1-6 Cable Distribution Design

The distribution design is made, based on the demand map and by the following procedures and methods:

1-6-1 Primary Cable

The number of required cable pairs is to be determined, based on the estimated demand 3-7 years ahead, in the following order:

(1) Cable Units per Cabinet Area

To compute the cable units to be distributed to each cabinet area, based on the estimated demand 3-7 years from now.

(2) Grouping of Units

To group by conductor diameter the cable units allocated to each cabinet along the primary cable route, from the end of cable route towards the exchange.

(3) Cable Pairs

To determine the number of cable pairs that meet the number of cable units in a cable route section. To use the large-pair cable for economic reasons and for effective utilization of duct.

(4) Temporary Distribution Area

For the primary cable extending to the area where the demand will arise in the future, to secure from the beginning the cable units in the capacity which will meet the estimated demand 3-7 years from now. However, when the number of cable is to be increased, not to install the additional cable from the outset.

(5) Free Units

To reserve the surplus of cable pairs terminated to the MDF of the exchange in excess of the distributed cable pairs, at the terminal of main cable as idle pairs or in the cabinet as free units.

1-6-2 Secondary Cable

For secondary cable, the number of required pairs which meet the demand 10-20 years ahead is to be determined as described below.

(1) Distribution Area

To divide the cabinet area into several distribution areas along the cable route in consideration of the existing cable and road conditions.

(2) Units per Distribution Area

To allocate the cable units that meet the estimated demand 10-20 years ahead in the cabinet area to each distribution area in proportion to the demand in the area.

(3) Cable Pairs

To determine the number of cable pairs that meet the number of allocated units. As for the existing cable, to examine whether the cable is defective or not and then to utilize it.

(4) Reserve Units

When the undeveloped or unoccupied land exists in the cabinet area, to reserve the number of cable pairs suitable for such land in the cabinet or on the cable route near the land.

1-7 Cable Entrance

The exchange entrance cable design is to comply with the long term planning and, as such, is to be rational and economical. In the design, emphasis is placed on the following points:

1-7-1 Cable Vault

(1) Selection of Duct

The duct for entrance cable to the exchange must be selected in order not to interrupt the installation of additional entrance cables in the future. At the same time, the duct must be selected from bottom to top so that there will be no excessive cable bending, nor cable crossing, in the cable vault.

(2) Cable Arrangement

Arrangement on the cable frame and cable hook must be carried out from the bottom line up so as to suit the entrance duct.

(3) Cable Termination

The primary cable that enters into the exchange is to be terminated directly to the MDF. In the case of gas pressurized cable, the gas dam must be provided in order to cut off the circulation of gas.

1-7-2 Main Distribution Frame (M.D.F.)

(1) Capacity of cable pair termination at the vertical row of an M.D.F. is assumed to be 800 pairs.

(2) Younger number of cable pair number should be allocated to the upper rung of M.D.F. and older number to the lower rung.

2. Design Policy for Five Local Exchanges

The design policy is based on the result of consultations with PERUMTEL.

2-1 Primary Cable Network

The new primary cable route is selected, based on the field survey findings and in accordance with the design standard.

(1) Primary Cable Pairs

Primary cable pairs are to suit the cable pair units corresponding to 1.3 - 1.5 times the estimated demand as of 1987.

(2) Existing Cable

The existing small-pair, direct-buried cable is not to be utilized for primary cable.

2-2 Secondary Cable Network

Secondary cable is to be direct-buried. The cable route is selected, based on the field survey findings.

(1) Secondary Cable Pairs

Secondary cable pairs are to suit the size of demand 1.3 - 1.5 times the estimated demand as of 1993. Furthermore, they are to be in the number large enough to serve the existing and potential subscribers, based on the field survey results.

(2) Existing Cable

The existing small-pair, direct-buried cables are overage. Moreover, the places where they are buried cannot be accurately known. For the purpose of cost comparison, two plans, one utilizing those existing cables and the other not utilizing them, are designed for the Kota I Exchange and the Jatinegara I Exchange, respectively. Meanwhile, aerial cables are excluded from the route plans for reason of small-pairs.

2-3 Underground Duct System

The required number of ducts for each underground cable section is calculated by the following criteria:

2-3-1 Number of Ducts

The number of required ducts consists of the number of duct cables and spare ducts.

(1) Number of Duct Cables

The computation method is to multiply the total required number of cables 20 years ahead by the demand variation factor of 1.5 times, raising fractions to the unit.

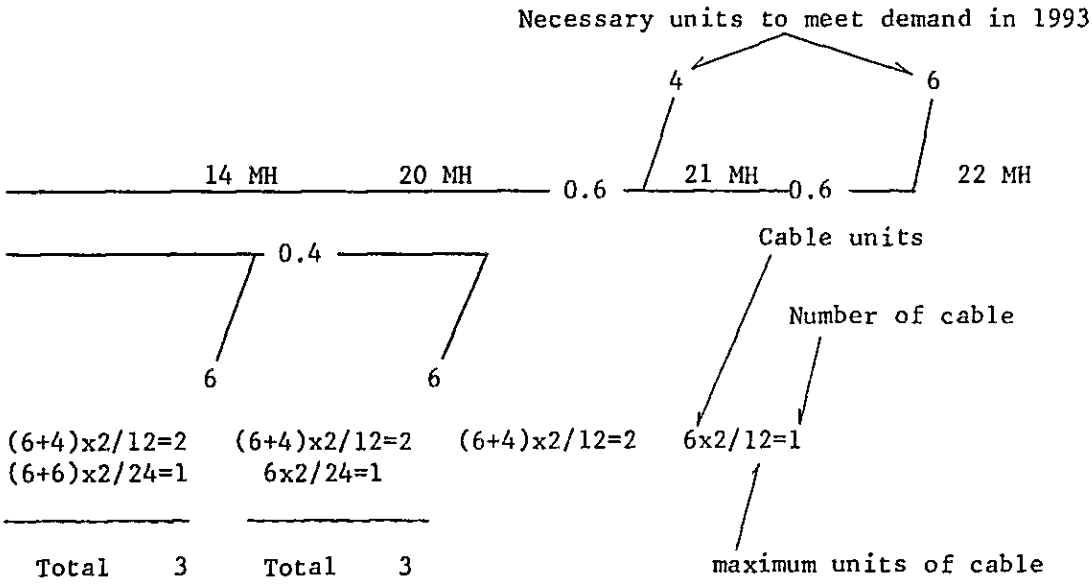
(2) Number of Required Cables 20 Years Ahead

The number of required cables 20 years ahead is to be computed for subscriber's cables, junction cables and toll cables, respectively.

1) Subscriber's Cables

The number of required units 20 years ahead is computed, based on the number twice the cable units that suit the estimated demand of 1993. Therefore, the number of cables 20 years ahead is computed by dividing the above units by the maximum units of cable of each conductor diameter, raising fractions to the unit.

Example:



2) Junction Cables, Toll Cables

To multiply the number of cables required, based on the long-term plan, by the variation factor of 1.3 times.

3. Basic Designs of Five Local Exchanges

For Kota I Exchange and Jatinegara I Exchange, site surveys were started in July 1979 and basic designs were completed in December 1979. For the remaining three exchanges, Kota II, Gambir I and Pluit Exchanges, site surveys were started in June 1980 and basic designs were completed in December 1980.

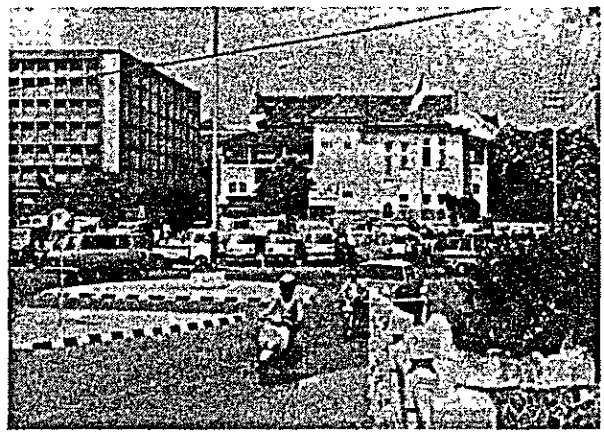
The drawings are presented in Annex III.

