivity in modern fishing is well above the national average (higher than estate rubber). It is one of the growth industries of the Nation (1966-67 average 17.6 percent per annum). It is capital intensive, and largely Malay employing. Although it does not seem likely that fishing can become a major employer on a national scale; in 1967, nationally only 52,000 were employed in traditional and 10,000 in modern fishing, the possible movement from traditional to modern fishing in the Penggerang villages where there is no other likely source of increased incomes and employment, demanded consideration.

The possibility that these areas could be adapted to modern fishing was therefore examined especially as the market for sea fish in southern Johor and the project regions is likely to expand.

Unfortunately, because there are no suitable port facilities, deep sea fishing is not a reasonable possibility for the east and south coast of Tanjong Penggerang. Suitable undeveloped sites at Johor Baharu Port, Kuantan and near Mersing have been identified and are being considered. No comparable sites exist within the project regions. Trapping in prawn ponds, and prawn culture research is already being undertaken, and considerable further development potential exists, but only in the S. Johor. The sea is not suitable for developing this industry, nor are the rivers suitable for fresh water fish culture.

The worst existing problem area is certainly Sedili Besar. Along the south coast of Tanjong Penggerang, however, the predominantly Chinese population appear to be making reasonable incomes by catching trash fish in nets and traps, and feeding these to pigs and poultry for sale in Singapore. Additional income is available from tapioca cultivation, harvesting coconuts and rubber; and employment in mining. But in the long term, opportunities in these areas for the growing population are extremely restricted.

Development planning needs therefore to encompass the other possibilities that occur for improving the economic base, and the social facilities available in these areas and the settlements in old estates. The Development Authority set up should be concerned with the development of the whole of Tanjong Penggerang including existing alienated and developed areas, and be interested and involved in making the people aware of the opportunities for alternative employment and residence that are being developed.

It should also give the existing population access to new development projects in the area, and improved access to work and social facilities both in the project regions and beyond.

2.6 Planning for Change

As time passes, certain of the constraints on planning settlements, communications and services will change. For example, as people own cars or motor-cycles, or earn greater incomes, they will have a greater capacity to travel further to work and social facilities in a given time or for a given proportion of their income than they do at present by walking or cycling, and, as the desire for greater incomes increases, rural depopulation at least for work purposes may be expected, allowing greater per capita incomes from a given unit of agricultural land.

The plan has to allow this to happen on land which has yet to be settled and where it is impossible to forecast accurately the extent and timing of such changes.

Certain principles need to be established, so that, within the state and national economy, the project areas will be capable of readily adjusting to such changes. The principles suggested are:-

(1) Land Holding Avoidance as far as possible of fragmented holdings and inflexible land ownership systems.

(2) Acreage: Family Ratios These should be high enough initially and capable of increasing in the long term to remain attractive in comparison with opportunities elsewhere.

(3) Diversification New enterprises both in primary and secondary activities need to be fully encouraged.

(4) Urban/Village developments should be separated from agricultural/induatrial enterprises.

(5) Enterprise organisations should be able to adjust labour requirements to give continually acceptable incomes to employees.

2.7 Conclusions for planning

The physical planning which follows takes account of the strong physical constraints and of the social objectives set out in other volumes.

The proposals must be designed to:-

(i) realise the potential for agriculture, forest exploitation and tourism;

(ii) promote the phased development of the Project Areas;

(iii) accommodate changes in behavioural and travel patterns as incomes increase and employment becomes diversified;

(iv) provide high standards of access to work, urban centres, and export and marketing outlets;

(v) stimulate the growth of urban activities and facilities;

(vi) provide a major role in early implementation for the Federal Land Development Authority (FLDA);

(vii) provide access to new social and economic opportunities for the existing population of the project areas;

(ix) provide an environment attractive to potential new residents, tourists, and visitors.

The proposals should also have enough flexibility to permit varying rates of development in commerce, industry, tourism and agriculture (particularly for livestock and other new crops) and allow for the participation of a variety of private and public development and production agencies.

CHAPTER 3

SETTLEMENT

3.1 Introduction

Appendix B describes the methods used to estimate the location and timing of labour force requirements and the resulting population and household numbers for master planning purposes, given in Table 3.2.1 and Table 3.2.

SUMMARY TABLE

Table 3.1 The Population of the Project Regions 1970-1990

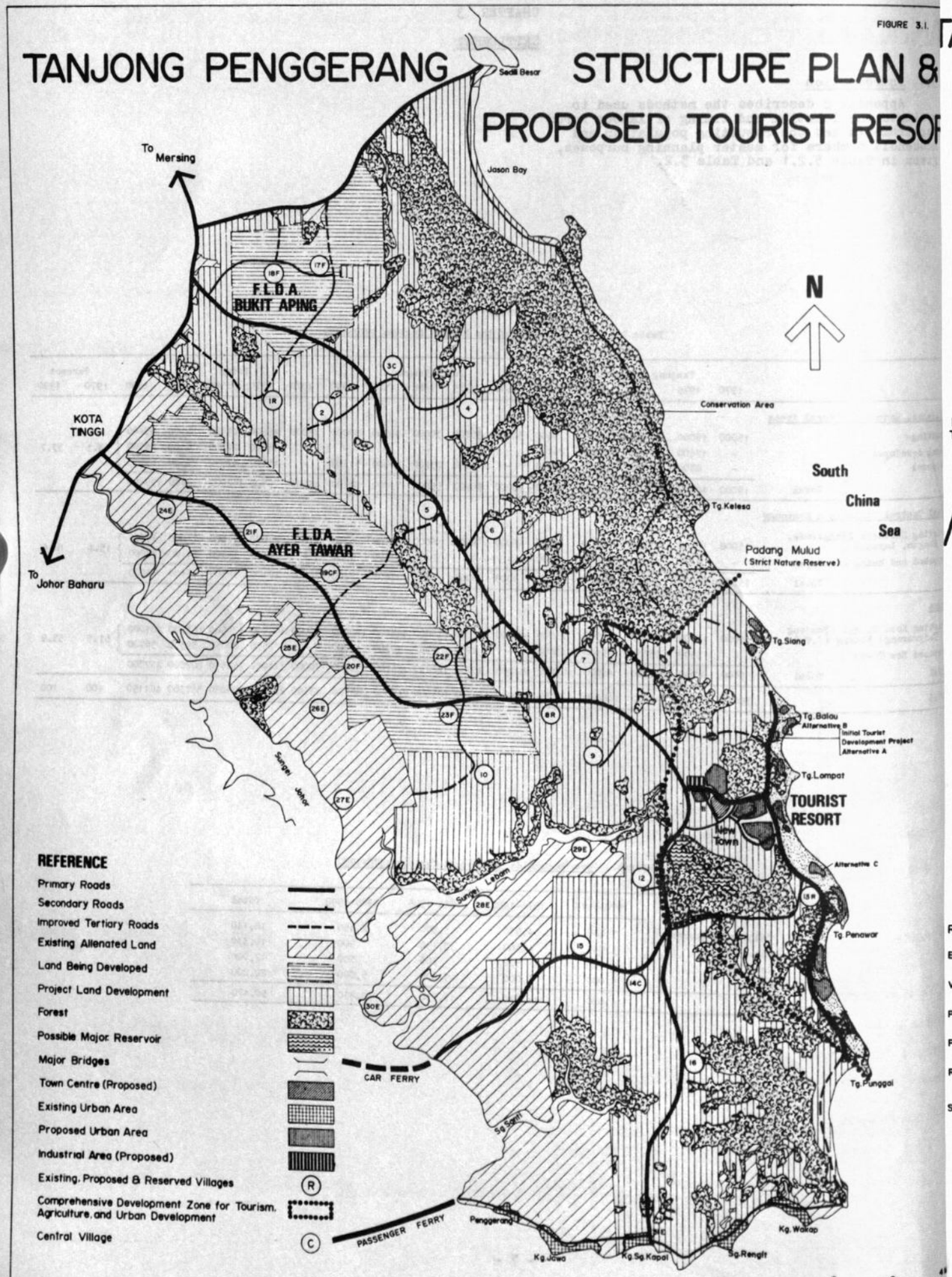
	Tanjong Penggerang					Johor Tengah					Total					Percent	
	1970	1975	1980	1985	1990	1970	1975	1980	1985	1990	1970	1975	1980	1985	1990	1970	1990
Villages, Kampongs & Rural Areas																	
Existing	15000	15000	11300	9500	9400	30000	30000	30000	30000	30000	45000	45000	41300	39500	39400		
Being developed	-	17600	22800	26400	26400	-	-	-	-	-	-	17600	22800	26400	26000	33.1	33.7
Proposed	-	8300	22700	32500	38150	-	6900	25200	41000	51500	-	15200	47900	73500	89650		
Total	15000	40900	56800	68400	73950	30000	36900	55200	71000	81500	45000	77800	112000	139400	155450		
Local Central Villages & Kampongs																	
Existing Southern Penggerang, Rengam, Layang2	15000	15000	15000	15000	15000	6000	6000	6000	6000	6000	21000	21000	21000	21000	21000		
Proposed and being developed	-	7100	13050	16500	17700	-	-	2450	7600	9300	-	7100	15500	24100	27000	15.4	10.4
Total	15000	22100	28050	31500	32700	6000	6000	8450	13600	15300	21000	28100	36500	45100	46000		
Towns																	
Existing Kota Tinggi (Tanjong Penggerang) Kluang (J.T.)	9000	11500	14500	17500	21000	61000	91000	116000	146000	180000	70000	102500	130500	163500	201000		
Proposed New Towns	-	3300	13800	29100	43800	-	4250	6250	10200	12900	-	7550	20050	39300	36700	51.5	55.9
TOTAL Total	9000	14800	28300	46600	64800	61000	95250	122250	156200	192900	70000	111050	150550	202800	257700		
TOTAL	39000	77800	113150	146500	171450	97000	139150	185900	240800	289700	13600	216950	299050	387300	461150	100	100

Table 3.2 New Households In Project Regions 1970-1990

	1970-1975	1976-1980	1981-1985	1985-1990	Total
Tanjong Penggerang	7,480	4,910	3,300	2,450	18,140
Johor Tengah	1,840	4,460	3,130	900	10,330
Kota Tinggi	500	500	500	500	2,000
Kluang	5,000	5,000	5,000	5,000	20,000
TOTAL	14,820	14,870	11,930	8,850	50,470

FIGURE 3.1.

TANJONG PENGGERANG STRUCTURE PLAN & PROPOSED TOURIST RESOR

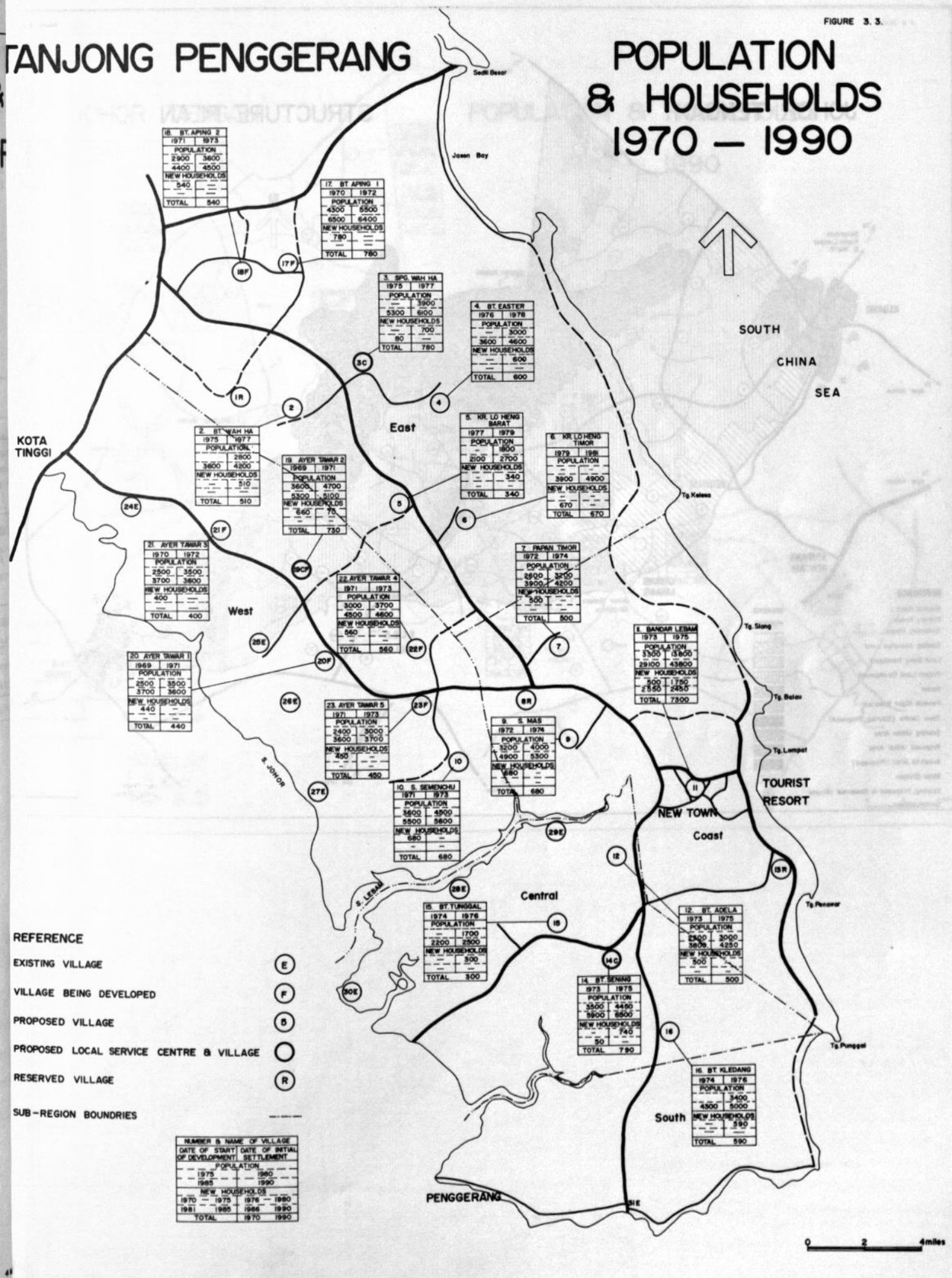


REFERENCE

- Primary Roads
- Secondary Roads
- Improved Tertiary Roads
- Existing Allenated Land
- Land Being Developed
- Project Land Development
- Forest
- Possible Major Reservoir
- Major Bridges
- Town Centre (Proposed)
- Existing Urban Area
- Proposed Urban Area
- Industrial Area (Proposed)
- Existing, Proposed & Reserved Villages (R)
- Comprehensive Development Zone for Tourism, Agriculture, and Urban Development
- Central Village (C)

FIGURE 3.3.

TANJONG PENGGERANG POPULATION & HOUSEHOLDS 1970 — 1990



18. BT. APING 2	
1971	1975
POPULATION	
2900	3600
4400	4500
NEW HOUSEHOLDS	
540	—
—	—
TOTAL	540

17. BT. APING 1	
1970	1972
POPULATION	
4300	5500
6500	6400
NEW HOUSEHOLDS	
780	—
—	—
TOTAL	780

3. SPG. WAH HA	
1975	1977
POPULATION	
—	3900
5300	6100
NEW HOUSEHOLDS	
—	700
80	—
TOTAL	780

4. BT. EASTER	
1976	1978
POPULATION	
—	3000
3600	4600
NEW HOUSEHOLDS	
—	600
—	—
TOTAL	600

2. BT. WAH HA	
1975	1977
POPULATION	
—	2800
3600	4200
NEW HOUSEHOLDS	
—	510
—	—
TOTAL	510

19. AYER TAWAR 2	
1969	1971
POPULATION	
3600	4700
5300	5100
NEW HOUSEHOLDS	
660	70
—	—
TOTAL	730

5. KR. LO HENG BARAT	
1977	1979
POPULATION	
—	1800
2100	2700
NEW HOUSEHOLDS	
—	340
—	—
TOTAL	340

6. KR. LO HENG TIMOR	
1979	1981
POPULATION	
—	—
3900	4900
NEW HOUSEHOLDS	
—	—
670	—
TOTAL	670

21. AYER TAWAR 3	
1970	1972
POPULATION	
2500	3500
3700	3800
NEW HOUSEHOLDS	
400	—
—	—
TOTAL	400

22. AYER TAWAR 4	
1971	1973
POPULATION	
3000	3700
4500	4600
NEW HOUSEHOLDS	
560	—
—	—
TOTAL	560

7. PAPAN TIMOR	
1972	1974
POPULATION	
2600	3200
3900	4200
NEW HOUSEHOLDS	
500	—
—	—
TOTAL	500

8. BANDAR LEBAM	
1973	1975
POPULATION	
13300	13600
29100	43800
NEW HOUSEHOLDS	
500	1750
2350	2450
TOTAL	7300

20. AYER TAWAR 1	
1969	1971
POPULATION	
2500	3500
3700	3600
NEW HOUSEHOLDS	
440	—
—	—
TOTAL	440

23. AYER TAWAR 5	
1971	1973
POPULATION	
2400	3000
3600	3700
NEW HOUSEHOLDS	
—	—
—	—
TOTAL	450

9. S. MAS	
1972	1974
POPULATION	
3200	4000
4900	5300
NEW HOUSEHOLDS	
680	—
—	—
TOTAL	680

10. S. SEMENCHU	
1971	1973
POPULATION	
4600	4900
5500	5600
NEW HOUSEHOLDS	
680	—
—	—
TOTAL	680

15. BT. TUNGGAL	
1974	1976
POPULATION	
—	1700
2200	2500
NEW HOUSEHOLDS	
—	300
—	—
TOTAL	300

12. BT. ADELA	
1973	1975
POPULATION	
2900	3000
3800	4250
NEW HOUSEHOLDS	
300	—
—	—
TOTAL	500

14. BT. SENING	
1973	1975
POPULATION	
3300	4450
5900	6500
NEW HOUSEHOLDS	
—	740
50	—
TOTAL	790

16. BT. KLEDANG	
1974	1976
POPULATION	
—	3400
4500	5000
NEW HOUSEHOLDS	
—	590
—	—
TOTAL	590

REFERENCE

- EXISTING VILLAGE (E)
- VILLAGE BEING DEVELOPED (F)
- PROPOSED VILLAGE (5)
- PROPOSED LOCAL SERVICE CENTRE & VILLAGE (○)
- RESERVED VILLAGE (R)
- SUB-REGION BOUNDRIES ----

NUMBER & NAME OF VILLAGE			
DATE OF START OF DEVELOPMENT		DATE OF INITIAL SETTLEMENT	
POPULATION			
—	1975	—	1980
—	1985	—	1990
NEW HOUSEHOLDS			
1970	— 1975	1976	— 1980
1981	— 1985	1986	1990
TOTAL		1970	1990

JOHOR TENGAH STRUCTURE PLAN

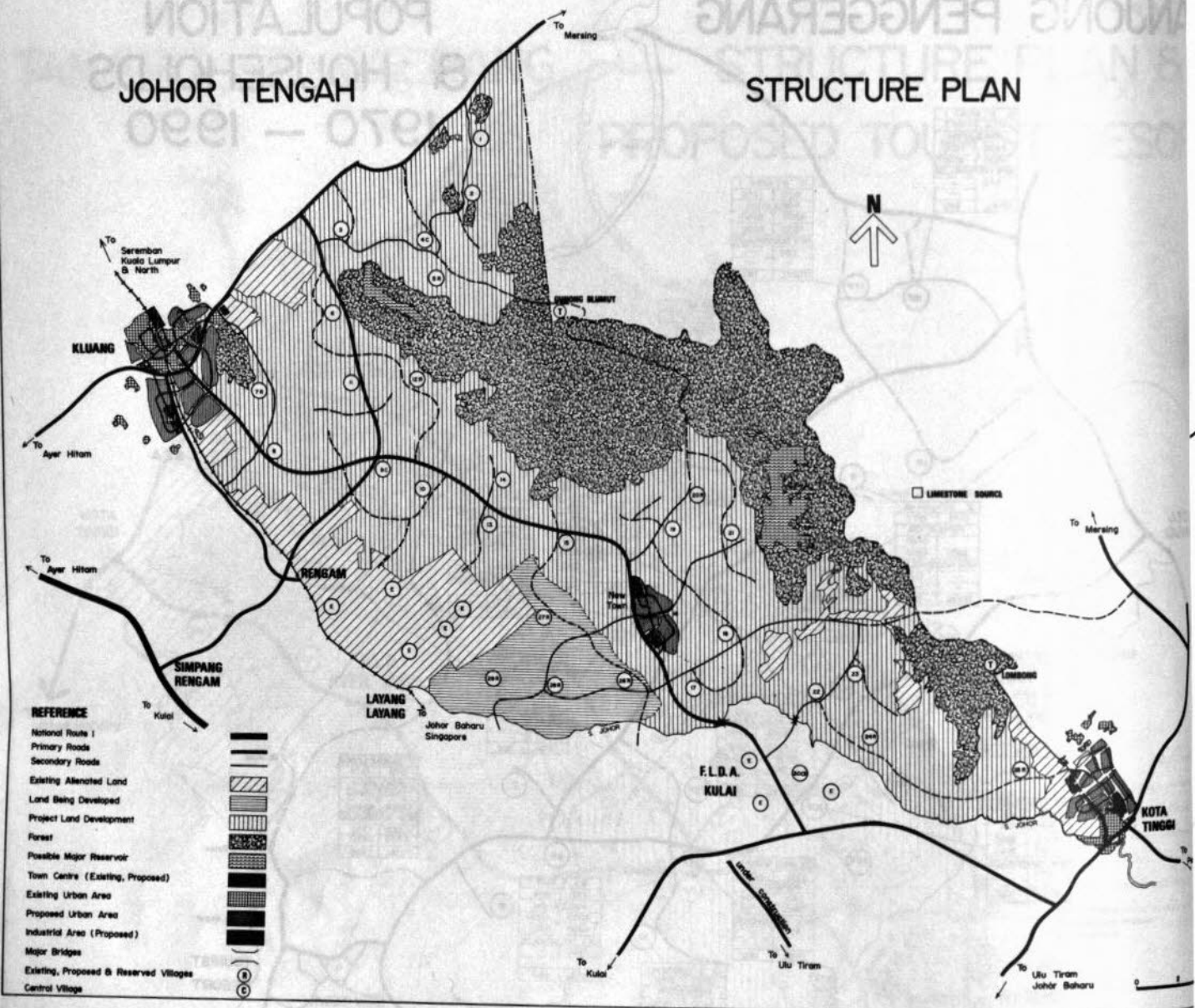
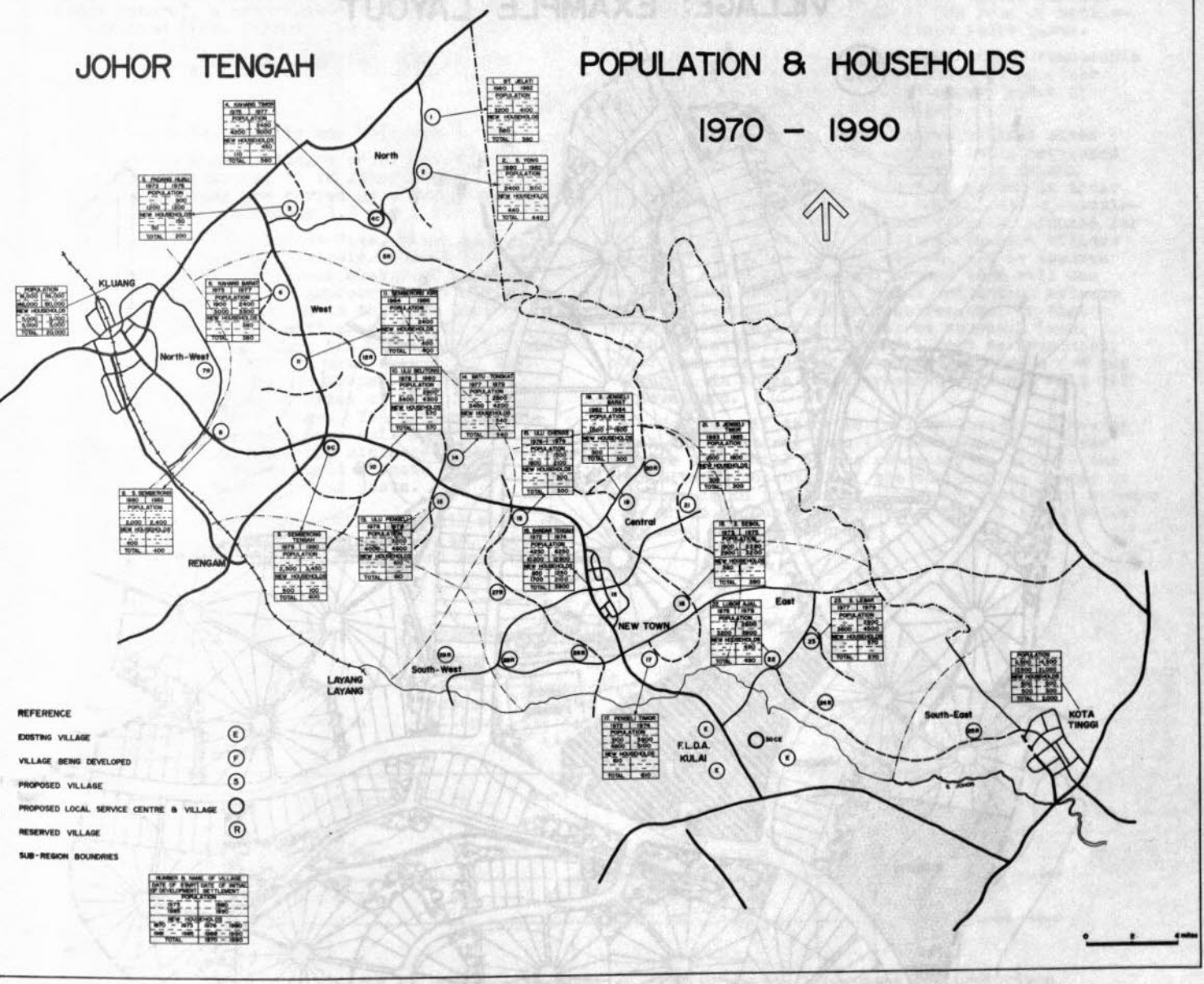


FIGURE 3.4.

JOHOR TENGAH

POPULATION & HOUSEHOLDS

1970 – 1990



REFERENCE

EXISTING VILLAGE (E)

VILLAGE BEING DEVELOPED (F)

PROPOSED VILLAGE (S)

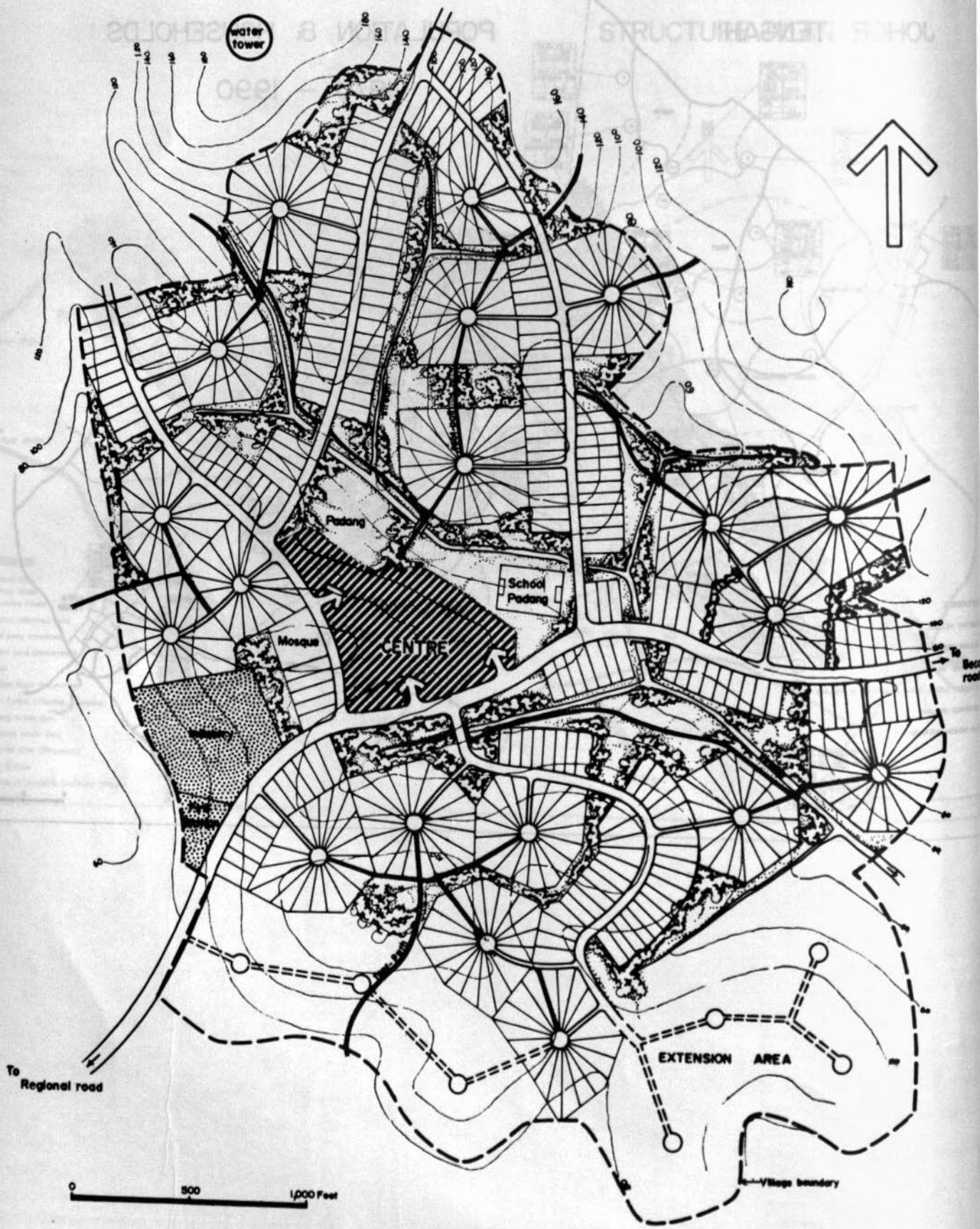
PROPOSED LOCAL SERVICE CENTRE & VILLAGE

RESERVED VILLAGE (R)

SUB-REGION BOUNDRIES

FIGURE 3.5.

VILLAGE: EXAMPLE LAYOUT



The hierarchy of places planned to serve the project area comprises the regional centre (Johor Baharu), a sub-regional centre (Kluang), one existing (Kota Tinggi) and two new major service centres, six central villages, 32-45 large villages, and the existing villages and kampongs.

3.2 Villages

3.2.1 Size, Form, Density and Location

Twenty-six new villages are proposed - 10 in Tanjong Penggerang, 16 in Johor Tengah. Groups of villages are served by a larger centre 5-8 miles away. (Sections 3.3 and 3.4).

Appendix C "Settlement Size, Form and Density" describes the analysis leading to the village proposals. Although scattered homes and farm groups might be appropriate in a few situations, the conclusion is that for most crops, the basic agricultural settlement should be a village of 3-600 families; the precise size would depend on the agricultural area served, on the labour requirements of the crops, and on the income and employment policies of the production agencies around the village. The proposed residential density is based on a half-acre house lot to provide adequate gardens and minimise sewerage costs. Compact layouts would promote social interaction and minimise road costs.

Villages of this size will give all families easy access to work and basic facilities, particularly roads, water supply, schools and health facilities, and will foster the growth of commercial services. The population of a 500 family village is likely to grow from 2,500 at the year of settlement to a maximum of 4,000 fifteen years later.

Each village has been located within reasonable travelling time of several agricultural or other employment opportunities. Preliminary sites of 200-300 acres have been identified.

In Johor Tengah, four reserve village sites are indicated in the area already being developed by GSA schemes and private estates near Layang Layang, in the hope that this will assist in their rational integration into the communication, settlement, and infrastructure framework being planned for the region as a whole. Additional reserve village sites are proposed in each region. It is assumed that the agricultural areas around them will use the residual labour on adjacent settlement schemes to meet their main labour requirements, or that their labour requirements may be so small (e.g. ranching cattle), that they will not be developed, other than for housing for management and a few key workers. In these cases, reserve villages will not be developed.

However, if there is full employment in nearby towns and villages, then the development of these reserve sites will become necessary to realise the agricultural potential of the surrounding areas; or if there is an increasing number of settlement schemes over those proposed at present, some of these sites will need to be developed.

TABLE 3.3 Proposed New Villages and Towns

Region	Proposed Villages	Reserve Villages (1)	Villages now being developed	Central Villages (5)	Major Services Centres (6)	Total New Settlement sites
Johor Tengah	16	10(2)	-	3	1	30
Tanjong Penggerang	10	3	6(3)	3	1	23(4)
T o t a l	26	13	6	6	2	53

Notes:

(1) Depend on timing and extent of private sector investment and proportion of labour available from planned villages and settlement schemes in adjacent areas and possible further development of settlement schemes.

(2) Includes four indicative sites on private estate and GSA schemes being developed near Layang Layang.

(3) FLDA Bukit Aping and Ayer Tawar schemes being developed.

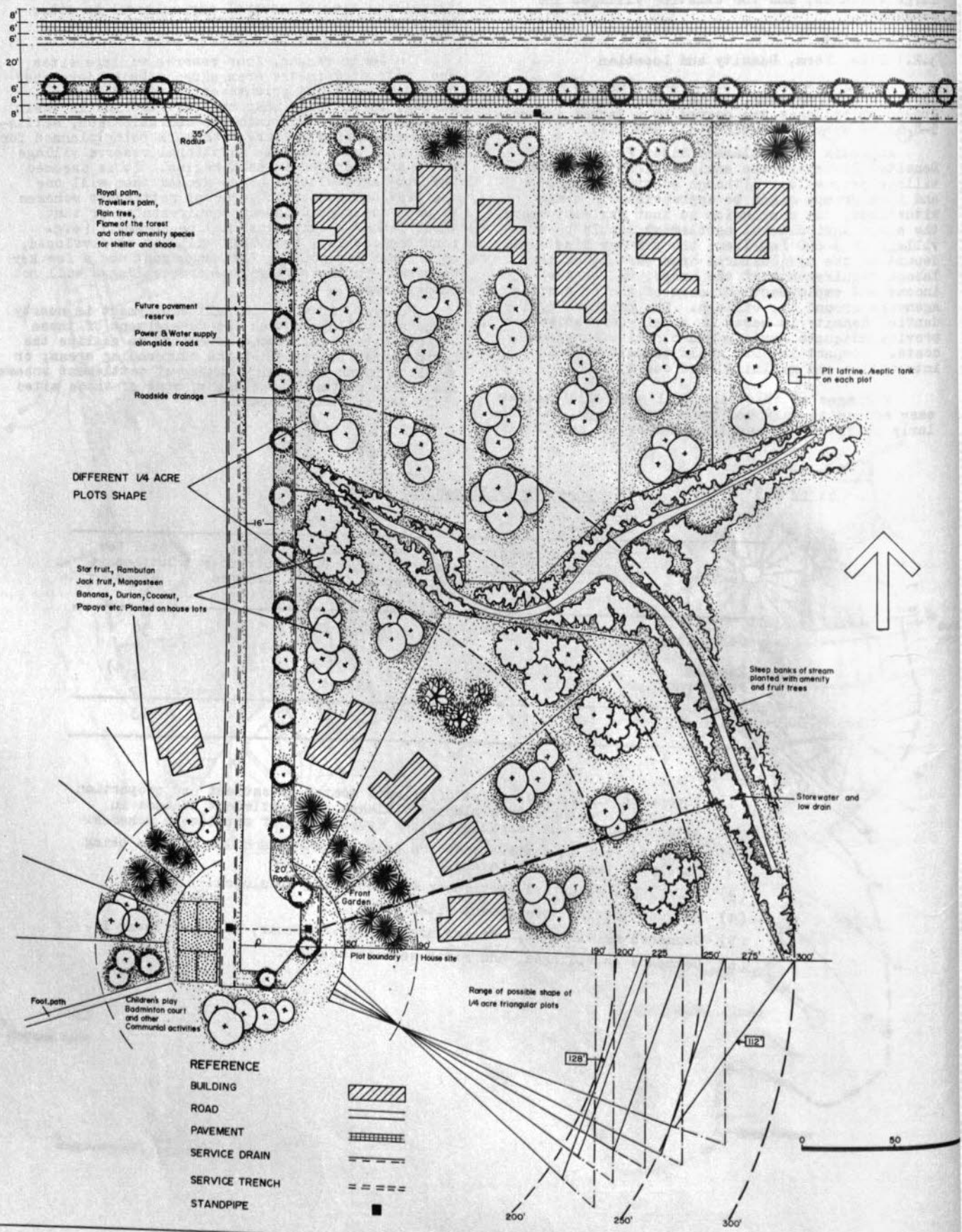
(4) Exclude tourist development sites (SV 7).

(5) Commence as villages, and include FLDA Bukit Besar, and Ayer Tawar II.

(6) Commence as villages, and minor service centres.

FIGURE 1

HOUSING LAYOUT EXAMPLE



In Tanjong Penggerang, six new villages and a main central village are already being developed by FLDA, within the size and density proposals of this plan.

3.2.2 Village Design

It is impractical to attempt to design the proposed villages and other settlements in detail until further survey information is available. It may even be that some of the village sites will need relocating, once the jungle is cleared and detailed contour surveys have been made.

The diagrammatic settlement plans illustrate principles for design and implementation. They have been based on existing village sites of similar topography for which detailed contours are available.

The plans illustrate methods of achieving the following objectives:-

(i) minising development costs;

(ii) introducing identity and interest to each village particularly in the design of the centre;

(iii) blending the village attractively into its landscape by the use of planting and open space in introducing areas for local pursuits for example, children's play areas, local shops, badminton courts for groups of houses;

(iv) clustering the houses to give a sense of place to various parts of the village;

(v) allowing direct and safe access to work and centres of local activity.

Villages should be sited near the centre of the agricultural area they serve. No part of the area should be more than 3 miles from the centre of the village, giving a maximum journey of 30 minutes to work (assuming all workers are able to own a bicycle). The average journey to work will be approximately 15 minutes.

Villages should have an internal road system separate from the agricultural roads.

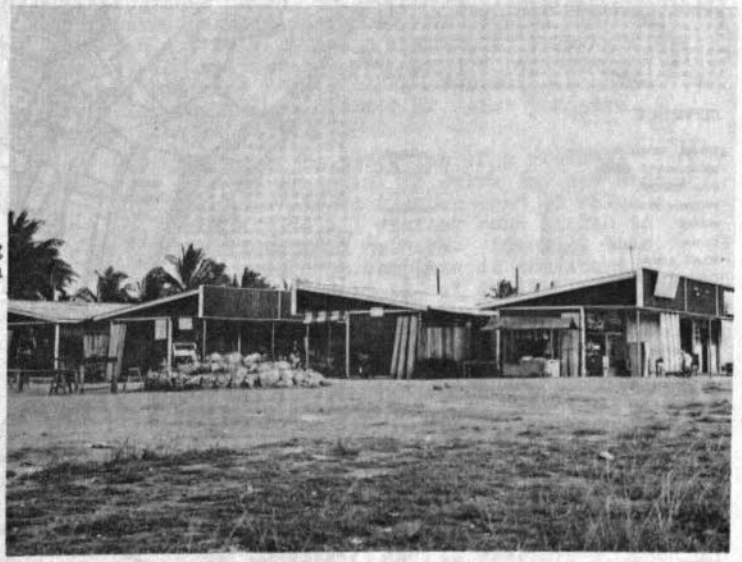
The functions of primary, secondary and agricultural roads are to move timber and agricultural produce to processing plants and to destinations outside the area as conveniently and speedily as possible. This is not compatible with the movement of persons in and around a village. If the village is to create an attractive, safe and convenient environment for the domestic life of the residents it must have its own separate network of streets, complete with footpaths, shopping areas, etc. They must be laid out in a way which will allow for the growth of car ownership and personal travel without creating traffic and road safety problems for tomorrow. Children must be able to walk to the primary school with ease and in safety. The shopping area and the village padang should be served by roads which are free from the danger and nuisance of heavily loaded logging trucks and commercial vehicles.

This concept is achievable through the planning of large villages, offering economies of scale which make it possible to separate heavy agricultrual traffic from the main village movements. The villages should be sited close to, but not on, the primary and secondary road system which will link them to the state and federal road system.

From alternative layouts for 4-600 dwellings on the contour and a study of plans of several sites that the most economical road system would consist of all weather feeder roads to the centre, with an access road to the primary and secondary roads. These feeder roads would serve each sector of the village, with groups of houses alongside them and

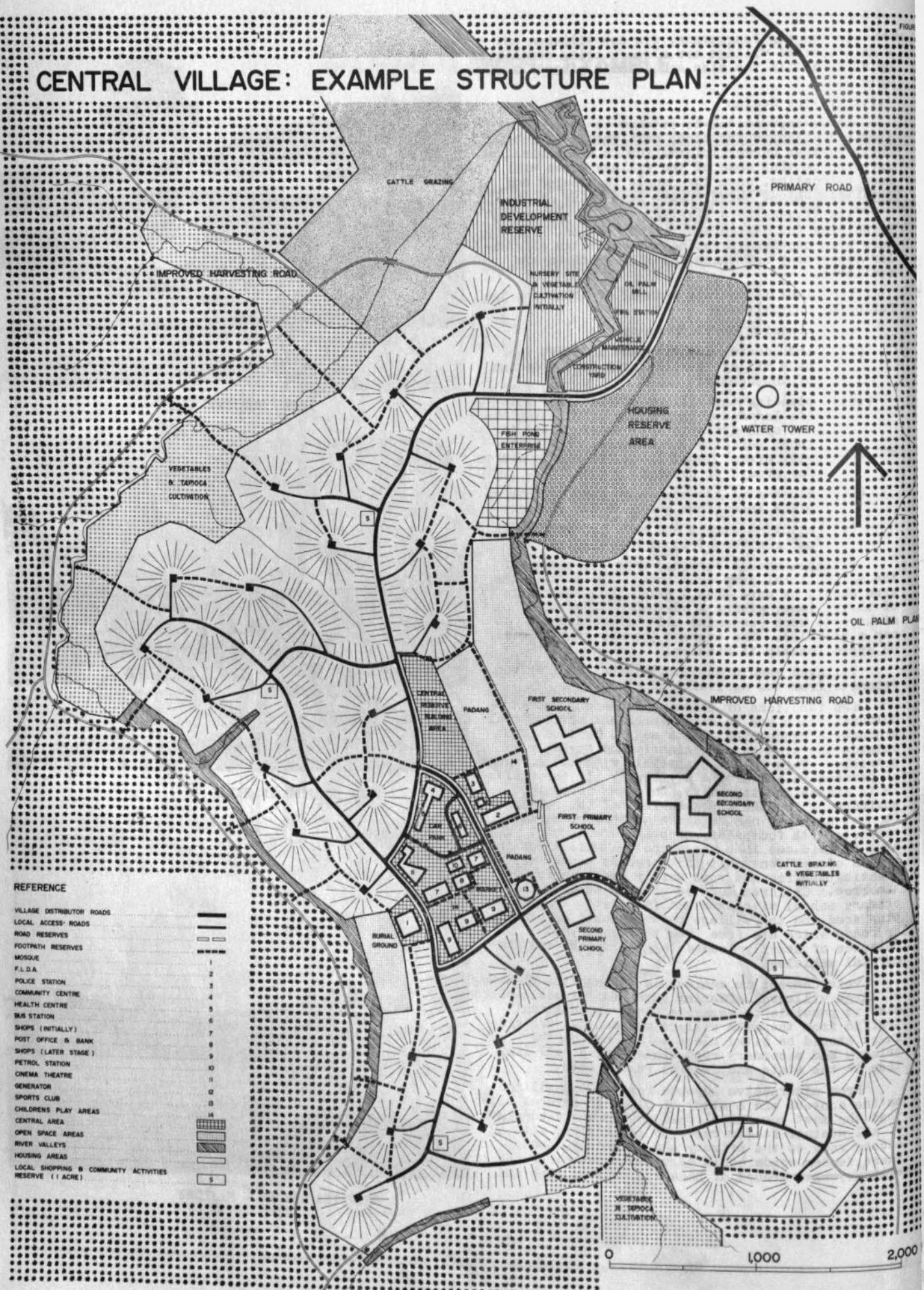
MARA HOUSING

FLDA HOUSING IN PASAK



SHOPPING CENTRE - MAJIDEE

CENTRAL VILLAGE: EXAMPLE STRUCTURE PLAN



REFERENCE

- VILLAGE DISTRIBUTOR ROADS
- LOCAL ACCESS ROADS
- ROAD RESERVES
- FOOTPATH RESERVES
- MOSQUE — 1
- F.L.D.A. — 2
- POLICE STATION — 3
- COMMUNITY CENTRE — 4
- HEALTH CENTRE — 5
- BUS STATION — 6
- SHOPS (INITIALLY) — 7
- POST OFFICE & BANK — 8
- SHOPS (LATER STAGE) — 9
- PETROL STATION — 10
- CINEMA THEATRE — 11
- GENERATOR — 12
- SPORTS CLUB — 13
- CHILDRENS PLAY AREAS — 14
- CENTRAL AREA
- OPEN SPACE AREAS
- RIVER VALLEYS
- HOUSING AREAS
- LOCAL SHOPPING & COMMUNITY ACTIVITIES RESERVE (1 ACRE) — S

and access to housing loop roads and culs-de-sac.

The majority of the carriageways in the cul-de-sac can be of gravel only, varying between 10 feet and 14 feet in width, with turning spaces for vehicles at the ends.

These culs-de-sac can serve up to 22 wedge shaped house plots of a quarter of an acre, each with a frontage of 10-15 feet, and 30 feet from the frontage a building width of 30-50 feet, and sides of 190-300 feet. From loop and feeder roads, wedge shaped and rectangular plots of 40-60 feet wide and 275-200 feet deep respectively are possible.

This variety of plot shapes will encourage the houses to be set well back from fence lines, and will allow adequate space for buildings to be extended as families grow.

The layout should be flexible so that the village can grow in a series of dwelling groups, having the quality of a kampong but capable of accommodating car ownership from 0-2 per dwelling.

To secure both the potential economies in development costs and the high environmental quality suggested, the survey and construction teams engaged in village development will require the advice and supervision of architects, engineers and town planners.

An area of 5-10 acres should be reserved for industrial developments. The larger figure should be used if a primary processing plant is required in the village, with up to five acres reserved for cottage and service industries to be developed by the residents. This should be located adjacent to the village building area alongside the access road.

The central area should be the focus of local activity at all periods of the village's development. At each stage a compact series of inter-linked central uses and buildings should be developed both to obtain economies in infrastructure costs and for the convenience of residents. This entails grouping together of the buildings which will be built at each stage. Initially, the first primary school, clinic, and FLDA or Development Corporation office; later other primary schools, offices, community hall, shops and cooperative; later still other social welfare, shopping, educational and recreational buildings. These should be developed to provide safe and direct separate road and footpath systems. The major open spaces of the schools and padangs, should be located so as to avoid taking up extensive frontages to the roads.

Schools will be the major central land use, and an expanding provision in each village will be required. Allowance for this must be made in each village plan.

The need is emphasised for school, office and other social buildings capable of flexible use and expansion in the development of the villages centres, together with communal use of access roads and car parks.

The landscape character of the centre will provide the main opportunity for each village to develop its own identity. Tree planting for shelter and shade, the parkscape treatment of the surrounding streams and hills, and the careful juxta-position of building groups to open spaces are critical to the development of an individual and attractive environment.

3.2.3 Suggested Method of Village Design

(i) Find within ½-1 mile of an agricultural area's centre, a site of 2-300 acres with as far as possible the following characteristics:-

above flood plain, gently sloping, crossed by few streams, within ¼-½ mile of hill 50 feet-100 feet above building limit, and a good stream. This is for ease and economy of construction and use, and for long and short term water supply considerations.

(ii) Delineate natural design constraints in and surrounding the site:-

stream, drainage patterns, steep slopes and hills.

(iii) Determine approximate limits of village building area.

(iv) Determine site of approximately 30 acres at centre of village, and reserve site for industrial development of 5-10 acres.

(v) Design shortest and most direct road system (maximum gradient 1 in 15) to link all housing areas and the industrial area to the centre and the village access road to the nearby primary or secondary road.

(vi) Prepare outline plan for town centre - locating major uses and open spaces. Adjust road system to run around the centre.

(vii) Outline all culs-de-sac and loop housing pockets and links to road system.

(viii) Adjust road system to give linear house lots along sides of road, where arrangements above are not practical.

(ix) Look for other potential areas, such as banks of streams and unusable land, to create linked pattern of open space, children's play areas, and casual footpaths, running throughout settlement.

(x) Adjust the village boundary to fit the plan.

(xi) Discuss with engineers (roads, foul and storm water drainage arrangements, and water and electricity reticulation requirement).

(xii) Amend plan.

(xiii) Design detailed plan for centre.

3.2.4 Village Development Programme

The work programme for the building of a new village covers two years from the date of commencing clearance to the date the first settlers move in. The sources used in building up this programme were the Jengka Report (TAMS-Hunting 1967), FLDA's programmes for Jengka and elsewhere, the World Bank Report - (IBRD Appraisal Mission) on Jengka, and discussions with other public authorities.

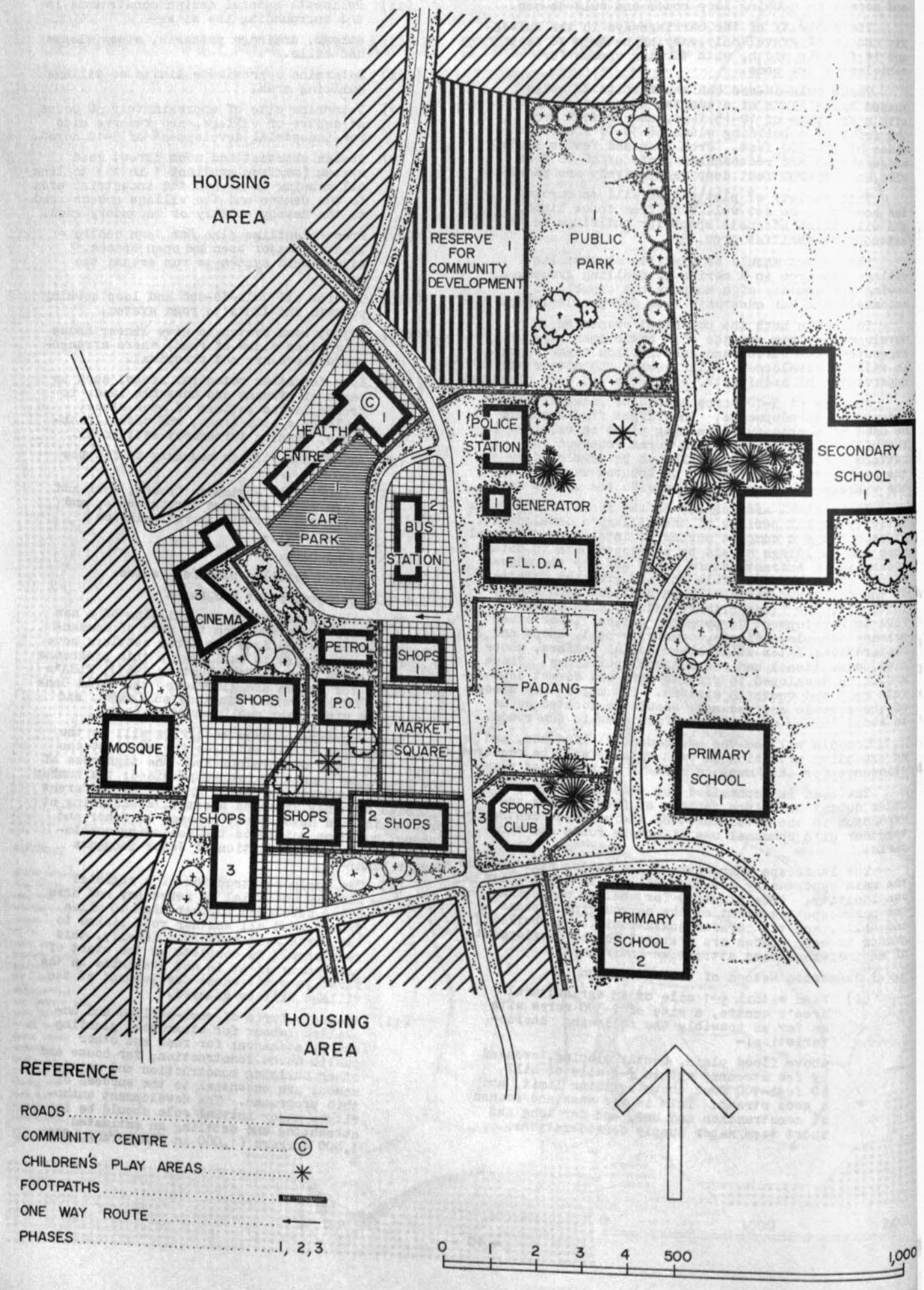
The programme assumes that FLDA will be the major developer of new villages for at least the first five years of development. The tightness of the programme cannot be over-emphasised; the number of inter-dependent operations by several different agencies not only explains shortfalls occurring at present in land development schemes in Johor and Pahang, but also points to the following conclusions for the implementation of Johor Tenggara Master Plan:-

(i) The early construction of a regional road is essential to serve any new area being developed further than 10 miles from a good all weather road linked to the State road network. Ideally, this road should be complete at the start of clearance; if it is not available in the first year the whole development of the village will be delayed.

(ii) Adequate force of semi-skilled and unskilled labour for clearance, planting and maintenance; for road and other public works construction; for house and other building construction and maintenance; are essential to the success of this programme. The development authority's major initial role should be in attracting and settling an estimated 1,800 workers (1,000 in Penggerang, 800

EXAMPLE LAYOUT — CENTRE OF CENTRAL VILLAGE

FIGURE 3.



in Johor Tengah), at first in temporary labour camps and later with their families in low cost housing.

(iii) There is no room time in the village development programme for design-tender-contract procedures, except for housing. Direct works procedures with subsequent accounting must be adopted. The early appointment of the chief technical officer (engineer/planner) of the development authority and his staff to organise the development programme is thus imperative. PERNAS or a private building enterprise might act as managing agents for the development corporation; the alternative is to set up special autonomous construction units of JKR with their own manpower and machinery under the direction of the development corporation's chief technical officer.

(iv) The desirable variety of types of housing and methods of construction can only be achieved if the sort of arrangements suggested in (ii) above are adopted.

(v) Clearance should start near the centre of each scheme on the provisional village site of 200 acres, and move outwards on to the most gently sloping areas of 200 acres or more. If clearance is then delayed, surveying of the village site can then proceed on time without delaying subsequent stages.

3.3 Central Villages

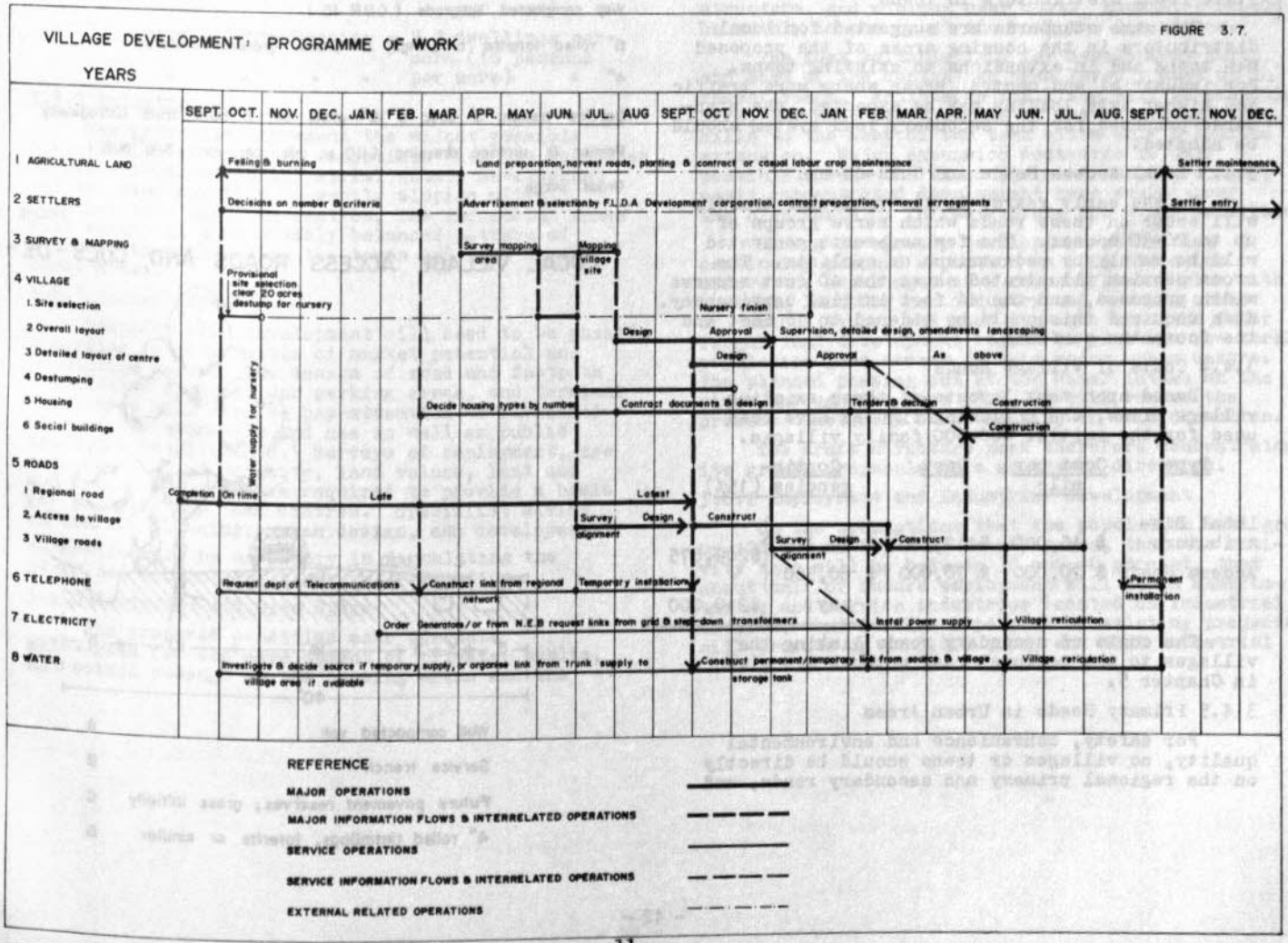
In the proposed regional settlement pattern several villages will be served by a central village. Six of these minor service centres are proposed - in Tanjong Penggerang at Ayer Tawar II, Simpang Wah Ha and Bukit Sening; and Johor Tengah at FLDA Bukit Besar, Sembrong Tengah and Kahang Timor. As well as housing workers on the surrounding agricultural areas, they will become local centres for processing, distribution, marketing, social services, commerce and entertainment for the existing and new population within five to eight miles.

This will allow a high level of services to be provided, as the central village will have a catchment area of between 5 and 9 villages. Depending on the size and shape of each area when developed, the population served by these central villages would be 10-25,000, growing in fifteen years to a maximum of 14-35,000. These catchments cover areas of up to 100 square miles, but as the central villages are reasonably central to each area, most villages will be no more than five miles away by all weather road. This is well within the distance children can be expected to travel to secondary school. The villages can be linked to the central village by taxis/school buses and a local bus service, with journeys taking as little as 10-15 minutes.

The central villages are located close to the primary roads so that they can be served by a fast, regular regional bus service providing links to urban centres such as Johor Baharu, Kluang, Kulai, Kota Tinggi and the proposed new towns.

Each central village will have an initial population of 2,500-3,000 based mainly on agricultural employment in the surrounding area (500-700 households).

The principles for the design and development of the central villages are similar to those for the villages given earlier. However larger allocations of land for the three major land uses are required, together with reserves for later expansion. The long term reserve areas could be developed for agriculture initially, if possible under short term crops and the control of a single public production agency, in order to facilitate their later release for development.



Housing: a short term reserve of 30 acres and a long term reserve of 50-100 acres depending on the size of the area served.

Industry: 10 acres for early development, and a long term reserve of 20-30 acres.

Town Centre: 30 acres for early development, and a long term reserve of an additional 10-30 acres, depending upon future school requirements.

3.4 Village and Town Roads

The standards and costs of the primary and secondary roads planned in the project area are described in Chapter 5.

Within the villages and towns, two road categories are proposed:-

(1) Local distributors.

(2) Local access roads and culs-de-sac.

3.4.1 Local Distributors in Villages

The functions of the local distributors are to link all parts of the village to the centre, and to the secondary route linking the village into the regional road network. It is expected that initially the main traffic will be pedestrians, cycles, motor cycles, and taxis but in the longer term extensive vehicle use is likely. The village drainage, water and electricity networks will run alongside these roads. For amenity, road safety, shelter and shade, extensive roadside tree planting is proposed. A total width of 60 feet should therefore be reserved for these roads, though a 20 feet carriageway will be adequate.

The cross section illustrated shows the proposed structure of these roads; a 30 m.p.h. design speed is suggested. 1 in 15 is the desirable maximum gradient, with an absolute maximum over short lengths where no alternative exists of 1 in 7.

3.4.2 Local Distributors in Towns

The same standards are suggested for local distributors in the housing areas of the proposed new towns and in extensions to existing towns. For industrial and central areas where more traffic and higher axle loading may be expected, the standards proposed for the secondary road system should be adopted.

3.4.3 Local Access Roads and Culs-de-sac

In the early years, little venicular traffic will occur on these roads which serve groups of up to 20-30 houses. The few movements generated will be mainly by pedestrians or cyclists. The cross section illustrated shows the 40 feet reserve width proposed, and the 14 feet initial carriageway. When required this could be widened to 16 feet and the footpaths surfaced.

3.4.4 Costs of Village Roads

Based upon test layouts of three existing village sites, the following figures have been used for the initial 400-600 family villages.

Type	Cost per mile	Cost	+ Contingencies (15%)	
Local Distributors	$ 45,000	$112,500	$129,375	$209,875
Access Roads	$ 20,000	$ 70,000	$ 80,500	
			say	$210,000

The costs of secondary roads linking the villages to the regional road network are given in Chapter 5.

3.4.5 Primary Roads in Urban Areas

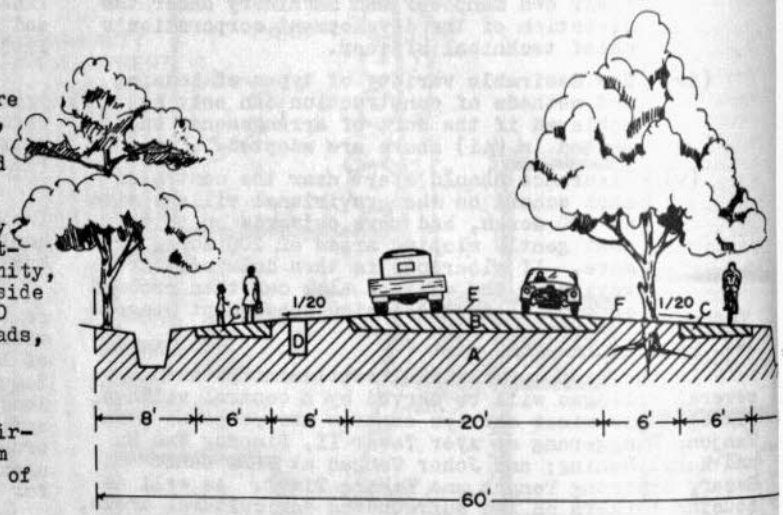
For safety, convenience and environmental quality, no villages or towns should be directly on the regional primary and secondary roads, and access to all property should be from the local distributors and other proposed local roads.

