(6) 150 kV substations for the Tuntang system, totalling 122 megavolt ampere (MVA),
(7) 20 kV substations for around Cepu, totalling 2.6 MVA,
(8) 150 kV transmission lines 177 km in length for the Ketenger system,
(9) 150 kV substations for the Ketenger system, totalling 70 MVA, and
(10) Distribution lines 1,489 km in length for the Tuntang system.

09.022 The construction of the following projects are ongoing at present:

(1) Steam generation unit I and II at Semarang with 2 x 50 MW, of which unit I will be completed in December 1977, and unit II in April 1978;

(2) Gas turbine generation unit III at Semarang with 1 x 20 MW, which will be completed in May 1977;

(3) 150 kV transmission lines 270 km in length; interconnectors between Semarang and Pekalongan, and Semarang-Magelang-D.I. Yogyakarta-Solo, which will be completed in 1978;

(4) 150 kV substations for the interconnecting systems, totalling 124 MVA, which will be completed in 1978; and
D
(5) Distribution lines 1,286 km in length for the Ketenger system, which will be completed in 1977.

(b) Development Prospects

09.024 A preliminary load forecast, together with the corresponding power development program, prepared by PLN, is presented in Figure 9.2. The figures for the load forecast obtained from Figure 9.2 are as follows:

End of	Upper MW	Upper GWh	Lower MW	Lower GWh
1976	60	407	60	407
77	217	1,184	141	768
78	249	1,364	160	870
79	286	1,571	182	985
80	329	1,807	207	1,113
81	377	2,076	234	1,257
82	432	2,383	265	1,417
83	494	2,733	300	1,595
84	564	3,132	338	1,795
85	644	3,586	381	2,016

Source: As in Figure 9.2.

09.025 The corresponding power development program is tentatively envisaged as follows:

Month	Year	Project		Total MW
Jan.	1977	Present Situation		125
May	1977	Semarang Gas-III	1 x 20 MW	145
Feb.	1978	Semarang Steam-I	1 x 50 MW	195
Mar.	1978	Sempor Hydro	1 MW	196
May	1978	Semarang Steam-II	1 x 50 MW	246
Mar.	1980	Garung Hydro	2 x 12 MW	270
Mar.	1981	Wonogiri	12.4 MW	282.4
Dec.	1983	Semarang Steam-III	1 x 200 MW	
Dec.	1984	Mrica-I Hydro	2 x 60 MW	

Source: As in Figure 9.2.

09.026 The interconnection of the systems may be tentatively envisaged as follows:

(1) Interconnection of Tuntang-Ketenger systems in the first quarter of 1978,

(2) Interconnection of the West Java and the Central Java systems in 1979 to 1980, and

(3) Interconnection of the Central Java and the East Java systems in 1979 to 1980.

09.027 Besides the power sources development plan described above, studies have been made for geothermal generation at Dieng plateau and a nuclear power plant at Lasem or Jepara. The feasibility studies have been carried out for the pilot Geothermal generation plant. The nuclear

power plant is planned tentatively to have an initial installation of 600 MW and to be commissioned around 1990. Further technical and economic studies are needed to justify its feasibility.

09.028 According to the suggested development schedule mentioned above, the electric power situation of the study area will be substantially improved, as follows:

	1975	1978	1983
Installed Capacity (MW)	125	246	480
Capability (MW)	98	206	418
Amount of Generation (GWH)	355	975	2,178
Population (1,000 Persons)	26,497	27,320	29,731
Annual Generation per Capita (kWH)	13.4	35.7	73.2

Source: As in Figure 9.2.

To achieve these improvements of per capita power generation, the development and improvement of power transmission and distribution facilities should be promoted to extend the amount and coverage of the power supply.

9.1.3 The Assessment of Progress in the Power Sector

09.029 The budget program for the power sector development in Central Java, during 1969/70 and 1976/77, is presented in Table 9.11, and is summarized as follows:

(Unit: Rp. Thousand)

	Repelita I	Repelita II (up to 1976/77)	Total (1969/70-76/77)	(%)
Thermal	1,684,288	16,907,387	18,591,675	39.5
Hydro	940,210	417,000	1,357,210	2.9
Transmission & Distribution	4,361,174	22,700,038	27,061,262	57.6
Total	6,985,672	40,024,475	47,010,147	100.0

Sources: Table 9.11.

Table 9.11 Yearly Budget for Power Sector in Central Java, 1969/70 - 1979/80

(Unit: Rp.1,000)

	1969/70	70/71	71/72	72/73	73/74	74/75	75/76	76/77	77/78	78/79	79/80
I. THERMAL GENERATION											
S Semarang I, II (2 x 50MW)	16,250	5,000	5,000	159,815	438,710	7,112,444	4,613,385	3,608,068	2,938,222[1]/	1,013,902[2]/	
G Semarang III (1 x 20MW)							311,350	958,279	434,650[1]/		
N Nuclear C.J.								40,300[3]/			
D C.J. Lot. 1 (5.25MW)	27,000	275,627	26,600	209,808	28,000	6,912	4,500				
D Yogyakarta I, II III (3 x 2.15MW)		29,200	10,000	62,000	153,000	51,000	4,500				
G Semarang II (1 x 20MW)		181,400	41,700	114,993	60,000	45,000					
D Sragen (1 x 0.25MW)											
Subtotal (Thermal)	43,250	491,227	83,300	386,801	679,710	7,215,356	4,994,335	4,697,696	3,372,872	1,013,902	
II. HYDRO GENERATION											
H Garung (2 x 12MW)	101,750	282,500	260,000	175,960	120,000	68,000	99,000	250,000	819,602*	6,593,038	2,334,474
III. TRANSMISSION AND DISTRIBUTION											
Transm. & Substa. Lot. 2 (105km, 132.1MVA)	75,000	68,776	116,280	493,600	869,268	2,064,747	567,670				
Transm. & Substa. Lot. 3/4 (270km, 143.5MVA)							929,356	2,102,480	3,383,690[1]/	1,989,352[2]/	
Distribution C.J.	105,000	68,250	209,000	593,500	1,037,500	2,009,954	923,034	878,800	1,476,191[1]/	526,244[2]/	
Distr. Ketenger				75,000	650,000	5,641,346	3,630,281	3,952,420	1,519,247[1]/	4,748,006[2]/	
Subtotal (Tr. & Dis.)	180,000	137,026	325,280	1,162,100	2,556,768	9,716,047	6,050,341	6,933,700	6,379,128	7,263,602	
Total	325,000	910,753	668,580	1,724,861	3,356,478	16,999,403	11,143,676	11,881,396	10,571,602	14,870,542	2,334,474

Notes: 1/ Source: Discussion with PLN officials on February 19, 1977.
2/ Source: Estimation.
3/ Discontinuation of budget.

Sources: PLN, Proyek Induk Pembangkit Termis Jawa Tengah.
PLN, Proyek Induk Pembangkit Hidro Jawa Tengah.
PLN, Proyek Induk Jaringan Jawa Tengah.

09.030 The total sum of the budget of the power sector during this period amounts to about Rp.47,010 million, of which the total sum during Repelita I is about Rp.6,986 million, while for Repelita II up to 1967/77 is about Rp.40,024 million. The budget during Repelita I was relatively small, but it made a considerable progress after 1974/75. Of the total sum of the budget, about 58 percent was spent for the transmission systems and distribution facilities, about 40 percent for thermal power generation, and a minor portion for the hydro power.

09.031 During the period, as already presented in Table 9.10, considerable efforts were made to improve the old 30 kV transmission systems and distribution facilities.

09.032 Though only a small addition of about 30 MW in generation was achieved during the period, another additional generation of 120 MW, which has been under construction, is scheduled to be commissioned in 1977 and 1978.

09.033 The construction of a 150 kV interconnector which will connect the Tuntang and Ketenger systems started. All the major systems in Central Java will be linked after completion of the interconnector in 1978.

09.034 The total figures of the power sector budget for Repelita I and II, including the estimation for 1977/78 to 1978/79, are summarized as follows:

(Unit: Tp. Thousand)

	Repelita I	Repelita II (up to 1978/79)	Total (%)	
Thermal	1,684,288	21,294,161	22,978,449	(31.7)
Hydro	940,210	7,829,640	8,769,850	(12.1)
Transmission & Distribution	4,361,174	36,342,818	40,703,992	(56.2)
Total	6,985,672	65,464,619	72,452,291	(100.0)

Source: Table 9.11.

The budget for Repelita II, although including some estimates, will be 9 times as great as that of Repelita I. Of the total sum of the budget for Repelita I and II, about 56 percent will be spent for transmission systems and distribution facilities, about 32 percent for thermal generation and about 12 percent for hydro-power.

9.1.4 Rural Electrification

09.035 In Central Java the rural electrification program has been promoted since 1974, in keeping with a decree by the Governor of the Province. The purpose of the program is understood as "to improve the living standard of rural population, to minimize the difference of living standard between the urban and the rural areas, and to utilize the increased potential for the rural people" (according to an officer in Rural Electrification Department of the Province).

09.036 The actual results of the program and yearly budget plan are as follows:

(1) Program results

Year	Number of Places	Installed Capacity (kVA)	Construction Cost (Rp. 1,000)	Remarks
1969	1	20	DPUTL Aid	Mirco-Hydro
1973	1	119	46,084	Diesel
1974	1	75	63,450	Micro-Hydro
1975	2	250	102,500	Diesel
1976	16	1,641	317,950	All Diesel
1977	4	700	152,208	Diesel

Source: Department of Rural Electrification, Central Java Province.

(2) Provincial budget

1975	Rp.130 million
1976	Rp.140 million
1977	Rp.201 million

09.037 The initial investment for construction of the power generation and distribution facilities is borne by the Government, and the beneficiaries pay tariffs almost corresponding to the running cost.

After the completion of the facilities, the projects will be handed over to kabupaten governments, with working capital for two months and personnel. During these months kabupaten government will collect the tariffs from the beneficiaries.

09.038 The tariff is slightly lower than the PLN's prevailing rate, Rp.950 per month for 100 VA. The surplus should be kept in reserve fund, and in the case of deficits, some loans will be provided by kabupaten governments.

09.039 The facilities are designed and built according to PLN standards. It is planned to increase the unit capacity of the generation facilities to attain an economy of scale in the future.

09.040 The program will have an important role, as far as no connection to PLN's network is expected among many parts of the rural areas in the near future, although the total costs including the initial investment for these smaller units will be rather higher than in the normal supply networks.

9.1.5 Development Problems and Objectives

(a) General

09.041 Since the beginning of Repelita II, as described in Section 9.1.3, assessment of Progress of Power, the power sector of Central Java has basically made a considerable progress. Although the addition of power generation capacity in the period appears relatively small by this date, efforts made during the period will bear fruit in the quite near future, by almost doubling the total generation in the area.

09.042 As for transmission lines, the interconnector will bring the Tuntang and Ketenger systems into one system in 1978, covering the major parts of the area. Thus the power sector of Central Java seems to be achieving the improvement of its basic structures which have been the main constraint for a long period. However, the sector will require obviously further continuous reinforcement efforts both on its structures and performances. In the following, the major problems which need such efforts will be discussed.

(b) Development of Power Sources and Other Facilities

09.043 As already shown in Table 9.1, the power sector of Central Java has a small share, about 15 percent, of entire Java, in both installation and production, whereas the population of Central Java and D.I. Yogyakarta accounts for about 32 percent of entire Java. This means that its power sector is at a very low level of development, and should be improved in proportion to the needs and the development potential of the area. An accelerated program of power development would be one of the most important objectives in the area. Although

the power supply situation relative to power demand is planned to be improved toward the end of 1978 according to Figure 9.2, the improved situation will not last long without introducing large scale thermal generation and some new hydro-generation into the area, even in the case of lower (suppressed) load forecase (see Figure 9.2).

09.044 Another important issue is a massive expansion of the trnans-mission and distribution capacities in order to widen the area serviced and to gain the private industries' demand which is now met by individual diesel generators. The development and improvement of power transmission and distribution facilities are prerequisite to expand the power supply.

(c) Interconnection of the Systems Between Other Regions

09.045 The interconnection between Tuntang and Ketenger systems within Central Java is being built at present and is scheduled for completion in the early period of 1978. Then the entire areas of Central Java will have a larger unified system with newly added alrge thermal units at Semarang. Also, the power demand will be greatly increased by that time.

09.046 The next step to be taken is the interconnection with other regions, which is reportedly planned in around 1979 to 1980 with West Java and in around 1979 to 1980 with East Java. The purposes of the regional interconnection are to take advantage of higher system reliability, to have the economic merits of large-scale thermal generation units and common use of reserved capacities between the systems, and then to enable the large-scale power development and supply and demand improvement throughout the whole Java island, which will substantially benefit the study area too.

(d) Improvement in General Services

09.047 There are many problems in regard to the general services as follows:

(1) Many complaints are lodged with PLN as to the inferior quality of electric power supply; below-normal voltage and frequency levels, and occurrence of frequent interruptions.

(2) Many industrial power consumers are still operating their own generating units, without being connected to the PLN network.

(3) People in many parts of the Province are not being supplied with electricity.

09.048 The improvement of the general services is one of the important objectives of power development and it should be a long-term program. This would require a large amount of investment and a considerable burden

of continuous efforts. Also it should be supported by reinforcement of the basic structures such as power-generation schemes and transmission schemes.

09.049 The imporvement of general services is of a great importance, since the power sector is designed as a public utility enterprise which is supposed to cover the entire terriroty and as a monopolistic enterprise which is supposed to serve all demand in the area.

(e) Power Supply to Cilacap

09.050 To meet the power demand at Cilacap, a gas turbine generation plant with three 15 MW units will be installed at Cilacap.

09.051 It is reported that Cilacap is scheduled to be brought up as an industrial development center, which would consume large amounts of power. Close cooperation between the power and industrial sectors is needed to analyze situations and to forecast the future power demand in Cilacap.

(f) Rural Electrification

09.052 The rural electrification program, now being promoted by the Provincial Government, is designed to improve the living of the rural population, to reduce disparities in living standard between urban and rural areas, and to permit increased utilization of the potential for the rural people.

09.053 Since there are many rural areas which may not be connected to the PLN networks even in the near future, the program would be important for the rural population. Close cooperation between the Provincial Government and PLN should be fostered in selection of the locations and other technical matters.

09.054 The unit size of generation has been studied recently about whether or not to adopt a larger size to decrease the per kW costs.

9.1.6 Recommendations

09.055 Although the power sector of Central Java is still remaining at the rather low level of development, it has made considerable progress especially since Repelita II. However, the general situation requires further development and improvement of PLN's performances, since the electric power sector plays a key role for the development of social life and industry. The recommendations are as follows:

(a) Development of Power Sources and Other Facilities

09.056 Development of new power sources should be pursued to cover the suppressed power demand at present and the future load increment which will arise from the development of the region.

09.057 It would be noted that at present the region has only a very small portion, about 15 percent, of the total power consumption of Java due to the insufficiency of power supply facilities.

09.058 The development and imporvement of power transmission and distribution facilities should be promoted to extend the amount and coverage of power supply. This would improve the very low figures of per capita power consumption in the study area.

(b) Interconnection With Other Regions

09.059 After the unification of the two power systems within the area, the interconnection with other regions should be promoted, first with West Java and next with East Java.

09.060 This inter-regional connection is for the large-scale power development and improvement in supply and demand coordination throughout whole Java, which will substantially benefit the study area too, taking advantage of higher reliability of system, merits of large-scale thermal generation unit and common use of reserved capacities between the systems.

(c) Improvement of General Services

09.061 Many problems in regard to general services exist, as outlined above.

09.062 The imporvement of the general services should be a long-term program, which would require a large amount of investment and a considerable burden of continuous efforts. Also it should be supported by reinforcement of power sources and other facilities. However, as the power supply is a basic prerequisite for development, high priority should be attached to its imporvement.

(d) Suggested Development Schedule and Estimate of Annual Expenditures

09.063 Considering the development priorities and suggested development programs described in 9.1.2, the work schedules and estimated annual expenditures calculated in 1977 prices for the power sector development in the study area are summarized in Table 9.12.

09.064 According to the suggested development schedule, the electric power situation of the PLN area will be imporved as follows:

Table 9.12 Suggested Schedule and Estimates of Annual Expenditures

for Electric Power Development in Central Java

(Unit: US$1,000 at 1977 Price)

Projects	Total	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	85/86
I. On-going Projects										
1. Semarang Steam I and II (2 x 50MW)					- 78/79					
2. Semarang Gas Turbine III (1 x 20MW)					- 77/78					
3. Garung Hydro (2 x 12MW)					- 79/80					
4. Transmission Lot 3/4 (270Km, 143.5MVA)					- 78/79	SMR - Pekal., SMR - Yog. - Solo				
5. Distribution System					- 78/79					
6. Ketenger System					- 78/79					
Subtotal I	113,048	52,862	52,243	7,943						
Foreign Currency	56,548	25,774	26,204	4,570						
Local Currency	56,500	27,088	26,039	3,373						
II. New Projects										
7. Semarang Steam III (1 x 200MW)					79/80 - 83/84					
8. Semarng Steam IV (1 x 200MW)					81/82 - 85/86					
9. Mrica Hydro (3 x 60MW)					78/79 - 85/86					
10. Wonogiri Hydro (10.2MW)					79/80 - 80/81					
11. Sempor Hydro (1MW)					78/79					
12. Cilacap Gas Turbine (2 x 20MW or 3 x 15MW)					78/79					
13. Transmission, Substation, Distribution etc.					78/79 - 85/86					
Subtotal II	906,656	-	4,971	97,919	117,628	152,916	216,972	173,220	93,674	49,356
Foreign Currency	568,322	-	2,699	59,501	68,993	95,208	136,692	111,692	62,904	30,633
Local Currency	338,334	-	2,272	38,418	48,635	57,708	80,280	61,528	30,770	18,723
Grand Total										
Total I & II	1,019,704	52,862	57,214	105,862	117,628	152,916	216,972	173,220	93,674	49,356
Foreign Currency	624,870	25,774	28,903	64,071	68,993	95,208	136,692	111,692	62,904	30,633
Local Currency	394,834	27,088	28,311	41,791	48,635	57,708	80,280	61,528	30,770	18,723
Total I & II (L.C.: Rp. Million)	(163,856)	(11,242)	(11,749)	(17,343)	(20,183)	(23,949)	(33,316)	(25,534)	(12,770)	(7,770)

Source: Study Team.

	1975	1978	1983
Installed Capacity (MW)	125	246	480
Amount of Generation (GWh)	355	975	2,178
Population Including Yogyakarta (1,000 Persons)	26,497	27,320	29,731
Annual Generation per Capita (kWh)	13.4	35.7	73.2

Source: Study team.

(e) Power Supply to Cilacap

09.065 The gas turbine generation at Cilacap are included in the implementation program at present, even though it is reported Cilacap is scheduled to be brought up as an industrial development center.

09.066 Some close cooperation between the power and the industrial sectors should be needed to analyze and forecast the future power demand and situaiton in Cilacap.

(f) Rural Electrification

09.067 The rural electrification program has been promoted by the Provincial Government. Since many rural areas may not be connected to the PLN networks at present, the program would play an important role for the population.

09.068 A close cooperation between the Provincial Government and PLN should be promoted in selection of the locations and other technical matters.

(g) Financial Considerations

09.069 To achieve these recommendations, required financial allocation and the schedule of annual expenditures are estimated and presented in Table 9.12.

9.2 Telecommunication

09.070 To facilitate flows of up-to-date information between distant locations is a prerequisite for healthy functioning of an economy. For

this purpose, telecommunication is essential. Also, according to developed countries' experience, telecommunication is a financially feasible sector in the long-run. In this section, (1) local installations and connections of the telephone system, (2) intercity and inter-regional transmission lines for telephone, telegraph, and telex, and (3) TV and radio broadcasting systems, are discussed.

9.2.1 Telephone Exchange Facility and Local Connections

(a) Existing Installations and Connections

09.071 Table 9.13 presents the number of telephones installed in Central Java. There were about 27 thousands of telephones in 1973, which was about 10 percent of the telephones in Indonesia. The number grew at the annual rate of 6.6 percent in Central Java from 1969 to 1973, whereas the number of telephones in the entire Indonesia grew by 9.3 percent. Central Java lags behind the national average. With respect to the number per 10,000 population, there were only 12 telephones in Central Java, while there were 21 telephones per 10,000 persons in Indonesia in 1973. Central Java is again lagging behind the national average.

09.072 Table 9.14 presents the automatic and manual exchange capacities and the number of persons waiting to have telephones installed within major telephone exchange areas in 1976. A substantial portion of the exchanges in these areas is still manually operated. Only 61 percent of the total exchange capacity is automated in the areas, and the share of automatic telephones, overall, will certainly be less than this if the other small branch exchange areas are included. The number of persons waiting to have telephones installed in the areas is not enormous and they could be served by use of existing capacity.

09.073 For those kabupaten centers not listed in Table 9.14, PERUMTEL (Perum Telecomunikasi) operates small branch exchanges in most of the smaller towns and it is said that there is already enough capacity to serve additional subscribers. So there is no substantial difference between the supply and the demand for telephone line units in Central Java in 1976. What is needed is to link the telephone systems within medium and small cities by transmission lines.

