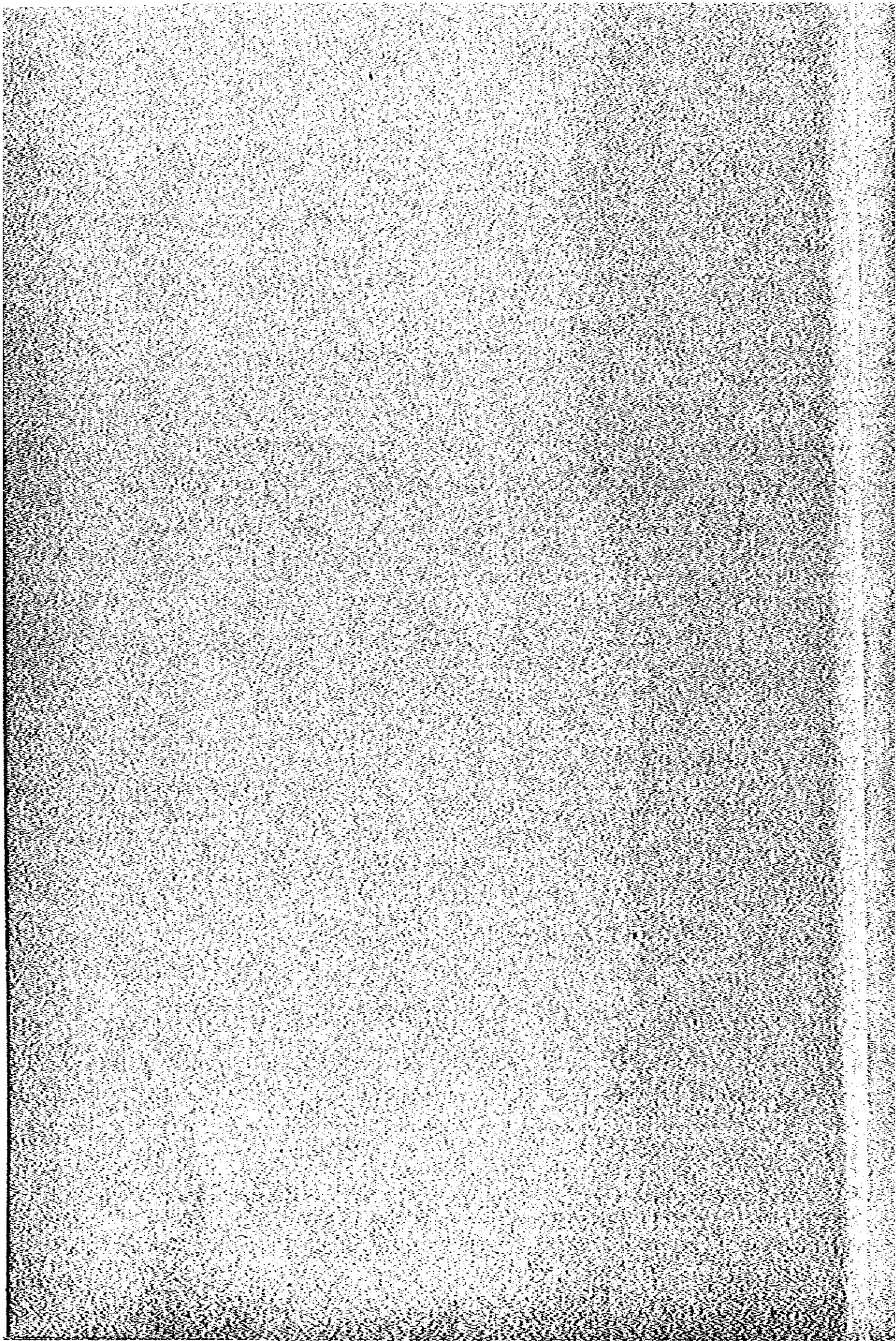


Chapter I.

INTRODUCTION



Chapter 1. INTRODUCTION

1.1 Background of the Study

The present urban transport condition of Medan City is in such a situation that causes daily serious congestion in the CBD in peak hours due to several reasons such as its high population density of its CBD which is expanding its traffic demand continuously, insufficient traffic capacities of the road network, insufficient bus fleet in the public transport system, variety of transport modes, inadequate one-way traffic control in certain parts of the CBD and the fact that the railway, which occupies a strategic position geographically in the CBD, does not presently share commuter service substantially.

The Government of Republic of Indonesia has recognized the importance not only in solving the current traffic problems but also in formulating Master Plan of Integrated Urban Transport System of Medan City and its surrounding areas as the third city in Indonesia to solve the urban transport problems succeeding Jakarta and Surabaya which were studied already.

Historically, the following studies relevant to the development of Medan City were performed in past or are underway at present:

- (a) Upon the request by Ministry of Public Works, Directorate General of Housing Building Planning and Urban Development (CIPTA KARYA) a British consultant formulated in 1973 "Medan City Master Plan" which was authorized in 1974. This plan required the municipal legislative area to expand from that of the former plan of 5,130 ha in area up to the present one of 26,510 ha to accommodate the estimated population of 2.29 to 2.57 millions in 2000 A.D. with the average annual growth rate of 3.28% to 3.74%.
- (b) Upon the request by Ministry of Communication, Directorate General of Sea Communication, a British consultant formulated in 1975 an expansion plan of Port of Belawan to cope with the future traffic through the port in 1998.
- (c) Upon the request by Ministry of Public Works, Directorate General of Housing Building Planning and Urban Development a consortium of American, Taiwanese and Indonesian consultants commenced "Medan Urban Development Study", in which the consultants are assigned to formulate long-term Urban Development Plan and to conduct feasibility study of First Stage Housing Development Project. The study is still underway at present.
- (d) Upon the request by Ministry of Communication, Indonesian State Railway a French consultant commenced in May 1979 the study called "North Sumatra Transportation Study", in which the consultant is assigned to survey the present situation of railway and road transports and their facilities, to forecast their future traffic demands and to propose their appropriate improvement plans to cope with their forecasted traffic up to 1993.

- (e) Upon the request by Ministry of Public Works, Directorate General of Highways, an Italian consultant conducted in 1978 Impact/Toll Study for Belawan-Medan and Medan Eastern Area. This tollway project is presently under final engineering and is scheduled to commence its construction in 1980.

Under such a situation the Government of Republic of Indonesia requested the Government of Japan to conduct "Medan Area Transport Study", consisting of surveying on the present situation of existing traffic conditions and transport facilities by mode, forecasting the future study of short-term improvements and formulating Urban Transport Master Plan for long-term for Medan City and its surrounding areas.

In response to this request, Japanese Government, as a part of its technical cooperation program, has undertaken to carry out this study. A preliminary survey mission organized by Japan International Cooperation Agency (JICA) in November 1978 was dispatched to Indonesia for field reconnaissance and preparation of Scope of Work. After a series of discussion with Indonesian government agencies concerned, Scope of Work was defined. JICA appointed a consortium of consultants, consisting of Pacific Consultants International and Japan Transportation Consultants to perform the study.

1.2 Objectives and Scope of Work

The Study Team's mission to carry out this study is specified in Scope of Work agreed upon both governments as follow:

Objectives of the Study

- Feasibility study of short-term Medan Urban Transportation Improvement Plan is to be conducted; and
- Master Plan of long-term Urban Transport in Medan Area is to be formulated.

Scope of the Study

- Geographical Study Area:

The study will be undertaken for the area of Medan City and its surroundings to be covered within a radius of approximately 20 km from the center of the CBD.

- Target Year:

The target years will be taken for the study as:

- i) Short-Term Plan 1985 A.D.
- ii) Long-Term Master Plan 2000 A.D.

1.3 Activities of Study Team

As Step 1 and Step 2 as mentioned in the Study Team's Inception Report, the consortium, working under the guidance of Japanese Supervisory Committee, dispatched a 10-member study team to Indonesia for field works for the period from September 10, 1979 to November 10, 1979.

Upon the completion of field works by the Study Team under the close cooperation provided by Indonesian Counterpart experts in the field, and the cooperation extended by members of Indonesian Steering Committee on this project a Progress Report and an Interim Report on Short-Term Improvements were submitted to the Government of Indonesia by the Study Team on November 5, 1979; in the former were presented the descriptions on field works, collected informations and data, findings on site as the results of field works, while in the latter were presented the study on the present socio-economic situation of the study area, the present land-use pattern of Medan City and its surrounding areas, the present situation of urban transport, volume of traffic and existing facilities by mode of transport, relevant development projects in the study area, and approach and methodology for proposals of short-term improvements. Through the discussion between Indonesian Government agencies concerned and the Study Team an overall policy for Step 3 of the study was confirmed.

On the basis of the policy confirmed, further work was subsequently carried out by the Study Team to conduct analyses of the present situation, to forecast the traffic demand in the target year of 1985 for short-term, to identify the suitable improvements which are expected to be effective enough with least additional investments, and thus necessary improvements were analyzed economically as well as financially to test their feasibility and viability as a whole of urban transport system.

1.4 Concept of Study

The objective of the study for the short-term solutions is to formulate the most urgent and effective measures for solving the current traffic problems arising in Medan area with the least additional investment. From such a point of view special attention was paid to the following categories in conducting the study:

- Formulating transport improvements for Medan Area, which enables its urban activities function satisfactorily;
- Not to emphasize road or railway itself individually in planning but formulate their mutually related improvements in the frame of integrated urban transport system of the area;
- Consistency is kept between the short-term improvements and the Third 5-Year Plan;
- In planning and implementation consistency is kept between each improvement and relevant other development projects under implementation in Province of North Sumatra as well as in Medan Area in the Third 5-Year Plan period;

- Consistency is kept between the short-term improvements aiming at the year 1985 and the long-term improvements aiming at 2000 A.D. with gradual transition from the former to the latter, the details of the latter are presented in Interim Report for Long-Term Master Plan;
- Stage construction is considered in implementing improvements.

In order to maintain the appropriate urban activities such factors are actually adopted as securing a balance between traffic demands and transport supply, citizens' accessibility to anywhere they want to go, convenient transport facilities easily available to those citizens who have no private transport measure, and traffic safety of citizens. Solving those categories the following short-term solutions for the transport system are to be studied:

- Improvement of roads;
- Improvement of road intersections;
- Improvement of traffic signaling;
- Improvement of one-way traffic control;
- Improvement of parking spaces and parking regulation;
- Improvement and adjustment of existing bus route network;
- Improvement of bus terminals;
- Improvements necessary for re-opening the railway passenger service on Belawan-Medan Line;
- Improvements relevant to Medan Railway Station;
- Improvement of railway crossings in the CBD; and
- Necessary steps to be taken in legislation, administration and social education.

SCHEDULE OF STUDY

1979								1980											
Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.			
Submission of Report, Explanations & Comments		Inception Report	I																
		Progress Report	I	Interim Report for Short-Term															
		Home Office Work																	
Field Survey			I																
Preparatory Work			I																

Draft Final Report for Short-Term	I																		
Interim Report for Long-Term																			
Final Report for Short-Term Solutions																			
Memo on Intermediate Term Planning																			
Draft Final Report for Long-Term Solutions	I																		
Final Report for Long-Term Solutions																			

1.5 Organization

The organization of relevant Committees and the study team are as follow:

(a) JICA Supervisory Committee

- | | | |
|----------------------------------|------------------|---|
| 1. Chairman | Dr. Y. Matsumoto | Professor, Faculty of Engineering, University of Tokyo |
| 2. Member
(Railway Transport) | Mr. K. Kitagawa | Director, Rolling Stock Industry Division
Railway Supervision Bureau,
Ministry of Transport |
| 3. Member
(Urban Transport) | Mr. N. Shiozumi | Deputy Director, Regional Planning Division, Secretariat to Minister,
Ministry of Transport |
| 4. Member
(Highway Planning) | Mr. H. Tokuhira | Director, First Research Division, International Construction Engineering Research Institute International Construction Engineering Association |
| 5. Member
(City Planning) | Mr. M. Sato | Director, Urban Bureau,
Chiba Municipal Government. |

(b) Indonesian Government Steering Committee

- | | | |
|------------------|--------------------------|--|
| 1. Chairman | Ir. Giri S. Hadihardjono | Secretary to Directorate General of Land Transport and Inland Waterways |
| 2. Vice-Chairman | Ir. Abdulrachman | Chief of Planning Bureau, Ministry of Communications & Tourism |
| 3. Member | Mr. E.H. Daoe | Chief of Planning Division, Planning Bureau, Ministry of Communication & Tourism |
| 4. Member | Mr. Gatot Soedjantoko | Chief of Planning Division, Directorate General of Land Transport and Inland Waterways, Ministry of Communication |
| 5. Member | Drs. Soeketjo | Chief of Urban Transport Division, Directorate General of Land Transport and Inland Waterways, Ministry of Communication |

- | | | |
|------------|-----------------------------|--|
| 6. Member | Drs. Muchtarudin
Siregar | Chief of Communication
and Tourism Bureau,
BAPPENAS |
| 7. Member | Drs. Saleh Siregar | Director of Development
Budget, Ministry of
Finance |
| 8. Member | Mr. Saleh Ariffin | Mayor of Medan City |
| 9. Member | Prof. Hadibroto | Chief of BAPPEDA, North
Sumatra |
| 10. Member | Ir. J.T.Situmorang | Chief of North Sumatra
Regional Office,
Indonesian State Railway |
| 11. Member | Iman Suwarso | Chief of Road Transport
of North Sumatra |
| 12. Member | Ir. Harbani | Deputy Chief, Planning
Center, Indonesian State
Railway, Bandung |

(c) JICA Study Team

1. Team Leader	Mr. M. Inoue	Pacific Consultants International
2. Deputy Team Leader	Mr. K. Yasukawa	PCI
3. Member Regional Planner/ Economist	Mr. N. Yamakawa	PCI
4. Transport Economist	Mr. K. Mochizuki	PCI
5. Transport Planner	Mr. Y. Nishiya	PCI
6. Regional Planner/ Land Use Planner	Mr. F. Sugiyama	PCI
7. Railway Operation & Management Planner	Mr. H. Koyama	Japan Transportation Consultants
8. Railway Civil Engineer	Mr. M. Honma	JIC
9. Highway Engineer/ Civil Engineer	Mr. K. Haruoka	PCI
10. Bus Operation Specialist	Mr. O. Mutoh	PCI

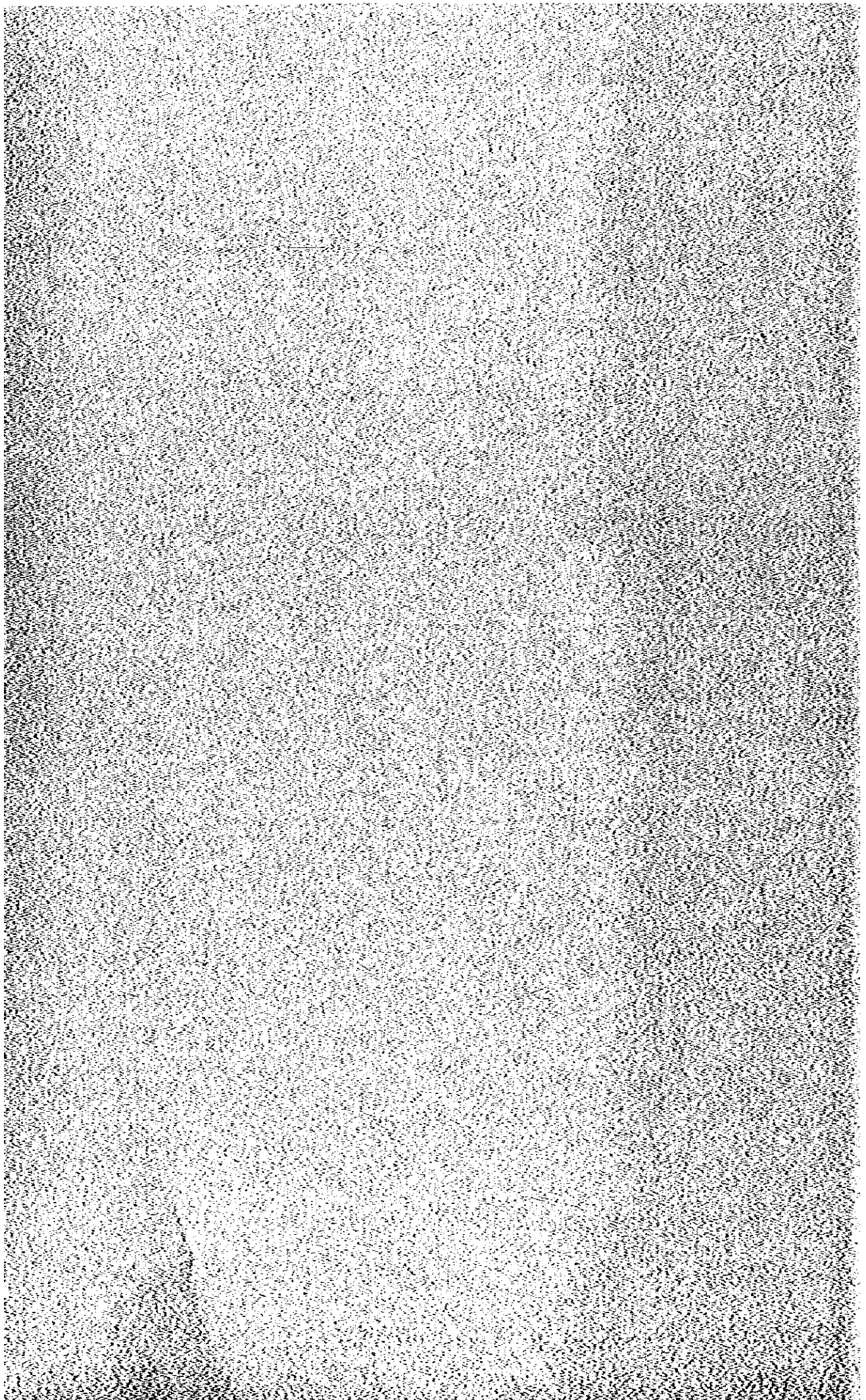
(d) Indonesian Counterpart Experts

1. Chief Counterpart/ Coordinator/ Transport Planner	Mr. Hasyim NT.	DLLAJR
2. Counterpart/ Administrator	Mr. Drs. Poernomo	PHBD
3. Counterpart/Trans- port Planner	Ir. Udji Atmomo	PHBD
4. Counterpart/Regional Planner	Ir. Sunarto	Cipta Karya
5. Counterpart/Traffic Engineer	Ir. Purnachean	Bina Marga
6. Counterpart/Bus Operation Economist	Drs. Iman Roedjoe	P.N. DANRI
7. Counterpart/Traffic Engineer	Mr. R. Rachmad Kondang	DLLAJR

- | | | | |
|-----|---------------------------------|---------------------------|-----------------|
| 8. | Counterpart/Transport Economist | Mr. Jatipold Purba | KOTAMADYA MEDAN |
| 9. | Counterpart/Transport Economist | Mr. Darwis | KOTAMADYA MEDAN |
| 10. | Counterpart/Regional Planner | Ir. Amir T. Lumban Tobing | BAPPEDA-SU |
| 11. | Counterpart/Transport Economist | Ir. Darwin S. | PHBD |
| 12. | Counterpart/Transport Economist | Mr. Adi Witjaksono | PJKA |
| 13. | Counterpart/Civil Engineer | Ir. Hardi | PJKA |

Chapter 2.

**SOCIO-ECONOMIC
AND LAND USE STUDY**



Chapter 2. SOCIO-ECONOMIC AND LAND USE STUDY

2.1 General

The main objectives of the socio-economic and land use study in the "Short-term Improvements" are:

- Inventory of the socio-economic and land use situations of the study area;
- Review of the available land use studies; and
- Provision of planning parameters for the Traffic Study.

Among the above three provisions of planning parameters for the traffic study is described in detail in the Long-Term Improvement Study, and in this chapter it is roughly outlined in Sec. 2.4 Projection and Zonal Allocation of Planning Parameters, providing planning parameters by zone for the base year, 1978, and the design year for the 'Short-term Improvement Study', 1985.

Sec. 2.2 Present Situation of Study Area and Sec. 2.3 Land Use of Medan City*) and its Surroundings deal with the region centered by Kot. Medan including Kab. D. Serdang, Kab. Langkat, Kot. T. Tinggi and Kot. Bunjai.

Notes: *) The hierarchy of study area's administrative structure is as follows:

- Kabupaten, Kotamadya: The North Sumatra Province is divided into 3 Kotamadyas and 14 Kabupatens, and Kabupatens are relatively urbanized areas.
- Kecamatan: Above Kabupatens and Kotamadyas are divided into Kecamatan. For example, Kot. Medan is divided into 11 Kecamatan.
- Kampung: Kecamatan are further divided into the smallest administrative units of Kampung.

2.2 Present Situation of Study Area

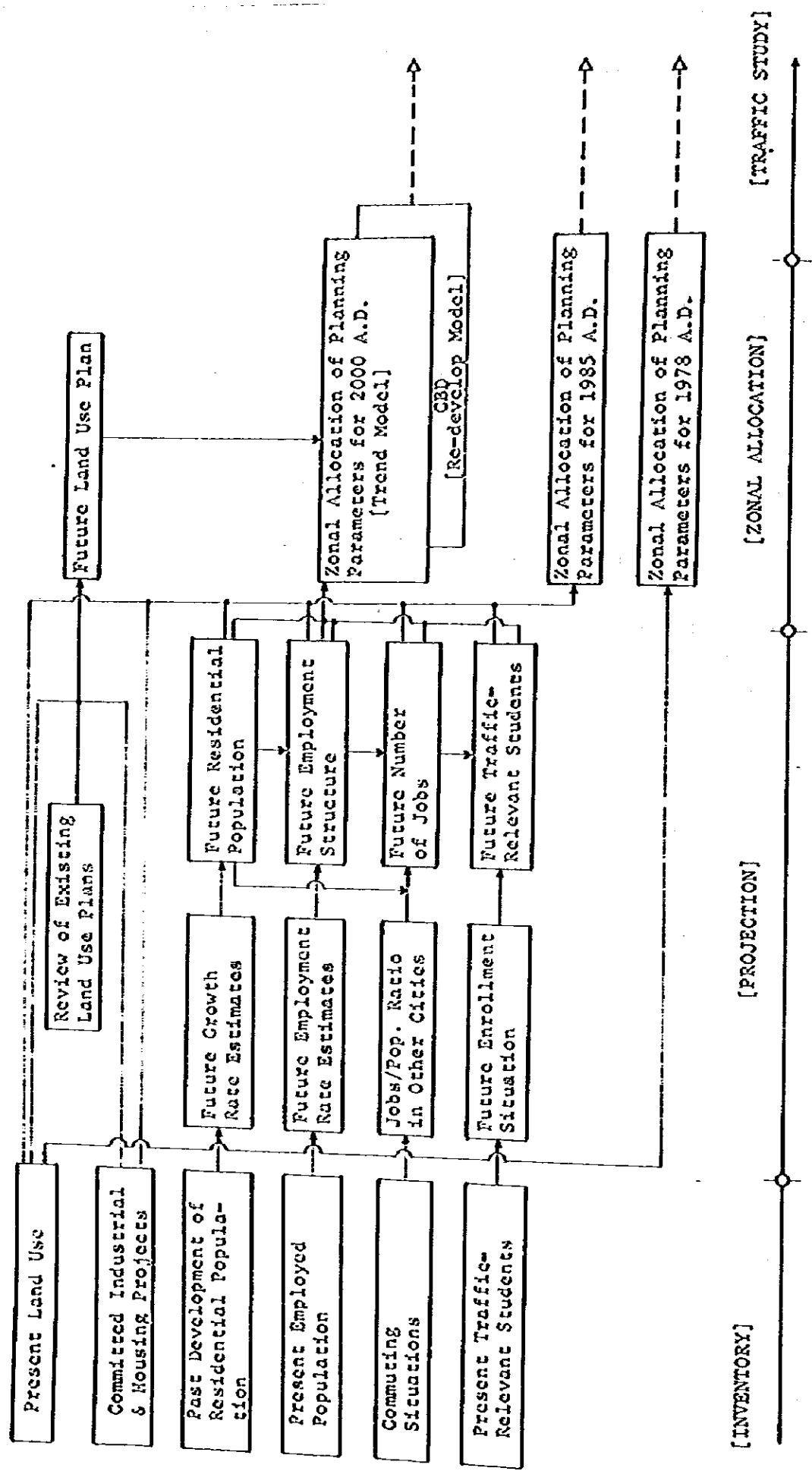
2.2.1 Residential Population

The residential population of the Province of North Sumatra in 1977 was about 7,470 thousand and its average annual growth rate in the period between 1967 and 1976 was around 2.3%/yr. which had exceeded that of the national total*).

