GOVERNMENT OF MALAYSIA

THE FEASIBILITY STUDY OF COMPUTERISED AREA TRAFFIC CONTROL SYSTEM IN PENANG, MALAYSIA

FINAL REPORT

SUPPLEMENTARY VOLUME : DRAWINGS

JANUARY 1988

JAPAN INTERNATIONAL COOPERATION AGENCY

ATC SYSTEM IN PENANG, MALAYSIA FINAL REPORT SUPPLEMENTARY VOLUME : DRAWINGS JANUARY

GOVERNMENT OF MALAYSIA

THE FEASIBILITY STUDY OF COMPUTERISED AREA TRAFFIC CONTROL SYSTEM IN PENANG, MALAYSIA

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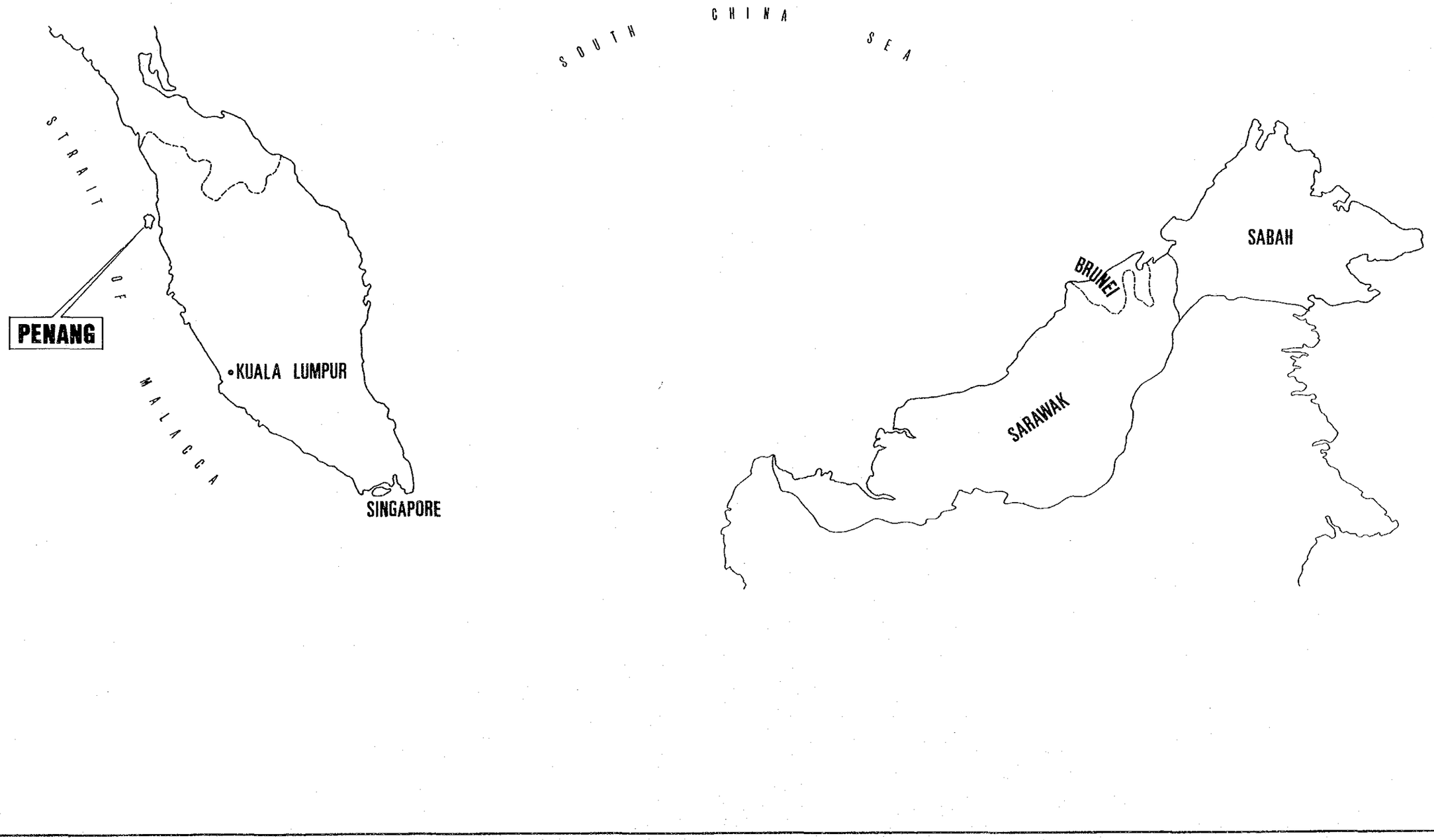
JANUARY 1988

JAPAN INTERNATIONAL COOPERATION AGENCY

MALAYSIA


SOUTH CHINA SEA
STRAIT OF MALACCA
PENANG
KUALA LUMPUR
SINGAPORE
BRUNEI
SABAH
SARAWAK

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1. ATC SYSTEM

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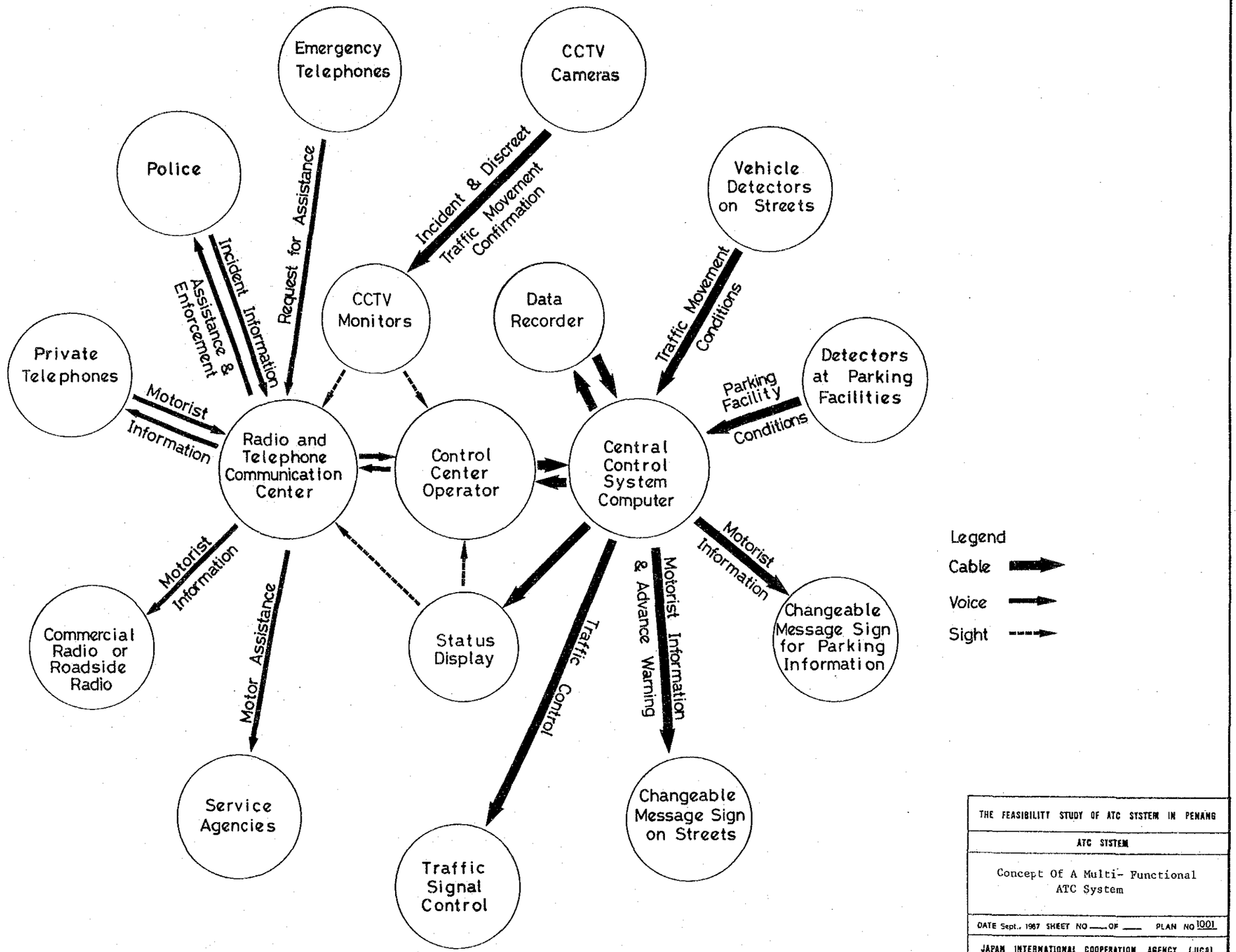


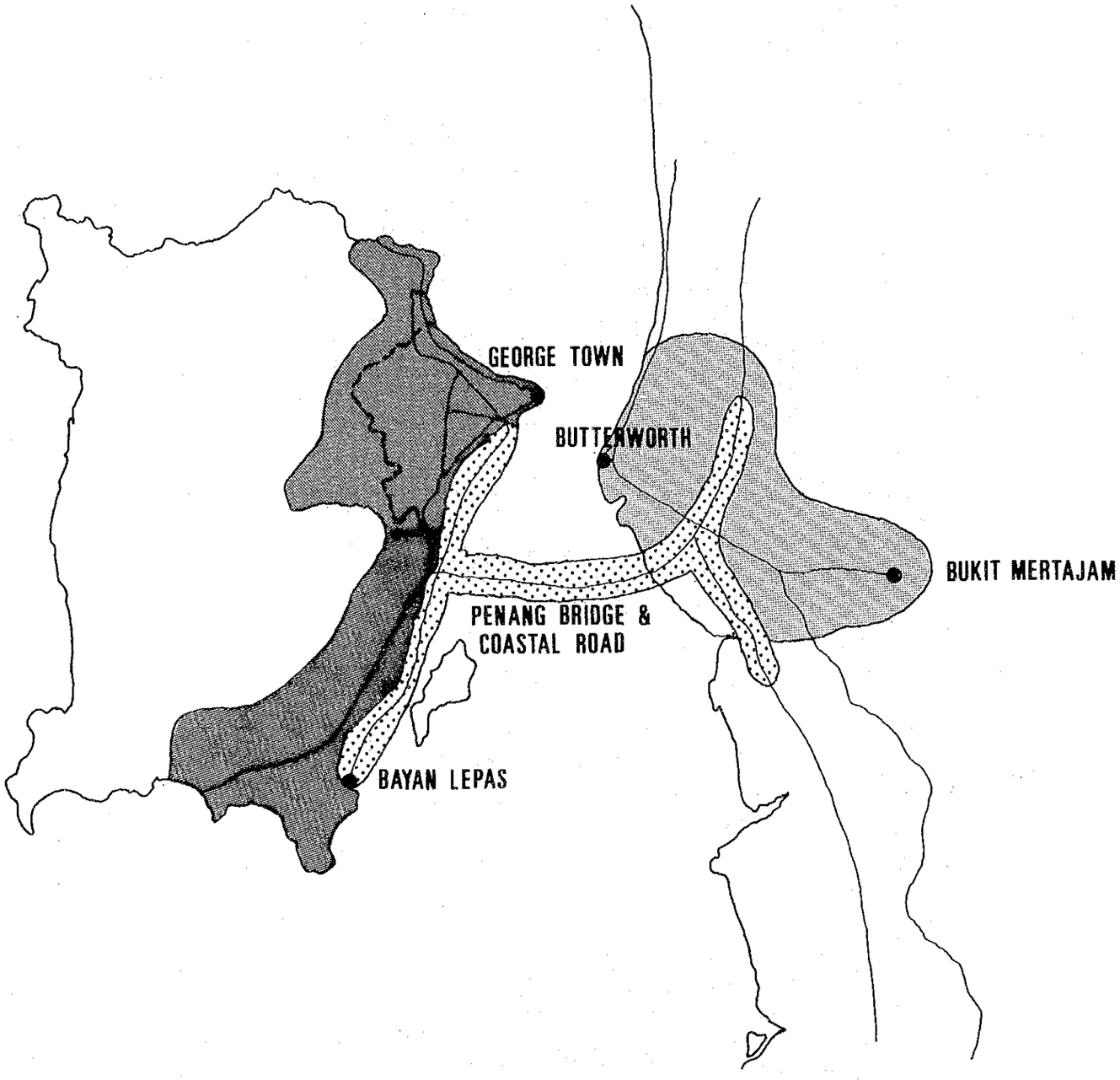
THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

ATC SYSTEM

Concept Of A Multi- Functional ATC System

DATE Sept., 1987 SHEET NO ___ OF ___ PLAN NO 1001

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)



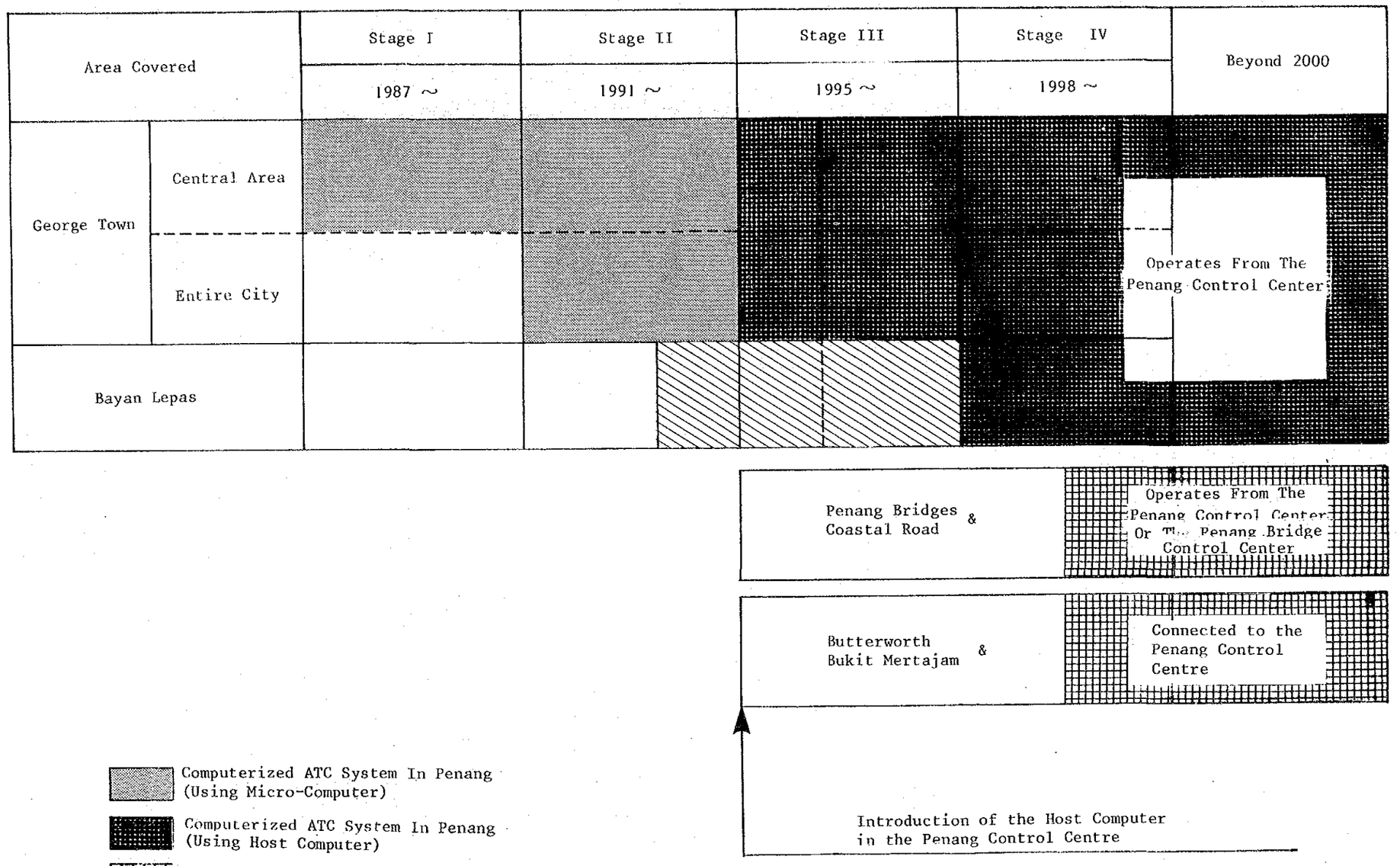
THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

ATC SYSTEM

Area Covered By The ATC System
In The Final Stage

DATE Sept., 1987 SHEET NO.__ OF __ PLAN No.1002

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)



Computerized ATC System In Penang (Using Micro-Computer)

Computerized ATC System In Penang (Using Host Computer)

Additional Isolated Signals

Computerized ATC System In Other Territories

Note: The entire operation for each stage begins from the year as indicated.

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

ATC SYSTEM

Planning Stages Of Area Covered By The ATC System

DATE Sept., 1987 SHEET NO.__ OF __ PLAN NO 1003

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

AREA COVERED		Stage I	Stage II	Stage III	Stage IV
		1987 ~	1991 ~	1995 ~	1998 ~
George Town	Central Area	Installation of computerized signals at 16 intersections	.44 intersections to be controlled by computerized signals .If other intersections required to be signalized in Stage III, micro-type of local controllers available to be connected to the computer will be adopted	29 intersections of high priority to be controlled by computerized signals 30 intersections of low priority to be controlled by computerized signals	Signalization requirements will be examined along the course of the project and necessary actions will be taken
	Entire City				
Bayan Lepas			5 intersections to be controlled by isolated signals, using the micro-type of local controller		Total 30 intersections to be controlled by computerized signals including 5 intersections installed in Stage II
Central Equipment		ATC Micro-Computer (Front -end processor) is introduced in the Control Centre		A host computer and a Front-End processor to be introduced in the Control Centre	A sub-station provided with a Front-End processor to be constructed in Bayan Lepas area
Foreseeable Events		Computerized ATC System in operation since April 1987		Opening of North Coastal Road	

Note: The entire operation for each stage begins from the year as indicated.

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

ATC SYSTEM

Planning Stages Of
The Atc System Aspects

Aspect 1: Traffic Signal Control System

DATE Sept., 1987 SHEET NO ___ OF ___ PLAN NO 1004

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

AREA COVERED	Stage I	Stage II	Stage III	Stage IV
	1987 ~	1991 ~	1995 ~	1998 ~
George Town	2 cameras and 2 monitor TV's	8 cameras and 8 monitor TV's	6 cameras and 6 monitor TV's	Necessary actions will be taken
Bayan Lepas				2 cameras and 2 monitor TV's
North Coastal Road and Penang Bridge				.8 cameras .8 monitor TV's .Necessary actions will be taken
Butterworth & Bukit Mertajam				.Some cameras and monitor TV's .Necessary actions will be taken

Note: The entire operation for each stage begins from the year as indicated.

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

ATC SYSTEM

Planning Stages Of
The Atc System Aspects
Aspect 2: CCTV System

DATE Sept. 1987 SHEET NO ___ OF ___ PLAN NO 1005

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

AREA COVERED	Stage I	Stage II	Stage III	Stage IV
	1987 ~	1991 ~	1995 ~	1998 ~
George Town			2 Changeable Message Signboards	. 3 Changeable Message Signboards . Introduction of a broadcasting system . Introduction of a mobile radio system
Bayan Lepas				2 Changeable Message Signboards
North Coastal Road				8 Changeable Message Signboards
Butterworth & Bukit Mertajam				Necessary actions will be taken

Note: The entire operation for each stage begins from the year as indicated.

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

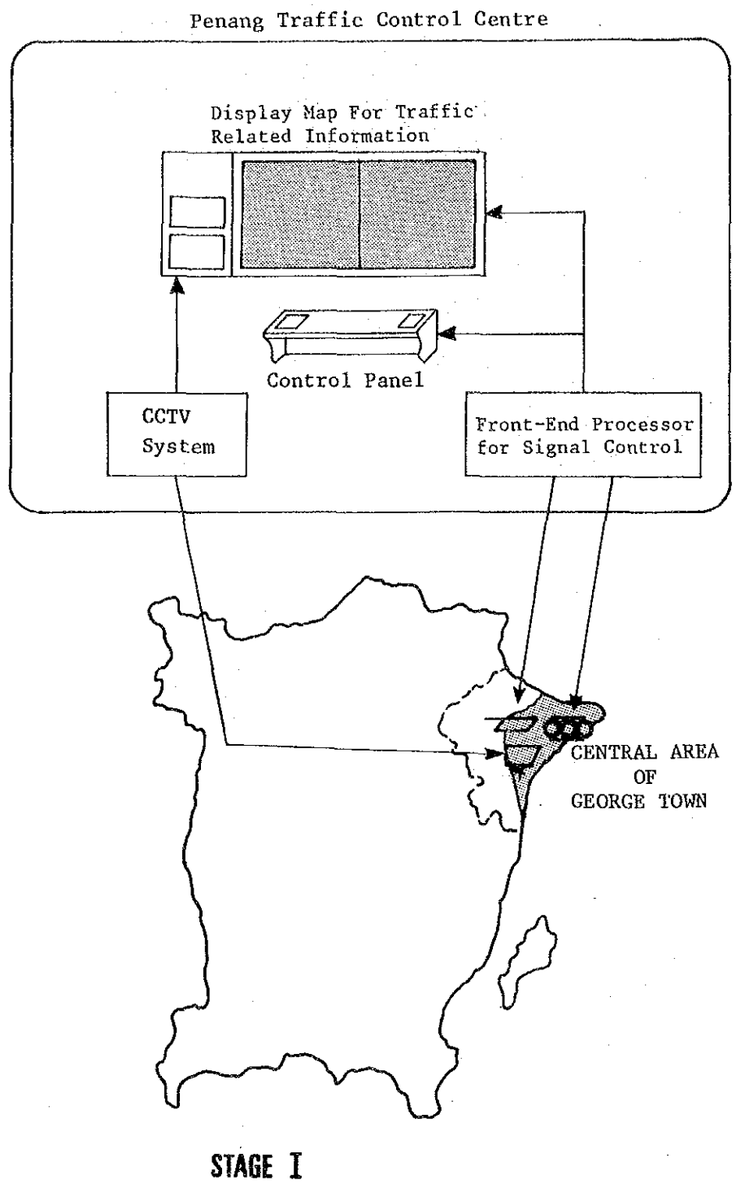
ATC SYSTEM

Planning Stages Of
The Atc System Aspects

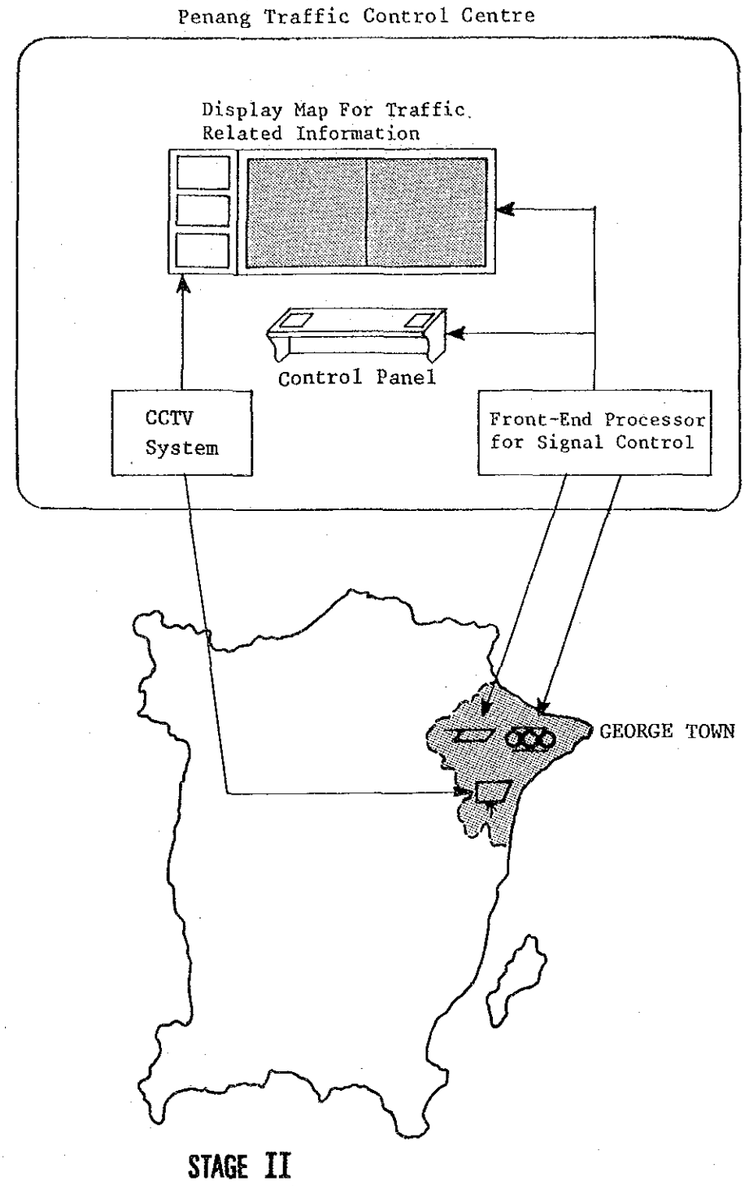
Aspect 3: Driver Information System

DATE Sept. 1987 SHEET NO ___ OF ___ PLAN NO 1006

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)



