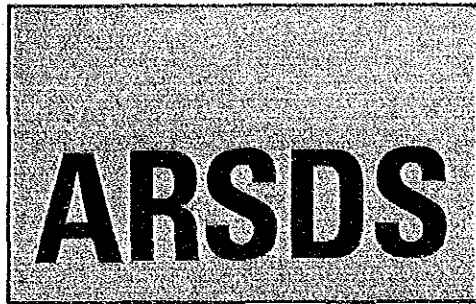


E NETWORK PLANNING
 E.1 METHODOLOGY OF METROPOLITAN ROAD AND STREET NETWORK PLANNING



The ARSDS did not conduct a simple traffic demand oriented network planning, but an urban development oriented network planning. Since the urban structure of the Jakarta Metropolitan Area needs to be changed in the future as previously described, the most important aspect of arterial road and street planning in this case is "how to induce the preferred urban development".

The recommended transportation network was checked by the future traffic demand for the initial network development and for the final network development.

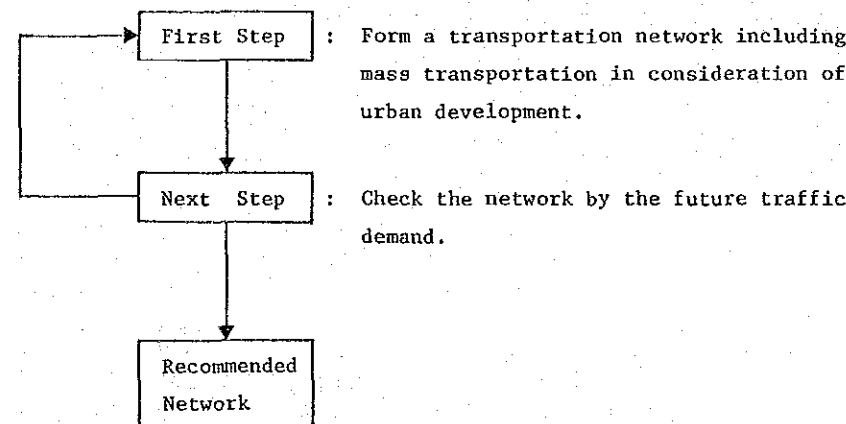
METHODOLOGY OF METROPOLITAN ROAD AND STREET NETWORK PLANNING

Generally, five criteria are used to form arterial road and street network; namely, to:

- minimize congestion;
- satisfy trip desires;
- facilitate access to land;
- provide system continuity; and,
- optimize facility spacing.

Arterial roads and streets are one of the major elements of urban structure. Since the urban structure of the Jakarta Metropolitan Area needs to be changed in the future, the most important aspect of arterial road and street planning in this case is "how to induce the preferred urban development".

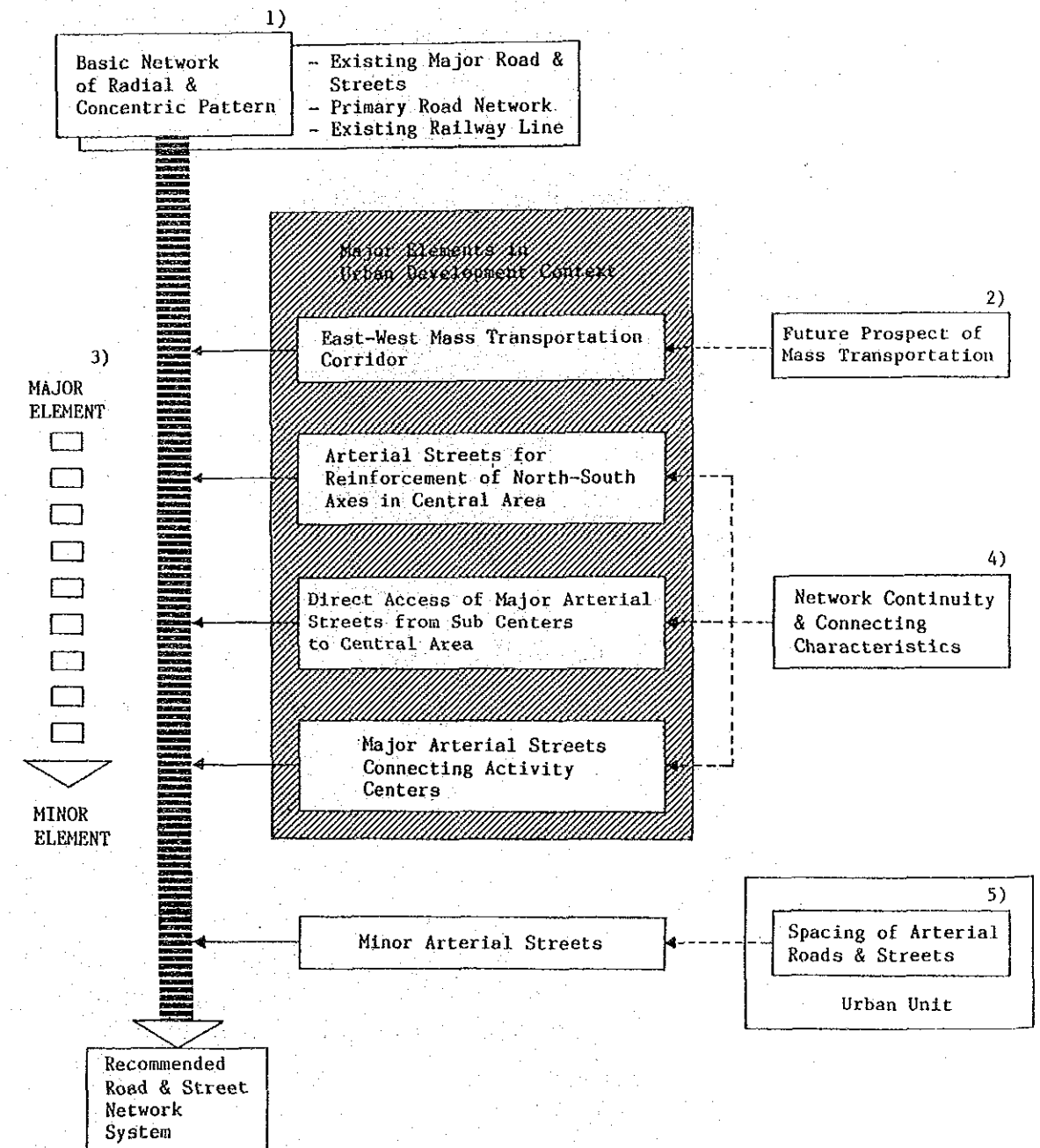
Therefore, in this study the following procedure was adopted to establish the recommended road and street network:



In the first step, the following principles were used in the procedure of forming the network:

- 1) Preserve basic features such as the radial and circumferential pattern of the existing road and street network
- 2) Decide on the location of medium/mass transportation required for the future urban development
- 3) First decide on the location of major elements of the road and street network and then decide on those of the minor elements
- 4) Attach importance to straight continuity and the connecting characteristics from a traffic engineering point of view, so as to achieve high speed movement
- 5) Decide on the location of minor arterial streets according to the guideline of spacing based on the urban unit

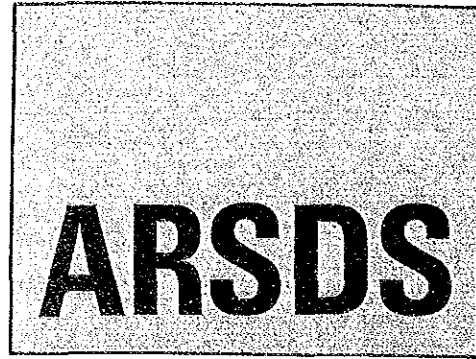
The flow chart shown in Fig. 18 shows the relationship between key elements of the network and the principles described above and the order of deciding on the network location.



Note : Number with parentheses denote principles for forming the network

Fig. 18 PROCEDURE OF FORMING THE ROAD AND STREET NETWORK

E.2 FUTURE PROSPECT OF RAIL TRANSPORTATION



The major role of public transportation is expected to be established. Therefore, mass transportation should be developed in parallel with arterial road and street development. In the DKI Structure Plan, the modernized existing railway system and the conventional bus system are considered to function as a public transportation system in 2005.

Feeder services and provision of station plaza and access roads are indispensable to realize the full function of railways.

Because the potential of improving the existing facilities and systems is limited in coverage and passenger transport capacity, the railway network system should be integrated with other new additional mass transport modes.

REVIEW OF THE REHABILITATION AND MODERNIZATION PROGRAM OF THE EXISTING RAILWAY FACILITIES AND SYSTEM

Even when the on-going rehabilitation and the expected modernization programs are completed, the existing railway lines will not have enough geographical coverage over the major development areas in the Jakarta Metropolitan Area as shown in Fig. 19.

The railway lines will have to carry the following four kinds of trains which use facilities in different ways. This implies that the carrying capacity of commuter trains will be limited by this mixed operation.

- Long distance train
- Medium distance train
- Cargo train
- Commuter train

Since the existing railway facilities were constructed for regional and goods transportation and not for urban and suburban railway services, the urban structure has been established independently of the railway alignment. Therefore the on-going rehabilitation program of the existing railway facilities alone cannot induce enough demand to fill the capacity supplied by the investment without changing landuse along the railway line.

The cost of implementing the rehabilitation and modernization program is huge compared to the benefits of its expected role. This huge cost is one of the reasons for the delay in implementation of the program.

In consideration of above aspects, the railway system improved by the on-going rehabilitation and the expected modernization program is considered to play a full role in the distant future at least beyond the next twenty years. Because the potential of improving the existing facilities and systems are limited in coverage and passenger transportation capacity, the railway network system should be integrated with other new additional mass transportation modes.

ADDITIONAL MEDIUM/MASS TRANSPORTATION REQUIRED

As shown in Fig. 19, there are many areas which are not covered by the improved railway system in the major development areas of the Jakarta Metropolitan Area. These areas will need additional medium/mass transportation.

Moreover, the transportation capacity of the Bekasi Line for commuters will be limited by the mixed operation of long/middle distance trains, cargo trains and commuter trains. The Tangerang Line does not have a large enough hinterland to attract enough passengers to cover the minimum transportation capacity provided by the improvement. Therefore, the areas near the Bekasi and Tangerang Lines will also need additional medium/mass transportation facilities.

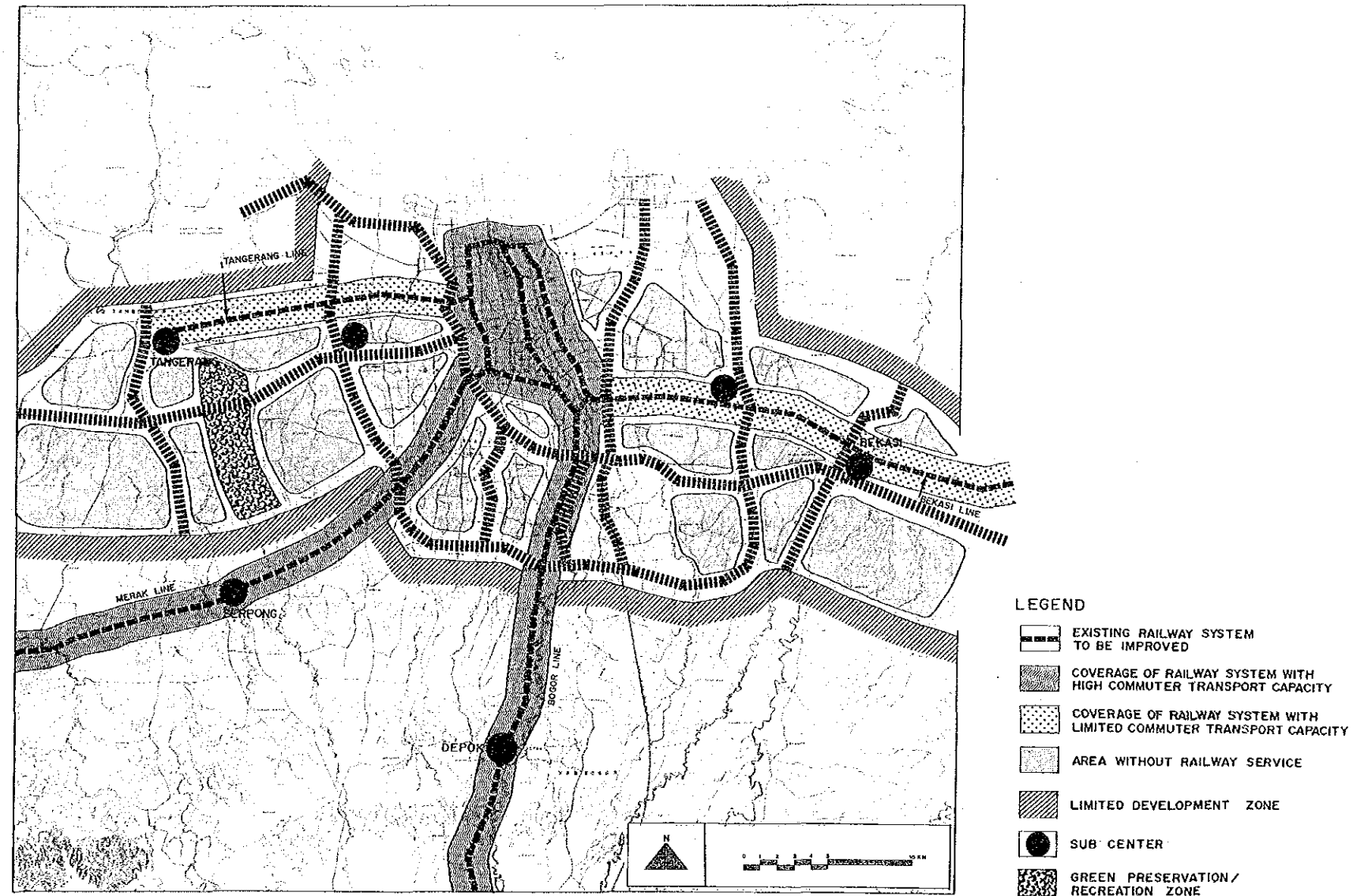
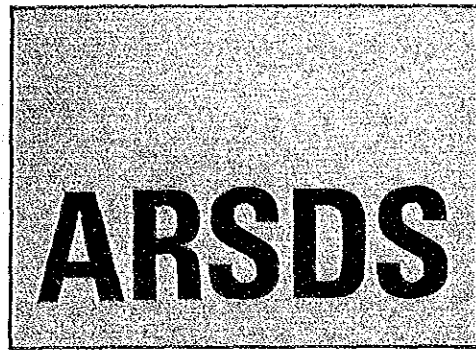


Fig. 19 COVERAGE OF THE EXISTING RAILWAY SYSTEM



The future quantitative prospects of the urban structure is important for the network and scale planning of transportation facilities.

The growth of the socio-economic framework and the change of urban structure reflects significant change of traffic demand. Future traffic demand is forecast as a material of transportation network and facility planning.

It is found that medium/mass transportation is indispensable in the east-west direction to meet the future traffic demand.

OBJECTIVE AND METHODOLOGY

Future prospects concerning urban structure and traffic demand were clarified quantitatively in the two following steps at the regional and urban level.

In the first stage, the regional development pattern was understood by the socio-economic framework in the case that the regional development will be conducted according to the regional development scenario. At the same time regional-wide person trip movement was analyzed.

In the second stage, the urban structure developed according to the selected urban development strategy was studied through the zonal planning parameters, such as the distribution of population and jobs. At the same time the future traffic demand in the urban area based on the selected urban structure was forecasted. The proposed future transportation system was analyzed in quantitatively by this estimated future traffic demand.

The traffic demand forecast was carried out by the conventional 4-staged sequential method as shown in Fig. 20. The traffic demand model for estimating the future demand was obtained by analyzing the mechanism of the existing demand. The data for this analysis was mainly obtained from the ARSDS Person Trip Survey executed in 1985.

