1.4 Cut-Over Design

The cut-over methods to be used for transferring the existing subscribers from Mahamek (MM) and Chayapruk (CP) Exchanges are as follows: (Refer to the Cut-Over Design Drawing)

1.4.1 Cut-Over Method for Subscriber Transfer from MM Exchange

The cut-over work is to be carried out in two ways: loop jumpering and multiple jointing.

(1) Loop Jumpering Method

CAB. NO.	NO. OF SUB.	PAIR COUNT OF EXISTING CABLE	PAIR COUNT OF NEW CABLE		JOINTING POINT	REMARKS
			CAB-MDF(KT EX.)-MM EX.			
MM #119	180	10-12: 901-1200	53-03:2101-2400	53-01:2001-2400 [10-12: 901-1300]	#003 MH(#019)	The existing subscriber's lines in (MM-12:1301-1450) to be transferred to the idle lines in (MM-12:901-1300).
MM #120	130	10-12:1201-1450	53-01:2401-2650	53-01:2001-2400 [10-12: 901-1300]	#003 MH(#019)	
MM #117	210	10-12: 601-900	53-04:2401-2700	53-01:1701-2000	#003 MH(#019)	
MM #118	130	10-12: 1-300	53-04:1201-1500	53-01:1101-1400	#003 MH(#019)	
MM #054	260	10-12: 301-400	53-04:1201-1500	53-01:1401-1500	#003 MH(#019)	Relating to Cabinet #017 (MM #118) and Cabinet #016
		10-07: 1-200	53-04:1501-1750	53-05:1901-2100	MH#001	
MM #083	140	10-12: 401-600	53-04:1801-2000	53-01:1501-1700	#003 MH(#019)	
MM #053	200	10-07: 201-500	53-04:2001-2300	53-05:2101-2400	MH#001	
MM #052	150	10-07: 501-650	53-03:2401-2650	53-02:2451-2600	#002 MH(#023)	
		10-06: 1-100		53-03:1701-1800	#003 MH(#019)	
MM #051	60	10-07: 651-700	53-02:2351-2400	53-02:2601-2650	#002 MH(#023)	
		10-07: 751-800	53-02:2401-2450	53-02:2651-2700		
		10-06: 101-200	53-12:2251-2350	53-03:1801-1900	#003 MH(#019)	
Total	1,460					

(2) Multiple Jointing Method

CAB. NO.	PAIR COUNT OF MULTI-JOINT		MULTIPLE JOINTING POINT	REMARKS
	MM EX.	KT EX.		
MM #114	10-12:2401-2700	53-03: 1-300	#029 PB(#022)	
MM #044	10-06:1601-1800 10-06:1201-1250	53-03: 301-550	#009 MH(#014)	
MM #076	10-07: 851-1050 10-07:1351-1450	53-03: 601-900	#016 PB(#032)	
MM #077	10-07:1051-1250 10-07:1251-1350	53-03:1201-1500	#005 PB(#027)	
MM #115	10-12:1951-2250	53-03: 901-1200	#005 PB(#027)	
MM #045	10-06:1401-1500 10-06: 901-1000	53-03:1501-1700	#004 PB(#033)	
MM #046	10-06: 751-900 10-07: 801-850	53-03:1901-2050 53-03:2051-2100	#003 PB(#034)	
MM #047	10-06: 601-750 10-12:1901-1950	53-01: 951-1100 53-01: 901-950	#011 MH(#020)	
MM #048	10-06: 351-500 10-12:1851-1900	53-01: 501-650 53-01: 851-900	#012 MH(#021)	
MM #049	10-06: 501-600 10-07: 701-750 10-12:1801-1850	53-01: 651-750 53-01: 751-800 53-01: 801-850	#012 MH(#021)	
MM #050	10-06: 201-350 10-12:1751-1800	53-01: 351-500 53-01: 301-350	#013 MH(#022)	
MM #116	10-12:1451-1750	53-01: 1-300	#063 PB(#050)	
MM #029	10-11: 801-1000	53-02:1801-2000	Aerial Pole No. Chuap-loang Rd. #22	To be jumpered between the primary cable and the secondary cable (032-01: 1-200) at Cabinet #032.
MM #028	10-04: 451-600 10-09:1401-1500	53-02: 1-250	Aerial Pole No. Yen-akart Rd. #1	
MM #039	10-09:1501-1650 10-09:1301-1400	53-02: 351-600	Aerial Pole No. Yen-akart Rd. #1	
MM #113	10-02: 1-300	53-02:1501-1800	#058 PB(#060)	
MM #038	10-05: 1-50 10-05: 201-400	53-02:1201-1450	Aerial Pole No. Sri Bamihen Rd. #19	To be transferred, using temporary cable.
MM #112	10-02: 401-650	53-02: 901-1150	#061 PB(#059)	
MM #037	10-05: 51-200 10-02: 651-750	53-02: 601-750	Aerial	To be transferred, using temporary cable. To transfer the existing subscriber's lines in (10-02: 651-750) to idle lines in (10-05:51-200).

1.4.2 Cut-Over Method for Subscriber Transfer from CP Exchange

The cut-over work is to be carried out by multiple jointing as in the following table.

CAB. NO.	PAIR COUNT OF MULTI-JOINT		MULTIPLE JOINTING POINT	REMARKS
	CP EX.	KT EX.		
CP:09-12 901-1050	09-12: 901-1050	53-04: 301-450	Aerial POLE #31	To be jumpered between the primary cable and the secondary cable (022-01:1-150) at Cabinet #022.
CP:09-12 851-900	09-12: 851-900	53-04:1001-1050	Aerial TOT POLE	To be jumpered between the primary cable and the secondary cable (020-01:101-150) at Cabinet #022.
CP:09-12 601-700	09-12: 601-700	53-04: 901-1000	Aerial TOT POLE	To be jumpered between the primary cable and the secondary cable (020-01:1-100) at Cabinet #022.
CP:09-12 701-850	09-12: 701-850	53-04: 1-150	Aerial POLE #26	To be jumpered between the primary cable and the secondary cable (023-01:1-150) at Cabinet #022.
CP:09-16 1001-1100	09-16:1001-1100	53-05:1201-1300	Aerial POLE #1	To be jumpered between the primary cable and the secondary cable (025-01:201-300) at Cabinet #022.
CP:09-16 1101-1200	09-16:1101-1200	53-05: 601-700	Aerial POLE #1	To be jumpered between the primary cable and the secondary cable (027-01:201-300) at Cabinet #022.
CP:09-16 801-1000	09-16: 801-1000	53-05: 401-600	Aerial POLE #18	To be jumpered between the primary cable and the secondary cable (028-02:1-200) at Cabinet #022.
CP:09-16 601-700	09-16: 601-700	53-05: 301-400	Aerial POLE #22	To be jumpered between the primary cable and the secondary cable (028-01:1-100) at Cabinet #022.
CP:09-16 701-800	09-16: 701-800	53-05: 151-250	Aerial POLE #46	To be jumpered between the primary cable and the secondary cable (029-02:1-100) at Cabinet #022.
CP:09-16 1-150	09-16: 1-150	53-05: 1-150	Aerial POLE #5	To be jumpered between the primary cable and the secondary cable (029-01:1-150) at Cabinet #022.

1.5 Design of Underground Conduit

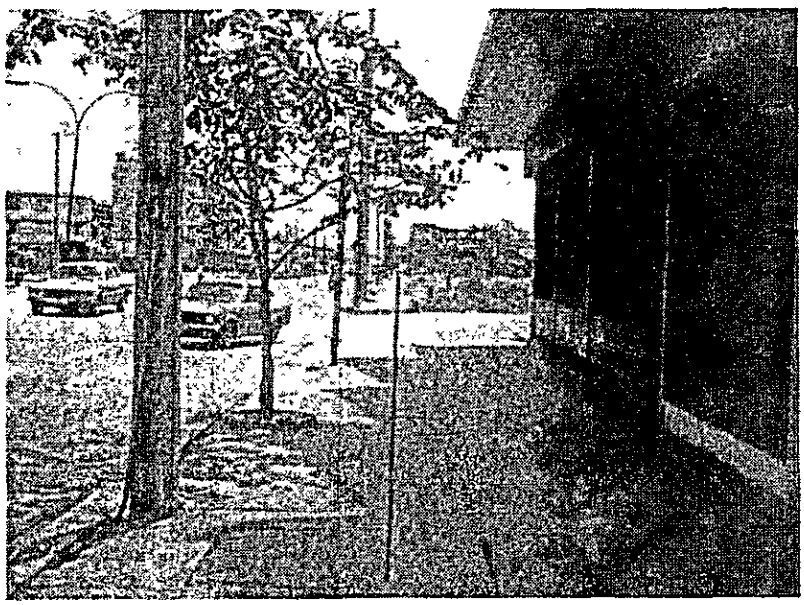
1.5.1 Number of Entrance Conduits

The number of entrance conduits is determined to be 36 ducts (6 lines x 6 rows) according to the civil work design criteria of TOT, as the total demand 10 years later in the Klong Toei (KT) Exchange service area amounts to 11,540.

1.5.2 Rama IV Road Area

Pulling-boxes, type JRC-14, are to be installed between PB #033 and PB #044 on the footpath of Rama IV Road because, under this road, many other underground facilities, such as water pipes and drainage pipes, are located, making new manhole installation impractical.

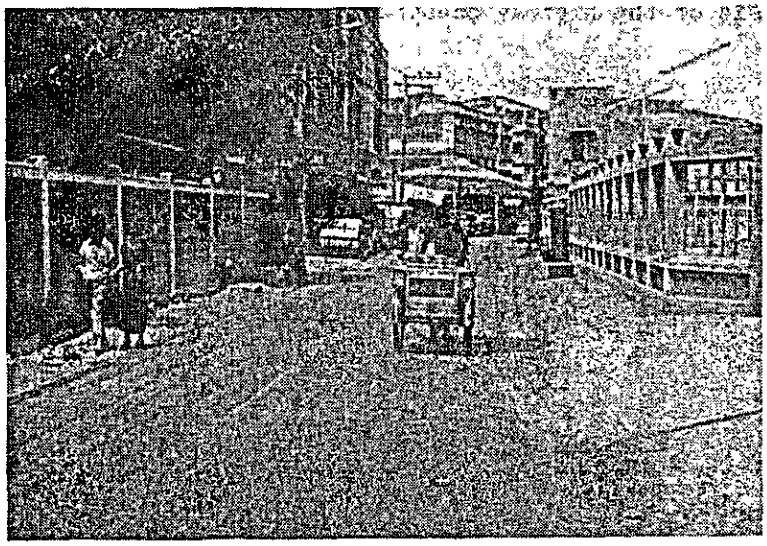
For the actual work, in-depth consultation between TOT and Water Service Administration is required because the movement of the existing water pipes is necessary.



New Conduit Route along Rama IV Road

1.5.3 Sribumpen Road Area

Pulling boxes, type JRC-14, instead of manholes are to be installed on the gravel portion of the Sribumpen Road because this road is not only narrow but also is paved with concrete and, moreover, the volume of traffic is large.



New Conduit Route along Sribumpen Road

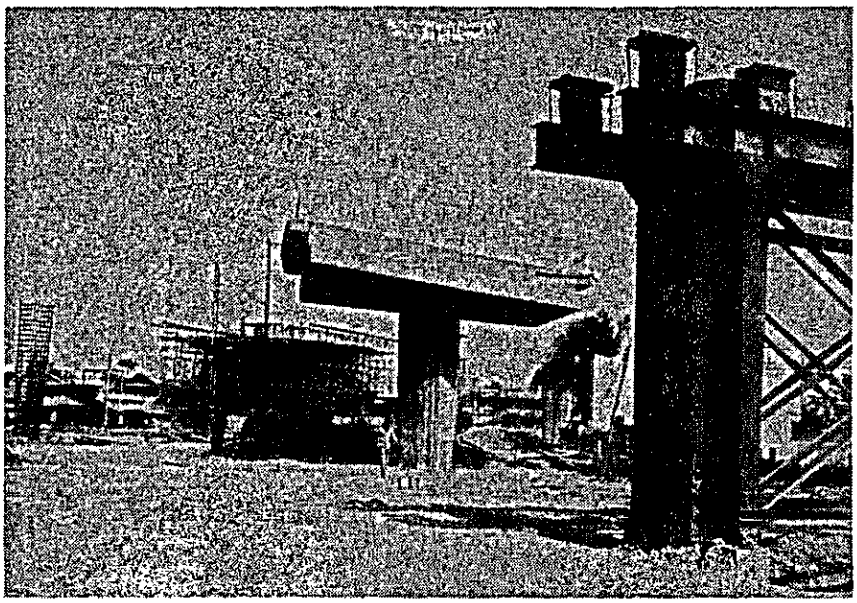
1.6 Secondary Cable Network Design

(1) The slums in the Cabinet #019 area are scheduled to be reclaimed as the port facilities area, so that the cable network is designed in accordance with the development plan drawings for the area.

(2) The secondary cable of Cabinet #018 and the primary cable of Cabinet #019 are designed as the underground siphon system for the section crossing the railway, instead of the existing aerial system.

The construction work in this section should be carried out by TOT earlier than the highway construction along the railway in case the latter work is to be started before TOT's project.

(3) The highway construction work is already in progress in the Cabinet #032 area so that the part of the aerial route relating to this construction is designed on the basis of the highway construction plan.



Highway under Construction

(4) In Cabinets #014 (MM #114), #036 (MM #037) and #037 (MM #039), the cut-over work of the secondary cable to remain in the Mahamek Exchange area should be carried out by TOT at the same time as the main work.

1.7 Amount of Construction Work

AMOUNT OF CONSTRUCTION WORK

SECTION	DESIGNATION	UNIT	QUANTITY			REMARKS
			PRIMARY	SECONDARY	TOTAL	
A	A - 8	ea	5	18	23	
B	B1BS	ea	3	52	55	
	B1CS	"	3		3	
	B1FS	"	1		1	
	B2B	"		4	4	
	Section "B" Total	"	7	56	63	
C	C5A2B	ea	7	52	59	
E	E 25 . 4 A2	100m		0.6 (0.6)	0.6 (0.6)	( ): Direct-buried
	E 50 . 4 A2	"		15.2	15.2	
	E 100 . 4 A2	"		17.2	17.2	
	E 200 . 4 A2	"	5.0	23.7	28.7	
	E 300 . 4 A2	"	2.1	2.4	4.5	
	E 400 . 4 A2	"	0.2	0.7	0.9	
	E 600 . 4 A2	"	5.3	0.9	6.2	
	E 50 . 5 A2	"		1.6	1.6	
	E 100 . 5 A2	"	0.8	1.1	1.9	
	E 200 . 5 A2	"	0.1		0.1	
	E 300 . 5 A2	"	5.5		5.5	
	E 10 . 4 A2(8)	"		1.3	1.3	
	E 25 . 4 A2(8)	"		10.6	10.6	
	E 50 . 4 A2(8)	"		27.2	27.2	
	E 100 . 4 A2(8)	"		15.0	15.0	
	E 50 . 5 A2(8)	"		1.2	1.2	
	Section "E" Total	"	19.0	119.3	138.3	

SECTION	DESIGNATION	UNIT	QUANTITY			REMARKS
			PRIMARY	SECONDARY	TOTAL	
G	G 300 . 4 A6	100m	12.0		12.0	AP-FSF Cable
	G 600 . 4 A6	"	17.7		17.7	"
	G 900 . 4 A6	"	2.5		2.5	"
	G1200 . 4 A6	"	7.0		7.0	"
	G1500 . 4 A6	"	2.2		2.2	"
	G1800 . 4 A6	"	8.4		8.4	"
	G2100 . 4 A6	"	2.3		2.3	"
	G2400 . 4 A6	"	13.9		13.9	"
	G2700 . 4 A6	"	14.5		14.5	"
	G 300 . 5 A6	"	0.5		0.5	"
	G 600 . 5 A6	"	3.1		3.1	"
	G 900 . 5 A6	"	6.9		6.9	"
	G1200 . 5 A6	"	1.4		1.4	"
	G1500 . 5 A6	"	1.2		1.2	"
	G1800 . 5 A6	"	11.7		11.7	"
	Section "G" Total	"	105.3		105.3	
J	J 300 . 5 03	10m	30.0		30.0	PVC Cable
K	KA11G2	ea	1	260	261	With Stub
	KA16G2	"		2	2	"
	K 30	"		1	1	Internal Terminal Box
	K 200	"		1	1	
	Section "K" Total	"	1	264	265	
L	L 900	ea	17		17	
	L 25 A	"	204	264	468	Without Stub
	L 50 B2	"		1	1	With Stub
	L 100 B2	"		5	5	"
	Section "L" Total	"	221	270	491	