STAGE I



STAGE II

LEGEND

- TRAFFIC SIGNAL
- DETECTOR
- CCTV CAMERA

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

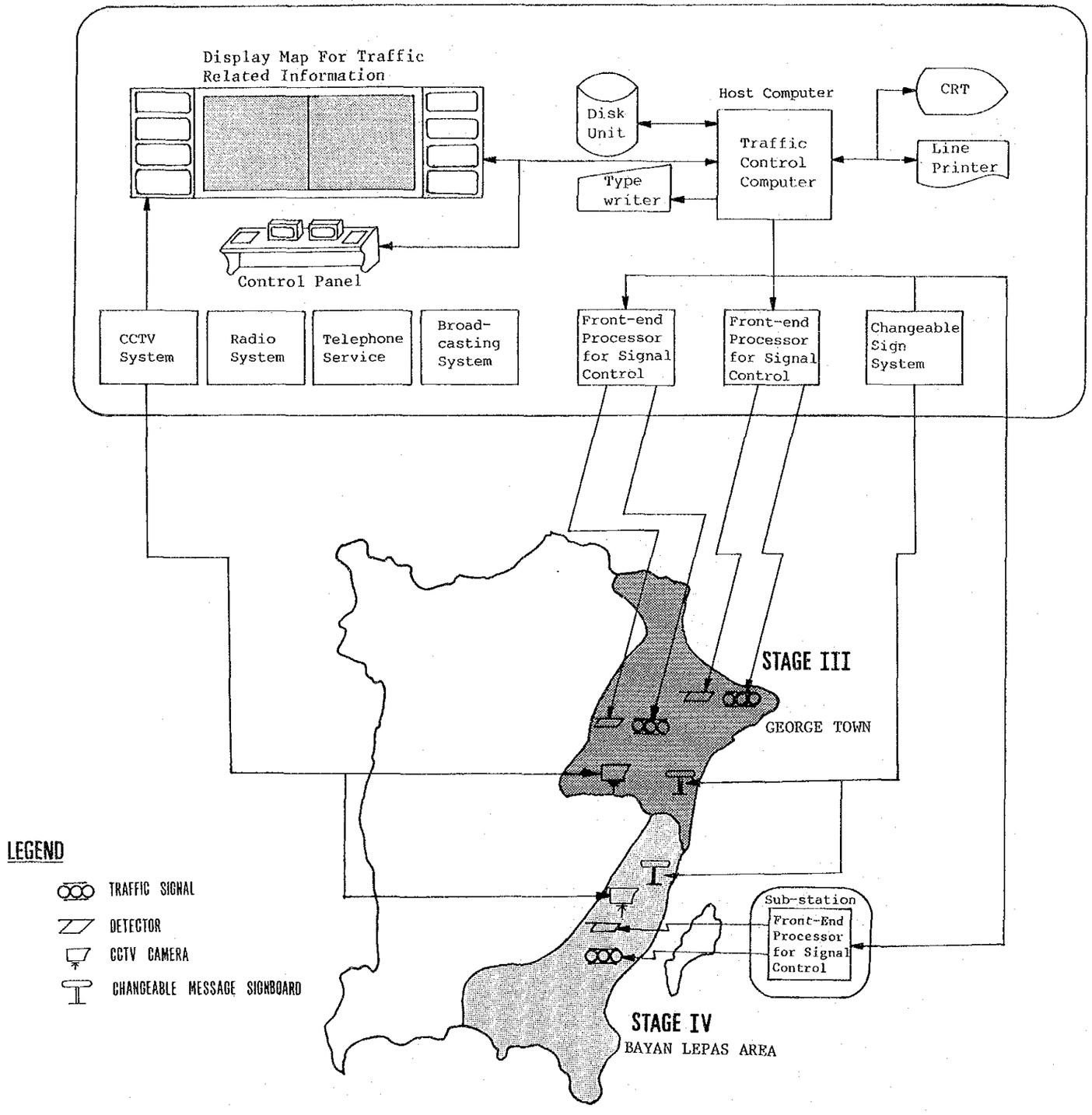
ATC SYSTEM

Main Hardware Structure Plan
In Stage I & II

DATE Sept., 1987 SHEET NO.__ OF __ PLAN NO 1002

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Penang Traffic Control Centre



THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

ATC SYSTEM

Main Hardware Structure Plan
Up To Stage III & IV

DATE Sept. 1987 SHEET NO ___ OF ___ PLAN NO 1008

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Penang Bridge and Coastal Road
Traffic Surveillance and Control System

Penang Traffic
Control Centre

Butterworth and Bukit Mertajam
Traffic Control Centre

Display Map for Traffic Related Information

Control Panel

CCTV System

Changeable Sign System

Front-end Processor for Ramp Control

FUTURE

Display Map for Traffic Related Information

Disk Unit

Host Computer

CRT

Traffic Control Computer

Line Printer

Type Writer

Control Panel

CCTV System

Radio System

Telephone Service

Broad-casting System

Front-end Processor for Signal Control

Front-end Processor for Signal Control

Changeable Sign System

STAGE I & II & III

Display Map for Traffic Related Information

Control Panel

CCTV System

Front-end Processor for Signal Control

FUTURE

GEORGE TOWN

BUTTERWORTH

PENANG BRIDGE & COASTAL ROAD

BUKIT MERTAJAM

Sub-Station

Front-end Processor for Signal Control

BAYAN LEPAS AREA

STAGE IV

LEGEND

- TRAFFIC SIGNAL
- DETECTOR
- CCTV CAMERA
- CHANGEABLE MESSAGE SIGNBOARD

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
ATC SYSTEM
Future Main Hardware Structure Plan
DATE Sept. 1987 SHEET NO ___ OF ___ PLAN NO 1009
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

N

CITY OF
GEORGE TOWN

0 500m 1km 1.5km

LEGEND:

- Existing Signalised Intersections
- Newly Signalised Intersections
- Primary Road
- Future Primary Road
- District Road
- Future District Road
- Local Road

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

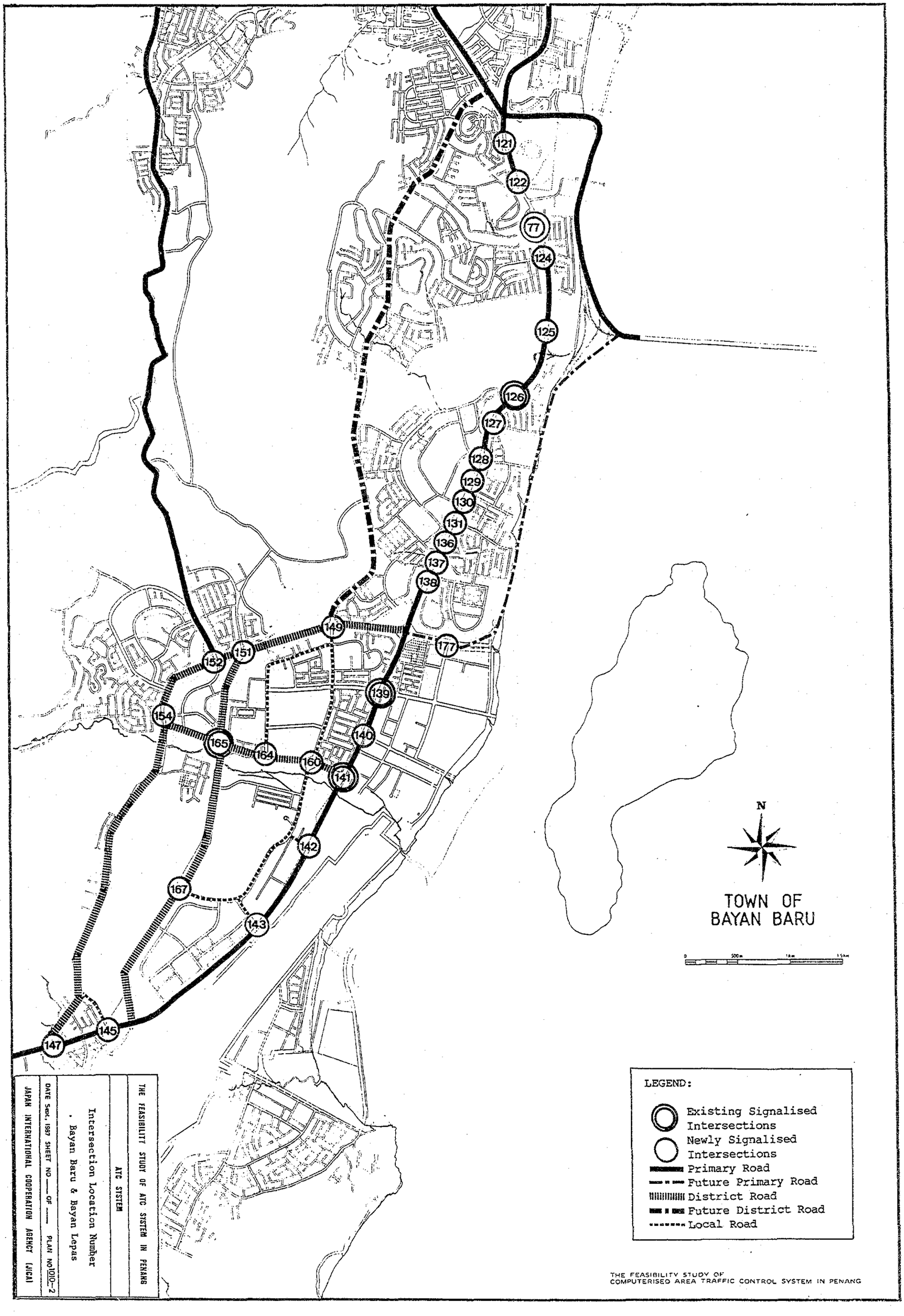
ATC SYSTEM

Intersection Location Number

City Of George Town

DATE Sept. 1987 SHEET NO. —— OF —— PLAN NO. 1010-1

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)



LEGEND:

- Existing Signalised Intersections
- Newly Signalised Intersections
- Primary Road
- Future Primary Road
- District Road
- Future District Road
- Local Road

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

ATC SYSTEM

Intersection Location Number

. Bayan Baru & Bayan Lepas

DATE Sept. 1997 SHEET NO.___ OF ___ PLAN NO 1010-2

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE FEASIBILITY STUDY OF
COMPUTERISED AREA TRAFFIC CONTROL SYSTEM IN PENANG

Intersection No.	Name
1	Weld Quay/Ferry Terminal
2	Weld Quay/Chulia St Ghaut
3	Beach St/Chulia St Ghaut
4	Pitt St/Chulia St Ghaut
5	Carnarvon St/Kimberly St
6	Carnarvon Circus
7	McNair St/Magazine Rd
8	Ria Rd/Magazine Rd
9	Magazine Intersection
10	Prangin Rd/Penang Rd/Burma Rd
11	Prangin Rd/Ria Rd/Sg. Ujong Rd
12	Penang Rd/Kimberly St/Phee Choon St
13	Penang Rd/Hutton Lane/Campbell St
14	Penang Rd/Chulia St/Argyll Rd
15	Transfer Rd/Burma Rd
16	Bridge St/macallum St/Macallum St Ght
17	Bridge St/Brick Kiln Rd/Jelutong Rd
18	Sg. Pinang Rd/Jelutong Rd
19	Dato Keramat Rd/Patani Rd/Siam Rd
20	Perak Rd/Sg. Pinang Rd
21	Perak Rd/Dato Keramat Rd
22	Perak Rd/Anson Rd
23	Dato Keramat Rd
24	Anson Rd/Macalister Rd
25	Burma Rd/Larut Rd/Anson Rd
26	Larut Rd/Northam Rd
27	Air Itam Rd/Trengganu Rd
28	Air Itam Rd/Kampar Rd
29	Air Itam Rd/Old Air Itam Rd
30	Air Itam Rd/Green Lane/Scotland Rd
31	Scotland Rd/York Rd/Batu Gantong Rd
32	Scotland Rd/Western Rd/Sepoy Lines
33	Western Rd/Macalister Rd/Brook Rd
34	Sg. Pinang Rd/Patani Rd
35	Green lane/Batu Lanchang Lane/Hamilton Rd
36	Green lane/Batu Lanchang Rd
37	Green lane/Jln Delima
38	Beach St/Light St/King Edward Place
39	Pitt St/Light St
40	Penang Rd/Farquhar St
41	Northam Rd/Transfer Rd
42	Transfer Rd/Argyll Rd
43	Weld Quay/North Coastal Rd
44	Prangin St Ghaut/Beach St/Bridge St
45	Northam Rd/Pangkor Rd
46	Pangkor Rd/Burma Rd
47	Pangkor Rd/Perak Rd/Peel Avenue
48	Perak Rd/Macalister Rd/Barrack Rd
49	Macalister Rd/Peel Avenue/Residency Rd
50	Ayer Rajah Rd/Cantonment Rd

Intersection No.	Name
51	Macalister Rd/Cantonment Rd
52	Burma Rd/Cantonment Rd
53	Kelawei Rd/Cantonment Rd
54	Western Rd/Brown Rd
55	Western Rd/Gottlieb Rd
56	Ayer Rajah Rd/Gottlieb Rd
57	Burma Rd/Gottlieb Rd/Bagan Jermal Rd
58	Tg. Tokomg Rd/Bagan Jermal Rd
59	Tg. Tokong Rd/Hock Lim Terrace
60	Tg. Tokong Rd/Fettes Rd
61	Tg. Tokong Rd/Old Tg. Tokong Rd
62	Western Rd/Ross Rd/Residency Rd
63	Western Rd/Dato Keramat Rd
64	York Rd/Air Itam Rd
65	Air Itam Rd/Batu Lanchang Lane
66	Thean Teik Rd/Air Itam Rd
67	Boundary Rd/Air Itam Rd
68	Zoo Rd/Air Itam Rd
69	Paya Terubung Rd/Kg. Pisang Rd
70	Free Sch. Rd/Trengganu Rd/Hamilton Rd
71	Free Sch. Rd/Perak Rd/Perak Lane
72	Jelutong Rd/Perak Lane
73	Jelutong Rd/Van Praagh Rd
74	Jelutong Rd/Perak Close/Jln Tengku
75	Jelutong Rd/Perak Rd/Batu Lanchang Rd
76	Gelugor Rd/Green Lane/Udini Rd
77	Gelugor Rd/Jln Hilir Pemancar
78	Beach St/Church St/Church St Ghaut
79	Beach St/China St/China St Ghaut
80	Pitt St/Church St
81	Pitt St/China St
82	Larut Rd/Hutton Lane/Argyll Rd
83	Burma Rd/Jln Zainal Abidin
84	Rangoon Rd/Burma Rd
85	Macalister Rd/Jln Zainal Abidin
86	Macalister Rd/Rangoon Rd
87	Brick Kiln Rd/Macallum St
88	Kampung Jawa Baru/Dato Keramat Rd
89	Patani Rd/Lines Rd
90	Sg. Pinang Rd/River Rd
91	Anson Rd/Siam Rd
92	Perak Rd/Lim Khoon Huat Rd
93	Barrack Rd/Tull Rd/Lim Khoon Huat Rd
94	Burma Rd/Brown Rd
95	Trengganu Rd/Caunter Hall Rd
96	Mount Erskine Rd/Hock Hin Terrace
97	Mount Erskine Rd/Fettes Rd
98	Tg. Tokong Rd/Jln Gajah
99	Jln Tg. Bungah/Jln Bunga Pudak
100	Tg. Bungah Rd/Cheah Beng Kim Rd

Intersection No.	Name
101	Tg. Bungah Rd/Vale of Tempe Rd
102	Tg. Bungah Rd/Chan Siew Teong Rd
103	Perak Rd/Van Praagh Rd
104	Jelutong Rd/Jelutong Avenue
105	Gelugor Rd/Gelugor Avenue
106	Batu Lanchang Rd/Jln Sir Ibrahim
107	Green Lane/Jln Tembaga
108	Green Lane/Batu Lanchang Avenue
109	Green Lane/Yeap Chor Ee Rd
110	Bridge St/Cecil St/Cecil St Ghaut
111	Macallum St Ghaut/Weld Quay Extension
112	Cecil St Ghaut/Weld Quay (Bunn Rd)
113	Sandilands St Ghaut/Weld Quay Extension
114	Sg. Pinang Rd/Weld Quay Extension
115	Perak Lane/Weld Quay Extension
116	Van Praagh Rd/Weld Quay Extension
117	Batu Lanchang Rd/Weld Quay Extension
118	Udini Rd/Weld Quay Extension
119	Green Lane/Free School Rd
120	Weld Quay/Lebuh Acheh
121	Glugor Rd/South Road (opposite Rescam)
122	Glugor Rd/Hala Pemancar
124	Glugor Rd/Jln Helen Brown
125	Glugor Rd/USM Main Entrance
126	Glugor Rd/Sg Dua Rd
127	Sg Nibong Rd/Tingkat Batu Uban Satu
128	Sg Nibong Rd/Persiaran Batu Uban
129	Sg Nibong Rd/Jln Pantai Jerejak
130	Sg Nibong Rd/Jln Helang
131	Sg Nibong Rd/Jln Aziz Ibrahim
136	Sg Dua Rd/Sg Nibong Rd
137	Sg Nibong Rd/Persiaran Pantai Jerejak
138	Sg Nibong Rd/Jln Bukit Kecil Satu
139	Sg Nibong Rd/Jln Mahsuri
140	Sg Nibong Rd/Lebuhraya Nibong
141	Sg Nibong Rd/Jln Tengah
142	Bayan Lepas Rd/Factory Entrance
143	Bayan Lepas Rd/Jln Mayang Pasir
145	Bayan Lepas Rd/Jln Mahkamah
147	Bayan Lepas Rd/Jln Relau
149	Relau Rd/Mayang Pasir Rd
151	Relau Rd/Jln Tun Datuk Dr Haji Awang
152	Relau Rd/Paya Terubong Rd
154	Relau Rd/Jln Tengah
160	Jln Tengah/Jln Mayang Pasir
164	Jln Tengah/Persiaran Mahsuri
165	Jln Tun Datuk Dr Haji Awang/Jln Tengah
167	Jln Tun Datuk Dr Haji Awang/Jln Sg Tiram
177	Relau Rd/Gerbang Bukit Kecil Satu(nearby)

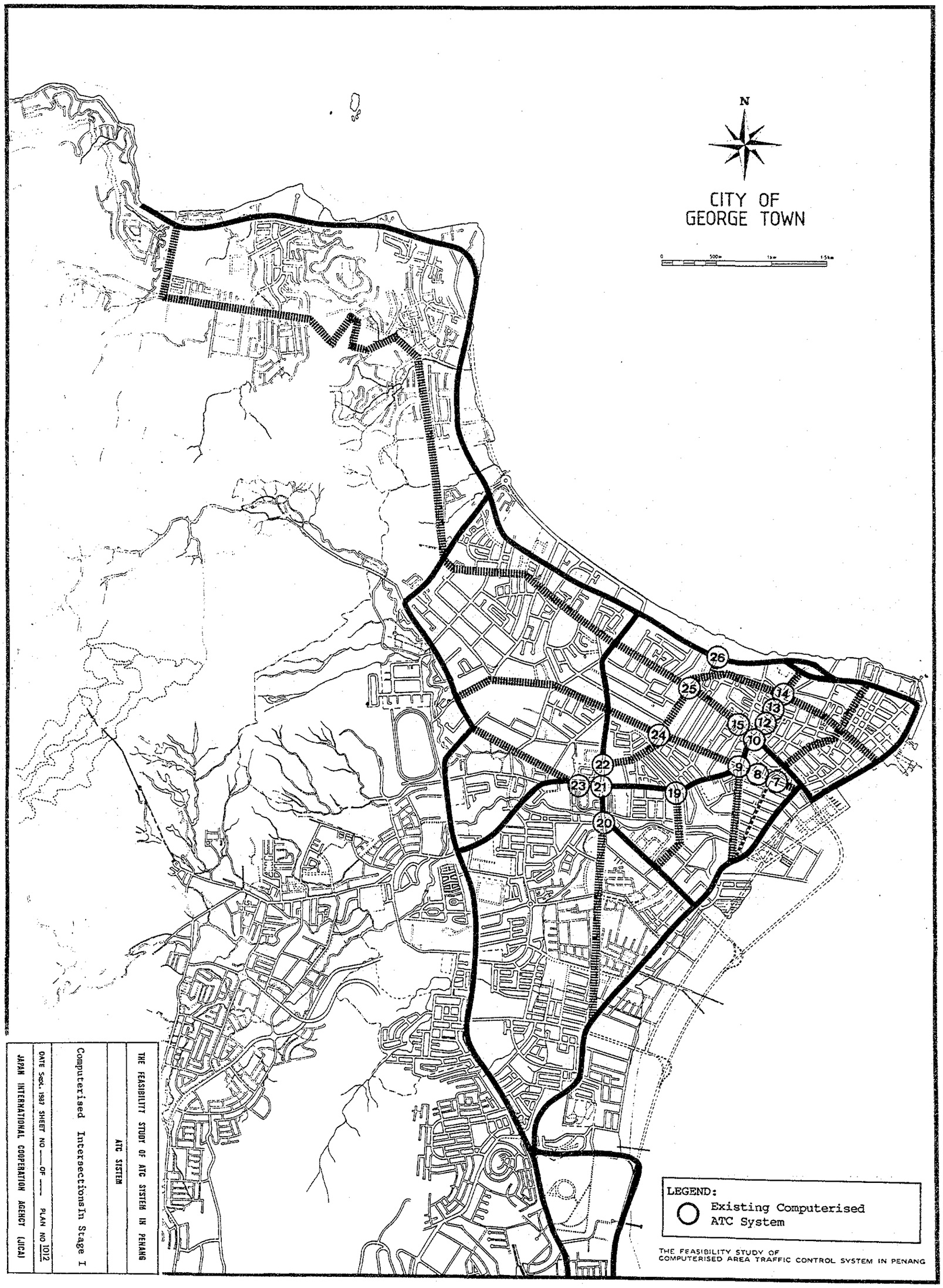
THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

