

ROUTE MAP OF K.L - KARAK HIGHWAY

PROPOSED FIELD EQUIPMENT LOCATION ON KARAK HIGHWAY (1/2)

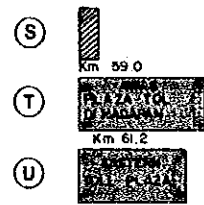
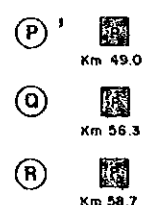
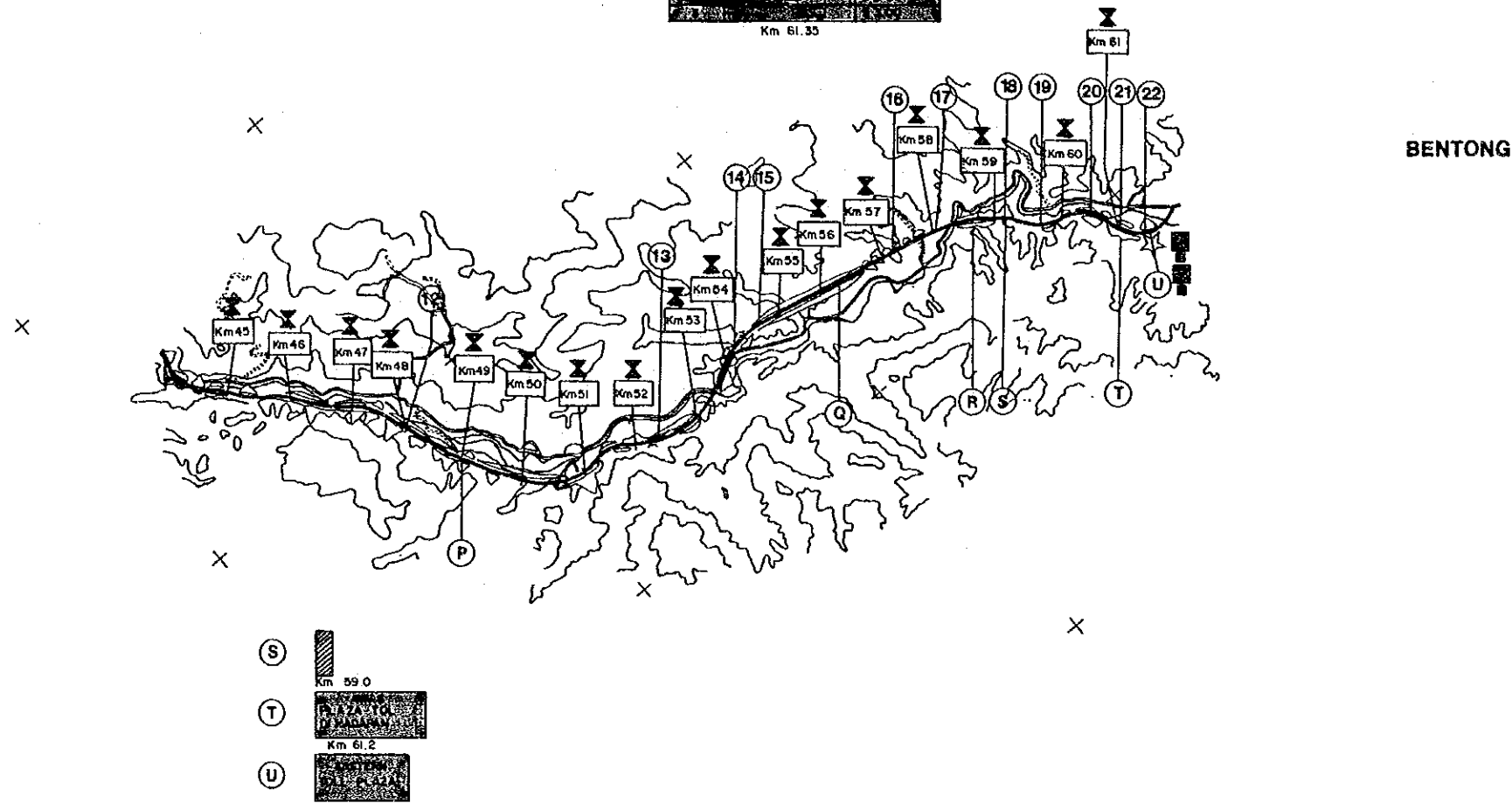
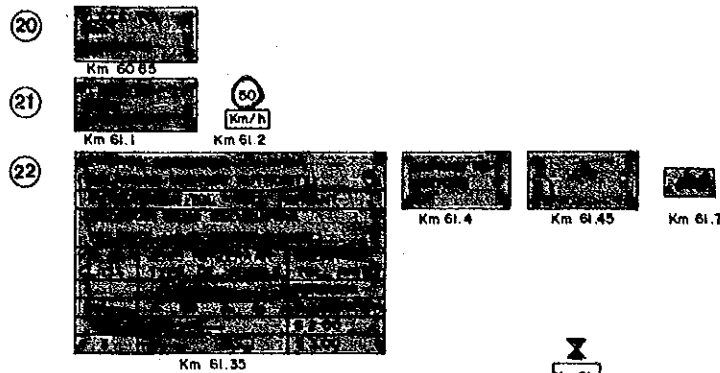
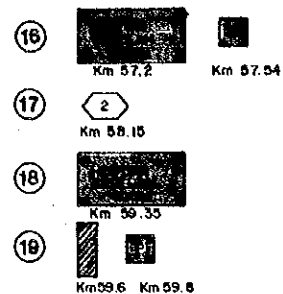
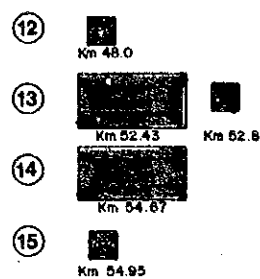
SCALE: 1:1000

DRAWING NO: B31

DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND MANAGEMENT SYSTEM OF MALAYSIAN EXPRESSWAYS AND TOLL HIGHWAYS

JAPAN INTERNATIONAL COOPERATION AGENCY



HORIZONTAL ALIGNMENT (M)																																			
VERTICAL ALIGNMENT (M)																																			
EMBANKMENT (+M)/CUT (-M)	<table border="1"> <tr> <td>Km 45.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td> </tr> </table>	Km 45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Km 45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
FINISHED LEVEL (M)	<table border="1"> <tr> <td>170.1</td><td>170.4</td><td>170.8</td><td>171.2</td><td>171.6</td><td>172.0</td><td>172.4</td><td>172.8</td><td>173.2</td><td>173.6</td><td>174.0</td><td>174.4</td><td>174.8</td><td>175.2</td><td>175.6</td><td>176.0</td><td>176.4</td><td>176.8</td><td>177.2</td><td>177.6</td><td>178.0</td><td>178.4</td><td>178.8</td><td>179.2</td><td>179.6</td><td>180.0</td><td>180.4</td><td>180.8</td><td>181.2</td><td>181.6</td><td>182.0</td><td>182.4</td><td>182.8</td><td>183.2</td> </tr> </table>	170.1	170.4	170.8	171.2	171.6	172.0	172.4	172.8	173.2	173.6	174.0	174.4	174.8	175.2	175.6	176.0	176.4	176.8	177.2	177.6	178.0	178.4	178.8	179.2	179.6	180.0	180.4	180.8	181.2	181.6	182.0	182.4	182.8	183.2
170.1	170.4	170.8	171.2	171.6	172.0	172.4	172.8	173.2	173.6	174.0	174.4	174.8	175.2	175.6	176.0	176.4	176.8	177.2	177.6	178.0	178.4	178.8	179.2	179.6	180.0	180.4	180.8	181.2	181.6	182.0	182.4	182.8	183.2		
KM POST	<table border="1"> <tr> <td>45.0</td><td>46.0</td><td>47.0</td><td>48.0</td><td>49.0</td><td>50.0</td><td>51.0</td><td>52.0</td><td>53.0</td><td>54.0</td><td>55.0</td><td>56.0</td><td>57.0</td><td>58.0</td><td>59.0</td><td>60.0</td><td>61.0</td><td>61.2</td><td>61.4</td><td>61.45</td><td>61.5</td><td>61.6</td><td>61.7</td> </tr> </table>	45.0	46.0	47.0	48.0	49.0	50.0	51.0	52.0	53.0	54.0	55.0	56.0	57.0	58.0	59.0	60.0	61.0	61.2	61.4	61.45	61.5	61.6	61.7											
45.0	46.0	47.0	48.0	49.0	50.0	51.0	52.0	53.0	54.0	55.0	56.0	57.0	58.0	59.0	60.0	61.0	61.2	61.4	61.45	61.5	61.6	61.7													

PROPOSED FIELD EQUIPMENT LOCATION ON KARAK HIGHWAY (2/2)

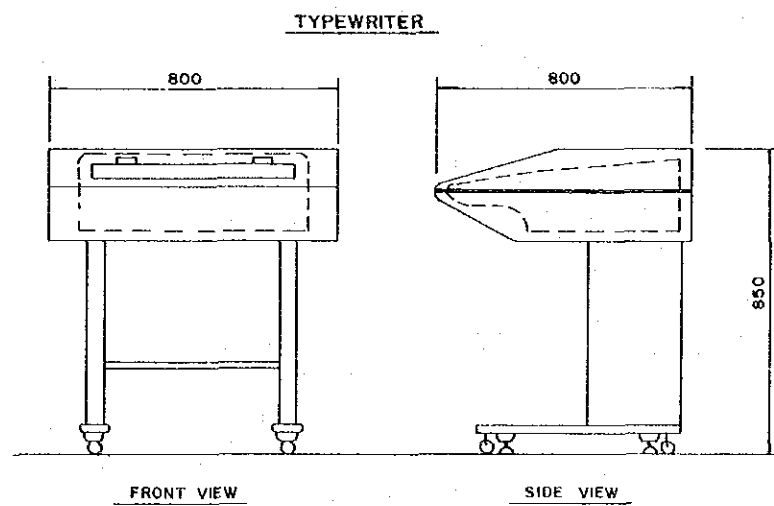
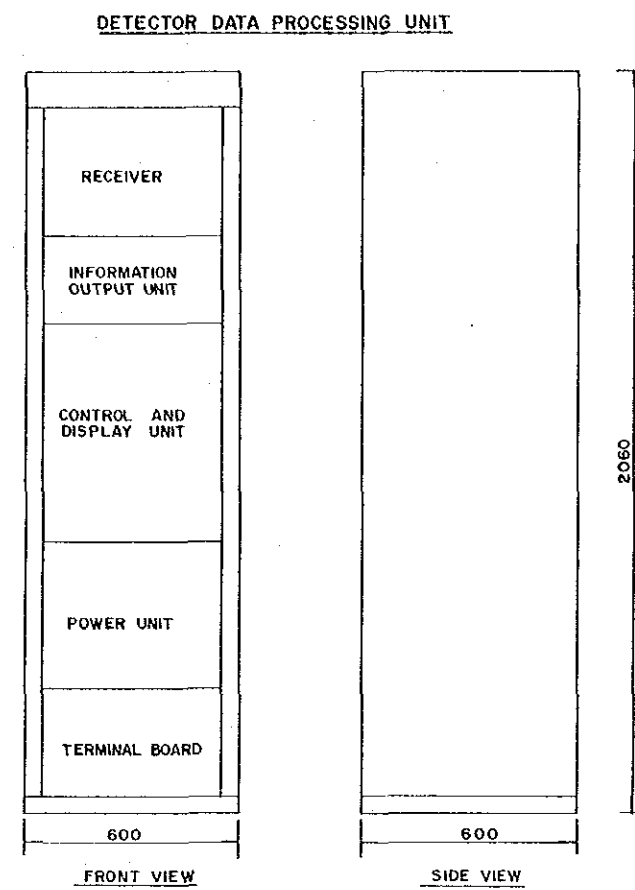
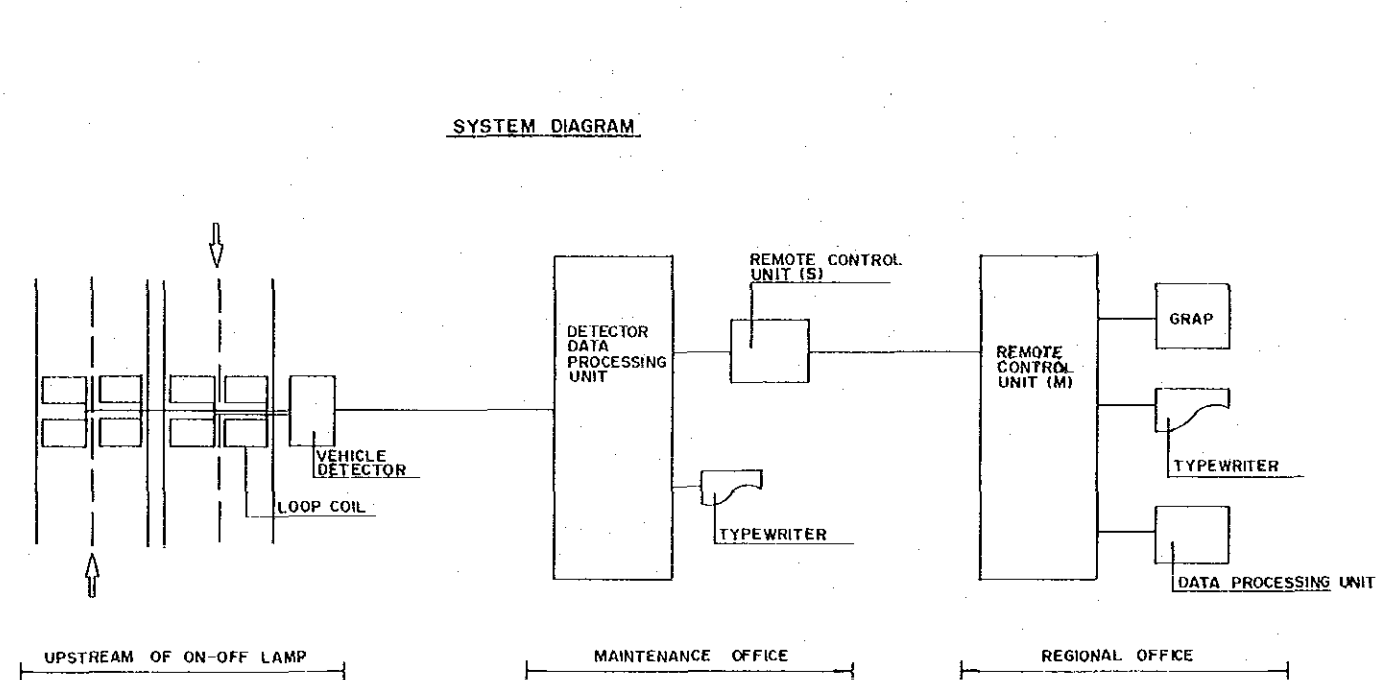
SCALE:
1000 0 2000
500 1000 meters

DRAWING NO: B32

DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND
MANAGEMENT SYSTEM OF MALAYSIAN
EXPRESSWAYS AND TOLL HIGHWAYS
JAPAN INTERNATIONAL COOPERATION AGENCY

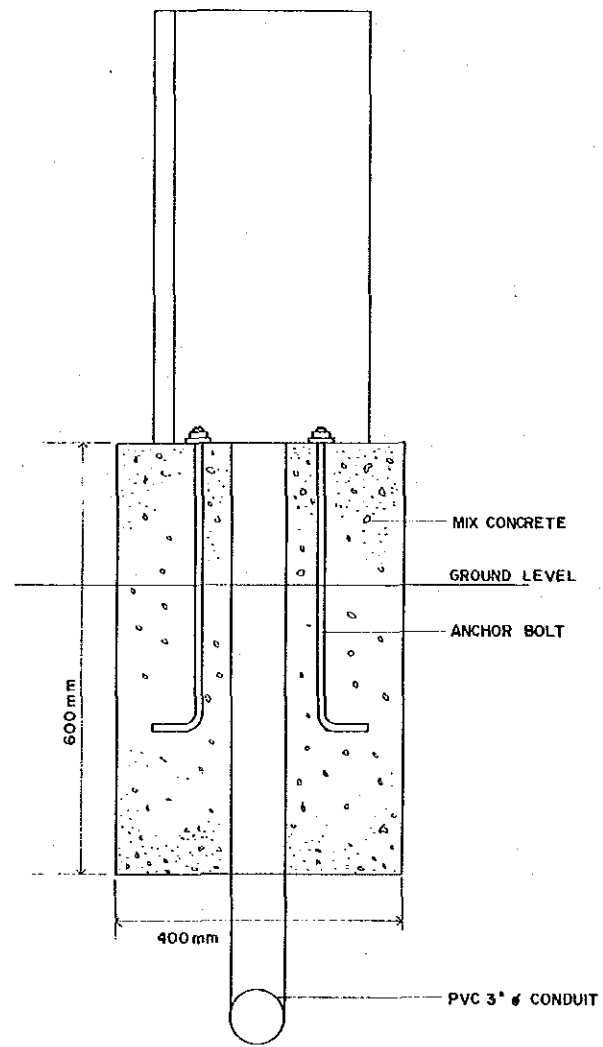
C. PRELIMINARY ENGINEERING DESIGN



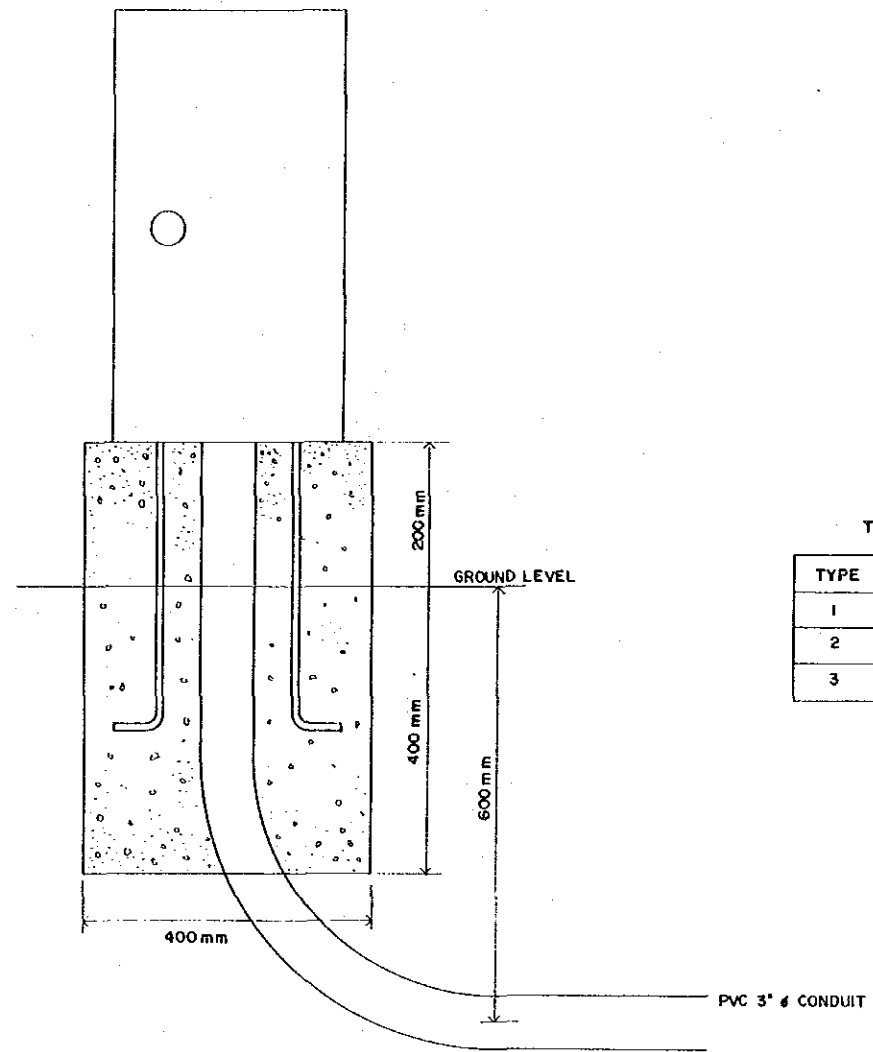
VEHICLE DETECTOR SYSTEM

SCALE:
DRAWING NO: C-1
DATE: DEC 1989

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EXPRESSWAYS AND TOLL HIGHWAYS**
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SIDE VIEW



FRONT VIEW

TYPE OF DETECTOR CABINET (mm)

TYPE	HEIGHT	WIDTH	DEPTH
1	600	320	300
2	800	320	300
3	1100	320	300

VEHICLE DETECTOR INSTALLATION PLAN

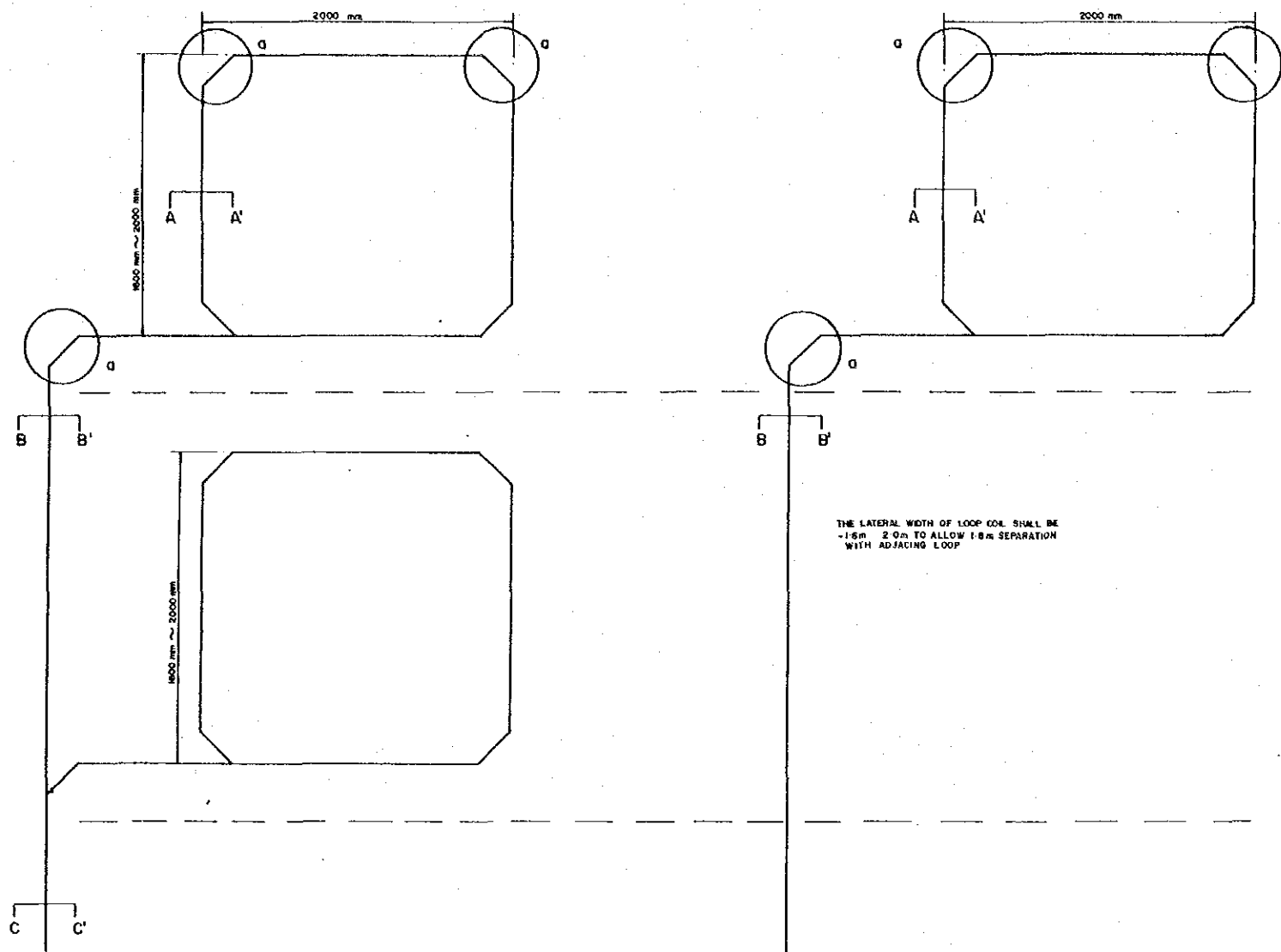
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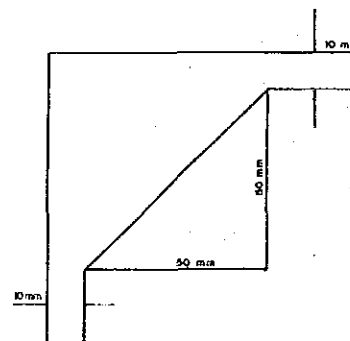
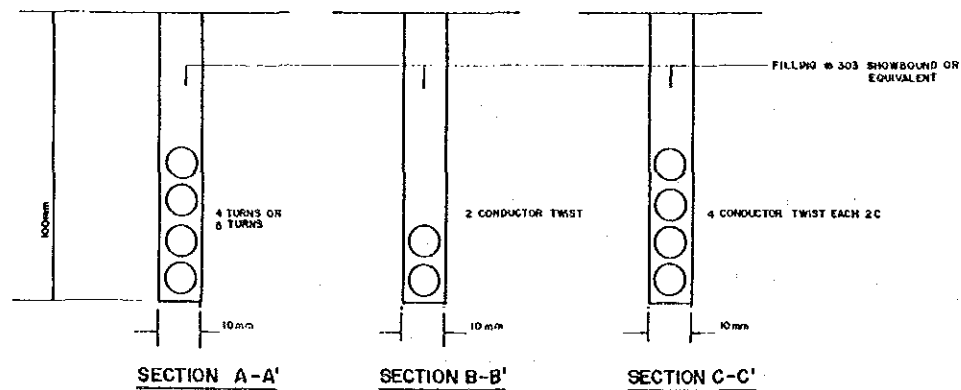
DATE:
DEC 1989

**STUDY ON TRAFFIC CONTROL AND
MANAGEMENT SYSTEM OF MALAYSIAN
EXPRESSWAYS AND TOLL HIGHWAYS**

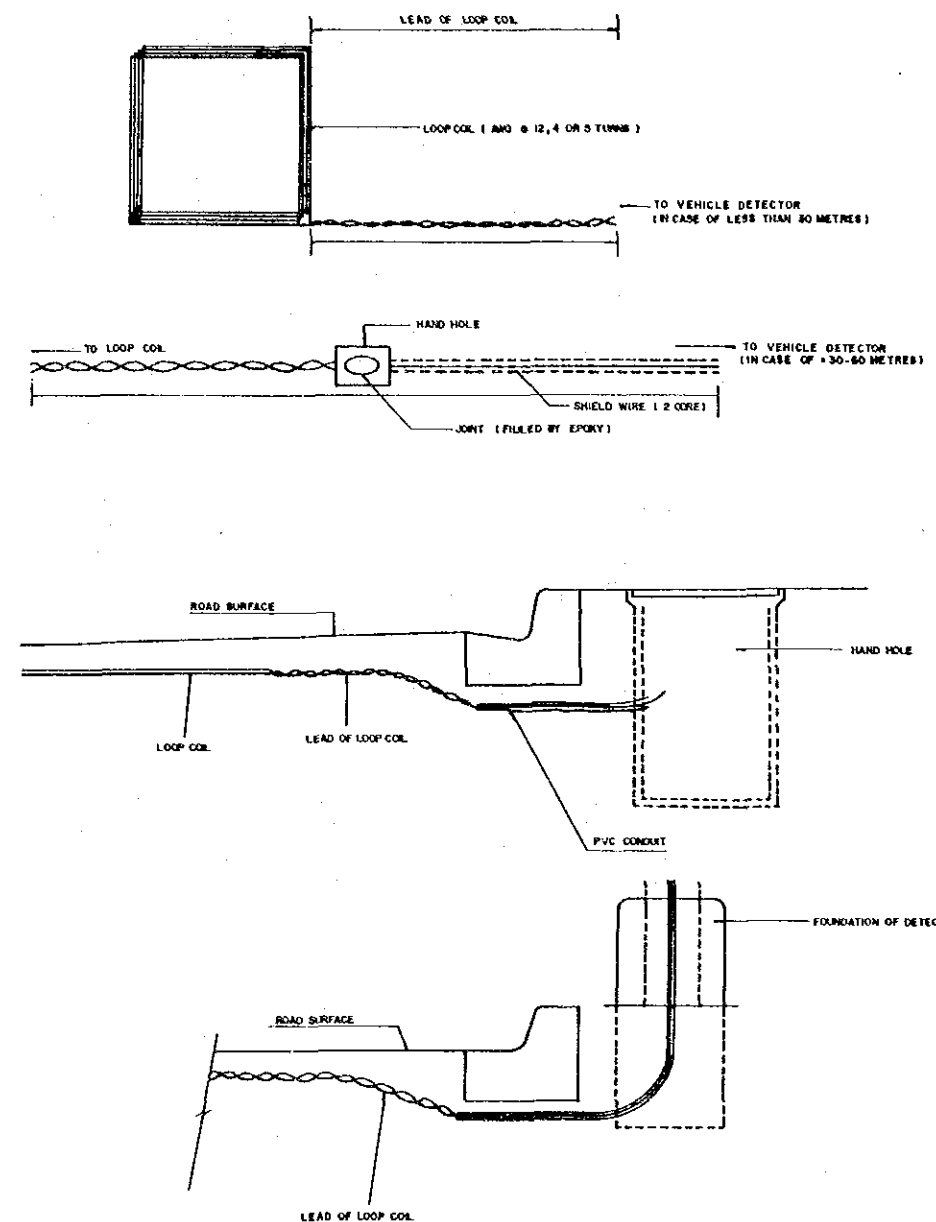
JAPAN INTERNATIONAL COOPERATION AGENCY



THE LATERAL WIDTH OF LOOP COIL SHALL BE 1.8m 2.0m TO ALLOW 1.8m SEPARATION WITH ADJACENT LOOP



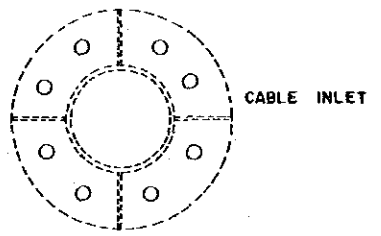
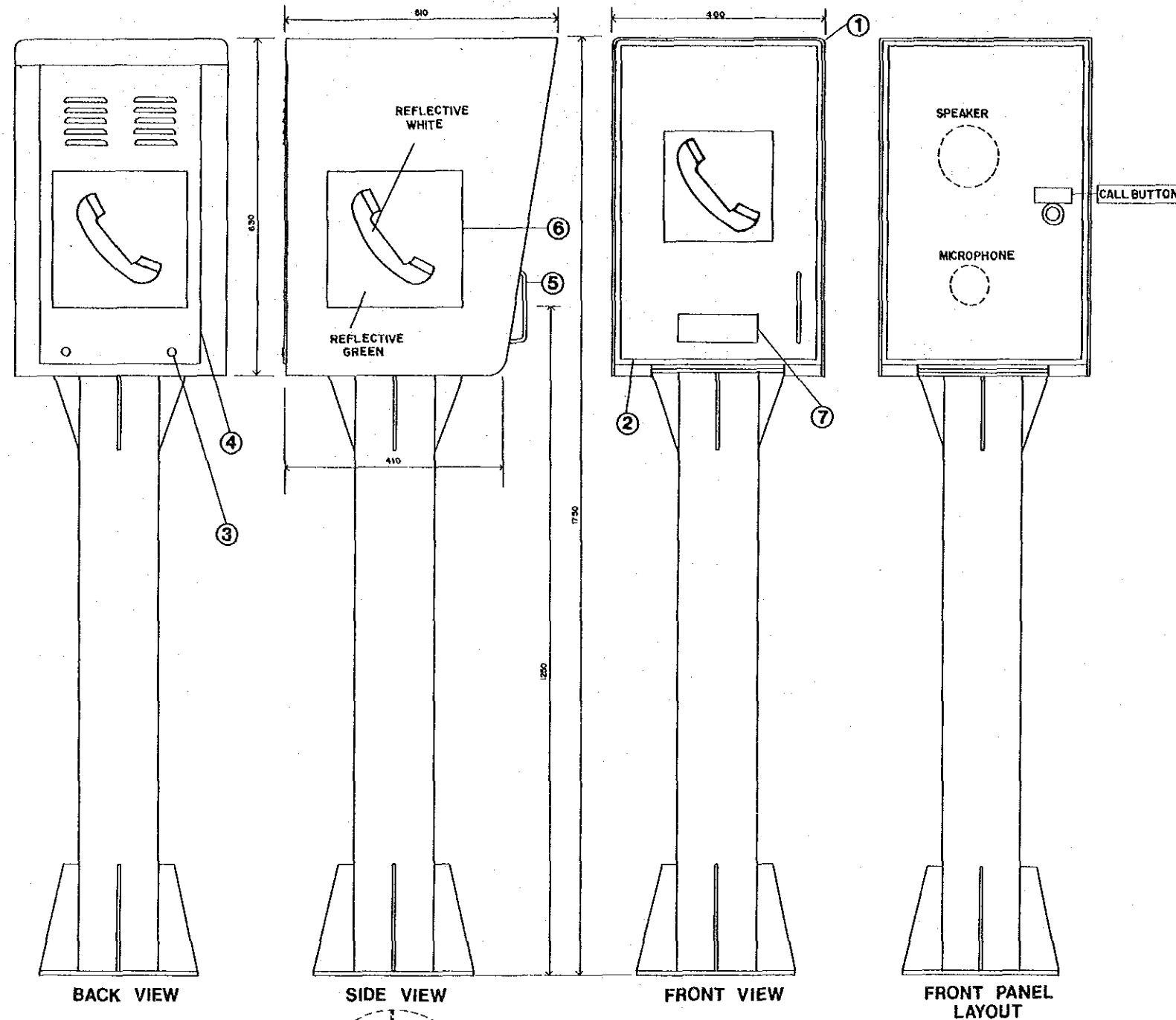
POINT a
SCALE: 1:1