09.074 In the rural areas, very little telephone service exists. In 1973, there were many kecamatans with only one telephone, according to Proyek Penelitian Statistik Potensi Desa Java Tengah 1973 by BAPPEDA. The shortage of telecommunication facilities in the rural areas has been a problem for commerce, health care and government administration as well as for other functions. For example, since there is only one Public Health Center in a kecamatan, its communication with desas in its service area is essential. Without telecommunication, the activities of these centers would be very limited. A similar situation exists between the Kabupaten Government and the kecamatans under it. According to the original plan of PERUMTEL for Repelita II, the expansion of telephone

Table 9.13 Number of Telephones in Use, by Year

Central Java, 1969 - 1973

		Number of Telephone[1]/		Number of Telephone Licenses[2]/		
		1969	1970	1971	1972	1973
Central Java	Number of Telephones	20,845	21,036	22,158	23,859	26,933
	Number of Telephones per 10,000 Population	9.8	9.7	10.1	-	11.9
Indonesia	Number of Telephones	184,202	204,465	221,780	240,828	262,991
	Number of Telephones per 10,000 Population	16.0	17.4	18.7	-	21.4

Sources: 1/ IBRD, Indonesia, Development Prospects and Needs, Basic Economic Report Statistical Annex, April, 1975, Table 10.5.

2/ BPS, Statistical Pocketbook, Indonesia, 1974/75, Central Bureau of Statistics, 1976, Table X 5.4.

Table 9.14 Exchange Capacity, Number of Connections, and Number of Waiting Persons by Some of Head Telephone Exchanges

Central Java, 1973-1976

(Unit: Line Unit)

Selected Head Telephone Exchanges	1973		1974			1975			1976		
	Capacity	Connections at Head Exchange	Capacity	Connections at Head Exchange	Waiting Persons	Capacity	Connections at Head Exchange	Waiting Persons	Capacity[2]	Connections at Head Exchange	Waiting Persons
Semarang	8,000	6,809	8,000	7,674	750	8,000	7,885	1,000	10,000 (A) (5,000 will be added)	8,674	836
Solo	4,000	3,922	4,000	3,956	600	4,000	3,934	202	5,000 (A)	3,974	91
Magelang	1,000	901	1,000	928	20	1,000	964	56	1,000	978	104
Purwokerto	800	786	1,120	800	77	1,120	903	66	1,120 (M)	1,006	28
Tegal	1,400	1,256	1,400	1,277	-	1,400	1,276	39	1,400 (M)	1,278	40
Pekalongan	1,320	1,182	1,520	1,377	69	1,520	1,467	42	1,720 (M)	1,563	20
Kudus	800	760	800	770	78	800	771	92	960 (M)	796	134
Cepu in Blora	640	211	640	224	-	640	237	10	510 (M)	255	-
Pati[3]									450 (M)		
Salatiga[3]									640 (M)		
Kendal[3]									200 (M)		
Cilacap[3]									640 (M)		
Kebumen[3]									250 (M)		
Klaten[3]									640 (M)		
Total[1]	17,960	15,825	18,480	17,006	1,594	18,480	17,437	1,507	24,530	18,524	1,253
Yogyakarta	2,000	1,959	2,000	1,974	1,063	2,000	1,983	1,343	2,000 (A) (2,000 will be added)	1,994	1,800

Notes: 1/ These are not all of the head telephone exchanges in Central Java. Basically each Kabupaten seems to have its own exchange, but not all of them are listed here.
2/ (A): Automatic exchange.
(M): Manual exchange.
3/ Source: *PERUMTEL/Daerah*, 1977.

Source: PERUMTEL/Daerah, "Dafter Capacitas Sentral, Jumlah Sambungan Telepon Induk, Dafter Tunggu Calon Abonee", 1977.

services to the rural areas would take place duirng Repelita III.[3] There are several problems accompanying its implementation. One is that of rural electrification. To maintain rural telephone services, electricity is necessary at least at kecamatan centers. But, it might be possible that some kecamatans will still have no electricity connection by the end of Repelita III. Another problem is that the installation of lines connecting desas to a kecamatan center and to a kabupaten center will be very costly. To cope with these difficulties, a battery-operated short wave radiotelephone system deserves serous consideration. The recent project in Special Region of Yogyakarta (D.I.Y.) is a good starting point for preparation of a plan for Central Java. D.I.Y. has recently developed a HF (short wave) radiotelephone system connecting 5 kabupatens and 87 kecamatans within the District, and it has cost about Rp.34 million.[4] This is Rp.370 thousand per one radiotelephone set. A study should be undertaken for Central Java for the development of a radiotelephone system in the rural areas.

(b) Telephone Development Program

09.075 Table 9.15 presents the plan for expansion of exchange capacity for Repelita II in Central Java. According to the original plan prepared in 1973, there would be the total capacity of 58,200 line units (line unit is an unit for measuring the capacity of exchange) by the end of Repelita II. Since the estimated population at the end of Repelita II will be about 25 million, the capacity in 1979 will be about 23.3 line units per 10,000 population, which is much lower than the forecasted necessary subscribers of 38.7 line units per 10,000 population for the entire nation in 1979.[5] The national targets for Repelita II are 650 line units per 10,000 persons for Jakarta and 31 line units for the other areas outside Jakarta per 10,000 persons. When this target, 31 line units per 10,000 population, is applied to Central Java, the planned capacity in Central Java in 1979 should be 77,500 line units instead of 58,200 line units.[6]

(c) Development Cost and Tariff Schedule

09.076 Telephone installation charges to a subscriber in Central Java in 1976 are as presented in Table 9.16. Charges differ by city. For example, it costs at least Rp.150,000 in Semarang but only Rp.25,000

3/ PERUMTEL, Proposal for Telecommunications Development in the Second Five Year Plan, Vol. I, Bandung, 1973.

4/ Source: PERUMTEL/Daerah, 1977.

5/ PERUMTEL, Proposal for Telecommunications Development in the Second Five Year Plan, Vol. I, Bandung, 1973.

6/ Ibid.

Table 9.15 Existing and Planned Telephone Exchange Capacity

Central Java, 1972-1979

(Unit: Line Unit)

Exchange	1972 Existing Capacity		1974 Forecasted Capacity		Installation Program						Removal Program		Planned 1979 Capacity	Revised[2] 1979 Capacity
	Auto	Manual	Auto	Manual	74/75	75/76	76/77	77/78	78/79	Total	Auto	Manual		
Semarang I[2]	8,000	--	8,000	--	-	-	2,000	-	-	2,000	-	-	10,000	
Semarang II[2]	-	1,050	-	1,050	2,000[1]	-	-	5,000	-	5,000	-	1,050	5,000	15,000
Semarang III	-	-	-	-	-	-	-	-	5,000	5,000	-	-	5,000	
Salatiga[2]	-	640	-	640	-	-	-	1,000	-	1,000	-	640	1,000	1,000
Kudus[2]	-	860	-	860	-	-	-	3,000	-	3,000	-	860	3,000	3,000
Jepara	-	140	-	140	-	-	-	-	300	300	-	140	300	-
Demak	-	140	-	140	-	-	-	-	300	300	-	140	300	-
Magelang	1,000	-	1,000	-	-	-	2,000	-	-	2,000	1,000	-	2,000	-
Temanggung	-	200	-	200	-	-	-	-	200	200	-	200	200	-
Muntilan	-	100	-	100	-	-	-	-	200	200	-	100	200	-
Pati[2]	-	320	-	320	-	-	-	1,000	-	1,000	-	320	1,000	1,000
Cepu	-	700	-	700	-	-	-	-	1,000	1,000	-	700	1,000	-
Solo I	4,000	-	4,000	-	-	-	1,000[1]	-	-	1,000[1]	-	-	5,000	6,000
Solo II	-	-	-	-	-	-	5,000	-	-	5,000	-	-	5,000	
Klaten[2]	-	650	-	650	-	-	-	2,000	-	2,000	-	650	2,000	3,000
Purwokerto[2]	-	800	-	1,120	-	-	-	3,000	-	3,000	-	1,120	3,000	3,000
Purbalingga	-	200	-	200	-	-	-	-	400	400	-	200	400	-
Cilacap[2]	-	510	-	510	-	-	-	3,000	-	3,000	-	510	3,000	3,000
Tegal[2]	-	1,230	-	1,230	-	-	-	3,000	-	3,000	-	1,230	3,000	3,000
Brebes	-	200	-	200	-	-	-	-	300	300	-	200	300	-
Slawi	-	200	-	200	-	-	-	-	200	200	-	200	200	-
Pekalongan[2]	-	1,290	-	1,290	-	-	-	3,000	-	3,000	-	1,290	3,000	3,000
Batang	-	100	-	100	-	-	-	-	300	300	-	100	300	-
Kedung Wuni	-	100	-	100	-	-	-	-	200	200	-	100	200	-
Wonosobo	-	200	-	200	-	-	-	800	-	800	-	200	800	-
Kendal[2]	-	-	-	-	-	-	-	1,000	-	1,000	-	-	1,000	-
Kebumen[2]	-	-	-	-	-	-	-	1,000	-	-	-	-	-	-
Total	13,000	9,630	13,000	9,950	2,000	0	10,000	26,800	8,400	44,200	1,000	9,950	58,200	na
Yogyakarta I	2,000	-	2,000	-	-	2,000[1]	-	2,000[1]	-	4,000[1]	-	-	6,000	7,000
Yogyakarta II	-	-	-	-	-	-	-	-	2,000	2,000	-	-	2,000	

Notes: na: Not applicable.
1/ Old system.
2/ Revised capacity, according to PERUMTEL Daerah, 1977.

Source: PERUMTEL, Proposal for Telecommunications Development in the Second Five Year Plan, 1973.

Table 9.16 Telephone Installation Cost Charged to a Subscriber

Central Java, 1976

(Unit: Rp.)

	Principal Cost (Distribution Line up to 6 km)	Additional Charge per 100 m Exceeding 6 km		
	0-6 km	6-10 km	10-20 km	Over 20 km
Semarang Telephone Office Area (Group III)	150,000	70,000	90,000	115,000
Kudus, Pekalongan, Tegal, Purwokerto (Group V)	75,000	60,000	80,000	105,000
Cepu (Groups VII)	25,000	50,000	70,000	95,000

Source: PERUMTEL/Daerah, Semarang, 1977.

in Cepu. These are the minimum installation charges for telephones to be installed within 6 km from a telephone exchange center. An applicant residing outside the 6 km radius has to pay the additional charge of Rp.70,000 (in Semarang) to Rp.50,000 (in Cepu) per additional 100 m, which is very expensive but roughly represents the real development cost for extension (see Table 9.16), according to provincial telecommunication officers.

09.077 The development costs of exchange expansion and intercity transmission lines and the costs for operation and maintenance are supposed to be met by the revenues from subscribers. The subscriber's monthly payment in 1976 consisted of the fixed charge of Rp.280, the minimum telephone-call charge of Rp.700 up to 35 calls, the additional charge of Rp.20 per one local call beyond 35 calls, and long distance call charges. Although this tariff schedule does not appear unreasonably low it is said that PERUMTEL will be financially in deficit at the national level until 1982.[7/] A major cause of the deficit appears to be the large discrepancy between the development cost and the installation charge. The development cost per one line unit was estimated to be US$940 for new development and US$870 for extensions, in 1972.[8/] The total development cost of local exchanges for the entire Indonesia for Repelita II is estimated to be US$443.6 million in 1972 prices for the additional capacity of 411,342 line units.[9/] This works out to US$1,078 per line unit. For these levels of development costs, the minimum installation charge is US$360 in Semarang and only US$60 in Cepu. A reexamination of the tariff schedule appears to be needed.

9.2.2 Transmission Facilities

09.078 The transmission demand is the aggregated demand of long distance telephone calls, telex, and telegraph.

(a) Domestic Long Distance Calls

09.079 Table 9.17 presents the number of domestic long distance calls from and to Central Java. Outgoing calls from Central Java increased on average by 39 percent annually during the period form 1971 to 1973, including operator-handled calls and Subscriber Long Distance Dialling (SLDD) calls. Long distance call traffic from Central Java is growing very rapidly. In Central Java, the first automatic trunk exchange for

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7/ According to officials in PERUMTEL/Province, 1977.

8/ PERUMTEL, Proposal for Telecommunications Development in the Second Five Year Plan, Vol. I, 1973.

9/ Ibid.

Table 9.17 Number of Domestic Long Distance Calls, Operator-Handled and by SLDD

		1971	1972	1973	1974	1975	1976 1/
Operator-Handled Long Distance Calls from and to Central Java (Thousand Calls)	Out	1,454	1,715	2,071	2,243	2,374	2,475
	In	1,512	1,788	2,151	2,244	1,195	1,012
	Transit	404	550	709	632	677	710
S.L.D.D. (Automatic) (Thousand Calls) from Semarang	Out	-	261	730	-	-	-
	In	-	-	-	-	-	-

Note: 1/ Source: PERUMTEL/Daerah, Semarang, 1977.

Source: Jawa Tengah, Dalam Angka 1973-1975, BAPPEDA/Central Java, 1977.

SLDD was established in Semarang during 1972 and seems to have been established in Surakarta and Magelang in 1975. The development plan of the automatic trunk exchange capacity is as presented in Table 9.18.

(b) Telex

09.080 Telex service in Central Java is available only in Semarang. Table 9.19 presents the existing telex capacity in 1972 and the development program for telex exchange capacity for Repelita II. The major objectives of Repelita II in regard to telex development are to cope with rising demand for telex facilities in major cities and to utilize telex for the users of the public telegraph service, under the Gentex program. Gentex is the telex unit located in a Public Telegraph Office and which sends telegraphs received from users to destinations in order to speed up telegraphy and eliminate mistakes in the process. Gentex and telex development program at the national level is presented as follows:

	1972 Actual	1974 Estimated	1979 Target
Direct Subscribers	874	1,060	1,780
Gentex Terminals	24	40	320
Total Required Telex Exchange Capacity	898	1,100	2,100

Source: PERUMTEL, Proposal for Telecommunications Development, 1973.

In Central Java, telegraph offices to be equipped with Gentex printers are listed in Figure 9.3. There would be 14 Gentex-equipped offices in total by 1979.

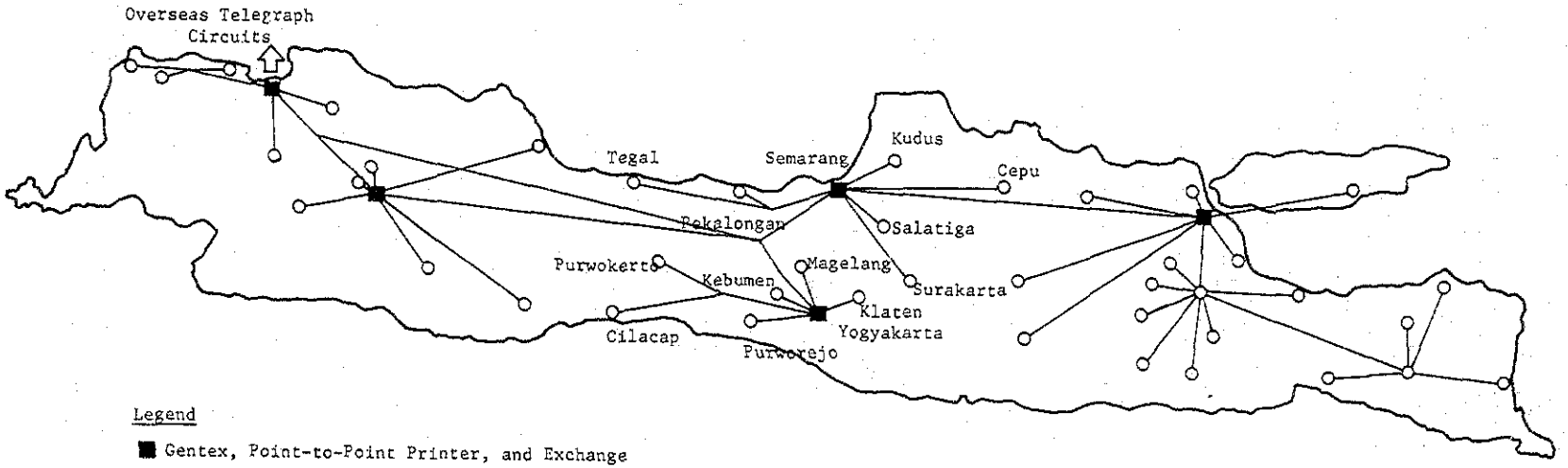
(c) Telegraph

09.081 Table 9.20 presents the actual extent of telegraph traffic from and to Central Java and the estimated number of telegrams in Indonesia. The extent of telegraph traffic outgoing from Central Java, which is about 6 percent of the number of telegrams in Indonesia in 1972, grew by 18 percent annually from 1971 to 1975. If the same rate of growth is assumed, there will be 558 thousand telegraphs outgoing from Central Java in 1979.

09.082 Before Repelita II, all telegraphs were carried by a point-to-point system, which conveys messages indirectly through intermediate relaying points by printers, Morse code, or telephones. In Repelita II, emphasis is on development of Gentex, which can convey messages directly

Figure 9.3 Planned Telegraph System for 1979, by PERUMTEL

Java & Madura, 1979



Legend

■ Gentex, Point-to-Point Printer, and Exchange

○ Gentex Office

Source: PERUMTEL, Proposed for Telecommunications Development in the Second Five Year Plan, 1973.

Table 9.18 Existing and Planned Automatic Trunk Exchange Capacity

Central Java, 1972-1979

(Unit: No. of Calls)

	1972 Existing	1974 Planned	1979 Planned
Semarang	80/77	80/77	580/500
Surakarta	-	320/320	320/320
Purwokerto	-	-	200/200

Note: Outgoing call/Incoming call

Source: PERUMTEL, Proposal for Telecommunications Development, 1973.

Table 9.19 Existing and Planned Capacity of Telex Exchange

Central Java, Indonesia, 1972-1979

(Unit: Telex Line)

	Existing Capacity	Capacity Development Program				
	1972	1974	75/76	76/77	77/78	78/79
Semarang	50	100	100	100	200	200
Yogyakarta	20	20	20	20	100	100
Total Indonesia	1,170	1,340	1,850	2,230	2,410	2,500
"	Direct Subscribers					1,780
"	Gentex Terminals					320

Source: PERUMTEL, Proposal for Telecommunications Development in the Second Five Year Plan, PERUMTEL, Bandung, 1973.

Table 9.20 Actual Number of Telegraph Traffic From and to Central Java, and Estimated Number of Telegrams in Indonesia
Central Java, 1973-1979

		1971 (Actual)	1972 (Actual)	1973 (Actual)	1974 (Actual)	1975 (Actual)	1979 (Target)
Telegraph Traffic[1/] (in 1,000) (Central Java)	Out	148	177	276	273	288	558[3/]
	In	166	199	305	306	318	-
	Transit	184	252	367	367	310	-
			(Actual)		(Estimated)		(Target)
Telegrams[2/] (in 1,000) (Indonesia)	Domestic	-	2,870	-	3,230	-	5,200
	International	-	1,020	-	1,070	-	1,370

Notes and Sources:

1/ Source: BAPPEDA/Central Java, Jawa Tengah Dalam Angka, 1973-1975, 1977.

2/ Source: PERUMTEL, Proposal for Telecommunications Development, 1973.

3/ Estimated figure based on 18 percent growth rate.

to destinations having telex terminals. Figure 9.3 summarizes the development plan of telegraph system based on Gentex, plan which was proposed by PERUMTEL.

09.083 As for the geographic distribution of telephone and telegraph offices, each kabupaten or kotamadya had at least one office and at most seven offices and there were in total 96 offices in Central Java in 1973.[10/]

(d) Transmission Lines for Telecommunication

09.084 Transmission lines are developed mainly on the basis of national rather than provincial considerations. The Indonesian transmission system comprises three levels: (1) the backbone route, (2) spur routes, and (3) rural transmission systems. The backbone route, which is called Nusantara Broadband System, is the principal route with large capacity which will connect major cities from Ace in Sumatra through Jakarta to Jayapura in Irian Barat by the end of Repelita II (see Figure 9.4). A spur route is a secondary route with medium capacity which connects secondary major cities with each other and those cities to the backbone route. A rural system is the smallest system; it connects small towns such as kecamatan centers. Besides these three systems, there is a domestic satellite system to serve as a backup system to the backbone route and to distribute one color TV and two black-and-white educational TV programs to 26 cities with VHF broadcasting.

09.085 The backbone route consists primarily of a terrestrial microwave system, troposphere scatter systems, VHF/UHF radio systems, and submarine cable systems for those parts where the terrestrial microwave system is not applicable or would be too costly (see Figure 9.4).[11/] The spur routes use landline carriers for lowland cities and VHF radio system for isolated cities. The rural systems use naked wire or HF (short wave) radiotelephone systems.

