

No. 1111

REPUBLIC OF INDONESIA
REPORT OF THE SURVEY ON THE TOLL ROAD
Feasibility Study of Jakarta Ring Road Project (Part II)

September, 1978.

Japan International Cooperation Agency

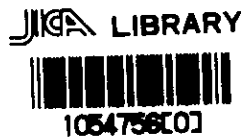
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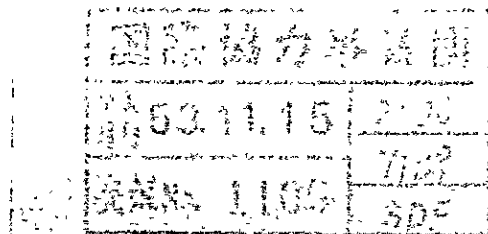
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P R E F A C E

In response to the request of the Government of Indonesia, the Japanese Government decided to conduct a survey of control and operation of the JAGORAWI toll road as a supplementary survey to the Jakarta Ring Road Project, and the survey was subsequently carried out by the Japan International Cooperation Agency.

In the survey on the Jakarta Ring Road Project, the Agency had previously examined the feasibility of operating the planned road as a toll road, and the results were compiled a survey report in March, 1978.

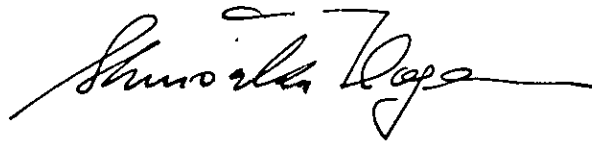
In view of the fact that the Indonesian Government introduced a toll road system in respect of the radial roads linking with the Ring Road, the Agency sent a survey team headed by Mr. Hisao Mochizuki, Technical Director, Nagoya Control Bureau, Japan Highway Public Corporation, for the period from May 19 to June 10, 1978, to conduct of survey on the actual condition of the system and its impact on the road transport system in Indonesia.

The field survey was carried out very satisfactorily thanks to the immense assistance given by the Indonesian Government. The survey team's work in Japan after its return from Indonesia has now been completed, and a report on the survey is presented herewith.

I hope the present report will contribute in some measure to the social and economic development of Indonesia and to the promotion of mutual understanding and friendship between our two peoples.

Finally, I wish to express my heartfelt thanks to those who have provided valuable assistance and cooperation to the survey team.

September, 1978.

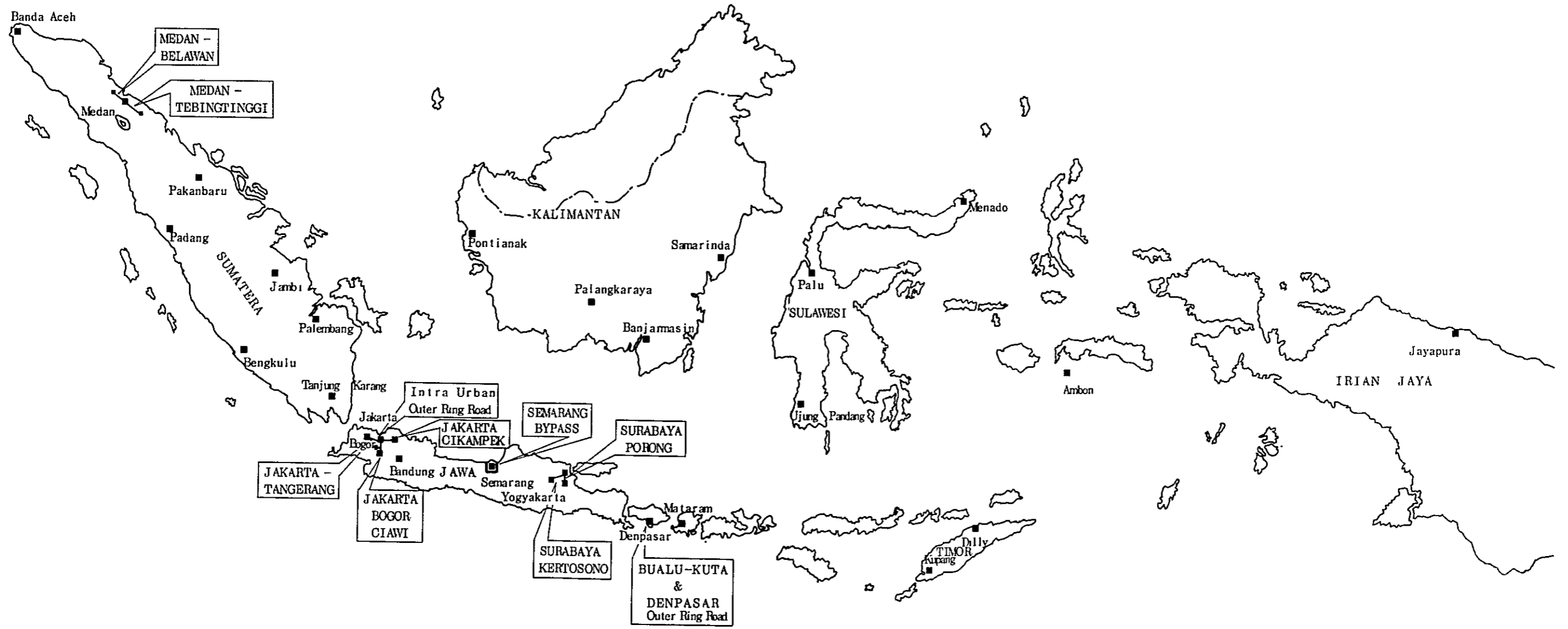


Shinsaku Hogen,

President,

Japan International
Cooperation Agency.

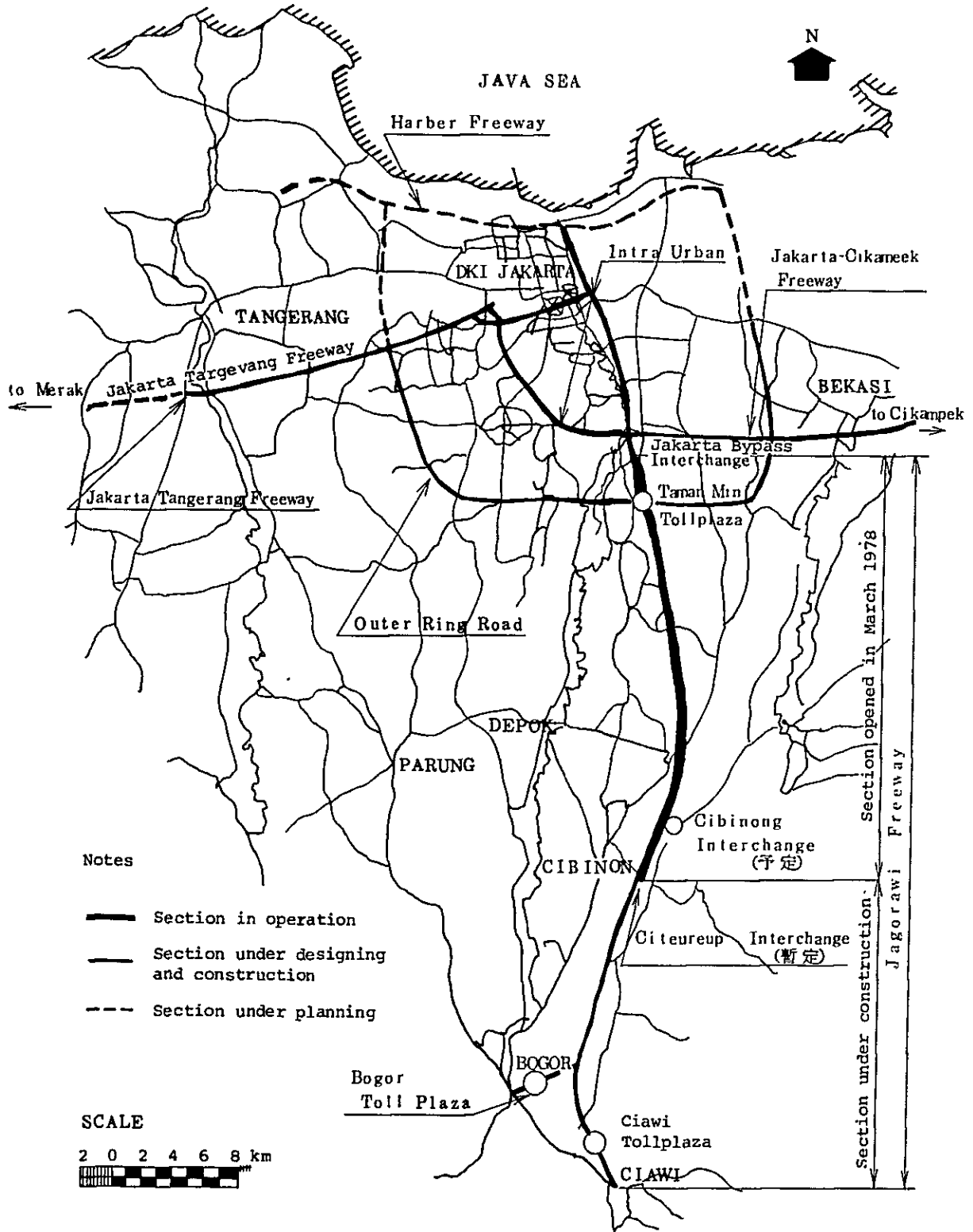
Fig.-A Project map of the toll road in the Republic of Indonesia



1. The first part of the document is a list of names and titles, including the names of the authors and the titles of their works. This list is organized in a structured manner, likely serving as a table of contents or a reference list for the document.

The main body of the document contains several sections of text, which appear to be the primary content or findings of the study. These sections are separated by headings and sub-headings, indicating a logical flow of information. The text is dense and covers a wide range of topics, likely related to the subjects mentioned in the list of names and titles.

Fig.-B Toll road network in Jakarta-West Jawa



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C O N T E N T S

Preface

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SUMMARY AND SUGGESTIONS

1. Introduction

The field survey regarding toll roads was conducted from May 19 to June 10, 1978, a period of 23 days, forming Part II of the Feasibility Study of Jakarta Ring Road. This field survey was supplementary to the feasibility study of Jakarta Ring Road conducted from March, 1977 to March, 1978, and was intended to examine the present condition and problems regarding planning, operation, management, maintenance and repairs of the Jakarta-West Java toll road network including Jagorawi Freeway which was opened to traffic in March, 1978, and to offer suggestions regarding measures for improvement and other points requiring attention.

Though the survey period was relatively short, the Survey Team was able to achieve its objectives, thanks to cooperation and assistance given by the Bina Marga and P. T. Jasa Marga of the Republic of Indonesia. After returning to Japan, the Survey Team has compiled the present report based on the findings of the survey and source material obtained in Indonesia.

2. Inauguration and conception of future development of a toll road system in the Republic of Indonesia

1) Jakarta-West Java toll road network

Since FY 1974, the Republic of Indonesia has been carrying out the Second 5-year Development Plan (REPERTA-II) which is to be completed in FY 1978. One of the major objectives of the Plan is to provide arterial roads. However, because of the limited amount of funds available, construction of new arterial roads cannot be expected to make rapid progress.

On the other hand, the population of DKI Jakarta, the center of Indonesian politics and economy, is estimated to be 5.4 million. It is concentrated in the central area of the city, and is increasing at an annual rate of over 4%. Thus, urbanization is spreading from the central area to the suburbs, and the phenomenon of sprawling is beginning to appear.

Accordingly, the Bina Marga and the DKI Jakarta Government have formed a long-term plan (JABOTABEK plan) that Jakarta's three satellite cities, Bogor in the south, Tangerang in the west and Bekasi in the east, are to be linked organically and to be developed as core cities, and development positions have deployed midway between them. In order to realize the plan, it is necessary to provide arterial roads and rail ways connecting these cities. Thus, it was planned to construct a free way network combining radial roads and ring roads, (Jakarta Metropolitan Area Transportation Study: JMATS).

However, there was some apprehension about the possible enlargement of regional difference between cities and the provinces through a large-scale investment in Jakarta and its suburbs. Finally, the Jakarta-West Java Toll Road Network was planned to construct three radial arterial roads and two ring roads as toll roads based on the principle of beneficiary charge (Fig. B).

Of the 258 km of the Jakarta-West Java toll road network, the Jagorawi Freeway (51 km) connecting Jakarta, Bogor and Ciawi was partially opened to traffic on March 9, 1978, between Jakarta and Citeureup (27 km). The remaining section of Jagorawi Freeway is being constructed by a Korean construction company under the supervision of American consultants.

Of the other two radial roads, the Jakarta-Cikampek section (67 km) is being designed in detail by West German consultants. The Jakarta-Tangerang section (20 km) has been designed in detail by Japanese consultants, and Bina Marga is making arrangements for a tender.

As has been mentioned, of the 89 km of the Jakarta Ring Road, 48 km was covered by the feasibility study conducted in March, 1978. With regard to the Jakarta Intra Urban, an interchange and grade separation are being designed by Japanese consultants, and a feasibility study of the whole Intra Urban is expected to be conducted before long.

2) Inauguration of the toll road system

On February 25, 1978, the toll road system of the Republic of

Indonesia was legislated under the provision of Government Regulation No. 4 of 1978. An outline of the Government Regulation is given below.

- a. A toll road is to be provided as a bypass for alternative existing public roads to be used exclusively by motor vehicles.
- b. The route is to be determined under a Presidential Decree.
- c. The Government is to delegate construction, administration, management and maintenance of the toll roads to the Corporation.
- d. When the corporation operates the toll road, three conditions are to be met:
 - i) The cost of using the toll road should be lower than that of using an existing road (higher benefit).
 - ii) The toll road should be of higher standards and special specifications.
 - iii) It should provide reliability more than public roads.
- e. Amount of toll and the aim of using them are to be determined by the President based on a proposal submitted by the Minister of Public Works after consulting with the Minister of Finance and the Minister of Communication.