DETECTOR LOOP INSTALLATION PLAN

SCALE:	
DRAWING NO: C3	DATE: DEC 1989

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EXPRESSWAYS AND TOLL HIGHWAYS
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PAINTING COLOR - BRIGHT ORANGE
(MUNSELL 7.5 YR 7.5/16)

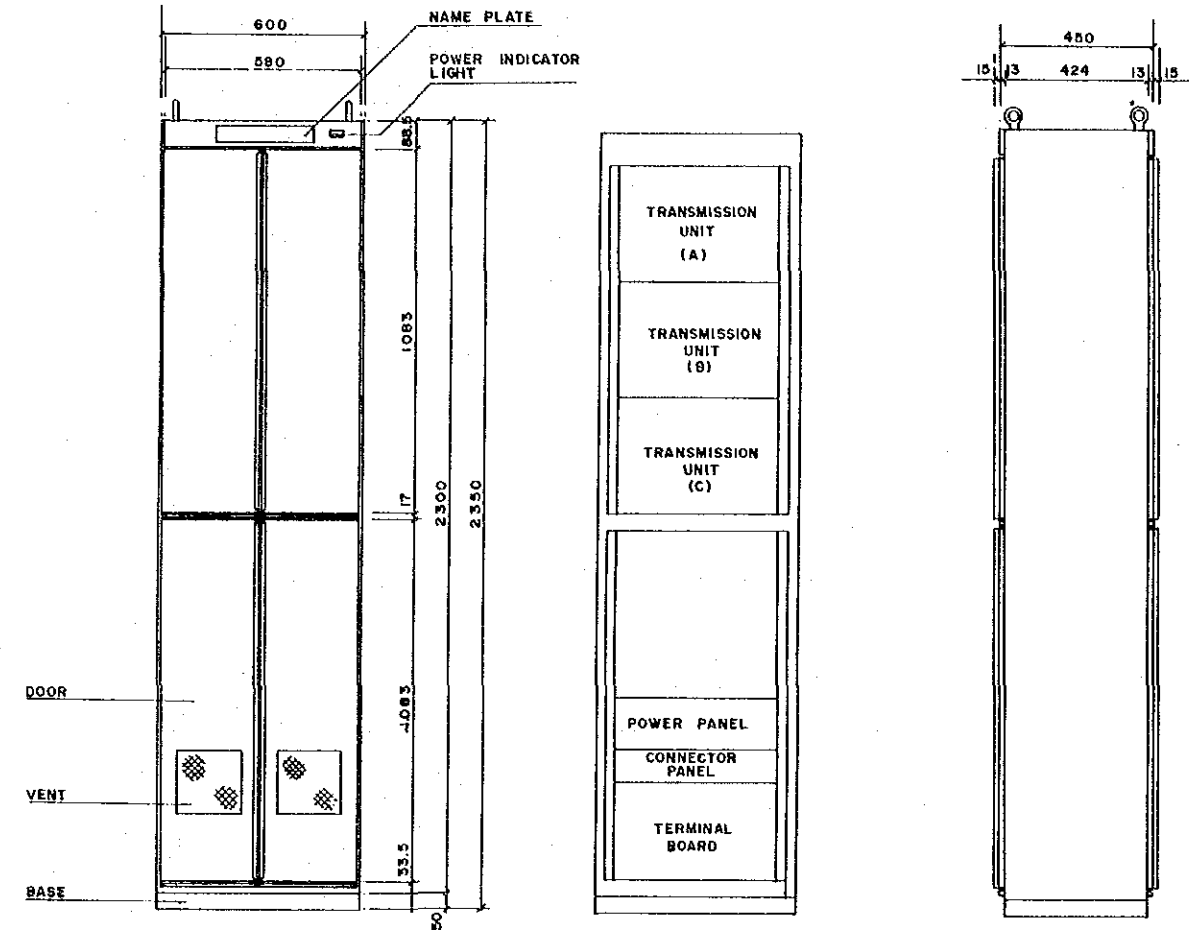
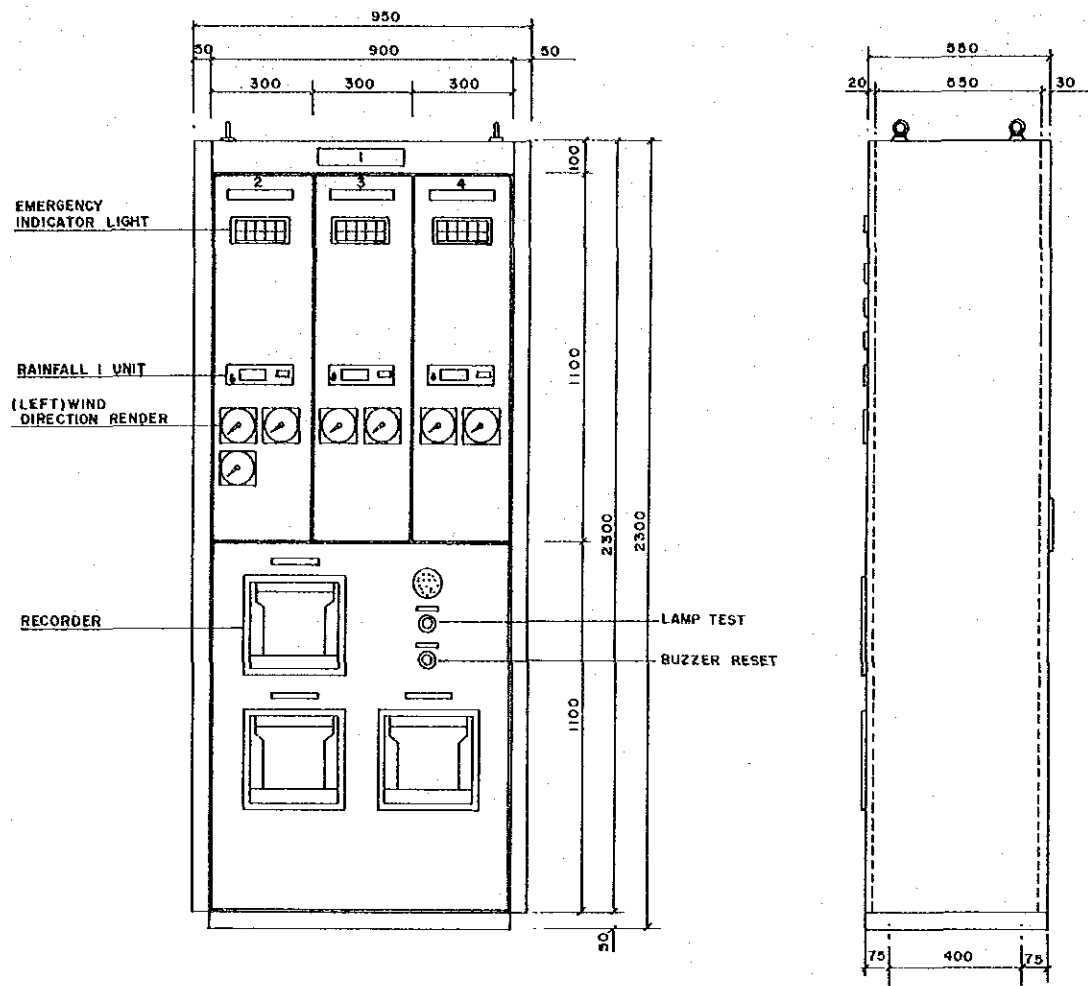
NO	ITEM	REMARKS
1	Frame	Steel Plate & Pipe - Chromate Plated and Three Layers of Epoxy Resin Enameling Paint
2	Front Cover	
3	Key	
4	Back Cover	Steel Plate - Chromate Plated and Three Layers of Epoxy Resin Enameling Paint
5	Knob	Steel Bar - Chrome Plated
6	Telephone Mark	Steel Plate - Chromate Plated and Three Layers of Epoxy Resin Enameling Paint
7	Name Plate	Aluminum

EMERGENCY TELEPHONE SET

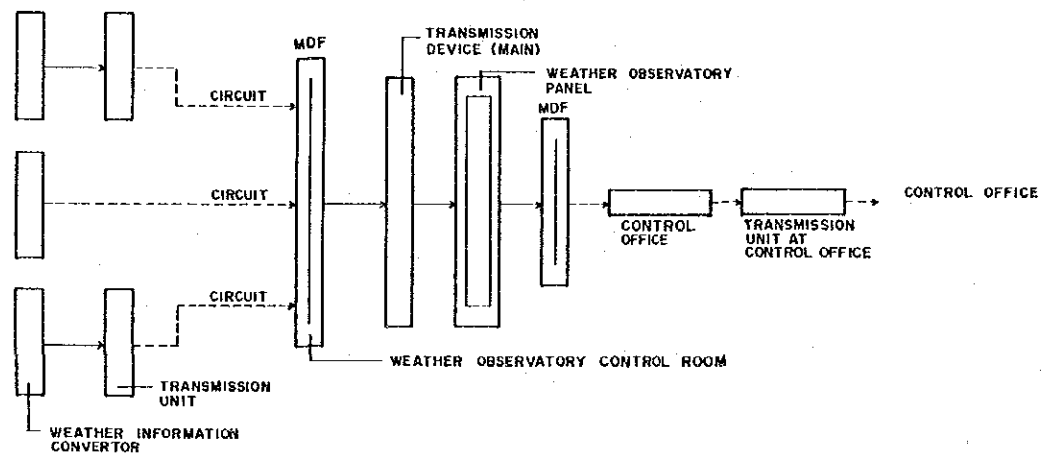
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DRAWING NO: C4 DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND MANAGEMENT SYSTEM OF MALAYSIAN EXPRESSWAYS AND TOLL HIGHWAYS
JAPAN INTERNATIONAL COOPERATION AGENCY

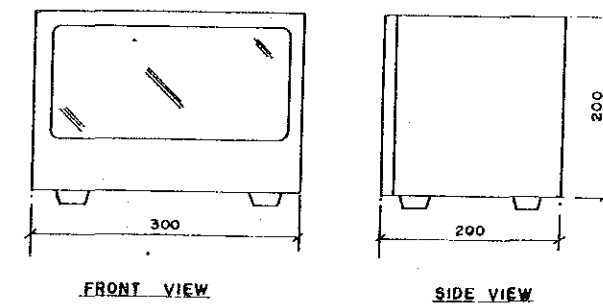
WEATHER OBSERVATORY PANEL



SYSTEM CONFIGURATION



RAINFALL AND WIND DIRECTION AND WIND VELOCITY RECORDER



WEATHER OBSERVATORY SYSTEM

SCALE:

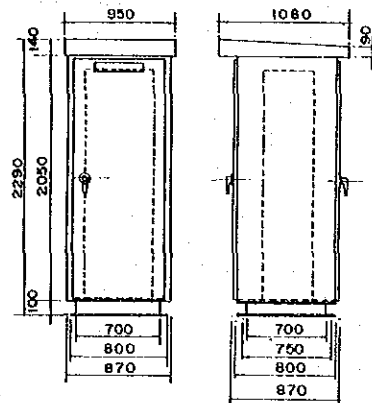
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C5

DATE:
DEC 1989

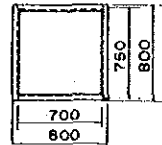
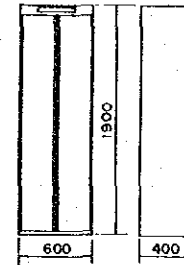
STUDY ON TRAFFIC CONTROL AND MANAGEMENT SYSTEM OF MALAYSIAN EXPRESSWAYS AND TOLL HIGHWAYS

JAPAN INTERNATIONAL COOPERATION AGENCY

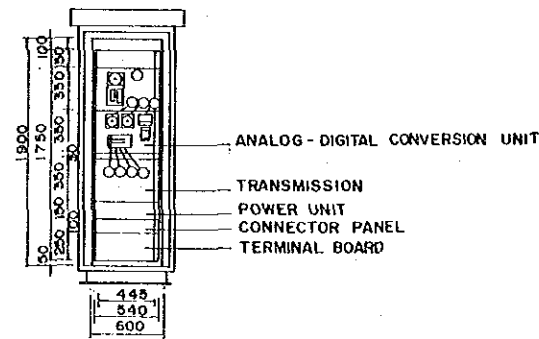
CUBICLE



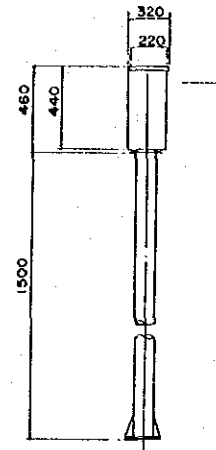
TRANSMISSION FRAME



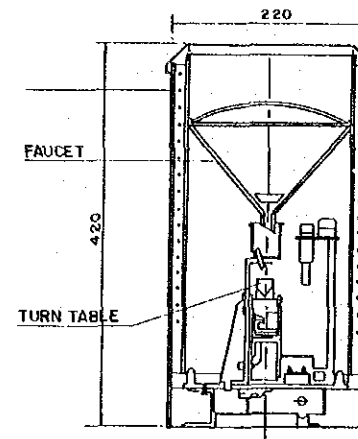
INTERNAL VIEW OF TRANSMISSION EQUIPMENT



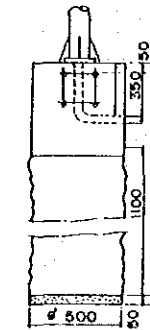
SETTING OF RAINFALL SENSOR



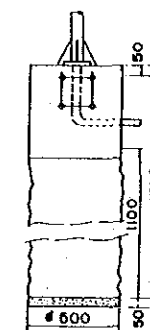
RAINFALL SENSOR



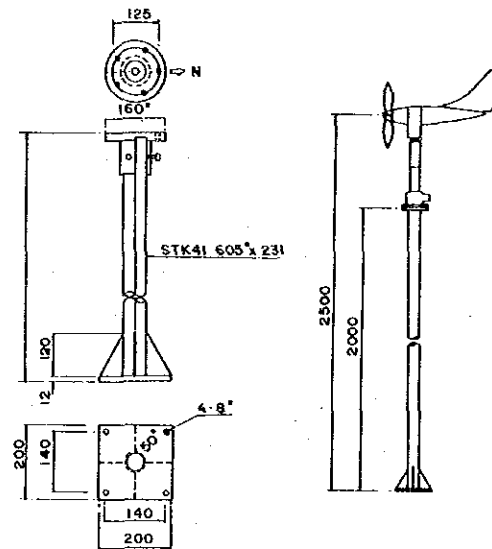
RAINFALL SENSOR FOUNDATION



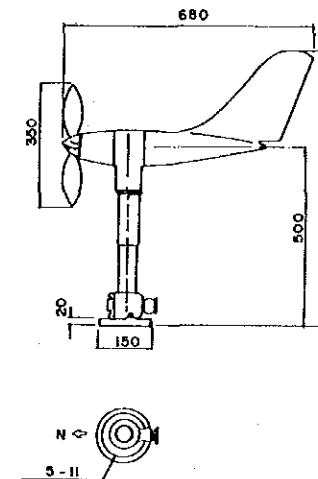
ANEMOMETER FOUNDATION



SETTING OF ANEMOMETER



ANEMOMETER

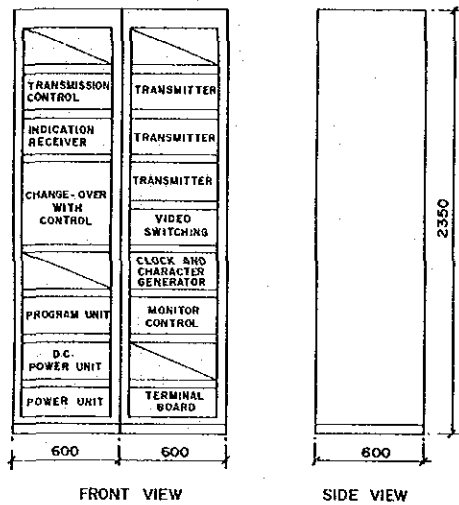


WEATHER OBSERVATORY EQUIPMENT

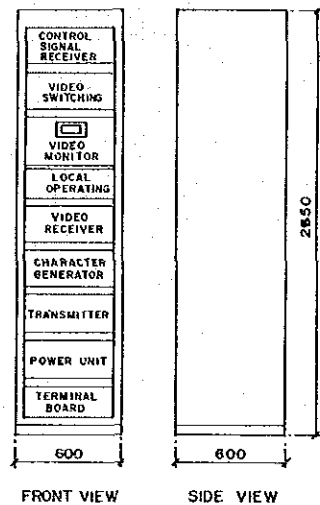
SCALE:
DRAWING NO: C6 DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND MANAGEMENT SYSTEM OF MALAYSIAN EXPRESSWAYS AND TOLL HIGHWAYS
JAPAN INTERNATIONAL COOPERATION AGENCY

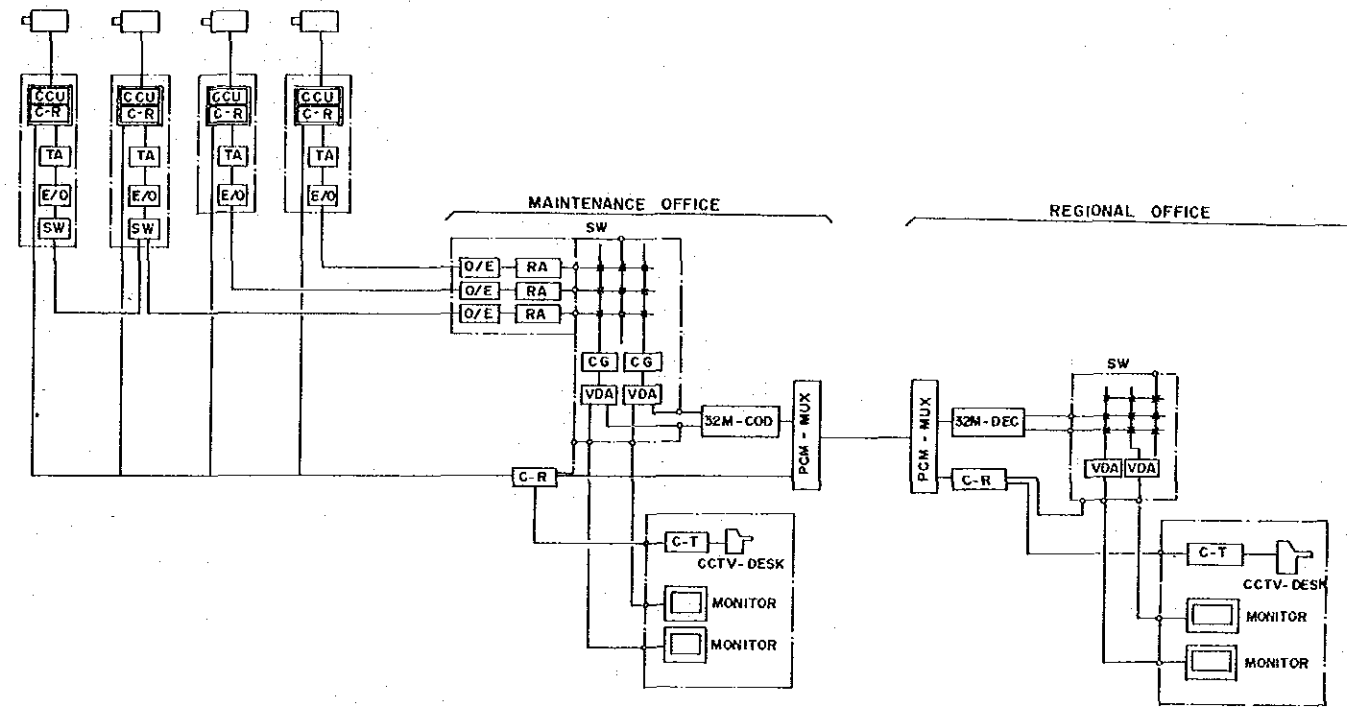
CONTROL EQUIPMENT
CONTROL MAINTENANCE OFFICE



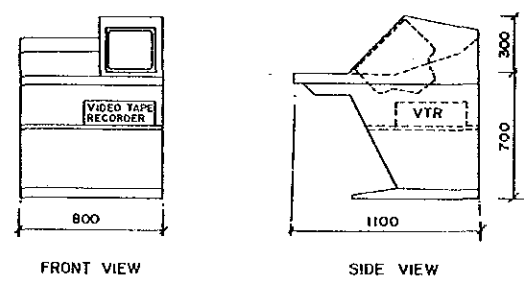
CONTROL EQUIPMENT
TOLL PLAZA OFFICE



SYSTEM DIAGRAM



CCTV DESK

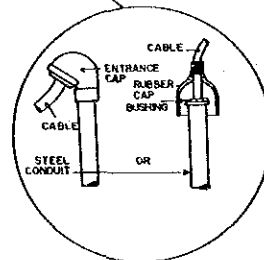
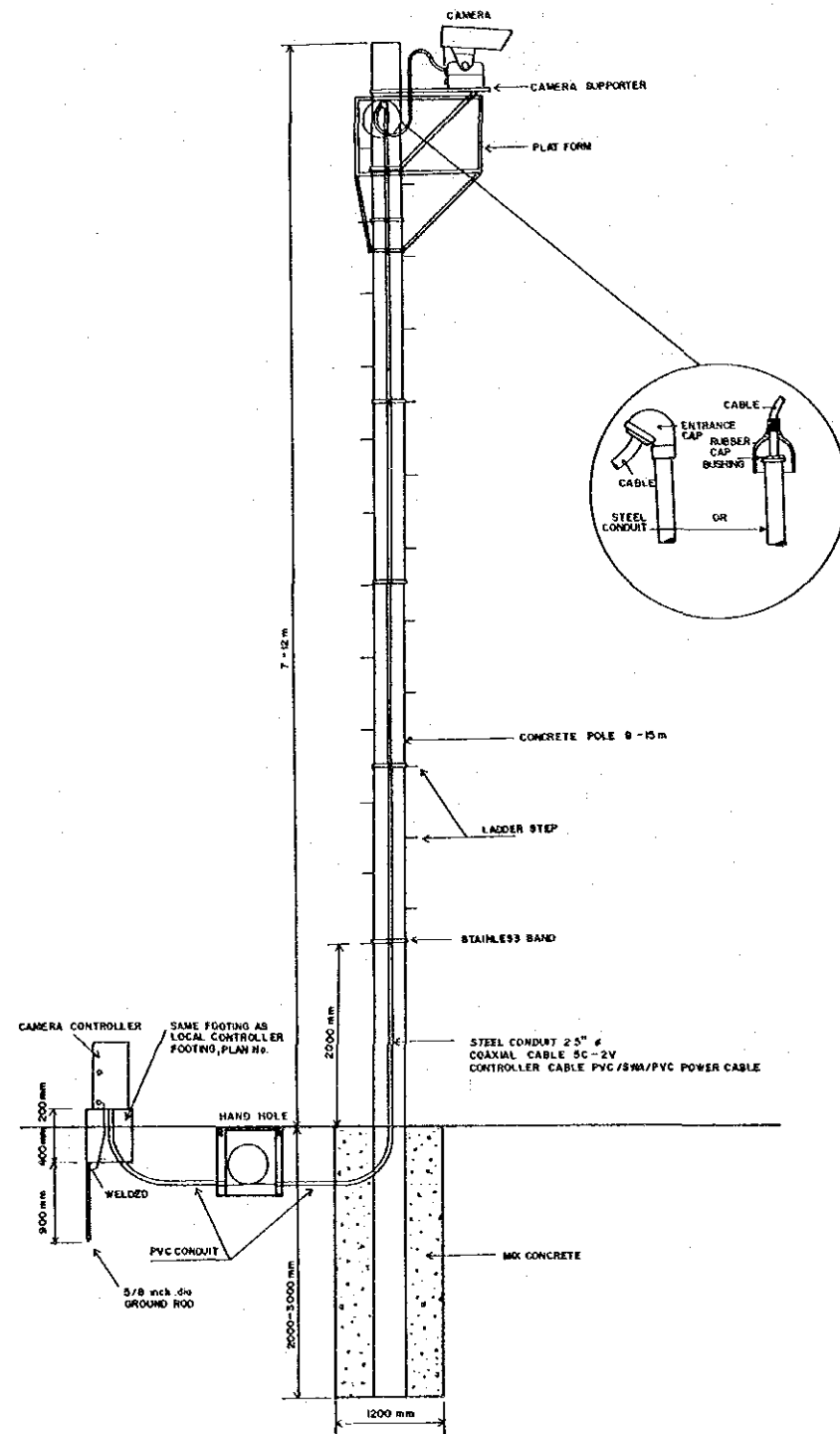


ABBREVIATION	WORD IN FULL
☐	CAMERA
CCU	CAMERA CONTROL UNIT
C-T	CONTROL TRANSMISSION
C-R	CONTROL RECEIVER
TA	TRANSMIT AMPLIFIER
RA	RECEIVE AMPLIFIER
VDA	VIDEO DISTRIBUTING AMPLIFIER
CG	CHARACTER GENERATOR
E/O, O/E	ELECTRIC/OPTICAL, OPTICAL/ELECTRICAL
SW	VIDEO SWITCHER

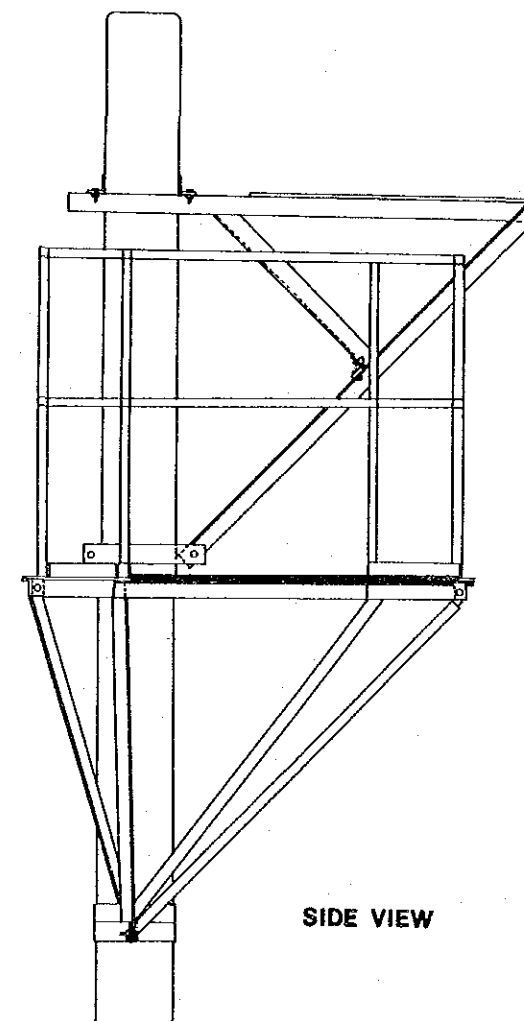
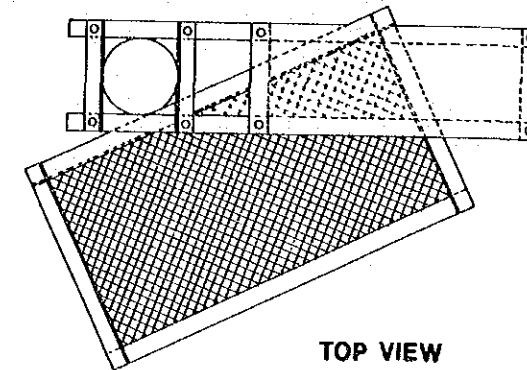
CCTV SYSTEM

SCALE:
DRAWING NO: C7
DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND
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CCTV PLATFORM