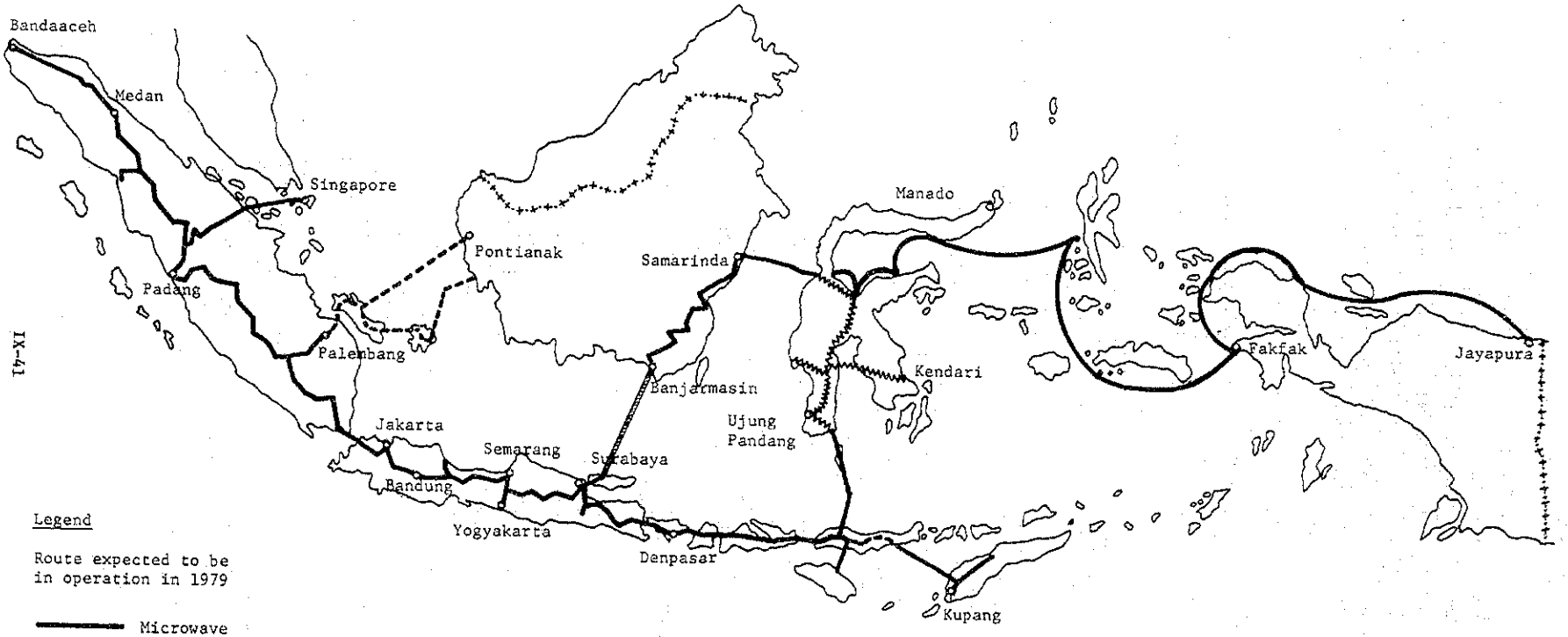
09.086 The main objective of transmission development in Indonesia is to cope with rising demand during the Repelita II. The primary demand in Indonesia comes from telephone expansion, telephone expansion which means 411,342 new line units and 14 new SLDD trunk exchanges to be added during Repelita II, in addition to which there is secondary new demand which comes from telegraph and telex expansion. To meet these demands, 6,763 km of microwave routes, 514 km of troposcatter routes, 3,750 km of submarine cables, and 5,245 km of spur routes will be constructed during Repelita II, achieving 7,771 km of microwave, 514 km of troposcatter, 3,750 km of submarine, and 13,165 km of spur routes by the end of 1979 in Indonesia.

10/ BAPPEDA, Proyek Penelitian, Statistik Potensi Desa, Jawa Tengah, 1973, 1975.

11/ VHF: Very High Frequency Wave which has 30 megacycles to 300 megacycles.
UHF: Ultra High Frequency Wave which has 300 megacycles to 3,000 megacycles.
Microwave: Wave which has a frequency of more than 3,000 megacycles.

Figure 9.4 Planned Nusantara Broadband System at the End of Repelita II

Indonesia, 1979



Source: PERUMTEL, Proposal for Telecommunications Development in the Second Five Year Plan, 1973.

(e) Microwave

09.087 The Java-Bali Microwave Network (see Figure 9.5) is a part of the backbone route and was completed to Denpasar in 1973. In Central Java, this network has one terminal station which is Semarang Station and one dropping station Surakarta. The Semarang Station is connected to the Bandung Station, and Surakarta Station is to the Madium Station. The existing channels between these stations, and the plan for their expansion are presented in Table 9.21.

Table 9.21 Existing and Planned Channels of Java-Bali Microwave Network, Central Java, 1976-1979

(Unit: Number of Channels)

	Existing Channels 1976	Planned Channels End of Repelita II
Semarang to Jakarta	114	120
Bandung	48	
Cirebon	24	36
Surakarta	84	
Yogyakarta	60	
Madium	24	
Surabaya	60	72
Surakarta to Jakarta	42	84
Bandung	6	36
Yogyakarta	36	48
Madium	24	
Surabaya	48	96

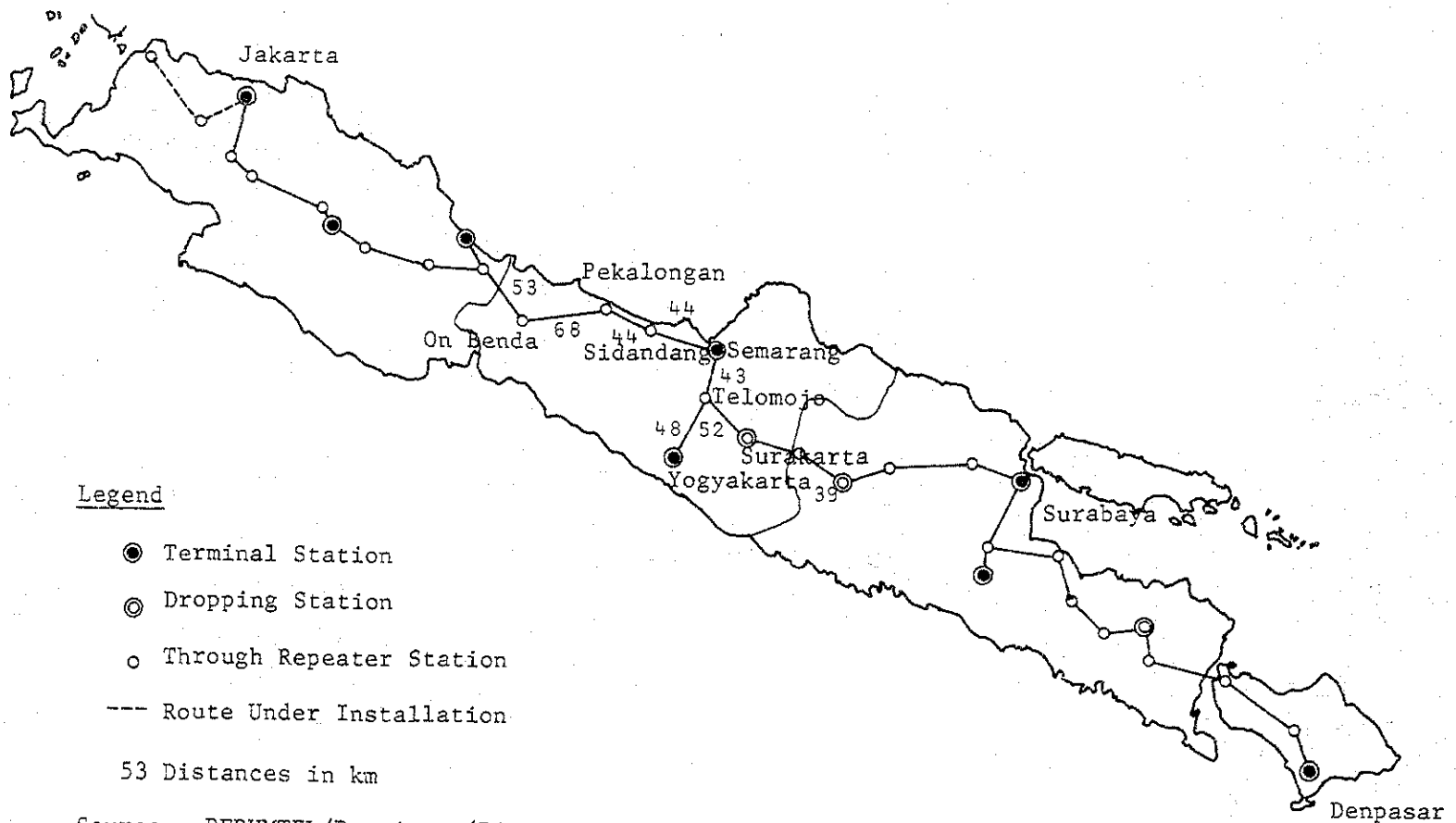
Source: PERUMTEL/Province, 1977.

(f) Spur Routes

09.088 The spur routes development plan is presented in Figure 9.6. The spur routes will connect all karesidenan centers (in other word, district centers of which there are six in the Province) and other major cities in Central Java including Cilacap according to the plan. Achievement of the plan as scheduled is recommended.

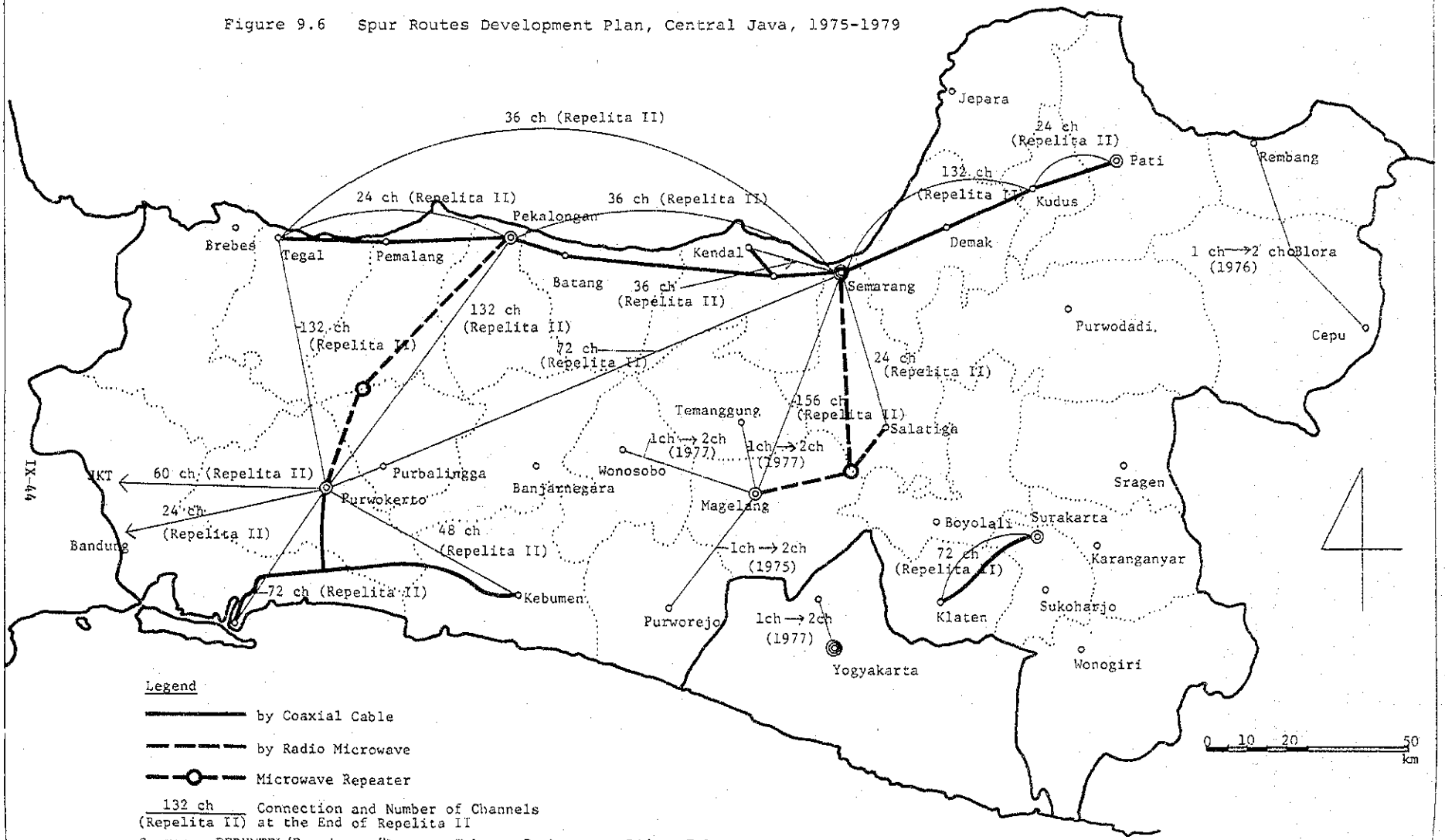
Figure 9.5 Java-Bali Microwave Network

Central Java, 1973



Source: PERUMTEL/Province (Biro Daerah Telekom), "Jaringan Microwave Java-Bali", PERUMTEL, 1973.

Figure 9.6 Spur Routes Development Plan, Central Java, 1975-1979



Source: PERUMTEL/Province, "Laporan Tahunan Pembangunan Bidang Telepon di Jawa-Tengah", 1977.

(g) Satellite

09.089 The domestic telecommunication satellite, called Palapa, was orbited in 1975 and its 40 earth stations were established in 1976. It has the total capacity of 2,400 channels (or 1,200 circuits), of which 144 channels are assigned to Semarang, which is one of the two earth stations in Central Java. No channel is allocated to the other station which is located at Cilacap. The 144 channels at Semarang comprise 48 channels from Semarang to Jakarta, 48 to Surabaya 24 to Bandung, and 24 to Yogyakarta.[12/]

9.2.3 Broadcasting Service: Radio and TV

(a) Radio

09.090 In Indonesia, radio broadcasting is a public undertaking, and is under the control of Radio Republic Indonesia (BRI). Until recently the radio programs were broadcast by HF (short
consists of islands scattered over a large area. The construction of medium wave facilities started in 1972 and medium wave broadcasting was started in 1976.

09.091 Although the number of licenses for radio receivers has decreased in recent years, the production of radio receivers has increased substantially, as presented in the following table:

	1969/70	70/71	71/72	72/73	73/74
Number of Radio Receivers[1/] Produced in Indonesia (1,000 Sets)	364	393	416	700	900
Number of Licenses for[2/] Radio Receivers in Indonesia (1,000 Sets)	3,653	3,477	3,029	2,670	2,300
Number of Licenses for[2/] Radio Receivers in Central Java (1,000 Sets)	522	454	194	164	164

Notes: 1/ Source: Commercial Advisory Foundation in Indonesia, "Production of TV and Radio Receiver Sets", CAFI, Jakarta, 1974.
2/ Source: Central Bureau of Statistics, Statistical Pocketbook Indonesia, 1974/75, 1976.

12/ Direktorat Jendral Pos dan Telekomunikasi, Sistim Komunikasi Satelit Domestik, 1975.

Table 9.22 Number of Radio and TV Receivers by KB/KDY

Central Java, 1973

			Number of Radio Receivers	Number of TV Receivers
1.	KDY	Magelang	9,500	679
2.	KDY	Surakarta	26,755	1,685
3.	KDY	Salatiga	4,114	336
4.	KDY	Semarang	58,854	6,649
5.	KDY	Pekalongan	7,704	511
6.	KDY	Tegal	13,569	349
7.	KB	Cilacap	17,049	96
8.	KB	Banyumas	28,669	185
9.	KB	Purbalingga	10,539	55
10.	KB	Banjarnegara	9,155	7
11.	KB	Kebumen	11,757	73
12.	KB	Purworejo	16,743	75
13.	KB	Wonosobo	9,896	69
14.	KB	Magelang	15,580	232
15.	KB	Boyolali	10,098	80
16.	KB	Klaten	26,568	397
17.	KB	Sukoharjo	11,437	90
18.	KB	Wonogiri	11,334	49
19.	KB	Karanganyar	9,566	114
20.	KB	Sragen	9,938	73
21.	KB	Grobogan	11,078	145
22.	KB	Blora	8,860	154
23.	KB	Rembang	5,661	71
24.	KB	Pati	12,903	364
25.	KB	Kudus	12,537	513
26.	KB	Jepara	6,918	167
27.	KB	Demak	7,750	202
28.	KB	Semarang	14,623	220
29.	KB	Temanggung	15,890	272
30.	KB	Kendal	14,195	379
31.	KB	Batang	6,282	113
32.	KB	Pekalongan	7,819	175
33.	KB	Pemalang	9,752	415
34.	KB	Tegal	12,467	205
35.	KB	Brebes	13,081	130
	Total		477,919	20,329

Source: BAPPEDA/Central Jawa, Proyek Penelitian Statistik Potensi Desa, Jawa Tengah, 1973, Table 00.14, 1976.

As for Central Java, Table 9.22 presents geographic distribution of radio receivers. There were 479 thousand receivers in Central Java in 1973, which means 2.1 sets per 100 population based on the 1973 registered population.

09.092 The development of medium wave radio broadcasting has 9 phases in total and at present the second phase is under construction. In the first phase which started in 1972, medium wave stations at Jakarta (300 kW, 610 kilocycles, 235 m antenna), Surabaya (100 kW, 580 kilocycles, 240 m antenna, covering the area within 175 km radius), and Medan (100 kW) were constructed, and in the second phase which started in 1974, construction was begun of the stations at Ujung Pandan (100 kW), Banjarmasin (50 kW), Palembang (50 kW), Pakanbaru (50 kW), and Semarang (10 kW), which are scheduled to be completed in 1977. Since its service area is limited to areas within a 100 km radius from Semarang, the southern part of Central Java cannot be serviced by the Semarang station. Two more stations at Purwokerto and Yogyakarta are planned to serve the southern part.

(b) Television (TV)

09.093 TV broadcasting is also a public undertaking, and is under the control of Television Republic Indonesia (TVRI). TVRI has its own microwave transmission line from Jakarta to Surabaya, but it is not in good condition.[13/] There is a plan to add one more bearer to the existing Java-Bali Microwave Network, which has two bearers in 1977, in order to substitute the TVRI's own transmission line.

09.094 Table 9.23 presents the number of TV sets registered in Central Java and Indonesia.

Table 9.23 Number of TV Sets Registered, Central Java, Indonesia, 1969-1976

(Unit: 1,000 Sets)

	1969	1970	1971	1972	1973	1974	1975 1/	1976 1/
Central Java	7	10	15	20	27	34	59	70
Yogyakarta	2	2	4	5	7	8		
Indonesia	112	133	189	209	283	351	430	497

Note: 1/ Source: Ministry of Information, "Banyaknya K.P. TV Yang Teldafter Selama Tahun 1972 SD Akhir Bulan Juni 1976", 1976.

Source: C.B.S., Statistical Pocketbook Indonesia, 1974/1975, 1976.

13/ PERUMTEL, Proposal for Telecommunications Development, 1973.

There were about 34,000 TV sets in Central Java in 1974, which means 1.5 sets per 1,000 population on average based on the 1974 registered population. In addition to this, it is said that there are unregistered sets which are estimated to be equal to as much as 60 percent of the number of registered sets. This would mean that there were about 2.4 sets per 1,000 population in 1974. As for the geographic distribution, Table 9.22 presents the number of TV sets by KB/KDYs. There are 7 sets at the minimum and 6,649 sets at the maximum in one KB or KDY in Central Java in 1973. It is said that recently the Ministry of Information started a program to supply every kecamatan head in Indonesia with one TV set free of charge in order to have villagers come and see it. Exposure to TV programs will have significant effects on the villagers' way of thinking and life style, and will be helpful in modernizing the villagers' attitudes.

09.095 The area serviced by TV broadcasting as a percent to the total provincial area is 35 percent in 1976 and will be 87 percent in 1977 as shown in the following table:

	Total Area	TV Serviced Area			
		1976 Existing	(%)	1977 Planned	(%)
Central Java (km^2)	34,206	11,900	35	29,600	87
Indonesia (km^2)	1,904,569	75,600	4	212,050	11

Source: Kaigai Keizai Kyoryoku Kikin.

9.2.4 Recommendations

09.096 With respect to urban telephone connections, there is no substantial unsatisfied demand at the moment in Central Java in 1976 (see Table 9.14). It seems, however, that the planned exchange capacity for 1979 is substantially less than the demand. There is a need to project the future demand by kabupaten center, so that the capacity and distribution line development plan may satisfy the future demand more efficiently.

09.097 As for rural areas, there are still some desas which cannot be reached by any transportation means except by horseback and foot, and many desas which are isolated during wet seasons. Telecommunication

is essential for these desas. Also, communication between a Public Health Center and desas is essential for the welfare of people in the desas, and communication between a kabupaten government and its desas is important for administrative purposes. These special telecommunication needs are more crucial than the needs for everyday activities. Rural telecommunication should be developed to meet these needs. Due to the importance of these emergency and administrative needs, rural telecommunication should be one of the priority issues within telecommunication development. To facilitate rural telecommunication, the possibility of rural electrification at least at every kecamatan center should be considered. Until such rural electrification is completed, a battery-operated short wave radio telephone system deserves serious consideration. As the first step, a study should be undertaken for developing a rural telecommunication system through comparison of alternative technologies and the identification of needs and demands.

09.098 For those medium and small cities having already telephone services, which is kabupaten centers and sometimes kecamatan centers, linking them with each other and to major cities by spur routes and intercity transmission lines should be given attention.

09.099 According to developed countries' experience, telecommunication is a sector with relatively high returns on investment, and its projects should be financially balanced in the long run. In order to make telecommunication projects feasible in Central Java, the installation charge to subscribers should be reexamined. At least, the installation charge to one line unit should cover a major portion of the combined cost of exchange development cost per line unit and the distribution line extension cost per line unit, which is in the order of US$1,000. At the same time, every effort to increase subscribers for fuller utilization of the available line unit capacity should be undertaken.

09.100 TV and radio broadcasting have significant educational effects on the population. In particular, they are said to have an effect of reducing the birth rate. The construction of the two medium wave stations at Purwokerto and Yogyakarta and some new TV broadcasting stations to cover the remaining areas in the Province should be given serious attention.

9.3 Water and Sanitation

9.3.1 General

09.101 Improvement of water supply and sanitation to the level necessary to maintain even minimum acceptable health standards will require a massive investment and improvement in organizational capabilities. However, the supply of good quality water and provision of sanitation are preventive measure against diseases, and save costs of

curative medical treatment and increases labor productivity, in addition to increasing the welfare of the population.