3-1 Kota I Exchange

3-1-1 Area Characteristics

In the Kota I Exchange area, the demand density is high, next to the demand densities in the Gambir Exchange and Kota II Exchange areas. In this area, centering around the Kota Railway Station, office buildings and merchant houses are massed in close order. Commercial activities are brisk. However, many buildings are old so that, in some parts of the area, plans are being made to replace those old buildings with new, modern structures.

The northern side of the railway line is the factory and residential district. A city planning is in progress, utilizing the reclaimed land in the seaboard district. This district is scheduled to become the factory district and, at the same time, the high-riser residential complex.



Scene in front of Kota I Exchange

3-1-2 Outline of Basic Design

The basic design comprises two aspects. Firstly, it presents the cutover design related to the re-accommodation of other exchange area subscribers who are now accommodated in the Kota I Exchange area.

Secondly, it includes the design to meet the increase of subscribers in the Kota I Exchange area.
The cutover work will be executed at first stage, and then the cable expansion work will follow. For the area covered by G-3 Project, the design places emphasis on the effective utilization of facilities already established.

(1) Cutover Design

The switching equipment now installed in Kota I Exchange has its capacity limited to 10,000 line units. At present, the addition of switching equipment is physically impossible because of the shortage of exchange building space. In the future, the present administration building will be rebuilt as the equipment building and the new type switching system will be installed in order to cope with the demand growth.
However, the re-accommodation of subscribers in other exchange areas, who are presently accommodated in Kota I Exchange, will provide room for the existing switching system, creating a solution for the immediate future.
Kota I Exchange subscribers including those in other exchange areas total 9,287. Of this total, 2,534 are other exchange area subscribers and 1,503 are to be re-accommodated as the result of exchange area modification. Therefore, after the scheduled re-accommodations, the Kota I Exchange subscribers will number 5,250.

Breakdown of Subscribers (based on October 1979 data)

a) The present number of subscribers at Kota I Exchange: 9,287

b) Other exchange area subscribers:

Kota II Exchange	1,870
Pluit Exchange	594
Slipi Exchange	55
Cengkareng Exchange	15
Total	2,534

c) Subscribers to be re-accommodated to Kota II Exchange as the result of exchange area modifications: 1,503

d) Kota I Exchange subscribers after the completion of re-accommodations: 5,250

(2) Installation Classification for Subscriber Re-Accommodation

The total number of subscribers who will be re-accommodated to other exchanges from Kota I Exchange is 4,037. Installation works for subscriber re-accommodation are classified as follows:

1) Cutover by PERUMTEL

To Kota II Exchange	1,050
To Pluit Exchange	150
To Slipi Exchange	55
To Cengkareng Exchange	15
Total	1,270

2) Cutover by the basic design of Kota I Exchange

To Kota II Exchange	820
Due to exchange area modification	1,503
Total	2,323

3) Cutover by the basic design of Pluit Exchange: 444

3-1-3 Amount of Works

(1) Manhole and Handhole

Type of Manhole	Quantity (each)
S - 1	3
Handhole	15

(2) Duct

Number of Ducts		Quantity (m)
100mm Pipe	2-duct Section	198.5
	4-duct Section	1,070.0
Total		1,268.5

(3) Primary Cable

Conductor Diameter(mm)	Number of Pairs	Quantity (m)
0.4	200	28.0
	300	365.0
	400	320.0
	600	563.5
	800	895.5
	1,000	525.6
	1,600	1,141.5
	1,800	405.0
	2,400	1,155.7
0.6	300	50.0
	400	255.0
	600	389.5
	1,200	3,485.0
Total		9,579.3

(4) Cross-Connecting Cabinet

Capacity	Quantity (each)
800 p	3
1,600 p	13
Total	16

(5) Secondary Cable

Conductor Diameter(mm)	Number of Pairs	Quantity (m)
0.4	30	2,210.0
	50	3,670.0
	100	8,030.0
	200	3,700.0
	300	800.0
	400	140.0
0.6	30	2,410.0
	50	1,320.0
	100	2,020.0
	200	210.0
Total		2,4510.0

(6) Secondary Cable (Alternative Plan)

Conductor Diameter(mm)	Number of Pairs	Quantity (m)
0.4	30	2,560.0
	50	4,510.0
	100	8,500.0
	200	5,740.0
	300	1,190.0
	400	640.0
0.6	30	2,410.0
	50	1,320.0
	100	2,020.0
	200	210.0
Total		29,100.0

3-1-4 Amount of Works for Cutover Plan

(1) Manhole and Handhole

Type of Manhole	Quantity (each)
S - 1	2
Handhole	1

(2) Duct

Number of Ducts		Quantity (m)
100mm Pipe	2-duct Section	5.0
	4-duct Section	791.4
	6-duct Section	234.0
	8-duct Section	400.0
Total		1,430.4

(3) Primary Cable

Conductor Diameter (mm)	Number of Cables	Quantity (m)
0.4	200	20.0
	300	55.0
	600	125.0
	1,200	100.0
	1,800	319.0
	2,400	2,090.4
Total		2,709.4

(4) Cross-Connecting Cabinet

Capacity	Quantity (each)
1,600 p	4

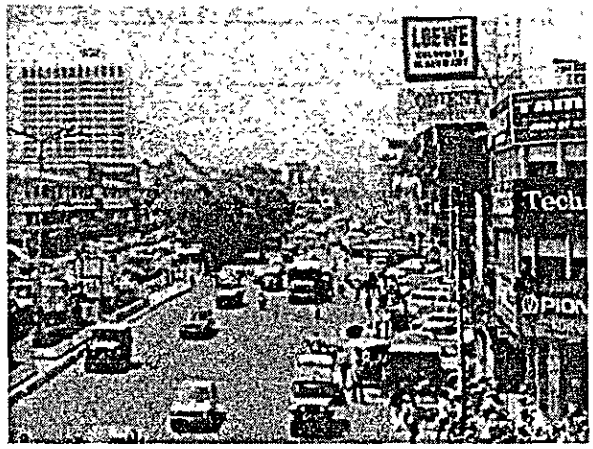
(5) Cut-over Plan (KOTA I - KOTA II)

Conductor Diameter (mm)	Number of Pairs	Quantity (m)
0.4	30	30.0
	200	10.0
	300	107.0
	400	272.0
Total		419.0

3-2 Kota II Exchange

3-2-1 Area Characteristics

The Kota II Exchange area embraces the top commercial district of Jakarta City and is teemed with business offices and merchant houses. Especially along the Gajah Mada Road and Hayam Wuruk Road that traverse the exchange area from north to south the buildings are being gradually modernized. Prospects loom large for telephone demand growth in the future.



Commercial Center in Kota II Exchange Area

3-2-2 Outline of Basic Design

The basic design is for accommodation of increased subscribers in the whole Kota II Exchange area inclusive of the area transferred from the Kota I Exchange area due to the lack of switching equipment capacity at Kota I Exchange. The cutover design for subscriber re-accommodation is already made. This basic design is on the assumption that the cutover work has been completed.

For the area where the existing distribution cables are feared to come into shortage, the basic design seeks a solution by means of the distribution area division and the additional installation of primary and secondary cables.