SECTION	DESIGNATION	UNIT	QUANTITY			REMARKS
			PRIMARY	SECONDARY	TOTAL	
M	M1AP	ea	6	91	97	L: Lead x Lead
	M1BP	"	17	23	40	Lead x Plastic
	M3AP	"		8	8	P: Plastic x Plastic
	M3BP	"	38	2	40	
	M3CP	"	58		58	
	M3AL	"	3		3	
	M3BL	"	31		31	
	M3CL	"	2		2	
	Section "M" Total	"	155	124	279	
N	N 1	100 pairs	1,385	197	1,582	Normal
	N 2	"	78		78	Bridged for Transfer
	Section "N" Total	"	1,463	197	1,660	
P	P 36 B	100m	0.2		0.2	
	P 12 B	"	0.3		0.3	
	P 6 B	"	8.2		8.2	
	P 4 B	"	27.0		27.0	
	P 4 A	"	0.9		0.9	
	P 2 A	"	2.4		2.4	
	Section "P" Total	"	39.0		39.0	
Q	Q T-6(a)	ea	1		1	
	Q L-2	"	1		1	
	Q A-1	"	4		4	
	Q JRC-14	"	17		17	
	Q JUF-11	"	4		4	
	Section "Q" Total	"	27		27	

1.8 Amount of Main Materials

MAIN MATERIALS LIST

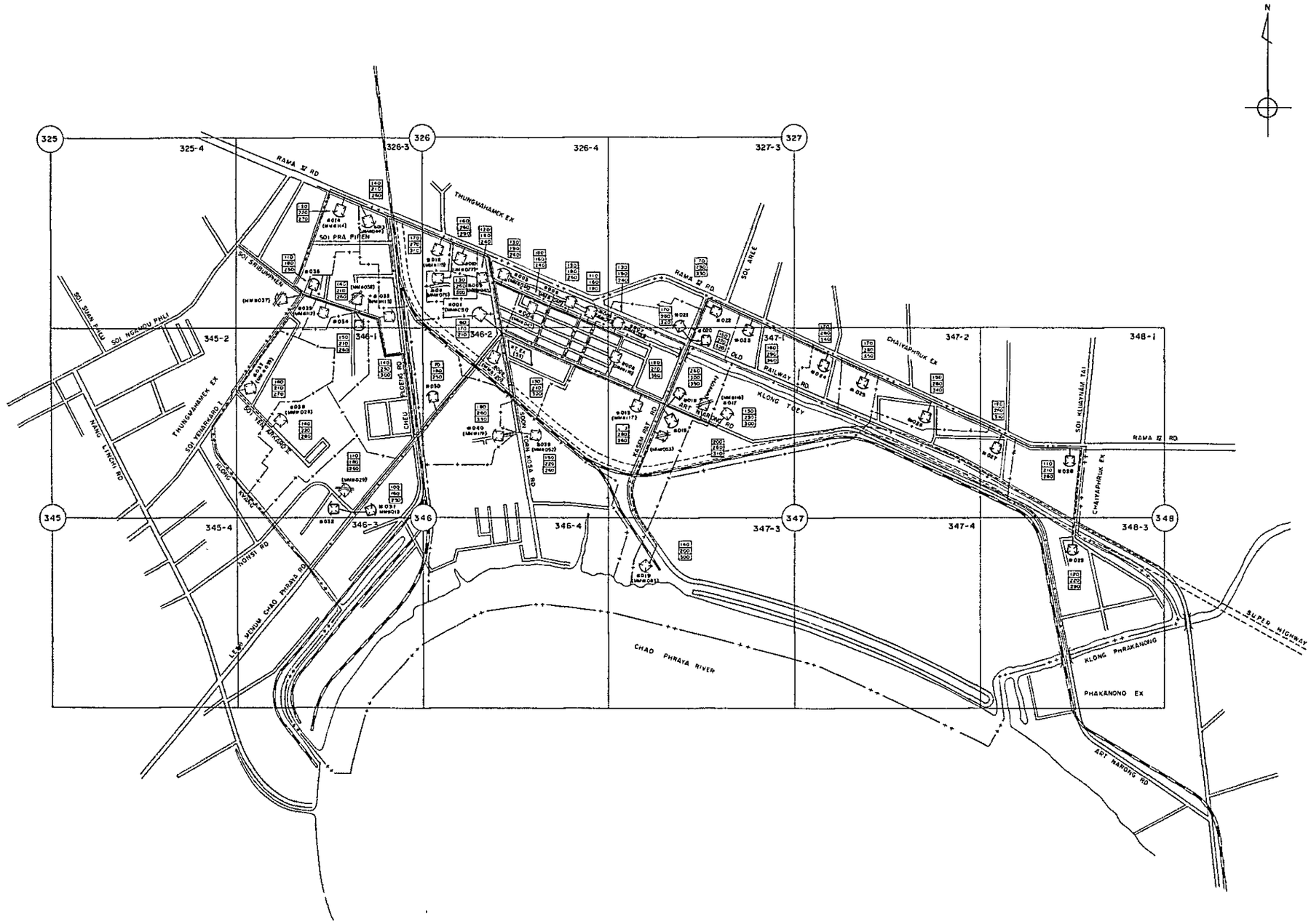
(1) Primary Cable Work

NAME OF MATERIAL	UNIT	QUANTITY	REMARKS
Cable			
1) AP-FSF Cable			
50-.4	m	15	
100-.4	"	25	
300-.4	"	1,483	
600-.4	"	1,840	
900-.4	"	266	
1200-.4	"	739	
1500-.4	"	252	
1800-.4	"	858	
2100-.4	"	230	
2400-.4	"	1,416	
2700-.4	"	1,487	
300-.5	"	73	
600-.5	"	312	
900-.5	"	699	
1200-.5	"	143	
1500-.5	"	125	
1800-.5	"	1,191	
Sub Total	"	11,154	
2) Alpeth Sheathed Cable			
50-.4	m	15	
100-.4	"	15	
200-.4	"	610	
300-.4	"	290	
400-.4	"	30	
600-.4	"	550	
100-.5	"	80	
200-.5	"	40	
300-.5	"	560	
Sub Total	"	2,190	
Total	m	13,344	

NAME OF MATERIAL	UNIT	QUANTITY	REMARKS
Cross Connecting Cabinet 900 PRS.	ea	17	
Cross Connecting Cabinet Terminal Block 25 PRS.	ea	204	
Concrete Pole 8 M	ea	5	
Strand Terminal 11 PRS.	ea	1	

(2) Secondary Cable

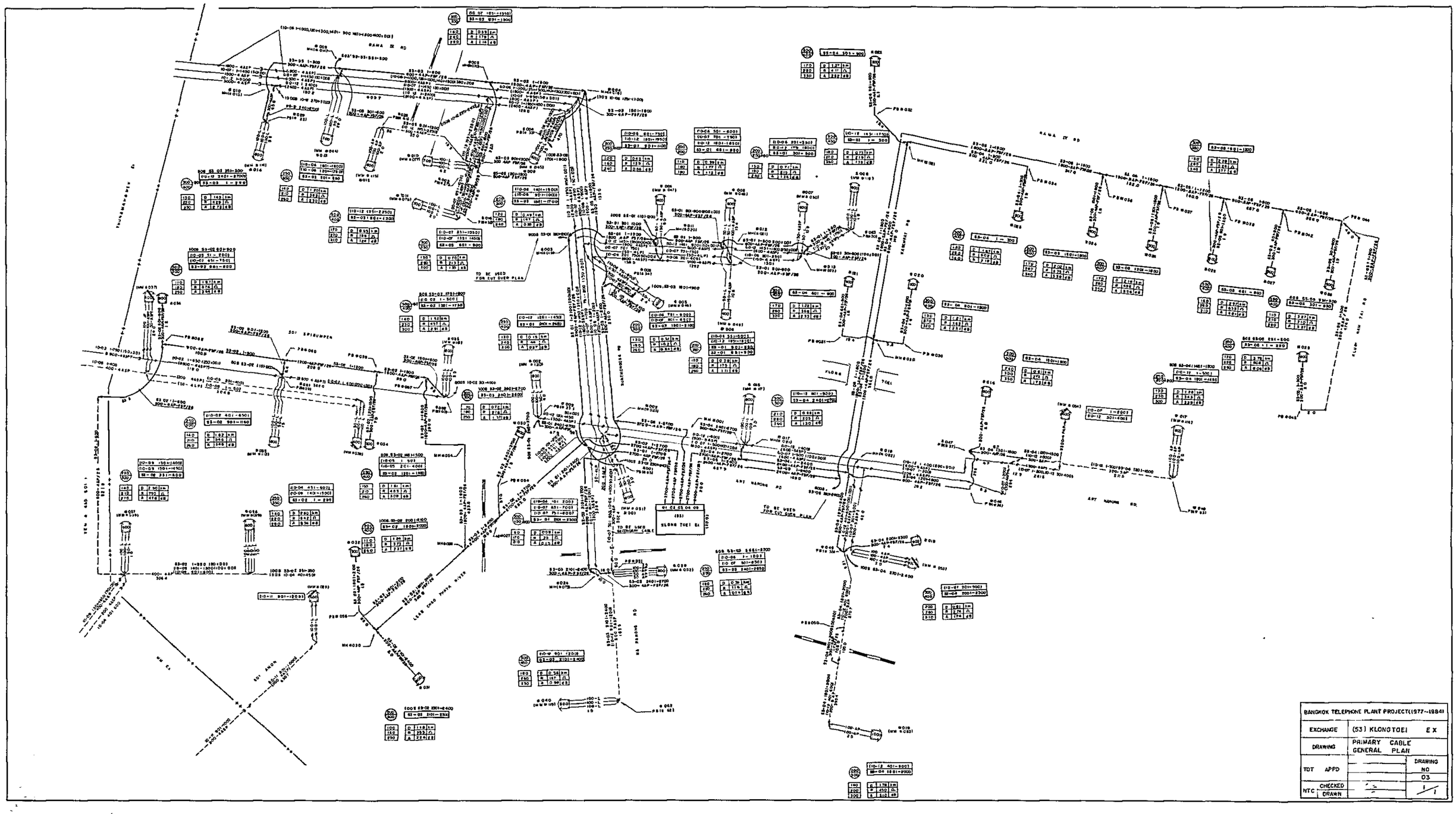
NAME OF MATERIAL	UNIT	QUANTITY	REMARKS
Cable			
1) Fig.(8) Alpeth Sheathed Cable			
10-.4 AP(8)	m	131	
25-.4 AP(8)	"	1,081	
50-.4 AP(8)	"	2,784	
100-.4 AP(8)	"	1,536	
50-.5 AP(8)	"	122	
Sub Total	"	5,654	
2) Alpeth Sheathed Cable			
25-.4 AP	m	129	
50-.4 AP	"	1,555	
100-.4 AP	"	1,757	
200-.4 AP	"	2,428	
300-.4 AP	"	247	
400-.4 AP	"	73	
600-.4 AP	"	94	
50-.5 AP	"	167	
100-.5 AP	"	110	
Sub Total	"	6,560	
Total	m	12,214	
Concrete Pole 8 M	ea	18	
Terminal Block with 10 PRS.	ea	23	In Door(NEN1001)
Strand Terminal 11 PRS.	"	260	Out Door
16 PRS.	"	2	
Total	"	285	
Cross Connecting Cabinet			
Terminal Block 25 PRS.	ea	264	
50 PRS.	"	1	
100 PRS.	"	5	
Total	"	270	

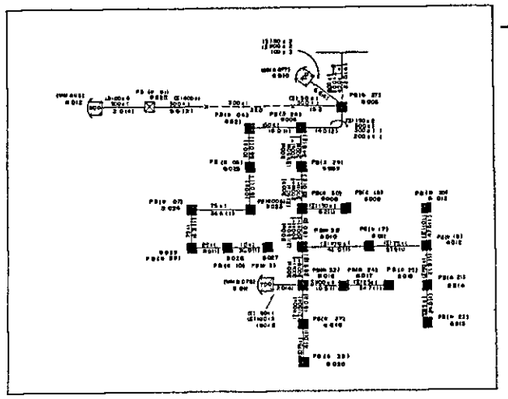


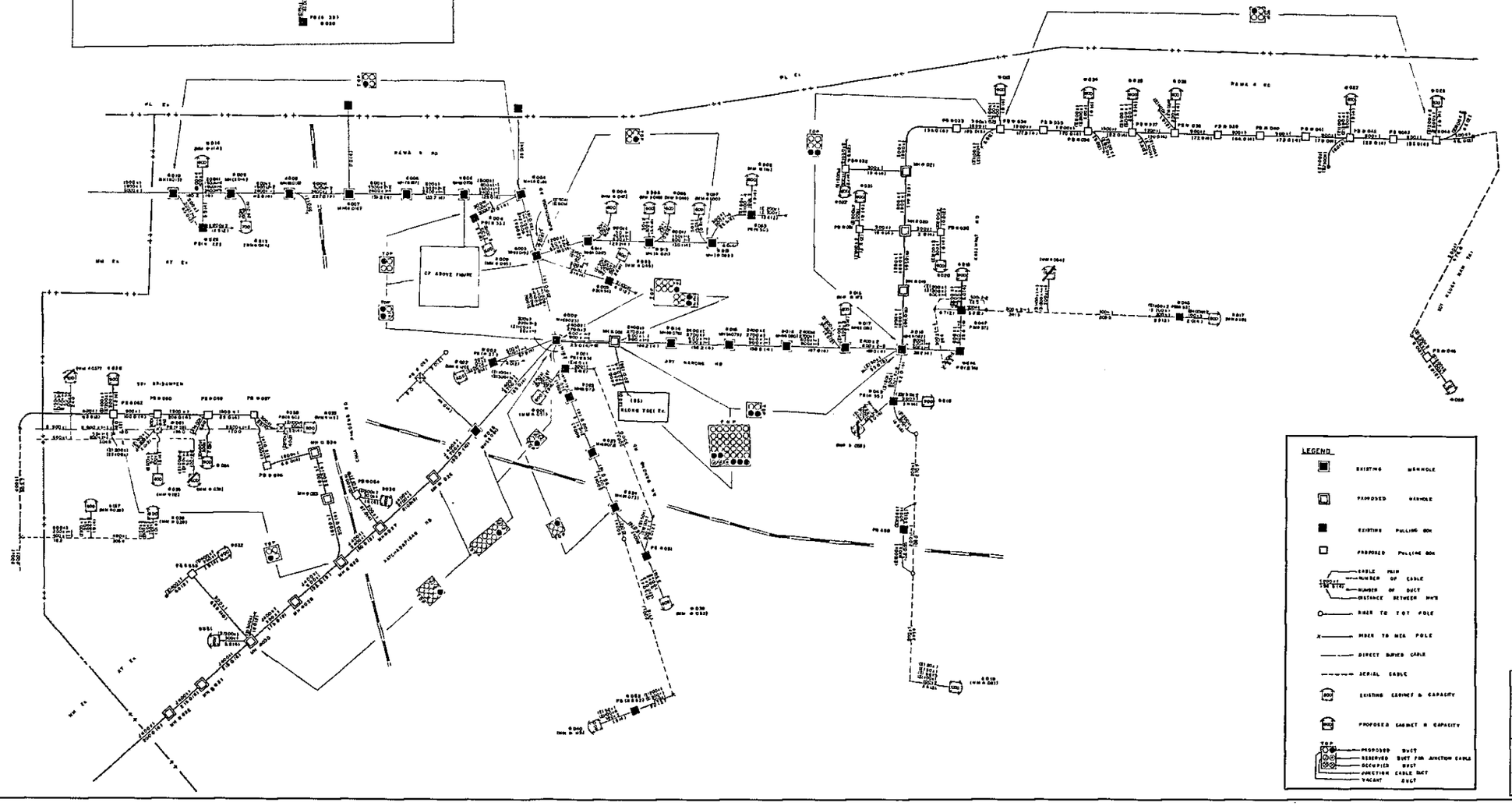
LEGEND

- BOUNDARY OF EXCHANGE
- BOUNDARY OF CABINET
- FEEDER CABLE ROUTE (UNDERGROUND)
- FEEDER CABLE ROUTE (AERIAL)
- EXISTING CABINET
- PROPOSED CABINET
- 210 — NUMBER OF PRESENT DEMAND
- 270 — NUMBER OF 5 YEAR DEMAND
- 370 — NUMBER OF 10 YEAR DEMAND

BANGKOK TELEPHONE PLANT PROJECT(1977~1984)			
EXCHANGE		(53) KLONG TOEY	
DRAWING		KEY PLAN	
TOT	APPD		DRAWING NO
			01
NTC	CHECKED		1/1
	DRAWN		


RAMA IV RD
SOI SRISUMPUN
SOI ARSON
KLONG TOEI EX
TO BE USED FOR CUT OVER PLAN
TO BE USED FOR CUT OVER PLAN
TO BE UNDERGROUND CABLE
FLOOD
TOEI
BANGKOK TELEPHONE PLANT PROJECT(1977-1984)
EXCHANGE (53) KLONG TOEI EX
DRAWING PRIMARY CABLE GENERAL PLAN
TOT APPD
NTC CHECKED
DRAWN
DRAWING NO 03





LEGEND

- EXISTING MANHOLE
- PROPOSED MANHOLE
- EXISTING PULLING BOX
- PROPOSED PULLING BOX
- CABLE PAIR / NUMBER OF CABLE / NUMBER OF DUCT / DISTANCE BETWEEN MH'S
- RISER TO TOT POLE
- RISER TO MEA POLE
- DIRECT BURIED CABLE
- AERIAL CABLE
- EXISTING CABINET & CAPACITY
- PROPOSED CABINET & CAPACITY
- PROPOSED DUCT
- RESERVED DUCT FOR JUNCTION CABLE
- OCCUPIED DUCT
- JUNCTION CABLE DUCT
- VACANT DUCT

BANGKOK TELEPHONE PLANT PROJECT(1977-1984)			
EXCHANGE	(53) KLONG TOEI EX		
DRAWING	DUCT SCHEME PLAN		
TOT	APPD		DRAWING NO 09
NTC	CHECKED		1 / 1
	DRAWN		

CHPATER 2. RACHBURANA TELEPHONE EXCHANGE

CONTENTS

CHAPTER 2. RACHBURANA TELEPHONE EXCHANGE

1.1 Service Area

The Rachburana Telephone Exchange is a new exchange whose service area consists of a newly transferred part of the service areas of the existing Daokanong and Phrapradeng Exchanges.

