STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK FOR THE GOVERNMENT OF MALAYSIA

SUMMARY

March 1992

JAPAN INTERNATIONAL COOPERATION AGENCY

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Preface

In response to a request from the Government of Malaysia, the Government of Japan decided to conduct a study on establishment of High Techonology and Electronic Industrial Park in Kulim and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Malaysia a study team headed by Mr.Hideki SATO, Nippon Koei Co., Ltd., five times between March 1991 and March 1992.

The team held discussions with the officials concerned of the Government of Malaysia, and conducted field surveys at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

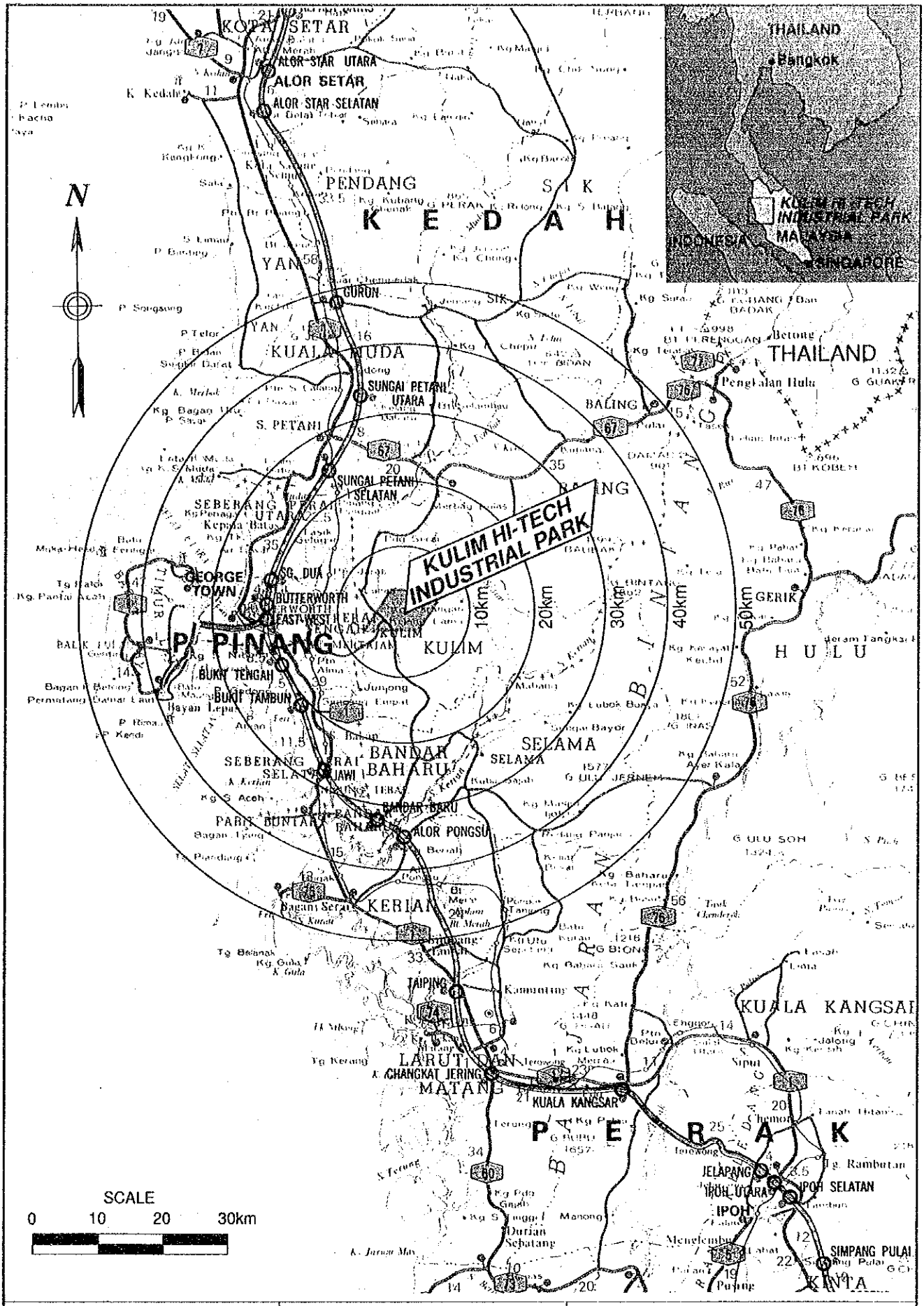
I hope that this report will contribute to the promotion of the project and the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Malaysia for their close cooperation extended to the team.

March 1992

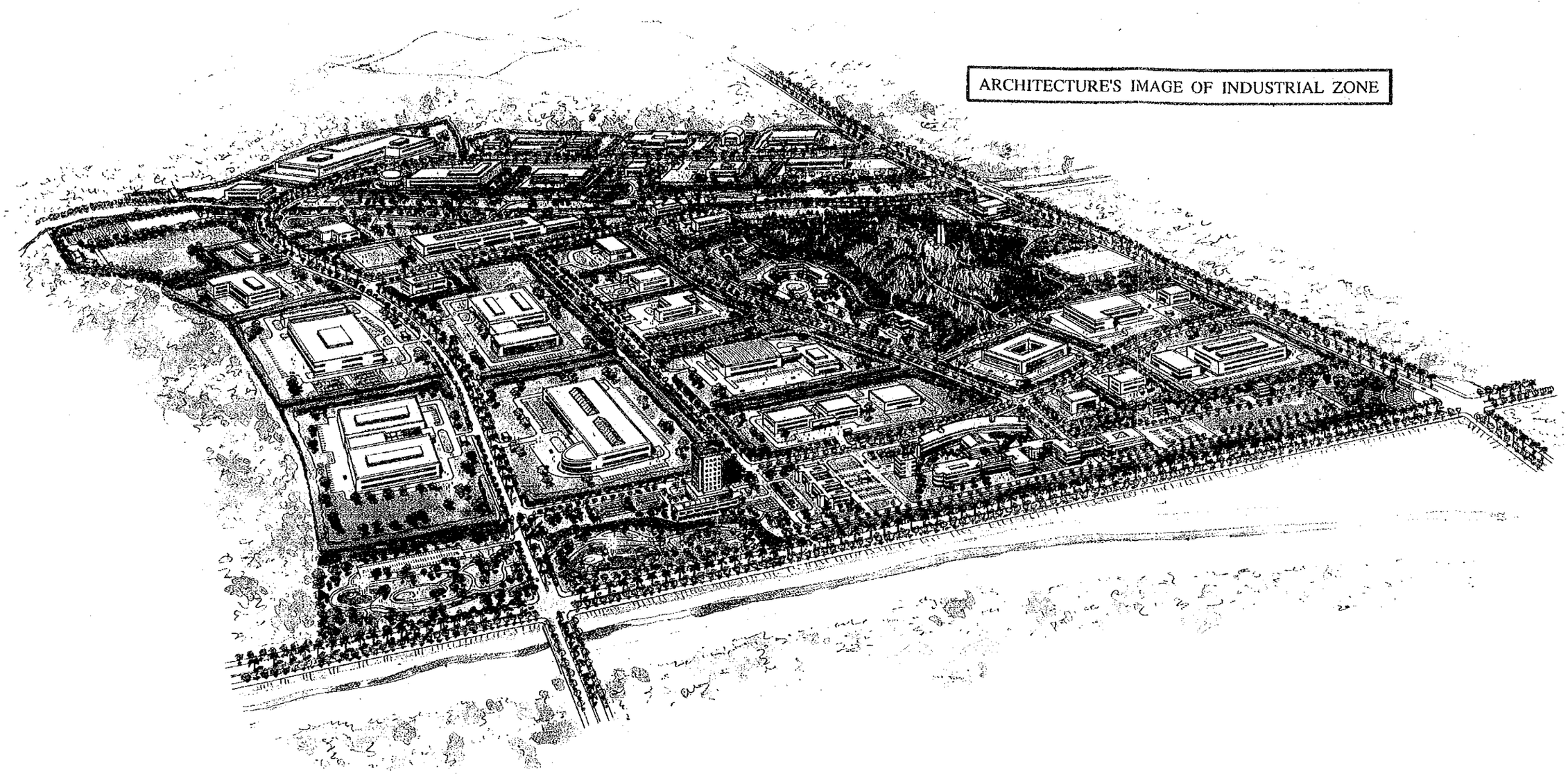
Kensuke Yanagiya

Kensuke YANAGIYA
President
Japan International Cooperation Agency



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Location Map

ARCHITECTURE'S IMAGE OF INDUSTRIAL ZONE



The Study Reports of Kulim Hi-Tech Industrial Park consist of the following four (4) volumes.

Volume 1 : SUMMARY

Volume 2 : MAIN REPORT

Volume 3 : ANNEX

Volume 4 : GUIDELINE (DRAFT) FOR BASIC PLAN AND DESIGN OF HI-TECH INDUSTRIAL PARK

This is the Volume 1 : SUMMARY

Principal Features
of
First Phase Hi-Tech Industrial Zone

1. Project name	:	Kulim Hi-Tech Industrial Park Project
2. Administrative body	:	KSDC (Kedah State Development Corporation) / EPU (Economic Planning Unit of Prime Minister's Department)
3. Location	:	Kulim District, Kedah State 30 km from Penang, 106 km from Alor Setar
4. Development area		
1) Total area	:	1,450 ha
2) First phase industrial zone	:	250 "
3) Land use plan of 1st phase industrial zone		- Factory lot 137.0 ha (55 %) - Urban block 14.5 " (6 ") - R & D block 8.7 " (3 ") - Utilities 56.3 " (22 ") - Parks/Greenery 33.5 " (14 ") Total 250 ha (100%)
5. Targetted industry	:	First phase - Electronics and mechatronics based industries. Second phase - Bio-technology and new materials based industries
6. Population projection	:	47,000 of overall, and 19,700 of 1st phase
7. Implementation plan	:	1992 - 1994 for 1st phase
8. Topography	:	Gentle slope, less than 10 % of gradient and EL. 30 to 40 m (1st phase industrial zone)
9. Geological condition	:	Clayey silt and sandy silt, N value is more than 10 at 3 m of depth below ground
10. Related infrastructures		
1) Transportation		
- Road	:	20 minutes to Penang by car upon completion of East-West highway in 1993. Close to North-South Expressway
- Seaport	:	25 km to Penang port
- Airport	:	30 km to Penang international airport
2) Power supply	:	Transmission line of 132 kV with 2-route, 4-circuit (ring system) Substation of 132/33/11 kV and 90 MVA for 1st phase
3) Water supply	:	Supply capacity of 27,000 m^3/day
4) Telecommunication	:	Telephone 900-line in 1993, 5000-line in 1996
5) Drainage	:	20 years return period, 100 years for retention pond
6) Sewerage	:	Separate system with central treatment plant
7) Industrial solid waste	:	Temporary storage site of 10 ha with for 25 years capacity
11. Labour force	:	Skill development center, politeknik, university
12. Investment promotion	:	MIDA's international network

STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Background of the Study

The Government of Malaysia (hereinafter called "GOM") intends to promote value-added industrialization and introducting of high-technology industry during the period of the Sixth Malaysia Plan, 1991 to 1995. Accordingly, GOM has executed the Study on Selected Industrial Product Development in Malaysia under technical assistance from the Japan International Cooperation Agency (hereinafter called "JICA") in the three-year period from 1988 to 1990. Through discussions between GOM and JICA during this study, GOM strongly wished to promote the establishment of Kulim Hi-Tech Industrial Park as a pioneer project and requested the Government of Japan to provide the technical assistance.

The Governments of Japan and Malaysia agreed to take the following actions:

(1) GOM requested UNIDO to formulate the concept plan of the Kulim Hi-Tech Industrial Park.
(2) GOM requested the Government of Japan to carry out the study for the planning and designing the physical components within the Industrial Zone based on the concept plan prepared by the UNIDO study team.

The UNIDO study team completed the Concept Plan Report in March 1991 and presented to GOM. Following the UNIDO Study, the Government of Japan sent the JICA Study Team to Malaysia to carry out the planning and designing the physical component within the Industrial Zone.

1.2 Objectives and Scope of the Study

(1) Objectives of the Study

The objective of the Study is to assist GOM to establish High Technology and Electronic Industrial Park in Kulim and to transfer the planning technique of the estate through planning and designing the physical components within the Industrial Zone of the Park in collaboration with GOM.

(2) Scope of the Study

The JICA Study Team shall concentrate on planning and design of the physical components within the Industrial Zone of the Park in collaboration with GOM, while GOM shall be solely responsible for planning and design of the physical

components outside the Industrial Zone.

(3) Outline of the Study

1) Review of the concept plan and conceptual layout plan available
2) Planning and designing the physical components within the Industrial Zone
3) Advice on the development plan of the Park other than the Industrial Zone
4) Advice on the development of related infrastructures outside of the Park

The Study was conducted by the Team in collaboration with GOM's counterpart personnel during March 1991 and March 1992, and the progress reports of (1), (2), (3) and draft final report were presented to GOM in March, July, September and December 1991 respectively.

However, it is noted that planning and designing for outside the industrial zone had commenced the study in October 1991 and being conducted by Malaysian side. Accordingly, a some minor deviation appear between both study teams of JICA and GOM due to the time lag of the study. In this final report, therefore, particular items on the study has been modified to avoid the such deviation according to the agreed minutes by GOM and JICA on the Techinical and Steering Committee Meetings in January 23rd and 25th 1992 at K.L. due to the time constraint. Parameter of population projection, zoning plan and housing scheme were used the JICA's study results.

2. BACKGROUND OF THE PROJECT

2.1 National Development Policy

The Government of Malaysia (GOM) intends to promote and accelerate high value-added industrialization and research and development (R & D) activities as well as introduction of high technology industry during the period of the Sixth Malaysia Plan, 1991 to 1995 (hereinafter called "the Sixth Plan").

The Sixth Plan is the first phase in the implementation of the Second Outline Perspective Plan (OPP2), 1991 – 2000, under the National Development Policy (NDP). The main thrust of the Plan is to sustain and manage the growth momentum and manages it successfully so as to achieve the objective of balanced development as enunciated in NDP. The emphasis on 'balanced development' is based on the recognition that while there has been progress in economic growth and distribution, the quality of the growth process needs to be improved to make it more broad-based.

With the launching of the Sixth Plan, Malaysia now stands poised for another period of sustained social and economic development in the nineteen-nineties. Since independence in 1957, the country has achieved remarkable progress in transforming the economy and raising the standard of living of the people through a series of five-year development plans under the New Economic Policy (NEP). Building upon the ongoing thrust of NEP to eradicate poverty and restructure society, NDP will encompass the following principal aspects:

- promote and strengthen national integration by reducing the wide disparities in economic development between states and between urban and rural areas in the country;
- promote human resource development including creating a productive and disciplined labour force and developing the necessary skills to meet the challenges in industrial development through a culture of merit and excellence without jeopardizing the restructuring objectives;
- make science and technology an integral component of socio-economic planning and development, which entails building competence in strategic and knowledge-based technologies, and promoting a science and technology culture in the process of building a modern industrial economy; and
- ensure that in the pursuit of economic development, adequate attention will be given to the protection of the environment and ecology so as to maintain the long-term sustainability of the country's development.

The role of science and technology as an important tool for economic development has been repeatedly stressed in the Fifth Malaysia Plan, 1986 - 1990, with a view toward increasing overall productivity and developing a strong industrial foundation. In this connection, high technology and strategic hi-tech oriented programmes that are expected to expand industrial capacity and enhance the technological capability of the country were sought.

Although efforts are being made to foster and upgrade indigenous capacity and competence in scientific and technological innovation, strong linkages between the private and public sector are not fully developed. The development of a hi-tech industrial park will provide one of the necessary ingredients in achieving this objective. Thus, the development of Kulim Hi-Tech Industrial Park is the first step towards achieving this target.

2.2 Socio-Economy

According to the population census of 1980, the total population of Kedah was 1,118,000 which increased from 989,000 in 1970. The population of Kedah in 1990 is presumed to be 1,620,000.

The state government has recently been launching a development strategy to emphasize a diversification policy, particularly in the manufacturing sector. To enhance a development drive for the industry sector, the Kedah state has strived to provide good infrastructures and has established six industrial estates to accommodate foreign and local investment in the state.

As a growth centre in the north of the country, Kedah enjoys better industrial infrastructures such as close proximity to Penang airport and port, cheap and still abundant workforce, and competitive prices for industrial estates. This can be illustrated in the recent increase in number of investment projects approved by MIDA (Malaysian Industrial Development Authority). As far as the number of projects are concerned, it increased from 12 in 1986 to 33 in 1989, while the amount of investment grew from M$32.8 million in 1986 to M$600 million in 1989. For 1990 the number of projects has already increased to 32 while the volume of investment amounted to M$3,705 million as of July.

In terms of industrial sub-sectors, electrical, transport equipment, textile, and rubber industries are the major manufacturing fields. Taiwan, Japan, UK, Singapore, and Hong Kong are prominent foreign investors.

In view of the strategic position of Kedah, it is expected that the growth of the state economy, especially the manufacturing sector, would continue to advance significantly.

2.3 Natural Condition

The proposed site for the Kulim Hi-Tech Industrial Park, is located about 26 km east of Butterworth, 5 km northeast of Kulim city of Kedah State, and near the existing Kulim industrial estate.

The Park is located on a gentle sloped area. The highest hill is EL.60.96 m (200 ft) in the Hi-Tech Industrial Zone of 250 ha. Two (2) small tributaries (S. Parit Bunian & S. Ayer Merah) run through the site. The lower flat land at EL.30.48 m (100 ft) is also extended widely. The proposed site is utilized as rubber and palm oil plantations at present. According to geological investigations the subsoil in the proposed site is composed of clayey and sandy silt. The rainfall pattern is heavy from April to May and from September to November. The mean annual rainfall is 2,686 mm. The temperature at Penang is 27°C – 30°C, and relative humidity is 70% – 90%.

2.4 Present Condition of Infrastructure

(1) Transportation Network

Federal Route No. 1 runs through the west side of Peninsular Malaysia from Johor Bahru, to Bukit Hitam, via Kuala Lumpur and Butterworth. The road length from Kuala Lumpur to Butterworth is 369 kilometers. The North – South Toll Expressway, just under construction, but partially opened, will be one of the most important transport network within the Peninsular Malaysia and mostly run along Federal Route No. 1. East – West Highway is planned from Butterworth to Kota Bharu. The construction of the section from Butterworth to Titi Karangan (approx. 34 km) will be completed by the end of 1993. After completion of this section, it is supposed to take about 20 minutes to Butterworth.

The nearest airport is Bayan Lepas International Airport. Cargo terminal expansion of the airport is under way. Facilities of the airport will be enough for the proposed Estate to import materials and equipment and to export products.

The nearest seaport is Penang Port, which is located in the towns of Butterworth and Georgetown, and is one of the premier seaports in the ASEAN region. The new container terminal will be operational from the beginning of 1994.

The railway near the proposed Park runs from Singapore to Bangkok via Butterworth. The line has cargo handling services at Butterworth station, but

without an unloading facility.

(2) Power Supply System

- As firm capacity, 149 MVA. Double circuit by using 300 sq. mm ACSR
- 27 MW at present demand. However, 54 MW is forecasted at the end of this century.
- It seems that the substation does not have enough space for a 132 KV switchgear extension. Land acquisition of the adjacent area may be required for this project.
- Almost all protective relay equipment is of electromagnetic type (mechanical type)

(3) Water Supply System

1) Present water supply system

The water supply systems are managed by PWD. The present water supply facilities for Kulim comprise mainly intake, treatment plant, service reservoir, and distribution main. The summary of the water supply systems is as follows:

(A) Pinang Tungal Water Treatment Plant

Source : Sungai Muda
Intake : Pinang Tungal
Treatment Plant
- Location : Pinang Tungal
- Type : Rapid sand filtration
- Capacity : 27.2 Mld

(B) Wang Pinang Water Treatment Plant

Source : Sungai Kulim
Intake : Wang Pinang
Treatment Plant
- Location : Wang Pinang
- Type : Rapid sand filtration
- Capacity : 30.0 Mld

2) Unaccounted for water

Unaccounted for water or non revenue water (NRW) of water supply systems in the district of Kulim/Bandar Baru was estimated at a high rate of 57 % in 1987 of which 50 % was leakage.