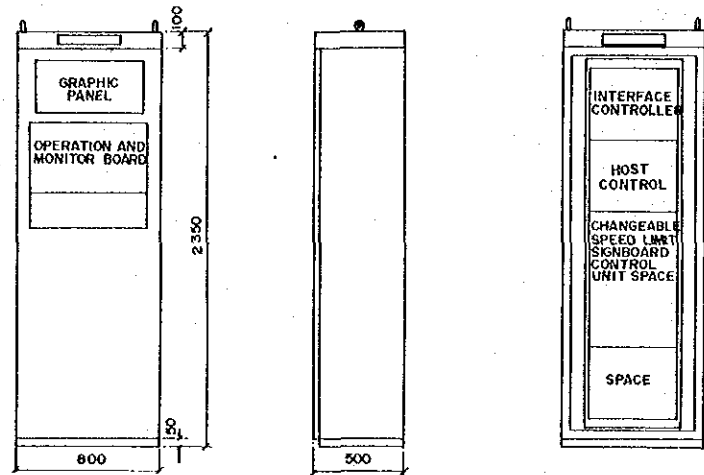


CCTV CAMERA INSTALLATION PLAN

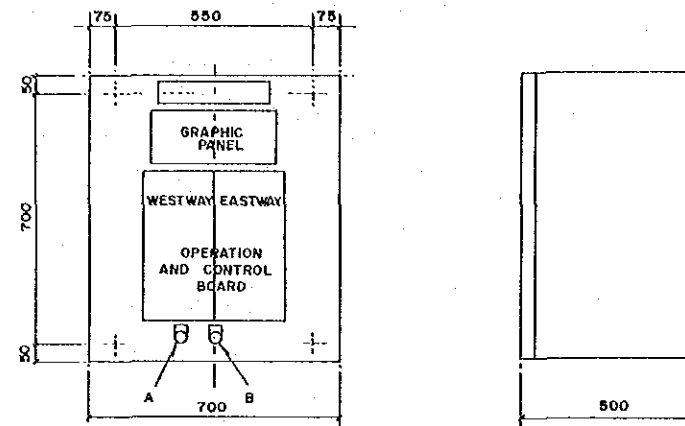
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DRAWING NO: C8	DATE: DEC 1989

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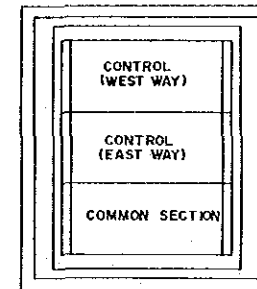
MONITOR AND CONTROL EQUIPMENT (INTERCHANGE)



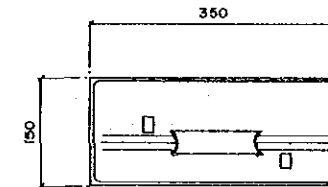
MONITOR AND CONTROL EQUIPMENT (TUNNEL)



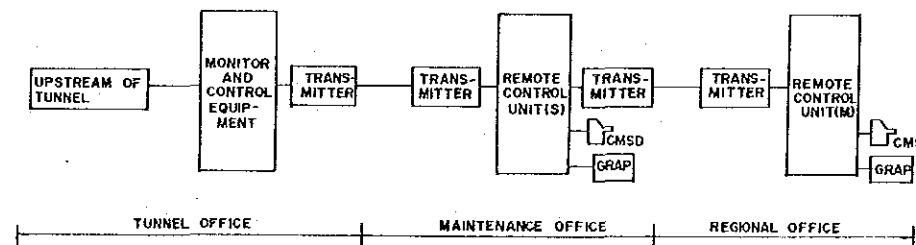
A REMOTE / MANUAL SWITCH
B BUZZER STOP SWITCH



GRAPHIC PANEL



SYSTEM DIAGRAM

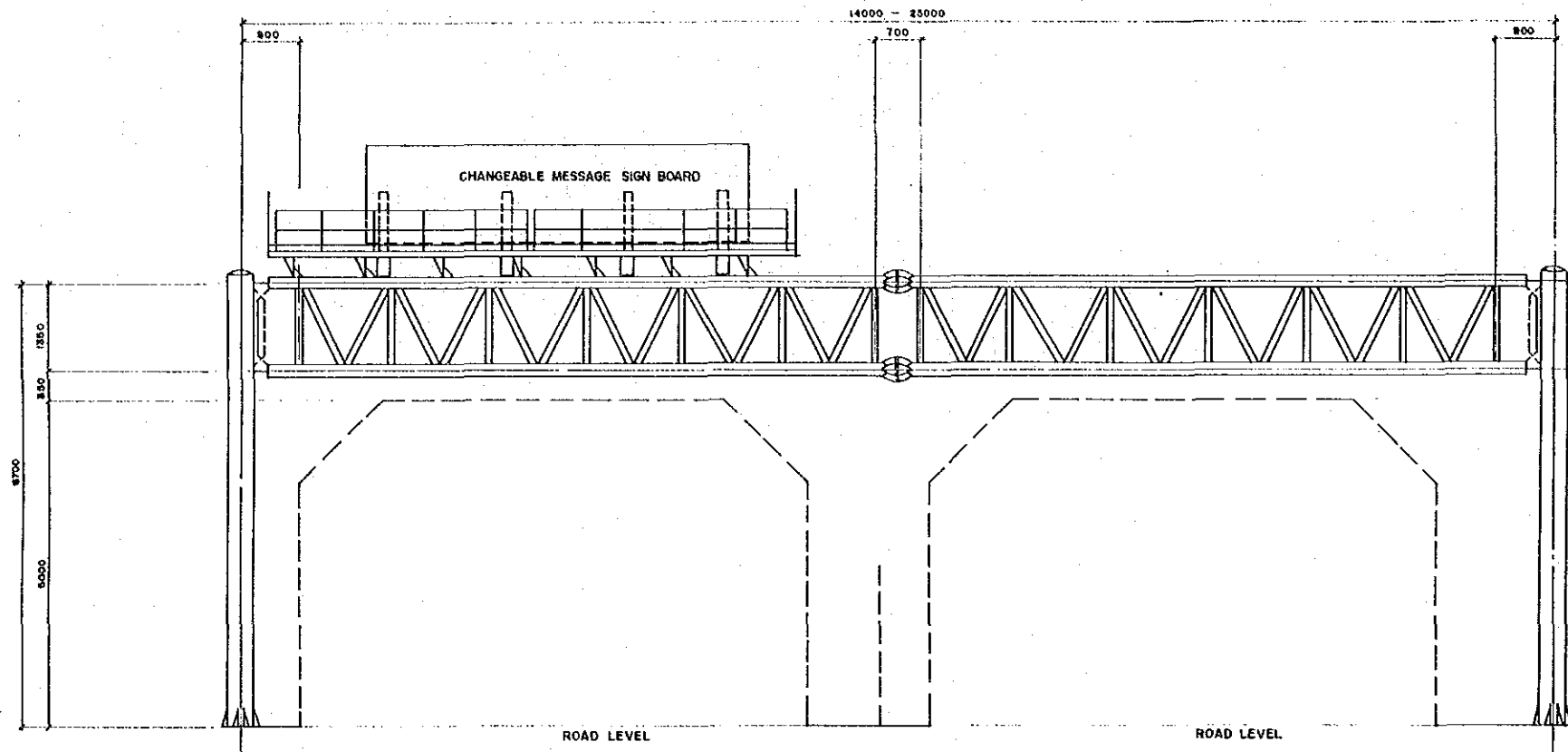


CHANGEABLE MESSAGE SIGN SYSTEM

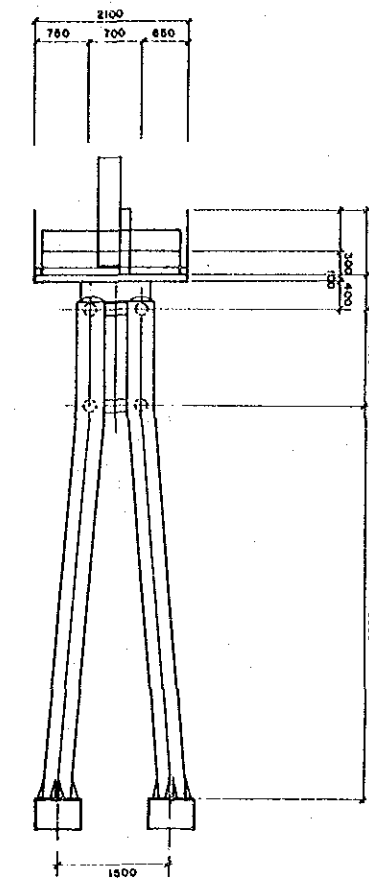
SCALE:

DRAWING NO: C9
DATE: DEC 1989

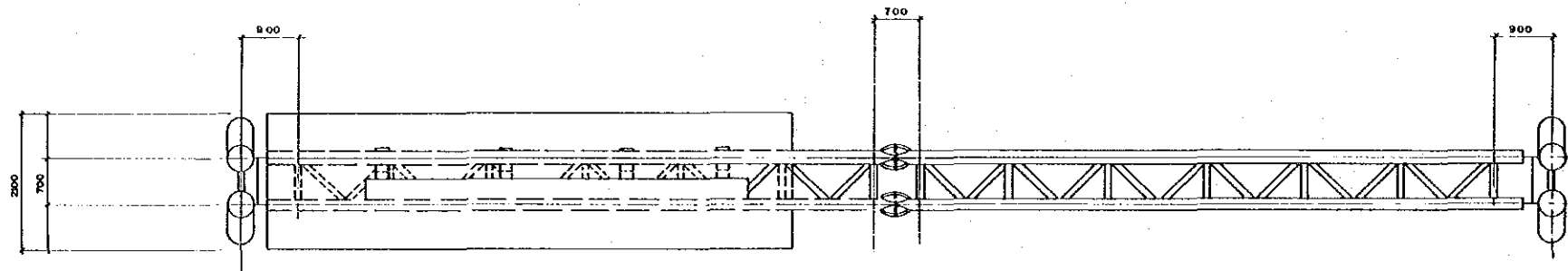
**STUDY ON TRAFFIC CONTROL AND
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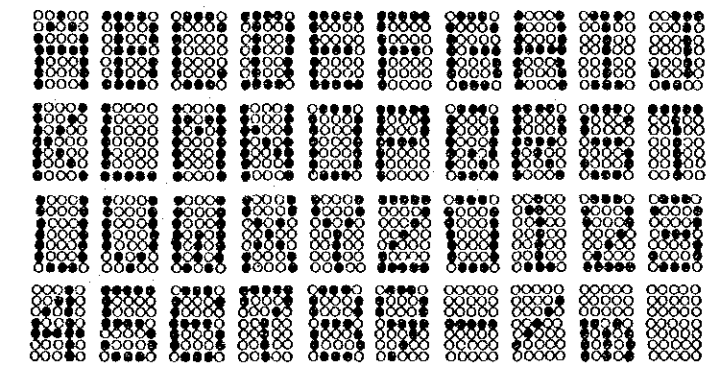
FRONT VIEW



SIDE VIEW



TOP VIEW



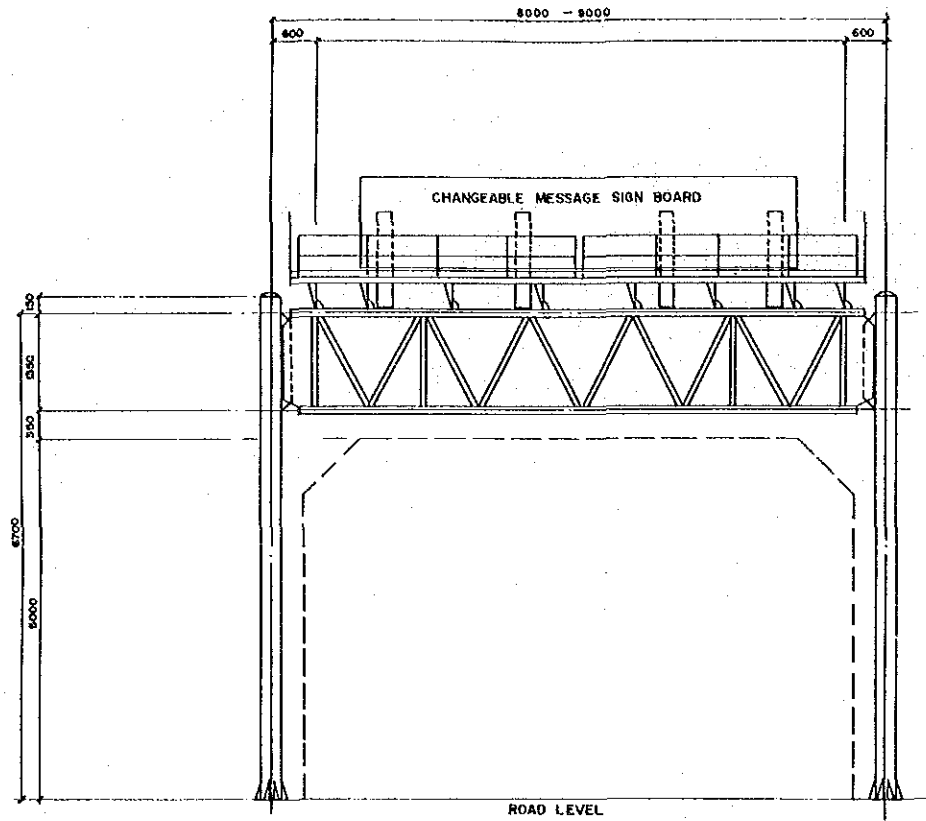
SAMPLE OF DISPLAY CHARACTERS

CHANGEABLE MESSAGE SIGN INSTALLATION PLAN (1)

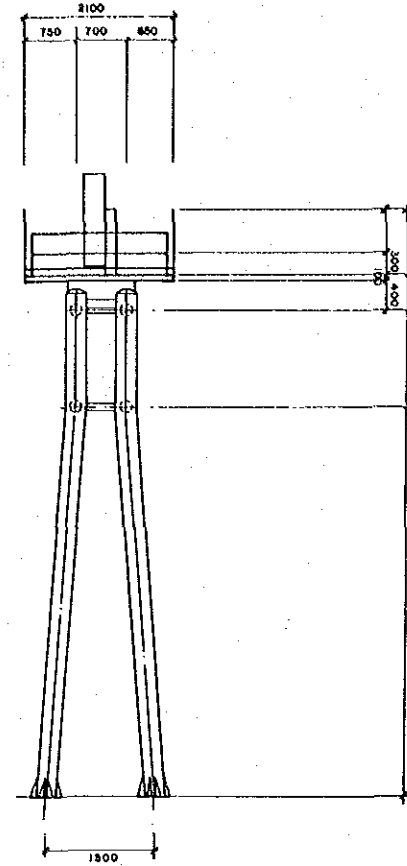
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DRAWING NO: C10
DATE: DEC 1989

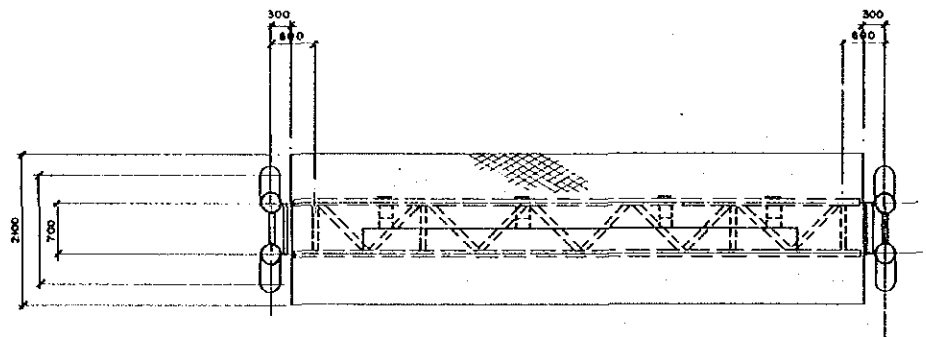
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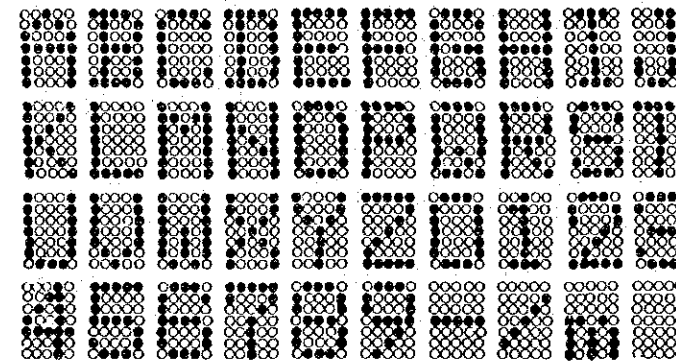
FRONT VIEW



SIDE VIEW



TOP VIEW



SAMPLE OF DISPLAY CHARACTERS

CHANGEABLE MESSAGE SIGN INSTALLATION PLAN (2)

SCALE:

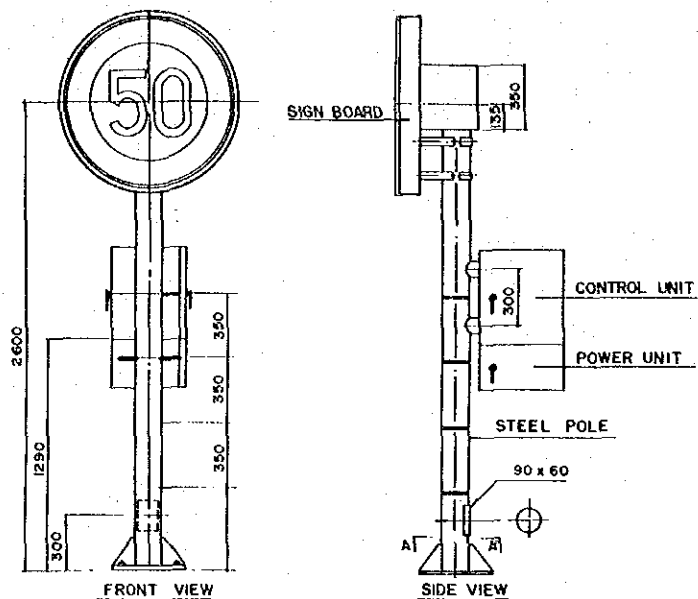
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DATE:
DEC 1989

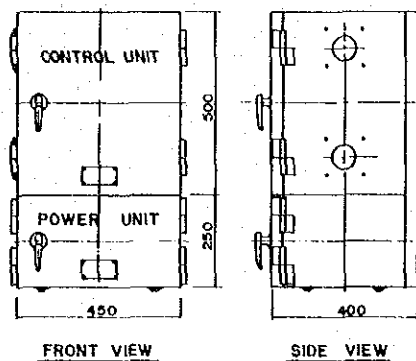
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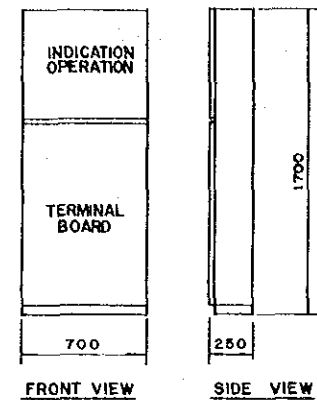
SETTING OF CHANGEABLE SPEED LIMIT SIGN BOARD



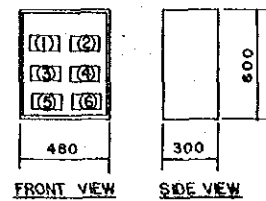
CONTROL / POWER UNIT



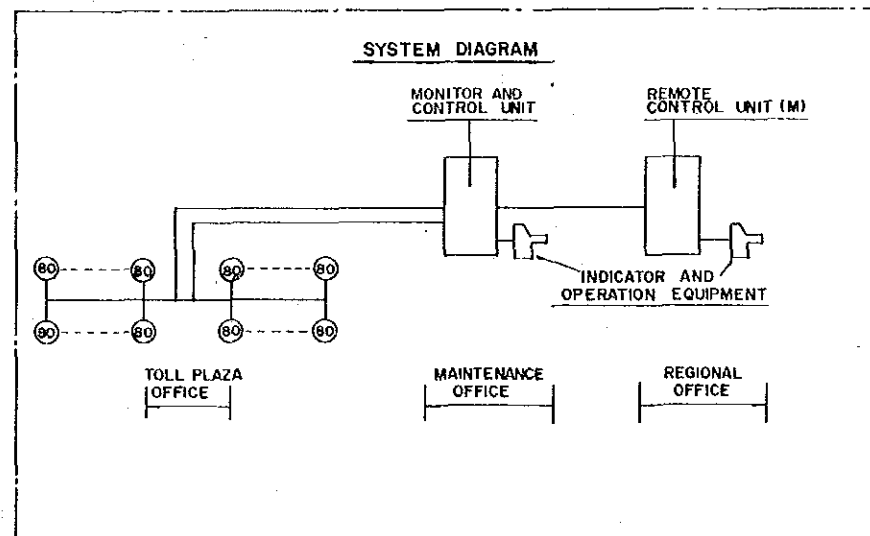
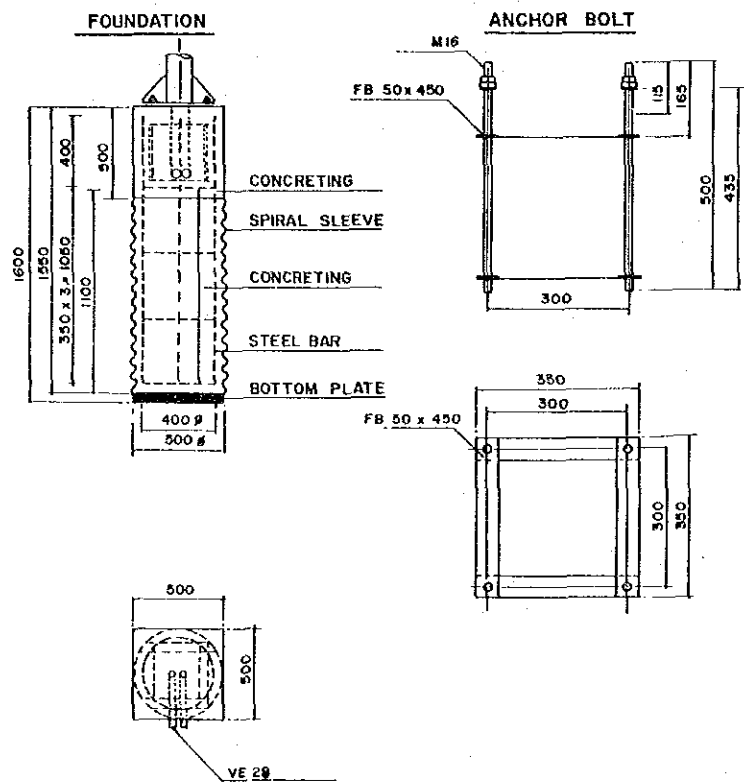
INDICATION / OPERATION EQUIPMENT



SUPERVISORY / CONTROL UNIT



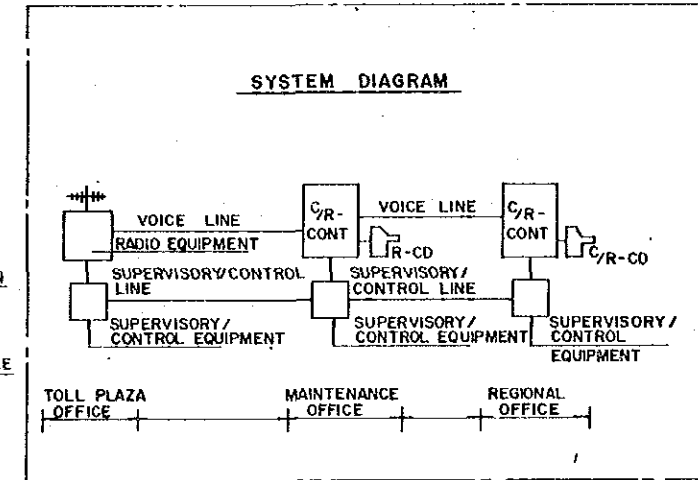
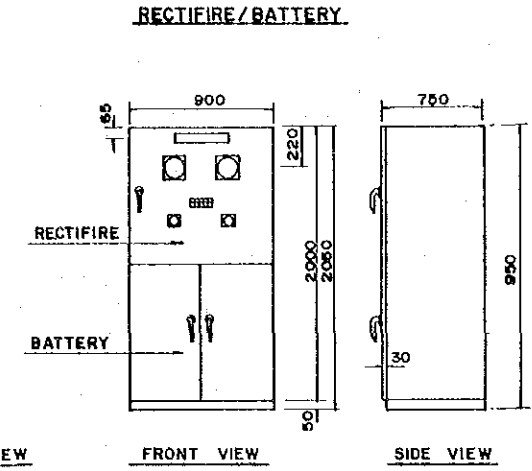
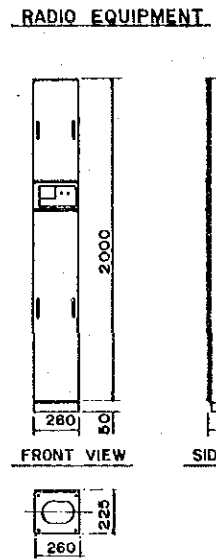
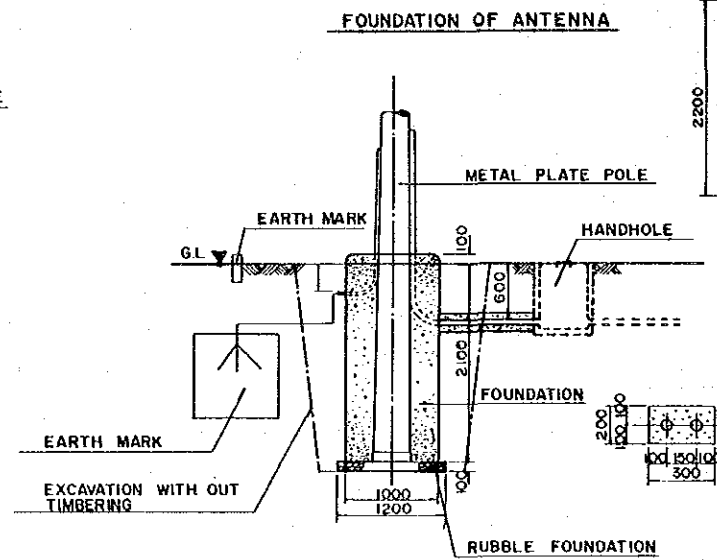
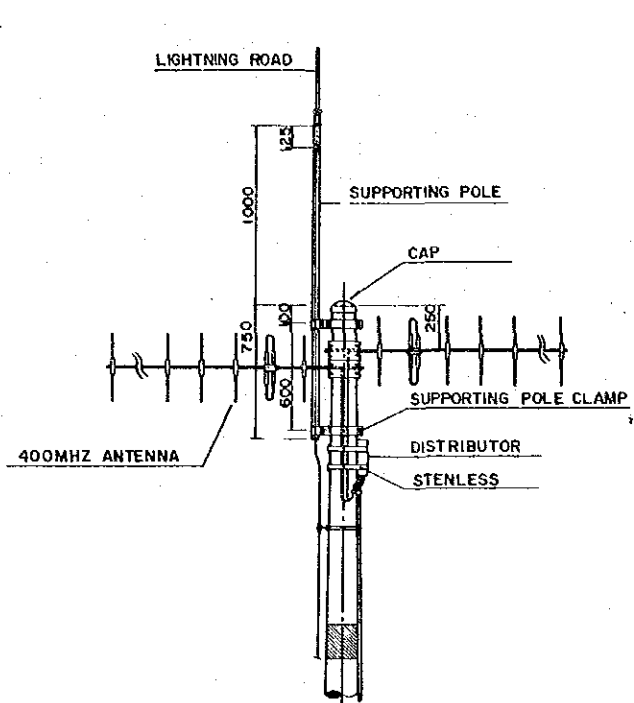
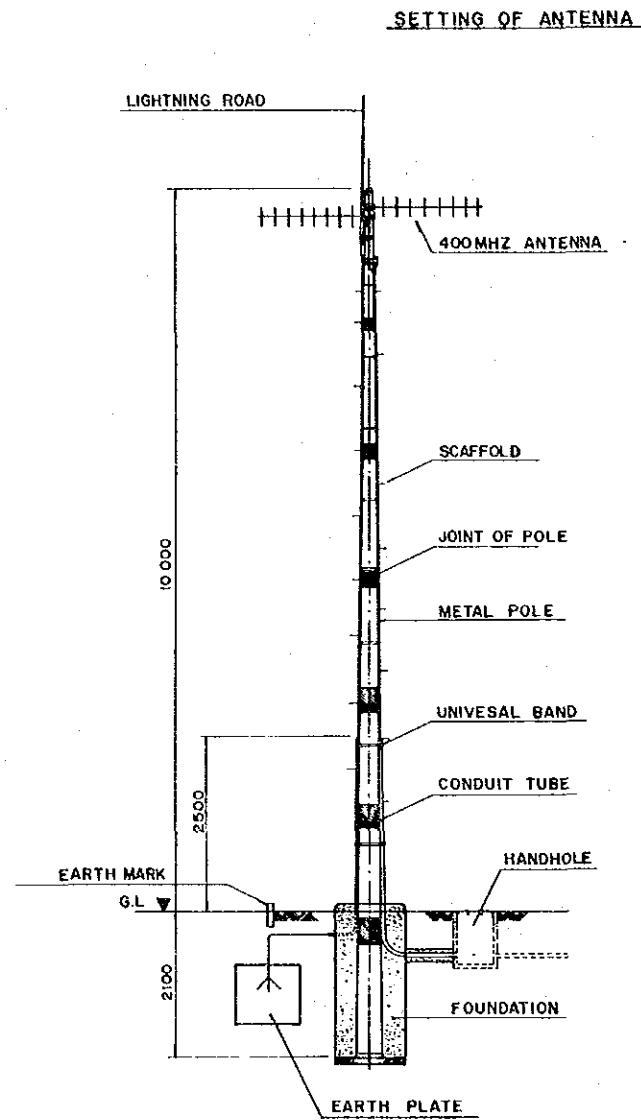
- ① SOMETHING WRONG INDICATOR
- ② ABNORMAL INDICATOR
- ③ SETTING OF ADDRESS SWITCH
- ④ SUPERVISORY
- ⑤ BLOCK DESIGNATE SWITCH
- ⑥ CONTROL SWITCH



CHANGEABLE SPEED LIMIT SIGN

SCALE:
DRAWING NO: C12
DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND
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JAPAN INTERNATIONAL COOPERATION AGENCY

