CHAPTER 7

JUNCTION CIRCUIT AND JUCTION CABLE

CHAPTER 1

MAKING MONEY AND BUYING MONEY

CHAPTER 7 JUNCTION CIRCUIT AND JUNCTION CABLE

7.1 General Description

In planning the junction cable network among the telephone exchange offices, it will be necessary to comprehend the following matters.

(a) Exchange office service area and exchange office establishment plan
(b) Demand by years
(c) Yearly telephone traffic among the exchange offices and number of circuits
(d) Tandem plan and numbering plan
(e) Transmission loss assignment
(f) Allowable DC resistance
(g) Service grade
(h) Classification of cables
(i) Others

The exchange office establishment plan presented in this chapter is based on the telephone demand as of 1993. The number of junction circuits has been calculated for the object years of 1979, 1983, 1988 and 1993.

The Plan No.1 and the Plan No.2 were prepared on the assumption that the new exchange system will be introduced into the Jakarta multi-exchange area after 1980.

The Plan No.1 adopts the five terminating tandems for both the EMD and the new system. The plan No.2 adopts the five terminating tandems for only the EMD, and the one terminating tandem is adopted for the new system.

The transmission loss assigned between EO and EO is 19 dB according to PERUMTEL's Fundamental Plan (1972). However, in consideration of the upgrading of transmission quality in the future and the mutual relation between allowable DC resistance and transmission loss assignment, a transmission loss assignment of 15 dB is applied.

In the discussion held on May 16, 1974 with members of PERUMTEL, it was decided to utilize cables of 0.4 mm conductor from 1983 but in this chapter, cables of 0.4 mm conductor will be applied in sections of large numbers of cables even prior to 1983. Consequently, if required, it will be necessary for PERUMTEL to change the cable of 0.4 mm conductor stated in this chapter to cable of 0.6 mm conductor.

Moreover, as indicated in the Work Flow Chart (refer to Fig. 7.1.(1)), the construction of the junction cable network will naturally influence the internal factors of PERUMTEL as well as such external factors as social environment and city planning.

Therefore, through the feedback of "plan", "do" and "see", PERUMTEL will be required to prepare and continually modify a more superior and practical plan suitable for the changing telephone demand and social environment.

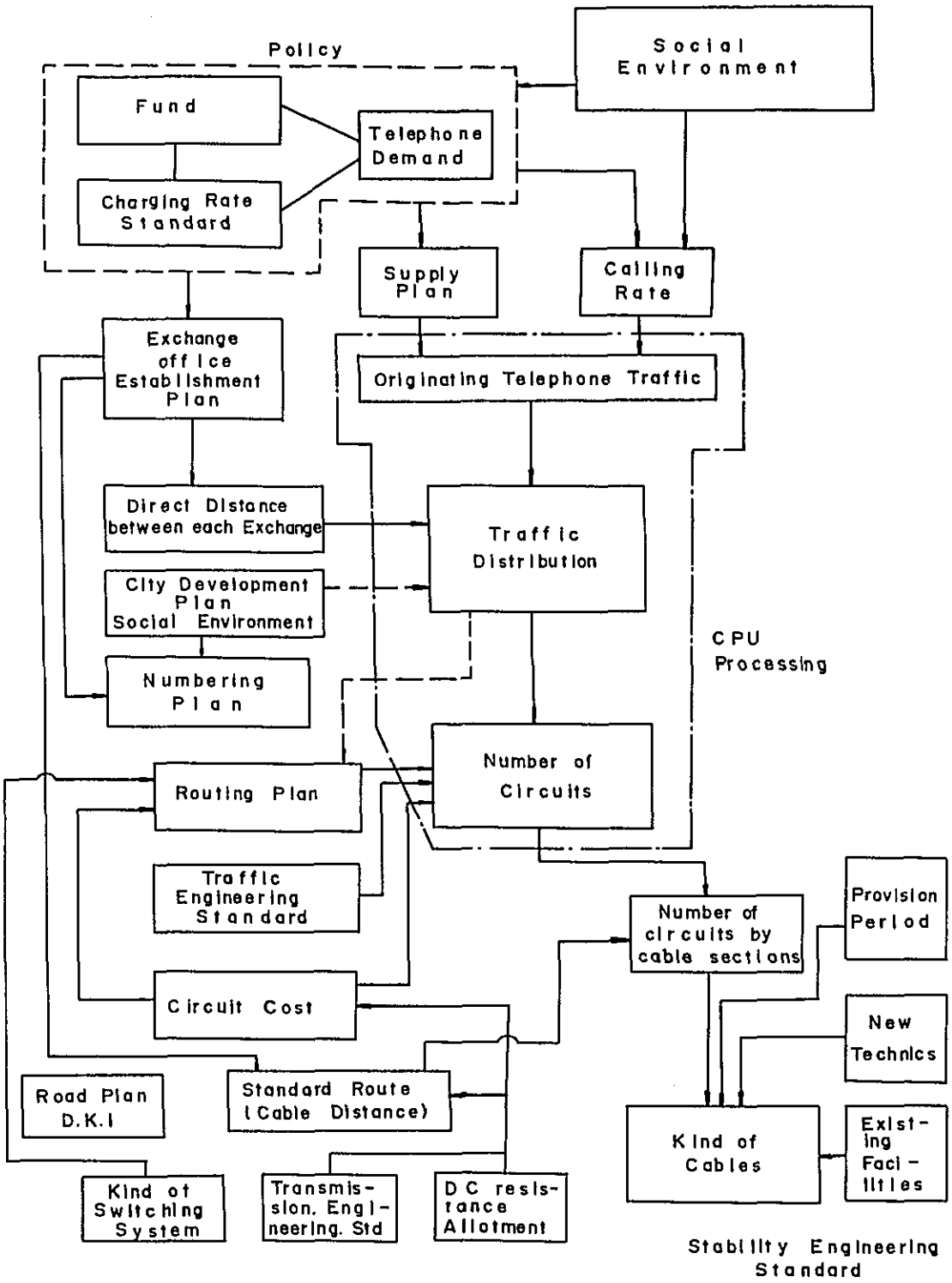


FIG. 7-1-(1) WORK FLOW

7.2 Basic Plan

7.2.1 Telephone Demand and Exchange Office Service Area

As shown in Table 7.2.1.(2) to (3), in regard to the junction circuits for the 1979 year, two kinds were calculated based on the switching expansion plan of PERUMTEL and demand forecasted by JTP. In regard to 1980 and onward, calculation was made based only on the demand forecasted by JTP.

In order to have flexibility to meet the changes in future expansion plans, the junction cable network has been planned for capability in accommodating 100% of the total telephone demand (present subscribers + waiting applicants + potential demand).

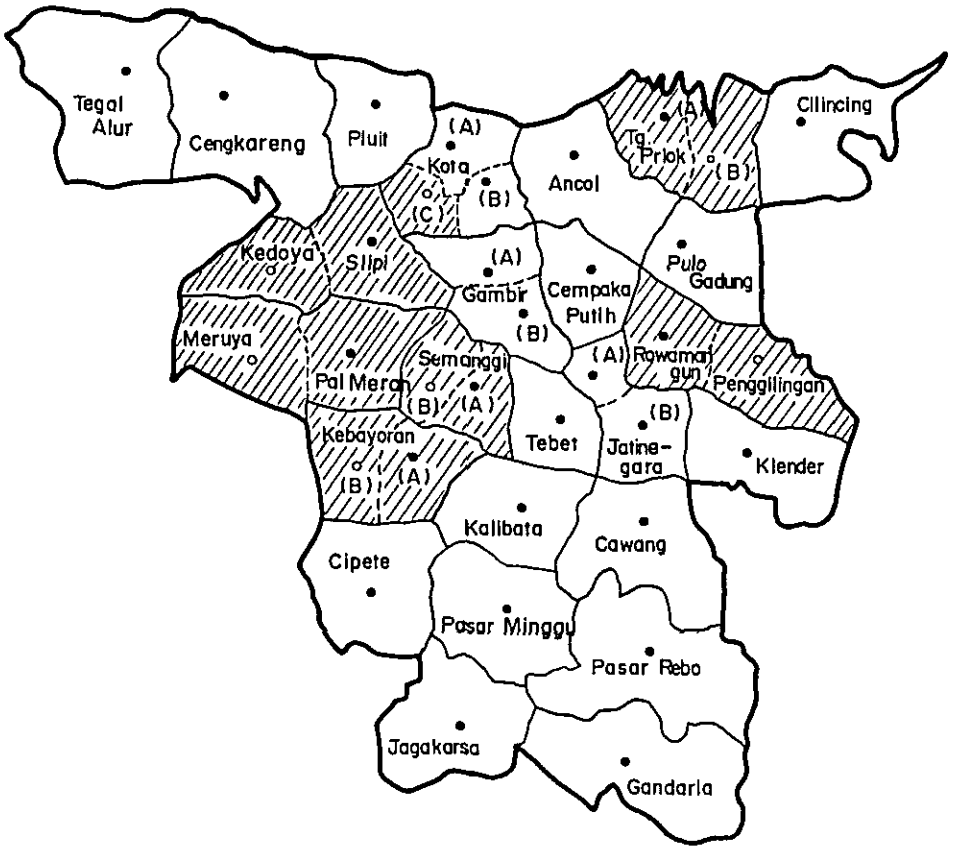
As for the service area of an exchange office which has not yet been constructed, the prerequisite is that the subscribers in that area will be accommodated in an adjacent existing exchange office most suitable for the cable network, as shown in Table 7.2.1.(1). Consequently, until the new exchange office building is constructed, the demand of such existing exchange office will include the demand in the service area of the new exchange office. The number of junction circuits has been calculated based on the demand forecasted in this way. Therefore, even if the total demand of the unopened exchange office is accommodated in the adjacent existing exchange office, there will be no problem in the capacity of the junction cables.

Table 7.2.1.(1) Commencement Year

Name of Exchange	Commencement Year		Temporary Exchange Until Commencement
	1980-1983	1984-1988	
Kota (C)	O		Kota (B)
Semanggi (B)		O	Semanggi (A)
Kedoya	O		Slipi
Meruya	O		Pal Merah
Penggilingan	O		Rawamangun
Tg. Priok (B)	O		Tg. Priok (A)
Kebayoran (B)	O		Kebayoran (A)

TABLE 7-2-1-(2)

TELEPHONE DEMAND AND EXCHANGE SERVICE AREA IN 1979

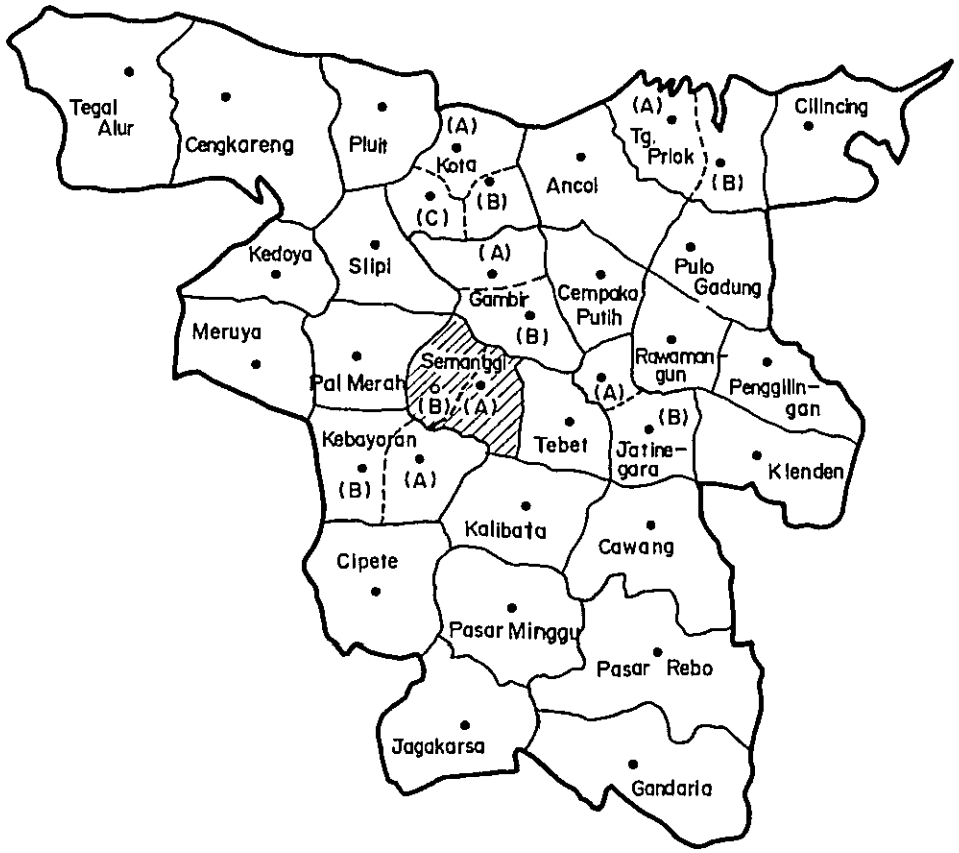


No.	Exchange Name	Telephone Demand	No.	Exchange Name	Telephone Demand	No.	Exchange Name	Telephone Demand
1	Kota (A)	(9.700) 2.500	13	Pal Merah	(9.700) 3.670	25	Cipete	(6.790) 2.400
2	Kota (B)	(29.100) 26.100	14	Kedoya	—	26	Kalibata	(4.850) 4.550
3	Kota (C)	—	15	Meruya	—	27	Pasar Minggu	(5.820) 1.600
4	Ancol	(5.820) 4.400	16	Cempaka Putih	(14.550) 10.700	28	Jagakarsa	970 (550)
5	Pluit	(7.760) 5.700	17	Rawamangun	(3.880) 4.520	29	Jatinegara (A)	3.880 (3.500)
6	Cenakareng	(5.820) 1.300	18	Pulo Gadung	(3.880) 470	30	Jatinegara (B)	(15.520) 6.100
7	Tegal Alur	(970) 730	19	Penggilingan	—	31	Cawang	(6.790) 2.300
8	Gambir (A)	(19.400) 17.700	20	TanjungPriok (A)	(5.820) 8.300	32	Pasar Rebo	(3.880) 910
9	Gambir (B)	(27.160) 19.200	21	TanjungPriok (B)	—	33	Klender	(3.880) 700
10	Semanggi (A)	(21.340) 14.950	22	Cilincing	(970) 870	34	Tebet	(12.610) 4.950
11	Semanggi (B)	—	23	Kebayoran (A)	(18.400) 16.100	35	Gandria	(1.940) 740
12	Slipi	(9.700) 9.080	24	Kebayoran (B)	—			

( ) : based on Perumtel Supply Plan

TABLE 7-2-1-(3)

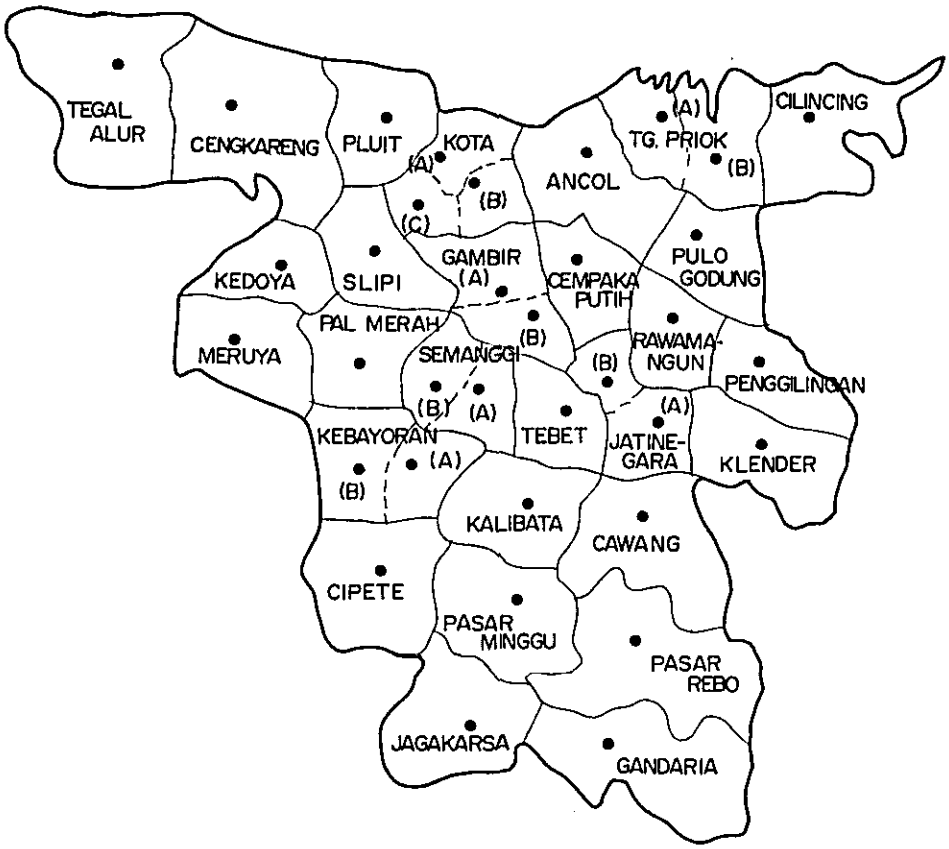
TELEPHONE DEMAND AND EXCHANGE SERVICE AREA IN 1983



No.	Exchange Name	Telephone Demand	No.	Exchange Name	Telephone Demand	No.	Exchange Name	Telephone Demand
1	Kota (A)	11.000	13	Pal Merah	5.300	25	Cipete	4.100
2	Kota (B)	32.600	14	Kedoya	1.080	26	Kalibata	7.500
3	Kota (C)	18.000	15	Meruya	1.600	27	Pasar Minggn	2.750
4	Ancol	7.500	16	Cempaka Purih	15.200	28	Jagakarso	1.050
5	Pluit	8.000	17	Rawamangun	6.500	29	Jatinegara (A)	5.900
6	Cengkareng	2.550	18	Pulo Gadung	1.000	30	Jatinegara (B)	8.800
7	Togal Alur	1.500	19	Penggilingan	1.150	31	Cawang	4.200
8	Gambir (A)	22.500	20	Tanjung Priok(A)	7.900	32	Pasar Rebo	1.700
9	Gambir (B)	25.500	21	Tanjung Priok(B)	6.500	33	Klender	1.800
10	Semanggi(A)	20.850	22	Cilincing	1.800	34	Tebet	7.900
11	Semanggi(B)	—	23	Kebayoran (A)	15.400	35	Gandaria	1.550
12	Slipi	13.000	24	Kebayoran (B)	5.200			

TABLE 7-2-1-(4)

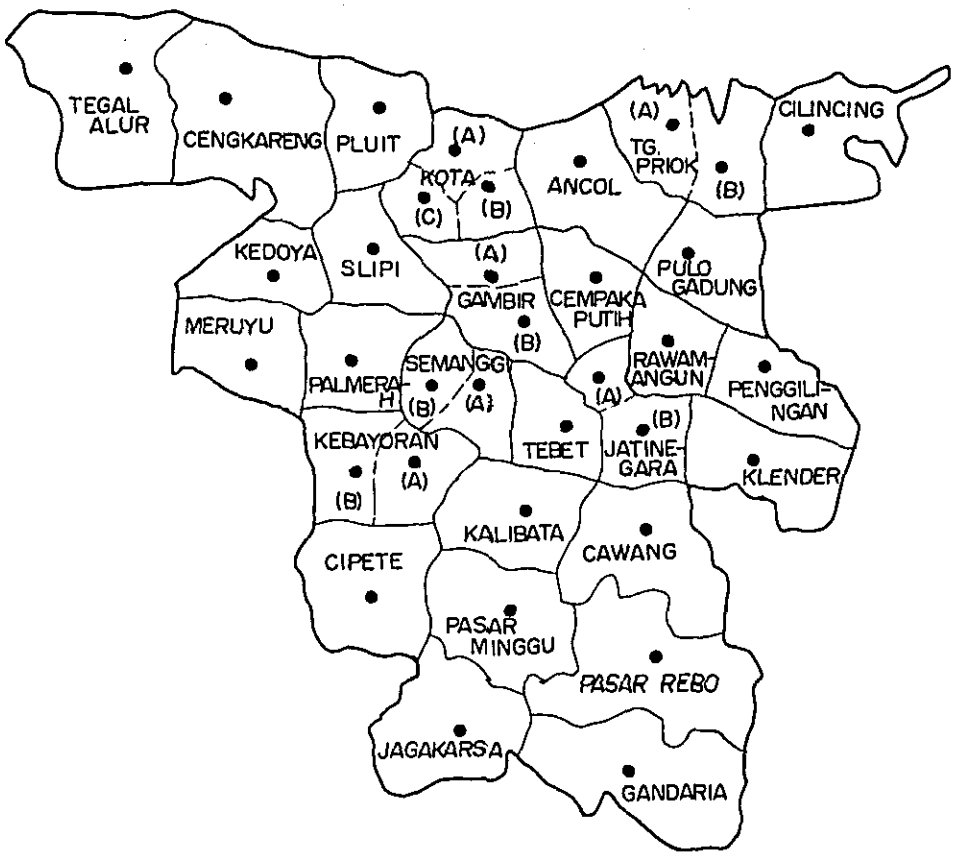
TELE PHONE DEMAND AND EXCHANGE SERVICE AREA IN 1988



NO.	Exchange Name	Telephone Demand	NO.	Exchange Name	Telephone Demand	NO.	Exchange Name	Telephone Demand
1	Kota (A)	15. 100	13	Pal Merah	11.700	25	Cipete	8.000
2	Kota (B)	33.800	14	Kedoya	3.200	26	Kalibata	14. 700
3	Kota (C)	26.400	15	Meruya	4.300	27	Pasar Minggu	5. 600
4	Ancol	14. 500	16	Cempaka Putih	23. 700	28	Jagakarsa	2. 450
5	Pluit	12. 200	17	Rawamangun	12.000	29	Jatinegara (A)	10. 100
6	Cengkareng	6.000	18	Pulo Gadung	2. 600	30	Jatinegara (B)	13. 300
7	Tegal Alur	3. 800	19	Penggilingan	3. 100	31	Cawang	10. 000
8	Gambir (A)	31. 500	20	Tanjung Priok(A)	16. 000	32	Pasar Rebo	4. 800
9	Gambir (B)	36.000	21	Tanjung Priok(B)	13. 500	33	Klender	6.000
10	Semanggi(A)	22. 450	22	Cilincing	4.600	34	Tebet	14. 700
11	Semanggi (B)	9. 700	23	Kebayoran (A)	20. 200	35	Gandaria	3. 850
12	Slipi	21. 300	24	Kebayoran (B)	9. 300			

TABLE 7-2-1-(5)

TELE PHONE DEMAND AND EXCHANGE SERVICE AREA IN 1993



NO.	Exchange Name	Telephone Demand	NO.	Exchange Name	Telephone Demand	NO.	Exchange Name	Telephone Demand
1	Kota (A)	20. 900	13	Pal Merah	26.000	25	Cipete	15. 700
2	Kota (B)	57. 100	14	Kedoya	10. 100	26	Kalibata	29. 200
3	Kota (C)	39. 400	15	Meruya	11. 800	27	Pasar Minggu	11. 400
4	Ancol	28. 300	16	Cenpaka Putih	40. 200	28	Jagakarsa	5. 800
5	Pluit	18. 800	17	Rawamangun	21. 900	29	Jatinegara (A)	17. 700
6	Cengkareng	14. 600	18	Pulo Gadung	6. 900	30	Jatinegara (B)	20. 000
7	Tegal Alur	9. 300	19	Penggilingan	8. 300	31	Cawang	24. 600
8	Gambir (A)	43. 700	20	Tanjung Priok(A)	32. 500	32	Pasar Rebo	15. 400
9	Gambir(B)	52. 200	21	Tanjung Priok(B)	29. 000	33	Klender	20. 300
10	Semanggi(A)	36. 100	22	Cilincing	11. 700	34	Tebet	27. 700
11	Semanggi(B)	14. 900	23	Kebayoran (A)	26. 000	35	Gandaria	9. 800
12	Slipi	35. 100	24	Kebayoran (B)	15. 600			

7.2.2 Telephone Traffic (Calling Rate) and Demand

In the future, the Jakarta multi-exchange office will be divided into the service areas of 35 exchange offices. The originating calling rate of each exchange office will vary according to the telephone demand structure as shown in Table 7.2.2.(1) to (3).

The number of junction circuits has been calculated in accordance with the telephone traffic data set forth in paragraph 3.4. The object years of the telephone traffic are the base years of 1979, 1983, 1988 and 1993.

7.2.3 Transmission Loss Assignment and Allowable DC Resistance

As stated in paragraphs 6.4 and 6.5, the transmission loss assignment allowable DC resistance have been planned with consideration for the existing switching equipment (EMD) and the use of the new switching system with common control to be introduced into Jakarta in the future. Attention is required in regard to the following matters in particular.

(a) Transmission loss between E0 and E0 has been improved from 19 dB (PERUMTEL's specified value) to 15 dB (JTP's recommended value).

(b) Transmission loss and DC resistance of each exchange office have been set at 1 dB and 20 ohm, respectively.

(c) In connection with the new switching system, with consideration for improvement in the DC resistance limit in the future, the DC resistance limit for direct circuits between E0 and E0 is 3,000 ohm which differs from the 2,4000 ohm of the exsisting EMD system.

7.2.4 Electrical Characteristics of Junction Cable

The maximum value of PERUMTEL's specifications has been used for the DC resistance (Ro) per km, and in regard to other items, the standard values of PERUMTEL's specifications and CCITT have been utilized.

Regarding the loading system, since this will have relation with projects already decided, the inductance of the loading coil was set at 80 mH and the loading spacing 1,500 m upon consultation with PERUMTEL.

Transmission loss per km was calculated in accordance with the following formula described in the CCITT Local Telephone Networks (Chapter V, page 20).

$$= \frac{1}{So}\left\{\left[\frac{SoRo}{2}\left(1-\frac{2}{3}\left(\frac{W}{Wo}\right)^2\right)+\frac{Rp}{2}\right]\sqrt{\frac{SoCo}{SoLo+Lp}}+\frac{SoGo}{2}\sqrt{\frac{SoLo+Lp}{SoLo}}\right\}$$

$$\frac{1}{\sqrt{1-\left(\frac{W}{Wo}\right)^2}}$$

Where

$$Wo=\frac{2}{\sqrt{SoLo\,(SoLo+Lp)}}$$

Ro : DC resistance (Ω/km)
Co : Capacitance (nF/km)
Lo : Inductance (mH/km)
Go : Conductance (℧/km)
So : Loading coil spacing (km)
Rp : Loading coil DC resistance (Ω/ea.)
Lp : Loading coil inductance (mH/ea.)

TABLE 7-2-2-(1)

TELEPONE TRAFFIC (CALLING RATE) AND DEMAND

unit : Demand=100

TANDEM	Exchange Name	Year					Remarks
		(P) 1979	(J) 1979	1983	1988	1993	
	Kota (A)	97 (0.084)	85(0.084)	85(0.077)	85 (0.066)	85(0.056)	Kota Tandem Area
	〃	—	—	26(〃)	66(〃)	124(〃)	
◎	Kota (B)	291(0.084)	261(0.084)	176(0.077)	261(0.066)	261(0.056)	
	〃	—	—	15(〃)	77(〃)	310(〃)	
	Kota (C)	—	—	—	—	—	
	〃	—	—	180(0.077)	264(0.066)	394(0.056)	
	Ancol	58.2(0.055)	44(0.055)	44(0.050)	44(0.043)	44(0.036)	
	〃	—	—	31(〃)	101(〃)	239(〃)	
	Pluit	77.6(0.055)	57(0.055)	57(0.055)	57(0.043)	57(0.036)	
	〃	—	—	23(〃)	65(〃)	131(〃)	
	Cengkareng	58.2(0.045)	13(0.045)	13(0.041)	13(0.035)	13(0.030)	
	〃	—	—	12.5(〃)	47(〃)	133(〃)	
	Tegal Alur	9.7(0.035)	7.3(0.035)	7.3(0.032)	7.3(0.027)	7.3(0.023)	
	〃	—	—	7.7(〃)	30.7(〃)	85.7(〃)	
◎	Gambir (A)	194 (0.084)	177(0.084)	177(0.083)	177(0.081)	177(0.080)	Gambir Tandem Area
	〃	—	—	48(〃)	138(〃)	260(〃)	
	Gambir (B)	271.6(0.084)	192(0.084)	192(0.083)	192(0.081)	192(0.080)	
	〃	—	—	63(〃)	168(〃)	330(〃)	
	Semanggi (A)	213.4(0.050)	149.5(0.050)	149.5(0.053)	149.5(0.056)	149.5(0.060)	
	〃	—	—	59(〃)	75(〃)	211.5(〃)	
	Semanggi (B)	—	—	—	—	—	
	〃	—	—	—	97 (0.054)	149(0.060)	
	Slipi	97 (0.050)	90.8(0.050)	90.8(0.045)	90.8(0.039)	90.8(0.033)	
	〃	—	—	39.2(〃)	122.2(〃)	260.2(〃)	
	Pal Merah	97 (0.045)	36.7(0.045)	36.7(0.041)	36.7(0.035)	36.7(0.030)	
	〃	—	—	16.3(〃)	80.3(〃)	223.3(〃)	

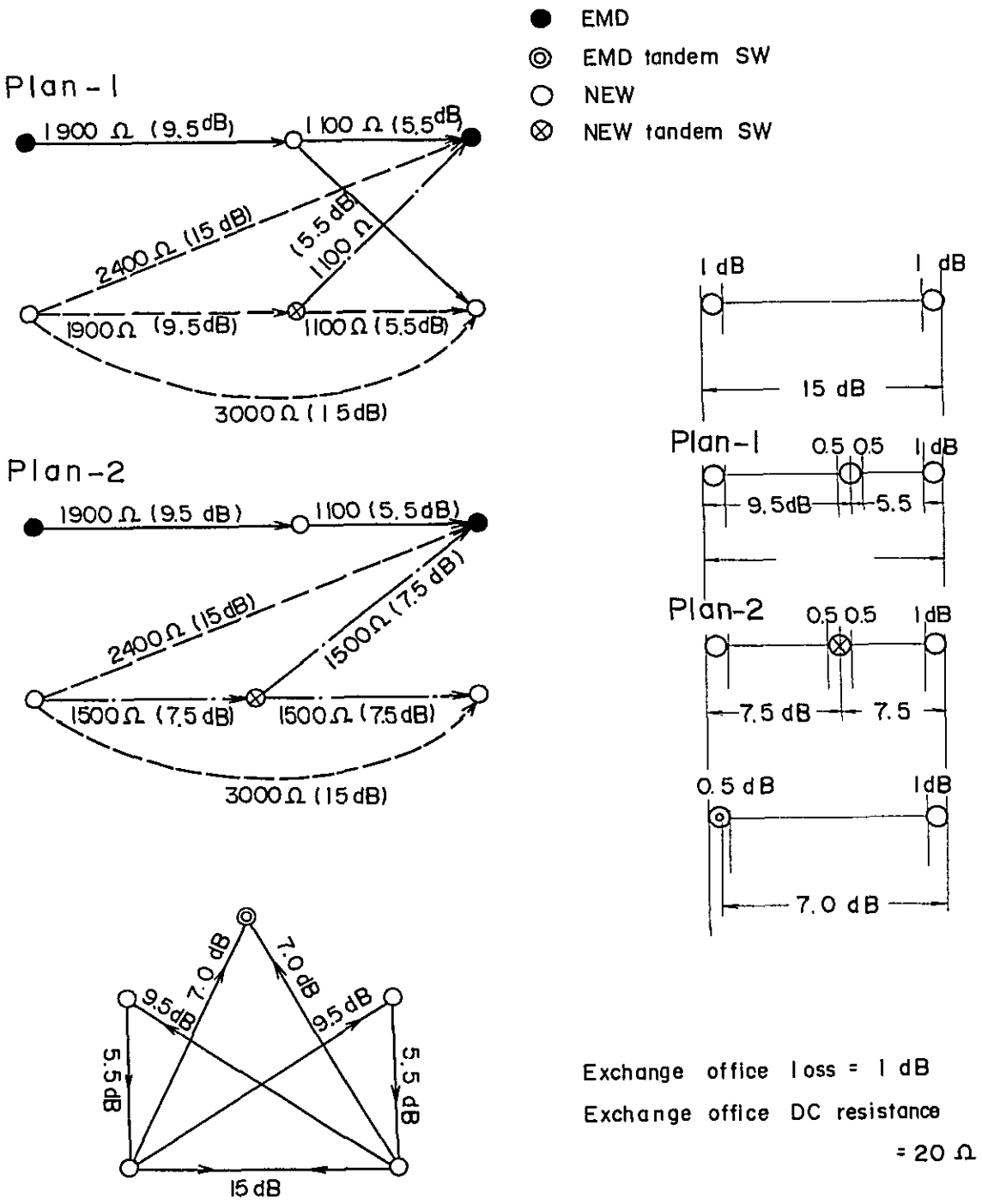
( ): Calling rate

TABLE 7-2-2-(2)

TANDEM	Exchange Name	Year					Remarks
		(P) 1979	(J) 1979	1983	1988	1993	
	Kedoya	—	—	—	—	—	
	〃	—	—	$10.^{8}$ (0.036)	32. (0.031)	101 (0.027)	
	Meruya	—	—	—	—	—	
	〃	—	—	16 (0.036)	43 (0.031)	118 (0.027)	
◎	Cemp. Putih	$145.^{5}$ (0.055)	107 (0.055)	107 (0.050)	107 (0.043)	107 (0.036)	Cempakaputih Tandem Area
	〃	—	—	45 (〃)	130 (〃)	295 (〃)	
	Rawamangun	$38.^{8}$ (0.045)	$45.^{2}$ (0.045)	$45.^{2}$ (0.044)	$45.^{2}$ (0042)	$45.^{2}$ (0.040)	
	〃	—	—	$19.^{8}$ (〃)	$74.^{8}$ (〃)	$173.^{8}$ (〃)	
	Pulo Gadung	$38.^{8}$ (0.045)	$4.^{7}$ (0.045)	$4.^{7}$ (0.041)	$4.^{7}$ (0.035)	$4.^{7}$ (0.030)	
	〃	—	—	$5.^{3}$ (〃)	$21.^{3}$ (〃)	$64.^{3}$ (〃)	
	Penggilingan	—	—	—	—	—	
	〃	—	—	$11.^{5}$ (0.047)	31 (0.050)	83 (0.052)	
	Tj Priok (A)	$58.^{2}$ (0.064)	83. (0.064)	79 (0.061)	83 (0.056)	83 (0.052)	
	〃	—	—	—	77 (〃)	242 (〃)	
	Tj Priok (B)	—	—	65 (0.061)	135 (0.056)	220 (0.052)	
	〃	—	—	—	—	70 (〃)	
	Cilincing	$9.^{7}$ (0.055)	$8.^{7}$ (0.055)	$8.^{7}$ (0.050)	$8.^{7}$ (0.042)	$8.^{7}$ (0.036)	
	〃	—	—	$9.^{3}$ (〃)	$37.^{3}$ (〃)	$108.^{3}$ (〃)	
◎	Kebayoran (A)	184. (0.050)	161 (0.050)	127 (0.045)	161 (0.039)	161 (0.033)	Kebayoran Tandem Area
	〃	—	—	27 (〃)	41 (〃)	29 (〃)	
	Kebayoran (B)	—	—	—	—	—	
	〃	—	—	52 (0.045)	93 (0.039)	156 (0.033)	
	Cipete	$76.^{9}$ (0.045)	24. (0.045)	24 (0.041)	24 (0.035)	24 (0.030)	
	〃	—	—	17 (〃)	56 (〃)	133. (〃)	
	Kalibata	$48.^{5}$ (0.045)	$45.^{5}$ (0.045)	$45.^{5}$ (0.041)	$45.^{5}$ (0.035)	$45.^{5}$ (0.030)	
	〃	—	—	$29.^{5}$ (〃)	$101.^{5}$ (〃)	$246.^{5}$ (〃)	
	Ps. Minggu	$58.^{2}$ (0.040)	16 (0.040)	16 (0.036)	16 (0.031)	16 (0.027)	
	〃	—	—	$11.^{5}$ (〃)	40 (〃)	98 (〃)	
	Jagakarsa	$9.^{7}$ (0.035)	$5.^{5}$ (0.035)	$5.^{5}$ (0.032)	$5.^{5}$ (0.027)	$5.^{5}$ (0.023)	
	〃	—	—	5 (〃)	19. (〃)	$52.^{5}$ (〃)	

TABLE 7-2-2-(3)

TANDEM	Exchange Name	Year					Remarks
		(P) 1979	(J) 1979	1983	1988	1993	
	Jatinegara (A)	38.8 (0.055)	35 (0.055)	35 (0.050)	35 (0.043)	35 (0.036)	Jatinegara Tanden Area
	〃	—	—	24 (〃)	66 (〃)	142 (〃)	
◎	Jatinegara (B)	55.2 (0.055)	61 (0.055)	61 (0.050)	61 (0.043)	61 (0.036)	
	〃	—	—	27 (〃)	72 (〃)	139 (〃)	
	Cawang	67.9 (0.050)	23 (0.050)	23 (0.048)	23 (0.044)	23 (0.041)	
	〃	—	—	19 (〃)	77 (〃)	223 (〃)	
	Pasar Rebo	38.8 (0.045)	9.1 (0.045)	9.1 (0.041)	9.1 (0.035)	9.1 (0.030)	
	〃	—	—	7.9 (〃)	38.9 (〃)	144.9 (〃)	
	Klender	38.8 (0.040)	7 (0.040)	7 (0.036)	7 (0.031)	7 (0.029)	
	〃	—	—	11 (〃)	53 (〃)	196 (〃)	
	Tebet	126.1 (0.050)	49.5 (0.050)	49.5 (0.045)	49.5 (0.039)	49.5 (0.035)	
	〃	—	—	29.5 (〃)	97.5 (〃)	227.5 (〃)	
	Gandaria	19.4 (0.050)	7.4 (0.050)	7.4 (0.045)	7.4 (0.039)	7.4 (0.035)	
	〃	—	—	8.1 (〃)	31.1 (〃)	90.6 (〃)	



Exchange office loss = 1 dB

Exchange office DC resistance

= 20 Ω

FIG. 7-2-3-(1)

TRANSMISSION LOSS ASSIGNMENT AND DC RESISTANCE ALLOCATION

Table 7.2.4.(1) Electric Characteristics of Junction Cable

Conductor diameter (mm)	Ro (Ω)	Co (nF)	Lo (mH)	G (℧)	Rp (Ω)	Lp (mH)	Non-loading (dB)	Loading (dB)	Remarks
0.4	300	50	0.7	1	7	80	1.69	1.229	Loading type
0.6	130	〃	〃	〃	〃	〃	1.11	0.557	80 mH - 1,500 m
0.8	72	〃	〃	〃	6	〃	0.826	0.322	
0.9	58	〃	〃	〃	〃	〃	0.742	0.267	
1.0	46	〃	〃	〃	〃	〃	0.660	0.219	

7.2.5 Line Distance Limit of Three-Wire System

The distance limit of three-wire system, as shown in Table 7.2.5.(1), is 2.0 km in the case of 0.4 mm conductor.