The new exchange office is located nearly at the center of the new service area and faces Suksawat Road that connects Thonburi and Phrapradeng districts.

Rachburana Exchange Site

The western part of the new service area adjoins the service area of the Ekachai Exchange by Klong Bang Mod River, and the northern part abuts on the Daokanong Exchange area by Thonburi Paktho Road and Klong Bangpra Kaew River, and the northeastern part faces the Chao Phraya River.

The eastern and southern parts of the area border the Phrapradeng Exchange area across Klong Changron River.

The whole service area covers approximately 4,050 hectares and is comparatively large.

2.2 Demand Potential and Locational Features

Business shops, branch bank offices, small business buildings, etc., are being constructed and the roadside town is being formed along Suksawat and Thonburi Paktho Roads.

Warehouses, small factories and residential houses stand in row at roadside along Charoen Nakorn Road.

The back area of this roadside business zone is being developed as new residential area for Metropolitan Bangkok.

The demand forecast is given in Table 4.2.1 and the special demand forecast in Table 4.2.2.

Table 4.2.1 Demand Forecast

	1983	1988	1993
General Demand	5,050	8,090	11,500
Special Demand	60	70	80
Public Telephones and Others	160	250	350
Total	5,270	8,410	11,930
Growth Rate	100%	160%	226%

Table 4.2.2 Special Demand Forecast

Demand Source	1983	1988	1993
Rachburana District Office	13	16	20
Thai Glass Industrial	13	15	20
King Mongkut's Institute of Technology	20	25	30
Siam Steel Pipe	5	7	10
Total	51 (60)	63 (70)	80 (80)

Note: Figure in parentheses consists of the base unit raised to the tenth unit.

CHPATER 2. RACHBURANA TELEPHONE EXCHANGE

CONTENTS

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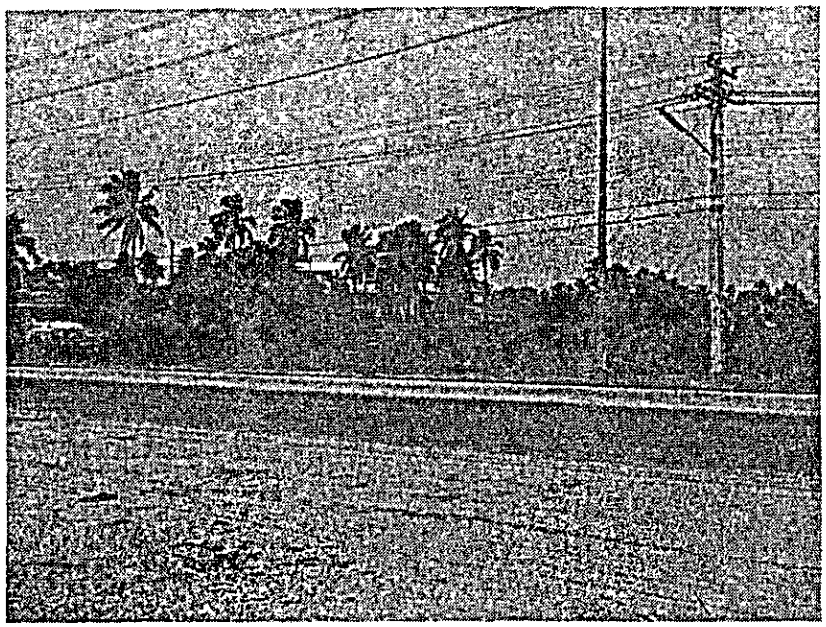

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Note: Figure in parentheses consists of the base unit raised to the tenth unit.

2.3 Primary Cable Network Design

2.3.1 Entrance Cable

The kinds of Rachburana Exchange entrance cables are as follows:

Cable No.	Kind of Cable (A)	Demand in 1988 (B)	Rate (A)/(B)	Remarks
01	1800-.4 AP-FSF	780	231% (154%)	Spare 600 Pairs at MH #003
02	1500-.5 AP-FSF	1,100	136%	
03	2700-.4 AP-FSF	2,060	131%	
04	1800-.5 AP-FSF	990	182% (121%)	Spare 600 Pairs at MH #019
05	2100-.4 AP-FSF	1,660	127%	
06	2400-.4 AP-FSF	1,820	132%	
Total	12,300	8,410	146% (132%)	

Note: Figure in parentheses is the ratio of the number of entrance cable pairs excluding spare pairs to the demand in 1988.

The total number of entrance cable pairs is 12,300 pairs and its rate to the telephone demand in 1983 is 146 percent.

The 1,200 pairs out of those 12,300 pairs are reserved, by 600 pairs each, at MH #002 and MH #019 to cover sporadic variation of telephone demand.

These spare pairs are to be used as the loop circuits for cut-over at the time of the exchange service-in.

2.3.2 Design of MDF

The design of MDF is made in the same way as in other existing and new standard exchanges because the design of the exchange building and the disposition of switching equipments have not yet been determined. That is to say:

(1) MDF is to be the combined distribution type.

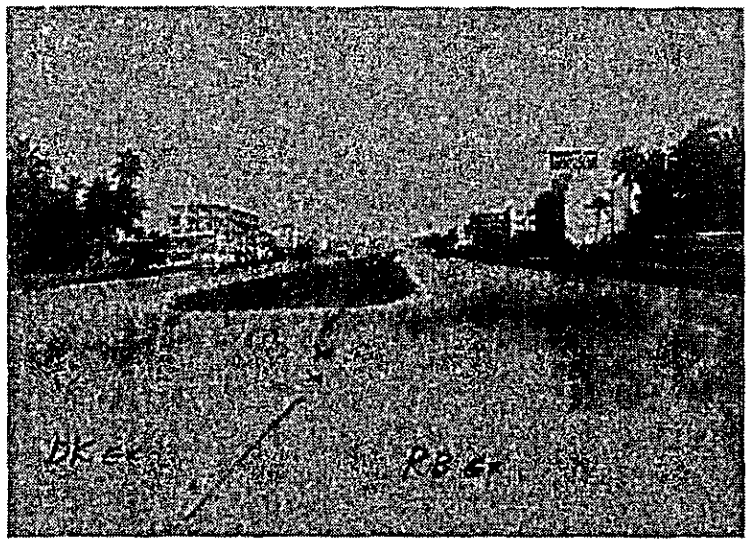
(2) On the line side, the 258R terminal board of 600 pairs per vertical is to be installed.

(3) At MDF, firstly the junction cables and then the local cables are to be terminated.

2.3.3 New Cable Installation in Various Directions

(1) Thonburi Paktho Road and Daokanong Area

This area is fed by three primary cables of (01) 1,800 pairs, (02) 1,500 pairs and (03) 2,700 pairs.
The 600 pairs in (01) Cable are reserved at MH #002 to meet sporadic demand uprise in this area and also to be used as the loop circuits at the time of the exchange cut-over.



Thonburi Paktho Road

(2) Pracha Unit Road and Phrapradeng Area

This area is fed by two primary cables of (04) 1,500 pairs and (05) 2,100 pairs.
The 600 pairs in (04) Cable are reserved at MH #019 to accommodate the unexpected demand change in this area and are also to be used as the loop circuits for cut-over at the time of the exchange service-in.

(3) Charon Nakorn Road and Suksawat Road Area

This area is fed by primary cable of (06) 2,400 pairs and the existing cabinet (DK) #051 is removed.

2.4 Cut-Over Design

The cut-over methods to be used for subscriber transfers from the existing Daokanong (DK), Bang Mod (BM) and Phrapradeng (PD) Exchanges are as follows: (Refer to the Cut-Over Design Drawing)

2.4.1 Cut-Over Method for Subscriber Transfer from DK Exchange

The cut-over work is to be carried out in two ways: loop jumpering and multiple jointing.

(1) Loop Jumpering

Loop jumpering is used as follows for approximately 640 subscribers:

CAB. NO.	NO. OF SUB.	PAIR COUNT OF EXISTING CABLE	PAIR COUNT OF NEW CABLE		JOINTING POINT	REMARKS
			CAB — MDF(RB EX.) — DK EX.			
DK #019	130	18-02:1001-1200	51-06:2101-2400 51-01: 901-1100	51-01:1401-1600	#002 MH(#035)	Relating to CAB #001
DK #018	170	18-02:1201-1400	51-01: 601-800	51-01:1601-1800	#002 MH(#035)	
DK #040	140	18-05:1201-1400	51-06:1201-1500	51-01:1201-1400	#002 MH(#035)	
DK #051	100	18-06: 1-200	51-06: 901-1200	51-04:1401-1600	MH#001	
DK #052	100	18-06: 201-400	51-06:1501-1700 51-06:1801-2000	51-04:1601-1800	MH#001	Relating to CAB #003
Total	640					

(2) Multiple Jointing

Multiple jointing is used as follows for approximately 750 subscribers:

CAB. NO.	PAIR COUNT OF MULTI-JOINT		MULTIPLE JOINTING POINT	REMARKS
	DK EX.	RB EX.		
DK #054	18-06: 601-800	51-03:1501-1700	#011 PB(#053)	
DK #053	18-06: 401-600 18-06: 601-650	51-01: 251-450 51-03:1501-1550	#009 PB(#034) #011 PB(#053)	Relating to CAB. DK #054
DK #041	18-05:1401-1550 18-06: 601-650	51-01: 451-600 51-03:1501-1550	#009 PB(#034) #011 PB(#053)	Relating to CAB. DK #054
DK #039	18-05:1501-1650	51-01: 1-150	#012 PB(#033)	
DK #055	18-06: 801-1000	51-03: 901-1100	#013 PB(#054)	
DK #042	18-01: 1-200	51-06: 601-800	Aerial	To jumper the primary cable and the secondary cable (006-01: 1-200) at Cabinet #006.
DK #033	18-01: 201-400	51-03:1301-1500	#039 PB(#075)	
DK part of #043	043-01: 1-150 043-01: 151-200	51-03:1101-1250 51-03:1251-1300	Aerial	To joint directly new primary cable and existing secondary cable, using temporary cable.

2.4.2 Cut-Over Method for Subscriber Transfer from BM Exchange

Multiple jointing is used as follows for approximately 420 subscribers:

CAB. NO.	PAIR COUNT OF MULTI-JOINT		MULTIPLE JOINTING POINT	REMARKS
	BM EX.	RB EX.		
BM #001	BM-01: 1-200	51-03:601-800	#041 PB(#001)	
BM #002	BM-01:201-400	51-03:301-500	#043 PB(#002)	Relating to CAB. BM #008
	BM-01:401-500	51-02:301-400	#048 PB(#003)	
BM #003	BM-01:401-600	51-02:301-500	#048 PB(#003)	
BM #006	BM-02:251-400	51-02: 1-150	Aerial	(1) Care must be exercised at the time of cut-over because BM(02) cable (301-400) is distributed in both RB and DK (CAB. BM #007) exchange areas and BM(02) cable (251-300) is distributed in both RB and EC (CAB. BM #005) exchange areas. (2) The secondary cable (01:101-112) in BM CAB. #006 is to be transferred to EC exchange area.

2.4.3 Cut-Over Method for Subscriber Transfer from PD Exchange

Multiple jointing is used as follows for approximately 1,000 subscribers:

CAB. NO.	PAIR COUNT OF MULTI-JOINT		MULTIPLE JOINTING POINT	REMARKS
	PD EX.	RB EX.		
PD:13-02 601-800	13-02:601-800	51-06: 1-200	Aerial	
PD:13-02 901-1000	13-02:901-1000	51-06: 201-300	Aerial	
PD:13-01 701-900	13-01:701-900	51-05:1801-2000	Aerial	
PD:13-02 401-450	13-02:401-450	51-05:2001-2050	Aerial	
PD:13-02 1-400	13-02: 1-400	51-05:1001-1400	Aerial	To joint directly new primary cable and existing secondary cable, using temporary cable.
PD #001 13-01:1-400	13-01: 1-400	51-05:1401-1800	#002 PB(#)	

Note: Conductor jointing work is required at the terminal point and the branch cable splicing point where the existing subscribers exist on the farther PD exchange side than the multiple jointing point.

2.5 Design of Underground Conduit

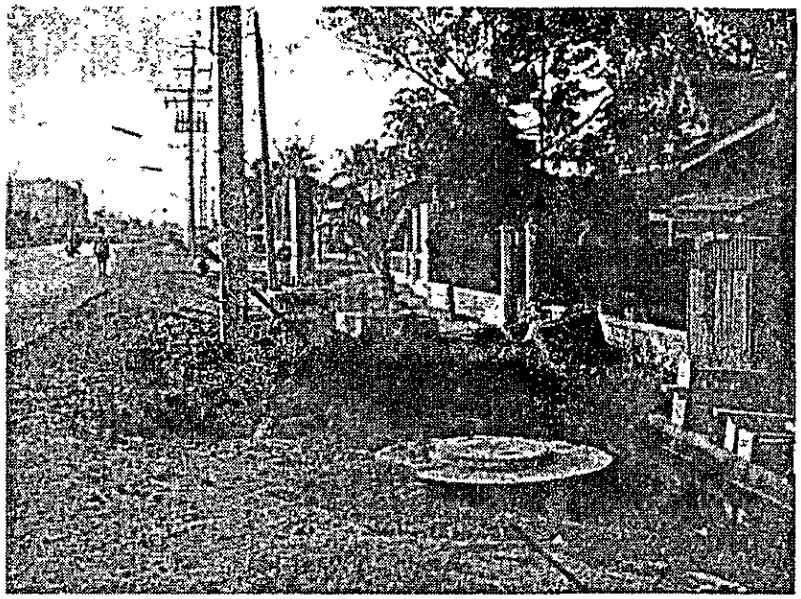
2.5.1 Number of Entrance Conduits

The number of entrance conduits is determined to be 36 ducts (6 lines x 6 rows) according to the civil work design criteria of TOT, as the total demand 10 years later in the Rachburana (RB) Exchange service area amounts to 11,930.

2.5.2 Suksawat Road

(1) New manholes and conduits in the section between MH #002 and DK MH #028 along Suksawat Road are to be constructed farther on the footway side than the existing underground route because the existing manholes and conduits on this road are located on the concrete paved carriageway so that the additional manhole and conduit construction on the same carriageway is impractical.

