

CHAPTER I

INTRODUCTION



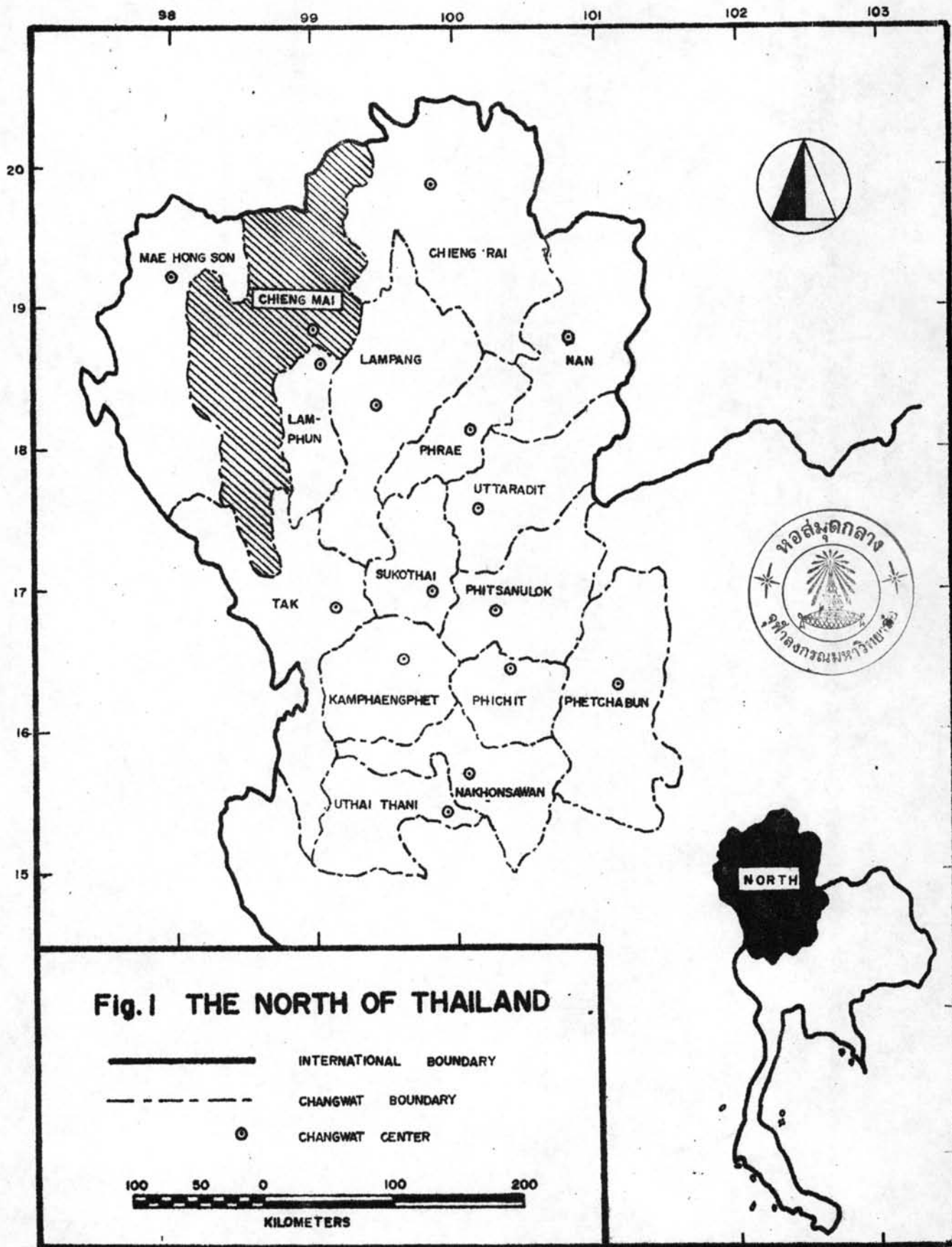
Location Description

Chieng Mai is located approximately 700 kilometers north of Bangkok and situated at latitude 19° North and longitude 99° East. It is 300 meters above sea level. Around it, mountain peaks rise to 600 and 900 meters. With low humidity, Chieng Mai has a delightful 20° C average temperature from October to January. From February to September, temperature rise to around 30° C, but monsoon showers and nightfall bring quick relief. Chieng Mai, composed of 18 amphoes¹, is one of the largest among 16 changwats² in the northern part of Thailand as shown in Fig.1. In many respects, it is the most important province next in order from Bangkok. The city wall with its adjacent ancient moat, the wall dating from the 13th century and still partially intact, seems to have become the symbol of Chieng Mai.