Notes: *) The average annual growth rate for the national total population in the period between 1967 and 1976 was 2.09%/yr.

The past development of the residential population of Medan City after

Fig. 2-1-1: FLOW-CHART FOR SOCIO-ECONOMIC & LAND USE STUDY



the boundary change in 1973 is summarized in Table 2-2-1. Its average growth rate in the period 1974 - 1979 was about 3.63%/yr., of which around 2.0%/yr. is estimated to be the natural growth portion and the rest to be the migration.

Note: "Statistical yearbook of Indonesia", Bino Pusat Statistik, Jakarta, 1976.

Table 2-2-1 Past Development of Population, Medan City (1974-1979)

(unit: person)

Year	Population
1974	987,661
1975	1,032,106
1976	1,079,370
1977	1,104,441
1978	1,140,116
1979	1,180,378

Source: Kantor Sensus dan Statistik, Kot. Medan

Table 2-2-2 Past Development of Population, Medan City, Kot. T. Tinggi, Binjai & Kab. D. Serdang

(Unit: person)

Year	Kot. Medan *)-1	Kot. Binjai	Kot. T. Tinggi	Kab. D. Serdang	Total
1971 *)-2	635,562	59,868	30,299	1,430,237	2,155,966
Area (km ²)	51	20	3	6,454	6,528
1976 *)-3	1,079,370	70,673	32,488	1,119,549	2,302,080
1977 *)-3	1,104,441	71,994	33,659	1,177,406	2,387,500
1978 *)-4	1,140,116	69,791	27,719	1,158,855	2,396,481
Area (km ²)	265	20	3	6,240	6,528

Source: *)-1 -1971 : 'SENSUS PENDUDUK 1971', Biro Pusat Statistik, Jakarta, 1974.

-1976, '77
and '78 : Kantor Sensus dan Statistik, Kot. Medan

*)-2 -'SENSUS PENDUDUK 1971', Biro Pusat Statistik, Jakarta, 1974.

*)-3 -Except Kot. Medan: 'BUKU STATISTIK TAHUNAN 1976 and 1977', Kantor Sensus dan Statistik Tk. I Sumatra Utara, Medan, 1977 and 1978.

*)-4 -Except Kot. Medan: 'PENDUDUK SUMATRA AKHIR 1978', Kantor Sensus dan Statistik Tk. I Sumatra Utara, Medan, 1979.

Among the above four administrative units, the population density of Kot. T. Tinggi is as high as the central four Kecamatan (the old Medan City district before the boundary change in 1973) and Medan City occupies almost 50% of the total regional population. This region, which has Medan, City as its center, occupies only around 10% of the whole North Sumatra provincial area, accommodating around 30% of its population. Besides the permanent residential population in the census, there would be a considerable number of people who visit the city for a certain length of period for the purpose of temporary works or tourism. This seasonal population element is extremely difficult to estimate. In the case of the Surabaya Area Transportation Study, it was estimated to be around 18% of the total population (i.e., permanent population is 82% of the total population^{*)}.

Notes: *) See, Page 15 of 'SURABAYA AREA TRANSPORTATION STUDY, RESULTS AND RECOMMENDATIONS', Halcrow Fox and Associates, 1977.

In 'Master Plan Kotamadya Medan', Dinas Planologi Kotamadya Medan, 1974, Kot. Medan's future residential population is projected to be between 2,567,000 and 2,288,100 in 2000 A.D. The 'Medan Urban Development Study Project (MUDS)' which is underway at present, forecasts a more moderate growth of 2.5%/Yr. or 1.95 millions in 2000. The central four Kecamatan, namely, Kec. Medan Kota, Kec. Medan Timur, Kec. Medan Baru and Kec. Medan Barat, which occupy more than a half of the total population of Medan City has recorded very small population growth in recent years. Taking the natural increase into considerations, a counter-migration to the suburban areas is identifiable. Also, Kec. Belawan which has already the density of 78.9 persons/ha has been losing its population by 0.4%/Yr. in an average since 1975.

Other Kecamatan except agricultural oriented Kec. Medan Johor have recorded a rapid population increase of around 10%/yr. in the last five years. Especially, Kec. Medan Deli in the east has already the density of 83.5 persons/ha and is still adding its population at the rate of 13.9%/yr.

2.2.2 Employment

In 'Sensus Penduduk 1971', the economically active population is defined as the portion of the population of 10 years of age and over excluding students, home makers, income recipients, etc. And it is further classified into the employed and the unemployed population. An economically active person is classified according to his or her status as well as industry. For the case of the unemployed population, industrial classification is made according to the works previously performed. The sectoral classification of industries, the agricultural sector (Sector I), the manufacturing sector (Sector II) and commercial/administrative sector (Sector III), is made for this study purpose as classified in Table 2-2-3.

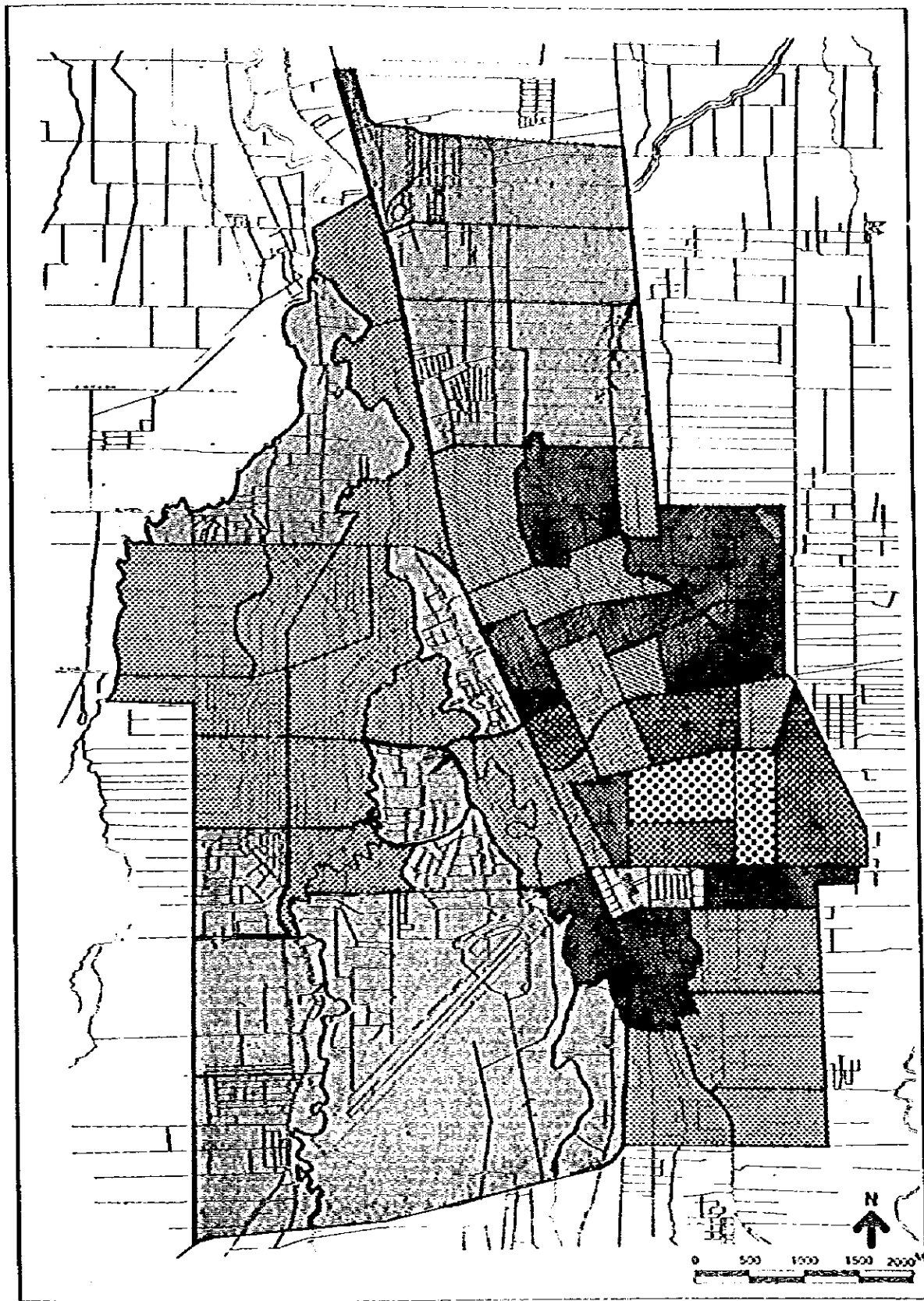







Fig. 2.2.1
Population Density by Kampung
Medan City (1978)

Legend

- | | | |
|---|---|---|
|  400 ~ |  200 ~ 400 |  200 ~ 300 |
|  100 ~ 200 |  ~ 100 | (Unit: Person/ha) |

Medan Area Transportation Study

Table 2-2-3 Sectoral Classification of Industries

Industry	Sector
Agriculture, Hunting, etc.	I
Mining and Quarrying	II
Manufacturing	II
Electricity, Gas and Water	III
Construction	II
Trade, Restaurant and Hotels	III
Transport, Storage and Communication	III
Financing, Insurance, etc.	III
Community Services, etc.	III
Activities not adequately defined	III

The economically active and employed populations are shown in Table 2-2-4 and 2-2-5.

Several characteristics observed in the above tables are such as:

- In Kab. D. Serdang which is predominantly rural in its character, the ratio between economically active population and the residential population is approximately 10% higher than urban regions, or Kotamadyas;
- The percentage of Sector I workers in Medan City has increased by around 7%/yr. between 1971 (before the boundary change) and 1978 because of the relatively rural character of the added fringe areas. And, contrarily, that of Sector III workers decreased while the share of Sector II workers remained almost same;
- Kot. Binjai's statistics indicate that it is still of semi-urban character because of its of Sector I workers' high percentage, 13%; and
- The highest rate of employment is that of Kot. T. Tinggi, 93.2%, possibly because of its small size of the administrative unit.

According to 'LAPORAN PEMBANGUNAN, DAERAH TINGKAT II KOTAMADYA MEDAN, SELAMA PELITA II', the high unemployment rate among the younger generation in the age between 10 and 24 years old in Medan City is one of the serious social problems at present. And the rate of employment is estimated to have grown by 3.7%/yr. The same report also urges the shortage of permanent employment for unskilled labour and a small percentage of skilled workers.

2.2.3 Education

Besides the residential population and the employed population, the number of students who also commute by some mode of transport should be reflected in the transportation study.

Medan City has been not only the regional economic center of the North

Table 2-2-4 Economically Active Population by Sector and by Municipality, 1971

Name of Kabupaten and Kotamadya	Residential Population	(unit: person)				
		Economically Active Population				
		Total	(%)	Sector I (%)	Sector II (%)	Sector III (%)
Kot. Medan	635,562	153,887	(24.2)	3,747 (2.4)	22,230 (14.5)	127,910 (83.1)
Kot. T. Tinggi	30,299	7,598	(25.1)	215 (2.9)	1,039 (13.6)	6,344 (83.5)
Kot. Binjai	59,868	15,067	(25.2)	1,826 (12.1)	1,766 (11.7)	11,475 (76.2)
Kab. D. Serdang	1,430,237	490,806	(34.3)	322,402 (65.7)	27,436 (5.6)	140,968 (28.7)

Source: 'SENSUS PENDUDUK 1971', Biro Pusat Statistik, Jakarta, 1974

Table 2-2-5 Employed Population by Sector and by Municipality, 1971

Name of Kabupaten and Kotamadya	Economically Active Pop.	(unit: person)				Rate of Employment (%)
		Employed Population				
		Sector I	Sector II	Sector III	Total (%)	
Kot. Medan (1971)	153,887	3,327 (2.6)	19,866 (15.2)	106,893 (82.2)	130,086 (20.5)	(84.5)
Kot. Medan (1978)	357,624	29,084 (9.2)	47,423 (15.0)	238,596 (75.8)	315,103 (27.6)	(88.1)
Kot. T. Tinggi (1971)	7,598	201 (2.8)	952 (13.4)	5,927 (83.8)	7,080 (23.4)	(93.2)
Kot. Binjai (1971)	15,067	1,778 (13.0)	1,689 (12.3)	10,217 (74.7)	13,684 (22.9)	(90.8)
Kab. D. Serdang (1971)	490,806	300,291 (69.8)	24,834 (5.8)	105,247 (24.4)	430,372 (30.0)	(87.7)

Source: 1971: 'SENSUS PENDUDUK 1971', Biro Pusat Statistik, Jakarta, 1974

1978: 'LAPORAN PEMBANGUNAN, DAERAH TINGKAT II, KOTAMADYA MEDAN, SELAMA PELITA II', Walikota Daerah Tk. II Medan, 1979

Sumatra Province, but also its cultural and social centers. The role of Medan City in this respect will continue in the future, or it will become even more important*).

Notes: *) See, for example, Page 108 of 'MASTER PLAN KOTAMADYA MEDAN, FINAL REPORT', Dinas Planologi Kotamadya Medan, 1974.

Out of 18 universities including academies*) existing in the North Sumatra Province, 15 are situated in Medan City, including two state universities.

Notes: *) Academies provide more vocational education than universities.

The number of students attending universities or academies in Medan City accounted for 16,000 or 1.6% of the total population in 1976.

Table 2.2.6 Number of University/Academy Students in Medan City, 1976

(unit: Student)		
Name of University/ Academy	Address	Number of Students
1. Univ. Islam Sum. Utara	Jl. Si-Singamangaraja, Medan	2,245
2. Univ. Dharma Agung	Jl. Timor, No. 36, Medan	101
3. Univ. Methodist Indonesia	Jl. Hang Tuah No. 8, Medan	246
4. Univ. Muhammadiyah SU	Jl. Gedung Area No. 53, Mdn	305
5. Univ. HKBP Nommensen	Jl. Sutomo No. 4, Medan	562
6. Univ. Panca Budi	Jl. Binjai Km. 4,5 Medan	137
7. Akademy Tekstil TD. Pardede Foundation	Jl. Bantan No. 21, Medan	182
8. Akademy Sekretaris Management Tugama	Jl. Tilak No. 59, Medan	70
9. Akademy Bahasa Asing Awadaya	Jl. Yose Rizal No. 3A, Mdn	89
10. Akademy Bank & Keuangan	Jl. Yose Rizal No. 3A, Mdn	348
11. Akademy Bahasa Asing Yaspendar	Jl. Imam Bonjol No. 37, Mdn	422
12. Akademy Sekretaris Management Yaspendar	Jl. Imam Bonjol No. 37, Mdn	301
13. Akademy Teknik Medan	Jl. Gedung Arce No. 26, Mdn	
14. Univ. Sumatra Utara	Jl. Dr. Mansyur No. 5, Mdn	7,740*)
15. IKIP Negeri Medan	Jl. Merbau, Medan	3,355
Total		16,103

Notes : *) Number of Students in 1975

Source: University Coordinator of North Sumatra Province

The number of schools and students of SD (primary school), SLP (Junior High School) and SLA (Senior High School) of the study area in 1979 are shown in the following table.

Table 2-2-7 Number of Pre-University Schools & Students by Kecamatan, 1979

Name of Kecamatan	S D		S L P		S L A	
	Schools	Students	Schools	Students	Schools	Students
1. Medan	114	45,822	37	13,601	35	15,311
2. Medan Timur	100	32,825	33	9,771	27	11,747
3. Medan Barat	59	23,276	22	5,419	12	3,794
4. Medan Baru	76	26,939	31	9,692	15	5,119
5. Medan Belawan	35	11,921	7	1,515	2	653
6. Medan Sunggal	54	18,505	21	3,927	8	-
7. Mdn. Tuntungan	19	3,326	5	586	1	-
8. Medan Johor	44	10,631	4	826	4	587
9. Medan Denai	68	19,576	14	2,386	6	875
10. Medan Deli	30	7,001	2	178	1	-
11. Mdn Labuhan	33	8,984	5	1,425	1	394
Total	631	208,806	181	49,326	121	-

Source: Department of Education, North Sumatra Province

According to the above table, the number of SD students in Medan City accounts for approximately 18.0% of the total population, and the distribution of schools throughout the municipal area is almost proportional to the residential population. Contrarily, the ratio of the SLP students to the residential population is higher in the central district than in the peripheral areas, and it is more so for SLA students. These facts indicate that a considerable number of SLP and SLA students commute into the central district crossing Kecamatan boundaries, and/or that the rate of enrollment is higher within the central area than within the suburban areas. Curious facts are that smaller Kotamadyas such as Kot. T. Tinggi or Kot. Binjai accommodate much higher percentage of SLP and SLA students to their residential population than in Medan City. This is very evident especially in Kot. T. Tinggi where the percentage of SLP and SLA students to its residential population is 18% and 17%, respectively (4.4% and 3.6% in Medan City). This is explained that a large portion of students commute into these Kotamadyas from their exterior rural areas.

2.2.4 Regional Income and Gross Regional Domestic Products

There is no GRDP (Gross Regional Domestic Products) or regional income figures found for Medan City except an assumption made in 'LAPORAN PEMBANGUNAN, DAERAH TINGKAT II KOTAMADYA MEDAN, SELAMA PELITA II (1974/1975 s/d 1978/1979)'. The above report estimates the growth rate of Medan's GRDP to be around 19% during the period 1974-1978. According to 'STATISTICAL YEAR BOOK, NORTH SUMATRA FIGURES, 1977', the GRDP per capita and the regional income at constant prices for the North

Table 2-2-8 Number of Pre-University Schools & Students by Municipality (1976-1978)

{Unit: School}
{Unit: Person}

	1976			1977			1978											
	SD	SLP	SLA	SD	SLP	SLA	SD	SLP	SLA									
	Schools	Students	Schools	Students	Schools	Students	Schools	Students	Schools	Students								
Kab. Deli Serdang	820	178,401	36	16,513	19	3,013	823	201,441	105	20,941	26	4,357	940	219,232	112	23,923	31	5,638
Kot. Medan	512	162,582	124	42,081	85	30,113	553	198,724	227	52,316	98	39,003	575	204,493	177	50,137	106	40,928
Kot. Binjoi	-	-	13	5,755	10	2,395	-	-	17	5,797	12	3,971	-	-	17	5,789	14	4,643
Kot. T. Tinsari	-	-	9	9,256	11	2,756	-	-	19	4,835	12	4,118	-	-	20	4,990	13	4,721
Total	-	-	182	69,605	125	38,277	-	-	368	83,839	148	51,449	-	-	326	84,839	133	55,930

Source: Department of Education, North Sumatra Province

Sumatra Province recorded about 4.8%/yr. of growth during the period 1972-1975. When the population growth rate of Medan City (3.6%/yr.) is taken into consideration, the growth rate of Medan's GRDP per capita is estimated to be about 30% higher than that of the whole North Sumatra Province*).

Notes: *) $(1.10/1.036 - 1)/0.048 = 1.29$

The above per capita figure for the North Sumatra Province (4.8%/yr.) exceeds the growth rate of regional income per capita for the whole nation during the same period (4.6%/yr.). However, it is lower than that for DKI Jakarta (7.4%/yr.).

Table 2-2-9 Regional Income of Indonesia, DKI Jakarta & North Sumatra (1972 & 1975)

(unit: Rupiah)

Item	Region	1972	1975
Regional Income per Capita at Current Prices	Indonesia	31,841	82,280
	DKI Jakarta	72,437	165,551
	North Sumatra	50,118	110,983
Regional Income per Capita at 1971 constant Prices	Indonesia	27,803	31,835
	DKI Jakarta	62,614	77,607
	North Sumatra	46,788	53,780

Source: Indonesia : 'STATISTICAL YEAR BOOK OF INDONESIA 1976', Biro Pusat Statistik, Jakarta

DKI Jakarta : 'REGIONAL INCOME OF JAKARTA', 1969-1975, Census and Statistical Office, Jakarta

North Sumatra: 'STATISTICAL YEAR BOOK, NORTH SUMATRA FIGURES, 1977', Kantor Sensus dan Statistik Tk. I Sumatra Utara, Medan, 1978

The sector composition of GRDP for the North Sumatra Province has not changed much in recent years except a drop in the manufacturing sector as shown in Table 2-2-10. Contrarily to the above figures, the production value of the industrial sector in Medan City is reported to have increased by 17.3% during the period 1974-1979, while the area for the agricultural land use has decreased by 3%/yr. *)

Notes: *) Page 4-18 and Page 4-16 of 'LAPORAN PEMBANGUNAN, DAERAH TINGKAT II KOTAHADYA MEDAN, SELAMA PELITA II (1974/1975 s/d 1978/1979)', Walikotaadya Daerah Tk. II Medan, 1979.