Where a primary road runs alongside or through an urban area, the land reserve should allow for dual carriageways in the long term. By 1990 the level of car ownership and use and the employment attractions of the towns are likely to result in a sufficiently high level of local movement.

The junctions of local distributors with primary and secondary roads should be restricted in village and urban areas to those indicated.

FIGURE 3.10

LOCAL DISTRIBUTORS IN VILLAGES & HOUSING ARE



Well compacted subgrade (CBR 15)

6" rolled laterite, tintailings, or similar granular material

4" " " " " " " "

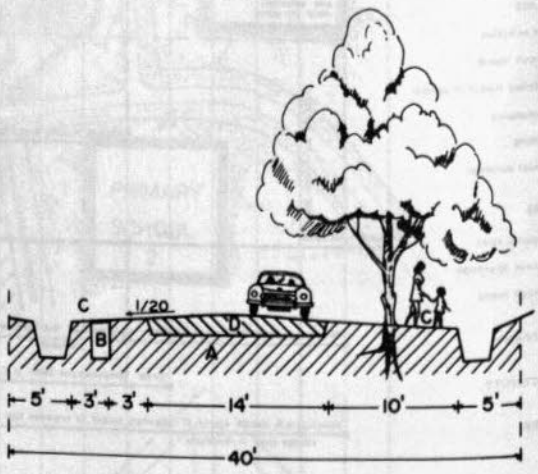
Service trench, 3' deep x 18" wide, set 3' back from carrageway

Primer & surface dressing (110 sq. yds. per ton; 3/8" N.S.)

Grass verge

FIGURE

LOCAL VILLAGE ACCESS ROADS AND CULS-DE-



Well compacted soil A

Service trench B

Future pavement reserves; grass initially C

4" rolled tintailings, laterite or similar D

3.5 Urban Densities and Design Criteria

3.5.1 Densities

The main variable in urban densities applicable to Johor Tenggara is the net residential density.

It has been assumed that net housing land (i.e. dwelling plots and local roads) represents 67 per cent of gross housing land (i.e. including schools, public open space and other ancillary uses).

Town and district centres, industrial zones, major roads, waste land, and other areas usually account for 30-40 percent of urban land. A figure of 33 percent has been used for planning purposes.

Net residential densities are likely to vary in each town, from exclusive detached housing at 1-2 dwellings per acre, detached housing at 4-6 dwellings per acre, especially for low cost Malay kampong areas, to 10-16 dwellings per acre higher density housing schemes near town centres. There would appear to be no justification in the towns in and around the project regions for extensive high rise flats and maisonette schemes - resulting in even higher densities, on social preference grounds, land scarcity, nor construction costs. Thus,for planning purposes, an average net residential density of 6 dwellings per acre has been assumed for the urban developments.

The resulting urban densities for the new towns and town expansion schemes can therefore be summarised as:-

1. Net Residential Density = 6 dwellings per acre (36 persons per acre)
2. Gross Residential Density = 4 dwellings per acre (24 persons per acre)
3. Overall Urban Density = 2.7 dwellings per acre (16 persons per acre)

3.5.2 Industry

The proposals represent the widest possible distribution of industry compatible with the economies of scale involved in industrial estate development and the need for flat or gently sloping sites. Together with the town centres, the industrial zones will result in a reasonably balanced pattern of journeys to work within the towns and from nearby rural areas.

3.5.3 Central Areas

Plansfor each development will need to be phased according to assessments of market potential and population served. The design of road and footpath circulation systems, car parking areas, and terminal facilities will need to pay attention to increased private car ownership and use as well as public transport requirements. Surveys of employment, age and condition of property, land values, land use and retail turnover are required to provide a basis for planning the town centres. Specialist advice on traffic planning, urban design, and development economics will be necessary in formulating the plans and controlling their implementation.

3.5.4 Landscape and Open Space

The proposed densities make adequate allowances for the development of private, public, and school padangs in the housing areas and the district and local centres, as well as in the town centre. Other smaller spaces for children's play, badminton, etc. should be designed as part of individual development schemes.

3.5.5 Communications

Within the framework of the regional road system access to individual development areas will be by the distributor road system shown on the plans for each town and to property by local development roads.

3.6 Kluang

Kluang is a sub regional and district centre and an important garrison town, which in recent years has acquired a strong base of service and manufacturing industries. It is the shopping, educational, health, entertainment and social centre for central Johor.

As far as can be ascertained, the population of the town and the immediately adjacent areas is around 60,000 at present and may be expected to reach 175,000-200,000 by 1990.

To accommodate this growth, an outline plan for the main land uses and communications is required; the objective is to produce a framework which would be attractive and convenient for residents; which would secure the highest possible returns on investment in infrastructure; which would be phased to allow for gradual development; and which would allocate sufficient land for the expansion of the main economic activities of the town - commerce and industry - as well as for housing and ancillary services.

3.6.1 Alternative Directions and Forms of Growth

The present size and form of the town suggest that satellite settlements would be inappropriate, and that to secure maximum returns on public investment in new roads, bridges and other infrastructure, and minimum user costs, expansion should be mainly in one or at the most two directions.

The most suitable land for development north and east of the centre has been largely used up in recent years. While some infilling will be possible here, the wide flood plains of the rivers and the hills to the east of the town allow only a limited expansion. Major expansion westwards is only possible across the flood plain of the S. Melanti; early concentrated development here would incur the high costs of infrastructure for a new satellite.

Kluang is already developing southwards. A continuing planned expansion in this direction offers the advantages of a compact phased plan with suitable land for new industry and housing areas of various types, and good linkages into the Johor Tengah land development region to give its new rural population good access to this major urban centre. The planned phasing out of the water intake on the river through the town (S.V. 3) will remove the present constraint on developing in this direction.

The draft structure plan therefore concentrates its growth proposals in a southerly direction.

3.6.2 Employment and Industrial Development

On the assumptions that the population will grow by 120,000 in the next twenty years, that the activity rate will be between 30 and 40 percent, that about half of future employment will be in manufacturing and service industries located on industrial estates, that further expansion of existing projects will provide up to 5,000 jobs, and that industrial

FIGURE 3.12.

KLUANG EXISTING STRUCTURE

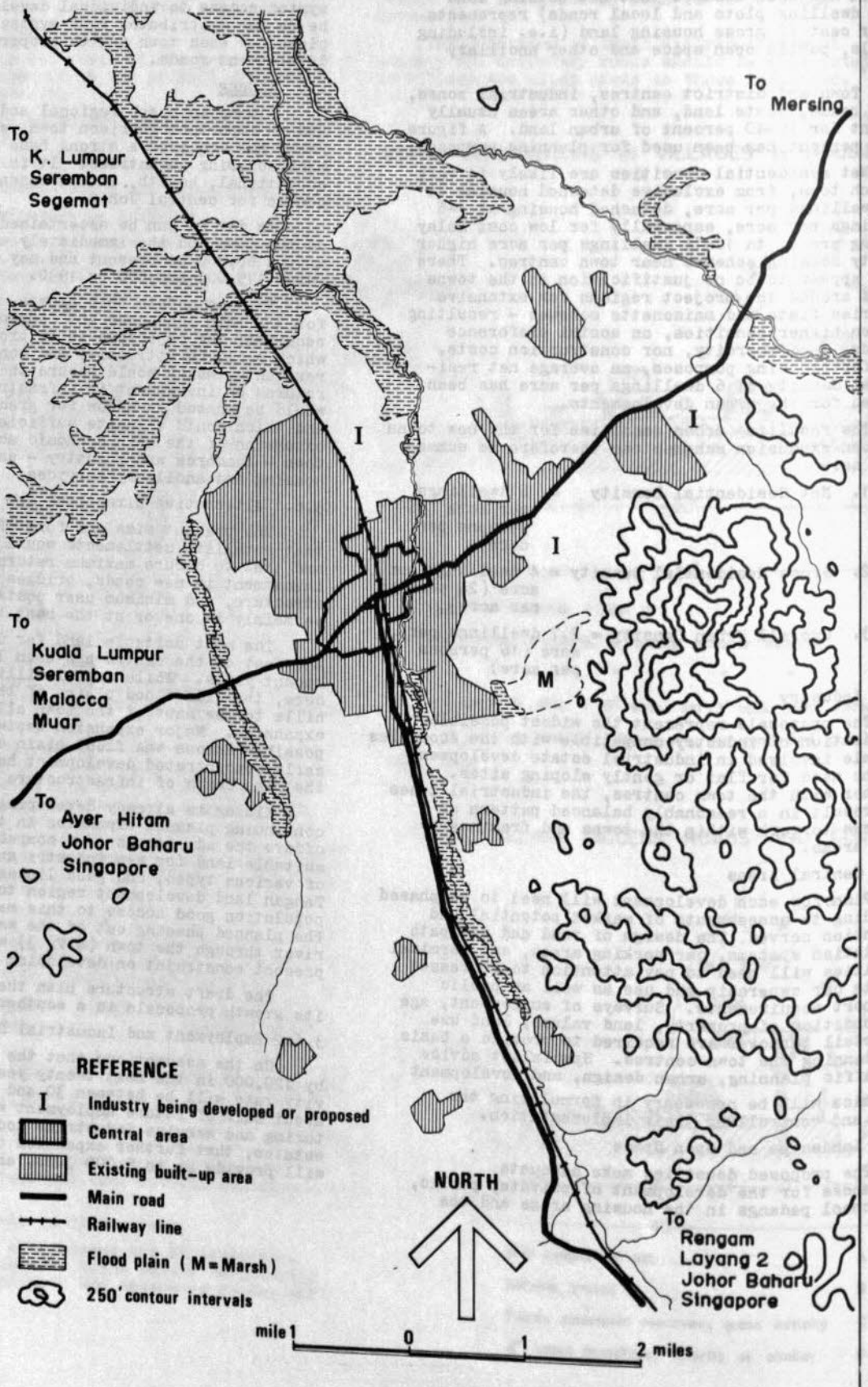
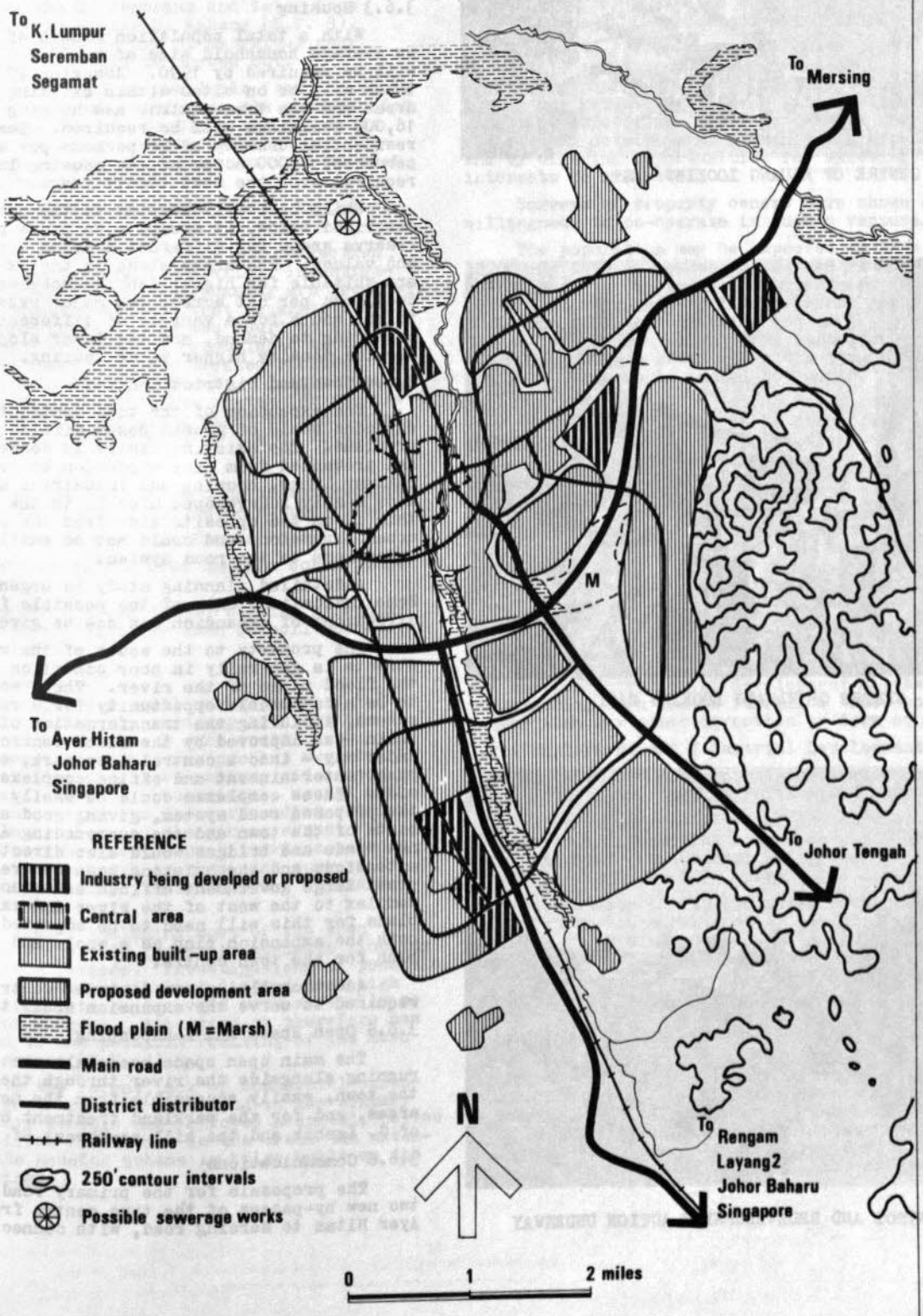


FIGURE 3. 13.

KLUANG DRAFT STRUCTURE PLAN TO 1990



densities will be between 20 and 40 workers per gross acre, 550-700 acres of land should be set aside for industrial development.

Several small estates and individual industrial projects are already developing on the south and east of the town. The existing town plan provides an area to the north of the town alongside the railway for industrial development. The outline structure map allows for the completion and extensi of these existing developments and proposals, addin some 200-250 acres to them, and proposes a major new industrial estate of 300-350 acres alongside th existing road to Rengam.

3.6.3 Housing

With a total population growth of 120,000 and an average household size of 6, 20,000 new houses will be required by 1990. Assuming 20 percent of these will be on sites within existing residential areas and the town centre, new housing areas for 16,000 dwellings will be required. Based on a gross residential density of 24 persons per acre (4 dwelli per acre) 4,000 acres of new housing land will be required over the next twenty years.

While basically keeping to the phasing proposal described below, it should also prove possible to reserve areas for different housing types, densities and values. The areas close to the existing town are suitable for higher density schemes (10-16 dwellings per net acre), the major expansion areas to the south for a variety of different schemes according to demand, and the lower slopes of G. Lamb for low density higher value housing.

3.6.4 Town and District Centres

The expansion of the town centre to meet the expected scale of growth poses difficult planning problems. The existing centre is densely developed, and prevented from easy expansion by rivers, roads, railway lines, housing and industrial areas. The most easily redeveloped area is to the north, but this is on the opposite side from the main area of urban expansion, and could not be easily served by extensions to the road system.

A detailed planning study is urgently required. Some indications only of the possible forms and directions of expansion can now be given.

The property to the south of the main shopping streets is generally in poor condition and within the flood plain of the river. There would appear to be a favourable opportunity for a redevelopment scheme, including the transformation of the flood plain - as improved by the flood control measures under way - into a central town park, with new shopping, entertainment and office complexes on either side. These complexes could be easily served from the proposed road system, giving good access from al parts of the town and the surrounding areas. The new roads and bridges would also directly link these extensions and the existing town centre to the proposed large government offices and educational complex to the west of the river and railway. The plans for this will need to be adjusted to fit into both the expansion plan as a whole and the detailed plan for the town centre.

Additionally, a new district centre will be required to serve the expansion areas to the south.

3.6.5 Open Space and Landscaping

The main open space proposals are for a park running alongside the river through the centre of the town, easily accessible from the new housing areas, and for the parkland treatment of the slopes of G. Lambak and the hill southwest of the town cent

3.6.6 Communications

The proposals for the primary road system incl two new by-passes of the town centre from the main Ayer Hitam to Mersing road, with connections to the

CENTRE OF KLUANG LOOKING WEST

CENTRE OF KLUANG LOOKING EAST

FLOOD CONTROL AND REDEVELOPMENT ACTION UNDERWAY

two other main regional routes - the existing Rengam/Johor Baharu road and the proposed Johor Tengah spinal route. These roads should not be used for direct access to property, and junctions should be limited to those shown on the plan.

The existing railway line and station are likely to prove adequate for future demands, although the detailed planning of the town centre will need to take access, car parking, and interchange facilities into account.

3.6.7 Services

Water supply will be provided from the new intake on the S, Sembrong and later from storage reservoir on the S. Kahang (S.V. 3). The existing intake on the S. Mengkibol near the centre of town will be phased out.

Electricity will be available from the 66 KV national grid network, which has the capacity for increase to 132 KV. No problems are likely to occur in the expansion of the exchange and distribution network for telecommunications to meet demand (Chapter 6).

Flood control measures on the S. Mengkibol are already being undertaken.

New sewage treatment works and collection systems will be required. Detailed investigations of methods, costs, and phasing are required, but outline studies suggest that separate storm water and foul drainage systems would be appropriate, with a major works established to the north of the town, with the treated effluent discharging into the S. Sembrong. Initially a separate works and collection system for the new expansion areas to the south might be considered, with the plant discharging into the S. Melanti.

3.6.8 Phasing

To secure maximum returns on infrastructure investment, development should be concentrated

(i) to the west of the Rengam road;

(ii) between Rengam road and the Johor Tengah route;

(iii) in other areas later, working generally from the existing town council boundary outwards.

3.7 Kota Tinggi

Kota Tinggi is a small market town of 8,300 population, on the only bridging point on the S. Johor, and on the national east coast route. It is at the junction of the two project regions, is the District administrative centre, and serves as the commercial, health, educational, social and entertainment centre for the surrounding rubber and oil palm estates and tin mining areas. Its population growth over the past thirteen years has been below the national average, and surveys of traders indicate that its economy has expanded little in recent years.

Large areas, including most of the town centre, are subject to frequent extensive flooding in the monsoon periods. Investigations of possible flood control measures have indicated that high costs are likely to be incurred with virtually no guarantee of success. Attention is therefore now being given to the possible resiting of the town on higher ground (S.V. 3).

Despite the recent lack of commercial expansion, the government is investing in new primary and secondary schools and improved hospital, police and post office facilities in the town. An extensive private housing scheme is being built on the western fringe.

Developments in the project regions and further land development in the east of the State are not only likely to increase the importance of Kota Tinggi as an administrative, distribution and service centre, but also to increase the potential labour force available within reasonable journeys of the town. Its strategic location on the main east west and Tanjong Penggerang road links to the expanding Johor Baharu and new port less than 20 miles to the south are likely to make it progressively more attractive to industrial and commercial investment, if confidence can be established in the conditions and services that will be available.

First among these considerations will be the availability of sites and services, free from the risk of damage, depreciation and disruption due to flooding.

These conditions will only be achieved by the early preparation of a plan for the town, by directing public and private investment into the new areas, by public expenditure on new roads and services, by controlling developments within areas liable to flood, and by offering opportunities for existing business interests to relocate.

Surveys of property owners have shown a marked willingness to co-operate in such a venture.

The population may be expected to grow to 20-30,000 by 1990. Because of the restricting physical constraints in the area, and uncertainty about the scale of development up to and beyond 1990, it is advisable that the direction and areas of growth should accommodate an ultimate capacity of 50,000 population. At a gross urban density of 15 persons per acre, this would need 3,300 acres, or about 5 square miles.

The area chosen has to be free from flood risks. It has preferably also to be as close as possible to the existing town so as to facilitate gradual development integrated into the existing urban fabric. It is also desirable that the high early infrastructure costs likely to result from the development of a new satellite town should be avoided, and that the area chosen should be suitable for the development of road, water supply, and sewerage systems. In addition, the town expansion scheme if possible should be on the eastern side of the S. Johor where the town's main area of influence is located.

The area within 5 miles radius of the existing town centre was examined in the light of these criteria, and the concentration of development northwards from the existing town centre fulfilled these conditions better than any other direction or form of growth.

3.7.1 Employment and Industrial Development

Up to 10,000 new general industrial jobs may be required by 1990, together with 6,000 jobs in services.

Allowing for one third of the service jobs to be located in industrial areas, some 400 acres need to be reserved for industrial development (based on an average density of 30 workers per acre).

Two estates of 150-250 acres each are proposed - the first to the north east of the existing town and the road to Mersing, the second to the west of the Lombong road some two miles north of the existing town centre.

No problems of making sufficient water and power available are anticipated, (Chapter 6 and S.V. 3).

3.7.2 Population and Housing

With a population growth of 12,000 and an average household size of 6, 2,000 new houses will be required by 1990. Assuming a 20 percent increase for the relocation of families living at present within the flood plain, land may be necessary for 2,400 houses. Assuming a gross residential density of 24 persons

FIGURE 3. 14.

KOTA TINGGI EXISTING STRUCTURE

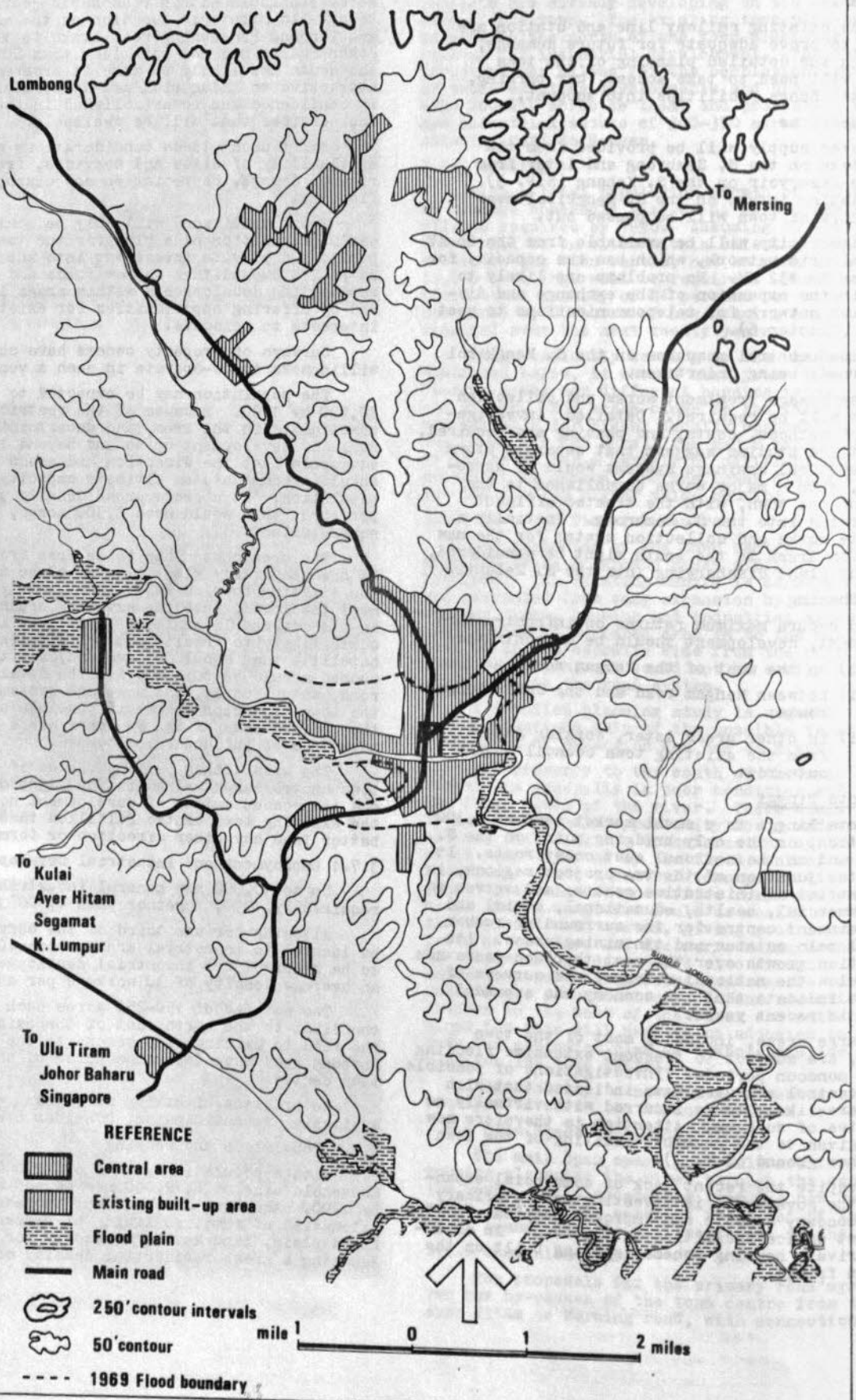
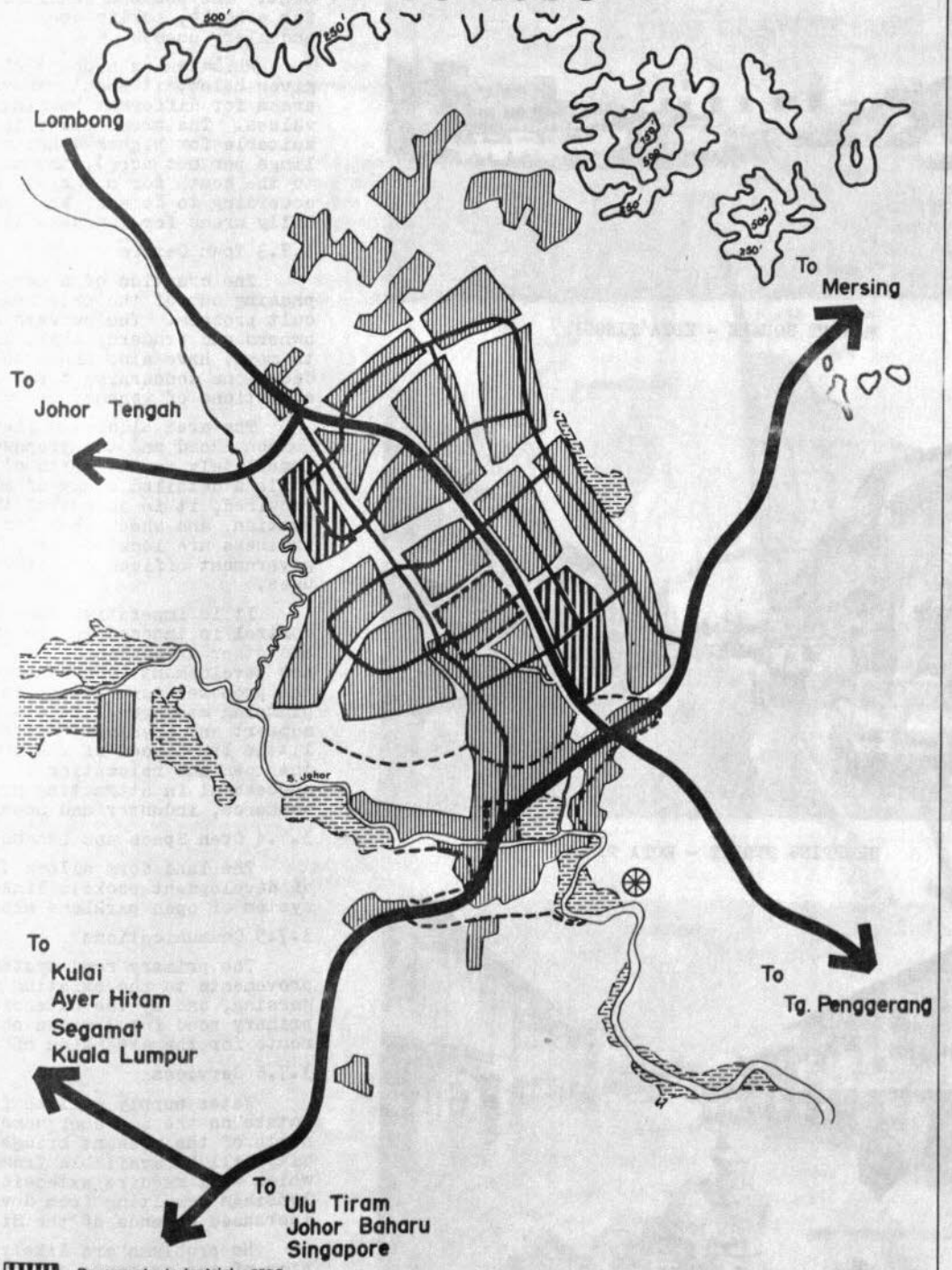


FIGURE 3. 15.

KOTA TINGGI DRAFT STRUCTURE PLAN TO 1990



MARKET SQUARE - KOTA TINGGI

SHOPPING STREET - KOTA TINGGI

SAME, IN 1969 FLOODS

per acre (4 dwellings per acre), 600 acres of land need to be reserved. In the longer term possible addition of a further 20-30,000 population should be borne in mind; this is equivalent to about 1,000 acres. These are in the areas shown to the north and east on the outline plan, which should be reserved for later development. The assumed densities include allowances for schools, public open space, roads, and other ancillary uses.

While taking account of the phasing proposals given below, it should prove possible to reserve areas for different housing types, densities and values. The areas close to the existing town are suitable for higher density schemes (10-16 dwellings per net acre), the major expansion areas to the south for a variety of different schemes according to demand, and the outer and the more hilly areas for low density higher value housing.

3.7.3 Town Centre

The creation of a new town centre, and the phasing out of the existing one will be a difficult process. The surveys of existing property owners and traders, while indicating a willingness to move, have also shown the importance of public decisions concerning terms of compensation and conditions of tenancy or ownership of new premises.

The area allocated lies between the existing Lombong Road and the proposed new spinal road immediately to the north of the existing town. While a detailed study of all potential uses is required, it is essential that the market, bus station, and shophouses for existing and new business are located here, together with new government offices and other social and community uses.

It is imperative that strong development control is imposed in the existing town centre and other areas liable to flooding, and that new development is encouraged to locate itself in the proposed town extension area. Unless strong planning measures with state and local government support and involvement are undertaken, there is little likelihood of the proposals for expanding the town and relocating the town centre proving successful in attracting private investment in commerce, industry and housing.

3.7.4 Open Space and Landscaping

The land form allows the creation of a series of development pockets linked to a continuous system of open parkland along the river valley.

3.7.5 Communications

The primary road system is provided by improvements to the existing roads to Lombong and Mersing, and by the extension of the Penggeri primary road for 3 miles northwards as a new route for the expansion of the town.

3.7.6 Services

Water supply will be from a proposed new intake on the S. Johor some three miles to the north of the present bridge (Volume 3). Electricity will be available from the national grid which will require extension both for the increased loadings resulting from development, and for increased demands of the Singapore PUB in

No problems are likely to occur in the expansion of the exchange and distribution network telecommunications to meet demand. (Chapter

New sewage treatment works and collection systems will be required. Detailed investigation of methods, costs and phasing are required, but outline studies suggest that separate storm water and foul drainage systems would be appropriate with a major works established to the south of town, with the treated effluent discharging to the S. Johor. Holding tanks will probably be

necessary so that the effluent can be pumped out on the ebb tide.

3.7.7 Phasing

To secure the maximum returns on infrastructure investment, and encourage the early relocation of the town centre and early industrial development, the phasing proposals envisage the early development of the main new road, with industry to the east of it, and housing and town centre uses between this route and the existing road to Lombong. Further housing development would be to the west of the Lombong road, and the latest areas to be developed would be to the north and east.

3.8 Johor Tengah New Town

This proposed town is referred to as Bandar Tengah at certain points in the text of this and other supporting volumes, and the Master Plan. Similarly the proposed new town in Tanjong Penggerang is referred to as Bandar Lebam. This is purely for ease of reference and tabulation layout in this report, and the naming of each town and village proposed is seen as a responsibility of the development authority, local government and residents.

3.8.1 The Need for a New Town

A new service, social and employment centre will be required for the central agricultural areas of Johor Tengah including the FLDA Kulai Complex and the private estate and smallholding areas to the east of Layang Layang. By 1990, there are likely to be over 60,000 people in this area without direct or convenient access to Kluang, Kulai or Kota Tinggi, and a demand for up to 6,000 jobs in general industrial development from the resident population in these parts of central Johor.

A base for marketing and distribution, construction and transport will be necessary in this area, together with a timber processing plant, and educational, health shopping, entertainment, religious and other social facilities. By 1975, the population of a new town could be expected to be over 4,000, with 1,700 jobs in agriculture, timber and services. By 1990 there could be approximately 13,000 people living in the town supported by 4,300 jobs in agriculture, timber, primary processing, service industries, commerce and other services.

The timber industries complex and the surrounding agricultural operations should be under way by 1975. The new town should start as a village and minor service centre, based on employment in agriculture, timber and agricultural processing, construction, and transport repair and maintenance. It may then be expected to expand gradually as the population of the region around it increases, with the consequential growth in demand for services.

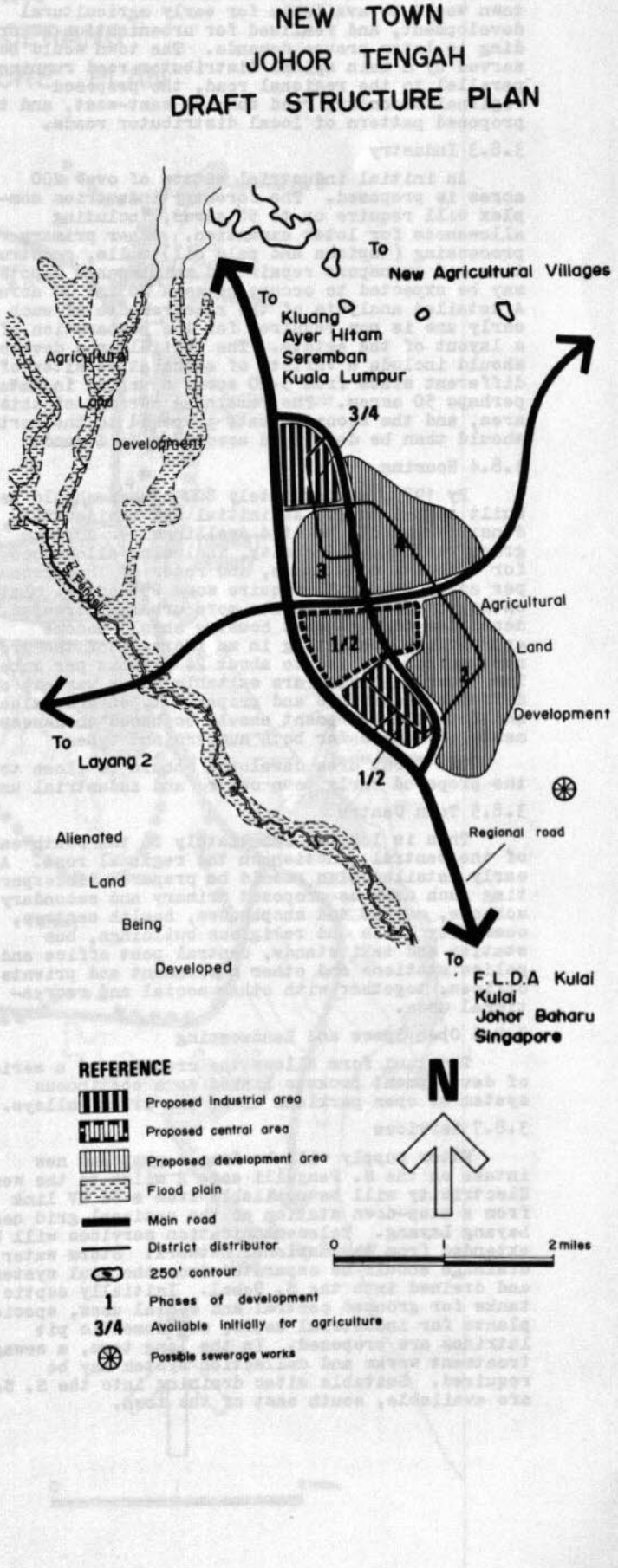
3.8.2 Size, Location and Urban Form

It is important that the site chosen should be capable of long term growth beyond the plan period. An ultimate population capacity of 50,000 was assumed as an upper design limit, requiring, at an overall urban density of 15 persons per acre a site of 3,300 acres, or nearly 5 square miles. The need is for a site of this size suitable for urban land uses, directly served from the proposed regional road system, central to the service area, and at which adequate water, power, and sewerage arrangements could be made available.

It is also necessary that some of this land should be available immediately, and served by early road proposals, and that the site should be compatible with crop diversification and other agricultural planning considerations.

The site chosen is some 3–4 miles north of the S. Sayong, immediately to the east of the S. Pengelli watershed, stretching alongside the proposed regional road for some three miles.

FIGURE 3.16.



Two industrial estates are proposed, one at each end of the town. The proposed central area lies between these two estates, with the housing areas to the east. The northern section of the town would be available for early agricultural development, and realised for urbanisation according to later proven demands. The town would be served by a main spinal distributor road running parallel to the regional road, the proposed regional secondary road running east-west, and the proposed pattern of local distributor roads.

3.8.3 Industry

An initial industrial estate of over 200 acres is proposed. The forestry industries complex will require up to 50 acres, including allowances for later expansion. Other primary processing (tapioca and palm oil) mills, construction and transport repair and maintenance depots may be expected to occupy between 20 and 30 acres. A detailed analysis of the requirements of each early use is now required for the preparation of a layout of the estate. The initial area developed should include a variety of speculative sites of different sizes from 5-20 acres covering in total perhaps 50 acres. The remaining acreage of this area, and the second estate proposed to the north should then be developed according to demand.

3.8.4 Housing

By 1975, approximately 800 houses should be built in the town. As initial net residential densities should be at 4 dwellings per acre (a gross residential density, including allowances for schools, open space, and roads of 16 persons per acre) this will require some 250 acres. Later on as the economy becomes more urban, increased densities for low cost housing should become appropriate, resulting in an increase of the gross residential density to about 24 persons per acre. The areas allocated are suitable for a variety of different densities and property types and values, and future development should be based on assessments of demand for both numbers and types.

The first area developed should be close to the proposed early town centre and industrial uses.

3.8.5 Town Centre

This is located immediately to the south east of the central junction on the regional road. An early detailed plan should be prepared, incorporating such uses as proposed primary and secondary schools, market and shophouses, health centres, community halls and religious buildings, bus station and taxi stands, central post office and police stations and other government and private offices, together with other social and recreational uses.

3.8.6 Open Space and Landscaping

The land form allows the creation of a series of development pockets linked to a continuous system of open parkland along the river valleys.

3.8.7 Services

Water supply will be from a proposed new intake on the S. Pengelli some 2 miles to the west. Electricity will be available from a 66 KV link from a step-down station on the national grid near Layang Layang. Telecommunication services will be extended from the national network. Storm water drainage should be separated from the foul systems and drained into the S. Sebol. Initially septic tanks for grouped central and social uses, special plants for industrial users, and domestic pit latrines are proposed. In the long term, a sewage treatment works and collection system may be required. Suitable sites draining into the S. Sebol are available, south east of the town.

3.8.8 Communications

A main spinal road to primary road standards runs throughout the town parallel to the regional road. This with the secondary road running east-west north of the town centre completes the primary road proposals.

3.9 Tanjong Penggerang New Town

3.9.1 The Need for a New Town

The proposed tourist resort along the Penggera Coast may ultimately support up to 100,000 populati (S.V. 7). This, together with the need for a social and service centre for the population of the existi and new agricultural settlements in the southern and central areas of the peninsula, resulted in the new town proposed. The town would be a centre for marketing and distribution, construction, and transport, tourist and agricultural service industries, together with educational, health, shopping entertai ment, religious and other social facilities. It would also provide residential opportunities for those employed in tourism, and in the potentially highly diverse agricultural operations possible on the adjacent and nearby land.

By 1975, the population of the town could be o the order of 3,300 supported by 1,100 jobs in agriculture, services and tourism. By 1990, based on the median projections of tourism potential, there could be some 44,000 people living in the town. By this time, the population of the agricultural areas served by the town is likely to be of the order of 56,000, giving a total of up to 100,000 people, excluding tourists.

Bandar Lebam would start as a village and mino service centre, based on employment in agriculture, construction, transport repair and maintenance, and other services. It may then expected to expand gradually as the demand for services increases, as the population and incomes of those resident in the service region rise, and as the demand for housing and services of those employed in tourism expands.

3.9.2 Size, Location and Urban Form

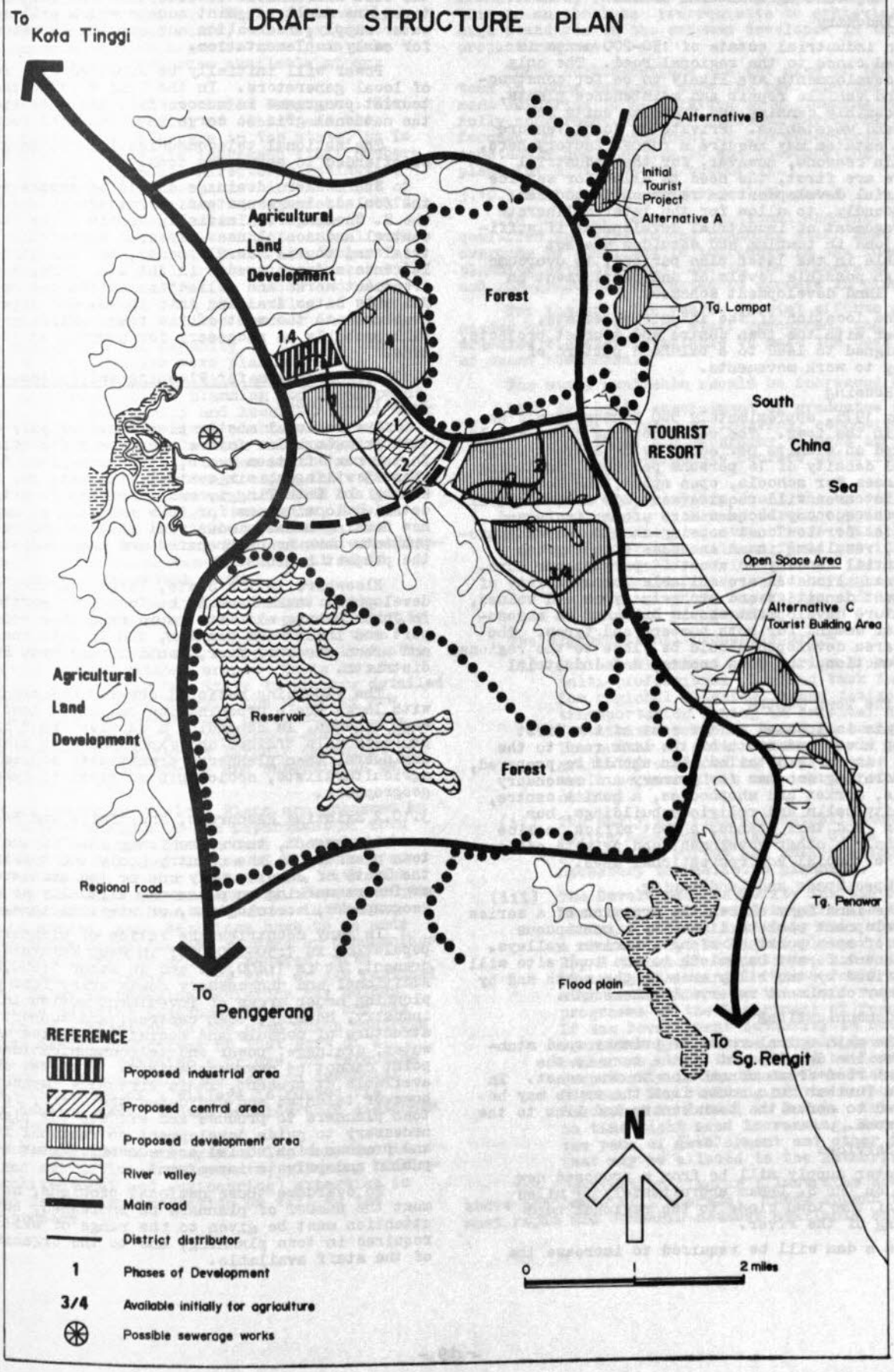
It is important that the site chosen should be capable of long term growth beyond the plan period. An ultimate population capacity of 60,000 was assumed as an upper design limit, which at an overal urban density of 15 persons per acre gave a site of 4,000 acres, nearly 6 square miles. The need is for a site of this size suitable for urban land uses, at which adequate water, power, and sewerage arrange ments could be made available, directly served from the proposed regional road system and central to the service area. It is also necessary that a proporti of the land should be available and served by early road proposals, and that the site should be compati with crop diversification and other agricultural planning considerations. It is also desirable that the initial housing and central uses should be mainl orientated towards the agricultural areas towards th north and south.

The site proposed lies immediately to the east of the proposed regional road and to the north of th S. Chemangar, and stretches some 3 miles eastwards in a band 1-2 miles wide to within half a mile of th coast south of Tanjong Lompat.

An industrial estate, the first housing areas and the first stage of the town centre are grouped close to the regional road, in order to give direct access from the agricultural areas to the north and south. The town would then expand gradually eastwards according to the demand for services and residence particularly resulting from the tourist development programme. It would be served by a spinal main link road running between the main regional road and the proposed scenic coastal highway. Two large future housing areas would be available for initial agricultural use.

FIGURE 3. 17.

NEW TOWN
TANJONG PENGGERANG
DRAFT STRUCTURE PLAN



REFERENCE

- Proposed industrial area
- Proposed central area
- Proposed development area
- River valley
- Main road
- District distributor
- 1 — Phases of Development
- 3/4 — Available initially for agriculture
- Possible sewerage works

The town would start with the early concentration of construction, vehicle repair and maintenance and agricultural processing plants together with facilities for secondary education, health, shopping, marketing, entertainment and social facilities, and housing for those employed in the adjacent agricultural areas.

3.9.3 Industry

An industrial estate of 150-200 acres is proposed close to the regional road. The only early developments are likely to be for construction and vehicle repair and maintenance plants, with possibly canning and freezing units for fruit and vegetables. Private or Joint Venture rubber estates may require a rubber factory here. The main reasons, however, for the industrial reserve are first, the need to allow for service industrial development in relation to tourism, and secondly, to allow for the later deliberate encouragement of industrial development if sufficient jobs in tourism and services are not available in the later plan periods, to overcome the high possible levels of underemployment on nearby land development schemes.

The location of the industrial estate, together with the town centre and tourist projects, is designed to lead to a balanced pattern of journey to work movements.

3.9.4 Housing

By 1975, approximately 500 houses should be built in the town. The early housing areas should be based on 4 units per acre giving a gross residential density of 16 persons per acre, including allowances for schools, open space, and roads. The first area will require some 250 acres. Later on as the economy becomes more urban, increased densities for low cost housing should become appropriate, resulting in an increase of the gross residential density to about 24 persons per acre. The areas allocated are suitable for a variety of different densities and property types and values, and future development should be based on assessments of demand for both numbers and types. The first area developed should be close to the regional road junction, the town centre, and industrial estate.

3.9.5 The Town Centre

This is located to the east of the first housing area, and south of the link road to the coast. An early detailed plan should be prepared, incorporating schemes for primary and secondary schools, market and shophouses, a health centre, community halls and religious buildings, bus station and taxi stands, a post office, police stations, other government and private offices and other social and recreational uses.

3.9.6 Open Space and Landscaping

The land form allows the creation of a series of development pockets linked to a continuous system of open parkland along the river valleys. A permanent forest backcloth to the town site will be provided by the hilly area to the north and by the water catchment reserve to the south.

3.9.7 Communications

The main spinal route of primary road standard for the development of the town is the regional road cross connection to the coast. In time, a further main route from the south may be required to serve the town centre and link to the first road.

3.9.8 Services

Water supply will be from a proposed new intake on the S. Lebam approximately 1½ miles south of the town close to the regional road crossing of the river.

As a dam will be required to increase the capacity of this source when demand exceeds 1.5 million gallons a day, it is important that the dam site should be surveyed at the same time as the road, so that the design requirements of each can be taken into account. The practicality and economics of a joint scheme should also be investigated. If the cost differences between this and the alternatives are small, a joint scheme which will secure water supply, recreation and amenity is recommended for early implementation.

Power will initially be supplied by a series of local generators. In the long term if the tourist programme is successful, the extension of the national grid to serve the town will be necessary

The national telecommunications network will be extended to serve the town.

Stormwater drainage should be separated from the foul drainage systems. Drainage should be into the S. Chemangar. Initially septic tanks for grouped central and social uses, special plants for industrial and tourist developments, and domestic pit latrines are proposed. In the long term, a sewage treatment works and collection system may be required Suitable sites draining into the S. Chemangar are available to the west of the town. Holding tanks will probably be necessary for pumping on the ebb tide.

3.10 Organisation for Planning and Implementation

3.10.1 The Tasks

The regional master plan provides only an outline framework for future planning and development. In the next fifteen years, structure plans for more than 25 villages, six central villages, two new towns Kluang and Kota Tinggi, and a tourist resort, with detailed local plans for town and village centres, new housing areas, industrial estates and other projects have to be prepared and executed within the project regions.

Elsewhere in the State, large planning and development tasks have to be faced, in particular in Johor Baharu with its rapid expansion and new port and industrial complex, and in both the rural and urban areas of Muar, Pontian, and Batu Pahat districts.

The expanding national development programme, with large scale urbanisation and major land settlement schemes, is demanding a massive input of professionals trained and experienced in planning - engineers, town planners, architects, economists, agriculturalists, sociologists, statisticians and geographers.

3.10.2 Existing Resources, Shortfalls and Needs.

At present, there are fewer than 20 qualified town planners in the country (only two working in the State of Johor), only one or two architects and engineers working in planning, virtually no economist geographers, sociologists, or statisticians.

In many countries the ration of planners to population is 1:50-100,000; in West Malaysia, at present, it is 1:400,000 and in Johor 1:600,000. Additional and unnecessary costs arise from not planning major areas of investment action in roads, industry, housing, town centres, and support infrastructure of schools and social facilities and of water, drainage, power and telecommunications. This point cannot be over-emphasised. With the skills available at present, it is virtually impossible, however talented and dedicated the staff, for the town planners to produce and execute the plans necessary to guide development on rational lines, and produce high social and economic returns on public and private investment.

To overcome these national problems, not only must the number of planners be increased, but also attention must be given to the range of skills required in town planning, and to the organisation of the staff available.

There is a need for attracting economists, architects, engineers, sociologists and geographers to work in planning, giving them opportunities to train and gain experience abroad. While the constraints of finance and time are recognised, past delays in staff expansion plans have now resulted in such a critical situation that a crash programme is required. While continually attempting to expand its staff, the department of town planning must also organise itself to make the best use of the resources available at any point in time.

From the "Proposed Expansion Programme: State Department of Town Planning of Johor" and the problems facing town planners in the state, it is apparent that not only are increased staff numbers needed, but that the State Director's estimates, while understandably conservative in the light of past experience in attempting to expand his staff, are low estimates of the number and range of skills required in relation to the technical work load facing the department. There are dangers that the work of the full proposed complement will be overloaded by administrative duties and ad hoc tasks, with the result that the backlog of work facing this department will be further increased.

To strengthen the capacity to plan in the state as a whole implies more planners and a greater range of skills as well as improved co-ordination between policy planning and development implementation, regionally and locally, in the work of both economic and physical planners. Research involving information collection and analysis, and the highlighting of policy issues is the major initial requirement for strengthening the capacity to plan in the State. However, the lack of technical capacity in urban design, economics, and transportation should also be emphasized. The backlog of work is such that the proposed establishment could be increased ten-fold and all staff would be busy on important tasks.

In relation to the implementation of the regional development plan, a Development Authority is proposed (S.V. 9). With regard to its town planning organisational and manpower requirements, a series of considerations arise. There is at present no capacity in the State to prepare detailed plans for Kluang, Kota Tinggi, the proposed new towns, and tourist development prospects. Also, the achievement of the environmental aims and cost targets described earlier is largely dependent on adequate professional advice and supervision as work is carried out.

At present FLDA Village Plans are prepared by a headquarters section of the Department of Town and Country Planning. The process of implementation is via the Regional Office of FLDA, contractually out to JKR, and/or Contractors, with site control by the FLDA scheme manager. Because of the many unavoidable problems that occur in the construction stages, some decisions have to be made on site; these decisions are reached by discussions between the Contractor and the Manager, with possibly some reference to the FLDA or JKR regional office. Delay in reaching decisions may holdup the village building programme in total, and may result in an alteration to the plan which destroys the total design objectives of that part of a village, e.g. not building a bridge, or rerouting a road and bridging point, so that an essential link to the centre of a village is routed via another housing area, adding considerable distances to all future trips.

To secure the advantages of low construction costs and attractive developments, planning (including architectural and engineering) expertise is required in the implementation as well as the design process.

Surveyors, contractors, and builders need to be instructed by, and have convenient access to, planners who are fully conversant with the reasons behind any plan and who preferably have both actually worked on its design, and also have access to associated professional advice - surveying, costing, architecture, building practice, engineering, etc. This is an absolute prerequisite to achieving high standards in the schemes developed in the project regions.

These considerations and the size of the planning task in Johor Tenggara show the need for the Development Authority to be serviced by a planning team fully conversant with the regional development plan, focused on the achievement of its objectives, and constantly contributing to and interpreting the plans for action by the authority.

3.10.3 Staff and Organisational Proposal

In the long term, the national shortage of qualified and experienced planning staff must be overcome by considerable increases in the total planning establishment, and in the numbers of graduates and non-graduates attracted to careers in planning.

For the next few years, special efforts are needed both to increase staff resources, and to organise the staff available to make the best use of scant resources.

The staff available should be increased by:-

(i) The early appointment of graduates in architecture, engineering, economics, sociology and geography to work in planning, with post-graduate courses after initial experience.

(ii) As a temporary expedient the use of foreign personnel, either by direct appointment or through aid projects. These could be either from consultant firms providing a full range of services, or by individual appointments. They would have great value in increasing the experience and training of national personnel.

The organisational proposals are:-

(i) The establishment of a series of mobile multi-professional planning task forces for regional planning, urban design, and transportation acting in critical areas for limited periods, based on headquarters. The number of action groups could be gradually expanded so that in time there would be several in each sector of the country.

(ii) The early staffing and establishment of a Policy/Research Division at State level to provide the survey and analysis background necessary to realistic planning.

(iii) The Development Authority for the regional development plan will require its own planning staff. Initially this should be a minimum of 1 architect planner (preferably 2), 2 technical assistants, and 8 town planning assistants. These could be dealt with as additions to the staff requirements programme of the Department of Town Planning. If the Development Authority is not fully operative by the time project development commences, this team should be located temporarily in the State Town Planning Office. The staffing of the Authority is described in detail in S.V.9. This staff in time might need increasing, depending on the pace of development and other tasks that may be alloted to the Authority.

The organisation diagram illustrates how the above proposals will operate. These appear to be the most rapid and economic methods available both of

extending the number of personnel and range of skills operative in town planning survey, analysis, design and implementation in the country, and of making the best use of the limited manpower available by accurately relating its work to the priority areas of investment action and social need.

The statement by Robert Nathan of the proposals for planning staff and organisation in Penang; "this may appear alarmingly high given the present pattern of proposed establishment.... but in comparison with the capability of other organisations, the proposals are extremely modest", (3) citing Singapore as an example, is as relevent to Johor Tenggara as to Penang. In a situation of rapid national economic, population and urban growth, the dangers resulting from failures to expand planning capabilities cannot be over-emphasized.

3.10.4 Planning Powers

The design criteria for the various settlements and the technical manpower and organisational proposals will not in themselves be sufficient to achieve high social and economic returns on development investment and the creation of an attractive environment. The need for comprehensive, efficient, clear, and strong planning legislation in the country has become more and more apparent in the course of Master Plan preparation.

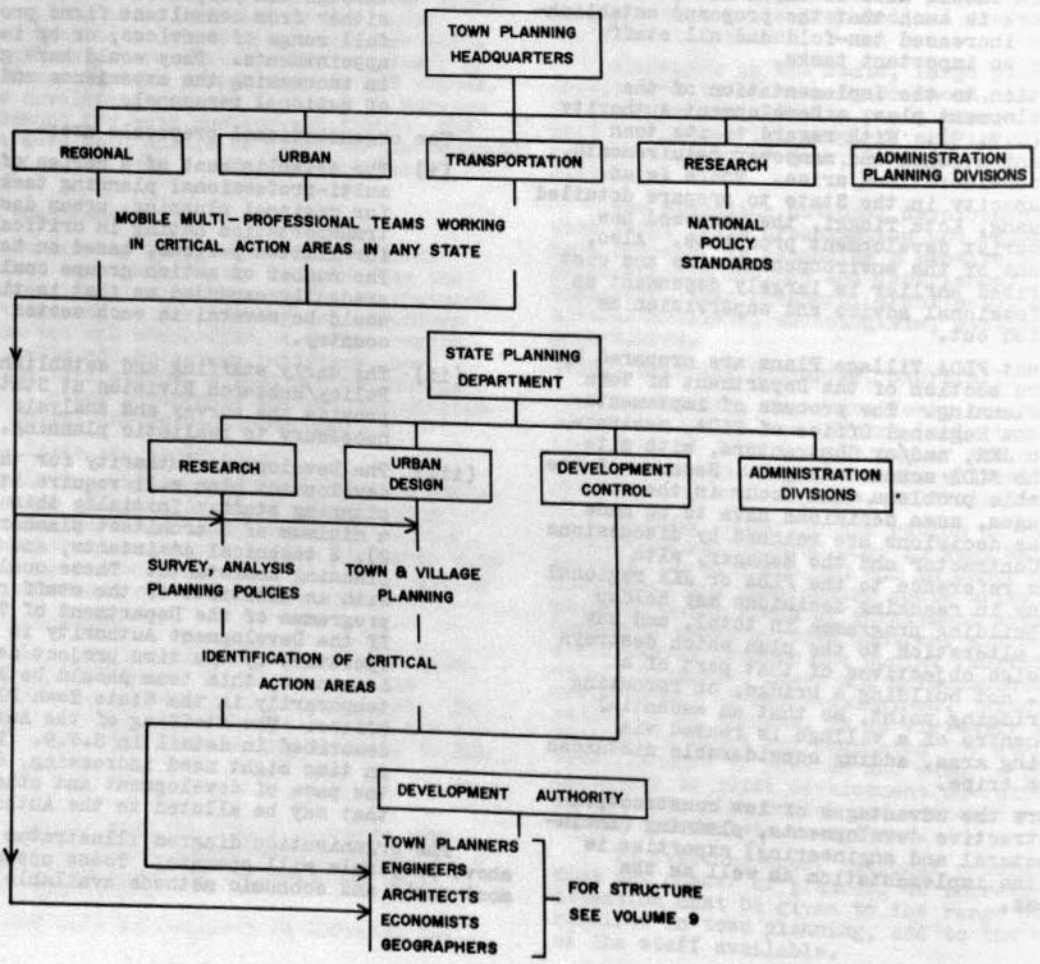
In particular, in relation to the development of the towns and the tourist resort, the need for a legal system for co-ordinating and integrating all developments, and for adequate control over land and building use, layout, and design, together with efficient and equitable arrangements for compulsory purchase, compensation and betterment cannot be over-emphasized.

This is a highly complex subject involving both federal and state legal and constitutional rights. However, the lack of a comprehensive planning legal system, used to co-ordinate all development, can result in the loss or destruction of development potential, and later higher costs and disruption of people and property.

Federal legislation has been under consideration for a considerable time. The need for an early conclusion and implementation of this draft legislation is stressed. Similarly, the need for parallel and complementing legislation at State Level should be considered.

FIGURE 3. 18.

PROPOSED ORGANISATION OF TOWN PLANNING



CHAPTER 4

INDUSTRY HOUSING AND LANDSCAPE PLANNING

4.1 Industry

In order to fulfill the leading sector development proposals, both industries processing products grown or growing in the area, for example oil palms, rubber, tapioca, fruit and vegetables, livestock and forest products, and industries serving the needs of the Project Area population, for example transport, construction, distribution and repair facilities, will need to be established.

4.1.2 Processing Industries

The most important of these will be for primary processing of oil palms and rubber. Other activities requiring facilities are likely to be:

(1) coconut, to be converted into copra

(2) tapioca, to be converted to flour and chips

(3) trees, to be sawn and converted into high value commodities such as plywood, moulding, kiln dried and air dried timber

(4) fruit and vegetables, requiring preservation

(5) grain and grass, and essential oils requiring preservation by drying

(6) grain milling

(7) essential oil extraction

(8) livestock products for preservation

(9) milk preservation

(10) livestock slaughter for urban consumption and export.

Primary processing of oil palm, and the products 1-5 above is necessary to remove the non-marketable proportions of the crop and produce the commodity in a marketable form. To avoid deterioration and high haulage costs, processing facilities are best located in the centre of the producing area. The dried grain may be milled either in the area or outside it, close to the internal market or export outlet. The same applies to extraction of essential oils and to livestock products by, for example, canning. Milk preservation and animals to be slaughtered for urban consumption and export are best handled close to market centres or export outlets. There is no advantage to be gained from locating these industries in the production areas.

In locating processing plant, economies of scale have to be balanced against the advantages of associating processing facilities with units of land ownership, as well as taking account of the need for water, power and communications, and the avoidence of pollution. FLDA is likely to be the major oil palm developer in the project regions; it is proposed that 40-50 tons per hour mills should be strategically located in each oil palm area close to the regional road system and near to the central village. This proposal takes into account balancing crop maturity between different schemes, including existing or proposed facilities near the project regions, notably the FLDA Kulai and Ayer Tawar developments.

Additional smaller oil palm mills may be necessary in Johor Tengah if extensive estates or smallholding areas are developed. Suitable sites for the mills occur in the proposed new town and in the central village in the Semberong area.

These two sites offer similar central locations for the processing of tapioca; a mill is proposed on the New Town industrial area to serve the 7,000 acres nearby. The Semberong central village, depending on the extent of crop diversification efforts, could also provide sites for canning of fruits and vegetables, and milling of tapioca, maize and sorghum. Similar opportunities may occur in the New Town in Tanjong Penggerang, where the adjacent land is suitable for a large variety of crops.

While very simple processing plants for sheet rubber produced by smallholders and on small estates can be expected to develop, there need be no special planning or control. For major producers economies of scale cost quality control considerations are becoming more important than haulage cost factors. As the pattern of rubber development is likely to be dispersed, particularly for FLDA, a central factory in Kota Tinggi is suggested. This would take rubber from as far as Endau, Kong Kong, and Kulai, as well as from the Project Regions. Factory sites for other producers could be made available in Kota Tinggi, Kluang and the New Town proposed in Tanjong Penggerang.

For the processing of the forest produce of Johor Tengah, a timber industry complex is proposed in the New Town, (SV 5). This would start in 1972, and employ up to 600 people by 1975. The complex will have a comprehensive range of processes - sawmilling, kilndrying, pressure treatment, mouldings, and possible pre-fabricated housing. Any further growth would be on a small scale, either to process increased amounts of 'residual' timber, or to produce such items as furniture, coffins and building timber.

Johor is rapidly becoming one of the world's major palm oil producing centres. Production is expected to rise to about 350,000 tons by 1975 (about 15 percent of world production), 550,000 tons by 1980 and 750,000 tons by 1985. Production on this scale should provide considerable opportunity for further industrial activity in fractionating and further refining oil, kernel crushing and possible manufacture of further products such as soaps. Such activity is perhaps more likely to be located adjacent to the proposed port than in the Project Area.

4.1.3 Service and Ancillary Industries

Industries serving the needs of the Project Areas will develop both inside and outside them, especially in Kluang and Kota Tinggi and in the the proposed New Towns, where the construction and vehicle repair and maintenance industries will require early bases (Section 4.2 Housing and Chapter 5). It is not considered that any special financial incentives should be offered for this type of activity, in the Project Area rather than elsewhere in the country. However, suitable sites for storage yards, workshops and shophouses, with the necessary power, water supply, and sewerage arrangements, should be made available according to demand.

