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

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

March 1992

JAPAN INTERNATIONAL COOPERATION AGENCY

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

STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK

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ABBREVIATIONS

(1) Plan

5MP	:	Fifth Malaysia Plan
6MP	:	Sixth Malaysia Plan
NDP	:	National Development Policy
OPP2	:	Second Outline Perspective Plan

(2) Domestic Organization

DOE	:	Department of Environment
DOS	:	Department of Statistics
EPU	:	Economic Planning Unit
ICU	:	Implementation and Coordination Unit
IMR	:	Institute of Medical Research
DID (JPT)	:	Drainage and Irrigation Department
PWD (JKR)	:	Public Works Department
MARDI	:	Malaysian Agricultural Research and Development Institute
MHA (LLM)	:	Malaysia Highway Authority
MIDA	:	Malaysian Industrial Development Authority
MIMOS	:	Malaysian Institute of Microelectronics System
MITI	:	Ministry of International Trade and Industry
MLRD	:	Ministry of Land and Regional Development
MOF	:	Ministry of Finance
MOH	:	Ministry of Health
MOPI	:	Ministry of Primary Industries
MOHLG	:	Ministry of Housing and Local Government
NDPC	:	National Development Planning Committee
KSDC (PKNK)	:	Kedah State Development Corporation
PORIM	:	Palm Oil Research Institute of Malaysia
PPC	:	Penang Port Commission
RDA	:	Regional Development Corporation
RRIM	:	Rubber Research Institute of Malaysia
SEDC	:	State Economic Development Corporation
SEPU	:	State Economic Planning Unit
SIRIM	:	Standard and Industrial Research Institute
STM	:	Malaysia Telecommunication Company
TEN	:	Tenaga Nasional
TPM	:	Technology Park Malaysia
UDA	:	Urban Development Authority

(3) International or Foreign Organization

ADB	:	Asian Development Bank
IBRD	:	International Bank Reconstruction Development

ILO	:	International Labor Organization
IMF	:	International Monetary Fund
JICA	:	Japan International Cooperation Agency
MITI	:	Ministry of International Trade and Industry
MOC	:	Ministry of Construction, Japan
OECD	:	Organization of Economic Cooperation Development
OECF	:	Overseas Economic Cooperation Fund, Japan
UNIDO	:	United Nations Industrial Development Organization
UNDP	:	United Nations Development Program
WHO	:	World Health Organizations

(4) Others

B	:	Benefit
BOD	:	Biochemical oxygen demand
C	:	Cost
CIF	:	Cost, insurance and freight
COD	:	Chemical oxygen demand
D & I	:	Domestic and industrial
FIRR	:	Financial Internal Rate of Return
EL.	:	Elevation above mean sea level
Fig.	:	Figure
FOB	:	Free on Board
GDP	:	Gross Domestic Product
GNP	:	Gross National Product
HWL	:	Reservoir high water level
LWL	:	Reservoir low water level
TWL	:	Top Water Level
O & M	:	Operation and maintenance
Ref.	:	Reference
SITC	:	Standard International Trade Classification
SS	:	Suspended Solid
TEU	:	Twenty feet Equivalent Unit
ADT	:	Average Daily Traffic

ABBREVIATIONS OF MEASUREMENT

Length

mm	=	millimeter
cm	=	centimeter
m	=	meter
km	=	kilometer
ft	=	foot
yd	=	yard

Atea

cm^2	=	square centimeter
m^2	=	square meter
ha	=	hectare
km^2	=	square kilometer

Volume

cm^3	=	cubic centimeter
l	=	litre
kl	=	kilolitre
m^3	=	cubic meter
gal.	=	gallon

Weight

mg	=	milligram
g	=	gram
kg	=	kilogram
ton	=	metric ton
lb.	=	pound

Time

s	=	second
min	=	minute
h	=	hour
d	=	day
y	=	year

Electrical Measurement

V	=	Volt
A	=	Amphere
Hz	=	Hertz (cycle)
GHz	=	Gigahertz
W	=	Watt
kW	=	kilowatt
MW	=	Megawatt
GW	=	Gigawatt
pr	=	pair

Other Measures

%	=	percent
PS	=	horsepower
°	=	degree
'	=	minute
"	=	second
10^3	=	thousand
10^6	=	million
10^9	=	billion

Derived Measures

m^3/s	=	cubic meter per second
cusec	=	cubic feet per second
mgd	=	million gallon per day
kWh	=	Kilowatt hour
MWh	=	Megawatt hour
GWh	=	Gigawatt hour
kWh/y	=	kilowatt hour per year
kVA	=	kilovolt amphere
BTU	=	British thermal Unit
psi	=	pound per square inch
lcd	=	litre per capita per day
Kb/s	=	Kilobit/second
Mb/s	=	Megabit/second

Currency

M$	=	Malaysian Ringgit
US$	=	US Dollar
¥	=	Japanese Yen
	=	
	=	

CONVERSION FACTORS

	From Metric System			To Metric System		
Length	1 cm	=	0.394 inch	inch	=	2.54 cm
	1 m	=	3.281 ft	1 ft	=	30.48 cm
			1.094 yd	1 yd	=	91.44 cm
	1 km	=	0.621 mile	1 mile	=	1.609 km
Area	1 cm^2	=	0.155sq.in	1 sq.ft.	=	0.0929 m^2
	1 m^2	=	10.76 sq.ft	1 sq.yd.	=	0.835 m^2
	1 ha	=	2.471 acres	1 acre	=	0.4047 ha
	1 km^2	=	0.386 sq.miles	1 sqmile	=	2.59 km^2
Volume	1 cm^2	=	0.610 cu in	1 cu ft.	=	8.32 lit
	1 lit	=	0.220 gal (imp)	1 cu yd	=	0.765 m^3
	1 kl	=	1 kl = 6.29 barrels	1gal (imp)	=	4.55 lit
	1 m^3	=	35.3 cu.ft.	1 gal (US)	=	3.79 lit
	10^6 m^3	=	811 acre ft.	1 acre ft	=	1233.5 m^2
Weight	1 g	=	0.0353 ounce	1 ounce	=	28.35 g
	1 kg	=	2.20 lb.	1 lb.	=	0.4536 kg
	1 ton	=	0.984 long ton	1 long ton	=	1.016 ton
		=	1.102 short ton	1 shortton	=	0.907 ton
Energy	1 kWh	=	3,413 BTU	1 BTU	=	1 BTU
Temperature	℃	=	(F - 32) x 5/9	F	=	1.8 C + 32
Derived	1 m^3/s	=	35.3 cusec	1 cusec	=	0.028 m^3/s
Measures	1kg/cm^2	=	14.2 psi	1 psi	=	0.703 kg/cm^2
	1ton/ha	=	891 lb/acre	1 lb/acre	=	1.12 kg/ha
	10^6m^3	=	810.7 acre ft.	1 acre ft	=	1,233.5 m^3
	1m^3/s	=	19.0 mgd	1 mgd	=	0.0526 m^3/s
Local	1 lit		0.220 gantang	1 gantang		4.55 lit
	1 kg		1.65 kati	1 kati		0.606 kg
	1 ton		16.5 pikul	1 pikul		60.6 kg

Exchange Rate (average in the month of May, 1991)

M$ 1	Y 50.065
M$ 1	US$ 0.7841

INDUSTRIAL TERMINOLOGY

ACM	Advanced Compound Material
AI	Artificial Intelligence
ATM	Asymmetric Transfer Mode
CAD	Computer Aided Design
CD	Compact Disk
CFRC	Carbon Fiber Reinforced Concrete
CFRP	Carbon Fiber Reinforced Plastic
CG	Computer Graphics
CIM	Computer Integrated Manufacturing
CISC	Compound Imperative Set Computer
CMOS	Complementary Metal-Oxide Semiconductor
DDS	Drug Delivery System
DRAM	Dynamic Random Access Memory
FRP	Fiber Reinforced Plastic
HDTV	High Definition Television
IFN	Interferon
ISDN	Integrated Services Digital Network
LAN	Local Area Network
LCD	Liquid Crystal Digital
LD	Laser Disk
LSI	Large Scale Integrated Circuit
MMC	Material of Metallic Compound
MSI	Middle Scale Integrated Circuit
NC	Numerically Controlled
PAN	Polyacrylic Nitril
PCB	Printed Circuit Board
RISC	Reduced Imperative Set Computer
ROM	Read Only Memory
SIS	Strategic Information System
SOR	Synchrotron Orbit Radiation
SRAM	Static Random Access Memory
SSI	Small Scale Integrated Circuit
SST	Super Sonic Transport
STM	Scanning Tunneling Microscope
STN	Super Twist Nematic
TFT	Thin Film Transistor
ULSI	Ultra-Large-Scale Integrated Circuit
VLSI	Very Large Scale Integrated Circuit
VTR	Video Tape Recorder

GUIDELINE 1

PREFACE

1. PREFACE

1.1 Objective

This guideline (draft) is prepared for the technology transfer to Malaysia in the field of basic plan and design of Hi-Tech Industrial Park. This guideline is prepared based on the experiences in Japan and should be used as a reference. It is recommended that this draft guideline will be improved taking into consideration the characteristic of Malaysia.

1.2 *Composition of Guideline*

The guideline is composed of the following items;

(1) Master Plan

(2) Sectoral Basic Plan and Design

(3) Management

(4) Environmental Impact Assessment

1.3 References

(1) Technoparks Manual : Development and Management (Draft) 1991
by Japan Industrial Location Centre

(2) Standards of Plan and Design for Core Industrial Park (Draft) 1980
by Japan Regional Development Corporation

(3) *Industrial Implementation Systems : No.1*
Programming and Control of Implementation of Industrial Projects in Developing Countries, 1970
by United Nations

(4) Temporary Guideline for Environmental Mitigation Measure of Hi-Tech Industrial Location, 1990
by department of Environment, Kanagawa, Japan

(5) Manual Book of Infrastructure (Planning & Design Load per Unit Activity of Source)
by Department of Urban Environment, Nippon Koei Co., Ltd., Japan

(6) Manual Book for Urban Planning, 1985
by Japan Urban Planning Society

GUIDELINE 2

MASTER PLAN

2. MASTER PLAN

2.1 Definition of Hi-Tech Industrial Park

According to the Technopolis Law in Japan, a Hi-Tech Industrial Park is defined as a place blending industrial, academic, and residential functions, and more as estates involving concepts focused on high technology manufacturing. Fig. 2.1.1 shows changes in Industrial Parks in Japan.

2.2 Development Concepts for Master Plan

A technopark is a way to construct new integrated technology cities which will be needed in the 21st century, and it must be provided with the following 5 functions.

(1) Research and development functions managed by either private enterprise or by governmental organizations

(2) Superior information and communication functions

It is important that research and development and corporate information from around the world be readily available, and that it is possible to transmit information concerning the technopark itself.

(3) Personnel resource training and exchange functions

In addition to information exchange facilities, conference or meeting rooms for example, which are directly connected with research and development, complete facilities for exchange activities of all kinds are required.

(4) Environmental adoption functions

It is essential that a technopark be planned so that it preserves the environment of its immediate surroundings and the world as a whole.

Planners must also do all in their power to maintain scenery which is suited to the environment surrounding the technopark in order to create a superior atmosphere for research activities.

(5) Operation and management functions

It is necessary to create an organization to conduct centralized management of relations between organizations within the technopark and with other technoparks, and to carry out planning and management to maintain and promote the planned objectives of the technopark.

These functions should be located in organically connected functional zones. It is also essential that there be a mix of technical information integration functions and high level research locations.

Also, in order to create a location which is attractive to those manufacturing and research industries using advanced technology, it is essential to nurture local companies richly endowed with the technological capacity and vigor they need to support Hi-Tech companies and research organizations that are attracted to the technopark from outside the region, and at the same time to occasionally create circumstances which increase competition among them.

2.3 Technopark Development Procedure

Flow chart of development procedure is shown in Fig. 2.1.2.

2.4 Constituent Elements of a Technopark

Table 2.1.1 shows the differences in the constituent elements desirable in different types of industrial parks.

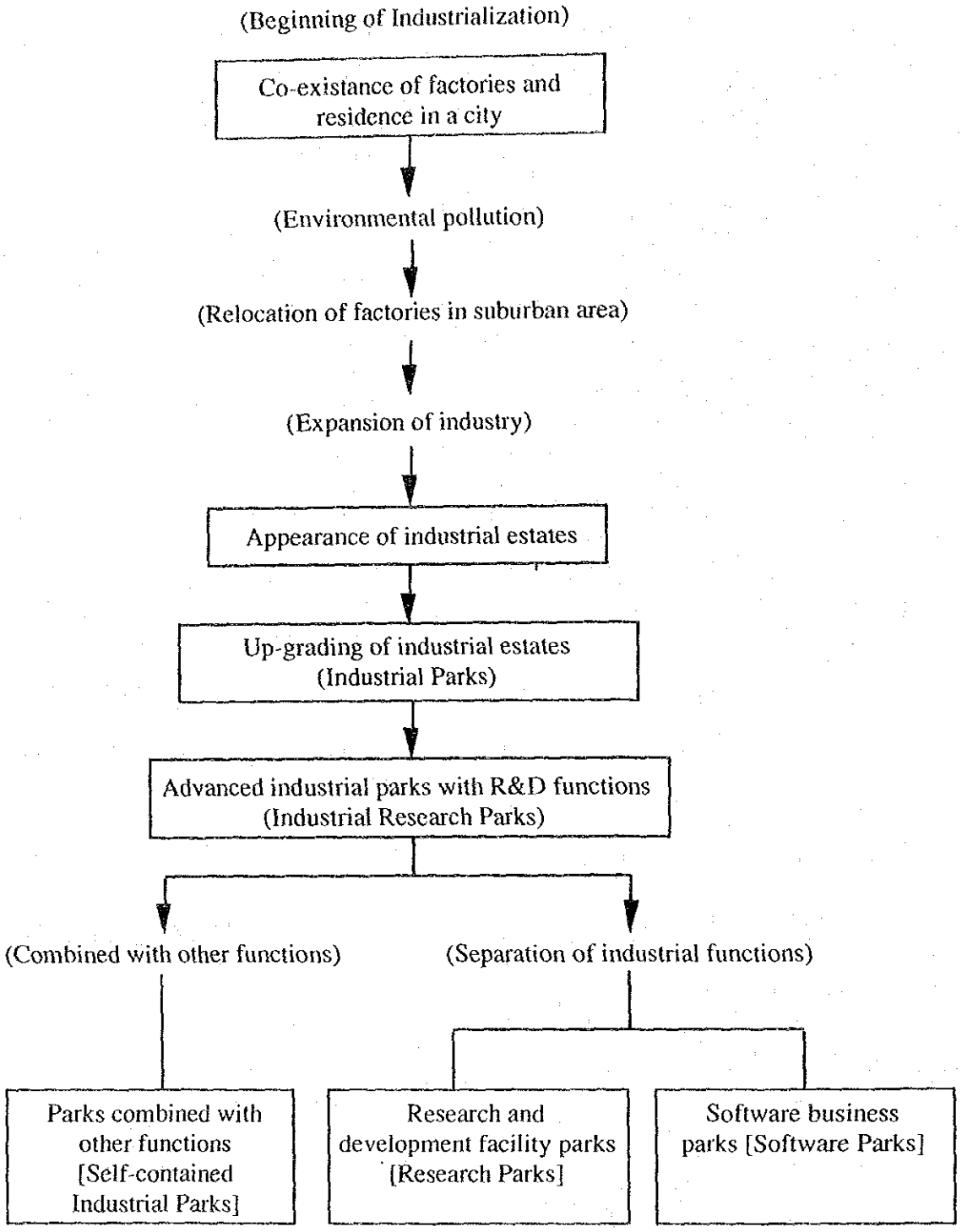
2.5 Work Flow of Master Plan

Refer Fig. 2.1.3.