Table 2-2-10 Sector Composition of GRDP at Current Prices, North Sumatra (1972-1975)

Sector	(unit: %)			
	1972	1973	1974	1975
1. Agriculture	35.30	39.54	38.81	36.00
2. Mining	4.79	4.67	7.99	7.73
3. Manufacturing	17.03	14.10	11.76	12.97
4. Construction	2.18	1.68	1.34	1.27
5. Electricity, Water and Gas	0.15	0.13	0.17	0.14
6. Transportation and Communication	2.92	2.70	2.93	4.05
7. Trade and Hotel	22.82	21.82	21.12	21.06
8. Banks and Insurance	4.03	4.52	4.52	5.15
9. House Rent	3.02	3.10	3.04	2.76
10. Government and Defence	4.53	4.57	4.66	4.94
11. Service	3.22	3.55	3.65	3.93
GRDP Total	100.00	100.00	100.00	100.00

Source: 'STATISTICAL YEAR BOOK, NORTH SUMATRA FIGURES, 1977', Kantor
Census dan Statistik Tk. I Sumatera Utara, Medan

2.2.5 Car Ownership

The number of motor vehicles including motorcycles registered in the North Sumatra Province and in Medan City in 1979 was 258,289 and 161,955, respectively. The number of motor vehicles in the North Sumatra Province has increased at an average annual rate of 9.8% since 1976 which exceeds the GRDS's growth rate per capita (around 5%/yr.)

The car ownership per 1,000 persons^{*)} for the North Sumatra Province and Medan City in 1977 was 7.0 and 34.7, respectively. Comparing to figures for the national total and DKI Jakarta, the car ownership for the North Sumatra Province is slightly higher than that for the whole nation (5.12 in 1976) while that for Medan City is lower than that for DKI Jakarta (40.05 in 1976).

Notes: *) Here, the car ownership rates do not include that of motorcycles.

Observing the composition of vehicle types, the difference between those for DKI Jakarta and Medan City becomes evident. The percentage of sedans and trucks in DKI Jakarta accounts for 74.1% and 21.1% respectively, while in Medan City 58.4% and 34.4%. The large percentage of trucks indicates the character of Medan City as a regional commodity distribution center. And, the low percentage of sedans in Medan can possibly be attributed to the low per capita income and the small size of the city.

Note: Also this could be attributable to the general tendency that the percentage of trucks declines along with the motorization growth.

Table 2-2-11 Number of Vehicles Registered in North Sumatra Province (1976-1979)

Vehicle Type	(unit: vehicle)			
	1976 (%)	1977	1978	1979 (%)
Sedan	25,368(15)	28,781	32,631	34,600(13)
Truck	14,799(8)	17,865	21,085	23,667(9)
Bus	5,032(3)	5,685	6,222	6,502(3)
Motorcycle	132,107(74)	153,608	176,208	193,520(75)
Total	177,576(100)	205,939	236,146	258,289(100)

Source: Kepolisian R.I. Komando Daerah Kepolisian III, Sumatra Utara

Table 2-2-12 Number of Vehicles Registered in Medan City, 1979

Vehicle Type	(unit: vehicle)	
	No. of Vehicles	(%)
Sedan	23,933	(15)
Truck	13,932	(9)
Bus	3,112	(2)
Motorcycle	120,978	(74)
Total	161,955	(100)

Source: Kepolisian R.J. Komando Daerah Kepolisian III, Sumatra Utara

2.3 Land Use of Medan City and its Surroundings

2.3.1 Existing Conditions

According to the map provided by Dinas Planologi Kotamadya Medan, the boundary of Medan City has been changed twice during the past 30 years; more specifically, it was, in 1951 and 1973 (See, Fig. 2.3.1). The area of Medan City before 1951 was 1,583 ha of the present central area including the downtown district on the east side of the railway track, the district of administrative land use on the west side and the low density residential district of Plonia. This old district remains to be the center of urban activities still at present. One of the most distinctive characters of the land use pattern of this central commercial and administrative district of Medan City would be its contrast between the east and west sides of the railway track. On the east side, traditionally wholesale markets and retails are situated, generating downtown activities. While on the west side, government offices, public buildings and rather large scale shops are located with a more comfortable density. In the middle along the railway track, PJKK-owned warehouses line up. In 1951, the boundary changed adding 3,546 ha of peripheral areas largely in the north and west directions. This 5,130 ha of the city limit is divided into four Kecamatan which accommodate 57% of the total City's population in 1979. However, as mentioned in Sec. 2.1.1 Residential Population, the residential population growth of these four Kecamatan has become very small during the period 1975-1979, and residential population's flowing-out movement is visible. And these central areas are now

changing their nature into the CBD. *)

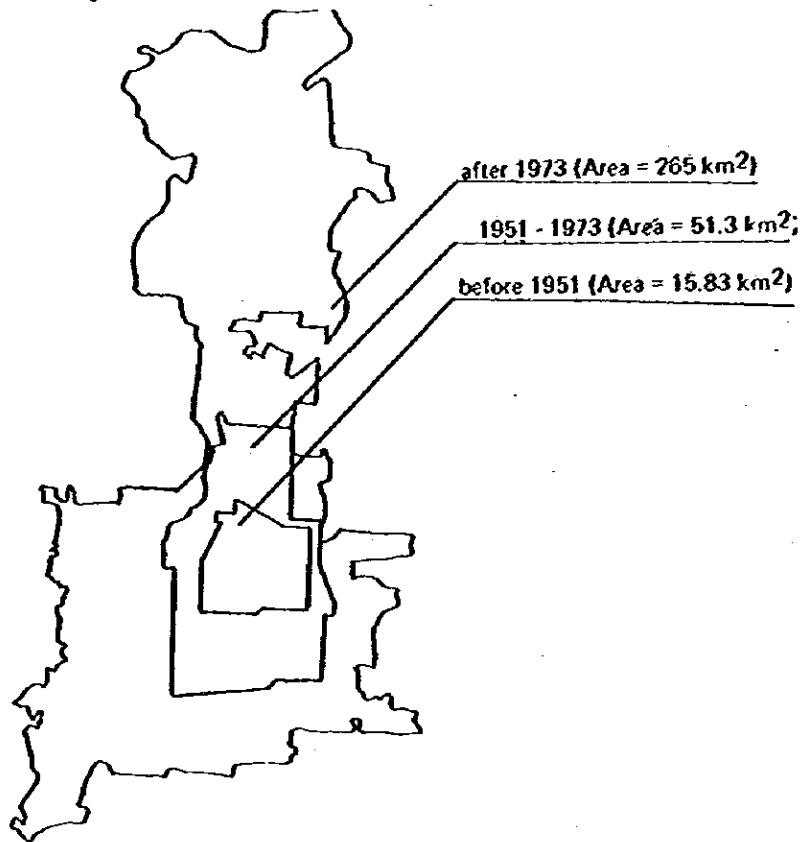
Notes: *) In more urbanized cities, the term CBD (Central Business District) applies to a district where business and administrative offices are concentrated without much residential population. In the case of Medan City the density of population in the central area is still very high.

The fact that it was enlarged in the direction of the Medan-Belawan corridor seems to prove that the Medan City had originally the role of regional distribution center of commodities into the whole hinterland of the Belawan Port. As the city grows creating its own character not merely as a center of imported commodity distribution, but also as an economic, administrative and cultural center in the region, the infrastructure developed within the central district as to serve for commodity distribution such as its road network pattern, cargo terminals and storages have become obstacles for the further growth of urban activities.

In 1973, the city limit was further expanded mostly into the direction of north up to Belawan adding extra 21,380 ha of rather rural areas. This action seems to be taken based upon evaluating the high developing potential of the Medan-Belawan corridor. However, observing the development trends after this decision, residential areas are penetrating outward along almost every radial corridors, especially to the east. Therefore, despite of the present shape of the city boundary, although the commodity flow through Belawan-Medan corridor is the strongest of all, this corridor should not be over-emphasized in a residential development aspect. In addition to it, it has a regular flooding problems.

Notes: *) "The flooding and drainage problems which are evident along the Medan-Belawan corridor are very likely to preclude this area from development as fully as the 1974 Master Plan contemplated" from "INTERIM STRATEGIC PLAN AND FEASIBILITY PROJECT", Medan Urban Development, Housing, Water Supply and Sanitation Project, 1979.

Fig. 2.3.1 EVOLUTION OF CITY BORDER



The existing land use formation of Medan City is summarized in Table 2.3.1.

Table 2.3.1 Land Use, Medan City, 1974

Land Use	Area(ha)	(%)
Residential	6,499.76	(24.53)
Commercial	123.96	(0.48)
Industrial	170.03	(0.65)
Administrative	115.68	(0.45)
Infrastructure/Recreational	44.31	(0.18)
Agricultural/Undeveloped	19,538.46	(73.71)
Total	26,510.00	(100.00)

Source: "LAPORAN PEMBANGUNAN, DAERAH TINGKAT II KOT. MEDAN, SELAMA PELITA II (1974/1975 s/d 1978/1979)"
Walikotamadya Daerah Tk. II Medan, 1979

The location of pasars^{*)} is one of the indication of distribution pattern of commercial activities.

Notes: *) Pasars are market places where activities and facilities for trading are concentrated.

Table 2-3-2 Area, Class & Location of Pasars Existing in Medan City (1979)

Kecamatan	Name of Pasar	Area (m ²)	Class	
1. Medan Kota	1. Mercuri Buana	23,400	I A	Pusat Pasar
	2. Loods II-IV PP	14,333	I	Pusat Pasar
	3. Proyek "C"	8,139	I	Pusat Pasar
	4. Jl. Halat	8,519	II	Pasar Merah
	5. Jl. Selat P	400	IV	Pasar Baru
	6. Pandu Baru	1,332	II	Kp. Mesjid
	7. Sambas	2,757	I	Kp. Mesjid
	8. Pasar Baru	4,580	I	Pasar Baru
	9. Sukaramai	3,150	II	Sukaramai II
	10. Jl. Akik	400	III	Sukaramai II
	11. Jl. Bakti	5,100	III	Tegalsari
	12. Beruang/Gajah	2,400	III	Padang Hulu
2. Medan Baru	13. Pringgau	11,400	II	Babura
	14. Huara Takus	7,508	II	Madnas Hulu
	15. Kp. Baru	388	III	Kp., Baru
	16. Padang Bulan	2,500	III	Pd. Bulan
3. Medan Barat	17. Jl. Suarna	400	III	Kesawan
	18. Jl. Hindu	640	III	Kesawan
	19. Medan Deli	8,500	III	P. Brayon
	20. Meranti	2,600	III	Sekip
	21. Glugur Kota	2,931	III	Glugur Kota
	22. Petisah	20,000	I	Petisah
4. Medan Timur	23. Sambu	3,410	I	Gg. Buntu
	24. Jl. Cahaya	2,100	III	Kp. Durian
	25. Jl. Sentosa	1,600	III	Sei Kera Hilir
5. Medan Sunggal	26. Sei Sikambang	5,324	II	Sei Sikambang

Source: LAPORAN PEMBANGUNAN, DAERAH TINGKAT II KOTAMADYA MEDAN SELAMA PELITA II (1974/75 s/d 1978/79)

Table 2-3-3 Distribution of Medium & Small Sized Industrial Enterprises in Medan City, 1976

Name of Kecamatan	No. of Enterprizes	No. of Employees
1. Medan Kota	35 (12.68%)	9,532 (10.73%)
2. Medan Barat	20 (7.25)	9,252 (10.62)
3. Medan Timur	22 (7.97)	9,555 (10.96)
4. Medan Barat	20 (7.25)	9,250 (10.61)
5. Medan Denai	32 (11.59)	7,525 (8.63)
6. Medan Labuhan	32 (11.59)	6,155 (7.06)
7. Medan Johor	15 (5.43)	8,525 (9.78)
8. Medan Belawan	40 (14.49)	7,525 (8.62)
9. Medan Deli	34 (12.32)	6,250 (7.17)
10. Medan Sunggal	20 (7.25)	7,251 (8.28)
11. Medan Tuntungan	6 (2.17)	6,575 (7.54)
Total	276(100%)	87,174(100%)

Source: "PADAN MEDAN HIGHWAY, ANNEX TO VOL. I", Sauti-Renardet-Ice, 1978

As shown in Table 2.3.2 most of pasars are found in the central four Kecamatan especially in Kec. Medan Kota. They are classified into several classes by the city government, but the criteria of classification was not identified during the survey period. During the period of Pelita II, 12 pasars were added and 3 are now under construction.*)

Note: *) From "LAPORAN PEMBANGUNAN, DAERAH TINGKAT II KOTAMADYA MEDAN SELAMA PELITA II (1974/1975 s/d 1978/1979)"

Residential areas are penetrating into peripheral areas along major corridors. The population density is the highest in the eastern side of the central district; and, for example, some Kampung in Kec. Medan Kota have an extremely high population density of more than 400 persons/ha. Contrarily, in the western side the old residential district of Polonia remains to be a residential area of density as low as 33 persons/ha. The Polonia Airport and its surrounding open areas, only 4 km away from the city center, form a barrier for the further development of the built-up area in this direction. The residential development to the north is only limited to the narrow zone along the Medan-Belawan corridor. This is the same for any residential development pattern in the rural areas where a collector road pattern has not been organized yet. Off highway areas are simply unaccessible within external areas.

There is no large industrial area at present in Medan City. Rather small scaled industrial enterprises are located along the Medan-Belawan corridor and Medan-T. Tinggi corridor. As shown in Table 2-3-3. The distribution is rather homogeneous throughout the city. Therefore, it should be noted that the present land use classification serves for not more than an indication of dominant use within an area, and that different kinds of small scaled land use coexist even where it is classified into one kind of use. From a view of the wider region centered by Medan City, it is found that the most of villages are located along major corridors (See, Fig. 2-3-2). Among them, the Medan-T. Tinggi corridor is the longest of all, and therefore it has a long ribbon of inhabited areas along it, such as L. Pakan, Perbaungan, S. Rampah, etc. On the other hand, the inhabitable areas in the west of Binjai become much scarce in the further west of Binjai, and no large built-up areas are found, and such condition is even more vivid in the mountainous southern areas.

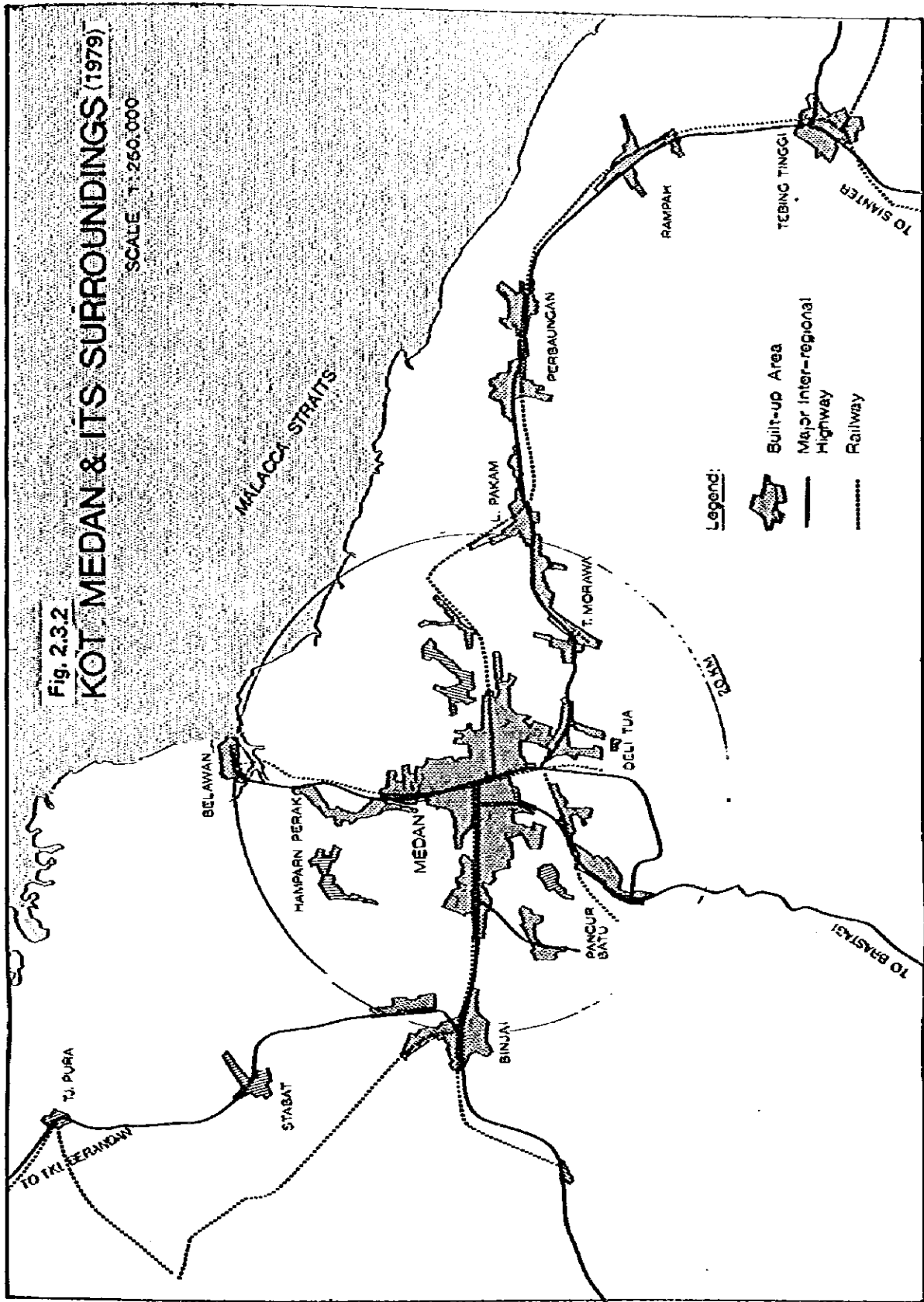
2.3.2 Review of 'MASTER PLAN OF MEDAN CITY'

(1) General

The central concept of "MASTER PLAN KOTAMADYA MEDAN", Dinas Planologi Kotamadya Medan, 1974, would be summarized as:

- Dispersion of urban facilities too much concentrated in the CBD at present to wider peripheral areas by a combined road pattern of a series of ring roads and radial roads; and
- Reorganization or new development of residential communities with a hierarchy of community centers.

For implementation of road network improvement and improvement or new



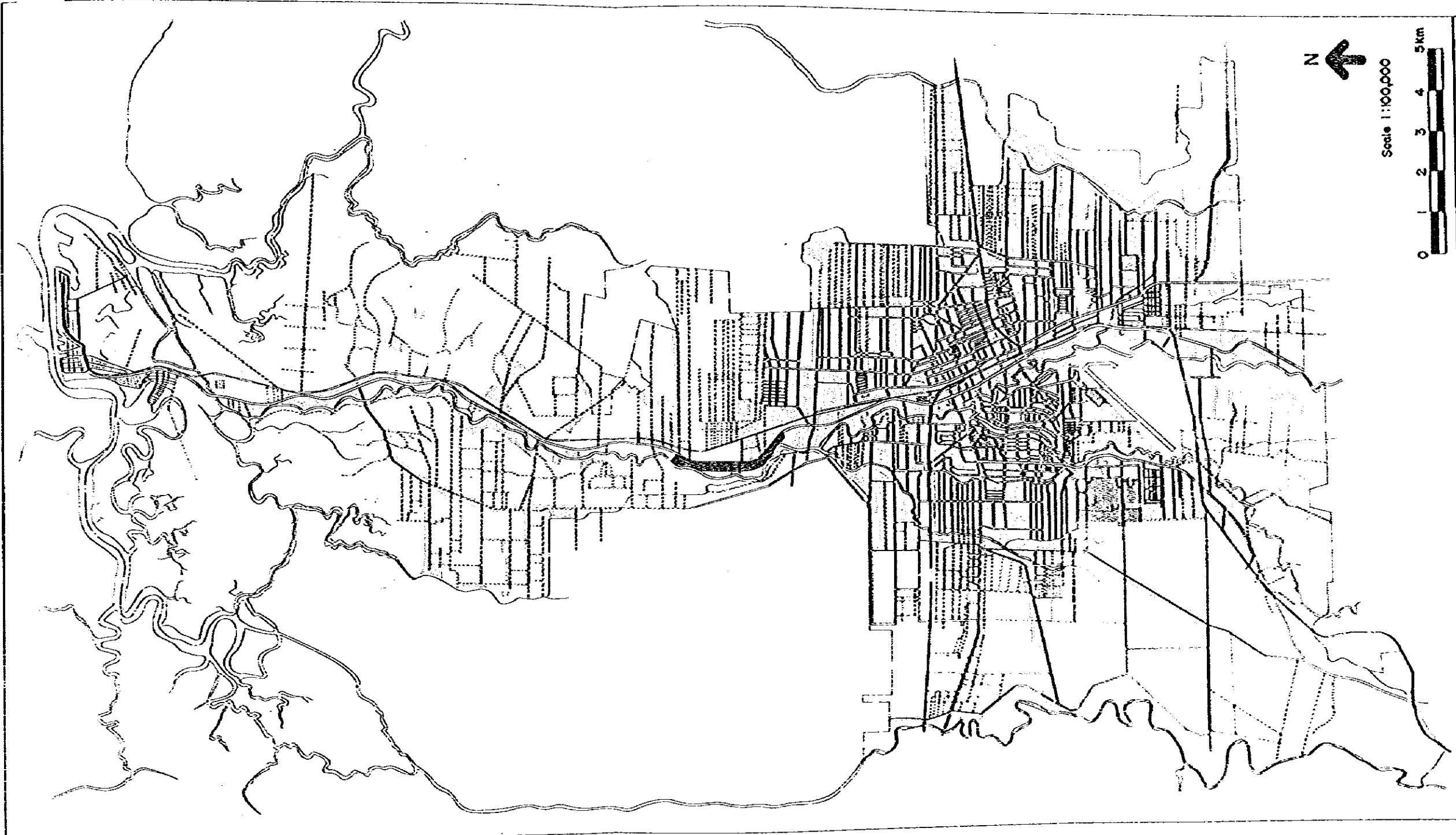






Fig. 2.3.3
 Present Land Use, (1974)
 Source: MASTER PLAN KOTAMADYA MEDAN

Medan Area Transportation Study

Legend

-  Commercial/Administrative Area
-  Residential Area
-  Land with Development Plan
-  Industrial Area

N ↑
 Scale 1:100,000
 0 1 2 3 4 5 km



construction of residential communities, the whole design period is phased into 5-year periods of:

- Stage I (1974-1978);
- Stage II (1979-1983);
- Stage III (1984-1988);
- Stage IV (1989-1993); and
- Stage V (1994-1998).

In general, in the early stages of road network improvement, radial roads and the Inner Ring Road and some portion of Intermediate Ring Road are scheduled to be implemented, followed by construction of the rest of the Intermediate Ring and the northern and the western section of the Outer Ring Road. In the later stages, the eastern section of the Outer Ring Road, and then in the final stage its western section are scheduled to Outer follow.

For residential area development, in the earlier stages before 1985 most of the existing residential areas within the Inner Ring Road and the eastern side off the Inner Ring Road are planned to be improved, followed by some of residential areas within the Outer Ring Road. Also, residential areas along the radial roads to Belawan and P. Batu, and some of them within the Outer Ring Road are scheduled to be constructed in accordance with the schedule of the road network improvement project. In the later stages housing projects in the peripheral areas outside the Outer Ring Road are scheduled to be implemented.

As mentioned in the previous section "MASTER PLAN KOTAMADYA MEDAN" was formulated within the limited sphere of the present city limit, and it is not made clear to what extent the development outside of Medan City has been taken into consideration. For example, one of the two housing projects presently implemented, the Medan Denai Housing Project, is in fact located outside of the City's boundaries.

