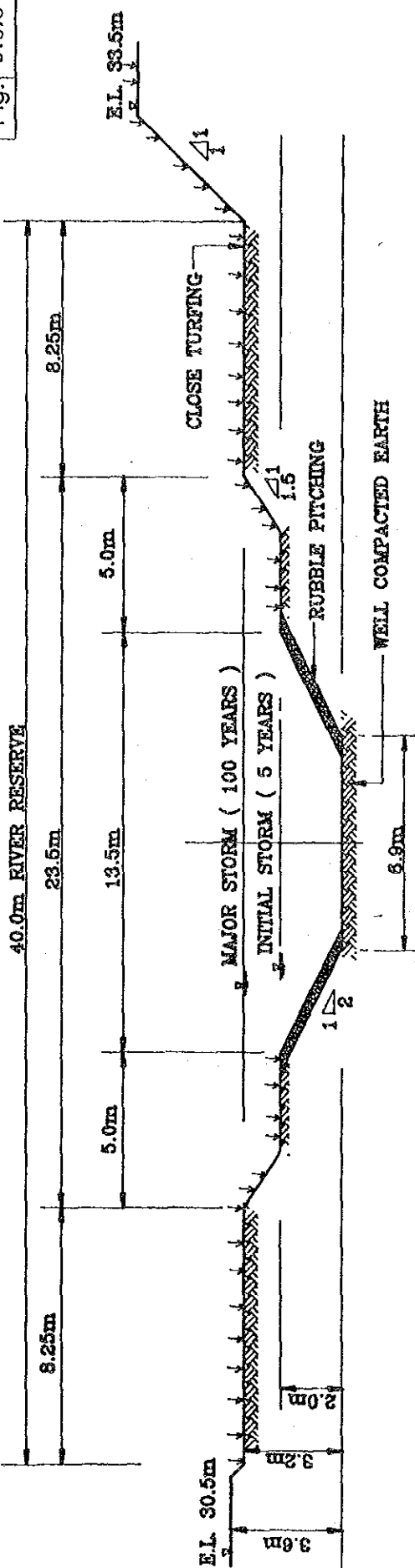
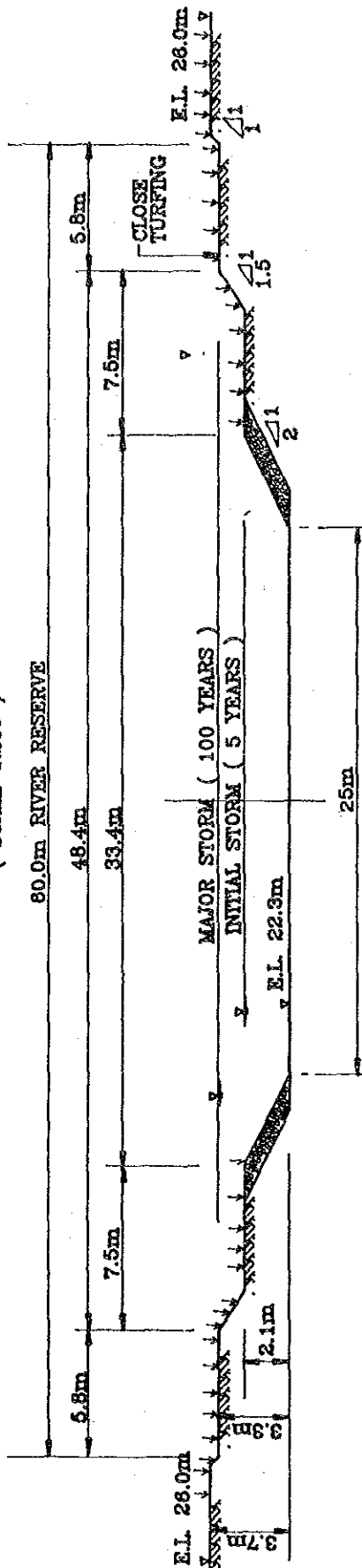


Fig. 5.6.8

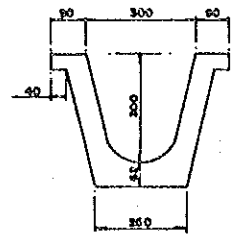


PARIT BUNIAN RIVER
(SCALE 1:200)

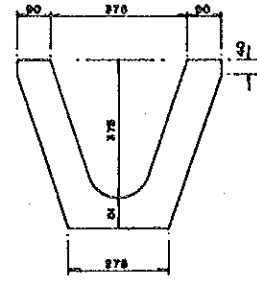


AYER MERAH RIVER
(SCALE 1:300)

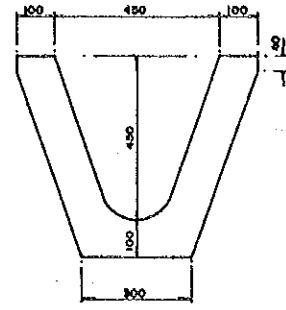
THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Enlargement of Rivers
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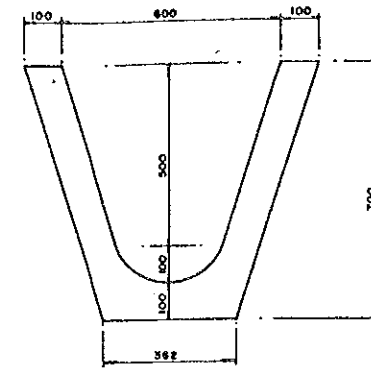
300mm BLOCK DRAIN IN 600mm LENGTH
(SCALE: 1:10)



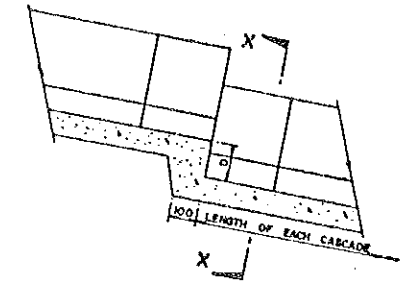
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(SCALE: 1:10)



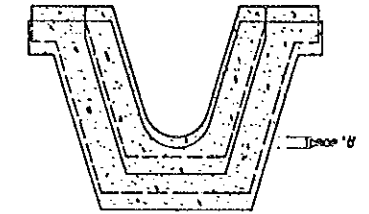
450mm BLOCK DRAIN IN 600mm LENGTH
(SCALE: 1:10)



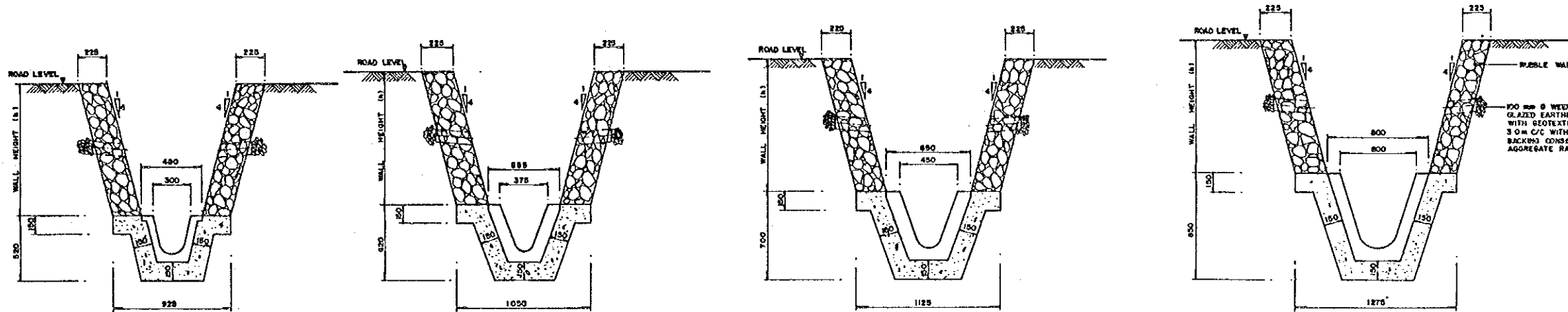
600mm BLOCK DRAIN IN 600mm LENGTH
(SCALE: 1:10)



DETAILS OF CASCADE
NOT TO SCALE



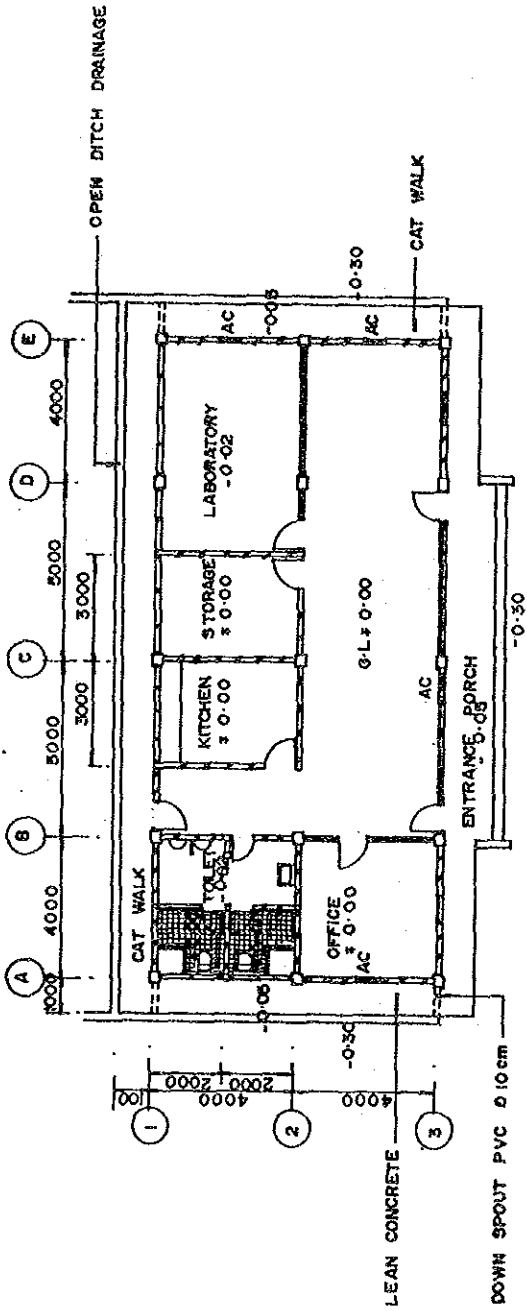
SECTION X-X



BLOCK DRAIN TYPICAL CROSS SECTIONS
(SCALE: 1:20)

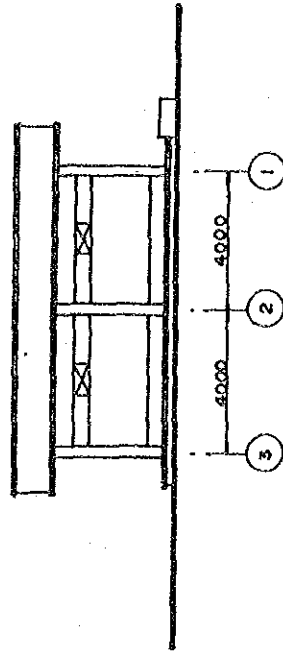
THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF HIGH TECHNOLOGY AND ELECTRONIC INDUSTRIAL ESTATE IN KULIM	TITLE
	JAPAN INTERNATIONAL COOPERATION AGENCY	TYPICAL BLOCK DRAIN DETAILS

Fig. 5.6.10



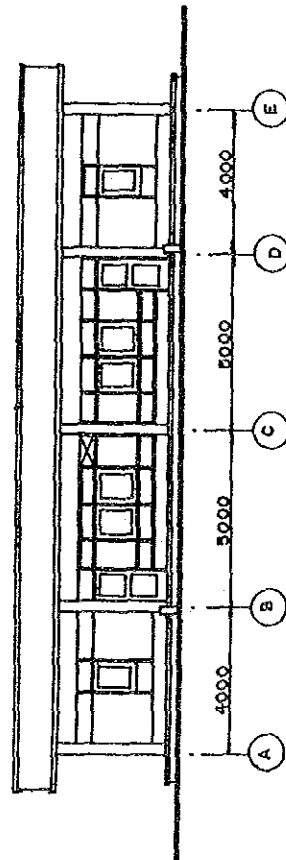
GROUND FLOOR PLAN

SCALE = 1 : 200



LEFT ELEVATION

SCALE = 1 : 200



FRONT ELEVATION

SCALE = 1 : 200

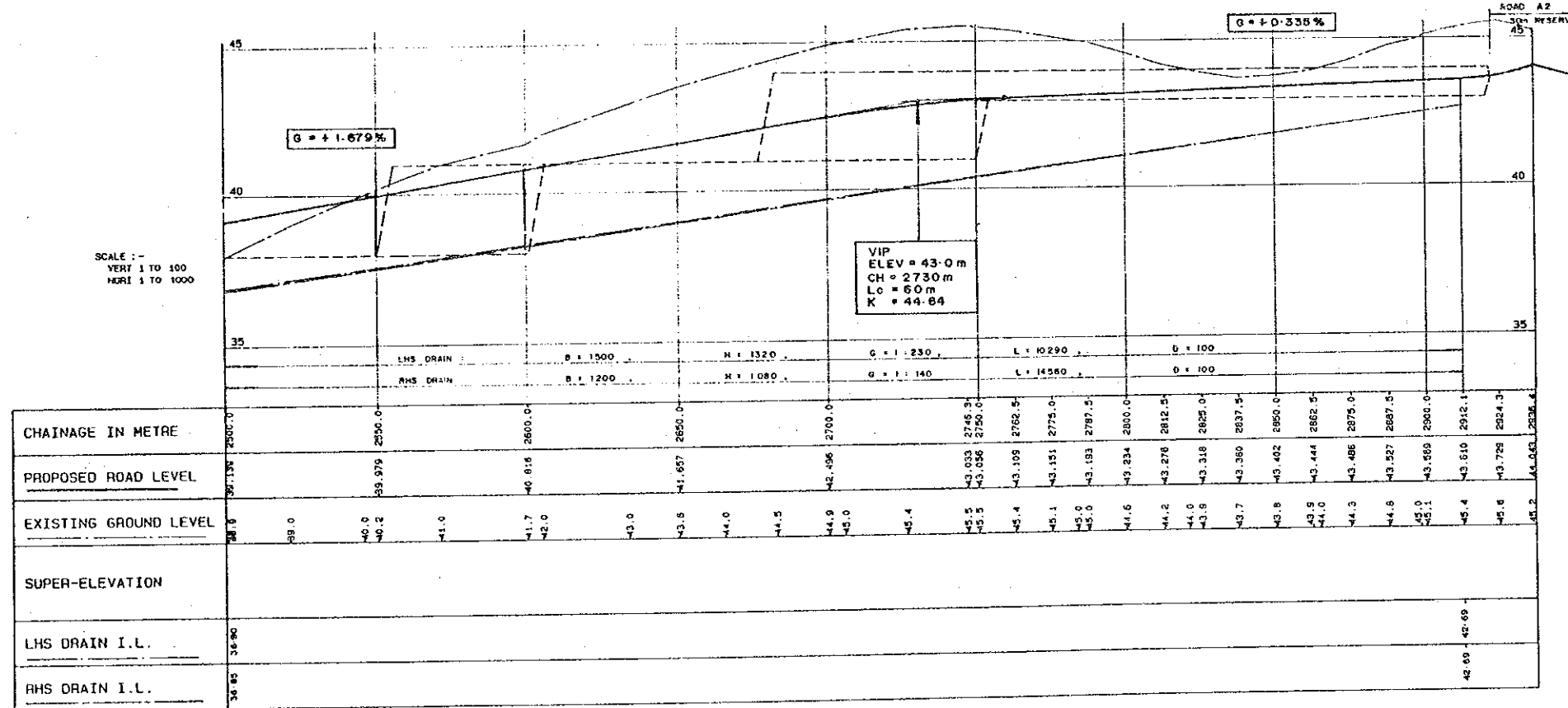
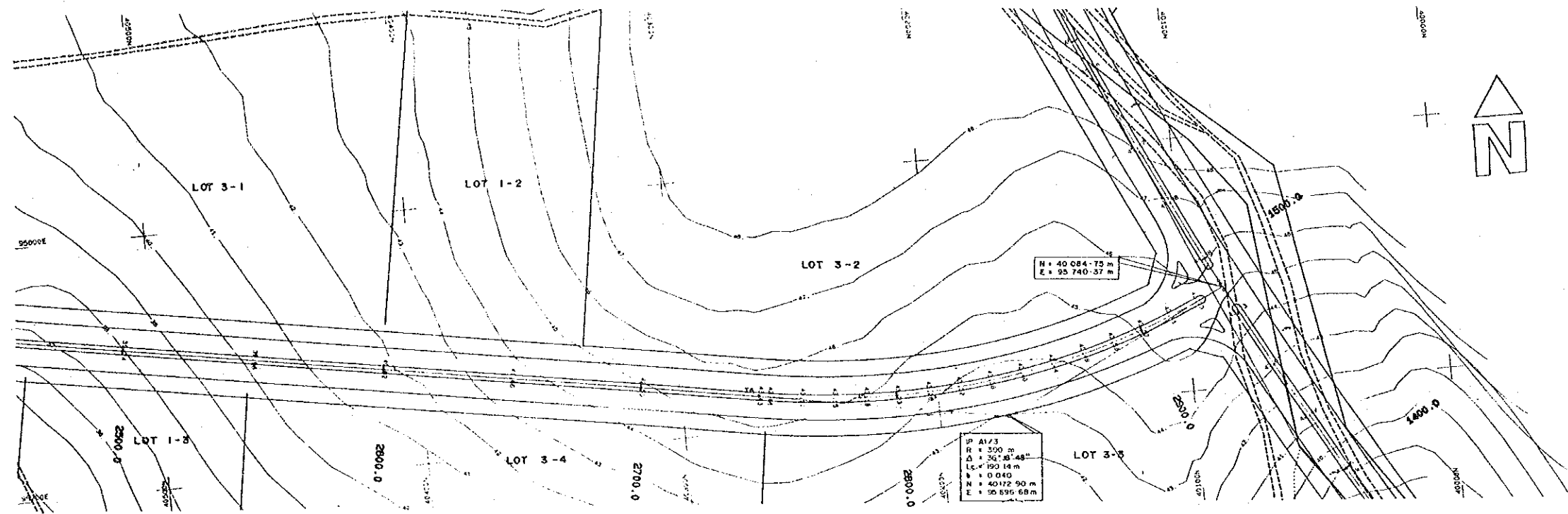
THE GOVERNMENT OF MALAYSIA
ECONOMIC PLANNING UNIT

THE STUDY ON ESTABLISHMENT
OF
KULIM HI-TECH INDUSTRIAL PARK
JAPAN INTERNATIONAL COOPERATION AGENCY

TITLE

Maintenance Building Plan

Fig. 5.6.11

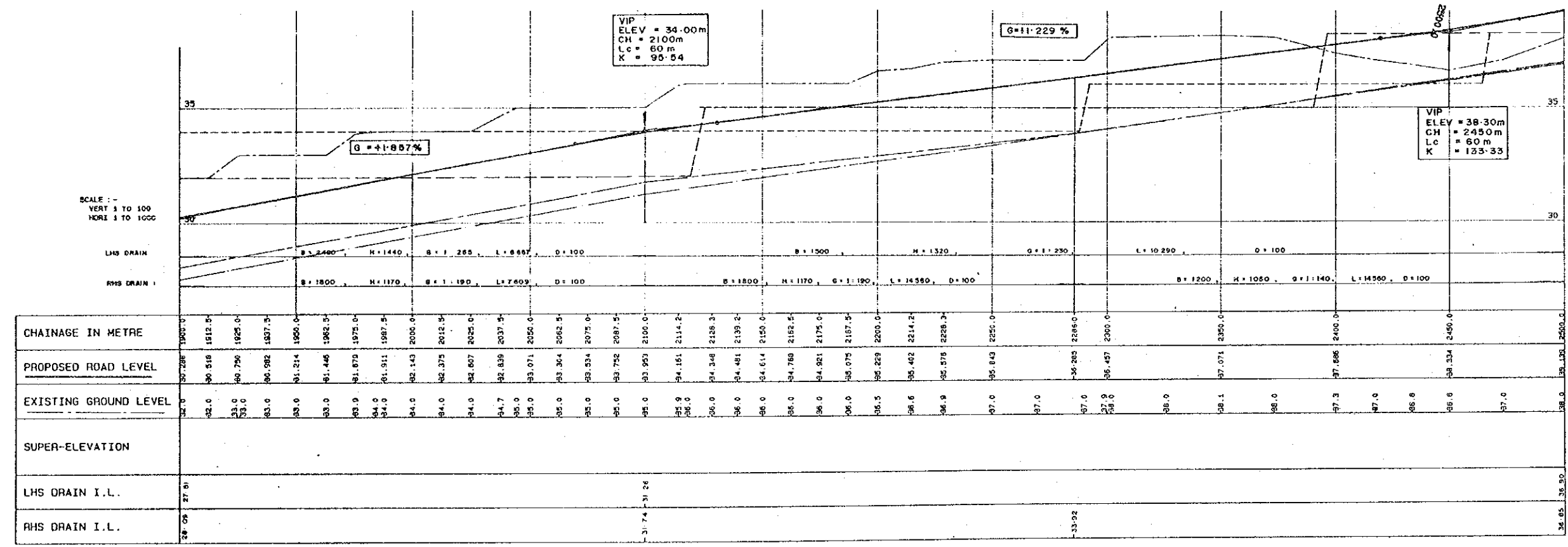
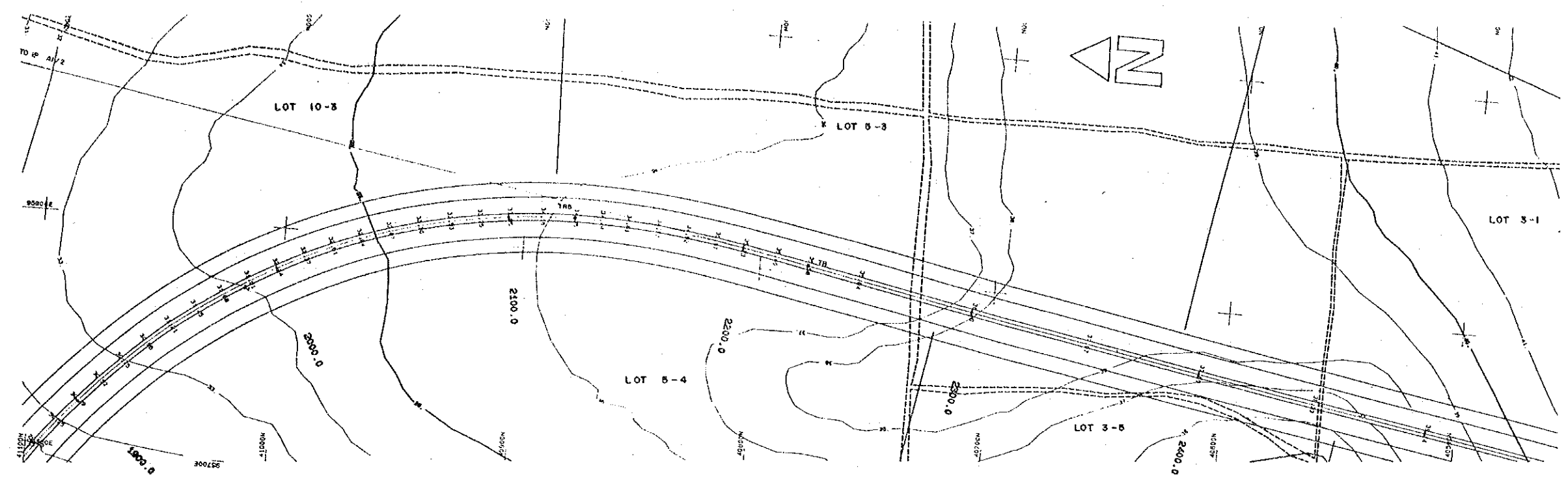


LEGEND
 B = BOTTOM WIDTH OF DRAIN IN MILLIMETRES
 G = GRADIENT OF DRAIN
 H = HYDRAULIC DEPTH IN MILLIMETRES
 L = LENGTH OF CASCADE DROP IN MILLIMETRES
 D = CASCADE DROP IN MILLIMETRES

ROAD A1

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF HIGH TECHNOLOGY AND ELECTRONIC INDUSTRIAL ESTATE IN KULIM	TITLE
	JAPAN INTERNATIONAL COOPERATION AGENCY	Profile of Drainage (1)