09.102 Diseases related to poor water and poor sanitation are among the principal causes of morbidity and mortality. Cholera, typhoid, dysentery, infectious hepatitis, and parasitic diseases transmitted by water still exist in the Province, and in particular parasitic diseases are prevalent. The health hazards due to poor water quality are serious. Table 9.24 presents the incidence of some of the diseases which are an outcome of those hazards. Unfortunately the incidence is slightly increasing, and in 1975 there were 26.7 incidents of parasitic disease patients, 12.7 incidents of typhoid fever patients, and 4.4 incidents of hepatitis patients all per 100 thousand population. When compared with the situation in developed countries, the incidence of parasitic diseases is about three times and typhoid fever about several hundred times, whereas the incidence of hepatitis is not particularly high. Table 9.25 presents the geographic distribution of these diseases. Typhoid was prevalent in KDY Semarang, KDY Salatiga, KB Purbalingga, KB Pati, and KB Temanggung. Hepatitis was prevalent in KDY Semarang and KB Rembang. Parasitic disease was prevalent in KDY Pekalongan and KB Kudus.

Table 9.24 Incidence of Water-Borne Diseases

Central Java, 1972-1975

(Unit: Incidence per 100,000 Population per Year)

	1972	1973	1974	1975
Typhoid Feber	6.0	14.3	18.6	12.7
Hepatitis	1.9	3.0	3.0	4.4
Parasitic Disease	nd	24.5	31.8	26.7

Note: nd indicates no data.

Source: Mission's estimation based on BAPPEDA, Jawa Tengah Dalam Angka, 1977.

Table 9.25 Geographic Distribution of Water-Borne Diseases

Central Java, 1972 and 1974

(Unit: Incidence per 100,000 Population per Year)

KB/KDY	Incidence			Population 1/	Incidence per 100,000 Population		
	Typhoid Fever 1972	Hepatitis 1972	Parasitic Disease 1974	1973	Typhoid Fever 1972	Hepatitis 1972	Parasitic Disease 1974
1. KDY Magelang	-	-	25	111,020	-	-	22.5
2. KDY Surakarta	-	-	289	464,395	-	-	62.2
3. KDY Salatiga	11	-	-	67,097	16.4	-	-
4. KDY Semarang	787	157	-	692,060	113.7	22.7	-
5. KDY Pekalongan	7	9	200	111,007	6.3	8.1	180.2
6. KDY Tegal	-	-	18	107,689	-	-	16.7
7. KB Cilacap	11	83	388	1,217,335	0.9	6.8	31.9
8. KB Banyumas	8	3	230	1,081,934	0.7	0.3	21.3
9. KB Purbalingga	77	35	117	602,776	12.8	5.8	19.4
10. KB Banjarnegara	1	-	100	609,820	0.2	-	16.4
11. KB Kebumen	41	-	175	953,197	4.3	-	18.3
12. KB Purworejo	-	-	133	667,842	-	-	19.9
13. KB Wonosobo	18	-	48	530,306	3.4	-	9.1
14. KB Magelang	4	-	206	842,104	0.5	-	24.5
15. KB Boyolali	28	4	235	726,746	3.9	0.6	32.3
16. KB Klaten	-	-	659	1,015,895	-	-	64.9
17. KB Sukoharjo	18	-	165	517,024	3.5	-	31.9
18. KB Wonogiri	12	-	299	921,190	1.3	-	32.5
19. KB Karanganyar	6	1	125	523,205	1.1	0.2	23.9
20. KB Sragen	-	2	452	672,034	-	0.3	67.3
21. KB Grobogan	3	1	304	910,187	0.3	0.1	33.4
22. KB Blora	-	-	71	625,852	-	-	11.3
23. KB Rembang	23	74	322	380,194	6.0	19.5	84.7
24. KB Pati	98	15	225	862,810	11.4	1.7	26.1
25. KB Kudus	-	-	869	457,606	-	-	189.9
26. KB Jepara	12	22	438	604,641	2.0	3.6	72.4
27. KB Demak	9	-	98	605,853	1.5	-	16.2
28. KB Semarang	1	2	168	691,920	0.1	0.3	24.3
29. KB Temanggung	66	-	166	483,736	13.6	-	34.3
30. KB Kendal	53	8	-	669,253	7.9	1.2	-
31. KB Batang	6	-	252	473,121	1.3	-	53.3
32. KB Pekalongan	8	-	196	570,445	1.4	-	34.4
33. KB Pemalang	-	-	81	819,345	-	-	9.9
34. KB Tegal	20	4	122	899,073	2.2	0.4	13.6
35. KB Brebes	11	4	103	1,085,797	1.0	0.4	9.5
Total	1139	425	7279	22,574,509	5.0	1.9	32.2

Notes: 1/ PAPPEDA & Kantor Sensus and Statistik, Statistik Potensi Desa, Jawa Tengah 1973, March 1975.

-: no data.

Source: BAPPEDA, Jawa Tengah Dalam Angka, 1977.

9.3.2 Urban Water Supply

(a) Urban Water Supply Situation

09.103 There are many cities which do not have a public supply of potable water in Indonesia, and among 35 urban areas in Central Java, 9 do not have public water supply (see Table 9.26). Even in cities having public water supply, the systems serve only a small portion of the population. Past development of water supply, present capacities, and the estimated demand, by city, in Central Java, is presented in Table 9.26. The 9 urban areas are kabupaten centers of Cilacap, Klaten, Sukoharjo, Karanganyar, Sragen, Pati, Jepara, Batang, and Pemarang. Among urban areas having water supplies, only Magelang, Salatiga, Purworejo, Demak, and Temanggung had a sufficient supply of water in 1976 according to Air Minum Daerah, CIPTA KARYA.

09.104 Thus most people in urban areas are dependent on dug wells, and people in rural areas are dependent on dug wells, springs and rivers. Wells would not be a problem as long as the water is good, but the water quality varies greatly, and always is under a threat of contamination. Table 9.27 presents the water supply situations in urban areas in KB/KDYs in 1971. About 48 percent of urban households in Central Java did not have a water source in their own yards. As for water sources, about 36 percent of urban households has piped or pumped water, about 63 percent depends on wells and springs, and about 11 percent depend on river or rain. Although households which are dependent on river and rain for their water supply are not many in number (see Table 9.27), urban areas in some kabupatens such as Demak, Wonosobo, Brebes, and Wonogiri had over 9 percent of the urban households which were dependent on river or rain in 1971. There have been some improvements since 1971, but the general situation has not been altered.

09.105 Even in the areas where public water supply exists, most existing systems suffer from low pressure and intermittent supply, and safe water entering the system will not always remain uncontaminated because of faulty distribution systems.

(b) Urban Water Supply Program

09.106 The urban water supply program in Indonesia is administered by the Directorate of Sanitary Engineering, CIPTA KARYA, of the Central Government. The urban water supply policy for Repelita I was rehabilitation of existing water supply systems by means of provision of subsidie to local governments which undertook implementation of rehabilitation works. The policy for Repelita II is to extend existing systems for large cities and to construct new systems for medium and small cities.

09.107 The form of assistance from the Central Government was changed from the subsidy to loans to local public water supply enterprises of kotamadyas (PAM: Perusahaan Air Minum). All water supply projects are

Table 9.26 Development of Urban Water Supply and Estimated Demand

Central Java, 1968 - 1977

(Unit: Liter/Second)

	Water Supply Capacity							Present Capacity 2/	Population (1,000) 2/	Demand 2/	Capacity per Demand (%)
	1/ 1968	1/ 69/70	1/ 70/71	1/ 71/72	1/ 72/73	1/ 73/74	3/ 1976	1977	1976	1976	1976
1. KDY Magelang	50	50	50	50	50	150	150	171	117	98	174
2. KDY Surakarta	150	150	150	150	150	150	150	150			
3. KDY Salatiga	30	30	30	45	90	90	90	60	73	61	98
4. KDY Semarang							800	700			
5. KDY Pekalongan								36	116	97	37
6. KDY Tegal	50	50	50	50	50	50	50	40	112	94	43
7. KOTA KB Cilacap							0	0			
8. KOTA KB Purwokerto	30	30	30	30	90	90	90	53			
9. KOTA KB Purbalingga	4	4	24	24	24	24	24	nd			
10. KOTA KB Banjarnegara								8	20	20	40
11. KOTA KB Kebumen								20	52	42	48
12. KOTA KB Purworejo	60	60	60	60	60	60	60	60	41	31	194
13. KOTA KB Wonosobo								10	70	59	17
14. KOTA KB Boyolali	10	10	10	10	35	35	35	15	20	17	88
15. KOTA KB Klaten								0			
16. KOTA KB Sukoharjo								0			
17. KOTA KB Wonogiri	3						3	3	25	21	14
18. KOTA KB Karanganyar								0			
19. KOTA KB Sragen								0	36	26	0
20. KOTA KB Purwodadi	10	10	10	10	10	10	10	10	41	26	38
21. KOTA KB Blora								4			
22. KOTA KB Rembang	4	4	4	4	14	14	14	8	31	26	31
23. KOTA KB Pati								0	35	31	0
24. KOTA KB Kudus								1	82	76	1
25. KOTA KB Jepara								0			
26. KOTA KB Demak							30	25	20	17	147
27. KOTA KB Temanggung	11	11	11	11	11	11	11	24	29	25	96
28. KOTA KB Kendal	2	2	2	2	2	2	2	3			
29. KOTA KB Batang								0			
30. KOTA KB Pemalang								0			
31. KOTA KB Brebes								Some			
32. Tawangmangu, Karanganyar							20	20			
33. Juana, Pati	3	3	3	3	3	3	3	4	20	15	27
34. Parakan, Wonosobo								0	13	10	0
35. Wuryantoro, Wonogiri								0	4	4	0

Notes and Sources:

nd: No data.

1/ Source: Table 132, Indonesian Handbook 1974, Min. of Information, 1974.
Minor Source: CIPTA KARYA, DPUTL, Jakarta.

2/ Source: Air Minum Daerah, CIPTA KARYA, DPUTL.

3/ Source: CIPTA KARYA, DPUTL, Jakarta.

Table 9.27 Number of Urban Household by Drinking Water Source and Whether Water & Obtained Inside the Yard and Outside the Yard, Central Java, 1971

(Unit: Households)

		Good Water (Piped, Pumped)	Medium Water (Well, Spring)		Not Good Water (River, Rain, Other)		Total Individual Household		HH Having Water Inside the Yard	HH Having Water Outside the Yard	
		No.	No.	%	No.	%	No.	%	No.	No.	%
1.	KDY Magelang	11,245	9,352	43.8	756	3.5	21,353	100	9,277	12,076	56.6
2.	KDY Surakarta	16,204	68,471	80.7	161	0.2	84,836	100	56,787	28,049	33.1
3.	KDY Salatiga	4,081	9,465	68.1	358	2.6	13,904	100	6,968	6,936	49.9
4.	KDY Semarang	95,347	33,028	25.6	468	0.4	128,843	100	46,457	82,386	63.9
5.	KDY Pekalongan	1,318	20,956	94.0	21	0.1	22,295	100	18,614	3,681	16.5
6.	KDY Tegal	9,928	11,502	53.4	120	0.6	21,550	100	11,517	10,033	46.6
7.	KB Cilacap	315	15,538	97.7	43	0.3	15,896	100	6,384	9,512	59.8
8.	KB Banyumas	1,763	14,723	88.4	174	1.0	16,660	100	11,680	4,980	29.9
9.	KB Purbalingga	485	4,003	88.9	13	0.3	4,501	100	2,598	1,903	42.3
10.	KB Banjarnegara	31	2,967	98.6	10	0.3	3,008	100	1,648	1,360	45.2
11.	KB Kebumen	685	5,875	89.1	35	0.5	6,595	100	3,980	2,615	39.7
12.	KB Purworejo	3,900	6,467	62.1	44	0.4	10,411	100	6,831	3,580	34.4
13.	KB Wonosobo	3,120	16	0.4	566	15.3	3,702	100	1,476	2,226	60.1
14.	KB Magelang		No Urban Population				0				
15.	KB Boyolali	845	2,653	74.2	78	2.2	3,576	100	1,732	1,844	51.6
16.	KB Klaten	94	7,460	98.2	45	0.6	7,599	100	5,608	1,991	26.2
17.	KB Sukoharjo	111	5,191	97.8	4	0.1	5,306	100	3,643	1,663	31.3
18.	KB Wonogiri	35	3,039	90.3	290	8.6	3,364	100	1,228	2,136	63.5
19.	KB Karanganyar	0	946	99.5	5	0.5	951	100	667	284	29.9
20.	KB Sragen	82	6,676	98.6	12	0.2	6,770	100	5,464	1,306	19.3
21.	KB Grobogan	3,123	664	17.5	5	0.1	3,792	100	647	3,145	82.9
22.	KB Blora	3,390	7,506	66.4	408	3.6	11,304	100	3,258	8,046	71.2
23.	KB Rembang	5,450	998	15.4	13	0.2	6,461	100	282	6,179	95.6
24.	KB Pati	54	9,207	99.2	22	0.2	9,283	100	6,106	3,177	34.2
25.	KB Kudus	391	17,784	97.7	32	0.2	18,207	100	14,000	4,207	23.1
26.	KB Jepara	591	4,258	87.4	24	0.5	4,873	100	2,945	1,928	39.6
27.	KB Demak	14	1,138	38.4	1,809	61.1	2,961	100	462	2,499	84.4
28.	KB Semarang	962	2,712	72.9	44	1.2	3,718	100	816	2,902	78.1
29.	KB Temanggung		No Urban Population				0				
30.	KB Kendal	2,222	937	28.4	138	4.2	3,297	100	562	2,735	83.0
31.	KB Batang		No Urban Population				0		0	0	
32.	KB Pekalongan		No Urban Population				0				
33.	KB Pemalang	185	15,912	97.9	157	1.0	16,254	100	9,392	6,862	42.2
34.	KB Tegal		No Urban Population				0				
35.	KB Brebes	2,706	5,763	61.7	864	9.3	9,333	100	2,922	6,411	68.7
	Total	168,677	295,207	62.7	6,719	1.4	470,603	100	243,951	226,652	48.2

Source: BPS, Housing Condition in Jawa Tengah 1971, Jakarta, 1976.

implemented by the Central Java Drinking Water Project Office (Proyek Air Minum Daerah) under the control of the Directorate of Sanitary Engineering of the Central Government, then transferred to PAMs operate and manage the water systems and pay back the development costs.

09.108 The water supply development plan by the Central Government is presented in Table 9.28. Among those cities which do not have water supply in 1977, Cilacap, Klaten and Sragen have a plan for development of water supply, but Sukoharjo, Karanganyar, Pati, Jepara, Batang and Pemarang do not. When compared with the future needs estimated by the Province (see Table 9.29), the planned supply is generally enough except the supply for kota-kabupatens of Wonosobo, Rembang, and Temanggung. Also, the IBRD-assisted water supply project in Purwokerto is planned to supply water to only 35 percent of the estimated population in 1981.[14/] KDY Pekalongan has no water development project, even though it has the water supply capacity of 36 liters per second (lps) in 1977 against the estimated water needs of 128 lps in 1980 and of 141 lps in 1985.

09.109 Due to the importance of water supply for the people's health, the cities mentioned in the previous paragraph as lacking water supply or having insufficient water supply should receive water supply projects in Repelita III. Table 9.30 presents priorities in water supply among kotamadya and kabupaten centers. These priorities are based on estimated water needs (Table 9.29) and the present water supply capacity (Table 9.26). Kabupaten centers of Kudus and Pati have the greatest need per capita among all KB/KDYs for which there are data. Also, some urban areas such as Cilacap, Purbalingga, Klaten, Sukoharjo, Karanganyar, Blora, Jepara, Kendal, Batang, Pemalang, and Brebes do not have any need of expanding the present capacity until 1985. Based on the priorities identified above, the financial resource which is required to develop necessary urban water supply projects in Central Java was estimated. The result is in the right column of Table 9.30.

09.110 In estimating the future demand, Air Minum Daerah, CIPTA KARYA in Semarang, is using the following standard of average consumption per capita per day:

(Unit: Liter/Capita/Day)

	1975-79	80-84	85-89	90-95	95-99	2000
Small Cities	100	110	120	130	140	150
Large Cities (such as Semarang, Tegal, Surakarta, Purwokerto, and Cilacap)	148	170	178			200

Source: Air Minum Daerah, CIPTA KARYA, Semarang, 1977.

14/ IBRD, Indonesia, the Five Cities Water Supply Projects, 1974.

Table 9.28 First Proposal of Water Supply Project for Repelita II

Central Java, 1974-1983

			Capacity		Duration of	Budget (Current Price)			Incremental Capacity	Unit Cost	Planned[3]	
			From lps	Up to lps	Implementation	Rp. Portion 1,000,000	US$ Portion US$1,000	Total Rp.1,000,000	lps	Rp.1,000,000(1/s)	Source of Water	Note
1.	KDY	Magelang[2]	50	150	-75/76						Spring	
2.	KDY	Surakarta	150	400	74/75-79/80	1,000	6,500	3,698	250	15	Spring	
3.	KDY	Salatiga[2]	30	90	-73/74						Spring	
4.	KDY	Semarang	800	2,000	74/75-81/82	26,000	58,000	50,000	1,200	42	Spring, River	
5.	KDY	Pekalongan										
6.	KDY	Tegal	40	290	76/77-81/82	895	7,000	3,800	250	15	Spring, Deep Well	
7.	KOTA KB	Cilacap	0	500	75/76-81/82	2,400	13,012	7,800	500	16	River	
8.	KOTA KB	Purwokerto	30	94	74/75-78/79	504	2,290	1,487	64	23	Spring	
9.	KOTA KB	Purbalingga									Spring	
10.	KOTA KB	Banjarnegara	50	65	77/78-79/80	700	0	700	15	47	Spring	
11.	KOTA KB	Kebumen	0	57	77/78-79/80	741	0	741	57	13		
12.	KOTA KB	Purworejo	60	122	76/77-78/79	322	1,165	806	62	13	Spring	
13.	KOTA KB	Wonosobo	0	40	77/78-78/79	340	385	500	40	13	Spring	
14.	KOTA KB	Boyolali[2]	10	35	-75/76						River	
15.	KOTA KB	Klaten	80	120	78/79-82/83	548	1,430	1,141	40	29		
16.	KOTA KB	Sukoharjo										
17.	KOTA KB	Wonogiri	3	26	76/77-78/79	938	1,500	1,560	23	68	River	
18.	KOTA KB	Karanganyar										
19.	KOTA KB	Sragen	60	100	77/78-79/80	585	1,000	1,000	40	25		
20.	KOTA KB	Purwodadi	52	142	76/77-79/80	712	836	1,080	90	12	Spring	
21.	KOTA KB	Blora										
22.	KOTA KB	Rembang[2]	4	14	-73/74						Spring, River	
23.	KOTA KB	Pati									Deep Well	
24.	KOTA KB	Kudus	65	130	77/78-80/81	938	1,500	1,560	65	24	Deep Well	
25.	KOTA KB	Jepara									Deep Well	
26.	KOTA KB	Demak	0	30	74/75-77/78	350	0	350	30	12	River	
27.	KOTA KB	Temanggung[2]	11	24	-76/77						Spring	
28.	KOTA KB	Kendal[1],[2]	0	20	-77/78				20		Deep Well	
29.	KOTA KB	Batang										
30.	KOTA KB	Pemalang										
31.	KOTA KB	Brebes										
32.	Tawangmangu, Karanganyar		0	20	74/75-75/76	50	0	50	20	3	Spring	Rehab.
33.	Juana, Pati				75/76-78/79	400	0	400	31	13	River, Spring	
34.	Parakan, Wonosobo[1],[2]				-77/78				20			
35.	Wuryantoro, Wonogiri[1],[2]				-77/78				10			

Notes: 1/ Source: "Allocated Fund of Water Supply Projects in Central Java", Division of Planning & Programming, CIPTA KARYA, 1976.
2/ Source: "Allocated Fund of Water Supply Projects in Central Java", Division of Planning & Programming, CIPTA KARYA, JKT, 1977.
3/ Source: "Air Minum", CIPTA KARYA, JKT, 1976.
lps: Liter per second.

Source: "Proposed Water Supply Program in Central Java", Directorate of Sanitary Engineering, CIPTA KARYA, 1973 or 1974.

Table 9.29 Estimated Future Demand for Urban Water Supply and Planned Water Source

Central Java, 1980-1985

		1971	1980		1985		
		Kecamatan[3] Population 1,000	Population 1,000	Average Water Need lps	Population 1,000	Average Water Need lps	Planned Water Source
1.	KDY Magelang		129	127	142	168	Ground Water
2.	KDY Surakarta						Ground Water
3.	KDY Salatiga		81	81	89	106	Ground Water
4.	KDY Semarang[1]			1,930		2,660	River
5.	KDY Pekalongan		128	128	141	167	Ground Water
6.	KDY Tegal		123	124	136	161	Ground Water
7.	KOTA KB Cilacap	119					
8.	KOTA KB Purwokerto[2]	125	258 (1981)	320 (1981)			
9.	KOTA KB Purbalingga	41					
10.	KOTA KB Banjarnegara	54	22	26	24	32	Ground Water
11.	KOTA KB Kebumen	82	59	54	65	74	Deep Well
12.	KOTA KB Purworejo	72	46	42	51	55	Ground Water
13.	KOTA KB Wonosobo	48	77	78	85	101	Ground Water
14.	KOTA KB Boyolali	42	22	22	24	29	River
15.	KOTA KB Klaten	59					Shallow Water
16.	KOTA KB Sukoharjo	51					
17.	KOTA KB Wonogiri	56	28	28	30	36	Ground Water
18.	KOTA KB Karanganyar	41					
19.	KOTA KB Sragen	51	40	34	44	45	Shallow Water
20.	KOTA KB Purwodadi	76	46	37	52	49	Ground Water
21.	KOTA KB Blora	68					
22.	KOTA KB Rembang	52	34	34	38	45	Ground Water
23.	KOTA KB Pati	75	37	40	39	50	Shallow Water
24.	KOTA KB Kudus	79	90	101	100	132	Artesian Well
25.	KOTA KB Jepara	75					
26.	KOTA KB Demak	58	22	22	24	28	River
27.	KOTA KB Temanggung	85	32	33	36	42	Ground Water
28.	KOTA KB Kendal	33					Artesian Well
29.	KOTA KB Batang	70					
30.	KOTA KB Pemalang	110					
31.	KOTA KB Brebes	88					
32.	Tawangmangu, Karanganyar	29					
33.	Juana, Pati	53	22	20	24	25	Ground Water
34.	Parakan, Wonosobo		15	13	17	17	
35.	Wuryantoro, Wonogiri		4	5	5	6	

Notes: 1/ Source: Durns & McDonnell, and Trans Asia Engineering, Water Supply Master Plan for the City of Semarang, CIPTA KARYA, 1976.
2/ Source: Study team's estimate based on IBRD, The Five Cities Water Supply Projects, 1974.
3/ Source: BPS, 1971 Population Census, Population by Sub-District in Java-Madura, Preliminary Figure, 1972.