Under the Presidential Decree No. 3 of 1978, "Decision of the JAKARTA-BOGOR-CIAWI FREEWAY to be JAGORAWI TOLLROAD and the amount of toll-charge, issued on March 7, 1978, the Jagorawi Freeway was decided as a toll road with the following toll rates.

- i) Vehicles under 2.5 tons 11-15 Rp per km.
- ii) Vehicles over 2.5 tons 20-25 Rp per km.

3) Conception of future development of toll roads

As has been mentioned, the budget for road construction under the Second 5-year Development plan is far below the necessary amount, giving no allowance for construction of new arterial roads.

Nevertheless, the demand for car transport is increasing rapidly in the outskirts of large cities such as Jakarta, Surabaya and Medan. Yet, a large-scale investment in road construction in these areas may enlarge regional differences between these cities and provinces,

inviting unfavorable national psychological reactions. The toll road system in the Republic of Indonesia has thus come into being for the reason that it is rational to collect tolls on a road of high standards according to the principle of beneficiary charge.

In addition to the Jakarta-Bogor-Ciawi section, the Indonesian Government is planning to construct and operate as toll roads the following sections (Fig. A).

- Java:
- a. Jakarta Intra Urban.
 - b. Jakarta Outer Ring Road.
 - c. Jakarta-Cikampek.
 - d. Jakarta-Tangerang.
(These belong to the Jakarta-West Java Toll Road Network.)
 - e. Surabaya-Porong.
 - f. Surabaya-Kertosono.
 - g. Semarang Bypass.
- Sumatra:
- a. Medan-Belawan.
 - b. Medan-Tebingtinggi.
- Bali:
- a. Bualu-Kuta.
 - b. Denpasar Outer Ring Road.

In addition, there is a plan that extensions of these roads, bridges and tunnels are to be toll road.

3. The condition after the opening of Jagorawi toll road

On March 9, 1978, Jagorawi toll road was opened to traffic in its 27 km section from the starting point Jakarta Bypass interchange to Citeureup temporary interchange.

The average daily traffic volume following the opening was 3,071 in March, 3,986 in April and 4,026 in May against the initial designed daily traffic volume of 1,750 and the budget designed daily traffic volume of 3,600. Especially, on Sundays and holidays, the volume was between 6,000 to 7,000. Large sized motor vehicles account for about 9% of the total at present.

With regard to the hourly traffic volume, it was between 250 and 300 in both directions in the mornings and in the evenings on weekdays,

whereas it was between 20 and 30 from midnight to 6 o'clock in the morning. On holidays, the traffic bound for Bogor in the mornings numbered about 650 and the traffic bound for Jakarta in the evenings was about 550.

The diversion ratio from existing roads was about 35% with small sized motor vehicles and about 5% with large sized motor vehicles. The difference in travel time from a given starting point to Cibinong, between the route via Jagorawi toll road and the one via existing roads, was estimated to be 15-20 min. with small sized motor vehicles and about 10 min. with large sized motor vehicles.

Judging from the above data, it seems that Jagorawi toll road is being used mainly for business, commuting and sightseeing rather than for industrial purposes for the time being.

With regard to toll rates, since there is only one section at present, uniform rates of 300 Rp and 500 Rp are collected for small sized motor vehicles (below 2.5 tons) and large sized motor vehicles (over 2.5 tons) respectively at the Taman Mini Toll Barrier. However, after the completion of the whole line to Bogor and Ciawi in March, 1979, there will be four sections. Thus, toll collection will operate on a closed system whereby toll tickets are issued at the entrance gate and collected at the exit gate. Then, Citeureup temporary interchange will be abolished, and an intensive interchange (trumpet type) is to be established at Gunung Putri.

Administration and management may be outlined as below.

- (1) P. T. Jasa Marga, which manages and operates, has 162 persons including the president, 11 in managerial positions from chief of section above, 49 connected with toll collection and 64 responsible for maintenance and traffic control.
- (2) Toll collection is by means of issuing tickets and collecting tolls at toll gate. Though time clocks and traffic counters are provided for auditing, actual auditing is by means of collating cash with half portions of tickets.
- (3) For the purpose of training, Taman Mini Toll Plaza has six booths open during the day and four booths open at night.
- (4) Patrolling for maintenance and repairs is conducted every 20 to

30 min. Those objects found on the road are removed, and disabled cars are given assistance or removed during patrol.

- (5) Since there are no wire communication facilities such as emergency telephones, all communications are conducted through radio between the office and patrol cars.
- (6) The police provide six patrol cars and twenty officers. First-aid operation is carried out by P. T. Jasa Marga with one ambulance and eight members of the staff.
- (7) Jagorawi toll road is a motorway but there are many cases of residents along the road stepping in or crossing Jagorawi toll road. Therefore, P. T. Jasa Marga is studying the possibility of constructing pedestrians' bridges and frontage road, or restrictions on entry.
- (8) Since Jagorawi toll road is the first freeway in the Republic of Indonesia, P. T. Jasa Marga is making efforts in publicity work on traffic safety placing emphasis on driving manners through the distribution of publicity leaflets or setting up signs.
- (9) There are virtually no guardrail at road sides at present. However, arrangements are being made to provide guardrail at high embankment or to protect piers of overbridges. Selection of the tree for the median is also being made.

4. P. T. Jasa Marga

P. T. Jasa Marga is a limited liability corporation founded upon certification of the articles of incorporation by a notary public on March 1, 1978, as prescribed under the Trade Law, based on the Government Regulation No. 4 of 1978, responsible for administration and management of Jagorawi toll road.

The terminal capital will be 10 billion Rp (10,000,000,000 Rp) in 1,000 shares (10 million Rp per share) made up of 200 preference shares and 800 common shares. At present only the preference shares are issued, out of which 199 shares are held by the Indonesian Government and the remaining one is held by the Minister of Public Works. It is a national enterprise owned entirely by the Government. The common

shares are to be issued upon approval by the meeting of preference share holders and preference shareholders are to have priority in buying them.

The Managing Board consisting of the President and up to four Directors (one at present) is responsible for management. Further, the Board of Directors consisting of three councilor (two at present) is responsible for maintaining supervision over the directors and the state of management. It has the power, if necessary, to suspend them. Councilors, President and Directors are appointed or relieved of their posts at a general meeting of share shareholders.

Profits are, after paying a dividend, put aside annually as Reserve Funds.

Though P. T. Jasa Marga is authorized to construct toll roads, at present it is only operating the opened section of Jagorawi toll road (toll collection, maintenance and control), and has not taken over the responsibility of constructing other sections.

The relationship between P. T. Jasa Marga and its responsible Government agency, Bina Marga, regarding approval and supervision, is not clearly prescribed by law. At present the former receives guidance and supervision in every aspect from the latter, and is only required to submit a monthly report on its operation including an annual budget plan regarding revenue and expenditure. This report is prepared for the Government, the owner and investor of the road, to serve as the basic material for policy making regarding the development of the toll road system in the Republic of Indonesia. It is scheduled to hold the general meeting of shareholders in June 1978. Since Jagorawi toll road is only partially operated, management of the Jasa Marga also seems to be regarded as being at a preliminary stage for the time being.

5. Suggestions

The Survey Team wishes to be paid attention to the following suggestions regarding the supply, management and administration of the toll road network in future.

- (1) On arranging a legal system regarding roads, including road laws, Government Regulations and Presidential Decrees, the relationship

between P. T. Jasa Marga and Bina Marga regarding governmental approval and supervision should be set out clearly.

Legal grounds should be provided clearly for imposing fines and disciplinary payments regarding traffic violations and fraud vehicles.

- (2) It is advisable to establish a section for collecting and studying basic material relating to the toll level and the determination of a toll system (diverted traffic volume, operation cost, economic indicators, etc.) and also a section for analyzing traffic phenomena and accidents peculiar to freeways so that safety measures may be established.
- (3) With regard to the toll system and the toll level for toll roads, it is desirable to re-examine them on the assumption that a pooling system of financial account will be applied to the whole toll road network of Jakarta-West Java. In this case, it is necessary to re-examine the toll level, especially, in relation to the repayment plan for the whole, by taking into consideration the actual situation on Jagorawi toll road, particularly the situation after the completion of the entire line, and recent studies made on other roads.
- (4) As for the toll collection system on completion of Jagorawi toll road, it is desirable to use a closed system whereby tickets are issued on the entrance gate and tolls collected at the exit gate. It is necessary, in this case, to introduce a totalling and auditing system which suits the conditions of the country.
- (5) Stepping in and crossing Jagorawi toll road by inhabitants along the road will be extremely dangerous for both the pedestrians and drivers, especially as traffic is expected to increase in future. Therefore, construction of overbridges, pedestrians' bridges and frontage roads should be completed by completion of whole Jagorawi toll road.
- (6) It is necessary to provide message signs to transmit accurate information in the case of an emergency such as a disaster or an accident to those vehicles entering an interchange and to those

the road. Further, a traffic control system or information service through radio should be considered in future.

- (7) With the establishment of a toll road network, it will be necessary to deploy a considerable number of personnel and equipment for patrolling and roadside assistance (assistance to and removal of disabled cars). Thus, it will be necessary to study the possibility of utilizing commercial repair and wrecking services. Further, it will be desirable to have filling stations, repair shops, rest houses, public lavatory and other service facilities positioned on the three radial roads outside the Outer Ring Road.
- (8) In the case of a major accident or a disaster, it will be necessary to transport a large number of injured persons. Thus, it is necessary to establish a disaster prevention system involving a communication network and a first-aid system among the local organizations concerned.
- (9) In order to control and operate the toll road safely and efficiently with the extension of the operating section and increasing traffic volume in future, it will be necessary to provide various standards and manuals regarding toll collection, traffic control, maintenance and repair work, and the installation or designing of rest facilities, toll booths and message signs.
- (10) Efficient utilization of Jakarta-West Java toll road network including Jagorawi toll road and Jakarta Ring Road is closely related to land use plan for the Jakarta Metropolitan area. Therefore, it is desirable to establish a specific land use plan promptly which include a dispersion of population and industry, development of those areas around interchanges and improvement of the access to each interchange, and to carry out construction, management and administration of the roads coordinated to this land use plan.

Purpose and Scope of the Survey

I. Purpose and Scope of the Survey

1-1. Objectives of the survey

In response to the request of the Government of the Republic of Indonesia, this survey was carried out. It was intended to find out about various opinions regarding present and future operation, control, maintenance and repairs of toll roads and to extract problems based on the findings so that suggestions could be made to the Indonesian Government regarding improvement and other points which would require attention.

1-2. Contents of the survey

The survey was conducted regarding the following matters.

- Matters relating to law.
- Matters relating to the scope of business of P. T. Jasa Marga.
- Matters relating to organization.
- Matters relating to finance.
- Matters relating to toll collection.
- Matters relating to maintenance and repairs.
- Matters relating to traffic control and service for users.
- Other matters.

In order to carry out the field survey satisfactorily, a questionnaire was prepared as below.

QUESTIONNAIRES TO BE RESPONDED BY THE GOVERNMENT OF THE REPUBLIC OF INDONESIA

According to the following questions in regard to toll road operation of your country, please be requested to explain present conditions and conception for the future stage and to provide them by letter for our efficient survey.

A. LAWS

1. Outline of contents of Indonesian Highway Corporation (I.H.C.) Law.
2. Outline of other highway-related laws and ordinances.

B. SCOPE OF I.H.C. BUSINESS

1. Scope of I.H.C. Business.
2. Appurtenant business such as operation of rest-house, filling station, truck terminal and so on.

C. ORGANIZATION

1. Organization chart and personel of the corporation.
2. Relationship with Bina Marga.

D. FINANCE

1. Kinds of financial sources and their contents including loan condition.
2. Budget table of this fiscal year.
3. Redemption plan of Jagorawi Freeway and whole network.

E. TOLL COLLECTION

1. Toll collection system. (contract or direct collection)
2. Working diagram of collectors.
3. Tables of vehicle classification and toll rate.
4. Discounted payment system such as commutation ticket.
5. Vehicle types of free of charge and their transaction.
6. Flow chart of detail works of collection.
7. Education and training for collectors.
8. Check system of toll collection
9. Countermeasures to fraud vehicle.
10. Any collecting equipments and their maintenance.

F. MAINTENANCE AND REPAIRS

1. Maintenance and repairs system and its works.
2. Frequency of patrolling and its works.
3. Traffic regulation for maintenance work on the expressway.
4. Execution for maintenance. (contract or direct.)
5. Types of facilities, and their disposition and maintenance.

G. TRAFFIC CONTROL AND TRAFFIC INFORMATION

1. Traffic control system and its works.
2. Cooperation with police and fire department.
3. Traffic conditions of Jagorawi Freeway and related roads after Jagorawi Freeway was opened.
4. Vehicle restriction such as weight, dimensions.
5. Ordinary traffic regulation such as maximum speed limit, parking and stopping prohibition, No U-turn, etc.
6. Temporary traffic regulation in case of accidents or disasters.
7. Aid to disabled vehicles.
8. Collection and presentation system of informations such as traffic condition, meteorological condition, emergency situation, etc.
9. P. R. for users about traffic manner.

H. OTHERS

1. Standards or manuals for operation and maintenance works.
2. Detail of the road, structures and facilities of Jagorawi Freeway.
3. Forms for records of operation works.

1-3. Composition of the Survey Team

The composition of the Survey Team is given below.

