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TRANSPORTATION AND POWER

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Since the mission's visit substantial changes have occurred in the effective exchange rate structure and prices have risen at a more rapid rate than during the previous months of 1967. These developments may require reconsideration of the magnitudes in the 1968 budget. However they have not altered the basic conclusions of the mission in respect of the performance and prospects of the economy.

ANNEX 3

TRANSPORTATION

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ANNEX 3

TRANSPORTATION

General

1. Nearly everywhere in Indonesia production and consumption areas are relatively close to ports, and interinsular shipping plays the role of the country's trunk transportation system. Each island has its own local transportation system. On most islands land transportation is predominantly to and from ports; only on Java, because of the high population density, there is also an extensive internal local transport network. Since distances to the many ports are relatively short, road transport is, or rather should be, of great importance.
2. Except in Java, railways play only a modest role. Java has 4,600 route kilometers of railroad and there are 4 separate areas in Sumatra which are served by 2,000 kilometers of railways. The railways' main function is passenger transport; in 1966 the number of passenger kms is about 8 times that of revenue ton-kms. Domestic air transport is also of more than average importance in view of the great distances separating the most productive areas such as North Sumatra, Java, Bali, Sulawesi and Kalimantan.
3. Because of shortage of funds, the dissipation of their purchasing power by inflation, and mistakes in planning and priorities, maintenance of the country's transportation infrastructure and vehicles has been neglected over many years, and dis-investment in this sector is probably proportionately larger than in most, if not all, other sectors of the economy. About 30% of the combined private and government owned interinsular shipping fleet is awaiting repair, and part of it should be scrapped. The railway's track and bridges suffer from deferred maintenance, and need strengthening. Much of the motive power and rolling stock is overage and some should be scrapped; the rest needs rehabilitation. There is a large backlog of maintenance dredging for the ports and their access channels. The condition of ports leaves much to be desired, particularly with respect to cranes and other port equipment, much of which needs repair or replacement. About half of the road vehicle fleet is over 10 years old. Much of the aircraft for domestic aviation is outmoded and need replacement.
4. The deficiencies in the transport sector, however, are not only a matter of physical deficiencies which could be removed by making funds available for rehabilitation and replacement. There is even more need for improvement in administration, organization, operation, financial arrangements, etc. Much professional ability is available in the country, but its usefulness is reduced because of administrative deficiencies and overly complicated organization systems. This situation is aggravated by the practice of putting members of the armed forces in key positions in the various agencies. This is done in an attempt to improve control and discipline, but it also leads to administrative shortcomings. In addition, military and civil administration responsibilities overlap in many instances, adding to the confusion. What is particularly lacking is managerial talent, which is different from professional skill.

5. Because of the size and geographical conditions of the country, there is need for a greater degree of decentralization of responsibilities. It might be that the present organizational and administrative system would be adequate if the local administrative agencies were involved only in routine operations and maintenance. Since now the emphasis must be shifted to rehabilitation and reconstruction, it will prove most difficult to arrange and administer everything from headquarters in Djakarta. This need for decentralization increases the problem of already existing shortage of managerial ability.

6. Technical Assistance. The mission was happy to find that the government recognizes the need for strengthening the management of the various transport sectors. It is now in the processes of finding ways and means to obtain assistance on the management level, either under bilateral arrangements or via international agencies. The mission was asked to investigate whether there is at present need and scope for an overall transportation survey, and if so, to help in preparing an application for the U.N.D.P. to finance such a survey. Its purpose would primarily be to assist the country's planning organization, Bappenas, in the preparation of a five-year program. The mission has come to the conclusion that the time is not ripe for a full-fledged transport survey along the usual lines for the following reasons:

- (a) Analyses of present conditions have already been made in several sectors by experts or teams of experts, and the deficiencies are generally well known. There is no immediate need for still more reports, and the time has now come to retain the services of operational advisors who can stay for a longer period than visiting missions.
- (b) Present economic conditions and the unpredictability of future developments in mining and other industries would make it hazardous to use present traffic flow information as a starting point. Also, there is a serious lack of basic data in several important transport sectors, e.g. interinsular cargo handling in ports, interinsular shipping by small craft, road transport, etc. Collecting these data will require a considerable amount of preparatory work and should be undertaken at once.
- (c) Until extensive improvements of an administrative nature have taken effect, it will be difficult to estimate what the actual capacity of existing facilities may be under normal conditions in Indonesia.
- (d) In any event, an investment program for the first three to five years will in essence be a rehabilitation program of existing transport facilities, the need for which has already been proven, rather than a development program for new facilities.

- (e) Another, but less important point, is that as long as rapid inflation continues, present costs, costing methods and cost estimates could not form a sound basis for a financing scheme for a long-term investment program.

7. The mission believes that Indonesia's transportation sector requires managerial and other technical assistance from both bilateral and multilateral sources. The advantage of bilateral assistance is that the management advisory teams needed for several agencies in Indonesia can be provided by similar agencies or companies in the assisting countries, each of which could undertake to assist in solving the problems in a particular sector. It is the mission's understanding that arrangements along these lines are presently being discussed between the government and some countries willing and able to provide such assistance.

8. The need for technical assistance in the road sector, however, goes far beyond that of the managerial level only. Because of the cost involved, technical assistance in the road sector can best be provided by the U.N.D.P. The mission has assisted the government in preparing an application to that agency. There is also need for two or three general transportation experts, working with their counterparts within Bappenas, to review and coordinate the findings in the reports already made for other sectors with that which will be made for the road sector, with a view to preparing an overall rehabilitation and development plan for the transportation sector. These experts will be included in the application to the U.N.D.P. mentioned above.

9. Some transport facilities appear to have spare capacity at present, with the exception of the road network which is a separate and much larger problem, as will be explained later. But the physical reconditioning of the transport sector will eventually call for very substantial funds and some requirements are already critical to avoid transportation deficiencies becoming bottlenecks when economic activities increase. Because of the above, the government has put much emphasis on the transportation sector in its project aid request for 1968; half of the US\$ 75 million has been earmarked for transport and communications projects (see table at the end of this Annex).

10. The mission has agreed with this program but wishes to make three important observations:

- (a) The cost estimates are very rough, and in many cases based on previous purchases at excessive prices for similar items with suppliers' credits; the mission during its short stay was unable to check the estimates.
- (b) The mission assumes that the strengthening of management as mentioned in paragraph 6, and in some cases technical assistance in specific fields, will become available to assist in placing orders so as to ensure that the most suitable types of equipment or materials are purchased.

- (c) A considerable part of the actual expenditures for the transport sector will probably spill over into 1969. The amount of 1968 disbursements will depend on when orders can be placed, which in turn depends upon when the required managerial and other technical assistance will be in the field. Most deliveries may be made within a year after ordering, with the exception of dredging by contract which will extend over several years.

11. The mission believes it to be unrealistic to expect that firm long range plans for new investments in the transport sector can be available in time to incorporate them in a 1969-1974, 5-year plan. It may take until mid-1968 before the various management teams are in the field to start their operations. Considering the complexity of the problems, and the difficult geographical conditions requiring extensive travel before the assistance teams will have obtained sufficient orientation to become really active and productive, most of 1968 may have elapsed before their advice can be used in the preparation of firm plans which in the initial years will be largely rehabilitation of existing facilities. The most important point will be to make sure that no funds are wasted on unnecessary works.

12. Finance. Financial statements over the years until the end of 1966 are meaningless because of the rampant inflation, and not enough figures are available for 1967 when indeed the financial situation for various transport sectors has somewhat improved. But, although in theory the most urgently needed spare parts and materials for rehabilitation can now be bought under the BE system, in practice this has been of little help because government agencies lack rupiahs. The US\$ 75 million program will be of some help in this regard but rehabilitation also requires extensive rupiah resources. The 1968 development budget should provide such funds if allocations are revised in accordance with actual needs and to match foreign aid availabilities.

13. Another problem for the state enterprises is the government's taxation system. Even if profits are made, taxation is so high as to leave insufficient funds for self-financing of replacements or expansion. As an example, Garuda (the most financially viable of the state enterprises in the transport sector) had a net income in 1966 of Rp. 146 million before, and Rp. 38 million after taxes. This leaves very little room for self-financing of fleet renewal or expansion.

14. Personnel. An extremely difficult but important problem is the obvious overstaffing in nearly all transport agencies and enterprises, which may be 50 percent or even more. For the time being the financial effects are still somewhat limited because wages have not kept abreast of inflation. The overstaffing problem will become more serious once a more normal wage level is reestablished as seems probable in 1968. An even more important aspect is the more than proportionate adverse effect of overstaffing on productivity of workers. Since every worker is waiting for the

other man to do the work, an overstaffing of say 30 percent may well lead to a 50 percent or more reduction in output per man. The mission fully recognizes the political and social problems involved in laying off large numbers of government workers under present conditions. But it also believes that to re-establish normal discipline and performance, it would be better to send surplus, incompetent or unwilling personnel home even, if need be, part of their pay were continued for a time preferably from the general budget. Without such drastic measures, even the most ambitious and competent management will be unable to put the house in order.

Roads

15. By far the largest problem facing the government in the transport sector is the need for rehabilitation and upgrading of the country's road network. Because of neglected maintenance nearly all roads are in poor condition. Many sections are completely impassable; a large percentage of the remainder is in such a run down condition that wear and tear on road vehicles is extremely high, resulting in high road transport cost. Less than 5% is considered good, 11% fair, 50% bad and 35% very bad. But the problem is not only that the roads are in such poor condition; an even greater problem is that the structural and geometric standards of the road network is still largely pre-1940.

16. The classification of the 80,000 km network is as follows:

Class	Maximum Axle Load (in metric tons)	Length in km			Total	Percent of Total
		National	Provincial	County		
I	7.00	65	54	--	118	0.2
II	5.00	1,241	1,214	--	2,455	3.0
III	3.50	3,201	8,466	--	11,667	14.5
III-A	2.75	1,964	3,416	--	5,380	6.7
IV	2.00	2,015	6,430	--	8,445	10.6
V	1.50	<u>1,614</u>	<u>520</u>	<u>49,800</u>	<u>51,934</u>	<u>65.0</u>
		<u>10,100</u>	<u>20,100</u>	<u>49,800</u>	<u>80,000</u>	<u>100.0</u>

17. The above table shows that only 3% of the country's road network is designed for axle loads of 5 tons; 21% for 2.75 to 3.5 tons, and 76% for 1-1/2-2 tons. Of the 10,000 km of national roads, 56% is designed for an axle load of 2.75 tons or less, and of the 20,000 km provincial roads, 50% is of the same low standard. Only 18% of the total network is asphalted, 44% is gravel or macadam, and 38% are earth roads. Needless to say such a network is inadequate to serve present day transport needs, even if it were in good condition. There is much overloading of trucks, most of which have much heavier axle loads than the pre-war vehicles for which the roads were designed. There is practically no control on weight, and only the poor condition of most bridges (which, of course, were also designed for lower axle loads) puts some limitation on the overloading of trucks. Heavy rainfall and poor drainage aggravate the situation.

