Transportation System Analysis and Software Application
A Case Study for the City of Piura, Peru

by

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Abstract

Transportation has always played an important role in influencing the development of societies. It is necessary to understand the current transportation systems to develop feasible future plans.

The transportation situation in developing countries is becoming critical because of the negative influence of transportation on the environment. While most of the focus of previous studies was mega-cities, cities with populations of less than a million, have also experienced the negative impacts.

This study is conducted as a case study to analyze the current transportation system and travel patterns in the middle-sized city of Piura, Peru. The primary purposes are (1) to better understand the transportation activities and travel behaviour of the city more, and (2) to construct a prototype transportation planning model for the city.

The study has achieved those primary purposes. The level of understanding of the transportation activities and travel characteristics of the city are certainly increased through the analysis of trip purpose, time and modes, for example. The successful prototype transportation modeling shows the applicability of a standard transportation system modeling tool. This study is a benchmark study for the city.

While this study has successfully demonstrated the use of planning techniques, there are difficulties which should be addressed and overcome. Further research is necessary in order to better understand the transportation system and develop a more effective transportation model.

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Chapter 1

Introduction

Transportation has always played an important role in influencing the development of societies. This in turn means that it is necessary to understand the current transportation systems in order to understand the societies and also to make suitable and feasible future plans for those societies.

Recently, developed countries have increasingly been concerned with the influences of motorized transportation systems on the environment. Negative impacts such as traffic jams, air pollution and noise pollution are often noted. In developing countries, the primarily focus is often not environmental issues even though the negative effects of transportation on the environment are clearly seen and often critical. Cities such as Bangkok and Mexico-city are used as examples of cities in terms of negative environmental impacts. A number of studies have been conducted to try to solve the problems. Those studies, however, have mostly focused on the mega-cities with populations of more than a few million, and less attention has been paid to cities with populations of less than a million.

The primary focus of this study is the transportation system of a middle-sized city in a developing country. The major interest is what kinds of transportation activities are functioning in the city. The city chosen for this study is the City of Piura, Peru, which had a population of approximately 366,000 in 1992, the primary base year for this study. This study is a case study which analyzes current transportation systems and travel patterns in the city, and which constructs a prototype transportation model of the city for future transport planning. The major information sources used are site investigation of traffic observations and meetings with the municipality officials in transportation sectors, a household survey conducted in 1993, and various plans and reports of the city.

This paper consists eight chapters. Chapter 2 clarifies the purpose and scope of the study. Chapter 3 deals with general information of the study area, such as geographical characteristics, plus the people's life style of the country and the city. In Chapter 4, the framework of the transportation system is introduced. Here, the basic statistics of the study area are analyzed. Then, Chapter 5 analyzes the system based on the traffic analysis zone system of the city and the household survey conducted in 1993. The survey consists two major parts, and in this chapter, the household travel characteristic part of the survey is analyzed. Further, Chapter 6 continues to analyze the household survey data. In this chapter, the other part of survey, trip diary or actual travel behaviour part, is analyzed. Then, Chapter 7 applies T-model2, a transportation modeling software. The settings of the simulation run are discussed, then the results are analyzed. Finally, Chapter 8 concludes this study and suggests some recommendations for further research.

Chapter 2

The Framework of the Study

2.1 The Needs

The interest for this study basically comes from three directions. The first is the increasing concern with the use of automobiles (or motorization), the second is the changing transportation environment and, simultaneously, public attitudes towards motorization in middle-sized cities in developing countries, and the third is the applicability of transportation planning tools, which is developed in developed countries, to the cities in developing countries. Since all of these directions are important aspects in transportation planning, there is certainly a need of this study.

The first direction is the increasing concern of motorization. The use of automobiles has occurred in all countries. In many cases, the automobiles have been criticized as a major contributor of the negative environmental impacts such as traffic jams, air pollution and noise pollution. In urban areas particularly, the impacts are noticeable.

Motorization has occurred in all developed countries. In Britain, for example, the biggest wave of motorization in the post war era came in the 1960's. The use of private automobiles such as cars, taxis and motorcycles increased by almost 100% to 303 billion passenger kilometres (bpk) in 1970 from 157 bpk in 1960. The proportion of automobiles in the total amount of travel also increased to 75% in 1970 from 54% in 1960. Table 2-1 shows this. In 1980, the increase from 1970 was 95 bpk and 6% in the share of transportation modes, and in 1990, the total amount by automobiles reached 597 bpk with the increase of 200 bpk from 1980, and their share increased to 86.6% with another 5% increase. Surprisingly, while the total amount of travel by road transportation modes had increased by almost three times during the three decades, only 8% of expansion can be explained by the increase of population.

Table 2-1 Increases in Travel in Britain, 1960-1990 (bpk)

Mode	*1960*		*1970*		*1980*		*1990*	
Bus and coach	79	27%	60	15%	52	11%	46	7%
Car, taxi and motorcycle	157	54%	303	75%	398	81%	597	86%
Pedal cycle	12	4%	4	1%	5	1%	5	1%
Road Total	248	86%	367	91%	455	92%	648	93%
Rail	40	14%	36	9%	35	7%	41	6%
Air	0.8	0.3%	2	0.5%	3	0.6%	5	0.7%
Total	288		405		493		694	
Average distance per person per year	5,640		7,500		8,900		12,440	

Source: D. Banister (1994) 'Transport Planning'

Table 2-2 International Comparisons of Motorization during 1980s.

Country	*Car + Taxi Ownership per 1000 1990*	*Growth in Car Ownership(%) 1980–90*	*Growth in Car Traffic (%) 1980–90*	*Average km per Car per Annum 1990*	*Percentage by Car 1990*
Belgium	393	22.4	15.0	12,200	82.0
Denmark	312	15.1	30.7	17,600	79.6
France	417	16.8	26.0	13,300	84.8
Germany	437	32.0	35.0	11,600	85.5
Greece	159	78.7	–	–	–
Ireland	228	4.1	30.4	24,200	–
Italy	433	39.7	36.4	10,400	79.1
Luxembourg	483	36.8	114.3	16,400	–
Netherlands	370	14.9	30.7	14,000	84.7
Portugal	242	112.8	52.0	10,200	80.2
Spain	308	52.5	50.6	6,700	74.0
UK	374	35.0	56.2	16,000	88.2
EC 12	*346*	*31.1*	*37.3*	*13,900*	*82.0*
Austria	384	28.4	31.8	10,700	73.8
Finland	386	50.8	50.4	17,300	79.9
Norway	380	25.4	54.3	15,500	87.0
Sweden	421	21.3	32.3	15,300	85.1
Switzerland	443	24.4	21.1	11,700	78.1
Japan	283	38.7	44.9	9,800	54.3
USA	648	18.2	39.7	15,400	98.6

Source: D. Banister (1994) 'Transport Planning'

Another surprise is that the use of other road transportation modes such as buses, coaches and pedal cycles had decreased, not increased, during the period in both the amount of travel and the share of modes.

Other developed countries had experienced motorization as shown in Table 2-2. While the average motorization growth of EC countries was 37.3%, some countries such as Luxembourg and Portugal experienced more than 50% growth in car traffic. The growth of car ownership during this period was also noticeable with at least 20% increase in most countries and more than 50% increase in some countries. One thing which should be mentioned is that car ownership in most countries is still around 300 to 400 per 1000 people. This number is far smaller than 648 for the USA, which is considered a country of automobiles.

Having experienced motorization, developed countries have also experienced the negative impacts. Those countries have been trying to solve the problems by employing new technologies, implementing new systems, and applying new approaches or policies, but the problems appear to have no single solution.

The second direction is the changing situation and public attitudes towards the motorization in middle-sized cities in developing countries. A number of developing countries are in a period of rapid motorization. Many megacities, where most of the people, industrial and economic activities are concentrated, have experienced far worse negative transportation impacts than cities in developed countries.

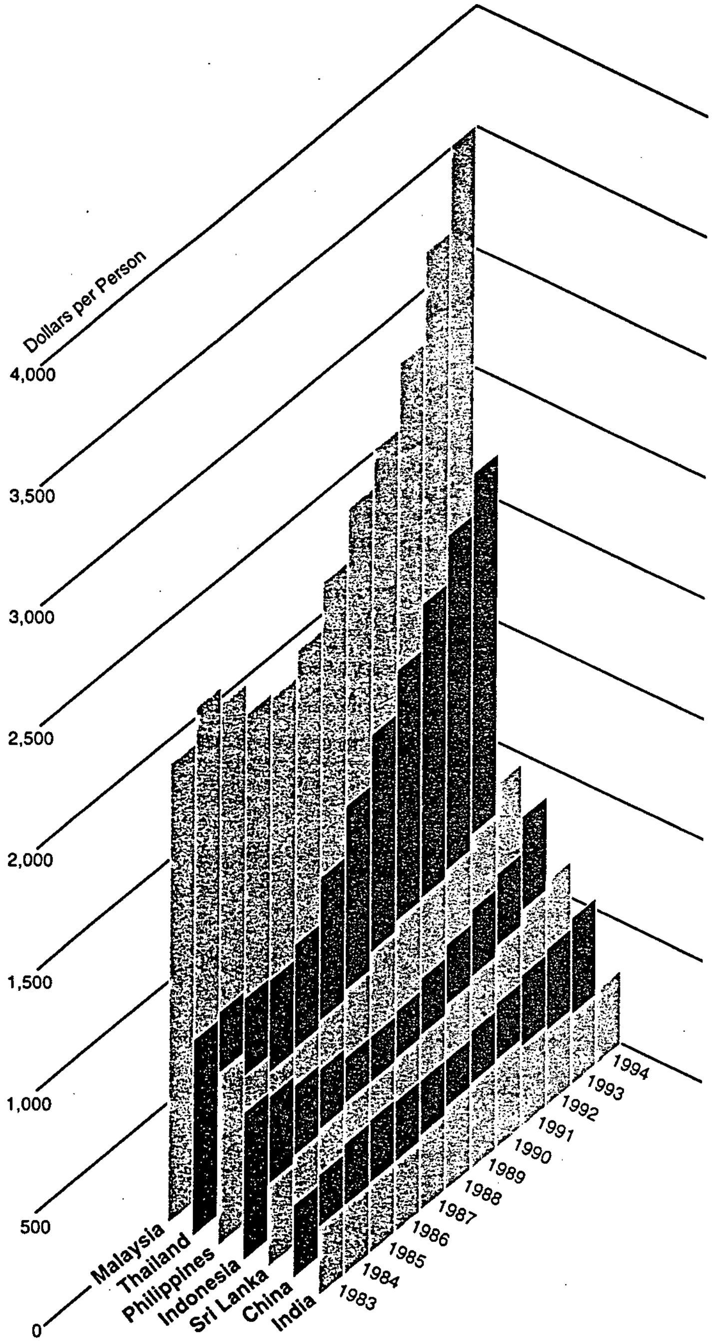
Southeast Asia, for example, is one area experiencing rapid economic growth, and also where many large cities are facing the negative impacts of motorization. Table 2-3 shows the number of car ownership per 1,000 persons in three South Asian countries in 1986 and 1993, Figure 2-1 shows per capita GNP trends in Asian countries, and Figure 2-2 shows the trends in car ownership per 1,000 persons. In Figure 2-1, Malaysia and Thailand have experienced rapid growth in the second half of 1980s, and even the Philippines and Indonesia have entered a growth phase in recent years. The car ownership in Thailand increased by 200% to 70.0 per 1,000 persons in 1993 from 23.1 in 1986. Because of the inappropriate traffic management, Bangkok is referred to as a city with the "world's worst traffic jams" with average speed of 8.1 km/h during peak rush hour periods in 1989 (Kubota 1996). From both Table 2-2 and Figure 2-1, however, the car ownership in these countries is still small when compared with that of developed countries. The capitals of the some South Asian countries in Table 2-3, such as Jakarta and Manila, have not experienced very large increases in car ownership, but have already experienced the problems represented by traffic congestion. If these cities pay no attention to the situation, they may likely become the second or third Bangkok.

In most cases, those transportation-oriented problems are often discussed only in megacities because the outcome is quite visible and enormous. The smaller cities, however, have not been reported upon. This may be because the problems in smaller cities have been less serious or received less attention, because the problems have not been recognized as a problem, or because the problems are just developing without notice. Even though the capitals, which are usually far larger than the other cities, are often studied, the smaller cities still accommodate a large number of people. Within the context of rapidly increasing population and ongoing motorization, these smaller cities will eventually face the same problems. As a study of transportation planning in developing countries suggested (Dimitriou 1992), it is also important to look at the middle-sized cities.

Table 2-3 Car ownership in three South Asian countries (1986 - 1993)

	1986	1993
Thailand	23.1	70.0
Indonesia	13.1	18.1
The Philippines	15.8	32.4

Source: H. Kubota (1996) 'Traffic Congestion', the wheel extended no. 96



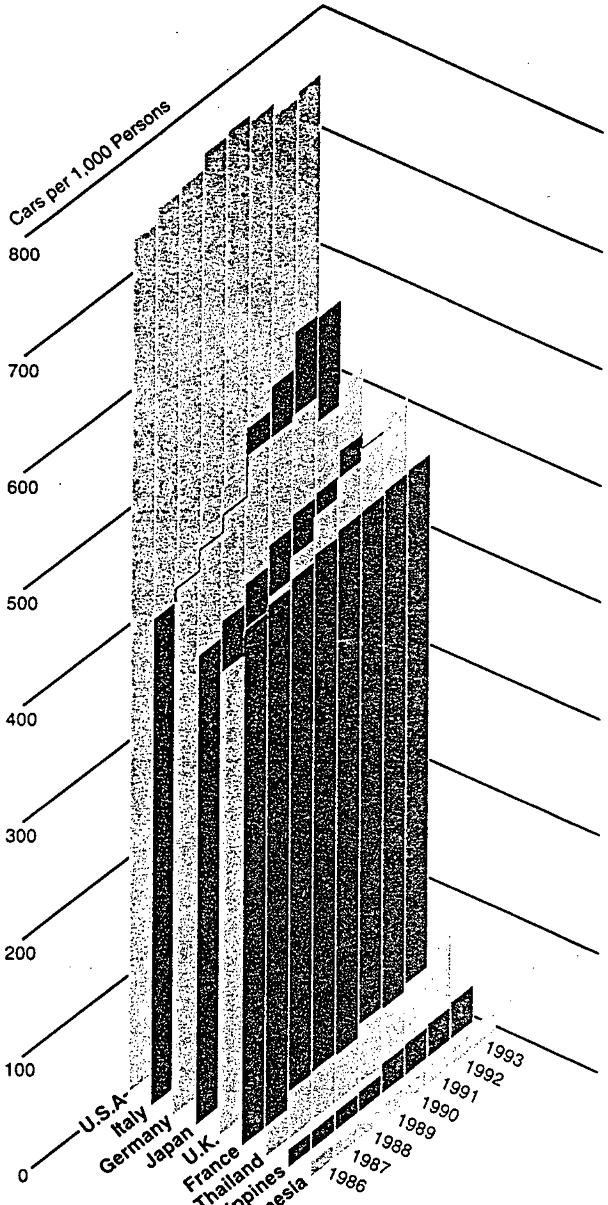


Figure 2-1 **Trend of per capita GNP in Asian countries** **Figure 2-2** **Trends in car ownership**

Source: H. Kubota (1996) 'Traffic Congestion', the wheel extended no. 96

The third direction is the applicability of transportation planning tools for the cities of developing countries. As mentioned in the introduction, transportation planning has played an important role in all levels of urban planning. It can be for a city, for a region or even for a whole nation. A number of studies have been conducted in this field in order to develop more reliable transportation planning tools for future prediction because the influences of transportation systems are important to the development of the area and eventually life styles of local people. Therefore, the focuses of these studies, particularly those with engineering approaches, are often set in order to increase the applicability of new or established transportation planning models as reliable and useful tools.

There are two recognized methods of examining the applicability of transportation planning models. The first is creating new models or refining the established models for more reliable use. In this direction, research has often been conducted at specific places in developed countries, where the major methods of urban transportation planning tools have been tried. In most of the cases, the emphasis is purely how much more reliable, precise and useful the models can be for future planning.

The second type of studies, on the other hand, have been performed in order to examining the workability of established models in different places and situations after the applicability of the models has been generally proved reliable enough. In this case, the major focus is often how much the established models can reliably work in the different socio-economic contexts. Since there is always a risk of inappropriately applying models, it is important to examine the applicability of the models in this way.

The applicability of established models has also been examined in developing countries, where the issue of technology transfer is often raised. Dimitriou, for example, tackled these issues in his study, and concludes that "critical technology-transfer questions in urban transport planning are not those which concern techniques but development strategy" (Dimitoriou 1992). That is, "the principal issue of this kind is whether a city in developing countries should duplicate the same type of development and transport strategy as is typically pursued by developed countries." The issues he discussed in the study for the question of technology-transfer are the following:

(1) urban development goals and traditional transport planning practice,
(2) the influence of urban planning approaches and transport planning,
(3) issues of technology transfer,
(4) problem of goal setting, and
(5) goals and availability of resources.

By examining not only functions and assumptions of transportation planning technologies developed in industrialized countries but also the difficulties of cross-cultural technology transfer, he stresses the importance of strategy, not techniques. Based on his point of view, therefore, there is always a certain level of successful application, and it is likely to be able to prove the applicability of those techniques for a city in developing countries as long as they are carefully used with the appropriate transportation strategies.

All three directions mentioned above are considered appropriate topics of study. There is uncertainty in implementing transportation planning techniques to the cities in developing countries, therefore, the first step should be to increase the understanding of societies' and people's values and, most importantly, demand for transportation, in order to make suitable and feasible future strategies for the society. As long as these fundamental aspects are maintained, it is worthwhile to conduct this benchmark study of the current transportation system in a middle-sized-city in a developing country.

2.2 The Purposes

As mentioned in the previous Chapter, this study has been conducted as a case study of the current transportation system of city of Piura, Peru. There is no extensive study of the transportation system of Piura, therefore, this study intends to conduct a benchmark study of its transportation systems. The primary purposes of this study are two-fold:

(1) to increase the understanding of human activities and trip characteristics in the city of Piura, and
(2) to construct a prototype transportation planning model for Piura.

Since the purposes are two-fold, this study has two major parts. The following eight steps were taken to achieve the purposes above:

(1) increasing the understanding of the general environmental characteristics of the city,
(2) reviewing previous studies on future planning and current transportation facilities in Piura,
(3) setting new traffic analysis zone system for this study,
(4) analyzing demographic and trip data from a previous questionnaire survey,
(5) introducing transportation planning software, T-model 2,
(6) calibrating the model and analyzing the model setting,
(7) examining the applicability of the model, and
(8) summarizing and making recommendation.

The first four parts, (1) to (4), are mainly for the first purpose, and the following three, (5), (6) and (7), for second. Then, the last part, (8), concludes the this case study of the analysis on the transportation systems in a middle sized city in a developing country.

Chapter 3

The Environment of the City of Piura, Peru

This chapter introduces the general environment of the study area, the City of Piura. First, basic environmental characteristics such as geographical characteristics, climates, recent historical background, economy and governmental division systems are mentioned from the national level point of view This is to clarify the environmental characteristics of the area in the country, Peru. Then, the subject is narrowed down to the environmental characteristics of the city of Piura.

3.1 The Environment of Peru

3.1.1 Geographical Environment

Peru (1,285,215 sq. km) is the third largest country in South America, and the 18th largest in the world. It is bounded to the north by Ecuador and Columbia, to the east by Brazil and Bolivia, to the south by Chile, and to the west by the Pacific Ocean. Peru lies entirely within the tropics. Its northernmost point is only a few km below the equator and its southernmost point just over 18° south. (See Figure 3-1 for the map of South America, and Figure 3-2 for the map of Peru.)

Geographically, Peru is divided into three main regions from west to east: a narrow coastal belt, the wide Andean mountain range, and the Amazon rainforest.

The narrow coastal strip is mainly desert, merging at the northern end, near Ecuador, into mangrove swamps and at the southern end into the Atacama Desert, one of the driest places on the earth. This coastal desert has Peru's major cities, including Piura at the north part of the strip. Approximately half of the nation's population live along the coast, and the coast is the location of its best highway, the "Pan-American." This asphalt-paved highway runs the

Figure 3-1 Map of South America

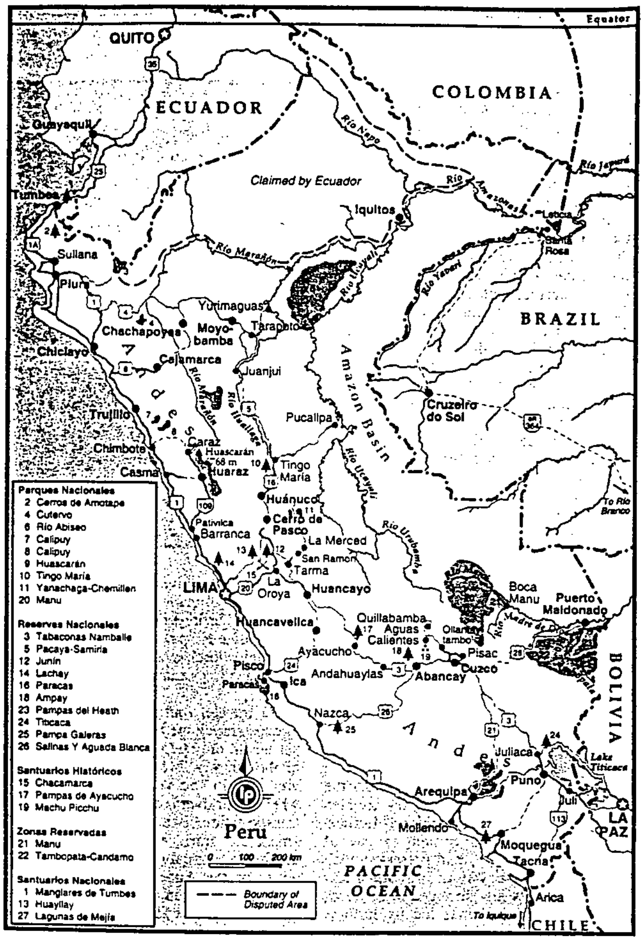


Figure 3-2 Map of Peru

Source: R. Rachowiecki (1996) Peru, *Lonely Planet*

entire length of Peru and through the City of Piura. The desert is crossed by rivers running down the western slopes of the Andes. Approximately 40 oases are formed and these are agricultural centres. Irrigation plays an essential role in supporting the coastal cities and creating valuable agricultural land. The valleys have good soil formed by the deposit of silt from the highlands but the intervalley areas are sand or rocky desert.

The Andes, the second greatest mountain chain in the world after the Himalayas, goes rapidly up from the coast. Heights of 6,000 metres are reached just 100 km inland. There is also an ocean trench 100 km offshore which is as deep as the Andes are high. The ongoing process is that the Nazca plate is going under the South American plate, and this contributes to the geological instability. Earthquakes are common particularly around the coastal areas. Active volcanoes are also found in Peru's southern Andes. Most of the Peruvian Andes lie between 3,000 and 4,000 metres above the sea level and the highlands support the most of the remaining half of the country's population. The mountains contain several types of mineral ores, and the soils are mostly poor with the exception of a few mountain basins.

The eastern slope of the Andes are less precipitous than the western slopes, but no less rugged. They receive much more rainfall than the dry western slopes and so are clothed in a mantle of green high-land forest or cloud forest. At lower elevations, the cloud forest becomes the rainforest of the Amazon Basin. This region has been penetrated by few roads and those that do exist go in only for a short distance. Comparatively few people live in the Amazon Basin although it covers over half of the country's area. Oil is extracted from the rainforests of northeastern Peru. Soil quality is generally poor in this region.

Figure 3-3 shows the geographical cross sections of the country. Its three regions; coastal desert, Andes highland and the forests on the eastern slopes, can be recognized from Figure 3-3.

3.1.2 Climates

Peru's climate can be divided into two seasons, wet and dry, though the weather varies greatly, depending on the geographical region. Figure 3-4 shows the climate charts for four of the major cities, which in turn shows four types of climates. The first is the desert coast which is arid. The climate chart of Lima (upper-left in Figure 3-4) shows the typical climate of this region. The climate chart of the city of Piura, the study city, has a similar shape. During the summer (January to March) the sky is often clear and the weather tends to be hot. During the rest of the year the gray coastal mist known as the "garúa" moves in and the sun is rarely seen. The "garúa" is caused by the cold Humbolt current from the Southern Pacific moving up the coast. The limited moisture provided by "garúa" is only thickening the mist rather than cooling down the temperature of surface as a shower. During the summer, warmer

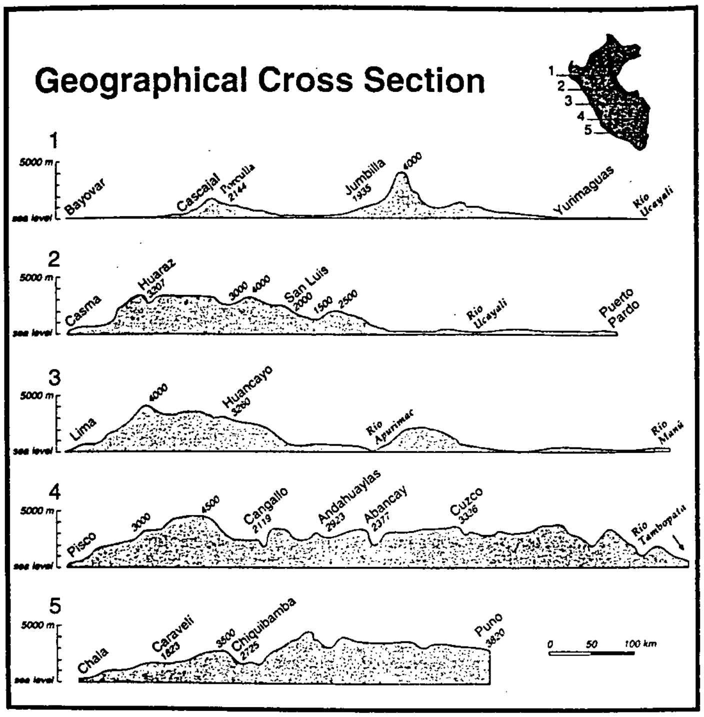


Figure 3-3 Geographical Cross Sections of Peru

Source: R. Rachowiecki (1996) Peru, *Lonely Planet*

central Pacific currents come down from Ecuador, and temporarily push back the colder Humbolt current, providing warmer temperatures and less mist.

Second, moving inland, the elevation soon becomes high enough to avoid the "garúa," so it is hot and sunny for most of the year. The climate chart of Arequipa (upper-right in Figure 3-4) shows a typical climate of this region. Nazca, which is 60 km inland and 600 metres above sea level, for example, is high enough to avoid the mist.

In the Andes, there are wet and dry seasons. The climate chart of Cuzco (lower-left in Figure 3-4) shows a typical climate of this region. The dry season, from May to September, is mostly sunny with occasional freezing temperatures during night at high altitude. Because of

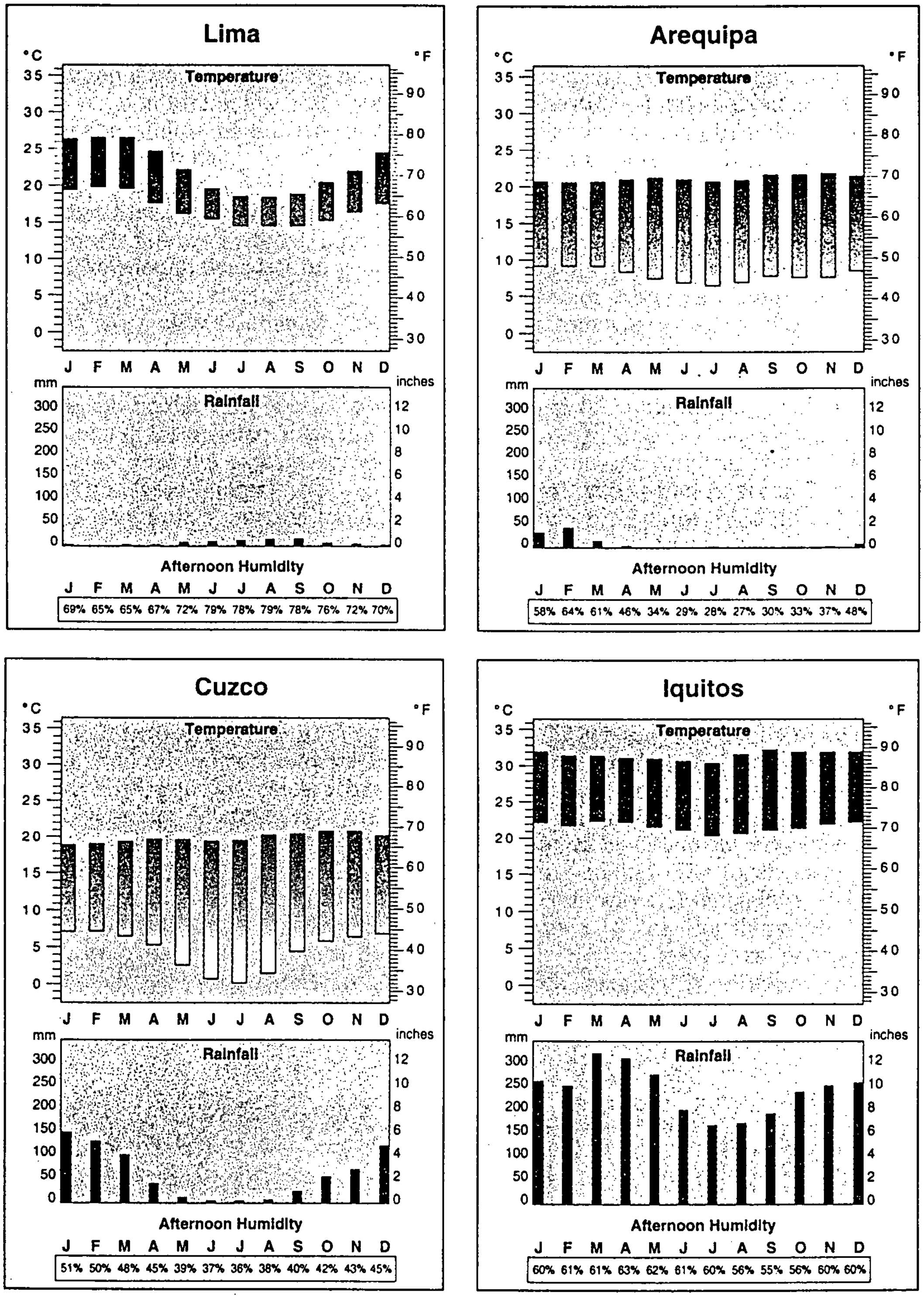


Figure 3-4 The Climate Charts of Four Major Cities in Peru

Source: R. Rachowiecki (1996) Peru, *Lonely Planet* the clear weather, the dry season in the Andes is often called summer and the warmer wet season, from October to May, is known as winter. This cause some confusion: when it is summer on the coast, it is winter in the highlands and vice versa. Therefore, the season is generally understood by dry or wet, not summer and winter, in this region.

At the Eastern slopes of the Andes, it becomes wetter. The driest season is the same as in the highland, and wettest months are from January to April. During the wet season, roads are often closed due to landslides or flooding. The weather is similar in the Amazon low lands. The climate chart of Iquitos (lower-right) shows typical climate of this region.

One major phenomenon which often affects Peru's climate is "El Niño." It happens every few years when the warm Pacific currents of January through March flows for a longer period. The phenomenon is characterized by abnormally high oceanic temperature in which much marine life such as seaweed and fishes are unable to survive. This often causes problems in the ecological circle especially for species that rely on the marine life ranging from seabirds to human. Moreover, floods in both the coastal areas and highlands can be devastating while other areas experience drought. A particularly intense "El Niño" in 1982-83 flooded much of Peru's north coast, including Piura, and washed out many kilometres of the highway Pan-American. The "El Niño" of 1997-98, which is occurring as this thesis is being written, may be greater than that of 1982-83.

3.1.3 Population, People and Society

Peru's population in 1994 was 23.4 million, which is approximately 6 million less than Canada's. Almost half of the population is concentrated in the narrow coastal deserts. The population is predicted to double by 2022. Lima (including the constitutional Province of Callao) has a population of over seven million, making the city far bigger than other cities. The second and third biggest cities are Arequipa and Trujillo, also in the coastal region, and they have populations of approximately 750,000 each.

The other half of the population is found in the highlands. They are mostly rural Natives or Mestizos who practice subsistence agriculture. There are few large cities in the highlands, but many small towns. Because of the poor standard of living in the highlands, many highlanders have migrated to the coast. Overpopulation problems in the coastal cities, however, have not helped improving their life and add to burden of the cities.

Although more than 60% of Peru lies in the Amazon Basin, east of the Andes, as yet only 5% of the population live there. This region is slowly becoming settled.

In addition, the racial groups are 47% Quechua-speaking Natives (mostly highlanders), 5% Aymara-speaking Natives, 2% Amazon Natives, 32% Mastizos, 12% Europian origin and the remaining less than 2% of other groups such as Blacks and Asians.

3.1.4 Economy

Peru's Gross National Product (GNP) in 1993 was almost US$ 34 billion or US$ 1,490 per capita. According to the World Bank classification, Peru is categorized in Class 2 third world country. (Class 2 countries have GNP per capita in excess of US$ 545 but below US$ 5,999, being referred to as "medium-income" economies.). The largest sector of the working population is involved in agriculture and fishing (approximately 33%), which produces 13% of the value of Gross Domestic Product (GDP). Conversely, mining employs only 2.4% of the labour force yet produces almost 11 % of the GDP. These three types of work; agriculture, fishing and mining have been traditional jobs in Peru.

In recent decades, however manufacturing has played an increasing role and now employs approximately 10% of the labour force, producing over 21% of GDP. The greatest part of the GDP (nearly 36%) is raised in the service industries which employ over 27% of workers.

In 1992, exports were worth a total of US$ 3,484 million, with minerals being the most important resource. Copper is by far the largest single export (23.1% of the total) and other significant mineral exports include zinc (9.6%), gold (5.6%), petroleum products (5.6%), lead (4.6%) and silver (2.2%). Fishing, particularly for anchoveta and pilchard, yields fishmeal that accounted for 12.6% of 1992 exports.

Imports, which during 1992 and 1993 exceeded exports by about 8%, are basic foodstuffs (particularly cereals), machinery, transportation equipment and manufactured goods. The biggest trading partner is the USA (27.2% of imports and 21.4% of exports) followed by Japan (7.7% of imports and 9.8% of exports). Columbia, Argentina, Brazil, Germany and Venezuela are also important sources of imports. China, UK, Italy, Brazil, Germany and Venezuela are important sources of export destinations.

Inflation, at an annual rate of over 10,000% in the early 1990s has dropped under 20%, and in 1994 Peru had achieved the highest economic growth of any Latin American country (11%).

3.1.5 Historical Background (recent years)

After the famous Inca Empire era which was in power until the early 16th century, Peru became a Spanish colony for approximately 3 centuries. Under the Spanish power, the rulers of the colony were the Spanish-born viceroys appointed by the Spanish crown. Immigrants had the most prestigious positions, while Spaniards born in the colony were generally less important. This is how the Spanish crown was able to control its colonies. Mestizos, people of mixed Native-Spanish descent, came still further down the social scale. The lowest of all were Natives themselves who were exploited and treated as "peons' or expendable labourers under the "encomienda (tribute)" system.

By the early 19th century, the inhabitants of Spain's Latin American colonies were dissatisfied with the lack of freedom and high taxation imposed upon them by Spain. All Spanish South America revolted and won independence. In the case of Peru, independence came in 1824 with the two decisive battles fought at Junín on August 6, 1824, and at Ayacucho on December 9, 1824.

After independence, Peru experienced two wars in the 19th century, one against Spain in 1866 which Peru won, and the other against Chile from 1879 to 1883, which Peru lost. In the 20th century, Peru went to another war with Ecuador over a border dispute in 1941. This border dispute with Ecuador still remains, and armed skirmishes have occurred between those two countries every few years. The brief war of 1995 was the worst in a couple of decades, but made no change in the recognized boundaries. (See Figure 3-2.)

From an economic point of view, the biggest problem in 1980s and early '90s was inflation, which exceeded 10,000% at one stage, and the foreign debt, which totaled approximately US$ 24 billion. The socio-economic situation began to improve after the 1990 election when Alberto Fujimori, the 52 year-old son of Japanese immigrants, was elected president. His immediate programs of severe economic austerity resulted in extremely high rises in the cost of food and other essentials, but also allowed a liberal reformation of import/export tax and foreign investment regulations leading to international financial support. Inflation rate dropped from 10,000% to under 20% by the end of 1994, as mentioned above, and the Peruvian currency has become stabilized for the first time in recent decades. Most importantly from the transportation point of view, previously prohibitive import taxes were restructured, allowing the easy import of items such as buses and cars. In the city areas, new bus fleets, taxies and even private cars are gradually taking over the old.

Even though the socio-economic situation is improving, there are still severe problems. A census in 1993 indicated that over 60% of the population lives at or below the poverty level. Health problems make the situation worse. Malnutrition and diseases such as cholera and dengue among the poor classes have been increasing because sanitation and health care programs are unable to keep up with population growth among the poorest people.

3.1.6 Governmental System

Under the new constitution approved in October 1993, Presidents hold office for five years and are permitted to run for re-election. The president has two vice presidents and a cabinet of 12 members. The congress is a unicameral or only one, and it consists of 120 members. Voting is compulsory for all citizens between the age of 18 and 70 and optional for older people.

The political division system in Peru is somewhat confusing after the new division system was introduced in 1993. The new regional system which organizes the country into 11 regions, two departments and the constitutional province of Callao, is officially in effect although the old departmental system, which divides the country into 24 departments (states) and the constitutional province of Callao is still widely accepted. Based on the old system, the departments are further divided into provinces, of which there are 155, and the provinces are subdivided into 1,586 districts.

3.2 The City of Piura, Peru

3.2.1 General Outlook

In this study, the city of Piura is defined as a combined urban area of the district Piura and the district of Castilla having a combined population of 366,206 in 1992, which is the base year of this study. Figure 3-5 shows the map of the city of Piura. The city is the fifth largest city in Peru and the capital of its department. Intense irrigation of the desert has made Piura a major agricultural centre for rice and cotton. Corn and bananas are also cultivated. The department's petroleum industry, based around the coastal oil fields near Talara, is as valuable as its agriculture.

Piura's economic development has been precarious, buffeted by extreme droughts and devastating floods. The department was among the hardest hit by the disastrous El Nino floods of 1983, which destroyed almost 90% of the rice, cotton and bananas crops as well as causing serious damage to roads, bridges, buildings and oil wells in the area. Piura was declared a disaster area. Crops were destroyed, land was flooded, and people had no food, homes or jobs. The area has now more or less recovered. Though signs of flood damage can still be seen. El Nino of 1992 washed out roads and bridges north of Piura, and going by bus to Tumbes involved a relay of buses, with passengers frequently wading rivers to meet a successive bus. Bridges on the Panamericana north of Piura were washed out.

3.2.2 Historical Background

Historically, Piura is referred to as the oldest colonial town in Peru. Its original site on the north banks of the Rio Chira was called San Miguel de Piura and was founded by Pizarro in 1532, before he headed inland and began the conquest of the Incas. The settlement moved three times before construction at its present location began in 1588. Piura's cathedral dates from that year and the city centre still has a number of colonial buildings though many were destroyed in the earthquake of 1912. Today, the centre of the city is the Plaza de Armas.

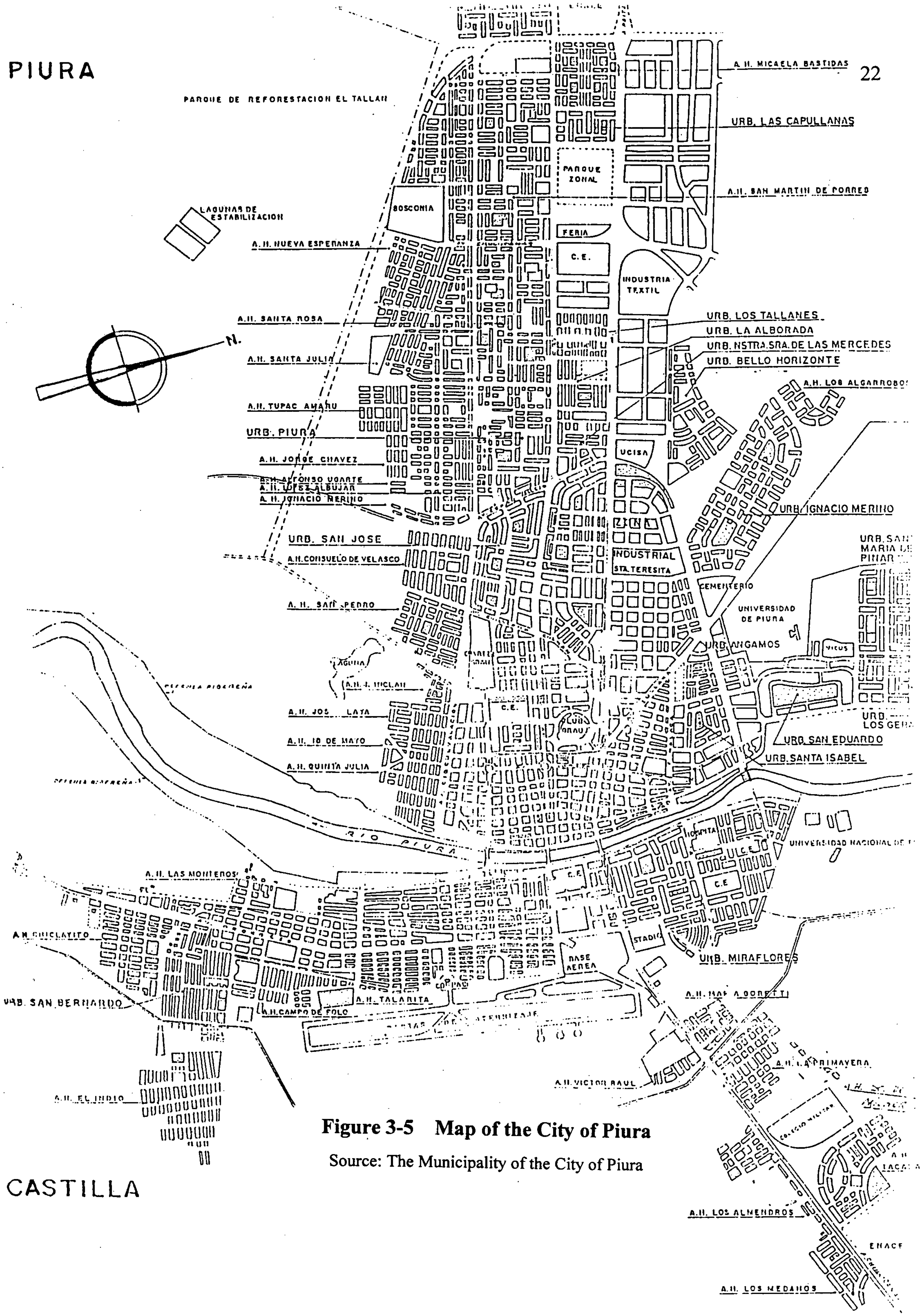


Figure 3-5 Map of the City of Piura

Source: The Municipality of the City of Piura

3.2.3 Governmental System

In the "Region Grau" which has the study area, the city of Piura, both the new regional system and old departmental system were in use even during 1996, the year of the visit for this study. The divisions by the regional and departmental systems both co-exist, although the regional system is the one officially recognized. For example, some materials such as "Compendio Estadistico Departmental (summary of departmental statistics)" only deal with the information of "the Department of Piura" of the old system while others such as "Plan Director De Piura Y Castilla" (done by the Province of Piura) mainly views the area from the regional point of view. The major difference between the two systems in this region is that the District of Piura in the regional system occupies the combined area of the District of Piura and the District of Sechura of the old departmental system and that the Province of Piura consequently has 15 districts under the new system. Under the old system it had only 8 districts. Figure 3-6 shows the general structure of the governmental division in Region Grau. Then, Table 3-1 and 3-2 show the changes in population of the Region Grau and the Province of Piura, and the District of Piura and Castilla respectively.

Fortunately, this study has not been largely affected by the uncertainty caused by the mixed

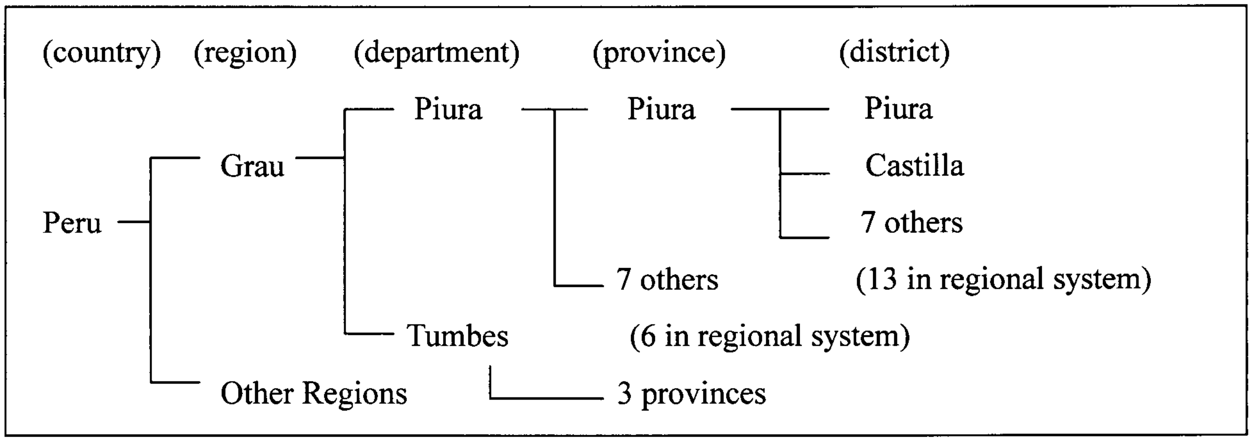


Figure 3-6 General Structure of the Political Division in Region Grau

Source: Ambito Regional (1992) Instituto Nacional de Deserrollo Urbano

Table 3-1 Population of Regions

Year	Region	Prov.
1981	1,229,704	413,688
1991	1,557,700	572,489
1992	1,590,005	595,389

* Region : Region Grau
* Prov. : Province of Piura

Table 3-2 Population of Districts

Year	The Destricts of Piura and Castilla						
	Total	Urban			Rural		
		Population	% (1)	% (2)	Population	% (1)	% (2)
1981	214,789	207,934	16.9	50.3	6855	0.56	1.66
1991	359,422	348,924	22.4	60.9	10498	0.67	1.83
1992	377,155	366,206	23.0	61.5	10949	0.69	1.84

% (1) : percentage of population in Region Grau
% (2) : percentage of population in Province of Piura

Source: Ambito Regional (1992) Instituto Nacional de Deserrollo Urbano

political system uses. The term, the City of Piura, is not the politically official term used, and it represents the combined urban area of the Districts of Piura and Castilla. This study focuses only on this area as the study boundary. In 1992, which is the base year of this study, the City of Piura has a population of 366,206 (See Table 3-2), which accounts for more than 60 percent of the population of the Province. The Province of Piura, in addition, is the government responsible for the City of Piura, the combined urban areas of the Districts of Piura and Castilla.

3.2.4 Basic Life Style

In Piura, which is located in the hot and dry desert area, people's life style in terms of hourly time schedule of a day is quite unique when compared to the standard in North-America or other developed countries. Figure 3-5 shows three types of typical time schedule in the city for summer time (from December to May). This is based on an interview with one person at the University of Piura.

First of all, workers, who usually play the most major roles for trip making, typically have two types of daily schedule: type A represented by private workers and type B represented by civil servants in Figure 3-7. The type A has two working periods in a day, separated by a uniquely long lunch break or siesta of 3 hours. The length of 3 hours is most likely because of

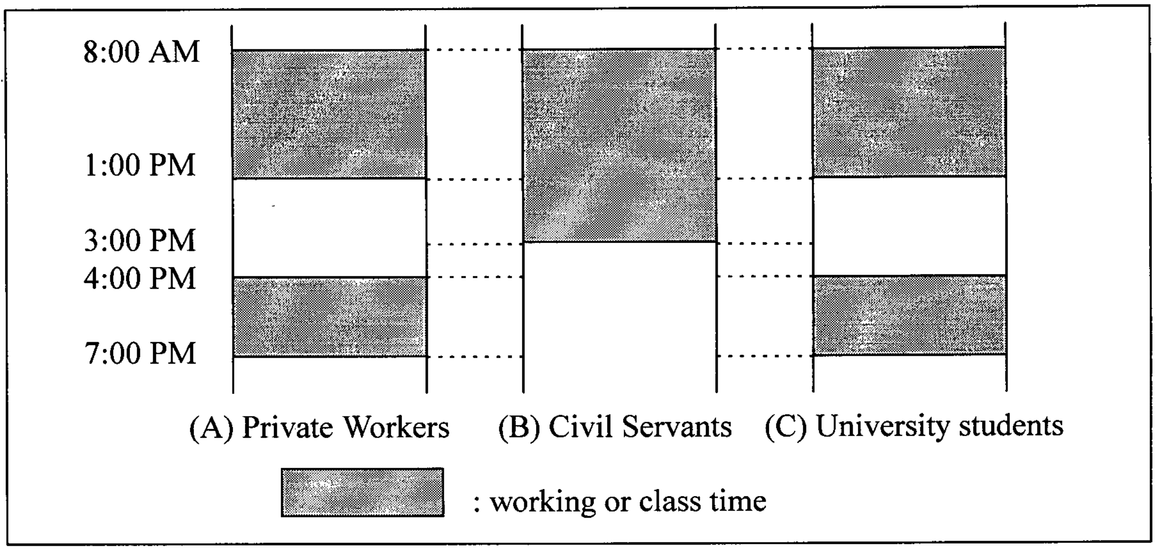


Figure 3-7 Typical Three Types of Time Schedule of a Day.

Source: Interview with a person at the university of Piura

high temperature during mid-day. In winter time, the working periods for type A shift eight to noon in morning and three to six in late afternoon, and the total working time becomes one-hour shorter. On the other hand, the type B, also unique, does not have a lunch break at all and work continuously for seven hours from eight in morning to three in the afternoon. Consequently, lunch time comes after the working hour. Some type B workers work slightly earlier, seven in morning to two in the afternoon, with the same amount of working time. The working day is usually from Monday to Friday for both types. Moreover, shopping time for workers is after work.

University students, who are another easily distinguishable group of people, basically have a daily time schedule similar to type A workers. They often have two separated class periods of eight to one in morning and four to seven in late afternoon. One difference is that they may take night classes from seven to ten in the evening. In this case, those students may not take either or both classes during day time. Most institutes for secondary or post secondary education basically have the same class periods of morning and late afternoon although primary schools often have only morning classes. School is usually from Monday to Friday with exception of some private institutes which offer Saturday classes.

Usually, the time periods for breakfast, lunch and dinner are between seven and eight in the morning, twelve and three in the afternoon, and seven and eight in the evening, respectively. Lunch is the main meal, generally speaking, and dinner is often much lighter.

In addition, summer in Piura usually represents the period between December and March because there is no rainy season.

Chapter 4

The Framework of Transportation System in the City of Piura

Demographics, socio-economic characteristics, land use characteristics, and physical transportation facilities and infrastructures are the primary factors needed to understand the transportation system. This chapter deals with those characteristics as the basic framework of the transportation system in the City of Piura. First, the demographics and socio-economic characteristics are presented. Second, land use characteristics are mentioned with an introduction of two kinds of land classification methods used by the city, "Sectorizacion" and "Zonificacion." Then, the summaries of the existing transportation infrastructures and of public transportation services are presented. Most of this data was obtained from the study, "Plan Director de Piura y Castilla al año 2010," and directly from interviews with the transportation sector personnel at the municipal meeting.

4.1 Demographics and Socio-economic Characteristics

4.1.1 Introduction

The first type of data are demographics and socio-economic characteristics of the city. The data presented in this section are (1) population and its growth rate and other demographic related rates and (2) a social classification system in Piura. These characteristics are primarily given from the material "Plan Director de Piura y Castilla al año 2010," which was prepared by the municipality of the Province of Piura. While the material is basically land use plan-oriented rather than transportation plan-oriented, it in fact was quite useful material for this study because of the close relationship between land use and transportation activity.

The years of 1992 and 1993 are set as the base year for this study. The former is the year in which most of the available data in the materials were based. The later is the year when a household survey, another main information source for this study, was conducted. (The details of the survey are mentioned in the following chapters.) By applying the assumption that "the trip characteristics in the city had not been dynamically changed during the two consecutive years," this study as a whole used the numerical data of 1992 with application of travel behaviour characteristics in 1993. Throughout this study, the total city population of 366,206 in 1992 was used.

4.1.2 Population and Growth Rates

The structure of the base population of 366,206 of the City of Piura in 1992 is shown in Table 3-2 in the previous chapter. The population was the sixth largest in the country, Peru, at the time following Lima, Arequipa, Trujillo, Chiclayo, and Chimbote. The City is the centre of most activities of Region Grau with a complete range of urban services available.

Table 4-1 shows the population of the city in 1981, 1991 and 1992, and growth rates of the three different periods between 1972 and 1981, between 1981 and 1991, and between 1991 and 1992. The city accounts for 23% and 61.5% of the population of the Region and the Province respectively in 1992. Between 1981 and 1992 the city had the average population growth rate of 5.0% per year, and the individual population growth rates for the district of Piura and Castilla were 5.2% and 4.4% per year respectively. The increase in population in the period is more than 76% although the growth rate was once reduced by the disastrous "El Niño" of the summer of 1983.

One of the important factors of maintaining the growth rates has been the strong immigration. The immigration to the region was 45 persons per 1,000 or 4.5% per year, and most of them were from the province of Ayabaca, Huancabanba, Morropõn and Sullana. The reason for the strong immigration tendency is, as imaginable, because the City of Piura is the centre of the region and possesses most of the major services of health, education, recreation and, most importantly, great possibility to find work. Two other major factors that maintained the level of the growth were the lack of strict family planning and the decline of mortality. A decrease of birth rate and the consequent change in age structure contributed to the slight decrease of

Table 4-1 City Population in the Past

Year	Total	% (1)	% (2)	GR (%)
1972				
1981	207,934	16.9	50.3	5.3
1991	348,924	22.4	60.9	5.0
1992	366,206	23.0	61.5	5.0

% (1) : Share of population in Region Grau
% (2) : Share of population in Province of Piura
GR : Growth Rate between the corresponding year and one before.

Table 4-2 Growth Rate

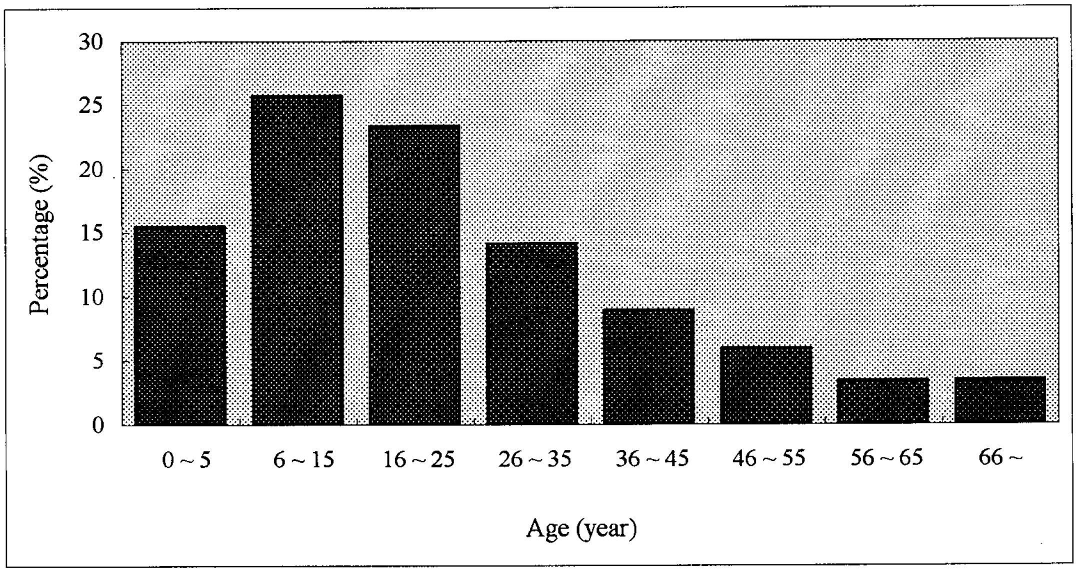
Rate (%)	Total	Piura	Castilla	Department	National
Population Growth	5.0	5.2	4.4	5.30	2.05
Fertility (per family)	4.3	4.3	4.3	4.12	3.86
Mortality (per 1,000)	5.0	3.4	8.7	9.62	7.62
Birth (per 1,000)	29.5	17.5	55.3	32.33	29.02

Table 4-3 Age Structure

Age	Men	(%)	Women	(%)	Total	(%)
0~4	28,970	16.4	27,585	14.6	56,555	15.4
5~14	46,864	26.5	47,184	24.9	94,048	25.7
15~24	40,551	22.9	44,868	23.7	85,419	23.3
25~34	24,014	13.6	27,514	14.5	51,528	14.1
35~44	15,020	8.5	17,626	9.3	32,646	8.9
45~54	10,218	5.8	11,373	6.0	21,591	5.9
55~64	5,620	3.2	6,525	3.4	12,145	3.3
65~	5,470	3.1	6,804	3.6	12,274	3.4
Total	176,727	48.3	189,479	51.7	366,206	100.0

Note : The numbers for women were adjusted by the ones for men and total

Figure 4-1 Age Structure



the growth rates between 1971 and 1992. Table 4-2 shows the rates of population growth, fertility, mortality and birth rates between 1981 and 1991.

The age structure, distribution of population by age groups, of the city, is shown in Table 4-3 and Figure 4-1. The shape of age structure was a typical pyramid-type shape, and this characteristic was also typical of other large cities in the country (this characteristic is also likely applicable to many other cities in other developing countries). The age group of less than 24 years predominated the total population by 64% while the oldest age group of more than 65 years accounted for only 3.5% of the total.

4.1.3 Forecasted Population

By considering the population growth rate of the period between 1971 and 1992, the reference material forecasted the population of 1995, 2000 and 2010, as 417,369, 519,136 and 803,897 respectively. The summary of the forecast is shown in Table 4-4. For this estimation, the City of Piura used a somewhat lower population growth rate of 4.6% by assuming that the tendency of the strong but slightly weaker population growth remains for a while. Based on this forecast, the estimated population in 1998 would likely be close to 480,000, which is approximately 30% larger than the base year population of 366,206 in 1992

4.1.4 Social Classification System in Piura

The City of Piura employs social classification system based simply on household incomes. Six social classes including sub divisions were identified while the primary division uses only three classes of high, middle and low. Table 4-5 shows the summary of the social structure, and Figure 4-2 shows the approximate income structure by percentages. The points in Figure 4-2 represent the average income of each category in new soles (S/.). The setting of the ranges, which were basically used as definition of each class, were the ones of the base year of 1992. From Figure 4-2, the predominance of lower class population is easily observed. A brief explanation of those classes follows:

Table 4-4 Forecasted Population

Year	Total	Piura	Castilla	GR (%)
1992	366,206	253,653	112,553	-
1995	417,369	291,126	126,243	4.70
2000	519,136	366,280	152,856	3.90
2010	803,897	579,800	224,097	4.46

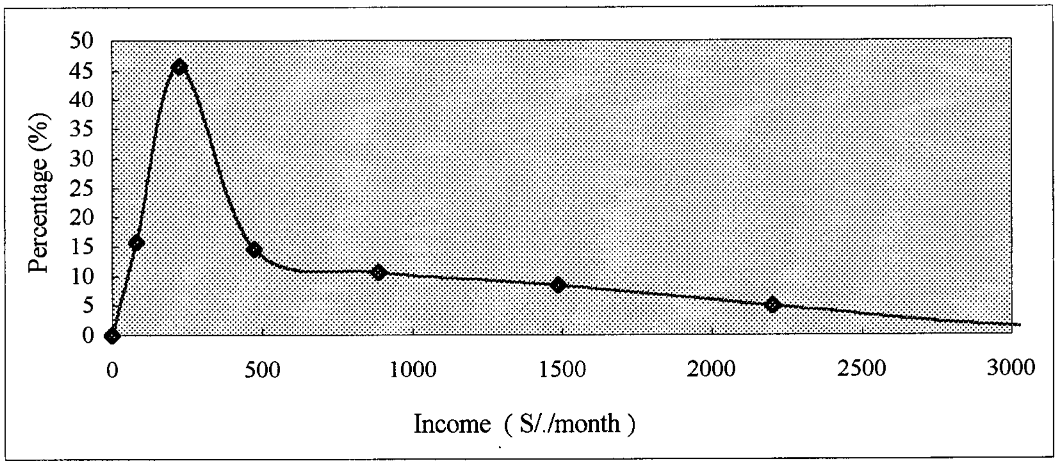
GR : Growth Rate between 1992 and the corresponding corumn.

Table 4-5 Social Class Structure

Social Class	Population (person)	Household (household)	Percentage (%)	Income range (IML)	Ave. income (S/.)
High	17,944	3,263	4.9	24 ~	2,203
Middle			33.6		
- High-middle	30,761	5,593	8.4	16 ~ 23.9	1,487
- Middle-midle	38,818	7,058	10.6	8.5 ~ 15.9	889
- Low-middle	53,466	9,720	14.6	4.5 ~ 8.4	473
Low			61.5		
- Low	167,356	30,428	45.7	1.5 ~ 4.4	227
- Low Critical	57,861	10,520	15.8	0 ~ 1.4	81
Total	366,206	66,582	100	-	-

Note 1 : 1 IML (ingreso minimo legal) = S/. 72.00, October 1992
Note 2 : The unit, S/., represents new soles

Figure 4-2 Income Structure



(1) High

This class is the highest social class which predominantly occupies high standard positions such as company owners of larger industries. Their economical dominance of the city is in fact very influential according to one city official. The population of this class accounts for approximately 4.9% of the population in Piura and Castilla, and they usually are capable of obtaining the highest education such as the one given by universities. Their residences are located in comfortable, physically safe and well equipped areas in the city.

(2) High-Middle

This social class accounts for 8.4% of the city population, and has similar characteristics to the highest class although their comfort and power level is less. People in this class are often in secondary positions of big or middle sized companies of products or services, or own relatively smaller firms. The level of their economical influence is still quite high.

(3) Middle-Middle

This social class accounts for 10.6% of the city population, and is the social group who are most likely affected by recessions. These people are mostly professionals who are in the secondary positions of middle sized companies, both in private and public, or more likely own small companies. The level of their economic influence becomes much less. The majority of them possess high education.

(4) Low-Middle

This class has much lower status, and was enlarged by the recessions in 1980s. It accounts for 14.6% of the total population in 1992. Working as employees in private or public companies becomes common, and sizes of those firms also become smaller. Some possess small businesses such as local grocery stores, and most often do not have the capability of making large saving. As for education level, the majority have completed secondary schools, but not higher than that. Most of their income is spent for the necessary elements such as food, cloth and housing, and less for purposes such as recreation.

(5) Low

This social group accounts for 45.7% of the city population, and is the predominant social class of the city. A large part of their income is spent for necessary food. The majority have not been able to complete secondary schools, and studying at private school is rarely affordable. In addition, while most of them are able to finish at least primary level education, quite a number of them (the number is unknown) are often forced to leave their classes. Many reasons are given, but most common is financial difficulties according to a study by the city.

(6) Low Critical

This social class is the lowest and worst equipped one. Their existence appears much worse because of the recessions. People in this class account for 15.8% of population, and are facing absolute poverty. The number, 15.8%, is quite high: one in 6.3 people faces poverty. In addition, most of them have not been involved even in primary education.

In Piura, the majority of high to middle class people live in the North and Central West parts of the city, and lower class people live in the South, South West, and far West parts of the city. In Castilla, the majority of high to middle class people live in the North, and lower class people live in the South and East of the city in the neighbour of the highway to Chiclayo or Chulucanas respectively (see the map of the city shown in Figure 3-5).

4.2 Land Use Characteristics

4.2.1 "Sectorizacion" and "Zonificacion"

From the future plan prepared by the City of Piura, two types of land use classification methods were identified: "sectorizacion" and "zonificacion." The former uses "sectors," which are geographically-oriented, and the latter use "zones," which are specific-land use oriented. In this study, the former is more focused because it is applicable to characterize "traffic analysis zones" of the city based on the geographical and socio-economical characteristics of sectors. The details of the application of "sectorizacion" to the traffic zone system are mentioned in the next section. Then, this section deals with the other classification method, "zonificacion."

The "zonificacion" is a land use classification method which is based on specific-land use. There are eight types of specific land uses identified in the city: seven of them are specific and the other is the mixed use of specific ones (also called the city centre). Table 4-6 shows the portions of those seven land uses in 1992 and the forecasted ones for the year of 2000 in the City plan. The classification of those land uses is primarily based on the National Urban System Standard used in many other cities in the country. According to Table 4-6, almost two third (62%) of the available land of 3,021 hectare (ha.) in 1992 was used as residential (including the mixed use areas), followed by 10.4% of education, 9.0% of industrial, 5.4% of recreation, 4.8% of commercial and 0.4% of health. The total of other uses, which include major uses of administrative, institutional and other special services such as its regional airport, occupied approximately 8.0% of the land. The brief explanation of those land uses are attached in appendix A. The forecast shows that the major land expansion will be for "residential" use with an increase of 936 ha. or 52.8% of the "residential" land size in 1992. The increase will strengthen the share of the "residential" land use by 5.6%. Moreover, Table 4-7 shows the details of the forecasted land use expansion by 2010 and during several periods by the year according to a study by the city. Those forecasts are done primarily based on the density (persons/ ha.) which is often used as the primary scale of "residential" use. The

Table 4-6 Land Use in 1992 and in 2000

Land Use	1992		2000	
	Land Size	Percentage	Land Size	Percentage
Residential	1,772.6	58.7	2,708.6	64.3
City (Town) Centre	103.0	3.4	103.0	2.4
Commercial	143.0	4.7	154.0	3.7
Education	313.0	10.4	332.5	7.9
Health	12.0	0.4	18.0	0.4
Recreation	162.7	5.4	231.2	5.5
Industrial	273.0	9.0	403.0	9.6
Other uses	241.7	8.0	260.7	6.2
Total	3,021.0	100.0	4,211.0	100.0

Table 4-7 Forecasted Land Use Expansion

Area	Plan	Period	Forecasted expansion			
				housing	density	size (ha)
Piura	present	1992	deficit	176	200	4.8
	short	93~95	increment	1,263	200	34.7
	middle	96~2000	"	8,111	200	223.0
	long	2001~10	"	38,822	240	647.0
	Total			48,372		909.6
Castilla	present	1992	deficit	2,693	200	74.1
	short	93~95	increment	1,139	200	31.3
	middle	96~2000	"	3,489	200	96.0
	long	2001~10	"	12,953	240	215.9
	Total			20,274		417.2
Total				68,646		1,326.8

Note(1) : the numbers in 1992 are estimated deficits by the city.

Note(2) : the numbers are defferences from ideal amounts in 1992.

density of 200 persons per hectare is used as the base for the future plan. A higher density of 240 is used for the long-term planning period without presenting any specific reasons for the increased density.

4.2.2 Sectorizacion and Land Use Plan

The primary land use classification method used in this study as well as the city plan is called "sectorizacion." Six sectors are identified, dividing the whole city into relatively large six geographical areas: Central and South Piura, West Piura, Industrial Piura, North Piura, North Castilla and South Castilla. Those six sectors are further divided into several sub-sectors, sixteen in total, based on their land use or socio-economic characteristics. Because of the geographical characteristics, the division of sectors, which is shown in Figure 4-3, is easily distinguishable.

The numerical summary of the sectors is presented in Table 4-8. Four of primary demographic characteristics, population, land size, density, and residential land use size and density were derived from the material "Plan Director de Piura y Castilla al año 2010." The total population of 366,206 and land size of 3,021 ha. in 1992 was used as the base. The descriptions of each sector follows.

(1) Sector 1

This sector lies at the central and central south parts of Piura, and has three sub-sectors of A, B and C shown in Figure 4-3. The sub-sector of A and B lie in the central parts of Piura. Those sub-sectors are the centre of most activities of the city, consisting two major activity centres, city centre and central market. Most types of services are available in these sub-sectors: typically observed activities are administrations, institutions, commercial activities, financing and even residential uses. The sub-sector C, which lies at the south end of central area, has been designated as a special zone of urbanization. The development, however, is much underachieved, and the economic development particularly is much lower than other two sub-sectors. The predominant

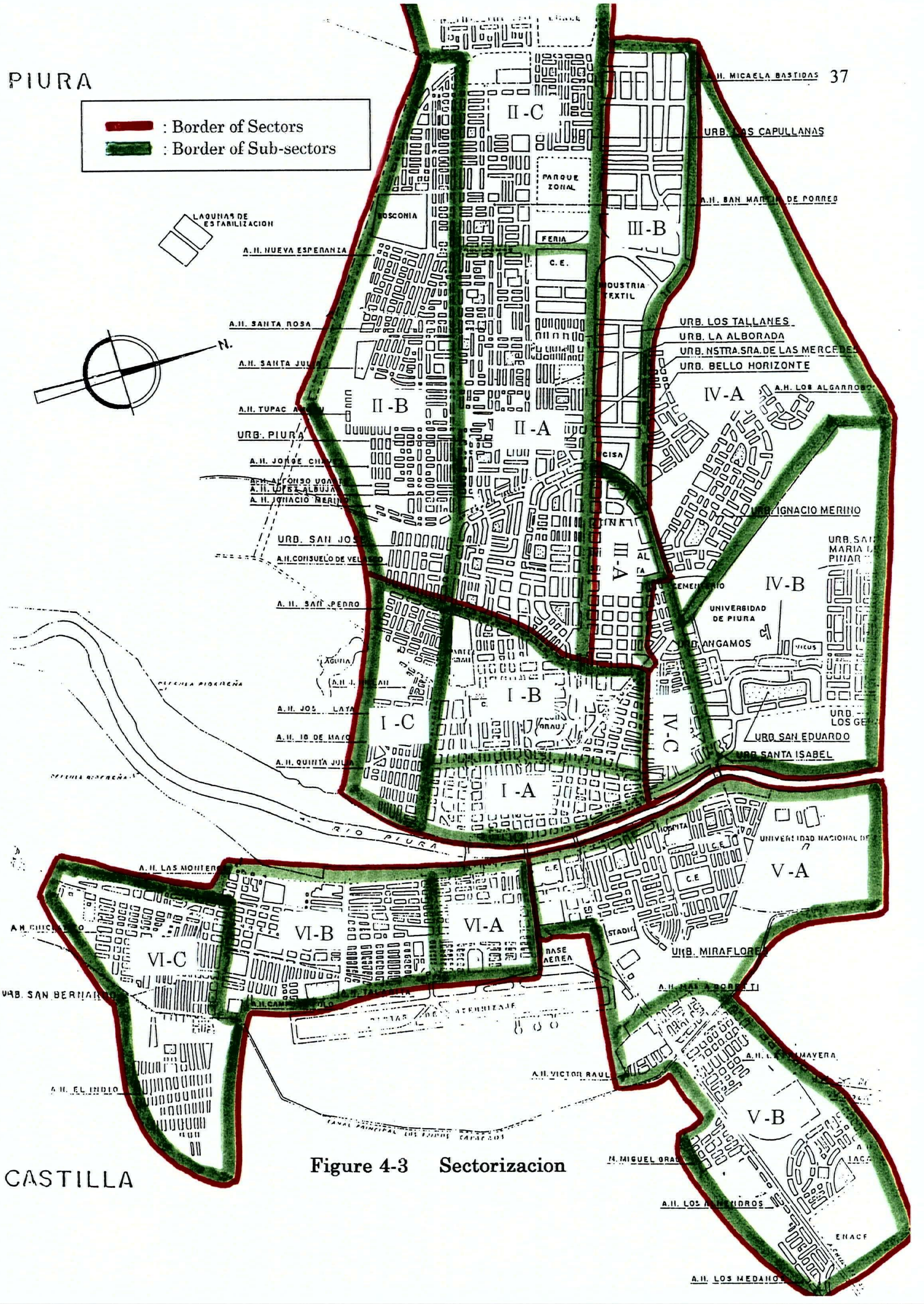


Figure 4-3 Sectorizacion

Table 4-8 Basic Demographic Data of Sectorizacion (1992)

Sector	Sub-Sector	Population	Land Size (ha)		Density (pop/ha)		Residential	
			Total	Net	Row Data	Net	Land Size	Density
	A	9,167	89.00	51.60	103	177	72.0	127
1	B	10,678	171.00	71.00	62	150	99.0	108
	C	21,050	129.00	75.60	163	278	105.5	200
Sub Total (by sector)		40,895	389.00	198.20	105	206	276.5	148
	A	43,711	318.00	172.00	137	254	239.9	182
2	B	47,277	279.00	158.00	170	300	220.4	215
	C	62,180	319.50	130.00	195	478	181.3	343
Sub Total (by sector)		153,168	916.50	460.00	167	333	641.7	239
3	A	-	68.00	40.80	-	-	56.9	-
	B	-	82.00	44.40	-	-	61.9	-
Sub Total (by sector)		-	150.00	85.20	-	-	118.8	-
	A	19,243	311.00	89.40	62	215	124.7	154
4	B	30,687	376.50	118.50	82	260	165.3	186
	C	9,660	63.00	32.70	153	295	45.6	212
Sub Total (by sector)		59,590	750.50	240.60	79	248	335.6	178
5	A	16,032	251.50	61.20	64	262	85.4	188
	B	26,536	197.00	96.00	135	276	133.9	198
Sub Total (by sector)		42,568	448.50	157.20	95	270	219.3	194
	A	11,310	65.00	37.80	174	300	52.7	214
6	B	20,969	137.50	74.70	153	280	104.2	201
	C	37,706	164.00	90.90	230	415	126.8	297
Sub Total (by sector)		69,985	366.50	203.40	190	344	283.7	247
Sub Total : Piura		253,653	2206.00	984.00	115	258	1372.6	185
Sub Total : Castilla		112,553	815.00	360.60	138	312	503.0	224
Total		366,206	3021.0	1344.6	120	272	1875.6	195

Table 4-9 Comparison of Sectorizacion between Two Years

Sector	1992 (base)			2010 (forecasted)		
	Population	Land Size	Density	Population	Land Size	Density
1	40,895	389.0	105.0	89,280	372.0	240
2	153,168	916.5	167.0	128,100	849.0	150
3	-	150.0	-	-	427.0	-
4	59,590	750.5	79.0	223,045	1,412.0	157
(5)				139,375	1,115.0	125
Sub Total	253,653	2206.0	115.0	579,800	4175.0	138.9
5 (6)	42,568	448.5	95.0	146,813	843.5	175.0
6 (7)	69,985	366.5	190.0	77,284	743.0	105.0
Sub Total	112,553	815.0	138.1	224,097	1586.5	141.3
Total	366,206	3021.0	120.0	803,897	5,761.5	195.2

Note : Definition of zones for each year is somewhat different from each other.

Note : New sector 5 is added for the future plan.

land use is residential, and social status here is also much lower than other sub-sectors in this sector. The sector Ⅰ as total accommodates 40,895 residents or 11.2% of the total city population, and occupies 389 ha. of land with the density of 105 persons per ha. in 1992.

(2) Sector Ⅱ

This sector lies at the west part of Piura, and has also three sub-sectors of A, B and C. The predominant land use is residential, and it has fourteen "Urbanizacions (Urb.s)" which mean urbanized areas, and twenty "Asentamientos Humanos (A.H.s)," which refer to less urbanized or developed areas. This sector does have many types of services, but the available services are mostly local and their size is much smaller than the one of Sector Ⅰ.

The sub-sector A lies at the geographically central part of the District of Piura, and is adjacent to sub-sector Ⅰ-B or one of the major activity centre, the central market. The social status is the highest in this sector, from high- middle to low-middle, and relatively high level of local services and social infrastructures such as water and electricity is available. In addition, all of the fourteen Urb.s of Sector Ⅱ are found in this sub-sector. The sub-sector B lies at the south to south-west parts of Piura, and the social status there becomes much lower. Most of the people there are classified as from low-middle to low critical. Particularly, many households at the south end of this sub-sector are the ones least developed areas in this city. This part has fifteen A.H.s and no Urb.s, and this also shows the less infrastructural development of this sub-sector. The sub-sector C, which lies at the west end of city, also has lower social status from low to low critical. The situation at the west end is almost similar to or even worse than the ones found at the south end of the sub-sector B, and the lack of infrastructure is critical. Five A.H.s. are found in this sub-sector.

As mentioned, the social status in this sector varies from high-middle to low critical. The change is mainly observed with respect to the distance from the city centre, and the social status usually lowers as the distance increases towards the west. Sector II accommodates 153,168 residents or 41.8% of the total population, and occupies 916.5 ha. of land with the density of 167 persons per ha. in 1992.

(3) Sector III

This sector lies at the central west part of Piura, and only accommodates industrial land uses. Most of its residents are temporary guards who usually have actual housing places in other sectors, and the residential number is considered as zero because of this characteristic. This sector has the sub-sectors of A and B, but the social-economic differences between the two are considered insignificant. Sector III occupies 150 ha. of land with no permanent residents as mentioned, and the density is consequently set as zero.

(4) Sector IV

This sector lies to the north and north-west of Piura. The primary land use is residential, and the sector has three sub-sectors, A, B and C. In 1992 it was considered that the University of Piura, a private university and one of two universities in Piura, occupies almost 70% of its land, causing lower densities shown in Table 4-8. The sub-sector A lies next to Sector I, and the level of social status varies from high to middle-middle, with the exception of A.H. Los Algarrobos, which is low. The sub-sector B, which consists of the University of Piura, lies at the north of sub-sector A, and is basically a newly developed or developing area. The social status there is quite high with mostly high or high-middle class. During the 1996 visit to the city, it was found that there are no specific public transportation routes in this sub-sector. As a result, the only available public transportation mode there is unrouted ones such as taxis and Mototaxis. Interestingly the use of taxis is quite common, leaving the idea that the people are capable of using this relatively high-cost mode regularly. The sub-sector C lies at the north-west part of the city, and its social status is relatively lower than other two sub-sectors, ranging from high-middle to low middle. The primary land use is residential, and most of the households are relatively well equipped. This sub-sector is also the one which is adjacent to the most favourable land for future expansion of the city. Finally, this sector accommodates 59,590 residents or 16.3% of the total, and occupies 750 ha. of land with the smallest average density of 79 persons per ha. in 1992.

(5) Sector V

This sector occupies the north half of urban Castilla. The primary land use is residential, but it also has two major destinations in the city; the National University of Piura, a public university, and the regional hospital. The sector has two sub-sectors of A and B. The sub-sector A lies at the north part of Castilla while the sub-sector B lies at the north-east part. The social status of the sub-sector A, which consists of both major destinations above, is mostly high-middle while the social status of the sub-sector B, which consists of five A.H.s, becomes much lower, ranging from low-middle to low-critical. The low-critical area is mainly found to the north-east edge of the sector along with the highway to Chulucanas. This sector accommodates 42,568 residents or 11.6% of the total, and occupies 448 ha. of land. Its density is relatively low with 95 persons per ha. in 1992 mainly because of the existence of the university.

(6) Sector VI

This sector occupies the south half of the District of Castilla. It has three sub-sectors of A, B and C, and their characteristics change noticeably. Sub-sector of A, which is located at the central part of the District of the Castilla and adjacent to the central city of Piura, has a very mixed land use with most types of services although the primary land use is still residential. The level of available services is much less than the one of Sector I. This sub-sector is the third largest activity centre following the sub-sector I -A and I -

B. The social status in this sub-sector varies, ranging from high-middle to low. Sub-sector B lies at the middle-south part of Castilla. The primary land use there becomes residential although it still has some multi-functional land use. The social status of this sector is lower, ranging from low-middle to low critical. The low critical area is found at the banks of Rio Piura and next to the regional airport. Sub-sector C, the last sub-sector, lies at the furthest south part of the Castilla. This sub-sector consists of one Urb. and six A.H.s, and the primary land use is residential. Its social status is low with the exception of the Urb. San Bernardo which has a higher status. The social class range varies from middle-high to low-critical. The low-critical area is found at the east and south east edge of the sub-sector. Sector VI accommodates 69,985 residents or 19.1% of total, and occupies 366.5 ha. of land with the density of 190 persons per ha. in 1992.

This Sectorizacion is also used for the future land use plans. Table 4-9 shows forecasted figures of population, land size and density for the year 1992 (base) and 2010 (forecasted and/or planned). One note is that a new sector V, which is likely in the District of Piura, was added for the future plan, forcing renumbering the sector V and VI as the new sectors of VI and VII. Despite that the geographical presentation of its division could not be found in any material, the location of the sector V can be assumed from another source, a map for the future road network plan: the location must be to the north or north-west of Piura where large scale land expansion was clearly observed in 1996.

The predicted expansion during the period from 1992 to 2010 is enormous. The forecasted population will more than double to 803,897 in 2010 from 366,206 in 1992, and also the planned land size will almost double to 5,761.5 ha. in 2010 from 3,021 ha. in 1992. The extensive expansion of land is expected at mostly suburban areas, particularly at the north and north-west of Piura. With the assumption that the new sector V is located in that part of the City, the increase of population and land size in Sectors IV and V (both assumed to occupy the north and north-west of Piura) is the most noticeable. The population increases by

608% to 362,420 in 2010 from 59,590 in 1992, and the land size by 337% to 2,527 ha. from 750.5 ha. in 1992. Another noticeable expanded area is the north-east part of Castilla. The movement of population into suburbs will likely cause an “urban sprawl” phenomenon. This is often observed in other cities all over the world.

The significance of the “urban sprawl” on the transportation system will be quite critical. With only two major activity centres in the city, the city centre and the central market, most people will continue to travel to the activity centres, and the increased travel distance will likely cause many changes in travel behaviour. For example, people who currently walk may change their primary travel mode to some kinds of motorized modes in order to adjust to the increased travel distance. Figure 4-4 shows so-called “gap zones” which summarize the relationship between distance (or time) and modes by defining six distance classification (ECMT, 1994). During the site visit to the City of Piura in November 1996, it was observed that the travel time by private car from suburban areas to the city centre was approximately five to twenty minutes. The travel time was not affected much by traffic conditions. The delay component of travel was less than ten minutes when congested areas were traveled. If the expansion into the suburbs simply makes the average travel distance larger, then, the mode change to private motorized modes such as automobiles appears rational. This situation will lead to more vehicles in the central areas, causing heavier congestion. Many developed countries and even developing countries have recently experienced such congestion which causes air pollution and noise pollution.

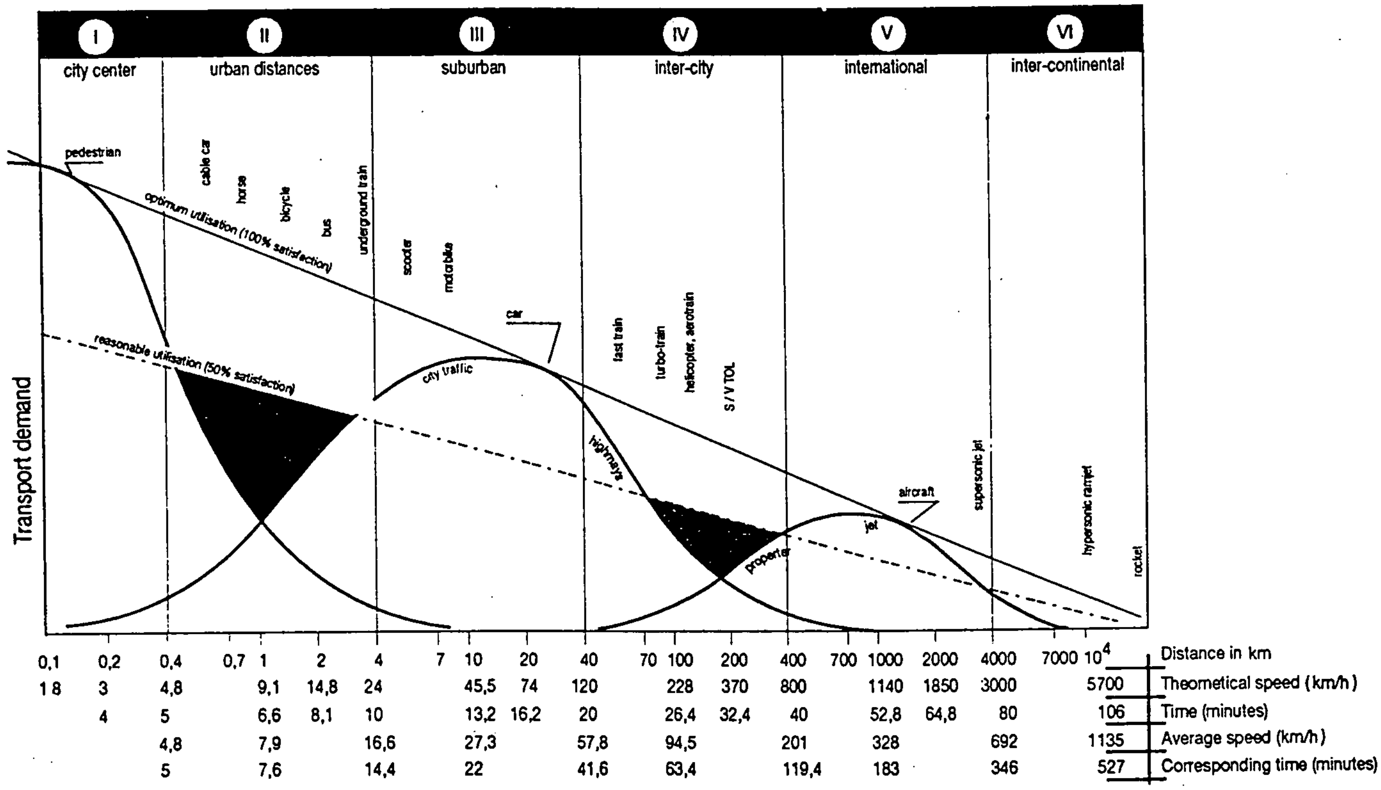


Figure 4-4 Gap Zones (partly covered by public transport modes)

Source: European Conference of Ministers of Transport (ECMT) (1994) Paris, Round Table 96, *Short-Distance Passenger Travel*

4.3 Transportation Facility and Infrastructures

4.3.1 Introduction

The data for transportation related infrastructure reported in this section are (1) the total length of roads, (2) vehicles registered and (3) the use of transportation section by demographic data. Some data was obtained from the material "Compendio Estadistico Departmental 1995-1996." Despite the large amount and acceptable quality of the available data, this data were not used in this study for two reasons. First, all of the data was based on the old departmental division system, not new regional system, causing the need of constant cautions to interpolate the figures since the division settings of Department and Province of Piura in the old departmental system is smaller and larger than the one of regional system respectively. Second, the study area of the City of Piura, the combined urban areas of the Districts of Piura and Castilla, was not used in the material. This in turn means that there is little applicable data for this study. As a result, the use of this data is limited to developing indications of current trends in larger geographical areas, which are the nation, departments or provinces.

4.3.2 Total Length of Road Surface

The first data mentioned is the total length of roads. Table 4-10 shows the summary of the total length of road surface classified by three different governmental levels and by surface types, and Figure 4-5 shows the summary of road classification in the Province of Piura. As observed from the data, the level of asphalting of 64% in the Province of Piura is much higher than the national average of 11.3 %. The share of local roads of 59% is almost identical to the national average of 58% while the share of the national roads of 30% is larger than the national average of 22.4%.

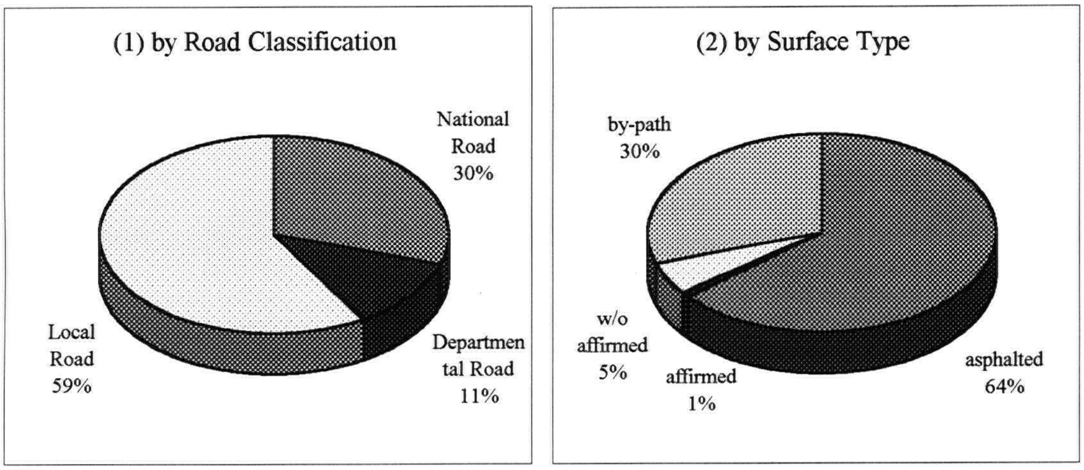
4.3.3 Registered Vehicles and Parking Lots

The second data is the number of vehicles and parking lots registered by the Department of Piura (of old system). Table 4-11, 4-12 and 4-13 shows the number of annual registered

Table 4-10 Length of Road Surface

Road classification	Total	Types of the Road Surface (km)			
		asphalted	affirmed	w/o affirmed	by-path
National Total	73,439.2	8,355.3	13,217.4	16,763.3	35,103.1
- National Road	16,518.6	6,476.4	6,602.3	2,773.1	666.9
- Departmental Road	14,331.3	1,089.0	3,842.0	6,045.6	3,354.8
- Local Road	42,589.3	790.0	2,773.1	7,944.6	31,081.5
Department of Piura	3,391.7	745.7	360.5	519.5	1,766.0
- National Road	783.9	476.3	154.5	116.1	37.0
- Departmental Road	669.3	216.0	116.8	130.2	206.3
- Local Road	1,938.5	53.4	89.2	273.2	1,522.7
Province of Piura	1,631.6	1,044.1	11.1	87.1	489.4
- National Road	313.7	313.7	-	-	-
- Departmental Road	118.5	94.2	-	-	24.3
- Local Road	611.9	48.2	11.1	87.5	465.1

Figure 4-5 Road Structure (in the Province of the Piura)



(1) by Road Classification

(2) by Surface Type

Table 4-11 Anual Registered Vehicles

Type \ year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Department of Piura	908	1,127	874	236	513	962	1,397	1,215	3,202	4,452
- Automobiles	125	79	41	17	22	189	230	180	418	910
- Station Wagon	47	18	11	2	7	37	47	47	198	117
- Pick-up Truck	180	235	118	80	163	331	206	183	330	352
- Rural truck	18	57	16	12	35	105	126	77	164	375
- Panel truck	4	-	-	1	3	6	1	1	2	48
- Omnibus	38	15	28	9	37	51	82	52	101	69
- Lorry truck	62	81	25	8	51	29	82	52	161	131
- Breakdowns	20	9	10	2	5	9	35	13	44	30
- Semi-breakdowns	17	5	9	10	6	7	22	13	47	28
- Minor vehicles	397	628	616	95	184	198	566	597	1,737	2,392
Total Increase since 1986	908	2,035	2,909	3,145	3,658	4,620	6,017	7,232	10,434	14,886

(vehicle units)

Table 4-12 Estimated Total Parking Lots

Type \ year	1990	1991	1992	1993	1994	1995
National Total	605,550	623,947	672,957	707,437	760,810	862,589
Department of Piura	21,436	21,773	22,442	23,268	24,177	25,787
- Automobiles	8,293	8,345	8,625	9,020	9,266	10,005
- Station Wagon	1,294	1,313	1,351	1,357	1,428	1,517
- Pick-up Truck	6,284	6,467	6,513	6,617	6,854	7,123
- Rural truck	1,048	1,130	1,237	1,354	1,536	1,890
- Panel truck	134	134	143	148	148	154
- Omnibus	506	545	689	838	917	965
- Lorry truck	3,552	3,491	3,508	3,520	3,565	3,616
- Breakdown lorry	143	159	179	204	227	258
- Breakdowns	182	189	197	210	236	259

(parking lot units)

Table 4-13 Increase of Vehicle Use

Type \ factors	Registered Vehicles						Estiamted Total Parking Lots			
	1986	1995	Inc. from 1986		Mode Share		1990	1995	Inc. from 1990	
	units	units	units	%	1986	1995	units	units	units	%
Department of Piura	908	4,452	3,544	390.3	100	100	21,436	25,787	4,351	20.3
- Automobiles	125	910	785	628.0	13.8	20.4	8,293	10,005	1,712	20.6
- Station Wagon	47	117	70	148.9	5.2	2.6	1,294	1,517	223	17.2
- Pick-up Truck	180	352	172	95.6	19.8	7.9	6,284	7,123	839	13.4
- Rural truck	18	375	357	1,983.3	2.0	8.4	1,048	1,890	842	80.3
- Panel truck	4	48	44	1,100.0	0.4	1.1	134	154	20	14.9
- Omnibus	38	69	31	81.6	4.2	1.5	506	965	459	90.7
- Lorry truck	62	131	69	111.3	6.8	2.9	3,552	3,616	64	1.8
- Breakdown lorry	-	-	-	-	-	-	143	258	115	80.4
- Breakdowns	20	30	10	50.0	2.2	0.7	182	259	77	42.3
- Semi-breakdowns	17	28	11	64.7	1.9	0.6	-	-	-	-
- Minor vehicles	397	2,392	1,995	502.5	43.7	53.7	-	-	-	-

note 1 : "Inc." stands for increase.

note 2 : "Mode Share" is calculated by the number of registered vehicles of the year.

automobiles between 1986 and 1995, the number of estimated total parking lots between 1990 and 1995, and their increase during the periods respectively. The numbers in Table 4-11 are accumulated numbers, and the ones in Table 4-12 are increments.

From Table 4-13, the most important finding is an increase of total annual registered vehicles from 908 in 1986 to 4,452 in 1995. The increase of 3,544 vehicles is equal to 390.3% of total registered vehicles in 1986. The number of total annual registered vehicles had constantly increased during the period as observed in Table 4-12. Moreover, the number of total estimated parking lots also increased by 20.3% between 1990 and 1995. These facts clearly show the on-going process of motorization in the department.

For specific modes, the noticeable increase of annual registered vehicles is observed in Rural trucks by 1,983.3%, Panel Trucks by 1,100.0% and Automobiles, which include taxis and Collectibos, by 628.0%. As for the actual increase number, minor vehicles such as motorcycles are the most significant with 1,995 vehicles followed by Automobiles with 785 vehicles. Among these modes, however, the most significant increase, in terms of influence on traffic in the city, must be of Automobiles. The extreme high percentages of Rural trucks and Panel trucks are caused by their small registered numbers in 1986, which were only 18 for Rural trucks and 4 for Panel trucks. The physical size of minor vehicles are much smaller than Automobiles, and the influence of this small mode on traffic is assumed less.

The noticeable increase of parking lots from 1990 to 1995 is observed in 90.7% of Omnibus and 80.3% of Rural trucks. These two modes are primarily used as shared public transportation modes. This indicates that the use of public transit , at least as a fleet number, is increasing. Another mode, which increase of parking lots is significant, is breakdown lorries. This fact likely means either that those breakdown vehicles are left at parking lots and not properly treated, or that vehicles keep breaking down because of their longevity or improper maintenance. As for the actual increase number, Automobiles are the most significant mode with 1,712 units followed by 842 of Rural trucks and 839 of Pick-up trucks. As for the total parking lot units in 1996, Automobiles are the most influential with 10,005 units or 38.8% of total 25,787 units followed by Pick-up truck of 7,123 or 27.6%. The large influence of Automobiles in the city is also observed from these facts.

Another noticeable fact is the increasing of mode share in annual registered vehicles by Automobiles from 13.8% to 20.4%. This simply means that the popularity of the automobiles is increasing. The increase of both parking and registration of automobiles, the absolute number itself, is much bigger. That is, the small increase of automobiles in percentage likely ends up a huge increase in vehicle number. If this trend of increasing popularity of Automobiles continues, the number of automobiles will explode in the near future, and their predominance will be strengthened.

4.3.4 Use of Transportation Section by Demographic Characteristics.

Interestingly, one of the available materials gives data of the use of transportation services with respect to several demographic characteristics: age, education level, employment condition, household income, and modes and purposes based on household income. The data is shown in Table 4-14 and Table 4-15. The major findings from this data is:

(1) surprisingly low percentage of population making trips ranging from 8.8% to 35.3% at the maximum,
(2) the most active travellers range in age of from 25 to 54, and have an education level higher than secondary school,
(3) employed people travel more,
(4) higher income people travel more,
(5) road transportation modes dominate regardless of the difference in income, and
(6) work trips average of 35.3% (from 27.1% to 45.6%) among several types of trip purposes.

Table 4-14 Use of Transportation Service (by demographic characteristics)

Characteristics	Total	Population (%)		Number	Trip Type (%)		Number
	(%)	travel	no travel	of Case	national	Interna.	of Case
Age	100	16.8	83.2	4,524	99.9	0.1	745
- 15 ~ 24	100	13.4	86.6	1,416	100		175
- 25 ~ 44	100	19.5	80.5	1,908	99.8	0.2	365
- 45 ~ 54	100	20.4	79.6	553	100		113
- 54 ~	100	13.0	87.0	647	100		92
Education	100	16.8	83.2	4,524	99.9	0.1	745
- no education	100	4.8	95.2	324	100	-	17
- primary	100	15.6	84.4	1,507	100	-	220
- secondary	100	16.3	83.7	1,816	99.7	0.3	270
- universities	100	35.3	64.7	308	100	-	136
- other post sec.	100	24.5	75.5	568	100	-	102
Active condition	100	16.8	83.2	4,524	99.9	0.1	745
- Employee	100	20.9	79.1	2,622	99.8	0.2	535
- employed	100	21.5	78.5	2,350	99.8	0.2	498
- unemployed	100	13.6	86.4	272	100	-	37
- Non-employee	100	10.8	89.2	1,902	100	-	210
Household Income	100	16.8	83.2	4,524	99.9	0.1	745
- ~ 200	100	8.8	91.2	494	100	-	38
- 200 ~ 399	100	12.8	87.2	821	100	-	98
- 400 ~ 599	100	18.7	81.3	851	100	-	141
- 600 ~ 899	100	20.6	79.4	866	99.5	0.5	172
- 900 ~ 1299	100	17.6	82.4	642	100	-	104
- 1300 ~	100	21.9	78.1	850	100	-	192
(S/.)							

note: "interna." stands for international.

Table 4-15 Use of Transportation Service (by Mode and Purpose)

Characteristics	Total	Household Income (S/.)					
	(%)	~ 200	200 ~	400 ~	600~	900 ~	1300 ~
Nation (by Mode)	99.9	100	100	100	100	100	100
- Road	95.4	98.5	96.6	94.6	96.8	95.8	92.3
- Rail	0.1	-	0.7	-	-	-	-
- Air	2.1	-	-	1.6	0.4	3.3	6.2
- Marine (ocean)	0.2	-	0.7	-	-	-	0.5
- River	-	-	-	-	-	-	-
- Others	2.7	1.5	2.0	3.8	2.8	0.9	1.0
(the number of case)	745	38	98	141	172	104	192
Nation (by Purpose)	99.9	100.0	100.0	100.0	100.0	100.0	100.0
- Work	35.3	28.5	40.0	25.6	45.6	43.7	27.1
- Study	5.9	7.5	7.1	7.9	2.2	7.3	5.5
- Business	6.2	4.6	6.3	6.9	4.6	4.3	8.9
- Health (sickness)	6.1	10.5	4.1	8.8	6.1	4.9	4.3
- Travel	5.0	4.2	4.3	4.2	3.7	5.4	7.6
- Others	41.8	44.7	38.2	46.6	37.8	34.4	46.6
(the number of case)	745	38	98	141	172	104	192

As mentioned, these findings can be the indications for the transportation activity in the City of Piura. One note here, however, is that the reliability of the data is unknown since the sampling methods and procedures are unknown.

4.3.5 Shared Use of Road Infrastructure

While there is a trend of the increasing popularity of automobiles, the road infrastructure in the City of Piura is shared by a surprising variety of modes. The modes include both private public modes. The private modes include vehicles such as automobiles, trucks, motorbikes, bicycles, tricycles, pedestrians and even donkeys. The public transportation modes include Combos, Omnibuses, Collectibos, taxis and Mototaxis. The existence of these many modes probably causes the complexity of transportation activity in the city and also serious problems for the use of transportation analysis methods used in developed when they are applied to developing countries. The developed country methods are based on automobile (or private vehicle) traffic. That is, the mixed use of road infrastructure, which is common in most developing countries, and the crucial point of transportation studies in developing countries is not built into most transportation planning tools.

In addition, the following are the definitions and classifications of primary modes identified in the city and also used in this study. These definitions are only for major modes, and were described by a city officer from the transportation section in the municipality of the Province of Piura.

(1) Combi

Combos are small types of vans which are a major public transportation mode. They can usually carry 12 to 15 people inside, but the number can be more because seating is not required by regulation. They are also called "Rural Truck" in some case.

(2) Omnibus

Omnibus is the biggest type of public transportation mode which can carry up to 40 people. It is also simply called a bus and travel along fixed routes.

(3) Microbus

A type of motorized transportation mode which fits between Combos and Omnibuses. It can carry approximately 25 people. In the analysis of this study, this type of mode is classified as an Omnibus.

(4) Taxi

An type of automobile transportation mode that does not have any designated routes. They can be used privately or shared.

(5) Taxi Collectibo

Another type of automobile transportation mode which does have certain routes with certain stopping spots. It is one of the major public transportation mode in the city. It is simply called "Collectibo."

(6) Mototaxi

A type of taxi which uses a tri-wheeled motorbike mostly with two-cycle engines. It can carry up to three passengers on the back seat (excluding a driver).

(7) Tricycle

A type of pedal transportation mode with three wheels. Usually two of the three wheels are fixed at front. They are often used to move light loads, and they are also common for private commercial activities.

4.4 Public Transportation Services

4.4.1 Introduction

The word “public transportation” in Piura means any kind of transportation mode which is used or shared by the public. All the public transportation in the City of Piura is run by private transportation companies, not by governments or crown companies. The enforcement of the governmental decisions or their preferences on the operations is often done by regulations and taxing. The influence of the regulation and taxing can often restrict their operation: for example, obtaining a new fleet or simply changing their routes is subject to taxation. Moreover, the amount of taxation is not small in their operation. (The discussion on the taxing system is not dealt in this study.)

4.4.2 Geographical Operation Areas

Three levels of public transportation services are identified geographically: (1) urban services, (2) interurban services, and (3) inter-provincial services. They represent the public transportation services which run within the city, between the cities in the province, and between the province and another province or region respectively. Since this study focuses on the travel characteristics within the city, the first type of public transportation was the primary target for investigation while the other two types also affect the traffic condition within the city to a certain level and were included.

Table 4-16 and Figure 4-5 show the summary of those three public transportation services. The total fleets for the services were 751, 195 and 178 respectively in 1992. Automobiles, which are Collectibos and taxis, are the most predominant public transportation services in the urban area with the share of 72.4%. Table 4-17 shows the summary of inter-provincial services. Generally speaking, most of the longer distance fleets are bigger in size than the urban services. Therefore, this type of service also affects the inner city traffic: the departure of 257 vehicles only for inter-provincial services means an average of 20 vehicles departing

Table 4-16 Public Transportation Service in 1992 (1)

Type of Service	Between / and	N.V.	N.S.	F
Urban Service	**within the city**	**751**	**n/a**	**n/a**
- OmniBus		49	n/a	n/a
- Microbus		70	n/a	n/a
- Automobile		385	n/a	n/a
- Taxi and Mototaxi		159	n/a	n/a
- Rapid Service		68	n/a	n/a
- Special Service		20	n/a	n/a
Interurban Service	**within Province**	**195**		
- **Omnibus**		**54**		
- Company 1	Piura - Catacaos	4	35	n/a
- Company 2	Piura - Sechura	25	30	n/a
- Company 3	Piura - Parachique	25	30	n/a
- **Microbus**	**Piura - Catacaos**	**20**	**20**	**n/a**
- **Collectibo**		**39**	**n/a**	**n/a**
- Company 1	Piura - Catacaos	28	5	n/a
- Company 2	Piura - Sechula	5	5	n/a
- Company 3	Piura - LaUnion	6	5	n/a
- **Rapid Service**	**to various destinations**	**39**	**15**	**n/a**
- **Rural truck**		**43**	**n/a**	**n/a**
- Company 1	Piura - Percal	6	15	n/a
- Company 2	Piura - San Padro	8	5	n/a
- Company 3	Piura - San Jacinto	15	5	n/a
- Company 4	Piura - Cerezal	4	15	n/a
Interprovincial Service	**within Department**	**178**	**n/a**	**257**
- Interprovincial (1)	within Department	87	n/a	214
- Interprovincial (2)	outside of Department	91	n/a	43

N.V. : Number of Vehicles in Operation
N.S. : Number of Seats per vehicle
F : Freaquency (departure per day)

Figure 4-6 Vehicle Units of Public Transportation

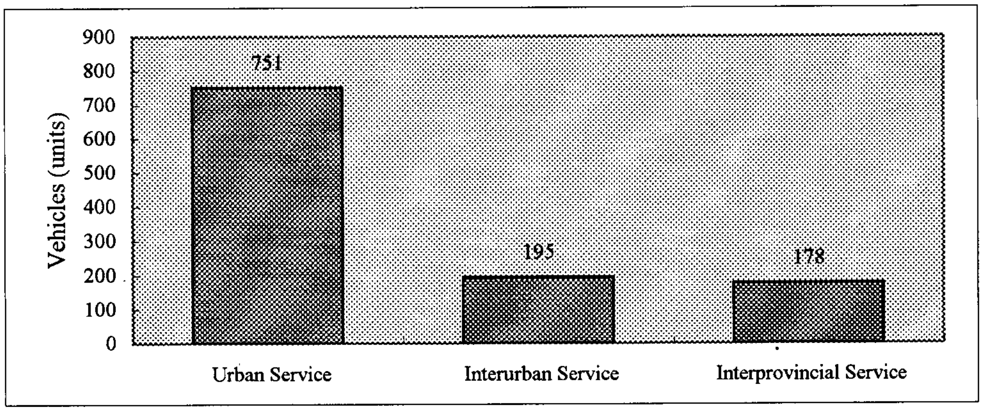


Table 4-17 Public Transportation Service in 1992 (2)

Type of Service	Between Piura and ...	N.V.	N.S.	F
Interprovincial Service	**within Department**	**178**	**n/a**	**257**
Interprovincial (1)	**within Department**	**87**	**n/a**	**214**
- Destination 1	Sullana	10	n/a	33
- Destination 2	Sullana - Talara	7	n/a	20
- Destination 3	Sullana - Ballavista	5	n/a	25
- Destination 4	Paita	1	n/a	7
- Destination 5	Paita - Sullana	5	n/a	6
- Destination 6	Bellavista	7	n/a	36
- Destination 7	Tambogrande	16	n/a	33
- Destination 8	Las Lomas	5	n/a	8
- Destination 9	Huancabamba	2	n/a	1
- Destination 10	Bigote	2	n/a	1
- Destination 11	Chulucanas	8	n/a	22
- Destination 12	La Quemazon	2	n/a	1
- Destination 13	Morrapon	6	n/a	6
- Destination 14	Canchaque - Faique	1	n/a	1
- Destination 15	Mancora	4	n/a	8
- Destination 16	PN Colan	6	n/a	6
Interprovincial (2)	**outside of Department**	**91**	**n/a**	**43**
- Destination 1	Lima	45	n/a	23
- Destination 2	Tumbes	5	n/a	2
- Destination 3	Lima - Tumbes *	4	n/a	1
- Destination 4	Lima - Sullana *	6	n/a	2
- Destination 5	Chiclayo	15	n/a	5
- Destination 6	Tumbes - Trujillo *	7	n/a	5
- Destination 7	Talara - Trujillo *	4	n/a	2
- Destination 8	Agnes Verdes	5	n/a	3

Note 1 : The mode for above all is "omnibuses."
Note 2 : * means that Piura is a middle stop between the cities.

N.V. : Number of Vehicles in Operation
N.S. : Number of Seats per vehicle
F : Freaquency (departure per day)

and arriving per hour constantly during the operation period between 6 AM and 6 PM. Moreover, most of their departures or arrivals are in the central area of the city.

4.4.3 Urban Public Transportation Services

In the city, three types of public transportation modes are dominant: (1) Comb (includes Omnibus), (2) Collectibo or routed taxi, and (3) taxi (taxi and Mototaxi). Combos, Omnibuses and Collectibos are owned by private companies, and the companies pay taxes for their operation. Table 4-18 shows the summary of the companies and their operating routes. The fleets owned by the companies are mainly Combos and Collectibos, both of which are operated on certain routes with certain frequency. One interesting fact is that the operation routes and optimized frequency have to be approved by the municipality, and in most cases those companies ask advice from the government, and then follow the advice. The frequency is decided by considering approximate demands estimated by the transportation sector of the municipality, and the frequency changes three times depending on the periods of the day: morning peak, mid-day and evening. According to the materials supplied, the difference of frequency between morning peak and mid-day is not large. This may likely be causing some waste in operation such as low occupancy during low demand periods. In addition, the "optimized frequency" for the routed public transport services is calculated by considering the estimated traffic demand of the busiest peak hour (morning) and the capacity of vehicles.

Mototaxis, which had been widely used in the city, has been experiencing difficulty in maintaining their existence mainly because of their noisy, air polluting two-cycle engines and because of the bad manners of drivers. The municipality decided to introduce a "restricted area" for this mode in 1995. Figure 4-7 shows the area. Since the restricted area includes two of the major activity centres, the city center and central market areas, the accessibility and popularity of the mode has declined dramatically and has been losing its competitive edge against other modes.

Table 4-18 Urbun Public Transportation Service in 1995

Company	Route	Veh.	Seat
Total		**754**	**340**
Collectibos		**550**	**90**
- Comite 1-C	Central market - Urb. Piura -Jr.Ica	44	5
- " 2-C	Central market - Chiclayito	56	5
- " 3-C	Central market - San Martin	79	5
- " 5-C	Central market - Chiclayito	19	5
- " 7-C	Tacala - Central market - Chiclayito	35	5
- " 8-C	Central market - Consuelo de Velasco	20	5
- " 10-C	Central market - Los Algarrobos	39	5
- " 11-C	Sullana highway km 7.5	17	5
- " 12-C	Central market - El Indio	20	5
- " 15-C	Central market - San Martin	48	5
- " 16-C	Central market - Sta Julia	28	5
- " 17-C	Av. Gulman - National University of Piura	14	5
- " 19-C	Central market - Chiclayito	20	5
- " 21-C	Central market - Sta Rosa	39	5
- " 22-C	Sanchez cerro - Mcdo Mdlo - Vicus	16	5
- " 24-C	Central market - Los Algarrobos	16	5
- " 25-C	Av. Sanchez cerro - Enace	22	5
- " 27-C	Central market - Cossio del Pomar	18	5
Omnibus		**88**	**159**
- Etrinsa M-1	Central market - El indio	11	21
- Sta Isabel 2M	Sta Julia - Ignacio Merino	13	20
- Etisch 3M	Central market - Chiclayito	9	28
- Ex emusta 4M	Nva Esperanza - Los Algarrobos	17	30
- San martin 5M	Central market - San Martin	17	30
- 6-M	- (not specified)	21	30
Rural service		**116**	**91**
- Miguel Grau	Central market - Enace	22	16
- Cooptuser	Central market - Tacala - Vicus	9	9
- Sta Rosa	UNP - Enace	26	12
- Comite 8R	Central market - San Martin	7	12
- STAR	Micaela Bastidos - Hospital Regional	25	18
- U.D.E.P.	University of Piura - calle Arequipa	7	9
- 3-R	Enace - Central market - Vicus	20	15

Note 1 : "Veh." means the number of vehicles operated by the company.
Note 2 : "Seat" means the average number of the seats of the the fleets.

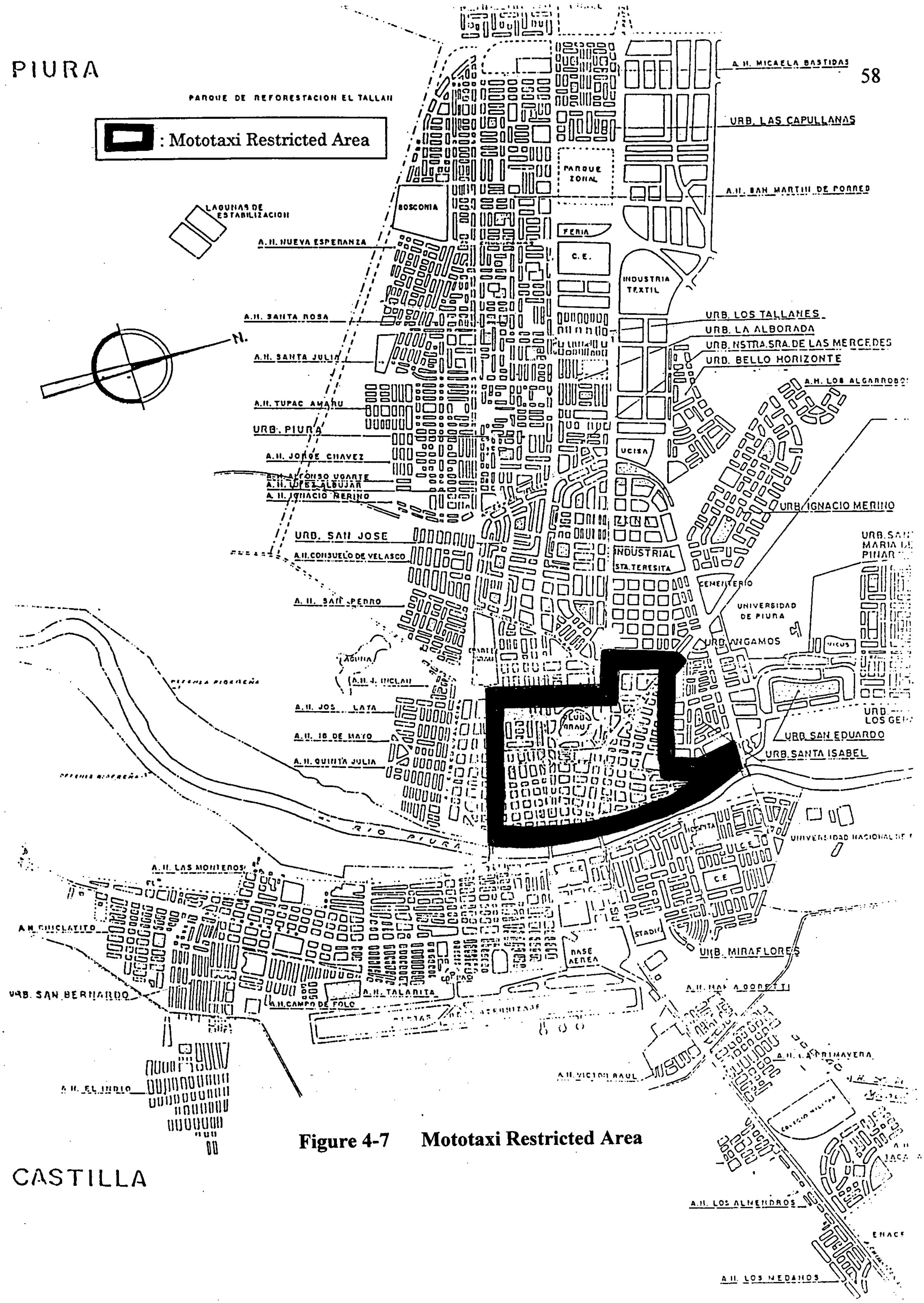


Figure 4-7 **Mototaxi Restricted Area**

According to city officials, the operation of Mototaxis was observed prior to 1990. Their number suddenly increased to approximately 12,000 around 1994, which is considered as the peak of the mode. In 1995, the City introduced the restricted area, and the number suddenly declined to 5,000. In late 1996, there were only 2,000 Mototaxis remaining. Among them, 1,200 to 1,300 were registered, and the others were operated illegally.

As the number of the Mototaxis has declined, it seems that the number of automobile taxis has increased. Although there is no comparative statistics, there were 274 registered taxis and estimated 600 to 800 non-registered ones in 1994. This service is not affected by the restricted areas, and one vehicle can carry up to four passengers. There were also a number of shared taxis with publicized fixed destination. These shared taxis can be recognized as illegal Collectibos, and their existence likely affects the operation of the registered urban services such as Collectibos. Moreover, most of them are quite new, and the comfort level during the ride is much better than the usual Collectibos. This is another factor of the popularity of the automobile taxis. As indicated above, the registration system on taxis has not been enforced strongly which makes controlling their operation difficult. Some changes are expected soon.

In addition, there is a "rent-a-car" company in the city although the data for quality and price of available cars was not obtained.

4.4.4 Costs of Modes

The costs can be dealt from four kinds of point of view: (1) operational cost from consumers' stand, (2) investing cost from consumers' stand, (3) operational cost from operators' stand, and (4) investing cost from operators' stand. Here, the costs are presented only from consumer's view. Table 4-19, 4-20 and 4-21 show the fare for taxi and Mototaxi, urban services, and interurban services. The fares were those in November 1996, but they are also easily changed as the economic situations change. These fares are considered the operating cost of consumers when those types of services are used. From the tables, it is obvious that the use of taxis or even Mototaxis is quite a luxury with at least 2.5 new soles for taxis and 1

Table 4-19 Fare of Taxi and Mototaxi

from Plaza de Armas to	Taxi (S/.)			Mototaxi (S/.)
	Rapid taxi	Tele taxi	H.P.Car	
Urb. Miraflores	2.5	2.5	3.0	1.0
Urb. Angamos	2.5	2.5	3.5	1.5
Hotel El Angolo	2.5	2.5	3.5	1.5
Urb. Piura	3.0	2.5	4.5	1.5
Urb. Sta.Isabel	2.5	2.5	3.0	1.5

note : "S/." represents new soles.