ATC SYSTEM

Intersection Location Names

DATE Sept. 1987 SHEET NO. — OF — PLAN NO. 1011

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)



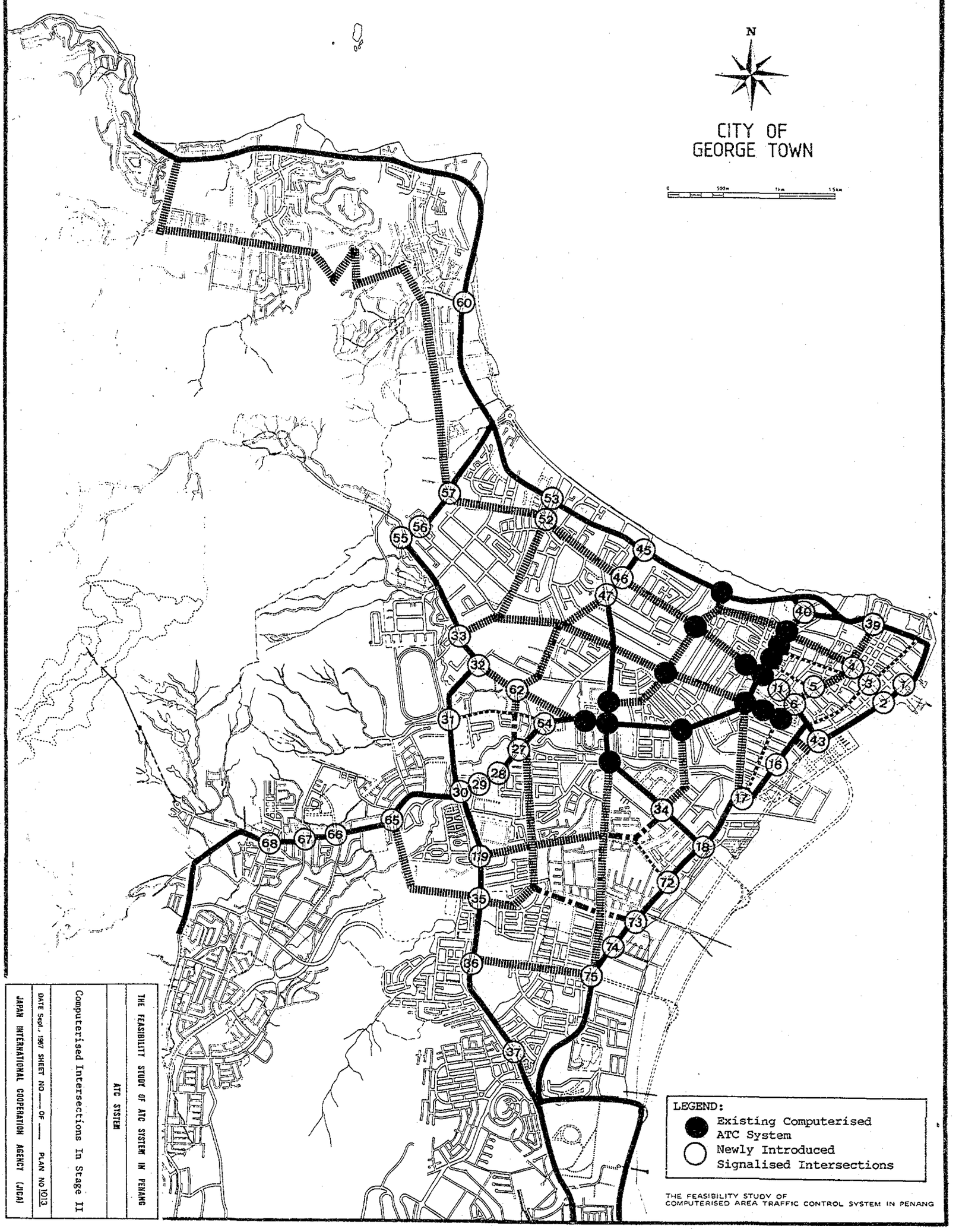
THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

ATC SYSTEM

Computerised IntersectionsIn Stage I

DATE Sept. 1987 SHEET NO ___ OF ___ PLAN NO 1012

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)



THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

ATC SYSTEM

Computerised Intersections In Stage II

DATE Sept. 1987 SHEET NO ——— OF ——— PLAN NO 1013

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

N

CITY OF
GEORGE TOWN

0 500m 1km 1.5km

LEGEND:
- Existing Computerised ATC System
- Newly Introduced Signalised Intersections

THE FEASIBILITY STUDY OF
COMPUTERISED AREA TRAFFIC CONTROL SYSTEM IN PENANG

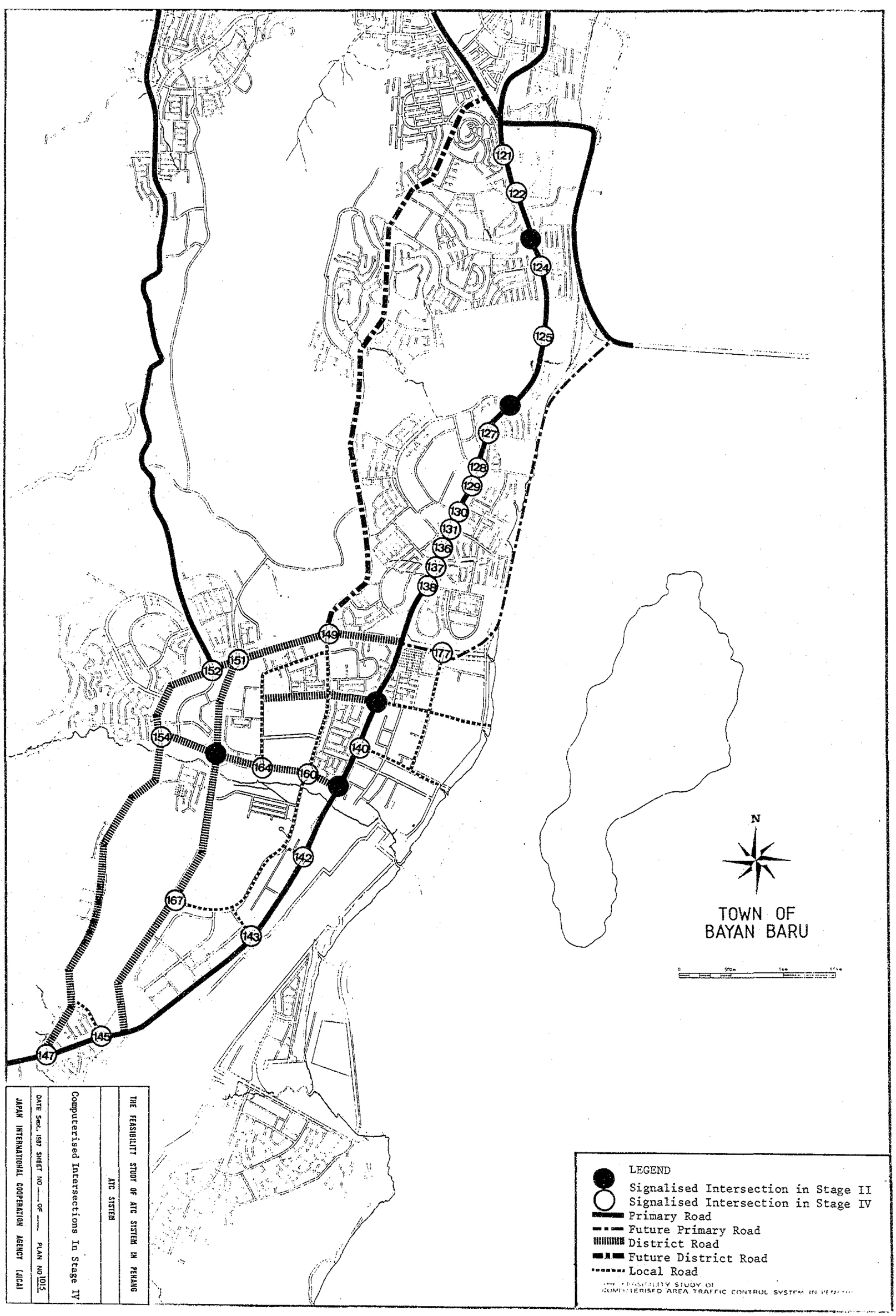
THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

ATC SISTEM

Computerised Intersections In Stage III

DATE Sept., 1987 SHEET NO. ___ OF ___ PLAN NO 1014

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)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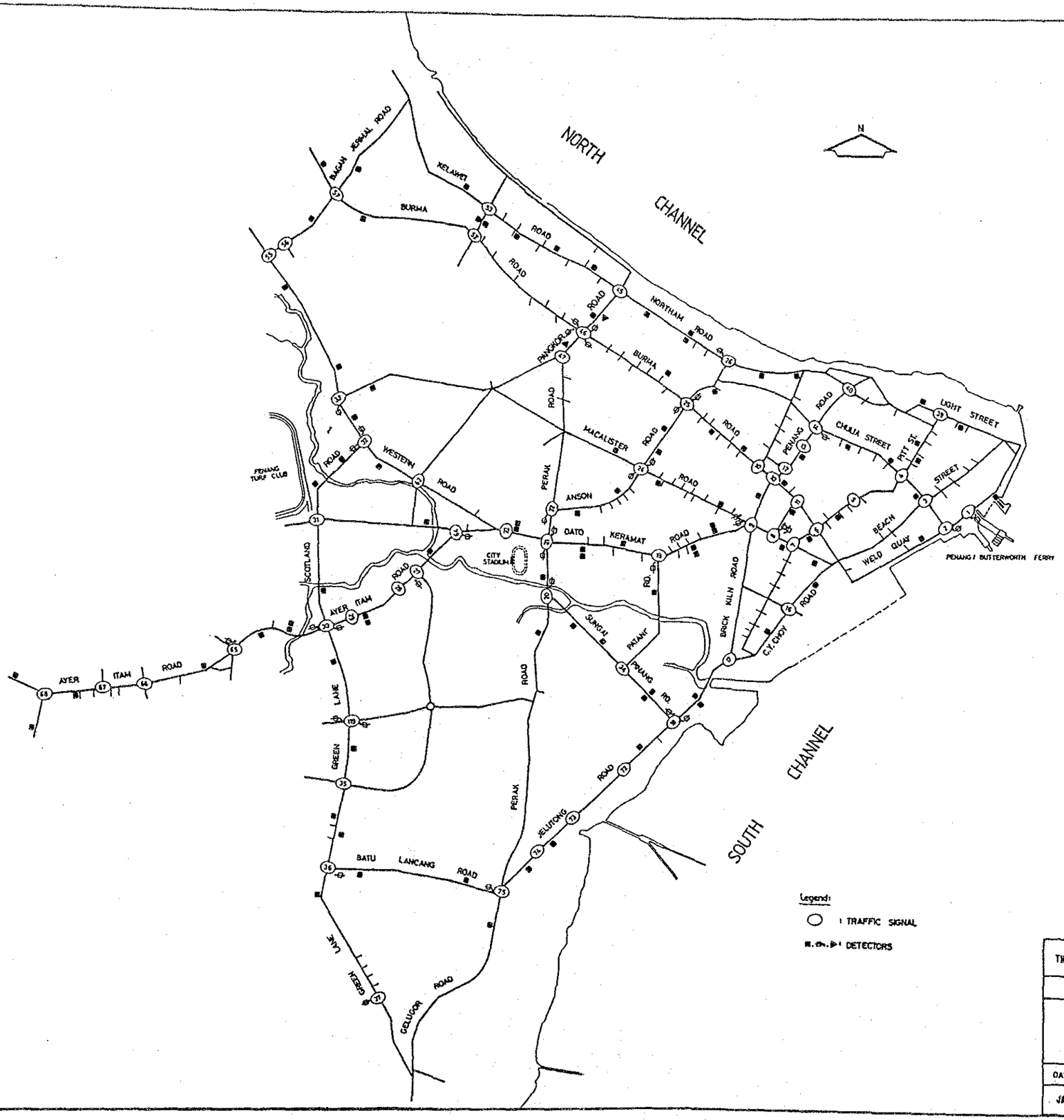
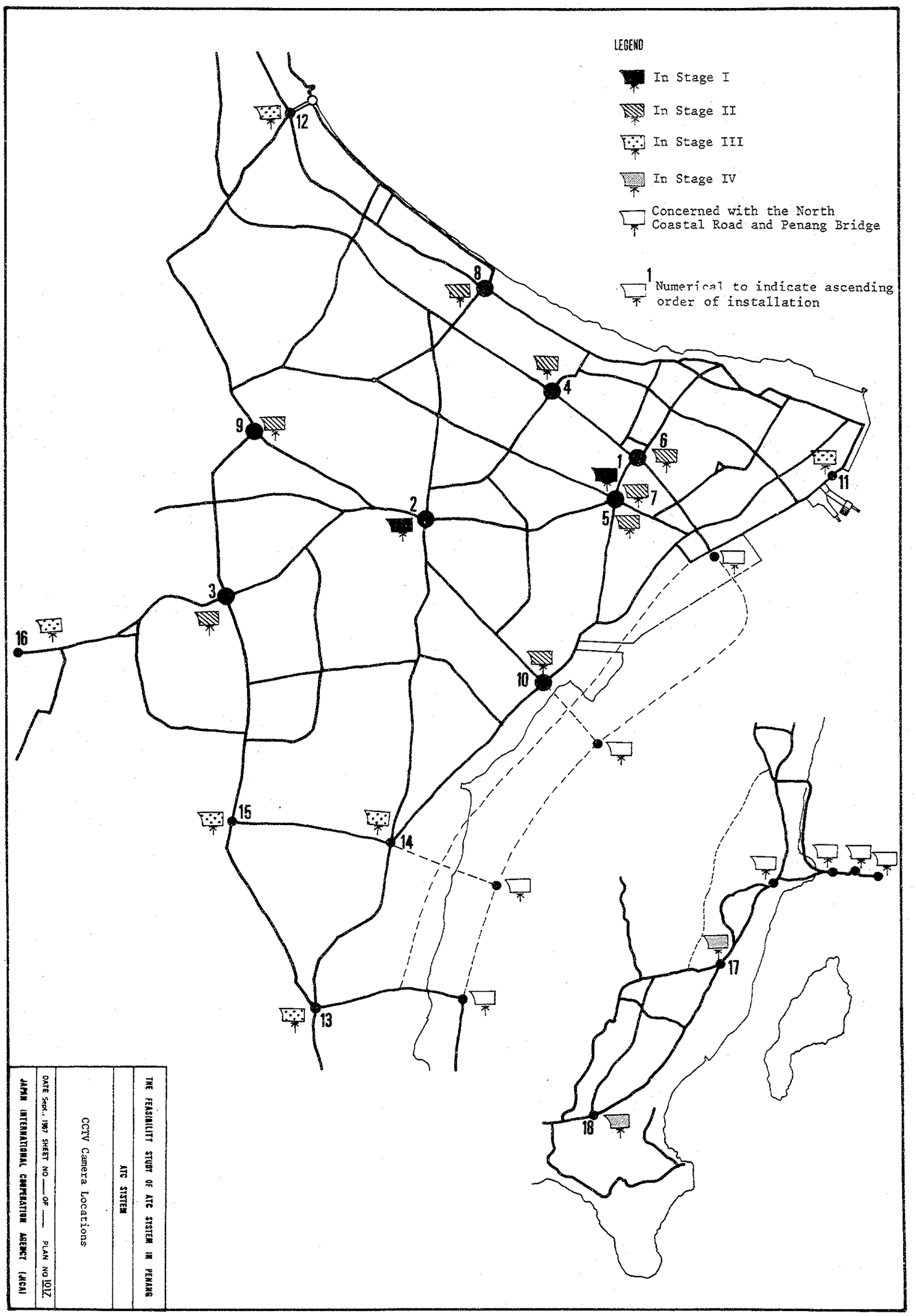
167
143
145
147
N
TOWN OF
BAYAN BARU
LEGEND
Signalised Intersection in Stage II
Signalised Intersection in Stage IV
Primary Road
Future Primary Road
District Road
Future District Road
Local Road
THE FEASIBILITY STUDY OF
COMPUTERISED AREA TRAFFIC CONTROL SYSTEM IN PENANG
THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
ATC SYSTEM
Computerised Intersections In Stage IV
DATE Sept. 1987 SHEET NO.—OF— PLAN NO 1015
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)



THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
ATC SYSTEM
Detector Locations In Stage II
DATE Sept., 1987 SHEET NO ___ OF ___ PLAN NO 1016
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)



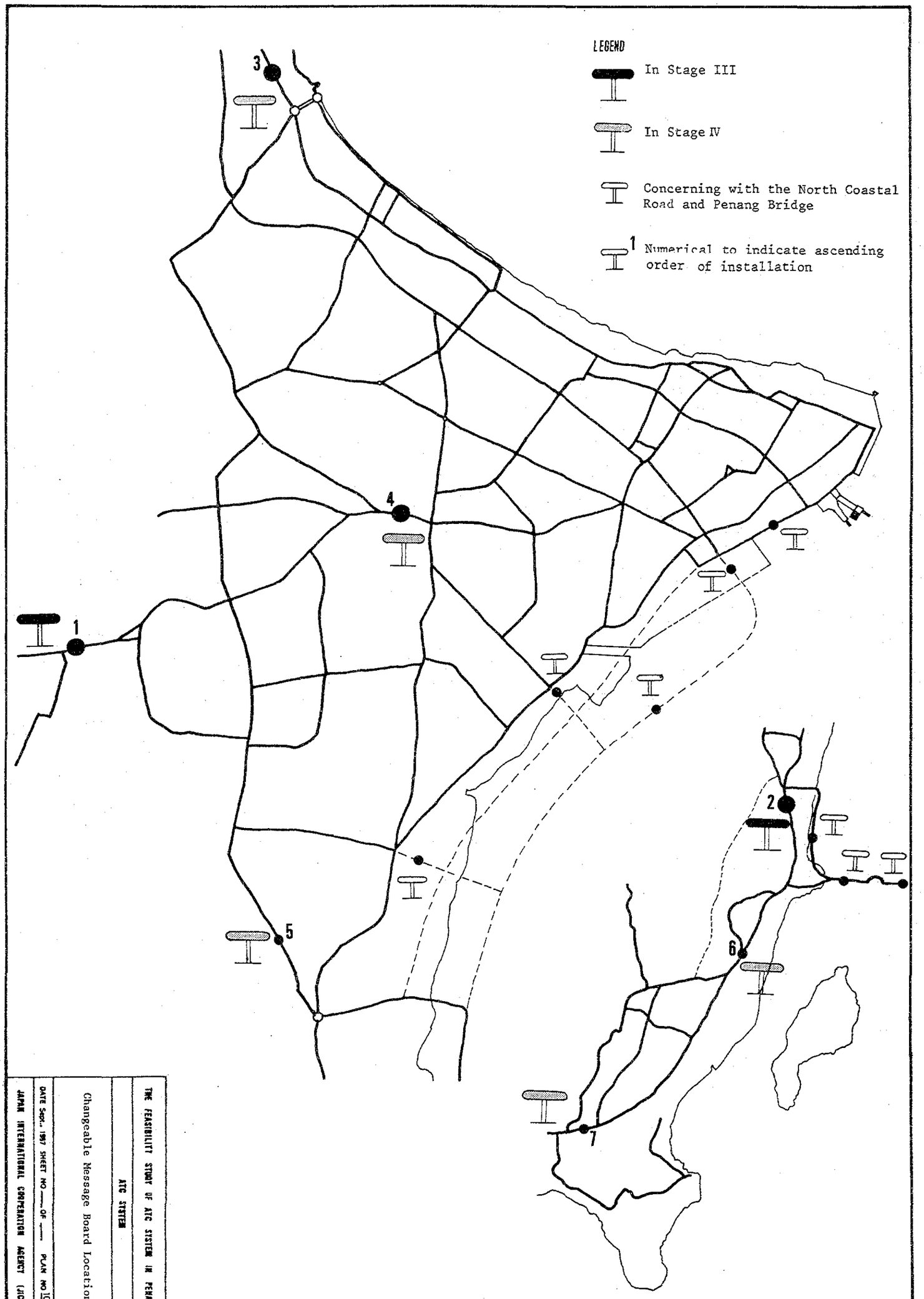
THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

ATC SYSTEM

CCTV Camera Locations

DATE Sept. 1987 SHEET NO. —— OF —— PLAN NO 101Z

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)