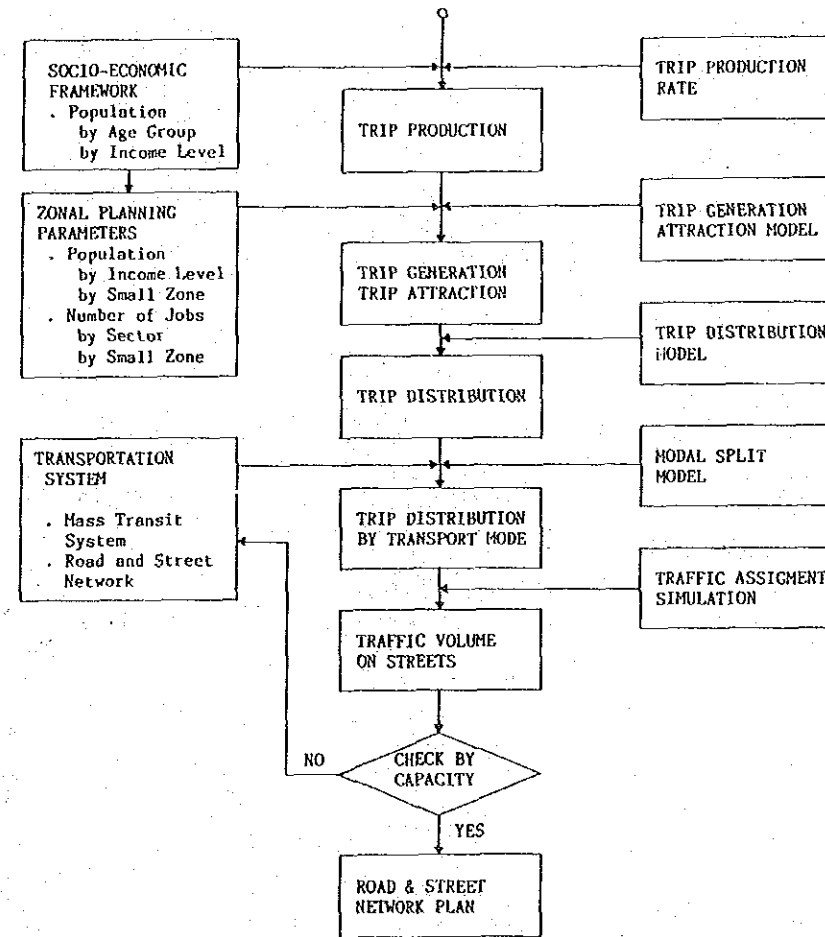


Fig. 20 FLOW CHART FOR FORECASTING OF FUTURE TRAFFIC DEMAND

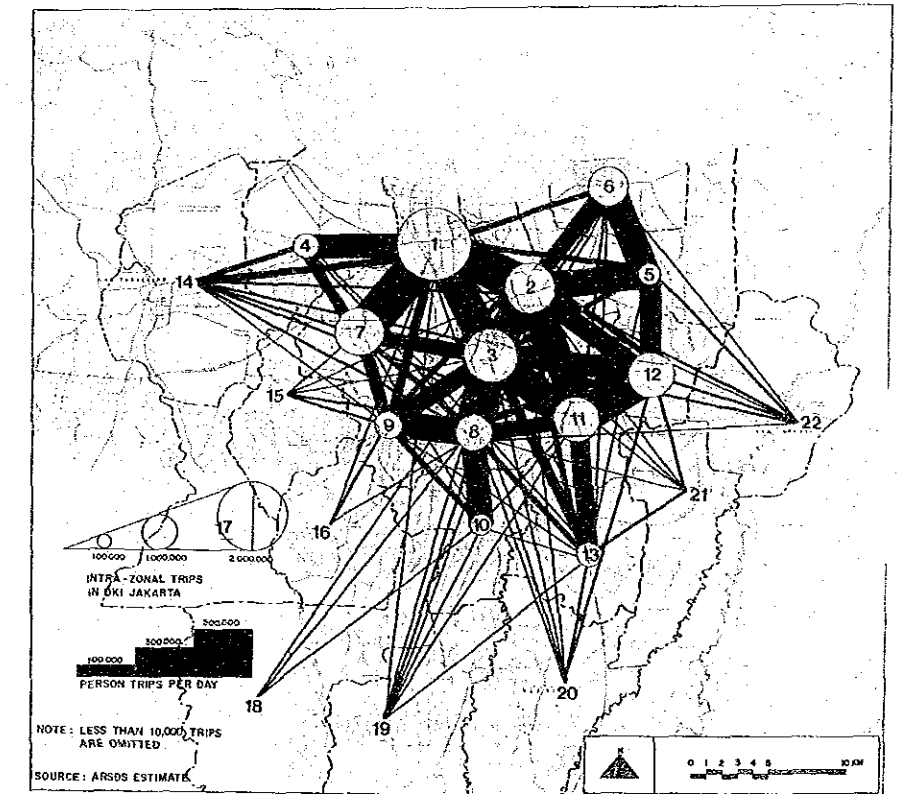


Fig. 21 PERSON TRIP FLOWS IN JAKARTA METROPOLITAN AREA, 2005

ARSDS

A large scale transportation infrastructure is required to establish the east-west development axis, which would induce the east and west development of housing and activity centers. The transport system should have a high speed service which is relatively competitive to existing transportation. In consideration of transport efficiency,

energy consumption and air pollution, the transportation to establish the east-west development axis should be a medium/mass transportation system, which usually forms a corridor. The location of the east-west medium/mass transportation corridor is recommended as shown in Fig. 22.

EXPECTED ROLES OF EAST-WEST DEVELOPMENT AXIS

By directly connecting the Central Area to the suburban areas with the Multi Corridor System, the following results are expected:

- The central commercial and business functions will have opportunities to expand their hinterlands, increase their accumulation and up-grade their functions
- An enormous amount of land in the suburban area will have opportunities to be supplied for urban use. Urban work places will be able to be created through activity center development in the suburban areas
- The land prices within the Outer Ring Road will be reduced and efficient land use will be formed. Consequently, uncontrolled urban sprawl will be stopped

Moreover, by connecting the Central Area to the East and West Centers, the following can be also expected:

- The East and West Centers will have incentives to be the location for high level functions, because business trips between centers can be warranted by public transportation
- The commuter traffic pattern will proportionately change to the east-west direction from the present north-south direction

CRITERIA FOR FORMATION OF THE EAST-WEST DEVELOPMENT AXIS

Having considered the expected roles of the axis above, the following criteria were adopted for deciding the location and function of the East-West Development Axis:

- To restrict continuous urbanization from Jakarta to the Jakarta Metropolitan boundaries
- To encourage housing development in the suburban areas
- To foster Sub Centers
- To promote utilization of east-west medium/mass transportation

REQUIRED TRANSPORTATION FOR THE EAST-WEST DEVELOPMENT AXIS

In the growing areas, such as the eastern and western suburban areas, provision of arterial streets is essential for guiding urban growth. The Multi Corridor System of arterial streets, including direct access to the Central Area, is advantageous to foster activity centers and to encourage efficient land use in the suburban areas, and this Multi Corridor System is required to install medium/mass transportation in the east-west direction. In this sense, the Circuit Medium/Mass Transportation Corridor in the Multi Corridor System is recommended.

In consideration of the development potentials, conditions and criteria, the location as shown in Fig. 22 is recommended for the Circuit Medium/Mass Transportation Corridor. The alternative locations are shown in Fig. 23.

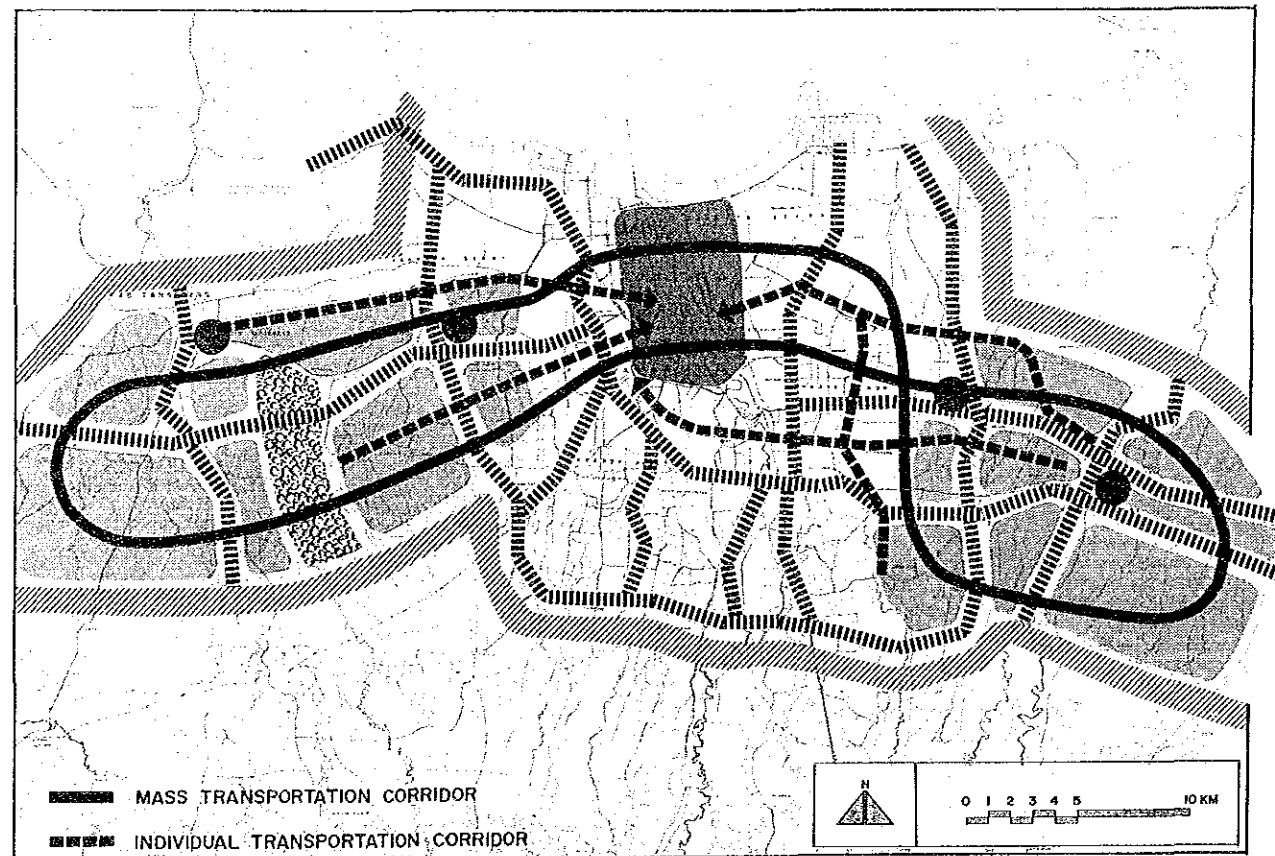


Fig. 22 RECOMMENDED LOCATION OF CIRCUIT MASS TRANSPORTATION CORRIDOR

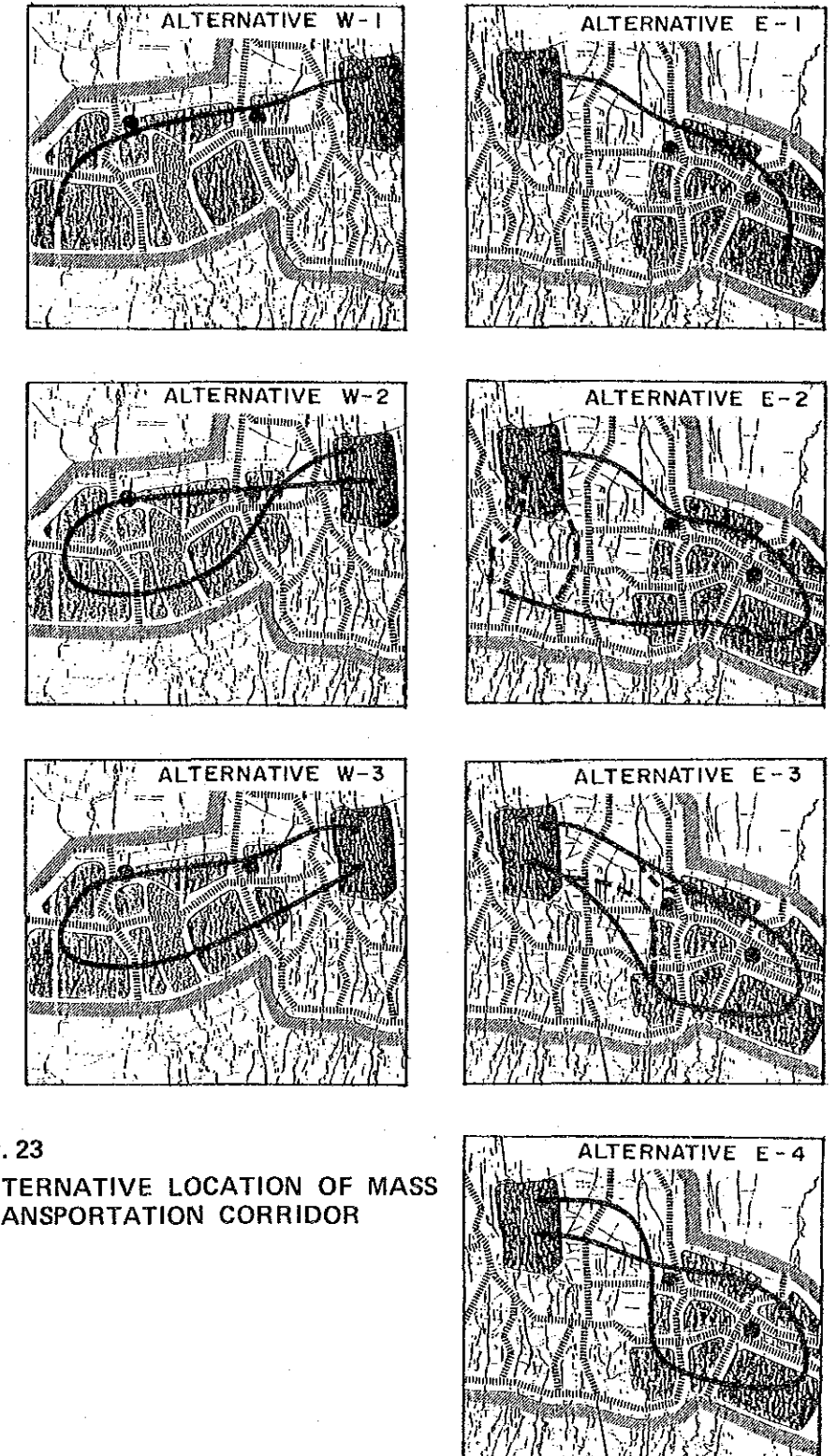
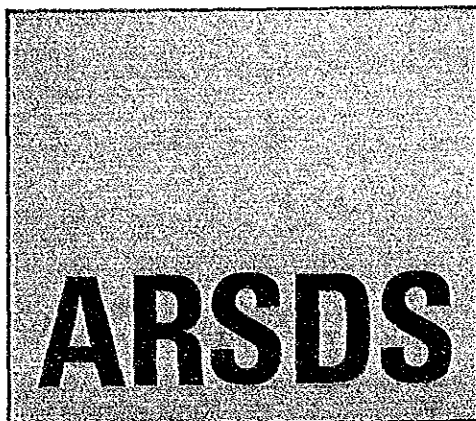


Fig. 23 ALTERNATIVE LOCATION OF MASS TRANSPORTATION CORRIDOR



The medium/mass transportation corridor promotes urbanization in the suburban areas by providing a wide arterial street. The Medium/Mass Transportation Corridor at the initial stage is recommended to have a joint right-of-way of busway and arterial streets. The right-of-way of the busway is designed to be convertible into a guideway system with a higher capacity and a higher speed according to the traffic demand.

The planned busway has a considerably large hauling capacity. To satisfy the capacity the supporting feeder system by small buses, etc. and street facilities should be provided so as to realize smooth delivery of passengers to the busway.

MEDIUM/MASS TRANSPORTATION CORRIDOR

Development of the Medium/Mass Transportation Corridors can avoid the following two basic difficulties with Rail transit on a separated right-of-ways. First, the minimum capacity of any type of rail transportation system is very large while costs of construction is inevitably high. Secondly, the difficulty is that rail transportation systems are constrained in the sense that once a route has been developed, it is fixed in location and in the type of traffic. The capital costs for Medium/Mass Transportation Corridors with busways, or all day reserved bus lanes, are much less than those for heavy railway or light railway systems. Bus transportation using the Mass Transportation Corridors has flexibility of operations, while railway or other fixed guideway systems do not.

The rapid line-haul bus service with high-volume public transportation capacity provided by the Medium/Mass Transportation Corridors with busways, or all day reserved bus lanes, is essential to attract higher income passengers and to reduce private automobile use. In the east and west development zones, the Multi Corridor System and the Medium/Mass Transportation Corridors with busways can be expected to induce development of activity centers and residential areas in a multi nucleus pattern along the two corridors to attract not only medium and lower income families, but also higher income families.