18. Rebuilding the road network to more realistic structural standards is imperative as soon as financial resources permit, but this will prove to be a major undertaking which will require very large expenditures and will take many years to complete. During say the next 10-15 years, every kilometer of the 80,000 km road network will have to be upgraded or rebuilt if the growing demand for road transport is to be accommodated. Assuming modest average figures of say \$8,000 per km for the local roads, \$20,000 per km for provincial roads and \$40,000 per km for national roads, the order of magnitude for a road reconstruction program would be some US\$ 1.2 billion. It may be assumed that under Indonesian conditions close to one-half of the amount would be in foreign currency for equipment, spare parts, and imported materials (since the domestic crude oil has a paraffin base asphalt has to be imported). Moreover, many road sections are in such poor condition that they must be kept open for traffic on an emergency basis at high cost, until they can be reconstructed to higher standards.

19. In order to be able to carry out effectively an undertaking of this size, a complete overhaul of administrative, technical and financial arrangements between the government, the provinces, and lower administrative entities will be required. The lowest class roads are in particularly poor shape. While local administrations in the past may have been able to carry out routine maintenance on a make-shift basis, they cannot be made responsible for the upgrading or reconstruction of roads under their jurisdiction without strengthening the local highway departments. The same is true, perhaps to a lesser extent, of the provincial highway departments. In addition, the introduction of new road construction and maintenance procedures and techniques is required. Setting up adequate shops for repair and maintenance of road equipment is needed, and so is training of foremen, mechanics and other staff on various levels. Although a sizeable number of competent staff on all levels is available in the country, the government realizes that outside expert help is needed to carry out this huge task. The plan being proposed for U.N.D.P. financing envisages selecting a few pilot areas where the road problem is to be tackled with the help of three consultants' teams, which are to be coordinated by another team at headquarters. It is the intention to include in the U.N.D.P. project also a fellowship program to provide training abroad for highway engineers. Although competent as to education and background,

because of very limited road work activities in recent years, highway engineers have not had an opportunity to keep up with modern road construction and maintenance techniques.

20. Much road construction and some maintenance equipment is available in the country, but its condition is unsatisfactory because of lack of spare parts and inadequate maintenance facilities and procedures. Preventive routine maintenance of equipment is practically non-existent. First priority, therefore, needs to be given to establishing and equipping proper work shops, including field shops and mobile shops. This will require also training of mechanics.

21. In the 1968 foreign aid program US\$ 7 million is earmarked for roads. US\$ 4 million is for asphalt including complimentary storage and transport equipment, US\$ 1.0 million for rehabilitation of bridges and US\$ 2.0 million for workshops for maintenance and repair of road equipment. These figures are, of course, only estimates which will have to be reviewed and adjusted. The advising highway teams recommended (U.N.D.P. application) should also be instrumental in the introduction of new techniques for which the equipment and materials are to be used. Present road maintenance and improvement procedures need first to be changed before bulk asphalt storage and transport facilities can be efficiently utilized.

22. The routine budget includes an amount of Rp 450 million for the routine maintenance of 10,000 km national roads, or say US\$ 250-300 equivalent per km. Although it is difficult to judge because of the present distorted wage scale, this amount would seem very low, possibly less than half of actual needs. The mission did not succeed in obtaining figures on the allocation for routine maintenance of provincial and county roads, but was informed that the averages are even lower in proportion to actual unit costs. This means that the dis-investment in the road network will still continue in 1968. The development budget contains Rp 2.5 billion for road rehabilitation. This is far below what eventually will be required annually for a long term road rehabilitation and reconstruction program. The government will have to face the fact that this amount will have to be much higher in future budgets, once a plan of action for solving the country's road problems has been prepared.

Road Transport

23. The following table shows the 1965 position with respect to road vehicles, and the growth thereof over the past 10 years:

<u>Year</u>	<u>Passenger Cars</u>	<u>Trucks</u>	<u>Motor Busses</u>	<u>Motorcycles</u>	<u>Total</u>
1955	61,104	43,128	9,620	67,194	181,046
1961	129,262	69,837	17,852	152,228	369,179
1962	124,406	66,043	16,846	163,066	370,360
1963	127,853	69,183	18,251	176,490	391,777
1964	-----	NO DATA AVAILABLE		-----	
1965	157,474	83,571	19,621	220,953	481,619

Road transport is over 90% in the private sector, and it proved extremely difficult for the mission to obtain information thereon. It is estimated that between 20 and 40% of the vehicle fleet is inoperative because of lack of tires and spare parts. In the Djakarta area about one-half of the 4-wheel vehicle fleet is more than 10 years old, and it is said that the situation is about the same for the rest of the country. The mission was also informed that of the older fleet a higher percentage is operative, because these vehicles are from Western countries, for which it is easier to obtain spare parts than for the newer fleet from Eastern block countries. Although BE exchange may be obtained for the purchase of spares, this appears to be still difficult in practice since most dealers are reluctant to tie up expensive capital in stocks of spares; for them it is more attractive to sell new trucks.

24. In theory road transport is rather strictly controlled. There is a license system for operating trucks and busses, control on rates and fares, control on weight and dimension limitations, and a twice yearly physical inspection. In practice most of these controls are not enforced, and road transport is largely a "free for all" business. In principle, rates are set at an average of Rp. 7-1/2 per ton-km, equivalent to US\$0.06 per ton-mile. This is a rather high rate but the mission was informed that even this rate cannot be controlled. Actual road transport cost varies with road conditions and with supply and demand. The mission was informed that rates are often double or triple the above, and this fact is frequently given as an explanation why the price of rice differs widely between areas not too far apart. While not denying that lower road transport cost is of great importance to the economy, the mission believes the above explanation to be largely a fallacy. Even if the cost of road transport in a certain area would be say 4 times the normal rate, this should cause a difference in price per ton of rice over a 100 km distance of only some Rp 2,200 per ton, or Rp 2.2 per kilogram. The actual differences in rice prices are frequently many times greater, which must result largely from other factors.

25. A major problem is the lack of control of overloading of vehicles, which is detrimental to the low standard roads, particularly during the rainy season. The mission observed several overloaded trucks without license plates, and was informed that these are trucks previously used by the armed forces, and now operated by either active or inactive military personnel. Since it will be a long time before all roads have been upgraded, the mission strongly recommends that private importers should not be permitted to bring in trucks with axle loads exceeding the highest road design standards, and government enterprises, civil or military, should not be permitted to import heavier trucks than the roads can accommodate. In general the use of trucks heavier than roads are designed to accommodate should be strictly controlled.

26. Another major problem in the road transport sector is intra-city bus transportation. Because of the low salaries and wages, it has been and will continue to be impossible for some time to charge fares adequate to cover the cost of bus transport for moving people to and from work. The government-owned bus companies are required to sustain this burden.

27. In the Djakarta area in October 1967, 237 busses were operative whereas the estimated need is for about 2,000. Of these operative busses, 78 are owned and operated by the Djakarta Municipal Enterprise (PPD), 108 by the government-owned enterprise operating in the Djakarta area (TAVIP), and 6 by a nation-wide government-owned enterprise (DAMRI). The balance of 95 busses are operated by four private enterprises who operate also more lucrative inter-city busses. The PPD and TAVIP are both in poor financial shape, and their vehicle fleet is in very poor condition. TAVIP suffers from the fact that its vehicles come from Eastern European countries, from which it is presently most difficult to obtain spare parts. The PPD owns at present 250 busses (not counting a few hundred which, according to the PPD management, must be scrapped), of which about 170 are awaiting repairs and spares. Even if the spare parts would arrive in the near future, it will still be a major exercise to make the above 170 busses operative. As to the necessity of scrapping the above few hundred busses, the mission has no judgment and suggest that this be determined by an independent expert.

28. In the US\$ 75 million program, an amount of US\$ 1.0 million has been requested for busses for the PPD. Because it would make little sense to buy new busses when 170 busses are still awaiting repair, the mission strongly recommends that, if such funds are made available, they be used strictly in the following order: (a) for the supply of parts for repair and rehabilitation; (b) for a worthwhile number of expatriate mechanics to assist in the speedy rehabilitation of the non-operative busses (providing at the same time practical training of local mechanics); and (c) to the extent funds are left after use for the above, for the supply of new busses. Equipment and facilities for the training of Indonesian mechanics is also needed.

29. In addition to the needs of the Djakarta area the mission was informed that funds may also be needed for the reinforcement of already existing transport systems in five other major cities -- Surabaya, Semarang, Bandung, Medan and Makassar -- which are operated either by local government or jointly with private agencies. It is estimated that for these cities some 250 small and medium-sized city busses, and necessary workshop equipment and spare parts are needed, estimated to cost about US\$ 2.0 million. This was not included in the US\$ 75 million program.

Ports

30. In an archipelago where interinsular shipping plays the role of the trunk transport system, and where all imports and exports must be transported by sea, ports are a very important link in transportation activities. Port conditions in general, and those in the 3 main ports, Tandjung Priok, Surabaya and Belawan in particular, were studied in April 1967 by a group of foreign experts, sponsored by ECAFE. The mission, which agrees with most of the conclusions and recommendations of their report, will mention only the major problems.

31. The responsibility for ports is vested in the General Directorate of Sea Communications within the Ministry of Maritime Affairs. In the major ports responsibility is divided among the head of the shipping region within which the port is located (of which there are 10); the port authority (in 28 ports); a port council; a technical advisory staff; and by the local harbor State Enterprise (in 7 ports). The head of the shipping region is also commander of the port in which his headquarters is situated, and as such, head of the port authority in that particular port. In other ports there is a separate port commander responsible to the head of the region. Since the head of the region has many other responsibilities in the field of shipping, he can only devote part of his time to ports. The Directorate is directly responsible among other things, for that part of port planning and engineering not done by the port authorities, and for navigational aids outside the port limits. It has recently taken over the direct responsibility for dredging of the ports and their access channels since the port authorities lack the necessary funds. To complicate things further, each harbor State Enterprise which acts as a servicing division of the port authority, is under the Directorate of Maritime State Enterprises. Needless to say such a complicated organization scheme leads to diffusion of responsibilities, both operational and financial. The mission strongly recommends a thorough overhaul and simplification of the port administration.