Table 2.1.1 Constituent Elements of a Technopark

Constituent Elements		Ordinary Industrial Parks	Technoparks			
			Basic Functions: 1. Research and Development Functions (Laboratories managed by private industries and government agencies) 2. Information and Communication Functions 3. Human Resources Development and Exchange Functions 4. Environment Adaptation Functions 5. Maintenance and Management Functions			
			Industrial Research Parks	Research Parks	Software Parks	Self-contained Industrial Parks
Basic Facilities	Building Lots	Securing large square lots	As part of the master plan, consider scenic elements such as green belts, and secure the required land area adapted to natural features.			
	Roads	Physical transport (operating large vehicles)	Physical transport (consider the scenery)	Human transport (emphasis on pedestrians and scenery)		Various improvements made on a step-by step basis
	Parkland	Securing space	Complete facilities, sports exchanges	(Mental diversion, stimulating motivation for development		Various improvements made on a step-by-step basis
	Greenbelts	Pollution prevention, buffer zones	Buffer zones, consideration for scenery	Buffer zones, scenery considerations, walking, security		
	Water	Supply large volumes	Water quality and quantity important	Industrial water resources almost unnecessary		According to requirements of individual facilities
	Electric Power	High voltage source to provide large quantities of power		Emphasis on aesthetics of power lines (ornamental poles, underground wiring)		
	Rain water drainage/sewerage	Release to a river or build a reservoir (the reservoir to be treated as an undesirable facility)		Release into a river or build a reservoir (emphasis on scenery by integrating the reservoir with parkland)		
Supplementary Facilities	Direct uses	None in particular (use external facilities)	Dining facilities such as restaurants and coffee shops, convenience stores etc. for light shopping, financial services such as post office and bank branches			
	Meetings		Meeting rooms, auditoriums, outdoor meeting spaces, etc.			
	Sports		Tennis courts, baseball fields, gymnasiums, golf courses, marinas, ski clubs, etc.			
	Social interchange		New product display room, places for casual socializing such as lounges			
	Personnel training		Technical training schools, seminar and training rooms, computer school, audio-visual facilities, etc.			
	Information provision		Provision of technical land market information,data base and ISDN services			
	Administrative support		Testing and analysis measurement equipment, incubators television conference systems, crime prevention systems			
	Others		Heliport, hotel, hospital, luxury housing, theme park, amusement park, CATV station, energy conservation centre, resource recycling garbage disposal, fire prevention centre, etc.			

Fig. 2.1.1

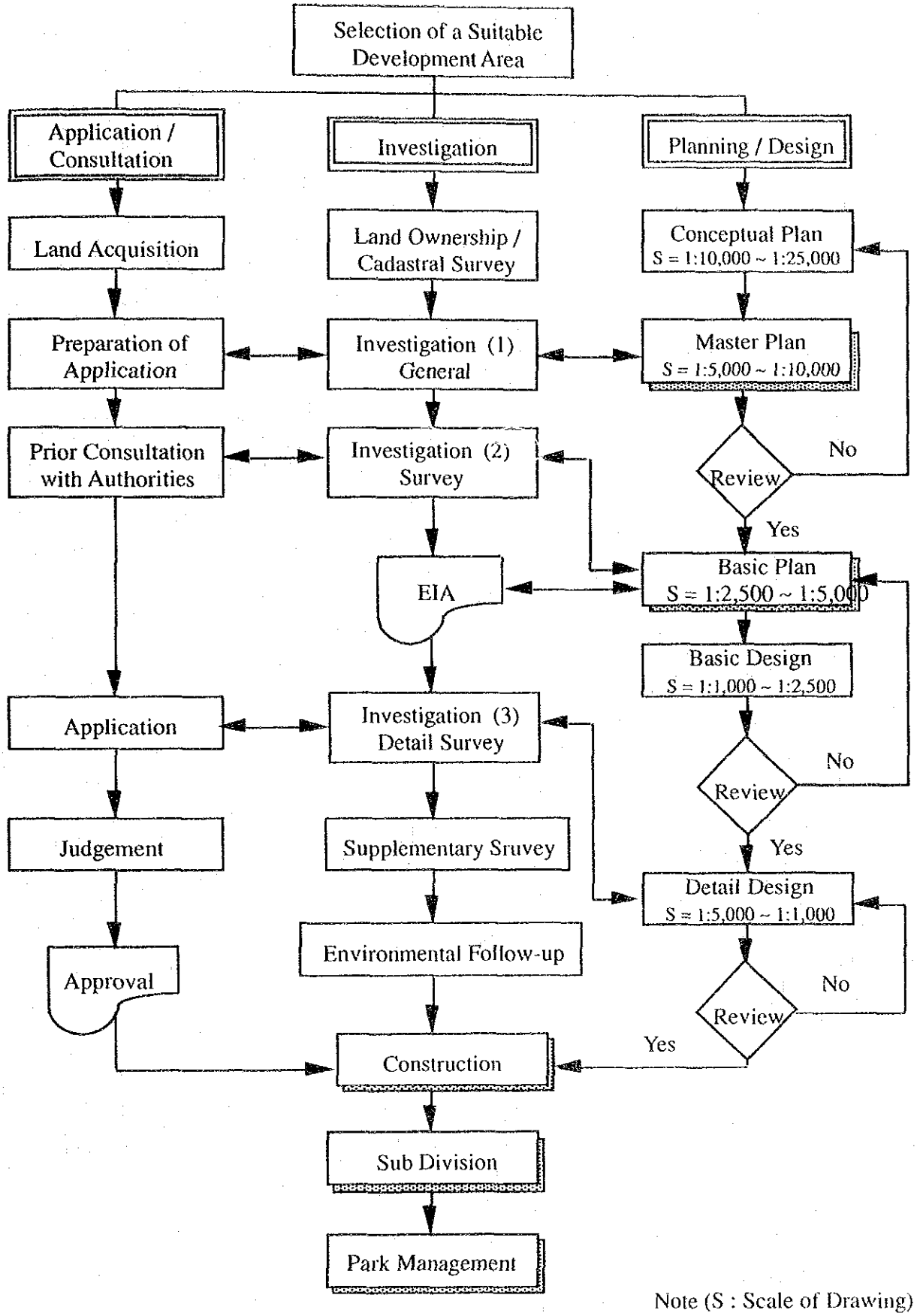


Industrial Parks : Change and Classifications

Source : Technoparks Manual (Draft), Development and Management, 1991, Japan

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Evolution of Industrial Parks in Japan

Fig. 2.1.2



Note (S : Scale of Drawing)

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Flow Chart of Development Procedure of Technopark

Fig. 2.1.3

Basic Development Policies
- Development area
- Site location
- Development methdology

Existing Condition of Circumustances
- Site location
- Topography
- Geology
- Meteorology
- Existing facilities

Site Analysis
- Land use
- Land use restrictions
- Social structure
- Industrial structure
- Condition of the industrial infrastructure
- Research and development organs already located in the areas

Coordination of the direction of development and the future concept of each area
- Coordination with regional development plans and development concepts
- Study of the future outlook for the industrial structure
- Industria park supply and demand situation and study to determine the appropriate scale
- Study of appropriate site supply prices
- Study of industrial park development and fundamental plolicies concerning the provision of new services to serve industry

Goals and Objective (1)
- Type of targeted industries
- Number of industries
- Population

Goals and Objective (2)
- Standard of development
- Standard of living
- Infrastructure requirement
- Related facility requirement
- Environmental requirement

Financial Judgement
- Investment cost
- Disbursement plan
- Sales schedule
- O & M cost
- Financial plan

Location Incentives
- Grants
- Tax reductions
- Low interest financing
- Infrastructure & Faciities

Determination of Development Concepts
- Development scale
- Target population
- Traffic condition
- Land use cocepts
- Demand
- Concepts for zoning

Preparation of Data for Plan
- Load per unit capita
- Load per unit industrial production
- Load per unit activity of source for infrastructure
- Allowable capacity
- Population & distribution
- Characteristic of area

Enactment of Conceptual Plan
- Establishment of plan framework (selection of type of industries to be included, etc.)
- Land use plan (factory and research facility land, common use and public land, (roads and utility installations, etc.), land for amenities)
- Site planing
- Facility planning
- Project schedule and rough etimate of project cost
- Zoning plan
- Amenity facility planning (Park Center, etc.)

Evaluation
NO
YES
Master Plan

Regional Development Plan

Consultation (1) with Authority / Local people
- Town plan
- Related superior plan
- Existing public facility
- Lagulation

Consultation (2) with Authority / Local people
- Land use coordination
- Feasibility of land purchase
- Environmental measures
- Securing water supplies for industrial and human use
- Policies to deal with cultural properties

Consultation (3) with Authority / Local people
- Capacity of existing public facility
- Road net work plan
- Landscape plan
- Regional sewerage plan
- Drainage net work plan
- Cost allocation
- Taxes

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

GUIDELINE 3

BASIC PLAN AND DESIGN

3 BASIC PLAN AND DESIGN

3.1 Land Preparation

A study flow of land preparation is shown in Fig. 3.1.1. An explanation is given as follows.

(1) Survey/investigation

Given or preconditions are surveyed and investigated before establishment of a basic policy of land preparation. Those items will mainly be,

- natural conditions,
- law and regulations, and
- social conditions

(2) Basic policy of land preparation

A basic policy will be made focusing the following elements.

- Balance of cut and fill
- To maintain present topography
- Harmonize with surrounding local and topographic conditions
- To decide appropriate design elevation considered with present topography and geography
- To meet with roads longitudinal alignment and gradient of water and drainage
- To maintain cultural assets, cemetery and historical relics
- To prevent from disaster

(3) Land use plan

- To adjust or feedback to land use plan especially, major traffic line and layout

(4) To check the critical conditions and their countermeasure

- to take countermeasure for poor subsoil, to prepare disaster prevention pond/s ponds and others

(5) Land preparation plan

(6) To check the cut and fill balance

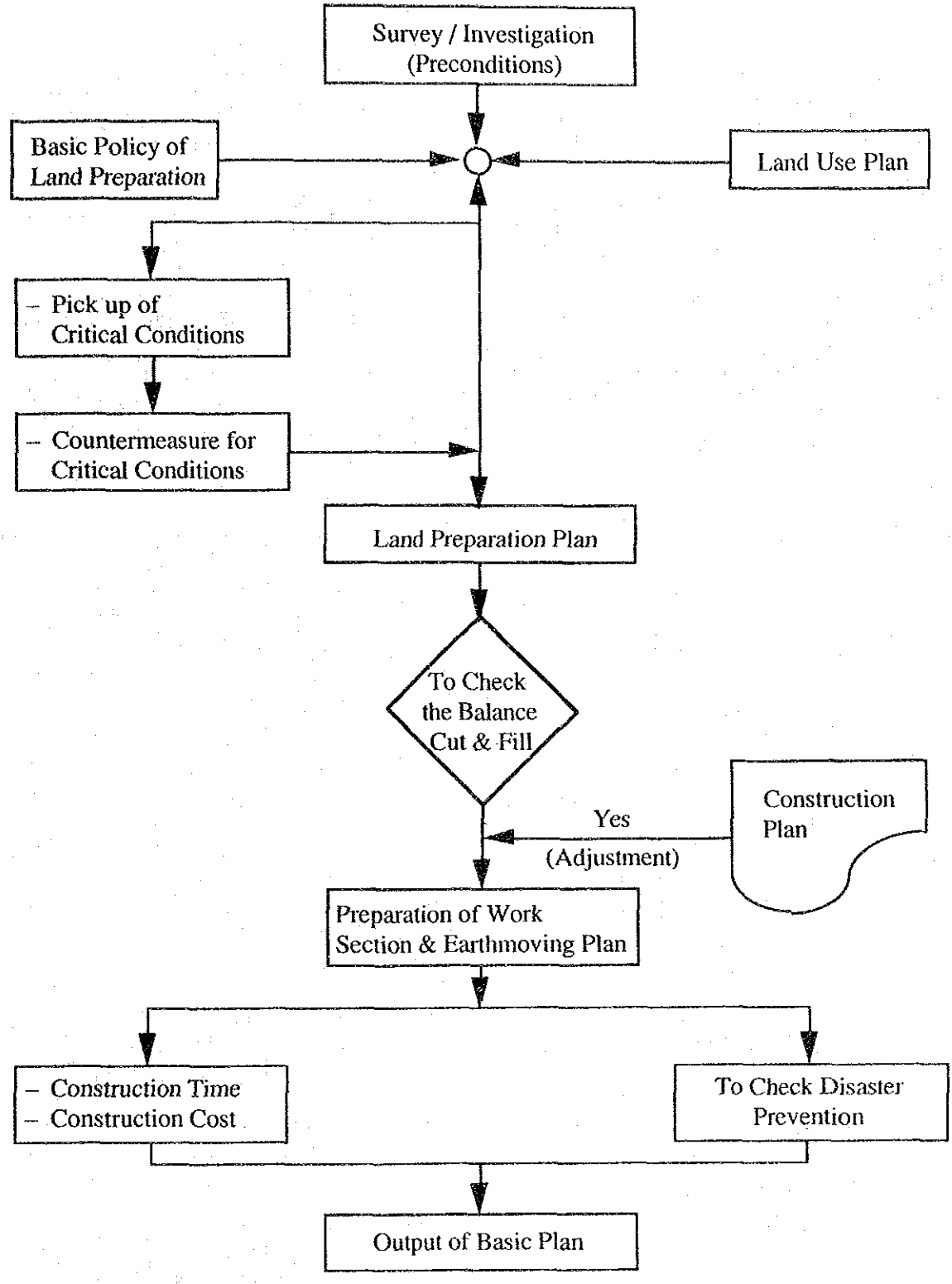
(7) Work section and earthmoving plan

(8) Determination of construction period

(9) Cost estimate

(10) Disaster prevention

Fig. 3.1.1



Source : A guide for design and construction on land preparation, edition 4 by a society for the study of synthesized construction technique, Taisei Publishing Company.

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Study Flow of Land Preparation

3.2 Road Network Plan

A standard work flow of road network plan on a Hi-Tech industrial estate is shown in Fig. 3.2.1. In the Figure, numbers from (1) to (9) are works for a basic plan and numbers from (10) to (15) are works for a basic design.

The works in the basic plan are mainly to establish the transportation network system outside/inside the planned hi-tech industrial estate and to determine standard structures of roads inside the estate based on traffic demand forecast for the estate. The basic design is to be carried out according to the basic plan.

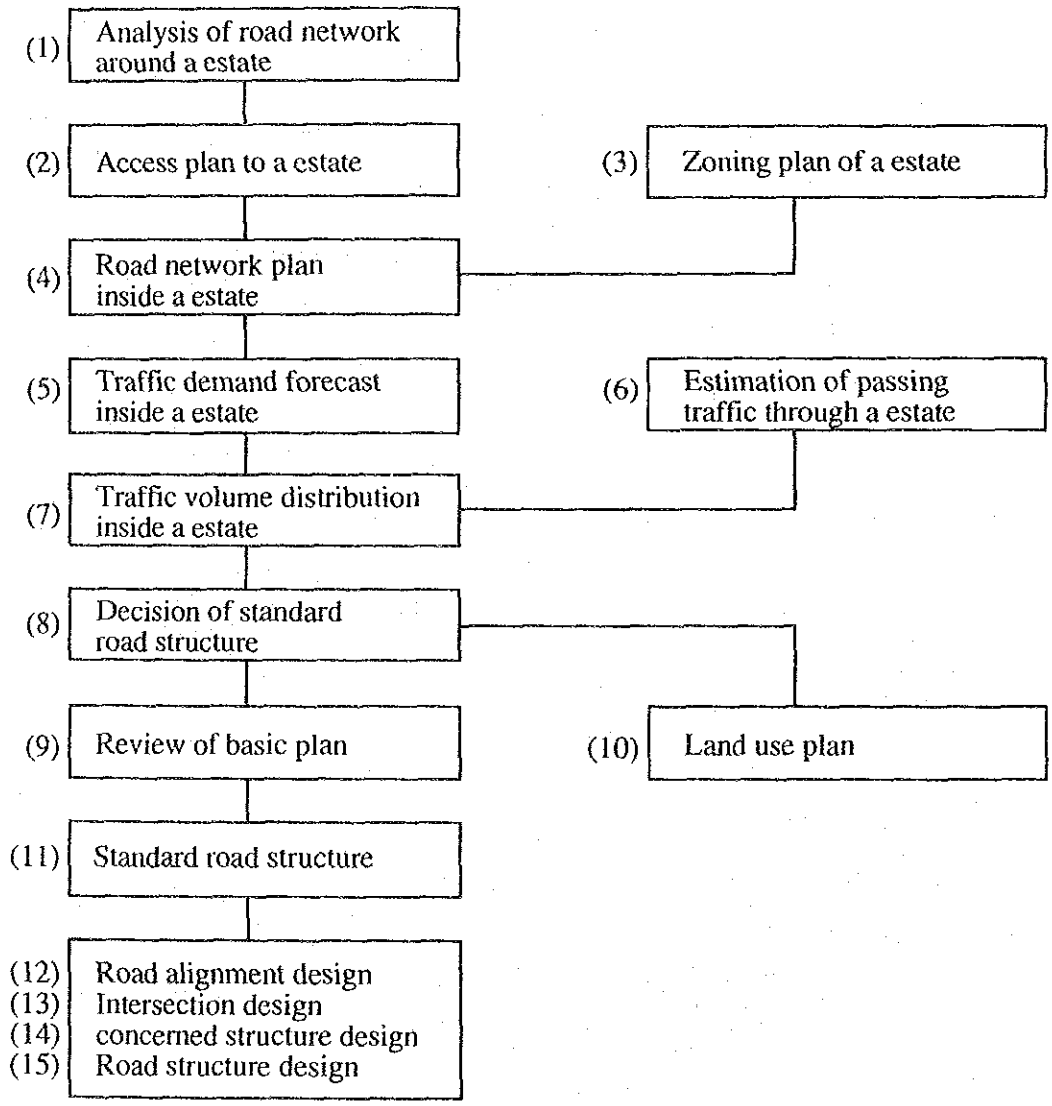


Fig. 3.2.1 Work Flow for Road Network Plan

(1) Analysis of road network around estate

In analysis of road network system around the planned industrial estate, existing or planned transportation system related to the estate shall be reviewed to establish a road network plan for the estate, such as an access road to the estate, road network inside the estate and possibility of passing traffic through the estate.