3) Water quality

The river water quality satisfies the WHO standard of raw water for drinking. Raw water is treated so as to meet the WHO standard. It is treated again by each company if necessary to satisfy the quality for

industrial use.

4) Water demand and supply balance

There has been no problem of water shortage in recent years thanks to abundant water resources. The Service factor to the total population of Kulim is said nearly 100 % at present.

(4) General Condition of Telephone Services

Using ratio of exchange terminal capacity is good enough in both Kedah and Malaysia. Cable pair capacity is also enough for the whole nation.

In Kulim, 4,500 subscribers are provided by 6,000 exchange terminals. The using ratio of 75 % is higher as compared with 61% for the whole of Malaysia. The ratio should be around 60% taking into account allowance.

The answered ratio of 38% in 1990 indicates considerable progress compared with 19% in 1983. But in comparison with targeted international value of 75%, it is still low.

(5) Drainage and Sewerage System

1) Drainage System

- The Ayer Merah River originates in the western boundary of the site and the Parit Bunian River originates in the eastern boundary.
- The existing capacity of both rivers is not large enough for the discharge of peak flow upstream, (present return period is less than 2 years) so this area has frequently suffered from floodinging.

2) Sewerage System

- There are not any public sewerage facilities in Kulim.
- As for industrial waste water, an Individual Treatment system is adopted in Malaysia.

(6) Industrial Waste Management

1) Industrial Solid Waste

- Lack of facilities for centralized treatment, storage and disposal of toxic and hazardous wastes is becoming a serious social problem, for instance, the problem of building a toxic waste disposal plant has been a serious issue.
- Basically all industrial solid wastes are kept in drums and stored at factory lots regardless of toxicity according to DOE's instruction.

2) Municipal Solid Wastes

- Kulim Local Council is responsible for municipal solid waste disposal.
- Kulim Local Council has an open dumping site.

3. OVERALL PLAN

3.1 Basic Concept of Kulim Hi-Tech Industrial Park

UNIDO Report proposed the concept plan and type of Hi-Tech Industrial Estate/Park. The JICA Study Team has accepted the concept plan of the UNIDO Report upon its review and requested the Malaysian side to prepare the Master Plan on the whole Park in parallel with the JICA Study.

Generally, a so called hi-tech park or science city is planned based on a development policy taking into consideration the following factors.

1) Infrastructures
2) Human resources
3) Industrial concentration
4) Academia and research organization
5) Urban amenity
6) Living condition
7) Natural environment, etc.

As for Kulim, there are some advantages and disadvantages as follows:

Advantages:

- convenient transportation network
  - * East-West Highway
  - * airport
  - * seaport
- concentration of industries
  - * existing industrial estates
  - * existing electric and electronics industries in Penang

Disadvantages:

- lack of the availability of highly developed academic and research functions
- shortage of skilled manpower
- lack of high-grade amenity

The introduction of R&D type to Kulim might be difficult due to the lack of conditions required by R&D type. Therefore, it is proposed that the type of Kulim Hi-Tech

industrial Park and the development strategy are as follows:

- In short-term : production oriented type
  Concentration on inducing hi-tech production factories which include the product development function
- In long-term : R & D and production combined type
  Private R & D industries will be induced.

3.2 Basic Development Policy

The development plan for Kulim Hi-Tech Park is formulated in line with three basic development policies given below:

- To establish a growth center for an advanced industrial structure
- To create new industries and new job opportunities
- To provide a favorable environment

3.3 Target Industry

Target industries were proposed in the UNIDO Report based on the reports by the Office of Technology Assessment, USA and MITI, Japan. The target industries for the Kulim Hi-Tech Industrial Park are as follows:

First Phase (1993 - 1995)

Electronics and mechatronics based industries

- IC industries
- Video equipment
- Color TV tube
- Electronics components
- Computer related industries
- LCD
- Audio equipment
- Metal machine tools

Supporting Industries

- Bearings
- Plastics processing machinery
- Plating and heat treatment
- Moulds
- Plastics products
- Metal press industries

Second Phase (1996 and onward)

Bio-technology and new materials based industries

- Pharmaceuticals
- Plant species improvement
- Agro-chemical
- Amorphous alloy
- Fine ceramics
- Photomagnetic

3.4 Conceptual Zoning Plan

In order to satisfy functions as a Hi-Tech Park, the Kulim Hi-Tech Industrial Park will be composed of five zones;

1) Hi-Tech Industrial Zone
   - To be located north of the watershed which runs east-west, slightly to the south of the central part of project site in order to avoid effluent of industrial waste water to the southern part of the watershed where water is withdrawn for water supply.
   - To use existing flat land as much as possible.
2) R & D Zone
   - To be located adjacent to the Hi-Tech Industrial Zone in order to ensure inter-face with Hi-Tech Industries.
   - To select location to certify the appropriate atmosphere for their activities.
3) Housing Zone
   - To be located on slope area.
   - To ensure in conformity with the direction of existing residential development.
   - To provide community and educational facilities.
4) Urban Zone
   - To locate urban facilities in order to integrate with other zones.
5) Amenity Zone
   - To utilize highest area as a natural park.
   - To locate recreational facilities in the vicinity of R & D and Housing Zone in order to preserve greenery.

   Amenity zone includes reserved area for future expansion.

Based on the above policy, the conceptual zoning plan of the project area is proposed as shown in Fig. 3.1. Basic framework of development for each zone is prepared based on the target industries and population.

Zone	First Phase	Overall Plan
Hi-Tech Industrial Zone	250 ha	360 ha
R & D Zone	30 ha	60 ha
Housing Zone	300 ha	710 ha
Urban Zone	10 ha	30 ha
Amenity Zone	180 ha	290 ha
Total	770 ha	1,450 ha

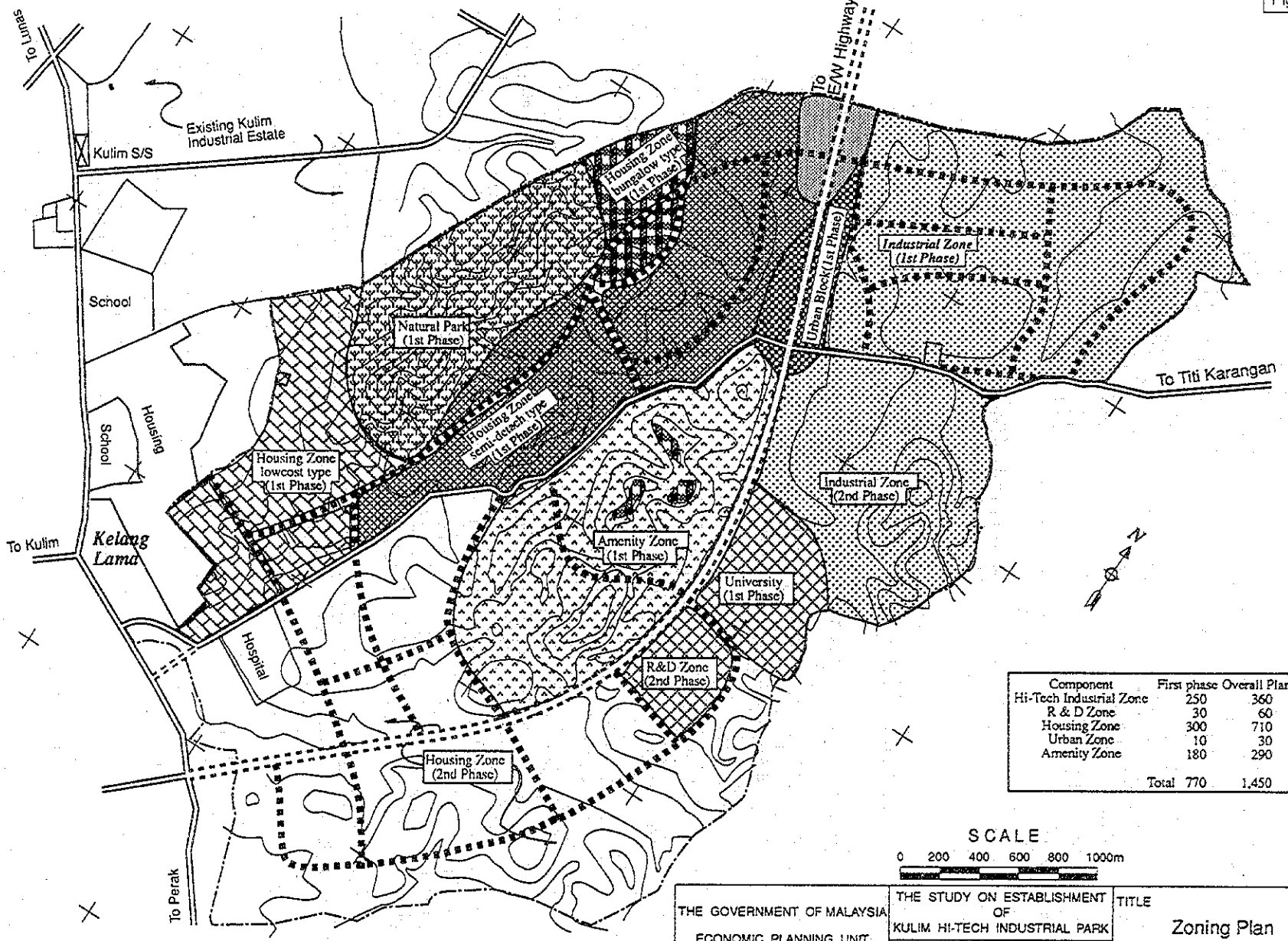
3.5 Population Projection

The procedure for population projection is as follows:

1) Direct Employment by the planned targeted industries for the first phase
2) Assume the family members based on the Malaysian standard, 5.8 persons per 1 family
3) Assume the ratio of single - married as 40% - 60%
4) Assume population to actual reside in the area as 40%

	Hi-Tech Industries No. of Employees	Other Components No. of Employees	Total Population Based on Employees	Actual Population living in the Housing Zone	No. of Families	Housing Area (ha)
First phase	12,540	2,530	58,700	19,700	5,050	300
Overall phase	15,540	8,660	94,600	47,000	12,060	710

Fig. 3.1



Component	First phase	Overall Plan
Hi-Tech Industrial Zone	250	360
R & D Zone	30	60
Housing Zone	300	710
Urban Zone	10	30
Amenity Zone	180	290
Total	770	1,450

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Zoning Plan

4. FIRST PHASE DEVELOPMENT PLAN

4.1 Targeted Industries

The targeted industries for the Kulim Hi-Tech Park are proposed as follows:

First Phase (1993 - 1995) : Electronics and mechatronics based industries

- IC industries
- Video equipment
- Color TV tube
- Electronics components
- Computer related industries
- LCD
- Audio equipment
- Metal machine tools

Supporting Industries

- Bearings
- Plastics processing machinery
- Plating and heat treatment
- Moulds
- Plastics products
- Metal press industries

Model plants of target industries are assumed as shown in Table 4.1.

4.2 Land Use Plan

In line with the strategy and zoning concept, the first phase development area is divided into five zones as shown below.

Zone	First phase Area (ha)
Hi-Tech Industrial Zone	250
R & D Zone	30
Housing Zone	300
Urban Zone	10
Amenity Zone	180
Total	770

The land use pattern for respective zones is as follows:

Zone	Utility/facility
Hi-Tech Zone (250 ha)	– Factory lot – Urban block – R & D block – Utility – Green belt and parks
R & D Zone (30 ha)	– University/Innovation center – Utility – Green belt and parks
Housing Zone (300 ha)	– Bungalow,semi-detached and low-cost type houses – Community center – Utility – Green belt and parks
Urban Zone (10 ha)	– City center – Utility
Amenity Zone (180 ha)	– Green belt and parks – Natural park – Sports facilities – Reserved area

4.3 Design Population

Based on the estimated direct and indirect employment from all components, the population that is expected to reside in the whole Park would amount to 19,700 in the first phase.

	Hi-Tech Industries No. of Employees	Other Components No. of Employees	Total Population based on Employees	Population living in the Housing Zone	No. of Families	Housing Area (ha)
First phase	12,540	2,530	58,700	19,700	5,050	300

4.4 Implementation Plan

The proposed completion time of land preparation for first phase industrial zone is June 1993. For the first phase development stepwise completion is recommended including infrastructures as follows based on the i) development scale / work scale, ii) duration of factory building construction with plant installation which will requires one (1) year approx by investor/(s) and iii) duration of procurement procedures for for construction works.

First step	:	June 1993
Second step	:	End 1993
Third and final step	:	End 1994

The following infrastructures should be completed to meet with the targeted schedule stipulated above.

1) Road network
2) Power supply system : Ring formation power supply system should be applied by the time of factory operation which needs reliable and stable power.
3) Water supply system
4) Sewerage system
5) Telecommunication system

The JICA Study Team recommended the facilities to be introduced by priority as indicated below based on the basic concept and strategy of this Hi-Tech Industrial Park.

Zone/(Block)	Facility	Priority		
		1st priority	2nd priority	3rd priority
Hi-Tech zone (Urban block)	– Skills development centre	*		
	– Administration core	*		
	– Business centre	*		
	– Telephone office	*		
	– Central plaza		*	
	– Fire station		*	
	– Police station		*	
	– Commercial centre			*
	– Others			*
R & D zone	– University		*	
	– Innovation centre		*	
	– Others			*
Housing zone	– Houses (low-cost, semi detached & bungalow type)	*		
	– Community center		*	
	– Others			*
Urban zone	– City center		*	
	– Hotel			*
	– Mosque		*	
	– Others			*
Amenity zone	– Sports facilities	*		
	– Others		*	

1st priority : June 1993 Completion
2nd priority : End 1993 Completion
3rd priority : End 1994 Completion

Table 4.1 Model Plant

	(1) LSI	(2) Personal Computer	(3) TV	(4) NC Machine Tool	(5) Magnetic Disc Drive	(6) Bearing	(7) Magnetic Head	(8) Printed Circuit Board	(9) Compact Disk	(10) Connector	(11) Plastic Form	(12) VTR	(13) LCD(excl. Assemble) 200x250mm	(14) TFT-LCD
	1000Pcs/M	Units/M	Units/M	Pcs/M	Pcs/M	1000Pcs/M	Pcs/day	¥1000/M	Pcs/day	Mil.Yen/M		Units/M	Pcs/M	1000Pcs/yr
1.Production	5,000	90,000	100,000	100	20,000	10,000	120,000	70,000	1,000	1,000		25,000	100,000	10,000
2.Land(m2)	200,000	100,000	200,000	50,000	150,000	100,000	15,000	3,000	10,000	100,000	3,000	100,000	5,000	30,000
Facility		20,000	80,000	10,000	15,000	25,000	5,000	750	2,500	15,500	1,000	35,000	2,300	10,000
3.Employment (persons)	2,500	700	2,000	140	600	400	400	60	160	350	70	550	150	700
4.Power Supply (kW)	16,000	4,000	5,500	700	2,300	6,000	470	150	400	2,200	600	2,500	180	30,000
(V)	6,600	6,600		400	6,000	66,000		6,600	6,600	6,000			3,300	
5.Water(m3/d)														
Supply	15,900	160	500	10	200	35	60		45	100	30	250	50	2,880
Recycle	4,100	40	100		200		70		20	90	120	50		2,880
Total	20,000	200	600	10	400	35	130		65	190	150	300	50	5,760
6.Waste Water (m3/d)	15,900	160	500	10	200	35	60		45	100	30	250	50	2,880

5. BASIC DESIGN OF FIRST PHASE INDUSTRIAL ZONE

5.1 Land Preparation

5.1.1 Land Use Plan

The total area of industrial zone in the first phase is planned to be 250 ha or 17% of whole Park of 1,450 by each ha. The land use of Industrial Zone is planned as shown in Fig. 5-1. The occupied area respective block of Industrial Zone is as follows:

	Zoning	Area (ha)	Ratio (%)
(1)	Factory lot	137.0	55
(2)	Urban block	14.5	6
(3)	R & D block	8.7	3
(4)	Utilities w/CTP,temporary yard	56.3	22
(5)	Parks and green belts	33.5	14
	Total	250	100

5.1.2 Earthwork Volume

Lot/Block	Cut (m^3)	Fill (m^3)	Balance (m^3)
Factory	2,060,000	1,800,000	+260,000
Urban block	30,000	470,000	- 440,000
R & D block	250,000	35,000	+215,000
CTP,temporary yard	86,000	290,000	- 204,000
Roads	270,000	150,000	+120,000
Drainage	210,000	70,000	+140,000
Sewerage	60,000	50,000	+ 10,000
Retention ponds	210,000	0	+210,000
Total	3,176,000	2,865,000	+311,000

5.2 Road Network

5.2.1 Primary Access Road

A new primary access road to the Industrial Zone was recommended to be constructed from Kelang Lama to the East West Highway as shown in Fig. 5-2. The rough alignment of this new primary access road is recommended as shown in Fig. 5-3.

The daily traffic volume of the new primary access road in the year 2013 is estimated to be about 12,700 vehicles/day. The design standard of the new road is recommended to be the same as the East - West Highway (standard "R5", 4 lanes and 40 m reserve width).

The Study Team recommends the primary access road to be constructed as 2 lanes for the first phase as scheduled by JKR and to expand to 4 lanes by the year 2000 when daily traffic volume will exceed 9,000 vehicles/day which is critical for 2 lanes. Further detailed study on the implementation of lane expansion of the road will be done later by the Malaysian side confirming actual growth of traffic volume on the road. Two signal systems beside the Industrial Zone are recommended to be constructed at the same time of road expansion from 2 lanes to 4 lanes.

The whole primary access road is recommended to be divided into three segments as follows (see Fig. 5-3):

(a) Outside the Hi-Tech Park
(b) Beside the Industrial Zone
(c) Other part inside the Hi-Tech Park

5.2.2 Road Network in the Industrial Zone

(1) Layout Plan

Basic design policies for the road network within the Industrial Zone are as follows:

(a) To utilize the present geography as far as possible for road network alignment
(b) To minimize the total road length for saving construction costs
(c) Not to provide cross roads within the Industrial Zone for ensuring safe traffic control and efficient traffic flow (T-shape junctions only)

Based on the above basic design policy, a road network in the Industrial Zone was recommended as shown in Fig. 5-4. Roads connected to the primary access road are arterials and the others are collector roads. All of the factory lots face onto the arterial and collector roads. Elevation difference at the entrance to factory lots from roads is less than 2 m. One front entrance to the Industrial Zone is located at the north end of the Urban Block along the primary access road. Three back entrances are located along the arterial road No. 2.

The generated daily traffic volume in the Industrial Zone was estimated to be approximately 6,800 vehicles per day. The distributed maximum traffic volumes on the arterial and collector roads were calculated at 3,900 and 1,000 vehicles/day,

respectively.

Based on the above estimated daily traffic volumes, design standards to be used for arterial and collector roads in the Industrial Zone were decided to be "U4" and "U3" of JKR standards, respectively.

Road lengths of the arterial and collector roads are 4.586 km and 4.175 km respectively. Total road length within the Industrial Zone is 8.761 km including 2 bridges with 30 m spans.