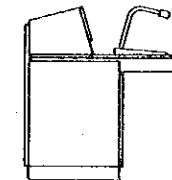
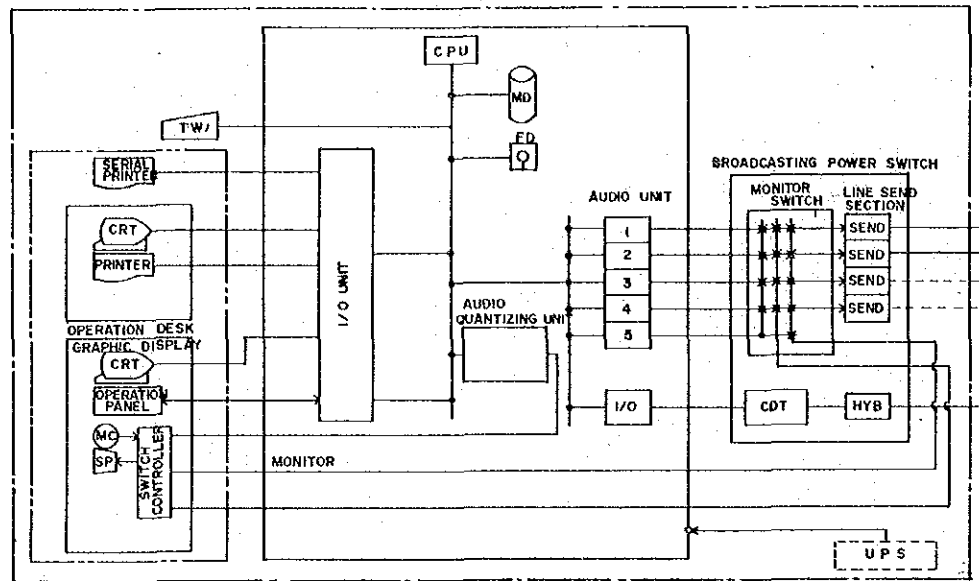


RADIO SYSTEM

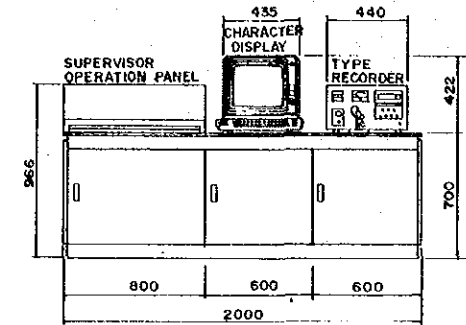
SCALE:
DRAWING NO: C13
DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND MANAGEMENT SYSTEM OF MALAYSIAN EXPRESSWAYS AND TOLL HIGHWAYS
JAPAN INTERNATIONAL COOPERATION AGENCY

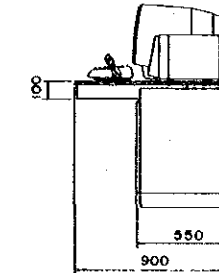
CONTROL UNIT



OPERATION DESK

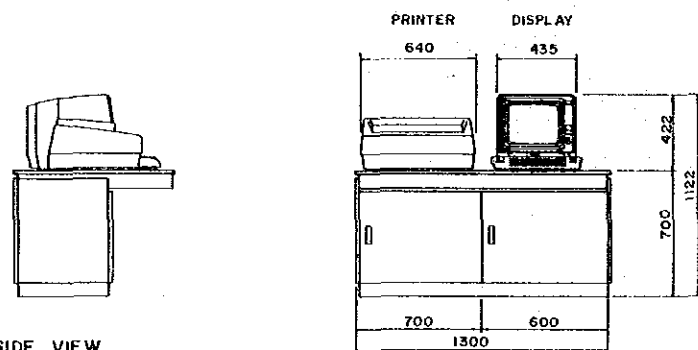


FRONT VIEW



SIDE VIEW

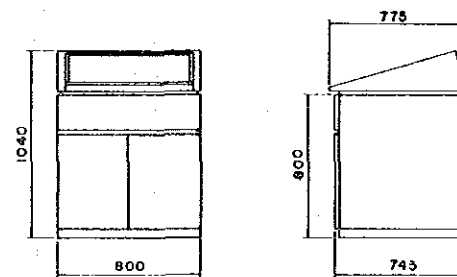
MESSAGE EDITING DESK



SIDE VIEW

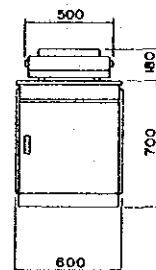
FRONT VIEW

SERIAL PRINTER

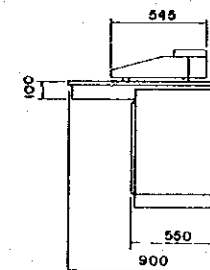


FRONT VIEW

SIDE VIEW

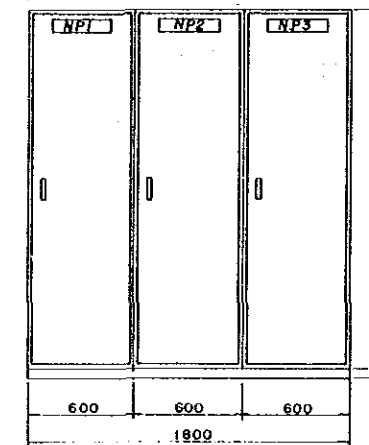


FRONT VIEW

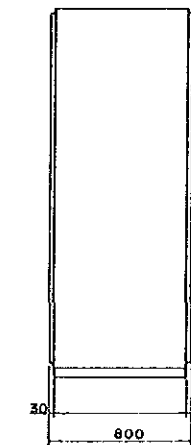


SIDE VIEW

CONTROL UNIT CONTROL UNIT BROADCASTING POWER SWITCHING UNIT
(1) (2)



FRONT VIEW



SIDE VIEW

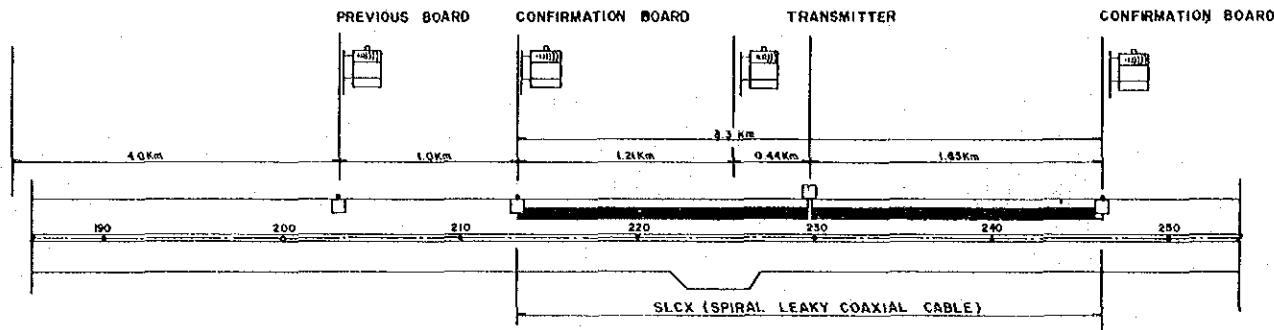
HIGHWAY RADIO SYSTEM (1)

SCALE:

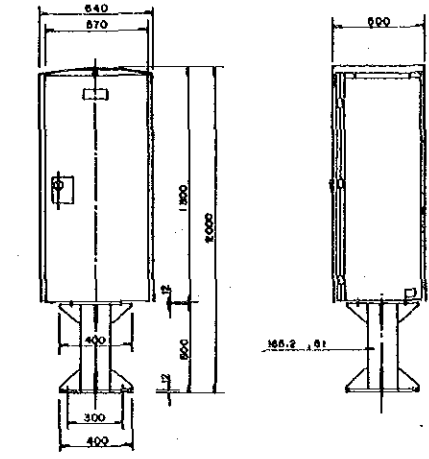
DRAWING NO: C14

DATE: DEC 1989

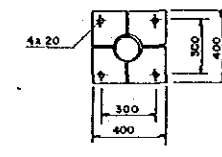
STUDY ON TRAFFIC CONTROL AND MANAGEMENT SYSTEM OF MALAYSIAN EXPRESSWAYS AND TOLL HIGHWAYS
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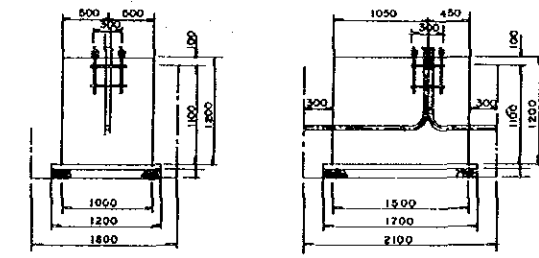
TRANSMITTER
S=1:20



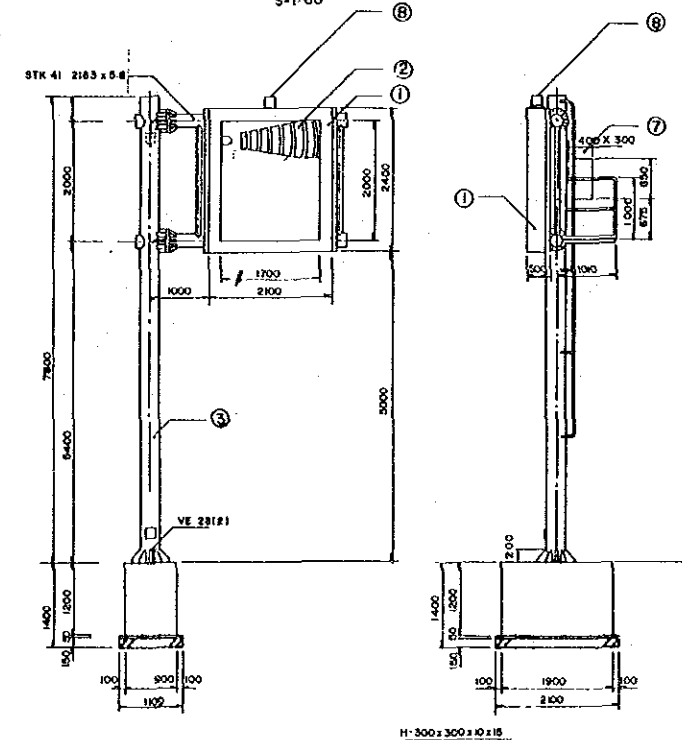
BASE PLATE



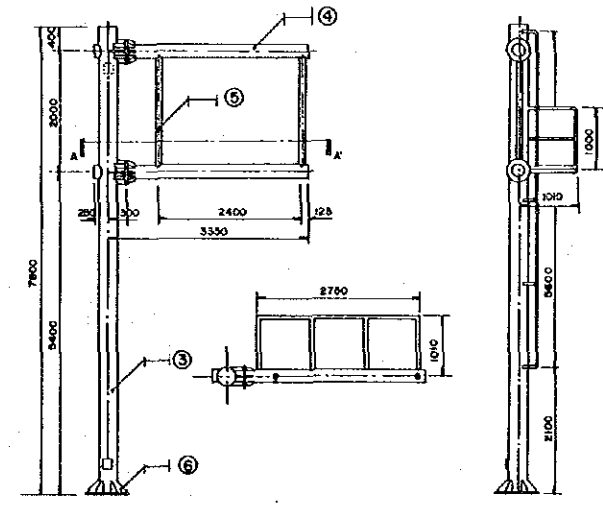
TRANSMITTER FOUNDATION
S=1:40



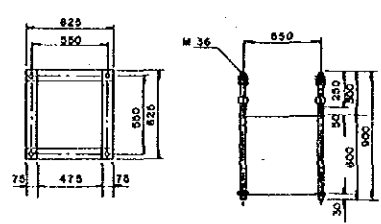
SETTING OF SIGN BOARD
S=1:60



PROP
S=1:60

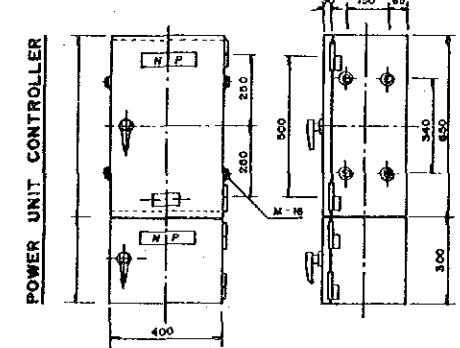


ANCHOR BOLT



NO	DESCRIPTION	MATERIAL
①	TRUE FORM	SPCC 1 2 3
②	SIGN BOARD	STRENGTHEN GLASS
③	PROP	STK 41 3185 x 10.3
④	BEAM	STK 41 216.3 x 5.8
⑤	GRILLE	STK 41 1016 x 4.2
⑥	BASE PLATE	SS 41 25
⑦	CONTROLLER	SPCC 23
⑧	TURN LIGHT	YELLOW

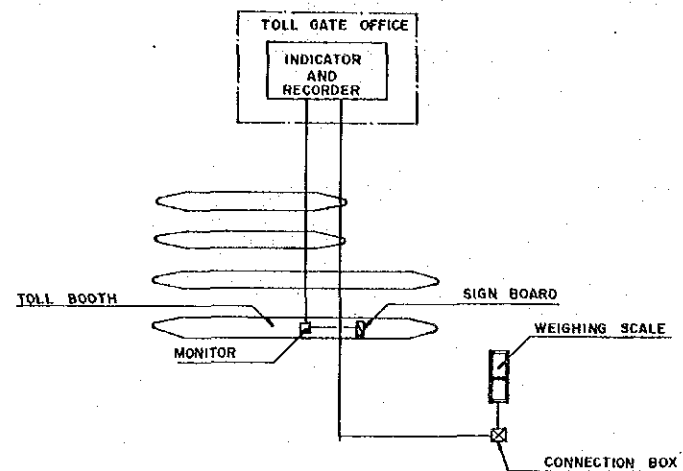
CONTROLLER



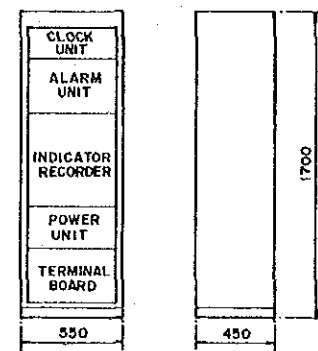
HIGHWAY RADIO SYSTEM (2)

SCALE:
DRAWING NO: C15
DATE: DEC 1989

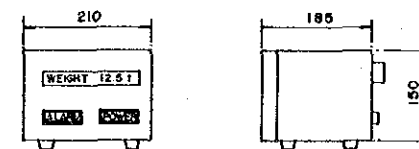
STUDY ON TRAFFIC CONTROL AND MANAGEMENT SYSTEM OF MALAYSIAN EXPRESSWAYS AND TOLL HIGHWAYS
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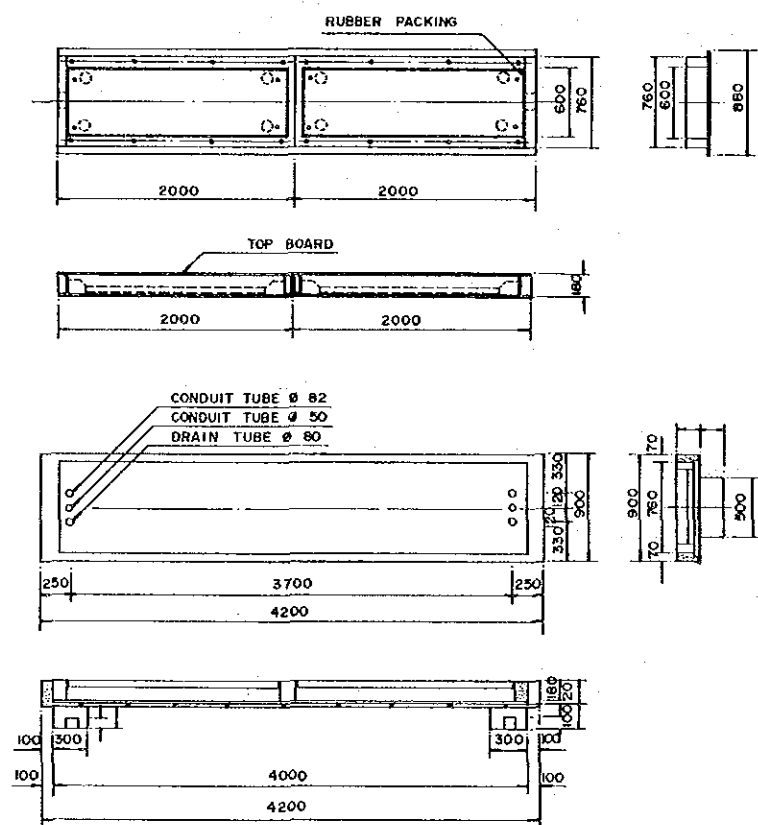
INDICATOR AND RECORDER EQUIPMENT



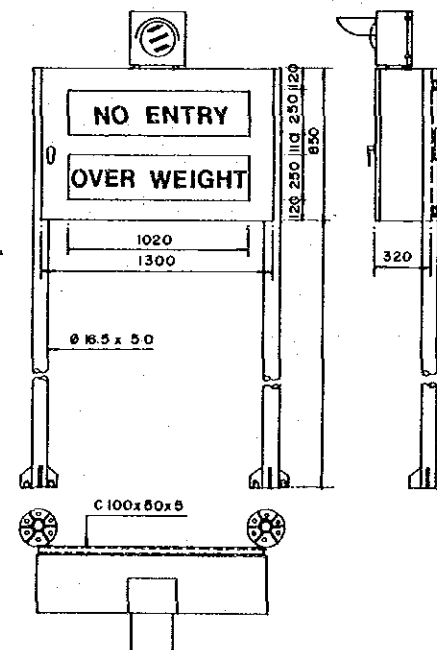
MONITOR



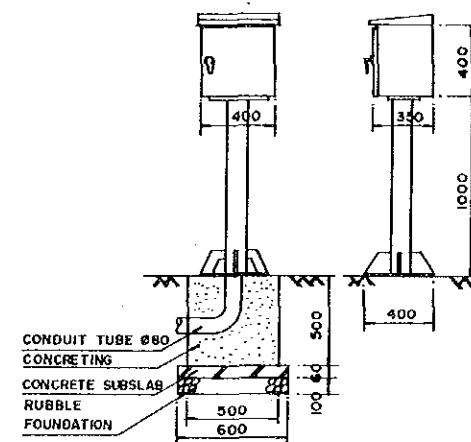
WEIGHING SCALE DETECTOR



SIGN BOARD



CONNECTION BOX

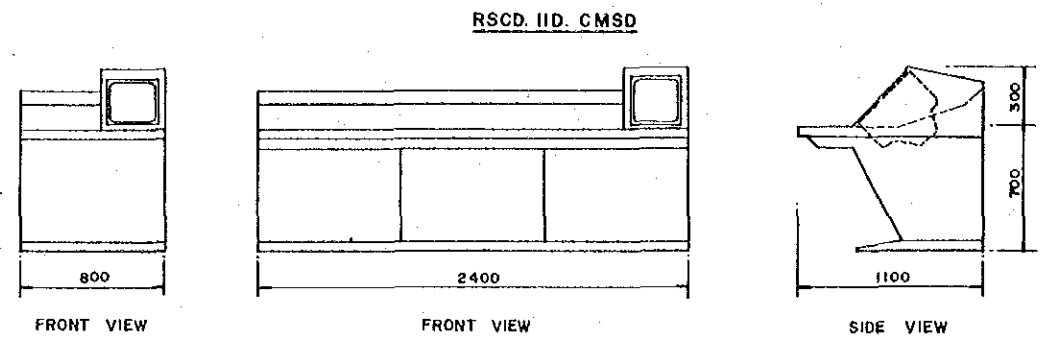
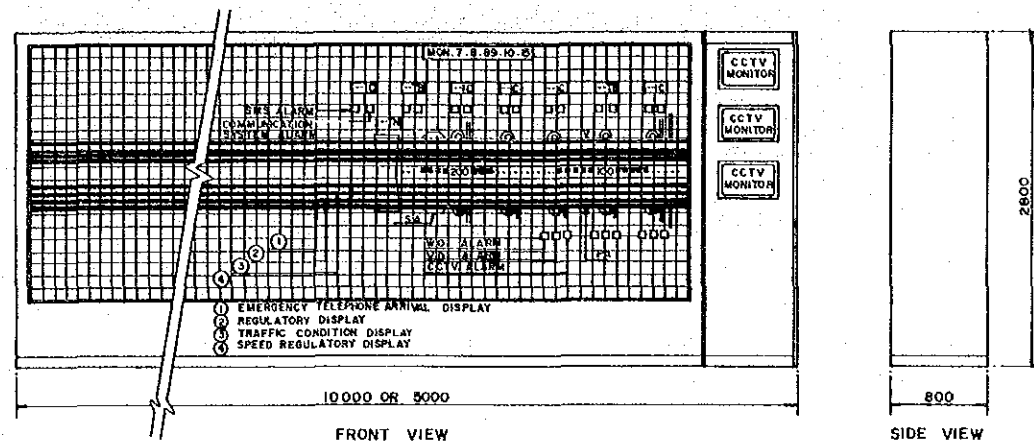


WEIGHING STATION

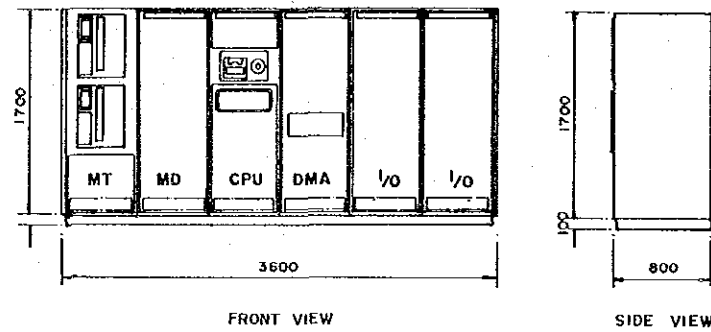
SCALE:
DRAWING NO: C16
DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND MANAGEMENT SYSTEM OF MALAYSIAN EXPRESSWAYS AND TOLL HIGHWAYS
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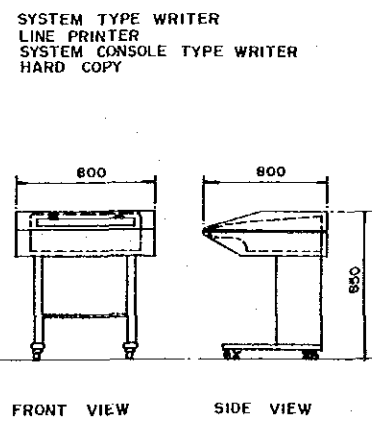
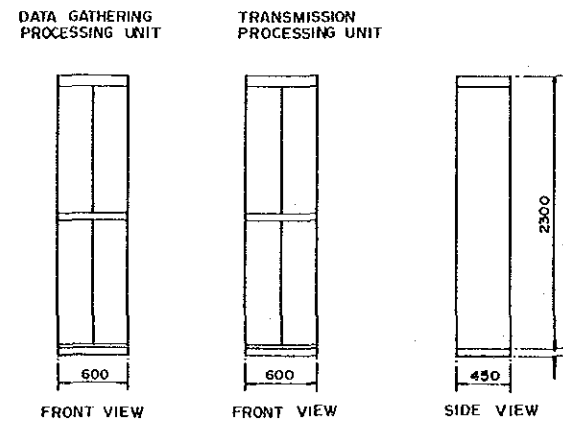
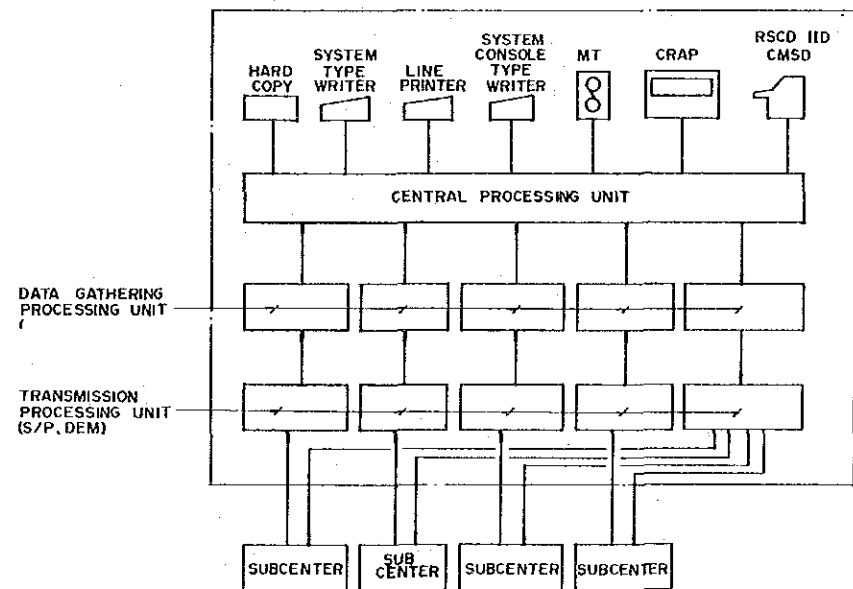
GRAPHIC PANEL



CENTRAL PROCESSING UNIT



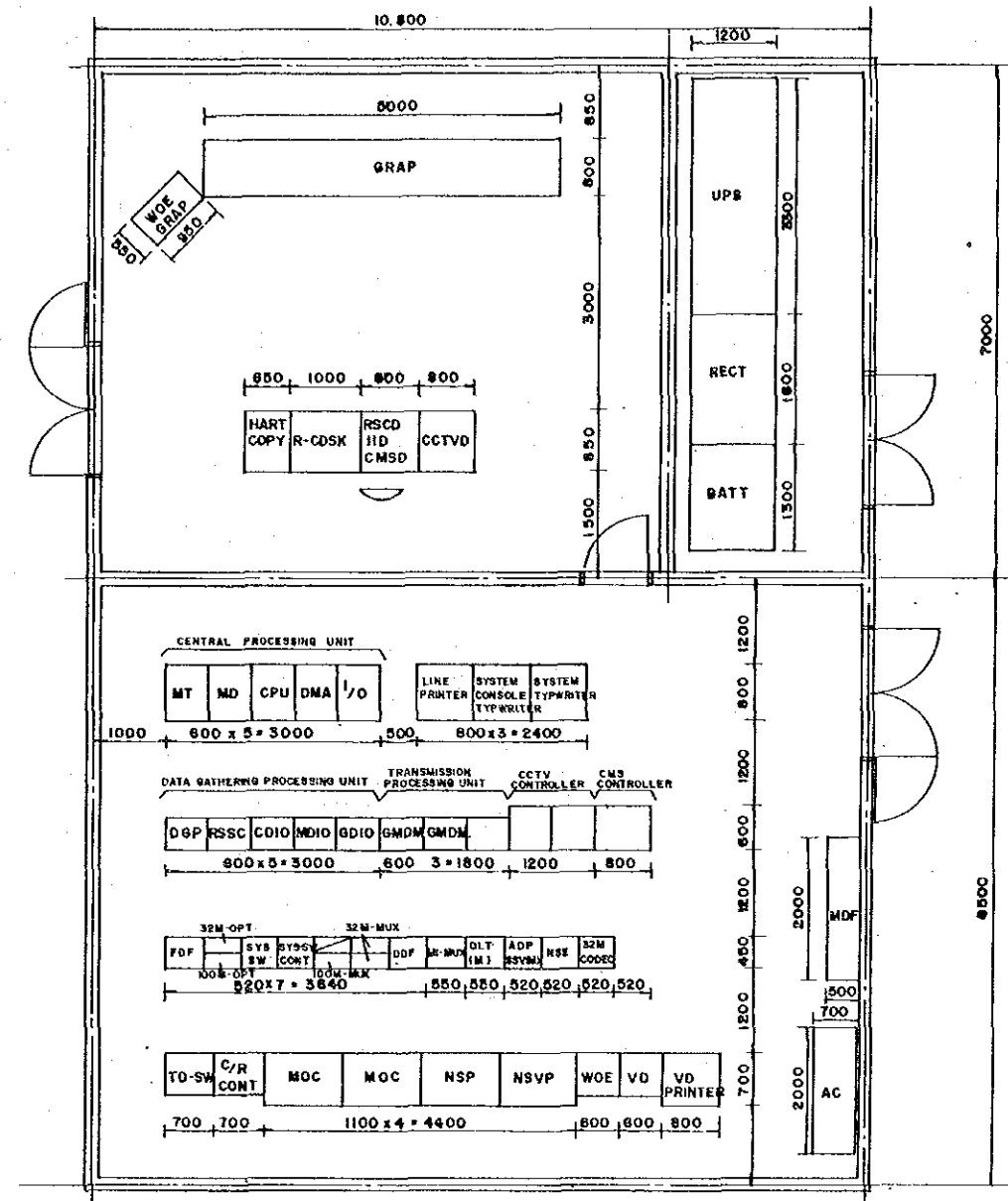
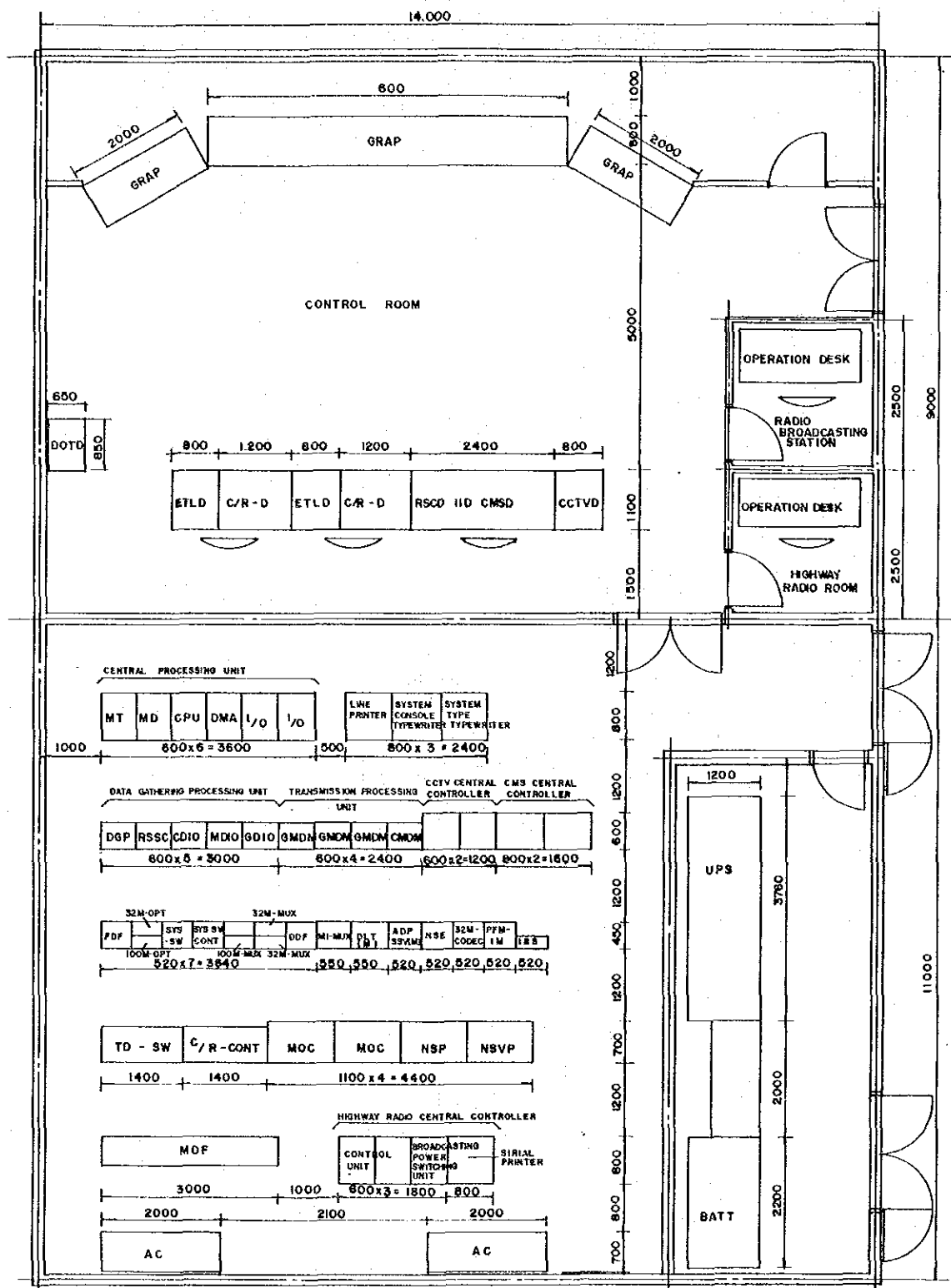
SYSTEM DIAGRAM