32. There is a serious lack of statistics and financial data, which makes sound management and planning of the ports extremely difficult. Financially the department, port authorities and harbor State Enterprises are in very poor shape since port dues and tariffs have not kept pace with the inflation. This has resulted in inadequate maintenance and many physical deficiencies in the ports. In general, however, because of the overall decline in economic activities, the ports do not at present create a bottleneck in the transport system. There is no waiting time for ships

in Tandjung Priok and Surabaya though there is sometimes delay in Belawan where 4 new berths cannot be used because of siltation. Movements through the ports are well below what was handled in earlier peak years, and much below what could be handled with improved organization and operations. There are, however, four main fields in which action has to be taken now, to prevent the ports becoming bottlenecks when economic activities increase.

33. The first problem is dredging. Annual maintenance dredging requirements are estimated at some 16 to 20 million cubic meters. The condition of the dredging fleet is also poor. Several dredges have been awaiting repair for years, as a result of lack of funds and spare parts. The average number of actual dredging days per vessel over the last 5 years was about 85, or less than one-third of what it should be. This has resulted in a dredging backlog now estimated at some 40 million cubic meters. There is, therefore, an urgent need for a thorough overhaul of all dredges; some may have to be scrapped if repair would prove to be uneconomic. Because of the unsatisfactory state of local dockyards, and the difficulty of importing parts for the many different makes of engines, it may be more efficient and certainly more expeditious to have this overhaul done in better equipped and staffed foreign shipyards.

34. As to the backlog, this can best be eliminated under contracts with foreign dredging concerns. Expanding the domestic fleet for this task would require very large investments, and it would ultimately lead to over-capacity once the backlog is removed. Estimates of dredging requirements vary greatly, however, and it is obvious that there is also a backlog in soundings; therefore, before dredging contracts can be let a sounding program for all ports and their accesses is required, including establishing the kind of soils to be dredged. On the basis of the results a study needs to be made as to the required widths and depths of the channels and port basins. This should take into account not only the draft of ships to be expected in the future, but also the fact that it is possibly not economically justified to provide that all ports should be accessible for all ships at low tide. Only after the above sounding program and studies are completed, will it be possible to establish a sound dredging program for which contracts can be let.

35. In connection with the above the mission recommends that hydraulic surveys be made of a number of access channels and port basins, to investigate whether changes in location or layout, or maybe the construction of current-deflecting structures, could lead to a reduction in annual maintenance dredging volumes. Pre-investigation by a hydraulic expert is needed to determine which situations are promising enough to justify more detailed hydraulic studies.

36. A second problem field is that of navigational aids. Only two of the five buoyage tenders for serving the navigational lights and aids are operative; two new vessels especially designed for this purpose are out of commission. Because of this, and lack of funds, spares and consummable supplies for the maintenance and operation of the lights, a high percentage of these are either not functioning or unreliable, with a very unfavorable effect on shipping. Apart from increased hazards, sailing in and out of

ports during dark hours must be prohibited. This in addition to the need for awaiting high tides because of the dredging backlog, causes frequent delays. Immediate action is recommended; repair of the buoyage tenders can possibly best be done abroad.

37. A third problem field is the lack of communications. This means that the arrival of ships in port cannot be announced in advance, and ship owners cannot make advance arrangements for freight for their vessels. They also do not know in advance whether their ships need repair. Import and export agents have to wait until the ship arrives before making arrangements for moving cargo. This leads to serious delays in port. Ship owners lose contact with their ships, making it impossible to adjust itineraries. Obviously a good shore-to-ship communication system is a necessity in Indonesia, and could justify investment. The mission got the impression, however, that it should be possible to use the communication system of the armed forces, particularly the Navy, for civilian purposes.

38. The needs for funds in the maritime sector for dredging, navigational aids and communications, are reflected in the government's request for project aid in 1968. There is one other problem in the port sector not requiring funds which the mission also considers of great importance; namely, improving the performance of labor and other staff working in the port. It is in this field that the mission has some reservations with respect to ECAFE's report, which presents a long list of improvements in social and working conditions for port labor. Whereas there is no disagreement on the desirability of implementing many of these recommendations, similar recommendations can be made for many ports in the world, particularly in developing countries. It would seem that at this time the government can ill afford the financial consequences of carrying out all recommended improvements. This is even true in view of the large overstaffing in the ports. What is needed most and first, is improved performance and better discipline, the lack of which is presently the main complaint of shippers and which apparently adds very much to their port costs. Only after these improvements have been achieved and a large part of the surplus labor has been laid off, it may become possible to gradually introduce the desirable improvements of social and working conditions in the ports.

Shipping

39. Under this heading a distinction needs to be made between interinsular shipping and international ocean going shipping. With respect to the latter, by the end of 1966 there were one state-owned company, Djakarta Lloyd, operating 28 ships (of which 10 are on charter) and 4 private companies operating 14 ships, all chartered. The mission considers provision of funds for international shipping of low priority, for two reasons. First, ocean going vessels are foreign currency earners, traveling to foreign ports where docking facilities, parts and materials are available. Therefore this fleet has been better maintained than the interisland fleet. Secondly, shortage of ocean going shipping capacity need not cause a bottleneck for economic development. Even if Indonesian ships were not available, ships of other countries will be available to meet the country's

economic needs. The disadvantage sometimes mentioned, that using foreign carriers would cost much more foreign currency, is exaggerated; a large part of the Indonesian carriers' cost of amortization and depreciation, interest, operations, fuel and other supplies, foreign port dues, etc. are also foreign currency costs. Even the crew has to be paid partly in foreign currency. Fuel sold to, and port dues paid by foreign carriers are foreign currency earning. Since there are no particular problems in ocean shipping, this report will focus only on the major problems in interinsular shipping.

40. What is said above with respect to international shipping also applies to interinsular shipping, albeit to a lesser extent. When it comes to determining priorities for the use of scarce funds, it should be kept in mind that it is also always possible to accommodate unforeseen or peak interinsular shipping demands by using foreign ships, either occasionally or under long term charter.

41. Shipping conditions were also studied in April 1967 by an expert from ECAFE. Since the mission agrees in general with the conclusions and recommendations in this ECAFE report, the mission's report will focus only on a few major aspects.

42. Interinsular shipping is performed by (a) a state owned company, Pelni, operating 89 ships (of which 4 are chartered) with a total capacity of about 140,000 DWT; (b) 32 private companies owning and operating 126 ships, with about 150,000 DWT capacity; and (c) some 300 smaller vessels with a total of some 30,000 DWT. In addition there are a large number of small vessels with auxiliary motors engaged in domestic shipping.

43. The physical condition of the interinsular fleet is poor. Of the Pelni fleet about 30% is inoperative, as are about 20% of the private companies' fleet. The causes are again (a) shortage of funds; (b) shortage of spares (this problem is much aggravated by the fact that some 160 different types and makes of main and auxiliary engines are in use); and (c) inadequate docking and repair facilities. The lack of funds is the basic and largest problem. Spares could be purchased under the B.E. system if rupiahs were available. The dockyards, which indeed are in poor physical condition, are presently better stocked with materials, but are now under-utilized because the ship owners do not have the funds for the advance payments to be made before entering the docks. This vicious circle will have to be broken some way, e.g. by giving the Pelni an initial shot-in-the-arm in the form of working capital.

44. Because of the poor physical condition of the fleet, heavy overstaffing, poor communications and navigational aids, and various other reasons such as lack of discipline, Pelni operations are very inefficient. On top of that, the operative part of the fleet is now under-utilized because of the general decline in economic activities. The government has this year for the first time ceased subsidizing Pelni, which has now to cover its expenditures by revenue. This has resulted in an average interinsular shipping rate of Rp 3.0^{1/} per ton nautical mile. This is much too high for shipping, and has a very unfavorable effect on the

1/ For shipments of 600 nautical miles.

distribution of food from surplus to deficient areas and on the transportation of other commodities throughout the country. For instance, the mission was informed that it is cheaper to ship cement to Djakarta from Tokyo than from the domestic cement plant in East Java.

45. Much of the blame for Pelni's inefficiency is again the lack of shore-to-ship communications. Whereas the mission recognizes the need, as already mentioned under the section in ports, it should be pointed out that this need would become less pressing if Pelni would operate its regular routes (by far the largest part of its operations) on a fixed time schedule, so that shippers could rely upon the arrival of ships in port on a pre-determined date. This used to be the practice of Pelni's predecessor company.

46. For Pelni the situation is more difficult also since it is obliged to operate fixed routes with insufficient traffic. Pelni has in 1966 moved only 525,000 tons with its 140,000 DWT capacity fleet. Making allowance for one-third being inoperative, this means only 5.6 tons per DWT capacity per year. According to statistics this is much less than half of what has been carried in earlier years.

47. Because of the decline in economic activities, the fleet utilization in 1967 was even lower; only 1.7 tons per operative DWT capacity was carried over the first half year, averaging 3.5 ton per year. This indicates that interinsular shipping capacity is at present not so much a bottleneck; it is its high cost which has adverse effects on the economy. Priority should be given to cost reducing measures, like laying off surplus and unsatisfactory staff, improved discipline, providing working capital, all leading to improved overall efficiency. It should be possible to handle more cargo with a smaller fleet, scrapping the uneconomic part of the fleet, without an immediate need for large investments for renewal.

48. The private companies are somewhat more efficient. Different from Pelni, they are in a position to lay off surplus or unsatisfactory staff and labor. They also are not obliged to service many fixed routes whether there is traffic or not, and sometimes obtain some foreign currency earnings by calling in neighboring foreign ports. They are now even better off since they have benefitted from being able to adopt the increased Pelni rates, and they should gradually be able to improve their position further if cargo volume increases.

49. In the US\$ 75 million aid request, US\$ 2.0 million is included for government vessels. This amount is to be used in the first instance for government department vessels such as tugs, buoyage tenders, launches, etc. needed for operations in ports and other operations which are government and port authority responsibilities. As to the Pelni, special funds for fleet rehabilitation should be obtained from that part of the development budget earmarked for state enterprises.

Railways

50. The railways play a relatively modest role in the country's total transportation system. Only Java has a rather extensive 4,600 route kilometer system covering the whole of the island. On Sumatra there are 4 isolated systems, with a total route length of about 2,000 km. With the exception of the 540 km Atjeh railway in North Sumatra which is a narrow 0.75 meter gauge line and 100 km of line with 0.60 meter gauge on Java, the system is 1.067 meter gauge. Of the total 7,930 track kms, only 255 kms is double track; 120 km is electrified.