Source: Air Minum Daerah, CIPTA KARYA, 1977.

Table 9.30 Priority and Required Budget for Urban Water Supply Projects

Central Java, 1977 - 1985

			Urban Population 1985 1,000 [1/]	Water Need 1985 lps(a) [1/]	Present Capacity 1977 lps (b) [2/]	Difference 1985-1977 (c) [3/]	Difference per 10^3 Population 1985-1977	Priority	Unit Cost Rp.1,000,000/lps (d) [4/]	Cost Required Until 1985 Rp.1,000,000 [5/]
1.	KDY	Magelang	142	168	171	0	0			0
2.	KDY	Surakarta			150	nd	nd		15	
3.	KDY	Salatiga	89	106	60	46	0.51	16	(15)	690
4.	KDY	Semarang		2,660	700	1,960	some	x	42	82,320
5.	KDY	Pekalongan	141	167	36	131	0.93	10	(15)	1,965
6.	KDY	Tegal	136	161	40	121	0.89	11	15	1,815
7.	KOTA KB	Cilacap			0	some	some	x	16	some
8.	KOTA KB	Purwokerto			53	nd	nd		23	
9.	KOTA KB	Purbalingga			nd	nd	nd			
10.	KOTA KB	Banjarnegara	24	32	8	24	1.00	7	47	1,128
11.	KOTA KB	Kebumen	65	74	20	54	0.83	13	13	702
12.	KOTA KB	Purworejo	51	55	60	0	0		13	0
13.	KOTA KB	Wonosobo	85	101	10	91	1.07	5	13	1,183
14.	KOTA KB	Boyolali	24	29	15	14	0.58	15	(15)	210
15.	KOTA KB	Klaten			0	some	some	x	29	some
16.	KOTA KB	Sukoharjo			0	some	some	x		some
17.	KOTA KB	Wonogiri	30	36	3	33	1.10	4	68	2,244
18.	KOTA KB	Karanganyar			0	some	some	x		some
19.	KOTA KB	Sragen	44	45	0	45	1.02	6	25	1,125
20.	KOTA KB	Purwodadi	52	49	10	39	0.75	14	12	468
21.	KOTA KB	Blora			4	nd	nd			
22.	KOTA KB	Rembang	38	45	8	37	0.97	9	(15)	555
23.	KOTA KB	Pati	39	50	0	50	1.28	2	(15)	750
24.	KOTA KB	Kudus	100	132	1	131	1.31	1	24	3,144
25.	KOTA KB	Jepara			0	some	some	x		some
26.	KOTA KB	Demak	24	28	25	3	0.13	18	12	36
27.	KOTA KB	Temanggung	36	42	24	18	0.50	17	(15)	270
28.	KOTA KB	Kendal			3	nd	nd			
29.	KOTA KB	Batang			0	some	some	x		some
30.	KOTA KB	Pemalang			0	some	some	x		some
31.	KOTA KB	Brebes			some	nd	nd			
32.	Tawangmangu, Karanganyar				20	nd	nd		3	
33.			24	25	4	21	0.88	12	13	273
34.	Parakan, Wonosobo		17	17	0	17	1.00	7	(15)	255
35.	Wuryantoro, Wonogiri		5	6	0	6	1.20	3	(15)	90
	Total									98,533+s

Notes: 1/ Source: Table 9.29.
2/ Source: Table 9.26
3/ = (a) - (b)
4/ Source: Table 9.28. The unit cost in ( ) is estimated by the Study Team, which is the median of the unit costs in Table 9.28.
5/ = (c) x (d)
nd: no data.
x: Priority can not be specified.
lps: Liter per second.

Source: Study team.

The average water consumption per capita per day in 1973 is estimated to range from about 60 to 110 liters in the five urban areas of Purwokerto, Malang, Banyuwangi, Jambi, and Samarinda, according to IBRD report.[15/] The water consumption in Kota KB Kebumen is about 60 liters per capita per day in 1976 according to the kabupaten officials. Although water consumption per capita per day increases as per capita GDP goes up, and the present supplies are not necessarily satisfying the demands of the users, the consumption standards assumed by Air Minum Daerah, are on the high side. Nonetheless, the projected water needs by urban area prepared by the Province can be used as a general framework for planning of water supply projects. What is needed now is to establish priority among competing urban areas and prepare specific project studies for high priority areas. In establishing priority, not only the unsatisfied need per capita but also the incidence of water-borne diseases and the quality of water from alternative sources should be taken into account.

(c) Unit Cost of Water Development and Water Rate

09.111 There are several sources of information concerning the unit development costs of water supply:

(1) The total cost of the water development projects for the five cities assisted by IBRD is estimated to be about Rp.6,010 million including 25 percent contingencies in the 1973 prices to serve an additional population of 430,000 persons or to increase the supply by 676 lps by 1981.[16/] The implied unit cost per lps is Rp.8.9 million;

(2) The total cost for the Purwokerto project is estimated to be Rp.846 million at 1973 prices to serve a population of 85,000 persons or to supply 97 lps. The implied unit cost per lps is Rp.8.7 million;

(3) According to officials of Air Minum Daerah, CIPTA KARYA, Semarang, the water development cost is roughly estimated to be from Rp.10 to Rp.15 million per lps in 1977; and

(4) Table 9.28 also provides some information about the unit development cost. It ranges from Rp.12 to Rp.68 million per lps at the current prices, and the median cost is Rp.15 million. Therefore, a typical unit cost can be said to be Rp.15 million per lps at 1977 prices.

09.112 The terms of loans from the Central Government to the PAMs for the five cities' water supply projects (see footnote 14/) are a grace

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15/ IBRD, op. cit.

16/ IBRD, op. cit.

period of 6 years, a repayment period of 30 years, and an annual interest rate of 9 percent starting after the grace period. Assuming the same terms of loans and assuming Rp.15 million of unit cost, the annual debt service for a water supply project is estimated to be Rp.951,957 per lps. As a consequence, the average daily debt service is Rp.2,608 per lps. If 100 percent utilization ratio of water is assumed, i.e., all supplied water is used by chargeable consumers without any loss, the part of water rate per m^3 attributable to debt service is estimated to be Rp.30.2 (2,608 ÷ 24 ÷ 60 ÷ 60 x 1,000). In reality, however, a water plant is designed on the basis of a maximum daily consumption which is about 20 percent higher than the average daily consumption. It means that about 83 percent of water is actually used. Also, there is unaccounted water or loss in distribution. At present this loss is about 30 percent of water produced, but it is assumed that the unaccounted for water will be reduced to 20 percent of total water produced after completion of new and rehabilitation projects. Thus the actual utilization ratio will be 66.4 percent (0.83 x 0.8) of total water capacity. Thus the part of water rate per m^3 attributable to debt service is estimated to be Rp.46 (30.2 ÷ 0.664) per water served.

09.113 According to officials in CIPTA KARYA, Jakarta, the operation and maintenance costs (OM costs) including salaries of the staff is about Rp.50 to Rp.75 per one cubic meter of water served. For the five cities' water development projects, estimated OM costs range from Rp.25 for Malang Project to Rp.92 for Samrinda Project per cubic meter of water sold in 1983. For Purwokerto Project, they are estimated to be Rp.36 per cubic meter sold in 1983. Assuming the OM costs of Rp.63 per cubic meter of water served which is the average of the above two figures provided by CIPTA KARYA officials, the required water rate will be Rp.109 per cubic meter. Since this calculation disregards inflation, the future water rate should be even greater.

09.114 At present the water rate in Central Java is about Rp.15 to Rp.35 per cubic meter. If the water supply projects need to be financially self-supporting, the water rate should be increased to 3 to 7 times the present level. Given the income level of the families in the urban areas of Central Java, it would not be possible to charge water rates to cover the full costs, but unlimited subsidization for water supply by the Central Government will naturally limit the actions of the Government. Therefore, it is considered appropriate to set the principle that each water supply project be self-supporting so far as OM costs are concerned.

(d) Recommendations

09.115 Potable water supply is important for health. By preventing diseases, it can save medical treatment costs and can increase labor productivity. But, water supply projects are expensive and hardly financially self-supporting in Central Java. Due to indirect benefits expected from then, however, complete financial feasibility need not be required of them. On the other hand, to depend heavily on subsidies

would become self-defeating as the areas to be covered by such programs would naturally be very much limited. Inexpensive ways of supplying good quality water need to be explored. Such alternatives would include (1) communal water taps instead of individual taps, (2) the use of relatively good quality water such as well or spring water with minimal treatment, (3) the distribution of simple treatment kits to individual households, (4) trucking of good quality water for sale to individuals, and (5) the enforcement of the practice of boiling water at individual households.

09.116 Obviously, the most inexpensive way to supply potable water to a community in an urban area, such as a kampung, is to find a reliable water source within the community and to construct a communal water tap. Reliable water sources could be identified first by examining water quality of existing wells. For some urban areas, deeper ground water may have to be explored. For small and medium cities the system of having community water taps based on clean and safe water sources would be a feasible way of maintaining hygienic water supply.

09.117 If there is no reliable water source in a community, a water supply system must be developed. The piped water supply system is the most common way for potable water supply, but it is very costly as discussed above. For the purpose of reducing the development costs, the communal supply rather than individual supply of piped water should be given first consideration.

09.118 In those urban areas in which there is no identifiable source of reliable water, two alternatives should be considered: (1) to undertake minimal treatment and (2) to bring in water from other by truck to communal taps.

09.119 As is practiced presently in a number of urban areas, different grades of water may have to be utilized for reducing the total cost: (1) clean and safe water from communal water taps and (2) water from existing wells. The water from wells should be used for washing and bathing and the reliable water for drinking and cooking. Through this separation of use, the consumption of the expensive water can be reduced drastically. For example, people in Kampung Kuningan in Semarang are buying the city water from a water truck at the price of Rp.25 for a 40-liter container in 1977. This price implies Rp.625 per cubic meter and is far more than the economic rate of piped water estimated in the previous section, which is Rp.109 per cubic meter. People are able to buy this water despite its high price because this water is used for specific purposes only and the consumption is very little.

09.120 For high income households who can afford to use high-priced piped water, individual water taps can be provided, and for this reason the water rate charged to them should be higher than the one for communal water. For very low income communities where people cannot afford to buy even communal water at a price reflecting its economic cost, the water rate could be reduced to a level at which OM costs can be recovered.

09.121 In those communities in which water from wells is not good enough but can be made sanitary through simple treatment, the Provincial Government should try to develop simple treatment kits for distribution to individual households. In addition, educational campaigns should be undertaken for fuller enforcement of the practice of boiling water for drinking and cooking at individual households. Such campaigns should be undertaken through community meetings and education of children at school.

09.122 One problems in making an urban water development plan is the lack of basic data. Basic data should be collected as a preliminary step for making water development projects for each urban area. The data should include the location, quality and quantity of available water, and the use of water by population group.

09.123 At present about 30 percent of produced water is presumably wasted or unaccounted because of the absence of water meters, a large number of faulty meters, and the leakage from distribution pipelines. Attempts should be made to reduce this loss through detection of leakages and replacement of pipes and fittings. Such reductions in leakage will reduce the chance of water contamination as well as the water loss itself.

09.124 One foreseeable problem is the management capabilities of local water supply enterprises, which may not be able to adequately operate and manage water supply systems and consequently not able to recover the development cost of projects. A program for retraining of the administrative staff of local water supply enterprises would be helpful.

9.3.3 Rural Water Supply

(a) Situation

09.125 According to data from Kanwil Health, about 61 percent of the rural water sources in Central Java is more or less contaminated, 47 percent is bacteriologically below standard, and 40 percent is chemically below standard.[17/] Table 9.31 presents the situation of water sources by KB/KDYs. About 70 percent of the rural households in Central Java in 1971 did not have water sources in their yards, and in some kabupatens such as Wonosobo, Demak, Wonogiri, Blora, Rembang, and Banjarnegara over 90 percent did not have water sources in their yards. About 87 percent of the rural households is dependent on wells or springs, and about 11 percent is dependent upon rivers or rain. In some kabupatens such as Demak, Wonosobo, and Banjarnegara, about 30 to 48 percent of the rural households is dependent on rivers or rain, and in Boyolali and Batang about 18 to 19 percent is dependent on rivers or rain. Thus, water situation in rural areas is far more critical than in urban areas in Central Java.

17/ Source: "Keadaan Sanitasi Lingkungan Menurut Survey di Jawa-Barat & Jawa-Tengah", Kanwil Health, JATENG, 1975.

Table 9.31 Number of Rural Household by Drinking Water Source and Whether Water Source Is Inside or Outside the Yard, Central Java, 1971

(Unit: Households)

		Good Water (Piped, Pumped)	Medium Water (Well, Spring)		Not Good Water (River, Rain, Other)		Total Individual Household		HH Having Water Inside the Yard	HH Having Water Outside the Yard	
		No.	No.	%	No.	%	No.	%	No.	No.	%
1.	KDY Magelang	0	0	-	0	-	0	-	0	0	-
2.	KDY Surakarta	0	0	-	0	-	0	-	0	0	-
3.	KDY Salatiga	0	0	-	0	-	0	-	0	0	-
4.	KDY Semarang	0	0	-	0	-	0	-	0	0	-
5.	KDY Pekalongan	0	0	-	0	-	0	-	0	0	-
6.	KDY Tegal	0	0	-	0	-	0	-	0	0	-
7.	KB Cilacap	685	203,752	89.9	22,193	9.8	226,630	100	120,830	105,800	46.7
8.	KB Banyumas	818	178,801	90.3	18,351	9.3	197,970	100	57,320	140,650	71.0
9.	KB Purbalingga	889	106,476	89.3	11,921	10.0	119,286	100	29,957	89,329	74.9
10.	KB Banjarnegara	392	80,651	70.1	33,982	29.5	115,025	100	11,689	103,336	89.8
11.	KB Kebumen	355	179,038	97.3	4,707	2.6	184,100	100	106,974	77,126	41.9
12.	KB Purworejo	0	128,192	97.3	3,502	2.7	131,694	100	62,029	69,665	52.9
13.	KB Wonosobo	0	61,190	60.1	40,702	39.9	101,892	100	4,907	96,985	95.2
14.	KB Magelang	6,025	158,335	88.1	15,270	8.5	179,630	100	24,024	155,606	86.6
15.	KB Boyolali	8,016	114,374	75.8	28,441	18.9	150,831	100	29,417	121,414	80.5
16.	KB Klaten	412	196,163	97.2	5,297	2.6	201,872	100	116,560	85,312	42.3
17.	KB Sukoharjo	570	96,185	99.2	189	0.2	96,944	100	45,130	51,814	53.4
18.	KB Wonogiri	102	154,920	89.3	18,462	10.6	173,484	100	13,576	159,908	92.2
19.	KB Karanganyar	96	99,029	97.6	2,332	2.3	101,457	100	28,428	73,029	72.0
20.	KB Sragen	392	121,117	90.8	11,809	8.9	133,318	100	21,511	111,807	83.9
21.	KB Grobogan	9,253	165,255	85.5	18,769	9.7	193,277	100	32,426	160,851	83.2
22.	KB Blora	8,699	93,300	79.0	16,164	13.7	118,163	100	7,222	110,941	93.9
23.	KB Rembang	4,649	69,169	93.2	399	0.5	74,217	100	6,022	68,195	91.9
24.	KB Pati	13,365	150,381	87.6	7,872	4.6	171,618	100	33,817	137,801	80.3
25.	KB Kudus	102	77,269	97.7	1,734	2.2	79,105	100	41,844	37,261	47.1
26.	KB Jepara	143	119,145	93.1	8,744	6.8	128,032	100	62,509	65,523	51.2
27.	KB Demak	7,529	59,786	45.9	62,859	48.3	130,174	100	7,776	122,398	94.0
28.	KB Semarang	960	122,395	87.8	16,091	11.5	139,446	100	19,541	119,905	86.0
29.	KB Temanggung	376	79,587	85.6	13,034	14.0	92,997	100	21,073	71,924	77.3
30.	KB Kendal	12,984	122,831	86.0	7,069	4.9	142,884	100	44,498	98,386	68.9
31.	KB Batang	10,380	68,371	71.3	17,141	17.9	95,892	100	22,949	72,943	76.1
32.	KB Pekalongan	765	103,358	87.0	14,689	12.4	118,812	100	62,812	56,000	47.1
33.	KB Pemalang	102	145,836	94.7	8,064	5.2	154,002	100	45,851	108,151	70.2
34.	KB Tegal	1,080	182,449	91.9	14,919	7.5	198,448	100	93,935	104,513	52.7
35.	KB Brebes	1,834	195,709	87.6	25,976	11.6	223,519	100	55,482	168,037	75.2
	Total	90,973	3,633,064	87.0	450,682	10.8	4,174,719	100	1,230,109	2,944,610	70.5

Source: BPS, Housing Condition in Jawa Tengah, 1971, JKT, 1976.

09.126 Demak seems to be the most seriously suffering area. According to the officials of KB Demak, only 50 good wells exist in the kabupaten serving about 15 percent of the population in 1977, and the rest of the population gets water mainly from rivers. Many kabupatens' officials suggested that the rural water supply is the first priority issue in health services. Substantial expansion of a rural water supply program will be necessary for the rest of Repelita II and Repelita III.

(b) Rural Water Supply Programs

09.127 There are several programs available for rural water projects. They are: (1) the INPRES/Health program which is under the control of kabupaten governments and is the largest supplier of the project funds; (2) the INPRES/Desa program under the Subdirectorate of Rural Community Development (PMD) of the Kabupaten Government, which is the next largest supplier; (3) the Rural Housing Program which is under the control of the Sub-directorate of Housing, CIPTA KARYA/Province; and (4) the Rural Housing Programs under the Province assisted by the Central Government and utilizing the APBD/Kabupaten budget. Also, UNICEF/WHO is assisting Indonesia in rural water supply programs but is serving a negligible portion of the rural population.

09.128 The INPRES/Health program started in 1974/75, and comprises four sub-programs, for (1) Public Health Centers, (2) medicine supply, (3) drinking water supply, and (4) family toilet supply. The drinking water supply sub-program has five alternative components: (1) the provision of hand pumps at the rate of one pump per five households, (2) the provision of artesian wells at the rate of one well per one desa, (3) the piping project installing a water pipeline from a spring to a desa, (4) the rain deposit project providing one rain collector of about 4 meters square to a desa, (5) the water source protection project which is one for a desa and (6) the provision of hydraulic rams. Among them, an appropriate water project can be selected according to the conditions of a kabupaten. Table 9.32 presents the past achievement and the unit development costs of the water supply sub-program, and Table 9.33 presents the geographic distribution of projects and their total expenditures in 1976/77. According to Table 9.32, the unit development cost of water supply per desa is cheapest in the case of the rain deposit program, but this program cannot always supply clean water and it is generally the last choice for desas. The second cheapest is the piping program from a spring, the third is the artesian well program, and the fourth is the hand pump project. So, in order to inexpensively develop a water supply to a desa, a clean water spring should be searched for first, then ground water for artesian well, and then ground water for hand pumps should be searched for. If none of them is found, the last choice will be a rain collector.

09.129 The INPRES/Desa fund given to desas is supervised by Subdirectorate of PMDs of kabupatens and LSDs of kecamatans, and can be used for four areas: (1) infrastructure related to production such as village irrigation; (2) roads and bridges; (3) desa market; and (4) social infrastructure such as public baths, drinking water systems,

Table 9.32 Water Supply and Toilet Provision Projects and Their Unit Costs by INPKES/Health

Central Java, 1974-77

	1974		1975		1976		1977		1976 3/
	Actual No.	Unit Cost Rp.1,000	Actual No.	Unit Cost Rp.1,000	Actual No.	Unit Cost Rp.1,000	Planned No.	Unit Cost Rp.1,000	Unit Cost per Desa Rp.1,000
Drinking Water Supply									
a. Hand Pump	1,200	60	2,220	60	2,200	70	2,570	75	7,840
b. Artesian Well	10	3,000	20	3,300	15	3,500	15	3,500	3,500
c. Piping from Spring	15	2,000	20	2,100	25	2,300	21	2,300	2,300
d. Rain Deposit 1/	0		nd	30,040	30	1,400	nd		1,400
e. Water Source Protection 1/	0		nd	(Total)	5	600	nd		600
Family Toilet	23,200	5	56,200	5	40,000	5	47,750	5	2,805
Total Budget 2/		248,000 (Total)		556,440 (Total)		509,000 (Total)		532,300 (Total)	

Notes: nd: No data.

1/ Source: Ministry of Health, "Program Bantuan Penbangunan Sarana Kesehatan Tahun 1976/77", 1977.

2/ Source: Kanwil Health, "INPRES/Kesehatan, No.5, 1974/75" to "INPRES/Kesehatan, No. 4, 1976/77", 1977.

3/ Average desa has 561 households based on 5 persons per household in 1976. Unit costs per desa of hand pumps and family toilets are estimated based on the above 561 households per desa.

Source: Kanwil Health, Province, 1977.

Ministry of Health, "Gambaran Jenis Bantuan dan Pembiayaan Dalam Rangka INPRES", 1977.