3-2-3 Amount of Works

(1) Manhole and Handhole

Type of Manhole	Quantity (each)
Manhole S - 1	11
Handhole	5

(2) Duct

Number of Ducts		Quantity (m)
100mm Pipe	2-duct Section	832.4
	4-duct Section	1,470.0
Total		2,302.4

(3) Primary Cable

Conductor Diameter (mm)	Number of Pairs	Quantity (m)
0.4	200	2,190.8
	300	43.0
	400	1,024.7
	600	1,037.0
	800	1,123.3
	1,000	1,153.2
	1,200	278.8
	1,600	398.0
	2,400	3,305.4
0.6	200	459.0
	300	350.0
	400	1,081.0
	600	100.0
	800	1,230.0
	1,200	2,028.5
Total		15,802.7

(4) Cross-Connecting Cabinet

Capacity	Quantity (each)
1,600 p	6

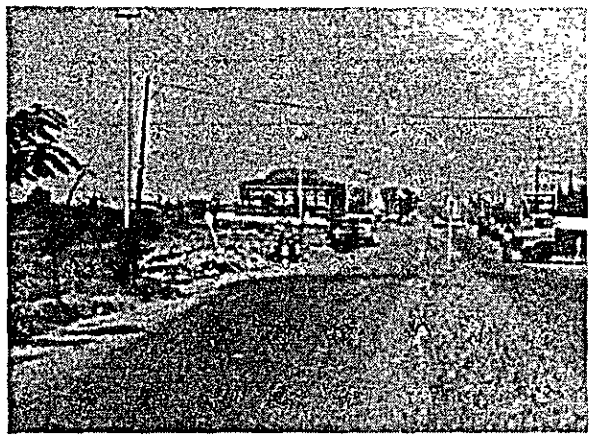
(5) Secondary Cable

Conductor Diameter(mm)	Number of Pairs	Quantity (m)
0.4	30	10,270.0
	50	9,630.0
	100	20,590.0
	200	8,390.0
	300	1,800.0
	400	560.0
0.6	30	3,970
	50	4,360.0
	100	9,040.0
	200	3,310.0
	300	570.0
Total		72,490.0

3-3 Pluit Exchange

3-3-1 Area Characteristics

The Pluit Exchange area covers the newly risen residential and factory area in the northern part of Jakarta City. The area still has many vacant lands. The road to the new interrnational airport is planned. This road traverses east to west the middle part of the exchange area. In the area west of the Pluit Exchange a large scale housing complex construction plan is in progress. A sharp rise of telephone demand is expected in this area.



Developing Area in Pluit Exchange Area

3-3-2 Outline of Basic Design

The present Pluit Exchange switching equipment capacity is 4,000 line units and the existing subscribers number 3,995. In this exchange, the additional switching equipment installation is urgently required.

The distribution cables are deficient in the whole exchange area. The expansion cable design covers the whole area except a part of area on the western side of the exchange where the land utilization plan remains undecided.

The 444 Pluit Exchange subscribers now accommodated by the Kota I Exchange must be cut over to the Pluit Exchange in this Project.

3-3-3 Amount of Works

(1) Manhole and Handhole

Type of Manhole		Quantity (each)
Manhole	S - 1	43
	S - 2	1
Total		44
Handhole		15

(2) Duct

Number of Ducts		Quantity (m)
100mm Pipe	2-duct Section	380.0
	4-duct Section	2,664.0
	6-duct Section	950.0
	8-duct Section	700.0
	10-duct Section	1,890.0
Total		6,584

(3) Primary Cable

Conductor Diameter (mm)	Number of Pairs	Quantity (m)
0.4	200	995.5
	300	446.5
	400	123.7
	600	1,370.9
	800	1,467.2
	1,200	936.7
	1,800	432.0
	2,400	1,234.9
0.6	200	10.0
	300	100.0
	400	580.0
	600	1,120.0
	800	430.0
	1,000	320.0
	1,200	10,114.5
Total		19,681.9

(4) Cross-Connecting Cabinet

Capacity	Quantity (each)
800 p	1
1,600 p	14
Total	15

(5) Secondary Cable

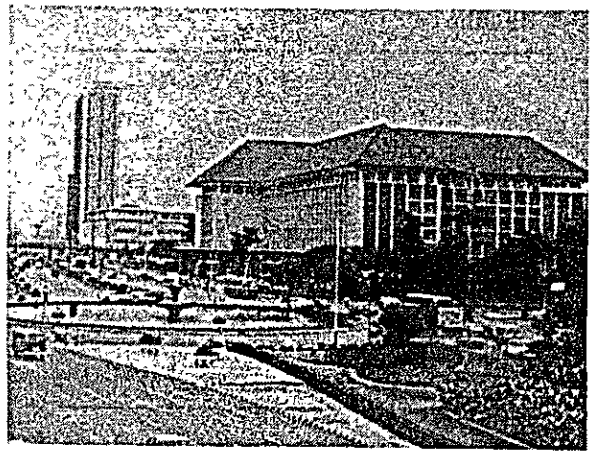
Conductor Diameter (mm)	Number of Pairs	Quantity (m)
0.4	20	710.0
	30	6,820.0
	50	11,950.0
	100	17,700.0
	200	10,080.0
	300	1,630.0
	400	3,470.0
0.6	30	1,240.0
	50	3,790.0
	100	6,440.0
	200	5,190.0
	300	600.0
	400	2,820.0
Total		72,440.0

3-4 Gambir I Exchange

3-4-1 Area Characteristics

The Gambir I Exchange area is located in the nearly central part of Jakarta City. In the surroundings of the Merdeka Square a large number of buildings including the governmental offices, banks and medium scale business houses stand in rows.

In both residential and commercial districts, the roads are well maintained. The whole exchange area constitutes an area where the demand remains relatively stable.



Central Area in Gambir I Exchange Area

3-4-2 Outline of Basic Design

The basic design is to accommodate the increased subscribers in the whole Gambir I Exchange area.

The present Gambir I Exchange switching equipment capacity is 36,000 line units and the present total number of subscribers of the exchange is 25,001. Out of these subscribers, 7,332 originally belong to the Gambir II Exchange. PERUMTEL is gradually cutting over those subscribers to the Gambir II Exchange. After the completion of this subscriber cutover, the Gambir I Exchange will have switching capacity to cater for the estimated demand of 1989.

The expansion cable design places top emphasis on the effective utilization of the existing cables. Since the primary cables installed recently by the crash program leave many free units, these free units are to be transferred to the distribution areas where the additional cable installation is required.

Subscribers, to whom the old small-pair direct-buried cables (of which the location of burying cannot be identified) are used, are scheduled to be cut over to the recently installed cables. After this cutover, the old direct-buried cables will be disused and the cross-connecting cabinets used for those old cables will be withdrawn and, at the same time, the aerial cables will also be discontinued. By these means, the cable room and M.D.F. room will be provided with sufficient floor space.

3-4-3 Amount of Works

(1) Manhole and Handhole

Type of Manhole	Quantity (each)
Manhole S - 1	5
Handhole	5

(2) Duct

Number of Ducts		Quantity (m)
100mm Pipe	2-duct Section	985.0
	4-duct Section	625.0
Total		1,610.0

(3) Primary Cable

Conductor Diameter (mm)	Number of Pairs	Quantity (m)
0.4	200	554.0
	300	537.0
	400	462.0
	600	1,456.0
	1,000	175.0
	1,200	952.0
	1,600	82.0
	1,800	178.0
	2,400	1,510.5
0.6	200	751.0
	300	385.0
	400	630.1
	600	574.8
	800	878.0
	1,000	874.2
	1,200	2,962.8
Total		12,962.4

(4) Cross-Connecting Cabinet

Capacity	Quantity (each)
1,600 p	4

(5) Secondary Cable

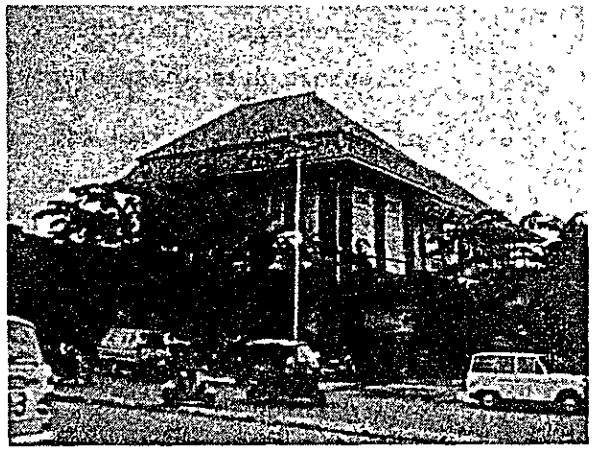
Conductor Diameter (mm)	Number of Pairs	Quantity (m)
0.4	30	970.0
	50	1,250.0
	100	4,510.0
	200	2,250.0
0.6	30	1,500.0
	50	490.0
	100	1,630.0
	200	1,230.0
Total		13,830.0

3-5 Jatinegara I Exchange

3-5-1 Area Characteristics

In the center of the Jatinegara I Exchange area, the Matraman Raya Road traverses from north to south.