Minor industries will grow as general development takes place, and if the tourism development programme is successful, local industries in handicrafts and food preparation may result. It is desirable that this process should be encouraged and that suitable sites be made available for industrial development in long term plans. There are many activities ancillary to primary production that could be encouraged; for example, wood packaging for crumb rubber etc., livestock foodstuffs, starch manufacture,

hides and leather goods and cooking oils. In aggregate these activities could benefit the economy and increase the scope and variety of employment.

4.1.4 General Industrial Development

As regards industries serving national or export markets, there is in West Malaysia, as in most countries, a strong tendency for industry to locate in major urban areas. A shortage of suitable industrial sites has developed in the Johor Baharu area and the Government has responded by planning to provide 1500 acres of industrial land close to the proposed new port site. Manufacturing employment in Johor State appears to have been rising recently at a rate of about 3,000 jobs a year; this could well increase, to perhaps 5,000 jobs a year, of which some 4,000 would be in South Johor. At this rate of growth the proposed industrial estate near the port and existing sites at Johor Baharu and Kluang will be full by the late 1970s and new sites will have to be found.

To create diversified settlements in the Project Area it would be desirable to encourage manufacturing industry, but this will be difficult so long as alternative sites often subsidised continue to be offered, near large urban centres, providing plentiful labour supplies, commercial and service facilities, power, water and good communications.

There are no major opportunities for large scale industrial development in the project regions. The only argument in favour of its deliberate early stimulation is that the more diverse economic and social opportunities that would be created, would increase the attraction of the Project Area for migrants. However, such as argument would appear far more powerful in a large underpopulated region completely lacking urban services such as South East Pahang, than in South East Johor, which is served by Singapore, Johor Baharu, Kulai, Kluang and Kota Tinggi.

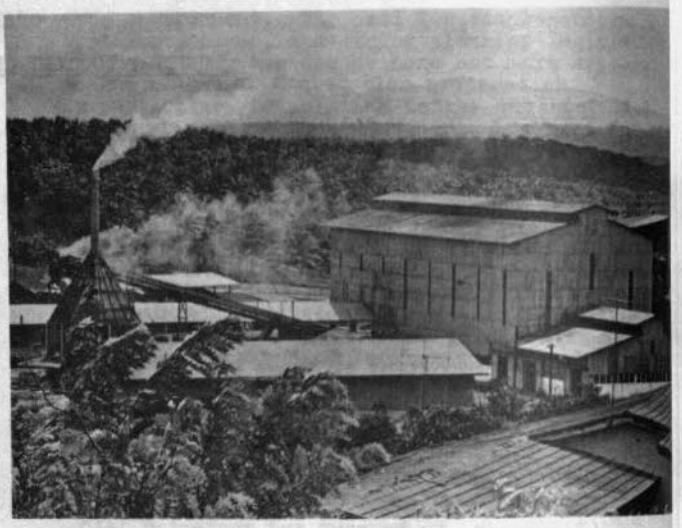
However, during the decade 1980-1990 a similar social need to that existing in the west coast districts is likely to arise in the project regions, owing to the expanding labour force from the families settled during 1970-1980. Kluang, Kota Tinggi and the two proposed New Towns are conveniently situated to both national and regional communication system and the work force of the surrounding areas. At this time, land, infrastructure and labour cost constraints resulting from the size of the Johor Baharu City region are likely to be such that industrial sites in the project regions will become increasingly attractive to potential developers.

Provision of infrastructure should be planned to service these areas from the late 1970s onwards. When full, they would employ perhaps 8,000 people or 20 percent of new manufacturing employment in South Johor in the 1980s.

4.1.5 Industrial Development Policy

The possibilities described above show that a gradually expanding programme of industrial development will be appropriate in the project regions. This would be based initially on the primary processing of agricultural and forest products and service industry requirements. Later, further processing and general industrial development on a considerable scale may become economically practical and socially desirable.

For economy of provision of infrastruc-



PLYWOOD AND VENEER FACTORY ON EDGE OF JOHOR TENGAH

VEHICLE ASSEMBLY PLANT IN JOHOR BAHARU

ture, particularly water, power, telecommunications and sewerage, and for environmental control, the industries should generally be concentrated in a few locations. These should be conveniently accessible from the surrounding areas, and situated close to the main regional road network. Industrial estates of 200-400 acres are proposed in Kluang, Kota Tinggi, and the two New Towns, together with smaller estates in the six central villages. Certain of these areas can be developed for agriculture initially, preferably under short-term crops. Agro-based mills and factories should as far as possible be the first industries on these estates, together with construction and vehicle repair and maintenance plants.

4.2 Housing

The Malay takes a great pride and interest in his home and garden. The variety of design, colour and decoration and the flowers and trees have created a rural environment of considerable character and charm. This tradition of rural housing, with the skilled use of timber is exceptional in the tropical world.

It is important that the Project Area should have the quality of housing and environment which the people have shown they can create quickly and at low cost. The success of MARA's rural housing has shown the possibility of integrating these traditional, skills and self-build and 'gotong royong' construction with industrialised production methods.

Over the next 20 years, developments in and around the project regions will require construction of about 50,000 houses. It is suggested that to meet the demands of different family sizes, incomes, and tastes, and to overcome the constraints imposed by rapid land settlement, a variety of house types and methods of construction should be used. Settlers should be able to select from these, and to choose between entirely building their own homes, building them from pre-cut timber and/or prefabricated panels, or having them built by construction teams.

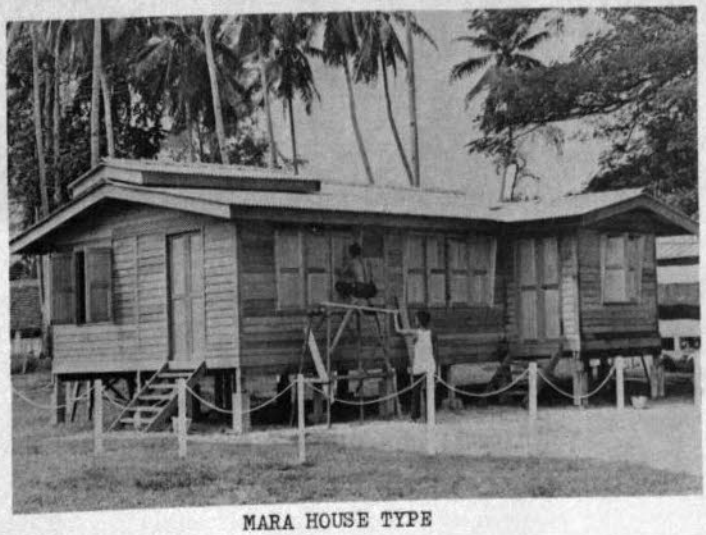
An organisation to coordinate the financing and development of housing in the Project Areas will be necessary. It will have to act as a channel for investment funds which could be obtained from both private and public sources, and which could be distributed, for public and private constructions, as grants, loans or mortages to individuals and co-operatives. While it has been assumed that in the immediate future, FLDA will continue to use standard house types erected by contractors, it is recommended that the Development Authority (S.V. 9) should investigate methods of offering alternative house types, methods of construction, prices and forms of finance to settlers.

Site preparation, surveying, provision of roads and water, and sewerage and electricity arrangements will need to be carried out in advance of house construction by specialised teams. Skilled or semi-skilled construction workers should be attracted from the west coast areas and residence and employment in the same way as agricultural workers.

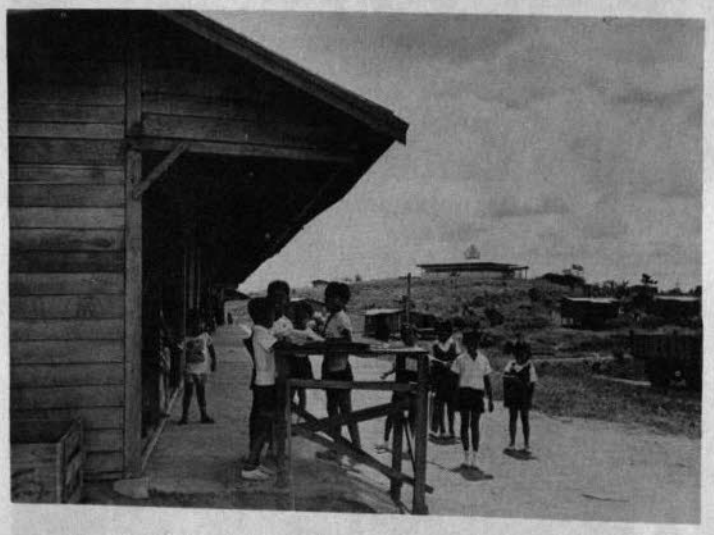
The construction labour force should be employed by enterprises set up by such an agency as MARA, in Johor Tengah alongside the timber industries complex, and in Tanjong Penggerang in association with tourist development. The construction enterprises should offer training and career opportunities to workers, in such a way that ownership can ultimately be handed over to them.

MALACCA HOUSE

FLDA HOUSE



MARA HOUSE TYPE



PLANTING AROUND FLDA HOUSING

CENTRE OF FLDA VILLAGE - LACK OF TOWNSCAPE CHARACTER

NEW ROAD THROUGH JUNGLE IN TG. PENGGERANG

JUNGLE CLEARANCE IN TANJONG PENGGERANG.

NEW ROAD AND PLANTING IN TANJONG PENGGERANG

4.3 Landscape Planning

Compared with the western and northern regions of West Malaysia, eastern and central Johor has a rather monotonous landscape. The foreground is generally dominated either by a single tree crop - rubber or oil palm - planted in serried ranks, or by the impervious green face of the jungle. Long views to distant hills, or down on to valleys or across open spaces are rare, and those that occur in hilly country are often dominated by trees with similar crown, shape, and colour. The towns and villages, especially the repetitious housing areas of the new settlement schemes, have little of the charm and interest of their west coast counterparts.

However, the visual character of the project regions need not be dull and it is important that as development takes place, a varied and pleasant landscape should emerge. There are many possibilities of making the countryside, the villages, and the roads attractive for the enjoyment of residents and visitors.

In the countryside, it is possible to avoid the domination of a single type of tree shape, and colour by the careful juxtaposition of different tree crops; by the introduction of grassland and arable farming where appropriate; by either retaining the jungle or planting commercial stands of timber in some valley bottoms and on steep slopes; and by planting amenity trees along the roads.

In the village and town centres, adequate land is allocated for open space. In the development of the padangs and other spaces round buildings, tree planting for shelter, shade and amenity is recommended. In residential areas, the planting of bananas and coconut, together with amenity species, would provide produce for residents, as well as giving variety and character to each area. Along the roadsides, the planting of avenues and clumps of saplings would incur only small additional costs, while the benefits of shelter, shade, and scenic variety would be enormous.

The expansion of agricultural tree nurseries to include a variety of fruit and amenity trees in each area for use in public works and for purchase by residents is critical to the implementation of these proposals.

B.A. Mitchell (4) lists a large number of appropriate tree, species, with soil and topographic suitability, rates of growth, and planting distances, methods of planting, and other characteristics.

While further investigations of the establishment of nurseries and the cost of various trees needs to be undertaken. The cost of amenity trees will be comparable with oil palm ($2.50 planted) and if bought ($3.00 planted). The resulting benefits would be obtained at low costs. For example, to plant one tree every 100 feet alongside a regional road, would mean 20 trees a mile, i.e. $50-60, perhaps 1/4,000 of the road.

A planting allowance of $50 per household is therefore recommended for use in landscape implementation projects, and has been included in the village and town development costs.

Planners and engineers should take account of landscape objectives in detailed design and implementation. The visual analysis of each town and village site should be an integral part of the urban designer's work. By careful use of slopes, valleys and open space uses, each settlement can be given an individual character and charm. This will be particularly important in the design of the tourist resort and the surrounding area.

In both regions there has been large scale land devastation through mining - particularly for tin around the S. Linggiu and near Lombong in Johor Tengah, and for bauxite and tin in southern Tanjong Penggerang. The reclamation of areas such as these is a national problem and reclamation research projects are already underway. The recommendations resulting from this work will need to applied to the affected sectors of the project regions.

In both types of area, much of the reject material could provide roadstone and should be so used where economically practical. Investigations into the possibilities of grading these areas at the time of extraction, and of planting with commercial tree species are recommended. This could be linked to the preparation of a detailed development plan for southern Tanjong Penggerang.

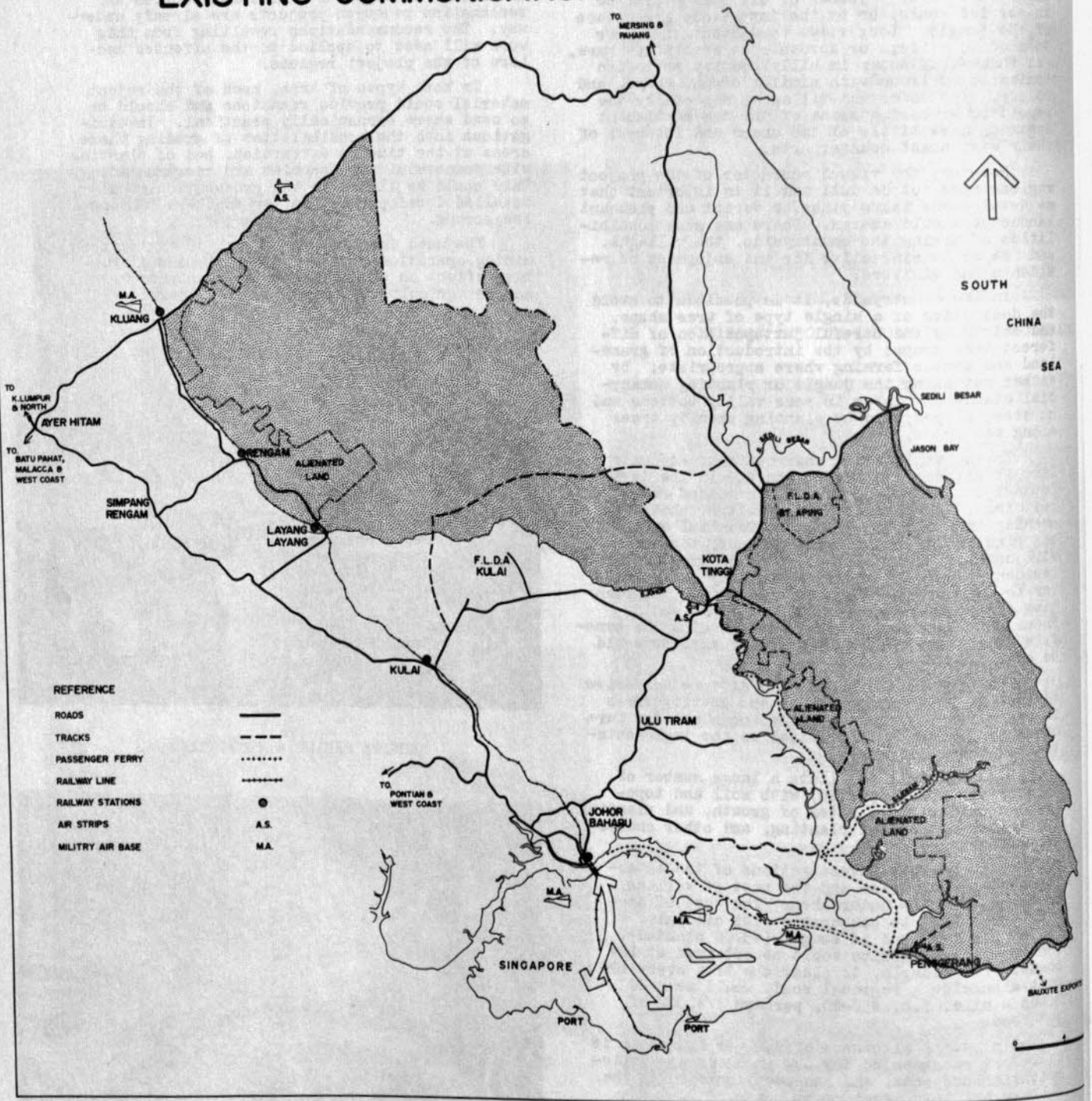
The need for careful control of any future mining operations to ensure the minimum disruptive effect on the character of the landscape and on agricultural operations is stressed.

BAUXITE MINING - PENGGERANG

TIN MINING - S. LINGGIU

FIGURE 1.1

EXISTING COMMUNICATIONS



CHAPTER 5

COMMUNICATIONS

5.1 The Existing Pattern of Communications

Good communications are already available to provide direct and potentially valuable links between the project regions and the major towns, airports and ports of West Malaysia (Fig. 5.1). However their location and present condition do not provide the necessary standards of access to and between the major resources and potential development areas of the project regions.

5.2 Roads

The main existing routes (Fig. 5.2) likely to serve the project regions are:-

i) Federal Trunk Route 1 Johor Baharu, Kulai, Ayer Hitam, Kuala Lumpur, Thailand: the major national north-south route.

ii) Federal Route Batu Pahat, Ayer Hitam, Kluang, Jemaluang: a major regional east-west route.

iii) Federal Route Johor Baharu, Kota Tinggi, Jemaluang, Mersing: the east coast route.

iv) Part Federal, Part State southern east-west cross route Kulai to Kota Tinggi, with FLDA access road.

v) State road from Simpang Rengam (on Federal route 1) to Kluang via Rengam.

These existing routes, with the exceptions of the first 10 miles of Federal Route 1 (Johor Baharu to junction for Pontian) and those sections within major urbanised areas (Kulai, Kluang, Kota Tinggi), have considerable spare capacity at the present time. They are the main routes for bus, taxi and goods transport within the region and, apart from iv + v above, form part of the country's national highway network.

Within the project regions the only roads are harvesting networks on existing estates, a dispersed pattern of mining and logging tracks, the first eight miles of the FLDA Ayer Tawar road from Kota Tinggi into Tanjong Penggerang, and the route running the length of the southern coast of the Penggerang peninsula, where a public bus service operates.

5.3 Rail

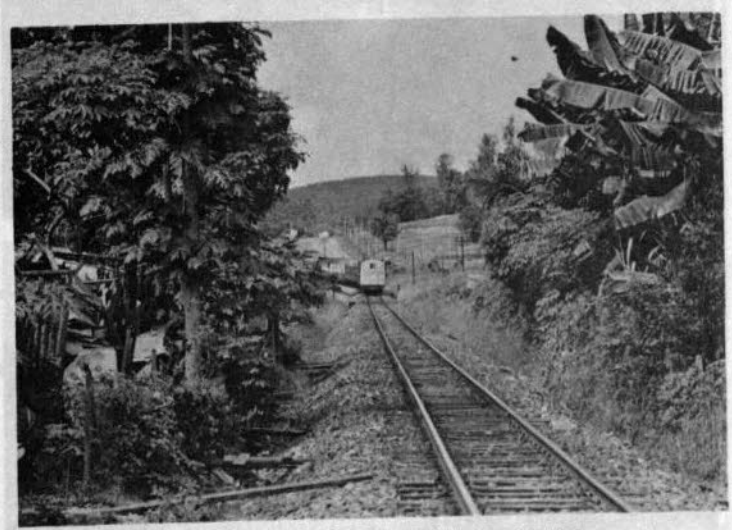
The main north-south national railway line (Kuala Lumpur, Johor Baharu, Singapore) is single track and forms the western boundary of the Johor Tengah region. There are passenger stations at Kluang, Rengam, Layang-Layang, and Kulai. The line is well used and carries substantial volumes of freight between Singapore, Kuala Lumpur and other main centres.

5.4 Sea and Inland Waterways

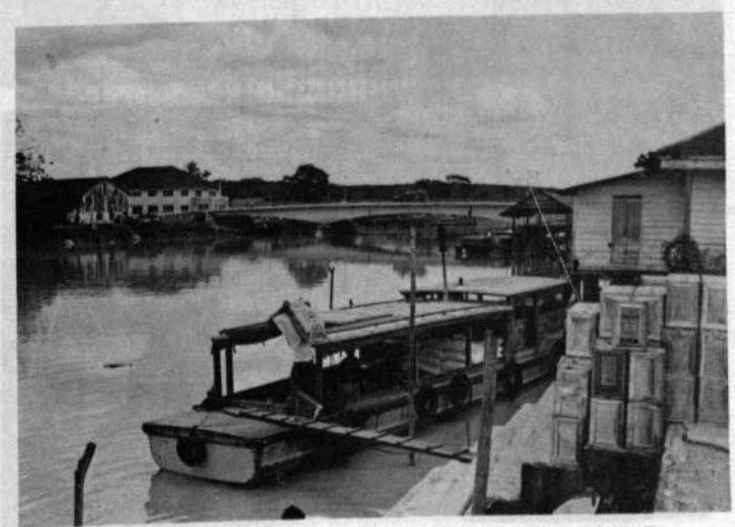
Water transport provides the main access to and communication within the Tanjong Penggerang Region. Although some internal roads exist, boats are used for external trips and for import of food and other essential supplies for the central and southern areas of the peninsula.

From the existing villages and estates on the southern and western sides of Tanjong Penggerang goods are moved across the Sungei Johor to Masai and across the Johor Straits to Singapore. Small ferries carry passengers to Langsatt and Kong Kong on the western side of the river and to Kota Tinggi and Johor Baharu. Some movement of goods and passengers takes place along the Sungei Lebam.

NATIONAL ROUTE 1 NEAR SIMPANG RENGAM

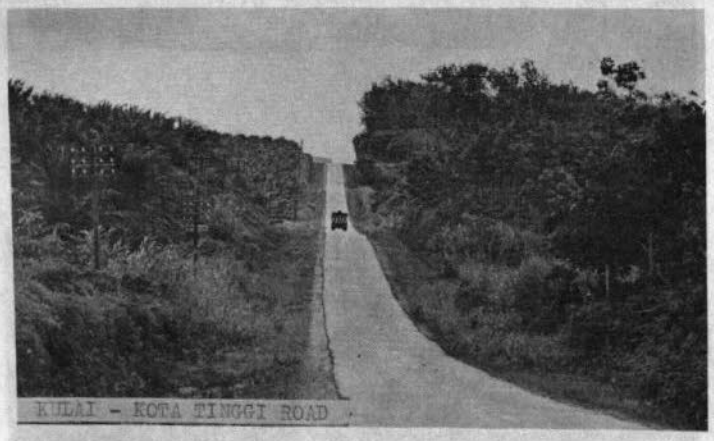


NORTH-SOUTH RAILWAY LINE AT KLUANG

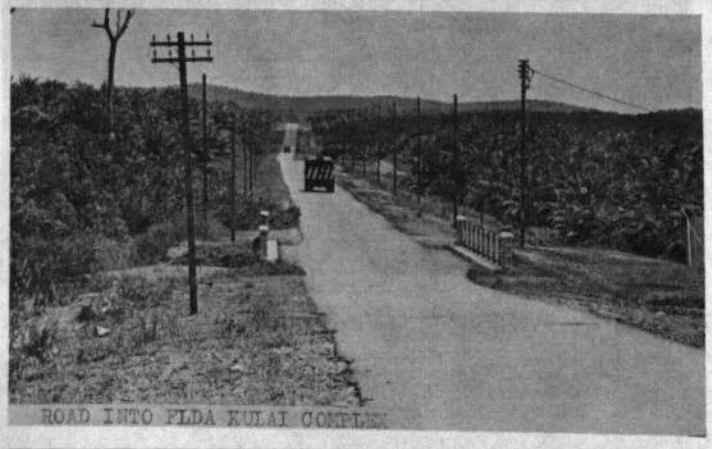


RIVER TRANSPORT AND ROAD BRIDGE AT KOTA TINGGI

KOTA TINGGI - JERSING ROAD



KULAI - KOTA TINGGI ROAD



ROAD INTO FLDA KULAI COMPLEX

NEW ROAD UNDER CONSTRUCTION IN TANJONG PENGGERANG

The only ocean going vessels calling in the project regions are those carrying bauxite from the mines in southern Tanjong Penggerang to their overseas markets. The villagers of southern Penggerang also own many small boats used mainly for inshore fishing.

5.5 Air

No major airstrips exist within the project area, the nearest airports providing national services being at Malacca and national and international services being at Singapore. There is a military airstrip at Kluang and private light plane airstrips at Kota Tinggi, Penggerang and Kahang. A new airport is proposed at Johor Baharu which would provide a major facility for access to national services from the project area.

5.6 The Future Pattern of Communications

The large scale development of the project area will create a demand for a comprehensive transportation system which must fulfil two basic needs. First, it must link the existing and proposed centres of population and production within the regions, and second, it must provide direct and convenient access between the regions and the major transport, servicing and marketing facilities and the social and administrative centres of the country.

The location of the two regions and their relationship to the existing state and federal road system have dictated that the internal requirements for the movement of people and goods can best be met by the construction of a comprehensive highway network. The proximity of the regions to the existing and proposed port facilities at Singapore and Johor Baharu has emphasised the relative importance of the external road links. Double handling would make it uneconomical to transfer exportable commodities from road to rail or road to water for the short distances to these export points, markets and further processing centres.

For these reasons the pattern of future communications will be dominated by the need for large scale investment in the phased construction of a comprehensive network of new roads within the region and in some improvement to the state and federal routes connecting the regions with Johor Baharu.

5.7 Roads

The aim of this section is to provide the basis from which a rational and economic internal highway network can be developed and to indicate those sections of the existing external networks which will need improvement.

5.7.1 Problems and Opportunities

The task of forecasting future road requirements is difficult owing to the almost total absence of roads within the project regions, the sparse pattern of existing development, and the lack of existing data. This is particularly relevant to passenger movement where rising real incomes will considerably increase the potential for car ownership and the propensity to travel of the new settlers.

At the same time the opportunity is presented both to plan an integrated land use/transportation system which will allow initial development to take place, and to stimulate the growth of population centres providing urban employment and living opportunities in the longer term. It is the forestry, agricultural and tourist potential of the regions which provide the framework within which the highway networks must develop.

5.7.2 Objectives.

In the short term the networks must serve the requirements for logging and provide immediate access to the areas designated for initial development.

A primary road system is required within each region to open up the potential centres of development and to provide the framework around which a comprehensive range of villages and towns can be planned.

A secondary road system is required to provide the villages with direct links to the primary road system, to facilitate inter-village movement and to give access to mining, tourism and other activities requiring all-weather roads.

A tertiary road system is required to fulfil the harvesting needs of the various agricultural crops. Wherever it is economically justifiable, the areas served by tertiary roads should also be served by direct routes of improved standard linking to the primary or secondary road systems.

The location of the various elements of these systems must satisfy the following objectives:-

a) The proposed primary roads must follow the most direct routes possible between primary processing plants and their export markets and between external commodity supply sources and the proposed centres of population.

b) Central villages and new towns must be directly served by primary roads.

c) Other villages and existing settlements must be directly served by either primary or secondary roads.

d) The location of secondary roads should enable villages to be grouped around a central village or proposed new towns.

e) The alignment and density of tertiary roads must meet the harvesting requirements of each crop, and be located within the physical constraints of the areas served. The improved tertiary roads should act as collectors within the harvesting areas to allow for more convenient and direct movement to the villages and primary processing plants.

Within the bounds of these objectives the detailed alignment of roads must achieve the greatest economy in construction costs by avoiding unstable soils, areas liable to flooding, and steep slopes.

For the detailed layout of roads to and within centres of population other environmental objectives have been identified. For local safety and convenience villages and towns within the regions should be planned to grow without creating long term conflicts between the movement of commercial vehicles and the day-to-day needs for movement within the settlements.

5.7.3 Existing data:

Information on road traffic within the State of Johor is available from two sources

a) Registration of motor vehicles
b) Traffic counts at particular locations.

The total number of motor vehicles registered in Johor State from 1962 to 1970 is illustrated in Fig. 5.3. No reliable population data exist these years and thus no inferences can be drawn as to changes in car ownership per head of population.

The number of cars and taxis registered in the State has risen from under 13,000 in 1962 to

TOTAL MOTOR VEHICLES REGISTERED IN JOHOR STATE

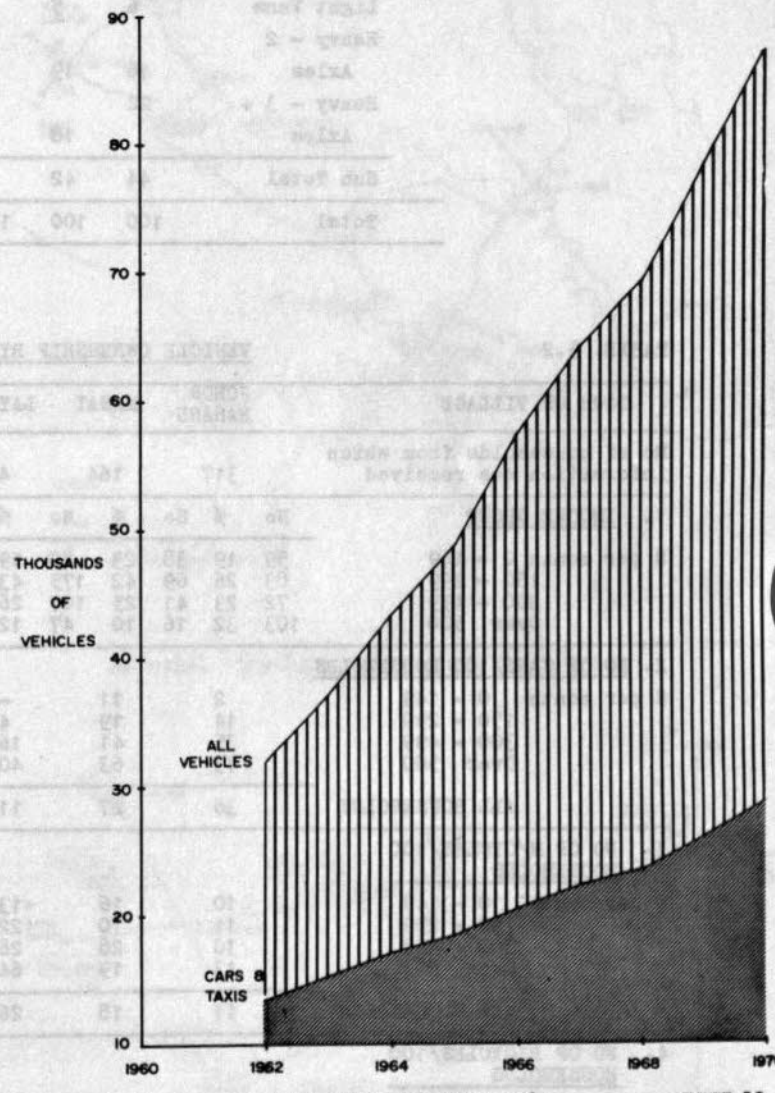


FIGURE 5.2.

TABLE 5.1b COMPOSITION OF TRAFFIC - JOHOR STATE - 1969

Station No.	Percentage of Average Daily Traffic						
	41	43	44	49	F.49	F.54	All stations
Motor Cycles	9	5	10	12	12	31	
Motorcars & Taxis	45	51	50	61	52	45	
Buses	2	2	3	6	4	3	
Sub Total	56	58	63	79	68	79	70
Light Vans	6	5	7	3	10	10	
Heavy - 2 Axles	16	19	17	11	13	8	
Heavy - 3 + Axles	22	18	13	7	9	3	
Sub Total	44	42	37	21	32	21	30
Total	100	100	100	100	100	100	100

TABLE. 5.2 VEHICLE OWNERSHIP BY INCOME GROUP IN JOHOR

TOWN OR VILLAGE	JOHOR BAHARU		MASAI		LAYANG 2		KUKUP		RENGAM		KOTA TINGGI		SEDILI BESAR		ALL	
No of households from which information was received	317		164		409		111		435		1274		288		2998	
1. INCOME GROUP	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
$ per month 0 - 149	59	19	38	23	80	19	40	36	135	31	300	24	203	71	855	28
150 - 299	83	26	69	42	175	43	50	45	178	41	494	39	74	26	1123	37
300 - 499	72	23	41	25	107	26	16	14	84	19	288	23	7	2	615	21
Over 500	103	32	16	10	47	12	5	5	38	9	192	15	4	1	405	14
2. NO OF CARS/100 HOUSEHOLDS																
$ per month 0 - 149	2		11		-		3		1		1		-		1	
150 - 299	14		19		4		2		5		6		-		6	
300 - 499	35		41		16		-		13		15		-		18	
Over 500	73		63		40		-		32		46		25		51	
ALL HOUSEHOLDS	36		27		11		+2		8		13		1		13	
3. NO OF M/CYCLES/100 HOUSEHOLDS																
$ per month 0 - 149	10		16		13		3		3		5		-		5	
150 - 299	11		10		22		-		15		12		-		12	
300 - 499	10		28		28		-		20		13		-		17	
Over 500	13		19		64		-		44		18		25		25	
ALL HOUSEHOLDS	11		18		26		+-		15		11		-		13	
4. NO OF BICYCLES/100 HOUSEHOLDS																
$ per month 0 - 149	29		39		76		10		64		69		11		48	
150 - 299	16		39		127		12		74		80		32		73	
300 - 499	29		56		167		19		98		90		14		92	
Over 500	20		56		221		20		124		89		25		87	
ALL HOUSEHOLDS	23		45		138		13		80		81		17		72	

+ HIGHER INCOME GROUPS OWNED BOATS

over 23,000 in 1969. During the same period the total number of vehicles registered has risen from 32,000 to over 72,000. Cars and taxis formed over 39 percent of all vehicles in the State in 1962 but only 32 percent in 1969. During the traffic counts carried out (within the State) in 1969, however, cars and taxis formed over 51 percent of the total daily traffic.

These data need to be used with extreme care as investigations during the Malaysian General Transportation Study (M.G.T.S. 1967) indicated quite substantial levels of tax evasion. Hence, there has been no existing basis from which to make even tentative forecasts of future car ownership in the project area.

Counts of traffic have been undertaken twice yearly (October and April) since 1967 at 45 points (16 manual, 29 machine) on the main road network within the State. At over half the stations counting has been continuous over a seven day period for 16 hours a day (0600-2200 hours). The 24 hour flows have been derived from the 24/16 hour ratios found in 1966.

Table 5.1 summarises the information available from the traffic counts taken at these stations.

The counts show that the average increase in daily traffic between 1967 and 1969 was about 7 percent per annum. This compares with a growth rate of 12 percent forecast in the MGTS carried out in 1967. Between 1967 and 1968, however, only a small increase occurred in traffic on Route 1 and its approach roads whilst substantial decreases occurred on the east coast and east-west routes. Between 1968 and 1969 the average increase on all roads was of the order of 10 percent although at some stations the increase exceeded 27 percent. The low base from which the forecasts were made may account for the variability of these figures.

Figure 5.5 shows the average 16 hour traffic volumes recorded on the roads around the project area in 1969 and also indicates the 16 hour two-way flows of commercial vehicles.

In 1968 commercial vehicles were 31 percent of the total 16 hour flows recorded within the State of Johor, decreasing to 30 percent in 1969.

No information essential for planning exists on car ownership by head of population or by per capita or family income, about average journey lengths, journey purposes, car occupancy, average loading of commercial vehicles or about any of the traffic generating characteristics of the urban and rural areas of the State.

The traffic counts however do reveal that, even in very remote rural areas passenger traffic is dominant in terms of the number of vehicles per day passing any point. They also indicate quite clearly that the proportion of commercial vehicles decreases with proximity to urban centres. Furthermore, the percentage of commercial vehicles recorded at all the traffic survey stations is decreasing. This may reflect rising real incomes and propensity to travel amongst the population of South East Johor, resulting from the increase in urban employment.

5.7.4 Traffic Surveys and Analysis:

Effort was concentrated during the project on collecting data vital for long term planning, and design methods were adapted to the level of information available.

The growth in commercial vehicle movement could be forecast by the detailed evaluation of agricultural development proposals. The traffic generated by the tourist resort could also be readily forecast for any stage of development. There were, however, no existing data on private vehicle ownership patterns or propensity to travel from which predictions could be made of the

FIGURE

STANDARD TRAFFIC SURVEY STATIONS
SOUTH EAST JOHOR

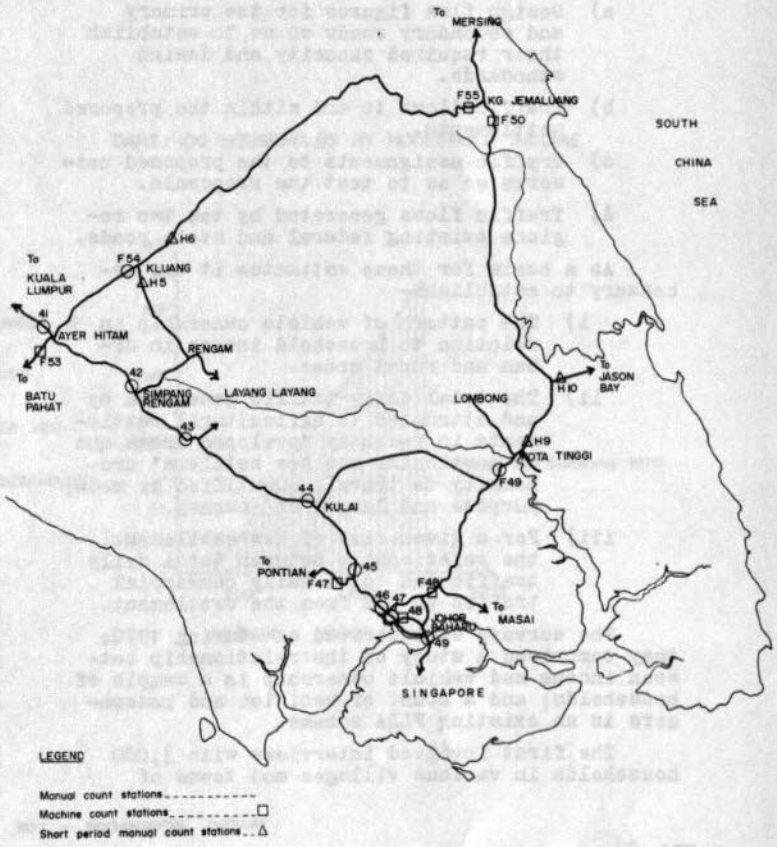
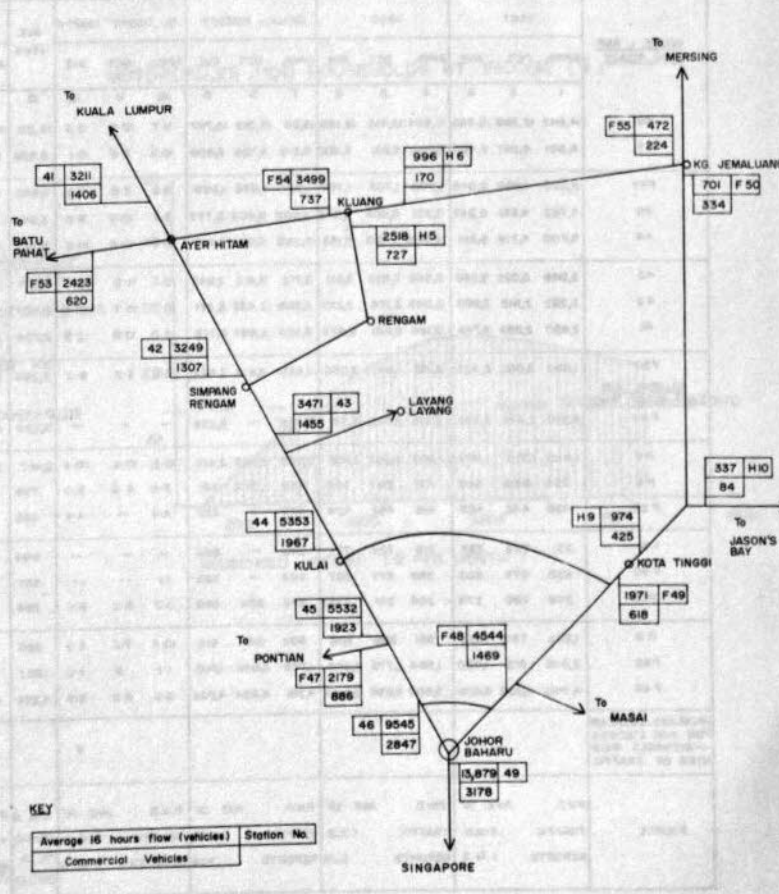


FIGURE 5.4

16 HOUR TRAFFIC FLOWS (TWO WAY) 1969



probable growth of private and public transport movements within the regions.

This information was required to estimate:-

a) Design flow figures for the primary and secondary roads so as to establish their required capacity and design standards.

b) Traffic flows to and within the proposed settlements.

c) Traffic assignments to the proposed networks so as to test the proposals.

d) Traffic flows generated by the two regions existing federal and state roads.

As a basis for these estimates it was necessary to establish:-

i) The pattern of vehicle ownership in relation to household income in urban and rural areas.

ii) The total daily traffic generated by and attracted to agricultural settlements in recently developed areas and in particular the new settlers' propensity to travel, quantified by mode, purpose and length of journey.

iii) For a given size of new settlement, the relationship between total daily traffic and total daily commercial traffic to and from the settlement.

The surveys were carried out during 1970: they comprised a study of the relationship between income and vehicle ownership in a sample of households; and a count of vehicles and passengers in an existing FLDA scheme.

The first involved interviews with 3,000 households in various villages and towns of South East Johor. Information was collected concerning car, motor-bicycle and bicycle ownership by household incomes and ethnic groups (Table 5.2). No significant differences in bicycle ownership were found between ethnic groups within the same income groups.

The median income for all the households interviewed is about $240 per household per month. There are about 13 cars per 100 households sampled, but car ownership varied considerably between the various income groups. There is less than one car per hundred households in the lowest income group. Car ownership then rises rapidly as income increases reaching one car for every two households in the highest income groups (those receiving more than $500 per month).

Figure 5.6 illustrates the relationship between car ownership and household income for these 3,000 households.

If the relationship between vehicle ownership and income remains constant, and if incomes for all groups in the sample rise by 3 percent per annum between 1970 and 1980 and by 3½ percent per annum between 1980 and 1990 then income distribution and car ownership would roughly double over 20 years. Table 5.3.

The growth in ownership of motorcycles is likely to be slower than the growth in car ownership. Figure 5.7 illustrates the 1970 relationship between motorcycle ownership and household incomes for the 3,000 households. Again assuming a 3 percent per annum rise in incomes for all households between 1970 and 1980 and a 3½ percent rise between 1980 and 1990, and assuming the same ownership/income relationship, then income distribution and motorcycle ownership for these households would be as shown in Table 5.4 (groups over $500 per month are grouped together).

TABLE 5.1 TRAFFIC INFORMATION — FOR PART OF JOHOR STATE

COUNT STATION	VEHICLES PER DAY (EXCLUDING MOTOR CYCLES — 24 HOURS)						TRAFFIC — INCLUDING MOTOR CYCLES									PERCENTAGE INCREASE IN TRAFFIC		COMMERCIAL TRAFFIC — 2/3 AXLES							
							24 HOUR DAY — 1968						16 HOUR 'DAY'					1968				1969			
ROUTE I AND LINK ROADS	1967			1969			DAILY — NUMBER			% 'NIGHT' TRAFFIC			AVE 1968	1969						PERCENTAGE OF TOTAL (INCL. M/C)			Nos. 16 HR AVE	Nos. 16 HOUR DAY			% INCR. 1969/1968	
	APRIL	OCT.	AVE.	APRIL	OCT.	AVE.	APRIL	OCT.	AVE.	APRIL	OCT.	AVE.		APRIL	OCT.	AVE.	1968/1967	1969/1968				APRIL	OCT.	AVE				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
49	14,842	12,388	13,665	11,924	12,414	12,169	13,311	14,213	13,787	11·7	10·9	11·3	12,211	14,379	13,379	13,879	-11	14	22·3	22·1	22·2	2,711	2,929	3,026	3,178	17	
46	8,901	8,087	8,494	8,768	8,831	8,800	9,510	9,708	9,609	10·3	9·9	10·1	8,638	9,059	10,051	9,545	4	11	29·5	30·3	29·9	2,583	2,668	3,025	2,847	10	
F47	2,220	1,865	2,043	1,779	1,755	1,767	1,898	1,936	1,868	5·9	6·9	6·4	1,842	2,141	2,215	2,178	-14	18	40·8	40·1	40·5	746	852	920	886	19	1 day manual count
45	5,782	4,931	5,347	5,301	5,585	5,443	5,602	5,952	5,777	8·1	10·5	9·3	5,240	5,580	5,504	5,532	2	6	34·4	35·2	34·8	1,824	1,880	1,965	1,923	5	
44	5,709	4,718	5,214	4,846	5,458	5,153	5,263	5,964	5,614	10·3	10·9	10·6	5,019	5,340	5,365	5,353	-1	7	35·6	37·3	36·5	1,832	1,933	2,000	1,967	7	
43	3,569	3,021	3,295	3,569	3,453	3,511	3,712	3,613	3,663	10·1	11·2	10·7	3,271	3,641	3,301	3,471	7	6	38·5	41·6	40·1	1,312	1,532	1,378	1,455	11	
42	3,362	2,815	2,989	3,280	3,174	3,227	3,508	3,433	3,471	10·0	10·7	10·4	3,110	3,458	3,039	3,249	9	4	35·2	39·1	37·2	1,157	1,404	1,209	1,307	13	
41	2,830	2,862	2,746	3,148	2,610	2,879	3,359	2,867	3,113	14·0	10·9	12·5	2,724	3,253	3,188	3,211	5	18	43·5	39·1	41·3	1,125	1,430	1,382	1,406	25	
F53 KLUANG AND EAST COAST ROADS	1,850	3,000	2,425	2,155	1,941	2,038	2,629	2,414	2,522	15·2	5·2	9·2	2,290	2,385	2,461	2,423	-16	6	26·3	25·6	26·0	595	605	635	620	4	1 day manual count
F54	2,859	2,345	2,452	2,316	2,345	2,331	3,229	—	3,229	—	—	—	3,229	3,409	3,589	3,499	-5	8	21·2	—	21·2	585	710	764	737	6	
H5	1,670	1,718	1,694	1,697	2,207	1,952	2,068	2,788	2,428	10·3	10·4	10·4	2,167	2,465	2,571	2,518	15	16	30·2	33·4	31·8	689	829	625	727	6	1 day manual count
H6	464	668	566	461	557	509	752	1,008	881	9·8	8·9	9·4	798	926	1,046	996	-10	25	24·0	17·7	20·9	167	170	170	170	2	" " "
F55	485	442	469	416	442	429	459	—	459	4·4	—	4·4	459	553	390	472	-9	8	37·5	—	37·5	165	248	200	224	36	
F51	731	722	727	719	722	721	846	—	846	—	—	—	846	934	925	930	-1	10	31·1	—	31·1	263	286	224	245	-7	
F50	630	575	603	538	575	557	563	—	563	1·1	—	1·1	557	696	704	701	-8	26	49·2	—	49·2	274	331	336	334	22	1 day manual count
H10	266	285	276	234	231	233	272	264	268	5·2	5·5	5·3	254	347	327	337	-16	33	12·8	23·5	18·2	46	77	91	84	83	" " "
H9	1,235	790	1,013	851	860	856	902	918	910	10·4	7·5	9·0	828	864	1,083	974	-15	18	51·2	50·6	50·9	421	397	452	425	1	1 day manual count
F49	2,048	1,612	1,830	1,584	1,776	1,680	1,759	2,046	1,903	1·1	8	4·0	1,827	1,921	2,020	1,971	-8	8	31·9	33·1	32·5	594	608	627	618	4	
F48	4,780	4,050	4,408	3,900	3,996	3,948	4,381	4,634	4,508	6·3	6·2	6·3	4,224	4,413	4,675	4,544	-10	8	32·0	26·9	29·5	1,246	1,325	1,612	1,469	18	" " "
INCREASE/DECREASE FOR FOR STATIONS — AVERAGES WEIGHTED BY TRAFFIC									9								-3	10			31					12	
SOURCE	P.W.D. TRAFFIC REPORTS		AVE. OF COLS. 1 & 2	P.W.D. TRAFFIC REPORTS		AVE. OF COLS. 4/5	P.W.D. TRAFFIC REPORTS		AVE. OF COLS. 7/8	P.W.D. TRAFFIC REPORTS		AVE. OF COLS. 10/11	COL. 9 MINUS % in COL. 12	P.W.D. TRAFFIC REPORTS		AVE. OF COLS. 14/15	COL. 6 AS % OF COL. 3 -100	COL. 18 AS % OF COL. 13 -100	P.W.D TRAFFIC REPORTS		AVE. OF COLS. 19/20	COL. 21 X COL. 13	P.W.D. TRAFFIC REPORTS		AVE. OF COLS. 23/24	COL. 25 AS % OF COL. 22 -100	

TABLE 5.3 INCOME DISTRIBUTION AND CAR OWNERSHIP 1970, 1980, 1990.

INCOME DISTRIBUTION				NUMBER OF CARS		
HOUSEHOLD INCOME GROUP	PERCENTAGE			PER 100 HOUSEHOLDS		
$ PER MONTH	1970	1980	1990	1970	1980	1990
0 - 149	28	11	4	1	1	1
150 - 299	37	35	20	6	6	6
300 - 499	21	32	42	18	18	18
500 +	14	22	34	51	51	51
ALL GROUPS	100	100	100	13.4	19	26

TABLE 5.4 INCOME DISTRIBUTION AND M/CYCLE OWNERSHIP, 1970, 1980, 1990.

INCOME DISTRIBUTION				NUMBER OF MOTORCYCLES		
INCOME GROUP	PERCENTAGE			PER 100 HOUSEHOLDS		
$ PER MONTH	1970	1980	1990	1970	1980	1990
0 - 149	28	11	4	5	5	5
150 - 299	37	35	20	12	12	12
300 - 499	21	32	42	17	17	17
Over 500	14	22	34	25	25	25
ALL GROUPS	100	100	100	13	16	18

Bicycle ownership is consistently high for all income groups, the 1970 average being 72 bicycles per 100 households.

A traffic survey (Appendix D) was carried our at FLDA Kulai on Saturday 3rd October and Tuesday 6th October 1970. The survey was continuous over 16 hours.

The main objective was to assess the present level of vehicle movement generated by the four existing villages of the Kulai complex with particular reference to mode of travel and destination.

The two days were chosen because Saturday was just before pay day and Tuesday just after. Both were normal working days. There was no significant difference in the number of trips recorded on the two days.

On both days the presence of the survey team accompanied by police was a deterrent to that part of the normal travel which disregards the regulations governing carriage of passengers for hire or reward in private cars and trucks. This did not significantly affect the number of vehicles only the number of passengers. Lorries passing the control point carried an average of four persons per vehicle. The average occupancy of the cars and taxis was also four persons, although the maximum occupancy reached a staggering eleven persons per car at times of greatest travel (6-7 a.m. 8 cars carried 88 passengers past the survey point).

The most important reason for travel was the journey to and from work, and of the 260 trips leaving the area on the Tuesday about half were associated solely with working opportunities outside the limits of the FLDA scheme.

FIGURE 5.5

CARS / 100 HOUSEHOLDS BY HOUSEHOLD INCOME

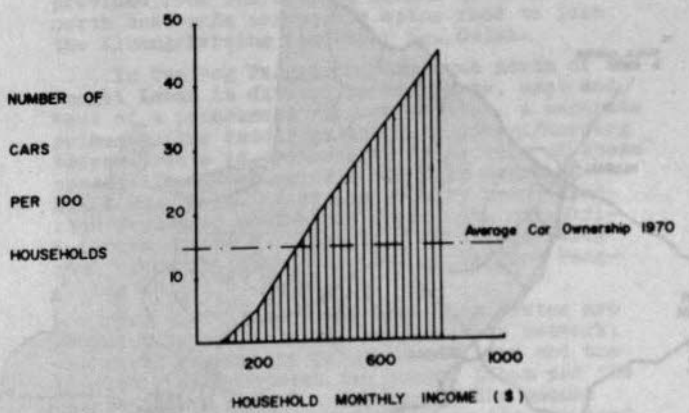
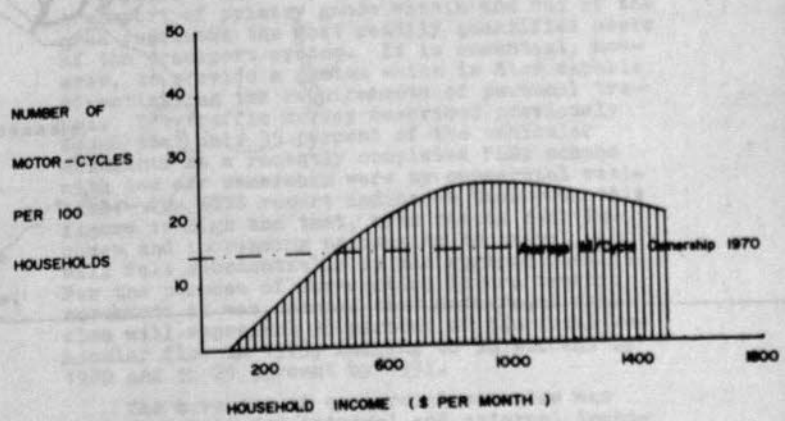
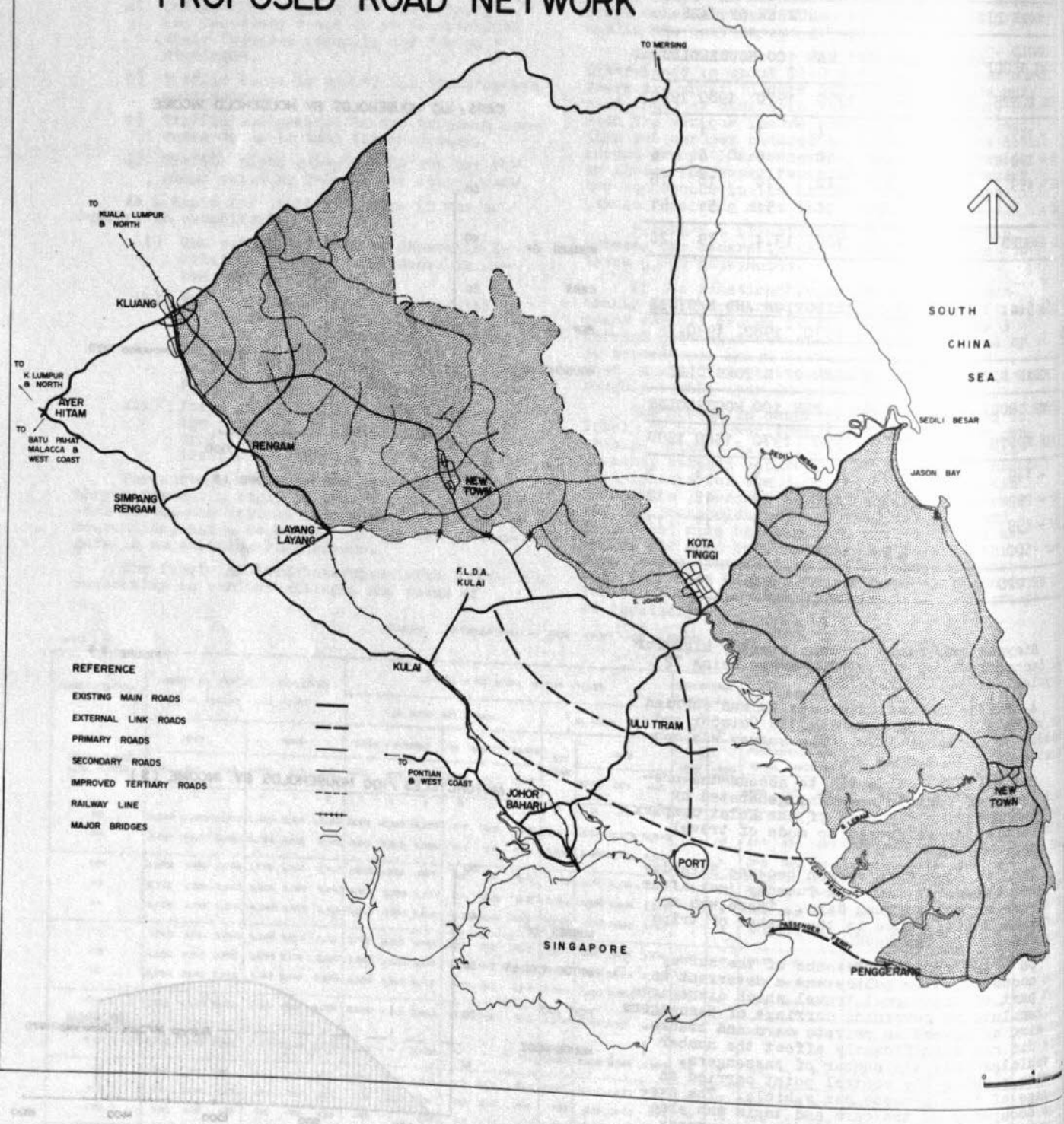


FIGURE 5.6

MOTORCYCLES / 100 HOUSEHOLDS BY INCOME ($)



PROPOSED ROAD NETWORK



The remaining trips, mainly for business and shopping, involved returning delivery vehicles, buses, cars and taxis and had the following main destinations:-

40 percent - Kulai town
14½ percent - Johor Baharu
7½ percent - Kota Tinggi

although trips to Singapore (3), Pontian (2), Muar (1) and Kuala Lumpur (1) were also recorded.

Part of the survey was concerned solely with movements into and out of the area. This part recorded approximately 950 two-way trips during the 16 hours of which 121 were by bicycle, 38 by motor cycle, 207 in cars or taxis, 405 in buses and 179 in trucks.

As the total population is approximately 12,000 (2,000 families), this represented about 0.5 trips per family per day to external destinations.

A count was also carried out at the main road junction within the complex. This indicated that the total daily trips by vehicle were at least three times the external trips, and when trips between adjoining villages on the outskirts of the scheme are taken into account a realistic figure would be in the region of 1.5-2.0 two way person trips/family/day by vehicular mode.

The total daily flow generated by or attracted to the four villages in terms of vehicles (excluding pedal cycles) was approximately 570 vehicles per day of which 200 (35 percent) were commercial vehicles.

It is to be particularly emphasised that these flows did not include any logging trucks as no logging is taking place in this area. Also, as some parts of the scheme have not reached maturity, the movements of lorries carrying fresh fruit bunches of oil palm is lower than can ultimately be expected.

No school buses were observed during the period of the study. The few school children attending secondary school apparently travelled either on the regular buses or in cars and taxis.

If the results of the two surveys are used as a guide to indicate possible levels of traffic flow associated with the future villages in the project area the following general conclusions and projections can be made:

i) The level of vehicular flow (non commercial) associated with an existing village of 450-500 houses is 100 vehicles per day.

ii) The average growth of vehicular movement (excluding commercial) could be of the order of 6 percent per annum. Thus by 1980 each village could generate/attract a total passenger vehicle flow of 180 vehicles per day rising to 320 vehicles per day in 1990. In fact, vehicle ownership is likely to rise more slowly during the first five years, increasing rapidly as harvesting commences.

iii) Commercial vehicles represent only 35 percent of the total vehicle movements on the main roads leading to the villages; this is likely to decrease to 30 percent by 1980 and to 25 percent by 1990.

iv) Car ownership in these existing villages could increase to 100 vehicles by 1980 and to 130 vehicles by 1990.

v) Motorcycle ownership could similarly increase to 80 vehicles per village in 1980 and to 90 by 1990.

5.7.5 The Proposed Road Network: the road network proposed in each region is characterised by a major primary spine road. (Fig. 5.8) In Johor Tengah this road is a continuation of the existing FLDA Kulai road, realigned to by-pass the village of Sungai Sayong. It continues through the centre of the development areas and joins the proposed inner bypass of Kluang. To facilitate movement of goods in the northern areas of the Tengah region and to provide alternative links to the national highway network an additional section of primary road will be provided from the Simpang Rengam to Rengam road north eastwards across the spine road to join the Kluang/Mersing road near Kg. Gajah.

In Tanjong Penggerang the area north of the Sungei Lebam is divided in two parts, east and west of a pronounced ridge of hills. A separate primary spine road from the Kota Tinggi/Mersing Federal route is proposed to serve each of these areas. These two spine roads join south of Bukit Ulu Papan. A single primary spine road then continues southwards across the main tributaries of the S. Lebam to join the existing road along the southern coast of Tanjong Penggerang at Kg. S. Kapal.

Two additional roads from this system are proposed to complete the primary road network: the first serves the proposed new town and the tourist resort between the Sungei Lebam and the coastal strip near Tg. Balau; and the second runs westwards from Bt. Senning to the proposed car ferry terminal on the S. Johor, at Kg. Belangkor.

In both regions a network of secondary roads will link the proposed centres of population and production to the primary roads. Provision is also made in Tanjong Penggerang for the eventual extension of the tourist coastal development roads to provide, in the long term, a continuous coastal route from Jason's Bay to the southern tip of the Peninsula.

5.7.6 Traffic Forecasts : the detailed development proposals for agriculture and forestry are explained in other supporting volumes. Their phasing and implementation programmes were used as the basis of a forecast of the total movement of commercial vehicles both within the regions and between the regions and external centres.

Those commercial vehicles used for the transport of primary goods within and out of the area represent the most readily quantified users of the transport system. It is essential, however, to provide a system which is also capable of satisfying the requirements of personal travel. The traffic survey described previously found that only 35 percent of the vehicular movements at a recently completed FLDA scheme with low car ownership were by commercial vehicles. The MGTS report indicates that even this figure is high and that, with rising real incomes and increasing propensity to travel, it will fall substantially as the regions develop. For the purpose of forecasting future traffic movements it was assumed that commercial vehicles will represent 35 percent of the total vehicular flow in 1975, falling to 30 percent by 1980 and to 25 percent by 1991.