Fig. 5.6.12

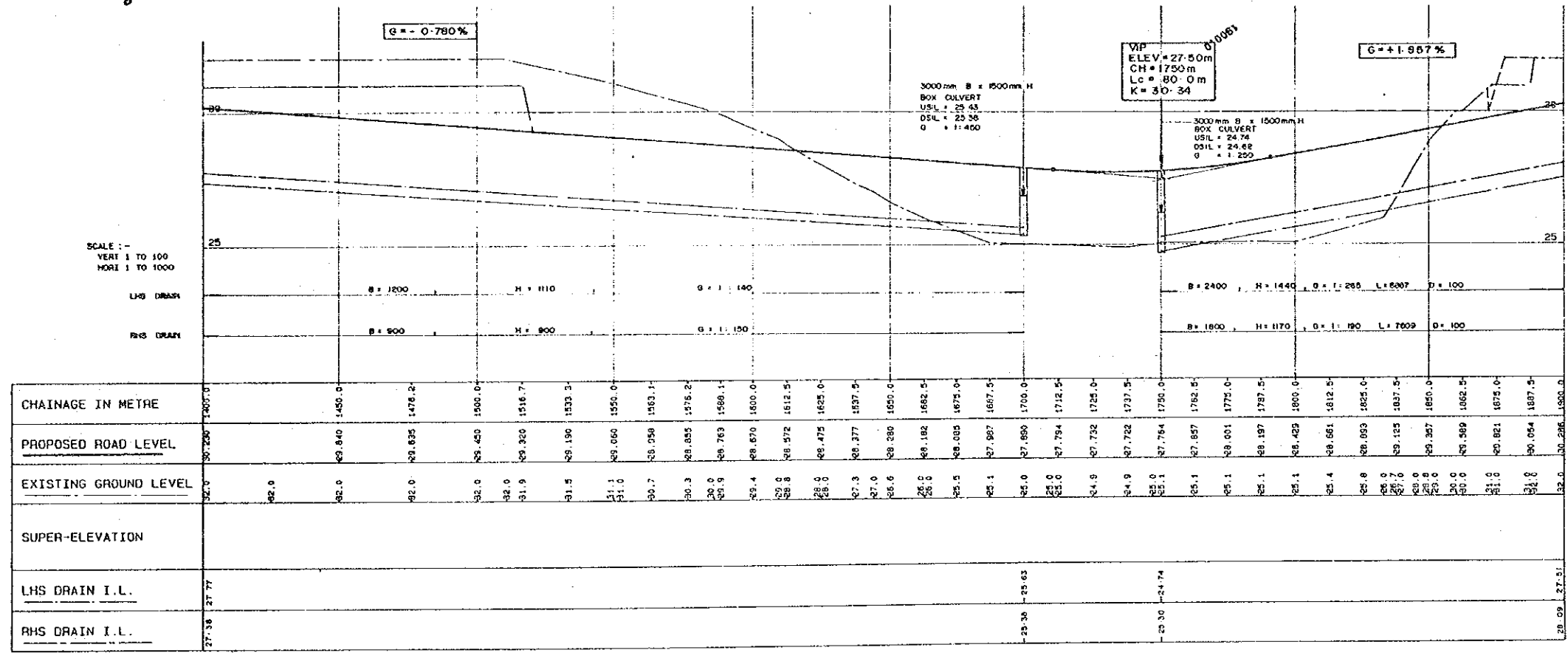
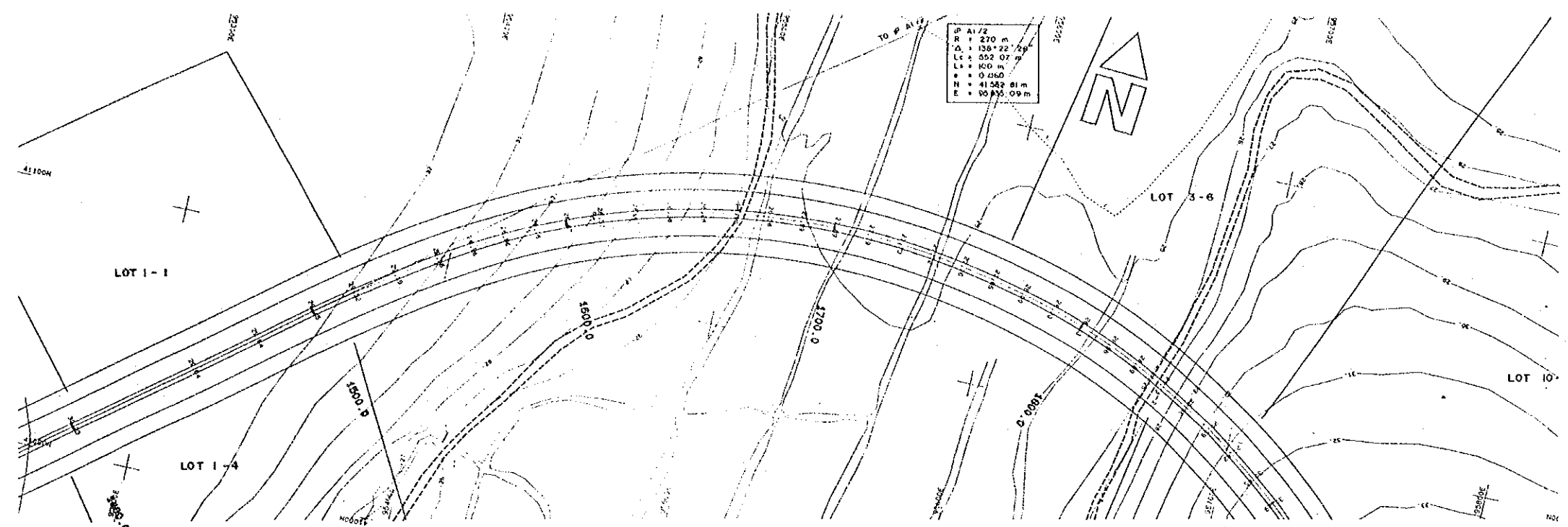


LEGEND
 B = BOTTOM WIDTH OF DRAIN IN MILLIMETRES
 G = GRADIENT OF DRAIN
 H = HYDRAULIC DEPTH IN MILLIMETRES
 L = LENGTH OF CASCADE DROP IN MILLIMETRES
 D = CASCADE DROP IN MILLIMETRES

ROAD A1

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF HIGH TECHNOLOGY AND ELECTRONIC INDUSTRIAL ESTATE IN KULIM	TITLE
	JAPAN INTERNATIONAL COOPERATION AGENCY	Profile of Drainage (2)

Fig. 5.6.13



CHAINAGE IN METRE	PROPOSED ROAD LEVEL	EXISTING GROUND LEVEL	SUPER-ELEVATION	LHS DRAIN I.L.	RHS DRAIN I.L.
1407.0	30.250	32.0		27.77	27.38
1450.0	29.840	32.0			
1475.2	29.635	32.0			
1500.0	29.450	32.0			
1516.7	29.320	31.9			
1533.3	29.190	31.5			
1550.0	29.060	31.1			
1563.1	28.950	30.7			
1575.2	28.855	30.3			
1589.1	28.763	30.0			
1600.0	28.670	29.4			
1612.5	28.572	28.8			
1625.0	28.475	28.0			
1637.5	28.377	27.3			
1650.0	28.280	26.6			
1662.5	28.182	25.0			
1675.0	28.085	24.5			
1687.5	27.987	24.1			
1700.0	27.890	24.0		23.63	23.38
1712.5	27.794	23.0			
1725.0	27.732	23.9			
1737.5	27.722	24.9			
1750.0	27.764	25.1		23.74	23.30
1762.5	27.837	25.1			
1775.0	28.001	25.1			
1787.5	28.197	25.1			
1800.0	28.429	25.1			
1812.5	28.661	25.4			
1825.0	28.893	25.6			
1837.5	29.125	26.9			
1850.0	29.367	28.0			
1862.5	29.599	29.0			
1875.0	29.821	31.0			
1887.5	30.054	32.0			
1900.0	30.286	32.0		23.51	23.09

SCALE :-
VERT 1 TO 100
HORI 1 TO 1000

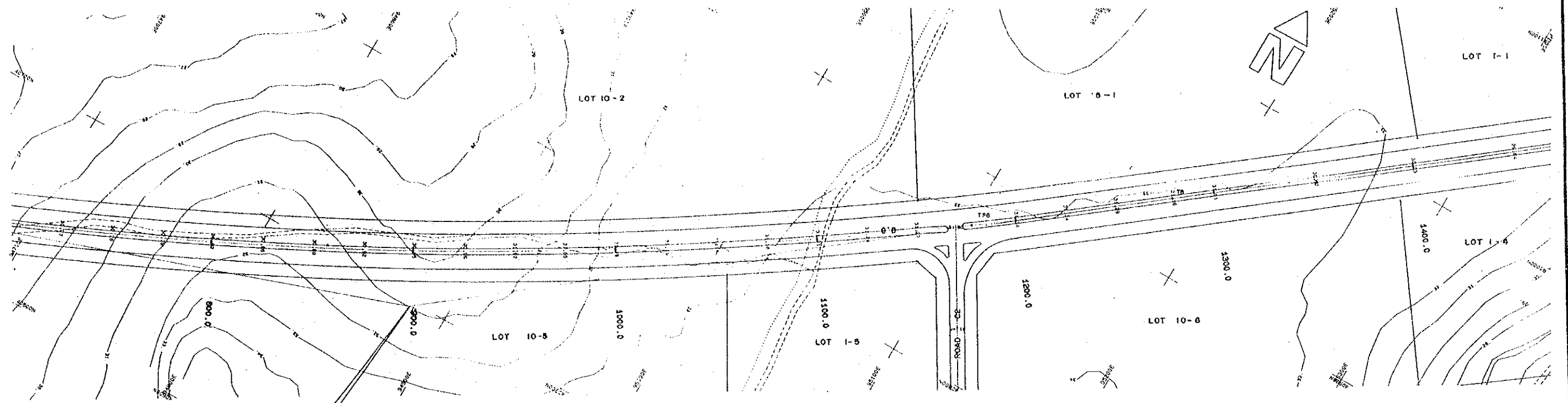
LHS DRAIN
RHS DRAIN

LEGEND :-
B = BOTTOM WIDTH OF DRAIN IN MILLIMETRES
G = GRADIENT OF DRAIN
H = HYDRAULIC DEPTH IN MILLIMETRES
L = LENGTH OF CASCADE DROP IN MILLIMETRES
D = CASCADE DROP IN MILLIMETRES

ROAD A1

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF HIGH TECHNOLOGY AND ELECTRONIC INDUSTRIAL ESTATE IN KULIM	TITLE
	JAPAN INTERNATIONAL COOPERATION AGENCY	Profile of Drainage (3)

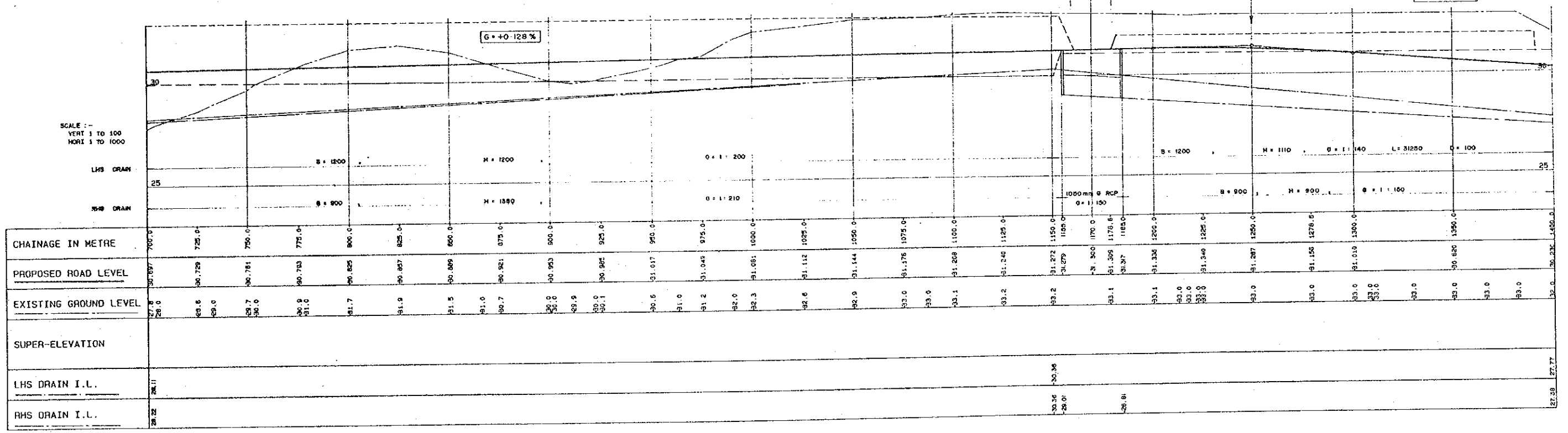
Fig. 5.6.14



P = 41.71
 R = 2000 m
 Δ = 18° 53' 35"
 LC = 559.49 m
 L = 410 m
 e = 0.080
 H = 40.934 - 97 m
 E = 9.4881 - 65 m

VIP
 ELEV = 31.40 m
 CH. = 1250.0 m
 Lc = 100 m
 K = 110.13

SCALE :-
 VERT 1 TO 100
 HORI 1 TO 1000



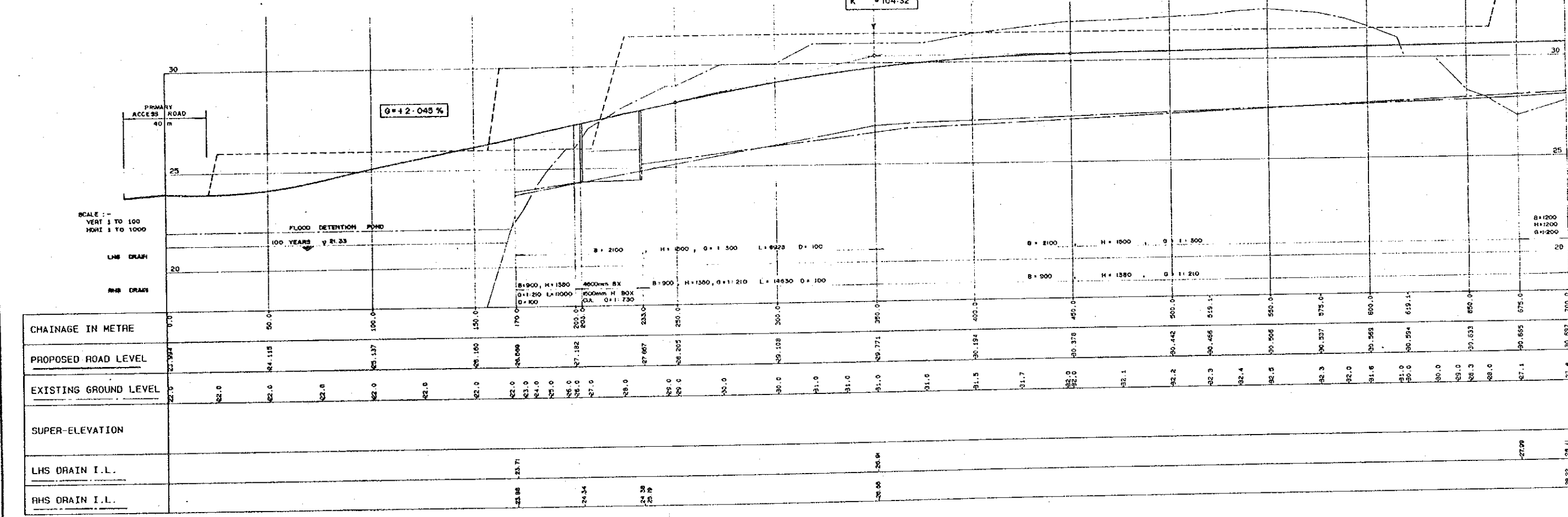
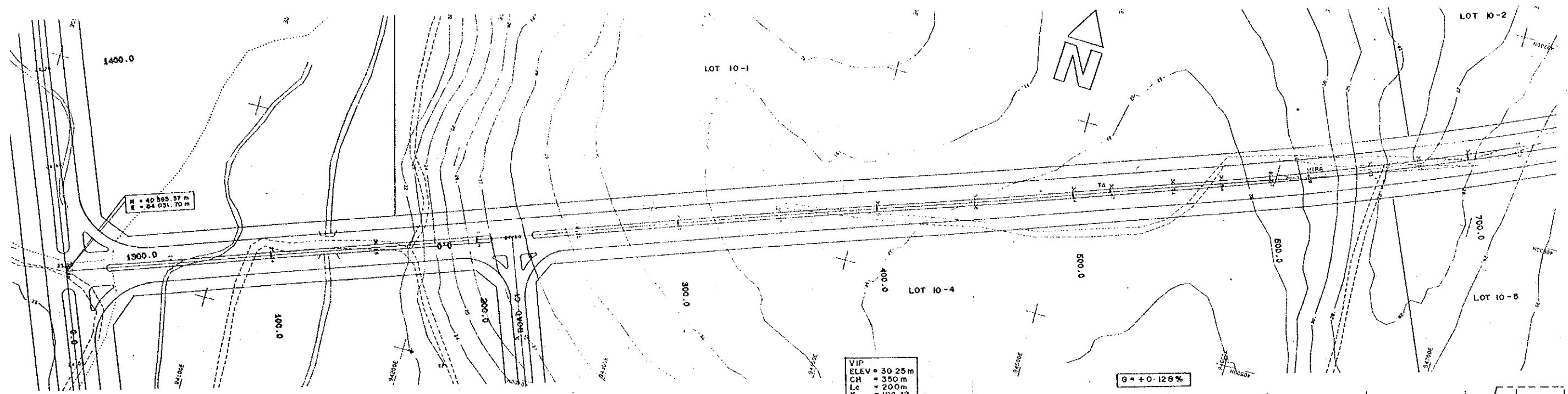
CHAINAGE IN METRE	700.0	725.0	750.0	775.0	800.0	825.0	850.0	875.0	900.0	925.0	950.0	975.0	1000.0	1025.0	1050.0	1075.0	1100.0	1125.0	1150.0	1175.0	1200.0	1225.0	1250.0	1275.0	1300.0	1325.0	1350.0	1375.0	1400.0	
PROPOSED ROAD LEVEL	30.637	30.729	30.781	30.783	30.825	30.837	30.889	30.921	30.953	30.985	31.017	31.049	31.081	31.112	31.144	31.176	31.208	31.240	31.272	31.279	31.305	31.307	31.333	31.287	31.155	31.010	30.820	30.620	30.420	
EXISTING GROUND LEVEL	27.9	28.6	28.7	28.9	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	31.0	31.1	31.2	31.3	31.4	
SUPER-ELEVATION																														
LHS DRAIN I.L.	28.11																			30.36	30.36									
RHS DRAIN I.L.	28.83																			28.01	28.01	28.81								27.77

LEGEND:
 B = BOTTOM WIDTH OF DRAIN IN MILLIMETRES
 G = GRADIENT OF DRAIN
 H = HYDRAULIC DEPTH IN MILLIMETRES
 L = LENGTH OF CASCADE DROP IN MILLIMETRES
 D = CASCADE DROP IN MILLIMETRES

ROAD A1

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF HIGH TECHNOLOGY AND ELECTRONIC INDUSTRIAL ESTATE IN KULIM	TITLE
	JAPAN INTERNATIONAL COOPERATION AGENCY	Profile of Drainage (4)

Fig. 5.6.15

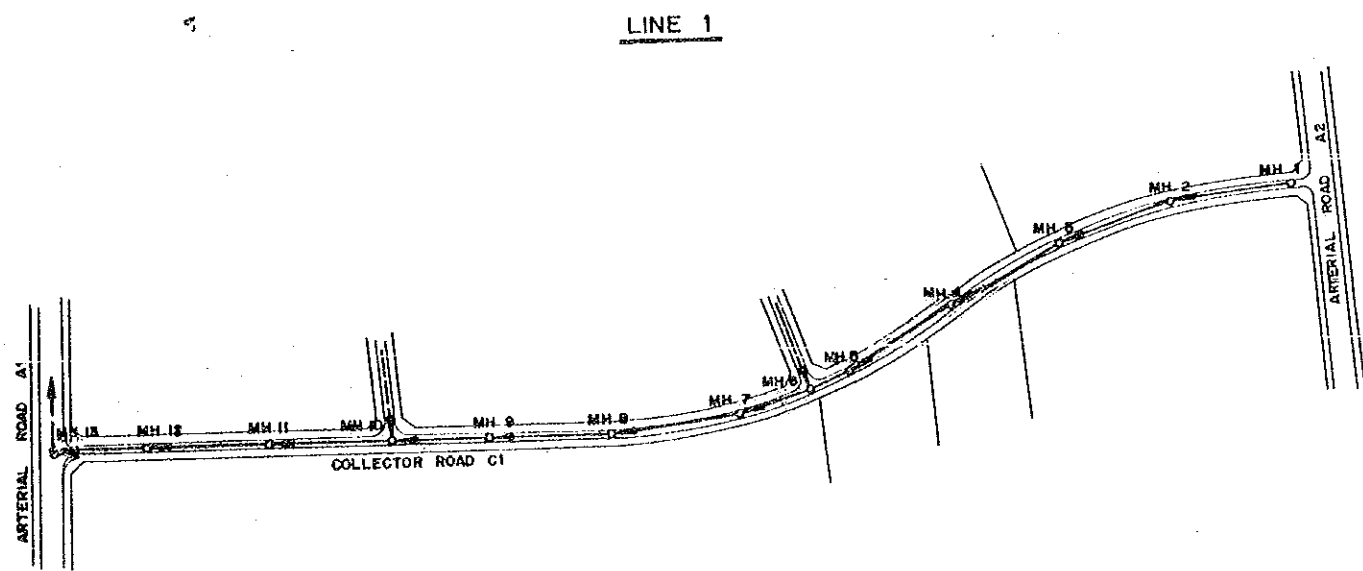
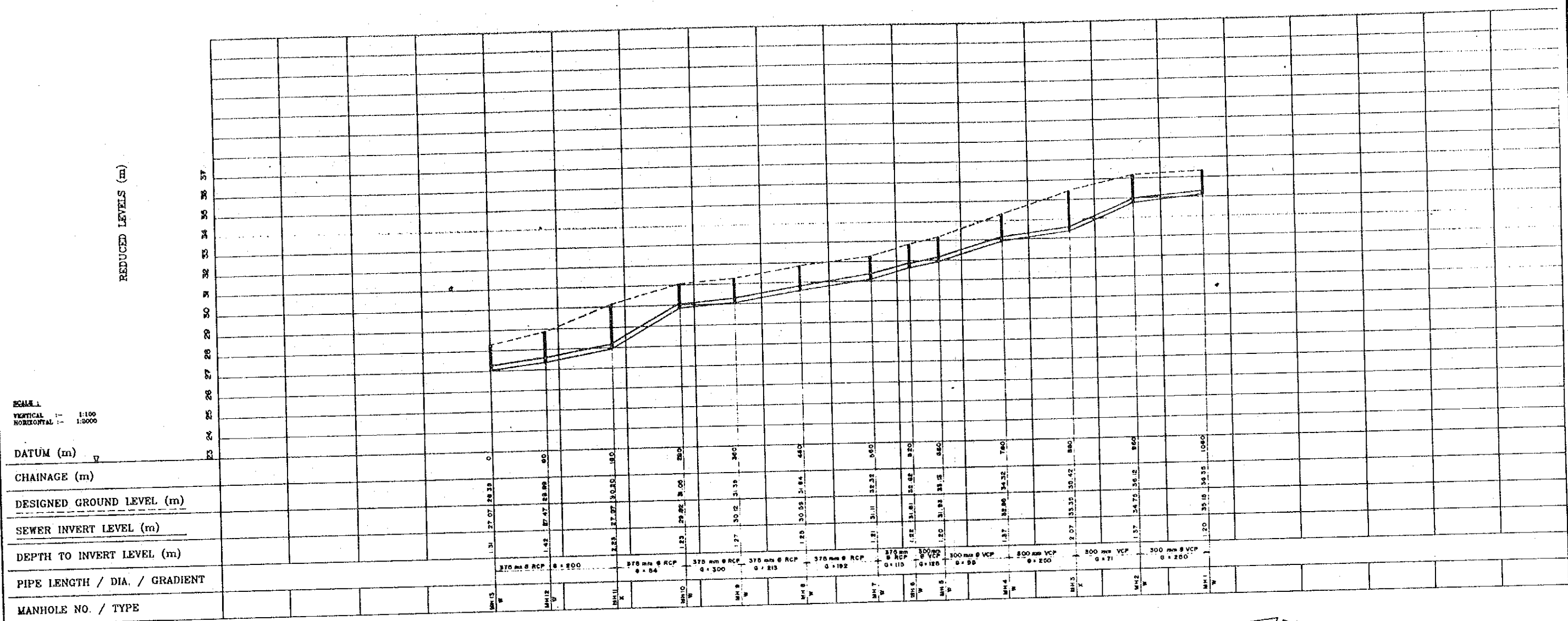