5.3 Power Supply System

5.3.1 Basic Design Conditions and Criteria

(1) Basic Design Conditions
   (a) Sufficient power supply system
   (b) High reliable power supply system
   (c) High stability of voltage
   (d) Reduction of manpower for operation and maintenance
   (e) Environmental harmony

(2) Basic Design Criteria

(a)	Voltage regulation	:	+5% of rated voltage of 33kV and 11kV, distribution line for enhancing stability
(b)	Power interruption	:	No long time power interruption for enhancing reliability
(c)	Output capacity of substation	:	180 MVA (Refer to power demand forecast)
(d)	Regulation and standard	:	TEN's regulation, IEC standard for equipment design

5.3.2 Power Demand

	Industrial Zone	Housing Zone	Others	Total
Phase 1	55 MVA	14.3 MVA	14.5 MVA	83.8 MVA
Phase 2	40 MVA	19.0 MVA	14.5 MVA	73.5 MVA
Total	95 MVA	33.3 MVA	29.0 MVA	157.3 MVA

Therefore, a 180 MVA substation is recommended in consideration of 5% allowance for distribution loss and voltage drop.

5.3.3 Basic Plan

Overall power supply system diagram is shown in Fig.5-5 and explained below.

(1) Transmission line

The available power source is TEN's Power Grid. The nearest power tapping point from the TEN's Power Grid is the Kulim substation, which is located 6 km away from the proposed Industrial Zone. It has enough capacity for power supply to the project area, because the existing load is 33MVA at maximum and power demand in Phase 1 is estimated as 84 MVA.

Therefore, power for the Kulim Hi-Tech Park should be supplied from the Kulim substation. A new 132kV transmission line may be mostly constructed as an overhead line. However, a 132kV underground power cable line should be applied within the Kulim Hi-Tech Industrial Park for environmental harmony and security of factories.

In order to enhance the reliability of power supply, one more new 132kV transmission line should be constructed between the Sungai Petani substation, 30 km away from the Industrial Zone, and new substation. Consequently, a 132kV transmission line will be interconnected with the TEN's power grid by ring formation .

The route map of 132 kV transmission line is as shown in Fig. 5-6. The basic design of new 132kV transmission line is as follows:

<u>Kulim S/S ~ New S/S</u>

(a)	Line voltage	:	132 kV
(b)	No. of circuit	:	2 circuits
(c)	Line length	:	Approximately 6 km

<u>Sungai Petani S/S ~ New S/S</u>

(a)	Line voltage	:	132 kV
(b)	No. of circuit	:	2 circuits
(c)	Line length	:	Approximately 30 km

(2) Substations

New substations are composed of one main substation and two substations, because sending capacity and length of distribution lines are limited by their

voltages of 33kV and 11kV and reducing cable loss. These substations are interconnected with each other by 33kV sub-transmission line for ring formation.

The basic design of new substations is given as below:

(a) Type : Indoor GIS (132kV side)
(b) Capacity : 180 MVA
- 90 MVA for Phase 1
- 90 MVA for Phase 2

(3) Distribution line

1) Applied line voltage for power supply to consumer:
- 4 MW to 15 MW : 33kV line
- 1 MW to 4 MW : 11kV line
- small consumer : 415/240V line

2) Applied ring form connection for important consumers

33kV and 11kV distribution lines are designed as ring formation and double circuits in order to secure a reliable power supply and to increase the line capacity.

In addition to the above, automatic line sectionalizer should be arranged at the respective consumers on the line to avoid long time power stop and to minimize the power stoppage section.

5.4 Water Supply System

5.4.1 Design Conditions

(1) Water demand projection for the whole Park

Water demand of the first phase Industrial Zone was estimated by the JICA Study Team and those of the other zones were estimated by the Malaysian Master Plan study team. They are as shown below.

1) Water demand estimated by the JICA Study Team
(a) First Phase Industrial Zone : 27,372 m^3/d
2) Water demand estimated by the Master Plan study team
(a) Second Phase Industrial Zone : 12,134 m^3/d
(b) R & D/Urban Zone : 4,082 m^3/d
(c) Housing Zone : 21,741 m^3/d

(d)	Amenity Zone	:	2,989 m^3/d
3)	Total water demand	:	68,318 m^3/d
4)	Unaccounted for water	:	15%
5)	Water requirement from JKR water supply system	:	80,400 m^3/d

5.4.4 Basic Design

Fig. 5-7 shows the basic layout of water supply system. The service reservoir R1, where water will be pumped up by JKR water supply system, will be located on Bukit Jelutong above EL.270 ft. The reservoir R1 will be connected with the service reservoirs R2 and R3, which will be located on the hill in the 2nd phase Industrial Zone, by the distribution trunk main. The distribution network in the 1st phase Industrial Zone is laid under the ground along the roads. The pipe diameter is determined as shown in Fig.5-8. The summary of water supply system is as follows:

Outside Park

Water supply system	: to be constructed by JKR
Design discharge to the Park	: 80,400 m^3/d (to be studied on phased supply)

Inside Park

Service Reservoirs

R1 Reservoir

Location	:	on Bukit Jelutong
Service area	:	R&D/Urban, Housing and Amenity Zones
Design capacity	:	33,900 m^3
Area of reservoir	:	5,600 m^2 (53 m x 53 m x 2 units)
High water level	:	295 ft. (90 m)
Low water level	:	275 ft. (84 m)
Design discharge to service area	:	4,238 m^3/h

R2 Reservoir

Location	:	on the hill in the 2nd phase Industrial Zone
Service Area	:	1st phase Industrial Zone
Design capacity	:	32,000 m^3
Area	:	5,400 m^2 (49 m x 55 m x 2 units)
High Water Level	:	230 ft. (71 m)

Low Water Level	:	213 ft. (65 m)
Design discharge to service area	:	4,025 m^3/h

R3 Reservoir

Location	:	on the hill in 2nd phase Industrial Zone
Service Area	:	2nd phase Industrial Zone
Design capacity	:	14,000 m^3
Area of ewawecoie	:	2,400 m^2 (40 m x 30 m x 2 units) type is to be reviewed.
Design discharge to service area	:	1,784 m^3/h

Distribution trunk main

Location	:	from R1 to R2
Design discharge	:	0.645 m^3/s
Length	:	3,940 m
Material	:	steel pipe
Diameter	:	750 mm

Distribution network

Location	:	1st phase Industrial Zone
Material	:	steel pipe, uPVC or high density poly-ethylene pipe

5.5 Telecommunication System

5.5.1 Demand Forecast

(1) Total number of main telephone lines

Total number of main telephone lines (subscribers) in phase 1 will be about 7,010 lines in 2003 as shown below.

Table Telephone Demand of Whole Park

Unit : Number of subscribers

		Phase 1 in 2003
1.	Industrial Zone	1,310
	(1) Factory Area	1,200
	(2) Administration centre	110
2.	R & D/Urban Zone	480
	(1) City Centre	390
	(2) R & D	90
	– university	90
	– private R & D	–
3.	Housing Zone	5,200
	(1) House	5,000
	(2) School	80
	(3) Community	120
4.	Amenity Zone	20
5.	Total	7,010

(2) Demand growth by year

	Phase 1
1993	890
1996	4,380
1998	5,010
2003	7,010
2008	9,860

5.5.2 Basic Design

The following is basic design values of the telecommunication facilities which should be consulted by 1993. Figs. 5-9 and 5-10 show cable plan and duct plan of Industrial Zone in Phase 1, respectively.

Location of telephone office	:	in the urban block
Site area	:	1 ha
Floor area	:	1,000 m2
Exchange capacity	:	5,000 lines
Toll junction system	:	Kulim telephone office to new telephone office

Cable	:	Optical fiber, 6 core
Length	:	6 km
Transmission system	:	1 system + stand by in 1993
		2 systems + stand by in 1998
Radio system	:	New telephone office to Penang
Type	:	Microwave, $2GH_2$, 24 MB
Relay station	:	At Bukit Mertajan hill
Teleport	:	To be considered in future

5.6 Drainage and Sewerage System (Ref. Fig. 5-11 & 12)

(1) Drainage System

This area has frequently suffered from floods. So, three (3) retention ponds of 100-year return period are set at Industrial Zone in order to minimize adverse effects to be caused by the development. Multi-purpose retention ponds, integrating the functions of sports and public park facilities, are adopted from the viewpoint of landscaping. Return period for drainage channel inside Industrial Zone is 20 years in consideration of important facilities to be invested by hi-tech industries.

(2) Sewerage System

Wastewater of hi-tech industries contains toxic and new substances which are not know to us at present. Most of the substances can not be removed by conventional sewage treatment process which aims to remove biologically organic materials of domestic origin. A separate system is adopted and individual treatment plant at each factory is designed according to the Pollutant's pay principle. As for domestic wastewater of first phase (Q = 2,890 m^3/d), central treatment plant is adopted. A treatment method is Activated sludge process.

(3) Monitoring System

Inspection ponds with fish are set by each factory. Further fish ponds are set in each retention pond in order to observe the deterioration of water quality in public.

5.7 Industrial Waste Management

Industrial solid waste is kept and monitored at the temporary secure storage facility in the Industrial Zone until the central disposal sites are made available by DOE. All wastes area sent to the storage facility and then separated into non-toxic wastes and toxic wastes. Non-process waste found to be non-toxic or hazardous is transported to the municipal domestic landfill site. Process wastes that are found to be toxic and hazardous are stored at the

secure storage facility. Generated value of process wastes is estimated 9.5 tons/d and non process is estimated 38 tons/d.

Although the storage area is secured for 25 years' capacity, the storage facility is at first constructed for 5 years' capacity according to DOE' guideline. After five years, the storage facility shall install more.

As for monitoring, a manifest tracking system is proposed. The manifest tracking system is a system of control by means of tracking and recording of the scheduled wastes from generation to disposal and including the movement of such wastes. Operating and Maintenance cost is estimated at M$ 210/m^3. O/M cost is charged from each industry in proportion to generation rate.

5.8 Landscaping

5.8.1 Basic Design Policy

(1) To emphasise on environmental harmony and scenery integrated Industrial Zone with parks and open space.
(2) To create landscaping with ample greenery to harmonize overall openness of the Zone independent of each lot.
(3) To provide recreational activity for estate workers as well as neighbouring people.

5.8.2 Basic Design Concept

(1) The highest hill area is conserved as park and open space for recreational purposes.
(2) A peripheral area outside the Industrial Zone is conserved as buffer green zone, especially the area to the north and east.
(3) The area around two(2) tributaries are landscaped as green fieldpark in natural scenic features, coordinated with land formation, water canal and retention reservoir, planting trees and recreation and sport facilities.
(4) The classified roads (arterial and collector) are planted with trees and shrubs at the roadsides and in the mid-section.
(5) The pedestrian footways are linked with the parks and green areas, and fulfill the role of a Green Network System.
(6) Each industry lot is to be allocated enough open space by a low building coverage, and a set back building, and landscaped by plentiful greenery and beautiful plants.
(7) Street furniture, lighting and public sign boards are to be integrated with park,

open space and street layout scenery harmoniously.

(8) Utilities such as sub-station, water tank, treatment plant etc. are to be landscaped around and partly covered by planting trees and plants.

(9) The Hindu cemetery in the southern part of the Industrial Zone is to be preserved in existing condition and landscaped by planting trees around the cemetery site.

5.8.3 Area Characteristics

The main categories of land use breakdown for landscape are as follows:

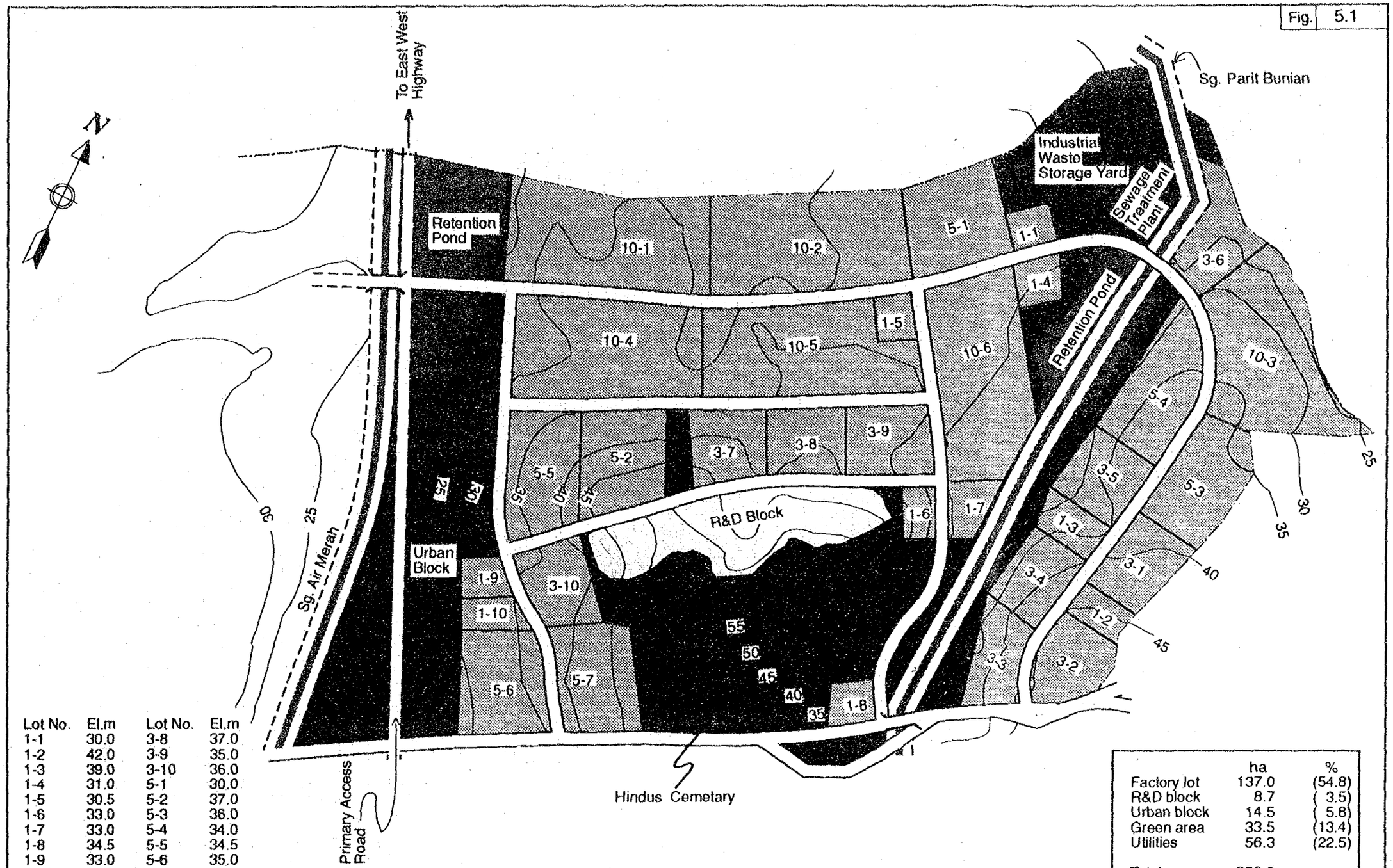
A) Conservation open space
B) Water front open space (at retention pond)
C) Community park, neighborhood park and others
D) Pocket plaza
E,F) Arterial road, Collector road, Local road
G) Shade promenade, green malls, green belts
H) Screen greenery
I) Factory lot greenery

Most of the park and green belt, characterized as a greenery and paved area, will be for the purpose of inducing outdoor activity to refresh minds of workers and researches. Landscape of the Industrial Zone is as shown on the "ARCHITECTURE'S IMAGE OF INDUSTRIAL ZONE".

5.9 Related Facilities (Ref. Fig. 5-13)

The complex of related facilities are planned in the Urban Block of 14.2 ha, which is planned in the land use plan of the Industrial Zone. The Block shall have functions of i) management and operation, ii) research and development of high technology, iii) business supporting, iv) coordination of joint study and business, v) incubation of new technology, vi) training and vii) information services.

Fig. 5.1

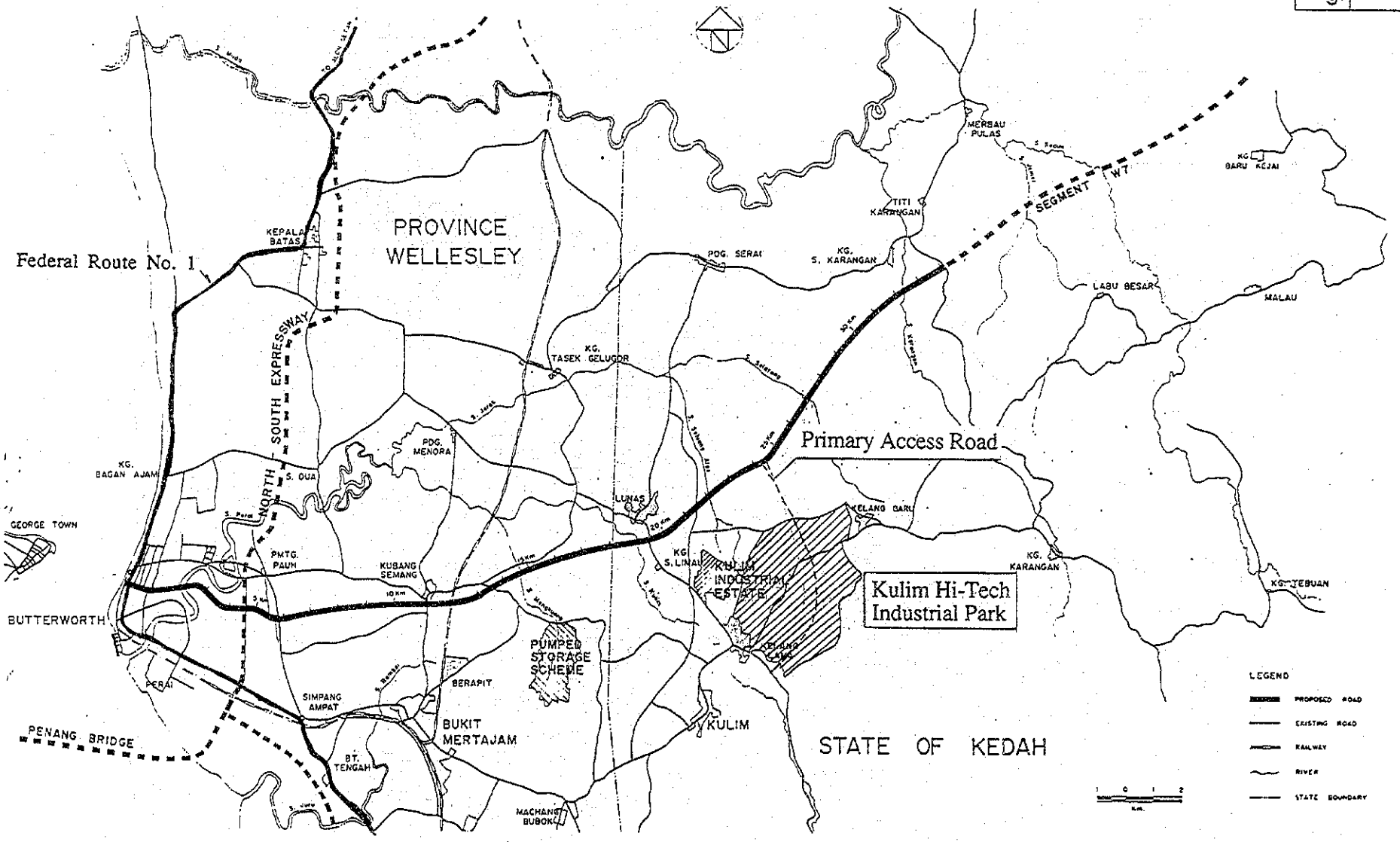


Lot No.	El.m	Lot No.	El.m
1-1	30.0	3-8	37.0
1-2	42.0	3-9	35.0
1-3	39.0	3-10	36.0
1-4	31.0	5-1	30.0
1-5	30.5	5-2	37.0
1-6	33.0	5-3	36.0
1-7	33.0	5-4	34.0
1-8	34.5	5-5	34.5
1-9	33.0	5-6	35.0
1-10	34.0	5-7	37.0
3-1	39.0	10-1	30.0
3-2	44.0	10-2	30.0
3-3	43.5	10-3	33.0
3-4	42.0	10-4	30.5
3-5	36.5	10-5	30.5
3-6	30.5	10-6	32.0
3-7	38.0		

	ha	%
Factory lot	137.0	(54.8)
R&D block	8.7	(3.5)
Urban block	14.5	(5.8)
Green area	33.5	(13.4)
Utilities	56.3	(22.5)
Total	250.0	