In recent years this second largest city in Thailand has

¹ Amphoe is a political and geographic subdivision of a changwat. An amphoe is roughly analogous to a county or district.

² Changwat means province. In Thailand the provincial capital takes the name of the province.



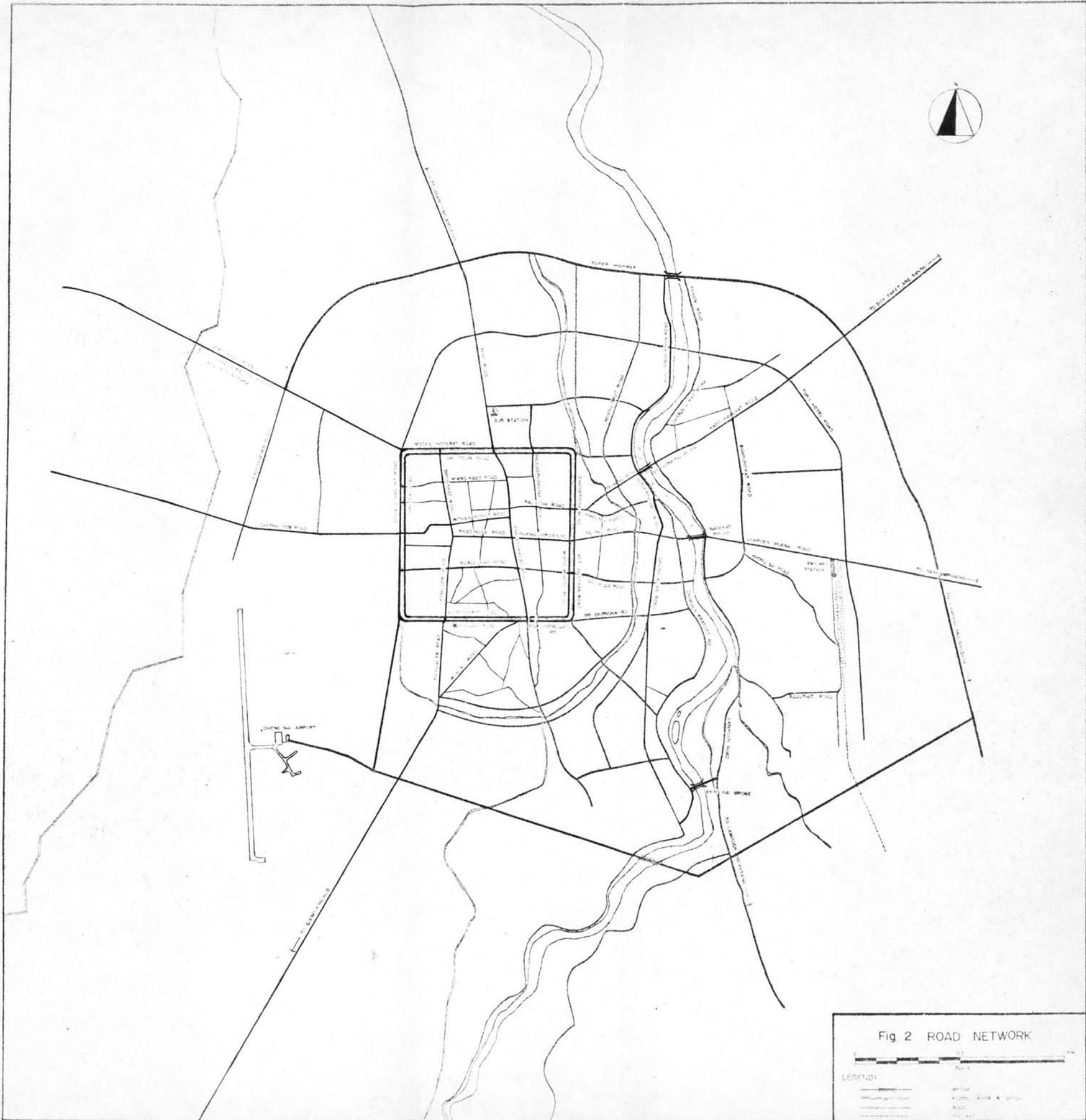


Fig. 2 ROAD NETWORK

become a tourist attraction, perhaps soon to be the "in" place of Southeast Asia. The structure of urban development in the city of Chiang Mai is greatly influenced by the ancient moat and the many historic places that restrain development of the built-up area and limit the lines of communication. The original settlement is now the residential area. Outside of the wall east to the Ping River is now the central business district (CBD) of the city where most of the economic activity is concentrated. The result is that the city today has distinct focal points for commercial, retailing, and other activities.

From the gates in the walls, main roads radiate northwards to Chiang Dao and Fang, north-eastwards to Doi Saket and Sansai, eastwards to Sankhampaeng, southwards to Chomthong and Hod, and westwards to Chiang Mai University and Huey