Especially, an airport, a seaport, expressways and highways which are important accesses to the estate shall be carefully analyzed.

(2) Access plan to estate

An access transport plan to the planned estate shall be formulated not only based on the result of analysis of road network around the estate but also taking into account freight traffic origin-destination (OD), commuting traffic OD, geographical conditions, environmental conditions, laws/regulations, etc. around the estate.

(3) Zoning plan of estate

A zoning plan of the planned estate shall be reflected in a road network plan inside the estate.

(4) Road network plan inside a estate

In the road network plan inside the planned estate, roads in the estate are to be classified into three (3) functions as follows:

- Arterial roads
- Collector roads
- Local streets

The constitution of the above roads inside the estate shall be studied based on locations of factory lots and functions of the estate land use.

(5) Traffic demand forecast inside estate

Traffic demand forecast inside the planned estate shall be carried out for road network design inside the estate as per the procedures shown in Fig. 3.2.2.

Total daily traffic volume from/to the estate consists of freight traffic volume, commuting traffic volume and business trip traffic volume.

(a) Freight traffic volume

Freight traffic volume is calculated from freight volume of materials carried in and product materials carried out. Freight volume is estimated based on the factory area of the targeted industries.

(b) Commuting traffic volume

Commuting traffic volume is estimated based on respective modal split of commuting ways of workers in the estate.

(c) Business trip traffic volume

Business trip traffic volume is estimated based on the number of workers in the estate.

(6) Estimation of passing traffic through a estate

Passing traffic volume through the planned estate shall be estimated and reflected in the road network design inside the estate.

(7) Traffic volume distribution inside a estate

In the traffic demand forecast inside the estate, generated daily traffic volume is to be calculated. The generated daily traffic volume is distributed on each arterial and collector road. In case passing traffic volume through the estate is generated, this traffic volume is also distributed on each road.

(8) Decision of standard road structure

In the decision of standard road structure, the following items shall be studied and determined:

- Road classification and standard
- Typical road cross section
- Road alignment
- Landscaping plan

The design standard of roads in urban area shall be adopted in road structure design for the planned hi-tech industrial estate. The design standards used for urban roads in Malaysia are shown as below:

ADT	All Traffic Volume	>10,000	10,000 -3,000	3,000 -1,000	1,000 -150	<150
Expressway	U6					
Arterials		U5	U4			
Collector			U4	U3		
Local Street				U3	U2	U1/U1a

In the design of roads for the estate, design standards of "U4" to "U2" are desirable as arterial, collector roads and local streets. General summary of geometric design criteria for urban roads in Malaysia is referred in Table 3.2.1.

(9) Land use plan

The basic road plan of items (1) to (8) mentioned above shall be reflected in the land use plan.

(10) Review of basic plan

At the beginning of a basic design stage of road network inside the planned estate, the basic road plan of items (1) to (9) shall be reviewed from the point of view of the followings:

(a) Route review

- Access plan to the estate
- Road network plan

(b) Traffic volume review

- Generated daily traffic volume from/to the estate
- Passing traffic volume through the estate
- Traffic volume distribution inside the estate

(c) Standard road structure review

- Road classification
- Typical road cross section
- Road alignment

(11) Standard road structure

Based on the result of basic plan review, standard road structure shall be

determined for a basic design of road network inside the planned estate. The basic design of arterial and collector roads inside the estate shall be conducted for semi-trailer class, for which dimensions are shown as follows:

Body length	:	16.5 m
Body width	:	2.5 m
Body height	:	3.8 m
Length between body front & front axle	:	1.3 m
Length between front & middle axle	:	4.0 m
Length between middle & back axle	:	9.0 m
Length between back axle & body back	:	2.2 m
Minimum turning radius	:	12 m

Components of typical road sections shall conform to the Malaysian standards of road design.

(12) Road alignment design

(13) Intersection design

(14) Concerned structure design

(15) Road structure design

The basic design of road alignments, intersections, concerned structures such as bridge, fly-over, tunnel, and pedestrian street. and road structures such as pavement and concerned utilities shall conform to the Malaysian standards of road design, of which manuals and guides are as follows:

- A guide on geometric design of roads
- Manual on pavement design
- A guide to the design of at-grade intersection
- A guide to the design of interchanges
- A guide to the design of traffic signals
- A guide to drainage design of roads
- Manual on design guidelines of longitudinal traffic barrier
- Manual on traffic control devices: standard traffic signs
- Manual on traffic control devices: traffic signs applications
- Manual on traffic control devices: temporary signs and work zone control
- Manual on traffic control devices: road marking and delineation
- Guidelines for presentation of engineering drawings

Table 3.2.1 GENERAL SUMMARY — GEOMETRIC DESIGN CRITERIA FOR ROADS IN URBAN AREAS (METRIC)

DESIGN CONTROL AND CRITERIA	1	DESIGN STANDARD	-	U6			U5			U4			U3			U2			U1			U1a		
	2	ACCESS CONTROL	-	FULL			PARTIAL			PARTIAL			PARTIAL/NIL			NIL			NIL			NIL		
	3	AREA TYPE	-	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
	4	DESIGN SPEED	km./hr	100	80	60	80	60	50	60	50	40	50	40	30	40	30	20	40	30	20	40	30	20
CROSS SECTION ELEMENTS	5	LANE WIDTH	m	3·50			3·50			3·25			3·00			2·75			(5·00) [a]			(4·50) [a]		
	6	SHOULDER WIDTH	m	3·00	3·00	2·50	3·00	3·00	2·50	3·00	2·50	2·00	2·50	2·00	1·50	2·00	1·50	1·50	1·50	1·50	0·50	1·50	1·50	1·50
	7	SHOULDER WIDTH (STRUCTURES >100 m)	m	1·00			1·00			1·00			0·50			0·50			0·50			0·50		
	8	MEDIAN WIDTH (MINIMUM)	m	4·00	3·50	3·00	3·00	2·50	2·00	2·50	2·00	1·50	2·00	1·50	1·00	N/A			N/A			N/A		
	9	MEDIAN WIDTH (DESIRABLE)	m	12·00	9·00	6·00	9·00	6·50	4·00	7·50	5·00	3·00	6·00	4·00	2·00	N/A			N/A			N/A		
	10	MARGINAL STRIP WIDTH	m	0·50			0·50			0·25			0·25			0·00			0·00			0·00		
	11	MINIMUM RESERVE WIDTH	m	60			50			40 (30) [b]			30 (20) [b]			20			12			12		
ELEMENTS OF DESIGN	12	STOPPING SIGHT DISTANCE	m	205	140	85	140	85	65	85	65	45	65	45	30	45	30	20	45	30	20	45	30	20
	13	PASSING SIGHT DISTANCE	m	N/A			550	450	350	450	350	300	350	300	250	300	250	200	300	250	200	300	250	200
	14	MINIMUM RADIUS	m	465	280	150	280	150	100	150	100	60	100	60	35	60	35	15	60	35	15	60	35	15
	15	MINIMUM LENGTH OF SPIRAL	m	73	63	53	45	35	32	35	32	26	32	26	23	N/A			N/A			N/A		
	16	MAXIMUM SUPERELEVATION	Ratio	0·06			0·06			0·06			0·06			0·06			0·06			0·06		
	17	MAXIMUM GRADE (DESIRABLE)	%	3	4	5	4	5	6	5	6	7	6	7	8	7	8	9	7	8	9	7	8	9
	18	MAXIMUM GRADE	%	6	7	8	7	8	9	8	9	10	9	10	12	10	12	15	10	12	15	10	12	15
	19	CREST VERTICAL CURVE (K)	—	60	30	15	30	15	10	15	10	10	10	10	5	10	5	5	10	5	5	10	5	5
	20	SAG VERTICAL CURVE (K)	—	40	28	15	28	15	12	15	12	10	12	10	8	10	8	8	10	8	8	10	8	8

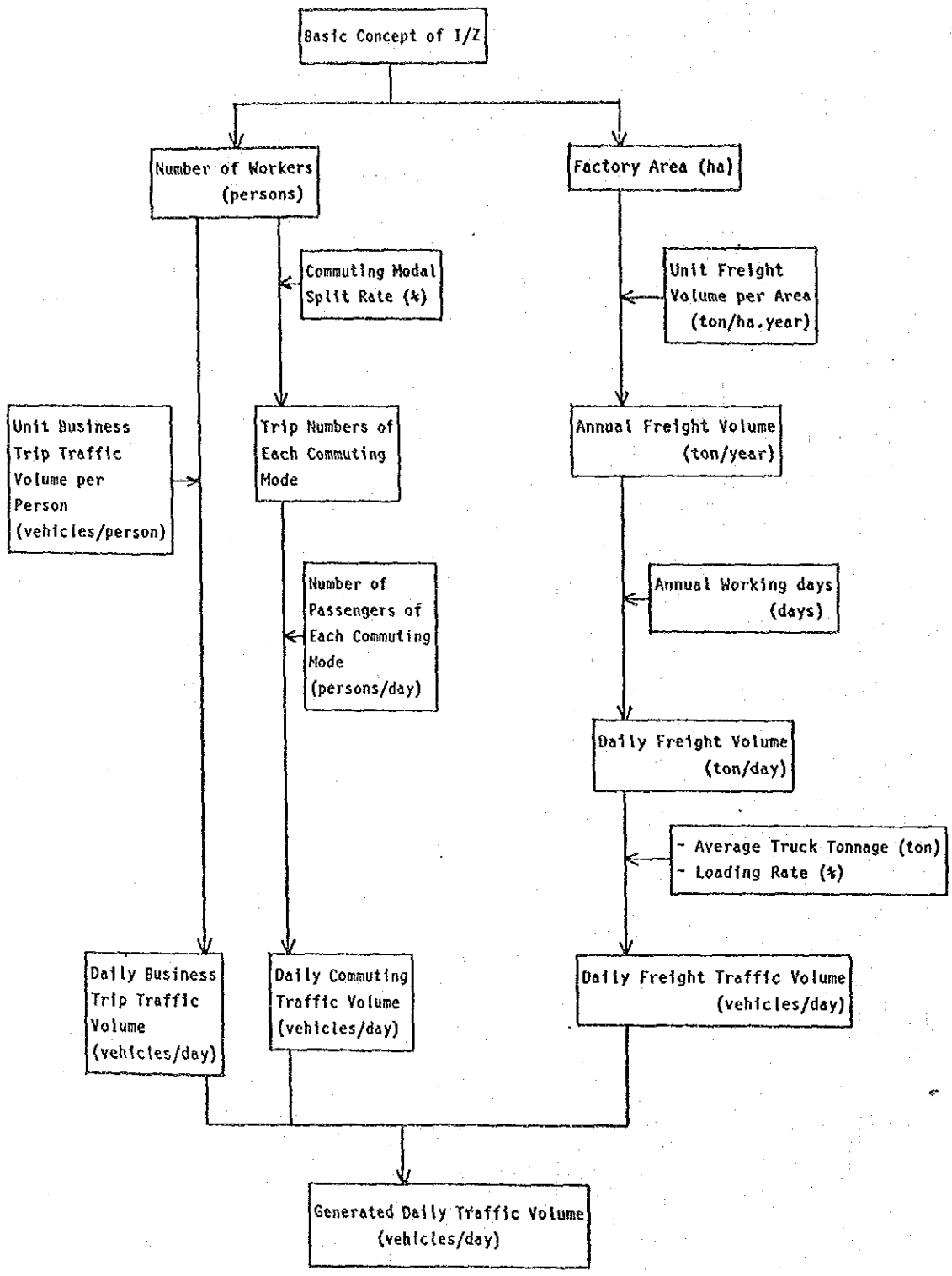
REMARK: 1) ALL VALUES SHOWN ABOVE ARE MINIMUM / MAXIMUM VALUES ALL EFFORT SHOULD BE MADE TO ACHIEVE AS HIGH A VALUE AS POSSIBLE.

2) FOR DEFINITION OF AREA TYPE SEE TABLE 3 – 28

3) ABBREVIATIONS: N/A NOT APPLICABLE
( )a TOTAL WIDTH OF PAVEMENT
( )b RESERVE WIDTH DEPENDS ON ROAD CATEGORY

(Source: PWD)

Fig. 3.2.2



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Flow Chart of Traffic Demand Forecast in Industrial Zone

3.3 Power Supply System

Generally consumers make contracts for electric power supply with electric power supply company. The electric power supply company provides facilities for power supply by itself. If necessary, an industrial estate should provide land for power supply facilities. Therefore, the study for power supply system should be made on the following items.

(1) Demand projection

In case of industrial estate in Japan, average unit power consumption rate of big consumers in 1977 is derived at 0.322 kWh/m^2-day. It is recommended as one method of demand projection to use the following equation.

Daily power demand (kWh/m^2-day) = 0.01082 x (Year -1925) - 0.24465

In case of Kulim Hi-Tech Park Project, 40 VA/m^2 was applied as the unit power demand at the full factory operation based on the record of power consumption of similar high tech industrial estates in Japan. The power demand for the Kulim Hi-Tech Park is forecasted as follows:

Power demand : 150 ha x 40 VA/m^2 = 60 MVA

(2) Power supply system

About 1% of industrial estate is recommended to reserve for power supply facilities. In case of substation, about 1 ha is recommended. If the land is not necessary, it can be converted to a factory lot. The location of the facilities should be studied in collaboration with the electric power supply company.

3.4 Water Supply System

3.4.1 Investigation

(1) Development Concept

Items to be considered for water supply to an industrial estate are as follows:

- Target industry,
- Factory lot by industry,
- Number of employees, visitors (if necessary),
- Commencement of operation and
- Operation hours of factory

(2) Data Collection

The following data shall be collected:

- Unit consumption rate
- Present water supply system
- Water quality
- Available water supply capacity
- Water tariff
- Design criteria and standards

3.4.2 Water Demand Projection

Water demand shall be divided into domestic water demand and industrial water demand. The demand shall be estimated on the basis of unit consumption rates which are collected from consumption records by kinds of industry. The following unit consumption rates were applied to Kulim Hi-Tech Park Project.