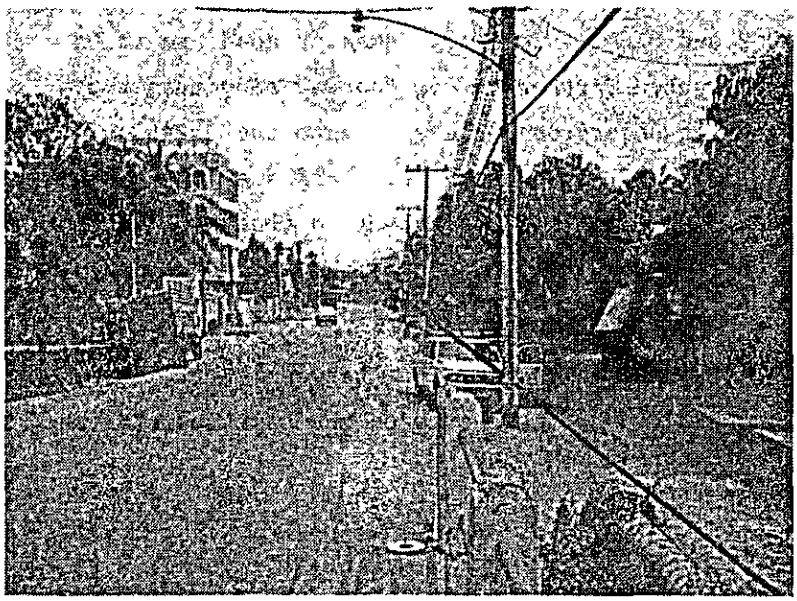
(2) New conduits in the section between MH #002 and MH #023 are to be constructed on the same route as the existing underground route.



Additional Conduit Route along Suksawat Road

2.5.3 Pracha Utit Road

In the proposed conduit sections between MH #034 and MH #035, and between MH #038 and MH #040, the construction work requires utmost care because this route is close to the existing water pipes. For the construction of new MH #035, #038 and #040, in-depth consultation between TOT and Water Severce Administration is required because in this work the movement of the existing water pipes is necessary.



New Conduit Route along Pracha Utit Road

2.5.4 SOI No. 26

Pulling boxes, Type JRC-14, instead of manholes, are to be installed on this route because the road is narrow and the volume of traffic is large.

2.5.5 SOI No. 27

The new conduit route is to be located farther on the carriageway side than the existing drainage route because the

road boundary in the section between MH #049 and #052 is not clear.

2.5.6 Special Construction

The iron sleeve pushing method is to be employed for the new duct construction in the section between MH #023 and MH #027 crossing Suksawat Road.

Light and manageable PVC pipe is to be inserted in the iron sleeve.

2.6 Secondary Cable Network Design

(1) The housing plan is prepared in the Cabinet #016 and #020 areas, so that in this design the desk plan is made based on the housing plan.
The pole erection in this area is designed to be carried out by TOT because MEA's pole construction plan was not yet decided at the survey time.
In the Cabinet #016 area, another housing plan is being prepared by Bang Mod Land Ltd. However, it will be at least 5 years before the construction work begins.
The design for this area is made on the assumption that the area will be divided in two in the future.

(2) The main distribution area of Cabinet #037 is along the road connecting Thonburi Paktho and Pracha Utit Roads. This area is being developed toward east from Thonburi Paktho Road. The area is 8 km distant from the new exchange.
The subscriber's loading system is employed in this area, based on the study of demand trend and of engineering economy.

2.7 Amount of Construction Work

AMOUNT OF CONSTRUCTION WORK

SECTION	DESIGNATION	UNIT	QUANTITY			REMARKS
			PRIMARY	SECONDARY	TOTAL	
A	A - 8	ea	11	136	147	
B	B1BS	ea	9	202	211	
	B1CS	"	7	6	13	
	B1ES	"		12	12	
	B1FS	"	5	1	6	
	Section "B" Total	"	21	230	251	
C	C5A2B	ea	21	221	242	
E	E 25 . 4 A2	100m		20.6	20.6	
	E 50 . 4 A2	"		40.1	40.1	
	E 100 . 4 A2	"	2.8	28.5	31.3	
	E 200 . 4 A2	"	9.1	35.9	45.0	
	E 300 . 4 A2	"	17.0	9.2	26.2	
	E 400 . 4 A2	"	5.2	0.7	5.9	
	E 600 . 4 A2	"	3.9		3.9	
	E 25 . 5 A2	"		1.6	1.6	
	E 50 . 5 A2	"		3.2	3.2	
	E 100 . 5 A2	"		3.5	3.5	
	E 200 . 5 A2	"		16.8	16.8	
	E 300 . 5 A2	"	3.5	8.5	12.0	
	E 400 . 5 A2	"	8.8	3.6	12.4	
	E 25 . 65 A2	"		1.3	1.3	
	E 50 . 65 A2	"		7.4	7.4	
	E 100 . 65 A2	"		3.7	3.7	
	E 200 . 65 A2	"		31.1	31.1	
	E 300 . 65 A2	"	9.0	0.7	9.7	
	E 10 . 4 A2(8)	"		13.1	13.1	

SECTION	DESIGNATION	UNIT	QUANTITY			REMARKS
			PRIMARY	SECONDARY	TOTAL	
E	E 25 . 4 A2(8)	100m		65.9	65.9	
	E 50 . 4 A2(8)	"		81.5	81.5	
	E 100 . 4 A2(8)	"		52.6	52.6	
	E 25 . 5 A2(8)	"		30.2	30.2	
	E 50 . 5 A2(8)	"		31.5	31.5	
	E 100 . 5 A2(8)	"		21.3	21.3	
	E 10 . 65 A2(8)	"		0.5	0.5	
	E 25 . 65 A2(8)	"		14.2	14.2	
	E 50 . 65 A2(8)	"		3.0	3.0	
	E 100 . 65 A2(8)	"		3.4	3.4	
	Section "E" Total	"	59.3	533.6	592.9	
G	G 300 . 4 A6	100m	7.3		7.3	AP-FSF Cable
	G 400 . 4 A6	"	0.6		0.6	"
	G 600 . 4 A6	"	10.4		10.4	"
	G 900 . 4 A6	"	21.0		21.0	"
	G1200 . 4 A6	"	6.7		6.7	"
	G1500 . 4 A6	"	12.8		12.8	"
	G1800 . 4 A6	"	1.6		1.6	"
	G2100 . 4 A6	"	12.7		12.7	"
	G2400 . 4 A6	"	4.2		4.2	"
	G2700 . 4 A6	"	4.7		4.7	"
	G 300 . 5 A6	"	7.4		7.4	"
	G 400 . 5 A6	"	0.7		0.7	"
	G 600 . 5 A6	"	14.0		14.0	"
	G1500 . 5 A6	"	22.6		22.6	"
	G1800 . 5 A6	"	7.1		7.1	"
	G 300 . 65 A6	"	0.2		0.2	"
	G 600 . 65 A6	"	2.8		2.8	"
	G 900 . 65 A6	"	10.7		10.7	"
	G1200 . 65 A6	"	31.9		31.9	"
	Section "G" Total	"	179.4		179.4	

SECTION	DESIGNATION	UNIT	QUANTITY			REMARKS
			PRIMARY	SECONDARY	TOTAL	
J	J 300 . 5 03	10m	26.6		26.6	PVC Cable
K	KA11G2	ea	2	467	469	With Stub
	KA16G2	"		5	5	"
	KB 12	"		262	262	Without Stub
	K 30	"		2	2	Internal Terminal Box
	Section "K" Total	"	2	736	738	
L	L 900	ea	23		23	
	L 25 A	"	276	374	650	Without Stub
	L 50 B2	"	7	3	10	With Stub
	L 100 B2	"	1	14	15	"
	Section "L" Total	"	307	391	698	
M	M1AP	ea	7	250	257	L:Lead x Lead
	M1BP	"	33	74	107	Lead x Plastic
	M3AP	"	3	8	11	
	M3BP	"	61	2	63	P:Plastic x Plastic
	M3CP	"	79		79	
	Section "M" Total	"	183	334	517	
N	N 1	100 pairs	1,285	491	1,776	Normal
	N 2	"	37		37	Bridged for Transfer
	Section "N" Total	"	1,322	491	1,813	
S	S 75	ea	3		3	66 mH
	S 100	"		2	2	"
	Section "S" Total	"	3	2	5	"

SECTION	DESIGNATION	UNIT	QUANTITY			REMARKS
			PRIMARY	SECONDARY	TOTAL	
P	P 36 B	100m	0.3		0.3	
	P 12 B	"	1.2		1.2	
	P 9 B	"	11.1		11.1	
	P 6 B	"	43.7		43.7	
	P 4 B	"	16.7		16.7	
	P 4 A	"	2.3		2.3	
	P 2 A	"	3.3		3.3	
	Section "P" Total	"	78.6		78.6	
Q	Q T-6(b)	ea	1		1	
	Q L-5	"	1		1	
	Q L-3	"	1		1	
	Q T-3	"	1		1	
	Q A-2	"	11		11	
	Q A-1	"	17		17	
	Q JRC-14	"	2		2	
	Q JUF-11	"	18		18	
	Section "Q" Total	"	52		52	

1.8 Amount of Main Materials

MAIN MATERIALS LIST

(1) Primary Cable Work

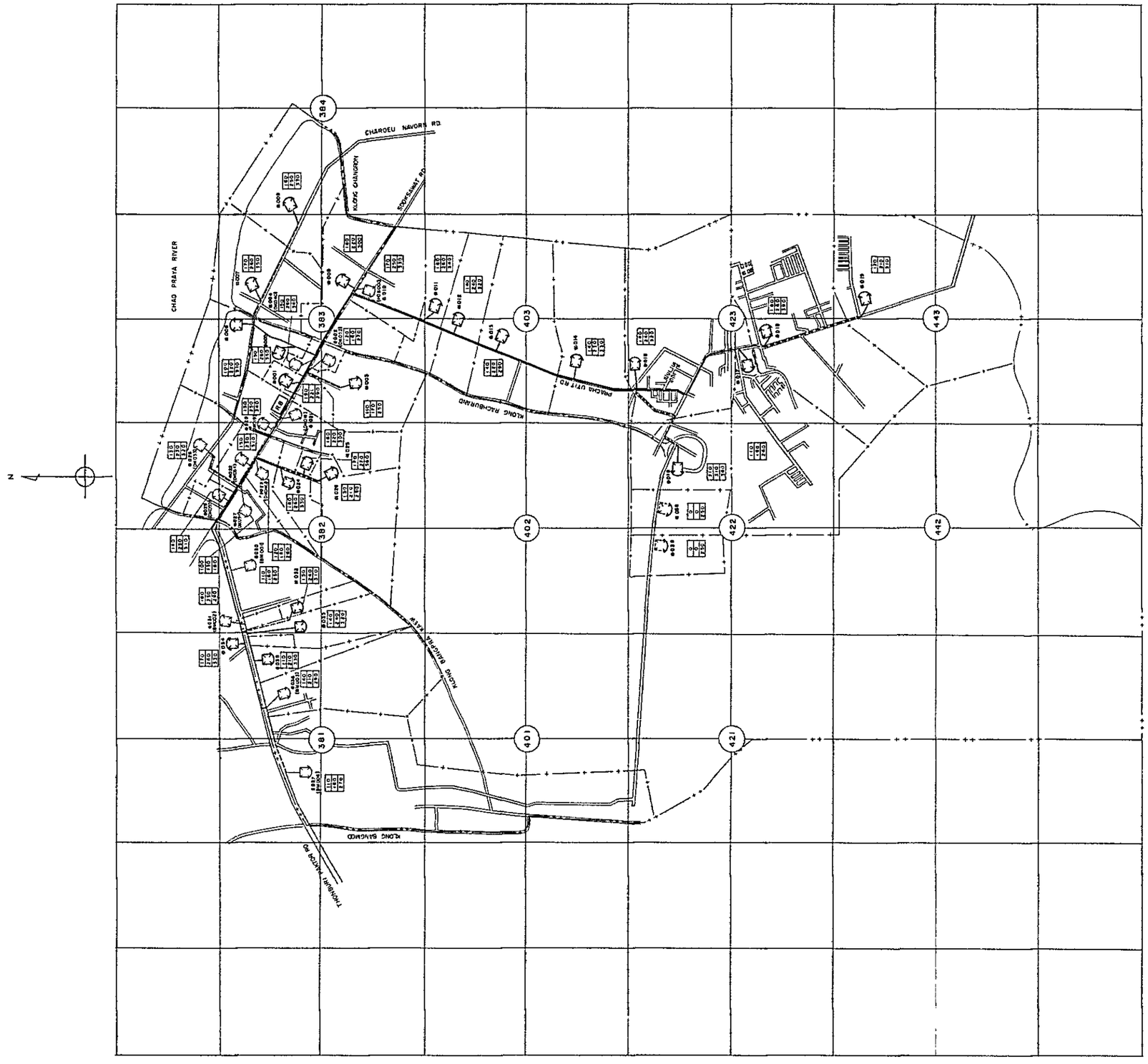
NAME OF MATERIAL	UNIT	QUANTITY	REMARKS
Cable			
1) AP-FSF Cable			
100-.4	m	20	
200-.4	"	5	
300-.4	"	1,008	
400-.4	"	99	
600-.4	"	1,102	
900-.4	"	2,158	
1200-.4	"	688	
1500-.4	"	1,308	
1800-.4	"	170	
2100-.4	"	1,298	
2400-.4	"	436	
2700-.4	"	481	
300-.5	"	793	
400-.5	"	90	
600-.5	"	1,426	
1500-.5	"	2,301	
1800-.5	"	728	
300-.65	"	44	
600-.65	"	285	
900-.65	"	1,088	
1200-.65	"	3,237	
Sub Total	"	18,765	
2) Alpeth Sheathed Cable			
50-.4	m	20	
100-.4	"	320	
200-.4	"	955	
300-.4	"	1,780	
400-.4	"	560	
600-.4	"	410	

NAME OF MATERIAL	UNIT	QUANTITY	REMARKS
300-.5	m	360	
400-.5	"	890	
300-.65	"	910	
Sub Total	"	6,205	
Total	m	24,970	
Manhole Loading Coil 75 PRS.	ea	2	66 mH
Pole Mounting Loading 75 PRS.	ea	1	66 mH
Cross Connecting Cabinet 900 PRS.	ea	23	
Cross Connecting Cabinet			
Terminal Block 25 PRS.	ea	276	
50 PRS.	"	7	
100 PRS.	"	1	
Total	"	284	
Concrete Pole 8 M	ea	11	
Strand Terminal 11 PRS.	ea	2	

(2) Secondary Cable Work

NAME OF MATERIAL	UNIT	QUANTITY	REMARKS
Cable			
1) Fig.(8) Alpeth Sheathed Cable			
10-.4 AP(8)	m	1,350	
25-.4 AP(8)	"	6,727	
50-.4 AP(8)	"	8,322	
100-.4 AP(8)	"	5,374	
25-.5 AP(8)	"	3,086	
50-.5 AP(8)	"	3,212	
100-.5 AP(8)	"	2,178	
10-.65 AP(8)	"	47	
25-.65 AP(8)	"	1,444	
50-.65 AP(8)	"	302	
100-.65 AP(8)	"	349	
Sub Total	"	32,391	
2) Alpeth Sheathed Cable			
25-.4 AP	m	2,108	
50-.4 AP	"	4,107	
100-.4 AP	"	2,911	
200-.4 AP	"	3,687	
300-.4 AP	"	943	
400-.4 AP	"	73	
25-.5 AP	"	165	
50-.5 AP	"	327	
100-.5 AP	"	352	
200-.5 AP	"	1,720	
300-.5 AP	"	867	
400-.5 AP	"	367	
25-.65 AP	"	133	
50-.65 AP	"	759	
100-.65 AP	"	381	