Kaeo. In all, there are six radial routes which form the basis of the main street network outside the walls. The main road network in the city is inter-connected by narrow streets which are approximately 3 to 4 meters in width. Fig.2 shows the road network in the city.

Chiang Mai is the principal employment center of the North. The existing routes radiating from the wall connect with other nearby amphoes and provinces. Especially strong are the links with Lamphun to the south of Chiang Mai. Many daily person trips

Table 1 Population in the Municipality of Chiang Mai

Year	Population	Index	Pop/sq.km
1965	77,858	100	4,449
1966	79,694	102	4,554
1967	81,579	105	4,662
1968	84,105	108	4,806
1969	87,437	112	4,996
1970	89,272	115	5,101
1971	91,264	117	5,215
1972	93,353	120	5,334
1973	96,196	123	5,497
1974	98,319	126	5,618

Source: Department of Local Administration, Bangkok

Table 2 Population in Changwat Chiang Mai

Year	Population	Index	Pop/sq.km
1965	911,903	100	39.7
1966	932,986	102	40.6
1967	949,731	104	41.3
1968	968,738	106	42.1
1969	983,422	108	42.8
1970	1,002,295	110	43.6
1971	1,023,223	112	44.5
1972	1,049,802	115	45.7
1973	1,072,833	117	46.6
1974	1,086,203	119	47.2