Table 4-20 Fare of Urban Transport

mode	Combi	Omnibus (large Combi	Collectibo
fare	50	30	60

note 1 : Fare is paid for each ride with regardless to the distance.
note 2 : Fare is based on "cent" or 1/100 "new soles."

Table 4-21 Fare of Interurban Transport

from Piura to	one-way (1/100 S/.)	return (1/100 S/.)	from Piura to	one-way (S/.)
Catacaos	12	15	Lima (company 1)	35.0
Sullana	40	45	(company 2)	32.0
Talara	100	130	(company 3)	30.0
Mancora	160	180	Chulucanas	2.0
Cangrejo	70	75	Huancabamba	8.0

Table 4-22 Prices of Variable Modes Sold in the City

Type of Mode	Description		Price
		new/used	
Automobiles	Daewoo Tico (Korean)		
	- 800cc engine, for 4 people	new	$ 8,490 ~
	- often used for private taxis	loaned	$ 9,126 ~
	Toyota sedan (1,800cc engine)	used	$ 4,500 -
	Toyota van (1,800cc engine)	used	$ 3,600 -
	Truck (made unknown, large)	used	$ 5,100 -
	Combi (appx. 10 seat capacity)	used	$ 3,400 -
Motorbikes	Plaggio motorbikes		
	- Vespa (150cc engine, 2 seats)	new	$ 2,195 -
	- Storm (2 cycle 50cc engine)	new	$ 2,970 -
	- Typhoon (50 & 80 cc engine)	new	$ 2,880 -
	- Skipper (150cc engine)	new	$ 3,620 -
Bicycles	Mountain bike type (good)	new	$ 270 -
	" (average)	new	$ 196 ~
	Mountain bike type	used	$ 150 ~
	"	used	S/. 390 ~

new soles for Mototaxis compared to 0.3 or 0.5 new soles for Combos. However, despite the cost difference, the use of taxis or Mototaxis is in fact quite popular and affordable because the fares likely become competitive enough when shared by multiple people. This case shows that people are “willing to pay” for a time saving and a comfortable ride.

Another aspect of costs is the investing cost, or the price of vehicles. Figure 4-22 shows the prices of vehicles found in the city. Considering that the average income of the city is approximately 513 new soles per month, the affordability as well as the availability of those modes is becoming higher while having a car is still considered luxury. A used private car of approximately US$3,000, which is equivalent to 6,000 new soles with an exchange rate of 2 soles per US dollar, is affordable for the average income family for approximately ten months income, which is well close to the situation when people in developed countries buy a new full-sized cars. Moreover, other modes such as bicycles and motorbikes are much cheaper and more affordable than automobiles. The approximate price of motorbikes ranges from US$2,000 to US$4,000, and bicycles range from US$150 to US$300. The availability of those private modes is increasing, it will continue as the level of people’s life especially in financial term improves.

Chapter 5

Traffic Analysis Zones and Household Survey

5.1 Introduction

To conduct travel analysis detailed data is needed. The data should include the characteristics of person trips such as trip purpose, mode specification, time of the day, and origins and destinations. For this study two major sources are used along with other minor reports. The first major source was a household self-completion survey, which had been conducted in March 1993. Most of the other necessary data are converted from other sources such as "Plan Director de Piura y Castilla al año 2010" and "Estudio de Transporte de los Distritos de Piura y Castilla."

This chapter explains the framework of the household survey. First, the major issues of transportation surveys in general are mentioned. The issues discussed here are the trade-offs of the surveys in the designing stages and the reliability of the surveys. Second, the actual physical survey areas and their boundaries are defined on a map as a set of "traffic analysis zones." The basic demographic data of these zones such as population are converted from the "sectorizacion" system mentioned in the previous chapter. Third, the survey methods are presented. The procedures are'briefly explained first, then, the instrument design (or survey form) is examined section-by-section. Fourth, the reliability of data is examined by comparing demographic data obtained from the survey with statistical data given in other materials. The sample sizes of each traffic analysis zone are also recalculated in order to compare the results with the actual sample sizes. Some household data is used for the calculation. Finally, the summary of household characteristics data is explained. Table 5-1 to 5-12 and Figure 5-6 to 5-7, which summarize this data, are attached at the end of this chapter. In addition, the data presented in the previous chapter are only briefly explained in this chapter.

In addition, the survey form has four sections (or pages), and the contents are primarily classified questions of two types of travel characteristics: (1) household travel characteristics and (2) individual trip records. The following sections in this chapter only explain the former, and the later is analyzed in the next chapter.

5.2 Transportation Survey in General

Conducting a travel survey should follow a series of logical, interconnected steps. The stages of a typical sample survey are shown in Figure 5-1. The issue to be addressed within each of these steps are listed as the survey documentation in Appendix C.

The essential factors of good survey design are (1) being able to deal with "trade-offs" between the competing demands of good design practice in several areas such as sample design and data expansion and (2) being able to reach the most cost effective, high quality survey which meets the budget constraints. The general nature of the trade-offs, in which quality and quantity are traded-off against resource (cost), is often called the "architect's triangle." The brief summary of the trade-offs is shown in Figure 5-2, and the "architect's triangle" is recognized at the top of the figure.

The quality of data to be collected is mainly a function of (1) survey methods and (2) the quality of the samples. The former depends on (a) the quality of the survey instrument design and (b) the quality control procedure for the implementation of the survey method. The survey instrument design should be designed on the variables of interest in an unbiased way, and the follow-up procedure should be able to verify the quality of the collected data. The latter depends on (a) the ability of the sampling frame to truly represent the population and (b) the sampling selection procedure to randomly select the appropriate extent from the sample frame.

The quantity of data is a function of (1) the number of respondents in the final data set and (2) the amount of information obtained from each respondent. The former obviously depends on (a) the size of the sample chosen from the population and (b) the response rate obtained from

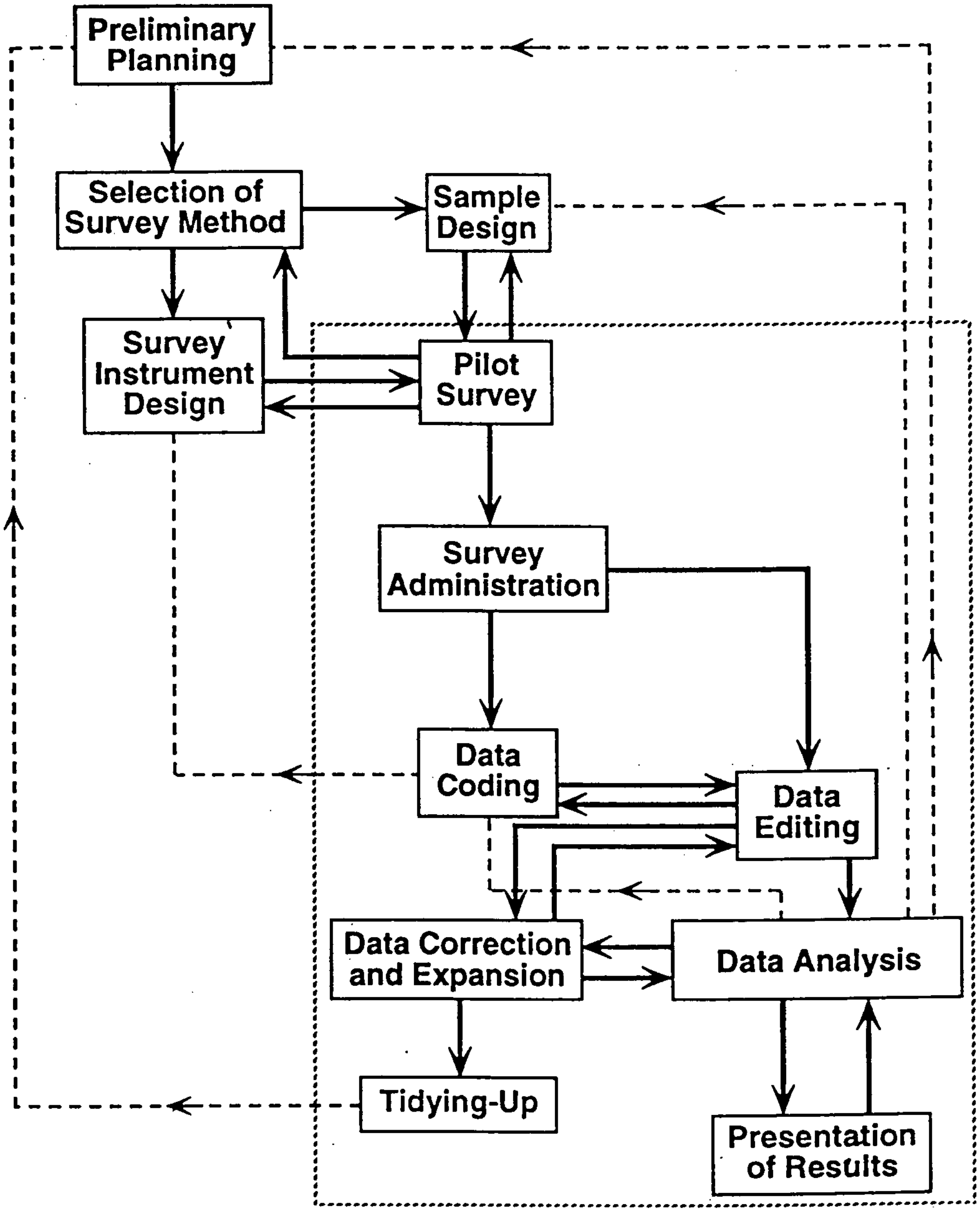


Figure 5-1 The Stages of a Transport Survey Process

Source: A. Richardson et al. (1995), *Survey Methods for Transport Planning*

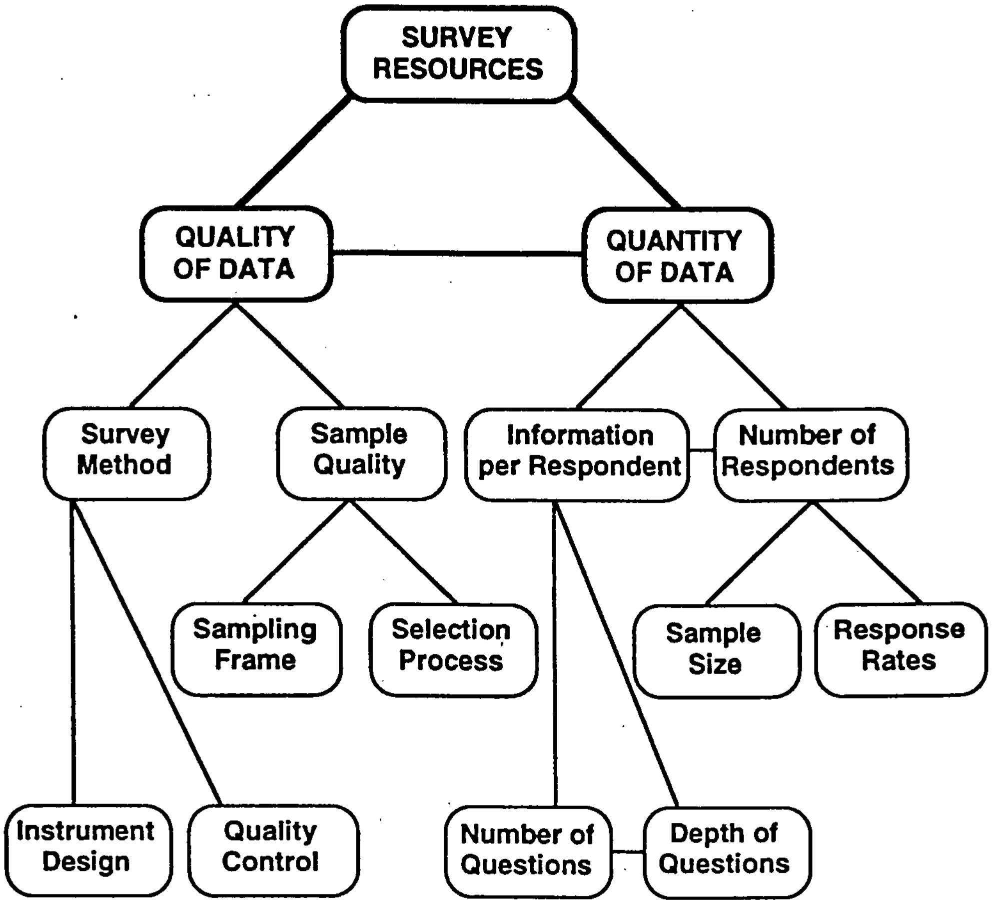


Figure 5-2 Trade-Offs in the Transport Survey Process

Source: A. Richardson et al. (1995), *Survey Methods for Transport Planning*

that sample. The latter depends on (a) the number of questions and (b) their detail in the survey. These factors are in the "trade-off" relationship with cost constraints. This situation is, in fact, unavoidable, and becomes a major issue when surveys are designed.

The major interactions of these trade-offs can be simplified as the issues of the survey instrument design and the sample size design. The former is directly responsible for the survey quality and the information per respondent while the latter is responsible for the sampling method and the number of respondents. Given the primary objective of reducing survey uncertainty, then improving the survey instrument to higher quality or more detailed, selecting a larger sample size or even doing both can be chosen. However, since either of those requires more cost, minimizing the uncertainty within fiscal constraints becomes the major task of the survey design. In many real cases, with a certain amount of budget given, collecting a limited amount of high quality data is preferred to collecting a greater quantity of low quality data in order to minimize uncertainty.

In this study, the quality and quantity of the survey is briefly examined by reviewing the survey methods and recalculating the sample size. In Section 5.4, the survey methods, procedure, and instrument design (or survey form), are reviewed. Then, the reliability of survey is examined by recalculating the sample sizes of the traffic analysis zones in Section 5.5.

5.3 Traffic Analysis Zones and Demographics

5.3.1 Introduction of Traffic Analysis Zones

The first step to conduct a transportation study is to divide the whole area under consideration into several "traffic analysis zones." The traffic analysis zones should have reasonably homogeneous characteristics for factors such as socio-economics and land uses. The traffic analysis zones in Piura are mainly divided by major arterials, and are, therefore, visually easily distinguishable. The socio-economic and land use characteristics within each zone are reasonably alike and can be well-characterized. The size of those zones are also considered appropriate with respect to the social-economic distribution. The distribution of those six social classes, from high to low-critical, within most traffic analysis zones are acceptably stable.

Thirty traffic analysis zones, 25 internals and 5 externals, are defined for this analysis as shown in Figure 5-3. The traffic analysis zone division system was converted from the original in "Estudio de Transporte de los Distritos de Piura y Castilla" in which 32 traffic zones including externals are introduced, see Figure 5-4. The reason for converting the zone

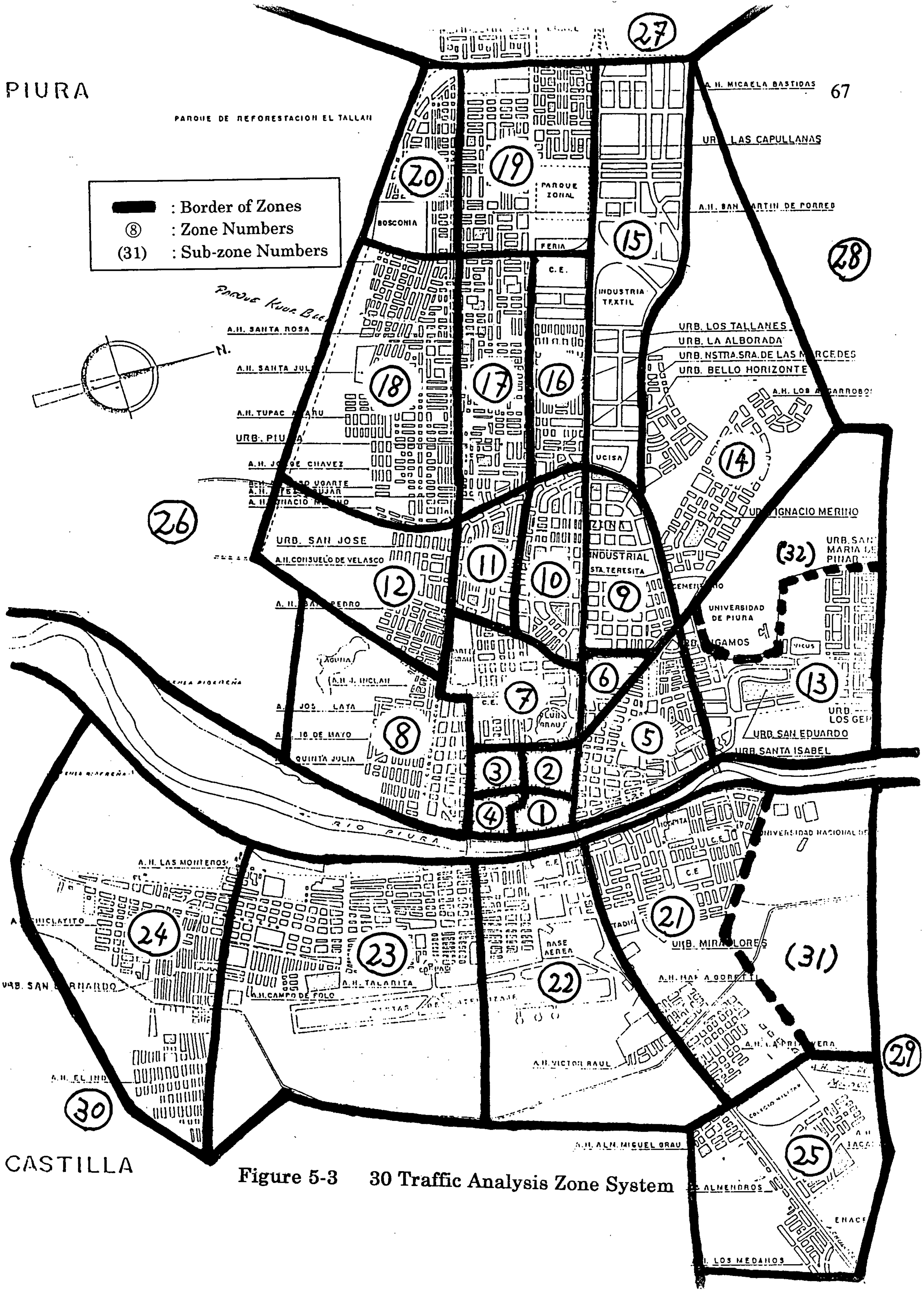


Figure 5-3 30 Traffic Analysis Zone System

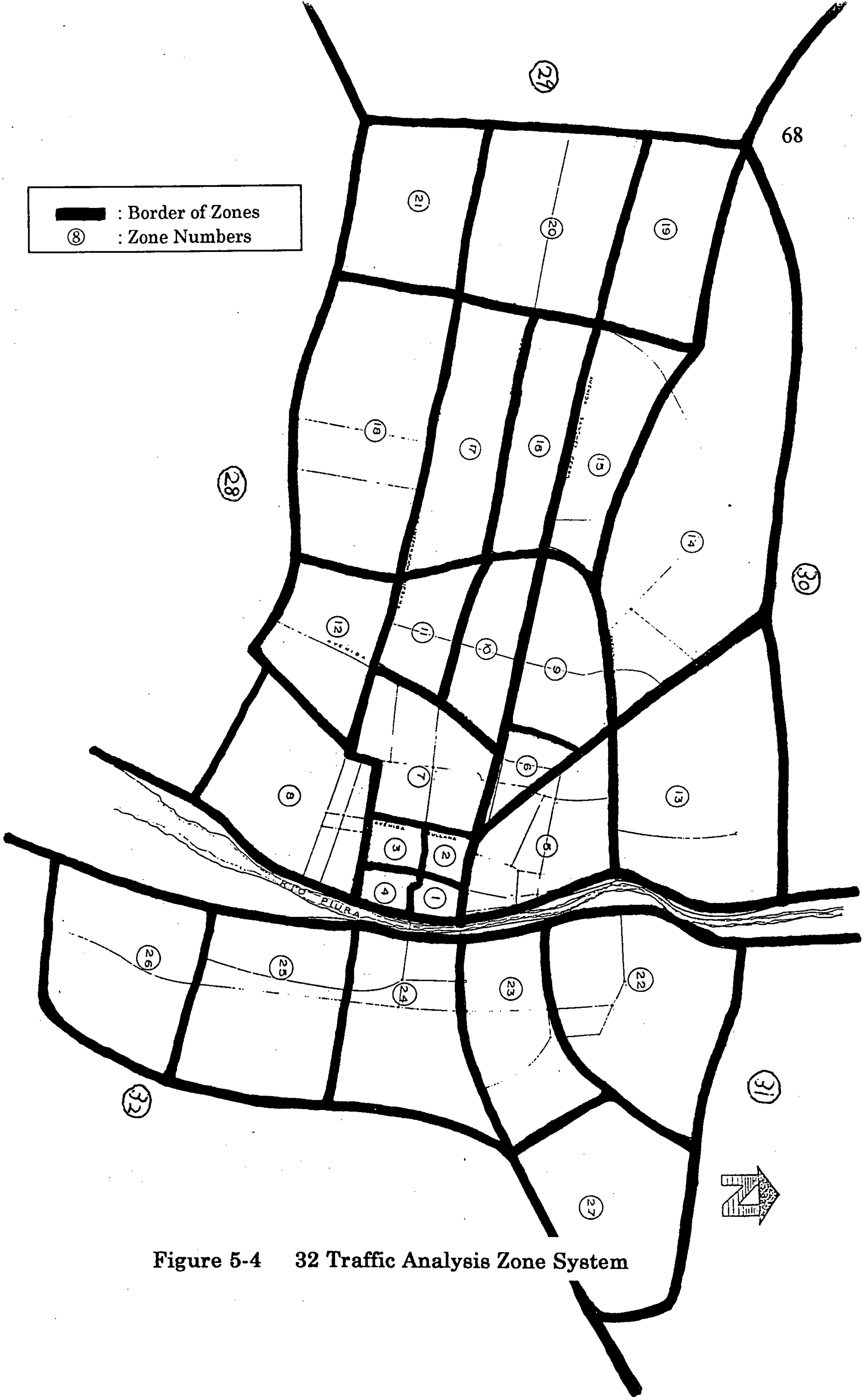


Figure 5-4 32 Traffic Analysis Zone System systems is insufficient sampling numbers of the interview survey at two of the 32 original traffic zones. The sample numbers do not even reach the minimum number of 10, which was set by the city.

The conversion to the 30 traffic analysis zone systems from the 32 traffic zone systems was made by two steps: (1) integration and (2) renumbering. First, the two zones with insufficient sampling, zone 19 and zone 22 of the 32 traffic analysis zone system, were integrated into zone 15 and zone 23 respectively, then, the newly made 30 zones are renumbered based on the order in the original 32 traffic analysis zone system. The comparison of those two traffic analysis zone systems are shown in Figure 5-5, and the visual differences between two are easily observed.

5.3.2 Conversion of Land Use Characteristics

Three of the primary demographic characteristics, population, land size and density, were converted from the data of "sectorizacion" mentioned in "Plan Director de Piura y Castilla al año 2010," see Table 4-8. The conversion was done by using the approximate land size ratios of each traffic analysis zone to a sector when a sector consists or shares several traffic analysis zones. This was done based on the assumption that "the land use and distribution of population in the sectors were uniform." Then, the total population of 366,206 and land size of 3,021 ha. in 1992 are used as the base data. The details of the conversion ratios are attached in Appendix B. The results of the estimated number for those three characteristics, population, land size and density, are derived by using the conversion ratios, and they are shown as item 12, 13 and 14 in Table 5-6. The other data are summarized in Table 5-8.

5.4 Household Survey Method

5.4.1 Survey Procedure

A household self-completion survey was conducted by the municipality of Province of Piura, who is responsible for the future plan of the city, in March 1993. The survey was done by

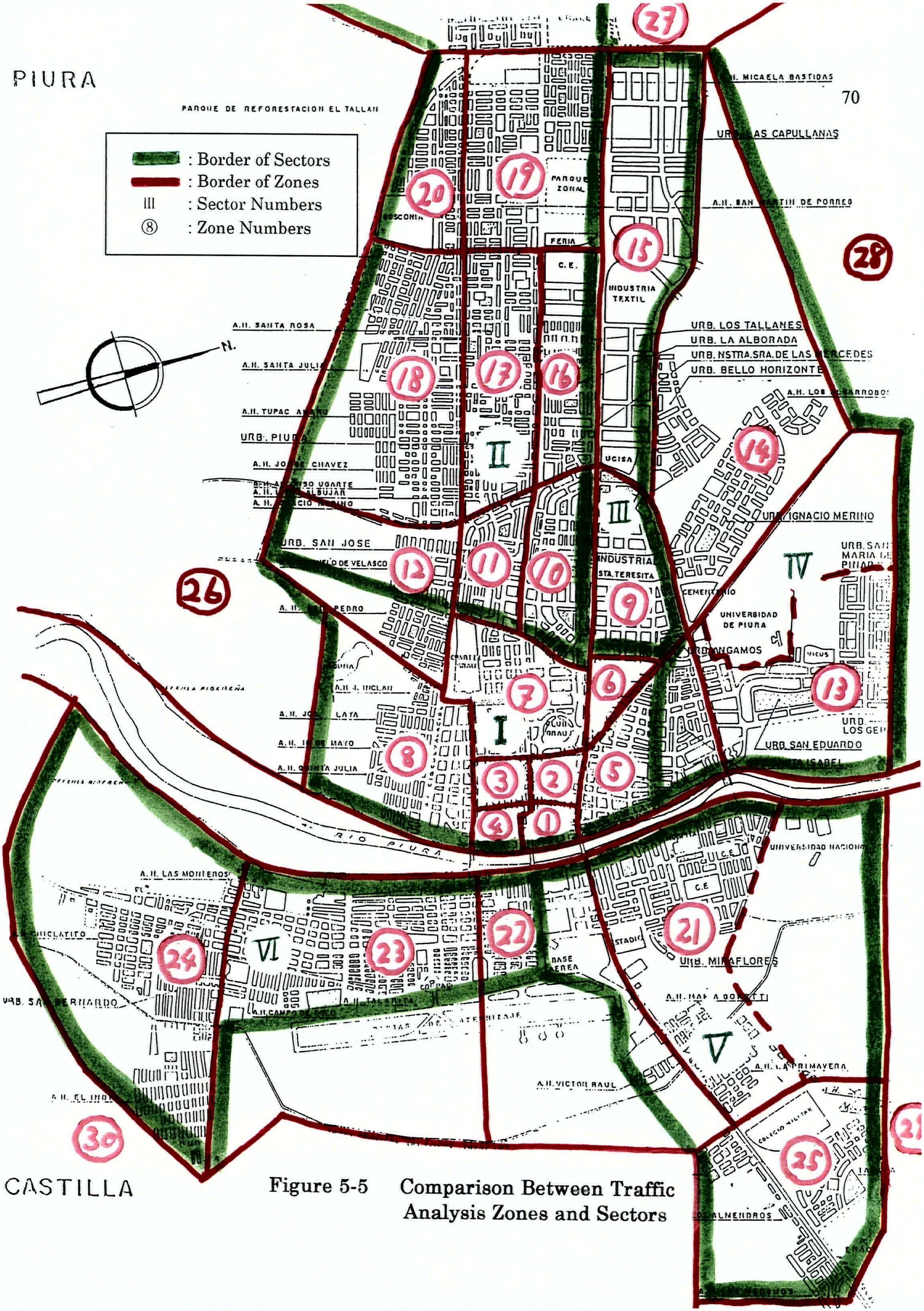


Figure 5-5 Comparison Between Traffic Analysis Zones and Sectors

"delivered to and collected from respondents" method. Questioning to the collector(s) by respondents was allowed during the collection periods, so the survey also had some characteristics of a household interview survey while the survey form was typical of a household self-completion survey. The deliverers and collectors of the survey forms were civil servants of the Transportation Section of the municipality. Approximately 20 households per traffic analysis zone were visited. According to the supervisor of the survey, the samples were randomly selected by the Transportation Sector. Unfortunately, there was no record of how the samples were randomly chosen. The author sensed during the data processing stage that the randomness had been of geographical locations. The collection rates were almost 100% because the collector(s) repeatedly visited the respondents' households until they received completed forms, although some incomplete forms were also accepted.

One important note, which should be mentioned, is that the way this survey been conducted was still at the level of a pilot survey. In fact, this survey was the first ever in the City. The sample size was decided with no specific analysis based on statistical characteristics of the traffic analysis zones. The questionnaire form also had some problems which may have caused some misunderstandings by some of respondents. While the survey had been conducted in March 1993, it had not been processed until January 1997 by the author.

The survey results were collected from approximately 20 households per a traffic analysis zone from all of the internal traffic analysis zones. There are 25 internal traffic analysis zones, but the survey data of only 24 of those 25 traffic analysis zones were available for this study. The missing data for zone 2 are substituted by the numbers estimated by taking averages of data of zone 1 and zone 3, both of which are geographically next to the zone 2, and have similar land-use characteristics as a part of the city central area. The total sample size collected was 481 households or 2,376 total family members including the estimated amount for zone 2. The 2,376 total family members account for 0.65 % of the total population of 366,206. The sample sizes collected for each zone are shown as item 1 of Table 5-1 and 5-6, and ratios to the total population are item 1 of Table 5-7.

5.4.2 Survey Form

The survey form consists of four parts: (1) domestic reports, (2) household data, (3) trip diary and (4) trip report to work. Further, the questions in these four parts can be classified into two categories: (a) household travel characteristics and (b) individual trip records. Generally speaking, the former is a set of questions asked to the representative(s) of each household, and the latter to the individuals who actually travel. The question of part (1) and (2) are characterized as the former, and the page (3) and (4) are as the latter. The detailed contents of the survey, which are translated in English from the original form in Spanish, are attached in Appendix D.

The first part, “domestic reports,” deals with the information of family members and of car ownership. The total number, age, gender and occupation of family members and the number of private cars at the households are asked in this section. The second part is “household data.” Household income and housing types are the important information from this section. Then, the third part is the “trip diary” which is used as the main data source of this study. The major questions are starting time and location of trips, ending time and location of trips, modes used and trip purposes. All the people aged above 5, which accounts for 2,105 of 2,376 or 88.6 % of total family members of the samples, were asked to report if they made trips. A successful collection rate for this part is approximately 83.7 % or 899 trip diary reports. A total of 1,074 out of 2,105 or 51.0 % of total family members whose age was over 5 (45.2 % of 2,376 total family members in all ages) answered “yes” when asked if they made trips. The last part of the questionnaire is “trip report to work.” The questions for this part are mostly stated preference questions with respect to commuting transportation methods, private cars or public transit, for working trips.

5.5 Reliability of Survey

5.5.1 Sample Size of Survey

In order to examine the reliability of the survey, the following two methods are used: (1) sample size recalculation based on income, and (2) comparison of income and age structures between the survey results and statistics given from "Plan Director de Piura y Castilla al año 2010" and "Estudio de Transporte de los Distritos de Piura y Castilla."

The first examination is the sample size recalculation based on one of the important socio-economic factors, income. As mentioned, the quality of data which truly represents the zone characteristics largely depends on the quality and quantity of samples chosen. The recalculation is done by traffic analysis zone and by following the guideline presented by A. Richardson et al. (1995). The summary of housing type is shown in Table 5-2, and the income structure is shown in Table 5-3. The result of the statistics including new sample sizes by recalculation is shown in Table 5-4.

Originally, the total sample size collected was 481 households or 2376 total family members, which accounts for 0.65 % of total population of 366,206. For each zone, an average of 19.2 households answered the survey. (The sample sizes for each zone are shown as total number of households in item 1 of Table 5-1 and 5-6. The exact numbers for the sample sizes for each traffic analysis zone vary from 12 to 23, and the ratio of sample size versus the estimated total household numbers varies from 0.20% to 9.16% depending on the estimated zone population. The average of those percentages is approximately 2.05% (shown as item 1 of Table 5-7).

For the recalculation, the data of household income is used. The total sample size for this characteristic is 465, which is slightly smaller than the original total of 481. This is because of the existence of non-responded questionnaires. The sample sizes of each traffic analysis zone for this characteristics are mostly similar to the original numbers (compare the numbers of item 2 of Table 5-4 with the ones of item 1 of Table 5-1).

As a result of the recalculation, the required number for the "total" sample size is 103 with the confidence limit of 5% (shown in Table 5-12 (c)). This number is far smaller than the number actually collected which was 465 households. This in turn means that the samples as a "whole" are good enough to represent the study area. For each traffic analysis zone, on the other hand, the collected sample sizes are mostly smaller than the recalculated ones. 21 of 25 traffic analysis zones require bigger sample sizes, see item 2 and 9 of Table 5-4. The most noticeable traffic analysis zones, of which recalculated sample sizes are far larger than the actually collected sample sizes, are traffic analysis zones of 1, 2, 3 and 4. These traffic analysis zones are located at the city center area where the variety types of land uses and accommodations are identified.

Then, in order to check the reliability of data for these traffic analysis zones, the sample size is again recalculated for these traffic analysis zones of 1 to 4 as a set. The required sample size by the recalculation for this area is 105, which is fairly close to the actual total sample size of 73. Because of this outcome, those traffic analysis zones are often dealt with as a set in the analysis.

Despite the treatment described above, the differences between the actual sample sizes and required sample sizes for each traffic analysis zone are still significant. Most traffic analysis zones require bigger sample sizes, and in some cases the numbers reach around 70. Since the sample size for the whole study area is good enough with the confidence limit of 5%, it can be said that the level of reliability in term of sample size as a total is good enough as an initial survey. However, it would be better if slightly larger sample sizes are used for some traffic analysis zones at the time of the next survey in order to increase the reliability.

5.5.2 Comparison of Income and Age Structures

The other examination of reliability is performed by a comparison of income and age structures between the survey results. The data for the comparison are given from "Plan Director de Piura y Castilla al año 2010" and "Estudio de Transporte de los Distritos de Piura y Castilla." Table 5-3 and 5-5 show the results of household income and age structure of the survey respectively, and Table 5-9 and 5-10 expand the results to the whole population. For this expansion, the multiplication factors defined as PPL1, shown as item 2 of Table 5-7, is used (the details of the multiplication factors are explained in the next section). Then, Table 5-11 and 5-12 compare the survey results of income and age structure with the statistics from the reference materials. Figure 5-6 and 5-7 also summarize the comparisons visually. The following section discusses the findings from this data. The Figures are used because of the ease of comprehension.

Figure 5-6 shows the differences in the household income structure between the survey data and the reference materials. Figure 5-6 (a) is simply the result of ordering the averages of each income categories from both sources on the X axis regardless of absolute scale. Figure 5-6 (b), on the other hand, is simply based on the absolute scale. The differences of the income structures between those two data are obvious from both Figures: the data from the survey has the higher and longer peak of the distribution. This fact is also supported by the higher average income of 741 new soles per month from the survey than the report data of 513 new soles per month. This outcome is likely the result of improper and/or insufficient sample selection: (1) people with higher income were likely preferred as samples or (2) people with higher income were accidentally picked as samples. The adult illiteracy rate of Peru (14.9% in 1990, UNESCO) might affect the sample selection.

Figure 5-7, on the other hand, shows the differences in age structures between the survey data and the report data. The most obvious difference is that the shape of the survey data is more right-sided with the peak at a higher age, compared with the report data. This is also supported by the difference in the average ages between them: the average age of the survey is 27.2 while the one of the report data is 22.8. This is also likely caused by improper and/or insufficient sampling. Households with fewer children seem to have been chosen more frequently for some reason.

These differences in income and age structures may be closely related. That is, households with higher income often have fewer children. This point of view can be supported by the changes in the population pyramid shape as the social-economic situation improves. Higher income households are often in physically better-equipped areas, the family members may have higher education, and the parents likely have a better idea of family planning. These households also likely have lower child mortality. When all of these things are considered, it can be said that higher income households tend to have less children. If so, the differences in Figures 5-6 and 5-7 are the outcome of selecting more higher income households as samples than their actual portion in the population.

5.5.3 Summary

By considering the proceeding outcomes, the following translations of the survey analysis are mentioned as notions of the travel behaviour analysis in this study:

(1) With the outcome of higher income structure, the result of the survey data analysis likely stresses the active travel behaviour by people with higher income: they often travel more and have more choices in selecting their travelling modes. Moreover, they may even afford their own private automobiles.

(2) With parents earning higher income, their children are more likely able to be involved in a better education environment. Those fortunate children are likely more active and make more trips by going to school regularly and attending more human activities such as shopping, commercial activities, going out with friends and school activities.

(3) From the shape of the higher age structure, the population of the working class is strengthened. This may estimate more working trips than the actual trip structure. Since working trips are the dominant trips in many cases, this point should always be kept in mind for the travel behaviour analysis.

(4) Another influence would be that the population of school age children is reduced. The total number of estimated trips may be smaller than the actual even though the children

who appeared in the survey may like be more active. This in turn means that the differences in behaviour between children at high and low income households are more pronounced. For example, those children whose parents earn higher income may use more luxury modes such as their parents cars rather than others from lower income households which more likely to use affordable shared public transportation modes or walk regularly.

(5) The higher income may be the results of the double income situation. If so, the average trips for households or by individuals likely increase. If this is the case, the number of estimated working trips is also increased. This may also produce an increase use of private or higher-cost public modes such as taxis and Mototaxis. Since most of the families do not have more than one car, the use of public transportation modes is likely strengthened. Moreover, with the perception of cheaper prices of shared taxis or Mototaxis, these working people will likely share rides if the their destinations are close, a situation that is likely because there are few major activity centres in the City.

In addition to the outcome above, the gender structure of the survey, 49.2% men and 50.8% women, is close to the statistics of 48.0% men and 52.0% women from the reports. This data is shown in Table 5-12 (d). While this fact shows the reliability of samples in total, it should be noted that the travel behaviour of men slightly strengthened.

5.6 Analysis on Household Travel Characteristics

5.6.1 Introduction

Three types of household travel characteristics data are discussed in this section. They are (a) household data, (b) data expansion factors, and (c) reliability of the data. The following three sections explain these data respectively. Their explanations are basically done by table-to-table comparison. The corresponding tables and figures are shown in Tables 5-1 to 5-6, Tables 5-7 to 5-8, and Tables 5-9 to 5-12 and Figures 5-6 to 5-7 respectively. Most of the data are summarized by traffic analysis zone. In addition, since the data used for reliability have been given in the previous section, these data are only briefly explained in this section. The most important part in this section is the data expansion factors since they are directly used in the next step; travel behaviour analysis.

5.6.2 Household Data

The household data are (1) demographic data of households such as age, gender and occupation of household members and (2) socio-economic data of households such as income. This data is obtained from pages 1 and 2 of the questionnaire. The data are traffic analysis zone oriented, and are summarized in Tables 5-1 to 5-6. This data is then expanded to represent the total trips of each traffic analysis zone.

The data summarized in Table 5-1 are (1) the number of households, (2) the number of persons interviewed (answered the survey), (3) gender structure, (4) age structure, (5) possession of driver's license and (6) the number of persons making trips. The numbers refer to the item numbers in Table 5-1. Among these items, item 6 becomes important because it is used in the data expansion: this item is the result of the question "if a person make trips." The findings from Table 5-1 are as follows:

(1) The number of total family members (family size) are somewhat smaller in the city centre area. In this area, the share of gender by men are higher and the estimated average ages are also higher. These outcomes indicate the tendency that (a) families with fewer children or single working class people are attracted to the city centre area.

(2) The possession of driver's license is still low with only 9.2 percent. This number shows the dependence of people on public transport. Moreover, by assuming the number represents the drivers who regularly use automobiles for their specific purposes, approximately one in eleven people use an automobile as their primary private mode. By considering this assumption, having a private car is a luxury.

(3) The possession of driver's licenses is higher in the city centre area (traffic analysis zones 1 to 4) and in the higher social class area (traffic analysis zones 7,10,13 and 16). Since the social class of the city centre is also high, people with high social status tend to obtain driver's licenses more, and this fact also supports the luxuriousness of having a private car.

(4) Total persons who make trips accounts for 46.3% of total family members. The number is higher in the city centre area and in traffic analysis zones 6, 8, 14, 15 and 24, most of which are the activity centres or close to them. The exception is zone 24 which is the south part of Castilla. The zones with smaller numbers, on the other hand, are zone 12, 18 and 20, all of which are located in the south to south west of Piura where the social classes are low.

Tables 5-2 to 5-5 summarize the original data of housing type structure, income structure, income statistics for sample size recalculation, and age structure respectively. Since Tables 5-3 to 5-5 have already been mentioned in the sample size recalculation section, their explanations are omitted here. From Table 5-2, 86% of the housing in the City are "one single family independent unit." Other kinds of housing types are often seen at the city centre area and industrial areas (traffic analysis zones 9 and 15).

Table 5-6 shows other household or demographic data. They are (3) average family size, (4) the number of family members who answered "trip diary" section of the survey, (5) the number of people who make trips, (6) total trips counted, (8) the number of hired housekeepers (servants), (9) total cars owned, (10) total cars leased or borrowed, and (11) total pick-ups or trucks owned (the numbers refer to the item numbers). This table also includes the estimated population, land sizes and density as items (12), (13) and (14) respectively. As mentioned previously, these numbers are calculated by the conversion from sectors to traffic analysis zones. The findings from this Table 5-6 are:

(1) As mentioned previously, total persons who make trips accounts for 46.3% of total family members. This number seems to be smaller than actual: usually people are involved in some kind of activities such as work, shopping or school, all of which require trips on most days in a week. In this study, however, this number is thought to represent the real situation.

(2) Average daily trips per person who make trips is 1.96. This number is questionable because travel outside the home usually requires at least two trips, going-to and coming-back. In fact, it was observed during data processing that coming-back trips were not on the trip diary section in several cases. The possible explanations are: (1) trips were actually one way trips. People stayed at the destination overnight as a guard or (2) the coming-back trips were simply not written down on the trip diary. Either way, the small number, which is close to two, shows the simple travel pattern by respondent, that is, most people make only going-to and coming-back trips.

In addition, items 1, 2, 4, 5 and 12 of Table 5-6 are used for the data expansion.

5.6.3 Data Expansion and Multiplication factors

The collected data had to be expanded to represent the total data in each traffic analysis zone. For this estimation, population expansion factors are usually applied. In this study, they are called "multiplication factors" (or M-factors). Four types of M-factors are considered in this study. They are PPL1, PPL2, PPL3, and FS, all of which are population based. These M-factors are primarily used for expanding trip data, and the results are used for travel behaviour analysis in the next chapter.

Table 5-7 summarizes the four types of multiplication factors and the estimated total trips for each traffic analysis zone calculated by the factors. As seen in Table 5-7, M-factors are zone-specific. This is mainly caused by the differences in the share of sample sizes to the total population in the traffic analysis zones: the percentages of samples to the total vary from

0.2% to 9.2% (see item 1). The following are the definitions of the four M-factors, PPL1, PPL2, PPL3, and FS, and formulations of the trip estimation by them.

PPL1 is simply based on a relationship between the number of household members and the estimated population in the traffic analysis zones. This is calculated by:

$$(PPL1)_z = P_z / P_c \tag{5.1}$$

where P_z = Estimated total population of a zone

P_c = The total number of family members in the survey

then, total trips are derived by:

$$T_z = (PPL1)_z \times T_c = (P_z / P_c) \times T_c \tag{5.2}$$

where T_z = Estimated total trips for a zone

T_c = The total number of trips counted

PPL2 is based on a relationship between the number of people interviewed directly and the estimated population in the traffic analysis zones. Since not many people were available at the time of survey, this M-factor tended to be large. That is, this M-factor would likely cause over estimation of total trips. The calculation is done by:

$$(PPL2)_z = P_z / P_s \tag{5.3}$$

where P_z = Estimated total population of a zone

P_s = The total number of people surveyed directly

then, total trips are derived by:

$$T_z = (PPL2)_z \times T_c = (P_z / P_s) \times T_c \tag{5.4}$$

where T_z = Estimated total trips for a zone

T_c = The total number of trips counted

PPL3 is based on a relationship between the number of household members and the estimated population in the traffic analysis zones, and the relationship between the number of people who make trips and the people interviewed for the survey. This is calculated by:

$$(PPL3)_z = (P_z / P_c) \times \{ (I_{nst} + I_{st}) / I_{st} \} \quad (5.5)$$

where P_z = Estimated total population of a zone

P_c = The total number of people counted in a survey

I_{nst} = The total number of people who make trips, but did not answer for trip diary

I_{st} = The total number of people who make trips and answered for trip diary

then, total trips are derived by:

$$T_z = (PPL3)_z \times T_c = (P_z / P_c) \times \{ (I_{nst} + I_{st}) / I_{st} \} \times T_c \quad (5.6)$$

where T_z = Estimated total trips for a zone

T_c = The total number of trips counted

FS is simply based on the estimated household size. It was fixed at 5.5, which is the average size of a household given in the material prepared by the City. This M-factor is calculated by:

$$(FS)_z = P_z / (H_s \times \text{Ave.}) \quad (5.7)$$

where P_z = Estimated total population of a zone

H_s = The total number of households surveyed

Ave. = Average household size defined by the City (=5.5)

then, total trips are derived by:

$$T_z = (FS)_z \times T_c = \{P_z / (H_s \times \text{Ave.})\} \times T_c \quad (5.8)$$

where T_z = Estimated total trips for a zone

T_c = The total number of trips counted

Among these M-factors, PPL3 is thought to be the most reliable multiplication factor (M-factor). The expansion results of estimated total trips by PPL1, PPL2, PPL3 and FS are 310,441, 793,753, 363,166 and 291,589. With the base population of 366,206, the share of the trip making population of 46.3% in the original data, and average trips per person of 1.96 from the original, all of PPL1, PPL3 or FS are acceptable. The decision was made by considering the definitions and its appropriateness through the data processing process. The detailed comparisons of the expanded data are in the next chapter.

5.6.4 Reliability of the Data.

Reliability of the data has already been examined. The appropriate Tables and Figures are Tables 5-4 and 5-9 to 5-12, Figure 5-6 and Figure 5-7. Here, only brief supplementary explanations are given.

Table 5-4 gives income statistics, which are used for sample size recalculation. Items 8 or 9 are the recalculated sample sizes for each traffic analysis zone. The detailed calculation formulas for the statistics are attached in Appendix E.

Tables 5-9 and 5-10 are the result of data expansion of income and age structures respectively. The M-factor of PPL1 is used for this expansion.

Then, Tables 5-11 and 5-12 compare data from the survey, both the original and expanded data, with the data from other studies. Figures 5-6 and 5-7, then, graphically display the results. Table 5-11 and Figure 5-6 show income structure, and Table 5-12 and Figure 5-7 show age structure.

For income structure, Tables 5-11 (a), (b) and (c) show data from the survey, data from other studies, and statistics from sample size recalculation respectively. Since the income categories are quite different, two Figures are given, (a) by simply ordering categories, and

(b) by an absolute scale. As mentioned in the previous analysis, the differences between two data are easily observed.

For age structure, Tables 5-12 (a), (b) and (c) show data from the survey, converted survey data based on similar age categories used in other studies, and data from the studies respectively. Unlike the income structure, the category conversion is possible for the age structure. Figure 5-7 shows the differences of the structure between the survey data and the data of other studies graphically. The differences for these data are easily observed as well.

In addition to the age structure data, gender structure data are attached at the bottom of Table 5-12. They have also been mentioned previously.

5.7 Conclusion

The framework of the household survey, the primary information source of this study, is explained in this chapter. A traffic analysis zone system, based on which the survey is conducted, is introduced to perform the travel characteristics analysis.

The reliability of survey is examined. The reliability of the survey is thought to be acceptable for this travel characteristics analysis study, particularly as the first ever survey in the city. The important notions to conduct analysis are presented.

The household travel characteristics are also analyzed in this chapter. The results are used as the foundation of individual travel characteristics analysis in the next chapter.

Table 5-1 Summary of Demographic Data (1)

Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	Ave.
1 Total # of household asked	20	19	17	20	20	20	20	20	20	20	23	20	13	21	12	20	19	20	17	20	20	20	21	20	19	-	-	-	-	-	481	-
2 Total # of persons interviewed	39	32	24	1	21	0	0	25	0	0	20	0	0	29	17	2	22	24	0	0	34	12	19	34	0	-	-	-	-	-	355	-
3 Total # of family members in households	57	68	78	105	82	117	110	105	80	105	108	109	66	122	25	124	122	117	89	90	111	97	102	77	110	-	-	-	-	-	2376	95.0
men	25	32	38	37	26	56	45	44	37	47	41	51	14	51	16	53	58	55	31	34	55	38	39	43	36	-	-	-	-	-	1002	-
women	14	23	32	50	34	43	56	46	31	49	64	54	23	53	5	58	46	58	26	42	56	51	54	25	41	-	-	-	-	-	1034	-
unknown (mostly "baby (<5)")	6	7	8	18	22	18	9	15	12	9	3	4	2	18	3	13	18	4	32	14	0	5	9	9	33	-	-	-	-	-	291	-
others (mostly "not available")	12	6	0	0	0	0	0	0	0	0	0	0	27	0	1	0	0	0	0	0	0	3	0	0	0	-	-	-	-	-	49	-
men / women	1.79	1.49	1.19	0.74	0.76	1.3	0.8	0.96	1.19	0.96	0.64	0.94	0.61	0.96	3.2	0.91	1.26	0.95	1.19	0.81	0.98	0.75	0.72	1.72	0.88	-	-	-	-	-	-	1.09
% of men (among known)	64.1	59.2	54.3	42.5	43.3	56.6	44.6	48.9	54.4	49.0	39.0	48.6	37.8	49.0	76.2	47.7	55.8	48.7	54.4	44.7	49.5	42.7	41.9	63.2	46.8	-	-	-	-	-	-	49.2%
4 Age Structure (estimated median)																																(%)
0 ~ 5 (3)	2	5	7	13	13	18	6	13	11	8	3	20	4	17	1	13	17	7	25	13	3	10	9	9	24	-	-	-	-	-	271	11.4
6 ~ 10 (8)	2	4	6	6	0	5	8	14	3	5	14	19	5	14	1	16	8	14	3	16	4	6	8	0	11	-	-	-	-	-	192	8.1
11 ~ 15 (13)	1	2	3	11	1	8	8	9	9	3	11	13	6	14	0	7	6	16	5	8	8	14	10	2	9	-	-	-	-	-	184	7.7
16 ~ 20 (18)	2	6	10	9	5	13	14	13	2	14	17	7	8	20	4	3	4	23	8	7	26	16	10	13	2	-	-	-	-	-	256	10.8
21 ~ 25 (23)	11	11	11	10	10	15	15	16	7	27	5	13	13	16	5	20	20	10	18	10	21	12	12	15	7	-	-	-	-	-	330	13.9
26 ~ 35 (30)	4	11	17	13	8	16	12	13	18	15	19	16	10	8	2	37	31	14	11	18	11	10	14	17	17	-	-	-	-	-	362	15.2
36 ~ 45 (40)	4	6	7	11	6	26	13	11	10	7	19	10	5	18	6	6	9	13	3	8	15	18	16	5	22	-	-	-	-	-	274	11.5
46 ~ 55 (50)	3	7	10	15	9	9	8	11	8	16	5	7	11	11	3	9	12	11	15	7	21	3	10	11	4	-	-	-	-	-	236	9.9
56 ~ 65 (60)	3	3	2	5	8	0	2	4	5	9	8	3	2	3	0	9	13	7	1	1	0	0	4	5	5	-	-	-	-	-	102	4.3
66 ~ (70)	1	3	4	12	7	6	10	1	6	1	7	1	1	0	0	4	2	1	0	1	1	0	9	0	2	-	-	-	-	-	80	3.3
unknown ("mostly not available")	24	13	1	0	15	1	14	0	1	0	0	0	1	1	3	0	0	1	0	1	1	8	0	0	7	-	-	-	-	-	92	3.9
Estimated Average Age	30.4	29.4	29	31.8	33.9	27.3	30	24.4	30.8	29.7	30	21	27.9	22.8	29.5	27.4	29	25.6	22.3	22.1	28.6	22.4	30.5	28.5	24.3	-	-	-	-	-	-	27.21
5 Possession of driver's license																																(%)
Yes	15	14	12	5	3	2	27	4	2	15	8	7	24	9	3	19	13	2	7	1	13	6	2	2	1	-	-	-	-	-	216	9.1
No	24	45	65	73	62	114	62	94	77	90	46	102	37	112	19	105	109	115	82	88	98	91	100	75	102	-	-	-	-	-	1987	83.6
unknown (mostly "No")	6	4	1	27	17	1	21	7	1	0	54	0	3	1	2	0	0	0	0	1	0	0	0	0	7	-	-	-	-	-	153	6.4
others (mostly "not available")	12	6	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	21	0.9
% of "Yes" (excluding others)	33.3	22.0	15.4	4.8	3.7	1.7	24.5	3.8	2.5	14.3	7.4	6.4	37.5	7.4	12.5	15.3	10.7	1.7	7.9	1.1	11.7	6.2	2.0	2.6	0.9	-	-	-	-	-	-	9.2%
6 Total # of persons making trips																																(%)
Yes	37	47	57	9	25	70	39	70	35	54	54	31	28	95	15	50	39	22	49	18	58	43	32	52	45	-	-	-	-	-	1074	45.2
No	8	15	21	96	43	45	71	32	45	51	54	78	33	27	9	74	81	93	40	72	52	49	70	24	62	-	-	-	-	-	1245	52.4
unknown ("no lo se":mostly "No")	0	0	0	0	6	0	0	0	0	0	0	0	3	0	0	0	1	0	0	0	0	2	0	0	3	-	-	-	-	-	15	0.6
others (mostly "not available")	12	6	0	0	8	2	0	3	0	0	0	0	2	0	1	0	1	2	0	0	1	3	0	1	0	-	-	-	-	-	42	1.8
% of "Yes" (among known)	82.2	76.4	73.1	8.57	36.8	60.9	35.5	68.6	43.8	51.4	50	28.4	45.9	77.9	62.5	40.3	32.5	19.1	55.1	20	52.7	46.7	31.4	68.4	42.1	-	-	-	-	-	-	46.3

Note : The data for Zone 2 ware given by taking averages of data of zone 1 and 3.

Table 5-2 Housing Type

Zone #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	(%)
1. Single Family Independent Unit	2	8	14	20	17	19	13	20	12	20	21	20	10	21	7	19	15	20	17	20	20	16	21	16	14	-	-	-	-	-	402	86.0
2. Single Family Attached Unit	0	0	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	2	0	0	4	-	-	-	-	-	10	2.1
3. Multi Family Apartment	0	0	0	0	0	0	4	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	-	-	-	-	-	7	1.5
4. Apt. in Residential Building	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	6	1.3
5. Senior House	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	-	-	-	-	-	4	0.7
6. Company House	12	7	2	0	2	1	2	0	7	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	1	-	-	-	-	-	39	8.3
Total	18	18	17	20	19	20	20	20	19	20	23	20	13	21	12	19	16	20	17	20	20	20	21	16	19	-	-	-	-	-	468	100

Note : The data for Zone 2 were given by taking averages of data of zone 1 and 3.

Table 5-3 Income Structure

monthly income	(median)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	(%)
1. ~ S/. 132	100	0	1	1	0	3	0	0	0	0	0	1	3	0	1	1	0	0	5	1	6	0	0	0	1	0	-	-	-	-	-	24	5.2
2. S/. 132 ~ S/. 300	220	10	8	5	4	8	12	2	6	1	0	6	11	0	5	10	0	1	10	11	8	0	7	4	5	0	-	-	-	-	-	134	28.8
3. S/. 300 ~ S/. 600	450	1	4	7	2	6	4	4	10	9	2	11	6	0	3	1	4	4	4	3	4	0	0	16	10	3	-	-	-	-	-	118	25.4
4. S/. 600 ~ S/.1200	900	3	2	1	9	2	3	7	2	7	8	5	0	6	9	0	8	8	1	2	1	5	11	1	0	14	-	-	-	-	-	115	24.7
5. S/.1200 ~ S/.2400	1800	3	3	3	3	0	0	5	2	1	9	0	0	4	3	0	5	6	0	0	0	15	1	0	0	1	-	-	-	-	-	64	13.8
6. S/.2400 ~ S/.4000	3200	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	-	-	-	-	-	5	1.1
7. S/.4000 ~	5000	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	-	-	-	-	-	5	1.1
Total # Q answered		18	18	17	20	19	19	19	20	18	20	23	20	12	21	12	19	19	20	17	19	20	19	21	16	19	-	-	-	-	-	465	100.0
Est. Average income (S/.)																																Ave.	
(by Sum(median*#Q)/total #Q)		875	751	626	1174	345	376	1092	561	687	1375	473	271	1883	764	229	1379	1054	270	334	266	1575	697	428	356	997	-	-	-	-	-	741	

Note : The data for Zone 2 were given by taking averages of data of zone 1 and 3.

Table 5-4 Income Statistics

Zone #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1. Estimated Population	1146	1591	1591	1146	11317	1334	5340	19412	2415	10490	6995	12017	30687	19243	500	10490	15736	27015	31090	13508	22205	8327	26624	37706	17691	-	-	-	31090	-	366206
2. # of household asked	18	18	17	20	19	19	19	20	18	20	23	20	12	21	12	19	19	20	17	19	20	19	21	16	19	-	-	-	-	-	465
3. Average	875	603	626	1174	345	376	1092	561	687	1375	473	271	1883	764	229	1379	1054	270	334	266	1575	697	428	356	997	-	-	-	-	-	741
4. Variance	######	352647	345474	######	54849	63204	576525	216894	134115	445921	65484	16241	######	280136	6027	######	315758	36632	54924	39980	159868	181256	20179	16425	362632	-	-	-	-	-	542753
5. Sta. Dev.	1190	594	588	1154	234	251	759	466	366	668	256	127	1515	529	78	1121	562	191	234	200	400	426	142	128	602	-	-	-	-	-	737
6. Confident limit (5%)	44	30	31	59	17	19	55	28	34	69	24	14	94	38	11	69	53	14	17	13	79	35	21	18	50	-	-	-	-	-	37
7. Sta.error (95%)	86	59	61	115	34	37	107	55	67	135	46	27	185	75	22	135	103	26	33	26	154	68	42	35	98	-	-	-	-	-	73
8. Sample Size (infinite pop.)	192	101	92	101	48	47	50	72	30	25	31	23	67	50	12	69	30	52	51	59	7	39	11	13	38	-	-	-	-	-	103
9. Sample Size (finite pop.)	165	95	87	92	48	45	50	71	29	25	30	23	67	50	12	68	30	52	51	58	7	39	11	13	38	-	-	-	-	-	103

Note : The data for Zone 2 were given by taking averages of data of zone 1 and 3.

Table 5-5 Age Structure

Age	(median)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	(%)
0 ~ 5	(3)	2	5	7	13	13	18	6	13	11	8	3	20	4	17	1	13	17	7	25	13	3	10	9	9	24	-	-	-	-	-	271	11.4
6 ~ 10	(8)	2	4	6	6	0	5	8	14	3	5	14	19	5	14	1	16	8	14	3	16	4	6	8	0	11	-	-	-	-	-	192	8.1
11 ~ 15	(13)	1	2	3	11	1	8	8	9	9	3	11	13	6	14	0	7	6	16	5	8	8	14	10	2	9	-	-	-	-	-	184	7.7
16 ~ 20	(18)	2	6	10	9	5	13	14	13	2	14	17	7	8	20	4	3	4	23	8	7	26	16	10	13	2	-	-	-	-	-	256	10.8
21 ~ 25	(23)	11	11	11	10	10	15	15	16	7	27	5	13	13	16	5	20	20	10	18	10	21	12	12	15	7	-	-	-	-	-	330	13.9
26 ~ 35	(30)	4	11	17	13	8	16	12	13	18	15	19	16	10	8	2	37	31	14	11	18	11	10	14	17	17	-	-	-	-	-	362	15.2
36 ~ 45	(40)	4	6	7	11	6	26	13	11	10	7	19	10	5	18	6	6	9	13	3	8	15	18	16	5	22	-	-	-	-	-	274	11.5
46 ~ 55	(50)	3	7	10	15	9	9	8	11	8	16	5	7	11	11	3	9	12	11	15	7	21	3	10	11	4	-	-	-	-	-	236	9.9
56 ~ 65	(60)	3	3	2	5	8	0	2	4	5	9	8	3	2	3	0	9	13	7	1	1	0	0	4	5	5	-	-	-	-	-	102	4.3
66 ~	(70)	1	3	4	12	7	6	10	1	6	1	7	1	1	0	0	4	2	1	0	1	1	0	9	0	2	-	-	-	-	-	80	3.3
unknown (mostly not available)		24	13	1	0	15	1	14	0	1	0	0	0	1	1	3	0	0	1	0	1	1	8	0	0	7	-	-	-	-	-	92	3.9
Total		57	68	78	105	82	117	110	105	80	105	108	109	66	122	25	124	122	117	89	90	111	97	102	77	110	-	-	-	-	-	2376	100.0
Estimated Average Age		30.4	29.4	29.0	31.8	33.9	27.3	30.0	24.4	30.8	29.7	30.0	21.0	27.9	22.8	29.5	27.4	29.0	25.6	22.3	22.1	28.6	22.4	30.5	28.5	24.3	-	-	-	-	-	Ave.	27.2

Note : The data for Zone 2 were given by taking averages of data of zone 1 and 3.

Table 5-6 Summary of Demographic Data (2)

Zone #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	Ave.
1 Total # : households asked	20	19	17	20	20	20	20	20	20	20	23	20	13	21	12	20	19	20	17	20	20	20	21	20	19	-	-	-	-	-	480.5	19.2
2 Total # : family members in household	57	68	78	105	82	117	110	105	80	105	108	109	66	122	25	124	122	117	89	90	111	97	102	77	110	-	-	-	-	-	2375.5	95.0
3 Average # : family members / household	2.9	3.6	4.6	5.3	4.1	5.9	5.5	5.3	4.0	5.3	4.7	5.5	5.1	5.8	2.1	6.2	6.4	5.9	5.2	4.5	5.6	4.9	4.9	3.9	5.8	-	-	-	-	-	-	4.9
4 Total # : people answered (trips)	42	29	23	19	22	53	44	33	33	52	40	29	57	36	14	36	35	26	44	13	67	55	32	25	40	-	-	-	-	-	899	-
5 Total # : people who make trips	37	47	57	9	25	70	39	70	35	54	54	31	28	95	15	50	39	22	49	18	58	43	32	52	45	-	-	-	-	-	1074	-
6 Total # : Trips	73	60	49	50	56	120	133	91	72	148	97	72	123	89	18	104	83	58	97	28	118	104	84	54	120	-	-	-	-	-	2101	-
7 Total # : babies (age<5)	2	5	8	13	12	17	6	13	11	8	5	20	5	17	2	13	18	12	25	13	3	10	9	9	24	-	-	-	-	-	280	11.2
8 Total # : servant (hired housekeeper)	4	4	3	1	3	4	12	0	2	5	2	0	11	4	0	5	4	2	1	2	3	2	0	1	19	-	-	-	-	-	94	3.7
9 Total # : cars owned	7	5	3	5	0	2	14	0	2	7	1	0	9	3	0	9	0	2	0	1	14	3	0	0	1	-	-	-	-	-	88	3.5
10 Total # : cars leased or borrowed	5	3	0	0	0	0	0	0	1	1	0	1	2	1	2	0	1	1	0	0	0	0	0	0	0	-	-	-	-	-	18	0.7
11 Total # : pick-ups and trucks owned	0	0	0	0	0	0	1	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	8	0.3
12 Estimated Population (Est. Pop.)	1146	1591	1591	1146	11317	1334	5340	19412	2415	10490	6995	12017	30687	19243	0	10490	15736	27015	31090	13508	22205	8327	26624	37706	17691	-	-	-	31090	-	366206	-
13 Estimated Land Size (ha)	11	18	18	11	99	30	86	140	75	76	51	72	376	311	82	76	115	159	160	80	276	74	170	164	131	-	-	-	160	-	3021	-
14 Estimated Density (ppl./ha:(12)/(13))	104	88	88	104	114	44	62	139	32	138	137	167	82	62	0	138	137	170	194	169	80	113	157	230	135	-	-	-	194	-	121	-

Table 5-7 Estimated Number of Trips by Zone Number

Zone #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	Ave.
1 Family members/Est.Pop.(%) [(2)/(12)]	5.0	4.2	4.9	9.2	0.7	8.8	2.1	0.5	3.3	1.0	1.5	0.9	0.2	0.6	-	1.2	0.8	0.4	0.3	0.7	0.5	1.2	0.4	0.2	0.6	-	-	-	-	-	0.6487	2.0503
2 Pop.-based 1 (PPL1) : [(12)/(2)]	20	24	20	11	138	11	49	185	30	100	65	110	465	158	1	85	129	231	349	150	200	86	261	490	161	-	-	-	-	-	-	154
3 Est. # Trips (average household size-based)	1468	1414	999	546	7729	1368	6457	16824	2174	14786	6283	7938	57189	14038	18	8798	10706	13392	33885	4202	23605	8928	21926	26443	19299	-	-	-	-	-	310414	-
4 Pop.-based 2 (PPL2) : [(12)/(4)]	27	55	69	60	514	25	121	588	73	202	175	414	538	535	1	291	450	1039	707	1039	331	151	832	1508	442	-	-	-	-	-	-	407
5 Est. # Trips (# of people answered-based)	1992	3292	3390	3016	28807	3020	16141	53530	5269	29856	16963	29835	66219	47573	18	30304	37317	60264	68539	29094	39107	15746	69888	81445	53073	-	-	-	-	-	793699	-
6 Pop.-based 3 (PPL3) : [(12*5)/(2*4)]	18	38	51	5	157	15	43	392	32	104	87	118	228	416	1	117	144	195	389	208	173	67	261	1019	181	-	-	-	-	-	-	184
7 Est. # Trips (# of people making trips-based)	1293	2292	2477	258	8783	1807	5723	35687	2305	15355	8481	8485	28093	37045	18	12220	11929	11332	37735	5819	20434	6980	21926	55002	21712	-	-	-	-	-	363190	-
8 Family size-based (FS) : [(12)/(5.5*(1))]	10	16	17	10	103	12	49	176	22	95	55	109	429	167	1	95	151	246	333	123	202	76	231	343	169	-	-	-	-	-	-	139
9 Est. # Trips (5.5 : est. ave. household size by City)	761	938	834	521	5761	1455	6457	16059	1581	14114	5364	7866	52790	14828	18	9918	12498	14244	32254	3438	23820	7873	19363	18510	20315	-	-	-	-	-	291579	-

Table 5-8 Summary of Demographic Data for Simulations

Zone #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	Ave.
1 Estimated Population	1146	1591	1591	1146	11317	1334	5340	19412	2415	10490	6995	12017	30687	19243	0	10490	15736	27015	31090	13508	22205	8327	26624	37706	17691	-	-	-	31090	-	366206	-
2 Est. Land Size (: standard) (ha)	11.1	18.3	18.3	11.1	98.0	31.6	85.5	140.4	75.3	76.3	50.9	72.1	376.5	311.0	82.0	76.3	114.5	159.4	159.8	79.7	275.3	74.4	170.0	164.0	131.3	-	-	-	159.8	-	3023	-
3 Est. Land Size (: net) (ha)	6.5	9.4	9.4	6.5	49.3	14.4	35.5	78.5	43.9	41.3	27.5	41.5	118.5	89.4	44.4	41.3	61.9	90.3	65.0	45.1	83.0	29.1	93.6	90.9	64.0	-	-	-	65.0	-	1345	-
4 Est. Land Size (: converted) (ha)	9.0	13.1	13.1	9.0	68.7	20.1	49.5	109.5	61.2	57.6	38.4	57.8	165.3	124.7	61.9	57.6	86.4	125.9	90.7	63.0	115.8	40.6	130.6	126.8	89.3	-	-	-	90.7	-	1876	-
5 Est. Density (: standard) (ha)	103	87	87	103	115	42	62	138	32	137	137	167	82	62	0	137	137	169	195	169	81	112	157	230	135	-	-	-	195	-	-	121
6 Est. Density (: net) (ha)	178	169	169	178	230	93	150	247	55	254	254	290	259	215	0	254	254	299	478	299	268	286	284	415	276	-	-	-	478	-	-	272
7 Est. Density (: converted) (ha)	127	121	121	127	165	66	108	177	39	182	182	208	186	154	0	182	182	215	343	215	192	205	204	297	198	-	-	-	343	-	-	195
8 Est. Average income (S/.)	875	751	626	1174	345	376	1092	561	687	1375	473	271	1883	764	229	1379	1054	270	334	266	1575	697	428	356	997	-	-	-	-	-	-	754
9 Total # of households answered	18	18	17	20	19	20	20	20	19	20	23	20	13	21	12	19	16	20	17	20	20	20	21	16	19	-	-	-	-	-	468	(%)
10 # of Single family unit	2	8	14	20	17	19	14	20	12	20	21	20	13	21	7	19	15	20	17	20	20	18	21	16	18	-	-	-	-	-	412	88.1
11 # of Multiple family units (inc. dorms)	16	10	3	0	2	1	6	0	7	0	2	0	0	0	5	0	1	0	0	0	0	2	0	0	1	-	-	-	-	-	56	11.9
12 Est. # of Total family unit	402	436	347	218	2760	228	971	3698	604	1998	1490	2205	6044	3312	0	1692	2451	4618	5939	3002	4001	1717	5481	9794	3056	-	-	-	-	-	66463	(%)
13 Est. # of Single family unit	45	199	286	218	2470	217	680	3698	381	1998	1360	2205	6044	3312	0	1692	2298	4618	5939	3002	4001	1545	5481	9794	2895	-	-	-	-	-	64376	96.9
14 Est. # of Multiple family units	357	237	61	0	291	11	291	0	222	0	130	0	0	0	0	0	153	0	0	0	0	172	0	0	161	-	-	-	-	-	2086	3.1
15 Total # of cars owned (original data)	7	5	3	5	0	2	14	0	2	7	1	0	9	3	0	9	0	2	0	1	14	3	0	0	1	-	-	-	-	-	88	-
16 Est. Total # of cars owned (*PPL1)	141	118	61	55	0	23	680	0	60	699	65	0	4185	473	0	761	0	462	0	150	2801	258	0	0	161	-	-	-	-	-	11151	-

Note : The data for Zone 2 were given by taking averages of data of zone 1 and 3.

Table 5-9 Income Structure (Expanded)

monthly income	(median)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	(%)
1. ~ S/. 132	100	0	24	20	0	414	0	0	0	0	0	65	331	0	158	1	0	0	1154	349	901	0	0	0	490	0	-	-	-	-	-	3906	6.2
2. S/. 132 ~ S/. 300	220	201	189	102	44	1104	137	97	1109	30	0	389	1213	0	789	10	0	129	2309	3843	1201	0	601	1044	2448	0	-	-	-	-	-	16987	26.8
3. S/. 300 ~ S/. 600	450	20	94	143	22	828	46	194	1849	272	200	712	661	0	473	1	338	516	924	1048	600	0	0	4176	4897	482	-	-	-	-	-	18497	29.2
4. S/. 600 ~ S/.1200	900	60	47	20	98	276	34	340	370	211	799	324	0	2790	1420	0	677	1032	231	699	150	1000	944	261	0	2252	-	-	-	-	-	14035	22.1
5. S/.1200 ~ S/.2400	1800	60	71	61	33	0	0	243	370	30	899	0	0	1860	473	0	423	774	0	0	0	3001	86	0	0	161	-	-	-	-	-	8544	13.5
6. S/.2400 ~ S/.4000	3200	0	0	0	11	0	0	49	0	0	100	0	0	0	0	0	85	0	0	0	0	0	0	0	0	161	-	-	-	-	-	405	0.6
7. S/.4000 ~	5000	20	0	0	11	0	0	0	0	0	0	0	0	930	0	0	85	0	0	0	0	0	0	0	0	0	-	-	-	-	-	1046	1.6
Est. Number of Household		362	424	347	218	2622	217	922	3698	543	1998	1490	2205	5579	3312	12	1607	2451	4618	5939	2852	4001	1631	5481	7835	3056	-	-	-	-	-	63420	100.0
Est. Average income (S/.) (by Sum(median*#Q)/total #Q)		875	751	626	1174	345	376	1092	561	687	1375	473	271	1883	764	229	1379	1054	270	334	266	1575	697	428	356	997	-	-	-	-	-	Ave. 741	

Note : The data for Zone 2 were given by taking averages of data of zone 1 and 3.

Table 5-10 Age Structure (Expanded)

Age	(median)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	(%)
0 ~ 5	(3)	40	106	143	142	1794	205	291	2403	332	799	194	2205	1860	2681	1	1100	2193	1616	8733	1951	600	858	2349	4407	3860	-	-	-	-	-	40866	12.2
6 ~ 10	(8)	40	94	122	65	0	57	388	2588	91	500	907	2095	2325	2208	1	1354	1032	3233	1048	2401	800	515	2088	0	1769	-	-	-	-	-	25721	7.7
11 ~ 15	(13)	20	47	61	120	138	91	388	1664	272	300	712	1433	2790	2208	0	592	774	3694	1747	1201	1600	1202	2610	979	1447	-	-	-	-	-	26092	7.8
16 ~ 20	(18)	40	141	204	98	690	148	680	2403	60	1399	1101	772	3720	3155	4	254	516	5311	2795	1051	5201	1374	2610	6366	322	-	-	-	-	-	40413	12.1
21 ~ 25	(23)	221	259	224	109	1380	171	728	2958	211	2697	324	1433	6044	2524	5	1692	2580	2309	6288	1501	4201	1030	3132	7345	1126	-	-	-	-	-	50494	15.1
26 ~ 35	(30)	80	247	347	142	1104	182	583	2403	543	1499	1231	1764	4650	1262	2	3130	3998	3233	3843	2702	2200	858	3654	8325	2734	-	-	-	-	-	50716	15.1
36 ~ 45	(40)	80	130	143	120	828	296	631	2034	302	699	1231	1102	2325	2839	6	508	1161	3002	1048	1201	3001	1545	4176	2448	3538	-	-	-	-	-	34394	10.3
46 ~ 55	(50)	60	153	204	164	1242	103	388	2034	242	1598	324	772	5115	1735	3	761	1548	2540	5240	1051	4201	258	2610	5387	643	-	-	-	-	-	38374	11.5
56 ~ 65	(60)	60	59	41	55	1104	0	97	740	151	899	518	331	930	473	0	761	1677	1616	349	150	0	0	1044	2448	804	-	-	-	-	-	14308	4.3
66 ~	(70)	20	59	82	131	966	68	485	185	181	100	453	110	465	0	0	338	258	231	0	150	200	0	2349	0	322	-	-	-	-	-	7154	2.1
unknown (mostly not available)		483	295	20	0	2070	11	680	0	30	0	0	0	465	158	3	0	0	231	0	150	200	687	0	0	1126	-	-	-	-	-	6608	2.0
Total		1146	1591	1591	1146	11317	1334	5340	19412	2415	10490	6995	12017	30687	19243	25	10490	15736	27015	31090	13508	22205	8327	26624	37706	17691	-	-	-	-	-	335141	100.0
Estimated Average Age		30.4	29.4	29.0	31.8	33.9	27.3	30.0	24.4	30.8	29.7	30.0	21.0	27.9	22.8	29.5	27.4	29.0	25.6	22.3	22.1	28.6	22.4	30.5	28.5	24.3	-	-	-	-	-	Ave.	26.6

Note : The data for Zone 2 were given by taking averages of data of zone 1 and 3.

Age	(median)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	Ave.
PPL1		20	24	20	11	138	11	49	185	30	100	65	110	465	158	1	85	129	231	349	150	200	86	261	490	161	-	-	-	-	-	-	154

Table 5-11 Comparison of Income Structure

(a) Data from Survey

Monthly Income per Household (S/.)	(median)	Row Total	Row (%)	Expanded Total	Expanded (%)
1. ~ S/. 132	(100)	24	5.2	3906	6.2
2. S/. 132 ~ S/. 300	(220)	134	28.8	16987	26.8
3. S/. 300 ~ S/. 600	(450)	118	25.4	18497	29.2
4. S/. 600 ~ S/.1200	(900)	115	24.7	14035	22.1
5. S/.1200 ~ S/.2400	(1800)	64	13.8	8544	13.5
6. S/.2400 ~ S/.4000	(3200)	5	1.1	405	0.6
7. S/.4000 ~	(5000)	5	1.1	1046	1.6
Total		465	100.0	63420	100.0
Est. Average income (S/.)		741		741	

(b) Data from Material

Monthly Income per Household (S/.)	(social class	Material (Ave.)	Material Pop.	Material Total	Material (%)
1. ~ 107	: Low critical	81	57861	10520	15.8
2. 108 ~ 323	: Low	227	167356	30428	45.7
3. 324 ~ 611	: Low-middle	473	53466	9720	14.6
4. 612 ~ 1151	: Mid-middle	889	38818	7058	10.6
5. 1152 ~ 1727	: High-middle	1487	30761	5593	8.4
6. 1728 ~	: High	2203	17944	3263	4.9
Total			366206	66582	100.0
Estimated Average income (S/.)				513	
Average family size (persons/family)				5.5	

(c) Statistics of Income Data

Statistics	Total	Statistics	
Estimated Population	366206		
# of household asked	465	C.L. (5%)	37
		S.E (95%)	73
Ave.	741		
Var.	542753	S.S.(infinite)	103
S.Dev.	737	S.S.(finite)	103

Ave. : Average Value of Survey Data
Var. : Variance of Survey Data
S.Dev. : Standard Deviation of Survey Data
C.L. : Confident Limit of Survey Data (5%)
S.E (95% : Stanard Error Value of Survey Data (95%)
S.S.(infinite) : Estimated Sample Size (infinite poplation)
S.S.(finite) : Estimated Sample Size (finite poplation)

Table 5-12 Comparison of Age Structure

(a) Data from Survey

Age Class	(median)	Row Total	Row (%)	Expanded Total	Expanded (%)
0 ~ 5	(3)	271	11.4	40866	12.2
6 ~ 10	(8)	192	8.1	25721	7.7
11 ~ 15	(13)	184	7.7	26092	7.8
16 ~ 20	(18)	256	10.8	40413	12.1
21 ~ 25	(23)	330	13.9	50494	15.1
26 ~ 35	(30)	362	15.2	50716	15.1
36 ~ 45	(40)	274	11.5	34394	10.3
46 ~ 55	(50)	236	9.9	38374	11.5
56 ~ 65	(60)	102	4.3	14308	4.3
66 ~	(70)	80	3.3	7154	2.1
unknown		92	3.9	6608	2.0
Total		2376	100	335141	100
Est. Average Age		27.2		26.6	

(b) Data from Survey (Converted)

Age Class	Row Total	Row (%)	Expanded Total	Expanded (%)
0 ~ 5	271	11.8	40866	12.4
6 ~ 15	376	16.5	51813	15.8
16 ~ 25	586	25.7	90907	27.7
26 ~ 35	362	15.8	50716	15.4
36 ~ 45	274	12.0	34394	10.5
46 ~ 55	236	10.3	38374	11.7
56 ~ 65	102	4.4	14308	4.4
66 ~	80	3.5	7154	2.2
Total	2284	100	328533	100
Est.Ave.Age	27.2		26.6	

(c) Data from Material

Age Class	Material Total	Material (%)
0 ~ 4	56555	15.4
5 ~ 14	94048	25.7
15 ~ 24	85419	23.3
25 ~ 34	51528	14.1
35 ~ 44	32646	8.9
45 ~ 54	21591	5.9
55 ~ 64	12145	3.3
65 ~	12274	3.4
Total	366206	100
Est.Ave.Age	22.8	

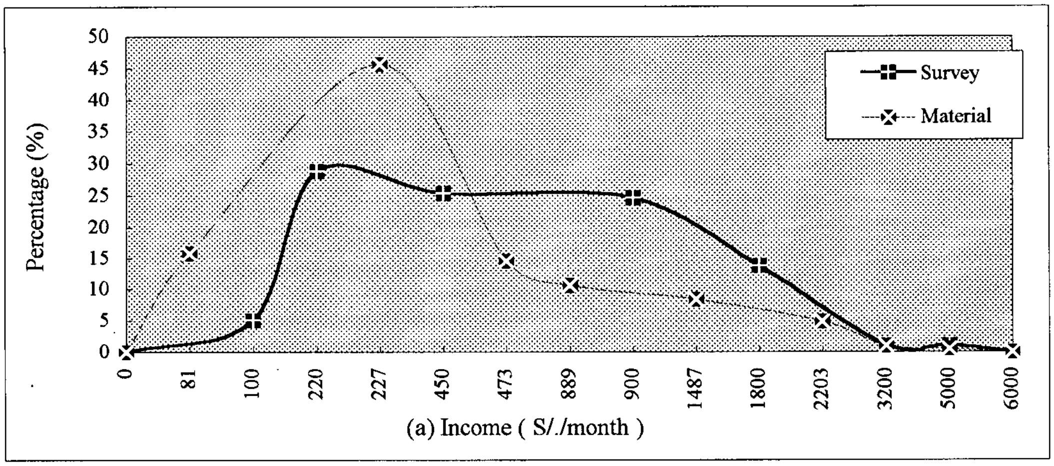
Row : Row Data from Survey
Expanded : Expanded by PPL1
Material : Statistics from Material

(d) Gender Structure

Gender	from Survey	Material
Men	49.2 %	48.0 %
Female	50.8 %	52.0 %

Figure 5-6 Income Structure

(a) Income by Category



(b) Income by Absolute Scale

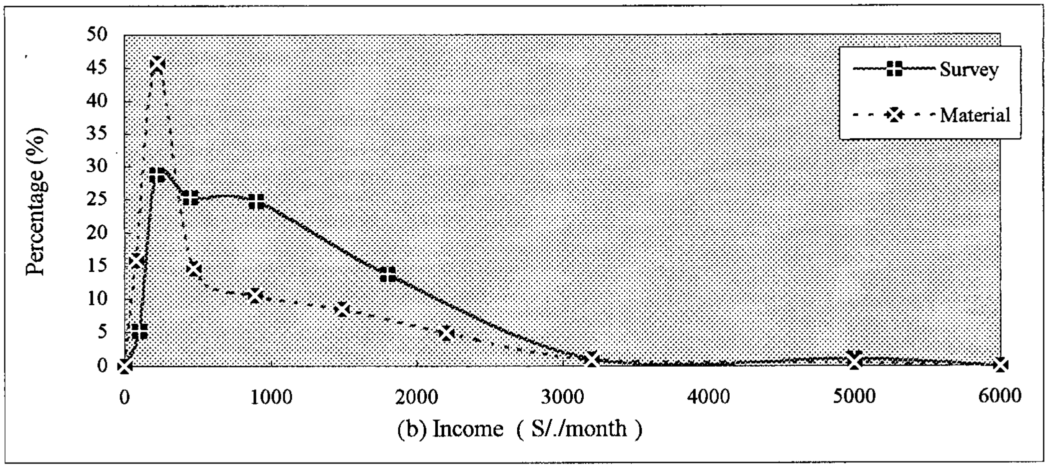
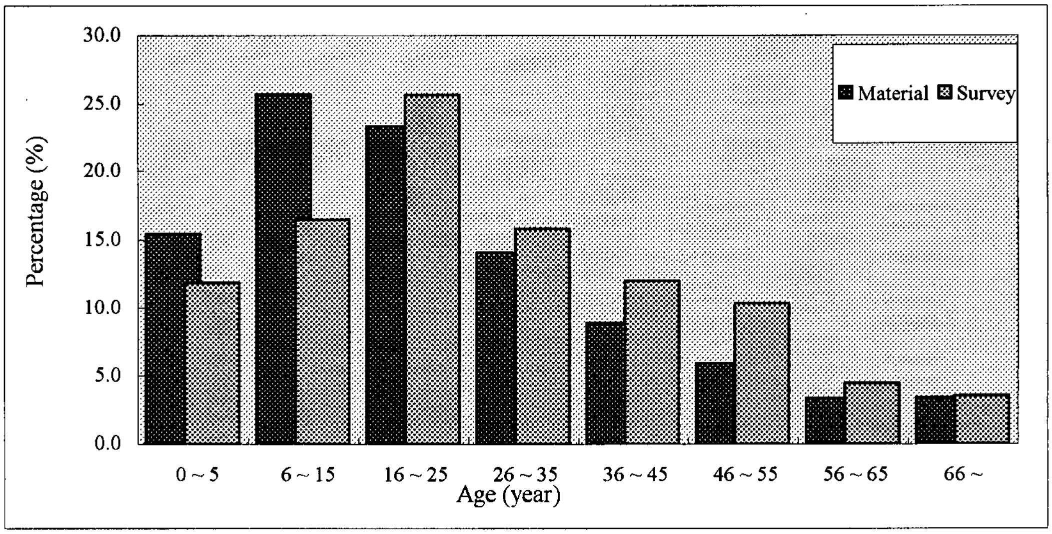


Figure 5-7 Age Structure



Chapter 6

Analysis of Travel Characteristics

The trip record part of the travel characteristics of Piura is analyzed in this chapter. As mentioned previously, the major source is a type of household self-completion survey conducted by the municipality in 1993. First, four types of attributes of trips used in this study are presented. Then, the summary of survey data are analyzed. The summary includes the data by the attributes, and the change of trips in a day. Second, total estimated trips, which are derived based on four kinds of Multiplication Factors mentioned in the previous chapter, are compared. Third, by focusing on the most reliable Multiplication Factor, PPL3, the trip characteristics are further analyzed. Finally, focusing on the morning peak period, between 6:00 a.m. and 8:59 a.m., mode specific person trip characteristics are analyzed.

6.1 Presentation of Survey Data

6.1.1 Attributes of Trips

Among a number of attributes of trips, the following four were chosen as primary factors in this study: trip purpose from, trip purpose to, trip starting time and modes. The first three attributes are used to estimate and analyze the trips of a whole day. The fourth one is only used for analyzing morning peak period trips. This is because the primary purpose of this survey is to find out the approximate travel patterns of people in a day in general. Tables 6-1 to 6-5 summarize the survey results of basic data, trip purpose from, trip purpose to, trip starting time, and modes respectively. All of these data are summarized by traffic analysis zone basis. Then, Tables 6-6 (a) to (e) summarize all these data. The detailed explanations of these data follows.

6.1.2 Basic Data

Table 6-1 Basic Data by Zone

Zone #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	Ave.
1. # Question	20	20	17	20	20	21	20	20	20	20	20	20	13	21	12	20	20	20	17	20	20	20	21	20	19	-	-	-	-	-	481	-
2. # Trips	73	60	49	50	56	120	133	91	72	148	97	72	123	89	18	104	83	58	97	28	118	104	84	54	120	-	-	-	-	-	2101	-
3. # People answered	42	29	23	19	22	53	44	33	33	52	40	29	57	36	14	36	35	26	44	13	67	55	32	25	40	-	-	-	-	-	899	-
4. Trips / person	1.7	2.1	2.1	2.6	2.5	2.3	3.0	2.8	2.2	2.8	2.4	2.5	2.2	2.5	1.3	2.9	2.4	2.2	2.2	2.2	1.8	1.9	2.6	2.2	3.0	-	-	-	-	-	2.3	-
5. Trips / household	3.7	3.0	2.9	2.5	2.8	5.7	6.7	4.6	3.6	7.4	4.9	3.6	9.5	4.2	1.5	5.2	4.2	2.9	5.7	1.4	5.9	5.2	4.0	2.7	6.3	-	-	-	-	-	4.4	-
6. Travel time (min)	15.0	15.4	13.6	17.5	22.9	20.3	18.7	21.2	35.3	19.4	15.5	23.8	16.3	27.1	27.9	17.8	20.6	19.2	24.3	22.4	13.1	30.6	26.5	24.2	11.7	-	-	-	-	-	-	20.3
7. Walking time (min)	4.3	5.2	6.8	10.5	7.5	2.8	3.0	9.5	9.4	5.9	6.7	5.5	2.3	6.5	8.1	3.4	5.4	6.7	8.4	8.9	2.1	2.1	2.3	7.3	11.1	-	-	-	-	-	-	5.5
8. Total travel time	19.3	20.6	20.4	27.9	30.4	23.2	21.7	30.7	44.7	25.3	22.2	29.3	18.6	33.6	36.0	21.2	26.0	25.9	32.6	31.3	15.1	32.8	28.7	31.5	22.8	-	-	-	-	-	25.8	-
9. Ave. Income (S/.)	875	751	626	1174	345	376	1092	561	687	1375	473	271	1883	764	229	1379	1054	270	334	266	1575	697	428	356	997	-	-	-	-	-	754	-

Note : The data for Zone 2 were given by taking averages of data of zone 1 and 3.

Table 6-2 Trip Purpose from

Zone #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	(%)
1. Work	29	22	15	14	11	12	26	18	21	33	18	19	17	19	11	48	28	16	28	9	30	5	22	10	34	-	-	-	-	-	515	24.5
2. Personal business	0	0	0	2	0	20	9	0	0	5	4	6	2	1	0	1	5	1	0	0	1	1	1	2	0	-	-	-	-	-	61	2.9
3. Shopping	2	3	6	0	1	9	3	16	1	2	6	8	5	6	2	0	1	7	13	1	0	23	6	8	5	-	-	-	-	-	134	6.4
4. Social	5	4	1	0	9	1	2	8	0	0	0	0	5	2	0	1	1	1	0	0	0	1	2	0	7	-	-	-	-	-	50	2.4
5. Recreation	0	0	0	0	0	3	0	2	0	0	4	0	4	0	0	2	1	0	5	0	3	0	0	0	1	-	-	-	-	-	25	1.2
6. School	0	2	2	5	6	14	26	4	14	32	14	4	21	12	0	0	2	2	4	2	24	22	9	7	9	-	-	-	-	-	237	11.3
7. Waiting for a ride	0	0	0	4	0	1	0	0	0	1	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	-	-	-	-	-	9	0.4
8. Changing modes	0	0	0	3	1	0	2	0	0	0	5	3	15	11	0	0	3	2	0	3	0	0	3	0	4	-	-	-	-	-	55	2.6
9. Home	37	29	24	22	28	60	65	43	36	74	46	32	54	38	5	51	40	28	47	13	58	52	41	27	60	-	-	-	-	-	1010	48.1
10. no indication	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	-	-	-	-	-	5	0.2
Total trips	73	60	49	50	56	120	133	91	72	148	97	72	123	89	18	104	83	58	97	28	118	104	84	54	120	0	0	0	0	0	2101	100.0

Note : The data for Zone 2 were given by taking averages of data of zone 1 and 3.

Table 6-3 Trip Purpose to

Zone #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	(%)
1. Work	33	22	15	14	11	12	25	19	21	32	21	19	17	19	2	49	28	20	28	8	30	5	22	10	35	-	-	-	-	-	517	24.6
2. Personal business	0	0	1	2	0	20	10	0	0	5	4	6	2	1	0	1	5	1	0	1	1	1	1	2	0	-	-	-	-	-	64	3.0
3. Shopping	3	4	7	0	1	10	3	15	1	2	6	8	5	6	4	0	2	7	13	1	0	23	6	8	5	-	-	-	-	-	140	6.7
4. Social	5	3	0	0	9	1	2	8	0	1	0	0	5	2	0	1	1	1	0	0	0	1	2	0	8	-	-	-	-	-	50	2.4
5. Recreation	0	0	0	0	0	3	0	2	0	0	5	0	4	0	0	2	1	0	5	0	3	0	0	0	1	-	-	-	-	-	26	1.2
6. School	0	2	2	5	6	14	26	4	14	32	14	4	21	12	0	0	2	2	4	2	24	22	9	7	9	-	-	-	-	-	237	11.3
7. Waiting for a ride	0	0	0	7	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	-	-	-	-	-	10	0.5
8. Changing modes	0	0	0	0	1	0	2	0	0	1	5	3	15	11	0	0	3	1	0	3	0	0	3	0	5	-	-	-	-	-	53	2.5
9. Home	32	29	23	22	28	59	65	43	36	74	42	32	54	38	11	50	39	26	47	13	58	52	41	27	57	-	-	-	-	-	998	47.5
10. no indication	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	2	0	0	0	0	-	-	-	-	-	6	0.3
Total trips	73	60	49	50	56	120	133	91	72	148	97	72	123	89	18	104	83	58	97	28	118	104	84	54	120	0	0	0	0	0	2101	100

Note : The data for Zone 2 were given by taking averages of data of zone 1 and 3.

Table 6-4 Starting Time of Trips

Zone #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	(%)
1 6:00 am ~ 8:59 am	21	20	17	20	14	58	39	29	32	41	33	22	36	34	3	29	28	23	25	9	55	30	21	18	32	-	-	-	-	-	689	32.8
2 9:00 am ~ 11:59 am	4	8	10	1	5	6	8	8	1	11	14	15	13	7	4	6	8	11	17	1	3	30	13	8	16	-	-	-	-	-	228	10.9
3 12:00 pm ~ 2:59 pm	10	13	8	11	13	23	39	14	22	37	26	13	27	27	0	27	15	5	9	7	50	24	18	9	24	-	-	-	-	-	471	22.4
4 3:00 pm ~ 5:59 pm	17	9	2	5	7	13	20	8	6	31	10	8	9	10	2	18	16	9	17	3	4	7	12	13	15	-	-	-	-	-	271	12.9
5 6:00 pm ~ 9:59 pm	9	9	4	13	13	15	16	3	9	22	11	9	20	8	6	20	11	6	14	4	4	6	15	1	25	-	-	-	-	-	273	13.0
6 10:00 pm ~ 5:59 am	2	1	3	0	1	4	9	1	0	6	2	5	7	1	0	0	5	3	13	4	0	2	3	1	3	-	-	-	-	-	76	3.6
7 no indication	10	0	5	0	3	1	2	28	2	0	1	0	11	2	3	4	0	1	2	0	2	5	2	4	5	-	-	-	-	-	93	4.4
Total trips	73	60	49	50	56	120	133	91	72	148	97	72	123	89	18	104	83	58	97	28	118	104	84	54	120	0	0	0	0	0	2101	100

Note : The data for Zone 2 were given by taking averages of data of zone 1 and 3.

Table 6-5 Modes

Zone #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	(%)
1 Driving a Car	22	8	10	8	0	8	29	0	2	16	2	4	39	6	0	24	0	1	1	0	20	8	0	0	0	-	-	-	-	-	208	9.9
2 Passenger in a Car	0	4	4	0	0	0	0	0	2	53	6	27	2	0	1	16	0	2	2	16	8	6	66	18	0	-	-	-	-	-	233	11.1
3 Taxi (Collectibo)	4	5	2	1	4	12	22	3	0	14	2	4	6	19	2	0	28	37	4	4	44	12	14	0	6	-	-	-	-	-	249	11.9
4 Public transit (combi)	4	17	24	25	36	71	42	88	60	45	49	18	46	54	13	60	29	14	70	8	44	40	3	30	109	-	-	-	-	-	999	47.5
5 School bus	0	0	0	0	0	0	12	0	0	0	0	0	12	3	0	0	0	0	0	0	0	6	1	0	0	-	-	-	-	-	34	1.6
6 Others	36	16	0	0	2	4	22	0	5	16	15	14	10	5	1	0	20	2	4	0	0	20	0	0	4	-	-	-	-	-	196	9.3
7 Walking	7	10	8	10	0	25	4	0	2	4	23	5	6	0	1	4	4	2	4	0	0	6	0	6	1	-	-	-	-	-	132	6.3
8 no indication	0	0	1	6	14	0	2	0	1	0	0	0	2	2	0	0	2	0	12	0	2	6	0	0	0	-	-	-	-	-	50	2.4
Total trips	73	60	49	50	56	120	133	91	72	148	97	72	123	89	18	104	83	58	97	28	118	104	84	54	120	0	0	0	0	0	2101	100

Note : The data for Zone 2 were given by taking averages of data of zone 1 and 3.

Figure 6-1 Basic Data vs Household Income

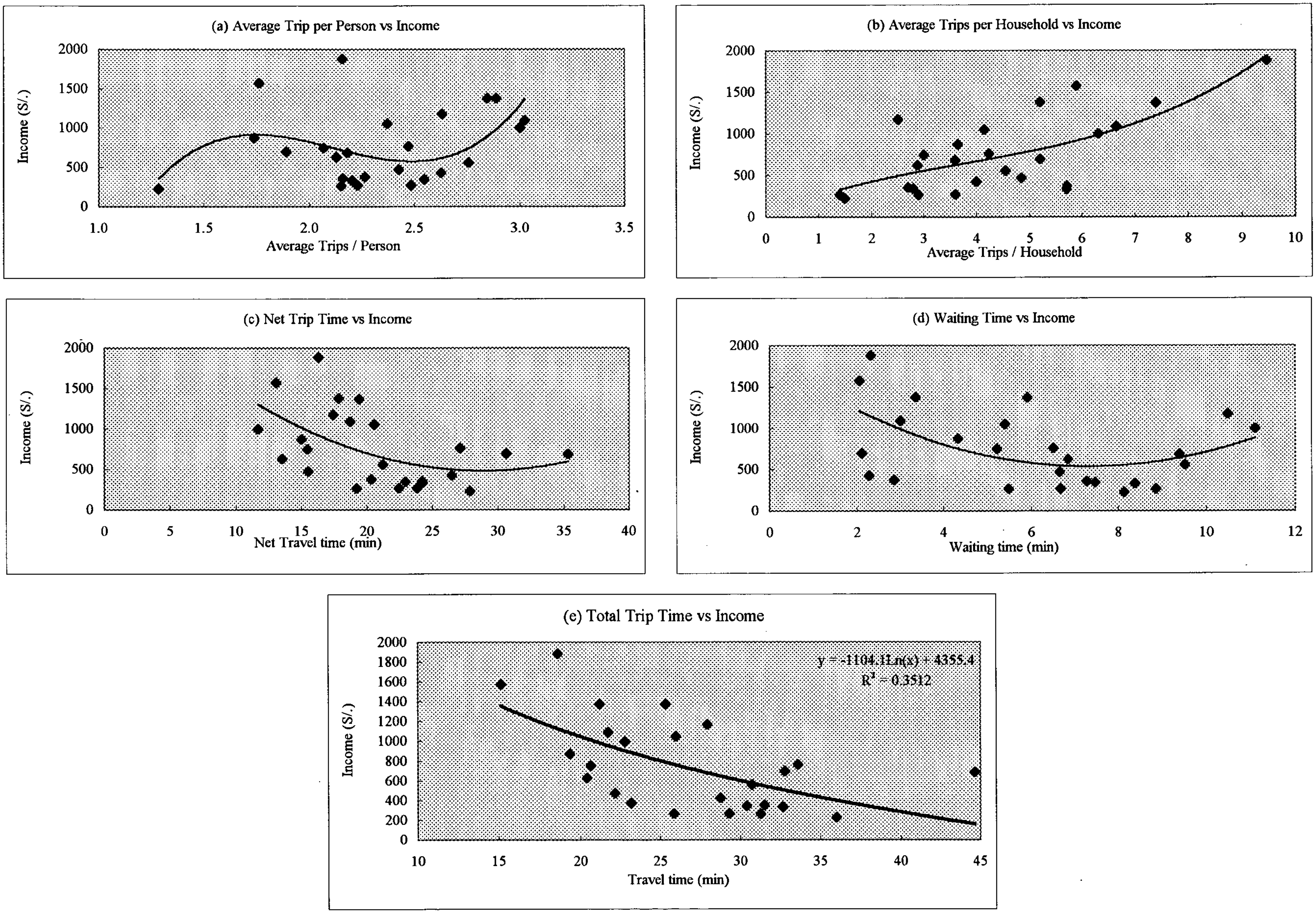


Table 6-1 shows the basic travel data. From 481 households, 2101 trips were recorded. The number of respondents were 899, which accounts for 83.7% of 1074 people who make trips (hereafter referred as trip making people). Item 4 and 5 show average trips per day, per trip making person and average trips per day, per household. Their relationships to household income are shown in Figures 6-1 (a) and (b) respectively. The average trips per day, per trip making person is 2.3 while the average trips per day, per household is 4.4. As mentioned previously, the noticeable facts are (1) that people have simple travel pattern of going out and coming in and (2) that approximately two persons per household make trips. From Figures 6-1 (a) and (b), the tendency that higher income households make slightly more trips is observed, while the number of average trips per person does not show the clear relationship to household income.

Items 6, 7 and 8 of Table 6-1 show average net travel time, waiting time and total travel time respectively. Then, Figures 6-1 (c), (d) and (e) show the relationships of net travel time, waiting time and total travel time to household income respectively. The average travel time is 25.8 minutes, in which net travel time and waiting time account for 20.3 and 5.5 minutes respectively. By considering that most of the activities occur in the city's central area, generally speaking, the closer to the city centre the traffic analysis zone is, the shorter the travel time is. The average total travel times range between 15.1 and 44.7 minutes while most of them occur between 20 to 30 minutes. Most of the average net travel times range between 10 and 25 minutes while the average waiting times range between 2 and 10 minutes. From Figures 6-1 (c) to (e), a tendency that people in higher income households make shorter trips in time is observed. This may be because (1) higher income persons have more affordability in their mode choice, and because (2) higher income persons tend to live close to the city central area.

6.1.3 By Trip Type (Trip Purpose)

Ten types of trip purposes were used for the survey. They are (1) work, (2) personal business, (3) shopping, (4) social, (5) recreation, (6) school, (7) waiting for a ride, (8) changing modes,

Table 6-6 Summary of Trip Data

(a) Brief Summary of Trip Data

Zones	Number of Trips	Number of People Asked	Ave. Travel Time (min)	Ave. Walking Time (min)
All	2101	899	20.3	5.5

(b) Trips by "Purpose from"

No.	Trip Type	Total	Ave.
(1)	Work	515	24.5
(2)	Personal business	61	2.9
(3)	Shopping	134	6.4
(4)	Social	50	2.4
(5)	Recreation	25	1.2
(6)	School	237	11.3
(7)	Waiting for a ride	9	0.4
(8)	Changing modes	55	2.6
(9)	Home	1010	48.1
(10)	no indication	5	0.2
	Total trips	2101	100.0

(c) Trips by "Purpose to"

No.	Trip Type	Total	Ave.
(1)	Work	517	24.6
(2)	Personal business	64	3.0
(3)	Shopping	140	6.7
(4)	Social	50	2.4
(5)	Recreation	26	1.2
(6)	School	237	11.3
(7)	Waiting for a ride	10	0.5
(8)	Changing modes	53	2.5
(9)	Home	998	47.5
(10)	no indication	6	0.3
	Total trips	2101	100.0

(d) Trips by "Starting time"

No.	Time Periods	Total	Ave.
(1)	6:00 ~ 8:59 AM	689	32.8
(2)	9:00 ~ 11:59 AM	228	10.9
(3)	0:00 ~ 2:59 PM	471	22.4
(4)	3:00 ~ 5:59 PM	271	12.9
(5)	6:00 ~ 9:59 PM	273	13.0
(6)	10:00 PM ~ 5:59 AM	76	3.6
(7)	no indication	93	4.4
	Total trips	2101	100.0

(e) Trips by "Modes"

No.	Modes	Total	Ave.
(1)	Driving a Car	208	9.9
(2)	Passenger in a Car	233	11.1
(3)	Taxi (Taxi Collectibo)	249	11.9
(4)	Public transit (combi)	999	47.5
(5)	School bus	34	1.6
(6)	Others	196	9.3
(7)	Walking	132	6.3
(8)	no indication	50	2.4
	Total trips	2101	100.0

(f) The Number of Hourly Trips and Relationship to Time periods

Hourly period		Trips			(%)	
		Hour	Time Period		/ Time P.	/ Day
(1)	5:00 ~ 5:59 AM	22	(6)		28.9%	1.0%
(2)	6:00 ~ 6:59 AM	117			17.0%	5.6%
(3)	7:00 ~ 7:59 AM	362	(1)	689	52.5%	17.2%
(4)	8:00 ~ 8:59 AM	210			30.5%	10.0%
(5)	9:00 ~ 9:59 AM	100			43.9%	4.8%
(6)	10:00 ~ 10:59 AM	74	(2)	228	32.5%	3.5%
(7)	11:00 ~ 11:59 AM	54			23.7%	2.6%
(8)	0:00 ~ 0:59 PM	87			18.5%	4.1%
(9)	1:00 ~ 1:59 PM	257	(3)	471	54.6%	12.2%
(10)	2:00 ~ 2:59 PM	127			27.0%	6.0%
(11)	3:00 ~ 3:59 PM	100			36.9%	4.8%
(12)	4:00 ~ 4:59 PM	100	(4)	271	36.9%	4.8%
(13)	5:00 ~ 5:59 PM	71			26.2%	3.4%
(14)	6:00 ~ 6:59 PM	78			28.6%	3.7%
(15)	7:00 ~ 7:59 PM	77	(5)	273	28.2%	3.7%
(16)	8:00 ~ 8:59 PM	79			28.9%	3.8%
(17)	9:00 ~ 9:59 AM	39			14.3%	1.9%
(18)	10:00 ~ 10:59 PM	25			32.9%	1.2%
(19)	11:00 ~ 11:59 PM	12			15.8%	0.6%
(20)	0:00 ~ 0:59 AM	1	(6)	76	1.3%	0.0%
(21)	1:00 ~ 1:59 AM	3			3.9%	0.1%
(22)	2:00 ~ 2:59 AM	2			2.6%	0.1%
(23)	3:00 ~ 3:59 AM	5			6.6%	0.2%
(24)	4:00 ~ 4:59 AM	6			7.9%	0.3%
(25)	no indication	93	(7)	93	100%	4%
	Total trips	2101		2101		100%

(g) Number of Trips during "Peak Hour" Periods (in detail)

Hourly Periods (min.)	(2) 6:00 ~ 6:59 AM	(3) 7:00 ~ 7:59 AM	(4) 8:00 ~ 8:59 AM	(9) 1:00 ~ 1:59 PM	(10) 2:00 ~ 2:59 PM
0 ~ 29	64	171	151	143	102
(0 ~ 14)	61	139	144	133	97
(15 ~ 29)	3	32	7	10	5
30 ~ 59	53	191	59	114	25
(30 ~ 44)	36	149	45	103	22
(45 ~ 59)	17	42	14	11	3
Total	117	362	210	257	127

(9) home and (10) no indication. These purposes are self-explanatory so that their definitions do not have to be mentioned. Tables 6-2 and 6-3 show the trip data of "trip purpose from" and "trip purpose to." The results of these two are quite similar because eventually destinations become origins. From this point, "trip purpose to" is primarily used as "trip type" for further analysis because this study is more concerned with destinations during peak periods.

The most frequent trip type is "home" trips at 48.1%, and account for almost half of total daily trips. This arguably supports the fact of the simple travel patterns in the city with the average trips per person per day of 2.3. These "home" trips, which represent all coming-back trips, are, however, not dealt with as a primary target in this analysis, and mainly used to read the total movement of other going-out trips.

Beside "home" trips, "work" trips, which account for 24.5% of total daily trips, are the most frequent trip type. This means almost half of non-coming-back trips are "work" trips. Then, "school" trips at 11.3% and "shopping" trips at 6.4% of the total daily trips follow it as the second and third most frequent trips respectively. These three trip types together account for 42.2% of total trips or 81.3% of non-coming-back trips.

6.1.4 By Time Period (Trip Starting Time)

For this study, seven time periods are used for trip starting time classification: they are 6 to 9 a.m., 9 to 12 a.m., 12 to 3 p.m., 3 to 6 p.m., 6 to 10 p.m., 10 p.m. to 6 a.m. and no indication. The reason for using basic three hour periods, not one hour periods, is (1) to obtain the general travel movement of the day, (2) to simplify the data processing, and (3) to increase the data reliability by increasing the sample size. The travel behaviours of hour periods are then calculated later, based on the share of travel counts in each time periods.

As expected from the experiences in developed countries, the busiest time period of the city is the morning period of 6 to 9 a.m., which accounts for 32.8% or approximately one third of the total daily trips. The second busiest is the early afternoon period of 12 to 3 p.m. by 22.4%

of the total daily trips followed by other three non-late-night time periods of 6 to 10 p.m., 3 to 6 p.m. and 9 to 12 a.m. by 13.0%, 12.9% and 10.9% respectively. These results are partly explained by the people's life style mentioned in Chapter 3: primarily, working time periods usually end in the early afternoon or late afternoon. The total trips during the afternoon periods of 12 to 6 p.m. accounts for 35.3%, which is close to the share of morning peak trips. That is, "coming-back" trips are reasonably scattered all over the afternoon periods with respect to the concentrated morning "going-out" trips. In addition, with only 4.4% of non-indicated trips, most of which belong to "home" trips, these numbers in share should be reliable enough.

6.1.5 By Mode

Eight types of mode classifications are used: they are (1) driving a car, (2) passenger in a car, (3) taxi (primarily Collectibo), (4) public transit (Combi), (5) school bus, (6) others, (7) walking and (8) no indications. Among these classifications, (2), (3) and (6) are somewhat fuzzy because of the unclear definition of taxis such as regular taxis, illegal shared taxis and even Mototaxis. The "car" of the mode type (2) definition may includes regular taxis and/or shared taxis, the definition of mode type (3), "taxi," may also includes regular taxis, shared illegal taxis and/or even Mototaxis, and the "others" of mode type (6) again may include all of them. In this study, however, it is assumed (a) that the "car" in the definition of the mode type (1) and (2) represents private cars, (b) that the mode type (3), "taxi," primarily represents taxi Collectibos, and (c) that other taxis such as regular taxis, illegal shared taxis and Mototaxis are included in the mode type (6), "others."

The most used transportation mode in the city is "public transit (Combis)," which accounts for 47.5% or almost half of the total daily trips. The second highly used mode is "taxi Collectibo" with a portion of 11.9% of the total daily trips. These two primary public transportation modes in the city together account for 59.4% of the total daily trips. From this fact, the importance of public transportation in the city is easily readable. Then, the third most used mode is "passenger in the car" with a portion of 11.1% of the total daily trips. As mentioned, the figures for this mode type is very difficult to read because of the fuzzy definition of the mode type: private cars are a major private mode while taxis usually belong to public modes. By applying the assumption that the "car" represents private cars, the total trips by private cars account for 21.0% summed up with "driving a car," which accounts for 9.9% of the total daily trips. This means that one in five trips is made by private cars while one in eleven people possesses a driver's license, and the summed up portion of 21.0% makes this mode the second most highly used mode in the city following "Combis." Since the major wave of motorization, which was experienced by many other countries, has not clearly observed in the city yet, it is likely that the modal share of "private cars" will become higher. Therefore, this number should be kept looked at. If the definition of "car" in mode type (2) includes some types of public modes such as regular taxis and Mototaxis, on the other hand, some parts of the mode type (2) trips should be included in the public transportation category. This simply strengthens the share of public transportation. The mode type "others," which accounts for 9.3% of the total daily trips, include not only public transportation modes such as taxis and Mototaxis but also private modes such as motorbikes and bicycles. These two types of two-cycle private modes are relatively easier to obtain than private cars. Therefore, it is also possible that the share of the mode type "others" will suddenly increase as a result of the increasing use of these two types of light, private modes in the near future. For the next survey, it may be better to use another category for these private two-cycle modes in order to distinguish them. In addition, another interesting fact is that approximately 6.3% of the total daily trips or one in 16 trip is made by "walking." That is, "walking" is also an important mode in the city.

6.1.6 Time Period and Hour Period

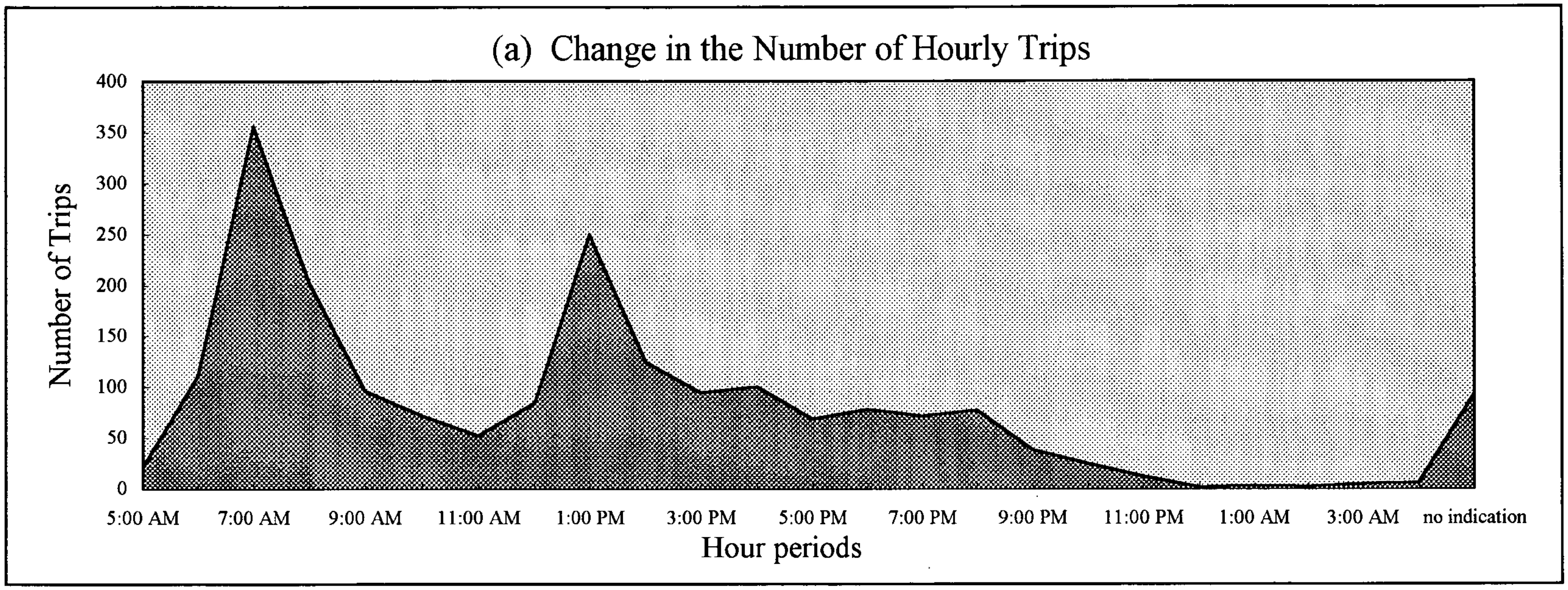
Time periods have been defined in Section 6.1.4. In this section, the characteristics of the hour period based trips are presented with respect to the time period based trips. The calculation of transformation between time periods and hour periods is simply performed by counting the trip starting time from the original survey, and then by multiplying the total time period based trips by the share of hourly trips within each time period. The outcome, the estimated traffic based on hour periods, is used for modeling the transportation system of the city in the next chapter.

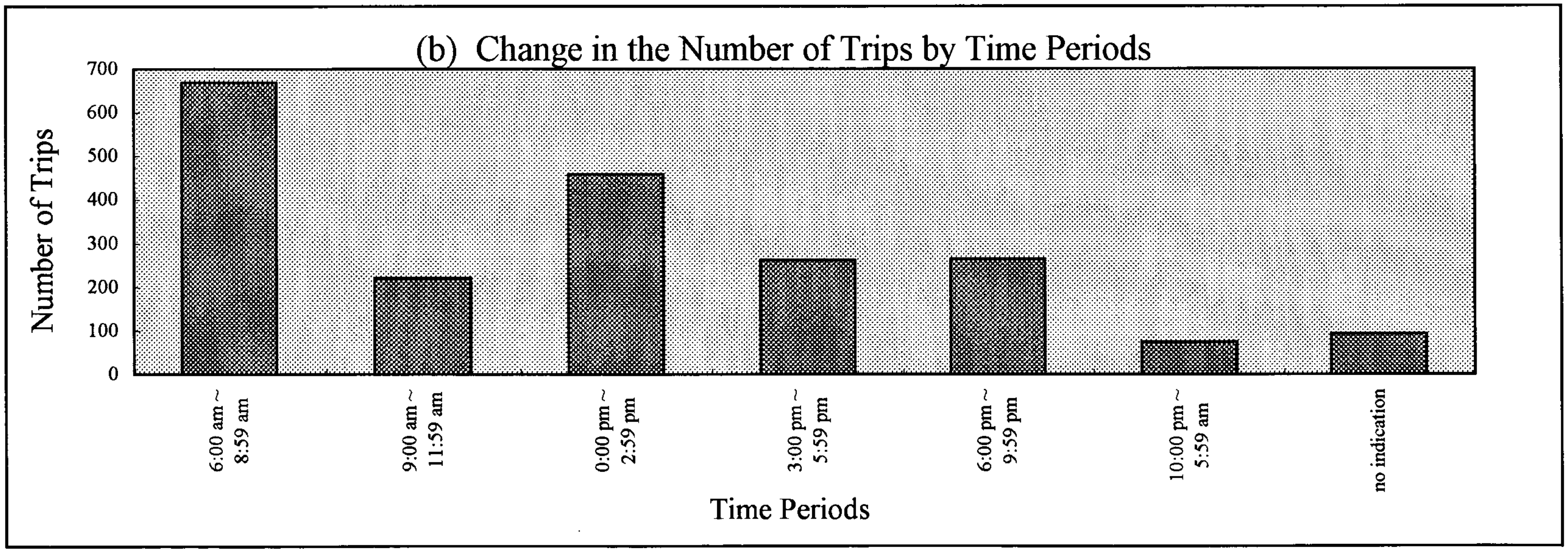
Table 6-6 (f) shows the relationships of hourly trips to time periods. From this table, the busiest hour period is between 7 to 8 a.m. with 52.5% of the total trips in the busiest morning time period (1) between 6 to 9 a.m., which accounts for 32.8% of the total daily trips. This also means that the morning peak hour of 7 to 8 a.m. alone is responsible for 17.2% of the total daily trips. The second highest peak occurs between 1 and 2 p.m. with a potion of 54.6% of the trips in time period (3), which is between 12 to 3 p.m. or 12.2% of the total daily trips. This hour period is the period when the majority of working people go back to their home. The third busiest is between 8 to 9 a.m. in the time period (1) with a portion of 10.0% of the total daily trips. While the hour period between 6 to 7 a.m. and 2 to 3 p.m. do have some influences from the primary peak hours with somewhat higher portions of 5.6% and 6.0% of the total daily trips respectively, most of other hour periods are relatively flat with a portion of less than 5% of the total daily trips.

