Financial Position

PERUMTEL's balance sheet as of December 31, 1984 is as shown below.

Table 10-2 Balance Sheet

(as of December 31, 1984)
(10^9 Rp., %)

Assets:		
Fixed assets	634.3	(55.39)
Deferred profit	97.5	(8.51)
Current assets	411.2	(35.91)
Other assets	2.1	(0.18)
Total	1,145.1	(100)
Liabilities:		
Capital/retained earnings	394.0	(34.41)
Long-term borrowings	454.2	(47.61)
Short-term borrowings	118.2	(10.32)
Other liabilities	87.7	(7.66)
Total	1,145.1	(100)

From the above table, the current ratio of short-term borrowings over liquid assets is calculated as 3.14 and the ratio of total borrowings/total assets as 58%, which indicate quite a strong financial position for this type of public enterprise. The debt service ratio is 4.0 and supports the above view. However, the current ratio is too high and leaves some room for improvement in the management of accounts receivable and short term borrowings.

In view of the large scale project which shall be undertaken in the future, it will be necessary to increase the capital of PERUMTEL itself in order to maintain this favorable financial position. With respect to sources and applications of fund, acquisition of relevant data was difficult. Therefore, it is only mentioned here the need of increasing the internal funds for PERUMTEL.

10-2 Financial Analysis of This Project

10-2-1 Internal Rate of Return

Here, financial internal rate of return is reviewed on the basis of the revenue estimation described in the previous chapter and the cost estimation in Chapter 8. Table 10-3 shows the cash flows from which the internal rate of return is calculated to review the financial viability of this project itself. Table 10-3a, b, and c represent the breakdown of the project cash flow by objective cities, i.e., cash flow for Medan, for Semarang and Solo. The internal rate of return[1/] for each project area in shown below, which exceeds the currently prevailing market interest rate for long term lending in Indonesia. This project itself is therefore found very viable in Indonesia.[2/] With respect to the revenues accruing to this project, please refer to Chapter 9.

	IRR (%)
Overall	20.93
Medan	21.75
Semarang	20.90
Solo	18.42

As stated in the previous paragraph, if all of the expenditures related to this project are assumed to be

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1/ A discounting factor which equates the cost and benefit (revenue) estimated at 1985 prices.

2/ Last 10 years in average, consumer price index showed over 10%/year growth. Thus the real interest rate is considered as around 8 to 12% per year.

the investment for the facilities of a level that matches the demand in 1993, the rate of return for the three big cities combined is reduced by about four percentage points to 17%.

In analyzing the internal rate of return, another type of rate of return is in due importance. Since this project is to be implemented by PERUMTEL, the internal rate of return for the implementing body is just as important as the rate of return for the project itself.

This results is about 4% lower than the FIRR[1/] of project itself. The main reason behind this is attributed to the tax treatment in the analysis. The former case, the IRR for the project itself case, does not include tax as an item for cash outflow. Because under this case, it is assumed that the government is a member of financier group so that the tax from this project is a mere transfer of benefit. On the other hand, IRR for PERUMTEL includes the tax as an item of cash outflow. Although the government has financed PERUMTEL's equity, PERUMTEL as a public corporation is obliged to pay tax in actual practice. If the incoming traffic of 20% of expected out-going traffic volume is to be assumed, the figure of FIRR for PERUMTEL increases significantly to 24.1%.[2/] In respect to these results, this project stands very much attractive to PERUMTEL with enormous possibility of contributing to the future financial position of PERUMTEL, as well as improving the current position.

1/ FIRR -- Financial Internal Rate of Return

2/ See Table 10-4.

Since PERUMTEL has several other projects within the period of REPELITA-IV, it is impossible to review the impact of this project in relation to those other projects with regard to the financial position of PERUMTEL. It is felt beneficial for POSTEL PERUMTEL, however, to carry out fund statement analysis just limited to this project so as to grasp the financial impact of this project.

In Section 10-2-4, the results of the above analysis is summarized.

Assumptions imposed on the analysis of the sources and applications of funds are the same as the followings which provide the framework for the analysis in this section.

(1) Necessary Funds

The total investment amounts 173.2 x 10^9 Rps., of which the foreign currency portion (19 x 10^9 Rps.) will be financed by soft loan from the Indonesian Government (15 year repayment with 12% p.a. interest with grace period of five years). The domestic currency portion is to be financed with PERUMTEL's own fund and domestic long-term borrowings, and that the about 60% of the total investment or 104 x 10^9 Rps. will be raised by borrowings. The conditions imposed on domestic borrowings are a 10 year repayment term with 18% p.a. interest and a four year grace period. These borrowing conditions were presented by PERUMTEL during survey in Indonesia. Therefore, 11% of the necessary amount will be raised by soft loan, 60% by domestic long-term loan and the remainder by

PERUMTEL's own internal fund. The repayment method is to repay in equal amount during the remaining period after the grace period of principal repayment.

(2) Depreciation

PERUMTEL adopts the straight line method of depreciation by the category of fixed assets. However, PERUMTEL is not subject to any constraint under the Business Law of Indonesia with respect to the method of depreciation. Therefore, the following will be assumed in this project in view of the issue of the project life and the residual values of the project as discussed in Chapter 9.

	Depreciation Period (years)	Depreciation Method	Ratio of the Amount of Each Project Component to Total Investment (%)
Transmission Section			
Batteries	10	Straight line	14
Others	20	Straight line	
Civil Engineering Section	20	Straight line	22
Cable Section	20	Sum of the years' digits method*	62

Note: * This method (sum of the years' digits depreciation) makes the rate of depreciation bigger as year of depreciation getting closer to the present and smaller to the end of the depreciable life. The advantage of this method is that it makes the tax payable smaller during the initial period of the project life and brings more internal funds than straight line method.

By applying the sum of the years' digits method of depreciation to the cable section, the rate of depreciation gradually decreases from 9.5% of the original value of facilities in the starting year of depreciation to 0.5% in the final year and this brings about an increase in the internal fund.

This sum of the years' digits method is considered appropriate to cope with the needs for internal fund when considering the scale of this project, and also answers the problems arising out of the residual value of the investment in this project.

(3) Working Capital

Working capital is definitely required for the project in view of smooth financial operation right after the construction of the project. In computing the required amounts of working capital, therefore, it is necessary to consider;

1) the cost to be incurred due to the duration of the time between call completion and the actual payment,

2) the available fund at hand due to the time lag between material purchase and the actual payments for those,

3) the cost by keeping maintenance materials and equipment in stock,

4) the necessary cash on hand.

In other words, the necessary amount of working capital is calculated as: working capital = 1) + 3) + 4) - 2).

Considering current PERUMTEL's practice on this working capital with current average collection period of about 90 days, the analysis here sets the working capital requirement as 25% of the annual operating revenue. As a reference, in the case of Japan, it is approximately 10% of the sales. Except in the first year, working capital is appropriated only for its increment or decrement, and recovered in its entirety in the final year of the project life.

(4) Maintenance Cost

The construction cost of transmission facilities includes the cost of maintenance service by the transmission contractor for one year after project completion but on the other parts of the project, maintenance work will incur right after the completion. PERUMTEL's maintenance cost during the last few years has been 7 to 9% of the total market value of facilities. Having this in mind, however, in consideration of the facilities' specifications and design standards under this project and also the maintenance cost of other similar line facilities projects, the maintenance cost was set at 3% of the total initial investments.

(5) Operating Expenses

The operating expenses in this project shall be 25% of the call and communication service revenue of this project. The operating expenses for the regional exchange central office WITEL I which supervises the local exchanges in Medan and for the regional exchange central office WITEL VI which supervises the local exchanges in Semarang

and Solo amount around 28% of the traffic revenue, or around 20% of the total operating revenue. In consideration of Japan's ratio of 30% to the operating revenue, in conjunction with the above with due attention on the ratio of the personnel cost to the operating expenses, the above stated ratio of operating expenses (25%) was adopted.

(6) Other Premises

The construction cost was calculated at the prices as of August, 1985, and the exchange rates were assumed to be 1 US$ = 1,100 Rps. = §250.

The contingency reserve is to cover incremental quantity and shall be 10% of the investment cost.

The construction cost for 1998 in the cash flow table is the cost of replacing power units and vehicles.

PERUMTEL's financial practice of appropriating 55% of the net profit after tax to the national development fund, and of retaining 25% internally and the remaining 20% as differed profit for losses shall be applied to this project as they are. Also, the newly introduced practice the way of writing off the installation revenue (5% for 20 years) is persued in this analysis

Tax rate reflects the Dec. 1984 change where the rate has reduced from 45% to 35%.

We might mention here that on these foregoing premises for financial evaluation, the Treasury Department of PERUMTEL has given its consent, confirmation or provision of data to the Survey Mission.

10-2-2 Sensitivity Analysis

The stability of the financial internal rate of return of the project against cost or benefit fluctuation is seen in the followings:

FIRR for Project Itself Variation
(base case Cash Flow Table 10-3)

Unit: %

Description	-30%	-20%	-10%	-5%	0	+5%	+10%	+20%	+30%
Increase/decrease in revenue	11.3	14.7	17.9	19.4	21.0	22.4	23.9	26.7	29.6
Increase/decrease in costs	33.2	28.2	24.2	22.6	21.0	19.5	18.2	15.8	10.9

FIRR for PERUMTEL[1/] Variation
(base case Cash Flow Table 10-4)

Description	-30%	-20%	-10%	-5%	0	+5%	+10%	+20%	+30%
Increase/decrease in revenue	-	9.4	16.6	20.3	24.1	28.0	32.1	40.8	50.0
Increase/decrease in costs initial investment	-	60.3	34.3	28.3	24.1	20.8	18.2	14.12	11.0

The analyses in this chapter are based on the assumption that the price structure as of February this year will prevail throughout the project life. Therefore, the changes in revenue can be interpreted as changes in tariff structure or changes in degree of demand capturing.

1/ 20% of out-going traffic revenue is included to encompass in-coming call revenue.

Considering the foregoing results, it is safely said that the profitability of this project can withstand various severe changes in circumstances. In both cases, 5% cost reduction (including initial investments and operating costs) brings better results than the 5% revenue increase. In case of 20% revenue reduction for FIRR for PERUMTEL, FIRR gets down to 9.4%. Considering on going real interest, this rate is still brings profitable opertion to PERUMTEL.

10-2-3 Analyses Based on the Financial Statements*

Based on the review of the statement of profit and loss, it is seen that the net income turns into black as early as 6 years from the commencement of the services, while the operating income is generated 2nd year of the project. The difference is attributable to the interest payment during the grace period of long-term debts. Depending on the availability of PERUMTEL's internal funds, the method of capitalization of the interest during the grace period should be considered.

Repayment of loans reaches its peak in 1992, but because of adequate cash income, it is possible to repay loans without liquidating internal reserves (retained earnings). The debt service ratio (operating

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* The case analyzed in this paragraph includes the revenue from the in-coming calls, which is assumed to be 20% of the revenue from the originating SLDD calls. This rate is rather stringent when the ratios of 37% to 50% recoded in the objective cities are considered. Tables 10-5 through 10-7 respectively represent the statement of profit and loss, the balance sheet, and the sources and applications of funds for this case.

income + depreciation/principal repayment and interest payment) also ranges between 1.4 and 1.8 during 1990 to 1996 period as shown on Table 10-8, and repayment of all loans will be completed by the year 2000. The times interest earned ratio to operating income also changes from 0.7 in 1988 to 2.0 in 1992. Thus, this project provides a quite sound investment opportunity.

The return on total assets ranges from 8.6% in 1988 to 25% in 1994, and the return on equity capital during the same period changes from 27% to 80%. The total capital turnover ratio ranges between 0.23 times in 1988 to 0.14 times in the final year of the project. This low turn over ratio implies assumption of no utilization of generated income to the other project.

From the above, it may be stated that this project can adequately respond to the structure of borrowing as assumed as a premise in the preceding Section 10-2-1. For further detailed financial ratios, refer Table 10-8.

10-3 Economic Evaluation

The purpose of economic evaluation is to grasp how effective this project is for the Indonesian economy. In other words, irrespective of the composition of investors of input goods (expenses) for this project or the composition of beneficiaries of outputs (benefit), it estimates how the utilization of various resources through this project will contribute to the Indonesian economy.[1/] Therefore, the degree of its contribution is calculated in terms of the prices for the Indonesian economy, or in terms of the economic prices.

Since the price of the communication services is the controled price based on the supply constraints condition, the price cannot be claimed as the one established on the basis of the true supply and demand relationship. What constitutes the basis then, is the consumers' willingness to pay for the services, and the economic benefit in this project therefore will be estimated in terms of this willingness to pay. In regard to economic cost, in recognition of the market for each input goods is distored by various reasons (import substitution, policies, government intervention into the pricing system, etc.), the effects of these should be eliminated from the market prices for economic evaluation of this project.

1/ How to maximize the contribution of capital to the national income.

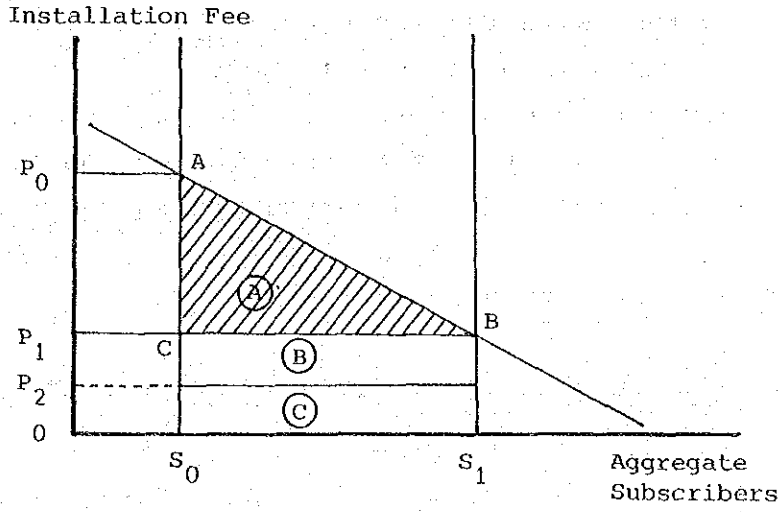
10-3-1 Economic Benefits

In general, goods and services traded in the world market is said to be under the free competitive market condition. A certain new project that supplies these goods and services can use these international prices as the numeral to estimate the economic benefits. Since the consumer's willingness to pay is deemed to be just the prices for these goods and services. In other words, the logic is behind that in comparison to the huge volume of these goods and services transacted in the world market, the volume of goods and services generated and supplied by the new project is quite small and only satisfies the marginal demand of the market concerned, and that the willingness to pay by the marginal demander is equal to the prevailing world market price.