ROAD A1

LEGEND:
 B = BOTTOM WIDTH OF DRAIN IN MILLIMETRES
 C = GRADIENT OF DRAIN
 H = HYDRAULIC DEPTH IN MILLIMETRES
 L = LENGTH OF CASCADE DROP IN MILLIMETRES
 D = CASCADE DROP IN MILLIMETRES

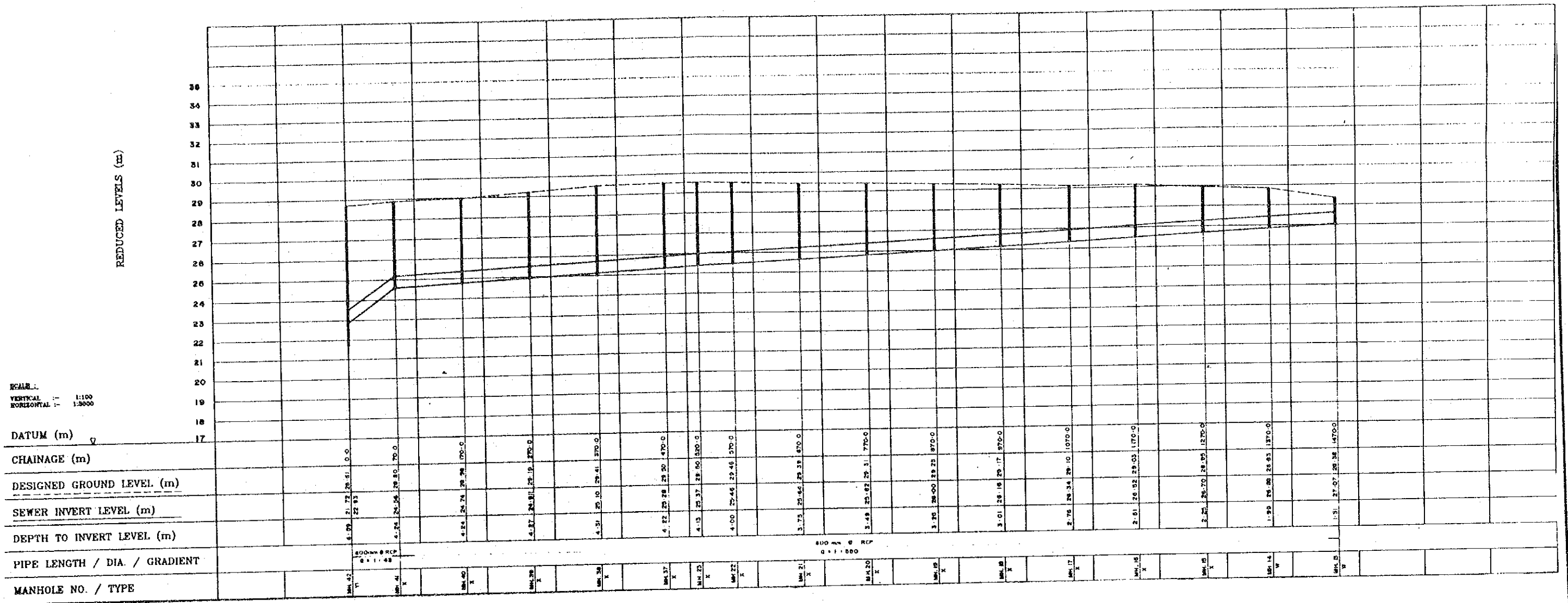
THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF HIGH TECHNOLOGY AND ELECTRONIC INDUSTRIAL ESTATE IN KULIM	TITLE
	JAPAN INTERNATIONAL COOPERATION AGENCY	Profile of Drainage (5)

Fig. 5.6.16

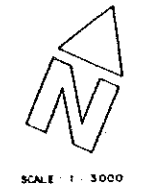
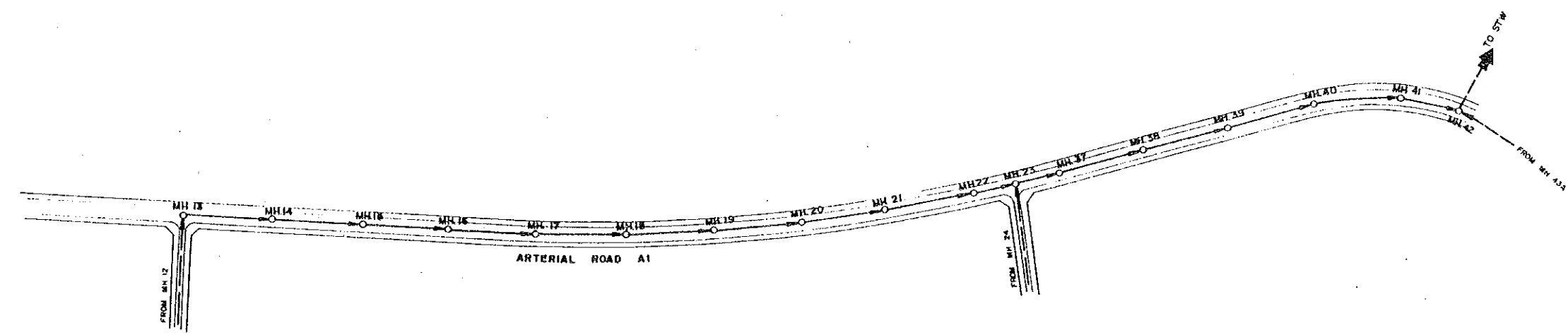


THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF HIGH TECHNOLOGY AND ELECTRONIC INDUSTRIAL ESTATE IN KULIM	TITLE
	JAPAN INTERNATIONAL COOPERATION AGENCY	SEWER PROFILE (LINE 1)

Fig. 5.6.17

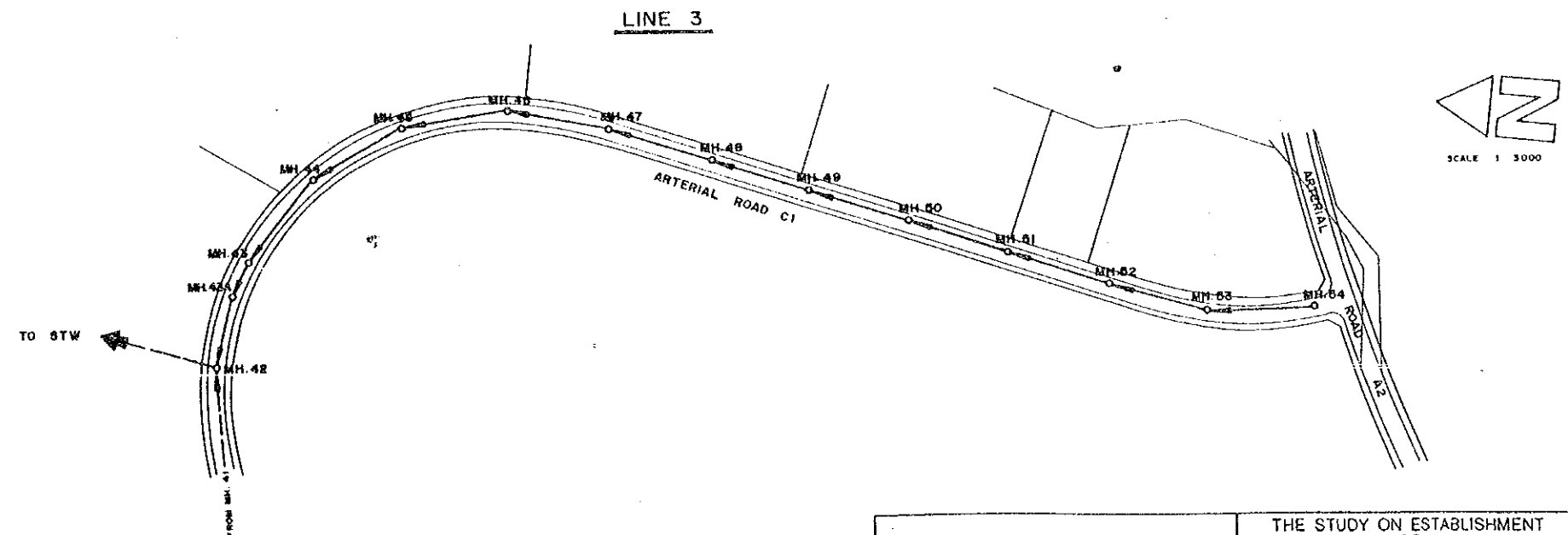
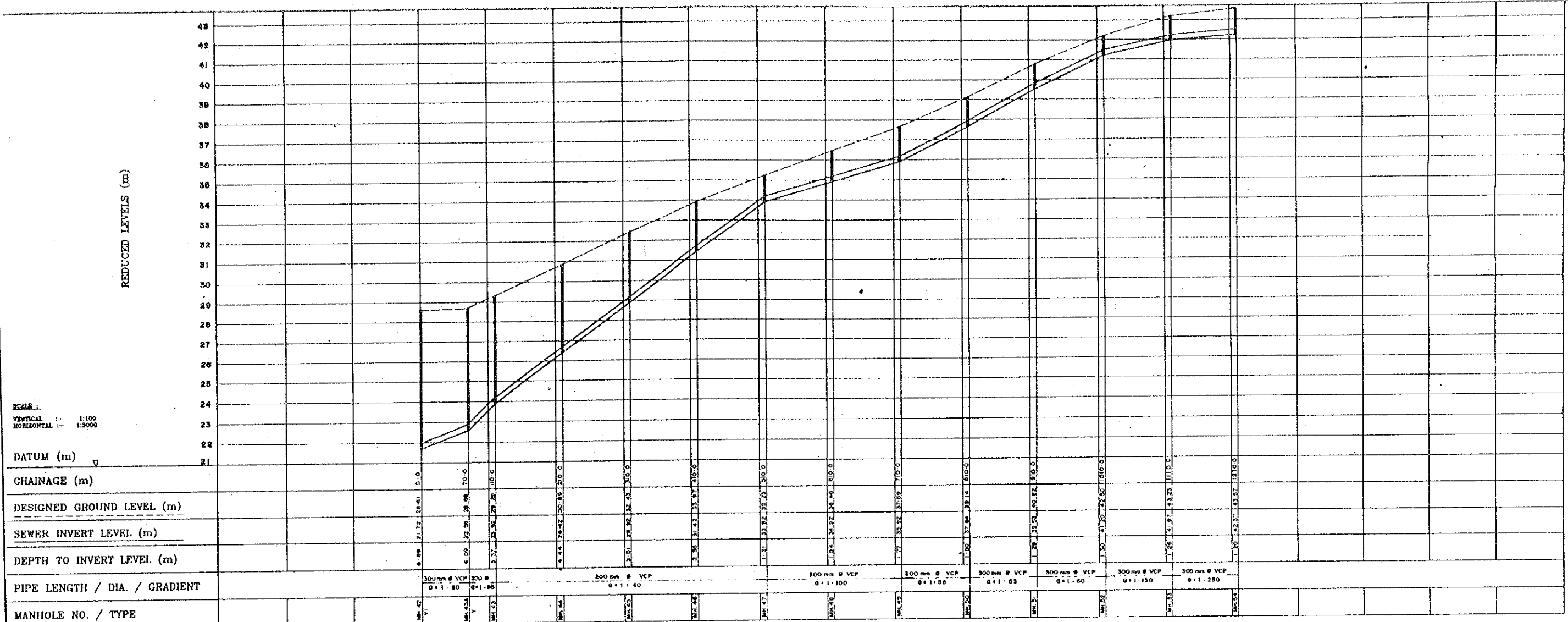


LINE 2



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF HIGH TECHNOLOGY AND ELECTRONIC INDUSTRIAL ESTATE IN KULIM	TITLE
	JAPAN INTERNATIONAL COOPERATION AGENCY	SEWER PROFILE (LINE 2)

Fig. 5.6.18



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF HIGH TECHNOLOGY AND ELECTRONIC INDUSTRIAL ESTATE IN KULIM	TITLE
	JAPAN INTERNATIONAL COOPERATION AGENCY	SEWER PROFILE (LINE 3)



5.7 Industrial Waste Management

5.7.1 Basic Management Policy

(1) General

Under the current methods of collection and disposal of wastes practiced, the following authorities are responsible for the respective wastes:

- (a) Domestic, Commercial and non-toxic and non-hazardous industrial waste.

Local Authorities and Ministry of Housing and Local Government.

- (b) Toxic and Hazardous Waste:

DOE of Ministry of Science, Technology and Environment.

It is quite clear that Local Authorities and the Department of Environment have different responsibilities for the management of industrial wastes. It is also clearly understood that under the Environmental Quality (Scheduled Waste) Regulations 1989, the generator is required to provide proper temporary storage facilities in their own premises until suitable disposal sites are made available by DOE.

In this project, it is proposed that all the industrial wastes generated from every industries will be taken to a central secured storage facility within the industrial zone. The wastes will consists of sludges and wastes from manufacturing processes and also solid waste that is generated from the occupants of the industries.

Because of the requirements stipulated in the Environment Quality (Scheduled Waste) Regulation 1989, all the wastes that are generated from each industries need to be characterized and thus a proper manifest systems has to be developed for each type of waste. To ensure its effectiveness the 'polluters pay principle' should be strongly adopted where each owner of the industries are responsible to characterize and manage the waste accordingly. They will be required to provide proper separate storage facilities at their own premises and transporting them to the secured storage facility in accordance with the procedures laid down

by DOE. The waste that arrived at the storage site must first of all be checked, recorded, and weighed at the monitoring station before approval is granted to dispose non-toxic waste at the municipal landfill situated outside the industrial zone. For the waste that fall within the lists of scheduled or hazardous wastes as defined by DOE, they will be stored at the storage facilities until suitable treatment facilities that will be provided by DOE is ready for operation.

The proposal to store all the industrial solid wastes from manufacturing process at a secure storage facility in the project comes primarily from the following reasons:

- (a) It is difficult to separate non-toxic from the toxic components in the industrial wastes generated. Unless separated, municipal domestic solid wastes disposal sites would not be willing to accept those wastes which are suspected to contain toxic wastes.
- (b) Although there are plans in the future to construct toxic waste treatment and disposal facilities, there are no such facilities operating currently in Malaysia.

The central secure storage facility will allow monitoring and separation of industrial wastes generated. All wastes will be sent to this facility and solid waste found to be non-toxic or hazardous will be transported for disposal at the municipal domestic landfill site. Process wastes that are found to be toxic and hazardous will be stored at the secure storage facility.

(2) Management policy to be adopted

The management of industrial wastes within the project must fall within existing legislations. The disposal of the non-toxic wastes needs only approval from local authorities and there should not be to much difficulty in obtaining such approval.

Environmental Quality (Scheduled Waste) Regulation 1989, 1974 and some of the provisions of this Regulation that are applicable to this project are:

- (a) All waste generators within the site must meet the requirements on the waste tracking and monitoring of the travel of the waste on leaving the factory to arrival at the disposal site.
- (b) The waste generators must transport their waste to the disposal facility by

their own means. However, all transport vehicles must follow acceptable procedures and waste must be kept in recommended containers.

- (c) The waste generators, office controller, and KSDC are required to keep records of the types, characterization and quantities of industrial solid wastes handled, (Manifest System) and at the same time, recording and checking by DOE.

Although it is the responsibility of KSDC to provide management services, it is strongly felt that a management corporation be set up to manage the waste. Because of legal implications, this proposed management company should be appointed by KSDC and will be responsible for providing disposal services and operating the storage facility. The various industries operating in this area should be responsible for storing and transporting the waste in a manner as prescribed by DOE either to the storage facility or to the municipal landfill. Accordingly, however, all the waste needs to be checked and recorded at the monitoring station before disposal permission is given according to the nature of waste. The waste generators are required to pay for the storage or disposal cost and the rate will be determined by KSDC for using storage facility or by Local Authorities for using the dumping ground, if and when required. (Refer to Fig. 5.7.1)

5.7.2 Design of Monitoring/Separation Station and Secure Storage Facility

(1) General

As discussed in Section 5.7.1, temporary storage facilities would be provided on site. The important consideration in the design of the storage facilities is to prevent spillage or leakage of the stored wastes into the environment. This is especially important to prevent contamination of groundwater. This is because the wastes generated from hi-tech industries needs special consideration and also past experiences in the U.S.A indicated serious contamination of groundwater with resulting difficulties in clean up operation if not handled properly. The facilities shall be designed to cater for wastes stored mainly in secure drums and bags.

(2) Storage Area

The storage of waste shall be in secured storage facilities located in an area

specially designated for this. A Layout Plan of this storage area is shown Fig. 5.7.2.

The storage area consists essentially of 31 nos. 100mx25m, 1 nos. 90mx25m, 1 nos. 60mx25m and 1 nos. 70mx25m, 1 nos. 35mx25m secure storage facilities.

In addition, there will also be an office and workshop and weighbridge on the site. There will be a network of access roads linking the various secure storage facilities. A buffer zone consisting of planted trees and shrubs will shield the storage area from view.

(3) Weighbridge (Ref. Fig. 5.7.3)

A weighbridge will be provided at the office and workshop area. This weighbridge is important for obtaining accurate weight information on the waste.

This weighbridge will have load cells connected to a P.C. computer located in the office to give instantaneous and cumulative electronic recordings.

(4) Office (Ref. Fig. 5.7.3)

The office will house the scale-house, within which the P.C. computer will be located. The office will also have rooms for staff, a meeting room, and lockers for the workmen. Sheltered parking bays will also be provided as an extension of the office. The office shall be a r.c. frame brick-walled structure with corrugated roofing materials. The size of the office shall be 15mx20m with parking bays of 2.5m x 6m each.

(5) Workshop (Ref. Fig. 5.7.3)

The workshop will be used mainly for equipment storage such as storage drums, bags, spareparts for vehicles.

The workshop shall also have an adjoining small open concrete area for minor repair and washing of vehicles and equipment.

The workshop shall be a R.C. frame brick-walled structure with corrugated roofing materials. The size of the workshop shall be 15m x20m and have a repair/wash area of 10mx15m.

(6) Secured Storage Facilities

Typical secured storage facilities details are presented in Fig. 5.7.4 – 5.7.6.

Each storage facility is a sheltered storage area consisting of:

(a) Roof

A steel truss roof with corrugated roofing sheets.

(b) Walls

Full height brickwalls surrounding the sides of each storage facility.

(c) Frame

Reinforced concrete columns, footings and ground beams.

(d) Floor

The flooring consist essentially of three (3) layers with varying function as follows:

Concrete Layer

The concrete layer provides a stable base for the placing of the storage containers and allows transmission of loading to the footings.

Sand Layer

The sand layer provides a medium for the absorption of any spilled or leaked wastes. This sand layer can be taken out and replaced with clean sand to dispose of the contamination.

Sheet Liner

Below the sand layer will be a layer of sheet liner material. Details for this are shown in Fig. 5.7.6.

This sheet liner layer is to prevent leakage of any spilled wastes from entering the ground and causing contamination of surface and ground-waters. This PVC layer is made from sheets fused together by welding to ensure complete water tightness.

(e) Gas Venting

Below the sheet liner, gas vent pipes are placed at fixed intervals. Details of this are shown also in Fig. 5.7.6.

These gas vent pipes allow escape of gases and air trapped underneath the sheet liner, thus ensuring that these are seated flat with no trapped gas/air pockets.

(f) Sub-Soil Drain

The sub-soil drains are located below the flooring to channel groundwater out and bring about a lowering of the water table. This will prevent uplift and buoyancy of the flooring.

(g) Unloading Area

This unloading area will have a temporary roof installed when there are loading operations. When the secure storage facility is full, the temporary roof will be removed.

Between the unloading area and the secure storage facility area, an emergency pit will catch any spillage or leakage of waste material. These areas shall have a crusher run layer sealed with a premix surfacing.

(h) Access Road

These provide access to all the secure storage facilities. A catch drain on one side of the road will provide proper drainage. These roads shall have a crusher run layer sealed with a premix surfacing.

(i) The whole area will be fenced in by a 3.0 metre high chain-link fence.

5.7.3 Proposed Manifest Tracking System

(1) General

A serious problem in industrial waste management is the proper disposal of the scheduled wastes. Improper control can result in illegal dumping, lack of knowledge of the material handled and difficulty of prescribing control measures during accidental spillage or environmental pollution.

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. The objectives of such a manifest track system are as follows:

- (a) To prevent illegal dumping
- (b) To identify liability of a generator and a contractor for the disposal of the wastes
- (c) To provide information to the disposal contractor and hence prevent accident in the process of collection, transportation, treatment and disposal.
- (d) To ensure ready available information on material handled in the event of accidents
- (e) To require a generator to consign to a contractor for disposal of scheduled wastes

(2) System Proposed

The manifest system proposed consists essentially of documentation by means of a multi carbon-copy shipping document. Each document consists of five sheets named Slip A, B, C, D, and E.

The journey of the wastes and the procedure for the handling of the Slips A, B, C, D and E are indicated in Figure 5.7.7 and are as follows:

- (a) The generator must fill out all the required information in the manifest, must sign the manifest certification by hand, and must give the transporter (can also be the generator himself) all copies of the manifest (Slip A to E) together with the industrial solid waste.
- (b) The generator/transporter must certify the information on the manifest and the content of received scheduled waste, must put the stamp or signature and data of acceptance on the manifest, and must give back slip A of the manifest to the generator.
- (c) The generator must retain slip A the manifest received from the transporter/generator.

- (d) The generator/transporter must give KSDC at the central storage facility the remaining copies of the manifest together with the scheduled waste.
- (e) KSDC must certify the information on the manifest and the content of received industrial waste, must put the stamp or signature and date of acceptance on the manifest, and must give back slip B of the manifest to the generator/transporter.
- (f) The generator/transporter must retain slip B of the manifest received from KSDC for at least 5 years from the date of slip B received.
- (g) The KSDC must put the stamp or signature and date of conclusion on the manifest, must retain slip C of the manifest for at least 5 years from the date of storage, and must return slip D of the manifest to the generator promptly.
- (h) The generator must check up the information on the returned slip D and retained slip A of the manifest, must certify the conclusion for storage of waste in accordance with the generator's instruction. Then, the generator must put the stamp or signature and date of certification on slips A and D of the manifest, and retain slips A and D of the manifest for at least 5 years.
- (i) The generator who does not receive slip D of the manifest from KSDC within 1 month from the date of the industrial solid waste was transported to the storage facility, or consider that there is a possibility of inappropriate disposal for consigned industrial solid waste, must contact the generator/ transporter or KSDC or the both to determine the status and the process of storage for the industrial solid waste, and must take a measure required to solve the problem.
- (j) Slip E will be sent to the DOE Regional office for their record by KSDC.