Along the main roads the middle and small sized business offices and merchant houses are gathered. Away from such main roads, the middle and lower class residential houses are clustered. Vacant lots are relatively few. All side roads are narrow. The improvement of these roads cannot be expected unless the town lots readjustment by the city planning is carried out.



Scene in front of Jatinegara I Exchange

3-5-2 Outline of Basic Design

This basic design conditions that the Jatinegara I Exchange be discontinued and its service area be incorporated into the Jatinegara II Exchange area. The purpose is to develop new subscribers in the Jatinegara I Exchange area, along with the re-accommodation of the existing subscribers in the area.

(1) Exchange Establishment Plan

The existing EMD of 4,000 line units will become short of the forecasted demand in 1985. Because of small site and building capacity, the installation of additional switching equipment is impossible. Moreover, due to the superannuation of building, 2,000 line units out of the existing 4,000 are being compelled to be withdrawn.

Hence, in consideration of all conditions and requirements and based on the result of engineering economy comparison, the decision has been made to discontinue the Jatinegara I Exchange and to have the subscribers in its service area absorbed by the Jatinegara II Exchange.

(2) Engineering Economy

In connection with the subscriber cable network expansion in the Jatinegara I Exchange area, the economic comparison has been made for two plans. One is to discontinue the Jatinegara I Exchange and have its service area consolidated into that of the Jatinegara II Exchange. The other is to keep the present Jatinegara I Exchange area in existence provided that the exchange building be reconstructed.

Plan A (Consolidation Plan):
To discontinue the Jatinegara I Exchange and consolidate the Jatinegara I and II Exchanges.

Plan B (Reconstruction Plan)
To reconstruct the Jatinegara I Exchange building.

In the case of plants with different investment periods and service lives, the comparison by the present value of annual cost will be adopted.

Reason: A fixed period makes the fair and just comparison possible.

1) Preconditions

a. Fixed Period for Comparison

15 years from 1981 through 1995

b. Interest Rate

12% per annum

c. Expected Service Life of Plant

Exchange building	40 years
Outside plant	20 years
Switching equipment	15 years

d. Operating Cost

The amortization cost ratio to annual charge is larger than the corresponding ratio of operating cost. Furthermore, data available are not complete. Hence, the operating cost computation is omitted.

e. Installation Cost for Outside Plant
The subscriber cable cost will be computed, based on the respective subscriber cable designs of Plan A and Plan B.

2) Year of Placement and Plant Cost
Year of placement is based on JTP '79 basic plan. By this basic plan, the plant cost was estimated as shown in Table VI-2.

3) Conclusion
The result of cost comparison by the present value of annual cost is as follows:

Plan A (Consolidation Plan) ... US$5,726,000
Plan B (Reconstruction Plan) ... US$5,736,000
(Refer to Table VI-3.)

Plan A (Consolidation Plan) is less costly by US$10,000. Furthermore, in the following respects, Plan A holds greater advantage:

a. Personnel cost for maintenance and related services.
b. Common personnel cost.

Availability of vacated exchange land for other purpose creates another advantage.
This advantage includes financial income accruing from sale of the vacated land.

Table VI-2 Year of Placement and Plant Cost

(Unit: Thousand US$)

Plan	Item	Year										
		1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
		Initial	1	2	3	4	5	6	7	8	9	10
A	Subscriber Cable											
	New Installation	2,426										
	Expansion						480					
	Jatinegara II Switching Equipment (Existing 8,000 LU)											
	New Installation 7,000 LU		2,730									
	Expansion 5,000 LU					975						
	Expansion 4,000 LU								780			
	Expansion 4,000 LU											780
B	Subscriber Cable											
	New Installation	2,183										
	Expansion						434					
	Jatinegara I Switching Equipment (Existing 4,000 LU)											
	Withdrawal 4,000 LU and New Installation 4,000 LU		1,560									
	Expansion 2,000 LU					390						
	Expansion 3,000 LU								585			
	Jatinegara II Switching Equipment (Existing 8,000 LU)											
	New Installation 4,000 LU			1,560								
	Expansion 3,000 LU							585				
	Expansion 4,000 LU										780	
	Jatinegara I Exchange Building											
	Reconstruction	500										

Table VI-3 Present Value of Annual Cost Comparison

Plan	Item	Year of Placement	Service Life (Year)	Investment Cost (Thousand US$) (1)	Annuity Factor for Future Amount (2)	Amortization Cost: Annual Investment Cost (Thousand US$) (3)=(1) x (2)	Amortization Cost: Annual Interest Cost (Thousand US$) (4)=(1) x 0.12	Annual Cost (Thousand US$) (5)=(3)+(4)	Present Value of Annuity Factor (6)	Present Value Factor (7)	Present Value of Annual Cost (Thousand US$) (8)=(5)x(6)x(7)
A	Subscriber Cable										
	New Installation	0	20	2,426	0.01388	34	291	325	6.811	1.0000	2,214
	Expansion	5	20	480	0.01388	7	5	65	5.650	0.5674	208
	Switching Equipment (JT II)										
	New Instalation 7,000 LU	1	15	2,730	0.02682	73	328	401	6.628	0.8929	2,373
	Expansion 5,000 LU	4	15	975	0.02682	26	117	143	5.938	0.6355	540
	Expansion 4,000 LU	7	15	780	0.02682	21	94	115	4.968	0.4523	258
	Expansion 4,000 LU	10	15	780	0.02682	21	94	115	3.605	0.3220	133
	Total										5,726
B	Subscriber Cable										
	New Installation	0	20	2,183	0.01388	30	262	292	6.811	1.0000	1,989
	Expansion	5	20	2,183	0.01388	6	52	58	5.650	0.5674	186
	Switching Equipment (JT I)										
	New Installation 4,000 LU	1	15	1,560	0.02682	42	187	229	6.682	0.8929	1,366
	Expansion 2,000 LU	4	15	390	0.02682	10	47	57	5.938	0.6355	215
	Expansion 3,000 LU	8	15	585	0.02682	16	70	86	4.564	0.4039	159
	Switching Equipment (JT II)										
	New Installation 4,000 LU	3	15	1,560	0.02682	42	187	229	6.194	0.7118	1,010
	Expansion 3,000 LU	6	15	585	0.02682	16	70	86	5.328	0.5066	232
	Expansion 4,000 LU	9	15	780	0.02682	21	94	115	4.111	0.3606	170
	Exchange Building (JT I)										
	Reconstruction	0	40	500	0.00004	-	60	60	6.811	1.0000	409
	Total										5,736

3-5-3 Amount of Works

(1) Manhole and Handhole

Type of Manhole		Quantity (each)
Manhole	S - 1	36
	S - 2	3
	S - 3	1
Total		40
Handhole		14

(2) Duct

Number of Ducts		Quantity (m)
100mm Pipe	2-duct Section	540.0
	4-duct Section	3,240.0
	6-duct Section	1,380.0
	8-duct Section	500.0
	10-duct Section	750.0
	16-duct Section	400.0
Total		6,810.0

(3) Primary Cable

Conductor Diameter (mm)	Number of Pairs	Quantity (m)
0.4	300	1,160.0
	600	640.0
	1,000	150.0
	1,800	1,279.0
0.6	300	10.0
	600	3,741.0
	1,000	2,747.0
	1,200	13,940.0
Total		23,667.0