Table 7.2.5.(1) Distance Limit of 3 Wire System

Conductor diameter	0.4 mm	0.6 mm	0.8 mm	0.9 mm	1.0 mm	Remarks
Distance	2.0 km	4.5 km	4.0 km	4.0 km	3.0 km	DC resistance limit 350Ω single wire

Circuit Section	Distance
Kota (B) → Kota (A)	1.8 km
Kota (B) → Kota (C)	1.7 〃
Kota (T) → Kota (A)	1.8 〃
Kota (T) → Kota (C)	1.7 〃
Semanggi (A) → Semanggi (B)	2.0 〃
Kebayoran (A) → Kebayoran (B)	2.0 〃
Kebayoran (T) → Kebayoran (B)	2.0 〃
Jatinegara (B) → Jatinegara (A)	2.4 〃
Jatinegara (T) → Jatinegara (A)	2.4 〃

7.2.6 Line Distance Limit based on Transmission Loss Assignment and Allowable DC Resistance Limit

The line distance limit based on transmission loss assignment and allowable DC resistance is as shown in Table 7.2.6.(1) and as mentioned previously, the switching office loss and DC resistance in each exchange office have been set at 1 dB and 20 ohm, respectively. The asterisk mark (*) denotes those based on DC resistance limit, and no mark denotes those based on transmission loss.

Table 7.2.6.(1) Distance Limits Based on Transmission Loss Assignment and DC Resistance Allocation

Diameter	R/km	Loss /km	EO → (T)	(T) → EO	EO ↔ MS	EO ↔ EO (2400Ω)	EO ↔ EO (3000Ω)	Toll ↔ EO	Remarks
	Ω	dB	km	km	km	km	km	km	
0.4 mm	(305) 300	(1.229) 1.69	*6.13	3.25	*4.82	*7.74	9.70	4.48	
0.6 mm	(135) 130	(0.557) 1.11	*13.85	7.80	10.77	17.48	21.93	9.87	
0.8 mm	(76) 72	(0.322) 0.826	*24.61	12.42	18.63	31.05	28.95	17.08	
0.9 mm	(62) 58	(0.267) 0.742	*29.96	14.98	32.47	38.06	47.74	20.60	
1.0 mm	(50) 46	(0.219) 0.660	*36.53	18.26	27.40	47.20	59.20	25.11	

* : DC resistance limit
( ): Loading circuit

7.2.7 Line Distance Limit of Non-Loading Circuit

Distance limit of non-loading circuit in each circuit section is shown in Table 7.2.7.(1). In the case of the 0.4 mm conductor cable between E0 and T (tandem office), the cable of up to 4.73 km will be non-loading. In the case of the 0.6 mm conductor cable, the cable of 6.13 km to 7.21 km will be non-loading.

Table 7.2.7.(1) Distance Limits of Non-Loading Circuits

Diameter	Resist-ance	Loss	EO → (T)	(T) → EO	EO → MS	EO ↔ EO (2400Ω)	EO ↔ EO (3000Ω)	Toll ↔ EO	Remarks
mm	Ω/ km	dB/km	km	km	km	km	km	km	
0.4	300	1.69	4.73	2.37	3.55	7.69	7.69	3.25	
0.6	130	1.11	6.13 ~ 7.21	3.25 ~ 3.00	4.82 ~ 5.41	7.74 ~ 11.71	9.70 ~ 11.71	4.48 ~ 4.95	

7.2.8 Kinds of Cables to be Installed

As shown in paragraph 1.4, nearly all the existing junction cables are 1.0 mm conductor 200 pair cables. It is only recently that large size cables of 0.6 mm conductor 600 pairs were introduced in the junction cable network of Jakarta. However, in line with the development of Jakarta City, a large number of junction circuits have become necessary among the various telephone exchange offices. In order to avoid the increase in civil works also, the introduction of large size cables of small diameter conductors should be considered for Jakarta.

It is necessary that PERUMTEL make an early study regarding the following cables:

(a) Early use of 0.4 mm conductor 2,400-pair cable.

(b) Use of large size 0.9 mm conductor cable.

(c) Introduction of 0.5 mm conductor cable.

In the discussion held on May 16, 1974 between PERUMTEL and the JTP, it was agreed upon that the 0.4 mm conductor cable be used from 1983. However, the number of junction circuits will be large in 1979 in the following cable sections. If 0.6 mm conductor cables were to be used, the installation cost would be become tremendous and uneconomical; therefore it is recommended to PERUMTEL that 0.4 mm cables be installed.

JAKARTA KOTA (A) – JAKARTA KOTA (B)	0.4 mm x 2,400 pairs
CAMBIR (A) – GAMBIR (B)	0.4 mm x 2,400 pairs
CAMBIR (A) – JAKARTA KOTA (B)	0.4 mm x 2,400 pairs

Table 7.2.8.(1) Kinds of Cables to be Installed

Diameter / Size	0.4 mm	0.6 mm	0.8 mm	0.9 mm	1.0 mm	Remarks
100	—	—	—	O	O	
200	—	—	O	O	O	
300	—	—	—	O	—	
400	O	O	O	O	—	
600	O	O	O	—	—	
800	O	O	O	—	—	
1200	O	O	—	—	—	
1600	O	—	—	—	—	
1800	O	—	—	—	—	
2400	O	—	—	—	—	

7.2.9 Standard Cable Route

The standard routes for junction cables are shown in Fig. 7.2.9.(1). In the selection of the standard routes for junction cables, the following points were considered.

(a) Trunking diagram (five terminating tandem system).

(b) Selection of routes of the shortest distance.

(c) Concentration of junction circuits in the cable sections.

(d) Selection of routes where there is no problem in civil works.

(e) Selection of routes which are in common with junction cables and subscriber cables.

(f) Selection of straight routes wherever possible with few sharp curves or obstruction.

(g) Exclusion of routes where there is the danger of floods, ground depression or cable creep.

(h) Selection of routes in such a manner that the cables to be terminated will not be concentrated to the large exchange offices.

(i) Select routes which will not give rise to problems in construction and maintenance.

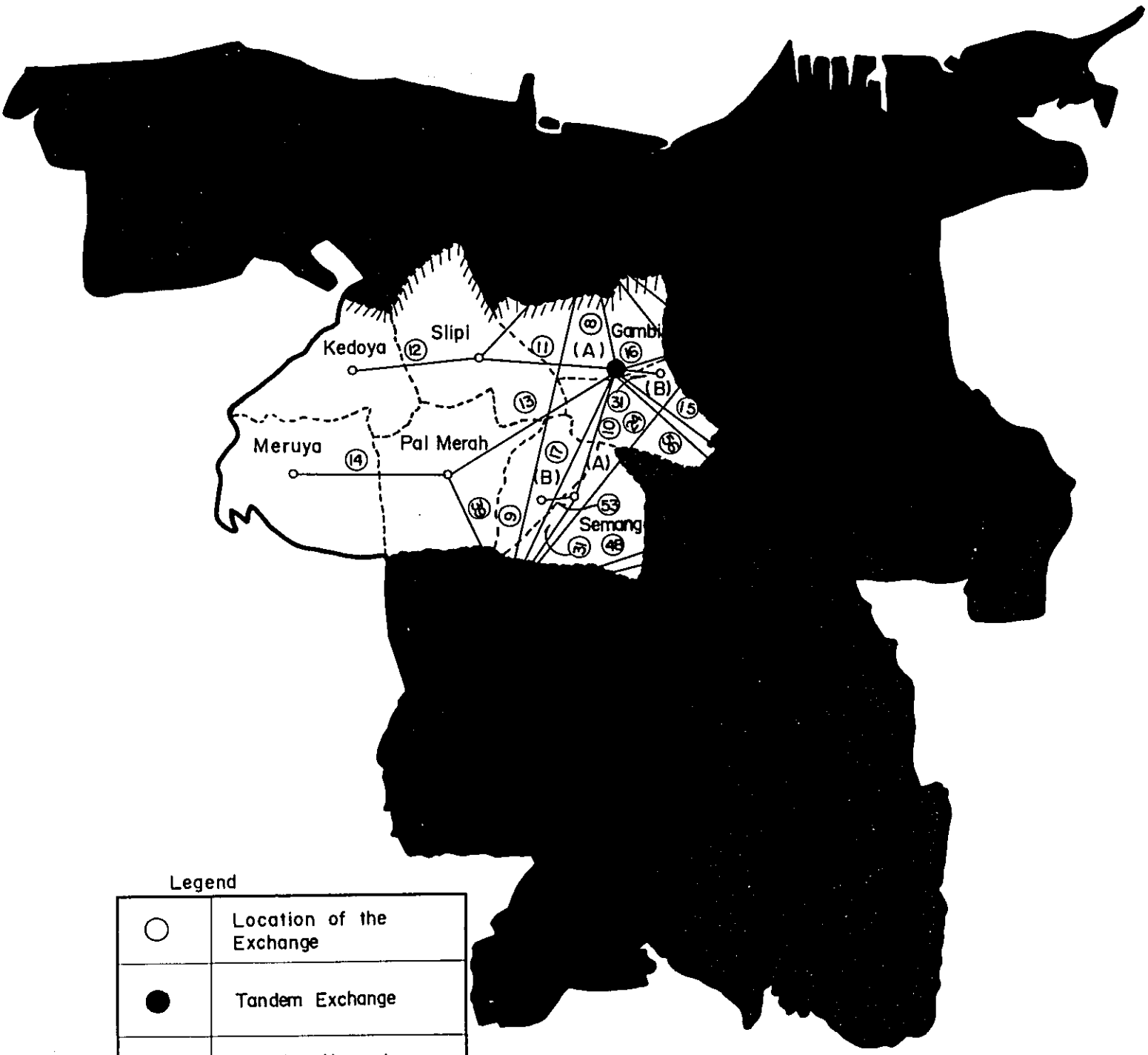
7.3 Trunking Diagram

As mentioned in paragraph 7.2, it must be considered that the existing switching system will continue to be in service for some time to come. Consequently, assumption was made on the composition of the junction cable network shown in Table 7.3.(1).

Furthermore, in determining the tandem plan, the following three plans were prepared.

Table 7.3.(1) Comparison of Trunking Diagrams

	Plan – 1	Plan – 2	Plan – 3
EMD System	5 terminating tandem	5 terminating tandem	5 terminating tandem
NEW System	5 terminating tandem	1 terminating tandem	5 originating tandem
Location of tandem	Kota (B) Gambir (A) Cempaka Putih Kebayoran (A) Jatinegara (B)	Gambir (A)	Kota (B) Gambir (A) Cempaka Putih Kebayoran (A) Jatinegara (B)



Legend

○	Location of the Exchange
●	Tandem Exchange
———	Junction Netwark betwen Exchanges
⑪	Cable Section Number.

FIG. 7-2-9-(1)

CABLE STANDARD ROUTE

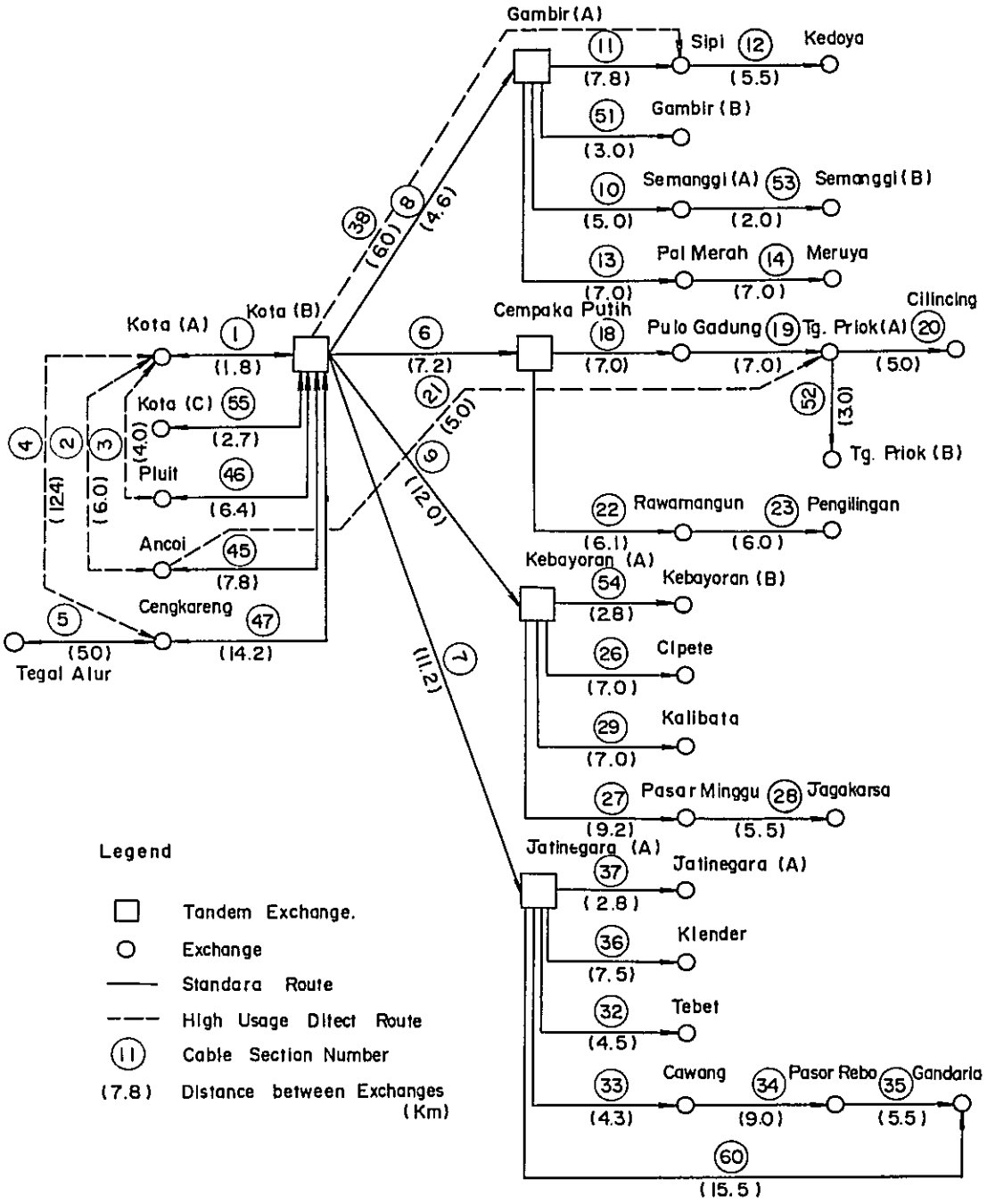


FIG. 7-2-9-(2)

KOTA - O/G

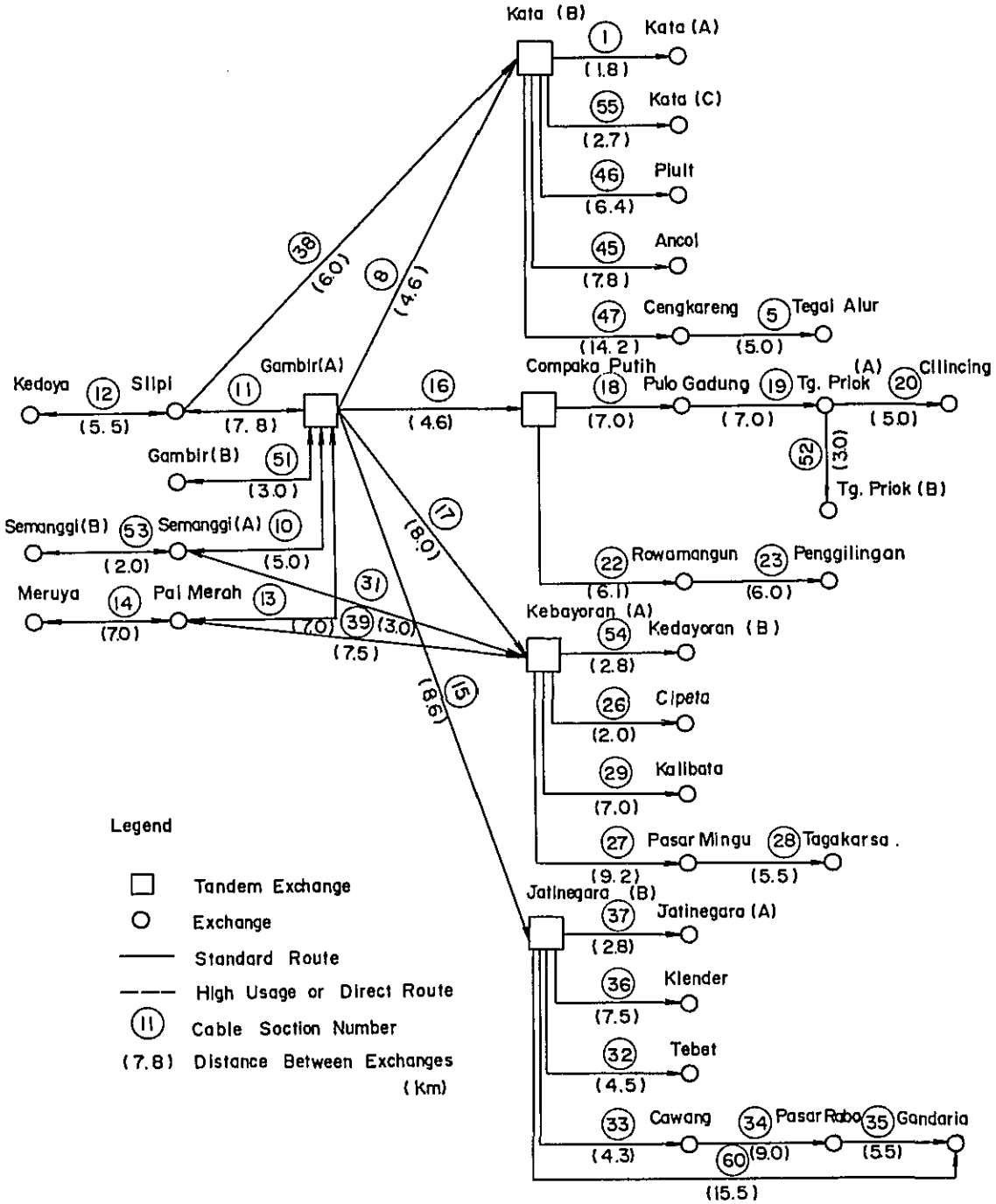


FIG. 7-2-9-(3)

GAMDIR - O/G

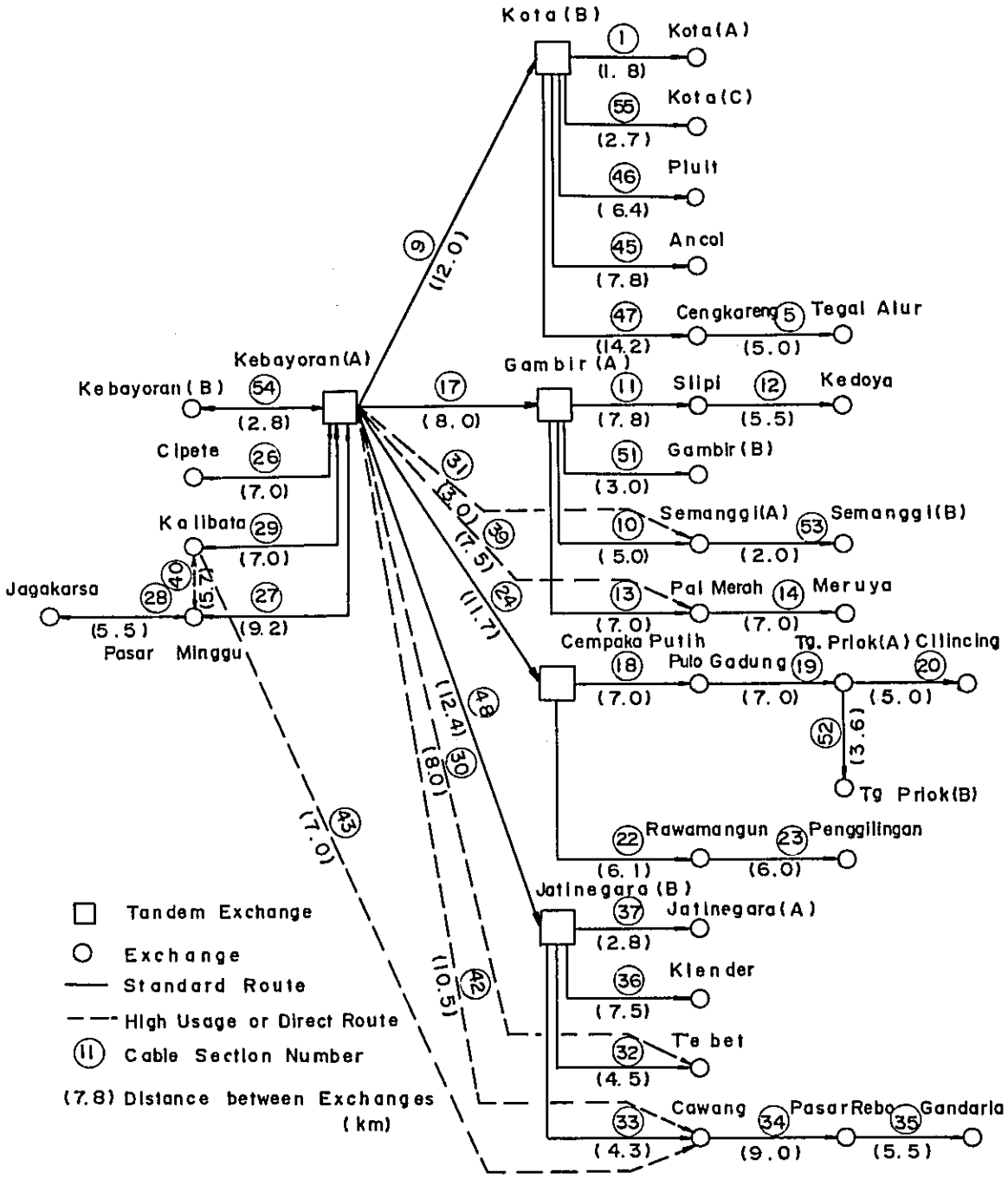


FIG. 7-2-9-(4) KEBAYORN O/G

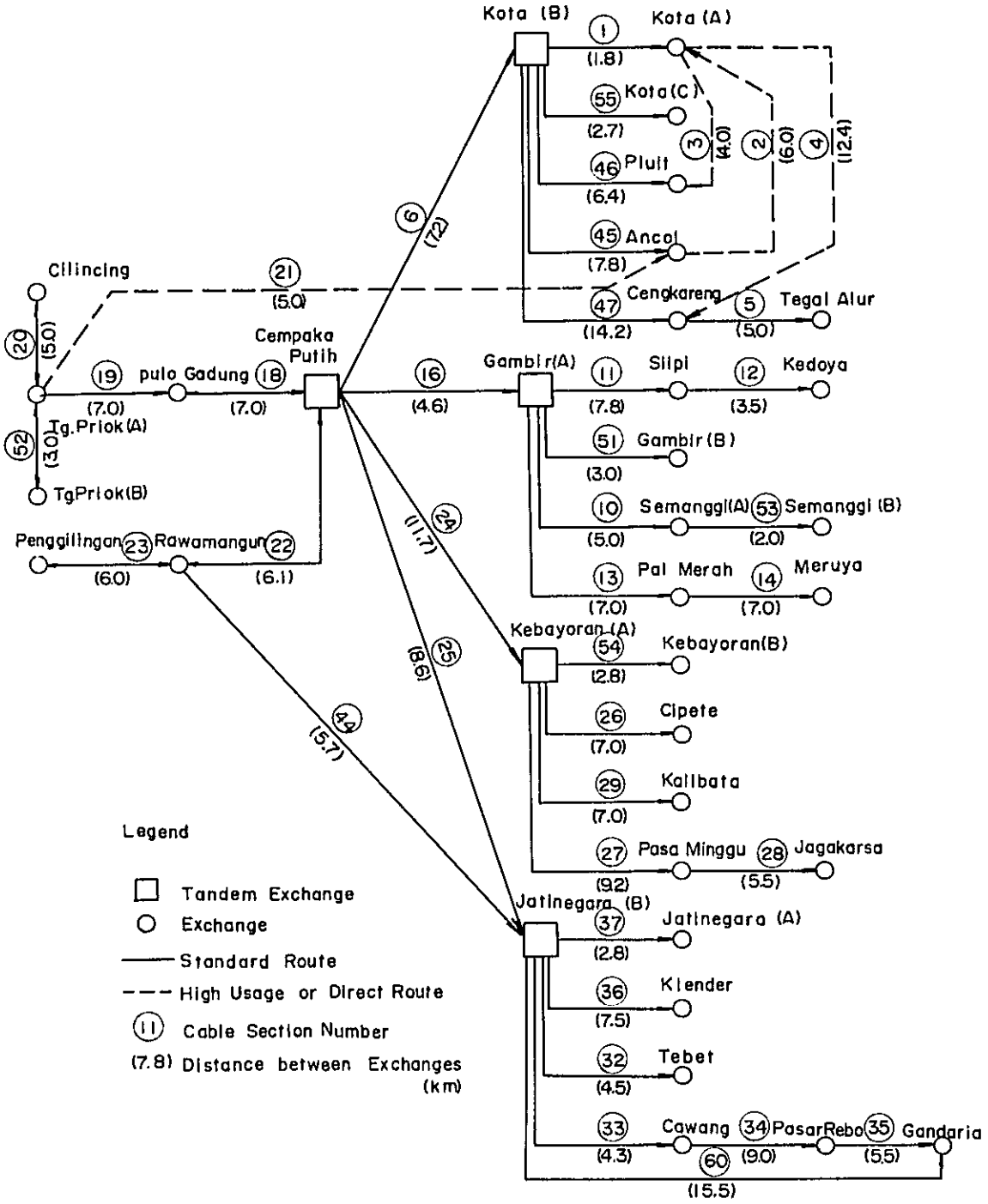


FIG.7-2-9-(5) CEMPAKA PUTIH - O/G

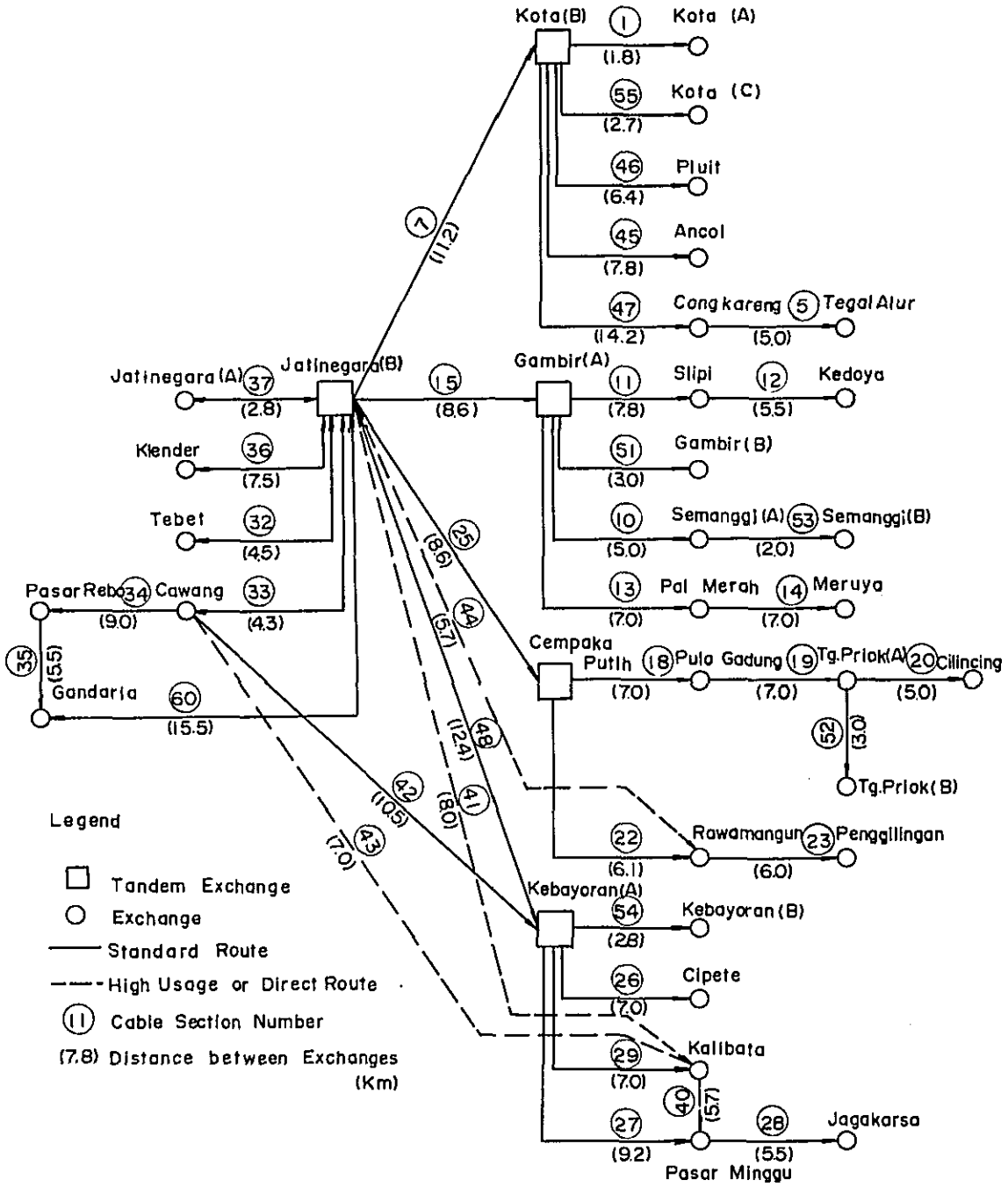


FIG. 7-2-9-(6) JATINEGARA - O/G

* The exchange office location of the EMD tandem switching offices in the Plan No.1 and the Plan No.2 is the same.
* For SLDD and 10X, direct circuits were established between the Toll Office and End Office.

Comparison of the network cost (cables + switching equipment + office building) of these three plans is shown in the table below.

Table 7.3.(2) Comparison of Junction Cable Network Costs

	Plan – 1	Plan – 2	Plan – 3
1983	102	100	105
1988	101	100	104
1993	101	100	103

Index: Plan – 2 --- 100

As can be seen from Table 7.3.(2), the network cost of the Plan No.2 is the lowest, followed in order by the Plan No.1 and the Plan No.3. However, there is hardly any difference in the cost of these plans, and which plan would be most suitable for the composition of the junction cable network cannot be simply be determined solely by cost comparison. Based on the result of a study of the various factors such as switchover from the present system, size of the office building site, road occupancy for civil works, maintenance, etc., it is recommended to adopt the Plan No.1.

7.4 Plan No.1

7.4.1 Junction Circuits

7.4.1.1 Number of Junction Circuits as of 1979, 1983, 1988 and 1993

The number of junction circuits was calculated by use of the computer on the basis of the telephone traffic flow among exchange offices, the tandem plan and the circuit cost.

(a) Object Years

1979, 1983, 1988 and 1993

(b) Classification of Circuit Sections

The number of junction circuits for each circuit section is shown in four combinations of the EMD and new system.

In other words, (EMD - EMD, EMD - NEW, NEW - EMD, NEW - NEW).

(c) Calculation Method

For an alternative routing network with one tandem stage, the determination of the number of the direct junctions and tandem junctions was made by calculation according to the formulas of R.I. Wilkinson, Y. Rapp and the loss formula of A.K. Arlang. (For details, refer to paragraph 6.2.6.)

Table 7.4.1.(1)

T: Terminating
O: Originating

O \ T		EMD		NEW		Toll	
		EO	T	EO	T	SLDD	10X
EMD	EO	EO → EO	EO → T	EO → EO	EO → T	EO → SLDD	EO → 10X
	T	T → EO	—	T → EO	—	—	—
NEW	EO	EO → EO	EO → T	EO → EO	EO → T	EO → SLDD	EO → 10X
	T	T → EO	—	T → EO	—	—	—
SLDD		SLDD → EO	—	SLDD → EO	—	—	—
10X		10X → EO	—	10X → EO	—	—	—

7.4.1.2 Number of Junction Circuits in Each Circuit Section

The number of junction circuits in each circuit section in the Plan No.1 is shown in Table 7.4.1.(2). The number of circuits (67,912) as of 1993 will be approximately three times the number of circuits (22,289) as of 1979. Among the circuit sections (EO - EO, EO - T (tandem), TOLL - EO), the circuit section with the highest rate of increase is the direct circuits between EO and EO, and the number of circuits (29,132) as of 1993 will be to about 6.4 times the number of circuits (4,534) as of 1979. The circuit section with the next highest increase rate is the "SLDD", "10X", and the number of circuits (15,466) as of 1993 will be about 5.6 times the number of circuits (2,759) as of 1979. Furthermore, although the number of tandem circuits (23,314) as of 1993 will be about 1.6 times the number of circuits (14,996) as of 1979, this will be due to the introduction of the new

switching system with common control which will make possible alternative routing, and the trend of increase will become very gradual.

Definition of Circuit Section

Circuit section means the section between switching systems. (For example, EO - EO, EO - T (tandem), TOLL - EO.)

7.4.1.3 Number of Junction Circuits and Non-Loading Circuits of Cable Section According to Conductor Diameter

The conductor diameter of each circuit section is determined on the basis of the previously mentioned DC resistance limit or transmission loss assignment. In principle, the same conductor diamter is utilized in one circuit section, as shown in Fig. 7.4.1.(3). However, when the tandem circuit cost [EO (1) → T(tandem) + T(tandem) → EO (2)] is compared with the direct circuit cost [EO (1) → EO (2)], there may be cases where the tandem circuit cost is lower, since the tandem circuit cost permits the use of different conductor diameters. In this case alone, the cable combination of different size conductor diameters in one circuit section will be applied.

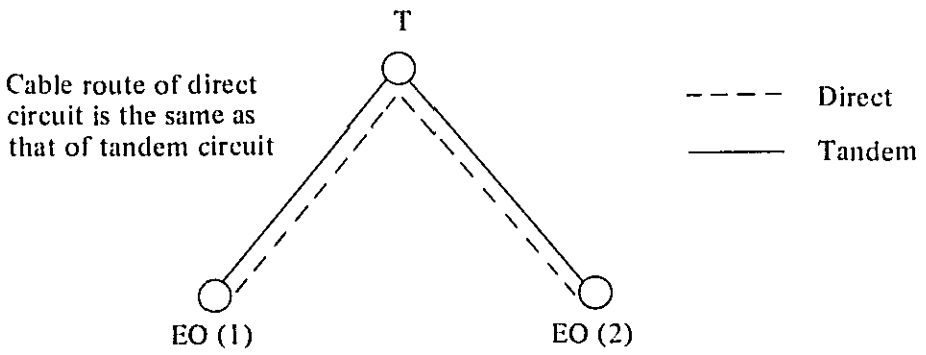


Fig. 7.4.1.(3)

Of all the cable sections, the No.5-1 cable section [Gambir (A) – Gambir (B)] will be the largest with a required number of circuits of 11,422 in 1993. The second is the No.8 cable section [Gambir (A) – Jakarta Kota (B)] with 10,708 and the third will be the No.10 cable section [(Gambir (A) – Semanggi (A)] which will require 7,659 circuits. Especially in regard to the Gambir (A) Exchange Office and the Jakarta Kota (B) Exchange Office, since a large number of cables will have to be terminated, it will be necessary to consider direct cable routes to other main exchange offices without passing through these exchange offices

TABLE 7-4-1-(2) NUMBER OF JUNCTION CIRCUITS BY SYSTEM

( ): Circuits which are originating and terminating within the same exchange office are excluded
lower side: Circuits which are originating and terminating within the same exchange office are included

Plan — No. 1

System \ Year		1979	1983		1988		1993	
		O	O	N	O	N	O	N
Grand total		(22,289) 30,927	(26,693) 23,775	(7,513) 8,356	(29,240) 36,373	(18,529) 20,298	(29,022) 35,643	(38,890) 42,464
EO — T	EO — T_1	2,678	2,389	635	2,098	1,017	1,778	1,322
	EO — T_2	3,491	2,726	869	2,614	1,277	2,197	1,673
	EO — T_3	1,294	1,171	474	1,262	,795	1,303	1,172
	EO — T_4	1,053	870	433	803	763	684	1,019
	EO — T_5	981	932	457	994	855	1,020	1,205
Sub. total		9,497	8,088	2,868	7,771	4,707	6,982	6,391
T — EO	T_1 — EO	(1,110) 3,078	(1,943) 3,089	(225) 257	(1,816) 2,990	(402) 473	(1,570) 2,647	(514) 662
	T_2 — EO	(2,642) 4,037	(2,616) 3,856	(226) 289	(2,676) 3,835	(498) 560	(2,435) 3,353	(762) 886
	T_3 — EO	(699) 1,475	(826) 1,569	(117) 164	(1,043) 1,716	(348) 408	(1,196) 1,792	(617) 672
	T_4 — EO	(327) 1,187	(569) 1,155	(121) 158	(635) 1,149	(274) 336	(646) 1,070	(409) 498
	T_5 — EO	(721) 1,095	(896) 1,263	(135) 172	(1,058) 1,409	(364) 439	(1,218) 1,511	(574) 659
Sub. total		(5,499) 10,872	(6,850) 10,932	(824) 1,040	7,228 11,099	1,886 2,216	(7065) 10,373	(2,876) 3,377
Total		(14,996) 20,369	(14,938) 19,020	(3,692) 3,908	(14,999) 18,870	(6,593) 6,923	(14,047) 17,355	(9,267) 9,768
SLDD, 10X — EO	SLDD — EO	(1,086) 1,236	(1,405) 1,632	(900) 963	1,787) 2,077	(2,552) 2,777	(1,889) 2,225	(6,017) 6,509
	10X — EO	(395) 445	(373) 425	(267) 283	(341) 387	(462) 496	(271) 308	(686) 739
Sub total		(1,481) 1,681	(1,778) 2,057	(1,167) 1,246	(2,128) 2,464	(3,014) 3,273	(2,160) 2,533	(6,703) 7,248
EO — SLDD, 10X	EO — SLDD	(924) 1,049	(1,196) 1,382	(740) 788	(1,495) 1,728	(1,903) 2,054	(1,568) 1,836	(4,155) 4,483
	EO — 10X	(354) 394	(341) 381	(255) 270	(318) 357	(441) 459	(262) 296	(618) 663
Sub total		(1,278) 1,443	(1,537) 1,763	(995) 1,058	(1,813) 2,085	(2,344) 2,513	(1,830) 2,132	(4,773) 5,146
Total		(2,759) 3,124	(3,315) 3,820	(2,162) 2,304	(3,941) 4,549	(5,358) 5,786	(3,990) 4,665	(11,476) 12,394
EO — EO		(4,534) 7,434	(18,440) 10,935	(1,659) 2,144	(10,300) 12,954	(6,578) 7,589	(10,985) 13,623	(18,147) 20,302

as much as possible.

As shown in Table 7.4.1.(4) to (9), the number of circuits in all of the circuit sections as of 1993 will be about 2 to 3 times of those of 1979. In this way, it can be considered that in line with the development of Jakarta City, the number of junction circuits among the required exchange offices will continue to increase.

For this purpose, when laying conduits in consideration of the road construction program, it will be very important to acquire a sufficient number of ductways on the basis of the long-term outside plant circuit network plan.

When considering the number of non-loading circuits, it is clearly seen in Tables 7.4.1.(4) to (9) that the No.51 cable section [Gambir (A) – Gambir (B)] is the largest with 4,955; the second is the No.8 cable section [Jakarta Kota (B) – Gambir (A)] with 4,309; and the third is the No.55 cable section [Jakarta Kota (B) – Jakarta Kota (C)] with 4,284 circuits.

Non-loading circuits remain only in a part of the cables with 0.4 mm and 0.6 mm conductors, and loading coils are inserted in all circuits with cables of 0.8 mm, 0.9 mm and 1.0 mm conductors.

7.4.1.4 Total Number of Junction Circuits and Number of Non-Loading Circuits

As shown in Table 7.4.1.(10), the ratio of loaded circuits to circuits of 0.4 mm conductor as of 1979 is approximately 21% and for 0.6 mm conductor circuits is about 80%. In regard to circuits of other conductor diameters, it will be 100% loaded. Further, the circuit composition ratios according to conductor diameters are 27.4% for 0.4 mm, 48.2% for 0.6 mm, 18.8% for 0.8 mm, 3.6% for 0.9 mm and 2.0% for 1.0 mm conductor cables.