51. The following table shows a summary of rail transport statistics over the 1939-1966 period:

A. Freight
(including non-revenue)

<u>Year ending Dec. 31</u>	<u>Tons loaded (1000)</u>	<u>Ton km (million)</u>	<u>Average haul km</u>
1939	9,710	1,126	115.9
1959	6,000	1,046	174.3
1962*	4,418	1,029	230.0
1966	2,950	792	267.0

B. Passengers

<u>Year ending Dec. 31</u>	<u>Passengers Embarked (million)</u>	<u>Passengers km (million)</u>	<u>Average Journey km</u>
1939	58	1,762	30.3
1959	147	6,297	42.8
1962*	165	7,094	44.0
1966	95	5,894	62.0

(*) From 1962 onward statistics exclude other than 1.067m gauge lines, which however, carry only a small percent from total traffic.

The table shows that it is now very much a passenger railway; the ratio between passenger and revenue freight traffic units has changed from 1.6 to 1 in 1939 to 6 to 1 in the peak year 1962 and to 8 to 1 in 1966. The decline in freight traffic has resulted partly from the decline in overall economic activities. Passenger fares were abnormally low (in real terms) during the period of inflation, which partly explains the large increase of passenger traffic in the peak years 1962-1964. Increased road competition is reflected in a continuous increase in length of haul. Another important factor in the decline of freight traffic must have been the deterioration in service, since the unit cost of road transport was and

still is much higher than rail transport. The average turn-around time per freight car in service in 1966 was about one month for an average haul of 270 kms. This is an extremely poor performance which must lead to very unsatisfactory service to the shipper.

52. The goods traffic density in 1966 was a low 115,000 ton km per km of line; in the peak year 1962 this figure was about 150,000 which still is a low density. The passenger density on the other hand was quite high; about 1.1 million passenger kilometers per km of line in the peak year 1960.

53. The alarming statistics are those on staffing. Total staff in 1966 was 85,000, which is 13 men per route km, and less than 100,000 traffic units per man for the peak years 1960 and 1961. These figures reflect a very heavy overstaffing, the more so because of the high passenger to goods traffic ratio. Spain has one man per 8.2 km of line and 186,000 traffic units per man per year (1966 figures); France 10.4 km and 270,000 units and the Netherlands 8.9 and 410,000, respectively (1964 figures). Wages are still very low, resulting in a total wagebill (including non-cash payments and benefits) of about 55% of expenditure. As soon as wages become normal, however, then the overstaffing will put the railways in great financial difficulties.

54. The railways have obviously also suffered from lack of funds in recent years. About two-thirds of both locomotives and rolling stock are more than 40 years old, and is generally in unsatisfactory condition; a considerable part, particularly of the motive power, will have to be scrapped. Even of the newer diesel electric locomotives, a large number are inoperative because of lack of spare parts. Track and bridges also need replacements and strengthening.

55. It is clear from the above and other operating statistics that the railways could handle much more traffic even under the present unsatisfactory physical conditions. Particularly much more freight could be handled; passenger traffic may well fall with more normal fares. The poor condition of track and bridges requiring speed restrictions, is often used as an explanation for the low performance statistics. It should be pointed out, however, that speed restrictions are of no importance for goods traffic as long as freight cars move only an average of 10 km per day; in other words, are standing still about 90% of the time. Increased capacity will first of all have to come from improved operations.

56. Notwithstanding the above problems, the condition of the railways is somewhat better than of most other transport media. Since the various parts of the system are located in the more densely populated areas where economic activities and demand for transport are largest, and because of still limited road transport competition as a result of the poor condition of roads and road vehicle fleet, the railways have suffered less financially and have managed to keep themselves going,

largely meeting the traffic demands. In 1966, notwithstanding the heavy inflation with rates and fares lagging far behind, expenditures exceeded revenues on a cash basis by only 25%. The 1967 and 1968 operating budgets show no cash deficits; no allowance, however, has been made for depreciation and interest charges. Considering the reduced economic activities in general, the heavy overstaffing, and the unfavorable physical conditions of facilities, it would appear that with reduction of staff and improved efficiency of operations for which there is ample room, the railways might be able to largely pay their way in the future, provided of course that rate adjustments follow closely any further inflation. Even after the manifold increases recently, present rates and tariffs are still quite reasonable.

57. If the railways were allowed to lay off surplus staff, and above all had enough working capital to buy the necessary materials and spares for the most urgently need rehabilitation, it should be possible to gradually improve them without very large outside investments. Rolling stock, although old, can be kept moving for a few more years. Longer term financing may be needed and justified for further gradual dieselization of motive power; this usually pays off rather quickly. Before going too far in this, however, a study in depth as to the future role of the railway: as opposed to other modes of transport will be needed when conditions have returned to normal. It would seem that an investment in motive power would be much more justified than the huge investment planned for the gauge conversion and rehabilitation of the Atjeh railway, for which an initial Rp 1,020 million (US\$ 5 million equivalent) allocation has been made in the 1968 Development Budget. The mission believes that this amount should not be allocated until much more detailed economic feasibility studies than those presently available prove the economic feasibility of this large project. The US\$ 5 million equivalent is only a first year expenditure, (but of course a commitment for completion) of a major project, estimated to cost about Rp 25 billion (US\$ 150 million equivalent) over a 10-year period, excluding funds for motive power and rolling stock and excluding interests during construction.

58. The mission not only is convinced that many other projects will show a much faster and higher rate of economic return, it even has serious reservations whether this project is really sound and justified at all, for the following reasons:

- (a) The goods traffic on the total 510 km line was about 116,000 tons over an average distance of about 150 km in 1964 (last data available; it may well be less in 1966). Experience shows that any new railway construction for transporting say 500,000 tons over a distance of less than 200 km requires careful comparison with the economic cost of transport by other modes, such as road transport. The above transport volume averages at only 40,000 tons/km per km of line per year, or 115 ton/km per km of line per day. Such volume can be carried by say 30 six-ton trucks daily, with a 65% load factor. A modest two-lane highway can carry a few thousand vehicles a day.

- (b) Passenger traffic amounts to 2.2 million a year over an average distance of 55 km, or 640 passenger/kilometer per km of line daily. Such traffic can be moved by say 20 busses daily. Bus transport would have the advantage of better service, because of higher speed and much greater frequency than train service would provide. The present 510 km trip takes 3 days and 2 nights. The same trip by bus on a reasonably good road may take 12 to 15 hours.
- (c) The present virtually impassable road needs reconditioning anyway. This will also be a costly affair, but this is a necessary project; the cost will be much less than for a railway, and it can be done gradually. Moreover, there will be no operating losses, as will be the case on the railway, and investment in road vehicles lends itself to private investment, whereas investment in motive power and rolling stock is a railway and thus a government obligation.

59. The mission therefore recommends strongly that the potential for a four-fold growth in traffic volumes, as is assumed, first be proven before spending any funds on the project. The above very high cost estimates show that a virtually new railway will have to be built. Over 1400 new bridges are needed, which for operational reasons cannot be built at the same site as the present bridges. Therefore, the new railway line has to be built largely on a new alignment. Building a better road first may well result in the present railway phasing itself out. If experience shows that there is indeed potential for a railway, then the building of a new railway can still be undertaken at a later stage.

60. The amounts for railways in the 1968 project aid are requested for track rehabilitation and strengthening, and for dieselization. The allocation in the Development Budget is largely for the same purpose if the Atjeh line project is eliminated. New diesels should not be ordered until their type, horsepower, traction power, and other specifications have been properly determined on the basis of, among other things,--

- (a) where they are to be used (on Java or on one of the three Sumatra systems),
- (b) on what routes and for what type of traffic they will be used,
- (c) a thorough review of train schedules, the most economic weight and length of trains, etc. so as to get the best and most economic utilization of the diesels.

No new diesels should be ordered until there is assurance that properly equipped diesel shops will be available for their maintenance; at present there is no diesel shop on Sumatra. To the extent needed, providing these shops, and instructors for training personnel, should be part of any contract for the supply of new diesels.

Civil Aviation

61. Under this heading a distinction needs to be made between (a) international air transport; (b) domestic air transport and (c) airports. Civil aviation is the overall responsibility of the Ministry of Transportation and Communications, which is directly responsible for the Directorates of Civil Aviation and Meteorology. It supervises the state enterprises Garuda Indonesian Airways, operating both the international routes and the domestic routes, and Merpati Nusantara which operates feeder routes. Garuda as a whole seems to be profitable, the loss on international routes being more than compensated by profits from domestic operations. Reports prepared by Pan American Airways and KLM, analyzing the problems and making recommendations for improvements, are available. The government is apparently in the process of making arrangements with one of the above airlines to provide extensive managerial assistance which is indeed very much needed. This report will focus only on a few major aspects.

62. International Air Transport. Garuda operates international routes to Tokyo and Amsterdam. Both load factors and utilization of aircraft are very unsatisfactory, resulting in a financial loss on these operations^{1/} Since eleven foreign airlines also call at Djakarta, its needs for international air transport are amply covered. Therefore, very low priority should be given to Garuda's international operations. They could most profitably be discontinued for some time, concentrating efforts on improving the much more important domestic services, and selling or leasing the international aircraft to obtain foreign currency for financing new aircraft for domestic services. An international fleet of one DC8 and two CV990's (one has been grounded for nearly two years because of lack of spare engines), is too small for economical and reliable long distance international operations. If it is decided to continue international services, then in any event a pooling arrangement with a foreign airline should be sought to reduce losses. Even to a larger extent than for shipping, foreign currency savings from an Indonesian international airline are highly exaggerated since nearly all financing and operating cost are foreign exchange costs.

63. Domestic Air Transport. In an archipelago such as Indonesia, with long distances over water where slow shipping is the only alternative, reliable domestic air transport is of great importance. Notwithstanding very satisfactory load factors, utilization of aircraft is low. Except for two Electras, the fleet for domestic services is old, consisting of fourteen DC3's and eleven Convairs 330 and 440. Garuda's operating account for 1966 seemingly shows a surplus of Rp 146 million before, and Rp 38 million after taxes. These results include an allowance of Rp 200 million

^{1/} After the mission left Indonesia we were informed that Garuda's international operations broke even financially in 1967.

for depreciation. Garuda is therefore one of the few, or possibly the only state enterprise in the transport sector which should have sufficient funds for maintaining its fleet. In late 1967, of the domestic fleet, three DC3's and one Convair 340 were grounded. The mission was informed that there would be no routes for these planes even if they were operative; on the other hand, the mission was informed that there is in general a shortage of seat capacity, leading to long waiting time for seat space.