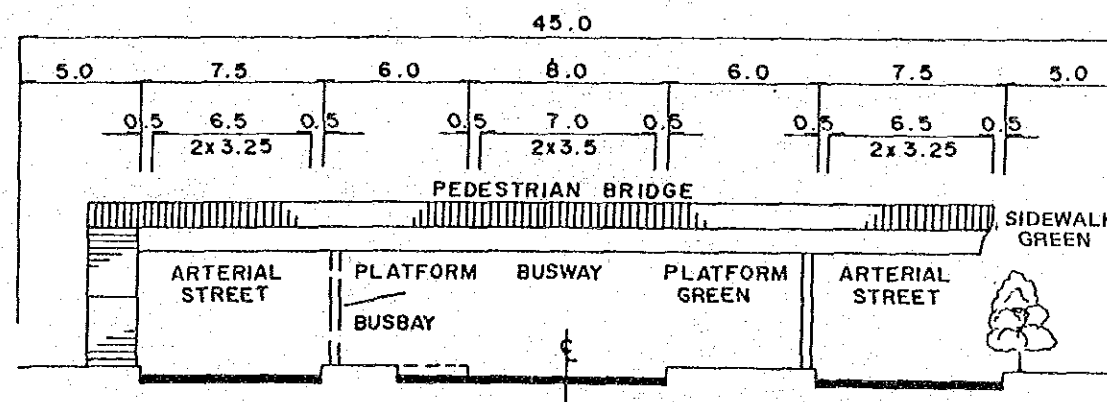
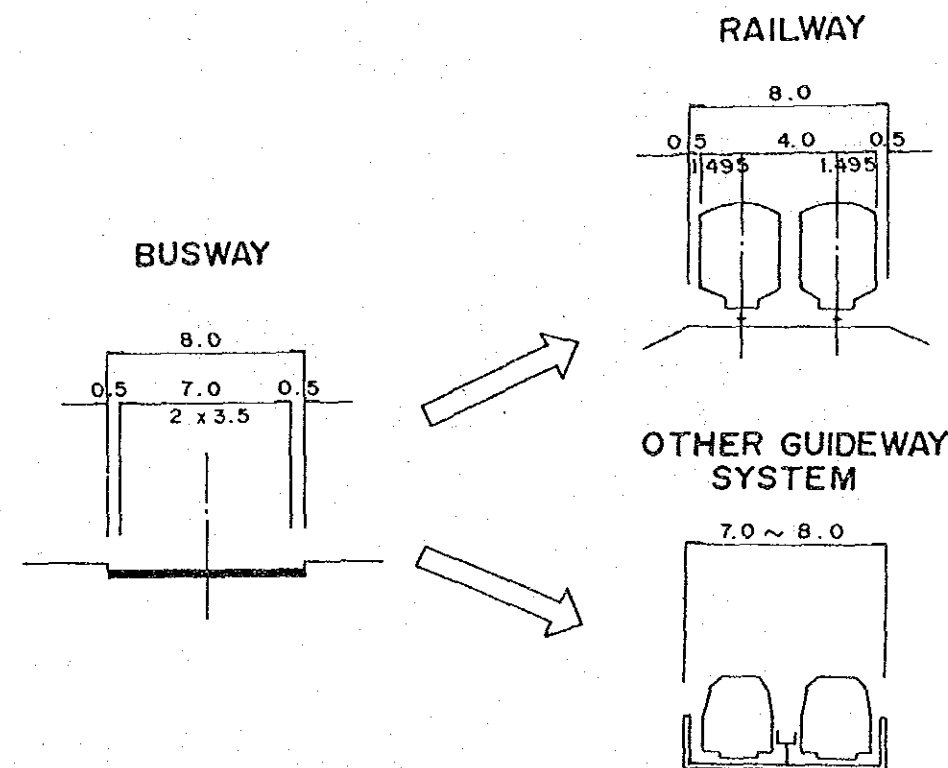
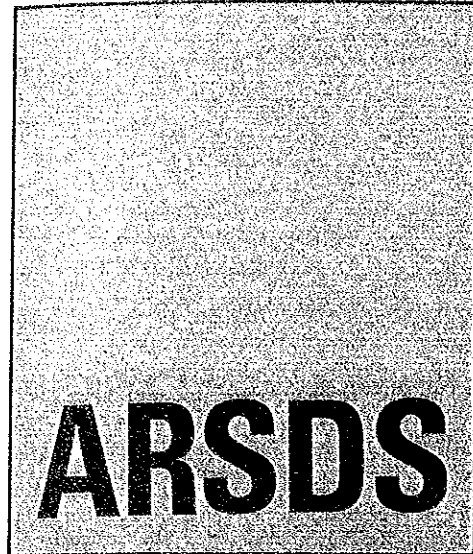


Fig. 24 CIRCUIT MASS TRANSPORTATION CORRIDOR



The major urban development policies are as follows:

- Decentralize the functions of the Central Area to suburban activity centers
- Encourage commerce and business activities to locate around the stations of the loopline railway line in a concentrated form, but not in a scattered form, by redeveloping the areas around the railway stations

These urban development policies should be supported by the following transportation development:

- Provision of east-west transportation to the suburban activity centers from the Central Area
- Loopline operation of railway and provision of station plazas
- New parking policy to be introduced in the central area
- Improvement of bus system on the provision of station plazas and their access roads

RECOMMENDED URBAN DEVELOPMENT POLICY IN THE CENTRAL AREA

The coexistence of both individual and medium/mass transportation is given first attention, and the recommendation on the urban development policy to achieve maximum utilization of medium/mass transportation is as follows:

- 1) Decentralize the existing functions of the Central Area to suburban activity centers:
 - By establishing direct access from the suburban areas to the Central Area through corridors with medium/mass transportation modes (Medium/Mass Transportation Corridor)
 - By providing arterial streets with straight continuity of traffic, not only in the north-south direction, but also in the east-west direction, to ensure mobility of trips to and from the direct access corridors described above

As the result of these transportation provisions, the hinterland of the commerce and business functions accumulated in the Central Area will be expanded and the Central Area may obtain a higher level of function.

- 2) Encourage commerce and business activities to locate around the stations of the loop railway line in a concentrated form, but not in a scattered form:
 - By redeveloping the areas around the railway stations
 - By providing arterial streets to distribute feeder transport services for rail transportation services
 - To encourage intra-urban trips and urban-suburban trips to use the railway system that will be improved by the railway modernization program
- 3) Establish nuclei by activity center development where urban functions concentrate to:
 - Make it convenient for medium/mass transportation users to fulfill any purpose, such as business, shopping and other private matters, within walking distance.
- 4) Utilize the development potential of nuclei at points where the loop railway line intersects with the Medium/Mass Transportation Corridor recommended above.

ACTIVITY CENTER DEVELOPMENT AROUND RAILWAY STATIONS

In order to create enough railway passengers for the transportation capacity provided by the railway system modernization program, activity center development is inevitable around stations of the railway line, which is recommended to be operated in a loop shape. The following potential areas are designated as follow:

- 1) The following existing activity centers around stations of the loop railway line have potential for redevelopment:
 - Kota
 - Senen
 - Tanah Abang
 - Jatinegara
 - Manggarai
- 2) Potential activity center areas at intersections between the loop railway line and Circuit Medium/Mass Transportation Corridor are:
 - Kemayoran
 - Duri
 - Kramat
- 3) Potential activity center areas at intersections between the loop railway line and major arterial streets are:
 - Pisang Batu
 - Angke
 - Kemayoran
 - Petojo
 - Salemba
 - Karet

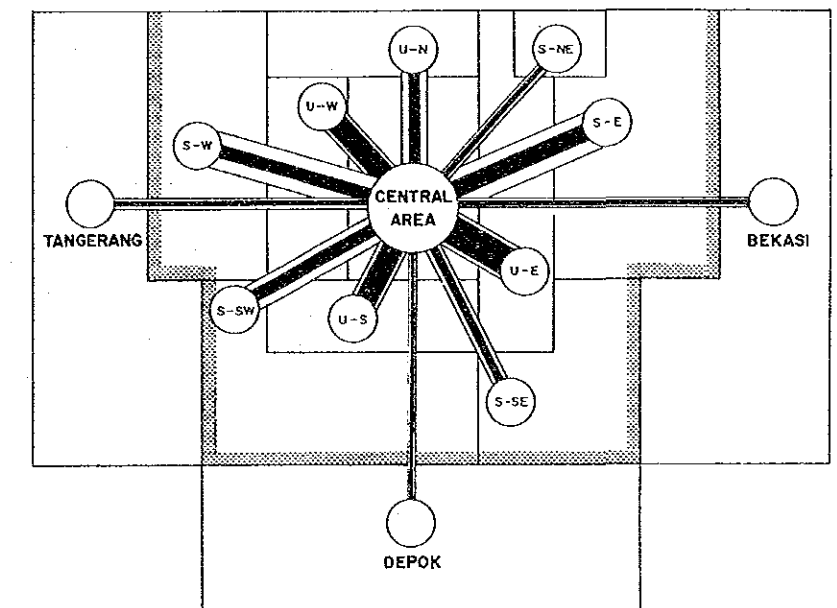


Fig.25 PERSON TRIP FLOWS FROM/TO THE CENTRAL AREA, 1985 & 2005

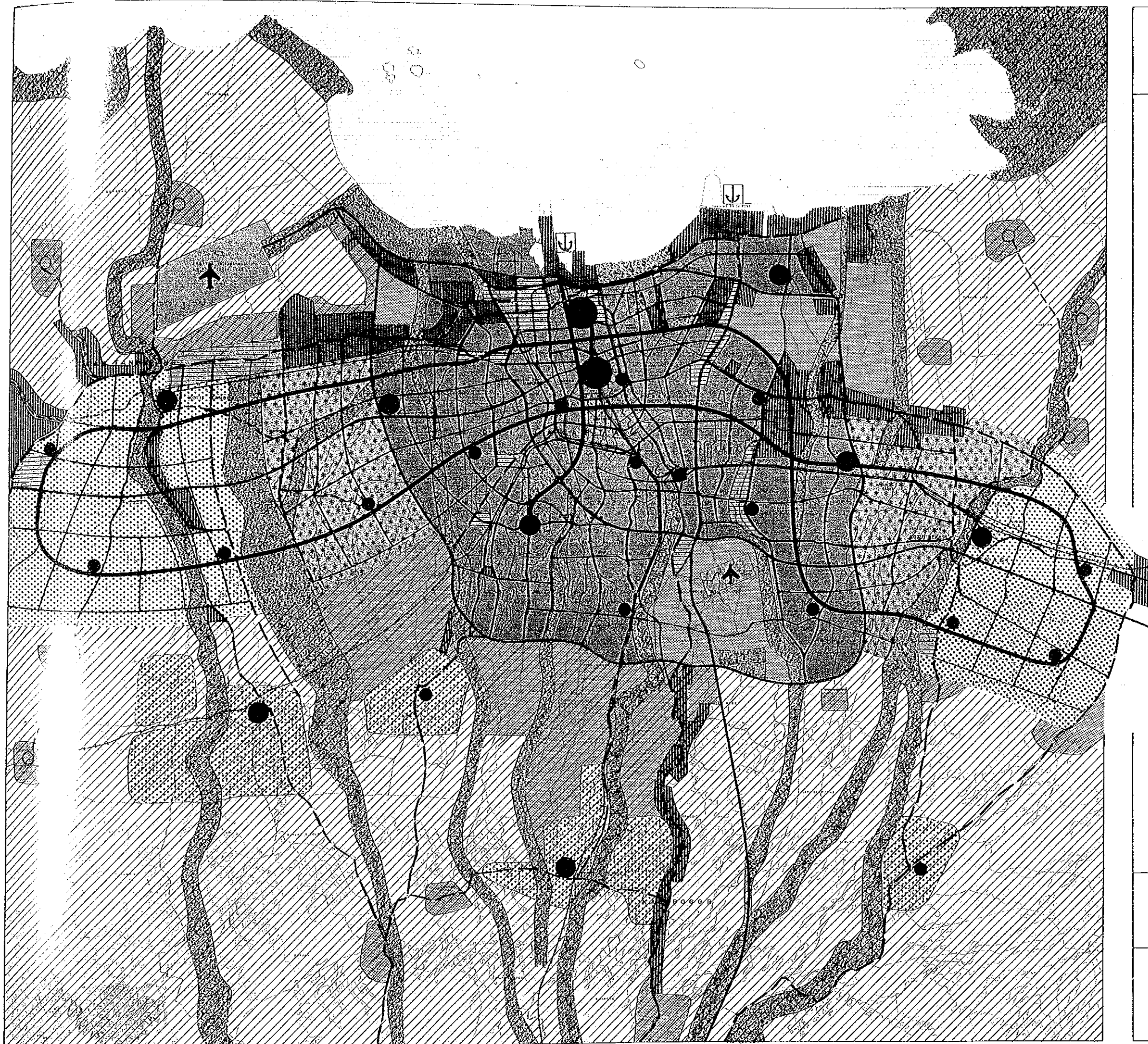





















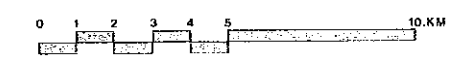
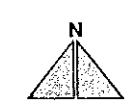


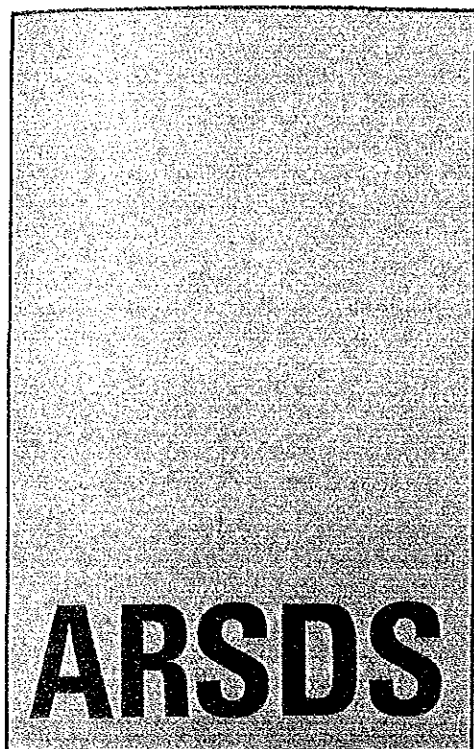
Fig. 26
**MAJOR LAND DEVELOPMENT AND
 TRANSPORTATION NETWORK**

LEGEND

-  Urbanized Area in Jakarta
-  Conurbation Area
-  Urban Development Area of Core City
-  Industry
-  Mixed Industry and Trade
-  Agriculture
-  Agriculture with Low Density Housing
-  Green Preservation / Recreation
-  Limited Development Area
-  Metropolitan Center
-  Sub Center
-  Secondary Center
-  Rural Center
-  Airport
-  Harbour
-  Medium/Mass Transportation Corridor
-  Freeways
-  Primary Roads
-  Secondary System Streets
-  Rural Roads
-  Railway



**ARTERIAL ROAD SYSTEM
 DEVELOPMENT STUDY
 IN JAKARTA METROPOLITAN AREA**



The facility scale of the proposed roads and streets should not only be decided by quantitative aspect such as the future traffic demand, but also by planning and functional aspects such as transportation policy/system, roadside landuse, multifunctions aspects (utilities, space, etc.), aesthetics, etc.

The proposed road/street facilities in 2005 are shown in Fig. 28 based on the traffic demand forecast (Fig. 29) and the typical street cross sections which are shown in Fig. 27.

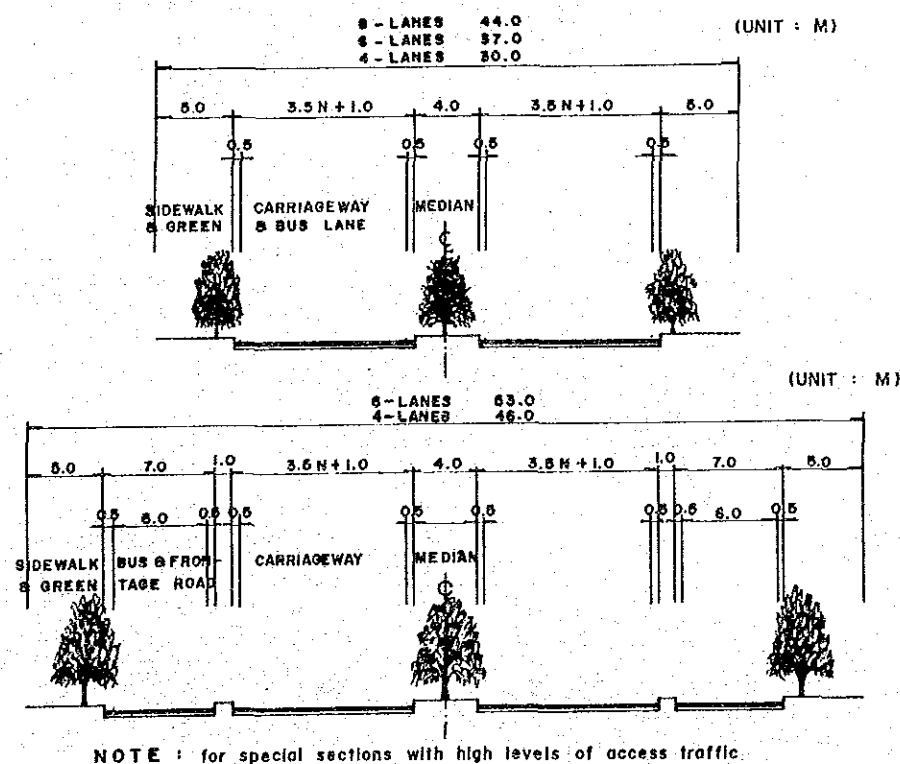
The team proposed the following policies especially on the planning of street facilities:

- A wide street of more than 8 lanes except medium/mass transportation corridors is not recommendable due to users (cars and pedestrian) inconvenience (access, crossing, lane crossing by car, etc.) and especially due to difficult land acquisition in the central area and center areas. Streets with fewer lanes are preferred.
- The street right-of-way is proposed to be a minimum of 6 lanes for major arterial streets and 4 lanes for minor arterial street due to their functional differences.