Because of its intrinsic form of market, this project is unable to use the market price (controled price) as a numeral to estimate its economic benefit. Therefore, it is required to seized the benefit based on the consumers' willingness to pay. Here, we would like to briefly explain about the consumers' surplus which is a representation of the aggregate consumers' willingness to pay.

The figure below shows the hypothetical demand curve and consumers' surplus in telephone installation. On the assumption that a project to liquidate the backlog (S_1-S_0) is to be implemented, at the assumed price of P_1. The consumer who installed the telephone at the S_0th turn under the old project is assumed to have been ready to pay P_0 rather than the actual price P_0 and enjoy the surplus benefit equivalent to AC. This

surplus gradually decreases from the S_0th consumer to the S_1th consumer based on the property of a demand curve and becomes nil getting near to the S_1th turn.



The total of the surplus value which each of the consumer enjoys is called the consumer's surplus. Implementation of a new project generates a new value represented by the hatched triangular portion A in the Indonesian economy. If the project is not implemented, these surplus values will not be generated, so that this is an incremental value for the Indonesian economy which is made possible only by the new project. Thus in order to properly evaluate the degree of contribution of this project to the Indonesian economy, the concept of consumers' surplus is adopted in this project.

On the other hand, the compensation for the individual economic resources utilized as inputs for this project (square C ; the cost for the Indonesian economy in implementing this project), is seized as square B . The net economic benefit in this project is, thus represented by the triangle A plus square B minus square C .

The economic internal rate of return for this project is calculated in accordance with the foregoing idea of consumers' surplus. The consumers' surplus consists of the portion concerned with installation and the portion concerned with the incremental traffic, both of which were taken into account in this project. In order to measure this consumers' surplus correctly, the respective demand curves for installation and for traffic are in due. These demand curves are as shown below.[1/]

The demand curve for subscribers

$$\ln D_1 = 8.147 + 0.738 \ln GRP - 0.534 \ln P_1 + 0.769 D$$

$$R^2 = 0.983$$

The demand curve for call service

$$\ln D_2 = 0.172 + 0.791 \ln (GRP/capita) - 0.119 \ln P_2$$

$$R^2 = 0.782$$

where D_1: Demand for subscriber (No. of main lines)

D_2: Demand for call service per subscriber (No. of pulses/subscriber)

GRP: Gross regional product

GRP/capita: Gross regional product per capita

1/ Because of the number of available data, a technique of data pooling for each area was utilized in deriving the curves.

P_1: Composite coefficient of installation charge and monthly rental

P_2: Pulse charge

D: Dummy variables in consideration of regional character

10-3-2 Economic Costs

Since the financial analyses were carried by the numeral of the domestic currency, the economic cost of the foreign currency portion shall be converted into the proper domestic economic prices using the foreign currency conversion rate (SER: Shadow Exchange Rate). SER can be expendiently derived by the difference in the weighted average tariff rate of Indonesia's major export and import commodities this time, it is calculated as 2%, which almost distortion free between Indonesian currency and foreign currency. In this project, therefore, the economic prices of its input goods shall be the value of input goods to this project expressed in the domestic currency less various import duties and taxes.

Also, since the ratio of the cost of unskilled labor to the total investment of this project is quite small, modification by the opportunity cost of unskilled labor is not applied in this analysis.

The results of the foregoing are as per Tables 10-9a, 9b, and 9c. Table 10-10 shows Indonesia's tariff rates applicable to this project.

10-3-3 Economic Internal Rate of Return

In consideration of the foregoing reviews, the economic internal rate of return (EIRR) for this project is calculated as 38.5%.

Having this EIRR, with what sort of cut off rate should be compared? In general, it is believed that such cut off rate should be either the opportunity cost or the marginal cost of capital. However it is difficult to calculate such opportunity cost here, because for this purpose, an exhaustive list of the total amount of available capital and all projects that can be implemented in Indonesia is required. Even if these data are made available, we cannot escape from the uncertainties involved in preparation of these data. The International Bank for Reconstruction and Development assumes that the opportunity cost of capital in each developing country lies between 8 to 15%. Accordingly, the project is evaluated in the light of the upper limit of 15%.

The economic internal rate of return for the project greatly exceeds these interest rates and proves that the said project will greatly contribute to the Indonesian economy.

10-4 Evaluation Synthesized

It has been made clear that the said project presents strong financial/economic benefits earning capacity through the projection and analyses in the previous sections. The financial economic rate of return of 21%, and the economic rate of return of 38.5% strongly recommend the implementation of the said project.

The necessity of the telecommunication system in the perspective of the regional development is obvious, not only from the point of view of economic aspects but also from the social aspects. Further it is expected that the role of telecommunications in the development scheme will increase its importance. In these instances it is felt beneficial to touch briefly on the feature of development in the said project cities.

The important future roles of Semarang with 1 million population and Solo with 480 thousands population as growth poles for JAWA TENGAH, are envisaged to be enormous. Semarang with currently ranked second class international port has a potential to grow as a major international commercial/industrial city in the perspective of JAWA TENGAH development having vast area for its hinterland such as Demah Kendal, Tugu, Kabupaten Semarang and in further Solo.

Solo also plays an important role in the central Jawa development as an inland industrial growth pole and a distribution center for the southern part of JAWA TENGAH utilizing its locational advantage. These functional advantages of Sole have already realized by industrial development in its vast hinterland namely, Ungaran, Karang Anyar, Bojolali and Sukoharjo. Another

indication of locational advantage of Solo is realized by the cargo terminal established in 1984 and currently in test operation, which deals with about a half of total cargo flow volume of JAWA TENGAH.

In addition to the above two growth poles JAWA TENGAH development is envisaged to be accomplished by three other growth poles namely, Tegal, Yogjakarta and Cilacap. Especially Cilacap has potential to grow as an industrial port and as a gateway to Indian Ocean. In these cities, Semarang and Solo are expected to grow as major growth centers. To contribute most to this scheme would be the development of efficient telecommunication network.

Medan holding 1.5 million population, is the third largest city in the country in terms of the population size. With the merit of having first rank international port at Belawan Medan will play a role as a growth center for the northern Sumatera region including the provinces of D.I. Aceh, Sumatera Utara, Sumatera Barat and Riau.

Medan has a long list of waiting applicants and can expect further latent demand for the line. The telephone line supply capacity for Medan and its surrounding areas is not matched to this revealed and latent demand.

Although there exists a big development potential of various economic activities including estate agriculture, commerce, manufacturing, tourism, banking and finance, the progress is handicapped by the slow provision of telephone and other telecommunication media. In these instances, the supply of further line

capacity for Medan can greatly facilitate the economic development. In further the earlier the implementation of such project the larger the benefits.

Then the another question how important the role of telecommunication sector in the economic structure of the said cities in terms of its required expansion to support the level of economy assumed as well as its contribution to the increment of the economy's outputs. Facing with lack of regional Input/Output table, the analyses of the national I/O table[1/] provides some key indication to the above question.

The forward linkage factor, and the backward linkage are calculated as 1.5539, 1.1556 respectively. The backward linkage implies, in the case where the telecommunication sector increases its output by one unit, the total output of Indonesian economy increases outputs by 1.5539 units. Therefore the total investment of 173.2 billion Rp. is assumed to bring back 269.1 billion Rp. worth of economic output to Indonesia. The forward linkage shows the requirement nature of telecommunication sector to support the assumed level of economic activities. Thus when all the economic sectors increases their output by one unit, the calculated forward linkage suggests that the telecommunication sector has to increase its production by 1.1556 units.

In this forward linkage analysis, the industries in manufacturing and the service sector show relatively higher forward linkage figures to those in agricultural

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1/ Input-Output Table Indonesia, 1980, Vol. 1 Biro Pusat Statistik

sector. In considering the economic structural change to be taken place in those three cities, where the outputs by the second and the third industry grow at increasing rate. The necessity of expansion in telecommunication sector capacity becomes due course of action.

Judging from the points discussed in the above, the presented project in this feasibility study, is highly recommended to be implemented as the study suggests. In further, the analysis of financial performance suggests that this project enables PERUMTEL to generate internal fund for future telecommunication network development in the rest of country.

The economic analysis presents the possibility for PERUMTEL to formulate effective strategies for distribution of telecommunication benefits. By setting tariff structure higher in few years hence from the project implementation, it is possible to seize the huge consumers' surplus and then to give this surplus back by lowering tariff in the future years. By this, PERUMTEL can redistribute economic benefits of telecommunication in view of welfare economics. Lowering tariff would be done by just keeping the tariff level as it would be, then the inflation automatically takes care of lowering the tariff.

In consideration of the limited financial resources available for the telecommunication development in this country (3.2 billion Rp., is planned to finance telecommunication development program during the REPELITA-IV period), and the urgent need of telecommunication capacity expansion to facilitate short-term goal of sub-regional development, it is quite natural for

POSTEL/PERUMTEL to set project priority based on the size of the waiting list for telephone installation.

In the long run however, PERUMTEL is expected to perform its role as a public enterprise in the above regard.

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Table 10-3 Cash Flow for the Project Itself

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994
A. Cash Inflow									
TELEPHONE									
1. Installation Fees	0.0	2330.3	5519.9	0.0	0.0	3968.1	107.6	0.0	1392.1
2. Annual Rentals	0.0	343.6	1168.1	1168.1	1168.1	1746.8	1767.2	1767.2	2216.8
3. Local/SLDD Calls	0.0	9150.6	31611.1	31869.4	32129.2	48024.7	49063.0	49407.9	61478.6
4. International Calls	0.0	68.6	102.3	141.1	185.7	236.9	295.8	363.6	388.0
TELEX									
5. Installation Fees	0.0	19.8	46.3	23.2	26.0	29.1	32.6	36.5	9.7
6. Annual Rentals	0.0	12.0	19.5	26.3	33.9	42.5	52.0	62.8	77.9
7. Telex Pulse Sales	0.0	454.4	733.9	991.0	1279.0	1601.5	1962.8	2367.4	2474.6
Total Inflow	0.0	12379.4	39201.0	34219.0	34821.8	55649.6	53281.0	54005.3	68037.6
B. Cash Outflow									
1. Initial Investment	35851.0	54703.0	72307.0	9073.0	0.0	0.0	0.0	0.0	0.0
2. Working Capital	0.0	3094.9	6705.4	-1245.5	150.7	5206.9	-592.1	181.1	3508.1
3. Maintenance	0.0	1076.0	2717.0	4886.0	5158.0	5158.0	5158.0	5158.0	5158.0
4. Operation & Administration	0.0	2328.3	7968.5	8056.1	8146.9	12149.6	12441.6	12564.1	15591.3
Total Outflow	35851.0	61202.2	89697.9	20769.6	13455.6	22514.6	17007.4	17903.1	24257.4
C. Surplus/deficit or (A-B)	-35851.0	-48822.8	-50496.9	13449.4	21366.2	33135.0	36273.6	36102.2	43780.2

FINANCIAL IRR (%) 20.93

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
481.3	122.5	950.3	606.6	506.6	752.5	678.6	727.0	779.6	847.1	916.2
2289.3	2309.0	2440.5	2526.5	2591.9	2697.8	2795.7	2900.5	3013.0	3130.5	3257.4
63523.1	64147.6	67567.6	69878.8	71669.7	74407.2	77007.5	79776.0	82764.1	85740.0	88941.1
401.1	406.6	432.5	451.5	467.7	492.3	517.3	545.2	576.4	611.2	656.5
10.5	11.5	12.5	13.6	9.7	10.2	10.8	11.5	12.2	12.9	13.7
94.4	112.3	131.9	153.3	82.2	85.2	88.4	91.7	95.3	99.1	103.1
2591.4	2718.8	2857.6	3008.9	3099.2	3212.7	3333.0	3460.5	3595.7	3739.0	3890.9
69391.1	69828.4	74393.0	76639.3	76426.9	81657.8	84431.2	87512.4	90836.4	94179.9	97778.9
0.0	0.0	0.0	1272.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
338.4	109.3	1141.1	561.6	446.9	807.7	693.4	770.3	831.0	835.9	-23545.0
5158.0	5158.0	5158.0	5158.0	5158.0	5158.0	5158.0	5158.0	5158.0	5158.0	5158.0
16112.9	16280.5	17147.9	17739.3	18195.1	18889.6	19550.5	20254.0	21013.2	21770.0	22583.9
21609.3	21547.8	23447.1	24730.8	23800.0	24855.3	25401.8	26182.3	27002.2	27763.8	4196.9
47781.8	48280.6	50945.9	51908.4	54626.9	56802.5	59029.4	61330.1	63834.2	66416.1	93582.0

Table 10-3a Cash Flow for Medan

(MILLION RP)

Year	1986	1987	1988	1989	1990	1991	1992	1993
A. Cash Inflow								
TELEPHONE								
1. Installation Fee	0.0	1440.6	3378.6	0.0	0.0	2535.8	0.0	0.0
2. Annual Rentals	0.0	172.9	578.3	578.3	578.3	882.6	882.6	882.6
3. Local/SLDD Calls	0.0	3693.4	12310.1	12392.2	12474.8	18864.8	18971.3	19078.3
4. International Calls	0.0	44.0	65.6	90.4	118.9	151.8	189.5	233.0
TELEX								
5. Installation Fee	0.0	16.2	37.8	18.9	21.2	23.7	26.6	29.8
6. Annual Rentals	0.0	8.6	13.9	18.8	24.2	30.3	37.1	44.8
7. Telex Pulse sales	0.0	291.5	470.9	635.9	820.7	1027.6	1259.4	1519.0
Total Inflow	0.0	5667.2	16855.1	13734.5	14038.1	23516.6	21366.6	21787.5
B. Cash Outflow								
1. Initial Investment	14787.0	22502.0	29739.0	3664.0				
2. Working Capital	0.0	1416.8	2797.0	-780.2	75.9	2369.6	-537.5	105.2
3. Maintenance		444.0	1119.0	2011.0	2121.0	2121.0	2121.0	2121.0
4. Operation & Administration	0.0	923.4	3077.5	3098.1	3118.7	4716.2	4742.8	4769.6
Total Outflows	14787.0	25286.2	36732.5	7992.9	5315.6	9206.9	6326.3	6995.8
C. Surplus/Deficit or (A-B)	-14787.0	-19618.9	-19877.4	5741.6	8722.5	14309.8	15040.3	14791.7