(4) Cross-Connecting Cabinet

Capacity	Quantity (each)
800 P	3
1,600 P	13
Total	16

(5) Secondary Cable

Conductor Diameter (mm)	Number of Pairs	Quantity (m)
0.4	30	3,320.0
	50	10,170.0
	100	12,410.0
	200	8,450.0
	300	1,320.0
	400	1,910.0
0.6	30	840.0
	50	1,920.0
	100	2,350.0
	200	870.0
Total		43,560.0

(6) Secondary Cable (Alternative Plan)

Conductor Diameter (mm)	Number of Pairs	Quantity (m)
0.4	30	3,320.0
	50	10,230.0
	100	12,760.0
	200	9,060.0
	300	1,690.0
	400	3,430.0
0.6	30	840.0
	50	2,070.0
	100	2,380.0
	200	880.0
	300	270.0
	400	280.0
Total		47,210.0

PART VII CONSTRUCTION COST ESTIMATE

PART VII CONSTRUCTION COST ESTIMATE

The construction cost estimate for the Jakarta Telephone Network expansion project is presented here. This cost estimate pertains to exchange buildings, switching system, subscriber and junction cables, underground duct system and PCM transmission system.
The cost estimate is for the period from 1981 through 1986. Based on the Jakarta Telephone Network Expansion Plan described in PART III, it is calculated for each exchange and for each work category. The cost estimate for outside plant construction to be carried out in the Third Five-Year Plan is separately tabulated.
In case the work period exceeds one (1) year, the object year of cost estimate is set for the year in which the work begins.
For all exchanges except the five for which the basic designs were specially formulated, the primary cable and underground duct system plans have been prepared as a yardstick to the subscriber cable work cost estimate (ANNEX IV).
The overall construction cost up to the year 1986 amounts to approximately 113,500 million Rupiahs (US$182 million).
The outside plant construction cost for the Third Five-Year Plan (1979-1983) is estimated to be approximately 43,241 million Rupiahs (US$69 million).

1. Unit Cost of Construction

The unit cost of construction for each year is based on the unit cost as of 1980, multiplied by the annual rate of increase.
The exchange building and underground duct system work costs are estimated in Indonesian Rupiah, the local currency. The costs of switching system, cable work and PCM transmission system are estimated in Japanese Yen, the foreign currency.
In the establishment of the unit cost of construction, the recent price behaviors in Indonesia and on the international market have been duly considered.
The exchange rate of currency is assumed to be as follows:
1 US Dollar = 220 Japanese Yen (¥) = 625 Indonesian Rupiahs (Rp.)

1-1 Exchange Building

The cost of exchange building construction consists of land cost and building cost.

The land cost is estimated by the unit cost as of 1980 worth 30,000 Rp/m^2. The unit cost used in the building cost estimate is 200,000 Rp/m^2.

The annual increase rate for each unit cost is set at 10%.

1-2 Switching System

The construction cost for switching system comprises the cost of main switching equipment, power plant and other components, and testing equipment.

The switching system expansion cost is estimated uniformly by the unit cost as of 1980 worth 80,000 Japanese Yen per line terminal, regardless of the addition of line terminals or new installation thereof.

The annual rate of unit cost increase is set at 5%.

This reasonable rate derives from the recent downtrend of prices of electronic devices.

1-3 Cable

Cable work is classified into the undermentioned main categories. The work cost is estimated according to this classsification. Meanwhile, the cable work except the secondary cable work does not include the underground duct system work.

a) Primary cable
b) Secondary cable
c) Cross-connecting cabinet
d) Juncton cable
e) Loading coil

The unit cost of each work category mentioned above, inclusive of installation cost and accessories prices, appears in Table VII-1.

Prices of cable jointing material and other accessories are assumed to occupy 15% of the cable price. The installation cost is set at 30% of the cable price.

Cable and accessories prices are to remain unchanged.

The annual increase rate of 10% applies to installaton cost only.

Table VII-1 Unit Cost of Cable Work

(1) Primary & Junction Cables

Pair/Diameter	Unit Cost (Yen/m)
200/0.4	2,310
300/0.4	3,476
400/0.4	4,532
600/0.4	6,446
800/0.4	7,392
1,000/0.4	8,382
1,200/0.4	9,350
1,600/0.4	11,264
1,800/0.4	12,210
2,400/0.4	15,092
200/0.6	3,608
300/0.6	5,412
400/0.6	7,304
600/0.6	9,174
800/0.6	11,066
1,000/0.6	12,936
1,200/0.6	14,828
200/0.8	5,412
300/0.8	8,360
400/0.8	11,088
600/0.8	13,992

(2) Secondary Cable

Pair/Diameter	Unit Cost (Yen/m)
10/0.4	1,914
20/0.4	1,980
30/0.4	2,046
40/0.4	2,112
50/0.4	2,222
60/0.4	2,288
70/0.4	2,354
80/0.4	2,420
100/0.4	2,552
200/0.4	3,278
300/0.4	4,004
400/0.4	4,686
10/0.6	2,750
20/0.6	2,882
30/0.6	3,014
40/0.6	3,168
50/0.6	3,300
60/0.6	3,432
70/0.6	3,564
80/0.6	3,740
100/0.6	4,004
200/0.6	5,412
300/0.6	6,798
400/0.6	8,228
10/0.8	3,476
20/0.8	3,696
30/0.8	3,960
40/0.8	4,202
50/0.8	4,466
60/0.8	4,686
70/0.8	4,950
80/0.8	5,192
100/0.8	5,676
200/0.8	8,118

(3) Cross-Connecting Cabinet

Capacity	Unit Cost (Yen/Ea.)
800	165,000
1,600	330,000

(4) Loading Coil

Pair	Unit Cost (Yen/Ea.)
100	1,003,640
200	1,168,860
300	1,334,520
400	1,499,960
600	1,830,840
800	2,161,940
1,000	2,492,820
1,200	2,823,480

1-4 Underground Duct System

Underground duct system work is classified into manhole work and duct work.

The unit cost of work inclusive of material cost and installation cost is based on the present unit cost of PERUMTEL. The unit cost list appears in Table VII-2.

The annual rate of unit cost increase is set at 10%.

1-5 PCM Transmission System

PCM transmission system work is classified into the following main materials categories:

a) PCM multiplexer
b) PCM office repeater
c) PCM line repeater housing
d) PCM line repeater unit

The unit cost of each main material mentioned above, inclusive of installation cost and accessories prices, is determined by the following conditions:

1) Accessories prices account for 20% of the main equipment cost.
2) Installation cost accounts for 20% of the sum of main equipment cost plus cost item in 1) above.
3) The unit cost of main materials as of 1980 follows:

PCM multiplexer	1,243,000	Japanese Yen
PCM office repeater	220,000	"
PCM line repeater housing	310,000	"
PCM line repeater unit	35,000	"

4) No annual increase is considered for each unit cost because of the recent downtrend of PCM equipment prices as the result of technological renovation.

Table VII-2 Unit Cost of Underground Duct System

(1) Manhole

Type of Manhole	Unit Cost (Rp./Ea.)
S-1	829,188
S-1R	970,188
S-2	1,375,500
S-2R	1,592,313
S-3	1,592,313
S-3R	1,849,188
S-4	2,149,125
S-4R	2,509,000
S-5	2,509,000
S-5R	2,849,000
T-1	3,666,000
T-2	2,600,000
Handhole	400,000

(2) Duct

Number of Ducts	Unit Cost (Rp./m)
1	12,875
2	13,875
4	20,625
6	28,875
7	34,375
8	35,813
10	44,875
12	52,313
14	61,375
16	67,000
20	84,625
24	99,125
26	107,875
28	113,313
30	123,500
32	133,438
36	143,875
38	153,125
42	165,375
48	184,000
54	205,000
60	226,625

2. Amount of Work

The amount of work calculation for the purpose of the construction work cost estimate is made for each work category in PARTs III, V, VI and VIII. Furthermore, for the amount of work calculation relating to the subscriber cable network construction, the primary cable and underground duct system plans have been especially formulated for all exchanges except the five for which the basic designs have been produced plus Kebayoran Lama Exchange.