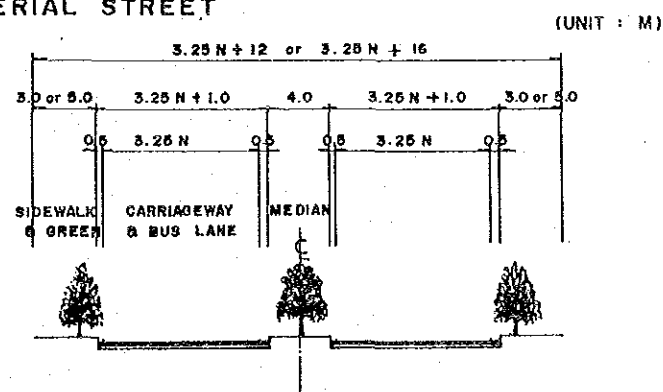
- A simple cross section without frontage roads is basically adopted for streets. The double cross section with frontage roads is for section of considerable access traffic such as in the central area and center areas.
- A wider sidewalk (more than 3 meters for minor arterial streets and 5m for major arterial streets) should be provided for walking environments, streets aesthetics, commuters in peak hours, shoppers in day time (especially in the central area and center areas) and space for utility, etc. Greenery of suitable size should be provided along carriageways as a buffer for sidewalks.
- Arterial streets should have flyovers for the crossings with railway, freeway and other arterial streets (with more than 4-lanes and heavy traffic demand). Interchanges should be provided for freeway crossings.
- Roadside parking should be prohibited on arterial roads and streets. This should be provided outside of arterial roads and streets and under the legal obligation of new builders.
- Arterial roads and streets should be planned in close cooperation with center development, station plaza, bus system, etc.

SECONDARY SYSTEM

MAJOR ARTERIAL STREET



MINOR ARTERIAL STREET



NOTE : N - Number of lanes (8, 6, 4 lanes)
Minimum Right-of-Way (m)







Area \ No. of Lanes	8	6	4
Central / Center Area	—	35.5	29.0
Suburban Area	38.0	31.5	25.0

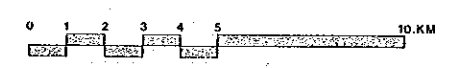
Fig. 27 TYPICAL CROSS SECTION OF SECONDARY SYSTEM.



Fig. 28
PROPOSED ROAD AND STREET PLAN IN 2005

LEGEND

-  10 LANES
-  8 LANES
-  6 LANES
-  4 LANES
-  2 LANES
-  MASS TRANSPORTATION CORRIDOR
4 + 2 or 6/8 + 2 LANES



**ARTERIAL ROAD SYSTEM
DEVELOPMENT STUDY
IN JAKARTA METROPOLITAN AREA**

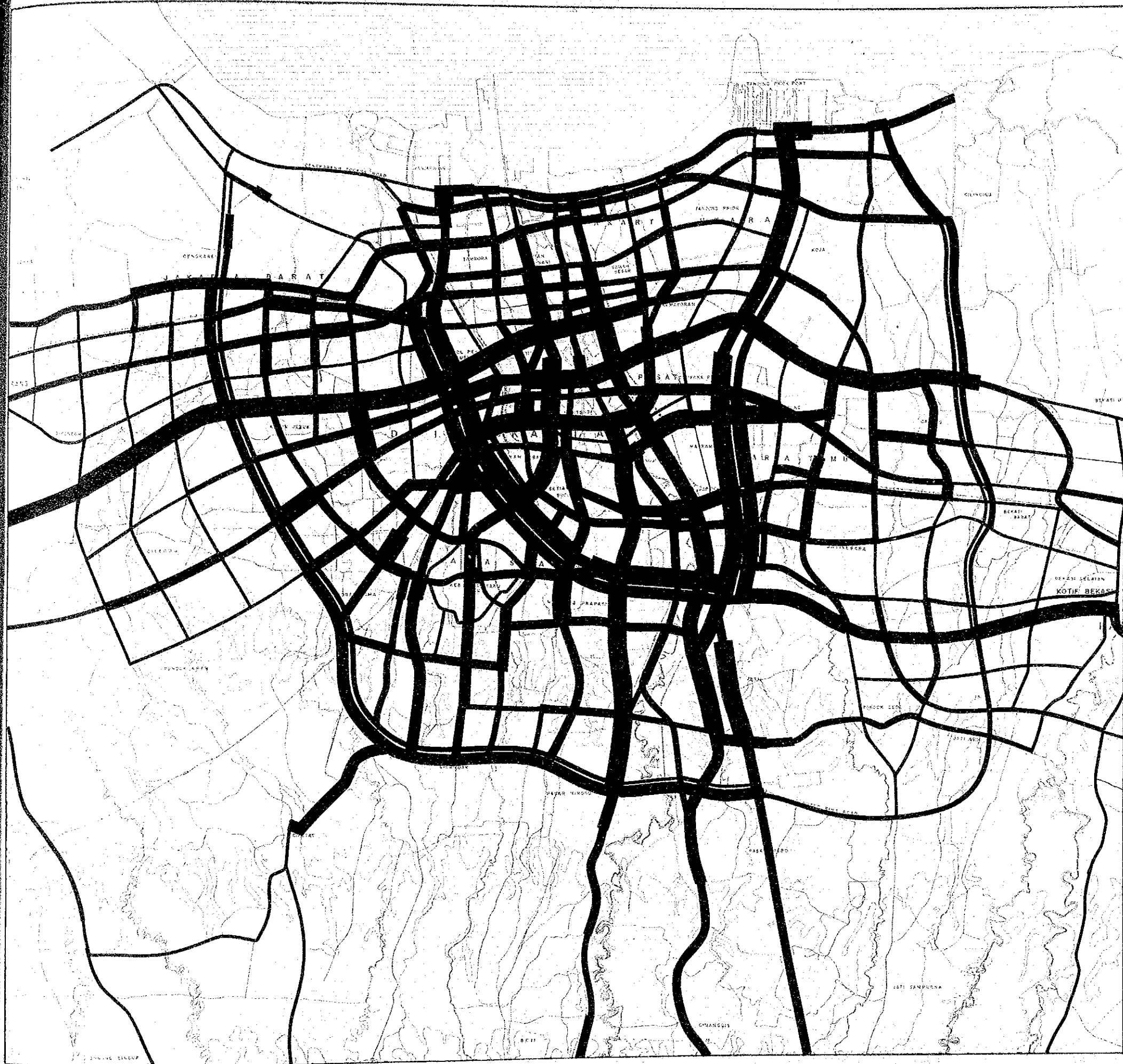
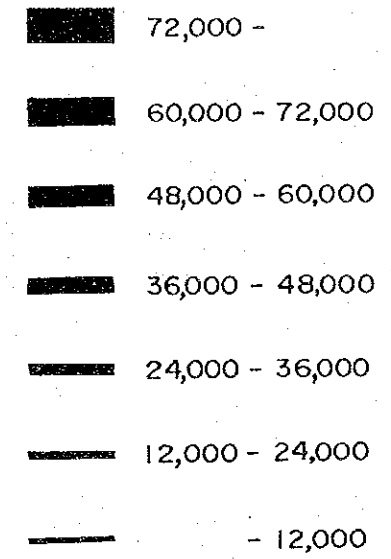
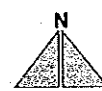


Fig. 29
MOTOR VEHICLE TRAFFIC ON THE
ROAD AND STREET NETWORK, 2005

LEGEND

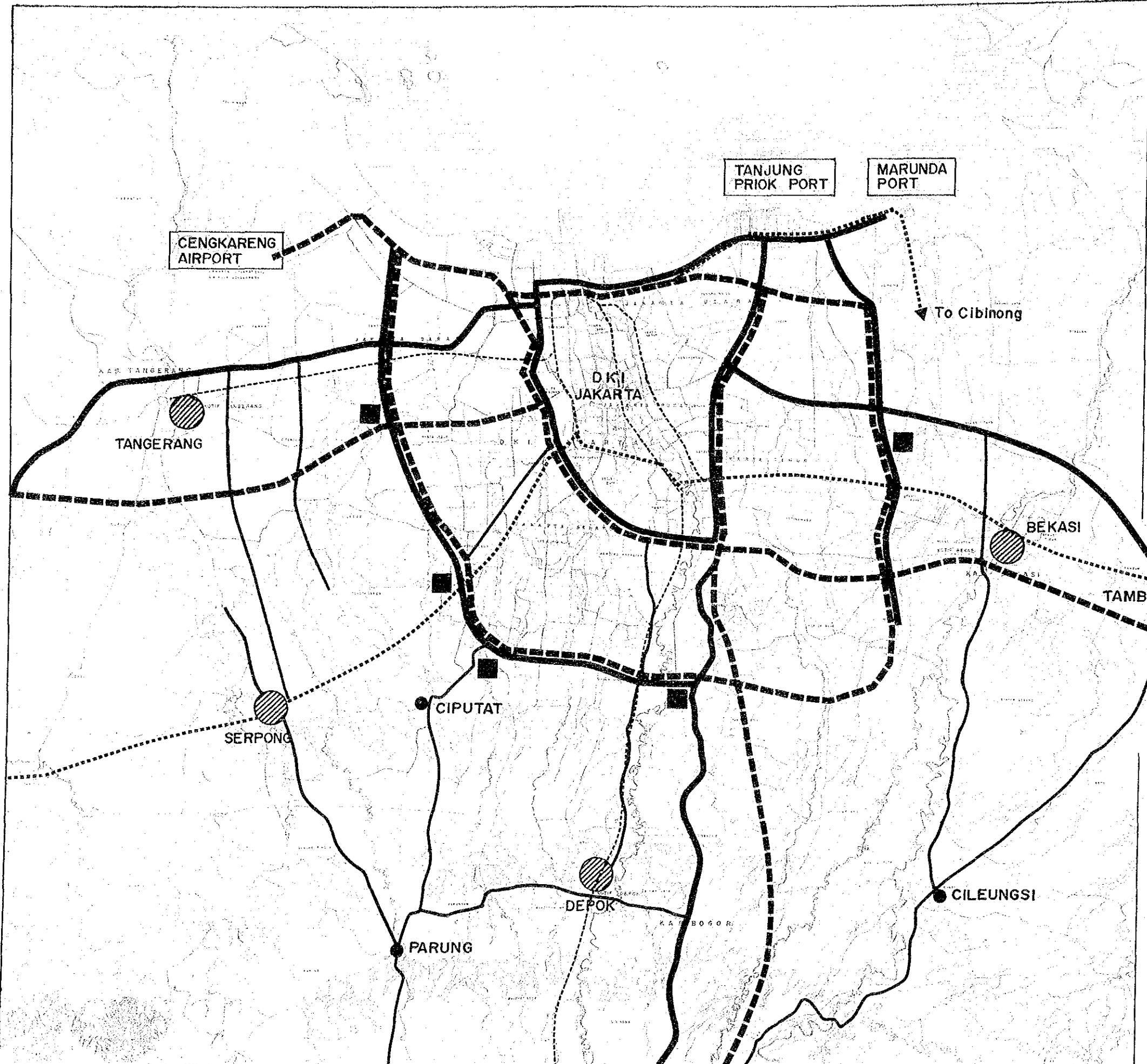


UNIT : PASSENGER CAR UNIT

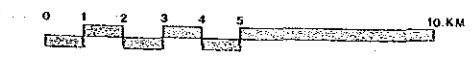
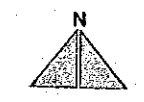


**ARTERIAL ROAD SYSTEM
DEVELOPMENT STUDY
IN JAKARTA METROPOLITAN AREA**

Fig. 30
**RECOMMENDED PRIMARY ROAD
 NETWORK AND CARGO
 TRANSPORTATION SYSTEM**



- LEGEND :
- NETWORK SYSTEM COMPONENT
- : Primary Arterial Road : Freeway
 - : Primary Arterial Road
 - : Primary Collector Road
- CARGO TERMINAL
- : Inter-regional Cargo Terminal
- KEY FACTORS FOR NETWORK AND TERMINAL SYSTEM
- : First Level Primary Function
 - : Second Level City
 - : Third Level City
 - : Railway Line for Cargo and Passenger
 - : Railway Line for Passenger



**ARTERIAL ROAD SYSTEM
 DEVELOPMENT STUDY
 IN JAKARTA METROPOLITAN AREA**

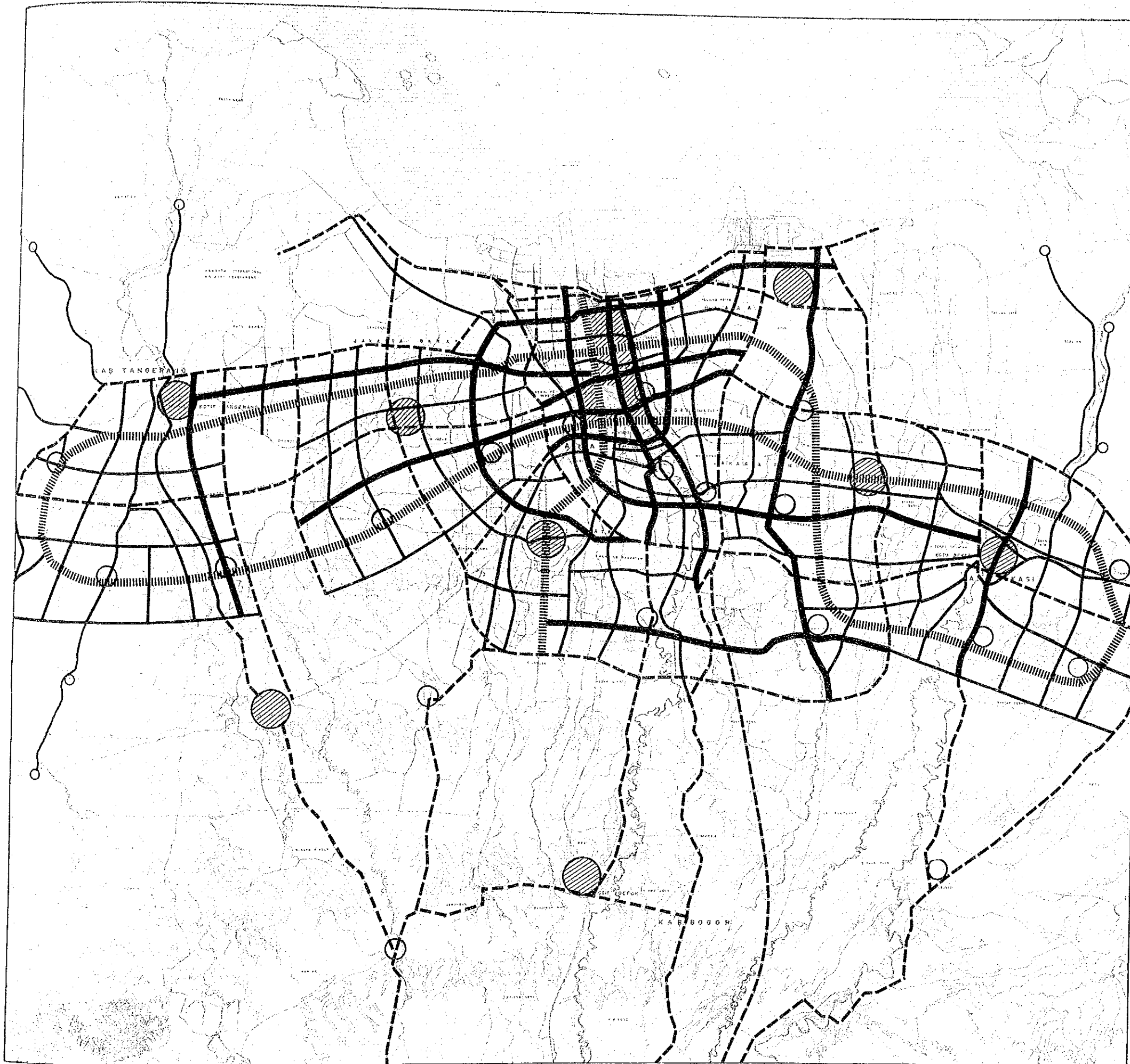






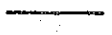
Fig. 31
RECOMMENDED SECONDARY ARTERIAL STREET NETWORK

LEGEND :





NETWORK SYSTEM COMPONENTS

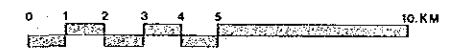
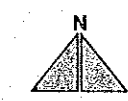
-  : Mass Transportation Corridor (Busway + Arterial Street)
-  : Secondary Major Arterial Street
-  : Secondary Minor Arterial Street