The implementation is being carried out slightly behind the schedule, and those under way at present are:

- The section of the Outer Ring Road between Gelgur and Sikambing;
- The Maryland Industrial Estate Project along the Medan-Belawan corridor;
- Kampung Improvement Project within the central district;
- The Medan Denai and Helvetia Housing Projects; and
- The new Medan-Belawan road parallel to the existing one.

Following the Maryland Industrial Estate Project listed above several industrial projects are planned to follow. Also, a site selection survey is under way for the third housing project, Medan III Housing Project.

(2) Road Network

The road network will be described in detail in Chapter 5: Evaluation of Present Situations, and the road network improvement scheme in "MASTER PLAN OF MEDAN CITY" will be roughly outlined, here. In Medan City there is no road classified into Class I by the Bina Marga's standard. In 1979, the beginning year of Pelita III, the length of paved road amounted to:

- Class II : 56.7 km;
- Class III : 130.7 km;
- Class IV : 292.75 km; and
- Class V : 42.00 km.

Notes: *) See, Page 4-1 to 4-4 of "LAPORAN PEMBANGUNAN, DAERAH TINGKAT II KOTAMADYA MEDAN, SELAMA PELITA II (1974/1975 s/d 1978/1979)", Walikota-medya Daerah Tk. II Medan, 1979.

During the 5 years period of Pelita II, approximately 100 km of the road length has been added, and 122 km of rehabilitation and up-grading was made.

Despite the efforts mentioned above, roads in poor conditions have also increased due to an excessive volume of traffic and a small maintenance budget.

In "MASTER PLAN OF MEDAN CITY" a schedule of road network improvement is outlined as follows:

- Stage I (1974-1978):

- A new road construction (mostly widening) connecting Titipapan and the city center in parallel to the existing Medan-Belawan road.
- The Inner Ring Road construction to reduce the traffic within the central district.

- Stage II (1979-1983):

- Continuous betterment of the Medan-Belawan road connected with the Medan-T. Tinggi road by the Inner Ring to by-pass the inter-regional traffic flow.
- Completion of the Inner Ring Road.
- To connect the Medan-Binjai road with the Medan-Belawan road by the north-west portion of Outer and Intermediate Ring roads.
- Reorganization of the feeder road system to the Medan-Deli Tua road.

- Stage III (1984-1988) :

- Continuous betterment of the Belawan-Medan-T. Morawa road.
- Reorganization of the feeder road system to the Medan-T. Tinggi road.

- Stage IV (1989-1993):

- Construction of Class III and Class IV roads for the areas of new residential development.

On the other hand, Medan-Belawan-T. Morawa Highway is scheduled to be commenced its construction in 1980 by the Ministry of Public Works as a 4-lane, full access controlled tollway. This tollway project was announced after the completion of "MASTER PLAN KOTAMADYA MEDAN".

(3) Residential Area Development

There are two kinds of residential development proposed in "MASTER PLAN OF MEDAN CITY", and they are:

- Up-grading of Existing Communities; and
- New Housing Development.

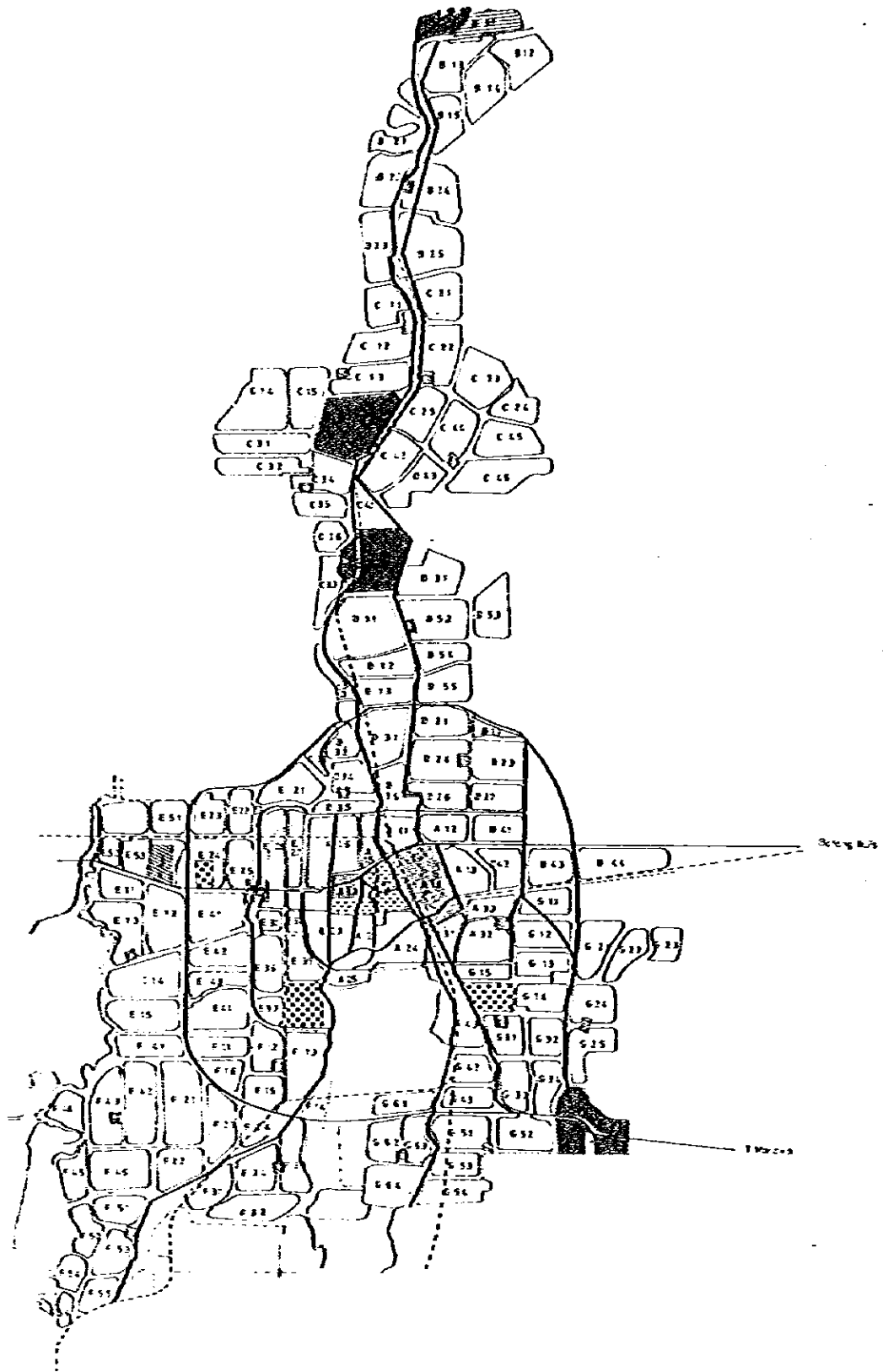
The latter is conducted by Perumnas (The National Housing Board) and the former, called the Kampung Improvement Project, by Cipta Karay. In order to accommodate the forecasted population of 2,288,100 to 2,567,000 in the year 2000 A.D., the gross population density of 94.8 persons/ha, the whole area within the city limit is planned to be developed except the airport surrounding areas and the green belt along the border. The whole Medan City is divided into 7 regions based on the administration units boundary, and as shown in Fig. 2.3.4: Map of Planning Unit Division the residential area in each region is further divided into planning units of three grades such as:

- Planning Unit I (5,000-10,000 persons/unit);
- Planning Unit II (20,000-40,000 persons/unit); and
- Planning Unit III (60,000-120,000 persons/unit).

The density of population in each Planning Unit I varies from 100 persons/ha to 300 persons/ha. Based upon this future population distribution plan for each areas, distribution plans for public facilities such as schools, social facilities, recreational facilities, etc. are formulated.

(4) Industrial Area Development

There are not many large scale industrial areas found within Medan at present, those of small scale are found along the Medan-Belawan corridor



Legend

- | | | |
|-----------------|----------|---------------------|
| Trade | Industry | Housing |
| Government | Port | Sub City Centre |
| Social Facility | Utility | Centre Of Community |

Fig. 2.3.4 MAP OF PLANNING UNIT DIVISION
IN MASTER PLAN OF MEDAN CITY

and the Medan-T. Tinggi Railway Line. The average number of workers per enterprise is around 25 employees for chemical and mechanical industry and 1.3 employees for handicraft industry. During the Pelita II period, the number of enterprises has increased at an average annual rate of 5.5%/yr. *)

Notes: *) See, Page 4-19 of "LAPORAN PEMABANGUNAN, DAERAH TINGKAT II KOTAMADYA MEDAN, SELAMA PELITA II (1974/1975 s/d 1978/1979)", Walikotaamadya Daerah Tk. II Medan, 1979

Four large scale industrial estate projects are planned in "MASTER PLAN OF MEDAN CITY" such as:

- Belawan Industrial Estate (43.4 ha);
- Titipapan Industrial Estate (218.6 ha);
- Maryland Industrial Estate (249.4 ha); and
- Timbang Deli Industrial Estate (250.4 ha).

Among these, the initial 100 ha portion of the Maryland Industrial Estate Project is now under construction.

(5) Commercial/Administrative Area Development

A hierarchy of commercial/administrative centers are proposed in "MASTER PLAN OF MEDAN CITY". For the intermediate scale between the central commercial/administrative district and the sub-center in neighbourhoods, 6 to 7 medium sized commercial/administrative regional centers are planned to be constructed throughout the city to disperse the trading and social activities too much concentrated in the CBD at present. The CBD area is planned to be expanded towards the western side of the Deli River. Those warehouses lining up on the eastern side of the railway station are planned to be demolished and converted to trading facilities. Also, the wholesale markets at present located in the eastern side of the railway track are planned to be concentrated in the district surrounded by Jl. Vetran, Jl. Sambu, Jl. Irian Barat and Jl. Sutomo. The retail facilities are planned to be expanded towards the westwards along Jl. G. Suburoto.

Also, a cargo distribution center is planned in Kec. Medan Timur to relocate the cargo distribution activities, but the exact location has not been made clear. There is an information that a plan of vegetable wholesale market in P. Batu exists but the probability of realization is unknown.

2.3.3 Review of Medan Urban Development Study

(1) General

In this section interests in analysis will be focused on land use proposed by 'Medan Urban Development Study' (MUDS). For reference its overall outline is found in Chapter 5: Relevant Development Projects under Study/-Implementation in the 'Short-Term Improvement Plan'. The most up-to-date and concrete information on the 'MEDAN URBAN DEVELOPMENT PLAN' available to the Study Team is 'TECHNICAL MEMORANDUM No. 21', Medan Urban Development, Housing, Water Supply and Sanitation Project, 1979. This project differs most conspicuously from 'MASTER PLAN KOTAMADYA MEDAN' mentioned in the previous section in the following two respects:

- While 'MASTER PLAN OF MEDAN CITY' proposes that the whole city area be divided into planning units of housing on the basis of geographical features and transportation reason, 'MEDAN URBAN DEVELOPMENT STUDY' proposes that the damp, low-elevation areas along the Medan-Belawan corridor should not be developed into residential areas because of environmental and hygienic reasons.
- Whereas the 'MASTER PLAN OF MEDAN CITY' proposes to keep a "greenbelt" along the outer edges of the city by way of environmental preservation and does not mention development of any sort for extramural areas, 'MEDAN URBAN DEVELOPMENT STUDY' proposes developments in those areas in so far as there is no urgent need for a large-scale public investment in urban infrastructures, and at the same time, the development does not affect agricultural productivity.

(2) Short-Term Land Use Strategy

It has been studied that the present land use in general, various kind of projects and effects of their investment which have been decided to be materialized (especially, the Medan Industrial Estate, Belaway Port Development, and Belawan-Medan-T. Morawa Highway, and so on) and it is recommended that the top priority of development should be given to the southern part of Medan City, or areas along the Outer Ring Road, and the second to the adjacent areas of the Belawan-Medan-T. Morawa Highway and Medan Industrial Estate.

The northeastern part of Medan City on the other hand, is not mentioned as a Development Encouraged Area in Fig. 2-3-5: Short-Term Land Use Strategy by MUDS, for it is after "Pelita III" that development effects will be increased by accomplishment of the above two projects.

Two types of housing development plans are in progress now as follows:

The Kampung Improvement Project (KIP), which is aimed at lower-income earners, proposes improvement of 4 Kampung (250 ha) in Kec. Medan Kota and Kec. Medan Timur, and an additional 100 ha during "Pelita III". A pilot program in Kec. Medan Kota has come to the final engineering stage now.

Permunas' Low-cost Housing Project has as its objective a higher-income earning class than the Kampung Improvement Project, and the Medan I Housing Project (Halvetia Housing Project) is situated near the Outer Ring Road on Medan-Binjel Railway Line, is nearly finished. Also, the construction is progressing for the Medan II Housing Project (Medan Denai Housing Project) along the Medan-T. Tinggi Railway Line situated on the eastern outskirts adjacent to the city border. Upon its completion 8,972 units are going to be prepared. Permunas is planning the third Low-cost Housing Project, and is now at the stage of its site selection. It is presumed that it will come out to be southwest of the Outer Ring Road (Fig. 2-3-5: Short-Term Land Use Strategy). The size of the project is not yet undetermined, although it is likely to come up with approximately 10,000 units.

Of the four industrial estate development plans mentioned in the previous section, two have been decided to be materialized, namely the Belawan Port/Industrial Area and Medan Industrial Estate. "MEDAN URBAN DEVELOPMENT PROJECT" envisages the potential site for warehousing around an interchange of the Belawan-Medan-T. Morawa Highway and Outer Ring Road. For specific information on demand calculation etc. see Sec. 4.2 Freight Flow in "Long-Term Improvement Study". Here, it is discussed about industrial development plans including warehouses and truck terminals.

The city authorities are taking a positive attitude toward relocating industrial establishments to the outskirts, and as an initial step they have put a license restriction in effect so as not to permit a new industrial establishment in residential areas. It can be assumed that if no regulating/guiding measure is taken, industries will tend to crowd into the areas along the Medan-Belawan corridor where transportation is very convenient. However, it is not desirable because of the expected increase in local traffic on it. The same problem holds true for relocation of warehouses.

According to 'PADANG-MEDAN Highway Report', by Santi-Renardet-Ice, Sept. 1978, there are altogether approximately 35 ha of warehouse areas in Medan City. 58% of which are concentrated in the central area (Internal Study Area). The warehouses can be classified into four categories:

- (a) Comparatively large warehouses for exporting commodities.
- (b) Comparatively large warehouses for imported commodities.
- (c) Comparatively small warehouses for wholesalers.
- (d) Comparatively small warehouses for retail salers.

Of all these, a) and b) are now forming large-scale groups near the Belawan Port and Medan Station, and especially those near the Belawan Port are used for exporting goods. While it has already been observed that some import warehouses have been crowding into areas along the Medan-Belawan road, it is disirable for them to move to somewhere areas around the intersection at the Belawan-Medan-T. Morawa Highway and railway line for T. Tinggi.

Although 'MEDAN URBAN DEVELOPMENT PROJECT' also specifies an area along the Outer Ring Road in the west as a suitable relocating site, it does not seem a very good site to store imported commodities to be consumed

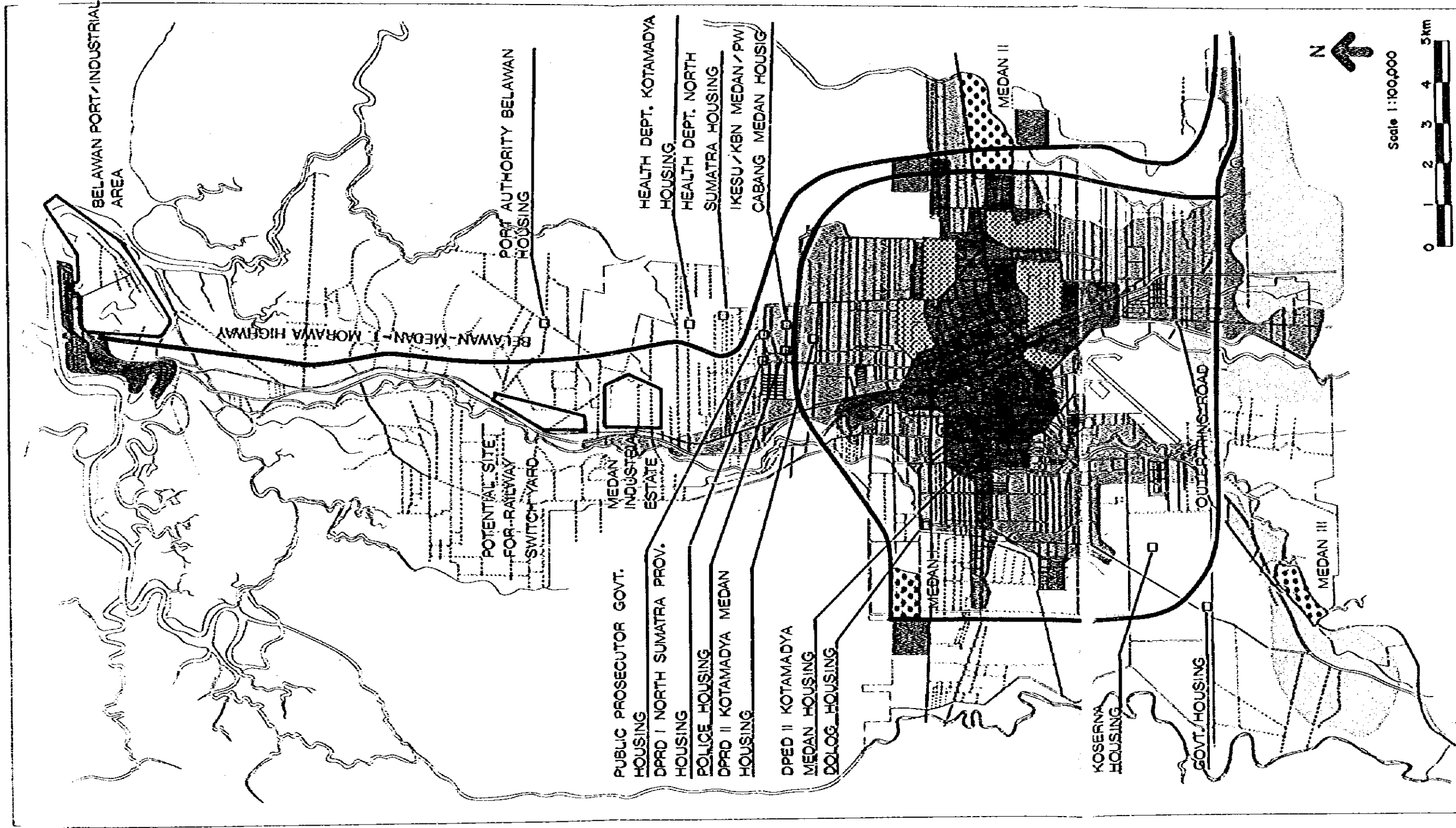


Fig. 2.3.5 SHORT-TERM LAND USE STRATEGY BY MUDS
 SOURCE: MEDAN URBAN DEVELOPMENT, HOUSING, WATER SUPPLY AND SANITATION PROJECT

Legend

□	Committed Institutional Housing Project
▨	Major Built-up Area
▩	KIP Project
▧	Infill Site
▦	Potential Site for Warehousing
▤	Development Encouraged Area

Medan Area Transportation Study

in Kot. Medan, because presently the center of commerce in downtown district is in the eastern area, and so, one has to go across the center of the city in order to get there. Rather, that proposed location would be suitable for handling inter-regional freight flow toward Binjai or P. Batu.

It is greatly beneficial to attach complexes with manufacturing functions adjacent to truck terminals whose main roles are freight handling and storing. Therefore the potential site for warehousing in "Fig. 2-3-5: Short Term Land Use Strategy" by MEDAN URBAN DEVELOPMENT STUDY should include not only warehouses but also facilities with manufacturing functions. However, since the expansion of the Belawan Port and Belawan-Medan-T. Marawa Highway construction are scheduled to take place during Pelita III, opening of truck terminals will have to be after 1985, the target year for the 'Short-term improvement Study'. Therefore, relocation of cargo terminals is not proposed in this study as a 'Short-term improvement'.

Table 2-3-4: Distribution of Warehouses in Medan City (1979)

Kecamatan	No. of Warehouses	(%)	Floor Area (m ²)	(%)
1. Medan Kota	111	(21.39)	67,777	(19.57)
2. Medan Timur	91	(17.53)	37,795	(10.91)
3. Medan Baru	44	(8.48)	19,106	(5.52)
4. Medan Barat	112	(21.58)	75,432	(21.78)
5. Medan Denai	5	(0.96)	1,121	(0.32)
6. Medan Labuhan	5	(0.96)	1,749	(0.51)
7. Medan Johor	6	(1.16)	5,505	(1.59)
8. Medan Tuntungan	2	(0.38)	1,317	(0.38)
9. Medan Belawan	55	(10.60)	92,349	(26.66)
10. Medan Sunggal	11	(2.12)	6,516	(1.88)
11. Medan Deli	55	(10.60)	27,316	(7.89)
12. Ownership/usage Unknown	22	(4.24)	10,324	(2.98)
Total	519	(100.00)	346,307	(100.00)

Source: Data Kotamadya Daerah Tingkat II Medan, Aug. 1976.

For those areas called major Built-up Areas in Fig. 2-3-5 are those areas where more commercial/business establishments are assumed to be located there than outside of it.

(3) Long Term Land Use Strategy

In order to develop areas along the western section of the Outer Ring Road, areas with the lowest priority as they are seen in the beginning of the previous section, flood control is necessary for both the Sikambang River and Deli River. As can be seen in Fig. 2-3-5: Proposed Land Use Pattern in the "Long Term Improvements", in the later stage of development all the areas except frequently flooded areas along the Medan-Belawan corridor, areas around the Polonia Airport, and environmental preservation areas in the west with poor accessibility due to insufficient roads, are going to be developed. The plan includes the development of adjacent extramural areas, too.

Presently Medan City and its satellite cities (Binjai, P. Batu, D. Tua, T. Morawa and T. Tinggi) are pretty well linked by means of a wide-spread radial traffic network, but by improving radial roads, a wide-spread development of the "Corridor Pattern" will be expected to occur rapidly.

It is assumed that the Polonia Airport, now the runway has been already expanded and an international terminal building is under construction, will bring about a serious environmental problems to the central area at their completion because of the air traffic increasing in a rapid pace, consequently necessitating its relocation in a long run.

2.4 Projection and Zonal Allocation of Planning Parameters

2.4.1 General

The target year for the "Short-Term Improvement Study" is 1985 as set in Sec. 2.1 General. The planning parameters to be projected, and then to be allocated to each zone are:

- Residential Population;
- Employed Population;*)-1
- Number of Jobs;*)-2
- Number of Traffic-Relevant Students, and
- Car Ownership*)-3

Notes: *)-1 Employed Population: A portion of the residential population in an area employed including those who commute to and work at outside of their residence area.