Figure 6-2 shows the comparison of the numbers of trips between hour periods and time periods. Figure 6-2 (a) shows the change of hourly trips while Figure 6-2 (b) summarizes the number trips by time period. From Figure 6-2 (a), two high peaks are easily observed: they are between 7 to 8 a.m. and 1 to 2 p.m.. Other than these peaks, the trip distribution of the day is relatively flat. These facts are also readable from Figure 6-2 (b). In fact, the shape of Figure 6-2 (a) is much similar to the shape of Figure 6-2 (b). In addition, "no indication" trips account for 4.0% of the total daily trips, making itself somewhat noticeable at the right end of both Figure 6-2 (a) and (b).

Table 6-6 (g) shows the detailed trip counting results during five busiest hour periods by thirty or fifteen minutes units. From this Table 6-6 (g), the busiest half hour is between 7:30 to 7:59 a.m. with 191 trips followed by 7 to 7: 29 a.m. with 171, 8 to 8:30 a.m. with 151, and

Figure 6-2 Comparison of the Number of Trips between Hour and Time Periods


(a) Change in the Number of Hourly Trips


(b) Change in the Number of Trips by Time Periods

1 to 1:29 p.m. with 143 trips. The data in fifteen minutes intervals, on the other hand, are not useful enough because the change of the numbers are somewhat inaccurate. This may be because the survey respondents preferred to describe their starting time in half hour units.

6.2 Multiplication Factors and Total Estimated Trips

6.2.1 Multiplication Factors and Total Trip Estimation

The four types of multiplication factors, PPL1, PPL2, PPL3 and FS, are mentioned in the previous chapter. These factors are defined as rates which represent the differences between the sample sizes and the estimated populations of traffic analysis zones, and are used to estimate the total trips of the city by multiplying the original survey data by them. Table 5-7 summarizes the multiplication factors and the estimated trips by applying the factors: the items 1, 3, 5 and 7 show the factors of PPL1, PPL2, PPL3, and FS, and the item 2, 4, 6 and 8 show the estimated trips by using the factors respectively.

The expanded data should be looked at carefully. For instance, the multiplication factors at the traffic analysis zones of 8, 13, 18, 19, 21, 23 and 24 are relatively bigger than the multiplication factors of other zones. This is mainly because the sample sizes of these traffic analysis zones are small compared with the total populations of the traffic analysis zones so that the data have to be expanded to a large scale. Since this situation may cause some errors when the expansion is executed, the data reliability, therefore, has been examined in the previous chapter. Since the data of traffic analysis zones with smaller multiplication factors, on the other hand, likely causes less errors, the expanded results should be more reliable. In addition, since the traffic analysis zone 15 is primarily an industrial area, which has no residences, the multiplication factor for the zone is set at 1 for all of the multiplication factors.

The data expansion is done based on two primary attributes: trip types and time periods. The data of "trip purpose to" is used for trip types. Ten trip types and seven time periods, defined in Section 6.1.3 and 6.1.4, are also applied for this total trip estimation. The expansion calculation is performed for each traffic analysis zone. The expansion results are summarized in Tables 6-7 to 6-11 and Figures 6-3 and 6-4. The explanations of those Tables and Figures follow.

Table 6-7 Comparison of M-Factors (1) : The number of trips by trip types and time periods

(a) Counted Number of Trips from Original Data (w/o Multiply Factor)

Type\Time	1	2	3	4	5	6	7	Total
1	344	29	15	84	15	24	6	517
2	38	6	4	12	2	1	1	64
3	74	54	2	5	1	4	0	140
4	5	15	10	5	13	2	0	50
5	2	9	1	8	6	0	0	26
6	170	6	17	35	3	1	5	237
7	6	0	0	0	3	1	0	10
8	21	1	17	2	9	1	2	53
9	27	107	404	120	221	42	77	998
10	2	1	1	0	0	0	2	6
Total	689	228	471	271	273	76	93	2101

[Trip Types]
1 : Work
2 : Personal Business
3 : Shopping
4 : Social
5 : Recreation
6 : School
7 : Waiting for a ride
8 : Changing modes
9 : Home
10 : No indication

[Time Periods]
1 : 6:00 AM ~ 8:59 AM
2 : 9:00 AM ~ 11:59 AM
3 : 0:00 PM ~ 2:59 PM
4 : 3:00 PM ~ 5:59 PM
5 : 6:00 PM ~ 9:59 PM
6 : 10:00 PM ~ 5:59 AM
7 : 6:00 AM ~ 6:59 AM

(b) Estimated Number of Trips (Multiply Factor = PPL1)

Type\Time	1	2	3	4	5	6	7	Total
1	47362	4717	1586	11304	1594	4981	749	72293
2	3427	632	363	827	165	20	465	5900
3	10546	10254	271	704	185	1113	0	23072
4	878	2130	494	1233	3159	187	0	8080
5	76	1478	65	1858	1916	0	0	5393
6	25342	1090	2159	5340	414	100	1642	36087
7	302	0	0	0	33	11	0	346
8	5592	100	3687	319	1577	150	930	12354
9	3897	16777	57506	18565	29339	7468	12756	146309
10	120	1	85	0	0	0	400	606
Total	97543	37179	66215	40150	38382	14029	16942	310441

(d) Estimated Number of Trips (Multiply Factor = PPL3)

Type\Time	1	2	3	4	5	6	7	Total
1	57894	5754	1924	12306	1855	5829	998	86560
2	4407	630	657	854	191	51	228	7019
3	15683	12152	459	1371	392	1255	0	31312
4	1725	3185	752	998	2563	200	0	9424
5	102	1520	87	2224	1270	0	0	5205
6	26448	888	3212	6462	640	104	933	38687
7	308	0	0	0	16	15	0	339
8	4596	104	3937	597	2181	208	457	12080
9	4672	18855	65034	26356	30225	6634	20144	171921
10	154	1	117	0	0	0	346	619
Total	115992	43090	76180	51168	39332	14295	23108	363166

(c) Estimated Number of Trips (Multiply Factor = PPL2)

Type\Time	1	2	3	4	5	6	7	Total
1	127567	14685	5372	29030	4408	15036	2276	198373
2	9501	2321	1301	2555	377	69	538	16661
3	32988	23738	740	2284	588	2295	0	62632
4	2867	6721	1404	3438	5935	636	0	21001
5	200	3172	175	3946	2789	0	0	10282
6	53903	2150	6749	13543	1240	202	2209	79995
7	1140	0	0	0	181	25	0	1347
8	10309	202	9329	977	4312	1039	1077	27244
9	12369	43732	137862	54166	76877	15587	34399	374992
10	271	1	291	0	0	0	663	1226
Total	251115	96721	163222	109938	96706	34889	41162	793753

(e) Estimated Number of Trips (Multiply Factor = FS)

Type\Time	1	2	3	4	5	6	7	Total
1	45387	4277	1555	10965	1491	4712	722	69108
2	3091	658	382	828	151	17	429	5555
3	9611	9187	252	697	176	1053	0	20976
4	809	2029	378	1111	3024	151	0	7503
5	67	1461	55	1776	1801	0	0	5161
6	23579	1001	1998	4703	422	95	1533	33331
7	343	0	0	0	31	12	0	386
8	5255	95	3489	336	1618	123	858	11774
9	3749	15836	54411	16751	27836	7086	11512	137182
10	112	1	95	0	0	0	404	612
Total	92003	34546	62615	37167	36551	13249	15458	291589

[Multiplied Factors]
PPL1 : Based on Average Household Size (from Data Obtained)
PPL2 : Based on Number of People Answered the Questionnaire
PPL3 : Based on Number of People Who Make Trips (from Data Obtained)
FS : Based on Estimated Average Household Size by the City of Piura

Table 6-8 Comparison of M-Factors (2) : Percentages of Trips (The total of each trip type is 100%)

(a) Percentage of Trips in Time Periods for Each Trip Type (Original Data)

Type\Time	1	2	3	4	5	6	7	Total
1	66.5	5.6	2.9	16.2	2.9	4.6	1.2	100.0
2	59.4	9.4	6.3	18.8	3.1	1.6	1.6	100.0
3	52.9	38.6	1.4	3.6	0.7	2.9	0.0	100.0
4	10.0	30.0	20.0	10.0	26.0	4.0	0.0	100.0
5	7.7	34.6	3.8	30.8	23.1	0.0	0.0	100.0
6	71.7	2.5	7.2	14.8	1.3	0.4	2.1	100.0
7	60.0	0.0	0.0	0.0	30.0	10.0	0.0	100.0
8	39.6	1.9	32.1	3.8	17.0	1.9	3.8	100.0
9	2.7	10.7	40.5	12.0	22.1	4.2	7.7	100.0
10	33.3	16.7	16.7	0.0	0.0	0.0	33.3	100.0
Total	32.8	10.9	22.4	12.9	13.0	3.6	4.4	100.0

[Trip Types]
1 : Work
2 : Personal Business
3 : Shopping
4 : Social
5 : Recreation
6 : School
7 : Waiting for a ride
8 : Changing modes
9 : Home
10 : No indication

[Time Periods]
1 : 6:00 AM ~ 8:59 AM
2 : 9:00 AM ~ 11:59 AM
3 : 0:00 PM ~ 2:59 PM
4 : 3:00 PM ~ 5:59 PM
5 : 6:00 PM ~ 9:59 PM
6 : 10:00 PM ~ 5:59 AM
7 : 6:00 AM ~ 6:59 AM

(b) Percentage of Trips in Time Periods for Each Trip Type (Multiply Factor = PPL1)

Type\Time	1	2	3	4	5	6	7	Total
1	65.5	6.5	2.2	15.6	2.2	6.9	1.0	100.0
2	58.1	10.7	6.2	14.0	2.8	0.3	7.9	100.0
3	45.7	44.4	1.2	3.1	0.8	4.8	0.0	100.0
4	10.9	26.4	6.1	15.3	39.1	2.3	0.0	100.0
5	1.4	27.4	1.2	34.5	35.5	0.0	0.0	100.0
6	70.2	3.0	6.0	14.8	1.1	0.3	4.5	100.0
7	87.2	0.0	0.0	0.0	9.5	3.3	0.0	100.0
8	45.3	0.8	29.8	2.6	12.8	1.2	7.5	100.0
9	2.7	11.5	39.3	12.7	20.1	5.1	8.7	100.0
10	19.9	0.2	14.0	0.0	0.0	0.0	66.0	100.0
Total	31.4	12.0	21.3	12.9	12.4	4.5	5.5	100.0

(c) Percentage of Trips in Time Periods for Each Trip Type (Multiply Factor = PPL2)

Type\Time	1	2	3	4	5	6	7	Total
1	64.3	7.4	2.7	14.6	2.2	7.6	1.1	100.0
2	57.0	13.9	7.8	15.3	2.3	0.4	3.2	100.0
3	52.7	37.9	1.2	3.6	0.9	3.7	0.0	100.0
4	13.7	32.0	6.7	16.4	28.3	3.0	0.0	100.0
5	1.9	30.8	1.7	38.4	27.1	0.0	0.0	100.0
6	67.4	2.7	8.4	16.9	1.5	0.3	2.8	100.0
7	84.7	0.0	0.0	0.0	13.4	1.9	0.0	100.0
8	37.8	0.7	34.2	3.6	15.8	3.8	4.0	100.0
9	3.3	11.7	36.8	14.4	20.5	4.2	9.2	100.0
10	22.1	0.1	23.8	0.0	0.0	0.0	54.1	100.0
Total	31.6	12.2	20.6	13.9	12.2	4.4	5.2	100.0

(d) Percentage of Trips in Time Periods for Each Trip Type (Multiply Factor = PPL3)

Type\Time	1	2	3	4	5	6	7	Total
1	66.9	6.6	2.2	14.2	2.1	6.7	1.2	100.0
2	62.8	9.0	9.4	12.2	2.7	0.7	3.3	100.0
3	50.1	38.8	1.5	4.4	1.3	4.0	0.0	100.0
4	18.3	33.8	8.0	10.6	27.2	2.1	0.0	100.0
5	2.0	29.2	1.7	42.7	24.4	0.0	0.0	100.0
6	68.4	2.3	8.3	16.7	1.7	0.3	2.4	100.0
7	91.0	0.0	0.0	0.0	4.6	4.4	0.0	100.0
8	38.0	0.9	32.6	4.9	18.1	1.7	3.8	100.0
9	2.7	11.0	37.8	15.3	17.6	3.9	11.7	100.0
10	24.9	0.2	19.0	0.0	0.0	0.0	55.9	100.0
Total	31.9	11.9	21.0	14.1	10.8	3.9	6.4	100.0

(e) Percentage of Trips in Time Periods for Each Trip Type (Multiply Factor = FS)

Type\Time	1	2	3	4	5	6	7	Total
1	65.7	6.2	2.2	15.9	2.2	6.8	1.0	100.0
2	55.6	11.8	6.9	14.9	2.7	0.3	7.7	100.0
3	45.8	43.8	1.2	3.3	0.8	5.0	0.0	100.0
4	10.8	27.0	5.0	14.8	40.3	2.0	0.0	100.0
5	1.3	28.3	1.1	34.4	34.9	0.0	0.0	100.0
6	70.7	3.0	6.0	14.1	1.3	0.3	4.6	100.0
7	88.8	0.0	0.0	0.0	8.1	3.1	0.0	100.0
8	44.6	0.8	29.6	2.9	13.7	1.0	7.3	100.0
9	2.7	11.5	39.7	12.2	20.3	5.2	8.4	100.0
10	18.3	0.2	15.6	0.0	0.0	0.0	65.9	100.0
Total	31.6	11.8	21.5	12.7	12.5	4.5	5.3	100.0

[Multiplied Factors]
PPL1 : Based on Average Household Size (from Data Obtained)
PPL2 : Based on Number of People Answered the Questionnaire
PPL3 : Based on Number of People Who Make Trips (from Data Obtained)
FS : Based on Estimated Average Household Size by the City of Piura

Table 6-9 Comparison of M-Factors (3) : Percentages of Trips (The total of each time period is 100%)

(a) Percentage of Trip Types by Time Period (Original Data)

Type\Time	1	2	3	4	5	6	7	Total
1	49.9	12.7	3.2	31.0	5.5	31.6	6.5	24.6
2	5.5	2.6	0.8	4.4	0.7	1.3	1.1	3.0
3	10.7	23.7	0.4	1.8	0.4	5.3	0.0	6.7
4	0.7	6.6	2.1	1.8	4.8	2.6	0.0	2.4
5	0.3	3.9	0.2	3.0	2.2	0.0	0.0	1.2
6	24.7	2.6	3.6	12.9	1.1	1.3	5.4	11.3
7	0.9	0.0	0.0	0.0	1.1	1.3	0.0	0.5
8	3.0	0.4	3.6	0.7	3.3	1.3	2.2	2.5
9	3.9	46.9	85.8	44.3	81.0	55.3	82.8	47.5
10	0.3	0.4	0.2	0.0	0.0	0.0	2.2	0.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[Trip Types]
1 : Work
2 : Personal Business
3 : Shopping
4 : Social
5 : Recreation
6 : School
7 : Waiting for a ride
8 : Changing modes
9 : Home
10 : No indication

[Time Periods]
1 : 6:00 AM ~ 8:59 AM
2 : 9:00 AM ~ 11:59 AM
3 : 0:00 PM ~ 2:59 PM
4 : 3:00 PM ~ 5:59 PM
5 : 6:00 PM ~ 9:59 PM
6 : 10:00 PM ~ 5:59 AM
7 : 6:00 AM ~ 6:59 AM

(b) Percentage of Trip Types by Time Period (Multiply Factor = PPL1)

Type\Time	1	2	3	4	5	6	7	Total
1	48.6	12.7	2.4	28.2	4.2	35.5	4.4	23.3
2	3.5	1.7	0.5	2.1	0.4	0.1	2.7	1.9
3	10.8	27.6	0.4	1.8	0.5	7.9	0.0	7.4
4	0.9	5.7	0.7	3.1	8.2	1.3	0.0	2.6
5	0.1	4.0	0.1	4.6	5.0	0.0	0.0	1.7
6	26.0	2.9	3.3	13.3	1.1	0.7	9.7	11.6
7	0.3	0.0	0.0	0.0	0.1	0.1	0.0	0.1
8	5.7	0.3	5.6	0.8	4.1	1.1	5.5	4.0
9	4.0	45.1	86.8	46.2	76.4	53.2	75.3	47.1
10	0.1	0.0	0.1	0.0	0.0	0.0	2.4	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(d) Percentage of Trip Types by Time Period (Multiply Factor = PPL3)

Type\Time	1	2	3	4	5	6	7	Total
1	49.9	13.4	2.5	24.0	4.7	40.8	4.3	23.8
2	3.8	1.5	0.9	1.7	0.5	0.4	1.0	1.9
3	13.5	28.2	0.6	2.7	1.0	8.8	0.0	8.6
4	1.5	7.4	1.0	2.0	6.5	1.4	0.0	2.6
5	0.1	3.5	0.1	4.3	3.2	0.0	0.0	1.4
6	22.8	2.1	4.2	12.6	1.6	0.7	4.0	10.7
7	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.1
8	4.0	0.2	5.2	1.2	5.5	1.5	2.0	3.3
9	4.0	43.8	85.4	51.5	76.8	46.4	87.2	47.3
10	0.1	0.0	0.2	0.0	0.0	0.0	1.5	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(c) Percentage of Trip Types by Time Period (Multiply Factor = PPL2)

Type\Time	1	2	3	4	5	6	7	Total
1	50.8	15.2	3.3	26.4	4.6	43.1	5.5	25.0
2	3.8	2.4	0.8	2.3	0.4	0.2	1.3	2.1
3	13.1	24.5	0.5	2.1	0.6	6.6	0.0	7.9
4	1.1	6.9	0.9	3.1	6.1	1.8	0.0	2.6
5	0.1	3.3	0.1	3.6	2.9	0.0	0.0	1.3
6	21.5	2.2	4.1	12.3	1.3	0.6	5.4	10.1
7	0.5	0.0	0.0	0.0	0.2	0.1	0.0	0.2
8	4.1	0.2	5.7	0.9	4.5	3.0	2.6	3.4
9	4.9	45.2	84.5	49.3	79.5	44.7	83.6	47.2
10	0.1	0.0	0.2	0.0	0.0	0.0	1.6	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(e) Percentage of Trip Types by Time Period (Multiply Factor = FS)

Type\Time	1	2	3	4	5	6	7	Total
1	49.3	12.4	2.5	29.5	4.1	35.6	4.7	23.7
2	3.4	1.9	0.6	2.2	0.4	0.1	2.8	1.9
3	10.4	26.6	0.4	1.9	0.5	7.9	0.0	7.2
4	0.9	5.9	0.6	3.0	8.3	1.1	0.0	2.6
5	0.1	4.2	0.1	4.8	4.9	0.0	0.0	1.8
6	25.6	2.9	3.2	12.7	1.2	0.7	9.9	11.4
7	0.4	0.0	0.0	0.0	0.1	0.1	0.0	0.1
8	5.7	0.3	5.6	0.9	4.4	0.9	5.6	4.0
9	4.1	45.8	86.9	45.1	76.2	53.5	74.5	47.0
10	0.1	0.0	0.2	0.0	0.0	0.0	2.6	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[Multiplied Factors]
PPL1 : Based on Average Household Size (from Data Obtained)
PPL2 : Based on Number of People Answered the Questionnaire
PPL3 : Based on Number of People Who Make Trips (from Data Obtained)
FS : Based on Estimated Average Household Size by the City of Piura

Table 6-10 Comparison of M-Factors (4) : Percentages of Trips (The total is 100%)

(a) Percentage of Trip by Types and Time Period (Original Data)

Type\Time	1	2	3	4	5	6	7	Total
1	16.4	1.4	0.7	4.0	0.7	1.1	0.3	24.6
2	1.8	0.3	0.2	0.6	0.1	0.0	0.0	3.0
3	3.5	2.6	0.1	0.2	0.0	0.2	0.0	6.7
4	0.2	0.7	0.5	0.2	0.6	0.1	0.0	2.4
5	0.1	0.4	0.0	0.4	0.3	0.0	0.0	1.2
6	8.1	0.3	0.8	1.7	0.1	0.0	0.2	11.3
7	0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.5
8	1.0	0.0	0.8	0.1	0.4	0.0	0.1	2.5
9	1.3	5.1	19.2	5.7	10.5	2.0	3.7	47.5
10	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.3
Total	32.8	10.9	22.4	12.9	13.0	3.6	4.4	100.0

[Trip Types]
1 : Work
2 : Personal Business
3 : Shopping
4 : Social
5 : Recreation
6 : School
7 : Waiting for a ride
8 : Changing modes
9 : Home
10 : No indication

[Time Periods]
1 : 6:00 AM ~ 8:59 AM
2 : 9:00 AM ~ 11:59 AM
3 : 0:00 PM ~ 2:59 PM
4 : 3:00 PM ~ 5:59 PM
5 : 6:00 PM ~ 9:59 PM
6 : 10:00 PM ~ 5:59 AM
7 : 6:00 AM ~ 6:59 AM

(b) Percentage of Trip by Types and Time Period (Multiply Factor = PPL1)

Type\Time	1	2	3	4	5	6	7	Total
1	15.3	1.5	0.5	3.6	0.5	1.6	0.2	23.3
2	1.1	0.2	0.1	0.3	0.1	0.0	0.1	1.9
3	3.4	3.3	0.1	0.2	0.1	0.4	0.0	7.4
4	0.3	0.7	0.2	0.4	1.0	0.1	0.0	2.6
5	0.0	0.5	0.0	0.6	0.6	0.0	0.0	1.7
6	8.2	0.4	0.7	1.7	0.1	0.0	0.5	11.6
7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
8	1.8	0.0	1.2	0.1	0.5	0.0	0.3	4.0
9	1.3	5.4	18.5	6.0	9.5	2.4	4.1	47.1
10	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
Total	31.4	12.0	21.3	12.9	12.4	4.5	5.5	100.0

(c) Percentage of Trip by Types and Time Period (Multiply Factor = PPL2)

Type\Time	1	2	3	4	5	6	7	Total
1	16.1	1.9	0.7	3.7	0.6	1.9	0.3	25.0
2	1.2	0.3	0.2	0.3	0.0	0.0	0.1	2.1
3	4.2	3.0	0.1	0.3	0.1	0.3	0.0	7.9
4	0.4	0.8	0.2	0.4	0.7	0.1	0.0	2.6
5	0.0	0.4	0.0	0.5	0.4	0.0	0.0	1.3
6	6.8	0.3	0.9	1.7	0.2	0.0	0.3	10.1
7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2
8	1.3	0.0	1.2	0.1	0.5	0.1	0.1	3.4
9	1.6	5.5	17.4	6.8	9.7	2.0	4.3	47.2
10	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
Total	31.6	12.2	20.6	13.9	12.2	4.4	5.2	100.0

(d) Percentage of Trip by Types and Time Period (Multiply Factor = PPL3)

Type\Time	1	2	3	4	5	6	7	Total
1	15.9	1.6	0.5	3.4	0.5	1.6	0.3	23.8
2	1.2	0.2	0.2	0.2	0.1	0.0	0.1	1.9
3	4.3	3.3	0.1	0.4	0.1	0.3	0.0	8.6
4	0.5	0.9	0.2	0.3	0.7	0.1	0.0	2.6
5	0.0	0.4	0.0	0.6	0.3	0.0	0.0	1.4
6	7.3	0.2	0.9	1.8	0.2	0.0	0.3	10.7
7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
8	1.3	0.0	1.1	0.2	0.6	0.1	0.1	3.3
9	1.3	5.2	17.9	7.3	8.3	1.8	5.5	47.3
10	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
Total	31.9	11.9	21.0	14.1	10.8	3.9	6.4	100.0

(e) Percentage of Trip by Types and Time Period (Multiply Factor = FS)

Type\Time	1	2	3	4	5	6	7	Total
1	15.6	1.5	0.5	3.8	0.5	1.6	0.2	23.7
2	1.1	0.2	0.1	0.3	0.1	0.0	0.1	1.9
3	3.3	3.2	0.1	0.2	0.1	0.4	0.0	7.2
4	0.3	0.7	0.1	0.4	1.0	0.1	0.0	2.6
5	0.0	0.5	0.0	0.6	0.6	0.0	0.0	1.8
6	8.1	0.3	0.7	1.6	0.1	0.0	0.5	11.4
7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
8	1.8	0.0	1.2	0.1	0.6	0.0	0.3	4.0
9	1.3	5.4	18.7	5.7	9.5	2.4	3.9	47.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
Total	31.6	11.8	21.5	12.7	12.5	4.5	5.3	100.0

[Multiplied Factors]
PPL1 : Based on Average Household Size (from Data Obtained)
PPL2 : Based on Number of People Answered the Questionnaire
PPL3 : Based on Number of People Who Make Trips (from Data Obtained)
FS : Based on Estimated Average Household Size by the City of Piura

Table 6-11 Trip Structure (Summary of Estimated Trips)

(a) The Number of Total Trips by Time Period

Time Period \ M-Factor		Orig.	PPL1	PPL2	PPL3	FS
1	6:00 AM ~ 8:59 AM	689	97543	251115	115992	92003
2	9:00 AM ~ 11:59 AM	228	37179	96721	43090	34546
3	0:00 PM ~ 2:59 PM	471	66215	163222	76180	62615
4	3:00 PM ~ 5:59 PM	271	40150	109938	51168	37167
5	6:00 PM ~ 9:59 PM	273	38382	96706	39332	36551
6	10:00 PM ~ 5:59 AM	76	14029	34889	14295	13249
7	6:00 AM ~ 6:59 AM	93	16942	41162	23108	15458
Total	Total	2101	310441	793753	363166	291589

(b) Percentage of Total Trips by Time Period

Time Period \ M-Factor		Orig.	PPL1	PPL2	PPL3	FS	Ave.
1	6:00 AM ~ 8:59 AM	32.8	31.4	31.6	31.9	31.6	31.9
2	9:00 AM ~ 11:59 AM	10.9	12.0	12.2	11.9	11.8	11.7
3	0:00 PM ~ 2:59 PM	22.4	21.3	20.6	21.0	21.5	21.4
4	3:00 PM ~ 5:59 PM	12.9	12.9	13.9	14.1	12.7	13.3
5	6:00 PM ~ 9:59 PM	13.0	12.4	12.2	10.8	12.5	12.2
6	10:00 PM ~ 5:59 AM	3.6	4.5	4.4	3.9	4.5	4.2
7	6:00 AM ~ 6:59 AM	4.4	5.5	5.2	6.4	5.3	5.3
	Total	100	100	100	100	100	100

(c) The Number of Total Trips for Each Trip Type (Based on M-factor)

T\P	1	2	3	4	5	6	7	8	9	10	Total
Orig	517	64	140	50	26	237	10	53	998	6	2101
PPl1	72293	5900	23072	8080	5393	36087	346	12354	146309	606	310441
PPL2	198373	16661	62632	21001	10282	79995	1347	27244	374992	1226	793753
PPL3	86560	7019	31312	9424	5205	38687	339	12080	171921	619	363166
FS	69108	5555	20976	7503	5161	33331	386	11774	137182	612	291589

(d) Percentage of Total Trips for Each Trip Type (Based on M-factor)

T\P	1	2	3	4	5	6	7	8	9	10	Total
Orig	24.6	3.0	6.7	2.4	1.2	11.3	0.5	2.5	47.5	0.3	100
PPl1	23.3	1.9	7.4	2.6	1.7	11.6	0.1	4.0	47.1	0.2	100
PPL2	25.0	2.1	7.9	2.6	1.3	10.1	0.2	3.4	47.2	0.2	100
PPL3	23.8	1.9	8.6	2.6	1.4	10.7	0.1	3.3	47.3	0.2	100
FS	23.7	1.9	7.2	2.6	1.8	11.4	0.1	4.0	47.0	0.2	100
Ave.	24.1	2.2	7.6	2.6	1.5	11.0	0.2	3.5	47.3	0.2	100

(e) The Number of Total Trips by Hourly Period

Hourly Period \ M-Factor		Orig.	PPL1	PPL2	PPL3	FS
(1)	5:00 AM ~ 5:59 AM	22	4061	10099	4138	3835
(2)	6:00 AM ~ 6:59 AM	117	16564	42642	19697	15623
(3)	7:00 AM ~ 7:59 AM	362	51249	131935	60942	48338
(4)	8:00 AM ~ 8:59 AM	210	29730	76537	35353	28042
(5)	9:00 AM ~ 9:59 AM	100	16307	42421	18899	15152
(6)	10:00 AM ~ 10:59 AM	74	12067	31392	13985	11212
(7)	11:00 AM ~ 11:59 AM	54	8806	22908	10205	8182
(8)	0:00 PM ~ 0:59 PM	87	12231	30149	14071	11566
(9)	1:00 PM ~ 1:59 PM	257	36130	89062	41567	34166
(10)	2:00 PM ~ 2:59 PM	127	17854	44011	20541	16884
(11)	3:00 PM ~ 3:59 PM	100	14816	40567	18881	13715
(12)	4:00 PM ~ 4:59 PM	100	14816	40567	18881	13715
(13)	5:00 PM ~ 5:59 PM	71	10519	28803	13406	9737
(14)	6:00 PM ~ 6:59 PM	78	10966	27630	11238	10443
(15)	7:00 PM ~ 7:59 PM	77	10826	27276	11094	10309
(16)	8:00 PM ~ 8:59 PM	79	11107	27985	11382	10577
(17)	9:00 PM ~ 9:59 AM	39	5483	13815	5619	5222
(18)	10:00 PM ~ 10:59 PM	25	4615	11477	4702	4358
(19)	11:00 PM ~ 11:59 PM	12	2215	5509	2257	2092
(20)	0:00 AM ~ 0:59 AM	1	185	459	188	174
(21)	1:00 AM ~ 1:59 AM	3	554	1377	564	523
(22)	2:00 AM ~ 2:59 AM	2	369	918	376	349
(23)	3:00 AM ~ 3:59 AM	5	923	2295	940	872
(24)	4:00 AM ~ 4:59 AM	6	1108	2754	1129	1046
(25)	no indication	93	16942	41162	23108	15458
	Total Trips	2101	310441	793753	363166	291589

(f) Percentage of Total Trips by Hourly Period

T\P	Orig.	PPL1	PPL2	PPL3	FS	Ave.
(1)	1.0	1.3	1.3	1.1	1.3	1.3
(2)	5.6	5.3	5.4	5.4	5.4	5.4
(3)	17.2	16.5	16.6	16.8	16.6	16.6
(4)	10	9.6	9.6	9.7	9.6	9.6
(5)	4.8	5.3	5.3	5.2	5.2	5.2
(6)	3.5	3.9	4.0	3.9	3.8	3.9
(7)	2.6	2.8	2.9	2.8	2.8	2.8
(8)	4.1	3.9	3.8	3.9	4.0	3.9
(9)	12.2	11.6	11.2	11.4	11.7	11.5
(10)	6.0	5.8	5.5	5.7	5.8	5.7
(11)	4.8	4.8	5.1	5.2	4.7	4.9
(12)	4.8	4.8	5.1	5.2	4.7	4.9
(13)	3.4	3.4	3.6	3.7	3.3	3.5
(14)	3.7	3.5	3.5	3.1	3.6	3.4
(15)	3.7	3.5	3.4	3.1	3.5	3.4
(16)	3.8	3.6	3.5	3.1	3.6	3.5
(17)	1.9	1.8	1.7	1.5	1.8	1.7
(18)	1.2	1.5	1.4	1.3	1.5	1.4
(19)	0.6	0.7	0.7	0.6	0.7	0.7
(20)	0.0	0.1	0.1	0.1	0.1	0.1
(21)	0.1	0.2	0.2	0.2	0.2	0.2
(22)	0.1	0.1	0.1	0.1	0.1	0.1
(23)	0.2	0.3	0.3	0.3	0.3	0.3
(24)	0.3	0.4	0.3	0.3	0.4	0.3
(25)	4.4	5.5	5.2	6.4	5.3	5.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

(g) Basic Trip Structure

	1 HBW	2 HBNW	3 NHB
Orig	24.6	70.4	5.0
PPl1	23.3	71.0	5.7
PPL2	25.0	69.5	5.5
PPL3	23.8	70.8	5.3
FS	23.7	70.4	5.9

HBW : Home based work (by Trip type1)

HBNW : Home based non w (by taking rest)

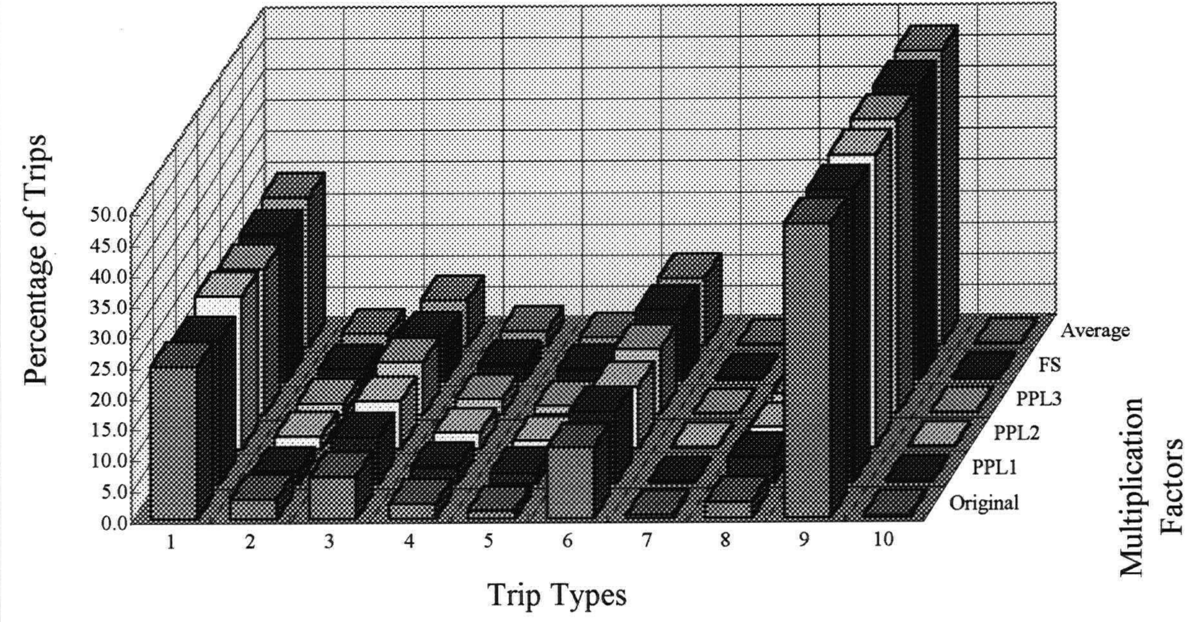
NHB : Non home based (by 1-(Type9*2))

(h) Trip Type

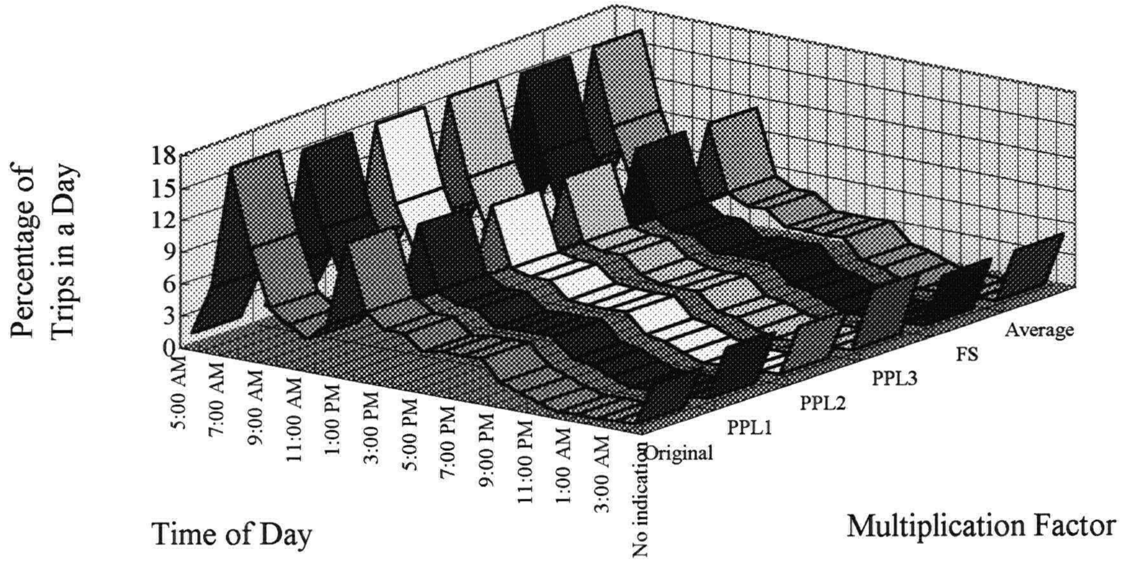
1	Work
2	Personal Business
3	Shopping
4	Social
5	Recreation
6	School
7	Waiting for a ride
8	Changing modes
9	Home
10	No indication

Figure 6-3 Comparison of Percentage of Trips by Multiplication Factors

(a) Percentage of Trips by trip Types



(b) Change in Percentage of Trips in a Day by Multiplication Factors



6.2.2 Comparison of Total Estimated Trips

Table 6-7 summarizes the results of the expansion calculation. Table 6-7 (a) to 6-7 (e) represent the results of the original data, by multiplication factor PPL1, by PPL2, by PPL3 and by FS respectively. The rows and columns represent ten trip types and seven time periods respectively.

The total estimated trips by PPL1, by PPL2, by PPL3 and by FS are 310,441, 793,753, 363,166 and 291,589 respectively. The portions of the estimated trips in the expansion results by these multiplication factors are basically as same as the portions of original data: "home" trips, trip type (9), and "work" trips, trip type (1), are the two primary trip types followed by "school" trips, trip type (6), and "shopping" trips, trip type (3). The busiest time period is the morning time period (1) between 6 and 9 a.m., followed by the early afternoon period (3) between 12 and 3 p.m..

Tables 6-8 to 6-10 summarize the portion of estimated trips by ① time periods within each trip type, by ② trip types within each time period, and by ③ the total estimated daily trips respectively. In either case of above three, no big differences of applying the four multiplication factors from the original data is observed. Moreover, the results of applying these four multiplication factors are quite similar to each other. Therefore, the primary difference of applying these multiplication factors is basically the expanding size. That is, the propriety of these multiply factors are primarily judged by considering how much the expanded results are close to the real or estimated total trips.

Table 6-11 further summarizes the original data and the total estimated trips, and also compare them with each other. Table 6-11 (a) and 6-11 (c) represent the original and estimated trips by time periods and trip types respectively, and Table 6-11 (b) and 6-11 (d) show the portions of those trips by time periods and trip types respectively. Then, Table 6-11 (e) and 6-11 (f) show the transformed results of the numbers and portions of the trips by hour periods respectively. Table 6-11 (g) shows the basic trip structure by home-based work, home-based non-work and non-home based trips.

As mentioned, the portions of the original data and the total estimated trips by PPL1, PPL2, PPL3 and FS are quite similar to each other despite the existence of some minor differences. This fact is also observed from Figure 6-3, which compares the portions of the original data, the estimated data by PPL1, by PPL2, by PPL3 and by FS with each other. Figure 6-3 (a) is summarized based on trip types while Figure 6-3 (b) shows the changes of portions of trips in a day based on hour periods. The noticeable observed similarities of the results of applying the multiplication factors to the original data are:

① two primary trip types are "home" trips, which is trip type (9), and "work" trips, which is trip type (1), followed by "school" trips, which is trip type (6) and "shopping" trips, which is trip type (3), and

② two peak periods, the busiest morning period of around 7 a.m. and the second busiest period of early afternoon around 1 p.m., are easily observed.

Further, Table 6-12 and 6-13 compare the detailed expansion results of the four multiplication factors based on trip types and time periods respectively. Table (a)s in these Tables show the number of trips and Table (b)s show the portions of the trips by trip types or by time periods. From this Table 6-12, which is based on trip types, some minor differences between the original data and the estimated results by four multiplication factors are observed at the trip type (7), "waiting a ride," and the trip type (10), "no indication." However, since their absolute numbers are not large compared with other trip types, it is assumed that their influence is not much. Other noticeable differences are observed at the trip type (4), "social," and the trip type (5) "recreation." The differences are shifts of portions of the expanded trips from one trip type to another also the shifts are not significant much. The portions of the expanded "social" trips in the time period (3) decreases from the original, and the portions of "recreation" trips in the time periods (1) and (3) also decrease from the original. The differences between the results of those multiplication factors, however, are not large so that

Table 6-12 (1) Trip Structures by Trip Types

Trip Type [1 : Work]

(a) Number of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS
T1	344	47362	127567	57894	45387
T2	29	4717	14685	5754	4277
T3	15	1586	5372	1924	1555
T4	84	11304	29030	12306	10965
T5	15	1594	4408	1855	1491
T6	24	4981	15036	5829	4712
T7	6	749	2276	998	722
Total	517	72293	198373	86560	69108

(b) Percentage of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS	Average
T1	66.5	65.5	64.3	66.9	65.7	65.6
T2	5.6	6.5	7.4	6.6	6.2	6.7
T3	2.9	2.2	2.7	2.2	2.2	2.3
T4	16.2	15.6	14.6	14.2	15.9	15.1
T5	2.9	2.2	2.2	2.1	2.2	2.2
T6	4.6	6.9	7.6	6.7	6.8	7.0
T7	1.2	1.0	1.1	1.2	1.0	1.1
Total	100	100	100	100	100	100

Trip Type [2 : Personal Business]

(a) Number of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS
T1	38	3427	9501	4407	3091
T2	6	632	2321	630	658
T3	4	363	1301	657	382
T4	12	827	2555	854	828
T5	2	165	377	191	151
T6	1	20	69	51	17
T7	1	465	538	228	429
Total	64	5900	16661	7019	5555

(b) Percentage of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS	Average
T1	59.4	58.1	57.0	62.8	55.6	58.4
T2	9.4	10.7	13.9	9.0	11.8	11.4
T3	6.3	6.2	7.8	9.4	6.9	7.5
T4	18.8	14.0	15.3	12.2	14.9	14.1
T5	3.1	2.8	2.3	2.7	2.7	2.6
T6	1.6	0.3	0.4	0.7	0.3	0.4
T7	1.6	7.9	3.2	3.3	7.7	5.5
Total	100	100	100	100	100	100

Trip Type [3 : Shopping]

(a) Number of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS
T1	74	10546	32988	15683	9611
T2	54	10254	23738	12152	9187
T3	2	271	740	459	252
T4	5	704	2284	1371	697
T5	1	185	588	392	176
T6	4	1113	2295	1255	1053
T7	0	0	0	0	0
Total	140	23072	62632	31312	20976

(b) Percentage of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS	Average
T1	52.9	45.7	52.7	50.1	45.8	48.6
T2	38.6	44.4	37.9	38.8	43.8	41.2
T3	1.4	1.2	1.2	1.5	1.2	1.3
T4	3.6	3.1	3.6	4.4	3.3	3.6
T5	0.7	0.8	0.9	1.3	0.8	1.0
T6	2.9	4.8	3.7	4.0	5.0	4.4
T7	0.0	0.0	0.0	0.0	0.0	0.0
Total	100	100	100	100	100	100

Trip Type [4 : Social]

(a) Number of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS
T1	5	878	2867	1725	809
T2	15	2130	6721	3185	2029
T3	10	494	1404	752	378
T4	5	1233	3438	998	1111
T5	13	3159	5935	2563	3024
T6	2	187	636	200	151
T7	0	0	0	0	0
Total	50	8080	21001	9424	7503

(b) Percentage of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS	Average
T1	10.0	10.9	13.7	18.3	10.8	13.4
T2	30.0	26.4	32.0	33.8	27.0	29.8
T3	20.0	6.1	6.7	8.0	5.0	6.5
T4	10.0	15.3	16.4	10.6	14.8	14.3
T5	26.0	39.1	28.3	27.2	40.3	33.7
T6	4.0	2.3	3.0	2.1	2.0	2.4
T7	0.0	0.0	0.0	0.0	0.0	0.0
Total	100	100	100	100	100	100

Trip Type [5 : Recreation]

(a) Number of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS
T1	2	76	200	102	67
T2	9	1478	3172	1520	1461
T3	1	65	175	87	55
T4	8	1858	3946	2224	1776
T5	6	1916	2789	1270	1801
T6	0	0	0	0	0
T7	0	0	0	0	0
Total	26	5393	10282	5205	5161

(b) Percentage of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS	Average
T1	7.7	1.4	1.9	2.0	1.3	1.7
T2	34.6	27.4	30.8	29.2	28.3	28.9
T3	3.8	1.2	1.7	1.7	1.1	1.4
T4	30.8	34.5	38.4	42.7	34.4	37.5
T5	23.1	35.5	27.1	24.4	34.9	30.5
T6	0.0	0.0	0.0	0.0	0.0	0.0
T7	0.0	0.0	0.0	0.0	0.0	0.0
Total	100	100	100	100	100	100

Table 6-12 (2) Trip Structures by Trip Types

Trip Type [6 : School]

(a) Number of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS
T1	170	25342	53903	26448	23579
T2	6	1090	2150	888	1001
T3	17	2159	6749	3212	1998
T4	35	5340	13543	6462	4703
T5	3	414	1240	640	422
T6	1	100	202	104	95
T7	5	1642	2209	933	1533
Total	237	36087	79995	38687	33331

(b) Percentage of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS	Average
T1	71.7	70.2	67.4	68.4	70.7	69.2
T2	2.5	3.0	2.7	2.3	3.0	2.8
T3	7.2	6.0	8.4	8.3	6.0	7.2
T4	14.8	14.8	16.9	16.7	14.1	15.6
T5	1.3	1.1	1.5	1.7	1.3	1.4
T6	0.4	0.3	0.3	0.3	0.3	0.3
T7	2.1	4.5	2.8	2.4	4.6	3.6
Total	100	100	100	100	100	100

Trip Type [7 : Waiting for a ride]

(a) Number of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS
T1	6	302	1140	308	343
T2	0	0	0	0	0
T3	0	0	0	0	0
T4	0	0	0	0	0
T5	3	33	181	16	31
T6	1	11	25	15	12
T7	0	0	0	0	0
Total	10	346	1347	339	386

(b) Percentage of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS	Average
T1	60.0	87.2	84.7	91.0	88.8	87.9
T2	0.0	0.0	0.0	0.0	0.0	0.0
T3	0.0	0.0	0.0	0.0	0.0	0.0
T4	0.0	0.0	0.0	0.0	0.0	0.0
T5	30.0	9.5	13.4	4.6	8.1	8.9
T6	10.0	3.3	1.9	4.4	3.1	3.2
T7	0.0	0.0	0.0	0.0	0.0	0.0
Total	100	100	100	100	100	100

Trip Type [8 : Changing modes]

(a) Number of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS
T1	21	5592	10309	4596	5255
T2	1	100	202	104	95
T3	17	3687	9329	3937	3489
T4	2	319	977	597	336
T5	9	1577	4312	2181	1618
T6	1	150	1039	208	123
T7	2	930	1077	457	858
Total	53	12354	27244	12080	11774

(b) Percentage of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS	Average
T1	39.6	45.3	37.8	38.0	44.6	41.4
T2	1.9	0.8	0.7	0.9	0.8	0.8
T3	32.1	29.8	34.2	32.6	29.6	31.6
T4	3.8	2.6	3.6	4.9	2.9	3.5
T5	17.0	12.8	15.8	18.1	13.7	15.1
T6	1.9	1.2	3.8	1.7	1.0	1.9
T7	3.8	7.5	4.0	3.8	7.3	5.6
Total	100	100	100	100	100	100

Trip Type [9 : Home]

(a) Number of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS
T1	27	3897	12369	4672	3749
T2	107	16777	43732	18855	15836
T3	404	57506	137862	65034	54411
T4	120	18565	54166	26356	16751
T5	221	29339	76877	30225	27836
T6	42	7468	15587	6634	7086
T7	77	12756	34399	20144	11512
Total	998	146309	374992	171921	137182

(b) Percentage of Trips

Time\MF	Orig	PPL1	PPL2	PPL3	FS	Average
T1	2.7	2.7	3.3	2.7	2.7	2.9
T2	10.7	11.5	11.7	11.0	11.5	11.4
T3	40.5	39.3	36.8	37.8	39.7	38.4
T4	12.0	12.7	14.4	15.3	12.2	13.7
T5	22.1	20.1	20.5	17.6	20.3	19.6
T6	4.2	5.1	4.2	3.9	5.2	4.6
T7	7.7	8.7	9.2	11.7	8.4	9.5
Total	100	100	100	100	100	100

Trip Type [10 : No indication]

Time\MF	Orig	PPL1	PPL2	PPL3	FS
T1	2	120	271	154	112
T2	1	1	1	1	1
T3	1	85	291	117	95
T4	0	0	0	0	0
T5	0	0	0	0	0
T6	0	0	0	0	0
T7	2	400	663	346	404
Total	6	606	1226	619	612

Time\MF	Orig	PPL1	PPL2	PPL3	FS	Average
T1	33.3	19.9	22.1	24.9	18.3	21.3
T2	16.7	0.2	0.1	0.2	0.2	0.1
T3	16.7	14.0	23.8	19.0	15.6	18.1
T4	0.0	0.0	0.0	0.0	0.0	0.0
T5	0.0	0.0	0.0	0.0	0.0	0.0
T6	0.0	0.0	0.0	0.0	0.0	0.0
T7	33.3	66.0	54.1	55.9	65.9	60.5
Total	100	100	100	100	100	100

Table 6-13 (1) Trip Structures by Time Periods

Time Period [1 : 6:00 am ~ 8:59 am]

(a) Number of Trips

Type\MF	Orig	PPL1	PPL2	PPL3	FS
1	344	47362	127567	57894	45387
2	38	3427	9501	4407	3091
3	74	10546	32988	15683	9611
4	5	878	2867	1725	809
5	2	76	200	102	67
6	170	25342	53903	26448	23579
7	6	302	1140	308	343
8	21	5592	10309	4596	5255
9	27	3897	12369	4672	3749
10	2	120	271	154	112
Total	689	97543	251115	115992	92003

(b) Percentage of Trips

Type\MF	Orig	PPL1	PPL2	PPL3	FS	Average
1	49.9	48.6	50.8	49.9	49.3	49.7
2	5.5	3.5	3.8	3.8	3.4	3.6
3	10.7	10.8	13.1	13.5	10.4	12.0
4	0.7	0.9	1.1	1.5	0.9	1.1
5	0.3	0.1	0.1	0.1	0.1	0.1
6	24.7	26.0	21.5	22.8	25.6	24.0
7	0.9	0.3	0.5	0.3	0.4	0.4
8	3.0	5.7	4.1	4.0	5.7	4.9
9	3.9	4.0	4.9	4.0	4.1	4.3
10	0.3	0.1	0.1	0.1	0.1	0.1
Total	100	100	100	100	100	100

Time Period [2 : 9:00 am ~ 11:59 am]

(a) Number of Trips

Type\MF	Orig	PPL1	PPL2	PPL3	FS
1	29	4717	14685	5754	4277
2	6	632	2321	630	658
3	54	10254	23738	12152	9187
4	15	2130	6721	3185	2029
5	9	1478	3172	1520	1461
6	6	1090	2150	888	1001
7	0	0	0	0	0
8	1	100	202	104	95
9	107	16777	43732	18855	15836
10	1	1	1	1	1
Total	228	37179	96721	43090	34546

(b) Percentage of Trips

Type\MF	Orig	PPL1	PPL2	PPL3	FS	Average
1	12.7	12.7	15.2	13.4	12.4	13.4
2	2.6	1.7	2.4	1.5	1.9	1.9
3	23.7	27.6	24.5	28.2	26.6	26.7
4	6.6	5.7	6.9	7.4	5.9	6.5
5	3.9	4.0	3.3	3.5	4.2	3.8
6	2.6	2.9	2.2	2.1	2.9	2.5
7	0.0	0.0	0.0	0.0	0.0	0.0
8	0.4	0.3	0.2	0.2	0.3	0.2
9	46.9	45.1	45.2	43.8	45.8	45.0
10	0.4	0.0	0.0	0.0	0.0	0.0
Total	100	100	100	100	100	100

Time Period [3 : 0:00 pm ~ 2:59 pm]

(a) Number of Trips

Type\MF	Orig	PPL1	PPL2	PPL3	FS
1	15	1586	5372	1924	1555
2	4	363	1301	657	382
3	2	271	740	459	252
4	10	494	1404	752	378
5	1	65	175	87	55
6	17	2159	6749	3212	1998
7	0	0	0	0	0
8	17	3687	9329	3937	3489
9	404	57506	137862	65034	54411
10	1	85	291	117	95
Total	471	66215	163222	76180	62615

(b) Percentage of Trips

Type\MF	Orig	PPL1	PPL2	PPL3	FS	Average
1	3.2	2.4	3.3	2.5	2.5	2.7
2	0.8	0.5	0.8	0.9	0.6	0.7
3	0.4	0.4	0.5	0.6	0.4	0.5
4	2.1	0.7	0.9	1.0	0.6	0.8
5	0.2	0.1	0.1	0.1	0.1	0.1
6	3.6	3.3	4.1	4.2	3.2	3.7
7	0.0	0.0	0.0	0.0	0.0	0.0
8	3.6	5.6	5.7	5.2	5.6	5.5
9	85.8	86.8	84.5	85.4	86.9	85.9
10	0.2	0.1	0.2	0.2	0.2	0.2
Total	100	100	100	100	100	100

Time Period [4 : 3:00 pm ~ 5:59 pm]

(a) Number of Trips

Type\MF	Orig	PPL1	PPL2	PPL3	FS
1	84	11304	29030	12306	10965
2	12	827	2555	854	828
3	5	704	2284	1371	697
4	5	1233	3438	998	1111
5	8	1858	3946	2224	1776
6	35	5340	13543	6462	4703
7	0	0	0	0	0
8	2	319	977	597	336
9	120	18565	54166	26356	16751
10	0	0	0	0	0
Total	271	40150	109938	51168	37167

(b) Percentage of Trips

Type\MF	Orig	PPL1	PPL2	PPL3	FS	Average
1	31.0	28.2	26.4	24.0	29.5	27.0
2	4.4	2.1	2.3	1.7	2.2	2.1
3	1.8	1.8	2.1	2.7	1.9	2.1
4	1.8	3.1	3.1	2.0	3.0	2.8
5	3.0	4.6	3.6	4.3	4.8	4.3
6	12.9	13.3	12.3	12.6	12.7	12.7
7	0.0	0.0	0.0	0.0	0.0	0.0
8	0.7	0.8	0.9	1.2	0.9	0.9
9	44.3	46.2	49.3	51.5	45.1	48.0
10	0.0	0.0	0.0	0.0	0.0	0.0
Total	100	100	100	100	100	100

Table 6-13 (2) Trip Structures by Time Periods

Time Period [5 : 6:00 pm ~ 9:59 pm]

(a) Number of Trips

Type\MF	Orig	PPL1	PPL2	PPL3	FS
1	15	1594	4408	1855	1491
2	2	165	377	191	151
3	1	185	588	392	176
4	13	3159	5935	2563	3024
5	6	1916	2789	1270	1801
6	3	414	1240	640	422
7	3	33	181	16	31
8	9	1577	4312	2181	1618
9	221	29339	76877	30225	27836
10	0	0	0	0	0
Total	273	38382	96706	39332	36551

(b) Percentage of Trips

Type\MF	Orig	PPL1	PPL2	PPL3	FS	Average
1	5.5	4.2	4.6	4.7	4.1	4.4
2	0.7	0.4	0.4	0.5	0.4	0.4
3	0.4	0.5	0.6	1.0	0.5	0.6
4	4.8	8.2	6.1	6.5	8.3	7.3
5	2.2	5.0	2.9	3.2	4.9	4.0
6	1.1	1.1	1.3	1.6	1.2	1.3
7	1.1	0.1	0.2	0.0	0.1	0.1
8	3.3	4.1	4.5	5.5	4.4	4.6
9	81.0	76.4	79.5	76.8	76.2	77.2
10	0.0	0.0	0.0	0.0	0.0	0.0
Total	100	100	100	100	100	100

Time Period [6 : 10:00 pm ~ 5:59 am]

(a) Number of Trips

Type\MF	Orig	PPL1	PPL2	PPL3	FS
1	24	4981	15036	5829	4712
2	1	20	69	51	17
3	4	1113	2295	1255	1053
4	2	187	636	200	151
5	0	0	0	0	0
6	1	100	202	104	95
7	1	11	25	15	12
8	1	150	1039	208	123
9	42	7468	15587	6634	7086
10	0	0	0	0	0
Total	76	14029	34889	14295	13249

(b) Percentage of Trips

Type\MF	Orig	PPL1	PPL2	PPL3	FS	Average
1	31.6	35.5	43.1	40.8	35.6	38.7
2	1.3	0.1	0.2	0.4	0.1	0.2
3	5.3	7.9	6.6	8.8	7.9	7.8
4	2.6	1.3	1.8	1.4	1.1	1.4
5	0.0	0.0	0.0	0.0	0.0	0.0
6	1.3	0.7	0.6	0.7	0.7	0.7
7	1.3	0.1	0.1	0.1	0.1	0.1
8	1.3	1.1	3.0	1.5	0.9	1.6
9	55.3	53.2	44.7	46.4	53.5	49.4
10	0.0	0.0	0.0	0.0	0.0	0.0
Total	100	100	100	100	100	100

Time Period [7 : No indication]

(a) Number of Trips

Type\MF	Orig	PPL1	PPL2	PPL3	FS
1	6	749	2276	998	722
2	1	465	538	228	429
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	5	1642	2209	933	1533
7	0	0	0	0	0
8	2	930	1077	457	858
9	77	12756	34399	20144	11512
10	2	400	663	346	404
Total	93	16942	41162	23108	15458

(b) Percentage of Trips

Type\MF	Orig	PPL1	PPL2	PPL3	FS	Average
1	6.5	4.4	5.5	4.3	4.7	4.7
2	1.1	2.7	1.3	1.0	2.8	2.0
3	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0
6	5.4	9.7	5.4	4.0	9.9	7.3
7	0.0	0.0	0.0	0.0	0.0	0.0
8	2.2	5.5	2.6	2.0	5.6	3.9
9	82.8	75.3	83.6	87.2	74.5	80.1
10	2.2	2.4	1.6	1.5	2.6	2.0
Total	100	100	100	100	100	100

Time Periods

T1 : 6:00 am ~ 8:59 am
T2 : 9:00 am ~ 11:59 am
T3 : 0:00 pm ~ 2:59 pm
T4 : 3:00 pm ~ 5:59 pm
T5 : 6:00 pm ~ 9:59 pm
T6 : 10:00 pm ~ 5:59 am
T7 : No indication

Trip Types

1 : Work
2 : Personal Business
3 : Shopping
4 : Social
5 : Recreation
6 : School
7 : Waiting for a ride
8 : Changing modes
9 : Home
10 : No indication

Multiplication Factors (MF)

PPL1 : Based on average household size
(from the original data obtained)

PPL2 : Based on the number of people answered the questionnaire
(from the original data obtained)

PPL3 : Based on the number of people who make trips
(from the original data obtained)

FS : Based on estimated average household size
defined by the city of Piura (5.5)

it is assumed that these shifts of trip portions are unavoidable when data are expanded. From Table 6-13, which shows the data based on time periods, no major differences in the portion distribution are identified. That is, the portions of the expanded data by time periods are similar enough to the original survey results in the case of applying any multiplication factor.

From these results that show the similarity in the distribution of trip portions, the question of superiority of the multiplication factor becomes a matter of how much the estimated trip numbers are close to the real. From the result, PPL3 is chosen as the most reasonable factor among the four multiplication factors. Obviously, the results by PPL2, which is 793,753 total estimated trips are far different from the ones by the other three factors. Therefore, PPL2 is excluded. The other expanded results by PPL1, PPL3 and FS, which are 310,441, 363,166 and 291,589 respectively, are all considerably acceptable by considering the fact that ① the base population is 366,206, that ② the share of trip making population is 46.3% in the original data, and that ③ average trips per person of 1.96 from the original data. Then, by the further consideration of the definition of those factors mentioned in the previous chapter, PPL3 is thought as best because ④ PPL3 is the only multiplication factor which considers the number of people who actually make trips.

6.3 Trip Characteristics

As discussed in the previous section, the multiplication factor PPL3 is chosen as the most reliable population expansion factor for this study. Then, this Section 6.3 performs further analysis on the estimated trips by applying PPL3. First, the expansion results by PPL3 are discussed. Second, some of the OD matrixes, which are the original expanded results based on the traffic analysis zones, are presented. Those original OD matrixes are further transformed to rough OD matrixes, which are summarized by 4 traffic areas and 12 traffic area zones instead of 30 traffic analysis zones, in order to grasp the approximate travel movement in the city. Then, origins and destinations, which are the outcomes of the OD matrixes, are presented.

6.3.1 By Trip Type and Time (Hour) Period

Tables 6-14 to 6-19 summarize the expansion results of PPL3. First, Tables 6-14 to 6-17 compare the differences of PPL3 data from the original. Each Table has four small tables as a combination of (a) original and (b) PPL3, and (1) time periods and (2) hour periods. Table 6-14 shows the trip numbers while Tables 6-15, 6-16 and 6-17 summarize the portions of trips based on each time period, on each trip type, and on the total daily trips respectively. By comparing the portions between the original data and the PPL3 data, with a particular focus on Table 6-17, no big differences are observed in either case. From Table 6-17 (1), the maximum difference is observed 2.2% at "home" trips between 6 and 9 p.m. while the maximum difference for the other nine trip types is 0.8% at "shopping" and "school" trips during the morning peak hours between 6 and 9 a.m.. From Table 6-17 (2), the maximum difference is 0.7% at "home" trips between 7 and 8 p.m. by excluding "no time indicated trips" while the maximum for the other trip types is 0.5% at "school" trips between 7 and 8 a.m..

Table 6-14 The Number of Trips : Original and PPL3 (by Time Periods and Hour Periods)

(1) by Trip Types and Time Periods

(a) Number of Trips for Each Trip Type and Time Period (Original Data)

T\P	1	2	3	4	5	6	7	8	9	10	Total
1	344	38	74	5	2	170	6	21	27	2	689
2	29	6	54	15	9	6	0	1	107	1	228
3	15	4	2	10	1	17	0	17	404	1	471
4	84	12	5	5	8	35	0	2	120	0	271
5	15	2	1	13	6	3	3	9	221	0	273
6	24	1	4	2	0	1	1	1	42	0	76
7	6	1	0	0	0	5	0	2	77	2	93
Total	517	64	140	50	26	237	10	53	998	6	2101

T: Time periods, P: Trip types

(b) Number of Trips for Each Trip Type and Time Period (M = PPL3)

T\P	1	2	3	4	5	6	7	8	9	10	Total
1	57894	4407	15683	1725	102	26448	308	4596	4672	154	115992
2	5754	630	12152	3185	1520	888	0	104	18855	1	43090
3	1924	657	459	752	87	3212	0	3937	65034	117	76180
4	12306	854	1371	998	2224	6462	0	597	26356	0	51168
5	1855	191	392	2563	1270	640	16	2181	30225	0	39332
6	5829	51	1255	200	0	104	15	208	6634	0	14295
7	998	228	0	0	0	933	0	457	20144	346	23108
Total	86560	7019	31312	9424	5205	38687	339	12080	####	619	363166

T: Time periods, P: Trip types

(2) by Trip Types and Hourly Periods

(a) Number of Trips for Each Trip Type and Hourly Period (Original)

H\P	1	2	3	4	5	6	7	8	9	10	Total
(1)	7	0	1	1	0	0	0	0	12	0	22
(2)	58	6	13	1	0	29	1	4	5	0	117
(3)	181	20	39	3	1	89	3	11	14	1	362
(4)	105	12	23	2	1	52	2	6	8	1	210
(5)	13	3	24	7	4	3	0	0	47	0	100
(6)	9	2	18	5	3	2	0	0	35	0	74
(7)	7	1	13	4	2	1	0	0	25	0	54
(8)	3	1	0	2	0	3	0	3	75	0	87
(9)	8	2	1	5	1	9	0	9	220	1	257
(10)	4	1	1	3	0	5	0	5	109	0	127
(11)	31	4	2	2	3	13	0	1	44	0	100
(12)	31	4	2	2	3	13	0	1	44	0	100
(13)	22	3	1	1	2	9	0	1	31	0	71
(14)	4	1	0	4	2	1	1	3	63	0	78
(15)	4	1	0	4	2	1	1	3	62	0	77
(16)	4	1	0	4	2	1	1	3	64	0	79
(17)	2	0	0	2	1	0	0	1	32	0	39
(18)	8	0	1	1	0	0	0	0	14	0	25
(19)	4	0	1	0	0	0	0	0	7	0	12
(20)	0	0	0	0	0	0	0	0	1	0	1
(21)	1	0	0	0	0	0	0	0	2	0	3
(22)	1	0	0	0	0	0	0	0	1	0	2
(23)	2	0	0	0	0	0	0	0	3	0	5
(24)	2	0	0	0	0	0	0	0	3	0	6
(25)	6	1	0	0	0	5	0	2	77	2	93
Total	517	64	140	50	26	237	10	53	998	6	2101

H: Hour periods, P: Trip types

(b) Number of Trips for Each Trip Type and Hourly Period (M = PPL3)

H\P	1	2	3	4	5	6	7	8	9	10	Total
(1)	1687	15	363	58	0	30	4	60	1920	0	4138
(2)	9831	748	2663	293	17	4491	52	780	793	26	19697
(3)	30418	2316	8240	907	54	13896	162	2415	2455	81	60942
(4)	17646	1343	4780	526	31	8061	94	1401	1424	47	35353
(5)	2524	277	5330	1397	667	390	0	46	8270	0	18899
(6)	1868	205	3944	1034	493	288	0	34	6120	0	13985
(7)	1363	149	2878	754	360	210	0	25	4466	0	10205
(8)	355	121	85	139	16	593	0	727	12013	22	14071
(9)	1050	358	251	410	48	1753	0	2148	35486	64	41567
(10)	519	177	124	203	24	866	0	1062	17536	32	20541
(11)	4541	315	506	368	821	2385	0	220	9725	0	18881
(12)	4541	315	506	368	821	2385	0	220	9725	0	18881
(13)	3224	224	359	262	583	1693	0	156	6905	0	13406
(14)	530	55	112	732	363	183	4	623	8636	0	11238
(15)	523	54	111	723	358	180	4	615	8525	0	11094
(16)	537	55	113	742	368	185	4	631	8746	0	11382
(17)	265	27	56	366	181	91	2	312	4318	0	5619
(18)	1918	17	413	66	0	34	5	68	2182	0	4702
(19)	920	8	198	32	0	16	2	33	1048	0	2257
(20)	77	1	17	3	0	1	0	3	87	0	188
(21)	230	2	50	8	0	4	1	8	262	0	564
(22)	153	1	33	5	0	3	0	5	175	0	376
(23)	384	3	83	13	0	7	1	14	436	0	940
(24)	460	4	99	16	0	8	1	16	524	0	1129
(25)	998	228	0	0	0	933	0	457	20144	346	23108
Total	86560	7019	31312	9424	5205	38687	339	12080	171921	619	363166

H: Hour periods, P: Trip types

Table 6-15 Percentages of Trips (1) : Original and PPL3 (The total of each time period is 100%.)

(1) by Trip Types and Time Periods

(a) Percentage of Trips by Trip Type (Original Data)

T\P	1	2	3	4	5	6	7	8	9	10	Total
1	49.9	5.5	10.7	0.7	0.3	24.7	0.9	3.0	3.9	0.3	100.0
2	12.7	2.6	23.7	6.6	3.9	2.6	0.0	0.4	46.9	0.4	100.0
3	3.2	0.8	0.4	2.1	0.2	3.6	0.0	3.6	85.8	0.2	100.0
4	31.0	4.4	1.8	1.8	3.0	12.9	0.0	0.7	44.3	0.0	100.0
5	5.5	0.7	0.4	4.8	2.2	1.1	1.1	3.3	81.0	0.0	100.0
6	31.6	1.3	5.3	2.6	0.0	1.3	1.3	1.3	55.3	0.0	100.0
7	6.5	1.1	0.0	0.0	0.0	5.4	0.0	2.2	82.8	2.2	100.0
Total	24.6	3.0	6.7	2.4	1.2	11.3	0.5	2.5	47.5	0.3	100.0

T: Time periods, P: Trip types

(b) Percentage of Trips by Trip Type (Multiplication Factor = PPL3)

T\P	1	2	3	4	5	6	7	8	9	10	Total
1	49.9	3.8	13.5	1.5	0.1	22.8	0.3	4.0	4.0	0.1	100.0
2	13.4	1.5	28.2	7.4	3.5	2.1	0.0	0.2	43.8	0.0	100.0
3	2.5	0.9	0.6	1.0	0.1	4.2	0.0	5.2	85.4	0.2	100.0
4	24.0	1.7	2.7	2.0	4.3	12.6	0.0	1.2	51.5	0.0	100.0
5	4.7	0.5	1.0	6.5	3.2	1.6	0.0	5.5	76.8	0.0	100.0
6	40.8	0.4	8.8	1.4	0.0	0.7	0.1	1.5	46.4	0.0	100.0
7	4.3	1.0	0.0	0.0	0.0	4.0	0.0	2.0	87.2	1.5	100.0
Total	23.8	1.9	8.6	2.6	1.4	10.7	0.1	3.3	47.3	0.2	100.0

T: Time periods, P: Trip types

(2) by Trip Types and Hourly Periods

(a) Percentage of Hourly Trips for Each Time Period (Original Data)

H\P	1	2	3	4	5	6	7	8	9	10	Total
(1)	9.1	0.4	1.5	0.8	0.0	0.4	0.4	0.4	16.0	0.0	28.9
(2)	8.5	0.9	1.8	0.1	0.0	4.2	0.1	0.5	0.7	0.0	17.0
(3)	6.7	1.4	12.4	3.5	2.1	1.4	0.0	0.2	24.7	0.2	52.5
(4)	1.0	0.3	0.1	0.6	0.1	1.1	0.0	1.1	26.1	0.1	30.5
(5)	5.6	1.2	10.4	2.9	1.7	1.2	0.0	0.2	20.6	0.2	43.9
(6)	1.0	0.3	0.1	0.7	0.1	1.2	0.0	1.2	27.8	0.1	32.5
(7)	7.3	1.0	0.4	0.4	0.7	3.1	0.0	0.2	10.5	0.0	23.7
(8)	0.6	0.2	0.1	0.4	0.0	0.7	0.0	0.7	15.8	0.0	18.5
(9)	16.9	2.4	1.0	1.0	1.6	7.0	0.0	0.4	24.2	0.0	54.6
(10)	1.5	0.2	0.1	1.3	0.6	0.3	0.3	0.9	21.8	0.0	27.0
(11)	11.4	1.6	0.7	0.7	1.1	4.8	0.0	0.3	16.3	0.0	36.9
(12)	2.0	0.3	0.1	1.8	0.8	0.4	0.4	1.2	29.9	0.0	36.9
(13)	8.3	0.3	1.4	0.7	0.0	0.3	0.3	0.3	14.5	0.0	26.2
(14)	1.6	0.2	0.1	1.4	0.6	0.3	0.3	0.9	23.1	0.0	28.6
(15)	8.9	0.4	1.5	0.7	0.0	0.4	0.4	0.4	15.6	0.0	28.2
(16)	1.9	0.3	0.0	0.0	0.0	1.6	0.0	0.6	24.0	0.6	28.9
(17)	3.5	0.4	1.0	0.3	0.2	1.6	0.1	0.4	6.8	0.0	14.3
(18)	10.4	0.4	1.7	0.9	0.0	0.4	0.4	0.4	18.2	0.0	32.9
(19)	1.0	0.2	0.0	0.0	0.0	0.8	0.0	0.3	13.1	0.3	15.8
(20)	0.3	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.6	0.0	1.3
(21)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(22)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(23)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(24)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(25)	6.5	1.1	0.0	0.0	0.0	5.4	0.0	2.2	82.8	2.2	100.0
Total	24.6	3.0	6.7	2.4	1.2	11.3	0.5	2.5	47.5	0.3	100.0

H: Hour periods, P: Trip types

(b) Percentage of Hourly Trips for Each Time Period (M = PPL3)

H\P	1	2	3	4	5	6	7	8	9	10	Total
(1)	11.8	0.1	2.5	0.4	0.0	0.2	0.0	0.4	13.4	0.0	28.9
(2)	8.5	0.6	2.3	0.3	0.0	3.9	0.0	0.7	0.7	0.0	17.0
(3)	26.2	2.0	7.1	0.8	0.0	12.0	0.1	2.1	2.1	0.1	52.5
(4)	15.2	1.2	4.1	0.5	0.0	6.9	0.1	1.2	1.2	0.0	30.5
(5)	5.9	0.6	12.4	3.2	1.5	0.9	0.0	0.1	19.2	0.0	43.9
(6)	4.3	0.5	9.2	2.4	1.1	0.7	0.0	0.1	14.2	0.0	32.5
(7)	3.2	0.3	6.7	1.8	0.8	0.5	0.0	0.1	10.4	0.0	23.7
(8)	0.5	0.2	0.1	0.2	0.0	0.8	0.0	1.0	15.8	0.0	18.5
(9)	1.4	0.5	0.3	0.5	0.1	2.3	0.0	2.8	46.6	0.1	54.6
(10)	0.7	0.2	0.2	0.3	0.0	1.1	0.0	1.4	23.0	0.0	27.0
(11)	8.9	0.6	1.0	0.7	1.6	4.7	0.0	0.4	19.0	0.0	36.9
(12)	8.9	0.6	1.0	0.7	1.6	4.7	0.0	0.4	19.0	0.0	36.9
(13)	6.3	0.4	0.7	0.5	1.1	3.3	0.0	0.3	13.5	0.0	26.2
(14)	1.3	0.1	0.3	1.9	0.9	0.5	0.0	1.6	22.0	0.0	28.6
(15)	1.3	0.1	0.3	1.8	0.9	0.5	0.0	1.6	21.7	0.0	28.2
(16)	1.4	0.1	0.3	1.9	0.9	0.5	0.0	1.6	22.2	0.0	28.9
(17)	0.7	0.1	0.1	0.9	0.5	0.2	0.0	0.8	11.0	0.0	14.3
(18)	13.4	0.1	2.9	0.5	0.0	0.2	0.0	0.5	15.3	0.0	32.9
(19)	6.4	0.1	1.4	0.2	0.0	0.1	0.0	0.2	7.3	0.0	15.8
(20)	0.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.6	0.0	1.3
(21)	1.6	0.0	0.3	0.1	0.0	0.0	0.0	0.1	1.8	0.0	3.9
(22)	1.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	1.2	0.0	2.6
(23)	2.7	0.0	0.6	0.1	0.0	0.0	0.0	0.1	3.1	0.0	6.6
(24)	3.2	0.0	0.7	0.1	0.0	0.1	0.0	0.1	3.7	0.0	7.9
(25)	4.3	1.0	0.0	0.0	0.0	4.0	0.0	2.0	87.2	1.5	100.0
Total	23.8	1.9	8.6	2.6	1.4	10.7	0.1	3.3	47.3	0.2	100.0

H: Hour periods, P: Trip types

Table 6-16 Percentages of Trips (2) : Original and PPL3 (The total of each trip type is 100%.)

(1) by Trip Types and Time Periods

(a) Percentage of Trips for Each Trip Type (Original Data)

T\P	1	2	3	4	5	6	7	8	9	10	Total
1	66.5	59.4	52.9	10.0	7.7	71.7	60.0	39.6	2.7	33.3	32.8
2	5.6	9.4	38.6	30.0	34.6	2.5	0.0	1.9	10.7	16.7	10.9
3	2.9	6.3	1.4	20.0	3.8	7.2	0.0	32.1	40.5	16.7	22.4
4	16.2	18.8	3.6	10.0	30.8	14.8	0.0	3.8	12.0	0.0	12.9
5	2.9	3.1	0.7	26.0	23.1	1.3	30.0	17.0	22.1	0.0	13.0
6	4.6	1.6	2.9	4.0	0.0	0.4	10.0	1.9	4.2	0.0	3.6
7	1.2	1.6	0.0	0.0	0.0	2.1	0.0	3.8	7.7	33.3	4.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

T: Time periods, P: Trip types

(b) Percentage of Trips for Each Trip Type (M = PPL3)

T\P	1	2	3	4	5	6	7	8	9	10	Total
1	66.9	62.8	50.1	18.3	2.0	68.4	91.0	38.0	2.7	24.9	31.9
2	6.6	9.0	38.8	33.8	29.2	2.3	0.0	0.9	11.0	0.2	11.9
3	2.2	9.4	1.5	8.0	1.7	8.3	0.0	32.6	37.8	19.0	21.0
4	14.2	12.2	4.4	10.6	42.7	16.7	0.0	4.9	15.3	0.0	14.1
5	2.1	2.7	1.3	27.2	24.4	1.7	4.6	18.1	17.6	0.0	10.8
6	6.7	0.7	4.0	2.1	0.0	0.3	4.4	1.7	3.9	0.0	3.9
7	1.2	3.3	0.0	0.0	0.0	2.4	0.0	3.8	11.7	55.9	6.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

T: Time periods, P: Trip types

(2) by Trip Types and Hourly Periods

(a) Percentage of Hourly Trips for Each Trip Type (Original)

H\P	1	2	3	4	5	6	7	8	9	10	Total
(1)	1.3	0.5	0.8	1.2	0.0	0.1	2.9	0.5	1.2	0.0	1.0
(2)	11.3	10.1	9.0	1.7	1.3	12.2	10.2	6.7	0.5	5.7	5.6
(3)	35.0	31.2	27.8	5.3	4.0	37.7	31.5	20.8	1.4	17.5	17.2
(4)	20.3	18.1	16.1	3.0	2.3	21.9	18.3	12.1	0.8	10.2	10.0
(5)	2.5	4.1	16.9	13.2	15.2	1.1	0.0	0.8	4.7	7.3	4.8
(6)	1.8	3.0	12.5	9.7	11.2	0.8	0.0	0.6	3.5	5.4	3.5
(7)	1.3	2.2	9.1	7.1	8.2	0.6	0.0	0.4	2.5	3.9	2.6
(8)	0.5	1.2	0.3	3.7	0.7	1.3	0.0	5.9	7.5	3.1	4.1
(9)	1.6	3.4	0.8	10.9	2.1	3.9	0.0	17.5	22.1	9.1	12.2
(10)	0.8	1.7	0.4	5.4	1.0	1.9	0.0	8.6	10.9	4.5	6.0
(11)	6.0	6.9	1.3	3.7	11.4	5.4	0.0	1.4	4.4	0.0	4.8
(12)	6.0	6.9	1.3	3.7	11.4	5.4	0.0	1.4	4.4	0.0	4.8
(13)	4.3	4.9	0.9	2.6	8.1	3.9	0.0	1.0	3.2	0.0	3.4
(14)	0.8	0.9	0.2	7.4	6.6	0.4	8.6	4.9	6.3	0.0	3.7
(15)	0.8	0.9	0.2	7.3	6.5	0.4	8.5	4.8	6.2	0.0	3.7
(16)	0.8	0.9	0.2	7.5	6.7	0.4	8.7	4.9	6.4	0.0	3.8
(17)	0.4	0.4	0.1	3.7	3.3	0.2	4.3	2.4	3.2	0.0	1.9
(18)	1.5	0.5	0.9	1.3	0.0	0.1	3.3	0.6	1.4	0.0	1.2
(19)	0.7	0.2	0.5	0.6	0.0	0.1	1.6	0.3	0.7	0.0	0.6
(20)	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0
(21)	0.2	0.1	0.1	0.2	0.0	0.0	0.4	0.1	0.2	0.0	0.1
(22)	0.1	0.0	0.1	0.1	0.0	0.0	0.3	0.0	0.1	0.0	0.1
(23)	0.3	0.1	0.2	0.3	0.0	0.0	0.7	0.1	0.3	0.0	0.2
(24)	0.4	0.1	0.2	0.3	0.0	0.0	0.8	0.1	0.3	0.0	0.3
(25)	1.2	1.6	0.0	0.0	0.0	2.1	0.0	3.8	7.7	33.3	4.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

H: Hour periods, P: Trip types

(b) Percentage of Hourly Trips for Each Trip Type (M=PPL3)

H\P	1	2	3	4	5	6	7	8	9	10	Total
(1)	1.9	0.2	1.2	0.6	0.0	0.1	1.3	0.5	1.1	0.0	1.1
(2)	11.4	10.7	8.5	3.1	0.3	11.6	15.4	6.5	0.5	4.2	5.4
(3)	35.1	33.0	26.3	9.6	1.0	35.9	47.8	20.0	1.4	13.1	16.8
(4)	20.4	19.1	15.3	5.6	0.6	20.8	27.7	11.6	0.8	7.6	9.7
(5)	2.9	3.9	17.0	14.8	12.8	1.0	0.0	0.4	4.8	0.1	5.2
(6)	2.2	2.9	12.6	11.0	9.5	0.7	0.0	0.3	3.6	0.1	3.9
(7)	1.6	2.1	9.2	8.0	6.9	0.5	0.0	0.2	2.6	0.0	2.8
(8)	0.4	1.7	0.3	1.5	0.3	1.5	0.0	6.0	7.0	3.5	3.9
(9)	1.2	5.1	0.8	4.4	0.9	4.5	0.0	17.8	20.6	10.4	11.4
(10)	0.6	2.5	0.4	2.2	0.5	2.2	0.0	8.8	10.2	5.1	5.7
(11)	5.2	4.5	1.6	3.9	15.8	6.2	0.0	1.8	5.7	0.0	5.2
(12)	5.2	4.5	1.6	3.9	15.8	6.2	0.0	1.8	5.7	0.0	5.2
(13)	3.7	3.2	1.1	2.8	11.2	4.4	0.0	1.3	4.0	0.0	3.7
(14)	0.6	0.8	0.4	7.8	7.0	0.5	1.3	5.2	5.0	0.0	3.1
(15)	0.6	0.8	0.4	7.7	6.9	0.5	1.3	5.1	5.0	0.0	3.1
(16)	0.6	0.8	0.4	7.9	7.1	0.5	1.3	5.2	5.1	0.0	3.1
(17)	0.3	0.4	0.2	3.9	3.5	0.2	0.7	2.6	2.5	0.0	1.5
(18)	2.2	0.2	1.3	0.7	0.0	0.1	1.5	0.6	1.3	0.0	1.3
(19)	1.1	0.1	0.6	0.3	0.0	0.0	0.7	0.3	0.6	0.0	0.6
(20)	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1
(21)	0.3	0.0	0.2	0.1	0.0	0.0	0.2	0.1	0.2	0.0	0.2
(22)	0.2	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1
(23)	0.4	0.0	0.3	0.1	0.0	0.0	0.3	0.1	0.3	0.0	0.3
(24)	0.5	0.1	0.3	0.2	0.0	0.0	0.4	0.1	0.3	0.0	0.3
(25)	1.2	3.3	0.0	0.0	0.0	2.4	0.0	3.8	11.7	55.9	6.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

H: Hour periods, P: Trip types

Table 6-17 Percentages of Trips (3) : Original and PPL3 (The total is 100%.)

(1) by Trip Types and Time Periods

(a) Percentage of Trips by Trip Types in a Day (Original Data)

T\P	1	2	3	4	5	6	7	8	9	10	Total
1	16.4	1.8	3.5	0.2	0.1	8.1	0.3	1.0	1.3	0.1	32.8
2	1.4	0.3	2.6	0.7	0.4	0.3	0.0	0.0	5.1	0.0	10.9
3	0.7	0.2	0.1	0.5	0.0	0.8	0.0	0.8	19.2	0.0	22.4
4	4.0	0.6	0.2	0.2	0.4	1.7	0.0	0.1	5.7	0.0	12.9
5	0.7	0.1	0.0	0.6	0.3	0.1	0.1	0.4	10.5	0.0	13.0
6	1.1	0.0	0.2	0.1	0.0	0.0	0.0	0.0	2.0	0.0	3.6
7	0.3	0.0	0.0	0.0	0.0	0.2	0.0	0.1	3.7	0.1	4.4
Total	24.6	3.0	6.7	2.4	1.2	11.3	0.5	2.5	47.5	0.3	100.0

T: Time periods, P: Trip types

(b) Percentage of Trips by Trip Types in a Day (M = PPL3)

T\P	1	2	3	4	5	6	7	8	9	10	Total
1	15.9	1.2	4.3	0.5	0.0	7.3	0.1	1.3	1.3	0.0	31.9
2	1.6	0.2	3.3	0.9	0.4	0.2	0.0	0.0	5.2	0.0	11.9
3	0.5	0.2	0.1	0.2	0.0	0.9	0.0	1.1	17.9	0.0	21.0
4	3.4	0.2	0.4	0.3	0.6	1.8	0.0	0.2	7.3	0.0	14.1
5	0.5	0.1	0.1	0.7	0.3	0.2	0.0	0.6	8.3	0.0	10.8
6	1.6	0.0	0.3	0.1	0.0	0.0	0.0	0.1	1.8	0.0	3.9
7	0.3	0.1	0.0	0.0	0.0	0.3	0.0	0.1	5.5	0.1	6.4
Total	23.8	1.9	8.6	2.6	1.4	10.7	0.1	3.3	47.3	0.2	100.0

T: Time periods, P: Trip types

(2) by Trip Types and Hourly Periods

(a) Percentage of Trips by Trip Types in a Day (Original Data)

H\P	1	2	3	4	5	6	7	8	9	10	Total
(1)	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.6	0.0	1.0
(2)	2.8	0.3	0.6	0.0	0.0	1.4	0.0	0.2	0.2	0.0	5.6
(3)	8.6	1.0	1.9	0.1	0.1	4.3	0.2	0.5	0.7	0.1	17.2
(4)	5.0	0.6	1.1	0.1	0.0	2.5	0.1	0.3	0.4	0.0	10.0
(5)	0.6	0.1	1.1	0.3	0.2	0.1	0.0	0.0	2.2	0.0	4.8
(6)	0.4	0.1	0.8	0.2	0.1	0.1	0.0	0.0	1.7	0.0	3.5
(7)	0.3	0.1	0.6	0.2	0.1	0.1	0.0	0.0	1.2	0.0	2.6
(8)	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1	3.6	0.0	4.1
(9)	0.4	0.1	0.1	0.3	0.0	0.4	0.0	0.4	10.5	0.0	12.2
(10)	0.2	0.1	0.0	0.1	0.0	0.2	0.0	0.2	5.2	0.0	6.0
(11)	1.5	0.2	0.1	0.1	0.1	0.6	0.0	0.0	2.1	0.0	4.8
(12)	1.5	0.2	0.1	0.1	0.1	0.6	0.0	0.0	2.1	0.0	4.8
(13)	1.0	0.1	0.1	0.1	0.1	0.4	0.0	0.0	1.5	0.0	3.4
(14)	0.2	0.0	0.0	0.2	0.1	0.0	0.0	0.1	3.0	0.0	3.7
(15)	0.2	0.0	0.0	0.2	0.1	0.0	0.0	0.1	3.0	0.0	3.7
(16)	0.2	0.0	0.0	0.2	0.1	0.0	0.0	0.1	3.0	0.0	3.8
(17)	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1	1.5	0.0	1.9
(18)	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.7	0.0	1.2
(19)	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.6
(20)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(21)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
(22)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
(23)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2
(24)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.3
(25)	0.3	0.0	0.0	0.0	0.0	0.2	0.0	0.1	3.7	0.1	4.4
Total	24.6	3.0	6.7	2.4	1.2	11.3	0.5	2.5	47.5	0.3	100.0

H: Hour periods, P: Trip types

(b) Percentage of Trips by Trip Types in a Day (M = PPL3)

H\P	1	2	3	4	5	6	7	8	9	10	Total
(1)	0.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.1
(2)	2.7	0.2	0.7	0.1	0.0	1.2	0.0	0.2	0.2	0.0	5.4
(3)	8.4	0.6	2.3	0.2	0.0	3.8	0.0	0.7	0.7	0.0	16.8
(4)	4.9	0.4	1.3	0.1	0.0	2.2	0.0	0.4	0.4	0.0	9.7
(5)	0.7	0.1	1.5	0.4	0.2	0.1	0.0	0.0	2.3	0.0	5.2
(6)	0.5	0.1	1.1	0.3	0.1	0.1	0.0	0.0	1.7	0.0	3.9
(7)	0.4	0.0	0.8	0.2	0.1	0.1	0.0	0.0	1.2	0.0	2.8
(8)	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.2	3.3	0.0	3.9
(9)	0.3	0.1	0.1	0.1	0.0	0.5	0.0	0.6	9.8	0.0	11.4
(10)	0.1	0.0	0.0	0.1	0.0	0.2	0.0	0.3	4.8	0.0	5.7
(11)	1.3	0.1	0.1	0.1	0.2	0.7	0.0	0.1	2.7	0.0	5.2
(12)	1.3	0.1	0.1	0.1	0.2	0.7	0.0	0.1	2.7	0.0	5.2
(13)	0.9	0.1	0.1	0.1	0.2	0.5	0.0	0.0	1.9	0.0	3.7
(14)	0.1	0.0	0.0	0.2	0.1	0.1	0.0	0.2	2.4	0.0	3.1
(15)	0.1	0.0	0.0	0.2	0.1	0.0	0.0	0.2	2.3	0.0	3.1
(16)	0.1	0.0	0.0	0.2	0.1	0.1	0.0	0.2	2.4	0.0	3.1
(17)	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1	1.2	0.0	1.5
(18)	0.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.6	0.0	1.3
(19)	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.6
(20)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
(21)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2
(22)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
(23)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3
(24)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3
(25)	0.3	0.1	0.0	0.0	0.0	0.3	0.0	0.1	5.5	0.1	6.4
Total	23.8	1.9	8.6	2.6	1.4	10.7	0.1	3.3	47.3	0.2	100.0

H: Hour periods, P: Trip types

The results above again indicate that the trip expansion does not affect the results of the portion distribution much while the differences of the expansion scale between traffic analysis zones are large. The primary observed differences are:

① the portions of two major trip types, "work" and "school," are decreased from 24.6% and 11.3% of the total daily trips in the original to 23.8% and 10.7% in the PPL3 data respectively,

② the portions of trip types, "shopping" and "changing modes," are increased from 6.7% and 2.5% of the total daily trips in the original to 8.6% and 3.3% in PPL3 data respectively,

③ the total portions of the time periods (1) and (3), both of which has one of two major peak periods, are decreased from 32.8% and 22.4% of the total daily trips in the original to 31.9% and 21.0% in PPL3 data respectively,

④ the portion of the time periods (2) and (4), which are the third and fourth busiest time periods respectively, are somewhat increased from 10.9% and 12.9% of the total daily trips in the original data to 11.9% and 14.1% in PPL3 data respectively, and

⑤ the total portion of "no indication" trips increases from 4.4% of the total daily trips in the original data to 6.4% in PPL3 data.

Tables 6-18 and 6-19 simply summarize the expansion results calculated by PPL3. Table 6-18 shows the results based on time periods, and Table 6-19 shows the results based on hour periods. Tables (a) to (d) in Table 6-18 and 6-19 summarize the number of trips, the portions of trips in the total trips, the portions of trips within each trip type, and the portions of trips within each time period respectively. The total estimated trips by PPL3 is 363,166 per day.

Besides "home" trips, "work" trips stand as the most frequent trips with 86,560 trips or 23.8% of the total daily trips. 57,894 or 66.9% of the "work" trips occur in the morning peak time period (1) between 6 and 9 a.m., and 30,418 or 52.5% of them are of the peak hour period between 7 to 8 a.m.. The "work" trips during the morning peak hour period alone account for 8.4% of the total daily trips, which is the second frequent individual trips. The

Table 6-18 Trip Structure by Trip Types and Time Periods (Multiplied by PPL3)

(a) The Number of Trips by Trip Types and Time Periods

Time Periods	# of Trips (%)		1	2	3	4	5	6	7	8	9	10	Total
1 : 6:00 am ~ 8:59 am	689	32.8	57894	4407	15683	1725	102	26448	308	4596	4672	154	115992
2 : 9:00 am ~ 11:59 am	228	10.9	5754	630	12152	3185	1520	888	0	104	18855	1	43090
3 : 0:00 pm ~ 2:59 pm	471	22.4	1924	657	459	752	87	3212	0	3937	65034	117	76180
4 : 3:00 pm ~ 5:59 pm	271	12.9	12306	854	1371	998	2224	6462	0	597	26356	0	51168
5 : 6:00 pm ~ 9:59 pm	273	13.0	1855	191	392	2563	1270	640	16	2181	30225	0	39332
6 : 10:00 pm ~ 5:59 am	76	3.6	5829	51	1255	200	0	104	15	208	6634	0	14295
7 : no indication	93	4.4	998	228	0	0	0	933	0	457	20144	346	23108
Total trips	2101	100	86560	7019	31312	9424	5205	38687	339	12080	171921	619	363166

(b) Percentage of Trips by Trip Types and Time Periods in Total Trips

Time Periods	# of Trips (%)		1	2	3	4	5	6	7	8	9	10	Total
1 : 6:00 am ~ 8:59 am	689	32.8	15.9	1.2	4.3	0.5	0.0	7.3	0.1	1.3	1.3	0.0	31.9
2 : 9:00 am ~ 11:59 am	228	10.9	1.6	0.2	3.3	0.9	0.4	0.2	0.0	0.0	5.2	0.0	11.9
3 : 0:00 pm ~ 2:59 pm	471	22.4	0.5	0.2	0.1	0.2	0.0	0.9	0.0	1.1	17.9	0.0	21.0
4 : 3:00 pm ~ 5:59 pm	271	12.9	3.4	0.2	0.4	0.3	0.6	1.8	0.0	0.2	7.3	0.0	14.1
5 : 6:00 pm ~ 9:59 pm	273	13.0	0.5	0.1	0.1	0.7	0.3	0.2	0.0	0.6	8.3	0.0	10.8
6 : 10:00 pm ~ 5:59 am	76	3.6	1.6	0.0	0.3	0.1	0.0	0.0	0.0	0.1	1.8	0.0	3.9
7 : no indication	93	4.4	0.3	0.1	0.0	0.0	0.0	0.3	0.0	0.1	5.5	0.1	6.4
Total Percentage	2101	100	23.8	1.9	8.6	2.6	1.4	10.7	0.1	3.3	47.3	0.2	100

(c) Percentage of Trips by Time Periods in Each Trip Type

Time Periods	# of Trips (%)		1	2	3	4	5	6	7	8	9	10
1 : 6:00 am ~ 8:59 am	689	32.8	66.9	62.8	50.1	18.3	2.0	68.4	91.0	38.0	2.7	24.9
2 : 9:00 am ~ 11:59 am	228	10.9	6.6	9.0	38.8	33.8	29.2	2.3	0.0	0.9	11.0	0.2
3 : 0:00 pm ~ 2:59 pm	471	22.4	2.2	9.4	1.5	8.0	1.7	8.3	0.0	32.6	37.8	19.0
4 : 3:00 pm ~ 5:59 pm	271	12.9	14.2	12.2	4.4	10.6	42.7	16.7	0.0	4.9	15.3	0.0
5 : 6:00 pm ~ 9:59 pm	273	13.0	2.1	2.7	1.3	27.2	24.4	1.7	4.6	18.1	17.6	0.0
6 : 10:00 pm ~ 5:59 am	76	3.6	6.7	0.7	4.0	2.1	0.0	0.3	4.4	1.7	3.9	0.0
7 : no indication	93	4.4	1.2	3.3	0.0	0.0	0.0	2.4	0.0	3.8	11.7	55.9
Total Percentage	2101	100	100	100	100	100	100	100	100	100	100	100

(d) Percentage of Trips by Trip Types in Each Time Period

Time Periods	# of Trips (%)		1	2	3	4	5	6	7	8	9	10	Total
1 : 6:00 am ~ 8:59 am	689	32.8	49.9	3.8	13.5	1.5	0.1	22.8	0.3	4.0	4.0	0.1	100
2 : 9:00 am ~ 11:59 am	228	10.9	13.4	1.5	28.2	7.4	3.5	2.1	0.0	0.2	43.8	0.0	100
3 : 0:00 pm ~ 2:59 pm	471	22.4	2.5	0.9	0.6	1.0	0.1	4.2	0.0	5.2	85.4	0.2	100
4 : 3:00 pm ~ 5:59 pm	271	12.9	24.0	1.7	2.7	2.0	4.3	12.6	0.0	1.2	51.5	0.0	100
5 : 6:00 pm ~ 9:59 pm	273	13.0	4.7	0.5	1.0	6.5	3.2	1.6	0.0	5.5	76.8	0.0	100
6 : 10:00 pm ~ 5:59 am	76	3.6	40.8	0.4	8.8	1.4	0.0	0.7	0.1	1.5	46.4	0.0	100
7 : no indication	93	4.4	4.3	1.0	0.0	0.0	0.0	4.0	0.0	2.0	87.2	1.5	100

Table 6-19 (1) Trip Structure by Trip Types and Hour Periods (Multiplied by PPL3)

(a) The Number of Trips by Trip Types and Hour Periods

Hour period	Time P.	(%)	1	2	3	4	5	6	7	8	9	10	Total	(Time)
(1) : 5:00 am ~ 5:59 am	6	28.9	1687	15	363	58	0	30	4	60	1920	0	4138	
(2) : 6:00 am ~ 6:59 am	1	17.0	9831	748	2663	293	17	4491	52	780	793	26	19697	115992
(3) : 7:00 am ~ 7:59 am	1	52.5	30418	2316	8240	907	54	13896	162	2415	2455	81	60942	
(4) : 8:00 am ~ 8:59 am	1	30.5	17646	1343	4780	526	31	8061	94	1401	1424	47	35353	
(5) : 9:00 am ~ 9:59 am	2	43.9	2524	277	5330	1397	667	390	0	46	8270	0	18899	43090
(6) : 10:00 am ~ 10:59 am	2	32.5	1868	205	3944	1034	493	288	0	34	6120	0	13985	
(7) : 11:00 am ~ 11:59 am	2	23.7	1363	149	2878	754	360	210	0	25	4466	0	10205	
(8) : 0:00 pm ~ 0:59 pm	3	18.5	355	121	85	139	16	593	0	727	12013	22	14071	76180
(9) : 1:00 pm ~ 1:59 pm	3	54.6	1050	358	251	410	48	1753	0	2148	35486	64	41567	
(10) : 2:00 pm ~ 2:59 pm	3	27.0	519	177	124	203	24	866	0	1062	17536	32	20541	
(11) : 3:00 pm ~ 3:59 pm	4	36.9	4541	315	506	368	821	2385	0	220	9725	0	18881	51168
(12) : 4:00 pm ~ 4:59 pm	4	36.9	4541	315	506	368	821	2385	0	220	9725	0	18881	
(13) : 5:00 pm ~ 5:59 pm	4	26.2	3224	224	359	262	583	1693	0	156	6905	0	13406	
(14) : 6:00 pm ~ 6:59 pm	5	28.6	530	55	112	732	363	183	4	623	8636	0	11238	39332
(15) : 7:00 pm ~ 7:59 pm	5	28.2	523	54	111	723	358	180	4	615	8525	0	11094	
(16) : 8:00 pm ~ 8:59 pm	5	28.9	537	55	113	742	368	185	4	631	8746	0	11382	
(17) : 9:00 pm ~ 9:59 am	5	14.3	265	27	56	366	181	91	2	312	4318	0	5619	
(18) : 10:00 pm ~ 10:59 pm	6	32.9	1918	17	413	66	0	34	5	68	2182	0	4702	14295
(19) : 11:00 pm ~ 11:59 pm	6	15.8	920	8	198	32	0	16	2	33	1048	0	2257	
(20) : 0:00 am ~ 0:59 am	6	1.3	77	1	17	3	0	1	0	3	87	0	188	
(21) : 1:00 am ~ 1:59 am	6	3.9	230	2	50	8	0	4	1	8	262	0	564	
(22) : 2:00 am ~ 2:59 am	6	2.6	153	1	33	5	0	3	0	5	175	0	376	
(23) : 3:00 am ~ 3:59 am	6	6.6	384	3	83	13	0	7	1	14	436	0	940	
(24) : 4:00 am ~ 4:59 am	6	7.9	460	4	99	16	0	8	1	16	524	0	1129	
(25) : no indication	7	100	998	228	0	0	0	933	0	457	20144	346	23108	23108
Total trips			86560	7019	31312	9424	5205	38687	339	12080	171921	619	363166	363166

(b) Percentage of Trips by Trip Types and Time Periods in Total Trips

Hour period	Time P.	(%)	1	2	3	4	5	6	7	8	9	10	Total	(Time)
(1) : 5:00 am ~ 5:59 am	6	28.9	0.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.1	
(2) : 6:00 am ~ 6:59 am	1	17.0	2.7	0.2	0.7	0.1	0.0	1.2	0.0	0.2	0.2	0.0	5.4	31.9
(3) : 7:00 am ~ 7:59 am	1	52.5	8.4	0.6	2.3	0.2	0.0	3.8	0.0	0.7	0.7	0.0	16.8	
(4) : 8:00 am ~ 8:59 am	1	30.5	4.9	0.4	1.3	0.1	0.0	2.2	0.0	0.4	0.4	0.0	9.7	
(5) : 9:00 am ~ 9:59 am	2	43.9	0.7	0.1	1.5	0.4	0.2	0.1	0.0	0.0	2.3	0.0	5.2	11.9
(6) : 10:00 am ~ 10:59 am	2	32.5	0.5	0.1	1.1	0.3	0.1	0.1	0.0	0.0	1.7	0.0	3.9	
(7) : 11:00 am ~ 11:59 am	2	23.7	0.4	0.0	0.8	0.2	0.1	0.1	0.0	0.0	1.2	0.0	2.8	
(8) : 0:00 pm ~ 0:59 pm	3	18.5	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.2	3.3	0.0	3.9	21.0
(9) : 1:00 pm ~ 1:59 pm	3	54.6	0.3	0.1	0.1	0.1	0.0	0.5	0.0	0.6	9.8	0.0	11.4	
(10) : 2:00 pm ~ 2:59 pm	3	27.0	0.1	0.0	0.0	0.1	0.0	0.2	0.0	0.3	4.8	0.0	5.7	
(11) : 3:00 pm ~ 3:59 pm	4	36.9	1.3	0.1	0.1	0.1	0.2	0.7	0.0	0.1	2.7	0.0	5.2	14.1
(12) : 4:00 pm ~ 4:59 pm	4	36.9	1.3	0.1	0.1	0.1	0.2	0.7	0.0	0.1	2.7	0.0	5.2	
(13) : 5:00 pm ~ 5:59 pm	4	26.2	0.9	0.1	0.1	0.1	0.2	0.5	0.0	0.0	1.9	0.0	3.7	
(14) : 6:00 pm ~ 6:59 pm	5	28.6	0.1	0.0	0.0	0.2	0.1	0.1	0.0	0.2	2.4	0.0	3.1	10.8
(15) : 7:00 pm ~ 7:59 pm	5	28.2	0.1	0.0	0.0	0.2	0.1	0.0	0.0	0.2	2.3	0.0	3.1	
(16) : 8:00 pm ~ 8:59 pm	5	28.9	0.1	0.0	0.0	0.2	0.1	0.1	0.0	0.2	2.4	0.0	3.1	
(17) : 9:00 pm ~ 9:59 am	5	14.3	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1	1.2	0.0	1.5	
(18) : 10:00 pm ~ 10:59 pm	6	32.9	0.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.6	0.0	1.3	3.9
(19) : 11:00 pm ~ 11:59 pm	6	15.8	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.6	
(20) : 0:00 am ~ 0:59 am	6	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
(21) : 1:00 am ~ 1:59 am	6	3.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	
(22) : 2:00 am ~ 2:59 am	6	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
(23) : 3:00 am ~ 3:59 am	6	6.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3	
(24) : 4:00 am ~ 4:59 am	6	7.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3	
(25) : no indication	7	100	0.3	0.1	0.0	0.0	0.0	0.3	0.0	0.1	5.5	0.1	6.4	6.4
Total Percentage			23.8	1.9	8.6	2.6	1.4	10.7	0.1	3.3	47.3	0.2	100	100

Table 6-19 (2) Trip Structure by Trip Types and Hour Periods (Multiplied by PPL3)

(c) Percentage of Trips by Time Periods in Each Trip Type

Hour period	% in Time P.		1	2	3	4	5	6	7	8	9	10
(1) : 5:00 am ~ 5:59 am	(6)	28.9	1.9	0.2	1.2	0.6	0.0	0.1	1.3	0.5	1.1	0.0
(2) : 6:00 am ~ 6:59 am	(1)	17.0	11.4	10.7	8.5	3.1	0.3	11.6	15.4	6.5	0.5	4.2
(3) : 7:00 am ~ 7:59 am	(1)	52.5	35.1	33.0	26.3	9.6	1.0	35.9	47.8	20.0	1.4	13.1
(4) : 8:00 am ~ 8:59 am	(1)	30.5	20.4	19.1	15.3	5.6	0.6	20.8	27.7	11.6	0.8	7.6
(5) : 9:00 am ~ 9:59 am	(2)	43.9	2.9	3.9	17.0	14.8	12.8	1.0	0.0	0.4	4.8	0.1
(6) : 10:00 am ~ 10:59 am	(2)	32.5	2.2	2.9	12.6	11.0	9.5	0.7	0.0	0.3	3.6	0.1
(7) : 11:00 am ~ 11:59 am	(2)	23.7	1.6	2.1	9.2	8.0	6.9	0.5	0.0	0.2	2.6	0.0
(8) : 0:00 pm ~ 0:59 pm	(3)	18.5	0.4	1.7	0.3	1.5	0.3	1.5	0.0	6.0	7.0	3.5
(9) : 1:00 pm ~ 1:59 pm	(3)	54.6	1.2	5.1	0.8	4.4	0.9	4.5	0.0	17.8	20.6	10.4
(10) : 2:00 pm ~ 2:59 pm	(3)	27.0	0.6	2.5	0.4	2.2	0.5	2.2	0.0	8.8	10.2	5.1
(11) : 3:00 pm ~ 3:59 pm	(4)	36.9	5.2	4.5	1.6	3.9	15.8	6.2	0.0	1.8	5.7	0.0
(12) : 4:00 pm ~ 4:59 pm	(4)	36.9	5.2	4.5	1.6	3.9	15.8	6.2	0.0	1.8	5.7	0.0
(13) : 5:00 pm ~ 5:59 pm	(4)	26.2	3.7	3.2	1.1	2.8	11.2	4.4	0.0	1.3	4.0	0.0
(14) : 6:00 pm ~ 6:59 pm	(5)	28.6	0.6	0.8	0.4	7.8	7.0	0.5	1.3	5.2	5.0	0.0
(15) : 7:00 pm ~ 7:59 pm	(5)	28.2	0.6	0.8	0.4	7.7	6.9	0.5	1.3	5.1	5.0	0.0
(16) : 8:00 pm ~ 8:59 pm	(5)	28.9	0.6	0.8	0.4	7.9	7.1	0.5	1.3	5.2	5.1	0.0
(17) : 9:00 pm ~ 9:59 am	(5)	14.3	0.3	0.4	0.2	3.9	3.5	0.2	0.7	2.6	2.5	0.0
(18) : 10:00 pm ~ 10:59 pm	(6)	32.9	2.2	0.2	1.3	0.7	0.0	0.1	1.5	0.6	1.3	0.0
(19) : 11:00 pm ~ 11:59 pm	(6)	15.8	1.1	0.1	0.6	0.3	0.0	0.0	0.7	0.3	0.6	0.0
(20) : 0:00 am ~ 0:59 am	(6)	1.3	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0
(21) : 1:00 am ~ 1:59 am	(6)	3.9	0.3	0.0	0.2	0.1	0.0	0.0	0.2	0.1	0.2	0.0
(22) : 2:00 am ~ 2:59 am	(6)	2.6	0.2	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.0
(23) : 3:00 am ~ 3:59 am	(6)	6.6	0.4	0.0	0.3	0.1	0.0	0.0	0.3	0.1	0.3	0.0
(24) : 4:00 am ~ 4:59 am	(6)	7.9	0.5	0.1	0.3	0.2	0.0	0.0	0.4	0.1	0.3	0.0
(25) : no indication	(7)	100	1.2	3.3	0.0	0.0	0.0	2.4	0.0	3.8	11.7	55.9
Total Percentage			100	100	100	100	100	100	100	100	100	100

(d) Percentage of Trips by Trip Types in Each Time Period

Hour period	Time P.	(%)	1	2	3	4	5	6	7	8	9	10	Total
(1) : 5:00 am ~ 5:59 am	6	28.9	40.8	0.4	8.8	1.4	0.0	0.7	0.1	1.5	46.4	0.0	100.0
(2) : 6:00 am ~ 6:59 am	1	17.0	49.9	3.8	13.5	1.5	0.1	22.8	0.3	4.0	4.0	0.1	100.0
(3) : 7:00 am ~ 7:59 am	1	52.5	49.9	3.8	13.5	1.5	0.1	22.8	0.3	4.0	4.0	0.1	100.0
(4) : 8:00 am ~ 8:59 am	1	30.5	49.9	3.8	13.5	1.5	0.1	22.8	0.3	4.0	4.0	0.1	100.0
(5) : 9:00 am ~ 9:59 am	2	43.9	13.4	1.5	28.2	7.4	3.5	2.1	0.0	0.2	43.8	0.0	100.0
(6) : 10:00 am ~ 10:59 am	2	32.5	13.4	1.5	28.2	7.4	3.5	2.1	0.0	0.2	43.8	0.0	100.0
(7) : 11:00 am ~ 11:59 am	2	23.7	13.4	1.5	28.2	7.4	3.5	2.1	0.0	0.2	43.8	0.0	100.0
(8) : 0:00 pm ~ 0:59 pm	3	18.5	2.5	0.9	0.6	1.0	0.1	4.2	0.0	5.2	85.4	0.2	100.0
(9) : 1:00 pm ~ 1:59 pm	3	54.6	2.5	0.9	0.6	1.0	0.1	4.2	0.0	5.2	85.4	0.2	100.0
(10) : 2:00 pm ~ 2:59 pm	3	27.0	2.5	0.9	0.6	1.0	0.1	4.2	0.0	5.2	85.4	0.2	100.0
(11) : 3:00 pm ~ 3:59 pm	4	36.9	24.0	1.7	2.7	2.0	4.3	12.6	0.0	1.2	51.5	0.0	100.0
(12) : 4:00 pm ~ 4:59 pm	4	36.9	24.0	1.7	2.7	2.0	4.3	12.6	0.0	1.2	51.5	0.0	100.0
(13) : 5:00 pm ~ 5:59 pm	4	26.2	24.0	1.7	2.7	2.0	4.3	12.6	0.0	1.2	51.5	0.0	100.0
(14) : 6:00 pm ~ 6:59 pm	5	28.6	4.7	0.5	1.0	6.5	3.2	1.6	0.0	5.5	76.8	0.0	100.0
(15) : 7:00 pm ~ 7:59 pm	5	28.2	4.7	0.5	1.0	6.5	3.2	1.6	0.0	5.5	76.8	0.0	100.0
(16) : 8:00 pm ~ 8:59 pm	5	28.9	4.7	0.5	1.0	6.5	3.2	1.6	0.0	5.5	76.8	0.0	100.0
(17) : 9:00 pm ~ 9:59 am	5	14.3	4.7	0.5	1.0	6.5	3.2	1.6	0.0	5.5	76.8	0.0	100.0
(18) : 10:00 pm ~ 10:59 pm	6	32.9	40.8	0.4	8.8	1.4	0.0	0.7	0.1	1.5	46.4	0.0	100.0
(19) : 11:00 pm ~ 11:59 pm	6	15.8	40.8	0.4	8.8	1.4	0.0	0.7	0.1	1.5	46.4	0.0	100.0
(20) : 0:00 am ~ 0:59 am	6	1.3	40.8	0.4	8.8	1.4	0.0	0.7	0.1	1.5	46.4	0.0	100.0
(21) : 1:00 am ~ 1:59 am	6	3.9	40.8	0.4	8.8	1.4	0.0	0.7	0.1	1.5	46.4	0.0	100.0
(22) : 2:00 am ~ 2:59 am	6	2.6	40.8	0.4	8.8	1.4	0.0	0.7	0.1	1.5	46.4	0.0	100.0
(23) : 3:00 am ~ 3:59 am	6	6.6	40.8	0.4	8.8	1.4	0.0	0.7	0.1	1.5	46.4	0.0	100.0
(24) : 4:00 am ~ 4:59 am	6	7.9	40.8	0.4	8.8	1.4	0.0	0.7	0.1	1.5	46.4	0.0	100.0
(25) : no indication	7	100	4.3	1.0	0.0	0.0	0.0	4.0	0.0	2.0	87.2	1.5	100.0

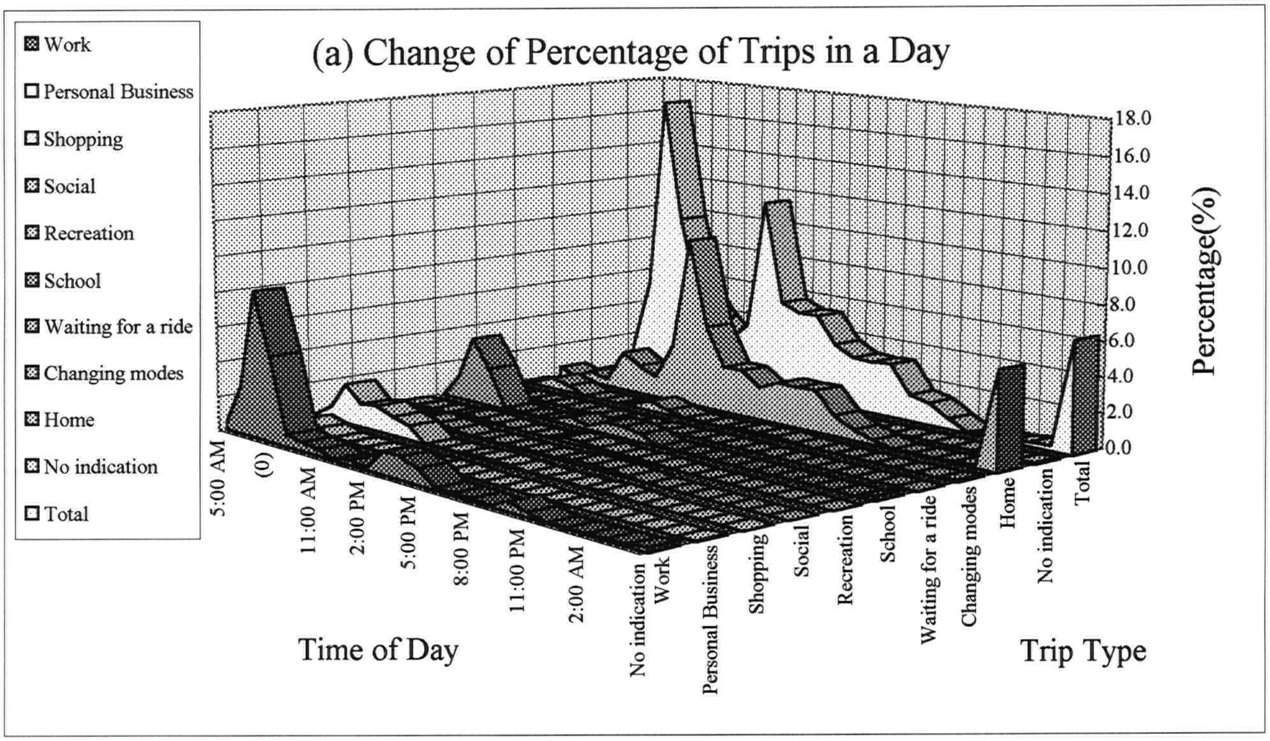
"home" trips, arguably the most frequent trip type, account for 171,921 or 47.3% of the total daily trips, and most frequently occur during the early afternoon time period (3) between 12 and 3 p.m. or the early afternoon peak hour between 1 and 2 p.m.. In fact, the early afternoon peak hour "home" trips, which account for 9.8% of the total daily trips, is the most frequent individual hourly trips. The third most frequent trip type is "school" trips which account for 10.7% of the total daily trips, followed by "shopping" trips which account for 8.6% of the total daily trips. Similar to the "work" trips, the busiest period for "school" and "shopping" trips is the morning peak time period between 6 and 9 a.m. with the portions of 68.4% and 50.1% of the total daily trips based on each trip type, or 7.3% and 4.3% of the total daily trips.