1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
857.8	289.8	54.1	711.0	428.9	316.1	549.3	462.8	500.4	530.5	648.4	699.8
1138.5	1173.3	1179.8	1265.1	1316.5	1348.9	1414.9	1470.4	1530.4	1594.1	1671.3	1755.3
24530.2	25296.9	25472.5	27315.8	28453.0	29124.3	30508.3	31670.5	32926.4	34256.8	35871.4	37626.5
240.1	248.0	250.8	269.6	282.4	292.4	309.2	325.5	343.8	364.1	387.9	414.3
7.9	8.6	9.4	10.2	11.1	7.9	8.4	8.9	9.4	9.9	10.5	11.2
46.8	49.0	51.4	54.1	56.9	58.6	60.8	63.1	65.5	68.0	70.8	73.6
1587.8	1662.8	1744.5	1833.6	1930.7	1988.6	2061.4	2138.6	2220.5	2307.2	2399.1	2496.6
28409.1	28728.4	28762.4	31459.3	32479.5	33136.8	34912.3	36139.7	37596.4	39130.7	41054.4	43077.3
				573.0							
1655.4	79.8	8.5	674.2	255.1	164.3	443.9	306.9	364.2	384.6	480.9	-10280.6
2121.0	2121.0	2121.0	2121.0	2121.0	2121.0	2121.0	2121.0	2121.0	2121.0	2121.0	2121.0
6132.5	6324.2	6368.1	6828.9	7113.2	7281.1	7627.1	7917.6	8231.6	8564.2	8987.8	9408.6
9909.0	8525.0	8497.6	9624.2	10062.3	9566.4	10191.9	10345.5	10716.8	11068.8	11589.8	1264.0
18500.2	20203.3	20264.8	21835.1	22417.2	23570.4	24720.3	25794.2	26879.6	28061.9	29464.6	41813.3

FINANCIAL IRR (%)
21.74713

Table 10-3b Cash Flow for Semarang

Year	1986	1987	1988	1989	1990	1991	1992	1993
A. Cash Inflow								
TELEPHONE								
1. Installation Fees	0.0	669.2	1626.8	0.0	0.0	1071.0	77.0	0.0
2. Annual Rentals	0.0	140.5	487.8	487.8	487.8	712.7	728.9	728.9
3. Local/SLDD Calls	0.0	4344.8	15368.4	15508.9	15650.3	23177.7	23896.7	24085.9
4. International Calls	0.0	19.8	29.5	40.7	53.6	68.4	85.4	105.0
TELEX								
5.Installation Fee	0.0	3.1	7.3	3.7	4.1	4.6	5.2	5.8
6.Annual Rentals	0.0	2.9	4.7	6.4	8.2	10.3	12.6	15.2
7.Telex Pulsesales	0.0	161.0	260.1	351.2	453.2	567.5	695.5	838.9
Total Inflow	0.0	5341.4	17784.6	16398.6	16657.2	25612.2	25501.3	25779.7
B. Cash Outflow								
1. Initial Investment	16435.0	24945.0	33597.0	4386.0				
2. Working Capital	0.0	1288.6	3082.1	-371.6	35.3	2205.8	-64.7	28.1
3. Maintenance		493.0	1241.0	2249.0	2381.0	2381.0	2381.0	2381.0
4. Operation & Administration	0.0	1126.4	3907.1	3965.0	4025.9	5936.3	6148.1	6231.2
Total Outflow	16435.0	27853.1	41827.2	10228.4	6442.2	10523.1	8464.4	8640.3
C. Surplus/Deficit or (A-B)	-16435.0	-22511.7	-24042.6	6170.2	10215.0	15089.1	17036.9	17139.4

1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
344.4	156.8	53.0	183.3	139.1	154.8	165.6	176.3	187.1	202.1	169.9	180.6
891.8	924.7	935.8	974.3	1003.5	1032.3	1067.1	1104.1	1143.4	1185.8	1221.5	1258.4
29487.8	30578.0	30944.4	32218.4	33184.3	34137.1	35288.2	36514.0	37814.4	39219.3	40399.3	41654.0
118.9	123.4	125.6	131.4	136.4	141.6	148.0	155.2	163.3	172.3	181.4	191.7
1.5	1.7	1.8	2.0	2.2	1.5	1.6	1.7	1.8	1.9	2.0	2.2
15.9	16.7	17.5	18.4	19.3	19.9	20.7	21.4	22.2	23.1	24.0	25.0
876.9	918.3	963.5	1012.7	1066.3	1098.3	1138.5	1181.1	1226.3	1274.2	1325.0	1378.8
31737.3	32719.5	33041.6	34540.4	35551.1	36585.4	37829.6	39153.9	40558.5	42078.7	43323.2	44691.7
				471.0							
1477.3	233.9	68.4	360.7	237.7	249.3	299.2	318.4	337.6	365.6	295.9	-10447.7
2381.0	2381.0	2381.0	2381.0	2381.0	2381.0	2381.0	2381.0	2381.0	2381.0	2381.0	2381.0
7591.2	7874.1	7977.0	8307.8	8562.6	8808.8	9106.7	9423.8	9760.2	10123.4	10431.1	10758.2
11449.5	10488.9	10426.4	11049.5	11652.4	11439.1	11786.9	12123.2	12478.8	12870.0	13107.9	2691.5
20287.8	22230.6	22615.2	23490.9	23898.8	25146.3	26042.8	27030.7	28079.7	29208.8	30215.2	42000.1

FINANCIAL IRR (%) 20.899525

Table 10-3c Cash Flow for Solo

Year	1986	1987	1988	1989	1990	1991	1992	1993
A. Cash Inflow								
TELEPHONE								
1. Installation Fee	0.0	220.5	514.5	0.0	0.0	361.4	80.6	0.0
2. Annual Rentals	0.0	30.2	102.0	102.0	102.0	151.5	155.7	155.7
3. Local/SLDD Calls	0.0	1112.4	3932.7	3968.3	4004.2	5982.2	6195.0	6243.7
4. International Calls	0.0	4.9	7.2	10.0	13.1	16.7	20.9	25.7
TELEX								
5.Installation Fee	0.0	0.5	1.2	0.6	0.6	0.7	0.8	0.9
6.Annual Rentals	0.0	0.5	0.8	1.1	1.5	1.9	2.3	2.7
7.Telex Pulsesales	0.0	1.8	2.9	3.9	5.1	6.4	7.8	9.4
Total Inflow	0.0	1370.8	4561.3	4085.9	4126.5	6520.8	6419.2	6438.2
B. Cash Outflow								
1. Initial Investment	4629.0	7256.0	8971.0	1023.0				
2. Working Capital	0.0	342.7	797.6	-118.8	10.2	598.6	-26.9	6.2
3. Maintenance	0.0	139.0	357.0	626.0	656.0	656.0	656.0	656.0
4. Operation & Administration	0.0	278.5	983.9	993.1	1002.3	1497.1	1550.7	1563.3
Total Outflow	4629.0	8016.3	11109.5	2523.2	1668.5	2751.7	2179.8	2225.5
C. Surplus/Deficit or (A-B)	-4629.0	-6645.4	-6548.2	1562.7	2458.0	3769.1	4233.4	4212.7

1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
189.9	34.8	15.5	56.0	38.6	35.7	37.6	39.5	39.5	47.0	33.9	35.7
186.5	191.3	193.4	201.1	206.4	210.7	215.8	221.3	226.7	233.1	237.8	242.7
7460.6	7648.2	7730.8	8033.4	8241.5	8408.3	8610.6	8823.0	9035.2	9288.0	9469.3	9660.7
28.9	29.7	30.2	31.6	32.7	33.8	35.1	36.5	38.1	40.1	41.9	50.5
0.2	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3
15.1	28.7	43.4	59.5	77.0	3.6	3.7	3.9	4.0	4.2	4.3	4.5
9.8	10.3	10.8	11.4	12.0	12.3	12.8	13.2	13.8	14.3	14.9	15.5
7891.2	7943.3	8024.4	8393.3	8608.6	8704.6	8915.9	9137.7	9357.6	9627.0	9802.4	10009.9
										0.0	
				228.0							
363.3	13.0	20.3	92.2	53.8	24.0	52.8	55.4	55.0	67.3	43.9	-2450.6
656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0	656.0
1867.6	1914.6	1935.4	2011.2	2063.4	2105.2	2155.9	2209.1	2262.2	2325.6	2371.0	2419.0
2886.9	2583.6	2611.7	2759.4	3001.2	2785.2	2864.7	2920.5	2973.2	3048.9	3070.9	624.4
5004.3	5359.6	5412.7	5633.9	5607.4	5919.5	6051.2	6217.2	6384.4	6578.0	6731.5	9385.5

FINANCIAL IRR (%) 18.424431

Table 10-4 (1/2) FIRR for PERUMTEL

Year / Cash Inflow	1986	1987	1988	1989	1990	1991	1992	1993	1994
A.TELEPHONE									
1. Installation Fees	0.0	2330.3	5519.9	0.0	0.0	3968.1	107.6	0.0	1392.1
2. Annual Rentals	0.0	343.6	1168.1	1168.1	1168.1	1746.8	1767.2	1767.2	2216.8
3. Local/SLDD Calls	0.0	9150.6	31611.1	31869.4	32129.2	48024.7	49063.0	49407.9	61478.6
4. International Calls	0.0	68.6	102.3	141.1	185.7	236.9	295.8	363.6	388.0
B.TELEX									
5. Installation Fees	0.0	19.8	46.3	23.2	26.0	29.1	32.6	36.5	9.0
6. Annual Rentals	0.0	12.0	19.5	26.3	33.9	42.5	52.0	62.8	73.3
7. Telex Pulse Sales	0.0	454.4	733.9	991.0	1279.0	1601.5	1962.8	2367.4	2474.6
B'.INCOMMING CALLS	0.0	1830.1	6322.2	6373.9	6425.8	9604.9	9812.6	9881.6	12295.7
C.Sub-Total	0.0	14209.5	45523.2	40592.9	41247.7	65254.5	63093.6	63886.9	80328.1
D.Loan Funds									
1.Soft Loan	19000.0								
2.Domestic Loan 1		52000.0							
3.Domestic Loan 2			52000.0						
E.Total Inflow (C+D)	19000.0	66209.5	97523.2	40592.9	41247.7	65254.5	63093.6	63886.9	80328.1
CASH OUTFLOW									
F.Capital Expenditure	35851.0	54703.0	72307.0	9073.0	0.0	0.0	0.0	0.0	0.0
G.Operating Expenses									
1. Working Capital	0.0	3552.4	7828.4	-1232.6	163.7	6001.7	-540.2	198.3	4110.3
2. Maintenance	0.0	1076.0	2717.0	4886.0	5158.0	5158.0	5158.0	5158.0	5158.0
3. Operation & Administrati	0.0	2328.3	7968.5	8056.1	8146.9	12149.6	12441.6	12564.1	15501.2
4. Taxes	0.0	0.0	0.0	0.0	0.0	3802.6	4905.6	6201.2	11609.2
H.Sub-Total	0.0	6956.7	18514.0	11709.5	13468.6	27112.0	21065.0	24121.6	36468.8
Debt Service									
Interest/Repayment for S.Laon	1140.0	2280.0	2280.0	2280.0	2280.0	3362.7	3362.7	3362.7	3362.7
Interest/Repayment for D.Laon 1		9360.0	9360.0	9360.0	9360.0	14867.3	14867.3	14867.3	14867.3
Interest/Repayment for D.Laon 2			9360.0	9360.0	9360.0	9360.0	14867.3	14867.3	14867.3
I.Sub-total	1140.0	11640.0	21000.0	21000.0	21000.0	27590.0	33097.3	33097.3	33097.3
J.Total Outflow (F + H + I)	36991.0	73299.7	111821.0	41782.5	34468.6	54702.0	55062.3	57218.9	69566.1
K.NET FLOW(Surplus/Deficit) or (E-K)	-17991.0	-7090.2	-14297.7	-1189.7	6779.1	10552.5	8031.4	6668.0	10762.0

FINANCIAL IRR (%) 24.07

Table 10-4 (2/2) FIRR for PERUMTEL

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
481.3	122.5	950.3	606.6	506.6	752.5	678.6	727.0	779.6	847.1	916.2
2289.3	2309.0	2440.5	2526.5	2591.9	2697.8	2795.7	2900.5	3013.0	3130.5	3257.4
63523.1	64147.6	67567.6	69878.8	71669.7	74407.2	77007.5	79776.0	82764.1	85740.0	88941.1
401.1	406.6	432.5	451.5	467.7	492.3	517.3	545.2	576.4	611.2	656.5
10.5	11.5	12.5	13.6	9.7	10.2	10.8	11.5	12.2	12.9	13.7
94.4	112.3	131.9	153.3	82.2	85.2	88.4	91.7	95.3	99.1	103.1
2591.4	2718.8	2857.6	3008.9	3099.2	3212.7	3333.0	3460.5	3595.7	3739.0	3890.9
12704.6	12829.5	13513.5	13975.8	14333.9	14881.4	15401.5	15955.2	16552.8	17148.0	17788.2
82095.7	82657.9	87906.5	90615.0	92760.9	96539.2	99832.7	103467.6	107389.2	111327.9	115567.1
82095.7	82657.9	87906.5	90615.0	92760.9	96539.2	99832.7	103467.6	107389.2	111327.9	115567.1
0.0	0.0	0.0	1272.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
441.9	140.5	1312.1	677.1	536.5	944.6	823.4	908.7	980.4	984.7	-27832.0
5158.0	5158.0	5158.0	5158.0	5158.0	5158.0	5158.0	5158.0	5158.0	5158.0	5158.0
16112.9	16280.5	17147.9	17739.3	18195.1	18889.6	19550.5	20254.0	21013.2	21770.0	22583.9
13705.8	15502.4	18525.8	20497.7	21451.8	22787.4	24089.3	25327.6	26646.3	27967.8	29375.1
35418.6	37081.5	42143.9	44072.1	45341.3	47779.6	49621.1	51648.4	53797.9	55880.4	29284.9
3362.7	3362.7	3362.7	3362.7	3362.7	3362.7					
14867.3	14867.3									
14867.3	14867.3	14867.3								
33097.3	33097.3	18230.0	3362.7	3362.7	3362.7	0.0	0.0	0.0	0.0	0.0
68515.9	70178.8	60373.9	48706.8	48704.0	51142.3	49621.1	51648.4	53797.9	55880.4	29284.9
13579.8	12479.2	27532.6	41908.2	44056.8	45396.9	50211.6	51819.2	53591.4	55447.5	86282.2