OTHERS

-  : Primary Road
-  : Rural Road

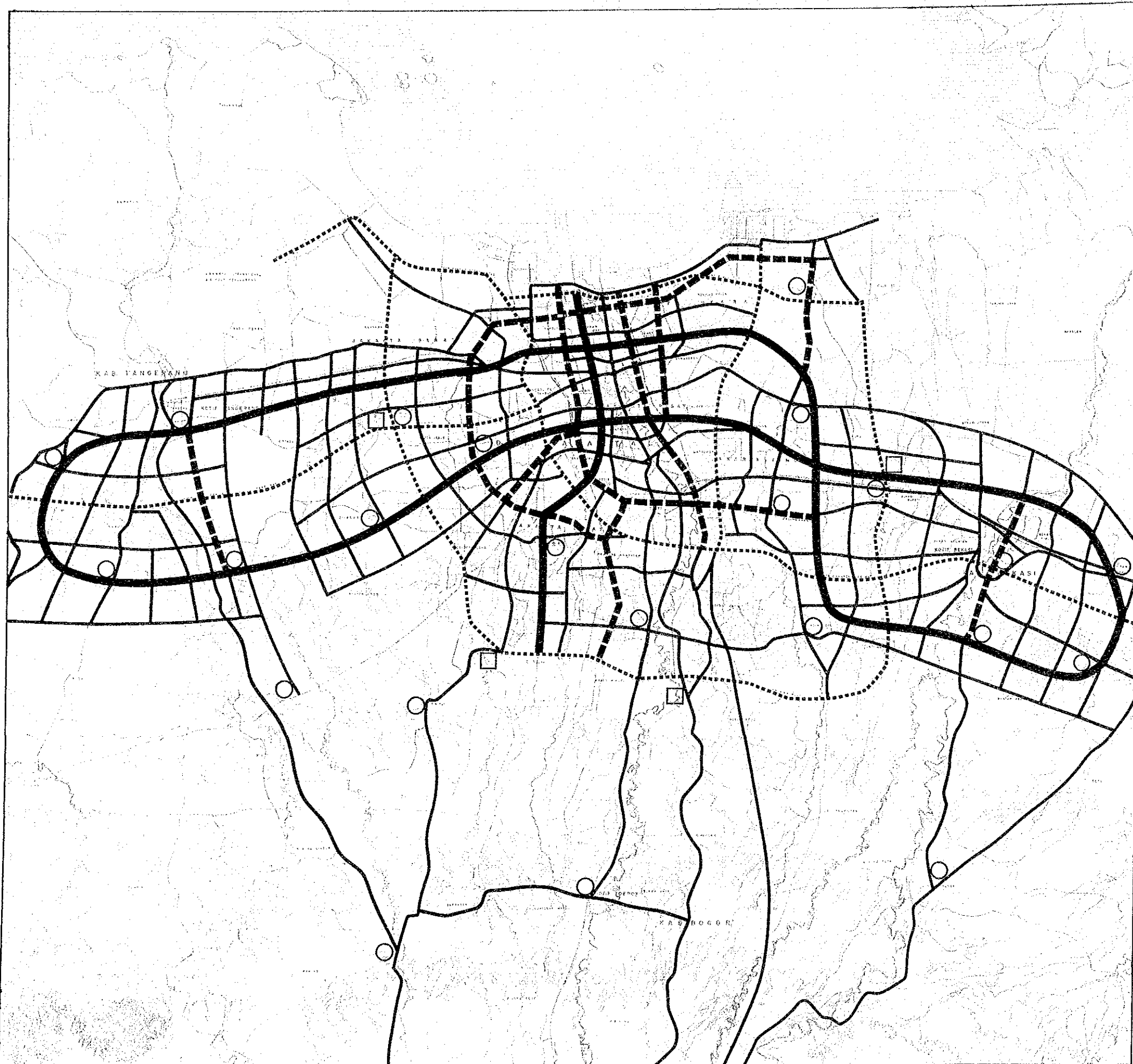
KEY FACTORS FOR NETWORK SYSTEM

-  : Metropolitan Center
-  : Sub Center
-  : Secondary Center
-  : Rural Center







ARTERIAL ROAD SYSTEM DEVELOPMENT STUDY IN JAKARTA METROPOLITAN AREA

Fig. 32
RECOMMENDED BUS SYSTEM





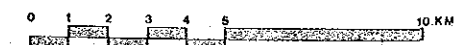
LEGEND :

Major Bus Operation Roads & Streets

-  : Mass Transportation Corridor with Busway or All Day Reserved Bus Lane
-  : Arterial Street with Reserved Bus Lane during Peak Hours
-  : Road & Street without Reserved Bus Lane during Peak Hours
-  : Freeway with Express Bus Service

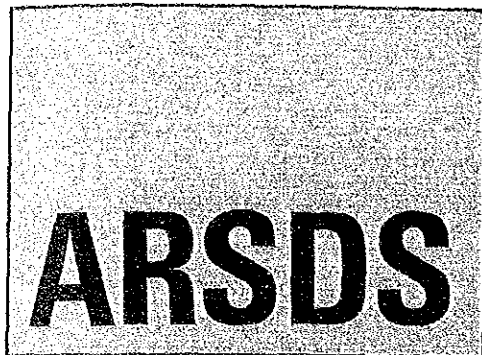
Bus Terminal

-  : Inter-city Bus Terminal
-  : Activity Center Bus Terminal



**ARTERIAL ROAD SYSTEM
DEVELOPMENT STUDY
IN JAKARTA METROPOLITAN AREA**

F IMPLEMENTATION PROGRAM
 F.1 TRANSPORTATION DEVELOPMENT STRATEGY



The transportation development policy should be interpreted into actions. These actions are broadly classified into two categories. One is "facility and system development" and the other is "traffic management". Transportation system development needs to be carried out continuously for the long term, with a proper long term perspective which is based on a comprehensive transportation system. On the other hand, traffic management should deal with the actual existing problems at all times according to the transportation system.

Actions in each transportation system development should not be taken independently. Actions in each transportation system development should be taken in coordination with not only actions in other transportation system developments, but also with urban system development. The transportation development strategy, which will be recommended here, is a strategic implementation of actions coordinated among several system developments related to the Jakarta Metropolitan Area.

RECOMMENDED TRANSPORTATION DEVELOPMENT STRATEGY

Each target system for transportation development is recommended in the Major points of the recommended strategy are as shown in Fig. 33 and as follows:

- 1) Each transportation system development should support the urban development strategies. First priority should be given to the formation of the east-west development axis. This applies to both the medium/mass transportation system development and the arterial street system development.
- 2) It is important to first establish the major infrastructures required for the long perspective and to later provide the minor infrastructures according to the demand following the progress of development.
- 3) The final target of the medium/mass transportation system development should be an integrated guideway transportation system consisting of the improved existing railway system and the other new guideway transportation system converted from the busway.
- 4) At the initial stage a rapid bus system based on an exclusive busway and reserved bus lane should be developed. To meet this end, Medium/Mass Transportation Corridors and arterial street development is essential.
- 5) To attract enough passengers to the rapid bus system operated on the Medium/Mass Transportation Corridor, development of activity centers and housing in the east and west suburban areas should be promoted. The housing development around railway stations in the suburban areas is a key to increase the ridership of the suburban railway lines.
- 6) Arterial street development in the Central Area should follow the formation of the east-west development axis. The improvement of the existing north-south axis should be immediately implemented and traffic problems be dealt with by traffic management measures and on-going projects.
- 7) To encourage medium/mass transportation usage, restraint of private automobile use should be conducted together with the arterial street development in the Central Area.
- 8) The on-going freeway system development should be continued in order to relieve the existing congestion.

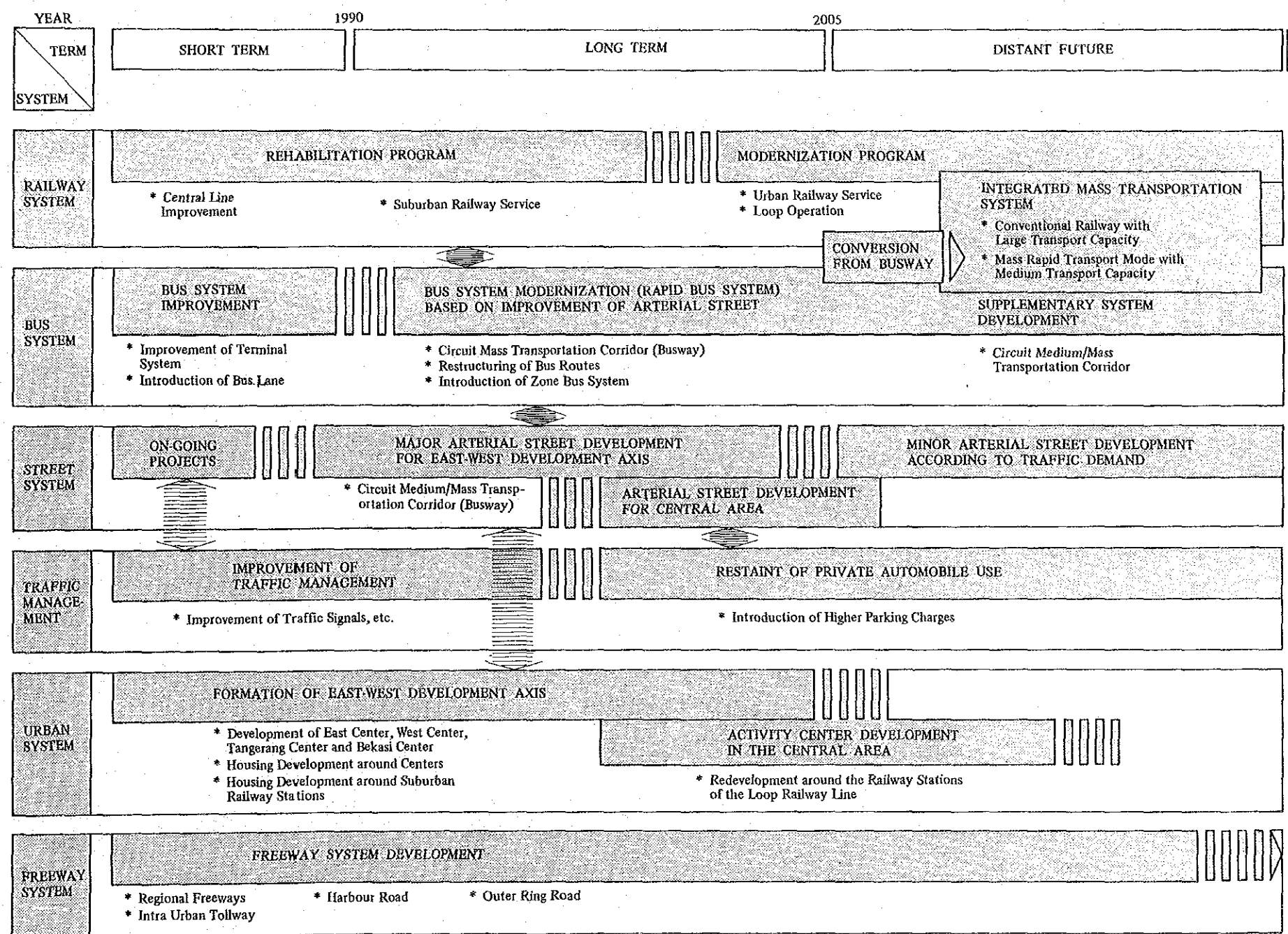
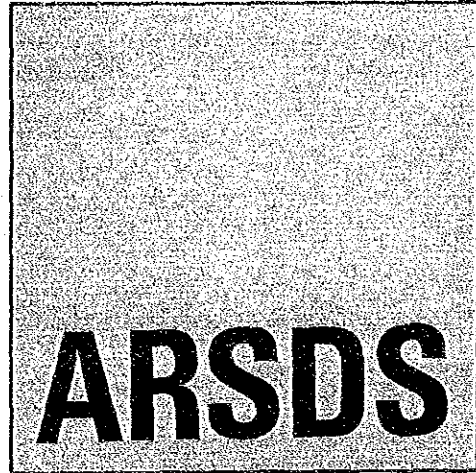


Fig. 33 RECOMMENDED TRANSPORTATION DEVELOPMENT STRATEGY



EVALUATION CRITERIA FOR LONG TERM PROJECTS

Evaluation criteria pursuing solutions for transportation problems alone are not suitable in the context that the Jakarta Metropolitan Area needs to be physically changed to a desirable urban structure in the future. In this situation, evaluation criteria to achieve the metropolitan development objectives should be used, and therefore, the following comprehensive evaluation fields were considered from the viewpoints of solving future urban problems, including transportation problems.

- a) Promote decentralization of job opportunities
- b) Encourage efficient urban land development
- c) Increase transportation efficiency

EVALUATION CRITERIA FOR SHORT TERM PROJECTS

Short term projects are relatively small scale projects which aim to solve existing problems and which can be completed in a short term. The basic requirement for short term projects are to have been authorized by the current structure plan or local plan. To evaluate priorities of short term projects, the following evaluation criteria are recommended:

- a) Solve existing severe transportation problems
- b) Support east and west development in a long perspective

BASIC PRIORITIES FOR LONG TERM PROJECTS

Through the project evaluation procedures based on the criteria described above, the basic priorities for long term projects are recommended as follows:

- First Priority : Provision of street system within the east and west conurbation area
- Second Priority (1): Provision of direct access from the East and West Centers to the Central Area
- Second Priority (2): Provision of street system within the Tangerang Core City and the Bekasi Core City
- Third Priority (1): Provision of direct access from the Tangerang and Bekasi Core Cities to the Central Area
- Third Priority (2): Provision of street system within the southeast and southwest conurbation areas
- Fourth Priority (1): Provision of direct access from the southeast and southwest conurbation areas to the Central Area
- Fourth Priority (2): Provision of connection between activity centers except for the above

PRIORITY PROJECTS FOR SHORT TERM

The projects which have been screened through the basic requirements for short term projects among the list of long term projects are evaluated using the criteria described above and the projects shown in Fig. 34 are recommended for the short term. The selected projects are existing problem-oriented, but are in line with the long perspective of east and west development.

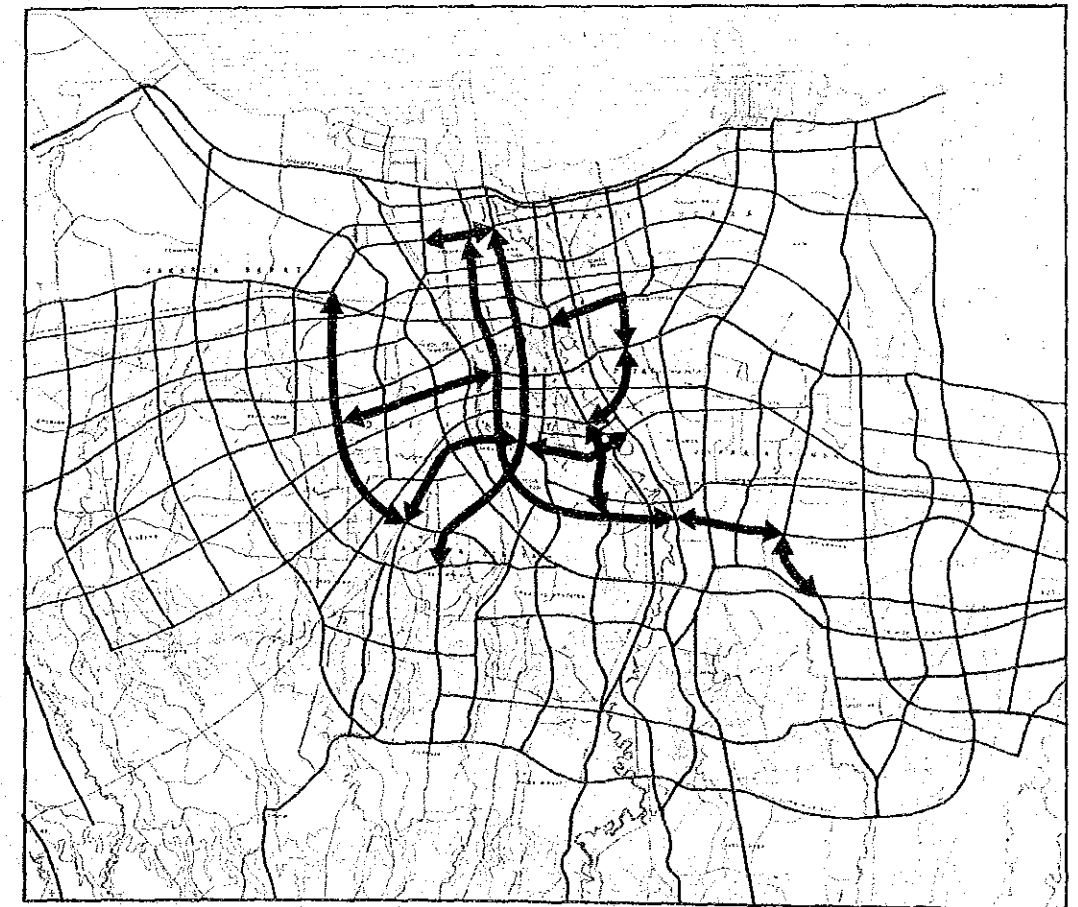
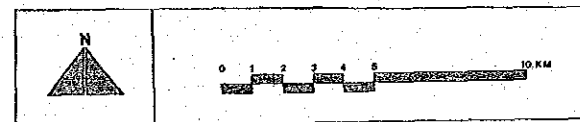
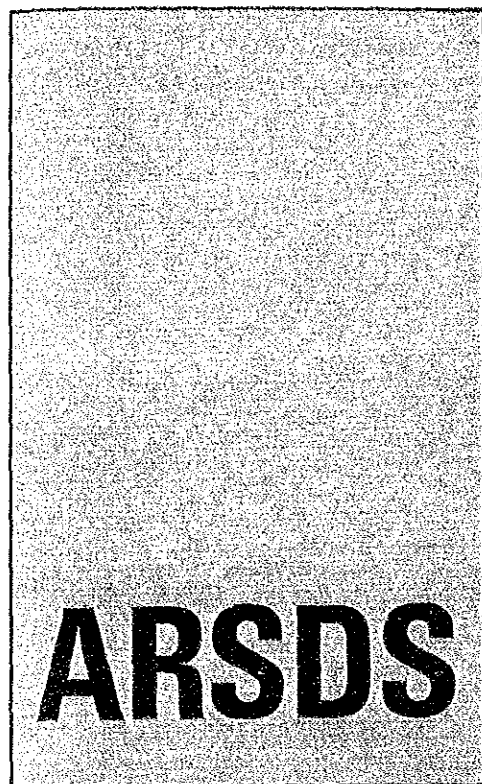


Fig. 34 PRIORITY PROJECTS FOR SHORT TERM



The recommended implementation programs of the arterial road and street system development are classified by their objectives into seven kinds of programs. Tables 8 through 14 show the priority project lists by the implementation program. Fig. 35 shows the implementation schedule by project. The formation and schedule of these programs are based on the transportation development strategy.