The movement of commercial vehicles was estimated both for internal and external transport. The method used was to convert the estimated crop yields in tonnages into vehicular trips per year using standard vehicle loadings. These trips were estimated on the basis of internal movements (field to primary processing) and external movements (primary processing to

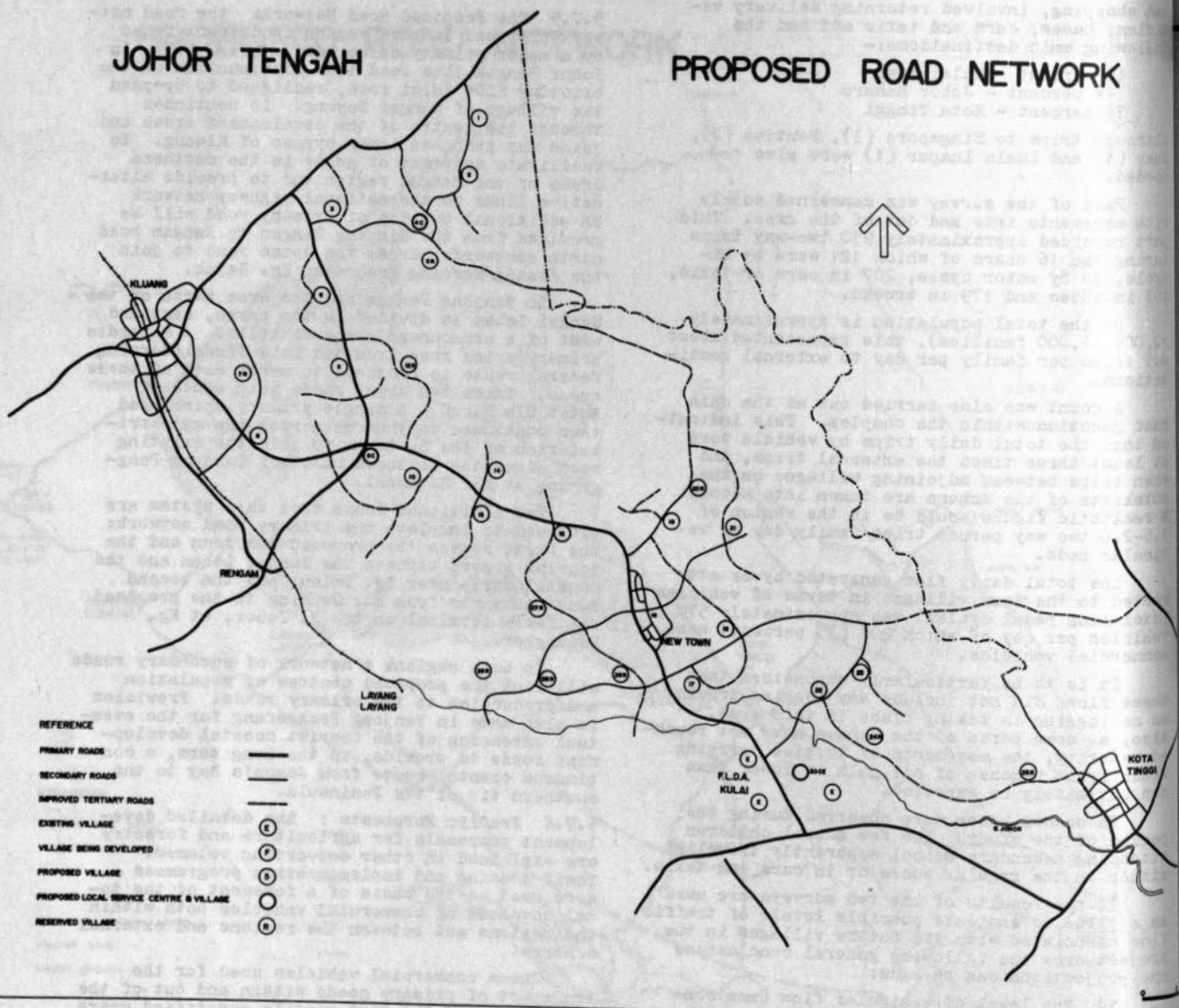

JOHOR TENGAH
PROPOSED ROAD NETWORK
KLUANG
RENGAM
LAYANG LAYANG
NEW TOWN
F.L.D.A. KULAI
KOTA TINGGI
REFERENCE
PRIMARY ROADS
SECONDARY ROADS
IMPROVED TERTIARY ROADS
EXISTING VILLAGE
VILLAGE BEING DEVELOPED
PROPOSED VILLAGE
PROPOSED LOCAL SERVICE CENTRE & VILLAGE
RESERVED VILLAGE

FIGURE...5.7.1.

TANJONG PENGGERANG

PROPOSED ROAD NETWORK

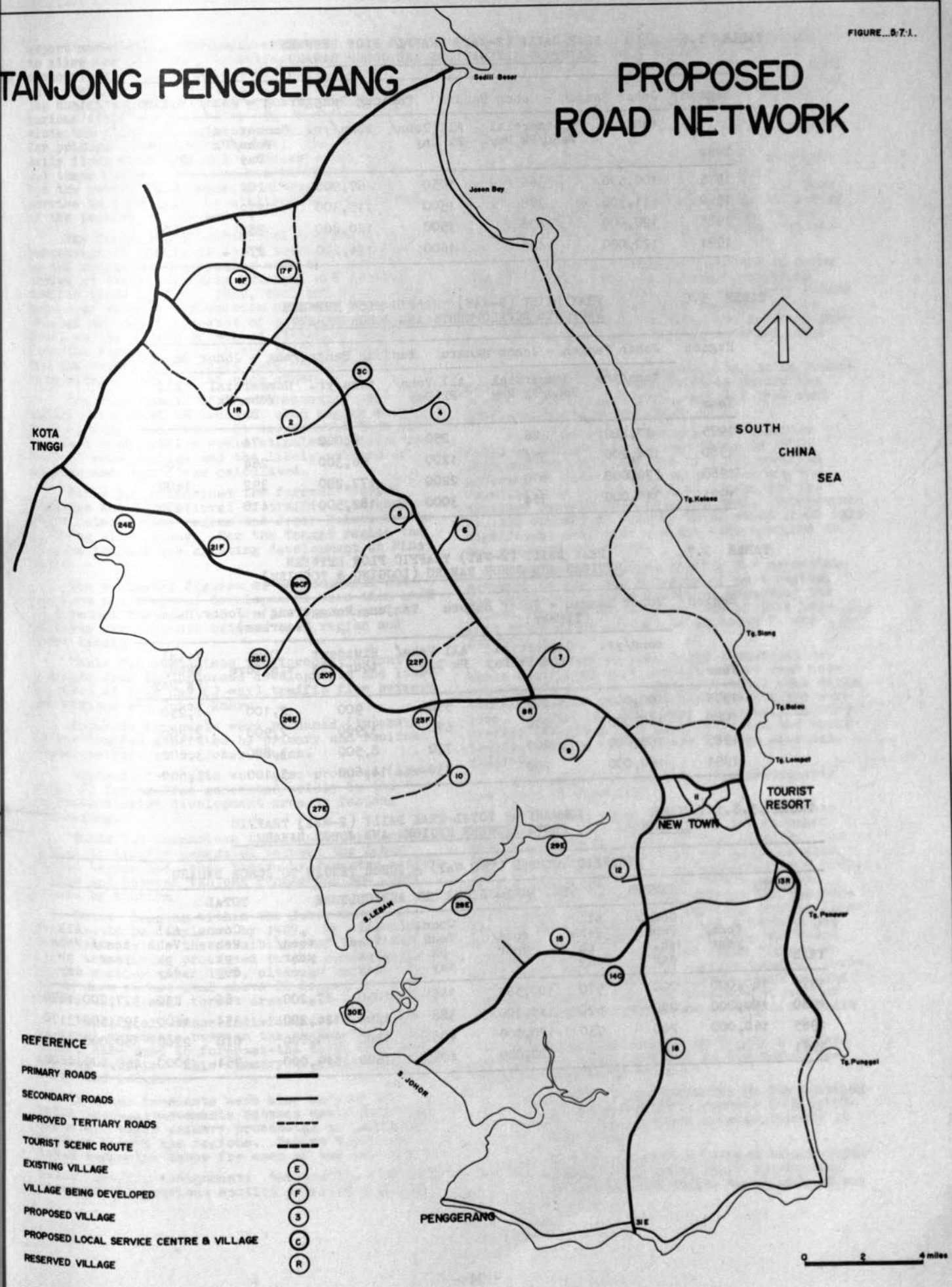


TABLE 5.5 PEAK DAILY (2-WAY) TRAFFIC FLOW BETWEEN EXISTING ALIENATIONS AND JOHOR BAHARU

Region	Johor Tengah - Johor Baharu			Tanjong Penggerang - Johor Baharu		
Year	tons/yr.	Commercial Vehs/Pk Day	All Vehs/ Pk Day	tons/yr.	Commercial Vehs/Pk Day	All Vehs/ Pk Day
1975	100,500	366	1050	67,900	204	600
1980	111,300	388	1300	115,300	272	900
1985	120,000	408	1500	120,800	282	1000
1991	120,000	408	1600	114,200	274	1100

TABLE 5.6 PEAK DAILY (2-WAY) TRAFFIC FLOW BETWEEN PROPOSED DEVELOPMENTS AND JOHOR BAHARU

Region	Johor Tengah - Johor Baharu			Tanjong Penggerang - Johor Baharu		
Year	tons/yr.	Commercial Vehs/Pk Day	All Vehs/ Pk Day	tons/yr.	Commercial Vehs/Pk Day	All Vehs/ Pk Day
1975	17,200	86	250	6,000	74	210
1980	124,200	354	1200	96,300	264	900
1985	270,000	610	2200	177,200	392	1400
1991	349,000	754	3000	182,500	410	1600

TABLE 5.7 PEAK DAILY (2-WAY) TRAFFIC FLOW BETWEEN REGIONS AND JOHOR BAHARU (LOGGING & TOURISM)

Region	Johor Tengah - Johor Baharu (Timber)			Tanjong Penggerang - Johor Baharu (Tourism)		
Year	tons/yr.	Commercial Vehs/Pk Day	All Vehs/ Pk Day	Risident tourists	Day visitors	Total Vehs/ Pk Day
1975	160,000	200	570	900	2,100	1,250
1980	160,000	200	670	3,900	2,900	2,200
1985	160,000	200	730	8,500	3,800	3,600
1991	160,000	200	730	14,600	5,400	5,600

TABLE 5.8.1 JOHOR TENGAH SUMMARY OF TOTAL PEAK DAILY (2-WAY) TRAFFIC FLOWS BETWEEN REGIONS AND JOHOR BAHARU

TRAFFIC VOLUMES (TWO WAY) - JOHOR TENGAH TO JOHOR BAHARU

SECTOR	TIMBER			EX. AGRICULTURE			NEW AGRICULTURE			TOTAL		
YEAR	tons/ year	Comn. Vehs pk. day	All Vehs pk day	tons/ year	Comn. Vehs pk day	All Vehs pk day	tons/ year	Comn. Vehs pk day	All Vehs pk day	tons/ year	All Vehs pk day
1975	160,000	200	570	100,500	366	1050	17,200	86	250	277,700	1870
1980	160,000	200	670	111,300	388	1300	124,200	354	1200	395,500	3170
1985	160,000	200	730	120,000	408	1500	270,000	610	2200	350,000	4430
1991	-	-	-	120,000	408	1600	349,000	754	3000	469,000	4600

export markets). Additional estimates were made to allow for planting, fertiliser and imported commodities. The figures were then converted into average daily trips based on the harvesting characteristics and forecast yields of the various crops through time. The figures include the flows generated by logging trucks both for primary and residual timber. The average daily flows are in loaded vehicles - one way. All these vehicles are assumed to return empty, but the return load capacity of general cargo lorries is assumed to be utilised for 50 percent of the imports to the areas.

The forecasts of commercial traffic as a percentage of the total daily traffic generated by the proposed developments were then used to arrive at the total daily internal and external traffic flows in 1975, 1980, 1985 and 1991. The passenger vehicle composition of these flows was checked against a forecast of passenger movement based on the likely growth of passenger traffic from the figures found in the traffic survey. The two separate estimates gave results which were within 5 percent.of each other.

The first stage of the forecasting procedure covered those areas of each region which were already alienated. It was assumed that the proposed road network would stimulate redevelopment of some estates and the likely pattern of outputs and inputs was calculated.

Table 5.5 summarises the forecast output tonnages and likely level of traffic flow generated between each region and Johor Baharu by the existing alienations. For the Tengah region the figures include the existing development at FLDA Kulai.

The estimated figures of agricultural output from the proposed developments were then used to forecast the level of trafficflow generated by these developments between each region and Johor Baharu.

Table 5.6 summarises the forecast output tonnages from the proposed developments and likely level of peak day (2 way) traffic flow between the regions and Johor Bahru.

Separate forecasts were produced (Appendix E) for traffic generated by primary and residual timber activities in Johor Tengah.

Separate forecasts were also produced (Appendix F) for traffic generated solely by the proposed tourist development area in Tanjong Penggerang.

Table 5.7 summarises these forecasts in relation to traffic generated between the Johor Tengah Region and Johor Baharu by forestry activities and between Tanjong Penggerang and Johor Baharu by tourism.

Note: Logging within the Johor Tengah region should be completed by 1989. No allowance has been made for the possibility of logs from other areas being processed in the Johor Tengah timber complex after 1989, although this could occur when forest land above 20 degree slope inside and outside forest area could be worked.

Finally all these individual forecasts of external movements between the regions and Johor Baharu were used to forecast the total external two way traffic. This summary is given in Tables 5.8.1 and 5.8.2.

Similar forecasts were also made of the total internal movements between newly developed areas and their primary processing or servicing centres within the regions. Tables 5.9.1 and 5.9.2 summarise these for each of the two regions.

5.7.7 Traffic Assignment: the traffic forecasts given in the previous section provided a general basis for traffic assignment. More detailed forecasts of peak daily commercial vehicle movement in 1975, 1980, 1985 and 1991 were made for the areas of influence of each existing and proposed settlement. All primary processing plants were located on a plan showing the proposed highway network and the existing and proposed villages.

A manual (shortest route) trip assignment programme was carried out for the crops harvested by each village during each of the four years. The commercial vehicles required during peak harvesting periods were assigned to the shortest route to the nearest primary processing facility.

The commercial vehicles required to carry output tonnages from the primary processing facilities to the export markets of Johor Baharu and Singapore were similarly assigned to the shortest route available using the internal primary road network and existing external major roads.

For the Tanjong Penggerang Region an economic evaluation of a vehicle ferry across the Sungei Johor (Appendix G) indicated that such a service could be viable by 1980.

It was therefore assumed that vehicles could be assigned to the car ferry in 1980, 1985 and 1991 but that for 1975 all vehicles entering or leaving the region would use the existing road system via Kota Tinggi and the proposed Tanjong Penggerang Highway. Subsequently, all commercial vehicle trips which could make significant user cost savings were assigned to the proposed car ferry.

Logging and tourist traffic was separately assigned to the road networks of each region, the assumptions and conclusions regarding the volume, origins and destinations of this traffic being given in full in Appendix F, and Appendix E.

The figures of peak daily commercial vehicle traffic on each section of the road network were then used to forecast total peak daily traffic volumes using the method described earlier. In Tanjong Penggerang peak daily tourist traffic was added as a last stage and the total traffic volumes per peak day (2 way) were calculated.

The results of these traffic assignments are given in Appendix I.

As a final stage the traffic assignments were used to test the impact of the proposed development on the external road network. For the purpose of this test it was again assumed that the car ferry would be available from 1980. It was also assumed that by 1980 a new road would be built between Kota Tinggi and the proposed Johor Baharu Port. Existing traffic flows in 1969 were assumed to grow at 6 percent per annum and the traffic assigned from the development regions was added to these figures to give total traffic on the various external roads. The figures of growth of existing traffic plus assigned traffic from the Development regions on to the external roads are listed in Appendix I and J.

The technique adopted is likely to underestimate the total movement in the region because no account is taken:-

i) of work trips attracted by the existing and proposed urban centres from existing villages where underemployment is very high.

ii) of the interaction between neighbouring villages and towns where intervening employment and social opportunities may

TABLE 5.8.2 TANJONG PENGGERANG SUMMARY OF TOTAL PEAK DAILY (2-WAY) TRAFFIC FLOWS BETWEEN REGIONS AND JOHOR BAHARU

TRAFFIC VOLUMES (TWO WAY) - TANJONG PENGGERANG TO JOHOR BAHARU

SECTOR	TOURISM		EX. AGRICULTURE			NEW AGRICULTURE			TOTAL	
YEAR	No. of Tourists	All Vehs peak day	tons/ year	Comn Vehs peak day	All Vehs peak day	tons/ year	Comn Vehs peak day	All Vehs peak day	tons/ year	All Vehs peak day
1975	900	1250	67,900	204	600	6,000	74	210	73,900	2000
1980	3,870	2200	115,300	272	900	96,300	264	900	211,000	4000
1985	8,450	3600	120,000	282	1000	177,200	382	1400	288,000	6000
1991	14,620	5600	114,200	274	1100	182,500	410	1600	296,700	8300

TABLE 5.9.1 JOHOR TENGAH SUMMARY OF TOTAL PEAK DAY (TWO DAY) TRAFFIC FLOWS WITHIN THE REGIONS

SECTOR	TIMBER			EX. AGRICULTURE			NEW AGRICULTURE			TOTAL	
YEAR	tons/ year	Comn Vehs peak day	All Vehs peak day	tons/ year	Comn Vehs peak day	All Vehs peak day	tons/ year	Comn Vehs peak day	All Vehs peak day	tons/ year	All Vehs peak day
1975	231,000	290	830	404,500	876	2500	27,900	98	280	663,400	3610
1980	231,000	290	970	448,000	970	3200	357,200	816	2,700	1,036,200	6870
1985	231,000	290	1060	483,000	1046	3800	901,200	1,960	7,200	1,615,200	12,060
1991	-	-	-	483,000	1046	4200	1,180,300	2,538	10,200	1,663,300	14,400

TABLE 5.9.2 TANJONG PENGGERANG SUMMARY OF TOTAL PEAK DAY (TWO DAY) TRAFFIC FLOWS WITHIN THE REGIONS

SECTOR	TOURISM		EX. AGRICULTURE			NEW AGRICULTURE			TOTAL	
YEAR	No. of tourists	All Vehs peak day	tons/ year	Comn Vehs peak day	All Vehs peak day	tons/ year	Comn Vehs peak day	All Vehs peak day	tons/ year	All Vehs peak day
1975	900	1250	261,300	632	1800	19,600	102	290	280,900	3340
1980	3870	2200	447,200	980	3300	358,200	828	2,800	805,400	8300
1985	8450	3600	463,100	1012	3700	668,300	1446	5,300	1,131,400	12,600
1991	14620	5600	435,600	954	3800	678,400	1460	5,800	1,114,000	15,200

create a substantial travel demand.

The routes taken by commercial vehicles are not necessarily the same as those favoured for private trips. For instance commercial vehicles will be travelling mainly between the regions and the proposed port at Johor Baharu, Private trips between the regions and Johor Baharu will be destined in the main for the town centre.

However, it should be stressed that this technique does provide a satisfactory basis both to test the adequacy of the proposed network, and to indicate the size, type and design standards applicable for the primary and secondary roads. The three limitations of the method described above are only likely to become significant in the later years of the plan period, and the proposals for design standards take account of these limitations in respect of the sections of the network most likely to be affected by them.

5.7.8 Traffic Evaluation and Design Standards: the traffic flows shown in Figures 5.9.1 to 5.9.4 and 5.10.1 to 5.10.4 were used to test the proposed road networks described in the earlier section and illustrated in Figure 5.8.

The assignments justified the allocation of primary road status to almost all the roads indicated as primary roads in Figure 5.8. The two exceptions were the sections of primary road between Kluang and Sembrong Tengah in Johor Tengah and between Kg. Sg. Kapal and Bukit Kledang in Tanjong Penggerang. In both cases however these result from the limitations of the assignment technique with regard to destinations of private, social and work trips. Not only will substantial levels of additional traffic use these sections of road due to relatively large numbers of existing population who will be served by them, but in the case of the section near Kluang the existing and future industrial work opportunities, together with expanding urbanisation, will give rise to substantial levels of newly generated traffic by 1985. The section in Tanjong Penggerang will be extensively used before 1980 by the existing population of southern Tanjong Penggerang for access to the employment opportunities.and social facilities of the new town

and tourist resort areas.

Traffic in Tanjong Penggerang on the section of proposed primary route between Lo Heng and Papan development units may only just reach the level which justifies primary road design standards in 1991. However, its function as a major collector road will require it to be designed to primary road standards.

In addition to the traffic volumes generated by the proposed development it is expected that increasing volumes of external traffic will use the primary roads within the Johor Tengah Region. These roads will provide a fast and attractive alternative to traffic travelling to Johor Baharu or Singapore from the existing and developing areas to north east of Kluang. A number of large scale new development schemes are proposed in these areas which could generate a substantial volume of new traffic. (This traffic). This traffic could avoid Kluang by using the section of primary road between the Mersing road and Rengam and then the existing Rengam-Simpang Rengam link to Federal Route 1. Alternatively some of this traffic may use the primary spine road to gain more direct access to the proposed port. Adequate capacity will be available on these primary roads to absorb this possible level of increased external traffic.

The assignments also indicated that access roads linking the villages to the primary road network will carry more than 400 vehicles per day when peak harvesting is reached and much more again where these roads are used by logging trucks.

Where more than one village is located on a secondary road together with a primary processing facility traffic flows of well in excess of 1500 vehicles per day may result.

Primary roads are recommended for construction to the approximate standards of J.K.R. design group 05. Some minor changes to existing design criteria are proposed where they will give rise to better performance or significant cost savings.

Secondary roads are proposed for construction to the general level of J.K.R. 04 design group. As in the case of primary roads some changes to the existing design standards are recommended either for improved performance or cost savings in construction.

The lengths of improved harvesting roads proposed within the region should generally be to the approximate level of the J.K.R., 02 design group standards. These roads are intended to improve the standard of communications between major agricultural harvesting areas and the primary/secondary road systems.

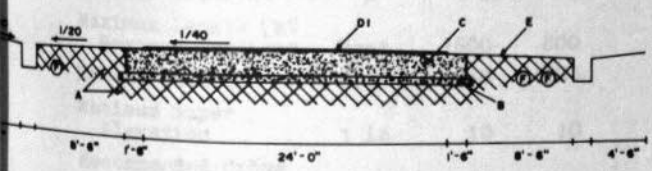
The proposed minimum design criteria for these three classes of road are shown in Table 5.11.

In addition to these road design groups the lengths of primary road running through each of the new town areas and the approach road to Kluang should have sufficient space reserved for their eventual widening to two lane dual carriageway urban design standards.

These standards should allow for minimum 11 feet width traffic lanes and a minimum central reserve of 20 feet (planted), with additional provision for footpaths, cycle tracks, and turning or parking manoeuvres.

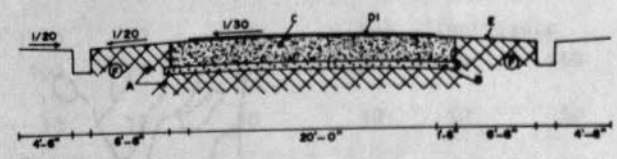
The detailed design of the roads in cross section take into account the possibility of using lime stabilisation for the road base rather than crushed stone. A preliminary assessment of

FIGURE 5.8.1. PRIMARY ROAD CONSTRUCTION



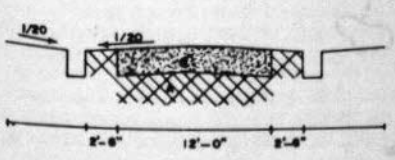
Well compacted subgrade (CBR 15)	A
3" sand blanketing	B
8" lime stabilised soil	C
Primer & surface dressing at 110 sq. yd. per ton (3/8" N.S.)	D1
Primer only	E
Service pipes & ducts as required : set 3' back from carriageway	F

FIGURE 5.8.2. SECONDARY ROAD CONSTRUCTION



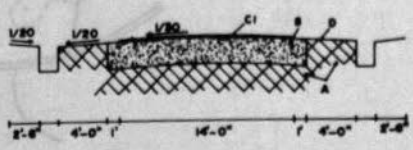
Well compacted subgrade (CBR 15)	A
2" sand blanketing	B
6" lime stabilised soil (or crusher run)	C
Primer and surface dressing at 90 sq. yds per ton (1/2" N.S.)	D1
Primer only	E
Services pipes and ducts	F

FIGURE 5.8.3. TERTIARY ROAD CONSTRUCTION (OIL PALM HARVESTING)



Well compacted soil	A
4" laterite, tin tailings or similar	B

FIGURE 5.8.4. IMPROVED TERTIARY ROAD CONSTRUCTION



Well compacted subgrade (C.B.R. 15)	A
6" laterite or crusher run	B
Primer and surface dressing at 110 sq. yds./ton (3/8" N.S.)	C1
Primer only	D

to be carried more than a distance of 8 chains (approximately 530 feet) to the nearest harvesting road and that the direction of carry is generally downhill.

In rubber areas tertiary roads can be spaced at greater distances as the carry distance for latex is not so critical. An average of about 0.5 chain per acre is adequate in these areas.

For quick delivery of fresh fruit bunches or latex to their primary processing facility it is proposed that groups of tertiary roads used entirely for harvesting should be linked directly to a collector road of improved tertiary standard. This improved tertiary road will provide a direct link to the nearest secondary or primary road, and are expected to be required at the rate of approximately 0.1 chains per acre.

The possibility of making savings in annual fruit collection costs in oil palm areas by reducing the carry distance was investigated. A significant saving did not occur until a level of provision of harvesting roads at 2 chains to the acre was reached. At this level increased road construction and maintenance costs indicated that the savings in harvesting costs were not sufficient to justify the provision of the additional roads.

A typical layout for tertiary and improved tertiary roads in an area of oil palm is shown in Figure 5.12.

5.7.9 Development Impact on External Roads: table 5.10.1 to 5.10.11 summarised the natural growth of traffic on the external roads and showed the level of traffic flows generated by the proposed development over the same period. the potential for the use of this method of construction is given in Appendix H. Significant savings could be made by using stabilisation and an immediate feasibility study should be undertaken to evaluate the proposal. Initially the completed road base should be primed and surface dressed. For primary roads a second surface dressing should be applied after one year.

The total cumulative number of repetitions of one way axle loadings on some sections of the regional roads is expected to reach almost 500,000 by early 1978. This is the level at which the application of a bituminous surfacing (minimum 2 inch thick) is required.

On this basis it is recommended that the application of a base course premix constructional layer is delayed for up to 5 years after surface dressing. The addition of the wearing course after a further 2-5 years will further extend the life of these roads.

These proposals for the roads in cross section are summarised in Figures 5.11.1 (primary roads) and 5.11.2 (secondary roads).

In rubber growing areas the tertiary roads for harvesting will carry far less traffic than in oil palm areas and should be simply graded earth roads. Laterite or similar material should be rolled into the surfacing only where the soil appears too weak to carry traffic. Regular maintenance by motor grader will ensure that these roads are kept in serviceable condition for most of the year.

It is estimated that tertiary roads in oil palm areas will be required at the rate of 0.8 chain per acre on flat land and up to 1.3 chains per acre on hilly land. The main objectives are to ensure that no fresh fruit bunches need

FIGURE 5.9...

TYPICAL ROAD LAYOUT (Oil Palm)

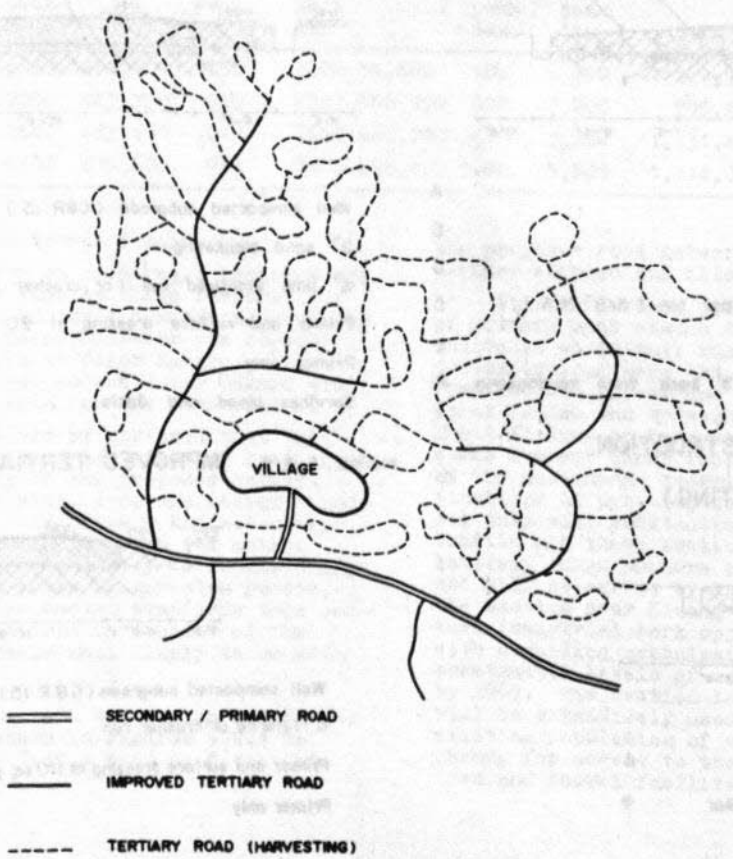


TABLE 5.11 MINIMUM GEOMETRIC DESIGN CRITERIA - PROPOSED ROAD SYSTEM

TYPES & FUNCTION OF ROAD		PRIMARY			SECONDARY			IMPROVED TERTIARY		
Design Capacity	Veh/day	8000			1500			500		
Design Capacity	Veh/hr.	800			150			-		
Terrain	Type	Flat	Rolling	Mountainous	Flat	Rolling	Mountainous	Flat	Rolling	Mountainous
Design Speed	mph	60	50	40	50	40	30	40	30	20
Carriage way width	Feet	24	24	24	20	20	20	14	14	14
Usable shoulder width	Feet	10	10	6	8	8	4	5	5	5
Reserve width	Feet	132	132	132(100)	100	100	100	66	66	66
Maximum Gradient	%	3%	5%	7%	4%	6%	8%	6%	7%	8%
Maximum Length (at Maximum Gradient	Feet	1600	800	600	1100	600	400	Not	Applicable	
Minimum Radius	Feet	1040	700	430	700	430	230	430	230	150
Maximum Super Elevation	1 in	10	10	10	10	10	10	10	10	10
Recommended Cross Fail	1 in	40	40	40	30	30	30	30	30	30
Transition Curves Minimum Length	Feet 01in10	270	240	210	240	210	180	210	180	180
Widening on Bends	Feet	-	-	2	-	2	4	2	2	4
Min. Sight Distance (stopping)	Feet	475	350	275	350	275	200	275	200	200
Min. Sight Distance (passing)	Feet	1400	1200	950	1200	950	750	950	750	650
Bridges (width between Parafets)	Feet	36	34	32	32	30	28	24	22	20

TABLE 5.12.1 ROAD PHASING AND COSTS - JOHOR TENGAH

YEAR	1971	1972	1973	1973	1975	1976	1977	1978	1979	1980	After 1980	TOTAL
Primary Road	(improvement to existing road.											
Miles	3	4	12	14	15	12	-	-	-	-	-	57
Cost ($000)	450	1600	4800	5600	6000	4800						23250
Secondary Road												
Miles		12	12	9	12	8	10	5	8	9	4	89
Cost ($000)		3600	3600	2700	3600	2400	3000	1500	2400	2700	1200	26700
Improved Tertiary Road												
Miles		16	13	15	14	24	20	12	8	24	54	200
Cost ($000)		400	325	375	350	600	500	300	200	600	1350	5000
Tertiary Road												
Miles		112	91	105	98	168	140	84	56	168	378	1400
Cost ($000)		900	730	840	780	1340	1120	670	450	1340	3030	11200
Bridges												
Feet		150			400				100			650
Costs ($000)		600			1600				400			2600
Total Costs ($000)	450	7100	9455	9515	12330	9140	4620	2470	3450	4640	5580	68750

TABLE 5.12.2 ROAD PHASING AND COSTS - TANJONG PENGGERANG

YEAR	1971/72	1972	1973	1974	1975	1976	1977	1978	1979	1980+	TOTAL
Primary Road	improve & complete existing road.										
Length Miles	15	12	16	16	12	12					83
Cost ($000)	3750	4800	6400	6400	4800	4800					30950
Secondary Road											
Length Miles	3	12	8	2	9	6	4	3	3	10	60
Cost ($000)	900	3600	2400	600	2700	1800	1200	900	900	3000	18000
Improved Tertiary Road											
Length Miles	11	19	20	22	21	22	11	16	16	2	160
Cost ($000)	275	475	500	550	525	550	275	2400	2400	50	24000
Tertiary Road											
Length Miles	60	106	116	124	122	123	60	87	90	12	900
Cost ($000)	480	850	930	990	970	980	480	700	720	100	7200
Bridges											
Length Feet			150								
Cost ($000)			600								600
Total Costs ($000)	5405	9725	10830	8540	8995	8130	1955	2000	2020	3150	60750

The level of total daily traffic shown in these tables was examined to see whether the impact of development traffic at any point in time indicated that any road should be constructed to higher standards than the natural growth of existing traffic would require at that time.

The development of the Johor Tengah region has no significant effect on the traffic volumes anticipated on Federal Route 1 to the north of Kulai. Between Kulai and Johor Baharu, however, improvements will be required at an earlier date than the natural growth of traffic would otherwise dictate. The improvement of this road between Johor Baharu and Ayer Hitam was recommended in the Second Malaysia Plan (S.M.P.) and was listed as urgent. The proposed development will simply emphasise the urgency of this proposal.

The development has no significant effect on the Ayer Hitam-Mersing road although within the town of Kluang the increase in urban traffic will be more rapid and the need for an inner bypass of the town centre and a bridge over the railway line may become critical before 1975.

Traffic on the Kluang-Rengam road is already high and some widening and realignment should be carried out by about 1976.

The Rengam-Simpang Rengam road should be upgraded to primary road status by 1980, with some realignment of this road to bypass the latter settlement.

The road between FLDA Kulai and Kota Tinggi is already in a very serious condition. Traffic volumes on this road could more than double by 1976 and urgent consideration should be given to its immediate reconstruction to primary road standards. Some alleviation of the existing problems will result when the proposed road from FLDA Kulai to Ulu Tiram is completed. The SMP recommended its construction by or soon after 1975. The figures of traffic flow shown in the tables serve to emphasise the possible importance of this road to the development.

The length of road to Bukit Besar (FLDA Kulai) is scheduled to become part of the new primary road system. It would be carrying almost 2000 vehicles per day by 1975. Some improvement will be necessary to bring it up to primary road standards.

Traffic on the Johor Baharu-Mersing road to the north east of Kota Tinggi could be more than doubled by 1975. Urgent consideration should be given to improving its standard and aligment by that time. The large increases in traffic volumes will occur and the major improvements will be required only between Kota Tinggi and the Tanjong Penggerang highway. It may be necessary to duplicate the existing bridge over the Johor by 1980, and to provide dual carriage main road through the town.

The existing traffic volumes between Kota Tinggi and Johor Baharu could be almost trebled by 1975, rising from the existing level of about 2000 vehicles per day to 5,500. In the State's submission for the Second Malaysia Plan improvements to this road were listed as "urgent". That conclusion is strongly endorsed by this study, but it is recommended that the possibility of constructing a new route from the junction with the Kulai road to Masai and the proposed Johor Baharu port should also be investigated. Such a route would be desirable by 1975 and could be essential by 1980. It would enable the greater part of the Johor/Kota Tinggi road to remain an improved two lane road at least until 1990. The proposed road should also be designed to two lane, primary road standards.

In addition to these requirements the recommended construction of a car ferry across the Johor will require a new road from Masai to the proposed terminal at Tanjong Langsat. This road should be constructed to primary road standards and could be required before 1980.

The costs of these alterations, improvements and additions to the existing road network are not attributable solely to the proposed development. Account has been taken of existing deficiencies and the anticipated growth of existing traffic in assessing the costs attributable to the development.

5.7.10 Road Phasing and Costs - Jonor Tengah: the very rapid build up of logging activities, followed immediately by clearance and crop planting, means that substantial savings can be made in road construction and user costs. These savings result from the use of the primary and secondary roads for the rapid and efficient transport of logs both to the proposed logging complex and processed products from the complex to the export markets of Johor Baharu and Singapore. These roads are then used to open up the freshly logged over areas for immediate development. For almost every area of timber this results in some lengths of primary and secondary road being constructed approximately 12 months earlier than would be required by the proposed agricultural development.

Figure 5.13.1 shows the dates by which the primary and secondary roads must be constructed if the recommended programmes for logging and development are to be realised. Failure to complete these roads by the dates indicated will prejudice the whole range of development opportunities which are the basis of the master planning proposals.

The critical section is the first extension of the FLDA Kulai road to the proposed new town site by the end of 1973. A major crossing of the Sayong will be needed by mid - 1973. This will require a bridge of approximately 150 feet length. Access to the bridging site and the new town area can also be obtained via the existing tracks through Frazer's estate to the north of Kulai. The proposed primary road should then be constructed as a continuous operation, using a road construction unit organisation capable of achieving a completion rate of approximately 15 miles of primary road per year.

A separate construction unit should be used to complete the secondary road development programme. The critical element of this programme is the completion of a 200 feet long bridge over the S. Johor (north of Bukit Besar) by the end of 1975.

Table 5.12.1 summarises the road construction requirements within the area for each year and estimates the likely costs to be incurred. Lime stabilisation has been assumed for primary and secondary roads. If crushed stone is used instead the road costs could be approximately 20 percent higher.

The following construction costs per mile were used (including design, supervision and administration). There were derived from an examination of the MGTS report, and discussions with JKR. The costs are given as single expenditure items; the value of the savings of staged construction proposed having been discounted in arriving at the costs used.

Improving existing roads - $150,000 per mile
New primary road - $400,000 per mile

JOHOR TENGAH

ROAD PHASING

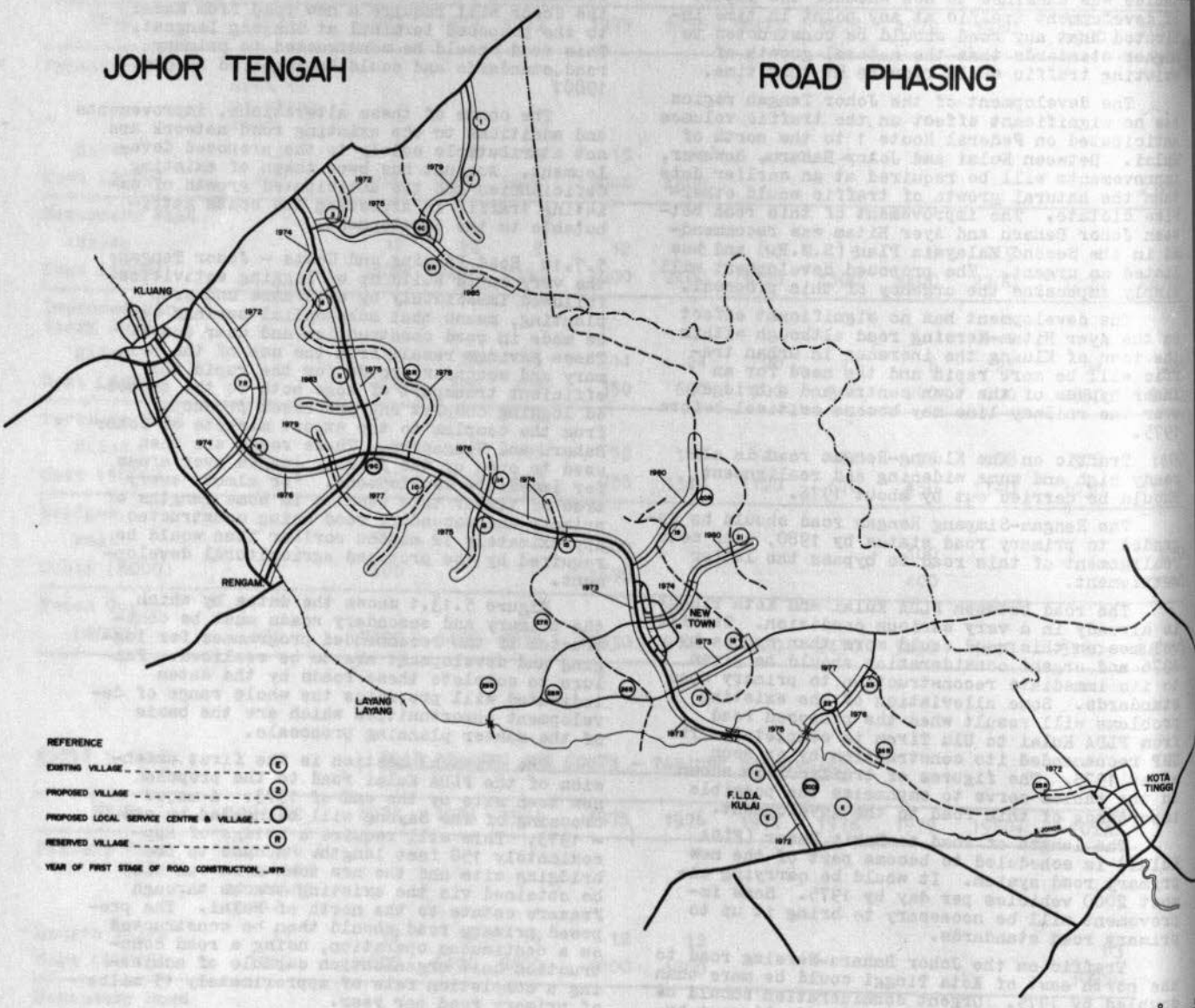
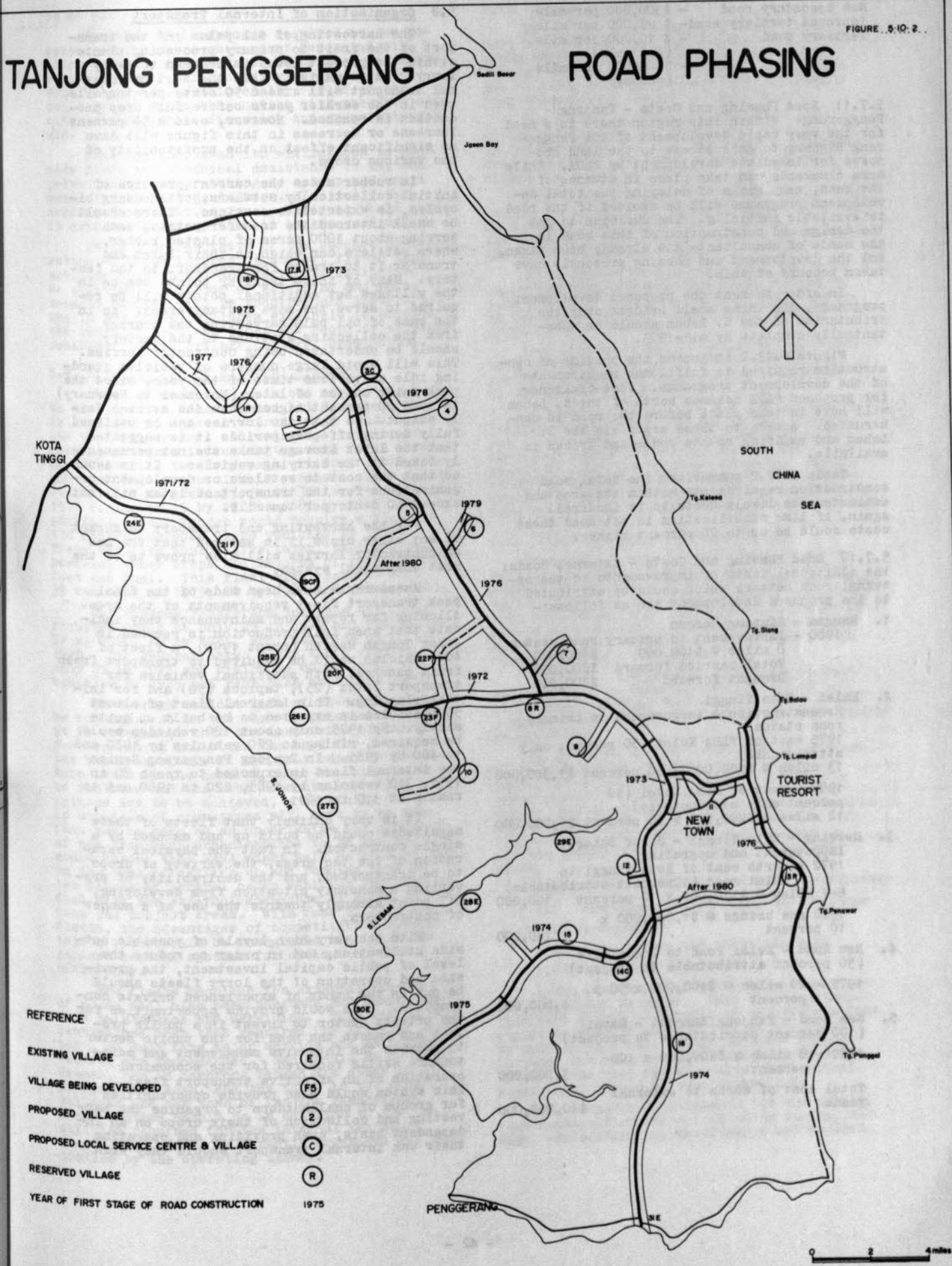


FIGURE 5:10:2

TANJONG PENGGERANG ROAD PHASING



New secondary road	- $300,000 per mile
Improved tertiary road	- $ 25,000 per mile
Tertiary road	- $ 10,000 per mile (oil palm)
	- $ 6,000 per mile (rubber)

5.7.11 Road Phasing and Costs - Tanjong Penggerang: within this region there is a need for the very rapid development of the Penggerang Highway to gain access to the land proposed for immediate development by FLDA. While some clearance can take place in advance of the road, many risks of delaying the total development programme will be avoided if the road is available initially. The decision to put the design and construction of this road in the hands of consultants has already been taken, and the development and phasing proposals have taken account of this.

In order to meet the proposed development programme, the three small bridges over the tributaries of the S. Lebam should be substantially complete by mid-1973.

Figure 5.13.2 indicates the phasing of construction required to fulfil the requirements of the development programme. Some clearance for proposed FLDA schemes north of the S. Lebam will have to take place before the road is constructed. Access to these areas via the S. Lebam and existing estate roads and tracks is available.

Table 5.12.2 summarises the total road construction requirements within the area and estimates the likely costs to be incurred. Again, if lime stabilisation is not used these costs could be up to 20 percent higher.

5.7.12 Road Phasing and Costs - External Roads: the additional costs of improvements to the external road network which could be attributed to the proposed development are as follows:-

1. Rengam - Simpang Rengam

1980 - Improvement to primary road status	
8 miles @ $100,000	$800,000
Total carried forward	$800,000
Brought forward	$800,000

2. Kulai - Kota Tinggi

Reconstruction & improvement to primary road status	
1975 east of FLDA Kulai (50 percent only attributable)	
13 miles @ $200,000 x 50 percent	$1,300,000
1980 - west of FLDA Kulai (50 percent only attributable)	
12 miles @ $200,000 x 50 percent	$1,200,000

3. Mersing - Kota Tinggi - Johor Baharu

Improvement and upgrading	
1972 - north east of Kota Tinggi to Kulai road (10percent attributable)	
6-7 miles @ $150,000 x 10 percent	100,000
1980 new bridge @ $1,000,000 x 10 percent	100,000

4. New Road - Kulai road to Johor port (50 percent attributable to project)

1975 - 20 miles @ $400,000 x 50 p percent	4,000,000

5. New Road - Tanjong Langsat - Masai (100 percent attributable to project)

1980 - 8 miles @ $400,000 x 100 percent	3,200,000
Total cost of works to external roads	$10,700,000

5.8 Organisation of Internal Transport

The harvesting of oil palms and the transport of the fruit to primary processing plants within the project areas is assumed to be by lorry. It is unlikely that the cost of internal transport will exceed 50 cents per ton/mile, even in the earlier years before full crop production is reached. However, even a 50 percent increase or decrease in this figure will have no significant effect on the profitability of the various crops.

In rubber areas the current practice of initial collection by settlers, often using bicycles, is expected to continue. There should be small intermediate transfer points, each serving about 1000 acres of planted rubber, where settlers can weigh in their latex and transfer it to trucks for transport to the factory. Many of these transfer points can be in the villages but additional points will be required to serve the more distant areas. As in the case of oil palm harvesting the journey from the collecting stations to the factory should be undertaken using contractor lorries. This will avoid large numbers of vehicles standing idle at various times of the year, since the peak daily output of latex (November to February) is some 30 percent higher than the average daily output. So that the lorries can be utilised fully during off-peak periods it is suggested that the latex storage tanks are not permanently fixed to the carrying vehicles. It is assumed that the cost to settlers or development organisations for the transport of latex will not exceed 50 cents per ton mile.

For the harvesting and transport to market of any other crops it is assumed that the use of contractor lorries will also prove to be the most economical system.

Assessments have been made of the final peak transport fleet requirements of the area. Allowing for repair and maintenance they indicate that when full production is reached in Johor Tengah Region (about 1990), a fleet of 400 vehicles would be required to transport fresh fruit bunches, with additional vehicles for transport latex (25), tapioca (50) and for initial planting. This internal fleet of almost 500 vehicles is expected to be built up quite slowly. By 1975 only about 120 vehicles would be required, rising to 220 vehicles by 1980 and to 400 by 1985. In Tanjong Penggerang Region the internal fleet is expected to reach 80 in 1975, 310 vehicles by 1985, 220 in 1980 and to remain at 310 in 1991.

It is very unlikely that fleets of these magnitudes could be built up and managed by a single contractor. In fact the physical separation of the two areas, the variety of crops to be transported, and the desirability of preventing a monopoly situation from developing, all point strongly towards the use of a number of contractors.

With the very high levels of possible outside utilisation, and in order to reduce the level of public capital investment, the provision and operation of the lorry fleets should be put in the hands of experienced private contractors. This would provide opportunities for the private sector to invest in a public project and remove the need for the public sector to provide the intensive management and maintenance skills required for the economical operation of an effective transport fleet. This system would also provide opportunities for groups of smallholders to organise the harvesting and collection of their crops on an independent basis, even providing and operating their own internal transport should they wish

to do so.

The size of investment required in new lorries and the extra employment generated will allow existing operators to be offered contracts with guaranteed volumes of transport over reasonable periods. Additionally, local groups could be set up in conjunction with the settlers, with initial public financial and organisational aid.

MARA has indicated its willingness to provide funds and technical assistance to any competent Malay group wishing to set up and run a small transport organisation. Initially the organisation would be run by MARA who would hand it over to the group when it became profitable.

It is a prerequisite of the successful operation of these internal transport fleets that adequate maintenance and servicing facilities be provided. A number of servicing and maintenance centres will be required and their siting in the central villages will help to broaden the range of jobs and widen the scope of services available to the new agricultural communities.

5.9 Organisation of External Transport

Vehicles carrying goods out of the two areas to the ports of Johor Baharu and Singapore can be expected to make an average of 2 round trips per vehicle per day. Allowing for repair and maintenance this indicates the need for a fleet of 100 lorries to carry palm oil from Johor Tengah once full production is reached. This fleet would build up gradually with 30 lorries only in 1975 rising to 45 by 1980 and 80 by 1985. In addition, Johor Tengah would require a fleet of 170 general purpose cargo vehicles by 1990. These vehicles would carry latex, tapioca, palm kernels, other crops and imports of fertilisers, food and fuel. This fleet might require only 35 vehicles in 1975, 80 by 1980 and 140 by 1985.

For Tanjong Penggerang the palm oil fleet required would be only 25 in 1975 and rising to 55 by 1980, 80 by 1985, and remaining at 80 in 1990. The general cargo fleet would require only 25 in 1975 and rising to 80 by 1980, 120 vehicles by 1985 and remaining at 120 in 1990.

An average vehicle life of seven years may be assumed. As in the case of internal transport it is recognised that the sheer size of the transport operation indicated the need for a contractor based service. If the full capacity for return loads in the general cargo vehicles is to be realised and the most economic operating conditions are to be achieved, a carefully drawn up schedule of operations will have to be made. This may be seen as an opportunity for a number of new transport organisations to be set up. It would appear that MARA might well be able to take on the task of setting up and running some of the fleets of general cargo vehicles required to deal with the external movements of goods to and from the project areas. With four of five major fleets, the advantages of competitive transportation rates could be integrated with well organised central systems for optimum operating efficiency.

The fleets required for external movement of goods will also need adequate and comprehensive maintenance and servicing. This can be more centralised than that required for internal transport, so only five major service and maintenance centres are recommended. Two should be in Johor Tengah, one in Sembrong Tengah the other in the proposed new town, and the three in the central villages and new town of Tanjong Penggerang. These centres should be in addition to the facilities required for the internal transport fleets, and should be directly organised and controlled by the operating agency.

5.10 Public Transport

Two levels of service for public transport are recommended. The first is direct express services on primary roads from Kluang through the new central villages of Johor Tengah to Johor Baharu, and from Tanjong Penggerang through Kota Tinggi to Johor Baharu.

The second will be by small buses providing a frequent inter-village service within the two project areas. It should be supplemented by small groups of taxis registered within the various villages.

It is probable that an agency such as MARA could, set up and run the network of buses that will be required within the two areas, as is the current practice in relation to large scale new land development schemes.

Steps should be taken to amend the existing regulations which forbid MARA services to pick up or set down passengers on those parts of the routes used by other public transport concessicnaires in Johor.

The smaller fleets of buses and taxis can initially be set up by MARA with control of operations and management passing ultimately to the settlers themselves.

Servicing, maintenance and administrative facilities should be provided at two centres, one in each area. These could be part of the centres required for commercial vehicles, and should be owned and operated by MARA. In time other facilities could be established independently for specialist servicing and maintenance work in the local central villages and new towns.

5.11 Plant and Manpower Requirements

In order to meet the requirements of the road construction programme up to 16 miles of primary and 12 miles of secondary road will need to be constructed per year in each region. This will require two road construction units in each region with detailed location, survey, design and supervision of primary and secondary road construction by consultants.

Initially the primary road route in each region should be investigated and marked out by a locator working with a small local group. A progress rate of up to 8 miles per month should be achieved.

Up to three survey teams will be required in each area, one of which could be used to survey the actual construction. Survey progress should be in the order of 3 miles per month. Design should be carried out using primary and secondary road design teams for each region. Each team should aim to achieve an average design rate of up to 1.5 miles per month.

Construction involves four main operations:-

(i) breaking out, clearing and drainage

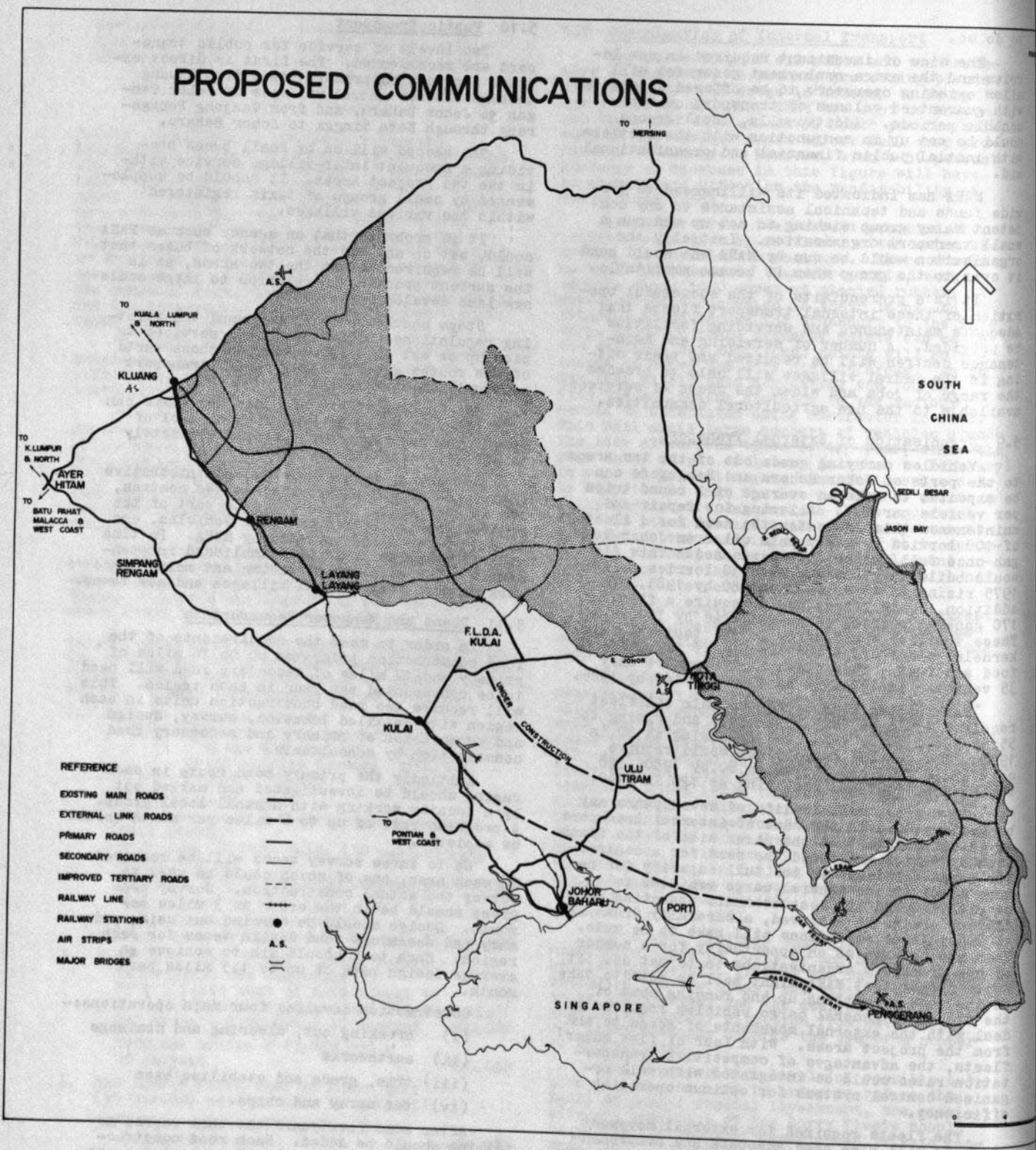
(ii) earthworks

(iii) trim, grade and stabilise base

(iv) tar spray and chips.

After some five years the base course metalling should be added. Each road construction unit should be capable of achieving a construction rate of about 1.3 miles per month. To achieve this rate a very delicate balance between the various activities must be maintained. The need for extensive professional supervision cannot be over-emphasised.

The manpower requirements for the primary road construction units (including survey, design, administration, maintenance and supervi-


PROPOSED COMMUNICATIONS
TO MERSING
A.S.
TO KUALA LUMPUR & NORTH
KLUANG
A.S.
TO K.LUMPUR & NORTH
AYER HITAM
TO BATU PAHAT MALACCA & WEST COAST
RENGAM
SIMPANG RENGAM
LAYANG LAYANG
F.L.D.A. KULAI
S. JOHOR
MOTA TINGGI
A.S.
UNDER CONSTRUCTION
KULAI
ULU TIRAM
TO PONTIAN & WEST COAST
JOHOR BAHARU
PORT
CAR FERRY
PASSENGER FERRY
SINGAPORE
R.A.F. PENGGERANG
SOUTH CHINA SEA
SEDILI BESAR
JASON BAY
S. SEDILI KECHIL
S. ERAS
REFERENCE
EXISTING MAIN ROADS
EXTERNAL LINK ROADS
PRIMARY ROADS
SECONDARY ROADS
IMPROVED TERTIARY ROADS
RAILWAY LINE
RAILWAY STATIONS
AIR STRIPS
A.S.
MAJOR BRIDGES

sion) should be of the following order.

4 Engineers

12 Assistant Engineers/Surveyors

4 Laboratory Assistants

400 Local personnel (10 percent staff, 40 percent skilled labour, 50 percent unskilled labour)

The minimum plant required by each unit could be:-

3 Bulldozers (1 angle dozer)

3 Self loading scrapers

2 Motor graders

2 Rotary hoes(a)

2 Four-wheeled tractors (a)

4 Water tankers with pressure sprays (a)

1 Grid iron roller (12 ton)

2 12-ton smooth wheeled rollers

1 6-ton smooth wheeled roller

1 Bitumen spray distributor

10 Trucks

2 Landrovers

(a) Items only required where lime stabilisation is used.

For secondary road construction units the plant and manpower requirements would be about 2/3 of those indicated for the primary units. These secondary road construction units should also be responsible for the construction of village and town roads.

5.12 Rail

The relatively short distances by road from the project regions to their main export/import and marketing centres (Johor Baharu and Singapore), together with the high costs of double handling, will render the large scale movement of goods from the project regions.uneconomical by train.

The proposed road system of the Johor Tengah region will, however, provide increased opportunities for both the existing and planned population of the region to enjoy a high level of accessibility to the passenger stations. This will facilitate social, work and pleasure trips to the major urban centres along the railway line.

In addition the proposed railway siding industrial site at Kluang should be reserved for developers who consider the volume and nature of their raw materials or produce suitable for transportation by rail.

5.13 Sea and Inland Waterways

The proposed Johor Baharu port together with the existing facilities at Singapore will provide adequate facilities for the potential imports and exports of the project regions. Ocean going vessels carrying bauxite from Southern Penggerang are expected to continue their present operations until the bauxite deposits are worked out.

Although improved water communications, unlike roads, are not a prerequisite for the development of the Project Area, it is desirable to improve access to services in Johor Baharu from Southern Penggerang. Appendix G describes the investigations carried out to establish the economic viability of a ferry service across the S. Johor. The provision of this service is recommended by 1980. The development of tourism may require an integrated bus and improved passenger ferry service between Singapore (Changi port) and Tanjong Penggerang at about the same time owing to the demand from visitors not using cars.

With the provision of the regions proposed road system and the car ferry the existing trend patterns by water acroqs the S. Johor and along the Lebam may be expected to decline in importance.

5.14 Air

A new airport is proposed for Johor Baharu by 1973. It will provide direct connections to other national and international destinations from the area of influence of Johor Baharu, including the project regions.

The existing military airstrip at Kluang could in the long term, be adapted for commercial use, and private facilities for pleasure flying and gliding could be provided there and within the proposed airport at Johor Baharu.

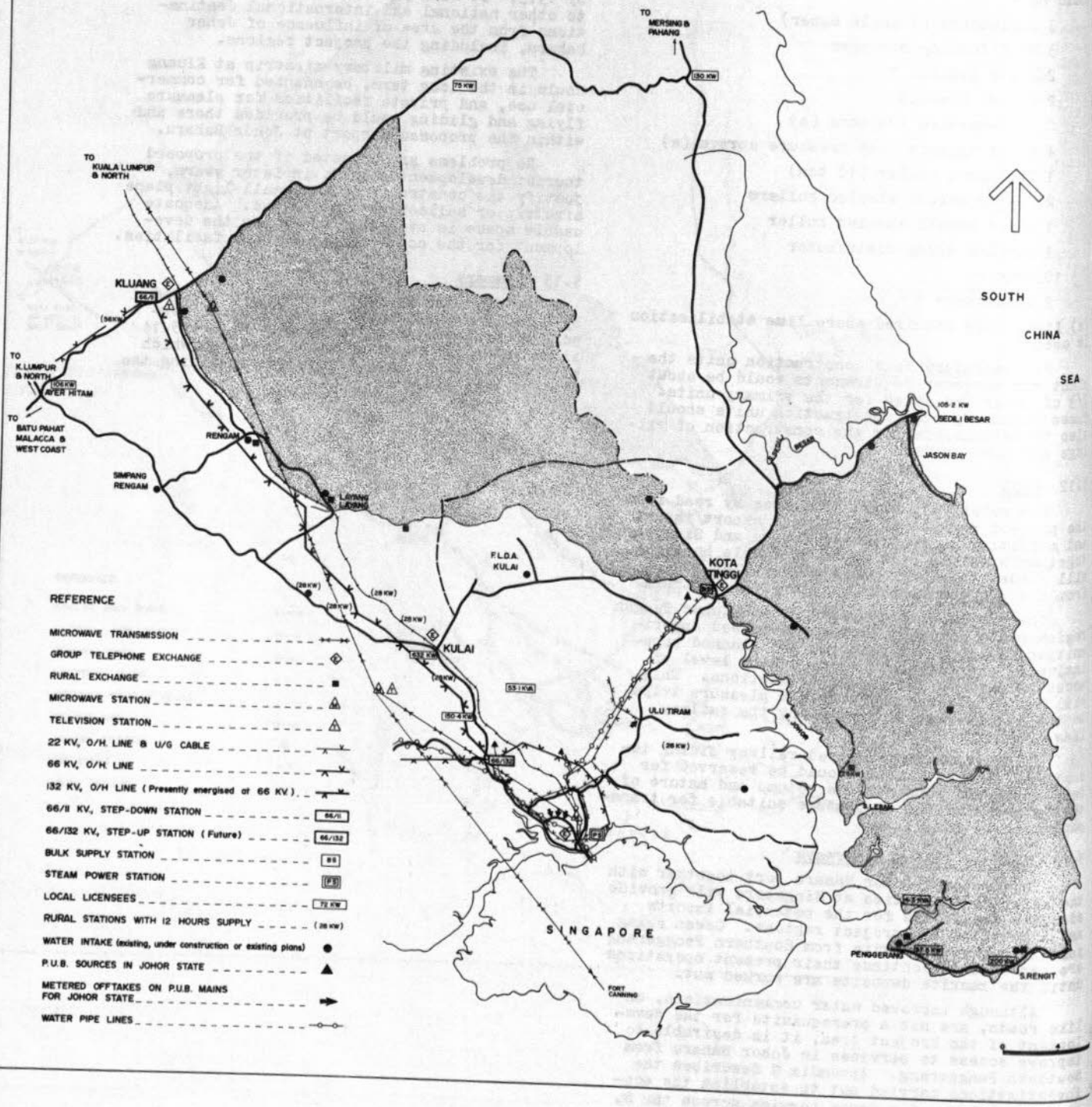
No problems are expected if the proposed tourist development should, in later years, justify the construction of a small light plane airstrip or helicopter landing pad. Adequate usable space is available adjoining the development for the construction of such facilities.