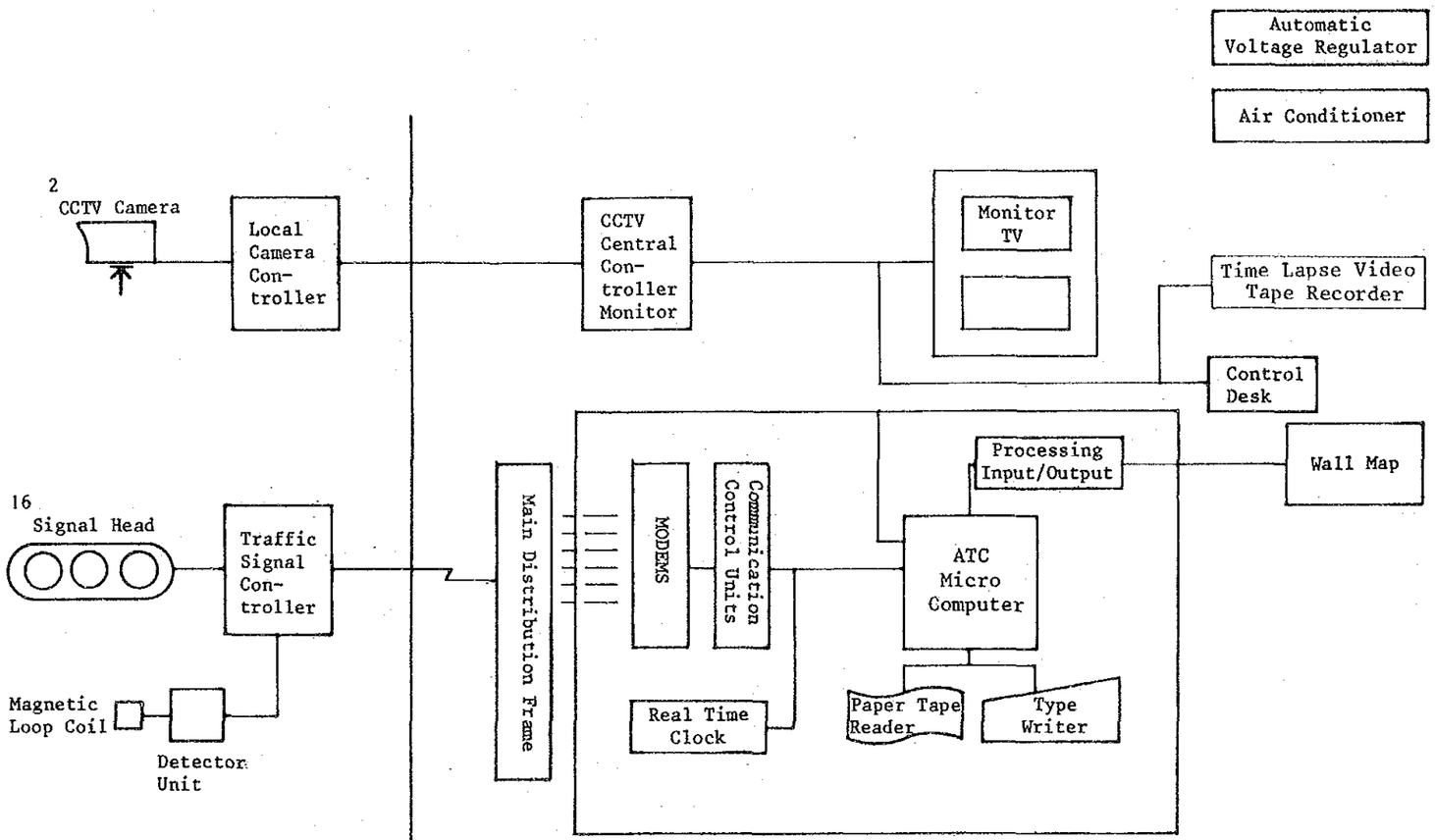
THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

ATC SYSTEM

Changeable Message Board Locations

DATE Sept., 1997 SHEET NO.___ OF ____ PLAN NO 1018

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)



THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

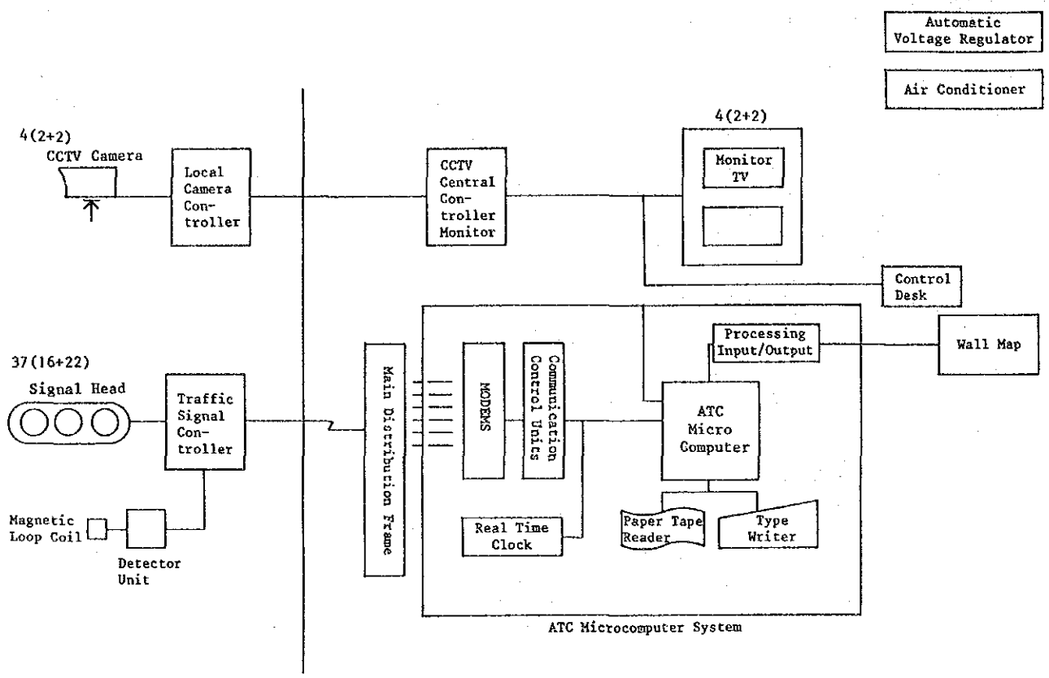
ATC SYSTEM

ATC System Configuration In Stage I

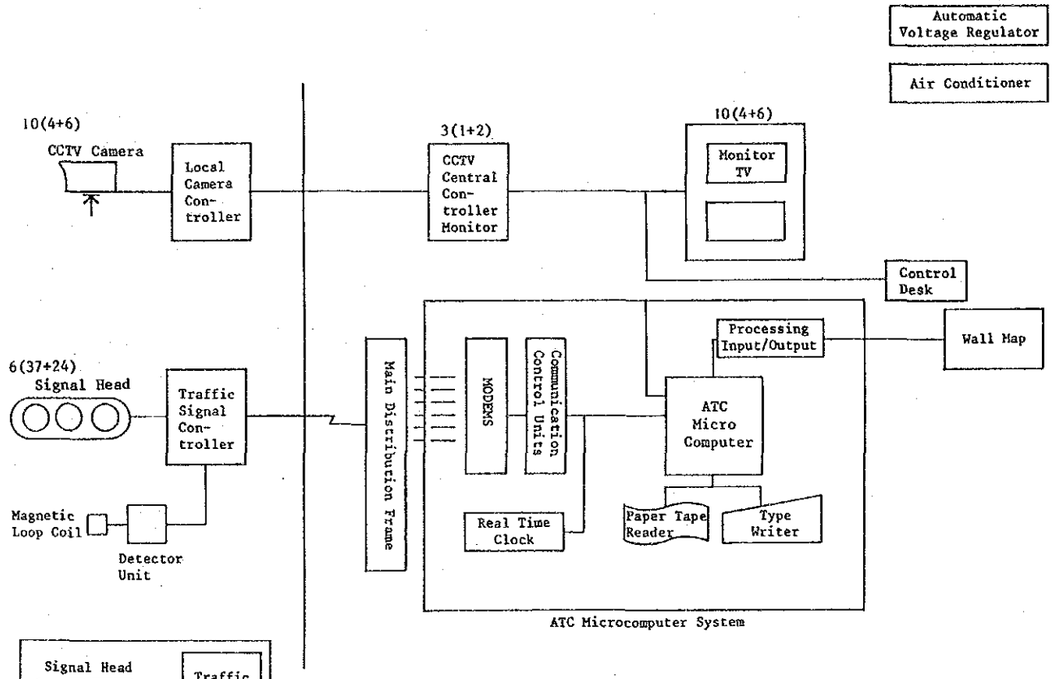
DATE Sept. 1987 SHEET NO ___ OF ___ PLAN NO 1019

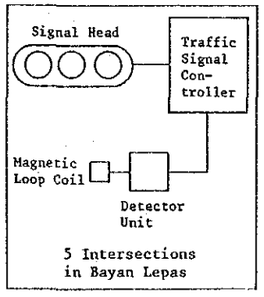
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Stage II (21 Computerised Intersections)



Stage II (Extension Plan For Computerised Intersections By 1990)



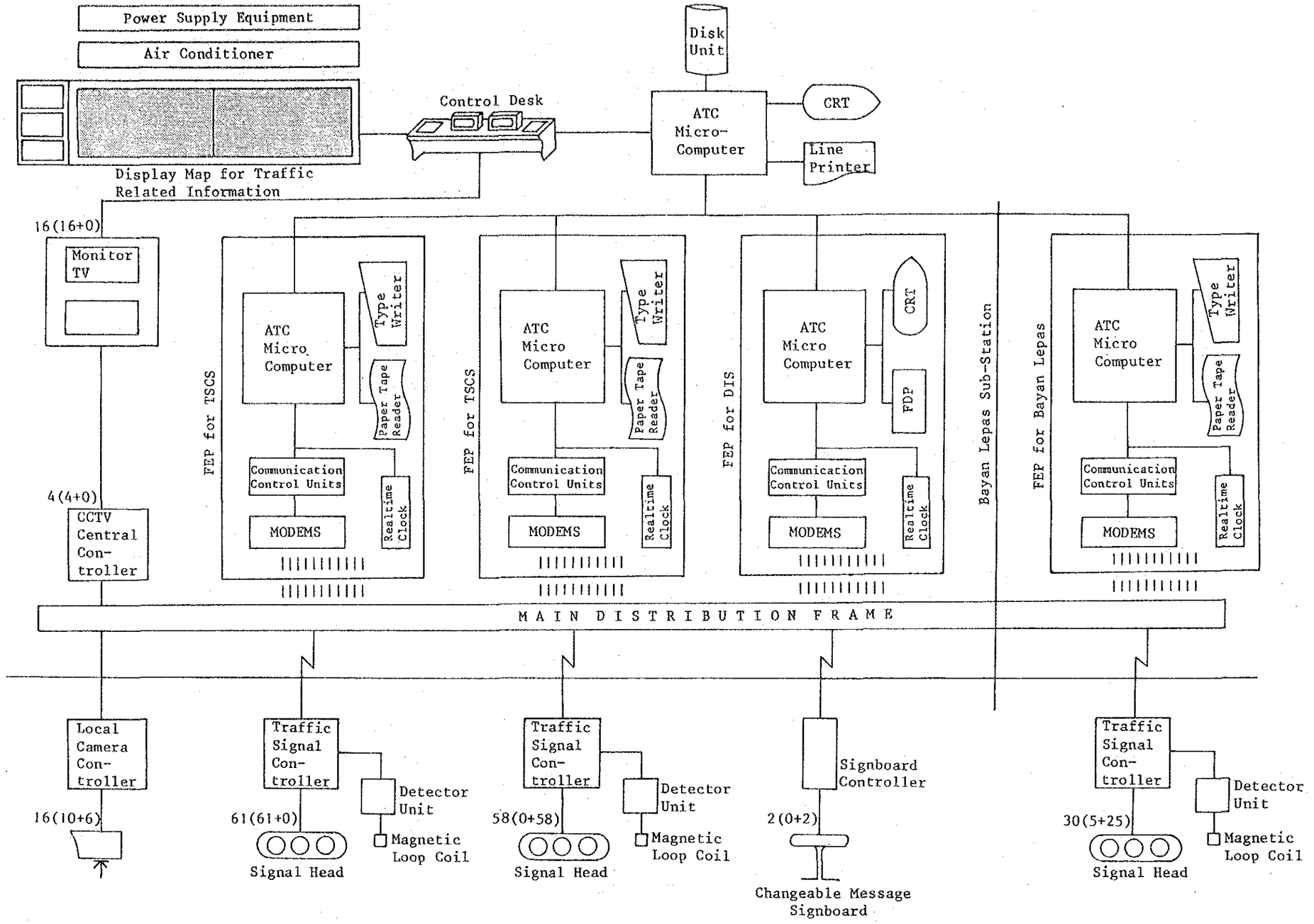


Legend

mn (i + j) where ;

mn : total number at this stage
i : total number up to the former stage
j : total number to be extended

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
ATC SYSTEM
ATC System Configuration In Stage II
DATE Sept. 1987 SHEET NO ___ OF ___ PLAN NO 1020
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

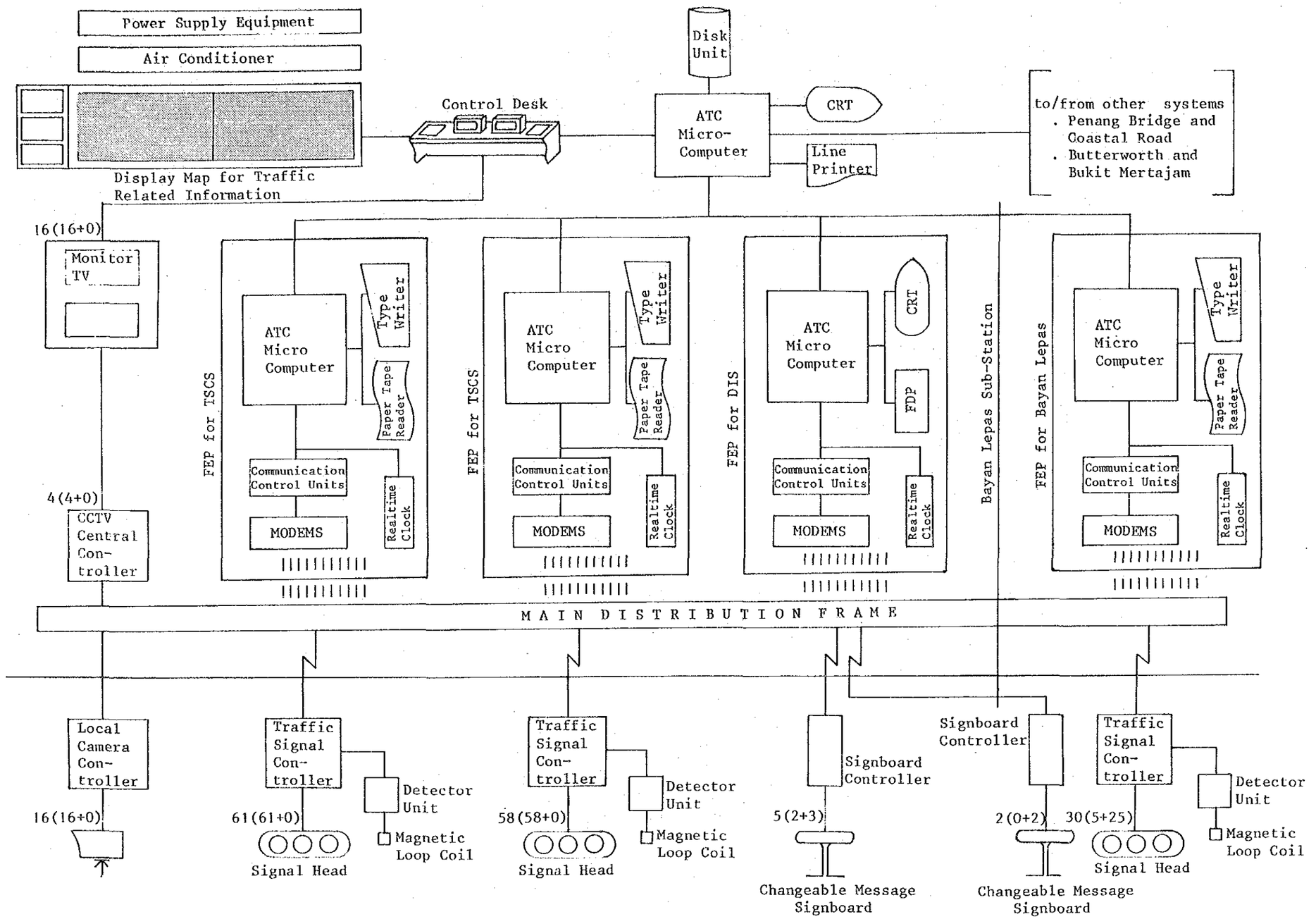


Legend

mn (i + j) where ;

mn : total number at this stage
i : total number up to the former stage
j : total number to be extended

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
ATC SYSTEM
ATC System Configuration In Stage III & IV
DATE Sept., 1987 SHEET NO. ___ OF ___ PLAN NO 1/21
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

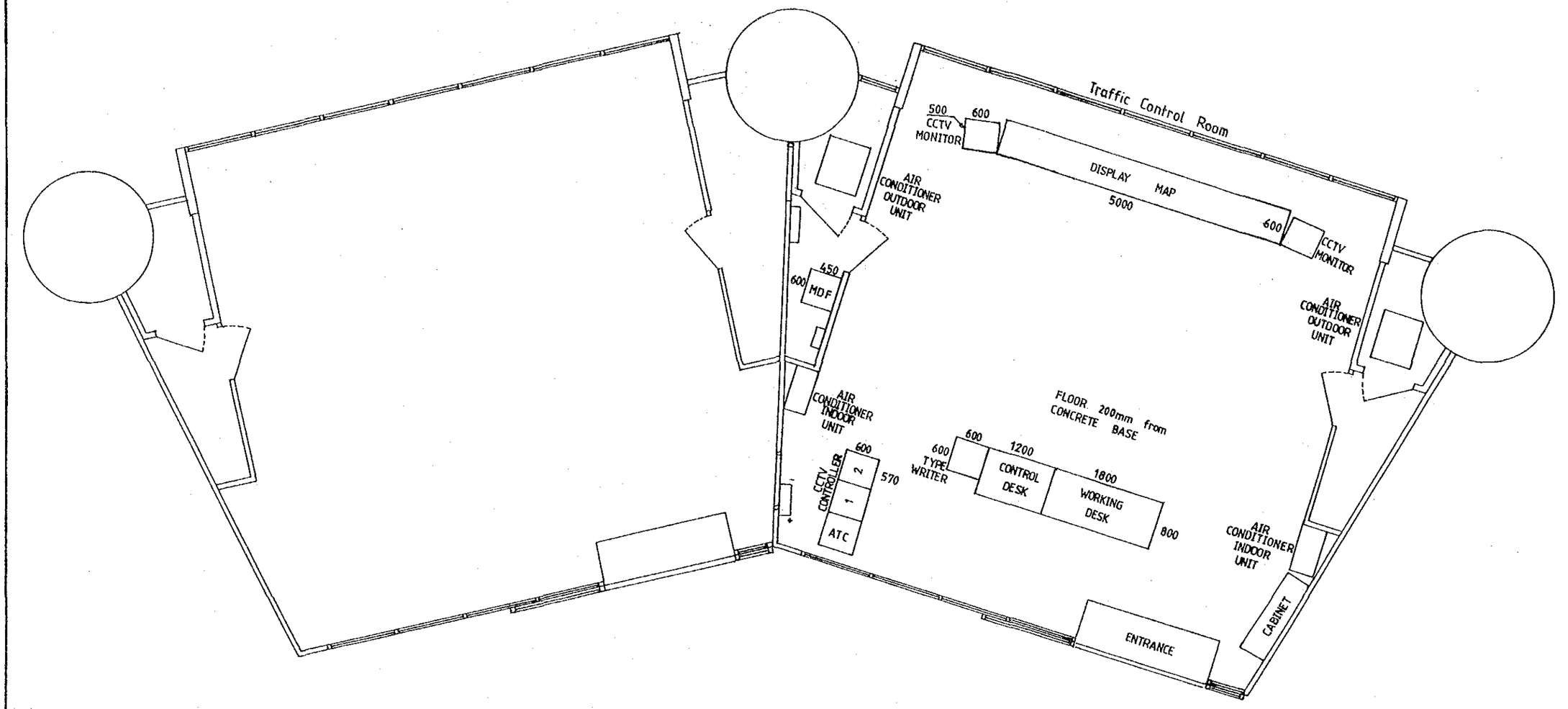


Legend

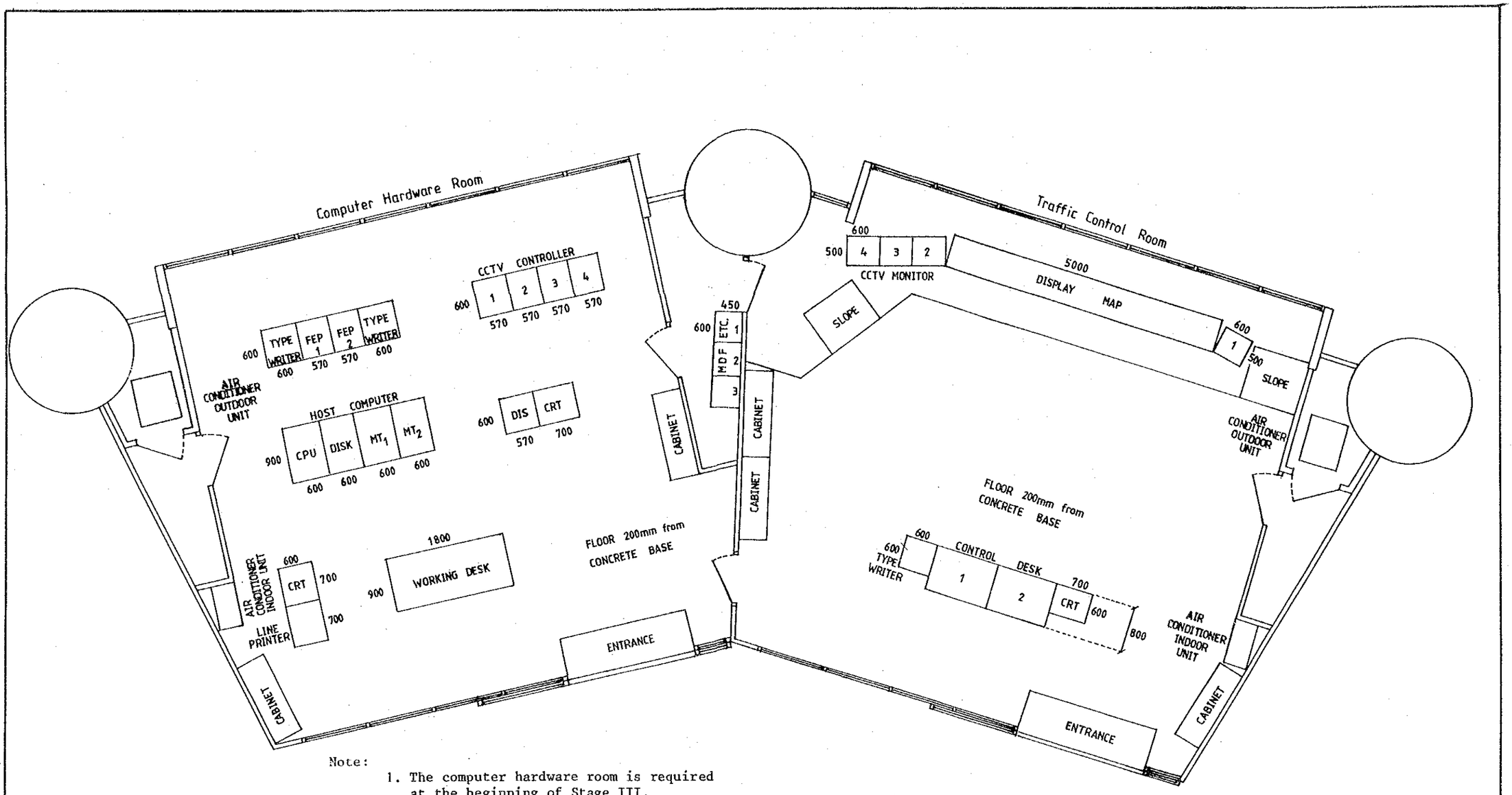
mn (i + j) where ;

mn : total number at this stage
i : total number up to the former stage
j : total number to be extended

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
ATC SYSTEM
Future ATC System Cofiguration
DATE Sept., 1987 SHEET NO ___ OF ___ PLAN NO 1022
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)



THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
ATC SYSTEM
Traffic Control Center Layout In Stage I & II
DATE Sept., 1987 SHEET NO ___ OF ___ PLAN NO 1023
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)



Note:

1. The computer hardware room is required at the beginning of Stage III.
2. The minimum space required to accommodate the power supply equipment for the emergency purposes is as follows:

Stage II	25.0 m^2
Stage III & Beyond	50.0 m^2

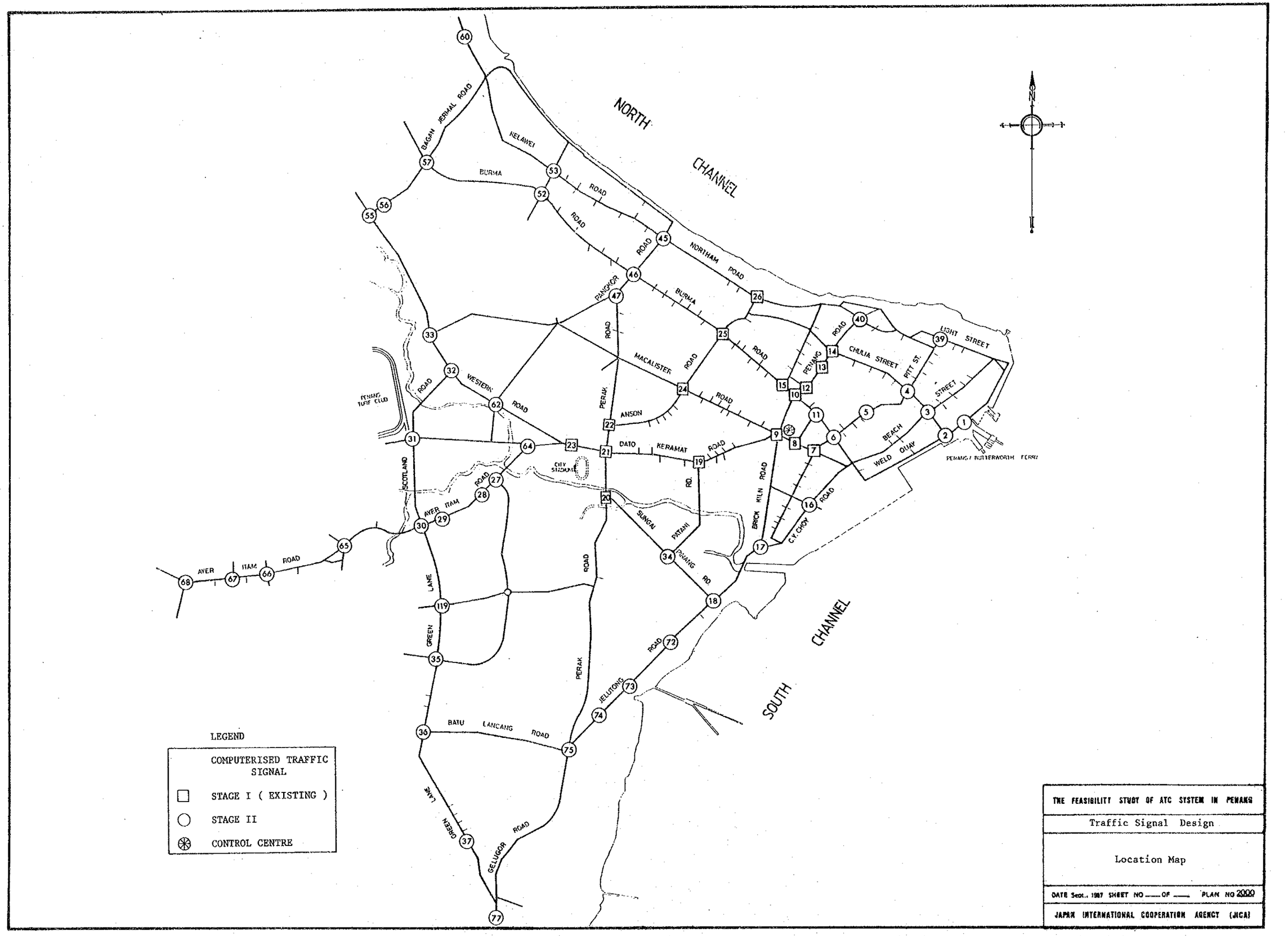
3. The minimum space required for a sub-station in Bayan Lepas is 6.0m^2.

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
ATC SYSTEM
Traffic Control Center Layout Between Stage III And The Future Stage
DATE Sept. 1987 SHEET NO ___ OF ___ PLAN NO 1024
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

2. INTERSECTION DESIGN FOR ATC SYSTEM

INDEX

** Excluded



THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

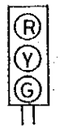
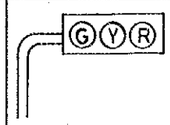
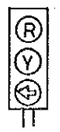
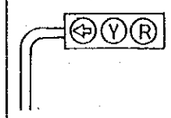
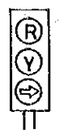
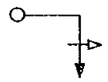
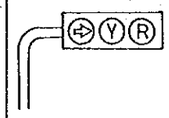
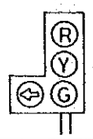
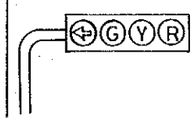
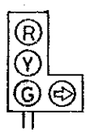
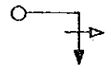
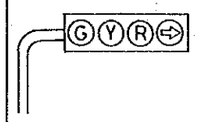
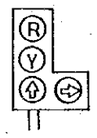
Traffic Signal Design

Location Map

DATE Sept., 1987 SHEET NO ____ OF ____ PLAN NO 2020

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL ASPECTS

SYMBOL	ITEM	TYPE	SYMBOL	ITEM	TYPE
		A11			B11
		A12			B12
		A13			B13
		A21			B21
		A22			B22
		A23			P
					PERMANENT GREEN ARROW
					PUSH BUTTON

LOCAL CONTROLLER & SIGNAL POST

SYMBOL	ITEM	SYMBOL	ITEM
	EXISTING TRAFFIC LOCAL CONTROLLER		NEW TRAFFIC LOCAL CONTROLLER
	EXISTING SIGNAL POST		NEW SIGNAL POST
	EXISTING CABLE		NEW CABLE (WITH PVC CONDUIT)

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

Traffic Signal Design

Intersection Designs

. Symbols

DATE Sept., 1987 SHEET NO.__ OF __ PLAN NO 2001-1

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Intersection Geometry Design Criteria

Generally, the intersection geometric design is based on the following criteria. Nevertheless, the specifications may be varied to suit the site conditions.

1. Road Classification:

   a. Primary Road
   b. District Road
   c. Others

2. Design Speed:

   a. Primary Road - 60 km/h
   b. District Road - 50 km/h
   c. Others - 30 km/h

3. Carriageway Width:

   Basically: Primary Road ⩾ 3.25m per lane
   District Road ⩾ 3.0m per lane

4. Right Turn Lane:

   Right turn lane would be set on Primary Road & District Road. Minimum width of 3.0m.

5. Storage Lane:

   Basically 30m in length

6. Taper Lane:

Design speed	Length
60 km/h	30m
50 km/h	25m

7. a. Acceleration Lane

   A combination of storage lane (90m) and taper lane (40m). Total length is 130 m.

   b. Deceleration Lane

   Likewise, it is a combination of storage lane (60m) and taper lane (45m). Total length is 105m.

   Note: These special design criteria are applicable only at intersections of Green Lane/Jalan Delima and Gelugor Rd/Jalan Hilir Pemancar.

8. Lane Shift Length:

   The length can be calculated using following equation:

$$L = \frac{V \times \Delta W}{3}$$

   V = Design speed (km/h)

   ΔW = Shift Width (m)

9. Setting of Traffic Island:

   Refuge island for pedestrian crossing (safety considerations on site).

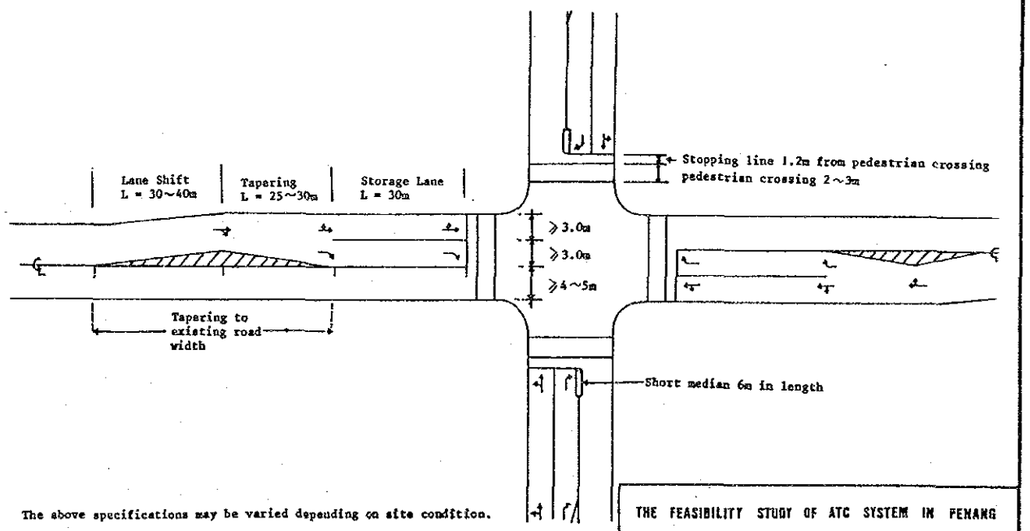
   Size : Length ⩾ 6m
   Area ⩾ $4m^2$

10. Pedestrian Crossing:

    Pedestrian crossing would be set at busy intersection and strategic locations. Width between 2-3m; depends on its pedestrian movement demand.

11. Markings:

    Based on JKR Technic Guildline (Road) 2D/85.



The above specifications may be varied depending on site condition.

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

TRAFFIC SIGNAL DESIGN

Intersection Design
.Geometry Design
Criteria

DATE Sept., 1997 SHEET NO. 1 OF 2001-2 PLAN NO 2001-2

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Table 2.1 : Design Criteria for Intersection

Items	Road Classification		
	Primary Road	District Road	Others
1. Design Speed (km/h)	60	50	30
2. Carriageway Width (m)	$\overline{W}$≥3.25m per lane	$\overline{W}$≥3.0m per lane	$\overline{W}$≥3.0m per lane
3. Right Turn Lane (m)	$\overline{W}$≥3.00m	$\overline{W}$≥3.0m	
4. Storage Lane length (m)	30.0	30.0	
5. Taper Lane length (m)	25～30	25～30	
6. Lane Shift length (m)	30～40	30～40	
7.* Acceleration Lane length (m)	130.0		
8.* Deceleration Lane length (m)	105.0		

Note : The above specifications may be varied according to the site conditions.

* Special design criteria applicable only at intersections of Green Lane/Jln Delima and Gelugor Rd/Jln Hilir Pemancar.

12. Channel Design

Procedure:

a. Select Ro and W where Ro is the outer curve radius and W is the width of the channel.

For Large Vehicle : Ro = 15 m
W = 5 m

For Passenger Car : Ro = 10 m
W = 3 m

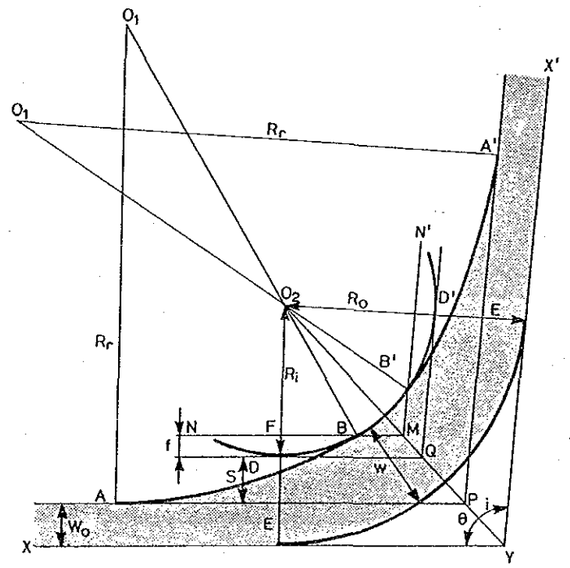
b. Draw Ro and Ri where Ri is the inner curve radius

Ri = Ro - W

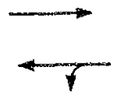
c. Calculate $\overline{AE}$ where $\overline{AE} = \sqrt{2(Rr-Ri)S-S^2}$

where, Rr = (3 ≈ 4)Ri
S = W - Wo

d. Using Rr connect point A and the inner curve



THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
TRAFFIC SIGNAL DESIGN
Intersection Design .Geometry Design Criteria (2)
DATE Sept. 1987 SHEET NO 2 OF 2001-2 PLAN NO 2001-2
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING	
1	2
	

CHINA STREET GHAUT

WELD QUAY

3.50m 3.50m 4.00m 4.50m 4.50m 3.50m 4.00m 3.25m 3.00m

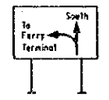
NOTE 1

3.25m 3.25m 3.25m 4.00m

NOTE 2

NOTE

1. Traffic Control Device Location.



2. Existing Location of Local Traffic Controller (Manual).
3. Use Existing Cabling System.

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

TRAFFIC SIGNAL DESIGN

Intersection Name: Weld Quay / Ferry Terminal

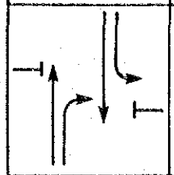
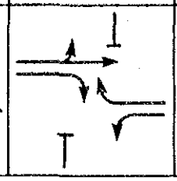
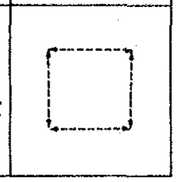
Intersection No. 1 Scale : 1/250

DATE Sept. 1987 SHEET NO ___ OF ___ PLAN NO 2002

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3
		

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
TRAFFIC SIGNAL DESIGN
Intersection Name: Weld Quay / Chulia St. Ghaut
Intersection No. 2 Scale : 1/250
DATE Sept.,1987 SHEET NO ___ OF ___ PLAN NO 2003
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3
		

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
TRAFFIC SIGNAL DESIGN
Intersection Name: Beach St. / Chulia St. Ghaut / Chulia St.
Intersection No. 3 Scale : 1/250
DATE Sept. 1987 SHEET NO.___ OF ___ PLAN NO 2004
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING			
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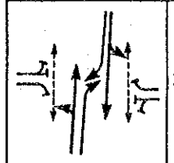
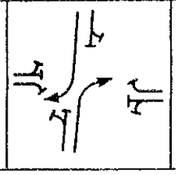
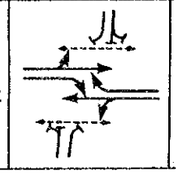
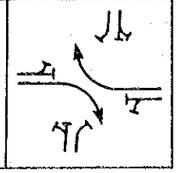
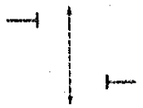
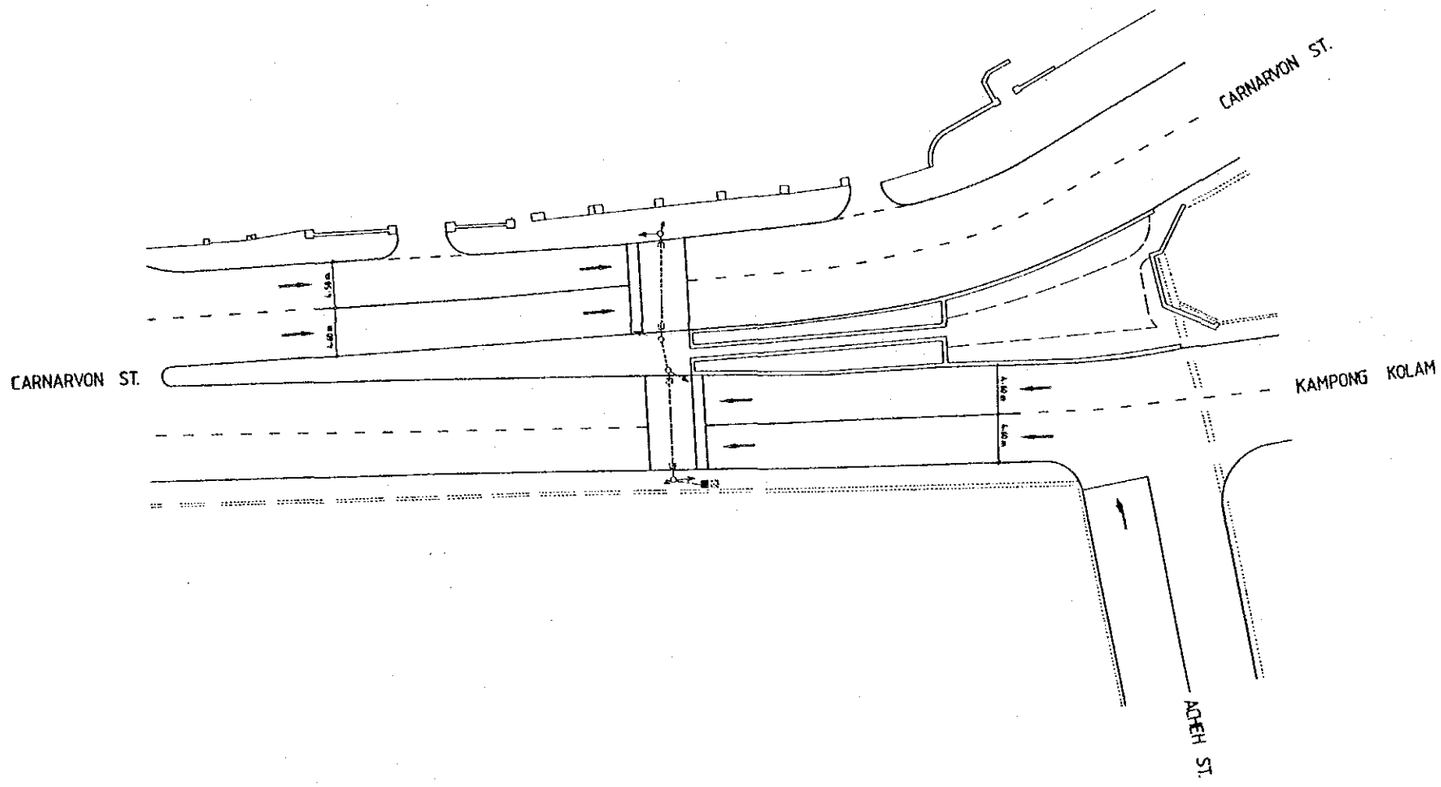
			

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
TRAFFIC SIGNAL DESIGN
Intersection Name: Pitt St. / Chulia St.
Intersection No.4 Scale : 1/250
DATE Sept. 1987 SHEET NO ___ OF ___ PLAN NO 2005
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING	
1	2
	



THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

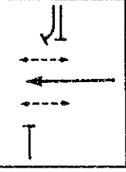
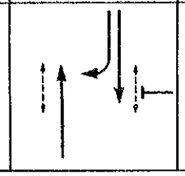
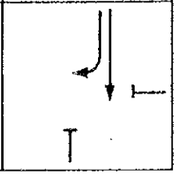
TRAFFIC SIGNAL DESIGN

Intersection Name: Carnarvon St. / Kg Kolam

Intersection No. 5 Scale : 1/250

DATE Sept. 1987 SHEET NO ___ OF ___ PLAN NO 2006

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3
		

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

TRAFFIC SIGNAL DESIGN

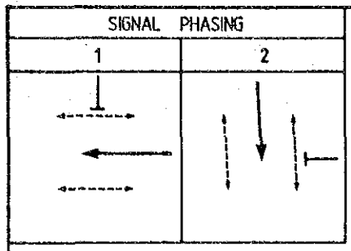
Intersection Name: Carnarvon Circus (1990)