GRAPHIC PANEL AND CENTRAL PROCESSING UNIT

SCALE:
DRAWING NO: C17 DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND MANAGEMENT SYSTEM OF MALAYSIAN EXPRESSWAYS AND TOLL HIGHWAYS
JAPAN INTERNATIONAL COOPERATION AGENCY



CONTROL CENTER AND MAINTENANCE OFFICE LAYOUT

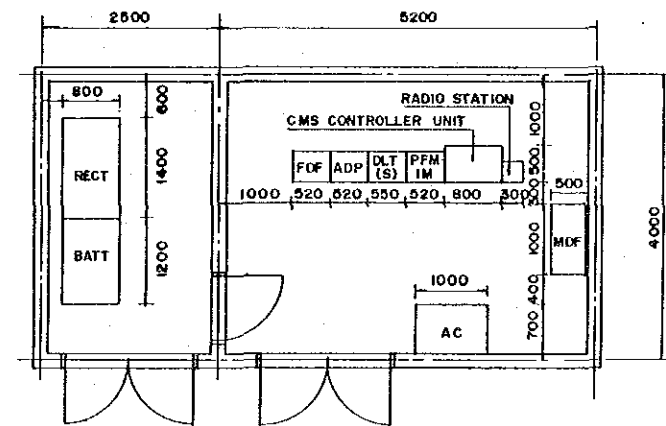
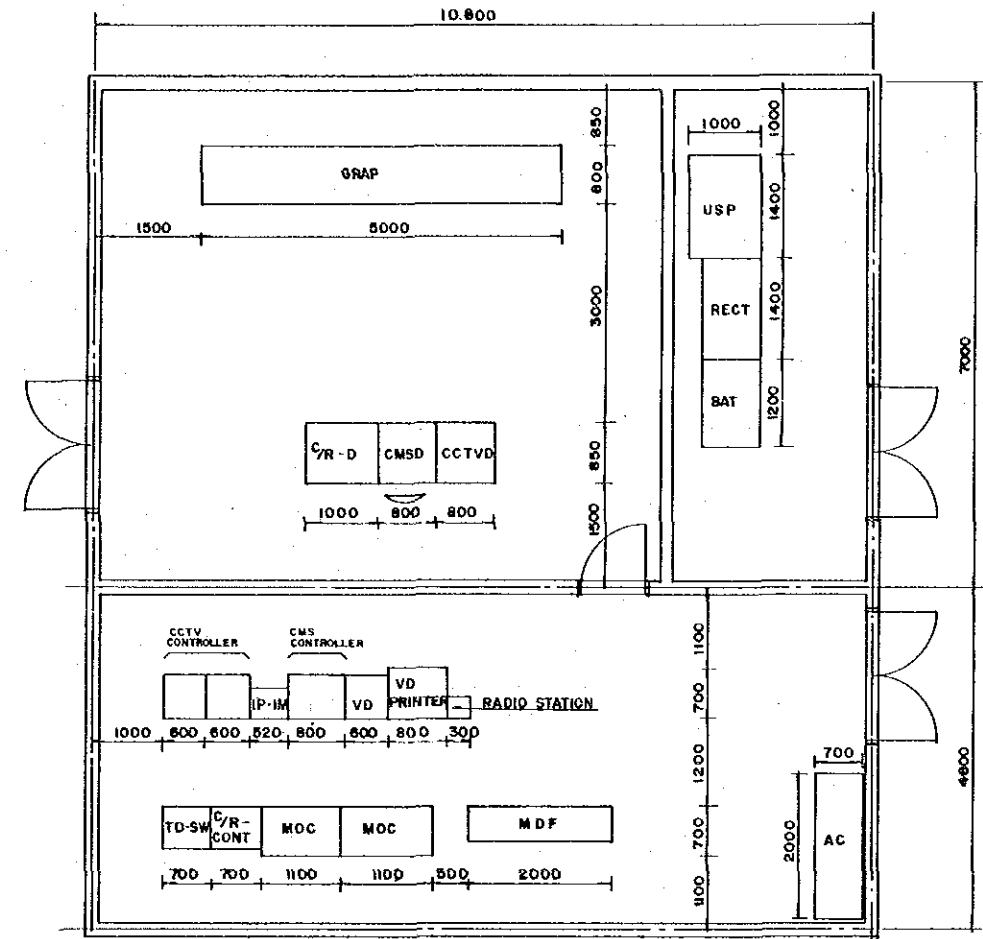
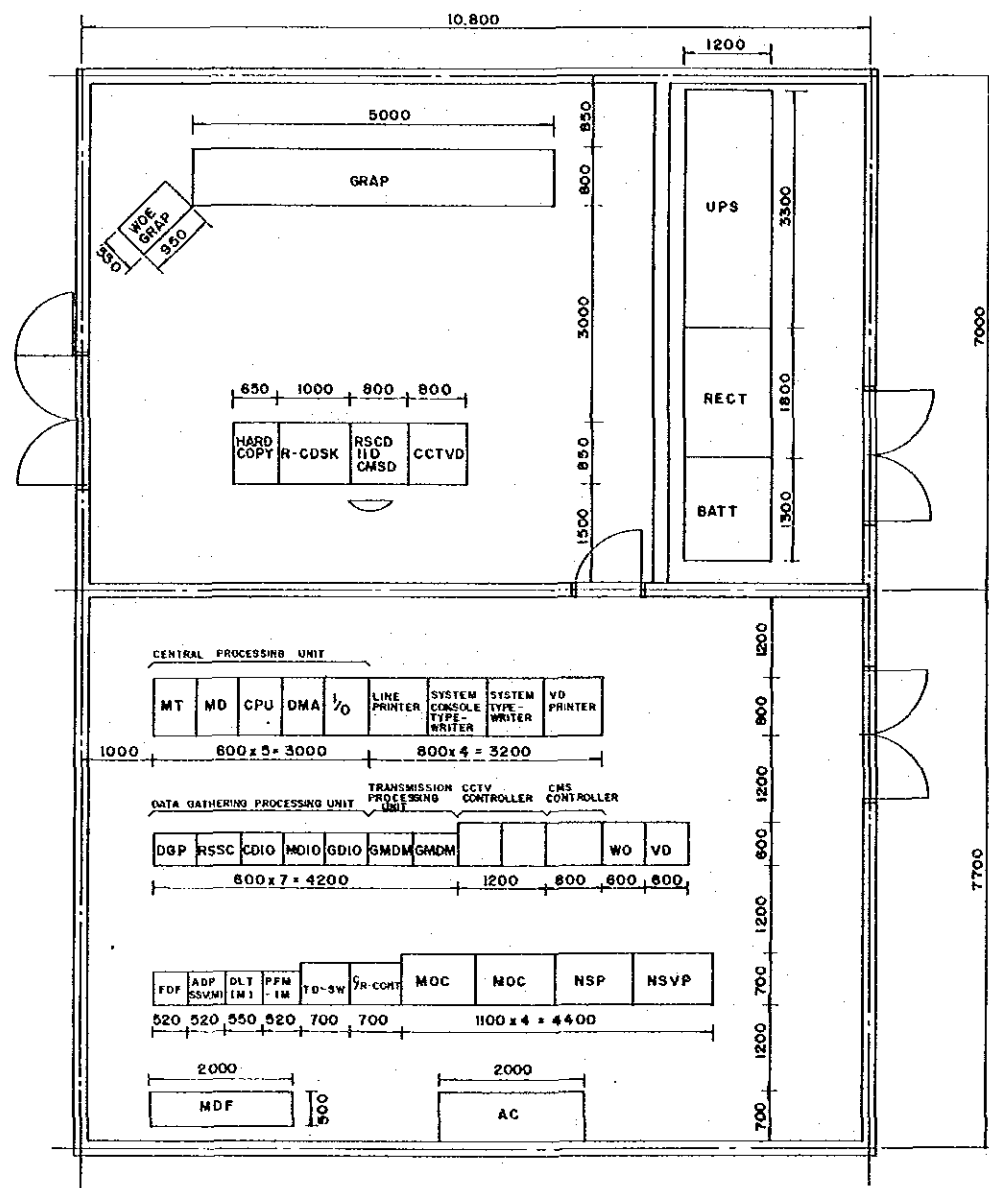
SCALE:

DRAWING NO: C-18

DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND MANAGEMENT SYSTEM OF MALAYSIAN EXPRESSWAYS AND TOLL HIGHWAYS

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MAINTENANCE OFFICE LAYOUT

SCALE:

DRAWING NO:
C19

DATE:
DEC 1989

**STUDY ON TRAFFIC CONTROL AND
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ABBREVIATION	WORD IN FULL
ADP	Adapter Frame
ATT	Attendant Console
ATTC	Attendant Console Controller
C _R -CD	Command/Radio Control Desk
C _R -D IF	Command/Radio Control Desk Interface
C _R -CONT	Command/Radio Control
C-TRK	Command Telephone Trunk
COT	Centre to Office Trunk
CPU	Central Processing Unit
COMT	Command OM Signalling Trunk
GCTV	Closed Circuit Television
CMS	Changeable Message Sign
CTL	Command Telephone Set
CA	Command and Answer Check Equipment
C-MON	Command Telephone Monitor
C-MON IF	Command Telephone Monitor Interface
D-SW	Digital Switcher
DLT (M,S)	Digital Loop Terminal Equipment (Master Slave)
DTK (E)	Digital Trunk (Emergency Telephone)
DTK (L)	Digital Telephone Trunk (Line)
ETRD IF	Emergency Telephone Call Receiving Desk Interface
ETRD	Emergency Telephone Call Receiving Desk
ERTL	Emergency Call Receiving Telephone Set
ET	Emergency Telephone Set
EXTL	Exclusive Telephone Set
E-MON IF	Emergency Telephone Monitor Interface
E-MON	Emergency Telephone Monitor
GI	Graded Index Mode Optical Fiber Cable
GP	Graphic Display Panel
GP IF	Graphic Display Panel Interface
I/O	Graphic Display Panel Interface
L-SV	Line-Supervisory Equipment
LC	Line-Circuit

ABBREVIATION	WORD IN FULL
MDF	Main Distribution Frame
MI-MUX	Multiple Interface-Multiplexer (Synchronous Multiplexing Terminal-Equipment)
MOC (TD-SW)	Maintenance Operating Console (TD-SW)
MOC (C _R -CONT)	Maintenance Operating Console (C _R -CONT)
MM	Main Memory
NSE (M,SM)	Net-work Synchronous Equipment (Main, Sub Main)
NSP	Net-work Service Processor
NSVP	Net-work Supervisory Processor
NLT	Night Telephone Trunk
NW	Network
OTD	Out-band Dialing Trunk Equipment
OMT	OM Signalling Trunk
PMF-IM	Pulse Frequency Modulation-Intensity Modulation Equipment
PCM-400M	Pulse Frequency Modulation-100 Mega bit Per Second
PCM-100M	Pulse Frequency Modulation-100 Mega bit Per Second
R-MON	Radio-Monitor Set
R-MON	Radio-Monitor Interface
RECT	Rectifier and Battery Set
RS	Radio Station
R-TRK	Radio Trunk
RCD	Radio Control Desk
SYS-SW	System Switcher
SSV (M,S)	System Supervisory Equipment (Master, Slave)
SLS	Changeable Speed Limit Sign
SM	Single Mode Optical Fiber Cable
SERTL	Special Emergency Telephone Call Receiving Set
TD-SW	Time Division Switch
VD	Vehicle Detector
V-SW	Video Switcher
WO	Weather Observatory Equipment
100M-OPT	100 Mega Optical Line Terminal Equipment
100M-MUX	100 Mega Multiplexer Equipment

ABBREVIATION	WORD IN FULL
32M-OPT	32 Mega Optical Line Terminal Equipment
32M-MUX	32 Mega Multiplexer Equipment
32M-DLN	32 Mega Digital Loop Network
32M-CODEC	32 Mega Television Coder-Decoder

LEGEND

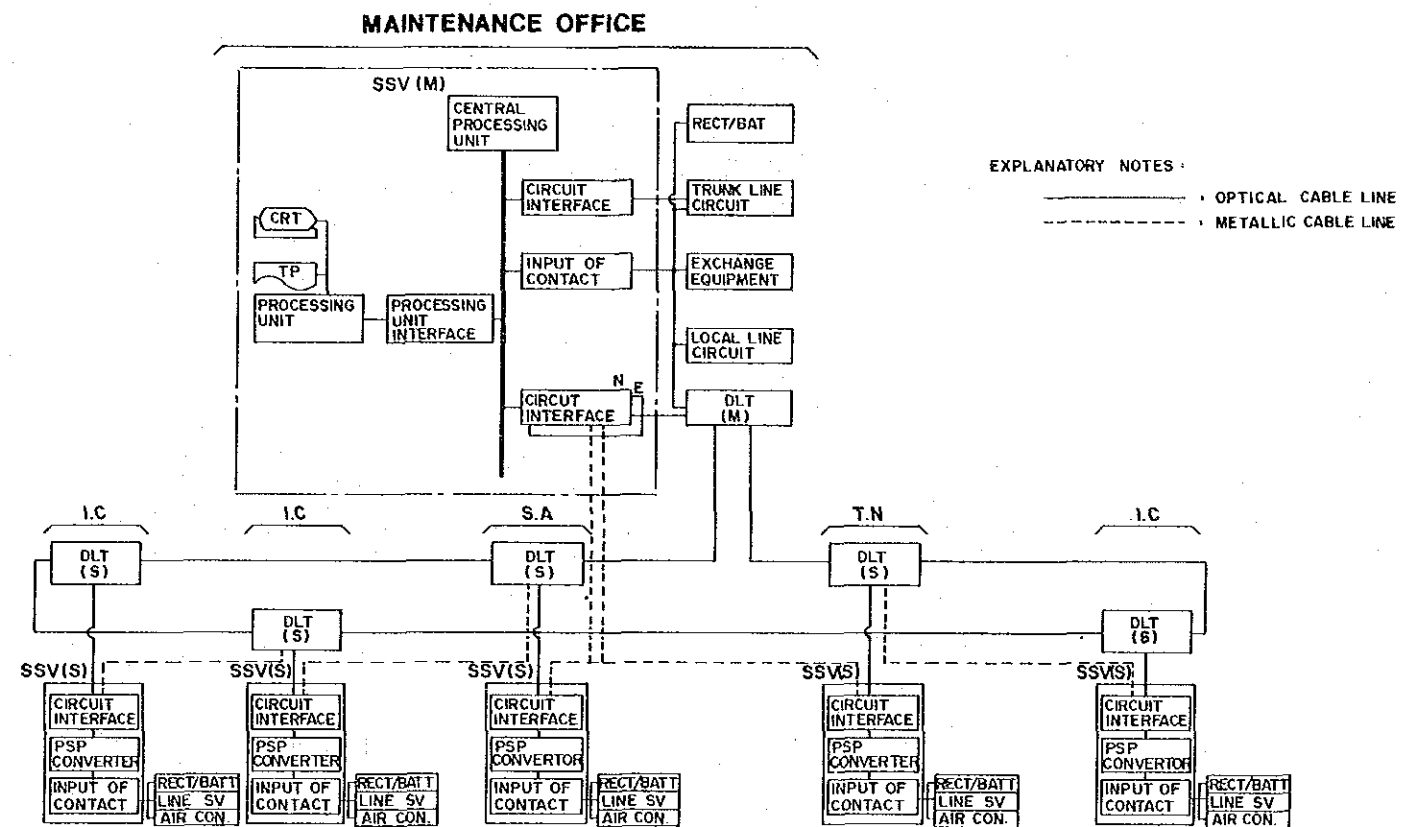
SCALE:

DRAWING NO:
C20

DATE:
DEC 1989

**STUDY ON TRAFFIC CONTROL AND
MANAGEMENT SYSTEM OF MALAYSIAN
EXPRESSWAYS AND TOLL HIGHWAYS**

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SUPERVISORY SYSTEM FOR COMMUNICATION EQUIPMENT

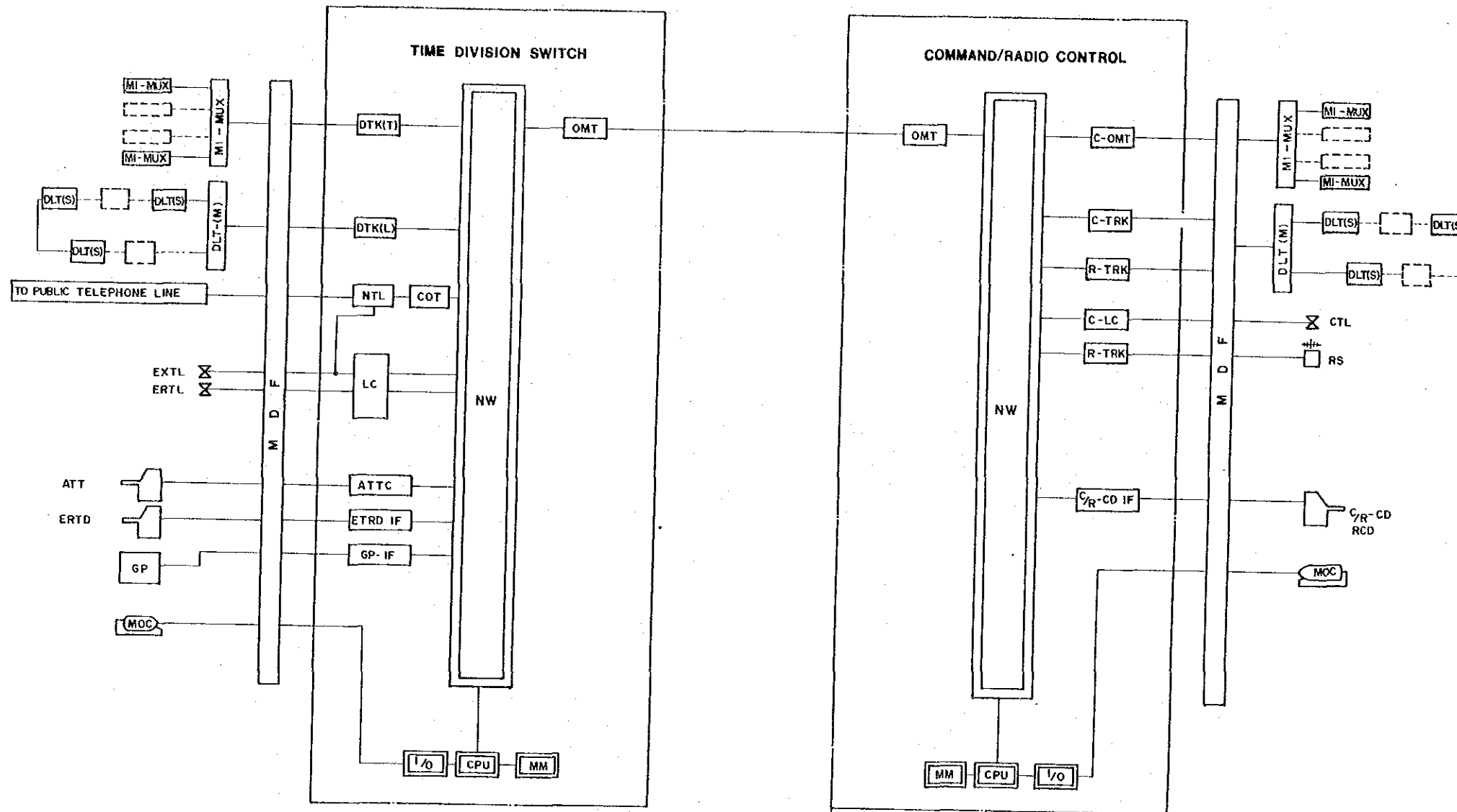
SCALE:

DRAWING NO:
C21

DATE:
DEC 1989

**STUDY ON TRAFFIC CONTROL AND
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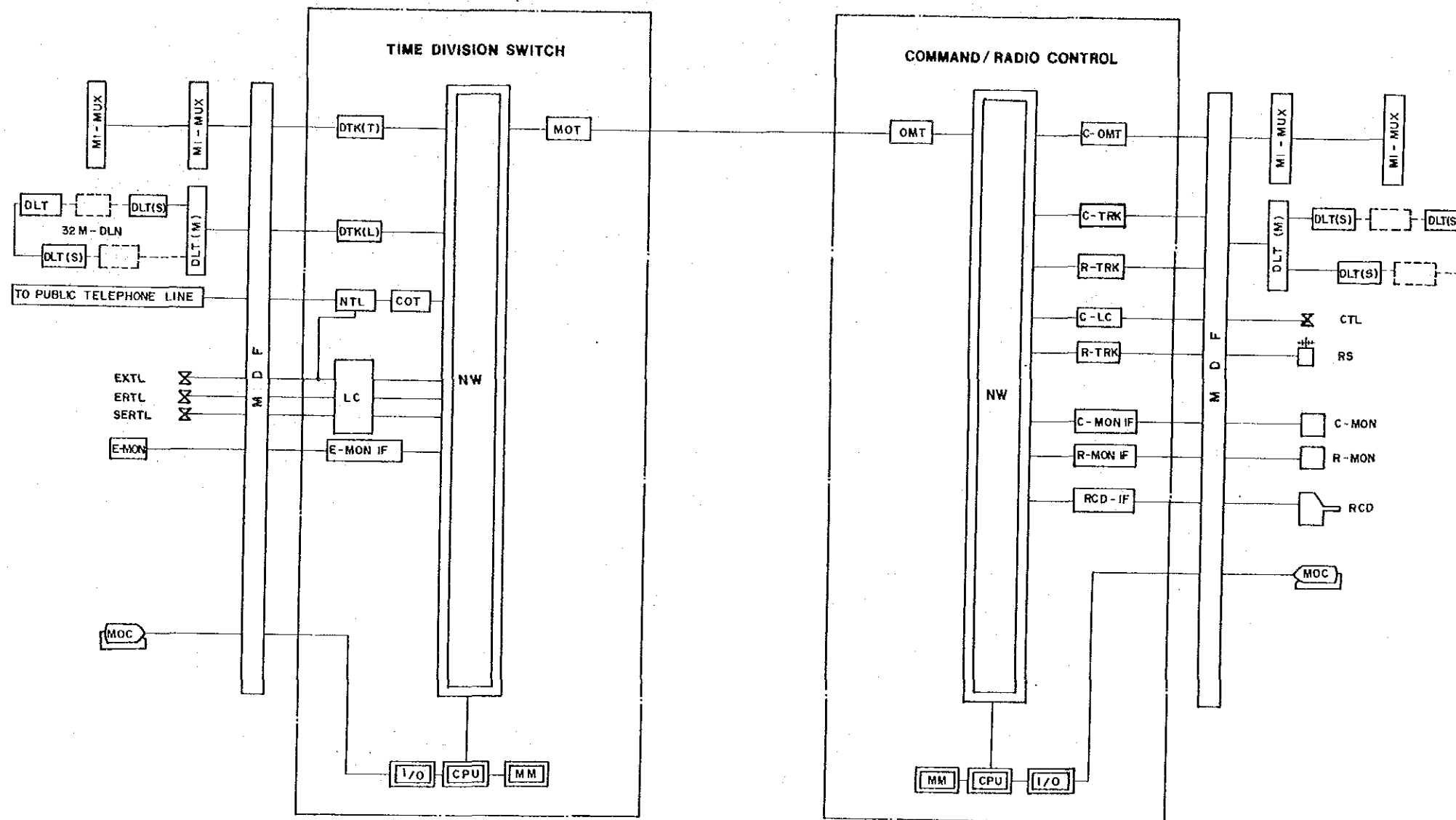
REGIONAL OFFICE TRUNKING DIAGRAMME

SCALE:

DRAWING NO: C22
DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND
MANAGEMENT SYSTEM OF MALAYSIAN
EXPRESSWAYS AND TOLL HIGHWAYS

JAPAN INTERNATIONAL COOPERATION AGENCY



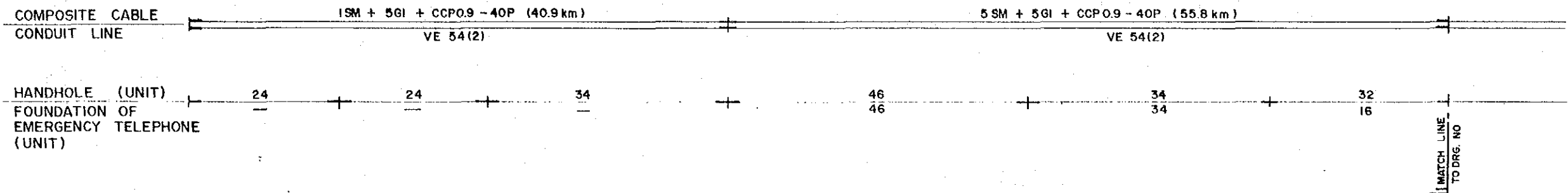
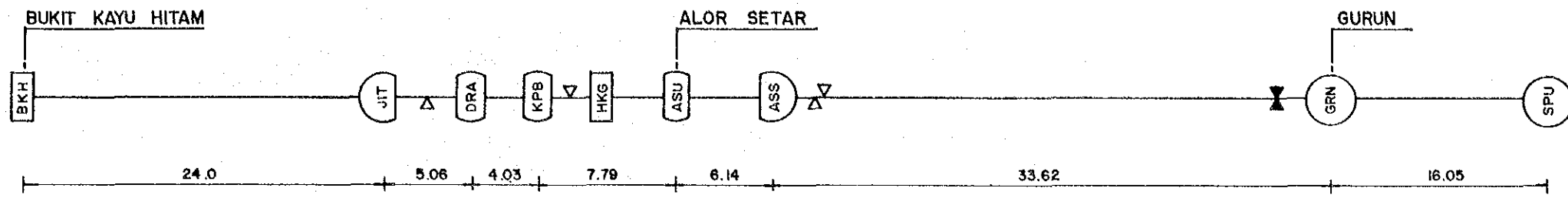
MAINTENANCE OFFICE TRUNKING-DIAGRAMME

SCALE:

DRAWING NO: C23
DATE: DEC 1989

**STUDY ON TRAFFIC CONTROL AND
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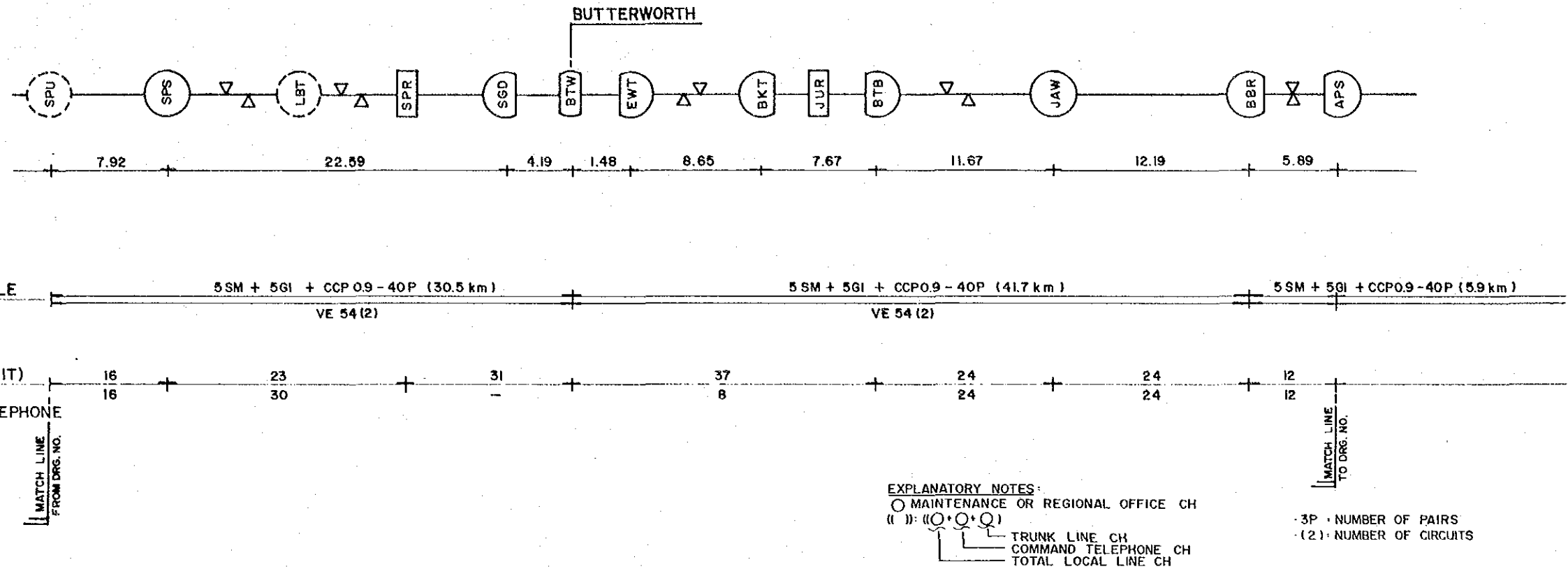
EXPLANATORY NOTES
 O - MAINTENANCE OR REGIONAL OFFICE CH
 (()) - ((O+O+O))
 L - TRUNK LINE CH
 L - COMMAND TELEPHONE CH
 L - TOTAL LOCAL LINE CH
 3P - NUMBER OF PAIRS
 (2) - NUMBER OF CIRCUITS