Table 3.4.1 Unit Consumption Rate

Per capita consumption	:	320 lcd	Golf course	:	
Employee in Factory	:	160 lcd	Tennis court	:	160 lcd
Public R&D institute	:	80 lcd	Football stadium	:	13,620 l/d
Science Technology Exchange Plaza	:	80 lcd	Gymnasium	:	120 lcd
			Hotels	:	1,430 lcd
Skill Development Center	:	80 lcd	Condominium	:	1,135 l/unit/d
			Bungalow	:	2,270 l/unit/d
Community hall	:	500 l/d	Semi-detached/double storey terrace house	:	1,590 l/unit/d
Religious Institution	:	4,540 l/d			
Police station	:	160 lcd	Low cost house	:	1,135 l/unit/d
Police box	:	160 lcd			
Fire station	:	160 lcd	Shophouses (1 storey)	:	2,270 l/unit/d
Post office	:	160 lcd	Shophouses (2 storey)	:	2,730 l/unit/d
School	:	45 lcd	Shophouses (3 storey)	:	4,090 l/unit/d
Kindergarten	:	45 lcd	Shophouses (4 storey)	:	4,550 l/unit/d
Super market	:	4,550 l/d			
Restaurant	:	64 lcd			
Bank	:	120 lcd			
Clinic	:	160 lcd			

1) Domestic water demand

Unit consumption rate	=	Per capita consumption rate
Domestic water demand	=	(Per capita consumption rate) x (Number of employees)
Hourly maximum water demand	=	(daily maximum water demand)/24 x peak factor

Per capita consumption rate in the existing industrial estates should be referred. It is recommended to prepare database on this item.

In case of water supply project, one method of water demand projection is to apply past trend of water demand growth. However, in case of industrial estate, the water demand should be estimated from the number of employees. The number of employees in the existing industrial estates should be referred.

2) Industrial water demand

Unit consumption rate	=	Unit water demand by kind of industry
Industrial water demand	=	Summation of water demand by kind of industry
Hourly maximum water demand	=	(daily maximum water demand)/24

It is recommended to prepare data on the unit consumption rate by kind of industry in Malaysia.

3) Water Supply Amount

Water supply amount = domestic water demand + industrial water demand

Industrial water should be studied on the necessity of treatment in accordance with the water quality requirement of factory.

3.4.3 Study on Water Supply System

Water sources of surface water, groundwater and reservoir should be compared on available capacity, water right, water quality and cost to select optimum source. Design of water supply facilities should be followed to design standards.

(1) Design discharge

(a) Daily average water consumption (DAWC)
= Daily water demand/(1 - Unaccounted for water)
(to be applied to design intake discharge)

(b) Daily maximum water consumption (DMWC)
= DAWC x peak factor
(to be applied to design discharge of distribution trunk main. 1.2 of peak factor was applied to the Kulim Hi-Tech Park.)

(c) Hourly maximum water consumption (HMWC)
= DMWC/24 x peak factor
(to be applied to distribution network. 2.5 of peak factor was applied to the Kulim Hi-Tech Park but it is recommended to apply smaller value of peak factor, especially that of industrial water which is not fluctuated hourly so much.)

(2) Distribution System

(a) Service reservoir

- Location : to be located in/near demand center
- Capacity : 8 to 16 hours (24 hours for Kulim Hi-Tech Park to ensure reliability of water supply. It is

recommended to have a receiving well by each factory to save project cost which affects to water tariff)

- Drawdown : 3 to 6 m
- Freeboard : more than 30 cm
- Dead water depth : more than 15 cm

(b) Distribution main

- material : to consider leakage, availability, workability.
- Velocity : 0.6 m/s < V < 2.6 m/s

(c) Flow calculation : Hazen-Williams Formula

$$V = 0.35464 \times C \times D^{0.63} \times (h/L)^{0.54}$$

where, C : coefficient for the future of 20 years
D : internal diameter in m
h : head loss in m
L : distance in m

(d) Residual pressure : to consider minimum and maximum pressure with material of pipe.

3.5 Telecommunication

3.5.1 Investigation

(1) Basic Element

- Zoning plan gives the number of factories and houses, number of workers and inhabitants.
- Sales activity gives information on telecommunication demand.
- Analysis of telecommunication statistics gives several kind of demand factors.

(2) Characteristic

- Telecommunication demand grows not only in quantity but also in quality and changes the type or kind of service.
- Telecommunication plant is separated into two parts of "basic portion" and "increasing portion".

3.5.2 Demand Forecasting

(1) Inside of Hi-Tech industrial estate

a) Factory : area (ha) of site
number of workers
kind of business
} ——> – ordinary telephone (number of subscriber and traffic)
– others : car telephone or mobiles telephone, leased circuit, statelite communication, etc.

b) House : number of houses, number of inhabitants ——> number of subscriber and traffic

c) Teleport : Analysis of teleport

(2) Outside of Hi-Tech industrial estate

- Traffic (outgoing/incoming/from/to local area)
- International traffic
- Calling rate

3.5.3 Basic Design

(1) Axis of time

Introduction of "Time axis" into demand decides the size of plant. Followings are important for design of plant:

a) the period of year between next design (construction)
b) the year of demand in design

(2) Fundamental (Basic) plant and increasing portion plant

a) *Increasing portion plant* : *The plant or equipment which is possible* to construct economically in short period.

b) Fundamental (Basic) plant : The plant which is economic in construction designed for long term or final demand.

(3) Design items

- Outside-plant (cable, duct, manhole, etc.)
- Telephone office (building and equipment)

a) Telecommunication equipment room

- Switching equipment, transmission equipment, power equipment, cable room, testing room

b) Business room

- Technical personnel, sales, material, general affairs, etc.

3) Outside of building

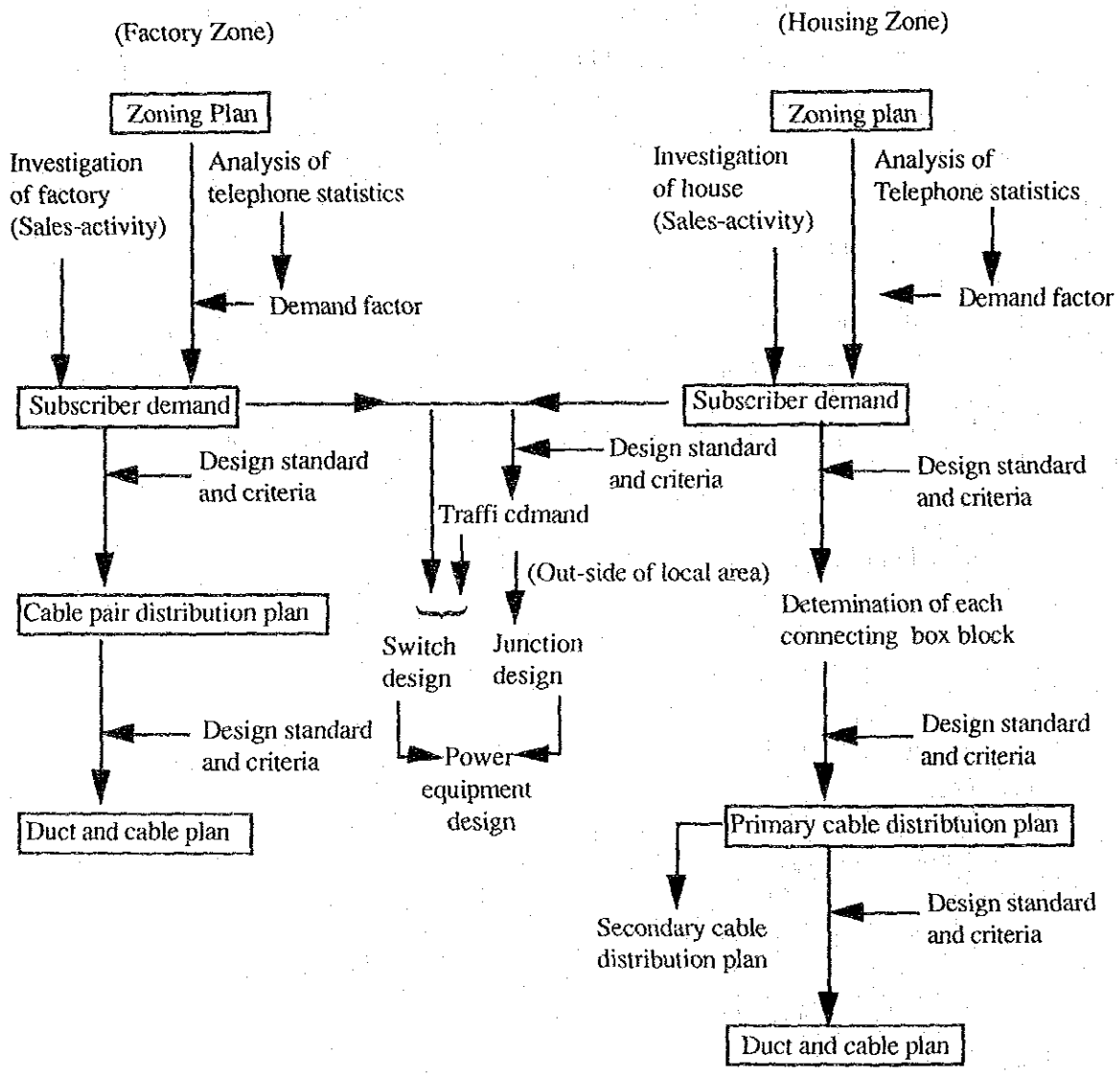
- Material store place
- Antenna tower for telecommunication radio (VHF, UHF, etc.)

4) Teleport

- Inside of building : Various kind of rooms and equipment for teleport function
- Outside of building : Satellite earth station

3.5.4 Work Flow

Work Flow is as shown below.



3.6 Drainage and Sewerage System

(1) A standard work flow of Drainage and Sewerage System is shown in Fig. 3.6.1.

(2) The following basic design policy and conception are adopted by the Technopolis in Japan.

(a) Design Period : $\geqq$ 20 years

(b) To emphasize on scenic beauty by integrating reservoirs with park.

(c) To take adequate counter measures against flood.

(d) The following Return Periods are recommended;

- Large scale river : 100 ~ 200 years
- Middle/small scale river : 30 ~ 40 years
- Drainage inside Technopolis : 20 ~ 50 years
- Reservoir (Dam Type) : 30 ~ 50 years
  (Digging type) : 5 ~ 10 years

(e) Agreement for environmental pollution control must be exchanged between a developer and each factory.

(f) To utilize the land effectively with suitable landscaping.

(g) Adequate monitoring and maintenance system must be established.

(h) Separate sewer system shall be adopted for the purpose of Environmental pollution control.

(i) The individual treatment plant or pretreatment at each factory must be set up according to the Polluters pay principle.

(j) As for Inorganic matter and Hazardous/Toxic, Individual treatment system is adopted usually.

(k) As for Organic matter, Central treatment system is adopted usually.

(3) Work flow of computation for Storm-Water Reservoir

(See Fig. 3.6.2.)

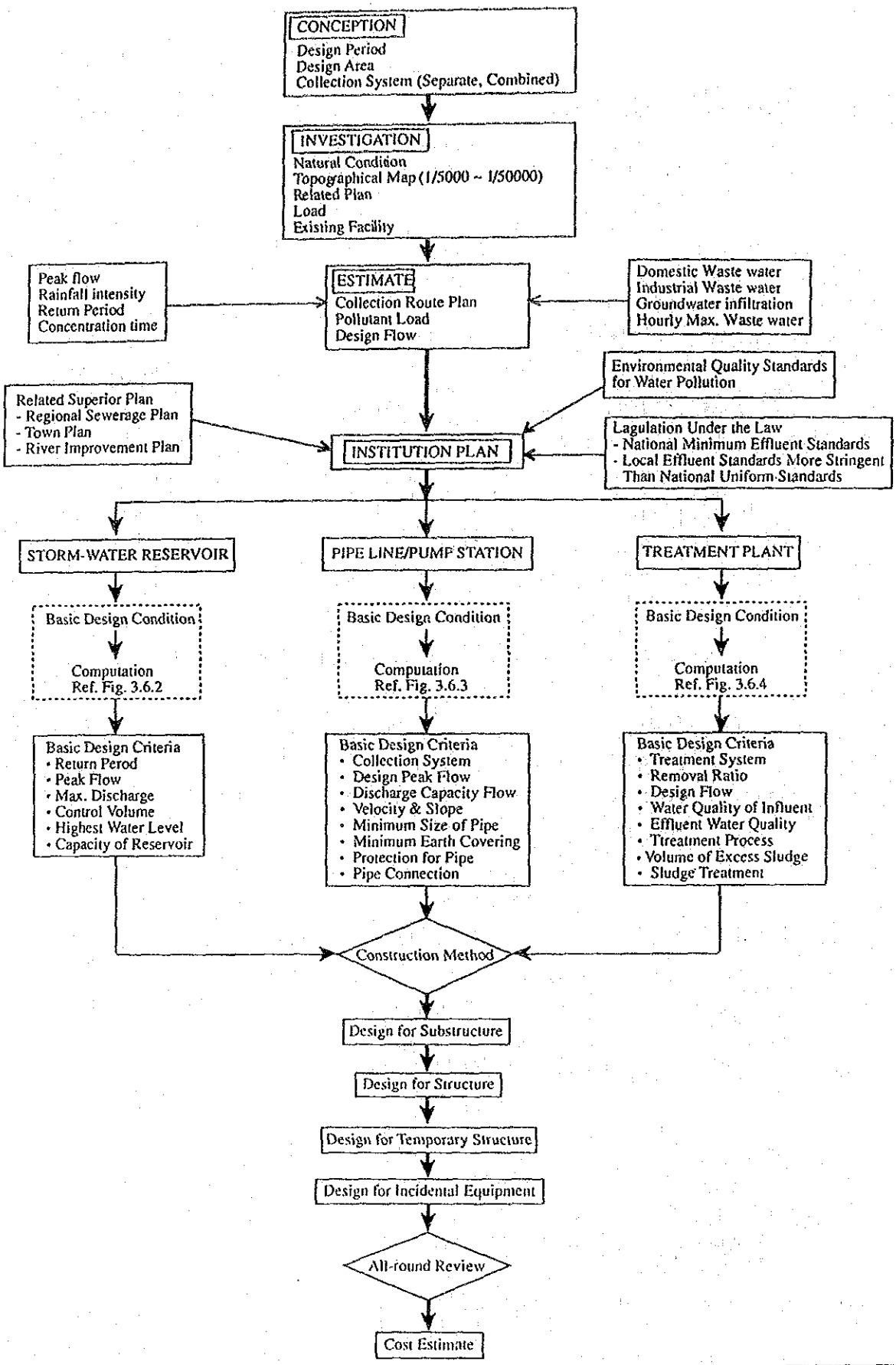
(4) Work flow of computation for Design Flow/Pipe Line

(See Fig. 3.6.3.)