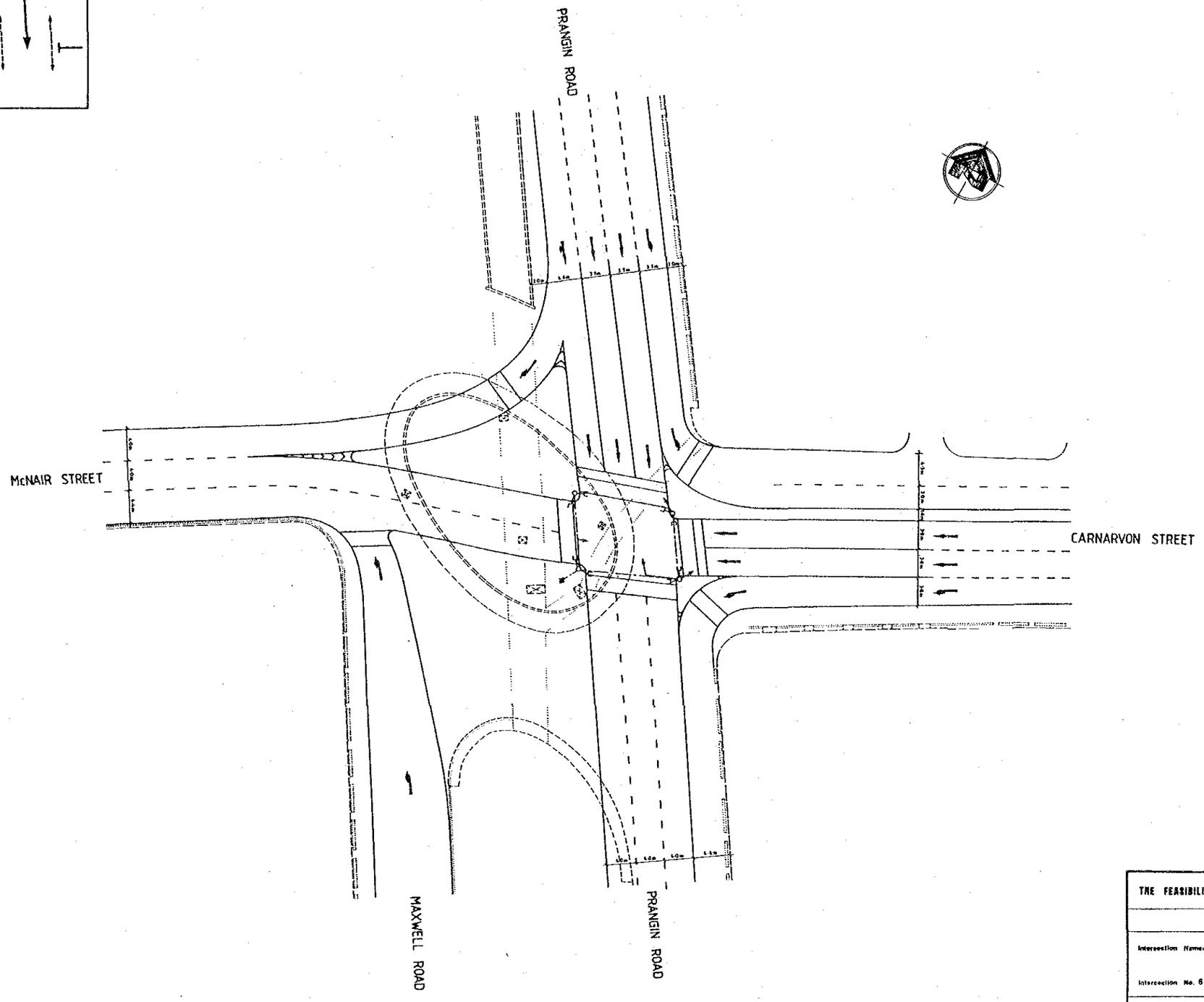
Intersection No. 8 Scale : 1/250

DATE Sept. 1987 SHEET NO 1 OF 2007 PLAN NO 2007-1

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING	
1	2





THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

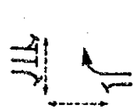
TRAFFIC SIGNAL DESIGN

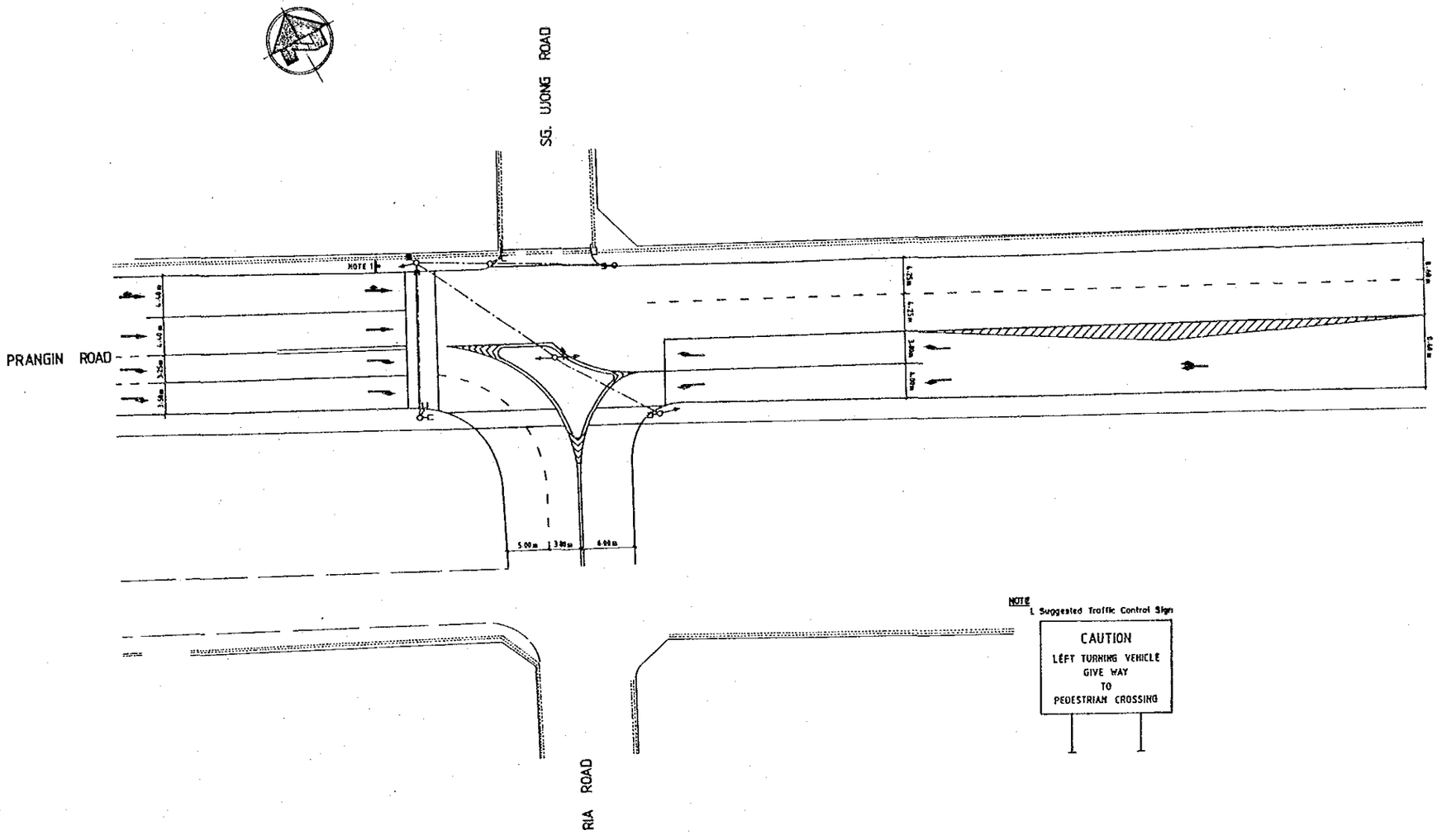
Intersection Name: Carnarvon Circus (1995)

Intersection No. 6 Scale : 1/250

DATE Sept., 1997 SHEET NO 2 OF 2007 PLAN NO 2007-2

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING	
1	2
	



THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

TRAFFIC SIGNAL DESIGN

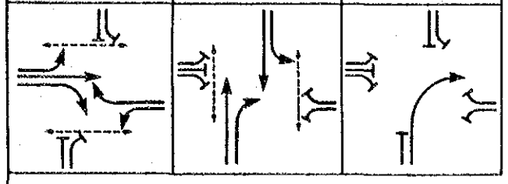
Intersection Name: Prangin Rd. / Ria Rd. / Sg. Ujong Rd.

Intersection No. 11 Scale : 1/250

DATE Sept., 1987 SHEET NO. ____ OF ____ PLAN NO 2008

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING



NOTE
1. Suggested Traffic Control Sign

CAUTION
LEFT TURNING VEHICLE
GIVE WAY
TO
PEDESTRIAN CROSSING

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

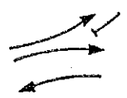
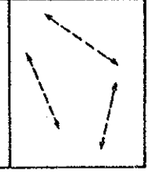
TRAFFIC SIGNAL DESIGN

Intersection Name: Bridge St. / Macallum St. / Macallum St. Ghaut

Intersection No.16 Scale : 1/250

DATE Sept.1987 SHEET NO ___ OF ___ PLAN NO 2009

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3
		

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

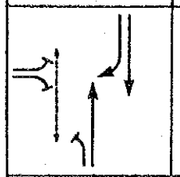
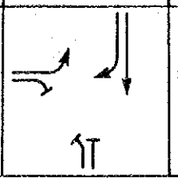
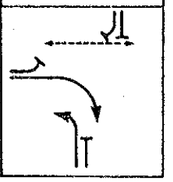
TRAFFIC SIGNAL DESIGN

Intersection Name: Bridge Street / Brick Kiln Road/Jelutong Road

Intersection No. 17 Scale : 1/250

DATE Sept. 1987 SHEET NO ___ OF ___ PLAN NO 2010

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3
		

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

TRAFFIC SIGNAL DESIGN

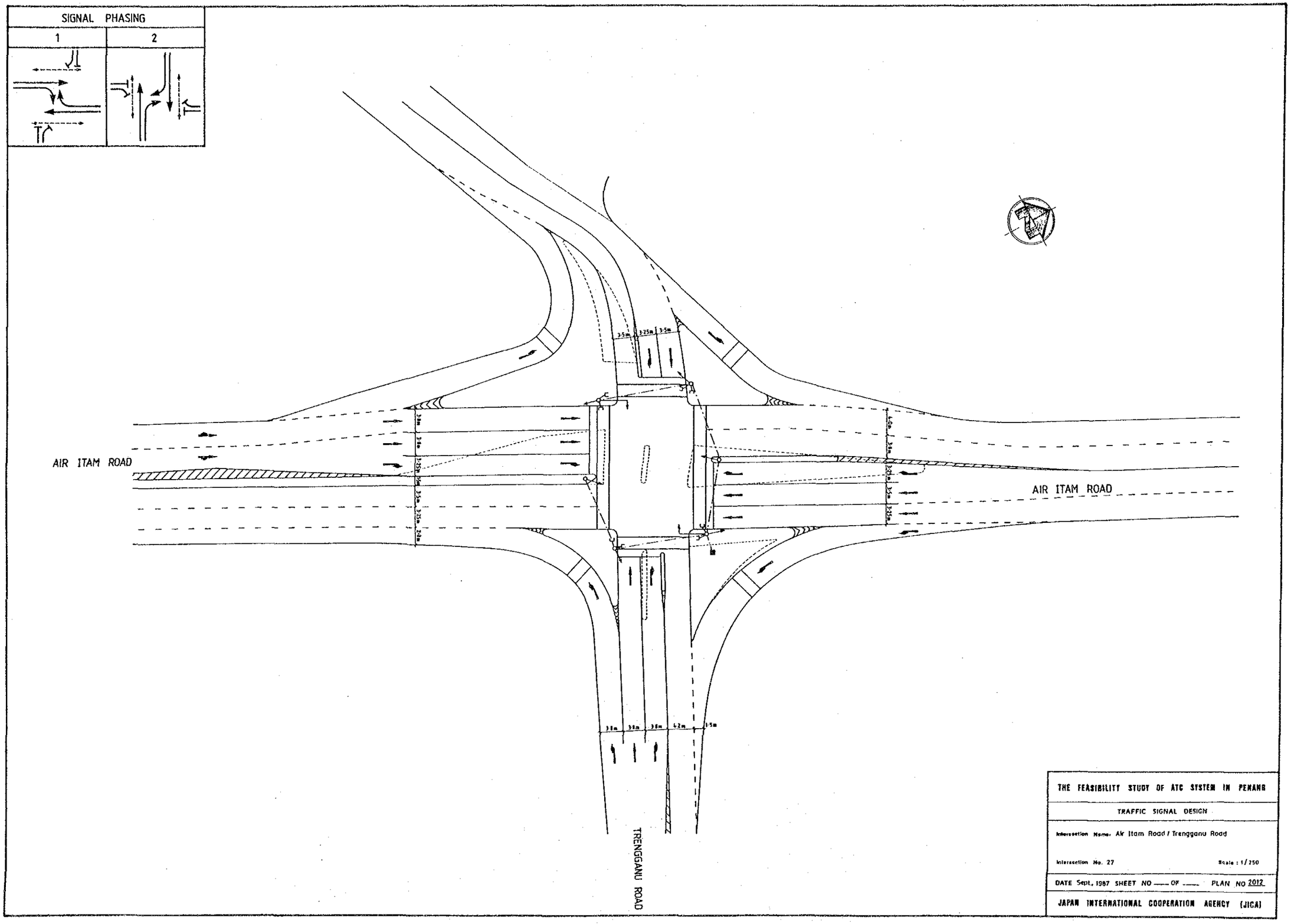
Intersection Name: Sg. Pinang Rd. / Jelutong Rd.

Intersection No.18 Scale : 1/250

DATE Sept., 1987 SHEET NO.___ OF ___ PLAN NO 2011

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING	
1	2



THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

TRAFFIC SIGNAL DESIGN

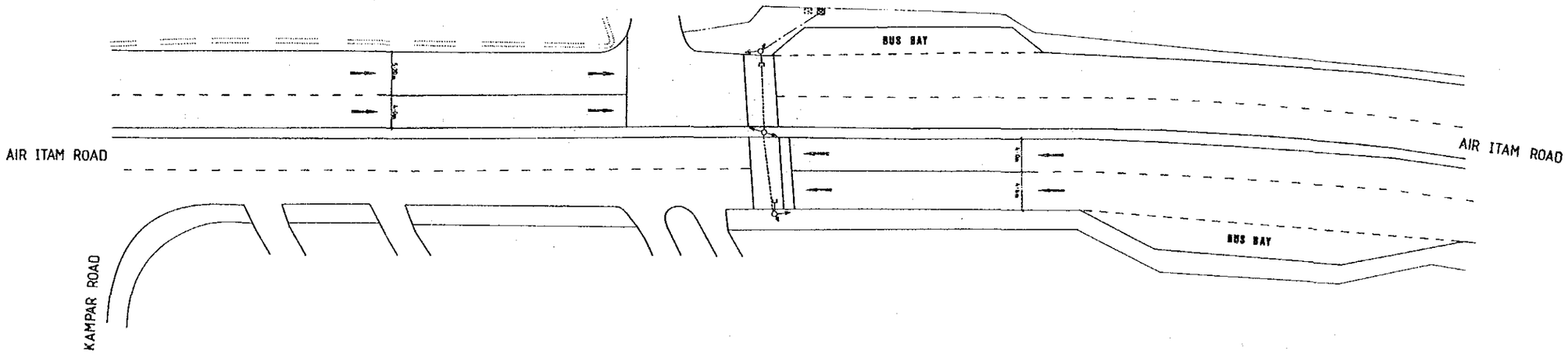
Intersection Name: Air Itam Road / Trengganu Road

Intersection No. 27 Scale : 1/250

DATE Sept, 1987 SHEET NO ____ OF ____ PLAN NO 2012

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING	
1	2
	



THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

TRAFFIC SIGNAL DESIGN

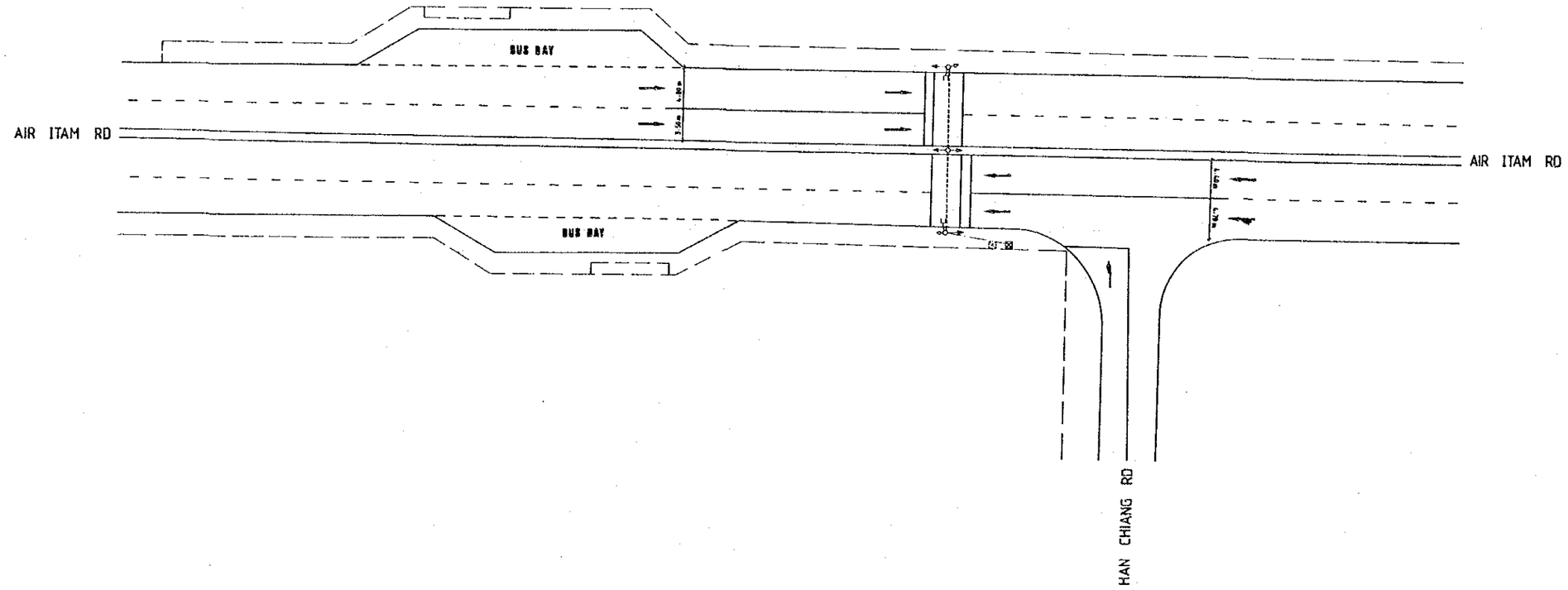
Intersection Name: Air Itam Road / Kampar Road

Intersection No. 28 Scale : 1/250

DATE Sept., 1987 SHEET NO ___ OF ___ PLAN NO 2013

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING	
1	2
→	⊣ ↓ ⊢
←	



THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

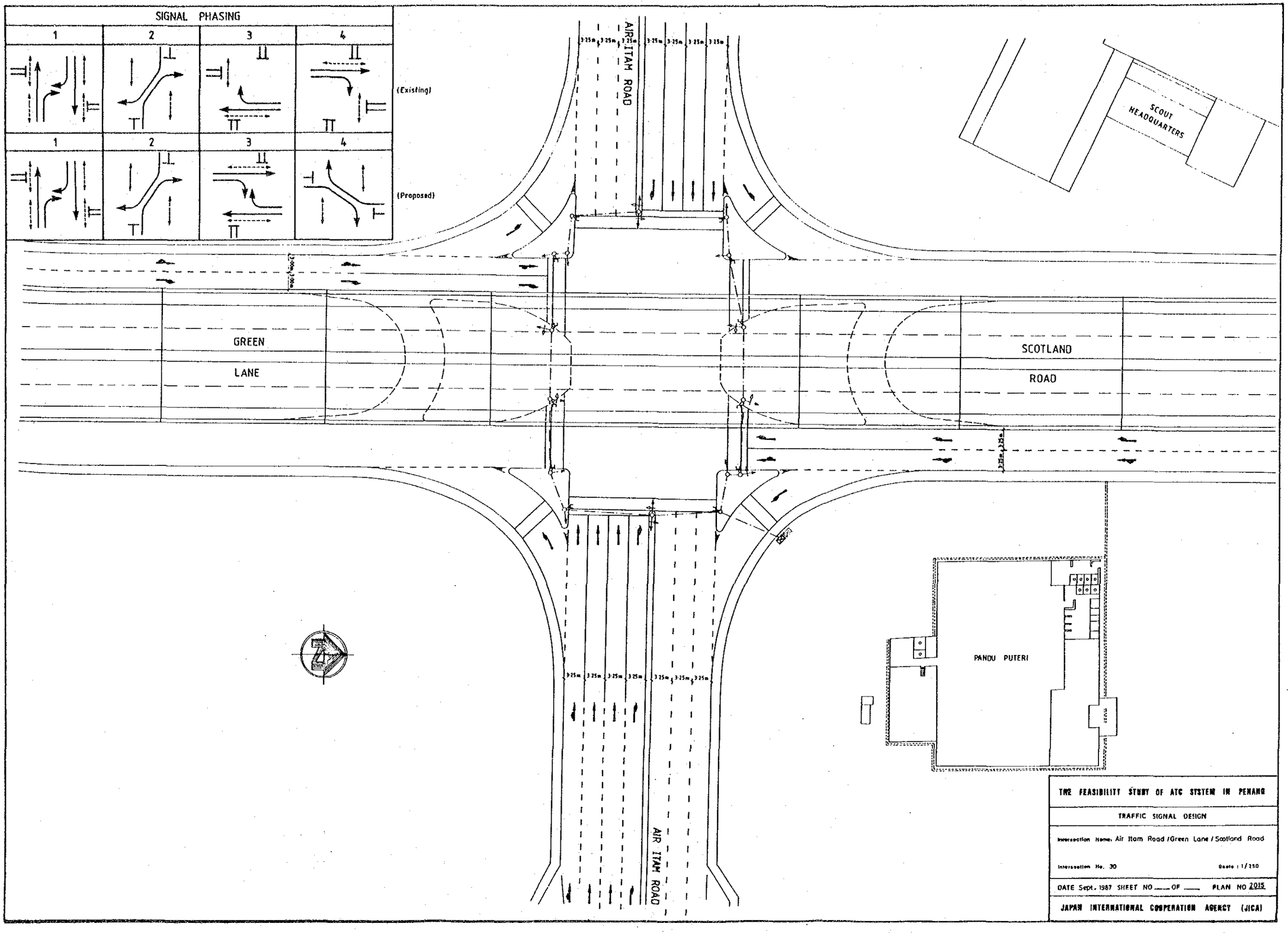
TRAFFIC SIGNAL DESIGN

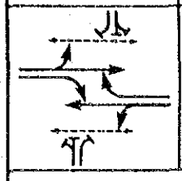
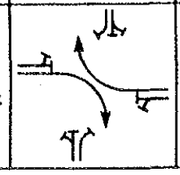
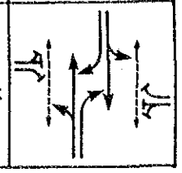
Intersection Name: Air Itam Rd. / Han Chiang Rd.