Source: Department of Local Administration, Bangkok

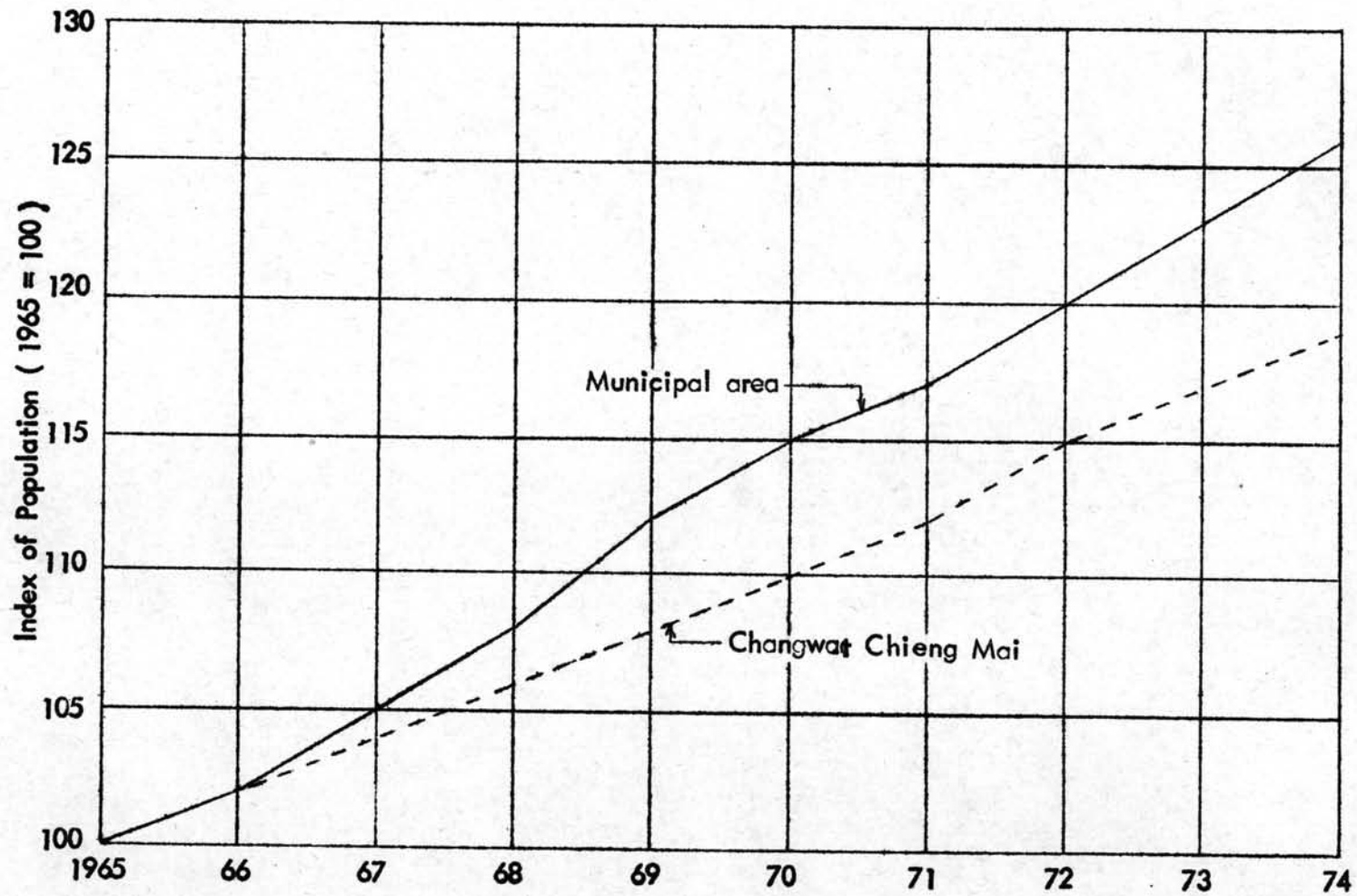


Fig. 3 Population in Changwat Chiang Mai and the Municipal Area

are made from the surrounding amphoes and provinces to Chieng Mai for business and other affairs. The records of population from 1965 to 1974, for the municipality and for Changwat Chieng Mai are shown, respectively, in Tables 1 and 2, and portrayed in Fig.3. The area of the Municipality is 17.5 sq.km; that of the Changwat is 22,993 sq.km. A planning report produced in 1969 by the Department of Town and Country Planning, Ministry of Interior, has indicated that the annual growth rate in the Municipality of about 4 percent is expected to increase in the future because of further migration.

Purpose and Scope

The urban transport problem is only one aspect of the much broader problem caused by growth of the city and it would be wrong to consider it in isolation. Over the next 15 years or so, in many urban areas in developing countries, an improved public transport system is likely to be the only alternative to increasing congestion and chaos, as it is unlikely that the communities concerned can afford to build the road networks needed to accommodate unrestrained travel by private car. In the past the task of public transport in most countries was mainly to provide a service for those with no other means of transport. In developing countries, this remains so but, with rapidly

increasing numbers of car owners all over the world, the task for organizations concerned with the operation of public transport is now also to attract an increasing number of people who have their own individual means of transport but who can be persuaded to use the public transport alternative at appropriate times.