<u>Name</u>	<u>Post and Title</u>
HISAO MOCHIZUKI (Team Leader)	Director of Engineering Department, Nagoya Operation Bureau, Japan Highway Public Corporation (J.H.P.C.)
OSAMU MATSUMOTO (Traffic Control)	Assistant Chief of Traffic Control Division, Operation Department, J.H.P.C.
TSUYOSHI OGAWA (Maintenance)	Assistant Chief of First Maintenance Division, Engineering Department, Nagoya Operation Bureau, J.H.P.C.
MANABU TAKATERA (Finance/Toll Collection)	Staff of System Development Division, General Affairs Department, J.H.P.C.
ISAO FUKUSHIMA (Coordinator)	Staff of Development Survey Division, Social Development Cooperation Department, Japan International Cooperation Agency.

Those officials of the Indonesian authorities who participated in consultations during the survey are given below.

Departemen Pekerjaan Umum Bina Marga

Mr. Suryatin	Secretariat to Director General of Bina Marga
Mr. Ruslan Diwirjo	Director of Highway Planning
Mr. Wiyoto Wiyono	Chief of Highway Planning Division

P. T. Jasa Marga

Mr. Joewono Kolopaking	President Director
Mr. Isbandi	Director
Mr. Sunaryo Sumadji	Deputy Director
Mr. Digdojo Pringgodigao	Chief of Administration Sub Division
Mr. Basuki Setiawan	Chief of Operation Sub Division
Mr. G. Karundeng	Chief of Security Sub Division
Miss Desty Yetty	Chief of Budget/Finance Administration Section
Miss Kristy Luddin	Chief of Accounting Section
Mr. Wiroso Wiyono	Chief of Toll Section
Mr. Kristiawan Rachmad	Chief of Maintenance Section

1-4. Survey schedule

The field survey was conducted as shown by the schedule below.

Date

May 19 (Fri)	Tokyo-Jakarta.
May 20 (Sat)	(Morning) Courtesy call at Bina Marga. Consultation on survey schedule. Questionnaire distributed. Scope of the survey explained. Consultation with Japanese Embassy and JICA Office on survey schedule and scope of the survey. (Afternoon) Reconnaissance of the roads in Jakarta (north to east sections).
May 21 (Sun)	Reconnaissance of the roads in Jakarta (central area).
May 22 (Mon)	(Morning) Questionnaire explained at Bina Marga. Heard the Indonesian view on the survey. Courtesy call at P. T. Jasa Marga. Questionnaire explained. Consultation on scope of the survey.

(Afternoon) Reconnaissance of Jagorawi toll road including the section under construction.

May 23 (Tues) (Morning) Collection of information on Intra Urban Project.
(Afternoon) Reconnaissance of Jakarta-Tangerang road.

May 24 (Wed) (Morning) Main points on the questionnaire outlined by P. T. Jasa Marga followed by discussion
(Afternoon) Reconnaissance of Jagorawi toll road and its related facilities.

May 25 (Thurs) (Morning) Consultation with P. T. Jasa Marga and collection of material.
(Afternoon) Reconnaissance of Jakarta-Bekasi road.

May 26 (Fri) Consultation with P. T. Jasa Marga and collection of material.

May 27 (Sat) Reconnaissance of Jakarta-Bogor road.

May 28 (Sun) Meeting of the Survey Team. Collected material sorted out.

May 29 (Mon) Present condition and problems clarified at P. T. Jasa Marga. Collection of material.

May 30 (Tues) Same as above. Travel Speed Survey of Jagorawi toll road and related roads.

May 31 (Wed) Measures studied at P. T. Jasa Marga.

June 1 (Thurs) Same as above. Interim report to Japanese Embassy and JICA Office.

June 2 (Fri) Consultation with Bina Marga.

June 3 (Sat) Consultation and collection of material at P. T. Jasa Marga.

June 4 (Sun) Meeting of the Survey Team. Collected material sorted out.

June 5 (Mon) Problems and measures studied at P. T. Jasa Marga.
Collection of material.

June 6 (Tues) Survey findings compiled in a memorandum.

June 7 (Wed) Consultation with Bina Marga. Japanese report (draft) prepared.

June 8 (Thurs) Consultation with Bina Marga and P. T. Jasa Marga on the memorandum. Signing. Comments submitted by Bina Marga.

June 9 (Fri) Survey results reported to Japanese Embassy and JICA Office.

June 10(Sat) Jakarta-Tokyo.

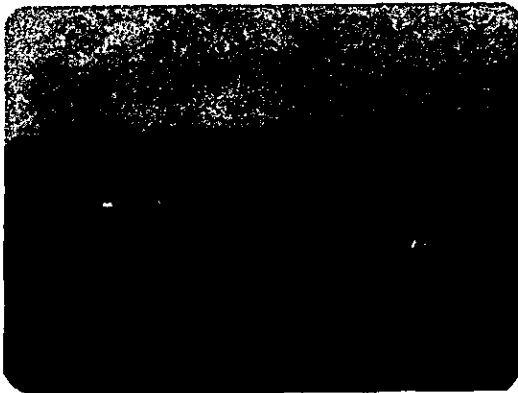


Photo-1 Central area in Jakarta seen from the Merdeka Tower

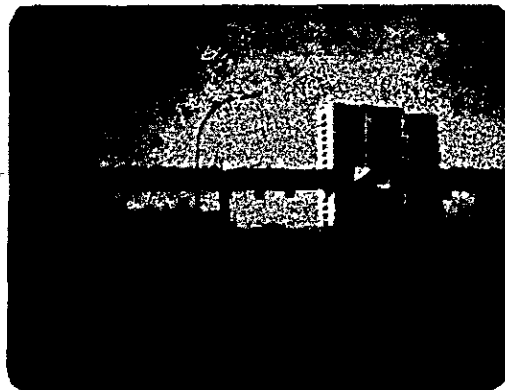
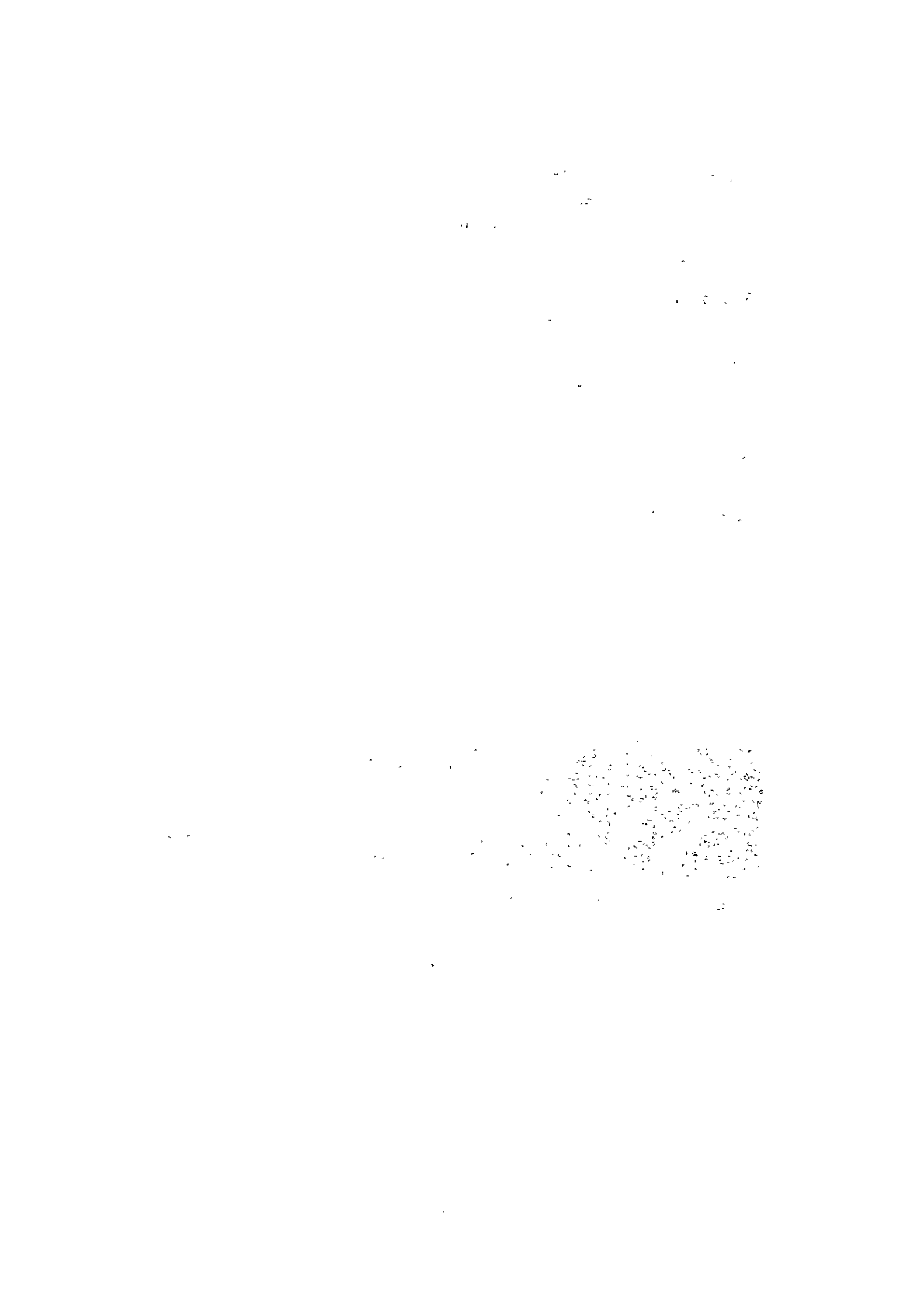


Photo-2 Main street in Jakarta



**The Toll Road System of the Republic
of Indonesia and Conception of Future
Development**

II. The Toll Road System of the Republic of Indonesia and Conception of Future Development

2-1. Background of introduction of the toll road system.

2-1-1. The Second 5-year Development Plan and JABOTABEK Plan

Since FY 1974, the Republic of Indonesia has been carrying out the Second 5-year Development Plan which is to be completed in 1979. One of the major policies for promoting the plan is "correction of enlargement of regional differences". That is, increasing concentration of population in urban areas is to be checked and maldistribution of population is to be corrected, promoting at the same time development which will ensure employment opportunities in provinces. Therefore, the most important measure under the plan was to improve the transport and communication network, particularly the arterial road network which had been under extremely poor condition.

However, the budget allocated to the Bina Marga during the Second 5-year Development Plan was only 353 billion Rp (353,000,000,000 Rp.), and 75% of the budget was to be appropriated to repair and improvement work on those roads under jurisdiction of Bina Marga totalling 33,000 km. Thus, it was difficult with the remaining 25% to push forward the construction of new arterial roads which would cost 300-500 million Rp (300,000,000-500,000,000 Rp) per km at 1975 prices.

On the other hand, though the DKI Jakarta occupies an area of about 600 km², about the size of Nagoya City with a total population of 2 million, it has a total population of 5.4 million. Further, almost the entire population is concentrated in the central area, equivalent in area to Sapporo or Fukuoka of Japan, and is increasing at an annual rate of over 4% (2.0% in natural increase and 2.3% in social increase). Consequently, urbanization has rapidly spread in recent years to the suburbs, and sprawling is beginning to appear in many places.

Accordingly, Bina Marga and the DKI Jakarta Government announced the "JABOTABEK Plan" in 1978 and have been revising it every year. As the name, which is made up of initials of four cities, DKI Jakarta, Bogor in the south, Tangerang in the west and Bekasi in the east, suggests, these four cities were to be linked organically under the plan. Further, the three satellite cities were to be developed as core cities for their areas, having small and medium development positions deployed midway between the four cities so that dispersion of population would be possible. However, realization of this plan was based on the assumption that new arterial roads connecting these cities would be constructed.

2-1-2. JMATS and Jakarta-West Java Toll Road Network

JMATS is a master plan prepared in 1974 by the Indonesian Ministry of Communications and the Ministry of Public Works together with local agencies of foreign governments, particularly the West German consultants, called the "Jakarta Metropolitan Area Transportation Study" with an interim target year of 1985 and with the final target year of 2000.

This study was intended to give shape to the transport sector of the JABOTABEK Plan and proposed to construct a freeway network, combining ring roads and radial roads, and railways as a means of mass transportation in DKI Jakarta.

Toward the end of the preparation of the master plan, the Indonesian Government began to study the introduction of a toll road network for the following reasons.

- 1) The budget for public works is small for the necessity of providing roads, and the budget under the Second 5-year Development Plan (REPERTA II) is far below the necessary amount even to maintain the existing road network, thus making it extremely difficult to invest in the construction of new arterial roads.
- 2) Transport demand is constantly increasing, particularly in cities and their suburbs.

- 3) If the road funds are invested only in cities and their suburban areas in response to the increasing transport demand, it will clearly arise the unbalance between regions and antagonize the residents of other areas.
- 4) Since car owners belong to the wealthy class, it is appropriate to collect tolls, according to the principle of beneficiary charge, so long as they are belong the amount of benefit obtainable through the use of the road of higher specifications than existing roads.

Thus, the Indonesian Government requested the West German consultants to conduct a feasibility regarding the conversion of these roads to toll roads.

The feasibility study was carried out from 1974 to 1975, and resulted in the "Jakarta-West Java Toll Road Network" consisting, of two ring roads (Intra Urban and Outer Ring Road) and three radial roads (Jakarta-Bogor-Ciawi, Jakarta-Tangera and Jakarta-Cikampek).

The results of the study, reported in January, 1976, may be outlined as follows.