(5) Work flow of Treatment Plant Planning

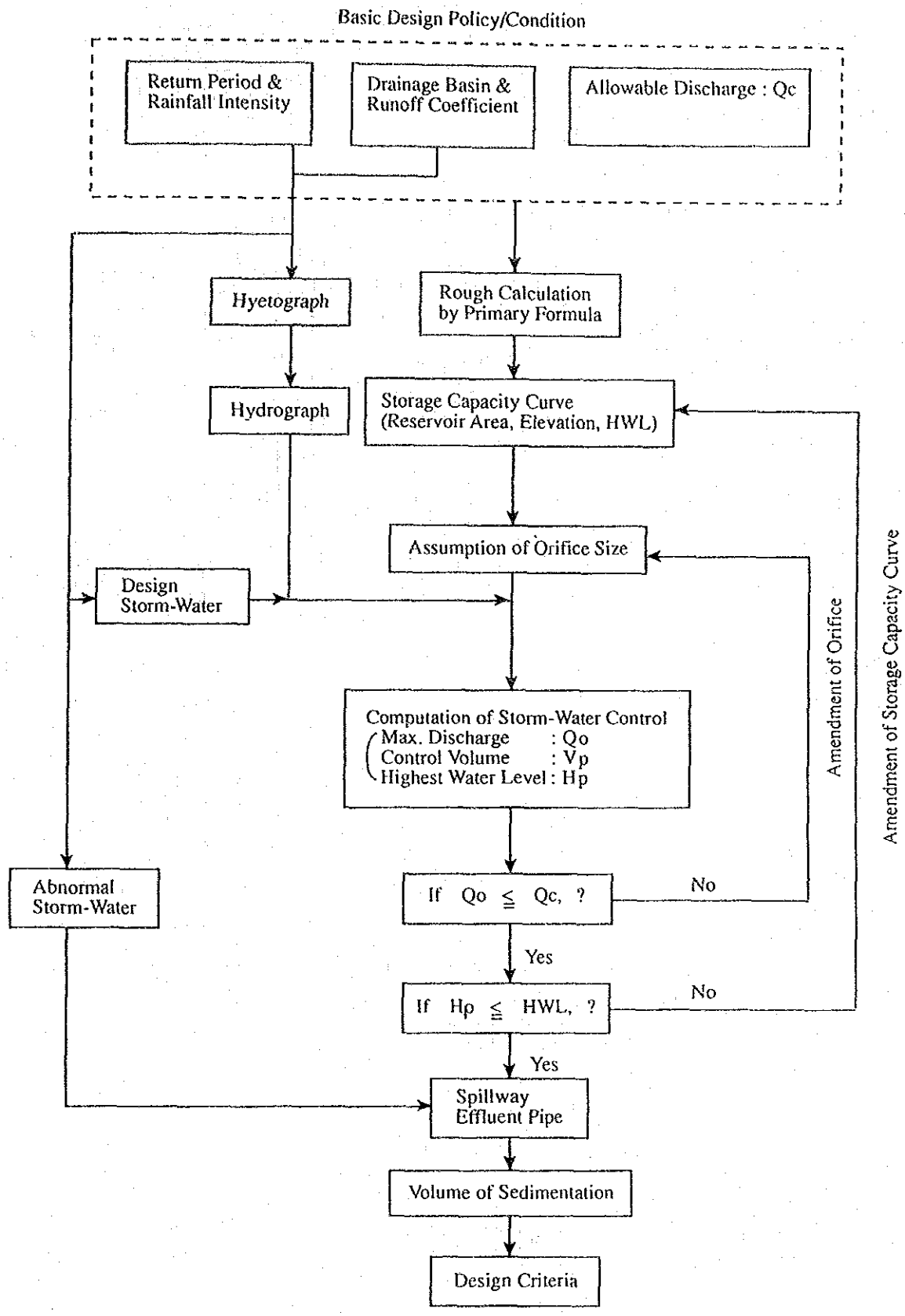
(See Fig. 3.6.4.)

Fig. 3.6.1



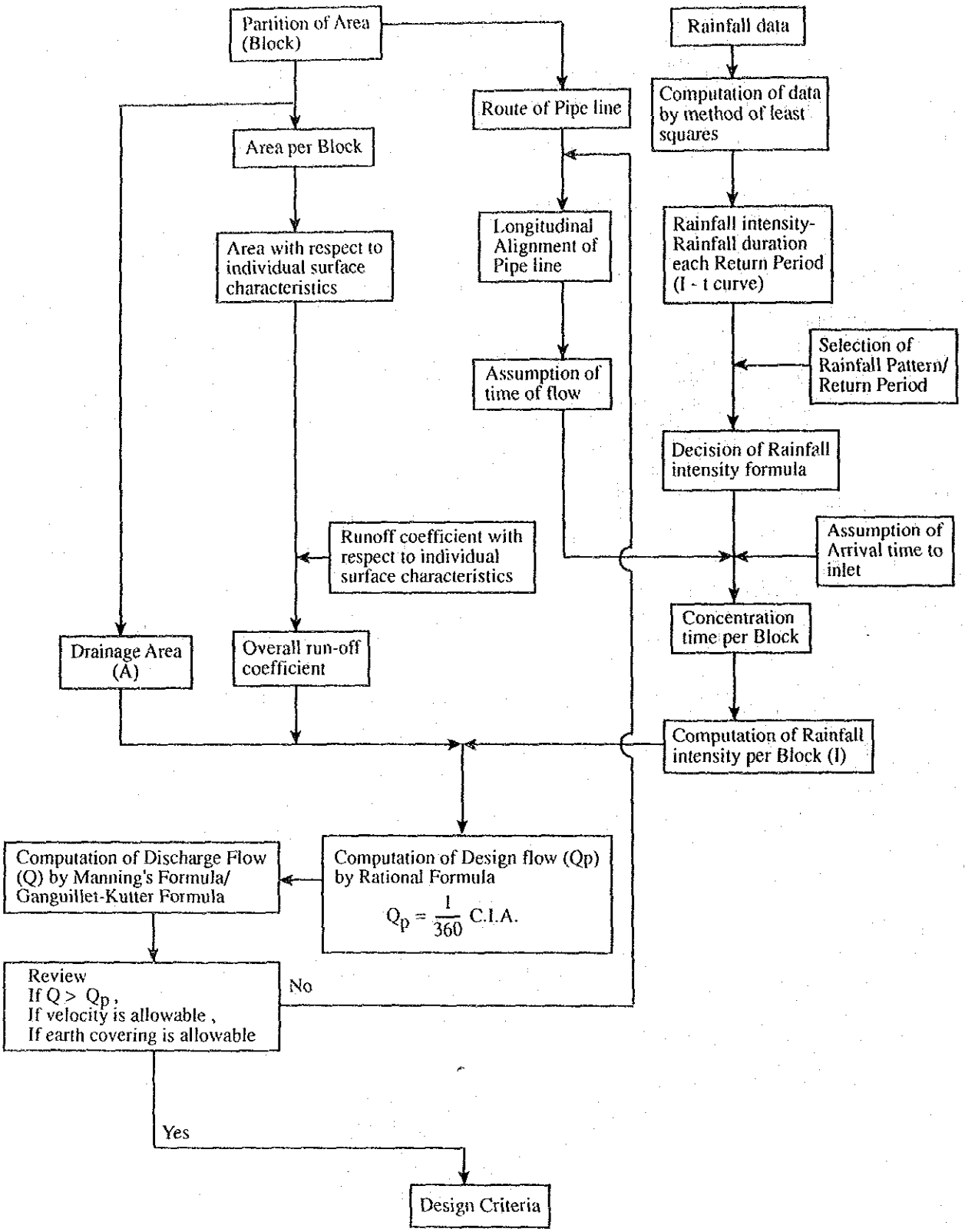
THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Work Flow of Drainage & Sewerage System

Fig. 3.6.2



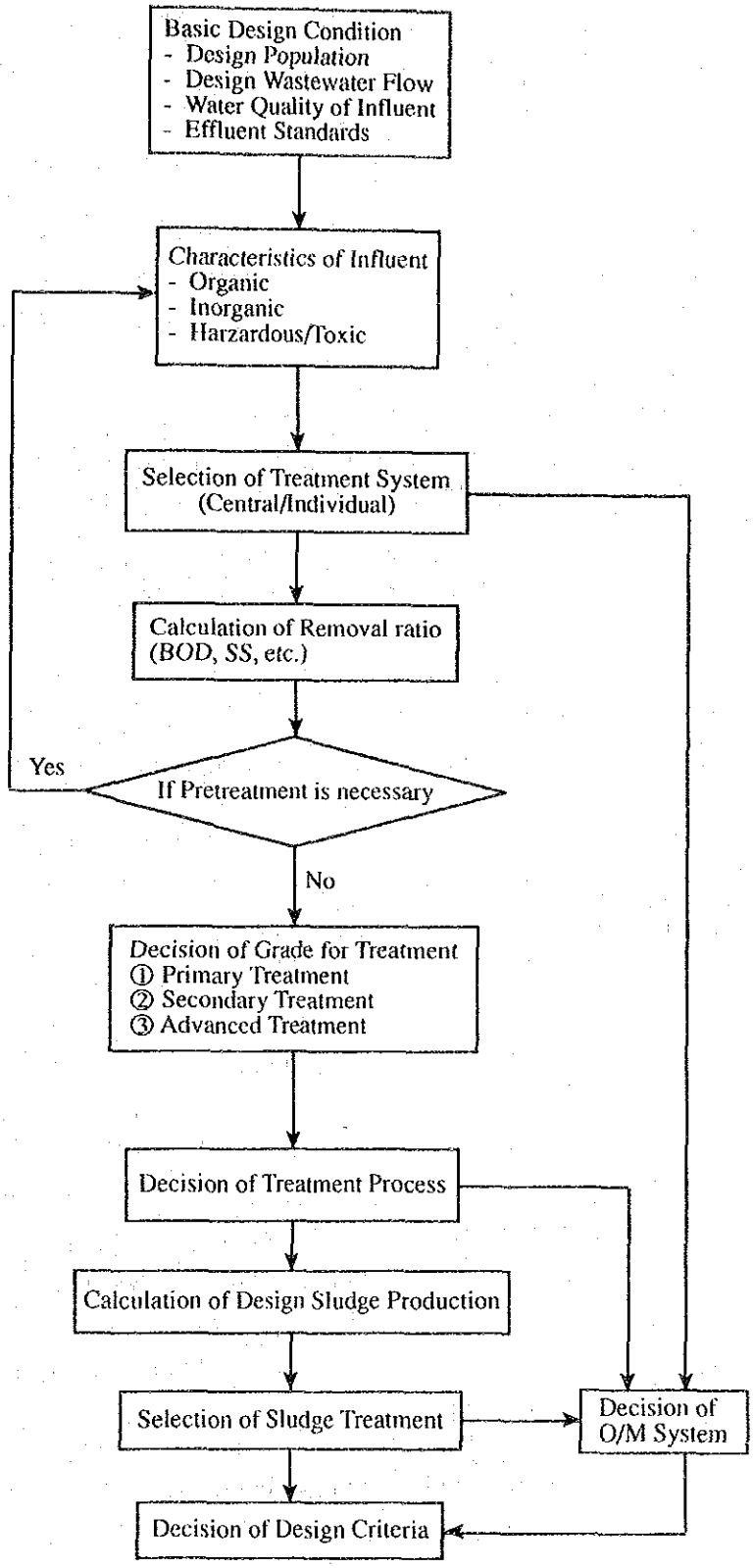
THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Work Flow of Computation for Storm-Water Reservoir

Fig. 3.6.3



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Work Flow of Computation for Design Flow/Pipe Line

Fig. 3.6.4



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Work Flow of Treatment Plant Planning

3.7 Industrial Waste Management

3.7.1 General

Problems caused by inappropriate management of industrial solid wastes are becoming more serious day by day all over the world. Increasing tendency of shipment of hazardous wastes and export of polluting industries from industrialized countries to Malaysia, and delay in the establishment of workable industrial waste management systems must already be producing serious environmental pollution. Therefore, it is necessary to develop appropriate management system of solid wastes, especially hazardous industrial solid wastes. For Hi-Tech industry, such a industrial hazardous solid wastes management system is an urgent necessity to prevent environmental pollution, because it is suspected to generate new toxic and Industrial hazardous material. Practical definition of manifest system for Hazardous solid waste as shown in Fig. 3.7.2.

A very simple industrial management system (Refer to Fig. 3.7.1), manifest system and manifest form (Refer to Fig. 3.7.2 and 3.7.3) is proposed

In these three simple figures, it is shown the guideline of the Industrial Wastes management of Hi-Tech Industrial Estate. This management system is based on two principle concepts, that is "Pollution pays principle" and "Cradle to grave"

3.7.2 Practical Definition of Hazardous Industrial Solid Waste

Although there is not a generally accepted definition of the term "hazardous" related with industrial solid wastes, this term is utilized to indicate the probability that an industrial waste will cause an adverse effect on human and/or environment because of the conditions under which they are handled. Therefore, the term "hazardous" has a very wide spectrum covering characteristics such as "toxic", "carcinogenic", "mutagenic", "teratogenic", "ignitable", "corrosive", "reactive", "radioactive", "infectious", "odorous", etc.

If the characteristic "toxic" is analyzed as an example, then toxicologists will say that all chemical substances are toxic under some exposure conditions. A very toxic substances will cause damage to an organism even if it is administered in a very small quantity. A substance with low toxicity will produce effects only when the quantity is large. This means that each characteristic also has a very broad intensity scale.

As it is impossible technically and economically to control all wastes, it is

indispensable to focus the effort primarily in the control of more hazardous wastes, if efficient management of hazardous wastes is to be pursued. Realistic focusing of efforts accompanied by practical definition of hazardous wastes is the key for successful hazardous solid waste management of every industrial estate.

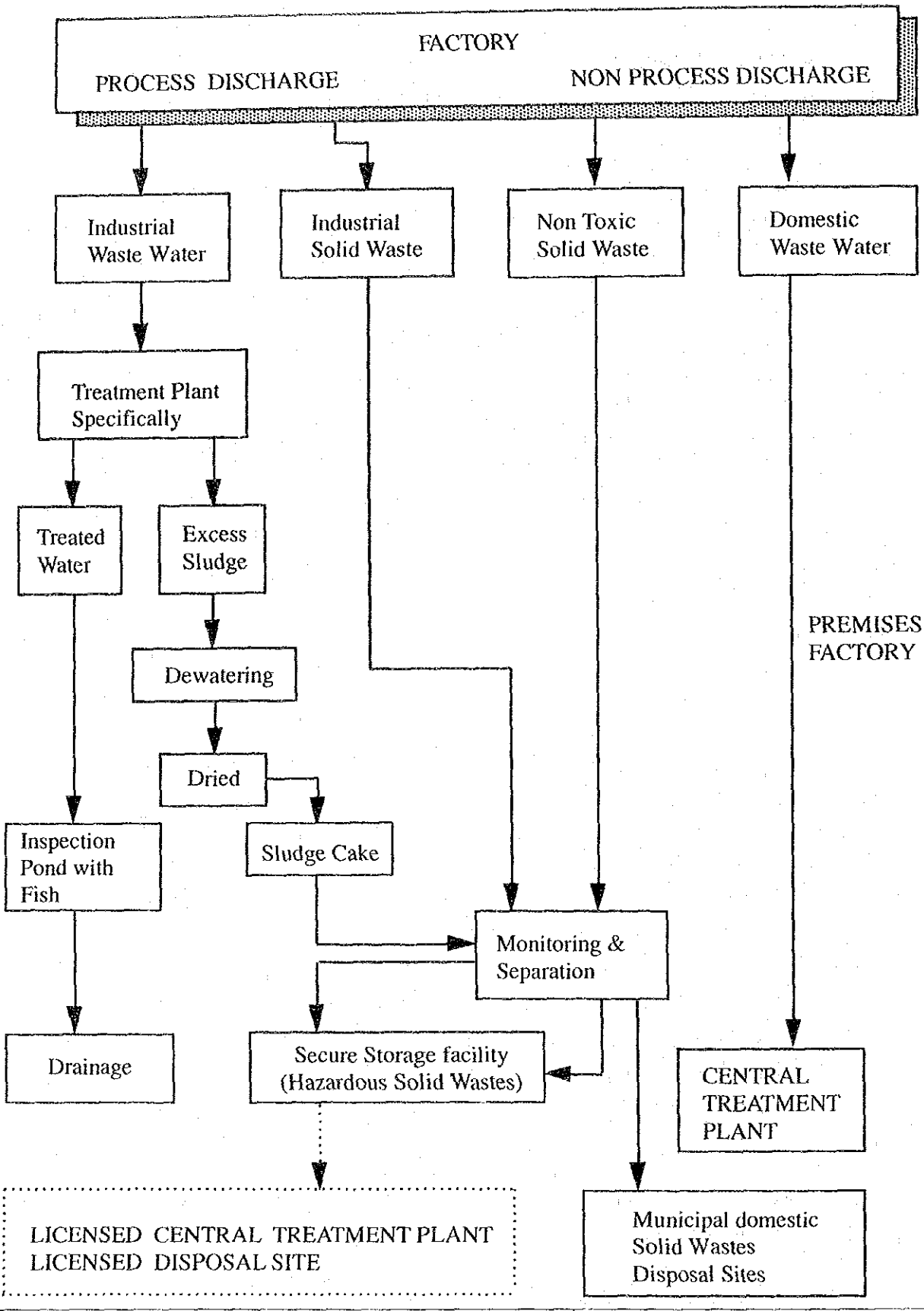
There are two methods for the definition of hazardous wastes. The first is the method by analysis of hazardous characteristics and the second is the method by lists. The first method can be considered as a direct definition of hazardous wastes while the second is considered as an indirect definition.