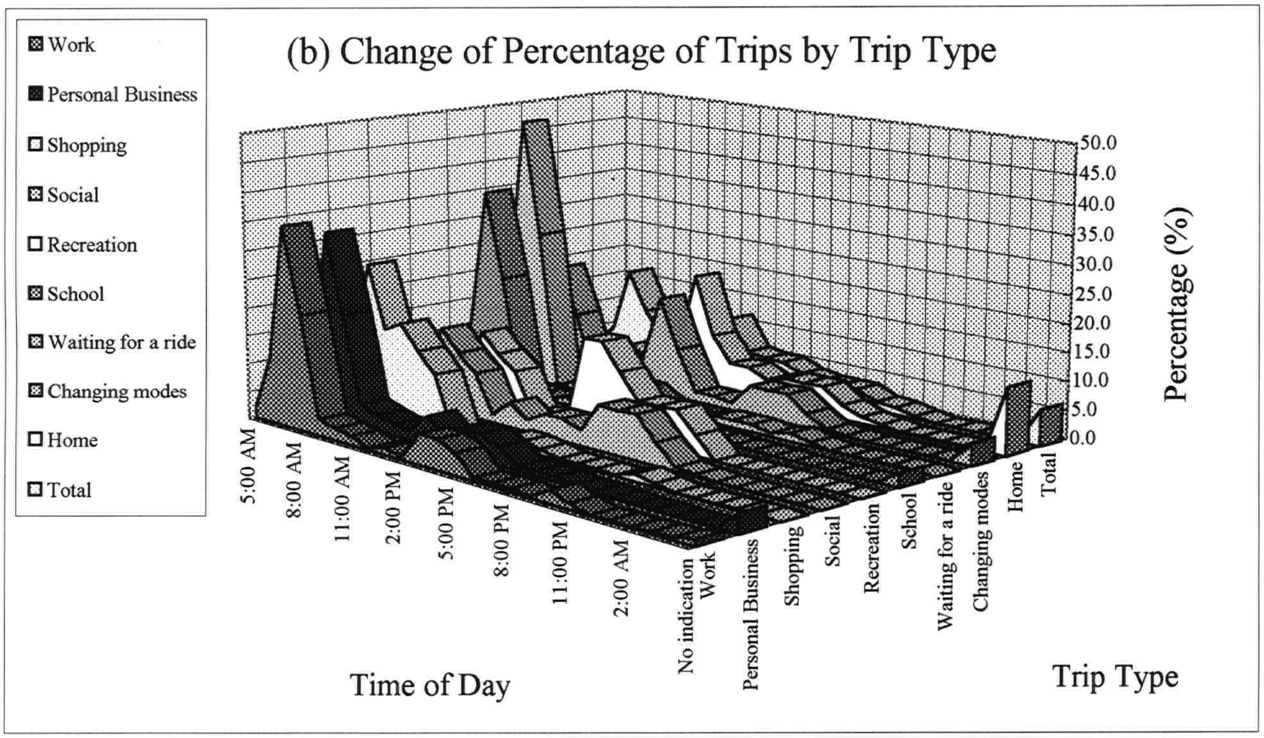
The busiest time period is between 6 and 9 a.m. with 32.8% of the total daily trips. The busiest hour period is between 7 and 8 a.m. with 16.8% of the total daily trips. The most frequent trip type in this time period is "work" with a portion of 49.9%, followed by "school" and "shopping" with 22.8% and 13.5% respectively. This in turn means that approximately 86.4% of the trips occurring in the morning peak belong to those three trip types. These three frequent trip types, "work", "school" and "shopping", in the morning peak account for 15.9%, 7.3% and 4.3% of the total daily trips based on the time period between 6 and 9 a.m. and 8.4%, 3.8% and 2.3% of the total daily trips based on the peak hour period between 7 and 8 a.m. respectively. Moreover, the totals of these three trip types become 27.5% for time period and 14.5% for hour period respectively.

The second busiest period is the time period (3) between 12 and 3 p.m. with 21.0% of the total daily trips, or the hour period (9) between 1 and 2 p.m. with 11.4% of the total daily trips. During this period, "home" trips account for 85.4% of the total peak trips. This arguably proves that the major travel pattern in the city is going to work, school and shopping in the morning and coming back home during this early afternoon peak.

Figure 6-4 summarizes the changes in percentages of trips. Figure 6-4 (a) is based on the total trip, in which the total of all trips is 100%, and Figure 6-4 (b) shows the changes based on

Figure 6-4 Change of Percentage of Trips (M = PPL3)


(a) Change of Percentage of Trips in a Day


(b) Change of Percentage of Trips by Trip Type

each trip type, in which the total of each trip type is 100%. From Figure 6-4 (a), the findings are:

① The previously discussed findings are clearly observed. That is, there are two peak periods, and the "work," "school" and "shopping" trips are the primary trip types for the busiest morning peak period while "home" is the major trip type for the second busiest, early afternoon peak period.

② There is also another "going out" period in the late afternoon between 2 and 5 p.m. although the second highest "going out" peak is much smaller than the highest morning peak. The "work" and "school" trips are responsible for the pattern.

③ "No indication" trips, which accounts for 6.4% of the total trips, are considered mostly "home" trips, and these trips may have some impacts on the afternoon peak while it is also likely that those trips are well-scattered throughout the day.

From Figure 6-4 (b), it is easily observed that the morning time period is the most frequent for most of the trip types. The exceptions are the "recreation" and "home" trips. The peaks for these trips occur between 3 and 6 p.m. and between 12 and 3 p.m. respectively. The "social" trips also have the second highest peak between 6 and 10 p.m., During this time period, the "recreation" trips are also responsible for the total trips made.

Throughout the analysis above, the primary travel pattern of "going to work, school and shopping" in the morning period and of "coming back home" during the early afternoon peak, which was obtained from the interview with a city personnel and was mentioned in Chapter 3 as "people's life style," is observed. That is, when the morning peak trips are focused, the travel characteristics of "work," "school" and "shopping" trips should be considered. Then, when the afternoon peak trips are focused, the travel characteristics of "home" trips should be considered.

In addition, the second going out period in the late afternoon, which was also obtained in the interview, is arguably observed from Figure 6-4 (b) although it is not clear from Figure 6-4 (a). The second going out behaviour, therefore, seems to be well-scattered throughout the afternoon period, and may be primarily responsible for the relatively gradual decrease of the trip numbers from the afternoon peak to the evening period. "Social" and "recreation" trips as well as "work" and "school" trips are responsible for the second going out peak.

6.3.2 OD matrix

The second task of the trip pattern analysis is to understand the physical movement of trips in the city. That is, the task is to find out how many people travel between the traffic analysis zones. For this purpose, OD matrixes are derived from the trip record part of the household survey. Those OD matrixes are based on person trips, and are calculated based on either trip types, time periods or hour periods. Since the OD data is huge in quantity, only 6 major matrixes are shown in Tables 6-20 (a) to (f). They are the OD matrix of (a) the total daily trips of 363,166, (b) the total daily "work" trips of 86,560, (c) the morning peak time period trips of 115,992, (d) the morning peak hour trips of 60,942, (e) the morning peak hour "work" trips of 30,418 and (f) the total daily "home" trips of 171,921. The numbers in rows and columns of Tables 6-20 (a) to (f) represent origins and destinations respectively. The numbers of origins and destinations are the ones of traffic analysis zones.

In the each of Table 6-20 (a) to (f), 34 traffic analysis zones are identified as origins and destinations. This 34 traffic analysis zone system is different from the previously defined 30 traffic analysis zone system. This is because four other noticeable origin and/or destination groups are found through the data processing stage by the author, and the four groups are added in the matrixes as the extra zones of 31, 32, 33 and 34. These extra zones, 31, 32, 33 and 34 represent the National University of Piura, the University of Piura, non-origin or destination specified trips and other types of no indication trips respectively. The National University of Piura and the University of Piura, which originally belong to traffic analysis zones 21 and 13 respectively, are treated individually because quite a number of trips indicated those universities as their origin or destination. In addition, the OD matrixes are the results of expanding only in-city-originated trips. That is, trips originated from externals,

Table 6-20 (a) OD-Matrix : The Numbers of Daily Trips

Trip type [All : Total (1) ~ (10)] , Time Period [All : (1) ~ (7)] , M-factor [PPL3]

# Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	Total
1	124	91	0	41	53	66	129	0	0	311	280	18	457	832	18	370	431	0	1167	0	693	18	261	1019	1086	0	0	0	0	0	35	301	0	0	7800
2	56	229	89	125	547	320	162	3529	32	1349	301	354	1142	2914	38	978	901	586	1945	623	769	0	1305	1280	1447	0	0	0	0	38	76	115	0	416	21666
3	0	89	152	106	314	551	230	392	0	104	175	0	0	832	0	822	482	195	0	208	274	0	261	783	0	0	0	0	0	101	228	0	152	0	6451
4	41	125	106	62	470	143	241	5	488	109	87	118	457	0	0	715	575	391	0	208	736	185	522	3578	362	0	0	0	5	0	0	16	0	0	9744
5	53	547	314	470	1998	329	827	0	506	0	157	118	1599	416	0	392	0	0	389	0	173	224	0	0	362	0	0	0	0	0	627	0	0	314	9814
6	48	712	551	56	329	554	576	7059	62	1025	612	1768	2741	3746	2	868	719	1758	7780	1039	346	1703	2349	4074	2171	0	228	0	181	30	408	0	0	346	43841
7	147	162	230	284	827	488	632	392	64	587	525	471	1599	416	0	587	431	195	1167	208	1255	416	304	0	118	0	0	0	0	87	731	301	0	43	12671
8	0	3529	0	397	0	6667	392	1961	0	784	87	0	0	392	0	235	0	0	0	0	0	784	392	0	0	0	0	0	0	784	784	0	0	1569	18759
9	0	32	0	96	506	77	64	392	448	32	0	118	228	448	0	32	144	0	0	0	0	0	0	64	0	32	32	0	0	0	128	0	0	160	3034
10	311	1349	104	109	0	830	587	784	32	207	661	118	207	0	0	207	0	195	0	0	484	67	0	622	0	0	0	0	0	0	1971	622	0	207	9678
11	280	213	175	175	157	437	437	87	0	661	1836	0	87	0	0	87	0	0	0	0	262	0	0	0	0	0	0	0	0	0	262	0	0	175	5333
12	18	354	0	118	118	1768	471	0	118	118	0	0	0	118	0	0	144	0	0	0	0	118	118	0	0	0	0	0	0	0	0	354	0	236	4168
13	457	685	228	457	1599	2741	1599	0	228	207	87	0	914	0	0	0	0	0	0	0	914	0	0	0	0	0	228	0	0	0	685	2056	0	685	13770
14	832	2497	832	0	416	2914	416	0	448	0	0	118	0	0	1249	416	416	0	0	0	2081	832	0	0	0	0	0	0	0	0	0	0	0	2497	15967
15	18	39	0	0	0	5	1	0	0	1	0	0	0	833	1	235	0	0	389	0	173	0	0	1020	0	0	0	0	0	0	0	0	0	4	2719
16	352	940	822	715	392	1284	587	235	32	207	87	0	0	0	235	0	431	195	778	208	587	185	352	0	0	0	0	0	0	0	0	0	0	117	8745
17	449	939	482	575	0	862	144	0	144	0	0	144	0	416	0	287	144	144	287	0	533	550	144	0	0	0	0	0	0	0	287	0	0	431	6962
18	0	586	195	586	0	1563	391	0	0	0	0	0	0	0	0	195	144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1954	5614
19	1167	1375	0	389	389	9337	0	0	0	0	0	0	0	0	389	778	676	0	0	208	0	778	0	0	0	0	0	0	0	0	3112	0	0	778	19376
20	208	416	208	208	0	1039	208	0	0	0	0	0	0	0	0	208	0	0	208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2702
21	693	769	274	811	173	346	1298	0	0	484	262	0	457	1249	173	587	144	0	389	0	2078	693	261	0	1086	0	0	0	0	0	2148	2218	0	866	17459
22	18	181	0	67	224	2162	467	392	0	67	0	0	0	832	0	185	550	0	778	0	693	852	589	5615	3619	0	0	0	261	67	67	0	0	873	18559
23	261	2088	1044	1044	0	1827	304	392	0	0	0	118	0	0	0	352	144	0	0	0	261	1111	1044	3839	0	0	0	0	0	0	0	0	0	1827	15657
24	1019	1019	0	3056	0	4074	0	0	64	622	0	0	0	0	1019	0	0	0	0	0	0	6111	2298	0	0	0	0	0	0	1019	8148	0	0	0	28448
25	724	1809	0	362	362	1990	0	0	0	0	0	118	0	0	0	0	0	0	0	0	1447	3438	0	0	0	0	0	0	0	0	0	0	0	181	10431
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	228	0	0	32	0	0	0	228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	489
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	5	0	181	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	261	0	0	0	0	0	0	0	0	0	0	0	0	447
30	0	38	51	0	0	30	87	784	0	0	0	0	0	0	0	0	0	0	0	0	0	67	0	1019	0	0	0	0	0	51	0	0	0	0	2127
31	35	164	392	0	627	264	731	392	160	1971	175	0	914	0	0	0	431	0	3112	0	2148	67	0	8148	0	0	0	0	0	0	0	0	0	0	19733
32	301	531	0	16	0	416	301	0	0	622	0	354	2056	416	0	0	0	0	0	0	1385	0	0	0	0	0	0	0	0	0	0	0	0	0	6398
33	0	0	152	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	152
34	0	832	0	0	314	346	43	1569	160	207	175	236	685	2497	1	117	431	1758	778	208	866	873	522	1305	181	0	0	0	0	0	0	0	0	346	14451
Total	7611	22341	6401	10329	9814	43839	11328	18367	3019	9679	5508	4168	13770	16360	3124	8657	7337	5419	19168	2909	18160	19333	10723	32365	10431	32	489	0	447	2177	19701	5982	152	14026	363166

Multiply Factors of Zones for Trip Estimation (PPL3)

Multiply Factors \ Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Average
Popul.-based 3 (PPL3)	18	38	51	5	157	15	43	392	32	104	87	118	228	416	1	117	144	195	389	208	173	67	261	1019	181	-	-	-	-	-	184

note : Total trips for zone 2 are estimated by taking average of ones for zone 1 and 3.

Table 6-20 (b) OD-Matrix : The Numbers of Daily "Work" Trips

Trip type [1 : Work] , Time Period [All : (1) ~ (7)] , M-factor [PPL3]

# Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	Total
1	89	53	0	35	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	35	283	0	0	531
2	38	153	38	115	0	115	38	0	0	0	0	0	0	0	38	0	38	0	0	0	0	0	0	0	0	0	0	0	0	38	76	76	0	416	1180
3	0	51	51	101	0	202	51	0	0	0	0	0	0	0	0	0	51	0	0	0	0	0	0	0	0	0	0	0	0	51	0	0	152	0	708
4	5	10	5	16	0	5	0	5	0	0	0	0	0	0	0	5	0	0	0	0	43	118	0	0	0	0	0	0	5	0	0	16	0	0	233
5	0	470	157	314	157	0	314	0	314	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1725
6	0	0	0	0	0	15	43	0	30	195	175	118	228	0	0	0	0	0	0	208	0	30	0	0	0	0	228	0	181	15	159	0	0	271	1896
7	104	0	86	172	0	86	86	0	0	172	0	0	0	0	0	0	0	0	0	0	43	129	0	0	0	0	0	0	0	87	43	43	0	43	1095
8	0	1569	0	392	0	2745	0	0	0	392	0	0	0	392	0	0	0	0	0	0	0	784	392	0	0	0	0	0	0	784	392	0	0	0	7843
9	0	32	0	32	128	0	32	0	224	32	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	32	32	0	0	0	32	0	0	0	608
10	0	934	104	0	0	311	207	0	0	104	311	0	0	0	0	207	0	195	0	0	207	0	0	415	0	0	0	0	0	0	104	207	0	207	3515
11	175	0	0	0	0	0	350	0	0	262	350	0	87	0	0	0	0	0	0	0	175	0	0	0	0	0	0	0	0	0	0	0	0	87	1486
12	18	354	0	118	0	471	236	0	118	0	0	0	0	118	0	0	0	0	0	0	0	118	0	0	0	0	0	0	0	0	0	354	0	0	1903
13	457	228	0	457	457	0	228	0	0	0	0	0	228	0	0	0	0	0	0	0	0	0	0	0	0	0	228	0	0	0	685	228	0	228	3426
14	832	416	0	0	416	832	416	0	416	0	0	0	0	0	832	0	416	0	0	0	832	0	0	0	0	0	0	0	0	0	0	0	0	1249	6660
15	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
16	235	940	822	705	235	705	470	235	0	0	0	0	0	0	235	0	0	0	0	0	470	117	352	0	0	0	0	0	0	0	0	0	0	117	5640
17	18	757	431	431	0	287	144	0	144	0	0	144	0	0	0	287	144	144	287	0	533	0	144	0	0	0	0	0	0	0	144	0	0	287	4325
18	0	586	195	391	0	391	195	0	0	0	0	0	0	0	0	195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1368	3321
19	778	389	0	0	0	4279	0	0	0	0	0	0	0	0	389	0	389	0	0	0	0	778	0	0	0	0	0	0	0	0	2334	0	0	778	10115
20	208	208	208	208	0	416	0	0	0	0	0	0	0	0	0	208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1455
21	346	385	224	811	173	346	693	0	0	173	0	0	0	0	173	0	0	0	0	0	346	520	0	0	0	0	0	0	0	0	346	346	0	520	5402
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117	416	0	389	0	0	0	0	0	0	0	0	0	0	67	0	0	0	268	1258
23	0	1044	522	1044	0	522	261	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	261	261	0	0	0	0	0	0	0	0	0	1827	5742
24	1019	1019	0	3056	0	2037	0	0	64	0	0	0	0	0	1019	0	0	0	0	0	0	1019	0	0	0	0	0	0	0	1019	0	0	0	0	10250
25	543	1267	0	362	362	1267	0	0	0	0	0	0	0	0	0	0	0	0	0	0	905	1267	0	0	0	0	0	0	0	0	0	0	0	181	6152
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	87
Total	4864	10863	2843	8758	1928	15033	3765	240	1310	1331	923	262	544	542	2704	1021	1454	339	676	208	3555	4897	1149	676	0	32	489	0	186	2061	4351	1554	152	7850	86560

Multiply Factors of Zones for Trip Estimation (PPL3)

Multiply Factors \ Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Average
Popul.-based 3 (PPL3)	18	38	51	5	157	15	43	392	32	104	87	118	228	416	1	117	144	195	389	208	173	67	261	1019	181	-	-	-	-	-	184

note : Total trips for zone 2 are estimated by taking average of ones for zone 1 and 3.

Table 6-20 (c) OD-Matrix : The Numbers of Morning Time Period Trips

Trip type [All : (1) ~ (10)] , Time Period [1 : 6:00 am ~ 8:59 am] , M-factor [PPL3]

# Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	Total
1	53	53	0	35	0	18	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	159	0	0	354
2	38	76	0	115	0	153	76	0	0	0	0	0	0	0	38	0	38	0	0	0	76	0	0	0	0	0	0	0	0	38	0	76	0	0	726
3	0	0	101	51	0	318	101	0	0	0	87	0	0	0	0	0	51	0	0	0	101	0	0	0	0	0	0	0	0	51	228	0	51	0	1140
4	5	5	5	21	0	10	21	5	0	5	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	16	0	0	103
5	0	314	157	157	842	314	157	0	314	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	470	0	0	157	2881
6	15	68	96	45	15	389	146	0	30	0	262	118	457	832	0	45	0	586	1556	416	0	112	522	0	0	0	228	0	0	30	249	0	0	136	6354
7	61	43	43	86	43	258	374	0	0	86	175	0	0	0	0	0	0	0	0	0	43	172	43	0	0	0	0	0	0	87	430	215	0	43	2203
8	0	1961	0	392	0	5490	0	392	0	392	0	0	0	392	0	0	0	0	0	0	0	784	392	0	0	0	0	0	0	784	392	0	0	392	11765
9	0	32	0	64	160	32	64	0	224	32	0	0	0	32	0	32	0	0	0	0	0	0	0	0	0	32	32	0	0	0	64	0	0	160	961
10	207	519	0	0	0	622	207	0	0	104	207	0	104	0	0	207	0	0	0	0	207	0	0	311	0	0	0	0	0	0	934	519	0	104	4254
11	175	0	87	87	0	262	350	87	0	175	350	0	87	0	0	87	0	0	0	0	175	0	0	0	0	0	0	0	0	0	87	0	0	87	2099
12	0	236	0	118	118	943	354	0	118	118	0	0	0	118	0	0	0	0	0	0	0	118	118	0	0	0	0	0	0	0	0	0	0	0	2357
13	228	457	228	228	1142	914	457	0	0	0	0	0	457	0	0	0	0	0	0	0	457	0	0	0	0	0	0	0	0	0	228	1370	0	457	6624
14	416	1665	0	0	416	2497	416	0	416	0	0	0	0	0	832	0	416	0	0	0	1665	832	0	0	0	0	0	0	0	0	0	0	0	2081	11654
15	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
16	235	470	587	235	117	587	352	0	0	0	0	0	0	0	117	0	0	0	0	0	235	117	235	0	0	0	0	0	0	0	0	0	0	117	3407
17	144	431	287	431	0	719	0	0	144	0	0	144	0	0	0	144	0	144	144	0	144	0	144	0	0	0	0	0	0	0	287	0	0	287	3593
18	0	391	195	391	0	977	195	0	0	0	0	0	0	0	0	195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1172	3517
19	778	208	0	0	0	3501	0	0	0	0	0	0	0	0	389	778	0	0	0	0	0	778	0	0	0	0	0	0	0	0	1167	0	0	778	8377
20	208	0	208	208	0	208	0	0	0	0	0	0	0	0	0	208	0	0	208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1247
21	693	693	173	693	173	346	693	0	0	173	0	0	0	0	173	0	0	0	0	0	1039	693	0	0	0	0	0	0	0	0	2148	1802	0	866	10357
22	0	0	0	0	67	671	134	0	0	67	0	0	0	0	0	0	483	0	0	0	0	268	67	0	0	0	0	0	261	67	67	0	0	470	2624
23	261	261	261	522	0	1305	261	0	0	0	0	0	0	0	0	0	0	0	0	0	0	261	261	0	0	0	0	0	0	0	0	0	0	1305	4698
24	1019	0	0	3056	0	4074	0	0	64	0	0	0	0	0	1019	0	0	0	0	0	0	1019	2037	0	0	0	0	0	0	0	6111	0	0	0	18398
25	362	905	0	181	362	1447	0	0	0	0	0	0	0	0	0	0	0	0	0	0	724	1628	0	0	0	0	0	0	0	0	0	0	0	181	5790
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	118
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	195	0	0	0	0	0	0	0	0	0	0	0	195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	391
Total	4898	8787	2430	7115	3456	26254	4359	485	1310	1152	1082	379	1105	1374	2587	1702	988	925	1908	416	4866	6801	3819	311	0	32	260	0	266	1058	12865	4157	51	8794	115992

Multiply Factors of Zones for Trip Estimation (PPL3)

Multiply Factors \ Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Average
Popul.-based 3 (PPL3)	18	38	51	5	157	15	43	392	32	104	87	118	228	416	1	117	144	195	389	208	173	67	261	1019	181	-	-	-	-	-	184

note : Total trips for zone 2 are estimated by taking average of ones for zone 1 and 3.

Table 6-20 (d) OD-Matrix : The Numbers of Morning Peak Hour Trips

Trip Type [All : Total (1) ~ (10)] , Hour Period [(3) : 7:00 am ~ 7:59 am] , Portion of [52.5] % in Time Period [1]

# Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	Total
1	28	28	0	19	0	9	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	84	0	0	186
2	20	40	0	60	0	80	40	0	0	0	0	0	0	0	20	0	20	0	0	0	40	0	0	0	0	0	0	0	0	20	0	40	0	0	381
3	0	0	53	27	0	167	53	0	0	0	46	0	0	0	0	0	27	0	0	0	53	0	0	0	0	0	0	0	0	27	120	0	27	0	599
4	3	3	3	11	0	5	11	3	0	3	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	8	0	0	54
5	0	165	82	82	442	165	82	0	165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	247	0	0	82	1514
6	8	36	50	24	8	204	76	0	16	0	138	62	240	437	0	24	0	308	818	218	0	59	274	0	0	0	120	0	0	16	131	0	0	71	3338
7	32	23	23	45	23	136	196	0	0	45	92	0	0	0	0	0	0	0	0	0	23	90	23	0	0	0	0	0	0	46	226	113	0	23	1157
8	0	1030	0	206	0	2885	0	206	0	206	0	0	0	206	0	0	0	0	0	0	0	412	206	0	0	0	0	0	0	412	206	0	0	206	6181
9	0	17	0	34	84	17	34	0	118	17	0	0	0	17	0	17	0	0	0	0	0	0	0	0	0	17	17	0	0	0	34	0	0	84	505
10	109	273	0	0	0	327	109	0	0	55	109	0	55	0	0	109	0	0	0	0	109	0	0	164	0	0	0	0	0	0	491	273	0	55	2235
11	92	0	46	46	0	138	184	46	0	92	184	0	46	0	0	46	0	0	0	0	92	0	0	0	0	0	0	0	0	0	46	0	0	46	1103
12	0	124	0	62	62	495	186	0	62	62	0	0	0	62	0	0	0	0	0	0	0	62	62	0	0	0	0	0	0	0	0	0	0	0	1238
13	120	240	120	120	600	480	240	0	0	0	0	0	240	0	0	0	0	0	0	0	240	0	0	0	0	0	0	0	0	0	120	720	0	240	3480
14	219	875	0	0	219	1312	219	0	219	0	0	0	0	0	437	0	219	0	0	0	875	437	0	0	0	0	0	0	0	0	0	0	0	1093	6123
15	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
16	123	247	309	123	62	309	185	0	0	0	0	0	0	0	62	0	0	0	0	0	123	62	123	0	0	0	0	0	0	0	0	0	0	62	1790
17	76	227	151	227	0	378	0	0	76	0	0	76	0	0	0	76	0	76	76	0	76	0	76	0	0	0	0	0	0	0	151	0	0	151	1888
18	0	205	103	205	0	513	103	0	0	0	0	0	0	0	0	103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	616	1848
19	409	109	0	0	0	1840	0	0	0	0	0	0	0	0	204	409	0	0	0	0	0	409	0	0	0	0	0	0	0	0	613	0	0	409	4401
20	109	0	109	109	0	109	0	0	0	0	0	0	0	0	0	109	0	0	109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	655
21	364	364	91	364	91	182	364	0	0	91	0	0	0	0	91	0	0	0	0	0	546	364	0	0	0	0	0	0	0	0	1129	947	0	455	5442
22	0	0	0	0	35	353	71	0	0	35	0	0	0	0	0	0	254	0	0	0	0	141	35	0	0	0	0	0	137	35	35	0	0	247	1378
23	137	137	137	274	0	686	137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	137	137	0	0	0	0	0	0	0	0	0	0	686	2469
24	535	0	0	1605	0	2141	0	0	34	0	0	0	0	0	535	0	0	0	0	0	0	535	1070	0	0	0	0	0	0	0	3211	0	0	0	9666
25	190	475	0	95	190	760	0	0	0	0	0	0	0	0	0	0	0	0	0	0	380	856	0	0	0	0	0	0	0	0	0	0	0	95	3042
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	103	0	0	0	0	0	0	0	0	0	0	0	103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	205
Total	2573	4617	1277	3738	1816	13794	2290	255	688	605	568	199	580	722	1359	894	519	486	1002	218	2557	3573	2007	164	0	17	137	0	140	556	6759	2184	27	4620	60942

Multiply Factors of Zones for Trip Estimation (PPL3)

Multiply Factors \ Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Average
Popul.-based 3 (PPL3)	18	38	51	5	157	15	43	392	32	104	87	118	228	416	1	117	144	195	389	208	173	67	261	1019	181	-	-	-	-	-	184

note : Total trips for zone 2 are estimated by taking average of ones for zone 1 and 3.

Table 6-20 (e) OD-Matrix : The Numbers of Morning Peak Hour "Work" Trips

Trip Type [1 : Work] , Hour Period [(3) : 7:00 am ~ 7:59 am] , Portion of [52.5] % in Time Period [1]

# Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	Total
1	28	28	0	19	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	74	0	0	168
2	20	40	0	60	0	60	20	0	0	0	0	0	0	0	20	0	20	0	0	0	0	0	0	0	0	0	0	0	0	20	0	20	0	0	281
3	0	0	27	27	0	106	27	0	0	0	0	0	0	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0	0	27	0	0	27	0	266
4	3	3	3	3	0	3	0	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	8	0	0	30
5	0	165	82	82	82	0	82	0	165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	659
6	0	0	0	0	0	8	23	0	16	0	92	62	120	0	0	0	0	0	0	109	0	16	0	0	0	0	120	0	0	8	83	0	0	40	696
7	32	0	23	45	0	23	23	0	0	45	0	0	0	0	0	0	0	0	0	0	23	45	0	0	0	0	0	0	0	46	23	0	0	23	349
8	0	618	0	206	0	1236	0	0	0	206	0	0	0	206	0	0	0	0	0	0	0	412	206	0	0	0	0	0	0	412	206	0	0	0	3709
9	0	17	0	17	50	0	17	0	118	17	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	17	17	0	0	0	0	0	0	0	286
10	0	218	0	0	0	109	55	0	0	55	109	0	0	0	0	109	0	0	0	0	55	0	0	109	0	0	0	0	0	0	55	55	0	55	981
11	92	0	0	0	0	0	138	0	0	46	46	0	46	0	0	0	0	0	0	0	46	0	0	0	0	0	0	0	0	0	0	0	0	46	459
12	0	124	0	62	0	124	124	0	62	0	0	0	0	62	0	0	0	0	0	0	0	62	0	0	0	0	0	0	0	0	0	0	0	0	619
13	120	120	0	120	240	0	120	0	0	0	0	0	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	120	120	0	120	1200
14	219	219	0	0	219	219	219	0	219	0	0	0	0	0	437	0	219	0	0	0	437	0	0	0	0	0	0	0	0	0	0	0	0	437	2843
15	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
16	123	247	309	123	62	309	185	0	0	0	0	0	0	0	62	0	0	0	0	0	123	62	123	0	0	0	0	0	0	0	0	0	0	62	1790
17	0	227	151	151	0	151	0	0	76	0	0	76	0	0	0	76	0	76	76	0	76	0	76	0	0	0	0	0	0	0	76	0	0	151	1435
18	0	205	103	205	0	0	103	0	0	0	0	0	0	0	0	103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	411	1129
19	409	0	0	0	0	1022	0	0	0	0	0	0	0	0	204	0	0	0	0	0	0	409	0	0	0	0	0	0	0	0	409	0	0	409	2861
20	109	0	109	109	0	0	0	0	0	0	0	0	0	0	0	109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	437
21	182	182	91	364	91	182	364	0	0	91	0	0	0	0	91	0	0	0	0	0	182	273	0	0	0	0	0	0	0	0	182	182	0	273	2730
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	219	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0	35	289
23	0	137	0	274	0	0	137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	686	1234
24	535	0	0	1605	0	1070	0	0	34	0	0	0	0	0	535	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3780
25	190	380	0	95	190	570	0	0	0	0	0	0	0	0	0	0	0	0	0	0	190	475	0	0	0	0	0	0	0	0	0	0	0	95	2186
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2062	2929	897	3568	934	5192	1635	3	688	460	247	137	286	285	1359	399	484	76	76	109	1131	1763	405	109	0	17	137	0	3	548	1153	459	27	2841	30418

Multiply Factors of Zones for Trip Estimation (PPL3)

Multiply Factors \ Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Average
Popul.-based 3 (PPL3)	18	38	51	5	157	15	43	392	32	104	87	118	228	416	1	117	144	195	389	208	173	67	261	1019	181	-	-	-	-	-	184

note : Total trips for zone 2 are estimated by taking average of ones for zone 1 and 3.

Table 6-20 (f) OD-Matrix : The Numbers of Daily "Home" Trips

Trip type [9 : Home] , Time Period [All : (1) ~ (7)] , m-factor [PPL3]

# Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	Total
1	35	38	0	5	0	30	129	0	0	311	262	0	457	832	0	370	431	0	1167	0	693	0	261	1019	1086	0	0	0	0	0	0	0	0	0	7127
2	18	76	51	10	470	90	86	3529	32	1349	262	354	1142	2914	0	978	862	586	1945	623	731	0	1305	1280	1447	0	0	0	0	0	0	0	0	0	20142
3	0	38	51	5	314	45	129	392	0	104	175	0	0	832	0	822	431	195	0	208	224	0	261	783	0	0	0	0	0	0	0	0	0	0	5010
4	35	115	101	31	470	45	215	0	96	104	87	118	457	0	0	705	575	391	0	208	693	67	522	3578	362	0	0	0	0	0	0	0	0	0	8975
5	53	76	0	0	314	15	43	0	192	0	0	118	1599	416	0	235	0	0	389	0	173	67	0	0	362	0	0	0	0	0	0	0	0	0	4052
6	18	229	506	10	314	211	430	7059	32	830	437	1650	1827	3746	2	822	719	1758	7780	831	346	1477	2349	4074	2171	0	0	0	0	0	0	0	0	0	39629
7	0	76	101	26	784	15	172	392	64	415	525	471	1599	416	0	587	431	195	1167	208	1212	201	261	0	0	0	0	0	0	0	0	0	0	0	9320
8	0	0	0	5	0	0	0	1176	0	0	87	0	0	0	0	235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1504
9	0	0	0	0	314	45	0	392	224	0	0	118	228	416	0	0	144	0	0	0	0	0	0	64	0	0	0	0	0	0	0	0	0	0	1945
10	0	0	0	5	0	0	172	392	32	104	350	118	0	0	0	0	0	0	0	0	173	67	0	0	0	0	0	0	0	0	0	0	0	0	1413
11	18	38	0	0	157	0	0	0	0	311	787	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1311
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144
13	0	0	0	0	0	228	0	0	0	207	87	0	457	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	980
14	0	0	0	0	0	0	0	0	32	0	0	118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150
15	18	39	0	0	0	1	0	0	0	1	0	0	0	833	1	235	0	0	389	0	173	0	0	1020	0	0	0	0	0	0	0	0	0	2	2712
16	0	0	0	10	157	45	0	0	32	207	87	0	0	0	0	0	431	195	778	208	0	67	0	0	0	0	0	0	0	0	0	0	0	0	2219
17	0	38	51	0	0	0	0	0	0	0	0	0	0	416	0	0	0	0	0	0	0	134	0	0	0	0	0	0	0	0	0	0	0	0	639
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	287	0	0	208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	495
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	38	51	0	0	0	86	0	0	311	262	0	457	1249	0	470	144	0	389	0	1039	0	261	0	1086	0	0	0	0	0	0	0	0	0	5842
22	18	0	0	0	157	45	215	392	0	0	0	0	0	832	0	0	0	0	389	0	693	336	522	5615	3619	0	0	0	0	0	0	0	0	0	12832
23	0	0	0	0	0	0	43	392	0	0	0	118	0	0	0	352	144	0	0	0	0	67	261	3578	0	0	0	0	0	0	0	0	0	0	4955
24	0	0	0	0	0	0	0	0	0	622	0	0	0	0	0	0	0	0	0	0	0	0	261	0	0	0	0	0	0	0	0	0	0	0	884
25	0	0	0	0	0	0	0	0	0	0	0	118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	118
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	32	0	0	0	228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	260
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
30	0	38	51	0	0	30	0	784	0	0	0	0	0	0	0	0	0	0	0	0	0	67	0	1019	0	0	0	0	0	0	0	0	0	0	1989
31	35	76	0	0	627	120	731	392	160	1971	175	0	914	0	0	0	431	0	3112	0	1732	67	0	8148	0	0	0	0	0	0	0	0	0	0	18694
32	301	115	0	0	0	0	301	0	0	622	0	354	2056	416	0	0	0	0	0	0	1385	0	0	0	0	0	0	0	0	0	0	0	0	0	5550
33	0	0	152	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	152
34	0	0	0	0	314	151	43	1569	160	207	87	118	685	2497	1	117	287	1758	778	208	866	873	522	1305	181	0	0	0	0	0	0	0	0	0	12728
Total	549	1032	1112	114	4391	1118	2797	16863	1089	7678	3672	3771	12105	15818	4	5931	5605	5080	18284	2702	10133	3490	6787	31481	10313	0	0	0	0	0	0	0	0	2	171921

Multiply Factors of Zones for Trip Estimation (PPL3)

Multiply Factors \ Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Average
Popul.-based 3 (PPL3)	18	38	51	5	157	15	43	392	32	104	87	118	228	416	1	117	144	195	389	208	173	67	261	1019	181	-	-	-	-	-	184

note : Total trips for zone 2 are estimated by taking average of ones for zone 1 and 3.

which are traffic analysis zones 26 to 30, and through traffic from externals to externals are not considered.

Table 6-20 (a) shows the OD matrix of the total daily trips. That is, this table shows approximate daily travel movement of the day. While this matrix shows the travel pattern of the whole day, this matrix, however, is difficult to read simply because it includes all the trip types in a whole day. That is, this OD matrix is not for distinguishing the specific travel characteristics such as going-out trips and coming-back trips, but for understanding total OD movement of the whole day with regardless to any trip characteristics. One note is that since the table also includes "home" trips, and since the travel pattern in the city is quite simple with almost no trip chains, the numbers of origins and destinations shown in the OD matrix are approximately the same, and the numbers basically shows the total production of each traffic analysis zones.

Table 6-20 (b), which shows the OD matrix of a specific trip type, "work" trips, clearly have the different total origins and destinations. This is simply because the "work" trips are theoretically only going-out trips. According to this OD matrix, the major origins are zones 8, 14, 16, 19, 21, 23, 24 and 25, all of which have relatively large populations. The major destinations are, as expected, the city central traffic analysis zones: the city centre represented as the traffic analysis zones of 1 to 4 attract 27,328 or 31.6% of "work" trips while the central market represented as the traffic analysis zone 6 accounts for 15,033 or 17.4% of "work" trips. Other noticeable destinations are the traffic analysis zone 22, which is the central Castilla, and the traffic analysis zone 31, which is the National University of Piura, attracting 4,897 and 4,351 trips respectively.

Other Tables 6-20 (c), (d) and (e) basically show the same results derived from Table 6-20 (b). The major origins are the traffic analysis zones with large population, and the major destinations are the city centre, which has traffic analysis zones 1 to 4, and the central market, which is represented as traffic analysis zone 6. For instance, during the morning peak time period between 6 and 9 a.m., the city centre and the central market attract 23,230 and 26,254 trips. These destinations account for 20.0% and 22.6% of the peak time period trips respectively.

In order to grasp the approximate total origins and destinations, reading the OD matrix of the daily "home" trips, shown as Table 6-20 (f), is likely worthwhile. Because of the simple travel pattern observed previously, the origins of the matrix should be close to the actual numbers of the destinations, and vice versa. By doing this, the major origins are similar to the ones from Table 6-20 (b) with zones 8, 10, 13, 14, 19, 21, 23, 24 and 25. As mentioned in the previous analysis, these zones have large populations. The major destinations are, similarly again, the city central traffic analysis zones: the city centre traffic analysis zones 1 to 4 are responsible for 41,254 or 24.0% of the total "home" trips while the central market, which is the traffic analysis zone 6, accounts for 39,629 or 23.1% of the total trips. Moreover, other primary destinations are the central Castilla, which is the traffic analysis zone 22, with 12,832 attracted trips and the National University of Piura, which is the traffic analysis zone 31, with 18,694 attracted trips as well.

In addition, one noticeable finding is that non-origin (destination)-indicated trips account for 12,728 or 7.4% of the total "home" trips, which is considerably large. While these trips are likely the wandering trips which are made by taxi drivers, public transport drivers or wandering merchants, their travel behaviours also affect the people's movement of the city. In this study, however, it is assumed that their travel pattern are usually alike to other trips because those who do not have specific destinations usually go to the places to which other people go, and the results of their travel behaviour do not affect this analysis much.

6.3.3 Rough OD Matrix

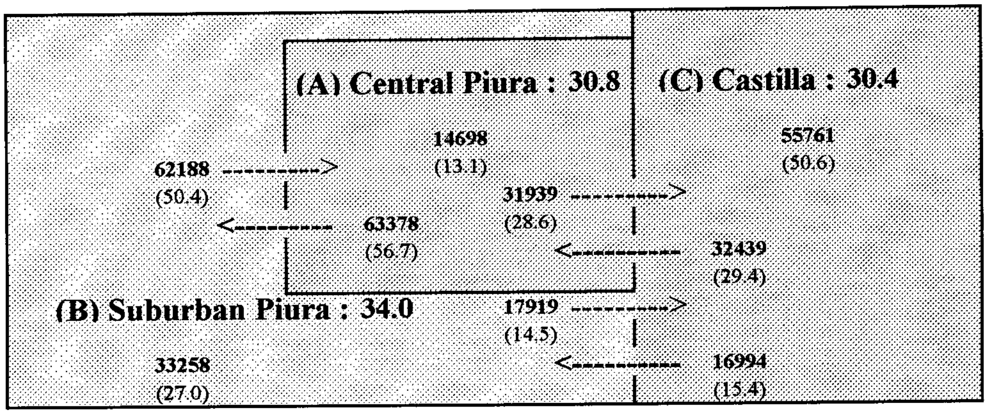
While those OD matrixes in the previous section show the travel behaviour of the specific traffic analysis zones, it is difficult to visualize the approximate movement within the city. Therefore, "rough OD matrixes" are further created. Tables 6-21 (a) to (g) show the "rough

Table 6-21 (a) Rough OD-Matrix: The Numbers of Daily Trips

Trip Type (purpose to)	[All : Total (1) ~ (10)	]
Time Period	[All : (1) ~ (7)	]
Multiply Factor	[PPL3	]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	A	(4)	(5)	(6)	(7)	B	(8)	(9)	(10)	C	(11)	(12)	D	
(1)	1435	1079	2635	**5149**	8450	5259	576	10598	**24882**	5707	203	9008	**14918**	144	568	**712**	45662
(2)	1366	554	1601	**3521**	6816	9439	64	12164	**28483**	2925	1703	6423	**11051**	439	346	**785**	43841
(3)	2696	1318	2013	**6028**	3973	2951	96	2992	**10013**	4560	484	927	**5970**	87	251	**338**	22349
A	**5497**	**2951**	**6250**	**14698**	**19239**	**17649**	**736**	**25754**	**63378**	**13193**	**2389**	**16358**	**31939**	**671**	**1164**	**1836**	**111851**
(4)	8221	6399	3973	**18594**	11469	834	2431	1613	**16347**	6228	1056	0	**7284**	228	3496	**3725**	45949
(5)	5259	8872	2864	**16994**	1226	3972	118	466	**5782**	1309	902	510	**2721**	784	1979	**2764**	28261
(6)	185	82	98	**365**	2016	510	449	800	**3775**	301	0	1084	**1385**	64	164	**228**	5753
(7)	10612	14085	1537	**26234**	1197	466	800	4892	**7355**	4520	1513	496	**6529**	0	3280	**3280**	43399
B	**24277**	**29438**	**8473**	**62188**	**15907**	**5782**	**3798**	**7771**	**33258**	**12358**	**3472**	**2090**	**17919**	**1077**	**8920**	**9997**	**123362**
(8)	6033	2601	4485	**13119**	5999	947	333	4664	**11943**	8907	4197	8409	**21514**	0	1047	**1047**	47623
(9)	266	2162	534	**2962**	1056	392	0	1513	**2962**	4378	852	6204	**11434**	328	873	**1201**	18559
(10)	9530	5901	927	**16358**	0	510	1083	496	**2089**	8409	7223	7181	**22813**	1019	1827	**2846**	44105
C	**15829**	**10664**	**5946**	**32439**	**7056**	**1849**	**1416**	**6673**	**16994**	**21695**	**12272**	**21794**	**55761**	**1347**	**3746**	**5093**	**110287**
(11)	94	439	87	**621**	228	784	32	0	**1045**	0	328	1019	**1347**	51	0	**51**	3063
(12)	984	346	251	**1581**	3496	1979	161	3293	**8929**	1047	873	1827	**3746**	0	346	**346**	14603
D	**1078**	**785**	**338**	**2201**	**3725**	**2764**	**193**	**3293**	**9974**	**1047**	**1201**	**2846**	**5093**	**51**	**346**	**397**	**17666**
Total	46681	43839	21007	**111526**	45926	28043	6143	43491	**123604**	48292	19333	43088	**110713**	3145	14177	**17323**	**363166**

Figure 6-5 (a) Rough Movement of Daily Trips



Total Trips (Trips from and to Area D included) **363166**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

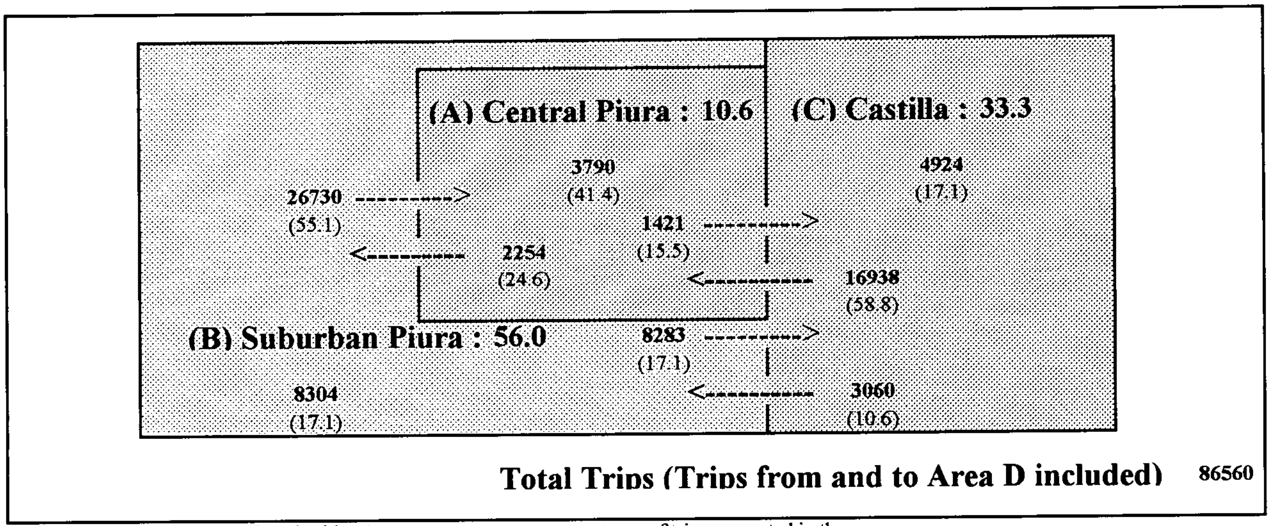
Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A Central Piura	(1) City Centre	1,2,3,4	C Castilla	(8) North Castilla	21,25,(31)
	(2) Market	6		(9) Central Castilla	22
	(3) Central Piura	7,10		(10) South Castilla	23,24
B Suburban Piura	(4) North Piura	5,13,14,(32)	D Else	(11) Externals	26,27,28,29,30
	(5) South Piura	8,11,12		(12) No destination	33
	(6) Industrial Area	9,15		(12) No indication	34
	(7) West Piura	16,17,18,19,20			

Table 6-21 (b) Rough OD-Matrix: The Numbers of Daily "Work" Trips

Trip Type (purpose to)	[1	: Work	]
Time Period	[All	: (1) ~ (7)	]
Multiply Factor	[	PPL3	]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	A	(4)	(5)	(6)	(7)	B	(8)	(9)	(10)	C	(11)	(12)	D	
(1)	759	322	89	**1170**	375	5	56	94	**530**	155	136	0	**290**	94	568	**662**	2653
(2)	0	15	238	**253**	228	293	30	208	**759**	159	30	0	**189**	424	271	**695**	1896
(3)	1399	397	569	**2366**	251	311	0	403	**965**	397	129	415	**941**	87	251	**338**	4610
A	**2159**	**734**	**897**	**3790**	**854**	**609**	**86**	**705**	**2254**	**711**	**295**	**415**	**1421**	**606**	**1089**	**1695**	**9159**
(4)	3332	832	958	**5122**	1487	0	1562	416	**3465**	1518	0	0	**1518**	228	1477	**1705**	11811
(5)	2625	3217	1240	**7081**	951	350	118	0	**1419**	567	902	392	**1861**	784	87	**872**	11233
(6)	64	0	65	**129**	160	0	224	0	**384**	32	0	0	**32**	64	1	**65**	610
(7)	7510	6078	809	**14397**	235	379	768	1655	**3036**	3481	896	496	**4872**	0	2551	**2551**	24856
B	**13530**	**10127**	**3072**	**26730**	**2833**	**728**	**2672**	**2071**	**8304**	**5597**	**1798**	**888**	**8283**	**1077**	**4116**	**5193**	**48510**
(8)	3936	1613	866	**6415**	881	0	173	0	**1055**	1597	1786	0	**3383**	0	700	**700**	11553
(9)	0	0	0	**0**	0	0	0	923	**923**	0	0	0	**0**	67	268	**336**	1258
(10)	7703	2559	261	**10523**	0	0	1083	0	**1083**	0	1019	522	**1541**	1019	1827	**2846**	15992
C	**11639**	**4172**	**1127**	**16938**	**881**	**0**	**1256**	**923**	**3060**	**1597**	**2805**	**522**	**4924**	**1086**	**2796**	**3882**	**28804**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	0	0	**0**	0	87	0	0	**87**	0	0	0	**0**	0	0	**0**	87
D	**0**	**0**	**0**	**0**	**0**	**87**	**0**	**0**	**87**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**87**
Total	27328	15033	5096	**47458**	4568	1425	4014	3698	**13705**	7906	4897	1825	**14628**	2768	8001	**10769**	**86560**

Figure 6-5 (b) Rough Movement of Daily "Work" Trips



note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

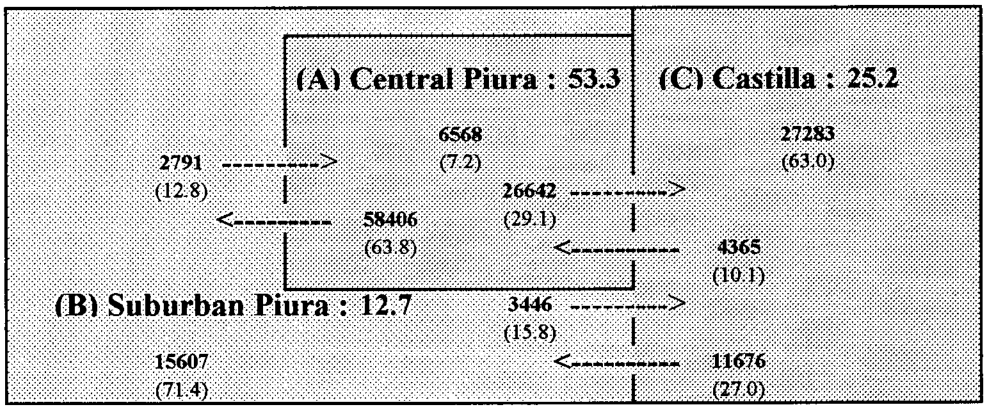
Area	Area Zones (AZ)		Traffic Zones	Area	Area Zones (AZ)		Traffic Zones
A Central Piura	(1)	City Centre	1,2,3,4	C Castilla	(8)	North Castilla	21,25,(31)
	(2)	Market	6		(9)	Central Castilla	22
	(3)	Central Piura	7,10		(10)	South Castilla	23,24
B Suburban Piura	(4)	North Piura	5,13,14,(32)	D Else	(11)	Externals	26,27,28,29,30
	(5)	South Piura	8,11,12		(12)	No destination	33
	(6)	Industrial Area	9,15		(12)	No indication	34
	(7)	West Piura	16,17,18,19,20				

Table 6-21 (c) Rough OD-Matrix: The Numbers of Daily "Home" Trips

Trip Type (purpose to) [9 : Home]
Time Period [All : (1) ~ (7)]
Multiply Factor [PPL3]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	**A**	(4)	(5)	(6)	(7)	**B**	(8)	(9)	(10)	**C**	(11)	(12)	**D**	
(1)	610	211	2427	**3248**	7889	5180	128	10499	**23696**	5235	67	9008	**14310**	0	0	**0**	41253
(2)	763	211	1260	**2234**	5887	9146	34	11911	**26978**	2518	1477	6423	**10417**	0	0	**0**	39629
(3)	209	15	863	**1087**	2799	2248	96	2589	**7732**	1385	268	261	**1915**	0	0	**0**	10734
A	**1581**	**437**	**4550**	**6568**	**16575**	**16574**	**258**	**24999**	**58406**	**9138**	**1812**	**15692**	**26642**	**0**	**0**	**0**	**91616**
(4)	545	243	1174	**1963**	5257	677	224	624	**6782**	1920	67	0	**1988**	0	0	**0**	10733
(5)	61	0	311	**372**	157	2051	0	379	**2586**	0	0	0	**0**	0	0	**0**	2959
(6)	57	46	1	**104**	1792	510	225	768	**3295**	173	0	1084	**1257**	0	2	**2**	4657
(7)	99	45	207	**352**	573	87	32	2251	**2944**	0	201	0	**201**	0	0	**0**	3497
B	**762**	**335**	**1694**	**2791**	**7779**	**3325**	**481**	**4022**	**15607**	**2094**	**268**	**1084**	**3446**	**0**	**2**	**2**	**21846**
(8)	201	120	3100	**3421**	3246	947	160	4546	**8900**	3856	67	8409	**12333**	0	0	**0**	24654
(9)	18	45	215	**278**	989	392	0	389	**1770**	4311	336	6137	**10784**	0	0	**0**	12832
(10)	0	0	666	**666**	0	510	0	496	**1006**	0	67	4100	**4167**	0	0	**0**	5839
C	**218**	**166**	**3981**	**4365**	**4236**	**1849**	**160**	**5431**	**11676**	**8168**	**470**	**18646**	**27283**	**0**	**0**	**0**	**43325**
(11)	94	30	0	**124**	228	784	32	0	**1045**	0	67	1019	**1086**	0	0	**0**	2254
(12)	152	151	251	**553**	3496	1774	161	3149	**8580**	1047	873	1827	**3746**	0	0	**0**	12880
D	**246**	**181**	**251**	**677**	**3725**	**2558**	**193**	**3149**	**9625**	**1047**	**940**	**2846**	**4832**	**0**	**0**	**0**	**15134**
Total	2807	1118	10475	**14400**	32314	24307	1093	37601	**95315**	20446	3490	38268	**62204**	0	2	**2**	**171921**

Figure 6-5 (c) Rough Movement of Daily "Home" Trips



Total Trips (Trips from and to Area D included) **171921**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

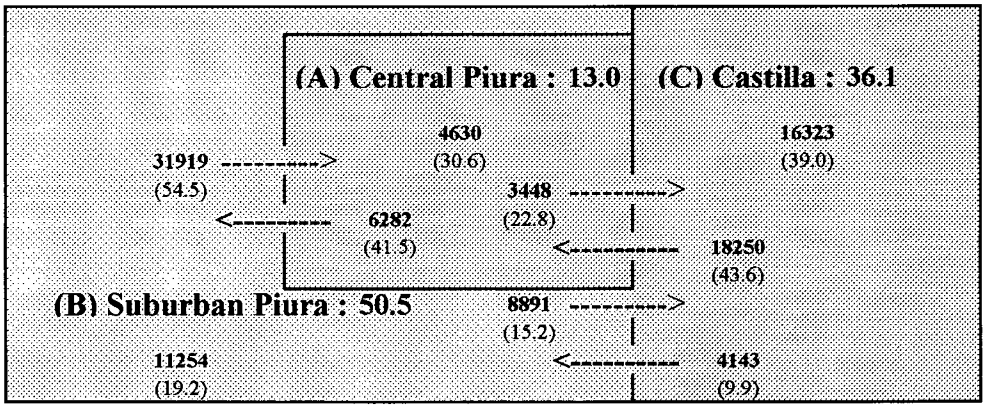
Area	Area Zones (AZ)		Traffic Zones	Area	Area Zones (AZ)		Traffic Zones
A	(1)	City Centre	1,2,3,4	C	(8)	North Castilla	21,25,(31)
Central	(2)	Market	6	Castilla	(9)	Central Castilla	22
Piura	(3)	Central Piura	7,10		(10)	South Castilla	23,24
	(4)	North Piura	5,13,14,(32)		(11)	Externals	26,27,28,29,30
B	(5)	South Piura	8,11,12	D	(12)	No destination	33
Suburban	(6)	Industrial Area	9,15	Else	(12)	No indication	34
Piura	(7)	West Piura	16,17,18,19,20				

Table 6-21 (d) Rough OD-Matrix: The Numbers of Morning Time Period Trips

Trip Type (purpose to)	[	All : (1) ~ (10)	]
Time Period	[	1 : 6:00 am ~ 8:59 am	]
Multiply Factor	[	PPL3	]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	A	(4)	(5)	(6)	(7)	B	(8)	(9)	(10)	C	(11)	(12)	D	
(1)	559	499	203	**1261**	251	93	56	94	**494**	406	18	0	**424**	94	51	**144**	2323
(2)	224	389	146	**758**	1304	380	30	2603	**4318**	249	112	522	**883**	259	136	**394**	6354
(3)	959	881	771	**2611**	881	382	0	207	**1471**	1615	172	354	**2141**	87	147	**234**	6456
A	**1742**	**1768**	**1120**	**4630**	**2436**	**855**	**86**	**2904**	**6282**	**2270**	**302**	**876**	**3448**	**440**	**333**	**773**	**15133**
(4)	3850	3725	1030	**8605**	4227	118	1562	416	**6324**	2821	832	0	**3653**	0	2695	**2695**	21277
(5)	3056	6695	1388	**11140**	715	829	118	87	**1750**	654	902	510	**2067**	784	480	**1264**	16220
(6)	96	34	97	**227**	192	0	224	32	**448**	64	0	0	**64**	64	160	**224**	964
(7)	5407	5992	548	**11947**	117	144	650	1820	**2732**	1833	896	379	**3107**	0	2355	**2355**	20141
B	**12410**	**16446**	**3063**	**31919**	**5252**	**1091**	**2555**	**2356**	**11254**	**5372**	**2630**	**889**	**8891**	**848**	**5690**	**6538**	**58602**
(8)	3699	1794	866	**6358**	2337	0	173	0	**2510**	3911	2321	0	**6232**	0	1047	**1047**	16147
(9)	0	671	201	**873**	67	0	0	483	**550**	67	268	67	**403**	328	470	**798**	2624
(10)	5379	5379	261	**11020**	0	0	1083	0	**1083**	6111	1280	2298	**9689**	0	1305	**1305**	23096
C	**9078**	**7844**	**1328**	**18250**	**2404**	**0**	**1256**	**483**	**4143**	**10089**	**3869**	**2365**	**16323**	**328**	**2822**	**3150**	**41867**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	195	0	**195**	0	0	0	195	**195**	0	0	0	**0**	0	0	**0**	391
D	**0**	**195**	**0**	**195**	**0**	**0**	**0**	**195**	**195**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**391**
Total	23230	26254	5511	**54995**	10092	1946	3896	5939	**21874**	17731	6801	4130	**28663**	1616	8844	**10461**	**115992**

Figure 6-5 (d) Rough Movement of Morning Time Period Trips



Total Trips (Trips from and to Area D included) **115992**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

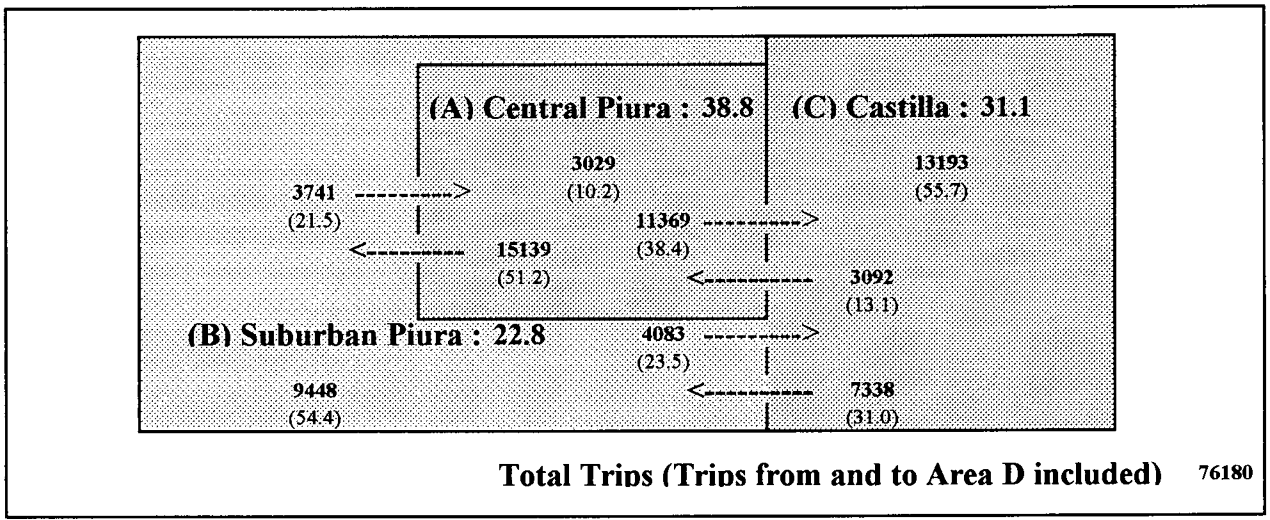
Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A	(1) City Centre	1,2,3,4	C	(8) North Castilla	21,25,(31)
Central	(2) Market	6	Castilla	(9) Central Castilla	22
Piura	(3) Central Piura	7,10		(10) South Castilla	23,24
	(4) North Piura	5,13,14,(32)		(11) Externals	26,27,28,29,30
B	(5) South Piura	8,11,12	D	(12) No destination	33
Suburban	(6) Industrial Area	9,15	Else	(12) No indication	34
Piura	(7) West Piura	16,17,18,19,20			

Table 6-21 (e) Rough OD-Matrix: The Numbers of Afternoon Time Period Trips

Trip Type (purpose to) [All : (1) ~ (10)]
Time Period [3 : 0:00 pm ~ 2:59 pm]
Multiply Factor [PPL3]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	**A**	(4)	(5)	(6)	(7)	**B**	(8)	(9)	(10)	**C**	(11)	(12)	**D**	
(1)	249	45	1197	**1491**	4127	964	456	4315	**9862**	3171	0	4125	**7297**	0	51	**51**	18701
(2)	89	0	618	**707**	385	2402	0	533	**3320**	897	336	1280	**2512**	0	0	**0**	6539
(3)	246	58	526	**831**	717	791	96	352	**1957**	1255	201	104	**1560**	0	0	**0**	4348
A	**584**	**103**	**2341**	**3029**	**5230**	**4156**	**552**	**5201**	**15139**	**5324**	**537**	**5509**	**11369**	**0**	**51**	**51**	**29587**
(4)	664	243	673	**1581**	3999	393	512	691	**5594**	1983	0	0	**1983**	0	0	**0**	9158
(5)	87	597	325	**1010**	0	917	0	144	**1061**	567	0	0	**567**	0	87	**87**	2725
(6)	32	0	0	**32**	605	0	64	117	**787**	32	0	1019	**1051**	0	0	**0**	1869
(7)	240	566	312	**1118**	534	87	32	1353	**2006**	0	483	0	**483**	0	0	**0**	3607
B	**1024**	**1407**	**1310**	**3741**	**5138**	**1397**	**608**	**2305**	**9448**	**2582**	**483**	**1019**	**4083**	**0**	**87**	**87**	**17359**
(8)	350	105	1468	**1923**	3121	567	96	2068	**5852**	3730	67	2298	**6095**	0	0	**0**	13870
(9)	181	504	129	**814**	832	392	0	0	**1225**	2140	268	1280	**3688**	0	67	**67**	5794
(10)	0	0	354	**354**	0	0	0	261	**261**	0	589	2820	**3409**	0	0	**0**	4025
C	**531**	**610**	**1951**	**3092**	**3953**	**959**	**96**	**2329**	**7338**	**5870**	**925**	**6398**	**13193**	**0**	**67**	**67**	**23689**
(11)	89	0	87	**176**	0	392	0	0	**392**	0	261	0	**261**	0	0	**0**	829
(12)	416	75	104	**595**	1893	87	160	728	**2869**	520	470	261	**1250**	0	0	**0**	4715
D	**505**	**75**	**191**	**771**	**1893**	**480**	**160**	**728**	**3261**	**520**	**731**	**261**	**1511**	**0**	**0**	**0**	**5544**
Total	2644	2195	5794	**10633**	16214	6992	1417	10563	**35186**	14295	2676	13186	**30156**	0	205	**205**	**76180**

Figure 6-5 (e) Rough Movement of Afternoon Time Period Trips



note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

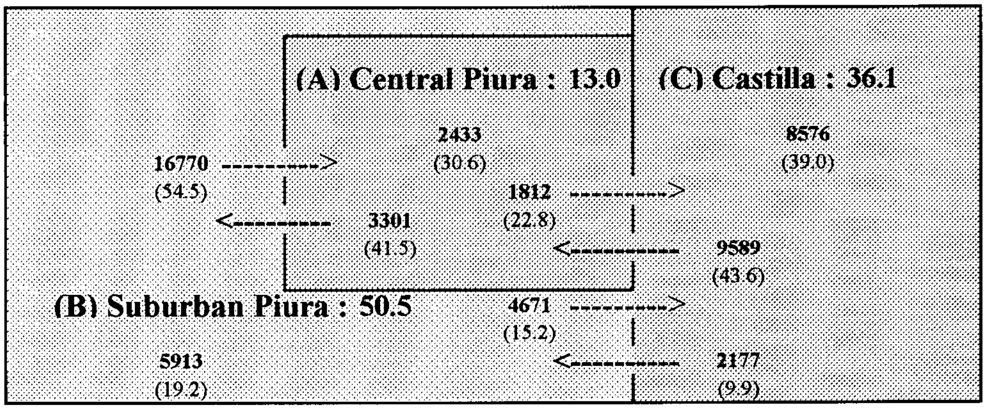
Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A	(1) City Centre	1,2,3,4	C	(8) North Castilla	21,25,(31)
Central	(2) Market	6	Castilla	(9) Central Castilla	22
Piura	(3) Central Piura	7,10		(10) South Castilla	23,24
	(4) North Piura	5,13,14,(32)		(11) Externals	26,27,28,29,30
B	(5) South Piura	8,11,12	D	(12) No destination	33
Suburban	(6) Industrial Area	9,15	Else	(12) No indication	34
Piura	(7) West Piura	16,17,18,19,20			

Table 6-21 (f) Rough OD-Matrix: The Numbers of Morning Peak Hour Trips

Trip Type (purpose to)	[All : Total (1) ~ (10)	]
Hour Period	[(3) : 7:00 am ~ 7:59 am	]
Time Period and Portion	[52.5 % of Time Period 1	]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	A	(4)	(5)	(6)	(7)	B	(8)	(9)	(10)	C	(11)	(12)	D	
(1)	294	262	107	**663**	132	49	29	49	**259**	213	9	0	**223**	49	27	**76**	1221
(2)	118	204	76	**398**	685	200	16	1368	**2268**	131	59	274	**464**	136	71	**207**	3338
(3)	504	463	405	**1372**	463	201	0	109	**773**	848	90	186	**1125**	46	77	**123**	3392
A	**915**	**929**	**588**	**2433**	**1280**	**449**	**45**	**1526**	**3301**	**1192**	**159**	**460**	**1812**	**231**	**175**	**406**	**7951**
(4)	2023	1957	541	**4521**	2221	62	821	219	**3323**	1482	437	0	**1919**	0	1416	**1416**	11179
(5)	1606	3518	729	**5853**	376	436	62	46	**919**	344	474	268	**1086**	412	252	**664**	8522
(6)	50	18	51	**119**	101	0	118	17	**236**	34	0	0	**34**	34	84	**118**	506
(7)	2841	3148	288	**6277**	62	76	342	956	**1435**	963	471	199	**1633**	0	1237	**1237**	10582
B	**6520**	**8641**	**1609**	**16770**	**2760**	**573**	**1342**	**1238**	**5913**	**2823**	**1382**	**467**	**4671**	**446**	**2989**	**3435**	**30789**
(8)	1943	942	455	**3341**	1228	0	91	0	**1319**	2055	1219	0	**3274**	0	550	**550**	8484
(9)	0	353	106	**458**	35	0	0	254	**289**	35	141	35	**212**	172	247	**419**	1378
(10)	2826	2826	137	**5790**	0	0	569	0	**569**	3211	672	1207	**5091**	0	686	**686**	12135
C	**4770**	**4121**	**698**	**9589**	**1263**	**0**	**660**	**254**	**2177**	**5301**	**2033**	**1243**	**8576**	**172**	**1483**	**1655**	**21997**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	103	0	**103**	0	0	0	103	**103**	0	0	0	**0**	0	0	**0**	205
D	**0**	**103**	**0**	**103**	**0**	**0**	**0**	**103**	**103**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**205**
Total	12205	13794	2895	**28894**	5303	1022	2047	3120	**11493**	9316	3573	2170	**15059**	849	4647	**5496**	**60942**

Figure 6-5 (f) Rough Movement of Morning Peak Hour Trips



Total Trips (Trips from and to Area D included) **60942**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

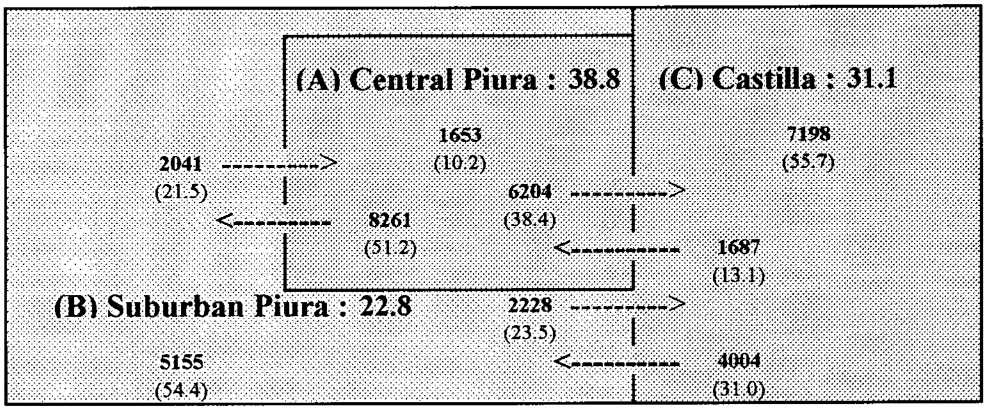
Area	Area Zones (AZ)		Traffic Zones	Area	Area Zones (AZ)		Traffic Zones
A	(1)	City Centre	1,2,3,4	C	(8)	North Castilla	21,25,(31)
Central	(2)	Market	6	Castilla	(9)	Central Castilla	22
Piura	(3)	Central Piura	7,10		(10)	South Castilla	23,24
	(4)	North Piura	5,13,14,(32)		(11)	Externals	26,27,28,29,30
B	(5)	South Piura	8,11,12	D	(12)	No destination	33
Suburban	(6)	Industrial Area	9,15	Else	(12)	No indication	34
Piura	(7)	West Piura	16,17,18,19,20				

Table 6-21 (g) Rough OD-Matrix: The Numbers of Afternoon Peak Hour Trips

Trip Type (purpose to) [All : Total (1) ~ (10)]
Hour Period [(9) : 1:00 pm ~ 1:59 pm]
Time Period and Portion [54.6 % of Time Period 3]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	**A**	(4)	(5)	(6)	(7)	**B**	(8)	(9)	(10)	**C**	(11)	(12)	**D**	
(1)	136	25	653	**814**	2252	526	249	2354	**5381**	1730	0	2251	**3981**	0	28	**28**	10204
(2)	48	0	337	**386**	210	1311	0	291	**1812**	489	183	698	**1371**	0	0	**0**	3568
(3)	134	32	287	**453**	391	431	52	192	**1068**	685	110	57	**851**	0	0	**0**	2372
A	**319**	**56**	**1278**	**1653**	**2854**	**2268**	**301**	**2838**	**8261**	**2905**	**293**	**3006**	**6204**	**0**	**28**	**28**	**16144**
(4)	363	133	367	**863**	2182	214	280	377	**3053**	1082	0	0	**1082**	0	0	**0**	4997
(5)	48	326	178	**551**	0	500	0	78	**579**	309	0	0	**309**	0	48	**48**	1487
(6)	17	0	0	**17**	330	0	35	64	**429**	17	0	556	**573**	0	0	**0**	1020
(7)	131	309	170	**610**	291	48	17	738	**1095**	0	264	0	**264**	0	0	**0**	1968
B	**559**	**768**	**715**	**2041**	**2803**	**762**	**332**	**1258**	**5155**	**1409**	**264**	**556**	**2228**	**0**	**48**	**48**	**9472**
(8)	191	58	801	**1049**	1703	309	52	1129	**3193**	2035	37	1254	**3326**	0	0	**0**	7568
(9)	99	275	70	**444**	454	214	0	0	**668**	1168	146	698	**2012**	0	37	**37**	3162
(10)	0	0	193	**193**	0	0	0	143	**143**	0	321	1539	**1860**	0	0	**0**	2196
C	**290**	**333**	**1065**	**1687**	**2157**	**523**	**52**	**1271**	**4004**	**3203**	**505**	**3491**	**7198**	**0**	**37**	**37**	**12926**
(11)	48	0	48	**96**	0	214	0	0	**214**	0	142	0	**142**	0	0	**0**	453
(12)	227	41	57	**325**	1033	48	87	397	**1565**	283	256	142	**682**	0	0	**0**	2573
D	**276**	**41**	**104**	**421**	**1033**	**262**	**87**	**397**	**1779**	**283**	**399**	**142**	**825**	**0**	**0**	**0**	**3025**
Total	1443	1198	3161	**5802**	8847	3815	773	5764	**19199**	7800	1460	7195	**16455**	0	112	**112**	**41567**

Figure 6-5 (g) Rough Movement of Afternoon Peak Hour Trips



Total Trips (Trips from and to Area D included) 41567

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A	(1) City Centre	1,2,3,4	C	(8) North Castilla	21,25,(31)
Central	(2) Market	6	Castilla	(9) Central Castilla	22
Piura	(3) Central Piura	7,10		(10) South Castilla	23,24
	(4) North Piura	5,13,14,(32)		(11) Externals	26,27,28,29,30
B	(5) South Piura	8,11,12	D	(12) No destination	33
Suburban	(6) Industrial Area	9,15	Else	(12) No indication	34
Piura	(7) West Piura	16,17,18,19,20			

OD matrixes" of (a) the total daily trips of 363,166, (b) the total daily "work" trips of 86,560, (c) the total daily "home" trips of 171,921, (d) the total morning peak time period trips of 115,992, (e) the total afternoon peak time period trips of 76,180, (f) the total morning peak hour trips of 60,942 and (g) the total afternoon peak hour trips of 41,567. Figures 6-5 (a) to (g), which are shown under Tables 6-21 (a) to (g) on the same pages, visualize the approximate rough travel movements of the corresponding tables.

The 34 traffic analysis zone system, which is used for the traffic analysis zone based OD matrixes in the previous section, are further classified into two levels of categories for these rough OD matrixes. The two larger scale categories are "4 traffic areas" and "13 traffic area zones". The traffic areas are the largest, and the traffic area zones fit at the middle of larger traffic areas and smaller traffic analysis zones. The four traffic analysis zones are (A) Central Piura, (B) Suburban Piura, (C) Castilla and (D) Else. Since "else" considers externals and non-identified trips, all of which are not the target of this study, the first three traffic areas are the primary traffic areas.

Those three traffic areas, (A) (B) and (C) consist of 3, 4 and 3 traffic area zones respectively. Central Piura consists of (1) the city centre, (2) the central market and (3) Central Piura, Suburban Piura includes (4) North Piura, (5) South Piura, (6) Industrial Piura and (7) West Piura, and Castilla has (8) North Castilla, (9) Central Castilla and (10) South Castilla in it. The summary of this type of zone classification, which is the relationships between traffic areas, traffic area zones and traffic analysis zones, are shown at the bottom of each data sheet of the rough OD matrixes.

From Table 6-21 (a), the general travel movement of the whole day is observed. The numbers of the generated trips in the three traffic areas, (A), (B) and (C), are almost even with 111,851, 123,362 and 110,287. These trips generated from traffic areas (A), (B)and (C) account for 30.8%, 34.0% and 30.4% of the total generated trips in the whole day. Then, the within-area trips, or intra-areal trips, of the traffic areas (A), (B) and (C) account for 13.1%, 27.0% and

50.6% respectively. This means that approximately half of the trips generated in (C) Castilla head for somewhere within Castilla while only one in eight trips generated in (A) Central Piura ends up within the traffic area.

Interestingly, more than 80% of trips attracted to Central Piura are from outside of the area. The numbers of the trips attracted to Central Piura are 14,698 (13.4%) within the area, 62,188 (56.9%) from Suburban Piura and 32,439 (29.7%) from Castilla. Moreover, 62,188 trips from Suburban Piura to Central Piura account for 50.4% of trips generated in the Suburban Piura. This simply means that the major destinations for people who live in Suburban Piura are in Central Piura.

From Table 6-21 (b), which summarizes the movement of 86,560 daily "work" trips, the attractiveness of Central Piura as work places particularly for people from other part of the city is easily observed. The Central Piura attracts 26,730 and 16,938 "work" trips from Suburban Piura and Castilla respectively while "work" trips within Central Piura account for only 3,790. The 26,730 trips from Suburban Piura and 16,938 trips from Castilla account for 55.1% and 58.8% of trips generated in those areas respectively.

The attractiveness of Central Piura for suburban people is also readable from Table 6-21 (c), which summarizes the movement of 171,921 total daily "home" trips, with previously mentioned travel pattern reading for "home" trips. Only 6,568 or 7.2% of "home" trips from Central Piura end up within a area while 58,406 (63.8%) and 26,642 (29.2%) trips head for Suburban Piura and Castilla respectively. In addition, the movement of the intra-areal trips in Castilla are also noticeable by accounting for 27,283 or 63.0% of the total trips generated in the traffic area.

Moving to the peak periods, the movements of going into Central Piura in the morning peak and going out from Central Piura in the afternoon peak are clearly observed from Table 6-21 (d), (e), (f) and (g), which show the movement of (d) the total morning peak time period trips,

(e) the total afternoon peak time period trips, (f) the total morning peak hour trips, and (g) the total afternoon peak hour trips respectively.

The movement of going into Central Piura in the morning peak is easily readable. From Table 6-21 (d), which summarizes the morning peak time period movement, for instance, 31,919 or 54.5% of trips generated in Suburban Piura and 18,250 or 43.6% of trips generated in Castilla head for Central Piura. These two together account for 50,169 or 43.3% of the total trips generated during the morning peak time period while only 9,730 or 8.4% of the total of 115,992 trips generated during the peak are going out from Central Piura. The same kinds of results are observed from Table 6-21 (f), which shows the travel movements during the morning peak "hour" period.

The movement of going out from Central Piura in the afternoon peak is also easily readable. In Table 6-21 (e)which summarizes the travel movement of the afternoon peak time period, for example, 15,139 or 51.2% and 11,369 or 38.4% of Central Piura generated trips head for Suburban Piura and Castilla respectively. These two together account for 26,508 or 34.8% of trips generated in the afternoon peak time period while only 6,833 or 9.0% of the total of 76,180 trips generated in the afternoon peak are going into Central Piura. The same kinds of results are observed from Table 6-21 (g), which shows the travel movements during the afternoon peak "hour."

In addition, those movements mentioned above are also stressed by reading the portions of the generated trips in the three areas. only 13% of the total trips are generated in Central Piura in the morning peak while 38.8% of the total afternoon peak trips are generated in the area.

Another noticeable travel movement during peak periods is the "intra-areal" trips within Castilla. 16,323 or 39.0% and 13,193 or 55.7% of Castilla generated trips are the "intra-areal" trips during the morning and afternoon peak time periods respectively. These trips also account for 14.1% and 17.3% of the total generated trips in the morning and afternoon peak respectively. Moreover, the “intra-areal” trips within Suburban Piura also account for 11,254 or 19.2% and 9,448 or 54.4% of Suburban Piura generated trips in the morning and afternoon peak respectively. These trips account for 9.7% and 12.4% of the total generated trips in the morning and afternoon peak respectively.

6.3.4 Origin and Destination

From the OD matrixes dealt in Section 6.3.2, the origins and destinations are obtained. Tables 6-22 (a) to (e) summarize the origins and destinations by the ten trip types, and Tables 6-23 (a) to (n) show the summaries of the origins and destinations of a whole day and hourly periods between 6 a.m. and 7 p.m..

The major findings from these tables are basically the same as the findings of the previous sections. Other noticeable findings are:

(1) while almost half of “work” trips head for the city central area, their origins are well distributed all over the city,

(2) the only major “shopping” destination is the central market, which is represented as the traffic analysis zone 6,

(3) the major destinations for “social” activities are the city central areas, and

(4) the destination of “school” trips are well scattered all over the city, probably because of the relatively well-distributed locations of primary and secondary schools while the National University of Piura is responsible to 31.5% or one third of the total “school” trips.

Table 6-22 (1) Origin and Destination of Trip Types by Time Periods

(a) Trip type (purpose to) 1 : Work] , m-factor [PPL3]

\Time	All		1		2		3		4		5		6		7	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	531	4864	319	3924	18	0	0	43	159	861	18	18	18	18	0	0
2	1180	10863	535	5575	76	1903	0	157	493	2578	38	76	38	182	0	392
3	708	2843	506	1707	51	142	51	0	0	944	51	51	51	0	0	0
4	233	8758	57	6791	166	234	0	235	10	1304	0	51	0	144	0	0
5	1725	1928	1255	1778	0	0	157	150	157	0	157	0	0	0	0	0
6	1896	15033	1325	9882	376	456	195	510	0	328	0	389	0	3469	0	0
7	1095	3765	665	3113	0	87	86	43	301	221	0	157	0	144	43	0
8	7843	240	7059	5	0	0	392	0	0	0	0	0	0	0	392	235
9	608	1310	544	1310	0	0	64	0	0	0	0	0	0	0	0	0
10	3515	1331	1867	875	207	87	104	195	1141	173	195	0	0	0	0	0
11	1486	923	874	470	262	87	0	0	262	191	87	175	0	0	0	0
12	1903	262	1179	262	118	0	0	0	253	0	0	0	354	0	0	0
13	3426	544	2284	544	228	0	0	0	685	0	0	0	228	0	0	0
14	6660	542	5411	542	0	0	0	0	832	0	0	0	416	0	0	0
15	2	2704	1	2587	1	0	0	0	0	117	0	0	0	0	0	0
16	5640	1021	3407	760	117	144	352	0	1527	0	0	117	0	0	235	0
17	4325	1454	2731	921	144	0	144	0	431	533	445	0	431	0	0	0
18	3321	339	2149	144	391	0	0	0	195	0	0	195	586	0	0	0
19	10115	676	5446	144	0	389	0	144	2334	0	389	0	1945	0	0	0
20	1455	208	831	208	208	0	0	0	0	0	0	0	416	0	0	0
21	5402	3555	5195	2154	0	341	118	0	0	490	89	570	0	0	0	0
22	1258	4897	550	3356	389	1136	0	0	67	405	117	0	67	0	67	0
23	5742	1149	2349	771	783	0	261	0	1827	379	0	0	261	0	261	0
24	10250	676	7194	207	2037	0	0	261	0	207	0	0	1019	0	0	0
25	6152	0	4161	0	181	0	0	0	1628	0	181	0	0	0	0	0
26	0	32	0	32	0	0	0	0	0	0	0	0	0	0	0	0
27	0	489	0	260	0	0	0	0	0	0	0	0	0	228	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	186	0	5	0	181	0	0	0	0	0	0	0	0	0	0
30	0	2061	0	1043	0	0	0	0	0	0	0	0	0	1019	0	0
31	0	4351	0	2194	0	56	0	32	0	2013	0	56	0	0	0	0
32	0	1554	0	874	0	118	0	104	0	298	0	0	0	118	0	43
33	0	152	0	51	0	0	0	51	0	0	0	0	0	51	0	0
34	87	7850	0	5408	0	392	0	0	0	1264	87	0	0	458	0	328
Total	86560	86560	57894	57894	5754	5754	1924	1924	12306	12306	1855	1855	5829	5829	998	998

Trip type (purpose to)

1 : Work
2 : Personal Business
3 : Shopping
4 : Social
5 : Recreation
6 : School
7 : Waiting for a ride
8 : Changing modes
9 : Home
10 : No Indication

Time Periods

1 : 6:00 am ~ 8:59 am
2 : 9:00 am ~ 11:59 am
3 : 0:00 pm ~ 2:59 pm
4 : 3:00 pm ~ 5:59 pm
5 : 6:00 pm ~ 9:59 pm
6 : 10:00 pm ~ 5:59 am
7 : No Indication

Zones

1~25 : Internal Zones
26~30 : External Zones
31 : National University of Piura
32 : University of Piura
33 : No Destination
34 : No Indication

(b) Trip type (purpose to) 2 : Personal Busines] , m-factor [PPL3]

\Time	All		1		2		3		4		5		6		7	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0	303	0	159	0	0	0	0	0	144	0	0	0	0	0	0
2	0	551	0	246	0	144	0	0	0	73	0	87	0	0	0	0
3	0	58	0	15	0	43	0	0	0	0	0	0	0	0	0	0
4	10	661	5	231	0	326	5	0	0	0	0	104	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	301	1914	271	1710	0	0	0	118	30	86	0	0	0	0	0	0
7	548	325	172	277	86	0	0	5	290	43	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	228	0	0	0	0	0	0	0	0	0	0	0	0	0	228
10	519	0	415	0	0	0	0	0	0	0	104	0	0	0	0	0
11	350	87	87	0	87	0	0	0	87	87	87	0	0	0	0	0
12	471	118	118	0	118	0	118	0	118	118	0	0	0	0	0	0
13	457	0	228	0	0	0	0	0	0	0	0	0	0	0	228	0
14	416	0	0	0	0	0	416	0	0	0	0	0	0	0	0	0
15	0	416	0	0	0	0	0	416	0	0	0	0	0	0	0	0
16	0	117	0	0	0	0	0	117	0	0	0	0	0	0	0	0
17	719	67	431	0	144	0	0	0	144	67	0	0	0	0	0	0
18	195	0	0	0	195	0	0	0	0	0	0	0	0	0	0	0
19	0	208	0	208	0	0	0	0	0	0	0	0	0	0	0	0
20	208	0	208	0	0	0	0	0	0	0	0	0	0	0	0	0
21	291	104	173	104	0	0	117	0	0	0	0	0	0	0	0	0
22	328	1019	261	1019	0	0	0	0	67	0	0	0	0	0	0	0
23	0	118	0	118	0	0	0	0	0	0	0	0	0	0	0	0
24	2037	0	2037	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	118	0	0	0	0	0	0	0	118	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	261	0	261	0	0	0	0	0	0	0	0	0	0	0	0
30	51	66	0	15	0	0	0	0	0	0	0	0	51	51	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	118	281	0	45	0	118	0	0	118	118	0	0	0	0	0	0
Total	7019	7019	4407	4407	630	630	657	657	854	854	191	191	51	51	228	228

Trip type (purpose to)

1 : Work
2 : Personal Business
3 : Shopping
4 : Social
5 : Recreation
6 : School
7 : Waiting for a ride
8 : Changing modes
9 : Home
10 : No Indication

Time Periods

1 : 6:00 am ~ 8:59 am
2 : 9:00 am ~ 11:59 am
3 : 0:00 pm ~ 2:59 pm
4 : 3:00 pm ~ 5:59 pm
5 : 6:00 pm ~ 9:59 pm
6 : 10:00 pm ~ 5:59 am
7 : No Indication

Zones

1~25 : Internal Zones
26~30 : External Zones
31 : National University of Piura
32 : University of Piura
33 : No Destination
34 : No Indication

Table 6-22 (2) Origin and Destination of Trip Types by Time Periods

(c) Trip type (purpose to) 3 : Shopping] , m-factor [PPL3]

\Time	All		1		2		3		4		5		6		7	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	53	0	35	0	18	0	0	0	0	0	0	0	0	0	0	0
2	153	2735	76	392	76	1167	0	0	0	784	0	392	0	0	0	0
3	354	30	101	30	202	0	0	0	51	0	0	0	0	0	0	0
4	87	30	0	30	87	0	0	0	0	0	0	0	0	0	0	0
5	157	0	157	0	0	0	0	0	0	0	0	0	0	0	0	0
6	543	19919	151	12120	0	6085	0	459	392	0	0	0	0	1255	0	0
7	129	0	86	0	43	0	0	0	0	0	0	0	0	0	0	0
8	4706	392	3137	0	784	0	0	0	392	392	392	0	0	0	0	0
9	32	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0
10	600	0	104	0	104	0	0	0	392	0	0	0	0	0	0	0
11	437	87	262	0	87	87	0	0	0	0	0	0	87	0	0	0
12	943	0	589	0	354	0	0	0	0	0	0	0	0	0	0	0
13	1142	0	0	0	1142	0	0	0	0	0	0	0	0	0	0	0
14	2497	0	2081	0	416	0	0	0	0	0	0	0	0	0	0	0
15	4	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	144	144	144	0	0	0	0	0	0	144	0	0	0	0	0	0
18	1172	0	977	0	195	0	0	0	0	0	0	0	0	0	0	0
19	5057	0	1556	0	2334	0	0	0	0	0	0	0	1167	0	0	0
20	208	0	208	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	1936	4617	671	0	805	4617	459	0	0	0	0	0	0	0	0	0
23	1566	0	1044	0	522	0	0	0	0	0	0	0	0	0	0	0
24	8148	0	4074	0	4074	0	0	0	0	0	0	0	0	0	0	0
25	905	0	0	0	905	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	51	0	0	0	0	0	0	0	51	0	0	0	0	0	0
31	0	3056	0	3056	0	0	0	0	0	0	0	0	0	0	0	0
32	0	56	0	56	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	339	195	195	0	0	195	0	0	144	0	0	0	0	0	0	0
Total	31312	31312	15683	15683	12152	12152	459	459	1371	1371	392	392	1255	1255	0	0

Trip type (purpose to)

1 : Work
2 : Personal Business
3 : Shopping
4 : Social
5 : Recreation
6 : School
7 : Waiting for a ride
8 : Changing modes
9 : Home
10 : No Indication

Time Periods

1 : 6:00 am ~ 8:59 am
2 : 9:00 am ~ 11:59 am
3 : 0:00 pm ~ 2:59 pm
4 : 3:00 pm ~ 5:59 pm
5 : 6:00 pm ~ 9:59 pm
6 : 10:00 pm ~ 5:59 am
7 : No Indication

Zones

1~25 : Internal Zones
26~30 : External Zones
31 : National University of Piura
32 : University of Piura
33 : No Destination
34 : No Indication

(d) Trip type (purpose to) 4 : Social] , m-factor [PPL3]

\Time	All		1		2		3		4		5		6		7	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	89	368	0	0	0	368	89	0	0	0	0	0	0	0	0	0
2	115	1395	0	392	0	365	115	0	0	261	0	377	0	0	0	0
3	0	1381	0	0	0	989	0	0	0	0	0	392	0	0	0	0
4	392	267	0	0	0	224	392	0	0	0	0	0	0	43	0	0
5	1411	515	157	0	470	157	157	130	314	0	157	228	157	0	0	0
6	196	573	0	392	181	0	0	0	0	0	15	181	0	0	0	0
7	86	1312	0	0	43	117	0	0	0	424	0	614	43	157	0	0
8	2353	784	1569	392	784	392	0	0	0	0	0	0	0	0	0	0
9	0	392	0	0	0	0	0	392	0	0	0	0	0	0	0	0
10	104	0	0	0	104	0	0	0	0	0	0	0	0	0	0	0
11	0	213	0	0	0	0	0	213	0	0	0	0	0	0	0	0
12	0	18	0	0	0	0	0	18	0	0	0	0	0	0	0	0
13	1142	0	0	0	0	0	0	0	228	0	914	0	0	0	0	0
14	832	0	0	0	832	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	117	0	0	0	117	0	0	0	0	0	0	0	0	0	0	0
17	144	0	0	0	144	0	0	0	0	0	0	0	0	0	0	0
18	195	0	0	0	0	0	0	0	195	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	228	0	0	0	0	0	0	0	0	0	228	0	0	0	0
22	429	881	0	0	67	181	0	0	0	157	362	543	0	0	0	0
23	522	0	0	0	261	0	0	0	261	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	905	0	0	0	181	0	0	0	0	0	724	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	392	0	0	0	0	0	0	0	0	0	392	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	1098	0	549	0	392	0	0	0	157	0	0	0	0	0	0
Total	9424	9424	1725	1725	3185	3185	752	752	998	998	2563	2563	200	200	0	0

Trip type (purpose to)

1 : Work
2 : Personal Business
3 : Shopping
4 : Social
5 : Recreation
6 : School
7 : Waiting for a ride
8 : Changing modes
9 : Home
10 : No Indication

Time Periods

1 : 6:00 am ~ 8:59 am
2 : 9:00 am ~ 11:59 am
3 : 0:00 pm ~ 2:59 pm
4 : 3:00 pm ~ 5:59 pm
5 : 6:00 pm ~ 9:59 pm
6 : 10:00 pm ~ 5:59 am
7 : No Indication

Zones

1~25 : Internal Zones
26~30 : External Zones
31 : National University of Piura
32 : University of Piura
33 : No Destination
34 : No Indication

Table 6-22 (3) Origin and Destination of Trip Types by Time Periods

(e) Trip type (purpose to) 5 : Recreation] , m-factor [PPL3]

\Time	All		1		2		3		4		5		6		7	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0	404	0	0	0	0	0	0	0	389	0	15	0	0	0	0
2	0	881	0	0	0	0	0	0	0	881	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	404	0	15	0	0	0	0	0	389	0	0	0	0	0	0
5	0	617	0	0	0	0	0	0	0	0	0	617	0	0	0	0
6	45	117	15	0	0	117	0	0	15	0	15	0	0	0	0	0
7	0	1368	0	0	0	575	0	0	0	565	0	228	0	0	0	0
8	784	0	0	0	392	0	0	0	392	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	437	262	87	87	175	175	87	0	87	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	914	0	0	0	228	0	0	0	0	0	685	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	235	0	0	0	235	0	0	0	0	0	0	0	0	0	0	0
17	144	0	0	0	144	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	1945	0	0	0	0	0	0	0	1556	0	389	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	520	346	0	0	346	117	0	0	173	0	0	228	0	0	0	0
22	0	181	0	0	0	0	0	0	0	0	0	181	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	181	0	0	0	0	0	0	0	0	0	181	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	623	0	0	0	536	0	87	0	0	0	0	0	0	0	0
Total	5205	5205	102	102	1520	1520	87	87	2224	2224	1270	1270	0	0	0	0

Trip type (purpose to)

1 : Work
2 : Personal Business
3 : Shopping
4 : Social
5 : Recreation
6 : School
7 : Waiting for a ride
8 : Changing modes
9 : Home
10 : No Indication

Time Periods

1 : 6:00 am ~ 8:59 am
2 : 9:00 am ~ 11:59 am
3 : 0:00 pm ~ 2:59 pm
4 : 3:00 pm ~ 5:59 pm
5 : 6:00 pm ~ 9:59 pm
6 : 10:00 pm ~ 5:59 am
7 : No Indication

Zones

1~25 : Internal Zones
26~30 : External Zones
31 : National University of Piura
32 : University of Piura
33 : No Destination
34 : No Indication

(f) Trip type (purpose to) 6 : School] , m-factor [PPL3]

\Time	All		1		2		3		4		5		6		7	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0	902	0	815	0	0	0	0	0	87	0	0	0	0	0	0
2	76	2534	76	1727	0	0	0	0	0	704	0	104	0	0	0	0
3	329	697	329	348	0	0	0	87	0	261	0	0	0	0	0	0
4	26	64	21	32	0	0	5	32	0	0	0	0	0	0	0	0
5	1626	992	1156	992	0	0	157	0	314	0	0	0	0	0	0	0
6	1040	181	424	181	0	0	0	0	15	0	144	0	0	0	457	0
7	1119	973	775	595	0	0	43	118	301	261	0	0	0	0	0	0
8	1569	87	0	87	0	0	392	0	784	0	392	0	0	0	0	0
9	448	0	384	0	0	0	32	0	32	0	0	0	0	0	0	0
10	3320	670	1764	278	311	0	104	0	934	392	104	0	104	0	0	0
11	1224	262	787	175	87	87	262	0	87	0	0	0	0	0	0	0
12	471	0	354	0	0	0	118	0	0	0	0	0	0	0	0	0
13	3198	1121	2284	561	228	0	0	0	457	0	0	0	0	104	228	457
14	3330	0	2914	0	0	0	416	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	1588	0	943	0	0	0	578	0	67	0	0	0	0	0	0
17	560	67	144	67	0	0	416	0	0	0	0	0	0	0	0	0
18	391	0	391	0	0	0	0	0	0	0	0	0	0	0	0	0
19	1764	0	1375	0	0	0	0	0	389	0	0	0	0	0	0	0
20	208	0	0	0	0	0	0	0	208	0	0	0	0	0	0	0
21	5405	2129	4989	1688	0	261	416	0	0	181	0	0	0	0	0	0
22	1477	3365	1141	1918	0	0	67	938	201	261	0	0	0	0	67	248
23	2349	2669	783	2408	261	0	783	261	522	0	0	0	0	0	0	0
24	7130	207	5093	104	0	0	0	104	2037	0	0	0	0	0	0	0
25	1628	0	1267	0	0	0	0	0	181	0	0	0	0	0	181	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	12191	0	7511	0	311	0	610	0	3614	0	144	0	0	0	0
32	0	4372	0	3227	0	0	0	416	0	500	0	0	0	0	0	228
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	3614	0	2792	0	228	0	67	0	134	0	392	0	0	0	0
Total	38687	38687	26448	26448	888	888	3212	3212	6462	6462	640	640	104	104	933	933

Trip type (purpose to)

1 : Work
2 : Personal Business
3 : Shopping
4 : Social
5 : Recreation
6 : School
7 : Waiting for a ride
8 : Changing modes
9 : Home
10 : No Indication

Time Periods

1 : 6:00 am ~ 8:59 am
2 : 9:00 am ~ 11:59 am
3 : 0:00 pm ~ 2:59 pm
4 : 3:00 pm ~ 5:59 pm
5 : 6:00 pm ~ 9:59 pm
6 : 10:00 pm ~ 5:59 am
7 : No Indication

Zones

1~25 : Internal Zones
26~30 : External Zones
31 : National University of Piura
32 : University of Piura
33 : No Destination
34 : No Indication

Table 6-22 (4) Origin and Destination of Trip Types by Time Periods

(g) Trip type (purpose to) 7 : Waiting for a rid‹] , m-factor [PPL3]

\Time	All		1		2		3		4		5		6		7	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	21	31	21	16	0	0	0	0	0	0	0	16	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	15	5	0	5	0	0	0	0	0	0	0	0	15	0	0	0
7	287	287	287	287	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	16	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	15	0	0	0	0	0	0	0	0	0	0	0	15	0	0
Total	339	339	308	308	0	0	0	0	0	0	16	16	15	15	0	0

Trip type (purpose to)

1 : Work
2 : Personal Business
3 : Shopping
4 : Social
5 : Recreation
6 : School
7 : Waiting for a ride
8 : Changing modes
9 : Home
10 : No Indication

Time Periods

1 : 6:00 am ~ 8:59 am
2 : 9:00 am ~ 11:59 am
3 : 0:00 pm ~ 2:59 pm
4 : 3:00 pm ~ 5:59 pm
5 : 6:00 pm ~ 9:59 pm
6 : 10:00 pm ~ 5:59 am
7 : No Indication

Zones

1~25 : Internal Zones
26~30 : External Zones
31 : National University of Piura
32 : University of Piura
33 : No Destination
34 : No Indication

(h) Trip type (purpose to) 8 : Changing modes] , m-factor [PPL3]

\Time	All		1		2		3		4		5		6		7	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0	104	0	0	0	104	0	0	0	0	0	0	0	0	0	0
2	0	2350	0	416	0	0	0	1101	0	416	0	416	0	0	0	0
3	0	228	0	228	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	842	1370	157	685	0	0	685	685	0	0	0	0	0	0	0	0
6	175	4978	175	1904	0	0	0	762	0	181	0	1466	0	208	0	457
7	86	501	43	87	0	0	43	295	0	0	0	118	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	104	0	0	0	104	0	0	0	0	0	0	0	0	0	0	0
11	87	0	0	0	0	0	87	0	0	0	0	0	0	0	0	0
12	236	0	118	0	0	0	0	0	0	0	118	0	0	0	0	0
13	2512	0	1827	0	0	0	228	0	0	0	0	0	0	0	457	0
14	2081	0	1249	0	0	0	416	0	416	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	416	0	0	0	0	0	0	0	0	0	416	0	0	0	0	0
17	287	0	144	0	0	0	0	0	0	0	144	0	0	0	0	0
18	195	0	0	0	0	0	195	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	623	0	0	0	0	0	416	0	0	0	0	0	208	0	0	0
21	0	1665	0	832	0	0	0	832	0	0	0	0	0	0	0	0
22	299	884	0	442	0	0	181	261	0	0	118	181	0	0	0	0
23	522	0	522	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	543	0	362	0	0	0	0	0	0	0	181	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	228	0	0	0	0	0	0	0	0	0	228	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	442	0	0	0	0	0	261	0	181	0	0	0	0	0	0	0
30	87	0	0	0	0	0	87	0	0	0	0	0	0	0	0	0
31	647	0	0	0	0	0	504	0	0	0	144	0	0	0	0	0
32	832	0	0	0	0	0	416	0	0	0	416	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	832	0	0	0	0	0	416	0	0	0	416	0	0	0	0	0
Total	12080	12080	4596	4596	104	104	3937	3937	597	597	2181	2181	208	208	457	457

Trip type (purpose to)

1 : Work
2 : Personal Business
3 : Shopping
4 : Social
5 : Recreation
6 : School
7 : Waiting for a ride
8 : Changing modes
9 : Home
10 : No Indication

Time Periods

1 : 6:00 am ~ 8:59 am
2 : 9:00 am ~ 11:59 am
3 : 0:00 pm ~ 2:59 pm
4 : 3:00 pm ~ 5:59 pm
5 : 6:00 pm ~ 9:59 pm
6 : 10:00 pm ~ 5:59 am
7 : No Indication

Zones

1~25 : Internal Zones
26~30 : External Zones
31 : National University of Piura
32 : University of Piura
33 : No Destination
34 : No Indication

Table 6-22 (5) Origin and Destination of Trip Types by Time Periods

(i) Trip type (purpose to) 9 : Home] , m-factor [PPL3]

\Time	All		1		2		3		4		5		6		7	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	7127	549	0	0	181	35	4320	89	725	124	1858	106	43	18	0	177
2	20142	1032	38	38	372	153	7353	382	2506	267	4877	192	1959	0	3038	0
3	5010	1112	153	51	159	253	2416	354	299	51	1383	101	0	51	600	253
4	8975	114	0	0	308	0	3956	47	2790	16	1827	52	51	0	43	0
5	4052	4391	0	0	0	314	2285	1568	303	314	1176	1725	67	0	221	470
6	39629	1118	3993	60	13367	90	6344	346	6349	137	3367	424	348	45	5863	15
7	9320	2797	175	0	157	129	3121	1506	1178	86	3182	688	959	344	549	43
8	1504	16863	0	0	0	1176	480	3922	5	784	0	0	0	392	1019	10588
9	1945	1089	0	0	15	32	221	608	875	128	214	256	0	0	621	64
10	1413	7678	0	0	0	311	847	3631	0	1141	173	2076	0	519	392	0
11	1311	3672	0	350	262	437	645	1661	56	350	348	700	0	87	0	87
12	144	3771	0	118	0	1061	144	1179	0	354	0	825	0	236	0	0
13	980	12105	0	0	0	1142	561	5253	87	685	332	2512	0	1370	0	1142
14	150	15818	0	832	0	1665	0	7908	118	2497	32	2082	0	0	0	832
15	2712	4	0	0	0	0	1552	0	980	0	179	1	0	0	0	3
16	2219	5931	0	0	0	235	1195	2585	352	587	477	2288	0	0	195	235
17	639	5605	0	0	89	575	483	2012	67	1581	0	1150	0	287	0	0
18	144	5080	0	781	0	1172	144	586	0	1368	0	977	0	0	0	195
19	495	18284	0	1556	0	3890	144	3501	0	2334	352	4279	0	1945	0	778
20	0	2702	0	208	0	0	0	1039	0	416	0	831	0	208	0	0
21	5842	10133	0	89	181	173	4455	8659	104	520	1103	693	0	0	0	0
22	12832	3490	0	67	2580	1141	5087	1477	442	134	1611	403	647	67	2466	201
23	4955	6787	0	522	118	1566	2669	3393	1136	522	640	0	0	522	392	261
24	884	31481	0	0	0	2037	311	9167	104	11236	207	4967	261	0	0	4074
25	118	10313	0	0	0	1267	0	4161	0	724	118	2895	0	543	0	724
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	260	0	0	0	0	0	0	0	0	0	260	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	5	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0
30	1989	0	0	0	0	0	481	0	1049	0	67	0	0	0	392	0
31	18694	0	0	0	147	0	8260	0	4582	0	2225	0	2072	0	1408	0
32	5550	0	118	0	56	0	3263	0	785	0	695	0	0	0	634	0
33	152	0	0	0	0	0	0	0	0	0	0	0	0	0	152	0
34	12728	2	195	0	864	0	4298	0	1464	1	3516	1	228	0	2161	0
Total	171921	171921	4672	4672	18855	18855	65034	65034	26356	26356	30225	30225	6634	6634	20144	20144

Trip type (purpose to)

1 : Work
2 : Personal Business
3 : Shopping
4 : Social
5 : Recreation
6 : School
7 : Waiting for a ride
8 : Changing modes
9 : Home
10 : No Indication

Time Periods

1 : 6:00 am ~ 8:59 am
2 : 9:00 am ~ 11:59 am
3 : 0:00 pm ~ 2:59 pm
4 : 3:00 pm ~ 5:59 pm
5 : 6:00 pm ~ 9:59 pm
6 : 10:00 pm ~ 5:59 am
7 : No Indication

Zones

1~25 : Internal Zones
26~30 : External Zones
31 : National University of Piura
32 : University of Piura
33 : No Destination
34 : No Indication

(j) Trip type (purpose to) 10 : No Indication] , m-factor [PPL3]

\Time	All		1		2		3		4		5		6		7	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0	117	0	0	0	0	0	117	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	51	51	51	51	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	104	0	104	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
16	117	0	0	0	0	0	117	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	104	0	104	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	346	347	0	0	0	1	0	0	0	0	0	0	0	0	346	346
Total	619	619	154	154	1	1	117	117	0	0	0	0	0	0	346	346

Trip type (purpose to)

1 : Work
2 : Personal Business
3 : Shopping
4 : Social
5 : Recreation
6 : School
7 : Waiting for a ride
8 : Changing modes
9 : Home
10 : No Indication

Time Periods

1 : 6:00 am ~ 8:59 am
2 : 9:00 am ~ 11:59 am
3 : 0:00 pm ~ 2:59 pm
4 : 3:00 pm ~ 5:59 pm
5 : 6:00 pm ~ 9:59 pm
6 : 10:00 pm ~ 5:59 am
7 : No Indication

Zones

1~25 : Internal Zones
26~30 : External Zones
31 : National University of Piura
32 : University of Piura
33 : No Destination
34 : No Indication

Table 6-23 (1) Origin and Destination of Hour Periods by Trip Types

(a) Hour Period [All : Total 0:00 am ~ 11:5!] , Time Period [All] , % in Time P. [100]

\Type	All		1		2		3		4		5		6		7		8		9		10	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	7800	7611	531	4864	0	303	53	0	89	368	0	404	0	902	0	0	0	104	7127	549	0	117
2	21666	22341	1180	10863	0	551	153	2735	115	1395	0	881	76	2534	0	0	0	2350	20142	1032	0	0
3	6451	6401	708	2843	0	58	354	30	0	1381	0	0	329	697	0	0	0	228	5010	1112	51	51
4	9744	10329	233	8758	10	661	87	30	392	267	0	404	26	64	21	31	0	0	8975	114	0	0
5	9814	9814	1725	1928	0	0	157	0	1411	515	0	617	1626	992	0	0	842	1370	4052	4391	0	0
6	43841	43839	1896	15033	301	1914	543	19919	196	573	45	117	1040	181	15	5	175	4978	39629	1118	0	0
7	12671	11328	1095	3765	548	325	129	0	86	1312	0	1368	1119	973	287	287	86	501	9320	2797	0	0
8	18759	18367	7843	240	0	0	4706	392	2353	784	784	0	1569	87	0	0	0	0	1504	16863	0	0
9	3034	3019	608	1310	0	228	32	0	0	392	0	0	448	0	0	0	0	0	1945	1089	0	0
10	9678	9679	3515	1331	519	0	600	0	104	0	0	0	3320	670	0	0	104	0	1413	7678	104	0
11	5333	5508	1486	923	350	87	437	87	0	213	437	262	1224	262	0	0	87	0	1311	3672	0	0
12	4168	4168	1903	262	471	118	943	0	0	18	0	0	471	0	0	0	236	0	144	3771	0	0
13	13770	13770	3426	544	457	0	1142	0	1142	0	914	0	3198	1121	0	0	2512	0	980	12105	0	0
14	15967	16360	6660	542	416	0	2497	0	832	0	0	0	3330	0	0	0	2081	0	150	15818	0	0
15	2719	3124	2	2704	0	416	4	0	0	0	0	0	0	0	0	0	0	0	2712	4	1	0
16	8745	8657	5640	1021	0	117	0	0	117	0	235	0	0	1588	0	0	416	0	2219	5931	117	0
17	6962	7337	4325	1454	719	67	144	144	144	0	144	0	560	67	0	0	287	0	639	5605	0	0
18	5614	5419	3321	339	195	0	1172	0	195	0	0	0	391	0	0	0	195	0	144	5080	0	0
19	19376	19168	10115	676	0	208	5057	0	0	0	1945	0	1764	0	0	0	0	0	495	18284	0	0
20	2702	2909	1455	208	208	0	208	0	0	0	0	0	208	0	0	0	623	0	0	2702	0	0
21	17459	18160	5402	3555	291	104	0	0	0	228	520	346	5405	2129	0	0	0	1665	5842	10133	0	0
22	18559	19333	1258	4897	328	1019	1936	4617	429	881	0	181	1477	3365	0	0	299	884	12832	3490	0	0
23	15657	10723	5742	1149	0	118	1566	0	522	0	0	0	2349	2669	0	0	522	0	4955	6787	0	0
24	28448	32365	10250	676	2037	0	8148	0	0	0	0	0	7130	207	0	0	0	0	884	31481	0	0
25	10431	10431	6152	0	0	118	905	0	905	0	181	0	1628	0	0	0	543	0	118	10313	0	0
26	0	32	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	489	489	0	489	0	0	0	0	0	0	0	0	0	0	0	0	228	0	260	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	447	447	0	186	0	261	0	0	0	0	0	0	0	0	0	0	442	0	5	0	0	0
30	2127	2177	0	2061	51	66	0	51	0	0	0	0	0	0	0	0	87	0	1989	0	0	0
31	19733	19701	0	4351	0	0	0	3056	392	0	0	0	0	12191	0	0	647	0	18694	0	0	104
32	6398	5982	0	1554	0	0	0	56	0	0	0	0	0	4372	16	0	832	0	5550	0	0	0
33	152	152	0	152	0	0	0	0	0	0	0	0	0	0	0	0	0	0	152	0	0	0
34	14451	14026	87	7850	118	281	339	195	0	1098	0	623	0	3614	0	15	832	0	12728	2	346	347
Total	363166	363166	86560	86560	7019	7019	31312	31312	9424	9424	5205	5205	38687	38687	339	339	12080	12080	171921	171921	619	619

(b) Hour Period [(2) : 6:00 am ~ 6:59 am] , Time Period [1] , % in Time P. [17.0]

\Type	All		1		2		3		4		5		6		7		8		9		10	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	60	832	54	666	0	27	6	0	0	0	0	0	0	138	0	0	0	0	0	0	0	0
2	123	1492	91	947	0	42	13	67	0	67	0	0	13	293	0	0	0	71	6	6	0	0
3	194	413	86	290	0	3	17	5	0	0	0	0	56	59	0	0	0	39	26	9	9	9
4	18	1208	10	1153	1	39	0	5	0	0	0	3	4	5	4	3	0	0	0	0	0	0
5	489	587	213	302	0	0	27	0	27	0	0	0	196	169	0	0	27	116	0	0	0	0
6	1079	4458	225	1678	46	290	26	2058	0	67	3	0	72	31	0	1	30	323	678	10	0	0
7	374	740	113	529	29	47	15	0	0	0	0	0	132	101	49	49	7	15	30	0	0	0
8	1998	82	1199	1	0	0	533	0	266	67	0	0	0	15	0	0	0	0	0	0	0	0
9	163	222	92	222	0	0	5	0	0	0	0	0	65	0	0	0	0	0	0	0	0	0
10	722	196	317	149	70	0	18	0	0	0	0	0	299	47	0	0	0	0	0	0	18	0
11	356	184	148	80	15	0	45	0	0	0	15	15	134	30	0	0	0	0	0	59	0	0
12	400	64	200	44	20	0	100	0	0	0	0	0	60	0	0	0	20	0	0	20	0	0
13	1125	188	388	92	39	0	0	0	0	0	0	0	388	95	0	0	310	0	0	0	0	0
14	1979	233	919	92	0	0	353	0	0	0	0	0	495	0	0	0	212	0	0	141	0	0
15	1	439	0	439	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	579	289	579	129	0	0	0	0	0	0	0	0	0	160	0	0	0	0	0	0	0	0
17	610	168	464	156	73	0	24	0	0	0	0	0	24	11	0	0	24	0	0	0	0	0
18	597	157	365	24	0	0	166	0	0	0	0	0	66	0	0	0	0	0	0	133	0	0
19	1423	324	925	24	0	35	264	0	0	0	0	0	233	0	0	0	0	0	0	264	0	0
20	212	71	141	35	35	0	35	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0
21	1759	826	882	366	29	18	0	0	0	0	0	0	847	287	0	0	0	141	0	15	0	0
22	446	1155	93	570	44	173	114	0	0	0	0	0	194	326	0	0	0	75	0	11	0	0
23	798	649	399	131	0	20	177	0	0	0	0	0	133	409	0	0	89	0	0	89	0	0
24	3124	53	1222	35	346	0	692	0	0	0	0	0	865	18	0	0	0	0	0	0	0	0
25	983	0	707	0	0	0	0	0	0	0	0	0	215	0	0	0	61	0	0	0	0	0
26	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	44	0	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	45	0	1	0	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	180	0	177	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	2185	0	373	0	0	0	519	0	0	0	0	0	1276	0	0	0	0	0	0	0	18
32	20	706	0	148	0	0	0	9	0	0	0	0	0	548	0	0	0	0	20	0	0	0
33	0	9	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	66	1493	0	918	0	8	33	0	0	93	0	0	0	474	0	0	0	0	33	0	0	0
Total	19697	19697	9831	9831	748	748	2663	2663	293	293	17	17	4491	4491	52	52	780	780	793	793	26	26

Table 6-23 (2) Origin and Destination of Hour Periods by Trip Types

(c) Hour Period [(3) : 7:00 am ~ 7:59 am] , Time Period [1] , % in Time P. [52.5]

\Type	All		1		2		3		4		5		6		7		8		9		10	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	186	2573	168	2062	0	83	19	0	0	0	0	0	0	428	0	0	0	0	0	0	0	0
2	381	4617	281	2929	0	129	40	206	0	206	0	0	40	907	0	0	0	219	20	20	0	0
3	599	1277	266	897	0	8	53	16	0	0	0	0	173	183	0	0	0	120	80	27	27	27
4	54	3738	30	3568	3	121	0	16	0	0	0	8	11	17	11	8	0	0	0	0	0	0
5	1514	1816	659	934	0	0	82	0	82	0	0	0	607	521	0	0	82	360	0	0	0	0
6	3338	13794	696	5192	142	899	79	6368	0	206	8	0	223	95	0	3	92	1001	2098	32	0	0
7	1157	2290	349	1635	90	145	45	0	0	0	0	0	407	312	151	151	23	46	92	0	0	0
8	6181	255	3709	3	0	0	1648	0	824	206	0	0	0	46	0	0	0	0	0	0	0	0
9	505	688	286	688	0	0	17	0	0	0	0	0	202	0	0	0	0	0	0	0	0	0
10	2235	605	981	460	218	0	55	0	0	0	0	0	927	146	0	0	0	0	0	0	55	0
11	1103	568	459	247	46	0	138	0	0	0	46	46	413	92	0	0	0	0	0	184	0	0
12	1238	199	619	137	62	0	310	0	0	0	0	0	186	0	0	0	62	0	0	62	0	0
13	3480	580	1200	286	120	0	0	0	0	0	0	0	1200	295	0	0	960	0	0	0	0	0
14	6123	722	2843	285	0	0	1093	0	0	0	0	0	1531	0	0	0	656	0	0	437	0	0
15	2	1359	1	1359	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	1790	894	1790	399	0	0	0	0	0	0	0	0	0	495	0	0	0	0	0	0	0	0
17	1888	519	1435	484	227	0	76	0	0	0	0	0	76	35	0	0	76	0	0	0	0	0
18	1848	486	1129	76	0	0	513	0	0	0	0	0	205	0	0	0	0	0	0	411	0	0
19	4401	1002	2861	76	0	109	818	0	0	0	0	0	722	0	0	0	0	0	0	818	0	0
20	655	218	437	109	109	0	109	0	0	0	0	0	0	0	0	0	0	0	0	109	0	0
21	5442	2557	2730	1131	91	55	0	0	0	0	0	0	2621	887	0	0	0	437	0	47	0	0
22	1378	3573	289	1763	137	535	353	0	0	0	0	0	599	1008	0	0	0	232	0	35	0	0
23	2469	2007	1234	405	0	62	549	0	0	0	0	0	411	1265	0	0	274	0	0	274	0	0
24	9666	164	3780	109	1070	0	2141	0	0	0	0	0	2676	55	0	0	0	0	0	0	0	0
25	3042	0	2186	0	0	0	0	0	0	0	0	0	665	0	0	0	190	0	0	0	0	0
26	0	17	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	137	0	137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	140	0	3	0	137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	556	0	548	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	6759	0	1153	0	0	0	1605	0	0	0	0	0	3946	0	0	0	0	0	0	0	55
32	62	2184	0	459	0	0	0	29	0	0	0	0	0	1696	0	0	0	0	62	0	0	0
33	0	27	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	205	4620	0	2841	0	24	103	0	0	288	0	0	0	1467	0	0	0	0	103	0	0	0
Total	60942	60942	30418	30418	2316	2316	8240	8240	907	907	54	54	13896	13896	162	162	2415	2415	2455	2455	81	81