- 1) On the whole, toll rates for the Intra Urban are to be 80 Rp per trip in the case of a passenger car and 220 Rp in the case of a truck. For radial roads, 13.5 Rp per km for a passenger car and 27 Rp for a truck. The loan is to be repaid in 15 years, and if the rate of interest is below 10%, the project can be self-supporting.
- 2) The Jakarta-Bogor-Ciawi line (Jagorawi toll road) and the Jakarta-Cikampek line are repayable in 10 years at an interest rate of 15%.
- 3) With regard to the Outer Ring Road, the income-cost ratio will be 0.88 at an interest rate of 10%. However, if it is constructed as a toll road, additional costs will amply be covered.
- 4) It is desirable to establish a public corporation under the supervision of the Ministry of Public Works, which

is responsible for construction, maintenance and operation of toll roads.

2-1-3. Feasibility study of Jakarta Ring Road Project

While the feasibility study of Jakarta-West Java Toll Road System by West Germany, the Indonesian Government made a request to Japan, well experienced in construction, maintenance and operation of toll roads, regarding technological transfer. In 1975, Indonesia asked Japan to send specialists in finance, organization, technology and training regarding toll roads, and also made a request for a feasibility study regarding Jakarta Ring Road on the assumption that it would be a toll road.

Following the completion of the study by West Germany, the Japanese Government sent a preliminary survey team of six members in December, 1976. After confirming the necessity of conducting a feasibility study, the Japanese Government sent Japanese consultants who carried out the study from March, 1977 to March, 1978. The results of the survey reported in March, 1978, may be outlined as follows.

- 1) Construction of the ring road as an outer ring road of Jakarta City is a desirable project which may give an impact to appropriate development of outer areas responding to dispersion of traffic and to changes in the direction of urbanization.
- 2) Since the project requires a huge amount of investment, it is desirable to operate it as a toll road from the viewpoint of regional allocation of state funds.
- 3) At an interest rate of 15%, repayment will be possible in 20-30 years. However, if early completion of repayment is desirable, the pooling system of financial account and other methods should be re-examined.
- 4) With regard to the toll system and the collection system, it is necessary to re-examine them after taking into consideration the whole toll road network in the metropolitan, especially the actual condition of Jagorawi toll road and studies on the Intra Urban toll road.

- 5) More concrete land use plan should be formulated at an early stage to serve as a guiding principle for the development. It is also necessary to provide effective measures for restrictions and guidance regarding development.

2-2. Inauguration of the toll road system

2-2-1. Legislation on the toll road system

Among those belonging to the proposed Jakarta-West Java Toll Road Network, the Jakarta-Bogor-Ciawi line was most advanced in planning. A feasibility study and detailed designing were carried out by U.S. consultants through a U.S. Aid. These were followed by an international tender in 1973. Thus, a Korean construction company has been constructing the road since 1974 under the supervision of U.S. consultants.

Though the construction cost far exceeded the estimate partly due to the "oil shock" during the period of construction, construction work made satisfactory progress, and, of the total 51 km, the 27 km section to the Citeureup Interchange near Cibinong was completed in March, 1978.

Before the opening of this section to traffic, the Indonesian Government hurried with legislation on toll roads and promulgated the Government Regulation No. 4 of 1978 on February 25.

This regulation, consisting of 16 articles in six sections, provides basic regulations for legislation on toll roads, and corresponds to the Road Improvement Special Measures Law (1953) of Japan, the Act regarding Construction of Highways and General Roads Law (1955) of Italy, or the Act regarding Motorways (1955) of France. (See Chapter IV.)

Previously the Republic of Indonesia did not have specific regulations regarding roads such as the Road Law or the National Expressway Law of Japan, and the Law regarding Transportation (1965 Law No. 3) had only the following provisions.

Article 13. The State is to have the jurisdiction over construction and maintenance of roads.

Article 14. The Government is to prescribe the provisions regarding the construction, ^{not} maintenance and use of roads.

2. The Minister of Transport and Communications is authorized to classify the roads and provide signs and road marking.

It seems that the Government Regulation No. 4 of 1978 was prescribed under the provision of Article 14 of the above law. Provisions under the Government Regulation No. 4 of 1978 are given below.

Outline of the Government Regulation No. 4 of 1978

Chapter 1. (Article 1) Definitions.

Chapter 2. (Articles 2-5) State investment and the capital of the Corporation.

Chapter 3. Provisions regarding supervision of toll road operation. (Article 6) Toll roads are to form part of the public road network.

2. Toll roads are to be alternative roads to existing roads.

(Article 7) Toll roads are provided only for car users.

2. Those who use toll roads are to observe laws and regulations regarding public roads and toll roads.

(Article 8) Authority regarding toll roads rests with the State.

2. The Government is to exercise supervision over toll roads.

(Article 9) Routes of toll roads are to be determined by Presidential Decree based on the authority of the State.

2. Based on the right of supervision, the Government is to delegate the authority to the Corporation regarding construction, operation, maintenance and control.

3. Though the governmental authority may be delegated to the Corporation as prescribed under the previous paragraph, the Government shall not be exempt from its responsibility for toll roads. (Article 10) The purpose of the establishment of the Corporation and its goal in management are to play a role in providing a road network intended for realization of the national goal aiming at development for the State and its people, which should be fair to each region, and also for security and defense of the State.

2. In order to realize the purpose and the goal prescribed under the previous paragraph, the Corporation is to carry out activities regarding the following matters.

- a. Operation, maintenance and control of toll roads.
- b. Supply of toll roads.
- c. Management of those facilities attached or related to toll roads.
- d. Other matters relating to the purpose and the goal of the establishment of the Corporation.

(Article 11) The scope of activities of the Corporation shall be as follows.

- a. Management, maintenance, control and supply of toll roads (including technical planning, supervision, maintenance, control and betterment work).
- b. Collection of tolls and other activities relating to the purpose and the goal of the

Corporation.

(Article 12) For the Corporation to operate toll roads, the following conditions are to be met.

- a. It is ensured that the cost of running a vehicle on a toll road is smaller than the cost of using existing roads.
- b. Toll roads are to be of special specifications and higher standards than existing general roads.
- c. Toll roads are to provide more reliability to users than existing roads.

Chapter 4. Determination of toll rates

(Article 13) Toll rates and how they are to be spent shall be determined by the President based on a proposal prepared by the Minister concerned (Minister of Public Works) upon consultation with Finance and Communication Ministers.

Chapter 5. Additional provisions

(Article 14) If the Corporation wishes to obtain cooperation from other organizations regarding operation, maintenance, control and supply of toll roads, written approval from the Government (the Minister in charge and Finance Minister) is to be obtained beforehand.

Chapter 6. Supplementary provision

(Article 15) Those matters not prescribed under this regulation will be regulated by the Minister in charge.

2-2-2. Conversion of Jagorawi Freeway to a toll road and the establishment of P. T. Jasa Marga

Under the provision of Article 9 of the above-mentioned Regulation, President Soeharto decided on March 7 that Jagorawi

Freeway was converted to a toll road, and determined the toll rates as prescribed under the provision of Article 13 of the Regulation.

Presidential Decree No. 3 of 1978
Decisions regarding the name and toll rates
for Jakarta-Bogor-Ciawi Freeway.

1. The freeway of 46 km in total length from Jakarta through Bogor to Ciawi is to be a toll road and to be named Jalan Tol Jagorawi (Jagorawi Freeway).
2. The toll section of Jagorawi Freeway is to be as follows.
 - a. North: Tama Mini Indonesia Indah Toll Plaza.
 - b. Middle: Gunung Putri Toll Plaza.
 - c. South: Bogor and Ciawi Toll Plaza.
3. The toll rates are to be as follows
 - a. 11-15 Rp per km for vehicles below 2 1/2 tons.
 - b. 20-25 Rp per km for vehicles over 2 1/2 tons.

Thus, the whole Jagorawi Freeway was officially converted to a toll road as the first one of the Jakarta-West Java Toll Road Network.

On March 9, an opening ceremony was held in the presence of President Soeharto, and after he duly paid the toll as the first one to use the toll road, it was opened to traffic.

Prior to the opening of Jagorawi Freeway, P. T. Jasa Marga was established. It was founded as a state corporation with a capital of 2 billion Rp (2,000,000,000 Rp) which was entirely financed by the Government (State and the Minister of Public Works). It is placed under the direct supervision of the Minister of Public Works.

Like other state corporations, P. T. Jasa Marga is founded upon certification of the articles of incorporation by a notary public as prescribed under the trade law. Initial appointments of Councilor, President, Directors and other officers and the capital were based on provisions under a Ministry of Finance Ordinance.

At present, the Corporation is engaged only in toll collection, maintenance and control regarding the opened section, and liabilities on the U.S. Aid or the authority regarding construction and control of unfinished sections have not yet been transferred from the Government to the Corporation. The income from tolls reverts to the Corporation, though the aim of using the income is not clear as the Presidential Decree prescribed under the provision of Article 13 of the above-mentioned Regulation has not been promulgated.

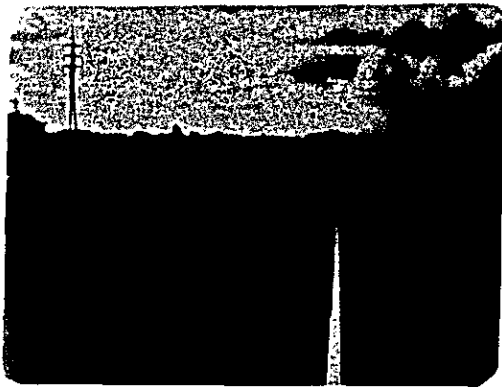


Photo-3 Jagorawi toll road



Photo-4 Signature of President Soeharto on the opening of Jagorawi toll road

2-3. Conception of future development of the toll roads

2-3-1 Overall conception of the toll road

For the reasons described already for the introduction of a toll road system, those roads which may be operated as toll roads in future are planned for the areas near large cities, and they are concentrated in Java.

Those roads which are planned to be toll roads at present are the following sections as shown by Fig. A.

- ° Jakarta-West Java Toll Road Network:
 - a. Jakarta Intra Urban.
 - b. Jakarta Outer Ring Road.
 - c. Jakarta-Bogor-Ciawi (Jagorawi Toll Road).
 - d. Jakarta-Cikampek.
 - e. Jakarta-Tangerang.
- ° Other networks:
 - a. Java Island.
 - 1) Surabaya-Porong.
 - 2) Surabaya-Kertosono.
 - 3) Semarang Bypass.
 - b. Sumatera Island
 - 1) Medan-Belawan.
 - 2) Medan-Tebingtinggi.
 - c. Bali Island.
 - 1) Bualu-Kuta.
 - 2) Denpasar Outer Ring Road.
 - d. Others
 - Extension of these roads, bridge and tunnel.

2-3-2. Jakarta-West Java Toll Road System

In order to solve the traffic and urban problems of the Metropolitan Jakarta, Jakarta-West Java Toll Road Network is planned to link the two ring roads, Jakarta Intra Urban and Jakarta Outer Ring Road, with the three radial roads, Jakarta-Bekasi-Cikampek to the east, Jakarta-Bogor-Ciawi (Jagorawi Freeway) to the south and Jakarta-Tangerang to the west.

Present situation regarding these road projects is given by Table 2-1. Table 2-2 gives a development flow chart regarding these roads.

Table 2-1. Present condition of Jakarta-West Java Toll Road Network

Name of the road	Length (km)	Present situation	Scheduled opening to traffic
Jakarta Intra Urban	31	1 interchange and grade separation are being designed in detail. Feasibility study of the whole Intra Urban is to be conducted.	1983
Jakarta Outer Ring Road	89	Feasibility study of a section in 48 km completed in March, 1978. Others being planned.	1984
Jakarta-Cikampek Freeway	67	Being designed in detail by West German consultants.	1983
Jagorawi Freeway	51		
Jakarta Bypass Interchange-Citeureup	(27)	In use.	
Temporary Interchange Citeureup			
Temporary Interchange-Bogor-Ciawi	(24)	Under construction.	1979
Jakarta-Tangerang Freeway	20	Detailed design completed. Arrangements being made for a tender	1982
Total	258		

Table 2-2. Jakarta-West Java Toll Road development work schedule

Route	1978	1979	1980	1981	1982	1983	1984	Remarks
Jagorawi Freeway (Jakarta ~ Bogor ~ Ciawi)	Under construc- tion	In use						Jakarta-Citeureup Citeureup-Bogor- Ciawi
	Under construc- tion	In use						
Jakarta ~ Tangerang	Detailed designing Negotia- tion	Land acquis- tion	Under construction	Under construction	In use			
		X—X						
Jakarta ~ Cikampek	Detailed design- ing Negotia- tion	Land acquis- tion	Under construction	Under construction	In use			
		X—X						
Jakarta Intra Urban	Detailed designing Negotia- tion	Land acquis- tion	Under construction	Under construction	In use			
		X—X						
Jakarta Outer Ring Road	Detailed design- ing Negotia- tion	Land acquis- tion	Under construction	Under construction	In use			
		X—X						

Construction of these roads is to be carried out in stage construction by cross section and profile section.

**Present Condition and Problems
regarding Administration and
Management of Jagorawi Toll Road**

III. Present condition and Problems Regarding Administration and Management of Jagorawi Toll Road

3-1. Outline of Jagorawi toll road

3-1-1. Background of the construction of Jagorawi toll road

Jagorawi Toll Road was planned as a completely access-controlled road, for the purposes of reducing social and economic loss due to traffic jam, accidents, cargo fall, etc in the existing road to connect Jakarta, the capital of the Republic of Indonesia to such southern areas as Bogor and Bandung, attaining the function of long distance traffic stream as an arterial road, and developing such satellite cities as Bogor.

Jagorawi Toll Road was partially opened to traffic as a result of the following development:

1963 Since the road has the highest priority in necessity as an arterial road, the first construction of the road as a motorway was decided.

1963 to 1965 The Ministry of Public Works and Electric Power made a pre-feasibility study, to materialize the plan.