*)-2 Number of Jobs: Workers at working places in an area including those who commute from outside of working places.

*)-3 The car ownership is projected but its zonal allocation is not carried out.

Each of projection and zonal allocation of planning parameters for the short-term target year of 1985 is described in detail in Sec. 2.2 Projection of Planning, Parameters and Sec. 2.4 Zonal Allocation of Planning Parameters in the 'Long-Term Improvement Study' along with that for the "Long-Term Improvement Study" in the target year 2000 A.D. In this section their outlines and results are explained referring to the 'Long-Term Improvement Study'.

The study area includes Medan City, Kot. T. Tinggi, Kot. Binjai, Kab. D. Serdang and Kab. Langkat and it is broken down into 4 kinds of study areas. Zone division of study area is illustrated in Fig. 2.4.1 Zone Division of Internal & Intermediate Study Area and Fig. 2.4.2 Zone Division of External & Outer Study Area.

Description of each study area is as follows:

- Internal Study Area (Zone #1 ~ #46): The Internal Study Area is the old district before Medan City's boundary change in 1973. It is divided into 4 Kecamatan.
- Intermediate Study Area (Zone #47 ~ #57): The Intermediate Study Area is the area within Medan City, and at the same time outside the Internal Study Area.
- External Study Area (Zone #58 ~ #66): The External Study Area includes the area outside Medan City and within the 20 km radius from the city center.
- Outer Study Area (Zone #67 ~ #69): The Outer Study Area is the area including Kot. D. Serdang, Kab. Langkat and Kot. T. Tinggi and outside the above three study areas.

Fig. 2.4.1 ZONE DIVISION FOR INTERNAL & INTERMEDIATE STUDY AREAS

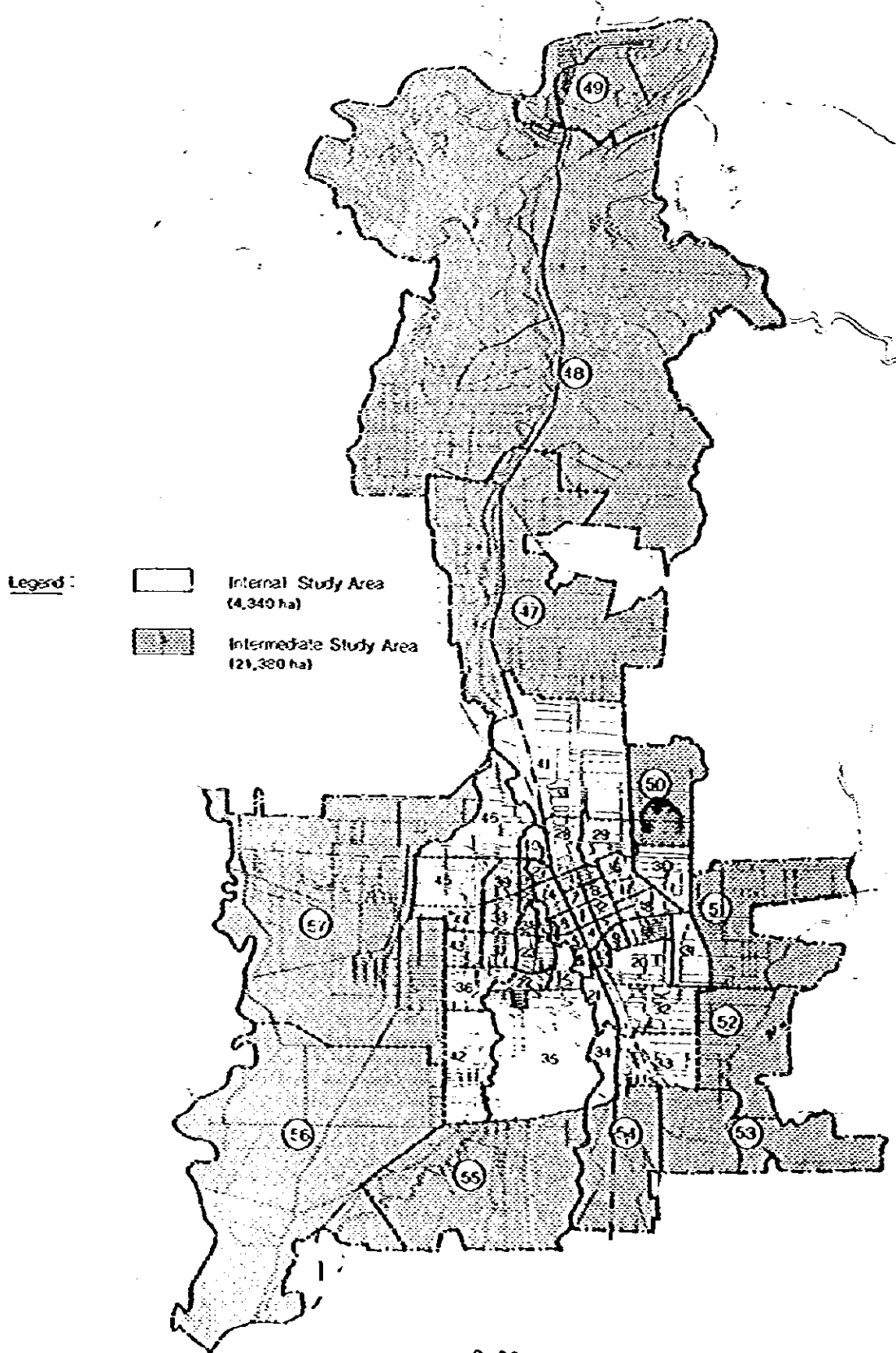
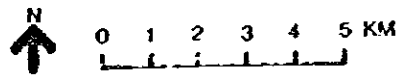
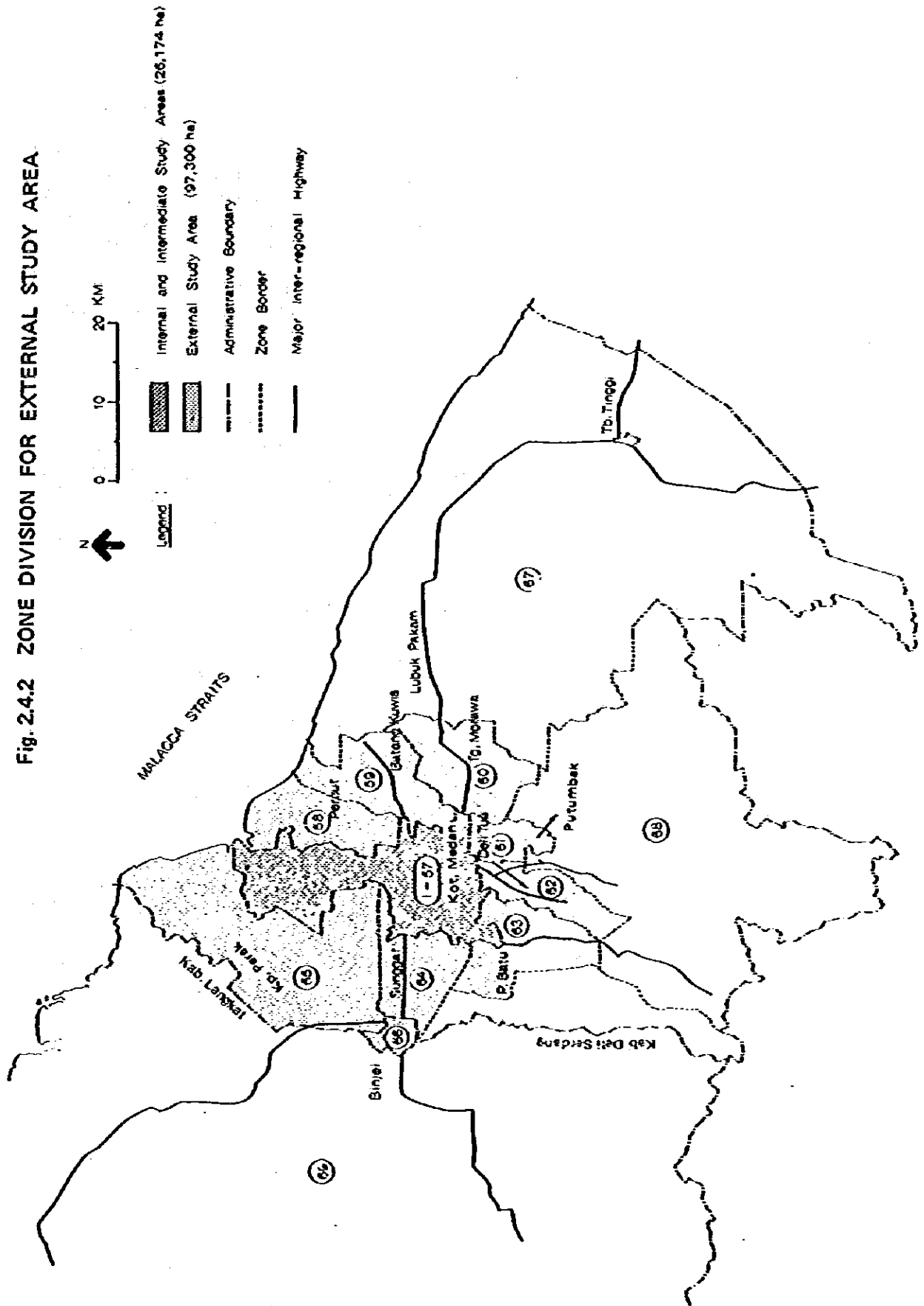


Fig. 2.4.2 ZONE DIVISION FOR EXTERNAL STUDY AREA



2.4.2 Residential Population

(1) Projection

Projection of the residential population is, as mentioned in Sec. 2.2.2: Residential Population in the 'Long-Term Improvement Study', performed for each administrative unit in Medan City and its surroundings, firstly. Then, the results are compiled by each study area defined in Sec. 2.4.1: General. These future estimates for each study area are to serve as control total values for their zonal allocation.

In their estimation for each study area, two alternative models are designed to cover wider scope of study area's future development, and they are:

- Current Trend Model; and
- CBD Re-development Model.

The Current Trend Model represents a case in which the present central district develops, as it has been, to be a mixture of residential places and those of commercial and administrative activities. Therefore, as it has been during the recent past years, the residential population in the Internal Study Area is estimated to increase at about the same rate as that of the natural growth.

On the other hand, the CBD Re-development Model represents a case in which the present central district develops to be a more specialized CBD accommodating commercial and administrative activities. For this case the residential population in the Internal Study Area is estimated to increase at a much lower growth rate than in the Current Trend Model dispersing a considerable portion of its population increase by the natural growth to peripheral area of new development.

Note: *) See, Sec. 2.3.1 Existing Conditions for the present situation of the central district.

For the Short-Term Improvement Study, the population growth rate for the Internal Study Area is applied as a mid-term value of the CBD Re-development Model. In other words, the flow-out migration movement is assumed not to occur drastically before 1985.

Table 2-4-1 Projected Residential Population by Study Area (1978 & 1985)

Study Area	Unit: 1,000 persons)	
	1978	1985
Internal Study Area	727.9	836.1
Intermediate Study Area	526.2	804.9
Kot. Medan	1,254.1	1,641.0
External/Outer Study Area	1,783.5	1,794.8
Study Area Total	3,037.6	3,435.8

Source: Calculated based on data from Kantor Sensus dan Statistics, Kot. Medan

(2) Zonal Allocation

Zonal Allocation of the present residential population is based on the residential population by Kampung at present. Zonal Allocation for 1985 is performed referring to the list of committed housing projects and the population allocation example by MEDAN URBAN DEVELOPMENT STUDY.

Table 2-4-2 Committed Small & Medium Sized Housing Projects

(Unit: Unit)			
Name of Housing Project	No. of Units	Name of Housing Project	No. of Units
-Port Authority Belawan Housing	186	-IRESU/KBN Medan/PWI Cabang Medan Housing	55
-Health Department of Kotamadya Housing	64	-DPRD II Kotamadya Housing	59
-Health Department of North Sumatra Housing	61	-Police Housing	32
-DPRD I North Sumatra Province Housing	220	-Polong-Su Housing	134
-Public Prosecutor Government Housing	55	-DPRD III Kotamadya Medan Housing	67
		-Municipality Government Housing	78

Source: "Fig. 18.1: SHORT-TERM LAND USE STRATEGY", MUDS

2.4.3 Employment Structure

(1) Employed Population

(a) Projection

The future employed population and its sectoral classification are conducted referring to results of other projects as mentioned in Sec. 2.2.3 Employment Structure of the 'Long-Term Improvement Study'.

Table 2-4-3 Projected Employed Population by Study Area (1978 & 1985)

Study Area	Sector	(Unit: 1,000 persons)	
		1978	1985
Internal Study Area	I ^(*) -I	1.4	1.4
	II + III	202.4	232.7
	Total	203.8	234.1
Intermediate Study Area	I	30.2	70.8
	II + III	117.1	194.6
	Total	147.3	225.4
Kot. Medan	I	31.6	32.2
	II + III	319.5	427.3
	Total	351.1	459.5
External/Outer Study Area	I	278.3	250.4
	II + III	256.8	306.0
	Total	535.1	556.4
Study Area Total	I	309.9	282.6
	II + III	576.3	733.3
	Total	886.2	1,015.9

(b) Zonal Allocation

The total employed population in each study area is distributed over zones proportionately to zonal residential population based on an assumption that the rate of employment is homogeneous for each zone. The total of the number of Sector I workers is distributed over zones proportionately to the area of agricultural use. Then, Sector I workers are extracted from the total number of jobs in each zone to obtain the zonal number of jobs in Sector II and III.

(2) Jobs

(a) Projection

There is no commuting assumed in the Sector I workers, and so in the Sector I the employed population is equal to the number of jobs in the same sector.

The number of jobs in the Sector II and III in 1978 are figured out from the employed population, and the number of commuting workers are estimated by the results of the Bina Marga's O-D. survey and cross-sectional traffic counting survey by the Study Team, as described in Sec. 2.2.3, (2) Jobs in the "Long-Term Improvement Study". Their 1985 figures are estimated from the ratio between the number of jobs and the residential population in the Sector II and III in various cities as illustrated in Fig. 2-4-1: Job/Population Ratio Comparison among Cities.

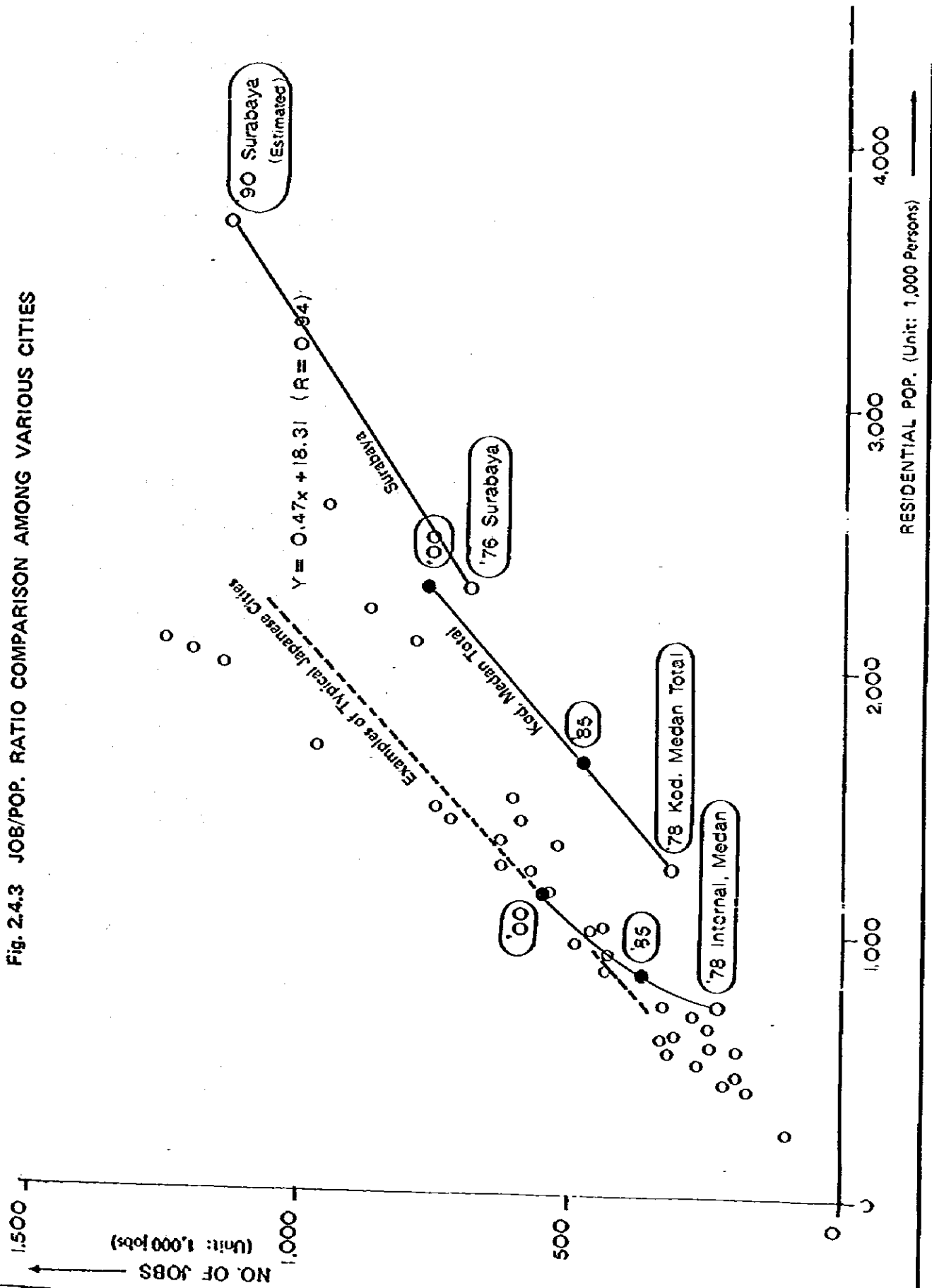
Table 2-4-4 Projected Number of Jobs by Study Area (1978 & 1985)

		(Unit: 1,000 jobs)	
		1978	1985
Internal Study Area	Employed	262.4	232.7
	[In]-[Out] *)	24.1	137.3
	Jobs	226.5	370.0
Intermediate Study Area	Employed	117.1	194.6
	[In]-[Out]	14.4	84.6
	Jobs	102.7	110.0
Kot. Medan Total	Employed	319.5	427.3
	[In]-[Out]	9.7	52.7
	Jobs	329.2	480.0
External/Outer Study Area	Employed	256.8	306.0
	[In]-[Out]	9.7	52.7
	Jobs	247.1	253.3
Study Area Grand Total	Employed	576.3	733.3
	[In]-[Out]		
	Jobs	576.3	733.3

Notes: *) [In]-[Out]: Excessive Flow-in Commuting Workers.

(b) Zonal Allocation

Fig. 2.4.3 JOB/POP. RATIO COMPARISON AMONG VARIOUS CITIES



The number of jobs in each study area estimated in the previous section is divided into 3 groups, and then distributed over zones proportionately to three kinds of zonal figures, these three groups are:

- To be allocated proportionately to the zonal commercial/administrative area;
- To be allocated proportionately to the zonal residential population; and
- To be allocated proportionately to the zonal industrial area.

2.4.4 Number of Traffic-Relevant Students

(1) Number of Traffic-Relevant Students at Studying Places

(a) Projection

In this study the number of traffic-relevant students which is reflected in the transportation study is limited to those of senior high schools, universities and academies out of those mentioned in Sec. 2.2.3 Education, because of their relatively large possibility of commuting by some transportation mode across the zone borders. The future senior high school students are estimated based on the future school age population and enrollment standard estimates by 'MEDAN URBAN DEVELOPMENT PROJECT'. The future university and academy-level students are assumed originally in this study. No future new school locations are presently not available, and they are not proposed in this study because of the lack of data and its large effects on commuting flow. Therefore, the increased portion of traffic relevant students at studying places is allocated to each study area proportionately to the residential population increase during the period 1978-1985. This is based on an assumption that establishment of new schools is encouraged in developing areas where population increase is expected to be noticeable.

Table 2-4-5 Projected Number of Traffic-Relevant Students as Studying Places by Study Area (1978 & 1985)

Study Area	(Unit: 1,000 persons)	
	1978	1985
Internal Study Area	55.7	73.9
Intermediate Study Area	5.0	52.0
Kot. Medan Total	60.7	125.9
External/Outer Study Area	23.2	46.7
Study Area Grand Total	83.9	172.6

Source: Calculated based on data from Department of Education North Sumatra Province.

(b) Zonal Allocation

Senior high school students at present are compiled by each Kecamatan by the Dept. of Education as shown in Table 2.2.8 Number of Pre-University Schools & Students by Kecamatan, 1979.

These Kecamatan totals are distributed over zones proportionately to the zonal residential population in each Kecamatan.

University and academy students are allocated to each zone using the data on school locations provided by the University Coordinator of North Sumatra, Table 2.2.6: Number of University Academy Students in Kot. Medan, 1976.

The increased portion of traffic-relevant students during 1978-1985 are distributed, like in the case of study area allocation, over zones proportionately to the population increase in each zone.

(2) Number of Traffic-Relevant Students at Residential Places

(a) Projection

The number of traffic-relevant students at residential places are figured out from those at studying places in the previous section and commuting students among study areas obtained from results of O-D survey by Bina Marga.

Their future estimate is made based on the assumptions such as:

- By 2000 the ratio between students at residential places and residential population within the Internal Study Area which is about 1.45 times more than the Medan City average at present would become homogeneous throughout the city; and
- The rate of the excessive flow-in commuting students and students at studying places in Medan City, about 3% at present will remain as it is now even in the future.

Table 2-4-6 Projected Number of Traffic-Relevant Students at Residential Places by Study Area (1978 & 1985)
(Unit: 1,000 persons)

		1978	1985
Internal Study Area	at Study Places	55.7	73.9
	[In] - [Out]	5.2	6.1
	at Residential Places	50.5	67.8
Intermediate Study Area	at Study Places	5.0	52.0
	[In] - [Out]	Δ 3.4	Δ 2.3
	at Residential Places	8.4	54.3
Kot. Medan	at Study Places	60.7	125.9
	[In] - [Out]	1.8	3.8
	at Residential Places	58.9	122.1
External-Outer Study Area	at Study Places	23.2	46.7
	[In] - [Out]	Δ 1.8	Δ 3.8
	at Residential Places	25.0	50.5
Study Area Ground Total	at Study Places	83.9	172.6
	[In] - [Out]	-	-
	at Residential Places	83.9	172.6

Note: [In] - [Out]: Excessive Flow-in Commuting Students

(b) Zonal Allocation

Assuming that the ratio between the traffic-relevant students at residential places and residential population in each zone is equal, each study area total is distributed over zones proportionately to zonal residential population.