(d) Hour Period [(4) : 8:00 am ~ 8:59 am] , Time Period [1] , % in Time P. [30.5]

\Type	All		1		2		3		4		5		6		7		8		9		10	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	108	1493	97	1196	0	48	11	0	0	0	0	0	0	248	0	0	0	0	0	0	0	0
2	221	2678	163	1699	0	75	23	120	0	120	0	0	23	526	0	0	0	127	12	12	0	0
3	347	741	154	520	0	5	31	9	0	0	0	0	100	106	0	0	0	70	47	15	15	15
4	32	2169	17	2070	2	70	0	9	0	0	0	5	6	10	6	5	0	0	0	0	0	0
5	878	1053	382	542	0	0	48	0	48	0	0	0	352	302	0	0	48	209	0	0	0	0
6	1936	8002	404	3012	83	521	46	3694	0	120	5	0	129	55	0	2	53	580	1217	18	0	0
7	671	1328	203	949	52	84	26	0	0	0	0	0	236	181	88	88	13	27	53	0	0	0
8	3586	148	2151	2	0	0	956	0	478	120	0	0	0	27	0	0	0	0	0	0	0	0
9	293	399	166	399	0	0	10	0	0	0	0	0	117	0	0	0	0	0	0	0	0	0
10	1296	351	569	267	126	0	32	0	0	0	0	0	538	85	0	0	0	0	0	0	32	0
11	640	330	267	143	27	0	80	0	0	0	27	27	240	53	0	0	0	0	0	107	0	0
12	718	116	359	80	36	0	180	0	0	0	0	0	108	0	0	0	36	0	0	36	0	0
13	2019	337	696	166	70	0	0	0	0	0	0	0	696	171	0	0	557	0	0	0	0	0
14	3552	419	1649	165	0	0	634	0	0	0	0	0	888	0	0	0	381	0	0	254	0	0
15	1	788	0	788	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	1039	519	1039	232	0	0	0	0	0	0	0	0	0	287	0	0	0	0	0	0	0	0
17	1095	301	832	281	131	0	44	0	0	0	0	0	44	20	0	0	44	0	0	0	0	0
18	1072	282	655	44	0	0	298	0	0	0	0	0	119	0	0	0	0	0	0	238	0	0
19	2553	581	1660	44	0	63	474	0	0	0	0	0	419	0	0	0	0	0	0	474	0	0
20	380	127	253	63	63	0	63	0	0	0	0	0	0	0	0	0	0	0	0	63	0	0
21	3157	1483	1583	656	53	32	0	0	0	0	0	0	1520	514	0	0	0	254	0	27	0	0
22	800	2073	168	1023	80	310	205	0	0	0	0	0	348	585	0	0	0	135	0	20	0	0
23	1432	1164	716	235	0	36	318	0	0	0	0	0	239	734	0	0	159	0	0	159	0	0
24	5608	95	2193	63	621	0	1242	0	0	0	0	0	1552	32	0	0	0	0	0	0	0	0
25	1765	0	1268	0	0	0	0	0	0	0	0	0	386	0	0	0	110	0	0	0	0	0
26	0	10	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	79	0	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	81	0	2	0	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	322	0	318	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	3921	0	669	0	0	0	931	0	0	0	0	0	2289	0	0	0	0	0	0	0	32
32	36	1267	0	266	0	0	0	17	0	0	0	0	0	984	0	0	0	0	36	0	0	0
33	0	15	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	119	2680	0	1648	0	14	60	0	0	167	0	0	0	851	0	0	0	0	60	0	0	0
Total	35353	35353	17646	17646	1343	1343	4780	4780	526	526	31	31	8061	8061	94	94	1401	1401	1424	1424	47	47

Table 6-23 (3) Origin and Destination of Hour Periods by Trip Types

(e) Hour Period [(5) : 9:00 am ~ 9:59 am] , Time Period [2] , % in Time P. [43.9]

\Type	All		1		2		3		4		5		6		7		8		9		10	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	95	222	8	0	0	0	8	0	0	161	0	0	0	0	0	0	0	46	79	16	0	0
2	230	1636	34	835	0	63	34	512	0	160	0	0	0	0	0	0	0	0	163	67	0	0
3	180	626	22	62	0	19	89	0	0	434	0	0	0	0	0	0	0	0	70	111	0	0
4	246	344	73	102	0	143	38	0	0	98	0	0	0	0	0	0	0	0	135	0	0	0
5	206	206	0	0	0	0	0	0	206	69	0	0	0	0	0	0	0	0	0	138	0	0
6	6107	2960	165	200	0	0	0	2669	79	0	0	52	0	0	0	0	0	0	5863	40	0	0
7	144	399	0	38	38	0	19	0	19	52	0	252	0	0	0	0	0	0	69	57	0	0
8	860	688	0	0	0	0	344	0	344	172	172	0	0	0	0	0	0	0	0	516	0	0
9	7	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	14	0	0
10	364	175	91	38	0	0	46	0	46	0	0	0	137	0	0	0	46	0	0	137	0	0
11	422	383	115	38	38	0	38	38	0	0	77	77	38	38	0	0	0	0	115	192	0	0
12	258	465	52	0	52	0	155	0	0	0	0	0	0	0	0	0	0	0	0	465	0	0
13	801	501	100	0	0	0	501	0	0	0	100	0	100	0	0	0	0	0	0	501	0	0
14	548	730	0	0	0	0	183	0	365	0	0	0	0	0	0	0	0	0	0	730	0	0
15	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	206	166	52	63	0	0	0	0	52	0	103	0	0	0	0	0	0	0	0	103	0	0
17	291	252	63	0	63	0	0	0	63	0	63	0	0	0	0	0	0	0	39	252	0	0
18	343	514	171	0	86	0	86	0	0	0	0	0	0	0	0	0	0	0	0	514	0	0
19	1024	1877	0	171	0	0	1024	0	0	0	0	0	0	0	0	0	0	0	0	1706	0	0
20	91	0	91	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	231	392	0	150	0	0	0	0	0	0	152	52	0	114	0	0	0	0	79	76	0	0
22	1685	3103	171	498	0	0	353	2025	29	79	0	0	0	0	0	0	0	0	1132	500	0	0
23	853	687	343	0	0	0	229	0	114	0	0	0	114	0	0	0	0	0	52	687	0	0
24	2680	893	893	0	0	0	1787	0	0	0	0	0	0	0	0	0	0	0	0	893	0	0
25	555	555	79	0	0	0	397	0	79	0	0	0	0	0	0	0	0	0	0	555	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	79	0	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	64	161	0	25	0	0	0	0	0	0	0	0	0	137	0	0	0	0	64	0	0	0
32	25	52	0	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	379	817	0	172	0	52	0	86	0	172	0	235	0	100	0	0	0	0	379	0	0	0
Total	18899	18899	2524	2524	277	277	5330	5330	1397	1397	667	667	390	390	0	0	46	46	8270	8270	0	0

(f) Hour Period [(6) : 10:00 am ~ 10:59 am] , Time Period [2] , % in Time P. [32.5]

\Type	All		1		2		3		4		5		6		7		8		9		10	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	70	165	6	0	0	0	6	0	0	119	0	0	0	0	0	0	0	34	59	11	0	0
2	170	1211	25	618	0	47	25	379	0	118	0	0	0	0	0	0	0	0	121	50	0	0
3	134	463	16	46	0	14	66	0	0	321	0	0	0	0	0	0	0	0	52	82	0	0
4	182	254	54	76	0	106	28	0	0	73	0	0	0	0	0	0	0	0	100	0	0	0
5	153	153	0	0	0	0	0	0	153	51	0	0	0	0	0	0	0	0	0	102	0	0
6	4519	2191	122	148	0	0	0	1975	59	0	0	38	0	0	0	0	0	0	4338	29	0	0
7	107	295	0	28	28	0	14	0	14	38	0	187	0	0	0	0	0	0	51	42	0	0
8	636	509	0	0	0	0	255	0	255	127	127	0	0	0	0	0	0	0	0	382	0	0
9	5	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	10	0	0
10	269	129	67	28	0	0	34	0	34	0	0	0	101	0	0	0	34	0	0	101	0	0
11	312	284	85	28	28	0	28	28	0	0	57	57	28	28	0	0	0	0	85	142	0	0
12	191	344	38	0	38	0	115	0	0	0	0	0	0	0	0	0	0	0	0	344	0	0
13	593	371	74	0	0	0	371	0	0	0	74	0	74	0	0	0	0	0	0	371	0	0
14	405	540	0	0	0	0	135	0	270	0	0	0	0	0	0	0	0	0	0	540	0	0
15	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	153	123	38	47	0	0	0	0	38	0	76	0	0	0	0	0	0	0	0	76	0	0
17	215	187	47	0	47	0	0	0	47	0	47	0	0	0	0	0	0	0	29	187	0	0
18	254	380	127	0	63	0	63	0	0	0	0	0	0	0	0	0	0	0	0	380	0	0
19	758	1389	0	126	0	0	758	0	0	0	0	0	0	0	0	0	0	0	0	1263	0	0
20	67	0	67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	171	290	0	111	0	0	0	0	0	0	112	38	0	85	0	0	0	0	59	56	0	0
22	1247	2296	126	369	0	0	261	1498	22	59	0	0	0	0	0	0	0	0	837	370	0	0
23	631	508	254	0	0	0	169	0	85	0	0	0	85	0	0	0	0	0	38	508	0	0
24	1983	661	661	0	0	0	1322	0	0	0	0	0	0	0	0	0	0	0	0	661	0	0
25	411	411	59	0	0	0	294	0	59	0	0	0	0	0	0	0	0	0	0	411	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	59	0	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	48	119	0	18	0	0	0	0	0	0	0	0	0	101	0	0	0	0	48	0	0	0
32	18	38	0	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	281	604	0	127	0	38	0	63	0	127	0	174	0	74	0	0	0	0	281	0	0	0
Total	13985	13985	1868	1868	205	205	3944	3944	1034	1034	493	493	288	288	0	0	34	34	6120	6120	0	0

Table 6-23 (4) Origin and Destination of Hour Periods by Trip Types

(g) Hour Period [(7) : 11:00 am ~ 11:59 am] , Time Period [2] , % in Time P. [23.7]

\Type	All		1		2		3		4		5		6		7		8		9		10	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	51	120	4	0	0	0	4	0	0	87	0	0	0	0	0	0	0	25	43	8	0	0
2	124	884	18	451	0	34	18	276	0	86	0	0	0	0	0	0	0	0	88	36	0	0
3	97	338	12	34	0	10	48	0	0	234	0	0	0	0	0	0	0	0	38	60	0	0
4	133	186	39	55	0	77	21	0	0	53	0	0	0	0	0	0	0	0	73	0	0	0
5	111	111	0	0	0	0	0	0	111	37	0	0	0	0	0	0	0	0	0	74	0	0
6	3298	1599	89	108	0	0	0	1441	43	0	0	28	0	0	0	0	0	0	3166	21	0	0
7	78	215	0	21	20	0	10	0	10	28	0	136	0	0	0	0	0	0	37	31	0	0
8	464	372	0	0	0	0	186	0	186	93	93	0	0	0	0	0	0	0	0	279	0	0
9	4	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	8	0	0
10	197	94	49	21	0	0	25	0	25	0	0	0	74	0	0	0	25	0	0	74	0	0
11	228	207	62	21	21	0	21	21	0	0	41	41	21	21	0	0	0	0	62	104	0	0
12	140	251	28	0	28	0	84	0	0	0	0	0	0	0	0	0	0	0	0	251	0	0
13	433	270	54	0	0	0	270	0	0	0	54	0	54	0	0	0	0	0	0	270	0	0
14	296	394	0	0	0	0	99	0	197	0	0	0	0	0	0	0	0	0	0	394	0	0
15	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	111	90	28	34	0	0	0	0	28	0	56	0	0	0	0	0	0	0	0	56	0	0
17	157	136	34	0	34	0	0	0	34	0	34	0	0	0	0	0	0	0	21	136	0	0
18	185	278	93	0	46	0	46	0	0	0	0	0	0	0	0	0	0	0	0	278	0	0
19	553	1014	0	92	0	0	553	0	0	0	0	0	0	0	0	0	0	0	0	921	0	0
20	49	0	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	125	212	0	81	0	0	0	0	0	0	82	28	0	62	0	0	0	0	43	41	0	0
22	910	1676	92	269	0	0	191	1093	16	43	0	0	0	0	0	0	0	0	611	270	0	0
23	461	371	185	0	0	0	124	0	62	0	0	0	62	0	0	0	0	0	28	371	0	0
24	1447	482	482	0	0	0	965	0	0	0	0	0	0	0	0	0	0	0	0	482	0	0
25	300	300	43	0	0	0	214	0	43	0	0	0	0	0	0	0	0	0	0	300	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	43	0	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	35	87	0	13	0	0	0	0	0	0	0	0	0	74	0	0	0	0	35	0	0	0
32	13	28	0	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	205	441	0	93	0	28	0	46	0	93	0	127	0	54	0	0	0	0	205	0	0	0
Total	10205	10205	1363	1363	149	149	2878	2878	754	754	360	360	210	210	0	0	25	25	4466	4466	0	0

(h) Hour Period [(8) : 0:00 pm ~ 0:59 pm] , Time Period [3] , % in Time P. [18.5]

\Type	All		1		2		3		4		5		6		7		8		9		10	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	814	46	0	8	0	0	0	0	16	0	0	0	0	0	0	0	0	0	798	16	0	22
2	1379	303	0	29	0	0	0	0	21	0	0	0	0	0	0	0	0	203	1358	71	0	0
3	456	82	9	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	446	65	0	0
4	805	58	0	43	1	0	0	0	72	0	0	0	1	6	0	0	0	0	731	9	0	0
5	636	468	29	28	0	0	0	0	29	24	0	0	29	0	0	0	127	127	422	290	0	0
6	1208	405	36	94	0	22	0	85	0	0	0	0	0	0	0	0	0	141	1172	64	0	0
7	608	363	16	8	0	1	0	0	0	0	0	0	8	22	0	0	8	55	576	278	0	0
8	233	724	72	0	0	0	0	0	0	0	0	0	72	0	0	0	0	0	89	724	0	0
9	59	185	12	0	0	0	0	0	0	72	0	0	6	0	0	0	0	0	41	112	0	0
10	195	707	19	36	0	0	0	0	0	0	0	0	19	0	0	0	0	0	157	671	0	0
11	200	346	0	0	0	0	0	0	0	39	16	0	48	0	0	0	16	0	119	307	0	0
12	70	221	0	0	22	0	0	0	0	3	0	0	22	0	0	0	0	0	27	218	0	0
13	146	970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	0	104	970	0	0
14	231	1461	0	0	77	0	0	0	0	0	0	0	77	0	0	0	77	0	0	1461	0	0
15	287	77	0	0	0	77	0	0	0	0	0	0	0	0	0	0	0	0	287	0	0	0
16	308	606	65	0	0	22	0	0	0	0	0	0	0	107	0	0	0	0	221	477	22	0
17	193	372	27	0	0	0	0	0	0	0	0	0	77	0	0	0	0	0	89	372	0	0
18	63	108	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	0	27	108	0	0
19	27	673	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	647	0	0
20	77	192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	77	0	0	192	0	0
21	943	1753	22	0	22	0	0	0	0	0	0	0	77	0	0	0	0	154	823	1599	0	0
22	1070	494	0	0	0	0	85	0	0	0	0	0	12	173	0	0	33	48	940	273	0	0
23	686	675	48	0	0	0	0	0	0	0	0	0	145	48	0	0	0	0	493	627	0	0
24	57	1761	0	48	0	0	0	0	0	0	0	0	0	19	0	0	0	0	57	1693	0	0
25	0	769	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	769	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0
30	105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	89	0	0	0
31	1619	119	0	6	0	0	0	0	0	0	0	0	0	113	0	0	93	0	1526	0	0	0
32	680	96	0	19	0	0	0	0	0	0	0	0	0	77	0	0	77	0	603	0	0	0
33	0	9	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	871	29	0	0	0	0	0	0	0	0	0	16	0	12	0	0	77	0	794	0	0	0
Total	14071	14071	355	355	121	121	85	85	139	139	16	16	593	593	0	0	727	727	12013	12013	22	22

Table 6-23 (5) Origin and Destination of Hour Periods by Trip Types

(i) Hour Period [(9) : 1:00 pm ~ 1:59 pm] , Time Period [3] , % in Time P. [54.6]

\Type	All		1		2		3		4		5		6		7		8		9		10	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	2405	136	0	23	0	0	0	0	48	0	0	0	0	0	0	0	0	0	2357	48	0	64
2	4074	895	0	86	0	0	0	0	63	0	0	0	0	0	0	0	0	601	4012	208	0	0
3	1346	241	28	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	1318	193	0	0
4	2378	171	0	128	3	0	0	0	214	0	0	0	3	17	0	0	0	0	2159	25	0	0
5	1878	1382	86	82	0	0	0	0	86	71	0	0	86	0	0	0	374	374	1247	856	0	0
6	3568	1198	107	278	0	64	0	251	0	0	0	0	0	0	0	0	0	416	3461	189	0	0
7	1797	1073	47	23	0	3	0	0	0	0	0	0	23	64	0	0	23	161	1703	822	0	0
8	690	2140	214	0	0	0	0	0	0	0	0	0	214	0	0	0	0	0	262	2140	0	0
9	173	546	35	0	0	0	0	0	0	214	0	0	17	0	0	0	0	0	121	332	0	0
10	576	2088	57	107	0	0	0	0	0	0	0	0	57	0	0	0	0	0	462	1981	0	0
11	590	1023	0	0	0	0	0	0	0	116	48	0	143	0	0	0	48	0	352	906	0	0
12	207	653	0	0	64	0	0	0	0	10	0	0	64	0	0	0	0	0	78	643	0	0
13	430	2866	0	0	0	0	0	0	0	0	0	0	0	0	0	0	125	0	306	2866	0	0
14	681	4315	0	0	227	0	0	0	0	0	0	0	227	0	0	0	227	0	0	4315	0	0
15	847	227	0	0	0	227	0	0	0	0	0	0	0	0	0	0	0	0	847	0	0	0
16	909	1790	192	0	0	64	0	0	0	0	0	0	0	316	0	0	0	0	652	1410	64	0
17	569	1098	78	0	0	0	0	0	0	0	0	0	227	0	0	0	0	0	264	1098	0	0
18	185	320	0	0	0	0	0	0	0	0	0	0	0	0	0	0	107	0	78	320	0	0
19	78	1989	0	78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	78	1910	0	0
20	227	567	0	0	0	0	0	0	0	0	0	0	0	0	0	0	227	0	0	567	0	0
21	2786	5179	64	0	64	0	0	0	0	0	0	0	227	0	0	0	0	454	2431	4725	0	0
22	3162	1460	0	0	0	0	251	0	0	0	0	0	37	512	0	0	99	142	2776	806	0	0
23	2026	1994	142	0	0	0	0	0	0	0	0	0	427	142	0	0	0	0	1457	1852	0	0
24	170	5201	0	142	0	0	0	0	0	0	0	0	0	57	0	0	0	0	170	5002	0	0
25	0	2271	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2271	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	142	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	142	0	0	0	0	0
30	310	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	262	0	0	0
31	4782	350	0	17	0	0	0	0	0	0	0	0	0	333	0	0	275	0	4507	0	0	0
32	2008	284	0	57	0	0	0	0	0	0	0	0	0	227	0	0	227	0	1780	0	0	0
33	0	28	0	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	2573	84	0	0	0	0	0	0	0	0	0	48	0	37	0	0	227	0	2345	0	0	0
Total	41567	41567	1050	1050	358	358	251	251	410	410	48	48	1753	1753	0	0	2148	2148	35486	35486	64	64

(j) Hour Period [(10) : 2:00 pm ~ 2:59 pm] , Time Period [3] , % in Time P. [27.0]

\Type	All		1		2		3		4		5		6		7		8		9		10	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	1189	67	0	12	0	0	0	0	24	0	0	0	0	0	0	0	0	0	1165	24	0	32
2	2013	442	0	42	0	0	0	0	31	0	0	0	0	0	0	0	0	297	1983	103	0	0
3	665	119	14	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	651	95	0	0
4	1175	85	0	63	1	0	0	0	106	0	0	0	1	9	0	0	0	0	1067	13	0	0
5	928	683	42	40	0	0	0	0	42	35	0	0	42	0	0	0	185	185	616	423	0	0
6	1763	592	53	137	0	32	0	124	0	0	0	0	0	0	0	0	0	205	1710	93	0	0
7	888	530	23	12	0	1	0	0	0	0	0	0	12	32	0	0	12	80	841	406	0	0
8	341	1057	106	0	0	0	0	0	0	0	0	0	106	0	0	0	0	0	129	1057	0	0
9	85	270	17	0	0	0	0	0	0	106	0	0	9	0	0	0	0	0	60	164	0	0
10	284	1032	28	53	0	0	0	0	0	0	0	0	28	0	0	0	0	0	229	979	0	0
11	292	505	0	0	0	0	0	0	0	57	24	0	71	0	0	0	24	0	174	448	0	0
12	102	323	0	0	32	0	0	0	0	5	0	0	32	0	0	0	0	0	39	318	0	0
13	213	1416	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	0	151	1416	0	0
14	337	2132	0	0	112	0	0	0	0	0	0	0	112	0	0	0	112	0	0	2132	0	0
15	419	112	0	0	0	112	0	0	0	0	0	0	0	0	0	0	0	0	419	0	0	0
16	449	885	95	0	0	32	0	0	0	0	0	0	0	156	0	0	0	0	322	697	32	0
17	281	543	39	0	0	0	0	0	0	0	0	0	112	0	0	0	0	0	130	543	0	0
18	91	158	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	0	39	158	0	0
19	39	983	0	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	944	0	0
20	112	280	0	0	0	0	0	0	0	0	0	0	0	0	0	0	112	0	0	280	0	0
21	1377	2559	32	0	32	0	0	0	0	0	0	0	112	0	0	0	0	224	1201	2335	0	0
22	1562	722	0	0	0	0	124	0	0	0	0	0	18	253	0	0	49	70	1372	398	0	0
23	1001	985	70	0	0	0	0	0	0	0	0	0	211	70	0	0	0	0	720	915	0	0
24	84	2570	0	70	0	0	0	0	0	0	0	0	0	28	0	0	0	0	84	2472	0	0
25	0	1122	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1122	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	0	0	0	0	0
30	153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	0	130	0	0	0
31	2363	173	0	9	0	0	0	0	0	0	0	0	0	164	0	0	136	0	2227	0	0	0
32	992	140	0	28	0	0	0	0	0	0	0	0	0	112	0	0	112	0	880	0	0	0
33	0	14	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	1271	42	0	0	0	0	0	0	0	0	0	24	0	18	0	0	112	0	1159	0	0	0
Total	20541	20541	519	519	177	177	124	124	203	203	24	24	866	866	0	0	1062	1062	17536	17536	32	32

Table 6-23 (6) Origin and Destination of Hour Periods by Trip Types

(k) Hour Period [(11) : 3:00 pm ~ 3:59 pm] , Time Period [4] , % in Time P. [36.9]

\Type	All		1		2		3		4		5		6		7		8		9		10	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	326	592	59	318	0	53	0	0	0	0	0	144	0	32	0	0	0	0	268	46	0	0
2	1106	2201	182	951	0	27	0	289	0	96	0	325	0	260	0	0	0	154	925	99	0	0
3	129	463	0	348	0	0	19	0	0	0	0	0	0	96	0	0	0	0	110	19	0	0
4	1034	630	4	481	0	0	0	0	0	0	0	144	0	0	0	0	0	0	1030	6	0	0
5	401	116	58	0	0	0	0	0	116	0	0	0	116	0	0	0	0	0	112	116	0	0
6	2510	270	0	121	11	32	145	0	0	0	6	0	6	0	0	0	0	67	2343	50	0	0
7	764	590	111	82	107	16	0	0	0	156	0	209	111	96	0	0	0	0	435	32	0	0
8	581	434	0	0	0	0	145	145	0	0	145	0	289	0	0	0	0	0	2	289	0	0
9	335	47	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	323	47	0	0
10	910	630	421	64	0	0	145	0	0	0	0	0	345	145	0	0	0	0	0	421	0	0
11	214	232	97	71	32	32	0	0	0	0	32	0	32	0	0	0	0	0	21	129	0	0
12	137	174	94	0	43	43	0	0	0	0	0	0	0	0	0	0	0	0	0	130	0	0
13	538	253	253	0	0	0	0	0	84	0	0	0	169	0	0	0	0	0	32	253	0	0
14	504	922	307	0	0	0	0	0	0	0	0	0	0	0	0	0	154	0	43	922	0	0
15	362	43	0	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	362	0	0	0
16	693	242	564	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	130	217	0	0
17	237	858	159	197	53	25	0	53	0	0	0	0	0	0	0	0	0	0	25	583	0	0
18	144	505	72	0	0	0	0	0	72	0	0	0	0	0	0	0	0	0	0	505	0	0
19	1579	861	861	0	0	0	0	0	0	0	574	0	144	0	0	0	0	0	0	861	0	0
20	77	153	0	0	0	0	0	0	0	0	0	0	77	0	0	0	0	0	0	153	0	0
21	102	439	0	181	0	0	0	0	0	0	64	0	0	67	0	0	0	0	38	192	0	0
22	287	353	25	149	25	0	0	0	0	58	0	0	74	96	0	0	0	0	163	50	0	0
23	1382	332	674	140	0	0	0	0	96	0	0	0	193	0	0	0	0	0	419	193	0	0
24	790	4223	0	77	0	0	0	0	0	0	0	0	752	0	0	0	0	0	38	4146	0	0
25	668	311	601	0	0	43	0	0	0	0	0	0	67	0	0	0	0	0	0	267	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	0	0	0	0	0
30	387	19	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	387	0	0	0
31	1691	2077	0	743	0	0	0	0	0	0	0	0	0	1334	0	0	0	0	1691	0	0	0
32	290	294	0	110	0	0	0	0	0	0	0	0	0	184	0	0	0	0	290	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	637	618	0	467	43	43	53	0	0	58	0	0	0	50	0	0	0	0	540	0	0	0
Total	18881	18881	4541	4541	315	315	506	506	368	368	821	821	2385	2385	0	0	220	220	9725	9725	0	0

(l) Hour Period [(12) : 4:00 pm ~ 4:59 pm] , Time Period [4] , % in Time P. [36.9]

\Type	All		1		2		3		4		5		6		7		8		9		10	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	326	592	59	318	0	53	0	0	0	0	0	144	0	32	0	0	0	0	268	46	0	0
2	1106	2201	182	951	0	27	0	289	0	96	0	325	0	260	0	0	0	154	925	99	0	0
3	129	463	0	348	0	0	19	0	0	0	0	0	0	96	0	0	0	0	110	19	0	0
4	1034	630	4	481	0	0	0	0	0	0	0	144	0	0	0	0	0	0	1030	6	0	0
5	401	116	58	0	0	0	0	0	116	0	0	0	116	0	0	0	0	0	112	116	0	0
6	2510	270	0	121	11	32	145	0	0	0	6	0	6	0	0	0	0	67	2343	50	0	0
7	764	590	111	82	107	16	0	0	0	156	0	209	111	96	0	0	0	0	435	32	0	0
8	581	434	0	0	0	0	145	145	0	0	145	0	289	0	0	0	0	0	2	289	0	0
9	335	47	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	323	47	0	0
10	910	630	421	64	0	0	145	0	0	0	0	0	345	145	0	0	0	0	0	421	0	0
11	214	232	97	71	32	32	0	0	0	0	32	0	32	0	0	0	0	0	21	129	0	0
12	137	174	94	0	43	43	0	0	0	0	0	0	0	0	0	0	0	0	0	130	0	0
13	538	253	253	0	0	0	0	0	84	0	0	0	169	0	0	0	0	0	32	253	0	0
14	504	922	307	0	0	0	0	0	0	0	0	0	0	0	0	0	154	0	43	922	0	0
15	362	43	0	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	362	0	0	0
16	693	242	564	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	130	217	0	0
17	237	858	159	197	53	25	0	53	0	0	0	0	0	0	0	0	0	0	25	583	0	0
18	144	505	72	0	0	0	0	0	72	0	0	0	0	0	0	0	0	0	0	505	0	0
19	1579	861	861	0	0	0	0	0	0	0	574	0	144	0	0	0	0	0	0	861	0	0
20	77	153	0	0	0	0	0	0	0	0	0	0	77	0	0	0	0	0	0	153	0	0
21	102	439	0	181	0	0	0	0	0	0	64	0	0	67	0	0	0	0	38	192	0	0
22	287	353	25	149	25	0	0	0	0	58	0	0	74	96	0	0	0	0	163	50	0	0
23	1382	332	674	140	0	0	0	0	96	0	0	0	193	0	0	0	0	0	419	193	0	0
24	790	4223	0	77	0	0	0	0	0	0	0	0	752	0	0	0	0	0	38	4146	0	0
25	668	311	601	0	0	43	0	0	0	0	0	0	67	0	0	0	0	0	0	267	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	0	0	0	0	0
30	387	19	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	387	0	0	0
31	1691	2077	0	743	0	0	0	0	0	0	0	0	0	1334	0	0	0	0	1691	0	0	0
32	290	294	0	110	0	0	0	0	0	0	0	0	0	184	0	0	0	0	290	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	637	618	0	467	43	43	53	0	0	58	0	0	0	50	0	0	0	0	540	0	0	0
Total	18881	18881	4541	4541	315	315	506	506	368	368	821	821	2385	2385	0	0	220	220	9725	9725	0	0

Table 6-23 (7) Origin and Destination of Hour Periods by Trip Types

(m) Hour Period [(13) : 5:00 pm ~ 5:59 pm] , Time Period [4] , % in Time P. [26.2]

\Type	All		1		2		3		4		5		6		7		8		9		10	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	232	421	42	226	0	38	0	0	0	0	0	102	0	23	0	0	0	0	190	32	0	0
2	786	1563	129	675	0	19	0	205	0	68	0	231	0	184	0	0	0	109	656	70	0	0
3	92	329	0	247	0	0	13	0	0	0	0	0	0	68	0	0	0	0	78	13	0	0
4	734	447	3	342	0	0	0	0	0	0	0	102	0	0	0	0	0	0	731	4	0	0
5	285	82	41	0	0	0	0	0	82	0	0	0	82	0	0	0	0	0	79	82	0	0
6	1782	192	0	86	8	23	103	0	0	0	4	0	4	0	0	0	0	47	1663	36	0	0
7	542	419	79	58	76	11	0	0	0	111	0	148	79	68	0	0	0	0	309	23	0	0
8	412	308	0	0	0	0	103	103	0	0	103	0	205	0	0	0	0	0	1	205	0	0
9	238	34	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	229	34	0	0
10	646	447	299	45	0	0	103	0	0	0	0	0	245	103	0	0	0	0	0	299	0	0
11	152	165	69	50	23	23	0	0	0	0	23	0	23	0	0	0	0	0	15	92	0	0
12	97	124	66	0	31	31	0	0	0	0	0	0	0	0	0	0	0	0	0	93	0	0
13	382	180	180	0	0	0	0	0	60	0	0	0	120	0	0	0	0	0	23	180	0	0
14	358	654	218	0	0	0	0	0	0	0	0	0	0	0	0	0	109	0	31	654	0	0
15	257	31	0	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	257	0	0	0
16	492	171	400	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	92	154	0	0
17	168	609	113	140	38	18	0	38	0	0	0	0	0	0	0	0	0	0	18	414	0	0
18	102	358	51	0	0	0	0	0	51	0	0	0	0	0	0	0	0	0	0	358	0	0
19	1121	612	612	0	0	0	0	0	0	0	408	0	102	0	0	0	0	0	0	612	0	0
20	54	109	0	0	0	0	0	0	0	0	0	0	54	0	0	0	0	0	0	109	0	0
21	73	312	0	128	0	0	0	0	0	0	45	0	0	47	0	0	0	0	27	136	0	0
22	204	251	18	106	18	0	0	0	0	41	0	0	53	68	0	0	0	0	116	35	0	0
23	981	236	479	99	0	0	0	0	68	0	0	0	137	0	0	0	0	0	298	137	0	0
24	561	2998	0	54	0	0	0	0	0	0	0	0	534	0	0	0	0	0	27	2944	0	0
25	474	220	427	0	0	31	0	0	0	0	0	0	47	0	0	0	0	0	0	190	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	0	0	0	0	0
30	275	13	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	275	0	0	0
31	1201	1474	0	527	0	0	0	0	0	0	0	0	0	947	0	0	0	0	1201	0	0	0
32	206	209	0	78	0	0	0	0	0	0	0	0	0	131	0	0	0	0	206	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	452	439	0	331	31	31	38	0	0	41	0	0	0	35	0	0	0	0	384	0	0	0
Total	13406	13406	3224	3224	224	224	359	359	262	262	583	583	1693	1693	0	0	156	156	6905	6905	0	0

(n) Hour Period [(14) : 6:00 pm ~ 6:59 pm] , Time Period [5] , % in Time P. [28.6]

\Type	All		1		2		3		4		5		6		7		8		9		10	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	536	40	5	5	0	0	0	0	0	0	0	4	0	0	0	0	0	0	531	30	0	0
2	1404	470	11	22	0	25	0	112	0	108	0	0	0	30	0	0	0	119	1393	55	0	0
3	410	155	14	14	0	0	0	0	0	112	0	0	0	0	0	0	0	0	395	29	0	0
4	522	63	0	14	0	30	0	0	0	0	0	0	0	0	0	4	0	0	522	15	0	0
5	426	735	45	0	0	0	0	0	45	65	0	176	0	0	0	0	0	0	336	493	0	0
6	1012	703	0	111	0	0	0	0	4	52	4	0	41	0	0	0	0	419	962	121	0	0
7	909	516	0	45	0	0	0	0	0	175	0	65	0	0	0	0	0	34	909	197	0	0
8	224	0	0	0	0	0	112	0	0	0	0	0	112	0	0	0	0	0	0	0	0	0
9	61	73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61	73	0	0
10	165	593	56	0	30	0	0	0	0	0	0	0	30	0	0	0	0	0	50	593	0	0
11	149	250	25	50	25	0	0	0	0	0	0	0	0	0	0	0	0	0	99	200	0	0
12	34	236	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	0	0	236	0	0
13	552	718	0	0	0	0	0	0	261	0	196	0	0	0	0	0	0	0	95	718	0	0
14	9	595	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	595	0	0
15	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51	0	0	0
16	255	687	0	34	0	0	0	0	0	0	0	0	0	0	0	0	119	0	136	654	0	0
17	168	329	127	0	0	0	0	0	0	0	0	0	0	0	0	0	41	0	0	329	0	0
18	0	335	0	56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	279	0	0
19	323	1223	111	0	0	0	0	0	0	0	111	0	0	0	0	0	0	0	100	1223	0	0
20	0	238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	238	0	0
21	340	491	25	163	0	0	0	0	0	65	0	65	0	0	0	0	0	0	315	198	0	0
22	631	374	34	0	0	0	0	0	103	155	0	52	0	0	0	0	34	52	460	115	0	0
23	183	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	183	0	0	0
24	59	1419	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	1419	0	0
25	396	827	52	0	0	0	0	0	207	0	52	0	0	0	0	0	52	0	34	827	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	0	74	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
30	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0	0	0
31	789	57	0	16	0	0	0	0	112	0	0	0	0	41	0	0	41	0	636	0	0	0
32	322	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	119	0	199	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	1149	112	25	0	0	0	0	0	0	0	0	0	0	112	0	0	119	0	1005	0	0	0
Total	11238	11238	530	530	55	55	112	112	732	732	363	363	183	183	4	4	623	623	8636	8636	0	0

6.4 Mode Specific Trips during Morning Peak Period

Travel behaviour is performed by some kinds of modes. In the City of Piura, a variety of modes are identified, and they are actually in use. This situation is apparently somewhat different from the cases in developed countries where private automobiles arguably predominate the total travel behaviour as the primary mode. In this section, therefore, mode specific trips are analyzed with by focusing on the morning peak period between 6 and 9 a.m..

The analysis in this section is performed by the similar manner used in the Section 6.3. First, the estimated mode specific person trips are calculated and then analyzed. Second, OD matrixes and rough OD matrixes given from the expanded data are presented to find out the characteristics of mode specific travel movements in the city. Then, from the OD matrixes, origins and destinations are summarized. In addition, the Multiplication Factor PPL3 is also used for this mode specific analysis.

6.4.1 By Trip Type and Mode

In order to ease the data processing and to accommodate the further software requirements, the newly reclassified 5 major modes and 6 trip types are used for this analysis. The new five mode classification is converted from the original 8 mode classification, which is shown in Table 6-5. Those newly classified 5 modes are ① the sum of “driving a car” and “Passenger in a car” as the mode type (1), ② public transit 1, which represents Taxi Collectibos, as the mode type (2),③ public transit 2, which represents Combis and “school buses,” as the mode type (3), ④ walking as the mode type (4), and ⑤ the sum of “others” and “no indication” as the mode type (5).

The new 6 trip types are converted from the original 10 trip type classification, which is summarized in Table 6-3. They are ① “work” as the trip type (1), ② “personal business” and “shopping” as the trip type (2), ③ “school” as the trip type (3), ④ “social” and “recreation” as the trip type (4), ⑤ “home” as the trip type (5) and ⑥ “waiting for a ride”, “changing modes" and "no indication" as the trip type (6), which is called "others." The summary of those new classifications, five modes and six trip types, are presented at the bottom of Table 6-24.

Table 6-24 summarizes the results of the expanded trips based on the classification above. These trips are "mode specific" person trips. In the Figure 6-24, three types of trip categories are used. They are (1) total trips, (2) origin specified trips and (3) destination specified trips. The total estimated trip numbers for them are 116,016, 115,626 and 106,548 respectively. The decrease simply shows the existence of trip of which either the origin, the destination or both are not specified. As mentioned previously, "wanderers" such as taxi drivers are likely the responsible groups of people for this type of trips.

For the analysis in this section, however, the trip category (1), total estimated trips, which includes non-specific trips, is used as a primary target among the three. This is simply because even those non-origin or destination specified trips use some kind of mode, and affect the actual modal movement. In addition, for some reason, the number of the total estimated trips, 116,016, is a little different from the one used in the previous section, which was 115,992. This difference is, however, assumed as a minor one, and the estimated number of 116,016 is used as an effective expansion result for the analysis in this section.

In Table 6-24, three Tables, (a), (b) and (c), are presented for each trip category, (1), (2) and (3). The three tables summarize (a) the number of estimated trips, (b) the modal share based on each trip type and (c) the portion of trip types based on each specific mode respectively.

First, the modal share based on each trip type, which is shown in Table 6-24 (1)-(b), is focused. For the six trip types as total, Combis are the most frequently used mode with 66,439 or 57.3% of the total estimated trips of 116,016. The mode specific trips by "automobiles," which account for 21,222 or 18.3% of the total trips, and by "taxi Collectibos," which accounts for 14,203 or 12.2% of the total trips, follow the most frequent mode specific trips

Table 6-24 Summary of Mode Specific Trips and Modal Share (morning peak time period)

(1) Total Trips

(a) The Number of Trips (Type\Mode)

Tp\Md	1	2	3	4	5	Total
(1)	11842	8451	31237	1743	4645	57919
(2)	5554	2217	11301	211	808	20091
(3)	3182	1509	16602	2440	2715	26448
(4)	0	15	1725	87	0	1828
(5)	261	1263	1696	432	1020	4672
(6)	384	747	3877	0	51	5059
Total	21222	14203	66439	4914	9238	116016

Tp: Trip type, Md : Mode type

(b) Modal Share by Trip Types

Tp\Md	1	2	3	4	5	Total
(1)	20.4	14.6	53.9	3.0	8.0	100
(2)	27.6	11.0	56.2	1.0	4.0	100
(3)	12.0	5.7	62.8	9.2	10.3	100
(4)	0.0	0.8	94.4	4.8	0.0	100
(5)	5.6	27.0	36.3	9.2	21.8	100
(6)	7.6	14.8	76.6	0.0	1.0	100
Total	18.3	12.2	57.3	4.2	8.0	100

Tp: Trip type, Md : Mode type

(c) The Percentage of Trips (by Trip Type)

Tp\Md	1	2	3	4	5	Total
(1)	55.8	59.5	47.0	35.5	50.3	49.9
(2)	26.2	15.6	17.0	4.3	8.7	17.3
(3)	15.0	10.6	25.0	49.7	29.4	22.8
(4)	0.0	0.1	2.6	1.8	0.0	1.6
(5)	1.2	8.9	2.6	8.8	11.0	4.0
(6)	1.8	5.3	5.8	0.0	0.5	4.4
Total	100	100	100	100	100	100

Tp: Trip type, Md : Mode type

(2) Origin specified Trips

(a) The Number of Trips (Type\Mode)

Tp\Md	1	2	3	4	5	Total
(1)	11842	8451	31237	1743	4645	57919
(2)	5554	2022	11301	211	808	19895
(3)	3182	1509	16602	2440	2715	26448
(4)	0	15	1725	87	0	1828
(5)	261	1263	1696	237	1020	4477
(6)	384	747	3877	0	51	5059
Total	21222	14008	66439	4719	9238	115626

Tp: Trip type, Md : Mode type

(b) Modal Share by Trip Types

Tp\Md	1	2	3	4	5	Total
(1)	20.4	14.6	53.9	3.0	8.0	100
(2)	27.9	10.2	56.8	1.1	4.1	100
(3)	12.0	5.7	62.8	9.2	10.3	100
(4)	0.0	0.8	94.4	4.8	0.0	100
(5)	5.8	28.2	37.9	5.3	22.8	100
(6)	7.6	14.8	76.6	0.0	1.0	100
Total	18.4	12.1	57.5	4.1	8.0	100

Tp: Trip type, Md : Mode type

(c) The Percentage of Trips (by Trip Type)

Tp\Md	1	2	3	4	5	Total
(1)	55.8	60.3	47.0	36.9	50.3	50.1
(2)	26.2	14.4	17.0	4.5	8.7	17.2
(3)	15.0	10.8	25.0	51.7	29.4	22.9
(4)	0.0	0.1	2.6	1.9	0.0	1.6
(5)	1.2	9.0	2.6	5.0	11.0	3.9
(6)	1.8	5.3	5.8	0.0	0.5	4.4
Total	100	100	100	100	100	100

Tp: Trip type, Md : Mode type

(3) Destination specified Trips

(a) The Number of Trips (Type\Mode)

Tp\Md	1	2	3	4	5	Total
(1)	10661	5759	29483	1287	4645	51836
(2)	5554	2217	11255	211	808	20046
(3)	2766	1141	15011	2440	2298	23656
(4)	0	15	1176	87	0	1279
(5)	261	1263	1696	432	1020	4672
(6)	384	747	3877	0	51	5059
Total	19626	11143	62499	4458	8822	106548

Tp: Trip type, Md : Mode type

(b) Modal Share by Trip Types

Tp\Md	1	2	3	4	5	Total
(1)	20.6	11.1	56.9	2.5	9.0	100
(2)	27.7	11.1	56.1	1.1	4.0	100
(3)	11.7	4.8	63.5	10.3	9.7	100
(4)	0.0	1.2	92.0	6.8	0.0	100
(5)	5.6	27.0	36.3	9.2	21.8	100
(6)	7.6	14.8	76.6	0.0	1.0	100
Total	18.4	10.5	58.7	4.2	8.3	100

Tp: Trip type, Md : Mode type

(c) The Percentage of Trips (by Trip Type)

Tp\Md	1	2	3	4	5	Total
(1)	54.3	51.7	47.2	28.9	52.7	48.7
(2)	28.3	19.9	18.0	4.7	9.2	18.8
(3)	14.1	10.2	24.0	54.7	26.1	22.2
(4)	0.0	0.1	1.9	2.0	0.0	1.2
(5)	1.3	11.3	2.7	9.7	11.6	4.4
(6)	2.0	6.7	6.2	0.0	0.6	4.7
Total	100	100	100	100	100	100

Tp: Trip type, Md : Mode type

< Trip type >

T-No.	No.	description	T-No.	No.	description
(1)	1	Work	(4)	5	Recreation
(2)	2	Personal Business	(5)	9	Home
(2)	3	Shopping	(6)	7	Waiting for a ride
(3)	6	School	(6)	8	Changing modes
(4)	4	Social	(6)	10	No Indication

* T-No. : New trip type numbers used for mode specific analysis (1~6)

* No. : Old trip type numbers of original trip type classification (1~10)

< Mode >

No.	description	O-No.
1	Private Automobile	1, 2
2	Public Transit 1 (Collectibo)	3
3	Public Transit2 (Combi)	4, 5
4	Walking	7
5	Others (Mototaxis)	6, 8

* O-No. : Old mode numbers shown in Table 6-5 (1~8)

made by "Combis." These three motorized modes together are responsible for 87.8% of the total estimated trips while two primary public transportation modes, Combis and taxi Collectibos, account for 67.5% or approximately two third of the total trips.

Focusing on the trip type (1), "work" trips, which is the most frequent trip type and accounts for 57,919 or 49.9% of the total trips, 31,237 or 53.9% of this trips are made by Combis, followed by "private cars" trips, which account for 11,842 or 20.4% of the trip type, and trips by "taxi Collectibos", which account for 8,451 or 14.6% of the total "work" trips. The two public transit modes, Combis and Collectibos, together are responsible for 68.5% of "work" trips. This result is also applied to the ones of the other trip types.

For the second frequent "school" trips, which accounts for 26,448 trips of the total, the top three modes change. "Combis" are the primary mode with 16,602 or 62.8% of the total "school" trips, followed by "private cars," which account for 3,182 or 12.0%, and "others," which account for 2,715 or 10.3% of the total "school" trips. Interestingly, "walking" trips are the fourth frequent with the relatively high share of 9.2%. This high share of "walking" trips may be the results of that ① the majority of "school" trip makers are children who usually do not have many mode choice and that ② the travel distances for this trip type are often short enough to walk because of the apparently well-distributed locations of primary and secondary schools.

For "personal business" and "shopping" trips, the third frequent trip type with 20,091 trips, the three primary modes are Combis, private cars and Collectibos, all of which are motorized modes. These three modes are responsible for 11,301 or 56.2%, 5,554 or 27.6% and 2,217 or 11.0% of the total trips for this specific trip type respectively. The modal share of private cars is maximum for this trip type among the six trip types.

Other noticeable findings from this figure are:

① 94.4% of "social" and "recreation" trips are predominantly made by Combis, ② the modal share of "home" trips is unique with the share of only 36.3% by Combis, which is the smallest among the six trip types for the mode,

③ for "home" trips, the noticeable share is of "taxi Collectibos" by 27.0%, which is the highest for the mode, and the share of "others" by 21.8% is also highest for the mode, and

④ 91.4% of "non-indication" trips are made by the two primary public transit modes, Combis and taxi Collectibos.

Table 6-24 (1)-(c) shows mode specific share within each of the six trip types. Combis, which are the primary mode with the share of 57.3% of the total trips, are used for "work" trips at 47.0%, for "school" trips at 25.0%, and for "personal business" and "shopping" trips at 17.0%. While the use of Combis for "school" trip is a little higher than the average of the total trips, the mode specific share by Combis are close to the share structure of the total trips, which considers all of the five modes. This simply means Combis are regularly used for all of the six trip types.

The second most highly used mode is "private automobiles." This mode, which is responsible for 18.3% of the total trips, are used at 55.8% for "work" trips, at 26.2% for "personal business" and "shopping" trips and at 15.0% for "school" trips. The shares of "work" trips, 55.8%, and "personal business" and "shopping" trips, 26.2%, are higher than the average shares of 49.9% and 17.3% while the share of "school" trips, 15.0%, is much lower than the average share of 22.8%. This indicates that the majority of automobile users are non-students who usually work or do domestic works.

Another primary mode is "taxi Collectibos". This mode, which has the third highest share at 12.2%, has a similar share structure by trip types to "automobiles." The shares are at 59.5% for "work" trips, at 15.6% for "personal business" and "shopping" trips and at only 10.6% for "school" trips. This fact also indicates the similar situations to the trips by "automobiles." That is, the majority of taxi Collectibo users are workers, students do not use the mode much.

Another interesting fact for this mode is that this mode is often used for going back home trips at the share of 8.9%, which is much higher than the average of 4.0%.

In addition to the major modes above, 49.4% of “walking” trips are “school” trips, which is the top purpose for the mode use. The share, 49.4%, is much higher than the average share of 22.8%. For this characteristics, the previously mentioned reasons of the less mode choice and the shorter distance for the ”school” trips are likely applicable.

6.4.2 OD Matrix

The OD matrixes and rough OD matrixes, both of which are used for the previous analysis, are also presented as the second step of the mode specific analysis. All the matrixes in this section are based on the total estimated trips of 116,016, and those matrixes are calculated based on either trip types or specific modes.

Tables 6-25 (a) to (f) show OD matrixes of the trips by (a) “private automobile,” which accounts for 21,222 trips, (b) “taxi Collectibo,” which accounts for 14,203 trips, (c) “Combi,” which accounts for 66,439 trips, (d) “walking,” which accounts for 4,914 trips, (e) “other mode,” which accounts for 9,238 trips and (f) the total estimated trips, which is 116,016. The row and columns in the tables represent origins and destinations respectively. The previously used 34 traffic analysis zone system is also applied, and those extra zones, 31, 32, 33 and 34, represent the National University of Piura, the University of Piura, non origin or destination specified trips and other no indication trips respectively.

First of all, Table 6-25 (c) is explained. This OD matrix summarizes the movement by Combis, which is the most frequently used mode with 66,439 trips. While origins are well scattered all over the city with respect to the zone populations, the major destinations are limited at the central market attracting 16,162 trips, the city centre attracting 11,695 trips, the National University of Piura attracting 11,214 trips and North and Central Castilla attracting 7,672 trips. The primary reason for the large number of north Castilla bound trips of 14,805,

Table 6-25 (a) Mode Specific OD-matrix

Mode [1 : Private Automobile], Trip type (purpose to) [All : Total (1~6)], Time Period [1 : 6:00 am ~ 8:59 am]

# Zo	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	Total
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	89	0	0	89
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	38	0	0	76
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51	0	0	51	0	101
4	0	0	5	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	261	0	0	0	0	0	0	0	0	0	0	15	291
7	0	43	43	0	0	0	86	0	0	0	0	0	0	0	0	0	0	0	0	0	0	86	0	0	0	0	0	0	0	0	86	0	0	0	344
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	32	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64
10	207	519	0	0	0	519	104	0	0	0	0	0	0	0	0	207	0	0	0	0	104	0	0	207	0	0	0	0	0	0	0	104	0	104	2075
11	0	0	0	87	0	87	0	0	0	87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	87	350
12	0	118	0	0	0	471	236	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	825
13	228	228	0	0	228	0	457	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	228	457	0	228	2056
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	416	0	0	0	0	0	0	0	0	0	0	0	416	832
15	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
16	235	352	235	117	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117	0	117	0	0	0	0	0	0	0	0	0	0	0	1175
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	208	208	0	0	0	0	0	0	0	0	0	0	0	208	0	0	208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	831
21	173	346	0	693	0	0	0	0	0	173	0	0	0	0	0	0	0	0	0	0	0	346	0	0	0	0	0	0	0	0	0	693	0	173	2598
22	0	0	0	0	0	134	0	0	0	0	0	0	0	0	0	0	416	0	0	0	0	201	0	0	0	0	0	0	0	0	0	0	0	0	752
23	261	261	261	522	0	1044	261	0	0	0	0	0	0	0	0	0	0	0	0	0	0	261	261	0	0	0	0	0	0	0	0	0	0	522	3654
24	0	0	0	1019	0	3056	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1019	0	0	0	0	0	0	0	0	0	0	0	0	5093
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1105	1883	752	2646	260	5317	1182	0	0	261	0	0	0	0	0	415	416	0	208	0	221	2330	640	207	0	0	0	0	0	89	314	1380	51	1546	21222

M-Factors of Zones for Total Trip Estimation

Multiply Factors \ Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Ave.
Popul.-based 3 (PPL3)	18	38	51	5	157	15	43	392	32	104	87	118	228	416	1	117	144	195	389	208	173	67	261	1019	181	-	-	-	-	-	184

note: The M-factor for Zone 2 is estimated by taking average of ones for Zone 1 and 3

Table 6-25 (b) Mode Specific OD-matrix

Mode [2 : Public Transit 1 (Collectibo)] , Trip type (purpose to) [All : Total (1~6)] , Time Period [1 : 6:00 am ~ 8:59 am]

# Zo	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	Total
1	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
2	0	0	0	0	0	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	416	454
3	0	0	0	0	0	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	157	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	157
6	0	0	15	15	0	0	0	0	0	0	0	0	0	416	0	0	0	586	0	0	0	15	261	0	0	0	0	0	0	15	0	0	0	0	1324
7	0	0	0	0	0	129	0	0	0	86	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	215
8	0	392	0	0	0	392	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	784
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	118	0	0	0	354	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	471
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	416	0	0	0	416	0	0	416	0	0	0	0	0	0	0	416	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	416	2081
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	287	287	0	287	287	0	0	0	0	144	0	0	0	0	0	0	0	0	0	0	144	0	0	0	0	0	0	0	0	0	0	144	1581
18	0	391	0	195	0	781	195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	781	2344
19	0	208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	208
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	346	173	173	0	173	173	346	0	0	0	0	0	0	0	0	0	0	0	0	0	173	173	0	0	0	0	0	0	0	0	520	346	0	520	3117
22	0	0	0	0	0	67	67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	134
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	783	783
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	181	0	0	0	0	0	0	0	0	0	0	0	0	181
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	195
Tota	364	1698	476	655	173	2884	1000	0	416	86	0	144	0	416	0	0	416	586	0	0	173	369	405	0	0	0	0	0	0	15	520	346	0	3060	14203

M-Factors of Zones for Total Trip Estimation

Multiply Factors \ Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Ave.
Popul.-based 3 (PPL3)	18	38	51	5	157	15	43	392	32	104	87	118	228	416	1	117	144	195	389	208	173	67	261	1019	181	-	-	-	-	-	184

note: The M-factor for Zone 2 is estimated by taking average of ones for Zone 1 and 3

Table 6-25 (c) Mode Specific OD-matrix

Mode [3 : Public Transit2 (Combi)] , Trip type (purpose to) [All : Total (1~6)] , Time Period [1 : 6:00 am ~ 8:59 am]

# Zo	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	Total
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	115	76	0	0	0	0	0	0	0	0	0	38	0	0	0	38	0	0	0	0	0	0	0	0	0	0	0	0	0	267
3	0	0	0	0	0	268	101	0	0	0	87	0	0	0	0	0	51	0	0	0	51	0	0	0	0	0	0	0	0	0	228	0	0	0	786
4	0	0	0	16	0	5	16	0	0	5	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	62
5	0	157	157	0	685	314	157	0	314	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	157	0	0	157	2097
6	15	53	81	30	15	30	58	0	45	0	87	118	457	416	0	45	0	0	778	416	0	30	0	0	0	0	228	0	0	15	90	0	0	120	3129
7	18	0	0	86	43	86	0	0	0	0	87	0	0	0	0	0	0	0	0	0	43	86	43	0	0	0	0	0	0	87	215	86	0	43	924
8	0	1569	0	392	0	5098	0	392	0	392	0	0	0	0	0	0	0	0	0	0	0	784	392	0	0	0	0	0	0	784	392	0	0	392	10588
9	0	32	0	32	128	0	32	0	160	32	0	0	0	32	0	32	0	0	0	0	0	0	0	0	0	0	32	0	0	0	96	0	0	160	768
10	0	0	0	0	0	104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104	0	0	0	0	0	0	830	207	0	0	1245
11	175	0	87	0	0	175	262	87	0	87	0	0	0	0	0	87	0	0	0	0	87	0	0	0	0	0	0	0	0	0	87	0	0	0	1137
12	0	0	0	0	118	0	0	0	118	118	0	0	0	118	0	0	0	0	0	0	0	118	118	0	0	0	0	0	0	0	0	0	0	0	707
13	0	228	228	0	914	914	0	0	0	0	0	0	228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	457	0	228	3198
14	416	1249	0	0	416	1665	0	0	0	0	0	0	0	0	832	0	0	0	0	0	1665	416	0	0	0	0	0	0	0	0	0	0	0	832	7492
15	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
16	0	117	235	117	117	587	352	0	0	0	0	0	0	0	117	0	0	0	0	0	117	117	117	0	0	0	0	0	0	0	0	0	0	117	2115
17	144	287	0	144	0	431	0	0	144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144	0	0	144	1437
18	0	0	195	195	0	195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	391	977
19	389	0	0	0	0	3112	0	0	0	0	0	0	0	0	0	389	0	0	0	0	0	778	0	0	0	0	0	0	0	0	1167	0	0	389	6224
20	0	0	0	0	0	208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	208	416
21	173	173	0	0	0	173	346	0	0	0	0	0	0	0	173	0	0	0	0	0	866	173	0	0	0	0	0	0	0	0	1628	763	0	173	4642
22	0	0	0	0	67	134	67	0	0	67	0	0	0	0	0	0	67	0	0	0	0	67	67	0	0	0	0	0	261	0	67	0	0	403	1268
23	0	0	0	0	0	261	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	261
24	1019	0	0	2037	0	1019	0	0	64	0	0	0	0	0	1019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6111	0	0	0	11268
25	362	905	0	181	362	1267	0	0	0	0	0	0	0	0	0	0	0	0	0	0	724	1447	0	0	0	0	0	0	0	0	0	0	0	181	5428
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2710	4771	984	3230	2866	16162	1468	480	845	702	262	118	685	566	2142	559	156	0	778	416	3591	4018	738	104	0	0	260	0	261	887	11214	1528	0	3939	66439

M-Factors of Zones for Total Trip Estimation

Multiply Factors \ Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Ave.
Popul.-based 3 (PPL3)	18	38	51	5	157	15	43	392	32	104	87	118	228	416	1	117	144	195	389	208	173	67	261	1019	181	-	-	-	-	-	184

note: The M-factor for Zone 2 is estimated by taking average of ones for Zone 1 and 3

Table 6-25 (d) Mode Specific OD-matrix

Mode [4 : Walking], Trip type (purpose to) [All : Total (1~6)], Time Period [1 : 6:00 am ~ 8:59 am]

# Zo	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	Total
1	35	18	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71
2	0	76	0	76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	0	0	0	0	0	0	0	0	0	0	0	0	191
3	0	0	51	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51	0	0	0	0	0	0	0	0	0	0	0	0	0	152
4	5	5	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	241	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	241
7	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32
10	0	0	0	0	0	0	0	0	0	104	104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	207
11	0	0	0	0	0	0	87	0	0	0	350	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	437
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	228	0	0	457
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	117	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	389	389
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	67
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2037	0	0	0	0	0	0	0	0	0	0	0	2037
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	118
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	195
Total	84	99	168	145	0	241	87	5	32	104	453	118	228	0	0	0	0	339	0	0	89	0	2037	0	0	0	0	0	0	0	0	228	0	456	4914

M-Factors of Zones for Total Trip Estimation

Multiply Factors \ Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Ave.
Popul.-based 3 (PPL3)	18	38	51	5	157	15	43	392	32	104	87	118	228	416	1	117	144	195	389	208	173	67	261	1019	181	-	-	-	-	-	184

note: The M-factor for Zone 2 is estimated by taking average of ones for Zone 1 and 3

Table 6-25 (e) Mode Specific OD-matrix

Mode [5 : Others (Mototaxis)] , Trip type (purpose to) [All : Total (1~6)] , Time Period [1 : 6:00 am ~ 8:59 am]

# Zo	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	Total
1	0	35	0	18	0	18	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	71	0	0	177
2	38	0	0	38	0	0	0	0	0	0	0	0	0	0	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	0	153
3	0	0	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51
4	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	10
5	0	157	0	0	157	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	314	0	0	0	627
6	0	0	0	0	0	15	0	0	0	0	175	0	0	0	0	0	0	0	778	0	0	67	0	0	0	0	0	0	0	0	159	0	0	0	1194
7	0	0	0	0	0	43	0	0	0	0	87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	129	129	0	0	389
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	32	0	32	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96
10	0	0	0	0	0	0	0	0	0	0	104	0	104	0	0	0	0	0	0	0	104	0	0	0	0	0	0	0	0	0	104	207	0	0	622
11	0	0	0	0	0	87	87	0	0	0	0	0	87	0	0	0	0	0	0	0	87	0	0	0	0	0	0	0	0	0	0	0	0	0	350
12	0	0	0	118	0	118	118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	354
13	0	0	0	228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	457	0	0	0	0	0	0	0	0	0	0	228	0	0	914
14	0	0	0	0	0	416	416	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	416	1249
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	144	0	0	0	0	0	0	0	0	0	0	0	0	0	144	0	0	144	0	144	0	0	0	0	0	0	0	0	0	144	0	0	0	719
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	195
19	389	0	0	0	0	389	0	0	0	0	0	0	0	0	389	389	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1556
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	336	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	0	0	0	0	403
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	181	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	181
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	427	336	51	439	157	1635	622	0	32	0	366	0	191	0	445	728	0	0	922	0	792	85	0	0	0	0	0	0	5	67	849	674	0	416	9238

M-Factors of Zones for Total Trip Estimation

Multiply Factors \ Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Ave.
Popul.-based 3 (PPL3)	18	38	51	5	157	15	43	392	32	104	87	118	228	416	1	117	144	195	389	208	173	67	261	1019	181	-	-	-	-	-	184

note: The M-factor for Zone 2 is estimated by taking average of ones for Zone 1 and 3

Table 6-25 (f) Mode Specific OD-matrix

Mode [All : Total of Mode 1~5], Trip type (purpose to) [All : Total (1~6)], Time Period [1 : 6:00 am ~ 8:59 am]

# Zo	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	Total
1	53	53	0	35	0	18	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	159	0	0	354
2	38	76	0	115	0	153	76	0	0	0	0	0	0	0	38	0	38	0	0	0	76	0	0	0	0	0	0	0	0	38	0	76	0	416	1142
3	0	0	101	51	0	318	101	0	0	0	87	0	0	0	0	0	51	0	0	0	101	0	0	0	0	0	0	0	0	51	228	0	51	0	1140
4	5	5	5	21	0	10	21	5	0	5	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	16	0	0	103
5	0	314	157	157	842	314	157	0	314	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	470	0	0	157	2881
6	15	68	96	45	15	286	58	0	45	0	262	118	457	832	0	45	0	586	1556	416	0	112	522	0	0	0	228	0	0	30	249	0	0	136	6179
7	61	43	43	86	43	258	86	0	0	86	175	0	0	0	0	0	0	0	0	0	43	172	43	0	0	0	0	0	0	87	430	215	0	43	1915
8	0	1961	0	392	0	5490	0	392	0	392	0	0	0	0	0	0	0	0	0	0	0	784	392	0	0	0	0	0	0	784	392	0	0	392	11373
9	0	32	0	64	160	32	64	0	224	32	0	0	0	32	0	32	0	0	0	0	0	0	0	0	0	0	32	0	0	0	96	0	0	160	961
10	207	519	0	0	0	622	207	0	0	104	207	0	104	0	0	207	0	0	0	0	207	0	0	311	0	0	0	0	0	0	934	519	0	104	4254
11	175	0	87	87	0	350	437	87	0	175	350	0	87	0	0	87	0	0	0	0	175	0	0	0	0	0	0	0	0	0	87	0	0	87	2273
12	0	236	0	118	118	943	354	0	118	118	0	0	0	118	0	0	0	0	0	0	0	118	118	0	0	0	0	0	0	0	0	0	0	0	2357
13	228	457	228	228	1142	914	457	0	0	0	0	0	457	0	0	0	0	0	0	0	457	0	0	0	0	0	0	0	0	0	228	1370	0	457	6624
14	416	1665	0	0	416	2497	416	0	416	0	0	0	0	0	832	0	416	0	0	0	1665	832	0	0	0	0	0	0	0	0	0	0	0	2081	11654
15	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
16	235	470	587	235	117	587	352	0	0	0	0	0	0	0	117	0	0	0	0	0	235	117	235	0	0	0	0	0	0	0	0	0	0	117	3407
17	144	431	287	431	0	719	287	0	144	0	0	144	0	0	0	144	0	144	144	0	144	0	144	0	0	0	0	0	0	0	287	0	0	287	3881
18	0	391	195	391	0	977	195	0	0	0	0	0	0	0	0	195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1172	3517
19	778	208	0	0	0	3501	0	0	0	0	0	0	0	0	389	778	0	0	0	0	0	778	0	0	0	0	0	0	0	0	1167	0	0	778	8377
20	0	0	208	208	0	208	0	0	0	0	0	0	0	0	0	208	0	0	208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	208	1247
21	693	693	173	693	173	346	693	0	0	173	0	0	0	0	173	0	0	0	0	0	1039	693	0	0	0	0	0	0	0	0	2148	1802	0	866	10357
22	0	0	0	0	67	671	134	0	0	67	0	0	0	0	0	0	483	0	0	0	0	268	67	0	0	0	0	0	261	67	67	0	0	470	2624
23	261	261	261	522	0	1305	261	0	0	0	0	0	0	0	0	0	0	0	0	0	0	261	261	0	0	0	0	0	0	0	0	0	0	1305	4698
24	1019	0	0	3056	0	4074	0	0	64	0	0	0	0	0	1019	0	0	0	0	0	0	1019	2037	0	0	0	0	0	0	0	6111	0	0	0	18398
25	362	905	0	181	362	1447	0	0	0	0	0	0	0	0	0	0	0	0	0	0	724	1628	0	0	0	0	0	0	0	0	0	0	0	181	5790
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	118
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	195	0	0	0	0	0	0	0	0	0	0	0	195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	391
Total	4690	8787	2430	7115	3456	26239	4359	485	1325	1152	1082	379	1105	982	2587	1702	988	925	1908	416	4866	6801	3819	311	0	0	260	0	266	1058	12897	4157	51	9418	116016

M-Factors of Zones for Total Trip Estimation

Multiply Factors \ Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Ave.
Popul.-based 3 (PPL3)	18	38	51	5	157	15	43	392	32	104	87	118	228	416	1	117	144	195	389	208	173	67	261	1019	181	-	-	-	-	-	184

note: The M-factor for Zone 2 is estimated by taking average of ones for Zone 1 and 3

which head for either the National University of Piura or north Castilla, is that most of the Combis' routes or terminals are in this area and there is another independent popular destination, the regional hospital, which is the biggest in the city.

From Table 6-25 (a), which shows mode specific trips by "automobiles," the second frequent mode, the main destination is the city centre with 6,386 trips, followed by the central market with 5,317 trips. Then, the third largest destination is central Castilla with 2,330 trips. The major origins of automobile trips are the traffic analysis zones, 10, 13, 16, 21, 23 and 24, most of which has large populations and high social status.

Other Tables of 6-25 (b), (d) and (e) basically show same results. That is, the major origins are traffic analysis zones which has large population, and the major destinations are the city central traffic analysis zones, 1 to 4, the central market, which is the traffic analysis zone 6, and north Castilla, which is the traffic analysis zone 21 and 31. In addition, the results shown in Table 6-25 (f) is similar to Table 6-20 (c) particularly the numbers for shares. This is because both of these matrixes, which summarize the morning peak OD movements, are derived from the same trip structure for the peak time.

6.4.3 Rough OD Matrix

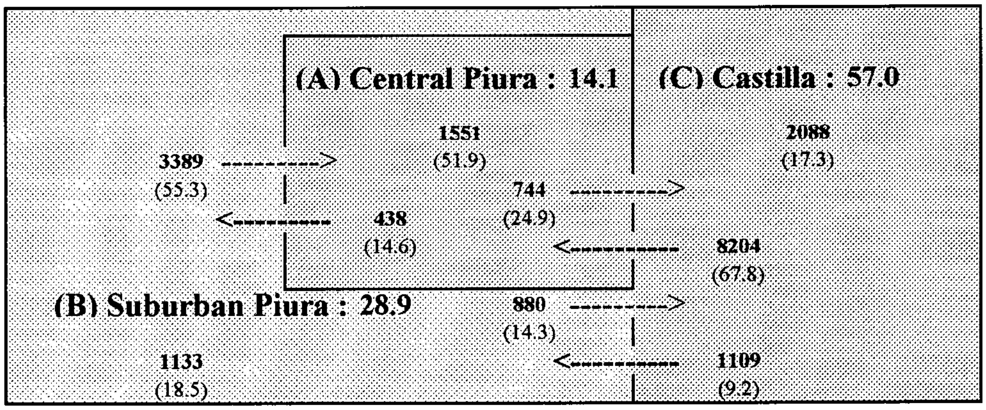
Similarly to the previous analysis, "rough OD matrixes" are further created for this analysis in order to visualize the approximate modal movement within the city. Tables 6-26 (a) to (f) show the "rough OD matrixes" of (a) private automobile, which accounts for 21,222 trips, (b) taxi Collectibo, which accounts for 14,203 trips, (c) Combi, which accounts for 66,439 trips, (d) walking, which accounts for 4,914 trips, (e) other mode, which accounts for 9,238 trips and (f) the total estimated trips, which is 116,016 respectively. Then, Figure 6-6 (a) to (f), which are shown under Table 6-26 (a) to (f) respectively, visualize the approximate travel movements according to the corresponding tables.

Table 6-26 (a) Mode Specific Rough OD-Matrix

Trip Type (T-model2)	[All	: Total (1~6)]
Time Period	[1	: 6:00 am ~ 8:59 am]
Mode	[**1**	**: Private Automobile**]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	**A**	(4)	(5)	(6)	(7)	**B**	(8)	(9)	(10)	**C**	(11)	(12)	**D**	
(1)	5	5	5	**16**	127	0	0	0	**127**	0	0	0	**0**	89	51	**139**	282
(2)	15	0	0	**15**	0	0	0	0	**0**	0	0	261	**261**	0	15	**15**	291
(3)	812	519	190	**1521**	104	0	0	207	**311**	190	86	207	**483**	0	104	**104**	2419
A	**833**	**524**	**195**	**1551**	**231**	**0**	**0**	**207**	**438**	**190**	**86**	**469**	**744**	**89**	**169**	**258**	**2992**
(4)	457	0	457	**914**	685	0	0	0	**685**	228	416	0	**645**	0	645	**645**	2888
(5)	205	559	323	**1087**	0	0	0	0	**0**	0	0	0	**0**	0	87	**87**	1175
(6)	0	0	33	**33**	32	0	0	0	**32**	0	0	0	**0**	0	0	**0**	65
(7)	1356	0	0	**1356**	0	0	0	416	**416**	117	0	117	**235**	0	0	**0**	2006
B	**2018**	**559**	**813**	**3389**	**717**	**0**	**0**	**416**	**1133**	**346**	**416**	**117**	**880**	**0**	**732**	**732**	**6134**
(8)	1212	0	173	**1385**	693	0	0	0	**693**	0	346	0	**346**	0	173	**173**	2598
(9)	0	134	0	**134**	0	0	0	416	**416**	0	201	0	**201**	0	0	**0**	752
(10)	2324	4100	261	**6684**	0	0	0	0	**0**	0	1280	261	**1541**	0	522	**522**	8747
C	**3536**	**4234**	**434**	**8204**	**693**	**0**	**0**	**416**	**1109**	**0**	**1827**	**261**	**2088**	**0**	**695**	**695**	**12096**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
D	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total	6386	5317	1442	**13145**	1640	0	0	1039	**2680**	536	2330	847	**3712**	89	1597	**1685**	**21222**

Figure 6-6 (a) Rough Movement of Mode Specific Trips



Total Trips (Trips from and to Area D included) **21222**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

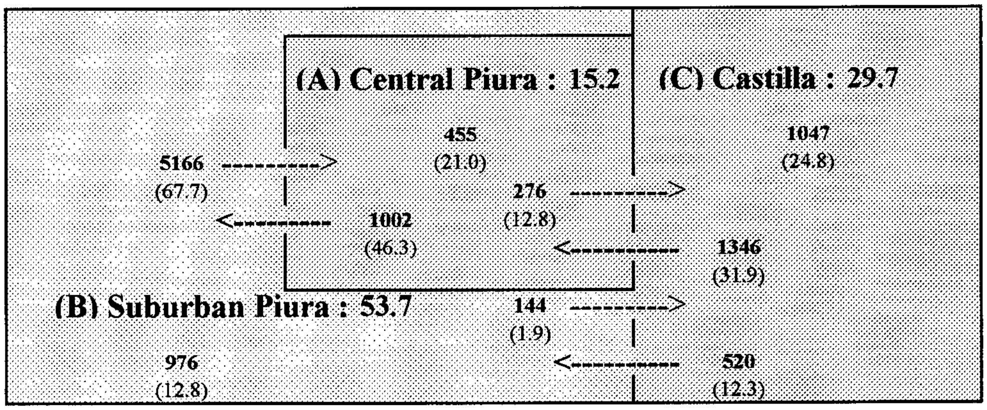
Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A	(1) City Centre	1,2,3,4	C	(8) North Castilla	21,25,(31)
Central	(2) Market	6	Castilla	(9) Central Castilla	22
Piura	(3) Central Piura	7,10		(10) South Castilla	23,24
	(4) North Piura	5,13,14,(32)		(11) Externals	26,27,28,29,30
B	(5) South Piura	8,11,12	D	(12) No destination	33
Suburban	(6) Industrial Area	9,15	Else	(12) No indication	34
Piura	(7) West Piura	16,17,18,19,20			

Table 6-26 (b) Mode Specific Rough OD-Matrix

Trip Type (T-model2) [All : Total (1~6)]
Time Period [1 : 6:00 am ~ 8:59 am]
Mode [**2 : Public Transit 1 (Collectibo)**]

\ To From \	Central Piura (1)	(2)	(3)	Sub-T **A**	Suburban Piura (4)	(5)	(6)	(7)	Sub-T **B**	Castilla (8)	(9)	(10)	Sub-T **C**	others (11)	(12)	Sub-T **D**	Total
(1)	18	89	0	**106**	0	0	0	0	**0**	0	0	0	**0**	0	416	**416**	523
(2)	30	0	0	**30**	416	0	0	586	**1002**	0	15	261	**276**	15	0	**15**	1324
(3)	0	129	190	**319**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	319
A	**48**	**218**	**190**	**455**	**416**	**0**	**0**	**586**	**1002**	**0**	**15**	**261**	**276**	**15**	**416**	**431**	**2165**
(4)	573	416	0	**989**	0	0	416	416	**832**	0	0	0	**0**	0	416	**416**	2238
(5)	510	746	0	**1256**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	1256
(6)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(7)	1369	1069	483	**2921**	0	144	0	0	**144**	0	0	144	**144**	0	925	**925**	4133
B	**2452**	**2231**	**483**	**5166**	**0**	**144**	**416**	**416**	**976**	**0**	**0**	**144**	**144**	**0**	**1341**	**1341**	**7627**
(8)	693	173	346	**1212**	520	0	0	0	**520**	693	354	0	**1047**	0	520	**520**	3298
(9)	0	67	67	**134**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	134
(10)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	783	**783**	783
C	**693**	**240**	**413**	**1346**	**520**	**0**	**0**	**0**	**520**	**693**	**354**	**0**	**1047**	**0**	**1303**	**1303**	**4215**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	195	0	**195**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	195
D	**0**	**195**	**0**	**195**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**195**
Total	3192	2884	1086	**7163**	936	144	416	1002	**2498**	693	369	405	**1467**	15	3060	**3075**	**14203**

Figure 6-6 (b) Rough Movement of Mode Specific Trips



Total Trips (Trips from and to Area D included) **14203**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

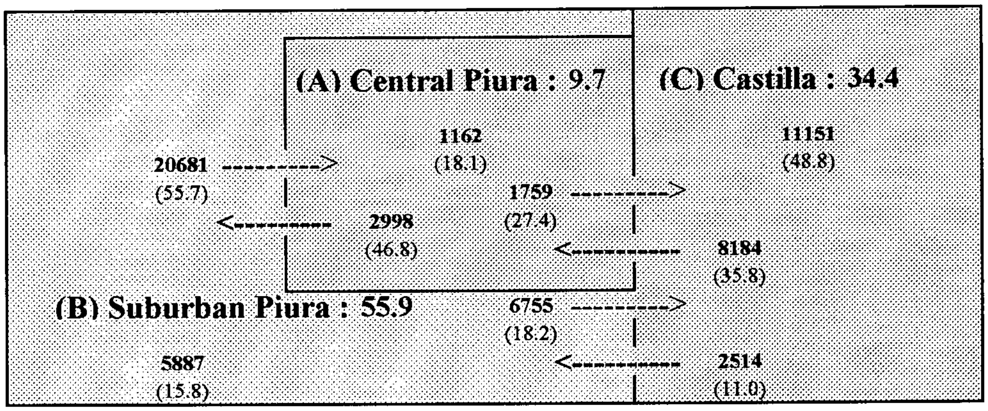
Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A	(1) City Centre	1,2,3,4	C	(8) North Castilla	21,25,(31)
Central	(2) Market	6	Castilla	(9) Central Castilla	22
Piura	(3) Central Piura	7,10		(10) South Castilla	23,24
	(4) North Piura	5,13,14,(32)		(11) Externals	26,27,28,29,30
B	(5) South Piura	8,11,12	D	(12) No destination	33
Suburban	(6) Industrial Area	9,15	Else	(12) No indication	34
Piura	(7) West Piura	16,17,18,19,20			

Table 6-26 (c) Mode Specific Rough OD-Matrix

Trip Type (T-model2) [All : Total (1~6)]
Time Period [1 : 6:00 am ~ 8:59 am]
Mode [**3 : Public Transit2 (Combi)**]

\ To From \	Central Piura (1)	(2)	(3)	Sub-T A	Suburban Piura (4)	(5)	(6)	(7)	Sub-T B	Castilla (8)	(9)	(10)	Sub-T C	others (11)	(12)	Sub-T D	Total
(1)	16	388	198	**601**	16	87	0	94	**197**	317	0	0	**317**	0	0	**0**	1115
(2)	179	30	58	**267**	888	205	45	1239	**2377**	90	30	0	**120**	243	120	**364**	3129
(3)	104	190	0	**294**	337	87	0	0	**424**	1088	86	147	**1321**	87	43	**130**	2169
A	**298**	**608**	**256**	**1162**	**1240**	**380**	**45**	**1333**	**2998**	**1496**	**116**	**147**	**1759**	**331**	**163**	**494**	**6413**
(4)	2435	2892	157	**5484**	2700	0	1146	0	**3846**	1822	416	0	**2238**	0	1218	**1218**	12786
(5)	2223	5273	860	**8356**	236	480	118	87	**921**	567	902	510	**1979**	784	392	**1176**	12432
(6)	64	2	64	**130**	160	0	160	32	**352**	96	0	0	**96**	32	160	**192**	770
(7)	1825	4534	352	**6711**	117	0	261	389	**768**	1428	896	117	**2441**	0	1249	**1249**	11169
B	**6547**	**12701**	**1433**	**20681**	**3214**	**480**	**1685**	**508**	**5887**	**3913**	**2214**	**628**	**6755**	**816**	**3019**	**3835**	**37158**
(8)	1794	1440	346	**3580**	1124	0	173	0	**1298**	3218	1621	0	**4839**	0	354	**354**	10070
(9)	0	134	134	**268**	67	0	0	67	**134**	67	67	67	**201**	261	403	**664**	1268
(10)	3056	1280	0	**4335**	0	0	1083	0	**1083**	6111	0	0	**6111**	0	0	**0**	11529
C	**4849**	**2853**	**481**	**8184**	**1192**	**0**	**1256**	**67**	**2514**	**9396**	**1688**	**67**	**11151**	**261**	**757**	**1018**	**22867**
(11)	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**	0	0	**0**	0
(12)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
D	**0**	**0**	**0**	0	**0**	**0**	**0**	**0**	0	**0**	**0**	**0**	0	**0**	**0**	0	0
Total	11695	16162	2170	**30027**	5645	860	2986	1908	**11400**	14805	4018	841	**19664**	1408	3939	**5347**	**66439**

Figure 6-6 (c) Rough Movement of Mode Specific Trips



Total Trips (Trips from and to Area D included) **66439**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

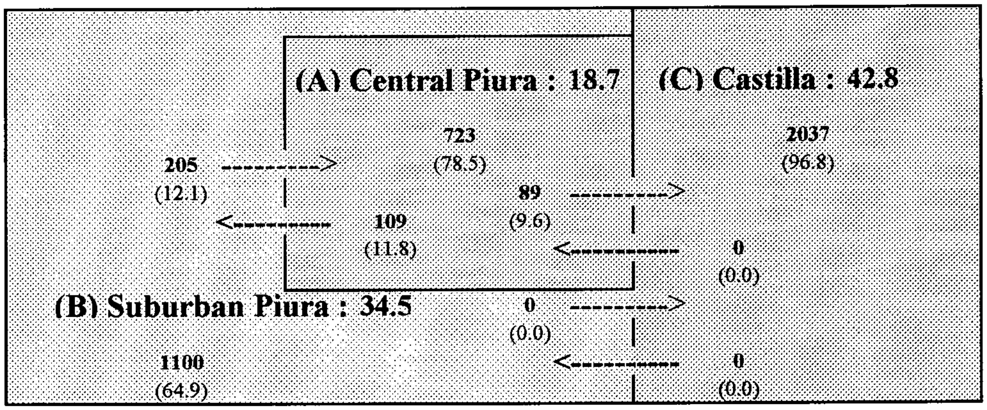
Area	Area Zones (AZ)		Traffic Zones	Area	Area Zones (AZ)		Traffic Zones
A	(1)	City Centre	1,2,3,4	C	(8)	North Castilla	21,25,(31)
Central	(2)	Market	6	Castilla	(9)	Central Castilla	22
Piura	(3)	Central Piura	7,10		(10)	South Castilla	23,24
	(4)	North Piura	5,13,14,(32)		(11)	Externals	26,27,28,29,30
B	(5)	South Piura	8,11,12	D	(12)	No destination	33
Suburban	(6)	Industrial Area	9,15	Else	(12)	No indication	34
Piura	(7)	West Piura	16,17,18,19,20				

Table 6-26 (d) Mode Specific Rough OD-Matrix

Trip Type (T-model2)	[All	: Total (1~6)]
Time Period	[1	: 6:00 am ~ 8:59 am]
Mode	[**4**	**: Walking**]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	A	(4)	(5)	(6)	(7)	B	(8)	(9)	(10)	C	(11)	(12)	D	
(1)	335	0	0	335	0	5	0	0	5	89	0	0	89	0	0	0	429
(2)	0	241	0	241	0	0	0	0	0	0	0	0	0	0	0	0	241
(3)	43	0	104	147	0	104	0	0	104	0	0	0	0	0	0	0	251
A	**378**	**241**	**104**	**723**	**0**	**109**	**0**	**0**	**109**	**89**	**0**	**0**	**89**	**0**	**0**	**0**	**920**
(4)	0	0	0	0	457	118	0	0	575	0	0	0	0	0	0	0	575
(5)	0	0	87	87	0	350	0	0	350	0	0	0	0	0	0	0	437
(6)	0	0	0	0	0	0	32	0	32	0	0	0	0	0	0	0	32
(7)	117	0	0	117	0	0	0	144	144	0	0	0	0	0	389	389	650
B	**117**	**0**	**87**	**205**	**457**	**468**	**32**	**144**	**1100**	**0**	**0**	**0**	**0**	**0**	**389**	**389**	**1694**
(8)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(9)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	67	67
(10)	0	0	0	0	0	0	0	0	0	0	0	2037	2037	0	0	0	2037
C	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2037**	**2037**	**0**	**67**	**67**	**2104**
(11)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(12)	0	0	0	0	0	0	0	195	195	0	0	0	0	0	0	0	195
D	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**195**	**195**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**195**
Total	496	241	191	928	457	577	32	339	1404	89	0	2037	2126	0	456	456	4914

Figure 6-6 (d) Rough Movement of Mode Specific Trips



Total Trips (Trips from and to Area D included) **4914**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

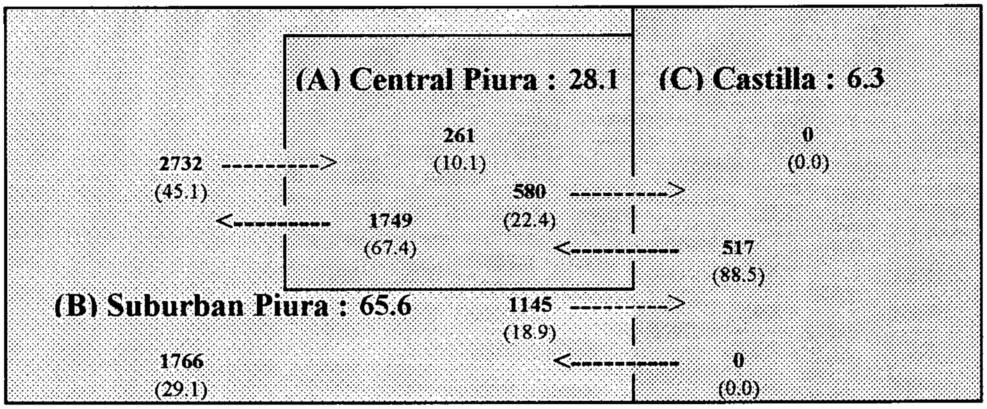
Area	Area Zones (AZ)		Traffic Zones	Area	Area Zones (AZ)		Traffic Zones
A	(1)	City Centre	1,2,3,4	C	(8)	North Castilla	21,25,(31)
Central	(2)	Market	6	Castilla	(9)	Central Castilla	22
Piura	(3)	Central Piura	7,10		(10)	South Castilla	23,24
	(4)	North Piura	5,13,14,(32)		(11)	Externals	26,27,28,29,30
B	(5)	South Piura	8,11,12	D	(12)	No destination	33
Suburban	(6)	Industrial Area	9,15	Else	(12)	No indication	34
Piura	(7)	West Piura	16,17,18,19,20				

Table 6-26 (e) Mode Specific Rough OD-Matrix

Trip Type (T-model2)	[All	: Total (1~6)	]
Time Period	[1	: 6:00 am ~ 8:59 am	]
Mode	[**5**	**: Others (Mototaxis)**	]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	A	(4)	(5)	(6)	(7)	B	(8)	(9)	(10)	C	(11)	(12)	D	
(1)	185	18	0	**203**	109	0	56	0	**165**	0	18	0	**18**	5	0	**5**	391
(2)	0	15	0	**15**	0	175	0	778	**953**	159	67	0	**226**	0	0	**0**	1194
(3)	0	43	0	**43**	440	191	0	0	**632**	337	0	0	**337**	0	0	**0**	1011
A	**185**	**76**	**0**	**261**	**549**	**366**	**56**	**778**	**1749**	**495**	**85**	**0**	**580**	**5**	**0**	**5**	**2596**
(4)	385	416	416	**1218**	385	0	0	0	**385**	770	0	0	**770**	0	416	**416**	2790
(5)	118	205	205	**528**	87	0	0	0	**87**	87	0	0	**87**	0	0	**0**	703
(6)	32	32	0	**64**	0	0	32	0	**32**	0	0	0	**0**	0	0	**0**	96
(7)	533	389	0	**922**	0	0	389	872	**1261**	287	0	0	**287**	0	0	**0**	2470
B	**1068**	**1043**	**622**	**2732**	**473**	**0**	**421**	**872**	**1766**	**1145**	**0**	**0**	**1145**	**0**	**416**	**416**	**6059**
(8)	0	181	0	**181**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	181
(9)	0	336	0	**336**	0	0	0	0	**0**	0	0	0	**0**	67	0	**67**	403
(10)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
C	**0**	**517**	**0**	**517**	**0**	**0**	**0**	**0**	0	**0**	**0**	**0**	0	**67**	**0**	**67**	**584**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
D	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total	1253	1635	622	**3509**	1022	366	477	1650	**3515**	1641	85	0	**1726**	72	416	**489**	**9238**

Figure 6-6 (e) Rough Movement of Mode Specific Trips



Total Trips (Trips from and to Area D included) **9238**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

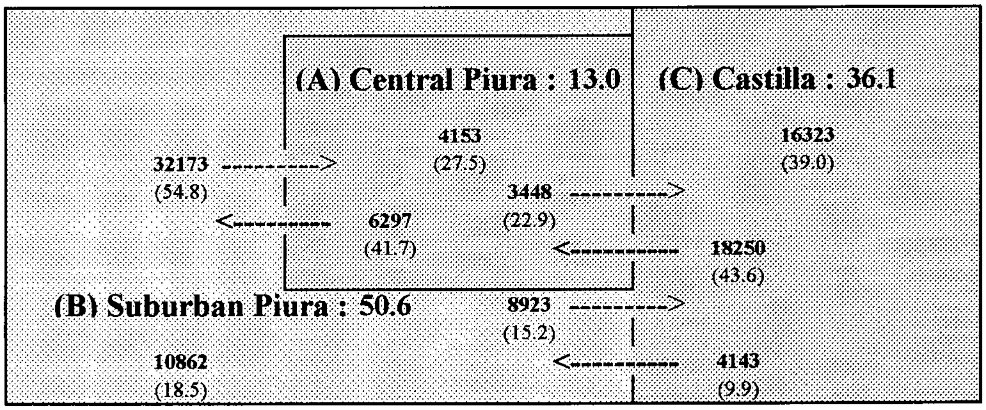
Area	Area Zones (AZ)		Traffic Zones	Area	Area Zones (AZ)		Traffic Zones
A Central Piura	(1)	City Centre	1,2,3,4	C Castilla	(8)	North Castilla	21,25,(31)
	(2)	Market	6		(9)	Central Castilla	22
	(3)	Central Piura	7,10		(10)	South Castilla	23,24
B Suburban Piura	(4)	North Piura	5,13,14,(32)	D Else	(11)	Externals	26,27,28,29,30
	(5)	South Piura	8,11,12		(12)	No destination	33
	(6)	Industrial Area	9,15		(12)	No indication	34
	(7)	West Piura	16,17,18,19,20				

Table 6-26 (f) Mode Specific Rough OD-Matrix

Trip Type (T-model2)	[All	: Total (1~6)	]
Time Period	[1	: 6:00 am ~ 8:59 am	]
Mode	[6	: Total (mode 1~5)	]

\ To From \	Central Piura (1)	(2)	(3)	Sub-T A	Suburban Piura (4)	(5)	(6)	(7)	Sub-T B	Castilla (8)	(9)	(10)	Sub-T C	others (11)	(12)	Sub-T D	Total
(1)	559	499	203	**1261**	251	93	56	94	**494**	406	18	0	**424**	94	467	**561**	2739
(2)	224	286	58	**568**	1304	380	45	2603	**4333**	249	112	522	**883**	259	136	**394**	6179
(3)	959	881	483	**2323**	881	382	0	207	**1471**	1615	172	354	**2141**	87	147	**234**	6169
A	**1742**	**1666**	**745**	**4153**	**2436**	**855**	**101**	**2904**	**6297**	**2270**	**302**	**876**	**3448**	**440**	**749**	**1189**	**15087**
(4)	3850	3725	1030	**8605**	4227	118	1562	416	**6324**	2821	832	0	**3653**	0	2695	**2695**	21277
(5)	3056	6783	1476	**11315**	323	829	118	87	**1358**	654	902	510	**2067**	784	480	**1264**	16003
(6)	96	34	97	**227**	192	0	224	32	**448**	96	0	0	**96**	32	160	**192**	964
(7)	5199	5992	835	**12027**	117	144	650	1820	**2732**	1833	896	379	**3107**	0	2563	**2563**	20429
B	**12202**	**16533**	**3438**	**32173**	**4860**	**1091**	**2555**	**2356**	**10862**	**5404**	**2630**	**889**	**8923**	**816**	**5898**	**6714**	**58672**
(8)	3699	1794	866	**6358**	2337	0	173	0	**2510**	3911	2321	0	**6232**	0	1047	**1047**	16147
(9)	0	671	201	**873**	67	0	0	483	**550**	67	268	67	**403**	328	470	**798**	2624
(10)	5379	5379	261	**11020**	0	0	1083	0	**1083**	6111	1280	2298	**9689**	0	1305	**1305**	23096
C	**9078**	**7844**	**1328**	**18250**	**2404**	**0**	**1256**	**483**	**4143**	**10089**	**3869**	**2365**	**16323**	**328**	**2822**	**3150**	**41867**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	195	0	**195**	0	0	0	195	**195**	0	0	0	**0**	0	0	**0**	391
D	**0**	**195**	**0**	**195**	**0**	**0**	**0**	**195**	**195**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**391**
Total	23022	26239	5511	**54772**	9700	1946	3911	5939	**21497**	17763	6801	4130	**28695**	1584	9468	**11053**	**116016**

Figure 6-6 (f) Rough Movement of Mode Specific Trips



Total Trips (Trips from and to Area D included) **116016**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A	(1) City Centre	1,2,3,4	C	(8) North Castilla	21,25,(31)
Central	(2) Market	6	Castilla	(9) Central Castilla	22
Piura	(3) Central Piura	7,10		(10) South Castilla	23,24
	(4) North Piura	5,13,14,(32)		(11) Externals	26,27,28,29,30
B	(5) South Piura	8,11,12	D	(12) No destination	33
Suburban	(6) Industrial Area	9,15	Else	(12) No indication	34
Piura	(7) West Piura	16,17,18,19,20			

The previously defined 4 traffic areas and 13 traffic area zones are also used for the mode specific rough OD matrixes. As mentioned, traffic areas are larger than traffic area zones, and the traffic area zones are larger than the traffic analysis zones. The relationships of those traffic areas, traffic area zones and traffic analysis zones are shown at the bottom of each data sheets of the rough OD matrixes.

Table 6-26 (c) shows the travel movement by the primary mode, Combis. This table has a similar ratio structure to the one for the total movement, which is made by all modes, shown in Table 6-26 (f). This fact indicates that the primary mode, Combi, is used evenly all over the city during the morning peak and, at the same time, the use of them is influential to the total travel behaviour of the city. The major differences of travel structures between the two figures are:

① the portion of "Combi" trips generated in Central Piura, which accounts for 9.7% of the total, is smaller than the ones of the total modes, which is 13.0%. This indicates that people who live in Central Piura use Combis less than those who live outside of the area.

② 55.9% of "Combi" trips are generated in Suburban Piura while Suburban Piura are responsible for 50.6% of the total trips. This fact indicates that the Combis are used more by those who live in Suburban Piura likely because of the longer travel distances.

The travel movement by "private automobiles," which is shown in Table 6-26 (a), is also basically similar to the total movement of Table 6-26 (f). In this Table 6-26 (a), however, the share of Castilla generated automobile trips, which is 57.0% of the total trips, is much larger than the share of the total modes, which is 36.1% as shown in Table 6-26 (f). The trips generated in Suburban Piura, on the other hand, has a much smaller share at 28.9% than 50.6% of the total by a big margin. This fact indicates that people in Castilla use automobiles more frequently than people in Piura, and people in Suburban Piura much less frequently use the mode than people who live in other parts of Piura.

Another interesting fact from this Table 6-26 (a) is that 67.3% of the Castilla generated automobile trips head for Central Piura while "intra-areal" trips account for only 17.3%. These numbers are much different from 43.6% and 39.0% of the total movement by all modes respectively. This fact indicates that the major destination of the automobile users in Castilla is Central Piura.

Other major findings from these matrixes are:

① the share of walking trips generated in Central Piura, which is 18.7%, is larger than 13.0% of total movements. This is likely the result of shorter travel distance to the major activity centres,

② the share of "intra-areal" trips for walking trips in all three areas are large with 78.5% in Central Piura, 64.9% in Suburban Piura and 96.8% in Castilla mainly because of the short travel distances,

③ "taxi Collectibos" have the most similar share structure to the total travel movement among the five specific mode types, and

④ "others" are frequently used in the Piura by 93.7%, which is the sum of 28.1% and 65.6% of the trips generated in Central Piura and Suburban Piura respectively.

6.4.4 Origin and Destination

Mode specific origins and destinations are summarized in Table 6-27, 6-28 and 6-29. Table 6-27 summarizes the mode specific origins and destinations based on the 34 traffic analysis zone system by 6 trip types. Table 6-28 transforms the results of Table 6-27 to the 30 zone system. The major difference between the two Tables is that non-specific trips, which are represented as the traffic analysis zones, 33 and 34, are not included in Table 6-28 or the 30 traffic analysis zone system. The universities, which are represented as the traffic analysis zone 31 and 32, are summed up to their original traffic analysis zones of 21 and 13 respectively. Then, Table 6-29 rearranges the mode specific origins and destinations of 30

Table 6-27 (1) The Numbers of Mode Specific Trips: Origin and Destination by Trip Type (34 zones)

(a) Mode Type [1 : Private Automobile] , Time Period [1 : 6:00 am ~ 8:59 am]

\Type	Total		(1)		(2)		(3)		(4)		(5)		(6)	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	89	1105	89	637	0	0	0	469	0	0	0	0	0	0
2	76	1883	76	1548	0	231	0	104	0	0	0	0	0	0
3	101	752	101	491	0	0	0	261	0	0	0	0	0	0
4	16	2646	5	2559	5	87	0	0	0	0	0	0	5	0
5	0	260	0	260	0	0	0	0	0	0	0	0	0	0
6	291	5317	15	1462	15	3732	0	0	0	0	261	0	0	123
7	344	1182	215	801	86	277	43	104	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	64	0	64	0	0	0	0	0	0	0	0	0	0	0
10	2075	261	1245	261	311	0	519	0	0	0	0	0	0	0
11	350	0	175	0	175	0	0	0	0	0	0	0	0	0
12	825	0	589	0	118	0	0	0	0	0	0	0	118	0
13	2056	0	1370	0	228	0	457	0	0	0	0	0	0	0
14	832	0	0	0	0	0	832	0	0	0	0	0	0	0
15	1	0	1	0	0	0	0	0	0	0	0	0	0	0
16	1175	415	1175	415	0	0	0	0	0	0	0	0	0	0
17	0	416	0	416	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	208	0	0	0	208	0	0	0	0	0	0	0	0
20	831	0	623	0	208	0	0	0	0	0	0	0	0	0
21	2598	221	2078	221	173	0	346	0	0	0	0	0	0	0
22	752	2330	416	432	134	1019	201	618	0	0	0	0	0	261
23	3654	640	1566	117	1044	0	783	261	0	0	0	261	261	0
24	5093	207	2037	207	3056	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	89	0	89	0	0	0	0	0	0	0	0	0	0
31	0	314	0	271	0	0	0	43	0	0	0	0	0	0
32	0	1380	0	473	0	0	0	907	0	0	0	0	0	0
33	0	51	0	51	0	0	0	0	0	0	0	0	0	0
34	0	1546	0	1130	0	0	0	416	0	0	0	0	0	0
Total	21222	21222	11842	11842	5554	5554	3182	3182	0	0	261	261	384	384

< Trip type >

1 (1) : Work
2 (2) : Personal Business
3 (2) : Shopping
4 (4) : Social
5 (4) : Recreation
6 (3) : School
7 (6) : Waiting for a ride
8 (6) : Changing modes
9 (5) : Home
10 (6) : No Indication

* Note: The numbers in ( ) represent new trip type numbers used in this table.

< Mode >

1 : Private Automobile
2 : Public Transit 1 (Collectibo)
3 : Public Transit2 (Combi)
4 : Walking
5 : Others (Mototaxis)

< Zones >

1~25 : Internal Zones
26~30 : External Zones
31 : National University of Piura
32 : University of Piura
33 : No Destination
34 : No Indication

(b) Mode Type [2 : Public Transit 1 (Collectibo)] , Time Period [1 : 6:00 am ~ 8:59 am]

\Type	Total		(1)		(2)		(3)		(4)		(5)		(6)	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	18	364	18	191	0	0	0	173	0	0	0	0	0	0
2	454	1698	454	1074	0	0	0	208	0	0	0	0	0	416
3	51	476	51	461	0	15	0	0	0	0	0	0	0	0
4	0	655	0	496	0	144	0	0	0	15	0	0	0	0
5	157	173	157	173	0	0	0	0	0	0	0	0	0	0
6	1324	2884	15	798	30	2044	0	0	15	0	1263	0	0	43
7	215	1000	86	645	86	0	0	67	0	0	0	0	43	287
8	784	0	784	0	0	0	0	0	0	0	0	0	0	0
9	0	416	0	416	0	0	0	0	0	0	0	0	0	0
10	104	86	104	86	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	471	144	118	144	354	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	2081	416	1249	0	416	0	0	0	0	0	0	416	416	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	1581	416	1006	416	287	0	0	0	0	0	0	0	287	0
18	2344	586	1368	0	781	0	195	0	0	0	0	586	0	0
19	208	0	0	0	0	0	208	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	3117	173	2078	173	0	0	1039	0	0	0	0	0	0	0
22	134	369	0	369	67	0	67	0	0	0	0	0	0	0
23	783	405	783	144	0	0	0	0	0	0	0	261	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	181	0	181	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	15	0	0	0	15	0	0	0	0	0	0	0	0
31	0	520	0	173	0	0	0	346	0	0	0	0	0	0
32	0	346	0	0	0	0	0	346	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	195	3060	0	2692	195	0	0	369	0	0	0	0	0	0
Total	14203	14203	8451	8451	2217	2217	1509	1509	15	15	1263	1263	747	747

< Trip type >

1 (1) : Work
2 (2) : Personal Business
3 (2) : Shopping
4 (4) : Social
5 (4) : Recreation
6 (3) : School
7 (6) : Waiting for a ride
8 (6) : Changing modes
9 (5) : Home
10 (6) : No Indication

* Note: The numbers in ( ) represent new trip type numbers used in this table.

< Mode >

1 : Private Automobile
2 : Public Transit 1 (Collectibo)
3 : Public Transit2 (Combi)
4 : Walking
5 : Others (Mototaxis)

< Zones >

1~25 : Internal Zones
26~30 : External Zones
31 : National University of Piura
32 : University of Piura
33 : No Destination
34 : No Indication

Table 6-27 (2) The Numbers of Mode Specific Trips: Origin and Destination by Trip Type (34 zones)

(c) Mode Type [3 : Public Transit2 (Combi)] , Time Period [1 : 6:00 am ~ 8:59 am]

\Type	Total		(1)		(2)		(3)		(4)		(5)		(6)	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0	2710	0	2378	0	159	0	173	0	0	0	0	0	0
2	267	4771	153	2518	38	407	76	1415	0	392	0	38	0	0
3	786	984	253	587	101	30	329	87	0	0	102	51	0	228
4	62	3230	26	3185	0	30	21	0	0	0	0	0	16	16
5	2097	2866	784	1188	157	0	842	992	157	0	0	0	157	685
6	3129	16162	1048	6621	151	7195	424	181	0	392	1506	30	0	1744
7	924	1468	320	1075	43	0	473	306	0	0	87	0	0	87
8	10588	480	5882	0	3137	0	0	87	1569	392	0	0	0	0
9	768	845	416	845	0	0	352	0	0	0	0	0	0	0
10	1245	702	207	424	104	0	830	278	0	0	0	0	104	0
11	1137	262	350	87	87	0	525	0	0	0	0	175	175	0
12	707	118	354	118	118	0	236	0	0	0	0	0	0	0
13	3198	685	457	457	0	0	914	228	0	0	0	0	1827	0
14	7492	566	3330	150	1665	0	1665	0	0	0	0	416	832	0
15	2	2142	0	2142	2	0	0	0	0	0	0	0	0	0
16	2115	559	2115	5	0	0	0	554	0	0	0	0	0	0
17	1437	156	862	89	287	0	144	67	0	0	0	0	144	0
18	977	0	586	0	195	0	195	0	0	0	0	0	0	0
19	6224	778	3890	0	1556	0	778	0	0	0	0	778	0	0
20	416	416	208	208	208	0	0	0	0	0	0	208	0	0
21	4642	3591	1039	1615	0	0	3603	1143	0	0	0	0	0	832
22	1268	4018	0	2536	395	0	873	1300	0	0	0	0	0	181
23	261	738	0	510	0	118	0	110	0	0	0	0	261	0
24	11268	104	5157	0	3056	0	3056	104	0	0	0	0	0	0
25	5428	0	3800	0	0	0	1267	0	0	0	0	0	362	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	260	0	260	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	261	0	0	0	261	0	0	0	0	0	0	0	0
30	0	887	0	887	0	0	0	0	0	0	0	0	0	0
31	0	11214	0	1479	0	3056	0	6575	0	0	0	0	0	104
32	0	1528	0	119	0	0	0	1409	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	3939	0	1754	0	45	0	1591	0	549	0	0	0	0
Total	66439	66439	31237	31237	11301	11301	16602	16602	1725	1725	1696	1696	3877	3877

< Trip type >

1 (1) : Work
2 (2) : Personal Business
3 (2) : Shopping
4 (4) : Social
5 (4) : Recreation
6 (3) : School
7 (6) : Waiting for a ride
8 (6) : Changing modes
9 (5) : Home
10 (6) : No Indication

* Note: The numbers in ( ) represent new trip type numbers used in this table.

< Mode >

1 : Private Automobile
2 : Public Transit 1 (Collectibo)
3 : Public Transit2 (Combi)
4 : Walking
5 : Others (Mototaxis)

< Zones >

1~25 : Internal Zones
26~30 : External Zones
31 : National University of Piura
32 : University of Piura
33 : No Destination
34 : No Indication

(d) Mode Type [4 : Walking] , Time Period [1 : 6:00 am ~ 8:59 am]

\Type	Total		(1)		(2)		(3)		(4)		(5)		(6)	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	71	84	71	84	0	0	0	0	0	0	0	0	0	0
2	191	99	153	99	0	0	0	0	0	0	38	0	0	0
3	152	168	101	168	0	0	0	0	0	0	51	0	0	0
4	16	145	16	145	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	241	241	0	0	211	211	0	0	0	0	30	30	0	0
7	43	87	43	87	0	0	0	0	0	0	0	0	0	0
8	0	5	0	5	0	0	0	0	0	0	0	0	0	0
9	32	32	32	32	0	0	0	0	0	0	0	0	0	0
10	207	104	207	104	0	0	0	0	0	0	0	0	0	0
11	437	453	175	191	0	0	175	175	87	87	0	0	0	0
12	0	118	0	0	0	0	0	0	0	0	0	118	0	0
13	457	228	228	0	0	0	228	228	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	117	0	117	0	0	0	0	0	0	0	0	0	0	0
17	144	0	144	0	0	0	0	0	0	0	0	0	0	0
18	0	339	0	144	0	0	0	0	0	0	0	195	0	0
19	389	0	389	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	89	0	0	0	0	0	0	0	0	0	89	0	0
22	67	0	67	0	0	0	0	0	0	0	0	0	0	0
23	0	2037	0	0	0	0	0	2037	0	0	0	0	0	0
24	2037	0	0	0	0	0	2037	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	118	228	0	228	0	0	0	0	0	0	118	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	195	456	0	456	0	0	0	0	0	0	195	0	0	0
Total	4914	4914	1743	1743	211	211	2440	2440	87	87	432	432	0	0

< Trip type >

1 (1) : Work
2 (2) : Personal Business
3 (2) : Shopping
4 (4) : Social
5 (4) : Recreation
6 (3) : School
7 (6) : Waiting for a ride
8 (6) : Changing modes
9 (5) : Home
10 (6) : No Indication

* Note: The numbers in ( ) represent new trip type numbers used in this table.

< Mode >

1 : Private Automobile
2 : Public Transit 1 (Collectibo)
3 : Public Transit2 (Combi)
4 : Walking
5 : Others (Mototaxis)

< Zones >

1~25 : Internal Zones
26~30 : External Zones
31 : National University of Piura
32 : University of Piura
33 : No Destination
34 : No Indication

Table 6-27 (3) The Numbers of Mode Specific Trips: Origin and Destination by Trip Type (34 zones)

(e) Mode Type [5 : Others (Mototaxis)] , Time Period [1 : 6:00 am ~ 8:59 am]

\Type	Total		(1)		(2)		(3)		(4)		(5)		(6)	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	177	427	142	427	35	0	0	0	0	0	0	0	0	0
2	153	336	115	336	38	0	0	0	0	0	0	0	0	0
3	51	51	0	0	0	0	0	0	0	0	0	0	51	51
4	10	439	10	407	0	0	0	32	0	0	0	0	0	0
5	627	157	314	157	0	0	314	0	0	0	0	0	0	0
6	1194	1635	246	986	15	649	0	0	0	0	933	0	0	0
7	389	622	0	504	43	0	258	118	0	0	87	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	96	32	32	32	32	0	32	0	0	0	0	0	0	0
10	622	0	104	0	104	0	415	0	0	0	0	0	0	0
11	350	366	175	191	87	0	87	0	0	0	0	175	0	0
12	354	0	118	0	118	0	118	0	0	0	0	0	0	0
13	914	191	228	87	0	0	685	104	0	0	0	0	0	0
14	1249	0	832	0	0	0	416	0	0	0	0	0	0	0
15	0	445	0	445	0	0	0	0	0	0	0	0	0	0
16	0	728	0	339	0	0	0	389	0	0	0	0	0	0
17	719	0	719	0	0	0	0	0	0	0	0	0	0	0
18	195	0	195	0	0	0	0	0	0	0	0	0	0	0
19	1556	922	1167	144	0	0	389	0	0	0	0	778	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	792	0	144	0	104	0	544	0	0	0	0	0	0
22	403	85	67	18	336	0	0	0	0	0	0	67	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	181	0	181	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	5	0	5	0	0	0	0	0	0	0	0	0	0
30	0	67	0	67	0	0	0	0	0	0	0	0	0	0
31	0	849	0	303	0	0	0	546	0	0	0	0	0	0
32	0	674	0	53	0	56	0	565	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	416	0	0	0	0	0	416	0	0	0	0	0	0
Total	9238	9238	4645	4645	808	808	2715	2715	0	0	1020	1020	51	51

< Trip type >

1 (1) : Work
2 (2) : Personal Business
3 (2) : Shopping
4 (4) : Social
5 (4) : Recreation
6 (3) : School
7 (6) : Waiting for a ride
8 (6) : Changing modes
9 (5) : Home
10 (6) : No Indication

* Note: The numbers in ( ) represent new trip type numbers used in this table.

< Mode >

1 : Private Automobile
2 : Public Transit 1 (Collectibo)
3 : Public Transit2 (Combi)
4 : Walking
5 : Others (Mototaxis)

< Zones >

1~25 : Internal Zones
26~30 : External Zones
31 : National University of Piura
32 : University of Piura
33 : No Destination
34 : No Indication

(f) Mode Type [All : Total (mode 1~5)] , Time Period [1 : 6:00 am ~ 8:59 am]

\Type	Total		(1)		(2)		(3)		(4)		(5)		(6)	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	354	4690	319	3717	35	159	0	815	0	0	0	0	0	0
2	1142	8787	951	5575	76	638	76	1727	0	392	38	38	0	416
3	1140	2430	506	1707	101	45	329	348	0	0	153	51	51	279
4	103	7115	57	6791	5	261	21	32	0	15	0	0	21	16
5	2881	3456	1255	1778	157	0	1156	992	157	0	0	0	157	685
6	6179	26239	1325	9866	422	13830	424	181	15	392	3993	60	0	1910
7	1915	4359	665	3113	258	277	775	595	0	0	175	0	43	375
8	11373	485	6667	5	3137	0	0	87	1569	392	0	0	0	0
9	961	1325	544	1325	32	0	384	0	0	0	0	0	0	0
10	4254	1152	1867	875	519	0	1764	278	0	0	0	0	104	0
11	2273	1082	874	470	350	0	787	175	87	87	0	350	175	0
12	2357	379	1179	262	707	0	354	0	0	0	0	118	118	0
13	6624	1105	2284	544	228	0	2284	561	0	0	0	0	1827	0
14	11654	982	5411	150	2081	0	2914	0	0	0	0	832	1249	0
15	3	2587	1	2587	2	0	0	0	0	0	0	0	0	0
16	3407	1702	3407	760	0	0	0	943	0	0	0	0	0	0
17	3881	988	2731	921	575	0	144	67	0	0	0	0	431	0
18	3517	925	2149	144	977	0	391	0	0	0	0	781	0	0
19	8377	1908	5446	144	1556	208	1375	0	0	0	0	1556	0	0
20	1247	416	831	208	416	0	0	0	0	0	0	208	0	0
21	10357	4866	5195	2154	173	104	4989	1688	0	0	0	89	0	832
22	2624	6801	550	3356	932	1019	1141	1918	0	0	0	67	0	442
23	4698	3819	2349	771	1044	118	783	2408	0	0	0	522	522	0
24	18398	311	7194	207	6111	0	5093	104	0	0	0	0	0	0
25	5790	0	4161	0	0	0	1267	0	0	0	0	0	362	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	260	0	260	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	266	0	5	0	261	0	0	0	0	0	0	0	0
30	0	1058	0	1043	0	15	0	0	0	0	0	0	0	0
31	0	12897	0	2226	0	3056	0	7511	0	0	0	0	0	104
32	118	4157	0	874	0	56	0	3227	0	0	118	0	0	0
33	0	51	0	51	0	0	0	0	0	0	0	0	0	0
34	391	9418	0	6032	195	45	0	2792	0	549	195	0	0	0
Total	116016	116016	57919	57919	20091	20091	26448	26448	1828	1828	4672	4672	5059	5059

< Trip type >

1 (1) : Work
2 (2) : Personal Business
3 (2) : Shopping
4 (4) : Social
5 (4) : Recreation
6 (3) : School
7 (6) : Waiting for a ride
8 (6) : Changing modes
9 (5) : Home
10 (6) : No Indication

* Note: The numbers in ( ) represent new trip type numbers used in this table.

< Mode >

1 : Private Automobile
2 : Public Transit 1 (Collectibo)
3 : Public Transit2 (Combi)
4 : Walking
5 : Others (Mototaxis)

< Zones >

1~25 : Internal Zones
26~30 : External Zones
31 : National University of Piura
32 : University of Piura
33 : No Destination
34 : No Indication

Table 6-28 (1) The Numbers of Mode Trips: Origin and Destination by 6 Trip Types (30 zones: morning peak period)

(a) Mode Type 1 : Private Automobile]

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	89	637	0	0	0	469	0	0	0	0	0	0	89	1105
2	76	1548	0	231	0	104	0	0	0	0	0	0	76	1883
3	101	491	0	0	0	261	0	0	0	0	0	0	101	752
4	5	2559	5	87	0	0	0	0	0	0	5	0	16	2646
5	0	260	0	0	0	0	0	0	0	0	0	0	0	260
6	15	1462	15	3732	0	0	0	0	261	0	0	123	291	5317
7	215	801	86	277	43	104	0	0	0	0	0	0	344	1182
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	64	0	0	0	0	0	0	0	0	0	0	0	64	0
10	1245	261	311	0	519	0	0	0	0	0	0	0	2075	261
11	175	0	175	0	0	0	0	0	0	0	0	0	350	0
12	589	0	118	0	0	0	0	0	0	0	118	0	825	0
13	1370	473	228	0	457	907	0	0	0	0	0	0	2056	1380
14	0	0	0	0	832	0	0	0	0	0	0	0	832	0
15	1	0	0	0	0	0	0	0	0	0	0	0	1	0
16	1175	415	0	0	0	0	0	0	0	0	0	0	1175	415
17	0	416	0	0	0	0	0	0	0	0	0	0	0	416
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	208	0	0	0	0	0	0	0	0	0	208
20	623	0	208	0	0	0	0	0	0	0	0	0	831	0
21	2078	493	173	0	346	43	0	0	0	0	0	0	2598	536
22	416	432	134	1019	201	618	0	0	0	0	0	261	752	2330
23	1566	117	1044	0	783	261	0	0	0	261	261	0	3654	640
24	2037	207	3056	0	0	0	0	0	0	0	0	0	5093	207
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	89	0	0	0	0	0	0	0	0	0	0	0	89
Total	11842	10661	5554	5554	3182	2766	0	0	261	261	384	384	21222	19626

(b) Mode Type 2 : Public Transit 1 (Collectibo)]

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	18	191	0	0	0	173	0	0	0	0	0	0	18	364
2	454	1074	0	0	0	208	0	0	0	0	0	416	454	1698
3	51	461	0	15	0	0	0	0	0	0	0	0	51	476
4	0	496	0	144	0	0	0	15	0	0	0	0	0	655
5	157	173	0	0	0	0	0	0	0	0	0	0	157	173
6	15	798	30	2044	0	0	15	0	1263	0	0	43	1324	2884
7	86	645	86	0	0	67	0	0	0	0	43	287	215	1000
8	784	0	0	0	0	0	0	0	0	0	0	0	784	0
9	0	416	0	0	0	0	0	0	0	0	0	0	0	416
10	104	86	0	0	0	0	0	0	0	0	0	0	104	86
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	118	144	354	0	0	0	0	0	0	0	0	0	471	144
13	0	0	0	0	0	346	0	0	0	0	0	0	0	346
14	1249	0	416	0	0	0	0	0	0	416	416	0	2081	416
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	1006	416	287	0	0	0	0	0	0	0	287	0	1581	416
18	1368	0	781	0	195	0	0	0	0	586	0	0	2344	586
19	0	0	0	0	208	0	0	0	0	0	0	0	208	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	2078	346	0	0	1039	346	0	0	0	0	0	0	3117	693
22	0	369	67	0	67	0	0	0	0	0	0	0	134	369
23	783	144	0	0	0	0	0	0	0	261	0	0	783	405
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	181	0	0	0	0	0	0	0	0	0	0	0	181	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	15	0	0	0	0	0	0	0	0	0	15
Total	8451	5759	2022	2217	1509	1141	15	15	1263	1263	747	747	14008	11143

< Trip Type >

1	(1)	: Work
2	(2)	: Personal Business
3	(2)	: Shopping
4	(4)	: Social
5	(4)	: Recreation
6	(3)	: School
7	(6)	: Waiting for a ride
8	(6)	: Changing modes
9	(5)	: Home
10	(6)	: No Indication

* Note: The numbers in ( ) represent new trip type numbers used in this table.