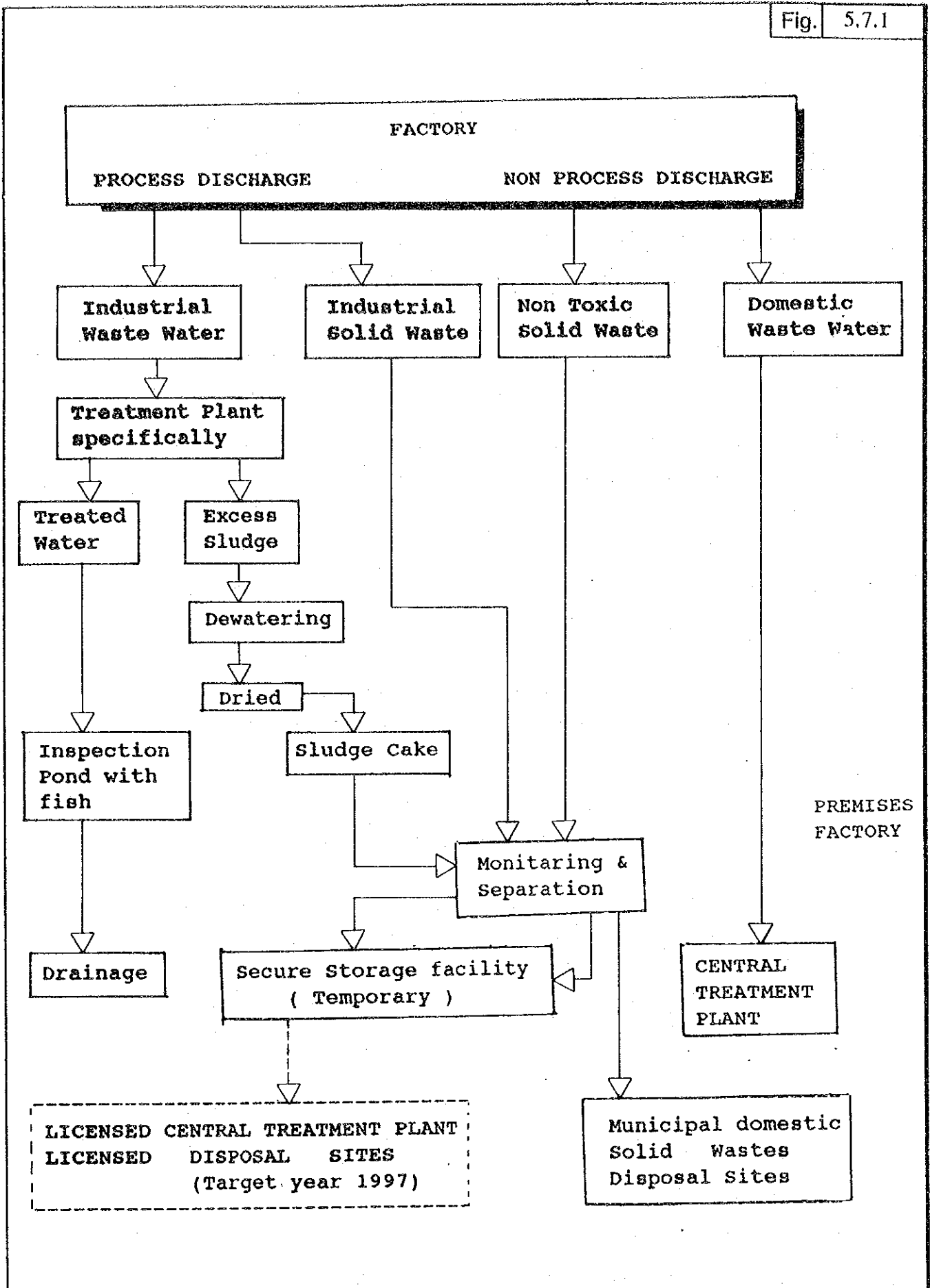
(3) Manifest

The proposed format of the manifest (consisting of Slips A, B, C, D and E) is shown in Figure 5.7.8. The information contained in the manifest are:

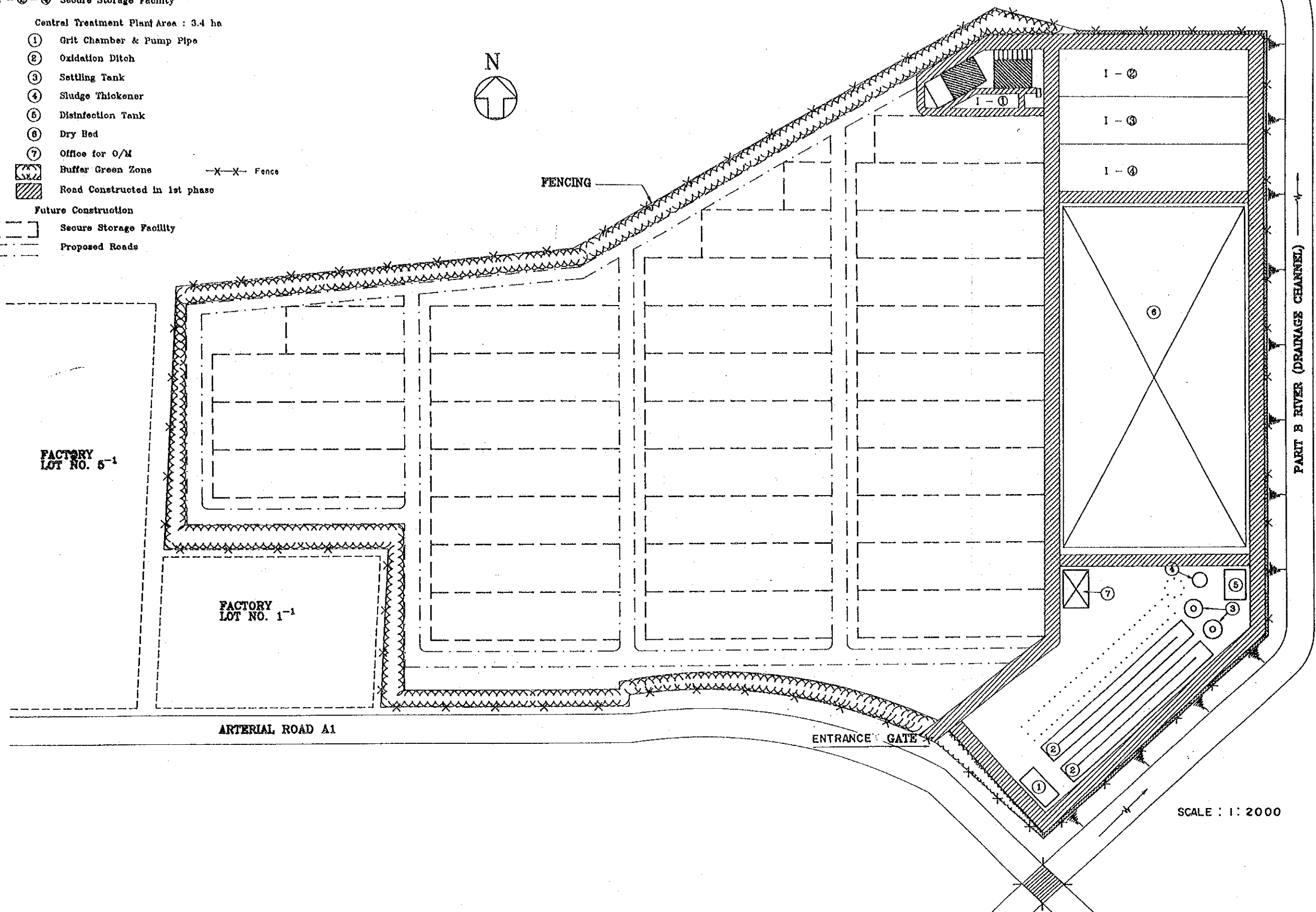
- (a) The generator's name, location, telephone number, name of plant or field office, document maker's name and position, driver's.

- (b) The name, location, transportation vehicle's license number;
- (c) A description, name, property, type of packing, quantity, weight or volume, content of hazardous materials, and notification on handling or each industrial waste.
- (d) Cost of storage, storage yard note that is Facility No., Zone No., and Lot No.

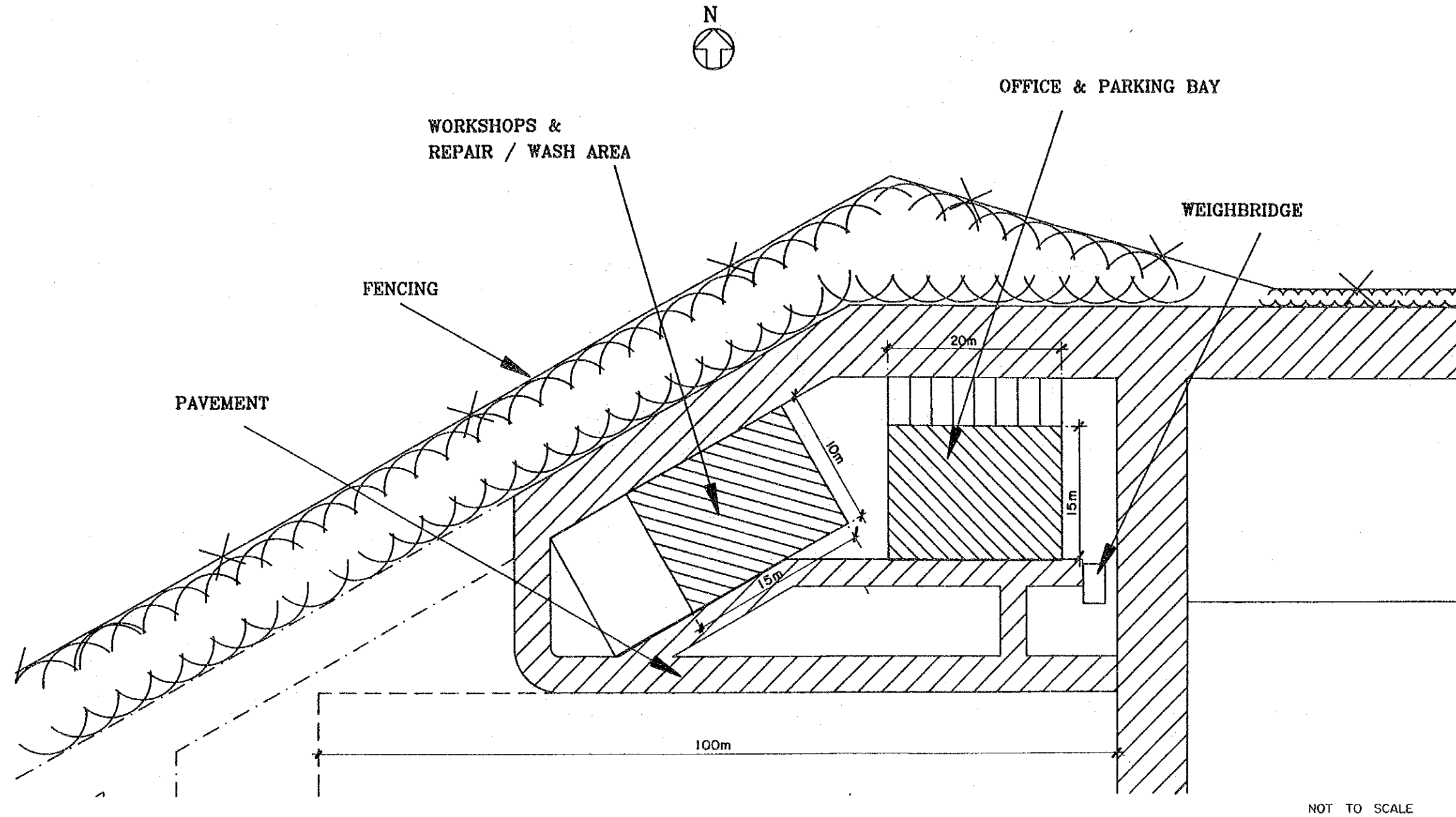
Fig. 5.7.1



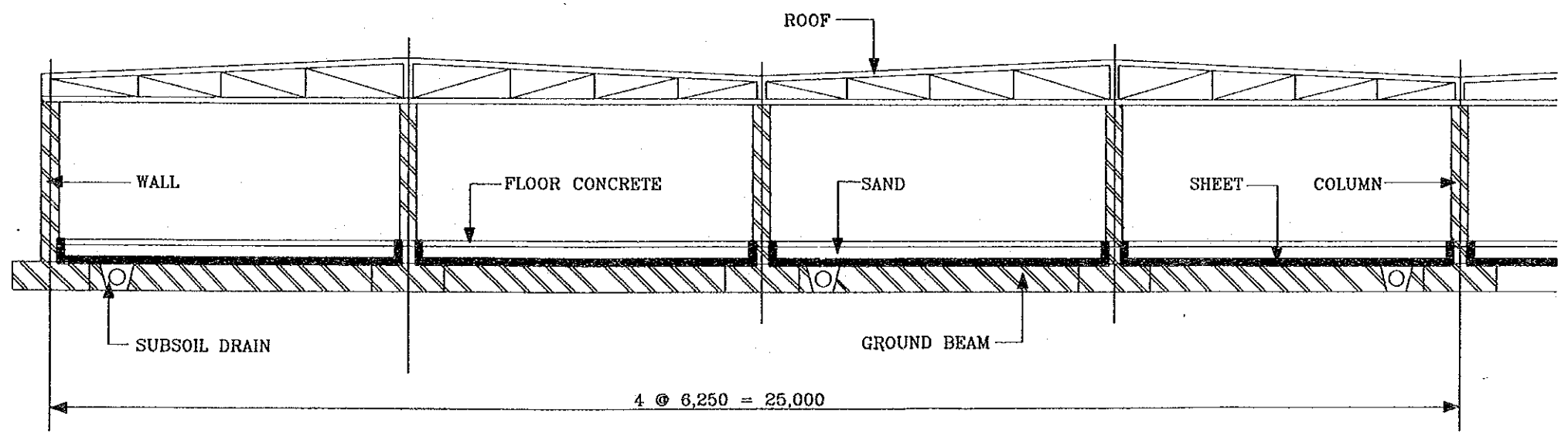
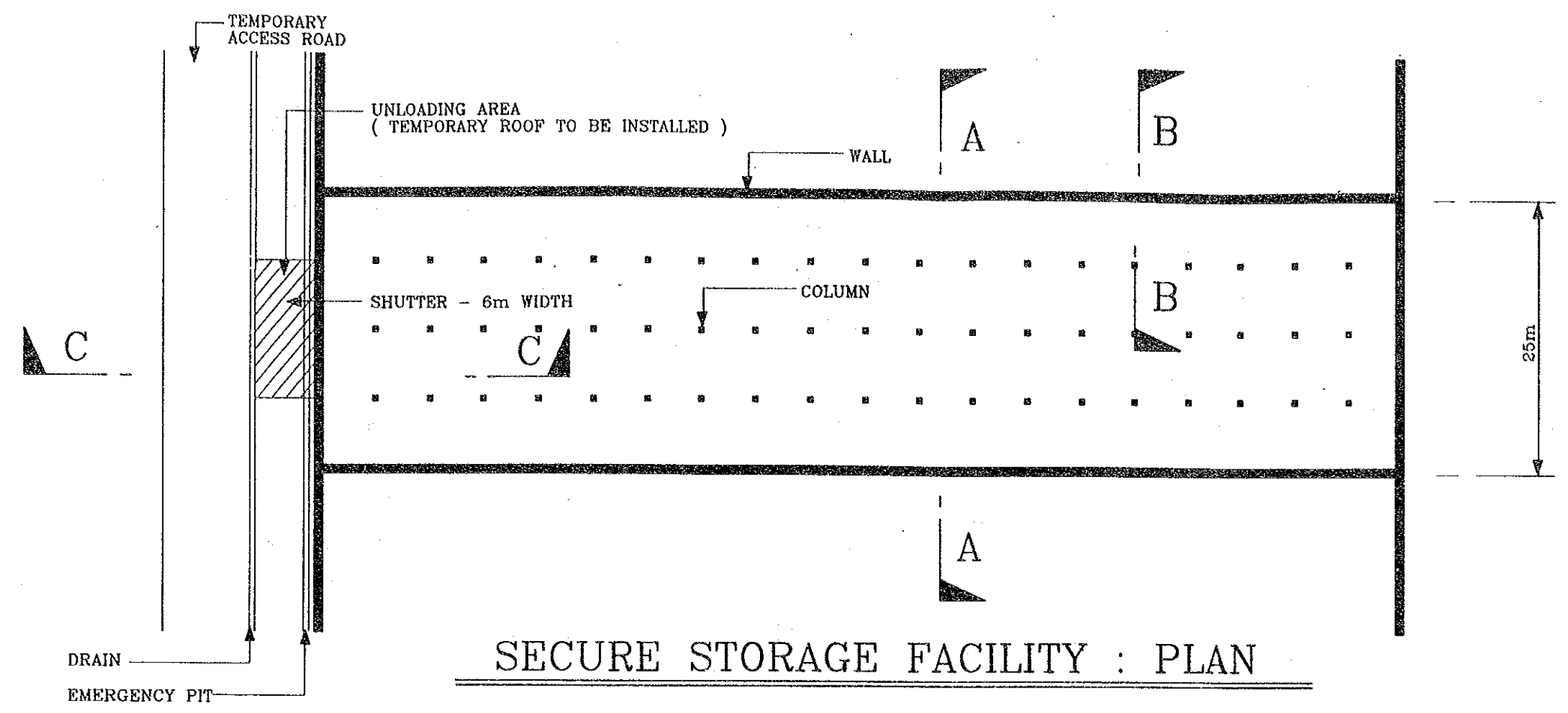
- LEGEND :**
- Facilities to be implemented in 1st phase
- I - ① Workshop & Office
 - I - ② - ④ Secure Storage Facility
- Central Treatment Plant Area : 3.4 ha
- ① Grit Chamber & Pump Pipe
 - ② Oxidation Ditch
 - ③ Settling Tank
 - ④ Sludge Thickener
 - ⑤ Disinfection Tank
 - ⑥ Dry Bed
 - ⑦ Office for O/M
- ⊞ Buffer Green Zone
 - ⊞ Road Constructed in 1st phase
- Future Construction
- ⊞ Secure Storage Facility
 - ⊞ Proposed Roads



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF	TITLE
	KULIM HI-TECH INDUSTRIAL PARK	LAYOUT PLAN INDUSTRIAL SOLID WASTE MANAGEMENT FACILITY & CENTRAL TREATMENT PLANT
	JAPAN INTERNATIONAL COOPERATION AGENCY	

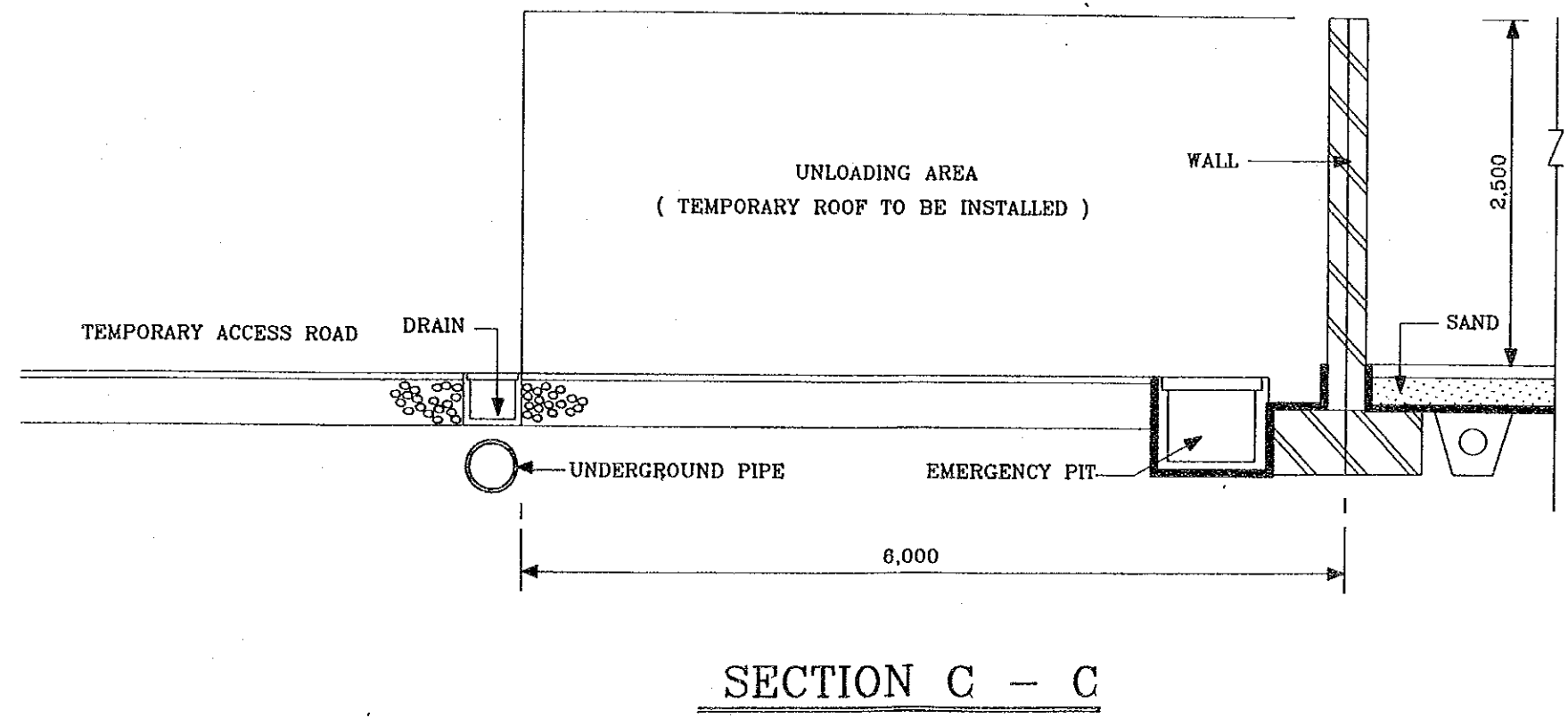
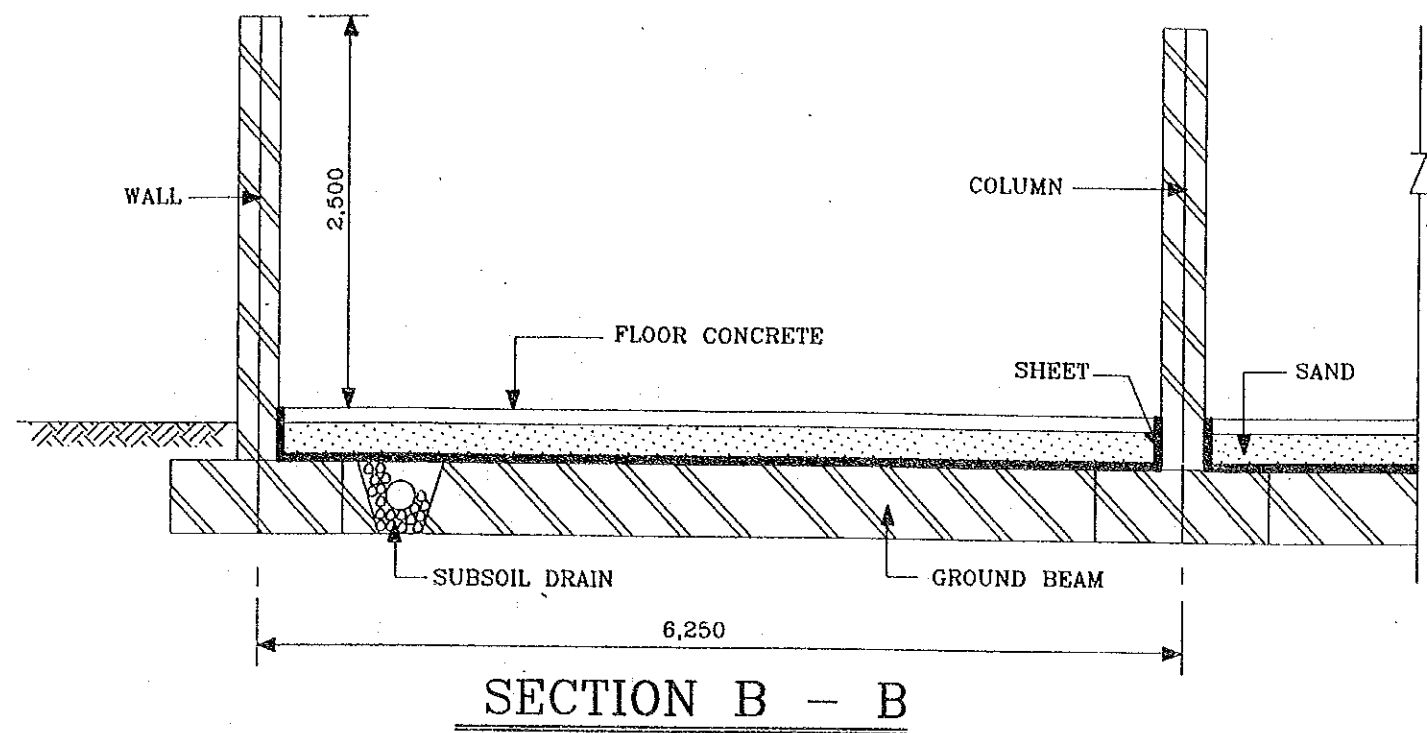


THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE LAYOUT PLAN INDUSTRIAL SOLID WASTE MANAGEMENT FACILITY & CENTRAL TREATMENT PLANT
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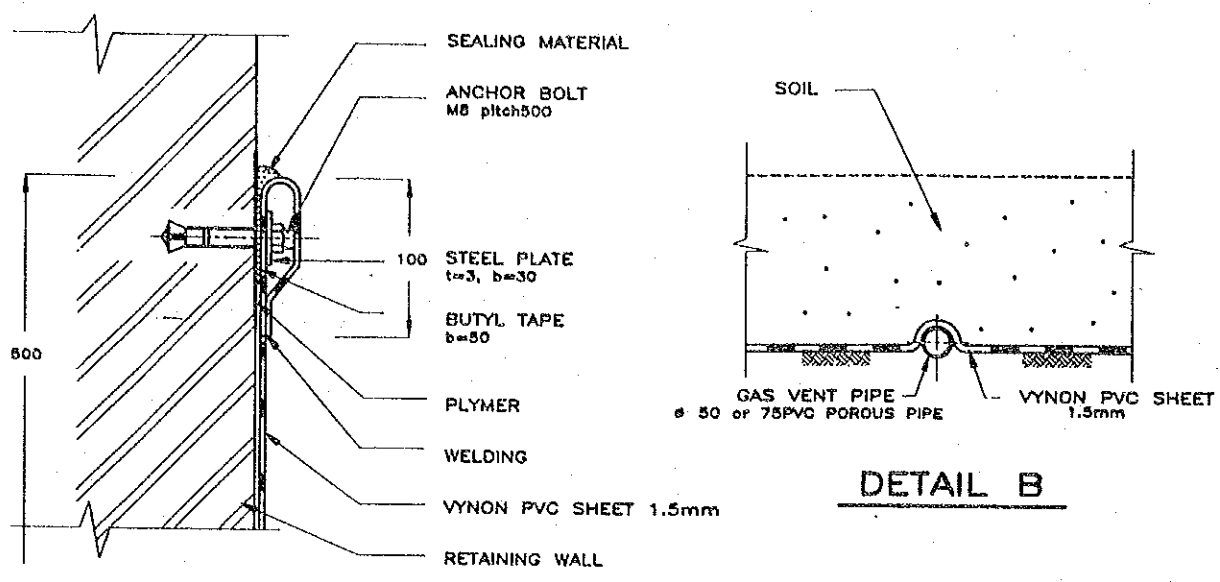
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THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK	TITLE
	JAPAN INTERNATIONAL COOPERATION AGENCY	SECURE STORAGE FACILITY & SECTION



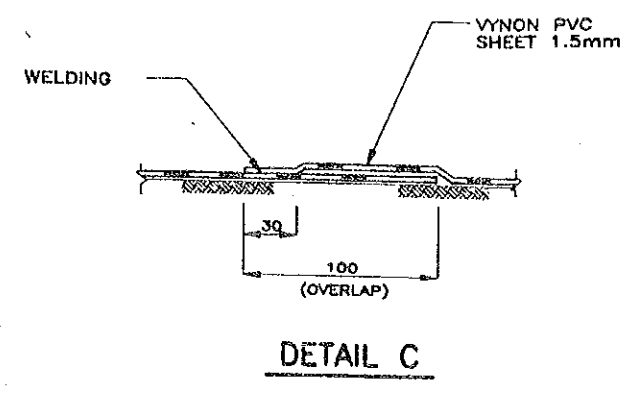
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	JAPAN INTERNATIONAL COOPERATION AGENCY	SECURE STORAGE FACILITY SECTION

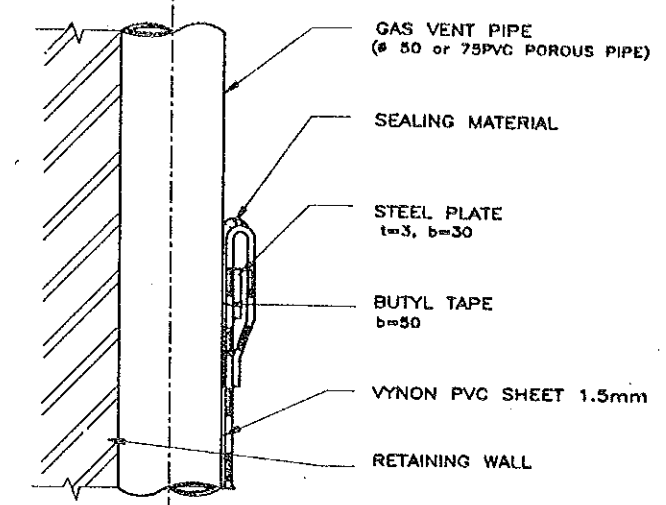


DETAIL A

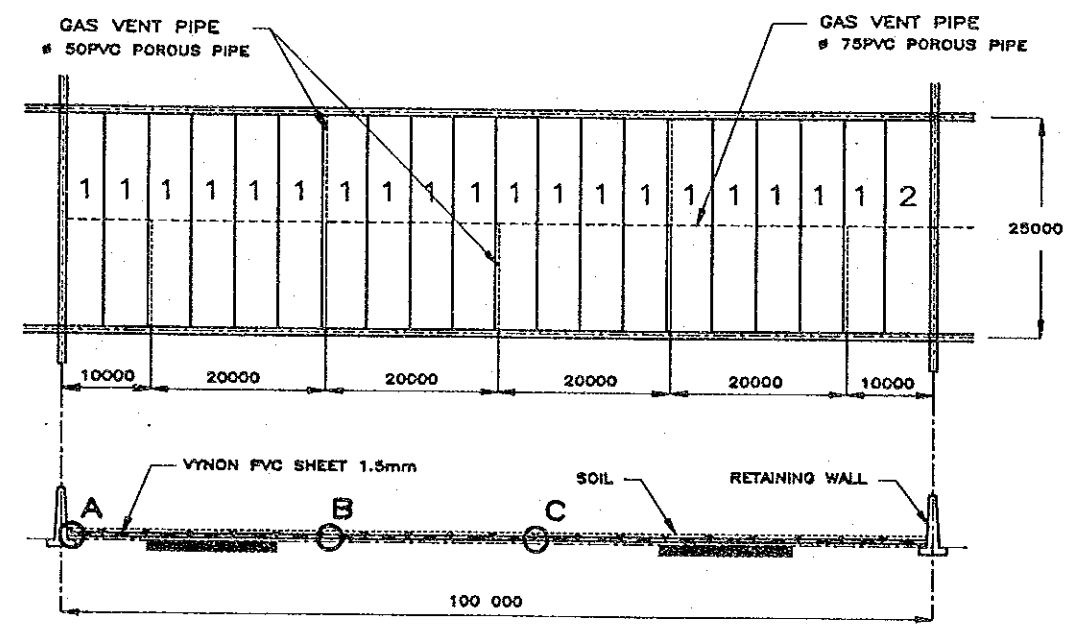
DETAIL B



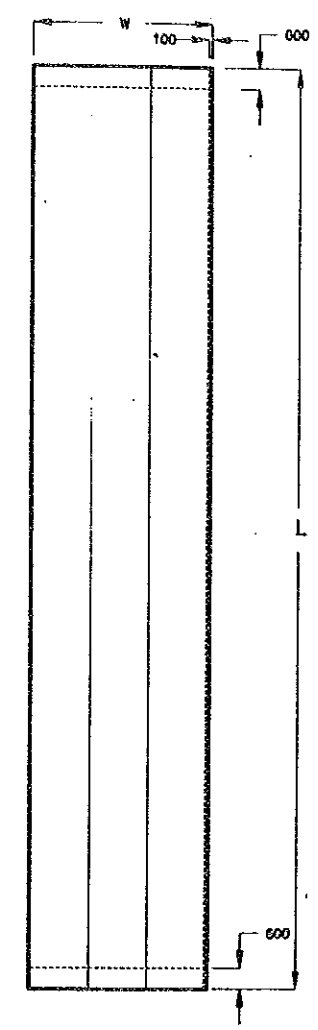
DETAIL C



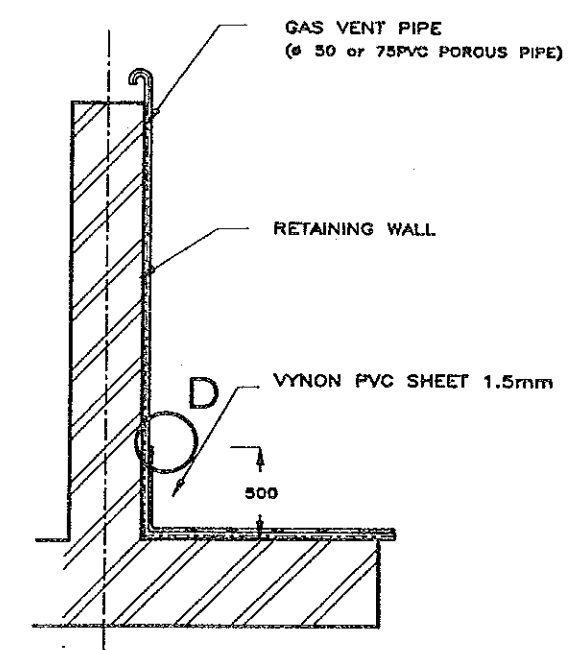
DETAIL D



A SURFACE IMPOUNDMENT SHEET LAYOUT



SHEET DETAIL



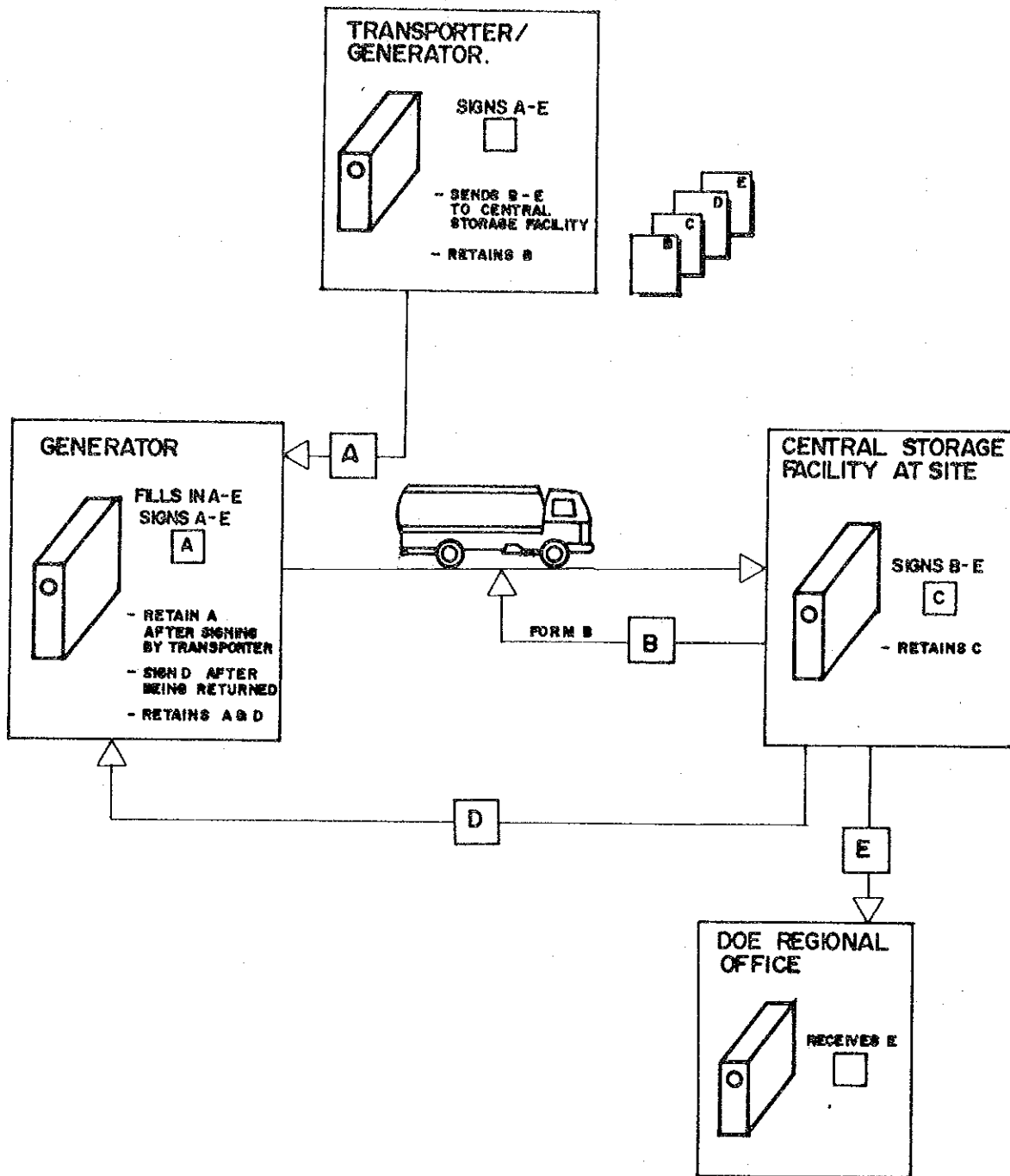
GAS VENT PIPE DETAIL

SHEET NO	W(m)	L (m)	QUANTITY	SUBTOTAL (m ²)
NO.1	5.1	26.2	19	2538.78
NO.2	6.8	28.2	1	178.16
GRAND TOTAL	-	-	20	2716.94

NOT TO SCALE
ALL VALUES IN mm

THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK	TITLE
	JAPAN INTERNATIONAL COOPERATION AGENCY	SECURE STORAGE FACILITY DETAILS

Fig. 5.7.7



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 m³

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 m³

Cost of Storage: \$

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

Date Received: Signature:

5.8 Landscaping

5.8.1 Basic Design Policy

Basic design policy for Hi-Tech Industrial Zone is as follows:

- (1) To emphasize 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 carefully consider the co-existence of the Zone (Phase 1) and future development area.
- (4) To follow environmental protection policy.
- (5) To provide recreational and sport activities for estate workers as well as neighbouring people.

5.8.2 Basic Design Concept

Basic design policy of landscaping for the Park would be representative of a Science and Research Park. It will project the "Hi-Tech & Hi-Touch" image. Major constituent landscape elements for this policy will be proposed based on the following concepts:

- (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 for 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, are treatment plant 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 its existing condition and landscaped by planting trees around the cemetery site.

5.8.3 Design Standard and Criteria

- (1) The following regulations and standards are applied for landscaping of the Industrial Zone:
 - Environmental Quality Act, 1974 (Act 129) in Malaysia.
 - Basic Law for Environmental Pollution Control in Japan.
 - Design Standard of Core Industrial Estate (Draft), 1978 Japan.
 - Uniformed Building by Laws, 1984 in Malaysia
 - Street, Drainage and Building Act, 1974 (ACT 133)
 - Town and Country Planning Act, 1976 (ACT 172)

- (2) Design Criteria

- 1) Establishment of the estate environmental standard and greenification

Existing vegetation in the project area is palm oil and rubber trees. However, for use of Industrial Estate, most of the area is to be newly landformed. The proposed open space, 33.5 ha (14 % in total) is allocated.

Green area more than 25% of total area would be taken as the estate environmental standard (excluding water surface area). 14 % of open space is proposed and over 11 % of inner open space within factory lots is anticipated. So, an overall 25 % in total open space for greenification will be established for the Hi-Tech Industrial Zone.

- 2) Open space

Open space is classified in accordance with the standard which is adopted to guide the planning and provision of both the estate and public

recreational parks in Malaysia.

- Open space along the canal in the east is to be planned as a community park. It is a linear park with retention pond and possesses the potential for multi purpose recreational use during the daytime. Ample park facilities and planting for shade will be provided.
- Open space in the central area of the site is planned as a neighbourhood park. It is to be gently sloped from the South to North direction and will provide rest space with shady trees and street furniture.

3) Industrial facility

Most industrial facilities would appear in an independent manner. According to the estate environmental policy, greenery coverage ratio of facilities, with a factory building location within lots, are to be allowed in accordance with regulation control.

The following items of landscape plan are to be clarified.

1. Site Utilization:

- a) Building Coverage
- b) Floor Area Ratio
- c) Maximum Height of Buildings

2. Setback:

- a) from arterial road
- b) from collector road

3. Green Areas : Mounds green are created around the lot.

4. Vehicle Entrance : Not more than two gateways.

5. Pollution Control :

Antipollution measures are taken in order to establish goodwill with peripheral communities.

6. Others:

For the design, color, layout, size and material of buildings, fences, plants, signs and advertisements, the landscape is taken into

consideration.

4) Retention pond

The proposed two (2) ponds, where are located adjacent to the canal on the east and west, will produce and enhance the "Hi-Tech landscaping" in accordance with diversified terrain and vegetational aspects. These pond areas contain a fish pond with water and multi-use ground. The surrounding areas within the pond area could be used for daily use of sports activities.

5) Central plaza in the Urban Zone

Approximately 1.6 ha of paved space would be created with integration of some urban sense and would be surrounded by both the center complex building and natural environmental components. It is one of the major gathering place for people within the estate, for social events and multiple activities.

6) Shade promenade

Shade promenade along the R & D block shall be recreated as shade pedestrian way with several rows of well silhouetted grand trees. It will provide the linear structure for the estate as functional, psychological and scenic integration medium. Shade promenade of seven meter width would be a major greenery and amenity element of the estate and would connect both east side and west side park and green open spaces.

7) Open space for conservation

Open space for conservation is located South of the site. It is at the highest in level and is the biggest in size. It will become a symbol of the estate. Maintaining hilly terrain with conservation of ground surface by vegetation is inevitably important in terms of erosion control. In future, new plants will be planted to replace existing rubber trees gradually. This conservation area provides the natural setting for numerous outdoor activities as well evacuation space for disaster.

8) Several green belts will be allocated to the project site to connect both parks and open spaces and basically serve as a pedestrian way with planting of trees and flowers.

9) Other areas

Area in the northern portion of the Zone is allocated for sewerage plant and industrial waste storage and would be hidden by trees.

10) The sloped areas produced by cut and fill land formation will also be greenified by shrubs and turf to prevent landsliding.

5.8.4 Area Characteristics

Following the basic design concept and criteria, the main categories of land use breakdown for landscape are park, open-space, plaza, water-surface, and green belt. All of them have been considered mainly in terms of activities and spatial image breakdown into 9 (A to I) categories. At same time, these categories present the facilities and outdoor furniture, the guideline of landscaping and recommendable plants (shown in Table 5.8.1 and Fig. 5.8.1).

Most of the park and green belt, characterized as a greenery and paved area, will be for the purpose of inducing outdoor recreational activity and providing activities corresponding to the sub-areas (refer to Figs. 5.8.2 and 5.8.3).

A) Conservation open space

There is a conservation area set as a natural greenery area, where a rubber plantation exists. It is proposed that the rubber trees will first be thinned and gradually replaced by native plants, becoming a comprehensive ecological system embracing flora and fauna. Furthermore, the area of flat land can be expected to play an important role of evacuation space for disaster and play ground. The area of the highest level will have a rest place and spectator deck as landmark of the park.

B) Water front open space (at retention pond)

The areas at both the west and east end of the Industrial Zone, where are a role of retention pond, will have flat open space and a fish pond. The open space will provide play ground and garden at the east and amphitheater at the west. The fish pond design will have a surface water of approximately 1.0 ha at the east and 1.5 ha at the west, average water depth of 1.0 m, water storage capacity of 250,000 m³. The foundation of pond bottom shall be set a bearing capacity and prevention of water leakage.

In order to maintain water quality, the replacement cycle of pond water should be considered, and also stable supply will be necessary from the central treatment plant.

C) Community park, neighborhood park and others

The community park containing the water front open space can be used for diverse recreational activities with sepak raga court at concave and stepped plaza at convex terrain. There are two bridges between sites separated by river.

The neighborhood park has paved area and a fountain, and also has a stepped plaza with downward orientation.

The corner parks link the different parts functionally. There are three places together with the pedestrian ways and they will form a liner mall along rows of trees, pavement and alcoves.

D) Pocket plaza

These plazas will be allocated for a bus bay of bus stop and also shall be coordinated with the entrance gate of the factory lot.

E,F) Arterial road, Collector road, Local road

On the basis of the quality of the road environment, the greenery of the road affects the overall scenery. The greenery has dignity and identity in accordance with classified function.

G) Shade promenade, green malls, green belts

These liner elements serving as pedestrian walkway will connect between two parts, together with corner park and green belt, one for community park and Urban Block, the other for Conservation open space and Factory lots through Neighborhood park.

H) Screen greenery

This greenery will be provided around objects, and, the surroundings of cemetery, industrial solid waste storage and central treatment plant.

I) Factory lot greenery

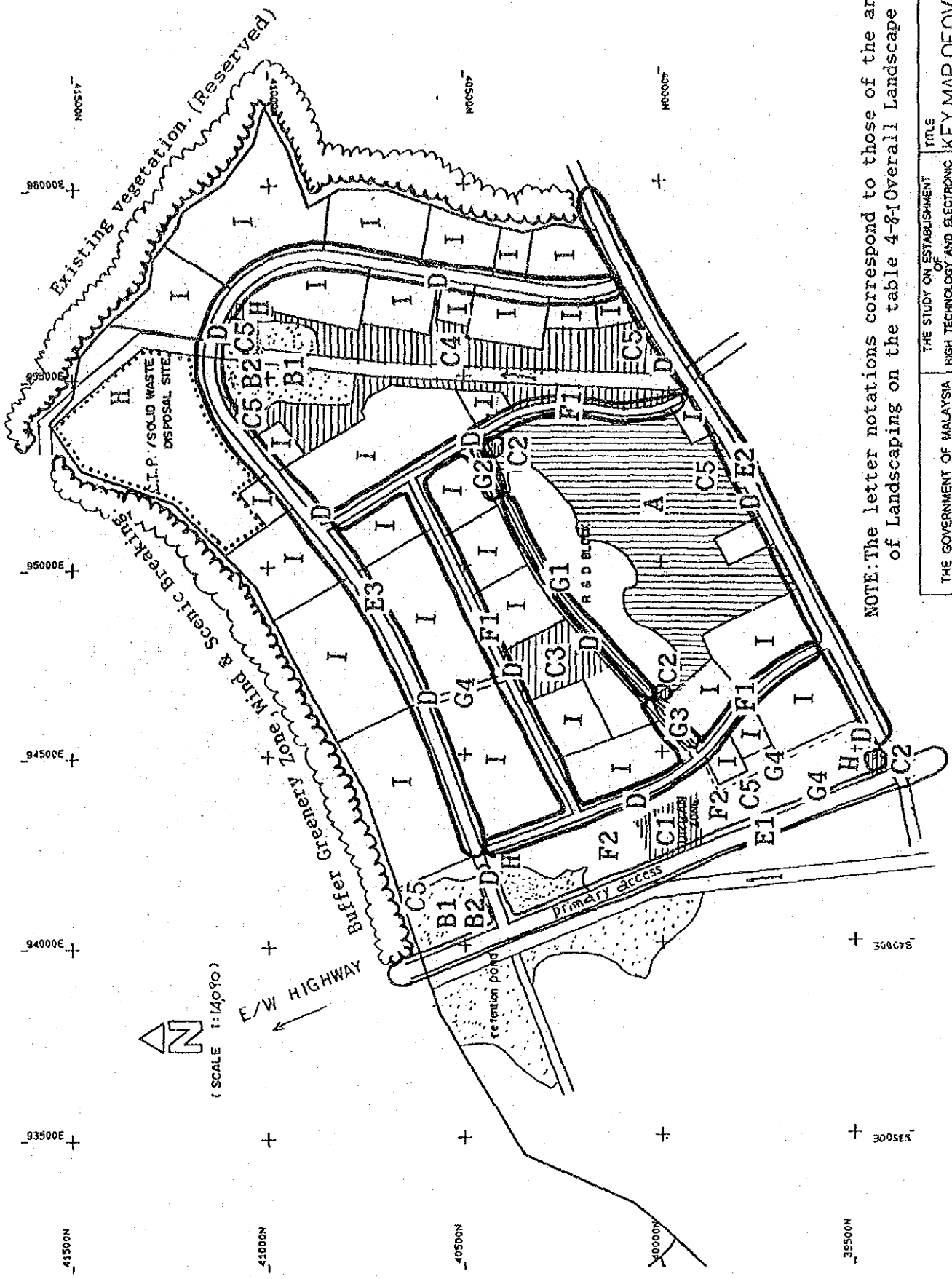
This greenery will be provided by each factory under agreement with said authorities. Especially, on the cut and fill slope condition planting and turfing will be effective in terms of erosion control as well aesthetic effect.

J) Others

1. The park road of 3.5 to 4 m in width will be provided for maintenance carriage, and a paved road in 2 m wide for pedestrian path. They will form a belt-shaped system.
2. Parking as the point of access will be connected with arterial road No. 1 and collector road in terms of security control, since arterial road No. 2 is more public in character than the internal road.
3. Outdoor furnitures like shade, litter basket, benches and guide and information must be provided, it being particularly important that visitors be able to easily seat, rest, and determine the direction in which they should approach (see Table 5.8.1).