Kebayoran Lama Exchange is scheduled to begin service in 1991 so that, in this design report, it is not counted as a separate exchange but is included in the Kebayoran Exchange area.

2-1 Exchange Building

The existing exchange building expansion is governed by the exchange building drawings in Item 8 of PART VIII: Building Layout by Exchanges. The criteria of building and site areas for the proposed new exchanges are:

1) Total floor space of standard exchange building: 1,000 m^2
2) Site area: 3,000 m^2

2-2 Switching System

The switching system expansion is to the proposed capacity in the Implementation Program in Table III-6 of PART III.

2-3 Junction Cable Network

The amount of cable work, PCM system work and underground duct system work conforms to the provisions of Item 3, Chapter 3, PART V: Junction Cable Network Plan.

In case the underground duct system work period of the junction cable coincides with that of the subscriber cable, the former work assumes priority and its amount of work is included in the amount of junction cable work.

2-4 Subscriber Cable Network

The amount of work for the five exchanges, of which the basic designs have been formulated, i.e., Kota I, Kota II, Pluit, Gambir I and Jatinegara I, conforms to the provisions of Chapter 3 in PART VI.

For the remaining 27 exchanges, the key maps and the primary cable and underground duct system plans have been formulated whereby to determine the amount of primary cable work, manhole work and duct system work, as well as the required number of cross-connecting cabinets.

For the newly proposed undeground cable routes, the field surveys have been conducted.

Cables to be installed under the planned but not yet built roads are reserved in the exchanges concerned. The amount of primary cable work, manhole work and duct system work in such areas is not counted in this design report. Nor is considered the secondary cable expansion in such areas.

The aforementioned design drawings are to meet the demand as of 1993 so that, depending upon the work period, the designs must be modified as required. The estimated amount of subscriber cable work for all exchanges appears in Table VII-3. Exchange by exchange details of the amount of work are given in Paragraph 14 of PART VIII.

The amount of secondary cable work varies according to the distribution area size and the average demand density. Based on the secondary cable design drawings for the five exchanges covered by the basic designs, and by the method described below, the average cable pairs and average cable length required have been analytically obtained and, by this means, the amount of work has been calculated.

1) To calculate by conductor diameters the average cable pairs of secondary cable distributed from the cross-connecting cabinet;
2) To aggregate by condutor diameters and in terms of pairs the cable length from the cross-connecting cabinet to the cable terminal, for all secondary cables; to divide this aggregate total by the demand as of 1993 and thereby calculate the average cable length in pairs per subscriber;

Table VII-3 Estimate of Amount of Subscriber Cable Work (1/2)

No.	Exchange	Underground Duct System		Primary Cable Work	Cross-Connecting Cabinet	
		Manhole (ea)	Duct (100m/pipe)	Cable Length (100 m)	Cabinet (ea)	Handhole (ea)
1	Kota I	3	46.8	95.5	16	15
2	Kota II	C.O 2	77.8	26.8	4	1
		11	75.4	158.0	6	5
3	Cengkareng	11	130.2	221.4	25	9
4	Pluit	44	416.2	196.8	15	15
5	Ancol	9	55.6	89.0	5	2
6	Tegar Alur	40	399.2	83.1	2	1
7	Gambir I	5	44.7	129.6	4	5
8	Gambir II	10	98.2	342.2	10	6
9	Semanggi I	21	336.5	168.2	11	18
10	Semanggi II	51	369.4	350.0	28	30
11	Slipi	64	711.0	401.5	33	33
12	Pal Merah	20	91.9	254.6	13	8
13	Kedaya	35	576.9	148.9	14	10
14	Meruya	77	845.0	247.5	17	17
15	Cempaka Putih	11	81.6	215.3	4	4
16	Rawa Mangun	37	230.9	176.0	15	7
17	Tanjung Priok	11	66.0	129.0	11	11
18	Kelapa Gading	25	335.8	168.5	12	11
19	Cilincing	30	355.0	100.3	10	10

Table VII-3 Estimate of Amount of subscriber Cable Work (2/2)

No.	Exchange	Underground Duct System		Primary Cable Work	Cross-Connecting Cabinet	
		Manhole (ea)	Duct (100m/pipe)	Cable Length (100 m)	Cabinet (ea)	Handhole (ea)
20	Penggilingan	62	1,149.0	361.0	17	17
21	Kebayaran	36	320.1	513.2	9	9
22	Cipete	22	139.8	329.9	16	15
23	Pasar Minggu	30	141.8	169.2	9	8
24	Kalibata	114	1,708.9	570.1	28	27
25	Jagakarsa	35	264.6	78.4	11	9
26	Jatinegara I	40	402.2	236.7	16	14
27	Jatinegara II	29	181.8	263.5	8	8
28	Cawang	27	302.4	255.6	7	10
29	Pasar Rebo	11	84.8	46.0	5	3
30	Tebet	19	218.2	197.7	5	5
31	Gandaria	56	461.7	210.4	14	14
32	Klender	48	944.6	234.6	12	12
Junction Cable	Phase 1	65	2,173.8	790.0	-	-
	Phase 2	120	1,115.7	363.4	-	-
Total		1,231	14,953.5	8,321.9	412	369

3) Then, to calculate the amount of secondary cable work by the following formula:

$$\text{Amount of Work (Km)} = \frac{\left[\left(\frac{\text{Demand}}{\text{in 1993}}\right) \times 1.3 - \left(\frac{\text{Existing cable pairs in cabinet}}{}\right)\right] \times \left(\frac{\text{Average cable length}}{}\right)^{*1}}{(\text{Average cable pairs})^{*2}}$$

*Note:

1. 0.4 mm ... 0.45 km. pair/subscriber
   0.6 mm ... 0.65 km. pair/subscriber
   0.8 mm ... 0.6 km. pair/subscriber

2. 0.4 mm ... 120 pairs
   0.6 mm ... 106 pairs
   0.8 mm ... 70 pairs

The calculating formula appearing above is applied to the cross-connecting cabinet area of each exchange whereby to calculate the amount of secondary cable work of each exchange.

3. Total Construction Work Cost

Based on the unit cost of construction in Chapter 1 and the amount of work in Chapter 2 of this PART VII, the total construction cost has been calculated for each exchange and for each work category. The calculation results appear in Table VII-4.

The outside plant work to be implemented during the Third Five-Year Plan period consists of subscriber cable construction for 19 exchanges and junction cable construction. The Third Five-Year Plan implementation schedule and outside plant construction cost estimate by exchanges and by years are presented in Table VII-5.

Table VII-4 Construction Cost by Years (1/3)

Unit: Building - Thousand Rupiahs
Switch - Thousand Yen
Cable - Thousand Yen
Duct - Thousand Rupiahs

No.	Exchange	Item	1981	1982	1983	1984	1985	1986	Total Cost	
									Yen Portion	Rupiah Portion
1.	Kota I	Building				297,840				
		Switch					1,250,310			
		Cable		193,988					1,444,298	338,146
		Duct		40,306						
2.	Kota II	Building								
		Switch				496,540				
		Cable	41,417			398,321			936,278	120,850
		Duct	43,486			77,364				
3.	Gengkareng	Building								
		Switch			377,700					
		Cable			319,343				697,043	94,950
		Duct			94,950					
4.	Pluit	Building								
		Switch		358,160				436,310		
		Cable		499,617					1,294,087	291,080
		Duct		291,080						
5.	Ancol	Building								
		Switch		179,080			312,580			
		Cable		111,351					603,011	47,221
		Duct		47,221						
6.	Tegar Alur	Building			384,869					
		Switch				198,620				
		Cable				163,189			361,809	717,387
		Duct				332,518				
7.	Gambir I	Building								
		Switch								
		Cable				192,281			192,281	47,747
		Duct				47,747				
8.	Gambir II	Building	116,160							
		Switch			2,171,760			545,380		
		Cable		682,177					3,399,317	188,149
		Duct		71,989						
9.	Semanggi I	Building	181,500							
		Switch			283,280			436,310		
		Cable				355,420			1,075,010	451,760
		Duct				270,260				
10.	Semanggi II	Building								
		Switch		268,620			416,770			
		Cable		731,773					1,417,163	297,707
		Duct		297,707						
11.	Slipi	Building	111,320							
		Switch			944,240					
		Cable		884,028					1,828,268	601,546
		Duct		490,226						
12.	Pal Merah	Building								
		Switch		179,080			208,390			
		Cable		479,745					867,215	88,151
		Duct		88,151						
13.	Kedoya	Building	350,144							
		Switch			377,700			218,160		
		Cable			328,171				924,031	746,721
		Duct			396,577					
14.	Meruya	Building	350,144							
		Switch			283,280					
		Cable			485,953				769,233	980,849
		Duct			630,705					