Table 2-4-7 Residential Population, Employed Population, & Number of Jobs & Traffic-Relevant Students by Zone, (1978)

(Unit: 1,000 persons)

	Residential Population		Employed Population			Jobs	Traffic Relevant Students	
	Resid. Pop.	(Density)	Sector I	Sector II+III	Total		At Resid. Places	At Study Places
1. Gang Buntu I	5.6	267	-	1.6	1.6	6.3	0.4	0.6
2. Pusat Pasar I	4.2	156	-	1.2	1.2	7.0	0.3	0.8
3. Pusat Pasar II	2.8	165	-	0.7	0.7	2.8	0.2	0.2
4. Pasar Baru	8.2	328	-	2.3	2.3	7.8	0.6	0.5
5. Aur I	4.6	192	-	1.2	1.2	7.2	0.3	0.1
6. Kesawan I	2.9	112	-	0.8	0.8	7.6	0.2	0.1
7. Gang Buntu II	5.6	280	-	1.6	1.6	3.7	0.4	0.6
8. Pandan Hilir I	6.4	183	-	1.8	1.8	2.1	0.4	0.6
9. Sei Rengas I	5.6	200	-	1.6	1.6	8.4	0.4	0.9
10. Sei Rengas II	5.2	186	-	1.4	1.4	4.4	0.4	0.3
11. Aur II	6.9	192	-	1.9	1.9	2.7	0.5	0.2
12. Hamdan	9.2	126	-	2.6	2.6	9.5	0.6	0.6
13. Petisah Tengah I	3.6	113	-	1.0	1.0	2.9	0.2	0.1
14. Kesawan II	4.9	111	-	1.3	1.3	4.7	0.3	0.2
15. Sidodadi I	5.6	147	-	1.6	1.6	0.6	0.4	0.6
16. Sidodadi II	7.8	170	-	2.2	2.2	3.1	0.5	0.8
17. Pandan Hilir	7.2	232	-	1.9	1.9	0.7	0.5	0.7
18. Pandan Hulu	17.3	228	-	4.9	4.9	1.7	1.2	1.1
19. Sei Rengas II	11.5	383	-	3.2	3.2	1.2	0.8	0.7
20. Kotamatsum	58.9	353	-	16.4	16.4	9.4	4.1	3.5
21. Sei Mati	14.0	350	-	3.9	3.9	1.4	1.0	0.3
22. Angerung	4.5	83	-	1.2	1.2	0.5	0.3	0.1
23. Madras Hulu	5.7	88	-	1.6	1.6	8.7	0.4	0.4
24. Petisah Tengah II	3.6	113	-	1.0	1.0	2.4	0.2	0.1
25. Sibals I	2.9	126	-	0.9	0.9	1.2	0.2	0.1
26. Sibals II	2.9	126	-	0.9	0.9	0.3	0.2	0.1
27. Kesawan III	3.9	111	-	1.1	1.1	4.6	0.3	0.1
28. Durian	23.2	219	-	6.4	6.4	10.1	1.6	1.3
29. Sidorame	36.4	284	-	10.1	10.1	14.5	2.5	0.8
30. Sei Kera Hilir	41.5	305	-	11.5	11.5	5.3	2.9	0.9
31. Tegul Sari	54.7	358	-	15.2	15.2	9.6	3.8	3.3
32. Teladang	40.6	187	-	11.3	11.3	7.2	2.8	5.7
33. Sitirejo	43.0	153	-	11.9	11.9	10.7	3.0	2.6
34. Baru	9.5	75	-	2.7	2.7	1.9	0.7	0.2
35. Polonia	24.2	33	0.1	6.7	6.8	4.7	1.7	0.5
36. Darat	13.7	107	0.1	3.8	3.9	2.6	1.0	0.3
37. Petisah Hulu	9.4	152	-	2.6	2.6	3.7	0.7	0.2
38. Petisah Tengah III	7.2	114	0.1	1.9	2.0	3.5	0.5	0.4
39. Sekip	10.8	177	-	3.0	3.0	4.5	0.7	0.3
40. Sibals	6.4	125	-	1.8	1.8	5.6	0.4	0.2
41. Bnayan	79.3	98	0.6	22.0	22.6	20.4	5.5	7.8
42. Padang Bulan	17.2	52	0.5	4.7	5.2	5.0	1.2	10.0
43. Babura	11.5	147	-	3.2	3.2	1.2	0.8	4.4
44. Sei Sikambing D.	13.5	190	-	3.8	3.8	3.3	0.9	0.4
45. Sei Putih	38.7	168	-	10.8	10.8	7.2	2.7	1.2
46. Sei Agul	25.6	96	-	7.2	7.2	2.6	1.8	0.8
Internal Study Area	777.9	142	1.4	202.4	203.8	276.5	50.5	55.7
47. Deli	57.5	27	2.9	13.2	16.1	17.9	0.9	0.5
48. Labuhan	63.6	8	12.9	4.9	17.8	11.6	1.0	0.6
49. Belawan	72.0	94	1.0	19.2	20.2	14.8	1.2	0.6
50. Sidorejo	34.8	94	0.1	9.6	9.7	6.0	0.6	0.3
51. Bandar	88.2	117	0.2	24.5	24.7	15.2	1.4	0.8
52. Kp. Binjel	16.6	24	0.8	3.8	4.6	3.5	0.3	0.1
53. Timbang Deli	23.9	33	1.0	5.7	6.7	4.2	0.4	0.2
54. Kedisi Drian	21.6	32	0.8	5.3	6.1	3.8	0.3	0.2
55. Gedung Johor	19.5	14	1.9	3.6	5.5	3.4	0.3	0.4
56. Tuntungan	20.8	7	4.8	1.0	5.8	3.6	0.3	0.2
57. Sungal	107.7	16	3.8	26.3	30.1	18.7	1.7	1.1
Intermediate Study Area	576.2	25	30.2	117.1	147.3	102.7	8.4	5.0
58. P. Sei Tuan	39.6	4	7.0	4.8	11.9	4.5	0.6	0.5
59. Bte. Kuwit	58.4	4	10.3	7.2	17.5	7.0	1.4	0.7
60. Tg. Morawa	61.4	4	9.7	8.7	18.4	6.4	1.2	0.8
61. Potumbak	20.9	5	3.3	3.0	6.3	2.6	0.3	0.3
62. Deli Tua	29.6	4	5.5	3.4	8.9	3.0	0.4	0.4
63. P. Batu	33.2	3	9.4	0.6	10.0	0.1	0.4	0.4
64. Sunggal	69.6	6	7.4	13.2	20.6	11.7	1.1	0.8
65. Kp. Perak	105.0	3	22.2	9.3	31.5	8.0	1.5	1.3
66. Binjel	69.8	3	1.1	19.8	20.9	19.1	4.6	4.6
External Study Area	486.5	5	75.9	70.0	145.9	62.4	11.5	9.8
67. East	625.8	2	68.8	119.0	187.8	117.7	6.6	6.5
68. South	79.0	1	19.1	4.6	23.7	4.4	0.8	0.8
69. West	592.2	1	114.5	63.2	177.7	62.6	6.1	6.1
Outside Total	1,297.0	1	202.4	186.8	389.2	184.7	13.5	11.4
Grand Total	3,037.6	2	309.9	576.3	886.2	586.3	83.9	83.9

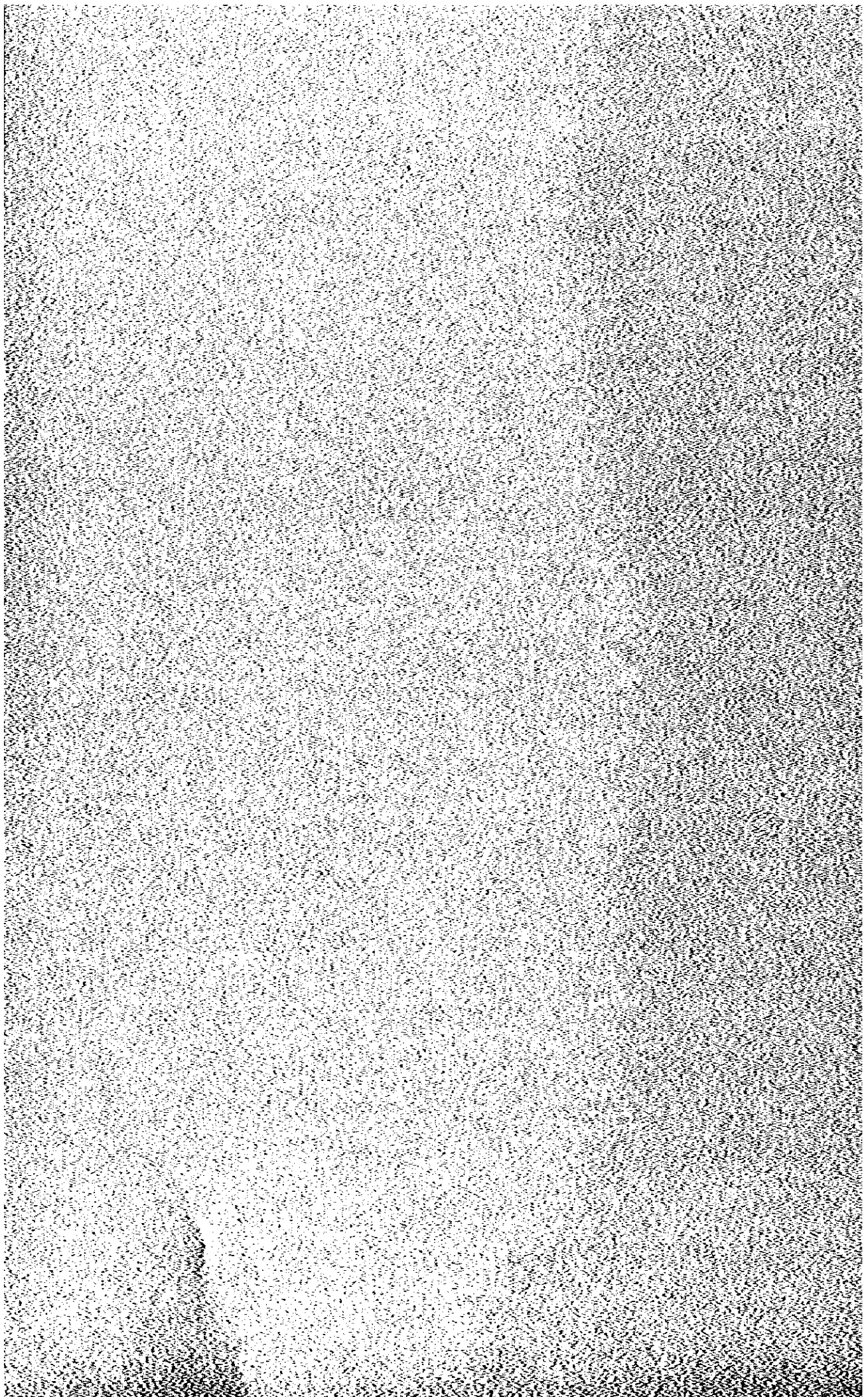
Note: Density is expressed in unit person/ha.

Table 2-4-8 Projected Residential Population, Employed Population & Number of Jobs & Traffic-Relevant Students by Zone, (1985)

	(Unit: 1,000 Persons)							
	Residential Population		Employed Population			Jobs	Traffic Relevant Students	
	Resid. Pop.	(Density)	Sector I	Sector II+III	Total		At Resd. Places	At Study Places
1. Gang Buntu I	5.8	27.6	-	1.6	1.6	6.4	0.5	0.6
2. Pusat Pasar I	4.9	181	-	1.4	1.4	6.9	0.4	0.9
3. Pusat Pasar II	3.4	200	-	0.9	0.9	3.4	0.3	0.3
4. Pasar Baru	8.8	352	-	2.5	2.5	7.3	0.7	0.6
5. Aur I	5.0	208	-	1.4	1.4	6.7	0.4	0.2
6. Kesawan I	3.3	127	-	0.9	0.9	7.1	0.3	0.2
7. Gang Buntu II	5.9	295	-	1.6	1.6	4.4	0.5	0.6
8. Pandan Hulu I	7.2	206	-	2.0	2.0	5.1	0.6	0.7
9. Sei Rengas I	6.2	221	-	1.8	1.8	7.8	0.5	1.0
10. Sei Rengas II	6.1	218	-	1.6	1.6	5.6	0.5	0.5
11. Aur II	8.0	222	-	2.2	2.2	5.5	0.7	0.4
12. Hamdan	11.0	151	-	3.0	3.0	16.1	0.9	0.9
13. Petisah Tengah I	4.4	138	-	1.2	1.2	5.1	0.4	0.2
14. Kesawan II	5.9	134	-	1.6	1.6	2.4	0.5	0.4
15. Sidodadi I	6.5	171	-	1.8	1.8	1.8	0.5	0.7
16. Sidodadi II	8.7	189	-	2.5	2.5	6.8	0.7	0.9
17. Pandan Hulu	7.9	255	-	2.2	2.2	2.1	0.6	0.8
18. Pandan Hulu	20.6	274	-	5.8	5.8	5.1	1.7	1.7
19. Sei Rengas II	11.7	390	-	3.3	3.3	3.6	0.9	0.7
20. Kotamatsam	59.8	358	-	16.6	16.6	24.4	4.8	3.7
21. Sei Mati	14.1	353	-	3.9	3.9	1.8	1.1	0.3
22. Angrong	6.3	117	-	1.8	1.8	0.8	0.5	0.4
23. Masjid Hulu	7.4	114	-	2.0	2.0	14.3	0.6	0.7
24. Petisah Tengah II	4.4	138	-	1.2	1.2	4.8	0.4	0.2
25. Silas I	3.5	152	-	0.9	0.9	3.2	0.3	0.2
26. Silas II	3.6	157	-	1.0	1.0	0.9	0.3	0.2
27. Kesawan III	4.7	134	-	1.3	1.3	6.4	0.4	0.2
28. Durian	25.3	239	-	7.1	7.1	17.6	2.1	1.7
29. Sidorame	35.7	287	-	10.2	10.2	13.5	3.0	0.9
30. Sei Kera Hulu	41.9	308	-	11.6	11.6	15.9	3.4	1.0
31. Tejal Sari	55.9	363	-	15.4	15.4	15.7	4.5	3.4
32. Teladang	49.9	230	-	13.9	13.9	13.5	4.0	7.3
33. Sitirejo	54.7	195	-	15.3	15.3	11.0	4.4	4.6
34. Baru	11.3	89	-	3.2	3.2	2.3	0.9	0.5
35. Polonia	30.6	41	0.1	8.5	8.6	5.6	2.5	1.6
36. Darat	17.3	137	0.1	4.8	4.9	3.2	1.4	0.9
37. Petisah Hulu	11.2	181	-	3.2	3.2	3.4	0.9	0.5
38. Petisah Tengah III	8.4	133	0.1	2.4	2.5	8.9	0.7	0.6
39. Skip	12.4	203	-	3.4	3.4	9.4	1.0	0.6
40. Silas	7.5	147	-	2.1	2.1	8.8	0.6	0.4
41. Bayan	96.8	119	0.6	26.9	27.5	36.2	7.8	10.7
42. Padang Bulan	23.8	72	0.5	6.6	7.1	0.9	1.9	11.1
43. Babura	14.1	181	-	3.9	3.9	1.8	1.1	4.8
44. Sei Skambang D.	15.4	217	-	4.4	4.4	1.0	1.2	0.7
45. Sei Putih	45.1	196	-	12.6	12.6	16.5	3.7	2.3
46. Sei Agal	33.1	124	-	9.2	9.2	4.0	2.7	2.1
Internal Study Area	836.1	163	1.4	232.7	234.1	370.0	67.8	73.9
47. Deli	22.5	35	3.1	17.3	20.4	18.0	4.9	2.5
48. Labuhan	55.9	11	13.0	11.1	24.1	12.0	5.8	3.8
49. Belawan	83.6	103	1.1	22.3	23.4	17.7	5.6	2.0
50. Sidorejo	43.1	132	0.2	13.5	13.7	6.1	3.3	2.3
51. Bandar	121.0	160	0.3	33.6	33.9	17.0	8.2	5.3
52. Kp. Binjai	28.9	41	0.8	7.3	8.1	3.8	1.9	1.8
53. Tumbang Deli	28.3	39	1.0	6.9	7.9	4.3	1.9	0.8
54. Kedih Daun	27.5	41	0.8	6.9	7.7	3.8	1.9	1.0
55. Gedung Johor	56.1	41	1.9	13.8	15.7	3.6	3.8	10.4
56. Tuntungan	104.8	35	4.8	24.5	29.3	4.5	7.1	15.5
57. Sunggal	147.2	50	3.8	37.4	41.2	18.2	9.9	6.6
Intermediate Study Area	604.9	35	30.8	191.6	225.4	110.0	54.3	52.0
58. P. Sei Tuan	42.3	4	7.4	5.7	13.1	3.6	1.2	1.0
59. Bg. Kuwis	105.6	8	10.9	21.3	33.7	18.6	2.8	2.6
60. Tg. Morawa	65.0	5	10.2	9.9	20.1	0.9	2.5	1.6
61. Potombak	22.1	5	3.5	3.3	6.8	0.7	0.7	0.5
62. Deli Tua	31.3	4	5.8	3.9	9.7	1.3	1.0	0.8
63. P. Bala	35.2	3	9.9	2.5	10.9	0.5	1.1	0.9
64. Sunggal	72.6	7	7.8	14.7	22.5	7.0	2.4	1.8
65. Kp. Perak	111.2	4	23.4	11.1	34.5	4.5	3.2	2.7
65. Binjai	86.0	4	1.2	25.5	26.7	21.3	6.1	5.7
External Study Area	574.3	5	69.1	97.9	78.0	58.4	21.0	17.7
67. East	588.9	2	57.9	124.7	162.6	117.0	14.3	14.0
68. South	74.3	1	16.1	6.9	23.0	5.1	1.8	1.8
69. West	557.3	1	36.3	76.5	172.6	72.8	13.4	13.2
Outside Total	1,220.5	1	170.3	268.1	378.4	194.9	29.5	29.0
Grand Total	3,435.8	3	282.6	733.3	1,015.9	333.3	172.6	172.6

Chapter 3.

**PRESENT TRANSPORT FACILITIES
AND TRAFFIC CONDITIONS**



Chapter 3. PRESENT TRANSPORT FACILITIES AND TRAFFIC CONDITIONS

3.1 General

As for the transportation facilities in Medan City, it is necessary to consider the whole transport mode not from separate but integrated point of view because a total evaluation on urban transportation system seems to be necessary to judge the prevailing transport facilities. However it is rather difficult to describe the present situation from integrated viewpoint, therefore, the followings are the descriptions on each transport facilities taking into account the relationship of all transport modes concerned.

3.2 Conditions of Existing Transport Facilities

3.2.1 Road Network and Bridges

(1) Road Network

The road network in Province of North Sumatra is generally not capable of handling further traffic growth without a very extensive upgrading. Roads are congested, and are being heavily damaged by consistent overloading by trucks. Road axle weights are officially 7 tons on major arterial roads.

The road network of Medan Area consists mainly of five arterial roads linking Medan City with surrounding towns, which forms one of causes of the existing traffic congestion in its CBD due to its radiating form of arterial roads from its CBD making it presently difficult to separate the through traffic from its inner one.

From the viewpoint of the present size of the city of 1.2 million in population the rate of road distribution, with width rather narrow in an average, to the city area is rather low; consequently, the present road network does not function satisfactorily at present for the traffic requirements.

Fig. 3-2-1 shows the existing major arterial roads of Medan area linking surrounding towns with Medan as follow:

<u>Linking Between</u>	<u>Name of Road</u>
Medan - Tanjung Morawa	Jl. Singamangaraja
Medan - Deli Tua	Jl. Brigjend Katonso
Medan - Pancur Batu	Jl. Kapten Batimura
Medan - Binjai	Jl. Jenderal Gatot Subroto
Medan - Belawan	Jl. Lakoma Yos Sudarso

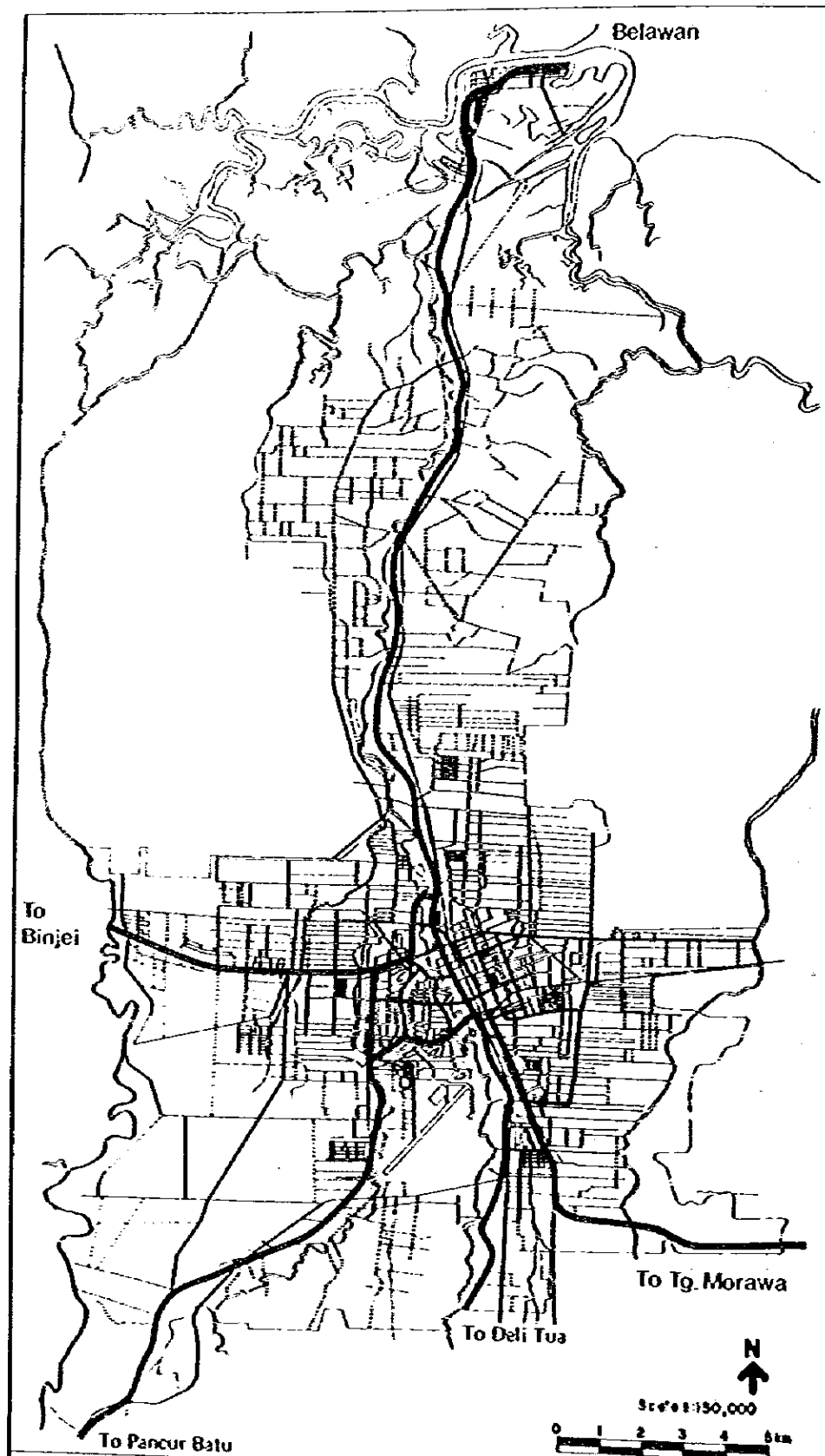


Fig. 3.2.1
Road Network(1979)

Medan Area Transportation Study

Legend

— Inter-City Aerial Roads

(2) Road and Bridge Inventories

The total length of roads in Province of North Sumatra, which DPUP-SU office (Public Works Division of North Sumatra) is responsible to maintain, is 3,221 km, while that of provincial roads is 2,428 km as shown in Table 3-2-1.