The total number of circuits according to conductor diamter in Table 7.4.1.(10) was calculated on the basis of the DC resistance limit and transmission loss assignment mentioned previously. It is, however, very uneconomical to lay cables of different conductors strictly following the results of such theoretical calculation. Therefore, the actual number of circuits according to conductor diameter would differ from that obtained from the theoretical calculation.

After calculating the required number of circuits according to conductor diameters, the actual conductor diameters were determined from the viewpoint of economy as described in the following paragraph 7.4.2.1.

TABLE 7—4—1-(4)

NUMBER OF JUNCTION CIRCUITS AND NON-LOADING CIRCUITS IN EACH SECTION BY CONDUCTOR DIAMETER (1/6)

Plan-NO.1

Section NO.	Cable Section	Distance (Km)	1979						1983						1988						1993					
			0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total
①	Kota (A)		(1934) 1934	(364) 855				2298 2789	(1,742)	(333)				2,075	(1,711)	(297)				2008	(1,591)	(267)				(1,858)
	~ Kota (B)	1.8	(826) 1826	(316) 737				2242 2563	1804	877				2681	1,922	974				2896	2032	1134				3,166
②	Kota (A)		(73) 73	(37) 37	27			(110) 137	(102)	(57)				(159)	(119)	(110)				(229)	(136)	(161)				(297)
	~ Ancol	6.0	(63) 63	(29) 29	16			(92) 108	102	82	45			229	119	181	53			353	136	323	82			541
③	Kota (A)		(113) 113	(37) 79	10			(150) 202	(124)	(99)				(223)	(126)	(71)				(197)	(120)	(85)				(205)
	~ Pluit	4.0	(95) 95	(29) 43	9			(124) 147	124	99	23			246	126	138	26			290	120	223	21			364
④	Kota (A)		109	37				146																		
	~ Cengkareng	12.4	44	25				69		120	60			180		166	69			235		208	103			311
⑤	Cengkareng		(11) 11	11	70	7	51	(11) 150	(20)					(20)	(27)					(27)	(39)					(39)
	~ Tegal Alur	5.0	(6) 6	11	64	6	40	(6) 127	20	52	135	12	93	312	27	84	171	20	147	449	39	130	229	35	245	678
⑥	Kota (B)			(539) 725	140	7		(539) 872	(20)	(491)				(511)	(98)	(526)				(624)	(200)	(512)				(712)
	~ Cempaka Putih	7.2		(488) 682	67	6		(488) 755	45	851	123	12		1,031	179	1036	171	20		1406	334	1,334	212	35		1,915
⑦	Kota (B)			569	383	50	7	1,009														(11)				(11)
	~ Jatinegara(B)	11.2		289	169	19	5	482		511	262	14	33	820		756	325	22	51	1154		1,211	408	39	71	1,729
⑧	Kota (B)		(1637) 1637	(628) 2760	348	71	22	2265 4838	(1,569)	(892)				2461	(2067)	(1273)				3340	(2546)	(1763)				(4309)
	~ Gambir (A)	4.6	(525) 1,525	(559) 2,315	204	28	18	2084 4090	1,952	2,703	654	64	42	5,415	2919	3,635	940	114	70	7,678	4,170	4882	1311	221	124	10,708
⑨	Kota (B)			474	169	75	18	736																		
	~ Kebayoran(A)	12.0		432	131	28	15	606		487	241	32	12	772		596	293	44	16	949		740	339	69	18	1,166
⑩	Gambir(A)		(402) 402	(623) 2799				(1025) 3201	(471)	(532)				1,003	(659)	(603)				1262	(938)	(729)				(1,667)
	~ Semanggi(A)	5.0	(341) 341	(405) 1,824				(746) 2165	540	2,133	379	129		3,181	944	3391	449	153		4937	1,745	5213	519	182		7,659

( ) : Number of non-loading circuits

TABLE 7-4-1-(5)

NUMBER OF JUNCTION CIRCUITS AND NON-LOADING CIRCUITS IN EACH CABLE SECTION BY CONDUCTOR DIAMETER (2/6)

Plan-NO.1

Section NO.	Cable Section	Distance (Km)	1979						1983						1988						1993					
			0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total
⑪	Gambir (A) ~ Slipi	7.8		(442) 980	585			(442) 1,565		(246)				(246)		(248)				(248)		(238)				(238)
				(427) 916	509			(427) 1425	21	1,154	604	39		1,818	67	1,645	707	72	4	2495	145	2413	790	142	29	3519
⑫	Slipi ~ Kedoya	5.5							(19)					(19)	(28)					(28)	(47)	(10)				(57)
									19	103	65	39		226	28	190	118	72		408	47	417	249	142		855
⑬	Gambir (A) ~ Pal Merah	7.0	(151) 151	(223) 1,077	131			(374) 1,359	(116)					(116)	(166)					(166)	(224)					(224)
			(79) 79	(88) 439	47			(167) 565	129	520	249	43		941	223	864	489	79		1655	370	1716	661	147		2894
⑭	Pal Merah ~ Meruya	7.0							(14)					(14)	(22)					(22)	(41)					(41)
									14	92	124	43		273	22	164	210	79		475	41	375	357	147		920
⑮	Gambir (A) ~ Jatinegara(B)	8.6		1,874	639		91	2604		(22)				(22)		(33)				(33)		(28)				(28)
				821	241		44	1,106		1063	439	169	100	1771	33	1,531	870	216	186	2836	65	2613	1605	263	400	4946
⑯	Gambir (A) ~ Cempaka Putih	4.6	(581) 581	(95) 815	291	100	26	(676) 1,813	(648)	(295)				(943)	(765)	(455)				(1,220)	(1,042)	(682)				(1,724)
			(488) 488	(78) 630	318	136	24	(566) 1,596	672	791	720	173	199	2555	931	1,321	1,158	384	409	4203	1,371	2305	1,951	767	886	7280
⑰	Gambir (A) ~ Kebayoran(A)	8.0		1,191	634	20	88	1933		(9)				(9)		(9)				(8)		(18)				(18)
				988	387	14	44	1433		1,134	675		96	1,905	40	1,470	952		151	2613	98	1,804	1,355		252	3514
⑱	Cempaka Putih ~ Pulo Gadung	7.0	(48) 48	334	768	169	42	(48) 1361	(34)					(34)	(39)					(39)	(49)					(49)
			(14) 14	142	811	205	37	(14) 1209	37	322	602	783	300	2044	45	649	958	1436	427	3515	60	1293	1,711	2596	636	6296
⑲	Pulo Gadung ~ Tg. Priok	7.0	(27) 27	(9) 84	595	169	42	(36) 917	(18)	(16)				(34)	(37)	(34)				(71)	(62)	(60)				(122)
			(11) 11	(5) 103	772	205	37	(16) 1128	18	223	561	775	300	1877	37	494	867	1426	427	3251	62	1,022	1470	2586	626	5766
⑳	Tg. Priok (A) ~ Cilincing	5.0	(15) 15	(9) 9	76	14	68	(24) 182	(29)	(15)				(44)	(66)	(15)				(81)	(121)	(47)				(168)
			(20) 20	(5) 5	73	9	61	(25) 168	44	38	158	17	133	390	103	63	223	27	227	643	227	177	318	47	396	1,165

TABLE 7-4-1-(6)

NUMBER OF JUNCTION CIRCUITS AND NON-LOADING CIRCUITS IN EACH CABLE SECTION BY CONDUCTOR DIAMETER ($^3/_6$)

Plan-NO. 1

Section NO	Cable Section	Distance (Km)	1979						1983						1988						1993					
			0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total
(21)	Tg. Priok (A) ~ Ancol	5.0		153	20			173	(11)	(12)				(23)	(52)	(52)				(104)	(130)	(101)				(231)
				231	20			251	21	377	82			480	100	715	94			909	243	226	169			1638
(22)	Cempaka Putih ~ Rawamangun	6.1	(49) 49	370	140			(49) 559	(89)					(89)	(116)					(116)	(150)					(150)
			(54) 54	413	149			(54) 616	102	664	321	6		1093	170	1051	628	6		1855	267	1668	1,187	6		3128
(23)	Rawamangun ~ Penggilingan	6.0							(16)					(16)	(20)					(20)	(33)	(18)				(51)
									16	52	154	6		228	29	129	321	6		485	55	452	648	6		1161
(24)	Cempaka Putih ~ Kebayoran (A)	11.7		158	105	35	8	306								(6)				(6)		(21)				(21)
				138	77	42	7	264		152	153	63	12	380		196	227	99	17	539		274	355	138	25	792
(25)	Cempaka Putih ~ Jatinegara (B)	8.6		403	202	14		619								(7)				(7)		(7)				(7)
				209	110	9		328		308	104	66		478	21	434	207	95		757	38	661	362	173		1234
(26)	Kebayoran (A) ~ Cipete	7.0	(98) 98	301	383			(98) 782	(72)	(14)				(86)	(83)	(23)				(106)	(83)	(24)				(107)
			(49) 49	108	157			(49) 314	83	219	279			581	105	349	390			844	163	579	529			271
(27)	Kebayoran (A) ~ Pasar Minggu	9.2								(44)				(44)		(48)				(48)		(47)				(47)
									6	143	228	53	96	526	9	173	317	67	151	717	15	272	421	119	252	1079
(28)	Pasar Minggu ~ Jagakarsa	5.5	(11) 11	(7) 7	31	26	67	(18) 142	(18)	(21)				(39)	(23)	(27)				(50)	(29)	(33)				(62)
			(6) 6	(7) 7	23	20	43	(13) 99	18	73	56	53	36	236	23	88	76	67	52	306	29	107	116	119	87	458
(29)	Kebayoran (A) ~ Kalibata	7.0	(66) 66	(64) 330	495	321	133	(130) 1345	(93)	(32)				(125)	(107)	(64)				(171)	(119)	(109)				(228)
			(72) 72	(31) 248	372	98	71	(103) 861	93	397	378			868	107	718	510			1335	119	1,144	780			2043
(30)	Kebayoran (A) ~ Tebet	8.0		91				91							(9)					(9)	(10)					(10)
				40				40		54				54	9	94				103	31	168				99

TABLE 7-4-1-(7) NUMBER OF JUNCTION CIRCUITS AND NON-LOADING CIRCUITS IN EACH CABLE SECTION BY CONDUCTOR SIZE ($^{4}/_{6}$)

Plan-NO. 1

Section NO.	Cable Section	Distance (Km)	1979						1983						1988						1993					
			0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total
(31)	Kebayoran (A) ~ Samanggi (A)	3.0	(167) 167 (118) 118					(167) 167 (118) 118	202 202	(8) 8				(210) 210	(251) 316	(36) 66				(287) 382	(366) 448	(76) 233				(442) 681
(32)	Jatinegara (B) ~ Tebet	4.5	234 234 (66) 66	(73) 309 (18) 515	323 137			(307) 1866 (84) 718	(128) 138	(17) 737	239			(45) 114	(158) 187	(20) 1099	388			(178) 1674	(188) 259	(22) 1622	579			(210) 2460
(33)	Jatinegara (B) ~ Cawang	4.3	190 190 (54) 54	598 218	412 155	141 39	54 22	(190) 395 (54) 488	(109) 139	445	310	110	115	(109) 119	(145) 197	822	498	187	201	(145) 1905	(202) 298	1675	978	324	399	(202) 3674
(34)	Cawang ~ Pasar Rebo	9.0		(29) 88 (9) 28	200 63	141 39	54 22	(29) 483 (9) 152	6	149	191	133	115	594	18	221	284	224	201	948	58	451	505	367	399	1780
(35)	Pasar Rebo ~ Gandaria	5.5							(24) 24	41	77	80	65	(24) 287	(31) 31	66	92	127	105	(31) 421	(54) 54	125	155	167	170	(54) 671
(36)	Jatinegara (B) ~ Klender	7.5	(52) 52 (11) 11	(14) 83 (7) 25	330 94			(66) 465 (18) 130	(31) 31	86	229			(31) 346	(44) 44	153	441			(44) 638	(66) 66	579	838			(66) 1483
(37)	Jatinegara (B) ~ Jatinegara (A)	2.8	(581) 590 (470) 477	(14) 59 (7) 48				(595) 649 (477) 525	(177) 685	186	36			(177) 907	(215) 842	214	53			(215) 1109	(261) 1051	(8) 284	63			(269) 1398
(38)	Kota (B) ~ Slipi	6.0							(18) 272	(15) 34				(33) 306	(91) 403	(22) 83				(113) 486	(176) 533	(31) 197	4			(207) 734
(39)	Kebayoran (A) ~ Pal Merah	7.5								34	13			47	(8) 8	61	22			(8) 91	(34) 34	136	33			(34) 203
(40)	Kalibata ~ Pasar Minggu	5.7	(23) 23 (13) 13	(71) 71 (38) 38	192 81	321 98	133 71	(94) 740 (51) 301	(34) 34	(21) 21	41			(55) 96	(45) 45	(27) 27	65			(72) 137	(59) 59	(33) 81	91			(92) 231

TABLE 7-4-1-(8) NUMBER OF JUNCTION CIRCUITS AND NON-LOADING CIRCUITS IN EACH CABLE SECTION BY CONDUCTOR SIZE (5/6)

Plan-NO. 1

Section NO.	Cable Section	Distance (Km)	1979						1983						1988						1993					
			0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total
(41)	Kalibata ~ Jatinegara(B)	8.0								59	41			100	8	71	65			144	32	(6) 125	86			(6) 243
(42)	Kebayoran(A) ~ Cawang	10.5								39	21	23		83		(7) (61)	36	37		(7) 134		(34) 134	49	43		(34) 226
(43)	Kalibata ~ Cawang	7.0													(26) 26					(26) 26	(90) 90	92	5			(90) 187
(44)	Jatinegara(B) ~ Rawamangun	5.7							51	13				64	(18) 108	30				(18) 138	(42) 226	(26) 186	6			(68) 418
(45)	Kota(B) ~ Ancol	7.8		(219) 514	506			(219) 1020	72	(260) 791	631			(260) 1494	157	(290) 1251	884			(290) 2292	315	(278) 1928	1248			(278) 3491
				(194) 534	382			(194) 916																		
(46)	Kota(B) ~ Pluit	6.4	(276) 276	558	195			(276) 1029	(193) 271	(53) 544	266			(246) 1041	(235) 337	(40) 683	321			(275) 1341	(274) 392	(31) 812	422			(305) 1626
			(240) 240	411	133			(240) 784																		
(47)	Kota(B) ~ Cengkareng	14.2		144	206	281	51	682		144	174	175	93	586		226	243	295	147	911		436	343	510	245	1534
				51	91	84	40	266																		
(48)	Kebayoran(A) ~ Jatinegara(B)	12.4		283	212	128	14	637		144	108			252		170	157			327		187	171			358
				134	81	40	7	262																		
(49)																										
(50)																										

TABLE 7-4-1-(9) NUMBER OF JUNCTION CIRCUITS AND NON-LOADING CIRCUITS IN EACH CABLE SECTION BY CONDUCTOR SIZE (6/6)

Plan - NO. 1

Section NO.	Cable Section	Distance (Km)	1979						1983						1988						1993					
			0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total
(51)	Gambir (A)	3.0	(1468) 4126	(623) 2084				(2091) 6210	(1927) 3902	(532) 2037	16			(2459) 5955	(2872) 5573	(519) 2477	△0			(3391) 8090	(4347) 7990	(608) 3373	59			(4955) 11422
	Gambir (B)		(1255) 2963	(405) 1415				(1660) 4378																		
(52)	Tg. Priok (A)	3.0							(72) 125	(23) 240	209	197	214	(101) 985	(167) 300	(28) 451	344	378	291	(195) 1754	(358) 687	(52) 800	717	819	△30	(410) 3453
	Tg. Priok (B)																									
(53)	Semanggi (A)	2.0													(404) 573	(164) 211	46			(568) 1830	(588) 875	(158) 1798	69			(746) 2742
	Semanggi (B)																									
(54)	Kebayoran (A)	2.8							(160) 535	82	172			(160) 789	(188) 736	113	265			(188) 1114	(217) 943	174	366			(217) 1483
	Kebayoran (B)																									
(55)	Kota (B)	1.7							2654 3403	889				(2654) 4292	2799 4021	1371				(2799) 5392	(4206) 4495	(78) 2014				(4284) 6309
	Kota (C)																									
(56)	Jatinegara (A)	5.8	112	149				261	(15) 166	129				(15) 295	(60) 261	(13) 216				(73) 477	(90) 355	(48) 377				(138) 732
	Gambir (A)		107	148				255																		
(57)																										
(58)																										
(59)																										
(60)	Jatinegara (B)	15.5		41	127	40	82	290					50	50					90	90					171	171
	Gandaria			15	60	24	41	140																		

TABLE 7-4-1-(10) TOTAL NUMBER OF JUNCTION CIRCUITS AND NON-LOADING CIRCUITS

Plan-NO.1

Year	Diameter	Number of Circuits	Number of Non-Loading Circuits	Loading Circuits Rate	Composition Rate
1979	0.4	8742	6876	21.3	27.4
	0.6	13405	3145	79.6	48.2
	0.8	6003	0	100.0	18.8
	0.9	1149	0	100.0	3.6
	1.0	649	0	100.0	2.0
	Total	31948	10021	68.6	100.0
1983	0.4	15936	10975	31.1	29.2
	0.6	22646	4059	32.0	41.5
	0.8	10608	0	100.0	19.4
	0.9	3309	0	100.0	6.1
	1.0	2104	0	100.0	3.8
	Total	54603	15034	72.5	100.0
1988	0.4	22592	13109	42.0	27.5
	0.6	34438	4961	85.6	41.9
	0.8	16063	0	100.0	19.5
	0.9	5752	0	100.0	7.0
	1.0	3370	0	100.0	4.1
	Total	82215	18070	78.0	100.0
1993	0.4	31282	19328	38.2	24.8
	0.6	53908	6460	88.0	42.7
	0.8	25045	0	100.0	19.8
	0.9	10209	0	100.0	8.1
	1.0	5861	0	100.0	4.6
	Total	126305	25788	79.6	100.0

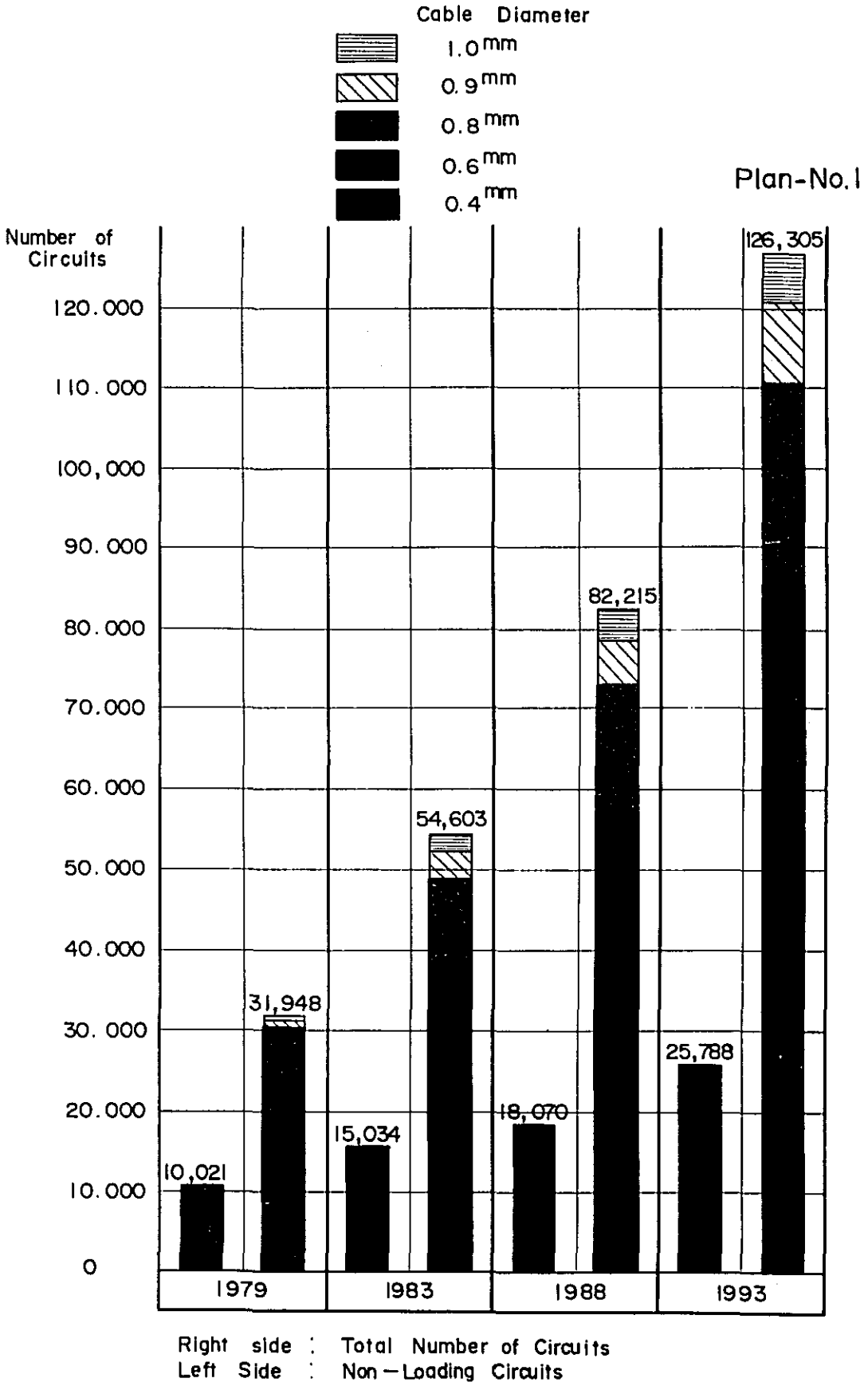


FIG. 7-4-1-(11)

TOTAL NUMBER OF JUNCTION CIRCUITS AND NON-LOADING CIRCUITS

7.4.2. Junction Cable

7.4.2.1 New Cables by Conductor Diameter and Cable Section

Based on the number of circuits of each conductor diameter and circuit sections as described in Tables 7.4.2.(1) to (12), the miscellaneous circuits such as telegraph circuits, telex circuits, leased circuits, etc. will be added and in consideration of the transmission loss and DC resistance limit, the cables to be newly installed will be determined.

In the case of a certain circuit section where almost all the circuits are of small size conductor and only a small number of circuits are of large size conductor, the cables of large size conductor can be replaced with those of economical size conductor which satisfy the limit value of the transmission loss, through application of new technologies, such as improvement of telephone set, or adoption of less severe limit value.

In principle, the pair number of the cable of each conductor diameter shall be the maximum one. However, in case the total number of circuits 15 years hence is less than the maximum number of pairs of the cable, the number of cable pairs which can satisfy the total number of circuits [(telephone circuits + miscellaneous circuits) x 1.2] will be applied. Futhermore, in calculating the number of circuits after 1993, the decision will be made by an extended provision period of 15 years on the assumption that the circuit increase rate in the five years from 1988 to 1993 will continue in the future.

As one example of a fundamental cable decision, let us look at the cable section No.5 between the Cengkareng Exchange Office and the Tegar Alur Exchange Office. The circuits to be accommodated in this cable section have various DC resistances and transmission losses. Theoretically, it is possibly to lay the cables having various diameter conductors suitable to the respective DC resistances and transmission losses. Actually, however, it is uneconomical to lay the cables of various conductors. Therefore, cables of the maximum diameter conductor will be laid in this cable section in order to satisfy all the conditions. In other words, the 1.0 mm x 200-pair cables will be laid as indicated in Table 7.4.2.(1).

Since this cable, however, cannot accommodate the total number of circuits (414) required by 1983, the 0.8 mm x 400-pair cable will be laid for circuits with conductor diameters of 0.4 mm, 0.6 mm and 0.8 mm. In this case, although the maximum cable size of the 0.8 mm is 800 pairs, it was planned that 400-pair cables be laid so as not to have too many spare pairs of the 0.8 mm conductor cables when the 0.6 mm conductor cables are installed additionally in the future.

Furthermore, in the case of cable section No.6 [Jakarta Kota (B) – Cempaka Putih], although the necessary number of circuits of 0.9 mm conductor cable is 10 circuits, this number is very small and there seems hardly any trend of increase in the future. In such case a restudy will be made on the DC resistance and transmission loss assignment among the exchange offices (EO → EO, EO → T, T → EO, EO → TOLL) as to whether or not it would be

possible to use 0.8 mm conductor cable instead of the 0.9 mm conductor cable, but ultimately the decision will be for use of 0.8 mm conductor cable. Of course, the use of two-way repeaters, etc. will be considered but the case may arise where it will be required to provisionally acknowledge a slight excess in allowable transmission loss assignment value.

Fundamentally, in order to avoid the increase in number of cables, 1.0 mm conductor cables are not used between tandem exchanges.

7.4.2.2 Proposed Cable Diagram for New Junction Cables

Based on the junction cables to be newly installed in the various cable sections described in the preceding paragraph 7.4.2.1, the Proposed Cable Diagrams for 1979 and 1993 were prepared. [Refer to Fig. 7.4.2.(13) and Fig. 7.4.2.(14).]

7.4.2.3 Amount of Work According to Number of Cable Pairs

The total cable length by 100-pair conversion of the existing cables up to 1974 was approximately 550 km, but in line with the increase in telephone demand in Jakarta, about 4,400 km of junction cables must be installed by 1979.

In the event the index of the 100-pair conversion cable length as of 1974 was set at 100, it will be 895 as of 1979, 1,165 as of 1983, 1,484 as of 1988 and 2,099 as of 1993.

The ratios of the 100-pair conversion cable lengths of the existing cables as of 1974 were 45.3% for 0.6 mm conductor cables, only 4% for 0.8 mm conductor cables while the balance of 50.7% was 1.0 mm conductor cables.

On the other hand, the ratios of 100-pair conversion cable lengths of 0.4 mm, 0.6 mm, 0.8 mm, 0.9 mm and 1.0 mm conductor cables as of 1993 will be 13.2%, 45.6%, 25.3%, 12.3% and 3.6%, respectively.

Although the installation of about 4,400 km of 100-pair conversion cable length is requested by 1979, the 100-pair conversion cable lengths to be expanded thereafter in the 3rd and 4th Five-Year Plans are 1,500 km and 1,800 km, respectively. During the duration of the 5th Five-Year Plan, 3,400 km of 100-pair conversion cable length will be extended. This is about twice of that of the 4th Five-Year Plan.

In Table 7.4.2.(15), the total cable length under the 2nd Five-Year Plan shows a very high figure.

In order to avoid the increase in the number of cables in the cable routes, this plan considers the laying of cables with the maximum cable size. As shown in 7.4.2.(15), the composition ratio of maximum size cables will be about 87% at 100-pair conversion cable length. As mentioned previously, in order not to hold too many spare pairs over a long period, there may be cases where cables of other than maximum cable size will be laid but this will be 13% at 100-pair conversion cable length.

TABLE 7-4-2-(1)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (1/12)

Plan-No.1

SECTION NO	NAME OF EXCHANGE	DISTANCE (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
①	KOTA (A) ~ KOTA (B)	1.8	(2410) 2,553	(973) 1,128				2381	1,158				2,537	1,286				2683	1,497			
			* 2,400	1,200				2,400	1,200				2,400	1,200 x2				2,400	1,200 x2			
②	KOTA (A) ~ ANCOL	6.0	(83) 97	(38) 49	(21) 36			135	109	60			157	239	70			180	427	109		
									600					600					600			
					200					200					200					200		
③	KOTA (A) ~ PLUIT	4.0	(125) 150	(57) 105	(12) 14			164	131	31			169	182	35			158	295	28		
																				400		
					400					400					400				800			
④	KOTA (A) ~ CENGKARENG	12.4		(58) 144	(33) 49				159	80				220	91				275	135		
					600					600					600					600		
⑤	CENGKARENG ~ TEGAL ALUR	5.0	(8) 15	(15) 15	(84) 93	(8) 10	(53) 68	27	69	179	16	123	30	111	226	26	144	52	172	302	47	324
							200					200					200			400		200x2
										400					400				400			

( ) : J.T.P ESTIMATION

LOWER SIDE : BASED ON PERUMTEL SUPPLY PLAN

TABLE 7-4-2-(2)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (2/12)

Plan-No. 1

SECTION NO	NAME OF EXCHANGE	DISTANCE (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(6)	KOTA (B) ~ CEMPAKA PUTIH	7.2		(900) 957	(88) 185	(8) 10		60	1,124	163	16		237	1,368	226	27		441	1,761	280	47	
				1,200					1,200					1,200 x2					1,200 x2			
					400					400					400					400		
(7)	KOTA (B) ~ JATINEGARA (B)	11.2		(381) 751	(223) 506	(25) 66	(7) 10		675	346	18	44		998	429	29	67		1,599	539	51	94
				1,200	600				1,200	600				1,200	600				1,200 x2	600		
						200					200					200					200	
(8)	KOTA (B) ~ GAMBIR (A)	4.6	(2013) 2,161	(3056) 3,644	(269) 460	(37) 94	(24) 29	2577	3,568	863	84	55	3853	4798	1241	150	92	5504	6444	1,731	292	164
				1,200 x3														2,400 x2	1,200 x6			
			2,400		800			2,400 x2	1,200 x3	800			2,400 x2	1,200 x4	800 x2					800 x3		
						400					400					400					400	
(9)	KOTA (B) ~ KEBAYORAN (A)	12.0		(570) 626	(173) 223	(37) 99	(20) 24		643	318	42	16		787	387	58	21		977	447	91	24
				1,200	600				1,200	600				1,200	600				1,200	600		
						200					200					200					200	
(10)	GAMBIR (A) ~ SEMANGGI (A)	5.0	(450) 531	(2,408) 3695				713	2816	500	170		1,246	4,476	593	202		2,303	6881	685	240	
				1,200 x4					1,200 x4	800	300		2,400	1,200 x4	800	300		2,400	1,200 x4	800	300	
				(1,200 x3)					(1,200 x3)													

TABLE 7-4-2-(3)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (3/12)

Plan-No.1

SECTION NO.	NAME OF EXCHANGE	DISTANCE (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(11)	GAMBIR (A) ~ SLIPI	7.8		(1,209) 1,294	(672) 773			28	1,523	797	51		88	2,171	933	95	5	191	3,185	1,043	188	38
				1,200					1,200 x2	800				1,200 x2	800				1,200 X3	800		
					800						400					400					400	
(12)	SLIPI ~ KEDOYA	5.5						25	136	86	51		37	251	156	95		62	550	329	187	
											300					300				600	300	
														1,200					1,200			
(13)	GAMIR (A) ~ PAL MERAH	7.0	(104) 200	(579) 1,422	(62) 173			170	686	395	57		294	1,140	645	104		488	2265	873	194	
				1,200					1,200	800	200			1,200					1,200 x2	800 400	200	
					800										800	200						
(14)	PAL MERAH ~ MERUYA	7.0						18	121	164	57		29	216	277	104		54	495	471	194	
										600	200				600	200				600	200	
																			1,200			
(15)	GAMBIR (A) ~ JATINEGARA (B)	8.6		(1,084) 2,474	(312) 844		(58) 121		1,403	579	223	132	44	2,021	1,148	285	246	86	3,449	2,119	347	528
				1,200 x2					1,200 x2	800				1,200 x2	800 x2				1,200 x2	800 x3		
				1,200	800						400					400 x2					400 x3	
						400																

TABLE 7-4-2-(4)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (4/12)

Plan-NO.1

Section NO.	Name of Exchange	Distance (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
⑯	Gambir (A) ~ Cempaka Putih	4.6	(644) 767	(832) 1076	(420) 385	(180) 132	(32) 35	887	1,044	950	228	263	1,299	1,744	1,529	507	540	1,810	3043	2575	1,012	1,170
				1,200 x2	800	400			1,200 x2	800 x2	400 x2		2400	1,200 x2	800 x2	400 x3		2,400	1,200 x3	800 x4	400 x6	
⑰	Gambir (A) ~ Kebayoran (A)	8.0	(1,304) 1573	(51) 837	(18) 27	(58) 117		1,497	891		127		53	1,940	1257		99	129	2388	1,789		333
			1,200 x2	800	400			1,200 x2	800 x2	400			1,200	800 x2	400			1,200 x3	800 x3	400		
⑱	Cempaka Putih ~ Pulo Gadung	7.0	(18) 64	(187) 441	(1,071) 1,014	(271) 224	(49) 56	49	425	795	1,034	396	59	857	1,265	1,896	564	79	1,707	2259	3427	840
			1,200	800 x2	400	200		1200	800 x2	400 x3	200 x2		1,200	800 x2	400 x5	200 x3		1,200 x2	800 x3	400 x9	200 x5	
⑲	Pulo Gadung ~ Tg. Priok (A)	7.0	(15) 36	(136) 111	(1,019) 786	(271) 224	(49) 56	24	294	741	1,023	396	49	652	1,144	1,882	564	82	1,349	1,940	3,414	826
			1,200	800	400	200		1,200	800	400 x3	200 x2		1,200	800 x2	400 x5	200 x3		1200	800 x3	400 x9	200 x5	
⑳	Tg. Priok (A) ~ Cilincing	5.0	(26) 20	(7) 12	(96) 101	(12) 19	(81) 90	58	50	209	22	176	136	83	294	36	300	300	234	420	65	523
							200			600		200			600		200 x2		1,200	600		200 x3

TABLE 7-4-2-(5)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (5/12)

Plan-No.1

SECTION NO	NAME OF EXCHANGE	DISTANCE (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(21)	TG. PRIOK (A) ~ ANCOL	5.0		(305) 202	(27) 27			28	498	108			132	944	124			321	1,618	223		
					400					400					400					400		
									1,200					1,200					1,200 x2			
(22)	CEMPAKA PUTIH ~ RAWAMANGUN	6.1	(72) 65	(546) 489	(197) 185			135	876	424	8		224	1,387	829	8		352	2202	1,567	8	
					800					800					800			1,200	1,200 x2	800 x2		
									1,200					1,200 x2								
(23)	RAWAMANGUN ~ PENGGILINGAN	6.0						21	69	203	8		38	170	424	8		73	597	855	8	
										800					800					800 x2		
(24)	CEMPAKAPUTIH ~ KEBAYORAN (A)	11.7		(183) 209	(102) 139	(56) 47	(10) 11		201	202	83	16		259	300	131	22		362	467	182	33
					800					800					800					800		
						200					200					200					200	
(25)	CEMPAKA PUTIH ~ JATINEGARA (B)	8.6		(276) 532	(146) 267	(12) 19			407	137	81		28	573	273	125		50	873	478	228	
				1,200					1,200					1,200		300			1,200		300	
						300					300				600					600		

TABLE 7-4-2-(6)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (6/12)

Plan-NO.1

Section NO.	Name of Excharge	Distance (km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(26)	Kebayoran(A) ~ Cipete	7.0	(65) 130	(143) 398	(208) 506			110	289	368			139	461	515			215	764	698		
				1200	800				1,200	800				1200	800				1200	800		
					(800)																	
(27)	Kebayoran (A) ~ Pasar Minggu	9.2						8	189	301	70	127	12	228	418	88	199	20	359	556	157	333
										600		200			600	400	200		1200	600	400	200 x2
(28)	Pasar Minggu ~ Jagakarsa	5.5	(8) 15	(10) 10	(31) 41	(27) 35	(57) 89	24	96	74	70	48	30	116	100	88	69	38	14	153	159	115
							200			400		200			400		200			400	400	200
(29)	Kebayoran (A) ~ Kalibata	7.0	(95) 88	(328) 436	(491) 654	(130) 424	(94) 176	123	524	499			141	948	673			157	1,510	1030		
				1200	800	400 200 (300)			1200	800	400 200 (300)			1,200	800	400 200 (300)			1200 x2	800	400 200 (300)	
(30)	Kebayoran (A) ~ Tebet	8.0		(53) 121					71				12	124				41	222			
				400					400					400					400			

TABLE 7-4-2 (7)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (7/12)

Plan-NO.1

Section NO.	Name of Exchange	Distance (km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(31)	Kebayoran (A) ~ Semanggi(A)	3.0	(156) 221					267	11				417	87				591	308			
				1200					1200					1200					1200			
(32)	Jatinegara (B) ~ Tebet	4.5	(88) 309	(680) 1,728	(181) 427			182	973	315			249	1451	512			342	2141	764		
				1,200					1200	800				1,200 x2	800				1200 x2	800		
					800																	
(33)	Jatinegara (B) ~ Cawang	4.3	(72) 251	(288) 790	(205) 544	(52) 187	(29) 72	183	587	409	145	152	260	1,085	657	247	265	393	2211	1291	428	527
				1200	800	400	200		1200	800	400	200		1,200		400	200 x2		1200 x2			
															800					800 x2	400 x2	200 x2
(34)	Cawang ~ Pasar Rebo	9.0		(37) 117	(84) 264	(52) 187	(29) 72	8	197	252	176	152	24	292	375	296	265	77	595	667	484	527
					800	400	200			800	400	200			800	400	200 x2			800	400	
																			1200			200 x3
(35)	Pasar Rebo ~ Gandaria	5.5						32	54	102	106	86	41	87	121	108	139	71	165	205	220	224
											400	200				400	200				400	200 x2
																				600		

TABLE 7-4-2-(8)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (8/12)

Plan-NO.1

Section NO	Name of Exchange	Distonce (km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(36)	Jatinegara (B) ~ Klender	7.5	(15) 69	(33) 110	(124) 436			41	114	302			58	202	582			87	764	1106		
					800					800					800					800 x2		
														1200					1200			
(37)	Jatinegara (B) ~ Jatinegara(A)	2.8	(630) 779	(64) 78				904	246	48			1,111	282	70			1387	375	83		
				1200					1200				2400	1200				2400	1200			
(38)	Kota (B) ~ Slipi	6.0						359	45				532	110				704	260	5		
									400				1200	400				1200	400			
(39)	Kebayoran (A) ~ Pal Merah	7.5							45	17			11	81	29			45	180	44		
										100					100					100		
														400					400			
(40)	Kalibata ~ Pasar Minggu	5.7	(18) 31	(51) 94	(107) 254	(130) 424	(94) 176	45	28	54			59	36	86			78	107	120		
					400 (200)	400 200 (300)				400 (200)	400 200 (300)				400 (200)	400 200 (300)				400 (200)	400 200 (300)	

TABLE 7-4-2-(9)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (9/12)

Plan-NO.1

Section NO.	Name of Exchange	Distance (km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(41)	Kalibata ~ Jatinegara (B)	8.0							78	54			11	94	86			42	165	114		
										400					400					400		
(42)	Kebayoran (A) ~ Cawang	10.5							51	28	30			81	48	49			177	65	57	
											400					400					400	
(43)	Kalibata ~ Cawang	7.0											34					119	121	7		
														400					400			
(44)	Jatinegara (B) ~ Rawamangun	5.7						67	17				143	40				298	246	8		
									600					600					600			
(45)	Kota (B) ~ Ancol	7.8		(705) 679	(505) 668			95	1,044	833			207	1,651	1,167			416	2545	1647		
				1,200	800				1,200	800				1,200	800 x2				1,200 x2	800 x2		

TABLE 7-4-2-(10)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (10/12)

Plan-NO.1

Section NO.	Name of Exchange	Distance (km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(46)	Kota (B) ~ Pluit	6.4	(317) 365	(543) 737	(176) 258			358	718	298			445	902	424			517	1,072	557		
				1,200	600				1,200	600			1,200	1,200	600			1,200	1,200	600		
(47)	Kota (B) ~ Cengkareng	14.2		(68) 190	(121) 272	(111) 371	(53) 68		190	230	231	123		298	321	389	194		536	453	678	323
					600	400	200			600	400	200			600	400	200		1,200	600	400 x2	200 x2
(48)	Kebayoran (A) ~ Jatinegara (B)	12.4		(177) 374	(107) 280	(53) 169	(10) 19		190	143				224	207				247	226		
					800					800					800					800		
(49)																						
(50)																						