Table 5.8.1 Overall Landscaping Plan

AREA	STATUS	ACTIVITY/UTILITY	SPATIAL IMAGE	FACILITY & OUT-DOOR FURNITURE	AREA	GUIDELINE OF LANDSCAPING	RECOMMENDABLE PLANT	REMARKS
A	Conservation open space area	Outdoor Activities such as Picnic. Evacuation for Disaster.	Natural Environment, Thin Forest on gentle hill. Landmark. Viewpoint.	Picnic ground Play ground Rest places Spectator deck Lightings Drinking water Litter basket	A	Area of Thinning ratio 30% for path(40% of openspace). Area of Thinning ratio 50% picnic(30% of OP). Area of Thinning ratio 70% playground(30% of OP).	Thinning of existing trees, gradually replacement of young propagation. Meranti Pipit Kayu Jati, Teak Kapur, Borneo Camphor Tree etc.	Control of Weeding.
B	B1 Water-front Open Space B2 Space	Green Space Recreational Park	Drainage system for overall site. Sport & Recreational facilities.	Adequate density of trees which provide Light & Shape. Lawn Area around/along Water surface.	B	B1 Medium & tall trees along water surface. B2	Tanjung Tembusu Ru Gelang, Cajeput, etc. Turf Grasses	Hedge Bamboo at water pond.
C	C1 Central plaza C2 Corner park C3 Neighbourhood Park C4 Community Park C5 Parking Space	Community spot/ Urban activities. Relaxation/ Recreation. Relaxation/Outdoor activities. Car parking. (Car and Bike)	Well-Designed urban plaza with pavement, Green & Flower. Stepped plaza with Pavement, Green & Flower. Daily used neighbourhood park linked with programme. Gate to parks & open spaces.	Fountain plaza Flag poles Sign board Kiosk Benches Sepak raga court Locker room (4) Gazebo & Benches Area of A, B (Retention pond), C Lightings	C	C1 Fountain, Paved area(30%) Shaded area(60%). C2 Gate with landmark character. C3 Shaded trees and Turfing. Strolling path & Gazebo at appropriate points. C4 C5 Shaded trees along Car park.	Randa Dedap Kemboja Frangipanni Traveller's Palm Talipot Palm, etc. Bunger, Rosa of India Bottle-brush Tree Mempat Pulai Jeneris, etc. Katapang, Sea Almond Mambu, Nim Tree, etc.	Tree of Kedah
D	Pocket Plaza	Rendezvous Spot, Bus Stop adjacent to Factory Entrance.	Sheltered space with ornamental plants.	Bus stop shelter Flower pot	D	Shaded trees with shrub & Hedges & Original made pavement.	Pride of Burma Rajah Kayu, Indian Laburnum Tapak Kuda, Kupu Orchid Tree	
E	E1 Primary Access RD (Walkway on both sides) E2 Arterial RD, no.2 (Walkway on both sides) E3 Arterial RD, no.1 (Walkway on both sides)	Commuting & Circulating.	Main access from E/W Highway. Main traffic spine with dignity & identity 'Hi-Tech' park.	Gate Guide sign Lightings	E	E1 E2 Lined grand trees on walkway and median. E3 Thin palms on median & well-siluetted trees. (sewage pipe underground)	Semarak Api, Frame of Forest Batai, Yellow Frame Tree Penaga, Ironwood Tree Jambul Merak Tanjung Betel Nut Palm Juniper, etc.	Shrub(cassia biflora, hibiscus rosa-sinensis, acalypha wilkesiana, siamensis)
F	F1 Collector RD (Walkway on both sides) F2 Local RD (Urban Block)	Commuting & Circulating.	Pleasant atmosphere with shade & Flower. Buffer Green.		F	F1 Lined trees & Shrubs. F2	Randa Mempari Kupo Orchid Tree ficus benjaminina Tapak Kuda, Kupo Orchid Tree, etc.	
G	G1 Shade Promenade w:7m G2 Green Mall, no.1 w:3m G3 Green Mall, no.2 w:3m G4 Green Belt w:7m	Relaxation. path.	Cool and Quiet pedestrian way with color and fragrance. Stepped path with pavement. Buffer Green.	Benches Lightings	G	G1 Well-siluetted grand trees along R&D block. G2 Mixed a few plants. G3 G4 Shaded and Instant trees.	Pukul Lima, Rain Tree Kelapa Sawit, Oil Palm Bunger, Rosa of India Pride of Burma Kemboja Frangipanni Sena Angsana, etc.	
H	Screen Greenery	Screen from object.	Lined Trees around area and object.		H	Medium & Tall trees, and shrubs as Hedges.	Kayu Manis, Indian Cinnamon Tree bahia nitida, etc.	Alomatic leaves.
I	Factory lot Greenery	Identity of cooperate image.	Environmental Harmony with ample greening.	Entrance gate Fence Advertising sign	I	Harmony with surroundings under regulation control. Green area along RD.	due to enterprise's idea.	necessary coordination between Pocket Plaza and Factory entrance

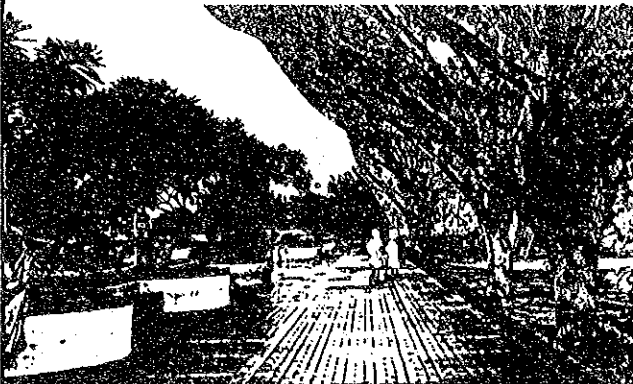


NOTE: The letter notations correspond to those of the area of Landscaping on the table 4-8-Overall Landscape Plan.

THE STUDY ON ESTABLISHMENT OF HIGH TECHNOLOGY AND ELECTRONIC INDUSTRIAL ESTATE IN KULIM	TITLE
JAPANESE INTERNATIONAL COOPERATION AGENCY	KEY MAP OF OVERALL LANDSCAPE PLAN
ECONOMIC PLANNING UNIT	
THE GOVERNMENT OF MALAYSIA	

SHADE PROMENADE

Paved walkway (w: 7m) with lined grand trees along R&D Block, Shadeways can provide shelter from foul weather or harsh sunlight.



PLAYING FIELD

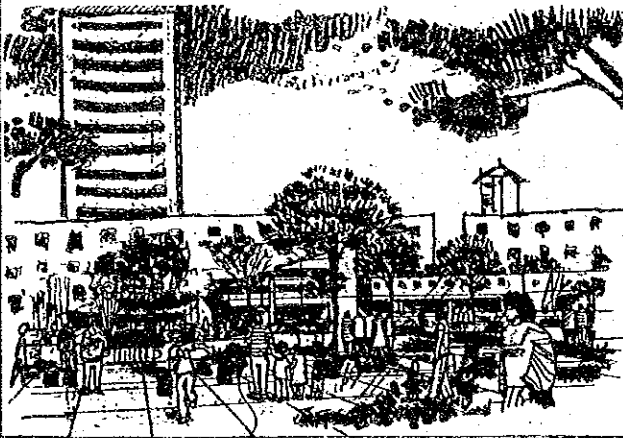
Fig. 5.8.2

A range of open spaces can be provided to accommodate a variety of recreational and sport activities.



CENTRAL PLAZA

This plaza at Urban Block will be the focus of various urban activities. Places to sit, shop, and play, etc. can be included.



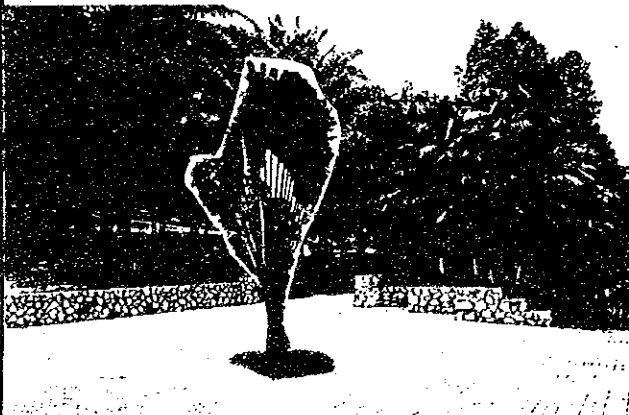
FISH POND

Pond can provide micro climate controls at a site, and views over water surface can be enjoyed.



CORNER PARK

Some places at corners can be paved for use as plaza. Corners can make a charming place with accent tree as a role of eye stop.



PICNIC GROUND

Open space at conservation area will provided people the oppotunity to spend a outdoor life, and will have a barbecue equipment.



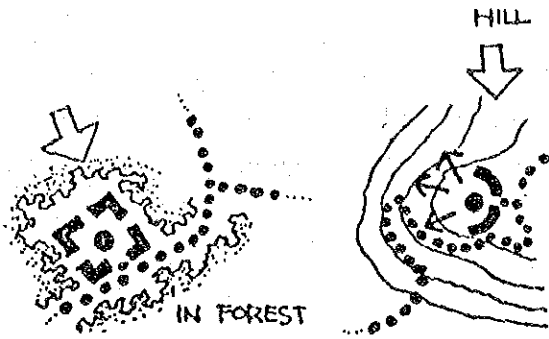
THE GOVERNMENT OF MALAYSIA
ECONOMIC PLANNING UNIT

THE STUDY ON ESTABLISHMENT
OF
HIGH TECHNOLOGY AND ELECTRONIC
INDUSTRIAL ESTATE IN KULIM
JAPAN INTERNATIONAL COOPERATION AGENCY

TITLE
SOME DESIGN IDEAS (1)

Rest Area

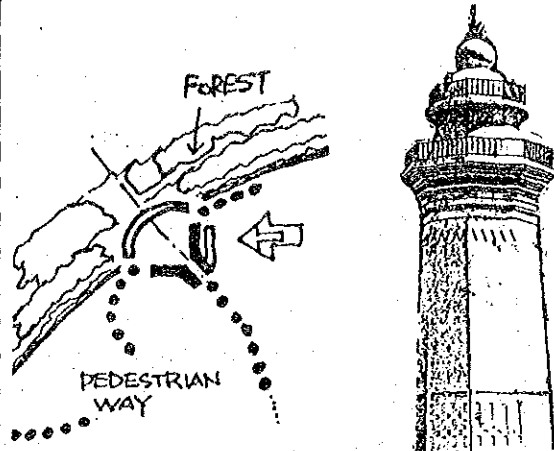
Sheltered Rest place at appropriate points along the pedestrian way, places for rest will be provided at Hill Top, wood area, Green Belt.



Hill Top Area

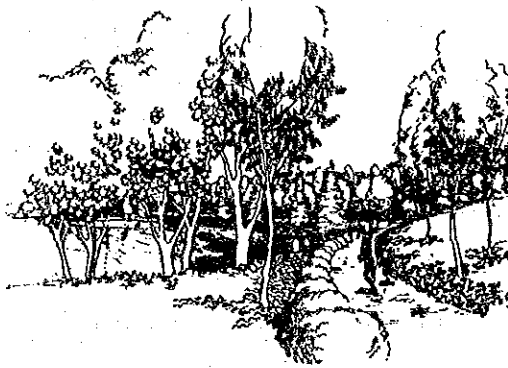
Fig. 5.8.3

Vista and psychological connection should be provided by spectator Deck at Hill top.



Pedestrian Path

From strolling path through the terrain, a view over the playing sport field, other facilities and natural landscape can be enjoyed.



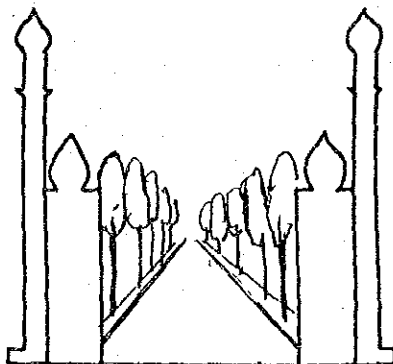
Berm and facilities in the berm.

Lockers space will be provided in the berm site.



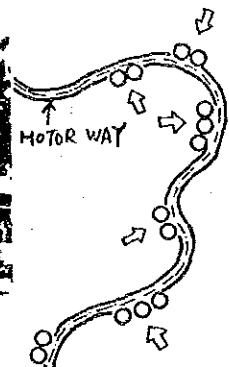
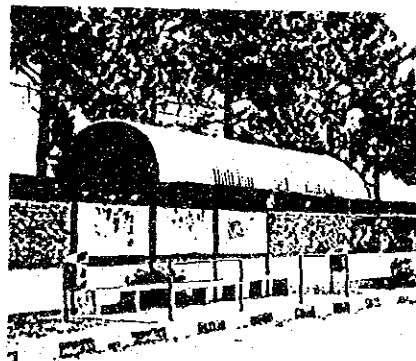
Gate Monument at the major Access points

Monuments will be located at the entrance of Arterial RD.



Bus Stop (AS POCKET PLAZA)

Internal road will be provided the Bus Stop where necessary.



Some Plazas should be designed with harmony between Bus stop and entrance gate of factory lot.

THE GOVERNMENT OF MALAYSIA
ECONOMIC PLANNING UNIT

THE STUDY ON ESTABLISHMENT
OF
HIGH TECHNOLOGY AND ELECTRONIC
INDUSTRIAL ESTATE IN KULIM
JAPAN INTERNATIONAL COOPERATION AGENCY

TITLE
SOME DESIGN IDEAS (2)

5.8.5 Basic Landscape Policy for Urban Block

- 1) **Setting of lattice pattern:** The general approach is establishment of visual characteristics and spatial relationship of the urban block on basis of lattice pattern and axial arrangement with hotel and teleport serving as the focal point.
- 2) **Central Plaza:** Besides emphasizing lattice pattern by setting the central plaza, access will be made possible from the overall Hi-Tech Park of 1,450 ha, and the Central Plaza will be given rich spatial quality by means of fountains and planting.
- 3) **Access:** Access to the urban block and hotel will be secured by providing arterial roads, collector roads and local roads. Pedestrian bridge over primary access road will connect the urban block and reserved urban block.
- 4) **Urban silhouette and view:** The layout will be such that the related facilities appear as a group form as viewed from primary access road.
- 5) **Facility layout and facility components:** The major related facilities are to be laid out around the central plaza in accordance with program.
- 6) **Greenery:** This greenery at the urban block is mainly facility greenery in function for beautification of surroundings on facilities and decorative purposes. There will be introduction of many kinds of gardening species. Each site will have edge greenery as function of physical boundaries.

5.8.6 Planting Study

The number of trees to be planted per unit of area, will depend on the planting area and the species planted in it. In terms of vertical composition, there can be different combination of high, medium and low trees, and viewed from above, the crown will overlap.

The thinning ratio ranged from 70% to 30% in accordance with the different use, will occur where the existing rubber trees are cut down at conservation open space area. Where a tropical natural forest is to be created gradually, native tropical plants will be introduced instead of the rubber trees, and will be expected to become a primeval forest with a multistrata composition in future.

A comparatively high planting density will be required for buffer greenery, edge greenery and screening greenery. On the other hand, the planting of roadside and aesthetic greenery at community parks and waterfront area is characterized by low density with priority given basically to high trees. In mall and promenade greenery, high trees are planted comparatively density (see Fig. 5.8.4 Landscaping for Road).

In central plaza, corner park and neighborhood park, there is some accentual planting of medium and low trees with shrubs and flowers.

In the case of turf greenery, it is covered by long grass, but since shade trees will be planted within retention pond area and at other strategic points of the open space, the density of turf greenery will be relatively high.

Although the overall density of factory lot greenery will be somewhat lower, where some high density planting of medium and low trees, will be expected by each factory. The trees, shrub, and turf to be planted in each area of the park, open space, and green belt will be roughly as indicated in Table 5.8.1 of overall landscape plan.

Nursery greenery or nursery site consist of a variety of seedlings, saplings and other nursery plants for park use, including flowers. It is recommendable that nursery greenery is to be located at the conservation open space area in order to ensure the supplying capacity.

Native species would be the most desirable plants at the ecological standpoint. Followings are list of recommendable natives species in both common and botanical name. (Table 5.8.2)

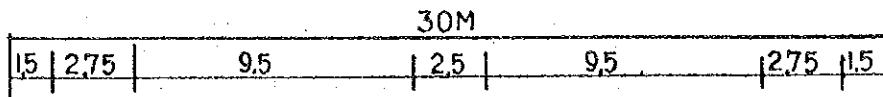
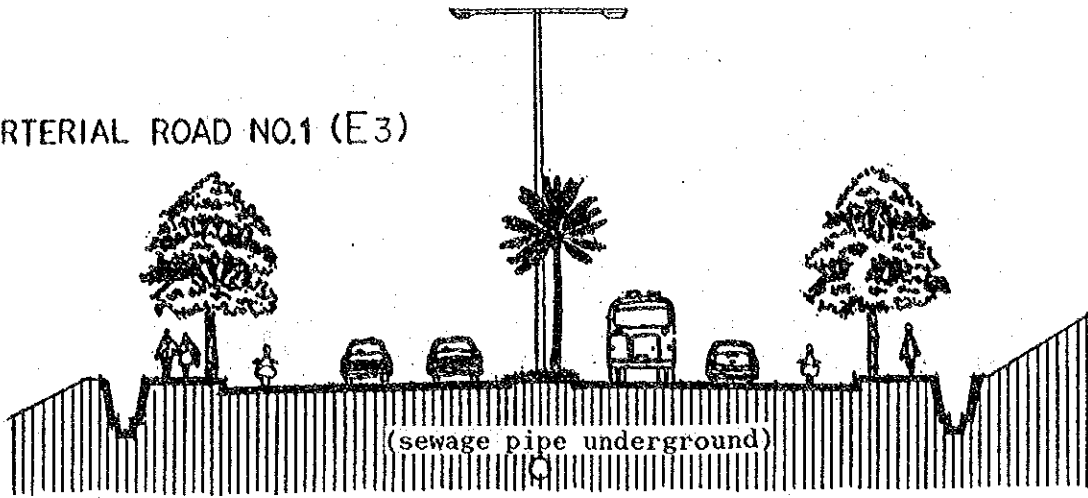
Table 5.8.2 List of Recommendable Plants

AREA	COMMON NAME	BOTANICAL NAME
A	NATIVE TREES <ul style="list-style-type: none"> ·Meranti Pipit ·Kayu Jati, Teak ·Kapur, Borneo Camphor Tree 	(shorea assamica) (tectona grandis) (dryobalanops aromatica)
B	TALL TREES <ul style="list-style-type: none"> ·Tembusu ·Jambu Laut, Sea Apple ·Jelutong ·Kayu Manis, Wild Cinnamon ·Tanjung ·Ru ·Gelam, Cajeput <p>FLOWERY TREES</p> <ul style="list-style-type: none"> ·Rajah Kayu, Indian Laburnum ·Kemboja, Frangipanni ·Jambul? <p>SHRUBS</p> <ul style="list-style-type: none"> · - · - · - 	(fagraea fragrans) (eugenia grandis) (dyera costulata) (cinnamomum iners) (mimusops elengi) (casuarina) (melaleuca leucadendron) (cassia fistula) (plumeria obtusa) (jacaranda ovalifolia) (acalypha wilkesiana) (codiaeum variegatum) (ficus roxburghii)
C	TALL TREES <ul style="list-style-type: none"> · - ·Jeneris ·Dedap? ·Randa ·Bunger, Rosa of India ·Purai ·Mempat <p>MIDDLE TREES</p> <ul style="list-style-type: none"> ·Kemboja Frangipanni ·Pride of Burma ·Katapang, Sea Almond ·Mambu, Nim Tree <p>PALMS</p> <ul style="list-style-type: none"> ·Kelapa, Coconut ·Royal Palm ·Pinang, Betel Nut Palm ·Pinang Raja, Sealing Wax Palm ·Palas? ·Talipot Palm ·Traveller's <p>SHRUBS</p> <ul style="list-style-type: none"> · - · - · - · - · - 	(filicium decipiens) (millettia atropurpurea) (erythrina glauca) (gardenia carinata) (lagerstroemia speciosa) (alstonia augustifolia) (cratoxylon formosum) (plumeria obtusa) (amherstia nobilis) (terminalia catappa) (melia indica) (cocos nucifera) (roystonea regia) (areca catechu) (cyrtostachys lakka) (licuala peltata) (corypha umbracaulifera) (ravenala madagascariensis) (hibiscus rosa-chinensis) (gardenia florida) (lxora spp) (vinca rosea) (lantana spp)

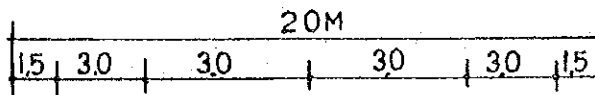
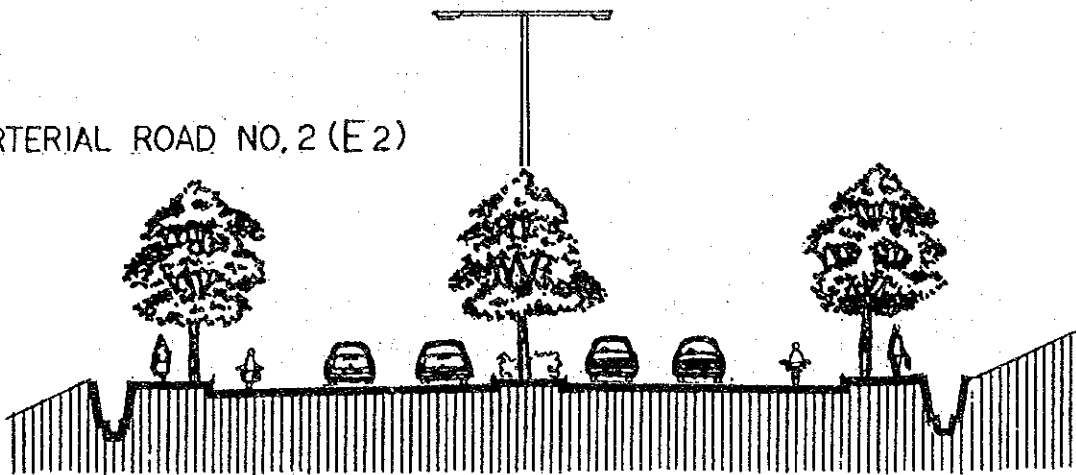
TO BE CONTINUED

AREA	COMMON NAME	BOTANICAL NAME
D	MIDDLE TREES <ul style="list-style-type: none"> ·Pride of Burma ·Rajah Kayu, Indian Laburnum ·Tapak Kuda, Kupu Orchid Tree? ·Dedap? ·Kemboja Frangipanni 	(amherstia nobilis) (cassia fistula) (bauhinia purpurea) (erythrina glauca) (plumeria obtusa)
E3	TALL TREES FOR MEDIAN <ul style="list-style-type: none"> ·Pinang, Betel Nut Palm ·Pinang Raja, Sealing Wax Palm · - SHRUBS FOR MEDIAN <ul style="list-style-type: none"> · - · - ·Juniper 	(areca catechu) (cyrtostachys lakka) (chrysalidocarpus lutescens) (draceana) (heliconia) (juniperus)
E2 & E3 & F	TALL TREES FOR SIDEWAY (5m in Spacing) <ul style="list-style-type: none"> · - ·Tanjung ·Jeneris · - ·Penaga, Ironwood Tree ·Batai, Yellow Frame Tree ·Semarak Api, Frame of Forest 	(filicium decipiens) (mimusops elengi) (millettia atropurpurea) (andira surinamensis) (mesua ferrea) (peltophorum pterocarpum) (delonix regia)
	MIDDLE TREES FOR SIDEWAY (10m in Spacing) <ul style="list-style-type: none"> ·Dedap? ·Tapak Kuda, Kupu Orchid Tree ·Jambul Merak? ·Kemboja, Frangipanni? · - ·Randa ·Mempari SHRUBS FOR SIDEWAY (as Hedge) <ul style="list-style-type: none"> · - · - · - · - GROUND COVER FOR SIDEWAY <ul style="list-style-type: none"> · - · - · - PAVEMENT AND TURF FOR SIDEWAY <ul style="list-style-type: none"> ·PC Block, 450x450 ·Turf Grass 	(erythrina glauca) (bauhinia blakeana) (jacaranda ovalifolia) (plumeria acuminata) (cassia spectabilis) (gardenia carinata) (pongamia pinnata) (acalypha wilkesiana) (acalypha siamensis) (hibiscus rosa-sinensis) (ficus benjaminina) (phyllanthus spp) (ophiopogon spp) (pandanus spp)
G	TALL AND MIDDLE TREES <ul style="list-style-type: none"> ·Pukul Lima, Rain Tree ·Kelapa Sawit, Oil Palm ·Bunger, Rosa of India ·Pride of Burma ·Kemboja Frangipanni ·Sena Angsana 	(samanea saman) (elaeis guineensis) (lagerstroemia speciosa) (amherstia nobilis) (plumeria obtusa) (pterocarpus indicus)
H	TALL, MIDDLE TREES AND SHRUBS <ul style="list-style-type: none"> ·Kayu Manis, Indian Cinnamon Tree · - 	(cinnamomum zeylanicum) (bahia nitida)

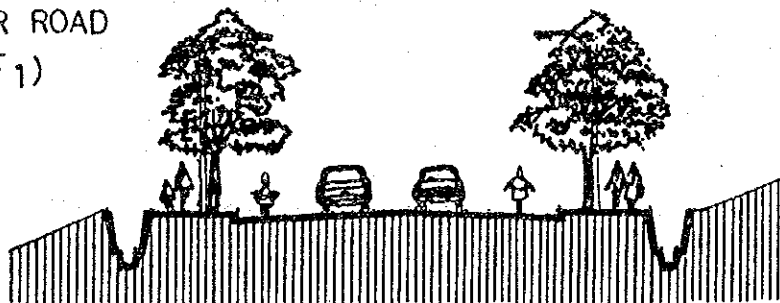
ARTERIAL ROAD NO.1 (E3)



ARTERIAL ROAD NO.2 (E2)



COLLECTOR ROAD NO.1~4 (F1)



THE GOVERNMENT OF MALAYSIA
ECONOMIC PLANNING UNIT

THE STUDY ON ESTABLISHMENT
OF
HIGH TECHNOLOGY AND ELECTRONIC
INDUSTRIAL ESTATE IN KULIM
JAPAN INTERNATIONAL COOPERATION AGENCY

TITLE
PLANTING FOR MAIN RD.