Table 10-5 (1/2) Income Statement

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994
A. Operating Revenues									
Installation fees	0.0	117.5	395.8	397.0	398.3	598.1	605.1	607.0	677.0
Annual rentals	0.0	343.6	1168.1	1168.1	1168.1	1746.8	1767.2	1767.2	2216.8
Local/SLDD calls	0.0	10980.7	37933.4	38243.3	38555.1	57629.6	58875.6	59289.5	73774.3
International calls	0.0	68.6	102.3	141.1	185.7	236.9	295.8	363.6	388.0
Telex Revenue	0.0	466.4	753.3	1017.3	1312.9	1644.0	2014.8	2430.1	2547.9
Total	0.0	11976.9	40352.9	40966.7	41620.0	61855.5	63558.6	64457.4	79604.0
B. Operating Expenses									
Operation & Administration	0.0	2328.3	7968.5	8056.1	8146.9	12149.6	12441.6	12564.1	15591.3
Maintenance	0.0	1076.0	2717.0	4886.0	5158.0	5158.0	5158.0	5158.0	5158.0
Depreciation	0.0	0.0	14539.9	13921.0	13302.1	12683.2	12064.3	11445.4	10826.5
Total	0.0	3404.3	25225.4	26863.1	26606.9	29990.8	29663.8	29167.4	31575.8
C. Operating Income (A-B)	0.0	8572.5	15127.5	14103.6	15013.0	31864.7	33894.7	35290.0	48028.2
Less: Interests									
S.Loan	1140.0	2280.0	2280.0	2280.0	2280.0	2280.0	2150.1	2004.6	1841.6
D.Loan 1	0.0	9360.0	9360.0	9360.0	9360.0	9360.0	8368.7	7198.9	5818.6
D.Loan 2			9360.0	9360.0	9360.0	9360.0	9360.0	8368.7	7198.9
D. Income Before Tax	-1140.0	-3067.5	-5872.5	-6896.4	-5987.0	10864.7	14016.0	17717.8	33169.1
E. Corporate Tax	0.0	0.0	0.0	0.0	0.0	3802.6	4905.6	6201.2	11609.2
F.Net Income	-1140.0	-3067.5	-5872.5	-6896.4	-5987.0	7062.0	9110.4	11516.6	21559.9
Development fund(55% of F)	0.0	0.0	0.0	0.0	0.0	3884.1	5010.7	6334.1	11857.9
Deferred Profit (25%)	0.0	0.0	0.0	0.0	0.0	1765.5	2277.6	2879.1	5390.0
Retaind Earnings (20%)	-1140.0	-3067.5	-5872.5	-6896.4	-5987.0	1412.4	1822.1	2303.3	4312.0

Table 10-5 (2/2) Income Statement

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
701.6	708.3	756.5	787.5	813.3	851.4	885.9	922.8	962.4	1005.4	1051.9
2289.3	2309.0	2440.5	2526.5	2591.9	2697.8	2795.7	2900.5	3013.0	3130.5	3257.4
76227.7	76977.1	81081.2	83854.6	86003.7	89288.6	92409.0	95731.2	99316.9	102888.0	106729.4
401.1	406.6	432.5	451.5	467.7	492.3	517.3	545.2	576.4	611.2	656.5
2685.8	2831.1	2989.5	3162.2	3181.3	3297.8	3421.3	3552.2	3691.0	3838.1	3994.0
82305.5	83232.2	87700.2	90782.2	93057.9	96627.9	100029.2	103651.9	107559.8	111473.3	115689.1
16112.9	16280.5	17147.9	17739.3	18195.1	18889.6	19550.5	20254.0	21013.2	21770.0	22583.9
5158.0	5158.0	5158.0	5158.0	5158.0	5158.0	5158.0	5158.0	5158.0	5158.0	5158.0
10207.6	9588.7	8969.8	8350.8	7732.0	7113.1	6494.2	5875.3	5256.4	4637.5	4018.6
31478.5	31027.1	31275.7	31248.1	31085.0	31160.7	31202.6	31287.3	31427.5	31565.4	31760.4
50827.0	52205.1	56424.5	59534.1	61972.9	65467.3	68826.6	72364.7	76132.3	79907.9	83928.7
1659.1	1454.6	1225.6	969.2	682.0	360.3	0.0				
4189.9	2267.9	0.0								
5818.6	4189.9	2267.9	0.0							
39159.5	44292.7	52930.9	58564.9	61290.9	65107.0	68826.6	72364.7	76132.3	79907.9	83928.7
13705.8	15502.4	18525.8	20497.7	21451.8	22787.4	24089.3	25327.6	26646.3	27967.8	29375.1
25453.6	28790.3	34405.1	38067.2	39839.1	42319.5	44737.3	47037.0	49486.0	51940.1	54553.7
13999.5	15834.6	18922.8	20936.9	21911.5	23275.7	24605.5	25870.4	27217.3	28567.1	30004.5
6363.4	7197.6	8601.3	9516.8	9959.8	10579.9	11184.3	11759.3	12371.5	12985.0	13638.4
5090.7	5758.1	6881.0	7613.4	7967.8	8463.9	8947.5	9407.4	9897.2	10388.0	10910.7

Table 10-6 (1/2) Balance Sheet

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994
A. Assets									
Plant in Operation			162861.0	171934.0	171934.0	171934.0	171934.0	171934.0	171934.0
Less: Accumulated Depreciation			14539.9	28460.8	41762.9	54446.0	66510.3	77955.6	88782.1
Net Plant in Operation			148321.2	143473.2	130171.2	117488.0	105423.8	93978.4	83152.0
Work in Progress	35851.0	90554.0							
Total Fixed Assets	35851.0	90554.0	148321.2	143473.2	130171.2	117488.0	105423.8	93978.4	83152.0
Account Receivables	0.0	3552.4	11380.8	10148.2	10311.9	16313.6	15773.4	15971.7	20082.0
Cash in hand	9.0	9918.8	16621.1	19431.4	26210.5	40565.6	53502.6	66371.8	88743.0
Total Current Assets	9.0	13471.2	28001.9	29579.6	36522.4	56879.3	69276.0	82343.6	108825.0
Total Assets	35860.0	104025.2	176323.0	173052.8	166693.6	174367.3	174699.8	176322.0	191977.0
B. Liabilities									
Equity: Equity Capital	18000.0	35000.0	56000.0	60000.0	60000.0	60000.0	60000.0	60000.0	60000.0
Retained Earnings	-1140.0	-4207.5	-10079.9	-16976.3	-22963.3	-21550.9	-19728.8	-17425.5	-13113.5
Undisbursed Surplus									
Deffered Installation Revenue	0.0	2232.6	7403.0	7029.2	6656.9	10055.9	9591.0	9020.5	9744.6
Development Fund A/C	0.0	0.0	0.0	0.0	0.0	3884.1	8894.8	15228.9	27086.9
Deffered Earnings	0.0	0.0	0.0	0.0	0.0	1765.5	4043.1	6922.2	12312.2
Provision for CO.Tax	0.0	0.0	0.0	0.0	0.0	3802.6	8708.2	14909.5	26518.6
Sub-Total	16860.0	33025.2	53323.0	50052.8	43693.6	57957.3	71508.3	88655.6	122548.8
Long-term Debts: Foreign	19000.0	19000.0	19000.0	19000.0	19000.0	17917.3	16704.7	15346.5	13825.4
Local 1	0.0	52000.0	52000.0	52000.0	52000.0	46492.7	39994.1	32325.7	23277.1
Local 2	0.0	0.0	52000.0	52000.0	52000.0	52000.0	46492.7	39994.1	32325.7
Total Borrowings	19000.0	71000.0	123000.0	123000.0	123000.0	116410.0	103191.5	87666.3	69428.2
Total Liabilities	35860.0	104025.2	176323.0	173052.8	166693.6	174367.3	174699.8	176322.0	191977.0

Table 10-6 (2/2) Balance Sheet

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
171934.0	171934.0	171934.0	173206.0	173206.0	173206.0	173206.0	173206.0	173206.0	173206.0	173206.0
98989.6	108578.3	117548.0	125898.9	133630.8	140743.9	147238.0	153113.3	158369.6	163007.1	167025.6
72944.4	63355.8	54386.0	47307.2	39575.2	32462.2	25968.0	20092.8	14836.4	10199.0	6180.4
72944.4	63355.8	54386.0	47307.2	39575.2	32462.2	25968.0	20092.8	14836.4	10199.0	6180.4
20523.9	20664.5	21976.6	22653.8	23190.2	24134.8	24958.2	25866.9	26847.3	27832.0	28891.8
116028.6	144010.2	190068.7	252474.1	317982.7	386167.0	460467.9	537614.8	617852.4	701267.7	788033.2
136552.6	164674.7	212045.3	275127.8	341172.9	410301.8	485426.1	563481.7	644699.8	729099.7	816925.0
209497.0	228030.5	266431.3	322435.0	380748.1	442764.0	511394.1	583574.4	659536.2	739298.7	823105.4
60000.0	60000.0	60000.0	60000.0	60000.0	60000.0	60000.0	60000.0	60000.0	60000.0	60000.0
-8022.8	-2264.7	4616.3	12229.7	20197.5	28661.4	37608.9	47016.3	56913.5	67301.5	78212.3
9534.8	8960.5	9166.9	8999.7	8702.7	8614.0	8417.5	8233.2	8062.6	7917.2	7795.2
41086.4	56921.0	75843.8	96780.8	118692.3	141968.0	166573.5	192443.9	219661.2	248228.2	278232.8
18675.6	25873.2	34474.5	43991.3	53951.0	64530.9	75715.2	87474.5	99846.0	112831.0	126469.4
40224.4	55726.9	74252.7	94750.4	116202.2	138989.7	163079.0	188406.6	215052.9	243020.7	272395.7
161498.5	205216.9	258354.2	316751.9	377745.7	442764.0	511394.1	583574.4	659536.2	739298.7	823105.4
12121.8	10213.7	8076.6	5683.1	3002.4	0.0	0.0	0.0	0.0	0.0	0.0
12599.6	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23277.1	12599.6	0.3	0.0		0.0	0.0	0.0	0.0	0.0	0.0
47998.4	22813.6	8077.2	5683.1	3002.4	0.0	0.0	0.0	0.0	0.0	0.0
209497.0	228030.5	266431.3	322435.0	380748.1	442764.0	511394.1	583574.4	659536.2	739298.7	823105.4

Table 10-7 (1/2) Funds Statement

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994
A. Sources									
Operating Income	0.0	8572.5	15127.5	14103.6	15013.0	31864.7	33894.7	35290.0	48028.2
Depreciation	0.0	0.0	14539.9	13921.0	13302.1	12683.2	12064.3	11445.4	10826.5
Installation Revenue Inflow	0.0	2232.6	5287.8	22.0	24.7	3797.3	133.2	34.6	1331.1
Installation Revenue Write-off			117.5	395.8	397.0	398.3	598.1	605.1	607.0
Installation Revenue Net Inflow			5170.3	-373.8	-372.3	3399.1	-465.0	-570.5	724.1
Internal Cash Generation	0.0	10805.2	34837.7	27650.8	27942.8	47946.9	45494.0	46164.8	59578.8
Long-term Borrowings: Foreign	19000.0	0.0	0.0	0.0					
Local 1	0.0	52000.0	0.0	0.0	0.0	0.0			
Local 2	0.0	0.0	52000.0	0.0	0.0	0.0			
Total Borrowings	19000.0	52000.0	52000.0	0.0	0.0	0.0			
Sub total	19000.0	62805.2	86837.7	27650.8	27942.8	47946.9	45494.0	46164.8	59578.8
Equity finance	18000.0	17000.0	21000.0	4000.0					
Total Sources	37000.0	79805.2	107837.7	31650.8	27942.8	47946.9	45494.0	46164.8	59578.8
B. Requirements									
Initial Investment	35851.0	54703.0	72307.0	9073.0	0.0	0.0	0.0	0.0	0.0
Foreign Loan: Interest	1140.0	2280.0	2280.0	2280.0	2280.0	2280.0	2150.1	2004.6	1841.6
Amortization	0.0	0.0	0.0	0.0	0.0	1082.7	1212.6	1358.1	1521.1
Local Loan 1: Interest	0.0	9360.0	9360.0	9360.0	9360.0	9360.0	8368.7	7198.9	5818.6
Amortization	0.0	0.0	0.0	0.0	0.0	5507.3	6498.6	7668.4	9048.7
Local Loan 2: Interest	0.0	0.0	9360.0	9360.0	9360.0	9360.0	9360.0	8368.7	7198.9
Amortization	0.0	0.0	0.0	0.0	0.0	0.0	5507.3	6498.6	7668.4
Total Debt-Service	1140.0	11640.0	21000.0	21000.0	21000.0	27590.0	33097.3	33097.3	33097.3
Total Requirements	36991.0	66343.0	93307.0	30073.0	21000.0	27590.0	33097.3	33097.3	33097.3
C. Change in Working Capital (A-B)	9.0	13462.2	14530.7	1577.8	6942.8	20356.9	12396.7	13067.5	26481.5

Table 10-7 (2/2) Funds Statement

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
50827.0	52205.1	56424.5	59534.1	61972.9	65467.3	68826.6	72364.7	76132.3	79907.9	83928.7
10207.6	9588.7	8969.8	8350.8	7732.0	7113.1	6494.2	5875.3	5256.4	4637.5	4018.6
467.3	127.3	914.6	589.3	490.4	724.6	655.0	701.5	752.2	817.0	883.4
677.0	701.6	708.3	756.5	787.5	813.3	851.4	885.9	922.8	962.4	1005.4
-209.7	-574.3	206.3	-167.2	-297.0	-88.7	-196.5	-184.3	-170.6	-145.4	-122.0
60824.8	61219.5	65600.6	67717.8	69407.8	72491.6	75124.3	78055.6	81218.1	84399.9	87825.3
60824.8	61219.5	65600.6	67717.8	69407.8	72491.6	75124.3	78055.6	81218.1	84399.9	87825.3
60824.8	61219.5	65600.6	67717.8	69407.8	72491.6	75124.3	78055.6	81218.1	84399.9	87825.3
0.0	0.0	0.0	1272.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1659.1	1454.6	1225.6	969.2	682.0	360.3	0.0	0.0			
1703.6	1908.1	2137.1	2393.5	2680.7	3002.4	0.0	0.0			
4189.9	2267.9	0.0	0.0	0.0	0.0	0.0	0.0			
10677.4	12599.4	0.0	0.0	0.0	0.0	0.0	0.0			
5818.6	4189.9	2267.9	0.0	0.0	0.0	0.0	0.0			
9048.7	10677.4	12599.4	0.0	0.0	0.0	0.0	0.0			
33097.3	33097.3	18230.0	3362.7	3362.7	3362.7	0.0	0.0			
33097.3	33097.3	18230.0	4634.7	3362.7	3362.7	0.0	0.0	0.0	0.0	0.0
27727.5	28122.2	47370.6	63083.1	66045.1	69128.9	75124.3	78055.6	81218.1	84399.9	87825.3