The present research attempts to elucidate the role of the mini-bus in a medium-sized city in Thailand. The project was conducted in Chiang Mai because of the dominant role of mini-buses in public transport at that city. Moreover, collecting data about mini-bus operation in Chiang Mai stood a reasonable likelihood of success as this intermediate form of public transport is well known by the people and many agencies concerned, and is fairly well regularized. Were this project to be conducted in Bangkok, the many irregular and **unlawful facets** of operation would have made difficult the gathering of data from operators of mini-buses. The study is aimed toward the concept that intermediate public transport can fill in gaps in transport service which large buses are not providing. In order to determine what the answers might be, it was necessary to make a detailed study of the operational characteristics, trip characteristics, organization, fare structure, and management of the existing public transportation services. Recommendations for organizational and other changes which seem desirable

in order to achieve the optimum utilization are made in this report.

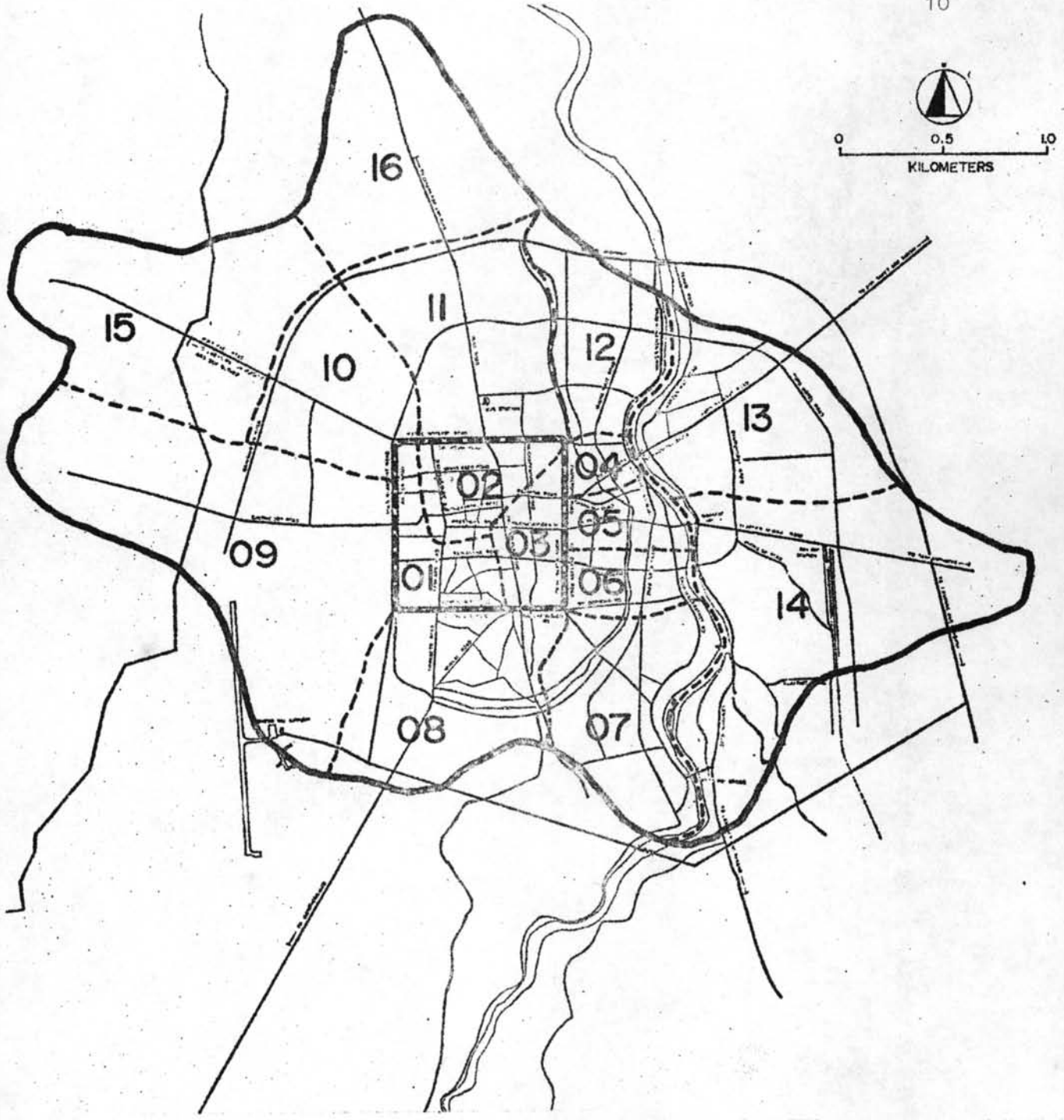
The analytical consideration dealt with the following categories of data : a survey of the origins and destinations of person trips ; study of travel time and delay ; a study of the waiting time of prospective passengers ; and considerations of the effects of mini-bus operation on street traffic.