TABLE 7-4-2-(11)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (11/12)

Plan-NO.1

Section NO.	Name of Exchange	Distance (km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(51)	Gambir (A) ~ Gambir (B)	3.0	3,912 (1,868) 5,447 2,751					5,151	2,689	21			7,356	3,270	53			10,547	4,452	78		
			2400 x2	1,200 x3				2400 x2	1200 x3				2400 x3	1,200 x3				2400 x5	1,200 x4			
(52)	Tg. Priok (A) ~ Tg. Priok (B)	3.0						165	317	276	260	282	396	595	454	499	384	907	1,056	946	1,081	568
										800	400	200 x2		1,200	800	400 x2	200 x2	2,400	1,200	800	400 x3	200 x3
(53)	Semanggi (A) ~ Semanggi (B)	2.0											756	1,612	61			1,123	2,373	91		
														1,200 x2				2,400	1,200 x2			
(54)	Kebayoran (A) ~ Kebayoran (B)	2.8						706	108	227			972	149	350			1,244	230	483		
								2400		800			2400		800			2,400		800		
(55)	Kota (B) ~ Kota (C)	1.7						4,492	1,173				5308	1,810				5,933	2,658			
								2400 x2	1,200				2400 x3	1,200 x2				2400 x3	1,200 x3			

TABLE 7-4-2-(12) LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION ($^{12}/_{12}$)

Plan – No. 1

Section No.	Name of Exchange	Distame (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(56)	Jatinegara (A) ~ Gambir (A)	5.8	(142) 148	(196) 197				219	170				345	285				469	498			
				1200					1200					1200					1200			
(57)																						
(58)																						
(59)																						
(60)	Jatinegara (B) Gandaria	15.5		(20) 55	(80) 168	(32) 53	(55) 109					66					119					226
						300					300					300				300		

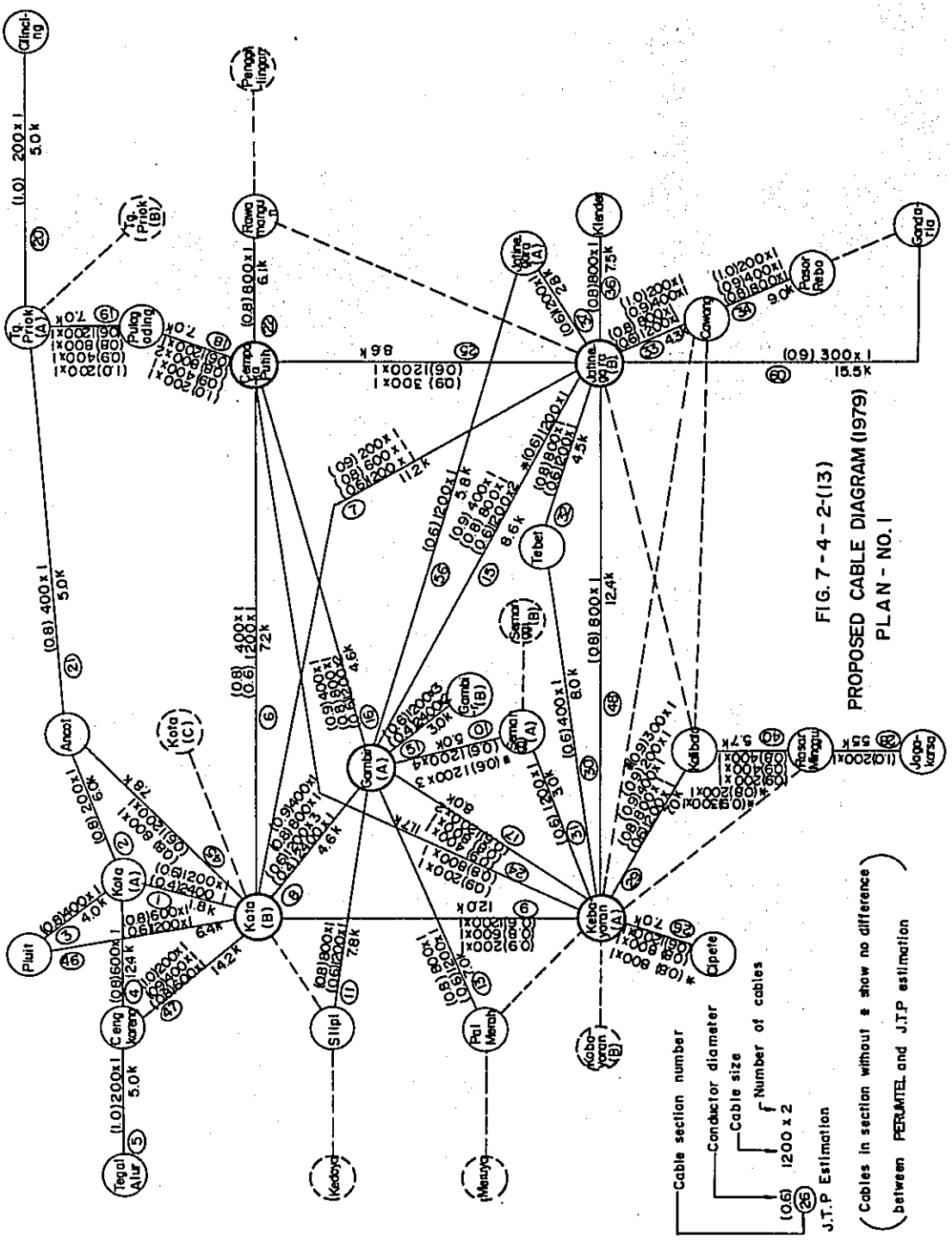


FIG. 7-4-2-(13) PROPOSED CABLE DIAGRAM (1979) PLAN - NO. I

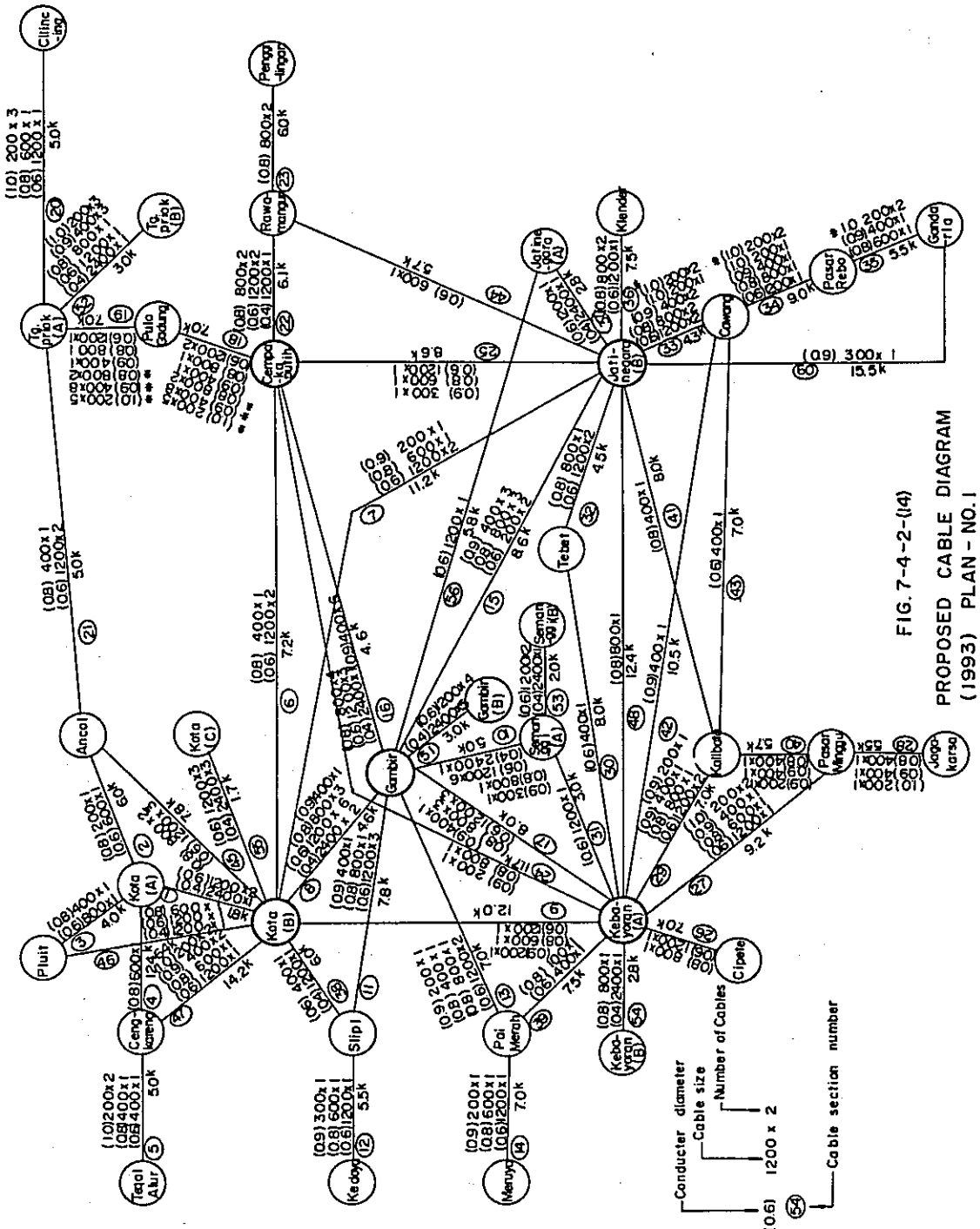


FIG. 7-4-2-(14)
PROPOSED CABLE DIAGRAM
(1993) PLAN - NO. I

TABLE 7-4-2-(15) TOTAL LENGTH BY CABLE PAIRS

Plan -NO.1 (Ur ; T : km)

Diameter (mm)	Cable Pairs	1979			1983			1988			1993		
		Cable Length	100-pair Length	Composition Rate	Cable Length	100-pair Length	Composition Rate	Cable Length	100-pair Length	Composition Rate	Cable Length	100-pair Length	Composition Rate
				%			%						
0.4	2400	12.4	297.6	6.0	25.2	604.8	9.4	43.3	1,039.2	12.7	54.3	1,303.2	11.3
	1200	—	—	—	—	—	—	12.4	148.8	1.8	18.5	222.0	1.9
	Sub Total	12.4	297.6	6.0	25.2	604.8	9.4	55.7	1,188.0	14.5	72.8	1,525.2	13.2
0.6	1200	203.4	2,440.8	49.6	225.0	2,700.0	42.1	271.9	3,262.8	40.0	418.7	5,024.4	43.5
	800	—	—	—	—	—	—	—	—	—	4.0	32.0	0.3
	600	—	—	—	11.7	70.2	1.1	11.7	70.2	0.8	11.7	70.2	0.6
	400	8.0	32.0	0.7	14.0	56.0	0.9	28.5	114.0	1.4	33.5	134.0	1.2
	Sub Total	211.4	2,472.8	50.3	250.7	2,826.2	44.1	312.1	3,447.0	42.2	467.9	5,260.6	45.6
0.8	800	138.9	1,111.2	22.6	168.3	1,346.4	21.0	196.3	1,570.4	19.2	264.6	2,116.8	18.3
	600	56.2	337.2	6.9	77.4	464.4	7.2	86.0	516.0	6.3	97.0	582.0	5.0
	400	21.9	87.6	1.8	40.4	161.6	2.5	40.4	161.6	2.0	47.4	189.6	1.6
	300	—	—	—	7.5	22.5	0.4	7.5	22.5	0.3	7.5	22.5	0.2
	200	6.0	12.0	0.2	6.0	12.0	0.2	6.0	12.0	0.1	6.0	12.0	0.1
	Sub Total	223.0	1,548.0	31.5	299.6	2,006.9	31.3	336.2	2,282.5	27.9	422.5	2,922.9	25.3
0.9	400	80.0	320.0	6.5	139.4	557.6	8.7	192.8	771.2	9.4	298.2	1,192.8	10.3
	300	24.1	72.3	1.5	34.6	103.8	1.6	34.6	103.8	1.3	34.6	103.8	0.9
	200	47.6	95.2	1.9	61.6	123.2	2.0	61.6	123.2	1.5	61.6	123.6	1.1
	Sub Total	151.7	487.5	9.9	235.6	784.6	12.3	289.0	998.2	12.2	394.4	1,420.2	12.3
1.0	200	57.0	114.0	2.3	91.7	183.4	2.9	124.0	248.0	3.0	207.2	414.4	3.6
	Sub Total	57.0	114.0	2.3	91.7	183.4	2.9	124.0	248.0	3.0	207.2	414.4	3.6
	Total	655.5	4,919.9	100.0	902.8	6,405.9	100.0	1,117.0	8,163.7	100.0	1,564.8	11,543.3	100.0

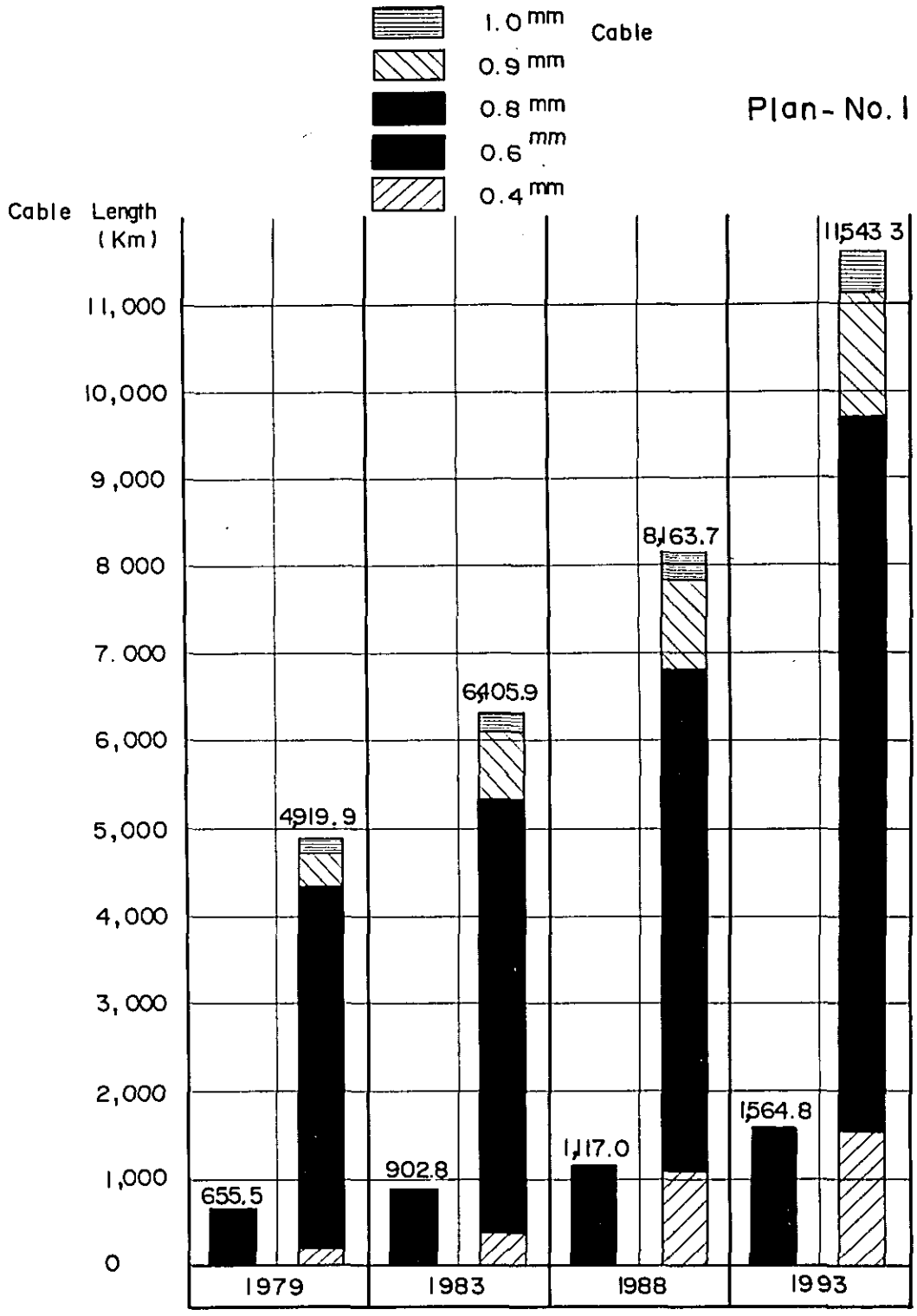


FIG. 7-4-2-(16)

TOTAL LENGTH BY CABLE DAIRS (1/2)

7.4.2.4 Situation in Use of Cable Conductors

The ratio of use of cable conductors assumed for each base year is 0.57 for 1979, 0.68 for 1983, 0.75 for 1988 and 0.83 for 1993. The reason why the cable use ratio for 1979 is very low is that a huge amount of installation work will be carried out at one time and cables of the maximum size will be installed in an extended provision period of 15 years. From 1993 and onwards, it is supposed that the average use ratio of about 85% from 1988 to 1993 will continue.

Generally speaking, when the number of circuits in the cable section is very large, the circuit use ratio is high; on the contrary, when the number of circuits is small, the ratio becomes low.

7.4.2.5 Number of Loading Coils of Each Cable Section According to Conductor Diameter

The number of pairs of loading coils, in principle, will be for a standard provision period of 5 years but since a large number of loading coils will be concentrated in the manholes in the half loading spacing from the exchange office, it is desirable that the loading coils having a large number of pairs be used for the junction cables between the tandem exchange offices in the central part of Jakarta wherever possible. Furthermore, in consideration of maintenance, material management and possibility of reducing manufacturing costs through unification of materials, the kinds of loading coils to be applied were determined as in the following.

Table 7.4.2.(21)
Capacity and Combinations of Loading Coils to be Applied

Capacity of cable	Capacity of loading coil applied to each cable
2400 P	800 P + 800 P + 800 P
1200 P	600 P + 600 P
800 P	800 P or 400 P + 400 P
600 P	600 P or 400 P + 200 P
400 P	400 P or 200 P + 200 P
300 P	300 P
200 P	200 P
100 P	100 P

* Installation of loading coil will be done twice.

TABLE 7-4-2-(17)

CIRCUIT UTILIZATION TO CABLES (1/4)

Plan – No. I

CABLE SECTION	C.S. NO.	DISTANCE (km)	1979			1983			1988			1993		
			(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
KOTA Ⓐ ~ KOTA Ⓑ	①	1.8	(3883) 3681	3,600	(0.94) 1.03	3539	3,600	0.98	3,823	4,800	0.80	4,180	4,800	0.87
〃 ~ ANCOL	②	6.0	(142) 182	200	(0.71) 0.91	304	800	0.38	466	800	0.59	716	800	0.90
〃 ~ PLUIT	③	4.0	(194) 269	400	(0.49) 0.67	326	400	0.82	386	400	0.97	481	1200	0.40
〃 ~ CENG KARENG	④	12.4	(91) 193	600	(0.15) 0.32	239	600	0.40	311	600	0.52	410	600	0.69
CENGKARENG ~ TEGAL ALUR	⑤	5.0	(168) 201	200	(0.84) 1.01	414	600	0.69	537	600	0.90	897	1,200	0.75
KOTA Ⓑ ~ CEMPAKA PUTIH	⑥	7.2	(996) 1,152	1,600	(0.62) 0.72	1,363	1,600	0.86	1,858	2,800	0.67	2,529	2,800	0.91
〃 ~ JATINEGARA Ⓑ	⑦	11.2	(636) 1,333	2,000	(0.32) 0.67	1,083	2,000	0.55	1,523	2,000	0.77	2,283	3,200	0.72
〃 ~ GAMBIR Ⓐ	⑧	4.6	(5,399) 6,388	7,200	(0.75) 0.89	7,147	9,600	0.74	10,134	11,600	0.87	14,135	14,800	0.96
〃 ~ KEBAYORAN Ⓐ	⑨	12.0	(800) 972	2,000	(0.40) 0.49	1,019	2,000	0.51	1,253	2,000	0.63	1,539	2,000	0.77
GAMBIR Ⓐ ~ KEBAYORAN Ⓐ	⑩	5.0	(2,858) 4,226	(3,600) 4,800	(0.79) 0.88	4,199	(4,700) 5,900	(0.89) 0.72	6,517	8,300	0.79	10,109	10,700	0.94
〃 ~ SLIPI	⑪	7.8	(1,880) 2,067	2,000	(0.94) 1.03	2,399	3,600	0.67	3,292	3,600	0.92	4,645	4,800	0.97
SLIPI ~ KEDOYA	⑫	5.5	—	—		298	300	1.00	539	1,500	0.36	1,128	2,100	0.54
GAMBIR Ⓐ ~ PAL MERAH	⑬	7.0	(745) 1,795	2,000	(0.37) 0.90	1,308	2,200	0.60	2,183	2,200	1.00	3,820	3,800	1.01
PALMERAH ~ MERUYA	⑭	7.0	—	—		360	800	0.45	626	800	0.78	1,214	2,000	0.61
GAMBIR Ⓐ ~ JATINEGARA Ⓑ	⑮	8.6	(1,460) 3,439	(2,400) 3,600	(0.61) 0.96	2337	3,600	0.65	3,744	4,800	0.98	6,529	6,000	1.09

( ) OF 1979 : BASED ON JTP ESTIMATION

LOWER SIDE OF 1979 : BASED ON PERUMTEL SUPPLY PLAN

TABLE 7-4-2-(18)

CIRCUIT UTILIZATION TO CABLES (2/4)

Plan – NO.1

Cable Section	C.S NO.	Distance	1979			1983			1988			1993		
			(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Gambir (A) ~ Cempaka Putih	⑯	4.6	(2108) 2,395	3,600	(0.59) 0.67	3,372	4,800	0.71	5,619	7,600	0.74	9,610	11,600	0.83
〃 ~ Kebayoran (A)	⑰	8.0	(1891) 2,554	3,600	(0.53) 0.71	2,515	4,400	0.58	3,349	4,400	0.76	4,639	6,400	0.73
Cempaka Putih ~ Pulo Gadung	⑱	7.0	(1596) 1,799	3,400	(0.47) 0.53	2,699	4,400	0.61	4,641	5,400	0.86	8,312	9,400	0.88
Pulo Gadung ~ Tg. Priok A	⑲	7.0	(1490) 1,213	2,600	(0.57) 0.47	2,478	3,600	0.69	4,291	5,400	0.78	7,611	8,200	0.93
Tg. Priok (A) ~ Cilincing	⑳	5.0	(222) 242	200	(1.11) 1.21	515	800	0.64	849	1,000	0.85	1,542	2,400	0.65
〃 ~ Ancol	㉑	5.0	(332) 229	400	(0.83) 0.58	634	1,600	0.40	1,200	1,600	0.75	2,162	2,800	0.78
Cempaka Gutih ~ Rawamangun	㉒	6.1	(815) 739	800	(1.02) 0.93	1,443	2,000	0.73	2,448	3,200	0.77	4,129	5,200	0.75
Rawamangun ~ Penggilingan	㉓	6.0	—	—		301	800	0.38	640	800	0.80	1,533	1,600	0.96
Cempaka Putih ~ Kabayoran (A)	㉔	11.7	(351) 406	1000	(0.35) 0.41	502	1,000	0.51	712	1,000	0.72	1,044	1,000	1.05
〃 ~ Jatinegara (B)	㉕	8.6	(434) 818	1,500	(0.29) 0.55	625	1500	0.42	999	2,100	0.48	1629	2,100	0.78
Kabayoran (A) ~ Cipete	㉖	7.0	(416) 1,034	(800) 2000	(0.52) 0.52	767	2000	0.39	1,115	2000	0.56	1,677	2000	0.84
〃 ~ Pasar Minggu	㉗	9.2	—	—		695	800	0.87	945	1,200	0.79	1,425	2600	0.55
Pasar Minggu ~ Jagakarsa	㉘	5.5	(133) 190	200	(0.67) 0.95	312	600	0.52	403	600	0.68	604	1,000	0.61
Kebayoran (A) ~ Kalibata	㉙	7.0	(1,138) 1,778	2300 2600	(0.49) 0.68	1,146	(2300) 2600	(0.50) 0.49	1,762	(2300) 2600	(0.77) 0.68	2697	(3600) 3800	(0.77) 0.71
Kebayoran (A) ~ Tebet	㉚	8.0	(53) 121	400	(0.13) 0.30	71	400	0.18	136	400	0.34	263	400	0.66

TABLE 7-4-2-(19)

CIRCUIT UTILIZATION TO CABLES (3/4)

Plan - NO.1

Cable Section	C.S NO.	Distance	1979			1983			1988			1993		
			(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Kabayoran (A) ~Semanggi (A)	(31)	3.0	(156) 221	1,200	(0.13) 0.19	278	1,200	0.24	504	1,200	0.42	899	1,200	0.75
Jatinegara (B) ~Tebet	(32)	4.5	(949) 2464	2000	(0.47) 1.24	1,470	2000	0.74	2210	3200	0.69	3247	3200	1.02
Jatinegara (B) ~Cawang	(33)	4.3	(646) 1,844	2600	(0.25) 0.71	1,476	2600	0.57	2514	2800	0.90	4850	5400	0.90
Cawang ~Pasar Rebo	(34)	9.0	(202) 640	1,400	(0.14) 0.46	785	1,400	0.56	1,252	1600	0.78	2,350	3,000	0.78
Pasar Rebo ~Gandaria	(35)	5.5	—	—		380	600	0.64	496	600	0.83	885	1400	0.64
Jatinegara (B) ~Klender	(36)	7.5	(172) 615	800	(0.22) 0.77	457	800	0.58	842	2000	0.43	1,957	2800	0.70
" ~Jatinegara (A)	(37)	2.8	(694) 857	1,200	(0.58) 0.72	1,198	1,200	1.00	1,463	3600	0.41	1,845	3600	0.51
Kota (B) ~Slipi	(38)	6.0	—	—		404	400	1.01	642	1,600	0.41	969	1,600	0.61
Kabayoran (A) ~Pal Merah	(39)	7.5	—	—		62	100	0.62	121	500	0.25	269	500	0.54
Kalibata ~Pasar Minggu	(40)	5.7	(400) 979	(500) 1,000	(0.80) 0.98	127	(500) 1,000	(0.25) 0.13	181	(500) 1,000	(0.36) 0.19	305	(500) 1,000	(0.01) 0.31
" ~Jatinegara (B)	(41)	8.0				132	400	0.33	191	400	0.48	321	400	0.81
Kabayoran (A) ~Cawang	(42)	10.5				109	400	0.28	178	400	0.45	299	400	0.75
Kalibata ~Cawang	(43)	7.0				—	—		34	400	0.09	247	400	0.62
Jatinegara (B) ~Rawamangun	(44)	5.7				84	600	0.14	183	600	0.31	552	600	0.92
Kota (B) ~Ancol	(45)	7.8	(1,210) 1,347	2000	(0.61) 0.67	1,972	2000	0.99	3,025	2800	1.08	4,608	5200	0.89

TABLE 7-4-2-(20)

CIRCUIT UTILIZATION TO CABLES (4/4)

Plan-No.1

CABLE SECTION	CS NO	DISTANCE (km)	1979			1983			1988			1993		
			(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
KOTA (B) ~ PLUIT	(46)	6.4	(1,036) 1,360	1,800	(0.73) 0.76	1,374	1,800	0.77	1,771	3,000	0.59	2,146	3,000	0.72
" ~ CENG KARENG	(47)	14.2	(353) 901	1,200	(0.29) 0.75	774	1,200	0.65	1,202	1,200	1.00	1,990	3,000	0.66
KEBAYORAN (A) ~ JATINEGARA (B)	(48)	12.4	(347) 842	800	(0.43) 1.06	333	800	0.42	431	800	0.54	473	800	0.60
	(49)													
	(50)													
GAMBIR (A) ~ GAMBIR (B)	(51)	3.0	(5780) 8,198	8,400	(0.69) 0.98	7,861	8,400	0.94	10,679	10,800	0.99	15,077	15,600	0.97
TG. PRIOK (A) ~ TG. PRIOK (B)	(52)	3.0	—	—		1,300	1,600	0.82	2,328	3,200	0.73	4,558	6,200	0.92
SEMANGGI (A) ~ SEMANGGI (B)	(53)	2.0	—	—		—	—		2,429	2,400	1.02	3,587	4,800	0.76
KEBAYORAN (A) ~ KEBAYORAN (B)	(54)	2.8	—	—		1,041	3,200	0.33	1,471	3,200	0.46	1,957	3,200	0.62
KOTA (B) ~ KOTA (C)	(55)	1.7	—	—		5,665	6,000	0.94	7,118	9,600	0.74	8,591	10,800	0.80
JATINEGARA (A) ~ GAMBIR (A)	(56)	5.8	(338) 345	1,200	(0.28) 0.29	389	1,200	0.33	630	1,200	0.53	967	1,200	0.81
	(57)													
	(58)													
	(59)													
JATINEGARA (A) ~ GANDARIA	(60)	15.5	(187) 385	300	(0.62) 1.29	66	300	0.22	119	300	0.40	226	300	0.76
TOTAL			(42,202) 60,414	74,000 78,400	(0.57) 0.77	72,147 72,147	106,400 108,100	(0.68) 0.67	108,315 108,315	143,700 144,500	(0.75) 0.75	166,667 166,667	200,100 200,900	(0.83) 0.83

According to the aforementioned DC resistance limit and transmission loss assignment, it would be effective to insert loading coils in the long distance circuits where 0.8 mm, 0.9 mm and 1.0 mm conductor cables are used. The reason is that it would be more strongly influenced through the transmission loss limit than the DC resistance limit and the insertion of loading coils in the circuits would be more economical than using cables of large conductor diameter.

On the other hand, as shown in Table 7.4.2.(22), in relation to short distance circuits using 0.4 mm and 0.6 mm conductor cables, non-loading circuit sections exist which satisfy both limits of DC resistance and transmission loss.

7.4.2.6 Total Number of Loading Coils

The number of loading coils will be 473 in 1979 and 1,380 in 1993. If these were converted to 100-pair coils, the number of coils will be 2,447 in 1979 and 6,341 in 1993. When small number of pairs of loading coils are numerously installed, this will cause a shortage in installation places which would require modification of the manholes and in order to avoid such cases, the use of coils of large pair numbers is being considered.

As the result, the composition rate of relatively small pair numbers of coils (such as 100 pairs, 200 pairs and 300 pairs) will be about 18% in 1979.

It is natural that the number of loading coils increase in proportion to the telephone demand. On the other hand, the amount of capital investment for loading coils is very small in comparison with that of other required materials such as cables, telephone poles, pipes and telephone sets. Furthermore, since the quantity is small, sufficient preparatory period must be allowed when ordering loading coils. In other words, the ordering of loading coils should be made earlier than purchase orders for cables, etc.

7.4.2.7 Number of Terminating Cables, Number of Loading Coils and MDF Length of Each Exchange

According to Tables 7.4.2.(32) to (35), the largest number of junction circuits will be terminated in the Gambir (A) Exchange Office, and the number of terminated junction cables will reach 70 cables in 1993.

When considering all cables including subscriber cables and toll cables, more than 100 cables will be terminated in the Gambir (A) Exchange Office.

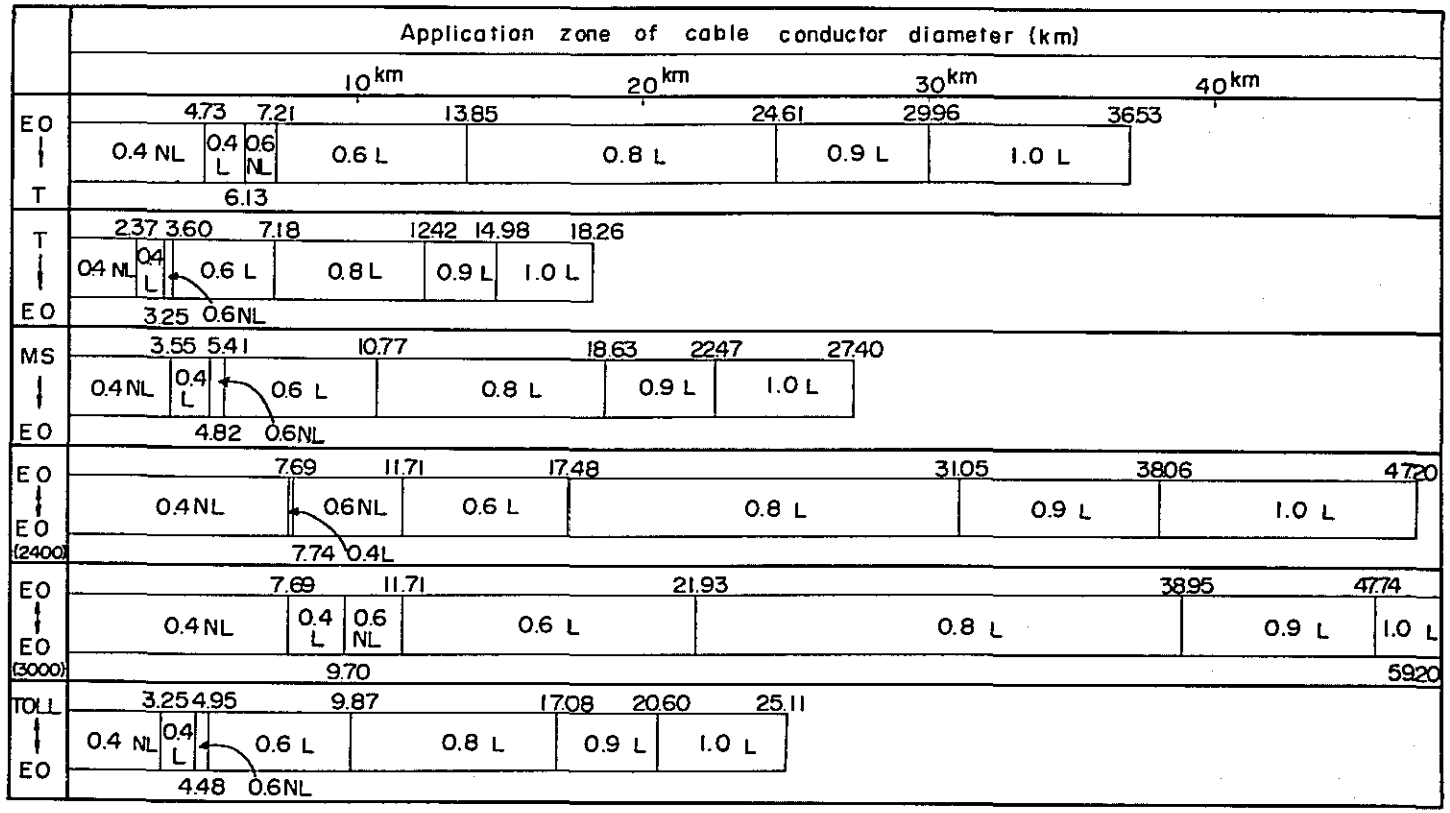
Therefore, a full survey of the number of entrance cables, length of MDF and the capacity of the manholes with loading coils nearest to Gambir (A) Exchange Office, as well as the setting up of a plan, will be very important.

As indicated in Table 7.4.2.(32), the length of the MDF for junction cables at Gambir (A) Exchange Office will be 22.9 m in 1993. Consequently, the MDF for junction cables should be separated from that for subscriber cables.

TABLE 7-4-2-(22)

Conductor diameter (mm)	Condition of Loading	Loss or Rosistance	Specified Value		EO—T	T—EO	MS—EO	EO—EO (old)	EO—EO (New)	TOLL—EO
			R/km (Ω)	Loss/km(dB)	9.5 dB 1900Ω	5.5 dB 1100Ω	7.5 dB 1500Ω	15.0 dB 2400Ω	15.0dB 3000Ω	7.0 dB 2400Ω
0.4	Non-loading	Loss	—	1.69	* 4.73	* 2.37	* 3.55	* 7.69	* 7.69	* 3.25
		Resistance	300	—	6.23	3.57	4.90	7.87	9.87	7.90
	Loading	Loss	—	1.229	6.51	* 3.25	4.88	10.58	10.58	* 4.48
		Resistance	305	—	* 6.13	3.51	* 4.82	* 7.74	* 9.70	7.77
0.6	Non-loading	Loss	—	1.11	* 7.21	* 3.60	* 5.41	* 11.71	* 11.71	* 4.95
		Resistance	130	—	14.38	8.23	11.31	18.15	22.77	18.23
	Loading	Loss	—	0.557	14.36	* 7.18	* 10.77	23.34	23.34	* 9.87
		Resistance	135	—	* 13.85	7.93	10.89	* 17.48	* 21.93	17.56
0.8	Non-loading	Loss	—	0.826	9.69	4.84	7.26	15.74	15.74	6.66
		Ressstance	72	—	25.97	14.86	20.42	32.78	41.11	32.92
	Loading	Loss	—	0.322	24.84	* 12.42	* 18.63	40.37	40.37	* 17.08
		Resistance	76	—	* 24.61	14.08	19.34	* 31.05	* 38.95	31.18
0.9	Non-loading	Loss	—	0.742	10.78	5.39	7.98	17.52	17.52	7.41
		Resistance	58	—	32.24	18.45	25.34	40.69	51.03	40.86
	Loading	Loss	—	0.267	* 29.96	* 14.98	* 22.47	48.69	48.69	* 20.60
		Resistance	62	—	30.16	17.26	23.71	* 38.06	* 47.74	38.23
1.0	Non-loading	Loss	—	0.660	12.12	6.06	9.09	19.70	19.70	8.33
		Resistance	46	—	40.65	23.26	31.96	51.30	64.35	51.52
	Loading	Loss	—	0.219	* 36.53	* 18.26	* 27.40	59.36	59.36	* 25.11
		Resistance	50	—	37.40	24.40	29.40	* 47.20	* 59.20	47.40

* Distance limit based on specified Value



EO → T (9.5 dB) (1,900Ω)
T → EO (5.5 dB) (1,100Ω)
MS → EO (7.5dB) (1,500Ω)
EO → EO (15.0dB) (2,400Ω)
EO → EO (15.0dB) (3,000Ω)
TOLL → EO (7.0dB) (2,400Ω)

FIG. 7-4-2-(23)

TABLE 7-4-2-(24) NUMBER OF LOADING COILS IN EACH CABLE SECTION BY CONDUCTOR DIAMETER ($^1/_6$)

Plan - NO. 1

Section NO.	Cable Section	Distance (km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
①	Kota (A) ~ Kota (B)	1.8	2400x1 (N.L)	1200x1 (6x2)				2400x1 (8x1)	1200x1 (6x2)				2400x1 (8x1)	1200x2 (6x2) (NL)				2400x1 (8x1)	1200x2 (6x2) (NL)			
②	Kota (A) ~ Ancol	6.0			200x1 (2x1)				600x1 (4x1)	200x1 (2x1)				600x1 (4x1)	200x1 (2x1)				600x1 (4x1)	200x1 (2x1)		
③	Kota (A) ~ Pluit	4.0			400x1 (2x1)					400x1 (2x1)					400x1 (2x1)				800x1 (4x1)	400x1 (2x1)		
④	Kota (A) ~ Cengkareng	12.4			600x1 (4x1)					600x1 (4x1)					600x1 (4x1) (2x1)					600x1 (4x1) (2x1)		
⑤	Cengkareng ~ Tegal Alur	5.0					200x1 (2x1)			400x1 (4x1)		200x1 (2x1)			400x1 (4x1)		200x1 (2x1)		400x1 (4x1)	400x1 (4x1)		200x2 (2x1)2
⑥	Kota (B) ~ Cempaka Putih	7.2		1200x1 (6x1)	400x1 (2x1)				1200x1 (6x1)	400x1 (2x1)				1200x2 (6x1)2	400x1 (2x2)				1200x2 (6x2) (6x1)	400x1 (2x2)		
⑦	Kota (B) ~ Jatinegara(B)	11.2		1200x1 (6x2)	600x1 (6x1)	200x1 (2x1)			1200x1 (6x2)	600x1 (6x1)	200x1 (2x1)			1200x1 (6x2)	600x1 (6x1)	200x1 (2x1)			1200x2 (6x2) (6x1)	600x1 (6x1)	200x1 (2x1)	
⑧	Kota (B) ~ Gambir(A)	4.6		1200x5 (6x2)2 (6x1) (NL)2	800x1 (8x1)	400x1 (4x1)			1200x5 (6x2)2 (6x1) (NL)2	800x1 (8x1)	400x1 (4x1)		2400x1 (8x1)	1200x5 (6x2)3 (NL)2	800x2 (8x1)2	400x1 (4x1)		2400x2 (8x3) (NL)	1200x6 (6x2)4 (NL)2	800x3 (8x1)2 (4x1)	400x1 (4x1)	
⑨	Kota (B) ~ Kebayoran(A)	12.0		1200x1 (6x2)	600x1 (4x1)	200x1 (2x1)			1200x1 (6x2)	600x1 (4x1)	200x1 (2x1)			1200x1 (6x2)	600x1 (4x1)	200x1 (2x1)			1200x1 (6x2)	600x1 (4x1) (2x1)	200x1 (2x1)	
⑩	Gambir(A) ~ Semanggi (A)	5.0		1200x4 (6x2)2 (6x1) (NL)					1200x4 (6x2)2 (6x1) (NL)	800x1 (8x1)	300x1 (3x1)		2400x1 (8x1)	1200x4 (6x2)3 (NL)	800x1 (8x1)	300x1 (3x1)		2400x1 (8x2)	1200x6 (6x2)5 (NL)	800x1 (8x1)	300x1 (3x1)	

2400x1 — Number of coil
└ Number of cable pairs.