1969 to 1970 Under the financial aid of UNDP (United Nations Development Programs), Kampsax-Louis Berger Consulting Engineers of USA made a feasibility study.

1971 to 1973 Under US Aid, Sverdrup & Parcel Inc. Consulting Engineers, USA made detailed design.

1972 to 1974 Land was acquired by the Land Acquisition Committee organized by the authorities of DKI Jakarta and West Java Provincial Government.

1973 An international tender was offered for the construction and the supervision of works.

1974 to 1978 Construction and supervision of works were executed under US Aid. The contractor was Hyundai Construction Co. of Korea, and the

works were supervised by Amman-Whitney & Trans
asia Engineering Corp. of USA.

1975 to 1976 In parallel with the construction, the
Ministry of Public Works and Electric Power
made Arge Intertraffic-Lenz Consult execute a
survey for the Jakarta-West Java Toll Road
System.

1976 to 1977 Detailed design was made, to change
Jagorawi Freeway into a toll road.

March 1, 1978 ... P. T. Jasa Marga was established.

March 9, 1978 ... In the presence of President Soeharto,
the opening ceremony of Jagorawi Toll Road
was held.

3-1-2. Outline of the road

- (1) Name of the toll road: Jalan Tol Jagorawi (Jagorawi
Toll Road)
- (2) Kind of the road: Freeway
- (3) Functional classification: Major arterial road
- (4) Section: Starting point Jakarta Timur
Terminal Ciawi
- (5) Road length: Total length 50.7 km (with
additional access roads of 7.2 km)
Earthwork length 48.8 km
Bridge length 1.9 km
- (6) Standard
Design speed 120 km/hr
Design load Wheel load 8.2 tons
Carriageway
width 3.75 m x 4 = 15.00 m
Shoulder width .. Outside-3.00 m
Median side 1.50 m
Median width 10.00 m (including the space for
future 2-lane widening)
Pavement Asphalt concrete (see Fig. 3-1)
- (7) Typical cross section: See Fig. 3-2.

- (8) Interchanges (5 places)
 Jakarta Bypass Interchange
 Toman Mini Interchange
 Gunung Putri Interchange
 Bogor Interchange
 Ciawi Interchange
- (9) Service area, parking area, bus stop: Nil
- (10) Month of completion
 Section A (Ciawi Interchange through Bogor Interchange
 to Citeureup Interchange: 24.0km) March, 1979
 (scheduled)
 Section B (Citeureup Interchange to Jakarta Bypass
 Interchange: 26.7km) March, 1978
- (11) Contents of work
 Earthwork 5,600,000m³
 Asphalt concrete 790,000 tons
 Crushed stone (for subbase course) 320,000m³
 Bridges (for 2 lanes) 3,710m at 46 places
 (average 80.7m)
 Culverts
 Pipes ... 14,898m at 269 places (average 55.4m)
 Boxes ... 2,305m at 33 places (average 69.8m)
 In addition, traffic signs, road markings, fences,
 lightings, etc.

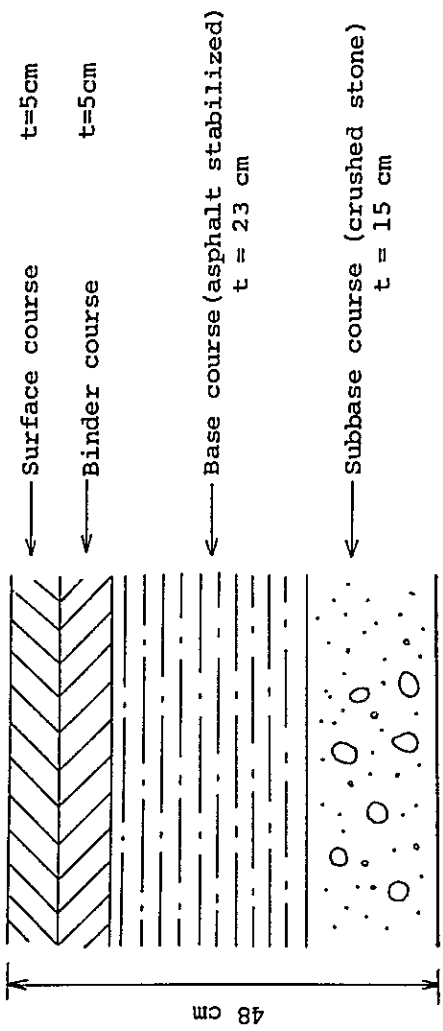


Fig. 3-1 Cross section of the pavement of Jagorawi toll road

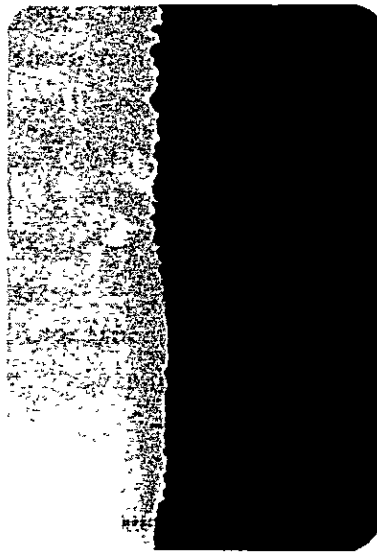


Photo-5. General view of Jagorawi toll road



Photo-6. Jakarta Bypass Interchange

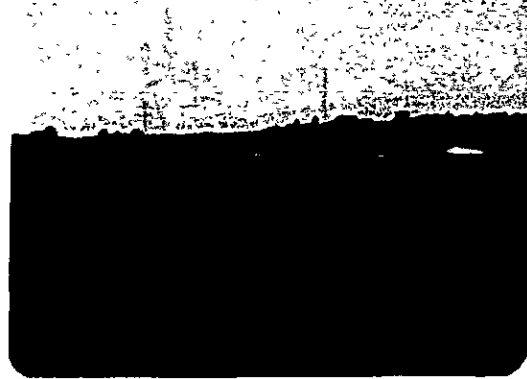


Photo-7. Taman Mini Toll Plaza where an interchange is scheduled to be established

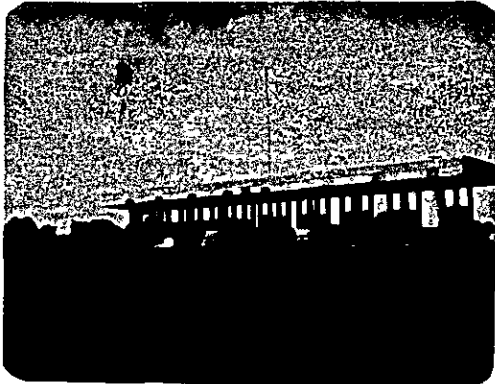


Photo-8. Taman Mini Toll Gate

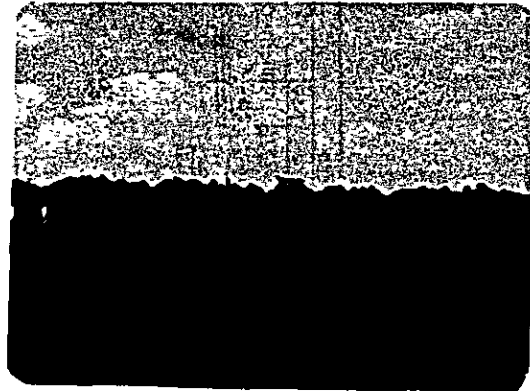


Photo-9. Scheduled site of the junction with Jakarta Outer Ring Road

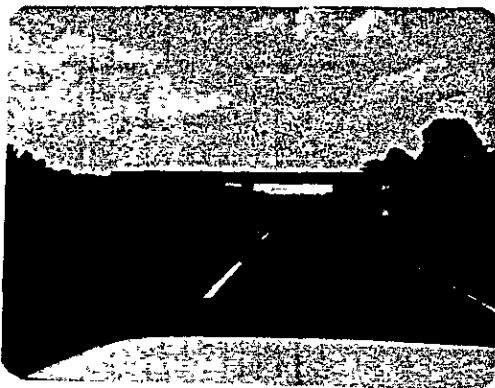


Photo-10. Scheduled site of Gunung Putri Interchange; Girders of the ramp bridge are already erected.

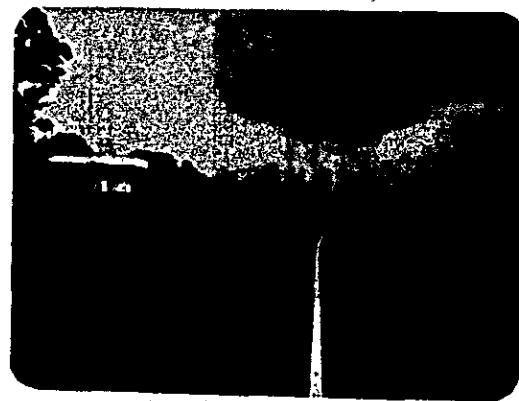


Photo-11. Citeureup Temporary Interchange

3-1-3. Project costs

The project costs of Jagorawi Toll Road are as shown in Table 3-1. As obvious from the table, the total cost of Jagorawi Toll Road amounts to Rp27, 990, 649, 670 (approx. 14,838 million yen) which consists of US\$26,795, 113 (40%) in foreign currency and Rp16,870,677,775 (60%) in domestic currency. All the foreign currency amount is covered by US Aid. The total amount corresponds to approx. 550 million rupiah (approx. 300 million yen) in terms of cost per km, being about 30%, compared with approx. 1,000 million yen (approx. 1,900 million rupian), project cost per km of Tomei Expressway of Japan completed in 1969. This is surmised to be caused by differences in quantity of structures due to difference of topographic features, and also in land cost, labor cost, etc. Land acquisition and compensation cost for Jagorawi Toll Road are as shown in Table 3-2, and the average cost per km is approx. 80 million rupiah (approx. 40 million yen), being about one seventh of approx. 270 million yen (approx. 500 million rupiah) per km of Tomei Expressway.

Table 3-1. Project costs of Jagorawi Toll Road

In the column for Foreign Currency, the figures in the parentheses show the corresponding values in rupiah.

Cost description	Foreign Currency (US\$)	Local Currency (Rp)	Total (Rp)	%
1. Detailed design	795,113 (329,971,895)	131,088,000	461,059,895	1.6
2. Land acquisition and compensation	0	3,894,297,643	3,894,297,643	13.9
3. Construction	22,835,328 (9,476,661,120)	11,141,602,987	20,618,264,107	73.7
4. Works supervision	2,915,487 (1,209,927,105)	1,096,771,845	2,306,698,950	8.2
5. Overhead	0	606,917,300	606,917,300	2.2

Cost description	Foreign Currency (US\$)	Local Currency (Rp)	Total (Rp)	%
6. Maintenance facilities	249,185 (103,411,775)	0	103,411,775	0.4
7. Total	26,795,113 (11,119,971,895)	16,870,677,775	27,990,649,670	100
%	39.7	60.3	100	-

Note: Exchange rate.... US\$1 = Rp415 (= ¥220)

Table 3-2 Land acquisition and compensation cost for Jagorawi toll road

Item	Region	Area (m ²)	Amount (Rp)	Unit price per m ²	
				(Rp/m ²)	(Yen/m ²)
Land acquisition	Kabupaten Bogor	5,909,031	1,100,846,248	186	99
	Kotamadya Bogor	186,162	46,744,380	251	133
	Jakarta Timur	2,495,568	2,045,214,700	820	435
	Sub-total	8,590,761	3,192,825,328	327	197
Compensation and others	-	-	701,472,315	-	-
Total	-	8,590,761	3,894,297,643	453	240

Note: Exchange rate US\$1 = Rp415 = ¥220

3-1-4. Present utilization

(1) Traffic volume

1) Average daily traffic volumes by month and by vehicle type

The average daily traffic volumes by month and by vehicle type for the first three months after opening are as shown in Table 3-3 and Fig. 3-3, which considerably exceeded the initial designed daily traffic volume of 1,750 units/day, and are about 10% higher than the budget designed daily traffic volume of 3,600 units/day.

The ratio of large sized motor vehicles (2.5 tons or more) was about 9%.

2) Daily traffic volumes by vehicle type

Daily traffic volumes by vehicle type for the approx. three months from the opening date of March 9 to May 31 are as shown in Table 3-4 and Fig. 3-4. From these figures and tables, the following can be pointed out.

- 1 Variation in a week is violent. Volumes are approx. 3,000 to 4,000 units/day on weekdays, approx. 4,000 to 5,000 units/day on Saturdays, and approx. 6,000 to 7,000 units/day on Sundays. The volume on Sundays is twice that of weekdays.
- 2 By vehicle type, small sized motor vehicles (less than 2.5 tons) show peaks on Sundays, about double the volume of weekdays. On the other hand, large sized motor vehicles rather decrease on Sundays, though slightly.

3) Hourly traffic volumes by direction

Hourly traffic volumes are totalized from the records of traffic counters (loop coils) installed in the respective booths, and therefore are not

broken down by vehicle type.

Hourly traffic volumes by direction for one week are as shown in Tables 3-5 and 3-6 and Figs. 3-5 to 3-7.

These figures and tables indicate the following:

- 1 According to Fig. 3-5, every day of the week, traffic volume starts increasing since 6 to 7 o'clock in the morning, and there are two peaks, each before and after the noon, with gradual decrease from 7 in the evening, and very small volume from about 10 at night to about 6, the next morning.
 - 2 The traffic volume toward Jakarta on weekdays shows peaks in the morning and in the afternoon, and that toward Cibinong does not show a clear peak in the morning, but shows a peak about 3 in the afternoon.
 - 3 On Saturday, there is much traffic particularly in the afternoon toward Cibinong.
 - 4 On Sunday, there is a clear trend of use by direction, and traffic from Jakarta to Cibinong is overwhelming in the morning, while on the contrary, there is overwhelming traffic toward Jakarta in the evening.
- 4) Characteristics of traffic variation of Jagorawi Toll Road

From the above, the characteristics of traffic volume variation of Jagorawi Toll Road can be summarized as follows:

- 1 Variation in the week is violent, and vehicle types of less than 2.5 tons increase doubly particularly on holidays such as Sundays and national holidays.
- 2 Large sized motor vehicles of 2.5 tons or more decrease on holidays on the contrary.