< Mode >

1	: Private Automobile
2	: Public Transit 1 (Collectibo)
3	: Public Transit2 (Combi)
4	: Walking
5	: Others (Mototaxis)

< Zone >

1~25	: Internal Zones
26~30	: External Zones

Table 6-28 (2) The Numbers of Mode Trips: Origin and Destination by 6 Trip Types (30 zones: morning peak period)

(c) Mode Type 3 : Public Transit2 (Combi)]

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0	2378	0	159	0	173	0	0	0	0	0	0	0	2710
2	153	2518	38	407	76	1415	0	392	0	38	0	0	267	4771
3	253	587	101	30	329	87	0	0	102	51	0	228	786	984
4	26	3185	0	30	21	0	0	0	0	0	16	16	62	3230
5	784	1188	157	0	842	992	157	0	0	0	157	685	2097	2866
6	1048	6621	151	7195	424	181	0	392	1506	30	0	1744	3129	16162
7	320	1075	43	0	473	306	0	0	87	0	0	87	924	1468
8	5882	0	3137	0	0	87	1569	392	0	0	0	0	10588	480
9	416	845	0	0	352	0	0	0	0	0	0	0	768	845
10	207	424	104	0	830	278	0	0	0	0	104	0	1245	702
11	350	87	87	0	525	0	0	0	0	175	175	0	1137	262
12	354	118	118	0	236	0	0	0	0	0	0	0	707	118
13	457	576	0	0	914	1638	0	0	0	0	1827	0	3198	2214
14	3330	150	1665	0	1665	0	0	0	0	416	832	0	7492	566
15	0	2142	2	0	0	0	0	0	0	0	0	0	2	2142
16	2115	5	0	0	0	554	0	0	0	0	0	0	2115	559
17	862	89	287	0	144	67	0	0	0	0	144	0	1437	156
18	586	0	195	0	195	0	0	0	0	0	0	0	977	0
19	3890	0	1556	0	778	0	0	0	0	778	0	0	6224	778
20	208	208	208	0	0	0	0	0	0	208	0	0	416	416
21	1039	3095	0	3056	3603	7719	0	0	0	0	0	936	4642	14805
22	0	2536	395	0	873	1300	0	0	0	0	0	181	1268	4018
23	0	510	0	118	0	110	0	0	0	0	261	0	261	738
24	5157	0	3056	0	3056	104	0	0	0	0	0	0	11268	104
25	3800	0	0	0	1267	0	0	0	0	0	362	0	5428	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	260	0	0	0	0	0	0	0	0	0	0	0	260
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	261	0	0	0	0	0	0	0	0	0	261
30	0	887	0	0	0	0	0	0	0	0	0	0	0	887
Total	31237	29483	11301	11255	16602	15011	1725	1176	1696	1696	3877	3877	66439	62499

(d) Mode Type 4 : Walking]

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	71	84	0	0	0	0	0	0	0	0	0	0	71	84
2	153	99	0	0	0	0	0	0	38	0	0	0	191	99
3	101	168	0	0	0	0	0	0	51	0	0	0	152	168
4	16	145	0	0	0	0	0	0	0	0	0	0	16	145
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	211	211	0	0	0	0	30	30	0	0	241	241
7	43	87	0	0	0	0	0	0	0	0	0	0	43	87
8	0	5	0	0	0	0	0	0	0	0	0	0	0	5
9	32	32	0	0	0	0	0	0	0	0	0	0	32	32
10	207	104	0	0	0	0	0	0	0	0	0	0	207	104
11	175	191	0	0	175	175	87	87	0	0	0	0	437	453
12	0	0	0	0	0	0	0	0	0	118	0	0	0	118
13	228	228	0	0	228	228	0	0	118	0	0	0	575	457
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	117	0	0	0	0	0	0	0	0	0	0	0	117	0
17	144	0	0	0	0	0	0	0	0	0	0	0	144	0
18	0	144	0	0	0	0	0	0	0	195	0	0	0	339
19	389	0	0	0	0	0	0	0	0	0	0	0	389	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	89	0	0	0	89
22	67	0	0	0	0	0	0	0	0	0	0	0	67	0
23	0	0	0	0	0	2037	0	0	0	0	0	0	0	2037
24	0	0	0	0	2037	0	0	0	0	0	0	0	2037	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1743	1287	211	211	2440	2440	87	87	237	432	0	0	4719	4458

< Trip Type >
1 (1) : Work
2 (2) : Personal Business
3 (2) : Shopping
4 (4) : Social
5 (4) : Recreation
6 (3) : School
7 (6) : Waiting for a ride
8 (6) : Changing modes
9 (5) : Home
10 (6) : No Indication

* Note: The numbers in ( ) represent new trip type numbers used in this table.

< Mode >
1 : Private Automobile
2 : Public Transit 1 (Collectibo)
3 : Public Transit2 (Combi)
4 : Walking
5 : Others (Mototaxis)

< Zone >
1~25 : Internal Zones
26~30 : External Zones

Table 6-28 (3) The Numbers of Mode Trips: Origin and Destination by 6 Trip Types (30 zones: morning peak period)

(e) Mode Type 5 : Others (Mototaxis)]

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	142	427	35	0	0	0	0	0	0	0	0	0	177	427
2	115	336	38	0	0	0	0	0	0	0	0	0	153	336
3	0	0	0	0	0	0	0	0	0	0	51	51	51	51
4	10	407	0	0	0	32	0	0	0	0	0	0	10	439
5	314	157	0	0	314	0	0	0	0	0	0	0	627	157
6	246	986	15	649	0	0	0	0	933	0	0	0	1194	1635
7	0	504	43	0	258	118	0	0	87	0	0	0	389	622
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	32	32	32	0	32	0	0	0	0	0	0	0	96	32
10	104	0	104	0	415	0	0	0	0	0	0	0	622	0
11	175	191	87	0	87	0	0	0	0	175	0	0	350	366
12	118	0	118	0	118	0	0	0	0	0	0	0	354	0
13	228	141	0	56	685	669	0	0	0	0	0	0	914	865
14	832	0	0	0	416	0	0	0	0	0	0	0	1249	0
15	0	445	0	0	0	0	0	0	0	0	0	0	0	445
16	0	339	0	0	0	389	0	0	0	0	0	0	0	728
17	719	0	0	0	0	0	0	0	0	0	0	0	719	0
18	195	0	0	0	0	0	0	0	0	0	0	0	195	0
19	1167	144	0	0	389	0	0	0	0	778	0	0	1556	922
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	446	0	104	0	1091	0	0	0	0	0	0	0	1641
22	67	18	336	0	0	0	0	0	0	67	0	0	403	85
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	181	0	0	0	0	0	0	0	0	0	0	0	181	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	5	0	0	0	0	0	0	0	0	0	0	0	5
30	0	67	0	0	0	0	0	0	0	0	0	0	0	67
Total	4645	4645	808	808	2715	2298	0	0	1020	1020	51	51	9238	8822

(f) Mode Type All : Total (mode 1~5)]

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	319	3717	35	159	0	815	0	0	0	0	0	0	354	4690
2	951	5575	76	638	76	1727	0	392	38	38	0	416	1142	8787
3	506	1707	101	45	329	348	0	0	153	51	51	279	1140	2430
4	57	6791	5	261	21	32	0	15	0	0	21	16	103	7115
5	1255	1778	157	0	1156	992	157	0	0	0	157	685	2881	3456
6	1325	9866	422	13830	424	181	15	392	3993	60	0	1910	6179	26239
7	665	3113	258	277	775	595	0	0	175	0	43	375	1915	4359
8	6667	5	3137	0	0	87	1569	392	0	0	0	0	11373	485
9	544	1325	32	0	384	0	0	0	0	0	0	0	961	1325
10	1867	875	519	0	1764	278	0	0	0	0	104	0	4254	1152
11	874	470	350	0	787	175	87	87	0	350	175	0	2273	1082
12	1179	262	707	0	354	0	0	0	0	118	118	0	2357	379
13	2284	1418	228	56	2284	3788	0	0	118	0	1827	0	6741	5262
14	5411	150	2081	0	2914	0	0	0	0	832	1249	0	11654	982
15	1	2587	2	0	0	0	0	0	0	0	0	0	3	2587
16	3407	760	0	0	0	943	0	0	0	0	0	0	3407	1702
17	2731	921	575	0	144	67	0	0	0	0	431	0	3881	988
18	2149	144	977	0	391	0	0	0	0	781	0	0	3517	925
19	5446	144	1556	208	1375	0	0	0	0	1556	0	0	8377	1908
20	831	208	416	0	0	0	0	0	0	208	0	0	1247	416
21	5195	4380	173	3159	4989	9199	0	0	0	89	0	936	10357	17763
22	550	3356	932	1019	1141	1918	0	0	0	67	0	442	2624	6801
23	2349	771	1044	118	783	2408	0	0	0	522	522	0	4698	3819
24	7194	207	6111	0	5093	104	0	0	0	0	0	0	18398	311
25	4161	0	0	0	1267	0	0	0	0	0	362	0	5790	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	260	0	0	0	0	0	0	0	0	0	0	0	260
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	5	0	261	0	0	0	0	0	0	0	0	0	266
30	0	1043	0	15	0	0	0	0	0	0	0	0	0	1058
Total	57919	51836	19895	20046	26448	23656	1828	1279	4477	4672	5059	5059	115626	106548

< Trip Type >

1	(1)	: Work	6	(3)	: School
2	(2)	: Personal Business	7	(6)	: Waiting for a ride
3	(2)	: Shopping	8	(6)	: Changing modes
4	(4)	: Social	9	(5)	: Home
5	(4)	: Recreation	10	(6)	: No Indication

* Note: The numbers in ( ) represent new trip type numbers used in this table.

< Mode >

1 : Private Automobile
2 : Public Transit 1 (Collectibo)
3 : Public Transit2 (Combi)
4 : Walking
5 : Others (Mototaxis)

< Zone >

1~25 : Internal Zones
26~30 : External Zones

Table 6-29 (1) Mode Specific Trips and Modal Share: Origin and Destination by Trip Type (30 zones: morning peak time period)

(a) Trips: Trip Type [(1) : Work]

\Mode	1		2		3		4		5		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	89	637	18	191	0	2378	71	84	142	427	319	3717
2	76	1548	454	1074	153	2518	153	99	115	336	951	5575
3	101	491	51	461	253	587	101	168	0	0	506	1707
4	5	2559	0	496	26	3185	16	145	10	407	57	6791
5	0	260	157	173	784	1188	0	0	314	157	1255	1778
6	15	1462	15	798	1048	6621	0	0	246	986	1325	9866
7	215	801	86	645	320	1075	43	87	0	504	665	3113
8	0	0	784	0	5882	0	0	5	0	0	6667	5
9	64	0	0	416	416	845	32	32	32	32	544	1325
10	1245	261	104	86	207	424	207	104	104	0	1867	875
11	175	0	0	0	350	87	175	191	175	191	874	470
12	589	0	118	144	354	118	0	0	118	0	1179	262
13	1370	473	0	0	457	576	228	228	228	141	2284	1418
14	0	0	1249	0	3330	150	0	0	832	0	5411	150
15	1	0	0	0	0	2142	0	0	0	445	1	2587
16	1175	415	0	0	2115	5	117	0	0	339	3407	760
17	0	416	1006	416	862	89	144	0	719	0	2731	921
18	0	0	1368	0	586	0	0	144	195	0	2149	144
19	0	0	0	0	3890	0	389	0	1167	144	5446	144
20	623	0	0	0	208	208	0	0	0	0	831	208
21	2078	493	2078	346	1039	3095	0	0	0	446	5195	4380
22	416	432	0	369	0	2536	67	0	67	18	550	3356
23	1566	117	783	144	0	510	0	0	0	0	2349	771
24	2037	207	0	0	5157	0	0	0	0	0	7194	207
25	0	0	181	0	3800	0	0	0	181	0	4161	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	260	0	0	0	0	0	260
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	5	0	5
30	0	89	0	0	0	887	0	0	0	67	0	1043
Total	11842	10661	8451	5759	31237	29483	1743	1287	4645	4645	57919	51836

(b) Modal Share of Trip Type [(1) : Work]

\Mode	1		2		3		4		5		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	27.8	17.1	5.6	5.1	0.0	64.0	22.2	2.3	44.4	11.5	0.6	7.2
2	8.0	27.8	47.8	19.3	16.1	45.2	16.1	1.8	12.1	6.0	1.6	10.8
3	20.0	28.8	10.0	27.0	50.0	34.4	20.0	9.8	0.0	0.0	0.9	3.3
4	9.1	37.7	0.0	7.3	45.5	46.9	27.3	2.1	18.2	6.0	0.1	13.1
5	0.0	14.6	12.5	9.7	62.5	66.8	0.0	0.0	25.0	8.8	2.2	3.4
6	1.1	14.8	1.1	8.1	79.1	67.1	0.0	0.0	18.6	10.0	2.3	19.0
7	32.4	25.7	13.0	20.7	48.2	34.5	6.5	2.8	0.0	16.2	1.1	6.0
8	0.0	0.0	11.8	0.0	88.2	0.0	0.0	100.0	0.0	0.0	11.5	0.0
9	11.8	0.0	0.0	31.4	76.5	63.7	5.9	2.4	5.9	2.4	0.9	2.6
10	66.7	29.8	5.6	9.8	11.1	48.5	11.1	11.9	5.6	0.0	3.2	1.7
11	20.0	0.0	0.0	0.0	40.0	18.6	20.0	40.7	20.0	40.7	1.5	0.9
12	50.0	0.0	10.0	54.9	30.0	45.1	0.0	0.0	10.0	0.0	2.0	0.5
13	60.0	33.4	0.0	0.0	20.0	40.6	10.0	16.1	10.0	9.9	3.9	2.7
14	0.0	0.0	23.1	0.0	61.5	100.0	0.0	0.0	15.4	0.0	9.3	0.3
15	100.0	0.0	0.0	0.0	0.0	82.8	0.0	0.0	0.0	17.2	0.0	5.0
16	34.5	54.7	0.0	0.0	62.1	0.7	3.4	0.0	0.0	44.6	5.9	1.5
17	0.0	45.2	36.8	45.2	31.6	9.6	5.3	0.0	26.3	0.0	4.7	1.8
18	0.0	0.0	63.6	0.0	27.3	0.0	0.0	100.0	9.1	0.0	3.7	0.3
19	0.0	0.0	0.0	0.0	71.4	0.0	7.1	0.0	21.4	100.0	9.4	0.3
20	75.0	0.0	0.0	0.0	25.0	100.0	0.0	0.0	0.0	0.0	1.4	0.4
21	40.0	11.2	40.0	7.9	20.0	70.7	0.0	0.0	0.0	10.2	9.0	8.4
22	75.6	12.9	0.0	11.0	0.0	75.6	12.2	0.0	12.2	0.5	1.0	6.5
23	66.7	15.2	33.3	18.6	0.0	66.1	0.0	0.0	0.0	0.0	4.1	1.5
24	28.3	100.0	0.0	0.0	71.7	0.0	0.0	0.0	0.0	0.0	12.4	0.4
25	0.0	0.0	4.3	0.0	91.3	0.0	0.0	0.0	4.3	0.0	7.2	0.0
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.5
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
30	0.0	8.5	0.0	0.0	0.0	85.1	0.0	0.0	0.0	6.4	0.0	2.0
Total	20.4	20.6	14.6	11.1	53.9	56.9	3.0	2.5	8.0	9.0	100.0	100.0

* Note: The percentages of "Total" is based on total trips of whale area

< Trip Type >

1	(1)	: Work
2	(2)	: Personal Business
3	(2)	: Shopping
4	(4)	: Social
5	(4)	: Recreation
6	(3)	: School
7	(6)	: Waiting for a ride
8	(6)	: Changing modes
9	(5)	: Home
10	(6)	: No Indication

* Note: The numbers in ( ) represent new trip type numbers used in this table.

< Mode >

1	: Private Automobile
2	: Public Transit 1 (Collectibo)
3	: Public Transit2 (Combi)
4	: Walking
5	: Others (Mototaxis)

< Zone >

1~25	: Internal Zones
26~30	: External Zones

Table 6-29 (2) Mode Specific Trips and Modal Share: Origin and Destination by Trip Type (30 zones: morning peak time period)

(a) Trips: Trip Type [(2) : Personal Business & Shoppin[ ]

\Mode	1		2		3		4		5		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0	0	0	0	0	159	0	0	35	0	35	159
2	0	231	0	0	38	407	0	0	38	0	76	638
3	0	0	0	15	101	30	0	0	0	0	101	45
4	5	87	0	144	0	30	0	0	0	0	5	261
5	0	0	0	0	157	0	0	0	0	0	157	0
6	15	3732	30	2044	151	7195	211	211	15	649	422	13830
7	86	277	86	0	43	0	0	0	43	0	258	277
8	0	0	0	0	3137	0	0	0	0	0	3137	0
9	0	0	0	0	0	0	0	0	32	0	32	0
10	311	0	0	0	104	0	0	0	104	0	519	0
11	175	0	0	0	87	0	0	0	87	0	350	0
12	118	0	354	0	118	0	0	0	118	0	707	0
13	228	0	0	0	0	0	0	0	0	56	228	56
14	0	0	416	0	1665	0	0	0	0	0	2081	0
15	0	0	0	0	2	0	0	0	0	0	2	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	287	0	287	0	0	0	0	0	575	0
18	0	0	781	0	195	0	0	0	0	0	977	0
19	0	208	0	0	1556	0	0	0	0	0	1556	208
20	208	0	0	0	208	0	0	0	0	0	416	0
21	173	0	0	0	0	3056	0	0	0	104	173	3159
22	134	1019	67	0	395	0	0	0	336	0	932	1019
23	1044	0	0	0	0	118	0	0	0	0	1044	118
24	3056	0	0	0	3056	0	0	0	0	0	6111	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	261	0	0	0	0	0	261
30	0	0	0	15	0	0	0	0	0	0	0	15
Total	5554	5554	2022	2217	11301	11255	211	211	808	808	19895	20046

(b) Modal Share of Trip Type [(2) : Personal Business & Shoppin[ ]

\Mode	1		2		3		4		5		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.2	0.8
2	0.0	36.2	0.0	0.0	50.0	63.8	0.0	0.0	50.0	0.0	0.4	3.2
3	0.0	0.0	0.0	33.3	100.0	66.7	0.0	0.0	0.0	0.0	0.5	0.2
4	100.0	33.5	0.0	55.0	0.0	11.5	0.0	0.0	0.0	0.0	0.0	1.3
5	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0
6	3.6	27.0	7.1	14.8	35.7	52.0	50.0	1.5	3.6	4.7	2.1	69.0
7	33.3	100.0	33.3	0.0	16.7	0.0	0.0	0.0	16.7	0.0	1.3	1.4
8	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	15.8	0.0
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.2	0.0
10	60.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	20.0	0.0	2.6	0.0
11	50.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	25.0	0.0	1.8	0.0
12	16.7	0.0	50.0	0.0	16.7	0.0	0.0	0.0	16.7	0.0	3.6	0.0
13	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	1.1	0.3
14	0.0	0.0	20.0	0.0	80.0	0.0	0.0	0.0	0.0	0.0	10.5	0.0
15	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	50.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	2.9	0.0
18	0.0	0.0	80.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	4.9	0.0
19	0.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	7.8	1.0
20	50.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0
21	100.0	0.0	0.0	0.0	0.0	96.7	0.0	0.0	0.0	3.3	0.9	15.8
22	14.4	100.0	7.2	0.0	42.4	0.0	0.0	0.0	36.0	0.0	4.7	5.1
23	100.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	5.2	0.6
24	50.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	30.7	0.0
25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	1.3
30	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total	27.9	27.7	10.2	11.1	56.8	56.1	1.1	1.1	4.1	4.0	100.0	100.0

* Note: The percentages of "Total" is based on total trips of whale area

< Trip Type >

1	(1)	: Work	6	(3)	: School
2	(2)	: Personal Business	7	(6)	: Waiting for a ride
3	(2)	: Shopping	8	(6)	: Changing modes
4	(4)	: Social	9	(5)	: Home
5	(4)	: Recreation	10	(6)	: No Indication

* Note: The numbers in ( ) represent new trip type numbers used in this table.

< Mode >

1	: Private Automobile
2	: Public Transit 1 (Collectibo)
3	: Public Transit2 (Combi)
4	: Walking
5	: Others (Mototaxis)

< Zone >

1~25	: Internal Zones
26~30	: External Zones

Table 6-29 (3) Mode Specific Trips and Modal Share: Origin and Destination by Trip Type (30 zones: morning peak time period)

(a) Trips: Trip Type [(3) : School]

\Mode	1		2		3		4		5		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0	469	0	173	0	173	0	0	0	0	0	815
2	0	104	0	208	76	1415	0	0	0	0	76	1727
3	0	261	0	0	329	87	0	0	0	0	329	348
4	0	0	0	0	21	0	0	0	0	32	21	32
5	0	0	0	0	842	992	0	0	314	0	1156	992
6	0	0	0	0	424	181	0	0	0	0	424	181
7	43	104	0	67	473	306	0	0	258	118	775	595
8	0	0	0	0	0	87	0	0	0	0	0	87
9	0	0	0	0	352	0	0	0	32	0	384	0
10	519	0	0	0	830	278	0	0	415	0	1764	278
11	0	0	0	0	525	0	175	175	87	0	787	175
12	0	0	0	0	236	0	0	0	118	0	354	0
13	457	907	0	346	914	1638	228	228	685	669	2284	3788
14	832	0	0	0	1665	0	0	0	416	0	2914	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	554	0	0	0	389	0	943
17	0	0	0	0	144	67	0	0	0	0	144	67
18	0	0	195	0	195	0	0	0	0	0	391	0
19	0	0	208	0	778	0	0	0	389	0	1375	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	346	43	1039	346	3603	7719	0	0	0	1091	4989	9199
22	201	618	67	0	873	1300	0	0	0	0	1141	1918
23	783	261	0	0	0	110	0	2037	0	0	783	2408
24	0	0	0	0	3056	104	2037	0	0	0	5093	104
25	0	0	0	0	1267	0	0	0	0	0	1267	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
Total	3182	2766	1509	1141	16602	15011	2440	2440	2715	2298	26448	23656

(b) Modal Share of Trip Type [(3) : School]

\Mode	1		2		3		4		5		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0.0	57.5	0.0	21.3	0.0	21.3	0.0	0.0	0.0	0.0	0.0	3.4
2	0.0	6.0	0.0	12.0	100.0	82.0	0.0	0.0	0.0	0.0	0.3	7.3
3	0.0	74.9	0.0	0.0	100.0	25.1	0.0	0.0	0.0	0.0	1.2	1.5
4	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0	0.1	0.1
5	0.0	0.0	0.0	0.0	72.9	100.0	0.0	0.0	27.1	0.0	4.4	4.2
6	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	1.6	0.8
7	5.6	17.4	0.0	11.3	61.1	51.4	0.0	0.0	33.3	19.8	2.9	2.5
8	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.4
9	0.0	0.0	0.0	0.0	91.7	0.0	0.0	0.0	8.3	0.0	1.5	0.0
10	29.4	0.0	0.0	0.0	47.1	100.0	0.0	0.0	23.5	0.0	6.7	1.2
11	0.0	0.0	0.0	0.0	66.7	0.0	22.2	100.0	11.1	0.0	3.0	0.7
12	0.0	0.0	0.0	0.0	66.7	0.0	0.0	0.0	33.3	0.0	1.3	0.0
13	20.0	23.9	0.0	9.1	40.0	43.2	10.0	6.0	30.0	17.7	8.6	16.0
14	28.6	0.0	0.0	0.0	57.1	0.0	0.0	0.0	14.3	0.0	11.0	0.0
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	58.7	0.0	0.0	0.0	41.3	0.0	4.0
17	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	0.5	0.3
18	0.0	0.0	50.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0
19	0.0	0.0	15.1	0.0	56.6	0.0	0.0	0.0	28.3	0.0	5.2	0.0
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	6.9	0.5	20.8	3.8	72.2	83.9	0.0	0.0	0.0	11.9	18.9	38.9
22	17.6	32.2	5.9	0.0	76.5	67.8	0.0	0.0	0.0	0.0	4.3	8.1
23	100.0	10.8	0.0	0.0	0.0	4.6	0.0	84.6	0.0	0.0	3.0	10.2
24	0.0	0.0	0.0	0.0	60.0	100.0	40.0	0.0	0.0	0.0	19.3	0.4
25	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	4.8	0.0
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	12.0	11.7	5.7	4.8	62.8	63.5	9.2	10.3	10.3	9.7	100.0	100.0

* Note: The percentages of "Total" is based on total trips of whale area

< Trip Type >

1 (1) : Work
2 (2) : Personal Business
3 (2) : Shopping
4 (4) : Social
5 (4) : Recreation
6 (3) : School
7 (6) : Waiting for a ride
8 (6) : Changing modes
9 (5) : Home
10 (6) : No Indication

* Note: The numbers in ( ) represent new trip type numbers used in this table.

< Mode >

1 : Private Automobile
2 : Public Transit 1 (Collectibo)
3 : Public Transit2 (Combi)
4 : Walking
5 : Others (Mototaxis)

< Zone >

1~25 : Internal Zones
26~30 : External Zones

Table 6-29 (4) Mode Specific Trips and Modal Share: Origin and Destination by Trip Type (30 zones: morning peak time period)

(a) Trips: Trip Type [(4) : Social & Recreation]

\Mode	1		2		3		4		5		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	392	0	0	0	0	0	392
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	15	0	0	0	0	0	0	0	15
5	0	0	0	0	157	0	0	0	0	0	157	0
6	0	0	15	0	0	392	0	0	0	0	15	392
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	1569	392	0	0	0	0	1569	392
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	87	87	0	0	87	87
12	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	15	15	1725	1176	87	87	0	0	1828	1279

(b) Modal Share of Trip Type [(4) : Social & Recreation]

\Mode	1		2		3		4		5		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	30.7
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2
5	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	8.6	0.0
6	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.8	30.7
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	85.8	30.7
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	4.8	6.8
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.8	1.2	94.4	92.0	4.8	6.8	0.0	0.0	100.0	100.0

* Note: The percentages of "Total" is based on total trips of whale area

< Trip Type >

1	(1)	: Work	6	(3)	: School
2	(2)	: Personal Business	7	(6)	: Waiting for a ride
3	(2)	: Shopping	8	(6)	: Changing modes
4	(4)	: Social	9	(5)	: Home
5	(4)	: Recreation	10	(6)	: No Indication

* Note: The numbers in ( ) represent new trip type numbers used in this table.

< Mode >

1 : Private Automobile
2 : Public Transit 1 (Collectibo)
3 : Public Transit2 (Combi)
4 : Walking
5 : Others (Mototaxis)

< Zone >

1~25 : Internal Zones
26~30 : External Zones

Table 6-29 (5) Mode Specific Trips and Modal Share: Origin and Destination by Trip Type (30 zones: morning peak time period)

(a) Trips: Trip Type [(5) : Home]

\Mode	1		2		3		4		5		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	38	38	0	0	0	38	38
3	0	0	0	0	102	51	51	0	0	0	153	51
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	261	0	1263	0	1506	30	30	30	933	0	3993	60
7	0	0	0	0	87	0	0	0	87	0	175	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	175	0	0	0	175	0	350
12	0	0	0	0	0	0	0	118	0	0	0	118
13	0	0	0	0	0	0	118	0	0	0	118	0
14	0	0	0	416	0	416	0	0	0	0	0	832
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	586	0	0	0	195	0	0	0	781
19	0	0	0	0	0	778	0	0	0	778	0	1556
20	0	0	0	0	0	208	0	0	0	0	0	208
21	0	0	0	0	0	0	0	89	0	0	0	89
22	0	0	0	0	0	0	0	0	0	67	0	67
23	0	261	0	261	0	0	0	0	0	0	0	522
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
Total	261	261	1263	1263	1696	1696	237	432	1020	1020	4477	4672

(b) Modal Share of Trip Type [(5) : Home]

\Mode	1		2		3		4		5		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.9	0.8
3	0.0	0.0	0.0	0.0	67.0	100.0	33.0	0.0	0.0	0.0	3.4	1.1
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	6.5	0.0	31.6	0.0	37.7	50.0	0.8	50.0	23.4	0.0	89.2	1.3
7	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	50.0	0.0	3.9	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	50.0	0.0	7.5
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	2.5
13	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	2.6	0.0
14	0.0	0.0	0.0	50.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	17.8
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	75.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	16.7
19	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	50.0	0.0	33.3
20	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	4.4
21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	1.9
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	1.4
23	0.0	50.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.2
24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	5.8	5.6	28.2	27.0	37.9	36.3	5.3	9.2	22.8	21.8	100.0	100.0

* Note: The percentages of "Total" is based on total trips of whale area

< Trip Type >

1	(1)	: Work	6	(3)	: School
2	(2)	: Personal Business	7	(6)	: Waiting for a ride
3	(2)	: Shopping	8	(6)	: Changing modes
4	(4)	: Social	9	(5)	: Home
5	(4)	: Recreation	10	(6)	: No Indication

* Note: The numbers in ( ) represent new trip type numbers used in this table.

< Mode >

1 : Private Automobile
2 : Public Transit 1 (Collectibo)
3 : Public Transit2 (Combi)
4 : Walking
5 : Others (Mototaxis)

< Zone >

1~25 : Internal Zones
26~30 : External Zones

Table 6-29 (6) Mode Specific Trips and Modal Share: Origin and Destination by Trip Type (30 zones: morning peak time period)

(a) Trips: Trip Type [(6) : Others (Trip Type 7,8,10)]

\Mode	1		2		3		4		5		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	416	0	0	0	0	0	0	0	416
3	0	0	0	0	0	228	0	0	51	51	51	279
4	5	0	0	0	16	16	0	0	0	0	21	16
5	0	0	0	0	157	685	0	0	0	0	157	685
6	0	123	0	43	0	1744	0	0	0	0	0	1910
7	0	0	43	287	0	87	0	0	0	0	43	375
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	104	0	0	0	0	0	104	0
11	0	0	0	0	175	0	0	0	0	0	175	0
12	118	0	0	0	0	0	0	0	0	0	118	0
13	0	0	0	0	1827	0	0	0	0	0	1827	0
14	0	0	416	0	832	0	0	0	0	0	1249	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	287	0	144	0	0	0	0	0	431	0
18	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	936	0	0	0	0	0	936
22	0	261	0	0	0	181	0	0	0	0	0	442
23	261	0	0	0	261	0	0	0	0	0	522	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	362	0	0	0	0	0	362	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
Total	384	384	747	747	3877	3877	0	0	51	51	5059	5059

(b) Modal Share of Trip Type [(6) : Others (Trip Type 7,8,10)]

\Mode	1		2		3		4		5		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.2
3	0.0	0.0	0.0	0.0	0.0	81.9	0.0	0.0	100.0	18.1	1.0	5.5
4	25.0	0.0	0.0	0.0	75.0	100.0	0.0	0.0	0.0	0.0	0.4	0.3
5	0.0	0.0	0.0	0.0	100.0	100.0	0.0	0.0	0.0	0.0	3.1	13.5
6	0.0	6.4	0.0	2.3	0.0	91.3	0.0	0.0	0.0	0.0	0.0	37.7
7	0.0	0.0	100.0	76.7	0.0	23.3	0.0	0.0	0.0	0.0	0.9	7.4
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0
11	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	3.5	0.0
12	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0
13	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	36.1	0.0
14	0.0	0.0	33.3	0.0	66.7	0.0	0.0	0.0	0.0	0.0	24.7	0.0
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	66.7	0.0	33.3	0.0	0.0	0.0	0.0	0.0	8.5	0.0
18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	18.5
22	0.0	59.1	0.0	0.0	0.0	40.9	0.0	0.0	0.0	0.0	0.0	8.7
23	50.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	10.3	0.0
24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	7.2	0.0
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	7.6	7.6	14.8	14.8	76.6	76.6	0.0	0.0	1.0	1.0	100.0	100.0

* Note: The percentages of "Total" is based on total trips of whale area

< Trip Type >

1	(1)	: Work	6	(3)	: School
2	(2)	: Personal Business	7	(6)	: Waiting for a ride
3	(2)	: Shopping	8	(6)	: Changing modes
4	(4)	: Social	9	(5)	: Home
5	(4)	: Recreation	10	(6)	: No Indication

* Note: The numbers in ( ) represent new trip type numbers used in this table.

< Mode >

1	: Private Automobile
2	: Public Transit 1 (Collectibo)
3	: Public Transit2 (Combi)
4	: Walking
5	: Others (Mototaxis)

< Zone >

1~25	: Internal Zones
26~30	: External Zones

Table 6-29 (7) Mode Specific Trips and Modal Share: Origin and Destination by Trip Type (30 zones: morning peak time period)

(a) Trips: Trip Type [All : Total]

\Mode	1		2		3		4		5		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	89	1105	18	364	0	2710	71	84	177	427	354	4690
2	76	1883	454	1698	267	4771	191	99	153	336	1142	8787
3	101	752	51	476	786	984	152	168	51	51	1140	2430
4	16	2646	0	655	62	3230	16	145	10	439	103	7115
5	0	260	157	173	2097	2866	0	0	627	157	2881	3456
6	291	5317	1324	2884	3129	16162	241	241	1194	1635	6179	26239
7	344	1182	215	1000	924	1468	43	87	389	622	1915	4359
8	0	0	784	0	10588	480	0	5	0	0	11373	485
9	64	0	0	416	768	845	32	32	96	32	961	1325
10	2075	261	104	86	1245	702	207	104	622	0	4254	1152
11	350	0	0	0	1137	262	437	453	350	366	2273	1082
12	825	0	471	144	707	118	0	118	354	0	2357	379
13	2056	1380	0	346	3198	2214	575	457	914	865	6741	5262
14	832	0	2081	416	7492	566	0	0	1249	0	11654	982
15	1	0	0	0	2	2142	0	0	0	445	3	2587
16	1175	415	0	0	2115	559	117	0	0	728	3407	1702
17	0	416	1581	416	1437	156	144	0	719	0	3881	988
18	0	0	2344	586	977	0	0	339	195	0	3517	925
19	0	208	208	0	6224	778	389	0	1556	922	8377	1908
20	831	0	0	0	416	416	0	0	0	0	1247	416
21	2598	536	3117	693	4642	14805	0	89	0	1641	10357	17763
22	752	2330	134	369	1268	4018	67	0	403	85	2624	6801
23	3654	640	783	405	261	738	0	2037	0	0	4698	3819
24	5093	207	0	0	11268	104	2037	0	0	0	18398	311
25	0	0	181	0	5428	0	0	0	181	0	5790	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	260	0	0	0	0	0	260
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	261	0	0	0	5	0	266
30	0	89	0	15	0	887	0	0	0	67	0	1058
Total	21222	19626	14008	11143	66439	62499	4719	4458	9238	8822	115626	106548

(b) Modal Share of Trip Type [All : Total]

\Mode	1		2		3		4		5		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	25.0	23.6	5.0	7.8	0.0	57.8	20.0	1.8	50.0	9.1	0.3	4.4
2	6.7	21.4	39.8	19.3	23.4	54.3	16.7	1.1	13.4	3.8	1.0	8.2
3	8.9	30.9	4.4	19.6	69.0	40.5	13.3	6.9	4.4	2.1	1.0	2.3
4	15.0	37.2	0.0	9.2	60.0	45.4	15.0	2.0	10.0	6.2	0.1	6.7
5	0.0	7.5	5.4	5.0	72.8	82.9	0.0	0.0	21.8	4.5	2.5	3.2
6	4.7	20.3	21.4	11.0	50.6	61.6	3.9	0.9	19.3	6.2	5.3	24.6
7	18.0	27.1	11.2	22.9	48.3	33.7	2.2	2.0	20.3	14.3	1.7	4.1
8	0.0	0.0	6.9	0.0	93.1	98.9	0.0	1.1	0.0	0.0	9.8	0.5
9	6.7	0.0	0.0	31.4	80.0	63.7	3.3	2.4	10.0	2.4	0.8	1.2
10	48.8	22.6	2.4	7.5	29.3	60.9	4.9	9.0	14.6	0.0	3.7	1.1
11	15.4	0.0	0.0	0.0	50.0	24.2	19.2	41.9	15.4	33.8	2.0	1.0
12	35.0	0.0	20.0	37.9	30.0	31.1	0.0	31.1	15.0	0.0	2.0	0.4
13	30.5	26.2	0.0	6.6	47.4	42.1	8.5	8.7	13.6	16.4	5.8	4.9
14	7.1	0.0	17.9	42.4	64.3	57.6	0.0	0.0	10.7	0.0	10.1	0.9
15	33.3	0.0	0.0	0.0	66.7	82.8	0.0	0.0	0.0	17.2	0.0	2.4
16	34.5	24.4	0.0	0.0	62.1	32.8	3.4	0.0	0.0	42.8	2.9	1.6
17	0.0	42.1	40.7	42.1	37.0	15.8	3.7	0.0	18.5	0.0	3.4	0.9
18	0.0	0.0	66.7	63.3	27.8	0.0	0.0	36.7	5.6	0.0	3.0	0.9
19	0.0	10.9	2.5	0.0	74.3	40.8	4.6	0.0	18.6	48.3	7.2	1.8
20	66.7	0.0	0.0	0.0	33.3	100.0	0.0	0.0	0.0	0.0	1.1	0.4
21	25.1	3.0	30.1	3.9	44.8	83.3	0.0	0.5	0.0	9.2	9.0	16.7
22	28.7	34.3	5.1	5.4	48.3	59.1	2.6	0.0	15.3	1.2	2.3	6.4
23	77.8	16.7	16.7	10.6	5.6	19.3	0.0	53.3	0.0	0.0	4.1	3.6
24	27.7	66.7	0.0	0.0	61.2	33.3	11.1	0.0	0.0	0.0	15.9	0.3
25	0.0	0.0	3.1	0.0	93.8	0.0	0.0	0.0	3.1	0.0	5.0	0.0
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.2
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	0.0	0.0	98.1	0.0	0.0	0.0	1.9	0.0	0.2
30	0.0	8.4	0.0	1.4	0.0	83.8	0.0	0.0	0.0	6.3	0.0	1.0
Total	18.4	18.4	12.1	10.5	57.5	58.7	4.1	4.2	8.0	8.3	100.0	100.0

* Note: The percentages of "Total" is based on total trips of whale area

< Trip Type >
1 (1) : Work
2 (2) : Personal Business
3 (2) : Shopping
4 (4) : Social
5 (4) : Recreation
6 (3) : School
7 (6) : Waiting for a ride
8 (6) : Changing modes
9 (5) : Home
10 (6) : No Indication

* Note: The numbers in ( ) represent new trip type numbers used in this table.

< Mode >
1 : Private Automobile
2 : Public Transit 1 (Collectibo)
3 : Public Transit2 (Combi)
4 : Walking
5 : Others (Mototaxis)

< Zone >
1~25 : Internal Zones
26~30 : External Zones

zones based on the 6 trip types, and also shows the modal share of trips generated from and/or attracted to the individual traffic analysis zones based on the 6 trip types.

What these tables show is basically the detailed "traffic analysis zone based" OD data of mode specific trips which are summarized in Table 6-24. Table 6-27 shows the detailed information of the total trips shown in Table 6-24 (1)-(a) based on each mode. Table 6-28 summarizes the origin specified trips and destination specified trips shown in Table 6-24 (2)-(a) and 6-24 (3)-(a) based on each specific mode. Table 6-29 also summarizes the number of the origin specified trips and destination specified trips, shown in Table 6-24 (2)-(a) and 6-24 (3)-(a), and the modal share of the specific trips, shown in Table 6-24 (2)-(b) and 6-24 (3)-(b), based on each trip type.

Since the data is quite extensive, the characteristics of only 4 specific traffic analysis zones are analyzed in this section. The selected traffic analysis zones are the traffic analysis zones 4, 6, 10 and 21. Table 6-29 (7), which shows the summary of mode specific data of all trip types, is used for this analysis. Table 6-29 (7)-(a) shows the number of origins and destinations, and Table 6-29 (7)-(b) shows the modal share of the specific trips based on each trip type.

(Traffic Analysis Zone 4)

Traffic analysis zone 4, which is a part of the city central area, is responsible for 0.1% of the total generated trips and 6.7% of the total attracted trips during the morning peak period. The difference between the two portions clearly shows the high attractiveness of this traffic analysis zone.

With respect to the generated trips, Combis are still the most frequently used mode at 60.0% of the modal share followed by private automobiles and walking, both of which accounts for 15.0% of the generated trips. The high share of 15% by walking, compared with the city average of 4.1%, is quite noticeable, and this is likely because of the short distance to the major activity centres.

With respect to the attracted trips, the top three modes are Combis at 45.4%, automobiles at 37.2% and taxi Collectibos at 9.2% of the modal share. From these figures, Combis are used less and automobiles are used more compared with the city averages of 58.7% and 18.4% respectively. This tendency of "less use of Combis and more use of automobiles" is also observed from other city centre traffic analysis zones.

(Traffic Analysis Zone 6)

Traffic analysis zone 6, which consists of the central market, is responsible for 5.3% of the total generated trips, which is 6,179, and 24.6% of the total attracted trips, which is 26,239 during the morning peak period between 6 and 9 a.m.. By considering that this traffic analysis zone accommodates only 0.4% of city population, the large numbers of the share of trips clearly show the quite high attractiveness and importance of this traffic analysis zone in the transportation interaction during the morning peak period. In fact, one in four trips is destined for this traffic analysis zone from all over the city.

With respect to the generated trips, Combis are the most frequently used mode with 50.6% of the modal share, followed by 21.4% of taxi Collectibos and 19.3% of others. By assuming that most of the "others" trips are made by taxis or Mototaxis, the top three public transportation modes account for more than 90% of the modal share. The modal share of automobiles is only 4.7%, which is much lower than the average of 18.4%.

With respect to the attracted trips, the top three modes are Combis with 61.6%, automobiles with 20.3% and taxi Collectibos with 11.0% of the modal share. These figures are all close to the averages of 58.7%, 18.4% and 10.5% respectively. By considering the number of the attracted trips and mode types, it is clear that quite a number of motorized vehicles head for the traffic analysis zone during the morning peak period.

(Traffic Analysis Zone 10)

Traffic analysis zone 10 is located in the central part of Piura, and most of its residents are high to middle class people. This traffic analysis zone, which accommodates approximately 1.0% of the total city population, is responsible for 3.7% of the total generated trips and 1.1% of the total attracted trips during the morning peak period. These figures of the trip share show the productivity, rather than attractiveness, of this traffic analysis zone.

With respect to the generated trips, automobiles become the most frequently used mode with 48.8% of the modal share, followed by Combis at only 29.3% and others at 14.6%. The high use of luxurious "automobiles" at 48.8%, compared with the average of 18.4%, likely shows that the social class of this traffic analysis zone is arguably high, and this is supported by the high average income from the survey shown in Table 5-9. If most of "others" trips are made by taxis or Mototaxis, both of which can be considered semi-private modes, the share of the private or semi-private modes becomes 63.4%, which is quite high. Moreover, the sum of the share of those three top motorized modes becomes 92.7%, and the share of "walking" is 4.9% which is slightly higher than the average of 4.1%.

Interestingly, the distances from the centre of this traffic analysis zone to the most of major activity centers at the city centre are less than two kilometres, which is not too long to travel but a little too long to walk (see Figure 4-4, Gap zones). This statement is, in fact, supported by the modal share of the "walking" trips at the other traffic analysis zones shown in Table 6-29 (b). The share of "walking" trips at the further traffic analysis zones decrease dramatically. By considering the fact that the share of "walking" trips at this traffic analysis zone, which is relatively close to the city central area, is almost the average, people who travel more than reasonable walking distance, which may be around two kilometres, likely chose modes other than walking. Then, if those people can afford some kind of private modes such as automobiles, they just go for the available modes just as those in this traffic analysis zone do.

With respect to the attracted trips, the top three modes are Combis at 60.9%, automobiles at 22.6% and walking at 9.0%. While the share of "walking" trips is higher than the average of 4.2%, those figures for the other top two modes are close to the total average of 58.7% and 18.4% respectively.

(Traffic Analysis Zone 21)

Traffic analysis zone 21 is located in North Castilla and has two major activity centres, the National University of Piura and the regional hospital. This traffic analysis zone accommodates only 0.5% of the total city population and their social status is high. This traffic analysis zone is responsible for 9.0% of the total generated trips and 16.7% of the total attracted trips during the morning peak period. Those figures, both of which are much higher than the share of the zonal population, clearly show both the high attractiveness as the third biggest destination and the high productivity of the traffic analysis zone.

With respect to the generated trips, the top three most frequently used modes are Combis at 44.8%, Collectibos at 30.1% and automobiles at 25.1%. The major difference of the share structure of this traffic analysis zone from the average is the shift of modal share from Combis to Collectibos and/or automobiles. In the total modal share, Combis, Collectibos and automobiles accounts for 58.7%, 10.5% and 18.4% respectively. This fact arguably supports the high status of this zone because automobiles are clearly considered more luxurious than Combis, and even Collectibos can be considered more luxurious than Combis .

With respect to the attracted trips, Combis predominate the modal share at 83.3%, followed by others at 9.2% and taxi Collectibos at only 3.9%. Surprisingly, automobiles, which is responsible for the second highest 18.4% of the total modal share, account for only 3.0% of the zonal modal share. The large modal share of Combis and the small modal share of automobiles and Collectibos are likely the result of the routes of the Combis, their frequency and users' characteristics. Many "Combi" companies use the National University of Piura and/or the regional hospital as a terminal or a stopping spot of their route, and as a result the frequency of Combis is quite high in this traffic analysis zone. As for users, most of them are likely university students and hospital patients who often prefer to use less costly modes and who consequently do not have many choices of mode.

6.5 Conclusion

This chapter analyzed the individual trip record part of survey as the travel characteristics of Piura. The discussions were on trip attributes, the summary of row data, the total estimated data based on multiplication factors, the trip characteristics based on PPL3, and mode specific person trip characteristics during the morning peak period.

Through the analysis in this chapter along with the analysis on household data performed in the previous chapter, the understanding of the travel characteristics of the city of Piura is certainly increased. Thus, the first purpose of this study, "to increase the understanding of human activities and trip characteristics in the city of Piura", is achieved successfully.

Chapter 7

Software Application and Analysis of Transportation System

The transportation planning software, T-model2, is introduced in this chapter. The primary purpose of applying T-model2 is to construct a prototype transportation model for the city of Piura. First, the fundamental functions of T-model2, such as the basic modeling concept, modeling procedure and simulation procedure are explained. Second, the modeling of a transportation system for Piura is developed based on a traditional four step transportation modeling method. Each step of the applied methods, the problems of the application and methods developed for this study are explained. Third, the analysis of the modeling are conducted in order to evaluate the workability of the model for the city. Finally, this chapter concludes with a summary of the analysis.

7.1 Modeling a Transportation System for Piura

7.1.1 Introduction of T-model2 as a Transportation Modeling Tool

T-model2 is supportive software which is designed as a powerful and cost-effective tool for transportation modeling. It can be used for analyzing near-term and/or future transportation demands and systems. It is also used to model a regional system or to analyze the impact of localized development.

The principle elements of transportation modeling in T-model2 are (1) the network, (2) the land use characteristics, and (3) the travel and behavioral characteristics. The network consists of links (streets) and nodes (intersections). Traffic using this network is generated and/or attracted by land use (residences and business), and it originates or ends on the network at points called zone centroids or internal zones. The actual zone is an area delineated to include all the land uses surrounding the zone centroids which load traffic onto the network at those zone centroids. In this way, all zones are described as nodes (intersections) and act as nodes in the simulation. Further, there are external zones, usually around the perimeter of the network, which represent traffic to and from the outside world. For these external zones, T-model2 usually uses traffic count information on the links which connect to those zones rather than land use information in order to quantify their interaction with the modeling area and with each other. Driver behaviour is characterized by much of the data and equation parameters of the model. This modeling data is set to quantify drivers' desires, habits, and perceptions.

The major modules of T-model2 are "distribution" and "assignment." The distribution module distributes trips. That is, given a probable number of trips from any zone based on the land use, and given driver behavioural characteristic as described by the "gravity model" parameters, the module apportions those trips out to the most probable zones as destinations. Then, the assignment module assigns the trips. That is, puts them on the most likely paths or routes between zones.

Moreover, while the T-model2 system duplicates the traditional network analysis methods, it also has other extensive uses for transportation modeling. For instance, T-model2 is designed to develop a peak hour model which dynamically models intersections, including methods to model partial stop sign control, all-way stop sign control, or signal control. Origins and destinations can be loaded to the network using a centrally located node in each zone; eliminating the need for centroid connectors. These and other features, including the easy editing options, make T-model2 an efficient tool for transportation system analysis.

While a transportation model is deterministic, which means that a transportation model always produces the same results given the same input, its development and calibration often requires insight: consistent and good results depend on consistent descriptions of land use and transportation system data, a dependable calibration methodology and knowledge of local conditions. Therefore, while there are many approaches which produce successful models, documentation of data, the files, the procedures, the assumptions, the calibration methods and any other pertinent information is critical. Given the amount of data, the number of decisions and assumptions, the elapsed time necessary to develop a model and the extended period over which it becomes useful, it is very important to establish a systematic and useable set of notes detailing its development and application rules for the future use of the model.

Finally, a transportation model or traffic simulation model is a snapshot in time of traffic conditions. It can only satisfy a certain set of conditions and produce a specific set of vehicle volumes. T-model2 is not an exception. Therefore, deciding the time and periods, such as hour (often peak hour), the day of the week, the month of the year and the year is important. The data which are not collected specifically for that hour, day, month and year should be adjusted to that snapshot.

7.1.2 Modeling Procedure

Basic Modeling procedure of T-model2 has 17 steps as shown below. In this study, however, only the first 15 steps are followed simply because the primary purpose of this study is to construct a prototype transportation model, and not to perform alternative scenarios or other extensive options. This section explains these steps of the modeling procedure in this study. Those 15 steps are summarized into three stages of the modeling procedure in this section: (1) Setting the Modeling Goal, (2) Setting Network and Land Characteristics, and (3) Perform Simulation and Calibration.

① Establish model goals
② Establish map base
③ Track network
④ Locate zone boundaries
⑤ Establish zone numbers
⑥ Establish node numbers
⑦ Digitize the network
⑧ Describe link characteristics
⑨ Describe node characteristics
⑩ Verify network data
⑪ Describe land use characteristics
⑫ Perform trip generation

⑬ Gather calibration (count) data
⑭ Perform Distribution and Assignment
⑮ Calibration
⑯ Alternative scenarios
⑰ Other options

7.1.2.1 Setting the Modeling Goal

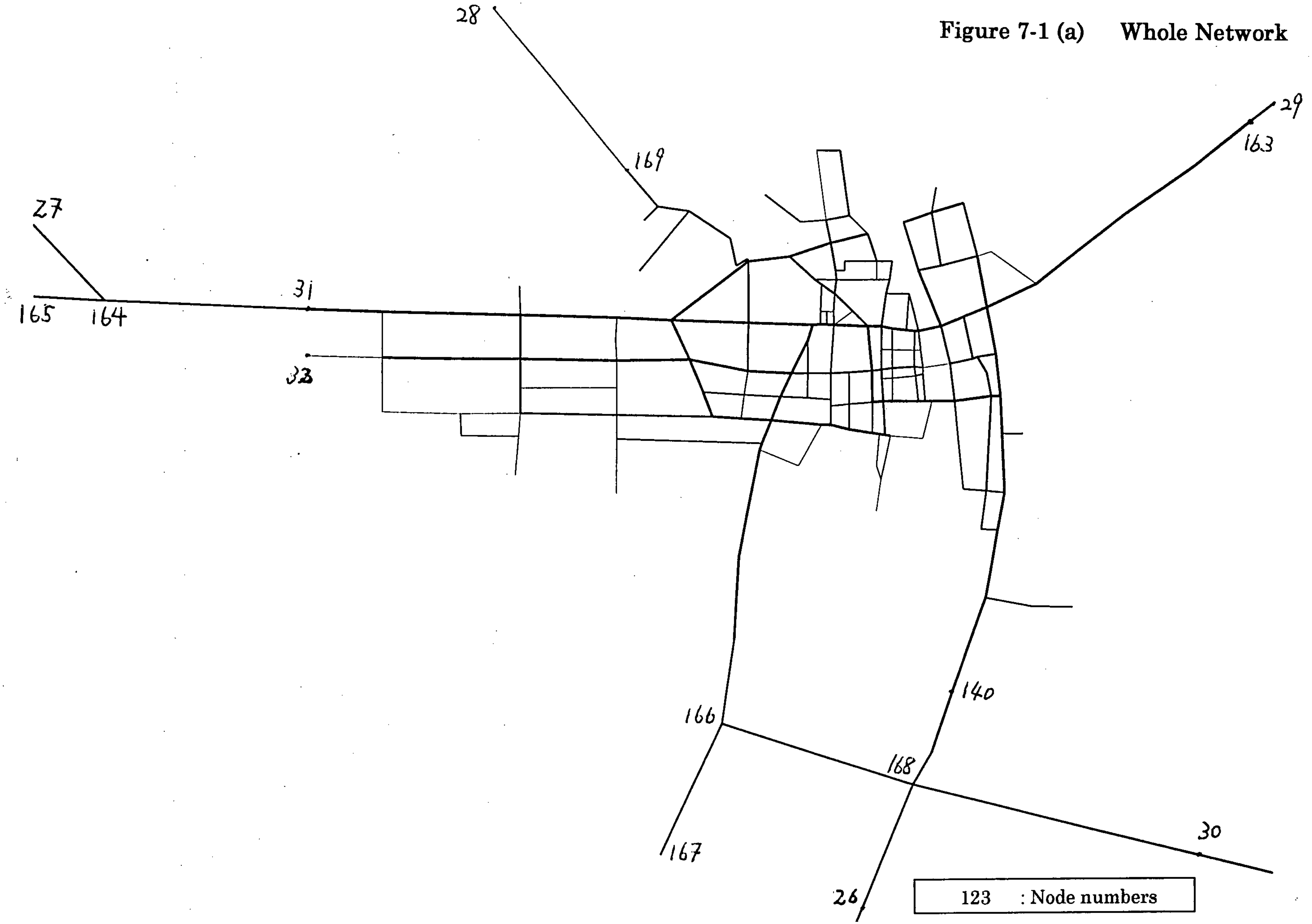
First, the modeling goal has to be established. The goal for this study is to construct a prototype transportation model which will be the benchmark of a transportation system analysis tool for the city. Therefore, the goal of this application is not to verify the model, but to summarize the application results for the next step. Since this study is the first extensive transportation study which deals with travel behaviour in the city, both quantity and quality of available data are limited. Therefore, the model constructed for this study is simplified as much as possible, and do not use any extensive function offered by T-model2. Further research is expected in order to verify this model.

7.1.2.2 Setting Network and Land Characteristics

The second step of modeling is setting-up the primary elements of transportation modeling. Those elements are (1) network and (2) land use characteristics. First, the study area has to be set. The study area in T-model2 modeling includes both internal and external zones. The 30 zone system shown in Figure 5-3 is used as a map base, and Figure 5-3 also summarizes zone boundaries and zone numbers used for the simulation setting.

Second, the actual network with in the study area has to be set. Figure 7-1 (a) to (h) summarizes the network with node numbers. Figure 7-1 (a) shows the whole network with external zone and node numbers. Figure 7-1 (b) to (g) show detailed maps of six segments of the city: West Piura, North-Central Piura, Central Piura, South-Central Piura, North Castilla and South Castilla. Figure 7-1 (h) shows a more detailed map of the central city. In T-model2, traffic analysis zones are treated as nodes. That is, zone centroids which represent traffic analysis zones are nodes. In this way, zones are specific nodes where trips begin or end. In Figure 7-1, the node numbers of 1 to 30 represent the zone centroids of traffic analysis zones

Figure 7-1 (a) Whole Network

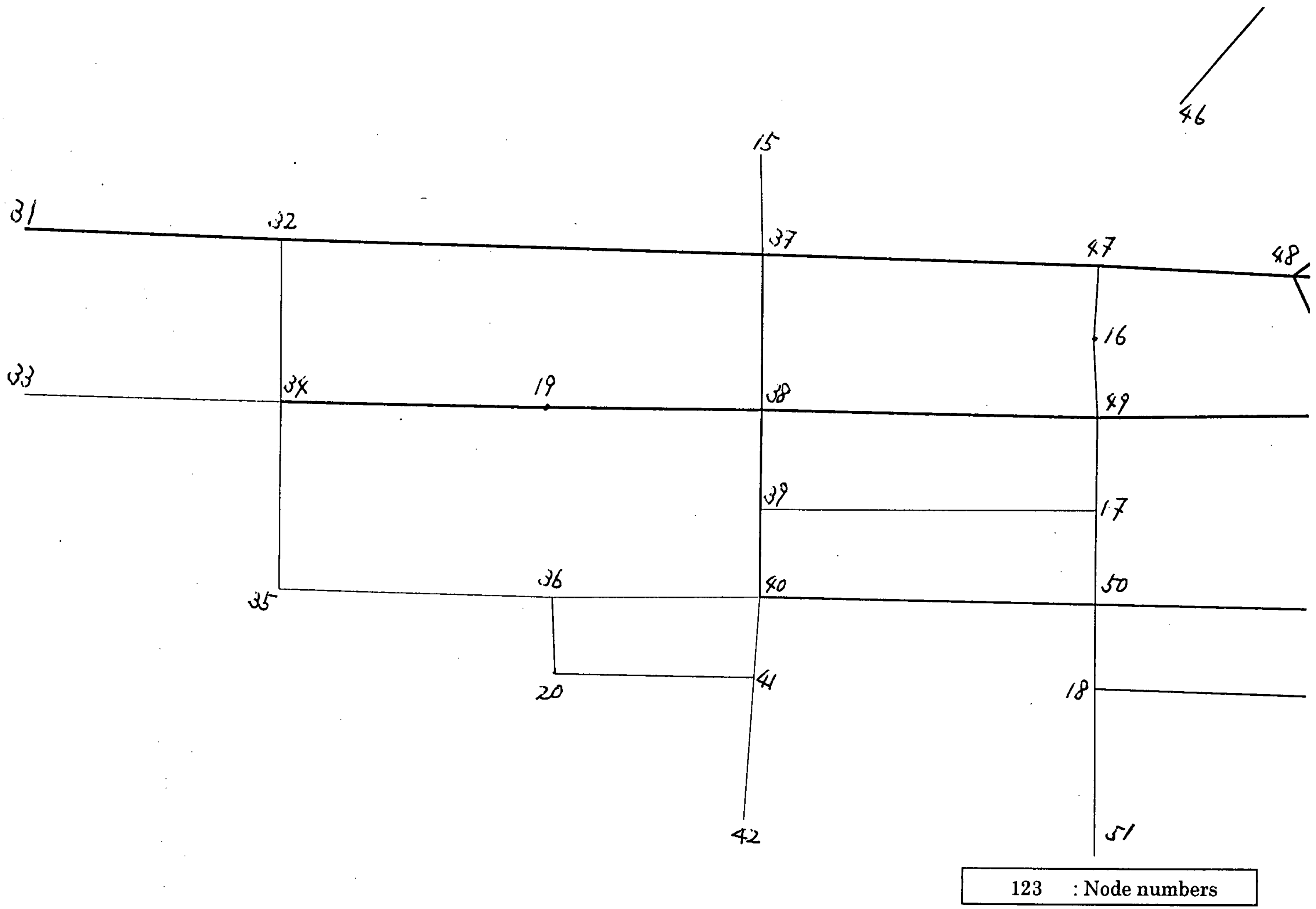


TMODEL™2

Transportation Network
Piura, 1993
G D HAMILTON & ASSOCS CONSULTING LTD. VANCOUVER, BC

P93.LNX
P93.NDE
P93.DAF
LL: 6500/10000
UR: 20000/20000
03-13-1998

Figure 7-1 (b) West Piura



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UR: 13500/17500
03-13-1998

Figure 7-1 (c) North Central Piura

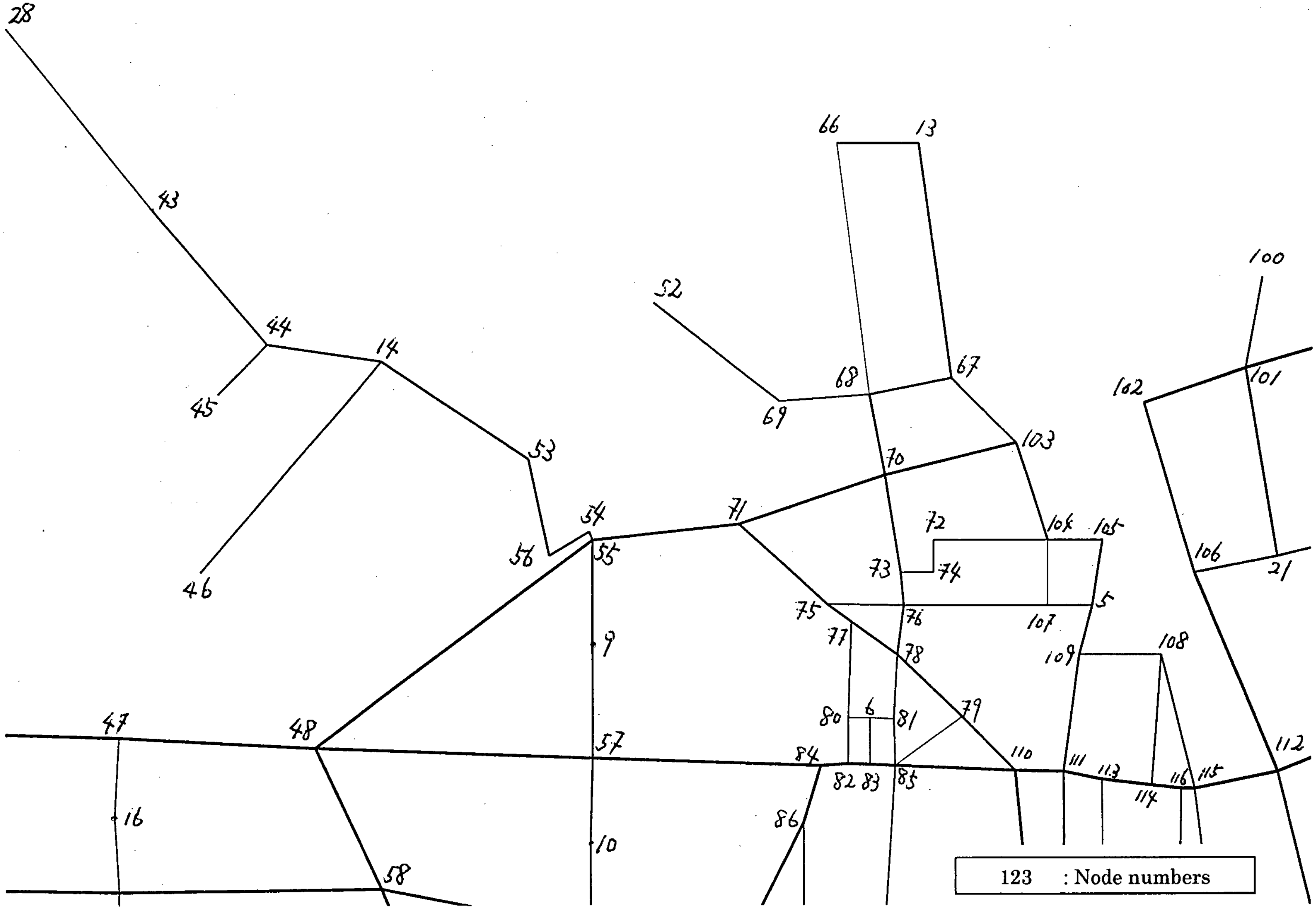

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Figure 7-1 (d) Central Piura

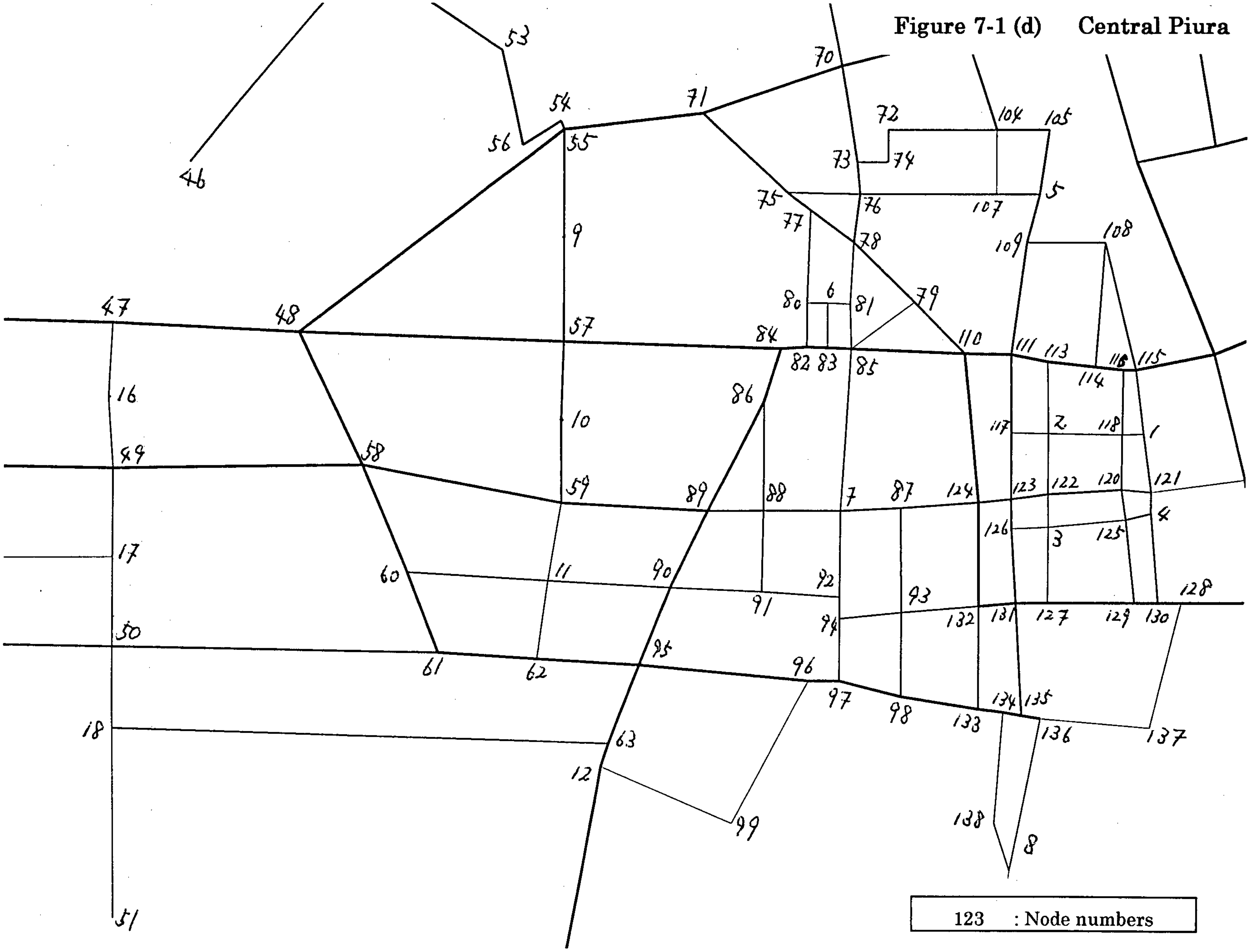

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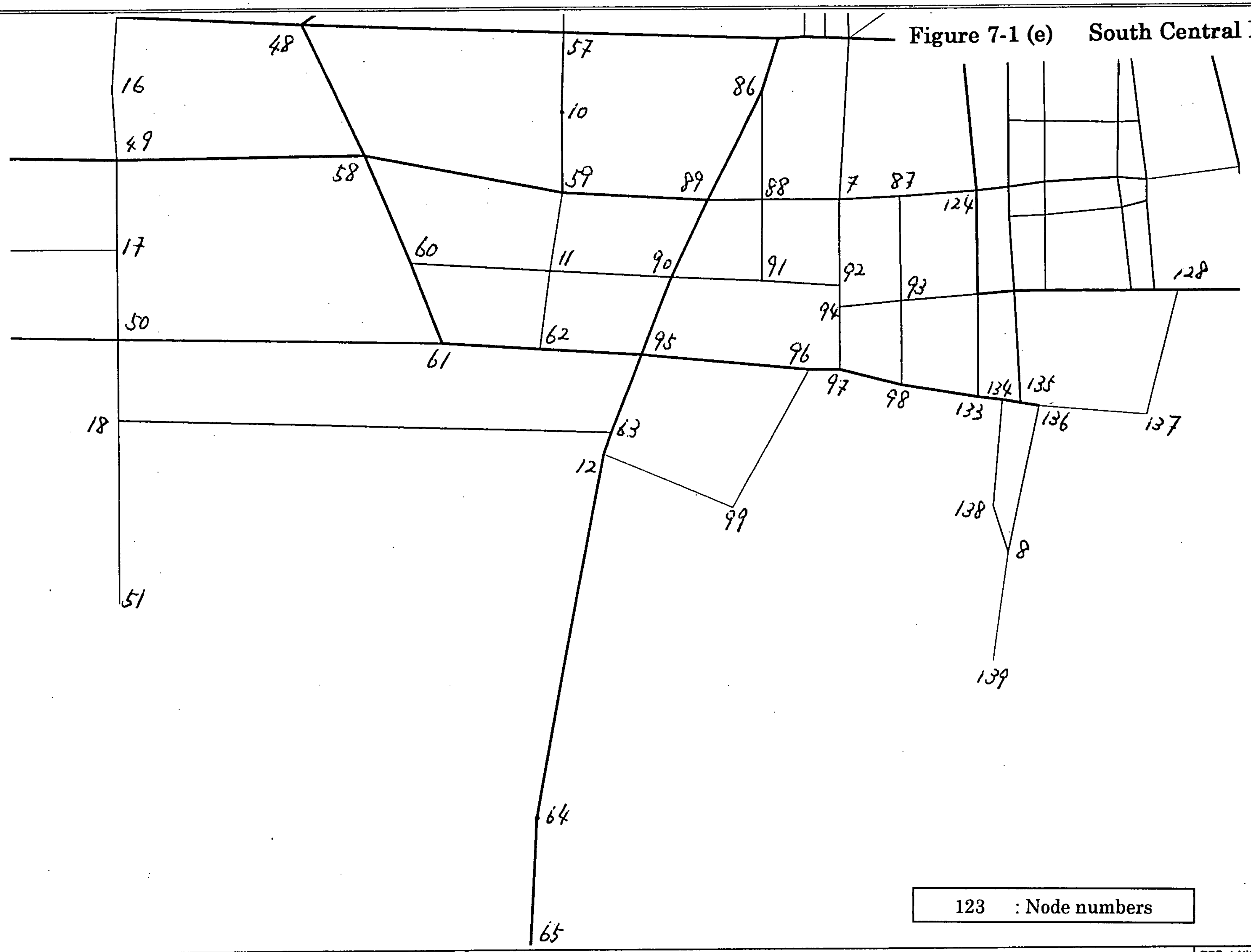
Figure 7-1 (e) South Central Piura



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Transportation Network

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03-13-1998

Figure 7-1 (f) North Castilla

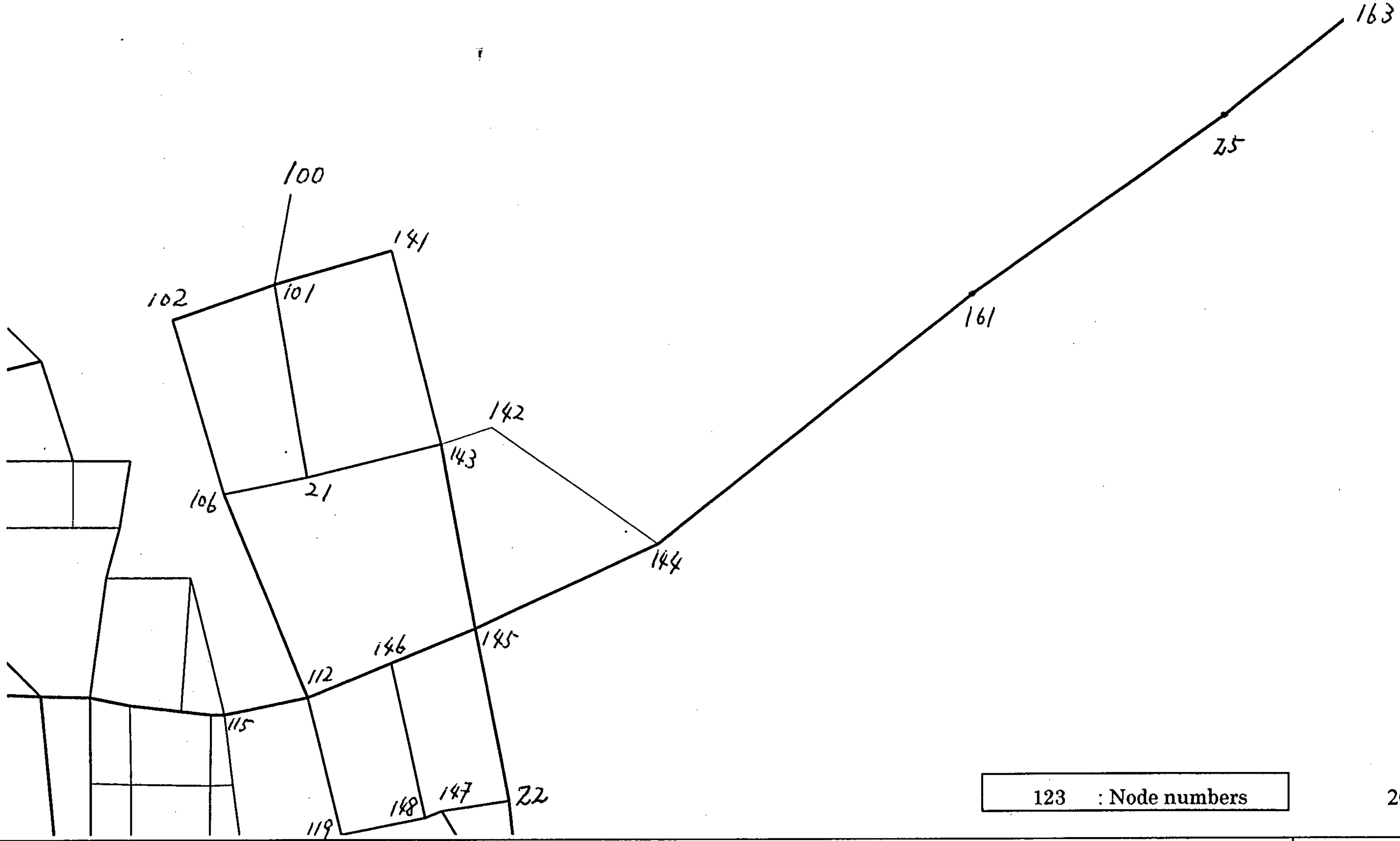
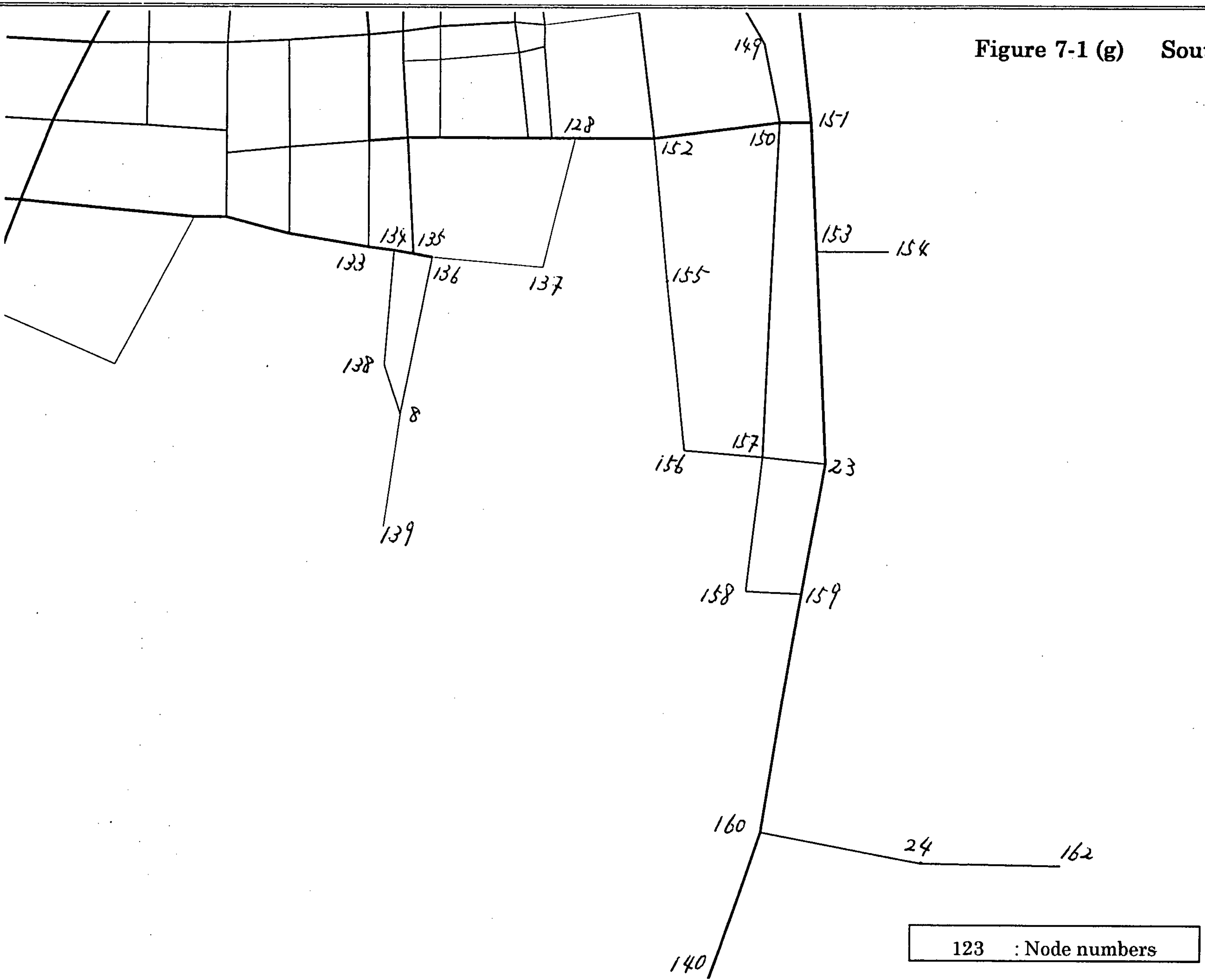


Figure 7-1 (g) South Castilla



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Transportation Network
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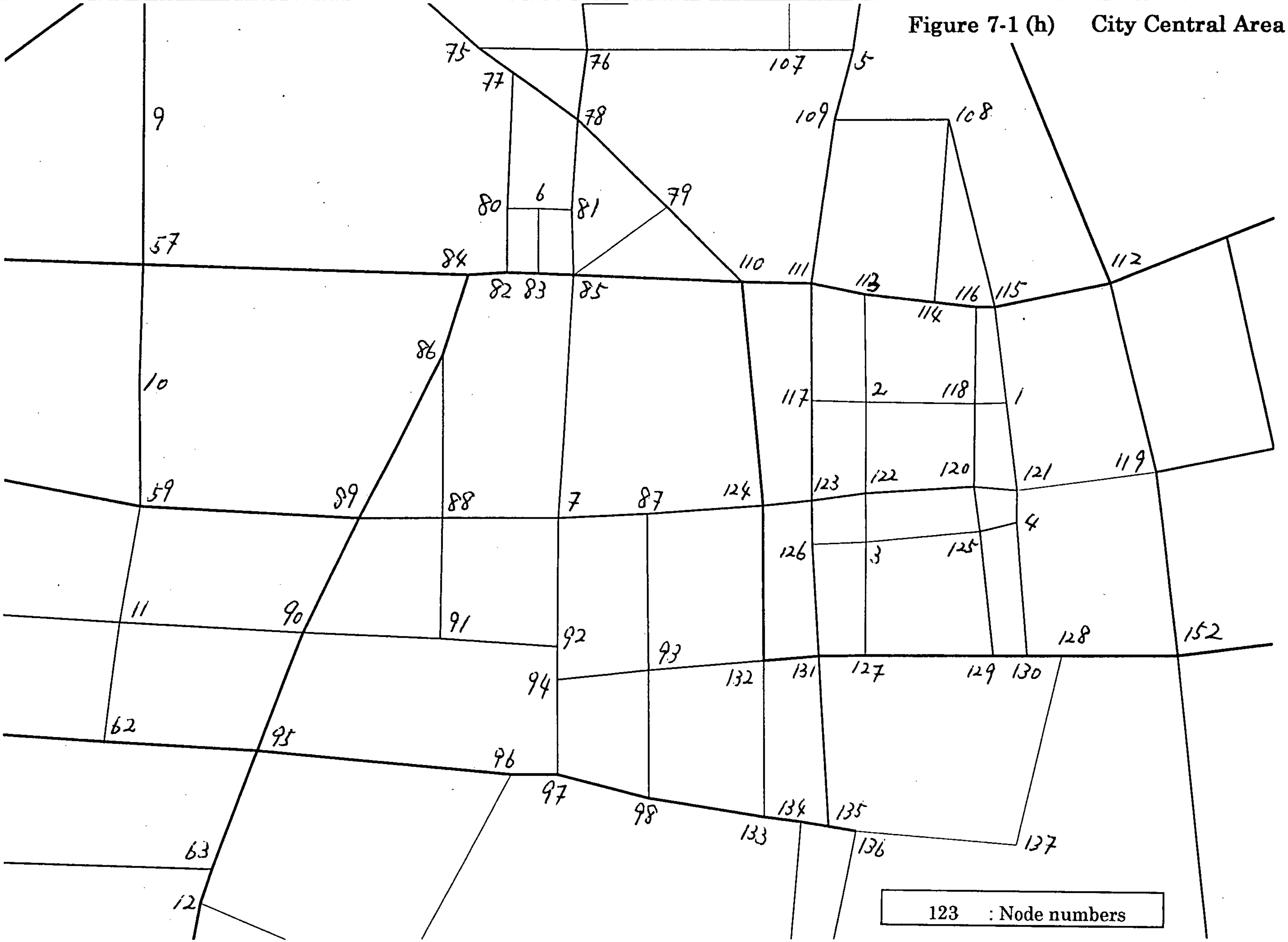
Figure 7-1 (h) City Central Area



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Transportation Network

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1 to 30 respectively. Other nodes are numbered from 31, based on their location: the lower the node numbers are, the more west or north their locations are. All nodes, including those zone centroids, are intersections in terms of their operating characteristics.

Then, the attributes of the network such as node characteristics and link characteristics have to be set. The primary link characteristics are design speed (free flow speed), capacity, the number of lanes and direction of links. They have to be specifically set for each link. Table 7-1 summarizes the classification of link setting, and Figure 7-2 and Figure 7-3 show the setting of design speed and capacity on the actual network respectively. The colours in Figure 7-2 and 7-3 correspond to the colours presented in Table 7-1. Moreover, the width of links in Figure 7-1 also corresponds to the classification: the thicker the width, the smaller the class numbers. The number of lanes is also important because the capacity used in T-model2 is the capacity per lane, not per link. Since this attribute directly changes the performance of the network, checking the capacity of a whole link becomes important. As for the direction, T-model2 treats a two-way link as a set of two single links. This method eases to model one-way streets. This function is also useful to characterize roadway segments which have different operating characteristics in each direction. Another important link characteristic is the distance of links. Since travel times of links or ones between zones are calculated by T-model2 using digitized locations of nodes and design speed, comparing the calculated travel time with actual travel time is useful to verify the basic network travel characteristics. In fact, the network shown in Figure 7-1 is compared with estimated travel times which were obtained from the investigation during the visit to the city. For the nodes, on the other hand, no specified attributes are used except their digitized locations. The node capacity, which is the primary attribute of nodes, is set as a constant for all nodes. The constant is set big enough so as not to discriminate against specific nodes. In this way, the network characteristics become more dependent on link characteristics, and this condition can help make the modeling simpler.

Table 7-1 Setting for Links: Capacity and Design Speed

Class	Description of Links	Capacity (/lane)	Speed (mile/hour)		Colour
			Standard	Range	
1	Highway A (interstate)	1500	45		red *
2	Highway B (interurban)	1500	40		" *
3	Highway C (urban)	1400	40		" *
4	Highway D (urban)	1400	35		"
5	Major Arterial A (wide)	1400	30		"
6	" B (narrow)	1200	30		"
7	Minor Arterial A (wide)	1200	25		green
8	" B (narrow)	1000	25		"
9	Major Collector	1000	20		yellow
10	Minor Collector	800	20		"
11	Residential	800	15		light blue
12	Unpaved	800	15	~ 20	"
13	Centroid Colector	variable	15		blue
14	Special 1	800	10		light blue
15	Special 2	600	15		"
16	Future Consideration 1				
17	Future Consideration 2				
18	External connector 1				
19	External connector 2				
20	External connector 3				

* : The colour is purple if located outside of the city area.

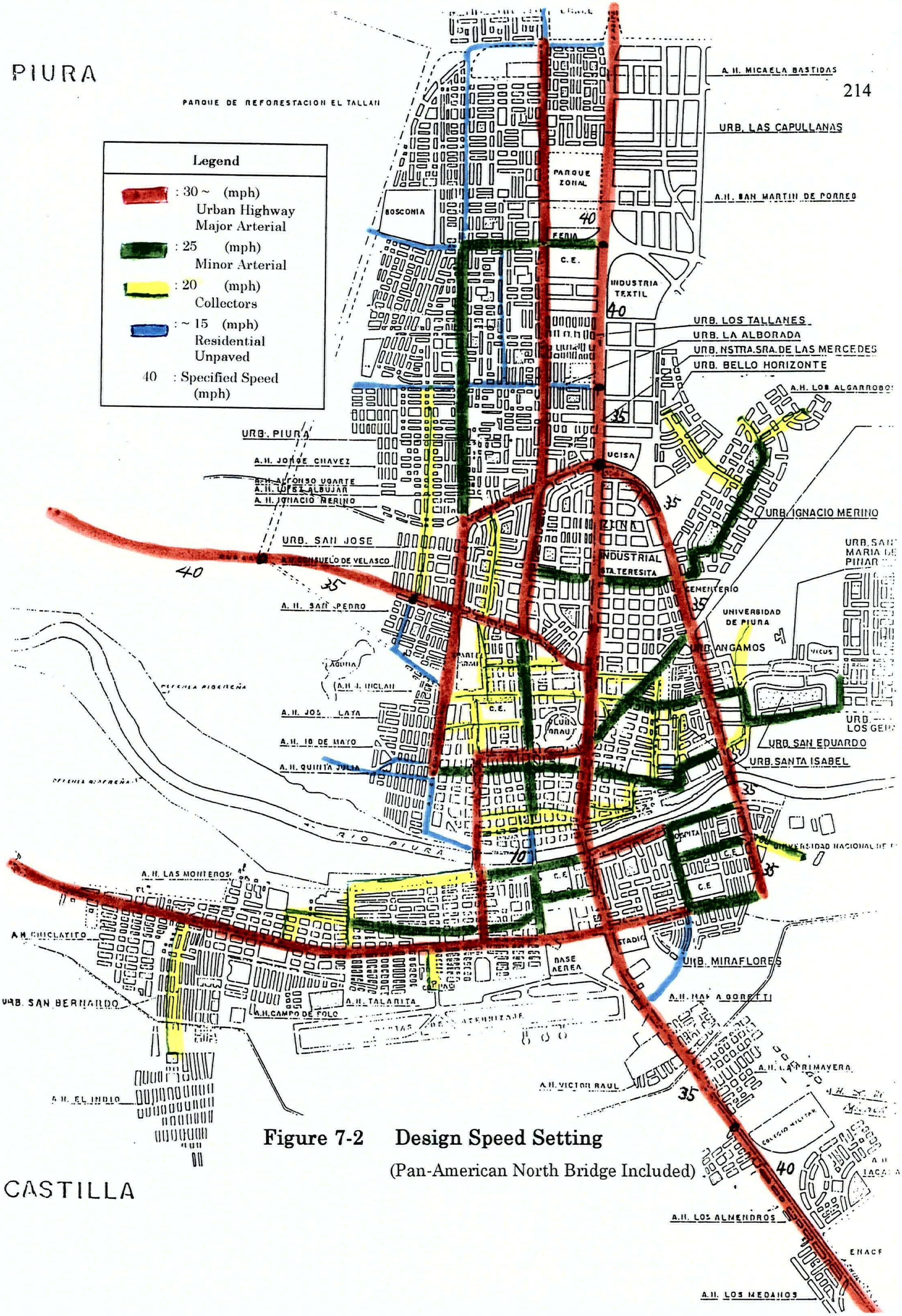


Figure 7-2 Design Speed Setting

(Pan-American North Bridge Included)

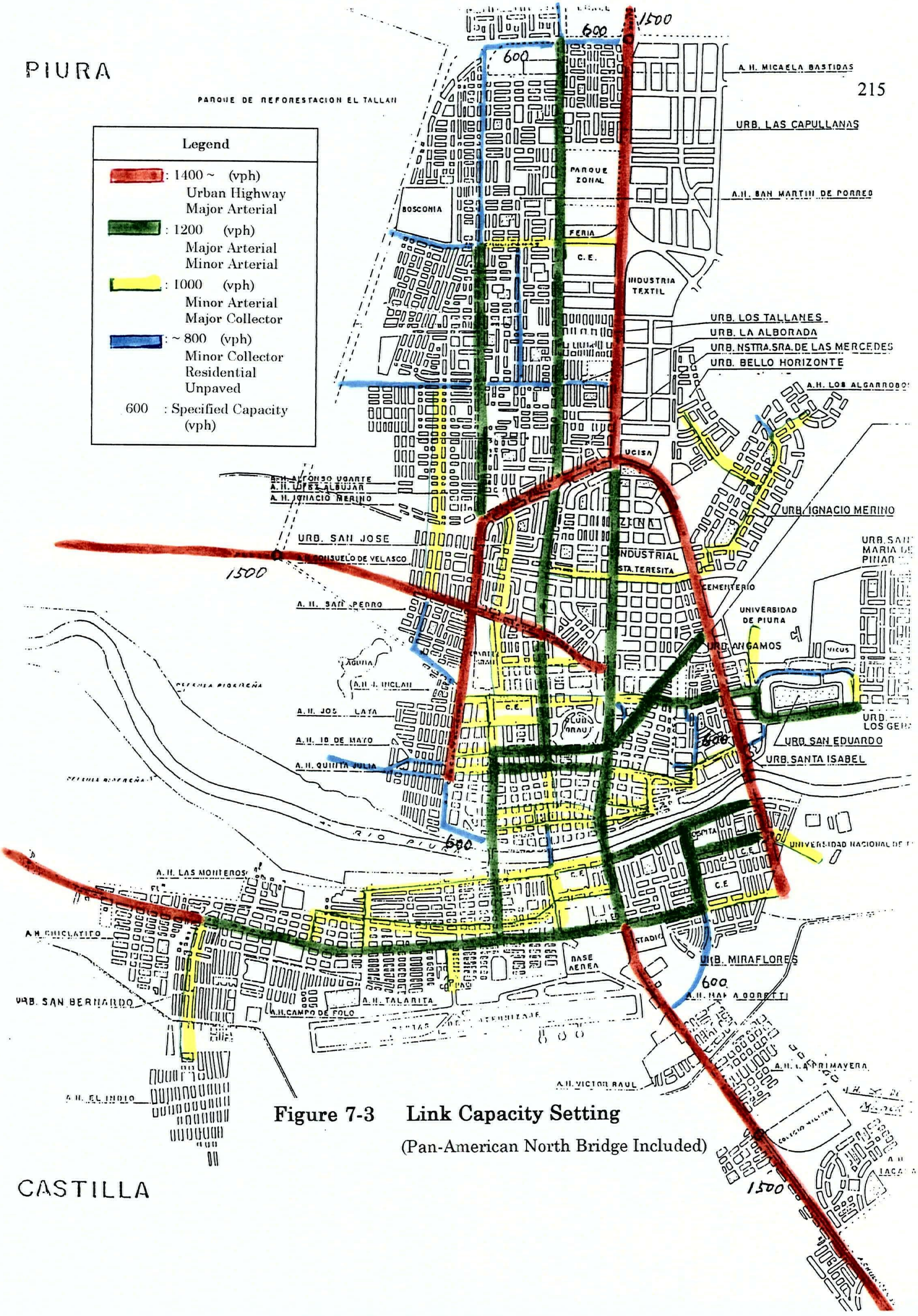


Figure 7-3 Link Capacity Setting

(Pan-American North Bridge Included)

Finally, land use characteristics have to be set. The land use characteristics, which quantify the land uses and which are used in T-model2, are four-folds: (1) single family dwelling units, (2) multiple-family dwelling units, (3) retail employees and (4) non-retail employees. For (1) and (2), the numbers of the item 13 and 14 in Figure 5-8 are used respectively: the item 13 and 14 in Figure 5-8 show the numbers of estimated single family dwelling units and multiple-family dwelling units from the survey respectively. For (3) and (4), no specific data are obtained. Instead, the number of estimated destined trips of type "shopping" and "work" shown at the section of destinations for all day period in Table 6-22 (c) and (a) respectively are used. This data is used to calculate origins and destinations.

In addition, in order to simplify the model and to focus on the traffic produced in the city area, external generated trips or trips made by non-city residents are not estimated and also not used in the simulation. This is mainly because of the lack of data of the external zones and traffic. As a result, the numbers of origins and destinations of externals in the actual simulation is likely much smaller than the real situation: the estimated external related trips are only produced by city dwellers.

7.1.2.3 Perform Simulation and Calibration

T-model2 is based on the traditional four step transportation modeling methods. In the actual simulation, however, only distribution and assignment steps are dealt automatically while the other two steps, trip generation and modal split, are calculated manually. Therefore, those four steps are basically separately performed, and also evaluated independently.

The evaluation of the model is performed as a presentation of the calibration results of the study period. First, the parameters for each step are adjusted. Then, simulation results are compared with other available data. The available data are (1) the estimated trip tables from the household survey and (2) traffic counts in 1993. Since available data in terms of both quantity and quality are limited, the comparison also has to be simplified. Since the model is simplified as much as possible, it should be further verified based on more reliable data from future research.

7.1.3 Basic Simulation Procedure

"Simulation procedure" in T-model2 is a set of actual "Distribution and Assignment" simulation steps. The procedure basically has 10 steps as shown below, and this section describes them. Figure 7-4 shows the typical flowchart of "Incremental loading procedure" of T-model2, which is used for this study, as the summary of the steps. In addition, T-model2 has another available method, "Iterative loading procedure." Since the steps of the "Iterative loading procedure" is almost identical with the ones of "Incremental loading procedure," they are not presented in this study.

① Setup Procedure
② Load Files
③ Calculate Link Travel Times
④ Calculate Node Delays
⑤ Assign Node Delays to Links
⑥ Weight Travel Times
⑦ Find Shortest Path Vines
⑧ Calculate Gravity Model
⑨ Assign Trips
⑩ Save Files

① Setup Procedure

The first step of "Distribution and Assignment" simulation is setting-up its procedure. This setup procedure is basically set to be saved and printed out as a summary report for model documentation.

② Load Files

At the beginning of the Distribution and Assignment, all of the files specified by the users are loaded into the computer's memory. In the "Full-Featured Distribution and Assignment" simulation, the number of usual loaded files are 9: DNA (setup-procedure) file, node source file, node delay source file, link source file, link delay source file, turn penalty file, turn penalty type file, origin and destination file and vine (shortest path) file.

Among those 9 types of files, only 5 have specifically been set. The files are DNA (setup-procedure) file, node source file, link source file, origin and destination file and

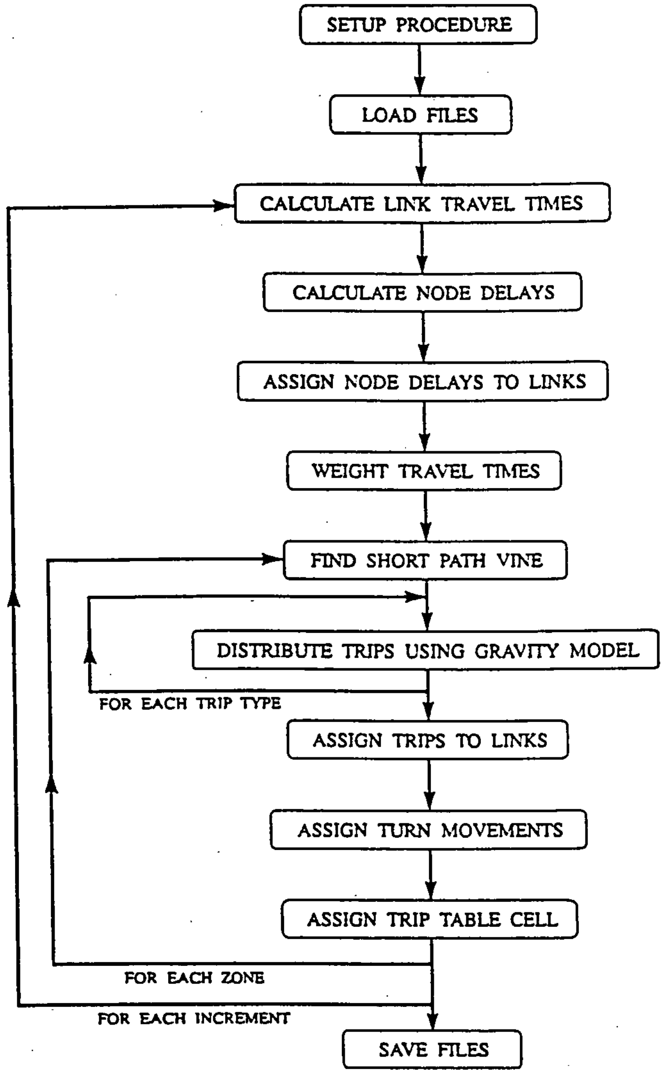


Figure 7-4 Flowchart of T-model2 Incremental Procedure

Source: T-model User's Manual (1993)

vine (shortest path) file. For the other 4 files of node delay source file, link delay source file, turn penalty file and turn penalty type file, default values or non-specific values are used in order to simplifythe model.

③ Calculate Link Travel Times

At the start of each increment or iteration, the link travel time is calculated using the volumes presented and the constraint functions. First, the "no-load" travel time is calculated. The calculation is a straight-forward procedure using the link length and design speed. Units are adjusted, with the resultant travel time being expressed in minutes. The travel time is then adjusted using the Link Delay Coefficients (LDC) file specifications for the different roadway classes. In this study, the following traditional BPR (Bureau of Public Roads) formula is used:

$$T_L = T_0 \left\{ 1 + 0.15 \left(\frac{V}{C} \right)^4 \right\} \tag{7.1}$$

where T_L = adjusted link travel time

T_0 = "no load" travel time

V/C = volume / capacity ratio

④ Calculate Node Delays

Node delays are calculated by examining the total entering volumes. The entering volumes are compared to the specified node capacity. The delay is computed by using the Node Delay Coefficient (NDC) files specified in the setup procedure. The delays are computed using the following equation. The equation was derived in *Transportation Research Circulate* 212 through regression analysis which compared average delays to V/C ratios. In this study, the capacities for all intersections are set as a constant of 10,000 which is big enough to cause small effects by node delay and to reduce the risk of misuse of lacking data on intersections.

$$ND = 0.64\left\{\left(\frac{V}{C}\right)^2\right\} + 0.04 + BS \tag{7.2}$$

where ND = node delay

BS = base delay

V/C = volume / capacity ratio

⑤ Assign Node Delays to Links

At this point, the node delays calculated in the previous step are assigned to the network links. In addition, no Special Delay Links (SDLs), the delay used for the approaches which do not follow the node delay equation in section ④, are assigned to the node in this study. This means that the resultant node delay is assigned to all links terminating in the node.

⑥ Weight Travel Times

After steps ③, ④ and ⑤ are completed, the link travel times are weighted according to time and distance. The weights are applied using the following equation. It is recommended that one uses the ratio of 0.9/0.1 for W_t/W_d in the T-model2.

$$WTT = \{W_t \times (T_L + ND)\} + (W_d \times T_L) \tag{7.3}$$

where WTT = weighted travel time

W_t = weight on travel time

T_L = link travel time

ND = node delay

W_d = weight on distance

T_L = link length in miles (or kilometres)

⑦ Find Shortest Path Vines

Shortest path vines are built to and from each zone using a proprietary algorithm set in T-model2 software (although the details of the algorithm are not found in the manual). This algorithm allows dynamic turn penalties although no special penalized turn is used in this study for the reason of simplicity.

The Full-Featured Distribution and Assignment (FFDA), the primary method of T-model2 simulation, saves each vine for use in the later Assignment process. This module builds all vines and saves them on a disk. In addition, the FFDA performs forced trip destination balancing before proceeding with the assignment, and the travel time matrix of each increment or iteration can be saved in this step.

⑧ Calculate Gravity Model

The trip length distribution curve derived from either an actual origin-destination survey or from a gravity model distribution and assignment is a manifestation of two interacting notions. The first notion is simply the spatial layout of the possible trip end locations. There are residences and business activities in reality and they are arbitrarily combined into traffic analysis zones for modeling purposes. When trips are distributed from zones to other zones, regardless of the distances between them, there would be a reasonably normal trip length frequency distribution curve. The second notion is the behavioral aspect of human activity. For economic and time reasons, people usually will choose a shortest trip over a longer trip to satisfy their needs. The gravity model is a mathematical attempt to insert the behavioral notion into transportation modeling.

The gravity model is computed for each trip type and for each zone for each increment or interaction. Among several forms of the gravity model, T-model2 uses the Inner Mode Subtractive (IMS) gravity model. The formula for this model is expressed as below, and the brief discussion of the derivation and the ideas behind this version of the gravity model are followed.

$$T_{ij} = \frac{\dfrac{P_i A_j}{\left\{ \left(D_{ij}\right)^{\beta} + K\left(D_{ij}\right)^{\alpha} \right\}}}{\sum \dfrac{A_j}{\left\{ \left(D_{ij}\right)^{\beta} + K\left(D_{ij}\right)^{\alpha} \right\}}} \tag{7.4}$$

where T_{ij} = trips between zones *i* to *j*

P_i = productions (origins) at zone *i*

A_j = attractions (destination) at zone *j*

D_{ij} = distance between zones *i* and *j*

K = constant

α, β = exponents

Application of the "gravity model" in transportation modeling is derived from earlier work, based on some fundamental economic interactions or the concept of "social physics". The assumption is simply that more interactions, such as trips, take place where more interactions exist and where the cost of interacting is less. As with the physics of gravitation, it has been found that for many human interactions the frequency of interaction is inversely related to the distance or cost between interactions and may be described using a negative exponential function. Since it is used in the denominator, this function, β, appears to be positive.

When including the cost of operation and time, certain modes dominate for certain ranges of trip length (refer to Figure 4-4, Gap Zones). However, there are probably quantum jumps of the proportionality factor due to structural cost changes such as the difference in cost of walking versus owning an automobile. If the primary interest is in roadways or automobile transportation, subtraction of any competing inner modes, such as walking and some urban bus travel, and of any competing outer modes such as airline travel must be somehow accounted for.

The outer mode problem does not usually have to be dealt with. While the friction caused by longer distance actually increases, it is often caused by the concept of "social physics" and not by the existence of competing modes. The substantially less frequencies at the greater distances for automobile traffic also support this statement. Moreover, the distance is not often the primary competing factor for automobile traffic for the long distance travel. Other competing factors, such as convenience, time and cost, also become important for the mode choice if there is other available modes while the available modes are often already limited.

For the inner mode competition, the friction caused by the distance for automobile trips actually increases for shorter trips below a certain distance, and increases to the point of eliminating auto trips for very short distances. To simulate this for modeling, it is necessary to add a second term to the friction of the distance function. This is a negative exponential function, α, to account for the decreasing competition as the distance increases. Further, it contains a proportionality factor, (constant, *K*) to account for any structural change in the cost for walking, and there is a quantum change in the time involved in walking versus driving. While these are offsetting in this case, they are not likely to be perfectly offsetting. However, since the original simple distance function is preferred because of the simplicity for modeling, both the negative exponential function, α, and the constant, *K*, are set to be equal to zero for this study.

Trips internal to the traffic analysis zones are also distributed by the gravity model using the "intrazonal" travel time. If intrazonal times are zero, the model will use the average of the times to the next lower and next higher numbered zones. It is recommended that the intrazonal times be established when trip generation is performed to assure more realistic estimates of the intrazonal times.

When the "Full-featured distribution and assignment" is performed, the gravity model will iterate through until the limits are met. The attractions or destinations are adjusted to attract more or fewer trips until the approximate correct number are attracted to the zones. In order to make the balancing procedure better, the total origins and destinations are set equal at the start of the procedure.

⑨ Assign Trips

After the gravity model has been calculated for each trip type, and the through movements from the input trip table are added, all trips are assigned to the trip table and the links. The trips are assigned to the links using the "shortest path vines," which represent the sets of links on the shortest paths. The volumes are rounded to the closest integer at this point. In addition, trips passing through any of the nodes with turn penalties are accumulated to properly compute the dynamic turn penalties.

⑩ Save Files

After the final increment or iteration, the files are saved to the disk using the names specified in the setup procedure. The output files are trip tables, travel time matrices, a loaded link file and a setup summary file.

7.2 Development of Modeling the Transportation System

7.2.1 Problem of Applying T-model2 for Piura

While the basic modeling and simulation procedures follow the steps mentioned in the previous section, a problem of applying T-model2 for Piura becomes evident. The problem is the treatment of a "multi-modal split" when transportation infrastructures are shared by various modes. This problem occurs when the results of modal split are applied to the assignment runs: what the modal split function of T-model2 does is to create "mode specific" trip tables which are later used to assign the "mode specific" trips on "mode specific" networks separately. This means that the results of "modal split" available in T-model2 are separated "mode specific" trip tables for separated "mode specific" assignments.

These separated "mode specific" assignments are the problem causing difficulties in setting of separated "mode-specific" networks and a possible cause of errors in the total results which can be obtained by summing up the results of the separated "mode specific" assignment runs when various modes share a limited infrastructure. Also it does not fit the primary purpose of constructing a simplified model. For these reasons, assigning trips of various modes on separated networks is preferably avoided especially for Piura where various modes share only one infrastructure, roads. Therefore, the treatment of the results of "modal split," particularly in its assignment stage, should be carefully considered in the T-model2 simulation.

7.2.2 Person Trips and Vehicular Trips

When modal split is considered, the difference in treatment between "person" trips and "vehicular" trips in T-model2 should be looked at closely. The former is based on "person trip" volumes and the latter is based on "vehicle or mode specific" volumes. The use of these two trip types is slightly different depending on the modules of simulation stages. Therefore, finding the relationships between those trip types and proper treatment for them in the simulation becomes important towards solving the problem.

As mentioned, T-model2 has two main simulation modules: the gravity model distribution module and the assignment module. The software is originally designed for dealing with only "automobile (or predominant mode-specific)" trips. That is, using "vehicular" volumes, not "person trip" volumes, is suggested as a basic method.

In its assignment stage, the last of four transportation modeling steps, this characteristic is quite distinctive. The settings of links, design speed and capacities in the network are based on the "vehicular" trips. Since most of those characteristics are easier to be set based on one specific mode, using "vehicular" trips for the assignment stage is more appropriate for the simulation.

For the gravity model distribution stage, on the other hand, both "person" trips and "vehicular" trips are applicable. In fact, the gravity model distribution module of T-model2 can handle both, and there is no big differences between them other than some parameter values when performing simulation runs. The use of trip types in this stage is more dependent on what kind of modal split method is used for the simulation.

As for the modal split stage, T-model2 can deal with both pre-distribution modal split or post-distribution modal split. If the former is used, "vehicular" trips are more likely used for the gravity model distribution while both "person" trips and "vehicular" trips can be used if the latter is applied. This means that the use of trip types not only for the gravity model distribution stage but also for the modal split stage depends on what kind of modal split method is chosen.

The major differences between applying pre-distribution modal split and post-distribution modal split, in term of the influence on executing the gravity model distribution, is the number of execution and the volume unit in the execution. When pre-distribution modal split is applied, the distribution has to be done separately based on the specific "vehicular" trips. When post-distribution modal split is applied, the distribution can be executed only once based on the total "person" trips, or can be done separately based on either "person" or "vehicular" trips, depending on which trip type is used in the results of the trip generation.

When the concept of the total gravitation is considered, executing the gravity model distribution only once for the total trips may be more appropriate. That is, using "person" trips and post-distribution modal split would be the preferable way for the gravity model distribution .

As for the trip generation, however, T-model2 indicates the use of "vehicular" trips as a primary method. The T-model2 manual suggests the use of the trip generation rates set by the Institute of Transportation Engineers (ITE), which use "average vehicle trip ends," not "person trip ends." This in turn means that T-model2 also indicates the use of "vehicular" trips throughout its simulation stages since the trip generation is the first step of the transportation modeling. This characteristic arguably shows the limited applicability of T-model2, which is primarily designed for the "automobile" traffic, although this is quite common among the transportation modeling tools developed in the developed countries, where "automobiles" predominate the modal share.

Despite the indication of the use of "vehicular" trips by T-model2, using "person" trips for the trip generation is preferable from the conceptual point of view, particularly for the case of Piura where various modes exist. That is, the trip generation rates should be set for the total "person" trips, not for "mode specific vehicular" trips when those various modes "share" the limited infrastructure. Using "person trips" also helps simplify the model by setting the trip generation rates for only one trip type, that is the total "person" trips. Obtaining the "mode specific vehicular" trip generation rates is quite a difficult task because of the existence of various modes and instability of their modal share against various factors. Therefore, the decision is made to use "person trips" for trip generation model for this study.

When "person" trips are used for the trip generation stage, some kinds of trip type transforming methods, which transform "person" trips to "vehicular" trips, should be applied before executing assignment runs simply because using "vehicular" trips for the assignment stage is easier for the network setting. Then, the problem becomes evident because once one of those kinds of trip type transformation methods, such as traditional modal split methods in T-model2, is performed, the trips are separated to "mode specific" trips, based on which problematic separated "mode specific" assignments are performed. In this way, in order to deal with the problem caused by the separated "mode specific" assignments, considering the treatment of the modal split and the trip type formation becomes a crucial point.

The treatment of modal split methods would likely become more complicated, particularly in developing countries. Various modes, especially public transportation modes such as Combis, Collectibos and even taxis in Piura contributes to the complexity of the modal split structure. The differences between total "person" trip table and total "vehicle" trip table would likely be bigger than the one in developed countries because of a higher average occupancy rate caused by the high use of the public transportation modes in developing countries. Therefore, the treatment of public transportation, which accounts for the large part of "person" trips in the city, is crucial for reliable modeling.

Since most transportation methods used in developed countries focus primarily on private automobile traffic, the treatment of modal split and its effects on assignment stages, becomes an extremely important issue when those tools are applied to developing countries. Either way, some kinds of arrangements are needed to perform more reliable modeling for realistically usable transportation planning, particularly for developing countries where various modes share a limited transportation infrastructure.

7.2.3 T-model2 and Modal Split

As mentioned previously, T-model2 has two types of traditional modal split methods: "pre-distribution modal split" and "post-distribution modal split". Because its assignment does not work properly with "person" trips, T-model2 simulation consequently requires all of the input trips to be or to be transformed to the "vehicular" term before its assignment run is performed when "person" trips are used for the trip generation stage. Those modal split methods, in fact, can do the transformation.

These modal split functions, however, are not included in the "full featured distribution and assignment," which is the primary simulation method in the software. That is, the execution of either pre-distribution modal split or post distribution modal has to be done separately away from the actual simulation run. The following two sections explains how those methods are dealt with in the software.

The first modal split method available in T-model2 is "pre-distribution modal split". This method creates "mode specific" OD tables before the gravity model distribution is executed. That is, several "mode specific" gravity model distribution runs are executed separately, and there will be as many trip tables as modes. T-model2, then, suggests that the assignment runs be executed for each mode, assigning all the "mode specific" trips to multiple "mode specific" networks which are basically designed only for each one mode, then after all the separated assignment runs, the results are integrated to one total assignment results.

The advantages and disadvantages of this method are as follows.

(Advantages)

1. The use of occupancy rates and/or other "mode specific" factors are not necessary for the modal split stage because new OD tables are derived only from zone characteristics.
2. The results of modal split execution is already transformed into the "vehicular" volume term. If not, they can easily be transformed into the "vehicular" volume term by applying occupancy rates and/or other "mode specific" characteristics.
3. There is no interruption between the distribution and assignment runs.

(Disadvantages)

(1) Both distribution and assignment runs have to be executed as many times as the modes specifically defined. These separated simulation runs likely create more errors in the network when integrated.

(2) The capacities of each link of each "mode specific" network have to be defined for each one specific mode. This is extremely difficult when a limited transportation infrastructure is shared by various modes.

(3) Even if the capacity setting is well done, the total results of executing the "mode specific" assignment may not be reliable enough because the volumes are assigned "mode specifically" and separately without regard to other trips by other modes on the network. This is quite crucial because using the proper numbers of volumes on links is important to calculate travel times for the next iteration (T-model2 uses traditional BPR formulas), and because the total link volumes which can be calculated by summing up the separately assigned "mode specific" volumes likely cause a high level of errors with regard to the actual volume of links.

The other method which T-model2 can deal with is "post-distribution modal split." This method splits a total "person" trip table, which is the outcome of only one gravity model distribution run, into several "mode specific" trip tables in either "person" or "vehicular" volume term. The "mode specific" trips are assigned separately to "mode specific" networks in the assignment stage. This procedure shows that while the gravity model distribution is performed only once for the total "person trips", there will be as many "mode specific" trip tables to be used for separated assignment runs as the modes used. This situation is identical to the one after the distribution run of pre-distribution modal split. That is, the outcomes of executing these modal split methods are separated "mode-specific" trip tables. This in tern means the differences between pre-distribution modal split and post-distribution modal split are primarily found in the distribution stage. Assignment runs are performed in the same way without regard to the modal split method applied.

In addition, post-distribution modal split of T-model2 applies occupancy rates to the process, along with modal share percentages, in order to transform a total "person" trip table to several "mode specific vehicular" trip tables. That is, the T-model2 manual suggests using "person" trips, not "vehicular" trips, for the gravity model distribution if this type of modal split is used. This situation is somewhat illogical because T-model2 also suggests using "vehicular" trips for its trip generation stage.

The advantages and disadvantages of this method in the T-model2 simulation are listed below.

(Advantages)

(1) Only one gravity model run is required, making the simulation run easier.
(2) The results done by only one distribution run may have less errors in the total "person" trip movements when compared to the one done by separated "mode specific" distribution runs of pre-distribution modal split.

(Disadvantages)

(1) While the distribution run is performed only once, the assignment has to be performed separately for each mode.
(2) There is an interruption between the gravity model distribution run and assignment runs during a T-model2 simulation.
(3) Since the assignment runs are "mode specific," the networks used for the assignment runs also have to be defined "mode specifically".
(4) Executing "mode specific" assignments may not work well because the "mode specific" volumes are not assigned with regard to other trips by other modes.
(5) Both occupancy rates and modal share percentages have to be set based on each traffic analysis zone. An accurate setting is quite difficult because extensive field observations or surveys becomes necessary and having reliable data is also difficult.

7.2.4 Other Possible Methods

The primary disadvantages of the two modal split methods available in T-model2 is the problematic separated “mode specific” assignment runs. This situation is inevitable if the results of the modal split methods of T-model2 are directly applied to its assignment runs,.

This disadvantage becomes more prominent when there is a mixture of various modes which share a transportation infrastructure. The case in Piura is obviously applicable to this situation. Several modes such as autos, taxis, Collectibos and Combis share only one infrastructure; roads. From this point, it is likely that performing “mode specific” assignment runs without any arrangement is not appropriate for Piura. At the same time, this also means that performing the traditional modal split methods (in the way T-model2 handles) is not a preferable option as a transportation planning tool for developing countries.

This section suggests some possible arrangements for the problem, the separated “mode specific” assignment runs. The major approach toward the problem is to “perform only one assignment run for all modes using only one network for all the trips”. That is, the only assignment run is performed “standardized vehicular” or “vehicle equivalent” trips by using a “standardized vehicular” network. The following five are the considered options.

(1) integrating all the “mode specific” trip tables to one “total” trip table by using applicable factors such as occupancy rates and vehicle equivalent factors, and creating only one standardized network,
(2) treating all the trips as “vehicle equivalent” trips, standardized trips to “automobile” term, from the trip generation stage,
(3) transforming all the “mode specific” trips to “vehicle equivalent” trips before the gravity model distribution stage,
(4) designing a “person” trip network based on “person” trip volumes and omitting any trip type formation, and
(5) integrating the modal split into the assignment run.

The common advantages and disadvantages of these options are caused by the simplicity. Standardizing all the "mode specific" trips to "vehicle equivalent" trips certainly eases the simulation steps, and also accommodates with the explanation of the modal complexity.