5.15 Summary

By 1991 the project area will be served by a fully comprehensive and integrated network of transportation services. Figure 5.14 illustrates the range of these services which will be available both within and adjoining the project regions.

FIGURE I

EXISTING PUBLIC UTILITIES



REFERENCE

- MICROWAVE TRANSMISSION
- GROUP TELEPHONE EXCHANGE
- RURAL EXCHANGE
- MICROWAVE STATION
- TELEVISION STATION
- 22 KV, O/H. LINE & U/G CABLE
- 66 KV, O/H. LINE
- 132 KV, O/H LINE (Presently energised at 66 KV.)
- 66/11 KV., STEP-DOWN STATION — 66/11
- 66/132 KV, STEP-UP STATION (Future) — 66/132
- BULK SUPPLY STATION — BS
- STEAM POWER STATION — PS
- LOCAL LICENSEES — 72 KW
- RURAL STATIONS WITH 12 HOURS SUPPLY — (28 KW)
- WATER INTAKE (existing, under construction or existing plans)
- P.U.B. SOURCES IN JOHOR STATE
- METERED OFFTAKES ON P.U.B. MAINS FOR JOHOR STATE
- WATER PIPE LINES

CHAPTER 6

PUBLIC SERVICES

6.1 Telecommunications

International and national telecommunication linkages from southern Johor are provided by the Singapore - Gunong Pulai - Gunong Lambak - Kuala Lumpur microwave transmission system.

The existing network of telephone and telegraph services operates from group exchanges at Johor Baharu, Kluang, Kulai and Kota Tinggi, and small rural exchanges at Rengam, Layang Layang, Tanjong Penggerang and S. Rengit. New small rural exchanges are planned or under construction at Pasir Raja, west of the FLDA Kulai Complex on the southern boundary of Johor Tengah, and Ayer Tawar V, Tanjong Lembam and Kangar Papan in Tanjong Penggerang.

The provision of modern telecommunication services in the project regions will be vital to their economic and social development. Public call boxes, lines to social administration units (schools, police stations, post offices, etc.) and to the offices of commercial enterprises will be required in each village. In towns, including the tourist resort, sufficient lines will need to be available for government agencies, industrial and commercial enterprises, and residential subscribers.

For planning purposes, it was assumed that initially each village and central village would require 5 telephone lines, and that an additional 20 lines would be necessary after 5 years. For each new town, initially 20 lines are required, with an additional 50 lines in the following 5 year periods. The medium rate of tourist development is likely to demand 50 lines by 1980 and an additional 100 lines in each further 5 year period.

The telecommunications Department have produced outline future regional networks, phased according to the proposed development programme. This system involves the gradual expansion of the main group exchanges at Kulai, Kluang, and Kota Tinggi, and the later development of new group exchanges in the two new towns. Rural automatic exchanges are proposed initially in the new towns and in the central villages. Inter exchange transmission will be by underground cable, or v.h.f. and u.h.f. radio as appropriate. For the five to ten miles served by each exchange local lines to subscribers will be on underground and overhead cables, according to local practicality and cost considerations.

Television transmission will be from the existing station at Gunong Pulai, near Johor Baharu.

6.2 Power

Part of a future national grid system exists in the 132 KV line from Johor Baharu power station to Kluang. This is energized to 66 KV at present. There is also a 22 KV link from Johor Baharu to Kota Tinggi, where supplementary power is produced from a bulk supply station. All other electricity supplies in and around the project region are by local oil generators.

Countryside consumption of electricity is rising rapidly. To meet this demand extended and new power stations, major new grid links, step down facilities and rural electrification programmes are under construction. For the foreseable future priority is likely to be given to major industrial and urban expansion areas. Thus it is probable that grid electricity will not be available in the project regions until the demand is sufficient to rank priority, and consumption is high enough to secure an adequate return on the investment. Investigations by the National Electricity Board (L.L.N.) showed that the capital cost of initially supplying all villages and towns with grid electricity would be nearly twice that of installing a series of local diesel generators. In addition, consumption could be very low in the early years of crop immaturity, relatively low incomes, smaller family sizes, and minimal social and commercial facilities. However, for tourist, town and industrial developments, and in time to meet the aspirations of the population, the availability of power, as well as lighting, in the regions will be essential.

Bulk power will be required for the timber and other industries in the Johor Tengah new town, and by the later years of the present decade an increase in the level of supply to Kota Tinggi will be required.

Therefore, it is proposed initially that local diesel generators should be installed in all villages, central villages, tourist development, and the Tanjong Penggerang new town, and that 66 KV links from the national grid should be constructed to Johor Tengah new town by 1974 and Kota Tinggi by 1978, with the necessary substations and high voltage cables.

Subsequently depending on the rate of tourist development, a 66 KV link from Kota Tinggi to Tanjong Penggerang new town should be installed. Based upon the medium estimates of growth, this would be in the period 1980-85. It is assumed the grid network will be gradually extended to serve all the villages, industries, and tourist development projects in the two regions between 1985 and 1990.

6.3 Water

The proposed supply system from the project regions to the various development schemes and to external areas have been described in Supporting Volume 3 and are shown in the diagram of proposed public utility services. The recommended supply system is to group the villages and new towns, and supply each group from separate intakes and treatment works. In Tanjong Penggerang, a small direct supply reservoir on in S. Lebam, may also be required at a later date. A new intake is recommended on the S. Johor for Kota Tinggi, and a small reservoir on the S. Kahang for the future requirements of Kluang.

Terminal storage tanks within each supply system are sited to command 1-3 villages, and the costs given (S.V. 3) for each scheme allow for the pipeline up to the perimeter of each village and town.

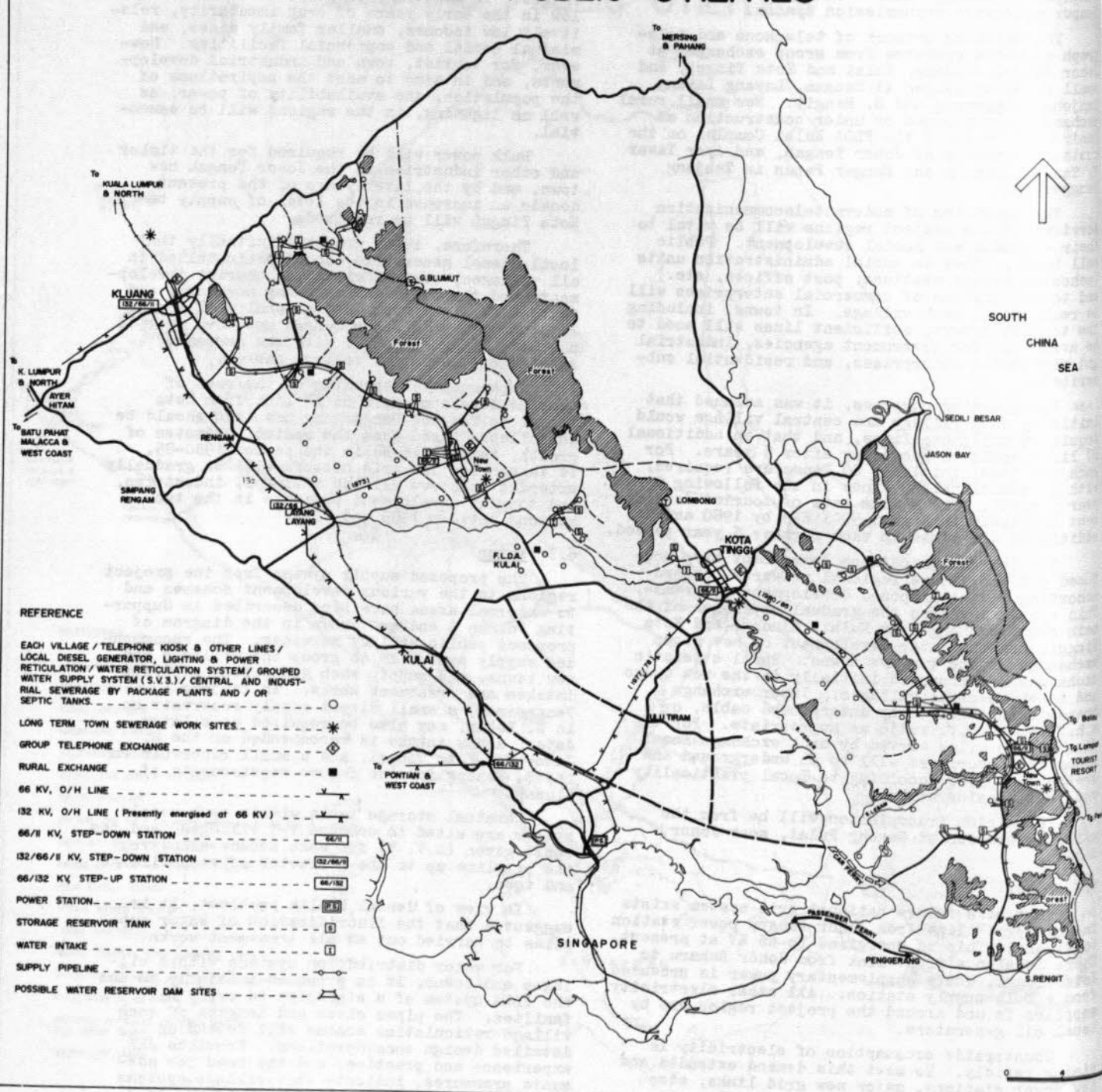
In view of dental health problems, it is suggested that the fluoridisation of water supplies be carried out at all treatment works.

For water distribution systems within villages and towns, it is proposed initially to use the FLDA system of a standpipe to every six families. The pipes sizes and lengths of each village reticulation scheme will depend on detailed design considerations. Previous JKR experience and practice, and the need for adequate pressures, indicate that village systems will require pipe networks from 8 inches to 3 inches, with up to 2 miles each of 6 inch, 4 inch and 3 inch pipe per village. Supplies for fire fighting in central and industrial areas require a minimum pipe size of 6 inches, with hydrants every 300 feet.

Depending on detailed design and topography, it may prove possible in certain situations to

FIGURE 1

PROPOSED PUBLIC UTILITIES



REFERENCE

EACH VILLAGE / TELEPHONE KIOSK & OTHER LINES / LOCAL DIESEL GENERATOR, LIGHTING & POWER RETICULATION / WATER RETICULATION SYSTEM / GROUPED WATER SUPPLY SYSTEM (S.V.S.) / CENTRAL AND INDUSTRIAL SEWERAGE BY PACKAGE PLANTS AND / OR SEPTIC TANKS. ○

LONG TERM TOWN SEWERAGE WORK SITES. ✱

GROUP TELEPHONE EXCHANGE ◈

RURAL EXCHANGE ■

66 KV, O/H LINE

132 KV, O/H LINE (Presently energised at 66 KV)

66/11 KV, STEP-DOWN STATION 66/11

132/66/11 KV, STEP-DOWN STATION 132/66/11

66/132 KV, STEP-UP STATION 66/132

POWER STATION PS

STORAGE RESERVOIR TANK S

WATER INTAKE I

SUPPLY PIPELINE

POSSIBLE WATER RESERVOIR DAM SITES

reduce the number of standpipes while maintain in the same degree of access. Those desiring and able to afford individual connections should pay for them.

6.4 Sewerage & Refuse

6.4.1 Introduction.

In the project regions, development will bring the risk of pollution not only of the streams supplying new developments within the regions, but also, in Johor Tengah, of south east Johor's major water supply catchments, streams and rivers (S.V. 3).

The proposed density of housing, the proposals given below, and the water intake points proposed, will in the early years of development avoid any large scale risk of pollution from domestic and ancillary sources. However, the number of industrial plants producing polluting wastes, for example oil palm and tapioca processing factories, will rapidly increase to a level where treatment will be required to render the water in the major rivers suitable for domestic consumption. It is far cheaper to treat such waste at source than to treat the water after intake for distribution.

In relation to the development of the Tanjong Penggerang coastal resort, it is essential that the present clear water and clean sand characteristics are not destroyed by the discharge of raw sewage directly into the sea.

While the Johor State Government has recently passed stringent anti-pollution legislation (Waters (Amendment) Enactment Bill 1971), at present there are few standards laid down for the quality of effluents from the various sources of pollution, and no regular programme of checking and control.

6.4.2 Industrial wastes.

The major industrial process resulting in pollution in the project regions in the first ten years is likely to be oil palm milling.

Oil palm mills use considerable quantities of water, and discharge large volumes of heavily polluted effluent. A 50 tons per hour mill at capacity production over 20 hours, will consume 300,000 gallons of water a day. S.V. 3 shows the quality of sample effluents from oil palm mills near the project regions. Considerable pollution from them has been observed already in the S. Johor.

To avoid the extensive contamination of water courses, many of which are important water supplies, the treatment of effluent at source is necessary for all oil palm mills, and other major industrial plants producing toxic or obnoxious effluents.

FLDA are already sponsoring research into possible methods and costs and the results of this work should be immediately implemented for developments in the Project Area. Applicable methods and costs are not at present available.

However, in the economic analysis and financial resource planning fields, preliminary cost estimates are required. The figures below are produced solely for this purpose, and will need to be revised, once the type of treatment process is decided, and costs obtained for initial schemes.

Based on United Kingdom and European costs, domestic sewerage works capital costs are generally between $50 and $100 per 100 gallons treated per day. Special trade waste costs are normally considerably higher. Despite lower construction costs in Malaysia, a figure of $200 per/gallons treated has been used because of the highly polluted quality of the effluent. This gives a total capital cost of $240,000 for a 40 ton per hour mill, and $300,000 for 50 tons per hour. Annual running costs are likely to be the order of $25,000.

Method used:

1) Water consumption = 300 gallons per ton.
2) Assumed discharge - 50 percent (steam used and losses)
3) 20 hours working per day.
4) Total daily discharge (T.D.D.) = $\frac{300}{2} \times \frac{20}{1} \times$ tons per hour
5) Capital Costs = TDD x $2
6) Running Costs = 10 percent of capital per annum.

Prospective developers must supply answers to questions on water consumption, industrial process, and form of effluent. Where appropriate conditions should then be attached to his permission to develop, to ensure that potentially obnoxious or dangerous wastes are not discharged into the land drainage pattern. For industrial users producing low quantities of waste, individual septic tank or package plant systems will generally be appropriate. For major water users producing polluted effluents, special larger treatment works will be required.

6.4.3 Tourism.

For each tourist development a comprehensive collection system could be required, with treatment by sewage works, package plant, or septic tank as appropriate for the scale and form of development.

6.4.4 Villages and towns.

The proposed villages and urban housing centres will require the standard pit latrine for house lots, and septic tanks or package plants for grouped higher density uses, e.g. the village centres and schools.

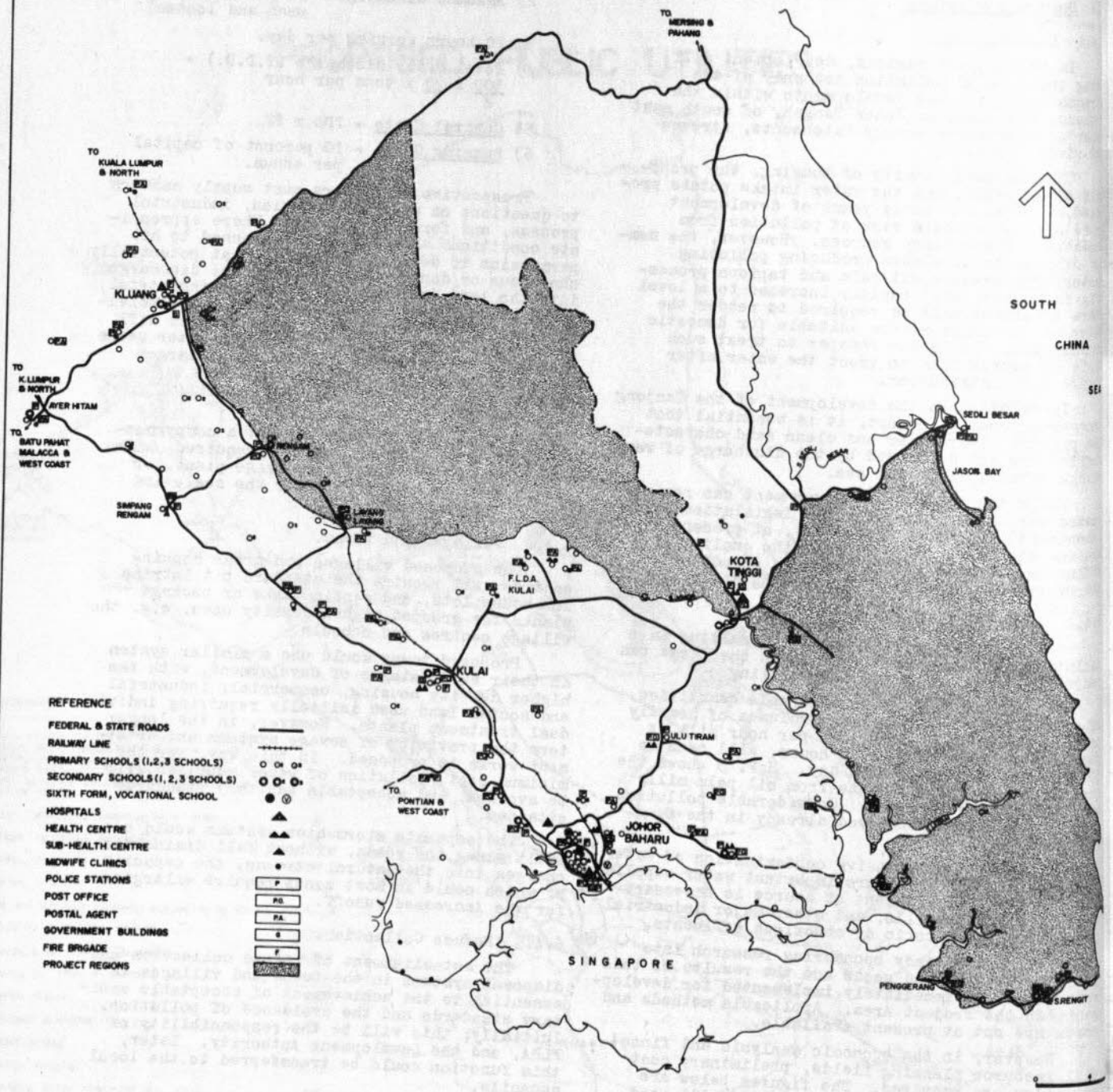
Proposed towns would use a similar system in their early stages of development, with the higher density housing, commercial, industrial and social land uses initially requiring individual treatment plants. However, in the longer term the provision of sewage systems and treatment works is proposed. In this way, for the minimum cost, pollution of water supplies will be avoided, and acceptable sanitary standards attained.

The separate stormwater systems would be built along the roads, without fall drains discharges into the natural streams, the capacity of which could in most cases require enlarging for the increased runoff.

6.4.5 Refuse Collection.

The establishment of refuse collection and disposal systems in the towns and villages is essential to the achievement of acceptable sanitary standards and the avoidance of pollution. Initially, this will be the responsibility of FLDA, and the Development Authority. Later, this function could be transferred to the local councils.

EXISTING SOCIAL FACILITIES



CHAPTER 7

SOCIAL SERVICES

7.1 Education

7.1.1 Introduction

The sociological studies undertaken as part of the project (S.V. 4) together with the government reports such as 'the Structure of Children and Youth in West Malaysia' have confirmed the strong demands for all levels of education, and the difficulties of providing adequate facilities in rural areas. The planning of educational facilities was thus identified as critical to the development of the project regions. Together with family income levels, inadequate communications and distance from schools, have been shown to be major functions of the high 'drop out' rates in rural areas and land development schemes.

7.1.2 Existing Facilities

The location of the existing schools in and around the project regions are shown on Fig. 7.1 and their present enrolment, number of classes and teachers, levels of education, and language mediums have been described (S.V. 4).

Although the existing schools in towns, villages and estates in and adjacent to the project areas are varied in type and size - primary, lower secondary, lower and upper secondary, secondary with sixth form, with and without 'Remove' classes, and of a series of language mediums, the schools are generally crowded, and will be inaccessible from the major new areas of development. Thus existing facilities cannot supply the educational needs of a large future population influx and growth in the project regions. Sixth form education is only available in Kluang, Kulai and Johor Baharu and secondary education in S. Rengit, Kota Tinggi, Kulai, Rengam, Kluang and Johor Baharu. Hostels for secondary school pupils existing in Johor Baharu and Kluang, and a new hostel is proposed in Kota Tinggi. New secondary schools in FLDA's schemes at Bukit Besar and Ayer Tawar are planned in the near future.

7.1.3 Planning Dates

A project paper 'Education and Project Planning' was produced (August 1970) identifying the need for projections from 1970-1990 for both existing and new areas, of household numbers, family size and population age structures. This paper used assumptions about attendance rates, examination achievement, sizes of classes, size of schools and sessions per day for each level of schooling, based on planning criteria derived from existing and probable future educational policies analysed in the project social services surveys (S.V. 4). Following discussions with the Johor Department of Education on the project paper, amended and revised planning assumptions were produced. These were then applied to the children of each age group per household projections, which were produced from analyses of a sample of FLDA applicants for migrants, the 1967 Socio-economic Survey, and for existing areas the preliminary field counts of the 1970 census.

The number of households introduced at each five year interval to each village, and subregion (Chapter 3) were then applied to the series of factors listed below, to give the children of each school age group, those likely to be attending school, the number of classes and classrooms required per annum for each level of schooling. The standard form used to correlate these elements is illustrated in Table 7.1 using Tanjong Penggerang new town an example.

Separate calculations were made as appropriate for existing settled areas, and these are given for the various types of school.

In planning the schools to be provided for the existing numbers of children throughout the two project regions, for each level of education, and each five year period, the economic provision of the appropriate range of facilities had to be balanced against accessibility factors, and the need for flexibility in incorporating possible future changes in education policies.

7.1.4 Conclusions

A standard six classroom primary school is proposed in each village, with sites reserved for extra classrooms or schools in the larger villages. Each initial school in the village should be completed when the first families move into the village. A series of twelve classroom primary schools are proposed in the two new towns, and in Kluang, Kota Tinggi, where they will supplement existing facilities. (Table 7.1&7.2)

Four types of large secondary schools are proposed. Large comprehensive schools of 20-30 classrooms with academic and technical streams in the upper school and sixth forms in the two new towns, Kluang and Kota Tinggi, where they will supplement existing facilities, and where the early provision of more extensive hostel accommodation is urgently required. Similar comprehensive schools for middle and upper schooling, but without sixth forms in the villages of Sembrong Tengah, Bukit Besar, Ayer Tawar II, Simpang Wa Ha, Sungei Sening, and Sungei Rengit; large lower secondary schools of 9-21 classrooms in Kahang Timor, Ulu Pengeli, Ayer Tawar V, Sedili Besar, Bukit Aping I and Sungei Mas; and comprehensive vocational schools for craft training of 16 and 17 years olds in Kluang (1974) and Kota Tinggi (1980). (Table 7.3)

In addition, it must be stressed that the attainment of an increasingly improved standard of secondary education in rural areas in general and the project regions in particular, and the development of the schools proposed is highly dependent upon the provision of good communications. The provision of subsidized school bus services for secondary education is recommended.

7.1.5 Planning Criteria

Children of each school age group per household: for new migrants, based on sample surveys of applicants to FLDA schemes it was assumed that the head of household age range would be from 20-34 years old, an average age of 27. (S.V.4)

The following years at school and age group assumptions for the four types of schooling were assumed:-

	Total Years	Approximate Age Group
Primary	6	7 - 12
Lower Secondary	3	13 - 15
Upper Secondary	2	16 & 17
Sixth Form	2	18 & 19

These gave the number of children of each age group per migrant household excluding wives at five year intervals from year of intake:-

	Year 1	Year 5	Year 10	Year 15
Primary	0.60	1.3	1.9	2.0

TABLE 7.1

CHILDREN OF SCHOOL AGE BY VILLAGE AND/OR SUBREGION

AREA: TANJONG PENGGERANG NEW TOWN.

SCHOOL AGE GROUP		PRIMARY								LOWER SECONDARY								UPPER SECONDARY								SIXTH FORM							
		Children per Household at period from intake				Total Children				Children per Household				Total Children				Children per Household				Total Children				Children per Household				Total Children			
YEARS		0-5	6-10	11-15	16-20	0-5	6-10	11-15	16-20	0-5	6-10	11-15	16-20	0-5	6-10	11-15	16-20	0-5	6-10	11-15	16-20	0-5	6-10	11-15	16-20	0-5	6-10	11-15	16-20	0-5	6-10	11-15	16-
PERIOD		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	
Intake Years	No. of H/hold																																
0-5	550	0.6	1.3	1.9	2.0	330	715	1045	1100	0.2	0.3	0.7	0.9	110	165	385	496	.01	.06	.20	.50	5.5	33	110	275	.01	.04	.15	.30	5.5	22	82.5	16
6-10	1750	-	0.6	1.3	1.9	-	1050	2275	3325	-	0.2	0.3	0.7	-	350	525	1225	-	.01	.06	.20	-	17.5	105	350	-	.01	.04	.15	-	17.5	70	24
11-15	2250	-	-	0.6	1.3	-	-	1530	3315	-	-	0.2	0.3	-	-	510	765	-	-	.01	.06	-	-	25.5	153	-	-	.01	.04	-	-	25.5	15
16-20	2450	-	-	-	0.6	-	-	-	1470	-	-	-	0.2	-	-	-	490	-	-	-	.01	-	-	-	24.5	-	-	-	.01	-	-	-	2
		TOTAL				330	1765	4850	9219					110	515	1420	2975					5.5	50.5	240.5	862.5					5.5	39.5	178	84

CHILDREN ATTENDING TYPES OF SCHOOL

PRIMARY								LOWER SECONDARY								UPPER SECONDARY								SIXTH FORM							
% Attendance				No. of Children				% Attendance				Numbers				% Attendance				Numbers				% Attendance				Numbers			
100	100	100	100	330	1765	4850	9219	60	70	80	90	66	361	1136	2678	30	40	50	60	1.65	20.2	120.5	481.5	3	4	5	6	.17	1.58	8.9	53

NUMBER OF CHILDREN PER ANNUM BY TYPE OF SCHOOL

6	6	6	6	55	294	808	1536	5	5	5	5	22	120	379	893	2	2	2	2	.83	10.1	60.2	240.8	2	2	2	2	.085	.79	4.45	16

NUMBER OF CLASSES BY TYPE OF SCHOOL

50	45	40	35	1.1	6.5	20.2	43.9	45	45	40	35	49	2.67	9.47	25.5	45	45	40	35	.018	.22	1.51	6.86	35	35	30	25	.002	.023	.148	.8

NUMBER OF CLASSROOMS BY TYPE OF SCHOOL

2	2	2	2	.55	3.25	10.1	21.96	2	2	2	2	.245	1.335	4.735	12.75	2	2	2	2	.009	.11	.76	3.44	4	4	4	4	.001	012	.074	.5

Lower Secondary	0.20	0.3	0.7	0.9
Upper Secondary	0.01	0.06	0.2	0.5
Sixth Form	0.01	0.04	0.15	0.3

The above factors were used for new developments while, for existing settled areas, the age of the average head of household was assumed to remain constant at 40, which for all periods of the plan gave 2 children per household of primary school age, 0.8 of secondary school, and 0.5 for both upper secondary and sixth forms.

7.1.6 Planning Criteria:Potential School Attendence

Based on existing attendance rates and assumed gradually increases in these and examination achievement, the following formula was derived for planning purposes.

	1975	1980	1985	1990
A. Primary	100	100	100	100
B. Lower Secondary	60%ofA	70%ofA	80%ofA	90%ofA
C. Upper Secondary	50%ofB	55%ofB	60%ofB	65%ofB
D. Sixth Form and other further education	10%ofC	10%ofC	10%ofC	10%ofC

On these assumptions, for each 100 children of each age group, the following attendance rates have to be planned for:-

	1975	1980	1985	1990
Primary	100	100	100	100
Lower Secondary	60	70	80	90
Upper Secondary	30	40	50	60
Sixth Form	3	4	5	6

7.1.7 Planning Criteria: Pupils per Class

Based on existing practice, policies, and objectives at state and national level, the following sizes of classes were assumed.

	1975	1980	1985	1990
Primary	50	45	40	35
Lower Secondary	45	45	40	35
Upper Secondary (all types)	45	45	40	35
Sixth Form	35	35	30	25

7.1.8 Planning Criteria: Numbers of classrooms, sessions by type of school

Based on existing practice, and the need for flexible use of facilities according to actual requirements in time, two sessions of schooling per day were planned for all schools, and the following range of number of classrooms per school.

	Normal	Minimum to Start	Notes
Primary	6 to 12	3	(a)
Lower Secondary	9+ (Unit) of 3to12	3	(b)(c)
Upper Secondary	8 to 14	2	(c)
Sixth Forms	4 to 6	2	(c)

Notes

(a) Half development of full school temporarily in small villages only.

(b) Single stream on same campus as primary school as temporary measure only.

(c) Normally attached together for comprehensive secondary schools.

7.1.9 Primary Education

The outcome of the projections for each town and village showed that either six or twelve classroom schools could be provided in each at an early date; and that while the facility in the smaller villages would not be used to capacity in first few years, by the time any village had been settled for 4 years, consideration would have to be given to adding extra classrooms or starting a second school. The examples of a range of villages planned to start in the first five years illustrate the extent of gradually expanding demand for primary education. Although villages to be developed in later phases will not exert their full demand within the period 1970-1990, reserves for later expansion will be necessary in their development.

Households in village	Years 0-5 P(1)	S(2)	6-10 P	S	11-15 P	S	16-20 P	S	e.g.
400 (380)	228	0.4	497	0.9	722	1.5	760	1.8	S.Sebol
500 (500)	300	0.5	650	1.2	950	2	1000	2.4	Bukit Adela
600 (610)	366	0.6	793	1.5	1159	2.4	1220	2.9	Pengeli Timor
700 (680)	408	0.7	880	1.7	1292	2.7	1360	3.3	S. Semenchu

Notes: (1) P= Pupils; (2) S= Schools of 6 classroom units.

As the children in the later plan phases have yet to be born, these estimates will require revision in the light of changes in settler selection criteria and the effects of family planning programmes for example. Therefore the estimates for the later periods of village development may be high. Accordingly the proposals involve slightly higher class sizes to those assumed above, in order to take these possibilities into account, and allow for a temporary bulge in demand 13 - 17 years from date of village intake.

The proposed 6 classroom primary schools to be developed, with date of commencement are given in tables 7.2 and 7.3. Where two schools are ultimately required in a village, wherever possible sites should be contiguous to allow for gradual expansion and joint use of facilities, ultimately developing into 12 classroom schools. A series of 6 and 12 classroom schools will be required in the new towns, Kluang and Kota Tinggi.

7.1.10 Lower Secondary Education (Appendix K)

At present a secondary school is normally only started where there is a demand for an eight classroom development. While for accessibility reasons it would be desirable to establish lower secondary schools in each village at an early date, the outcome of the projections showed that a development on this scale could be justified only at a very late stage at the village level. At the period when incomes are lowest (0 - 10 years from date of settlement) a single lower secondary school would have to serve groups of villages, resulting in the need for inter-village travel to school. The number of upper school and sixth form pupils is not high enough to affect this conclusion. In general, lower secondary schools should be developed in multiples of 3 classroom units, as this allows the full age range to attend school at any period of time.

Once the travel habit is established, the continuing use of transport to larger secondary schools with upper and sometimes sixth forms, and the consequential broader range of facilities - libraries, laboratories, playing fields, etc. in the periods when incomes are rising would appear to be justified. This would also assist in providing flexibility to new educational policies at this level with respect to specialisation, streaming, and vocational educa-

TABLE 7.2 TANJONG PENGGERANG

PRIMARY SCHOOL PROPOSALS : BASED ON STANDARD SIX CLASSROOM PRIMARY SCHOOL

Village or Town	Start	Schools to be built 1970+	1975+	1980+	1985+	Notes
Sungei Semenchu	1973	1	1			Sites to be large to allow for extra classrooms which may be required later (a)
Ayer Tawar I	1971	1	1R			First school either 3 classrooms or single session to start (b) Reserve site for possible second school, adjacent to first site (c)
Ayer Tawar II	1971	1	1			As (a)
Ayer Tawar III	1972	1				As (b)
Ayer Tawar IV	1973	1	-	1	-	(b)
Ayer Tawar V	1973	1	-	-	-	(a)(b)
Simpang Wa Ha	1977	-	1	1	1	(a)
Bukit Wa Ha	1977	-	1	1R		(b)(c)
Bukit Easter	1978	-	1	-	1	(a)
Lo Heng Barat	1979	-	1	-	-	(a)(b)
Lo Heng Timor	1981	-	-	1	1	(a)
Bukit Aping I	1972	1	1	-	-	(a)(c)
Bukit Aping II	1973	1	-	1	-	(b)
Sungei Mas	1974	1	1	-	-	(a)(c)
Papan Timor	1974	1	-	1R	-	(a)(b)(c)
Bandar Lebam	1975	1	2	7	11	(a)(b)(c)
Bukit Adela	1975	1	-	1R		(a)(b)(c)
Bukit Sening	1975	1	1	1R	-	(a)(c)
Bukit Tunggal	1976	-	1	-	-	(b)
Bukit Kledang	1976	-	1	1		(a)
Kota Tinggi	N.A.	1	1	2	2	Need to be balanced by education and planning departments in relation to existing accommodation.
TOTAL		14	15	18	15	62

TABLE 7.3 JOHOR TENGAH

PRIMARY SCHOOL PROPOSALS: BASED ON STANDARD SIX CLASSROOM PRIMARY SCHOOL.

Town or Village	Start	Schools to be built 1970+	1975+	1980+	1985+	Notes
Pengeli Timor	1974	1	-	1	1R	(b)(c)
Sungei Sebol	1975	-	1	-	-	(a)(b)
Bandar Tengah	1974	1	2	2	2	
Ulu Chenas	1979	-	1	-	-	(b)
Sungei Jengeli Barat	1984	-	-	1	-	(b)
Sungei Jengeli Timor	1985	-	-	-	1	(b)
Lubok Ajal	1978	-	1	-	1R	(b)(c)
Sungei Lebak	1979	-	1	-	1R	(b)(c)
P. Hijau	1985	-	-	-	1	Initial travel to central village.
Kahang Timor	1977	-	1	-	1R	(b)(c)
Sungei Yong	1980	-	-	1	-	(b)
Bukit Jelati	1982	-	-	1	1R	(a)(c)
Kahang Barat	1977	-	1	-	-	(a)(b)
Ulu Pengeli	1978	-	1	1	-	(a)
Batu Tong Kat	1979	-	1	-	1	(b)
Ulu Benitong	1980	-	-	1	1	(b)
Sembrong Tengah	1980	-	-	1	1R	(a)(c)
Sungei Sembrong	1982	-	-	1	-	(b)
Sembrong Kiri	1986	-	-	-	1	(b)
Kluang	N.A.	5	12	22	30	
TOTAL	-	8	22	33	41	104
TOTAL BOTH REGIONS	-	22	37	51	56	166

tion.

The outcome of the projections given provided the basis of planning the provision of these schools.

As well as extra schools in Kota Tinggi and Kluang, new schools are proposed in the two new towns, and in Johor Tengah at Kahang Timor, Ulu Pengeli, Sembrong Tengah and Bukit Besar, and in Tanjong Penggerang at Ayer Tawar II and V, Sedili Besar, Bukit Apping, Simpang Wa Ha, Sungei Mas and Sungei Sening, together with an extension to the existing school at S. Rengit.

In certain cases the school is proposed to start with 3 or 6 classrooms and the same campus as the local primary school, developing later to its full size (9 - 12 classrooms).

7.1.11 Upper Secondary (Appendix K)

This is the area of education most liable to changing policies in respect of vocational training, specialisation, streaming, etc. in the future. It is important that the educational proposals should be sufficiently flexible to accommodate these changes, and still be easily accessible from all parts of the area. Comprehensive secondary schools are proposed in each central village and new town. Each school will need to expand in stages.

7.1.12 Sixth Forms (Appendix K)

These should be added to Secondary Schools. Existing policy in that a sixth form should be established where more than 100 children in any area served have qualified for sixth form education. Two streams of two years of 25 pupils might be regarded as a reasonable number (100) of pupils, with preference for 150 - 200 pupil sixth forms. Only in the four towns are numbers of children of these orders from the towns and the areas around them likely to emerge.

7.1.13 Summary of Secondary Education proposals

These are given in Appendix K and Table 7.4.

7.4 SUMMARY : PROPOSED SECONDARY SCHOOLS

	Classrooms							
	Existing Equivalent	To be Constructed 1970+	1975+	1980+	1985+	TOTAL	Date of Start	Type of School and Explanatory Notes
JOHOR TENGAH								
Kluang	85	31	32	111	192	455	N.A.	Lower, Upper & Sixth forms (3)(4) all mediums vocational schools etc.
Kahang Timor	-				9	9	1985	Lower
Sembrong Tengah	-				13	13	1985	Lower & Upper
Ulu Pengeli	-			6	9	15	1980	Lower (1)
Bandar Tengah	-		9	15	18	42	1975	Lower, Upper & Sixth (2 schools)
Bukit Besar	-	9	11	4	6	30	1970	Lower & Upper (3)
TANJONG PENGGERANG								
Kota Tinggi	27	1	9	22	27	86	N.A.	Lower, Upper & Sixth forms (3)(4) all mediums vocational school, etc.
Ayer Tawar II	-	9	8	12	15	44	1973	Lower & Upper (2 schools)
Ayer Tawar V	-			12	9	21	1980	Lower
Bukit Aping	-	3	-	6	6	15	1974	Lower(1)
Sedili Besar	-			9	-	9	1980	Lower (3)
Simpang Wa Ha	-		8	6	22	36	1978	Lower & Upper
Sungei Mas	-			[6]	6	12	1980	Lower (2)
Bandar Lebam	-	6	5	14	37	62	1975	Lower, Upper & Sixth (2 schools)
Sungei Sening	-		[6]	3	20	29	1977	Lower & Upper (2)
Sungei Rengit	9	3	3	6	8	29	N.A.	Lower & Upper (3)

Notes

(1) Site to be adjacent to primary school.

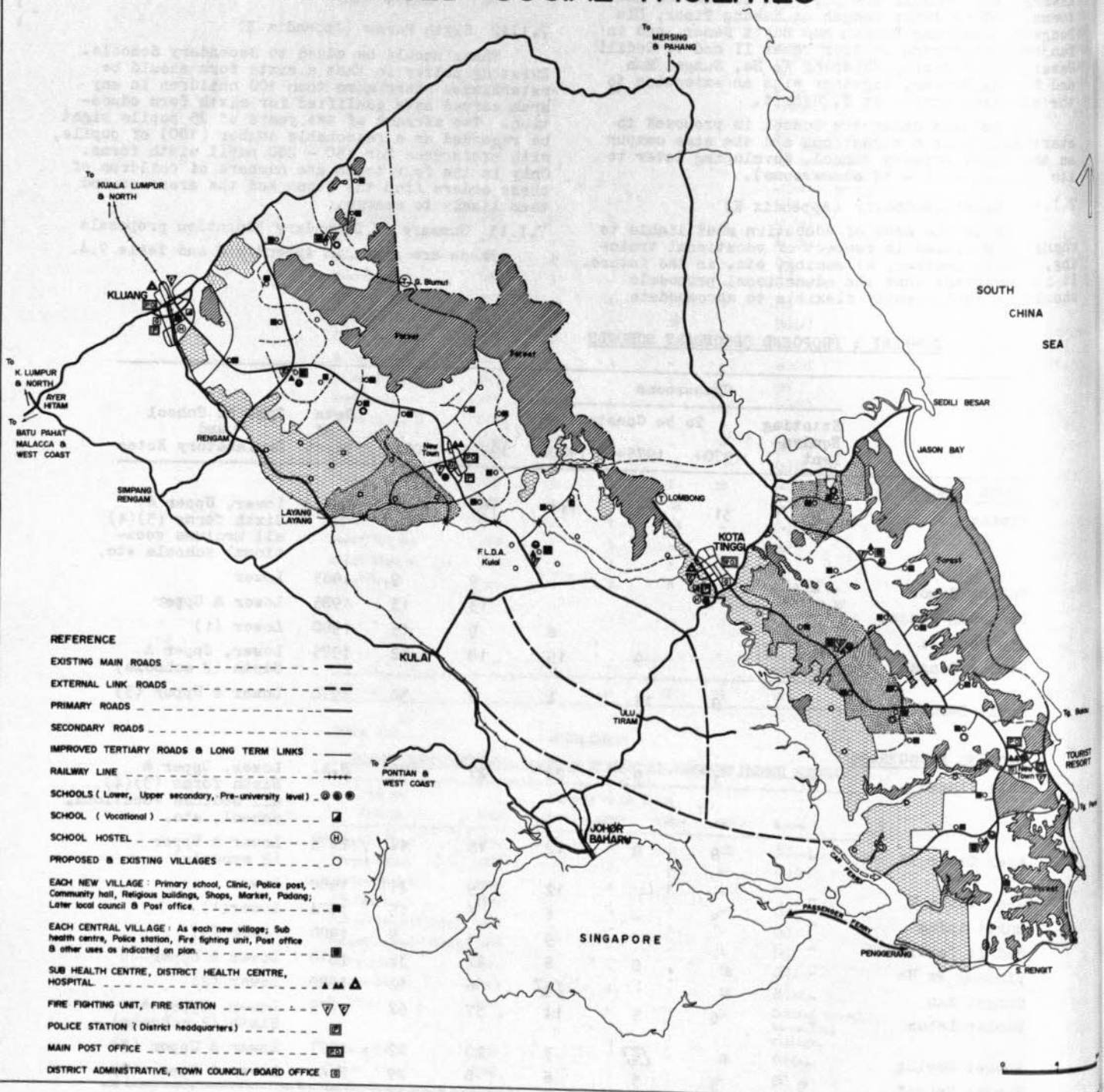
(2) Earlier building of an additional 12 classrooms at Bandar Lebam could enable these schools to start later at full 9 classrooms size.

(3) In and serving areas outside land development areas of master plan.

(4) Will require early and future re-appraisals in light of 1970 detailed census data, future educational policies, etc.

FIGURE 11

PROPOSED SOCIAL FACILITIES



7.2 Health Services

7.2.1 Existing Situation and Existing plans in the Project Area (S.V.4)

Tanjong Penggerang is part of the Kota Tinggi/Mersing Health District. There is a hospital at Kota Tinggi which is to be extended in the SMP period. There is a sub-health centre at Kota Tinggi which is to become a main health centre, and there is a sub-health centre at S. Rengit where sick bays are being built. There are also longer term plans to develop S. Ringit into a main health centre or sub-district hospital. No plans have yet been made for a sub-health centre for the Ayer Tawar complex. There are 3 clinics in the Tanjong Penggerang area and five new clinics are planned for the area in the SMP period.

The east side of Johor Tengah is in Kota Tinggi/Mersing Health District and the west side is in Kluang Health District. There is a hospital at Kluang which is to be extended under the SMP.

In Kluang District there is no main health centre but there are health sub-centres at Simpang Rengam and Paloh. A sub-health centre is underway at Bukit Besar in the FLDA Kulai complex. In Kluang District, there are 4 midwife clinics other than those attached to sub-health centres.

7.2.2 Rural health service criteria in West Malaysia.

These are described in detail (S.V.4), but can be summarised as follows. Expansion of the rural health services is in accordance with a formula contained in the Ministry's guidance manual "Organisation of Rural Health Services in Malaya" 1963. The formula is for rural health units to provide an administrative framework for a population of 50,000. Each rural health unit has consisted of;

1 Main health centre to serve as the administrative centre and to provide medical services for 10,000 people (including 1 midwife clinic);

4 Health sub-centres each serving a population of 10,000 (including 1 midwife clinic in each sub-centre); and 20 Midwife clinics-cum-quarters each serving a population of 2,000.

The provision of ancillary medical services, such as dental services, maternity and child welfare, family planning, public health services etc. is accommodated within these arrangements.

This general framework is now being reconsidered and one unit to 75,000 may be introduced or more radical changes may be made. Evaluation of the rural health services is being undertaken by a newly established Ministry Operations Research Unit advised by the Wordd Health Organisation (WHO).

New policies resulting from the WHO report will not be decided until after the completion of this project; the proposals in this section are therefore based on the existing criteria for health services. However, any revised health service criteria could be applied easily to the hierarchy of towns and villages proposed for the South East Johor regions.

7.2.3 Proposals for the South East Johor regions: Populations and areas served (Table 7.5)

	Population served (thousands)	Maximum Radii of service (miles)
Clinics in villages	2-4	½ - 1

TABLE 7.5 HEALTH SERVICE UNITS IN SOUTH EAST JOHOR - 1972-85

Unit/Location	Johor Tengah			Tanjong Penggerang			All South East Johor		
	To 1975	1975-1980	1980 Onwards	To 1975	1975-1980	1980 Onwards	To 1975	1975-1980	1980 Onwards
MAIN HEALTH CENTRES									
Kota Tinggi	1			In Progress			1		
Kluang			1(1)						1
New Town - JT						1(1)			1
New Town - TP									
TOTAL	1	-	1	-	-	1	1	-	2
SUB-HEALTH CENTRES									
Bukit Besar	In Progress						1		
New Town - JT	1(1)						1	2	
North JT		2		1			1		
Ayer Tawar II				1(1)			1		
New Town - TP				1			1		
Southern TP				1				1	
Northern TP					1				
TOTAL	1	2	-	4	1	-	5	3	-
Clinics (Exc. above)	3	13	8	5	10	-			

(1) The sub-health centres in the new towns would probably need to be upgraded by 1985.

(2) Excludes Bukit Besar sub-health centre and Kota Tinggi main health centre.

Sub-health centres in the central villages.	15 - 25	5 - 8
Main health centres in Kluang, Kota Tinggi and the two new towns	85 or more in 1985	up to 15 miles

7.2.4 Main health centres

Ultimately one will be required in Kluang, Kota Tinggi, and the two new towns. One is presently being developed in Kota Tinggi, and a further one should be developed before 1975 in Kluang. Sub-health centres should be developed in the new towns by 1975, being upgraded to main health centres by 1985.

7.2.5 Sub-health centres

There should be 3 sub-health centres in each of the two South East Johor regions. For Johor Tengah, one is already being built at Bukit Besar which would serve part of the region. By 1975 there should be a sub-health centre at the new town in Johor Tengah which by 1985 would be upgraded into a main health centre. By 1980, two more sub-centres should be operating in the two northern central villages.

A sub-health centre should be provided as soon as possible at Ayer Tawar II. By 1975, two sub-centres should be in operating in the southern part of Tanjong Penggerang, the first at S. Rengit and the second in the new town in the centre of the peninsula. The latter should be upgraded to a main centre by 1985. The northern part of Tanjong Penggerang will require another sub-health centre in about 1976/77, located in its central village.

7.2.6 Midwife clinics

In addition to the clinics required for the above sub-centres and main centres, additional facilities would be needed as shown in Table 7.5.

The clinics in Johor Tengah would include 20 for proposed villages, 2 for minor service centres, (excluding Bukit Besar), 2 for the major service centres of Kluang and the new town and 4 for the villages being developed. An additional 2 clinics might be needed for the reserve villages.

In Tanjong Penggerang, six clinics would be required for the villages being developed in Bukit Aping and Ayer Tawar (including Ayer Tawar II), eleven for the proposed villages, and a further three for the minor service centres, excluding Ayer Tawar II, but including the new town which would initially serve as a minor service centre.

7.2.7 Ancillary services and dental health

Assessments of malaria, family planning, malnutrition and recommendations are contained in S.V. 4.

It is also recommended that fluoridation should be extended to all water supplies in the project regions, S.V.3. There have been experiments in fluoridation in Johor State and the plan is to extend it throughout West Malaysia.

There is a serious shortage in Tanjong Penggerang of dental services, because of the lack of sub-health centres, difficult access and shortage of staff. The first two problems will be overcome by the implementation of the Master Plan.

7.3 Other Public and Social Services

7.3.1 Existing Facilities

The guidelines given in Supporting Volume 4 were derived from project studies of existing social services and future needs for the project regions in the context of national policies and plans. As well as the education, and health facilities described above, these studies covered employment, youth employment, children in need, reformatory services, public assistance, emergency relief, adult education, illiteracy, Bahasa Malaysia, home economics, vocational training, libraries, etc. Most of these services in and around the project area fall short of national objectives and or existing national ratios of facilities to population, and considerable attention to these problems will be necessary in the detailed planning and implementation of developments in the Project Area.

There are district administration and local government offices, post offices, fire and police stations in Kota Tinggi, Kluang and Johor Baharu at present, together with postal agents and police posts in the existing settled areas. While these provide a basis for the expansion of services to serve the large scale population influx and growth planned in the Project Area, they will not be capable of providing the services necessary in the future. In location, they are at the periphery of the development regions, and will be inaccessible to the majority of new population. In addition they have been developed in relation to the present demands of a dispersed rural population of less than 150,000. By 1990, the areas served by the centres including the project regions is likely to be in excess of 4 - 500,000; and by this time expectations in respect of most social services are likely to be far higher than they are today.

7.3.2 District administration offices

It is proposed that any changes to district boundaries and responsibilities for the Project Area should take place at the time of a reorganisation of local government within the State (S.V.9). However, depending on the speed and scale of land development, tourism, and population intake, by the 1980's offices will probably be required for the execution of district administration functions for southern Tanjong Penggerang and central Johor Tengah.

These functions include land administration, jurisdiction in magistrates' courts, and co-ordination of state government services such as irrigation and drainage, public works, forestry, agricultural extension and research, animal health, land surveys, social services, education and health, cooperative development, religious affairs and local government.

To supplement the existing offices in Kota Tinggi, Kluang, and Johor Bahru, new offices for the efficient execution of these functions will ultimately be required in the two new towns.

7.3.3 Welfare and employment

As the population increases, additional district welfare offices will be required in Kota Tinggi, Kluang and the two new towns, together with sub-employment offices according to the job opportunities being developed.

7.3.4 Community development

Community halls are proposed in each village and in the towns. These will provide facilities for libraries and various forms of further education, together with a centre for local meetings and social activities, and an initial base for village and town council offices and meetings. In addition the joint use of schools for social activities, further education and recreation should be encouraged.

7.3.5 Local council offices

While the form of local councils in the future will depend upon policy decisions following the Royal Commission into Local Government, it is expected that local councils will be formed in each of the villages and that in time the town councils and town boards will develop. These councils will be advised by the district offices. They will be concerned with the provision and maintenance of local services and facilities. While initially, a base could be provided by the occasional use of schools and community halls, in time offices will be required for the execution of their business.

Office space will be required in the two new towns of 4-5000 sq. ft. and in the villages and central villages of 1000 - 1500 square feet. It is assumed that these will be developed in the fifth year from the start of each settlement.

7.3.6 Postal services

There are three levels of post office being developed in the state. There are main post offices in Johor Baharu and Muar, and a third is planned in Kluang in the next few years. A district post office has recently been completed in Kota Tinggi. Post offices are usually established where 3000 or more people can be commercially served. At present, the only one in the Project Area is at Penggerang. In outlying areas, these offices are at present supplemented by a system of postal agents and mobile units. For initial services to newly developed areas the Post Office is progressively expanding the mobile unit service as this bring a full range of facilities to each settlement.

By 1990, the population within the project regions is expected to require the expansion of the district office in Kota Tinggi to the level of a main post office, and the creation of district post offices in the two new towns.

Post offices are proposed initially in each central village, with a reserve site in each village for later development. A team of three mobile units in Johor Tengah and five in Tanjong Penggerang are proposed for the first 10 to 12 years. As vehicle life is likely to be about six years, this will require the purchase of five vehicles in 1973 and five in 1978.

7.3.7 Police services

The provision of services related to the need to protect life and property. A rigid formula is not used nationally because of differing local physical and social characteristics. The police headquarters of the state are in Johor Baharu. There are district headquarter stations serving the project regions in Kluang and Kota Tinggi. By 1985, new district headquarter stations are assumed for the two new towns.

In the meantime, class A police stations are proposed in the new towns, class B police station in the central villages and police posts in each village.

The facilities should be developed in the first year of settlement.

7.3.8 Fire services

Fire protection services are state and local government responsibilities. At present while there are fire stations in Kota Tinggi, Kluang, and Kulai, the vehicles are at the end of their economic life, and in urgent need of replacement. The Johor State Fire Officer considers the number of vehicles, staff and existing premises are inadequate for the requirements of the Project Area.

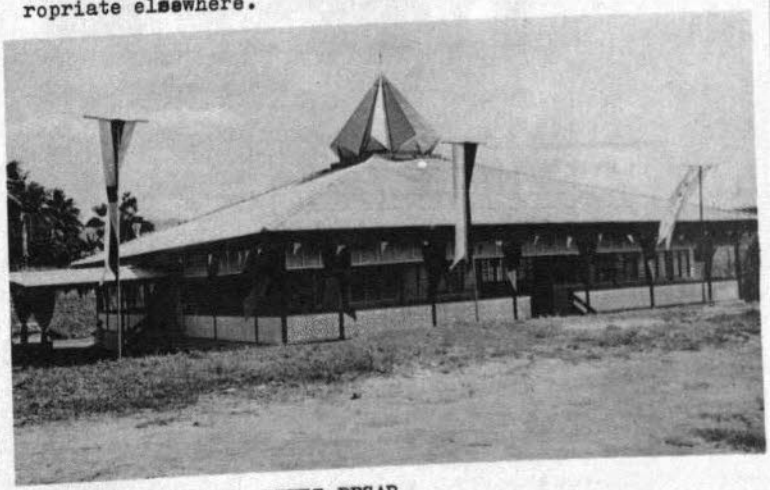
There are no services available in the villages, estates and FLDA schemes in and around the project regions.

No fire protection is proposed for housing areas of the villages and towns. The costs of increasing the water reticulation network and storage to give adequate flows would be very high; as the incidence of domestic fires in new villages is extremely rare, and the houses will be well separated from each other.

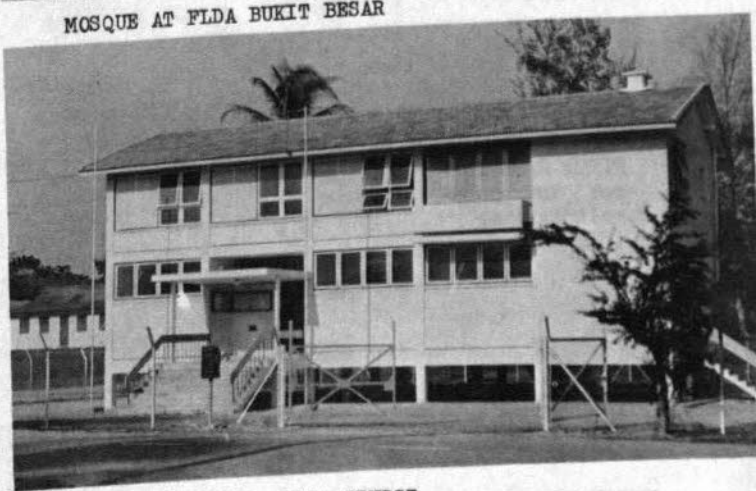
However in the central and industrial areas where the risk of major losses through fire is far higher, the water reticulation system should include hydrants at 300' intervals on pipes of a minimum diameter of 6 inches. The 24 hour storage for grouped villages is likely to prove adequate for fire fighting purposes, as long as pipe diameters from the storage reservoir to the hydrants are sufficient to maintain flows. Major economics will be obtained in designing the village layout and reticulation network by linking the central and industrial areas closely to the main supply from the storage reservoir.

The main risks of fire and major possible losses appear to be in the agricultural areas, in dry periods. Fires resulting in these circumstances can only economically be dealt with by beating. Training in rudimentary fire fighting techniques and fire prevention measures should be given to residents of the new towns and villages.

Fire stations are proposed in the master villages and new towns. Two/three engine units are proposed in Kluang, Kota Tinggi and the new towns, while single engine units will be appropriate elsewhere.



MOSQUE AT FLDA BUKIT BESAR



POST OFFICE - KOTA TINGGI

CHAPTER 8

Investment in Settlements, Communications and Services

8.1 Introduction

The capital costs for settlements, communications and services described in this chapter are provided for two main purposes. Firstly for the budgetary requirements of the various public bodies likely to be involved in the development of the Project Areas, and secondly to provide essential input information for the cost benefit and rate of return studies both for the project as a whole, and for major schemes within the Master Plan.

The related running and maintenance costs are given where appropriate in the financial analyses of Supporting Volume 11, and Chapter 10 of the Master Plan Volume.

The chapter describes only the capital investment costs for public works including any associated costs, for example police and school housing in the project regions. It does not give the capital costs described elsewhere in the regional development plan; for example, the water supply, forestry, and tourism costs given in Supporting Volumes 3, 5, and 7 together with their associated development costs for such items as housing, harvesting roads, and offices.

To assist in the financial planning of each village and town unit capital costs for each type of settlement are given in 8.4 for items such as shops, banks, and housing. These are not directly involved in either the financial analysis, or public budgetary allocations, as they are not necessary initial public costs. For example, the development of shops will arise through demand, and will be financed by the expenditure of money earned in the project regions. While their provision is a integral part of the development programme, they, unlike public services, should be self financing, and not incur a demand for Government investment which does not secure a financial return. Alternatively certain costs, for example housing, have already been taken into account in the agricultural and tourist analyses.

8.2 Capital Costs Used

The costs for schools, health facilities, government offices, post offices, police stations, and fire fighting are listed under each heading, below and not included in the village development costs given. For roads, the village and town roads are given separately from the regional road systems. The building costs include all costs for furniture, fixtures and fittings and power, water and sewerage, works on site.

TABLE 8.1 Roads

Item	Unit	Cost per Unit $	Sources
Primary roads	1 mile	400,000	MGTS/JKR/RRL
Secondary roads	"	300,000	MGTS/JKR/RRL
Improved harvesting	"	25,000	JKR/FLDA/TAMS
Village & town distribution	"	45,000	JKR
Local access roads	"	20,000	JKR/FLDA
Industry & central areas	"	300,000	
Improving existing Primary roads		150,000	MGTS/JKR

TABLE 8.2 Village & town roads:

Households per Settlement	Cost Thousands Dollars	Sources
350	165	Project test layouts, JKR & FLDA
400	180	"
500	210	"
600	240	"
700	270	"
Town roads: each additional 100 households	40	

TABLE 8.3 Village and town water reticulation

Households per Settlement	Cost Thousands Dollars	Sources
-350	80	JKR, & Project test layouts
400	90	"
500	100	"
600	110	"
700	120	"
New town & village water reticulation: first 500 households	150	
Each additional 100 households	10	
Tourist development: first 100 bedspaces	25	
Each addition 100 bedspaces	5	

\+ Industry: included in village and new town supply and reticulation costs.

TABLE 8.4 Village development costs

Item: Each Village	Cost $	Year	Sources
Community centre	20,000	1	FLDA, JKR, Project studies
Landscaping, padang, market place & other public works	40,000	1	"
Religious buildings	40,000	1	"
Total	100,000		
Contingencies at 15 percent say	115,000		
Central villages and new town development costs			
Community centre	20,000	1	FLDA, JKR, Project studies
Landscaping, market place, padang & other public works	55,000	1	"
Religious buildings	55,000	1	"
Total	130,000		
Contingencies at 15 percent say	150,000		

TABLE 8.5 Telecommunications

	Item	Cost	Notes
1.	Rural automatic exchange (RAX) in new towns & tourist resort in Tanjong Penggerang (60, lines)	600,000$	Includes buildings, siteworks trunk links, equipment, and distribution network.
2.	RAX central village (60 lines)	225,000$	"
3.	RAX central village (30 lines)	220,000$	"
4.	New group exchange	600,000$	All equipment, siteworks & buildings excluding distribution network.
5.	New group exchange Kota Tinggi (increase pop. 150 to 600 lines)	1,500,000$	As 1, 2, & 3.
6.	New group exchange Kluang (increase from 720 - 3000 lines)	3,800,000$	"
7.	Additional exchange capacity	10,000$	30 lines
8.	Telephone routes (new)	5,000$ per mile	
9.	Additional lines	2,000$ per mile	
10.	Call box & equipment	1,000$ each	

All costs supplied by the Department of Post and Telecommunications Office, Johor Baharu.

TABLE 8.6 Power

	Item	Unit	Cost	Sources and Notes
1.	Local diesel generation			
1.1	Tanjong Penggerang	1 village or central village	320,000$	LLN (National Electricity Board)
1.1.2		New town & tourist resort	2,181,000$	"
1.2	Johor Tengah	1 village or central village	281,000$	"
2.	Bulk Supply			
2.1	Tanjong Penggerang			
2.1.1	Water bulk supply to tourist resort new town from K.T.	30 miles 66KV transmission line, 2(66/77) substations H.V. cables etc.	3,200,000$	"
2.2.2	Bulk supply to Kota Tinggi to 66KV	30 miles 66KV transmission line, substations H.V. cables, etc.	3,300,000$	"
2.1.3	Ultimate bulk supply to all after completion of 1.1, 2.1.1, & 1.3	All additional lines, cables substations, etc.	3,800,000$	"
2.2.1	Bulk supply to new town factories and central uses, etc.	15 miles of 66 KV transmission line, 2(66/77) substations and associated H.V. cables, etc.	2,900,000$	"
2.2.2	Ultimate bulk supply to all villages, after completion of 1.2 & 1.2.1	All additional lines, cables substations, etc.	4,800,000$	"

TABLE 8.7 Capital costs for educational facilities

In Land development areas:

Primary schools in land development areas (including accommodation for teachers)

Classrooms	6	325,000$
	12	600,000$

Additional classrooms and housing 30,000$ each.

Primary schools outside land development areas

Classrooms	6	165,000$
	12	300,000$
Addition =	10,000$	

Lower secondary including accommodation of teachers

Classrooms	9	540,000$
Additional classrooms & housing		33,500$

Lower & upper secondary including accommodation

Classrooms	9	660,000$
Classrooms	18	1,200,000$
Additional classrooms & housing		36,000$

In towns, outside land development areas:

Lower secondary excluding accommodation for teachers

Classrooms	9	310,000$ (Maximum 15 classrooms) (15 acre sites)
Additional classrooms		11,500$

Lower & upper including accommodation for teachers

Classrooms	9	372,000$
Classrooms	18	590,000$
Additional classrooms		13,000$

These costs include all special teaching rooms (laboratories, arts rooms etc., all services on site, all equipment and furniture, all external works, etc,) and are based on information supplied by the Ministry of Education, the Johor Department of Education, and the Asian Regional Institute of School Building Research study of utilization, design and cost of secondary schools in Malaysia.