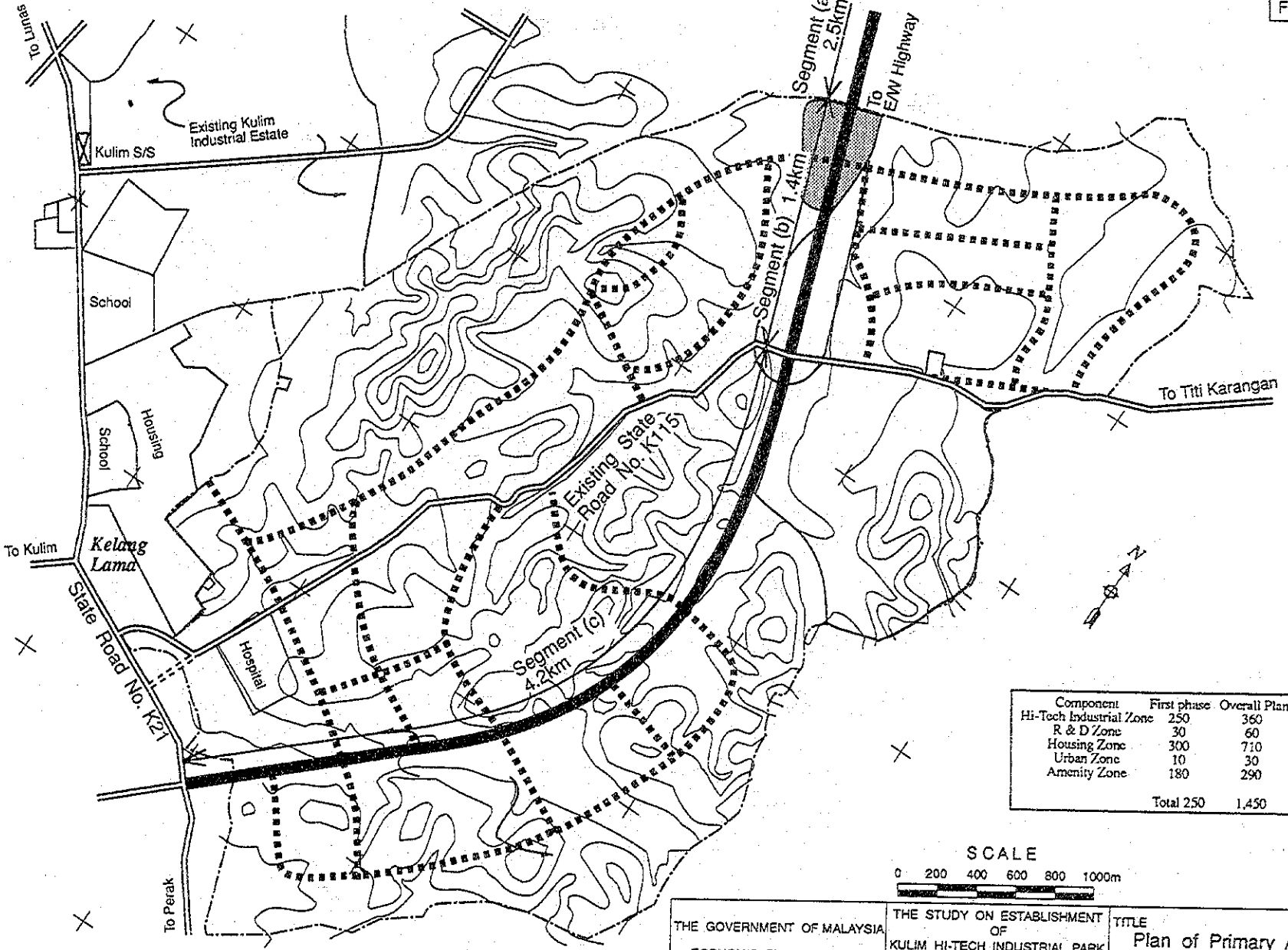
THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Land Use Plan

Fig. 5.2



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Road Network around Kulim Hi-Tech Industrial Park (Source : PPC)

Fig. 5.3

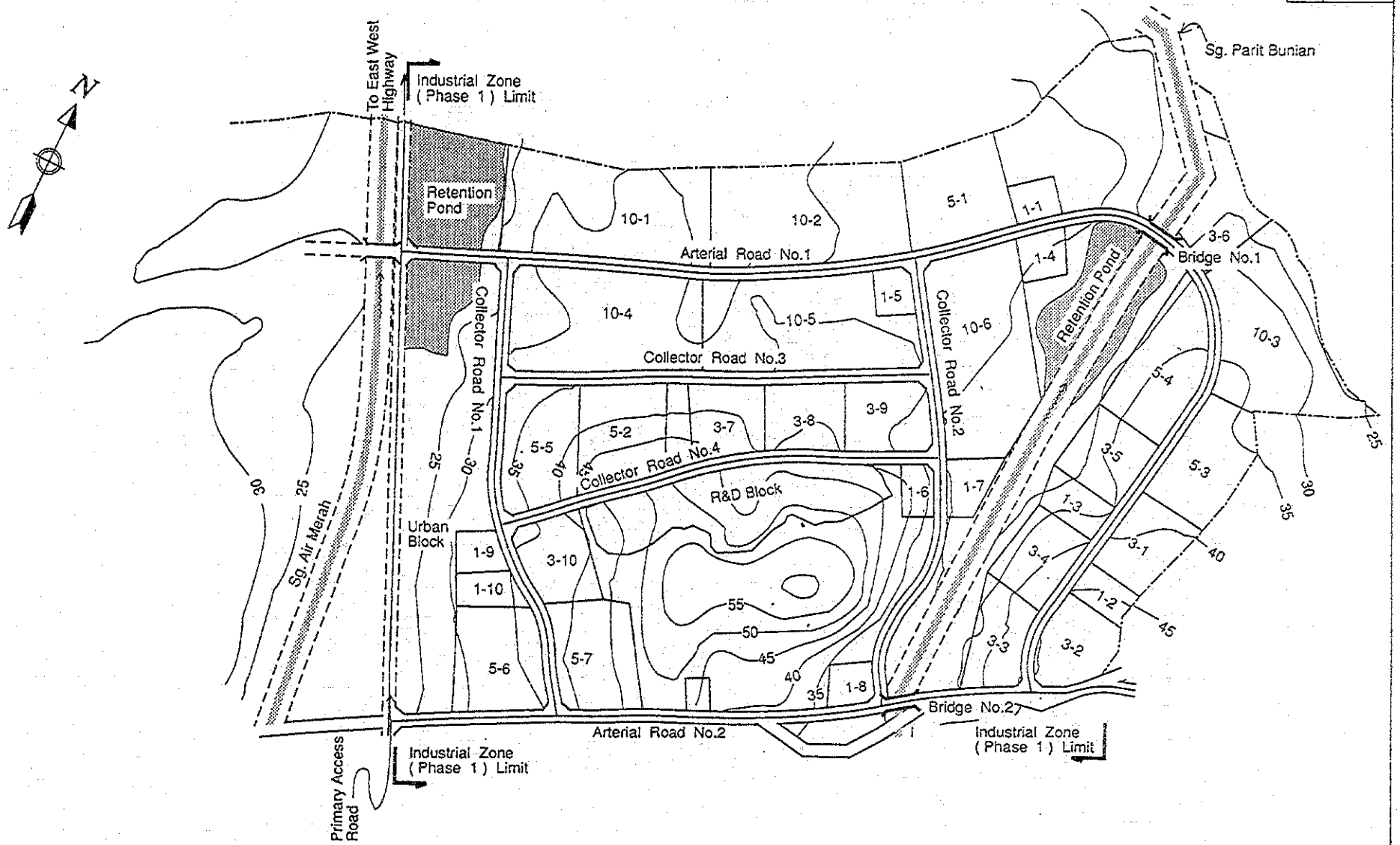


Component	First phase	Overall Plan
Hi-Tech Industrial Zone	250	360
R & D Zone	30	60
Housing Zone	300	710
Urban Zone	10	30
Amenity Zone	180	290
	Total 250	1,450

SCALE
0 200 400 600 800 1000m

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Plan of Primary Access Road

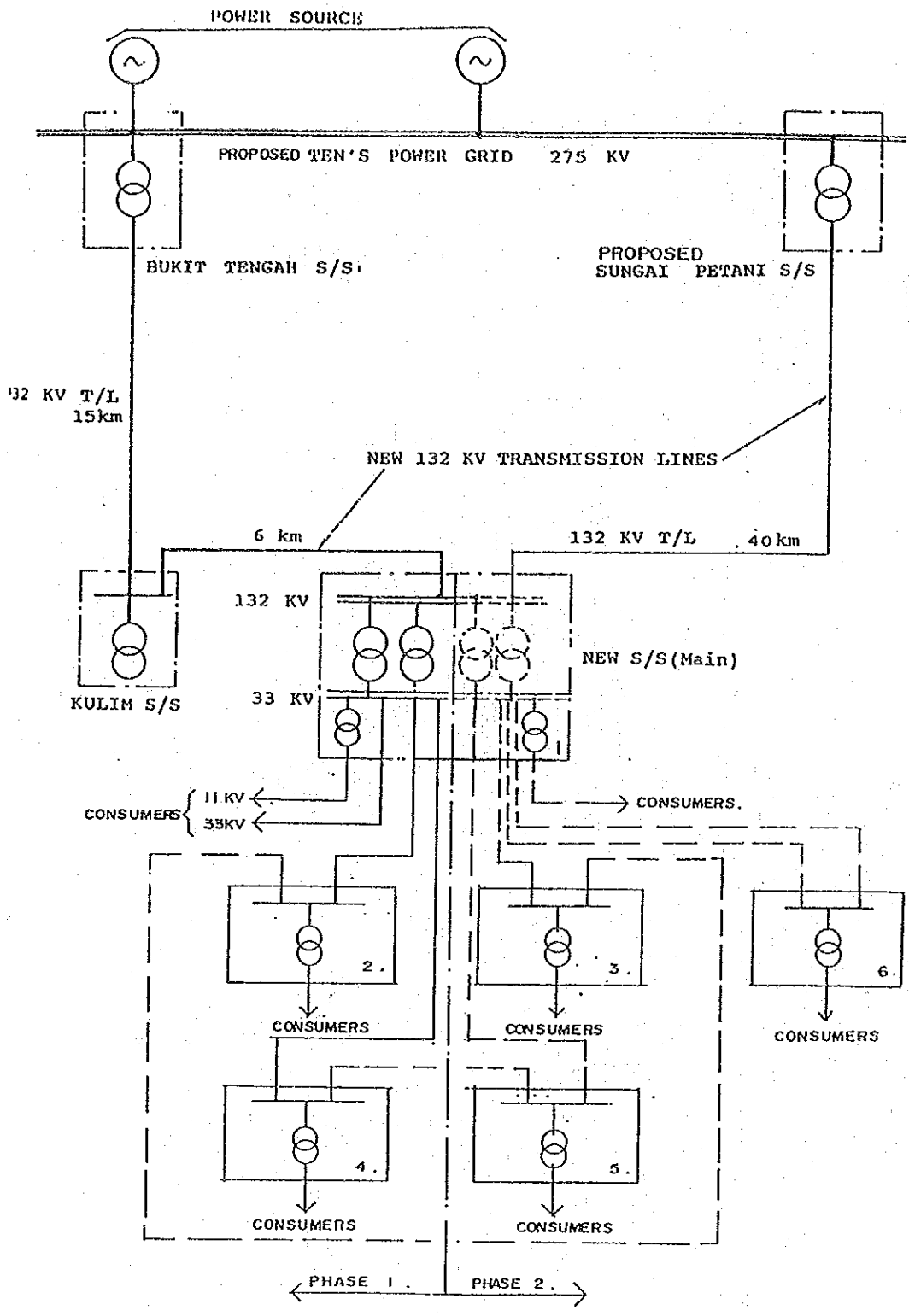
Fig. 5.4



SCALE
0 100 200 300 400 500m

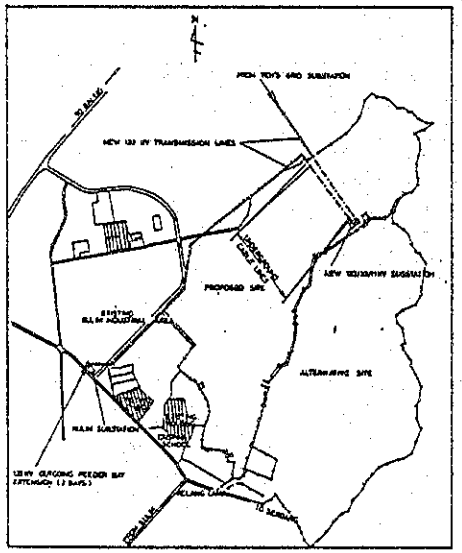
THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Road Network Plan in Industrial Zone

Fig. 5.5

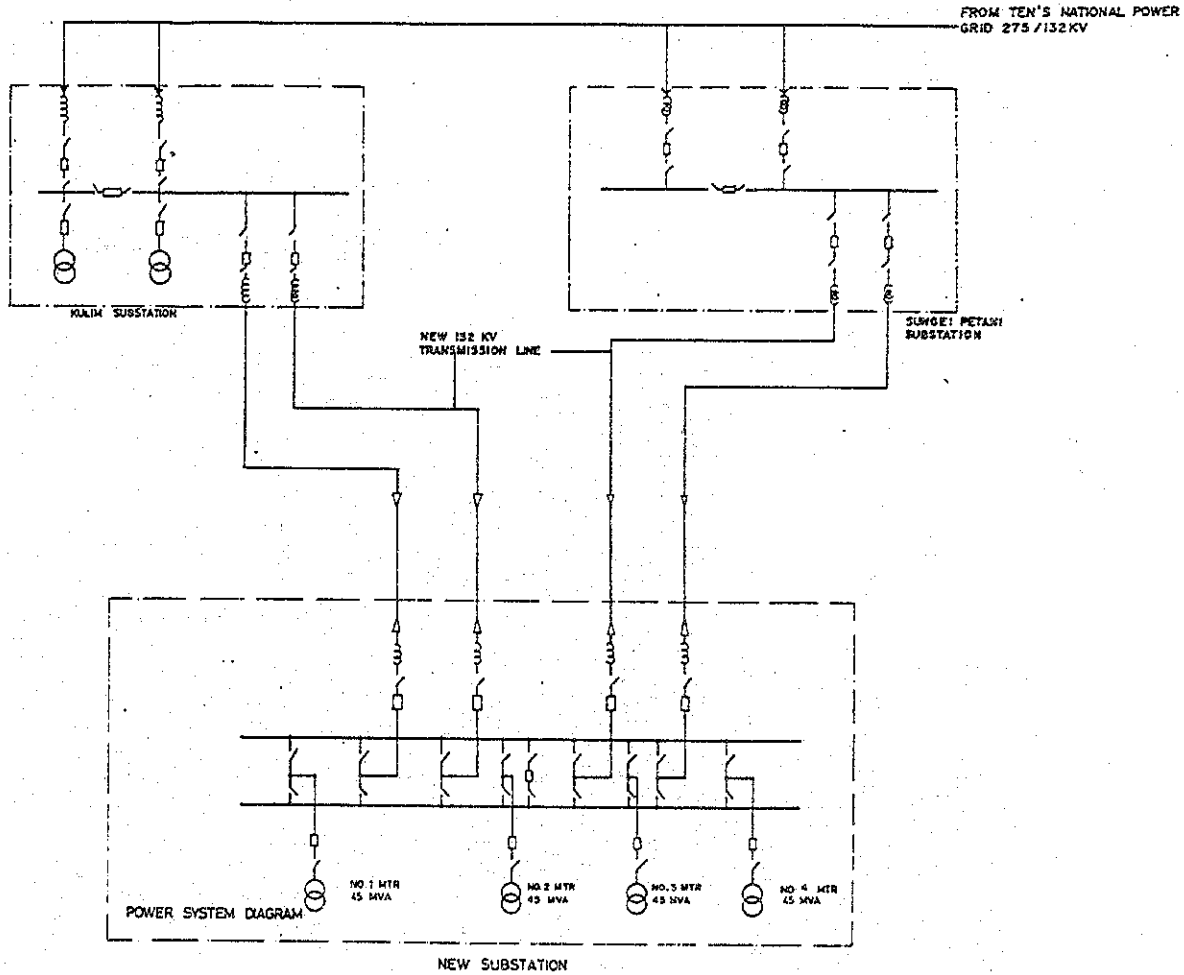


THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Overall Power Supply System Diagram