Table 9.33 Geographic Distribution of Water Supply and Family Toilet Provision and Total Budget by INPRES/Health

Central Java, 1976/77

			Water Supply Program						Family Toilet Program No.	Total Budget Rp.10³
			Hand Pump No.	Artesian Well No.	Piping from Spring No.	Rain Deposit No.	Water Source Protection	Total No.		
1.	KDY	Magelang	-	-	-	-	-	-	300	1,500
2.	KDY	Surakarta	-	-	-	-	-	-	200	1,000
3.	KDY	Salatiga	-	-	-	-	-	-	300	1,500
4.	KDY	Semarang	-	-	-	-	-	-	400	2,000
5.	KDY	Pekalongan	-	-	-	-	-	-	500	2,500
6.	KDY	Tegal	-	-	-	-	-	-	300	1,500
7.	KB	Cilacap	80	1	1	-	--	82	1,700	19,900
8.	KB	Banyumas	100	-	1	-	-	101	1,400	16,300
9.	KB	Purbalingga	50	-	1	-	-	51	1,200	11,800
10.	KB	Banjarnegara	60	-	-	2	-	62	1,000	12,000
11.	KB	Kebumen	60	-	-	-	2	62	1,600	13,400
12.	KB	Purworejo	140	-	-	-	-	140	1,200	15,800
13.	KB	Wonosobo	50	-	1	-	1	52	1,000	11,400
14.	KB	Magelang	70	-	1	-	-	71	1,000	12,200
15.	KB	Boyolali	80	-	1	5	-	86	1,200	15,300
16.	KB	Klaten	100	6	1	6	3	63	1,200	15,300
17.	KB	Sukoharjo	100	-	1	-	-	101	1,200	15,300
18.	KB	Wonogiri	90	-	1	-	-	91	1,400	15,600
19.	KB	Karanganyar	60	-	1	-	-	61	1,800	13,500
20.	KB	Sragen	100	-	1	-	-	101	1,200	15,300
21.	KB	Grobogan	80	-	1	-	2	83	1,200	15,100
22.	KB	Blora	80	-	1	-	-	81	1,200	13,900
23.	KB	Rembang	60	-	1	5	-	66	1,200	19,500
24.	KB	Pati	60	2	1	5	-	68	1,700	29,000
25.	KB	Kudus	80	1	1	-	-	82	1,600	19,400
26.	KB	Jepara	50	1	-	4	-	55	1,200	20,600
27.	KB	Demak	20	2	-	5	-	27	1,600	23,400
28.	KB	Semarang	100	-	1	-	-	101	1,200	15,300
29.	KB	Temanggung	90	-	1	-	-	91	1,000	13,600
30.	KB	Kendal	80	2	1	-	-	83	1,200	20,900
31.	KB	Batang	80	1	1	-	-	82	1,200	18,900
32.	KB	Pekalongan	80	1	1	-	-	82	1,200	17,400
33.	KB	Pemalang	80	2	1	-	-	83	1,200	20,900
34.	KB	Tegal	60	-	2	2	-	64	900	16,100
35.	KB	Brebes	100	2	1	-	-	103	1,600	24,300
		Total	2,200	15	25	30	5	2,275	40,000	509,000

Source: "Program Bantuan Penbangunan Sarana Kesehatan Tahun 1976/77, Perincian Jumlah Projek dan Biaya Sarana Air Minum dan Jamban Keluarga", Ministry of Health, 1977.

hygiene facilities, or mosques. Each desa can use it as it pleases. For example, about Rp.3.3 million which is about 5 percent of all INPRES/Desas aids to KB Pemalang was used for drinking water projects in the kabupaten in 1976/77, whereas no funds are used for a drinking water project in KB Batang in 1976/77.

09.130 The Rural Housing Program under CIPTA KARYA has provided only 7 rural water projects in Central Java so far (1974-1977); they are presented in the following table:

	1974/75	75/76	76/77 Actual	77/78 Planned	Note
Number of Water Supply Projects	0	0	7	8	Supply of Pumps (One Project per One Desa)

Source: Building Information Center/Province, 1977.

09.131 There are no data on the past achievement by the rural Housing Programs under Province and kabupatens, but they provided an almost negligible amount of water supply projects.

(c) Recommendations

09.132 As discussed at the beginning of this section, water situation in rural areas is far more critical than in urban areas in Central Java. For example, about 11 percent of the rural households in Central Java was dependent upon river or rain water in 1971. Especially in kabupatens Demak, Wonosobo, and Banjarnegara, about 30 to 48 percent is dependent on river or rain, and in Boyolali and Batang about 18 to 19 percent is dependent on river or rain, all in 1971. Also, many kabupaten officials suggested that the rural water supply is the first priority issue in health services. So, a substantial expansion in the rural water supply program is recommended for the rest of Repelita II and Repelita III. Special emphasis should be placed on avoiding use of river water. Since the INPRES/Health program has a wide variety of water supply projects and it can offer an appropriate project to each desa according to its present conditions, the water supply sub-program of INPRES/Health programs should be utilized for rural water supply.

09.133 The unit development cost of water per desa is cheapest in the use of the piping program, followed by the artesian well program. So, in order to develop water supply to a desa inexpensively, first a clean and safe water spring should be sought and it necessary then ground water for artesian well should be sought.

09.134 Finding a source of safe water is the first thing which should be undertake to improve the water situation in rural areas. Especially the coastal regions which have only saline water and the mountainous regions which do not have access to ground water should be assisted by governments in efforts at finding water resource.

09.135 The water supply situation in rural areas has not yet been well surveyed and officers concerned with water supply programs do not exactly know the number of desas which need water supply projects. Since the lack of study funds is a major cause of this problem, surveys for identification of needs and potential should be funded. To cover all the desa in such surveys would require input of many man-days. Therefore, the first step should be to request each desa to report to Kanwil/Dinas Health about its water situation at present, its specific needs in terms of water supply, and potential sources of clean water. Then surveyors should inspect those desas which in the first round appeared to have serious water problems. In this survey, also, the sanitary and toilet conditions of desas should be inspected. The required labor input for this survey would be in the order to 3,000 man-days to cover all desas, on the assumption that one surveyor covers three desas in a day.

09.136 Research indicates that about 21 percent of the rural households in Central Java do not always boil water for drinking.[18/] Health extension service should try to popularize the practice of boiling of water before human consumption. In addition, water purification by means of a sand filter, or water sterilization by chlorinated lime ($Ca(ClO_2)$) should be promoted.

9.3.4 Urban and Rural Sanitation

(a) Urban Sewerage, Toilet, and Drainage

09.137 There is no urban population served by sewerage in Central Java. Only kotamadyas Semarang and Surakarta have drainage projects, but they do not have sewerage projects. The allocated budget for the drainage projects in kotamadyas Semarang and Surakarta are as follows:

	1974/75	75/76	76/77	77/78
Surakarta (Rp. Million)	20	150	200	150
Semarang (Rp. Million)	0	0	190	

Source: CIPTA KARYA, Jakarta, 1977.

18/ "Keadaan Sanitasi Lingkungan Merunut Survey di Jawa-Barat & Jawa-Tengah", Kanwil Kesehatan, 1975.

09.138 Table 9.34 presents shares of the households having toilets against the total number of private households in the urban and rural areas in 1971. In the urban area, only 69 percent has toilets, which are private, shared or public. Human excreta is mainly discharged into septic tanks, privies, storm drainage ditches, or directly into rivers. In some cases these practices apparently cause pollution of well and river water. For the City of Semarang, there is no sewerage system and no MCK unit,[19/] which is a set of public toilets, a public washing space, and a public bath, developed by the Rural Housing Program. Only 20 percent of households have septic tanks and the rest 80 percent uses privies and open drainage facilities, as of 1975.

09.139 According to health officials, all kotamadyas in Central Java have tank trucks for collecting night soil but have no treatment plant. It is not known how they are disposing the night soil. At any rate, plants for treatment of night soil is a priority issue in urban sanitation in order to prevent pollution of rivers. Kabupatens centers do not have even a tank turck.

09.140 Storm drainage is another problem for cities. There are many cities which experience frequent inundation because of their poor drainage system. The deterioration of sanitary conditions is apparent during the period of inundation.

09.141 At the national level, Directorate of Sanitary Engineering, CIPTA KARYA, is responsible for sanitation development, but the majority (more than 90 percent) of its budget is allocated to drinking water development projects rather than sanitation projects.

09.142 Sanitation is closely related to water supply. Water-borne diseases are caused by contaminated water. There are three ways to treat human excreta and maintain satisfactory sanitary conditions in urban area. They are a sewerage system, tank trucks combined with a plant for treatment of night soil, and septic tanks. Sewerage is a complete system for sanitary treatment but is too expensive to implement. Septic tanks are inexpensive and easy to handle, but a tank has to be a certain distance (usually, 15 to 30 meters) from wells depending on conditions of soil and ground water level. So, this solution does not fit well to urban areas. Tank trucks and a plant for treatment of night soil are not so expensive and comprise a complete system for sanitary treatment. Thus, a combination of tank trucks and a treatment plant is recommended for sanitary treatment for urban areas in Central Java. Treatment plants should be first constructed for all kotamadyas, since they already have tank trucks but lack treatment plants. Then, this system should be gradually extended to each kabupaten center, in order to keep rivers and bodies of water clean and prevent diseases.

19/ MCK unit is a communal facilities for sanitation, which is a combination of bathing spaces, washing spaces and toilets with a large septic tank.

Table 9.34 Share of Households Having Toilets Against Total Number of Households in Urban or Rural Areas Central Java, 1971

		Household Which Have Toilet (Private, Shared, or Public)	
		in Urban Area %	in Rural Area %
1.	KDY Magelang	55.9	-
2.	KDY Surakarta	72.7	-
3.	KDY Salatiga	76.5	-
4.	KDY Semarang	84.3	-
5.	KDY Pekalongan	48.4	-
6.	KDY Tegal	63.2	-
7.	KB Cilacap	76.5	58.5
8.	KB Banyumas	44.7	36.5
9.	KB Purbalingga	29.7	11.0
10.	KB Banjarnegara	84.1	23.6
11.	KB Kebumen	57.0	48.7
12.	KB Purworejo	56.5	51.9
13.	KB Wonosobo	94.8	69.2
14.	KB Magelang	-	35.1
15.	KB Boyolali	66.8	52.4
16.	KB Klaten	24.5	16.7
17.	KB Sukoharjo	80.2	41.2
18.	KB Wonogiri	82.6	64.7
19.	KB Karanganyar	23.0	45.5
20.	KB Sragen	73.1	69.1
21.	KB Grobogan	83.5	70.5
22.	KB Blora	91.3	77.0
23.	KB Rembang	63.6	29.0
24.	KB Pati	88.1	69.2
25.	KB Kudus	71.3	34.2
26.	KB Jepara	65.7	47.6
27.	KB Demak	51.0	57.8
28.	KB Semarang	37.5	34.6
29.	KB Temanggung	-	44.9
30.	KB Kendal	38.9	28.2
31.	KB Batang	-	33.6
32.	KB Pekalongan	-	23.7
33.	KB Pemalang	25.6	22.5
34.	KB Tegal	-	15.9
35.	KB Brebes	54.0	21.5
	Total	69.4	42.5

Source: Study team's calculation based on Housing Condition in Jawa Tengah, 1971, BPS, 1976, Table 17.

(b) Rural Toilet and Drainage

09.143 The toilet conditions in the rural area are much worse than in the urban area. Table 9.34 indicates that only 43 percent of rural households has toilets. According to research on rural sanitation, only 33 percent of households has toilets and about 63 percent uses rivers for toilets.[20/] A typical privy in a poor desa is just a large hole on the ground without a roof, which is located on the fringe of a desa's inhabited area. After becoming filled, it is covered by soil, and another hole is dug elsewhere.

09.144 As for drainage, storm drainage inside and around desas generally is not working well, and inundation frequently causes water to stand inside and around desas even one day after rain.

09.145 Governmental programs which can be used for rural toilet and drainage are the INPRES/Health program, Rural Housing Program, and the INPRES/Desa program under PMDs. The INPRES/Health program is for family toilets, and does not provide communal toilets or bathing places. The program provides 25 toilet bowls to 25 households in a desa without septic tanks at the cost of Rp.5,000 per bowl, at 1976 prices. The number of bowls provided by this program is presented in tables 9.32 and 9.33. On the average, every year more than 1,000 bowls have been provided per one kabupaten. In 1976, about 1,600 desas received family toilets, assuming 25 bowls per one desa.

09.146 In contrast to the INPRES/Health program, the Rural Housing Program by CIPTA KARYA provides only communal facilities, which is called "unit MCK" and is a combination of bathing spaces, washing spaces, and toilets with a large septic tank. It can provide more functions than the family toilet program of the INPRES/Health program, and its development cost of Rp.250,000 per each unit MCK which is not expensive as compared with the unit cost of one family toilet, that is Rp.5,000. Generally three unit MCKs are provided to one desa and one unit MCK can easily serve more than 100 families, therefore the cost per family is less than Rp.2,500. Also, an unit MCK has its septic tank, whereas the family toilet program does not provide a septic tank. Thus, the unit MCK program is a preferable alternative to the family toilet program for solving the sanitation problem of desas.

20/ From "Keadaan Sanitasi Lingkungan Menurut Survey di Jawa-Barat & Jawa-Tengah", Kanwil Health, 1975.

CHAPTER X

HUMAN SETTLEMENTS AND COMMUNITY FACILITIES

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10.1 Human Settlements Problem

10.001 Basically, the human settlement problem is a population problem and an urban problem since urban settlements require greater public actions due to their high density and high rate of expansion. In most developing countries, about half of population growth in urban areas is attributable to in-migration and the other half to natural growth.

10.002 From the experience of developed countries, it is clear that large cities can contribute powerfully to economic growth and to the process of social and economic modernization. At the same time, it is clear that, under present conditions, the continuing expansion of large urban centers creates physical and social problems. Problems typical to urban areas in developing countries are: (1) expansion of slums and lags in improvement of infrastructure, and traffic congestion or poor transportation services taken as physical problems; and (2) the emergence of the urban poor, and the urban unemployed, as well as political instability because of the above mentioned factors taken as social problems.

10.003 In Central Java today there are not such serious human settlement problems as exist in Jakarta. However in some cities such as Semarang and Tegal human settlement problems may be anticipated commensurate with their rapid growth.

10.004 Population movement from rural areas to those cities is the major cause of anticipated human settlement problems, and the in-flow will be intensified by the high level of natural population growth in the rural areas. To cope with this rural and urban population growth, intensification of family planning is essential and at the same time intensification of efforts promoting transmigration is also required. Whether these programs work effectively or not, the population in Central Java will grow and the rural area will not be able to absorb all of the additional labor force. Consequently, the urban areas,

existing or emerging, have to absorb that additional labor force and are required to provide employment opportunities. Thus, employment creation is an urgent problem which should be solved by the efforts to promote the economic development of the Province, especially in the non-agricultural urban sectors such as manufacturing and commerce. The development of the manufacturing sector might lead to environmental pollution problems, which requires the Government to be active in environmental protection and pollution control. On the other hand, to supply enough foods to growing urban population, development of the agricultural sector is also required. Thus, the human settlement problems require comprehensive efforts by the Governments.

10.005 Each of these sectors which are related to human settlement problems is discussed in the respective chapters of this report. To be specific, however, it can be said that human settlement problems are essentially the problems of physical infrastructure to support the every-day activities of human life, infrastructure such as housing, water and sanitary facilities, hospitals, and schools. Needless to say there are many other physical or nonphysical systems which support people's every-day life such as roads or police protection, but these four are the major elements of physical structure which support human activities. Thus these four are discussed in this chapter and in Chapter IX. At the end of this chapter, in order to coordinate these four elements and to promote comprehensive development efforts on human settlements, the necessity of upgrading planning capability of local officials is discussed.

10.2 Public Housing

10.2.1 Housing Policy and Programs in Indonesia

10.006 During Repelita II, housing is given higher priority than before. During Repelita I, there was no housing provision program as such except for research programs on specific topics. During the first two years of Repelita II, a number of housing related institutions were established such as the National Housing Policy Board (BKPN, established in 1974) for housing policy making, the National Housing Development Corporation (PERUMNAS, established in 1975) for urban housing production, and the Housing Mortgage Bank (established in 1975) for housing finance. In addition, three urban housing supply programs and one rural housing program were created. They are: (1) kampung improvement program (KIP), (2) site and services program (S & S), (3) low cost housing program (LCH) and (4) rural housing program (RH). Operation of all three urban housing programs was initially entrusted to PERUMNAS, but the operation of the kampung improvement program was later transferred to the Directorate of Housing, CIPTA KARYA, and then to the Ministry of Home Affairs in 1976.

(a) Housing Development Programs for Urban Areas

10.007 According to a paper on housing policy in Indonesia submitted to the Conference of Housing in Asia held in Korea in 1976, the housing policy in the country is described as presented below.[1/] During the Repelita II period, the annual housing needs in the whole country just to meet the demand created by annual population growth was estimated to be 440,000 units based on the assumption of 5 persons per household. The annual housing production by private efforts is estimated to be 230,000 units annually. The difference, that is 210,000 units annually comprising 90,000 units in urban areas and 120,000 units in rural areas, is the annual deficit in housing supply. The rural housing deficit is supposed to be met by the self-help efforts by the rural people.

10.008 The urban housing deficit for the five years of Repelita II would total 450,000 units, and the Government plans to meet the deficit by the three programs described in Table 10.1. Each program has a specific target population as follows:

(1) The KIP is for the lowest income bracket of the population which represents about 20 percent of the urban population having family income up of to Rp.7,000 per month in 1974 (Rp.10,000 in 1976), based on a sample survey in Jakarta.[2/] The majority of this population live in low quality kampungs and squatter settlements.

(2) The site and services program is for the low income population bracket which represents about 50 percent of the urban population having family income of about Rp.7,000 to Rp.20,000 per month in 1974 (or Rp.10,000 to Rp.30,000 in 1976) again in the case of Jakarta.

(3) The low cost housing program is for the moderate income bracket of the population which represents about 20 percent of the urban population having family income of Rp.20,000 to Rp.30,000 in 1974 (or Rp.30,000 to Rp.50,000 in 1976) in the case of Jakarta.

1/ Directorate of Housing, CIPTA KARYA, Housing Policy and Program in Indonesia, submitted to the Conference of Housing in Asia, in Seoul, Korea, 1976.

2/ Directorate of Housing, CIPTA KARYA, Housing Policy and Program in Indonesia, 1976. The year of the survey is not specified in the report.

Table 10.1 Governmental Housing Development Program for Urban Area

Indonesia, Repelita II, 1974-1979

Income Group (1)	Income Range in 1976 Rp./Month (2)	Population Share in Urban Area % (3)	Housing Deficit by Income Group in Urban Area Unit (4)	Program to Meet the Deficit: Governmental Provision Unit (5)	Share % (6)	Program (7)	Program Contents (8)	Financial Source and Support (9)	Units to be Developed by Private Efforts Unit (10)=(4)-(5)
The Lowest	Less than 10,000	20	90,000	90,000	100	KIP	Improvement of Community Roads, Drainage, Water, Public Bath/WC, etc.	APBN, APBD, and INPRES	0
Low	10,000 - 30,000	50	225,000	53,000	23.6	S & S	Services and Sites with Lot Size of 80-140 m^2	a. PERUMNAS for Construction b. Ownership Loan and Building Material's Loan from a Government Bank	70,000 172,000
Moderate	30,000 - 50,000	20	90,000	20,000	22.2	LCH	House Size of 45-70 m^2, Lot Size of 80-140 m^2	a. PERUMNAS for Construction b. Ownership Loan from a Government Bank	45,000
Middle	50,000 - 90,000	8	45,000	0	0	-	House Size of 70-150 m^2, Lot Size of 140-300 m^2	a. Construction Loan b. Consumers/Buyers Credit	
High	Over 90,000	2					House Size of 150-300 m^2, Lot Size of 300-750 m^2		
Total		100	450,000						

Sources: 1. Noer Saijidi, Mass Housing in Indonesia, Directorate of People's Housing, CIPTA KARYA, JKT, 1976.(?)

2. Sardjono, Some Notes on Economic Aspects of Housing Development Policy and Programs, report prepared for the Cairo Conference on Low Cost Housing in 1975.

3. Housing Policy and Program in Indonesia, prepared for the Conference of Housing in Asia, held in Seoul, Korea, 1976.

Private housing developers and builders will serve for the middle income population which represents about 8 percent of the urban population having family income of Rp.30,000 to Rp.60,000 in 1974 (Rp.50,000 to Rp.90,000 in 1976), and for the high income population bracket which represents 2 percent of the urban population having family income of over Rp.60,000 in 1974 (Rp.90,000 in 1976). The income levels of the target populations are all based on the levels prevailing in Jakarta, but these standards are considered meaningful as about a half of the units to be provided under the site and services and the low cost housing programs are planned to be located in the Jakarta region. However, their relevance to Central Java needs should be reexamined.

10.2.2 Existing Urban Housing Policies and Assessment of Progress to Date

(a) Kampung Improvement Program

10.009 The kampung improvement program (KIP) is not a housing supply program but a program for upgrading residential areas. It provides to the existing low quality residential areas (1) road improvement including expansion and realignment, (2) road pavement including storm drains, (3) communal water supply, (4) communal sewage disposal with large septic tanks for each 50 or so households, (5) solid waste disposal systems, (6) Public Health Centers (Puskesmas), and (7) schools (SD and SLTP). One problem here is that there are many agencies involved. The Public Works Section of a city has to work in coordination with such agencies as the Water Authority, the Sanitation Department, and the Health Department. Projects should be planned and implemented solely by cities while the Central Government provides technical assistance to the cities. There are two kinds of KIP: (1) KIP initiated by cities and (2) KIP committed by the Central Government. The former has nothing to do with the Central Government, while the latter will be assisted by the Central. As for the latter, 50 percent of the total development cost has to be met by the city and the other 50 percent is to be met by the Central Government's loan to the city, whose terms of lending are 12 percent interest per year and 20 years for repayment. A major portion of the original fund for the loans is anticipated to come from international organizations, especially IBRD.