Table VII-4 Construction Cost by Years (2/3)

Unit: Building - Thousand Rupiahs
Switch - Thousand Yen
Cable - Thousand Yen
Duct - Thousand Rupiahs

No.	Exchange	Item	1981	1982	1983	1984	1985	1986	Total Cost	
									Yen Portion	Rupiah Portion
15.	Cempaka Putih	Building Switch Cable Duct	253,000	626,780			361,282 92,538	436,310	1,424,372	345,538
16.	Rawa Mangun	Building Switch Cable Duct			283,280	324,876 230,596		327,230	935,386	230,596
17.	Tanjung Priok	Building Switch Cable Duct		447,700			294,683 79,701		742,383	79,701
18.	Kelapa Gading	Building Switch Cable Duct			472,120 362,419 253,019				834,539	253,019
19.	Cilincing	Building Switch Cable Duct		350,144	283,280 222,305 258,743			218,160	723,745	608,887
20.	Penggilingan	Building Switch Cable Duct		350,144	377,700 807,952 772,326				1,185,652	1,122,470
21.	Kebayoran	Building Switch Cable Duct				912,998 303,373			912,998	303,373
22.	Cipete	Building Switch Cable Duct				625,114 151,014			625,114	151,014
23.	Pasar Minggu	Building Switch Cable Duct				99,310		301,293 187,703	400,603	187,703
24.	Kalibata	Building Switch Cable Duct		1,133,702 1,097,870				436,310	1,570,012	1,097,870
25.	Jagakarsa	Building Switch Cable Duct			384,869	198,620 160,004 243,321			358,624	628,190
26.	Jatinegara I	Building Switch Cable Duct	441,057 257,067						441,057	257,067
27.	Jatinegara II	Building Switch Cable Duct	74,800	626,780 371,378 156,140			520,960		1,519,118	230,940
28.	Cawang	Building Switch Cable Duct			283,280		593,655 274,984	545,380	1,422,315	274,984

Table VII-4 Construction Cost by Years (3/3)

Unit: Building - Thousand Rupiahs
Switch - Thousand Yen
Cable - Thousand Yen
Duct - Thousand Rupiahs

No.	Exchange	Item	1981	1982	1983	1984	1985	1986	Total Cost Yen Portion	Total Cost Rupiah Portion
29.	Pasar Rabo	Building						218,160	557,147	87,358
		Switch		268,620			70,367			
		Cable					87,358			
		Duct								
30.	Tebet	Building							580,364	181,826
		Switch				297,930				
		Cable				282,434				
		Duct				181,826				
31.	Gandaria	Building		242,000				109,080	823,064	621,753
		Switch			283,280					
		Cable			430,704					
		Duct			379,753					
32.	Klender	Building							673,338	545,091
		Switch		268,620						
		Cable		404,718						
		Duct		545,091						
Building			327,800	2,051,556	769,738	297,840	-	-	-	3,446,934
Switching System			-	3,223,440	6,420,900	1,291,020	2,709,010	3,926,790	17,571,160	-
Subscriber Cable Network		Cable	482,474	5,492,477	2,956,847	3,414,637	1,319,987	301,293	13,967,715	8,772,710
		Duct	300,553	3,125,781	2,786,073	1,838,019	534,581	187,703		
Junction Cable Network		Cable		1,116,788	488,796	-	-	-	3,332,321	2,188,143
		Duct		1,320,997	867,146	-	-	-		
		PCM		1,194,411	532,326	-	-	-		
Total Cost	Yen portion		482,474	11,027,116	10,398,869	4,705,657	4,028,997	4,228,083	34,871,196	-
			(1,370,665)*	(31,327,034)*	(29,542,242)*	(13,368,344)*	(11,446,014)*	(12,011,600)*	(99,065,898)*	-
	Rupiah Portion		628,353	6,498,334	4,422,957	2,135,859	534,581	187,703	-	14,407,787
Grand Total in Rupiah			1,999,018	37,825,368	33,965,199	15,504,203	11,980,595	12,199,303	113,473,685	

*Note: Equivalent in Rupiah

Table VII-5 Implementation Schedule and Outside Plant Construction Cost Estimate for the Third Five-Year Plan

Unit: Thousand Yen
Thousand Rupiahs

No.	Exchange	1981	1982	1983	Total Cost	
					Yen Portion	Rupiah Portion
1.	Kota I		- - - - - - -		193,988	40,306
2.	Kota II	- - - - - -			41,417	43,486
3.	Cengkareng			- - - - - - -	319,343	94,950
4.	Pluit		- - - - - - -		499,617	291,080
5.	Ancol		- - - - - - -		111,351	47,221
6.	Gambir II		- - - - - - -	- - - - - - -	682,177	71,989
7.	Semanggi II		- - - - - - -	- - - - - - -	731,773	297,707
8.	Slipi		- - -	- - - - - - -	884,028	490,226
9.	Pal Merah		- - - - - - -		479,745	88,151
10.	Kedoya			- - - - - - -	328,171	396,577
11.	Meruya			- - - - - - -	485,953	630,705
12.	Kelapa Gading			- - - - - - -	362,419	253,019
13.	Cilincing			- - - - - - -	222,305	258,743
14.	Penggilingan			- - - - - - -	807,952	772,326
15.	Kalibata		- - - - - - -		1,133,702	1,097,870
16.	Jatinegara I	- - -	- - - -		441,057	257,067
17.	Jatinegara II		- - - - - - -		371,378	156,140
18.	Gandaria			- - - - - - -	430,704	379,753
19.	Klender		- - - - - - -		404,718	545,091
	Junction Cable		- - - - - - -	- - - - - - -	3,332,321	2,188,143
Total Cost	Yen Portion	482,474* (1,370,665)	7,803,676* (22,169,534)	3,977,969* (11,301,048)	12,264,119* (34,861,247)	-
	Rupiah Portion	300,553	4,446,778	3,653,219	-	8,400,550
Grand Total in Rupiah		1,671,218	26,616,312	14,954,267	43,241,797	

*Note: Equivalent in Rupiah

APPENDICES

APPENDICES

Appendix 1. Members of JICA Team and Service Period

1-1 Preliminary Study Team

The preliminary study team was sent to Indonesia for establishing the scope of work concerning the survey for improvement of telephone network in the City of Jakarta for a period from December 4, 1978 to December 22, 1978.

The members of the preliminary study team are named below.

Shigeru FUKUDA	Minister's Secretariat Ministry of Posts and Telecommunications
Yoshiro MISHIMA	Senior Staff Engineer International Affairs Bureau Nippon Telegraph & Telephone Public Corporation
Kiyoshi FUKUYAMA	ditto
Kazuyoshi TAKABATAKE	ditto
Tokuichi KATAGIRI	Coordinator Japan International Cooperation Agency (JICA)

1-2 Survey Team and Survey Period

The survey team organization and the survey period are described below. All team members were from The Nippon Telecommunications Consulting Co., Ltd.