Table 10-8 Analysis from Projected Financial Statements

	1986	1987	1988	1989	1990	1991	1992	1993	1994
LEVERAGE RATIO									
DEBTS TO EQUITY	105.56	202.86	219.64	205.00	205.00	194.02	171.99	146.11	115.71
DEBTS TO TOTAL ASSETS	52.98	68.25	69.76	71.08	73.79	66.76	59.07	49.72	36.16
DEBT SERVICE COVERAGE	0.00	0.74	1.41	1.33	1.35	1.61	1.39	1.41	1.78
TIMES INTEREST EARNED	0.00	0.74	0.72	0.67	0.71	1.52	1.71	2.01	3.23
ACTIVITY RATIO									
FIXED ASSETS TURNOVER	0.00	0.13	0.27	0.29	0.32	0.53	0.60	0.69	0.96
TOTAL ASSETS TURNOVER	0.00	0.12	0.23	0.24	0.25	0.35	0.36	0.37	0.41
PROFITABILITY RATIO									
RETURN ON INVESTMENT	0.00	8.24	8.58	8.15	9.01	18.27	19.40	20.01	25.02
RETURN ON NETWORTH	0.00	24.49	27.01	23.51	25.02	53.11	56.49	58.82	80.05
RETURN ON FIXED ASSETS	0.00	9.47	10.20	9.83	11.53	27.12	32.15	37.55	57.76
PROFITABILITY RATIO (AGAINST NET INCOME)									
PROFIT MARGIN ON SALES		-25.61	-14.55	-16.83	-14.38	11.42	14.33	17.87	27.08
RETURN ON INVESTMENT		-2.95	-3.33	-3.99	-3.59	4.05	5.21	6.53	11.23
RETURN ON NETWORTH		-8.76	-10.49	-11.49	-9.98	11.77	15.18	19.19	35.93
RETURN ON FIXED ASSETS		-3.39	-3.96	-4.81	-4.60	6.01	8.64	12.25	25.93

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
80.00	38.02	13.46	9.47	5.00	0.00	0.00	0.00	0.00	0.00	0.00
22.91	10.00	3.03	1.76	0.79	0.00	0.00	0.00	0.00	0.00	0.00
1.84	1.87	3.59	20.19	20.73	21.58					
4.36	6.60	16.15	61.43	90.87	181.71					
1.13	1.31	1.61	1.92	2.35	2.98	3.85	5.16	7.25	10.93	18.72
0.39	0.37	0.33	0.28	0.24	0.22	0.20	0.18	0.16	0.15	0.14
24.26	22.89	21.18	18.46	16.28	14.79	13.46	12.40	11.54	10.81	10.20
84.71	87.01	94.04	99.22	103.29	109.11	114.71	120.61	126.89	133.18	139.88
69.68	82.40	103.75	125.85	156.60	201.67	265.04	360.15	513.15	783.49	1357.98
30.93	34.59	39.23	41.93	42.81	43.80	44.72	45.38	46.01	46.59	47.16
12.15	12.69	12.91	11.81	10.46	9.56	8.75	8.06	7.50	7.03	6.63
42.42	47.98	57.34	63.45	66.40	70.53	74.56	78.40	82.48	86.57	90.92
34.89	45.44	63.26	80.47	100.67	130.37	172.28	234.10	333.54	509.27	882.69

Table 10-9a Economic Costs (Medan)

	F/C	L/C	Taxes	Economic Costs
1. Cable work	2,428	37,274	4,771	39,702
2. Civil engineering work	-	13,880	1,388	13,880
3. Transmission system	1,084	37	366	1,121
4. Tools, measuring instruments, vehicles	527	-	155	527
5. Training, etc.	112	19	12	131
6. Consultancy services	1,084	37	112	1,121
7. Contingency reserve	524	5,125	680	5,648
8. Total	5,759	56,372	7,484	62,130

	1986	1987	1988	1989
1. Cable work	7,941	10,210	18,760	2,789
2. Civil engineering work	2,775	6,939	4,165	-
3. Transmission system	225	477	419	-
4. Tools, measuring instruments, vehicles	105	105	317	-
5. Training	64	40	5	22
6. Coinsultancy services	487	290	277	67
7. Contingency reserve	1,160	1,806	2,394	288
8. Total	12,757	19,867	26,337	3,166

Table 10-9b Economic Costs (Semarang)

	F/C	L/C	Taxes	Economic Costs
1. Cable work	2,732	42,305	5,405	45,037
2. Civil engineering work	-	16,168	1,617	16,168
3. Transmission system	794	27	268	821
4. Tools, measuring instruments, vehicles	462	-	132	462
5. Training, etc.	376	31	41	407
6. Consultancy services	1,012	525	153	1,537
7. Contingency reserve	538	5,906	762	6,444
8. Total	5,914	64,962	8,378	70,876

	1986	1987	1988	1989
1. Cable work	9,009	11,287	21,425	3,314
2. Civil engineering work	3,234	8,085	4,850	-
3. Transmission system	168	349	306	-
4. Tools, measuring instruments, vehicles	92	92	277	-
5. Training	205	103	13	86
6. Coinsultancy services	661	402	399	74
7. Contingency reserve	1,337	2,032	2,727	347
8. Total	14,706	22,350	29,997	3,821

Table 10-9c Economic Costs (Solo)

	F/C	L/C	Taxes	Economic Costs
1. Cable work	640	10,677	1,343	11,317
2. Civil engineering work	-	5,330	533	5,330
3. Transmission system	108	4	37	112
4. Tools, measuring instruments, vehicles	248	-	73	248
5. Training, etc.	120	8	12	128
6. Consultancy services	432	255	68	687
7. Contingency reserve	155	1,627	207	1,782
8. Total	1,703	17,901	2,273	19,604

	1986	1987	1988	1989
1. Cable work	2,261	2,951	5,319	786
2. Civil engineering work	1,066	2,665	1,598	-
3. Transmission system	21	47	44	-
4. Tools, measuring instruments, vehicles	51	51	146	-
5. Training	82	31	5	10
6. Coinsultancy services	294	179	177	37
7. Contingency reserve	378	592	729	83
8. Total	4,153	6,516	8,018	916

Table 10-10 Tariff Table of Indonesia

(Units in %)

	Inp. Duty	VAT
1. Cable	30	10
2. Bulldozer Excavator Grader	20	10
3. Switchboard and exchanges	20	10
Generator and motors	30	10
4. Measuring instruments	10	10
Vehicles (special vehicles)	20	10
Trucks	60	10

CHAPTER 11 PROJECT IMPLEMENTATION PLAN

CHAPTER 11 PROJECT IMPLEMENTATION PLAN

(1) Execution of Work

Major items of works be undertaken by Contractor awarded to successful bidder in international competitive bidding, and executed on turn-key basis.

(2) Completion of Work

Target of completion of works be at the end of February, 1989, according to the end of REPELITA-IV. However, installation works of outside plants for some exchanges where installation works of inside plants were finished may be completed before target date and subscriber service may be partially commenced in such exchanges. Such partial commencements of subscriber service be scheduled from the latter half of year 1987.

(3) Cordination with Other Projects

In order to make this project to be smooth in progress and to be completed at target date, cordination be made with progress of other projects such as construction work of new exchange building and installation work of inside plants, etc.

(4) Subscriber's Premise Work, etc.

Drop wire work and subscriber's premise wiring, as well as telephone set installation be undertaken by PERUMTEL in view of specific nature of this work category.

(5) Training

All the training courses for technical staff to maintain new outside plants and digital transmission facilities be completed by Contractor within this project period.

(6) Maintenance Assistance

Maintenance assistance, especially for new digital transmission system, be undertaken by Contractor for the period of 1 year after completion of this project.

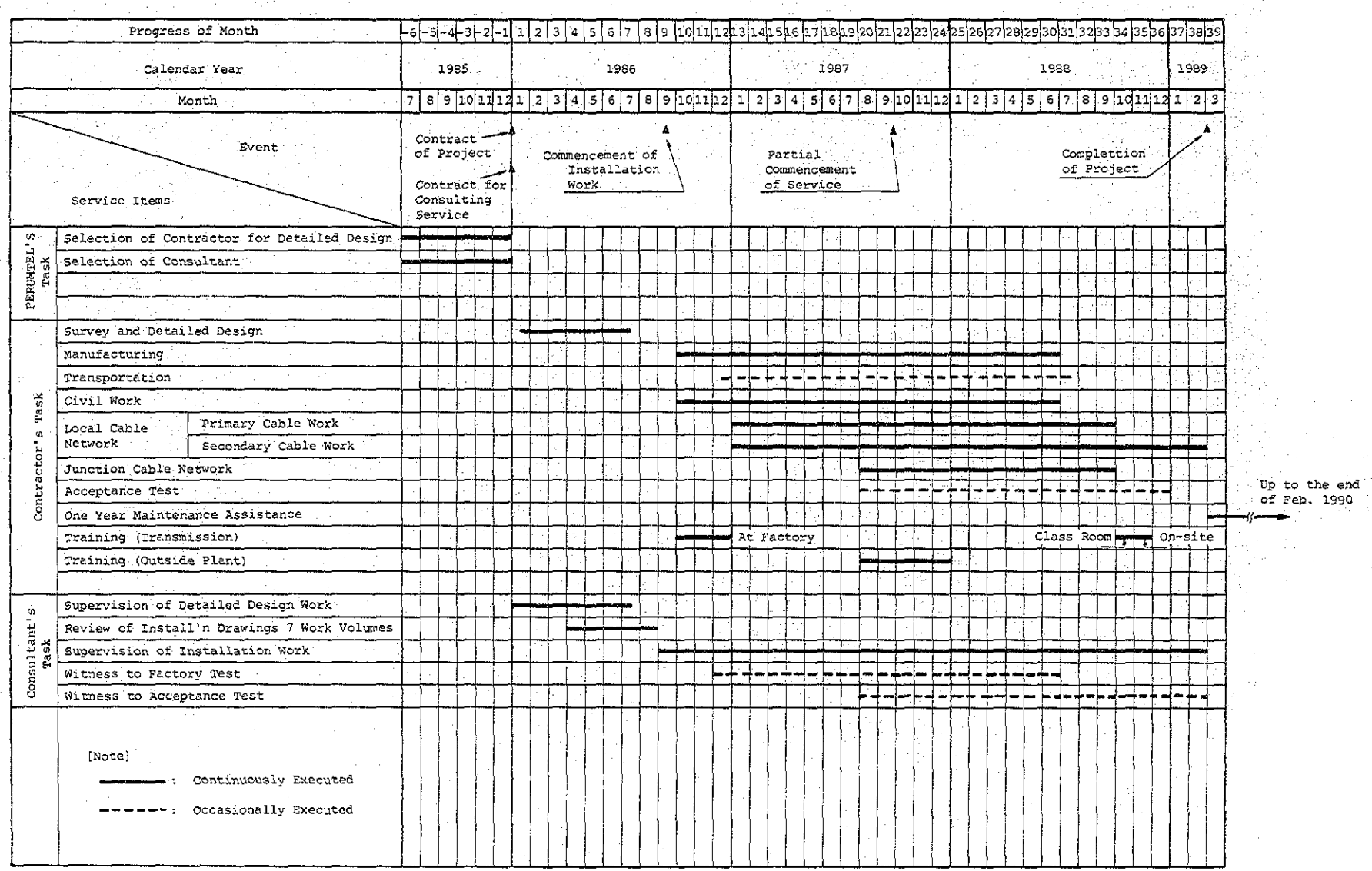
(7) Employment of Consultant

This is to take full advantage of the Consultant's expertise in project planning and basic design making, and in adjustment to other projects, detail design screening, witness to factory inspection, work supervision and final workmanship assessment.

(8) Implementation Schedule

Implementation schedule for this project is shown in Table 3-2.

Table 11-1 Project Implementation Schedule



CHAPTER 12 SUGGESTIONS OF FACILITIES MAINTENANCE AND MANAGEMENT

CHAPTER 12 SUGGESTIONS OF FACILITIES MAINTENANCE AND MANAGEMENT

12-1 Outside Plant Facilities

12-1-1 Facilities Characteristics

Outside plant facilities occupy major weight in the whole telecommunications system facilities. Therefore, telecommunications business management depends a great deal upon whether outside plant facilities are operated rationally and efficiently, or not.

Unlike indoor facilities, outside plant facilities are exposed to severe social and natural environments. Special considerations are required in the aspects of design, construction and maintenance.

Especially for maintenance, implications are serious. Although outside plant facilities troubles transpire automatically to a certain extent, troubleshooting requires manpower in many respects. Furthermore, outside plant facilities are not only multiple in kinds but are used in large quantities so that maintenance and management methods are diversified. And the improvement and upgrading of such methods are not as easy to realize as in the case of facilities of other kinds.

12-1-2 Maintenance Standard

Maintenance standard indicates the degree of maintenance service required to subscribers and is determined

balance of the enterprise concerned. Routine maintenance activities to prevent troubles and, should trouble occur, reduce hours or days required for troubleshooting to possible minimum are important. Special emphasis is placed on elimination of no connection, wrong connection and heavy crosstalk complaints.

Subscribers always expect desirable maintenance service from the enterprise concerned. However, to keep maintenance standard at high level, a large amount of expense and a great deal of manpower are required.

Methods whereby to elevate maintenance standard are threefold. They are:

(1) To reduce the number of troubles;

(2) To curtail time requirement for troubleshooting;

(3) To improve maintenance service management.

12-1-3 Facilities Status Quo

In the object cities of this study, a large number of in-conduit or direct buried primary and secondary cable facilities already past the service life exist. Areas where new and old cable networks are duplicated are also numerous.

As for aerial cables, many cases are found wherein cables and drop wires are installed without using laying metals or are spliced not with regular splicing material but by makeshift method.

In the case of cross-connecting cabinets and distribution points, cable fixing points of terminal boards are, for the most part, without moisture-proof treatment using compounds or the like.

For subscriber's premise facilities also, drop wire and indoor wire sheathing is time-worn in many cases. Wiring itself is not by regular practice in not a few cases.