- 3 Only a small number of large sized motor vehicles use the road.
- 4 The traffic from Jakarta toward Cibinong sharply increases in the afternoon of Saturday and in the morning of Sunday.
- 5 The traffic from Cibinong toward Jakarta increases sharply particularly in the evening of Sunday.

Table 3-3 Average daily traffic volume by month and by vehicle type

Vehicle type		Month	3	4	5	Average
		—				
Less than 2.5 tons (small sized motor vehicles)	Traffic volume (vehicles/day)		2,878	3,630	3,649	3,431
	Growth rate		(100)	(126.1)	(126.8)	(119.2)
2.5 tons or more (large sized motor vehicles)	Traffic volume (vehicles/day)		193	356	377	319
	Growth rate		(100)	(129.8)	(131.1)	(122.1)
Total	Traffic volume (vehicles/day)		3,071	3,986	4,026	3,750
	Growth rate		(100)	(129.8)	(131.1)	(122.1)
Ratio of large sized motor vehicles (%)			6.3	8.9	9.4	8.5

Note: In the Growth rate, the value of March was set as 100.

Fig. 3-3 Average daily traffic volume by month and by vehicle type

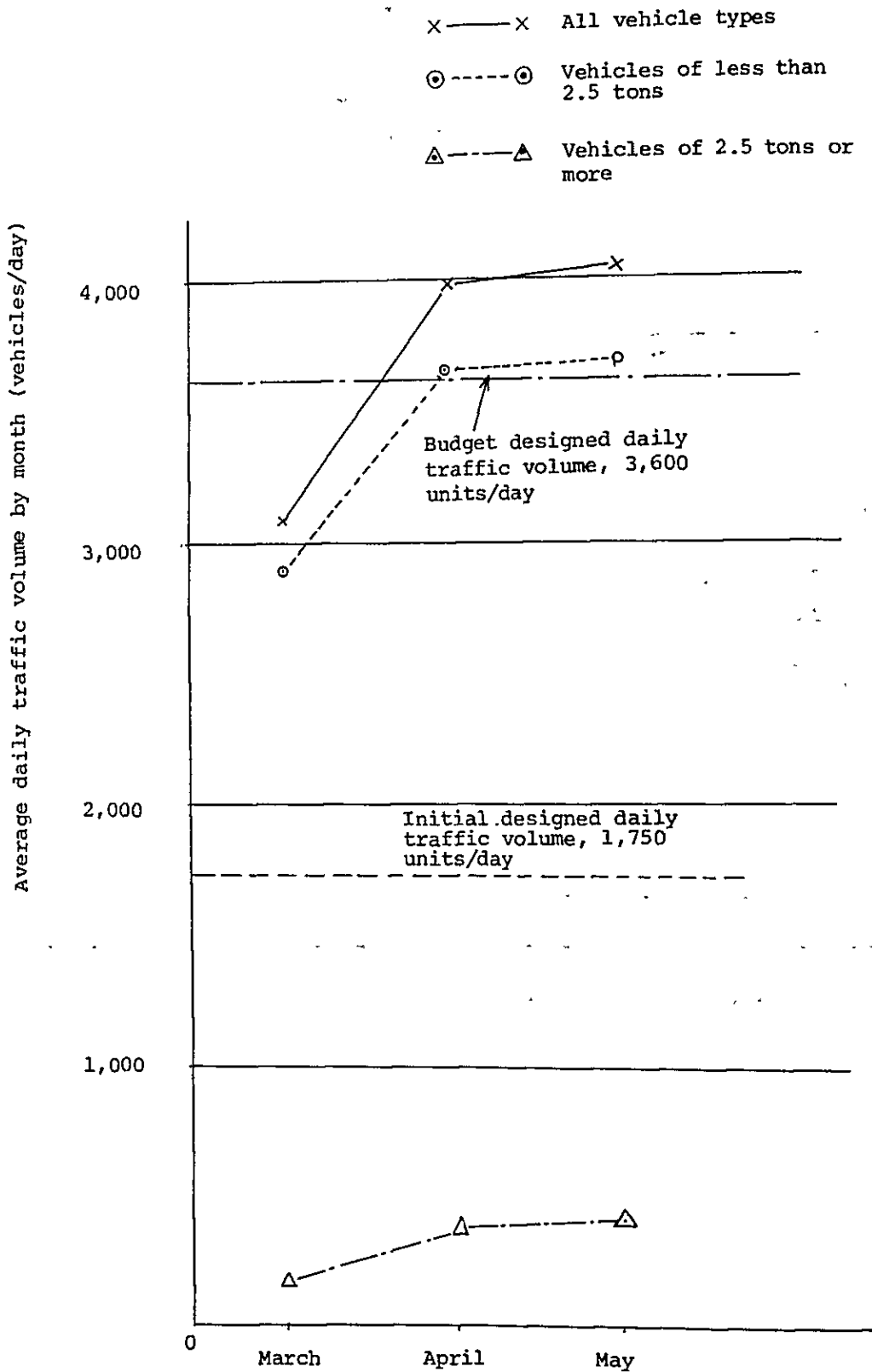


Table 3-4. Daily traffic volume by vehicle type

March				April				May			
Date & day of the week	<2.5ton	>2.5ton	Total	Date & day of the week	<2.5ton	>2.5ton	Total	Date & day of the week	<2.5ton	>2.5ton	Total
1 Wed.				1 Sat.	3,744	262	4,006	1 Mon.	2,686	390	3,076
2 Thu.				2 Sun.	6,594	241	6,835	2 Tue.	1,870	332	2,202
3 Fri.				3 Mon.	2,677	280	2,957	3 Wed.	3,059	386	3,445
4 Sat.				4 Tue.	2,674	313	2,987	4 Thu.	5,360	354	5,714
5 Sun.				5 Wed.	2,863	343	3,206	5 Fri.	3,009	390	3,399
6 Mon.				6 Thu.	2,952	331	3,283	6 Sat.	3,714	356	4,070
7 Tue.				7 Fri.	3,093	314	3,407	7 Sun.	6,003	290	6,293
8 Wed.	March 9 opened to traffic			8 Sat.	3,681	293	3,974	8 Mon.	2,912	394	3,306
9 Thu.	1,355	53	1,408	9 Sun.	6,246	262	6,508	9 Tue.	2,804	339	3,143
10 Fri.	1,729	40	1,769	10 Mon.	2,914	322	3,236	10 Wed.	2,907	331	3,238
11 Sat.	2,134	82	2,216	11 Tue.	2,712	410	3,122	11 Thu.	3,002	368	3,370
12 Sun.	4,669	53	4,722	12 Wed.	2,804	419	3,223	12 Fri.	3,145	320	3,465
13 Mon.	1,798	92	1,890	13 Thu.	2,789	411	3,200	13 Sat.	3,946	329	4,275
14 Tue.	1,858	124	1,982	14 Fri.	2,982	309	3,251	14 Sun.	6,097	254	6,351
15 Wed.	1,967	127	2,094	15 Sat.	3,965	312	4,277	15 Mon.	3,168	325	3,493
16 Thu.	2,165	176	2,341	16 Sun.	6,094	256	6,350	16 Tue.	3,013	352	3,365
17 Fri.	2,231	207	2,438	17 Mon.	3,212	372	3,584	17 Wed.	3,008	386	3,394
18 Sat.	3,035	175	3,210	18 Tue.	2,882	367	3,249	18 Thu.	2,996	418	3,414
19 Sun.	6,201	172	6,373	19 Wed.	2,821	356	3,177	19 Fri.	3,401	414	3,815
20 Mon.	2,242	224	2,466	20 Thu.	3,152	397	3,549	20 Sat.	4,261	372	4,633
21 Tue.	2,069	210	2,279	21 Fri.	3,540	459	3,999	21 Sun.	6,283	251	6,534
22 Wed.	2,202	224	2,426	22 Sat.	4,159	325	4,484	22 Mon.	3,080	400	3,480
23 Thu.	2,683	229	2,912	23 Sun.	6,096	283	6,379	23 Tue.	2,885	458	3,343
24 Fri.	5,104	208	5,312	24 Mon.	2,983	463	3,446	24 Wed.	2,961	453	3,414
25 Sat.	3,276	207	3,483	25 Tue.	2,829	418	3,247	25 Thu.	3,280	415	3,695
26 Sun.	5,953	163	6,116	26 Wed.	2,901	429	3,330	26 Fri.	3,325	374	3,749
27 Mon.	2,665	444	3,109	27 Thu.	3,001	445	3,446	27 Sat.	4,603	431	5,034
28 Tue.	2,534	320	2,853	28 Fri.	3,271	471	3,742	28 Sun.	6,773	400	7,172
29 Wed.	2,641	308	2,949	29 Sat.	3,901	460	4,361	29 Mon.	3,344	467	3,811
30 Thu.	2,750	307	3,057	30 Sun.	5,381	354	5,735	30 Tue.	3,017	444	3,461
31 Fri.	2,930	304	3,234					31 Wed.	3,153	508	3,661
Total	66,195	4,449	70,644	Total	108,913	10,677	119,590	Total	113,114	11,701	124,815

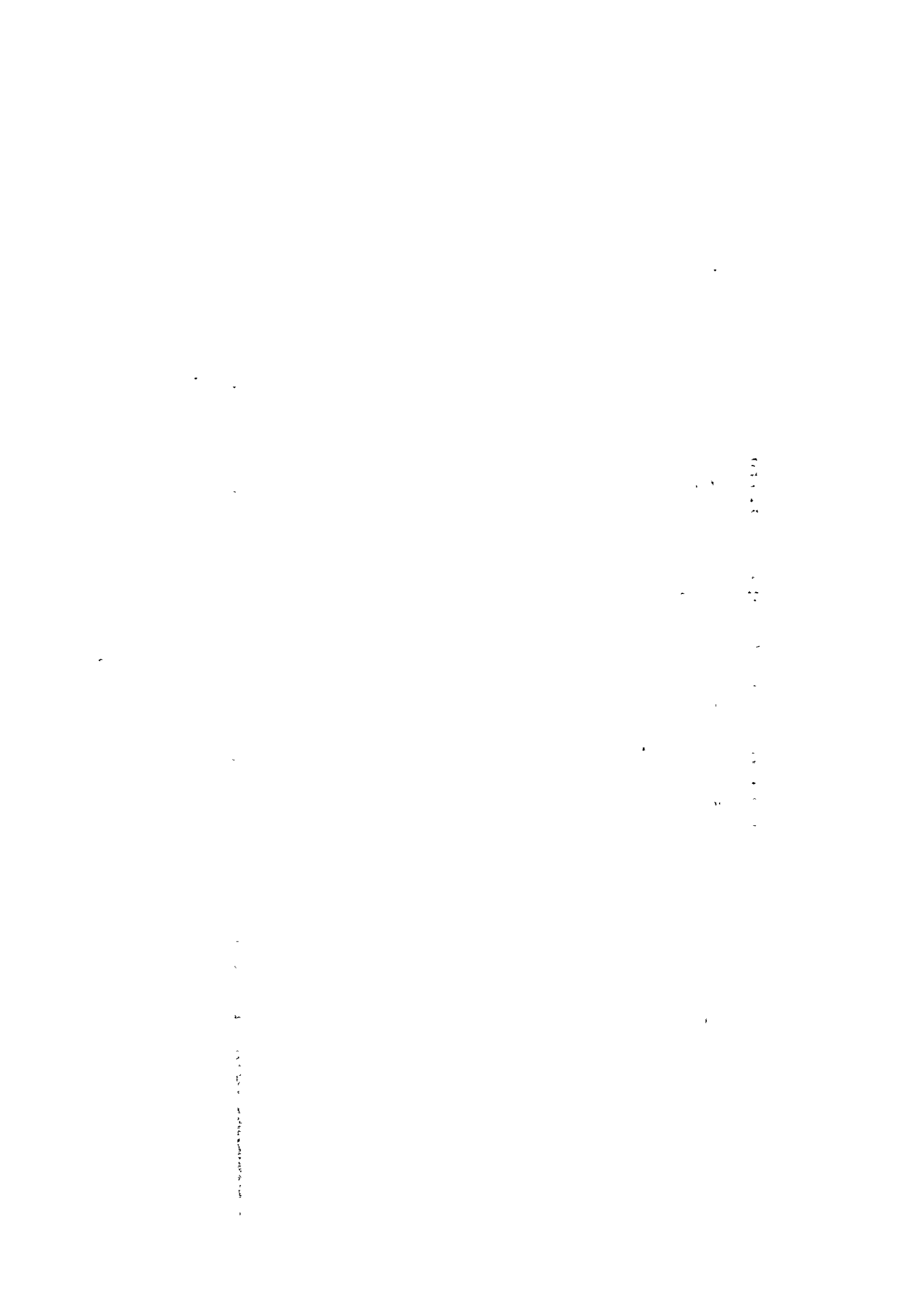


Table 3-5 Hourly traffic volume by direction

Day of the week Toward Time zone	Average of weekdays			Saturday			Sunday		
	Jakarta	Cibinong	Total	Jakarta	Cibinong	Total	Jakarta	Cibinong	Total
0 ~ 1	18	15	33	9	9	18	35	29	64
1 ~ 2	12	7	19	14	6	20	14	24	38
2 ~ 3	6	4	10	13	5	18	13	10	23
3 ~ 4	5	3	8	11	2	13	12	17	29
4 ~ 5	9	6	15	7	10	17	8	12	20
5 ~ 6	23	21	44	19	49	68	9	16	25
6 ~ 7	71	38	109	79	65	144	12	83	95
7 ~ 8	122	107	229	102	104	206	92	205	297
8 ~ 9	134	99	233	130	129	259	114	395	509
9 ~ 10	136	122	258	120	178	298	137	343	480
10 ~ 11	102	143	245	107	147	254	147	627	774
11 ~ 12	94	150	244	107	178	285	151	442	593
12 ~ 13	90	143	233	80	106	186	154	343	497
13 ~ 14	98	168	266	102	295	397	196	277	473
14 ~ 15	111	195	306	149	321	470	340	322	662
15 ~ 16	118	176	294	152	295	447	308	286	594
16 ~ 17	134	179	313	181	301	482	397	204	601
17 ~ 18	147	158	305	218	159	377	515	174	689
18 ~ 19	115	122	237	158	146	304	529	140	669
19 ~ 20	74	95	169	81	106	187	397	92	489
20 ~ 21	53	59	112	61	86	147	300	88	388
21 ~ 22	44	54	98	56	68	124	162	88	250
22 ~ 23	25	34	59	34	22	56	108	54	162
23 ~ 24	21	21	42	18	21	39	56	20	76
Total	1, 762	2, 119	3, 881	2, 008	2, 808	4, 816	4, 206	4, 291	8, 497
Remarks	Average of June 1(Thu), 2(Fri), 5(Mon), 6(Tue) and 7(Wed)			June 3 (Sat)			June 4 (Sun)		