64. An amount of US\$ 4.5 million for the purchase of new domestic planes is included in the request for US\$ 75 million foreign aid. Whereas the mission does not disagree that the time may have come for renewal and modernization of the domestic fleet, it should not be overlooked that DC3's and Convairs are still providing satisfactory service in many countries all over the world. For domestic aviation, speed is not of primary importance and certainly not as long as the utilization of the fully depreciated, old aircraft is only a few hours daily. The large expenditures for new aircraft can be justified only if a high utilization factor is ensured. Therefore a long-term plan for fleet renewal and expansion needs first to be prepared on the basis of a route and market study, so as to insure that for Indonesian conditions the most suitable type of plane is selected, and the maximum utilization of new aircraft will be obtained. The envisaged managerial assistance for aviation should be closely involved with the above study. It also may be that some un-economic, low density passenger shipping routes, which must be served regularly at great financial losses by the interinsular shipping company Pelni, could be more economically served by air transport; in any event the service would most likely be more frequent and thus better. It also should be recognized that for Indonesia tourism could be an important source of foreign currency earnings, but that reliable domestic air services is one of the necessary conditions to encourage travel agencies abroad to recommend a visit to Indonesia to their clients.

65. Because of the favorable load factors, it should be possible, if and when new domestic aircraft is purchased, to pay for them out of revenue, provided that their utilization is satisfactory. Only if credit financing on favorable terms is not available should the purchase of planes be financed out of the US\$ 75 million foreign aid.

66. Airports. Provided the selection of domestic aircraft takes account of existing airport conditions, no very large investments need to be made immediately for expansion and strengthening of airport runways. The airport on Bali should be completed as soon as possible, to accommodate tourists. This would recompense in part for the large investments already made in this airport and hotel accommodations.

67. Large amounts are earmarked in both the development budget and the project aid program for aeronautical telecommunications and fire-fighting equipment. The mission agrees in general with the need for better communications, but is not in a position to comment in detail on this item. Further study would be desirable before new orders are placed. Also, the possibility of achieving economies by using the public P & T telecommunica-

tion system for airport to airport communications should be included in any general telecommunication study, similar to that already suggested with respect to communication between ports. With respect to the large expenditure for non-productive fire-fighting equipment, a distinction should be made between desirabilities on the one hand, and definite ICAO requirements on the other. This should also be studied further before orders are placed. It should not be overlooked that three shift crews for the fire-fighting trucks will be a recurrent expenditure in the budget for the Department of Civil Aviation.

1968 Project Aid Program

68. The portion of US\$ 75 million aid program for the transportation and communications sector is summarized as follows:

Transport and Communication

(In "000" US\$ Equivalent)

<u>Busses</u> for city transportation, including spare parts (Djakarta)	<u>1,000</u>
<u>Railway:</u>	<u>6,600</u>
(a) rehabilitation of tracks, bridges and telecommunications	3,600
(b) diesels	3,000
<u>Aviation:</u>	<u>10,000</u>
(a) rehabilitation of telecommunication (for aeronautical communication)	2,000
(b) airport-power supply units (runway lighting)	2,000
(c) fire-fighting equipment	500
(d) spare parts for fleet rehabilitation	1,000
(e) new aircraft for domestic flights	4,500
<u>Maritime:</u>	<u>9,500</u>
(a) rehabilitation of coastal communication	1,700
(b) rehabilitation of lighthouses and marine safety equipment	2,000
(c) dredging by foreign firms (part of longer term program) and rehabilitation of dredgers	2,000
(d) rehabilitation of government vessels	2,000
(e) rehabilitation of docks and repair facilities	1,800
<u>Roads:</u>	<u>7,000</u>
(a) asphalt including bulk transportation and storage	4,000
(b) rehabilitation of bridges	1,000
(c) workshops for maintenance of road equipment	2,000

(In "000" US\$ Equivalent)

<u>Communications:</u>	<u>3,600</u>
(a) microwave project Bandung-Semarang, West to Central Java	2,000
(b) automatic telephone exchange Semarang, Central Java	1,100
(c) spares and maintenance equipment	<u>500</u>
TOTAL	<u>37,700</u>

ANNEX 4

POWER

Past and Present Status of Electricity Supply

- 1 Prior to 1954, commercial electricity supply in Indonesia was largely the responsibility of private electric companies, participation by the Government being limited to generation and transmission in West Java, certain areas in East Java, North Sulawesi, South Sumatra and a few isolated towns. In these the Government established generating stations (mostly hydroelectric) and made bulk power supply available for redistribution to the public.
- 2 By a Presidential Decree dated October 3, 1953 a decision was made to nationalize all private electricity supply companies. The process of nationalization commenced in 1954 and was completed in 1957. In September 1958 a State Electricity Enterprise, Perusahaan Listrik Negara (PLN) was created to administer all public owned electricity companies. Twelve (later fifteen) regions were created to administer the supply of power in their respective geographical areas. PLN is responsible for the generation and distribution of electric power throughout the country and also for the construction of minor electric power projects. The organization is controlled by a Board consisting of a President and three Directors responsible for development and construction, operations and logistics, and commercial activities, respectively. The President and Directors are appointed by the Government. The activities of PLN and similar enterprises are coordinated and supervised by the Directorate General of Power and Industry. The Directorate is also responsible for the execution of major projects in the field of electric power which are carried out by special organizations created for the purpose. The Directorate General of Power and Industry is directly responsible to the Minister of Public Works and Energy.
- 3 The installed generating capacity throughout Indonesia at the beginning of 1967 totaled 585,811 kw comprising 282,599 kw hydro, 125,194 kw steam and 178,018 kw diesel. There are 67 individual hydro units, 18 steam and 493 diesel units housed in 190 separate power stations. Further details are given in Attachment 1. The available firm capacity is about 335,000 kw. Energy generated by public utility stations in 1966 was about 1,561 million kwh. The above figures do not take into account the considerable number of captive plants which exist, particularly in industry. No reliable statistics of the capacity of these plants are available but it is estimated to amount to about 200,000 kw.
4. Apart from local distribution networks associated with individual generating stations, there are no transmission networks of any consequence except on the island of Java, which has four isolated systems (see Map 2). The highest transmission voltage now in use is 150 kv connecting the Djatiluhur hydroelectric project in East West Java with the cities of Djakarta and Bandung. Other voltages in use are 70 kv, 30 kv, 25 kv and 15 kv. Interconnection of the four separate systems may not be appropriate at this time but the possibility of future interconnected operation should

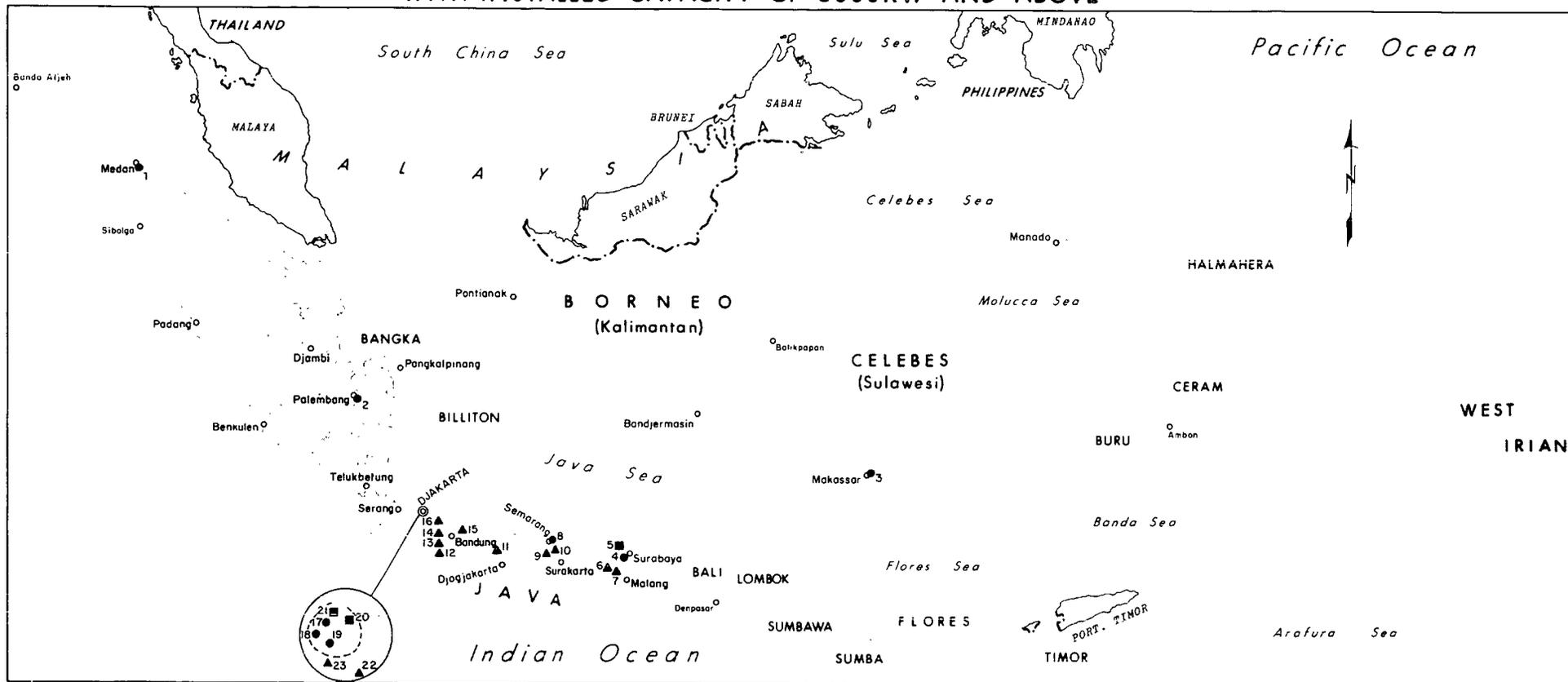
Table 1

Details of Installed Plant

Capacity

REGION	Number of Stations	Number of Units and Capacity						TOTAL kw
		Hydro		Steam		Diesel		
		Units	kw	Units	kw	Units	kw	
I MEDAN	19	2	120	-	-	76	24,295	24,415
II PALEMBANG	9	2	1,320	-	-	29	20,956	22,276
III PONTIANAK	8	-	-	-	-	17	4,322	4,322
IV BANDJARBARU	10	-	-	-	-	24	7,229	7,229
V MANADO	7	1	4,440	-	-	15	2,682	7,122
VI MAKASSER	7	-	-	-	-	16	14,232	14,232
VII AMBON	6	-	-	-	-	27	4,192	4,192
VIII DENPASAR	21	-	-	-	-	56	5,513	5,513
IX SURABAJA	26	15	42,722	6	59,482	59	20,567	122,771
X SEMARANG	27	14	42,300	-	-	59	21,493	63,793
XI BADUNG	11	26	157,952	-	-	10	2,614	160,566
XII DJAKARTA	11	6	33,675	6	62,700	37	36,861	133,236
XIII BANDA ATJEH	9	-	-	-	-	27	3,742	3,742
XIV PADANG	19	1	70	6	3,012	41	9,320	12,402
	190	67	282,599	18	125,194	493	178,018	585,811