The Study Area

For the research undertaken, the study area was selected to include all of the developed area in Chiang Mai, and extended to include the terminals of each city-bus line. Investigation showed that most of the urban area was included within the route of the superhighway to the east and north, and the route of the Chiang Mai by-pass to the south. Westward the boundary of the study area was set to include the University of Chiang Mai, set on a 200-hectare campus, and the city's largest shopping center which includes an international-standard hotel now under construction. With consideration for the characteristics of person trips in the city, the boundaries of the area are shown in Fig.4.

Sources of Data

Investigation showed that no statistical data of the nature



———— BOUNDARY LINE OF STUDY AREA
----- BOUNDARY LINE OF TRAFFIC ZONES

Fig. 4 STUDY AREA TRAFFIC ZONES

of a transportation study were available. Thus, it was necessary that the details of public transport data be collected from field surveys. This proved to be the most difficult part of the research. Field studies were made of traffic volumes, travel times and delay, and passenger waiting times to evaluate the service characteristics of the public transport systems. An origin-destination survey was conducted to investigate the characteristics of person trips in the study area, and the expansion of these data to total daily person trips was obtained by screen line checks.

The data for this study included statistical data which were obtained by visiting the offices of the appropriate ministries in Bangkok. The principal sources of data in Bangkok were the Department of Town and Country Planning, the Department of Highways, the Police Department, and the Department of Local Administration.

Expected Usefulness of the Research

This research is part of a world-wide study of intermediate forms of public transport being conducted by the British Transport and Road Research Laboratory. Considerable attention is now being given to the question in other cities of the world by researchers at the University of London, the American University

of Beirut , and the Transport and Road Research Laboratory, as well as universities in the United States. The results of the present research are expected to have far-reaching effects, serving as a model for similar studies being conducted by other researchers in Beirut, Istanbul, Manila, etc. Furthermore, it is expected that the present research should enable the Thai authorities to make decisions on whether or not to encourage this intermediate form of public transport. Another potential benefit from the results will be consideration of the economy of petroleum fuel (as yet, an unavailable natural resource in Thailand) by the reduction of the growth of private cars through the offering of an efficient and economical means of public transport.

Literature Review

Among the impersonal and standard modes of public transportation that serve the cities of the world, there are still a few that are unique and operate unlike most others. Intermediate public transport of several different types have grown up in the very different economic and social climates of developing countries, often in parallel with the more conventional forms like publicly-owned buses. These intermediate systems generally are composed of individually controlled vehicles carrying

more people than a taxi but fewer than a conventional bus. Thus there is achieved flexibility in routing and scheduling without sacrificing entirely the efficiencies of large-scale operation. Examples are the "jeepneys" of Manila, "dolmus" (English : shared taxi) in Istanbul and Ankara, "jitneys" in Venezuela, "service" in Beirut and Jordan, "bemos" in Indonesia, and converted vans and trucks ("mammy wagons") found in West Africa ; some of these are shown in Fig. 5. An examination of these transport systems may be of interest, not only for many cities throughout the developing world, but also for possible applications in the cities of Western Europe and North America. It is expected that the present study of intermediate public transport will be of interest to transportation planners who are considering various types of systems and attempting to develop the mixture of facilities and services needed to meet the variety of transportation demands found in urban areas.