Fig. 5.6



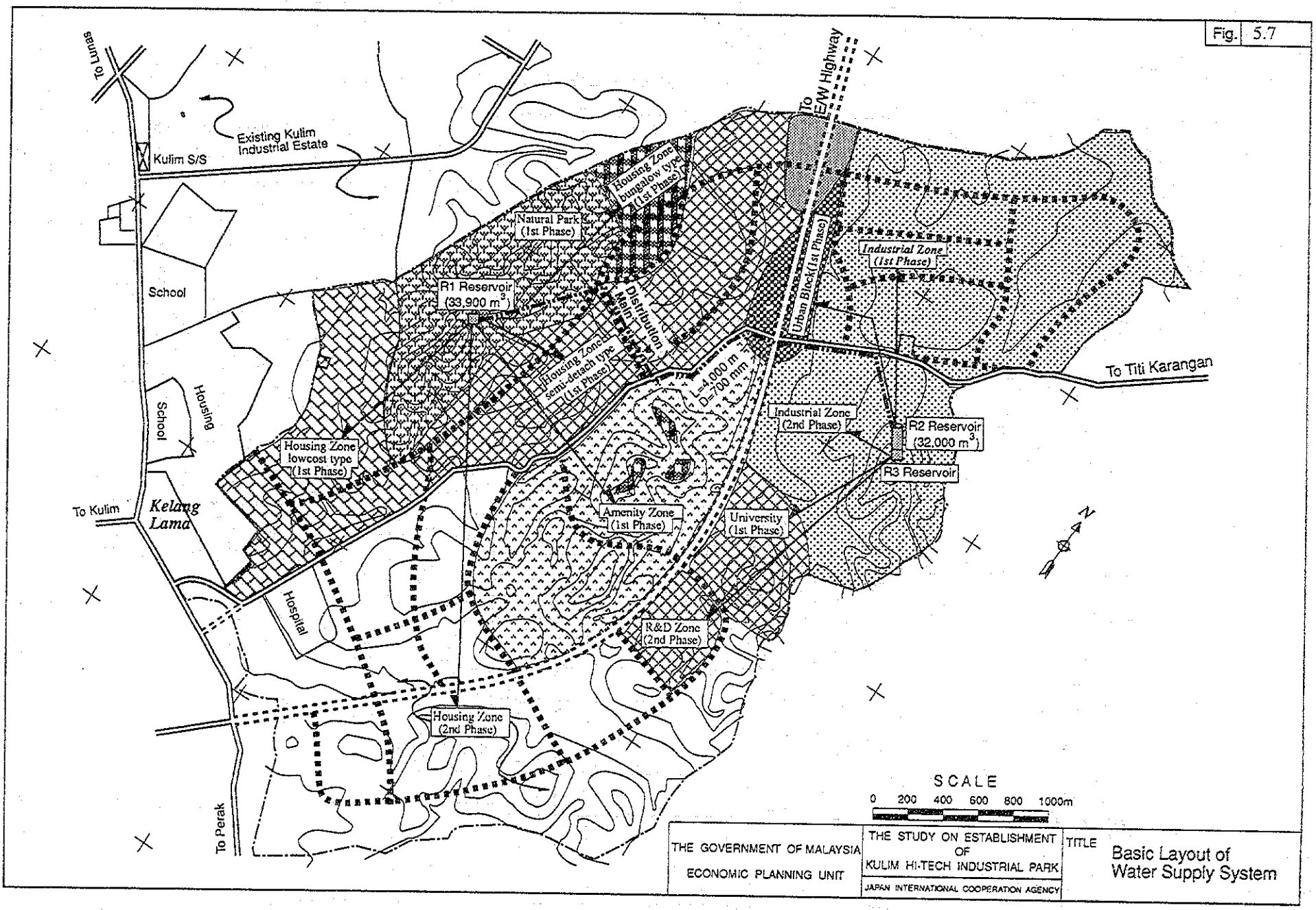
ROUTE MAP OF TRANSMISSION LINE



POWER SYSTEM DIAGRAM

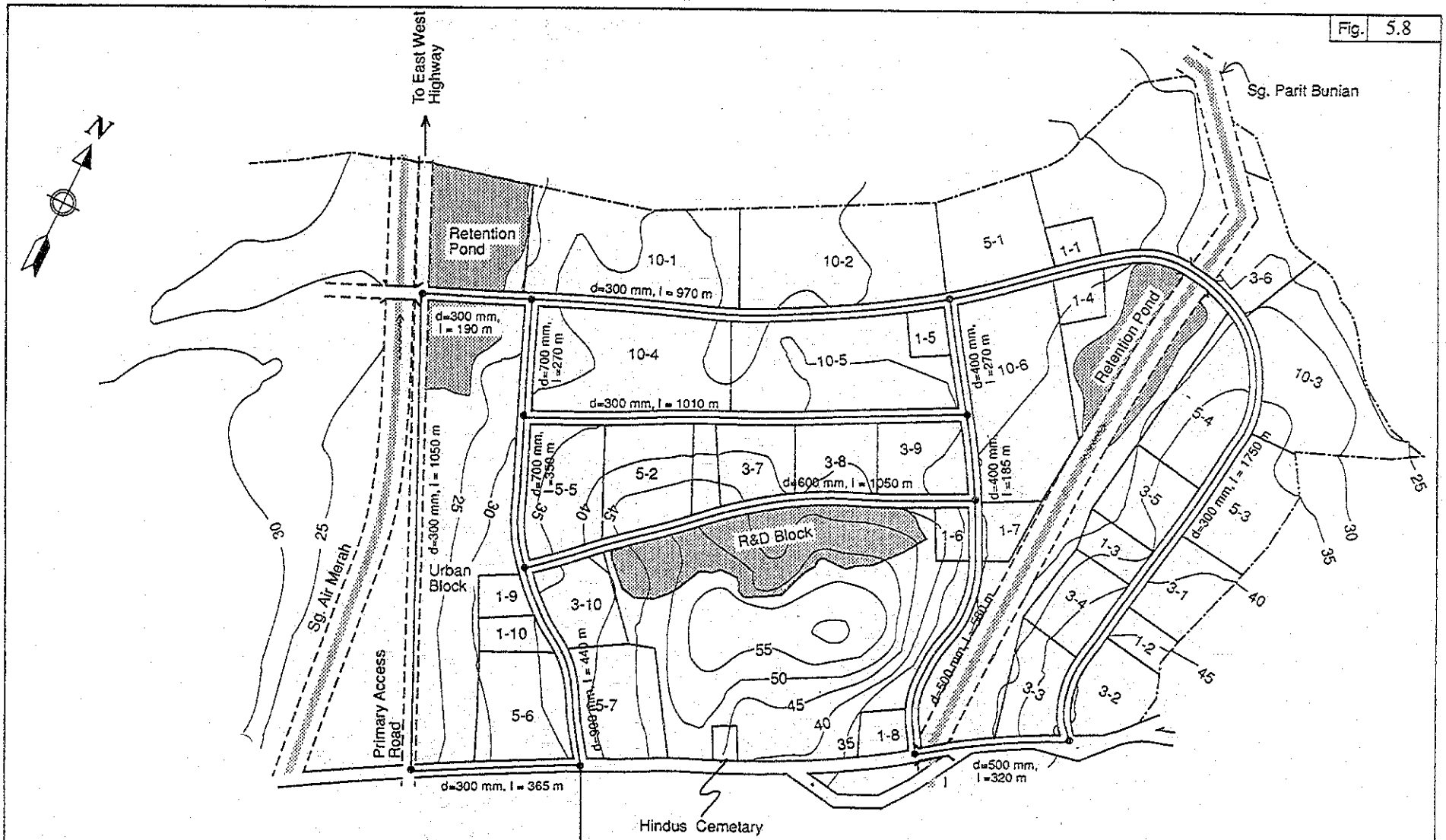
THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE POWER SYSTEM DIAGRAM AND ROUTE MAP OF TRANSMISSION LINE

Fig. 5.7



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Basic Layout of Water Supply System

Fig. 5.8



Lot No.	El.m	Lot No.	El.m	Lot No.	El.m	Lot No.	El.m
1-1	30.0	3-1	39.0	5-1	30.0	10-1	30.0
1-2	42.0	3-2	44.0	5-2	37.0	10-2	30.0
1-3	39.0	3-3	43.5	5-3	36.0	10-3	33.0
1-4	31.0	3-4	42.0	5-4	34.0	10-4	30.5
1-5	30.5	3-5	36.5	5-5	34.5	10-5	30.5
1-6	33.0	3-6	30.5	5-6	35.0	10-6	32.0
1-7	33.0	3-7	38.0	5-7	37.0		
1-8	34.5	3-8	37.0				
1-9	33.0	3-9	35.0				
1-10	34.0	3-10	36.0				

SCALE

0 100 200 300 400 500m

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Distribution Network

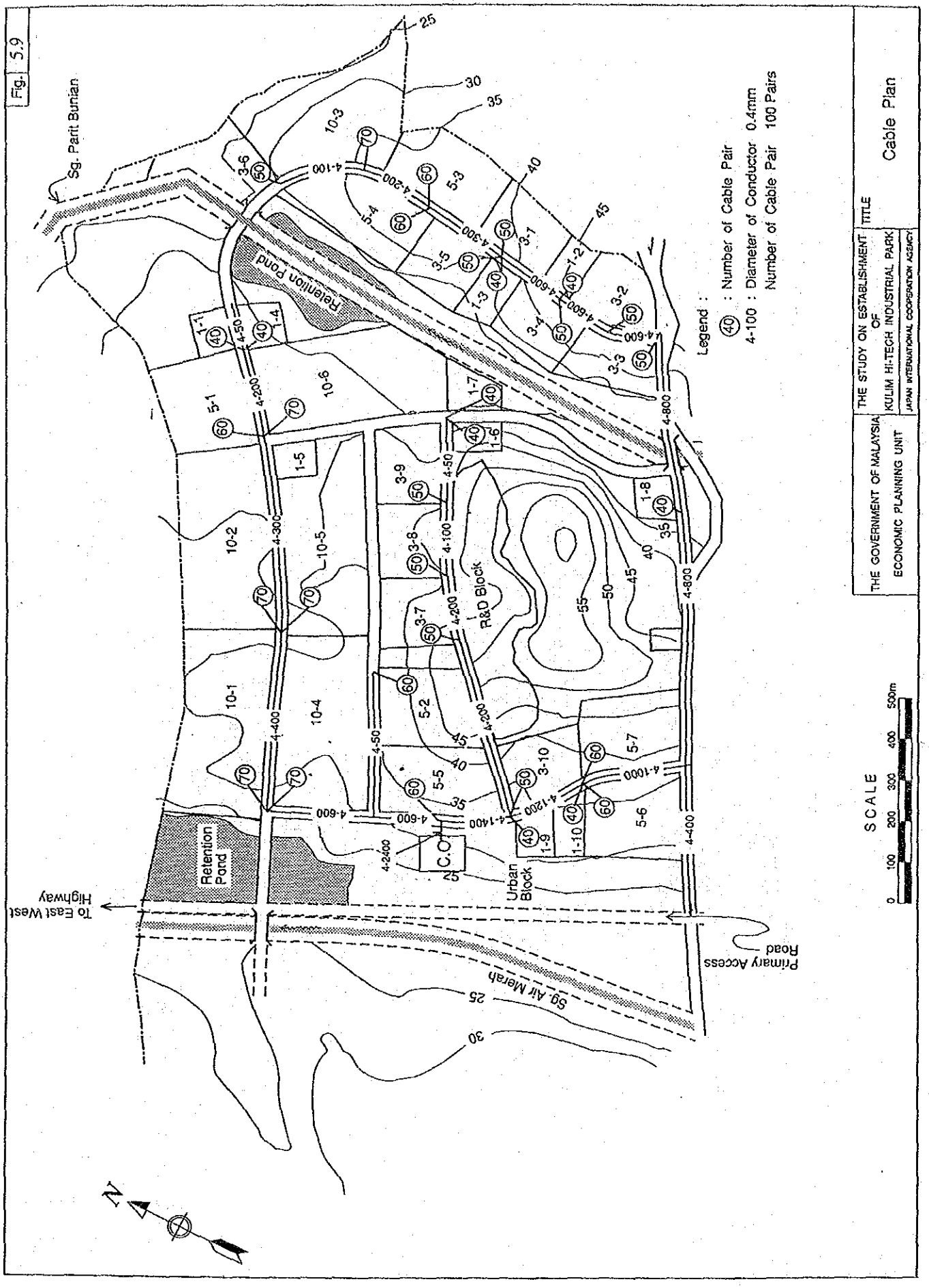
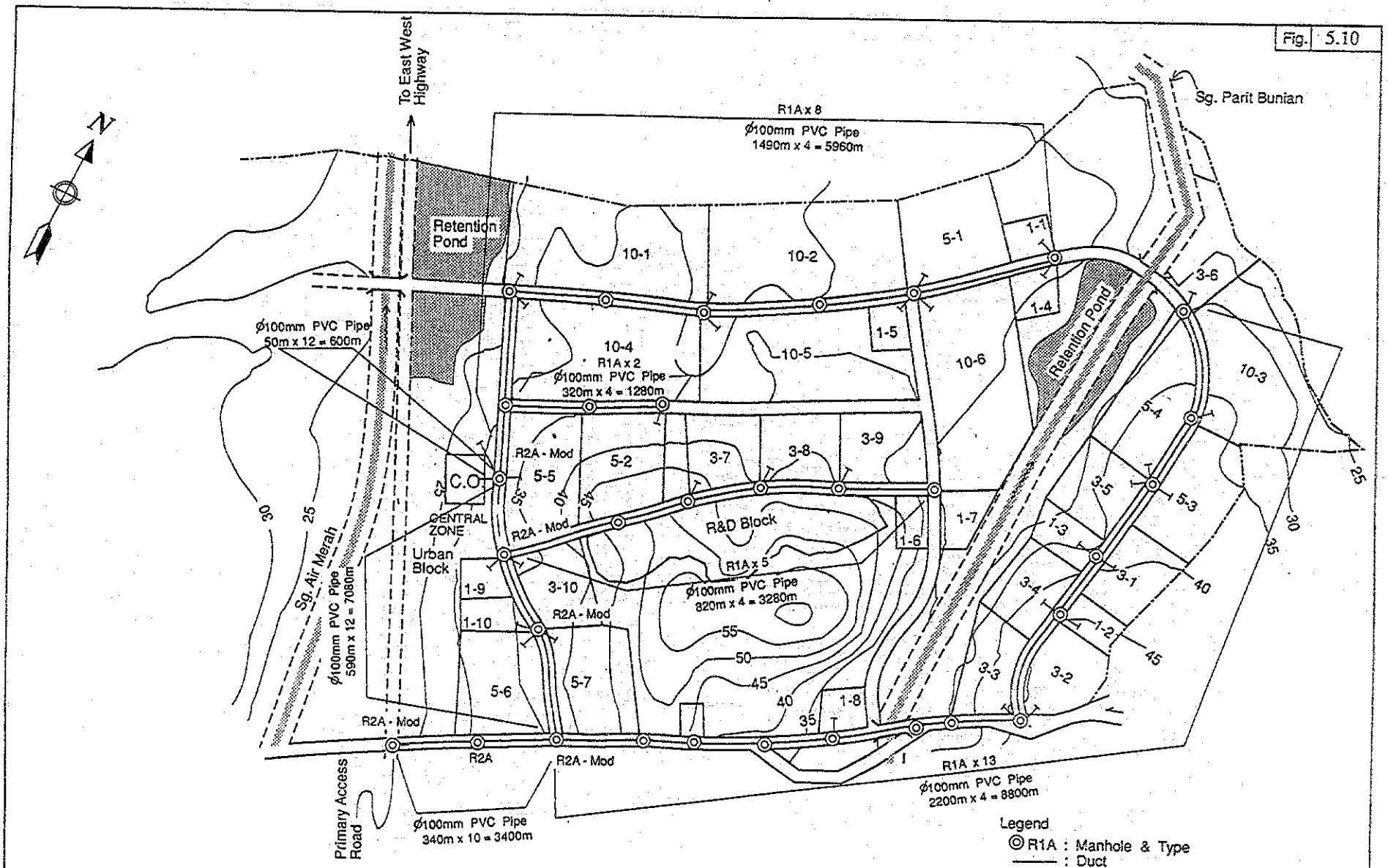


Fig. 5.9
Sg. Parit Bunian
Retention Pond
Retention Pond
To East West Highway
Primary Access Road
Sg. Air Merah
R&D Block
Urban Block
C.O.
SCALE
0 100 200 300 400 500m
Legend :
(40) : Number of Cable Pair
4-100 : Diameter of Conductor 0.4mm
Number of Cable Pair 100 Pairs
THE GOVERNMENT OF MALAYSIA
ECONOMIC PLANNING UNIT
THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK
JAPAN INTERNATIONAL COOPERATION AGENCY
TITLE
Cable Plan

Fig. 5.10


To East West Highway
Sg. Parit Bunian
R1A x 8
Ø100mm PVC Pipe
1490m x 4 = 5960m
Retention Pond
10-1
10-2
5-1
1-1
1-4
1-5
10-4
R1A x 2
Ø100mm PVC Pipe
320m x 4 = 1280m
10-5
10-6
Retention Pond
3-6
10-3
Ø100mm PVC Pipe
50m x 12 = 600m
R2A - Mod
5-2
3-7
3-8
3-9
5-4
5-5
C.O
CENTRAL ZONE
Urban Block
R&D Block
1-7
1-6
3-5
5-3
1-3
3-1
Sg. Air Merah
Ø100mm PVC Pipe
590m x 12 = 7080m
R1A x 5
Ø100mm PVC Pipe
820m x 4 = 3280m
1-9
3-10
1-10
5-6
5-7
1-8
3-4
1-2
3-3
3-2
R2A - Mod
R2A
Primary Access Road
Ø100mm PVC Pipe
340m x 10 = 3400m
R1A x 13
Ø100mm PVC Pipe
2200m x 4 = 8800m
Legend
R1A : Manhole & Type
: Duct
: Entry Duct
SCALE
0 100 200 300 400 500m
THE GOVERNMENT OF MALAYSIA
ECONOMIC PLANNING UNIT
THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK
JAPAN INTERNATIONAL COOPERATION AGENCY
TITLE
Duct Plan

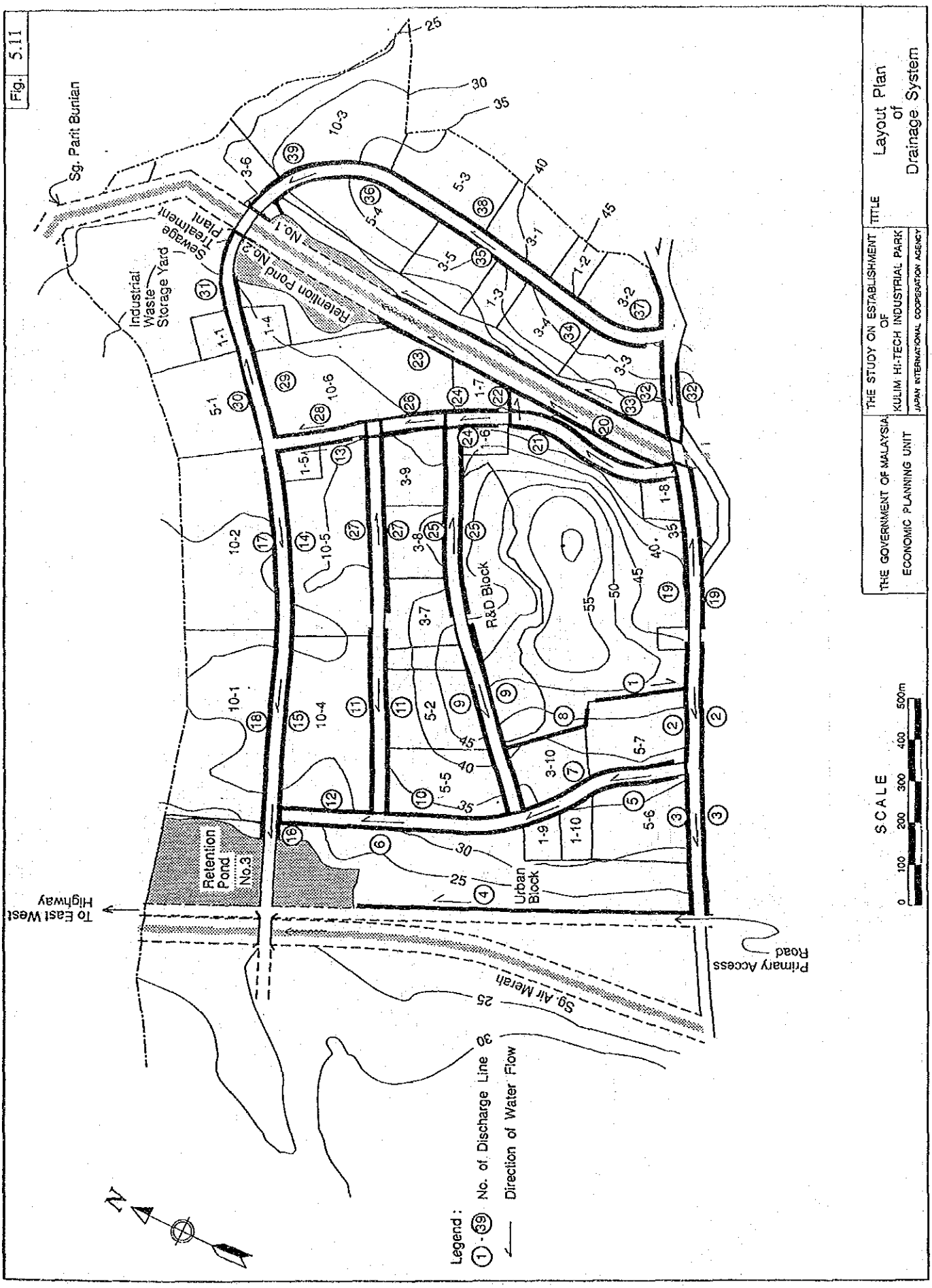
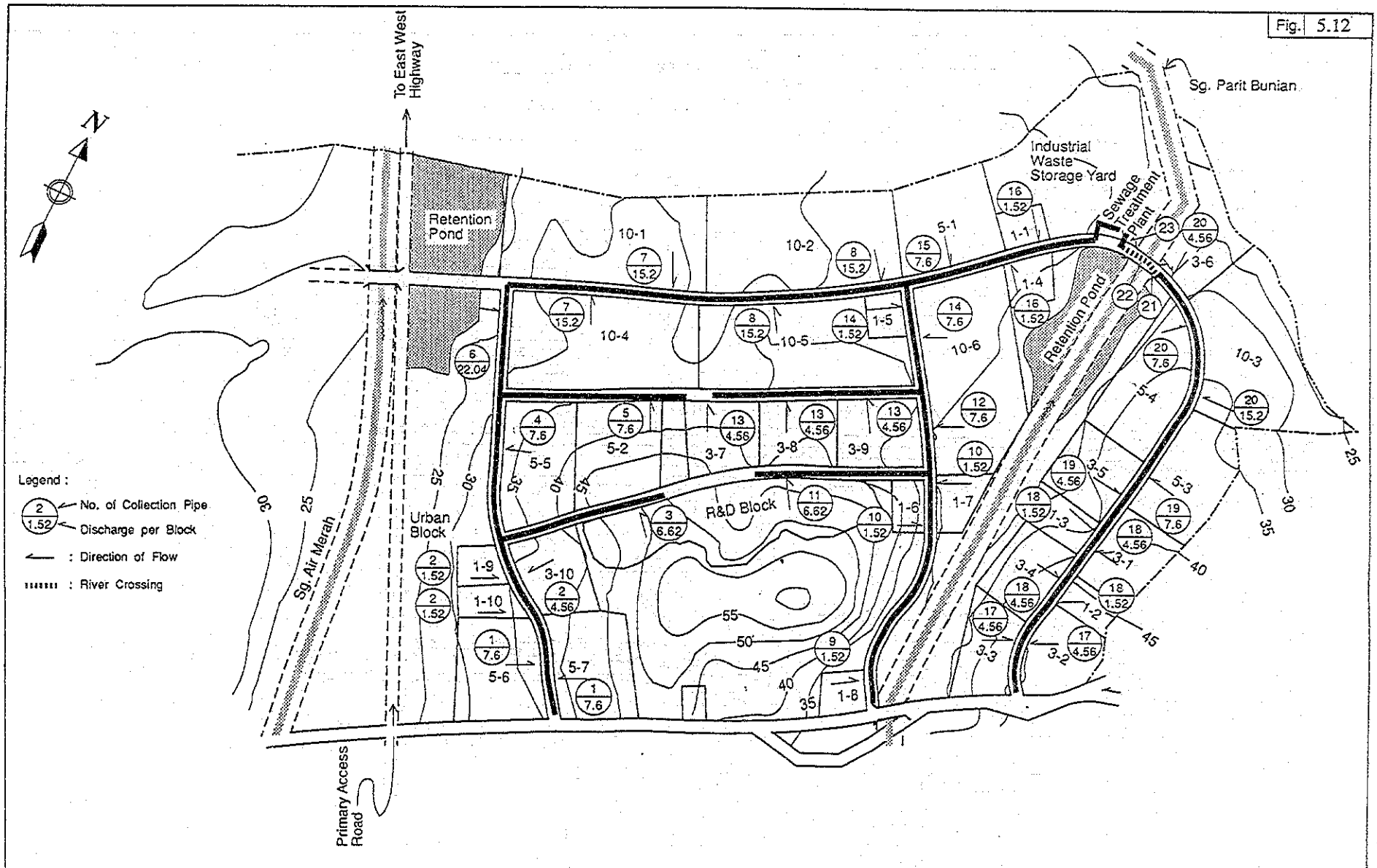