5.8.7 Industrial Lot Planning

The following guideline for an industrial lot of the Kulim High-Tech Industrial Park is prepared as reference. The guideline is to be allowed in accordance with regulation control by said authorities before commencing the construction.(Refer Figs. 5.8.5 to 5.8.9).

- 1) Site Utilization
 - a) Building coverage : 40 % (due to the inclusion of the slope area)
 - b) Floor Area Ratio : 200 %
 - c) Maximum Height of Buildings : below 31 m and 60 degree angle inclination line from another building
- 2) Setback
 - a) Front (from arterial road) : 12 m (due to slope)
(from collector road) : 12 m (Ditto)
 - b) Side (lot of 10 ha, 5 ha) : 10 m (due to Max. 20' difference level)
(lot of 3 ha, 1 ha) : 6 m
 - c) Back (one road) : 6 m
(two road) : 6 m
 - d) Other (adjacent to park) : 6 m
(openspace and green belt)
- 3) Green Areas : over 30% (Min. 20% of green area required, and 10% of exterior space)
Mound green are created around lots, and soft turfing are covered on other area.
- 4) Vehicle Entrance : one gateway and over 30 m away from corner of road.
- 5) Pollution Control : (refer to environmental assessment)

6) Others

- a) Design of building to be taken into consideration
 - layout
 - size
 - color
 - materials

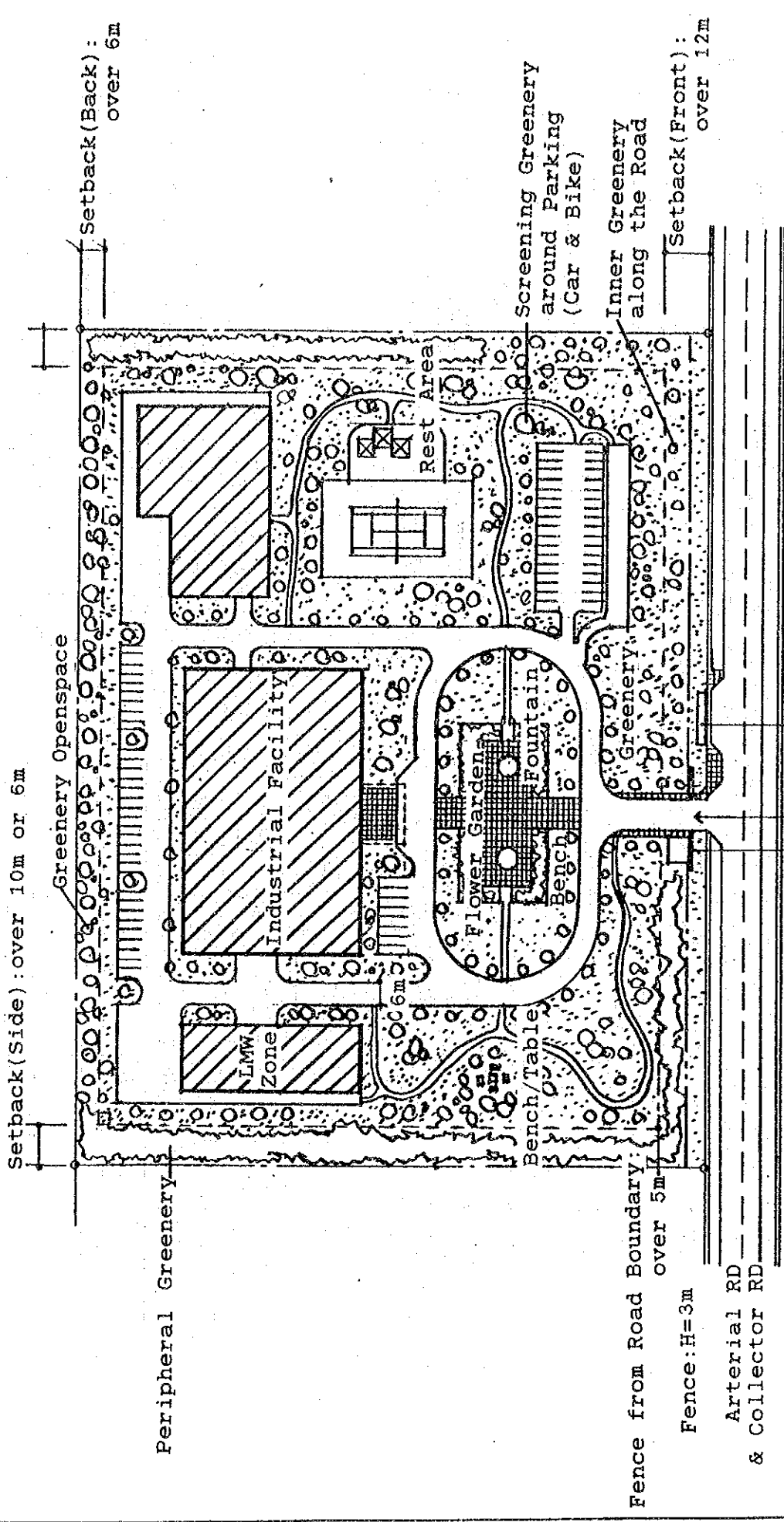
- b) Design of exterior
 - required guard house
 - acceptable for transparent fence visually and installed at 5 m away road boundary and 3 m in height
 - planting at the periphery area over 6 m width
 - sign and advertisement are taken into consideration.
 - around parking space hidden by mound green.

- c) Inner road
 - 6 m wide is required as a security and safety measure to provide space for protection from fire and disaster.

- d) Parking space
 - one car space for each 140 m² of factory and each 47 m² of office area.

Fig 15.8.5

MODEL PLAN FOR INDUSTRIAL LOT,
KULIM HI-TECH INDUSTRIAL PARK
KEDAH, MALAYSIA



<p>Sign Board Entrance Gate with Guard House</p>	<p>Bus Stop or Bus Bay</p>
<p>THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT</p>	<p>THE STUDY ON ESTABLISHMENT OF HIGH TECHNOLOGY AND ELECTRONIC INDUSTRIAL ESTATE IN KULIM JAPAN INTERNATIONAL COOPERATION AGENCY</p>
<p>TITLE MODEL PLAN FOR INDUSTRIAL LOT</p>	

Boundary openspace: over 5m

Peripheral openspace: over 10m

Front yard Openspace from Road Boundary: over 10m

Boundary openspace: over 5m

④ Fountain
④ Bench

③ Garden Flower

Industrial Facility

④ Improving Soil Condition

⑤ Existing Greenery

① Rest Area

Existing Conservation Greenery

⑫ Greenery

① Bench/ Table

Fence from Road Boundary: over 5m

Screening Greenery

⑩ around Object

⑩ Screening Greenery around Parking

⑥ Sign Board

⑦ Entrance Gate

② Inner Greenery along the Road

⑪ Fence: H=below 1.2m

TITLE

THE STUDY ON ESTABLISHMENT OF

KULIM HI-TECH INDUSTRIAL PARK

JAPAN INTERNATIONAL COOPERATION AGENCY

THE GOVERNMENT OF MALAYSIA

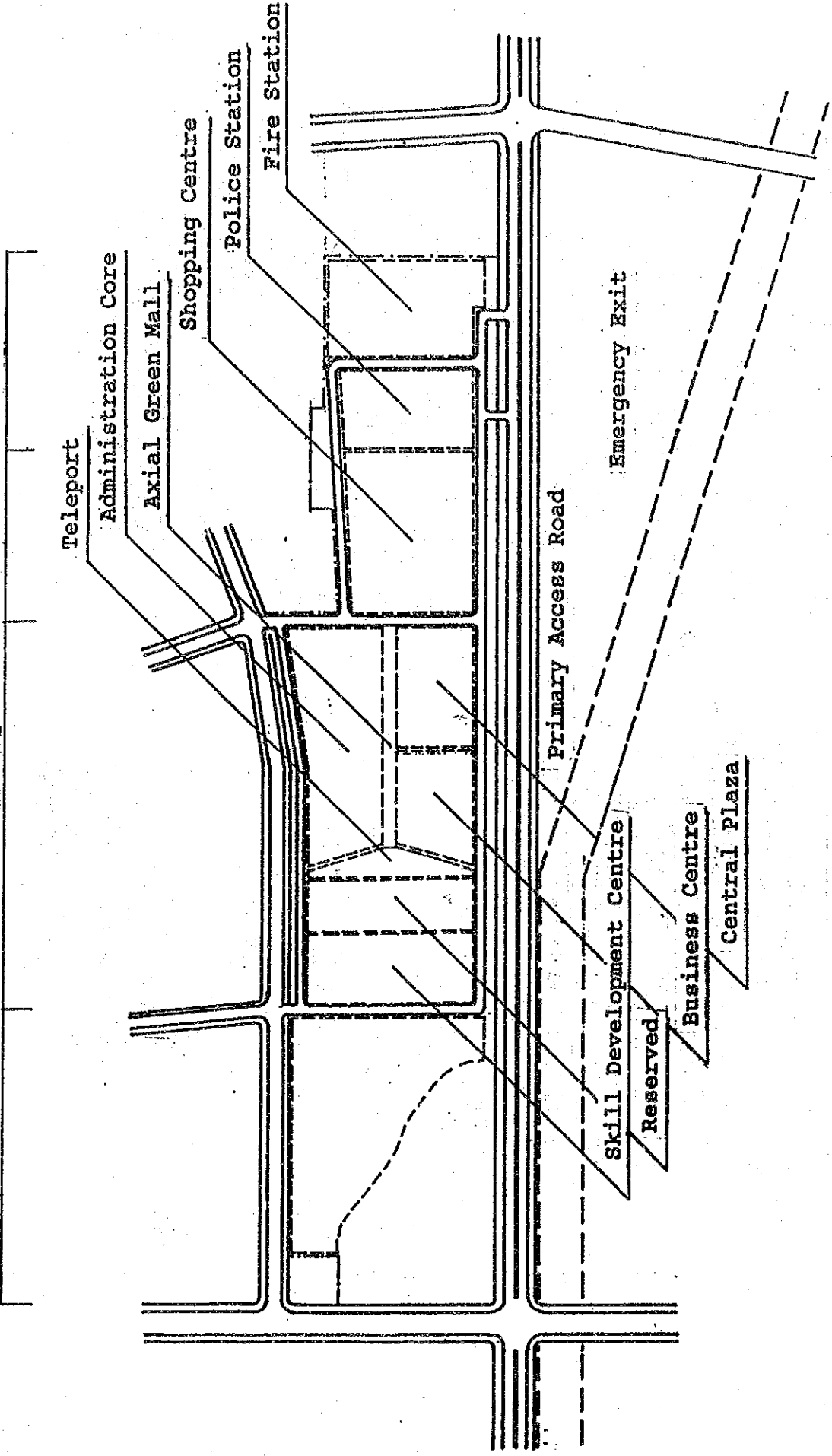
ECONOMIC PLANNING UNIT

JAPANESE EXAMPLE OF MODEL PLAN FOR INDUSTRIAL LOT,

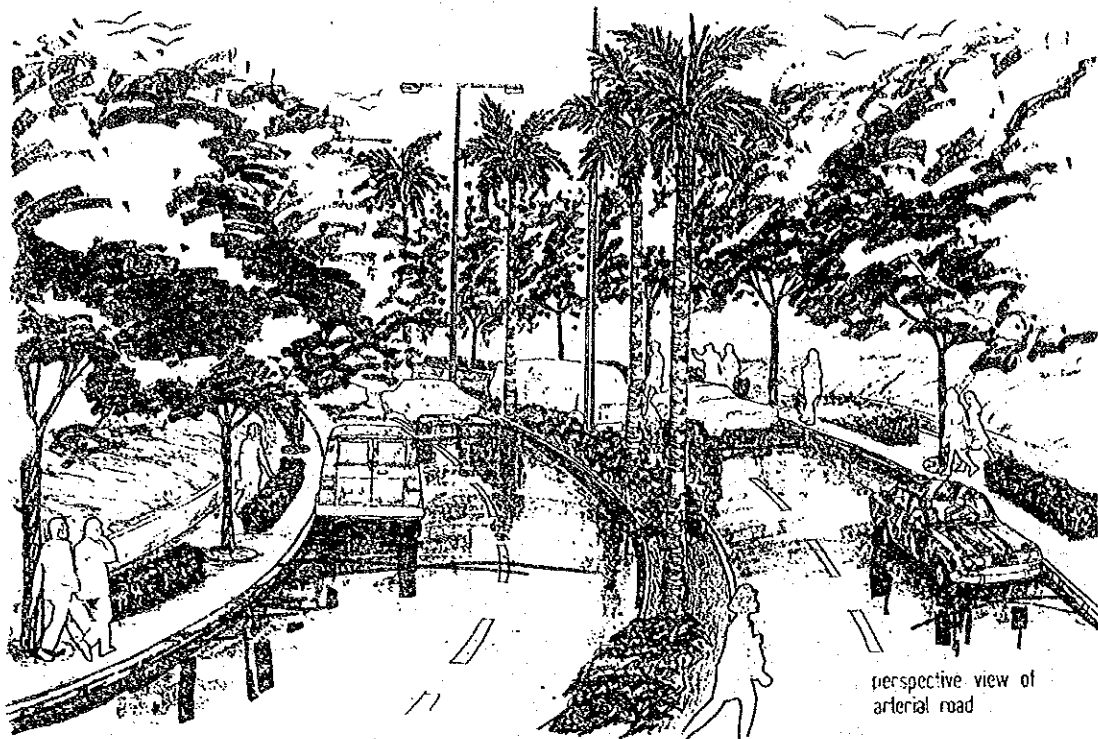
TECNO PARK TOYOSATO, TSUKUBA

Model Plan for Industrial Lot

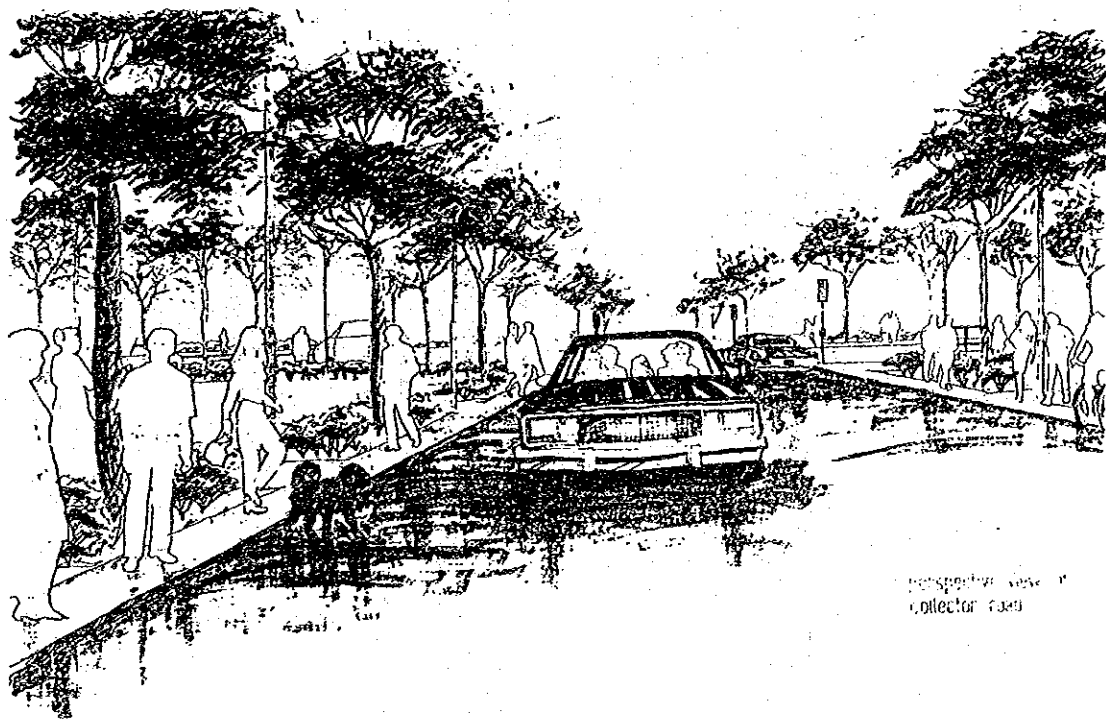
Accommodation Hi-Tech Core Commercial Public



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Visual Context at Urban Block
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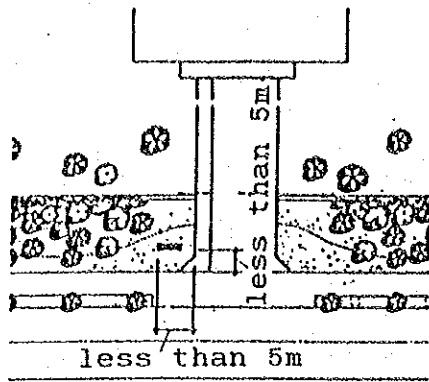
perspective view of arterial road



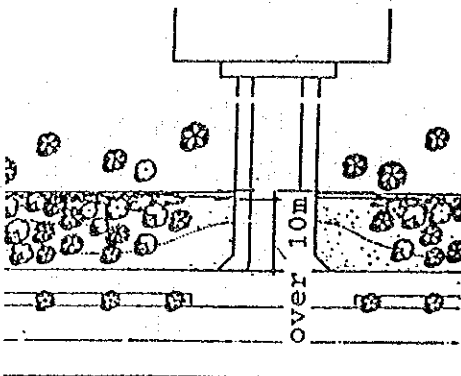
perspective view of collector road

<p>THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT</p>	<p>THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY</p>	<p>TITLE Perspective View of Road</p>
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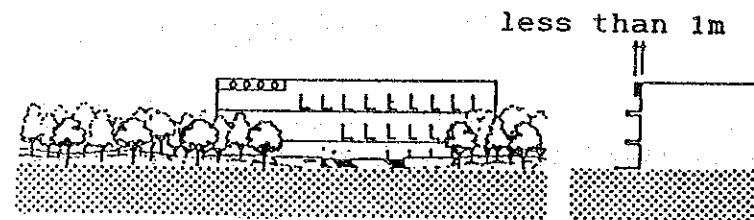
GUIDELINE OF SIGN BOARD INSTALLATION,
TECNO PARK TOYOSATO, TSUKUBA



①. FREE STANDING TYPE

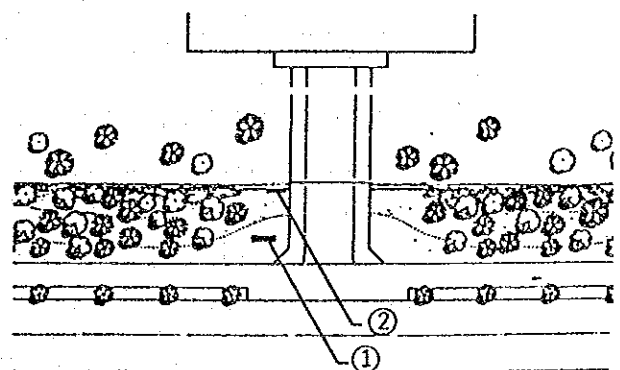
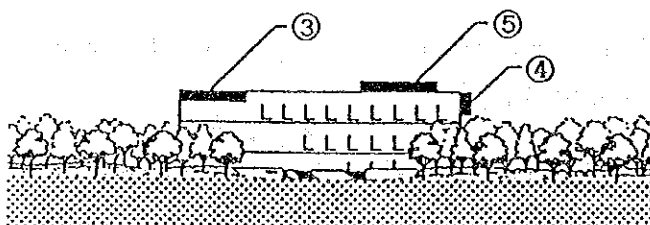


②. FENCE WALL TYPE



③.④. FACADE TYPE

⑤. ROOF TOP TYPE



THE GOVERNMENT OF MALAYSIA
ECONOMIC PLANNING UNIT

THE STUDY ON ESTABLISHMENT
OF
KULIM HI-TECH INDUSTRIAL PARK
JAPAN INTERNATIONAL COOPERATION AGENCY

TITLE
Guideline of Sign Board
Installation

5.9 Related Facilities

Turning a key to ignite the development is quite an important task for the promotion and managing body. It is strongly required to prepare incentives for creating an attractive business atmosphere and environment for private enterprise to settle down in the Zone from the first stage. It is expected to establish some facilities such as public R & D institute that will give an essential character, incubations for promoting technological development and technology community of the park, region and Malaysia. The related facilities in the Urban Block will contribute to the development of the primary images of the Hi-Tech Industrial Zone.

The Urban Block, the leading core of the Zone with an area of 14.2 ha, is located in the east-most fringe of the proposed Industrial Zone, which is next to the housing zone of future development. The site is surrounded by roads on three sides, the north, east, and west. The western one is the primary access road to other zones in the Hi-Tech Industrial Park. Beyond the southern limit are three private factory lots.

The role of related facilities in the Urban Block is to support the Industrial Zone to be established as a nuclear of Hi-Tech industry development at both regional and national level. Thus, objectives of the related facilities required to achieve the goals above can be resumed as follows;

- to operate and manage the zone to work in its best condition with maintaining its ideal business conditions
- to promote Hi-Tech industries in the zone and support their development
- to develop technology and technics required in the zone and the region

Considering Kulim's situation, following can be pointed out as required conditions for construction of the Urban Block.

- to build up at the early stage of the construction to make the urban block to work from the start of operation in the industrial zone
- to include a full set of service facilities to make the block attractive for enterprises settle

To achieve these objectives, the Urban Block shall be installed functions as follows;

a) Administration

This function is to provide public and semi-public services for management and operation of the zone, to be well maintained in both physical and institutional aspect.

b) R & D and its supporting

This function includes not only R & D activities itself but also services to be provided to support Hi-Tech industries' activities.

c) Coordination

Function of coordination and arrangement for joint business and studies, and providing chance for good cooperation and contact amongst private enterprises and public institutes, which is expected to stimulate each other and to create new science and technology.

d) Incubation

This function is expected to support and encourage new creative venture industries to establish their business as a stable ones with engineering and economical assistance.

e) Training

It is a critical to supply well skilled man-power, and up-grading them. This is one of important functions of the Urban Block.

f) Information

Comprehensive and advanced technology information which is requested by industries for development of Hi-Tech industries should be provided.

g) Others

The Urban Block is required to supply basical public and private services also. Services are to be provided chiefly to staffs, workers and visitors of the Industrial Zone and the Urban Block, which include communication, security and retailing.

5.9.1 Model Plan of the Urban Block

Roles and functions mentioned above with consideration of Kulim's conditions, the following facilities are proposed as components of the Urban Block.