Table 3-6 Hourly traffic volume by direction (weekdays)

From June 1 (Thu) to June 8 (Thu), 1978

Date of the week	Time zone	Toward																								Total
		0 ~1	1 ~2	2 ~3	3 ~4	4 ~5	5 ~6	6 ~7	7 ~8	8 ~9	9 ~10	10 ~11	11 ~12	12 ~13	13 ~14	14 ~15	15 ~16	16 ~17	17 ~18	18 ~19	19 ~20	20 ~21	21 ~22	22 ~23	23 ~24	
1 (Thu)	Jakarta						27	102	129	132	110	105	101	125	109	136	162	161	127	63	55	48	36	21	(1,749)	
	Cibinong						32	100	92	128	124	136	120	157	153	157	171	132	106	66	47	40	33	15	(1,809)	
	Total						59	202	221	260	234	241	221	282	262	293	333	293	233	129	102	88	69	36	(3,558)	
2 (Fri)	Jakarta	10	10	9	11	18	27	68	98	121	123	105	97	86	107	143	125	152	172	119	93	78	62	37	33	1,904
	Cibinong	13	4	8	3	8	51	23	90	103	141	146	131	140	193	235	185	167	166	107	99	70	48	32	21	2,184
	Total	23	14	17	14	26	78	91	188	224	264	251	228	226	300	378	310	319	338	226	192	148	110	69	54	4,088
5 (Mon)	Jakarta	26	19	7	8	13	42	167	195	198	168	132	103	102	99	133	99	130	153	146	93	38	26	14	17	2,128
	Cibinong	16	13	2	2	10	41	38	110	121	123	189	171	149	205	244	144	208	161	159	96	63	78	26	18	2,367
	Total	42	32	9	10	23	63	205	305	319	291	321	274	251	304	377	243	338	314	305	189	101	104	40	35	4,495
6 (Tue)	Jakarta	11	7	6	1	1	8	64	64	93	99	60	55	71	79	79	87	87	99	78	52	41	36	15	15	1,208
	Cibinong	10	4	2	6	1	6	24	107	117	196	181	175	163	175	188	219	195	173	117	117	52	54	39	25	2,344
	Total	21	11	8	7	2	14	88	171	210	295	241	230	234	254	267	306	282	272	195	169	93	90	54	40	3,554
7 (Wed)	Jakarta	18	13	4	0	0	17	45	240	130	159	105	112	89	78	92	141	139	149	103	69	53	48	25	17	1,846
	Cibinong	9	7	4	2	6	22	60	204	63	23	75	135	145	110	153	176	158	161	121	98	64	50	41	27	1,914
	Total	27	20	8	2	6	39	105	444	193	182	180	247	234	188	245	317	297	310	224	167	117	98	66	44	3,760
8 (Thu)	Jakarta	13	12	6	7	14	23	57	32																	(164)
	Cibinong	24	8	3	0	4	7	48	33																	(127)
	Total	37	20	9	7	18	30	105	65																	(291)
Average	Jakarta	18	12	6	5	9	23	71	122	134	136	102	94	90	98	111	118	134	147	115	74	53	44	25	21	1,762
	Cibinong	15	7	4	3	6	21	38	107	99	122	143	150	143	168	195	176	179	158	122	95	59	54	34	21	2,119
	Total	33	19	10	8	15	44	109	229	233	258	245	244	233	266	306	294	313	305	237	169	112	98	59	42	3,881

Fig. 3-5 Hourly traffic volume by direction

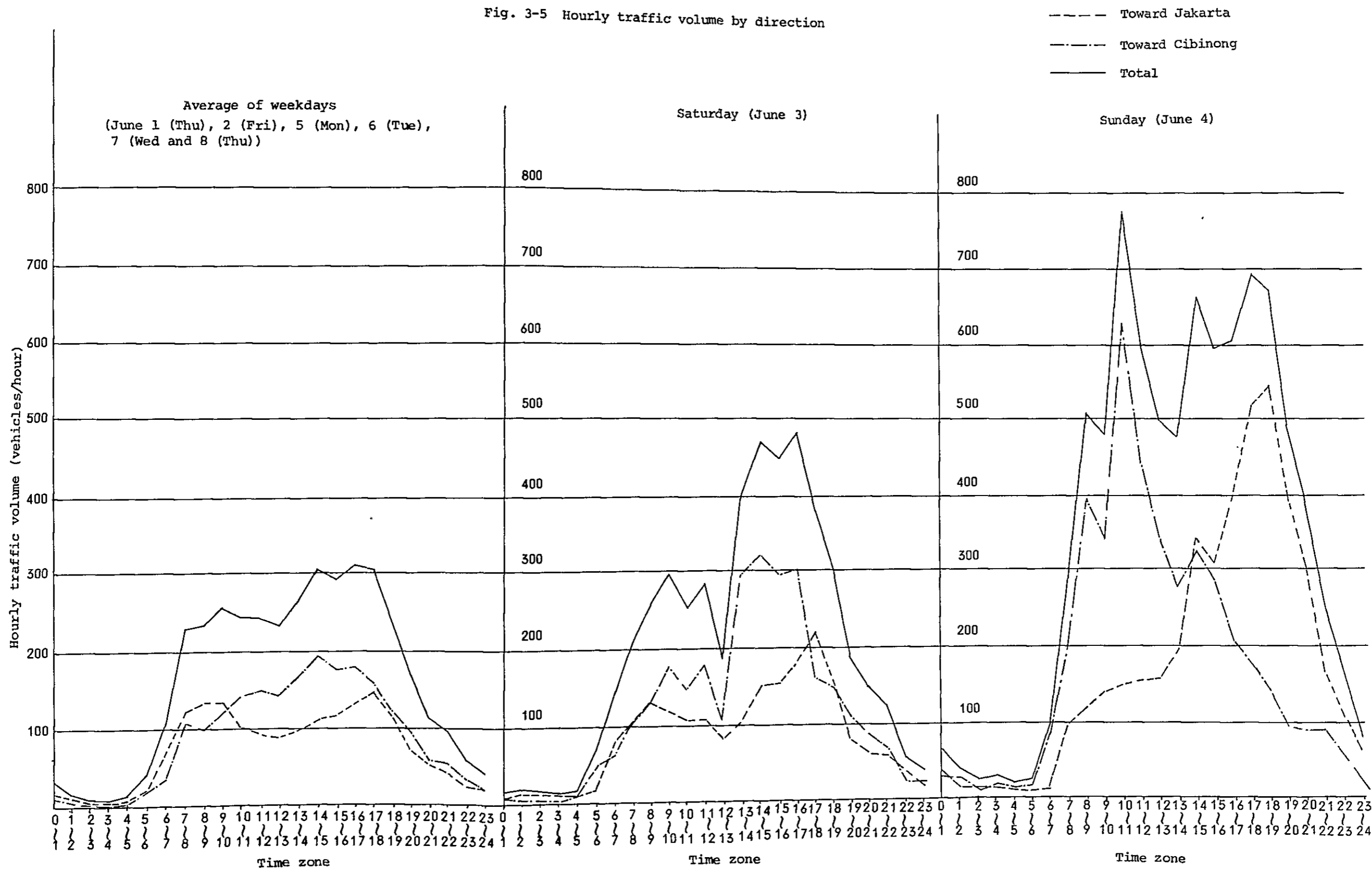


Fig. 3-6 Hourly traffic volume (toward Jakarta)

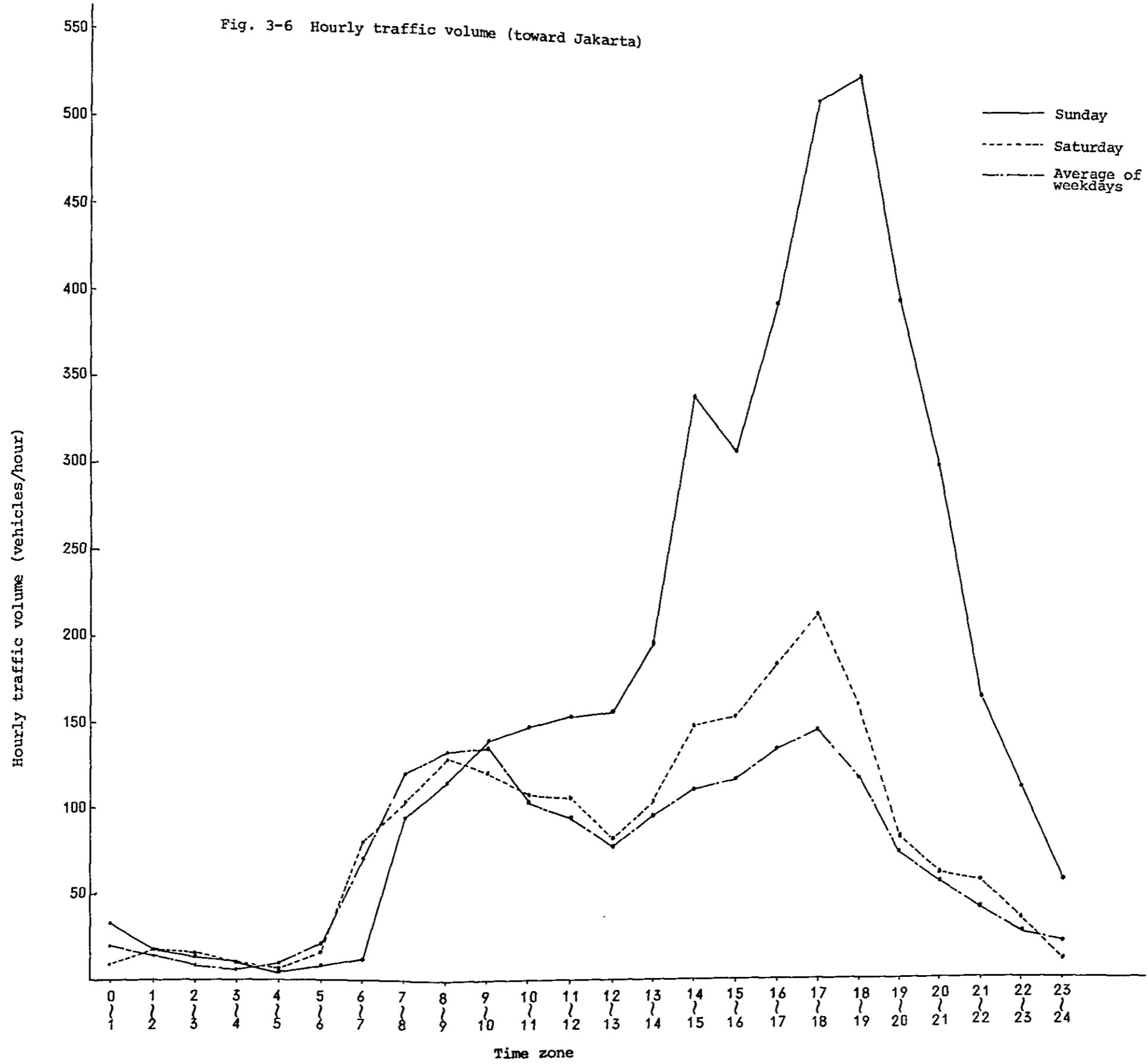
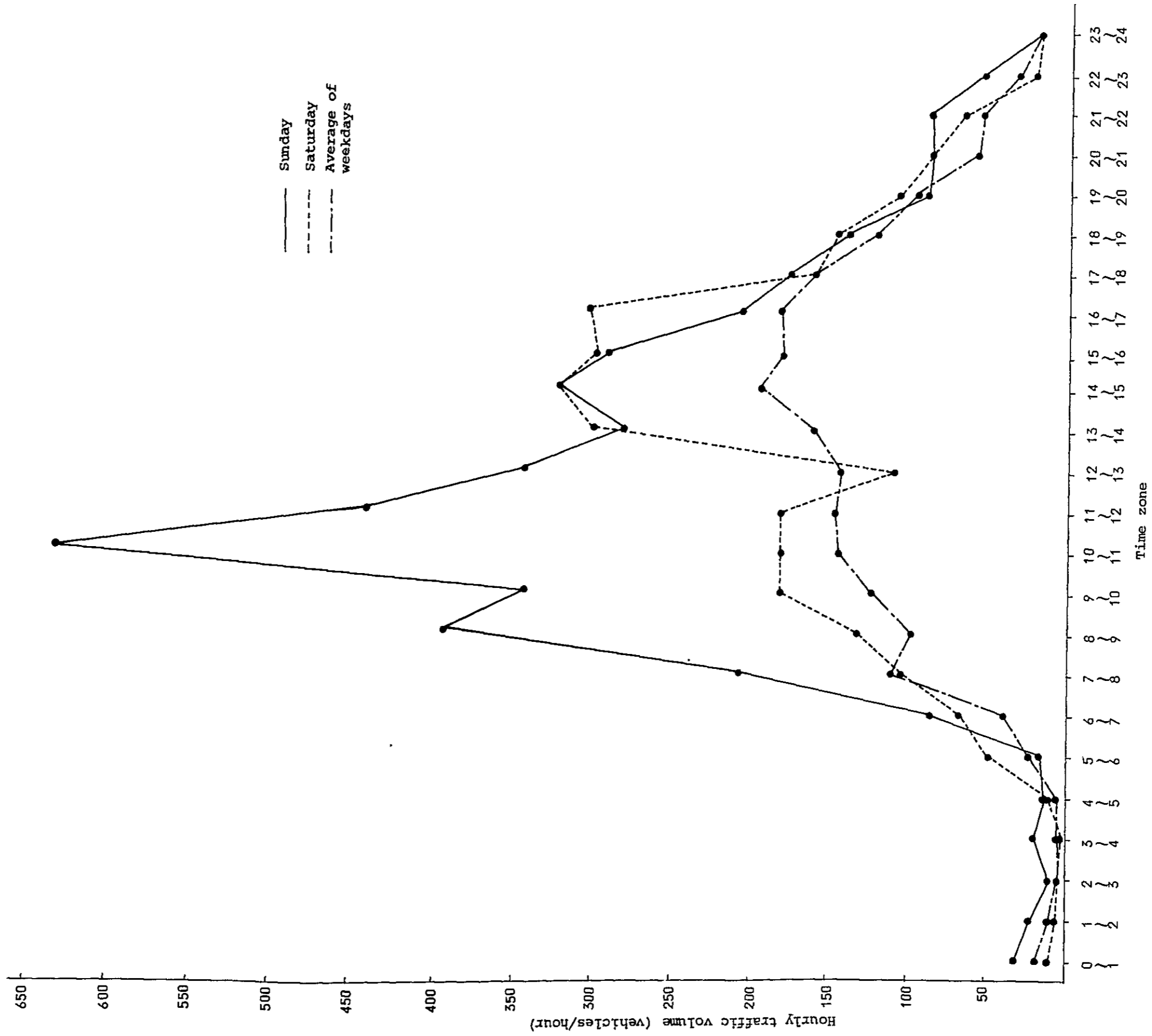