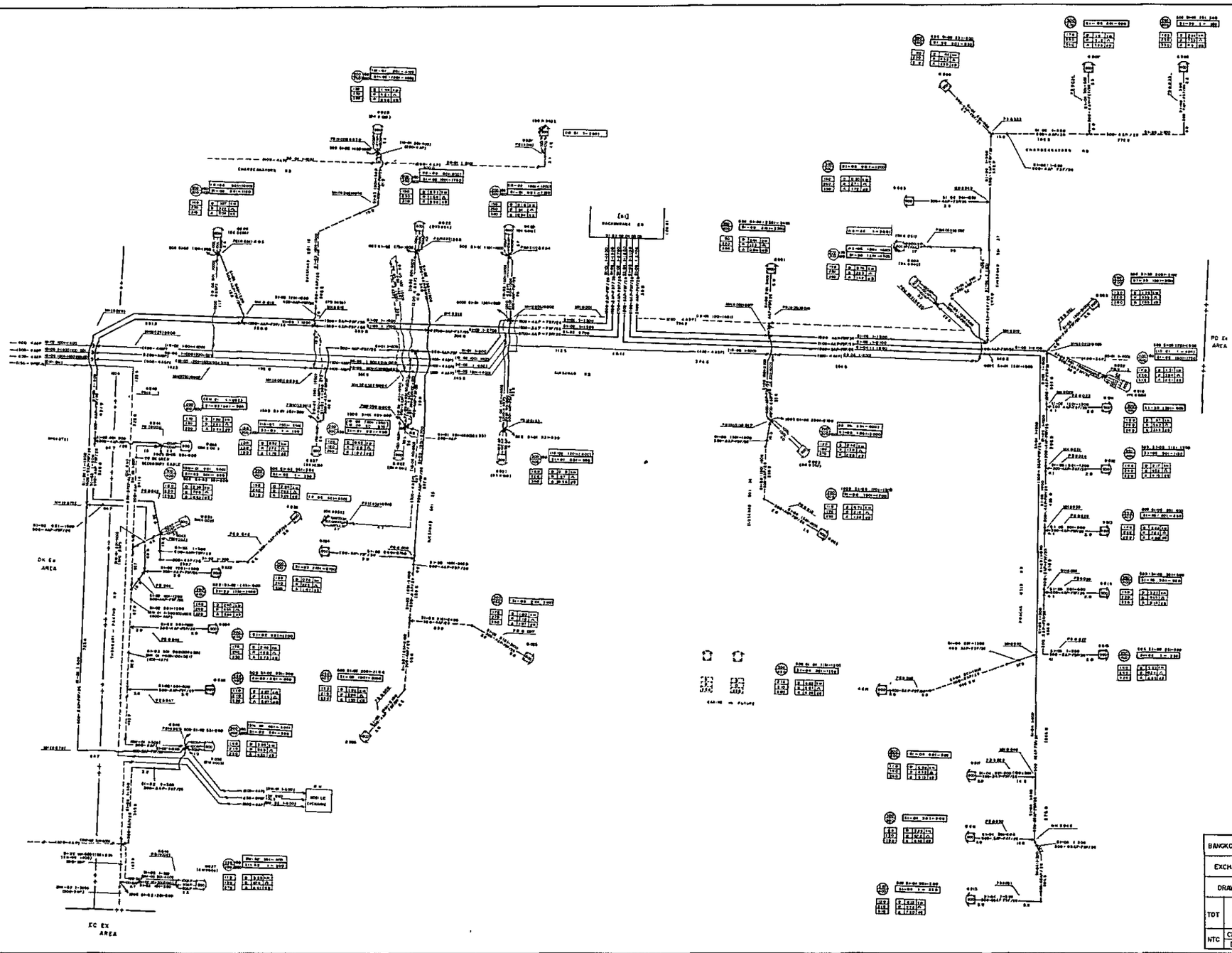
NAME OF MATERIAL	UNIT	QUANTITY	REMARKS
200-.65 AP	m	3,167	
300-.65 AP	"	67	
Sub Total	"	22,134	
Total	m	54,525	
Pole Mounting Loading Coil 100 PRS.	ea	2	66 mH
Concrete Pole 8 M	ea	136	
Ready Access Terminal			
Type 100 MB	ea	217	
100 MBY	"	21	
200 MB	"	15	
200 MBY	"	9	
Total	"	262	
Terminal Block with 10 PRS.	ea	7	In Door(NEN1001)
Strand Terminal 11 PRS.	"	467	Out Door
16 PRS.	"	5	
Total	"	479	
Cross Connecting Cabinet			
Terminal Block 25 PRS.	ea	374	
50 PRS.	"	3	
100 PRS.	"	14	
Total	"	391	



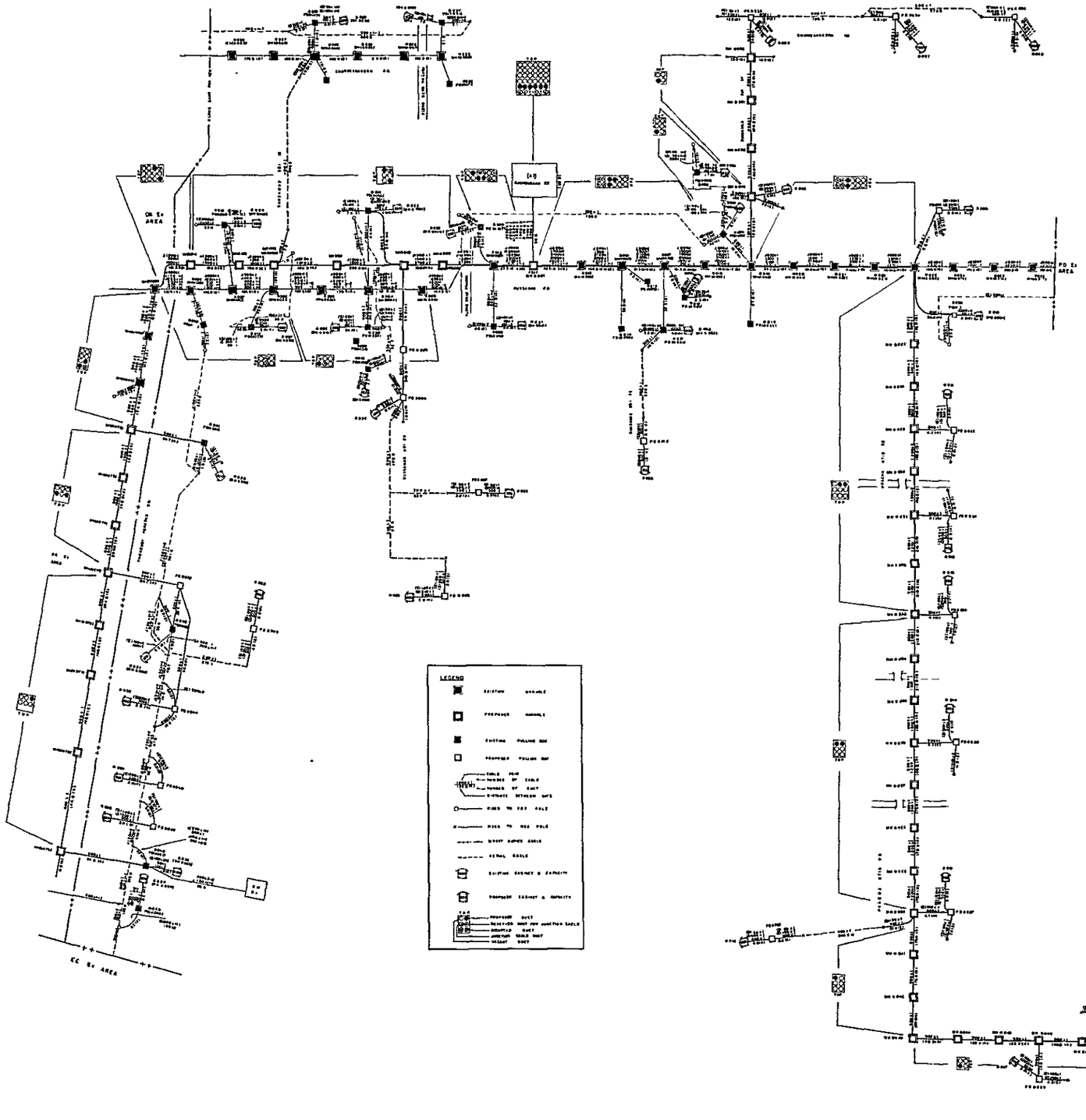
LEGEND

- BOUNDARY OF EXCHANGE
- BOUNDARY OF CABINET
- FEEDER CABLE ROUTE (UNDERGROUND)
- FEEDER CABLE ROUTE (AERIAL)
- EXISTING CABINET
- PROPOSED CABINET
- 210 / 170 / 130 — NUMBER OF PRESENT DEMAND / NUMBER OF 5YEAR DEMAND / NUMBER OF 10YEAR DEMAND

BANGKOK TELEPHONE PLANT PROJECT(1977~1984)			
EXCHANGE		(51) RACHBURANA EX.	
DRAWING		KEY PLAN	
TOT	APPD		DRAWING NO. 01
NTC	CHECKED		1/1
	DRAWN		



BANGKOK TELEPHONE PLANT PROJECT (1977–1984)			
EXCHANGE		(51) RACHBURANA EX	
DRAWING		PRIMARY CABLE GENERAL PLAN	
TOT	APPD		DRAWING NO
			03
NTC	CHECKED		1 / 1
	DRAWN		



BANGKOK TELEPHONE PLANT PROJECT(1977-1984)			
EXCHANGE	(61) RACHBURANA EX		
DRAWING	DUCT SCHEME PLAN		
TOT	APPD		DRAWING NO. 09
NTC	CHECKED		
	DRAWN		

CHAPTER 3. EKACHAI TELEPHONE EXCHANGE

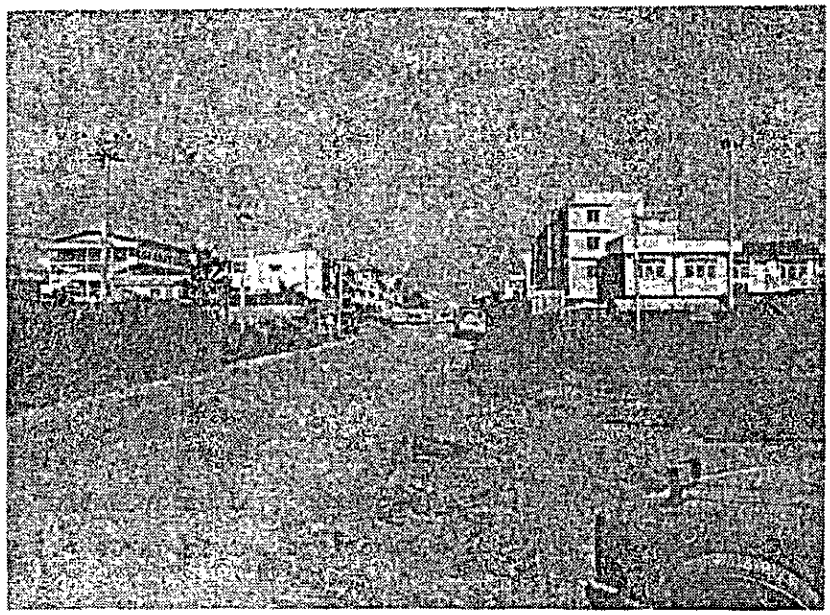
CONTENTS

CHAPTER 3. EKACHAI TELEPHONE EXCHANGE

3.1 Service Area

The Ekachai Telephone Exchange is a new exchange whose service area consists of a newly transferred part of the service areas of the existing Daokanong Exchange, Bang Mod Satellite Exchange and Prasricharoen Exchange.

The new exchange office faces Ekachai Road.



Ekachai Exchange Site

The northern part of the new service area adjoins the service area of Prasricharoen Exchange by Klong Bangkolad River.

The eastern part boarders the areas of Bangkae, Daokanong and Bang Mod Exchanges by Klong Bangwa, Klong Dran and Klong Bang Mod Rivers.

This exchange is located on the extreme outer perimeter in the southwestern part of Metropolitan Bangkok.

The western and southern parts of this service area are occupied by the undeveloped, no-demand area so that the boundaries are not clear.

The whole service area covers approximately 9,100 hectares and is extremely large.

3.2 Demand Potential and Locational Features

Lots of residential houses and business shops are being constructed along Ekachai Road and Thonburi Paktho Highway.

Rapid development is expected as a new residential zone of Metropolitan Bangkok.

The main housing plans are as follows:

(1) Thonburi National Housing Project
Projected number of houses 5,159

(2) Sutchit Arcade
Projected number of houses 1,016

(3) Sutchit Nivet Village
Projected number of houses 963

(4) Amnuay Pon Shopping Center
Projected number of houses 354

The demand forecast by major categories is given in Table 4.3.1 and the breakdown of special demand forecast in Table 4.3.2.

Table 4.3.1 Demand Forecast

	1983	1988	1993
General Demand	4,960	8,330	12,370
Special Demand	70	90	140
Demand for Public Telephones and Others	160	260	380
Total	5,190	8,680	12,890
Growth Rate	100%	167%	248%

Table 4.3.2 Special Demand Forecast

Demand Source	1983	1988	1993
Court of Justice	27	45	90
District Office of Bangkhunthian Area	35	40	50
Total	62 (70)	85 (90)	140 (140)

Note: Figure in parentheses consists of the base unit raised to the tenth unit.

3.3 Primary Cable Network Design

3.3.1 Entrance Cable

The kinds of Ekachai Exchange entrance cables are as follows:

Cable No.	Kind of Cable (A)	Demand in 1988 (B)	Rate (A)/(B)	Remarks
01	2700-.4 AP-FSF	1,990	136%	
02	2700-.4 AP-FSF	2,170	124%	
03	1500-.5 AP-FSF	1,130	133%	
04	2700-.4 AP-FSF	1,730	156%	
05	1200-.65 AP-FSF	690	174%	
06	1500-.5 AP-FSF	950	158%	
Total	12,300	8,660	142%	

The total number of entrance cable pairs is 12,300 pairs and the rate of this number of entrance cable pairs to telephone demand in 1983 is 142 percent.

3.3.2 Design of MDF

The design of MDF is made in the same way as in other existing and new standard exchanges because the design of the exchange building and the disposition of switching equipments have not yet been determined. That is to say:

(1) MDF is to be the combined distribution type.

(2) On the line side, the 258R terminal board of 600 pairs per vertical is to be installed.

(3) At MDF, the junction cables are to be terminated firstly from the far end, and then the local cables are to be terminated.

3.3.3 New Cable Installation in Various Directions

(1) Ekachai Road and Sukapibran Road Area

This area is fed by three primary cables of 6,900 pairs, that is, (01) 2,700 pairs, (02) 2,700 pairs and (03) 1,500 pairs cables.
The existing cabinets of DK #028, DK #029, DK #030 and DK #061 are to be removed because their locations are not suitable in the Ekachai Road expansion plan.

New Conduit Route along Ekachai Road

(2) Thonburi Paktho Road Area

This area is fed by three primary cables of 5,400 pairs, that is, (04) 2,700 pairs, (05) 1,200 pairs and (06) 1,500 pairs cables.
Rapid development in the form of reclamation of housing lands and business shop sites and construction of new roads is expected in the area along Thonburi Paktho Road.
The subscriber's loading system is adopted for the subscriber's lines in Cabinets #040 and #041 relating to (06) 1,500 pairs cable.

3.4 Cut-Over Design

The cut-over methods to be used for transferring the existing subscribers from Prasricharoen (PC), Bang Mod (BM) and Daokanong (DK) Exchanges are as follows: (Refer to the Cut-Over Design Drawing)

3.4.1 Cut-Over Method for Subscriber Transfer from PC Exchange

Multiple jointing is used as follows for approximately 400 subscribers:

CAB. NO.	PAIR COUNT OF MULTI-JOINT		MULTIPLE JOINTING POINT	REMARKS
	PC EX.	EC EX.		
PC #014	35-02: 1-200	52-02:2101-2300	#009 PB(#044)	
PC #015	35-02: 201-400	52-01: 1-200	#006 PB(#043)	
PC #016	35-02: 401-600	52-01:1301-1500	#078 MH(#045)	
PC #017	35-02: 601-850 35-02:1101-1200	52-01: 851-1100 52-01:1101-1200	#044 PB(#037)	

3.4.2 Cut-Over Method for Subscriber Transfer from BM Exchange

Multiple jointing is used for transfer of approximately 140 subscribers.

CAB. NO.	PAIR COUNT OF MULTI-JOINT		MULTIPLE JOINTING POINT	REMARKS
	BM EX.	EC EX.		
BM #004	BM-02: 1-150 BM-02:151-200	52-04:901-1050 52-05:601-650	#031 PB(#004)	Relating to CAB. #005
BM #005	BM-02:151-250 BM-02:251-300	52-05:601-700 52-05:701-750	#036 PB(#005)	To exercise care at the time of cut-over because the existing BM #005 Cabinet distribution area covers both EC and RB exchange areas.
BM #006-01:101-112	Secondary: 006-01:101-112	52-05: 1-5	Terminal (#0137)	To use idle circuits in existing 300-.5 AP cable.

3.4.3 Cut-Over Method for Subscriber Transfer from DK Exchange

Multiple jointing is used for transfer of approximately 660 subscribers.

CAB. NO.	PAIR COUNT OF MULTI-JOINT		MULTIPLE JOINTING POINT	REMARKS
	DK EX.	EC EX.		
DK #030	18-05: 1-200	52-02:1501-1700	Aerial	To be jumpered between the primary cable and the secondary cable. To use temporary aerial 200-.4 AP cable.
DK #029	18-05:201-400	52-03: 901-1100	Aerial	To be jumpered between the primary cable and the secondary cable. To use temporary aerial 200-.4 AP cable.
DK #061	18-07:201-400	52-02: 601-800	Aerial	To be jumpered between the primary cable and the secondary cable (018-01:101-300) at Cabinet #018.
DK #028	18-05:401-600	52-03: 301-500	Aerial	To be jumpered between the primary cable and the secondary cable (021-01:1-200) at Cabinet #021.
DK #060	18-07: 1-200	52-03: 601-800	#016 PB(#059)	
DK #023-02:1-200	Secondary 023-02: 1-200	52-03: 1-200	Aerial	To be jumpered between the primary cable and the secondary cable (022-01:1-200) at Cabinet #022.
DK #026-02:1-100	Secondary 026-02: 1-100	52-03: 201-300	Aerial	To be jumpered between the primary cable and the secondary cable (022-01:201-300) at Cabinet #022.