On the other hand, the standardization likely cause errors, reducing the effects of the "mode specific characteristics. When the "standardized vehicular" network is applied, all the "mode specific" trips have to be standardized to "vehicle equivalent" trips. If the "person" trip network is applied, similarly, all the "mode specific vehicular" characteristics have to be standardized to "person" trip terms. Thus, the effects of the simplicity, both positive and negative aspects, should be kept in mind.

Figure 7-5 summarizes the flow charts of those five approaches along with the two traditional methods of pre-distribution modal split and post-distribution modal split with respect to trip types treated. The option numbers in Figure 7-5 correspond to the numbers above while option "A" and "B" represent pre-distribution modal split and post-distribution modal split respectively. The details of the calculation for the flow steps are attached in Appendix F. Further explanations of those five options follow.

7.2.4.1 Integrating "mode specific" trip tables to one "total" trip table

This trip type transformation (TTT) method is called "post post-distribution trip type transformation." This method creates a total "vehicular" or "vehicle equivalent" trip table from multiple "mode specific" trip tables derived by post-distribution modal split. Then, the total "vehicular" or "vehicle equivalent" trip table is applied to only one assignment, which uses one standardized network based on regular "automobiles". The calculation for this option can be done by using occupancy rates, modal share percentages and vehicle equivalent factors.

The primary advantage of this method is its simplicity. Both the gravity model distribution and the assignment are executed once for each although there is an interruption between

Figure 7-5 Flowchart : Treated Trip Types for Seven Options

\ Flow Option \	Total Trip Estimation	Pre-distribution Modal Split	Trip Type Transformation	Gravity Model Distribution	Post-distribution Modal Split	Trip Type Transformation	Assignment
A	P / S	P --> MV TTT	-	MV / Multi	-	-	MV / Multi
B	P / S	-	-	P / S	P --> MV TTT	-	MV / Multi
(1)	P / S	-	-	P / S	P --> MP/ MV TTT	MP/ MV --> V TTT	V / S
(2)	V / S	-	-	V / S	-	-	V / S
(3)	P / S	P --> MP/ MV TTT	MP/ MV --> V TTT	V / S	-	-	V / S
(4)	P / S	-	-	P / S	-	-	P / S
(5)	P / S	-	-	P / S	-	-	Mixed / Mixed

A : Pre-distribution Modal Split (T-model2)
B : Post-distribution Modal Split (T-model2)

(1) : Post post-distribution Trip Type Transformation (TTT)
(2) : TTT in Total Trip Estimation (Only Vehicle Equivalent Trips)
(3) : Post pre-distribution TTT
(4) : No TTT (Only Person Trips)
(5) : Multi-modal Assignment

Above / : Trip Types
/ Bellow : The Number of Trip Tables Dealt

(Above)
P : Person Trips
MP : Mode Specific Person Trips
MV : Mode Specific Vehicular Trips
V : Vehicle Equivalent Trips
- : Not executed
(Bellow)
/ S : One Total Trip Table
/ Multi : Multiple Trip Tables
TTT : TTT (M-->V)
TTT : TTT (P-->M)
/ Mixed : TTT (mixed)

them. That is, this method is relatively easier to construct than other options. Using the total "person" trips for only one gravity model is also conceptually suitable.

The disadvantage of this method is also simplicity. It is quite difficult to characterize the differences of "mode specific" travel characteristics such as loading and unloading of passengers by public transportation and taxis, turning movement of bigger modes or restricted areas for some specific modes such as Mototaxis in Piura on a standardized network.

Moreover, the errors caused by the standardization likely become more evident when the differences of "mode specific" characteristics become bigger. Occupancy rates in Piura, for example, are quite high and variable depending on the type of modes, on observed locations and also on specific time periods mainly. The bigger the variance of applied factors becomes, the bigger the possible errors are in creating a total "vehicle equivalent" trip table. Thus, this method still needs some arrangements in order to reduce the risk of big errors.

7.2.4.2 Treating all the trips as "vehicle equivalent" trips

This option is called "TTT in the total trip estimation" or "TTT in the trip generation". This method transforms all the trips in "vehicle equivalent" terms within the total trip estimation stage, and treated as "vehicle equivalent" trips throughout the simulation after that. In this case, similarly to the previous option, only one gravity model distribution and assignment run are performed based on the "vehicle equivalent" trips.

The major advantage of this method is its simplicity. Only one gravity model distribution and assignment run is required without any interruption between them. Moreover, the trip type transformation itself is omitted by using only "vehicle equivalent" trips throughout the simulation.

The main disadvantage is the treatment of trips in the trip generation stage. The outcomes of the trip generation, somehow, have to be in "vehicle equivalent" terms. This can be done two methods. First, the trip generation rates can be set based on "vehicle equivalent" term. This is, however, quite difficult because of the complexity and instability of modal structure, depending on various factors. The second is performing trip type formation after trips are generated in "person" trip terms although no specific trip type transformation stage is presented in Figure 7-5. In this case, the disadvantages of the option (1) mentioned in Section 7.2.4.1 are also applied.

7.2.4.3 Transforming "mode specific" trips to "vehicle equivalent" trips before the distribution stage

This option is called "post pre-distribution trip type transformation." This option transforms all the "mode specific" trips to "vehicle equivalent" trips after pre-distribution modal split is performed, and treats the trips in "vehicle equivalent" terms after that. In this option, only one simulation run, one gravity model distribution and assignment run without any interruption, is performed based on the "vehicle equivalent" trips. This is the same as option (2). The multiple "mode specific" OD sets, the results of pre-distribution modal split, are transformed into one "vehicle equivalent" OD set to be used for the simulation run.

The major advantage of this method is again its simplicity. Only one gravity model distribution and assignment run is required without any interruption between them. Then, the primary disadvantage is also caused by the simplicity: Those disadvantages are as same as the ones of the option (1) mentioned in Section 7.2.4.1.

7.2.4.4 Designing a network based on "person" trips

Another option is defining a network based on "person" trips, and applying the trip type throughout the simulation with "no trip type transformation." For this option, since the assignment is performed based on "person" trips, the network should be set based on "person" trips. Link capacities, for example, should be set for "person" trips while design speed should be set based on average travel time without regard to mode differences. If the modal share percentages of links and average occupancy rates of specific modes during specific time periods are known, it may be possible to find out the relationships between total vehicle volumes and actual "person" trip volumes, and to define approximate "person" trip link capacities from them. Since the capacity setting is the primary difficulty, once the capacity is properly set, the assignment module is workable with the "person" trips" by assuming that the concept of travel time (or impedance) calculations is also technically applicable to "person" trips.

The primary advantage of this method is, again, the simplicity. It requires only one distribution run and only one assignment run without interruption between them. Moreover, no specific TTT stage is also required. That is, once the network is properly set, T-model2 takes care of everything.

On the other hand, the primary disadvantage is obviously the network setting, particularly of the link capacities and design speed, in "person" trip term. All related factors, such as the modal share and occupancy rates of links, are quite variable, depending on a number of factors such as modes, land use characteristics, characteristics in transit networks and even the level of motorization of the area. While using "person" trip capacities can be useful for fixed service modes such as rails, it is quite difficult to set them properly for Piura because each mode, which shares an infrastructure, has different "person" capacities. Moreover, one major assumption is required: the concept of travel time (or impedance) calculations by link volumes in the assignment stage is applicable to "person" trips. Before using the "person" trip network, the applicability of using "person" trips in the assignment stage should be checked.

7.2.4.5 Integrating the modal split into the assignment run

This method is called "multi-modal assignment". In a static situation, a total "person" trips can be transformed to "mode specific" trips by the traditional modal split methods, which are also available in T-model2. Then, the opposite, transforming "mode specific" trip tables to a total "person" trip table, is also possible. So, the question is what if this type of transformation were proved applicable in an active situation, that is, during the assignment runs. While this option is not proved to be applicable, it would be worthwhile to discuss the possibility of this option. The next section explains this.

7.2.5 Possibility of Multi-modal Assignment

This section briefly discuss the idea of "multi-modal assignment". The initial steps for constructing the "multi-modal assignment" would be twofold:

(1) finding the relationships and methods for transformation between:
  ① separated "mode specific" trip tables and one total "person" trip table,
  ② one total "person" trip table and "person" trip link volumes,
  ③ total "person" trip link volumes and "mode specific" link volumes, and
  ④ "mode specific" link volumes and "mode specific" trip tables, and

(2) integrating separated "mode specific" networks to one "multi-modal" network with some kinds of setting standards for the differences of various modes in use.

For the former step (1), those trip type formations could be done by similar or opposite methods used in the other options by using occupancy rates, modal share percentages and vehicle equivalent factors for each mode. The vehicle equivalent factors are not used in T-model2. The basic idea of calculation steps of the transformation between a total "person" trip table and link volumes would be:

(A) dividing a total "person" trip table to "mode specific person" trip tables based on the modal share of each mode,

(B) obtaining "mode specific vehicular" trip tables or "mode specific" link volumes by dividing the "mode specific person" trip tables by corresponding occupancy rates, and

(C) multiplying them by corresponding vehicle equivalent factors for total "vehicle equivalent" link volumes for actual link volume estimation.

Calculating (A) and (B) could be done in the same manner that post-distribution modal split of T-model2 performs, and the same method used for highway capacity calculations could be used for (C). If properly used, they could transform total "person" trips to "vehicular (or vehicle equivalent)" link volumes or vice versa with relatively well estimated link volumes. In addition, the occupancy rates would be set based on the characteristics of modes and zones in the network, and specific time periods would also be assumed.

The major difficulty for the latter step (2) is the setting of standards for various modes for various factors, which is the same as in the other options. The primary difficulty is setting the differences of various modes in the network. The network used in the "multi-modal" assignment should integrate all the possible "mode specific" networks (or links) while it should also have the relationship between link volumes and their availability with regard to the total link capacities simultaneously. The link volume availability for each mode could be modeled by a kind of overlay method, distinguished by link class, which is used in T-model2. Using vehicle equivalent factors likely helps to set common capacities.

In the "multi-modal" assignment, which uses a total "person" trip table as input, the proper time to apply trip type transformation between "person" trips and "vehicle link volumes" would be:

① at the end of each iteration when "vehicle" volumes, not "person" trip volumes, on links have to be calculated in order to derive new travel times for next iteration (assuming traditional BPR formulas or similar are used), and

② at the middle of each iteration when the "person" trips of various modes in an increment (or iteration) are assigned as partial mode specific "person" trips on the network.

If multi-modal assignment were possible, it would be quite preferable. Total “person” trips would be considered on one multi-mode network while the assignment modules would simultaneously deal with total link volumes and travel times although the capacities and volumes are likely in “vehicular or vehicle equivalent” term. The advantage of this method would be:

(1) both a total “person” trip table and “vehicle” volumes on the links were simultaneously kept track of during active assignment runs,

(2) only one trip table, not several “mode specific” trip tables, were dealt with for only one total transportation network, and

(3) most importantly, modal split were included in the assignment stage.

In either case, the primary problem is the treatment of modal split and assignment for various modes which share the same infrastructures. From this point, finding the possible ”multi-modal” assignment method, which can deal with the problem, would be quite a challenge.

7.2.6 Conclusion

The modeling concept, problems, and possible options for applying T-model2 to the city of Piura is discussed in this section. Seven options, including two traditional modal split methods available in T-model2 and the inapplicable multi-modal assignment, are discussed. Figure 7-5, again, summarizes the flow chart of these seven options with respect to the trip types in the simulation flow.

The trip type formation is basically a necessary step for the simulation. Using “person” trips is preferable from a conceptual point of view for both trip generation and gravity model distribution stages while the networks are basically constructed in the “mode specific” or “vehicular” term. Therefore, the treatment of trip types and their transformation become a crucial point for the T-model application to the city of Piura.

While some of the options discussed in this section are briefly examined in the next section, the preferable method, in terms of a construction point of view, would be option (1) after considering the advantages and disadvantages of each option. Option (1) performs transforming "mode specific" trip tables in "vehicle equivalent" trip term after the post-distribution mode split, totaling them to create only one total "vehicle equivalent" trip table and then using it for only one assignment. The reasons for this preference are:

① If one of the methods available in T-model2 (option A or B) is used, there are as many assignment runs required as modes exist.

② When pre-distribution modal split is executed, there are also as many gravity model distributions as modes exist.

③ "Person" trips, rather than "mode specific" or "vehicle equivalent" trips, are better to be used with respect to the concept of trip generation and gravity model distribution.

④ Avoiding using separated "mode specific" assignment is the priority.

There is one important assumption for this preference. For the simulation results, the negative effects caused by the differences of mode characteristics or by using only one standardized network are less significant than the ones caused by separated "mode specific" assignments, which use separated "mode specific" networks for various modes sharing the same transportation infrastructure. The differences of mode characteristics may not affect the simulation results as significantly as expected in terms of assigned link volumes if properly handled simply because most of modes are basically small to medium sized automobiles.

On the other hand, if the assignment is executed separately, it is imaginable that most of the trips assigned will concentrate on the most attractive links unless the capacities of "mode specific" networks are set properly. This may cause a major imbalance with regard to the equilibrium concept when the total trips are considered. Thus, while this assumption is likely, it should be examined by comparing those two types of options, executing one standardized assignment or separated "mode specific" assignments.

7.3 Modeling, Simulation and Analysis

T-model2 has been used as a tool for constructing a prototype transportation model for the city of Piura in this study. In this section, the results of modeling and simulation are presented and analyzed. First, trip generation models are presented. Those models are primarily based on survey results, and do not follow the way T-model2 suggests. Second, T-model2 modeling and simulation data are presented and analyzed. Those data are gravity model parameters, trip tables, loaded link data, travel time matrixes, and screen line analysis data.

7.3.1 Trip Generation Model

Trip generation models are constructed based on the total daily "person" trips. Since T-model2 is primarily designed to use "automobile" trips, the trip generation curve fitting is performed away from T-model2 software. This is simply because using "vehicular" trips is difficult for the trip generation model with a high mixture of various modes. Table 7-2 shows the summary of trip generation data, which is based on five groups of data sets, "Productions (1) to (4)" and "Attraction", and Table 7-3 shows the summary of the curve fitting results. Tables 7-2 (a), (b), (c) and (d) show the data of the trip estimation, variables for Production (1), variables for Productions (2) to (4), and variables for Attraction respectively. Tables 7-3 (a) to (e) correspond to the results of Production (1) to (4) groups and Attraction respectively. Figure 7-6 shows the curve fitting results of Production (1), Figure 7-7 shows the curve fitting results of Production (2) to (4), and Figure 7-8 shows the ones of Attraction.

7.3.1.1 Trip Production Model

Trip production is examined based on four kind of variable set, Production (1) to (4), show the data of the trip generation variables vs. estimated total trip, vs. estimated total trips per population, vs. estimated total trips per trip making population, and vs. estimated total trips per household respectively.

The variables for Production (1) are:

Table 7-2 Summary of Trip Generation Data

(a) Summary of Trip Estimation

Zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	Ave.
1 Total # of household asked	20	19	17	20	20	20	20	20	20	20	23	20	13	21	12	20	19	20	17	20	20	20	21	20	19	-	-	-	-	-	481	-
2 Total # of persons interviewed	39	32	24	1	21	0	0	25	0	0	20	0	0	29	17	2	22	24	0	0	34	12	19	34	0	-	-	-	-	-	355	-
3 Total # of family members in households	57	68	78	105	82	117	110	105	80	105	108	109	66	122	25	124	122	117	89	90	111	97	102	77	110	-	-	-	-	-	2376	95.0
4 Total % of persons making trips	82.2	76.4	73.1	8.6	36.8	60.9	35.5	68.6	43.8	51.4	50.0	28.4	45.9	77.9	62.5	40.3	32.5	19.1	55.1	20.0	52.7	46.7	31.4	68.4	42.1	-	-	-	-	-	-	46.3
5 Estimated Population (Est. Pop.)	1146	1591	1591	1146	11317	1334	5340	19412	2415	10490	6995	12017	30687	19243	0	10490	15736	27015	31090	13508	22205	8327	26624	37706	17691	-	-	-	31090	-	366206	-
6 Pop.-based 1 (PPL1) : [(12)/(2)]	20	24	20	11	138	11	49	185	30	100	65	110	465	158	1	85	129	231	349	150	200	86	261	490	161	-	-	-	-	-	-	154
7 Pop.-based 3 (PPL3) : [(12*5)/(2*4)]	18	38	51	5	157	15	43	392	32	104	87	118	228	416	1	117	144	195	389	208	173	67	261	1019	181	-	-	-	-	-	-	184
8 Est. # Trips (PPL3)	1293	2292	2477	258	8783	1807	5723	35687	2305	15355	8481	8485	28093	37045	18	12220	11929	11332	37735	5819	20434	6980	21926	55002	21712	-	-	-	-	-	363190	-

(b) Production (1) : vs Estimated Total Trips

Trip Generation (Production)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	Ave.
1 Total Est. Trips	1293	2292	2477	258	8783	1807	5723	35687	2305	15355	8481	8485	28093	37045	18	12220	11929	11332	37735	5819	20434	6980	21926	55002	21712	-	-	-	-	-	363190	-
(Variables)																																
1 Estimated Population	1146	1591	1591	1146	11317	1334	5340	19412	2415	10490	6995	12017	30687	19243	0	10490	15736	27015	31090	13508	22205	8327	26624	37706	17691	-	-	-	31090	-	366206	-
2 Est. pop. making trips (PMT)	942	1216	1163	98	4161	812	1893	13322	1057	5395	3498	3418	14086	14984	0	4230	5114	5168	17117	2702	11708	3892	8353	25799	7440	-	-	-	-	-	169638	-
3 Est. Land Size (: standard) (ha)	11	18	18	11	98	32	86	140	75	76	51	72	377	311	82	76	114	159	160	80	275	74	170	164	131	-	-	-	160	-	3023	-
4 Est. Total # of Total Family Units	402	436	347	218	2760	228	971	3698	604	1998	1490	2205	6044	3312	0	1692	2451	4618	5939	3002	4001	1717	5481	9794	3056	-	-	-	-	-	66463	-
5 Est. Total # of cars owned (*PPL1)	141	118	61	55	0	23	680	0	60	699	65	0	4185	473	0	761	0	462	0	150	2801	258	0	0	161	-	-	-	-	-	11151	-
6 Est. Total # of all vehicles owned (*PPL1)	241	177	61	55	0	23	728	0	91	799	65	110	5115	631	9	761	129	693	0	150	2801	258	0	0	161	-	-	-	-	-	13056	-
7 # of Possession of driver's license	382	349	245	55	414	23	1311	740	60	1499	518	772	11508	1420	0	1607	1677	462	2445	150	2601	515	522	979	161	-	-	-	-	-	30413	-

(c) Production (2)~(4) : vs Estimated Total Trips per Other Factors

Trip Gen. per factors (Production)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	Ave.
1 Trips / Population	1.13	1.44	1.56	0.23	0.78	1.35	1.07	1.84	0.95	1.46	1.21	0.71	0.92	1.93	0.00	1.16	0.76	0.42	1.21	0.43	0.92	0.84	0.82	1.46	1.23	-	-	-	-	-	-	0.99
2 Trips / Pop. Making Trips	1.37	1.89	2.13	2.63	2.11	2.23	3.02	2.68	2.18	2.85	2.43	2.48	1.99	2.47	0.00	2.89	2.33	2.19	2.20	2.15	1.75	1.79	2.63	2.13	2.92	-	-	-	-	-	-	2.14
3 Trips / Family	3.22	5.26	7.14	1.18	3.18	7.92	5.89	9.65	3.82	7.68	5.69	3.85	4.65	11.18	0.00	7.22	4.87	2.45	6.35	1.94	5.11	4.07	4.00	5.62	7.11	-	-	-	-	-	-	5.46
(Variables)																																
1 Est. Average income (S/.)	875	751	626	1174	345	376	1092	561	687	1375	473	271	1883	764	229	1379	1054	270	334	266	1575	697	428	356	997	-	-	-	-	-	-	754
2 Est. Density (persons/ha)	103	87	87	103	115	42	62	138	32	137	137	167	82	62	0	137	137	169	195	169	81	112	157	230	135	-	-	-	195	-	-	121
3 % of Single family unit (%)	11.1	45.7	82.4	100.0	89.5	95.0	70.0	100.0	63.2	100.0	91.3	100.0	100.0	100.0	58.3	100.0	93.8	100.0	100.0	100.0	100.0	90.0	100.0	100.0	94.7	-	-	-	-	-	-	88.13
4 Possession of driver's license (%)	33.3	22.0	15.4	4.8	3.7	1.7	24.5	3.8	2.5	14.3	7.4	6.4	37.5	7.4	12.5	15.3	10.7	1.7	7.9	1.1	11.7	6.2	2.0	2.6	0.9	-	-	-	-	-	-	9.2%
5 Average # : family members / household	2.9	3.6	4.6	5.3	4.1	5.9	5.5	5.3	4.0	5.3	4.7	5.5	5.1	5.8	2.1	6.2	6.4	5.9	5.2	4.5	5.6	4.9	4.9	3.9	5.8	-	-	-	-	-	-	4.9
6 % of men (among known)	64.1	59.2	54.3	42.5	43.3	56.6	44.6	48.9	54.4	49.0	39.0	48.6	37.8	49.0	76.2	47.7	55.8	48.7	54.4	44.7	49.5	42.7	41.9	63.2	46.8	-	-	-	-	-	-	49.2%
7 Estimated Average Age	30.4	29.4	29.0	31.8	33.9	27.3	30.0	24.4	30.8	29.7	30.0	21.0	27.9	22.8	29.5	27.4	29.0	25.6	22.3	22.1	28.6	22.4	30.5	28.5	24.3	-	-	-	-	-	-	27.2

(d) Attraction : vs Estimated Total Destination Trips

Trip Generation (Attraction)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16.	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total	Ave.
1 Total Est.Trips (destination)	7611	22341	6401	10329	9814	43839	11328	18367	3019	9679	5508	4168	19752	16360	3124	8657	7337	5419	19168	2909	37861	19333	10723	32365	10431	32	489	0	447	2177	348988	-
(Variables 1)																																
1 Work trips (total destination)	4864	10863	2843	8758	1928	15033	3765	240	1310	1331	923	262	2098	542	2704	1021	1454	339	676	208	7906	4897	1149	676	0	32	489	0	186	2061	78559	-
2 Shop trips (total destination)	0	2735	30	30	0	19919	0	392	0	0	87	0	56	0	0	0	144	0	0	0	3056	4617	0	0	0	0	0	0	0	51	31117	-
(Variables 2: per**)																																
3 Work/ Popuration	4.2	6.8	1.8	7.6	0.2	11.3	0.7	0.0	0.5	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.4	0.6	0.0	0.0	0.0	-	-	-	-	-	0.2	-
4 Shop/ Land size	0.0	149.9	1.7	2.7	0.0	629.8	0.0	2.8	0.0	0.0	1.7	0.0	0.1	0.0	0.0	0.0	1.3	0.0	0.0	0.0	11.1	62.0	0.0	0.0	0.0	-	-	-	-	-	10.3	-
(Other factors for origins)																																
5 Total Est. Trips	1293	2292	2477	258	8783	1807	5723	35687	2305	15355	8481	8485	28093	37045	18	12220	11929	11332	37735	5819	20434	6980	21926	55002	21712	-	-	-	-	-	363190	-
6 Estimated Population (Est. Pop.)	1146	1591	1591	1146	11317	1334	5340	19412	2415	10490	6995	12017	30687	19243	0	10490	15736	27015	31090	13508	22205	8327	26624	37706	17691	-	-	-	31090	-	366206	-
7 Est. Land Size (: standard) (ha)	11	18	18	11	98	32	86	140	75	76	51	72	377	311	82	76	114	159	160	80	275	74	170	164	131	-	-	-	160	-	3023	-

Table 7-3 Summary of Trip Generation Curve Fitting

(a) Production (1) : vs Estimated Total Trips

	Variables	Fittited Curve	R*2
1	Estimated Population	y = 1.131x - 633.57	0.75
2	Est. pop. making trips (PMT)	y = 2.1982x + 672.97	0.97
3	Est. Land Size (: standard) (ha)	y = 105.77x - 2415.1	0.46
4	Est. Total # of Total Family Units	y = 5.3647x - 265.37	0.77
5	Est. Total # of cars owned (*PPL1)	y = 2.9758x - 13200	0.04
6	Est. Total # of all vehicles owned (*PPL1)	y = 2.6119x - 13164	0.04
7	# of Possession of driver's license	y = 2.2008x - 11850	0.12

(b) Production (2) : vs Estimated Total Trips per Population

	Variables	Fittited Curve	R*2
1	Est. Average income (S/.)	y = 0.0001x + 0.94	0.01
2	Est. Density (persons/ha)	y = 0.0007x + 0.9517	0.01
3	% of Single family unit (%)	y = 0.0006x + 0.9793	0.00
4	Possession of driver's license (%)	y = 0.0049x + 0.9827	0.01
5	Average family members / household	y = 0.0982x + 0.5516	0.05
6	% of men (among known)	y = - 0.0009x + 1.0778	0.00
7	Estimated Average Age	y = - 0.0195x + 1.5701	0.02

(c) Production (3) : vs Estimated Total Trips per Trip Making Population

	Variables	Fittited Curve	R*2
1	Est. Average income (S/.)	y = 0.0003x + 1.9734	0.06
2	Est. Density (persons/ha)	y = 0.0047x + 1.6769	0.17
3	% of Single family unit (%)	y = 0.0141x + 0.9818	0.26
4	Possession of driver's license (%)	y = - 0.0133x + 2.3549	0.05
5	Average family members / household	y = 0.442x + 0.0518	0.56
6	% of men (among known)	y = - 0.0466x + 4.5701	0.45
7	Estimated Average Age	y = - 0.0209x + 2.7926	0.01

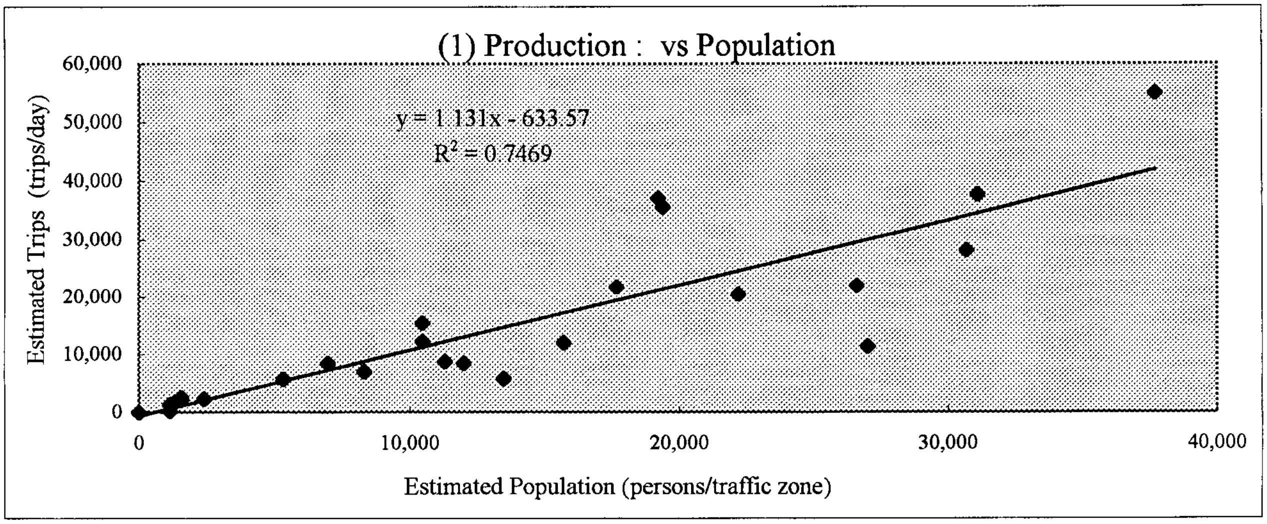
(d) Production (4) : vs Estimated Total Trips per Household

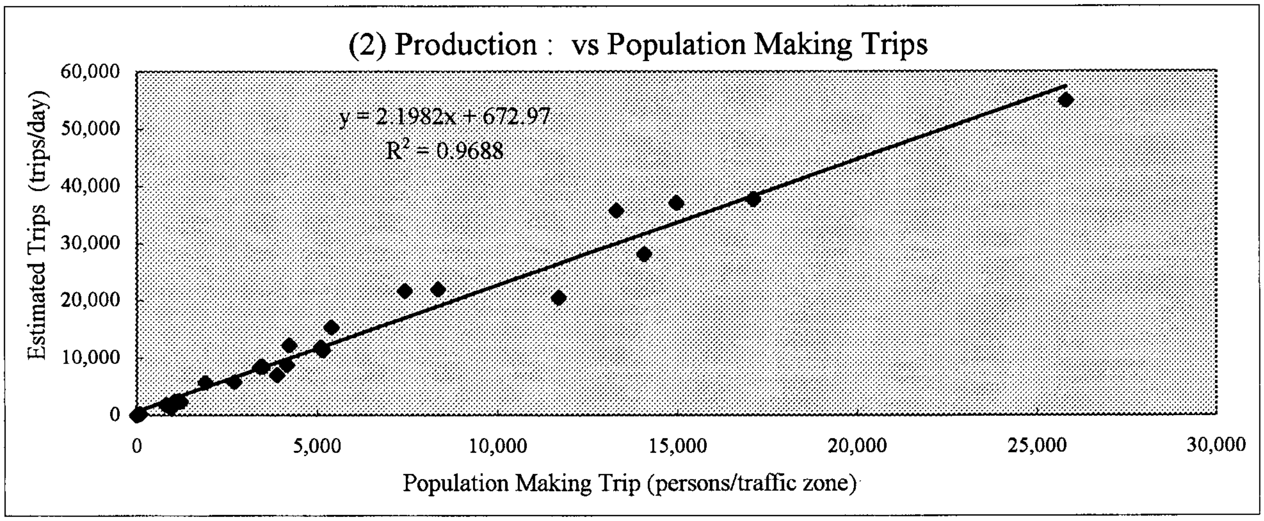
	Variables	Fittited Curve	R*2
1	Est. Average income (S/.)	y = 0.0011x + 4.329	0.04
2	Est. Density (persons/ha)	y = 0.0021x + 4.9261	0.00
3	% of Single family unit (%)	y = 0.0329x + 2.2846	0.08
4	Possession of driver's license (%)	y = - 0.003x + 5.1935	0.00
5	Average family members / household	y = 1.2485x - 0.9553	0.25
6	% of men (among known)	y = - 0.0417x + 7.2703	0.02
7	Estimated Average Age	y = - 0.2092x + 10.922	0.08

(e) Attraction : vs Estimated Total Destination Trips

	Variables	Fittited Curve	R*2
1	Work trips (total destination)	y = 1.7469x + 8537.8	0.38
2	Shop trips (total destination)	y = 1.8157x + 11577	0.46
3	Work/ Popuration	y = 1605.4x + 11597	0.19
4	Shop/ Land size	y = 52.753x + 12012	0.39
	(Combinations of Work and Shopping Trips)		
5	Trip Weight (Work:Shopping) = (1:1)	y = 1.0144x + 9497.7	0.48
6	" = (2:1)	y = 0.6635x + 8986.4	0.45
7	" = (4:1)	y = 0.3833x + 8709.8	0.43
8	" = (6:1)	y = 0.2677x + 8631	0.41
9	" = (8:1)	y = 0.2054x + 8597.6	0.41
10	" = (10:1)	y = 0.1665x + 8580.2	0.40
11	" = (15:1)	y = 0.1129x + 8560.7	0.39
12	" = (20:1)	y = 0.0853x + 8552.8	0.39
13	" = (30:1)	y = 0.0574x + 8546.2	0.38
14	" = (1:2)	y = 0.6686x + 10145	0.48
15	" = (1:4)	y = 0.3897x + 10715	0.48
16	" = (1:6)	y = 0.2736x + 10964	0.48
17	" = (1:8)	y = 0.2106x + 11102	0.47
18	" = (1:10)	y = 0.1711x + 11190	0.47

Figure 7-6 (a) Trip Generation (Production (1))





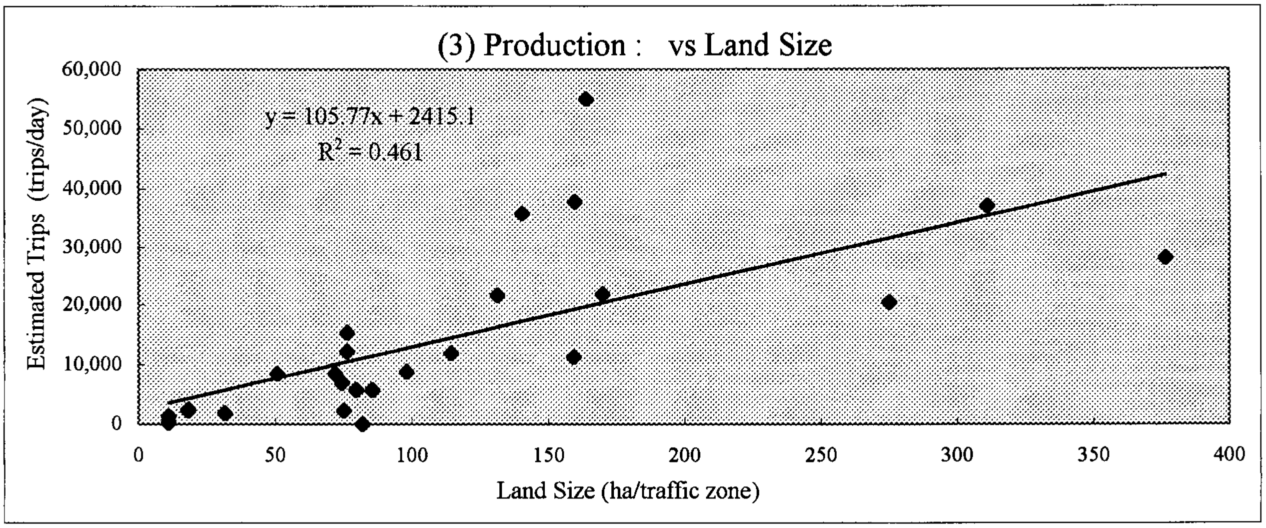
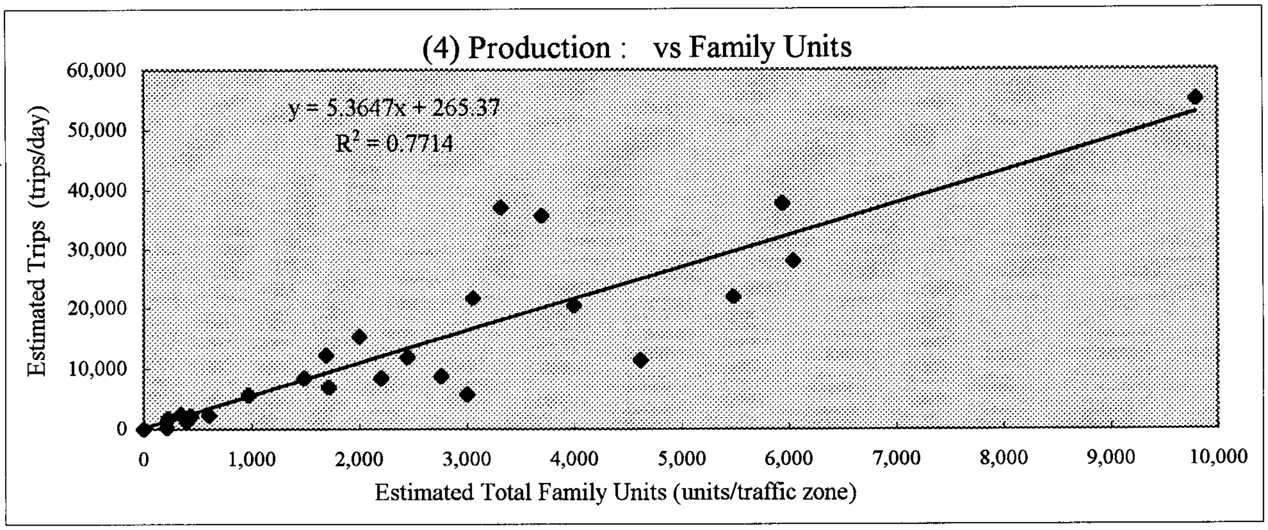
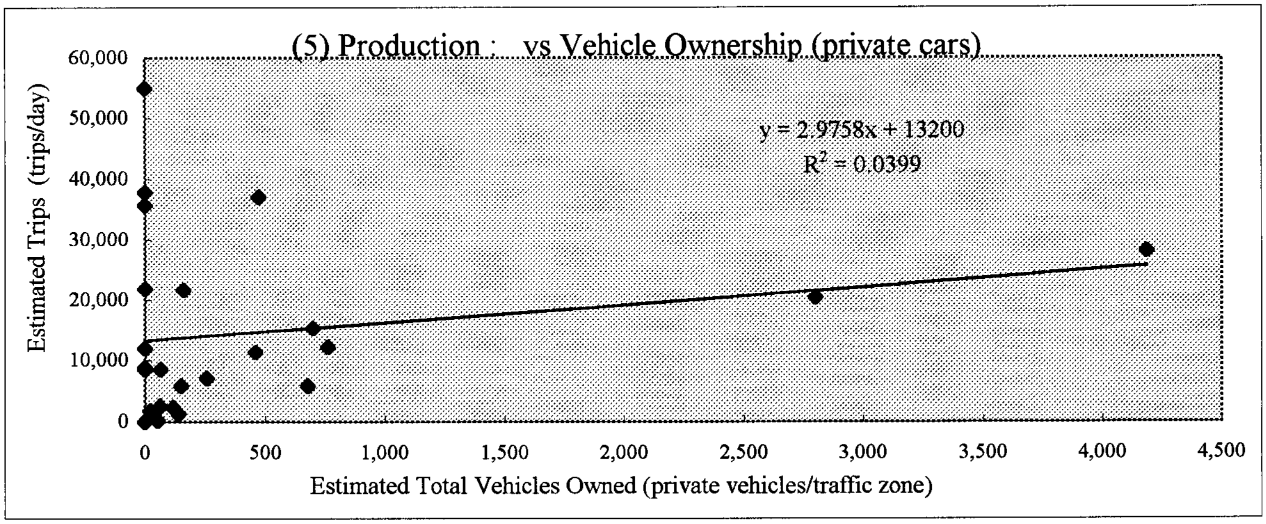


Figure 7-6 (b) Trip Generation (Production (1))





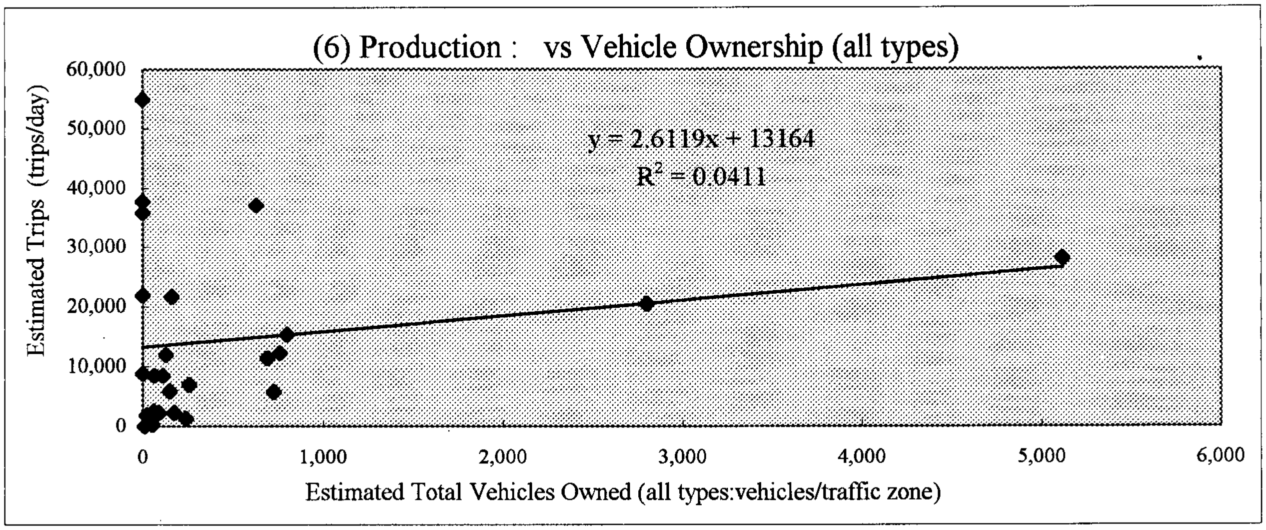


Figure 7-6 (c) Trip Generation (Production (1))

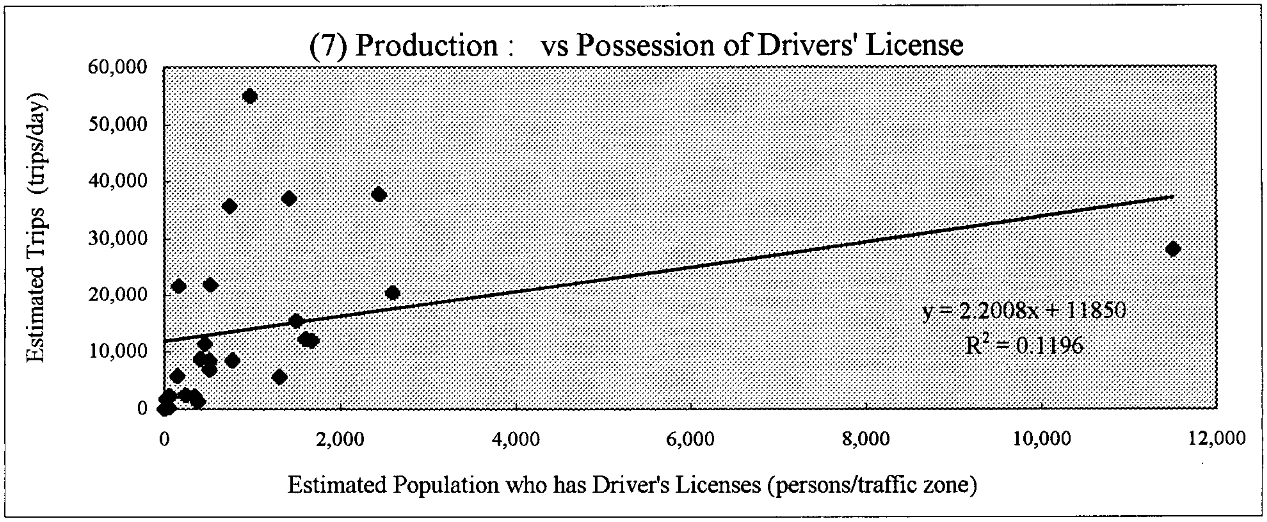
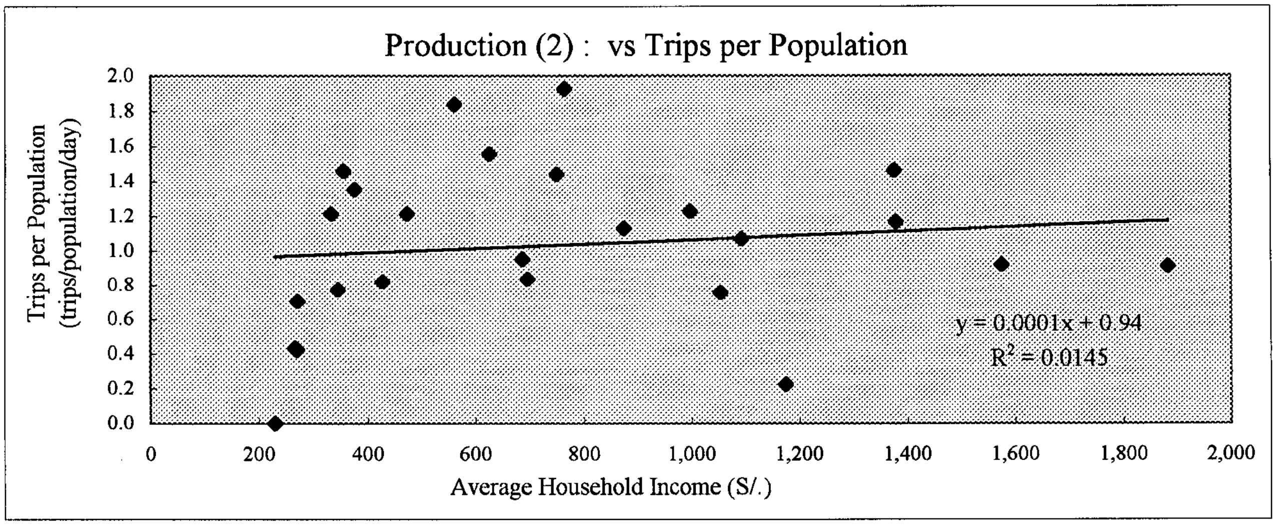
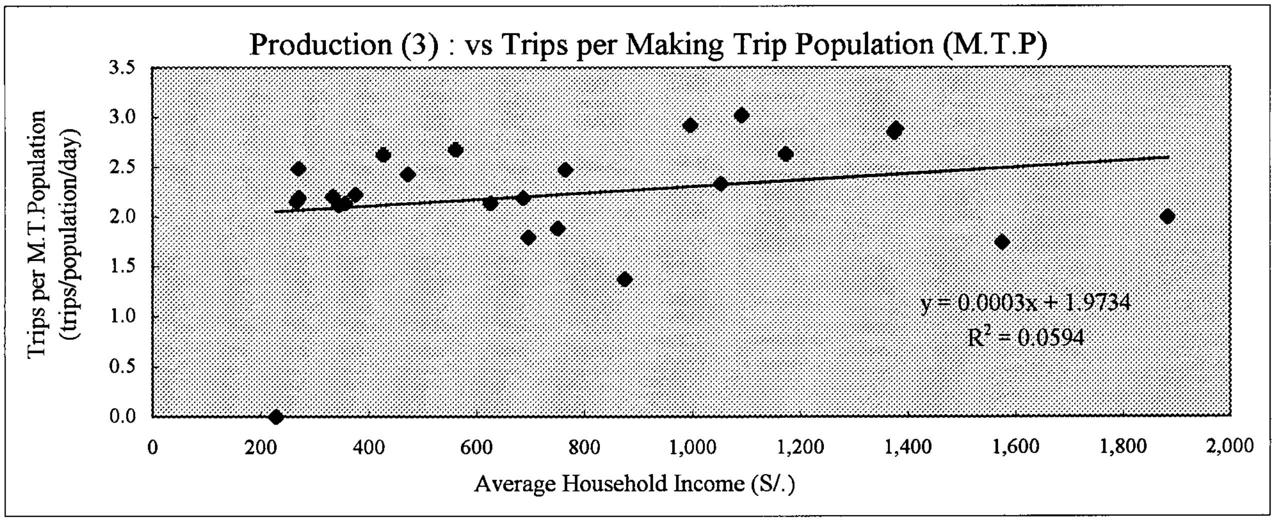


Figure 7-7 (a) Trip Generation (Production : vs Average Income)


Production (2) : vs Trips per Population


Production (3) : vs Trips per Making Trip Population (M.T.P)

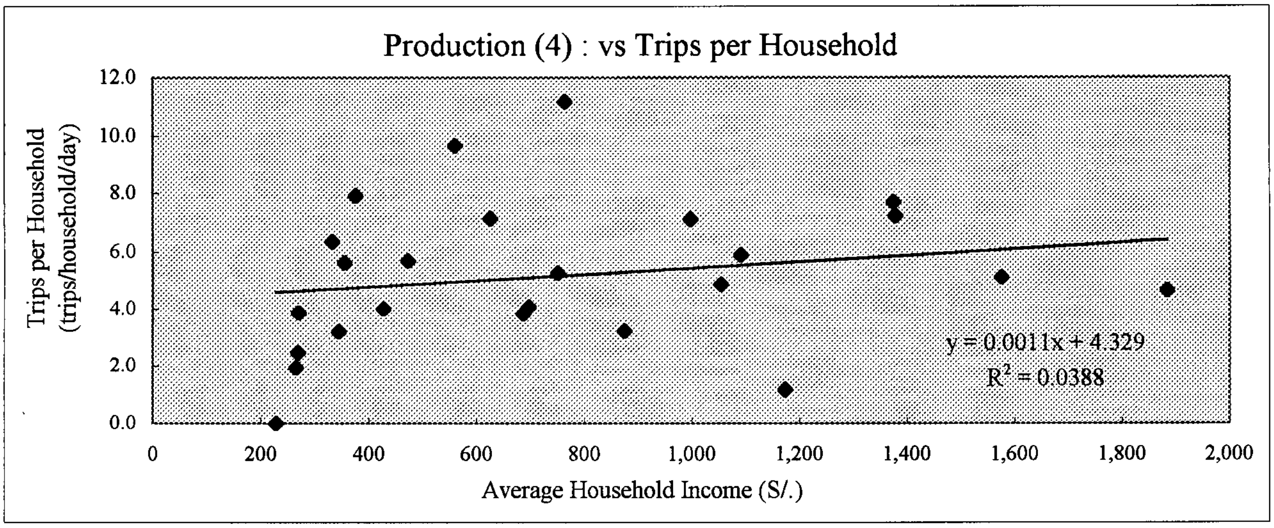
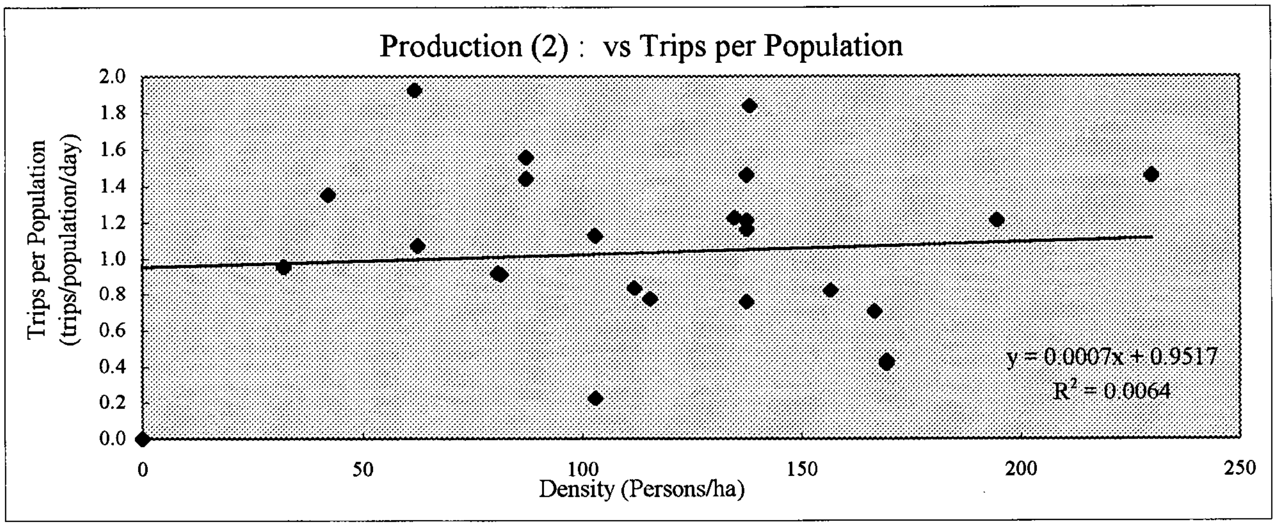
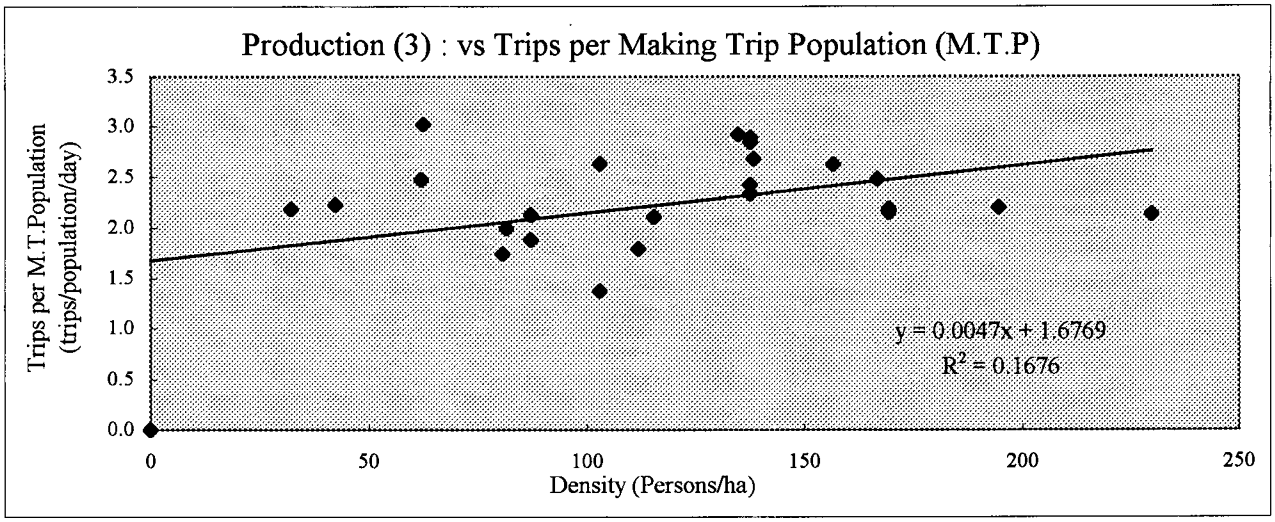

Production (4) : vs Trips per Household

Figure 7-7 (b) Trip Generation (Production : vs Density)





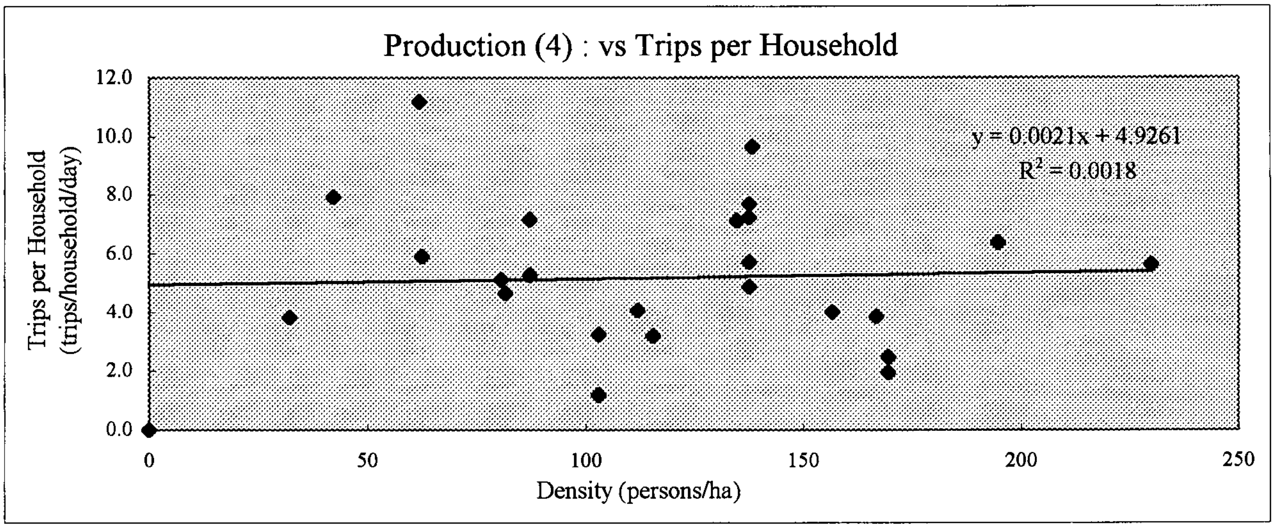
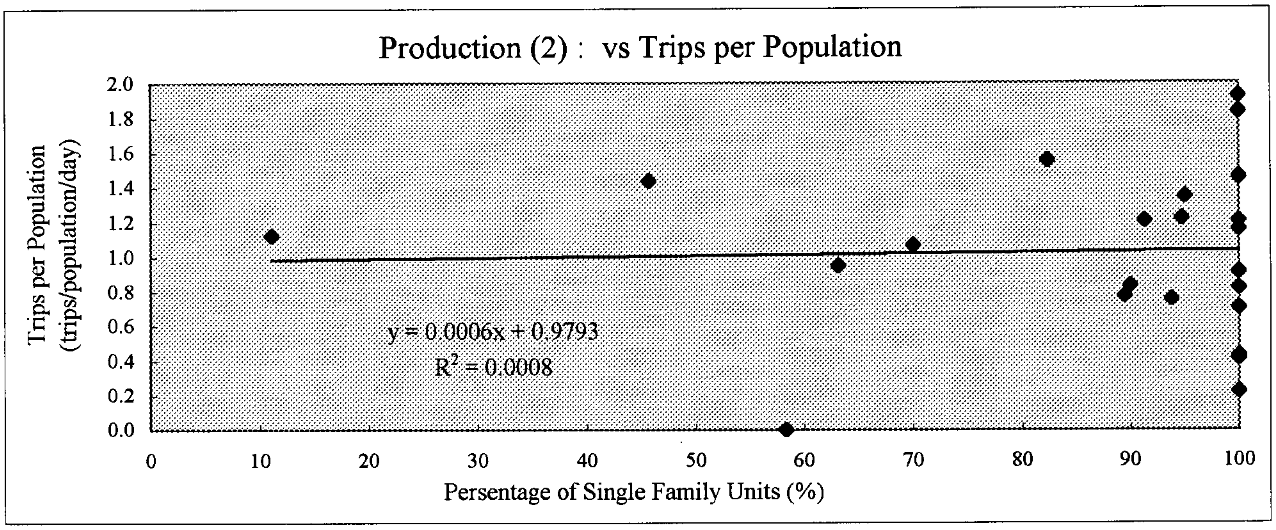
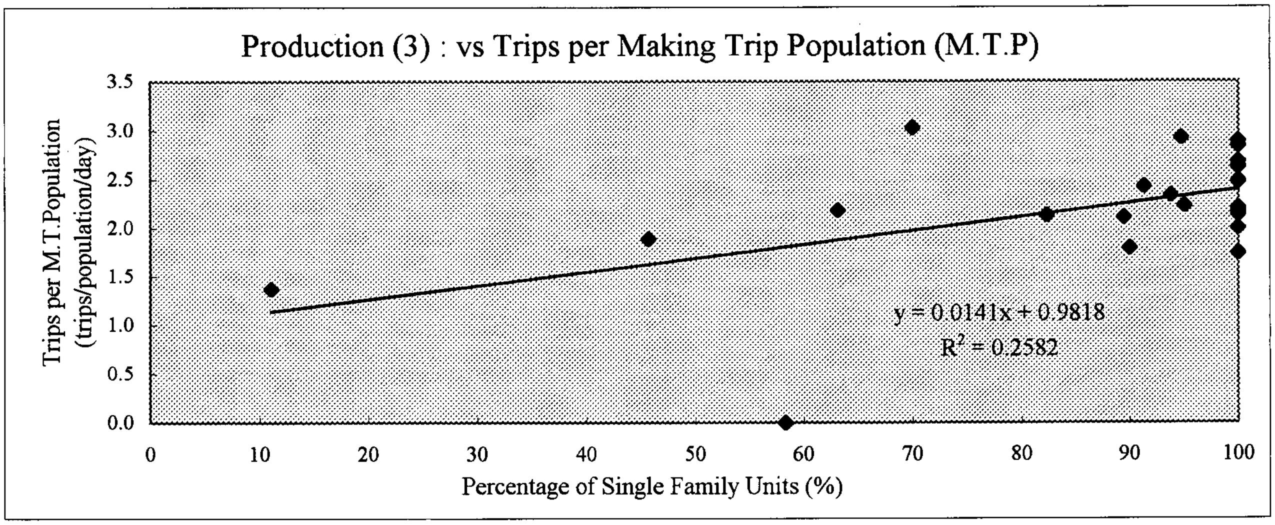


Figure 7-7 (c) Trip Generation (Production : vs Single Family Unit)


Production (2) : vs Trips per Population


Production (3) : vs Trips per Making Trip Population (M.T.P)

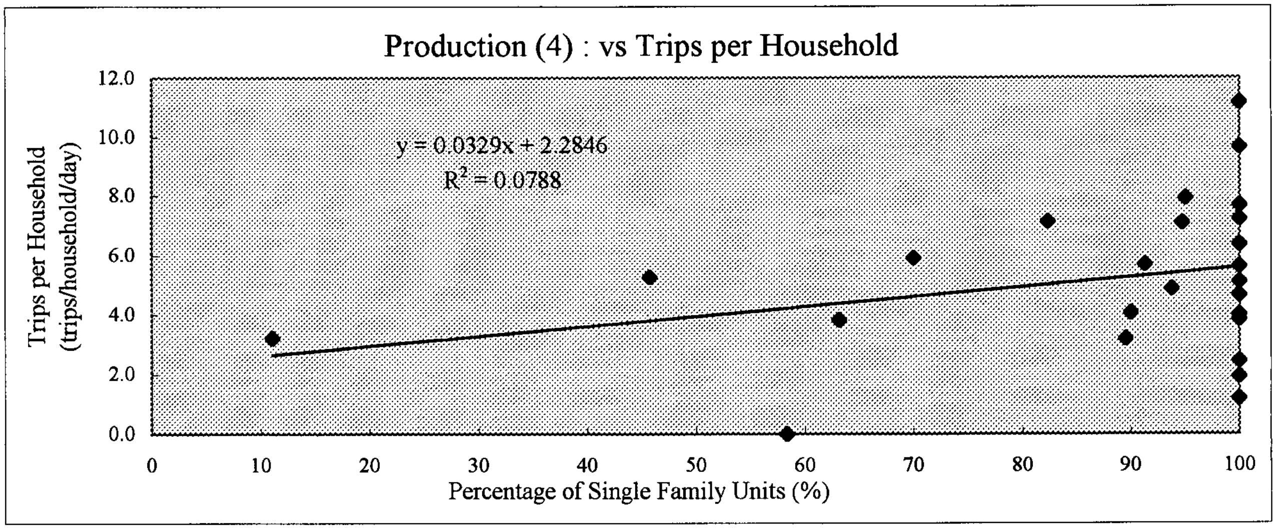
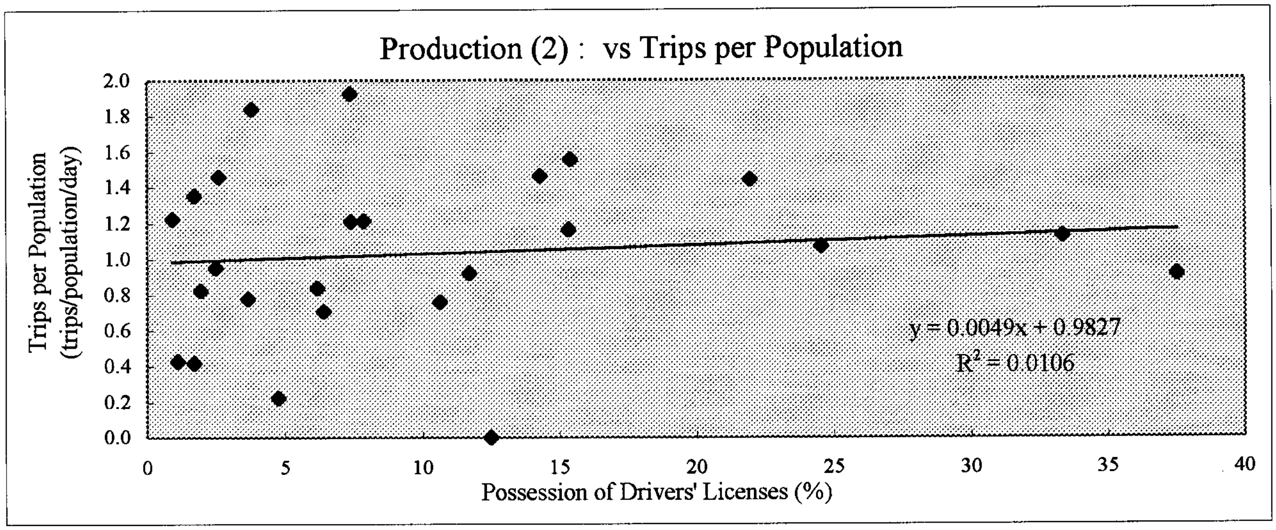
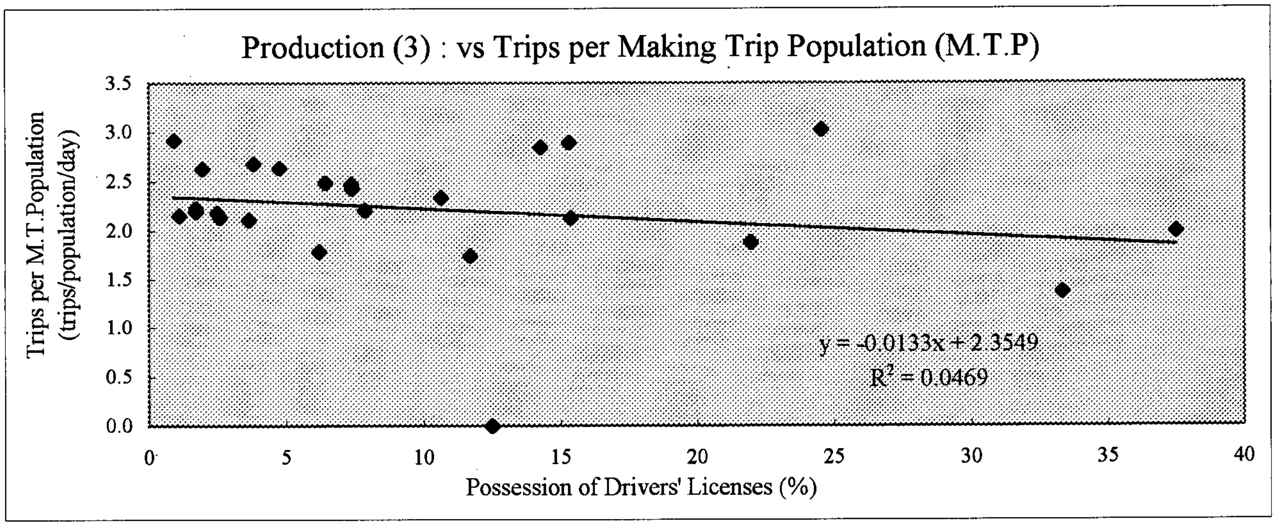

Production (4) : vs Trips per Household

Figure 7-7 (d) Trip Generation (Production : vs Drivers' License)





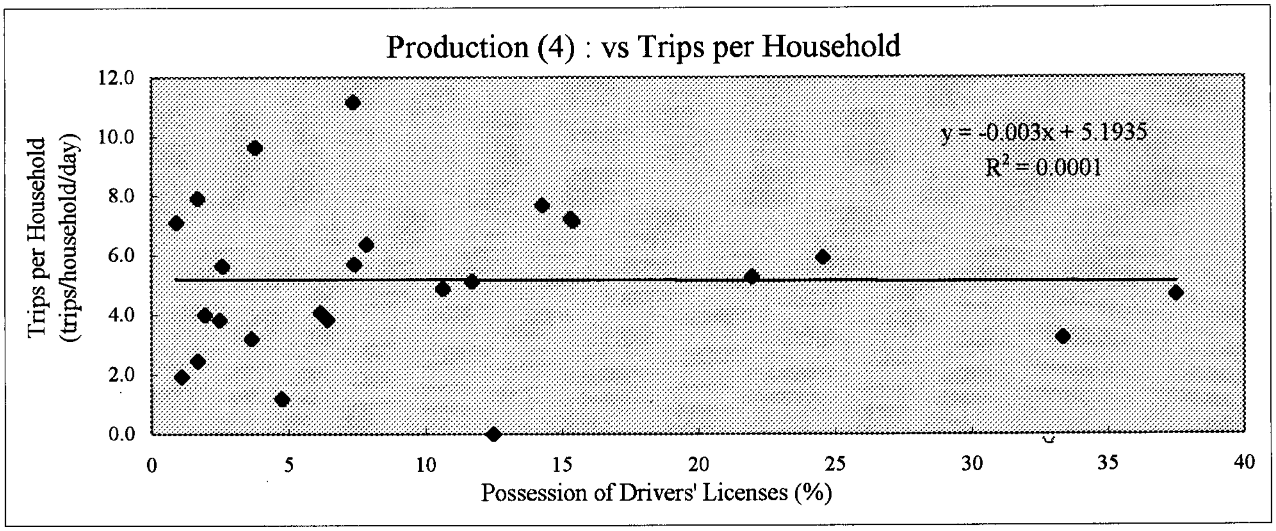
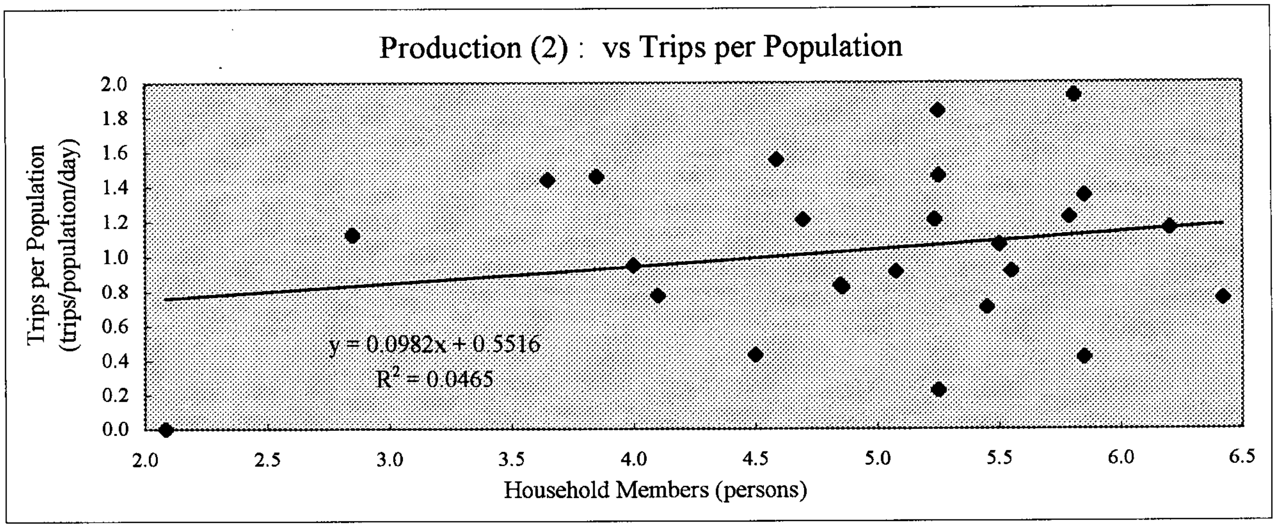
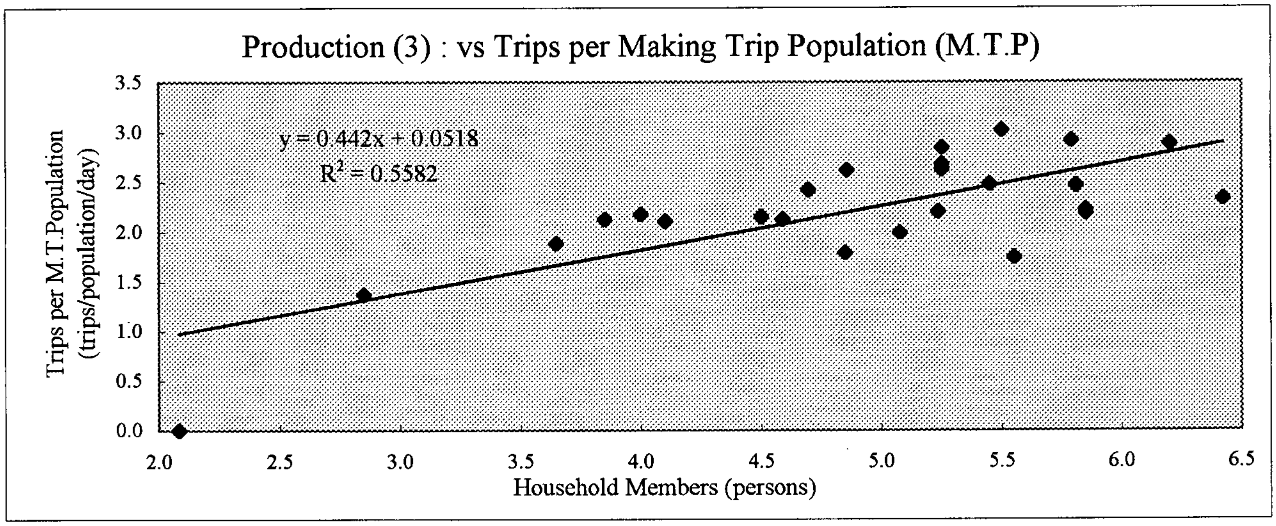


Figure 7-7 (e) Trip Generation (Production : vs Household Members)





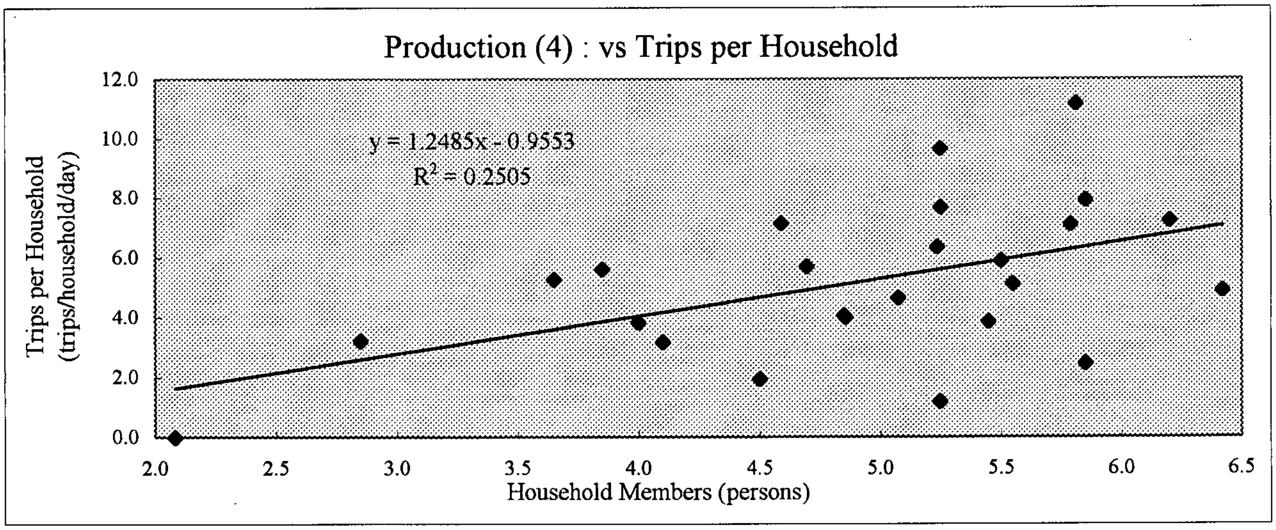
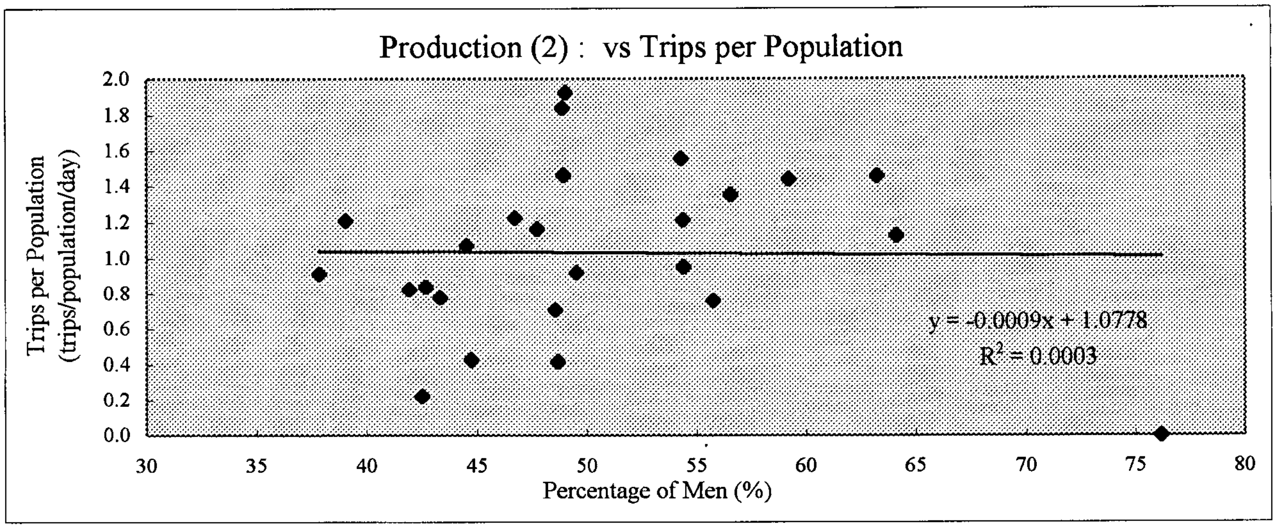
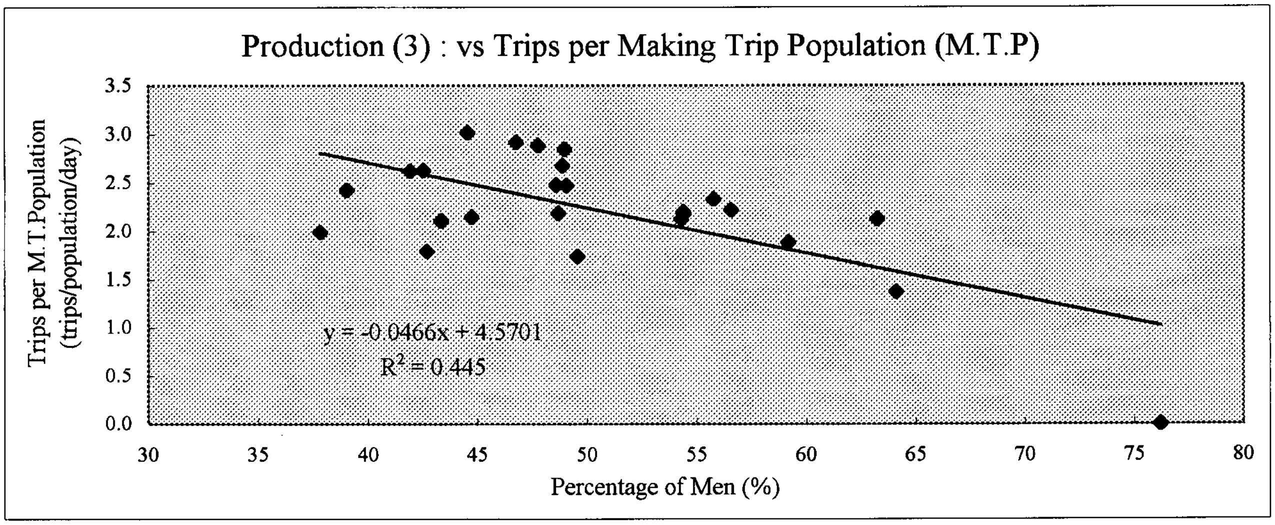


Figure 7-7 (f) Trip Generation (Production : vs Gender Structure)


Production (2) : vs Trips per Population


Production (3) : vs Trips per Making Trip Population (M.T.P)

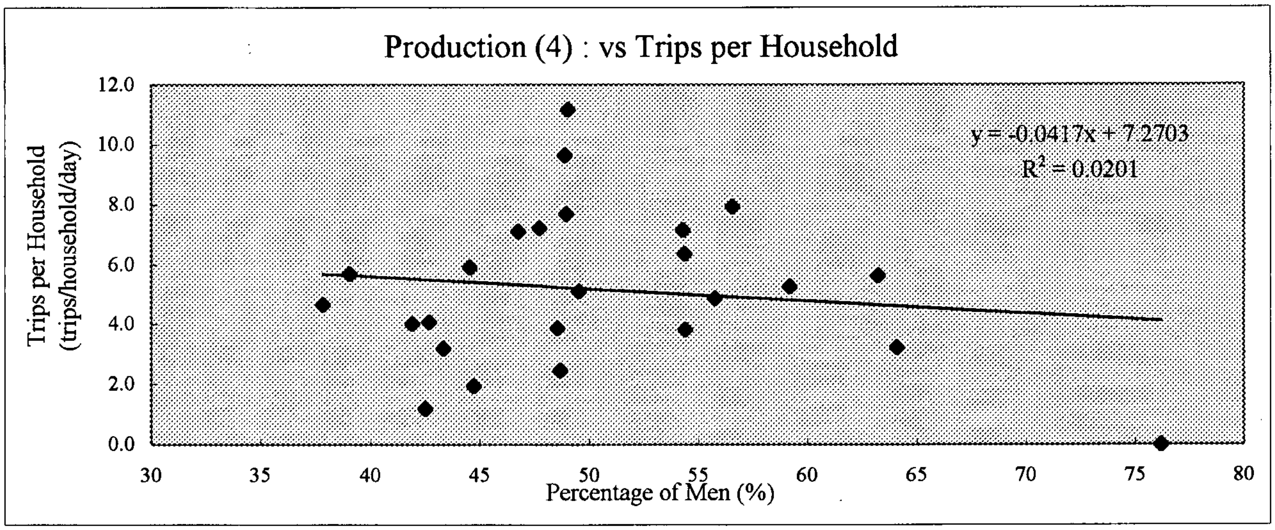

Production (4) : vs Trips per Household

Figure 7-7 (g) Trip Generation (Production : vs Average Age)

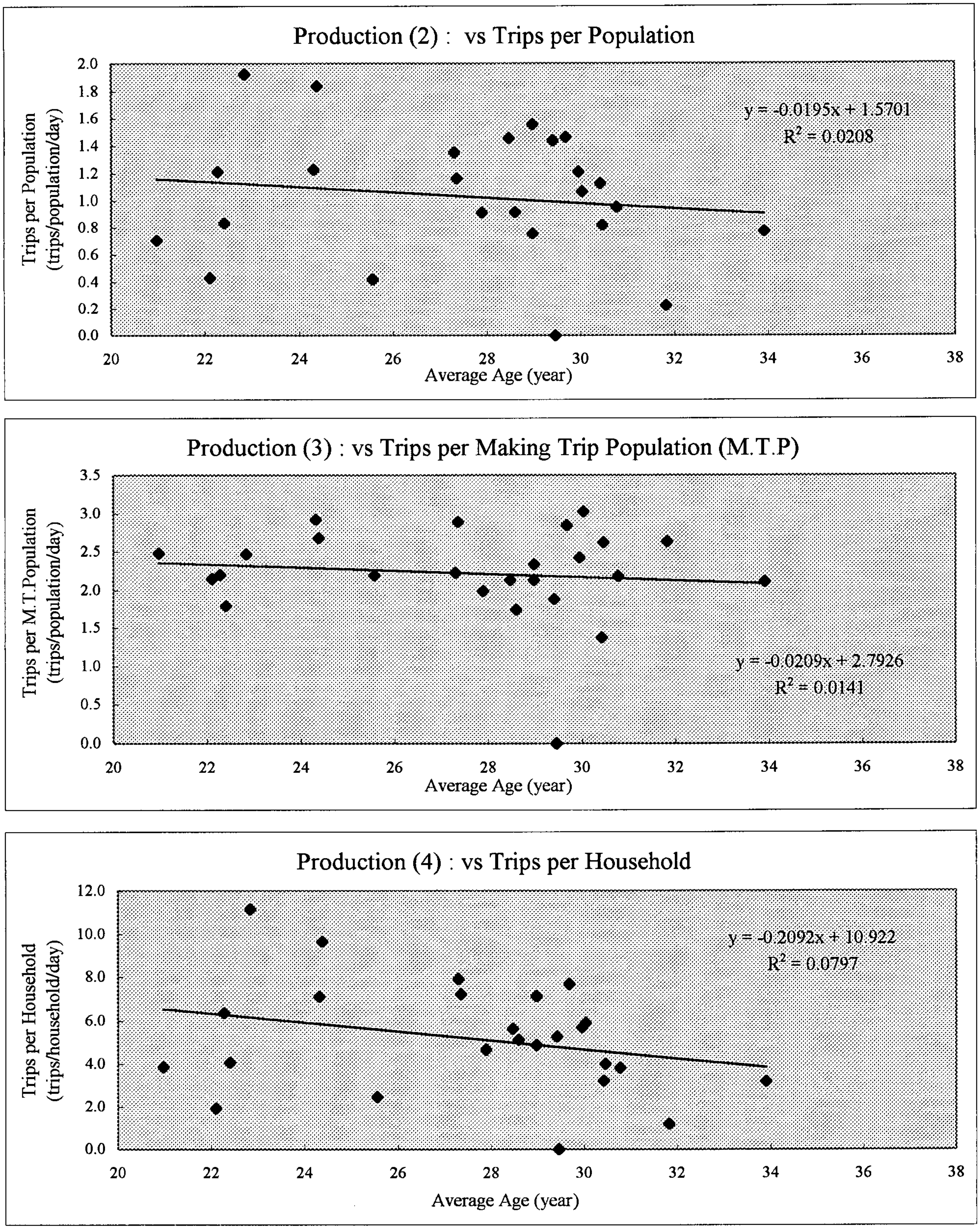
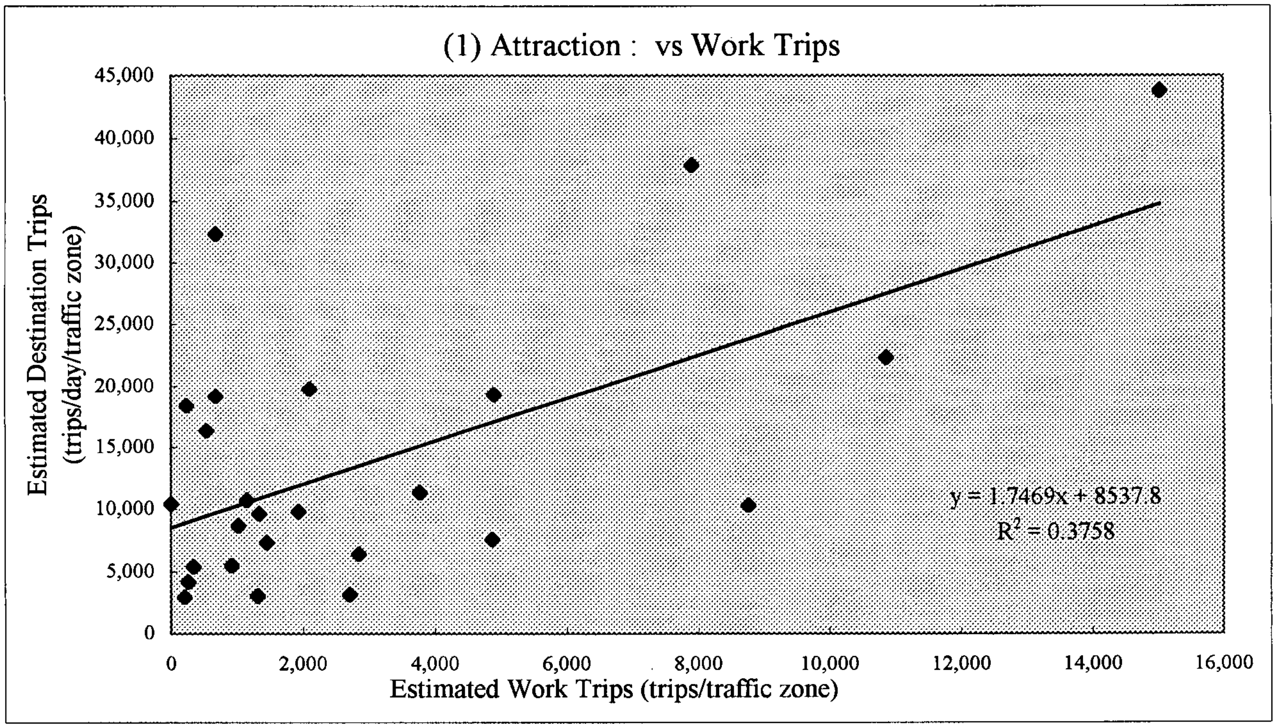


Figure 7-8 (a) Trip Generation (Attraction)



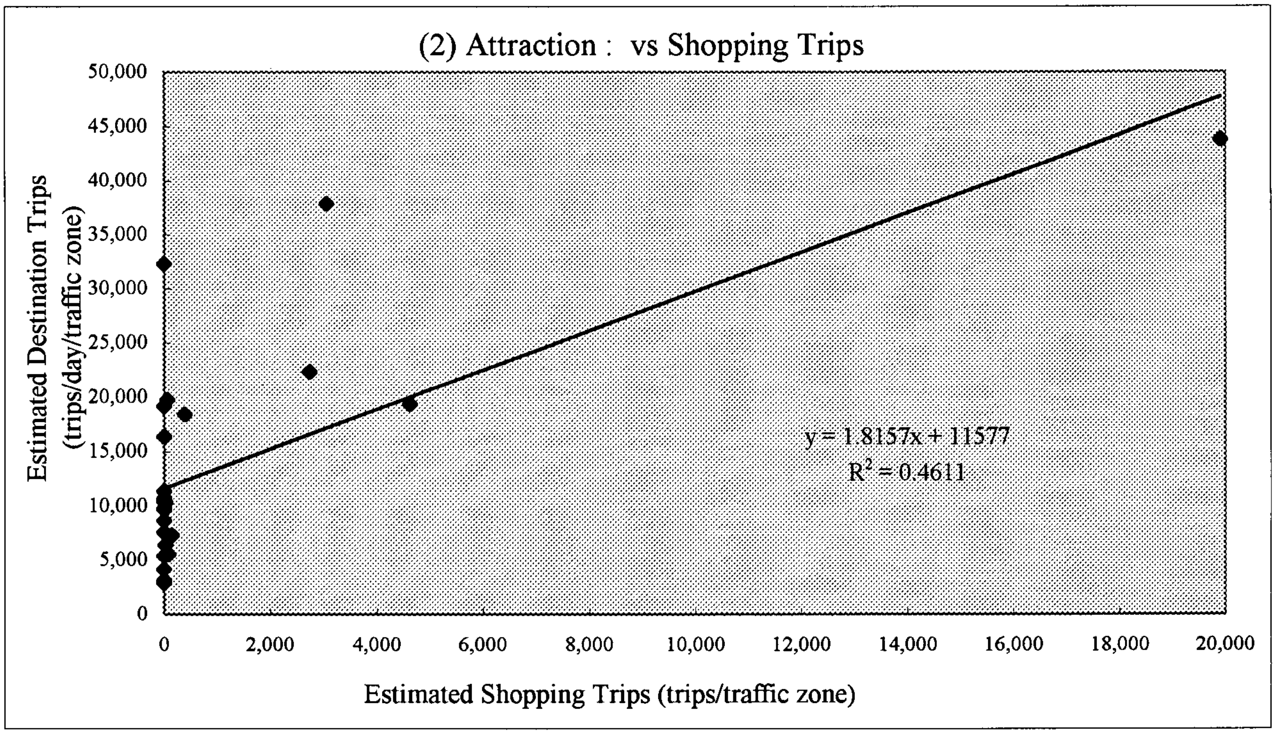
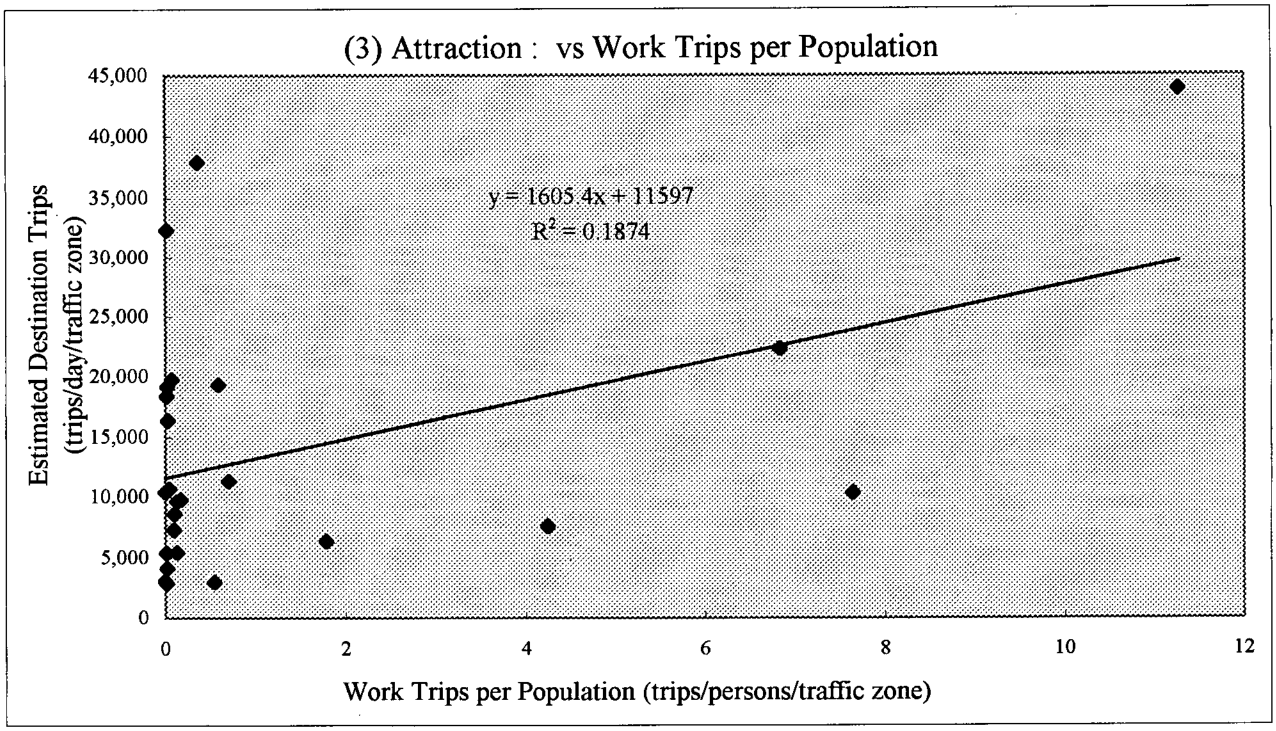


Figure 7-8 (b) Trip Generation (Attraction)



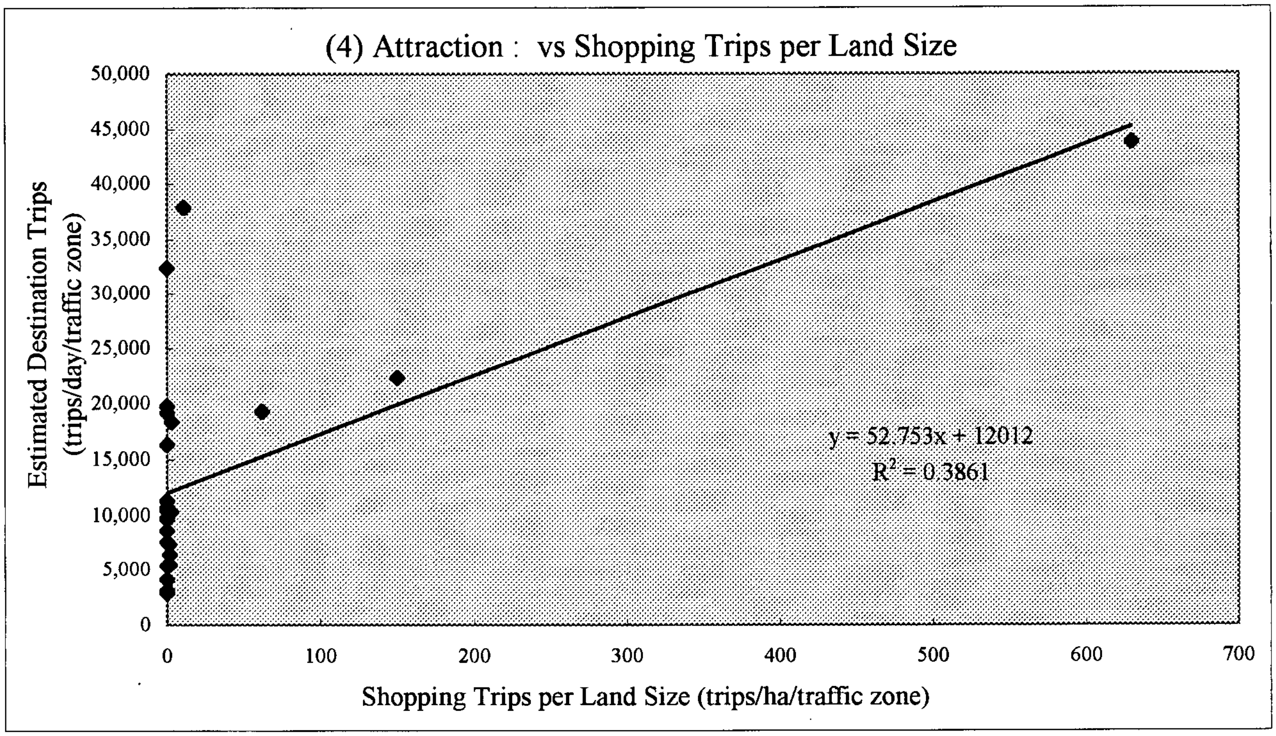
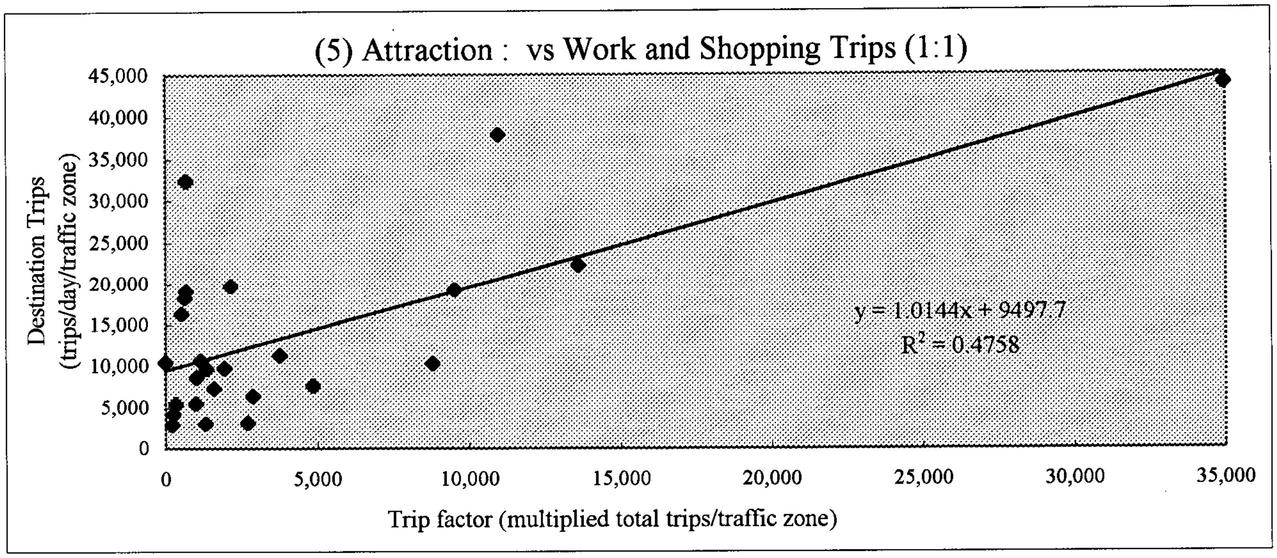
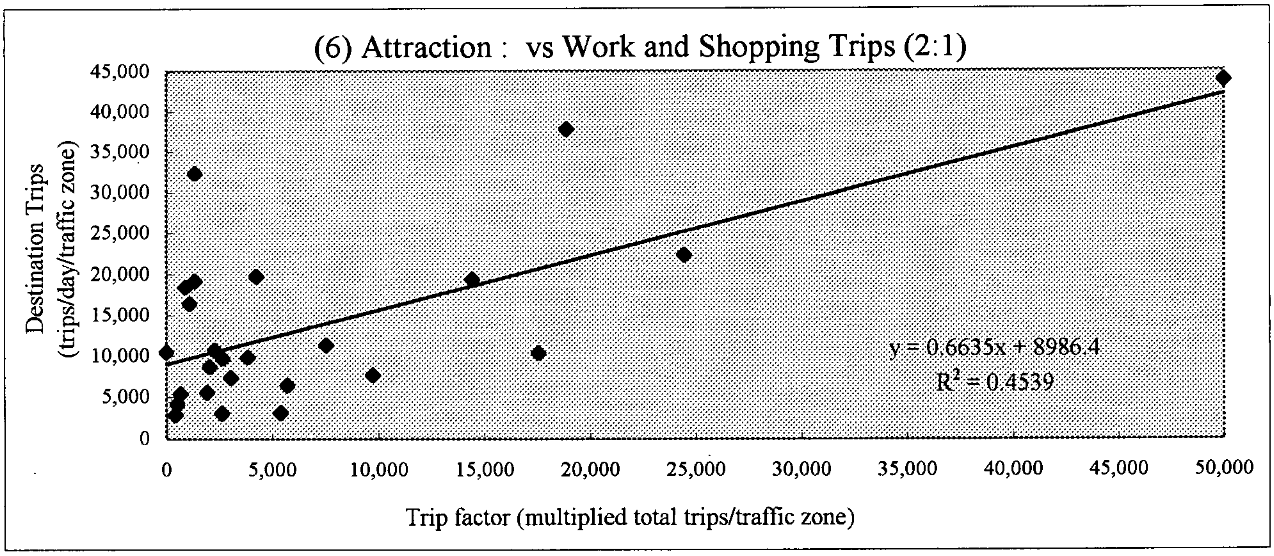


Figure 7-8 (c) Trip Generation (Attraction)





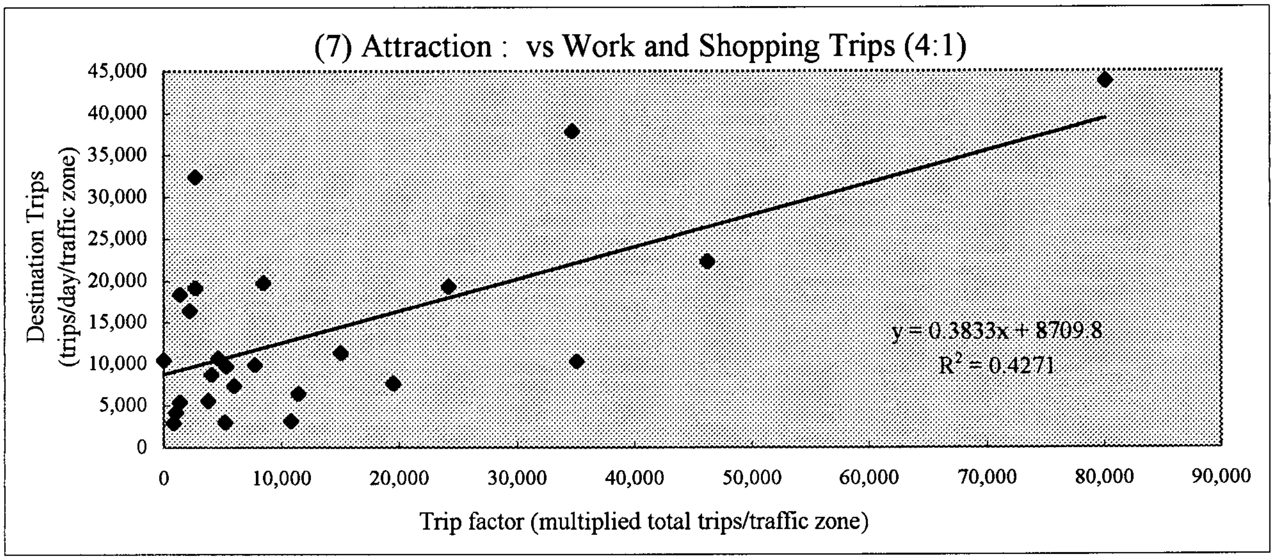
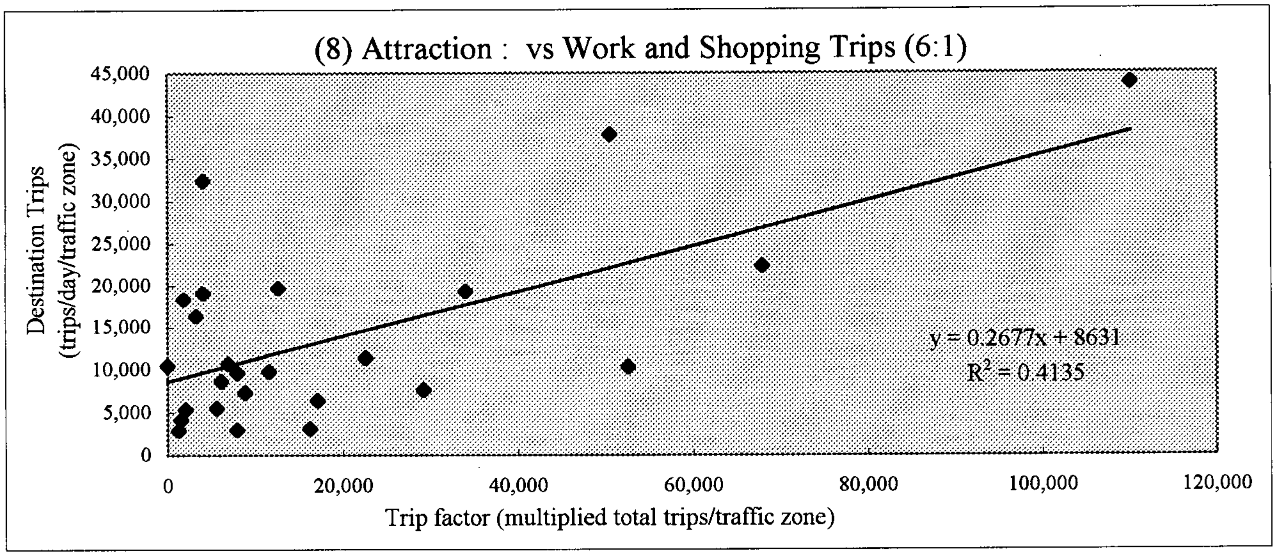
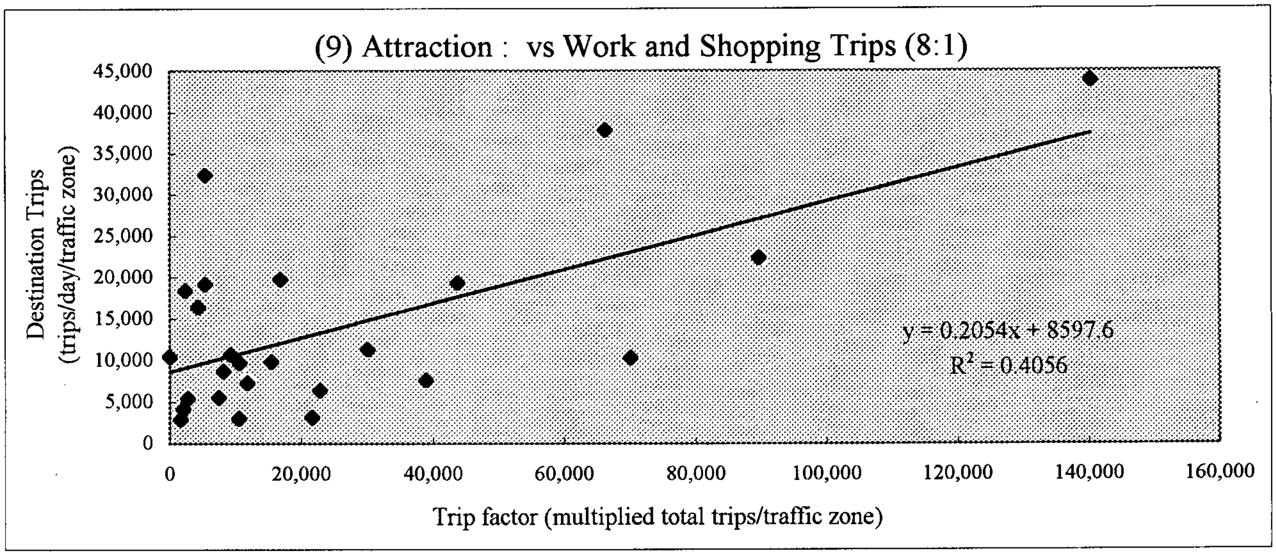


Figure 7-8 (d) Trip Generation (Attraction)


(8) Attraction : vs Work and Shopping Trips (6:1)


(9) Attraction : vs Work and Shopping Trips (8:1)

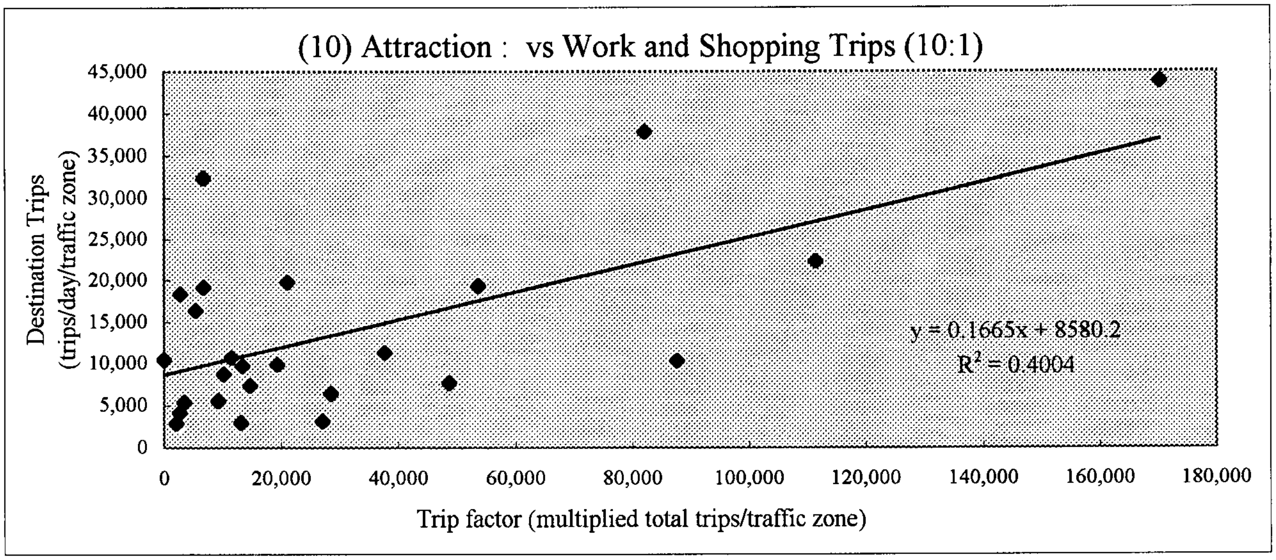
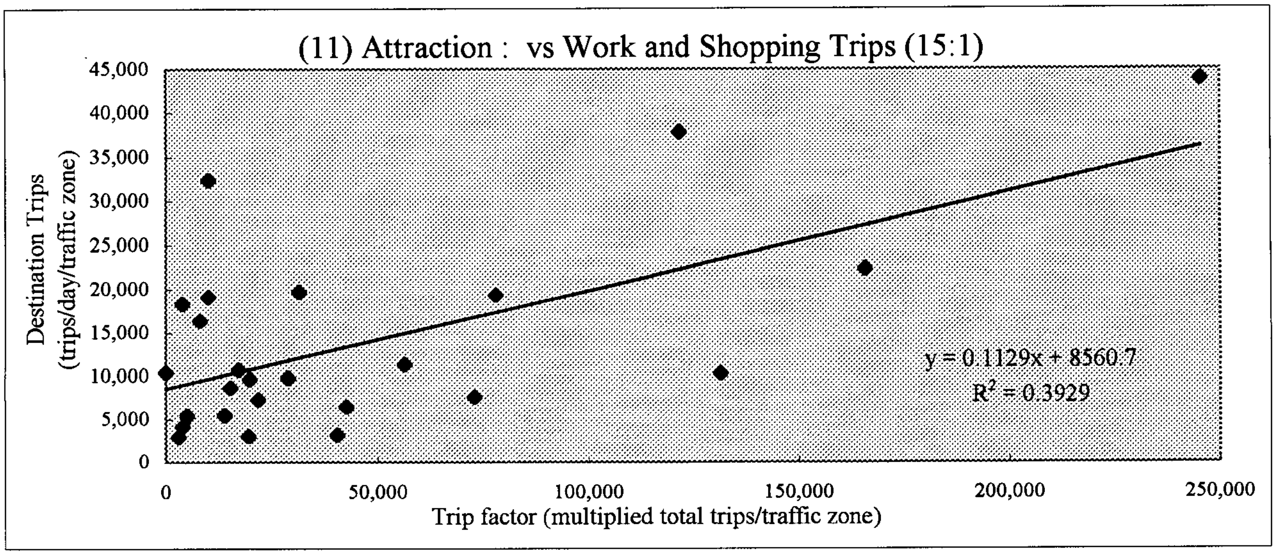
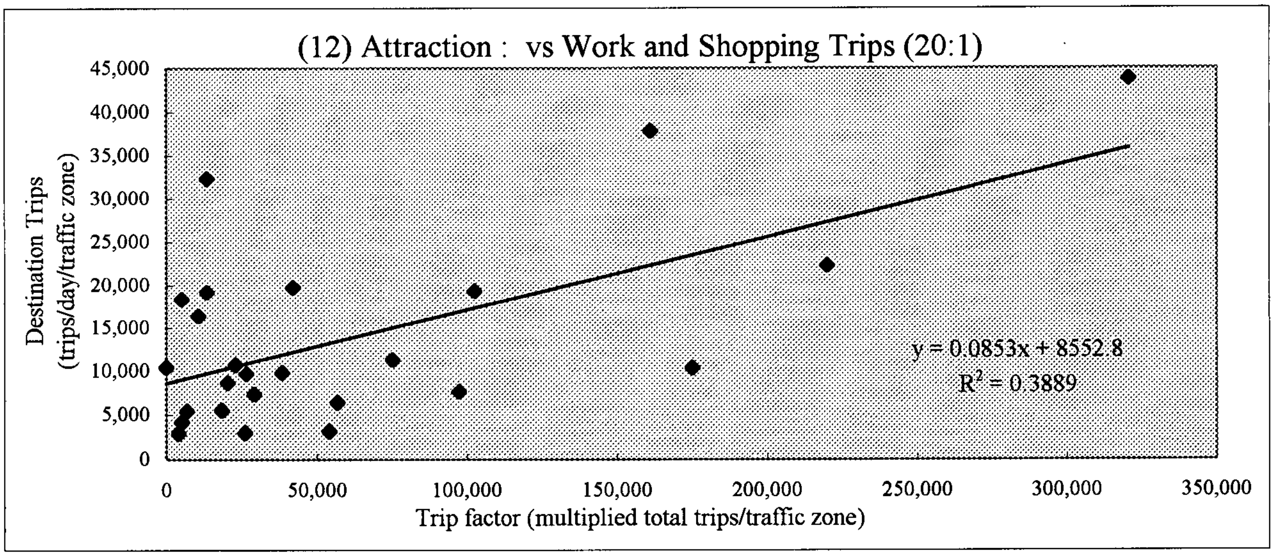

(10) Attraction : vs Work and Shopping Trips (10:1)

Figure 7-8 (e) Trip Generation (Attraction)





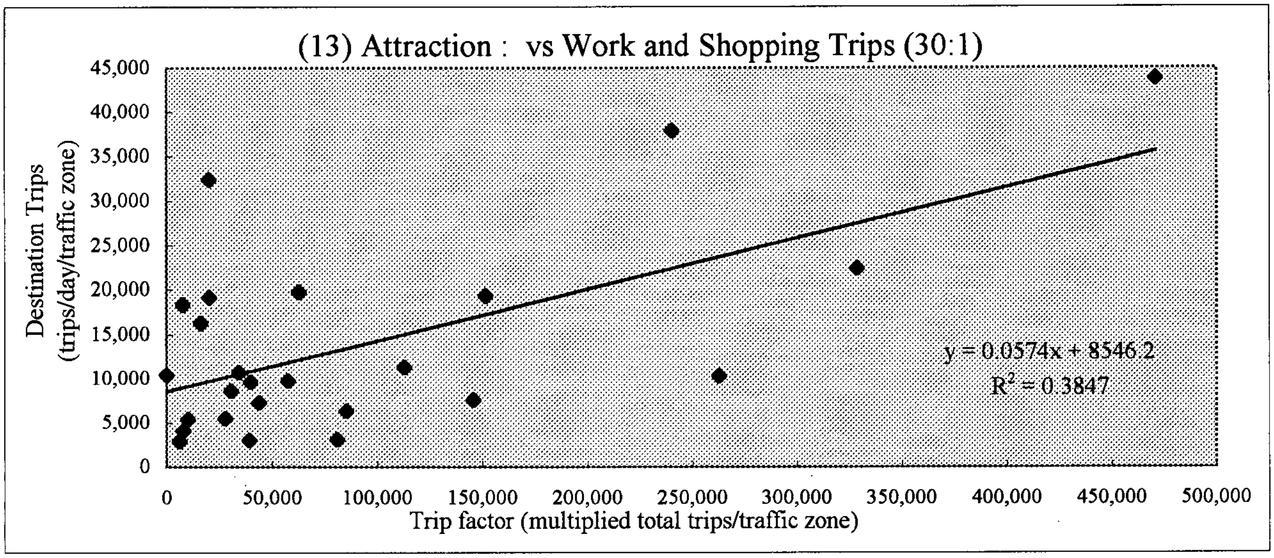
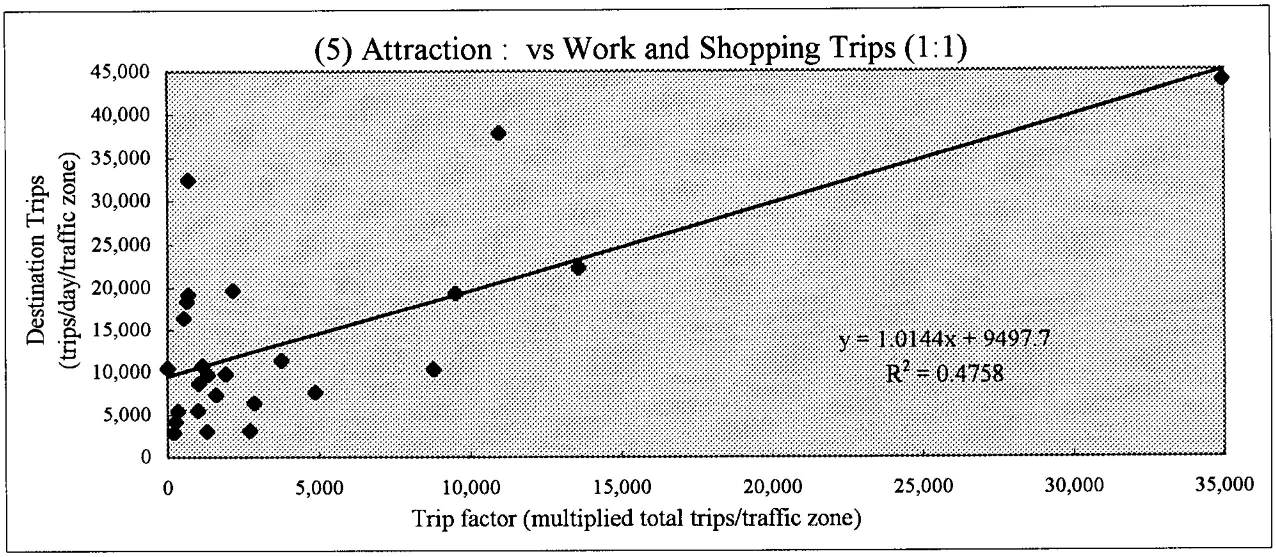
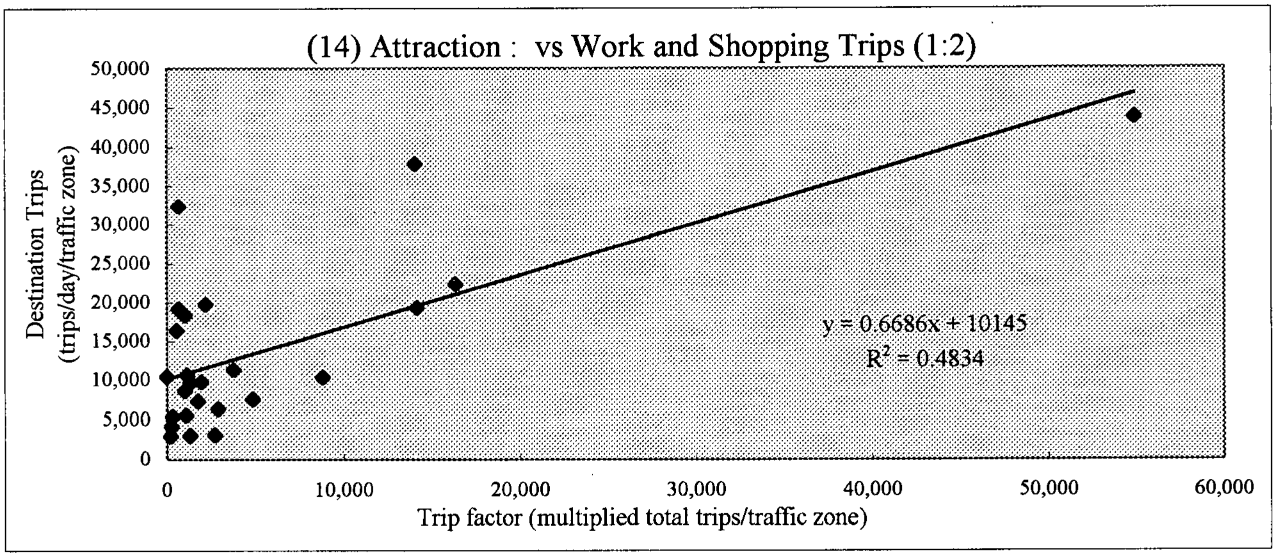


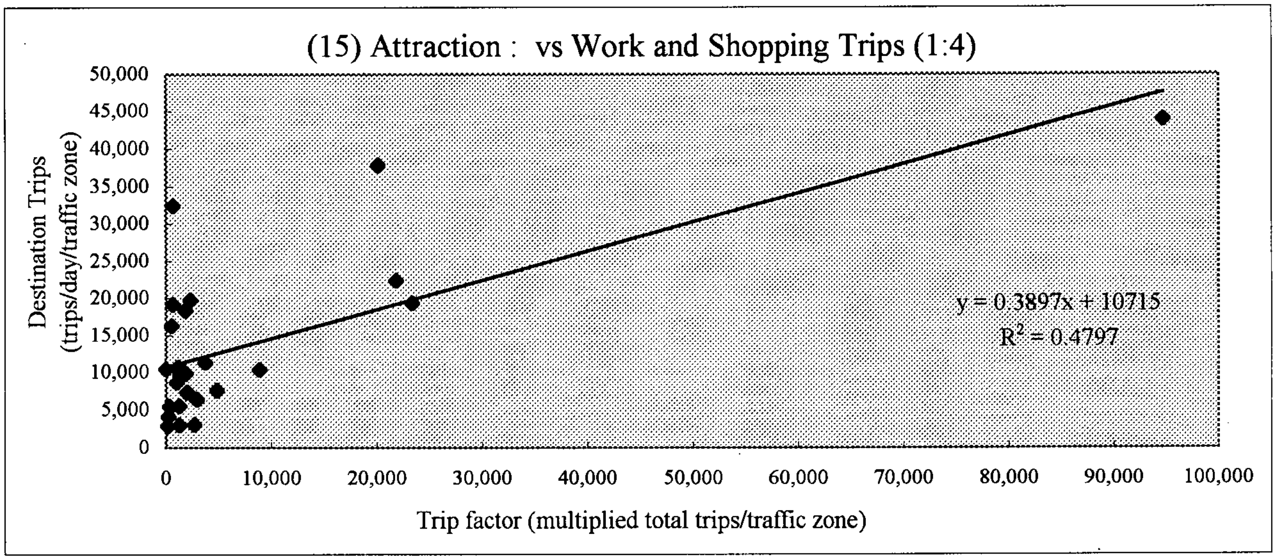
Figure 7-8 (f) Trip Generation (Attraction)



(5) Attraction : vs Work and Shopping Trips (1:1)

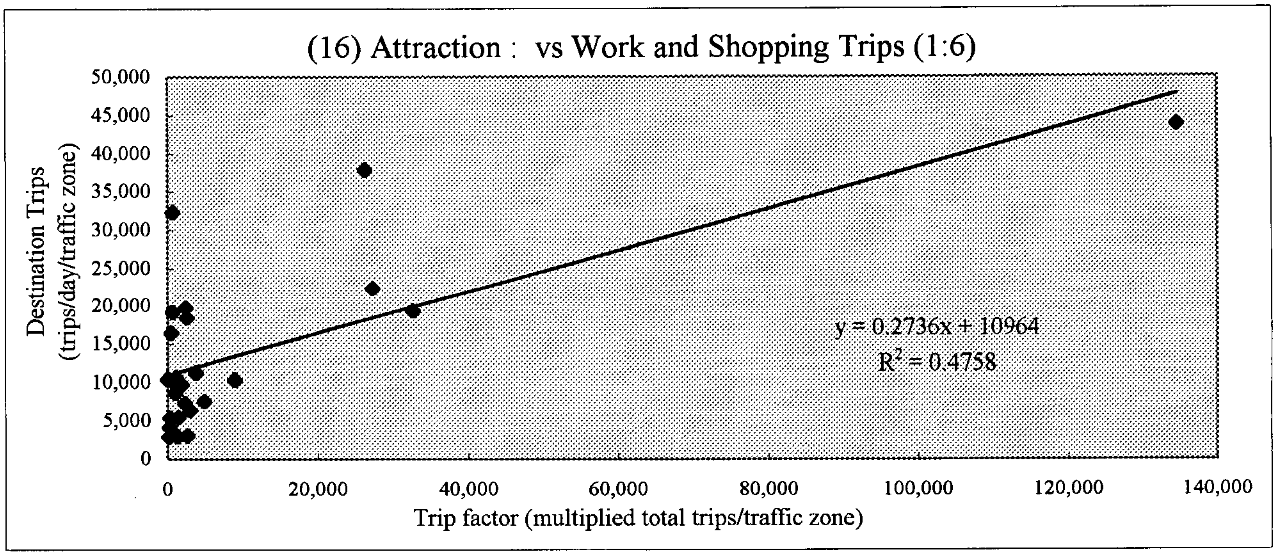


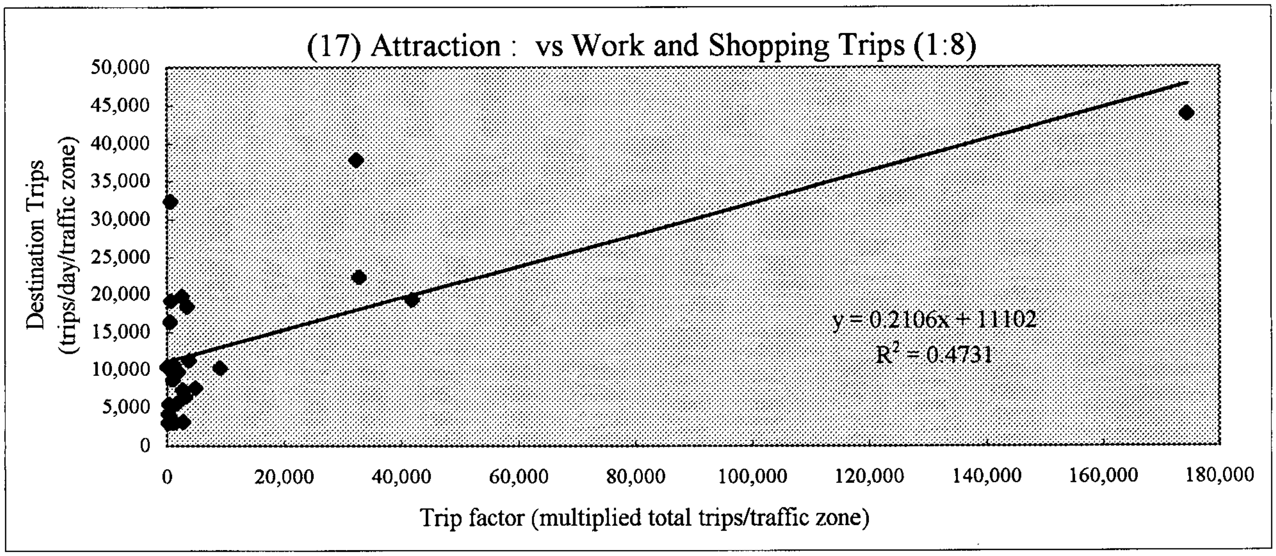
(14) Attraction : vs Work and Shopping Trips (1:2)

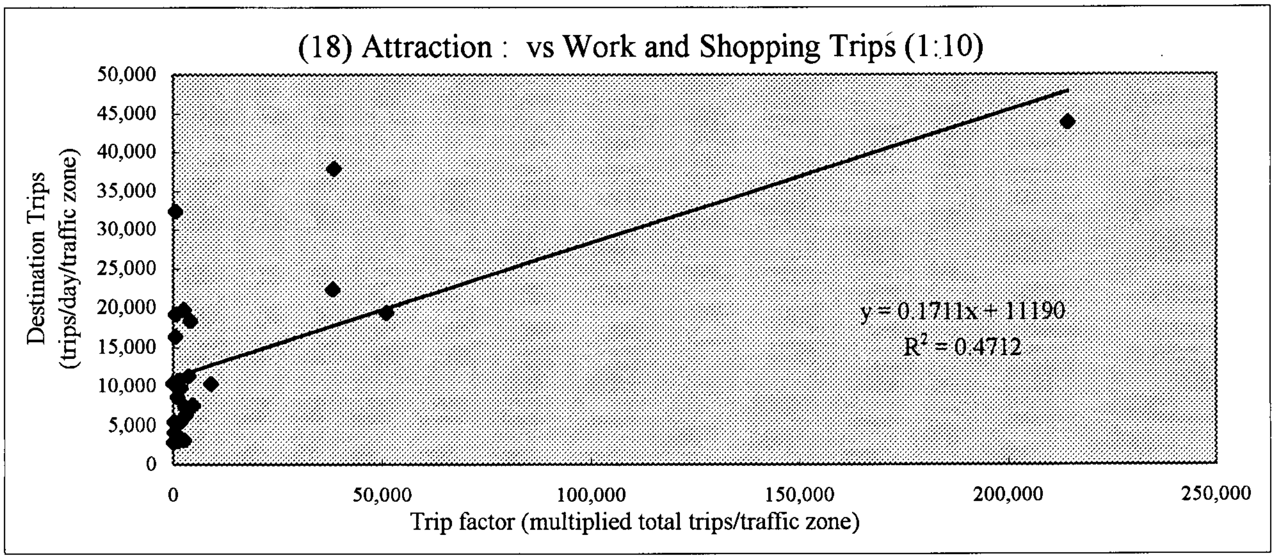


(15) Attraction : vs Work and Shopping Trips (1:4)

Figure 7-8 (g) Trip Generation (Attraction)







① the estimated populations,
② the estimated trip making populations,
③ the estimated land sizes,
④ the estimated number of total family units,
⑤ the estimated number of private cars owned,
⑥ the total estimated number of all types of vehicles, and
⑦ the number in possession of drivers' licenses.