(6 x 5) — Number of loading coil
└ 600 pairs loading coil
(N L) Non loading

TABLE 7-4-2-(25)

NUMBER OF LOADING COILS IN EACH CABLE SECTION
BY CONDUCTOR DIAMETER (2/6)

Plan-NO.1

Section NO.	Cable Section	Distance (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
⑪	Gambir (A) ~ Silpi	7.8		200×1	800×1				200×2	800×1	400×1			200×2	800×1	400×1			200×3	800×1	400×1	
				(6×2)	(8×1)				(6×2) (6×1)	(8×1)	(2×1)			(6×2)2	(8×1)	(2×1 / 2×1)			(6×2)2 (6×1)	(8×1)	(2×1 / 2×1)	
⑫	Silpi ~ Kedoya	5.5									300×1			200×1		300×1			200×1	600×1	300×1	
											(3×1)			(6×1)		(3×1)			(6×1)	(4×1)	(3×1)	
⑬	Gambir (A) ~ Pal Merah	7.0		200×1	800×1				200×1	800×1	200×1			200×1	800×1	200×1			200×2	800×1 / 400×1	200×1	
				(6×2)	(4×1)				(6×2)	(4×1)	(2×1)			(6×2)	(4×2)	(2×1)			(6×2)2	(4×2) (2×1)	(2×1)	
⑭	Pal Merah ~ Meruya	7.0								600×1	200×1				600×1	200×1			200×1	600×1	200×1	
										(4×1)	(2×1)				(4×1 / 2×1)	(2×1)			(6×1)	(4×1 / 2×1)	(2×1)	
⑮	Gambir (A) ~ Jatinegara (B)	8.6		200×2	800×1	400×1			200×2	800×1	400×1			200×2	800×2	400×2			200×2	800×3	400×3	
				(6×2)2	(8×1)	(4×1)			(6×2)2	(8×1)	(4×1)			(6×2)2	(8×1) (4×1)	(4×1)2			(6×2)2	(8×1)·2 (4×1) (4×1)	(4×1)·3	
⑯	Gambir (A) ~ Cempaka Putih	4.6		200×2	800×1	400×1			200×2	800×2	400×2		2400×1	200×2	800×2	400×3		2400×1	200×3	800×4	400×6	
				(6×2) (NL)	(8×1)	(4×1)			(6×2) (NL)	(8×1) (4×1)	(4×1)2		(8×1)	(6×2) (NL)	(8×1) (4×2)	(4×1)·3		(8×1)	(6×2)2 (NL)	(8×1)·2 (4×2) (4×1)	(4×1)·6	
⑰	Gambir (A) ~ Kebayoran (A)	8.3		200×2	800×1	400×1			200×2	800×2	400×1			200×2	800×2	400×1			200×3	800×3	400×1	
				(6×2) (6×1)	(2×1)	(2×1)			(6×2) (6×1)	(8×1) (4×1)	(2×1)			(6×2)·2	(8×1) (4×2)	(2×1)			(6×2)2 (6×1)	(8×1) (4×2) (4×1)	(2×2)	
⑱	Cempaka Putih ~ Pulo Gadung	7.0		200×1	800×2	400×1	200×1		200×1	800×2	400×3	200×2		200×1	800×2	400×5	200×3		200×2	800×3	400×9	200×5
				(6×1)	(8×1) (4×1)	(4×1)	(2×1)		(6×1)	(8×1) (4×1)	(4×1)·3	(2×1)2		(6×2)	(8×1) (4×2)	(4×1)·5	(2×1)3		(6×2) (6×1)	(8×1)·2 (4×2)	(4×1)9	(2×1)5
⑲	Pulo Gadung ~ Tg. Priok (A)	7.0		200×1	800×1	400×1	200×1		200×1	800×1	400×3	200×2		200×1	800×2	400×5	200×3		200×1	800×3	400×9	200×5
				(6×1)	(8×1)	(4×1)	(2×1)		(6×1)	(8×1)	(4×1)·3	(2×1)2		(6×2)	(8×1) (4×1)	(4×1)·5	(2×3)3		(6×2)	(8×1)·2 (4×2)	(4×1)9	(2×1)5
⑳	Tg. Priok (A) ~ Cilincing	5.0					200×1			600×1		200×1			600×1		200×1		200×1	600×1		200×3
							(2×1)			(4×1)		(2×1)			(4×1)		(2×1)·2		(6×1)	(4×1 / 2×1)		(2×1)·3

TABLE 7-4-2-(26) NUMBER OF LOADING COILS IN EACH CABLE SECTION BY CONDUCTOR DIAMETER (3/6)

Plan-NO. 1

Section NO.	Cable Section	Distance (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(21)	Tg. Priok(A) ~ Ancol	5.0			400x1				1200x1	400x1				1200x1	400x1				1200x2	400x1		
					(4x1)				(6x1)	(4x1)				(6x2)	(4x1)				(6x2) (6x1)	(4x1)		
(22)	Cempaka Putih ~ Rawamangnn	6.1			800x1				1200x1	800x1				1200x2	800x1			1200x1	1200x2	800x2		
					(8x1)				(6x2)	(8x1)				(6x2) (6x1)	(8x1)			(6x1)	(6x2)2	(8x1)2		
(23)	Rawamangun ~ Penggilingan	6.0								800x1					800x1					800x2		
										(4x1)					(4x2)					(8x1) (4x2)		
(24)	Cempaka Putih ~ Kebayoran(A)	11.7			800x1	200x1				800x1	200x1				800x1	200x1				800x1	200x1	
					(4x1)	(2x1)				(4x1)	(2x1)				(4x2)	(2x1)				(4x2)	(2x1)	
(25)	Cempaka Putih ~ Jatinegara(B)	8.6		1200x1		300x1			1200x1		300x1			1200x1	600x1	300x1			1200x1	600x1	300x1	
				(6x1)		(3x1)			(6x1)		(3x1)			(6x1)	(4x1)	(3x1)			(6x2)	(4x1) (2x1)	(3x1)	
(26)	Kebayoran(A) ~ Cipete	7.0		1200x1	800x1				1200x1	800x1				1200x1	800x1				1200x1	800x1		
				(6x1)	(4x1)				(6x1)	(4x1)				(6x1)	(4x2)				(6x2)	(4x2)		
(27)	Kebayoran(A) ~ Pasar Minggu	9.2								600x1		200x1			600x1	400x1	200x1		1200x1	600x1	400x1	200x2
										(6x1)		(2x1)			(6x1)	(2x1)	(2x1)		(6x1)	(6x1)	(2x1)	(2x1)2
(28)	Pasar Minggu ~ Jagakarsa	5.5					200x1			400x1		200x1			400x1		200x1			400x1	400x1	200x1
							(2x1)			(2x1)		(2x1)			(2x1)		(2x1)			(2x2)	(2x1)	(2x1)
(29)	Kebayoran(A) ~ Kalibata	7.0		1200x1	800x1	400x1 200x1			1200x1	800x1	400x1 200x1			1200x1	800x1	400x1 200x1			1200x2	800x1	400x1 200x1	
				(6x1)	(8x1)	(4x1) (2x1)			(6x1)	(8x1)	(4x1) (2x1)			(6x2)	(8x1)	(4x1) (2x1)			(6x2) (6x1)	(8x1)	(4x1) (2x1)	
(30)	Kebayoran(A) ~ Tebet	8.0		400x1					400x1					400x1					400x1			
				(2x1)					(2x1)					(2x1)					(2x2)			

TABLE 7-4-2-(27) NUMBER OF LOADING COILS IN EACH CABLE SECTION BY CONDUCTOR DIAMETER (4/6)

Plan - NO. 1

Section NO.	Cable Section	Distance (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(31)	Kebayoran (A) ~ Semanggi (A)	3.0		1200x1					1200x1					1200x1					1200x1			
				(NL)					(NL)					(6x1)					(6x1)			
(32)	Jatinegara (B) ~ Tebet	4.5		1200x1	800x1				1200x1	800x1				1200x2	800x1				1200x2	800x1		
				(6x2)	(8x1)				(6x2)	(8x1)				(6x2) (6x1)	(8x1)				(6x2)2	(8x1)		
(33)	Jatinegara (B) ~ Cawang	4.3		1200x1	800x1	400x1	200x1		1200x1	800x1	400x1	200x1		1200x1	800x1	400x1	200x2		1200x2	800x2	400x2	200x3
				(6x2)	(8x1)	(2x1)	(2x1)		(6x2)	(8x1)	(2x1)	(2x1)		(6x2)	(8x1)	(2x2)	(2x1)2		(6x2)2	(8x1)2	(2x2) (2x1)	(2x1)3
(34)	Cawang ~ Pasar Rebo	9.0			800x1	400x1	200x1			800x1	400x1	200x1			800x1	400x1	200x2		1200x1	800x1	400x1	200x3
					(4x1)	(2x1)	(2x1)			(4x2)	(2x1)	(2x1)			(4x2)	(2x2)	(2x1)2		(6x2)	(4x2)	(2x2)	(2x1)3
(35)	Pasar Rebo ~ Gandaria	5.5									400x1	200x1				400x1	200x1			600x1	400x1	200x2
											(4x1)	(2x1)				(4x1)	(2x1)			(6x1)	(4x1)	(2x1)2
(36)	Jatinegara (B) ~ Klender	7.5			800x1					800x1				1200x1	800x1				1200x1	800x2		
					(4x1)					(4x2)				(6x1)	(4x2)				(6x1)	(4x2) (4x1)		
(37)	Jatinegara (B) ~ Jatinegara (A)	2.8		1200x1					1200x1				2400x1	1200x1				2400x1	1200x1			
				(6x1)					(6x2)				(8x2)	(6x2)				(8x2)	(6x2)			
(38)	Kota (B) ~ Silpi	6.0							400x1				1200x1	400x1				1200x1	400x1			
									(4x1)				(6x1)	(4x1)				(6x1)	(4x1)			
(39)	Kebayoran (A) ~ Pal Merah	7.5								100x1				400x1	100x1				400x1	100x1		
										(1x1)				(2x1)	(1x1)				(2x2)	(1x1)		
(40)	Kalibata ~ Pasar Minggu	5.7			400x1	400x1 200x1				400x1	400x1 200x2				400x1	400x1 200x1				400x1	400x1 200x1	
					(4x1)	(4x1) (2x1)				4x1	(4x1) (2x1)				(4x1)	(4x1) (2x1)				(4x1)	(4x1) (2x1)	

TABLE 7-4-2-(28)

NUMBER OF LOADING COILS IN EACH CABLE SECTION CONDUCTOR DIAMETER ($^5/_6$)

Plan- NO.1

Section NO.	Cable Section	Distance (km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(41)	Kalibata ~ Jatinegara (B)	8.0								400x1 (2x1)					400x1 (2x1)					400x1 (2x2)		
(42)	Kabayoran (A) ~ Cawang	10.5									400x1 (2x1)					400x1 (2x1)					400x1 (2x2)	
(43)	Kalibata ~ Cawang	7.0												400x1 (NL)					400x1 (2x1)			
(44)	Jatinegara (B) ~ Rawamangun	5.7							600x1 (2x1)					600x1 (2x1)					600x1 2x1 (4x1)			
(45)	Kota (B) ~ Ancol	7.8		200x1 (6x1)	800x1 (8x1)				200x1 (6x2)	800x1 (8x1)				200x1 (6x2)	800x2 (8x1)·2				200x3 (6x2)·2 (6x1)	800x2 (8x1)·2		
(46)	Kota (B) ~ Pluit	6.4		200x1 (6x2)	600x1 (4x1)				200x1 (6x2)	600x1 (4x1)			200x1 (6x1)	200x1 (6x2)	600x1 (6x1)			200x1 (6x1)	200x1 (6x2)	600x1 (6x1)		
(47)	Kota (B) ~ Cengkareng	14.2			600x1 (4x1)	400x1 (4x1)	200x1 (2x1)			600x1 (4x1, 2x1)	400x1 (4x1)	200x1 (2x1)			600x1 (4x1, 2x1)	400x1 (4x1)	200x1 (2x1)		200x1 (6x1)	600x1 (4x1) 2x1	400x2 (4x1)·2	200x2 (2x1)·2
(48)	Kebayoran (A) ~ Jatinegara (B)	12.4			800x1 (8x1)					800x1 (8x1)					800x1 (8x1)					800x1 (8x1)		
(49)																						
(50)																						

TABLE 7-4-2-(29) NUMBER OF LOADING COILS IN EACH CABLE SECTION BY CONDUCTOR DIAMETER (6/6)

Plan - NO. 1

Section NO.	Cable Section	Distance (km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(51)	Gambir (A) ~ Gambir (B)	3.0	2400x2 (8x3) (8x2)	1200x3 (6x2)2 (N·L)				2400x2 (8x3) (8x2)	1200x3 (6x2)2 (N·L)				2400x3 (8x3) (8x2) (N·L)	1200x3 (6x2)2 (6x1)				2400x5 (8x3)2 (N·L)3	1200x4 (6x2)3 (N·L)			
(52)	Tg. Priok (A) ~ Tg. Priok (B)	3.0								800x1 (8x1)	400x1 (4x1)	200x2 (2x1)2		1200x1 (6x2)	800x1 (8x1)	400x2 (4x1) (2x1)	200x2 (2x1)2	2400x1 (8x1)	1200x1 (6x2)	800x1 (8x1)	400x3 (4x1) 2 (2x2)	200x3 (2x1)3
(53)	Semanggi(A) ~ Semanggi(B)	2.0												1200x2 (6x2) (6x1)				2400x1 (8x1)	1200x2 (6x2)2			
(54)	Kebayoran(A) ~ Kebayoran(B)	2.8						2400x1 (8x1)		800x1 (4x1)			2400x1 (8x1)		800x1 (4x2)			2400x1 (8x2)		800x1 (4x2)		
(55)	Kota (B) ~ Kota (C)	1.7						2400x2 (8x2) (N·L)	1200x1 (6x2)				2400x3 (8x2) (N·L)2	1200x2 (6x2) (6x1)				2400x3 (8x2) (NL)2	1200x3 (6x2)2 (6x1)			
(56)	Jatinegara (A) ~ Gambir (A)	5.8		1200x1 (6x1)					1200x1 (6x1)					1200x1 (6x1)					1200x1 (6x2)			
(57)																						
(58)																						
(59)																						
(60)	Jatinegara (B) ~ Gandaria	15.5				300x1 (3x1)					300x1 (3x1)					300x1 (3x1)					300x1 (3x1)	

TABLE 7-4-2-(30) TOTAL NUMBER OF LOADING COILS

Plan – No.1

Year	Loading Coil Pairs.	Total Cable Length (Km)	Number of Loading Coils (Loaing Interval 1.5Km)	Composition Rate
1979	100	—	—	—
	200	104.7	70	14.8
	300	24.1	17	3.6
	400	156.6	105	22.2
	600	309.0	206	43.5
	800	111.7	75	15.9
	Total	706.1	473	100.0
1988	100	7.5	5	0.7
	200	251.5	168	24.0
	300	34.6	24	3.4
	400	271.6	182	26.0
	600	359.2	240	34.2
	800	122.7	82	11.7
	Total	1047.1	701	100.0
1988	100	7.5	5	0.5
	200	393.2	263	27.0
	300	34.6	24	2.5
	400	342.7	229	23.5
	600	522.9	349	35.8
	800	154.9	104	10.7
	Total	1455.9	974	100.0
1993	100	7.5	5	0.4
	200	527.3	352	25.5
	300	34.6	24	1.7
	400	547.8	366	26.5
	600	725.9	484	35.1
	800	223.5	149	10.8
	Total	2066.6	1380	100.0

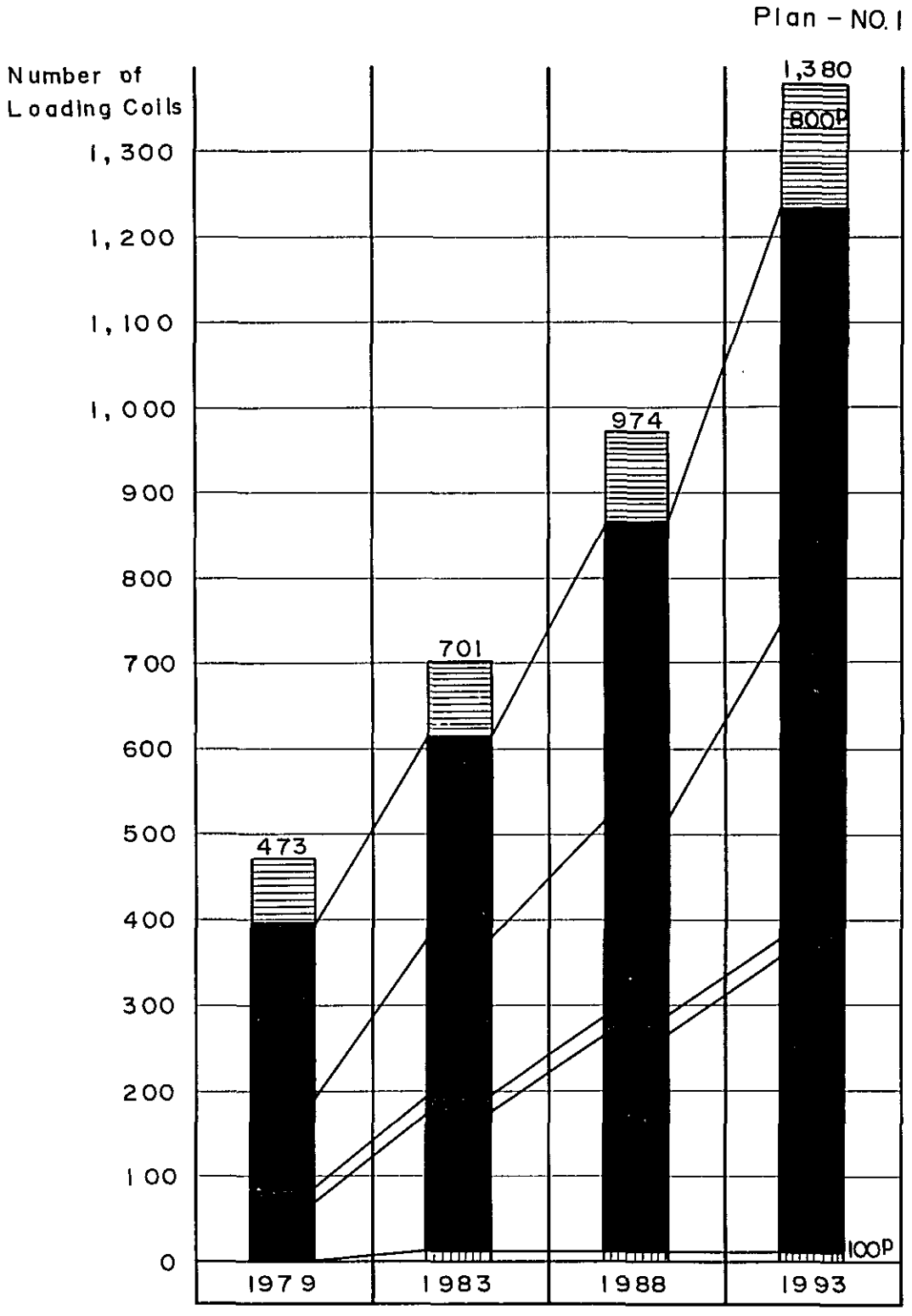


FIG. 7-4-2-(31) TOTAL NUMBER OF LOADING COILS

Moreover, the number of loading coils installed in the manholes nearest to Gambir (A) Exchange Office will become 97 coils. Supposing that even if the entrance cables were divided into four routes, about 25 loading coils will be installed in the same manhole. Therefore, a dispersion of loading coil manholes and entrance cables will be requested.

When PERUMTEL expands the telecommunication facilities, it is recommended that sufficient space be given to the manholes, MDF, etc. based on the long-term expansion plan.

7.5 Plan No. 2

7.5.1 Junction Circuits

7.5.1.1 Number of Junction Circuits as of 1979, 1983, 1988 and 1993

The number of junction circuits was calculated by utilizing the computer on the basis of the telephone traffic flow among the exchange offices, the tandem plan and the circuit cost.

(a) Object Years

1979, 1983, 1988 and 1993

(b) Classification of Circuit Sections

The number of junction circuits for each circuit section is shown in four combinations of the EMD and the new system.

In other words, (EMD → EMD, EMD → NEW, NEW → EMD, NEW → NEW).

(c) Calculation Method

For an alternative routing network with one tandem stage, the determination of the number of the direct junctions and tandem junctions was made by calculation according to the formulas of R.I. Wilkinson, Y. Rapp and the loss formula of A. K. Erlang. (The details are described in paragraph 6.2.6.)

7.5.1.2 Number of Junction Circuits in Each Circuit Section

The number of junction circuits in each circuit section in the Plan No. 2 is indicated in Table 7.5.1.(2). The number of circuits (67,669) as of 1993 will be to about three times the number of circuits (22,289) as of 1979. Among the circuit sections (EO - EO, EO - T (tandem), TOLL - EO), the circuit section with the highest rate of increase is the direct circuits between EO and EO, and the number of circuits (29,783) as of 1993 will be to about 6.6 times the number of circuits (4,534) as of 1979. The circuit section with the second highest increase rate is the "SLDD", "10X", and the number of circuits (15,466) as of 1993 will be about 5.6 times the number of circuits (2,759) as of 1979. Furthermore, although the number of tandem circuits (22,420) as of 1993 will be about 1.5 times the number of circuits (14,996) as of 1979, this will be due to the introduction of the new

TABLE 7-4-2-(32)

TOTAL NUMBER OF TERMINATING CABLES, LOADING COILS AND MDF LENGTH FOR JUNCTION CABLE OF EACH EXCHANGE (1/4)

Plan - NO.1

NO.	Name of Exchange	Telephone Demand	Terminating Circuit	Total Junction Cable	Conductor Diameter					Total Number of Loading Coils	Loading Coil Pairs						MDF Length for Junction Cable (m)
					mm 0.4	mm 0.6	mm 0.8	mm 0.9	mm 1.0		P 100	P 200	P 300	P 400	P 600	P 800	
1	Kota (A)	20,900	(4,532) 3,433	7,400	2400x1	600x1 800x1 1200x2	200x1 400x1 600x1			9		3		3	2	1	2.4
2	〃 (B)	57,100	(20,238) 15,332	51,200	1200x2 2400x6	400x1 1200x21	400x1 600x4 800x5	200x2 400x3	200x2	60		8		7	35	10	15.5
3	〃 (C)	39,400	(8,705) 6,595	10,800	2400x3	1200x3				7					5	2	3.3
4	Ancol	28,300	(3,891) 2,948	8,800		600x1 1200x5	200x1 400x1 800x2			13		1		2	8	2	2.7
5	Pluit	18,800	(2,627) 1,990	4,200	1200x1	800x1 1200x1	400x1 600x1			6		1		1	4		1.3
6	Cengkareng	14,600	(1,657) 1,255	4,800		400x1 1200x1	400x1 600x2	400x2	200x4	13		6		6	1		1.5
7	Tegal Alur	9,300	(895) 678	1,200		400x1	400x1		200x2	4		2		2			0.4
8	Gambir (A)	43,700	(46,461) 35,198	76,100	2400x9	1200x30	400x1 800x16	200x1 300x1 400x2		97		6	1	21	48	21	22.9
9	〃 (B)	52,200	(15,077) 11,422	16,800	2400x5	1200x4				12					6	6	5.1
10	Semanggi (A)	36,100	(8,138) 6,165	16,700	2400x2	1200x9	800x1	300x1		20			1		15	4	5.1

( ) : including miscellaneous circuits

TABLE 7-4-2-(33)

TOTAL NUMBER OF TERMINATING CABLES, LOADING COILS AND MDF LENGTH FOR JUNCTION CABLE OF EACH EXCHANGE (2/4)

Plan-NO. 1

NO.	Name of Exchange	Telephone Demand	Terminating Circuit	Total Junction Cable	Conductor Diameter					Total Number of Loading Coils	Loading Coil Pairs						MDF Length for Junction cable (m)
					mm 0.4	mm 0.6	mm 0.8	mm 0.9	mm 1.0		p 100	p 200	p 300	p 400	p 600	p 800	
11	Semanggi (B)	14.900	(3,619) 2,742	4,800	2400x1	1200x2				5					4	1	1.5
12	Slipi	35,100	(4,607) 3,490	8,500	1200x1	400x1 1200x4	600x1 800x1	300x1 400x1		13		2	1	2	7	1	2.7
13	Pal Merah	26,000	(3,222) 2,441	6,300		400x1 1200x3	100x1 400x1 600x1 800x1	200x2		15	1	6		3	5		2.0
14	Kedoya	10,100	(1,128) 855	2,100		1200x1	600x1	300x1		3			1	1	1		0.8
15	Meruya	11,800	(1,214) 920	2,000		1200x1	600x1	200x1		4		2		1	1		0.8
16	Cempaka Putih	40,200	(12,193) 9,237	32,100	1200x1 2400x1	1200x10	400x1 600x1 800x10	200x1 300x1 400x15	200x5	57		9	1	23	17	7	9.8
17	Rawamangun	21,900	(3,285) 2,489	6,800	1200x1	1,200x2	800x4			10				2	5	3	2.2
18	Pulo Gadung	6,900	(989) 747	6,000		1,200x3	800x2	400x2		11				6	5		1.8
19	Penggilingan	8.300	(1,533) 1,161	1,600			800x2			3				2		1	0.6
20	Tg. Priok (A)	32,500	(5,291) 4,008	19,600	2400x1	1200x5	400x1 600x1 800x4	400x12	200x11	41		14		15	8	4	6.0

TABLE 7-4-2-(34) TOTAL NUMBER OF TERMINATING CABLES, LOADING COILS AND MDF LENGTH FOR JUNCTION CABLE OF EACH EXCHANGE (3/4)

Plan- NO. I

NO.	Name of Exchange	Telephone Demand	Terminating Circuit	Total Junction Cable	Conductor Diameter					Total Number of Loading Coils	Loading Coil Paris						M.D.F. Length for Junction Cable(m)
					mm 0.4	mm 0.6	mm 0.8	mm 0.9	mm 1.0		p 100	p 200	p 300	p 400	p 600	p 800	
21	Tg. Priok(B)	29,000	(4,558) 3,483	6,200	2400x1	1200x1	800x1	400x3	200x3	11		5		2	2	2	2.0
22	Cilincing	11,700	(1,538) 1,165	2,400		1200x1	600x1		200x3	6		4		1	1		0.8
23	Kebayoran(A)	26,000	(7,672) 5,812	24,300	2400x1	400x2 1200x9	100x1 600x3 800x8	200x3 400x4	200x2	47	1	15		11	15	5	7.4
24	〃 (B)	15,600	(1,975) 1,496	3,200	2400x1		800x1			4				2		2	1.1
25	Cipete	15,700	(1,677) 1,271	2,000		1200x1	800x1			4				2	2		0.8
26	Kalibata	29,200	(3,184) 2,421	6,000		400x1 1200x2	400x3 800x1	200x1 400x2		12		5		3	3	1	1.8
27	Pasar Minggu	11,400	(1,201) 910	4,600		1200x1	400x2 600x1	200x1 400x3	200x3	12		8		2	2		1.5
28	Jagakarsa	5,800	(605) 458	1,000			400x1	400x1	200x1	4		4					0.4
29	Jatinegara(A)	17,700	(2,350) 1,780	4,800	2400x1	1200x2				6					4	2	1.5
30	〃 (B)	20,000	(8,930) 6,765	29,000	2400x1	600x1 1200x11	400x1 600x3 800x9	200x1 300x2 400x5	200x3	52		11	2	10	21	8	8.9

TABLE 7-4-2-(35)

TOTAL NUMBER OF TERMINATING CABLES, LOADING COILS AND MDF LENGTH FOR JUNCTION CABLE OF EACH EXCHANGE (4/4)

Plan-NO. 1

NO.	Name of Exchange	Telephone Demand	Terminating Circuit	Total Junction Cable	Conductor Diameter					Total Number of Loading Coils	Loading Coil Pairs						MDF Length for Junction Cable (m)
					0.4 mm	0.6 mm	0.8 mm	0.9 mm	1.0 mm		P 100	P 200	P 300	P 400	P 600	P 800	
31	Cawang	24,600	(1,973) 1,495	8,400		400x1 1,200x3	800x3	400x4	200x2	20		10		2	6	2	2.6
32	Pasar Rebo	15,500	(1,622) 1,229	3,100		1,200x1	600x1 800x1	400x2	200x1	9		3		3	3		1.1
33	Klendar	20,300	(1,937) 1,463	2,800		1,200x1	800x2			4				3	1		0.9
34	Tebet	27,700	(3,510) 2,659	3,600		400x1 1,200x2	800x1			7		2			4	1	1.1
35	Gandaria	9,800	(1,111) 842	1,700			600x1	300x1 400x1	200x2	5		2	1	1	1		0.6

switching system with common control which will make possible alternative routing, and the trend of increase will become very gradual.

Definition of Circuit Section

Circuit section means the section between switching systems. (For example, EO - EO, EO - T (tandem), TOLL - EO.)

Table 7.5.1.(1)

T: Terminating
O: Originating

O \ T		EMD		NEW		Toll	
		EO	T	EO	T	SLDD	1OX
EMD	EO	EO → EO	EO → T	EO → EO	EO → T	EO → SLDD	EO → 1OX
	T	T → EO	—	T → EO	—	—	—
NEW	EO	EO → EO	EO → T	EO → EO	EO → T	EO → SLDD	EO → 1OX
	T	T → EO	—	T → EO	—	—	—
SLDD		SLDD → EO	—	SLDD → EO	—	—	—
1OX		1OX → EO		1OX → EO	—	—	—

7.5.1.3 Number of Junction Circuits and Non-Loading Circuits of Cable Section According to Conductor Diameter

The conductor diameter of each circuit section is determined on the basis of the aforementioned DC resistance limit or transmission loss assignment. In principle, the same conductor diameter is used in one circuit section, as shown in Fig. 7.5.1.(3). However, when comparison is made between the tandem circuit cost [EO (1) → T(tandem) + T(tandem) → EO (2)] and the direct circuit cost [EO(1) → EO (2)], they may be cases where the tandem circuit cost is lower, since the tandem circuit cost permits the use of different kinds of conductor diameters. Only in such case, the cable combination of different size conductor diameters in one circuit section will be applied.

Of all the cable sections, the No. 51 cable section [Gambir (A) – Gambir (B)] will be the largest with a circuit requirement of 11,395 as of 1993. The second will be the No. 8 cable section [Gambir (A) – Jakarta Kota (B)] with 10,600 and the third will be the No. 16 cable section [Gambir (A) – Cempaka Putih] which will require 8,341 circuits. Especially in regard to Gambir (A) Exchange Office and Jakarta Kota (B) Exchange Office, since a large

TABLE 7-5-1-(2)

NUMBER OF JUNCTION CIRCUITS BY SYSTEM

( ): CIRCUITS WHICH ARE ORIGINATING AND TERMINATINS WITHIN THE SAME EXCHANGE OFFICE ARE EXCLUDED

LOWER SIDE: CIRCUITS MENTIONED ABOVE ARE INCLUDED

Plan-No.2

SYSTEM \ YEAR		1979	1983		1988		1993	
		O	O	N	O	N	O	N
GRAND. TOTAL		(31,696) 42,173	(25,875) 32,461	(8,123) 9,032	(28,235) 39,632	(19,382) 21,101	(27,882) 33,835	(39,787) 43,276
EO — T	EO — T_1	3,254	2,389		2,098		1,778	
	EO — T_2	4,708	2,726		2,614		2,197	
	EO — T_3	1,589	1,171		1,262		1,303	
	EO — T_4	1,528	870		803		684	
	EO — T_5	2,079	932		994		1,020	
	EO — MS			(2,049) 2,146		(3,524) 3,609		(4,674) 4,870
SUB TOTAL		13,158	8,088	(2,049) 2,146	7,771	(3,524) 3,609	6,982	(4,674) 4,870
T — EO	T_1 — EO	(1,463) 3,566	(1,778) 2,778		(1,607) 2,570		(1,359) 2,202	
	T_2 — EO	(3,993) 5,395	(2,257) 3,371		(2,216) 3,226		(1,924) 2,695	
	T_3 — EO	(715) 1,792	(702) 1,352		(881) 1,462		(1,019) 1,514	
	T_4 — EO	(659) 1,777	(479) 967		(511) 874		(506) 748	
	T_5 — EO	(1,568) 2,489	(736) 1,051		(845) 1,116		(950) 1,157	
	MS — EO			(2,215) 2,396		(3,744) 3,945		(5,006) 5,248
SUB TOTAL		(8,398) 15,019	(5,952) 9,519	(2,215) 2,396	(6,060) 9,248	(3,744) 3,945	(5,758) 8,316	(5,008) 5,248
TOTAL		(21,556) 28,177	(14,040) 17,607	(4,264) 4,542	(13,831) 17,019	(7,268) 7,554	(12,740) 15,298	(9,680) 10,118
SLDD → EO 10X	SLDD — EO	(1,512) 1,676	(1,405) 1,632	(900) 963	(1,787) 2,077	(2,552) 2,777	(1,889) 2,225	(6,017) 6,509
	10X — EO	(524) 578	(373) 425	(267) 283	(341) 387	(462) 496	(271) 308	(686) 739
SUB TOTAL		(2,036) 2,254	(1,778) 2,057	(1,167) 1,246	2,128 2,464	(3,014) 3,273	(2,160) 2,533	(6,703) 7,248
EO → SLDD 10X	EO — SLDD	(1,280) 1,416	(1,196) 1,382	(740) 788	(1,495) 1,728	(1,903) 2,054	(1,568) 1,836	(4,155) 4,483
	EO — 10X	(476) 516	(341) 381	(255) 270	(318) 357	(441) 459	(262) 294	(618) 663
SUB TOTAL		(1,756) 1,932	(1,537) 1,763	(995) 1,058	(1,813) 2,085	(2,344) 2,513	(1,830) 2,130	(4,773) 5,146
TOTAL		(3,792) 4,186	(3,315) 3,820	(2,162) 2,304	(3,941) 4,549	(5,358) 5,786	(3,990) 4,663	(11,476) 12,394
EO — EO		(6,348) 9,810	(8,524) 11,034	(1,697) 2,186	(10,463) 18,064	(6,756) 7,761	(11,152) 13,874	(18,631) 20,764

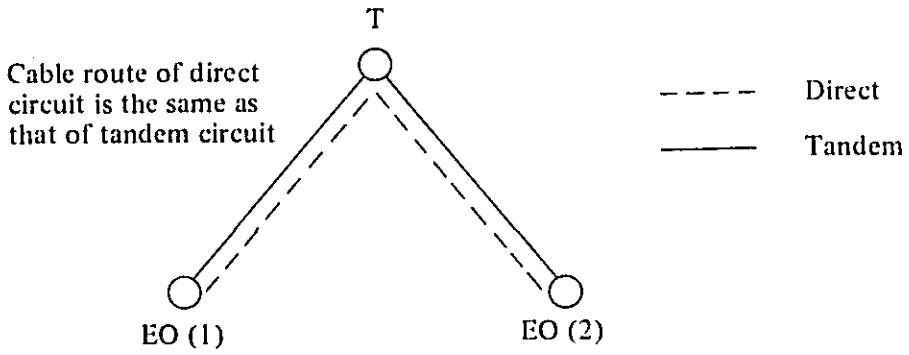


Fig. 7.5.1.(3)

number of cables will have to be terminated, the consideration of direct cable routes to other main exchange offices without passing through these exchange offices will be necessary.

As shown in Tables 7.5.1.(4) through (9), the number of circuits in all of the circuit sections as of 1993 will be to approximately 2 to 3 times of those of 1979. In this way, it can be considered that with the progress in city development of Jakarta, the number of junction circuits among the required exchange offices will continue to increase.

Consequently, when laying conduits in consideration of the road construction program, it will be very important to acquire a sufficient number of ductways on the basis of the long-term outside plant circuit network plan.

When considering the number of non-loading circuits, it can clearly be seen in Tables 7.5.1.(4) to (9) that the No. 51 cable section [Gambir (A) – Gambir (B)] is the largest with 5,405, the second is the NO. 8 cable section [Jakarta Kota (B) – Gambir (A)] with 4,277 and the third is the No. 1 cable section [Jakarta Kota (A) – Jakarta Kota (B)] with 1,688 circuits.

Non-loading circuits remain only in a part of the cables with 0.4 mm and 0.6 mm conductors, and loading coils are inserted in all circuits with cables of 0.8 mm, 0.9 mm and 1.0 mm conductors.

7.5.1.4 Total Number of Junction Circuits and Number of Non-Loading Circuits

As shown in Table 7.5.1.(10), the ratio of loaded circuits to circuits of 0.4 mm conductor as of 1979 is approximately 26% and for 0.6 mm circuits is about 82%. Regarding circuits of other conductor diameters, it will 100% loaded.

The circuit composition ratios according to conductor diameters are 24.3% for 0.4 mm, 49.2% for 0.6 mm, 19.5% for 0.8 mm, 4.7% for 0.9 mm and 2.3% for 1.0 mm conductor cables.