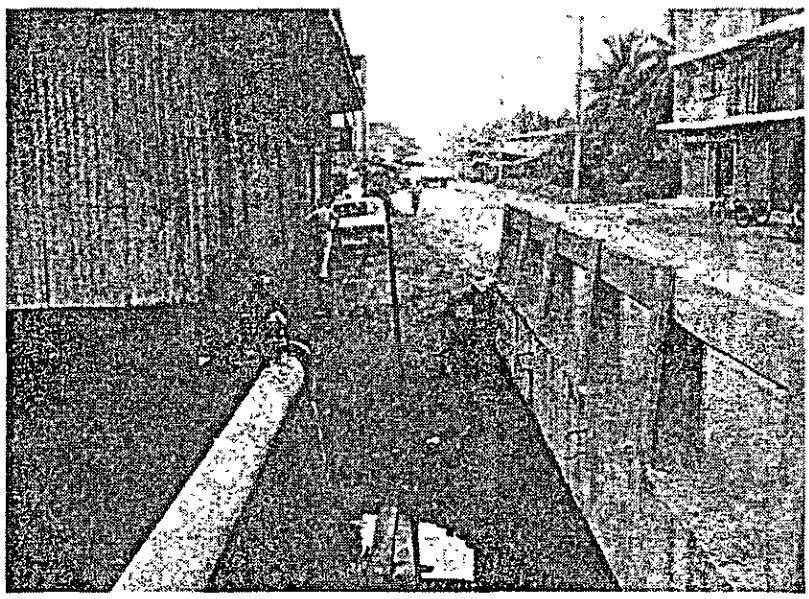
3.5 Design of Underground Conduit

3.5.1 Number of Entrance Conduits

The number of entrance conduits is determined to be 36 ducts (6 lines x 6 rows) according to the civil work design criteria of TOT, as the total demand 10 years later in the Ekachai (EC) Exchange area amounts to 12,890.

3.5.2 Ekachai Road Area

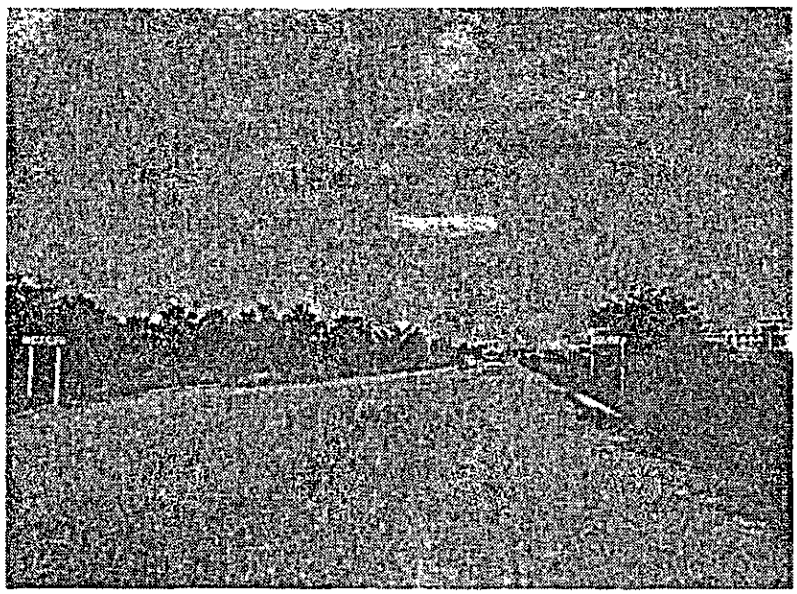
The Ekachai Road width expansion is expected. Although the locations of conduits and manholes on the road have been selected by negotiations with the road authorities, the re-confirmation of the locations is necessary before the construction work. The locations of new manholes between MH #025 and MH #027 are to be shifted 50 cm to the road center from the standard locations.



New Conduit Route along Ekachai Road

3.5.3 Thonburi Paktho Road Area

The manholes #045, #063 and #069 to be installed along Thonburi Paktho Road are to be equipped with capped ducts in consideration of duct installation in the future.



New Conduit Route along Thonburi Paktho Road

3.5.4 Special Construction

The iron sleeve pushing method is employed in the new duct installation in the following sections:

MH #028 - MH #029	Crossing the railway
MH #034 - MH #035	Crossing the railway
MH #041 - MH #042	Crossing Thonburi Paktho Road

For main ducts to be inserted in the iron sleeve, light and manageable PVC pipes are used.

3.6 Secondary Cable Network Design

(1) Residential housing and shopping center construction on governmental and/or private basis is planned in Cabinets #009, #011, #013, #024, #026, #027, #028, #029, #031, #033, #035, #036, #037 and #038 areas.
The design for these areas is the desk plan based on the housing plan drawings and MEA pole erection drawings, where obtainable.

(2) For the area along Ekachai Road with its width scheduled to be expanded and for the housing plan area, where the MEA pole erection plan could not be ascertained at the time of design, the pole erection is designed to be carried out by TOT.

(3) Out of Cabinet #012 area, the southern part from the railway is temporarily distributed by Cabinet #012. However, when the road to this area from Cabinet #031 is constructed in the future, this area is to be transferred to Cabinet #031.

(4) The long distance aerial cable route along Thonburi Paktho Road is reinforced with bothside guys and longitudinal guys.

(5) The subscriber's loading system is employed to cater for demand in Cabinets #040 and #041 areas.

3.7 Amount of Construction Work

AMOUNT OF CONSTRUCTION WORK

SECTION	DESIGNATION	UNIT	QUANTITY			REMARKS
			PRIMARY	SECONDARY	TOTAL	
A	A - 8	ea	41	728	769	
	A -10	"		50	50	
	Section "A" Total	"	41	778	819	
B	B1BS	ea	11	681	692	
	B1CS	"	12	10	22	
	B1ES	"		7	7	
	B1FS	"		26	26	
	B2B	"		27	27	
	Section "B" Total	"	23	751	774	
C	C5A2B	ea	23	724	747	
E	E 25 . 4 A2	100m		8.8	8.8	
	E 50 . 4 A2	"		5.1	5.1	
	E 100 . 4 A2	"		9.4	9.4	
	E 200 . 4 A2	"	0.8	27.4	28.2	
	E 300 . 4 A2	"	11.3	7.8	19.1	
	E 400 . 4 A2	"	0.1	6.4	6.5	
	E 600 . 4 A2	"	3.3		3.3	
	E 25 . 5 A2	"		3.5	3.5	
	E 50 . 5 A2	"		3.6	3.6	
	E 100 . 5 A2	"		8.9	8.9	
	E 200 . 5 A2	"		27.8	27.8	
	E 300 . 5 A2	"	10.3	29.6	39.9	
	E 400 . 5 A2	"		17.1	17.1	
	E 25 . 65 A2	"		4.1	4.1	
	E 50 . 65 A2	"		22.6	22.6	
	E 100 . 65 A2	"		4.8	4.8	
	E 200 . 65 A2	"	0.8	108.6	109.4	

SECTION	DESIGNATION	UNIT	QUANTITY			REMARKS
			PRIMARY	SECONDARY	TOTAL	
E	E 300 . 65 A2	100m	32.4	5.4	37.8	
	E 400 . 65 A2	"		7.6	7.6	
	E 10 . 4 A2(8)	"		8.9	8.9	
	E 25 . 4 A2(8)	"		42.9	42.9	
	E 50 . 4 A2(8)	"		79.9	79.9	
	E 100 . 4 A2(8)	"		32.3	32.3	
	E 10 . 5 A2(8)	"		1.3	1.3	
	E 25 . 5 A2(8)	"		108.5	108.5	
	E 50 . 5 A2(8)	"		84.5	84.5	
	E 100 . 5 A2(8)	"		50.8	50.8	
	E 10 . 65 A2(8)	"		5.5	5.5	
	E 25 . 65 A2(8)	"		104.2	104.2	
	E 50 . 65 A2(8)	"		117.4	117.4	
	E 100 . 65 A2(8)	"		88.1	88.1	
	Section "E" Total	"	59.0	1,032.8	1,091.8	
G	G 300 . 4 A6	100m	4.6		4.6	AP-FSF Cable
	G 400 . 4 A6	"	0.3		0.3	"
	G 600 . 4 A6	"	9.6		9.6	"
	G 900 . 4 A6	"	3.6		3.6	"
	G1800 . 4 A6	"	14.2		14.2	"
	G2100 . 4 A6	"	4.5		4.5	"
	G2400 . 4 A6	"	3.9		3.9	"
	G2700 . 4 A6	"	38.7		38.7	"
	G 300 . 5 A6	"	9.6		9.6	"
	G 600 . 5 A6	"	22.7		22.7	"
	G 900 . 5 A6	"	4.3		4.3	"
	G1200 . 5 A6	"	6.0		6.0	"
	G1500 . 5 A6	"	44.6		44.6	"
	G 300 . 65 A6	"	3.7		3.7	"
	G 600 . 65 A6	"	31.9		31.9	"

SECTION	DESIGNATION	UNIT	QUANTITY			REMARKS
			PRIMARY	SECONDARY	TOTAL	
G	G 900 . 65 A6	100m	15.8		15.8	AP-FSF Cable
	G1200 . 65 A6	"	72.1		72.1	"
	Section "G" Total	"	290.1		290.1	
J	J 300 . 5 03	10m	26.2		26.2	PVC Cable
K	KA11G2	ea		477	477	With Stub
	KA16G2	"		1	1	"
	KB 12	"	1	541	542	Without Stub
	K 30	"		1	1	Internal Terminal Box
	Section "K" Total	"	1	1,020	1,021	
L	L 900	ea	35		35	
	L 25 A	"	420	540	960	Without Stub
	L 50 B2	"	2	1	3	With Stub
	L 100 B2	"	3	10	13	"
	Section "L" Total	"	460	551	1,011	
M	M1AP	ea		195	195	L:Lead x Lead
	M1BP	"	40	205	245	Lead x Plastic
	M1CP	"		4	4	
	M3AP	"	3		3	P:Plastic x Plastic
	M3BP	"	39		39	
	M3CP	"	140		140	
	Section "M" Total	"	222	404	626	
N	N 1	100 pairs	2,402	631	3,033	Normal
	N 2	"	31		31	Bridged for Transfer
	Section "N" Total	"	2,433	631	3,064	

SECTION	DESIGNATION	UNIT	QUANTITY			REMARKS
			PRIMARY	SECONDARY	TOTAL	
S	S 50	ea		1	1	66 mH
	S 100	"		1	1	"
	S 400	"	5		5	"
	Section "S" Total	"	5	2	7	
P	P 36 B	100m	0.2		0.2	
	P 30 B	"	1.1		1.1	
	P 20 B	"	1.9		1.9	
	P 16 B	"	20.6		20.6	
	P 12 B	"	7.1		7.1	
	P 9 B	"	65.8		65.8	
	P 6 B	"	39.8		39.8	
	P 4 B	"	2.3		2.3	
	P 4 A	"	7.0		7.0	
	P 2 A	"	5.4		5.4	
	Section "P" Total	"	151.2		151.2	
Q	Q L-6	ea	2		2	
	Q L-5	"	2		2	
	Q T-5	"	1		1	
	Q L-3	"	1		1	
	Q A-3	"	13		13	
	Q L-2	"	5		5	
	Q A-2	"	35		35	
	Q A-1	"	17		17	
	Q JUF-11	"	35		35	
	Section "Q" Total	"	111		111	

3.8 Amount of Main Materials

MAIN MATERIALS LIST

(1) Primary Cable Work

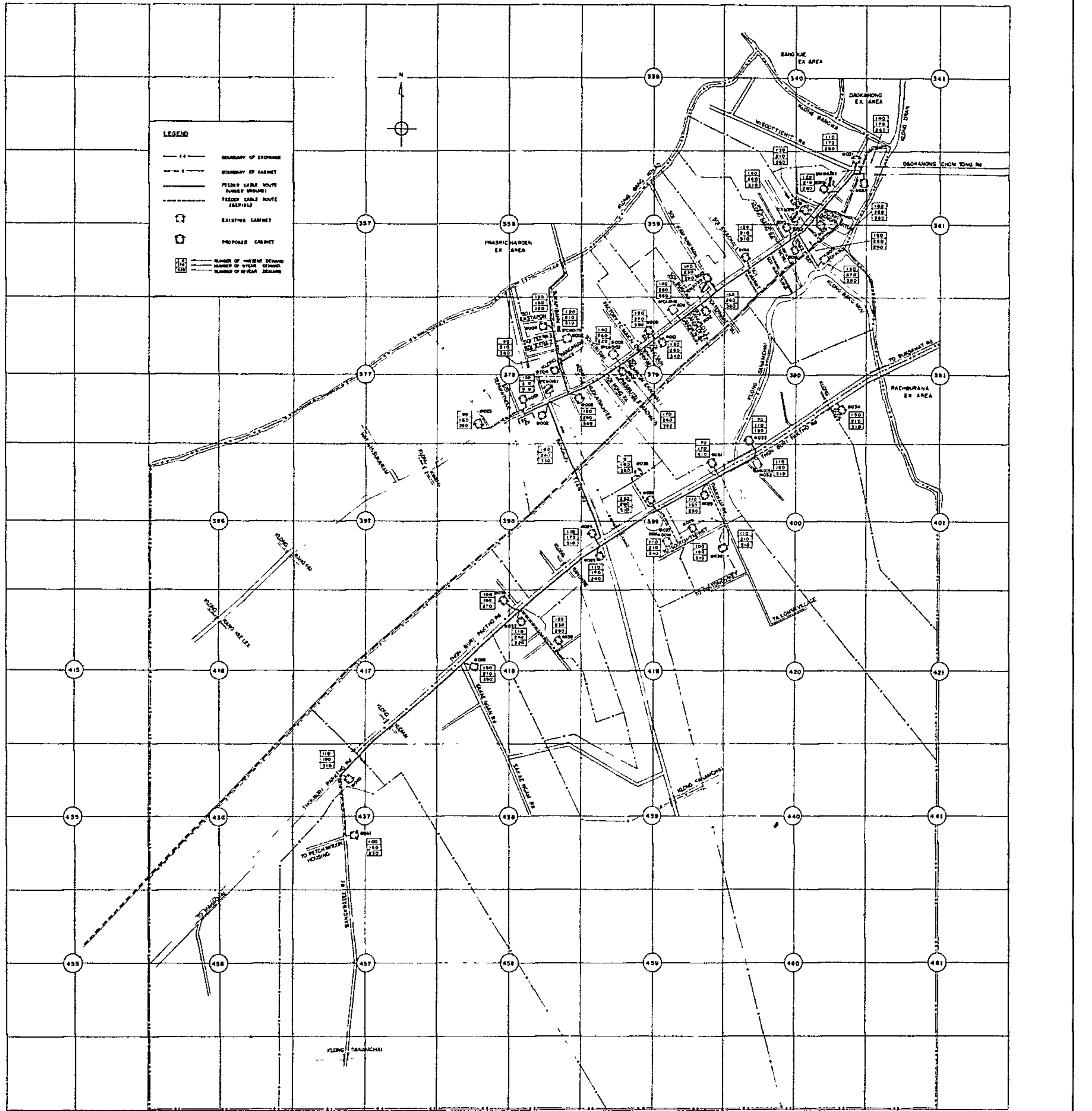
NAME OF MATERIAL	UNIT	QUANTITY	REMARKS
Cable			
1) AP-FSF Cable			
300-.4	m	655	
400-.4	"	40	
600-.4	"	1,002	
900-.4	"	375	
1200-.4	"	18	
1500-.4	"	18	
1800-.4	"	1,443	
2100-.4	"	462	
2400-.4	"	390	
2700-.4	"	3,940	
300-.5	"	1,155	
600-.5	"	2,300	
900-.5	"	435	
1200-.5	"	603	
1500-.5	"	4,524	
300-.65	"	504	
600-.65	"	3,241	
900-.65	"	1,613	
1200-.65	"	7,327	
Sub Total	"	30,045	
2) Alpeth Sheathed Cable			
50-.4	m	10	
200-.4	"	100	
300-.4	"	1,150	
400-.4	"	30	
600-.4	"	330	
300-.5	"	1,060	