INDONESIA
**LOCATION OF GENERATING FACILITIES
 WITH INSTALLED CAPACITY OF 5000KW AND ABOVE**



● DIESEL

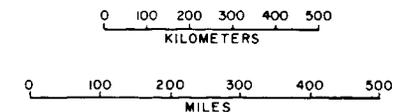
■ STEAM

▲ HYDRO

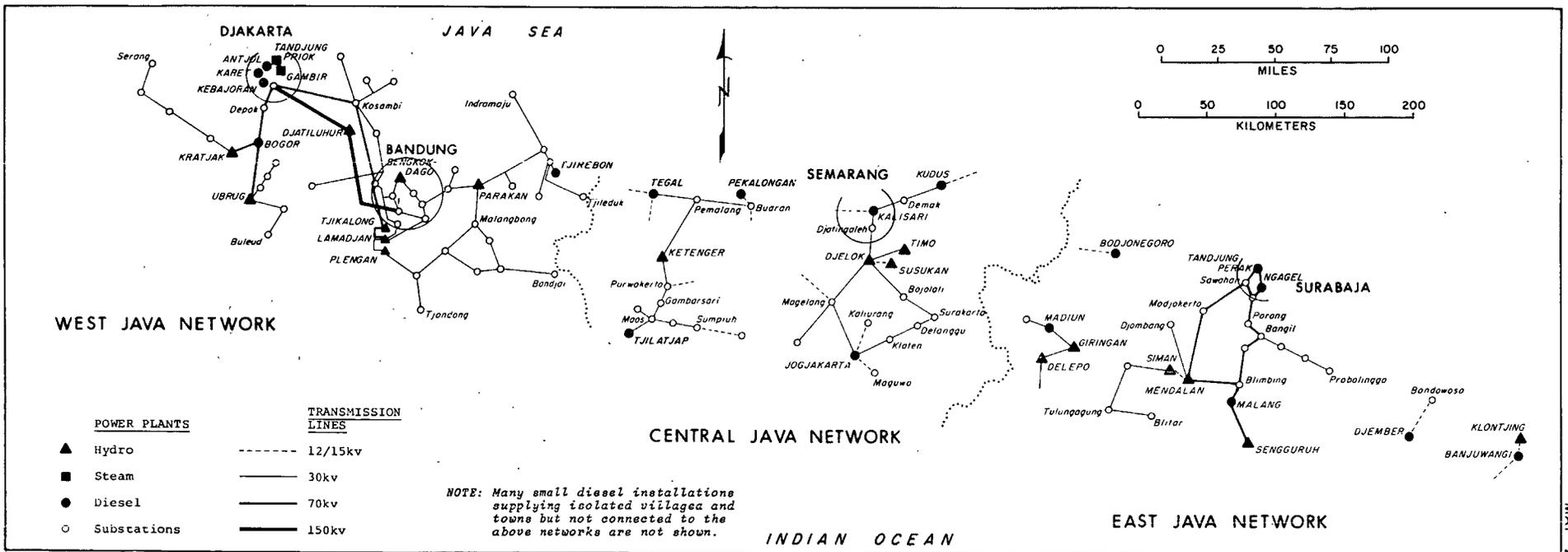
	Installed MW	Max.Cap. MW
1. Medan	16.2	6.6
2. Palembang	14.1	5.7
3. Makassar	13.1	4.4
4. Ngagel	8.0	8.0
8. Kalisari	6.0	6.0
17. Antjol	11.0	9.0
18. Karet	12.0	10.0
19. Kebajoran	12.6	12.6

	Installed MW	Max.Cap. MW
5. Tanjung Perak (Surabaya)	50.0	50.0
20. Gambir (Jakarta)	12.7	4.0
21. Tanjung Priok (Jakarta)	50.0	50.0

	Installed MW	Max.Cap. Mw
6. Mendalan	23.0	23.0
7. Siman	10.8	10.8
9. Djelok	20.5	20.5
10. Timo	12.0	12.0
11. Ketenger	7.0	7.0
12. Plengan	5.2	5.2
13. Lamadjan	19.2	19.2
14. Tjikalong	19.2	19.2
15. Parakan Kondang	10.0	10.0
16. Djatiluhur	100.0	100.0
22. Ubrug	17.1	17.1
23. Kratjak	16.6	16.6



INDONESIA
SIMPLIFIED DIAGRAM OF
12kv, 30kv, 70kv AND 150kv NETWORKS IN JAVA



now be receiving attention to ensure the best utilization of the larger generating stations now under construction or contemplated.

Future Development Program

5 Three important generating stations have been commissioned since 1962; 50,000 kw thermal stations at Tandjung Priok (Djakarta) and Tandjung Perak (Surabaja) and the 100,000 kw Djatiluhur hydroelectric station in East West Java. In addition, generating capacity now under construction and which should be commissioned during 1968 includes one additional unit of 25,000 kw at Djatiluhur and gas turbine units of 14,000 kw capacity each at Medan and Palembang (Sumatra) and Semarang (Central Java).

6 Other projects either under construction or planned for completion during the next six years include the following:

<u>Project</u>	<u>Location</u>	<u>Type</u>	<u>Capacity</u> (in kw)	<u>Anticipated Date of Completion</u>
*Makassar	Sulawesi	Steam	25,000	1969
Palembang	Sumatra	Steam	25,000	1970/71
Medan	Sumatra	Steam	25,000	1971/72
Semarang	Java	Steam	50,000	1970/71
Tandjung Priok III	Java	Steam	75,000	1971
Tandjung Priok IV	Java	Steam	75,000	1972
Pontianak	Kalimantan	Steam	20,000	1971
*Riam Kanan	Kalimantan	Hydro	20,000	1970/71
*Tonsea Lama	Sulawesi	Hydro	4,800	1969
*Karang Kates	Java	Hydro	70,000	1971
Kali Konto	Java	Hydro	4,500	1971
Asahan - Stage I	Sumatra	Hydro	320,000	1973

*Construction in Progress.

The preparation of the feasibility study and initial designs for the Asahan project, carried out by the Russians, was completed early in 1966 at which time they withdrew from the project. No site construction has started except for a few access roads and construction camps. An installed capacity of 320,000 kw is envisaged for the first stage and possibly 600,000 kw after the project has been fully developed. The Government of Indonesia has been negotiating with the Aluminum Company of America (ALCOA) for the granting of mining rights and the possible construction of an aluminum smelter which it is likely would be sited in the vicinity of Medan. Asahan would be the source of power for this smelter.

7 Although the above expansion program is impressive there is little evidence to indicate that any real planning has been done. For example the relative merits of thermal generation as against hydro (of which there is apparently considerable potential) have not been studied or research into the potential power market been undertaken. It is particularly important that the power market be studied soon since with the rehabilitation of system networks, particularly in Java, it is probable that as the

present unsatisfied demand is taken up, sales will increase at a much faster rate than hitherto, and it is also possible that with a more reliable distribution system, particularly in the city of Djakarta, some of the larger buildings and offices will substitute public supply for generation by captive plant.

8 For the past few years, because of the scarcity of funds available for investment in the power sector, work on some projects has slowed down and in some instances stopped. The expansion of generating and distribution facilities has not kept pace with the demand and due to the lack of proper maintenance and essential spare parts much of the existing plant and equipment has had to be taken out of service. Benefits from many of the above projects lie far in the future. Something must be done in the immediate future to rehabilitate existing generating plant and distribution systems and to insure that work on some of the existing projects continues. Much of this is covered by the 1968 Electrification Program (henceforth called the Program), which the Government hopes to finance from the \$75 million of project aid requested by the Government of Indonesia from the Inter-Governmental Group on Indonesia. One of the major tasks of the mission was to review the proposals presented for this Program. After considering the benefits to be achieved and taking into account the needs of high priority projects in other sectors, we recommended the projects to which such funds should be allocated. These recommendations were accepted. The Program and the mission's comments thereon are discussed in detail in paragraphs 19-33.

Power Survey

9 Indonesia has expressed interest in a general power survey and in possible Bank help in organizing such a survey. The mission believes that what is needed at this time is a limited power survey covering the islands of Java and Sumatra only. The remaining territories, which account for only a small fraction of total consumption, are served by small isolated stations and there is no scope in the near future for interconnected or integrated operation of these facilities. The expansion of existing stations or the installation of new small stations would have to match local development in these isolated areas.

10 A power survey in Java and Sumatra would be of considerable assistance to PLN in planning its future generating plant and transmission line requirements, particularly in Java where, in view of the size of new generating plant now being installed or planned for the near future, interconnection of the isolated networks may be advantageous. Future power requirements will depend, very largely, upon industrial development and until plans for such development are more firm, forecasts of future power requirements must be approximate. After the initial survey, therefore, frequent updating of market information will be essential.

11 While agreeing that a power market survey is necessary, the mission believes that it should form part of an overall power survey which would include a critical review of the PLN organization, particularly in the fields of technical and commercial operation, planning, and project construction. A review of existing tariffs is also very necessary,

particularly industrial tariffs, as the present structure is not attractive to industry and encourages the setting up of private generating plants. This review might best be done by a small group of experts, say two or three, working closely with the management of PLN for an initial period of perhaps three to six months. This small group should then be in a position to recommend detailed terms of reference for the subsequent overall survey.

Power Market

12. Total energy sales throughout Indonesia in 1966 were about 1,196 million kwh as compared with energy production of 1,561 million kwh. Units used in auxiliaries, lost in transmission and transformation or otherwise unaccounted for represented 23% of units generated. This is a high figure but understandable in view of PLN's scattered generating facilities and dilapidated distribution systems. Of the total sales, the island of Java accounted for 979 million kwh or 82% and the island of Sumatra 145 million kwh or about 12%. Thus sales throughout the rest of Indonesia were 71 million kwh or only about 6%.