In industrialized countries, both methods are used jointly in the definition of hazardous wastes as shown in Fig. 3.7.4 (Definition of Hazardous Wastes in Japan) and Fig. 3.7.5 (definition of Hazardous Waste in U.S.A.). However, it is not wise to depend on the first method by analysis of hazardous characteristics in the case of developing countries because, except in very rare cases, these countries lack the expertise and sophisticated laboratories required for such analysis. The method by analysis should be introduced only gradually into the definition system of hazardous wastes paying special attention to the laboratory capacity available in the governmental agency responsible for hazardous Solid Waste management.

A practical definition of hazardous wastes in many developing countries will be, therefore, based on the method by lists. These lists usually include hazardous wastes from nonspecific sources (e.g. wastes containing PCB and PCT) and the ones from specific sources (e.g. sludges from the re-refining of used oil products). Hazardous wastes in these lists are called as "scheduled wastes". A definition system of hazardous wastes based on the method by lists is used in Malaysia.

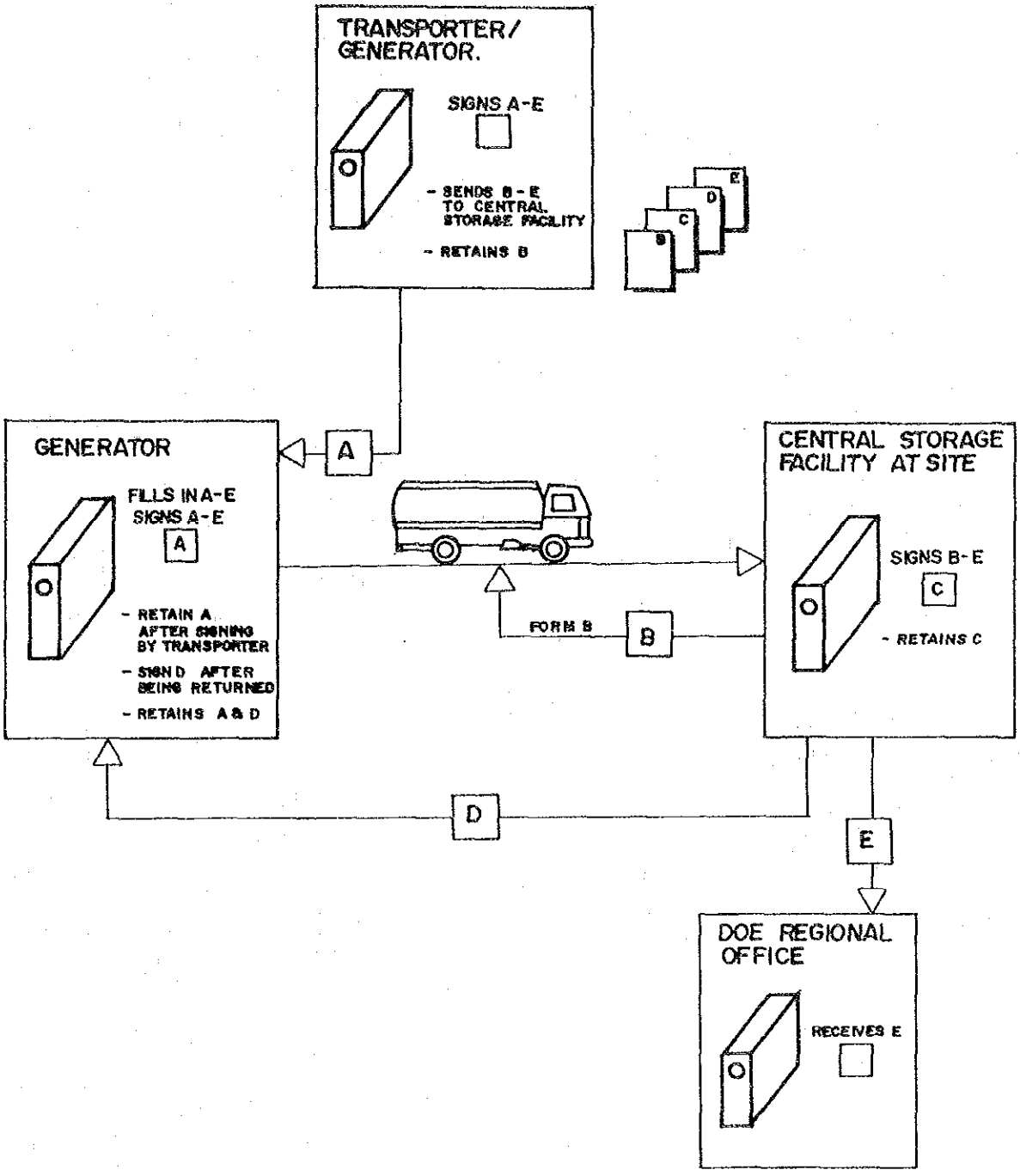
The advantage of the definition system based on the method by lists is that the required laboratory works can be very little. The drawback of this system is the fact that hazardous wastes and non-hazardous wastes are mixed in the lists, that is to say solid wastes what have to be kept at storage are quantities of huge. If generating industries consider their wastes non-hazardous, a practical way to overcome the drawback is for generating industries to make an application with evidence to authorities and to get their wastes to recognize as non-hazardous.

Fig. 3.7.1



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Flow Chart of Industrial Waste Management

Fig. 3.7.2



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Flow Chart of Proposed Manifest System

A. WASTE GENERATOR Waste Generator Code: ☐☐☐☐☐ ☐☐☐ ☐☐☐☐

Name of Waste Generator : .....

Address : .....

Name of Responsible Person : .....

Tel. No : ..... Fax. No : ..... Telex No : .....

Name of Waste : ..... Waste Category Code : ☐☐☐☐

Waste Component : .....

Waste Origin : ..... Waste Origin Code : ☐☐☐☐

Type of Waste :

☐ Solid ☐ Sludge ☐ Liquid

Waste Packaging : ☐ Pallet Container ☐ Canister ☐ 55 gal. (250 Litre) Drum

☐ Others (Specify) .....

Quantity : ☐☐☐☐ ☐☐☐ ☐☐☐☐ ☐☐☐

Metric tonnes m^3

Delivery Date : ..... Signature of Responsible Person

.....

B CONTRACTOR

Vehicle Registration No : .....

Name of Driver : .....

Date Received : ..... Signature of Driver : .....

Contractor Code : ☐☐☐☐☐ ☐☐☐ ☐☐☐

Type of Waste :

Quantity of Waste Received : ☐☐☐☐ ☐☐☐ ☐☐☐☐ ☐☐☐

Metric tonnes m^3

Cost of Storage : $ .....

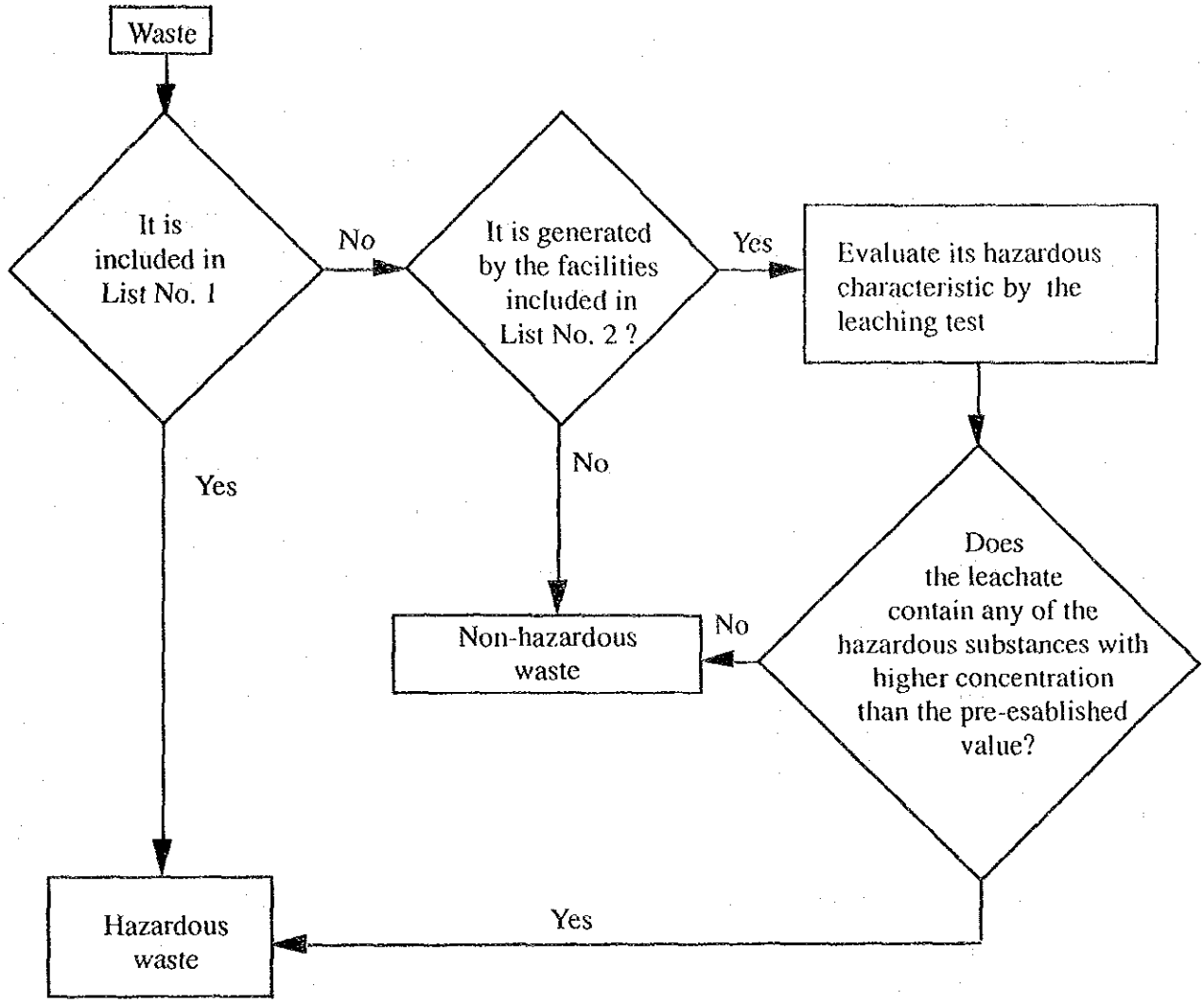
Storage Yard : ☐☐ Facility No. ☐☐ Zone No. ☐☐ Lot No.

Date Received : ..... Signature : .....

FIGURE : 3.7.3

MANIFEST FORM
(SAMPLE)

Fig. 3.7.4



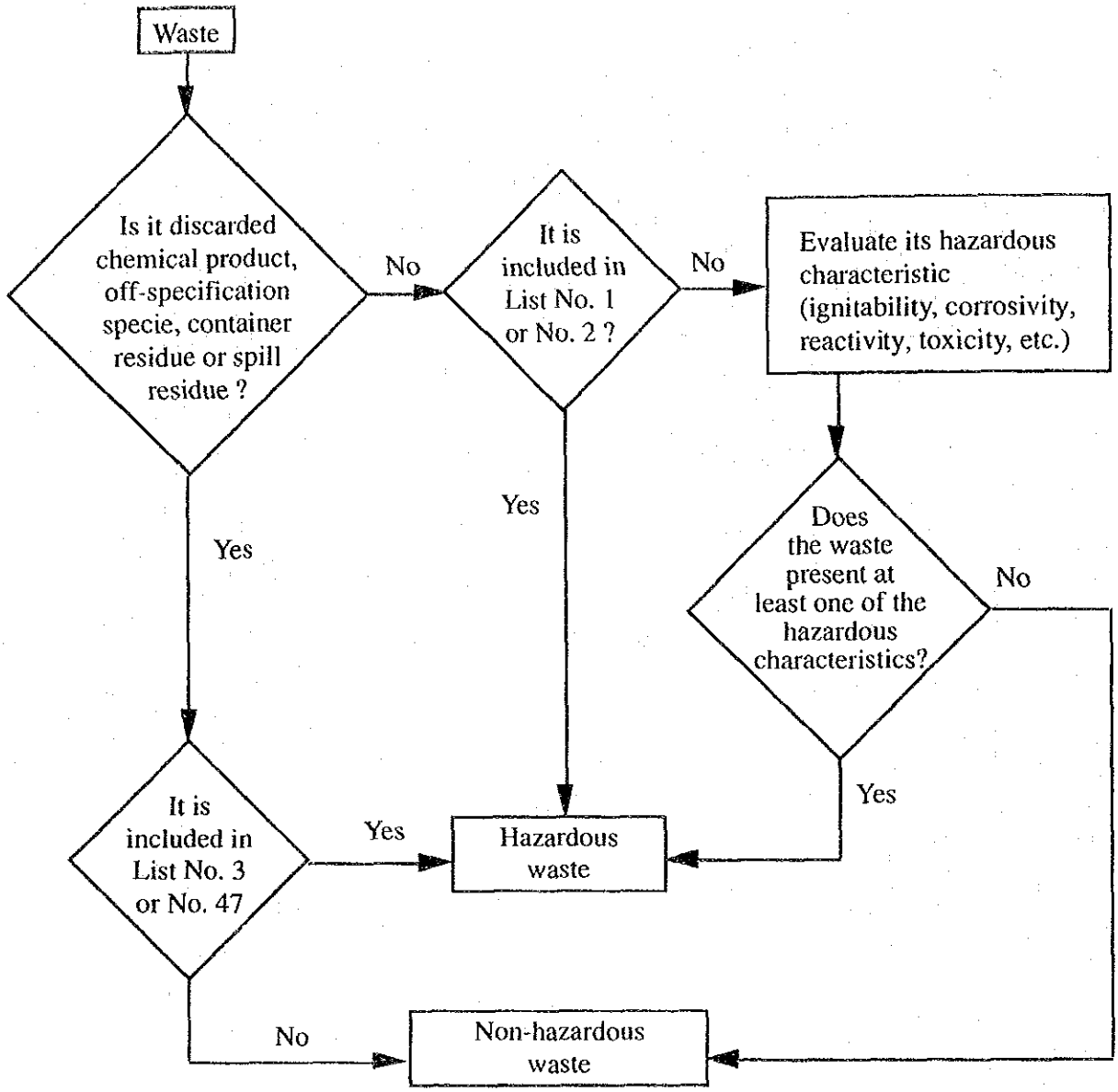
Notes : List No.1 - Hazarous wastes from nonspecific sources (waste alkali and waste containing PCB

List No.2 - Scheduled facilities and/or process

(Waste Disposal and Public Cleansing Law, 1970, Japan)

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Definition of Hazardous Wastes in Japan

Fig. 3.7.5



Notes : List No.1 - Hazarous wastes from nonspecific sources
List No.2 - Hazarous wastes from specific sources
List No.3 - Acute hazarous wastes substance
List No.4 - Toxic substance

Evaluation methods : ignitability
corrosivity
reactivity
toxicity

(Resource Conservation and Recovery Act, 1976, U.S.A.)

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Definition of Hazardous Wastes in U.S.A.

3.8 Landscape Planning

3.8.1 Basic Design Policy and Conception

The following basic design policy and conception are adopted by the Technopolis in Japan.

(1) To emphasize environmental harmony and scenery integrated Industrial Park with parks and open space.

(2) To create landscaping with ample greenery to harmonize overall openness of the Industrial Park independent of each lot.

(3) To carefully consider the co-existence of the proposed area and future development area.

(4) To follow environmental protection policy.

(5) To provide recreational and sport activity for estate workers as well as neighboring people. Not only fields for team sports, but more varied sports facilities such as tennis courts, a baseball park, and gymnasium should be included in the plan so that the research staff will have places to refresh themselves mentally and revive their creativity. The number of self-contained industrial parks adjoining wooded park land and golf courses is growing.

3.8.2 Work Flow of Landscape Planning

A standard work flow of Landscape Planning is shown in Fig. 3.8.1.

(1) Location Plan of Park/Open Space

Park/Open Space is allocated tentatively in corresponding to zoning of Land Use Plan.