12-1-4 Maintenance Status Quo

In Medan area, local telephone failure rate is 8 cases/month per 100 telephones. Out of these failures, upwards of 90% are due to troubles with outside plant facilities. Troubleshooting for outside plant facilities requires many hours or days. Average troubleshooting rate per worker per day is 0.7 cases.

In the object cities of this study, in-depth maintenance management data are not available sufficiently, including data concerning trouble distribution per day, trouble distribution by days of week, average time requirement for troubleshooting, and number of serious troubles that defy at-site repair work. Data availability is too poor to be effectively reflected in maintenance activities.

Maintenance work vehicles also are practically not available. For troubleshooting of general subscriber telephones, maintenance workers proceed to trouble sites by bicycle or autobicycle. In most cases, they cannot attend to repair work with necessary spare parts and materials, as well as work tools.

Shortage of maintenance staff plus deficiency of troubleshooting knowhow and of measuring equipment available necessitate otherwise unnecessary long term in trouble spot discovery and repair work.

Cases are not infrequent wherein lack of repair parts and materials impedes proper, rapid troubleshooting so that trouble equipment/facilities are left in temporarily repaired state for a long time, only to have the same trouble replace in due course.

Failure in plant record updating also causes inconvenience to affect planning, design, construction and maintenance.

12-1-5 Facilities Improvement and Modernization

Maintenance service improvement for subscribers is the demand of the times. Outside plant facilities innovation and facilities management practice upgrading and modernization contribute to earnings performance improvement of the enterprises concerned.

In view of outside plant facilities status quo, characteristics and implications involved, the following can be listed as maintenance practice modernization objectives:

1) Desirable construction and maintenance work organization

2) Adoption of maintenance work vehicles

3) Full assortment of measuring equipment and work tools

4) Plant record updating

5) Trouble control practice improvement

6) Equipment/materials inventory management improvement

7) Training of personnel in charge

Method to accomplish the above objectives effectively and at reasonable cost is to establish the lineman center in each object city of study. The proposed lineman center is to undertake centralized execution of outside plant facilities construction and maintenance.

12-1-6 Lineman Center Characteristics

To provide desirable service to subscribers by means of high efficiency operation of extensively distributed outside plant facilities, the optimum method is to establish lineman center to undertake outside plant facilities construction and maintenance.

Required lineman center functions are as under.

1) To make thorough facilities maintenance management and thereby hold correct knowledge about operating conditions of facilities;

2) To carry out equipment/materials inventory management so that there will be no difficulty in the supply of necessary equipment/materials for routine work;

3) To keep up-to-date all apparatuses including work vehicles and measuring equipment with a view to work efficiency elevation;

4) To administer work oriented training to staff workers so as to improve their capabilities;

5) To make plant record updating promptly every time new facilities are established or existing facilities are modified in the course of construction work and subscriber cutover work besides maintenance work;

6) To create new workshop environment and thus enhance workers' morale.

12-2-7 Lineman Center Scale and Number

(1) Medan Area

In Medan area, the number of subscribers number is about 27,000 as of 1985. According to demand forecast and installation plan, the number of subscribers as of 1995 and 2005 is estimated at 100,000 and 250,000, respectively.

Figure 12-3 shows that out of about 150 workers who take care of outside plant facilities, up to about 120 are in charge of subscriber cables and subscriber premise facilities maintenance. The present average trouble rate is 8 cases/month per 100 telephones as shown in Figure 12-1 and Figure 12-2. In view of subscriber cable and subscriber premise facilities improvement and expansion by

this project and future plans, the desired trouble rate reduction is to 5 cases/month per 100 telephones in 1995 and to 3 cases or less/month per 100 telephones in 2005.

The present troubleshooting capability per worker per day is not more than 0.7 cases. After lineman center establishment, on account of training for knowhow improvement and mobility increase by use of work vehicles, etc., the desired troubleshooting capability enhancement is to 1.5 cases per worker per day in 1995 and to 2 cases or more per worker per day in 2005. In this eventuality, the necessary increase of workers in charge of subscriber cable and subscriber premise facilities maintenance is to not more than about 140 in 1995 and about 160 in 2005, compared with the present 120.

Necessary number of indirect service personnel in charge of design, equipment/materials inventory and plant records, as well as personnel in supervisory positions, will be about 30. Thus the whole lineman center staff will consist of about 170 men in 1995 and about 190 in 2005.

Considering normal operating scale required of lineman center and time requirement for maintenance tour by work vehicles, one lineman center has to be established during this project period and another sometime around 1995.

(2) Semarang Area

As of 1985, the number of subscriber in Semarang area is about 16,000. Estimate by demand forecast and installation plan sets the number of subscribers in 1995 and 2005 at about 80,000 and 160,000, respectively.

According to Figure 12-4, out of about 120 workers who take care of outside plant facilities, about 90 are in charge of subscriber cable and subscriber premise facilities maintenance.

As regards the present average trouble rate and troubleshooting rate in Semarang area, detailed data are not available. However, both rates are considered to be nearly the same as in Medan area. Thus, for 1995 and 2005 also, both rates are assumed to be about the same as in Medan area. Then, the number of maintenance workers in both years will necessarily increase from the present level of about 90 but not to more than 110 for each.

About 30 workers are necessary for indirect services, such as design, equipment/materials inventory and plant record keeping, plus supervisory service. This fact brings the whole lineman center staff to about 140 men. Considering normal operating scale required of lineman center and time requirement for maintenance tour by work vehicles, one lineman center needs to be established during this project period and another around 1995.

(3) Solo Area

As of 1985, the number of subscribers in Solo area is about 6,000. Estimate by demand forecast and installation plan sets the number at 30,000 in 1995 and 52,000 in 2005.

According to Figure 12-5, out of about 60 workers who take care of outside plant facilities, up to about 50 are in charge of subscriber cable and subscriber premise facilities maintenance.

Concerning the present average trouble rate and troubleshooting rate in Solo area, detailed data are not available. However, both rates are considered to be nearly the same as in Medan area. Therefore, assumption is made that both rates as of 1995 and 2005 are also about the same as in Medan area.

Then, the number of maintenance workers required may possibly decrease from the present level of about 50 to about 40 for each of 1995 and 2005. Considering that about 10 workers are necessary for indirect services, such as design, equipment/ materials inventory and plant record keeping, plus supervisory service, the whole lineman center staff will consist of about 50 men.

Therefore, one lineman center established during this project period is just enough.

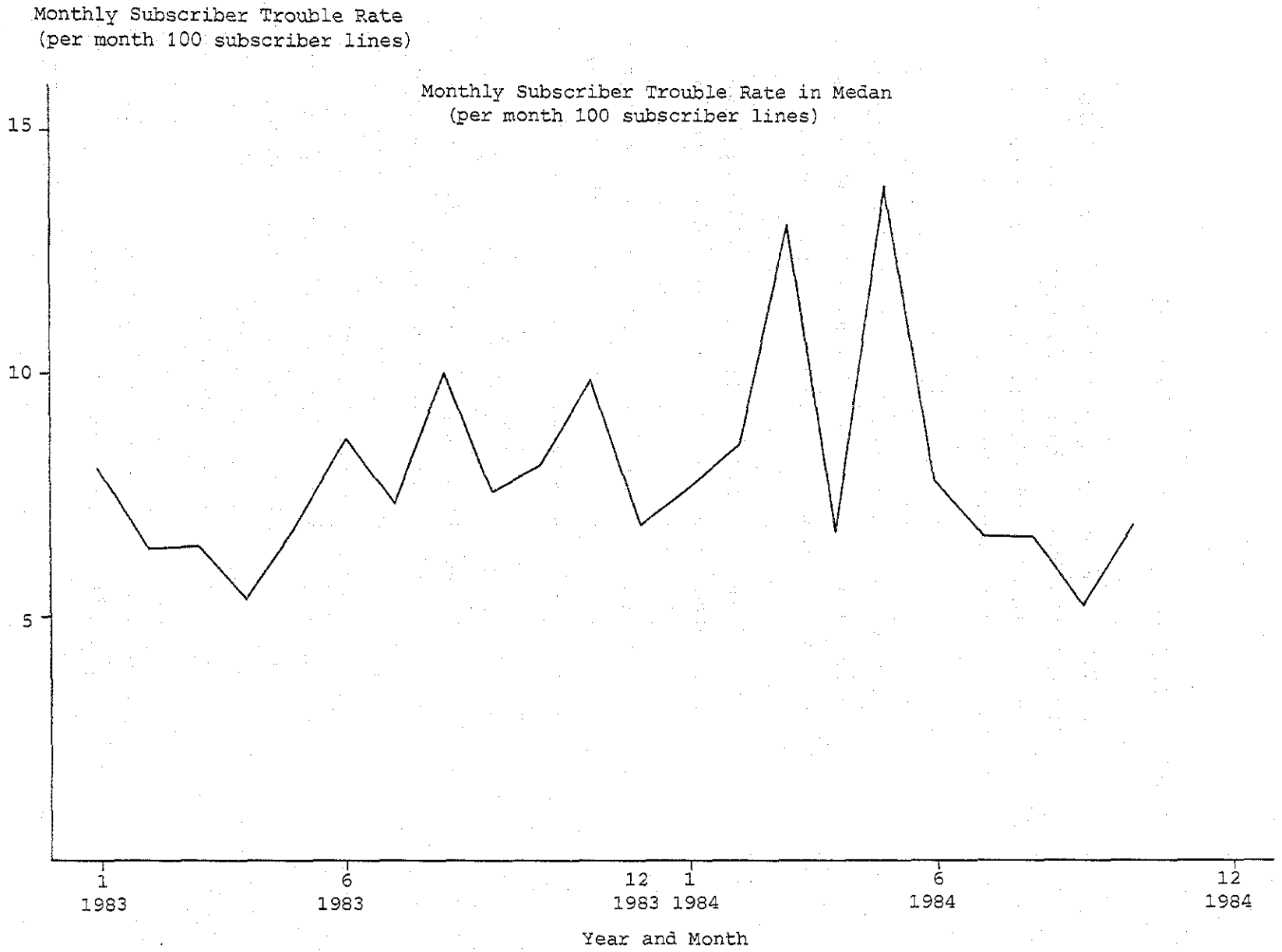


Figure 12-1 Monthly Subscriber Trouble Rate in Medan
(per month 100 subscriber lines)

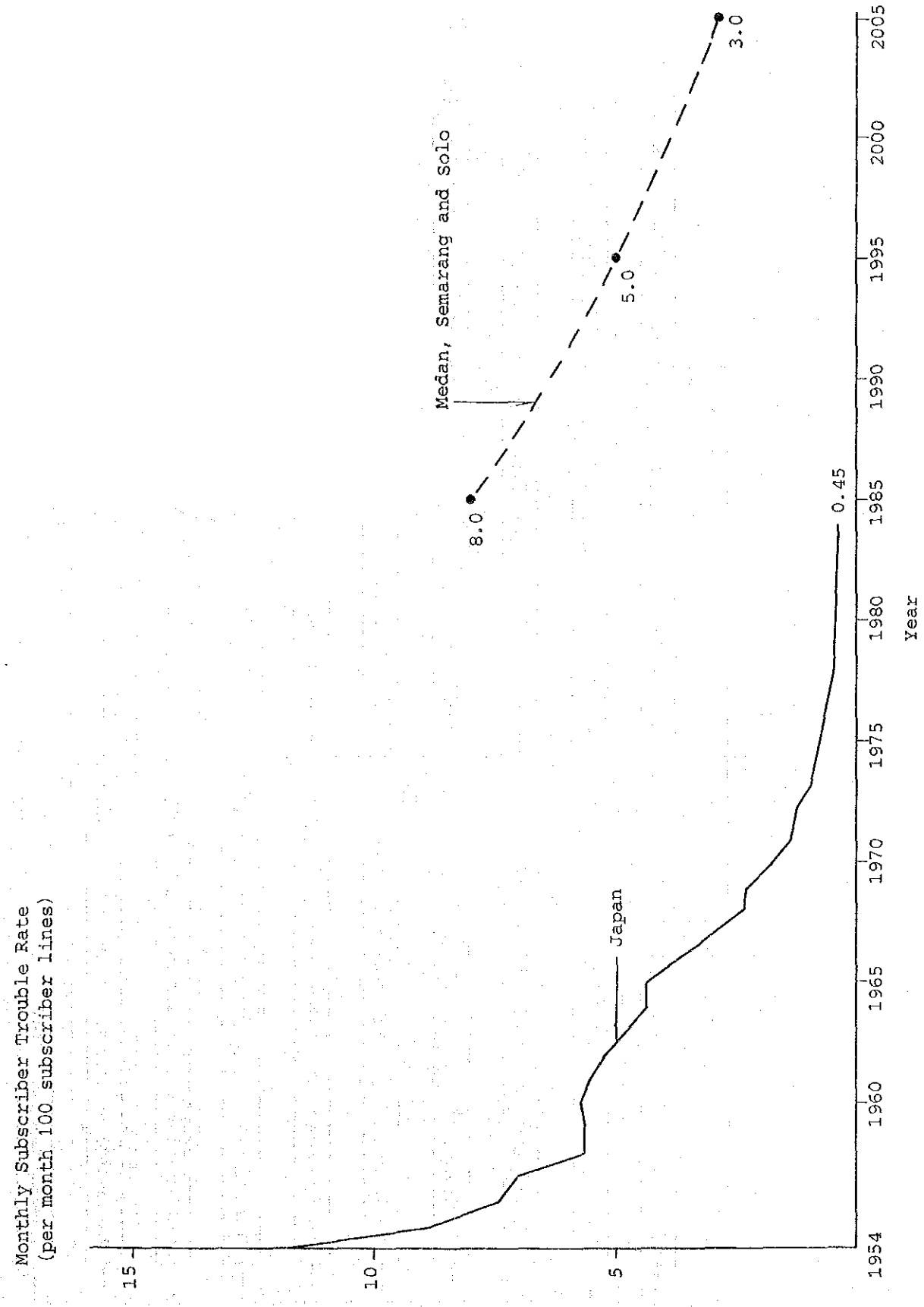


Figure 12-2 Proposed Monthly Subscriber Trouble Rate in Medan, Semarang and Solo (per month 100 subscriber lines)