GRAVA (1972) investigated the mass transportation system of Manila which consists basically of public utility buses and jeepney networks, with the two services operation in almost a complete overlap. His study set forth many details about the operational and service characteristics of the jeepney system. The results showed that the jeepneys of Manila are important,

not only for personal transportation, but they are also the raison d'être of an entire manufacturing and service subsection employing a sizable work force engaged in producing and maintaining the vehicles. The typical jeepney has a front seat that holds the driver and two passengers. In the back, upholstered benches are fitted along each side, their length varying from 4 to 6 seating positions. The total capacity of the vehicle is thus 10 to 14 passengers. From the operational standpoint, one of the most important features of the jeepneys is their ability to maintain high average speeds. That is, their total driving time for any given distance is not significantly inferior to that of private automobiles or taxis following the same route. The reason is that, during peak hours, most of the passengers are loaded at the beginning points and are let off on demand without much loss of time. Aggressive driving also accounts for time savings. Specific choices by passengers are quite personal, with the chief difference being that jeepneys are recognized as faster, while buses are more comfortable for longer journeys. A major existing physical deficiency of the jeepney service in Manila is the almost complete absence of parking and waiting space at trip terminal points. There is no argument that a fully loaded bus can carry more passengers per lane than any other motor vehicle, but the jeepney provides a more rapid,

flexible, and personalized service, and it can more easily negotiate the narrow streets of central Manila.

Dr. Grava concluded that there are many problems associated with jeepney operation in Manila. These include deplorable driving habits and flagrant disregard for traffic regulations, lack of loading and unloading areas or their proper utilization, safety and insurance problems, abuses of labor practices, and many others. Clearly, this type of transportation cannot serve all the requirements of a great metropolitan area, but there might be a proper role for it in an integrated system. After all, the jeepneys do provide a successful, albeit imperfect, service. A large investment in rolling stock has been made, and, more importantly, an entire manufacturing and maintenance industry with an employment and facility structure exists.

OZDIRIM (1970) studied the small-unit transport system known as "dolmus", called in English "shared taxis", in the main cities of Turkey : Istanbul and Ankara. Dolmus is a transport system which is provided by taxis, mini-buses or station-wagons for a typical maximum of nine passengers. Dolmus cars have a fixed fare and operate on the same routes as the public transport system. People can board them and get out wherever they want. As dolmus picks up most of its passengers from the public

transport stops they have caused a deficit in revenue for the public transport system. The overall delay to traffic in the main streets of the big towns is attributed to the dolmus system. It seems that Özdirim does not support the dolmus systems operating in Ankara and Istanbul. In his study, he stated the disadvantages likely to occur by increasing the number of dolmus as follows.

1. About 54 percent of all urban traffic accidents in all the towns of Turkey involved dolmus.

2. The speed of traffic always decreases where dolmus operates. The reason for this is the dangerous behaviour of the dolmus drivers.

3. The starting delay of dolmus at signalized intersections is greater than that of private passenger cars.

Özdirim concluded that although these cars might seem to be more flexible in answer to the transport demand, they actually bring more losses than benefits due to the behaviour of their drivers. In his report, he emphasized the detrimental results of increasing the number of small public transport vehicles, such as "dolmus".

According to a background paper for an OECD CONFERENCE (1975), Environment Committee U/T/75.125, it is stated that shared taxis differ from conventional taxis by operating on fixed routes, and differ from conventional buses by operating on shorter headways without fixed schedules. Shared taxis are hailed from

the street by prospective customers, and stop to set down passengers upon request. Shared taxis provide a comfortable, relatively inexpensive, frequent and rapid mode of transport. Where pick-up points are designated for group riding, cruising in search of customers is decreased and therefore energy consumption and air pollution may be reduced. However, it was reported that shared taxis require longer starting times at signalized intersections than passenger cars, and the frequent picking up and setting down of passengers could disrupt the smooth flow of traffic and contribute to delays unless appropriate arrangements were made. Generally speaking, the shared-taxi system provides both advantages and disadvantages.