NAME OF MATERIAL	UNIT	QUANTITY	REMARKS
200-.65	m	110	
300-.65	"	3,310	
Sub Total	"	6,100	
Total	m	36,145	
Manhole Loading Coil 400 PRS.	ea	5	66 mH
Cross Connecting Cabinet 900 PRS.	ea	35	
Cross Connecting Cabinet			
Terminal Block 25 PRS.	ea	420	
50 PRS.	"	2	
100 PRS.	"	3	
Total	"	425	
Concrete Pole 8 M	ea	40	
Ready Access Terminal Type 200 MBY	ea	40	

(2) Secondary Cable Work

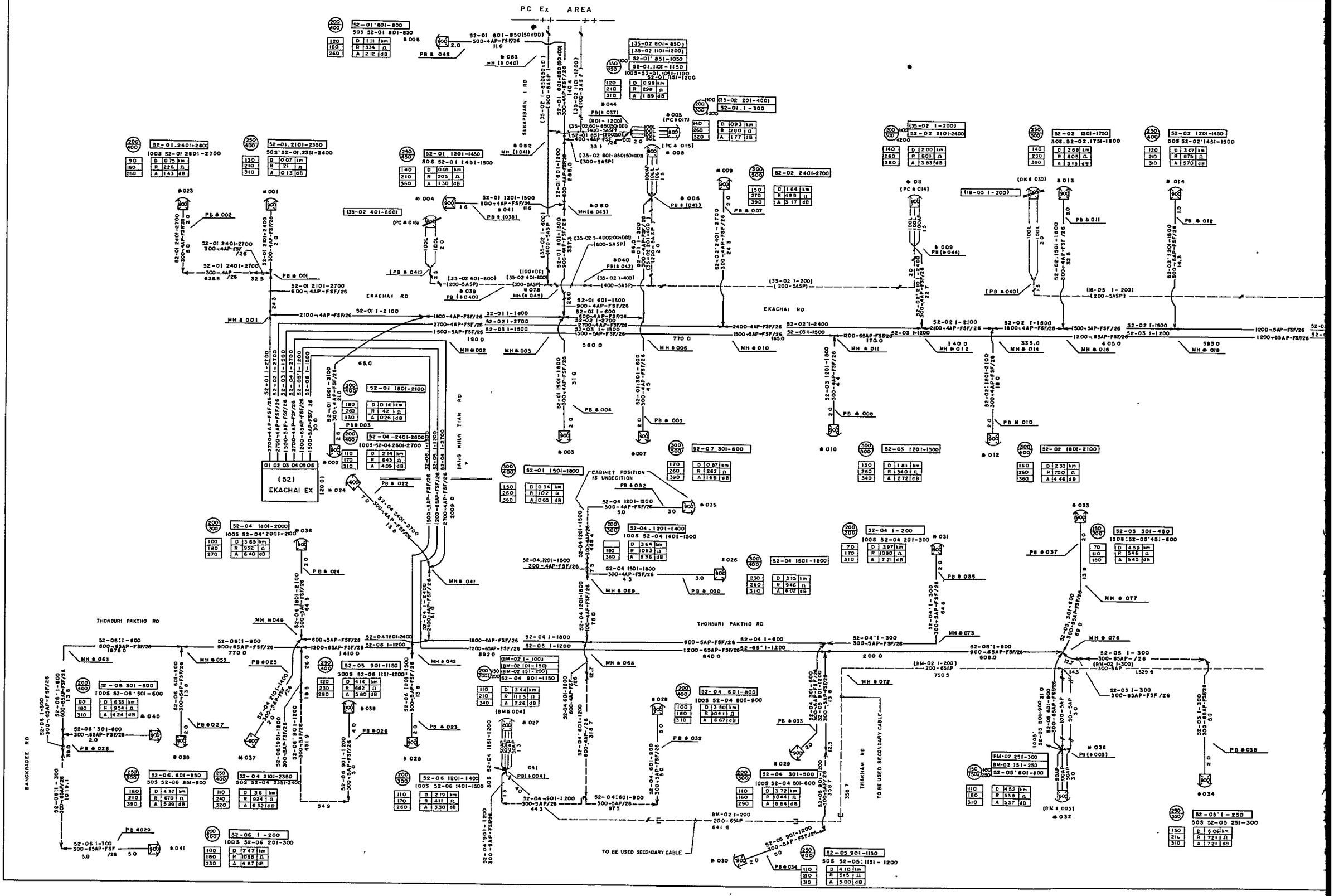
NAME OF MATERIAL	UNIT	QUANTITY	REMARKS
Cable			
1) Fig.(8) Alpeth Sheathed Cable			
10-.4 AP(8)	m	912	
25-.4 AP(8)	"	4,385	
50-.4 AP(8)	"	8,154	
100-.4 AP(8)	"	3,305	
10-.5 AP(8)	"	135	
25-.5 AP(8)	"	11,071	
50-.5 AP(8)	"	8,628	
100-.5 AP(8)	"	5,187	
10-.65 AP(8)	"	568	
25-.65 AP(8)	"	10,636	
50-.65 AP(8)	"	11,986	
100-.65 AP(8)	"	8,994	
Sub Total	"	73,961	
2) Alpeth Sheathed Cable			
25-.4 AP	m	898	
50-.4 AP	"	523	
100-.4 AP	"	963	
200-.4 AP	"	2,797	
300-.4 AP	"	802	
400-.4 AP	"	651	
25-.5 AP	"	358	
50-.5 AP	"	372	
100-.5 AP	"	907	
200-.5 AP	"	2,843	
300-.5 AP	"	3,022	
400-.5 AP	"	1,743	
25-.65 AP	"	421	
50-.65 AP	"	2,308	
100-.65 AP	"	494	

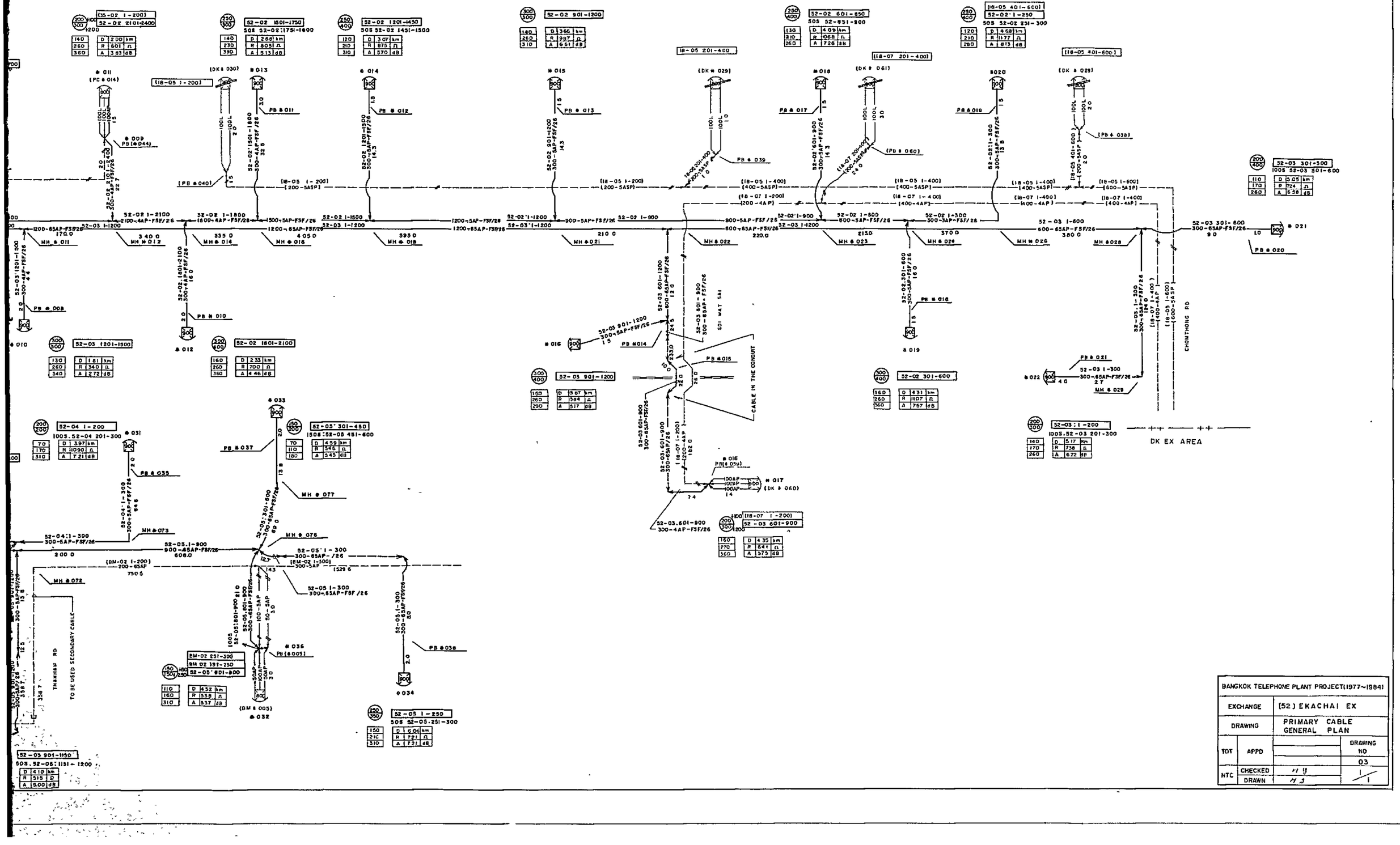
NAME OF MATERIAL	UNIT	QUANTITY	REMARKS
200-.65 AP	m	11,087	
300-.65 AP	"	551	
400-.65 AP	"	779	
Sub Total	"	31,519	
Total	m	105,480	
Pole Mounting Loading Coil			
50 PRS.	ea	1	66 mH
100 PRS.	"	1	66 mH
Total	"	2	
Concrete Pole 8 M	ea	728	
10 M	"	50	
Total	"	778	
Ready Access Terminal			
Type 100 MB	ea	424	
100 MBY	"	24	
200 MB	"	73	
200 MBY	"	20	
Total	"	541	
Terminal Block with 10 PRS.	ea	3	In Door(NEN1001)
Strand Terminal 11 PRS.	"	477	Out Door
16 PRS.	"	1	
Total	"	481	
Cross Connecting Cabinet			
Terminal Block 25 PRS.	ea	540	
50 PRS.	"	1	
100 PRS.	"	10	
Total	"	551	



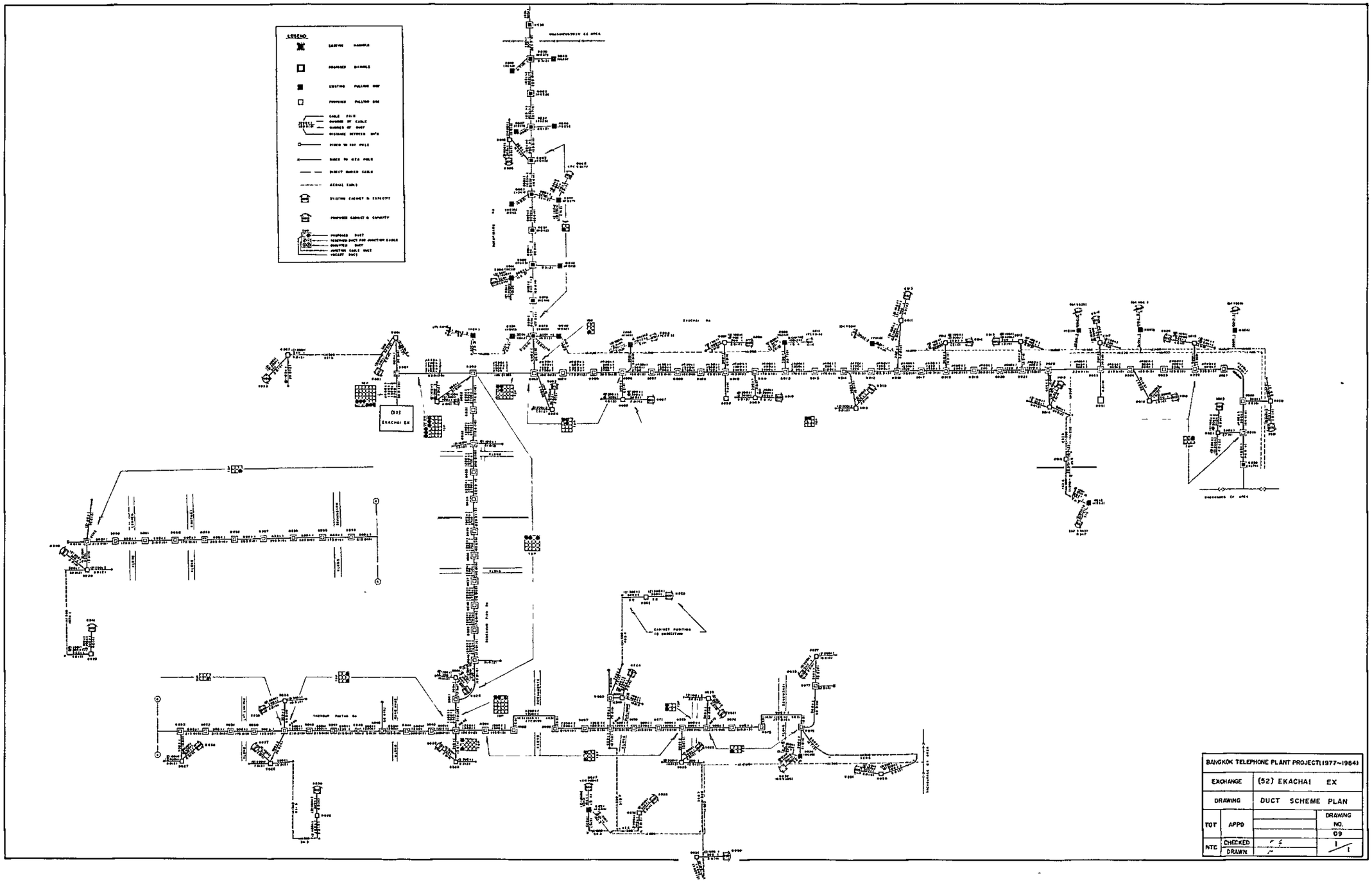
BANGKOK TELEPHONE PLANT PROJECT (1977–1984)			
EXCHANGE		(52) EKACHAI EX	
DRAWING		KEY PLAN	
TOT	APPD		DRAWING NO 01
NTC	CHECKED		1/1
	DRAWN		

7


PC Ex AREA
EKACHAI RD
SUKAPIBARN 1 RD
BANG KHUN TIAN RD
(52) EKACHAI EX
THONBURI PAKTHO RD
BANGKRADEE RD
THANHAM RD
TO BE USED SECONDARY CABLE
CABINET POSITION IS UNDECITION
52-01 601-850(50x DD)
500-4AP-FSF/26
52-01 601-850(50x100)
52-01 851-1200
52-01 1201-1500
52-01 1501-1800
52-01 1801-2100
52-01 2101-2350
52-01 2401-2700
52-01 2701-2900
52-02 1201-1450
52-02 1451-1500
52-02 1501-1750
52-02 1751-1800
52-02 2101-2400
52-02 2401-2700
52-03 1201-1500
52-04 1201-1500
52-04 1501-1800
52-04 1801-2000
52-04 2101-2350
52-04 2351-2400
52-05 1201-1400
52-05 1401-1500
52-06 601-850
52-06 851-900
52-07 301-600
(35-02 601-850)
(35-02 1101-1200)
52-01 851-1050
52-01 1101-1150
(35-02 201-400)
52-01 1-300
(35-02 1-200)
52-02 2101-2400
(18-05 1-200)
(OK # 030)
(35-02 401-600)
(35-02 1-400)
(35-02 1-200)
(18-05 1-200)
(BM-02 1-100)
(BM-02 101-150)
(BM-02 151-200)
(BM-02 1-200)
(BM-02 1-300)
(BM-02 251-300)
(BM-02 151-250)
(BM # 005)
(BM # 004)
(52) EKACHAI EX



BANGKOK TELEPHONE PLANT PROJECT(1977~1984)		
EXCHANGE		(52) EKACHAI EX
DRAWING		PRIMARY CABLE GENERAL PLAN
TOT	APPD	DRAWING NO 03
NTC	CHECKED	1/1
	DRAWN	


LEGEND
EXISTING MANHOLE
PROPOSED MANHOLE
EXISTING POLLING DOT
PROPOSED POLLING DOT
CABLE PAIR
NUMBER OF CABLE
NUMBER OF DUCT
DISTANCE BETWEEN DUCT
DUCT TO TOT POLE
DUCT TO NTC POLE
DIRECT BURIED CABLE
AERIAL CABLE
EXISTING CABINET & CAPACITY
PROPOSED CABINET & CAPACITY
PROPOSED DUCT
RESERVED DUCT FOR JUNCTION CABLE
OCCUPIED DUCT
JUNCTION CABLE DUCT
VACANT DUCT
(52) EKACHAI EX
CABINET POINTING TO BANGLUMPHU
BANGKOK TELEPHONE PLANT PROJECT(1977-1984)
EXCHANGE (52) EKACHAI EX
DRAWING DUCT SCHEME PLAN
TOT APPD
NTC CHECKED
DRAWN
DRAWING NO. 09

APPENDIX

CALCULATIONS OF MANHOLE STRENGTH

1. General

Special manholes shall be located in front of the Exchanges named below, to allow the entrance of cables. These manholes are designed, based on their unit stress calculated by computer and the reinforcing bar arrangement plan drawn by computer-plotter.