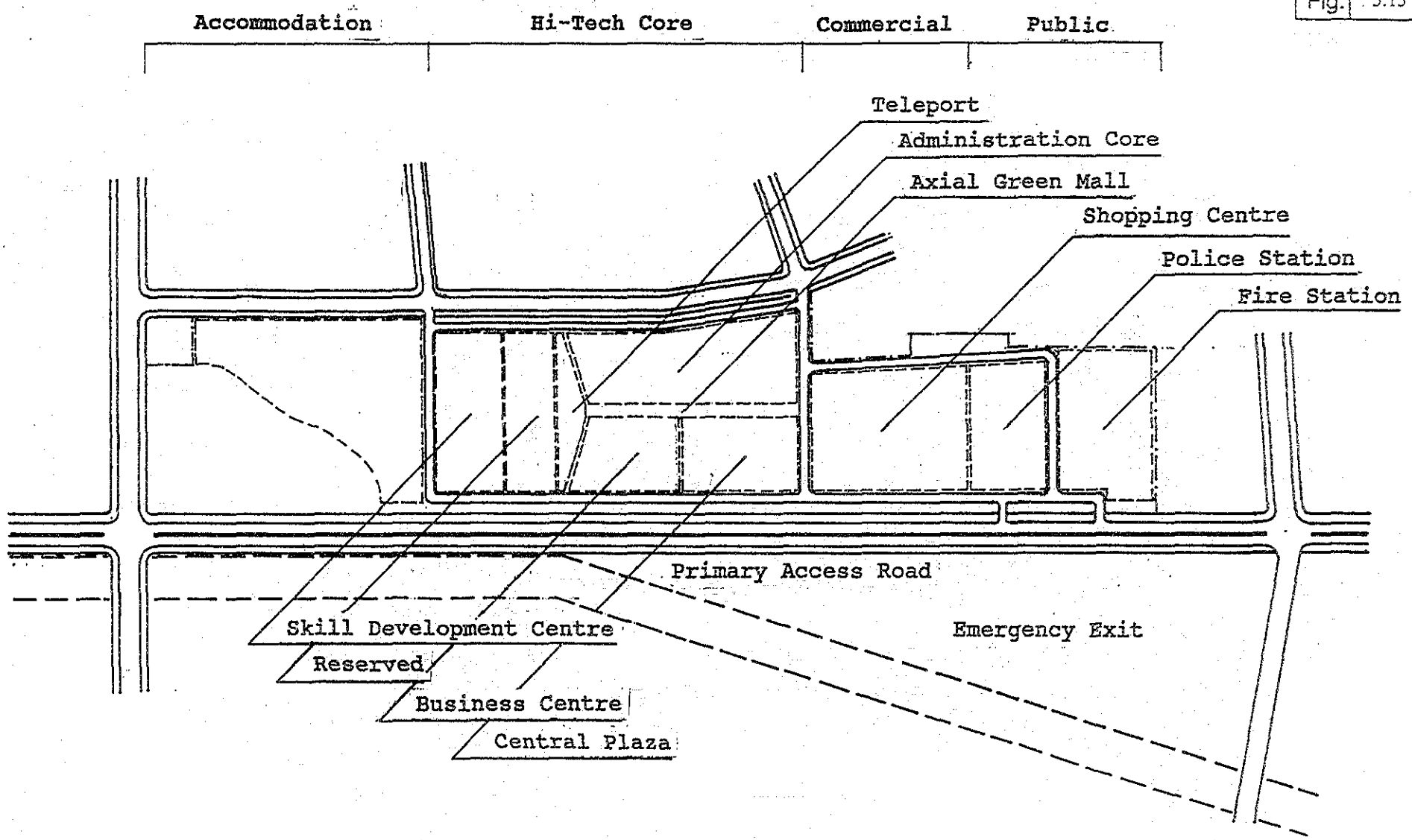
Fig. 5.11
Sg. Parit Bunian
Sewage Treatment Plant
Industrial Waste Storage Yard
Retention Pond No.2
Retention Pond No.1
Retention Pond No.3
To East West Highway
Primary Access Road
Sg. Air Merah
R&D Block
Urban Block
Legend :
No. of Discharge Line
Direction of Water Flow
SCALE
0 100 200 300 400 500m
THE GOVERNMENT OF MALAYSIA
ECONOMIC PLANNING UNIT
THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK
JAPAN INTERNATIONAL COOPERATION AGENCY
TITLE
Layout Plan of Drainage System

Fig. 5.12



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Layout & Block Plan of Waste Water Collection System

Fig. 5.13



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Schematic Layout Plan

6. IMPLEMENTATION PLAN OF FIRST PHASE INDUSTRIAL ZONE

6.1 Cost Estimate

The project investment cost mentioned here includes those of necessary infrastructures outside the Industrial Zone for the implementation of first phase Industrial Zone. Allocated investment cost and O&M cost are described in the Chapter 8 for financial analysis.

The following conditions and assumptions are applied for the cost estimate.

1) Price level
   The price level of October 1991 was applied which was the time of execution of field investigation related to the cost estimate works.
2) Exchange rate
   The foreign exchange rate was adopted as follow.
   US$ One (1) = M$ 2.70 = Japanese Yen ¥ 130.0
3) Disbursement of investment cost
   The investment cost is assumed to be disbursed from 1992 to 1994.

The project investment costs for the first phase Industrial Zone was worked out as tabulated below.

	Cost items	Cost in M$ million
i)	Direct construction cost	221.0
ii)	Land acquisition	9.0
iii)	Administration expense*	11.5
iv)	Engineering expense**	26.5
	Sub total i) to iv)	268.0
v)	Contingencies***	45.7
	Total, i) to v)	313.7
vi)	Interest ****	50.6
	G. Total, i) to vi)	364.3

* 5% of i) + ii)

** 12% of i) for design and supervision

*** 10% of sub total for physical contingency, and 3.2% p.a. for price contingency of 1992 and 1994.

**** 8.0% p.a. during construction, 1992 to 1994

Direct construction cost comprises the following cost items.

1) Land preparation of the Industrial Zone of 250 ha
2) Road network within the Industrial Zone including 2 bridges
3) Power supply system
   - Transmission lines from existing Kulim and Sungai Petani substations
   - Extension of feeder bay for Kulim and Sungai Petani substations
   - Main and distribution substations and distribution lines in the Industrial Zone
4) Water supply system
   - Muda intake, treatment plant, transmission main, outside Park
   - R1 and R2 service reservoirs, distribution main between R1 and R2 service reservoirs, pumping station situated other zones
   - Distribution pipes in the Industrial Zone

Note:
Direct construction cost for water supply system has been modified from M$40.4 million to 46.4 million due to the design change the reservoirs capacity.

5) Telecommunication system
   - Kulim switching center, junction line, outside Park
   - Duct and cables, other zones and outside Park
   - Telephone office with equipment, duct and cables in the Industrial Zone
6) Drainage system
   - Drainage channels, ditches and pipes, Industrial Zone
   - Retention ponds, industrial zone and other zones
7) Sewerage system
   - Sewer collection, monitoring facilities and waste water central treatment plant, Industrial Zone
8) Industrial waste storage
   - Temporary storage yard and facilities and incidentals in the Industrial Zone
9) Architecture works (related facilities of urban block in the Industrial Zone)
   - Skills development center, administration core, business center, commercial center, central plaza, etc.
10) Landscaping for Industrial Zone

6.2 Operation and Maintenance Cost

The operation and maintenance costs consist of the salary of staffs, labours charge, costs for materials and equipment for O & M works of the facilities.

The annual operation and maintenance costs were estimated by each sector. As a result, the ratio to the direct construction cost becomes as follows.

	Facilities	Annual O & M Cost (M$ thousand)	Ratio to Direct Construction Cost
1.	Road	100	0.6 %
2.	Power supply	1,500	1.8 %
3.	Water supply	250	0.6 %
4.	Telecom system	430	5.0 %
5.	Drainage system	100	1.0 %
6.	Sewerage system	150	1.5 %
7.	Industrial solid waste	100	1.0 %
8.	Related facilities (Buildings)	500	2.0 %
9.	Landscaping	150	3.0 %
	Total	3,280	

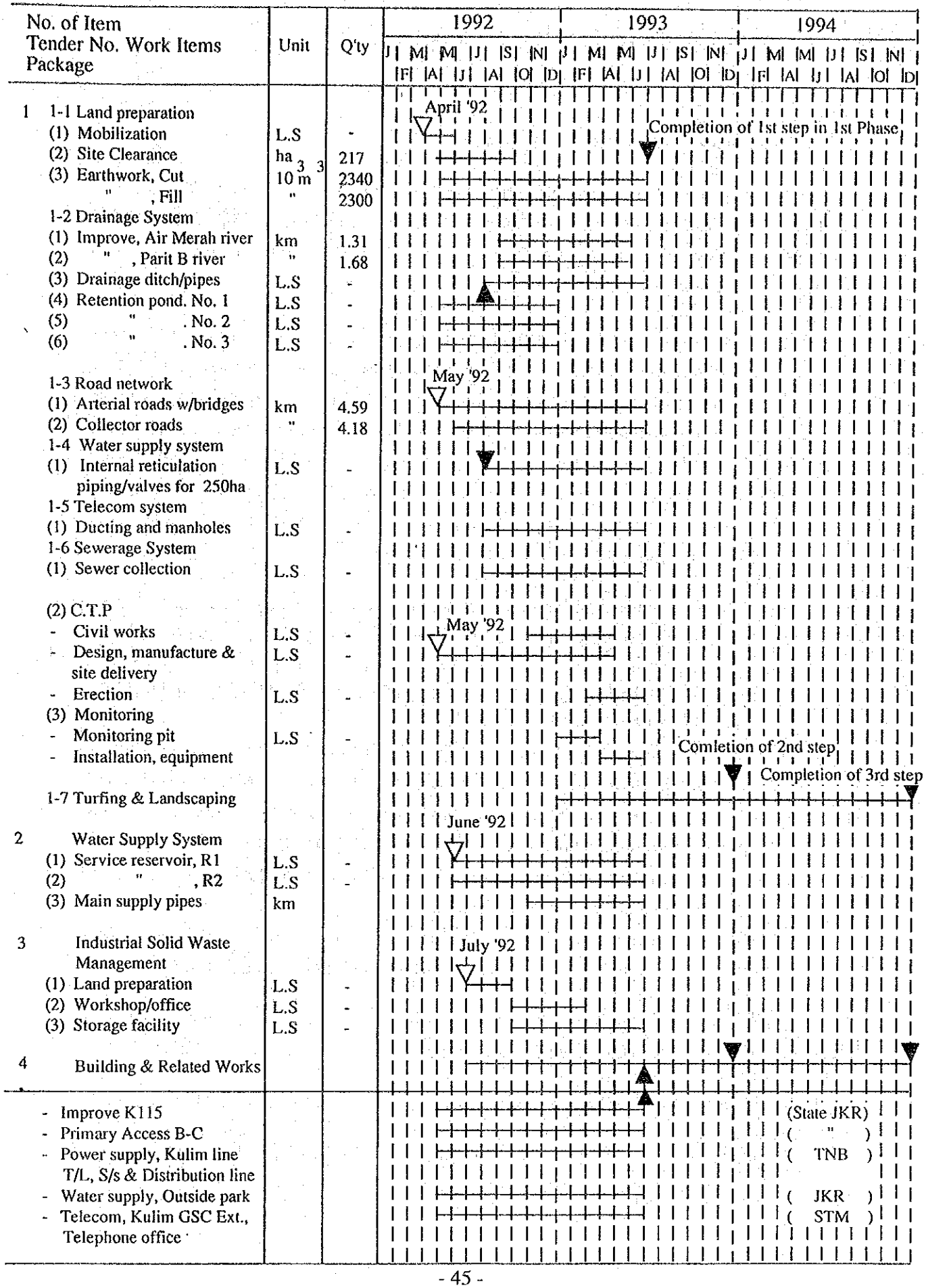
6.3 Construction Plan and Schedule

Following to the proposed implementation schedule, the construction works of the first phase industrial zone is scheduled to be completed in the middle of 1993. Required construction items and its construction field for the first phase Industrial Zone are summarized as follows.

Construction items	Construction field		
	Industrial Zone	Other Zones	Outside Park
Land preparation	*		
Road network			
– Arterial roads	*		
– Collector roads	*		
– Primary access, B–C		*	
– State road, K–115		*	
Power supply system			
– T/L, 132 kV		*	*
– Extension, Kulim S/S feeder bay			*
– Main substation	*		
– Distribution S/S	*		
– Distribution lines	*		
Water supply system			
– Muda intake, treatment plant, pump station			*
– Transmission main		*	*
– Service reservoir, R1		*	
– Service reservoir, R2		*	
– Pipe laying	*	*	
Telecom system			
– Telephone office	*		
– Duct/cables/manholes	*	*	*
– Kulim GSC extension			*
– Junction line	*	*	*
Drainage system			
– Improve. Air Merah river	*		
– Improve. Parit B. river	*		
– Drainage ditch/pipes	*		
– Retention ponds	*	*	
Sewerage system			
– Sewer collection	*		
– Central treatment plant	*		
– Monitoring system	*		
Industrial solid waste			
– Access road/drainage	*		
– Workshop/office	*		
– Storage facility	*		
Architecture works	*		
Landscaping	*		

Fig. 6-1 shows proposed construction time schedules for the first phase Industrial Zone. Most items of construction works will be carried out concurrently from 1992 to 1994.

Fig. 6.1 CONSTRUCTION TIME SCHEDULE FOR INDUSTRIAL ZONE OF FIRST PHASE



No. of Item Tender No. Work Items Package	Unit	Q'ty
1 1-1 Land preparation		
(1) Mobilization	L.S	-
(2) Site Clearance	ha	217
(3) Earthwork, Cut	$10^3 m^3$	2340
" , Fill	"	2300
1-2 Drainage System		
(1) Improve, Air Merah river	km	1.31
(2) " , Parit B river	"	1.68
(3) Drainage ditch/pipes	L.S	-
(4) Retention pond. No. 1	L.S	-
(5) " . No. 2	L.S	-
(6) " . No. 3	L.S	-
1-3 Road network		
(1) Arterial roads w/bridges	km	4.59
(2) Collector roads	"	4.18
1-4 Water supply system		
(1) Internal reticulation piping/valves for 250ha	L.S	-
1-5 Telecom system		
(1) Ducting and manholes	L.S	-
1-6 Sewerage System		
(1) Sewer collection	L.S	-
(2) C.T.P		
- Civil works	L.S	-
- Design, manufacture & site delivery	L.S	-
- Erection	L.S	-
(3) Monitoring		
- Monitoring pit	L.S	-
- Installation, equipment		
1-7 Turfing & Landscaping		
2 Water Supply System		
(1) Service reservoir, R1	L.S	-
(2) " , R2	L.S	-
(3) Main supply pipes	km	
3 Industrial Solid Waste Management		
(1) Land preparation	L.S	-
(2) Workshop/office	L.S	-
(3) Storage facility	L.S	-
4 Building & Related Works		
- Improve K115		
- Primary Access B-C		
- Power supply, Kulim line T/L, S/s & Distribution line		
- Water supply, Outside park		
- Telecom, Kulim GSC Ext., Telephone office		

7. INSTITUTION AND MANAGEMENT ASPECT

7.1 Institutional Aspect

There is more than one hundred fifty (150) industrial estates in Malaysia. Most of them have been constructed by the State Economic Development Corporations (SEDCs). The continued expansion of the industrial sector has brought about a sign of turning point to address the institutional weaknesses of the industrial estate as follows:

1) there has been lack of spatial planning coordination among existing authorities involved in industrial estate development at the pre-construction stage,
2) there has been also lack of coordination for potential and existing investors among existing authorities in providing licenses, permits and approvals at the pre-investment stage, and
3) there has been absence of operation and maintenance services in industrial estate providing adequate utilities services such as power, water, telecommunication for industrialists at the post-investment stage.

In addition, in view of new horizons that the hi-tech park can achieve, the management body is expected to perform the following new functions:

a) It would facilitate technology interface among private industries, universities, and public research institutions,
b) It would assist manpower development by providing on-the-job training schemes such as Skill Development Centre,
c) It would nature potential R & D venture capital under incubation system,
d) It would liaise with universities under innovation centre,
e) It would help organizing seminars and workshops on technology exchange among the industries in the hi-tech park, and lastly,
f) It would provide supporting services for the industries through privatization such as banking, shopping, courier, restaurants, library, and so forth.

In this regards, a question is raised, how to integrate the related functions or whether it would be appropriate to establish a new institutional body to solve the above matters.