NAME OF EQUIPMENT	IF	CABLE	CABLE SEGMENTS											
EMERGENCY TELEPHONE	ETEL	3P	3P	3P	3P	3P	3P	3P	3P (2)	3P (2)	3P (2)	3P (2)	3P (2)	3P (2)
EXCLUSIVE TELEPHONE	2W	IP	5P (5)	(2)	(5)	5P (5)	(5)	5P (5)	(16)	5P (5)	(2)	6P (6)	(5)	(5)
COMMAND TELEPHONE	CTEL	IP	2P (2)	(2)	2P (2)	(2)	2P (2)	(4)	2P (2)	(2)	2P (2)	(2)	(2)	
RADIO STATION	4W	5P	5P (1)	(1)	5P	5P (1)	5P	5P (1)	5P	5P	5P	5P (1)	5P	5P (1)
HIGHWAY RADIO	4W	3P												
CHANGEABLE MESSAGE SIGN	4W												(2)	
MAINLINE		2P											2P (1)	2P (1)
ACCESS ROAD		2P												
TUNNEL		2P												
VEHICLE DETECTOR	4W	2P	2P (1)							2P (1)		2P (1)	(1)	2P (1)
WEATHER OBSERVATORY	4W	2P												
SPEED LIMIT SIGN	4W	2P												
CLOSED CIRCUIT TELEVISION	4W	2P												
COMMUNICATION SYSTEM SV	4W	2P	(1)	2P	(2)	2P	(2)	2P	(2)	2P	(2)	2P	(2)	2P
TOLL COLLECTION SYSTEM	4W	2P						2P (1)	(1)	2P (1)			(1)	(1)
INTERFACE TOTAL	ETEL							2 ((12))		4		4		4
	CTEL		2		2		2	6 ((12))				4		2
	2W		7		5		5	2 ((35))		2		11		5
	4W		4		3		3	4 ((22+12+12=46))		2		7		3
METALLIC CABLE TOTAL			23 x 1.5 = 345 + 40P						25P x 1.5 = 37.5 + 40P					

COMMUNICATION CABLE INSTALLATION PLAN (1/12)

SCALE:
 DRAWING NO: C24
 DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND MANAGEMENT SYSTEM OF MALAYSIAN EXPRESSWAYS AND TOLL HIGHWAYS
 JAPAN INTERNATIONAL COOPERATION AGENCY



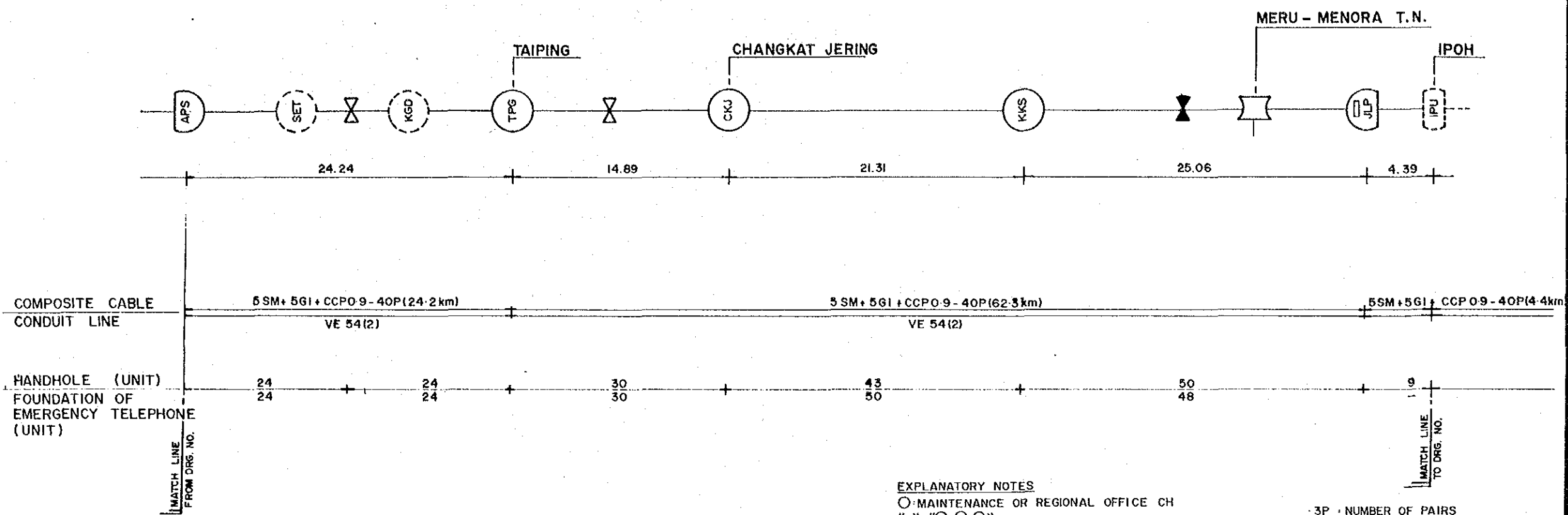
NAME OF EQUIPMENT	IF	CABLE															
EMERGENCY TELEPHONE	E TEL	3P	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)
EXCLUSIVE TELEPHONE	2W	1P	(5)	(5)	(5)	5P(5)	5P(5)	5P(5)	5P(5)	10P(10)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
COMMAND TELEPHONE	C TEL	1P	(2)	(2)	(2)	2P(2)	2P(2)	2P(2)	2P(2)	4P(4)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
RADIO STATION	4W	5P	(1) 5P	5P	(1) 5P	5P	(1) 5P	(1) 5P	5P	(1) 5P	5P	5P	(1) 5P	5P	(1) 5P	5P	(1) 5P
HIGHWAY RADIO	4W	3P															
CHANGEABLE MESSAGE SIGN	4W																
MAINLINE		2P															
ACCESS ROAD		2P															
TUNNEL		2P															
VEHICLE DETECTOR	4W	2P			2P(1)	2P(1)	2P(1)			2P(1)							
WEATHER OBSERVATORY	4W	2P							2P(1)								
SPEED LIMIT SIGN	4W	2P															
CLOSED CIRCUIT TELEVISION	4W	2P															
COMMUNICATION SYSTEM SV	4W	2P	(1)	(1)	2P	(2)	2P	2P	2P	(2)	2P	(2)	2P	(1)	(1)		
TOLL COLLECTION SYSTEM	4W	2P		(1)	(1)	2P(1)				2P(1)	(1)	(1)		(1)	(1)		
INTERFACE TOTAL	E TEL			4	4				④ ((20))	4	4	4	4				
	C TEL			2	4				⑥ ((16))	6	2	2	2				
	2W			5	10				②⑥ ((40))	15	5	5	5				
	4W			4	8				④ ((25+16+11 = 52))	6	4	3	3				
METALLIC CABLE TOTAL				23P x 1.5 = 345 + 40P				30P x 1.5 = 45 + 40P									

COMMUNICATION CABLE INSTALLATION PLAN (2/12)

SCALE:

DRAWING NO: C25
 DATE: DEC 1989

**STUDY ON TRAFFIC CONTROL AND
 MANAGEMENT SYSTEM OF MALAYSIAN
 EXPRESSWAYS AND TOLL HIGHWAYS**
 JAPAN INTERNATIONAL COOPERATION AGENCY



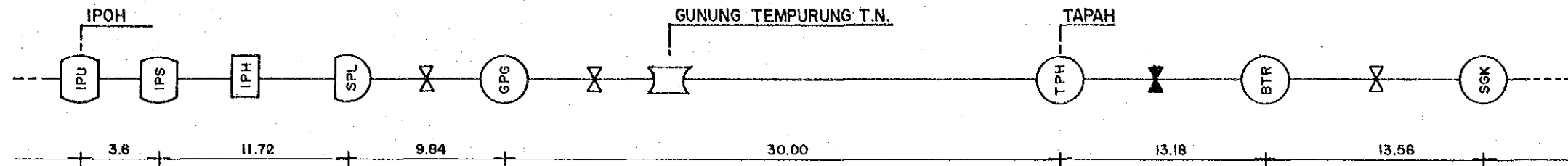
EXPLANATORY NOTES
 ○: MAINTENANCE OR REGIONAL OFFICE CH
 (()) ((○ ○ ○))
 — TRUNK LINE CH
 — COMMAND TELEPHONE
 — TOTAL LOCAL LINE CH
 · 3P · NUMBER OF PAIRS
 · (2) · NUMBER OF CIRCUITS

NAME OF EQUIPMENT	IF	CABLE																	
EMERGENCY TELEPHONE	ETEL	3P	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	
EXCLUSIVE TELEPHONE	2W	1P	(5)		(2)	5P(5)		(16)		(5)		(5)		(2)	6P(6)	5P(5)	(32)	5P(5)	
COMMAND TELEPHONE	CTEL	1P	(2)		(2)	2P(2)		(2)		(2)		(2)		(2)	2P(2)	2P(2)	(4)	2P	
RADIO STATION	4W	5P	5P (1)	5P	5P (1)	5P	5P (1)	5P	5P (1)	5P	5P (1)	5P	5P (1)	5P (1)	5P (1)	5P (1)	5P (1)	(1)	5P (1)
HIGHWAY RADIO	4W	3P																	
CHANGEABLE MESSAGE SIGN	4W													(2)				(1)	
MAINLINE		2P													2P (1)	2P (1)			
ACCESS ROAD		2P																	
TUNNEL		2P																2P	2P
VEHICLE DETECTOR	4W	2P																	2P (1)
WEATHER OBSERVATORY	4W	2P					2P (1)												2P (1)
SPEED LIMIT SIGN	4W	2P							(1)	2P		2P	(2)	2P	2P	(2)	2P		
CLOSED CIRCUIT TELEVISION	4W	2P																	
COMMUNICATION SYSTEM SV	4W	2P	(1)	2P	(2)	2P		2P	(2)	2P		(2)	2P		(1)				2P
TOLL COLLECTION SYSTEM	4W	2P	(1)	2P (1)	2P (1)		(1)		(1)			(1)						2P (1)	(1)
INTERFACE TOTAL	ETEL		4		4		④ ((20))		④			4		4		4		4	
	CTEL		2		4		② ((16))		②			2		6		6		6	
	2W		5		7		⑩ ((35))		⑤			5		13		37		37	
	4W		4		4		④ ((31+16+14+6))		⑤			8		8		4		4	
METALLIC CABLE TOTAL			19P x 1.5 = 28.5 = 30P → 40P				28P x 1.5 = 42 = 40P												

COMMUNICATION CABLE INSTALLATION PLAN (3/12)

SCALE:
 DRAWING NO: C26
 DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND MANAGEMENT SYSTEM OF MALAYSIAN EXPRESSWAYS AND TOLL HIGHWAYS
 JAPAN INTERNATIONAL COOPERATION AGENCY



COMPOSITE CABLE
CONDUIT LINE

5 SM + 5GI + CCP 0.9 - 40P (81.9 km)
VE 54 (2)

HANDHOLE (UNIT)
FOUNDATION OF
EMERGENCY TELEPHONE
(UNIT)

31

80

26

27

MATCH LINE
FROM DRG. NO.

MATCH LINE
TO DRG. NO.

EXPLANATORY NOTES:

- MAINTENANCE OR REGIONAL OFFICE
- () TRUNK LINE CH
- () COMMAND TELEPHONE CH
- () TOTAL LOCAL LINE CH

- 3P - NUMBER OF PAIRS
- (2) - NUMBER OF CIRCUITS

NAME OF EQUIPMENT	IF	CABLE												
EMERGENCY TELEPHONE	ETEL	3P	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)
EXCLUSIVE TELEPHONE	2W	1P	5P (32)	5P (5)	5P (5)	5P (5)	5P (5)	5P (5)	5P (5)	5P (5)	5P (5)	5P (5)	5P (5)	5P (5)
COMMAND TELEPHONE	CTEL	1P	4	2P(2)	2P(2)	2P(2)	2P(2)	2P(2)	2P(2)	2P(2)	2P(2)	2P(2)	2P(2)	2P(2)
RADIO STATION	4W	5P	5P (1)	5P (1)	5P (1)	5P (1)	5P (1)	5P (1)	5P (1)	5P (1)	5P (1)	5P (1)	5P (1)	5P (1)
HIGHWAY RADIO	4W	3P												
CHANGEABLE MESSAGE SIGN	4W			(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
MAINLINE		2P		4P(2)	4P(2)	4P(2)	4P(2)	4P(2)	4P(2)	4P(2)	4P(2)	4P(2)	4P(2)	4P(2)
ACCESS ROAD		2P												
TUNNEL		2P												
VEHICLE DETECTOR	4W	2P		4P(2)	4P(2)	4P(2)	4P(2)	4P(2)	4P(2)	4P(2)	4P(2)	4P(2)	4P(2)	4P(2)
WEATHER OBSERVATORY	4W	2P		2P(1)	2P(1)	2P(1)	2P(1)	2P(1)	2P(1)	2P(1)	2P(1)	2P(1)	2P(1)	2P(1)
SPEED LIMIT SIGN	4W	2P												
CLOSED CIRCUIT TELEVISION	4W	2P												
COMMUNICATION SYSTEM SV	4W	2P		2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P
TOLL COLLECTION SYSTEM	4W	2P		(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
INTERFACE TOTAL	ETEL		4 ((20))	4	4	4	4	4	4	4	4	4	4	4
	CTEL		6 ((14))	6	6	6	6	6	6	6	6	6	6	6
	2W		37 ((38))	15	15	15	15	15	15	15	15	15	15	15
	4W		4 ((37+14+15))	11	11	11	11	11	11	11	11	11	11	11
METALLIC CABLE TOTAL														

28P x 15 = 42 + 40P

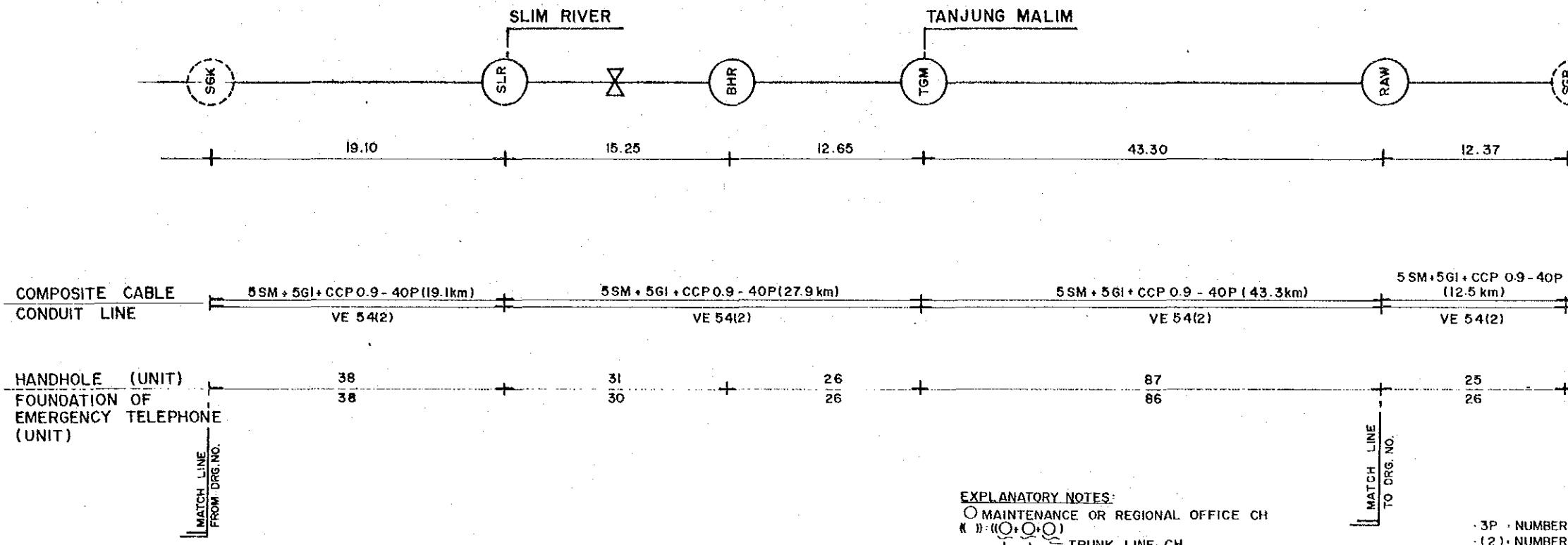
COMMUNICATION CABLE INSTALLATION PLAN (4/12)

SCALE:

DRAWING NO:
C27

DATE:
DEC 1989

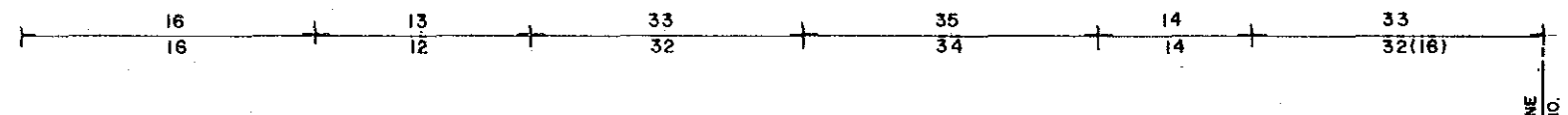
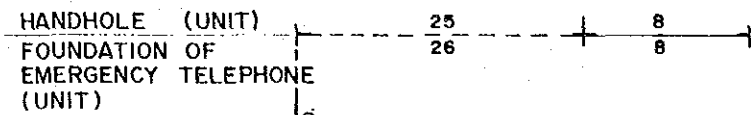
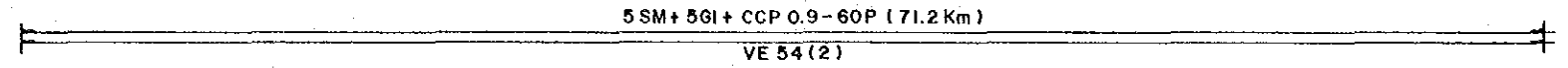
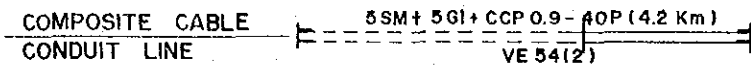
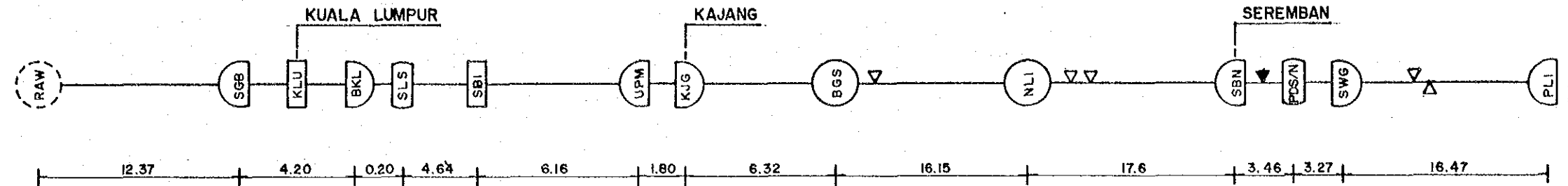
STUDY ON TRAFFIC CONTROL AND
MANAGEMENT SYSTEM OF MALAYSIAN
EXPRESSWAYS AND TOLL HIGHWAYS
JAPAN INTERNATIONAL COOPERATION AGENCY



EXPLANATORY NOTES:
 ○ MAINTENANCE OR REGIONAL OFFICE CH
 () (()) (()) (())
 ——— TRUNK LINE CH
 ——— COMMAND TELEPHONE CH
 ——— TOTAL LOCAL LINE CH

· 3P · NUMBER OF PAIRS
 · (2) · NUMBER OF CIRCUITS

NAME OF EQUIPMENT	IF	CABLE											
EMERGENCY TELEPHONE	ETEL	3P	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)
EXCLUSIVE TELEPHONE	2W	1P	(5)	(5)	(5)	(6)	(2)	(5)					
COMMAND TELEPHONE	CTEL	1P	(2)	(2)	(2)	(2)		(4)					
RADIO STATION	4W	5P	(1)	5P(1)	5P(1)	5P(1)	5P(1)	5P(1)	5P(1)	5P(1)	5P(1)	5P(1)	5P(1)
HIGHWAY RADIO	4W	3P						2P(1)	2P(1)				
CHANGEABLE MESSAGE SIGN	4W					(2)		(4)					
MAINLINE		2P				2P(1)	2P(1)		2P(1)	2P(1)			
ACCESS ROAD		2P							2P(1)	2P(1)			
TUNNEL		2P											
VEHICLE DETECTOR	4W	2P	2P(1)	2P(1)	2P(1)	2P(1)						4P(2)	
WEATHER OBSERVATORY	4W	2P					2P(1)						
SPEED LIMIT SIGN	4W	2P											
CLOSED CIRCUIT TELEVISION	4W	2P											
COMMUNICATION SYSTEM SV	4W	2P	(1)	(1)	2P	(2)	2P		2P	(2)		(1)	
TOLL COLLECTION SYSTEM	4W	2P	(1)	(1)	(1)	(1)	(1)		(1)	(1)		(1)	
INTERFACE TOTAL	ETEL		4	4	4	4	4	4	4	4	4	4	4
	CTEL		2	2	2	2	2	2	2	2	2	2	2
	2W		5	5	5	5	5	5	5	5	5	5	5
	4W		5	6	5	5	5	5	5	5	5	5	5
METALLIC CABLE TOTAL			14P x 1.5 = 21 ÷ 30P → 40P				18P x 1.5 = 27 ÷ 30P → 40P						



EXPLANATORY NOTES:

○ MAINTENANCE OR REGIONAL OFFICE CH

() TRUNK LINE CH

⊥ COMMAND TELEPHONE CH

⊥ TOTAL LOCAL LINE CH

3P - NUMBER OF PAIRS

(2) - NUMBER OF CIRCUITS

NAME OF EQUIPMENT	IF	CABLE																	
EMERGENCY TELEPHONE	ETEL	3P	(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)
EXCLUSIVE TELEPHONE	2W	1P	(5)	5P(5)	(5)	5P(5)	10P(10)	(16)	(5)	(5)	(5)	3P(3)	5P(5)	(5)	(5)	(5)	(5)	(5)	(5)
COMMAND TELEPHONE	CTEL	1P	(2)	2P(2)	(2)	2P(2)	4P(4)	(2)	(2)	(2)	(2)	(2)	1P(1)	2P(2)	(2)	(2)	(2)	(2)	(2)
RADIO STATION	4W	5P	(1)	5P	(1)	5P	5P(1)	(1)	5P	5P(1)	(1)	5P	5P(1)	(1)	5P	5P(1)	(1)	5P	5P(1)
HIGHWAY RADIO	4W	3P																	
CHANGEABLE MESSAGE SIGN	4W		(4)					(4)											
MAINLINE		2P	2P(1)	2P(1)			2P(1)	2P(1)					2P(1)	2P(1)					
ACCESS ROAD		2P	2P(1)	2P(1)			2P(1)	2P(1)					2P(1)	2P(1)					
TUNNEL		2P																	
VEHICLE DETECTOR	4W	2P	4P(2)				6P(3)	6P(3)	8P(4)	4P(2)	4P(2)	6P(3)						2P(1)	
WEATHER OBSERVATORY	4W	2P					2P(1)												
SPEED LIMIT SIGN	4W	2P																	
CLOSED CIRCUIT TELEVISION	4W	2P					2P(1)											2P(1)	
COMMUNICATION SYSTEM SV	4W	2P	(1)	(1)	2P				2P	(2)	2P	(2)	2P	(2)	2P	(2)	2P	(2)	2P
TOLL COLLECTION SYSTEM	4W	2P	(1)		2P(1)		2P(1)	(1)	(1)		(1)	(1)		(1)	2P(1)	(1)			(1)
INTERFACE TOTAL	ETEL		4		4		④(22)		2		4		4		4		4		4
	CTEL		2		6		⑥(19)		2		2		3		4		4		2
	2W		5		15		⑤(48)		5		5		8		10		10		5
	4W		10		3		⑩(43+19+5=77)		9		9		13		5		5		4
METALLIC CABLE TOTAL					19P x 1.5 = 28.5 + 30 → 40P						40P x 1.5 = 60P								

COMMUNICATION CABLE INSTALLATION PLAN (6/12)

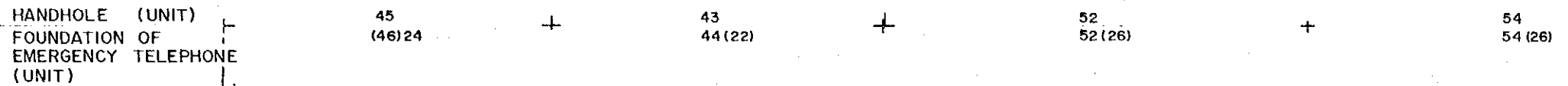
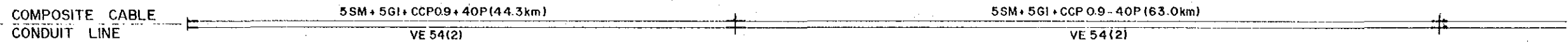
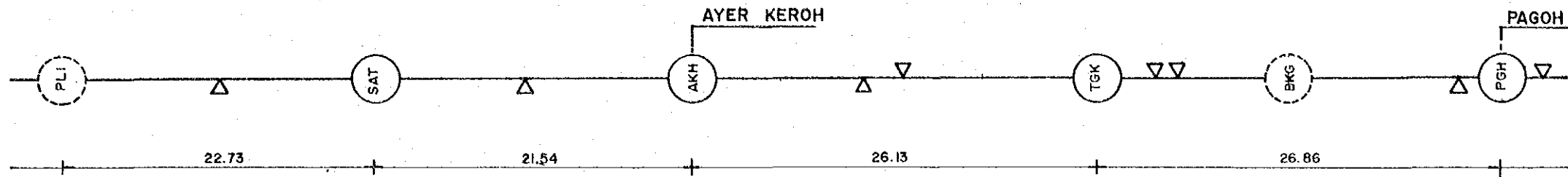
SCALE:

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DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND MANAGEMENT SYSTEM OF MALAYSIAN EXPRESSWAYS AND TOLL HIGHWAYS

JAPAN INTERNATIONAL COOPERATION AGENCY



EXPLANATORY NOTES:

- MAINTENANCE OR REGIONAL OFFICE CH
- ⊕ TRUNK LINE CH
- ⊕ COMMAND TELEPHONE
- ⊕ TOTAL LOCAL LINE CH

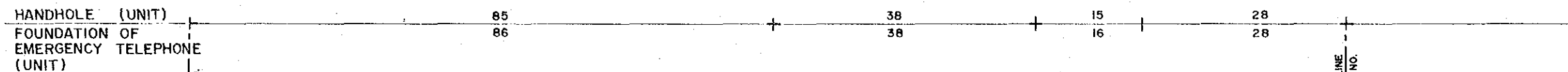
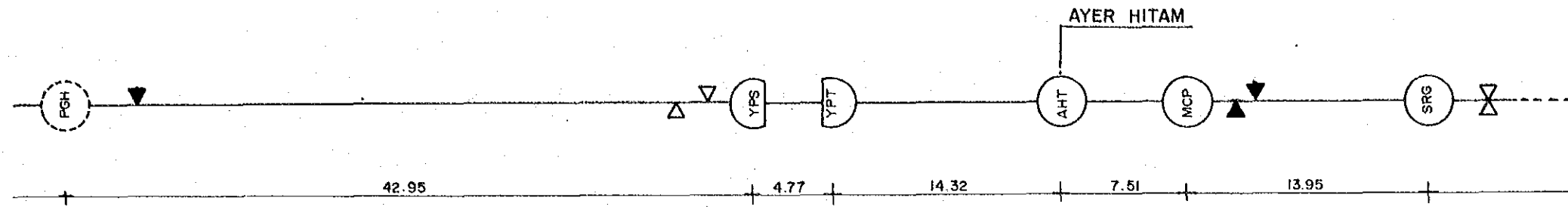
- 3P - NUMBER OF PAIRS
- (2) - NUMBER OF CIRCUITS

NAME OF EQUIPMENT	IF	CABLE	CABLE SEGMENTS															
EMERGENCY TELEPHONE	ETEL	3P	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	
EXCLUSIVE TELEPHONE	2W	1P	(5)	(5)	(5)	6P(6)	(32)	(2)	(2)	(5)	(5)	(5)	(5)	(5)	3P(3)	(5)		
COMMAND TELEPHONE	CTEL	1P	(2)	(2)	(2)	2P(2)	(4)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	1P(1)	(2)		
RADIO STATION	4W	5P	(1)	5P(1)	(1)	5P	5P(1)	(1)	5P	5P	(1)	5P	5P	(1)	5P	5P	(1)	5P
HIGHWAY RADIO	4W	3P																
CHANGEABLE MESSAGE SIGN	4W						(2)											
MAINLINE		2P				2P(1)	2P(1)											
ACCESS ROAD		2P																
TUNNEL		2P																
VEHICLE DETECTOR	4W	2P				2P(1)												
WEATHER OBSERVATORY	4W	2P				2P(1)												
SPEED LIMIT SIGN	4W	2P																
CLOSED CIRCUIT TELEVISION	4W	2P																
COMMUNICATION SYSTEM SV	4W	2P	(1)	(1)	(1)	2P	2P	(2)	2P	(2)	2P	(2)	2P	(2)	2P	(1)	(1)	
TOLL COLLECTION SYSTEM	4W	2P	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
INTERFACE TOTAL	ETEL		4	4	4	4	④ ((18))	4	4	4	4	4	4	4	4	2		
	CTEL		2	2	2	2	⑤ ((9))	-	2	2	2	2	2	2	2	3		
	2W		5	5	5	5	③ ((25))	2	2	2	2	2	2	2	2	8		
	4W		4	4	4	4	⑦ ((18 + 9 + 12 = 39))	3	3	3	3	3	3	3	3	3		
METALLIC CABLE TOTAL						24P x 1.5 = 36 ÷ 40P									16P x 1.5 = 24 ÷ 30P = 40P			

COMMUNICATION CABLE INSTALLATION PLAN (7/12)

SCALE:
DRAWING NO: C30
DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND MANAGEMENT SYSTEM OF MALAYSIAN EXPRESSWAYS AND TOLL HIGHWAYS
JAPAN INTERNATIONAL COOPERATION AGENCY



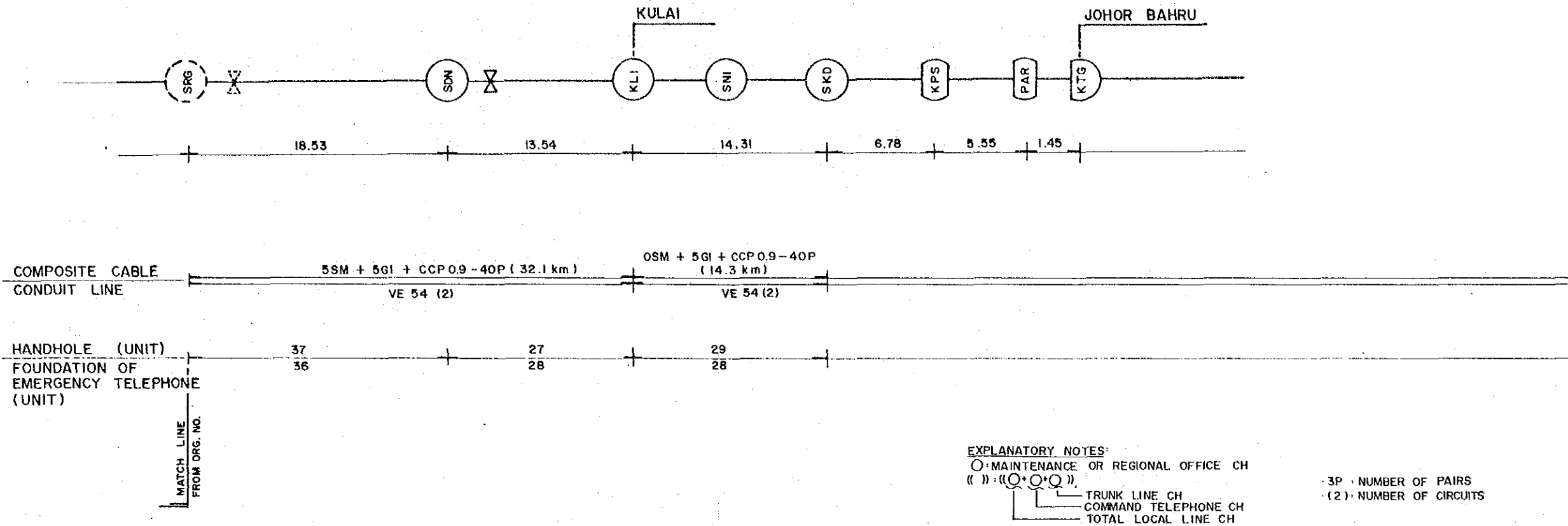
EXPLANATORY NOTES
 ○ MAINTENANCE OR REGIONAL OFFICE CH
 () (○+○+○)
 L TRUNK LINE CH
 COMMAND TELEPHONE CH
 TOTAL LOCAL LINE CH
 3P - NUMBER OF PAIRS
 (2) - NUMBER OF CIRCUITS