TABLE 8.8 Health

Item	Unit	Cost per Unit	Sources and Notes
Clinic	1	$ 16,000	JKR, Ministry of Health
Health sub centre	1	$155,000	"
Main health centre	1	$350,000	"
Upgrading sub to main health centre	1	$200,000	"

TABLE 8.9 Government offices

Item	Unit	Cost per Unit	Sources and Notes
Local council office	1000Sq.ft	$ 10,000	JKR, Jengka Report (TAMS-HUNTINGS 1967)
Local central village	1500Sq.ft	$ 15,000	"
Town council offices	5000Sq.ft	$ 50,000	"
District offices including quarters sites	50000Sq.ft	$900,000	"

TABLE 8.10 Police stations

Item	Unit	Cost per Unit	Sources and Notes
Police post	1	$ 21,000	JKR, Royal Malaysian Constabulary
Police station type A	1	$ 80,000	"
Police station type B	1	$ 60,000	"
District police stations	1	$280,000	"

TABLE 8.11 Post office

Item	Cost per Unit	Sources and Notes
Rural post office	$ 50,000	JKR, Department of Post & Telecommunications
District post offices	$ 70,000	"
Main post offices	$450,000	"
Mobile units	$ 7,000	"

TABLE 8.12 Fire services

Item	Unit	Cost per Unit	Sources and Notes
Fire engines	1	$40,000	Johor State Fire Officer (10 years life)
Fire stations & housing ancillaries & equipment	1 engine	$70,000	"
Fire hydrants & design of adequate flows in water supply and distribution networks	1 village	$20,000	Assumed from project studies & JKR costs in Johor
	1 central village	$30,000	

8.3 Capital Investment Requirements

From the unit costs given above to phased capital investment programmes for 1971 - 1990 annually, and for 1981 - 1990 in five year periods have been produced. These are subdivided into three areas; the project land development areas; other places in and close to the project regions: Kluang, Kota Tinggi, Sedili Besar, S. Rengit, and FLDA's schemes at Ayer Tawar, Bukit Aping and Bukit Besar as appropriate.

8.4 Other Capital Costs

Other capital costs are given in Appendix M which whilst they are not initially involved in the settlement, communication and services development costs. However, they have either been used in certain feasibility studies - e.g. the FLDA programme in the project regions or the initial tourist project, or they may be required in the implementation process, e.g. costs of shops and banks.

TABLE 8.3.1 ROAD SYSTEM CAPITAL CONSTRUCTION COSTS IN THOUSANDS DOLLARS 1970-1990 TANJONG PENGGERANG AND JOHOR TENGAH
(EXCLUDING VILLAGE, TOWN, AGRICULTURAL ROADS)

		1971 - 1975						1976 - 1980						1981 To	1986 To	TOTAL 1970 -
		71	72	73	74	75	Total	76	77	78	79	80	Total	1986	1990	1990
Tanjong Penggerang	Primary roads	3750	4800	6400	6400	4800	26150	4800					4800	-	-	30950
	Secondary	900	3600	2400	600	2700	10200	1800	1200	900	900	1500	6300	1500	-	18000
	Improved tertiary	275	475	500	550	525	2325	550	275	400	400	50	1675	-	-	4000
	Bridges			600			600						-	-	-	600
	Car ferry											3600	3600	900	900	5400
	Total	4925	8875	9900	7550	8025	39275	7150	1475	1300	1300	5150	16375	2400	900	58950
Johor Tengah	Primary		2050	4800	5600	6000	18450	4800					4800	-	-	23250
	Secondary		3600	3600	2700	3600	13500	2400	3000	1500	2400	2700	12000	1200	-	26700
	Improved tertiary		400	325	375	350	1450	600	500	300	200	600	2200	1350	-	5000
	Bridges		600			1600	2200				400		400	-	-	2600
	Total		6650	8725	8675	11550	35600	7800	3500	1800	3000	3300	19400	2550	-	57550
Both regions total																
Cost of external roads & improvements attributable to project regions		-	100	-	-	5300	5400	-	-	-	-	3200	3200	1300	-	9900
TOTAL		4925	15625	18625	16225	24875	80275	14950	4975	3100	4300	11650	38975	6250	900	126400

TABLE 8.3.2 VILLAGE AND TOWN ROADS CAPITAL CONSTRUCTION COSTS IN THOUSANDS DOLLARS 1970-1990 TANJONG PENGGERANG & JOHOR TENGAH

		1971 - 1975						1976 - 1980						1981 To	1986 To	TOTAL 1970 -
		71	72	73	74	75	Total	76	77	78	79	80	Total	1985	1990	1990
1.	Initial costs															
1.1	FLDA Ayer Tawar + Bukit Aping (7 villages)	450	450	630			1530						-	-	-	1530
1.2	Tanjong Penggerang (13 villages + towns)			270	480	720	1470	420	480	240	165	-	1305	270	-	3045
1.3	Johor Tengah (19 villages + towns)				510	180	690	-	420	450	615	660	2145	815	180	3830
1.4	Total initial costs	450	450	900	990	900	3690	420	900	690	780	660	3450	1085	180	8405
1.5	Total project land development initial costs			270	990	900	2160	420	900	690	780	660	3450	1085	180	6875
2.	Expansion costs															
2.1	Kluang	400	400	400	400	400	2000	400	400	400	400	400	2000	2000	2000	8000
2.2	Kota Tinggi	40	40	40	40	40	200	40	40	40	40	40	200	200	200	800
2.3	Bandar Lebam (Tanjong Penggerang)							120	120	120	160	180	700	1020	980	2700
2.4	Bandar Tengah (Johor Tengah)							-	20	20	20	20	80	180	160	420
2.5	Total expansion costs	440	440	440	440	440	2200	560	580	580	620	640	2980	3400	3340	11920
2.6	Total project land development expansion costs							120	140	140	180	200	780	1200	1140	3120
3.	Total all costs	Grand total	890	890	1340	1430	1340	5890	980	1480	1270	1400	1300	6430	4485	3520	20325
3.1	Tanjong Penggerang				270	480	720	1470	540	600	360	325	180	2005	1290	980	5745
3.2	Johor Tengah					510	180	690	-	440	470	635	680	2225	995	340	4250
3.3	All project land development				270	990	900	2160	540	1040	830	960	860	4230	2285	1320	9995

TABLE 8.3.3 VILLAGE & TOWN - WATER RETICULATION CAPITAL CONSTRUCTION COSTS IN THOUSANDS DOLLARS 1970-1990 TG. PENGGERANG & JOHOR TENGAH

		1971 - 1975						1976 - 1985						1981 To	1986 To	TOTAL 1970 -
		71	72	73	74	75	Total	76	77	78	79	80	Total	1985	1990	1990
1.	Initial costs															
1.1	FLDA Ayer Tawar and Bukit Aping (7 villages)	210	210	300			720						-	-	-	720
1.2	Tanjong Penggerang (13 villages and towns)			120	220	330	670	200	220	110	80	-	610	120	-	1400
1.3	Johor Tengah (19 villages and towns)				230	90	320	-	200	210	290	310	1010	440	90	1860
1.4	Total initial costs	210	210	420	450	420	1710	200	420	320	370	310	1620	560	90	3980
1.5	Total project land development initial costs	-	-	120	450	420	990	200	420	320	370	310	1620	560	90	3260
2.	Expansion costs															
2.1	Kluang	100	100	100	100	100	500	100	100	100	100	100	500	500	500	2000
2.2	Kota Tinggi	10	10	10	10	10	50	10	10	10	10	10	50	50	50	200
2.3	Bandar Lebam (Tanjong Penggerang)						-	30	30	30	40	45	175	255	245	675
2.4	Bandar Tengah (Johor Tengah)							-	5	5	5	5	20	45	40	105
2.5	Total expansion costs	110	110	110	110	110	550	140	145	145	155	160	745	850	835	2980
2.6	Total project land development expansion costs							30	35	35	45	50	195	300	285	780
3.	Total all costs Grand total	320	320	530	560	530	2260	340	565	465	525	470	2365	1410	925	6960
3.1	Tanjong Penggerang			120	220	330	670	230	250	140	120	45	785	375	245	2075
3.2	Johor Tengah				230	90	320	-	205	215	295	315	1030	485	130	1965
3.3	All project land development	-	-	120	450	420	990	230	455	355	415	360	1815	860	375	4040

TABLE 8.3.4 VILLAGE DEVELOPMENT CAPITAL CONSTRUCTION COSTS IN THOUSANDS DOLLARS 1970-1990 TG. PENGGERANG & JOHOR TENGAH

	1971 - 1975						1976 - 1980						1981 To	1986 To	TOTAL 1970 -
	71	72	73	74	75	Total	76	77	78	79	80	Total	1985	1990	1990
FLDA Ayer Tawar and Bukit Aping	115	230	445			790									790
Tanjong Penggerang			115	230	115	460	230	115	115	115	-	575	115	-	1150
Johor Tengah				115	115	230	-	115	230	345	230	920	690	115	1955
Total project land development areas			115	345	230	690	230	230	345	460	230	1495	805	115	3105
Total	115	230	560	345	230	1480	230	230	345	460	230	1495	805	115	3895

TABLE 8.3.5 CENTRAL VILLAGES AND NEW TOWNS DEVELOPMENT CONSTRUCTION COSTS IN 000'$ 1970 - 1990 TANJONG PENGGERANG AND JOHOR TENGAH

	1971 + 1975						1976 - 1980						1981 To	1986 To	TOTAL 1970 -
	71	72	73	74	75	Total	76	77	78	79	80	Total	1985	1990	1990
FLDA Ayer Tawar	150					150									150
Tanjong Penggerang					300	300		150				150	-	-	450
Johor Tengah				150		150		150			150	300	-	-	450
Total project land development				150	300	450		300			150	450	-	-	900
Total	150	-	-	150	300	600		300			150	450	-	-	1050
Total central villages, villages, & new towns															
FLDA Ayer Tawar - Bukit Aping	265	230	445			940							-	-	-	940
Tanjong Penggerang			115	230	415	760	230	265	115	115	-	275	115	-	1600
Johor Tengah				265	115	380	-	265	230	345	380	1220	690	115	2405
Project land development			115	495	530	1140	230	530	345	460	380	1945	805	115	4005
Total inc. FLDA Ayer Tawar and Bukit Aping	265	230	560	495	530	2080	230	530	345	460	380	1945	805	115	4945

TABLE 8.3.6 POWER SUPPLY - CAPITAL CONSTRUCTION COSTS IN THOUSANDS DOLLARS 1970-1990 TG. PENGGERANG & JOHOR TENGAH

		1971 - 1975						1976 - 1980						1981 To 1985	1986 To 1990	Total 1970-1990
		71	72	73	74	75	Total	76	77	78	79	80	Total			
1.	Tanjong Penggerang Total	640	640	1280	640	1003	4203	1003	1003	2183	2483	363	2035	3520	3800	18558
1.1	FLDA Ayer Tawar & Bukit Aping	640	640	960			2240									
1.2.2	Villages in project land development areas			320	640	640	1600	640	640	320	320		1920	320	3800	
1.2.2	Tourist resort & new town					363	363	363	363	363	363	363	1815	3200		
1.3	Kota Tinggi									1500	1800		3300			
1.4	Total project development			320	640	1003	1963	1003	1003	683	683	363	3735	3520	3800	13018
2.	Johor Tengah Total		1400	1500	281	281	3462		562	562	843	843	2810	1405	5081	12758
2.1	Villages in project land development areas				281	281	562		562	562	843	843	2810	1405	5081	9858
2.2	New town		1400	1500			2900									2900
3.	Total project land development		1400	1820	921	1284	5425	1003	1565	1245	1526	1206	6545	4925	8881	25766
4.	Total all areas	640	2040	2780	921	1284	7665	1003	1565	2745	3326	1206	9845	4925	8881	31316

TABLE 8.3.7 TELECOMMUNICATION - CAPITAL CONSTRUCTION COSTS IN THOUSANDS DOLLARS 1970-1990 TG. PENGGERANG & JOHOR TENGAH

		1971 - 1975						1976 - 1980						1981 To 1985	1986 To 1990	Total 1970 - 1990
		71	72	73	74	75	Total	76	77	78	79	80	Total			
1.	Rural automatic exchanges and distribution systems															
1.1.1	Tanjong Penggerang project land development areas	-	-	-	820	-	820	220	-	-	50	-	270	50	50	1190
1.1.2	FLDA Ayer Tawar	-	225	220	-	-	445	-	50	50	-	-	100	50	50	645
1.1.3	Total Tanjong Penggerang	-	225	220	820	-	1265	220	50	50	50	-	370	100	100	1835
1.2.1	Johor Tengah project land development areas	-	-	-	600	-	600	220	50	-	50	225	545	100	50	1295
1.2.2	FLDA Kulai and other areas	-	225	-	-	-	225	-	50	-	-	-	50	50	50	375
1.2.3	Total Johor Tengah	-	225	-	600	-	825	220	100	-	50	225	595	150	100	1670
1.3	Total	-	450	220	1420	-	2090	440	150	50	100	225	965	250	200	3505
1.4	Total project land development areas	-	-	-	1420	-	1420	440	50	-	100	225	815	150	100	2485
2.	Group exchanges and distribution systems															
2.1	Tourist resort and new town in Tanjong Penggerang	-	-	-	-	-	-	-	-	-	-	-	-	1200	300	1500
2.2	Kota Tinggi	-	-	500	500	100	1100	20	20	20	20	20	100	150	150	1500
2.3	New town in Johor Tengah	-	-	-	-	-	-	-	-	-	-	-	-	-	1500	1500
2.4	Kluang	-	-	1300	2000	100	3400	20	20	20	20	20	100	150	150	3800
2.5	Project land development Total	-	-	-	-	-	-	-	-	-	-	-	-	1200	1800	3000
2.6	Total	-	-	1800	2500	200	4500	40	40	40	40	40	200	1500	2100	8300
3.	Total	-	450	2020	3920	200	6590	480	190	90	140	265	1165	1750	2300	11805
4.	Total project land development costs	-	-	-	1420	-	1420	440	50	-	100	225	815	1350	1900	5485

TABLE 8.3.8 EDUCATIONAL CONSTRUCTION CAPITAL COSTS IN THOUSANDS DOLLARS 1970-1990 TG. PENGGERANG AND JOHOR TENGAH

			1971 - 1975						1976 - 1980						1981 To 1985	1980 To 1990	Total 1970 - 1990
			71	72	73	74	75	Total	76	77	78	79	80	Total			
1.	Primary education																
1.1	Tanjong Penggerang	Total	650	650	1540	650	1050	4540	1540	975	975	650	650	4790	5025	4350	18,705
1.1.1	FLDA Ayer Tawar and Bukit Aping		650	650	1050	-	-	2350	325	325	325	-	-	975	650	-	3,975
1.1.2	Kota Tinggi				165	-	-	165	165	-	-	-	-	165	300	300	930
1.1.3	Project development areas				325	650	1050	2025	1050	650	650	650	650	3650	4075	4050	13,800
1.2	Johor Tengah (x)	Total		165	300	650	625	1740	900	950	950	1350	1650	5800	5525	7700	20,765
1.2.1	Kluang (x)			165	300	-	300	765	300	300	300	300	600	1800	3300	4500	10,365
1.2.2	Project development areas					650	325	975	600	650	650	1050	1050	4000	2225	3200	10,400
1.3	Total primary education (x)		650	815	1840	1300	1675	6280	2440	1925	1925	2000	2300	1050	10550	12050	39,470
1.4	Total primary project development areas		-	-	325	1300	1375	3000	1650	1300	1300	1700	1700	7650	6300	7250	24,200
2.	Secondary education																
2.1	Tanjong Penggerang	Total				540	648	1188	1686	-	101	-	761	2548	4775	7469	15,980
2.1.1	FLDA Ayer Tawar and Bukit Aping					540	540	1080	101	-	101		101	303	1841	817	4,041
2.1.2	Kota Tinggi, Sedili Besar and S. Rengit						108	108	385				660	1045	1192	995	3,340
2.1.3	Project development areas								1200					1200	1742	5657	3,599
2.2	Johor Tengah (x)	Total	540		662		285	1487	945	732	675			2352	5031	8917	17,787
2.2.1	FLDA Bukit Besar		540	-	-	-	-	540	-	732	-	-	-	732	144	216	1,632
2.2.2	Kluang (x)		-	-	662	-	285	947	265	-	675	-	-	960	3579	6056	11,542
2.2.3	Project development areas								660	-	-	-	-	660	1308	2645	4,613
2.3	Total secondary education (x)		540	-	662	540	933	2675	2631	732	776	-	761	4900	9806	16386	33,767
2.4	Total secondary: project development areas							-	1860	-	-	-	-	1860	3042	8302	13,204
3.	Total all education (x)		1190	815	2502	1840	2608	8155	5071	2657	2701	2000	3061	15490	20356	28436	73,237
4.	Total all education project development areas		-	-	325	1300	1375	3000	3510	1300	1300	1700	1700	9510	9342	15552	37,404

Note (x): The total figures for each type of school are greatly affected by the requirements of Kluang. If the speed and scale of total expansion there is lower than anticipated, this could considerably reduce the total figures, particularly for the period 1980 - 1990.

TABLE 8.3.9 HEALTH - CAPITAL CONSTRUCTION COSTS IN THOUSANDS DOLLARS 1970-1990 TANJONG PENGGERANG & JOHOR TENGAH

		1971 - 1975						1976 - 1980						1981 To 1985	1986 To 1990	Total 1970 - 1990
		71	72	73	74	75	Total	76	77	78	79	80	Total			
1. Clinics	Total	16	32	64	48	32	192	32	32	48	64	32	208	112	16	528
1.1 Tanjong Penggerang	Total	16	32	64	32	16	160	32	16	16	16	-	80	16	-	256
1.1.1 FLDA Ayer Tawar and Bukit Aping		16	32	48			96									96
1.1.2 Project development areas				16	32	16	64	32	16	16	16	-	80	16		160
1.2 Johor Tengah project development areas					16	16	32	-	16	32	48	32	128	96	16	272
1.3 Total project development areas				16	48	32	96	32	32	48	64	32	208	112	16	432
2. Health sub centres	Total		155	155	155	310	775		310			155	465	-	-	1240
2.1 Tanjong Penggerang	Total		155	155		310	620		155				155			775
2.1.1 FLDA Ayer Tawar and S. Rengit			155	155			310									310
2.1.2 Project development areas						310	310		155				155			465
2.2 Johor Tengah project development areas					155		155		155			155	310			465
2.3 Total project development areas					155	310	465		310			155	465			930
3. Health centre	Total	350		350			700						-	400		1100
3.1 Tanjong Penggerang	Total	350					350							200		550
3.1.1 Kota Tinggi		350					350						-			350
3.1.2 Project land development (Bandar Lebam)														200		200
3.2 Johor Tengah	Total			350			350						-	200		550
3.2.1 Kluang				350			350						-			350
3.2.2 Project land development (Bandar Tengah)														200		200
3.3 Total project land development														400		400
4. Total		366	187	569	203	342	1667	32	342	48	64	187	673	512	16	2868
5. Total project land development				16	203	342	561	32	342	48	64	187	673	512	16	1762

TABLE 8.3.10 GOVERNMENT OFFICES - CAPITAL CONSTRUCTION COSTS IN THOUSANDS DOLLARS 1970-1990 TG. PENGGERANG & JOHOR TENGAH

			1971 - 1975						1976 - 1980						1981 To 1985	1986 To 1990	Total 1970-1990
			71	72	73	74	75	Total	76	77	78	79	80	Total			
1.	Local village councils (unit cost 10,000)	Total							10	20	40	30	20	120	130	80	330
1.1	Tanjong Penggerang	Total							10	20	40	20	10	100	50	10	160
1.1.1	FLDA Ayer Tawar + Bukit Aping								10	20	30			60			60
1.1.2	Project development areas										10	20	10	40	50	10	100
1.2	Johor Tengah project development areas											10	10	20	80	70	170
1.3	Project land development areas	Total									10	30	20	60	130	80	270
2.	Local central village councils (unit cost 15,000)	Total							15				15	30	60	-	90
2.1	Tanjong Penggerang	Total							15				15	30	30	-	60
2.1.1	FLDA Ayer Tawar								15					15			15
2.1.2	Project development areas												15	15	30		45
2.2	Johor Tengah project development areas														30		30
3.	Town councils offices	Total										50	50	100			100
3.1	Tanjong Penggerang												50	50			50
3.2	Johor Tengah											50		50			50
4.	District administrative, welfare & employment offices	Total												-	1800		1800
4.1	Tanjong Penggerang														900		900
4.2	Johor Tengah														900		900
5.	Total								25	20	40	80	85	250	1990	80	2320
6.	Total project land development areas								-	-	10	80	85	175	1990	80	2245

TABLE 8.3.11 POLICE POST AND STATIONS - CAPITAL CONSTRUCTION COSTS IN THOUSANDS DOLLARS 1970-1990 TANJONG PENGGERANG & JOHOR TENGAH

			1971 - 1975						1976 - 1990						1981 To 1985	1986 To 1990	Total 1970 - 1990
			71	72	73	74	75	Total	76	77	78	79	80	Total			
1.	Police posts																
1.1	Tanjong Penggerang	Total	21	42	84	42	21	210	42	21	21	21	-	105	21	-	336
1.1.1	FLDA Ayer Tawar & Bukit Aping		21	42	63			126									126
1.1.2	Project land development areas				21	42	21	84	42	21	21	21		105	21		210
1.2	Johor Tengah project land development					21	21	42		21	42	63	42	168	126	21	357
1.3	Total police posts		21	42	84	63	42	252	42	42	63	84	42	273	147	21	693
1.4	Total police posts project land development				21	63	42	126	42	42	63	84	42	273	147	21	567
2.	Police stations 'B'																
2.1	Tanjong Penggerang	Total	60				60	120		60				60			180
2.1.1	FLDA Ayer Tawar		60					60									60
2.1.2	Project land development areas						60	60		60				60			120
2.2	Johor Tengah land development areas									60			60	120			120
2.3	Total police stations 'B'		60				60	120		120			60	180			300
2.4	Total police stations 'B' project land development						60	60		120			60	180			240
3.	Police stations 'A' (unit cost 80,000$)	Total				80	80	160									160
3.1	Tanjong Penggerang) All project land development areas						80	80									80
3.2	Johor Tengah)					80		80									80
4.	Upgrading 4 district police stations and 9 'B' stations to 'A'	Total													560		560
4.1	Tanjong Penggerang														280		280
4.2	Johor Tengah														280		280
5.	Total		81	42	84	143	182	532	42	162	63	84	102	453	707	21	1713
6.	Total for project areas				21	143	182	346	42	162	63	84	102	453	707	21	1527

TABLE 8.3.12 POST OFFICE - CAPITAL CONSTRUCTION COSTS IN THOUSANDS DOLLARS 1970-1990 TG. PENGGERANG & JOHOR TENGAH

			1971 - 1975						1976 - 1980						1981 To 1985	1986 To 1990	Total 1970 - 1990
			71	72	73	74	75	Total	76	77	78	79	80	Total			
1.	Post offices (x)	Total	50			50	100	200	50	200	200	150	150	750	650	400	2000
1.1	FLDA Ayer Tawar and Bukit Aping		50					50	50	100	150			300			50
1.2	Tanjong Penggerang						100	100		50	50	100	50	250	250	250	650
1.3	Johor Tengah					50		50		50		50	100	200	400	350	1000
2.	District post offices in new towns	Total													140		140
2.1	Tanjong Penggerang														70		70
2.2	Johor Tengah														70		70
3.	Main post offices	Total			450			450							450		900
3.1	Kluang				450			450									450
3.2	Kota Tinggi														450		450
4.	Mobile units	Total		21	14			35			21	14		35			70
4.1	Tanjong Penggerang			21				21			21			21			42
4.2	Johor Tengah				14			14				14		14			28
5.	Total capital costs		50	21	464	50	100	685	50	200	221	164	150	785	1240	400	3110
6.	Total capital costs project areas			21	14	50	100	185	-	100	71	164	150	485	790	400	1860

Note x: Initially in each central village, and five years from date of settlement in other villages.

TABLE 8.3.13 FIRE SERVICES - CAPITAL CONSTRUCTION COSTS IN THOUSANDS DOLLARS 1970-1990 TG. PENGGERANG & JOHOR TENGAH

			1971 - 1975					1976 - 1990						1981 To	1986 To	Total 1970 -
			71	72	73	74	75	Total	76	77	78	79	80	Total	1985	1990	1990
1.	Fire engines																
1.1	Tanjong Penggerang	Total		120	40		80	240	40	40			40	120	280	120	760
1.1.1	Kota Tinggi & S. Rengit			80				80	40					40	120	40	280
1.1.2	FLDA Ayer Tawar & Bukit Aping			40	40			80							80		160
1.1.3	Project land development areas						80	80		40			40	80	80	80	320
1.2	Johor Tengah	Total		200		40		240		40		80		120	320	120	800
1.2.1	Kluang, Kulai & Bukit Besar			200				200							280		480
1.2.2	Project land development areas					40		40		40		80		120	40	120	320
1.3	Total project land development areas					40	80	120		80		80	40	200	120	200	740
1.4	Total			320	40	40	80	480	40	80		80	40	240	600	240	1560
2.	Fire stations																
2.1	Tanjong Penggerang	Total		210	70		140	420	70	70			70	210	70		700
2.1.1	Kota Tinggi & S. Rengit			140				140	70					70	70		280
2.1.2	FLDA Ayer Tawar & Bukit Aping			70	70			140									140
2.1.3	Project land development areas						140	140		70			70	140			280
2.2	Johor Tengah	Total		350		70		420		70		140		210	140		770
2.2.1	Kluang, Kulai & Bukit Besar			350				350				140					490
2.2.2	Project land development areas					70		70		70		140		210			280
2.3	Total project land development areas					70	140	210		140		140	70	350			560
2.4	Total			560	70	70	140	840	70	140		140	70	420	210		1470
3.	Project land development reticulation costs for fire fighting	Total			20	90	100	210	40	100	60	90	60	350	120	20	700
3.1	Tanjong Penggerang				20	40	80	140	40	50	20	20		130	20		290
3.2	Johor Tengah					50	20	70		50	40	70	60	220	100	20	410
4.	Total cost			880	130	200	320	1530	150	320	60	310	170	1010	930	260	3730
5.	Total project land development				20	200	320	540	40	320	60	310	170	900	240	220	1900

APPENDIX A

APPENDIX A

PROJECTIONS FOR JOHOR STATE

1970-1990

A.1 Agricultural Output and Value Added

The first exercise was to attempt to project the total output of agriculture in the State to 1990 and the value added by agriculture in the period. The Land Capability Classification Report for Johor indicates that at present there are approximately 1.4 million acres of land in soil capability classes 1, 2 and 3, which are unalienated. It was assumed that approximately one million acres could be developed for agricultural use by 1990. This was broken down into 300,000 acres of rubber (15,000 per year over 20 years), 500,000 acres of oil palm and 200,000 acres of other crops, including 120,000 acres in short term crops, 25,000 acres pineapples and 30,000 acres tapioca. An estimate of growth in the livestock industries based upon previous projections of demand and potential Johor supplies was also mad made. Table 1 shows the acreages assumed for the various crops in 1970, 1980 and 1990. Having made assumptions about the annual output per acre and value purchased input per acre the gross output and value added for each activity was estimated and is also shown in Table 1.

These estimates indicated that gross agricultural output would rise from $600 million in 1970 to $950-$1050 million in 1980 and $1650 million by 1990. Since a fair proportion of the increase in output was in oil palm, short term crops and livestock, the proportion of purchased inputs to total output rises over the 20 year period from 11 percent to 25 percent of the total output.

In order to place this output in the context of the overall State economy a number of assumptions had to be made. It has been estimated that per capita product in Johor is perhaps two or three percent below the national average. It was assumed then that the Gross State Product (GSP) in 1970 is $1500 million or 15 percent of a GNP of $10,000 million (the population of Johor is approximately 15.15 percent of the total for West Malaysia). The estimated Agricultural Net Value added of $530 million is approximately 35 percent of this. It is assumed that agricultural net value added will fall as a proportion of GSP to 30 percent in 1980 and 22.5 percent in 1990. On this basis estimated GSP rises from $1500 million in 1970 to $2550-$2950 in 1980 and $4900-$5500 million in 1990. The rates of growth implied for the 20 year period are 5.1 percent for Gross Agricultural Output, 4.3 percent for Net Value added, 6.6 percent for GSP. These results are fairly in line with possible national growth rates and are elaborated in Table 2.

A.2 Agricultural Labour Force

An attempt was then made to estimate the agricultural labour force which might be associated with these land use and output projections. Two sets of assumptions of labour use per acre were used for this purpose and are given in Table 3. The first of these was an estimate made by the Economic Planning Unit (EPU) in 1968. The second was derived from studies carried out by the consultants on possible agricultural activities in the project area. Three estimates of the agricultural labour force were made:-

A. EPU coefficients were used throughout
B. EPU coefficients were used for the 1970 acreages and consultants estimates for all new acreages developed.
C. Consultants estimates were used throughout.

In those few activities where no EPU estimate was available the consultants estimates were used throughout. The estimated labour forces obtained were as follows:-

Agricultural Labour Force Estimates
1970-1990 (Thousands)

	1970	1980		1990	
		Total	Increase over 1970	Total	Increase over 1980
Estimate A	247	309	62	377	68
Estimate B	247	286	39	330	44
Estimate C	172	213	39	256	44

Note that these figures contain 20,000 fishermen and other miscellaneous workers, and that these figures are not a measure of the present labour force but represent the numbers of full-time workers required to work the estimated acreages given assumptions as to the acres worked per man. Reference to sections 3 and 4 where other estimates have been made, indicates that the above estimate of 247,000 is probably fairly near the present level. Projections made on the basis of migration estimates indicate that the labour force available to agriculture in 1990 in the State may lie in the range 240-330 thousand, i.e. in the range indicated by the above estimates B and C.

The total labour force in the State was estimated from population estimates. The population growth of Johor in the planning period was estimated from the Department of Statistics Projections for West Malaysia assuming that Johor maintains the same proportion of the national population as at present i.e. 15.15 percent. The Statistics Department makes four different estimates of population growth and in this exercise "medium A" assumption was taken. This assumes declining fertility and mortality rates over the period to the end of the century. The labour force was estimated in two ways. First, by taking it to be the male population age 15-54 plus 20 percent of the female population in the same age group. The second estimate took the labour force in 1970 to be 30 percent of the population (as indicated by the Socio-economic Survey) and one-third of the population in 1990. These population and labour force projections are given in Table 4.

Numerical estimates used in the remainder of this report have been based upon the larger of these two estimates (i.e. estimate 2). On this basis the agricultural labour force in 1970 as estimated is approximately 58 percent of the total state labour force. This percentage would decline as follows:-

TABLE 4 Estimated Agricultural Labour Force Requirements as a Percent of Total Labour Force

	1970	1980	1990
Estimate A	58	51	46
Estimate B	58	48	40
Estimate C	40	36	31

A.3 Population Growth and Urban Migration

This exercise involved a series of natural growth rate and migration assumptions for each period 1957-1970 and 1970-1990. The first to provide a base; the second to provide a picture

TABLE 1

	1970						1980						1990					
	Acreage Gross	Acreage Mature	Output Per Acre	Gross Output	Purchased Inputs	Value Added	Acreage Gross	Acreage Mature	Output Per Acre	Gross Output	Purchased Inputs	Value Added	Acreage Gross	Acreage Mature	Output Per Acre	Gross Output	Purchased Inputs	Value Added
			$	$Mil.	$Mil.	$Mil.			$	$Mil.	$Mil.	$Mil.			$	$Mil.	$Mil.	$Mil.
Rubber - Estate	450000	350000	550	175	15	160	600000	380000	540-600	205-228	217	184-207	750000	550000	600	330	25	305
- Smallholder	750000	450000	385	173	5	168	750000	550000	450-500	248-275	12	236-263	750000	550000	520	286	15	271
Oil Palm	205400	125000	1000	125	19	106	450000	350000	700-900	245-315	52	193-263	700000	575000	900	517	115	402
Coconuts	135000	135000	140	19	-	19	135000	135000	160	21	-	21	135000	135000	190	24	-	24
Pineapples	36000	36000	300	11	2	9	50000	40000	400	20	4	16	60000	60000	500	30	6	24
Tapioca							20000	20000	350	7	2	5	30000	30000	400	12	4	8
Pepper and Vegetables	3000	2000	3000	6	1	5	4500	3500	3500	11	12	9	6000	5000	4000	20	5	15
Sugar							20000	20000	1000	20	8	12	20000	20000	1000	20	8	12
Other S.T.C.							30000	30000	500	15	7	8	120000	120000	700	84	40	44
Livestock Numbers																		
Pigs - Fat	120000			13	9	4	275000			30	22	8	650000			65	49	16
Poultry - Broilers/Year	6 Mil.			18	13	5	20 Mil.			56	42	14	60 Mil.			150	113	37
- Layers	340000			5	3	2	800000			12	9	3	1.9Mil.			30	23	7
Cattle and Goats				1	-	1				8	1	7				20	3	17
Other Subsistence				50		50				50		50				50		50
				596	67	529				948-1068	192	756-876				1638	406	1232

TABLE 2

Growth of Agricultural Industry

1970	Gross output	=	$596 million
	Net Value Added	=	$529 million
	Gross State Product	=	$1,500 million
	Agric. N.V.A.	=	35.3 percent G.S.P.
	Gross Agric. Output	=	39.7 percent G.S.P.
1980 (I)	Gross Agric. Output	=	$948 million
	Net Value Added	=	$756 million
	Let Agric. N.V.A.	=	30 percent of G.S.P.
	G.S.P.	=	$2,520 million
	Rate of Growth 1970-80		
	(a) Gross Agric. Output	=	4.8 percent p.a.
	(b) Net Value Added	=	3.6 percent p.a.
	(c) G.S.P.	=	5.4 percent p.a.
(II)	Gross Agricultural Output	=	$1,068 million
	N.V.A.	=	$876 million
	G.S.P.	=	$2,920 million
	Rate of Growth 1970-80		
	(a) Gross Agric. Output	=	6.0 percent p.a.
	(b) Net Value Added	=	5.2 percent p.a.
	(c) G.S.P.	=	6.9 percent p.a.
1990	Gross Agric. Output	=	$1,638 million
	Net Value Added	=	$1,232 million
	II Let N.V.A. in agric.	=	22.5 percent of G.S.P.
	G.S.P.	=	$5,475 million
	Rate of Growth 1970-90		
	(a) Gross Agric. Output	=	5.1 percent
	(b) N.V.A.	=	4.3 percent
	(c) G.S.P.	=	6.6 percent
	Rate of Growth 1980-90 1980 - Low Figure		
	(a) Gross Agric. Output	=	5.7 percent
	(b) N.V.A.	=	5.0 percent
	(c) G.S.P.	=	8.0 percent
	Rate of Growth 1980-90 1980 - High Figure		
	(a) Gross Agric. Output	=	4.4 percent
	(b) N.V.A.	=	3.5 percent
	(c) G.N.P.	=	6.5 percent

TABLE 3

AGRICULTURE LABOUR REQUIREMENTS

ACTIVITY	E.P.U. Estimate	Consultants Estimate
	Acres/man	
Rubber	6.67	10.0
Oil Palm	8.0	15.0
Coconuts	12.0	12.0
Pineapples	5.0	6.0
Tapioca	12.0	20.0
Vegetables	4.0	5.0
Sugar	n.a.	10.0
Short term crops	n.a.	20.0
Other	5.0	5.0
	Output/man	
Cattle	n.a.	$10,000
Pigs	n.a.	450 fat pigs
Poultry	n.a.	$15,000 broilers
Layers	n.a.	3,000 layers

TABLE 4

JOHOR POPULATION AND LABOUR FORCE 1970-1990

	1970	1980	1990
Population	1,425,000	1,900,000	2,450,000
Labour Force I	415,000	580,000	780,000
II	425,000	598,000	815,000

of possible future trends. (Tables 5-6).

i) The base

Based on a sample survey, the Department of Statistics has estimated a three percent natural increase rate per annum for the State of Johor 1957-69, but no estimate has been made of migration patterns within the State. Project surveys show that, largely because of migration, growth per annum 1957-70 has varied between 1-2 percent per annum (Kota Tinggi, Rengam, Layang2) to 4 percent (Kulai), and even to possibly 5.6 percent (Kluang), It should be noted that the 1960 Johor Baharu Town Plan was based on an estimated five percent per annum population growth, i.e. including two percent per annum migration.

Urban migration can occur, often on a massive scale, despite a lack of opportunities for migrant population in the urban areas. Similarly the development of rural opportunities cannot be expected, however attractive, to detract totally or even largely from the extent of urban migration therefore it is necessary to make some sort of migration model.

Because of this, the migration attraction of the major towns, was weighted as far as could be ascertained to get an existing population picture. No reliable estimates exist at all of the present population of Johor Baharu, which probably has the highest per annum growth rate anywhere in the State. As much of its real growth is and will continue outside its town boundaries, an artificially defined area - the Johor Baharu City Region, was taken as a base. (Scudai - Ulu Tiram - Masai). Estimated population 1970 : 175,000.

ii) The method

From the 1970 base, for Johor Baharu, the medium size towns (Batu Pahat, Muar, Kluang, and Segamat) and other towns of near 10,000 population in 1970, populations were calculated according to the assumptions I-V listed in iii for 1980 and 1990. I

It was then assumed that (a) employment created by the new agricultural development between now and 1990 would be as previously estimated. (b) In these areas an additional 50 percent of that employment would be created in service industries. (c) One-third of the population is economically active. These assumptions provided an estimate of the population in present rural areas and villages. Estimates of the number of people employed in agriculture under these assumptions were then made. The resulting figures are given in Table 6.

iii) Assumptions

I Present trends - Department of Statistics Medium A estimate of Natural Increase, combined with the continued estimates of existing urban migration rates within the State.

II "Controlled" growth - As I. Except greater migration assumed to New Towns, Town

TABLE 5A. Population Distribution of District - Johor
Existing Trends Assuming Urban Migration Only

District			1957	1970	1980	1990	
Johor Baharu		Town	95,168	188,000	318,161	539,099	
		Rural	63,017	44,295	6,169	-	
		Total	158,185	232,295	324,330	418,215	
	Percent	Town	60.16	80.93	98.10	128.90	
Batu Pahat		Town	45,655	80,000	125,974	198,678	
		Rural	150,614	208,221	276,446	320,232	
		Total	196,269	288,221	402,420	518,910	
	Percent	Town	23.26	27.76	31.30	38.29	
Kluang		Town	31,181	60,000	101,522	171,777	
		Rural	60,748	74,998	86,958	71,263	
		Total	91,929	134,998	188,480	243,040	
	Percent	Town	33.92	44.45	50.86	70.68	
Muar		Town	48,058	84,000	131,616	206,637	
		Rural	173,045	240,690	321,724	377,933	
		Total	221,103	324,690	453,340	584,570	
	Percent	Town	21.74	25.87	29.03	35.35	
Segamat		Town	25,165	40,500	60,081	89,202	
		Rural	68,768	97,441	132,389	158,983	
		Total	93,933	137,941	192,470	248,185	
	Percent	Town	26.79	29.36	31.22	35.94	
Pontian		Town	8,459	13,000	18,338	25,867	
		Rural	90,644	132,533	184,772	236,038	
		Total	99,103	145,533	203,110	261,905	
	Percent	Town	8.54	8.93	9.03	9.88	
Mersing		Town	7,228	10,600	14,245	19,145	
		Rural	18,693	27,465	38,955	49,455	
		Total	25,921	38,065	53,200	68,600	
	Percent	Town	27.88	27.85	26.78	27.91	
Kota Tinggi		Town	7,475	8,300	9,168	10,128	
		Rural	32,932	51,038	73,672	96,692	
		Total	40,407	59,338	82,840	106,820	
	Percent	Town	18.50	13.99	11.07	9.48	
Total							
State of Johor		Town	268,389	484,400	786,265	1,282,524	
		Rural	658,461	876,681	1,113,925	1,288,605	
		Total	926,850	1,261,081	1,900,190	2,571,129	
		Town	28.96	35.59	41.38	49.88	percent
+ 10,000 (Pop) Urban Total		(20 percent of Rural in Small Towns)				60.00	percent

TABLE 5B. Population Projection - Towns Existing Trends

	Census Base 1957 Population	State Department 1969 Estimates at 3 percent	Various Sources Estimated Per annum Percent Increase 57-69	Various Sources Estimated 1970 Population	1970 Base Population	Rate	1980	1990
JOHOR BAHARU	74,909	108,200	5.5(4.5)	150,000	175,000	5.5	298,918	510,615
J.B. Surrounding Area	12,500	25,300	3.0	25,000	(160,000)	(4.5)	248,480	385,872
BATU PAHAT	39,294	57,000	4.8	70,000	70,000	4.8	111,868	178,780
KLUANG	31,181	45,100	5.4	61,000	60,000	5.4	101,522	171,777
MUAR	39,046	56,600	4.8	70,000	70,000	4.8	111,868	178,780
SEGAMAT	18,445	26,800	4.2	30,000	30,000	4.2	45,270	68,309
TOTAL	127,966	185,500		231,000	230,000		370,528	597,646
TANGKAK	9,012	13,100	3.5	14,000	14,000	3.5	19,748	27,857
YONG PENG	6,361	9,230	3.5	10,000	10,000	3.5	14,106	19,898
PONTIAN	8,459	12,290	3.5	13,230	13,000	3.5	18,338	25,867
MERSING	7,228	10,550	3.0	10,600	10,600	3.0	14,245	19,145
LABIS	6,720	9,740	3.5	10,500	10,500	3.5	14,811	20,893
KOTA TINGGI	7,475	10,800	1.0	8,300	8,300	1.0	9,168	10,128
KULAI	7,759	11,250	4.0	13,000	13,000	4.0	19,243	28,484
TOTAL	53,014	76,960		79,630	79,400		109,659	152,272
GRAND TOTAL	268,000	396,000		486,000	485,000		779,000	1,260,000

TABLE 5C. TOWNS - CONTROLLED GROWTH

	Planned Growth Rate (x)	Base 1970	1980	1990
J.B.	5.5	175,000	298,918	510,615
B.P.	4.2	70,000	105,625	159,387
K	5.0	60,000	97,734	159,198
M	4.2	70,000	105,625	159,387
S	4.2	30,000	45,270	68,309
TOTAL		230,000	354,254	546,281
T	3.5	14,000	19,748	27,857
Y.P.	3.5	10,000	14,106	19,898
P	3.5	13,000	18,338	25,867
M	3.5	10,600	14,952	21,092
L	3.5	10,500	14,811	20,893
K.T.	4.0	8,300	12,286	18,186
K	4.0	13,000	19,243	28,484
		79,400	113,484	162,277
				1,220,000
		NEW TOWNS		40,000
				1,260,000

OTHER NEW TOWNS = J.B. OVERSPILL SAY 5 PERCENT = 25,000

TABLE 5D. Distribution of Population in Johor 1970-1990

		1970	1980	1990
I	Present Trends			
	Johor Baharu	175,000	299,000	510,000
	Medium Towns	230,000	320,500	598,000
	Other Towns	79,000	109,700	152,000
	New Agriculture	-	196,000	389,000
	Rural and Villages	941,000	925,000	801,000
		1,425,000	1,900,000	2,450,000
II	Controlled Growth			
	Johor Baharu	175,000	299,000	511,000
	Medium Towns	230,000	354,000	546,000
	Other Towns	79,000	113,000	162,000
	New Agriculture	-	196,000	389,000
	Rural and Villages	941,000	925,000	801,000
	'New Towns'	-	13,000	41,000
		1,425,000	1,900,000	2,450,000
III	Rapid Growth of J.B.			
	Johor Baharu	175,000	328,000	616,000
	Medium Towns	230,000	354,000	546,000
	Other Towns	79,000	113,000	162,000
	New Agriculture	-	196,000	389,000
	Rural and Villages	941,000	896,000	696,000
	'New Towns'	-	13,000	41,000
		1,425,000	1,900,000	2,450,000
	(J.B. 'surplus over II')		(29,000)	(105,000)
IV	Controlled growth with Higher Population Growth Rate			
	Johor Baharu	175,000	299,000	510,000
	Medium Towns	230,000	354,000	546,000
	Other Towns	79,000	113,000	162,000
	New Agriculture	-	196,000	389,000
	Rural and Villages	941,000	985,000	1,001,000
	'New Towns'	-	13,000	41,000
		1,425,000	1,960,000	2,650,000
V	Controlled growth with Immigration			
	Johor Baharu	175,000	299,000	510,000
	Medium Towns	230,000	354,000	546,000
	Other Towns	79,000	113,000	162,000
	New Agriculture	-	196,000	389,000
	Rural and Villages	941,000	1,065,000	1,201,000
	'New Towns'	-	13,000	41,000
		1,425,000	2,040,000	2,850,000

TABLE 5E. New Towns in Land Development Regions

Population Sources:

1)	Difference between Existing Trends "Controlled Growth" see 5E	41,000
2)	New Agric (20 percent in Towns, 10 percent in New Towns)	39,000
3)	Johor Baharu (Planned) overspill (5 percent:50 percent to New Towns)	25-30,000
	say	100,000+

Population Distribution to 1990 say:

1)	Johor Tengah and Tanjong Penggerang	60 percent	= 60,000
2)	Sembrong/Sedili/Lenggor/ Mersing		= 40,000

TABLE 6. Agriculture Labour Force - Under Above Assumptions

Assumption	1970	1980	1990
I	209,109	249,109	264,418
II	209,109	249,109	264,418
III	209,109	242,664	241,109
IV	209,109	262,442	308,886
V	209,109	280,219	353,330

Expansion Schemes, etc., rather than existing West Coast Towns, attracting population to Development Regions.

III Johor Baharu accelerated Growth - Probably actually closer to rate of what is already happening with the Port, Industrial Development Areas, State Development Corporation etc. (6.5 percent per annum assumed, as compared with 5.5 percent in other assumptions). Otherwise as II.

IV "Controlled" growth (higher natural increase)

As III except Department of Statistics Higher Estimate of Natural Increase used.

V "Controlled" growth with migration into the State

As III except assumed migration into the State occurs so as to raise the population in the State to 17.5 percent of the national total by 1990.

iv) Summary

It cannot be expected that these projections will prove accurate. The data available does not allow such projections to be made. All produces is a general picture of the scale of growth likely in the various sectors of the State over the next twenty years.

The summary table 7 lists the results of these projections to 1990. The residual population is expressed as in "Existing Rural Areas". While this is a useful device to express the pressures on those areas, in fact the larger growth assumptions (IV and V) would probably increase the extent of urban growth and result in a decrease in the population figures given below for the "Existing Rural Areas".

exceed the 200,000 allowed for in Assumption V, bearing in mind the continued economic expansion of the Kuala Lumpur Region, and the probable developments in Pahang immediately north of the State. Even this level of migration, will only take place if urban and industrial development are more rapid than suggested here. Out of State Migration (e.g. to Singapore, East Malaysia) has not been estimated, but it does not appear likely to create major population movements. Singapore may of course provide attractive job opportunities in significant numbers for residents of southern Johor.

e) It can be seen that New Town Projects within Agricultural Development Regions are possible, as far as population resources are concerned (Table 5E). As far as an industrial base is concerned, primary and secondary processing, commerce, and services for the agricultural hinterlands are certainly possible. It remains to be seen to what extent manufacturing industry can be attracted.

f) The relocation of Kota Tinggi on a site above flood level appears necessary, if the State and Federal Governments are to avoid future flooding, as investigations have shown flood control measures to be impractical and uneconomic. Taking into account the relationship of the Town to the Project areas and to future agricultural development areas to the North East, and the improvement of the national east coast road from Pahang to Johor Baharu, a town expansion scheme for Kota Tinggi would appear to be advisable. This could secure the maximum benefits from the investment to new infrastructure that will be necessary in order to relocate the existing town.

TABLE 7

Results Summarized for 1990; Population State of Johor (Thousand)

1970	Assumptions : 1990	I	II	III	IV	V
175	Johor Baharu	510	511	616	616	616
230	Other large towns	598	546	546	546	546
79	Smaller & new towns (+ 10,000)	152	203	203	203	203
-	New Rural (& villages)	389	389	389	389	389
941	Existing rural (& villages)	801	801	696	895	1096
1425	Totals	2450	2450	2450	2650	2850
672	Urban+	1498	1498	1582	1622	1660
753	Rural	952	952	868	1028	1190

+ Including 20 percent of existing and new rural

The major conclusions from these projections are:-

a) The rural population in 1990 ranges from 868,000 to 1,192,000 and the agricultural labour force from 241,000 - 330,000.

b) Johor Baharu will grow, in the absence of specific overspill measures to between 510,000 and 620,000. It should be noted that even the highest figure could be a conservative estimate.

c) Batu Pahat, Muar, and Kluang will by 1990 each have population of around 170,000 i.e. as big as Johor Baharu at present.

d) Migration into the State is unlikely to

g) It appears that somewhere between the figures expressed in the assumptions is the most likely trend, and that a policy of 'planned' urban growth with industrial overspill to Town Expansion Projects, New Town Projects, etc. would be advisable. Rounding off the figures, this could give a 1990 settlement hierarchy something like this:-

TABLE 8

1970			1990
175,000	Regional Centre	Johor Baharu City Region	500,000 - 625,000
60,000		Kluang	175,000
70,000		Batu Pahat	150,000
70,000		Muar	150,000
30,000		Segamat	75,000
230,000	Major Towns (50,000+)		550,000 - 625,000
-	(New Towns and	i) Johor Tengah	50,000
-	Town Expansion	ii) Penggerang	25,000
8,000	Schemes)	iii) Kota Tinggi	50,000
-	Another	iv) Jemaluang, say	25,000
71,000	Existing Smaller Towns		200,000
79,000	Towns, (10-50,000)		350,000 - 400,000
-	New Rural Areas		350,000 - 400,000
941,000	Existing Rural Areas		700,000 - 800,000
1,425,000	TOTAL (Johor, 1990)		2,450,000 - 2,850,000

A.4 Occupational Distribution and Economic Activity

The final exercise was to consider how the future labour force might be allocated between industries and whether the growth in employment opportunities is compatible with the projected division of population between urban and rural areas.

The socio-economic survey indicated a distribution of the labour force between occupations as shown in the first column of Table 9. Fifty-one percent of the labour force is at present in agriculture, 12 percent in manufacturing and mining, 3 percent in construction and 33 percent in service activities. Since countries such as Malaysia are moving towards a western type of economy it is likely that the proportion of the population employed in service industries will rise considerably in the future.

This exercise can be approached in two ways. First projections of the percentage distribution of the labour force between industries can be made and by applying these to the projected labour force estimates of employment in different industries obtained. These can be examined to see how likely they are to be achieved and how compatible they are with the migration assumptions. The second approach is to divide the State economy into leading and dependent sectors, forecast employment in leading sectors (agriculture, manufacturing, investment, tourism) and then by multiplier analysis estimate growth in the dependent service sectors.

Both of these approaches were attempted. Estimates from the first approach are shown in Tables 9 and 10. Three alternative sets of assumptions have been made on the distribution of employment in Johor in 1990, all embodying a declining proportion of employment in agriculture and a rising share for manufacturing and service industries. They are shown in Table 9.

1. High Agriculture - This assumes an increase of manufacturing employment to 14 percent of the total, construction to 6 percent and service industries to 40 percent. Agriculture is about 38 percent of the total.

2. Medium Agriculture - Manufacturing employment is assumed to grow to 16 percent and service employment to 42 percent; agriculture thus falls to 34 percent of the total.

3. Low Agriculture - Service employment rises to 45 percent of the total and agriculture falls to 31 percent.

Assuming a total labour force of 815,000 in 1990 total employment in the different industries is shown in Table 10. Agricultural employment ranges from 310,000 in High Agriculture Assumption to 253,000 in the Low Agricultural Assumption. It is noticeable that the agricultural labour force under the Low Medium Agricultural Assumption is virtually the same as that estimated under the Present Trends population growth and unbanisation assumption (See Table 6).

The alternative approach considered the growth of employment between 1970 and 1980 given a rate of land development of 50,000 acres a year, an increase in manufacturing employment of 4,000 a year and a growth in government employment in line with population growth.

The results of this exercise are shown in Table11. They show a possible growth in employment opportunities of just over 180,000,

TABLE 9. Occupational Distribution (Percent)

Occupation	Malaysia	U.K.	Johor		
	1967	1966	1990		
			High Agriculture	Medium Agriculture	Low Agriculture
Agriculture	51.56	3.2	38	34	31
Mining	3.05	2.3	2	2	2
Manufacturing	9.08	34.8	14	16	16
Construction	3.34	7.8	6	6	6
Public Utilities	0.94	1.7	1	1	1
Commerce	10.76	13.4	13	14	14
Transport and Communication	3.64	6.7	5	5	5
Services	17.46	29.8	21	22	25
Miscellaneous	0.15	0.3			

TABLE 10. Employment Distribution. Johor 1990 (Thousand)

Occupation	High Agriculture	Medium Agriculture	Low Agriculture
Agriculture	310	277	253
Mining	16	16	16
Manufacturing	114	130	130
Construction	49	49	49
Public Utilities	8	8	8
Commerce	106	114	114
Transport and Communication	41	41	41
Services	171	179	204
	815	815	815

TABLE 11. Forecast Growth of Employment in Johor 1970-1980 from Multiplier Analysis

	Thousands		
	Rural	Urban	Total
Agriculture	67	7	72
Manufacturing and Construction	5	39	44
Distribution	8	21	29
Transport	1	3	4
Services	11	22	33
Total	90	92	182

about the same as the growth in the labour force. But the increase in employment opportunities is split half and half between urban and rural areas, whereas if the migration assumptions discussed in Section 3 materialize some 80 percent of the growth of the labour force would be in urban areas and only 20 percent in rural areas. We could then be presented with a situation of labour shortage in rural areas but continuing unemployment in towns.

Looking at the evidence of the 1960's the multiplier exercise may have underestimated the likely growth in the distribution and service sectors in the next 10 years but the urban labour force is expected to grow by about 140 to 150 thousand over the next 10 years and it is difficult to see this order of employment being created without faster development of leading sectors than assumed in the multiplier exercise.

APPENDIX B

APPENDIX B

JOBS, POPULATION, HOUSEHOLDS AND THE GROWTH OF SETTLEMENTS 1970 - 1990 : THE PROJECT REGIONS

1. Introduction

The employment model for the project regions produced at the draft report stage gave estimates of both the leading sector and services job creation and resulting from developments in the project regions by 1990.

TABLE 1 Projected Employment and Population in Project Development Areas: 1990

Jobs in	(i) Leading sectors (agriculture & tourism)	38,000
	(ii) Services (medium estimate)	22,800
Total Employment		60,800
Households (medium estimate)		27,600
Population		166,000

NOTE:

The total employment multiplier from leading sector jobs has been estimated at between 2.2 and 2.4. Thus, the total number of jobs likely to be created by 1990 in West Malaysia by project developments is likely to be between 84,000 and 91000.

It was necessary to estimate the location and timing of the jobs created, the labour force available and required and the resulting population and household numbers that have to be incorporated in the Master Plan. This exercise had also to take into account the existing developed areas, and areas being developed, such as Ayer Tawar, Bukit Aping, and the areas to the east of Layang Layang, and the likely extent of future journeys to work.

The stages of this exercise were therefore,

a) To locate the primary job locations - agriculture and tourism.
b) To group these areas into sub-regions for journey to work and social and commercial facilities purposes.
c) To estimate the jobs required in each sub-region through time.
d) Estimate the work force available by sub-regions through time.
e) Estimate intake population, location, and timing requirements resulting from growth of employment.

2. Sub-Regional Areas: Jobs, Population and Households

2.1 Tourism being largely confined to the central Penggerang area presented no locational problems. The land suitable for new agricultural development in the two regions has divided into a series of development units; additionally in each region, there are areas already alienated, resettled, and in production, and areas being developed, settled and coming into production at present.

The employment and settlement opportunities and access to existing and new social and commercial facilities would not in time prove to be exclusive to each development unit, particularly for services such as main health centres and secondary schools for example which are not supportable at the village level. Therefore each region was divided into a series of sub-regions:-

Tanjong Penggerang:-	Johor Tengah:-
1) West	North West
2) East	West
3) Coast	South West
4) Central	Central
5) South	East
	South East

The boundaries of these sub-regions were decided in relation both to topographical considerations, and according to access to communications and population centres.

2.2 Assumptions of Population, Households and Work Force

These are given below and are based on the research described in Supporting Volume 4.

a) Settlement Schemes

At period of intake, there would be 1.5 workers per family, and five persons per family; at five year intervals, the family size would grow by one person per family reaching a maximum of eight fifteen years later, when there would be 2.2 - 2.5 workers per household. Table 2 describes the resulting population and employment patterns throughout the Project Area.

b) Other Development Schemes

At the period of development, it was assumed that they would only take in the population necessary to work the crops, over and above the labour force available in the sub-region, from settlement schemes or existing areas of settlement. Otherwise the detailed assumptions as above.

c) The Existing Areas

The existing populations it was assumed would move towards a ratio of ten acres per worker of nett agricultural land (80 percent of total) 2.2 workers per family, and 6.5 persons per family.

3. Service Employment Resulting from Agricultural Development

Both for areas already being developed, and for areas covered by project proposals, in total by 1990, the service jobs resulting from agricultural development, could be in the order of 12,000 in Johor Tengah and 8,600 in Tanjong Penggerang.

It was assumed that the full multiplier affects of existing developed areas have already taken place within the economy. As the primary agricultural jobs are located within the proposed villages, the next stage was the allocation of service jobs, to settlement heirarchy. Based on project research, the total primary to secondary job multiplier of 2.2 - 2.6 in West Malaysia, could be defined approximately as 1 primary; 0.6 - 1 outisde project regions; 0.2 local; 0.2 local centre; 0.2 district centre.

The resulting patterns of service job allocation resulting from agricultural development is given in Table 2.

At local level, the provision of housing, shops, schools, markets, cottage industires, etc makes adequate allowance for the development of the service sector jobs within the village.

4. Other Employment Opportunities

Other jobs for example, Tourism and Forestry, and related services were then be applied to the areas they occurred in and a total job demand and supply at each point of time for each sub-region, and possible journey to work area (Table 3).

TABLE 2 1990 Location of Service Jobs from Agricultural Development: Johor Tengah

	No. of Villages Served		Jobs		
	Local	District	Local	District	Total
Kluang	1	14	140	1960	2100
Central Village N	5	-	700	-	700
Central Village W	8	-	1120	-	1120
New Town	10	14	1400	1960	3360
Bukit Besar	3	-	520	-	520
Kota Tinggi	1	1	140	140	280
T O T A L	29	29	4160	4060	8220
Villages					3770
Total Service Jobs					11990

TABLE 3 1990 Location of Service Jobs from Agricultural Development - Tanjong Penggerang

	No. of Villages Served		Jobs		
	Local	District	Local	District	Total
Kota Tinggi	-	13	-	1820	1820
Central Village (Ayer Tawar)	6	-	840	-	840
Central Village (East)	7	-	980	-	980
New Town	4	8	560	1120	1680
Central Village (South)	4	-	560	-	560
Villages	-	-	-	-	2730
T O T A L	21	21	2940	2940	8610

This enabled a picture of the demand for jobs from existing areas, settlement schemes, and population growtn to be related through time to the total supply of jobs, with the intention that as far as possible regional development should move towards a full employment situation, as far as compatible with the successful operation of the various industires and enterprises within the project areas.

Tanjong Penggerang

While the demand for labour by 1990 appears likely to exceed supply, it should ne noted that this is a large part due to developments in relations to tourism. Neither by skills or distance will the majority of jobs in the service sectors, and urban tourist areas be totally accessible to the population. It was therefore assumed that approximately 25 percent of the jobs in the coastal sub-region would be taken from those looking for jobs, resident in the other sub-regions. Additionally it was assumed that 67 percent of the services jobs developed in the west, east and central region central villages would be taken up by people already resident there.

Conclusions for Tanjong Penggerang

This shiws that:-

a) The non-settlement schemes for agriculture throughout the region will not require the construction of further village except where the agriculture is specialised (the coastal sub-region), and except for managers and supervisory staff, unless the creation of full employment in the development of Settlement Schemes becomes future policy, or this land is developed for settlement schemes.

b) The attainment of a low levels of unemployment in the region is heavily dependent upon the success of tourism, and the development of industrial and commercial opportunities in Kota Tinggi. Up to 7500 people from the Penggerang region could be looking for jobs in the Kota Tinggi Area by 1990. If the demand for jobs in the Kota Tinggi from ourside the region is of the same order, then up to 10,000 primary sector jobs will need to be created in Kota Tinggi primarily in manufacturing industry. If large scale employment in the long-term is to be minimized as further settlement schemes should be planned.

Johor Tengah

a) Central Sub-Region

This includes allowances for FLDA Kulai, as well as schemes in project areas, and for the areas to the west of the Pengeli now being developed by private enterprise. As the forestry construction and agricultural development in this sub-region up to 1985, will take place in an area where the supply and demand appear likely to be in balance, the urban activities will require the development of a settlement (th basis of the new town) additional to FLDA's village developments. Additionally distance and timing considerations of the Ulu Chenas and Jengeli development units suggest that the majority of their labour should be resident in these uhits. The most northerly village site in Jengeli is a reserve to be developed only if a situation of full employment and exclusive labour to settlement scheme policies exist at the time this area is developed.

b) East

S. Kachur has a reserve village site, for similar reasons to the Jengeli area described above.

c) West

Sembrong Kiri has one reserve village site. The remaining three non settlement villages in total should offer residence of up to 2750 workers.

d) North

The initial diary area is planned as a specialist operation developing gradually, and not taking in labour from adjacent areas.

e) North West

Early rubber smallholdings.

f) South East

Possible beef cattle area; reserve village if other crops developed.

g) Conclusions.

The extensive labour supply resulting in FLDA Kulai and the central and eastern regions from 1985 onwards points to the need for the development of industrial jobs in the new town from this period onwards.

If large scale unemployment in this regions is to be avoided, there should be no further development of partial employment settlement schemes additional to that planned.

5. Households and Population

From the calculations described above, the required population intake, and new household requirements could be calculated for the total development of both the project regions to 1990. These are given in tables 4, 5, and 6. Additionally the population and household projections for Kluang and Kota Tinggi were calculated in table 7, Tables 8 and 9 summarises the population and household growth patterns for both regions from 1970 to 1990.