Three alternative options are proposed as follows:

Alternative 1: Establishment of Kulim Hi-Tech Industrial Park Corporation (private corporation style)

Alternative 2: Establishment of Kulim Hi-Tech Industrial Park Authority (State corporation style)

Alternative 3: Strengthening Kedah State Development Corporation (Extension of KSDC(PKNK))

7.2 Management Organization

7.2.1 Alternative 1: Establishment of Kulim Hi-Tech Industrial Park Corporation (KHIPC)

This is an option to create a private management company under KSDC with participation of private sector. This option would bring about substantial improvement in the present development and management in view of private sector's commercial initiative. Investment promotion would be undertaken certainly in a more effective as well as efficient manner and management would be also carried out differently in a style of private company to cater to local industrialists' requirements such as courier, communication, business support services and community development.

Yet, there are some demerits. It would be difficult for the KHIPC to take part in the Federal and State's regional planning to coordinate regional infrastructure. It would be hardly possible that official licensing and approval procedures can be performed as "one-stop centre". And this private company alone is not financially capable of providing adequate maintenance services unless it collects very heavy management fees. Present industrial land sales alone may not be feasible. The housing scheme and amenities development need to be integrated.

The suggested organizational structure is illustrated separately. The PKNK would set up a subsidiary private company to manage the industrial zone while housing/commercial zone development would be tendered out to the private sector and amenity zone would be developed by another subsidiary to be established by PKNK/KHIPC. The role of "one-stop-centre" would be played by the present Kulim Local Council.

7.2.2 Alternative 2: Establishment of Kulim Hi-Tech Industrial Park Authority (KHIPA)

This is an option to establish a new state corporation. It should be entrusted with overall responsibility for the Park's management and maintenance. The regional planning and coordination function for industrial infrastructure development as well as permits and approval issuing functions could be transferred to the KHIPA and it would be empowered like the Local Authority to collect assessment charges from industrial tenants. The utilities maintenance services would be also performed by this State Authority. This is an institutional frame which is being practiced by Jurong Town Corporation (Singapore) and Hsinchu Science Park

(Taiwan).

This alternative has some disadvantages. It may go through time-consuming legal steps and it may need full-fledged technical manpower and necessary physical equipment for operation and maintenance activities which would incur considerable financial burden and requirement problems on the Authority.

Possible solutions could be 1) sub-contract out of maintenance work to related organizations or private sector, 2) assistance of KSDC experienced staff to this authority.

7.2.3 Alternative 3: Strengthening Kedah State Development Corporation

This could be considered as a conservative solution. The Johor State, for instance, applied a new system to Pasir Gudang Industrial Estate whereby the Pasir Gudang Local Council (PGLC) was established under the Johor State Economic Development Corporation (JSEDC). Both JSEDC and PGLC are in constant liaison with each other to streamline bureaucracy.

The PKNK should reorganize its structure to cater to creating a special unit. A "task force" team has been already established at the State level under the State Secretary to coordinate planning and implementation of the related infrastructure development. It is recommended that this task force should be developed into the Kulim Hi-Tech Industrial Park Committee. The PKNK can also act as Local Authority if so authorized and if the land is alienated to the PKNK. It then could collect assessments from Park tenants.

The disadvantages are that the PKNK undergoes wide-range development projects such as housing, commercial, and industrial projects under limited technical personnel. With this staffing situation running the hi-tech park, especially with the new dimension of industry supporting services would be difficult.

7.2.4 Recommended Hybrid Organization

The comparison of the alternatives in quantitative term is difficult. Yet after thorough examination as well as in the context of the present situations and ease of implementation, it is recommended that a hybrid between the alternative one and three should be adopted as the most appropriate form of management among the proposed three alternatives. The suggested organization should be thus,

1) establishing a subsidiary under PKNK to deal with development and management of the Hi-Tech Park as well as promotion of R & D activities, and
2) creating a new local council under control of PKNK to provide "one-stop services" maintenance services functions.

The subsidiary to be set up should be fully-owned private company by PKNK which undertakes implementation of industrial zone development. For housing/commercial zone it should contract out to private developers while for amenity zone it should create another subsidiary, this time a joint-venture with a private sector, which undertakes development and management of the sports facilities such as golf club.

The subsidiary should also perform R & D promotional activities for this Hi-Tech Park include incubation, technology exchange, skill development centre and joint research programme among industries, research institutions and university.

The local council which is to be newly created should administer the area of Hi-Tech Park which must be designated and legally gazetted under PKNK. It should facilitate foreign and local investors in their plan approvals and their ordinary maintenance services such as rubbish collection, road cleaning and lighting maintenance. It should, however, have a minimal number of the staff personnel by privatizing the said maintenance activities to the subsidiary company. The subsidiary company would be called upon to provide appropriate maintenance services to the park and cross-subsidise such services if the need arises.

To ensure financial viability, the proposed subsidiary should collect management fees from the industries while the new local council collect annual assessment. To further strengthen financial sustainability, it is proposed that the federal grant for road maintenance services should be channeled through the new local council.

Besides, in order to ensure efficient management and implementation of the Hi-Tech Park, it is strongly suggested that the utility authorities should set up their respective unit specifically to cater for the needs of the Park, namely, TNB, STMB, and JKR.

The recommended form of the management organization is thus depicted in the Fig. 7.4

In summary, to achieve the said objectives effectively the proposed management organization should preform the following functions

(a) "one-stop centre" to deal with problems and complaints from industrialists regarding investment-related permits and approvals, security, and environment and to undertake investment promotional activities.

(b) "industrial facilitator" to make efficient management and maintenance services for Hi-tech industrial tenants in close combination with relevant technical agencies. The sewerage treatment plant and temporary industrial waste storage facility are proposed to be managed by the management organization.

(c) "interface catalyst" to manage and maintain common service functions and facilities for Hi-Tech industries including Skill Development Centre (manpower training), University Innovation centre (University of Science Malaysia, University of North etc.), Technology Development Centre (public R & D institutions: SIRIM, MIMOS, etc.), Incubation unit, Science Technology Exchange Plaza (technology transfer promotion), exhibition centres, and amenities.

7.3 Training

It is a necessary condition for forming a industrial zone to secure manpower in both quantitative and qualitative terms. Qualified manpower is particularly required for the Industrial Zone. Thus, the block is planned to prepare its own training facility, so called skilled development centre, for developing Hi-Tech skills of technicians. The Training Centre will house 200 trainees maximum to answer the needs of 1,950 trainees trained by 1997 with 360 hours basic training program. The Centre shall be run by the association which consists of enterprises of the zone, higher education institutes, and Kedah State Development Corporation, and will cope with the needs of enterprises. In the future, it will enrich its training program by cooperating with existing Penang Skill Development Centre, training centres that would be established, and higher education institutes of the region.

7.4 Investment Promotion

7.4.1 Trend of Hi-tech Industries in 1990s

Major changes are taking places in locational factors, particularly in the sector of electric and electronics hi-tech industries. In case of Japan, the leading electric and electronics industries have reviewed global production network and marketing strategies and started to put them into implementation. It is also true that the shortage of operations in Japan is getting more serious and labor costs have gone up which have made the industries extremely uncompetitive to continue their production in Japan and thus accelerate a dramatic shift in production location from Japan to ASEAN countries.

As production centers move form the headquarters, some of the research functions will shift to the abroad accordingly. The typical function would be "product development " research which usually needs to be located nearby production center to comply with the needs of the consumers.

In view of forthcoming shortage of manpower, Malaysia needs to upgrade human resource development, and strengthen research and development (R&D) capacities in order to meet requirements of the higher value added production and capital-intensive production of the

private industries.

The concentration of electric and electronics industries and their related component industries in Malaysia has become distinguished. Nevertheless housing, amenity, transportation (Penang airport should be international) and utilities are problematic. The integrated functions such as a hi-tech industrial estate would be an effective vehicle to pull the foreign potential investors.

7.4.2 Proposed Criteria for Hi-Tech Industries

As we indicated in the report, a high technologies can be considered not only in the products but also in the production process. Nevertheless we have prepared tentative criteria as the second best for hi-tech industries and products in reference to the case of Office of Technology Assessment (OTA), USA. The industries of "technology intensity" are defined as those of which R&D expenditures are more than 3.2% to the value-added production and the engineers' proportion against the total employees is more than 2.8%. For hi-tech industries 10% and 10% or more taken respectively.

For investment promotion the criteria of the hi-tech industries would be necessary to identify and shortlist potential investors. The tentative list of Japanese hi-tech companies are prepared for the use of MIDA. For other countries it needs a study on potential hi-tech companies based on the sub-sectors and products discussed above.

For selection of the investors which can be qualified to move in the proposed hi-tech park, the following general criteria are recommended.

1) The industry which applies for entry in the hi-tech park should be the one to contribute to technology development of Malaysia.
2) The industry should submit an appropriate investment plan, production plan and research and development plan for the years to come (e.g. 5 years).
3) Incase of R&D oriented industry the research topics and R&D plan, preferably in the sector of hi-tech industries such as electric, electronics, new materials and bio-technologies should be submitted.
4) The industry should contribute to human resource development of Malaysia.
5) The industry should be financially sound and submit a financial report for the last three years.
6) The industry should be free of pollution and should be equipped with appropriate treatment facilities in case of toxic waste production potentials.
7) The industry should have appropriate proportion of permanent research staff and should submit a staff personnel plan.

7.4.3 Suggested Plan of Action for Implementation

The following two steps are proposed.

1) Preliminary Promotion

The "Task Force" headed by MIDA should be established comprising PKNK, SIRIM, MIMOS, and other relevant agencies. The task force will identify the list of the hi-tech products and prepare overall hand-outs. Dissemination of hand-outs to foreign and local firms should be undertaken as soon as possible.

2)Intensive Promotion

The task force will shortlist potential investors to which intensive investment promotion will be carried out. Overseas promotion missions and investment seminars abroad need to be effectively organized. Follow-up missions will be necessary afterwards.

7.4.4 Proposed Investment Incentives

Under present Promotion of Investment Act 1986, special incentives specifically for hi-tech industries are not granted. Nevertheless in order to launch into effective investment promotion for Kulim Hi-Tech Industrial Park, the "promoted industrial area" concept should be introduced and the following incentives, in addition to existing incentives sch as Pioneer Status, Investment Tax Allowance (ITA), should be provided.

Pioneer Status/ITA : The companies which are allowed to come to the Park will be automatically granted pioneer Status or Investment Tax Allowance (ITA).

R & D Incentive : The companies which are allowed to enter the Park will be automatically eligible for double deduction for R & D expenditures and tax holiday for seven (7) years period for hi-tech industries.

Training Incentive : The companies which are allowed to be located in the Park will be automatically eligible for initial allowance of twenty (20) percent and annual allowance of five (5) percent for expenditure on training.

Abatement of Adjusted Income : Abatement of more than five (5) percent of adjusted income for location of hi-tech industries at the Park will be granted.

Export Incentive : Double deduction for export expenses and allowance for five (5) percent for FOB values of export will be granted.

Equity Ownership : No equity conditions will be imposed on companies to be located in the Park.

Employment of foreign Expatriate Personnel : Those companies which are allowed to enter in the Park will be automatically granted ten (10) or more expatriate posts including key posts. The appropriate numbers of expatriate posts will be decided upon application.

Royalty Incentive : Ratio of royalty will be raised to five (5) percent for those hi-tech industries locating at the Park.

7.5 Questionnaire Survey

7.5.1 Questionnaire Survey on Potential Investors in Japan

In order to sound preliminary interests of the potential investors in Japan as well as to identify their requested requirements for utilities services, a questionnaire survey was undertaken in Japan between May and June, 1991. As a result, this questionnaire contributed to exposure of the proposed project among related Japanese industrialists.

The companies were selected out of the ones which can be categorized as hi-tech industries and their supporting industries, amounting to a sample number of one hundred and seventy - eight (178) companies. The fifty -nine (59) replies were returned, resulting in a return ratio of 33.1%.

Regarding a question if they have a keen interest in locating their factory/R&D facilities in Kulim Hi-Tech Park, fifteen (15) companies responded favorably.

Very Interested	2 (3.4%)
Interested	13 (22.0%)
Not Interested	16 (27.1%)
Don't Know	28 (47.5%)

Those which replied favorably are CD, audio equipment, IC, oxygen gas, LED, computer-related parts industries.

7.5.2 Questionnaire Survey on Potential Investors in Malaysia

In view of facilitating an advanced investment promotional activities, a questionnaire survey has been done with mainly Japanese-related companies which are located and operating in Malaysia. Primary objectives are 1) to expose the proposed project to the attentions of Japanese industries, 2) to question if they have any new investment plan in near future, and 3)

to sound their interest in relocating factories to Kulim.

To do above study, a questionnaire format has been prepared and distributed among major Japanese-related firms based on the directory of the JACTIM (Japanese Chamber of Trade and Industry, Malaysia) members. The sampled number is one hundred twenty four (124) in total while the answers returned are forty seven (47) resulting in a return ratio of 37.9% which appears rather high.

Interest in Participation in Kulim Hi-Tech Park

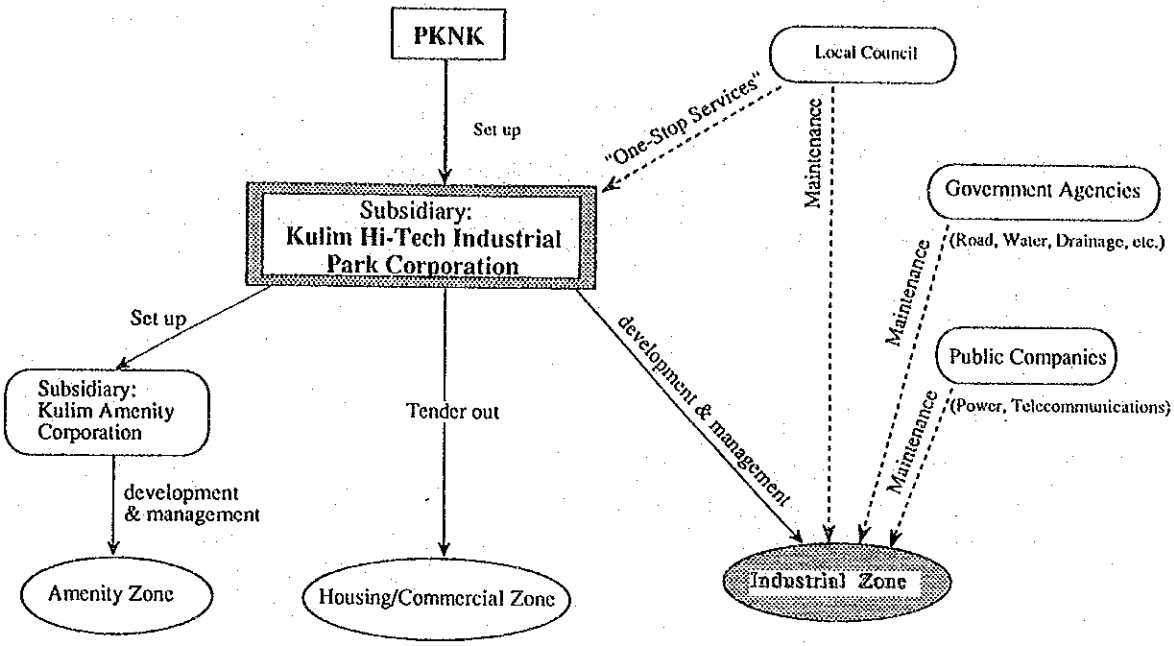
Among the companies sampled nine (9) firms showed that they would like to participate in the proposed hi-tech park project.

Very interested	4 (8.5%)
Interested	5 (10.6%)
Not interested	38 (90.9%)

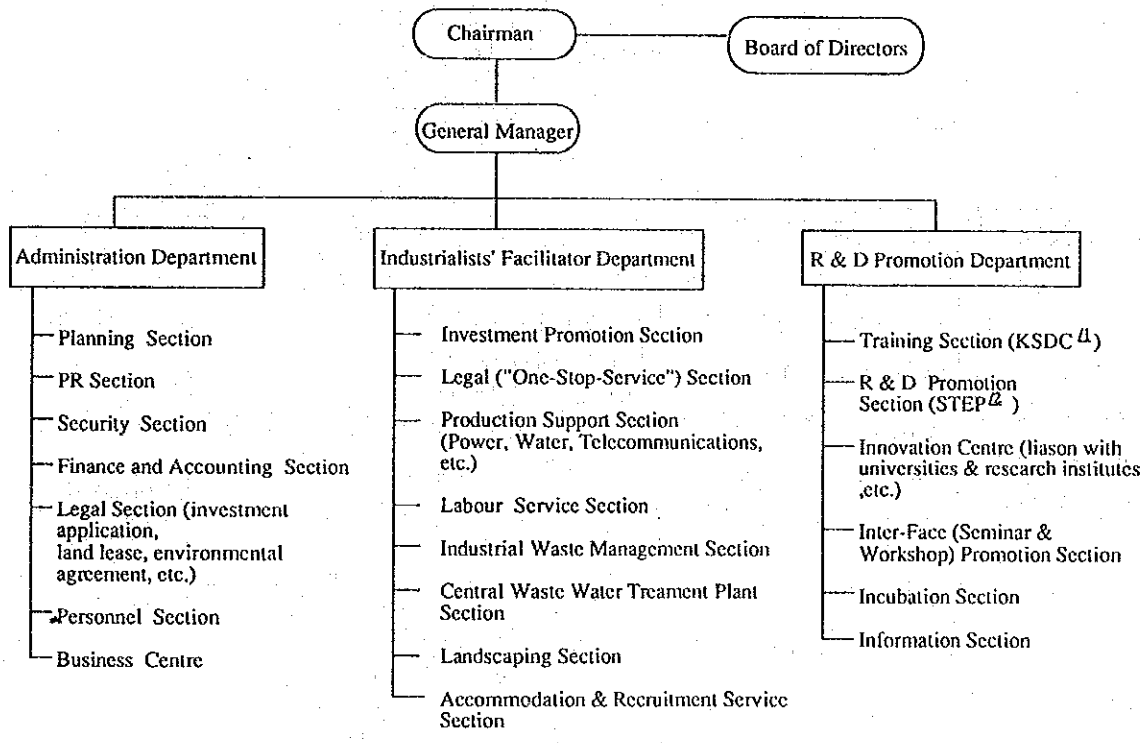
Those which answered favorably are optical fiber, audio products, computer-related components, electronics parts, oxygen gas, capacitor, CD player industries.