The minimum amount of required investment for the medium/mass transportation corridor (busway at the initial stage) and arterial roads/streets is the same as that for the freeway project for changing the existing urban structure to the targeted urban structure in order to solve the future crucial urban problems concerning transportation. Moreover, the immediate actions, such as review study of the existing plans and feasibility studies for fixing the location of transportation, need to be taken immediately.

The recommended implementation programs of the arterial road and street system development are classified by their objectives as follows:

- (1) Medium and Mass Transportation Corridor Development Program is a long term program designed to connect activity centers to the Central Area by providing exclusive busways and arterial streets in a joint right-of-way.
- (2) Major Arterial Street Development Program is a long term program

designed to connect activity centers to the Central Area and/or to connect activity centers to each other.

- (3) Arterial Street Development Program in the Newly Urbanizing Area is a long term program designed to support land supply for housing development around activity centers in the suburban areas.
- (4) Present Traffic Problem Oriented Program is a short term program designed, from the viewpoint of the overall network, to solve the present traffic problems by providing proper street sections. This program includes the on-going projects and committed projects.
- (5) East-West Connection Improvement Program in the Central Area is designed to increase the transport capacity in the east-west direction by providing same street sections in addition to the existing streets.
- (6) North-South Axis Strengthening Program in the Central Area is designed to support the activities in the Central Area by providing arterial streets in the north-south direction.
- (7) Freeway Development Program is the on-going tollway projects consisting of the Jakarta Intra Urban Tollway, the Jakarta Harbour Road, the Outer Ring Road and the three regional tollways.

RECOMMENDED ACTIONS IN THE NEXT FIVE YEAR PERIOD

The DKI Jakarta Structure Plan is regulated to be reviewed every five years. On the occasion of the next review the recommendations made by this study will be highly appreciated for strengthening the present transportation plan. The following actions are required in the next five-year period.

- 1) Feasibility study on the whole mass transportation corridor development program in order to decide upon the alignment, and to start the development control to secure the right-of-way.
- 2) Feasibility study on the north-south corridor (Blok-M - Kota) development and parking facility development in the Central Area. The reinforcing facility to be examined are arterial road, toll road, busway, medium/mass transportation mode, etc.
- 3) Central Area development planning study including activity center development/redevelopment, parking plan, station plaza plan, traffic management plan, arterial road plan, etc./which are essential for the provision of direct access to the Central Area from activity centers in the suburban area.
- 4) Feasibility study on the present traffic problem oriented program.
- 5) Feasibility study on the major arterial streets and primary roads.
- 6) Budgetary study of transport sector.

RECOMMENDED IMPLEMENTATION PROGRAMS

Using the evaluation criteria the priority projects were selected among the potential projects. Based on the transportation and urban development strategies, the recommended implementation programs were established from the selected priority projects and the implementation schedule was made in five-year periods. Tables 8 through 14 show the project lists by the implementation program. Fig. 35 shows the implementation schedule by project.

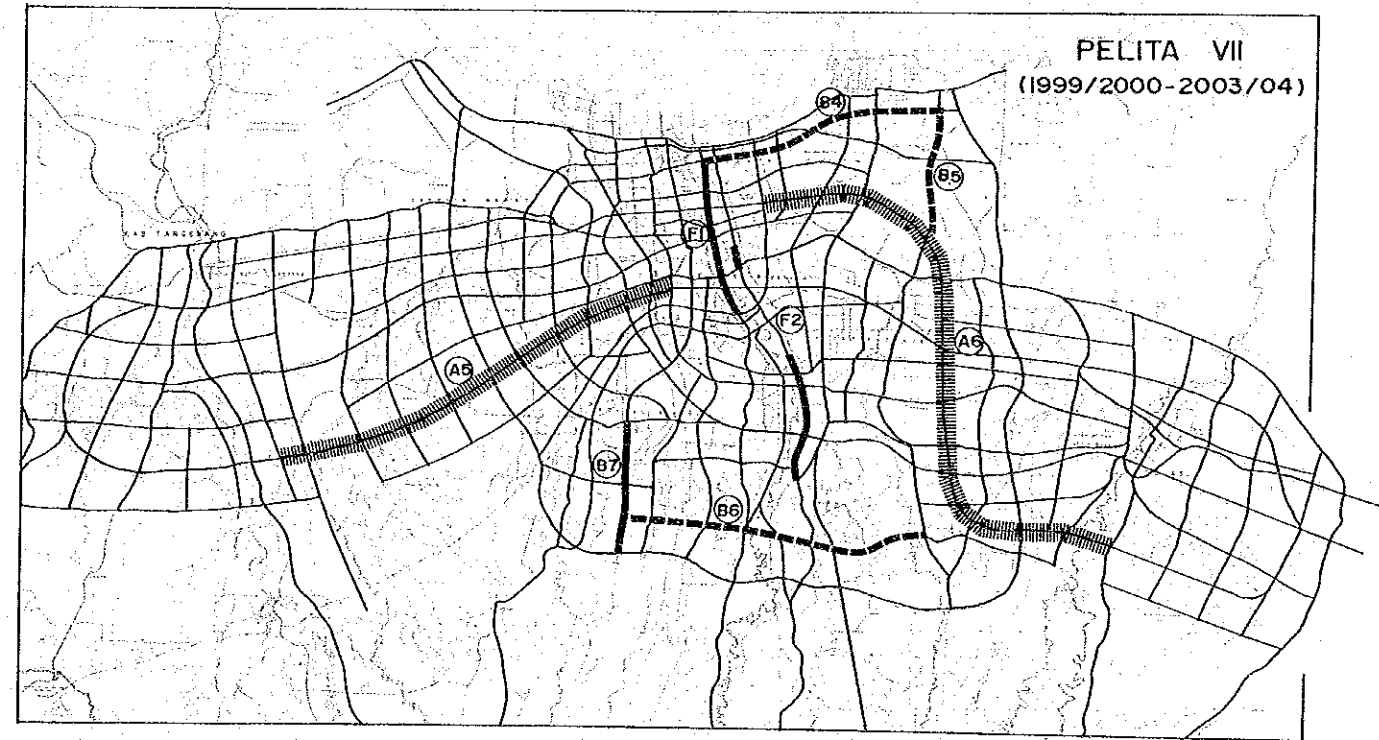
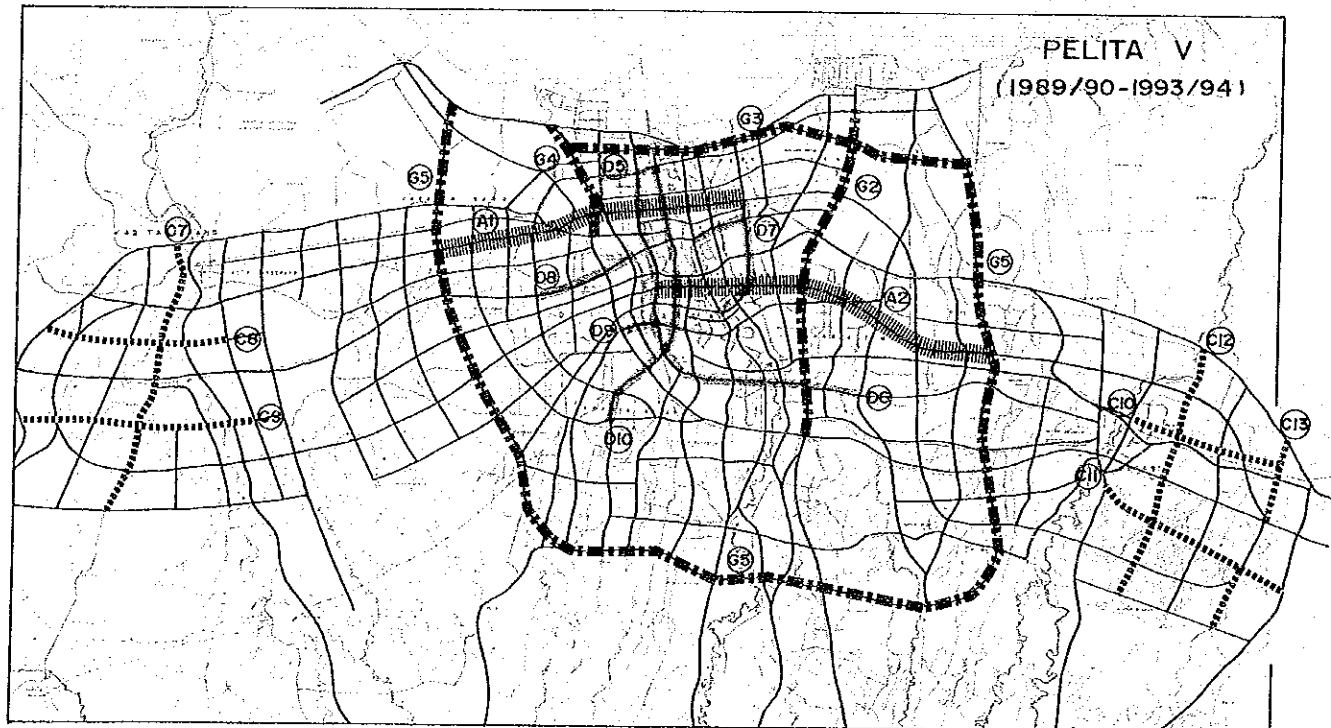
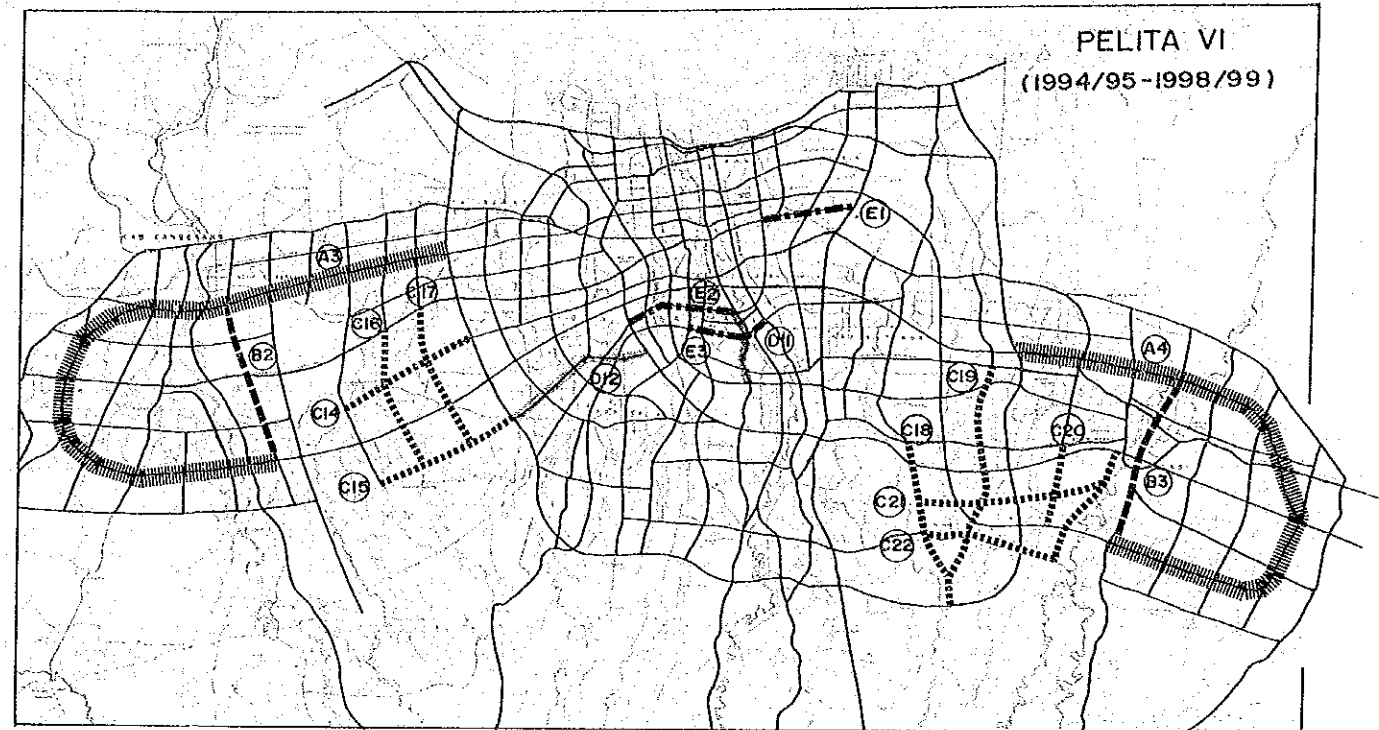
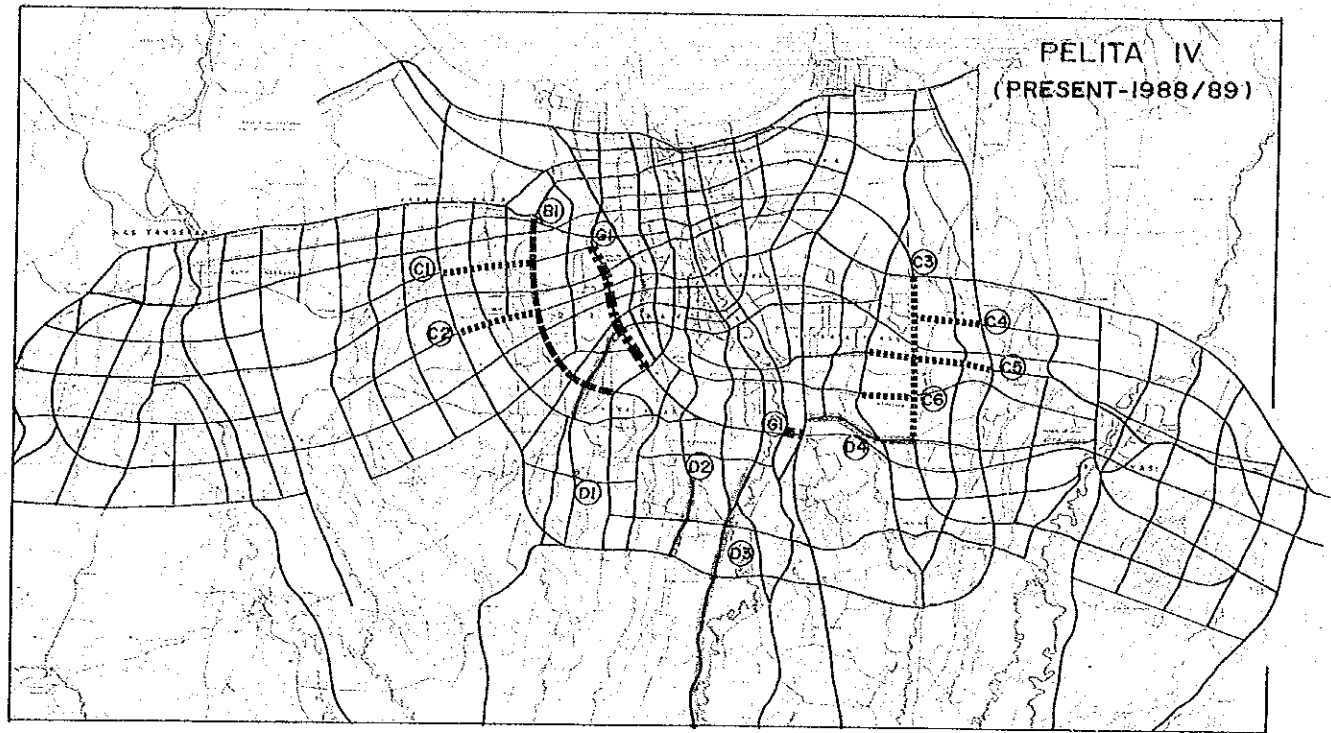
COST OF PROGRAMS

Table 7 summarizes the total project costs by program. This shows that the required amount of investment for the Mass Transportation Corridor (busway at the initial stage) and arterial roads/streets is almost the same as that for the on-going freeway projects. This is the minimum practical level of investment required for changing the existing urban structure to the targeted urban structure in order to solve the future crucial urban problems.