13. On an all-Indonesia basis 20% of PLN's sales have been to industry and this figure has remained fairly constant over the last five years. The percentage varies from region to region and in 1966 was as high as 41% for Region XIV (Padang) and as low as 2% for Region XIII (Banda Atjeh) but these extremes are not representative on account of the very small total sales base on which they have been calculated. More meaningful would be the percentage of industrial sales in East West Java, West West Java, Central Java and East Java which, in 1966, were 20%, 24%, 13% and 24%, respectively. Even these figures would have to be adjusted upward if industrial consumption from captive plant were taken into account. Reliable figures for such consumption are not available.

14. The island of Java is divided into three main regions, East, Central, and West Java based on Surabaya, Semarang, and Djakarta, respectively, although for administrative purposes West Java is further divided into two separate regions, West West Java based on Djakarta and East West Java based on Bandung.

For the period 1962 - 1966 energy sales were as follows:

	<u>Sales</u>		
	<u>Millions of KWH</u>		
	<u>West Java</u>	<u>Central Java</u>	<u>East Java</u>
1962	405.90	151.03	216.87
1963	415.84	153.38	218.53
1964	483.03	159.30	216.08
1965	519.67	185.42	249.98
1966	567.94*	164.32*	247.02

*Estimated

The growth rates indicated by these figures are low, about 8% per annum for West Java and a little under 5% for East Java. In both systems adequate generating capacity is available at this time but the capacity of the transmission and distribution systems restricts the demands that can be met. In both systems, however, the work of strengthening and rehabilitating the networks is in progress, in West Java with the assistance of a French credit, and in East Java with the assistance of a Yugoslav credit. As this work progresses a significant increase in growth rates could occur. Even so, generating capacity presently available should be sufficient to meet expected demand until about 1971 when the 70,000 kw Karang Kates hydroelectric project is expected to be commissioned in East Java and the third and fourth units, possibly 75,000 kw each, of Tandjung Priok thermal station Djakarta, should be in operation. The low rate of growth in the Central Java System is undoubtedly due to the lack of generating capacity and inadequate distribution networks. Some improvement will result from the 14,000 kw gas turbine unit now being installed at Semarang and the addition of about 15,000 kw of diesel plant included in the 1968 Program. Future plans include the construction of a 50,000 kw thermal station, also at Semarang. Map 1 indicates the locations of all generating stations with an installed capacity exceeding 5,000 kw. Map 2 shows, in simplified form, the transmission networks of the three independent systems in Java.

15 Sumatra is divided into four regions with headquarters at Palembang, Medan, Banda Atjeh and Padang. No information is available on energy production at captive industrial plants but sales by PLN in Sumatra represent about 12% of total PLN sales throughout Indonesia.

For the period 1962-66 energy sales were as follows:

Millions of kWh

1962	129.8
1963	144.5
1964	134.8
1965	137.2
1966	145.1

Approximately 43% of these sales occur in the Palembang area where energy sales of 62 million kWh in 1966 showed no appreciable increase over that for 1965 and only about an 8.5% increase over 1964. Energy sales in the Medan area, which accounts for about 33% of the total, were 47 million in 1966, an increase of about 5% over 1965 but 14% lower than sales for 1964.

16 Undoubtedly the main reason for these poor performances is the lack of generating capacity or perhaps more properly stated, PLN's inability to use existing generating capacity because plant is out of service due to breakdown or lack of spare parts. Statistics giving details of plant outage for the whole of Sumatra are not available at this time except for the two largest diesel stations in the cities of Palembang and Medan. At Palembang, out of an installed capacity of 14,135 kw, 5,195 kw has been

taken out of service since 1965. At Medan, out of a total installed capacity of 16,154 kw, 9,530 kw of capacity has been taken out of service since 1963. Of this 4,100 kw of plant has been irreparably damaged and 5,430 kw awaits the receipt of spare parts ordered earlier this year.

17 Some relief can be expected in these two areas by the end of the first quarter of 1968 when gas turbine generating units of 14,000 kw capacity, now under construction in the cities of Palembang and Medan, should be in commission. Other plans for significant expansion include the proposed two-unit steam power station of 25,000 kw capacity at Palembang but construction has not yet started so that no benefits could be expected before the end of 1970 or the middle of 1971. A new steam station of 50,000 kw capacity is also planned for Medan but as with Palembang benefits lie well in the future and any growth in the Sumatra system in the next two or three years will have to be met by the piece-meal addition of diesel or gas turbine plant.

1968. Electrification Program

18 The program, prepared by the Directorate General of Power and Electricity, called for an allocation for 1968 of US\$23,151,000 equivalent, detailed under eight separate headings which are discussed briefly below. The proposed allocations are also set out in Table 2 together with the amounts recommended by the mission.

19 A. Rehabilitation and Reinforcement of Electrification Systems in Central and East Java

The amount requested by the Directorate was US\$8,015,000 of which US\$4,015,000 would be for the purchase of new diesel generators and US\$4,000,000 would be the estimated cost of materials and equipment required to rehabilitate and reinforce the existing distribution networks.

These amounts were further subdivided as follows:

	<u>Central Java</u>	<u>East Java</u>
Diesel generators	\$3,190,000	\$ 825,000
Distribution	\$2,000,000	\$2,000,000
	<u>\$5,190,000</u>	<u>\$2,825,000</u>

20 In Central Java there are two main systems: the Ketenger System and the Tuntang System. The generating facilities in both systems are predominantly hydro with small storage capacity (see Maps 1 and 2) with the result that compulsory daily restrictions on the use of power occur during the dry season and, although the installed generating capacity in the Tuntang System is about 45,000 kw, the dry season capacity is only 18,000 kw. With an installed capacity of 13,000 kw in the Ketenger System the dry season capacity is about 6,000 kw. A 14,000 kw gas turbine unit is under construction at Semarang and should be commissioned about the end of February 1968. This will bring much needed relief to the Tuntang System. The 1968 Program

Table 2
Directorate General of Power and Electricity
Electrification Program for 1968

Name of Project	Requested Allocation (US \$)	Recommended Allocation (US \$)
A. ^{2/} Rehabilitation and reinforcement of electrification systems in Central and East Java:		
i) Diesel units	4,015,000	4,000,000
ii) Distribution material	4,000,000	3,500,000
B. ^{3/} 3-K Projects	6,362,000	1,700,000
C. Tandjung Priok Steam Station: Units 3 and 4	3,774,000	1,000,000
D. AID and Czechoslovakian Diesel Projects (approximately 100 stations). Spare parts and distribution materials	2,500,000	2,000,000
E. ^{2/} Makassar (Sulawesi)		
Bandjarmasin (Kalimantan)		
Pontianak ("		
Medan (Sumatra)		
Bukittingi ("		
Diesel Electrification Projects	2,000,000	2,000,000
F. Micro hydro-electrification projects	300,000	--
G. Tonsea Lama hydro-electric project Purchase of generator	100,000	--
H. Technical Experts	100,000	--
TOTAL	<u>23,151,000</u>	<u>14,200,000</u>

^{1/} It is estimated that local costs will amount to Rp 513,700,000 or about 15% of the foreign exchange requirements. This amount has been included in the 1968 National Budget.

^{2/} Further details of Items A, D and E are given in Table 3.

^{3/} The 3-K Projects are multipurpose projects, Riam Kanan (Kalimantan), Karang Kates and Kali Konto (East Java). Finance required under Item B refers only to Riam Kanan (2 x 10 MW) and Karang Kates (2 x 35 MW).

calls for the further installation of 9,500 kw of diesel generators in the Tuntang System, 4,000 kw in the Ketenger System and 2,000 kw in isolated areas. Also included in the Program is a short 30 kv transmission line which will interconnect the extremities of the two systems and an amount which is estimated to cover the cost of the rehabilitation and reinforcement of the existing distribution networks.

21 Further plans include the commissioning of a 2x25 MW steam power station at Semarang but this station is unlikely to be in operation before 1971 or 1972 and does not form part of the Program.

22 In East Java most supplies are fed from the Kali Konto System which includes the major generating facilities at Surabaya (50,000 kw thermal), Mendalen (23,000 kw hydro) and Siman (11,000 kw hydro), and generating capacity in this system should be sufficient until the Karang Kates hydroelectric project (2x35,000 kw) is commissioned in 1971. The transmission and distribution network requires to be strengthened and part of this work is underway with the assistance of a Yugoslav credit. In the extreme east of the region the isolated systems of Djember and Banjuwangi need to be rehabilitated and reinforced in order to meet local demand, which is presently growing at the rate of about 15% per annum. The Program calls for the installation of 3,000 kw of diesel plant in these systems.

23 The estimated costs of the diesel installations have been based on recent costs of such plant in Indonesia and, although they appear to be on the high side, varying between \$155 and \$275 per kw installed, depending on size, they may be considered to be acceptable. The cost of the proposed distribution works has been very roughly estimated and seems high, and it was therefore agreed during discussions with PLN and the Directorate to reduce the allocation for this work from \$4,000,000 to \$3,500,000. Further details of individual estimates and recommended allocations are given in Tables 3 and 4.