Fig. 7.1

Alternative 1: Establishment of Kulim Hi-Tech Industrial Park Corporation (Private Company Type)



Suggested Organizational Structure for Kulim Hi-Tech Industrial Park Corporation

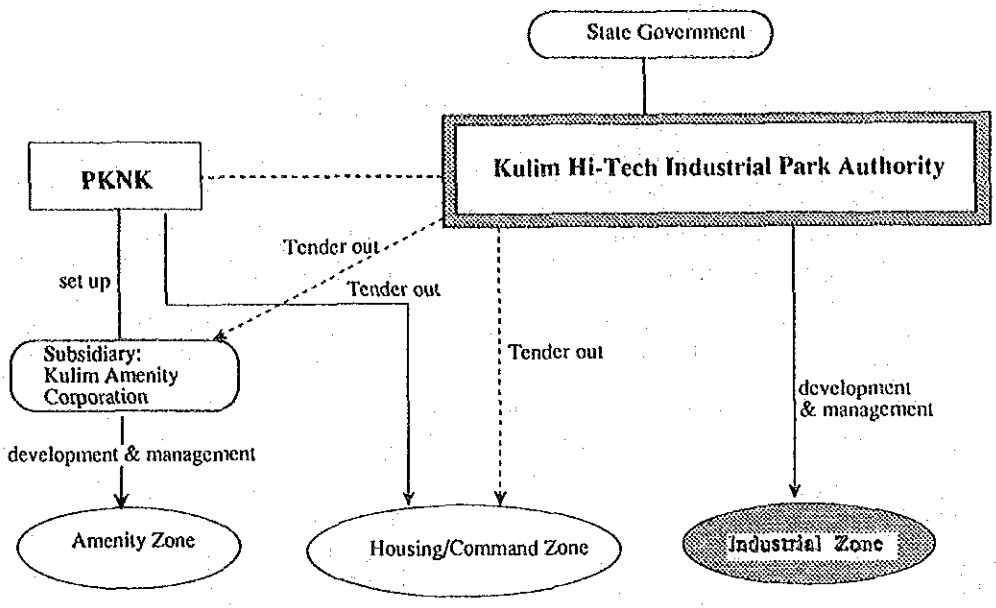


/1 KSDC: Kedah Skill Development Centre
/2 STEP: Science Technology Exchange Plaza

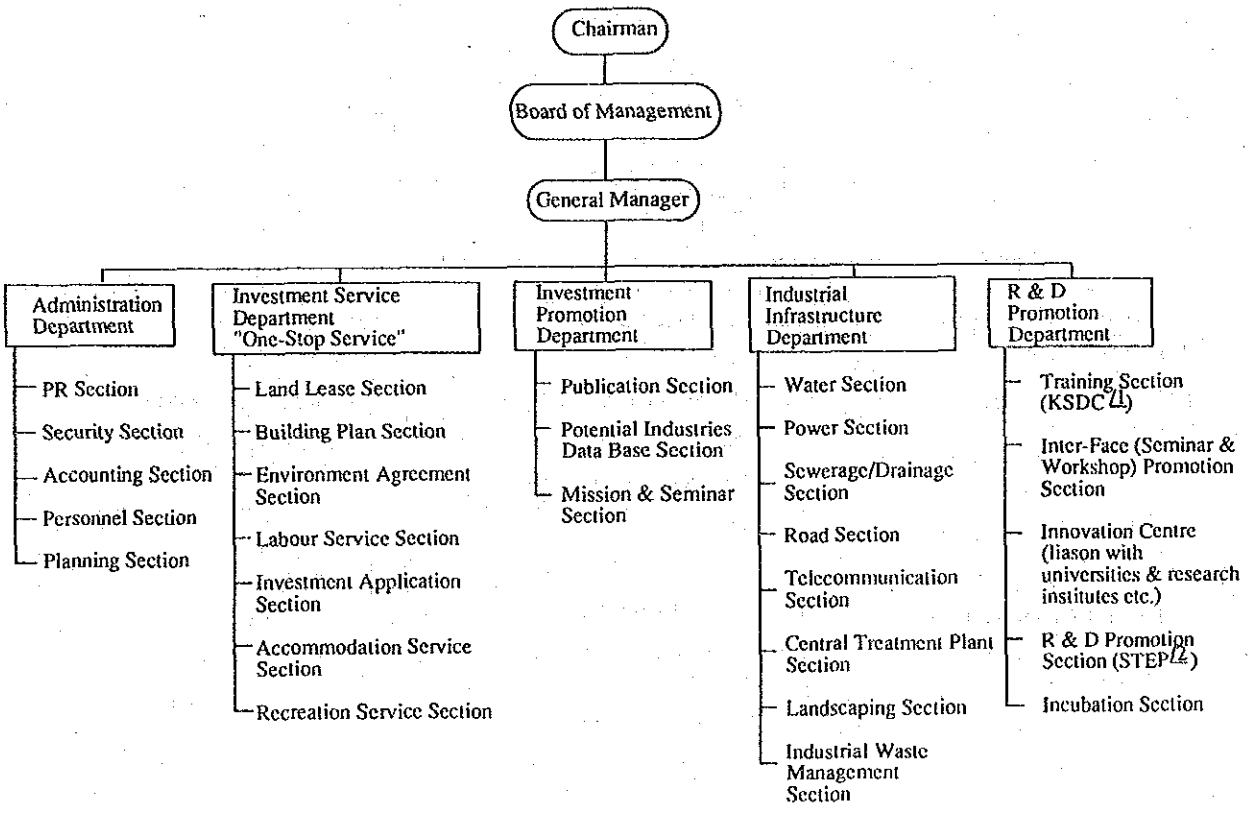
THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Alternative 1

Alternative 2: Establishment of Kulim Hi-Tech Industrial Park Authority
(State Authority Type)

Fig. 7.2



Suggested Organizational Structure for Kulim Hi-Tech Industrial Park Authority

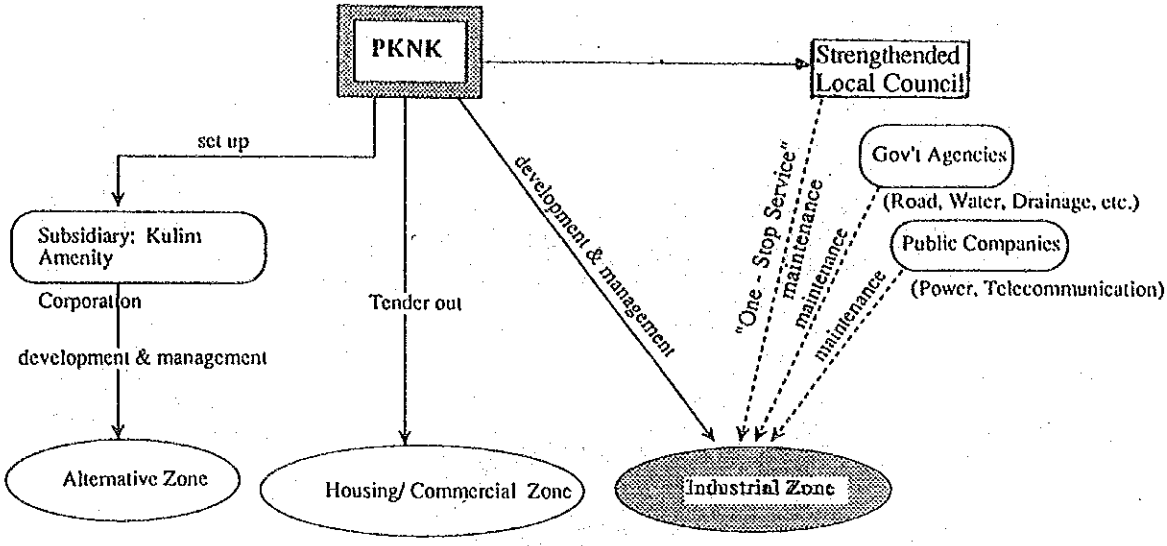


/1 KSDC: Kedah Skill Development Centre
/2 STEP: Science Technology Exchange Plaza

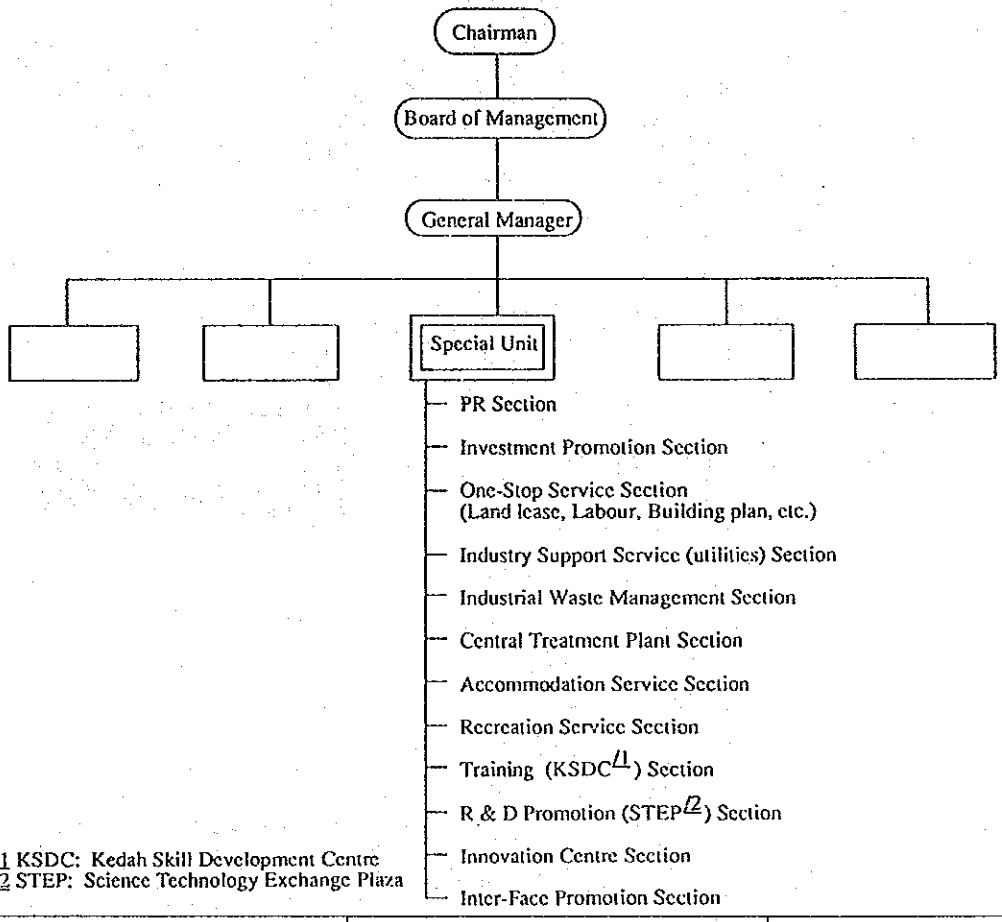
THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Alternative 2

Alternative 3: Strengthening Kedah State Development Corporation

Fig. 7.3



Suggested Organizational Structure for PKNK

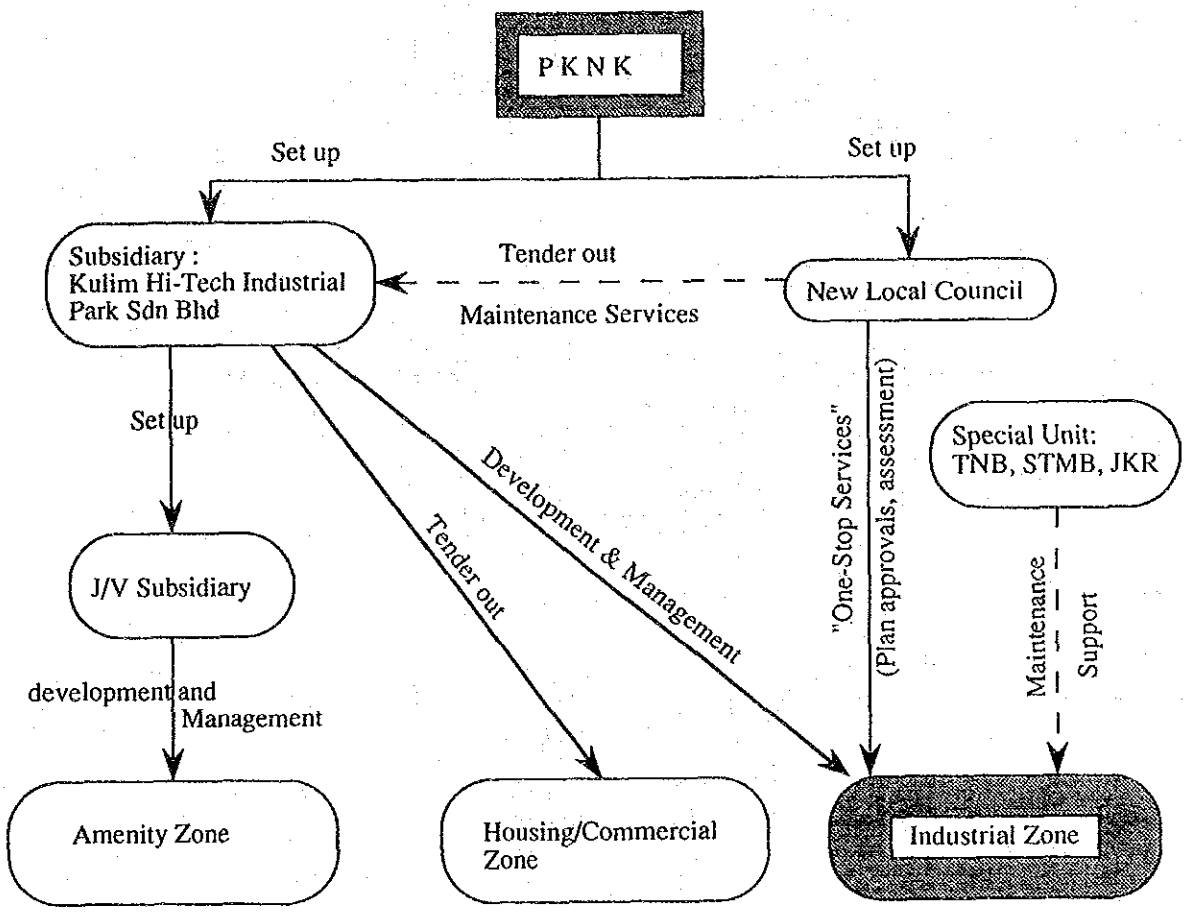


/1 KSDC: Kedah Skill Development Centre
/2 STEP: Science Technology Exchange Plaza

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Alternative 3

Fig. 7.4

HYBRID MANAGEMENT ORGANIZATION
ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK
SDN BHD AND NEW LOCAL COUNCIL
(Recommeded)



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Hybrid Alternative

8. FINANCIAL ANALYSIS

8.1 Investment Costs

The investment cost for the proposed First Phase Industrial Zone of the Kulim Hi-Tech Industrial Park has been estimated at M$305.6 million. Among the breakdowns of the Project investment costs, some of the costs could be separated out totally and some could be reduced partially from the land sales cost items in terms of their cost recovery systems and national policy point of view. In so doing, the project investment costs were re-adjusted as follows:

Re-adjusted Project Investment Costs

	(Unit: M$ million)
(1) Land acquisition	9.0
(2) Direct construction cost	66.7
Land preparation	10.4
Road network	15.7
Water system	15.0
Telecom ducting	0.9
Drainage system	9.7
Sewerage system	10.0
Landscaping	5.0
(3) Sub-Total	75.7
Administration expense (5%)	3.8
Engineering service (12%)	9.1
(4) Sub-Total	88.6
Contingency	14.7
Grand Total	103.3 (M$ 68.9/m^2)

If these costs are considered as Project financial costs, the unit land cost per m^2, which is derived from the saleable land area (150 ha), becomes M$68.9/$m^2$ which appears competitive. In view of neibouring land prices, appropriate pricing would be in a range betwen M$80.0/$m^2$ and M100.0m^2$ at maximum initial stage.

8.2 Financial Assumptions

A financial analysis has been confined to the industrial zone in the Hi-Tech Industrial Park on the following assumptions:

(1) Project Investment Costs : M$103.3 million.

(2) Disbursement plan : Between 1992 and 1994

(3) Land price and sales schedule

Two sets of the land sale prices and sales schedule have been proposed as optional plans A and B.

Plan A	1992	1993	1994	1995	1996
Sales price (M$/m^2)	90.0	100.0	110.0	110.0	110.0
Sales schedule (%)	10.0	20.0	20.0	20.0	30.0

Plan B	1992	1993	1994	1995
Sales price(M$/m^2)	80.0	80.0	90.0	90.0
Sales Schedule (%)	20.0	30.0	30.0	20.0

(4) Operation and maintenance cost : M$0.57 million.

(5) Cost of sales : Two percent (2.0%) of land sales revenue.

(6) Income Tax : thirty-five percent (35.0%) of gross revenues.

(7) Dividends : 8.0 percent p.a. of the paid-up capital.

(8) Depreciation:

Due to financial practice in Malaysia, depreciation allocations are omitted in this analysis.

(9) Management Fees : M$0.57 million per annum.

(10) Financial Plan

Federal loan is assumed with the following conditions:

Interest rate : 8.0% per annum

Grace period : three (3) years
Repayment period : ten (10) years

And equity portions would be 20% of the investment costs.

8.3 Financial Analysis

Based on the above assumptions, the following three cases are evaluated in terms of financial rates of return i.e., ROI (return on investment) and ROE (return on equity).

(1) Case 1A : In case PKNK is a management organization which is to finance all the costs by loan, to pay income taxes and to collect management fees.

FIRR (ROI): 1.8%, (ROE): not relevant

Case 1B: as above

FIRR (ROI): Negative, (ROE): not relevant

Case 1A gives a positive ROI (return on investment) whereas the Case 1B shows a negative ROI. From sensitivity analysis, the following policy implications are revealed to make this option case feasible:

1) Tax (income tax) exemption should be admitted for the initial two years, or

Plan A		Plan B	
FIRR (ROI) :	12.9%	FIRR (ROI) :	Negative
(ROE) :	not relevant	(ROE) :	not relevant

2) Around 20% of investment cost should be provided by grant system, or

Plan A		Plan B	
FIRR (ROI) :	18.5%	FIRR (ROI) :	Negative
(ROE) :	not relevant	(ROE) :	not relevant

3) Management fees should be raised double.

Plan A		Plan B	
FIRR (ROI) :	6.5%	FIRR (ROI) :	Negative
(ROE) :	not relevant	(ROE) :	not relevant

(2) Case 2A : In case the management body is a state corporation type where an equity is to be set at 20% of the total project costs, a loan to be borrowed to finance

the remaining project costs, income tax is to be exempted and management fees are to be collected. The results show:

FIRR (ROI) : 37.99%, (ROE): 50.86%

Case 2B : As above.

FIRR (ROI) : 51.18%, (ROE) : 73.74%

Both cases reveal high internal rates of return due to better conditions such as no tax payment and reduced loan burdens.

(3) Case 3A: In case the management body is a private company type where investment costs are to be financed by equity (20%) and loan (80%), taxes are to be paid, dividends also to be paid, and management fees are to be collected.

FIRR (ROI): Negative, (ROE): Negative

Case 3B : As above.

FIRR (ROI): Negative, (ROE): Negative

Both cases show negative internal rates of due to severe conditions such as tax payment, and dividends payment . Land prices cannot be further raised since they would become on competitive in terms of marketing policy. Policy implications for this case are:

1) Tax (income tax) exemption should be allowed for the first three (3) years, or

Plan A		Plan B	
FIRR (ROI) :	13.6%	FIRR (ROI) :	34.4%
(ROE) :	19.4%	(ROE) :	55.8%

2) Management fees should be increased double, or

Plan A		Plan B	
FIRR (ROI) :	Negative	FIRR (ROI) :	Negative
(ROE) :	Negative	(ROE) :	Negative

3) Twenty (20) percent of the investment costs should be financed by grant scheme.

Plan A		Plan B	
FIRR (ROI) :	9.6%	FIRR (ROI) :	Negative
(ROE) :	17.9%	(ROE) :	Negative

As a result of the financial evaluation, the policy implications have been summarized

as follows:

For Case 1 PKNK type of management body, the results show not very much exciting. It is foreseen that government supports such as tax exemption and subsidy, and management fee increase would be necessary.

For Case 2 a state corporation type of management organization, the proposed land pricing and sales schedule of both Case 2A and 2B reveal very high internal rates of return. As stated above, it was due to the fact that the public organization could enjoy the merits of the public status such as tax exemption. Financially this would be the best alternative.

Case 3 was a private company type of the management body. The results, however, show negative rates of financial return for both Case 3A and 3B. This was because a private company needs to pay taxes and dividends which would bring about negative factors in the financial analysis. Since the land pricing as seen above is rather high already, substantial incentives such as tax exemption, and financial subsidy from the government would seem to be essential for this type of management organization.

For a hybrid type of management between the alternative one and three which was recommended in the chapter of Institution and Management Aspect, the financial analysis results however are negative as the Case-3, though the latter assumed provision of the equity by twenty (20) percent of the Project costs. The policy implication would be, in addition to tax holiday and subsidy, to further welcome private sector's participation by equity holder.

It is also suggested that the housing and recreational development in the Project should be privatized to the private developers under the proposed management organization. These revenues generated might well contribute to financial position of the said management body.

Note : due to progress in work of on-going Master Plan Study and unavailability of cost data for development outside industrial zone, financial computation for cross- subsidization by housing and recreational facility sales was difficult here.