(2) Adjustment of condition

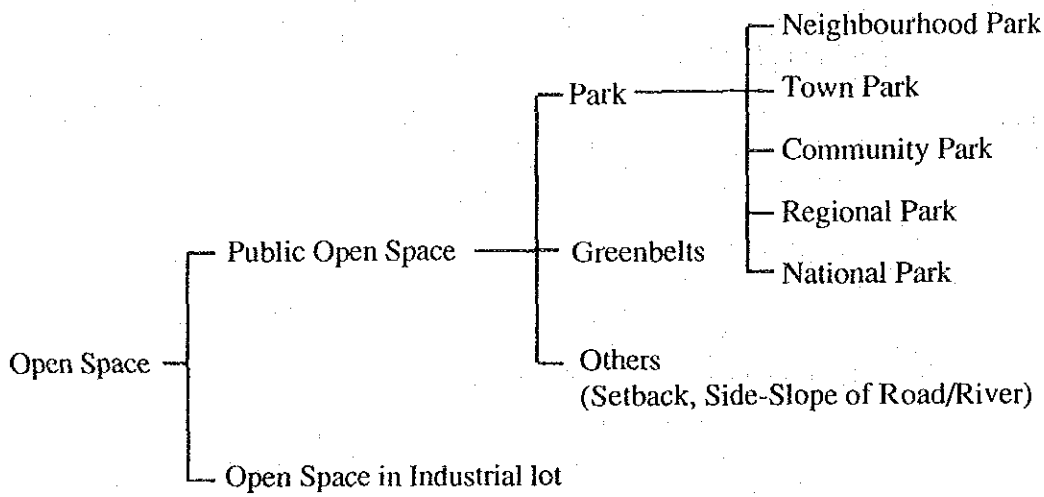
Results of investigation must be adjusted as follows:

(a) Situation of existing Park/Open space around the Estate
(b) Related Landscape Planning around the Estate

(c) Related Town Land Use Plan
(d) Land Use Plan of the Estate
(e) Access/approach between the Estate and circomference

(3) Classification of Park/Open Space

Park/Open Space for the Estate shall be selected from the following classification.



(4) Review of Location

Adequate location shall be decided in consideration of the following items;

(a) Type of users and number of users
(b) Sphere of utility and covering area of Open Space
(c) Outline for component of Institution

(5) Review of Area

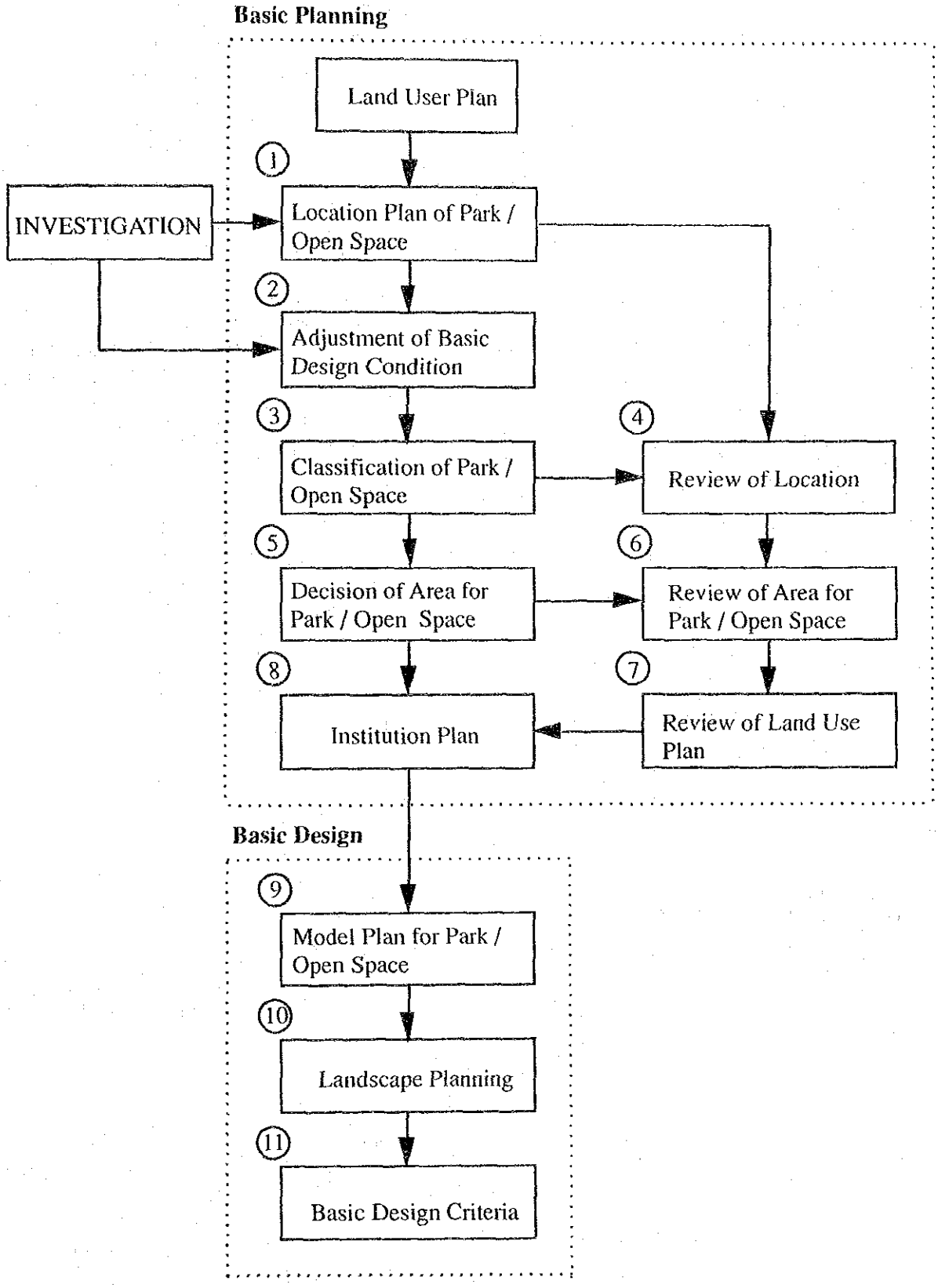
Standard of Area is as follows;

(a) Open Space : $\geqq$25% of the development area
(b) Park : $\geqq$ 3% of the development area

3.8.3 Example of Landscape Plan

Basic design criteria of typical Technopolis in Japan is shown in Table 3.8.1.

Fig. 3.8.1



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Work Flow of Landscape Planning

Table 3.8.1 Comparison of Landscape Plan (Japan, U.S.A. and Malaysia)

Items	JAPAN		U.S.A.	Malaysia	
	Tsukuba	Hakusan	Dallas	Penang Is. Code	Kedah State Code
1. Agreement of landscape plan before construction	Yes	Yes	Yes		Yes
2. Building Coverage	40%	40%	50%	–	–
3. Floor Area Ratio	160%	200%	–	–	–
4. Max Height of Building	not too high	>31m	not to be shown	15m above (Setback) no limitation 5F + 1.5m setback (over 6F)	60 angle inclination from other building
5. Set Back.					
Front Primer RD	25m	15m (15m RD)	Min. 7.62m(25')	–	–
• Front					
Arterial R	1.5m	12m (12m RD)		Min.6m (20')	9m (30')
Collect RD.	15m	10m (10m RD)		12m (Average)	
• Side	10m	not to be shown	Min. 3.04m(10')	2m	6m(20'),3m(10')
• Back	not to be shown	not to be shown	Min. 3.04m	–	6m (20')
• Other	10m (Green Belt, park) 20m (public park, along the primary RD)	not to be shown	No (eaves)	Yes (eaves)	Yes (eaves)
6. Green Areas within lots	over 30%	over 20%	over 10% Min. 3m (10') along RD.	–	–
7. Sidewalk (2 m) along 12 m wide Rd.	not to be shown	2m along the sidewalk	31m RD–1.8m 30m RD–30m 20m RD–4.5m	–	–
8. Vehicle Entrance & gate	not less than 2 gateway>9m in width >1.5m in Height (10m from RD)	not less than 2 gateway	2 gateway	2 gateway (within free zone)	1 Custom office, if necessary
9. Pollution Control	Yes	Yes	not to be shown	–	–
10. Other available open space wall installation	Yes	Yes	Yes		Yes, safety lane for Emergency
11. Parking					
• Screening	Yes	to be taken into consideration	–	–	–
• Exterior element	Yes	Yes	Yes	–	Fence Yes (Custom need)

3.9 Related Facility

(1) A standard work flow of mixed-use urban block development plan with Related Facilities is shown in Fig. 3.9.1.

(2) Technopolis Manual of Japan lists the following facilities as a typical menu of selection.

(a)	Direct services	:	Restaurants, coffee shops, convenience store, post office, bank.
(b)	Meeting places	:	Meeting Rooms, auditorium.
(c)	Sports	:	Tennis courts, baseball park, gymnasium, golf course, marina, skiing facility.
(d)	Exchange facilities	:	New product display room, consultation room, public lounge.
(e)	Personnel Training	:	Technical school, study and training room.
(f)	Information services	:	Provision of technical and market information, data bases, ISDN system.
(g)	Business Support services	:	Testing, analysis, measurement, incubator, tele-conference system, security service.
(h)	Other facilities	:	Heliport, hotel. hospital, luxury housing, theme park, amusement park, CATV, energy conservation centre, fire station.

(3) On planning a development of mixed-use urban block, the following can be listed as planning check points.

(a) to lay-out facilities to maximize their potentiality and combine them as a unit.

(b) to construct functional infrastructures such as parking, utility, mechanical and structural system, which will provide sufficient services to diversified functions.

(c) to connect each component and other zones by adequate transportation and communication system.

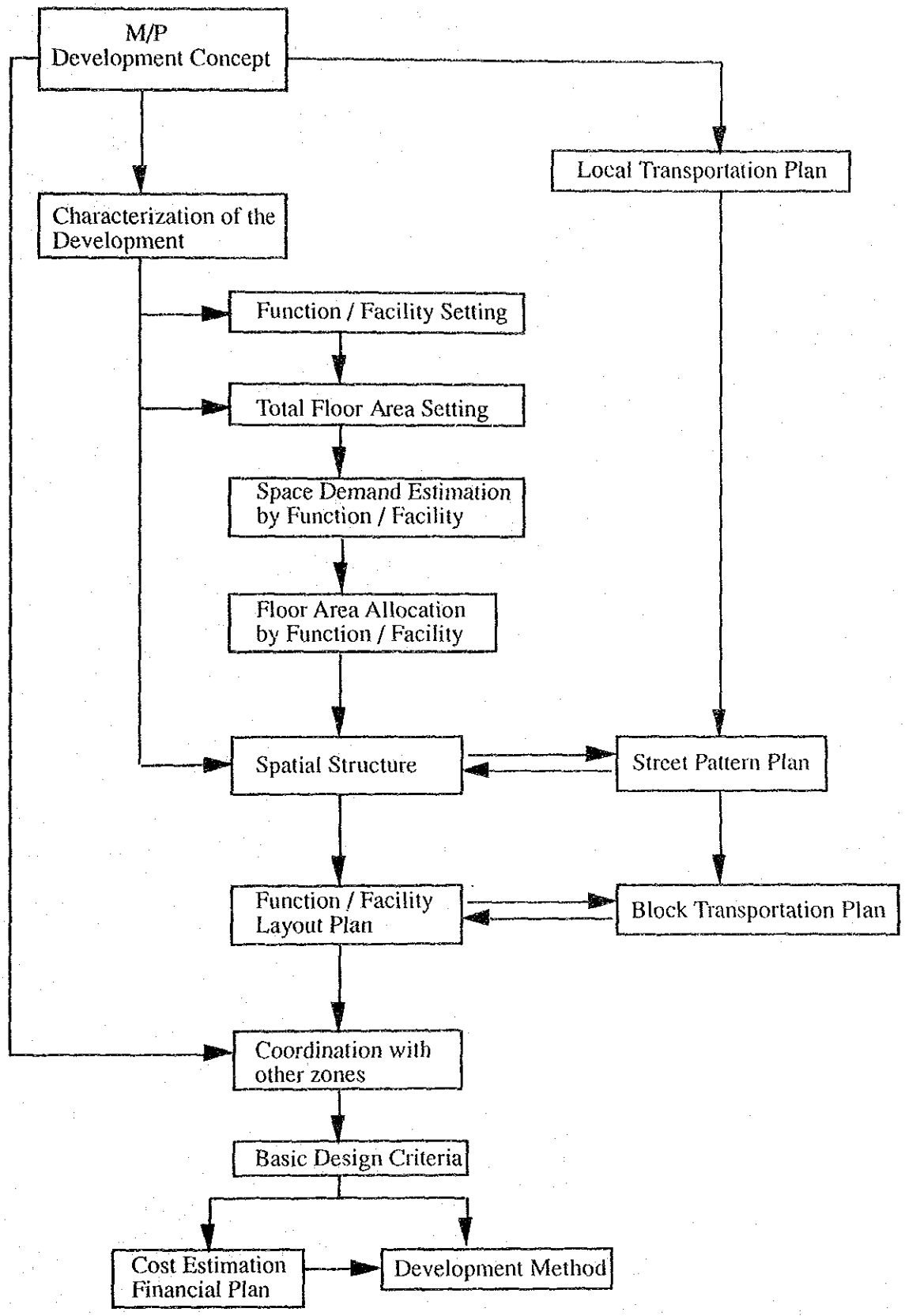
(d) to create amenities and attractions which mono-use urban blocks cannot offer.

(e) to maximize advantage of the site by harmonizing with natural settings and functional relation with other zones.

(f) to plan their gradual development programme to create unity of the group of buildings

(g) to avoid confections in planning process of each individual facilities.

Fig. 3.9.1



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Standard Work Flow of Mixed Use Urban Block Development Plan

GUIDELINE 4

MANAGEMENT

4. MANAGEMENT

For Successful planning and implementation of Hi-Tech industrial park, the management organization is extremely important. It is important because:

(1) it is expected to coordinate regional development planning (e.g. infrastructure, housing, amenity facilities, community development) to provide better infrastructure endowment for the Hi-Tech industries,

(2) it is expected to facilitate legal and administrative procedures (e.g. layout plan, building plan) by local as well as foreign investors to be located in the Hi-Tech park in terms of investment promotional activities, and

(3) it is expected to promote research linkages among related R & D institutions, universities and private sector, and ensure appropriate level of utilities services for Hi-Tech industries.

A study should be done, therefore, on how to establish a management body which would be best fitted for the above functions.

4.1 Management Organization

The possible alternative types of the organization can be thought as follows:

(1) Private sector type of management

One alternative is to establish a private-owned management company to run a Hi-Tech industrial park. The private sector, in this connection, is developers, construction companies, banks, manufacturing companies, trading companies, and others. It would act as a purely private concern, therefore, its financial viability in terms of costs and benefits analysis must be verified. As an extension of the company, amenity facilities such as golf courses, tennis court, and housing plan can be combined into one package of the project under the same management. Compared with other alternatives, it is required to pay income taxes and dividends in addition to loan repayments.

(2) Public sector type of management

Either federal or state government could establish a public corporation to operate the Hi-Tech park. This corporation may be either on the national level or state

level. The public corporation should play a role of "one-stop-service" centre to facilitate investors' legal application procedures. It should also function as a catalyst to link Hi-Tech industries with universities and public research institutes for technology interface activities. Training services such as skill development centre should be also initiated to supply qualified man power to the industries. Seminars and workshops should be also organized to enhance R & D activities.

(3) Joint form of management between private and public sector

The federal or state government can create a subsidiary under State Economic Corporations in collaboration with the private companies. This subsidiary can have benefits as both public and private entity in terms of investment promotion, operation and management (O & M) services, legal procedures and financial feasibility.