The present paved ratio of those roads are 0% in Provincial roads and 95% in National roads.

Table 3-2-1 Total Length of Roads in North Sumatra Province (1979)
Excluding City Roads in Medan

<u>Bina Marga</u> <u>Classifi-</u> <u>cation</u>	<u>Pavement</u> <u>Width</u> <u>(m)</u>	<u>National Roads</u>	<u>Provincial Roads</u>	<u>Total</u>
II	5.0<	190.45 km	86.46 km	276.91 km
III	~4.5	491.00	1,139.43	1,630.43
IV	<4.0	112,00	1,202.06	1,314.06
Total:		793.45 km	2,427.95 km	3,221.40 km

Source: DPUP - SU

Table 3-2-2 Total Length of Roads in Medan City (1979)

<u>Classification</u>	<u>City Roads</u>
II	56.50 km
III	136.17
IV	292 .75
V	59.08
Total:	545.5 km

Source: DPU - Kot. Medan

Note : Classification of roads in Medan City is different from that of Bina Marga.

In Kabupaten Deli-Serdang, which covers all Medan's present satellite towns, there exist 88 km of provincial roads and 60 km of National roads as shown in Table 3.2.5, the pavement of which are all of asphalt concrete. The Table 3.2.5 in the next page shows inventories of roads and bridges in North Sumatra, which link Medan City to its satellite towns.

Public Works Division of Medan City (DPU-Kot. Medan) is responsible for the maintenance of 545.5 km of paved streets in the City as follow:

Table 3-2-3 Present Total Street Length Classified by Their Pavement Width, Medan City (1979)

Width (m)	Less than 5	6	7	8-14	More than 15	Total
Length (km)	42	239.8	54.0	143.2	66.5	545.5

Source: DPU - Kot. Medan

There exist presently 57 bridges including 7 wooden pedestrian bridges in Medan City. Accumulated length and bridge surface area classified by bridge type are shown in Table 3-2-4.

Table 3-2-4 Bridge Inventories of Medan City (1979)

Item	Reinforced Concrete	Composite Girders	Steel	Wooden	Total
Length (m)	416	233	159	254	1,062
Surface Area (m ²)	4,526	1,834	1,412	381	8,153
Number of Bridges	23	21	6	7	57

As far as the inside of Medan City is concerned, most of roads are paved as shown in the road inventories compiled by Medan Municipality. However, some portions are damaged at present and overlaying and/or some other improvements seem to be urgently necessary.

Concerning road width, it can be observed that two Kecamatan of the city area divided by the existing railway track and yard into two different characters; namely, the west side is of the road network of rather narrow roads, while on the east side the area is of network of comparatively wide roads. Even the road network patterns of those two districts show the different types as shown in Fig. 3-2-2.

In the west side, any clear network cannot be seen, mainly due to its geographical features; while in the east side the area consists of an orderly grid network pattern.

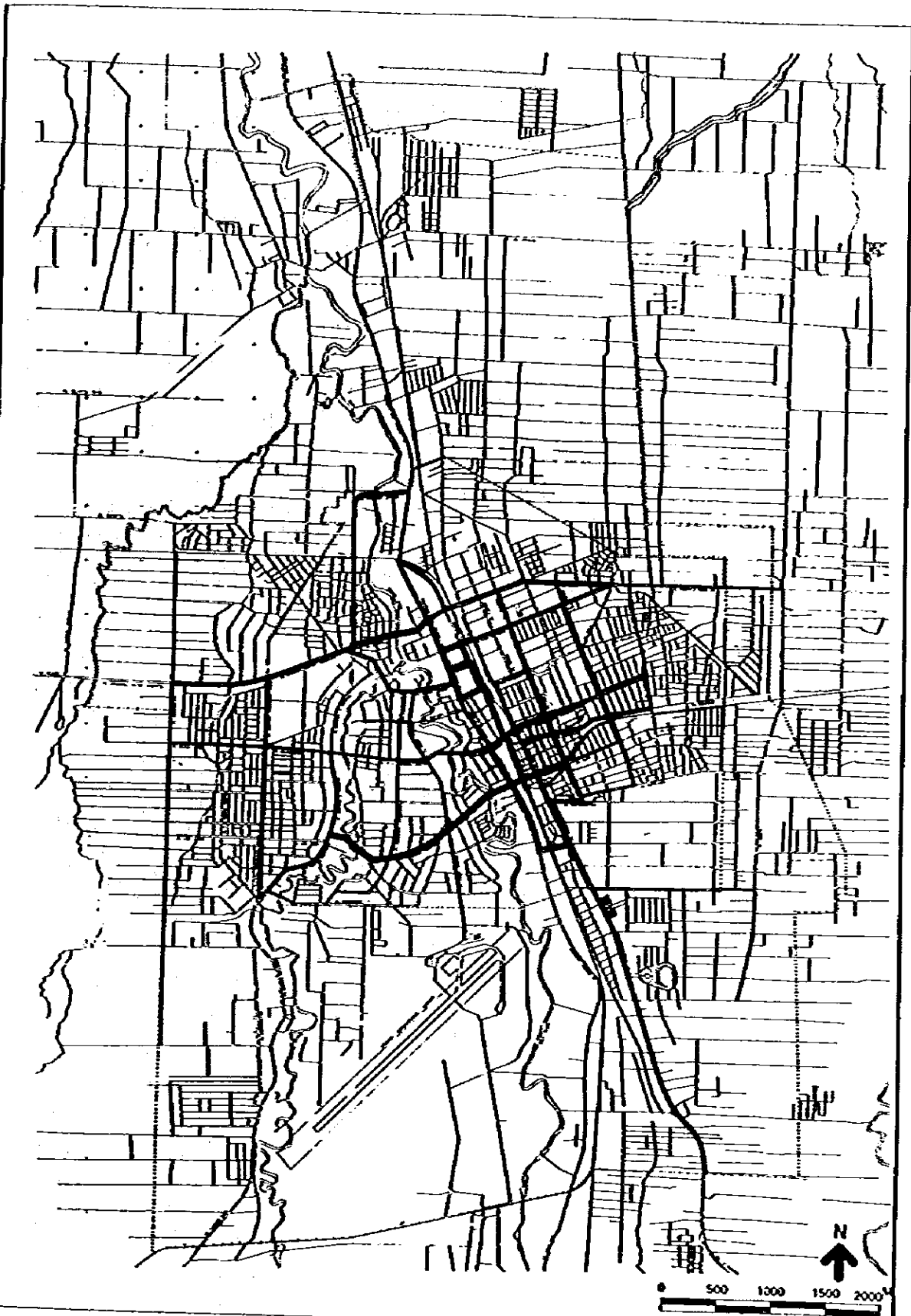


Fig. 3.2.2
Road Classification by Parent Width,
Medan City (1978)

Medan Area Transportation Study

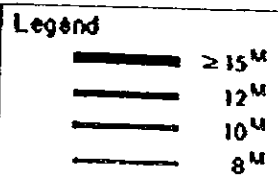


Table 3-2-5 Inventories of Road and Bridge, National and Provincial Roads in Study Area (1979)

National/Provincial Roads	Roads					Bridges			
	Class	Road Length (km)			Pavement Width (m)	Class	Number of location	Total Length (m)	Total Deck Area (m ²)
		Total	DPUP-SU	Medan City					
1. National roads:									
Medan - Binjai	II	19.3	15.1	4.2	7.0	I	18	251.0	1,862
Medan - T. Morawa	II	16.0	7.7	8.3	6.0	I	15	118.0	924
2. Provincial roads:									
Medan - Belawan	II	26.0	17.3	8.7	8.0	I	12	80.0	636
Medan - P. Batu	II	17.0	8.2	8.8	5.0	I	1	3.0	21
Medan - Deli Tus	III	12.0	7.2	4.8	5.0	III	1	2.3	14

- Notes: 1) Study area is Medan City and its surrounding areas to be covered roughly with a radius of 20 km from the center of central area of Medan City. (Refer to Fig. 2-3-2)
- 2) Figures do not include those of City roads.

(3) Road Area Ratio

It is meaningless to discuss about the road area ratio to the whole area of Medan City. Therefore, compiling by Kecamatan, the present ratios are as shown in Table 3-2-6, and in Fig. 3.2.3. From this table, we can see that the 3 Kecamatans in the main area, namely Medan Kota, Medan Timur and Medan Baru have the ratio of 6-8% and those ratios are slightly higher compared to the other Kecamatans. This ratio, however, can only be applied to the roads that are managed by the public administration. There might be a slight increase in the actual number but the ratio seems to be rather low as a city that has a population of 1,200,000 and is a metropolis of Sumatra Island.

Table 3-2-6 Road Area Ratio by Kecamatan Medan City (1979)

Name of Kecamatan	Length of Roads (m)	Road Area (ha)	Land Area (ha)	Road Area* Ratio (%)
1. MEDAN BARU	76,323	139.2	1,759	7.9
2. MEDAN DENAI	16,980	24.5	1,825	1.3
3. MEDAN DELI	3,220	3.9	2,098	0.2
4. MEDAN LABURAN	7,843	11.4	8,002	0.1
5. MEDAN JOHOR	25,430	26.7	2,784	1.0
6. MEDAN BELAWAN	16,013	22.1	768	2.9
7. MEDAN TUNJUNGAN	28,100	33.5	2,969	1.1
8. MEDAN KOTA	58,218	83.6	1,049	8.0
9. MEDAN TIMUR	51,272	82.1	1,244	6.6
10. MEDAN BARAT SUNGGAL	85,521	135.9	4,022	3.4
Total	368,920m	562.9ha	26,520ha	2.1%

Data Source: DPU-Kot. Medan

$$* \text{Road Area Ratio (\%)} = \frac{\text{Road Area}}{\text{Land Area}}$$

3.2.2 Public Transport Facilities

(1) General

The Road public transportation system of Medan City consists of bus, Bemo (including Daihatsu), Becak and taxi although the number of taxis is rather insignificant from public transport point of view.

As far as the bus system is concerned, two types of sector can be observed, one is P.N. DAMRI as public sector and the other is a group of private bus companies. The present bus routes for city buses are provided already on major streets which stretch out of the CBD of Medan City, and almost all of those routes are originated from and terminated at the central bus terminal called Pasar Sambu. (Refer to Fig. 3.2.8)

Due to such a concentration of bus routes to Pasar Sambu, serious traffic congestion can be seen presently in this bus terminal. As to inter-city buses, the routes of which cover almost the whole area of North Sumatra Province, are widely provided and the originate from and destinate at the bus terminals located on the perimeter of central area of Medan City. All inter-city buses are operated by private companies of rather small in size.

Concerning the Bemo system the fixed routes are provided as well as that of the bus system, but Bemo routes are taken into account not to compete with those of bus. The Bemo system serves for intermediate length of trips in moderate charges; and accordingly, it keeps an important role in the public transportation system in Medan area (Refer to Fig. 3.2.9). According to the recent information, new 46 routes for Bemo are planned to be opened by the City effective on and after October 25th, 1979. Regarding the Becak system, it consists of three types of vehicle, Becak machine, Becak and special Becak for freight transport. Becak and Becak machine have been operated in different zones separately (Refer to Fig. 3.2.10) and only Becak machine can serve to the central area of the City. In Medan City considerable number of Becak as many as 18,000 units are presently existing and they are easily available for short-trip passengers. However, the Becak system seems to be one of the direct causes of traffic congestion because of its low speed and its rather bigger width. Furthermore the authorized Becak Day-Time Operating zone system has been adopted and Becak can only be operated inside the respective limited area.

(2) Number of Vehicles of Public Transport

(a) City-Buses

Table 3-2-7 shows the present number of city buses assigned for intra-city operation in Medan City and its present total indicates a little more than 300. As to P.N. DAMRI the number of buses has become two times in the past year. It seems that these facts mean a tremendous potential demand of citizens on the public transportation system.

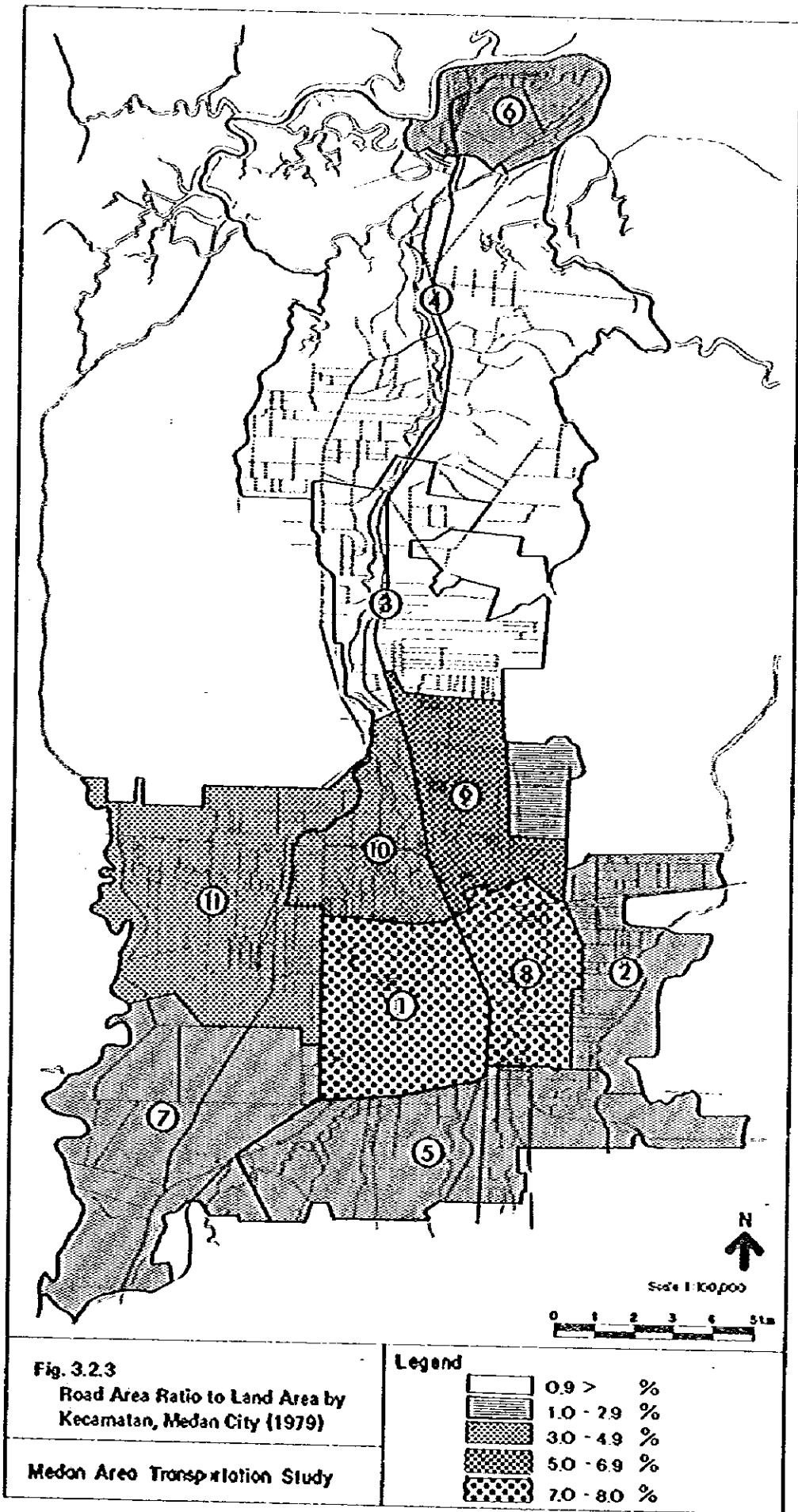


Table 3-2-7 Present Number of Buses Assigned for Intra-City Transport, Medan City (1979)

<u>Name of Bus Company</u>	<u>No. of Buses Assigned</u>
P.N. DAMRI	75
PELITA ANCKUTAN	28
C.V. BUDI	29
C.V. SETIA	28
C.V. DESA MAJU	75
C.V. POVRI	26
C.V. KOBUN	24
C.V. BATANG GADIS	7
MEDAN BUS	12
NATIONAL	24
ANTARA	7
Total	334

Source: DILAJR-SU and P.N. DAMRI

(b) Inter-City Buses

As far as the inter-city bus operation is concerned, so many number of private companies are existing. These private companies can be classified into three categories statistically, namely, inter-city, inter-province and inter North-East Sumatra. Table 3-2-8 shows the number of companies and the number of buses operated in each category. Although more than a half of the total number of buses in North Sumatra are originated from and terminated at bus terminals in Medan City for inter-city service, some of such transferring of passengers between them are performed at open spaces inside of Medan City.

Table 3-2-8 Present Number of Inter-City Buses Registered in North Sumatra (1978)

<u>Kind</u>	<u>No. of Companies</u>	<u>No. of Buses</u>
Inter-City Buses	9	205
Inter Province Buses	40	574
Inter North Sumatra - East Sumatra	29	482
Total	78	1,261

Source: DILAJR - SU

(c) Bemo

The present number of Bemo including Daihatsu in Medan City reaches a total of 2,571 and the following table shows their numbers by type.

Table 3-2-9 Present Registered Number of Bemo, Medan City (1978)

Type	Number of Bemo
Bemo	575
Daihatsu	1,996
Total	2,571

Source: DLLAJR-SU

(d) Becak

The Becak system is divided into Becak, Becak machine and the one for freight transport.

The present existing numbers of those by type are shown in the following table.

Table 3-2-10 Present Registered Number of Becak, Medan City (1978)

Type	Number of Becak
Becak Mesin	1,935
Becak	12,000*
Becak for freight	4,000*
Total	17,935

Source: DLLAJR-SU

Note: * marked figures are approximate numbers.

(e) Taxicabs

Taxicabs consist of city taxi and inter-city taxi, which numbers are shown in Table 3-2-11.

Table 3-2-11 Present Registered Number of Taxicabs, Medan City (1978)

Type	Number of Taxis
City Taxi	144
Inter City Taxi	487
Total	631

Source: DLLAJR-SU

(3) Bus Terminal

Presently in the City of Medan, there exist only 3 official bus terminals, such as Teladan, Sei Wampu and Gelugur. However, the Gelgur Bus Terminal

is not in operation at the present. And Teladan and Sei-Wampu are used only for inter-city bus terminals. Although Gelugur is not performing its function, and the facilities in Jl. Sambu and Mercuri Buana that are performing its function as a bus terminal. This bus terminal is in effect, functioning as the terminal only for the city buses, Bemo and Daihatsu. (Refer to Fig. 3.2.4)

Table 3.2.12 shows the existing bus terminals of Medan and their functions.

Table 3-2-12 Existing Bus Terminals in Medan City

Name	Assignment	Area (m ²)
i) Teladan	For Inter-city Buses	6,700
ii) Sei Wampu	For Inter-city Buses	3,600
iii) Gelugur		Unknown
iv) Sambu	For City-Buses, Bemo & Daihatsu	81,000
v) Mercuri Buana	For City-Buses, Bemo & Daihatsu	Unknown

Source: DLLAJR-SU

(a) Sambu Bus Terminal

Eight out of eleven city bus routes are presently concentrated at the Sambu Bus Terminal. Most of Bemo and Daihatsu gather at the terminal as well, and therefore, a serious congestion can be seen from 7:30 to 8:30 in the morning and 5:00 to 6:00 in the evening every day.

This terminal, along with Jl. Sambu is granted as a city bus terminal. With respect to Bemo, Jl. Bengkalis and Jl. Rupert are used as its stations. With respect to Daihatsu, Jl. Bengkalis I, and Jl. Bengkalis II and part of Jl. Sambu are used as its stations.

This means that those facilities are not equipped with terminals but the public road spaces are used as terminals.

Fig. 3.2.5 are the sketches of each bus terminal.

Fig. 3.2.6 is the results of the survey of the total in-out traffic volume per day that was conducted in October of 1979 of Sambu Bus Terminal.

According to Table 3-2-13, the present hourly and total in-out traffic volume of Sambu Bus Terminal is approximately 32,300 vehicles per day. City buses occupies approximately 10% of this figure, amounting to 3,100 vehicles per day of the in-out traffic volume. Approximately, 90% of the total volume is shared by Bemo and Daihatsu, which amount to 29,200 vehicles per day.

Table 3-2-13 Results of Traffic Counting Survey at Sambu Bus Terminal

(Unit: Bus/hour)

Time	Bemo/Daihatsu		Bus		Total	
	in	out	in	out	in	out
5:00-6:00	99	161	30	28	129	189
6:00-7:00	705	567	104	105	809	672
7:00-8:00	1,557	1,317	124	149	1,681	1,466
8:00-9:00	1,449	1,266	134	140	1,583	1,406
9:00-10:00	1,169	1,099	86	119	1,255	1,218
10:00-11:00	1,035	1,074	91	117	1,126	1,191
11:00-12:00	1,007	970	98	112	1,105	1,082
12:00-13:00	1,162	998	97	104	1,259	1,102
13:00-14:00	1,126	1,305	114	113	1,240	1,418
14:00-15:00	999	1,032	115	92	1,104	1,124
15:00-16:00	1,166	1,209	139	90	1,305	1,299
16:00-17:00	1,053	1,219	120	116	1,173	1,335
17:00-18:00	1,013	1,169	105	136	1,118	1,305
18:00-19:00	804	808	94	135	898	943
19:00-20:00	25253	275	29	57	282	332
20:00-21:00	67	20	7	0	74	20
21:00-22:00	13	0	0	0	13	0
Total	14,667	14,489	1,487	1,613	16,154	16,102

Source: Traffic data counted by JICA Study Team in October 1979

(b) Mercu Buana Bus Terminal

In this terminal two routes of city bus are handled, being used by Bus, Bemo and Daihatsu.

Those two bus routes are Medan-Kp. Lalang and Medan-Tg. Morawa while the Medan-Tg. Morawa route is operated by a private bus company.

In regard to this bus terminal, all buses are parked on Jl. Letjen Haryono M.T. during the peak hour in the morning. Therefore it is actually performing the function of a bus station on road. This is one of the problems of the present traffic jams in the CBD.