Intersection No. 29 Scale : 1/250

DATE Sept., 1987 SHEET NO ____ OF ____ PLAN NO 2014

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)


SIGNAL PHASING
1
2
3
4
(Existing)
1
2
3
4
(Proposed)
AIR ITAM ROAD
SCOUT HEADQUARTERS
GREEN LANE
SCOTLAND ROAD
PANDU PUTERI
AIR ITAM ROAD
3.25m
THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
TRAFFIC SIGNAL DESIGN
Intersection Name. Air Itam Road /Green Lane / Scotland Road
Intersection No. 30
Scale : 1/250
DATE Sept. 1987 SHEET NO. ___ OF ___ PLAN NO 2015
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3
		

NOTE
1. Suggested Traffic Control Sign

CAUTION
LEFT TURNING VEHICLE
GIVE WAY
TO
PEDESTRIAN CROSSING

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

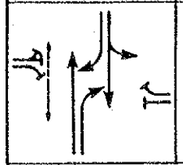
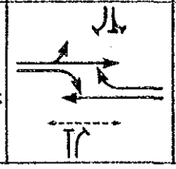
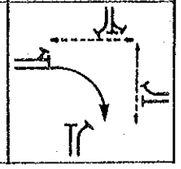
TRAFFIC SIGNAL DESIGN

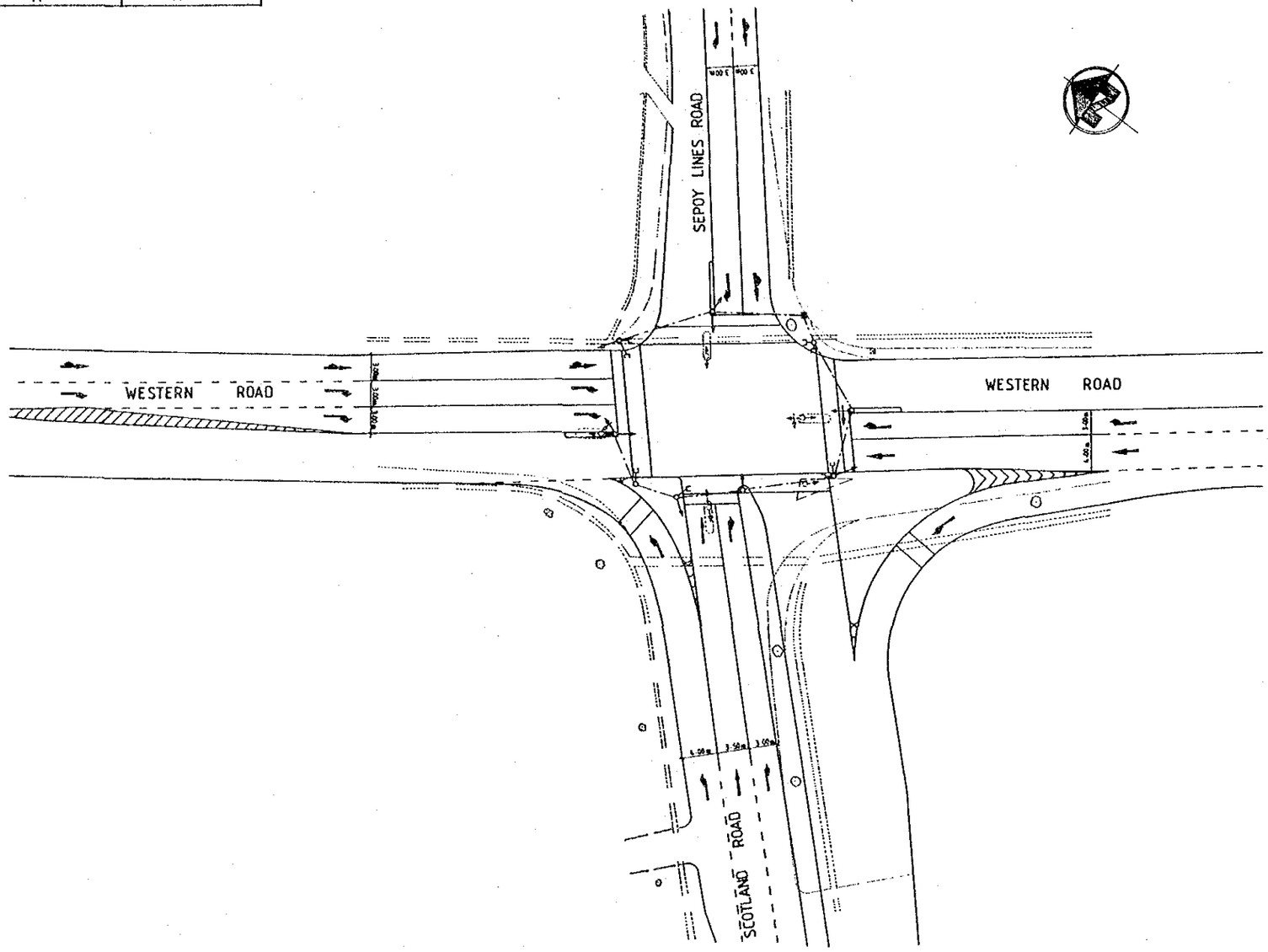
Intersection Name: Scotland Road / Batu Gantong Road / York Road

Intersection No. 31 Scale : 1/250

DATE Sept., 1997 SHEET NO ____ OF ____ PLAN NO 2016

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3
		



THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

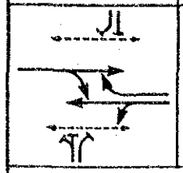
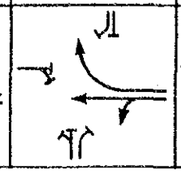
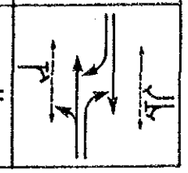
TRAFFIC SIGNAL DESIGN

Intersection Name: Scotland Road/Western Road/ Sepoy Lines Road

Intersection No. 32 Scale : 1/250

DATE Sept. 1987 SHEET NO.—OF— PLAN NO 2017

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3
		

NOTE
1. Suggested Traffic Control Sign

CAUTION
LEFT TURNING VEHICLE
GIVE WAY
TO
PEDESTRIAN CROSSING

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

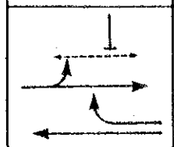
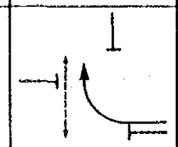
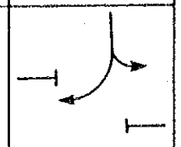
TRAFFIC SIGNAL DESIGN

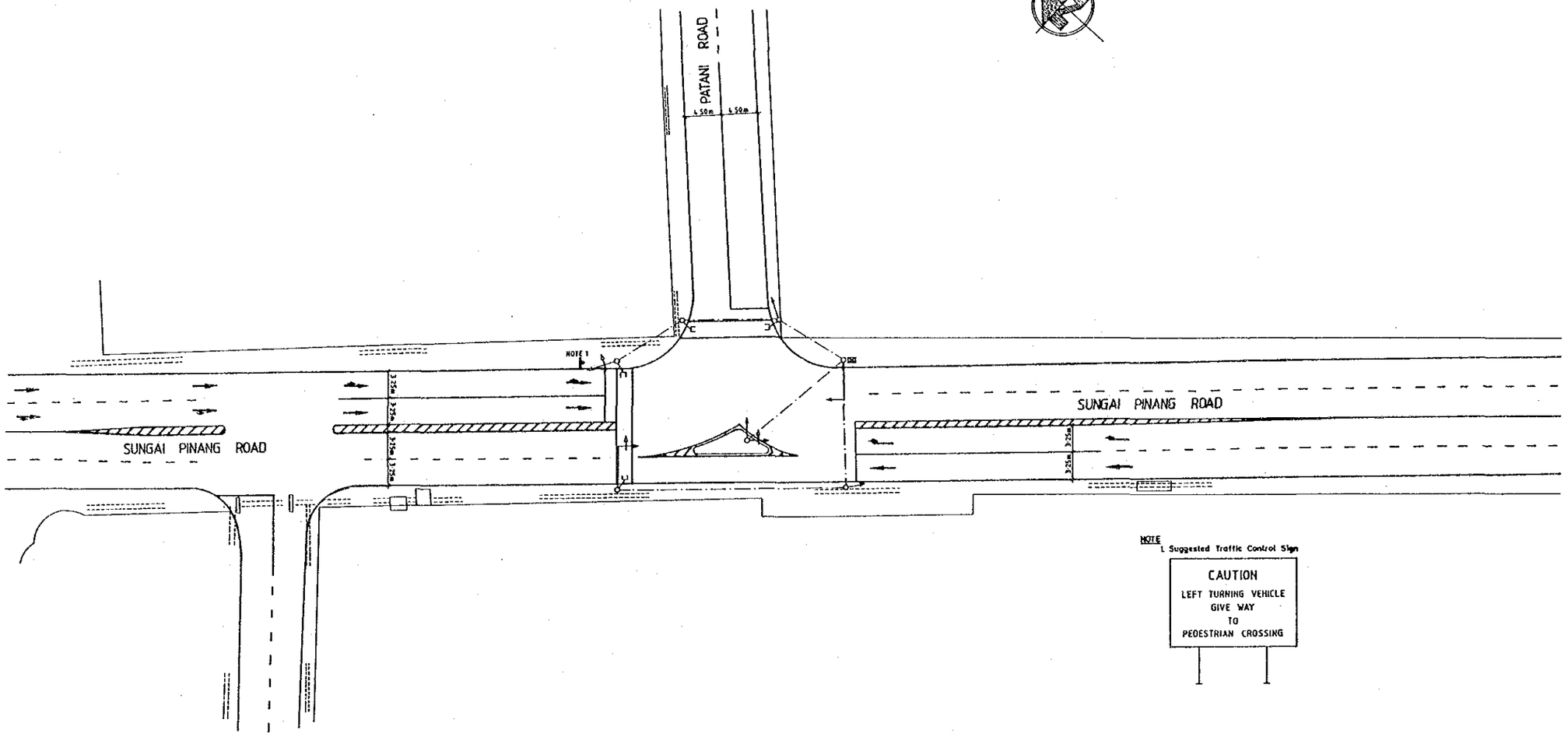
Intersection Name: Western Road / Macalister Road / Brook Road

Intersection No. 33 Scale : 1/250

DATE Sept., 1987 SHEET NO. ___ OF ___ PLAN NO 2018

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3
		



NOTE
1. Suggested Traffic Control Sign

CAUTION
LEFT TURNING VEHICLE
GIVE WAY
TO
PEDESTRIAN CROSSING

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

TRAFFIC SIGNAL DESIGN

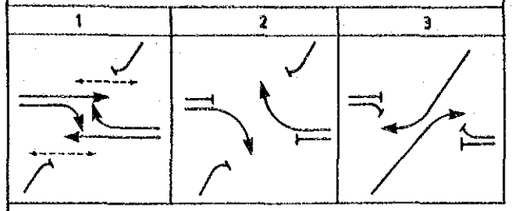
Intersection Name: Sungai Pinang Road / Patani Road

Intersection No. 34 Scale : 1/250

DATE Sept.1987 SHEET NO ___ OF ___ PLAN NO 2019

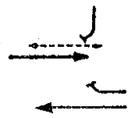
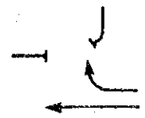
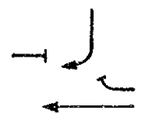
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3



NOTE:
1. Use existing cabling system

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG	
TRAFFIC SIGNAL DESIGN	
Intersection Name: Green Lane / Batu Lancang Lane / Hamilton Road	
Intersection No. 35	Scale : 1/250
DATE Sept. 1987 SHEET NO ____ OF ____	PLAN NO 2020
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	

SIGNAL PHASING		
1	2	3
		

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

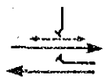
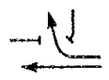
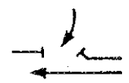
TRAFFIC SIGNAL DESIGN

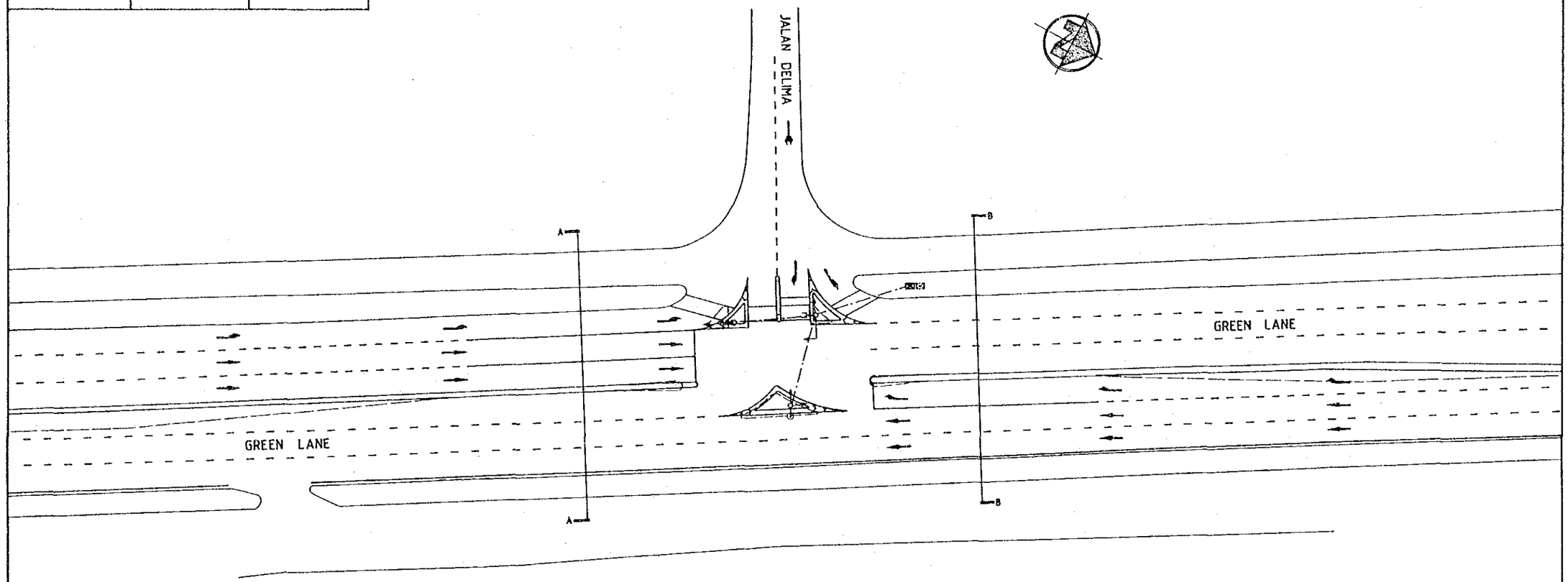
Intersection Name: Green Lane / Batu Lancang Road

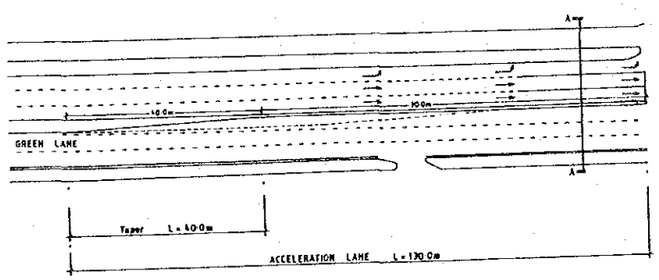
Intersection No. 38 Scale : 1/250

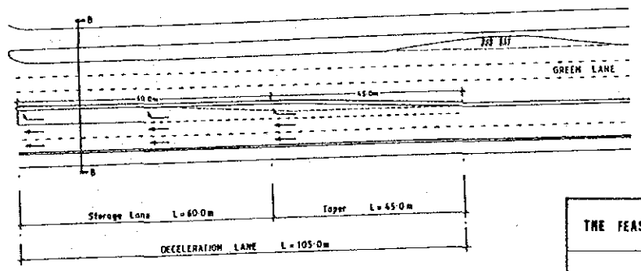
DATE Sept., 1987 SHEET NO ___ OF ___ PLAN NO 2021

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3
		

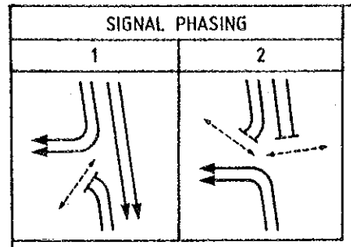






THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
TRAFFIC SIGNAL DESIGN
Intersection Name: Green Lane / Jalan Delima
Intersection No. 37 Scale : 1/250
DATE Sept. 1987 SHEET NO ___ OF ___ PLAN NO 2022
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING	
1	2



THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

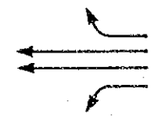
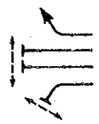
TRAFFIC SIGNAL DESIGN

Intersection Name: Pitt Street / Light Street

Intersection No. 39 Scale : 1/250

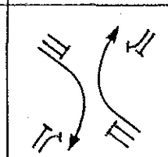
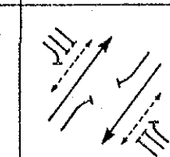
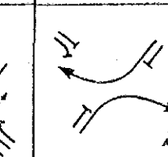
DATE Sept.1987 SHEET NO ___ OF ___ PLAN NO 2023

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING	
1	2
	

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG	
TRAFFIC SIGNAL DESIGN	
Intersection Name: Penang Road / Farquhar Street	
Intersection No. 40	Scale : 1/250
DATE Sept. 1987 SHEET NO ___ OF ___	PLAN NO 2024
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	

SIGNAL PHASING

1	2	3	4
			

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

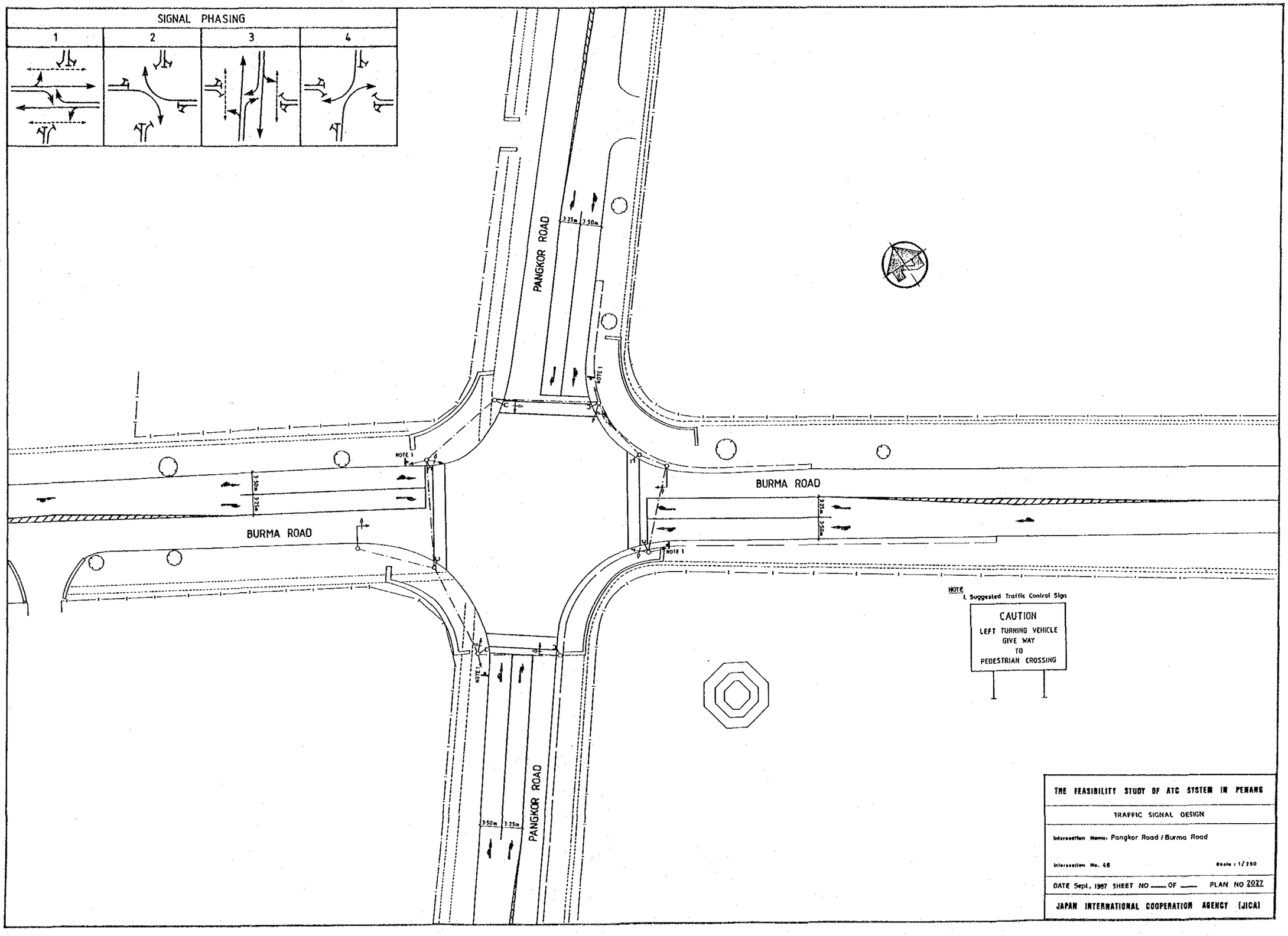
TRAFFIC SIGNAL DESIGN

Intersection Name: Northam Road / Pangkor Road

Intersection No. 45 Scale : 1/250

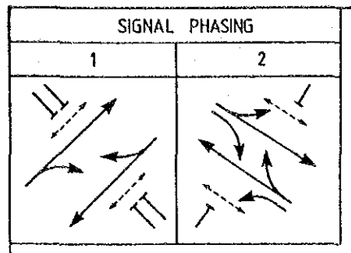
DATE Sept. 1987 SHEET NO ___ OF ___ PLAN NO 2026

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)


SIGNAL PHASING
1
2
3
4
PANGKOR ROAD
BURMA ROAD
BURMA ROAD
PANGKOR ROAD
NOTE 1
NOTE 1
NOTE 1
3.25m
3.50m
3.50m
3.25m
3.25m
3.50m
3.50m
3.25m
NOTE
1. Suggested Traffic Control Sign
CAUTION
LEFT TURNING VEHICLE
GIVE WAY
TO
PEDESTRIAN CROSSING
THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
TRAFFIC SIGNAL DESIGN
Intersection Name: Pangkor Road / Burma Road
Intersection No. 46
Scale : 1/250
DATE Sept., 1997 SHEET NO ____ OF ____ PLAN NO 2027
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING

1	2



PEEL AVENUE

PERAK ROAD

PANGKOR ROAD

PERAK ROAD

NOTE 1

NOTE
1. Suggested Traffic Control Sign

CAUTION
LEFT TURNING VEHICLE
GIVE WAY
TO
PEDESTRIAN CROSSING

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

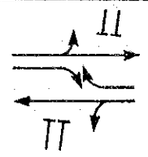
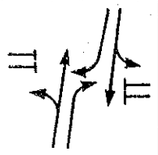
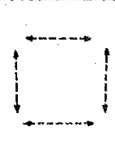
TRAFFIC SIGNAL DESIGN

Intersection Name Pangkor Road / Perak Road / Peel Avenue

Intersection No. 47 Scale : 1/250

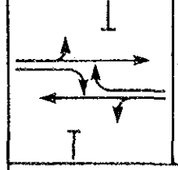
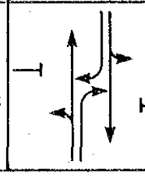
DATE Sept., 1987 SHEET NO. ___ OF ___ PLAN NO 2028.