Exchange	MH No.	MH Type	Drawing No.	Internal Dimension
Ekachai	#001	T-6(b)	1074	4.6 × 1.8 × 2.3
Rachburana	#001	L-6	1072	6.9 × 1.65 × 2.3
Klong Toei	#001	T-6(a)	1073	4.6 × 1.8 × 2.3

2. Calculation of Strength

2.1 Structural Analysis

The manhole is analyzed as a box-type rigid frame structure whose vertical section consists of the combined top, side and bottom slabs.

2.2 Design Conditions

2.2.1 Soil

It is assumed that the internal frictional angle, ground water level and specific weight of soil are of the following values:

Internal frictional angle (ϕ) ..... 10°
Ground water level (Ho) 1.0m
Specific weight of soil (w)
Unit weight above ground water level ..... 1,600 kg/m^3
Unit weight under ground water level ..... 2,000 kg/m^3

2.2.2 Concrete

Concrete shall be of the following values:
Design standard strength in 28 days ..... σk = 240 kg/cm^2
Maximum dimension of coarse aggregate ..... 25 mm

2.2.3 Reinforcing Bar

(1) Standard

Main and distributing reinforcing bars shall be the SD-30 (JIS) type and erection bars shall be the SR-24 (JIS) type.

(2) Diameter

Diameter of main and distributing reinforcing bars shall be 10mm or more. Maximum diameter shall be determined according to Table 2.1.

Table 2.1 Maximum Diameter of Main and Distributing Bars

Thickness of Concrete (cm)	Max. Diameter of Bar (mm)
17	13
20	16
25	19
30	22

(3) Protective Cover for Reinforcing Bar

Protective cover for reinforcing bar shall be as shown in Table 2.2.

Table 2.2 Protective Cover for Reinforcing Bar (in cm)

Diameter of Steel Bar (mm)	Inside Protective Cover	Outside Protective Cover
Up to 16	2.5	4
Over 16	2.5	5

2.2.4 Specific Weight of Reinforced Concrete

Specific weight of reinforced concrete shall be 2,500 kg/m^3.

2.2.5 Allowable Unit Stress

Allowable unit stresses shall be as shown in Table 2.3.

Table 2.3 Allowable Unit Stresses

Material	Kind of Unit Stress	Allowable Unit Stress (kg/cm^2)	
Steel bar	SR-24 SD-30	σsa	1,400 1,600
Concrete	Bending unit stress	σca	80
	Shearing unit stress	τa	8
	Bond unit stress	τoa	14
	Bearing unit stress	$\sigma ca'$	60

2.2.6 Live Load to be Imposed by Truck

Live loads demonstrated in the practical test are shown in Table 2.4.

Table 2.4 Surcharge Load

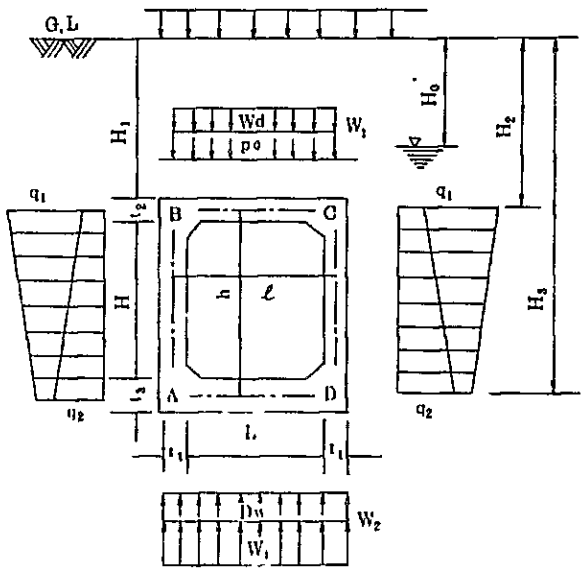
Deepness (m)	Live Load (kg/m^2)	Deepness (m)	Live Load (kg/m^2)
Up to 0.5	8,930	3.0	1,180
1.0	3,820	3.5	1,130
1.5	2,560	4.0	1,120
2.0	1,570	4.5	1,100
2.5	1,300	Over 5.0	1,090

Note: Intermediate live load values between each two deepness values above are to be obtained by proportional allotment.

2.2.7 Load

Load to be imposed on top, side and bottom slabs shall be as shown in Figure 2.1.

Figure 2.1 Loads on Slabs



Notes:

Po : Surcharge at top slab (kg/m^2) - Refer to Table 2.4
Ho : Depth to top of ground water level from surface (m)
H_1 : Depth to top slab from surface (m)
$H_2 = H_1 + \frac{t_2}{2}$ (m)
$H_3 = H_1 + t_2 + H + \frac{t_3}{2}$ (m)
W_1 : Weight of top slab (kg/m^2)
W_2 : Weight of bottom slab (kg/m^2)
Wd : Weight of top slab and soil on top slab (kg/m^2)
q : Resultant of all horizontal force to side slab (kg/m^2)
Dw : $\frac{\text{Weight of side slab and cables}}{\text{Outside length in short direction}}$ (kg/m^2)
L : Inner length (m)
H : Inner depth (m)
t_1 : Thickness of side slab (m)
t_2 : Thickness of top slab (m)
t_3 : Thickness of bottom slab (m)

2.3 Calculation of the Strength

2.3.1 Bending moment, shearing force and unit stress of manholes, type "T-6(a)" and T-6(b)", are shown in Figure 2.2 and in Table 2.5.

Figure 2.2 Bending Moment and Shearing Force Diagram "T-6(a)", "T-6(b)"

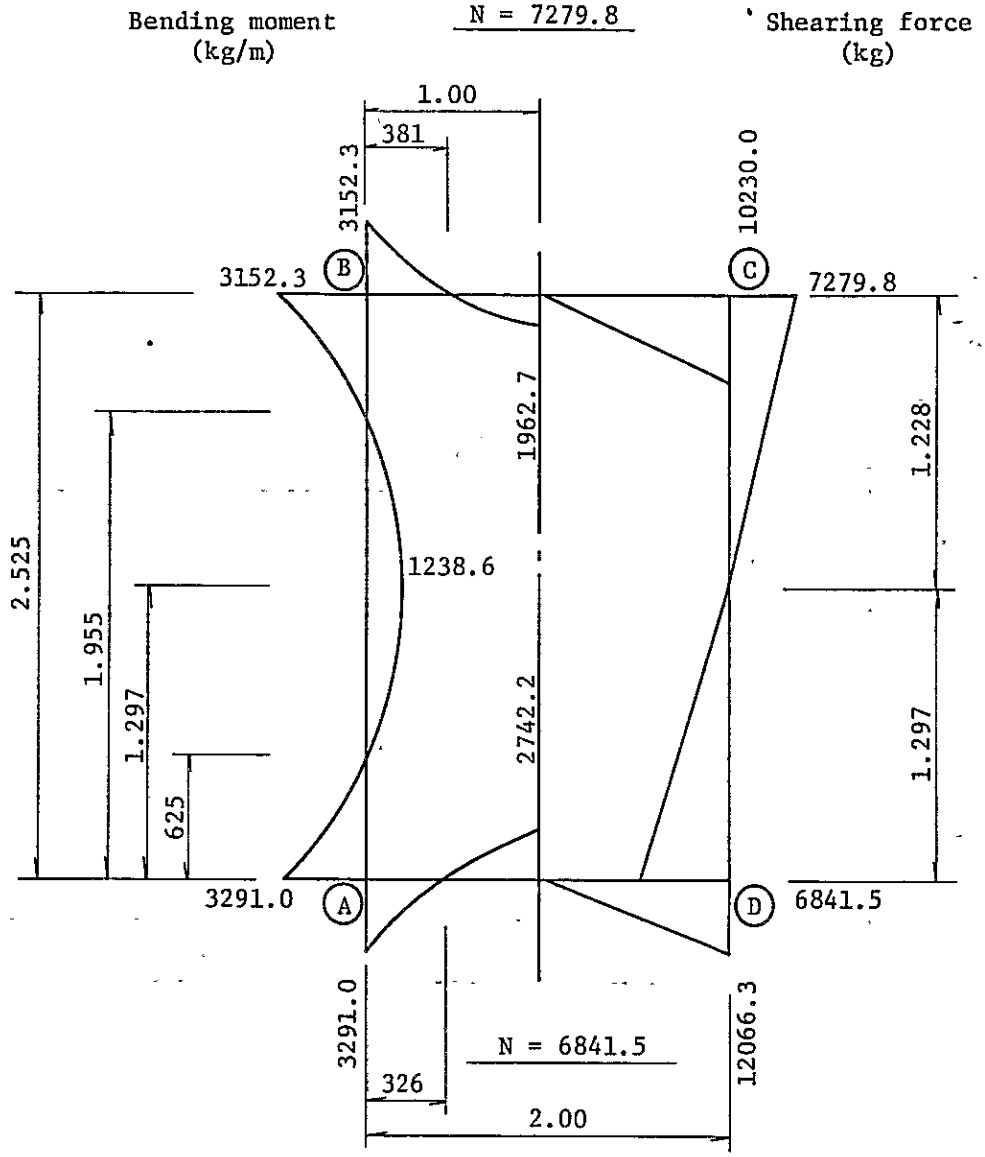


Table 2.5 Unit Stress

"T-6(a)", "T-6(b)

MARK \ PANEL / POINT / UNIT		BC		AB	AD	
		B	1.00	1.297	A	1.00
M	kg-m	3,152.3	1,962.7	1,238.6	3,291.0	2,742.2
N	kg	7,279.8	7,279.8	11,029.0	6,841.5	6,841.5
S	kg	10,230.0	0	0	12,066.3	0
b	cm	100.0	100.0	100.0	100.0	100.0
h	cm	25.0	20.0	20.0	30.0	25.0
d	cm	19.2	16.7	16.7	24.2	19.2
d'	cm	8.3	5.8	5.8	8.3	5.8
As	cm^2	D16-200	D16-200	D16-200	D16-200	D16-200
		9.928	9.928	9.928	9.928	9.928
$P = \frac{As}{bd}$		5.2	5.9	5.9	4.1	5.2
As'	cm^2	D16-400	D16-400	D16-400	D16-400	D16-400
		4.964	4.964	4.964	4.964	4.964
$P' = \frac{As'}{bd}$						
$c = \frac{M}{N} + (\frac{h}{2} - d')$	cm	43.3	27.0	11.2	48.1	40.0
σc	kg/cm^2	59.9	47.7	30.1	42.6	37.5
σs	kg/cm^2	1,437.7	998.2	367.5	1,164.1	562.5
r	kg/cm^2	5.5	-	-	5.1	-

2.3.2 Bending moment, shearing force and unit stress of manhole, type "L-6", are shown in Figure 2.3 and Table 2.6.

Figure 2.3 Bending Moment and Shearing Force Diagram "L-6"

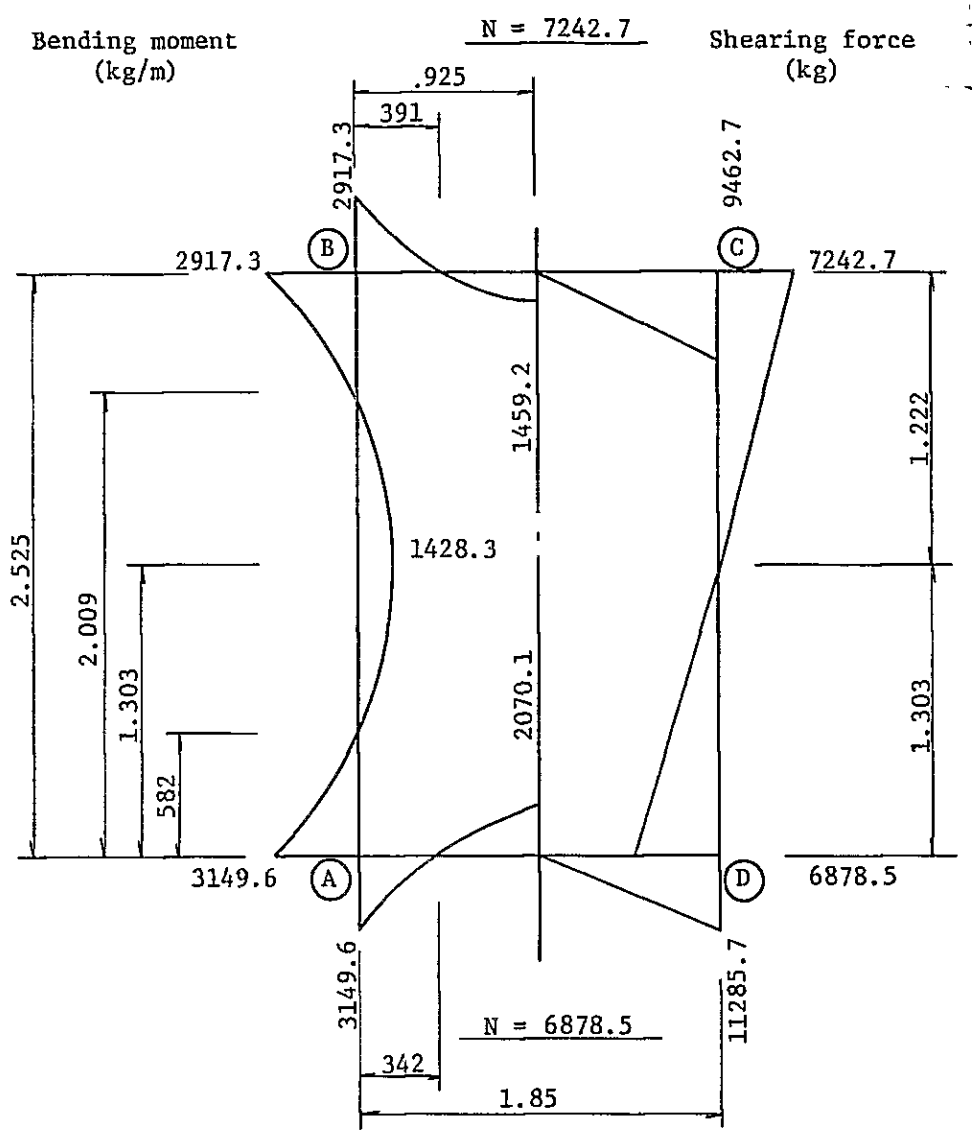


Table 2.6 Unit Stress

"L-6"

MARK	UNIT	PANEL / POINT	BC		AB	AD	
			B	0.925	1.303	A	0.925
M	kg-m		2,917.3	1,459.2	1,428.3	3,149.6	2,070.1
N	kg		7,242.7	7,242.7	10,243.0	6,878.5	6,878.5
S	kg		9,462.7	0	0	11,285.7	0
b	cm		100.0	100.0	100.0	100.0	100.0
h	cm		25.0	20.0	20.0	30.0	25.0
d	cm		19.2	16.7	16.7	24.2	19.2
d'	cm		8.3	5.8	5.8	8.3	5.8
As	cm^2		D16-200	D16-200	D16-200	D16-200	D16-200
			9.928	9.928	9.928	9.928	9.928
$P = \frac{As}{bd}$			5.2	5.9	5.9	4.1	5.2
As'	cm^2		D16-400	D16-400	D16-400	D16-400	D16-400
			4.964	4.964	4.964	4.964	4.964
$P' = \frac{As'}{bd}$							
$c = \frac{M}{N} + (\frac{h}{2} - d')$	cm		40.3	20.1	13.9	45.8	30.1
σc	kg/cm^2		55.4	35.6	34.8	40.9	32.4
σs	kg/cm^2		1,305.2	662.3	515.8	1,112.9	637.2
r	kg/cm^2		5.0	-	-	4.7	-