TABLE 7-5-1-(4)

NUMBER OF JUNCTION CIRCUITS AND NON-LOADING CIRCUITS IN EACH CABLE SECTION BY CONDUCTOR DIAMETER (1/6)

Plan-NO.2

Section NO.	Cable Section	Distance (km)	1979						1983						1988						1993					
			0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total
①	Kota (A) ~ Kota (B)	1.8	(934) 1934	(364) 855				2298 2789	(635)	(302)				(937)	(205)	(642)				(847)	(463)	(225)				(688)
			(826) 1826	(316) 737				2142 2563	1699	938				2657	1408	1477				2885	1884	1240				3124
②	Kota (A) ~ Ancol	6.0	(73) 73	(37) 37	27			(110) 137	(102)	(57)				(159)	(119)	(115)				(234)	(136)	(170)				(306)
			(63) 63	(29) 29	16			(92) 108	102	84	48			234	119	191	55			365	136	344	78			558
③	Kota (A) ~ Pluit	4.0	(113) 113	(37) 79	10			(130) 202	(124)	(57)				(181)	(126)	(71)				(197)	(120)	(85)				(205)
			(95) 95	(29) 43	9			(124) 147	124	99	26			249	126	139	28			243	120	229	21			370
④	Kota (A) ~ Cengkareng	12.4		109	37			146																		
				44	25			69		237	117			354		326	133			459		228	109			337
⑤	Cengkareng ~ Tegal Alur	5.0	(11) 11	11	70	7	51	(11) 150	(20)					(20)	(27)					(27)	(39)					(39)
			(6) 6	11	64	6	40	(6) 127	20	52	119	6	104	301	27	84	131	6	183	431	39	130	170	6	366	711
⑥	Kota (B) ~ Cempaka Putih	7.2		(539) 725	140	7		(539) 872	(20)	(438)				(458)	(95)	(468)				(563)	(191)	(413)				(604)
				(488) 682	67	6		(488) 755	69	663	63	6		801	231	764	61	6		1062	418	963	68	6		1455
⑦	Kota (B) ~ Jatinegara(B)	11.2		569	383	50	7	1009								(14)				(14)		(23)				(23)
				289	169	19	5	482		385	155	7	16	563		546	127	7	15	696		948	174	7	13	1142
⑧	Kota (B) ~ Gambir (A)	4.6	(1637) 1637	(628) 2760	348	71	23	(2265) 4838	(1515)	(828)				(2843)	(2049)	(193)				(3242)	(2592)	(1685)				(4277)
			(1525) 1525	(559) 2315	204	28	18	(2084) 4090	2145	2326	826	127	76	5500	3275	2892	1181	261	152	7761	4653	3556	1661	452	279	10600
⑨	Kota (B) ~ Kebayoran(A)	12.0		474	169	75	18	736																		
				432	131	28	15	606		397	127	17	6	547		442	105	14	5	566		533	79	29	5	646
⑩	Gambir(A) ~ Semanggi(A)	5.0	(402) 402	(623) 2799				(1025) 3201	(471)	(535)				(1006)	(659)	(651)				(1310)	(988)	(762)				(1700)
			(341) 341	(405) 1824				(746) 2165	540	2271	345	97		3253	953	3710	389	109		5161	1746	5135	366	128		7375

( ) : Number of non-loading circuits.

TABLE 7-5-1-(5)

NUMBER OF JUNCTION CIRCUITS AND
NON-LOADING CIRCUITS IN EACH CABLE SECTION BY CONDUCTOR DIAMETER (2/6)

Plan-NO.2

Section NO.	Cable Section	Distance (km)	1,979						1,983						1,988						1,993					
			0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total
(11)	Gambir (A) ~ Slipi	7.8		(442) 980	585			(442) 1,565		(246)				(246)		(248)				(248)		(238)				(238)
				(427) 916	509			(427) 1,425	21	1297	486	26		1,830	67	1,856	550	38	4	2,515	1,45	2,642	666	54	29	3536
(12)	Slipi ~ Kedoya	5.5							(19)					(19)	(28)					(28)	(47)	(22)				(69)
									19	84	84	26		213	28	153	177	38		396	47	368	364	54		833
(13)	Gambir (A) ~ Pal Merah	7.0	(151) 151	(223) 1077	131			(374) 1359	(116)					(116)	(166)					(166)	(256)	(88)				(344)
			(79) 79	(88) 439	47			(167) 565	129	646	246	28		1,049	223	1097	373	41		1,734	402	1,964	523	60		2949
(14)	Pal Merah ~ Meruya	7.0							(14)					(14)	(22)					(22)	(41)					(41)
									14	92	123	28		257	22	164	227	41		454	41	376	417	60		894
(15)	Gambir (A) ~ Jatinegara (B)	8.6		1874	639		91	2604		(22)				(22)		(33)				(33)		(28)				(28)
				821	241		44	1106		1060	734	171	155	2120	33	1612	1324	275	322	3,566	65	2,594	2,109	391	677	5836
(16)	Gambir (A) ~ Cempaka Putih	4.6	(581) 581	(95) 815	291	100	26	(676) 1,813	(586)	(295)				(881)	(692)	(454)				(1146)	(910)	(681)				(1,591)
			(488) 488	(78) 630	318	136	24	(566) 1,596	832	827	748	330	266	3,003	1,090	1,378	1411	587	552	5018	1,481	2,304	2,327	1,117	1,112	8341
(17)	Gambir (A) ~ Kebayoran (A)	8.0		1191	634	20	88	1,933		(9)				(9)		(8)				(8)		(18)				(18)
				988	387	14	44	1433		1226	1004		128	2358	40	1656	1571		222	3,489	98	2,012	2,090		399	4,599
(18)	Cempaka Putih ~ Pulo Gadung	7.0	(48) 48	334	768	169	42	(48) 1,361	(37)					(37)	(45)					(45)	(60)					(60)
			14 14	142	811	205	37	(14) 1,209	37	289	629	819	288	2,062	45	576	1087	1384	424	3516	60	1,147	1853	2547	564	6,171
(19)	Pulo Gadung ~ Tg. Priok (A)	7.0	(27) 27	(9) 84	595	169	42	(36) 917	(18)	(12)				(30)	(37)					(37)	(62)	(60)				(122)
			(11) 11	(5) 103	772	205	37	(16) 1,128	18	219	560	811	288	1,896	37	486	931	1374	424	3252	62	1,023	1,489	2,502	564	5,640
(20)	Tg. Priok (A) ~ Cilincing	5.0	(15) 15	(9) 9	76	14	68	(24) 182	(29)					(29)	(55)					(55)	(121)	(50)				(171)
			(20) 20	(5) 51	73	9	61	(25) 168	44	38	114	8	170	374	103	64	143	8	305	623	227	179	274	7	505	1,192

TABLE 7-5-1-(6) NUMBER OF JUNCTION CIRCUITS AND NON-LOADING CIRCUITS IN EACH CABLE SECTION BY CONDUCTOR DIAMETER ($^3/_6$)

Plan-NO.2

Section NO.	Cable Section	Distance (km)	1979						1983						1988						1993					
			0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total
(21)	Tg. Priok (A) ~ Ancol	5.0		153	20			173	(11) 22	(13) 392	27			(24) 441	(33) 100	(59) 721	23			(92) 844	(132) 245	(125) 1283	50			(257) 1578
				231	20			251																		
(22)	Cempaka Putih ~ Rawamangun	6.1	(49) 49	370	140			(49) 559	(79) 102	672	305	6		(79) 1085	(116) 171	1081	607	6		(116) 1865	(150) 269	1751	1115	6		(150) 3141
			(54) 54	413	149			(54) 616																		
(23)	Rawamangun ~ Pengilingan	6.0							(16) 16	41	148	6		(16) 211	(29) 29	102	323	6		(29) 460	(35) 55	(12) 424	632	6		(67) 1117
(24)	Cempaka Putih ~ Kebayoran(A)	11.7		158	105	35	8	306		116	70	34	6	226		(6) 145	69	31	5	(6) 250		(28) 210	128	25	5	(28) 368
				138	77	42	7	264																		
(25)	Cempaka Putih ~ Jatinegara (B)	8.6		403	202	14		619		198	90	16		304	22	(15) 279	108	16		(15) 425	39	(15) 489	227	14		(15) 769
				209	110	9		328																		
(26)	Kebayoran(A) ~ Cipete	7.0	(98) 98	301	383			(98) 782	(67) 83	(14) 188	299			(81) 570	(83) 105	(23) 266	435			(106) 806	(83) 167	(26) 481	617			(109) 1265
			(49) 49	108	157			(49) 314																		
(27)	Kebayoran(A) ~ Pasar Minggn	9.2							3	(44) 143	211	29	128	(44) 514	9	(48) 173	295	30	222	(48) 729	15	(67) 273	374	31	399	(47) 1092
(28)	Pasar Minggr ~ Jagakarsa	5.5	(11) 11	(7) 7	31	26	67	(18) 142	(18) 18	(21) 73	20	29	68	(39) 208	(23) 23	(27) 88	34	30	123	(50) 298	(29) 29	(33) 107	34	31	234	(62) 435
			(6) 6	(7) 7	23	20	43	(13) 99																		
(29)	Kebayoran(A) ~ Kalibata	7.0	(66) 66	(64) 330	495	321	133	(130) 1345	(93) 93	(32) 316	461			(125) 870	(107) 107	(64) 472	667			(171) 1246	(119) 119	(109) 982	931			(228) 2032
			(72) 72	(31) 248	372	98	71	(103) 861																		
(30)	Kebayoran(A) ~ Tebet			91				91		33				33	(11) 11	67				(11) 78	(11) 36	143				(11) 179
				40				40																		

TABLE 7-5-1-(7)

NUMBER OF JUNCTION CIRCUITS AND NON-LOADING CIRCUITS
IN EACH CABLE SECTION BY CONDUCTOR DIAMETER (4/6)

Plan-NO. 2

Section NO.	Cable Section	Distance (km)	1979						1983						1988						1993					
			0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total
(31)	Kebayoran (A) ~ Semanggi (A)	3.0	(167) 167					(167) 167	(183)	(3)				(191)	(240)	(36)				(276)	(365)	(76)				(441)
			(118) 118					(118) 118	183	8				191	273	79				352	410	262				672
(32)	Jatinegara (B) ~ Tebet	4.3	(234) 234	(73) 1309	323			(307) 1866	(128)	(17)	387			(145)	(158)	(20)				(178)	(188)	(22)				(210)
			(66) 66	(18) 515	137			(84) 718	138	590				1115	187	900	618			1705	259	1367	855			248
(33)	Jatinegara (B) ~ Cawang	4.3	(190) 190	598	412	141	54	(190) 1395	(109)	329	390	114	141	(109)	(145)	637	608	220	274	(145)	(202)	1458	1039	334	554	(202)
			(54) 54	218	155	39	22	(54) 488	139					1113	197					1936	298					3683
(34)	Cawang ~ Pasar Rebo	9.0		(29) 88	200	141	54	(29) 483	6	(10) 149	142	125	141	(10)	18	(12) 221	157	230	274	(12) 900	58	(14) 464	305	349	554	(14)
				(9) 28	63	39	22	(9) 152						563												1730
(35)	Pasar Rebo ~ Gandaria	5.5							(24) 24	41	77	38	91	(24) 271	(31) 31	66	88	34	178	(31) 397	(54) 54	125	103	29	325	(54) 636
(36)	Jatinegara (B) ~ Klender	7.5	(52) 52	(14) 83	330			(66) 465	(31) 31	86	213			(31) 330	(44) 44	153	416			(44) 613	(66) 66	607	799			(66) 1472
			(11) 11	(7) 25	94			(18) 130																		
(37)	Jatinegara (B) ~ Jatinegara (A)	2.8	(581) 590	(14) 59				(595) 649	(166) 600	130	27			(166) 757	(218) 703	135	25			(218) 863	(226) 905	198	35			(226) 1138
			(470) 477	(7) 48				(477) 525																		
(38)	Kota (B) ~ Slipi	6.0							(18) 246	(18) 28				(36) 274	(108) 384	(25) 51				(133) 435	(207) 530	(46) 155	6			(253) 691
(39)	Kebayoran (A) ~ Pal Merah	7.5								20				20	(9) 9	(8) 38				(17) 47	(35) 35	(15) 118				50 153
(40)	Kallbata ~ Pasar Minggu	5.7	(23) 28	(71) 71	192	321	133	(94) 740	(34)	(21)	22			(55)	(45)	(27)	22			(72)	(59)	(33)	26			(92)
			(13) 13	(38) 38	81	98	71	(51) 301	(34) 21					77	45	27				94	59	87				172

TABLE 7-5-1-(8) NUMBER OF JUNCTION CIRCUITS AND NON-LOADING CIRCUITS IN EACH CABLE SECTION BY CONDUCTOR DIAMETER (5/6)

Plan – NO.2

Section NO.	Cable Section	Distance (km)	1979						1983						1988						1993					
			0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total	0.4	0.6	0.8	0.9	1.0	Total
(41)	Kalibata ~ Jatinegara(B)	8.0								35	22			57	10	33	22			65	37	(9) 101	22			(9) 160
(42)	Kebayoran(A) ~ Cawang	10.5								20	11	11		42		25	10	10		45		(10) 113	18	8		(10) 139
(43)	Kalibata ~ Cawang	7.0													(29) 29					(29) 29	(92) 92	105	4			(92) 201
(44)	Jatinegara (B) ~ Rawamangun	5.7							34					34	(20) 82					(20) 82	(50) 217	(31) 175				(81) 392
(45)	Kota (B) ~ Ancol	7.8		(219) 514	506			(219) 1020	61	(260) 767	588			(260) 1416	157	(290) 1217	824			(290) 2198	(278) 1035	1932	1136			(278) 4103
				(194) 534	382			(194) 916																		
(46)	Kota (B) ~ Pluit	6.4	(276) 276	558	195			(276) 1029	(191) 269	(53) 432				(244) 1039	(235) 337	(40) 484	466			(275) 1287	(274) 392	(31) 559	652			(305) 1603
			(240) 240	411	133			(240) 784																		
(47)	Kota (B) ~ Cengkareng	14.2		144	206	281	51	682		144	120	193	104	561		226	125	338	183	872		435	196	550	366	1547
				51	91	84	40	266																		
(48)	Kebayoran(A) ~ Jatinegara(B)	12.4		283	212	128	14	637		108	43			151		114	41			155		125	37			162
				134	81	40	7	262																		
(49)																										
(50)																										

TABLE 7-5-1-(9)

NUMBER OF JUNCTION CIRCUITS AND NON-LOADING CIRCUITS IN EACH CABLE SECTION BY CONDUCTOR DIAMETER (1/6) Plan-No.2

SECTION NO	CABLE SACTION	DISTANCE (Km)	1979						1983						1988						1993					
			0.4	0.6	0.8	0.9	1.0	TOTAL	0.4	0.6	0.8	0.9	1.0	TOTAL	0.4	0.6	0.8	0.9	1.0	TOTAL	0.4	0.6	0.8	0.9	1.0	TOTAL
51	GAMBIR (A)	3.0	(1,468)	(623)				(2091)	(2247)	(289)				(2536)	(3,327)	(302)				(3629)	(5,006)	(399)				(5,405)
	~GAMBIR (B)		4,126	2,084				6210																		
			(1,255)	(405)				(1,660)	4,012	1,939	16			5,967	5,741	2,290	7			8038	8,344	3,014	37			11,395
			2,963	1,415				4,378																		
52	TG. PRIOK (A)	3.0							(78)	(140)				(218)	(167)	(55)				(222)	(358)	(92)				(450)
	~TG. PRIOK (B)								126	251	43	188	275	883	300	476	131	248	468	1,623	687	837	526	429	851	3,330
53	SEMANGGI (A)	2.0													(286)	(70)				(356)	(427)	(72)				(499)
	~SEMANGGI (B)														592	245	14			1851	839	1,849	28			2,716
54	KEBAYORAN (A)	2.8							(124)					(124)	(150)					(150)	(165)					(165)
	~KEBAYORAN(B)								507	49	222			778	689	75	346			1,110	883	44	466			1,393
55	KOTA (B)	1.7							(2553)					(2553)	(2681)					(2681)	(2546)					(2546)
	~KOTA (C)								3,352	734				4086	3,957	1,037				4,994	4,459	1,404				5,863
56	JATINEGARA (A)	5.8	112	149				261							(25)					(25)	(34)	(21)				(55)
	~GAMBIR (A)		107	149				255	144	283				427	207	473				680	326	662				988
57																										
58																										
59																										
60	JATINEGARA (B)	15.5		41	127	40	82	290																		
	~GANDARIA			15	60	24	41	140					50	50					90	90					171	171

The total number of circuits according to conductor diameter in Table 7.5.1.(10) was calculated on the basis of the aforementioned DC resistance limit and transmission loss assignment. It is, however, very uneconomical to lay cables of different conductors strictly following the results of such theoretical calculation. Therefore, the actual number of circuits according to conductor diameters would differ from that obtained from the theoretical calculation.

After calculating the required number of circuits according to conductor diameters, the actual conductor diameters were determined from the viewpoint of economy as described in paragraph 7.5.2.1 below.

7.5.2 Junction Cables

7.5.2.1 New Cables by Conductor Diameter and Cable Section

Based on the number of circuits of each conductor diameter and circuit section as stated in Tables 7.5.2.(1) to (12), the miscellaneous circuits such as telegraph circuits, telex circuits, leased circuits, etc. will be added and in consideration of the transmission loss and DC resistance limit, the cables to be newly installed will be determined.

In the case of a certain circuit section where almost all the circuits are of small size conductor and only a small number of circuits are of large size conductor, the cables of large size conductor can be replaced with those of economical size conductor which satisfy the limit of the transmission loss, through application of new technologies, such as improvement of telephone set, or adoption of less severe limit value.

In principle, the pair number of the cable of each conductor diameter shall be the maximum one. However, in case the total number of circuits 15 years hence is less than the maximum number of pairs of that cable, the number of cable pairs which can satisfy the total number of circuits [(telephone circuits + miscellaneous circuits) x 1.2] will be applied. Furthermore, in computing the number of circuits after 1993, assuming that the circuit increase ratio in the five years from 1988 to 1993 will continue in the future, the decision will be made by an extended provision period of 15 years.

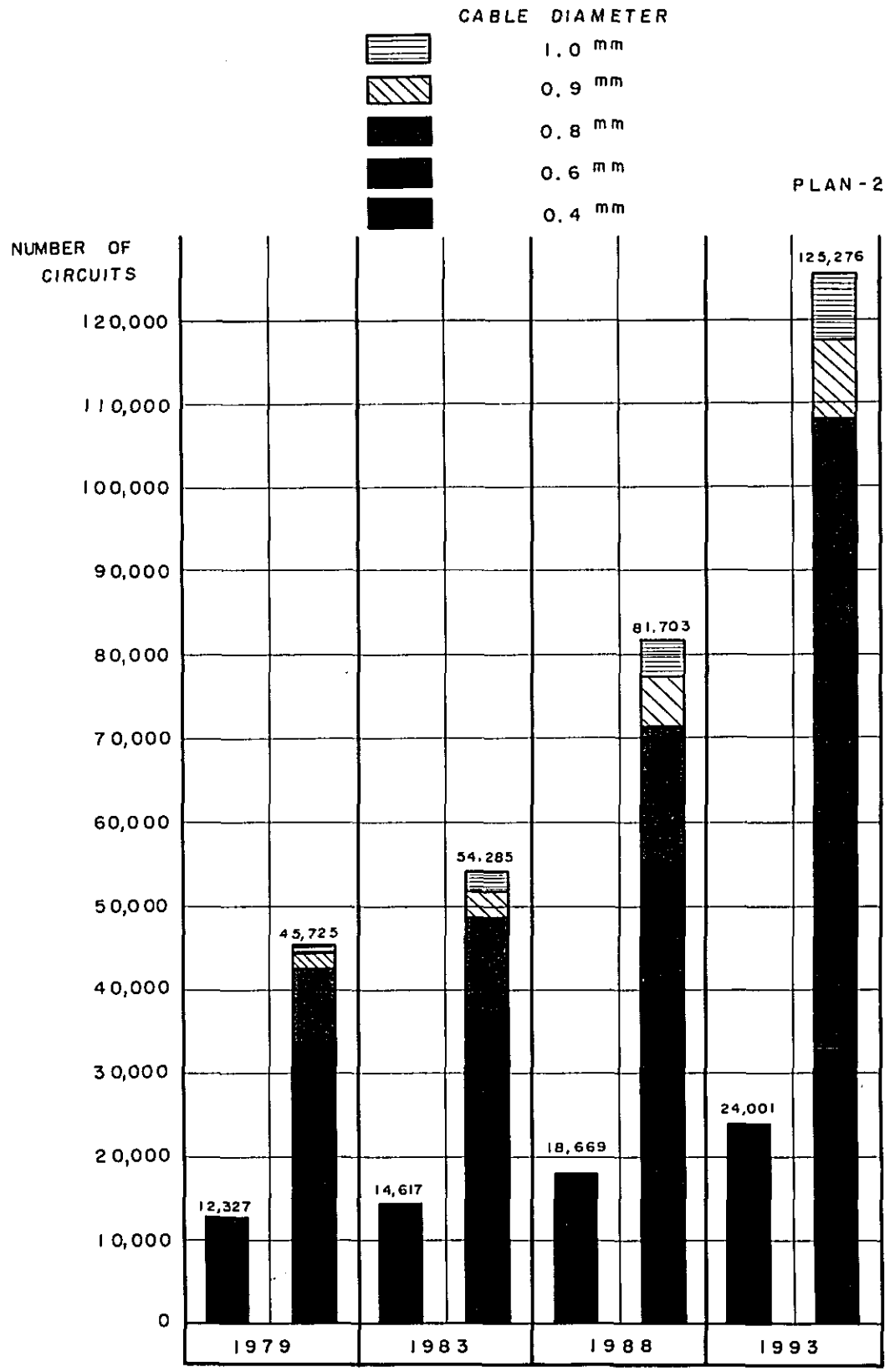
As one example of a fundamental cable decision, look at the cable section No. 5 between Cengkareng Exchange Office and Tegar Alur Exchange Office. The circuits to be accommodated in this cable section have various DC resistances and transmission losses. Theoretically, it is possible to lay the cables having various diameter conductors suitable to the respective DC resistances and transmission losses. Actually, however, it is uneconomical to lay the cables of various conductors. Therefore, cables of the maximum diameter conductor will be laid in this cable section in order to satisfy all the conditions. In other words, the 1.0 mm x 200-pair cables will be laid as shown in Table 7.5.2.(1).

Since this cable, however, cannot accommodate the total number of circuits (399)

TABLE 7-5-1-(10) TOTAL NUMBER OF JUNCTION CIRCUITS AND NON-LOADING CIRCUITS

Plan —No. 2

Year	Diameter	Numberof Circuits	Number of Non-Looding Circuits	Loading Circuits Rate	Composition Rate
1979	0.4	11095	8207	26.0	24.3
	0.6	22504	4120	81.7	49.2
	0.8	8945	0	100.0	19.5
	0.9	2130	0	100.0	4.7
	1.0	1051	0	100.0	2.3
	Total	45725	12327	73.0	100.0
1983	0.4	16056	10876	32.3	29.6
	0.6	21586	3741	82.7	39.7
	0.8	10846	0	100.0	20.0
	0.9	3296	0	100.0	6.1
	1.0	2501	0	100.0	4.6
	Total	54285	14617	73.1	100.0
1988	0.4	22396	13645	39.1	27.4
	0.6	33009	5024	84.8	40.4
	0.8	16485	0	100.0	20.2
	0.9	5388	0	100.0	6.6
	1.0	4425	0	100.0	5.4
	Total	81703	18669	77.2	100.0
1993	0.4	32583	18187	44.2	26.0
	0.6	50253	5814	88.4	40.1
	0.8	25236	0	100.0	20.1
	0.9	9232	0	100.0	7.4
	1.0	7972	0	100.0	6.4
	Total	125276	24001	80.8	100.0



RIGHT SIDE : TOTAL NUMBER OF CIRCUITS
LEFT SIDE : NON-LOADING CIRCUITS

FIG. 7-5-1-(11)

TOTAL NUMBER OF JUNCTION CIRCUITS AND NON-LOADING CIRCUITS

required by 1983, the 0.8 mm x 400 pair cable will be laid for circuits with conductor diameters of 0.4 mm, 0.6 mm and 0.8 mm. In this case, although the maximum cable size of the 0.8 mm conductor cable is 800 pairs, it was planned that 400 pair cables be laid so as not to hold too many spare pairs of the 0.8 mm conductor cables when the 0.6 mm conductor cables are installed additionally in the future.

Moreover, in the case of cable section No. 6 [Jakarta Kota (B) – Cempaka Putih], although the required number of circuits of 0.9 mm conductor cable is 10 circuits, this number is very small and there seems to be hardly any trend of increase in the future. In such case a restudy will be made on the DC resistance limit and transmission loss assignment among the exchange offices (EO → EO, EO → T, T → EO, EO → TOLL) as to whether or not it would be possible to use the 0.8 mm conductor cable instead of the 0.9 mm conductor cable, but ultimately the decision will be for use of 0.8 mm conductor cable. Of course, the use of two-way repeaters, etc. will be considered but the case may arise where it will be necessary to provisionally acknowledge a slight excess in allowable transmission loss assignment value.

Fundamentally, in order to avoid the increase in number of cables, 1.0 mm cables are not used mutually between tandem exchanges.

7.5.2.2 Proposed Cable Diagram for New Junction Cables

On the basis of the junction cables to be newly installed in the various cable sections as described in the preceding paragraph 7.5.2.1, the Proposed Cable Diagram for 1979 and 1993 were prepared. [Refer to Fig. 7.5.2.(13) and Fig. 7.5.2.(14).]

7.5.2.3 *Amount of Work According to Number of Cable Pairs*

The total cable length by 100-pair conversion of the existing cables up to 1974 was approximately 550 km, but with the increase in telephone demand in the city of Jakarta, about 4,300 km of junction cables must be installed by 1979.

Should the index of the 100-pair conversion cable length in 1974 be 100, it will be 873 as of 1979, 1,153 as of 1983, 1,494 as of 1988 and 2,069 as of 1993.

The ratios of the 100-pair conversion cable lengths of the existing cables as of 1974 were 45.3% for 0.6 mm conductor diameter cable and only 4% for 0.8 mm cables, while the balance of 50.7% was 1.0 mm conductor cables.

On the other hand, the ratios of 100-pair conversion cable lengths of 0.4 mm, 0.6 mm, 0.8 mm, 0.9 mm and 1.0 mm conductor cables as of 1993 will be 15.3%, 41.2%, 26.3%, 12.6% and 4.6%, respectively.

It is requested that 4,300 km of 100-pair conversion cable length be installed by 1979, but the 100-pair conversion cable lengths to be extended thereafter in the 3rd and 4th Five-Year Plan are 1,500 km and 1,900 km, respectively. And during the period of the 5th

TABLE 7-5-2-(1)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (1/12)

Plan-No.2

SECTION NO	NAME OF EXCHANGE	DISTANCE (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
①	KOTA (A) ~ KOTA (B)	1.8	(2410) 2553	(973) 1,128				2,243	1,265				1,859	1,950				2,487	1,637			
			* 2,400	1,200				2,400	1,200 x2				2,400	1,200 x2				2,400	1,200 x2			
②	KOTA (A) ~ ANCOL	6.0	(83) 97	(38) 49	(21) 36			135	111	64			157	253	73			180	454	103		
					200					200					200					200		
									600					600					600			
③	KOTA (A) ~ PLUIT	4.0	(125) 150	(57) 105	(12) 14			164	131	35			167	184	37			159	303	28		
					400					400					400				800	400		
④	KOTA (A) ~ CONGKARENG	12.4		(58) 144	(33) 49				313	155				431	176				301	144		
					600					600					600					600		
⑤	CENGKARENG ~ TEGAL ALUR	5.0	(8) 15	(15) 15	(84) 93	(8) 10	(53) 68	27	69	157	8	138	36	111	173	8	242	52	172	225	8	484
							200			400		200			400		200 x2		400	400		200 x3

TABLE 7-5-2-(2)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CALE SECTION (2/12)

Plan - NO.2

Section NO.	Name of Exchange	Distance (Km)	1,979					1,983					1,988					1,993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
⑥	Kota (B) ~ Cempaka Putih	7.2		(900) 957	(98) 185	(8) 10		91	876	84	8		305	1,009	81	8		552	1,272	90	8	
				1,200	200				1,200	200				1,200 x2	200				1,200 x2	200		
⑦	Kota (B) ~ Jatinegara (B)	11.2		(381) 751	(223) 506	(25) 66	(7) 10		509	205	10	22		721	168	10	20		1,252	230	10	18
				1,200	600	100			1,200	600	100			1,200	600	100			1200	600	100	
⑧	Kota (B) ~ Gambir (A)	4.6	(2,013) 2,161	(3,056) 3,644	(269) 460	(37) 94	(24) 29	2832	3071	1,091	168	101	4323	3818	1,559	345	201	6142	4693	2,193	597	369
			2,400	1,200 x3	800	400		2400	1,200 x3	800 x2	400		2400 x2	1,200 x4	800 x2	400 x2		2400 x3	1200 x4	800 x3	400 x3	
⑨	Kota (B) ~ Kebayoran (A)	12.0		(570) 626	(173) 223	(37) 99	(20) 24		524	168	23	8		584	139	19	7		704	105	39	7
				800	400	100			800	400	100			800	400	100			800	400	100	
⑩	Gambir (A) ~ Semanggi (A)	5.0	(450) 531	(2408) 3695				713	2998	456	128		1,258	4,898	514	144		2305	6779	484	169	
				1200 x4 (1200 x3)				2400	(1200 x3)	600	200		2400	1200 x4	600	200		2400	1200 x6	600	200	

( ): based on JTP estimation

down side: based on PERUMTEL supply plan

TABLE 7-5-2-(3)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (3/12)

Plan-No.2

SECTION NO	NAME OF EXCHANGE	DISTANCE (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(11)	GAMBIR (A) ~ SLIPI	7.8		(1,209) 1,294	(672) 773			28	1,712	642	35		89	2450	726	51	6	192	3,488	880	72	39
				1,200					1,200 x2	800	200			1,200 x2					1,200 x3	800		
					800										800	200					200	
(12)	SLIPI ~ KEDOYA	5.5						25	111	111	35		37	202	234	51		62	486	481	72	
											300					300				800	300	
														1,200					1,200			
(13)	GAMBIR (A) ~ PAL MERAH	7.0	(104) 200	(579) 1,422	(62) 173			171	853	325	37		295	1,448	493	55		531	2,593	691	80	
				1,200					1,200	800	200			1,200 x2	800	200			1,200 x3	800	200	
					800																	
(14)	PAL MERAH ~ MERUYA	7.0						19	122	163	37		29	217	300	55		55	497	551	80	
										600	200				600	200				600	200	
																			1200			
(15)	GAMBIR (A) ~ JATI NEGARA (B)	8.6		(1,084) 2,474	(318) 844		(58) 121		1,400	969	226	205	44	2128	1,748	363	425	86	3,424	2,784	517	894
				1,200 x2					1,200 x2	800				1,200 x2	800 x3				1,200 x3	800 x4		
					800						400 x2					400 x2					400 x4	
				(1,200)		400																

TABLE 7-5-2-(4)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (4/12)

Plan - No.2

SECTION NO	NAME OF EXCHANGE	DISTANCE (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(16)	GAMBIR (A) ~ CEMPAKA PUTIH	4.6	(644) 767	(832) 1,076	(420) 385	(180) 132	(32) 35	1,099	1,092	988	436	352	1,439	1,819	1,752	696	638	1,955	3,042	3,072	1,475	1,468
				1,200 x2	800	400			1,200 x2	800 x2	400 x2		2,400	1,200 x2	800 x3	400 x4		2,400	1,200 x3	800 x4	400 x8	
(17)	GAMBIR (A) ~ KEBAYORAN (A)	8.0		(1,304) 1,573	(511) 837	(18) 27	(58) 117		1,619	1,326		169	53	2,186	2,074		293	130	2,663	2,759		527
				1,200 x2	800	400			1,200 x2	800 x2	400			1,200 x2	800 x3	400			1,200 x2	800 x4	400 x2	
(18)	CEMPAKA PUTIH ~ PULO GADUNG	7.0	(18) 64	(187) 441	(1,071) 1,014	(271) 224	(49) 56	49	382	831	1,082	381	60	761	1,435	1,827	560	80	1,514	2,446	3,363	745
				1,200	800 x2	400	200		1,200	800 x2	400 x3	200 x2		1,200	800 x2	400 x5	200 x3		1,200 x2	800 x3	400 x9	200 x4
(19)	PULO GADUNG ~ TG. PRIOK (A)	7.0	(15) 36	(136) 111	(1,019) 786	(271) 224	(49) 56	24	289	740	1,071	381	49	642	1,229	1,814	560	82	1,351	1,966	3,303	745
				1,200	800	400	200		1,200	800	400 x3	200 x2		1,200	800 x2	400 x5	200 x3		1,200	800 x3	400 x9	200 x4
(20)	TG. PRIOK ~ CILINCING	5.0	(26) 20	(7) 12	(96) 101	(12) 19	(81) 90	58	51	151	11	225	136	85	189	11	403	300	237	362	10	667
							200			600		200 x2			600		200 x2		800	600		200 x4

TABLE 7-5-2-(5)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (5/12)

Plan - No.2

SECTION NO	NAME OF EXCHANGE	DISTANCE (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(21)	TG. PRIOK (A) ~ ANCOL	5.0		(305) 202	(27) 27			29	518	36			132	952	31			324	1,694	66		
					200					200					200					200		
					(400)				1,200	(400)				1,200	(400)				1,200 x2	(400)		
(22)	CEMPAKA PUTIH ~ RAWAMANGUN	6.1	(72) 65	(546) 489	(197) 185			135	887	403	8		226	1,427	802	8		355	2,312	1,472	8	
					800					800					800			1,200	1,200 x2	800 x2		
									1,200					1,200 x2								
(23)	RAWAMANGUN ~ PENGILINGAN	6.0						22	55	196	8		39	135	427	8		73	560	835	8	
										800					800					800 x2		
(24)	CEMPAKA PUTIH ~ KEBAYORAN (A)	11.7		(183) 209	(102) 139	(56) 47	(10) 11		154	93	45	8		192	91	41	7		278	169	33	7
						400					400					400					400	
(25)	CEMPAKA PUTIH ~ JATINEGARA (B)	8.6		(276) 532	(146) 267	(12) 19			262	119	22		29	369	143	22		52	646	300	19	
					800	200				800	200				800	200				800	200	
																			1,200			

TABLE 7-5-2-(6) LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (6/12)

Plan-No.2

Section No.	Name of Exchange	Distance (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(26)	Kebayoran (A) ~ Cipete	7.0	(65) 130	(143) 398	(208) 506			110	249	395			139	352	575			221	635	815		
				1200	800 (800)				1200	800				1200	800				1200	800		
(27)	Kebayoran(A) ~ Pasar Minggu	9.2						4	189	279	39	169	12	229	390	40	293	20	361	494	41	527
										800					800					800		
												200					200 x2					200 x3
(28)	Pasar Minggu ~ Jagakarsa	5.5	(8) 15	(10) 10	(31) 41	(27) 35	(57) 89	24	97	27	39	90	31	117	45	40	163	39	142	45	41	309
							200					200					200					200 x2
										400					400					400		
(29)	Kebayoran (A) ~ Kalibata	7.0	(95) 88	(328) 436	(491) 654	(130) 424	(94) 176	123	418	609			142	623	881			157	1297	1229		
				1200	800				1200	800				1200	800				1200 x2	800		
						400 200 (300)					400 200 (300)					400 200 (300)					400 200 (300)	
(30)	Kebayoran(A) ~ Tebet	8.0		(53) 121					44				15	89				48	189			
				400					400					400					400			

TABLE 7-5-2-(7) LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION(7/12)

Plan-No2

Section No.	Name of Exchange	Distance (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(31)	Kebayoran (A) ~ Semanggi (A)	3.0	(156) 221					242	11				361	105				542	346			
				1200					1200					1200					1200			
(32)	Jatinegara (B) ~ Tebet	4.5	(88) 309	(680) 1728	(181) 427			183	779	511			247	1188	816			342	1805	1129		
				1200					1200	800				1200	800 x2				1200 x2	800 x2		
					800																	
(33)	Jatinegara (B) ~ Cawang	4.3	(72) 251	(288) 790	(205) 544	(52) 187	(29) 72	184	435	515	151	187	260	841	803	291	362	394	1925	1372	441	732
				1200	800	400	200		1200	800	400	200		1200	800	400	200 x2		1200 x2	800 x2	400	200 x4
(34)	Cawang ~ Pasar Rebo	9.0		(37) 117	(84) 264	(52) 187	(29) 72	8	197	188	165	187	24	292	208	304	362	77	613	403	461	732
					800	400	200			800	400	200			800	400	200 x2		800	800	400	200 x4
(35)	Pasar Rebo ~ Gandaria	5.5						32	55	102	51	121	41	88	117	45	235	72	165	136	39	429
											400	200				400	200 x2				400	200 x3

TABLE 7-5-2-(8) LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (8/12)

Plan-No.2

Section No	Name of Exchange	Distance (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(36)	Jatinegara (B) ~ Klender	7.5	(15) 69	(33) 110	(124) 436			41	114	282			58	202	550			88	802	1055		
					800					800					800					800 x2		
														1200					1200			
(37)	Jatinegara (B) ~ Jatinegara (A)	2.8	(630) 779	(64) 78				792	172	36			928	179	33			1195	262	47		
				1200					1200					1200				2400	1200			
(38)	Kota (B) ~ Slipi	6.0						325	37				507	68				700	205	8		
									400				1200	400				1200	400			
(39)	Kebayoran (A) ~ Pal Merah	7.5							27				12	51				47	156			
									400					400					400			
(40)	Kalibata ~ Pasar Minggu	5.7	(18) 31	(51) 94	(107) 254	(130) 424	(94) 176	45	28	29			60	36	29			78	115	35		
					400 (200)	400 200 (300)				400 (200)	400 200 (300)				400 (200)	400 200 (300)				400 (200)	400 200 (300)	

TABLE 7-5-2-(9) LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (9/12)

Plan - NO. 2

Section NO.	Name of Exchange	Distance (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(41)	Kalibata ~ Jatinegara (B)	8.0							47	29			14	44	29			49	134	29		
										400					400					400		
(42)	Kebayoran (A) ~ Cawang	10.5							27	15	15			33	14	14			150	24	11	
											400					400					400	
(43)	Kalibata ~ Cawang	7.0											39					122	139	6		
														400					400			
(44)	Jatinegara (B) ~ Rawamangun	5.7						45					109					287	231			
									600					600					600			
(45)	Kota (B) ~ Ancol	7.8		(705) 679	(505) 668			81	1013	777			208	1607	1088			1367	2551	1500		
				1200	800				1200	800				1200 x2	800 x2			2400	1200 x2	800 x2		

TABLE 7-5-2-(10) LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (10/12)

Plan-No.2

Section No.	Name of Exchange	Distance (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(46)	Kota (B) ~ Pluit	6.4	(317) 365	(543) 737	(176) 258			355	571	447			445	639	616			518	738	861		
				1200	800				1200	800				1200	800				1200	800 x2		
(47)	Kota (B) ~ Cengkareng	14.2		(68) 190	(121) 272	(111) 371	(53) 68		190	159	255	138		299	165	447	242		575	259	726	484
					800	400	200			800	400	200			800	400	200 x2			800	400 x2	200 x3
(48)	Kebayoran (A) ~ Jatinegara(B)	12.4		(177) 374	(107) 280	(53) 169	(10) 19		143	57				151	55				165	49		
					800 (400)					800 (400)					800 (400)					800 (400)		
(49)																						
(50)																						

TABLE 7-5-2-(11)

LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION (11/12)