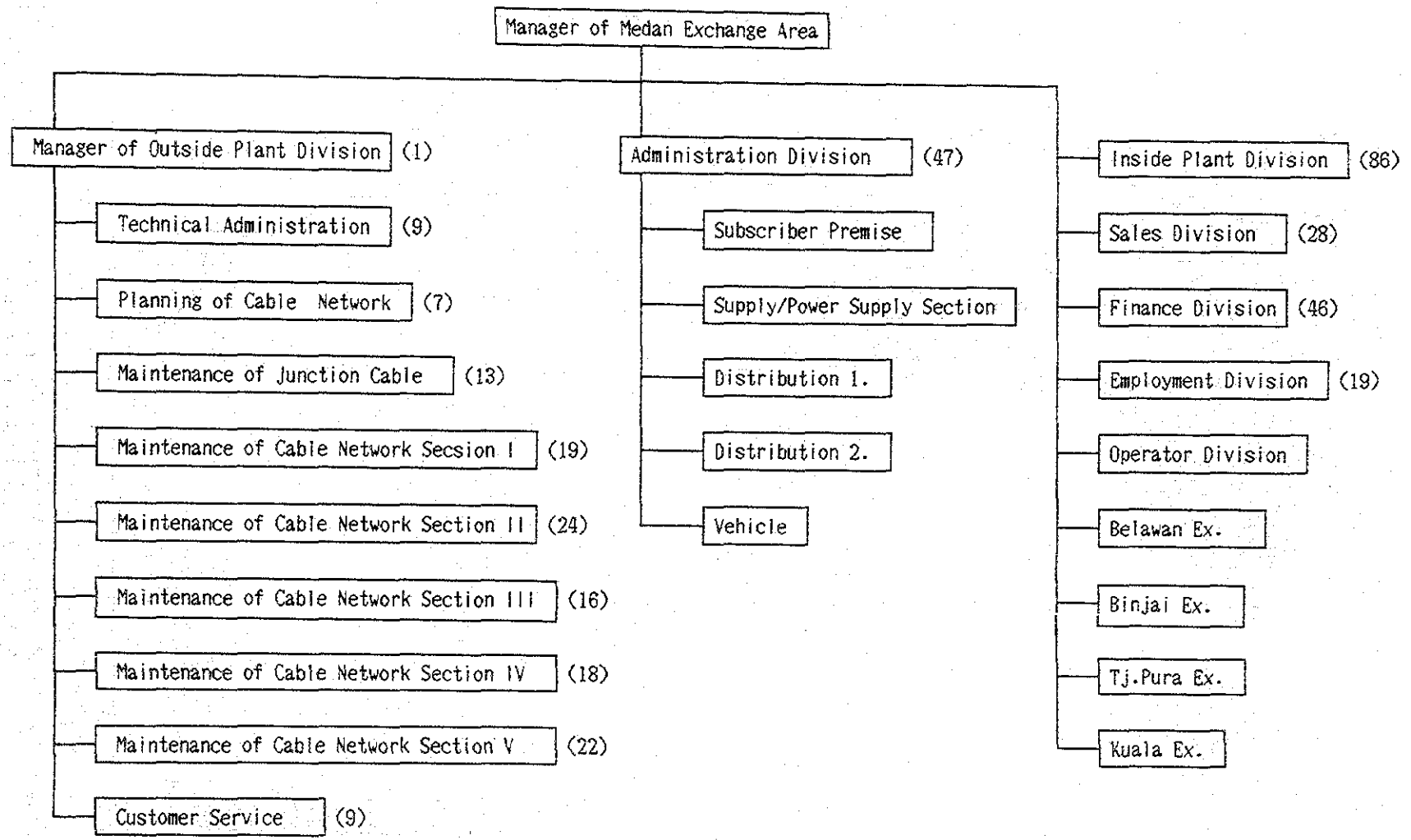


Figure 12-3 Organization Chart of Medan Exchange Area

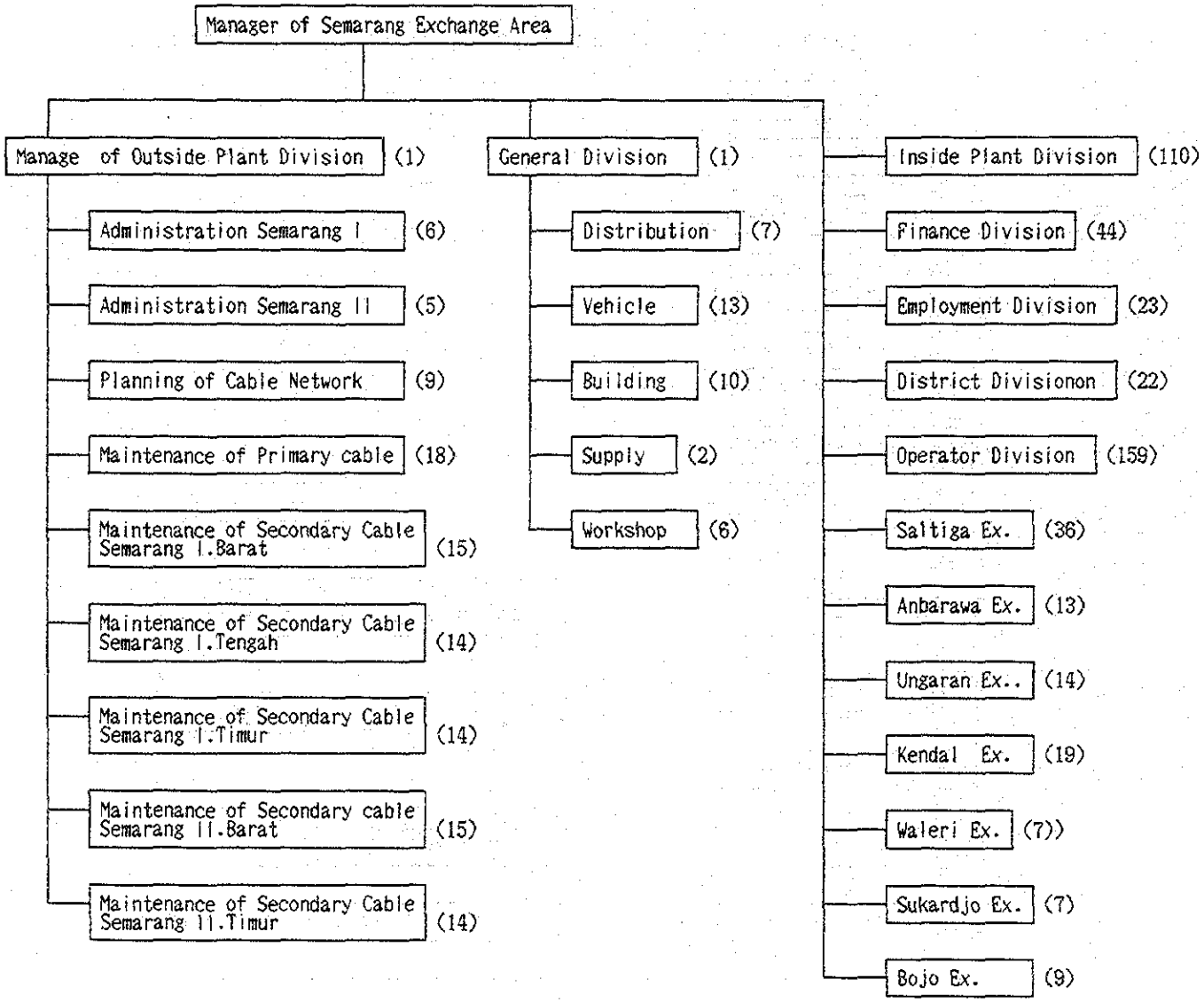


Figure 12-4 Organization Chart of Semarang Exchange Area

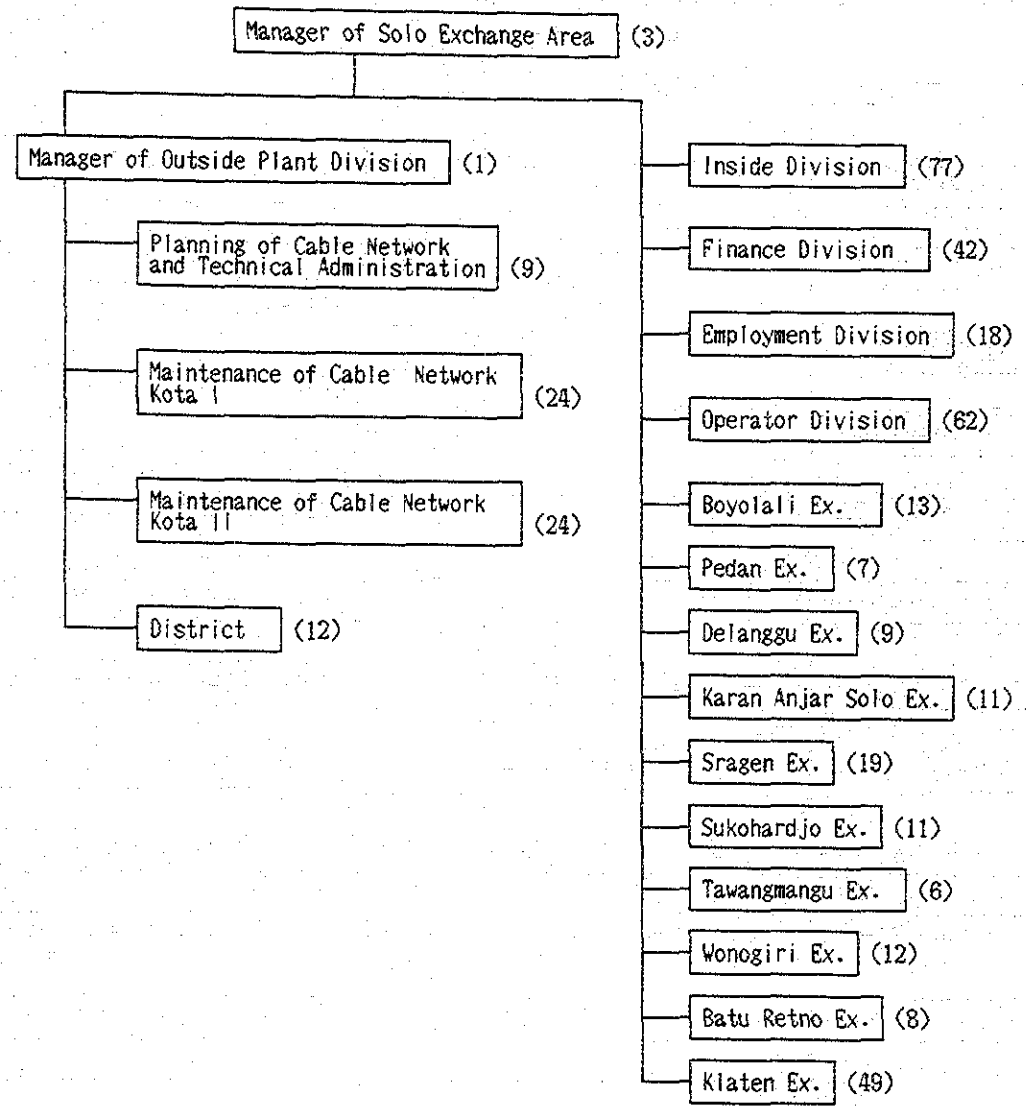


Figure 12-5 Organization Chart of Solo Exchange Area

12-1-8 Training

Maintenance staff training is to be carried out by equipment supplier. Training comprises two categories. One is overseas training for engineer class. The other is domestic training for technicians to be provided in Indonesia.

Domestic training is divided into two groups, i.e., subscriber cable group and subscriber premise facilities group. Both domestic trainings are given in Medan and Semarang.

Training period is one month for overseas training and domestic training (including two groups), respectively.

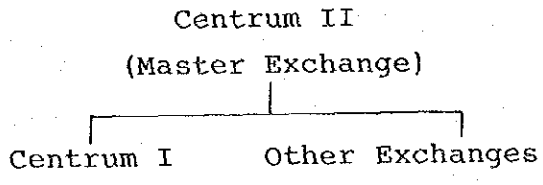
12-2 Transmission Facilities

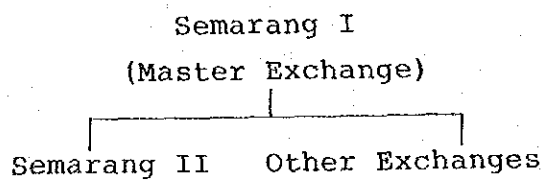
12-2-1 Maintenance Organization

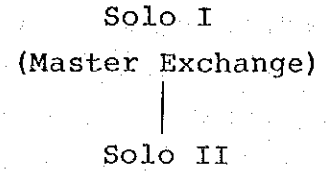
Digital junction networks planned by this project are to be newly introduced in three object cities of study. Therefore, maintenance system for those networks must also be newly organized.

At present, toll transmission facilities maintenance centers are located in Centrum II, Semarang I and Solo I exchange compounds. Those maintenance centers are staffed with full time maintenance personnel mainly for microwave radio system and coaxial cable system. New maintenance system for new digital junction networks should be organized, centering upon those three exchanges which will assume key positions in the prospective junction networks.

Therefore, those three exchanges will be used as maintenance centers for the proposed digital junction networks. Network control systems of the three exchanges are as under.







12-2-2 Maintenance Arrangement and Staffing

Proposal is made that maintenance of transmission equipment and power supply equipment to transmission equipment, to be installed at each telephone exchange, be by full time maintenance staff, i.e., attended maintenance, and that transmission route maintenance be subject to control by master exchange. During night time, all exchanges except master exchange will have no maintenance staff on duty.

Based on the above maintenance arrangement, all necessaries for maintenance of digital junction networks, including measuring equipment, spare parts and tools, are to be distributed as under.

- Measuring equipment for maintenance to be used frequently be distributed to each exchange whereas measuring equipment of low degree of use be stocked at master exchange.

- Spare panels and spare parts be stocked at master exchange. For maintenance tools and consumables, necessary minimum be distributed to each exchange.

- One maintenance vehicle be distributed to each exchange.

Periodical tests and inspections of digital systems in the network are carried out, initiated by master exchange, with cooperation of each exchange. Field troubles are reported to master exchange by remote supervisory system. Indoor equipment troubles are attendeed to by maintenance staff of the exchange concerned, in principle.

For junction route troubles, troubleshooting team is organized mainly by master exchange maintenance staff with assistance of maintenance staff of the exchange concerned as instructed by master exchange. In case where trouble is in cable section, master exchange arranges with lineman center for troubleshooting.

Maintenance staffing in conformity to the foregoing maintenance arrangement is as under.

1) Master Exchange (Centrum II, Semarang I, Solo I)

Chief	1	
Engineers	2	(1 in Solo)
Technicians	3	(2 in Solo)
General administration	4	(2 in Solo)

2) Big Exchange (Centrum I, Semarang II)

Engineer	1
Technicians	3

3) Other Exchange

Engineer	1
Technician	1

Total maintenance staff requirement by area breaks down as under.