From June 16, 1979 to December 27, 1979

Hideo SANO	Team Leader
Fujio AIHARA	Outside Plant Enginner
Tetsuya MIMA	ditto

From July 16, 1979 to December 27, 1979

Yutaka TAKIDOUCHI	Outside Plant Engineer

From August 22, 1979 to March 3, 1980

Hideyasu IMAIZUMI	Inside Plant Engineer

From September 21, 1979 to March 3, 1980

Tetsuo KATO	Inside Plant Engineer
Mitsuaki SONE	Outside Plant Engineer

From June 10, 1980 to October 7, 1980

Hideo SANO	Team Leader
Hideyasu IMAIZUMI	Inside Plant Engineer
Fujio AIHARA	Outside Plant Engineer
Takaaki IIDA	ditto
Yoshiaki KOBAYASHI	ditto
Seishiro FUJINAMI	ditto
Yutaka TAKIDOUCHI	ditto
Masamichi SAKAGUCHI	Inside Plant Engineer
Tetsuo KATO	ditto
Mitsuaki SONE	Outside Plant Engineer

Appendix 2. Work Itinerary

Month & Year	Main Activities
June, 1979	1) First Survey Team Arrival in Jakarta on June 16
	2) Preparation for the Survey Work
	3) Data Collection and Analysis
July, "	1) Macroscopic Demand Forecast
	2) Survey Work in Jakarta City
	3) Data Collection and Analysis
	4) Regular Meeting between PERUMTEL and JTP '79 at Bandung on July 16
August, "	1) Site Survey
	2) Demand Forecast in Each Exchange Area
	3) Study of Exchange Boundaries
	4) Collection of Plant Record
	5) Regular Meeting at Jakarta on August 2
September, "	1) Survey of Kota I and Jatinegara I Exchange Areas
	2) Cut-over Plan for Kota II from Kota I
	3) Conclusion of Demand Forecast
	4) Survey of MDF and Switching Room in Certain Exchanges
	5) Collection of Traffic Data
	6) Regular Meeting at Bandung on September 29
October, "	1) Study of Wire Center for Six Exchanges
	2) Traffic Study
	3) Study of Junction Cable Routing
	4) Planning of Subscriber Cable Network for Kota I and Jatinegara I Exchanges
	5) Regular Meeting at Bandung on October 29
November, "	1) Study of Design Standard
	2) Planning of Subscriber Cable Network for Kota I and Jatinegara I Exchanges

Month & Year	Main Activities
	3) Manhole Survey for two Exchange Areas
	4) Study of Optimum Transmission System
	5) Preparation for Computer Processing
	6) Regular Meetings at Bandung on November 3 and November 20
	7) Basic Design Meeting at Jakarta on November 3
December, "	1) Planning of Subscriber Cable Network for Kota I and Jatinegara I Exchanges
	2) Junction Circuit Grouping
	3) Regular Meeting at Bandung on December 1
	4) Meetings at Jakarta on December 6, 13 and 21
January, 1980	1) Junction Circuit Grouping
	2) Regular Meeting at Bandung on January 15
February, "	1) Junction Circuit Grouping
	2) Regular Meeting at Jakarta on February 9
March, "	1) Survey Team Departure from Jakarta
	2) Meeting at Jakarta
June, "	1) Work Restart on June 10
	2) Data Collection
	3) Survey of New Junction Routes
	4) Survey of Subscriber Cable Network in Kota II, Pluit and Gambir I Exchange Areas
	5) Interim Report Submitted to POSTEL and PERUMTEL
	6) Several Courtesy Visits
July, "	1) Survey of New Junction Cable Routes
	2) Survey of Subscriber Cable Network in Kota II, Pluit and Gambir I Exchange Areas
	3) Survey of Cable Vault, MDF and Switching Room
	4) Preparation of Drawings for Cost Estimate
	5) Regular Meeting at Jakarta on July 16

Month & Year	Main Activities
August, "	1) Basic Design Work for Kota II, Pluit and Gambir I Exchanges
	2) Drawings for Cost Estimate
	3) Study of Historical Trend
	4) Regular Meeting at Bandung on August 27
	5) Junction Cable Network Meeting at Jakarta on August 8
September, "	1) Completion of Basic Designs for Kota II, Pluit and Gambir I Exchanges
	2) Finalization of Drawings for Cost Estimate
	3) Draft Report Submitted to POSTEL and PERUMTEL
	4) Regular Meeting at Jakarta on September 10
October, "	1) Work Amount Estimate
	2) Survey Team Departure from Jakarta on October 7

Appendix 3. Supporting Document

The data and information used in the survey are listed below.

3-1 From PERUMTEL

(1) Fundamental Plan 1972 for the Telephone Network in Indonesia

(2) The Third Five-Year Plan for Telecommunication Service (Draft 2) 1979/1980 - 1983/1984

(3) Tariff System

1) Tariff System Indonesia 1978 (Penunjuk Telex)

2) Press Release (ISSN-0125-1857)

(4) Technical Standard

1) Outside Plant Installation Design Principle

2) Line Plant Record

3) Standard Symbol

4) Manual of Standard Practices

5) Design Policy

6) Transmission Loss Distribution Standard

7) System Description of TWK-9 and TWK-D

8) Circuit Diagram of EMD 2-wire Yc and O/9 Repeater

9) Circuit Description of EMD 2-wire O/G and I/C Repeater

(5) Engineering Instruction

1) Outside Plant Planning	E. 200L
2) Outside Plant Conduit	MH. 200L
3) Outside Plant Conduit	CL. 300L
4) Duct System Installation Methods	CL. 3001
5) Outside Plant Cable	SU. 3002
6) Outside Plant Cable	CL. 3003
7) Modified Duct System	CL. 3004

(6) Specification

1) Cable	S1-3-006
2) Cable: jelly filled	S1-4-007
3) Cable	S1-6-009
4) Self Supporting Cable	S2-1-001
5) Rigid P.V.C. Pipe Bend and Coupling	S.P.-1-012

(7) Statistical Data

1) Traffic Dalam Angka (1977 - 1978)
2) LAPORAN PROYEK PROYEK
3) List of Number of Telegrams (1974 - 1979)
4) List of Leased Lines Sept., 1978
5) Present Number of Telex Subscribers
6) Present Number of Trunk Circuits
7) Waiting List of Telex Subscribers
8) Present List of Leased Circuits
9) Number of Subscribers, Applicants and Installed Subscribers from January, 1979 to June, 1980

(8) Statistics on Telephone Traffic

1) List of Exchanges, Types, Capacities, Office Codes and Traffics of 1977
2) Telephone Traffics in Jakarta Area
3) Network Change Agreement 001
4) Junction Matrix of Jakarta Telephone Network
5) Trunking Diagram
6) Routing Diagram
7) Originating and Terminating Traffic Data for PRX Exchange

(9) Floor Layout Plan for Each Exchange

(10) Construction Cost

1) Harga Standard PERUMTEL untuk Pekerjaan Pembangunan Jaringan Telepon di Jakarta

(11) Plant Record

1) Subscriber Cable Network
2) Junction Cable Network

3-2 From Other Sources

(1) Statistics Pertinent to the Jakarta Area

1) Statistical Yearbook of Indonesia 1977
2) Statistical Pocketbook of Indonesia 1977/1978
3) Population & Manpower Statistics 1976 - 2001
4) Post and Telecommunication Statistics 1977

5) Survey Social Ekonomi National Tahap ke Lima (January - April, 1976)
6) Population Estimate of Indonesia at the End of 1971 - 1981 by Region
7) Main Tables of the National Income of Indonesia 1971 - 1977
8) Survey Angkatan kerja Nasional 1977
9) Statistical Year Book of Jakarta 1978
10) Regional Income of Jakarta 1969 - 1977
11) City Block Plan
12) Surveying Data in 1978: Population, Area, Number of Office Buildings, Shops, Houses and Households for Each Kelurahan

(2) The Third Five-Year Development Plan
Rencana Pembangunan Lima Tahun Ketiga (1979/1980-1983/1984)
(3) Jakarta Planning Atlas 1975
(4) Statistical Year Book 1977, United Nations
(5) World Telephone
(6) Telephony