Plan-No.2

SECTION NO	NAME OF EXCHANGE	DISTANCE (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(51)	GAMBIR (A) ~ GAMBIR (B)	3.0	(3,912) 5,447	(1,868) 2,751				5,296	2,560	22			7,579	3,023	10			11,014	3,979	49		
			2,400x3	1,200x3				2,400x3	1,200x3				2,400x4	1,200x3				2,400x5	1,200x4			
(52)	TG. PRIOK (A) ~ TG. PRIOK (B)	3.0						167	332	57	249	363	396	629	173	328	618	907	1,105	695	567	1124
										800	400	200x2		1,200	800	400	200x4	2,400	1,200	800	400	200x6
(53)	SEMANGGI (A) ~ SEMANGGI (B)	2.0											782	1,644	19			1,108	2,441	37		
														1,200x2				2,400	1,200x2			
(54)	KEBAYORAN (A) ~ KEBAYORAN (B)	2.8						670	65	293			910	99	457			1,166	58	616		
								2,400					2,400					2,400				
										800					800					800		
(55)	KOTA (B) ~ KOTA (C)	1.7						4,425	969				5,224	1,369				5,886	1,854			
								2,400 X3	1,200				2,400x2					2,400 X3	1,200x2			
														1,200x2								

TABLE 7-5-2-(12) LIST OF PROPOSED CABLES BY CONDUCTOR DIAMETER AND CABLE SECTION ($^{12}/_{12}$)

Plan-No 2

Section No.	Name of Exchange	Distance (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(56)	Jatinegara (A) ~ Gambir (A)	5.8	(142) 148	(196) 197				190	374				274	625				431	874			
				1200					1200					1200					1200			
(57)																						
(58)																						
(59)																						
(60)	Jatinegara (B) ~ Gandaria	15.5		(20) 55	(80) 168	(32) 53	(55) 109					66					119					226
						300					300					300					300	

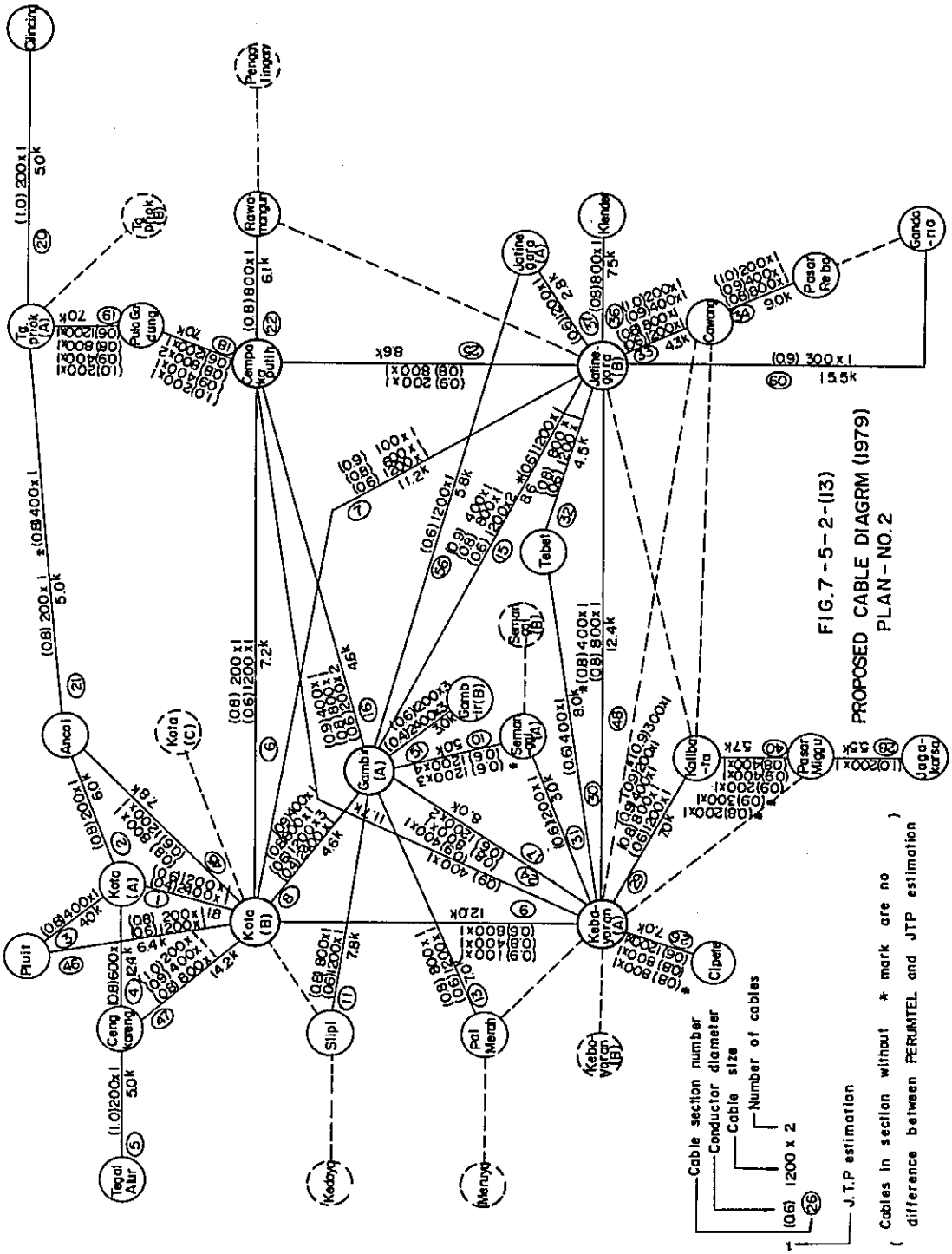


FIG.7-5-2-(13)
PROPOSED CABLE DIAGRM (1979)
PLAN-NO.2

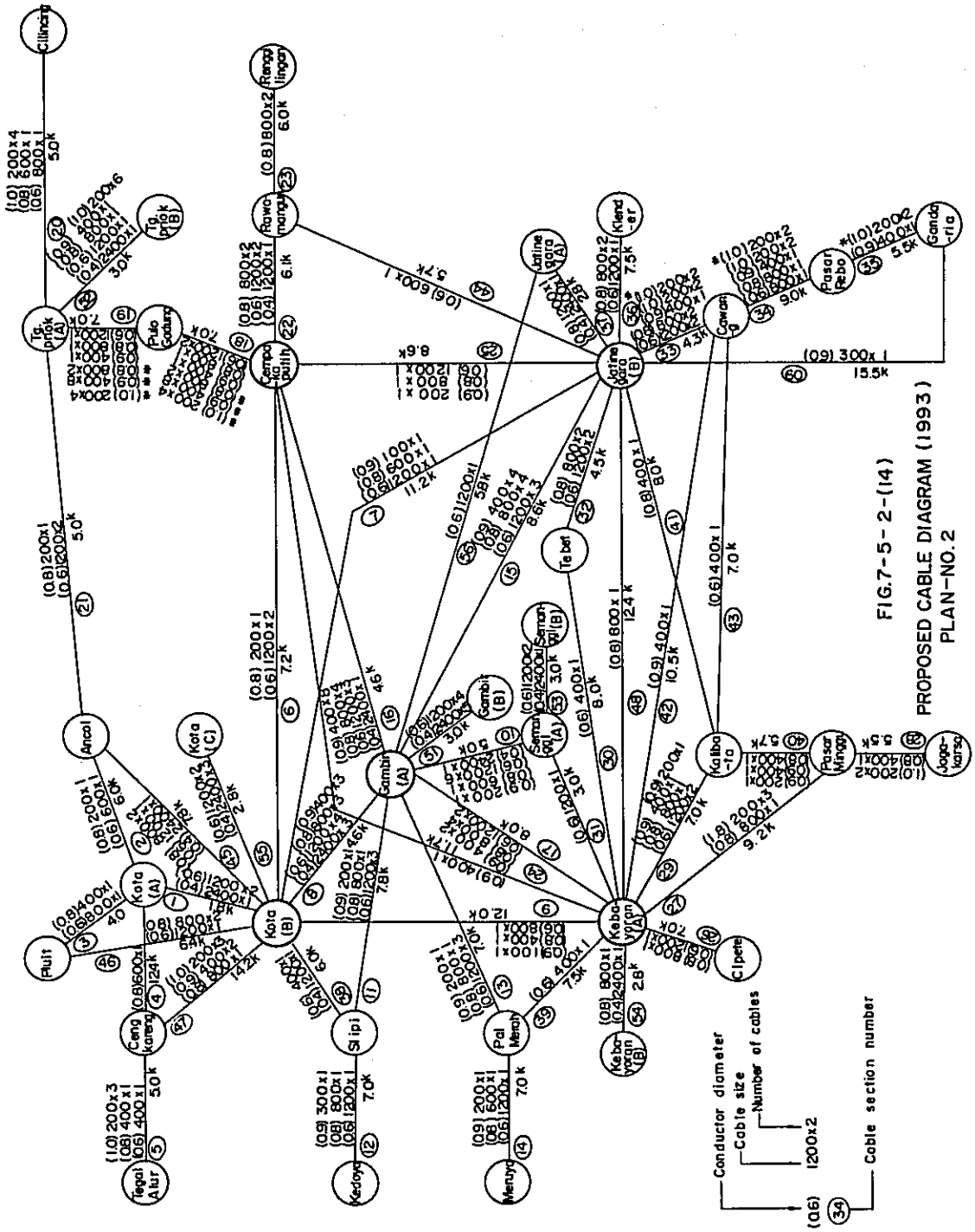


FIG.7-5-2-(14)
PROPOSED CABLE DIAGRAM (1993)
PLAN-NO.2

Five-Year Plan, the extension of 3,200 km of 100-pair conversion cable lengths is projected. This will be about 1.7 times of the cable length in the 4th Five-Year Plan.

In Table 7.5.2.(15), the total cable length under the 2nd Five-Year Plan shows a very high figure.

This plan considers the laying of cables with the maximum cable size in order to avoid increasing the number of cables in the cable routes. Consequently, the composition ratio of the maximum size cables will be about 89% at 100-pair conversion cable length, as shown in Table 7.5.2.(15). In order not to hold too many spare pairs over a long period as aforementioned, the case will arise where cables of other than maximum cable size will be laid but this will be 13% at 100-pair conversion cable length.

7.5.2.4 Situation in Use of Cable Conductors

The ratio of use of cable conductors assumed for each base year is 0.57 for 1979, 0.66 for 1983, 0.77 for 1988 and 0.83 for 1993. The reason for the low cable use ratio as of 1979 is that a tremendous amount of installation work will be implemented at one time and cables of the maximum size will be installed in an extended provision period of 15 years. The supposition is that from 1993 and onwards, the average use ratio of approximately 85% in the period from 1988 to 1993 will continue.

Generally speaking, in case the number of circuits in the cable section is very large, the circuit use ratio is high while on the contrary, the ratio becomes low when the number of circuits is small.

7.5.2.5 Number of Loading Coils of Each Cable Section According to Conductor Diameter

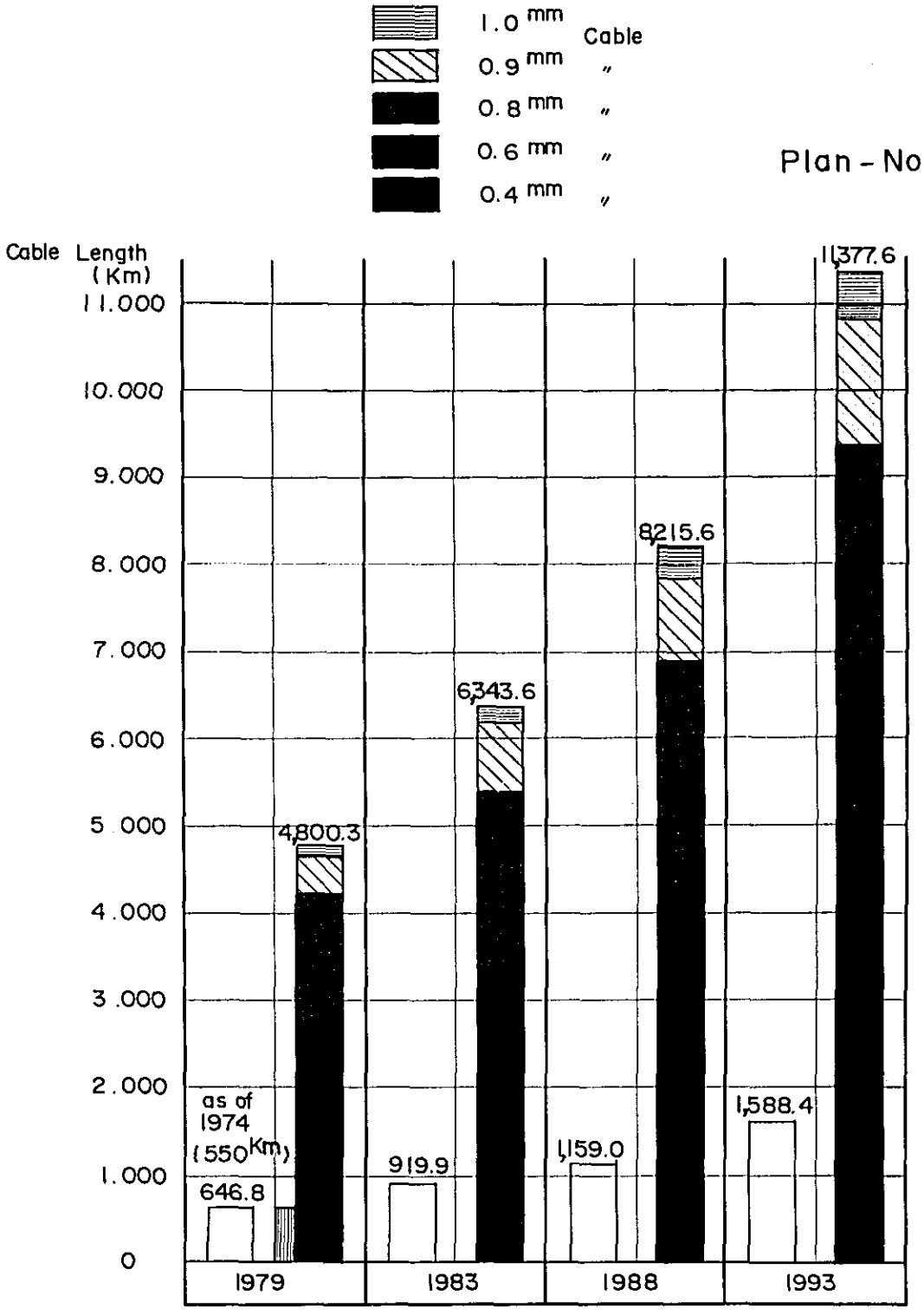
In principle, the number of pairs of loading coils shall be for a standard provision period of 5 years; however, since large numbers of loading coils will be concentrated in the manhole in the half loading spacing from the exchange office, it is desirable that the loading coils having a large number of pairs be used for the junction cables between the tandem exchange offices in the central part of Jakarta wherever possible. Furthermore, in consideration of maintenance, material management and the possibility of reduction in manufacturing costs through the unification of materials, the kinds of loading coils to be applied were determined as in the following.

In accordance with the DC resistance limit and transmission loss assignment previously mentioned, it would be effective to insert loading coils in the long distance circuits where 0.8 mm, 0.9 mm and 1.0 mm conductor cables are utilized. The reason is because it would be more strongly influenced through the transmission loss limit than the DC resistance limit, and the insertion of loading coils in the circuits would be more economical than the use of cables of large conductor diameter.

TABLE 7-5-2-(15) TOTAL LENGTH BY CABLE PAIRS

Plan-NO.2 (Unit : Km)

Dia-meter (mm)	Cable Pairs	1979			1983			1988			1993		
		Cable Length	100-Pair Length	Composition Rare	Cable Length	100-Pair Length	Composition Rare	Cable Length	100-Pair Length	Composition Rare	Cable Length	100-Pair Length	Composition Rare
0.4	2400	15.4	369.6	7.7	23.6	566.4	8.9	40.8	979.2	11.9	66.7	1600.8	14.1
	1200	–	–	–	–	–	–	6.0	72.0	0.9	12.1	145.2	1.3
	Sub. Total	15.4	369.6	7.7	23.6	566.4	8.9	46.8	1051.2	12.8	78.8	1746.0	15.3
0.6	1200	182.8	2193.6	45.7	212.0	2544.0	40.1	267.4	3208.8	39.0	351.8	4221.6	37.1
	800	12.0	96.0	2.0	12.0	96.0	1.5	12.0	96.0	1.2	35.0	280.0	2.5
	600	–	–	–	11.7	70.2	1.1	11.7	70.2	0.9	11.7	70.2	0.6
	400	8.0	32.0	0.7	21.5	86.0	1.4	28.5	114.0	1.4	28.5	114.0	1.0
	Sub Total	202.8	2321.6	48.4	257.2	2796.2	44.1	319.6	3489.0	42.5	427.0	4685.8	41.2
0.8	800	156.4	1251.2	26.1	194.6	1556.8	24.6	243.7	1949.6	23.7	319.3	2554.4	22.5
	600	23.6	141.6	2.9	40.6	243.6	3.8	40.6	243.6	3.0	40.6	243.6	8.1
	400	21.7	86.8	1.8	40.2	160.8	2.5	40.2	160.8	2.0	40.2	160.8	1.4
	200	18.2	36.4	0.8	18.2	36.4	0.6	18.2	36.4	0.4	18.2	36.4	0.3
	Sub Total	219.9	1516.0	31.6	293.6	1997.6	31.5	342.7	2390.4	29.1	418.3	2995.2	26.3
0.9	400	91.7	366.8	7.6	151.9	607.6	9.6	193.7	774.8	9.4	312.1	1248.4	11.0
	300	15.5	46.5	1.0	21.0	63.0	1.0	21.0	63.0	0.7	21.0	63.0	0.6
	200	21.3	42.6	0.9	48.1	96.2	1.5	48.1	96.2	1.2	48.1	96.2	0.8
	100	23.2	23.2	0.5	23.2	23.2	0.4	23.2	23.2	0.3	23.2	23.2	0.2
	Sub Total	151.7	479.1	10.0	244.2	790.0	12.5	286.0	957.2	11.6	404.4	1430.8	12.6
1.0	200	57.0	114.0	2.3	96.7	193.4	3.0	163.9	327.8	4.0	259.9	519.8	4.6
	Sub Total	57.0	114.0	2.3	96.7	193.4	3.0	163.9	327.8	4.0	259.9	519.8	4.6
	Total	646.8	4800.3	100	915.3	6343.6	100	1159.0	8215.6	100	1588.4	11377.6	100



Right Side : 100-Pair Length

Left Side : Cable Length

FIG. 7-5-2-(16)

TOTAL LENGTH BY CABLE PAIRS (2/2)

TABLE 7-5-2-(17) CIRCUIT UTILIZATION TO CABLES (1/4)

Plan — No. 2

Cable Section	C.S No.	Distance	1979			1983			1988			1993		
			(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Kota (A) ~ Kota (B)	①	1.8 K	(3383) 3681	3600	(0.94) 1.02	3508	4800	0.73	3809	4800	0.80	4124	4800	0.86
" ~ Ancol	②	6.0	(142) 182	200	(0.71) 0.91	310	800	0.39	483	800	0.61	737	800	
" ~ Pluit	③	4.0	(194) 269	400	(0.49) 0.63	330	400	0.83	388	400	0.97	490	1200	0.41
" ~ Cengkareng	④	12.4	(91) 193	600	(0.15) 0.33	468	600	0.78	607	600	1.02	445	600	0.75
Cengkareng ~ Tegal Alur	⑤	5.0	(168) 201	200	(0.85) 1.01	399	600	0.67	570	800	0.72	941	1400	0.68
Kote (B) ~ Cempaka Putih	⑥	7.2	(996) 1152	1400	(0.71) 0.53	1059	1400	0.76	1403	2600	0.54	1922	2600	0.74
" ~ Jatinegara (B)	⑦	11.2	(636) 1333	1900	(0.33) 0.71	746	1900	0.46	919	1900	0.49	1510	1900	0.80
" ~ Gambir (A)	⑧	4.6	(5399) 6388	7200	(0.75) 0.89	7263	8000	0.91	10246	12000	0.85	13,994	15,600	0.90
" ~ Kebayoran (A)	⑨	12.0	(800) 972	1300	(0.62) 0.75	723	1300	0.56	749	1300	0.58	855	1300	0.66
Gambir (A) ~ Kebayoran (A)	⑩	5.0	(2858) 4226	(3600) 4800	(0.79) 0.88	4295	(6800) 5600	(0.63) 0.77	6814	8000	0.86	9737	10,400	0.94
" ~ Slipi	⑪	7.8	(1881) 2067	2000	0.94 1.04	2417	3400	0.71	3322	3400	0.98	4671	4600	1.02
Slipi ~ Kedoya	⑫	5.5	—	—	—	282	300	0.94	524	1500	0.35	1101	2300	0.48
Gambir (A) ~ Pal Merah	⑬	7.0	(745) 1795	2000	(0.37) 0.85	1386	2200	0.63	2291	3400	0.68	3895	4600	0.85
Pal Merah ~ Meruya	⑭	7.0	—	—	—	341	800	0.43	601	800	0.75	1183	2000	0.60
Gambir (A) ~ Jatinegara (B)	⑮	8.6	(1460) 3439	(2400) 3600	(0.61) 0.96	2800	4000	0.70	4708	5600	0.84	7705	8400	0.92

( ) : based on JTP estimation

down side : based on Perumtel Supply Plan

TABLE 7-5-2-(18)

CIRCUIT UTILIZATION TO CABLES (2/4)

Plan-No.2

CABLE SECTION	C.S. NO.	DISTANCE (km)	1979			1983			1988			1993		
			(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
GAMBIR (A) ~ CEMPAKA PUTIH	(16)	4.6	(2,108) 2,395	3,600	(0.59) 0.67	3,967	4,800	0.83	6,344	8,800	0.72	11,012	12,400	0.89
~ KEBAYORAN (A)	(17)	8.0	(1,891) 2,554	3,600	(0.53) 0.71	3,114	4,400	0.71	4,606	5,200	0.89	6,079	6,400	0.95
CEMPAKA PUTIH ~ PULO GADUNG	(18)	7.0	(1,596) 1,799	3,400	(0.47) 0.53	2,725	4,400	0.62	4,643	5,400	0.86	8,148	9,200	0.89
PULO GADUNG ~ TG. PRIOK (A)	(19)	7.0	(1,490) 1,213	2,600	(0.57) 0.34	2,505	3,600	0.70	4,294	5,400	0.80	7,447	8,000	0.93
TG. PRIOK (A) ~ CILINCING	(20)	5.0	(222) 242	200	(1.11) 1.21	496	1,000	0.50	824	1,000	0.83	1,576	2,200	0.72
~ ANCOL	(21)	5.0	(332) 229	(400) 200	(0.83) 1.15	583	(1,600) 1,400	(0.36) 0.42	1,115	(1,600) 1,400	0.80	2,084	(2,800) 2,600	(0.74) 0.81
CEMPAKA PUTIH ~ RAWAMANGUN	(22)	6.1	(815) 739	800	(1.02) 0.93	1,433	2,000	0.72	2,463	3,200	0.77	4,147	5,200	0.80
RAWAMANGUN ~ PENGGILINGAN	(23)	6.0	—	—	—	281	800	0.36	609	800	0.77	1,476	1,600	0.93
CEMPAKA PUTIH ~ KEBAYORAN (A)	(24)	11.7	(351) 406	400	(0.88) 1.02	300	400	0.75	331	400	0.83	487	400	1.22
~ JATINEGARA (B)	(25)	8.6	(434) 818	1,000	(0.43) 0.82	403	1,000	0.41	563	1,000	0.57	1,017	2,200	0.47
KEBAYORAN (A) ~ CIPETE	(26)	7.0	(416) 1,034	(800) 2,000	(0.52) 1.00	754	(800) 2,000	(0.94) 0.73	1,066	2,000	0.48	1,671	2,000	0.75
~ PASAR MINGGU	(27)	9.2	—	—	—	680	1,000	0.68	964	1,200	0.81	1,443	1,400	1.03
PASAR MINGGN ~ JAGAKARSA	(28)	5.5	(133) 190	200	(0.67) 0.95	277	600	0.47	396	600	0.66	576	800	0.72
KEBAYORAN (A) ~ KALIBATA	(29)	7.0	(1,138) 1,778	(2,300) 2,600	(0.49) 0.69	1,150	(2,300) 2,600	(0.50) 0.45	1,646	(2,300) 2,600	(0.72) 0.64	2,683	(3,500) 3,800	(0.77) 0.71
KEBAYORAN (A) ~ TEBET	(30)	8.0	(53) 121	400	(0.13) 0.31	44	400	0.11	104	400	0.26	237	400	0.60

TABLE 7-5-2-(19)

CIRCUIT UTILIZATION TO CABLES (3/4)

Plan-No.2

CABLE SECTION	C.S. NO.	DISTANCE (km)	1979 (1)	1979 (2)	1979 (3)	1983 (1)	1983 (2)	1983 (3)	1988 (1)	1988 (2)	1988 (3)	1993 (1)	1993 (2)	1993 (3)
KEBAYORAN (A) ~ SEMANGGI (A)	(31)	3.0	(156) 221	1,200	(0.13) 0.19	253	1,200	0.21	466	1,200	0.39	888	1,200	0.74
JATINEGARA (B) ~ TEBET	(32)	4.5	(949) 2,464	2,000	(0.47) 1.24	1,473	2,000	0.74	2251	2,800	0.81	3276	4,000	0.82
JATINEGARA (B) ~ CAWANG	(33)	4.3	(646) 1,844	2,600	(0.25) 0.71	1,472	2,600	0.57	2,557	2,800	0.92	4,864	5,200	0.94
CAWANG ~ PASAR REBO	(34)	9.0	(202) 640	1,400	(0.14) 0.46	745	1,400	0.54	1,190	1,600	0.75	2,286	2,800	0.82
PASAR REBO ~ GANDARIA	(35)	5.5	—	—	—	361	600	0.61	526	800	0.66	841	1,000	0.85
JATINEGARA (B) ~ KLENDER	(36)	7.5	(172) 615	800	(0.22) 0.77	437	800	0.55	810	2,000	0.41	1,945	2,800	0.69
" ~ JATINEGARA (A)	(37)	2.8	(694) 857	1,200	(0.58) 0.72	1,000	1,200	0.83	1,140	1,200	0.95	1,504	3,600	0.42
KOTA (B) ~ SLIPI	(38)	6.0	—	—	—	362	400	0.91	575	1,600	0.36	913	1,600	0.57
KEBAYORAN (A) ~ PALMERAH	(39)	7.5	—	—	—	27	400	0.07	63	400	0.16	203	400	0.51
KALIBATA ~ PASAR MINGGU	(40)	5.7	(400) 979	(500) 1,000	(0.80) 0.98	102	(500) 1,000	(0.20) 0.10	125	(500) 1,000	(0.25) 0.13	228	(500) 1,000	(0.46) 0.23
" ~ JATINEGARA (B)	(41)	8.0	—	—	—	76	400	0.19	87	400	0.22	212	400	0.53
KEBAYORAN (A) ~ CAWANG	(42)	10.5	—	—	—	57	400	0.14	61	400	0.15	185	400	0.46
KALIBATA ~ CAWANG	(43)	7.0	—	—	—	—	—	—	39	400	0.10	267	400	0.67
JATINEGARA (B) ~ RAWAMANGUN	(44)	5.7	—	—	—	45	600	0.08	109	600	0.18	518	600	0.86
KOTA (B) ~ ANCOL	(45)	7.8	(1,210) 1,347	2,000	(0.61) 0.67	1871	2,000	0.94	2903	4,000	0.73	5,418	6,400	0.85

TABIE 7-5-2-(20) CIRCUIT UTILIZATION TO CABLES (4/4)

Plan-NO.2

Cable Section	C.S NO.	Distance	1979			1983			1988			1993		
			(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Kota (B) ~ Pluit	(46)	6.4	(1036) 1360	2000	(0.52) 0.68	1373	2000	0.69	1700	2000	0.85	2117	2800	0.76
〃 ~ Cengkareng	(47)	14.2	(353) 901	1400	(0.25) 0.64	742	1400	0.53	1153	1600	0.72	2044	2200	0.93
Kabayoran (A) ~ Jatinegara (B)	(48)	12.4	(347) 842	(400) 800	(0.87) 1.05	200	(400) 800	(0.50) 0.25	206	(400) (800)	(0.52) 0.26	214	(400) (800)	(0.54) 0.27
—	(49)	—	—	—	—	—	—	—	—	—	—	—	—	—
—	(50)	—	—	—	—	—	—	—	—	—	—	—	—	—
Gambir (A) ~ Gambir (B)	(51)	3.0	(5780) 8198	10800	(0.54) 0.76	7878	10800	0.73	10612	10800	0.98	15042	16800	0.90
Tg. Priok (A) ~ Tg. Priok (B)	(52)	3.0	—	—	—	1168	1600	0.73	2144	3200	0.67	4398	6000	0.73
Semanggi (A) ~ Semanggi (B)	(53)	2.0	—	—	—	—	—	—	2445	2400	1.02	3586	4800	0.75
Kebayoran (A) ~ Kebayoran (B)	(54)	2.8	—	—	—	1028	3200	0.32	1466	3200	0.46	1840	3200	0.58
Kota (B) ~ Kota (C)	(55)	1.7	—	—	—	5394	6000	0.90	6593	7200	0.92	7740	3600	0.81
Jatinegara (A) ~ Gambir (A)	(56)	5.8	(338) 345	1200	(0.28) 0.29	564	1200	0.47	899	1200	0.75	1305	1200	1.09
	(57)													
	(58)													
	(59)													
Jatinegara (A) ~ Gandaria	(60)	15.5	(187) 385	300	(0.62) 1.29	66	300	0.22	119	300	0.40	226	300	0.76
Total			(42202) 60414	(74300) 78800	(0.57) 0.77	(71733) 71733	(107800) 108800	(0.66) 0.66	(107641) 107641	(140200) 141200	(0.77) 0.76	(165453) 165453	(199300) 200300	(0.83) 0.83

Table 7.5.2.(21)
Capacity and Combinations of Loading Coils to be Applied

Capacity of cable	Capacity of loading coil applied to each cable
2400 P	800 P + 800 P + 800 P
1200 P	600 P + 600 P
800 P	800 P or 400 P + 400 P
600 P	600 P or 400 P + 200 P
400 P	400 P or 200 P + 200 P
300 P	300 P
200 P	200 P
100 P	100 P

* Installation of loading coil will be done twice.

On the other hand, in connection with short distance circuits using 0.4 mm and 0.6 mm cables, as shown in Table 7.5.2.(22), there will be non-loading circuit section existing which satisfies both the limits of DC resistance and transmission loss.

7.5.2.6 Total Number of Loading Coils

The number of loading coils will be 484 as of 1979 and 1,314 as of 1993. Should these figures be converted to 100-pair coils, the number of coils as of 1979 will be 2,413 and 6,326 as of 1993. If small number of pairs of loading coils are numerously installed, a shortage in installation places will occur which would require modification of the manholes; in order to avoid such cases, the composition ratio of small pair number coils (100 pairs, 200 pairs and 300 pairs) as of 1979 will be approximately 23%.

It is natural that the number of loading coils increase in proportion to the telephone demand. On the other hand, the capital investment amount for loading coils is very low in comparison with the amount for other required materials and equipment such as cables, telephone poles, pipes and telephone sets. Moreover, when issuing purchase orders for loading coils, a sufficient advance period must be allowed, since the quantity is small. That is, the ordering of loading coils should be made earlier than the purchase orders for cables, etc.

7.5.2.7 Number of Terminating Cales and Loading Coils and MDF Length for Junction Cables

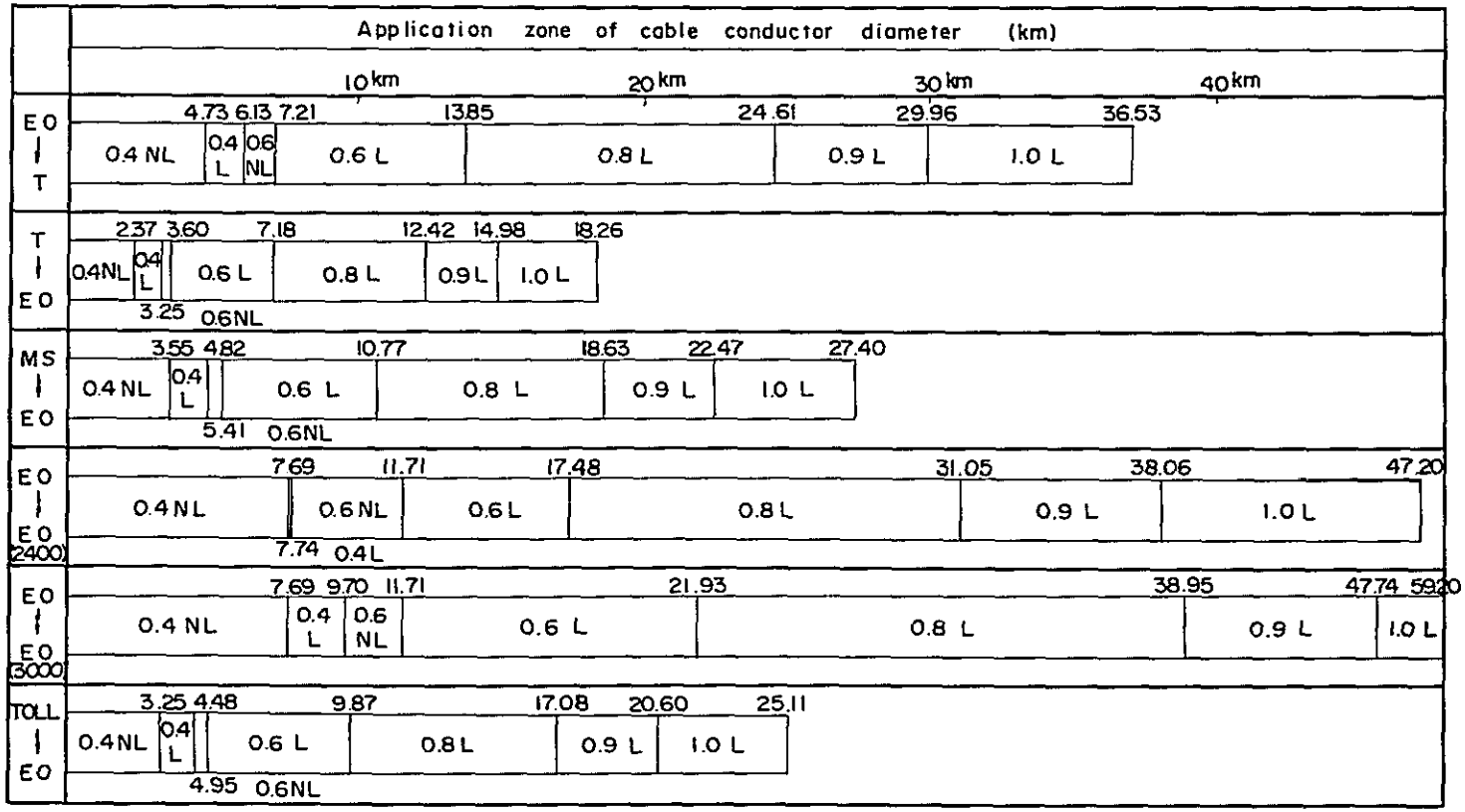
In accordance with Tables 7.5.2.(32) to (35), the maximum number of junction circuits will be terminated in Gambir (A) Exchange Office, and the number of terminated junction cables will reach 77 cables as of 1993.