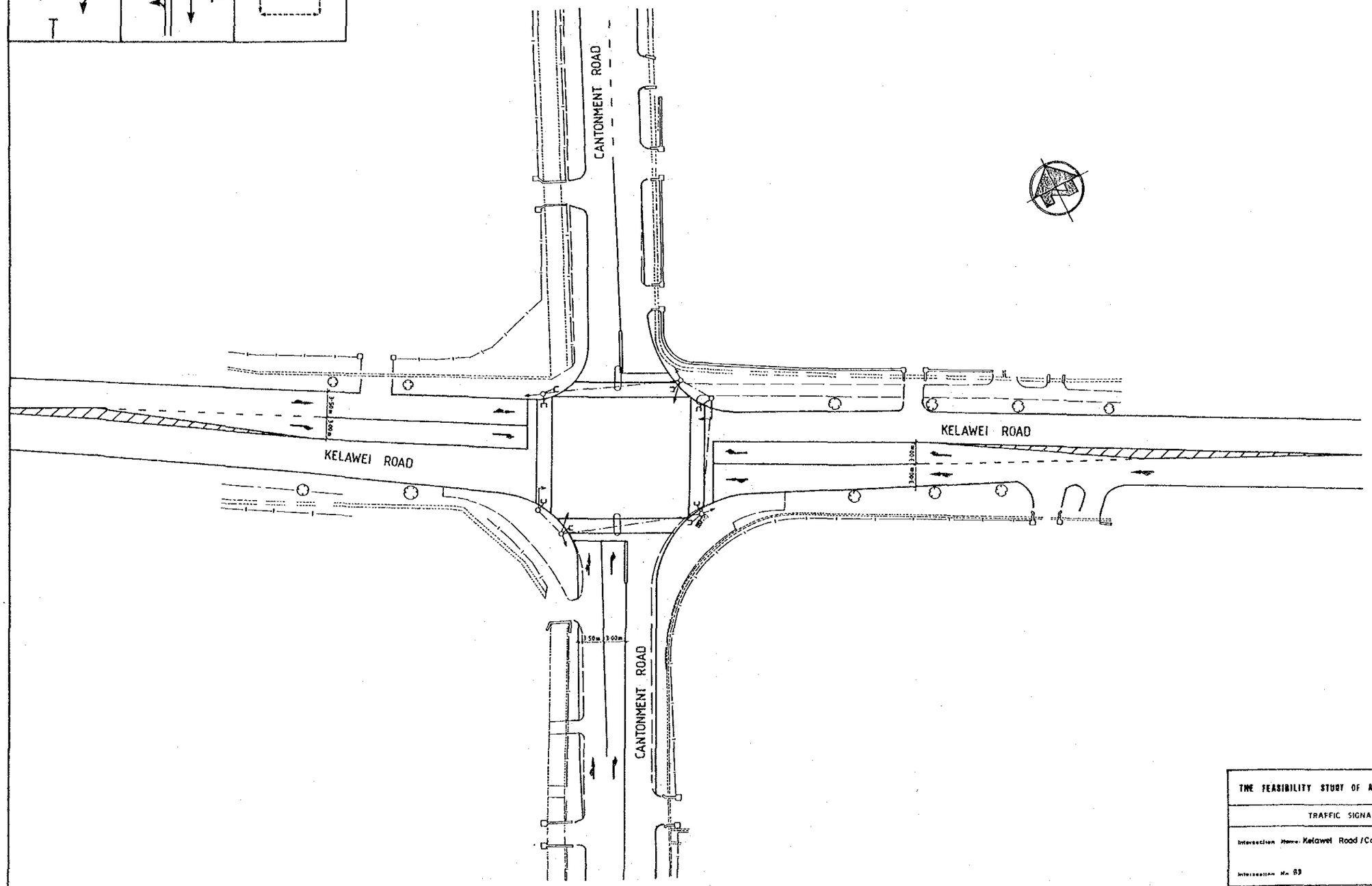
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3
		

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
TRAFFIC SIGNAL DESIGN
Intersection Name: Burma Road / Cantonment Road
Intersection No 62 Scale : 1/250
DATE Sept.1987 SHEET NO ___ OF ___ PLAN NO 2029
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING

1	2	3
		



THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

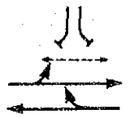
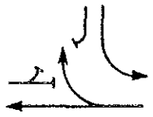
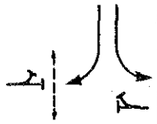
TRAFFIC SIGNAL DESIGN

Intersection Name: Kelawei Road / Cantonment Road

Intersection No. 83 Scale : 1/250

DATE Sept.,1987 SHEET NO. ___ OF ___ PLAN NO 2010

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3
		

NOTE
1. Suggested Traffic Control Sign

CAUTION
LEFT TURNING VEHICLE
GIVE WAY
TO
PEDESTRIAN CROSSING

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

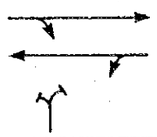
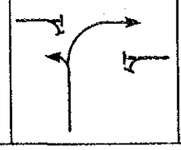
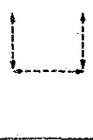
TRAFFIC SIGNAL DESIGN

Intersection Name: Western Road / Gottlieb Road

Intersection No. 88 Scale : 1/250

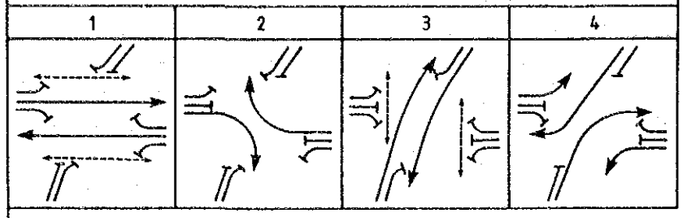
DATE Sept., 1987 SHEET NO.___ OF ___ PLAN NO 2031

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3
		

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG
TRAFFIC SIGNAL DESIGN
Intersection Name: Gottlieb Rd. / Ayer Rajah Rd.
Intersection No. 56 Scale 1 / 240
DATE Sept., 1987 SHEET NO. ____ OF ____ PLAN NO 2032
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING



NOTE:
1. Use Existing Cabling System

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

TRAFFIC SIGNAL DESIGN

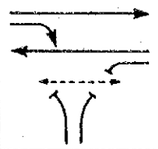
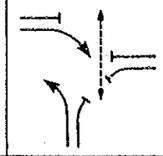
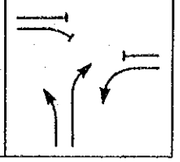
Intersection Name: Burma Road/Gottlieb Road/Bagan Jermal Road

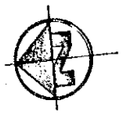
Intersection No. 57 Scale : 1/250

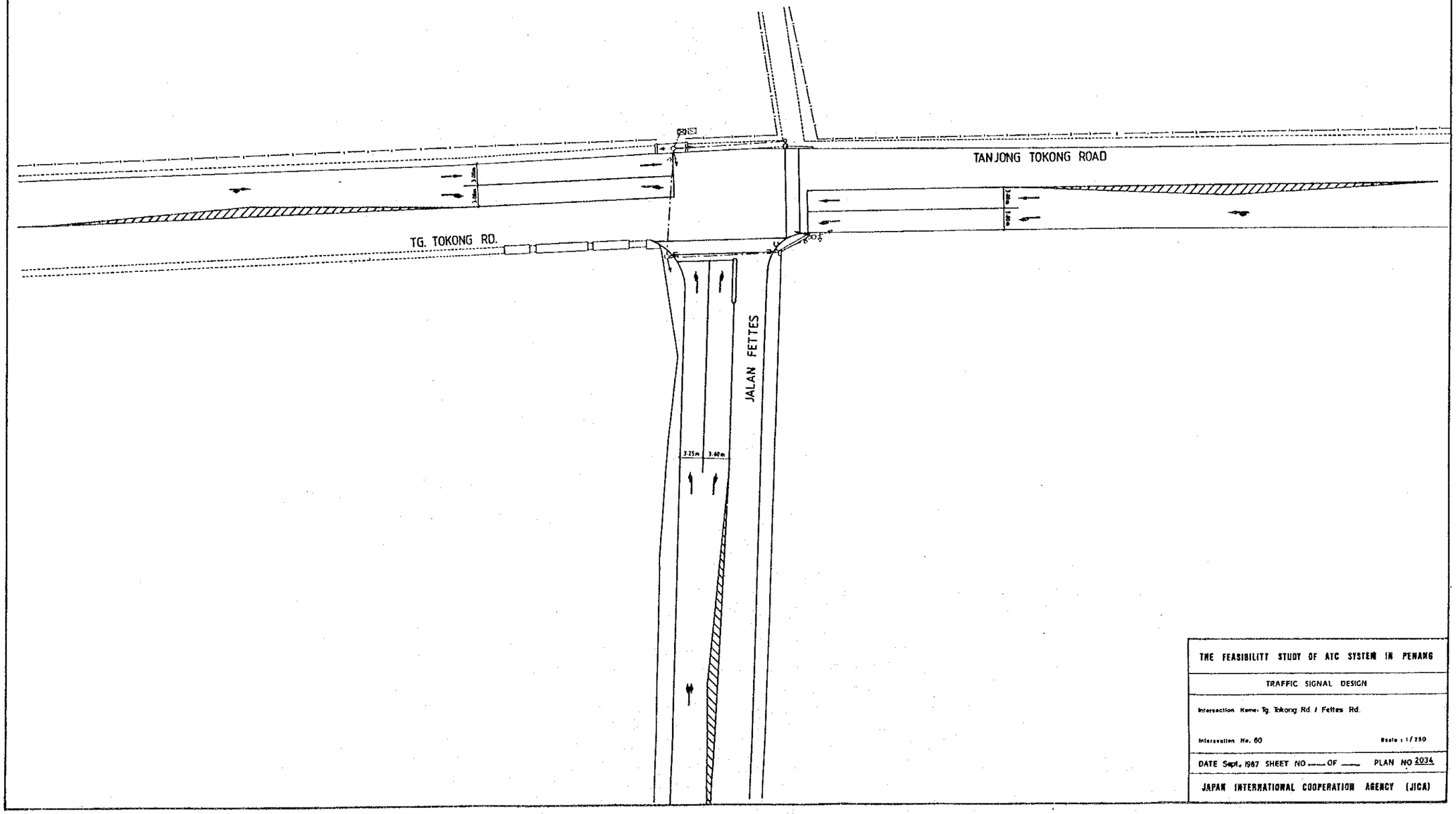
DATE Sept. 1987 SHEET NO ___ OF ___ PLAN NO 2033

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING

1	2	3
		





THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

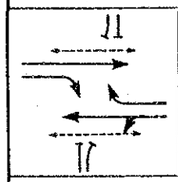
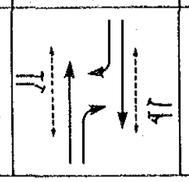
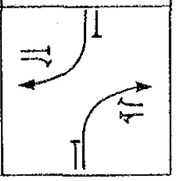
TRAFFIC SIGNAL DESIGN

Intersection Name: Tg. Tokong Rd. / Fettes Rd.

Intersection No. 60 Scale : 1/250

DATE Sept. 1987 SHEET NO. ___ OF ___ PLAN NO 2034

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3
		

NOTE
1. Suggested Traffic Control Sign

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

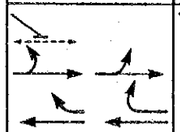
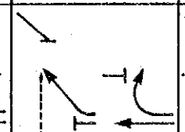
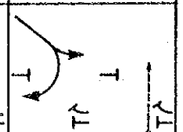
TRAFFIC SIGNAL DESIGN

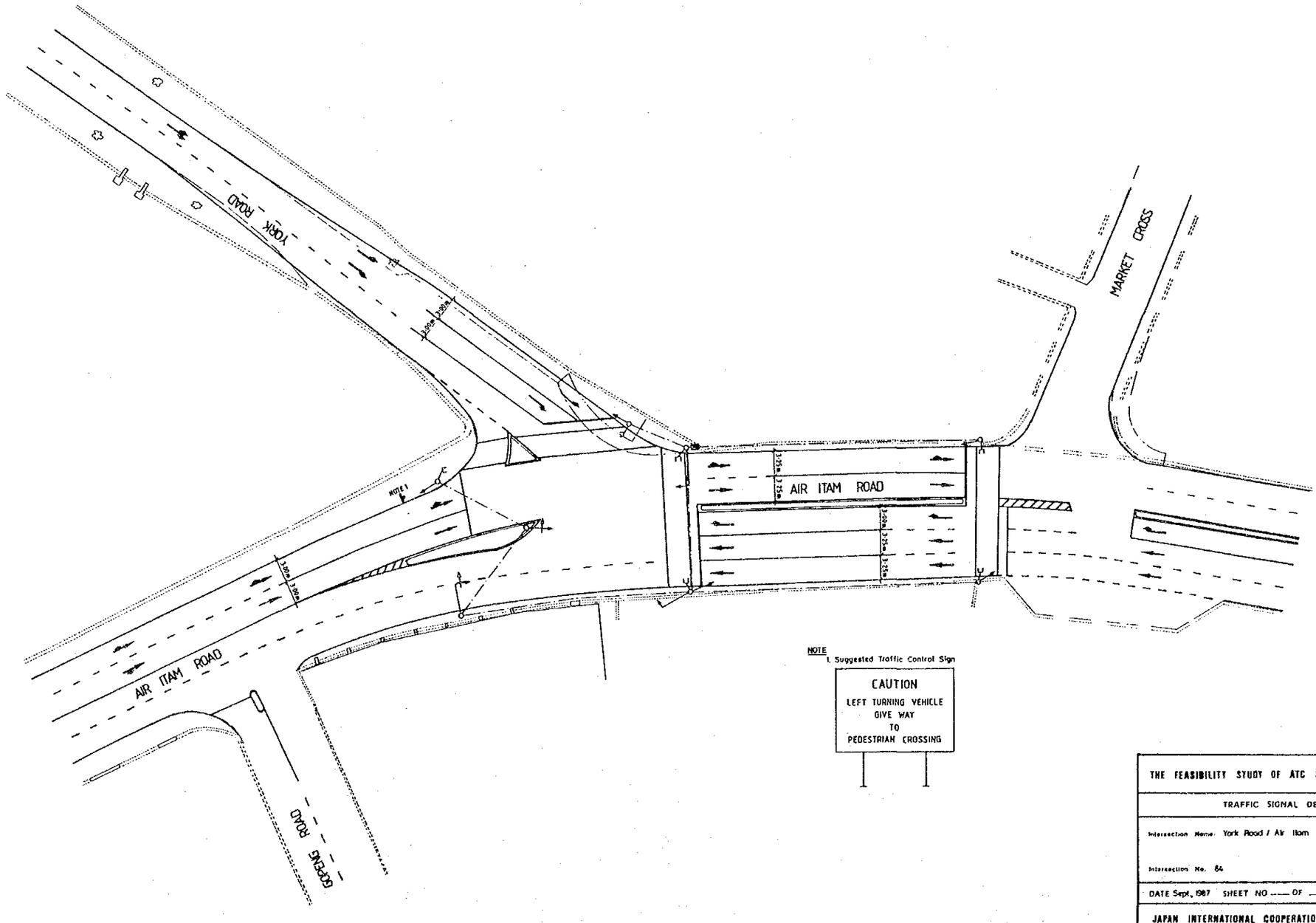
Intersection Name: Western Rd / Residency Rd / Ross Rd.

Intersection No. 62 Scale : 1/250

DATE Sept.1987 SHEET NO ___ OF ___ PLAN NO 2035

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3
		



NOTE
1. Suggested Traffic Control Sign

CAUTION
LEFT TURNING VEHICLE
GIVE WAY
TO
PEDESTRIAN CROSSING

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

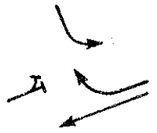
TRAFFIC SIGNAL DESIGN

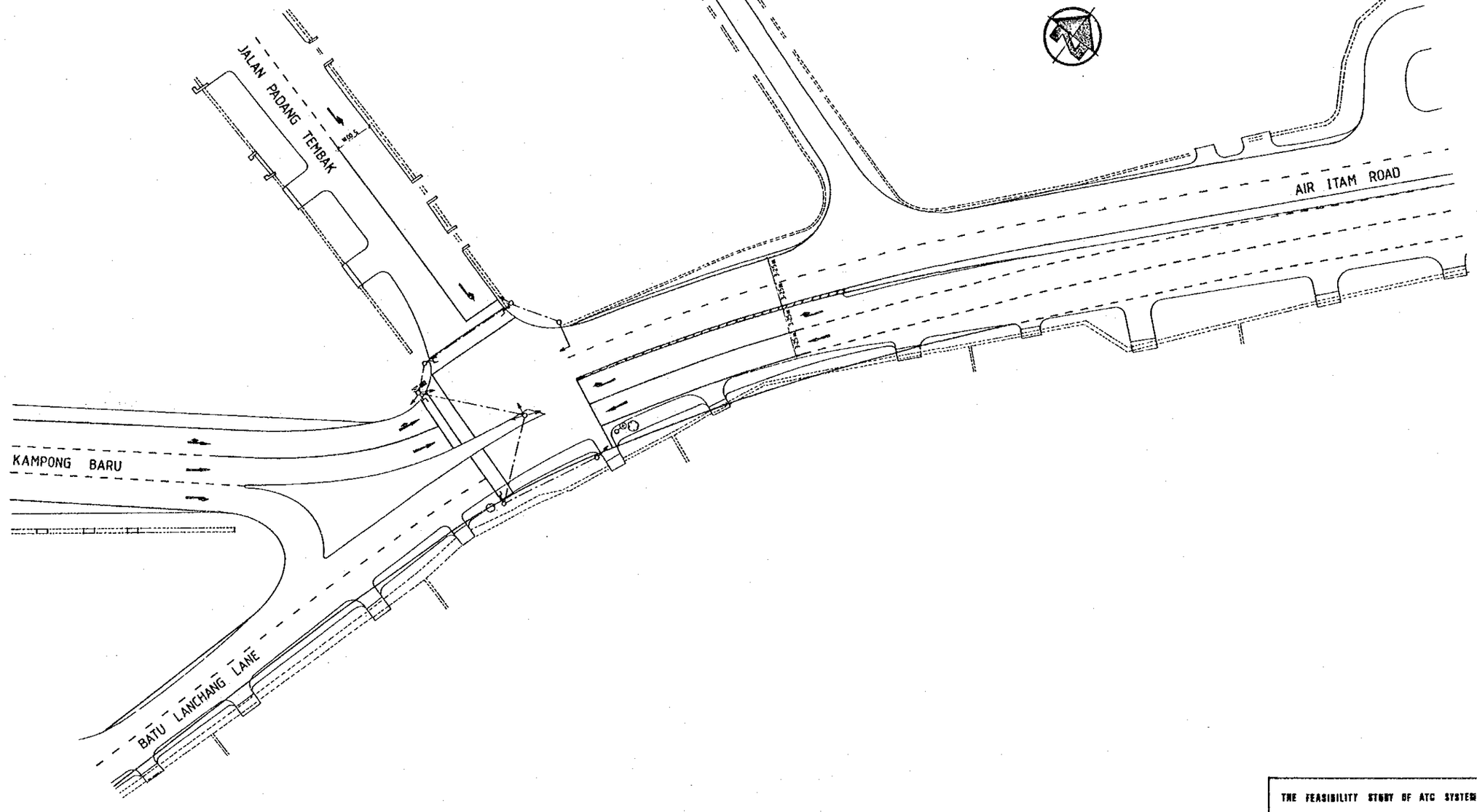
Intersection Name: York Road / Air Itam Road

Intersection No. 84 Scale : 1/250

DATE Sept. 1987 SHEET NO ..... OF ..... PLAN NO 2036

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING		
1	2	3
		



THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

TRAFFIC SIGNAL DESIGN

Intersection Name: Ayer Itam Road / Batu Lanchang Lane / Jalan Padang Tembak

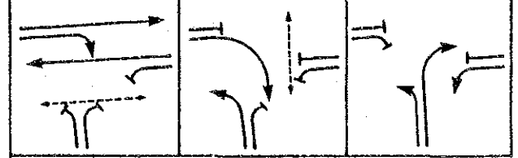
Intersection No. 65 Scale : 1/250

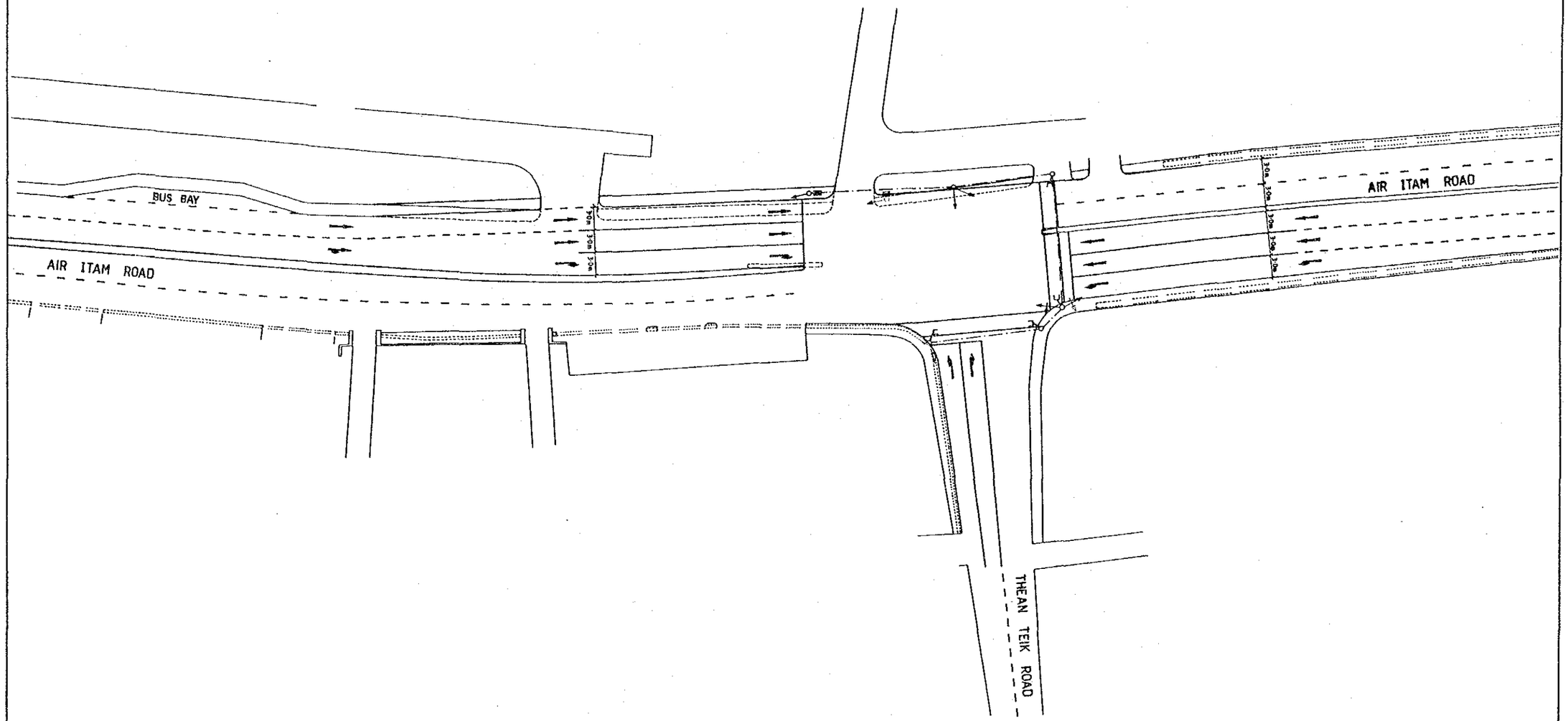
DATE Sept. 1987 SHEET NO.___ OF ___ PLAN NO 2037

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING

1	2	3





THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

TRAFFIC SIGNAL DESIGN

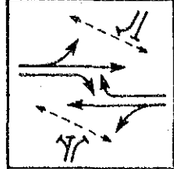
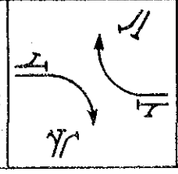
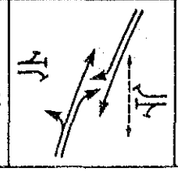
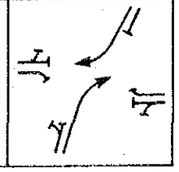
Intersection Name: Thean Teik Road / Air Itam Road

Intersection No. 66 Scale : 1/250

DATE Sept. 1987 SHEET NO ___ OF ___ PLAN NO 2038

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SIGNAL PHASING

1	2	3	4
			

BOUNDARY ROAD

AIR ITAM ROAD

AIR ITAM ROAD

JALAN KAMPUNG MELAYU

NOTE 1

NOTE 1

NOTE

1. Suggested Traffic Control Sign

CAUTION
LEFT TURNING VEHICLE
GIVE WAY
TO
PEDESTRIAN CROSSING

THE FEASIBILITY STUDY OF ATC SYSTEM IN PENANG

TRAFFIC SIGNAL DESIGN

Intersection Name: Boundary Road / Air Itam Road

Intersection No. 67 Scale : 1/250

DATE Sept. 1987 SHEET NO. ___ OF ___ PLAN NO 2039

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)