Table 7 COST OF PROGRAMS

PROGRAM	ESTIMATED PROJECT (Million Rupiah)				
	PELITA IV	PELITA V	PELITA VI	PELITA VII	TOTAL
A) Mass Transportation Corridor Development Program	-	159,471	226,352	209,737	595,560
B) Major Arterial Street Development Program	63,342	-	44,827	132,788	240,957
C) Arterial Street Development Program in the Newly Urbanizing Area	113,855	94,486	110,073	-	318,414
D) Present Traffic Problem Oriented Program	37,959	274,307	42,188	-	354,454
E) East-West Connection Improvement Program	-	-	38,363	-	38,363
F) North-South Axis Strengthening Program	-	-	-	40,685	40,685
G) Freeway Development Program	164,500	1,500,589	-	-	1,665,089
Total	215,156 (379,656)	528,264 (2,028,853)	461,803 (461,803)	383,210 (383,210)	1,588,433 (3,253,522)

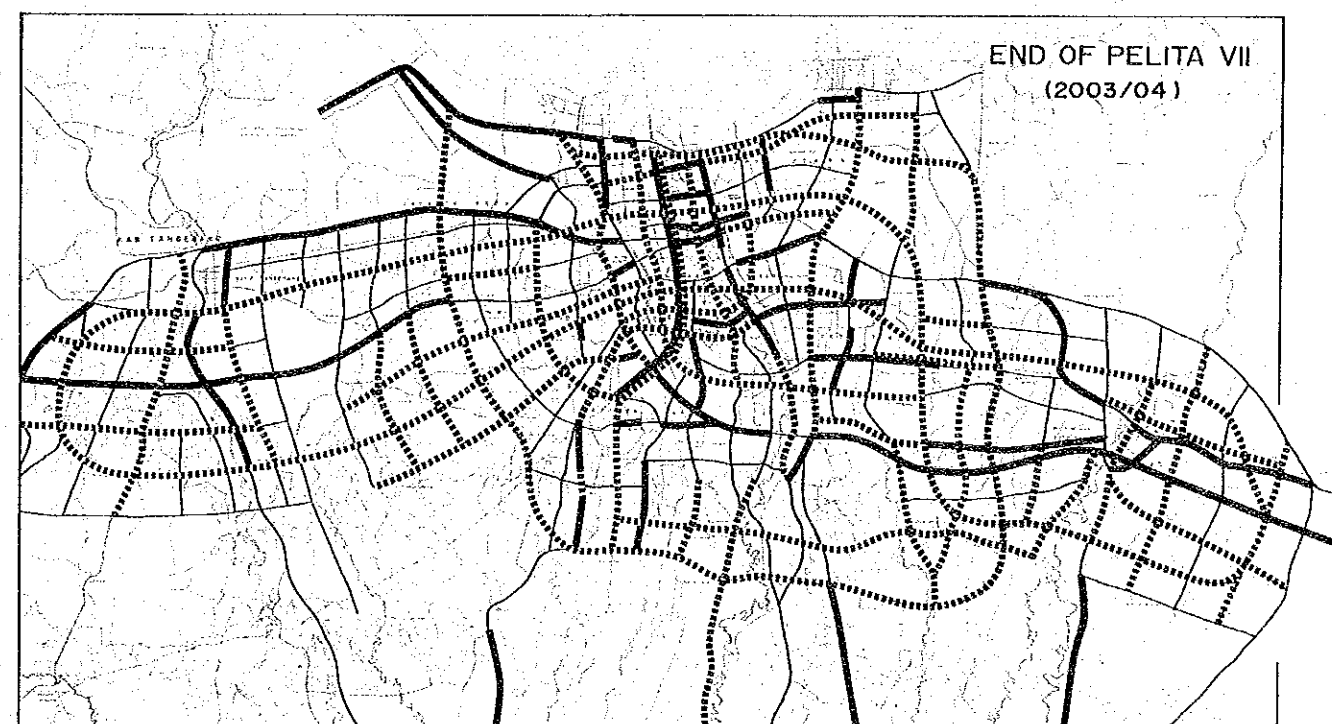
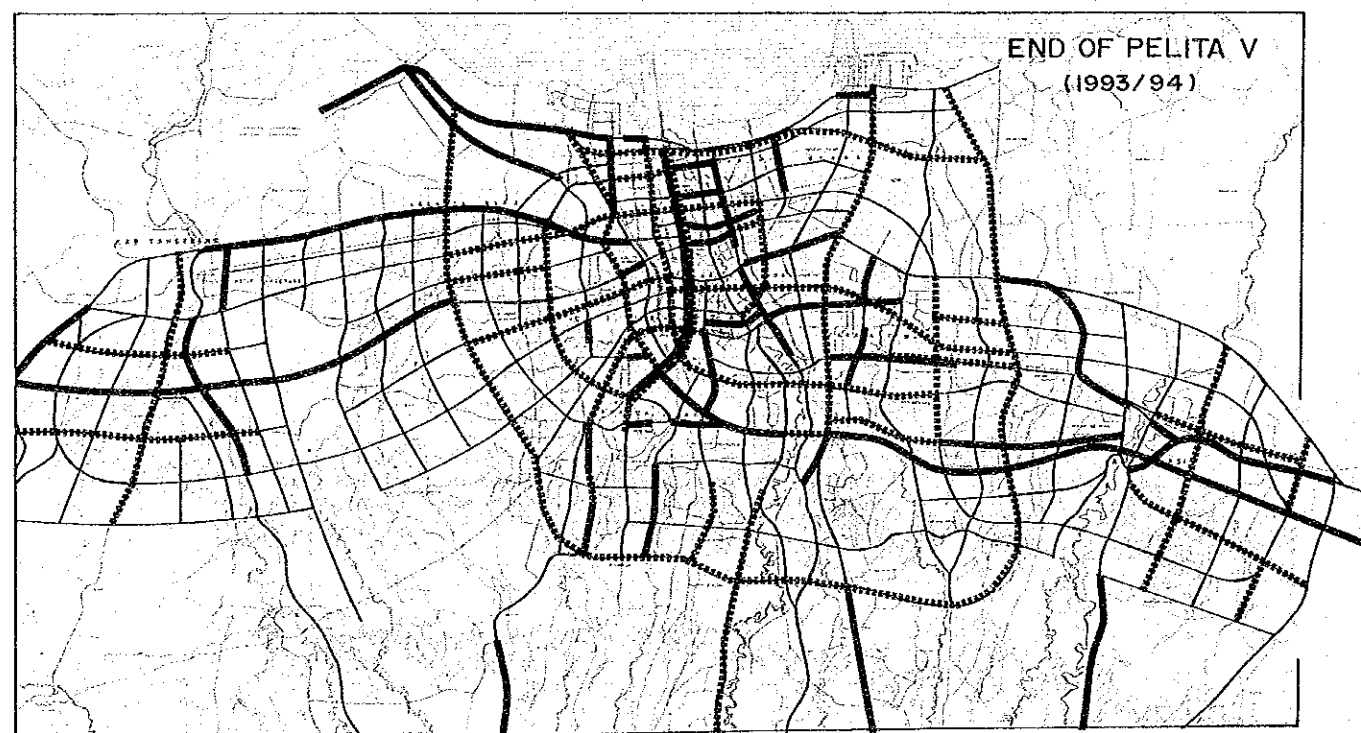
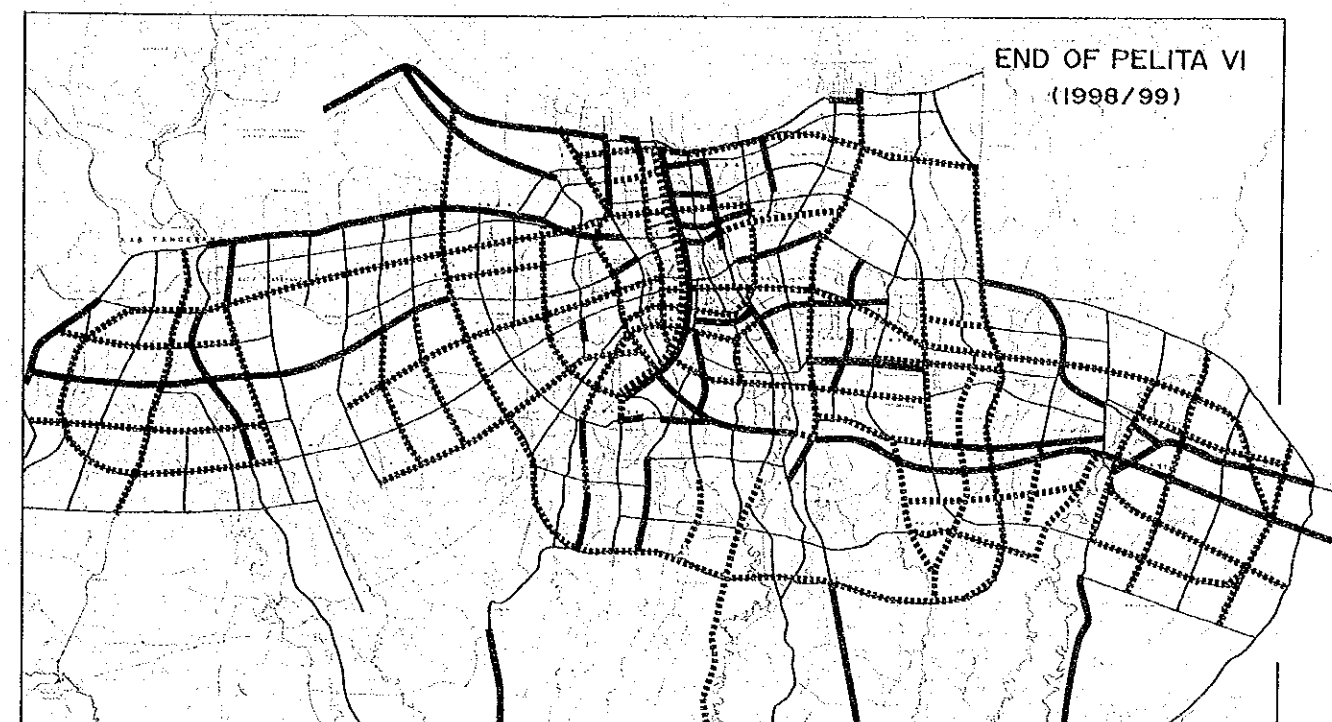
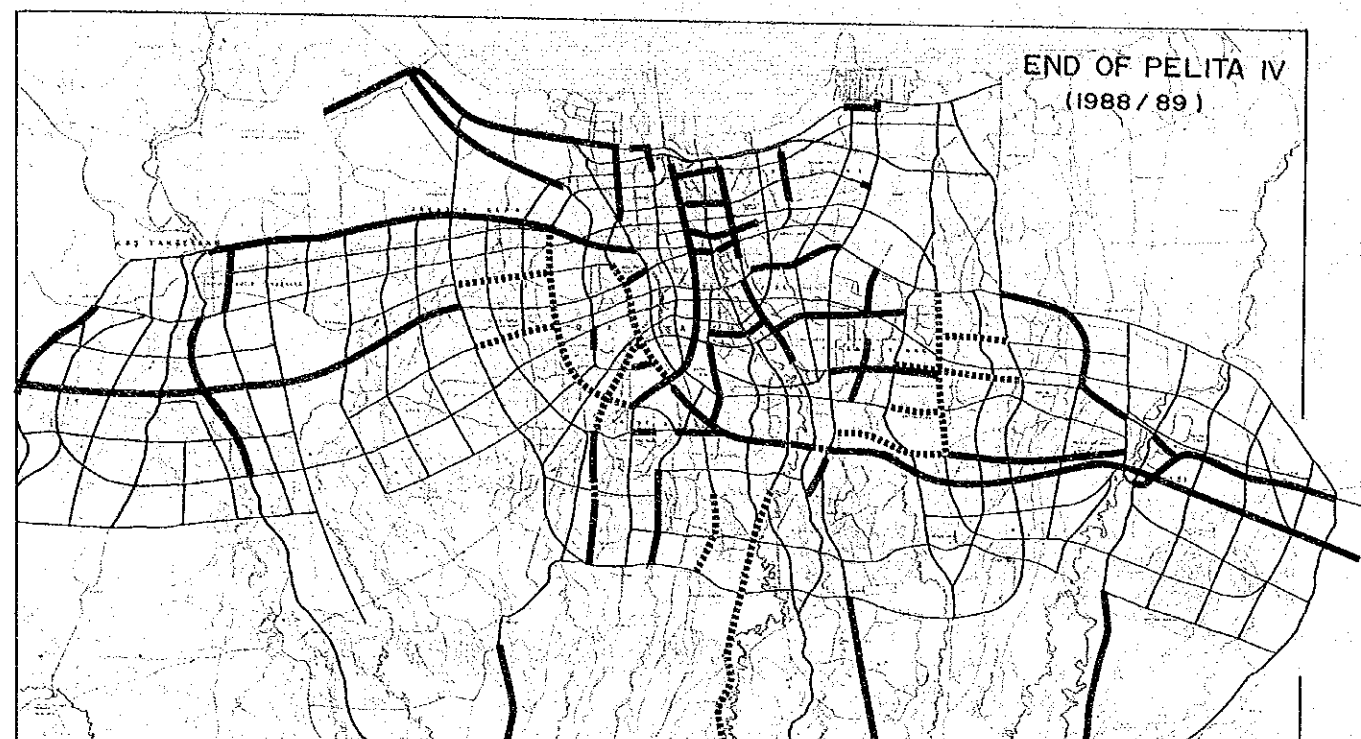
Note : Figures in () show total costs and those without () are exclusive of freeway costs



- LEGEND :
- MASS TRANSPORTATION CORRIDOR DEVELOPMENT PROGRAM
 - MAJOR ARTERIAL STREET DEVELOPMENT PROGRAM
 - ARTERIAL STREET DEVELOPMENT PROGRAM IN THE NEWLY URBANIZING AREA
 - PRESENT TRAFFIC PROBLEM ORIENTED PROGRAM
 - EAST-WEST CONNECTION IMPROVEMENT PROGRAM IN THE CENTRAL AREA
 - NORTH-SOUTH AXIS STRENGTHENING PROGRAM IN THE CENTRAL AREA
 - FREEWAY DEVELOPMENT PROGRAM



Fig. 35 RECOMMENDED IMPLEMENTATION PROGRAM



LEGEND

- EXISTING ROAD AND STREET AVAILABLE FOR 2005
- RECOMMENDED ROAD AND STREET BY DEVELOPMENT PROGRAM

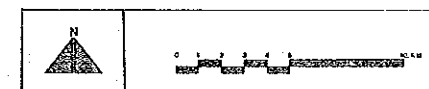


Fig. 36 IMPLEMENTATION PROGRESS OF RECOMMENDED PROGRAM

Table 8 PROJECT LIST OF MASS TRANSPORTATION CORRIDOR DEVELOPMENT PROGRAM

No	Name/Location	No. of Lane	Length (Km)	Implementation Period (Pelita)	Construction Cost (x 10 ⁶ Rp)
A1	Ex-Kemayoran -- West Center	6	13.9	V	88,910
A2	Tn. Abang -- West Center	6	16.0	V	70,561
A3	West Center -- Tangerang Ring	6	30.3	VI	110,571
A4	East Center -- Bekasi Ring	6	26.3	VI	115,781
A5	Tangerang South -- Tanah Abang	6	19.3	VII	98,464
A6	Bekasi South -- Ex-Kemayoran	6	27.0	VII	111,273
Total					595,560

Table 9 PROJECT LIST OF MAJOR ARTERIAL STREET DEVELOPMENT PROGRAM

No	Name/Location	No. of Lane	Length (Km)	Implementation Period (Pelita)	Construction Cost (x 10 ⁶ Rp)
B1	Pesing -- Kebayoran Baru	6	9.6	IV	63,342
B2	Tangerang MTC Supplemental Link	4	9.4	VI	21,200
B3	Bekasi MTC Supplemental Link	4	7.1	VI	23,627
B4	Ancol -- Cilincing	6	10.3	VII	53,097
B5	Cilincing -- Pulo Gadung Lor	4	6.4	VII	23,707
B6	Pondok Gede -- Fatmawati	4	15.9	VII	40,659
B7	Blok M -- Cilandak	6	5.4	VII	15,325
Total					240,957

Table 10 PROJECT LIST OF ARTERIAL STREET DEVELOPMENT PROGRAM IN THE NEWLY URBANIZING AREA

No	Name/Location	No. of Lane	Length (Km)	Implementation Period (Pelita)	Construction Cost (x 10 ⁶ Rp)
C1	East Center Related Street (Kembangan -- Kupuh 1)	4	6.7	IV	9,177
C2	East Center Related Street (Meruya Udik -- Rawatiga Suku)	4	3.7	IV	9,867
C3	West Center Related Street (Pulo Gadung -- Rawadomba)	4	7.2	IV	25,750
C4	West Center Related Street (Rawa Terate -- Ujung Kranjang 1)	4	3.0	IV	33,555
C5	West Center Related Street (Klender -- Bojong)	4	5.8	IV	23,289
C6	West Center Related Street (Gedung 2 -- Cilungu 2)	4	2.3	IV	12,217
C7	Bugel 1 -- Legok	4	6.5	V	12,207
C8	Jakarta -- Kampung Kelapa 1	2	7.8	V	10,655
C9	Kontrakan -- Donkel 2	2	9.7	V	11,811
C10	Bekasi -- Tambun	2	7.0	V	11,151
C11	Rawapajang -- Rawa Banteng	2	8.6	V	9,400
C12	Teluk Betung -- Ps. Bondo	4	9.9	V	27,351
C13	Tambun -- Tambun South	2	4.9	V	11,921
C14	Ciledug -- Meruya Udik	2	5.9	VI	16,844
C15	Pondok Aren -- Juraganan	2	6.3	VI	13,001
C16	Cipondoh -- Cipadu	2	6.3	VI	8,595
C17	Kebaren -- Bantenan	2	6.4	VI	8,529
C18	Kali Malang -- Kp. Asem	4	7.3	VI	16,412
C19	Malaka 3 -- Pondok Meloh	2	8.4	VI	12,695
C20	Kp. Gunung -- Kebantenan 1	2	3.0	VI	12,073
C21	Rangkalanwsmgin -- Pekayon 2	2	7.0	VI	13,941
C22	Pondok Gede -- Pondok Bend	2	4.1	VI	7,983
Total					318,424