(c) Teladan and Sei Waapu Bus Terminals

These two terminals are presently serving as inter-city bus terminals.

The function as an inter-city bus terminal are divided between Sei Waapu and Teladan. The routes served by Sei Waapu terminal are for Bingei and Pancur Batu. The routes served by Teladan terminal are for Tg. Morawa, T. Tinggi and Deli Tua.

Table 3-2-14 and Table 3-2-15 show the results of the traffic counting survey of buses/Daihatsu of both bus terminals.

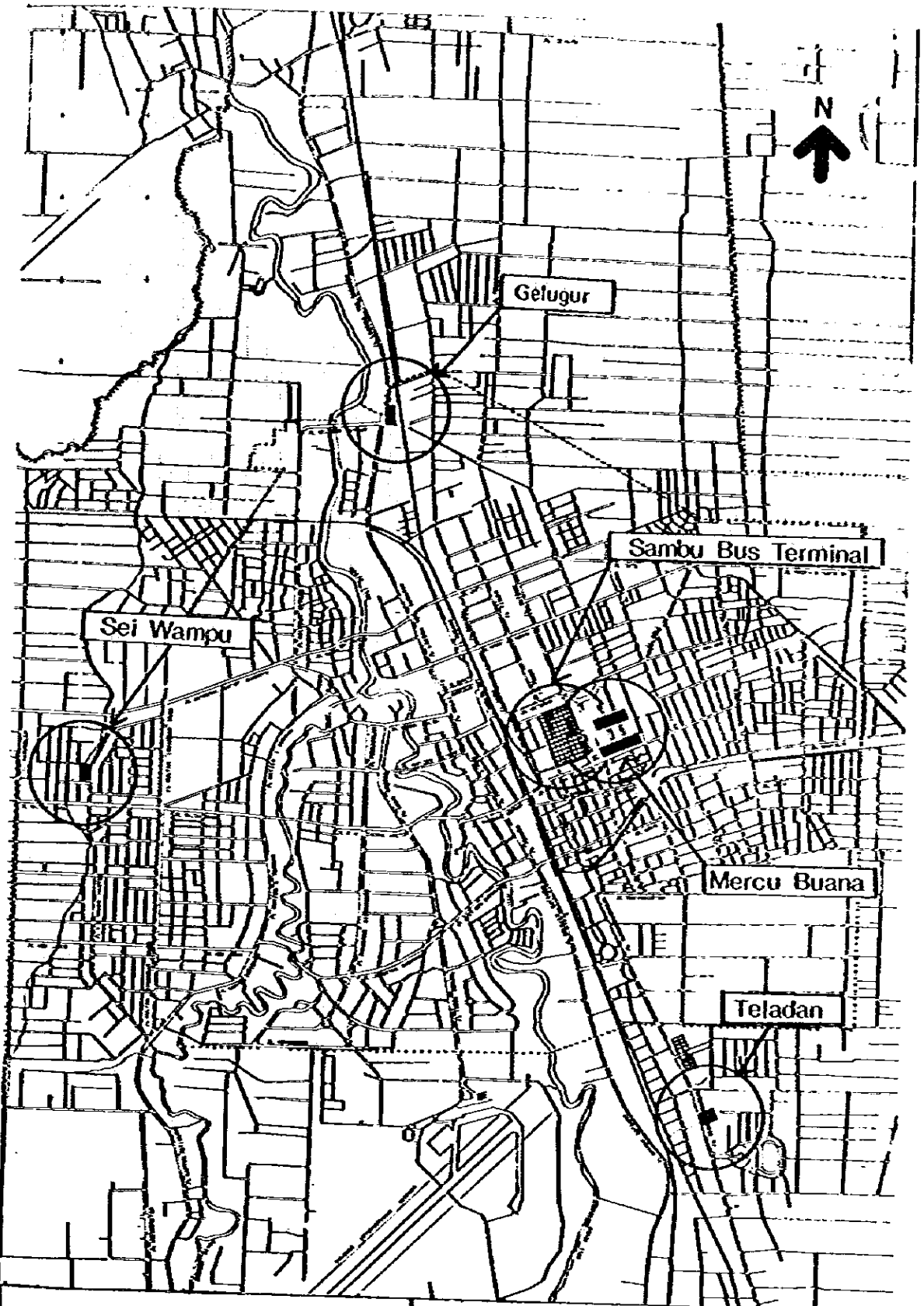




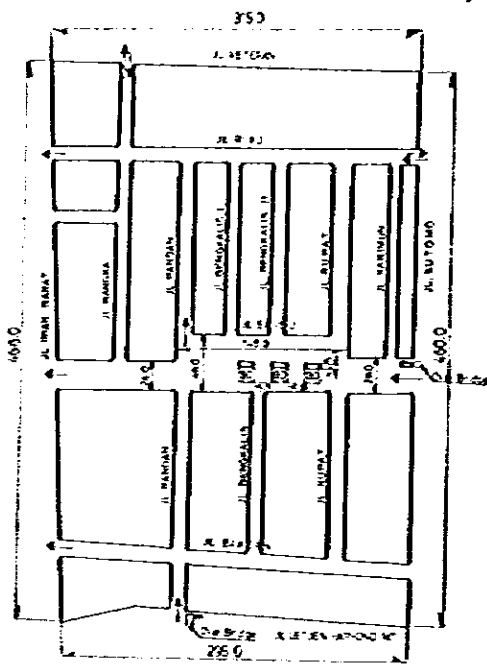
Fig. 3.24
Locations of Existing Bus Terminals (1979)

Legend

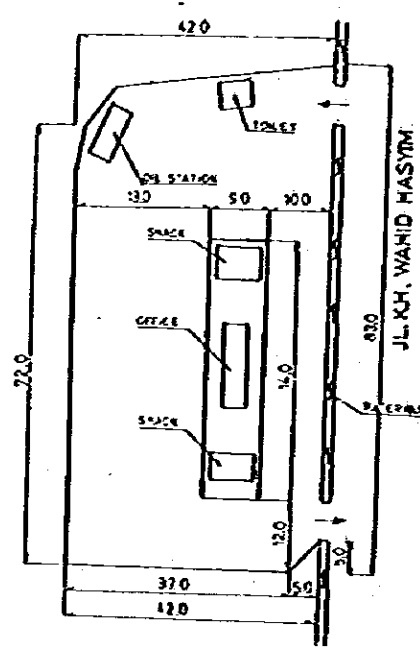
-  Location of Bus Terminals (1979)
-  Location of Bus Terminals (1979)

Medan Area Transportation Study

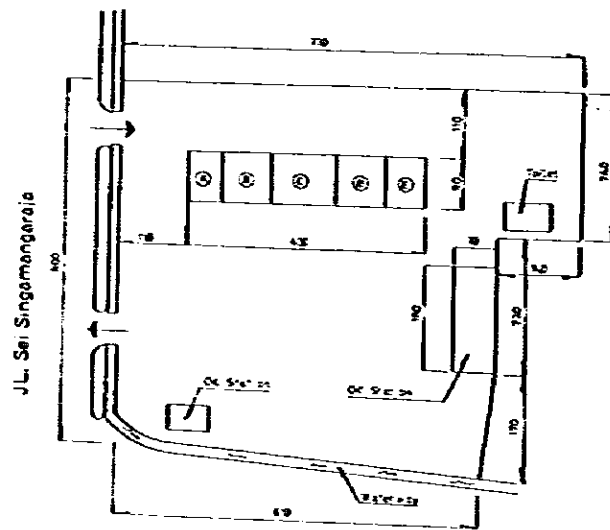
* Gelugur Bus Terminal is not in use



Sambu Bus Terminal



Sei Wampu Bus Terminal

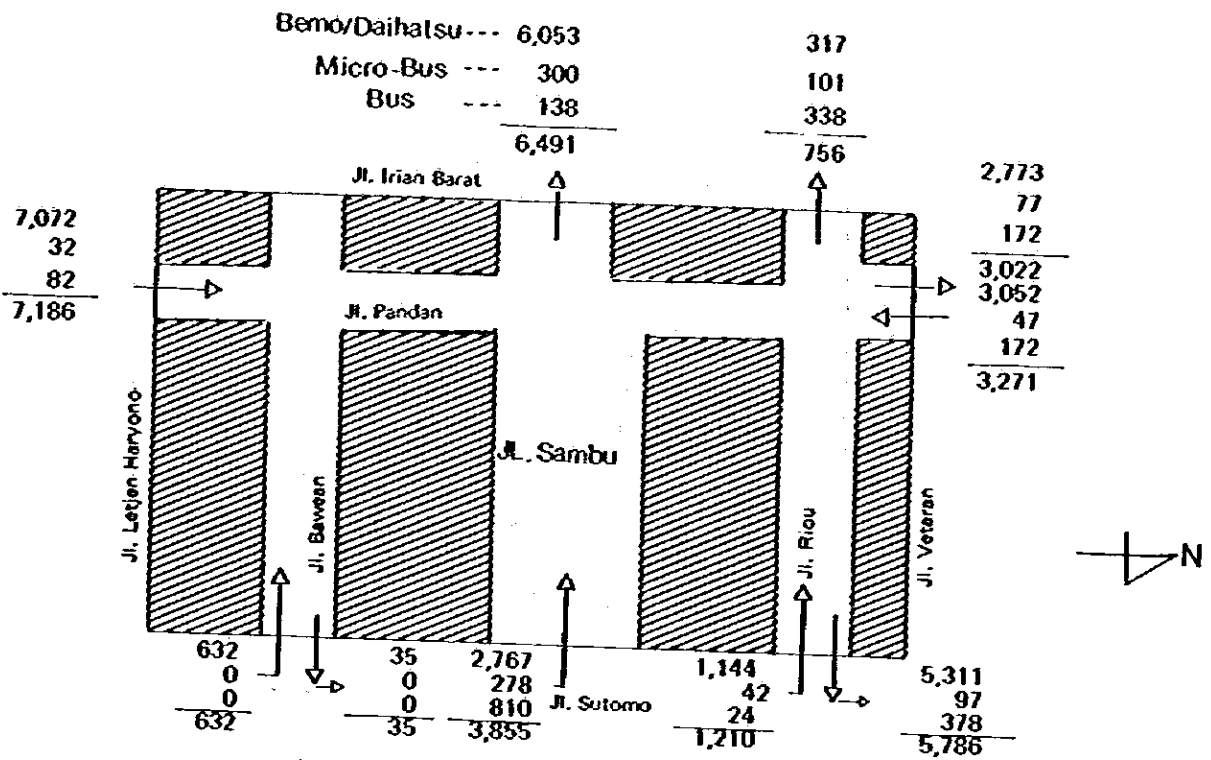


Teladan Bus Terminal

- ① — Office
- ② — Office
- ③ — Waiting Room
- ④ — Coffee Shop
- ⑤ — Truck

Fig. 3.2.5 Sketches of Existing Bus Terminals (1979)

Fig. 3.2.6 Daily Public Transport Flows at Sambu Bus Terminal (1979)



(Unit: Bus/day)			
Type of Bus	In	Out	Total
Bemo & Daihatsu	14,667	14,489	29,156
Micro-Bus	399	575	974
Bus	1,088	1,038	2,126
Total	16,154	16,102	32,256

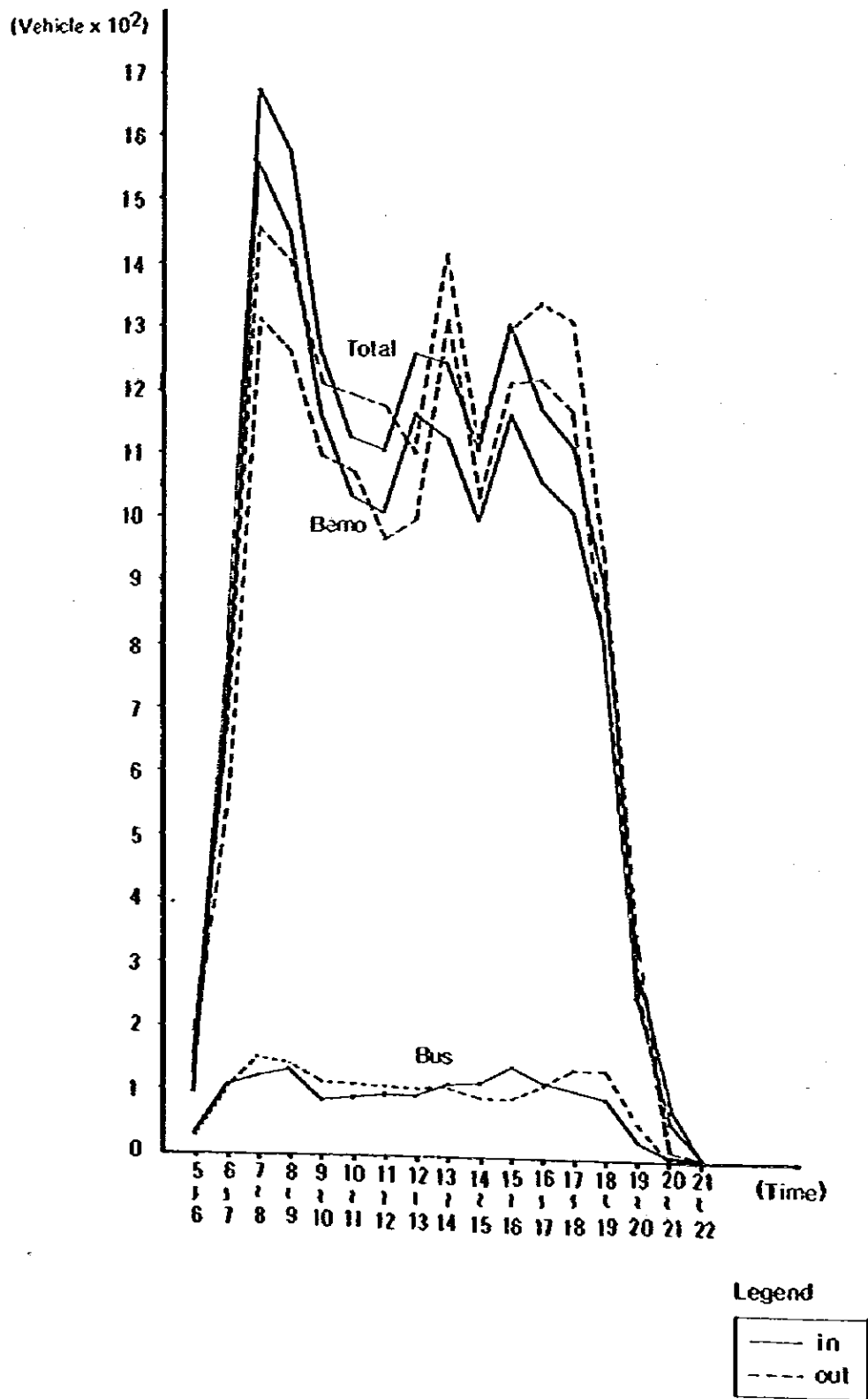


Fig. 3.2.7 Hourly Variation in Bus Traffic at Sambu Bus Terminal (1979).

Table 3-2-14 Results of Traffic Counting Survey at Inter-City Bus Terminal-TELADAN (West Terminal) (1979)

(Unit: Bus/hour)

	Bemo		Oplet Daihatsu Colt		Micro Bus		Bus		Total	
	in	out	in	out	in	out	in	out	in	out
7:00-8:00	1	1	7	10	5	5	23	27	36	43
8:00-9:00	0	0	11	12	5	5	21	20	37	37
9:00-10:00	0	0	6	4	6	4	26	16	38	24
10:00-11:00	1	0	10	7	4	4	24	23	39	34
11:00-12:00	0	0	8	7	4	5	22	18	34	30
12:00-13:00	0	0	4	4	5	3	18	22	27	29
13:00-14:00	0	0	7	7	5	7	15	18	27	32
14:00-15:00	0	0	2	2	5	5	11	15	18	22
15:00-16:00	0	0	3	3	4	7	15	17	22	27
16:00-17:00	1	1	3	3	4	3	8	7	16	14
Total	3	2	61	59	47	48	183	183	294	292

Source: Traffic data counted by the JICA Study Team in October 1979.

Table 3-2-15 Results of Traffic Counting Survey at Inter-City Bus Terminal - SEI WAMPU (East Terminal) (1979)

(Unit: Bus/hour)

Time	Bemo		Oplet Daihatsu Colt		Micro Bus		Bus		Total	
	in	out	in	out	in	out	in	out	in	out
7:00-8:00	0	0	10	11	15	15	20	16	45	42
8:00-9:00	0	0	14	12	18	18	18	17	50	47
9:00-10:00	0	0	6	9	15	13	14	15	35	37
10:00-11:00	0	0	13	13	10	14	20	22	43	49
11:00-12:00	0	0	15	15	13	12	10	10	38	37
12:00-13:00	0	0	9	5	30	29	14	15	53	49
13:00-14:00	0	0	7	8	15	14	12	13	34	35
14:00-15:00	0	0	4	4	19	19	14	14	37	37
15:00-16:00	0	0	7	7	17	19	15	16	39	42
16:00-17:00	0	0	11	8	14	13	15	12	40	33
Total	0	0	96	92	166	166	152	150	414	408

Source: Data counted by the JICA Study Team in October 1979.

(4) Operating Routes

(a) City Bus System

The City Bus System has been fixed its authorized routes which are shown in Fig. 3.2.8 and Table 3-2-16. At present city buses are operated by 10 individual bus companies and on 12 separate routes.

Table 3-2-16 City-Bus Routes in Medan City (1978)

Route	Company	No. of Buses Assigned
Medan - Belawan	CV. Setia	28
	CV. Budi	28
	PT. Pelita Angkutan	28
	PN. Damri	40
Medan - Kp. Lalang	PN. Damri	24
Medan - Simp. Tuntungan	Kop. Bus Nas.	24
Medan - Deli Tua	PT. Povri	26
Medan - Jl. M. Nawi Harahap	CV. Medan Bus	12
Medan - Tg. Morawa	PN. Damri	10
	PT. Medan National	-
	PT. Pelita Angkutan	-
Medan - Tembung	CV. Desa Maju	20
	Kobun	24
Medan - Jl. Cemara Ujung	CV. Desa Maju	21
Medan - Jl. Pabrik Tenun	CV. Desa Maju	10
Medan - Helvetia	CV. Desa Maju	12
Medan - Tanjung Sari	CV. Desa Maju	12
Medan - Mandala by Pass	CV. Desa Maju	-
	Kobun	-
TOTAL	12 Routes	319 Buses
	10 Companies	

Source: DLLAJR-SU

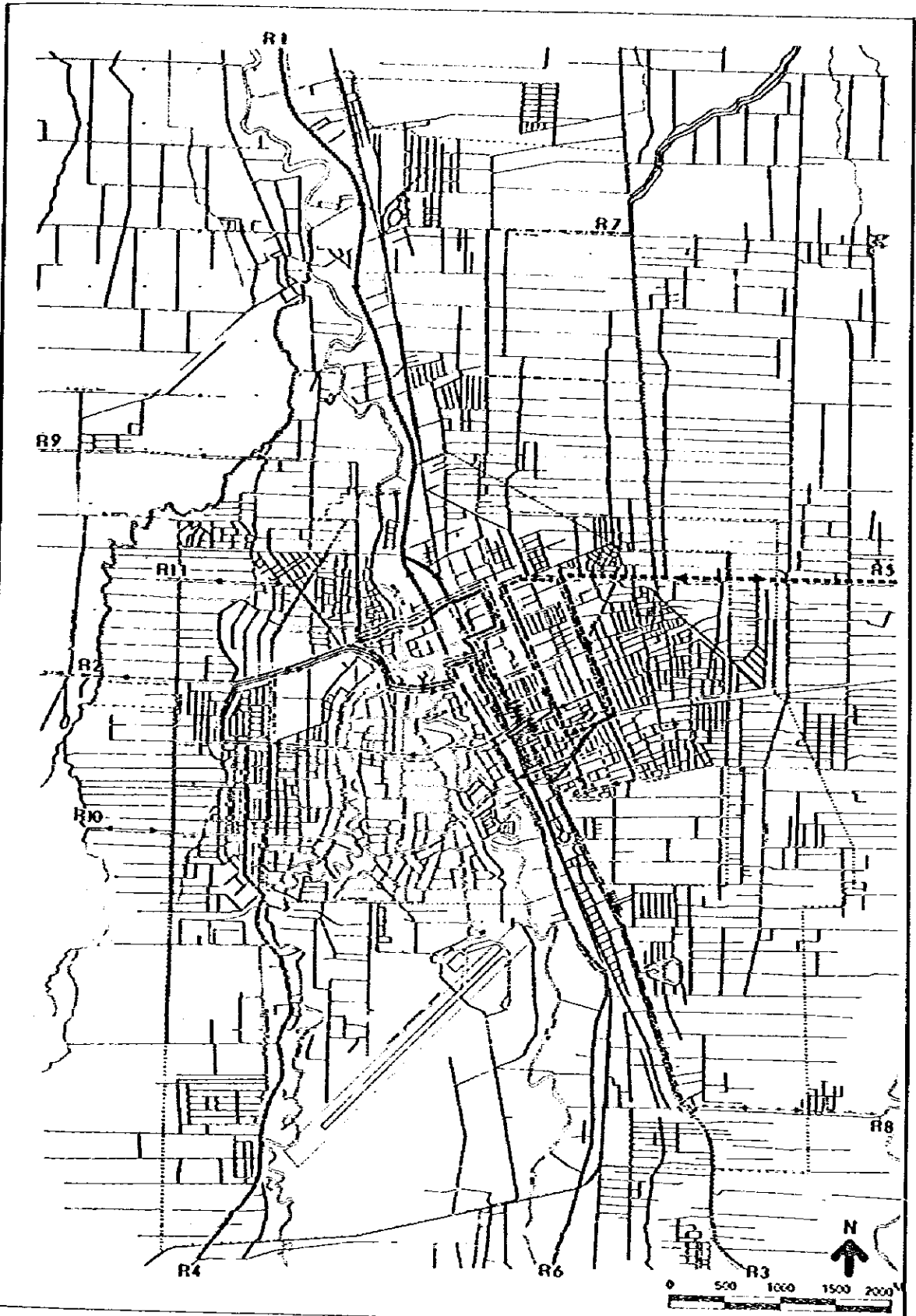


Fig. 3.28
Present Bus Route Map Medan City
(1979)

Medan Area Transportation Study

Legend

- | | | | | | |
|----|-------|------------------|-----|-------|-------------------------|
| R1 | ----- | Insaniat Belawan | R7 | ----- | Ujung Jln. Cempaka |
| R2 | ----- | Kp. Lembang | R8 | ----- | Ujung Jln. M. Nuri 1989 |
| R3 | ----- | lg. Morass | R9 | ----- | Jln. Asrama |
| R4 | ----- | Sungai Tuntungan | R10 | ----- | lg. Sejanak |
| R5 | ----- | Tembung | R11 | ----- | Ujung Jln. Pabrik Temu |
| R6 | ----- | De. 201 | | | |