4.2 Function of Management Company

The management company should have the following functions:

(1) Investment Promotion

To invite local as well as foreign investors, aggressive promotional activities are essential. For this purpose the following actions are necessary:

- Preparation of leaflets and hand-outs
- Identification of prospective international and local companies
- PR and promotion seminars and meetings

(2) "One-Stop-Service" Centre

To facilitate prospective investors/industrialists, the following services need to be provided:

- Legal application procedures
- Land lease agreement
- Pollution prevention agreement
- Landscaping preservation agreement
- Utilities operation and maintenance services

(3) R & D promotion activities

To encourage technology exchange and R & D activities in the Hi-Tech park the promotional services shown below should be undertaken:

- Inter face promotion activities among research institutes, universities and industries (e.g. joint research, workshop)
- Technical training institutions (e.g. skill development centre)
- R & D financing and sponsoring facilities (e.g. subsidy and grant)
- Incubation activities
- Joint research programme
- Seminars and workshops

(4) Environment protection activities

To preserve appropriate natural endowment environment protection activities such as industrial waste management, waste water treatment and greenery landscaping should be performed. Individual agreement with respective industry for pollution control need to be considered.

- Industrial solid waste management
- Domestic waste management
- Waste water treatment plant
- Landscaping management

(5) Business support services

To facilitate industries activities business supporting services need to be provided:

- Shopping centre
- Banks, mail, restaurant
- Library
- Courier services
- Security services

(6) Amenity services

To enhance R & D activities and research environment recreational services should be provided:

- Tennis court
- Golf course

- Swimming pools
- Gymnastic

(7) Habitation services

Housing area and housing schemes need to be integrated to cater for the the requirements of the management personnel and workers as follows:

- High-grade housing (e.g. bungalow type)
- Condominium
- Hotels
- Low-cost housing
- Community centre

4.3 Selection of Qualified Industries

For selection of the investors which are qualified to participate in the proposed Hi-Tech park, the following general criteria and contents of application are recommended:

The industry which applies for entry in the Kulim Hi-Tech Industrial Park,

(1) should contribute to technology development for Malaysia,

(2) should contribute to human resource development of Malaysia,

(3) should be free of pollution and should be equipped with appropriate treatment facilities in case of toxic waste production potentials,

(4) should submit an appropriate investment plan with related production plan and R & D plan for subsequent five years,

(5) should submit, in case of R & D-oriented industry a research topics and R & D plan preferably in the sub-sector of electric, electronics, new materialism and bio-technology,

(6) should submit financial report for the last three (3) years which show financially sound, and

(7) should submit a staff personnel plan which depicts appropriate proportion of permanent engineer/research staff (preferably 5% or more engineers/ researchers)

As to actual selection of applicants, it is recommended the selection committee headed by MIDA in cooperation with related agencies, should be established to examine and assess the application form of the investors.

4.4 Criteria for Hi-Tech Industry

There has been no authorized or even quantitative definition of Hi-Tech industry as well as Hi-Tech products. It is because the technologies change and develop in a dynamic manner and thus static definition of the technologies easily become obsolescent. Chronic reviews, therefore, are necessary.

In fact, Hi-Technology can be considered not only in the products but also in the production process itself. Sophistication of the technologies in production and the properties of the products face an extreme difficulty in defining.

Nevertheless, as the second best there is a tentative definition done by the Office of Technology Assessment (OTA), USA. According to OTA, Hi-Tech industry or industry of "technology intensity" is the one, of which R & D expenditures are more than 10.0% of the value added production while the engineers' proportion against the total employees is more than 10.0%. In view of the present situation in Malaysia, the rations to be applied may start from 5.0% respectively and then increase gradually.

4.5 Financial Evaluation

In general, a financial analysis should be carried out as follows:

(1) Estimation of construction costs

First it should estimate direct construction costs of which breakdowns are in the following,

Land Acquisition Cost
Land Preparation Cost
Road Construction Cost
Power Supply Cost
Water Supply Cost
Telecommunication System Cost
Drainage System Cost

Sewerage System Cost
Solid (Industrial and Domestic) Waste Management Cost
Architectural cost
Landscaping Cost

The addition to the direct construction costs, there are indirect costs such as administration expenses, engineering service cost and contingencies (price and physical contingencies).

(2) Estimation of unit land cost

From the total construction costs, re-adjustment should be made to separate cost breakdowns between the ones to be include in the unit land cost and the ones to be excluded from the unit land cost. As a general guideline the following costs could be excluded or partially excluded:

- costs which could be recovered from subsequent tariff revenues
- costs which should be borne by the government
- costs which could be sub-contracted out to the private sector.

For detailed cost allocation, there should be coordination meetings among the government, SEDCs, related public agencies and private sector.

(3) Estimation of benefits

The benefit items of a Hi-Tech industrial park are mainly 1) revenue of land sales, and 2) management fees collection. The revenues of land sales would be calculated annually with several options of land sales pricing and marketing schedule. For catering to operation and management costs of Hi-Tech park, management fees could be collected from the industries.

(4) Financing plan

To finance the project there would be three means 1) Equity, 2) loan, and 3) grant facilities. Depending on available terms of conditions various financing schemes would be developed.

(5) Financial Analysis

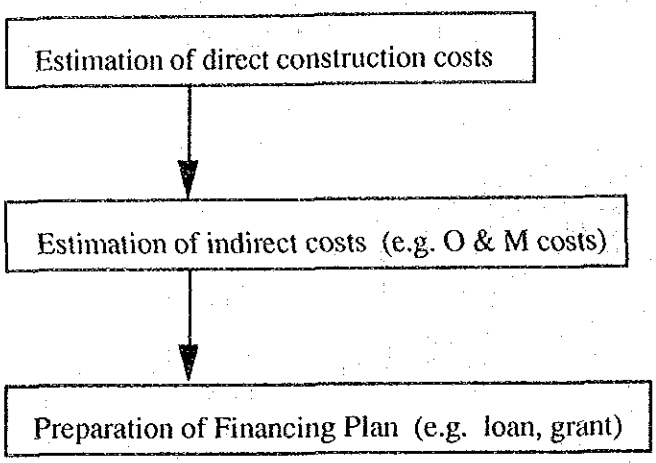
A financial analysis is to be carried out 1) determining cost items, 2) determining benefit items, and 3) comparing cost flow and benefit flow. The common tools of financial analysis is net present worth and internal rate of

return. The net present worth method is used primarily to evaluate public sector investment and to determine the least cost combination in project optimization. The net present worth is the values of the net benefit of project, which is the present worth of the benefits less the present worth of the costs, discounted at the opportunity cost of capital.

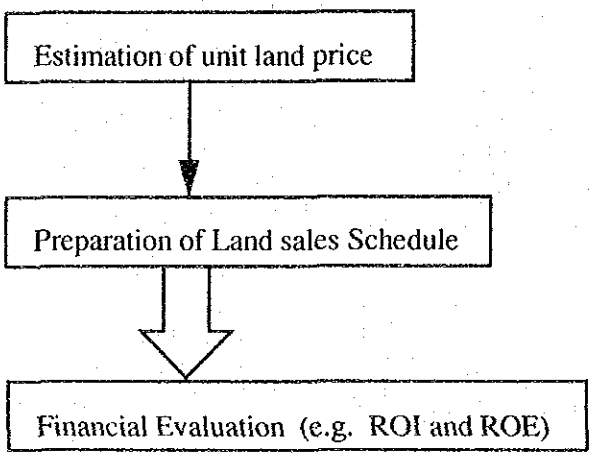
The internal rate of return is an interest rate at which the net present worth of benefits and the net present worth of costs become equal. The financial internal rate of return (FIRR) is the results based on market prices while the economic internal rate of return (EIRR) is on converted economic prices. A return on investment (ROI) is an internal rate of return against investment portion while a return on equity (ROE) is an internal rate of return against equity portion. Finally the result of IRR must be examined to assess if the project is feasible. Please note that in theory it must be related to the prevailing opportunity cost of capital in Malaysia.

The work of financial analysis will be done as follows:

Work Flow of Financial Viability Analysis



Estimation of benefits:

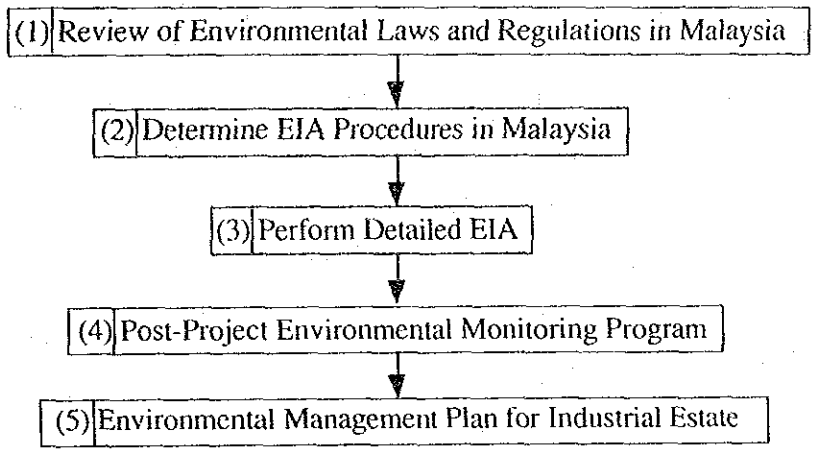


GUIDELINE 5

ENVIRONMENTAL IMPACT ASSESSMENT

5. ENVIRONMENTAL IMPACT ASSESSMENT

The Environmental Impact Assessment (EIA) of the industrial estate was conducted by considering it as part of the project planning itself. The EIA of the project is moulded around the normal planning process. In this way, the EIA is a continuous process throughout the course of project planning. Flow chart of the environmental assessment work plan is shown below.



(1) Review of environmental laws and regulations in Malaysia

This is to determine adequacy of existing laws and regulations for environmental pollution control. It was found that Malaysia has well defined laws, regulations and environmental standards for various environmental aspects. The standards and regulations for hazardous and toxic wastes in particular are amongst the strictest in the world.

(2) Determine EIA procedures in Malaysia

Malaysia has well defined procedures for EIA. An outline of the EIA procedure in Malaysia is given in Fig. 5.1.

In case of the present project, no preliminary EIA was done. However, considering the nature of activities (industry and housing construction and operation) of the project, a detailed assessment was determined to be necessary to clearly determine environmental impact and mitigation measures. Accordingly, Terms of Reference for the detailed EIA were prepared and approval of DOE concerning the same was obtained. As far as possible, the methods listed in "A HandBook of Environmental Impact Assessment

Guidelines" published by DOE, Malaysia (1988) were used in doing the EIA. It was found that these guidelines were sufficiently detailed and appropriate for the EIA of the industrial estate.

(3) Perform detailed EIA

This involved the following sequential series of steps:

(a) Collection of baseline data on physical, biological and socioeconomic environmental components for the project area. The project area was defined as an area of 4 km radius from the boundary of the proposed project site. Data collection methods included field visits for sampling and surveys, published materials from various sources as well as interviews with factory personnel, government agency officials and people living in the area.

(b) Identification of project activities.

This step basically involved collection and review of information regarding project setting and proposal for development. The UNIDO study report was a very important source of information. The various project activities during construction as well as during operation of industry, housing, and research centers respectively which could influence various environmental components were identified.

(c) Determination of project impacts.

The impact of project activities identified on various environmental components (physio-chemical, biological and human) were determined using the baseline data on the existing environment collected earlier. The significance and degree of importance of the impacts were evaluated using a matrix.

(d) Determination of mitigation measures.

Mitigation measures were formulated for each potential impact identified with respect to each project activity.

(4) Post-construction environmental monitoring program

The purpose of post-construction monitoring is to make periodic checks on the actual environmental impacts of the projects over the years following

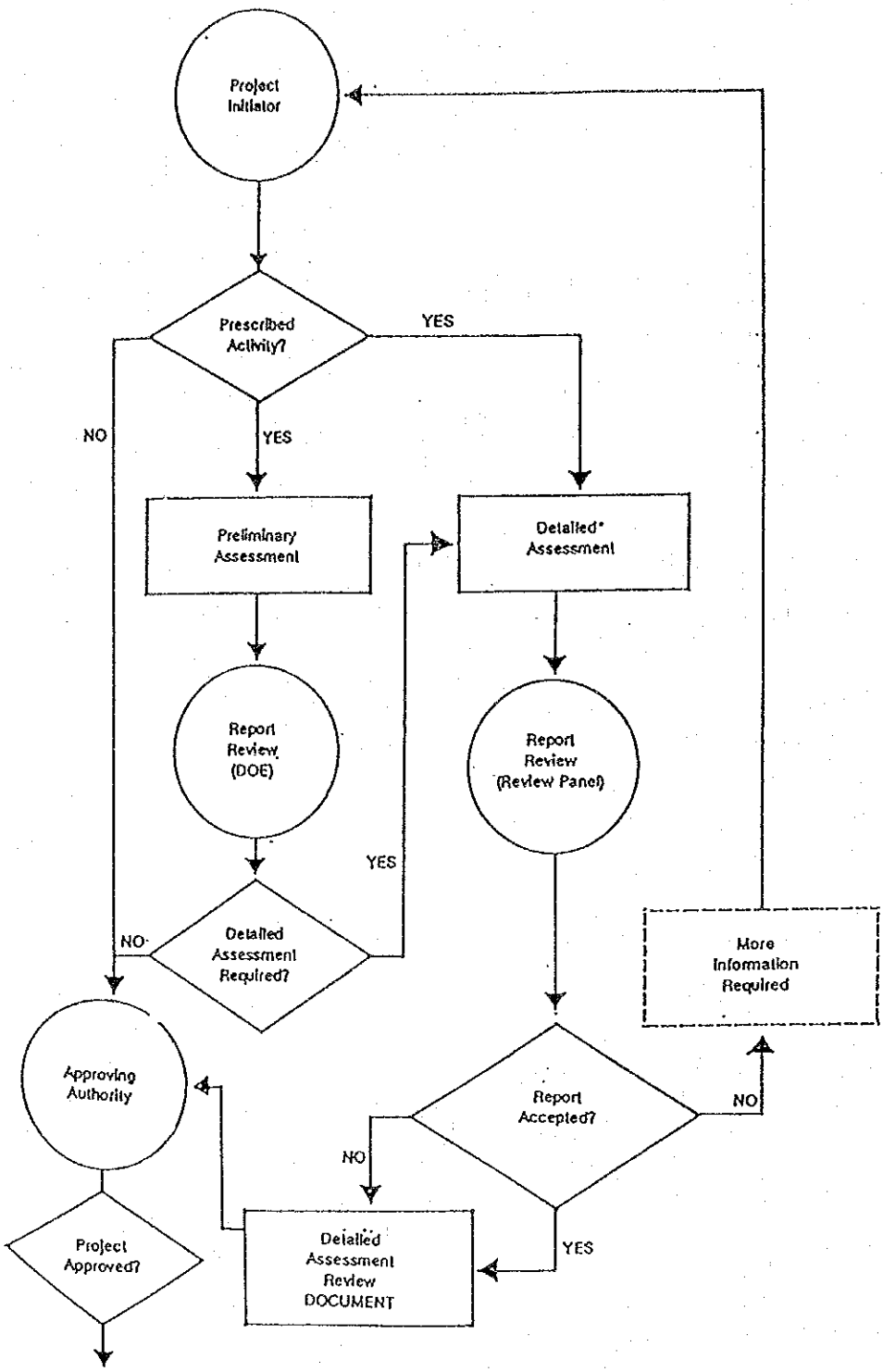
completion of construction, as compared with those projects at time of project appraisal.

A review of the EIA was done to identify the environmental aspects which need to be monitored periodically during industry and housing operations. Two kinds of monitoring - individual industry monitoring and overall surveillance monitoring are necessary. Details of the latter program were formulated.

(5) Environmental management plan (EMP) for the industrial estate.

A comprehensive post-construction environmental management plan for the industrial estate is being formulated by the local consultant GEA sdn. bhd. The EMP will clarify the roles, responsibilities, and activities of the various bodies involved with environmental monitoring and operation and maintenance of facilities and utilities in the estate. These bodies include individual industries, DOE, KSDC and the new management company to be formulated for efficient running of the industrial estate. Some of the institutional aspects regarding the responsibilities of the management company are presented in the main report. Recommendations regarding the contents of agreements to be made concerning environmental aspects between each industry and, DOE and KSDC were also formulated and are presented in the main report.

Fig. 5.1



Source : Handbook of EIA Guidelines, DOE, Malaysia, 1988

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Outline of Environmental Impact Assessment Procedure in Malaysia