24 B. 3-K Projects (Riam Kanan, Karang Kates and Kali Konto)

The following allocations were requested to enable construction work on the projects to continue during 1968:

Karang Kates (East Java)	\$4,250,000
Riam Kanan (Kalimantan)	\$2,112,000
	<u>\$6,362,000</u>

25 All civil construction for Karang Kates is being undertaken by the Ministry of Public Works. The \$4,250,000 represents estimated expenditure for 1968 on main generating equipment, other electrical and mechanical equipment, engineering services and materials required for the erection of the plant. This sum is only approximate and at this time there is no sound basis for the estimate. No designs or specifications have been prepared, and it is unlikely that a contract for the plant, which, again very approximately, is estimated to cost \$10 million could be placed before the end of 1968, a date which would suit present site construction progress. Should initial payments be required, the amount of such payments would depend upon

Table 3

Directorate General of Power and Electricity
Electrification Program for 1968 - Diesel Stations

I T E M	Capacity Requirements			Additional Diesel Units Proposed		Rehabilitation and Reinforcement of Local Networks		Total Estimated Cost	
	LOCATION	1967	1970	1970	Number & Capacity kw	Estimated Cost US \$	Estimated Cost US \$	Remarks	US \$
		Dry Season Capacity kw	Estimated Demand kw	Estimated Shortfall kw					
A1.	<u>Central Java</u>				(3 x 2500	1,155,000	1,000,000	Additional 6/30 kv power transfers, 30 kv and 6kv transmission equipment, lv distribution equipment, etc. for replacement and reinforcement	2,650,000
	a) Tuntang System	18,000	39,000	21,000	(2 x 1000	495,000			1,690,000
	b) Ketenger System	6,800	11,000	4,200	4 x 1000	990,000	700,000		
	c) Isolated Diesel Stations								
	Tjepu	707	1,500	793	2 x 500		300,000	Additional 6kv and lv distribution equipment for replacement and reinforcement	850,000
	Tuban	204	350	146	1 x 500	550,000			
	Lasem	188	350	162	1 x 500				
A2.	<u>Isolated Diesel Power Stations-</u> <u>East Java</u>								
	a) Djember	1,036	2,600	1,564	2 x 500				
	b) Sitobondo	350	700	350	1 x 500	825,000	2,000,000	Equipment for 40 km of 30 kv transmission line and 6kv and lv distribution reinforcement	2,825,000
	c) Banjuwangi	446	1,100	654	1 x 500				
	d) Pamekasan	322	650	328	2 x 500				
D.	<u>Systems Outside Java</u> Diesel stations financed by AID and Czechoslovakia		about 48,000		Spare parts for 1968-70	500,000	2,000,000	Equipment for expansion of existing distribution systems and new 7kv, 6kv, and lv distribution equipment for distribution systems not yet provided	2,500,000
E.	<u>Systems Outside Java (other than 3 above)</u>								
	a) Makassar (Sulawesi)								
	b) Bandjarmasin								
	c) Pontinak		about						
	d) Medan		100,000				2,000,000	Reinforcement of existing 7kv, 6kv and lv distribution systems	2,000,000
	e) Bukittingi								
	f) Numerous small stations								
									TOTAL 12,515,000

This annex shows details of proposed rehabilitation and expansion of diesel systems only and forms part only of the 1968 Electrification Program. For full program see Attachment 2.

Table 4

Directorate General of Power and Electricity
Electrification Program for 1968 - Recommended Allocation

Item	Additional Equipment (US \$)	Rehabilitation and Reinforce- ment of Exist- ing Network (US \$)	Subtotals (US \$)	Remarks
<u>A. Rehabilitation and Reinforcement of Electric Systems in Central and East Java</u>				
1. <u>Central Java:</u>	(a) Tuntang System 1,650,000	750,000		For details of additional generating equipment and transmission and distribution works, see Attachment 3.
	(b) Ketenger System 990,000	700,000		
	(c) Isolated diesels at:			
	Tjepu)			
	Toban(
	Lasen)	<u>300,000</u>	4,940,000	
2. <u>East Java:</u>	(a) Djember (
	(b) Sitabondo)	810,000	1,750,000	
	(c) Banjuwangi (
	(d) Pamekason)		2,560,000	
B. <u>3-K Projects:</u>	(i) Riam Kanan 1,600,000			"
	(ii) Karang Kates 100,000			
	(iii) Kali Konto --		1,700,000	
<u>C. Tandjung Priok Steam Station</u>				
Studies and preliminary work for Units 3 and 4:	1,000,000	--	1,000,000	
D. Diesel Systems Outside Java: Diesel stations financed by AID and Czechoslovakia (about 100)	<u>500,000</u>	<u>1,500,000</u>	2,000,000	See Table 3.

(Continued)

Item	Additional Equipment	Rehabilitation and Reinforce- ment of Exist- ing Network	Subtotals	Remarks
E. Diesel Systems Outside Java: (other than 3 above)				
(a) Makasser (Sulawesi)				
(b) Bandjarmasin (Kalimantan)				
(c) Pontianak (
(d) Medan) Sumatra				
(e) Bukittingi)		2,000,000	2,000,000	See Attachment 3.
(f) Numerous small stations				
		TOTAL	<u><u>14,200,000</u></u>	

a contract still to be negotiated. The mission therefore recommended that the allocation for Karang Kates be reduced from \$4,250,000 to a nominal amount of \$100,000 to cover the cost of engineering services required for the preparation of designs and for preparatory work required for the plant.

26 The whole of the works, civil, electrical and mechanical, for the Riam Kanan project are being undertaken by the Directorate General of Power and Industry. The sum of \$2,112,000 covers estimated expenditure during 1968 on civil construction plant and materials, initial payments for generating plant and transmission line equipment and engineering services in respect of supervision and design. Similar comments apply to this project as for Karang Kates in respect of generating plant and transmission line equipment and the mission recommended that the amount requested for this section of the work be deleted reducing the total allocation from \$2,112,000 to \$1,600,000. Under Item B it was therefore recommended that the requested allocation of \$6,362,000 be reduced to \$1,700,000.

27 C. Units III and IV Tandjung Priok Thermal Generating Station, Djakarta

Units I and II, each of 25,000 kw capacity, were commissioned in 1962 and 1964, respectively. In 1965 an agreement was signed with Sumitomo of Japan for the construction of Units III and IV, each of 75,000 kw capacity. Units of 50,000 kw capacity were also considered but in view of the probable economy which it was thought would result from the lower cost per installed kw and lower operating costs of a larger unit the decision was made to accept the larger units. The agreement was never implemented and none of the work covered by the agreement has been started. The requested allocation of \$3,774,000 represents an initial payment of 10% of the contract price, to be paid on shipment of the whole of the plant, and the first repayment under the credit (which was for seven years) due twelve months after the initial payment. Even if early agreement was reached to proceed with the work it is unlikely that the two payments would be required much before the end of 1969 and 1970, respectively.

28 Further, the mission had some doubts regarding the size of the units to be installed. The maximum demand in the West West Java System is presently 85,000 kw. The rate of growth in this system since 1963 has been slightly over 5% per annum. There are a number of possible reasons for this low rate of growth, an important one being the restrictions on supply to consumers brought about by a completely inadequate transmission and distribution system in the city and suburbs of Djakarta. This situation is being remedied with the assistance of a French credit but improvement is unlikely to be spectacular during the next year or two. Assuming a growth rate of 10% per annum for the next two years and 15% per annum thereafter, the maximum demands in the West West Java System would be:

1968 - 93,000 kw
1969 - 103,000 kw
1970 - 118,000 kw
1971 - 139,000 kw
1972 - 160,000 kw

29 The firm generating capacity presently available in the system is 115,000 kw with a maximum capability of 185,000 kw. The former figure assumes worst possible generating conditions including the outage of one of the 25,000 kw units at Tandjung Priok, firm output only at the diesel stations of Antjol, Karet, and Kebajoran and minimum generation from Djatiluhur and other hydroelectric stations. It is probable that an average year-round output capacity of 160,000 kw could be achieved from all generating facilities in the system. Additional generating capacity ought to be available by the end of 1971 but it is the mission's view that the installation of two 75,000 kw units at that time would be inadvisable because (i) the probable load growth after 1971 could be absorbed for two or three years by smaller units, (ii) such units would be difficult to "cover" during outage periods, and (iii) the minimum daily loads for a year or two after 1971 would be such as to necessitate a daily start-up and shutdown of at least one of these two large units, so that the resulting additional operating costs would nullify any financial advantage which should result from their lower capital cost per kw and higher efficiency.

30 Although the precise information required to make a proper assessment was not available it was the mission's view that an extension at Tandjung Priok consisting of two 50,000 kw units would be more appropriate and if possible (bearing in mind that a contract has already been signed with Sumitomo) the Directorate General should give the matter further detailed consideration. In order that work on the project may be started as soon as a decision with regard to the size of unit has been reached an allocation of \$1,000,000 was recommended.

31 D. AID and Czechoslovakian Diesel Projects

An allocation of \$2,500,000 was requested to cover the cost of spare parts (\$500,000) and for the provision of distribution equipment and materials for 7 kv, 6 kv and LV distribution systems for about 100 isolated diesel installations. The original credit agreements for these installations made no provision for the respective distribution systems so that the electrification schemes have, in most cases, never been fully effective.

32 A detailed schedule of the spares required has been made and recent prices are available in most cases. It has not been possible for the mission to confirm that all the spares listed are required but in view of the condition of some of the installations visited the list would not appear to be excessive. It was therefore recommended that the amount requested for spares should be allocated in full. The requirements for the distribution systems have been very roughly estimated and in view of the scarcity of funds available to the Program it is recommended that the requested allocation of \$2,000,000 be reduced to \$1,500,000, making a total under this heading of \$2,000,000. This amount should be sufficient to enable PLN to make substantial progress in the rehabilitation and reinforcement of these existing isolated diesel stations which are, almost entirely, situated outside the island of Java.

33 E. Isolated Diesel Stations Outside Java Other Than Those Under D

The requested allocation of \$2,000,000 was intended to cover the cost of reinforcing and rehabilitating existing 7 kv, 6 kv and LV distribution networks for existing systems at Makassar (Sulawesi), Bandjarmasin and Pontianak (Kalimantan), Medan and Bukittingi (Sumatra) and a number of smaller stations for which new diesel plant was purchased in 1967. The work to be undertaken is extensive and it was recommended that the requested allocation be made in full.

34 F. Micro-hydro Electrification Projects

An allocation of \$300,000 has been requested to cover the cost of installing 6 - 10 small hydroelectric pilot projects in remote areas of the archipelago. Each plant would have an output varying between 40 - 125 KVA. The amount of civil works involved would be very small and each installation would cost in the region of \$30,000 including the local distribution network. Should the pilot projects prove successful, it is the Government's intention to extend the use of such installations to develop remote agricultural and rural areas. There is much merit in the proposal but the mission considers that such finance as is available should be reserved for more immediate problems.

35 G. Tonsea Lama Hydro-electric Project

This is a small project of 4,800 kw capacity in North Sulawesi which has been under construction since 1955. Completion has been delayed for over two years because of the need to replace a generator and other essential components which were ordered but never arrived at site. As the equipment required is to be purchased from the original supplier and the amount involved is small, it is considered that the simplest approach would be to negotiate directly with the original supplier.

36 H. Technical Experts

Although an allocation of \$100,000 was requested under this head little thought appears to have been given to the manner in which these funds would be used or to the types of experts which would be required. Until more definite proposals are available it is recommended that the requested allocation be deleted. However, the mission is of the opinion that a general power survey, restricted at this time to the islands of Java and Sumatra would be most desirable. This might be undertaken with the assistance of the UNDP. The subject has been discussed more fully elsewhere in the report.