- | | |
|-------------------------|---|
| a. Administration | <ul style="list-style-type: none">• Management company office• Local government office |
| b. R & D and supporting | <ul style="list-style-type: none">• Public R & D institutes• Assembly hall• Conference room• Private office |
| c. Coordination | <ul style="list-style-type: none">• Innovation centre |
| d. Incubation | <ul style="list-style-type: none">• Incubation/start-up room |
| e. Training | <ul style="list-style-type: none">• Skill development centre |
| f. Information | <ul style="list-style-type: none">• Library• Science and technology exchange plaza |
| g. Others | <ul style="list-style-type: none">• Bank• Restaurant/Cafe• Post Office• Telephone office• Police station• Fire station• Accommodation• Commercial centre |

Detailed character and dimension of each facilities are as described below.

a. Administration

i) Management company office

The office is a headquarter for management, operation, promotion and supervision of the whole Industrial Zone, which consists of several sections; administrator, public relations, security, investment promoter,

company section and finance.

Number of staffs and approximate net floor area by section and sub-total are as below;

Section	Minimum No. of Staff	Net Floor Area (m ²)
- Administration	10	200
- Public Relation	5	100
- Security	5	100
- Investment Promotion	5	100
- Company Section	5	100
- Finance	10	200
Sub-total	40	800

Following are common facilities of the company.

- Meeting room	60 m ²
- Guest room	20 m ²
- Reception corner	20 m ²
Sub-total	100 m ²

Thus the total net floor area of the management company office is to be 900 m².

ii) Local government office

The office is a space for stationing branch office of local authority to cooperate with the management company.

Number of staff is assumed five, thus 100 m² net floor area is given.

b. R & D and supporting

i) Public R&D institute

It is planned that public R & D institutes will be introduced to the zone, which will be an effective incentive for development and up-grading of the zone. These institutes will stimulate and activate Hi-Tech industries and support their activities.

They are planned as five units of office-style laboratory with 10 staffs and net floor area of 400 m² each. Thus the total number of staffs is 50 with

floor area of 2,000 m².

ii) Assembly hall

The hall is placed as one of the major information stations of the zone, which can house domestic and international technology conventions to promote the development of the Hi-Tech industry and encourage information and technology exchange.

It will shelter an audience of 200 ~ 300 and is of 600 m² net floor area (2 ~ 3 m²/per) with annexed exhibition hall of 200 m².

iii) Conference room

Medium scaled conference rooms are to be prepared for meetings and conferences of members of the Industrial Zone and the Urban Block for technological matters and management affairs.

2 units of 150 m² for a maximum 50 attendants are planned.

iv) Private office

The Urban Block is also expected to invite private business companies to provide high quality business supporting service to Hi-Tech industries of the zone. These services include not only basic service such like transportation, communication, equipment supply and secretarial service, but also highly sophisticated service, i.e. management, marketing, custom, patent, and engineering consulting.

Each office units have a prepared floor area of 100 m² for 5 staff and total number of units is assumed 15.

c. Coordination

i) Innovation centre

The centre is an office that arranges and coordinates good partnership of joint study amongst private enterprises, public and academic institutes, engineering consultants etc. This cooperation will help to stimulate Hi-Tech industry development of the zone and Malaysia as well.

The centre is managed by five staff and 10 m² nett floor area is to be prepared.

d. Incubation

i) Incubation/start-up room

This is a facility for still young venture industries endeavoring to establish their technology and enterprises. The facility consists of low-rent laboratories with consulting/advisory rooms which are used flexibly to meet occasional requirements. The facility is also installed a computer workshop and an information and technology exchange salon for junior engineers.

15 units of office-style laboratory will 40 m² floor for two engineers with movable light partitions, computer workshop with five personal computers of 50 m² and salon of 50 m² are to be prepared.

e. Training

i) Skill development centre

The skill development centre is planned to be run by the association of enterprises of the industrial zone with powerful supports and assistances from authorities related and institutes i.e. KSDC, Polymax, USM. The facility will start from the minimum scale and then grow up bigger as the organization of the association is stabilized and becomes more powerful and active.

In the centre, 6 units of classrooms for 25 trainees with 100 m² floor each, 2 units of workshops for 25 trainees with 200 m² floor each, 260 m² canteen for students and 100 m² administration office for 5 staffs are planned.

(For detail, see Section 6.6 Training.)

f. Information

i) Library

A small library with Hi-Tech advanced equipments such as computer reference system, on-line access to data-bases in the world as a technology information terminal, is planned.

The library will be managed by a minimum staff of three and have normal

section and reference section with five computers. Total net floor area is assumed 200 m².

ii) Science and technology exchange plaza (STEP)

STEP is aims to provide a space for communication as a technology community centre of members of the park to stimulate each other. It also works as an information terminal for the industries and a exhibition space of the Hi-Tech industries of Kulim to the visitors and the common.

The facility consists of 3 sections; exhibition hall & salon of 200 m², 3 conference rooms of 100 m² (40 attendants maximum) and information centre of 100 m² for 5 staff.

g. Others

i) Bank

Local and international banks' branch offices, which are to be connected with the main offices by an on-line system, will be installed for service for the enterprises and the common as well.

3 units of 200 m² for 10 staffs each are to be prepared.

ii) Restaurant/cafe

For workers and visitors of the Urban Block, a self-service style restaurant/cafe is planned. Its capacity is assumed to be 100, which is 40% of the total workers of the Hi-Tech Core, with 140 m² floor.

iii) Post office

The post office is to provide service chiefly to the Industrial Zone, but also to the housing zone nearby as well. Its service includes something special for the needs of the industries such as domestic and international super-express service etc.

The office itself is provided with a staff of 10 staffs and 200 m², and collection/ distribution section of 5 staff and 200 m².

iv) Telephone office

Telephone office is planned to serve the industrial area which will develop

its function to teleport for providing more advanced Hi-Tech service. At first it will start as a telephone office with 1,000 m² floor area, but has land of 1.0 ha for future development. Details are mentioned in Section 5.4

For other facilities, accommodation, commercial, police station and fire station, land for development are to be reserved as summarized below.

v) Police station

1.0 ha. of land is reserved for police station according to the federal planning standard to serve as an areal station.

vi) Fire station

1.2 ha. of land, which is requested from the local fire department, is reserved for fire station.

vii) Accommodation

3.0 ha. of land is reserved for accommodation facilities with sports facilities and garden. Accommodation facilities are assumed classified hotel with 100 rooms and condominium style hotel with 50 rooms.

viii) Commercial facility

2.0 ha of land is reserved for commercial facility which consists of super market, speciality shops, restaurants and parking.

Above mentioned facilities shall be housed in following five buildings in accordance with their styles of management and characters of function.

- Administration Core : housing public and semi-public facilities for service to the industries.
 - Management Company Office
 - Local Government Office
 - Public R & D Institute
 - Incubation/Start-up Room
 - Innovation Centre
 - Library
 - Post Office

- Assembly Hall
 - Conference Room
- Business Centre : housing private offices for service of industry supporting business
- Central Plaza : housing semi-public and public oriented private facilities i.e.
 - Science Technology Exchange Plaza
 - Bank
 - Restaurant/Cafe
- Telephone Office
- Skill Development Centre

The above mentioned five buildings are to be components which compose the very core, namely the Hi-Tech Core, which functions as the centre of the Industrial Zone as well. These buildings are to be located in the central portion of the Urban Zone and to be circled by the main rroup of service road. The northern part of the Urban Zone is planned as a reserved land for accommodation facilities, for its easy access and environment that forces the pond, and others. The southern part is reserved for commercial facilities and pubic security facilities, police and fire station. The commercial centre is planned to be located just next to the central plaza to give bustling atmosphere to the zone and land for security facilities is reserved at the south most area and secured emergency exit to the primary road.

Transport circulation Block plan, location of functions, and image plan of the Hi-Tech Core are shown in Fig. 5.9.1, 5.9.2, 5.9.3 and 5.9.4.

5.9.2 Development Programme

Facilities are classified into categories below by priorities.

- Programme 1 – Administration Core
 Business Centre
 Skill Development Centre
 Telephone office

Programme 2 – Police Station
Police Station
Central Plaza

Programme 3 – Hotel/Condominium
Commercial Centre

Above programme is a subject to be rearranged. All the structures were recommended to be steel and glass to reserve the expansibility of building and the flexibility of planning.

Table 5.9.1 Facilities of the Hi-Tech Core

	Floor Area/Staff (m ² /par)	Minimum No. of Staff	No. of Unit	Net Floor Area	Built-up Area (m ²)	Site (ha)
ADMINISTRATION CORE					2,500	1.5
i) Management Company Office				900		
- Administration	20	10	1	200		
- Public Relation	20	5	1	100		
- Security	20	5	1	100		
- Investment Promotion	20	5	1	100		
- Company Section	20	5	1	100		
- Finance	20	10	1	200		
- Meeting Room	-	-	1	60		
- Guest Room	-	-	1	20		
- Reception	-	-	1	20		
ii) Local Government Office	20	5	1	100		
iii) Public R & D Institute	40	10	5	2,000		
iv) Incubation/Start-up Room				700		
- Laboratory	20	2	15	600		
- Computer Workshop	10	5	1	50		
- Salon	-	-	1	50		
v) Innovation Centre	20	5	1	100		
vi) Library				200		
- Office	20	3	1	60		
- Reading Section	2	15	1	30		
- Reference Section	5	6	1	30		
- Storage	-	-	1	80		
vii) Post Office				400		
- Office	20	10	1	200		
- Collection/Distribution Section	40	5	1	200		
viii) Assembly Hall				800		
- Hall	3	200	1	600		
- Exhibition Hall	-	-	1	200		
ix) Conference Room	3	50	2	300		
BUSINESS CENTRE				1,500	100	0.6
i) Private Office	20	5	5	1,500		
CENTRAL PLAZA				1,400	1,000	0.6
i) Science and Technology Exchange Plaza				600		
- Exhibition Hall/Salon	-	-	1	200		
- Conference Room	3	33	3	300		
- Information Centre	20	5	1	100		
ii) Bank	20	10	3	600		
iii) Restaurant/Cafe				200		
- Self-service Style Floor	1.4	100	1	140		
- Kitchen	20	3	1	60		
iv) Plaza				1,600		
SKILL DEVELOPMENT CENTRE				1,300	850	1.2
i) Training Room	4	25	6	600		
ii) Workshop	8	25	2	400		
iii) Administration Office	20	5	1	100		
iv) Canteen				200		
- Self-service Style Floor	1.4	100	1	140		
- Kitchen	20	3	1	60		

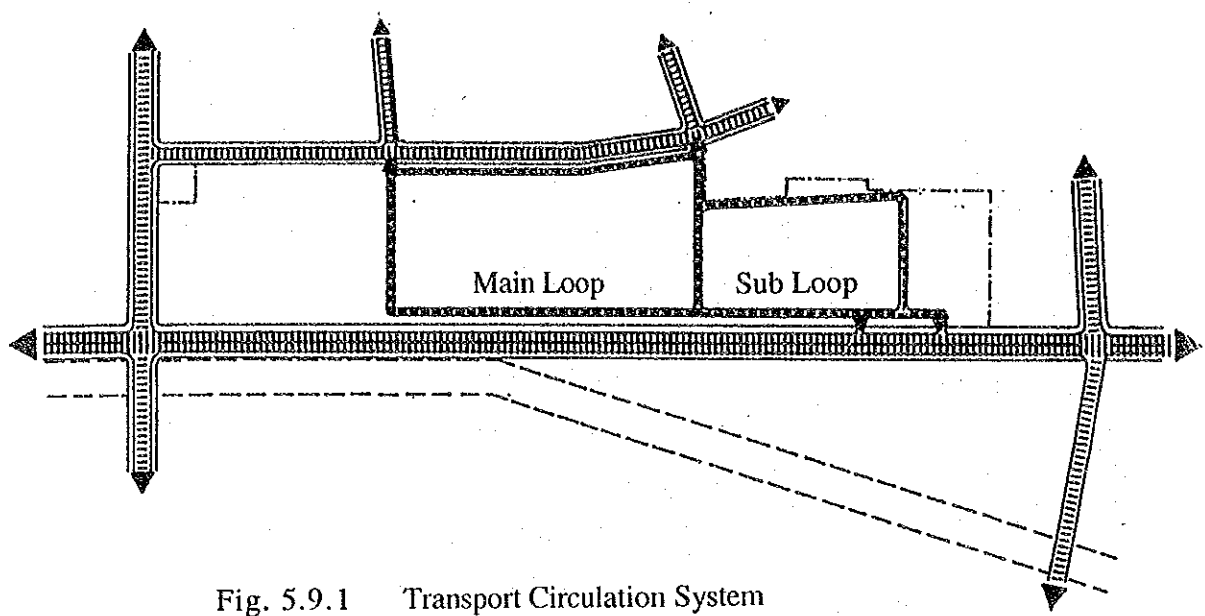


Fig. 5.9.1 Transport Circulation System

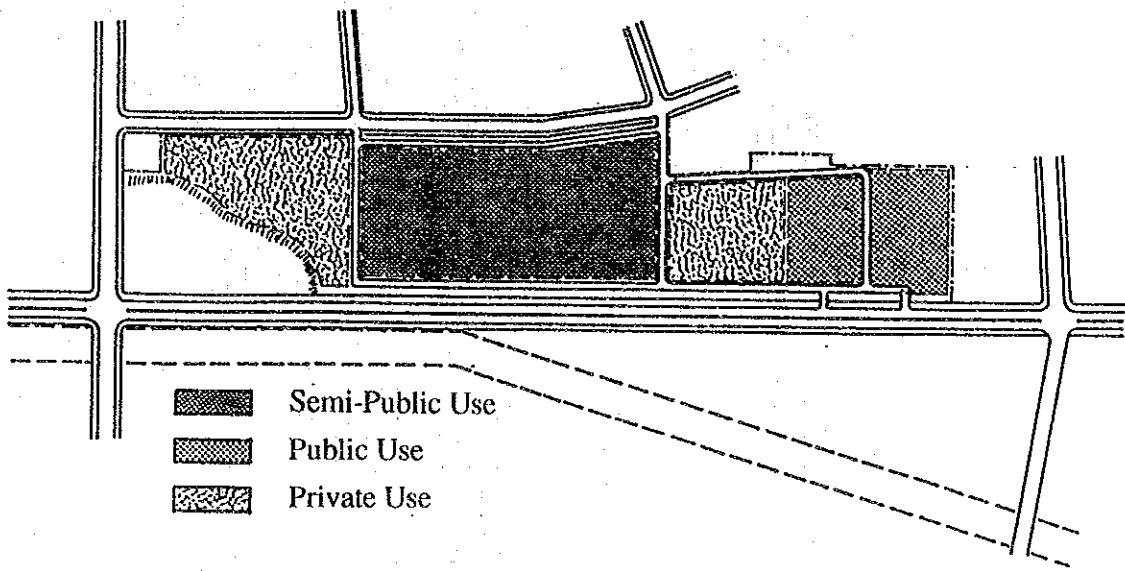
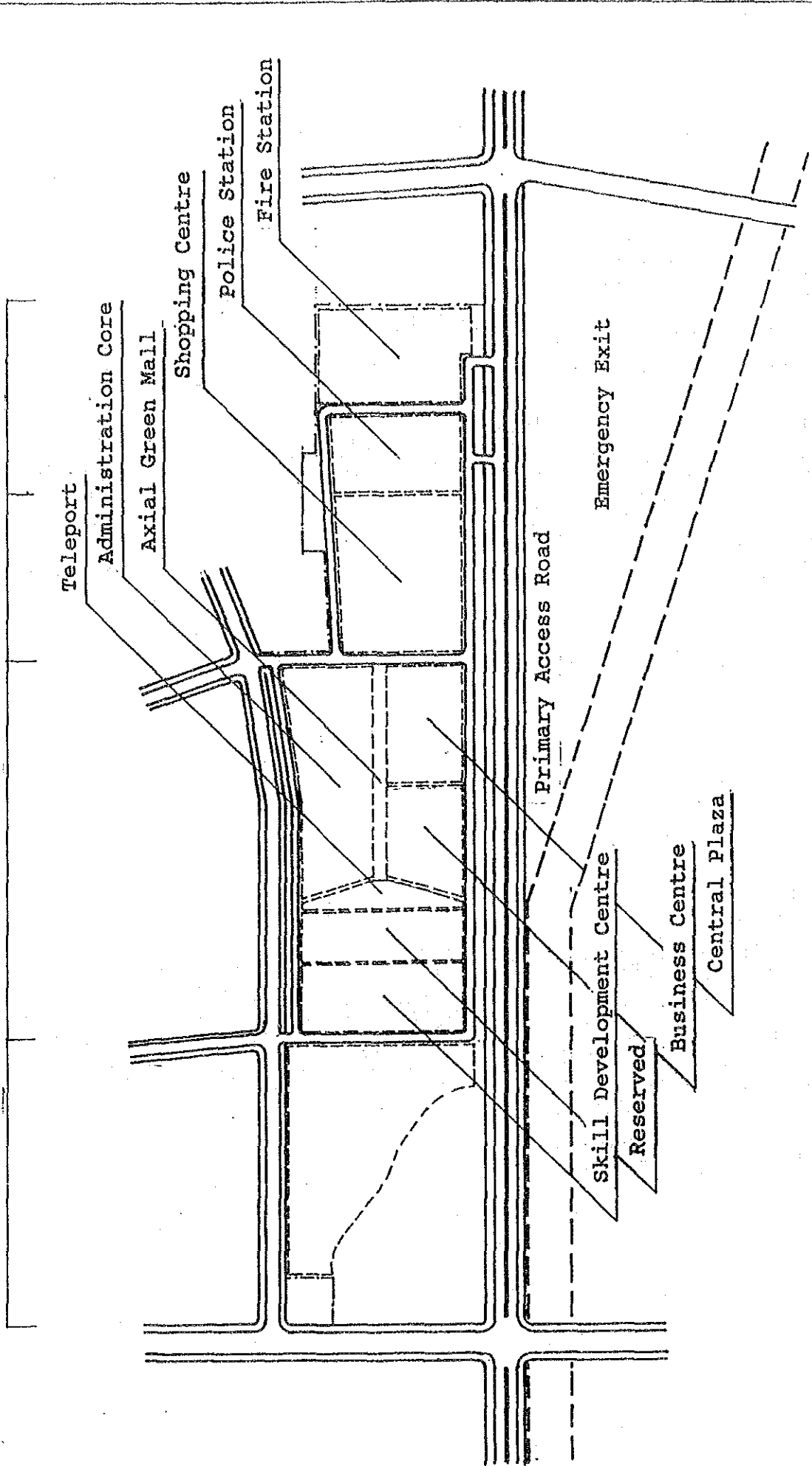


Fig. 5.9.2 Block Land Use

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

Fig. 5.9.3

Accommodation Hi-Tech Core Commercial Public

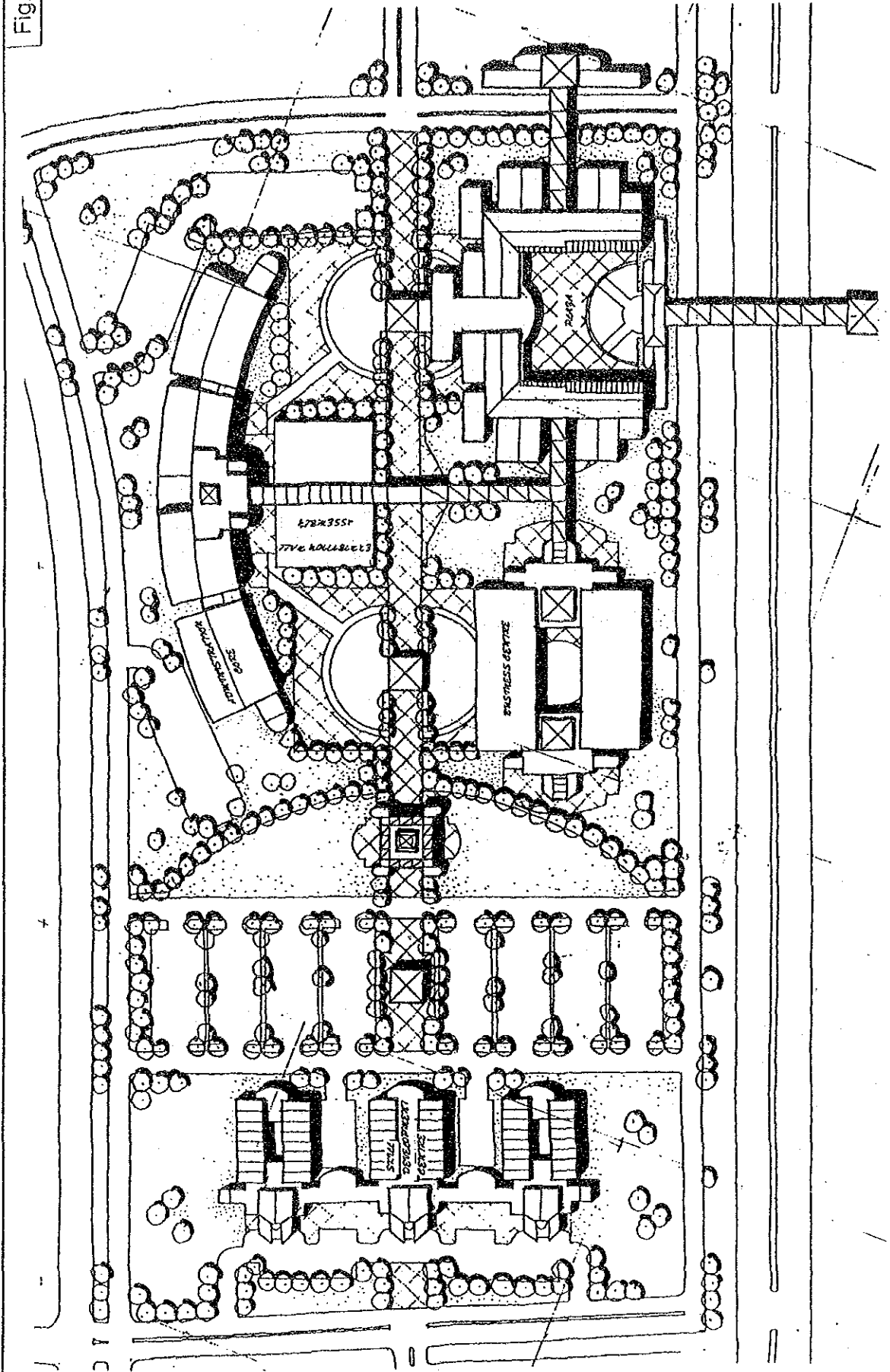


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KULIM HI-TECH INDUSTRIAL PARK
JAPAN INTERNATIONAL COOPERATION AGENCY

TITLE
Schematic Layout Plan

Fig. 5.9.4



THE GOVERNMENT OF MALAYSIA ECONOMIC PLANNING UNIT	THE STUDY ON ESTABLISHMENT OF KULIM HI-TECH INDUSTRIAL PARK JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Image Plan of Hi-Tech Core
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CHAPTER 6

IMPLEMENTATION PLAN OF FIRST PHASE INDUSTRIAL ZONE

6. IMPLEMENTATION PLAN OF FIRST PHASE INDUSTRIAL ZONE

6.1 Cost Estimate

6.1.1 General

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 costs are described in Chapter 8 for financial analysis. The direct construction cost for water supply system was amended from 40.4 million to 46.4 million according to the design change of reservoirs capacity.

The investment cost consists of the following cost items, as shown in Fig. 6.1.

- Direct construction cost
- Land acquisition/compensation cost
- Administration cost
- Engineering services cost
- Interest during construction
- Physical and price contingencies

The project investment cost for the first phase Industrial Zone was estimated based on the field investigations and collected data at site. Major survey items were as follows;

- Unit construction cost recently
- Unit prices of construction materials
- Labour wages
- Plant and equipment cost
- Inland transportation cost
- Taxation
- Unit cost for land acquisition and compensation cost
- Social charges

6.1.2 Condition and Assumptions for Cost Estimate

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

(1) Price level

The price level of October 1991 was applied that are the time of execution of field investigation related the cost estimate works.

(2) Exchange rate

The foreign exchange rate was adopted as follow.

$$\text{US\$ One (1) = M\$ 2.70 = Japanese Yen ¥ 130.0}$$

(3) Currency of estimate

The estimated costs are indicate by the Malaysian Ringgit.

(4) Disbursement of investment cost

The investment cost is assumed to be disbursed following the proposed implementation period of three (3) years started from 1992.

6.1.3 Estimate of Construction Cost

(1) Direct construction cost

The following cost items were included in the direct construction cost for the industrial zone of 250 ha in the first phase.

1) Land preparation

- Industrial Zone of 250 ha

2) Road network

- Cost for the road network within the Industrial Zone including two (2) bridges

3) Power supply system

- Transmission line cost between the Hi-Tech Park and Kulim sub-station and Sungai Petani substation for 132 kV
- Extension cost of feeder bay at Kulim and Sungai Petani existing S/S
- Main and distribution S/S and distribution lines in the Industrial Zone