Table 11 PROJECT LIST OF PRESENT TRAFFIC PROBLEM ORIENTED PROGRAM

No	Name/Location	No. of Lane	Length (Km)	Implementation Period (Pelita)	Construction Cost (x 10 ⁶ Rp)
D1	Pondok Pinang -- Pejompongan	4	5.2	IV	8,960
D2	Ragunan -- Buncit Raya	6	4.6	IV	2,923
D3	Ps. Minggu -- Depok	4-6	20.4	IV	23,291
D4	Kali Malang	4	4.7	IV	2,785
D5	Kota -- Jembatan Dua	6	2.3	V	13,642
D6	Ex-Kemayoran -- Cikini	4-6	14.6	V	14,988
D7	Pejajaran -- Pondok Baru	6	1.6	V	77,446
D8	Rawatingasuku -- Tanah Abang	4	5.1	V	34,352
D9	Pejompongan -- Karet Kubur	4	1.7	V	5,489
D10	Blok M -- Kota	8	13.5	V	128,390
D11	Cikini -- Menteng Palbatu	6	3.4	VI	18,198
D12	Outer Ring Road -- Senayan C.C	4	7.0	VI	23,990
Total					354,454

Table 12 PROJECT LIST OF EAST-WEST CONNECTION IMPROVEMENT PROGRAM

No	Name/Location	No. of Lane	Length (Km)	Implementation Period (Pelita)	Construction Cost (x 10 ⁶ Rp)
E1	Ex-Kemayoran -- J.I.U.T. N-S Link	4	4.1	VI	14,636
E2	Cikini -- Slipi	4-6	4.8	VI	23,727
Total					38,363

Table 13 PROJECT LIST OF NORTH-SOUTH AXIS STRENGTHENING PROGRAM

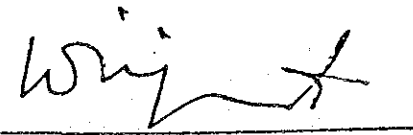
No	Name/Location	No. of Lane	Length (Km)	Implementation Period (Pelita)	Construction Cost (x 10 ⁶ Rp)
F1	Cikini -- Kampung Bandan	4	4.6	VII	25,612
F2	Senen -- Jatinegara -- Cililitan	6-8	6.9	VII	15,073
Total					40,685

Table 14 PROJECT LIST OF FREEWAY DEVELOPMENT PROGRAM

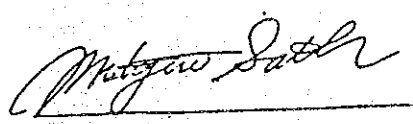
No	Name/Location	No. of Lane	Length (Km)	Implementation Period (Pelita)	Construction Cost (x 10 ⁶ Rp)
G1	J.I.U.T. S-W Arc (Jakarta I.C. -- Sec. 13)	6+6/8	7.0	IV	164,500
G2	J.I.U.T. N-S Link (Tg. Priok I.C. -- Jakarta I.C.)	6+8	13.0	V	420,600
G3	Jakarta Harbour Road	4	19.0	V	539,900
G4	Northern Extention of S-W Arc	6	4.3	V	85,000
G5	Jakarta Outer Ring Road	4+4	59.4	V	455,089
Total					1,665,089

SCOPE OF WORK
FOR
THE ARTERIAL ROAD SYSTEM DEVELOPMENT STUDY
IN
JAKARTA METROPOLITAN AREA
IN
THE REPUBLIC OF INDONESIA

BETWEEN
DIRECTORATE GENERAL OF HIGHWAYS
MINISTRY OF PUBLIC WORKS
AND
JAPAN INTERNATIONAL COOPERATION AGENCY


Mr. Wiyoto Wiyono

Secretary of the Directorate of
Urban Road Planning
Directorate General of Highways
Ministry of Public Works.


Mr. Motojiro SATO

Team Leader,
The Preliminary Study Team,
JICA

I. INTRODUCTION

In response to the request of the Government of the Republic of Indonesia, the Government of Japan has decided to conduct an Arterial Road System Development Study in Jakarta Metropolitan Area in the Republic of Indonesia (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan. Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programs of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of the Government of the Republic of Indonesia.

II. OBJECTIVE OF THE STUDY

The objective of the study, among others is to prepare the master plan of the arterial road system in DKI Jakarta in consideration of the future traffic demand, effects of the tollway construction program and the development program of public transport especially railway by producing an up-to date OD matrix which can be used in the evaluation of future projects in the transport sector.

III. SCOPE OF THE STUDY

1. Study Area

The planning area covers D.K.I. JAKARTA and its surroundings

2. Target Year

The year 2005 will be defined as the target year of the Study and intermediately the years 1995 and 2000 be defined as supplementary target year.

3. Study Items

The Study will cover the following items:

- 3.1 Existing data collection and analysis
a) Review of existing reports


A.S.

- b) Socio-economic aspects of the study area
 - (1) Population
 - (2) Commerce and industries
 - (3) Others, including income distribution
- c) Land use and Urban developments
- d) Inventory survey of present transport facilities
- e) Urban Transport
- f) On-going and proposed road projects

3.2 Traffic Survey and its analysis

- a) Home Interview survey
- b) Road-side interview survey
- c) Traffic count survey
- d) Others, including public transport and truck survey
- e) Data-processing and Analysis of O-D survey

3.3 Forecast of Future Traffic Demand

- a) Socio-economic Framework
- b) Traffic generation
- c) Modal Split
- d) Traffic distribution

3.4 Identifiation of Problems

3.5 Planning of Arterial Road System (including tollway) and Recommendation

- a) Preparation of the package of policies and project as alternatives
- b) Traffic Assignment
- c) Evaluation
- d) Recommendation of arterial road system, priority, cost and implementation program.

IV. STUDY SCHEDULE

The whole work will be conducted in accordance with the attached schedule.

V. REPORTS

JICA will prepare and present the following reports in English to the Government of the Republic of Indonesia.

1. Inception Report
Fifty (50) copies at the beginning of the Study
2. Progress Report I, II and III
Fifty (50) copies in the course of the Study in Indonesia
3. Interim Report
Fifty (50) copies within 14 months after the commencement of the field survey
4. Draft Final Report
Fifty (50) copies within 30 months after the commencement of the field survey
5. Final Report
Hundred (100) copies within two months after the receipt of the comments on the Draft Final Report from the Government of the Republic of Indonesia.

VI. UNDERTAKING OF THE GOVERNMENT OF THE REPUBLIC OF INDONESIA

1. To facilitate smooth conduct of the Study, the Government of the Republic of Indonesia will take necessary measures:
 - (1) to secure the safety of the Japanese study team
 - (2) to permit the members of the Japanese study team to enter, leave and sojourn in Indonesia for the duration of their assignment therein, and exempt them from alien registration requirements and consular fees
 - (3) to exempt the members of the Japanese study team from taxes, duties, fees and other charges on equipment, machinery and other materials brought into Indonesia for the conduct of the Study.

- (4) to exempt the members of the Japanese study team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Japanese study team for their services in connection with the implementation of the Study.
- (5) to provide the necessary facilities to the Japanese study team for the remittances as well as utilization of funds introduced into Indonesia from Japan in connection with the implementation of the Study
- (6) to secure permission for entry into private properties and restricted area in connection with field survey, according to prevailing regulations of the Government of the Republic of Indonesia
- (7) To make arrangements for the study team to use the data, maps and materials for analysis in Japan subject to the approval of the Government of the Republic of Indonesia.

2. The Government of the Republic of Indonesia shall bear claims, if any arises, against the members of the Japanese study team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or wilful misconduct on the part of the members of the Japanese study team.

3. Bina Marga shall act as counterpart agency to the Japanese study team and also as coordinating body in relation with other governmental and non-governmental organization concerned for the smooth implementation of the Study

4. Bina Marga shall provide the Japanese study team with the following, in cooperation with other agencies concerned, if necessary.

- (1) available data and information related to the Study
- (2) counterpart personnel
- (3) suitable office with necessary equipment in Jakarta

- (4) credentials of identification cards
- (5) assistance for quick access to medical service.

VII. UNDERTAKING OF THE GOVERNMENT OF JAPAN

For the implementation of the Study, the Government of Japan will, in accordance with the relevant laws and regulations in force in Japan, through JICA, take necessary measures:

1. To dispatch, at its own expense, a study team to Indonesia
2. to pursue technology transfer to the Indonesian counterpart personnel in the course of the Study.

TENTATIVE STUDY SCHEDULE

	MONTH
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Inception Report	
Works in Indonesia	
Progress Report I	
Interim Report	
Progress Report II	
Progress Report III	
Draft Final Report	
Comments on Draft Final Report	
Final Report	

MINUTES OF THE MEETING
FOR
THE ARTERIAL ROAD SYSTEM DEVELOPMENT STUDY
IN
JAKARTA METROPOLITAN AREA

The Japan International Cooperation Agency (hereinafter called "JICA") dispatched the Preliminary Study Team, headed by Mr. Motojiro SATO, to the Republic of Indonesia for the above project from June 2, 1984 to June 9, 1984 for the purpose to exchange views and to get agreement on the scope of work of the Study.

The major points discussed by the Japanese mission and the Indonesian Government were the following :

1. Directorate General of Highways and the Team agreed on the Study area as follows :
DKI JAKARTA and its surroundings consisting of JAKARTA Metropolitan area within JABOTABEK.
2. The Indonesian Government mentioned that as the fundamental data and information, "the masterplan of DKI Jakarta year 2005" (Rencana Umum Tata Ruang Daerah DKI Jakarta 2005) should be referred and the recommendation of the Study should be in line with this Master Plan.
3. Both sides agreed on the study period to be thirty three (33) months.
4. (i) The Indonesian Government proposed that the basic concept of planning should be contained in Progress Report II and discussed by the both sides.
(ii) The Japanese mission agreed with the above proposal.
5. Both sides agreed that all materials, data and results of the study should belong to the Indonesian Government.

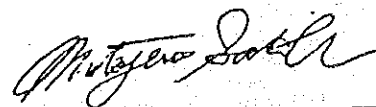
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6. (i) The Indonesian Government requested strongly that soft ware and equipments such as traffic counter and personal computer used in the Study would belong to the Indonesian Government in order to secure smooth transfer of technology when the study is completed.
- (ii) The Japanese mission expressed that they will transfer the above request of the Indonesian Government to the Japanese Government.
7. Both sides agreed that the place where the actual study team carries out the study should be Jakarta as much as possible to maximise the technical transfer.
8. As some items not concluded by the previous JICA team on the undertakings by JICA, it was agreed that costs of surveyors, copy machine, blueprint machine and survey office for surveyors should be covered by JICA expenses.
9. Counterpart training in Japan.
- (i) The Indonesian Government requested that the counterpart training shall also be conducted in Japan.
- (ii) The Japanese mission expressed that they will transfer the above request of the Indonesian Government to the Japanese Government.

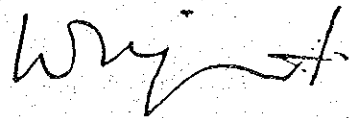
Jakarta, June 7, 1984

ON BEHALF OF JAPAN
INTERNATIONAL COOPERATION AGENCY



Mr. Motojiro SATO
Team Leader
JICA Preliminary Study Team

ON BEHALF OF DIRECTORATE
GENERAL OF HIGHWAYS,
MINISTRY OF PUBLIC WORKS



Mr. Wiyoto Wiyono
Secretary of the Directorate of
Urban Road Planning
Directorate General of Highways
Ministry of Public Works

APPENDIX 2. MAIN PARTICIPANTS OF THE STUDY

The Republic of Indonesia

1) Directorate General of Bina Marga, Ministry of Public Works

1. Mr. Suryatin Sastronijoyo : Director General of Highways
2. Mr. Muhammad Solechan : Director of Urban Road Planning, Directorate General of Highways
3. Mr. F.A. Rubiyanto : Ex-Director of Urban Road Planning
4. Mr. Wiyoto Wiyono MSc : Secretary of Urban Road Planning
5. Mr. H. Soedjarwoko : Head of DKI Jakarta Regional Office, Ministry of Public Works
6. Mr. Soekasdi : Sub-Director of Central Region, Directorate of Urban Road Planning
7. Mr. Muksin : Staff of the Directorate of Urban Road Planning
8. Mr. Triharjo : Staff of the Directorate of Urban Road Planning
9. Mr. Moh. Anas Aly : Head of Sub-Directorate of Technical Development, Urban Road, Dit. of Urban Road Planning

2) Directorate of Urban and Resional Planning, Directorate General of Cipta Karya, Ministry of Public Works

1. Mr. Mustaram : Sub-Director of City Planning
2. Mr. Bambang : Staff of Sub-Dit. of City Planning

3) Directorate General of Land Transport and Inland Waterways, Ministry of Communications

1. Mr. Iman Sudrajat : Director of Urban Transport
2. Mr. Hatmaji : Chief of Urban Transport Planning
3. Mr. Udji Atmono : Staff of Urban Transport Planning

4) Government of West Java

1. Dr. Ateng Syafrudin SH : Head of Regional Development Planning Bureau (BAPPEDA)
2. Mr. Sukanda M : Head of Provincial Cipta Karya (DPUP)
3. Mr. Kusudinan Sudjana : Secretary of Regional Development Planning Bureau (BAPPEDA)
4. Mr. Makhmuddin Makdurah : Head of Provincial Public Works (DPUP)
5. Mr. Suwardi W.S. : Head of Provincial Bina Marga (DPUP)

5) DKI Jakarta

1. Mr. Herbowo : Head of Regional Development Planning Bureau (BAPPEDA)
2. Mr. Ery Chayaridipura : Head of Regional Development Bureau
3. Mr. Tb. M. Rais : Deputy Head of BAPPEDA
4. Mr. Budiharjo S. : Head of Road Traffic and Transportation Bureau
5. Mr. Kandar : Head of City Planning Bureau
6. Mr. J. Supranto M.A : Head of Statistics Bureau
7. Mr. Irzal Djamal : Section Chief of BAPPEDA
8. Mr. H. Syamsu Romli : Head of Public Works
9. Mr. Djatnika : Staff of City Planning Bureau
10. Mr. Ika Effendy S. : Section Chief of City Planning Bureau
11. Mr. Dimmy Kirbandiman : Section Chief of Road Traffic and Transportation Bureau
12. Mr. Bambang Burhana : Section Chief of Road Traffic and Transportation Bureau
13. Mrs. Handayani : Section Chief of BAPPEDA

6) BKSP Jabotabek

1. Mr. A. Sudrajat : Head of the Office
2. Mr. Ojok Sunarja : Deputy of the Office

7) Counterparts

1. Mr. Rachmat Effendi A. : Project Officer, Dit. of Urban Road Planning, Bina Marga
2. Mr. Indra Tarigan : Dit. of Urban Road Planning, Bina Marga
3. Mr. Achiad D.G. : Dit. of Urban Road Planning, Bina Marga
4. Mr. Avi Prapancha S. : Dit. of Urban Road Planning, Bina Marga
5. Mr. Sinaga D. : Bureau of Public Works, DKI Jakarta
6. Mr. T. Emir Mirza M. : Bureau of Public Works, DKI Jakarta
7. Mr. Abdul Azis Harahap : Bureau of Road Transportation and Traffic, DKI Jakarta
8. Mrs. Azizah : Bureau of Road Transportation and Traffic, DKI Jakarta
9. Mr. Johnny : Bureau of Statistics, DKI Jakarta
10. Mr. Sarjono : Bureau of City Planning, DKI Jakarta

Government of Japan

1) JICA Supervisory Committee

1. Dr. Yoshiro Watanabe : Chairman
2. Mr. Motojiro Sato : Member
3. Mr. Ryuzaburo Inoue : Member
4. Mr. Yasuyuki Tanaka : Member
5. Mr. Shoichi Kubota : Member
6. Mr. Akira Honda : Member
7. Mr. Shozou Takagi : Member

2) JICA Office

1. Mr. Masayoshi Enomoto : Deputy Representative of JICA, Jakarta
2. Mr. Hisamitsu Nishio : JICA, Tokyo
3. Mr. Toshio Morooka : JICA, Tokyo
4. Mr. Norio Matsuda : JICA, Jakarta

3) Embassy of Japan

1. Mr. Koichi Uzuka : First Secretary, Public Works

4) Study Team

1. Mr. Nobuwaka Yamakawa : Team Leader
2. Mr. Yoshinobu Nomura : Transportation/Urban Planning
3. Mr. Isamu Gunji : Transportation Planning/
Traffic Survey
4. Mr. Toshiaki Watanabe : Traffic Survey
5. Mr. Katsuhide Nagayama : Urban Planning
6. Mr. Yoshihiro Asano : Regional Planning
7. Mr. Maki Imai : Urban Planning
8. Mr. Hidemoto Nojima : Highway/Transportation
Facility Planning
9. Mr. Hideo Arikawa : System Engineering
10. Mr. Hideyuki Sasaki : Transportation Planning/
Traffic Survey
11. Mr. Tomokazu Wachi : Traffic Survey

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