NAME OF EQUIPMENT	IF	CABLE	CABLE												
EMERGENCY TELEPHONE	ETEL	3P	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)	P(2)	3P(2)	3P(2)	3P(2)
EXCLUSIVE TELEPHONE	2W	1P	(5)	(3)	(2)	(5)	5P(5)	(16)	(5)	6P(6)	(5)				
COMMAND TELEPHONE	CTEL	1P	(2)	(1)		(2)	2P(2)	(2)	(2)	2P(2)	(2)				
RADIO STATION	4W	5P	(1) 5P	5P(1)	5P	(1) 5P(1)	5P	(1) 5P	5P	(1) 5P	5P	(1) 5P	5P	(1) 5P	5P
HIGHWAY RADIO	4W	3P													
CHANGEABLE MESSAGE SIGN	4W														
MAINLINE		2P													
ACCESS ROAD		2P													
TUNNEL		2P													
VEHICLE DETECTOR	4W	2P													
WEATHER OBSERVATORY	4W	2P													
SPEED LIMIT SIGN	4W	2P													
CLOSED CIRCUIT TELEVISION	4W	2P													
COMMUNICATION SYSTEM SV	4W	2P	(1)	(1)	2P	(2)	2P	(2)		2P	2P	(2)	2P	(1)	
TOLL COLLECTION SYSTEM	4W	2P													
INTERFACE TOTAL	ETEL		2	4		4		4		④ ((20))	4			4	
	CTEL		3	1				4		② ((11))	4			2	
	2W		8	3		2		10		⑥ ((31))	11			5	
	4W		3	2		3		6		⑦ ((20+11+11=42))	5			4	
METALLIC CABLE TOTAL			23P x 1.5 = 34.5 + 40P						24P x 1.5 = 36 + 40P						

COMMUNICATION CABLE INSTALLATION PLAN (8/12)

SCALE:
 DRAWING NO: C31
 DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND
 MANAGEMENT SYSTEM OF MALAYSIAN
 EXPRESSWAYS AND TOLL HIGHWAYS
 JAPAN INTERNATIONAL COOPERATION AGENCY

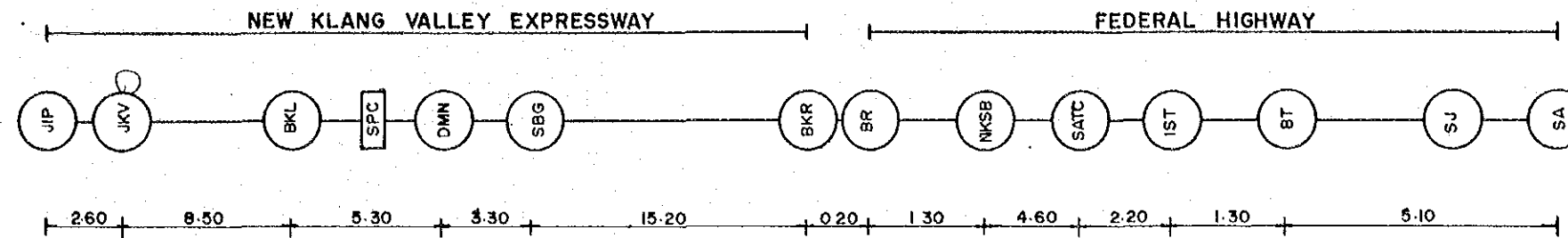


NAME OF EQUIPMENT	IF	CABLE							
EMERGENCY TELEPHONE	E TEL	3P	3P (2)	3P (2)	3P (2)	3P (2)	3P (2)	3P (2)	
EXCLUSIVE TELEPHONE	2W	1P	(5)	(5)	(6)	(5)			
COMMAND TELEPHONE	C TEL	1P	(2)	(2)	(2)	(2)			
RADIO STATION	4W	5P	(1) 5P	5P (1) 5P	5P (1) 5P	5P (1) 5P	5P (1) 5P		
HIGHWAY RADIO	4W	3P							
CHANGEABLE MESSAGE SIGN	4W				(1)				
MAINLINE		2P			2P	2P			
ACCESS ROAD		2P							
TUNNEL		2P							
VEHICLE DETECTOR	4W	2P	2P (1)	2P (1)	2P (1)	2P (1)			
WEATHER OBSERVATORY	4W	2P			2P (1)				
SPEED LIMIT SIGN	4W	2P							
CLOSED CIRCUIT TELEVISION	4W	2P							
COMMUNICATION SYSTEM SV	4W	2P	(1)	(1)	2P	2P	(1)		
TOLL COLLECTION SYSTEM	4W	2P	(1)	(1)	(1)	2P	(1)		
INTERFACE TOTAL	E TEL		4	4	④ (6)		2		
	C TEL		2	2	② (4)		2		
	2W		5	5	⑥ (10)		5		
	4W		4	4	⑥ (8+4+7+19)		4		
METALLIC CABLE TOTAL			14P x 1.5 = 21 + 30P → 40P		18P x 1.5 = 27 + 30P → 40P				

COMMUNICATION CABLE INSTALLATION PLAN (9/12)

SCALE:
DRAWING NO: C32
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TO N.S. JUNCTION

COMPOSITE CABLE OSM + 5GI + CCP 0.9 - 40P 5SM + 5GI + CCP 0.9 - 40P OSM + 5GI + CCP 0.9 - 40P (29.9km)

CONDUIT LINE (10.6km) VE 54(2) (8.6km) VE 54(2) VE 54(2)

HANDHOLE (UNIT) 70

FOUNDATION OF EMERGENCY TELEPHONE (UNIT) 70

EXPLANATORY NOTES

○ MAINTENANCE OR REGIONAL OFFICE CH

⊙ TRUNK LINE CH

⊙ COMMAND TELEPHONE CH

⊙ TOTAL LOCAL LINE CH

3P - NUMBER OF PAIRS

(2) - NUMBER OF CIRCUITS

NAME OF EQUIPMENT	IF	CABLE	CABLE SPECIFICATIONS							
EMERGENCY TELEPHONE	E TEL	3P	3P(2)	3P(2)	3P(2)	3P(2)	3P(2)			
EXCLUSIVE TELEPHONE	2W	1P	(5)	5P(5)	5P(5)	(16)		(5)		(5)
COMMAND TELEPHONE	C TEL	1P	(2)	2P(2)	2P(2)	(2)		(2)		(2)
RADIO STATION	4W	5P	(1)	5P	5P	(1)	5P	5P	(1)	5P (1)
HIGHWAY RADIO	4W	3P								
CHANGEABLE MESSAGE SIGN	4W		(4)			(4)			(2)	
MAINLINE		2P	2P(1)	2P(1)	2P(1)	2P(1)				
ACCESS ROAD		2P	2P(1)	2P(1)	2P(1)	2P(1)	2P(1)	2P(1)	2P(1)	2P(1)
TUNNEL		2P								
VEHICLE DETECTOR	4W	2P	2P(1)	6P(2)	4P(2)	10P(5)	2P(1)	2P(1)	2P(1)	2P(1)
WEATHER OBSERVATORY	4W	2P								
SPEED LIMIT SIGN	4W	2P								
CLOSED CIRCUIT TELEVISION	4W	2P		2P(1)	2P(1)					2P(1)
COMMUNICATION SYSTEM SV	4W	2P	(1)	2P	2P	(2)	2P	(2)	2P(1)	
TOLL COLLECTION SYSTEM	4W	2P	(1)	2P(1)		(1)		(1)		2P(1)
INTERFACE TOTAL	E TEL		4			④ (14)	2			
	C TEL		4			④ (16)	2	2		2
	2W		10			② (45)	5	5		5
	4W		11			⑭ (42 + 16 + 0 = 58)	7	7		4
METALLIC CABLE TOTAL			29P x 1.5 = 43.5 = 40P		29P x 1.5 = 43.5 = 40P		26P x 1.5 = 39 = 40P			

COMMUNICATION CABLE INSTALLATION PLAN (10/12)

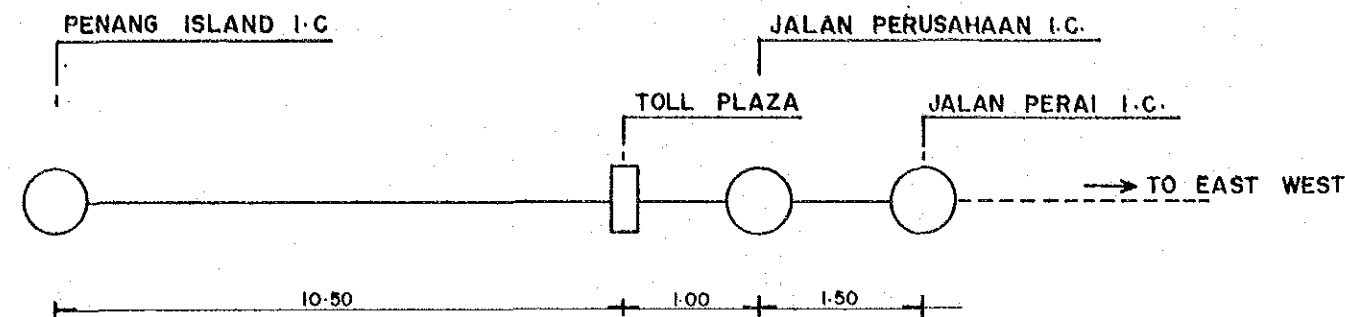
SCALE:

DRAWING NO: C33

DATE: DEC 1989

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COMPOSITE CABLE
CONDUIT LINE

2G1 + CCP 0.9 + 40P (13.0km)

HANDHOLE (UNIT)
FOUNDATION OF
EMERGENCY TELEPHONE
(UNIT)

EXPLANATORY NOTES:
 ○: MAINTENANCE OR REGIONAL OFFICE CH
 () : (○ + ○ + ○)
 L: TRUNK LINE CH
 L: COMMAND TELEPHONE CH
 L: TOTAL LOCAL LINE CH

3P : NUMBER OF PAIRS
 (2) : NUMBER OF CIRCUITS

NAME OF EQUIPMENT	IF	CABLE	
EMERGENCY TELEPHONE	E TEL	3P	3P(2)
EXCLUSIVE TELEPHONE	2W	1P	(16) 5P(5)
COMMAND TELEPHONE	C TEL	1P	(2) 2P(2)
RADIO STATION	4W	5P	(1)
HIGHWAY RADIO	4W	3P	
CHANGEABLE MESSAGE SIGN	4W		(1) 2P(1)
MAINLINE		2P	
ACCESS ROAD		2P	4P
TUNNEL		2P	
VEHICLE DETECTOR	4W	2P	
WEATHER OBSERVATORY	4W	2P	
SPEED LIMIT SIGN	4W	2P	
CLOSED CIRCUIT TELEVISION	4W	2P	4P(2)
COMMUNICATION SYSTEM SV	4W	2P	
TOLL COLLECTION SYSTEM	4W	2P	2P(1)
INTERFACE TOTAL	E TEL		2
	C TEL		4
	2W		21
	4W		4
METALLIC CABLE TOTAL			22P x 1.5 = 33P + 40

COMMUNICATION CABLE INSTALLATION PLAN (11/12)

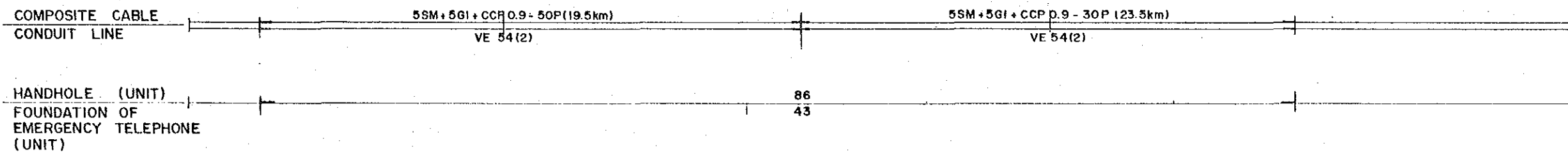
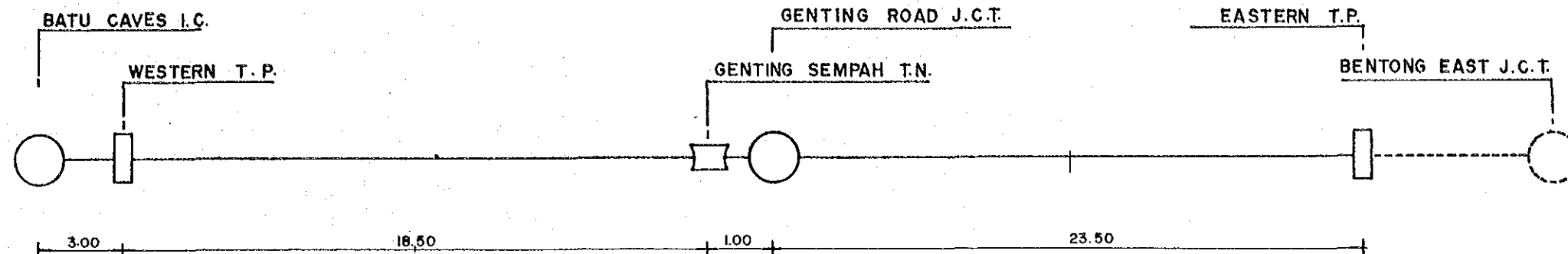
SCALE:

DRAWING NO:
C34

DATE:
DEC 1989

STUDY ON TRAFFIC CONTROL AND
MANAGEMENT SYSTEM OF MALAYSIAN
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EXPLANATORY NOTES:

- - MAINTENANCE OR REGIONAL OFFICE CH
- ⊕ - TRUNK LINE CH
- ⊖ - COMMAND LOCAL LINE CH
- ⊔ - TOTAL LOCAL LINE CH

3P - NUMBER OF PAIRS
 (2) - NUMBER OF CIRCUITS

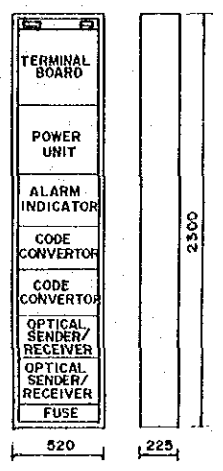
NAME OF EQUIPMENT	IF	CABLE	CABLE SPECIFICATIONS			
EMERGENCY TELEPHONE	ETEL	3P	3P(1)	6P(2)	3P(1)	3P(1)
EXCLUSIVE TELEPHONE	2W	1P	(5)	2P(2) (6)	(2)	(5)
COMMAND TELEPHONE	CTEL	1P	(2)	(2)		(2)
RADIO STATION	4W	5P	(1) 5P(1)	10P(2) (1)	5P	5P (1)
HIGHWAY RADIO	4W	3P				
CHANGEABLE MESSAGE SIGN	4W		(1)		(1)	
MAINLINE		2P	2P(1)			2P(1)
ACCESS ROAD		2P				
TUNNEL		2P		4P(2)		
VEHICLE DETECTOR	4W	2P	4P(2)	2P(1)	2P(1)	
WEATHER OBSERVATORY	4W	2P			2P(1)	
SPEED LIMIT SIGN	4W	2P				
CLOSED CIRCUIT TELEVISION	4W	2P	2P(1)	6P(3)		
COMMUNICATION SYSTEM SV	4W	2P	(1) 2P	2P	2P	2P (2) 2P 2P (1)
TOLL COLLECTION SYSTEM	4W	2P	(1)			(1)
INTERFACE TOTAL	ETEL		1		③ ((4))	1
	CTEL		2		② ((4))	2
	2W		5		⑩ ((12))	5
	4W		7		⑪ ((6))	3
METALLIC CABLE TOTAL			34P x 1.5 = 51P ± 50P		16P x 1.5 = 24 ± 30P	

COMMUNICATION CABLE INSTALLATION PLAN (12/12)

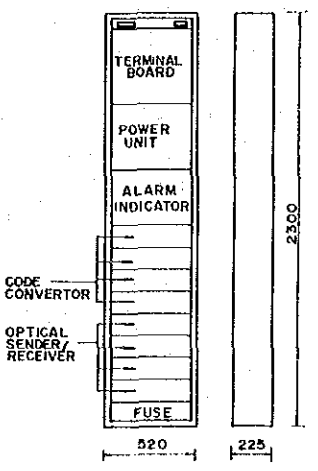
SCALE:
 DRAWING NO: C35
 DATE: DEC 1989

**STUDY ON TRAFFIC CONTROL AND
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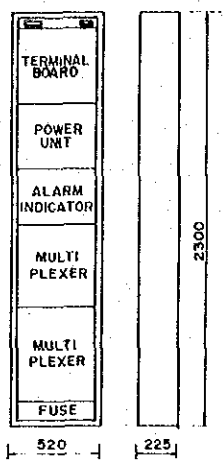
100M - OPT



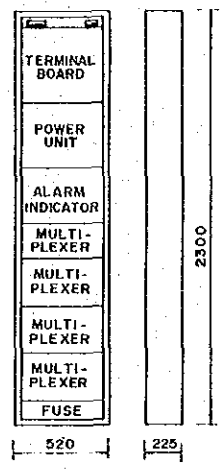
32M - OPT



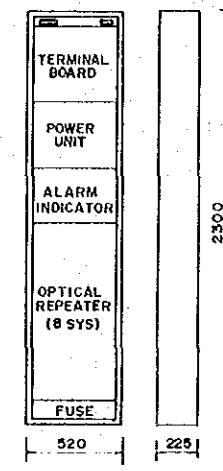
100M - MUX



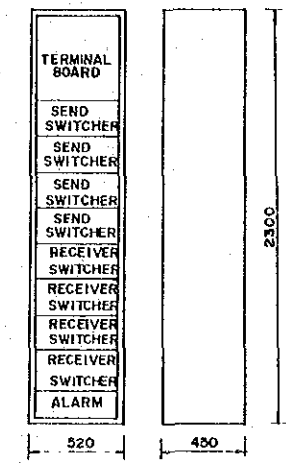
32M - MUX



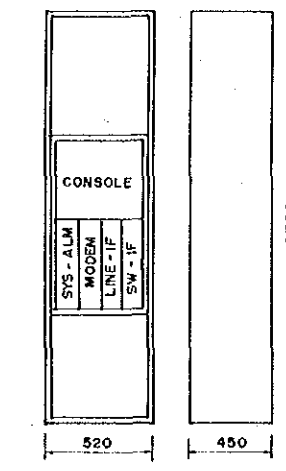
32M - REP



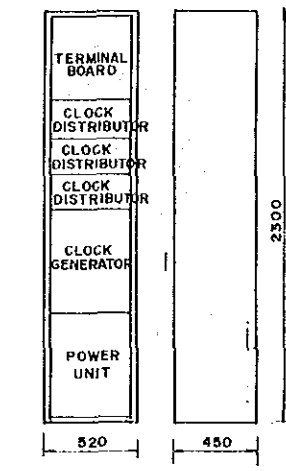
SYS - SW



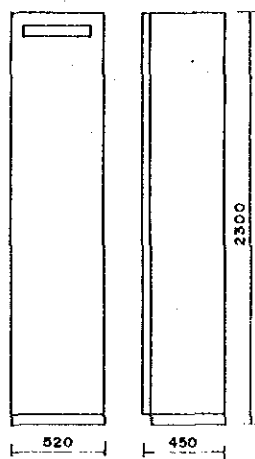
SYS - SW CONT



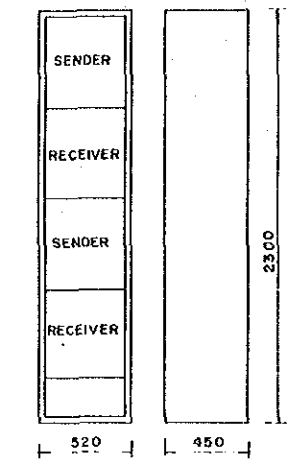
NSE



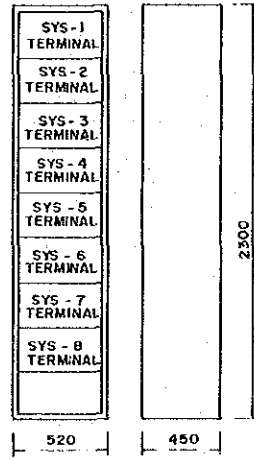
MI-MUX



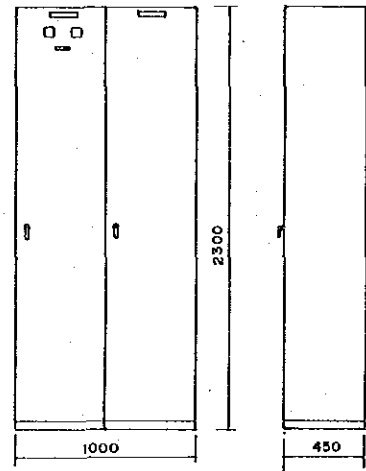
32M - CODEC



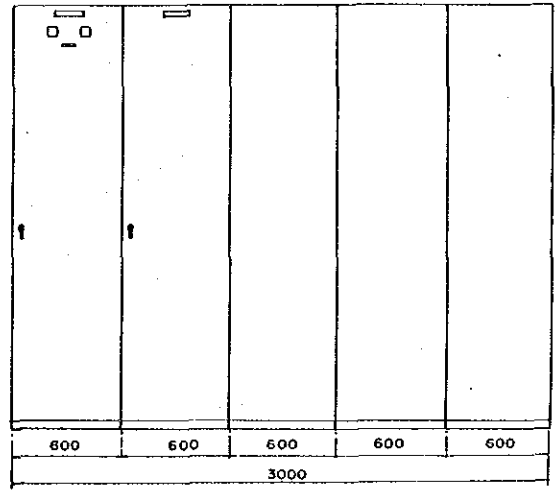
DIGITAL DISTRIBUTION FRAME



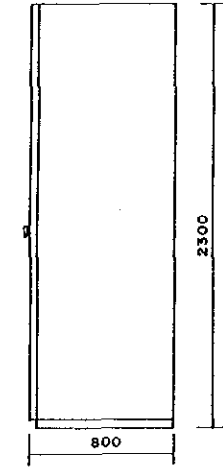
25A x 3



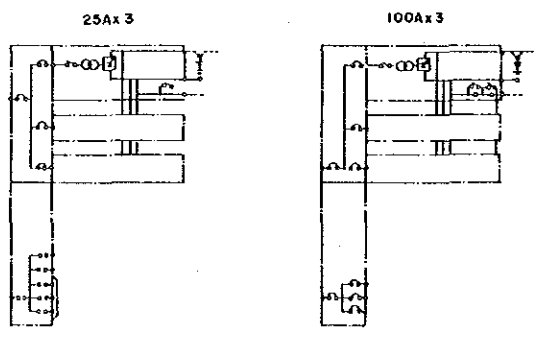
RECTIFIER



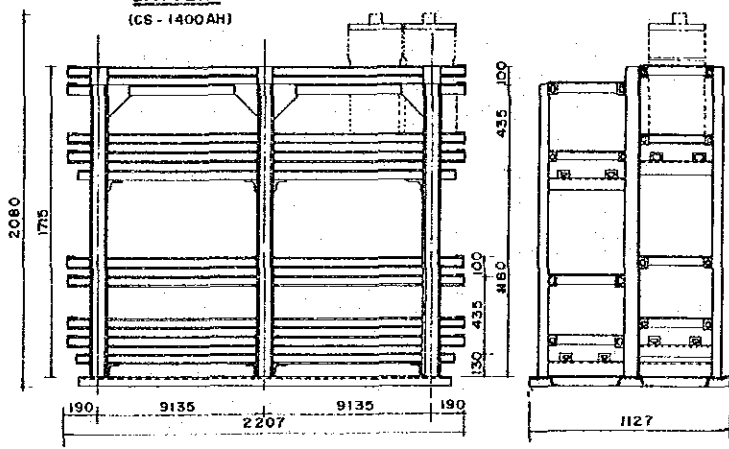
100A x 4



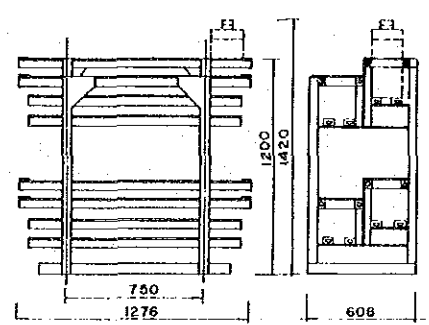
STANDARD CIRCUIT



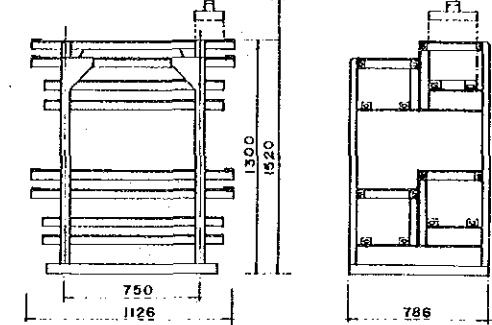
BATTERY (CS - 1400AH)



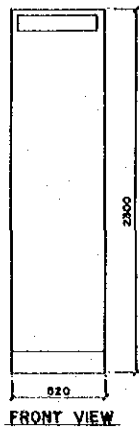
BATTERY (CS - 250 280AH)



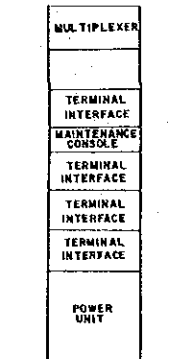
BATTERY (CS - 400AH)



DLT (M-S)

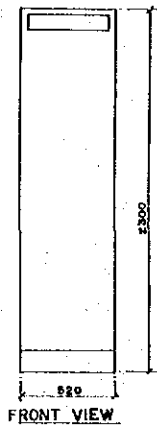


FRONT VIEW

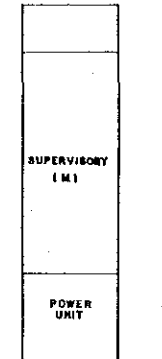


CHASSIS LAYOUT

S SV(M)