10.010 During Repelita I, 2,400 ha of kampung areas in Jakarta were upgraded by this program, being financed by the Special City of Jakarta itself. At present there are two ongoing projects: one in Jakarta and the other in Surabaya, but there are none in Central Java. Two studies for KIP projects in Central Java have been completed with assistance from international agencies.3/ They have identified Semarang,

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3/ Those studies are: a) Directorate General of CIPTA KARYA, Kampung Improvement Program, Semarang, Preliminary Data and Analysis for Project Development, assisted by UNDP, 1975; and b) PADCO, A Proposed Kampung Improvement Program for Middle-Sized Cities in Central Java, sponsored by USAID, 1976.

Solo, Cilacap, Pekalongan, Purwokerto, Kebumen, Jepara, and Kudus as locations of possible KIP projects.

10.011 There is one community in Semarang, Kampung Pancakula, which implemented KIP solely by cooperative efforts of the city and the community. Its streets were paved by means of Gotong Royong with the construction materials supplied by the KDY Semarang Government. The INPRES/D.T. II was utilized to meet the cost of construction materials. After this upgrading of community streets, individual houses were rehabilitated by each family's efforts under the guidance of the City Planning Section of Semarang City. The utilization of Gotong Royong must have certainly reduced the cost of the project.

10.012 As for the city of Semarang, there are some communities which seem to need upgrading of the environment. The city of Semarang intends to undertake KIP projects in the north-central portion of the city, and the study report by CIPTA KARYA selected three kampungs in the area for possible KIP project areas. The three kampungs are Bugangan, Widoharso, and Kemejin, the locations of which are shown in Figure 10.1. Also, city planning officials of Semarang City suggested to the Study team Kuningan, Karangkidul and Bugangan as kampungs for potential KIP projects (see Figure 10.1). At the moment, no definite decision has been made within Semarang for KIP projects.

10.013 The per capita cost of a KIP program is the lowest among the three urban housing programs, and is about US$ 40 (Rp.16,000) per person served according to the experiences obtained in Jakarta during the period from 1974 to 1976.[4/] The other source indicates the per capita cost of a KIP program to be Rp.32,000.[5/] Although the cost of the project is not charged to the residents, it is expected that the cost will be partially recovered by increased land tax revenue. For example, according to the report Housing Policy and Program in Indonesia land values in improved kampungs in Jakarta have been increased considerably, although the degree of increase in the value is not specified.

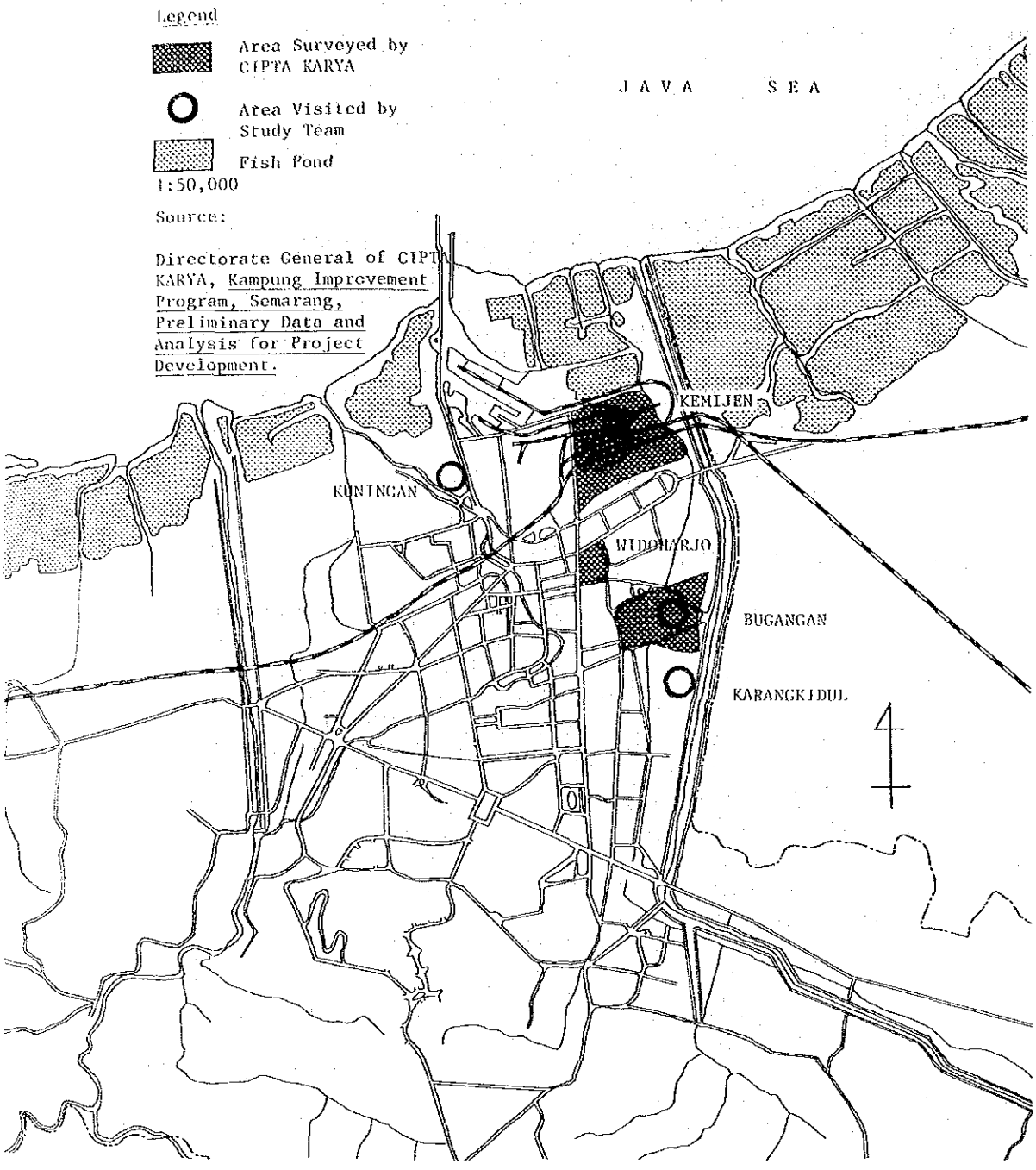
10.014 Since there are communities which need environmental upgrading and the KIP is an effective and inexpensive program to upgrade existing low quality residential areas, it is recommended to apply this program to the needy cities in Central Java. Probably the first city that should have a KIP project would be Semarang. The location, areal extent and the specific contents of the project should be carefully studied on the bases of (1) experiences obtained at Jakarta and Semarang and (2) a survey of existing conditions of the potential areas and socio-economic characteristics of the population.

4/ See the Appendix 3 of Housing Policy and Program in Indonesia, the paper prepared for the Conference on Housing in Asia in 1976.

5/ PADCO, op. cit.

Figure 10.1 Three Potential KIP Project Areas

in Semarang Surveyed by CIPTA KARYA in 1975



10.015 In this connection, attempts should be made to develop a method of charging fees to the people who would obtain benefits, thereby to recover development costs as well as secure maintenance costs of such communal facilities as toilets or water supply facilities.

(i) Investment Requirement for KIP Projects

10.016 Tentative calculation of the required investment for KIP projects in Central Java was made based on the two reports previously mentioned (Kampung Improvement Program, Semarang, Preliminary Data and Analysis for Project Development by the Directorate General of Cipta Karya, and A Proposed Kampung Improvement Program for Middle-Sized Cities in Central Java by PADCO).

10.017 According to the Cipta Karya report, the north-central portion of the City of Semarang is of low quality in terms of physical environment and housing, and suffers from routine flooding. The area is thought by the City to be a target area of the potential KIP projects. If it is assumed that the north-central portion means kecamatans Tengah and Utara of KDY Semarang, the north-central protion occupies about a quarter of the urbanized area of the city. Since the area has a higher population density than the other urbanized area of the city, the population within the area can be assumed to account for about one-third of the city population. Since the registered population of KDY Semarang in 1976 is about 750,000, the population within the area is estimated at 250,000. The per capita cost of a KIP project is estimated to be Rp.32,000, so the investment required for the KIP projects for the area is Rp.8 billion.

10.018 The PADCO report identified 6 medium-size cities for the potential KIP projects in Central Java, from which the report further identified three cities for the KIP pilot projects. Those cities identified are Kudus, Purwokerto and Jepara. The proposed pilot projects will serve 40,000 persons and cost Rp.1.28 billion at 1976 prices. Thus the total investment required for the cities of Semarang, Kudus, Purwokerto, and Jepara is estimated at aroumd Rp.9.28 billion during the period of 1977/78 to 1983/84. In addition, Tegal might be included in the cities which need KIP projects after an examination on housing situation in the city since the city is growing fast.

(b) Sites and Services Program

10.019 While KIP is for the existing low quality residential areas, site and services programs are for the outskirts of cities, to provide adequate services and core houses to newcomers to cities. The program emphasizes self-help housing construction. Housing sites are sold to occupants who are obliged to pay back the cost of the site development costs. Under this program, PERUMNAS provides along with housing sites those infrastructure services which low income families are hardly able to provide by themselves, i.e., core houses[6/] and overall

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6/ A core house in this program is a 20 sq. meters roofed structure containing kitchen, toilet and one bedroom. The core house is intended to satisfy the immediate housing needs of a family and is expected to be expanded through self-help.

community planning and administrative services. PERUMNAS also supervises self-help efforts for expansion of the housing structures by site occupants.

10.020 The development module for a site and services project for the lowest incomes is a 50 ha site with the gross density of 50 units per hectare. Within the development module, housing areas account for 60 percent, commercial and industrial sites for 4 percent, open space and community facilities for 20 percent, and the circulation for 16 percent of the total area. 80 percent of the housing sites is of 90 or 120 sq. meters with minimum levels of services, which are usually water and sanitation only. The remaining 20 percent is of 160 to 200 sq. meters which will be sold to middle income families at prices which depend on market conditions at each location of projects in order to utilize its profits as a subsidy for low income lots. Also, completed demonstration houses are provided to guide residents for expansion of their houses.

10.021 Prepared sites are equipped with individual water faucets, septic tanks (one for one lot, two lots or four lots), and core houses each comprising one kitchen, one toilet and one bedroom (duplex or quadruplex), but no electricity. The infrastructure provided includes roads, storm drainage, school sites, health center sites, and playgrounds. Among them, the last three are donated to local governments free of charge.

10.022 The target population is those families having income from Rp.10,000 to Rp.30,000 per month at 1976 prices which include the first and the second grade public employees (whose salaries are Rp.10,000 and Rp.28,000 per month in 1976, respectively). However, the larger sites are aimed for middle income families having higher income.

10.023 The planned targets of this program for the entire Indonesia and Central Java are presented in Table 10.2. The first site and services project in Indonesia will soon be constructed with IBRD assistance in Klender, Jakarta. For Central Java, there was only one site and services project planned within Repelita II, the project which was planned to be undertaken in 1976/77 in the City of Surakarta to provide 1,500 sites. However, this project will not be implemented before 1978 according to the revised plan of PERUMNAS as presented in Table 10.4. The budget in Table 10.4 also implies that there is a sites and services project in the City of Semarang which should have been started in 1976/77. However, it has not been started nor have its details been specified.

10.024 Table 10.3 and Table 10.4 present the original and the revised plans for the site and services program. According to them, Central Java was originally planned to receive Rp.4,331 million, which is about 14 percent of the total national program during Repelita II, but according to the revised plan, Central Java will receive only Rp.1,666 million by 1978 which is 5.2 percent of the original national total.

Table 10.2 Planned Target of Site and Services and Low Cost Housing, Indonesia, Central Java, 1974-1979

(Unit: Lot or Unit)

Site and Services	1974/75	75/76	76/77	77/78	78/79	Total [3]
Central Java [1]						
Semarang	0	0	0	0	0	-
Solo	0	0	1,500	0	0	-
Indonesia [2]						
JABOTABEC Area	0	0	2,000	7,100	-	26,500
Outside JABOTABEC Area	0	0	0	5,100	-	26,500

Low Cost Housing	1974/75	75/76	76/77	77/78	78/79	Total [3]
Central Java [1]						
Semarang	0	438	0	600	0	-
Solo	0	0	100	100	0	-
Indonesia [2]						
JABOTABEC Area	-	-	3,150	4,100	-	10,000
Outside JABOTABEC Area	-	-	2,765	3,200	-	10,000

Notes and Sources: 1/ Cipta Karya.
2/ PERUMNAS, Revisi Anggaran Tahun 76/77, Rancangan Anggaran Tahun 77/78.
3/ Table 10.1.

Table 10.3 The Original Plan of Site and Services Projects by PERUMNAS for Indonesia and Central Java, 1974-1979

(Unit: Rp. Million)

	1974/75	75/76	76/77	77/78	78/79	Total 1974/75-78/79
Klender (JKT)	1	54	1,334	1,950	0	3,338
Depok (JKT)	1	0	0	1,780	1,170	2,950
Semarang	0	6	500	1,280	1,170	2,950
Solo	0	169	712	500	0	1,381
Yogyakarta	0	6	0	500	0	506
Total Indonesia	354	389	5,455	13,910	11,725	31,753

Source : PERUMNAS, Anggaran Investasi Penyediaan Lingkungan Perumahan (Site and Services) 1974/75-78/79.

Table 10.4 Actual and Revised Plan for Site and Services Projects
Indonesia, Central Java, 1975-1978

(Unit: Rp. Million)

		Land Purchasing (1)	Land Development (2)	Housing Development (3)	Other Administrative (4)	Total (5)	Unit Developed No. (6)
1975/76 (Actual)	Klender (JKT)	0	0	0	54	54	0
	Depok (JKT)	0	0	0	0	0	0
	Semarang	-	-	-	-	6	0
	Solo	169	0	0	-	169	0
	Yogyakarta	0	0	0	0	0	0
1976/77 (Planned)	Klender (JKT)	-	750	440	-	1,334	2,000
	Depok (JKT)	0	0	0	0	0	0
	Semarang	-	0	0	-	1,491	0
	Solo	-	0	0	0	0	0
	Yogyakarta	0	0	0	0	0	0
	Total Indonesia	-	870	440	0	-	2,000
1977/78 (Planned)	Klender (JKT)	0	575	1,122	40	1,737	5,100
	Depok (JKT)	0	0	0	0	0	0
	Semarang	0	0	0	0	0	0
	Solo	0	0	0	0	0	0
	Yogyakarta	0	0	0	0	0	0
	Total Indonesia	-	1,897	3,792	-	-	12,200

Notes: na: Not applicable. -: No data.

Source: 1. PERUMNAS, Rencana Kerja Dan Anggaran Biaya 1975/76, Revisi Anggaran Tahun 1976/77, and Rancangan Anggaran Tahun 1977/78.
2. As a minor source: Anggaran Investasi Rumah Rakyat 1974/75-1978/79 and [illegible]

10.025 Although there are no data on the unit development cost of the site and services projects in Central Java, it is possible to estimate the unit cost from Table 10.4 in the case of the Klender project in Jakarta. It is about Rp.440,000 per site for the three years shown in the plans without including the cost of land (see Table 10.5).

Table 10.5 Actual & Revised Plan for Klender Site & Services Projects Jakarta, 1975/76 - 1977/78

(Unit: Rp. Million)

	Total Cost Rp. Mil. (1)	Unit Developed No. (2)	Development Cost per Unit Rp. Mil. (3)=(1)/(2)
1975/76 (Actual)	54	0	na
1976/77 to 77/78 (Planned)	3,071	7,100	na
Total	3,125	7,100	0.44

Note: na indicates "not applicable".

Source: Table 10.4.

Another source reports that, in the Klender project, a 80 sq. meters lot with a 20 sq. meters core house, which is the type accounting for 70 percent of the total number of sites, will be sold at the price of about Rp.700,000 in 1976 prices.7/

7/ See the article: Ishiguro, Toshio "Problems in Housing Development Planning in Indonesia (Japanese)", Jutaku, Vol. 25, No. 1, 1976. The year of the price is not specified in the article but seems to be 1976.

10.026 The cost charged to the site occupants is about 75 percent of the total development cost, since they are not required to pay the costs for commercial and industrial sites, sites for infrastructures, primary and secondary school sites, large and small health center sites, demonstration house, external infrastructure to the site, and interest and management.8/

10.027 Assuming the land cost is 50 percent of the development costs, the average unit cost is Rp.660,000. Then, the cost charged to a site occupant will be about Rp.500,000. The monthly installment required for the charged cost is estimated to be about Rp.5,000 per month at 1976 prices assuming a credit of 15 years amortization period, 12 percent annual interest rate, and 20 percent down payment, which is the most likely credit for housing in Indonesia. The government officials think that the maximum housing expenditure which people can pay in Indonesia is about 20 percent of their income. Based on this, the minimum income required for purchasing a housing site in the site and services project is Rp.25,000 per month in 1976. If the charged cost is Rp.700,000 per unit, the monthly installment will be Rp.6,400. Assuming the same terms of credit, the minimum income required is estimated to be Rp.32,000. So, the minimum income for a family to be able to buy a S & S plot is somewhere between Rp.25,000 and Rp.32,000 per month. It means the site and services program can serve only a small part of the target families originally envisaged by Repelita II, i.e., income range of Rp.10,000 to Rp.30,000. The site and services project is still too expensive to serve for the low income people. The above comparison is made with respect to the income levels prevailing in Jakarta. The general income level in cities of Central Java is much lower than in Jakarta. Therefore, a cheaper version of this program should be developed in Central Java. Every effort should be made to reduce development cost. For example, the following alternatives need to be considered: no provision of a core house, communal provision of water supply and toilets instead of provision on an individual basis, a site area smaller than 80 sq. meters, and gravel roads. In terms of income level, most families in need of housing in Central Java are in the class of Rp.10,000 to Rp.30,000 or below. Serious attention should be directed to develop cheaper versions of this program in the Province.

10.028 Among kotamadyas in Central Java, Semarang is the most rapidly growing city, and Tegal is the next. Based on the Study team's analysis, these two cities are projected to grow at highest growth rates among kabupaten/kotamadyas in the Province in the future (see Table B.6). Therefore, the first priority in site and services projects should be given to Semarang and Tegal.

8/ "Urban Development Study, Sites and Services", by Directorate TATA KOTA, DPUTL, Indonesia. The year of its publication is not specified. The year might be 1972.

10.029 As for Semarang, the registered population in 1976 is about 750,000, and the additional housing needs for 1977 is estimated to be 4,545 units, with the assumptions of the population growth rate of 3.03 percent per year and the average household size of 5 persons. Assuming that about 70 percent of the necessary units is provided by individual efforts and that about a half of the remaining families would apply for sites provided by the site and services program, the number of sites required in the program is about 660 per year. Thus Semarang alone needs more than 500 site-and-services lots per year.

(c) Low Cost Housing

10.030 The low cost housing program is mainly for the moderate income group having an income level from Rp.30,000 to Rp.50,000 per month. The program can be implemented by PERUMNAS itself, local governments, non-profit housing organizations, or private developers. The program would provide two-storied terrace houses with the average gross density of 40 to 50 units per ha. Its typical module is for the area of 50 ha with the gross density of 48 units per ha. 80 percent of the total units would be for the moderate income group, and the remaining 20 percent be sold to higher income families presumably for obtaining profits for use in subsidizing the former group. Typical standards are as follows:

Type	Site Area m^2	Floor Area per Housing Unit m^2
Moderate Income Families	90 or 120	20, 36, 45 or 60
Higher Income Families	200 or 300	70

10.031 The planned target of the low cost housing development for Repelita II is presented in Table 10.2. About 20,000 units are planned for 15 cities in Indonesia but the most of the projects have not yet been designed in detail. The first project is in Depok Baru near Jakarta and will provide 7,000 units when completed. For Central Java, it is planned to provide 1,038 units in Semarang and 200 units in Surakarta during Repelita II.

10.032 Table 10.6 presents the original budgets for the low cost housing projects. Central Java is allocated only 6.3 percent of the total budget. However, the planned expenditure for Surakarta was increased from Rp.371 million in the original budget to Rp.1,388 million

Table 10.6 Original Budget for Low Cost Housing Projects Indonesia, Central Java, 1974-1979

(Unit: Rp. Million)

	1974/75	75/76	76/77	77/78	78/79	Total 74/75-78/79
Klender (JKT)	0	0	0	0	1,723	1,723
Depok (JKT)	79	3,794	3,354	3,445	2,594	13,267
Semarang	158	643	20	340	1,034	2,195
Surakarta	0	26	162	182	0	371
Yogyakarta	0	0	200	527	851	1,578
Total Indonesia	461	6,405	8,770	11,452	13,329	40,416

Source: PERUMNAS, Anggaran Investasi Rumah Rakyat 1974/75-1978/79.