Medan area	30	(including 4 for general administration)
Semarang area	24	(including 4 for general administration)
Solo area	8	(including 2 for general administration)

12-2-3 Training

Maintenance staff training is to be carried out by equipment supplier. Training comprises two categories. One is in-factory training in equipment supplier's country, aimed at engineer class. The other is domestic training for technicians to be provided in Indonesia. Training period is three months for overseas in-factory training and, for domestic training in Indonesia, one month each for classroom lectures and on-the-job training.

CHAPTER 13 RECOMMENDATION

CHAPTER 13 RECOMMENDATION

Telecommunication, like power generation and transportation, is indispensable for modern economic and social development. Itself a means of development strategy and hence a vital infrastructure, telecommunication service holds an important role to play.

Investment in telecommunication service depends a great deal upon import of advanced technology. As such, it is capital intensive. Nevertheless, its external economic effect is significant indeed.

As seen in the results of financial and economic analyses contained in this Report, the current Project is feasible as public telecommunication service project. In a national economic sense also, its implementation is desirable. Recommendation is hereby made that this Project be implemented as planned, i.e., in strict accordance with the implementation schedule.

Following are the main points of recommendation in the technical aspects relating to the implementation of this project.

1. Subscriber Cable Network

   In order to economize installation and maintenance works in subscriber cable network, the following are to be recommended.

   (1) Use of larger pair cables for economic reason and effective utilization of duct.

   (2) Introduction of updated splicing technology for outer sheathes and conductors to be connected between two different cables.

(3) Use of compounds to be put on the jointing part of cables.

(4) Wetproof of cable cabinet, distribution box and jointing part of stub cables.

(5) Adopt of round type manhole cover.

2. Junction Cable Network

(1) Use of PCM Cable System

To adopt PCM cable system which uses screen cable as transmission media. This is from cost consideration at the present price level. In this project, initial cable system capacity is to be commensurate with circuit demand as of 1998, i.e., 10 years after the whole system commissioning. For transmission system which can meet demand after 1998, optical fiber cable system is considered to be eligible. Final decision for or against adopting this system depends upon the result of re-consideration on that occasion.

(2) Building Space for Transmission Equipment

Exchange building plan, be it new building construction or existing building remodelling, should place emphasis on sufficient floor space where to install transmission equipment required in this project.

3. Implementation of Project

This project is aimed at subscriber cable network and junction cable network improvement and expansion. To raise the project implementation effect to the maximum, PERUMTEL should establish and promote an integrated plan fully coordinated to all associated projects.

4. Maintenance of New Facilities Installed in This Project

Under consideration of efficiency of maintenance work for new outside facilities, provision of at least one (1) lineman centre is recommended for each objective city.

ANNEX

CONTENTS

ANNEX 1

STUDY ON NUMBER OF EXCHANGE AND EXCHANGE LOCATION

CONTENTS

ANNEX 1 STUDY ON NUMBER OF EXCHANGES AND EXCHANGE LOCATIONS

1. Number of Exchanges

When deciding, from the viewpoint of exchange site selection, whether to divide a certain area into two service areas or to use the whole area as one service area, comparison is made for approximate investment costs of subscriber network components, to choose whichever case that commands greater economic advantage.

Investment costs estimates are made for the undermentioned facilities in approximate quantities commensurate with forecasted demand as of 2005.

1) Primary cables
2) Secondary cables
3) Underground conduit facilities
4) Switching equipment and power supply equipment thereto
5) Transmission equipment
6) Exchange buildings
7) Exchange building sites

(1) Tanjung Mulia and Labuhan Areas

These two areas lie north of Medan City. Both are vast areas located between Belawan Exchange and Pulau Brayan Exchange.

Two cases are assumed. One is the case where the areas are divided into northern and southern halves with one exchange established in each half (i.e.,

the case where two exchanges are used). The other is the case of establishing one exchange at the center of the area.

For each case, basic facilities design is made and, based on this basic design, investment costs are estimated as under.

(x US$1,000)

	Facility	Case of One Exchange	Case of Two Exchanges
1)	Primary cables	8,590	4,650
2)	Secondary cables	10,510	6,310
3)	Underground conduit facilities	5,860	4,020
4)	Switching equipment and power supply equipment	13,100	14,410
5)	Transmission equipment	150	290
6)	Exchange buildings	400	500
7)	Exchange building sites	50	60
	Total	38,660 (128%)	20,240 (100%)

In case where one exchange is established at the center of the areas, total investment costs are about 28% greater than in case where two exchanges are used. Hence the conclusion that greater economic advantage can be expected from dividing the areas into northern and southern halves and establishing Tanjung Mulia and Labuhan exchanges in the respective half sectors.

(2) Tugu and Mang Kang Areas

These two areas are vast areas located west of Semarang City.

Cases to be considered are two. One is the case where the areas are divided into eastern and western halves with one exchange established in each half. The other is the case of establishing one exchange at the center of the areas.

For each case, basic facilities design is made and, based on this basic design, investment costs are estimated as under.

(x US$1,000)

	Facility	Case of One Exchange	Case of Two Exchanges
1)	Primary cables	13,820	7,020
2)	Secondary cables	16,290	9,830
3)	Underground conduit facilities	8,580	6,500
4)	Switching equipment and power supply equipment	17,100	18,810
5)	Transmission equipment	170	300
6)	Exchange buildings	450	650
7)	Exchange building sites	50	60
	Total	56,460 (131%)	43,170 (100%)

In case where one exchange is established at the center of the areas, total investment costs are 31% greater than in case where two exchanges are used. Hence the conclusion that greater economic advantages can be expected from dividing the areas into eastern and western halves and establishing Tugu and Mang Kang exchanges in the respective half sectors.

2. Exchange Locations

(1) Banyumanik Exchange

After the definition of service area, study of theoretical wire center was made, based on demand distribution maps for 2005 and 1995. Study results are in Figure AN-1-1 (1/2 - 2/2).

As of 2005 and 1995, wire center is on west side of service area center, i.e., main road leading to Solo. More precisely, wire center is in the neighborhood about 1 km east of Dr. Setia Budi street.

Wire center surroundings are now being developed as residential area. However, exchange site acquisition is possible.

Road from residential area connects with Dr. Setia Budi street only so that the shortest primary cable routes to northern, eastern and southern sectors of service area cannot be obtained.

Primary cable distance to northern, eastern and southern sectors of service area necessarily increases by 1 km, i.e., the distance from wire center to Dr. Setia Budi street. Therefore, by reason of transmission loss limits, primary and secondary cables of larger conductor diameter than otherwise necessary must be used. For underground conduit facilities also, growth in scale is unavoidable.

To eliminate the aforementioned 1 km extra distance, decision is made on Banyumanik Exchange site with wire center transferred to a point along Dr. Setia Budi street. Exchange site decision conforms to field survey result.

(2) Tugu Exchange and Mang Kang Exchange

Theoretical wire centers of Tugu Exchange and Mang Kang Exchange as of 2005 and 1995 are in Figure 5-2 (1/2 - 2/2) and Figure 5-3 (1/2 - 2/2).

Wire centrse of both exchanges in the years mentioned are along Siliwangi street as main road to/from Kendal. Both wire centers coincide almost completely with field survey results so that decision is made on Tugu Exchange and Mang Kang Exchange sites along Siliwangi street.

(3) Tanjung Mulia Exchange and Labuhan Exchange

Theoretical wire centers of Tanjung Mulia Exchange and Labuhan Exchange as of 2005 and 1995 are in Figure 5-4 (1/2 - 2/2) and Figure 5-5 (1/2 - 2/2).

Wire centers of both exchanges in 2005 are along Laksana Yos Sudarso street as main road to/from Belawan and are transferred about 1 km to the north, compared with locations in 1995.

Based on field survey results, decision is made on Tanjung Mulia Exchange and Labuhan Exchange sites along Laksana Yos Sudarso street, i.e., in the neighborhood of wire centers as of 2005.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	Total	
1		0	0	0																																																							0	
2		0	0	0	0	0																																																						0	0
3	0	0	0	0	0	0	0	28	28	92	92																																																	240	240
4	0	0	4	0	4	0	0	0	0	28	40	28	28	28	28	28	28	28	28																																										300	540
5		0	0	0	0	4	0	0	0	28	28	40	28	28	28	28	28	28	28	0																																									296	836
6			0	0	0	4	4	4	4	4	28	92	0	28	28	28	28	28	0	0	0										0	0	0	0																									280	1116
7				0	0	4	4	4	4	4	28	28	88	88	40	28	0	0	0	0	0									0	0	0	0	0																									320	1436
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12						4	28	28	28	12	28	28	40	40	40	28	28	28	0	0	8	8	8	8	4	4	4	0	0	0	0	0	0	0	4	0	4	4	20																				436	3588
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21						0	32	32	32	32	32	32	32	32	92	32	32	32	32	32	32	32	32	20	20	20	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																				712	8940
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29						0	28	28	28	28	28	28	28	28	24	24	24	24	24	24	0	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	376	13600
30						0	28	28	28	28	28	28	28	28	24	24	24	24	24	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	368	13968
31					0	28	28	28	28	28	28	28	28	28	24	24	24	24	24	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	396	14364
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37						0	0	28	28	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84	15952
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39				0	0	28	28	24	4	4	0	0	0	0																																															88	16188
40				0	0	28	28	28	28	28	0	0	0	4																																														144	16332
41				0	28	28	28	28	28	28	0	0	0	0																																														168	16500
42				0	28	28	28	28	28	28	0	0	0																																															168	16668
43			0	0	28	28	28	28	28	28	0	0	0																																															168	16836
44			0	0	0	24	12	88	28	28	0																																																	84	17100
45			0	0	0	0	0	28	28	28																																																		0	17100
46			0	0	0	0	0	0	0																																																			0	17100
47				0	0		0																																																					0	17100
48				0																																																									17100
Total	0	0	4	0	172	428	896	1020	1136	1184	996	1216	1044	1180	884	1080	1120	872	848	592	360	328	328	228	228	240	232	228	52	18	4	4	4	8	8	12	16	64	64	28	12	0	4	0	4	4	16	16	4	0	0	0	0	4	0	0	0	17100	
		0	4	4	176	604	1500	2520	3656	4840	5836	7052	8096	9276	10160	11160	12280	13152	14000	14592	14952	15280	15608	15828	16056	16296	16528	16756	16808	16824	16828	16832	16836	16844	16852	16864	16880	16944	17008	17036	17048	17048	17052	17052	17056	17060	17076	17092	17096	17096	17096	17096	17100	17100	17100	17100	

Figure AN-1-1 (1/2) Wire Center Study in Banyumanik (2005)

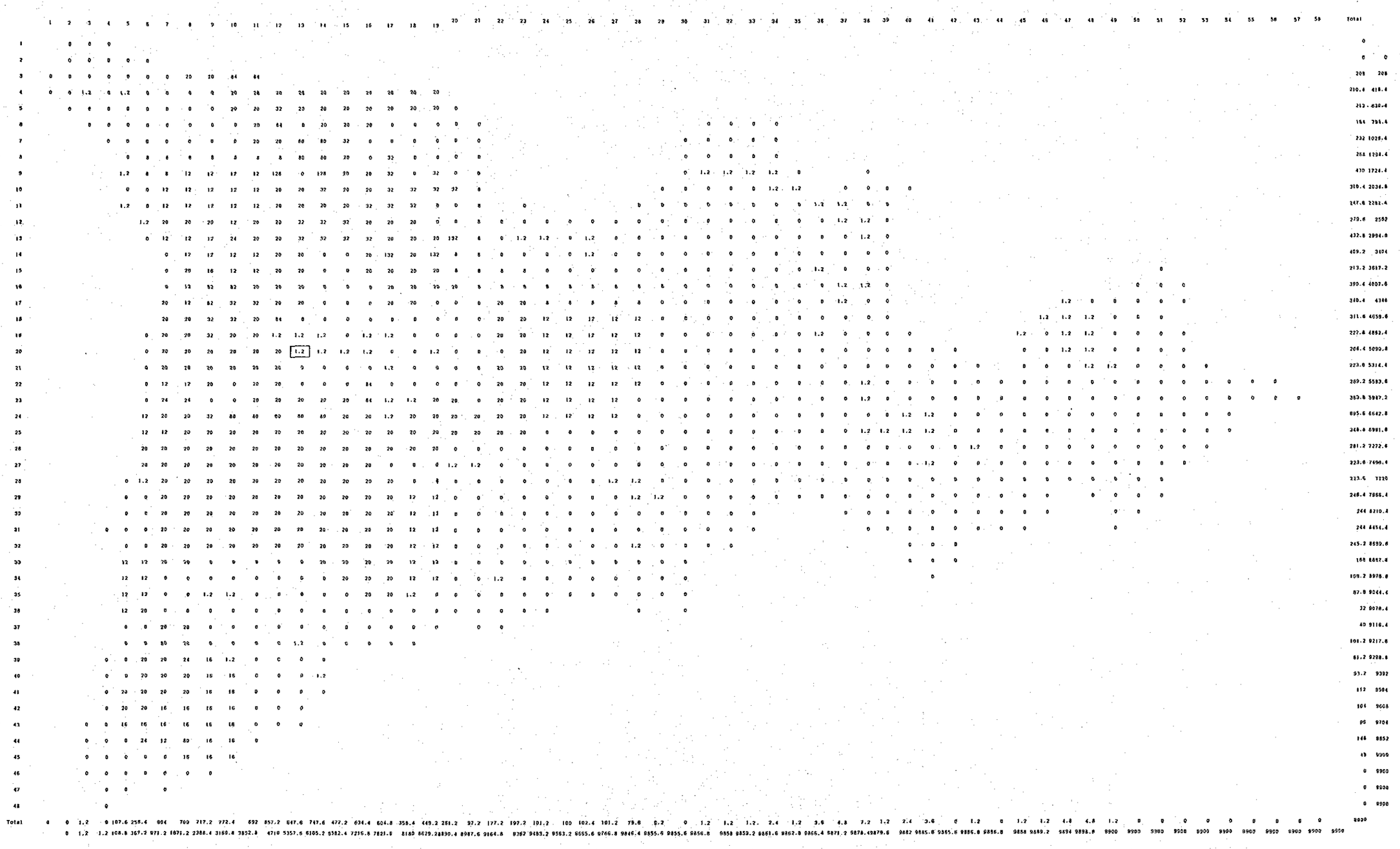

Figure AN-1-1 (2/2) Wire Center Study in Banyumanik (1995)