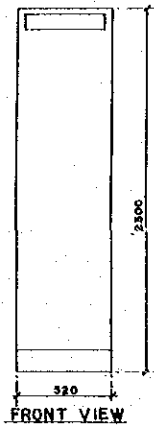


FRONT VIEW

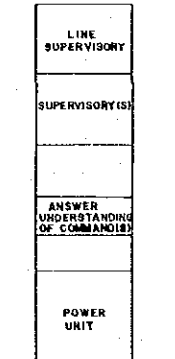


CHASSIS LAYOUT

ADP

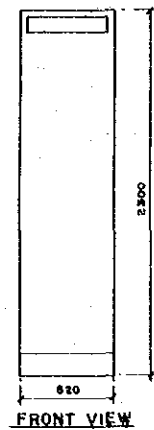


FRONT VIEW

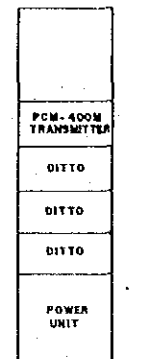


CHASSIS LAYOUT

ITV-400M

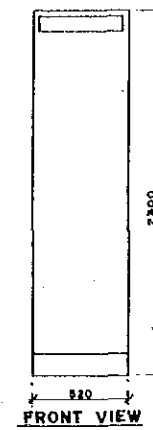


FRONT VIEW

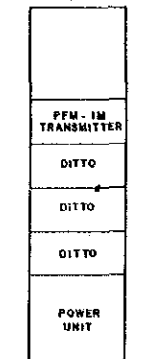


CHASSIS LAYOUT

PFM-1M

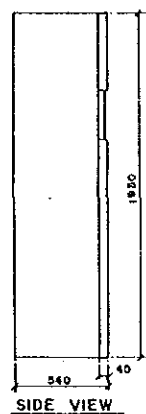


FRONT VIEW

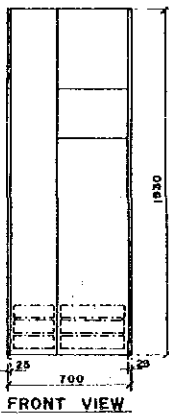


CHASSIS LAYOUT

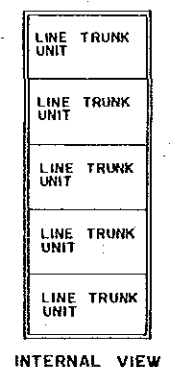
ID-SW



SIDE VIEW

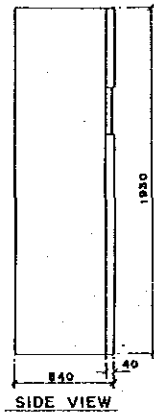


FRONT VIEW

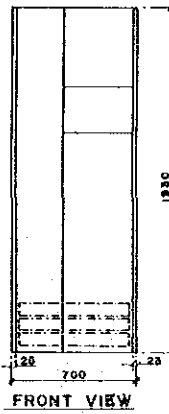


INTERNAL VIEW

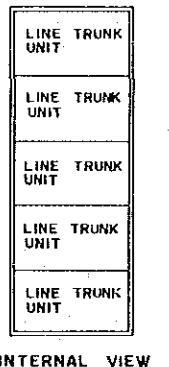
C/R - CONT



SIDE VIEW

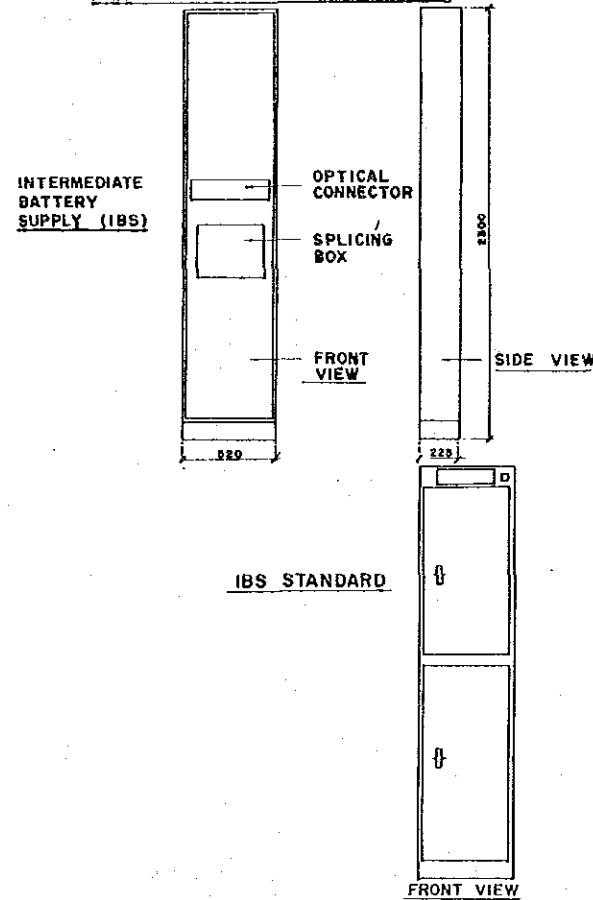


FRONT VIEW



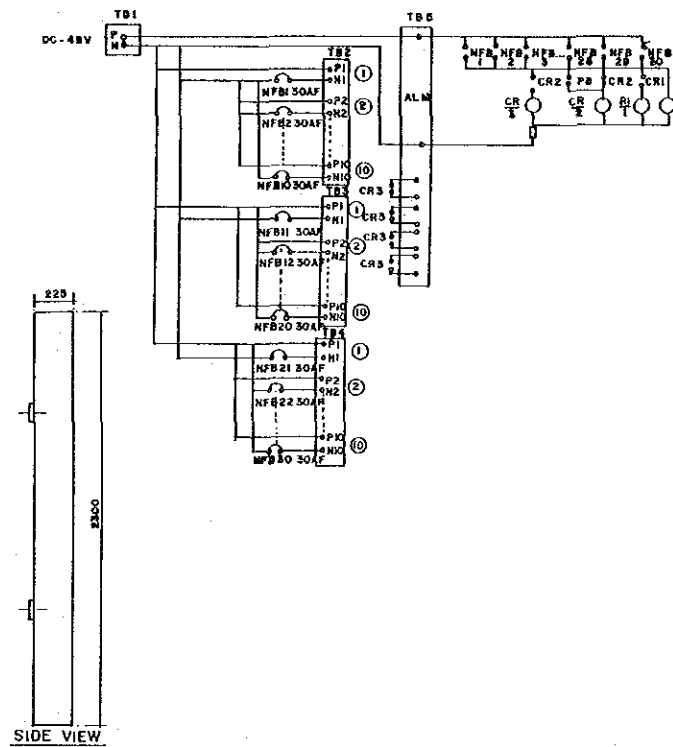
INTERNAL VIEW

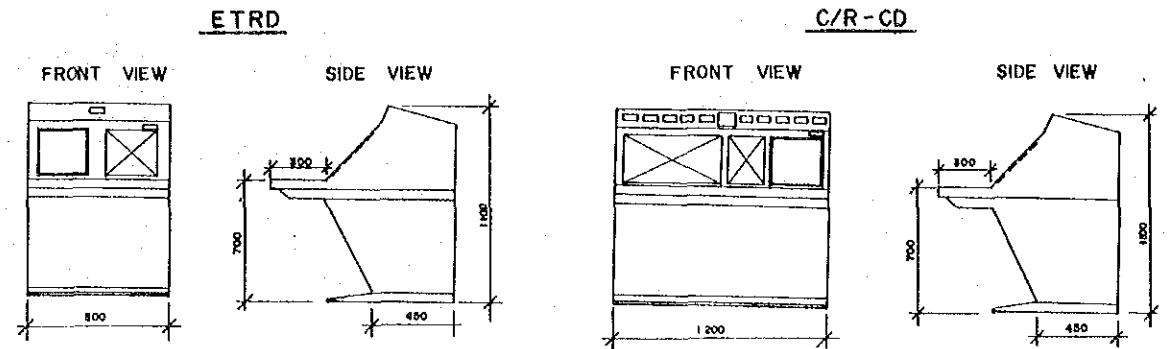
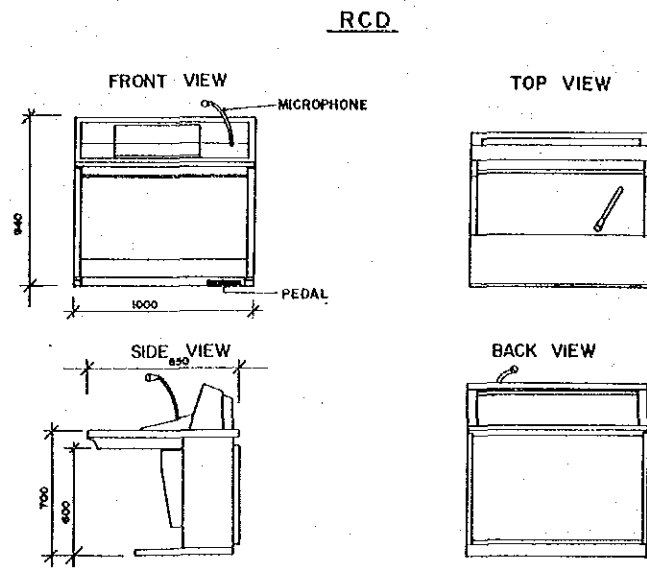
FIBER DISTRIBUTION FRAME (FDF)



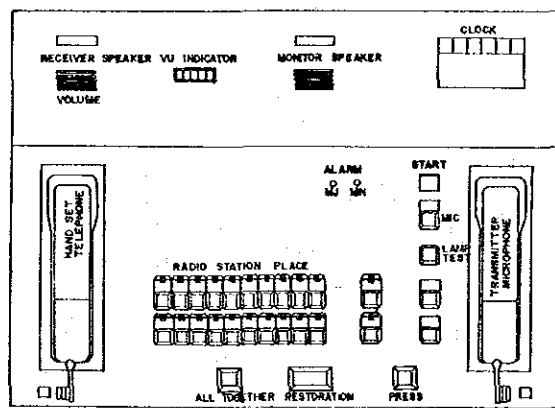
IBS STANDARD

IBS STANDARD CIRCUIT

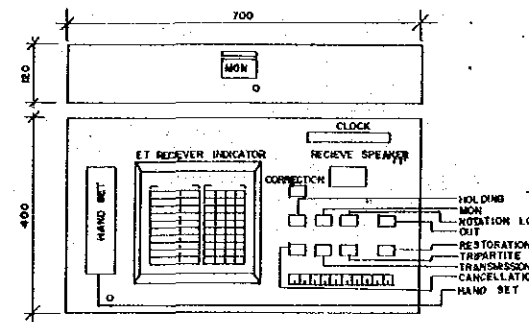




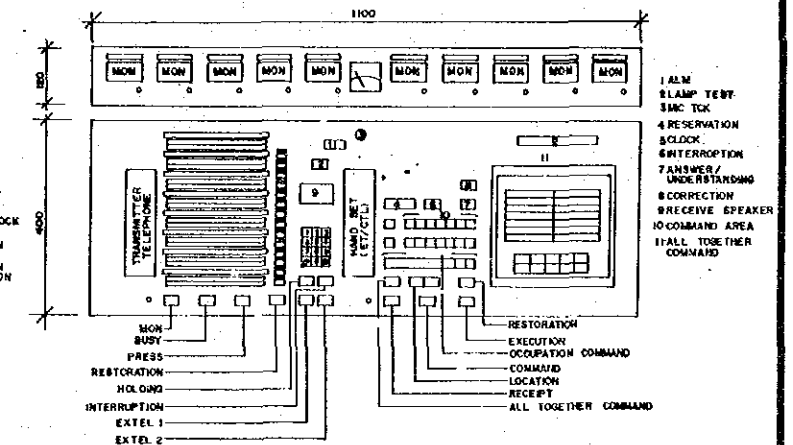
FRONT PANEL LAYOUT



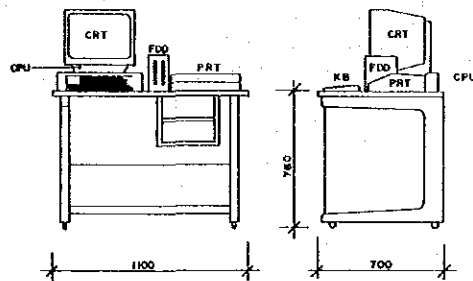
ETRD FRONT PANEL LAYOUT



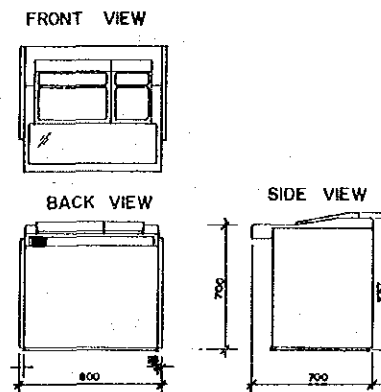
C/R-CD FRONT PANEL LAYOUT



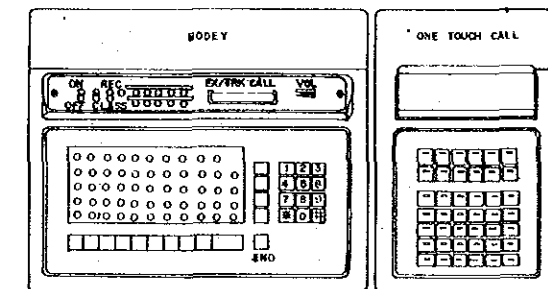
MOC (TD-SW, C/R-CONT)



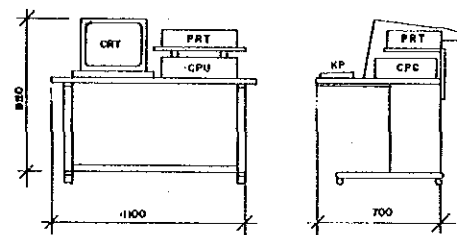
ATT



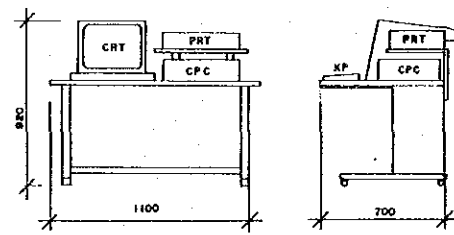
ATT FRONT PANEL LAYOUT



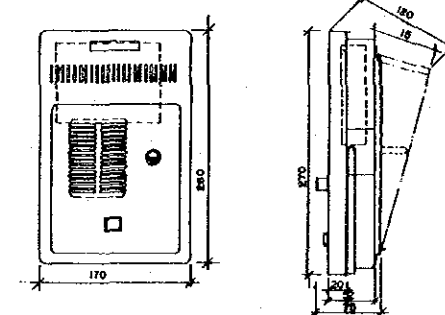
NSVP



NSP



C-MON, E-MON, R-MON

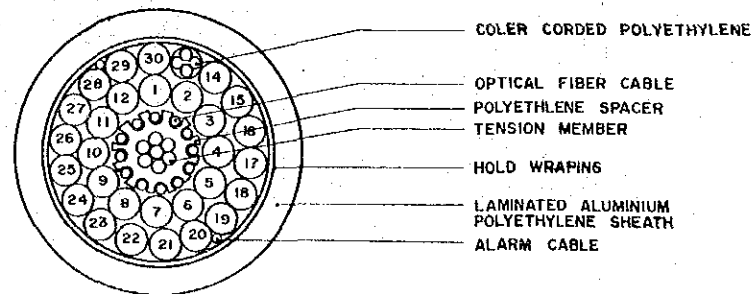


COMMUNICATION SYSTEM CONSOLE

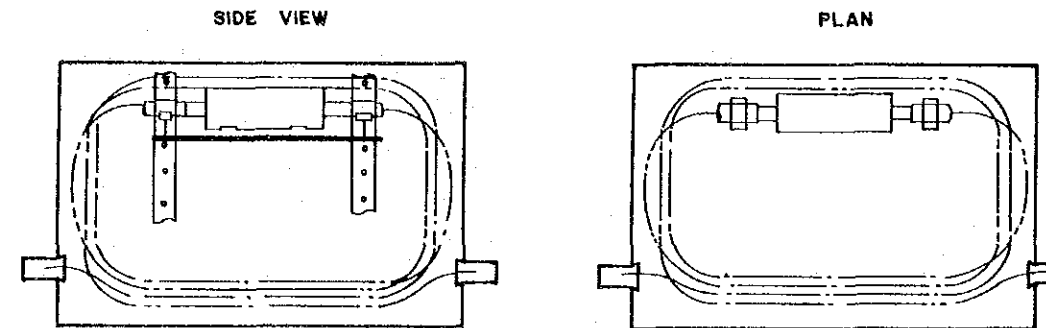
SCALE:
DRAWING NO: C38 DATE: DEC 1989

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JAPAN INTERNATIONAL COOPERATION AGENCY

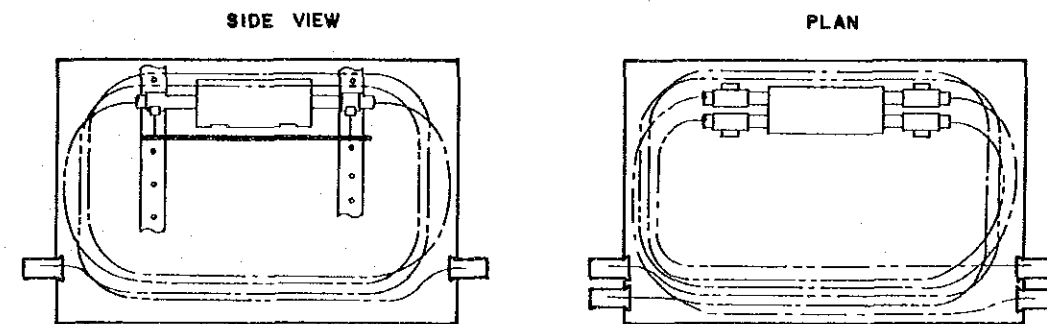
STRUCTURE OF COMPOSITE CABLE



STRAIGHT JOINT (IN HANDHOLE)



BRANCH JOINT (IN HANDHOLE)



ITEM	MEASURE
Optical Fiber Cable (SM.GI) (C)	1~10
Metallic Cable 0.9mm (pair)	60
Alarm Cable 0.9mm (C)	2
Tension Member (Pieces/mm)	7/1-8
Standard Outer Diameter (mm)	32
Rough Estimate Weight (kg/km)	1300
Allowable Tension (kg)	650
Bending Allowable Laying (20D) (mm)	640
Radius Joint And Fixed (mm)	288

STRUCTURE AND SETTING OF CABLE IN HANDHOLE

SCALE:

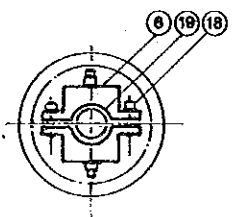
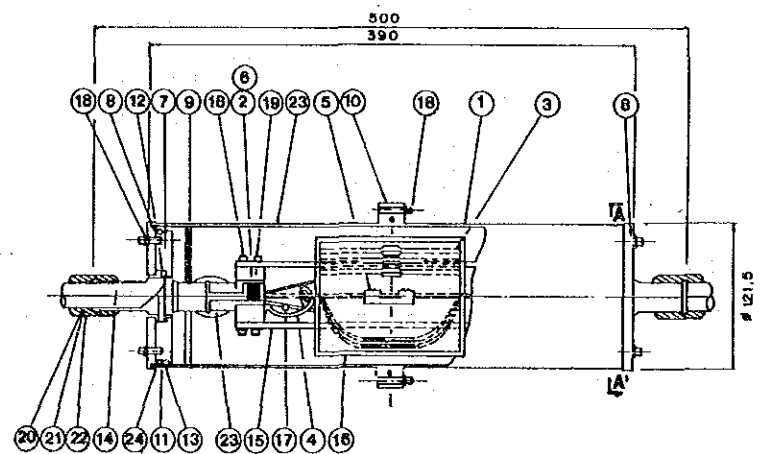
DRAWING NO:
C39

DATE:
DEC 1989

**STUDY ON TRAFFIC CONTROL AND
MANAGEMENT SYSTEM OF MALAYSIAN
EXPRESSWAYS AND TOLL HIGHWAYS**

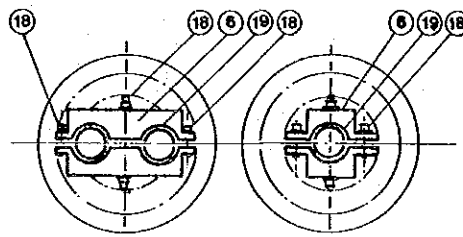
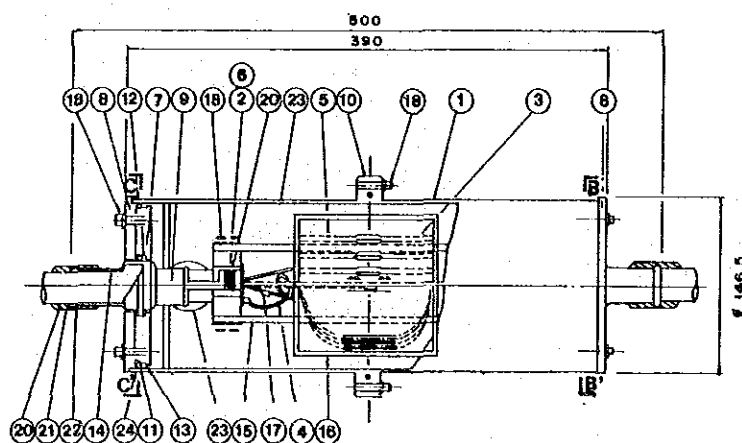
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STRAIGHT JOINT



A-A' VERTICAL SECTION

BRANCH JOINT



B-B' VERTICAL SECTION C-C' VERTICAL SECTION

NO.	NAME
1	Main Sleeve
2	Holding Spacer
3	Spare Length Sheet
4	Unit Centre Cap
5	Fixed Extension Cable Tool
6	Outside Holding Tool
7	Inside Holding Tool
8	Outside End Plate
9	Rubber Tube
10	Connecting O Ring
11	Circle Shield
12	Rubber Tube Circle Shield
13	Back-up Ring
14	Flat Shield
15	Connecting Rod
16	Auxiliary Lead Sleeve
17	Discriminating Tape
18	Hexagonal Bolt
19	Inside Holding Tool
20	Self-Adhesive Tape
21	Self-Adhesive Aluminium
22	Protection PVC Tape
23	Main Sleeve
24	Sleeve O Ring

CONSTRUCTION OF MECHANICAL JOINT

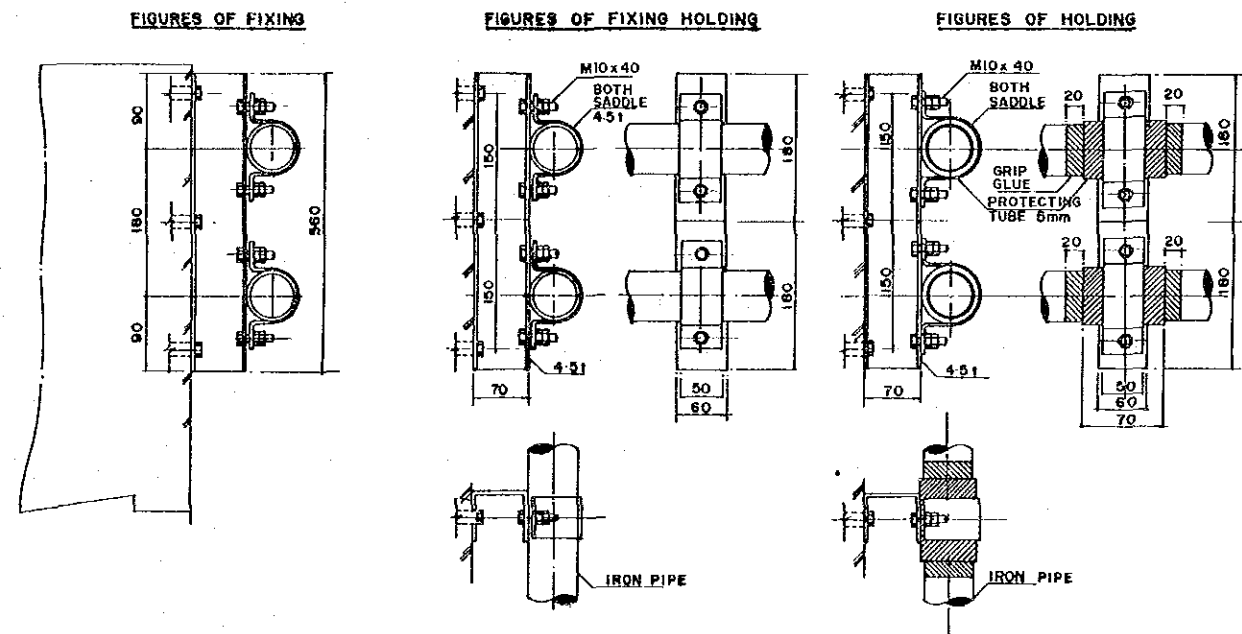
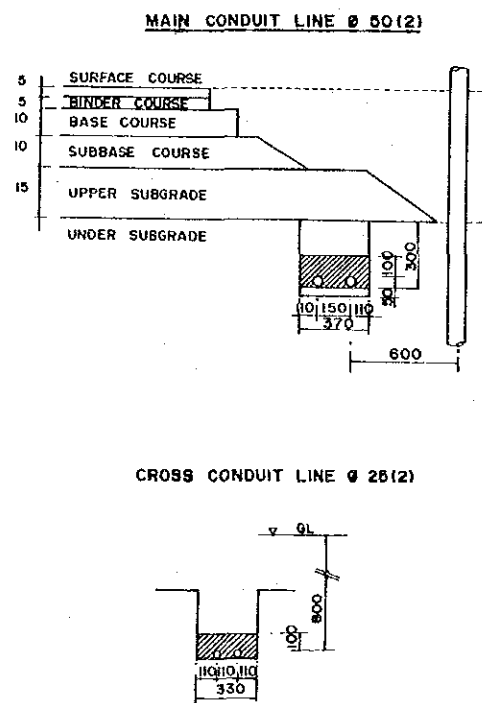
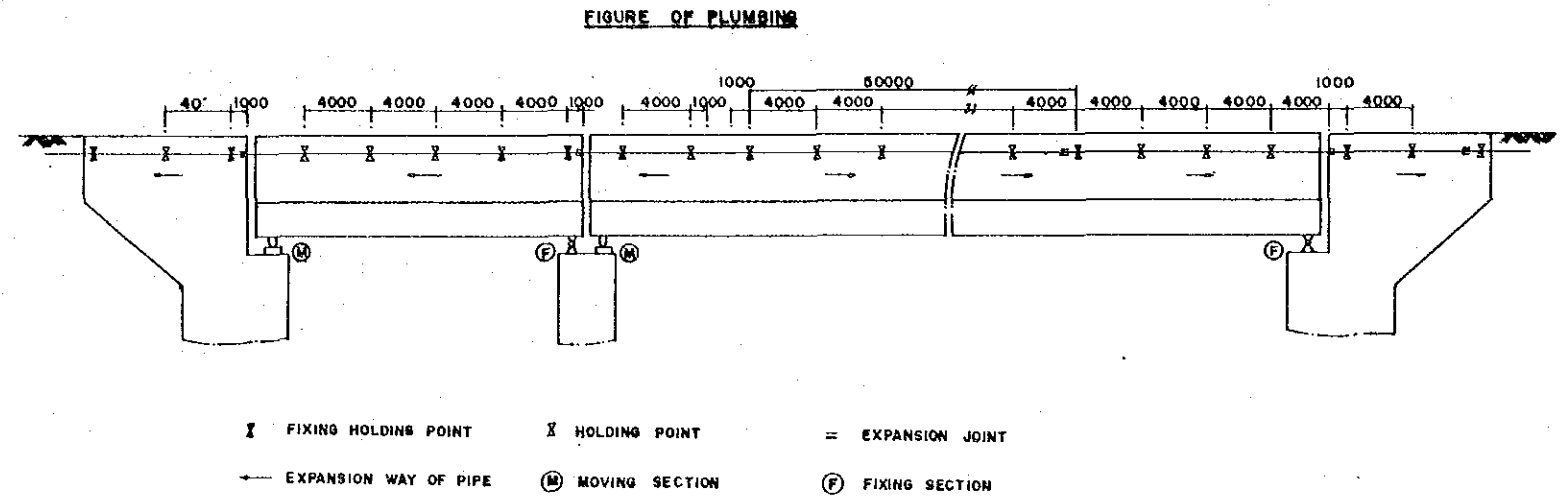
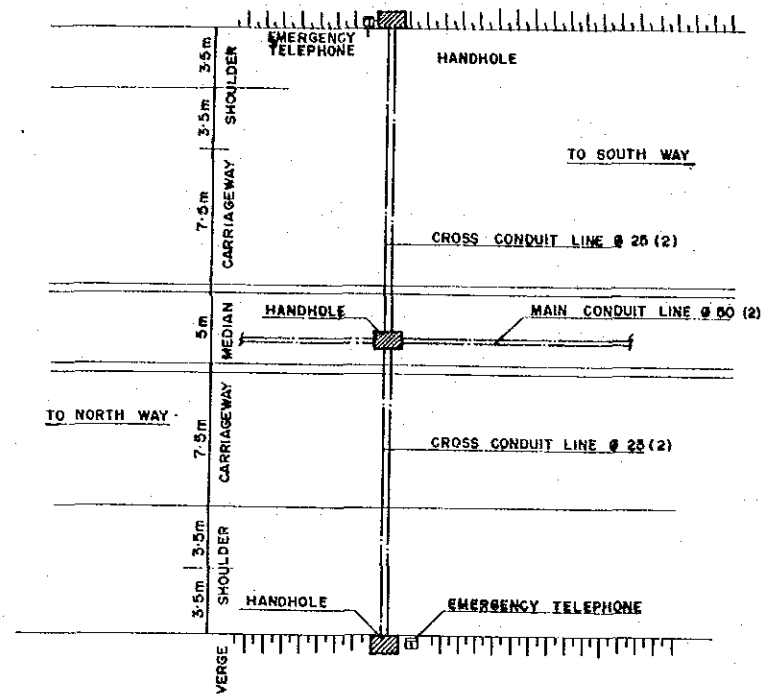
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DATE:
DEC 1989

STUDY ON TRAFFIC CONTROL AND
MANAGEMENT SYSTEM OF MALAYSIAN
EXPRESSWAYS AND TOLL HIGHWAYS

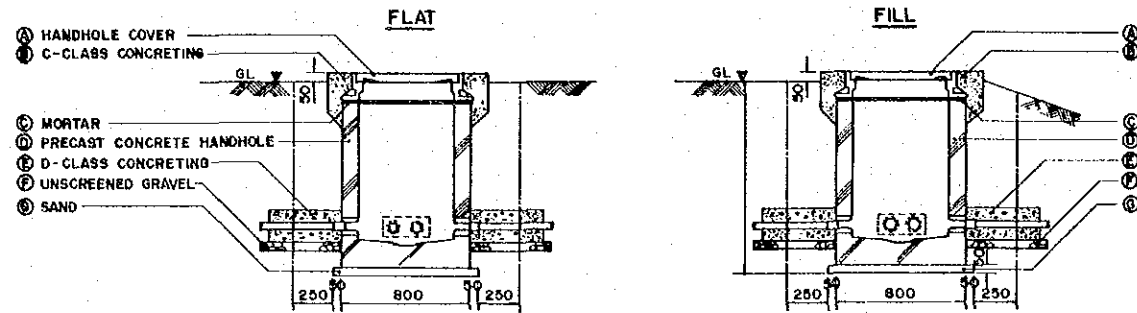
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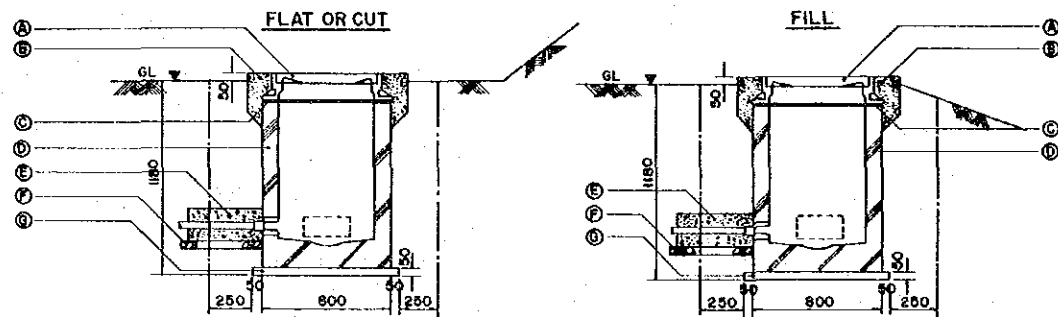
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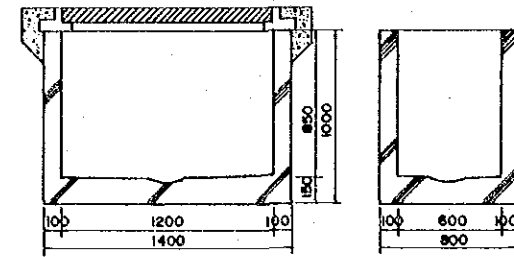
STUDY ON TRAFFIC CONTROL AND
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 JAPAN INTERNATIONAL COOPERATION AGENCY



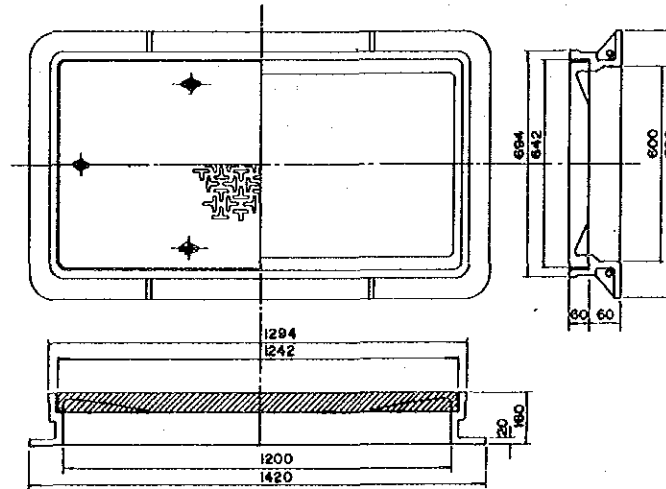
SETTING OF MEDIAN HANDHOLE



SETTING OF ROAD SIDE HANDHOLE



HANDHOLE



HANDHOLE COVER

HANDHOLE

SCALE:

DRAWING NO: C42
DATE: DEC 1989

STUDY ON TRAFFIC CONTROL AND
MANAGEMENT SYSTEM OF MALAYSIAN
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