Table 10.7 Actual and Revised Budget for Low Cost Housing Projects
Indonesia, Central Java, 1975-1978

(Unit: Rp. Million)

		Land Purchasing Rp. Mil. (1)	Land Development Rp. Mil. (2)	Housing Development Rp. Mil. (3)	Other Administrative Rp. Mil. (4)	Total Rp. Mil. (5)	Units Developed No (6)	Unit Cost Rp. Mil./Unit (7)=(5)/(6)	Direct Unit Cost Rp. Mil./Unit (8)=(2)+(3)/(6)
1975/76	Klender (JKT)	0	0	0	0	0	0	na	
(Actual)	Depok (JKT)	950	681	2,060	(103)	3,794	1,480	2.56	1.85
	Semarang	27	90	502	(24)	643	438	1.47	1.35
	Surakarta	-	0	0	-	26	0	na	
	Yogyakarta	0	0	0	0	0	0	na	
	Total Indonesia	-	-	-	-	-	-	-	
1976/77	Klender (JKT)	-	275	700	-	-	680	-	
(Planned)	Depok (JKT)	-	860	2,717	-	3,637	2,470	1.47	1.45
	Semarang	-	0	0	-	-	0	na	
	Surakarta	0	510	820	(32)	1,362	1,525	0.89	0.87
	Yogyakarta	-	0	0	-	210	0	na	
	Total Indonesia	-	2,410	5,352	-	-	5,915		1.31
1977/78	Klender (JKT)	0	0	0	0	0	0	na	
(Planned)	Depok (JKT)	2,000	1,035	3,400	(100)	6,535	2,600	2.33	1.58
	Semarang	467	173	550	(139)	1,329	500	2.66	1.45
	Surakarta	0	0	0	0	0	0	na	
	Yogyakarta	300	103	330	(19)	752	300	2.51	1.44
	Total Indonesia	-	2,639	8,570	-	-	7,300	-	1.54

Note: ( ): Estimated figure.

Source: As in Table 10.2.

in the revised budget (presented in Table 10.7), in response to the increase in the number of units to be provided, which is now 1,525.

10.033 One project is already under construction at Sambangan in Semarang, where 438 units will be completed by the end of 1977. The project provides housing units each having two bedrooms, one living room, one kitchen, and one bath and toilet room. The utilities provided comprise city water with individual meters, individual septic tanks, and 400 watts per house electricity. Housing structures are of reinforced-concrete columns and beams, brick and asbestos wall, tiled floor for the ground level, plywood floor for the second level, and asbestos for the roof. The interior finish is of plaster and plywood.

10.034 The unit development cost can be well represented by the development cost of the Sambangan project, which is presented in Table 10.8.

Table 10.8 Total and Unit Cost of Sambangan LCH Project, Semarang, 1975/76-1976/77

(Unit: Rp. Thousand at Current Prices)

Item	Unit	Cost (Rp.1,000)
Land Cost	6.4 ha	48,099
Preliminary Work		503
Land Preparation		162,784
Housing Construction	438 Unit	482,557
Beds Installed		2,550
Total Excluding Land Cost		648,402
Unit Cost Excluding Land Cost		1,480
Unit Cost Including Land Cost		1,590

Source: PERUMNAS/Daerah, "DATA-2 Teknis Proyek PERUMNAS Semarang" Semarang", PERUMNAS/Province, 1977.

The construction cost of building alone is about one million Rupiahs and the total development cost is about Rp.1.6 million per unit in 1976. This unit cost is about 2.4 times larger than the unit cost acoording to the site and services program, which is estimated to be Rp.660,000 per unit.

10.035 Formerly, all units developed under the low cost housing program were for sale, but at present all units are for rental. This seems to be a provisional policy and PERUMNAS is preparing hire-purchase and mortagage loan schemes for the low cost housing projects. The economic rent can be calculated on the basis of plausible assumptions. For a normal and standard quality house, the life may be 40 to 50 years. Assuming the 40 years life and 12 percent of annual interest rate, 12.13 percent of the total cost becomes the annual rent. Since the construction cost of the low cost housing per unit is Rp.1.6 million, the required rent should be Rp.194,080 per year or Rp.16,170 per month.

10.036 According to PERUMNAS, the monthly rent of a unit in the Sambangan project in Semarang would be Rp.5,300. This rent is substantially below the economic rent. Therefore, a sizeable amount of subsidy would be required for this project.

10.037 As is mentioned in the previous section, the low cost housing is expected to be sold eventually. When a likely housing loan is assumed, such the terms of 15 years repayment period, 12 percent of annual interest rate, and 20 percent of down payment, the monthly installment required is estimated to be Rp.15,400. It means a family has to have Rp.77,000 monthly income to be able to buy a low cost housing unit. This is far above the income level assumed for the target population. Therefore, it should be concluded that the low cost housing is too expensive to be within the reach of the moderate income group. Particularly in Central Java, the low cost housing is not recommended as a principal instrument for housing development policy.

10.2.3 Existing Rural Housing Policies and Assessment of Progress to Date

(a) Rural Housing Problems

10.038 Housing quality is lower in the rural area than in the urban area. Table 10.9 presents the quality of the housing stock in the urban and rural areas in Central Java. In the rural areas about 15 percent of the total housing is non-permanent, i.e., housing units with bamboo wall or leaf roof. According to another source, in the rural areas in Central Java excluding all kabupaten centers in 1975,[9/] 79 percent of housing units are structually not in good condition, 69 percent have bamboo walls, and 89 percent have dirt floors.

9/ Source: Kanwil Health Province, Kedaan Sanitasi Lingkugan Menurut Survey Di Jawa-Barat & Jawa-Tengah, 1975.

Therefore, the major task in rural housing in the Province is to upgrade the existing stock of housing rather than to build new units.

Table 10.9 Housing Quality

Central Java, 1971

(Unit: Households)

	Household			
	Rural Area		Urban Area	
	No.	%	No.	%
Non-Permanent Housing (Category IV in the Statistics)	626,491	(15.0)	18,257	(3.9)
Semi-Permanent Housing (Category II and III)	3,297,539	(79.0)	335,608	(71.3)
Permanent Housing (Category I)	250,639	(6.0)	116,738	(24.8)
Total	4,174,719	(100.0)	470,603	(100.0)
(%)	(89.9)		(10.1)	

Source: BPS, Housing Condition in Jawa Tengah, 1971, Jakarta, 1976

(b) Rural Housing Program

10.039 The rural housing program (Program Penbinahan Pemgaran Perumahan Desa), which is the only program for rural housing in Indonesia, started in 1970 and was called "demonstration project" in the Repelita I, and is called "rural housing program" in Repelita II. Its major objectives are improvement of housing and environmental sanitation, and its major instruments are the utilization of Gotong Royong, technical information service from the Building Information Center, and the utilization of local materials and local technology.

10.040 The rural housing program offers three types of programs which are used according to the three type of desas. All desas in Indonesia are classified into three types: Swasembada, Swakarya, and Swadaya. Basic objectives are, for Swasembada, development of new

demonstration housing units and development of local raw materials; for Swakarya, housing rehabilitation and improvement of environmental sanitation; and for Swadaya, improvement of environmental sanitation.

10.041 Table 10.10 presents their definitions, their percentage shares in Indonesia, and number of projects planned for each type of desa during Repelita II. Only 1.7 percent of all desas would receive a rural housing project during Repelita II. Each type of program is devised to meet the varying conditions of the each desa. Table 10.11 presents the program components and unit cost for each type.

10.042 The selection process of target desas is as follows: taking the case of 1976/77, the Directorate General for Housing, Building, Planning and Urban Development, Cipta Karya in Jakarta, approved the APBN development fund for 50 desas in Central Java. Then, the Provincial Government designated 10 kabupatens for the projects, and each kabupaten selected 5 desas.

10.043 Although there is no charge to the rural people or to the desas under this program, the people's participation by Gotong Royong system is often required to lessen the development costs (see Table 10.11).

10.044 The planned number of rural housing projects during Repelita II for Indonesia and for Central Java are presented in Table 10.12. As for Central Java, there will be 146 projects in total from 1970 to 1978, but there are 8,466 desas in Central Java. Only 1.7 percent of the desas will receive projects by 1978. The geographic distribution of these programs by program component and the housing condition represented by the percentage of non-permanent housing of each geographic area are presented in Table 10.13. The program distribution does not correspond well to the housing condition of the geographic areas. For example, Kabupaten Sragen, where 78 percent of the households is living in non-permanent houses, has not received any rural housing projects, while the city of Surakarta had already one rural housing project. Although the prevalence of non-permanent houses may not be the only criterion for measuring the need of housing improvement, and other factors should also be used for allocating the projects, there is little indication that the allocation was made on the basis of systematic criteria. At least, three criteria should be considered for allocation: (1) low quality of the present housing stock, (2) the prospect for improvement and (3) achievement of the area in some development fields not necessarily in housing. The last criterion is to use the rural housing program as a reward for general development efforts by a geographic unit. As far as the housing condition is used as a criterion the following areas should receive priority in receiving Swakarya and Swadaya projects: KBs Sragen, Pekalongan, Pemarang, Jepara, Kudus, Demak, and Pati.

Table 10.10 Definition, Percentage Share of Desas, and Number of Rural Housing Project by Desa Type Indonesia, 1976

	Definition	Number of Desas		No. of Projects	Percent of Desas Covered by RHP During Repelita II	Number of Desas in Central Java[2/]	
		No.	%	No.	%	No.	%
Swasembada	Economically Self-sustaining Modern Close to Cities	1,160 3,767[1/]	(2) (6.4)[1/]	73	(6.3)	666	(7.9)
Swakarya	Economically Medium Transitional Inbetween	29,580 32,646[1/]	(51) (55.6)[1/]	802	(2.7)	6,980	(82.4)
Swadaya	Economically Poor Traditional Local	27,260 22,262[1/]	(47) (38.0)[1/]	125	(0.5)	820	(9.7)
Total		58,000 58,675	(100) (100.0)	1,000	(1.7)	8,466	(100.0)

Notes: 1/ Ministry of Home Affairs.
2/ D.G. Rural Development, Ministry of Interior.

Source: Housing Policy and Program in Indonesia, 1976.

	Basic Policies	Program Components	Number of Unit	Unit Cost		Training by BIC[2/]
				Central Rp.1,000	Gotong Royong Requirement	
Swasembada	New Housing and Credit System	1. New Demonstration House (One Duplex Unit, 90 m^2)	1	750	No	Yes
		2. Public MCK Unit [1/]	3	650	No	Yes
		3. Development of Local Raw Material for Building [3/]	na	600	No	Yes
		4. Small Credit System for New Construction	na	0	No	Yes
		Total Program Cost		2,000		
Swakarya	Housing Rehabilitation & Environmental Sanitation	1. Housing Rehabilitation	50	1,250	Yes	Yes
		2. Public MCK Unit	3	750	No	Yes
		3. Material Supply which is not Available in the Desa				
		4. Technical Assistance to Gotong Royong				
		Total Program Cost		2,000		
Swadaya	Environmental Sanitation	1. Drinking Water Supply	1	300	No	Yes
		2. Public MCK Unit	4	1,000	No	Yes
		3. Desa Road Improvement with Drainage		575	Yes	Yes
		4. Housing Rehabilitation	5	125	Yes	Yes
		Total Program Cost		2,000		

Notes: 1/ MCK = A set of bathing space (Mandi), washing space (Cuci), and toilets (Kakus).

2/ BIC = Building Information Center.

3/ Exploitaiton of raw material and processing it into building material, e.g., limestone into plaster.

Sources: 1. Jawatan Building, Cipta Karya/Province.

2. Housing Policy and Program in Indonesia, 1976.

Table 10.12 Planned Number and Required APBN Expenditure for Rural Housing Projects
Indonesia and Central Java, 1970-1978

(Unit: Projects)

		Realized				Planned					
		Repelita I				Repelita II					
		1970/71	71/72	72/73	73/74	74/75	75/76	76/77	77/78	78/79	Total
Swasembada	Indonesia 1/	-	-	-	-	0	30	5	11	27	73
	Central Java 2/	-	-	-	-	0	3	2	2	n.a.	n.a.
Swakarya	Indonesia 1/	-	-	-	-	15	12	135	235	405	802
	Central Java 2/	-	-	-	-	5	4	41	48	n.a.	n.a.
Swadaya	Indonesia 1/	-	-	-	-	0	0	20	40	65	125
	Central Java 2/	-	-	-	-	0	0	7	8	n.a.	n.a.
Total	Indonesia 1/	-	-	-	-	15	42	160	286	497	1,000
	Central Java 2/	1	3	6	16	5	7	50	58	n.a.	n.a.
Expediture in Rp. Million	Indonesia 1/	45	36	61	61	95	125	750	1,430	2,733	5,133
	Central Java 3/	-	-	-	-	18	17	158	268	n.a.	n.a.

Note: -: No data.

Sources: 1/ Housing Policy and Program in Indonesia, 1976.
2/ Cipta Karya, DPUTL, JKT, 1977.
3/ Jawatan Building/Cipta Karya, Province, 1977.

Table 10.13 Geographic Distribution of Rural Housing Program and Housing Condition in 1971

Central Java, 1974-1977

(Unit: Numbers of each unit)

	1974/75				1975/76				1976/77				Housing 1/ Condition in 1971
	Hng. Rehab.	Model Duplex	Unit MCK	Water Pump	Hng. Rehab.	Model Duplex	Unit MCK	Water Pump	Hug. Rehab.	Model Duplex	Unit MCK	Water Pump	
1. KDY Magelang													0.0
2. KDY Surakarta	12	0.5	1	0									0.1
3. KDY Salatiga													0.2
4. KDY Semarang													0.1
5. KDY Pekalongan													21.3
6. KDY Tegal													0.7
7. KB Cilacap					50	0	0	0	205	0	16	1	32.5
8. KB Banyumas													9.6
9. KB Purbalingga													9.0
10. KB Banjarnegara	35	1	1	0									8.6
11. KB Kebumen													7.7
12. KB Purworejo	40	1	0	0					205	0	16	1	9.3
13. KB Wonosobo													0.5
14. KB Magelang					50	0	0	0	250	0	15	0	0.2
15. KB Boyolali													1.0
16. KB Klaten									155	1	16	1	0.3
17. KB Sukoharjo					5	1	0	0					0.6
18. KB Wonogiri					50	0	0	0	205	0	16	1	1.4
19. KB Karanganyar									250	0	15	0	1.5
20. KB Sragen													78.0
21. KB Grobogan									105	1	16	1	7.3
22. KB Blora									205	0	16	1	1.0
23. KB Rembang					5	1	0	0	205	0	16	1	3.1
24. KB Pati													44.8
25. KB Kudus													30.4
26. KB Jepara													49.7
27. KB Demak													25.8
28. KB Semarang													0.8
29. KB Temanggung (Kedu)					5	1	0	0					1.0
30. KB Kendal	0	0	3	0									34.5
31. KB Batang					50	0	0	0					35.7
32. KB Pekalongan													54.3
33. KB Pemalang													44.8
34. KB Tegal									250	0	15	0	6.3
35. KB Brebes	0	0	5	0									10.0
Total	87	2.5	10	0	215	3	0	0	2,035	3	157	7	

Note: 1/ Percentage of households in non-permanent houses within total rural or urban households.
Source: BPS, Housing Condition in Jawa Tengah, 1971, Table 7.

Source: Building Information Center/Province, 1977.

10.045 As for the costs of the rural housing program, Table 10.14 presents unit costs for program components in Central Java. The most expensive component in the program is the development of model duplex houses, which is Rp.800,000 per duplex with 90 sq. meters floor space, or Rp.400,000 per one housing unit with 45 sq. meters floor space. It is 16 times the cost of housing rehabilitation, but the completed housing units under these two projects do not show much difference in quality according to the observations by the Study team. Therefore, the housing rehabilitation projects rather than the model housing projects should be given priority in the rural housing program.

Table 10.14 Unit Costs of Rural Housing Program

Central Java, 1974 - 1976

(Unit: Rp. at Current Price)

Unit MCK (Communal Bath, Lavatory and Washing Space)	Rp. 250,000/unit
Model Duplex House	800,000/duplex
Housing Rehabilitation	25,000/house
Community Street	500/m^2
Water Pump	300,000/pump
Total Program per Desa	2,000,000/desa

Source: *Building Information Center/Province.*

10.046 In addition to the housing condition itself, the low levels of water supply and toilet installation should receive attention. In Central Java, only 45.2 percent of the total households has access to a toilet, which is either for own use, shared or public toilet. In the rural areas, only 42.5 percent has access to a toilet.[10/]

10/ Source: Central Bureau of Statistics, Housing Condition in Indonesia, 1971 Population Census, Indonesia, 1975, table 17.

Table 10.15 presents the number of households by their sources of drinking water. About 11 percent of the rural households in Central Java obtain water from rivers, rain, or some other unsafe, unstable sources. These toilet and water supply problems are also issues which should be attacked by means of the water and sanitation programs (see Section 9.3) as well as the rural housing program.

Table 10.15 Households by Drinking Water Source

Central Java, 1971

	Household			
	Rural		Urban	
	No.	%	No.	%
Piped Water	69,031	(1.7)	153,198	(32.6)
Pumped Water	21,942	(0.5)	15,479	(3.3)
Well	2,683,083	(64.3)	286,373	(60.9)
Spring	948,981	(22.7)	3,834	(0.8)
River, Rain, Others	450,682	(10.8)	6,719	(1.4)
Total	4,174,719	(100.0)	470,603	(100.0)

Source: BPS, Housing Condition in Jawa Tengah, 1971, 1976, Table 12.

10.047 A typical house in poor rural desas has a dining and living room where children seem to sleep, a sleeping room for parents, a kichen, and a storage room for rice and staple foods, each of which is separated by a bamboo wall. In many cases, houses also accomodate such animals as goats and chicken, which causes hygienic problems. Also, most of the poor houses have no window at all, thereby creating the problems of darkness and the lack of ventilation. The floor is made of dirt and limestone powder, which becomes wet or damp in the rainy season and causes hygienic problems.

10.048 Thus, poor hygienic conditions is still one of the major problems in the rural areas of Central Java. In addition to housing rehabilitation, therefore, improvement of environmental sanitation such as by the provision of public toilets, and storm drainage, the separation of animals from human quarters, and kitchen improvement should be given priority within the rural housing program. As for water supply, the INPRES/Health program also has water supply components. It has a larger fund and a greater variety of water supply projects than the rural housing program. Therefore, functional specialization should be established between them. It is recommended that the INPRES/Health program should cover water supply projects and the rural housing program should be confined to sanitation projects including water supply for communal toilets and bathing places (unit MCK) as well as individual toilets. The first step which should be taken in this respect is a survey on the toilet conditions of all desas in Central Java, in order to identify the type, quantity and locations of toilets which should be provided on the priority basis.

10.049 Based on our observations of the rural housing program, the families who had their houses rehabilitated seems to be satisfied with the program and have actually started to upgrade their housing quality by repairing their houses by themselves and by adopting more sanitary way of living. According to a kecamatan head and a rural housing program officer at the provincial level, the program is welcomed by villagers. Also, the idea of housing rehabilitation and sanitation is spreading to other desas. For example, in Kecamatan Sigalu, Banjarnegara, several desas have started their own rural housing program using their own funds after examining a desa which had a project under the rural housing program.[11/]

10.050 Technology diffusion has been successful due to the activities of the Building Information Center which will be described in a later paragraph. Therefore, the rural housing program should be expanded along the lines recommended in the previous sections. It, also, should be mentioned that the housing rehabilitation is as inexpensive a program as KIP.

10.051 Nonetheless, because the program can not cover a large part of the rural housing units, it has to depend for its success on the demonstration effect. In order to diffuse the demonstration effect, at least one project per kecamatan is required since most villagers

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11/ For their own rehabilitation program, in most cases, villagers utilize the Ayasan System under the initiatives of desa heads. In the Ayasan System, 10 to 15 families form an Ayasan and contribute Rp.300 to 400 per month per family to rehabilitate one family's house. After finishing the rehabilitation for one family, the contributions go to the next family and so on to the last family in the Ayasan.

do not frequently go beyond their kecamatan boundaries. This should be considered as a feasible target to be achieved by the end of Repelita III, that is 1983/84.

(c) Other Rural Housing Programs

10.052 There are two other sources of funds for the rural housing program: (1) Provincial Development Expenditures (APBD/Province Development) subsidized by the Ministry of Home Affairs and (2) KB/KDY Development Expenditures (APBD/Kabupaten Development). Their programs are operated under the same name, the rural housing program, and have the exactly the same program components. Their relation to the original rural housing program is as follows: the rural housing program by Cipta Karya utilizing the Central Government Project Expenditures (APBN Development) starts one pilot project in a certain desa, then the program by Provincial Development Expenditures provides projects to desas adjoining to the pilot desa, and then the program by KB/KDY Development Expenditures follows suit. Also, the Subdirectorate of Rural Community Development (PMD) of a kabupaten government under the control of Ministry of Home Affairs has one small program which is called Demonstration Rehabilitation Program, which (1) pays for partial improvement of rural houses, e.g., roof, window, door, or wall, and (2) provids technical assistance, equipments and training support. But, its funds are very limited and it can rehabilitate very a few houses. In order to strengthen the effectiveness of these programs a greater degree of coordination appear to be warranted.

(d) Building Information Center (BIC)

10.053 The Building Information Center is a part of the Jawatan Building, Cipta Karya/Province, and another important part of the rural housing program. It provides extension services on housing and hygiene in the rural housing program.

10.054 It operates as follows: in the rural housing program, each kabupaten selects five desas and designates one desa as a BIC training desa. Heads of those 5 desas recommend two STM (technical senior secondary school) graduates per desa as candidates for the site engineering training. BIC sends those 10 graduates to Gajamada University in D.I. Yogyakarta for the several months to one year of training in the fields of road construction, water supply, wood preservation, and all other necessary skills except carpentry skills. After their training, BIC holds a five-day training course for 60 participants at the BIC desa. 60 participants comprise three kabupaten officials, the two STM graduates who has finished their training, two carpenters from the BIC desa (if there is no carpenter, one comes from outside of the BIC desa), one person from each family which was designated by the desa head to rehabilitate its own house, and the rest from desas surrounding the BIC desa. From desas outside the BIC desa, 25 persons, at the maximum, are invited. The course comprises one observation trip to the desa which has already finished the rural housing program, and four days of lectures. The lecturers are three persons for housing an hygiene extension and two persons for a film-and-slide show from BIC. After the BIC course, the three kabupaten officials and the two film and slide persons hold four