TABLE 2A. Penggerang Region: Population Projections by Sub Regions & Development Units for Settlement Schemes

Sub-region	Type of Scheme	Name/Or Location	Year of start	Number of Households	Total Population				Additional Labour Force Available			
					1975	1980	1985	1990	1975	1980	1985	1990
West	Settlement Existing	Pasak	1960's	300	1,800	2,100	2,400	2,300	-	-	-	-
	Settlement Underway	Ayer Tawar I	1969	439	2,534	3,505	3,688	3,556	180	320	520	820
		II	1969	597	3,433	4,358	5,015	4,836	245	435	680	1,100
		III	1970	396	2,178	2,772	3,287	3,247	112	265	420	700
		IV	1971	560	2,968	3,696	4,508	4,648	260	300	540	840
		V	1971	450	2,385	2,970	3,622	3,735	200	240	425	675
			Total	2,442	13,488	17,301	20,120	20,022	997	1,560	2,585	4,135
	New Settlement	Semenchu	1971	680	3,604	4,488	5,474	5,644	300	350	640	1,020
			Grand Total	3,422	18,892	23,889	27,994	27,966	1,297	1,910	3,225	5,155
East	Settlement Underway	Bukit Aping I	1970	781	4,295	5,467	6,482	6,404	370	225	300	730
		II	1971/72	544	2,883	3,590	4,379	4,515	360	190	190	460
			Total	1,325	7,178	9,057	10,861	10,919	730	415	490	1,190
	Settlements Planned	Simpang Wah Ha	1975	610	-	3,355	4,270	5,063	-	145	340	550
		Bukit Wah Ha	1975	510	-	2,805	3,570	4,233	-	170	410	640
		Bukit Easter	1976	600	-	3,000	3,600	4,560	-	-	170	340
		Lo Heng Barat	1977	340	-	1,751	2,142	2,669	-	155	180	325
		Lo Heng Timor	1979	670	-	-	3,853	4,891	-	-	240	420
			Total	2,730	-	10,911	17,435	21,416	-	470	1,340	2,275
			Grand Total	4,055	7,178	19,968	2,296	32,335	730	885	1,830	3,465
Coast	Settlement	Papan Timor	1972/76	500	2,575	3,150	3,925	4,200	340	520	190	450
		S. Mas	1972	630	3,245	3,969	4,946	5,292	-	540	150	400
			Total	1,130	5,830	7,119	8,871	9,492	340	1,060	340	850
Central	Settlement	Bukit Adela	1973	500	2,500	3,000	3,800	4,250	-	185	375	675
		Bukit Sening	1973	700	3,500	4,200	5,320	5,950	-	260	525	950
		Bukit Tunggal	1974	300	-	1,725	2,190	2,520	-	245	430	710
		Bukit Kledang	1974	590	-	3,393	4,307	4,956	-	123	220	360
			Total	2,090	6,000	12,318	15,617	17,676	-	813	1,550	2,695
COAST	Existing / Others	Southern Penggerang / Bukit Saga	Existing and New Agriculture	350	2,300	2,300	2,300	2,300				
		Mining, Services, Fishing etc.		1,850	13,000	13,000	13,000	13,000	2,000	2,000	2,000	2,000
		Assumed 50 percent of workers seek employment in region										
			Total	2,200	15,000	15,000	15,000	15,000				

TABLE 2B. Johor Tengah: Population Projections By Sub Regions And Development Units

Sub-region	Type of Scheme	Name/Or Location	Year of start	Number of Households	Total Population				Additional Labour Force Available			
					1975	1980	1985	1990	1975	1980	1985	1990
North	Settlement	Kahang Timor	1975	400	-	2,200	2,800	3,320	-	112	270	420
		S. Dengar	1980	130	-	-	715	910	-	-	50	100
		Bt. Jelati	1980	580	-	-	3,190	4,060	-	-	170	390
		S. Yong	1980	440	-	-	2,420	3,080	-	-	125	300
			Total	1,550	-	2,200	9,125	11,370	-	112	615	1,210
West	Settlement	Kahang Barat	1975	380	1,900	2,900	3,000	3,300	-	160	275	450
		Ulu Belitong	1978	570	-	2,850	5,420	4,332	-	-	210	430
		Ulu Pengeli	1976	10	-	3,233	4,026	4,910	-	270	320	580
		Batu Tongkat	1977	540	-	2,781	3,402	4,239	-	260	270	460
			Total	2,100	1,900	11,764	13,848	16,781	-	640	1,000	1,900
Central	Settlement	Pengeli Timor	1972	610	3,142	3,843	4,789	5,124	300	300	520	860
		S. Sebol	1973	380	1,900	2,280	2,888	3,230	-	145	290	500
			Total	990	5,042	6,123	7,677	8,354	300	445	810	1,360
East	Settlement	Lubok Ajal	1976	490	-	2,597	3,234	3,945	-	220	260	470
		S. Lebak	1977	570	-	2,936	3,591	4,475	-	280	280	960
			Total	1,060	-	5,533	6,825	8,420	-	500	540	960

TABLE 3A. Penggerang 1975 - 1990 Total Jobs By Sub Region

Sub-region	Type of development	Additional labour force available				Additional demand for labour				Available jobs for new migrants			
		1975	1980	1985	1990	1975	1980	1985	1990	1975	1980	1985	1990
West	Settlement schemes	1,300	1,900	3,250	5,150	-	-	-	-				
	Services in Central Village					400	850	850	850	130	280	280	280
East	Settlement schemes	700	900	1,800	3,500								
	Services in Central Village					500	1,000	1,000	1,000	170	330	330	330
	Agriculture					-	700	650	850				
						1,200	1,700	1,650	1,850				
Coast	Settlement schemes	350	1,050	350	850								
	Agriculture					300	1,300	1,450	1,750				
	Services (Agriculture) in new town					100	650	1,200	1,700				
	Tourism and Services					1,100	4,200	8,950	1,600				
						1,500	6,150	11,600	19,450	1,100	4,600	8,700	14,600
Central	Settlement schemes	-	800	1,550	2,700								
	Services in Central Village					-	250	550	550	-	80	180	180
South	Southern Penggerang Village	1,000	1,500	2,000	2,000								
	Total	3,350	6,150	8,950	14,200	3,100	8,950	14,650	22,700	1,400	5,300	9,500	15,400
	Total Adjusted	3,350	6,150	8,950	14,200	1,700	3,650	5,150	7,300				

TABLE 4A. Additional Households In Settlements In Penggerang

	Jobs				Households				Population			
	1975	1980	1985	1990	1975	1980	1985	1990	1975	1980	1985	1990
Ayer Tawar Central Village	130	280	280	280	65	140	140	140	400	850	850	850
Eastern Sub Region Central Village	170	330	330	330	85	165	165	165	500	1,000	1,000	1,000
South Sub Region Central Village	-	80	180	180	-	40	90	90	-	250	550	550
New Town and Tourist Resort	1,100	4,600	8,700	14,600	550	7,300	4,850	7,300	3,300	13,800	29,100	43,800

TABLE 3B. Tengah 1975-1990 Total Jobs By Sub Region

Sub Region	Type of development	Additional labour force available 1975	1980	1985	1990	Additional demand for labour 1975	1980	1985	1990	Available jobs for new migrants 1975	1980	1985	1990
Central	Settlement Schemes	1,300	1,450	1,810	2,360								
	Agriculture from town area									300	300	300	300
	Forestry									600	600	600	600
	Services (including construction)									800	1,600	2,500	3,400
	Total for Town									1,700	2,500	3,400	4,300
	Other agriculture (Ulu Sebol)					1,180	1,800	1,710	1,710				
	Agriculture (Ulu Chenas)					-	150	150	150	600	600	600	600
	Agriculture (Jengeli)					-	-	120	120	-	-	1,200	1,200
	TOTAL					1,200	2,000	2,000	2,000	2,300	3,100	5,200	6,100
East	Settlement Schemes	-	8000	540	960								
	Other agriculture					-	450	400	400				
West	Settlement Schemes	-	640	1,100	1,900	-	-	2,009	-	-	-		
	Other agriculture					-	300	1,800	3,300	-	-	1,600	2,400
	Services to agriculture in Central Village							800	1,100	-	-	250	350
						-	300	2,800	4,400	-	-	1,850	2,750
North	Settlement Schemes	-	100	625	1,200								
	Central Village					-	300	700	700	-	100	230	230
	Agriculture (Ulu Dengar)					-	-	-	660				
	Agriculture (Higan (Dairy))					-	200	280	400	-	200	280	400
North-west	Lambak										580	580	580
South-east	Sisek											480	480

TABLE 4B Additional Households In Settlements In Johor Tengah

	Jobs 1975	1980	1985	1990	Households 1975	1980	1985	1990	Population 1975	1980	1985	1990
New Town	1,700	2,500	3,400	4,300	850	1,250	1,700	2,100	4,250	6,250	10,200	12,900
Ulu Chenas	-	600	600	600	-	300	300	300	-	1,500	1,600	2,100
Jengeli (1)	-	-	600	600	-	-	300	300	-	-	1,500	1,800
Jengeli (2)	-	-	600	600	-	-	300	300	-	-	1,500	1,800
Western Central Village	-	-	1,050	1,150	-	-	500	600	-	-	2,500	3,450
Sungei Semberong	-	-	800	800	-	-	400	400	-	-	2,000	2,400
Semberong Kiri	-	-	-	800	-	-	-	400	-	-	-	2,400
Dairy Settlements	-	300	400	400	-	150	200	200	-	900	1,200	1,200
Northern Central Village	-	100	230	230	-	50	110	110	-	250	660	770

TABLE 5A. Tanjong Penggerang: Population And Households: 1970-1990

Sub Region	Present Status	Settlement Ref. No.	Name Functions(1)	Population 1975	1980	1985	1990	New Households 1975	1980	1985	1990	Total	Year Development Start	Initial Year of Settlement
West	Proposal (2)	10	S. Semenchu (A)	3600	4500	5550	5600	680	-	-	-	680	1971	1973
	Being developed	20F	Ayer Tawar I (A)	2500	3500	3700	3600	440	-	-	-	440	1969	1971
		19FC	Ayer Tawar II(A,PP,LSC)	3600	4700	5300	5100	660	70	-	-	730	1969	1971
		21F	Ayer Tawar III (A)	2500	3500	3700	3600	400	-	-	-	400	1970	1972
		22F	Ayer Tawar IV (A)	3000	3700	4500	4600	560	-	-	-	560	1971	1973
		23F	Ayer Tawar V (A/PP)	2400	3000	3600	3700	450	-	-	-	450	1971	1973
	Total			14000	18400	20800	20600	2510	70	-	-	2580	-	-
	Total			17600	22900	26350	26200	3190	70	-	-	3260	-	-
	Existing	24E	Pasak (A)	1800	2100	2400	2300	-	-	-	-	-	-	-
		25E-27E	Private Estates (A)	6800	5700	4500	4500	-	-	-	-	-	-	-
	Total			8600	7800	6900	6800	-	-	-	-	-	-	-
Total				26200	30700	33250	33000	3190	70	-	-	3260	-	-
East	Proposal	3C	Simpang Wah Ha (A/PP/LSC)	-	3900	5300	6100	-	700	80	-	780	1975	1977
		2	Bukit Wah Ha (A)	-	2800	3600	4200	-	510	-	-	510	1975	1977
		4	Bukit Easter (A)	-	3000	3600	4600	-	600	-	-	600	1976	1978
		5	Kr. Lo Heng Barat (A)	-	1800	2100	2700	-	340	-	-	340	1977	1979
		6	Kr. Lo Heng Timor (A)	-	-	3900	4900	-	-	670	-	670	1979	1981
	Total			-	11500	18500	22500	-	2150	750	-	2900	-	-
	Being developed	17F	Bukit Aping (A)	4300	5500	6500	6400	780	-	-	-	780	1970	1972
		18F	Bukit Aping (A)	2900	3600	4400	4500	540	-	-	-	540	1971	1973
	Total			7200	9100	10900	10900	1320	-	-	-	1320	-	-
Total				7200	20600	29400	33400	1320	2150	750	-	4220	-	-
Coast	Proposal	9	S. Mas (A)	3200	4000	4900	5300	680	-	-	-	680	1972	1974
		7	Papan Timor (A)	2600	3200	3900	4200	500	-	-	-	500	1972	1974
		11C	Bandar Lebam (A/PP/I/MSC/T)	3300	13800	29100	43800	550	1750	2550	2450	7300	1973	1975
	Total			9100	21000	37900	53300	1730	1750	2550	2450	8480	-	-
Central	Proposal	12	Bukit Adela (A)	2500	3000	3800	4250	500	-	-	-	500	1973	1975
		14C	Bukit Sening (A/PP/LSC)	3500	4450	5900	6500	740	50	-	-	790	1973	1975
		15	Bukit Tunggal (A)	-	1700	2200	2500	-	300	-	-	300	1974	1976
		16	Bukit Kledang (A)	-	3400	4300	5000	-	590	-	-	590	1974	1976
	Total			6000	12550	16200	18250	1240	940	-	-	2180	-	-
	Existing	28E-30E	Private Estates /A	4400	3500	2600	2600	-	-	-	-	-	-	-
Total				10400	16050	18800	20850	1240	940	-	-	2180	-	-
South	Existing	31E	Estates, Smallholdings etc. (A/LCS/PP/M/F)	15000	15000	15000	15000	-	-	-	-	-	-	-
Regional Totals All				67900	103350	134350	155550	7480	4910	3300	2450	18140	-	-
	All Proposals			18700	49550	78150	99650	3650	4840	3300	2450	14240	-	-
	All Existing (E)			28000	26300	24500	24400	-	-	-	-	-	-	-
	All Being developed (F)			21200	27500	31700	31500	3830	70	-	-	3900	-	-

TABLE 5B. Johor Tengah: Population And Households: 1970-1990

Sub Region	Present Status	Ref. No.	Settlement Name	Functions	Population 1975	1980	1985	1990	New Households 1975	1980	1985	1990	Total	Year Development starts	Initial settlement year
Central	Proposal	17	Pengeli Timor	A	3100	3800	4800	5100	610	-	-	-	610	1972	1974
	-	18	S. Sebol	A	1900	2300	2900	3200	380	-	-	-	380	1973	1975
	-	16	Bandar Tengah	A/PP/I/MSC	4250	6250	10200	12900	850	400	450	400	2100	1972	1974
	-	15	Ulu Chenas	A	-	1500	1800	2100	-	300	-	-	300	1976	1979
	-	19	S. Jengeli Barat	A	-	-	1500	1800	-	-	300	-	300	1982	1984
	-	21	S. Jengeli Timor	A	-	-	1500	1800	-	-	300	-	300	1983	1985
Totals					9250	13850	22700	26900	1840	700	1050	400	3990	-	-
East	-	22	Lubok Ajal	A	-	2600	3200	3900	-	490	-	-	490	1976	1978
	-	23	S. Lebak	A	-	2900	3600	4500	-	570	-	-	570	1977	1979
Total	-				-	5500	6800	8400	-	1060	-	-	1060	-	-
West	-	6	Kahang Barat	A	-	2400	3000	3300	-	380	-	-	380	1975	1977
	-	13	Ulu Pengeli	A/PP	-	3200	4000	4900	-	610	-	-	610	1976	1978
	-	14	Batu Tongkat	A	-	2800	3400	4200	-	540	-	-	540	1977	1979
	-	10	Ulu Bentong	A	-	2900	3400	4300	-	570	-	-	570	1978	1980
	-	9C	Semberong Tengah	A/PP/LSC	-	-	2500	3450	-	-	500	100	600	1979	1980
	-	8	S. Semberong	A	-	-	2000	2400	-	-	400	-	400	1980	1982
	-	11	Semberong Kiri	A	-	-	-	2400	-	-	-	400	400	1984	1986
Total					1900	11300	18300	24950	-	2100	900	500	3500	-	-
North	-	3	Padang Hijau	A	-	900	1200	1200	-	150	50	-	200	1972	1976
	-	4C	Kahang Timor	A/PP/LSC	-	2450	4200	5000	-	450	110	-	560	1975	1977
		2	S. Yong	A	-	-	2400	3100	-	-	440	-	440	1980	1982
		1	Bukit Jelati	A	-	-	3200	4100	-	-	580	-	580	1980	1982
Total					-	3350	11000	13400	-	600	1180	-	1780	-	-
Total for Region					11150	34000	58800	73650	1840	4460	3130	900	10330	-	-

Notes (1) A = Agriculture
PP= Primary Processing
I = General Industrial development

LSC = Local Service Centre
MSC = Major Service Centre
T = Tourism
M = Mining

(2) Proposed developments by the Consultants;

F = FLDA villages already being developed or proposed;
E = Existing villages and kampongs.

TABLE 6A. Penggerang Region: Total Households to be developed 1970-1990

	F 1 - 7 Areas Being Developed	1 - 13 Proposed Developments	Total
1970-75	3830	3650	7480
1976-80	70	4840	4910
1981-85	-	3300	3300
1986-90	-	2450	2450
Total	3900	14240	18140

TABLE 6B. New Households 1970-1990: Johor Tengah

1970 - 1975	1,840
1976 - 1980	4,460
1981 - 1985	3,130
1986 - 1990	900
Total	10,330

TABLE 7A. Kluang: Population and Households in 1990

Estimated: 180,000. 1990 (see Appendix A)
Existing: 60,000
New Population: 120,000
New Households: 20,000 i.e. For each five year period 5,000 new households.
(All size of 6pp Household).

TABLE 7B. Kota Tinggi

Assumed jobs to be created : Primary Sector - 10,000 of which 10 percent resident in Kota Tinggi.
Service Sector - 6,000 of which 50 percent resident in Kota Tinggi.

New jobs to be created for residents of Kota Tinggi: 4,000 total by 1990.
New Households (assumed 2 workers per household) - 2,000 households (500 for each five year period).
Additional Population (6 persons per household) - 12,000 people.
Existing Population - 9,000 people.
Total Population - 21,000 people.

TABLE 8. The Population of the Project Regions 1970-1990

	Tanjong Penggerang					Johor Tengah					Total					Percent	
	1970	1975	1980	1985	1990	1970	1975	1980	1985	1990	1970	1975	1980	1985	1990	1970	1990
Villages, Kampongs & Rural Areas																	
Existing	15000	15000	11300	9500	9400	30000	30000	30000	30000	30000	45000	45000	41300	39500	39400	33.1	33.7
Being developed	-	17600	22800	26400	26400	-	-	-	-	-	-	17600	22800	26400	26000		
Proposed	-	8300	22700	32500	38150	-	6900	25200	41000	51500	-	15200	47900	73500	89650		
Total	15000	40900	56800	68400	73950	30000	36900	55200	71000	81500	45000	77800	112000	139400	155450		
Local Central Villages & Kampongs																	
Existing Southern Penggerang, Rengam, Layang2	15000	15000	15000	15000	15000	6000	6000	6000	6000	6000	21000	21000	21000	21000	21000	15.4	10.4
Proposed and being developed	-	7100	13050	16500	17700	-	-	2450	7600	9300	-	7100	15500	24100	27000		
Total	15000	22100	28050	31500	32700	6000	6000	8450	13600	15300	21000	28100	36500	45100	46000		
Towns																	
Existing Kota Tinggi (Tanjong Penggerang) Kluang (J.T.)	9000	11500	14500	17500	21000	61000	91000	116000	146000	180000	70000	102500	130500	163500	201000	51.5	55.9
Proposed New Towns	-	3300	13800	29100	43800	-	4250	6250	10200	12900	-	7550	20050	39300	36700		
TOTAL Total	9000	14800	28300	46600	64800	61000	95250	122250	156200	192900	70000	111050	150550	202800	257700		
TOTAL	39000	77800	113150	146500	171450	97000	139150	185900	240800	289700	13600	216950	299050	387300	461150	100	100

TABLE 9. New Households In Project Regions 1970-1990

	1970-1975	1976-1980	1981-1985	1985-1990	Total
Tanjong Penggerang	7,480	4,910	3,300	2,450	18,140
Johor Tengah	1,840	4,460	3,130	900	10,330
Kota Tinggi	500	500	500	500	2,000
Kluang	5,000	5,000	5,000	5,000	20,000
TOTAL	14,820	14,870	11,930	8,850	50,470

APPENDIX C

C.1 Settlement Size Form and Density

1 The Problem

The major question as far as physical planning within the Project Areas is concerned in what should be the form and size of settlements planned: Scattered houses on smallholdings, groups of houses on larger farms, or villages or various sizes.

The proposals of the Jengka report were not adopted by the Government and FLDA, the settlement history of rural Malaysia shows no single traditional pattern, large scale migration to new agricultural development regions has so far only been successful in the large FLDA villages; yet there is a constant demand for smallholding type schemes, where the settler lives on his plot.

While certain crops largely dictatesthat the farm worker lives on or very close to the land, (diary farming) other do not (oil palm). Types of crop, acreages of units, forms of enterprise all condition the form of settlement. These were taken into account - See C3.

Whatever pattern of settlement is proposed might be equally suitable, and possibly should be, for various types of organisations - co-operatives, low-cost family settlements, private estates, FLDA, or other new public or private enterprises. While in certain areas, constraints on settlement size and form will result from topographical considerations, there will usually be more than one possible settlement pattern. No necessarily clear indications emerged from the Sociological Studies.

There is no foolproof way of deciding the appropriate settlement pattern, as many of the factors concerned in deciding between alternatives cannot be costed, and any detailed infrastructure cost comparisons would be of limited value because of the extent of interpretation involved in decided the appropriate level of services for different alternatives. There are also various transfer or hidden cost items - for example self built housing, use of mobile power sources as against network systems, deferred expenditure, etc.; which would make any study of this sort extremely difficult, and the end result of limited value. However, certain general statements about costs between alternatives can be made and used to assist in deciding the form, or forms of appropriate settlement patterns.

C.2 Comparative Analysis of Alternatives

In order to take account of as many considerations as possible, the following schedule, with summary notes of the apparent advantages and disadvantages of the three basic alternatives was prepared.

The list below is not exhaustive. Notes are added where they appeared required. The ranking system (Poor/Good/Medium) is crude, but appears sufficient for the consideration of alternative concepts taking into account the potentials and opportunities that appear likely.

C.3 Conclusions

Although in a few situations, scattered houses and farm groups may be appropriate and necessary, in general our settlement proposals should be for a village system. The greatest advantage of this is that potentially it offers diversity and flexibility, and yet can have many of the advantages of inherent in the traditional settlements.

C.4 The Size of Village

4.1 The Problem

The size of any village will be mainly determined by the size its surrounding agricultural catchment area, by the density of workers and the number of workers per family.

The Size of the Surrounding Area will have to be decided by examination of topographical constraints, considerations arising from likely crops, and journey to work limitations.

The Density of Workers and Workers per family will be decided by income opportunities necessary to work the crops concerned.

Acres per family may vary from 10 to 20. That a maximum journey to work of most crop types is 3 miles (See 4.2.v) and that the larger the village the better the social facilities particularly schooling, within it are likely to be. (Range 150-500 families). In order to attempt to make decisions on the size of village the attached table was prepared.

4.2 Summary

i) The village of more than 500 families is only practical when acreage of 10 per family or less are being considered.

ii) The village of 400 families is the maximum possible at 15 acres per family.

iii) The village of 300 families works at all acreage assumptions.

iv) While villages of 150 families may be necessary and appropriate in certain situations (topography and crops) and a minimum level of local social facilities for example, Primary schooling can be provided, in general the higher unit development and running costs of social and physical infrastructure makes them less generally applicable than larger villages. These are among the reasons given for the Jengka village sizes.

v) Recent research and development by FLDA's engineering section into methods of surveys and design of tertiary roads indicate that more direct routings and higher standards for the major tertiary roads should considerably reduce average journey to work times. This should enable even larger villages to be developed in the future, without reducing labour access to crops.

4.3 Conclusions

Except in areas where special considerations come into play, our basic agricultural settlement pattern should be one of villages of 300-600 families.

C.5 Residential Densities in Villages

Residential density, i.e. dwellings per acre, is usually one of the major variables affecting the cost of new dwellings and settlements. The length of distribution systems for water, electricity, roads, and sewers, are functions of density.

Conversely, from lower to higher densities, various thresholds of type of system to give the same service come into play; for example 1) at much more than 4 dwellings per acre, the individual dwelling soak away pit for sewerage usually becomes a health hazard, and a more

TABLE 4.1 Advantages and Disadvantages of Three Basic Settlement Types

Item	A) Scattered houses on smallholdings	B) Small Groups of tied houses on farms/ estates	C) Villages
1. Size assumptions	Acreage 6-20	20-1000+ acres	150-500 families i.e. 900-10,000 acres.
2. Access to regular work	Good	Good	Not so good. For most crops acceptable criteria can be established, but impossible for certain crops, and the larger the village, the poorer the access. (See Section 4. Size of village).
3. Access to alternative job opportunities	Poor	Poor/Medium	Good.
4. Compatibility with organisation giving freedom to resident to set up own industries, etc.	Good	Poor	Good.
5. Opportunities of residents to set up own industries, etc.	Poor/Medium. Not so good as (c). Poorer access and less identifiable markets	Poor	Good.
6. Community organisation and Enterprise.	Poor	Poor/Medium	Good.
7. Ability for agricultural innovation.	Poor on small acreages. Medium/ Is good on larger acreages	Good	Not comparable.
8. Land Tenure Flexibility.	Poor	Medium	Not comparable.
9. People desire to live on own agricultural holding.	Good	Medium/Poor	Poor, but acceptable arrangements possible with certain crops.
10. House site ownership	Good	Poor	Good.
11. Access to schools, and other social facilities.	Poor	Poor	Good.
12. Opportunity for Agricultural Training.	Poor	Very good	Good.
13. Security of crop against theft, fine, etc.	Good	Good	Poor. Measures however can be taken to overcome problem to some extent, and not applicable to certain crops.
14. Quality of water supply, assuming similar unit costs.	Poor	Medium	Good.
15. Cost/Return on water supply of a given standard.	Poor	Medium	Good.
16. Quality of power supply assuming similar unit costs.	Poor	Medium/Good	Medium/Good.
17. Cost/Return on power supply of given standard.	Poor	Medium/Good	Good.
18. Standards of health risk due to sewage.	Good	Good	Good for low densities and certain soils. Depends on density of village, drainage pattern, etc. Acceptable standards attainable, but generally Good/ Medium.
19. Cost of treatment to adequate standard.	Good	Good	Medium.
20. Cost/Return on items of Social Infrastructure.	Poor	Poor/Medium	Good.
21. Movement Cost/Return, e.g. Journey to market, schools etc.	Poor	Poor/Medium	Good.
22. Road Construction Costs, to a given standard of road access.	Poor	Poor/Medium	Good.
23. Policing in emergencies.	Poor	Poor/Medium	Good.
24. Suitability to all types of terrain e.g. Flood risks.	Poor	Medium/Good	Good.
25. Proven suitability for large scale land settlement.	Poor	Poor	Good.
26. Suitability for administration and development of Social Services.	Poor	Poor/Medium	Good.
27. Possibility of preservation of desired features of traditional settlements.	Poor	Poor	Good.

TABLE 4.2 Various Assumptions of Families/Village: Acres/Family

Column Reference Number	A1	A2	A3	B1	B2	B3	C1	C2	C3	D
1. Families per village.		150			300		500			500
2. Acres per family (Agriculture).	10	15	20	10	15	20	10	15	20	8
3. Agricultural Acres Total.	1,500	2,250	3,000	3,000	4,500	6,000	5,000	7,500	10,000	4,000
4. Gross Overall Villages Area (+ 15 percent for other uses) in Square Miles.	2.5	4.0	5.3	5.3	8.1	10.8	9.00	13.3	18.00	7.2
5. /of 4	1.57	2.0	2.3	2.3	2.9	3.3	3.0	3.7	4.2	2.6
6. Journey to Work Range Min. (Assumes Existing Village Densities).	0.2	0.2	0.2	0.4	0.4	0.4	0.6	0.6	0.6	0.6
Max. (+ 25 percent for topography). All modes to extremity of area.	1.4	1.8	2.0	2.0	2.5	3.0	2.6	3.4	3.8	2.3
7. Radius for Crude Location Purposes.	0.9	1.1	1.3	1.3	1.6	1.9	1.7	2.0	2.4	1.5
8. Used in First Draft Concept Plan.					X		X			

Note: D = The largest existing FLDA villages eg. Oil Palm Ayer Tawar and Kulai: FLDA villages are generally 300-500 houses in size.

expensive and sophisticated system is required, for example 2) at much more than 20 dwellings per acre, it usually becomes very difficult to give direct vehicle access and parking space to each dwelling.

The density chosen for any development is usually conditioned by the price of land, the cost of infrastructure, the cost and speed of building construction, and the market - what the people willing to come and live in an area want and are able to afford.

Although a considerable time would be spent calculating costs and benefits for a whole series of residential densities, bearing in mind local construction costs, etc., this did not appear justified as:-

1) The sociological studies conclude that potential settlers require the security of a plot of ground around the home sufficient to support some subsistence and cash crops. The minimum plot size for this appears to be the area alloted by FLDA at present, i.e. about four dwellings per acre.

2) This is close to the traditional Kampong Density.

3) It is a density which lends itself well to the traditional Malay detached wooden house, and to the gradual expansion of the dwelling as family size and incomes increase, using wooden construction.

4) It is a density at which changes in modes of transport, for example rising car ownership and use can be accommodated.

5) Land values, which here are only the product of development costs, are not sufficiently high to secure major economies by increasing the density.

6) At an increased density of 6-10 dwellings an acre: a detached expandable wooden house would still be possible, but the value of the produce of the plot would be very limited, and each group of dwellings would require a sewerage system.

7) At 10+ dwelling per acre, semi-detached and terrace houses would be necessary. This would probably increase initial construction costs in sound proof/fire proof/cross walks etc. and call for greater design control and ingenuity to allow dwellings to expand. There would be insufficient land for produce from the plot to assist family to any extent.

5.1 Conclusion

Within the village areas, a residential density of four dwellings per acre should be used.

C.6 Accessibility Constraints by Crop Types

6.1 Oil Palms

Most oil palm schemes are large. Theft will be little problem from estate area as fruit is not easily saleable. Some security measures are necessary for factory and stores areas but can be provided by one or two watchmen. No need for field and harvesting labour to live on site although a 16,000 acre estate is about 25 square miles and if one village served this for labour then maximum journey from the centre would be 2.8 miles and from one edge 5.6 miles.

Factory labour will be required to work night shifts but otherwise no requirement to live on site. Usual practise on estates is to rotate labour around the estate so everyone has share of nearest and further land. Disease and pest inspection will be taken up in course of normal daily routine, no requirement to live on site for this. No likelihood of crises requiring labour living on site.

Scale is large enough to generally be able to cope with high proportion of labour from one village.

6.2 Rubber

Although there are economies of scale, smallholdings can be attractive for provision of income. Theft is possible by illegal tapping of unsupervised area - especially of new high yielding trees. There may be pressure by smallholders to live on site due to this - and also of course in order to build their houses

on their own (to them - free) land. On larger estates, security is normally handled by watchmen and in areas where theft is prevalent, armed patrols are used. Rubber factories are often worked on a shift system but otherwise no particular need for on the spot dwelling. Tappers start work at dawn and this is necessary to extract maximum yields from the trees. It may be as well to allow for the tapping force at least to have as short a pre-dawn journey as possible. Disease and pest inspection has no requirement for immediate crisis type access to labour.

6.3 Other tree crops, Coconuts, Cocoa

These have the same accessibility constraints as rubber.

6.4 Fruit crops

Security only necessary when fruit is ripe.

6.5 Annual crops

Grain vegetables and root crops are only worth stealing when they are ripe - i.e. at certain circumscribed and know periods of time. Security can be provided at these times. No other requirement for labour on site.

In early years on new clearings, there will almost certainly be a requirement to guard against large animal pests. Some pests such as porcupine and rats can be dealt with by poison baiting and no constant supervision is necessary. Others such as wild pig must be trapped or shot, and farmers may well feel that they have to live on site and have at least a certain proportion of their labour with them. This problem together with theft will tend to decrease in importance as the area under these crops gets larger.

6.6 Livestock

All classes of livestock are liable to produce crises at all times of the year and 24 hours per day. Farmers will require a very high proportion of their labour force to be living on site all the time.

APPENDIX D

APPENDIX D

RESULTS OF FLDA KULAI TRAFFIC SURVEY

A. TOTAL TWO WAY VEHICULAR FLOW INTO/OUT FROM AREA (16 HOURS)

A.1 Saturday 3rd. October, 1970

	Cycles	Motor Cycles	Cars Taxis	Buses	Trucks	Total
Into area	111.0	46.0	59.0	19.0	49.0	284
Out from area	9.0	27	62.0	23.0	47.0	167
TOTAL	120.0	73.0	121.0	42.0	96.0	451
P.C.U.S. factor	0.5	1.0	1.0	3.0	3.0	(1.48)
P.C.U.S.	60.0	73.0	121.0	126.0	288.0	668

A.2 Tuesday 6th. October, 1970

	Cycles	Motor Cycles	Cars Taxis	Buses	Trucks	Total
Into area	113.0	23.0	57.0	21.0	54.0	268
Out from area	108.0	22.0	51.0	22.0	56.0	260
TOTAL	121.0	45.0	108.0	43.0	110.0	528
P.C.U.S. factor	0.5	1.0	1.0	3.0	3.0	(1.28)
P.C.U.S.	60.0	45.0	108.0	129.0	330.0	672

B. TOTAL TWO WAY PASSENGER FLOW INTO/OUT FROM AREA

B.1 Tuesday 6th. October, 1970

Mode of Travel	Cycles	Motor Cycles	Cars Taxis	Buses	Trucks	Total
Into area	121	38	207	405	179	950
Out from area	113	35	218	361	227	954
TOTAL	234	73	425	766	406	1904

C. DESTINATIONS OF VEHICLES LEAVING AREA

Day	Saturday 3rd. Oct.		Tuesday 6th. Oct.	
Place	Number of Vehicles	% age	Number of Vehicles	% age
Kulai	63	37.5%	64	25.7%
Kota Tinggi	27	16.1%	12	4.6%
Johor Baharu	24	14.3%	23	8.9%
Singapore	5	3.0%	3	1.2%
Pontian	3	1.8%	2	0.8%
Outside work-places	15	8.9%	120	16.3%
Other	31	18.4%	35	13.5%
TOTALS	168	100.0%	259	100.0%

D. AVERAGE VEHICLE OCCUPANCY RATES

Tuesday 6th. October, 1970

Mode of Travel	Number of Vehicle	Number of Passengers	Occupancy Rate
Motorcycle	45 (15%)	73 (4.5%)	1.5
Cars/taxis	108 (35%)	425(25.5%)	8.9
Bus	43 (14%)	766(46%)	17.8
Truck	110 (36%)	406(24%)	3.7

E. SUMMARY OF INTERNAL MOVEMENTS

E.1 Saturday 3rd. October, 1970

E.1.1 Internal to Internal Movements.

16 hours		Total
161 vehicles	129 vehicles	290 vehicles
Estimated 24 hours	320 vehicles (474 pcus)	

E.1.2 Internal to External Movements.

16 hours		Total
99 vehicles	62 vehicles	161 vehicles
Estimated 24 hours	180 vehicles (256 pcus)	

E.1.3 External to Internal Movements.

16 hours		Total
101 vehicles	166 vehicles	267 vehicles
Estimated 24 hours	300 vehicles (445 pcus)	

E.1.4 Total Movements

(1.1)	320 vehicles	474 pcus.
(1.2)	180 vehicles	256 pcus.
(1.3)	300 vehicles	445 pcus.
Total	800 vehicles	1,175 pcus.
Average per village	200 vehicles	294 pcus.

E.2 Tuesday 6th. October

E.2.1 Internal to Internal Movements.

16 hours		Total
164 vehicles	199 vehicles	363 vehicles
Estimated 24 hours	290 vehicles (372 pcus)	

E.2.2 Internal to External Movements.

16 hours		Total
92 vehicles	171 vehicles	263 vehicles
Estimated 24 hours	290 vehicles (372 pcus)	

E.2.3 External to Internal Movements.

16 hours		Total
74 vehicles	184 vehicles	258 vehicles
Estimated 24 hours	284 vehicles (364 pcus).	

E.2.4 Total Movements

(2.1)	400 vehicles	512 pcus.
(2.2)	290 vehicles	372 pcus.
(2.3)	284 vehicles	364 pcus.
Total	974 vehicles	1,248 pcus.
Average per village	244 vehicles	312 pcus.

APPENDIX E

APPENDIX E

TRAFFIC FORECAST - TIMBER

PART I PRIMARY LOGGING

ASSUMPTIONS

Primary Timber Available only in Johor Tengah

(i) Volume available - 90,000 acres @ 20 F.D. tons/acre.

(ii) Logging starts - 1974-5.

(iii) Logging for - 15 years.

(iv) Annual clearance - 6,000 acres.

(v) Annual yield - 120,000 tons (F.D.)/ year

Note: Forest Department (F.D.) ton = 1.15 true tons.

A. Primary Destination of Logs

13% to Johor Baharu say 16,000 F.D. tons per year (i)

20% to Kluang say 24,000 F.D. tons per year (ii)

67% to Forest Complex say 80,000 F.D. tons per year (iii)

B. Secondary Destination of Logs (processed timber)

(Note volume reduced to 60% or less after processing for the purpose of these forecasts 60% has been assumed).

From (ii) 14,000 tons total
3,000 tons per year local use (iv)
11,000 tons per year to Johor Baharu/ Singapore (v).

From (iii) 48,000 tons total
4,000 tons per year local use (vi)
44,000 tons per year to Johor Baharu/Singapore (vii)

C. Movement Characteristics

Allowing 8 F.D. tons per vehicle

Internal - Internal trips

(ii) 24,000 tons/year

(iii) 80,000 tons/year

(iv) 3,000 tons/year

(vi) 4,000 tons/year

Total 111,000 tons/year
@ 8 tons per vehicle = 14,000 loaded vehs./year
@ 300 days per year = 47 vehs./average day

If peak day = 1.5 x average day

Then peak daily internal movements = 70 vehs. (one way loaded).

Thus total internal flow = 140 vehs./peak day

Internal - External Trips

(i) 16,000 tons/year

(vii) 44,000 tons/year

Total 60,00 tons/year
@ 8 tons per vehicle = 7,500 loaded vehicles/ year.

@ 300 days/year = 25 loaded vehicles/ average day.

If peak day = 1.5 x average day

Then peak daily movements = 38 vehicles. (one way loaded)

Thus total internal-external traffic = 76 vehicles/peak day.

External - external Trips

(v) 11,00 tons/year

@ 8 tons per vehicle = 1,375 loaded vehicles/ year

@ 300 days per year = 5 loaded vehicles per average day.

If peak day = 1.5 x average day

Then peak daily external-external movements = 8 vehicles (one way loaded)

Thus total external-external flow = 16 vehicles/ peak day.

PART II RESIDUAL TIMBER

ASSUMPTIONS

Residual Timber only Logged from Areas of Primary Timber in Johor Tengah

(i) Start - 1975

(ii) Annual rate - 6,000 acres per year+

(iii) Yield - 20 F.D. tons/acre = 120,000 tons/year

(iv) Clearance period - 15 years

+ The total residual timber available is considerably greater. If an early decision to exploit it is made the forecast-traffic flow will be considerably increased.

A. Primary Destination (Raw Logs)

Forest Complex - 120,000 tons/year (i)

B. Secondary Destination (Timber and Chips)

Johor Baharu - 100,000 tons/year (ii)

C. Movement Characteristics (Sawn Timber and Chips)

Allow 8 tons/vehicle (internal and external)

Internal - Internal Movements

(i) 120,000 tons/year
@ 8 tons/vehicle = 15,000 loaded vehicles/ year

@ 300 days/year = 50 loaded vehicles/ average day

If peak day = 1.5 x average day

Then peak daily internal movements = 75 vehicles (one way loaded)

Thus total internal flow = 150 vehicles per peak day

Internal to External Movements

(ii) 100,000 tons/year
@ 8 tons/vehicle = 12,500 loaded vehicles/ year

@ 300 days/year = 42 loaded vehicles/ average day

@ Peak day 1.5 x average day = 63 loaded vehicles/peak day.

Thus total internal-external flow = 126 vehicles/peak day.

PART III SUMMARY

Internal Trips - Forest to Complex
- Complex to Internal

PRIMARY	140 vehicles/peak day (two way)
RESIDUAL	150 vehicles/peak day (two way)
TOTAL	290 vehicles/peak day (of which 30 are between Complex and Kluang).

External Trips - Forest to Kluang
- Complex to Johor Baharu
- Forest to Johor Baharu
  PRIMARY - 76 vehicles/peak (two way)
  RESIDUAL - 126 vehicles/peak day (two way)
  TOTAL - 200 vehicles/peak day

External Trips - Kluang - Johor Baharu - 16 vehicles/peak day (two way)

Total Traffic from Timber Exploitation

	Internal	External
1975 (Logging is 35% of total)	- 830 vehs/peak day	570 vehs/peak day
1980 (Logging is 30% of total)	- 970 vehs/peak day	670 vehs/peak day
1985 (Logging is 27% of total)	-1060 vehs/peak day	730 vehs/peak day

(Logging ends 1989)

APPENDIX F

APPENDIX F

APPENDIX F

PART I TRAFFIC FORECASTS - TOURIST DEVELOPMENT

The proposals for the provision of intensive and recreational facilities on and adjoining the beaches of the east coast of central Tanjong Penggerang are described in detail in Supporting Volume No. 7.

This appendix considers the traffic flows generated by the proposed development in relationship to the three growth rates considered in the supporting volume.

Table F.1, F.2 and F.3 illustrate the growth in average and peak daily arrivals in 1975, 1980, 1985 and 1991 at the resort at the three growth rates.

Table F.4 gives the resulting average day and peak day traffic volumes between Johor Baharu/ Singapore and the resort facilities (for resident tourists only).

TABLE F.1 Tourist Daily Arrivals By Mode Of Travel

High Rate

Year	No. of Beds	Max. No. of Tourists	Average Daily Arrivals					Peak Daily Arrivals				
			No.	By car		By bus		No.	By car		By bus	
				tourists	cars	tourists	buses		tourists	cars	tourists	buses
1975	1,000	200	150	120	48	30	1	225	180	72	45	1
1980	5,700	5,100	850	680	272	170	4	1,280	1,030	412	250	5
1985	12,800	11,500	1,920	1,540	616	380	8	2,800	2,310	922	570	12
1991	24,200	21,700	3,620	2,900	1,160	720	15	5,430	4,350	1,740	1,080	22

TABLE F.2

Medium Rate

Year	No. of Beds	Max. No. of Tourists	Average Daily Arrivals					Peak Daily Arrivals				
			No.	By car		By bus		No.	By car		By bus	
				tourists	cars	tourists	buses		tourists	cars	tourists	buses
1975	1,000	200	150	120	48	30	1	225	180	72	45	1
1980	4,300	3,870	645	515	206	130	3	970	778	310	194	4
1985	8,400	8,450	1,410	1,130	452	280	6	2,120	1,700	680	520	11
1991	16,300	14,620	2,440	1,960	782	480	10	3,660	2,930	1,170	730	15

TABLE F.3

Low Rate

Year	No. of Beds	Max. No. of Tourists	Average Daily Arrivals					Peak Daily Arrivals				
			No:	By car		By bus		No.	By car		By bus	
				tourists	cars	tourists	buses		tourists	cars	tourists	buses
1975	1,000	200	150	120	48	30	1	225	180	72	45	1
1980	3,000	2,700	450	360	144	90	2	680	540	216	140	3
1985	5,800	5,220	870	695	278	175	4	1,305	1,045	418	260	6
1991	10,400	9,360	1,560	1,250	500	310	7	2,340	1,875	750	465	10

TABLE F.4 Resident Tourists Peak Daily Traffic To Johor Baharu/Singapore

	Maximum No. of tourists	Arrivals peak day (vehicles)	Departures peak day (vehicles)	Peak day tourist flow (vehicles)
1975	900	75	73	146
1980	3,870	314	314	628
1985	8,450	691	691	1,382
1991	14,620	1,185	1,185	2,370

For the purpose of forecasting traffic flows the following general assumptions were made:-

a) Maximum number of tourists - 90 percent of total bed spaces.

b) Average length of stay - 6 days.

c) Mode of arrival - 80 percent by car
- 20 percent by bus

d) Vehicle occupancy - 2.5 persons per car
- 50 persons per bus

PART II TRAFFIC GENERATED BY DAY TRIPPERS

A successful tourist resort will attract increasing numbers of day visitors from the major population centres of Johor Baharu and Singapore. As soon as the beaches are accessible day visitors will begin using them. Up to 350,000 day visitors per annum could travel to the beaches in 1975. The rate of growth of day visitors per year could vary between 3 percent and 10 percent per year. For the purpose of traffic forecasts and average figure of 6 percent per annum has been assumed.

Table F.5 illustrates the growth in traffic between Johor Baharu/Singapore and the tourist resort which could result from day trips alone.

The figure of 5,400 day trippers on a peak day in 1991 would utilise only 20 percent of the total available spare beach capacity even if the high rate of development is achieved for provision of facilities for resident tourists.

For the purpose of producing this forecast the following assumptions were made:-

a) Average growth rate 1975 - 1991 - 6 percent per annum

b) Mode of arrival - 60 percent by car
40 percent by bus

c) Vehicle occupancy - 3 persons per car
50 persons per bus.

d) Average daily visitors - 1/250 x total annual visitors.

e) Peak daily visitors - 1.5 x average daily visitors.

PART III ADDITIONAL TRAFFIC GENERATED BY OR ATTRACTED TO THE TOURIST RESORT

The level of additional Private and services vehicle trips between Johor Baharu/Singapore and the tourist resort is assumed to be 20 percent of the peak daily flow of tourist vehicles.

Thus additional 2-way traffic flow between Johor Baharu/Singapore and the resort could be:

1975 - 200 vehicles/peak day.

1980 - 350 vehicles/peak day.

1985 - 600 vehicles/peak day.

1991 - 900 vehicles/peak day.

PART IV TOTAL PEAK DAILY GENERATED BY TOURIST RESORT

Based on the figures used in Parts I, II and III, Table F.6 gives the forecasts of total peak daily flow between Johor Baharu/Singapore and the proposed resort. These forecasts are based on the medium growth rates of both residential and day tourism and it is important to realise that the achievement of high rates of growth in either of these sectors will considerably increase both the total numbers of tourists and their demand for road space and parking places.

In addition to these traffic flows, employees' journeys to work together with tourists shopping and site seeing trips between the beaches and the new town will need to be accepted on the proposed roads between the new town and the tourist developments.

It is expected that this additional traffic will be of the same order of magnitude as the total figures shown in Table F.6.

TABLE F.5 Traffic Generated By Day Visitors From Johor Baharu/Singapore

	Number of Day Visitors							Two Way Traffic	
		Average Day			Peak Day			Average Day	Peak
	Annual	Total	By Car No. of Cars	By Bus No. of Buses	Total	By Car No. of Cars	By Bus No. of Buses	(Vehicles)	(Vehicles)
1975	350,000	1,400	840 / 280	560 / 12	2,100	1260 / 420	840 / 17	600	900
1980	469,000	1,900	1140 / 380	760 / 16	2,900	1740 / 560	1160 / 24	800	1200
1985	626,500	2,500	1500 / 500	1000 / 20	3,800	2280 / 760	1520 / 31	1050	1600
1991	669,000	3,600	2160 / 720	1440 / 29	5,400	3240 / 1090	2160 / 44	1500	2300

TABLE F.6

Total Peak Daily Traffic Between Johor Baharu/Singapore And The Tourist Resort

Year	Number of Tourists		Traffic flow (2 way)		Peak Day	
	Resident (Maximum)	Day Visitors (Peak Day)	Resident Tourists (Vehicles)	Day Visitors (Vehicles)	Other (Vehicles)	Total (Vehicles)
1975	900	2,100	150	900	200	1,250
1980	3,870	2,900	650	1,200	350	2,200
1985	8,450	3,800	1,400	1,600	600	3,600
1991	14,620	5,400	2,400	2,300	900	5,600

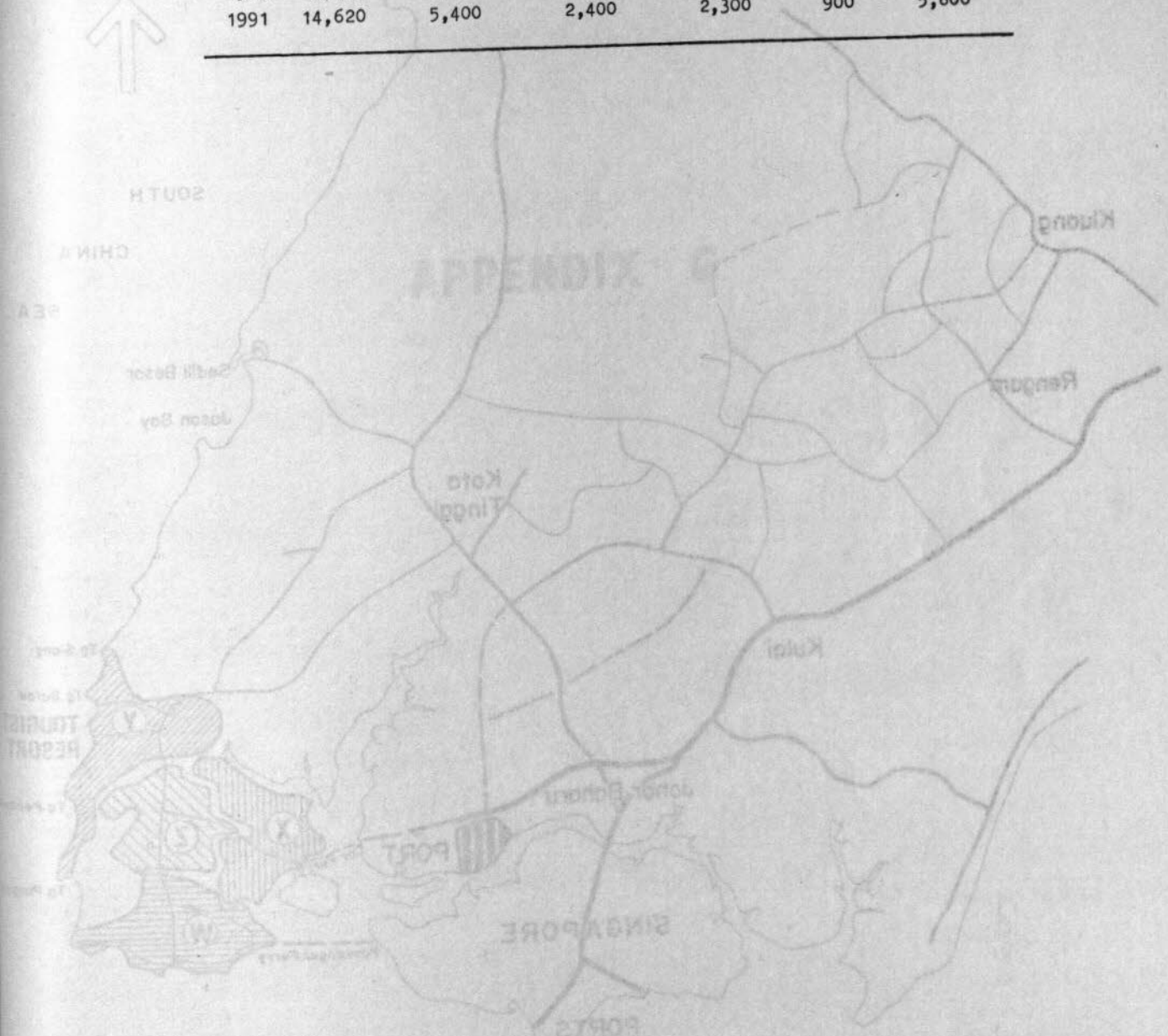
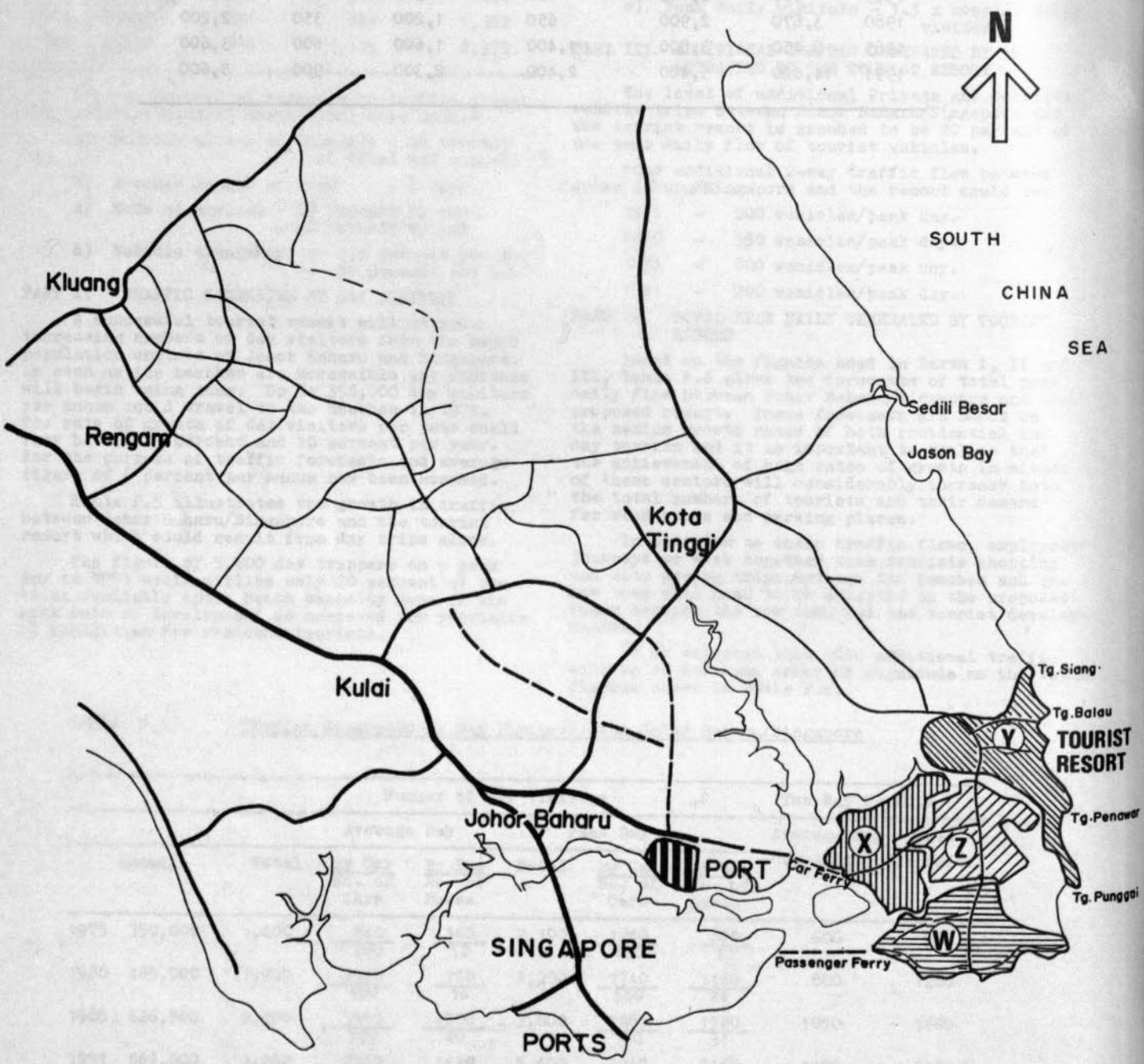


FIGURE G.1

PROPOSED CAR FERRY AREAS OF INFLUENCE



AREAS CONSIDERED FOR DIVERSION OF OUTPUT TONNAGES TO CAR FERRY:

W – Oil Palm / Rubber

X – Oil Palm / Rubber

Y – Rubber / Others

Z – Oil Palm

0 10 20 miles

APPENDIX G

APPENDIX G

COMMUNICATIONS

Evaluation - Proposed S. Johor Car Ferry

1. GENERAL

A preliminary assessment of possible output tonnages from Southern Penggerang together with the evaluation of possible tourist traffic indicated that a car ferry across the Sungei Johor might give rise to substantial savings in transport user costs. Suitable car ferry terminal areas were identified - at Tanjong Langsat on the west bank and Kampong Belungkor on the eastern side, giving a 4½ to 5 mile crossing (9 to 10 mile return trip) and linking directly to the proposed Johor Baharu port.

2. SUMMARY OF DIVERTED OUTPUT/INPUT TONNAGES

The approximate location and route of the car ferry is shown on Figure G.1. This figure also indicates the four areas (W, X, Y and Z) from which major user cost savings for commercial traffic might originate if the car ferry is available.

Tables G.1 to G.4 show annual tonnages of agricultural outputs and commidity imports between the areas and Johor Baharu or Singapore.

TABLE G.1 Export/Input Tonnages Area W (South Penggerang)

1975	1980	1985	1991
13,500	17,800	18,400	18,400

TABLE G.2 Export/Input Tonnages/Year Area X (Lebam)

1975	1980	1985	1991
12,100	16,200	23,200	23,200

TABLE G.3 Export/Input Tonnages/Year Area Y (New Town area)

1975	1980	1985	1991
13,600	31,300	49,200	52,500

TABLE G.4 Export/Input Tonnages/Year Area Z (Central Peninsula)

1975	1980	1985	1991
6,700	55,800	69,600	63,600

In addition to the commercial movements needed for these tonnages a number of private vehicle trips might also be attracted from the resident population and tourists. Table G.5 indicates the possible level of these additional movements by private vehicles.

TABLE G.5 Resident And Tourist Vehicles Per Average Day Using Car Ferry

	1975	1980	1985	1991
Tourists	400	750	1,200	1,900
Residents	50	150	300	450
T o t a l	450	900	1,500	2,350

3. SUMMARY OF POSSIBLE TRANSPORT USER COST SAVINGS BY USE OF PROPOSED FERRY

Commercial traffic;

From Area W - mileage saving = 70 miles (round trip).

From Area X - mileage saving = 100 miles (round trip)

From Area Y - mileage saving = 55 miles (round trip)

From Area Z - mileage saving = 85 miles (round trip).

Assumed: (i) Cost per vehicle mile = 66 cents (MGTS)

(ii) Average load factor = 4 tons

(iii) Therefore Average Cost= 16.5 cents/ton mile.

Table G.6 summarises the possible annual transport savings to commercial traffic from each area, calculated by multiplying the annual tonnage by the saving in distance and by the cost per ton mile.

TABLE G.6 Annual Savings (Commercial Vehicles) Area W

	1975	1980	1985	1991
Area W	156	206	213	213
X	200	267	383	383
Y	123	284	447	476
Z	94	783	976	892
Total ($000)	573	1,540	2,018	1,964

Table G.7 gives the possible user cost savings resulting from resident and tourists using the proposed car ferry. Each one way trip is assumed to save an average of $7.50 in decreased travel between Johor Baharu and Southern Penggerang being about 30 miles at 25 cents per mile.

TABLE G.7 Annual Savings (Private Vehicles) in Thousands Dollars.

	1975	1980	1985	1991
Number of one way trips @ $7.50	450x300 days	900x300	1500x300	2350x300
Total savings ($000)	1,013	2,025	3,375	5,290

Thus total annual benefits to commercial and other traffic could be as shown in Table G.8

TABLE G.8 Total Annual Transport User Cost Savings ($ millions)

1975	1980	1985	1991
1.6	3.6	5.4	7.3

4. COST OF PROVISION OF CAR FERRY

In order to assess the economic viability of the proposed car ferry service the total annual benefits must be compared with the total annual costs (capital and operating) which would be incurred by the investing agency.

The capital costs will be the annual repayment costs incurred with respect to the capital invested in the construction of the terminals and in the purchase of ferry vessels.

The construction cost of terminal facilities is assumed to be 2 x $2,500,000 = $5 million. The cost of purchase of vessels is assumed to be $2.5 million per vessel. The number of vessels required at any time will be related to average daily traffic volumes. Table G.9 summarises the average daily one way vehicle trips which might use the car ferry.

TABLE G.9 Average Daily Traffic (Vehicles)

1975	1980	1985	1991
500	1,000	1,700	2,500

For the purpose of calculating the numbers of vessels required to cater for these volumes of movement the following assumptions have been made:-

(i) Average capacity/vessel = 30 vehicles
(ii) Crossing distance (one way) = 5 miles
(iii) Average speed = 10 miles per hour
(iv) Average journey time (one way) = 30 minutes
(v) Average loading/unloading time (one terminal) = 15 minutes
(vi) Total round trip time = 1.5 hours
(vii) Average number of trips/vessel/day = 6
(viii) Total daily capacity/vessel = 360 vehicles
(ix) Average loading factor = 70-75 percent
(x) Average capacity/vessel/day = 260 vehicles
(xi) Annual capacity/vessel @ 300 days/year = 78,000

By applying the average capacity per vessel per day to the traffic volumes shown in Table G.9 the following requirements for vessels are found.

1975	1980	1985	1991
2 vessels	4 vessels	7 vessels	10 vessels

Operating costs are considered in relationship to the average annual miles travelled by each vessel. At 6 round trips per day over 300 days per year each vessel would cover 18,000 miles per year. Total operating costs have been assumed to be in the region of $20 per mile.

Thus operating costs = $360,000 per vessel/year, and Table G.10 summarises total operating costs for each year being considered.

TABLE G.10 Total Car Ferry Operating Costs

	1975	1980	1985	1991
Number of vehicles	2	4	7	10
Annual operating cost/vessel	$360,000	360,000	360,000	360,000
Total operating cost/year	$720,000	$1,440,000	$2,520,000	$3,600,000

The annual cost of capital for the provision of 2 car ferry terminals and 2 vessels in 1975 plus 2 vessels in 1980, 3 vessels in 1985 and 3 vessels in 1991, amortised over 20 years at 10 percent per annum is summarised in Table G.11.

TABLE G.11 Annual Capital Costs ($ Millions)

Year	Item	Capital Cost	Annual Costs ($m) @ 10% per annum			
			1975	1980	1985	1991
1975	Terminals	5	0.6	0.6	0.6	0.6
1975	2 vessels	5	0.6	0.6	0.6	0.6
1980	2 vessels	5		0.6	0.6	0.6
1985	3 vessels	7.5			0.9	0.9
1991	3 vessels	7.5				0.9
Total Annual Capital Costs $m			1.2	1.8	2.7	3.6

The total annual costs (capital and operating) are shown in Table G.12.

TABLE G.12 Total Annual Costs ($ millions)

	1975	1980	1985	1991
Operating	0.7	1.4	2.5	3.6
Capital	1.2	1.8	2.7	3.6
Total Annual Costs $m.	1.9	3.2	5.2	7.2

5. COMPARISON OF BENEFITS AND COSTS

These annual costs can be compared to the annual benefits from savings in vehicle mileage given in Table G.8. They show that by 1980 the annual benefits could be significantly greater than the annual costs. These results are summarised in Table G.13.

TABLE G.13 Comparison Of Annual Costs And Benefits.

	1975	1980	1985	1991
Annual Costs ($000)	1,900	3,200	5,200	7,200
Annual Benefits ($000)	1,600	3,600	5,400	7,300
Annual Surplus (+) or deficit (-) ($000)	- 300	+ 400	+ 200	+ 100

6. CONCLUSION AND RECOMMENDATIONS

The figures shown in Table G.13 indicate that the provision of a car ferry facility across the Sungei Johor is likely to be economically justified before 1980. The initial capital expenditure could be of the order of $15 million.

The fluctuations in the annual surplus of benefits over costs between 1980 and 1991 is due to the increasing proportion of passenger traffic, which attracts considerably lower savings per vehicle than commercial traffic.

Two major problems have been identified in carrying out this evaluation. The first is that a large proportion of the total savings in annual user costs accrue to tourist traffic, much of which is expected to originate from Singapore. Thus the figures of total annual benefits include a significant amount of benefits which would accrue to Singapore rather than to Malaysia. The second problem is that if it is assumed that these benefits can be realised in Malaysia by instituting a reasonable charge for car ferry travel then many of the vehicles which have been assumed to use the car ferry might be diverted back onto the Penggerang Highway. For the purpose of this evaluation it has been assumed that all tourist traffic uses the ferry in one direction, the return trip being made by road via Kota Tinggi.

In order to assess the viability of the car ferry if no tourist traffic was attracted to it a separate calculation was carried out. The commercial and residents traffic from Southern Penggerang would require only 2 vessels in 1975 and 1980 rising to 3 vessels in 1985 and 1991. Table G.14 summarises the annual costs and benefits resulting if no tourist traffic uses the car ferry.

TABLE G.14 Comparison Of Annual Costs And Benefits (No Tourist Traffic)

	1975	1980	1985	1991
Annual Costs ($000)	1,900	1,900	2,500	2,500
Annual Benefits ($000)	700	1,900	2,700	3,000
Annual Surplus (+) or deficit (-) ($000)	- 1,200	-	+ 200	+ 500

Thus the provision of a car ferry facility across the Sungei Johor might be marginally justifiable for local traffic alone by 1980.

No attempt has been made to quantify the many secondary benefits which might arise from the provision of such a service. These secondary benefits include:-

(i) Savings to users not travelling by car or lorry.

(ii) Development benefits accruing within the region.

(iii) Benefits to the existing population (15,000 people) arising from increased access to social, commercial and employment facilities in Johor Baharu.

The Penggerang highway should be substantially complete before 1975 and thus no recommendation can be made for the immediate provision of a car ferry facility. Between 1975 and 1980 however the total benefits accruing from the provision of a car ferry could exceed the total annual costs. Therefore it is firmly recommended that a re-evaluation of this analysis is carried out in 1975 by which time existing traffic volumes can be used to provide traffic forecasts for 1980. Such a study could then precede the detailed design of terminal facilities if the provision of the car ferry service is shown to be a viable proposition.