Fig. 3-7 Hourly traffic volume (toward Cibinong)



(2) Diversion ratio (utilization rate) and travel time

1) Traffic volume of the existing road

The traffic volume between Jakarta and Cibinong in Jakarta-Cibinong-Bogor (Jakarta-Bogor Bypass) as the existing road for Jagorawi Toll Road are as shown in Table 3-7.

Table 3-7 Traffic volume between Jakarta and Cibinong (existing road) (vehicles/day)

Year Vehicle type	1974	1975	1976	1977
Passenger car	9,577	11,375	11,271	10,859
Bus	2,464	1,777	1,685	1,859
Truck	6,090	6,900	7,018	6,249
Total	18,131	20,052	19,974	18,967

Though the details as to the date and time of counting are not known, the traffic volume show no marked fluctuations these few years, and the present traffic volumes in 1978 are estimated to be almost the same.

2) Traffic volume and diversion rate (utilization rate) of Jagorawi Toll Road

The traffic volume of Jagorawi toll road are counted at Taman Mini Toll Gate, and according to the counting, the volume as of May, 1978 are, as mentioned above,

small sized motor vehicles 3,649 vehicles/day

large sized motor vehicles 377 vehicles/day

Therefore, the diversion rate (utilization rate) are 33.6% for small sized motor vehicles (regarded as passenger cars), and 4.6% for large sized motor vehicles (buses and trucks).

3) Shortening of running time

As a result of the running investigation of three times by the Survey Team, the running time from the starting point (the interchange of Jakarta-Bogor Bypass and Jagorawi toll road) to Cibinong central area was as follows.

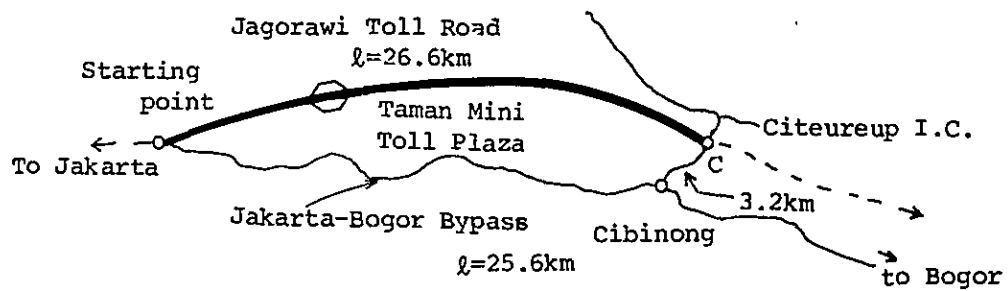


Fig. 3-8 Jagorawi toll road and existing road.

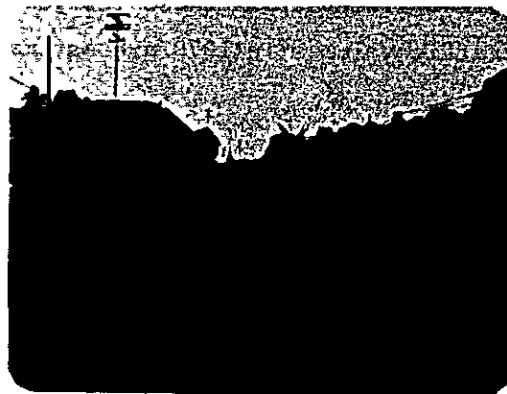


Photo 12 Intersection with the access road at Cibinong of Jakarta-Bogor Bypass

① Length

Through Jagorawi Toll Road (A-C-B)

.... 29,8km (toll road 26.6km, access road 3.2km)

Through Jakarta-Bogor Bypass (A-B) ... 25.6km

② Required running time

a. Jagorawi Toll Road (A-C)

Passenger car ... 16 minutes (100km/hr)

Truck 23 minutes (70km/hr)

b. Jakarta-Bogor Bypass (A-B)

Passenger car 40 minutes (38km/hr)

Truck 40 minutes (38km/hr)

c. Cibinong to Citeureup Interchange (B-C)

Passenger car 6 minutes (32km/hr)

Truck 6 minutes (32km/hr)

③ Time difference (shortened time)

Passenger car $40 - (16 + 6) = 18$ minutes

Truck $40 - (23 + 6) = 11$ minutes

In the case of Japanese toll roads managed by Japan Highway Public Corporation, the diversion rate (utilization rate) of passenger cars and trucks on ordinary road (bypass toll roads) near large cities are about 40 to 60%, and compared with these figures, the diversion rate of trucks in Jagorawi Toll Road is very small.

From (1) and (2), it is surmised that Jagorawi Toll Road is not used as an industrial road yet, but is used for the purposes of business, commutation, sight seeing, etc. With regard to this matter, origin-destination study should be conducted.

Traffic volume is the most fundamental data used in all the phases from road planning to operation and management such as deciding the scale of road and incidental facilities, reviewing the initial plan, deciding the timing of stage construction, checking tolls collected, and deciding the grade of maintenance and repairs. Therefore, traffic volume data of Jagorawi Toll Road must be obtained continuously also in future, by day, by vehicle type (small sized vehicle, large sized vehicle, trailer, etc), by direction, etc. In addition, traffic volume by time had better be counted periodically.

(3) Accidents and troubles

The accidents and troubles for the two months after the opening of Jagorawi Toll Road are as shown in Tables 3-8 and 3-9.

Table 3-8 Traffic accidents

Period	Number of vehicles caused accidents	Casualties			Cause
		Lightly injured	Seriously injured	Dead	
March 9 to March 31	2	-	-	-	Puncture
April 1 to April 27	8	2	1	2	People rushing out and puncture
Total	10	2	1	2	

Table 3-9 Troubles and running out of gasoline

Period	Number of vehicles in trouble			Number of vehicles running out of gasoline
	<2.5 ton	≥2.5 ton	Total	
March 9 to March 31	54	5	59	12
April 1 to April 27	125	17	142	29
Total	179	22	201	41

Vehicle troubles were caused by unsatisfactory fixing of vehicles and the following are main causes.

- Radiator water exhaustion
- Fan belt breaking
- Oil shortage
- Insufficient air pressure of tires

These causes occurred since users were unfamiliar with high speed driving. Since the opening to traffic, leaflets (see Photo 13) as directions for driving have been distributed at Taman Mini Toll Gate, informing how to fix vehicles, how to pass another motorcar ahead correctly, etc. Also in future, information should be given by various means such as radio broadcasting and signboards.



Photo 13 Publicity leaflet regarding driving manners

1. Keep left.
2. Pass another motorcar ahead on the right lane.
3. Give a signal, when you are going to cross a line.
4. The opening for U-turn can be used only by patrol cars.
5. No U-turn.
6. Only vehicles in trouble can park or stop on shoulders.
7. Drive your car at less than 120km/hr.
8. Caution ! Many accidents by tire puncture.
9. Check your car (tires, brakes, gaoline, etc).

3-2. Outline of P. T. Jasa Marga

3-2-1. Significance of P. T. Jasa Marga

Jasa Marga has a meaning of "Regional Service" in Indonesian (Jasa = service, Marga = region), being a name to directly express the mind of the governmental authorities concerned to outside, that this company has been established to pursue toll system for the purpose of regional services.

This name is surmised to have been given in close relation with the supervisory office, Bina Marga (meaning "Regional Construction" in Indonesian).

P. T. is an abbreviation with the meaning of "limited liability corporation" in Indonesian, meaning that Jasa Marga is not Public Corporation but a limited liability corporation legally. Therefore, the organization is called Indonesian Highway Corporation (I.H.C.) in English. However, Jasa Marga was established based on the respective laws concerning the purpose, business contents, financing, etc prepared by the government, and in light of background of the establishment, it can be said to be a complete Highway Public Corporation in Indonesia from a view point of its character.

3-2-2. Organization and scope of business of P. T. Jasa Marga

The organization, scope of business operation, etc of P. T. Jasa Marga are described in detail in "Notarial Act No. 1" (March 1, 1978) as the articles of the corporation certified by a notary public based on the Trade Law of the Republic of Indonesia. The outline is as follows:

- ° Name and location
P.T. Jasa Marga, Jakarta
- ° Term of existence
75 years

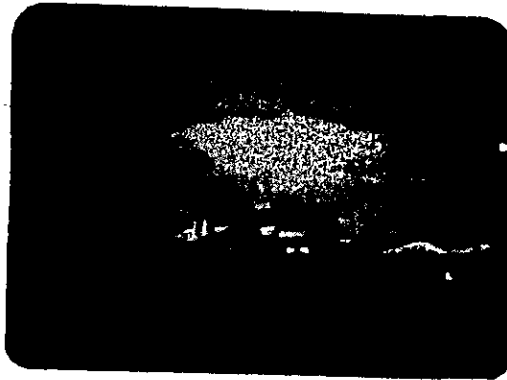


Photo 14 Office of Jasa Marga

° Objective

To supply, manage and operate the road networks for recovering the role of roads as toll roads, by effective utilization of private funds without resorting to the governmental aid, in the areas where road function drops due to the increase of traffic volume.

° Scope of business

- ① Operation, maintenance and supply of toll roads
- ② Toll collection and other activities suitable for the objective of the company

As for the other various activities of ②, they include appurtenant business, and for future, the operations of restaurants, filling stations, etc seem to be considered. But no concrete conceptions as to the kinds of business, styles of operations, etc are yet clarified.

° Capital

The final capital is scheduled to be 10,000 million rupiah, with one thousand 10 million rupiah shares. At present, 200 preference shares are held by the government, and the present capital is 2,000 million rupiah. The remaining shares are decided to be issued as necessary, but since the preference shareholder has priority to buy shares, it can be said to be a national enterprise placed under the control of the government also in future.

° Management

Jasa Marga is to be controlled and operated by Managing Board consisting of one president and maximum four directors, under the supervision of Board of Directors consisting of three councilors. The councilors are appointed and released by the general meeting of shareholders, but at present, the following are appointed temporarily.

Chief councilor: Mr. Poernomosidi Hadjisarosa, Minister
of Public Works

Councilor: Mr. Sumpono Bayuaji, Director General of Land
Communication, Ministry of communications

The Board of Directors supervises the activities of the Managing Board, and when necessary, can inspect the management situations, having the authority to suspend any director from duty, when the director has made improper activities.

The Managing Board represents the company legally and in the other matters than those stipulated by law, and clarifies the policy, having the authority to execute operational activities as the representative of the company under the approval of the Board of Directors and the meetings of preference shareholders. Directors are appointed and released by the general meeting of shareholders, but at present, the following are appointed temporarily:

President: Mr. Joewno Kolopaking

Director: Mr. Isbandi

The Managing Board are assisted by the following members.

Managers of division

Chiefs of sub division, Chiefs of section

Chiefs of respective routes of the toll road system

The above can be shown by the following organization chart.

Fig. 3-9 Organization chart of P. T
Jasa Marga