KUDLICK (1969) studied one of the modes of public transportation in Caracas, Venezuela : the "por puesto" or "jitney" taxi service. Virtually all por puesto vehicles are four-door, six-occupant (including driver) sedans. Por puesto operation consists of shared taxicabs that pick up and drop off passengers along prescribed routes and normally charge each passenger carried a fixed fare on a zone basis. The por puesto system has a number of characteristics -- frequent service and speeds comparable to the private automobile -- that are similar to those of various proposed small-car and minibus public transportation

systems. One favorable aspect of por puestos is that drivers can seek out alternative streets to avoid traffic congestion. Travel time studies indicate that average por puesto speeds are virtually identical to average speeds obtained by private automobiles. Por puestos stop to discharge passengers only as requested, and stop to pick up passengers only when signaled from the sidewalk. This causes considerable interference to the smooth flow of traffic. However, in comparison to bus trips, the use of por puesto can reduce public-transportation travel times by almost one-third, on the average.

Kudlick concluded that the por puesto system arose as a result of inadequate bus service. It should be recognized that the use of por puesto as part of a public transportation system has several attractive aspects, including great flexibility in routing and scheduling, a seat for every passenger, and ability to provide frequent service at short headways. Nonetheless, there is evidence that the number of por puestos in operation in Caracas declined as a result of the provision of improved bus service and a rail rapid-transit system. The future role of the por puesto system will probably be limited primarily to transit-line feeder and distribution service.

JOUZY and NAKKASH (1973) investigated the characteristics of some "jitney" systems in Beirut (Republic of Lebanon) and Amman (Jordan). In Beirut, the rather unique public transport system called "service" is operated. The overall speed of "service" cars is not different from the speed of private cars in the same traffic stream. Compared with buses, the speed of the "service" is higher. The time lost in setting down and picking up passengers is compensated for by the more aggressive driving habits of "service" drivers. Beirut "service" have flexibility in scheduling. In Amman, the "service" system has some interesting features that warrant mentioning. A "service" vehicle must not deviate from its assigned route. However, the car is permitted to operate as a taxi, but on the backhaul the driver is not permitted to pick "service" passengers from other than his prescribed route. The fare is set for each route depending on the length of trip. However, the "service" systems as described have the same advantages and disadvantages as the por puesto service in Caracas. Systems similar to the "service" are operating in many cities of the world under various names.

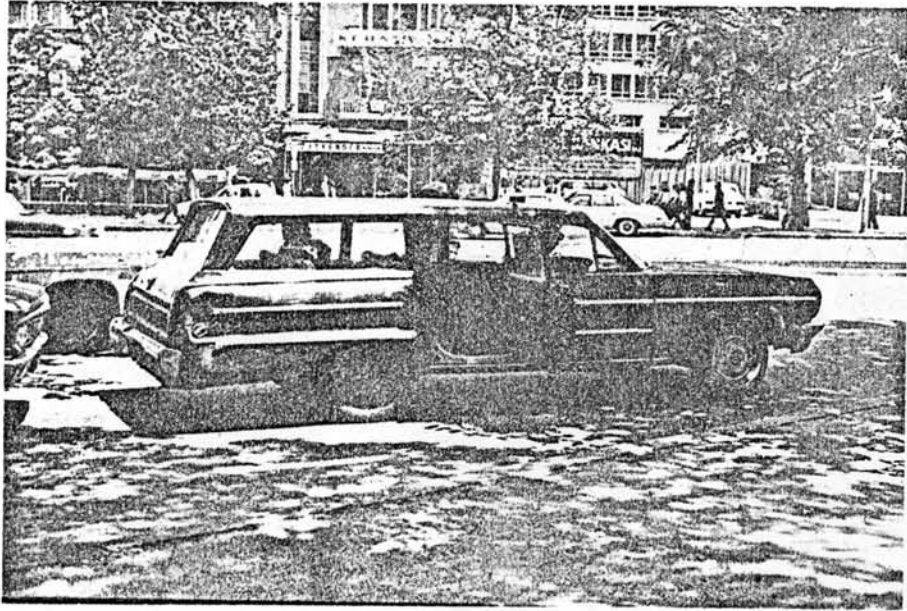


Fig. 5a. DOLMUS IN ANKARA, TURKEY



Fig. 5b. BEMOS IN SURABAYA, INDONESIA