When all cables including subscriber cables and toll cables are considered, cables in

TABLE 7-5-2-(22)

Conductor diameter (mm)	Condition of Loading	Loss or Rasistance	Specified Value		E O—T	T—E O	MS—E O	E O—E O (Old)	E O—E O (New)	TOLL—E O
			R/Km(Ω)	Loss/Km(dB)	9.5 dB	5.5 dB	7.5 dB	15.0 dB	15.0 dB	7.0 dB
					1900Ω	1100Ω	1500Ω	2400Ω	3000Ω	2400Ω
0.4	Non-Loading	Loss		1.69	* 4.73	* 2.37	* 3.55	* 7.69	* 7.69	* 3.25
		Resistance	300		6.23	3.57	4.90	7.87	9.87	7.90
	Loading	Loss		1.229	6.51	* 3.25	4.88	10.58	10.58	* 4.48
		Resistance	305		* 6.13	3.51	* 4.82	* 7.74	* 9.70	7.77
0.6	Non-Loading	Loss		1.11	* 7.21	* 3.60	* 5.41	*11.71	* 11.71	* 4.95
		Resistance	130		14.38	8.23	11.31	18.15	22.77	18.23
	Loading	Loss		0.557	14.36	* 7.18	*10.77	23.34	23.34	* 9.87
		Resistance	135		*13.85	7.93	10.89	*17.48	* 21.93	17.56
0.8	Non-Loading	Loss		0.826	9.69	4.84	7.26	15.74	15.74	6.66
		Resistance	72		25.97	14.86	20.42	32.78	41.11	32.92
	Loading	Loss		0.322	24.84	*12.42	* 18.63	40.37	40.37	*17.08
		Resistance	76		* 24.61	14.08	19.34	*31.05	* 38.95	31.18
0.9	Non-Loading	Loss		0.742	10.78	5.39	7.98	17.52	17.52	7.41
		Resistance	58		32.24	18.45	25.34	40.69	51.03	40.86
	Loading	Loss		0.267	* 29.96	* 14.98	* 22.47	48.69	48.69	*20.60
		Resistance	62		30.16	17.26	23.71	*38.06	* 47.74	38.23
1.0	Non-Loading	Loss		0.660	12.12	6.06	9.09	19.70	19.70	8.33
		Resistance	46		40.65	23.26	31.96	51.30	64.35	51.52
	Loading	Loss		0.219	* 36.53	* 18.26	* 27.40	59.36	59.36	* 25.11
		Resistance	50		37.40	24.40	29.40	*47.20	* 59.20	47.40

* Distance limit based on specified value



EO — T (9.5dB) (1900Ω)
T — EO (5.5dB) (1100Ω)

MS — EO (7.5dB) (1500Ω)
EO — EO (15dB) (2400Ω)
EO — EO (15dB) (3000Ω)

TOLL — EO (7.0dB) (2400Ω)

FIG. 7-5-2-(23)

TABLE 7-5-2-(24) NUMBER OF LOADING COILS IN EACH CABLE SECTION .BY (1/6)

CONDUCTOR SIZE

Plan — No.2

Section No.	Cable Section	Distance (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
①	Kota (A) ~ Kota (B)	1.8	2400x1 (8x1)	1200x1 (6x1)				2400x1 (8x1)	1200x2 (6x2) (NL)				2400x1 (8x1)	1200x2 (6x2) (NL)				2400x1 (8x1)	1200x2 (6x2) (6x1)			
②	Kota (A) ~Ancol	6.0			200x1 (2x1)				600x1 (4x1)	200x1 (2x1)				600x1 (4x1)	200x1 (2x1)				600x1 (4x1)	200x1 (2x1)		
③	Kota (A) ~ Pluit	4.0			400x1 (2x1)					400x1 (2x1)					400x1 (2x1)				800x1 (4x1)	400x1 (2x1)		
④	Kota (A) ~ Cengkareng	12.4			600x1 (2x1)					600x1 (4x1) (2x1)					600x1 (4x1) (2x1)					600x1 (4x1) (2x1)		
⑤	Cengkareng ~ Tegal Alur	5.0					200x1 (2x1)			400x1 (4x1)		200x1 (2x1)			400x1 (4x1)		200x2 (2x1)·2		400x1 (4x1)	400x1 (4x1)		200x3 (2x1)·3
⑥	Kota (B) ~ Cempaka Putih	7.2		1200x1 (6x1)	200x1 (2x1)				1200x1 (6x1)	200x1 (2x1)				1200x2 (6x2) (NL)	200x1 (2x1)				1200x2 (6x2) (NL)	200x1 (2x1)		
⑦	Kota (B) ~ Jatinegara (B)	11.2		1200x1 (6x1)	600x1 (6x1)	100x1 (1x1)			1200x1 (6x2)	600x1 (6x1)	100x1 (1x1)			1200x1 (6x2)	600x1 (6x1)	100x1 (1x1)			1200x1 (6x2)	600x1 (6x1)	100x1 (1x1)	
⑧	Kota (B) ~ Gambir (A)	4.6	2400x1 (8x1)	1200x4 (6x2)·2 (6x1) (NL)	800x1 (8x1)	400x1 (4x1)		2400x1 (8x2)	1200x4 (6x2)·2 (6x1) (NL)	800x2 (8x1) (4x1)	400x1 (4x1)		2400x2 (8x3) (NL)	1200x4 (6x2)·2 (6x1) (NL)	800x2 (8x1) (4x2)	400x2 (4x1) (2x1)		2400x3 (8x3) (8x1) (NL)	1200x4 (6x2)·2 (6x1) (NL)	800x3 (8x1)·2 (4x2)	400x3 (4x1)·2 (2x1)	
⑨	Kota (B) ~ Kebayoran (A)	12.0		800x1 (8x1)	400x1 (4x1)	100x1 (1x1)			800x1 (8x1)	400x1 (4x1)	100x1 (1x1)			800x1 (8x1)	400x1 (4x1)	100x1 (1x1)			800x1 (8x1)	400x1 (4x1)	100x1 (1x1)	
⑩	Gambir (A) ~ Semanggi (A)	5.0		1200x4 (6x2)·2 (6x1) (NL)					1200x4 (6x2)·2 (6x1) (NL)	600x1 (6x1)	200x1 (2x1)		2400x1 (8x1)	1200x4 (6x2)·3 (6x1)	600x1 (6x1)	200x1 (2x1)		2400x1 (8x2)	1200x6 (6x2)·5 (NL)	600x1 (6x1)	200x1 (2x1)	

(8x1) — Number of loading Coil; 800P loading coil

2400x1 — Number of cables; Number of cable pairs

TABLE 7-5-2-(25)

NUMBER OF LOADING COILS IN EACH CABLE SECTION BY CONDUCTOR SIZE (2/6)

Plan-NO.2

Section NO.	Cable Section	Distance (km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
⑪	Gambir (A) ~ Slipi	7.8		1200x1 (6x2)	800x1 (8x1)				1200x2 (6x2) (6x1)	800x1 (8x1)	200x1 (2x1)			1200x2 (6x2)2	800x1 (8x1)	200x1 (2x1)			1200x3 (6x2)3	800x1 (8x1)	200x1 (2x1)	
⑫	Slipi ~ Kedoya	5.5									300x1 (3x1)			1200x1 (6x1)		300x1 (3x1)			1200x1 (6x1)	800x1 (8x1)	300x1 (3x1)	
⑬	Gambir (A) ~ Pal Merah	7.0		1200x1 (6x2)	800x1 (4x1)				1200x1 (6x2)	800x1 (4x1)	200x1 (2x1)			1200x2 (6x2) (6x1)	800x1 (4x2)	200x1 (2x1)			1200x3 (6x2)2 (6x1)	800x1 (4x2)	200x1 (2x1)	
⑭	Pal Merah ~ Meruya	7.0								600x1 (4x1)	200x1 (2x1)				600x1 (4x1 2x1)	200x1 (2x1)			1200x1 (6x1)	600x1 (4x1 2x1)	200x1 (2x1)	
⑮	Gambir (A) ~ Jatinegara(B)	8.6		1200x2 (6x2)2	800x1 (8x1)	400x1 (4x1)			1200x2 (6x2)2	800x1 (8x1)	400x2 (4x1)2			1200x2 (6x2)2	800x3 (8x1)2 (4x1)	400x2 (4x1)2			1200x3 (6x2)3	800x4 (8x1)3 (4x1)	400x4 (4x1)4	
⑯	Gambir (A) ~ Cempaka Putih	4.6		1200x2 (6x2) (NL)	800x1 (4x1)	400x1 (2x1)			1200x2 (6x2) (NL)	800x2 (8x1) (4x1)	400x2 (2x2) (4x1)		2400x1 (8x1)	1200x2 (6x2) (NL)	800x3 (8x1)2 (4x1)	400x4 (4x1)3 (2x2)		2400x1 (8x1)	1200x3 (6x2)2 (NL)	800x4 (8x1)3 (4x2)	400x8 (4x1)7 (2x2)	
⑰	Gambir (A) ~ Kebayoran (A)	8.0		1200x2 (6x2) (6x1)	800x1 (8x1)	400x1 (4x1)			1200x2 (6x2) (6x1)	800x2 (8x1)2	400x1 (4x1)			1200x2 (6x2)2	800x3 (8x1)3	400x1 (4x1)			1200x2 (6x2)2	800x4 (8x1)4	400x2 (4x1)2	
⑱	Cempaka Putih ~ Pulo Gadung	7.0		1200x1 (6x1)	800x2 (8x1) (4x1)	400x1 (4x1)	200x1 (2x1)		1200x1 (6x1)	800x2 (8x1) (4x1)	400x3 (4x1)3	200x2 (2x1)2		1200x1 (6x2)	800x2 (8x1) (4x2)	400x5 (4x1)5	200x3 (2x1)3		1200x2 (6x2) (6x1)	800x3 (8x1)2 (4x2)	400x9 (4x1)9	200x4 (2x1)4
⑲	Pulo Gadung ~ Tg. Priok (A)	7.0		1200x1 (6x1)	800x1 (8x1)	400x1 (4x1)	200x1 (2x1)		1200x1 (6x1)	800x1 (8x1)	400x3 (4x1)3	200x2 (2x1)2		1200x1 (6x2)	800x2 (8x1)2	400x5 (4x1)5	200x3 (2x1)3		1200x1 (6x2)	800x3 (8x1)3	400x9 (4x1)9	200x4 (2x1)4
⑳	Tg. Priok ~ Citincing	5.0					200x1 (2x1)			600x1 (4x1)		200x2 (2x1)2			600x1 (4x1)		200x2 (2x1)2		800x1 (4x1)	600x1 (4x1)		200x4 (2x1)4

TABLE 7-5-2-(26)

NUMBER OF LOADING COILS IN EACH CABLE SECTION BY CONDUCTOR DIAMETER ($^{3}/_{6}$)

Plan-NO.2

Section NO.	Cable Section	Distance (km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(21)	Tg. Priok (A) ~ Ancol	5.0			200x1 (2x1)				200x1 (6x2)	200x1 (2x1)				200x1 (6x2)	200x1 (2x1)				200x2 (6x2) (6x1)	200x1 (2x1)		
(22)	Campaka Putih ~ Rawamangun	6.0			800x1 (4x1)				200x1 (6x2)	800x1 (4x2)				200x2 (6x2) (6x1)	800x1 (4x2)			200x1 (6x1)	200x2 (6x2)2	800x2 (8x1) (4x2)		
(23)	Rawamangun ~ Penggilingan	6.0								800x1 (4x1)					800x1 (4x2)					800x2 (8x1) (4x2)		
(24)	Cempakaputih ~ Kebayoran (A)	11.7				400x1 (4x1)					400x1 (4x1)					400x1 (4x1)					400x1 (4x1)	
(25)	Cempaka Putih ~ Jatinegara (B)	8.6			800x1 (8x1)	200x1 (2x1)				800x1 (8x1)	200x1 (2x1)				800x1 (8x1)	200x1 (2x1)			200x1 (6x2)	800x1 (8x1)	200x1 (2x1)	
(26)	Kebayaran (A) ~ Cipete	7.0		200x1 (6x1)	800x1 (8x1)				200x1 (6x1)	800x1 (8x1)				200x1 (6x1)	800x1 (8x1)				200x1 (6x2)	800x1 (8x1)		
(27)	Kebayoran (A) ~ Pasar Minggu	9.2								800x1 (8x1)		200x1 (2x1)			800x1 (8x1)		200x2 (2x1)·2			800x1 (8x1)		200x3 (2x1)·2
(28)	Pasar Minggu ~ Jagakarsa	5.5					200x1 (2x1)			400x1 (2x1)		200x1 (2x1)			400x1 (2x1)		200x1 (2x1)			400x1 (2x1)		200x2 (2x1)·2
(29)	Kebayoran (A) ~ Kalibata	7.0		200x1 (6x1)	800x1 (8x1)	400x1 200x1 (4x1) (2x1)			200x1 (6x1)	800x1 (8x1)	400x1 200x1 (4x1) (2x1)			200x1 (6x1)	800x1 (8x1)	400x1 200x1 (4x1) (2x1)			200x2 (6x2) (NL)	800x1 (8x1)	400x1 200x1 (4x1) (2x1)	
(30)	Kebayoran (A) ~ Tebet	8.0		400x1 (2x1)					400x1 (2x1)					400x1 (2x1)					400x1 (2x2)			

TABLE 7-5-2-(27) NUMBER OF LOADING COILS IN EACH CABLE SECTION BY CONDUCTOR SIZE (4/6)

Plan - NO.2

Section NO.	Cable Section	Distance (km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(31)	Kebayoran (A) ~ Semanggi (A)	3.0		1200x1					1200x1					1200x1					1200x1			
				(N L)					(N L)					(6x1)					(6x1)			
(32)	Jatinegara (B) ~ Tebet	4.5		1200x1	800x1				1200x1	800x1				1200x1	800x2				1200x2	800x2		
				(6x2)	(8x1)				(6x2)	(8x1)				(6x2)	(8x1)·2				(6x2)·2	(8x1)·2		
(33)	Jatinegara (B) ~ Cawang	4.3		1200x1	800x1	400x1	200x1		1200x1	200x1	400x1	200x1		1200x1	800x1	400x1	200x2		1200x2	800x2	400x1	200x4
				(6x2)	(8x1)	(2x1)	(2x1)		(6x2)	(8x1)	(2x1)	(2x1)		(6x2)	(3x1)	(2x2)	(2x1)2		(6x2)2	(8x1)2	(2x2)	(2x1)4
(34)	Cawang ~ Pasar Rebo	9.0			800x1	400x1	200x1			800x1	400x1	200x1			800x1	400x1	200x2		800x1	200x1	400x1	200x4
					(4x1)	(2x1)	(2x1)			(4x1)	(2x1)	(2x1)			(4x2)	(2x2)	(2x1)2		(8x1)	(4x2)	(2x2)	(2x1)4
(35)	Pasar Rebo ~ Gandaria	5.5									400x1	200x1				400x1	200x2				400x1	200x3
											(4x1)	(2x1)				(4x1)	(2x1)2				(4x1)	(2x1)3
(36)	Jatinegara (B) ~ Klender	7.5			800x1					800x1				1200x1	800x1				1200x1	800x2		
					(8x1)					(8x1)				(6x1)	(8x1)				(6x2)	(8x1) (4x1)		
(37)	Jatinegara (B) ~ Jatineggara (A)	2.8		1200x1					1200x1					1200x1				2400x1	1200x1			
				(6x1)					(6x2)					(6x2)				(8x2)	(6x2)			
(38)	Kata (B) ~ Slipi	6.0							400x1				1200x1	400x1				1200x1	400x1			
									(4x1)				(6x1)	(4x1)				(6x1)	(4x1)			
(39)	Kebayoran (A) ~ Pal Merah	7.5							400x1					400x1					400x1			
									(2x1)					(2x1)					(2x1)			
(40)	Kalibata ~ Pasar Minggu	5.7			400x1	400x1 200x1				400x1	400x1 200x1				400x1	400x1 200x1				400x1	400x1 200x1	
					(4x1)	(4x1) (2x1)				(4x1)	(4x1) (2x1)				(4x1)	(4x1) (2x1)				(4x1)	(4x1) (2x1)	

TABLE 7-5-2-(28) NUMBER OF LOADING COILS IN EACH CABLE SECTION BY CONDUCTOR SIZE (5/6)

Plan - NO. 2

Section NO.	Cable Section	Distance (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(41)	Kalibata ~ Jatinegara (B)	8.0								400x1					400x1					400x1		
										(2x1)					(2x1)					(2x2)		
(42)	Kebayoran (A) ~ Cawang	10.5									400x1					400x1					400x1	
											(2x1)					(2x1)					(2x1)	
(43)	Kalibata ~ Cawang	7.0												400x1					400x1			
														(2x1)					(2x2)			
(44)	Jatinegara (B) ~ Rawamanggun	5.7							600x1					600x1					600x1			
									(2x1)					(2x1)					(2x1) (4x1)			
(45)	Kota (B) ~ Ancol	7.8		1200x1	800x1				1200x1	800x1				1200x2	800x2			2400x1	1200x2	800x2		
				(6x1)	(8x1)				(6x2)	(8x1)				(6x2) (6x1)	(8x1) (4x1)			(8x2)	(6x2)2	(8x1) (4x2)		
(46)	Kota (B) ~ Pluit	6.4		1200x1	800x1				1200x1	800x1				1200x1	800x1				1200x1	800x2		
				(6x2)	(4x1)				(6x2)	(4x2)				(6x2)	(4x2)				(6x2)	(4x2) (4x1)		
(47)	Kota (B) ~ Cengkareng	14.2			800x1	400x1	200x1			800x1	400x1	200x1			800x1	400x1	200x2			800x1	400x2	200x3
					(8x1)	(4x1)	(2x1)			(8x1)	(4x1)	(2x1)			(8x1)	(4x1)	(2x1)2			(8x1)	(4x1)·2	(2x1)·3
(48)	Kebayoran (A) ~ Jatinegara (B)	12.4			800x1					800x1					800x1					800x1		
					(8x1)					(8x1)					(8x1)					(8x1)		
(49)																						
(50)																						

TABLE 7-5-2-(29) NUMBER OF LOADING COILS IN EACH CABLE SECTION BY CONDUCTOR SIZE (6/6)

Plan - NO. 2

Section NO.	Cable Section	Distance (Km)	1979					1983					1988					1993				
			0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0	0.4	0.6	0.8	0.9	1.0
(51)	Gambir (A)	3.0	2400x3	1200x3				2400x3	1200x3				2400x4	1200x3				2400x5	1200x4			
	Gambir (B)		(8x3) (8x2) (NL)	(6x2)2 (NL)				(8x3) (8x2) (NL)	(6x2)2 (NL)				(8x3) (8x2) (NL)-2	(6x2)2 (6x1)				(8x3)2 (NL)-3	(6x2)3 (NL)			
(52)	Tg. Priok (A)	3.0								800x1	400x1	200x2		1200x1	800x1	400x1	200x4	2400x1	1200x1	800x1	400x1	200x6
	Tg. Priok (B)									(4x1)	(4x1)	(2x1)2		(6x2)	(4x1)	(4x1)	(2x1)4	(8x1)	(6x2)	(4x1)	(4x1)	(2x1)6
(53)	Semanggi (A)	2.0												1200x2				2400x1	1200x2			
	Semanggi (B)													(6x2)2				(8x1)	(6x2)2			
(54)	Kebayoran (A)	2.8						2400x1		800x1			2400x1		800x1			2400x1		800x1		
	Kebayoran (B)							(8x1)		(4x1)			(8x1)		(4x2)			(8x2)		(4x2)		
(55)	Kota (B)	1.7						2400x2	1200x1				2400x2	1200x2				2400x3	1200x2			
	Kota (C)							(8x2) (NL)	(6x2)				(8x3) (NL)	(6x2) (6x1)				(8x3) (8x1) (NL)	(6x2)2			
(56)	Jatinegara (A)	5.8		1200x1					1200x1					1200x1					1200x1			
	Gambir (A)			(6x1)					(6x1)					(6x2)					(6x2)			
(57)																						
(58)																						
(59)																						
(60)	Jatinegara (B)	15.5				300x1					300x1					300x1					300x1	
	Gandaria					(3x1)					(3x1)					(3x1)					(3x1)	

TABLE 7-5-2-(30)

TOTAL NUMBER

OF LOADING COILS

Plan-NO. 2

Year	Loading Coil Pairs	Total Cable Length (km)	Number of Loading Coils (Loading Interval 1.5km)	Composition Rate
1979	100	23.2	16	3.3
	200	138.8	93	19.2
	300	15.5	11	2.3
	400	131.6	88	18.2
	600	263.4	176	36.3
	800	149.7	100	20.7
	Total	722.2	484	100.0
1983	100	23.2	16	2.3
	200	247.1	165	23.4
	300	21.0	14	2.0
	400	251.6	168	23.8
	600	327.4	219	31.1
	800	184.3	123	17.4
	Total	1054.6	705	100.0
1988	100	23.2	16	1.7
	200	346.2	231	24.5
	300	21.0	14	1.5
	480	341.6	228	24.2
	600	442.8	296	31.5
	800	233.9	156	16.6
	Total	1408.7	941	100.0
1993	100	23.2	16	1.2
	200	458.2	306	23.3
	300	21.0	14	1.1
	400	508.4	339	25.8
	600	608.2	406	30.9
	800	348.9	233	17.7
	Total	1967.9	1314	100.0

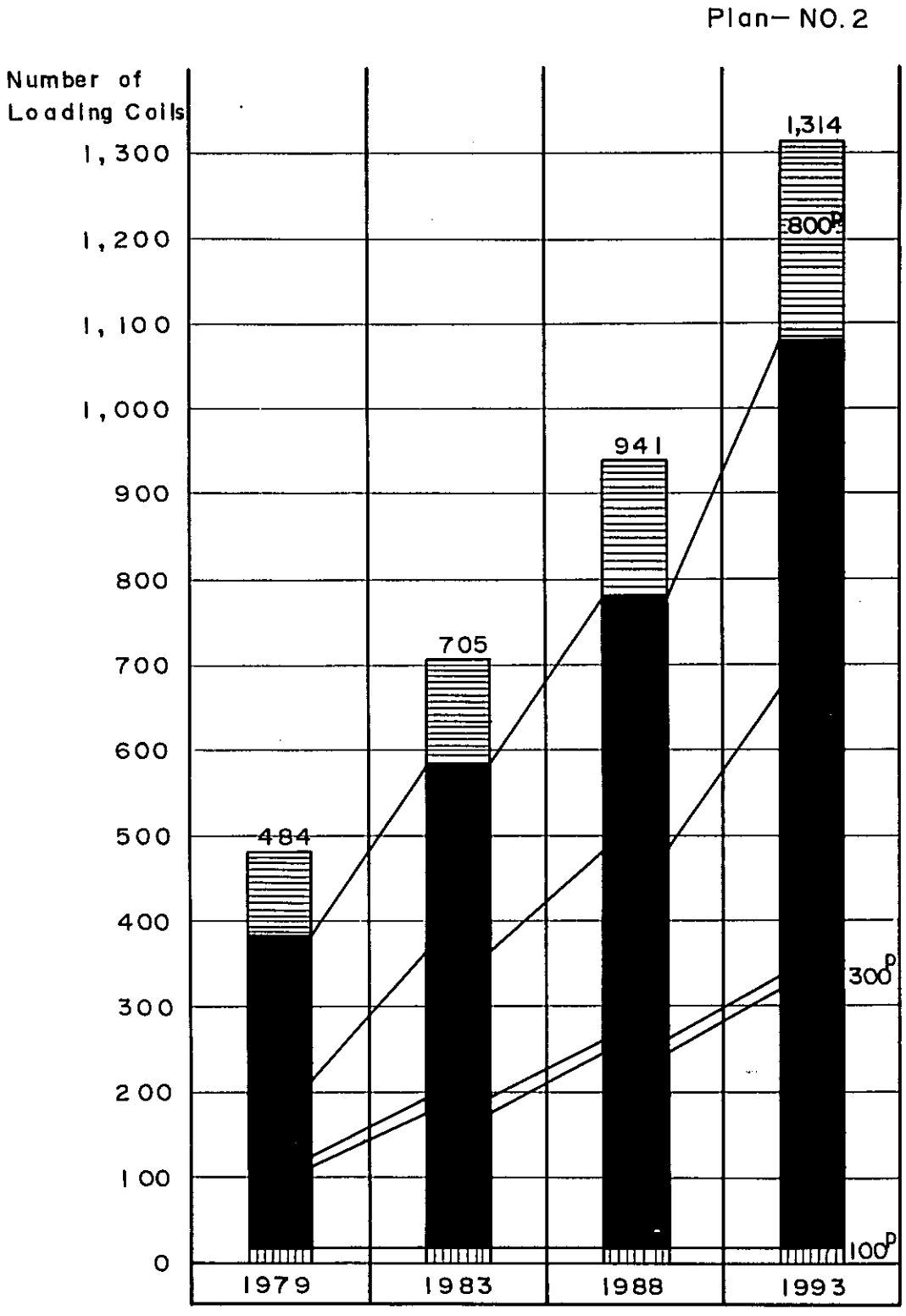


FIG. 7-5-2-(31) TOTAL NUMBER OF LOADING COILS

excess of 100 will be terminated in Gambir (A) Exchange Office.

Therefore, an intensive survey of the number of entrance cables, length of the MDF and the capacity of the manholes with loading coils nearest to Gambir (A) Exchange Office as well as the setting up a plan will be of prime importance.

The length of the MDF for junction cables at Gambir (A) Exchange Office will be 24.2 meters as of 1993, as shown in Table 7.5.2.(32). Therefore, the MDF for junction cables should be separated from that for subscriber cables.

The number of loading coils installed in the manholes nearest to the Gambir (A) Exchange Office, moreover, will become 101 coils. Supposing that even if the entrance cable were divided into four routes, about 25 loading coils will be installed in the same manhole. Therefore, a dispersion of loading coil manholes and entrance cables will be requested.

At the time when PERUMTEL expands the telecommunication facilities, it is recommended that sufficient space be given to the manholes, MDF, etc., based on the long-term expansion plan.

7.6 Comparison Between Plan No. 1 and Plan No. 2

As stated in paragraph 7.3, there is hardly any difference in the Plan No. 1 and the Plan No. 2 in regard to the installation cost. For example, the 100-pair conversion cable length as of 1993 in the Plan No. 1 will be 11,543 km while the Plan No. 2 will be 11,378 km which is only a slight difference. However, the centralization of the tandem switching equipment of the new system in the exchange offices of the Plan No. 2 will bring about problems on the following points.

(a) Maintenance problem in case the MDF is lengthened.
(b) Necessity of large-size manholes or telephone-tunnels.
(c) Service restoration in time of trouble.
(d) Difference in circuit routes between the EMD system and the new system.
(e) Difficulty in purchase of sites for exchange office buildings.

For the reasons mentioned above, the Plan No. 1 is considered recommendable, even though the Plan No. 2 has an advantage in that losses which may arise from the separate installation of the new tandem switching equipment can be avoided by the installation of the equipment in one exchange office.

7.7 Conclusion

As can be seen from the proposed junction cable diagrams for the Plan No. 1 and the Plan No. 2, there will be a large increase in the installation of junction cables in the future. Consequently, in regard to the junction network, a full study of not only the outside plant facilities but also the accommodation limit of the inside plant facilities should be made and a systematic plan must be set up.

TABLE 7-5-2-(32)

TOTAL NUMBER OF TERMINATING CABLES LOADING COILS AND MDF LENGTH FOR JUNCTION CABLE OF EACH EXCHANGE (1/4)

Plan-No.2

NO	NAME OF EXCHANGE	TELEPHONE DEMAND	TERMINATING CIRCUIT	TOTAL JUNCTION CABLE	CONDUCTOR DIAMETER					TOTAL NUMBER OF LOADING COIL	LOADING COIL PAIRS						MDF LENGTH (m) FOR JUNCTION CABLE
					mm 0.4	mm 0.6	mm 0.8	mm 0.9	mm 1.0		P 100	P 200	P 300	P 400	P 600	P 800	
1	KOTA (A)	20,900	(4,487) 3,399	7,400	2400x1	600x1 800x1 1200x2	200x1 400x1 600x1			10		3		3	3	1	2.4
2	〃 (B)	57,100	(16,773) 12,707	48,800	1200x1 2400x8	400x1 800x1 1200x4	200x1 400x1 600x1 800x8	100x2 400x5	200x3	60	2	5		13	24	16	14.8
3	〃 (C)	39,400	(7,740) 5,863	9,600	2400x3	1200x2				8					4	4	2.9
4	ANCOL	28,300	(3,890) 2,947	9,800	2400x1	600x1 1200x4	200x2 800x2			15		2		3	7	3	3.1
5	PLUIT	18,800	(2,607) 1,973	4,000		800x1 1200x1	400x1 800x2			7		1		4	2		1.3
6	CENA KARENG	14,600	(1,627) 1,230	4,200		400x1	400x1 600x1 800x1	400x2	200x6	13		7		5		1	1.3
7	TEGAL ALUR	9,300	(941) 711	1,400		400x1	400x1		200x3	5		3		2			0.6
8	GAMBIR (A)	43,700	(52,698) 40,074	80,400	2400x10	1200x29	600x1 800x17	200x3 400x17		101		6		20	49	26	24.2
9	〃 (B)	52,200	(15,041) 11,395	16,800	2400x5	1200x4				12					6	6	5.1
10	SEMANGGI (A)	36,100	(8,160) 6,182	16,400	2400x2	1200x9	400x1	200x1		20		1			16	3	5.1

( ) : INCLUDING MICELLANEOUS CIRCUITS

TABLE 7-5-2-(33)

TOTAL NUMBER OF TERMINATING CABLES LOADING COILS AND MDF LENGTH FOR JUNCTION CABLE OF EACH EXCHANGE (2/4)

Plan-No.2

No.	Name of Exchange	Telephone Demand	Terminating Circuit	Total Junction Cable	Conductor Diameter					Total Number of Loading Coils	Loading Coil Pairs						MDF Length for Junction Cable
					mm 0.4	mm 0.6	mm 0.8	mm 0.9	mm 1.0		P 100	P 200	P 300	P 400	P 600	P 800	
11	SAMANGGI (B)	14,900	(3,568) 2,702	4,800	2,400x1	1,200x2				5					4	1	1.5
12	SLIPI	35,100	(4,595) 3,481	8,500	1,200x1	400x1 1,200x4	800x2	200x1 300x1		13		1	1	1	8	2	2.7
13	PAL MERAH	26,000	(3,107) 2,354	7,000		400x1 1,200x4	600x1 800x1	200x2		13		4		3	6		2.2
14	KEDOYA	10,100	(1,101) 833	2,300		1,200x1	800x1	300x1		3			1		1	1	0.8
15	MERUYA	11,800	(1,183) 894	2,000		1,200x1	600x1	200x1		4		2		1	1		0.8
16	CEMPAKA PUTIH	40,200	(9,351) 7,084	32,000	1,200x1 2,400x1	1,200x10	200x1 800x10	200x1 400x18	200x4	53		8		21	16	8	9.8
17	RAWAMANGUN	21,900	(3,322) 2,517	7,400	1,200x1	600x1 1,200x2	800x4			13		1		5	5	2	2.4
18	PULO GADUNG	6,900	(965) 731	6,000		1,200x3	800x2	400x2		10				4	5	1	1.8
19	PENGGILINGAN	8,300	(1,476) 1,117	1,600			800x2			3				2		1	0.6
20	TG. PRIOK (A)	32,500	(5,298) 4,014	18,800	2,400x1	800x1 1,200x4	200x1 600x1 800x4	400x10	200x14	39		15		13	7	4	5.8

TABLE 7-5-2-(34) TOTAL NUMBER OF TERMINATING CABLES, LOADING COILS AND MDF LENGTH FOR JUNCTION CABLE OF EACH EXCHANGE (3/4)

Plan-NO. 2

NO.	Name of Exchange	Telephone Demand	Terminating Circuit	Total Junction Cable	Conductor Diameter					Total Number of Loading Coils	Loading Coil Pairs						MDF Length for Junction Cable (m)
					0.4 mm	0.6 mm	0.8 mm	0.9 mm	1.0 mm		p 100	p 200	p 300	p 400	p 600	p 800	
21	Tg. Priok (B)	29,000	(4,398) 3,330	6,000	2,400x1	1,200x1	800x1	400x1	200x6	11		6		2	2	1	1.8
22	Cilincing	11,700	(1,576) 1,192	2,200		800x1	600x1		200x4	6		4		2			0.8
23	Kebayoran(A)	26,000	(5,236) 3,967	21,700	2,400x1	400x2 800x1 1,200x6	400x1 800x9	100x1 200x1 400x5	200x3	36	1	8		7	9	11	6.7
24	〃 (B)	15,600	(1,840) 1,393	3,200	2,400x1		800x1			4				2		2	1.1
25	Cipete	15,700	(1,671) 1,265	2,000		1,200x1	800x1			3					2	1	0.8
26	Kalibata	29,200	(3,175) 2,405	5,600		400x1 1,200x2	400x2 800x1	200x2 400x2		12		6		3	2	1	1.8
27	Pasar Minggu	11,400	(1,159) 878	3,200			400x2 800x1	200x1 400x1	200x5	10		7			2	1	1.1
28	Jagakarsa	5,800	(576) 435	800			400x1		200x2	3		3					0.4
29	Jatinegara(A)	17,700	(2,644) 2,003	4,800	2,400x1	1,200x2				6					4	2	1.5
30	〃 (B)	20,000	(5,698) 4,317	30,200	2,400x1	600x1 1,200x11	400x1 600x1 800x12	100x1 200x1 300x1 400x5	200x4	54	1	10	1	7	23	12	9.2

TABLE 7-5-2-(35)

TOTAL NUMBER OF TERMINATING CABLES, LOADING COILS AND MDF LENGTH FOR JUNCTION CABLE OF EACH EXCHANGE (4/4)

Plan-NO.2

NO.	Name of Exchange	Telephone Demand	Terminating Circuit	Total Junction Cable	Conductor Diameter					Total Number of Loading Coil	Loading Coil Pairs						MDF Length for Junction Cable (m)
					0.4 mm	0.6 mm	0.8 mm	0.9 mm	1.0 mm		P 100	P 200	P 300	P 400	P 600	P 800	
31	Cawang	24,600	(3,444) 2,609	8,000		400x1 800x1 1200x2	800x3	400x3	200x4	20		11		2	4	3	2.6
32	Pasar Rebo	15,500	(1,587) 1,202	3,000		800x1	800x1	400x2	200x3	9		5		3		1	0.9
33	Klender	20,300	(1,945) 1,472	2,800		1200x1	800x2			4				1	2	1	0.9
34	Tebet	27,700	(3,503) 2,654	4,400		400x1 1200x2	800x2			8		2			4	2	1.5
35	Gandaria	9,800	(1,067) 807	1,300				300x1 400x1	200x3	5		3	1	1			0.6

Attention should be paid to the following points in particular.

(a) Exchange office establishment plan

(b) Demand fulfilment plan

(c) Tandem plan

(d) MDF and switching capacity

(e) Acquisition of road occupancy rights for civil works

(f) Relation between road construction program and PERUMTEL's expansion plan.

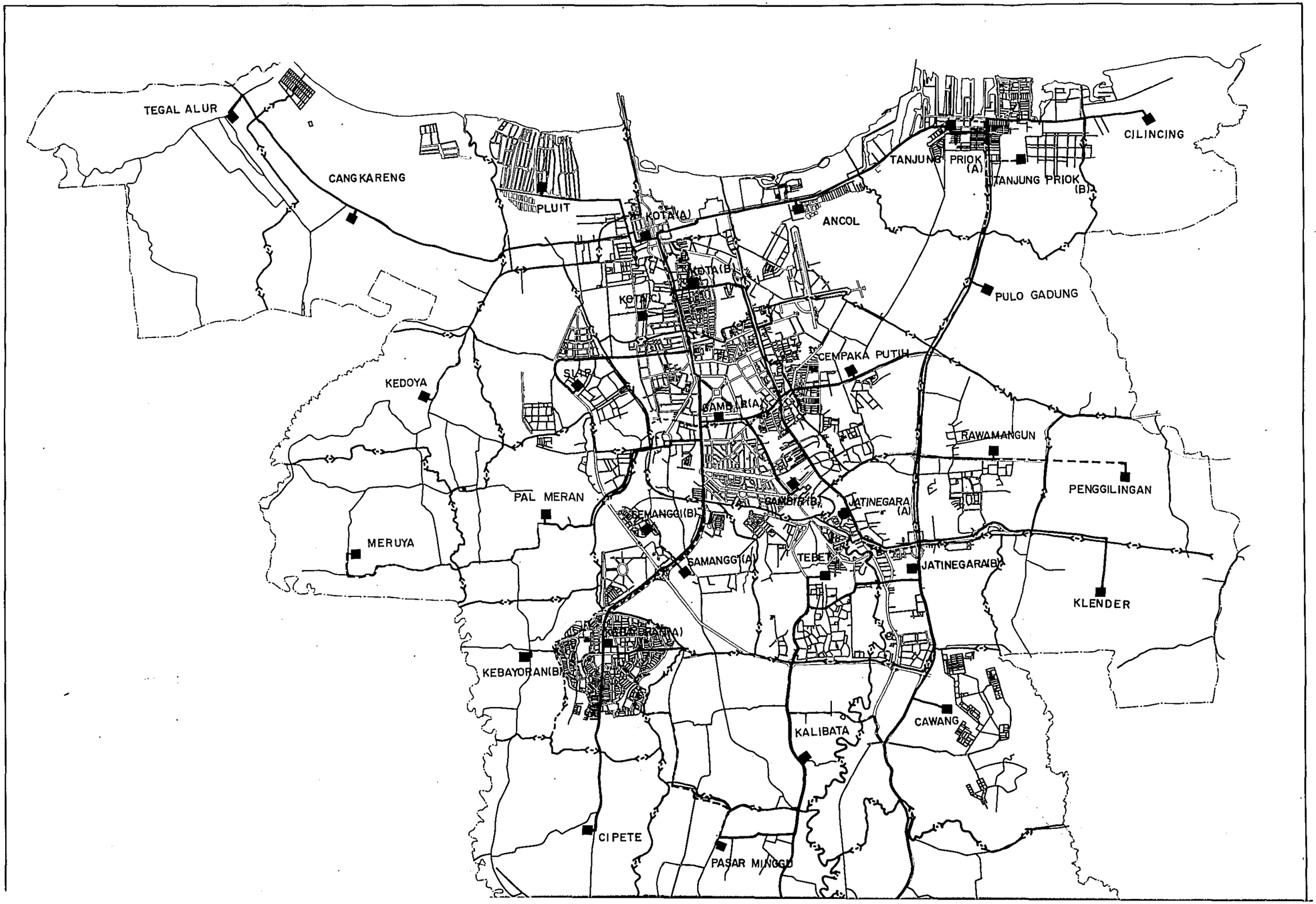
As mentioned before, there is hardly any difference in costs between the Plan No. 1 and the Plan No. 2 and which plan would be the most suitable for network composition cannot be determined simply by comparision of costs. Therefore, as the result of the study of other factors such as switchover from the present system (5 terminating tandem → one tandem), size of the exchange office building site, road occupancy for civil works, maintenance, etc., the Plan No. 1 is deemed desirable.

It is recommended that: firstly, PERUMTEL should endeavor to plan for improvement of the DC resistance limit due to difficulty in the acquisition of road occupancy rights for cable laying and for the saving of copper.

Secondly, 0.5 mm conductor cables should be used in the future; it is assumed that the use ratio of this cable will be about 22%.

Thirdly, two-way repeaters should be applied in the future.

As mentioned previously, a long-term plan will have to change in accordance with the environment and prevailing conditions. Therefore, in setting up the junction cable plan, it will be necessary to make revisions in compliance with the usable limits of the basic plan prepared by JTP while coping with the changing prerequisite conditions.


TEGAL ALUR
CANGKARENG
PLUIT
KOTA(A)
KOTA(B)
KOTA(C)
ANCOL
TANJUNG PRIOK (A)
TANJUNG PRIOK (B)
CILINCING
PULO GADUNG
CEMPAKA PUTIH
SUNTER
GAMBIR(A)
KEDOYA
RAWAMANGUN
PENGGILINGAN
PAL MERAN
SEMANGGI(B)
GAMBIR(B)
JATINEGARA (A)
MERUYA
SEMANGGI(A)
TEBET
JATINEGARA(B)
KLENDER
KEBAYORAN(A)
KEBAYORAN(B)
CAWANG
KALIBATA
CIPETE
PASAR MINGGU

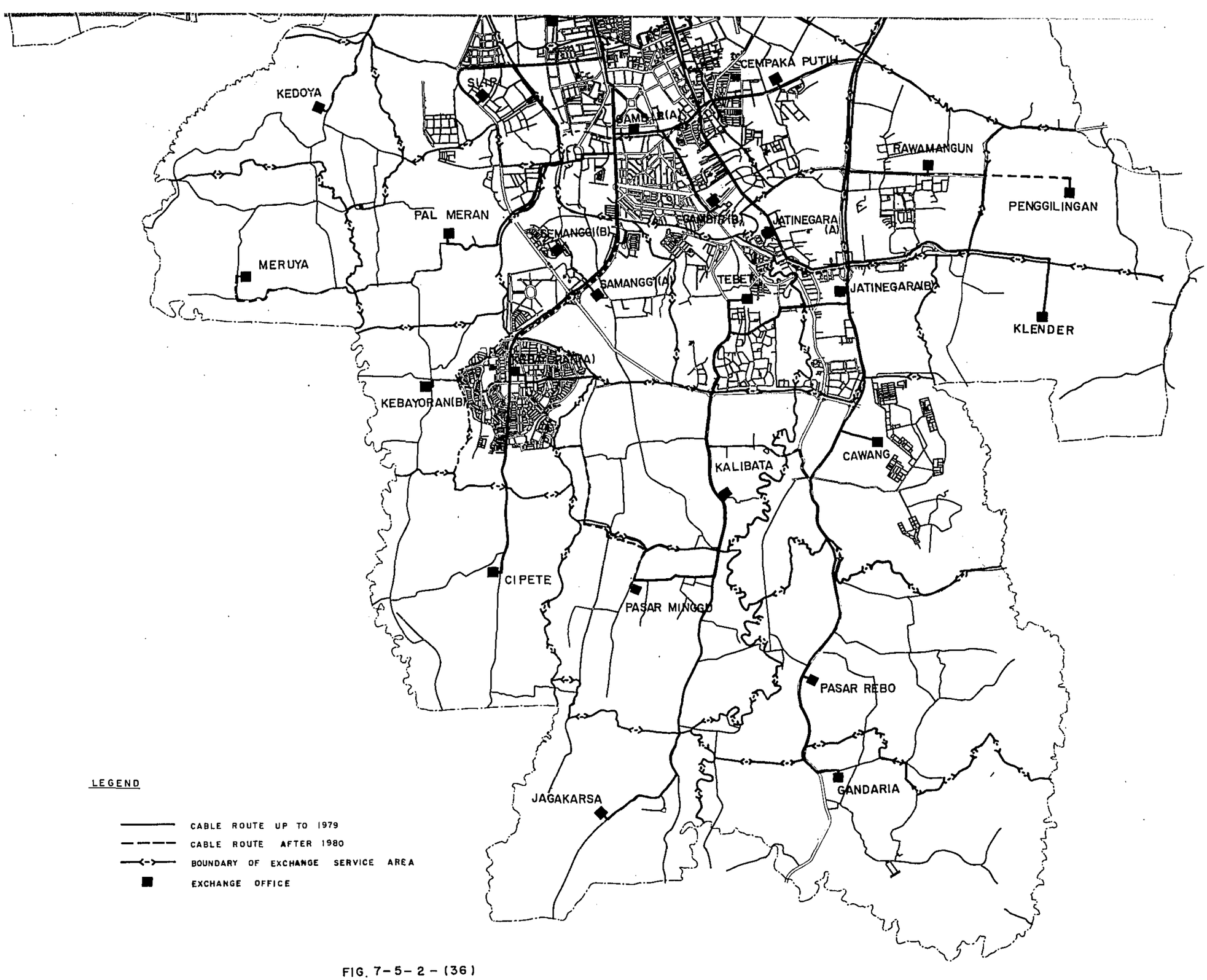


FIG. 7-5-2-(36)

JUNCTION CABLE ROUTE