APPENDIX H

APPENDIX H

POTENTIAL FOR SOIL STABILISATION BY LIME IN ROAD CONSTRUCTION

In assessing the standards of construction required for primary and secondary roads two major factors were considered. Firstly the existing supplies of good quality roadstone are being rapidly exhausted and secondly a major deposit of high quality limestone was located to the north west of Kota Tinggi. This limestone outcrop was the subject of a separate geological investigation and a reference is made to the special report produced. In addition there is an unchecked report of a possible limestone outcrop on Sime Darby's estates near Layang Layang.

The major soil types underlying the proposed roads are the Rengam and Harimau Series with some areas of Yong Peng Soils. In Penggerang part of the primary road runs over an area of mixed soils including deposits of laterite and pea gravel.

The typical particle size distribution of the major soil types was compared with three similar soils previously subjected to lime stabilisation tests in Kenya.

The soils used in Kenya all gave very satisfactory results after lime stabilisation. Figures H.1 to H.5 shows the particle distribution curves for the main soils of the area together with the curves obtained for the three soils (A, B and Murram Gravel) used in Kenya. Soils A and B were types of "red coffee" clay and are the most similar to the soils encountered in the development areas. It can be seen that in physical properties these soil types appear to be suitable for lime stabilisation.

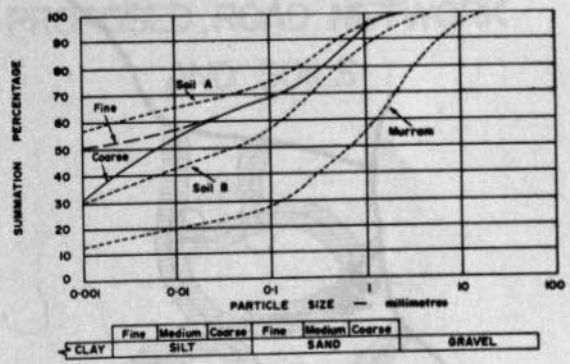
No opportunity existed for carrying out more detailed mechanical tests on the various soils and it is recommended that such tests be carried out as soon as possible if a decision is made to exploit the potential of the limestone deposit.

In the absence of this additional information it is tentatively proposed that with the exception of a small section of the Penggerang Highway and the long term coastal route, lime stabilisation should be used for the construction of the base for most lengths of primary and secondary roads within the project area.

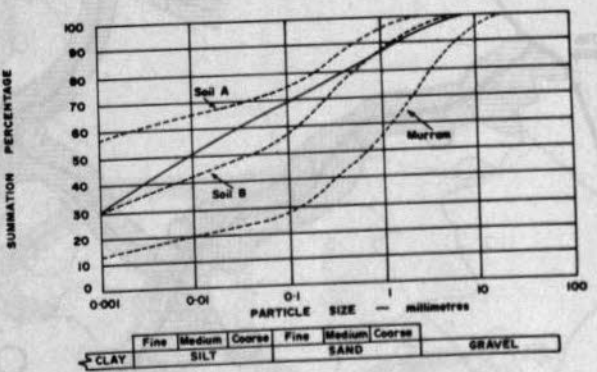
Figures H.6 and H.7 indicate the soil series underlying the various lengths of the proposed primary and secondary road networks.

The cost of constructing primary and secondary roads could be reduced by up to 20-25 percent as compared with using a crushed stone base for the C.B.R. strengths required.

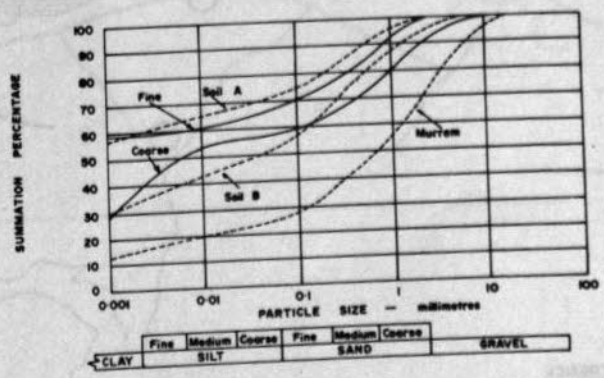
YONG PENG SERIES (coarse & fine)



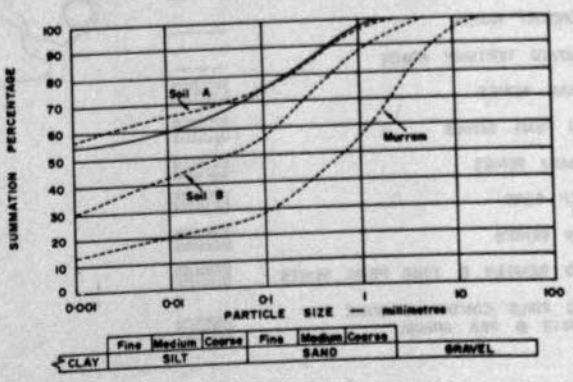
HARIMAU SERIES (shallow on shale)



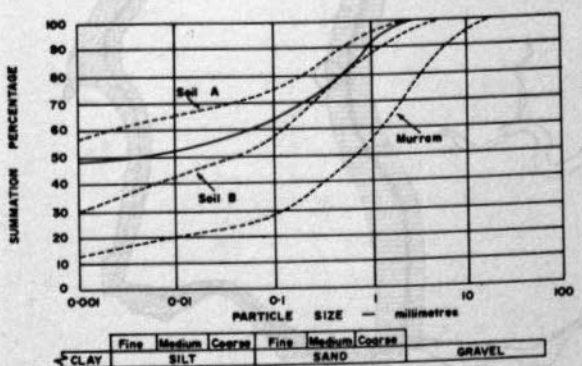
RENGAM SERIES (coarse & fine)



POHOI SERIES

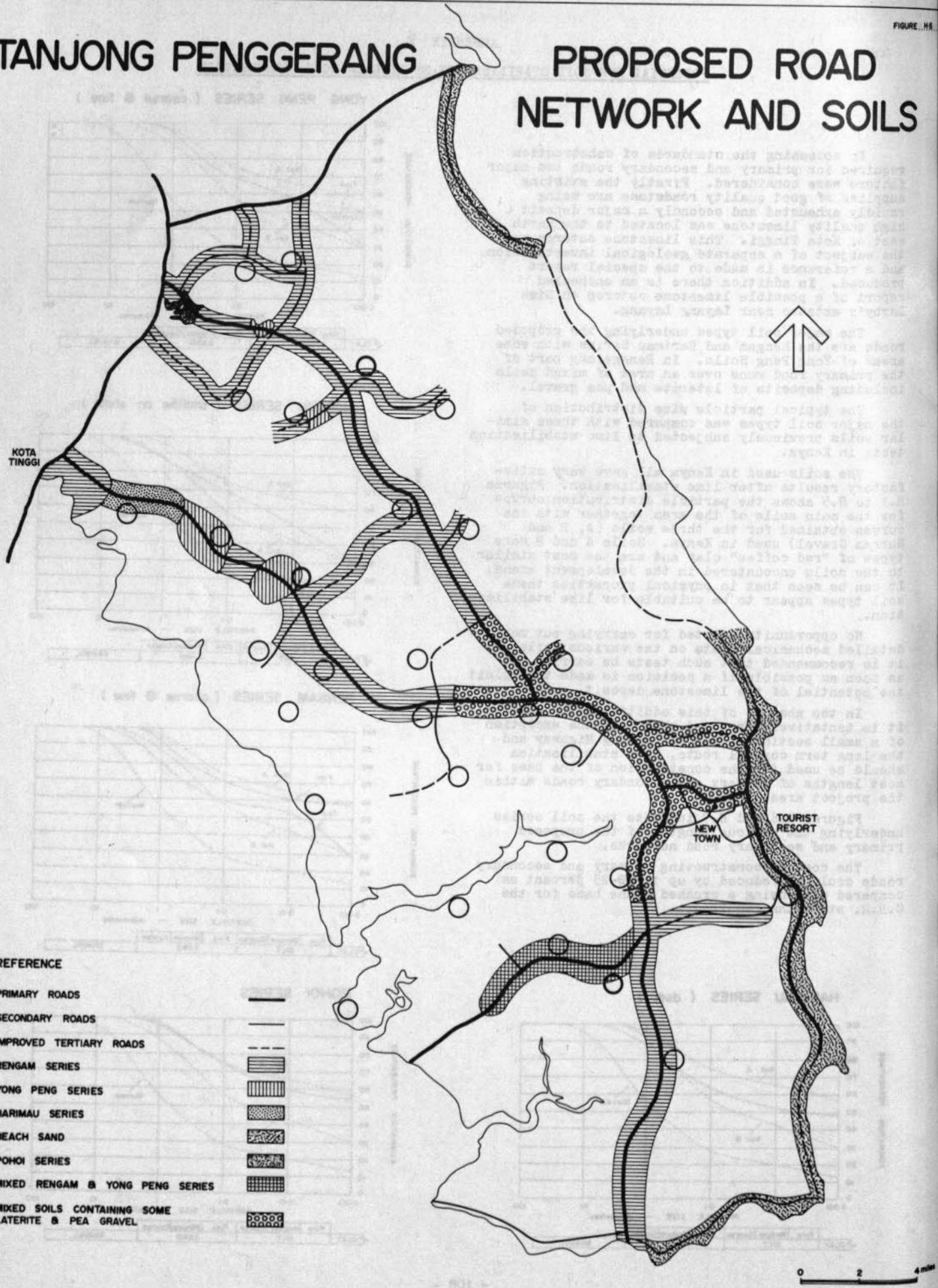


HARIMAU SERIES (deep)



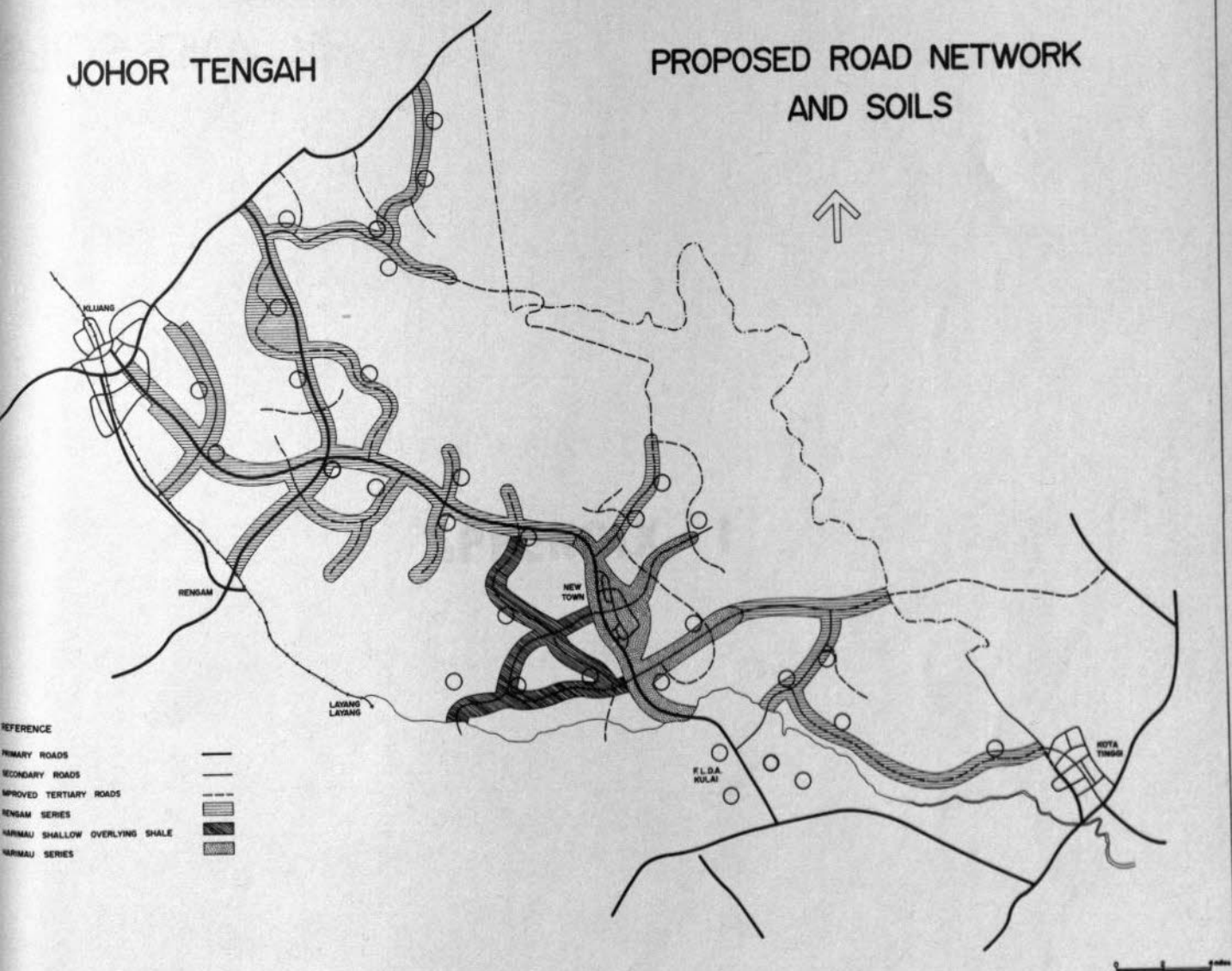
TANJONG PENGGERANG

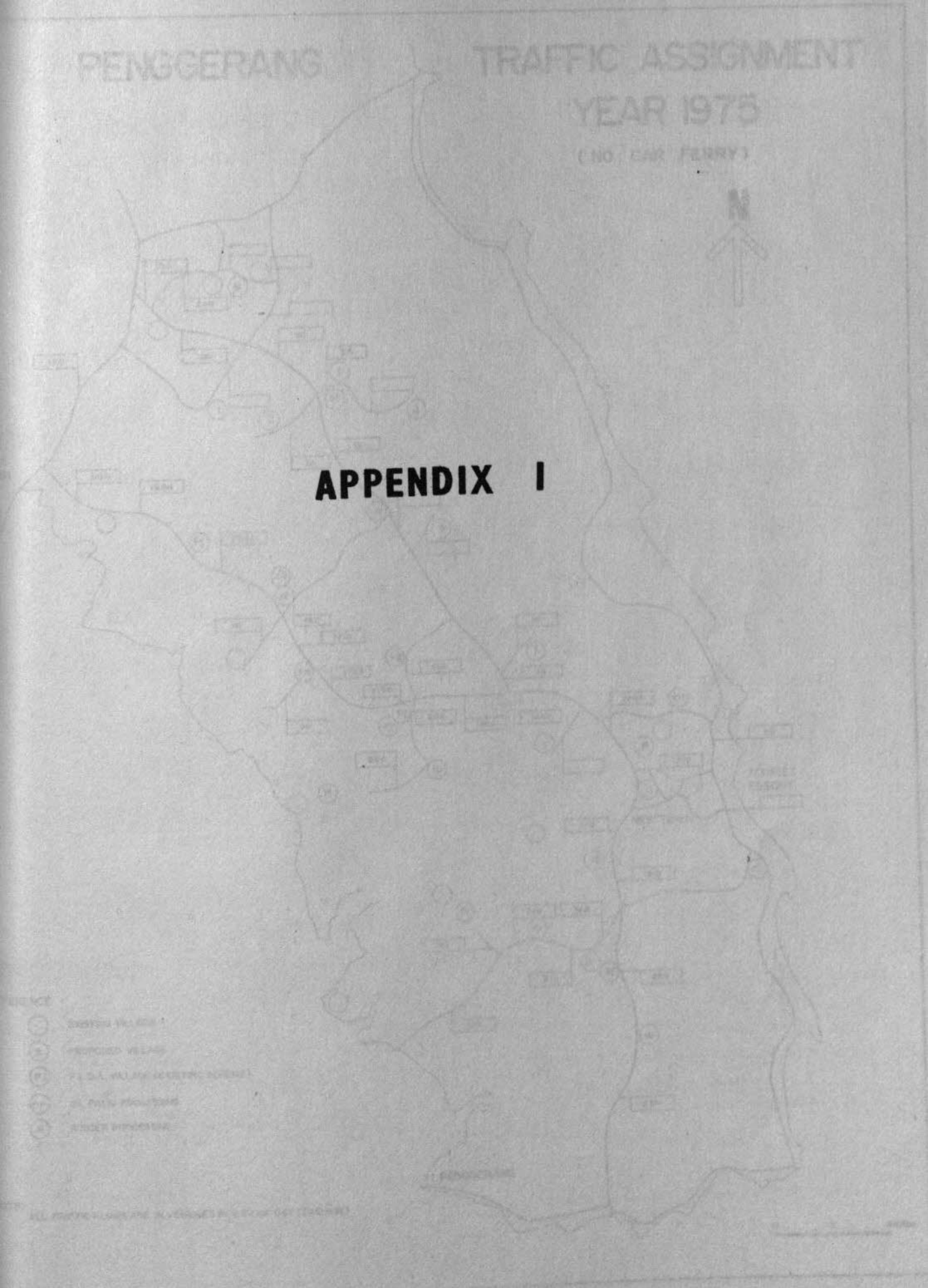
PROPOSED ROAD NETWORK AND SOILS



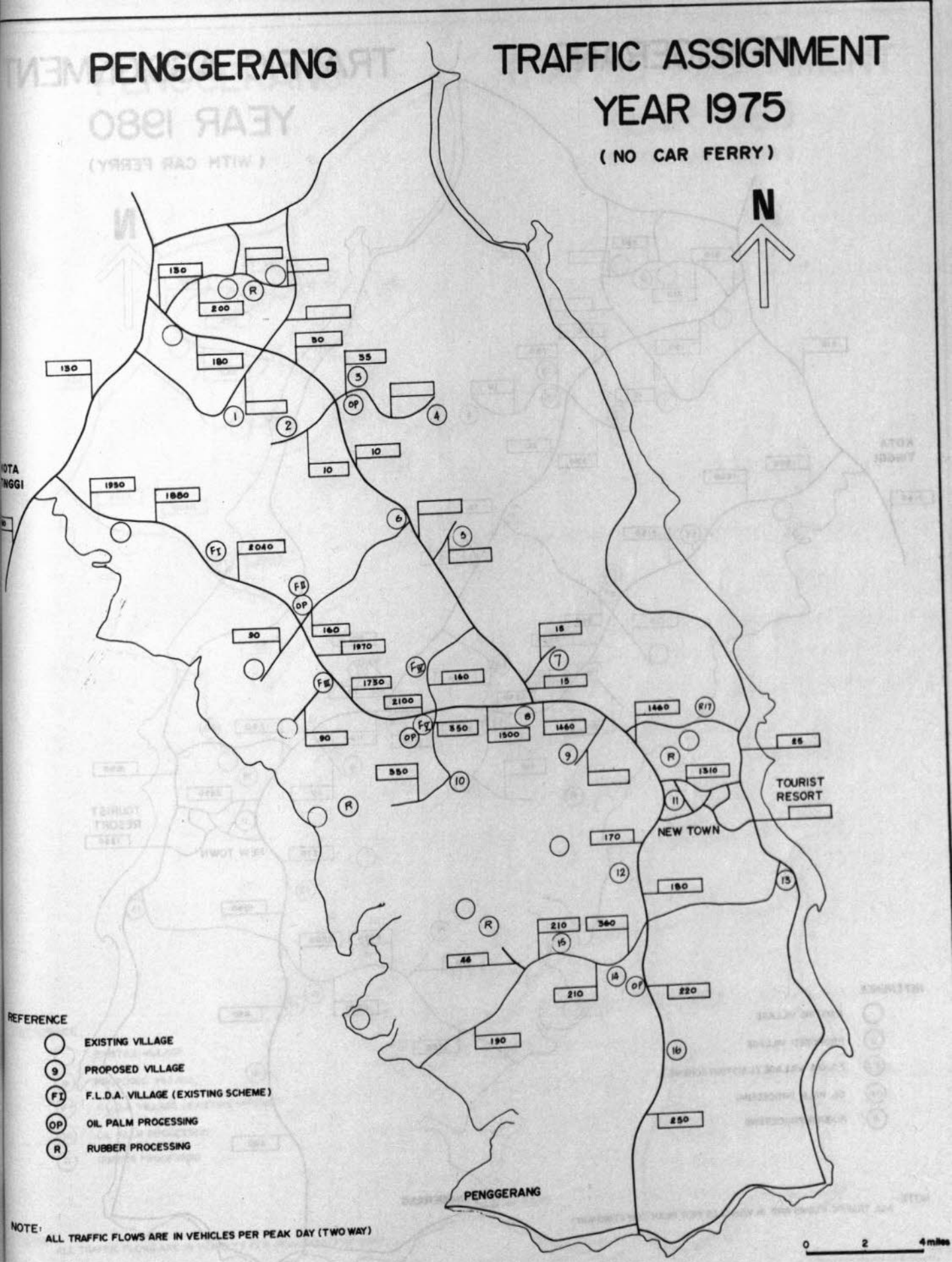
JOHOR TENGAH

PROPOSED ROAD NETWORK AND SOILS



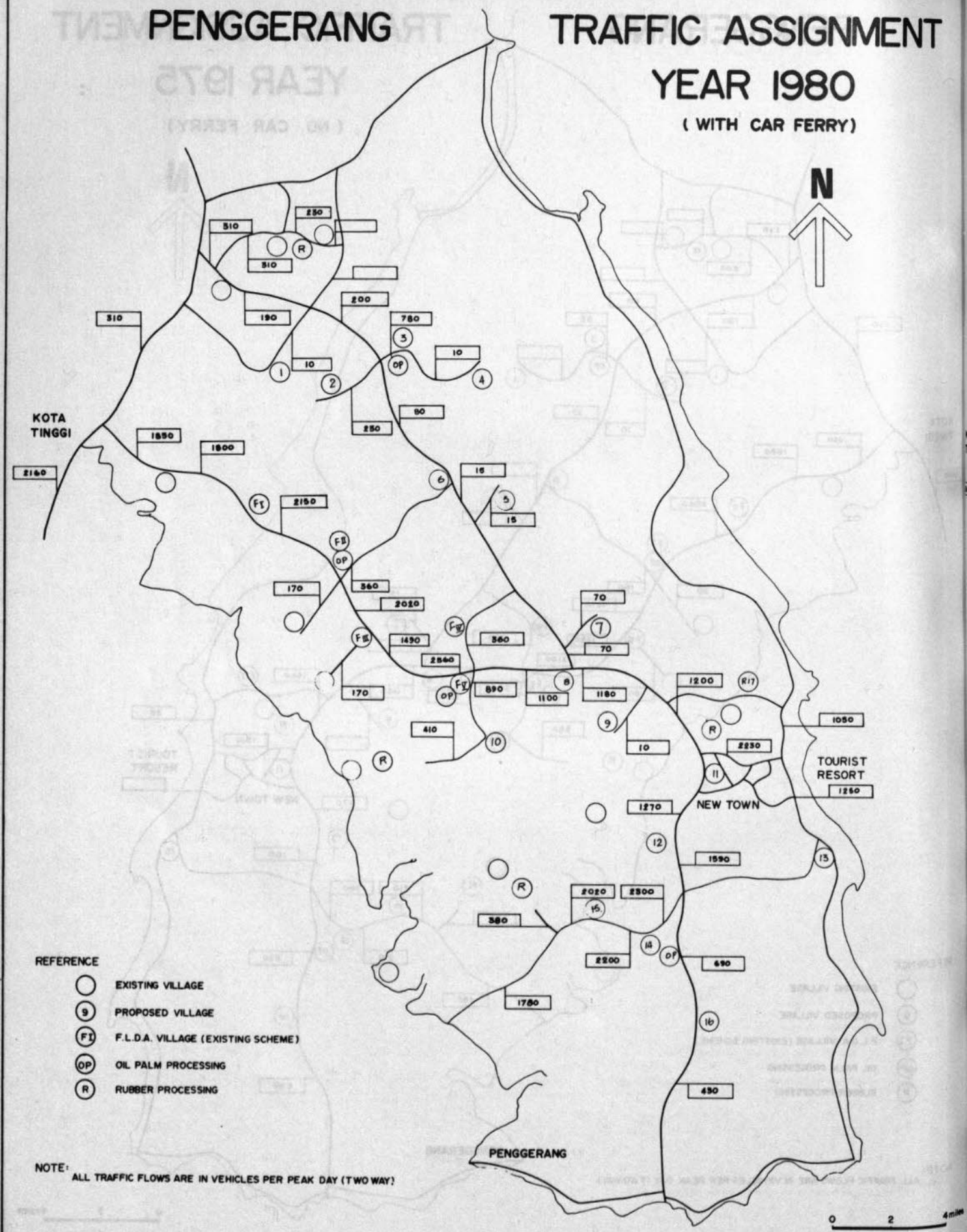


APPENDIX I


PENGGERANG
TRAFFIC ASSIGNMENT
YEAR 1975
(NO CAR FERRY)
N
TOURIST RESORT
NEW TOWN
PENGGERANG
REFERENCE
EXISTING VILLAGE
PROPOSED VILLAGE
F.L.D.A. VILLAGE (EXISTING SCHEME)
OIL PALM PROCESSING
RUBBER PROCESSING
NOTE: ALL TRAFFIC FLOWS ARE IN VEHICLES PER PEAK DAY (TWO WAY)
0 2 4 miles

PENGGERANG TRAFFIC ASSIGNMENT YEAR 1980

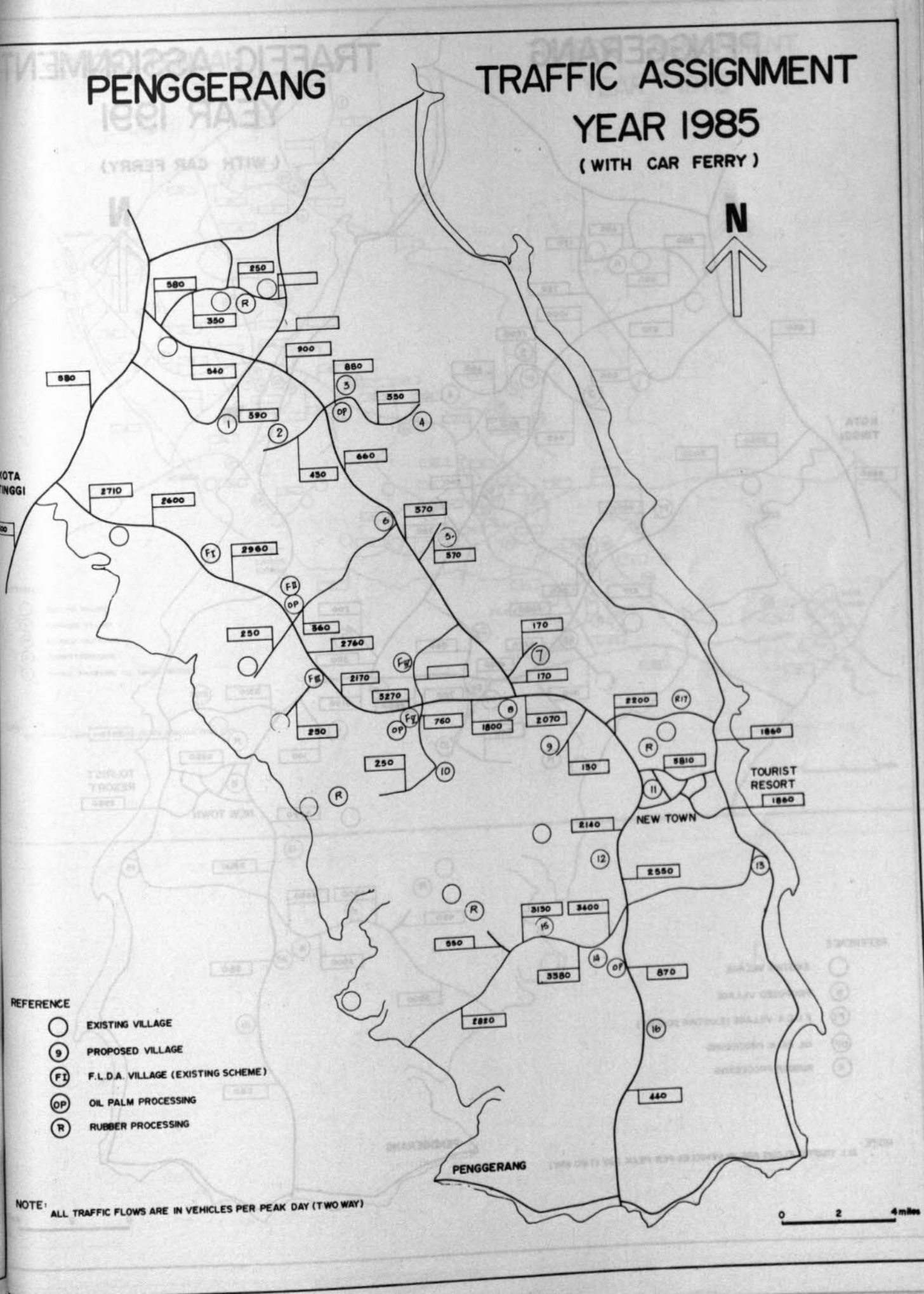
(WITH CAR FERRY)



PENGGERANG

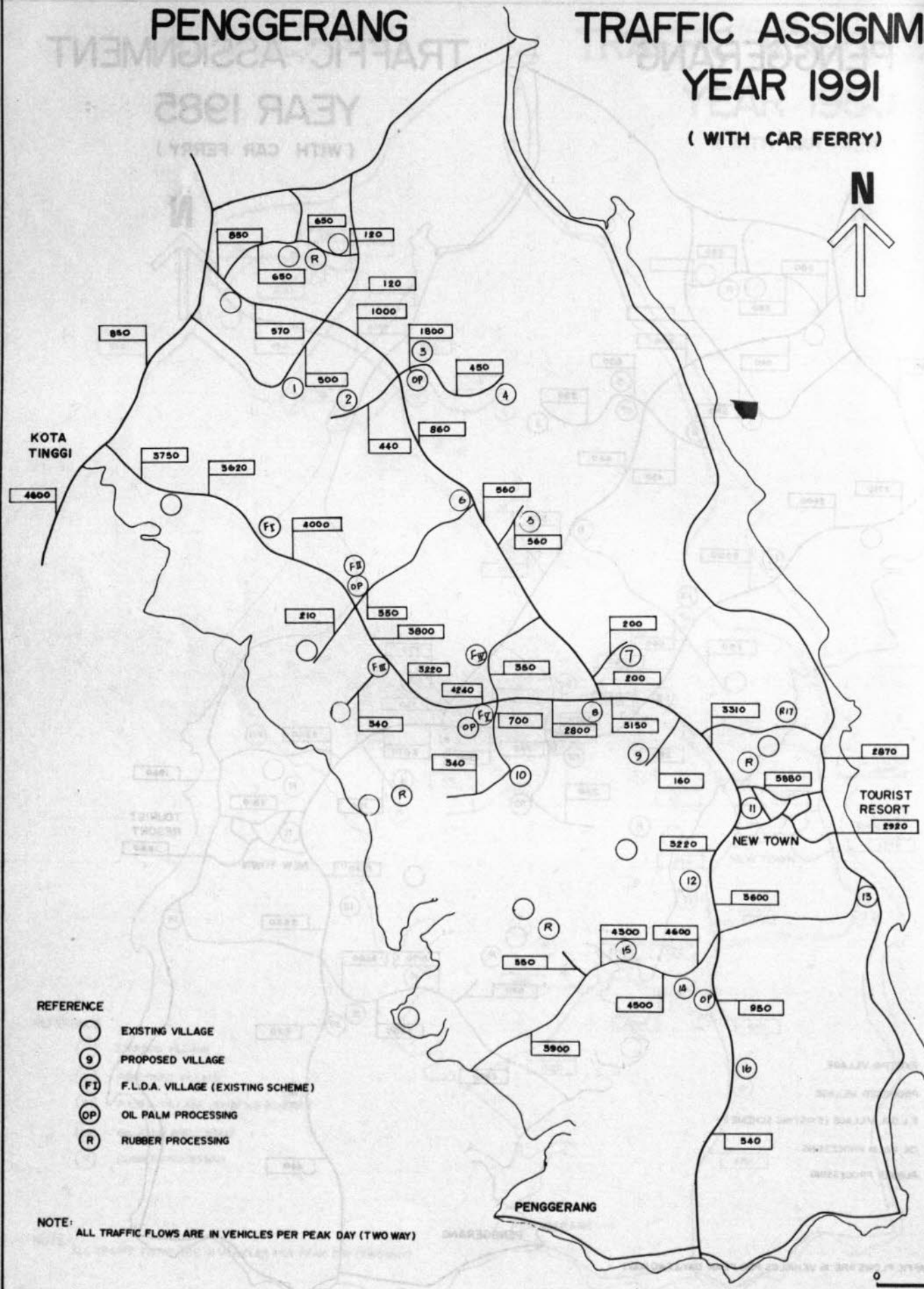
TRAFFIC ASSIGNMENT YEAR 1985

(WITH CAR FERRY)



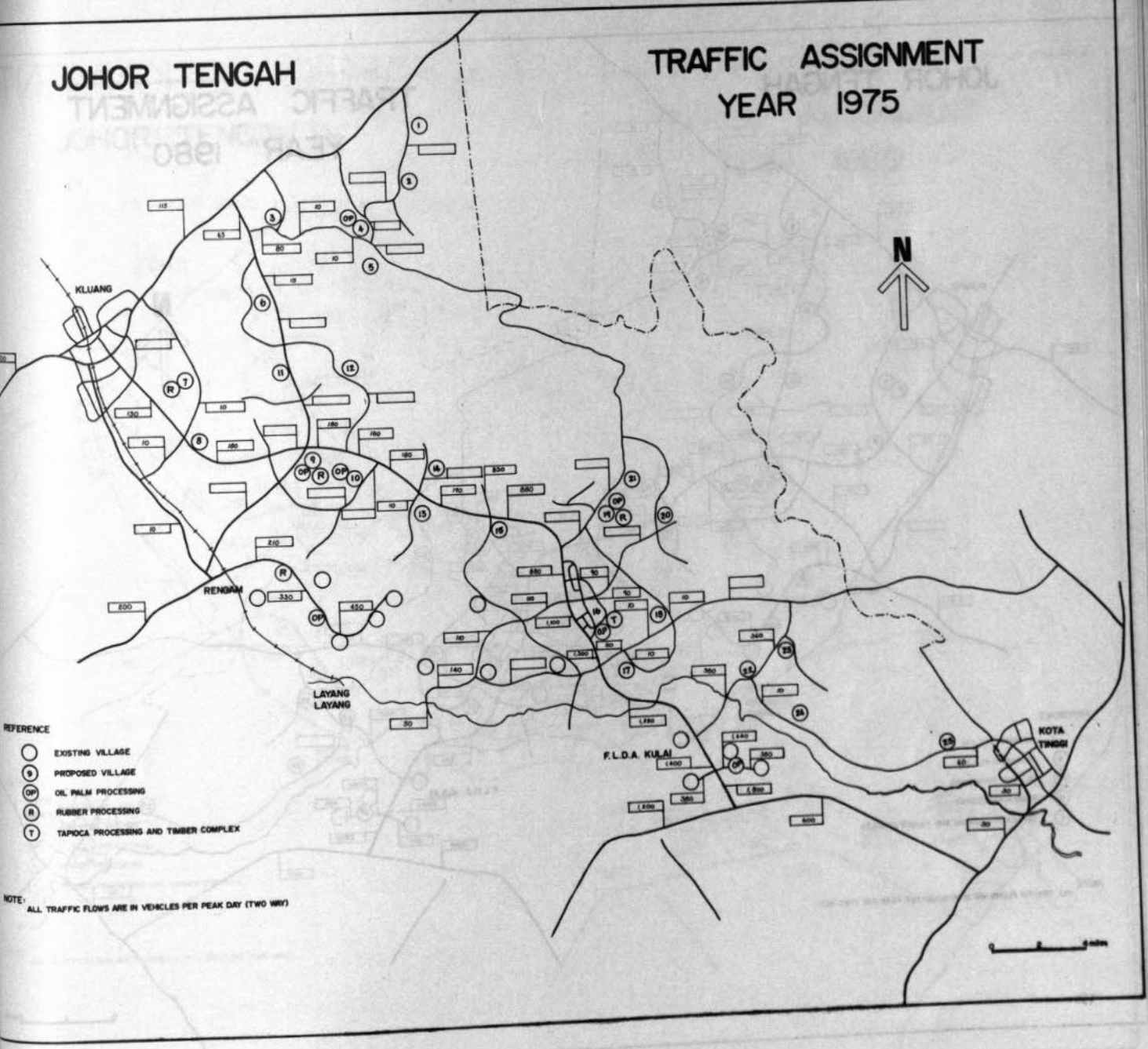
PENGGERANG TRAFFIC ASSIGNMENT YEAR 1991

(WITH CAR FERRY)



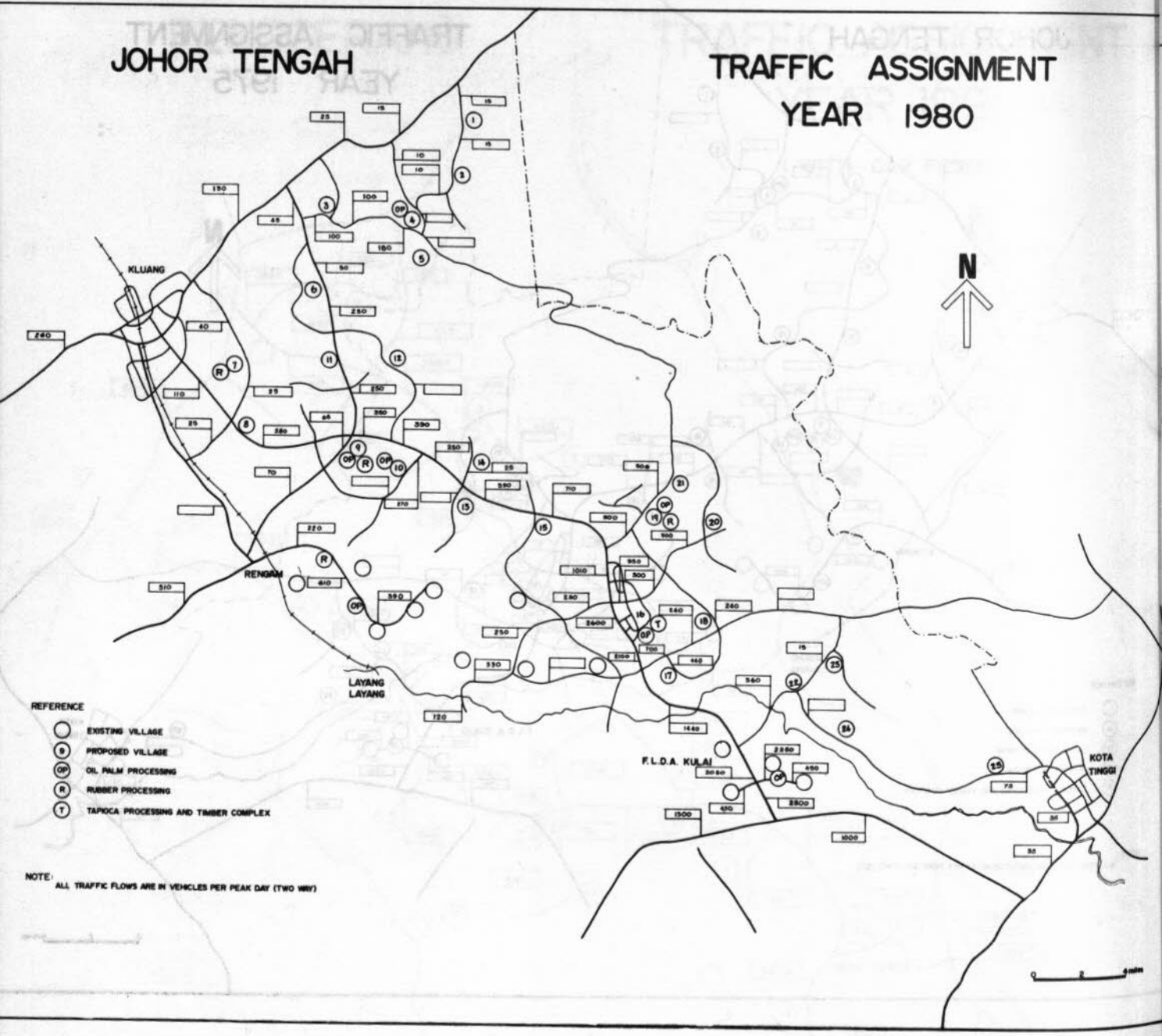
JOHOR TENGAH

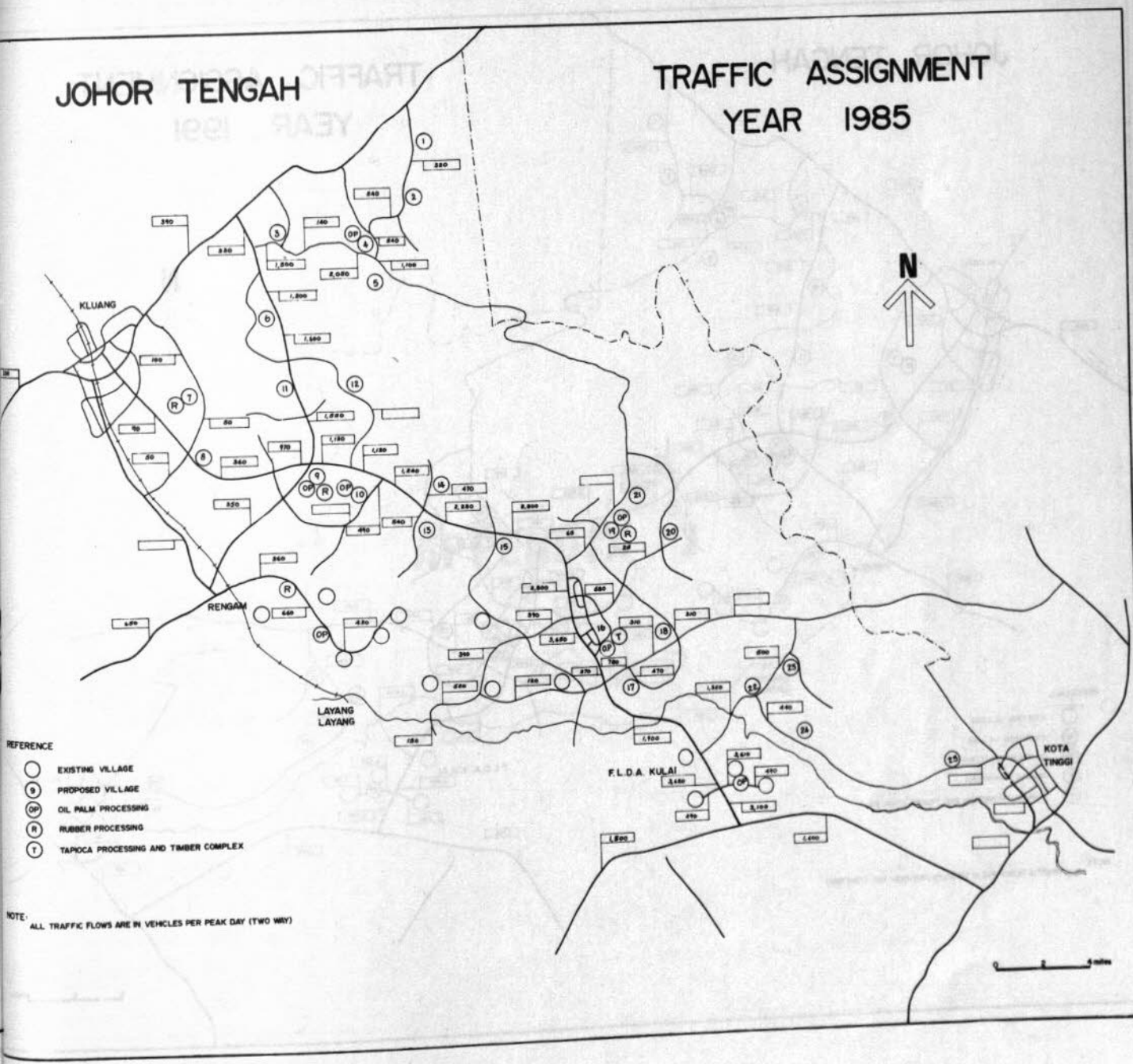
TRAFFIC ASSIGNMENT YEAR 1975



JOHOR TENGAH

TRAFFIC ASSIGNMENT
YEAR 1980

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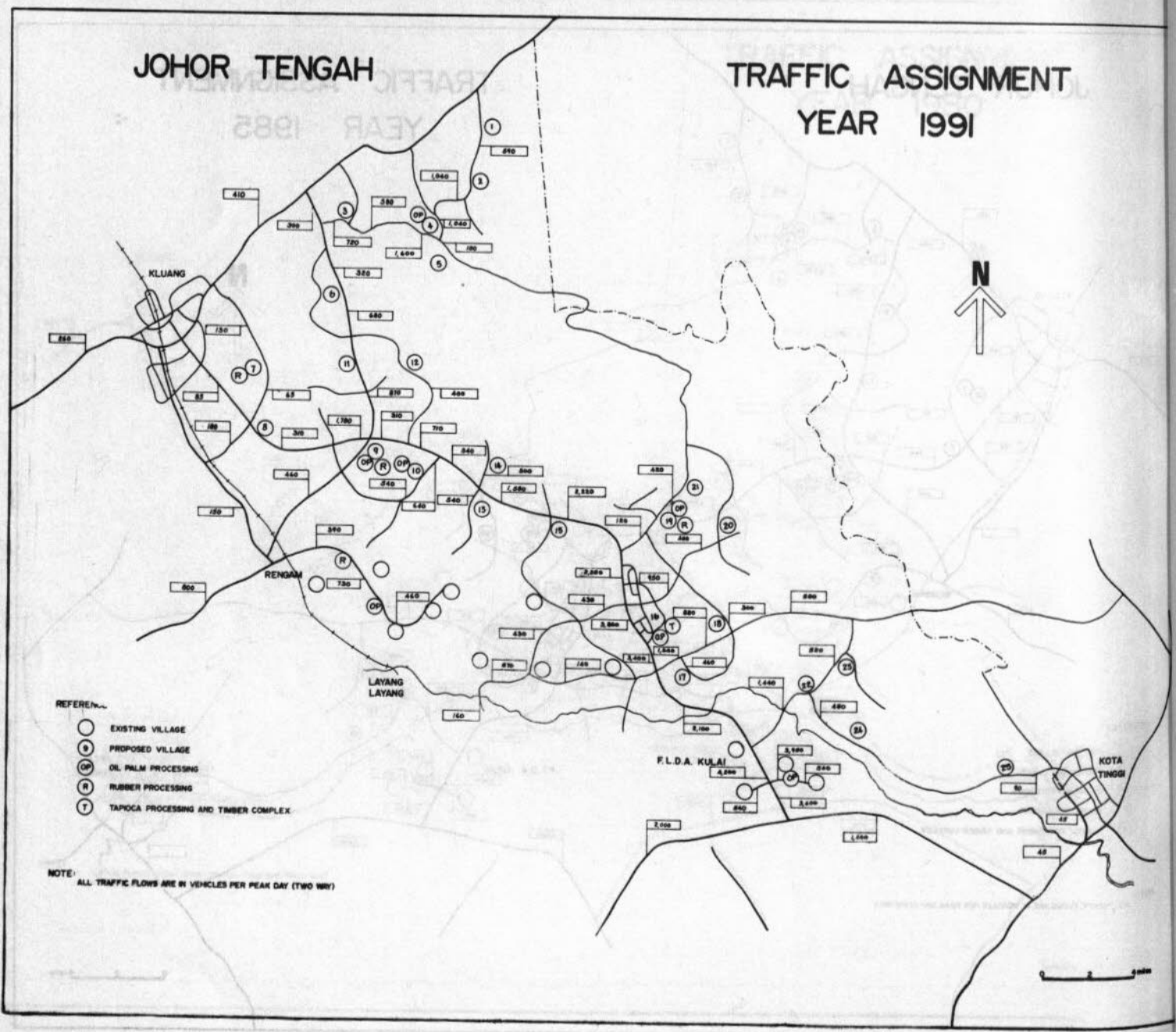
TRAFFIC ASSIGNMENT
YEAR 1985
N
KLUANG
RENGAM
LAYANG LAYANG
F.L.D.A. KULAI
KOTA TINGGI
REFERENCE
EXISTING VILLAGE
PROPOSED VILLAGE
OIL PALM PROCESSING
RUBBER PROCESSING
TAPIOCA PROCESSING AND TIMBER COMPLEX
NOTE: ALL TRAFFIC FLOWS ARE IN VEHICLES PER PEAK DAY (TWO WAY)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YEAR 1991
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RENGAM
LAYANG LAYANG
F.L.D.A. KULAI
KOTA TINGGI
REFERENCE
EXISTING VILLAGE
PROPOSED VILLAGE
OIL PALM PROCESSING
RUBBER PROCESSING
TAPIOCA PROCESSING AND TIMBER COMPLEX
NOTE:
ALL TRAFFIC FLOWS ARE IN VEHICLES PER PEAK DAY (TWO WAY)

APPENDIX J

APPENDIX J

TRAFFIC EXISTING ROADS 1969 - 1991

TABLE 5.10.1 Federal Route 1 North Of Kulai
Total Daily Traffic - 2 Way

	1969	1975	1980	1985	1991
Non-project	5,300	7,600	10,200	13,600	19,300
Project	-	400	600	900	1,100
Total	5,300	8,000	10,800	14,500	20,400

TABLE 5.10.2 Federal Route 1 South Of Kulai
Total Daily Traffic - 2 Way

	1969	1975	1980	1985	1991
Non-project	5,500	7,800	10,500	14,000	19,800
Project	-	1,600	1,900	2,400	3,100
Total	5,500	9,400	12,400	16,400	22,900

TABLE 5.10.3 Federal Route Mersing-Ayer Hitam
East of Kluang - Daily Traffic
- 2 Way Total

	1969	1975	1980	1985	1991
Non-project	1,000	1,400	1,900	2,500	3,600
Project	-	100	200	400	400
Total	1,000	1,500	2,100	2,900	4,000

TABLE 5.10.4 Federal Route Mersing-Ayer Hitam
West of Kluang - Daily Traffic
- 2 Way Total

	1969	1975	1980	1985	1991
Non-project	3,500	5,000	6,700	8,900	12,600
Project	-	200	300	300	300
Total	3,500	5,200	7,000	9,200	12,900

TABLE 5.10.5 Federal Route Mersing-Kota Tinggi-Johor Baharu North-East Of Kota Tinggi-
Daily 2 Way Total Traffic

	1969	1975	1980	1985	1991
Non-project	1,000	1,400	1,900	2,500	3,500
Project	-	2,100	2,200	3,300	4,600
Total	1,000	3,500	4,100	5,800	8,100

TABLE 5.10.6 Federal Route Mersing-Kota Tinggi-Johor Baharu South West Of Kota Tinggi-
Daily 2 Way Total Traffic

	1969	1975	1980	1985	1991
Non-project	2,000	2,800	3,700	5,000	7,100
Project (Penggerang)	-	2,100	2,200	3,300	4,600
Project (Tengah)	-	600	1,000	1,600	1,600
Total	2,000	5,500	6,900	9,900	13,300

TABLE 5.10.7 State Road Kluang-Rengam
Total Daily Traffic 2 Way

	1969	1975	1980	1985	1991
Non-project	2,500	3,600	4,800	6,400	9,100
Project	-	100	100	200	200
Total	2,500	3,700	4,900	6,600	9,300

TABLE 5.10.8 State Road Rengam-Simpang Rengam
Total Daily Traffic 2-Way

	1969	1975	1980	1985	1991
Non-project (estimate)	600	800	1,100	1,500	2,200
Project	-	200	300	600	800
Total	600	1,000	1,400	2,100	3,000

TABLE 5.10.9 State/Federal Road Kulai-Kota Tinggi
West Of F.L.D.A. Kulai - Total Daily
Traffic - 2 Way

	1969	1975	1980	1985	1991
Non-project	300	400	600	800	1,100
Project	400	1,200	1,300	1,500	2,000
Total	700	1,600	1,900	2,300	3,100

TABLE 5.10.10 State/Federal Road Kulai-Kota Tinggi
East Of F.L.D.A. Kulai - Total Daily
Traffic - 2 Way

	1969	1975	1980	1985	1991
Non-project	300	400	600	800	1,100
Project	100	600	1,000	1,600	1,600
Total	400	1,000	1,600	2,400	2,700

TABLE 5.10.11 New Road Car Ferry - Masai
Total Daily Traffic - 2 Way

	1969	1975	1980	1985	1991
Non-project	-	-	-	-	-
Project	-	-	1,800	2,800	3,900
Total	-	-	1,800	2,800	3,900

APPENDIX K

APPENDIX K

SECONDARY SCHOOL PUPILS AND CLASSROOM REQUIREMENTS - 1970-1990

TABLE 1. New Development Lower Secondary School Units Of 3 Classrooms

Johor Tengah	1970	1975	1980	1985
Kluang	3.5	9.0	25	50
Kahang Timor (North)	-	.3	1.4	3.3
Sembrong Tengah (West)	-	.2	0.7	2.5
Ulu Pengeli (West)	-	.9	1.7	5.4
Bandar Tengah (Central)	..6	1.6	5.5	10
Lubok Ajal	-	.6	1	3.1
FLDA Kulai (Bukit Besar)	2.2	5.5	8.75	6

Tanjong Penggerang	1970	1975	1980	1985
Kota Tinggi	-	2.6	4.5	-
Ayer Tawar II (West)	.7	1.3	3.6	5.1
Ayer Tawar V (West)	.75	1.4	4	6.6
Simpang Wa Ha (East)	-	1	1.85	5.5
K. Lo Heng Barat (East)	-	.2	.80	1.9
Bukit Aping (East)	.6	1	3	5
Sungei Mas (Coast)	.5	.9	2.7	4.6
Banda Lebam (Coast)	.5	1.7	5.9	14.7
Sungei Sening (Central)	.3	1	2.6	5.6

TABLE 2 Potential Lower Secondary Pupils In Existing Settled Areas

	1970-75	1976-80	1981-85	1986-90
Percentage Attendance	60	70	80	90
Kluang Mukim (72,000 population) (12,000 households)	5,800	6,700	7,700	8,600
Kluang District (60,000 population) (10,000 households)	4,800	5,600	6,400	7,200
Total Kluang District	10,600	12,300	14,100	15,800
FLDA KULAI COMPLEX (2000 households)	.400	1,000	1,400	1,260
Kota Tinggi Town (8,700 population) (1,450 households)	700	812	930	1,040
Rest of Kota Tinggi District excluding project regions. (22,800 population) (3,800 households)	1,800	2,130	2,600	2,740
Tanjong Penggerang Sub-Regions				
West (part of Kota Tinggi Mukim and Johor Lama). (9,600 population) (1,600 households)	770	900	1,020	1,150
East Sedili Besar (6,000 population) (1,000 households)	480	560	640	720
Central (Tg. Surat) (2,000 population) (370 households)	180	210	240	270
South (12,300 population) (2,050 households)	980	1,150	1,310	1,450

TABLE 3 Existing Areas Lower Secondary 3 Classrooms School Units Required

	1970+	1975+	1980+	1985+
Kluang	22	25	32	41
Kluang District excluding Project Area	18	23	27	34
FLDA Kulai	2.2	5.5	8.75	66
Kota Tinggi Town Rest of Kota Tinggi	2.6	3.0	3.9	5
District excluding Project Area	6.6	7.9	10	13
Tanjong Penggerang				
West	2.9	3.3	4.3	5.5
East	1.8	2.1	2.7	3.4
Centre	0.7	0.8	1	1.3
South	3.6	4.3	5.5	6.9

TABLE 4 Proposed Location And Number Of Lower Secondary School 3 Classroom Units Including Existing Provision

Johor Tengah	1970+	1975+	1980+	1985+
Kluang	25 + 9 =	34 + 25 =	59 + 32 =	91
Kahang Timor	-	-	-	3
Sembrong Tengah	-	-	-	3
Ulu Pengeli	-	-	2 + 3 =	5
Bandar Tengah	-	3 + 3 =	6 + 4 =	10
Bukit Besar	3 + 3 = 6		6	7

Tanjong Penggerang	1970+	1975+	1980+	1985+
Kota Tinggi (1)	6	8	13	19
Ayer Tawar II (2)	3	5	8	10
Ayer Tawar V	-	-	4	7
Bukit Aping (2)	1	1	3	5
Sedili Besar	-	-	3	3
Simpang Wa Ha	-	2	3	7
Sungei Mas	-	-	2	4
Bandar Lebam	2	3	6	15
Sungei Sening	-	2	3	7
Existing Village of South Penggerang	3	4	5	7

(1) Includes allowances for other developments in Kota Tinggi District example FLDA Bukit Besar.

(2) Includes allowances of gradual build up of use from existing areas where secondary school attendance has not personally been normal practice.

(3) Added to Simpang Wa Ha.

TABLE 5 Upper Secondary School Pupils

Tanjong Penggerang

Sub Region	1970–75		1976–80		1981–85		1986–90	
Kota Tinggi	1		14		68		231	
West (existing)	105		140	- 201(x)	175	- 430(y)	210	- 970(y)
West (proposed)	8	- 270	61		253		761	
East (existing)	150		200	- 240(x)	250	- 450(y)	300	- 980(y)
East (proposed)	4		40		200		681	
Coast (proposed)	5		49		238 (388)		836 (1036) (y)	
Central (proposed)	4	- 370 (b)	34	- 253(x)	152	- 231(x)	485	- 585 (y)
Central (existing)	50		70		80		100	
South (existing)	310		410 (310)		510 (360)		610 (410)	

Johor Tengah

Sub Region	1970–75		1976–80		1981–85		1986–90	
Kluang (a)	15		140	- 150	675	- 767	1,710	- 1,825
North	-		2		24		115	
West	-		8		68		287 (x)	
Centre	6		47		210 (x)		676	
East	-	- 42 (c)	4	- 211(x)	31	- 531(y)	127	
FLDA Kulai Complex	36		160		500		600	

Notes:

x = New school established.

y = Major extension to school.

(a)= Includes only requirements of new population, and does not include existing population of town and area served.

(b)= to Sungei Rengit.

(c)= to Kulai/Kota Tinggi.

TABLE 6 Proposed Upper Secondary Schools. Total Classrooms Required In Addition To Existing Facilities

	1975–80	1981–85	1986–90
Ayer Tawar II	2	5	14
Simpang Wa Ha	2	5	14
Bandar Lebam	2	5	14
Bukit Sening	-	3	8
Bukit Besar	2	6	9
Bandar Tengah	-	4	10
Sembrong Tengah	-	-	4
Kota Tinggi	-	-	2
Kluang	1	10	26

TABLE 7 Potential Upper Secondary School Pupils In Existing Settled Areas 1970 - 1990

Percentage Attendance	30	40	50	60
	1975	1980	1985	1990
Kluang Mukim				
Population 1970 = 72,000 Households 1970 = 12,000 Age group children per household (0.5)	2,000	2,400	3,000	3,600
Rest of Kluang District				
Population 1970 = 60,000 Households 1970 = 10,000 Pupils 0.5 per household	1,500	2,000	2,500	6,600
Total Kluang District	3,500	4,400	5,500	6,600
Classrooms required	38	49	68	94
Kota Tinggi District				
Rest of district excluding project regions and Sedili Besar including existing town Population 1970 = 30,000 Households 1970 = 5,000 Age group children per households (0.5)	750	1,000	1,250	1,500
Classrooms Required	8	11	16	21
Kluang and District Total Classrooms	38	50	78	120
Kota Tinggi	8	11	16	23
Southern Penggerang				
Pupils	310	310	510	610
Classrooms	3	3	6	8

TABLE 8

Sixth Form Pupils

1. Pupils From Existing Areas Excluding Project Regions And Future Growth

	1970	1975	1980	1985	1990
Kluang District	150	150	200	250	660
Kota Tinggi District	75	75	100	125	150

2. Future Pupils Johor Tengah

Kluang	-	50	250	1,000	2,500
Johor Tengah (North)	-	-	-	2	8
Johor Tengah (West)	-	-	1	5	21
Johor Tengah (Central)	-	1	3	16	42
Johor Tengah (East)	-	-	-	2	9
FLDA Kulai	1	4	16	50	60

3. Future Pupils Tanjong Penggerang

Kota Tinggi	-	-	1	5	15
West Existing	10	10	14	18	21
West Proposed	-	1	4	19	46
East Existing	15	15	20	25	30
East Proposed	-	-	3	15	45
Coast	-	-	3	18	54
Central Proposed	-	-	2	11	31
Central Existing	5	5	7	8	10
South Existing	31	31	41	51	61

4. Pupils At Schools

Kluang	150	200	451	1,257	3,189
Kota Tinggi	100(c)	101(c)	142(c)	207	307
Bandar Tengah	1(a)	5(a)	19(a)	68	111
Bandar Lebam	36(b)	36(b)	53(b)	88	156

Notes:

(a) These pupils will have to travel to Kulai or Kota Tinggi, or board in Johor Baharu.

(b) Temporary facilities at Sungei Rengit, or boarding in Johor Baharu necessary.

(c) These numbers will not be realised until adequate communications exist in Tanjong Penggerang and adequate subsidised bus services etc. But as these problems are alleviated, there will be an advantage in starting a sixth form in Kota Tinggi in the next few years.

TABLE 9 Sixth Form Classrooms Required

	1970+	1975+	1980+	1985+
Kluang	3	6	21	64
Kota Tinggi	2	2	4	6
Bandar Tengah	-	-	2	2
Bandar Lebam	-	-	2	3

TABLE 10 Existing Secondary School Provision 1970

Place	Pupils	Pupils per class	Classes	THEORETICAL Classes/Day	Classroom
Kluang and nearby	4,200	25	170	2	85
Kota Tinggi	1,400	25	54	2	27
Sungei Rengit	428	25	17	2	9

APPENDIX L

APPENDIX L

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APPENDIX M

APPENDIX M

OTHER CAPITAL COSTS

M.1 Housing

Item	Cost in $	Sources	Notes
FLDA Settlers Houses	1,500	FLDA/JKR	Includes latrine, surface drainage works, etc.
Site Levelling, etc.	30		
Felling, stumping, etc.	70		
	1,600		
Temporary Staff Quarters	2,600	- do -	Includes conversion costs to Driver's Accommodation.
Managers House	18,500	- do -	Includes furniture, fixtures and fittings and all development costs for each scheme
Assistant Manager	10,000	- do -	
Senior Supervisors & Clerks	6,100	- do -	
Field and Settler Development Assistants	5,400	- do -	
Mill Engineers' quarters	27,000	- do -	each mill
MARA Self-build Type A	2,200+	MARA	Excludes labour costs, but includes site work and land costs
prefabricated houses Type B	2,800+		
Self build timber construction	1,000+	Project enquiries	Excludes labour and land costs but includes site works, etc.

M.2 Offices and ancilliary equipment

FLDA Permanent Office and Garage	15,600	FLDA	Includes furniture, fixtures etc.
Temporary Offices	4,000	- do -	Each scheme, includes late conversion costs ($300) to Store. Residual Value 5 years $4000
Land Rover	9,200	- do -	
Tractor	15,000	- do -	
Generator	15,000	- do -	- do - $2500

M.3 Shops and banks

FLDA Cooperative	7,000	FLDA/JKR	Each scheme
Temporary shops	7,000	- do -	Includes land and site preparation and services, excludes fixtures, furniture fittings.
Shop Houses in Terrace	15,000+	JKR & Project Enquiries	
Banks in Shop House	22,000+	- do -	