The variables for Productions (2) to (4) are:

① the estimated average income,
② the estimated density,
③ the percentage of single family units,
④ the percentage in possession of drivers' licenses,
⑤ the average number of family members per household,
⑥ the percentage of men, and
⑦ the estimated average age.

From the results shown in Tables 7-3 (a) to (d), Figure 7-6 and Figure 7-7, using simple factors such as estimated population, estimated trip making population, and total family units, show good curve fitting results with r^2 values of 0.75, 0.97, and 0.77 respectively. Their figures shown in Figure 7-6 (a) are also good. While the result of estimated trip making population is particularly good, this item is more difficult to estimate than the other two: an extensive survey or another research is necessary while the others require only statistical data. Therefore, using estimated population or family units would be a good idea for Piura for the reason of simplicity. If the reliability of data of estimated trip making persons becomes higher, it then would be better to use it as a trip generation variable.

The effectiveness of using "trip making population" is also observed from Tables 7-3 (b), (c) and (d). When Production (2), (3) and (4), which correspond to Tables 7-3 (b), (c) and (d) respectively, are compared, the results by using trip making population (Production (3) shown in Table 7-3 (c)) is mostly better than the results by the other two Productions. From this point, again, if the reliability of estimating trip making person becomes higher, it would likely increase the reliability of trip production estimation.

Moreover, another high r^2 value of 0.56 is observed at the item 5 of Table 7-3 (c), which shows the relationship between estimated total trips per trip making population and the average number of family members. This relationship simply indicates that the more household members there are, the more trip making persons are in a household. This indication is acceptable simply because of the nature of the trip making characteristics. That is, the more people there are, the more trips there are.

7.3.1.2 Trip Attraction Model

For attraction, the variables used are ① total attracted trips of work trips, ② total attracted trips of shopping trips, ③ work trips per population, ④ shopping trips per land size, and the combinations of work and shopping trips weighted by several rates shown in Figure 7-3 (e). Since no data of the number of employees, retail employee nor retail land size of each traffic analysis zone were obtained, the simple estimation for total attracted trips by using the total estimated "work" and "shopping" trips is performed: the number of "work" trips should be close to the real employee number, and "shopping" trips should be relative to the size of commercial activity. That is, because of the lack of data, the trip generation models only for total attracted trips are constructed while the models for specific trip types are not considered in this study. In addition, the combinations of weighted "work" and "shopping" trips for variables is used (1) to examine the relationship of "work" and "shopping" trips and (2) to find out the relationship of "shopping" trips to the real commercial activity or the number of retail employees.

From the results shown in Table 7-3 (e) and Figure 7-8, the strong relationship, which is r^2 value of more than 0.50, is not observed. Instead, it is found that most of the results of r^2

values are between 0.38 and 0.48. The highest values of between 0.47 and 0.48 are found at the items 5 and 14 to 18 of Table 7-3 (e), in which the weights between "work" trips and "shopping" trips vary 1:1 to 1:10. Despite the fact that the r^2 values are between 0.38 and 0.48, which is not high enough to be used as a highly reliable model, the shape of fitting curves shown in Figure 7-8, particularly Figures 7-8 (a), (c) and (f) show quite acceptable results. These facts indicate :

(1) the attraction trip generation model is not effective enough to use as a final model because all of the r^2 values are less than 0.50,

(2) there is no big differences among the items to be used with most of the r^2 values between 0.38 and 0.48,

(3) stressing "work" trips does not seem to work well because increasing weights of "work" trips results in smaller r^2 values, and

(4) it may be acceptable to set the ratio of "shopping" trips and the retail employee numbers between 1 to 10 because the change of weights of "shopping" trip to "work" trips, of which the ratio to the working employee number should be close to 1, from 1 to 10 does not affect the results much.

7.3.1.3 Conclusion

From the analysis of those results above, the trip generation models for trip production likely work well enough by using simple population variables such as the estimated populations and the family unit numbers while the trip attraction model still needs more work to improve its reliability. In this study, particularly, the lack of data for attraction functions of traffic analysis zones is serious. Therefore, these data should be obtained for future improvement.

In addition, while these trip generation models are based on total daily trips, the results, which are origin and destination matrixes, have to be transferred to peak hour term. In this study, this transformation is done by simply using the ratio of the number of hourly generated or attracted trips to the number of the total daily (or time period) generated or attracted trips respectively without respect to other factors suggested in T-model2, such as peak hour factors and production-attraction factors. The detailed calculation is shown in the section of "total trip estimation" in Appendix F.

7.3.2 T-model2 Simulation Setting

The settings for T-model2 simulation are presented in this section. There are 9 options used for the T-model2 simulation, and Figure 7-9 shows the summary of the flow chart of the options. Options (1) to (3) are based on "person" trips, Options (4) to (6) consider "mode (or vehicular)" trips, and Options (7) to (9) use "vehicle equivalent" trips. The "vehicle equivalent" trips are simply derived by multiplying "vehicle equivalent factor" to the "mode" trips.

As mentioned in the previous chapters, the primary problem in applying T-model2 to the city of Piura is because there is a high mixture of modes sharing a limited transportation infrastructure. This situation causes difficulties in applying the two modal split methods offered by T-model2; pre-distribution modal split and post-distribution modal sprit. The complicated modal structures contribute to the difficulties in setting the required factors for these methods. In fact, it is found that the obtained data are not reliable enough for T-model2 application because of the small sample size for each traffic analysis zone when specific modes are separately considered. In this study, therefore, simplified options, which follow the guidelines below, are used for the simulation:

① Three trip types, "person", "mode" and "vehicle equivalent" trips, are used in the simulation,

② The estimated total or mode specific "person" trip OD matrix, which are derived from the household survey, are directly applied,

③ The modal split methods offered by T-model 2 are not used because the estimated OD matrixes given have the same form as the outcome of pre-distribution modal split, and

④ The distribution and assignment modules in T-model2 are basically performed consecutively except when the outcome of "mode specific" trip tables are summed up.

Figure 7-9 Flowchart : Trip Types in T-model2 Simulation

\ Flow Option\	OD matrix (Trip estimation)	Trip Type Transformation	Mode Split	Gravity Model Distribution	Trip Type Transformation	Assignment
(1)	P / S	-->	-->	P / S	-->	P / S
(2)			--> MP / Multi	MP / Multi	-->	MP / Multi
(3)			--> MP / Multi	MP / Multi	Summed up	P / S
(4)	P / S	--> M / S	-->	M / S	-->	M / S
(5)			--> MM / Multi	MM / Multi	-->	MM / Multi
(6)			--> MM / Multi	MM / Multi	Summed up	P / S
(7)	P / S	--> V / S	-->	V / S	-->	V / S
(8)			--> MV / Multi	MV / Multi	-->	MV / Multi
(9)			--> MV / Multi	MV / Multi	Summed up	V / S

(Option)

(1) : Total Person Trips
(2) : Mode Specific Person Trips
(3) : Summed-up Mode Specific Person Trips
(4) : Total Mode Trips
(5) : Mode Specific mode Trips
(6) : Summed-up Mode Specific Mode Trips
(7) : Total Vehicle equivalent Trips
(8) : Mode Specific Vehicle Equivalent Trips
(9) : Summed-up Vehicle Equivalent Trips

(Above)

P : Total Person Trips
MP : Mode Specific Person Trips
M : Total Mode Trips
MM : Mode Specific Mode Trips
V : Total Vehicle Equivalent Trips
MV : Mode Specific Vehicle Equivalent Trips
--> : Not executed

Above . : Trip Types

/ Bellow : The Number of Trip Tables Dealt

(Bellow)

/ S : only one execution
/ Multi : multiple execution

Options (1) to (3) in Figure 7-9 use only "person" trips throughout the simulation. Even in the assignment stage, "person" trips are used although network setting, design speed and capacity, is based on regular "automobile" trips. Option (1) uses only one total "person" trip OD matrix and performs one distribution and one assignment. Options (2) and (3), on the other hand, use mode specific "person" trip OD matrixes. The mode specific "person" trip OD matrixes are in fact the same as the outcome of pre-distribution modal split. In this way, the actual modal split stage offered by T-model2 is omitted. Option (2) uses the separated mode specific "person" trips throughout the simulation, and it performs multi-distributions and multi-assignments. Option (3) uses the separated mode specific "person" trips for its distribution stage, but an integrated total trip table, which is simply the sum of "mode specific" trip tables, is used for only one assignment. In these three methods, the distribution stage is more focused because the assignment stage can not handle "person" trips properly because of the network settings, which are based on regular "automobile" trips.

The groups of Options (4) to (6) and Options (7) to (9) basically use the same setting as the group of Options (1) to (3). The only difference of Options (4) to (6) and Options (7) to (9) from Options (1) to (3) is "trip types" used. Options (4) to (6) use "mode" trips, and Options (7) to (9) use "vehicle equivalent" trips while Options (1) to (3) use "person" trips. Thus, those 9 options are summarized as:

(1) using one total "person" trip OD table throughout simulation,
(2) using mode specific "person" trip tables for separated assignments,
(3) summing up mode specific "person" trip tables for assignment,
(4) using one total "mode" trip OD table throughout simulation,
(5) using mode specific "mode" trip tables for separated assignments,
(6) summing up mode specific "mode" trip tables for assignment,
(7) using one total "vehicle equivalent" trip OD table throughout simulation,
(8) using mode specific "vehicle equivalent" trip tables for separated assignments, and
(9) summing up mode specific "vehicle equivalent" trip tables for assignment.

When “mode” trips are used in Options (4) to (6), the outcomes of simulation are based on actual “mode” volumes of each mode. These Options are useful when “mode specific” movements in “volume” term are focused. Moreover, these options can be more appropriately applied to the assignment stage than the group of Options (1) to (3) because most of the major modes are motorized ones while the network settings are basically done in “automobile” trips.

“Vehicle equivalent” trips are used in Options (7) to (9). These options estimate the “standardized vehicle” trips by weighting each “mode specific” trips. While these “vehicle equivalent” trips are not a direct indication of either “person” or “mode” trips in volume, it does fit most properly for the network setting in the assignment stage than the other two trip types because all the trips are standardized in “automobile” terms. That is, it is expected that these Options perform better in the assignment stage.

Table 7-4 summarizes the OD tables of those options. Tables 7-4 (1) to (3) show the OD data of “person” trips for the specific modes, (a) private automobile, (b) Collectibo, (c) Combi, (d) walking, (e) others, and (f) the total of the five specific modes respectively. Then, Tables 7-4 (4) to (6) and Tables 7-4 (7) to (9) correspond to the OD data of “mode” trips and “vehicle equivalent” trips for specific modes (a) to (f) respectively. To calculate “mode” trips and “vehicle equivalent” trips, occupancy rates and vehicle equivalent rates are used. Their values for the specific modes (a) to (e) are 2.5, 4, 12, 1 and 2.5 for occupancy rates and 1, 1.5, 2, 0.2 and 1.25 for vehicle equivalent factors respectively. These values are results of other reports by the city and the calibration process of the simulation.

Table 7-4 (1) Morning Peak Hour OD Table of "Person" Trips

(a) Mode Type [1 : Private Automobile]

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	46	334	0	0	0	246	0	0	0	0	0	0	46	580
2	40	813	0	121	0	54	0	0	0	0	0	0	40	989
3	53	258	0	0	0	137	0	0	0	0	0	0	53	395
4	3	1343	3	46	0	0	0	0	0	0	3	0	8	1389
5	0	137	0	0	0	0	0	0	0	0	0	0	0	137
6	8	767	8	1959	0	0	0	0	137	0	0	65	153	2791
7	113	421	45	145	23	54	0	0	0	0	0	0	181	620
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	34	0	0	0	0	0	0	0	0	0	0	0	34	0
10	654	137	163	0	272	0	0	0	0	0	0	0	1089	137
11	92	0	92	0	0	0	0	0	0	0	0	0	184	0
12	309	0	62	0	0	0	0	0	0	0	62	0	433	0
13	719	248	120	0	240	476	0	0	0	0	0	0	1079	724
14	0	0	0	0	437	0	0	0	0	0	0	0	437	0
15	1	0	0	0	0	0	0	0	0	0	0	0	1	0
16	617	218	0	0	0	0	0	0	0	0	0	0	617	218
17	0	219	0	0	0	0	0	0	0	0	0	0	0	219
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	109	0	0	0	0	0	0	0	0	0	109
20	327	0	109	0	0	0	0	0	0	0	0	0	436	0
21	1091	259	91	0	182	23	0	0	0	0	0	0	1364	281
22	219	227	70	535	106	324	0	0	0	0	0	137	395	1223
23	822	62	548	0	411	137	0	0	0	137	137	0	1918	336
24	1069	109	1604	0	0	0	0	0	0	0	0	0	2674	109
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	47	0	0	0	0	0	0	0	0	0	0	0	47
Total	6217	5597	2916	2916	1670	1452	0	0	137	137	202	202	11142	10303

(b) Mode Type [2 : Public Transit 1 (Collectibo)]

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	9	100	0	0	0	91	0	0	0	0	0	0	9	191
2	239	564	0	0	0	109	0	0	0	0	0	219	239	891
3	27	242	0	8	0	0	0	0	0	0	0	0	27	250
4	0	260	0	75	0	0	0	8	0	0	0	0	0	344
5	82	91	0	0	0	0	0	0	0	0	0	0	82	91
6	8	419	16	1073	0	0	8	0	663	0	0	23	695	1514
7	45	339	45	0	0	35	0	0	0	0	23	151	113	525
8	412	0	0	0	0	0	0	0	0	0	0	0	412	0
9	0	219	0	0	0	0	0	0	0	0	0	0	0	219
10	54	45	0	0	0	0	0	0	0	0	0	0	54	45
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	62	75	186	0	0	0	0	0	0	0	0	0	247	75
13	0	0	0	0	0	182	0	0	0	0	0	0	0	182
14	656	0	219	0	0	0	0	0	0	219	219	0	1093	219
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	528	219	151	0	0	0	0	0	0	0	151	0	830	219
18	718	0	410	0	103	0	0	0	0	308	0	0	1231	308
19	0	0	0	0	109	0	0	0	0	0	0	0	109	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	1091	182	0	0	545	182	0	0	0	0	0	0	1636	364
22	0	194	35	0	35	0	0	0	0	0	0	0	70	194
23	411	75	0	0	0	0	0	0	0	137	0	0	411	212
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	95	0	0	0	0	0	0	0	0	0	0	0	95	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	8	0	0	0	0	0	0	0	0	0	8
Total	4437	3024	1062	1164	792	599	8	8	663	663	392	392	7354	5850

Table 7-4 (2) Morning Peak Hour OD Table of "Person" Trips

(c) Mode Type [3 : Public Transit2 (Combi)]

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0	1249	0	83	0	91	0	0	0	0	0	0	0	1423
2	80	1322	20	214	40	743	0	206	0	20	0	0	140	2505
3	133	308	53	16	173	46	0	0	54	27	0	120	413	516
4	14	1672	0	16	11	0	0	0	0	0	8	8	33	1696
5	412	624	82	0	442	521	82	0	0	0	82	360	1101	1504
6	550	3476	79	3777	223	95	0	206	791	16	0	915	1643	8485
7	168	564	23	0	248	161	0	0	46	0	0	46	485	771
8	3088	0	1647	0	0	46	824	206	0	0	0	0	5559	252
9	219	443	0	0	185	0	0	0	0	0	0	0	403	443
10	109	223	54	0	436	146	0	0	0	0	54	0	654	368
11	184	46	46	0	275	0	0	0	0	92	92	0	597	138
12	186	62	62	0	124	0	0	0	0	0	0	0	371	62
13	240	302	0	0	480	860	0	0	0	0	959	0	1679	1162
14	1748	79	874	0	874	0	0	0	0	219	437	0	3933	297
15	0	1124	1	0	0	0	0	0	0	0	0	0	1	1124
16	1110	3	0	0	0	291	0	0	0	0	0	0	1110	293
17	453	47	151	0	75	35	0	0	0	0	75	0	755	82
18	308	0	103	0	103	0	0	0	0	0	0	0	513	0
19	2042	0	817	0	408	0	0	0	0	408	0	0	3268	408
20	109	109	109	0	0	0	0	0	0	109	0	0	218	218
21	545	1625	0	1604	1892	4052	0	0	0	0	0	492	2437	7773
22	0	1332	208	0	458	683	0	0	0	0	0	95	666	2109
23	0	268	0	62	0	58	0	0	0	0	137	0	137	387
24	2707	0	1604	0	1604	54	0	0	0	0	0	0	5916	54
25	1995	0	0	0	665	0	0	0	0	0	190	0	2850	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	137	0	0	0	0	0	0	0	0	0	0	0	137
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	137	0	0	0	0	0	0	0	0	0	137
30	0	466	0	0	0	0	0	0	0	0	0	0	0	466
Total	16400	15479	5933	5909	8716	7881	906	618	890	890	2036	2036	34880	32812

(d) Mode Type [4 : Walking]

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	37	44	0	0	0	0	0	0	0	0	0	0	37	44
2	80	52	0	0	0	0	0	0	20	0	0	0	100	52
3	53	88	0	0	0	0	0	0	27	0	0	0	80	88
4	8	76	0	0	0	0	0	0	0	0	0	0	8	76
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	111	111	0	0	0	0	16	16	0	0	126	126
7	23	46	0	0	0	0	0	0	0	0	0	0	23	46
8	0	3	0	0	0	0	0	0	0	0	0	0	0	3
9	17	17	0	0	0	0	0	0	0	0	0	0	17	17
10	109	54	0	0	0	0	0	0	0	0	0	0	109	54
11	92	100	0	0	92	92	46	46	0	0	0	0	230	238
12	0	0	0	0	0	0	0	0	0	62	0	0	0	62
13	120	120	0	0	120	120	0	0	62	0	0	0	302	240
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	62	0	0	0	0	0	0	0	0	0	0	0	62	0
17	75	0	0	0	0	0	0	0	0	0	0	0	75	0
18	0	75	0	0	0	0	0	0	0	103	0	0	0	178
19	204	0	0	0	0	0	0	0	0	0	0	0	204	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	47	0	0	0	47
22	35	0	0	0	0	0	0	0	0	0	0	0	35	0
23	0	0	0	0	0	1069	0	0	0	0	0	0	0	1069
24	0	0	0	0	1069	0	0	0	0	0	0	0	1069	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	915	676	111	111	1281	1281	46	46	124	227	0	0	2477	2340

Table 7-4 (3) Morning Peak Hour OD Table of "Person" Trips

(e) Mode Type [5 : Others (mototaxis)]

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	74	224	19	0	0	0	0	0	0	0	0	0	93	224
2	60	176	20	0	0	0	0	0	0	0	0	0	80	176
3	0	0	0	0	0	0	0	0	0	0	27	27	27	27
4	5	214	0	0	0	17	0	0	0	0	0	0	5	231
5	165	82	0	0	165	0	0	0	0	0	0	0	329	82
6	129	518	8	341	0	0	0	0	490	0	0	0	627	858
7	0	264	23	0	136	62	0	0	46	0	0	0	204	326
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	17	17	17	0	17	0	0	0	0	0	0	0	50	17
10	54	0	54	0	218	0	0	0	0	0	0	0	327	0
11	92	100	46	0	46	0	0	0	0	92	0	0	184	192
12	62	0	62	0	62	0	0	0	0	0	0	0	186	0
13	120	74	0	29	360	351	0	0	0	0	0	0	480	454
14	437	0	0	0	219	0	0	0	0	0	0	0	656	0
15	0	234	0	0	0	0	0	0	0	0	0	0	0	234
16	0	178	0	0	0	204	0	0	0	0	0	0	0	382
17	377	0	0	0	0	0	0	0	0	0	0	0	377	0
18	103	0	0	0	0	0	0	0	0	0	0	0	103	0
19	613	75	0	0	204	0	0	0	0	408	0	0	817	484
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	234	0	54	0	573	0	0	0	0	0	0	0	861
22	35	9	176	0	0	0	0	0	0	35	0	0	211	45
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	95	0	0	0	0	0	0	0	0	0	0	0	95	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	3	0	0	0	0	0	0	0	0	0	0	0	3
30	0	35	0	0	0	0	0	0	0	0	0	0	0	35
Total	2439	2439	424	424	1425	1207	0	0	536	536	27	27	4850	4632

(f) Mode Type [All : Total (mode 1~5)]

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	167	1951	19	83	0	428	0	0	0	0	0	0	186	2462
2	499	2927	40	335	40	906	0	206	20	20	0	219	600	4613
3	265	896	53	24	173	183	0	0	80	27	27	146	598	1276
4	30	3565	3	137	11	17	0	8	0	0	11	8	54	3736
5	659	934	82	0	607	521	82	0	0	0	82	360	1512	1814
6	696	5180	221	7261	223	95	8	206	2096	32	0	1003	3244	13776
7	349	1634	136	145	407	312	0	0	92	0	23	197	1005	2288
8	3500	3	1647	0	0	46	824	206	0	0	0	0	5971	255
9	286	696	17	0	202	0	0	0	0	0	0	0	504	696
10	980	459	272	0	926	146	0	0	0	0	54	0	2233	605
11	459	247	184	0	413	92	46	46	0	184	92	0	1194	568
12	619	137	371	0	186	0	0	0	0	62	62	0	1237	199
13	1199	745	120	29	1199	1989	0	0	62	0	959	0	3539	2763
14	2841	79	1093	0	1530	0	0	0	0	437	656	0	6119	516
15	1	1358	1	0	0	0	0	0	0	0	0	0	2	1358
16	1789	399	0	0	0	495	0	0	0	0	0	0	1789	894
17	1434	484	302	0	75	35	0	0	0	0	226	0	2037	519
18	1128	75	513	0	205	0	0	0	0	410	0	0	1846	486
19	2859	75	817	109	722	0	0	0	0	817	0	0	4398	1002
20	436	109	218	0	0	0	0	0	0	109	0	0	655	218
21	2727	2299	91	1659	2619	4829	0	0	0	47	0	492	5437	9326
22	289	1762	489	535	599	1007	0	0	0	35	0	232	1377	3571
23	1233	405	548	62	411	1264	0	0	0	274	274	0	2467	2005
24	3777	109	3208	0	2674	54	0	0	0	0	0	0	9659	163
25	2185	0	0	0	665	0	0	0	0	0	190	0	3040	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	137	0	0	0	0	0	0	0	0	0	0	0	137
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	3	0	137	0	0	0	0	0	0	0	0	0	140
30	0	547	0	8	0	0	0	0	0	0	0	0	0	555
Total	30407	27214	10445	10524	13885	12420	960	671	2350	2453	2656	2656	60703	55938

Table 7-4 (4) Morning Peak Hour OD Table of "Mode" Trips

(a) Mode Type [1 : Private Automobile] Occ 2.5

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	19	134	0	0	0	98	0	0	0	0	0	0	19	232
2	16	325	0	49	0	22	0	0	0	0	0	0	16	395
3	21	103	0	0	0	55	0	0	0	0	0	0	21	158
4	1	537	1	18	0	0	0	0	0	0	1	0	3	556
5	0	55	0	0	0	0	0	0	0	0	0	0	0	55
6	3	307	3	784	0	0	0	0	55	0	0	26	61	1117
7	45	168	18	58	9	22	0	0	0	0	0	0	72	248
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	13	0	0	0	0	0	0	0	0	0	0	0	13	0
10	261	55	65	0	109	0	0	0	0	0	0	0	436	55
11	37	0	37	0	0	0	0	0	0	0	0	0	73	0
12	124	0	25	0	0	0	0	0	0	0	25	0	173	0
13	288	99	48	0	96	190	0	0	0	0	0	0	432	290
14	0	0	0	0	175	0	0	0	0	0	0	0	175	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	247	87	0	0	0	0	0	0	0	0	0	0	247	87
17	0	87	0	0	0	0	0	0	0	0	0	0	0	87
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	44	0	0	0	0	0	0	0	0	0	44
20	131	0	44	0	0	0	0	0	0	0	0	0	175	0
21	436	103	36	0	73	9	0	0	0	0	0	0	545	112
22	87	91	28	214	42	130	0	0	0	0	0	55	158	489
23	329	25	219	0	164	55	0	0	0	55	55	0	767	134
24	428	44	642	0	0	0	0	0	0	0	0	0	1069	44
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	19	0	0	0	0	0	0	0	0	0	0	0	19
Total	2487	2239	1166	1166	668	581	0	0	55	55	81	81	4457	4121

Mode	Occ
1	2.5
2	4
3	12
4	1
5	2.5

(b) Mode Type [2 : Public Transit 1 (Collectibo)] Occ 4

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	2	25	0	0	0	23	0	0	0	0	0	0	2	48
2	60	141	0	0	0	27	0	0	0	0	0	55	60	223
3	7	60	0	2	0	0	0	0	0	0	0	0	7	62
4	0	65	0	19	0	0	0	2	0	0	0	0	0	86
5	21	23	0	0	0	0	0	0	0	0	0	0	21	23
6	2	105	4	268	0	0	2	0	166	0	0	6	174	379
7	11	85	11	0	0	9	0	0	0	0	6	38	28	131
8	103	0	0	0	0	0	0	0	0	0	0	0	103	0
9	0	55	0	0	0	0	0	0	0	0	0	0	0	55
10	14	11	0	0	0	0	0	0	0	0	0	0	14	11
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	15	19	46	0	0	0	0	0	0	0	0	0	62	19
13	0	0	0	0	0	45	0	0	0	0	0	0	0	45
14	164	0	55	0	0	0	0	0	0	55	55	0	273	55
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	132	55	38	0	0	0	0	0	0	0	38	0	208	55
18	180	0	103	0	26	0	0	0	0	77	0	0	308	77
19	0	0	0	0	27	0	0	0	0	0	0	0	27	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	273	45	0	0	136	45	0	0	0	0	0	0	409	91
22	0	48	9	0	9	0	0	0	0	0	0	0	18	48
23	103	19	0	0	0	0	0	0	0	34	0	0	103	53
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	24	0	0	0	0	0	0	0	0	0	0	0	24	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	2	0	0	0	0	0	0	0	0	0	2
Total	1109	756	265	291	198	150	2	2	166	166	98	98	1838	1462

Table 7-4 (5) Morning Peak Hour OD Table of "Mode" Trips

(c) Mode Type [3 : Public Transit2 (Combi)] Occ 12

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0	104	0	7	0	8	0	0	0	0	0	0	0	119
2	7	110	2	18	3	62	0	17	0	2	0	0	12	209
3	11	26	4	1	14	4	0	0	4	2	0	10	34	43
4	1	139	0	1	1	0	0	0	0	0	1	1	3	141
5	34	52	7	0	37	43	7	0	0	0	7	30	92	125
6	46	290	7	315	19	8	0	17	66	1	0	76	137	707
7	14	47	2	0	21	13	0	0	4	0	0	4	40	64
8	257	0	137	0	0	4	69	17	0	0	0	0	463	21
9	18	37	0	0	15	0	0	0	0	0	0	0	34	37
10	9	19	5	0	36	12	0	0	0	0	5	0	54	31
11	15	4	4	0	23	0	0	0	0	8	8	0	50	11
12	15	5	5	0	10	0	0	0	0	0	0	0	31	5
13	20	25	0	0	40	72	0	0	0	0	80	0	140	97
14	146	7	73	0	73	0	0	0	0	18	36	0	328	25
15	0	94	0	0	0	0	0	0	0	0	0	0	0	94
16	93	0	0	0	0	24	0	0	0	0	0	0	93	24
17	38	4	13	0	6	3	0	0	0	0	6	0	63	7
18	26	0	9	0	9	0	0	0	0	0	0	0	43	0
19	170	0	68	0	34	0	0	0	0	34	0	0	272	34
20	9	9	9	0	0	0	0	0	0	9	0	0	18	18
21	45	135	0	134	158	338	0	0	0	0	0	41	203	648
22	0	111	17	0	38	57	0	0	0	0	0	8	55	176
23	0	22	0	5	0	5	0	0	0	0	11	0	11	32
24	226	0	134	0	134	5	0	0	0	0	0	0	493	5
25	166	0	0	0	55	0	0	0	0	0	16	0	237	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	11	0	0	0	0	0	0	0	0	0	0	0	11
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	11	0	0	0	0	0	0	0	0	0	11
30	0	39	0	0	0	0	0	0	0	0	0	0	0	39
Total	1367	1290	494	492	726	657	75	51	74	74	170	170	2907	2734

(d) Mode Type [4 : Walking] Occ 1

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	37	44	0	0	0	0	0	0	0	0	0	0	37	44
2	80	52	0	0	0	0	0	0	20	0	0	0	100	52
3	53	88	0	0	0	0	0	0	27	0	0	0	80	88
4	8	76	0	0	0	0	0	0	0	0	0	0	8	76
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	111	111	0	0	0	0	16	16	0	0	126	126
7	23	46	0	0	0	0	0	0	0	0	0	0	23	46
8	0	3	0	0	0	0	0	0	0	0	0	0	0	3
9	17	17	0	0	0	0	0	0	0	0	0	0	17	17
10	109	54	0	0	0	0	0	0	0	0	0	0	109	54
11	92	100	0	0	92	92	46	46	0	0	0	0	230	238
12	0	0	0	0	0	0	0	0	0	62	0	0	0	62
13	120	120	0	0	120	120	0	0	62	0	0	0	302	240
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	62	0	0	0	0	0	0	0	0	0	0	0	62	0
17	75	0	0	0	0	0	0	0	0	0	0	0	75	0
18	0	75	0	0	0	0	0	0	0	103	0	0	0	178
19	204	0	0	0	0	0	0	0	0	0	0	0	204	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	47	0	0	0	47
22	35	0	0	0	0	0	0	0	0	0	0	0	35	0
23	0	0	0	0	0	1069	0	0	0	0	0	0	0	1069
24	0	0	0	0	1069	0	0	0	0	0	0	0	1069	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	915	676	111	111	1281	1281	46	46	124	227	0	0	2477	2340

Table 7-4 (6) Morning Peak Hour OD Table of "Mode" Trips

(e) Mode Type [5 : Others (mototaxis)] | Occ | 2.5 |

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	30	90	7	0	0	0	0	0	0	0	0	0	37	90
2	24	71	8	0	0	0	0	0	0	0	0	0	32	71
3	0	0	0	0	0	0	0	0	0	0	11	11	11	11
4	2	86	0	0	0	7	0	0	0	0	0	0	2	92
5	66	33	0	0	66	0	0	0	0	0	0	0	132	33
6	52	207	3	136	0	0	0	0	196	0	0	0	251	343
7	0	106	9	0	54	25	0	0	18	0	0	0	82	131
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	7	7	7	0	7	0	0	0	0	0	0	0	20	7
10	22	0	22	0	87	0	0	0	0	0	0	0	131	0
11	37	40	18	0	18	0	0	0	0	37	0	0	73	77
12	25	0	25	0	25	0	0	0	0	0	0	0	74	0
13	48	30	0	12	144	140	0	0	0	0	0	0	192	182
14	175	0	0	0	87	0	0	0	0	0	0	0	262	0
15	0	93	0	0	0	0	0	0	0	0	0	0	0	93
16	0	71	0	0	0	82	0	0	0	0	0	0	0	153
17	151	0	0	0	0	0	0	0	0	0	0	0	151	0
18	41	0	0	0	0	0	0	0	0	0	0	0	41	0
19	245	30	0	0	82	0	0	0	0	163	0	0	327	194
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	94	0	22	0	229	0	0	0	0	0	0	0	345
22	14	4	70	0	0	0	0	0	0	14	0	0	85	18
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	38	0	0	0	0	0	0	0	0	0	0	0	38	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	1	0	0	0	0	0	0	0	0	0	0	0	1
30	0	14	0	0	0	0	0	0	0	0	0	0	0	14
Total	975	975	170	170	570	483	0	0	214	214	11	11	1940	1853

(f) Mode Type [All : Total (mode 1~5)]

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	88	396	7	7	0	129	0	0	0	0	0	0	95	532
2	187	699	10	66	3	111	0	17	20	2	0	55	220	950
3	92	277	4	3	14	59	0	0	31	2	11	21	152	362
4	13	903	1	39	1	7	0	2	0	0	2	1	16	951
5	121	162	7	0	103	43	7	0	0	0	7	30	244	236
6	103	908	128	1614	19	8	2	17	498	17	0	108	749	2672
7	93	452	40	58	84	69	0	0	22	0	6	42	245	620
8	360	3	137	0	0	4	69	17	0	0	0	0	566	24
9	55	115	7	0	22	0	0	0	0	0	0	0	84	115
10	415	139	92	0	232	12	0	0	0	0	5	0	743	151
11	181	144	59	0	133	92	46	46	0	44	8	0	426	326
12	179	24	101	0	35	0	0	0	0	62	25	0	340	86
13	476	274	48	12	400	568	0	0	62	0	80	0	1065	854
14	484	7	127	0	335	0	0	0	0	73	91	0	1038	79
15	0	187	0	0	0	0	0	0	0	0	0	0	0	187
16	401	159	0	0	0	106	0	0	0	0	0	0	401	265
17	396	146	50	0	6	3	0	0	0	0	44	0	497	149
18	246	75	111	0	34	0	0	0	0	180	0	0	391	255
19	620	30	68	44	143	0	0	0	0	197	0	0	831	271
20	140	9	53	0	0	0	0	0	0	9	0	0	193	18
21	755	378	36	155	367	621	0	0	0	47	0	41	1158	1242
22	137	254	125	214	89	187	0	0	0	14	0	63	351	731
23	432	66	219	5	164	1129	0	0	0	89	66	0	882	1289
24	653	44	775	0	1203	5	0	0	0	0	0	0	2632	48
25	228	0	0	0	55	0	0	0	0	0	16	0	299	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	11	0	0	0	0	0	0	0	0	0	0	0	11
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	1	0	11	0	0	0	0	0	0	0	0	0	13
30	0	72	0	2	0	0	0	0	0	0	0	0	0	74
Total	6853	5936	2206	2230	3444	3151	123	99	633	736	359	359	13619	12511

Table 7-4 (7) Morning Peak Hour OD Table of "Vehicle Equivalent" Trips

(a) Mode Type [1 : Private Automobile] VET 1

\Type Zone	(1) Orig.	(1) Dest.	(2) Orig.	(2) Dest.	(3) Orig.	(3) Dest.	(4) Orig.	(4) Dest.	(5) Orig.	(5) Dest.	(6) Orig.	(6) Dest.	Total Orig.	Total Dest.
1	19	134	0	0	0	98	0	0	0	0	0	0	19	232
2	16	325	0	49	0	22	0	0	0	0	0	0	16	395
3	21	103	0	0	0	55	0	0	0	0	0	0	21	158
4	1	537	1	18	0	0	0	0	0	0	1	0	3	556
5	0	55	0	0	0	0	0	0	0	0	0	0	0	55
6	3	307	3	784	0	0	0	0	55	0	0	26	61	1117
7	45	168	18	58	9	22	0	0	0	0	0	0	72	248
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	13	0	0	0	0	0	0	0	0	0	0	0	13	0
10	261	55	65	0	109	0	0	0	0	0	0	0	436	55
11	37	0	37	0	0	0	0	0	0	0	0	0	73	0
12	124	0	25	0	0	0	0	0	0	0	25	0	173	0
13	288	99	48	0	96	190	0	0	0	0	0	0	432	290
14	0	0	0	0	175	0	0	0	0	0	0	0	175	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	247	87	0	0	0	0	0	0	0	0	0	0	247	87
17	0	87	0	0	0	0	0	0	0	0	0	0	0	87
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	44	0	0	0	0	0	0	0	0	0	44
20	131	0	44	0	0	0	0	0	0	0	0	0	175	0
21	436	103	36	0	73	9	0	0	0	0	0	0	545	112
22	87	91	28	214	42	130	0	0	0	0	0	55	158	489
23	329	25	219	0	164	55	0	0	0	55	55	0	767	134
24	428	44	642	0	0	0	0	0	0	0	0	0	1069	44
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	19	0	0	0	0	0	0	0	0	0	0	0	19
Total	2487	2239	1166	1166	668	581	0	0	55	55	81	81	4457	4121

Mode	VET
1	1
2	1.5
3	2
4	0.2
5	1.25

(b) Mode Type [2 : Public Transit 1 (Collectibo)] VET 1.5

\Type Zone	(1) Orig.	(1) Dest.	(2) Orig.	(2) Dest.	(3) Orig.	(3) Dest.	(4) Orig.	(4) Dest.	(5) Orig.	(5) Dest.	(6) Orig.	(6) Dest.	Total Orig.	Total Dest.
1	3	38	0	0	0	34	0	0	0	0	0	0	3	72
2	89	211	0	0	0	41	0	0	0	0	0	82	89	334
3	10	91	0	3	0	0	0	0	0	0	0	0	10	94
4	0	98	0	28	0	0	0	3	0	0	0	0	0	129
5	31	34	0	0	0	0	0	0	0	0	0	0	31	34
6	3	157	6	402	0	0	3	0	249	0	0	8	261	568
7	17	127	17	0	0	13	0	0	0	0	8	57	42	197
8	154	0	0	0	0	0	0	0	0	0	0	0	154	0
9	0	82	0	0	0	0	0	0	0	0	0	0	0	82
10	20	17	0	0	0	0	0	0	0	0	0	0	20	17
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	23	28	70	0	0	0	0	0	0	0	0	0	93	28
13	0	0	0	0	0	68	0	0	0	0	0	0	0	68
14	246	0	82	0	0	0	0	0	0	82	82	0	410	82
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	198	82	57	0	0	0	0	0	0	0	57	0	311	82
18	269	0	154	0	38	0	0	0	0	115	0	0	462	115
19	0	0	0	0	41	0	0	0	0	0	0	0	41	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	409	68	0	0	205	68	0	0	0	0	0	0	614	136
22	0	73	13	0	13	0	0	0	0	0	0	0	26	73
23	154	28	0	0	0	0	0	0	0	51	0	0	154	80
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	36	0	0	0	0	0	0	0	0	0	0	0	36	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	3	0	0	0	0	0	0	0	0	0	3
Total	1664	1134	398	437	297	225	3	3	249	249	147	147	2758	2194

Table 7-4 (8) Morning Peak Hour OD Table of "Vehicle Equivalent" Trips

(c) Mode Type [3 : Public Transit2 (Combi)] VET 2

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	0	208	0	14	0	15	0	0	0	0	0	0	0	237
2	13	220	3	36	7	124	0	34	0	3	0	0	23	417
3	22	51	9	3	29	8	0	0	9	4	0	20	69	86
4	2	279	0	3	2	0	0	0	0	0	1	1	5	283
5	69	104	14	0	74	87	14	0	0	0	14	60	183	251
6	92	579	13	630	37	16	0	34	132	3	0	153	274	1414
7	28	94	4	0	41	27	0	0	8	0	0	8	81	128
8	515	0	275	0	0	8	137	34	0	0	0	0	926	42
9	36	74	0	0	31	0	0	0	0	0	0	0	67	74
10	18	37	9	0	73	24	0	0	0	0	9	0	109	61
11	31	8	8	0	46	0	0	0	0	15	15	0	99	23
12	31	10	10	0	21	0	0	0	0	0	0	0	62	10
13	40	50	0	0	80	143	0	0	0	0	160	0	280	194
14	291	13	146	0	146	0	0	0	0	36	73	0	656	50
15	0	187	0	0	0	0	0	0	0	0	0	0	0	187
16	185	0	0	0	0	48	0	0	0	0	0	0	185	49
17	75	8	25	0	13	6	0	0	0	0	13	0	126	14
18	51	0	17	0	17	0	0	0	0	0	0	0	85	0
19	340	0	136	0	68	0	0	0	0	68	0	0	545	68
20	18	18	18	0	0	0	0	0	0	18	0	0	36	36
21	91	271	0	267	315	675	0	0	0	0	0	82	406	1295
22	0	222	35	0	76	114	0	0	0	0	0	16	111	352
23	0	45	0	10	0	10	0	0	0	0	23	0	23	65
24	451	0	267	0	267	9	0	0	0	0	0	0	986	9
25	332	0	0	0	111	0	0	0	0	0	32	0	475	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	23	0	0	0	0	0	0	0	0	0	0	0	23
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	23	0	0	0	0	0	0	0	0	0	23
30	0	78	0	0	0	0	0	0	0	0	0	0	0	78
Total	2733	2580	989	985	1453	1313	151	103	148	148	339	339	5813	5469

(d) Mode Type [4 : Walking] VET 0.2

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	7	9	0	0	0	0	0	0	0	0	0	0	7	9
2	16	10	0	0	0	0	0	0	4	0	0	0	20	10
3	11	18	0	0	0	0	0	0	5	0	0	0	16	18
4	2	15	0	0	0	0	0	0	0	0	0	0	2	15
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	22	22	0	0	0	0	3	3	0	0	25	25
7	5	9	0	0	0	0	0	0	0	0	0	0	5	9
8	0	1	0	0	0	0	0	0	0	0	0	0	0	1
9	3	3	0	0	0	0	0	0	0	0	0	0	3	3
10	22	11	0	0	0	0	0	0	0	0	0	0	22	11
11	18	20	0	0	18	18	9	9	0	0	0	0	46	48
12	0	0	0	0	0	0	0	0	0	12	0	0	0	12
13	24	24	0	0	24	24	0	0	12	0	0	0	60	48
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	12	0	0	0	0	0	0	0	0	0	0	0	12	0
17	15	0	0	0	0	0	0	0	0	0	0	0	15	0
18	0	15	0	0	0	0	0	0	0	21	0	0	0	36
19	41	0	0	0	0	0	0	0	0	0	0	0	41	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	9	0	0	0	9
22	7	0	0	0	0	0	0	0	0	0	0	0	7	0
23	0	0	0	0	0	214	0	0	0	0	0	0	0	214
24	0	0	0	0	214	0	0	0	0	0	0	0	214	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	183	135	22	22	256	256	9	9	25	45	0	0	495	468

Table 7-4 (9) Morning Peak Hour OD Table of "Vehicle Equivalent" Trips

(e) Mode Type [5 : Others (mototaxis)] VET 1.25

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	37	112	9	0	0	0	0	0	0	0	0	0	46	112
2	30	88	10	0	0	0	0	0	0	0	0	0	40	88
3	0	0	0	0	0	0	0	0	0	0	13	13	13	13
4	3	107	0	0	0	8	0	0	0	0	0	0	3	115
5	82	41	0	0	82	0	0	0	0	0	0	0	165	41
6	65	259	4	170	0	0	0	0	245	0	0	0	313	429
7	0	132	11	0	68	31	0	0	23	0	0	0	102	163
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	8	8	8	0	8	0	0	0	0	0	0	0	25	8
10	27	0	27	0	109	0	0	0	0	0	0	0	163	0
11	46	50	23	0	23	0	0	0	0	46	0	0	92	96
12	31	0	31	0	31	0	0	0	0	0	0	0	93	0
13	60	37	0	15	180	176	0	0	0	0	0	0	240	227
14	219	0	0	0	109	0	0	0	0	0	0	0	328	0
15	0	117	0	0	0	0	0	0	0	0	0	0	0	117
16	0	89	0	0	0	102	0	0	0	0	0	0	0	191
17	189	0	0	0	0	0	0	0	0	0	0	0	189	0
18	51	0	0	0	0	0	0	0	0	0	0	0	51	0
19	306	38	0	0	102	0	0	0	0	204	0	0	408	242
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	117	0	27	0	286	0	0	0	0	0	0	0	431
22	18	5	88	0	0	0	0	0	0	18	0	0	106	22
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	47	0	0	0	0	0	0	0	0	0	0	0	47	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	1	0	0	0	0	0	0	0	0	0	0	0	1
30	0	18	0	0	0	0	0	0	0	0	0	0	0	18
Total	1219	1219	212	212	713	603	0	0	268	268	13	13	2425	2316

(f) Mode Type [All : Total (mode 1~5)]

\Type	(1)		(2)		(3)		(4)		(5)		(6)		Total	
Zone	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.	Orig.	Dest.
1	67	500	9	14	0	148	0	0	0	0	0	0	76	662
2	165	855	13	84	7	187	0	34	4	3	0	82	189	1246
3	64	263	9	6	29	62	0	0	14	4	13	33	129	369
4	8	1036	1	49	2	8	0	3	0	0	2	1	13	1098
5	182	234	14	0	156	87	14	0	0	0	14	60	379	381
6	163	1302	48	2008	37	16	3	34	683	6	0	187	934	3553
7	95	531	50	58	118	93	0	0	31	0	8	64	302	746
8	669	1	275	0	0	8	137	34	0	0	0	0	1081	43
9	62	168	8	0	39	0	0	0	0	0	0	0	109	168
10	349	120	102	0	290	24	0	0	0	0	9	0	750	144
11	132	78	67	0	87	18	9	9	0	61	15	0	311	167
12	209	39	136	0	52	0	0	0	0	12	25	0	421	51
13	412	211	48	15	380	601	0	0	12	0	160	0	1012	827
14	756	13	228	0	430	0	0	0	0	118	155	0	1568	131
15	0	304	0	0	0	0	0	0	0	0	0	0	0	304
16	444	177	0	0	0	151	0	0	0	0	0	0	444	327
17	477	177	82	0	13	6	0	0	0	0	69	0	641	183
18	372	15	171	0	56	0	0	0	0	136	0	0	598	151
19	688	38	136	44	211	0	0	0	0	272	0	0	1035	354
20	149	18	62	0	0	0	0	0	0	18	0	0	211	36
21	936	560	36	295	593	1039	0	0	0	9	0	82	1565	1984
22	112	390	164	214	132	243	0	0	0	18	0	71	408	936
23	483	98	219	10	164	278	0	0	0	106	78	0	944	492
24	879	44	909	0	481	9	0	0	0	0	0	0	2269	53
25	416	0	0	0	111	0	0	0	0	0	32	0	558	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	23	0	0	0	0	0	0	0	0	0	0	0	23
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	1	0	23	0	0	0	0	0	0	0	0	0	24
30	0	114	0	3	0	0	0	0	0	0	0	0	0	117
Total	8286	7307	2787	2822	3387	2978	163	115	745	765	580	580	15948	14568

7.3.3 T-model2 Simulation Results

T-model2 simulation data are presented in this section. As mentioned, T-model2 consists of the two major modules; distribution and assignment. The outcomes of distribution are trip tables along with the gravity model parameters, and the ones of assignment are loaded link data and travel time matrix. Then, by using loaded link data, screen line analysis is further performed. The simulation results are ones of Options (1) to (9) mentioned in Section 7.3.2. The following sections present and analyze ① the gravity model parameter calibration, ② trip tables, ③ travel time matrixes, ④ loaded link data and ⑤ screen line analysis data.

7.3.3.1 Gravity Model Parameter Calibration

Gravity model parameter calibration is a simple repeating procedure to find proper values for exponents α and β and a constant K of Equation (7.1). Since β and K are set as zero, only α is dealt with in this study. The exponent α has to be set for all six trip types, which are re-grouped for T-model2 simulation, independently. The six trip types are defined in Section 6.4.1, and are also shown in Tables 6-27, 6-28 and 6-29.

Table 7-5 shows an example of the gravity model parameter calibration data. In this table, α s are set as 2, 2, 3.6, 2.3, 2.6 and 3.1 for the six trip types. The execution for all six trip types results in the maximum destination error of less than 1 % within ten iterations. Since the maximum destination errors represent the differences between the input OD and the output OD in percentage, those result of less than 1 % for all six trip types is in fact quite good. Moreover, maximum absolute errors, which represent the differences of absolute values between the input OD and the output OD, are 1.7, 0.9, 1.0, 0.9, 0.7 and 1.4 for the six trip types respectively. By considering the total trips of 60,940, this result is also fairly good.

Then, Table 7-6 shows the summary of the gravity model parameter calibration for the exponents α. In each Table 7-6 (1) to (6), the exponents α for the six trip types are examined respectively. For trip type 1, the α value is examined from 1.5 to 2.2, then it is

Table 7-5 Example Data of Gravity Model Parameter Calibration

< Data Setting >

Year [1992]
Condition [w/o Panamericana Bridge]
Trip Type [All : (1) ~ (6)]
[Person Trip]
Total Trip Numbe [60940]
Hour Period [(3) : 7:00 am ~ 7:59 am]

< Simulation Setting >

Type [Gravity Model Only]
Max. Iteration [10]
Max. Error [1%]
Weight for Travel : Time [0.9]
Distance [0.1]

< Parametres >

Trip Type	B	K	A
1	2	0	0
2	2	0	0
3	3.6	0	0
4	2.3	0	0
5	2.6	0	0
6	3.1	0	0

B : Beta (Constant 1)
K : Constant 2
A : Alpha (Constant 3)

< Simulation Files >

DNA file [P93G-106.DNA]
Node Source File [P93.NDE]
Node Delay File [P93.NDC]
Link Source File [P93.LNX]
Link Delay File [P93.LDC]
Turn Penalty File [P93.TNP]
TP Type File [P93.TPT]
OD File [H3-AL.OND]
Vine File [VINE93.TR1]

< Output Files >

Link Storage File [P93-OUT.LLX]
Travel Time File [P93G-106.TT1]
Trip Table File [P93G-106.TTB]
Summary File [P93G-106.1]

< Simulation Run Result >

Type : Trip Type
Ite. : The number of iteration
TOT : Total Original Destination Trips
TAT : Total Assigned Destination Trips
Diffe. : Difference between TOT and TAT
MDE : Maximum destination error (%)
ADE : Average destination error (%)
MAE : Maximum absolute error
AAE : Average absolute error
WE : Weighted error

Data Number [(106)]

Type	Ite.	TOT	TAT	Diffe.	MDE	at Zone	ADE	MAE	at Zone	AAE	WE
1	1	30417	30417.9	0.87	112.1%	17	37.2%	965.6	21	175.7	5270.3
1	2	30417	30417.9	0.86	97.9%	29	20.5%	549.1	6	100.9	3027.2
1	3	30417	30417.9	0.88	94.0%	29	14.1%	383.4	30	47.1	1411.5
1	4	30417	30417.9	0.87	83.5%	29	8.5%	157.5	6	25.8	772.9
1	5	30417	30417.9	0.85	58.8%	29	4.7%	68.1	27	10.8	325.4
1	6	30417	30417.9	0.87	17.4%	29	1.3%	28.3	6	4.7	140.1
1	7	30417	30417.9	0.87	5.0%	29	0.5%	13.1	6	2.2	67.2
1	8	30417	30417.9	0.88	2.8%	29	0.3%	6.6	6	1.1	33.7
1	9	30417	30417.9	0.86	1.3%	29	0.1%	2.9	6	0.5	16.3
1	10	30417	30417.9	0.87	0.7%	29	0.1%	1.7	6	0.3	8.4
2	1	10556	10556.9	0.94	214.5%	23	23.1%	294.5	22	40.1	1202.4
2	2	10556	10556.9	0.94	97.2%	29	11.6%	266.7	6	30.9	925.9
2	3	10556	10556.9	0.94	92.0%	29	6.7%	130.3	6	13.0	390.4
2	4	10556	10556.9	0.93	78.4%	29	3.5%	107.5	29	8.5	253.7
2	5	10556	10556.9	0.92	48.0%	29	2.3%	65.8	29	4.8	144.1
2	6	10556	10556.9	0.93	6.2%	29	0.5%	9.9	6	1.1	33.2
2	7	10556	10556.9	0.92	2.6%	29	0.2%	3.6	29	0.5	13.7
2	8	10556	10556.9	0.93	1.4%	29	0.1%	2.4	6	0.3	7.9
2	9	10556	10556.9	0.93	0.7%	29	0.1%	0.9	29	0.1	2.7
3	1	13894	13894.9	0.93	488.7%	10	55.1%	3326.4	21	319.1	9571.8
3	2	13894	13894.9	0.89	262.4%	10	24.0%	432.8	21	73.6	2208.7
3	3	13894	13894.9	0.91	58.2%	10	8.1%	94.8	10	18.8	563.2
3	4	13894	13894.9	0.91	37.7%	10	2.8%	61.4	10	6.9	205.7
3	5	13894	13894.9	0.93	8.9%	11	0.8%	13.1	2	2.0	58.6
3	6	13894	13894.9	0.91	2.7%	11	0.3%	5.2	2	0.8	23.8
3	7	13894	13894.9	0.91	1.3%	11	0.2%	2.3	2	0.4	10.7
3	8	13894	13894.9	0.91	0.6%	11	0.1%	1.0	2	0.2	4.9
4	1	959	960.0	0.97	52.6%	2	4.9%	154.6	2	10.6	318.2
4	2	959	960.0	0.97	37.9%	2	3.6%	111.5	2	7.6	229.2
4	3	959	960.0	0.97	14.1%	4	1.3%	26.3	2	2.1	62.0
4	4	959	960.0	0.96	8.5%	4	0.7%	13.7	2	1.1	33.7
4	5	959	960.0	0.97	3.7%	4	0.3%	7.0	2	0.5	15.9
4	6	959	960.0	0.96	1.8%	4	0.2%	3.1	2	0.3	8.5
4	7	959	960.0	0.98	1.0%	4	0.1%	2.0	2	0.1	3.9
4	8	959	960.0	0.97	0.4%	4	0.0%	0.9	6	0.1	2.3
5	1	2456	2457.0	0.95	744.6%	6	85.3%	553.6	19	68.3	2050.3
5	2	2456	2457.0	0.95	267.0%	2	27.3%	134.4	19	15.2	455.4
5	3	2456	2457.0	0.96	37.5%	2	3.6%	33.0	19	3.4	101.5
5	4	2456	2456.9	0.94	31.4%	2	2.4%	14.1	19	1.9	55.6
5	5	2456	2456.9	0.93	5.4%	6	0.7%	9.0	19	0.8	23.3
5	6	2456	2456.9	0.93	2.9%	6	0.3%	4.0	19	0.4	12.1
5	7	2456	2457.0	0.95	1.4%	6	0.2%	2.5	19	0.2	5.7
5	8	2456	2457.0	0.95	0.7%	6	0.1%	0.7	19	0.1	3.2
6	1	2658	2659.0	0.96	60.0%	21	7.0%	295.0	21	25.4	760.6
6	2	2658	2659.0	0.97	23.0%	7	3.6%	63.9	21	9.5	285.7
6	3	2658	2659.0	0.96	12.3%	7	1.3%	24.3	7	3.5	103.8
6	4	2658	2659.0	0.95	3.7%	7	0.4%	7.3	7	1.1	31.8
6	5	2658	2658.9	0.94	1.6%	7	0.1%	3.2	7	0.4	12.7
6	6	2658	2659.0	0.95	0.7%	7	0.1%	1.4	7	0.1	4.3

Table 7-6 (1) Gravity model Parameter Calibration Summary

< Data Setting >

Year [1992]
Condition [w/o Panamericana Bridge]
Trip Type [All : (1) ~ (6)]
[Person Trip]
Total Trip Number [60940]
Hour Period [(3) : 7:00 am ~ 7:59 am]

< Simulation Setting >

Type [Gravity Model Only]
Max. Iteration [10]
Max. Error [1%]
Weight for Travel : Time [0.9]
Distance [0.1]
Data Number [(101) ~ (108)]

Data	Type	B	K	A	Ite.	TOT	TAT	Diffe.	MDE	at Zone	ADE	MAE	at Zone	AAE	WE
(101)	1	1.5	0	0	8	30417	30417.8	0.84	0.97%	29	0.11%	2.73	6	0.68	20.4
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(102)	1	1.6	0	0	9	30417	30417.9	0.87	0.68%	29	0.10%	1.40	6	0.36	10.7
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(103)	1	1.7	0	0	9	30417	30417.9	0.85	0.66%	27	0.11%	1.72	6	0.42	12.6
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(104)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(105)	1	1.9	0	0	9	30417	30417.9	0.88	0.84%	29	0.10%	2.49	6	0.49	14.8
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(106)	1	2	0	0	10	30417	30417.9	0.87	0.67%	29	0.06%	1.68	6	0.28	8.4
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(107)	1	2.1	0	0	10	30417	30417.9	0.87	0.56%	29	0.08%	1.86	6	0.31	9.2
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(108)	1	2.2	0	0	10	30417	30417.8	0.83	0.68%	27	0.08%	1.97	6	0.32	9.5
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3

Type : Trip Type
Ite. : The number of iteration
TOT : Total Original Destination Trips
TAT : Total Assigned Destination Trips
Diffe. : Difference between TOT and TAT
MDE : Maximum destination error (%)
ADE : Average destination error (%)
MAE : Maximum absolute error
AAE : Average absolute error
WE : Weighted error

Table 7-6 (2) Gravity model Parameter Calibration Summary

< Data Setting >

Year	[1992]
Condition	[w/o Panamericana Bridge]
Trip Type	[All : (1) ~ (6)]
	[Person Trip]
Total Trip Number	[60940]
Hour Period	[3 : 7:00 am ~ 7:59 am]

< Simulation Setting >

Type		[Gravity Model Only]
Max. Iteration		[10]
Max. Error		[1%]
Weight for Travel :	Time	[0.9]
	Distance	[0.1]
Data Number		[(109) ~ (116)]

Data	Type	B	K	A	Ite.	TOT	TAT	Diffe.	MDE	at Zone	ADE	MAE	at Zone	AAE	WE
(109)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	1.7	0	0	9	10556	10556.9	0.94	0.66%	29	0.05%	0.94	6	0.12	3.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(110)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	1.8	0	0	8	10556	10556.9	0.94	0.99%	29	0.08%	1.35	29	0.18	5.4
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(111)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	1.9	0	0	7	10556	10556.9	0.93	0.56%	4	0.10%	2.31	21	0.22	6.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(112)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(113)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2.1	0	0	10	10556	10556.9	0.93	0.59%	29	0.04%	1.17	6	0.10	3.1
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(114)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2.2	0	0	10	10556	10557.0	0.95	0.62%	29	0.04%	1.15	6	0.10	3.1
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(115)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2.3	0	0	9	10556	10556.9	0.91	0.67%	29	0.05%	1.06	21	0.10	3.2
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(116)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2.4	0	0	9	10556	10556.9	0.94	0.51%	29	0.06%	0.91	6	0.12	3.5
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3

Type : Trip Type
Ite. : The number of iteration
TOT : Total Original Destination Trips
TAT : Total Assigned Destination Trips
Diffe. : Difference between TOT and TAT
MDE : Maximum destination error (%)
ADE : Average destination error (%)
MAE : Maximum absolute error
AAE : Average absolute error
WE : Weighted error

Table 7-6 (3) Gravity model Parameter Calibration Summary

< Data Setting >

Year [1992]
Condition [w/o Panamericana Bridge]
Trip Type [All : (1) ~ (6)]
[Person Trip]
Total Trip Number [60940]
Hour Period [(3) : 7:00 am ~ 7:59 am]

< Simulation Setting >

Type [Gravity Model Only]
Max. Iteration [10]
Max. Error [1%]
Weight for Travel : Time [0.9]
Distance [0.1]
Data Number [(117) ~ (124)]

Data	Type	B	K	A	Ite.	TOT	TAT	Diffe.	MDE	at Zone	ADE	MAE	at Zone	AAE	WE
(117)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	2.8	0	0	7	13894	13894.9	0.89	0.70%	4	0.16%	3.17	21	0.49	14.7
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(118)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3	0	0	7	13894	13894.9	0.90	0.69%	3	0.12%	1.96	21	0.40	12.0
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(119)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.2	0	0	8	13894	13894.9	0.92	0.59%	11	0.08%	0.87	21	0.19	5.8
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(120)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.4	0	0	8	13894	13894.9	0.92	0.82%	11	0.09%	0.92	2	0.19	5.8
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(121)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(122)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.8	0	0	8	13894	13894.9	0.93	0.55%	10	0.09%	0.96	2	0.20	5.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(123)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	4	0	0	8	13894	13894.9	0.89	0.52%	7	0.11%	1.80	7	0.24	7.0
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(124)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	4.2	0	0	9	13894	13894.9	0.93	0.63%	11	0.07%	0.97	7	0.15	4.4
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3

Type : Trip Type
Ite. : The number of iteration
TOT : Total Original Destination Trips
TAT : Total Assigned Destination Trips
Diffe. : Difference between TOT and TAT
MDE : Maximum destination error (%)
ADE : Average destination error (%)
MAE : Maximum absolute error
AAE : Average absolute error
WE : Weighted error

Table 7-6 (4) Gravity model Parameter Calibration Summary

< Data Setting >

Year [1992]
Condition [w/o Panamericana Bridge]
Trip Type [All : (1) ~ (6)]
[Person Trip]
Total Trip Number [60940]
Hour Period [3 : 7:00 am ~ 7:59 am]

< Simulation Setting >

Type [Gravity Model Only]
Max. Iteration [10]
Max. Error [1%]
Weight for Travel : Time [0.9]
Distance [0.1]
Data Number [(125) ~ (132)]

Data	Type	B	K	A	Ite.	TOT	TAT	Diffe.	MDE	at Zone	ADE	MAE	at Zone	AAE	WE
(125)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	1.9	0	0	7	959	960.0	0.98	0.87%	4	0.08%	1.97	2	0.12	3.6
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(126)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2	0	0	7	959	960.0	0.97	0.94%	4	0.08%	1.97	2	0.12	3.7
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(127)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.1	0	0	8	959	960.0	0.98	0.36%	4	0.04%	0.88	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(128)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.2	0	0	8	959	960.0	0.97	0.39%	4	0.04%	0.90	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(129)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(130)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.4	0	0	7	959	960.0	0.98	0.99%	4	0.09%	2.00	2	0.13	3.9
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(131)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.5	0	0	7	959	960.0	0.98	0.92%	4	0.09%	2.02	2	0.13	4.0
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(132)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.6	0	0	7	959	960.0	0.97	0.85%	4	0.08%	2.03	2	0.13	4.0
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3

Type : Trip Type
Ite. : The number of iteration
TOT : Total Original Destination Trips
TAT : Total Assigned Destination Trips
Diffe. : Difference between TOT and TAT
MDE : Maximum destination error (%)
ADE : Average destination error (%)
MAE : Maximum absolute error
AAE : Average absolute error
WE : Weighted error

Table 7-6 (5) Gravity model Parameter Calibration Summary

< Data Setting >

Year [1992]
Condition [w/o Panamericana Bridge]
Trip Type [All : (1) ~ (6)]
[Person Trip]
Total Trip Number [60940]
Hour Period [(3) : 7:00 am ~ 7:59 am]

< Simulation Setting >

Type [Gravity Model Only]
Max. Iteration [10]
Max. Error [1%]
Weight for Travel : Time [0.9]
Distance [0.1]
Data Number [(133) ~ (140)]

Data	Type	B	K	A	Ite.	TOT	TAT	Diffe.	MDE	at Zone	ADE	MAE	at Zone	AAE	WE
(133)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.2	0	0	6	2456	2457.0	0.95	0.92%	6	0.17%	2.72	18	0.32	9.6
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(134)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.3	0	0	7	2456	2457.0	0.95	0.73%	2	0.09%	1.80	19	0.17	5.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(135)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.4	0	0	8	2456	2456.9	0.94	0.59%	2	0.07%	0.66	18	0.08	2.5
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(136)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.5	0	0	8	2456	2456.9	0.94	0.70%	2	0.09%	0.63	19	0.10	2.9
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(137)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(138)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.7	0	0	8	2456	2456.9	0.93	0.58%	6	0.07%	0.84	19	0.10	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(139)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.8	0	0	7	2456	2457.0	0.95	0.66%	20	0.11%	2.86	19	0.20	6.1
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(140)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.9	0	0	7	2456	2456.9	0.93	0.83%	2	0.15%	2.90	19	0.24	7.1
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3

Type : Trip Type
Ite. : The number of iteration
TOT : Total Original Destination Trips
TAT : Total Assigned Destination Trips
Diffe. : Difference between TOT and TAT
MDE : Maximum destination error (%)
ADE : Average destination error (%)
MAE : Maximum absolute error
AAE : Average absolute error
WE : Weighted error

Table 7-6 (6) Gravity model Parameter Calibration Summary

< Data Setting >

Year [1992]
Condition [w/o Panamericana Bridge]
Trip Type [All : (1) ~ (6)]
[Person Trip]
Total Trip Number [60940]
Hour Period [3 : 7:00 am ~ 7:59 am]

< Simulation Setting >

Type [Gravity Model Only]
Max. Iteration [10]
Max. Error [1%]
Weight for Travel : Time [0.9]
Distance [0.1]
Data Number [(141) ~ (148)]

Data	Type	B	K	A	Ite.	TOT	TAT	Diffe.	MDE	at Zone	ADE	MAE	at Zone	AAE	WE
(141)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	2.8	0	0	6	2658	2659.0	0.97	0.77%	7	0.06%	1.51	7	0.16	4.8
(142)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	2.9	0	0	6	2658	2659.0	0.97	0.75%	7	0.06%	1.47	7	0.15	4.7
(143)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3	0	0	6	2658	2659.0	0.96	0.72%	7	0.06%	1.42	7	0.15	4.5
(144)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.1	0	0	6	2658	2659.0	0.95	0.69%	7	0.06%	1.36	7	0.15	4.3
(145)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.2	0	0	6	2658	2659.0	0.95	0.66%	7	0.07%	1.30	7	0.15	4.4
(146)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.3	0	0	6	2658	2659.0	0.95	0.62%	7	0.07%	1.22	7	0.15	4.5
(147)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.4	0	0	6	2658	2659.0	0.95	0.58%	7	0.07%	1.14	7	0.15	4.5
(148)	1	1.8	0	0	9	30417	30417.9	0.86	0.62%	27	0.09%	2.08	6	0.47	14.0
	2	2	0	0	9	10556	10556.9	0.93	0.67%	29	0.05%	0.92	29	0.09	2.7
	3	3.6	0	0	8	13894	13894.9	0.91	0.60%	11	0.08%	0.97	2	0.16	4.9
	4	2.3	0	0	8	959	960.0	0.97	0.37%	4	0.04%	0.91	6	0.08	2.3
	5	2.6	0	0	8	2456	2457.0	0.95	0.68%	6	0.09%	0.74	19	0.11	3.2
	6	3.5	0	0	6	2658	2659.0	0.95	0.54%	7	0.07%	1.06	7	0.15	4.6

Type : Trip Type
Ite. : The number of iteration
TOT : Total Original Destination Trips
TAT : Total Assigned Destination Trips

Diffe. : Difference between TOT and TAT
MDE : Maximum destination error (%)
ADE : Average destination error (%)

MAE : Maximum absolute error
AAE : Average absolute error
WE : Weighted error

found the value of 2.0 would be the best among eight candidates shown in Table 7-6 (1). In the same way, the α values are set as 2.1, 3.6, 2.2, 2.5 and 3.5 for the other trip types 2 to 6 respectively.

7.3.3.2 Trip Tables

Trip tables are the outcome of the gravity model distribution. Tables 7-7, 7-8 and 7-9 show the results of "person" trips, "mode" trips and "vehicle equivalent" trips respectively. In each Table 7-7, 7-8 or 7-9, Table (a) shows the total trip tables, which are the outcome of Option 1, 4 or 7 respectively. Tables (b) to (f) show the "mode specific" trip tables, which are the outcome of Option 2, 5 or 8. Then, Table (g) sums up the "mode specific" trip tables of Tables (b) to (f) to one total trip table, which are the outcome for Option 3, 6 or 9. Table (h) further shows the differences between Tables (a) and (g) in absolute numbers. In this way, the first three sheets of (1) to (3) in each Table 7-7, 7-8 or 7-9 present the results of "mode specific" distribution, and the sheet (4) of each Table 7-7, 7-8 or 7-9 compares the outcome of Option (1) and (3), Option (4) and (6) or Option (7) and (9) respectively.

First, two methods, "using a total OD table" and "summing up multiple mode specific trip tables", are compared. From Table 7-7 (h), which compares Tables 7-7 (a) and (g), for example, many different OD values between the two "person" trip tables are observed. In fact, the differences of individual "zone to zone" trips, are observed in most part of the Tables. The maximum difference happens for the individual trips from zone 24 to zone 23 with 628 trips, followed by the trips from zone 24 to zone 6 with 531 trips. The maximum difference, 628 trips, is fairly large when the maximum value of the individual "zone to zone" trips, which is 3,041 trips, is considered. On the other hand, the maximum difference between the totals of ODs for each traffic analysis zone is only 133 attracted trips to zone 6 in comparison with the total estimated trips of 60,706.

The same kinds of facts are also observed from Tables 7-8 and 7-9. The maximum difference of individual "zone to zone" trips for "mode" trips is 112 trips from zone 24 to 23, which is

Table 7-7 (1) T-model 2 Simulation Results : Trip Table of "Person" Trips

(a) Person Trips for Mode [All : (1) ~ (5)], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	43	65	7	38	5	12	4	0	0	0	1	0	0	1	0	0	0	0	0	0	7	6	0	0	0	0	0	0	0	0	189
2	136	212	62	68	15	40	18	1	1	2	1	0	3	2	2	0	0	1	5	2	17	6	3	0	0	0	0	0	0	2	599
3	28	265	56	96	9	30	21	0	0	0	6	0	1	4	1	0	0	8	17	2	21	4	22	0	0	0	1	0	0	0	592
4	28	13	5	5	1	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	60
5	91	355	57	91	38	260	54	14	10	6	4	0	275	1	7	5	0	0	2	0	198	28	6	1	0	0	1	0	0	3	1507
6	38	124	30	45	60	640	125	2	11	5	156	49	50	391	4	4	0	345	691	90	121	39	223	1	0	0	0	0	0	2	3246
7	58	234	93	72	41	173	19	8	8	18	29	6	30	8	4	11	1	16	31	3	98	21	27	0	0	0	1	0	0	5	1015
8	306	887	239	768	127	1826	398	270	39	26	76	24	71	6	46	12	9	5	11	4	435	268	46	7	0	0	9	0	15	41	5971
9	10	26	9	20	22	94	25	1	9	94	11	3	89	4	10	16	3	0	0	0	43	8	1	0	0	0	0	0	0	4	502
10	45	106	30	70	56	455	203	6	204	256	202	6	197	6	27	82	10	2	3	3	207	31	14	1	0	0	1	0	1	9	2233
11	27	82	24	43	21	276	194	14	28	133	62	11	58	1	12	41	5	3	4	0	113	20	15	1	0	0	1	0	1	2	1192
12	46	106	35	89	28	447	154	6	15	15	23	1	35	0	15	14	3	0	6	0	125	39	18	2	0	0	0	0	1	15	1238
13	101	265	78	131	630	847	129	3	42	19	3	5	476	20	31	25	5	9	29	6	556	75	34	1	0	0	4	0	1	14	3539
14	180	333	96	290	201	2104	165	5	114	43	17	9	627	9	89	53	13	3	9	9	1391	167	73	11	0	0	20	0	13	72	6116
15	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
16	67	110	34	135	53	316	104	0	75	41	24	10	62	10	315	84	154	12	15	10	79	36	9	2	0	0	11	0	0	22	1790
17	61	127	50	133	49	549	134	0	37	33	19	11	47	6	125	221	133	36	29	12	127	55	9	5	0	0	5	0	3	24	2040
18	54	114	36	123	32	586	99	0	23	20	23	22	53	3	73	107	164	10	22	15	158	51	15	2	0	0	10	0	6	25	1846
19	139	244	71	269	109	1181	179	2	71	47	30	14	297	10	571	275	67	11	47	47	447	110	41	8	0	0	43	0	8	55	4393
20	24	40	13	50	12	240	27	0	10	4	5	3	17	2	59	8	10	4	19	2	57	21	5	2	0	0	7	0	1	13	655
21	530	565	122	461	191	387	115	7	19	12	8	4	197	3	20	9	4	1	3	0	972	1421	350	11	0	0	3	0	2	20	5437
22	75	74	19	72	11	212	15	1	2	2	0	1	6	0	2	1	0	0	0	0	529	83	261	1	0	0	0	0	8	4	1379
23	121	150	68	262	37	397	59	0	8	6	2	4	24	2	11	2	3	1	1	1	469	475	259	69	0	0	2	0	7	23	2463
24	286	413	112	517	139	3041	182	8	39	22	15	13	374	9	77	24	12	4	23	7	2825	468	656	46	0	0	29	0	72	248	9661
25	205	250	71	306	84	302	80	2	18	9	5	3	65	2	23	4	5	0	2	3	1042	433	83	6	0	0	7	0	2	27	3039
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	2699	5160	1417	4154	1971	####	2504	350	783	813	722	199	3054	500	1525	998	601	471	969	216	####	3867	2170	177	0	0	155	0	141	630	####

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	186	600	598	54	1512	3244	1005	5971	504	2233	1194	1237	3539	6119	2	1789	2037	1846	4398	655	5437	1377	2467	9659	3040	0	0	0	0	0	####
Des	2672	5006	1384	4054	1969	####	2483	276	755	656	616	216	2998	560	1474	970	563	527	1087	237	####	3875	2176	177	0	0	148	0	152	603	####

(b) Person Trips for Mode [1 : Private Automobiles], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	10	15	1	17	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	51
2	5	15	3	10	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	38
3	4	14	5	26	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52
4	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	7
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	2	2	1	2	0	8	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	136	0	0	0	0	0	0	0	154
7	9	34	24	35	1	58	6	0	0	2	0	0	3	0	0	1	0	0	0	0	4	4	0	0	0	0	0	0	0	0	181
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	2	3	1	5	0	10	2	0	0	6	0	0	1	0	0	1	1	0	0	0	2	0	0	0	0	0	0	0	0	0	34
10	74	91	69	91	11	309	166	0	0	71	0	0	114	0	0	25	15	0	1	0	18	29	1	1	0	0	0	0	0	2	1088
11	2	13	3	15	1	98	22	0	0	9	0	0	7	0	0	2	1	0	2	0	2	7	0	0	0	0	0	0	0	0	184
12	10	40	17	58	5	174	68	0	0	10	0	0	9	0	0	9	8	0	2	0	11	11	0	1	0	0	0	0	0	2	435
13	86	131	56	125	48	278	58	0	0	9	0	0	179	0	0	21	11	0	1	0	34	32	3	2	0	0	0	0	0	3	1077
14	51	13	28	0	0	0	5	0	0	0	0	0	313	0	0	0	0	0	0	0	6	17	6	0	0	0	0	0	0	0	439
15	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
16	17	51	16	68	10	80	42	0	0	17	0	0	34	0	0	104	151	0	0	0	18	3	1	4	0	0	0	0	0	1	617
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	14	40	14	61	6	109	31	0	0	8	0	0	25	0	0	35	32	0	32	0	14	7	2	2	0	0	0	0	0	3	435
21	178	240	66	336	28	165	51	0	0	8	0	0	45	0	0	10	4	0	2	0	24	187	10	5	0	0	0	0	0	4	1363
22	45	42	16	70	6	56	13	0	0	1	0	0	10	0	0	1	0	0	2	0	43	64	22	4	0	0	0	0	0	1	396
23	90	122	65	285	13	340	71	0	0	5	0	0	33	0	0	8	5	0	7	0	67	598	139	61	0	0	0	0	0	10	1919
24	62	207	54	339	18	1183	137	0	0	11	0	0	48	0	0	20	13	0	57	0	76	341	36	40	0	0	0	0	0	30	2672
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	662	1075	439	1543	149	2874	680	0	0	158	0	0	822	0	0	238	241	0	106	0	323	1302	356	120	0	0	0	0	0	56	####

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	46	40	53	8	0	153	181	0	34	1089	184	433	1079	437	1	617	0	0	0	436	1364	395	1918	2674	0	0	0	0	0	0	####
Des	627	1069	427	1502	148	3018	671	0	0	148	0	0	783	0	0	236	236	0	118	0	304	1323	363	118	0	0	0	0	0	50	####

Table 7-7 (2) T-model 2 Simulation Results : Trip Table of "Person" Trips

(c) Person Trips for Mode [2 : Transit 1(Collectibos)], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	0	4	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
2	20	102	44	22	6	13	19	0	2	0	0	0	0	0	0	0	1	0	0	0	9	1	1	0	0	0	0	0	0	0	240
3	0	14	3	6	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	27
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	4	28	6	5	3	16	9	0	1	1	0	0	0	0	0	0	0	0	0	0	7	1	3	0	0	0	0	0	0	0	84
6	0	2	0	9	0	14	3	0	0	0	0	0	0	220	0	0	0	306	0	0	1	0	136	0	0	0	0	0	0	1	692
7	1	32	7	10	0	50	6	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	111
8	13	93	59	49	13	47	64	0	10	5	0	10	0	0	0	0	3	0	0	0	27	13	8	0	0	0	0	0	0	0	414
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	1	4	2	1	0	12	9	0	19	1	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	52
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	2	8	6	11	1	191	20	0	2	1	0	2	0	0	0	0	2	0	0	0	1	1	1	0	0	0	0	0	0	0	249
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	13	225	32	42	26	367	128	0	158	18	0	11	0	0	0	0	10	0	0	0	43	14	6	0	0	0	0	0	0	1	1094
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	8	121	26	38	12	222	165	0	42	16	0	18	0	0	0	0	118	0	0	0	27	9	7	0	0	0	0	0	0	1	830
18	14	80	42	64	16	477	109	0	37	12	0	50	40	0	0	0	181	0	0	0	82	14	10	0	0	0	0	0	0	4	1232
19	1	4	0	0	0	0	7	0	0	0	0	0	58	0	0	0	0	0	0	0	37	0	0	0	0	0	0	0	0	0	107
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	179	409	89	131	44	137	114	0	32	7	0	11	144	0	0	0	4	0	0	0	164	143	28	0	0	0	0	0	0	0	1636
22	0	0	2	8	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	70
23	15	51	33	54	8	30	35	0	5	0	0	6	0	0	0	0	2	0	0	0	53	74	46	0	0	0	0	0	0	0	412
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	4	15	9	6	3	12	9	0	1	1	0	2	0	0	0	0	1	0	0	0	20	9	2	0	0	0	0	0	0	0	94
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	275	1192	361	456	133	1614	699	0	312	62	0	112	242	220	0	0	322	306	0	0	509	279	249	0	0	0	0	0	0	7	7350

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	9	239	27	0	82	695	113	412	0	54	0	247	0	1093	0	0	830	1231	109	0	1636	70	411	0	95	0	0	0	0	0	7354
Des	240	1121	314	432	114	1904	660	0	275	57	0	95	229	275	0	0	275	387	0	0	457	244	267	0	0	0	0	0	0	10	7354

(d) Person Trips for Mode [3 : Transit2 (Combis)], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	34	52	8	13	1	18	1	0	1	0	0	0	1	0	0	0	0	0	0	0	11	1	1	0	0	0	0	0	0	0	142
3	21	203	25	53	9	33	7	2	0	1	3	0	1	4	0	0	0	0	15	6	23	4	3	0	0	0	0	0	0	0	413
4	13	6	5	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	31
5	58	234	28	44	51	261	19	11	8	1	1	1	140	1	7	0	0	0	0	0	204	29	0	0	0	0	0	0	0	3	1101
6	40	102	21	36	66	385	67	0	11	9	75	2	36	206	7	0	1	0	355	97	102	14	1	0	0	0	1	0	0	6	1640
7	19	138	20	33	35	63	7	3	2	9	12	2	14	2	4	2	0	0	22	7	79	8	1	1	0	0	0	0	0	1	484
8	357	736	127	549	136	1900	172	293	46	24	10	17	43	10	60	1	1	0	0	10	663	260	57	0	0	0	14	0	26	48	5560
9	10	22	3	11	25	85	14	0	5	79	2	2	58	6	8	9	1	0	0	1	50	8	1	1	0	0	0	0	0	2	403
10	5	33	6	7	28	128	59	3	26	115	3	1	68	0	3	28	4	0	0	0	127	4	1	1	0	0	0	0	0	2	652
11	12	35	11	19	19	149	65	5	14	85	6	2	28	0	8	19	3	0	0	0	106	9	0	0	0	0	0	0	0	2	597
12	13	31	6	20	10	118	37	5	6	10	2	0	14	1	5	4	2	0	0	1	71	9	2	0	0	0	2	0	0	4	373
13	19	45	41	24	461	570	27	1	8	3	0	0	93	2	7	7	0	0	0	1	337	27	6	1	0	0	0	0	0	2	1682
14	117	161	48	131	175	1428	57	5	114	33	6	5	297	14	83	26	0	0	0	10	1004	107	26	2	0	0	19	0	16	44	3928
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
16	55	61	13	73	41	272	41	0	67	27	6	6	30	10	241	5	18	0	0	11	62	39	6	0	0	0	11	0	0	17	1112
17	28	33	18	41	18	269	26	0	19	14	3	4	15	1	58	67	15	0	0	6	78	21	6	0	0	0	2	0	4	11	757
18	19	28	7	29	10	159	15	3	12	4	4	4	13	1	28	30	35	0	0	5	72	16	3	1	0	0	2	0	3	9	512
19	111	135	28	142	82	1040	67	4	64	34	7	8	121	15	549	123	19	0	0	52	455	83	22	1	0	0	44	0	16	46	3268
20	7	10	3	8	4	103	1	0	5	1	1	0	3	0	18	1	1	0	0	0	36	5	2	0	0	0	2	0	4	4	219
21	135	293	18	74	186	96	21	8	6	3	0	1	114	1	7	4	1	0	0	0	691	742	18	9	0	0	1	0	0	5	2434
22	13	28	2	1	9	71	2	1	0	0	0	0	6	0	0	1	0	0	0	0	492	11	23	2	0	0	0	0	4	0	666
23	0	0	13	4	5	12	2	0	0	0	0	0	0	0	0	0	0	0	0	0	56	45	0	0	0	0	0	0	0	0	137
24	226	225	50	285	109	1327	65	7	40	18	4	9	128	12	73	8	5	0	0	10	2376	355	192	35	0	0	34	0	66	258	5917
25	193	166	35	204	89	334	38	0	21	11	3	1	39	7	28	1	1	0	0	2	1144	444	41	5	0	0	8	0	0	34	2849
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	1505	2777	536	1801	1570	8822	811	351	475	481	148	65	1262	293	1194	336	107	0	392	219	8244	2241	412	59	0	0	140	0	139	498	####

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	0	140	413	33	1101	1643	485	5559	403	654	597	371	1679	3933	1	1110	755	513	3268	218	2437	666	137	5916	2850	0	0	0	0	0	####
Des	1513	2662	549	1803	1599	9020	819	268	471	392	146	66	1235	316	1195	312	87	0	434	232	8263	2242	412	58	0	0	145	0	146	495	####

Table 7-7 (3) T-model 2 Simulation Results : Trip Table of "Person" Trips

(e) Person Trips for Mode [4 : Walking], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	10	8	5	14	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39
2	15	14	29	12	0	3	5	0	0	0	1	4	4	0	0	0	0	5	0	0	8	0	0	0	0	0	0	0	0	0	100
3	1	12	16	18	0	3	2	0	0	0	2	10	3	0	0	0	0	9	0	0	7	0	0	0	0	0	0	0	0	0	83
4	1	1	1	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	112	0	0	0	0	0	6	0	0	0	0	0	5	0	0	6	0	0	0	0	0	0	0	0	0	129
7	2	1	7	6	0	0	1	0	0	0	4	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	2	1	0	0	0	0	0	8	1	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17
10	0	6	6	5	0	0	9	0	10	19	40	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	108
11	3	2	8	5	0	0	10	0	2	18	157	0	17	0	0	0	0	4	0	0	0	0	2	0	0	0	0	0	0	0	228
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	8	11	14	13	0	3	8	1	2	6	17	14	145	0	0	0	0	38	0	0	9	0	12	0	0	0	0	0	0	0	301
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	4	3	5	0	0	3	1	3	4	10	0	16	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	61
17	0	3	4	4	0	0	2	0	2	2	9	0	10	0	0	0	0	38	0	0	0	0	0	0	0	0	0	0	0	0	74
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	9	10	17	15	0	0	14	0	6	13	27	0	56	0	0	0	0	39	0	0	0	0	0	0	0	0	0	0	0	0	206
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	3	4	7	9	0	0	2	0	0	2	1	0	5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	34
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	3	0	11	0	0	0	0	0	0	0	0	0	1056	0	0	0	0	0	0	0	1070
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	52	76	119	109	0	121	56	3	25	72	272	34	289	0	0	0	0	151	0	0	30	0	1070	0	0	0	0	0	0	0	2479

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	37	100	80	8	0	126	23	0	17	109	230	0	302	0	0	62	75	0	204	0	0	35	0	1069	0	0	0	0	0	0	2477
Des	46	55	93	80	0	134	49	3	18	58	252	65	254	0	0	0	0	188	0	0	49	0	1132	0	0	0	0	0	0	0	2477

(f) Person Trips for Mode [5 : Others (Mototaxis)], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	23	15	0	20	1	18	2	0	0	0	0	0	4	0	1	0	0	0	0	0	8	0	0	0	0	0	0	0	0	1	93
2	21	13	0	9	2	25	2	0	0	0	1	0	2	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	1	79
3	0	0	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29
4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5
5	24	28	0	18	9	43	18	0	0	0	3	0	66	0	2	2	0	0	0	0	117	0	0	0	0	0	0	0	0	0	330
6	14	13	0	8	7	48	30	0	1	0	78	0	2	0	1	3	0	0	378	0	11	35	0	0	0	0	0	0	0	0	629
7	0	0	0	10	0	21	5	0	0	0	12	0	18	0	0	7	0	0	31	0	96	2	0	0	0	0	0	0	0	0	202
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	1	2	0	2	0	19	3	0	0	0	1	0	15	0	1	2	0	0	0	0	6	1	0	0	0	0	0	0	0	0	53
10	2	5	0	3	4	65	44	0	2	0	10	0	50	0	0	39	0	0	0	0	100	0	0	0	0	0	0	0	0	0	324
11	5	8	0	7	1	66	32	0	0	0	12	0	12	0	1	12	0	0	0	0	30	1	0	0	0	0	0	0	0	1	188
12	3	3	0	6	1	75	27	0	1	0	5	0	14	0	2	5	0	0	0	0	40	1	0	0	0	0	0	0	0	0	183
13	12	8	0	12	13	37	17	0	2	0	2	0	130	0	3	20	0	0	0	0	222	0	0	0	0	0	0	0	0	2	480
14	39	28	0	38	21	129	41	0	8	0	15	0	134	0	20	41	0	0	10	0	122	2	0	0	0	0	0	0	0	9	657
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	17	16	0	26	7	60	41	0	2	0	19	0	10	0	28	95	0	0	24	0	23	0	0	0	0	0	0	0	0	8	376
18	6	6	0	9	3	21	11	0	1	0	8	0	4	0	6	9	0	0	6	0	10	0	0	0	0	0	0	0	0	3	103
19	33	27	0	39	13	95	58	0	3	0	21	0	45	0	164	187	0	0	30	0	88	4	0	0	0	0	0	0	0	11	818
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	6	3	0	5	1	120	1	0	0	0	1	0	15	0	0	0	0	0	0	0	59	0	0	0	0	0	0	0	0	0	211
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	14	6	0	13	3	14	6	0	0	0	1	0	3	0	0	2	0	0	1	0	27	3	0	0	0	0	0	0	0	2	95
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	224	181	29	225	86	856	338	0	20	0	189	0	524	0	229	426	0	0	480	0	960	49	0	0	0	0	0	0	0	39	4855

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	93	80	27	5	329	627	204	0	50	327	184	186	480	656	0	0	377	103	817	0	0	211	0	0	95	0	0	0	0	0	4850
Des	235	185	28	242	86	899	342	0	18	0	201	0	476	0	245	400	0	0	507	0	902	47	0	0	0	0	0	0	3	37	4850

Table 7-7 (4) T-model 2 Simulation Results : Trip Table of "Person" Trips

(g) Person Trips for Mode [All : Sum of Table (b) ~ (f)], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	43	42	7	51	1	23	3	0	0	0	0	0	6	0	1	0	0	0	0	0	11	0	0	0	0	0	0	0	0	1	189
2	95	196	84	66	10	60	28	0	3	1	2	4	7	0	0	2	1	5	0	0	30	2	2	0	0	0	0	0	0	1	599
3	26	243	78	103	10	36	13	2	0	1	5	10	5	4	0	0	0	9	15	6	31	4	3	0	0	0	0	0	0	0	604
4	19	8	6	2	2	2	1	1	0	0	0	0	0	0	0	1	0	0	0	0	4	2	0	0	0	0	0	0	0	1	49
5	86	290	34	67	63	320	46	11	9	2	4	1	206	1	9	2	0	0	0	0	328	30	3	0	0	0	0	0	0	3	1515
6	56	119	22	55	73	567	103	0	12	9	153	8	38	426	8	3	1	311	733	97	120	49	273	0	0	0	1	0	0	7	3244
7	31	205	58	94	36	192	25	3	5	11	28	2	37	2	4	10	0	0	53	7	180	14	2	1	0	0	0	0	0	1	1001
8	370	829	186	598	149	1947	236	293	56	29	10	27	43	10	60	1	4	0	0	10	690	273	65	0	0	0	14	0	26	48	5974
9	13	27	6	19	25	114	19	0	5	93	4	2	79	6	9	12	2	0	0	1	58	9	1	1	0	0	0	0	0	2	507
10	82	139	83	107	43	514	287	3	57	206	53	3	245	0	3	92	19	0	1	0	246	33	2	2	0	0	0	0	0	4	2224
11	22	58	22	46	21	313	129	5	16	112	175	2	64	0	9	33	4	4	2	0	138	17	2	0	0	0	0	0	0	3	1197
12	28	82	29	95	17	558	152	5	9	21	7	2	37	1	7	18	12	0	2	1	123	22	3	1	0	0	2	0	0	6	1240
13	125	195	111	174	522	888	110	2	12	18	19	14	547	2	10	48	11	38	1	1	602	59	21	3	0	0	0	0	0	7	3540
14	220	427	108	211	222	1924	231	5	280	51	21	16	744	14	103	67	10	0	10	10	1175	140	38	2	0	0	19	0	16	54	6118
15	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3
16	72	116	32	146	51	352	86	1	70	48	16	6	80	10	241	109	169	12	0	11	80	42	7	4	0	0	11	0	0	18	1790
17	53	173	48	109	37	551	234	0	65	32	31	22	35	1	86	162	133	38	24	6	128	30	13	0	0	0	2	0	4	20	2037
18	39	114	49	102	29	657	135	3	50	16	12	54	57	1	34	39	216	0	6	5	164	30	13	1	0	0	2	0	3	16	1847
19	154	176	45	196	95	1135	146	4	73	47	55	8	280	15	713	310	19	39	30	52	580	87	22	1	0	0	44	0	16	57	4399
20	21	50	17	69	10	212	32	0	5	9	1	0	28	0	18	36	33	0	32	0	50	12	4	2	0	0	2	0	4	7	654
21	492	942	173	541	258	398	186	8	38	18	0	12	303	1	7	14	9	0	2	0	879	1072	56	14	0	0	1	0	0	9	5433
22	67	77	27	93	16	272	18	1	0	3	2	0	36	0	0	2	0	1	2	0	629	75	45	6	0	0	0	0	4	1	1377
23	105	173	111	343	26	382	108	0	5	5	0	6	33	0	0	8	7	0	7	0	176	717	185	61	0	0	0	0	0	10	2468
24	288	432	104	624	127	2510	202	7	40	29	7	9	187	12	73	28	18	0	57	10	2452	696	1284	75	0	0	34	0	66	288	9659
25	211	187	44	223	95	360	53	0	22	12	4	3	42	7	28	3	2	0	1	2	1191	456	43	5	0	0	8	0	0	36	3038
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	2718	5301	1484	4134	1938	####	2584	354	832	773	609	211	3139	513	1423	1000	670	457	978	219	####	3871	2087	179	0	0	140	0	139	600	####

Origin and Destination Trips from Original data

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	186	600	598	54	1512	3244	1005	5971	504	2233	1194	1237	3539	6119	2	1789	2037	1846	4398	655	5437	1377	2467	9659	3040	0	0	0	0	0	####
Des	2672	5006	1384	4054	1969	####	2483	276	755	656	616	216	2998	560	1474	970	563	527	1087	237	####	3875	2176	177	0	0	148	0	152	603	####

(h) Person Trips [Defference between Table (a) and (g)], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	0	23	0	13	4	11	1	0	0	0	1	0	6	1	1	0	0	0	0	0	4	6	0	0	0	0	0	0	0	1	0
2	41	16	22	2	5	20	10	1	2	1	1	4	4	2	2	2	1	4	5	2	13	4	1	0	0	0	0	0	0	1	0
3	2	22	22	7	1	6	8	2	0	1	1	10	4	0	1	0	0	1	2	4	10	0	19	0	0	0	1	0	0	0	12
4	9	5	1	3	1	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	2	0	0	0	0	0	0	0	0	1	11
5	5	65	23	24	25	60	8	3	1	4	0	1	69	0	2	3	0	0	2	0	130	2	3	1	0	0	1	0	0	0	8
6	18	5	8	10	13	73	22	2	1	4	3	41	12	35	4	1	1	34	42	7	1	10	50	1	0	0	1	0	0	5	2
7	27	29	35	22	5	19	6	5	3	7	1	4	7	6	0	1	1	16	22	4	82	7	25	1	0	0	1	0	0	4	14
8	64	58	53	170	22	121	162	23	17	3	66	3	28	4	14	11	5	5	11	6	255	5	19	7	0	0	5	0	11	7	3
9	3	1	3	1	3	20	6	1	4	1	7	1	10	2	1	4	1	0	0	1	15	1	0	1	0	0	0	0	0	2	5
10	37	33	53	37	13	59	84	3	147	50	149	3	48	6	24	10	9	2	2	3	39	2	12	1	0	0	1	0	1	5	9
11	5	24	2	3	0	37	65	9	12	21	113	9	6	1	3	8	1	1	2	0	25	3	13	1	0	0	1	0	1	1	5
12	18	24	6	6	11	111	2	1	6	6	16	1	2	1	8	4	9	0	4	1	2	17	15	1	0	0	2	0	1	9	2
13	24	70	33	43	108	41	19	1	30	1	16	9	71	18	21	23	6	29	28	5	46	16	13	2	0	0	4	0	1	7	1
14	40	94	12	79	21	180	66	0	166	8	4	7	117	5	14	14	3	3	1	1	216	27	35	9	0	0	1	0	3	18	2
15	0	1	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
16	5	6	2	11	2	36	18	1	5	7	8	4	18	0	74	25	15	0	15	1	1	6	2	2	0	0	0	0	0	4	0
17	8	46	2	24	12	2	100	0	28	1	12	11	12	5	39	59	0	2	5	6	1	25	4	5	0	0	3	0	1	4	3
18	15	0	13	21	3	71	36	3	27	4	11	32	4	2	39	68	52	10	16	10	6	21	2	1	0	0	8	0	3	9	1
19	15	68	26	73	14	46	33	2	2	0	25	6	17	5	142	35	48	28	17	5	133	23	19	7	0	0	1	0	8	2	6
20	3	10	4	19	2	28	5	0	5	5	4	3	11	2	41	28	23	4	13	2	7	9	1	0	0	0	5	0	3	6	1
21	38	377	51	80	67	11	71	1	19	6	8	8	106	2	13	5	5	1	1	0	93	349	294	3	0	0	2	0	2	11	4
22	8	3	8	21	5	60	3	0	2	1	2	1	30	0	2	1	0	1	2	0	100	8	216	5	0	0	0	0	4	3	2
23	16	23	43	81	11	15	49	0	3	1	2	2	9	2	11	6	4	1	6	1	293	242	74	8	0	0	2	0	7	13	5
24	2	19	8	107	12	531	20	1	1	7	8	4	187	3	4	4	6	4	34	3	373	228	628	29	0	0	5	0	6	40	2
25	6	63	27	83	11	58	27	2	4	3	1	0	23	5	5	1	3	0	1	1	149	23	40	1	0	0	1	0	2	9	1
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	19	141	67	20	33	133	80	4	49	40	113	12	85	13	102	2	69	14	9	3	27	4	83	2	0	0	15	0	2	30	1

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	186	600	598	54	1512	3244	1005	5971	504	2233	1194	1237	3539	6119	2	1789	2037	1846	4398	655	5437	1377	2467	9659	3040	0	0	0	0	0	####
Des	2672	5006	1384	4054	1969	####	2483	276	755	656	616	216	2998	560	1474	970	563	527	1087	237	####	3875	2176	177	0	0	148	0	152	603	####

Table 7-8 (1) T-model 2 Simulation Results : Trip Table of "Mode" Trips

(a) Mode Trips for Mode [All : (1) ~ (5)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	15	26	4	30	0	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	0	0	0	0	0	0	0	0	93
2	38	62	26	36	4	18	9	0	0	0	0	0	2	1	0	0	0	5	2	0	9	2	3	0	0	0	0	0	0	0	217
3	8	47	23	39	1	5	9	0	0	0	0	2	0	1	0	0	0	4	3	0	2	4	7	0	0	0	0	0	0	0	155
4	8	2	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	17
5	19	47	8	17	6	38	8	1	2	0	5	0	46	0	1	1	0	1	0	0	37	6	0	0	0	0	0	0	0	0	243
6	8	36	12	14	2	158	23	0	1	3	32	41	7	50	2	0	0	118	126	6	46	10	53	0	0	0	0	0	0	0	748
7	13	42	30	21	6	54	7	0	2	3	10	3	8	2	2	0	1	3	7	0	24	2	7	0	0	0	0	0	0	0	247
8	26	81	36	94	11	154	42	18	2	4	26	3	10	0	5	0	2	3	3	0	23	19	4	2	0	0	1	0	0	0	569
9	4	7	0	4	2	23	4	0	1	13	2	0	11	0	2	3	0	0	0	0	4	2	1	0	0	0	0	0	0	0	83
10	19	37	13	33	9	190	84	0	39	73	96	1	56	1	5	14	2	1	2	0	58	3	4	1	0	0	1	0	1	1	744
11	11	21	11	17	6	94	54	3	4	44	76	3	22	0	4	10	3	0	0	1	32	4	8	0	0	0	0	0	0	3	431
12	7	20	10	21	7	137	51	0	2	7	19	1	9	0	4	1	1	5	1	0	21	8	3	0	0	0	0	0	0	1	336
13	44	82	26	58	83	205	43	2	10	9	6	7	193	7	6	13	0	16	28	1	174	19	24	2	0	0	1	0	0	6	1065
14	28	74	22	52	31	272	41	0	28	19	15	0	255	0	13	24	4	3	2	1	111	21	15	0	0	0	2	0	0	4	1037
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	14	27	13	32	8	66	32	0	10	13	13	2	23	0	34	28	41	9	7	2	16	4	2	1	0	0	1	0	0	4	402
17	9	35	11	34	8	102	43	0	7	11	11	2	16	3	15	65	39	34	13	1	20	10	1	1	0	0	0	0	0	3	494
18	10	21	10	24	7	123	26	1	4	6	12	1	19	0	8	23	43	8	11	1	19	9	0	0	0	0	1	0	1	3	391
19	25	50	19	64	13	141	52	1	11	14	16	4	76	0	100	92	30	12	16	6	56	14	5	4	0	0	2	0	0	8	831
20	6	12	6	18	3	57	12	0	4	1	6	0	9	0	14	5	3	6	10	2	10	4	0	1	0	0	2	0	0	2	193
21	169	160	50	169	31	116	37	1	5	5	6	1	59	1	2	7	1	1	0	0	53	206	72	4	0	0	0	0	0	3	1159
22	15	23	5	33	4	78	7	0	1	1	0	0	8	0	0	0	0	0	0	0	114	33	26	0	0	0	0	0	0	0	348
23	37	49	30	111	7	144	29	0	2	1	5	1	12	0	1	2	0	0	4	0	112	186	119	21	0	0	0	0	1	8	882
24	60	90	39	144	18	568	52	2	6	4	8	1	70	0	6	6	2	4	11	0	299	173	1005	15	0	0	3	0	8	34	2628
25	20	35	11	39	9	28	10	0	2	0	3	0	12	0	3	0	2	0	1	0	83	30	8	1	0	0	1	0	0	4	302
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	613	1086	419	1106	276	2778	678	29	143	231	367	73	923	66	227	294	174	233	247	21	1331	770	1367	53	0	0	15	0	11	84	####

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	95	220	152	16	244	749	245	566	84	743	426	340	1065	1038	0	401	497	391	831	193	1158	351	882	2632	299	0	0	0	0	0	####
Des	579	1034	394	1035	257	2909	675	26	125	165	355	93	929	86	204	288	162	278	295	20	1352	796	1403	52	0	0	12	0	14	80	####

(b) Mode Trips for Mode [1 : Private Automobiles], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	7	7	0	6	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	24
2	3	4	2	5	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
3	0	7	1	10	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
4	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	5
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	54	1	0	0	0	0	0	0	59
7	2	15	12	13	0	23	0	0	0	3	0	0	2	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	72
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	3	0	2	0	3	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	13
10	28	39	26	35	5	128	64	0	0	27	0	0	48	0	0	11	6	0	3	0	7	7	2	0	0	0	0	0	0	0	436
11	1	5	1	8	0	36	9	0	0	5	0	0	3	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	71
12	7	17	6	20	4	69	27	0	0	5	0	0	3	0	0	4	3	0	0	0	4	5	0	0	0	0	0	0	0	0	174
13	37	47	28	49	18	111	23	0	0	2	0	0	75	0	0	9	3	0	2	0	14	10	3	2	0	0	0	0	0	2	435
14	20	6	11	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	1	5	3	0	0	0	0	0	0	0	174
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	7	20	6	26	4	32	16	0	0	6	0	0	15	0	0	44	59	0	0	0	6	3	0	1	0	0	0	0	0	3	248
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	3	17	2	25	1	45	15	0	0	4	0	0	11	0	0	12	13	0	12	0	4	8	1	0	0	0	0	0	0	0	173
21	77	96	28	131	14	68	22	0	0	2	0	0	20	0	0	5	0	0	0	0	11	62	5	2	0	0	0	0	0	3	546
22	17	16	5	30	3	24	4	0	0	0	0	0	4	0	0	1	0	0	0	0	18	22	12	1	0	0	0	0	0	1	158
23	33	46	27	117	7	132	27	0	0	3	0	0	14	0	0	2	2	0	3	0	24	247	54	23	0	0	0	0	0	3	764
24	24	86	21	141	8	462	58	0	0	4	0	0	19	0	0	4	4	0	18	0	31	144	20	17	0	0	0	0	0	10	1071
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	266	433	176	618	64	1140	269	0	0	62	0	0	343	0	0	95	92	0	39	0	123	516	154	47	0	0	0	0	0	22	4459

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	19	16	21	3	0	61	72	0	13	436	73	173	432	175	0	247	0	0	0	175	545	158	767	1069	0	0	0	0	0	0	4457
Des	251	428	171	601	59	1207	268	0	0	59	0	0	313	0	0	94	95	0	47	0	122	529	145	47	0	0	0	0	0	20	4457

Table 7-8 (2) T-model 2 Simulation Results : Trip Table of "Mode" Trips

(c) Mode Trips for Mode [2 : Transit 1(Collectibos)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2	5	25	11	6	0	5	6	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	60
3	1	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	1	7	2	1	1	5	2	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	22
6	0	1	0	3	0	4	0	0	0	0	0	0	0	58	0	0	0	76	0	0	0	0	32	0	0	0	0	0	0	0	174
7	0	7	1	3	0	16	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	29
8	4	23	14	10	7	9	17	0	3	1	0	4	0	0	0	0	0	0	0	0	7	2	3	0	0	0	0	0	0	0	104
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	2	0	0	2	2	0	6	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	14
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	1	1	1	1	49	3	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	60
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	3	58	5	10	7	93	31	0	42	3	0	2	0	0	0	0	4	0	0	0	11	1	5	0	0	0	0	0	0	0	275
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	1	29	6	12	2	57	42	0	10	2	0	7	0	0	0	0	29	0	0	0	7	3	1	0	0	0	0	0	0	0	208
18	1	20	11	14	4	122	26	0	12	3	0	10	9	0	0	0	46	0	0	0	23	2	2	0	0	0	0	0	0	0	305
19	0	1	0	0	0	0	4	0	0	0	0	0	12	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	29
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	48	99	24	31	13	33	31	0	7	3	0	2	35	0	0	0	1	0	0	0	37	35	8	0	0	0	0	0	0	0	407
22	0	0	1	2	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	1	19
23	3	14	8	12	3	8	8	0	1	0	0	2	0	0	0	0	1	0	0	0	10	22	11	0	0	0	0	0	0	0	103
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	1	4	3	0	1	5	1	0	0	0	0	1	0	0	0	0	0	0	0	0	6	0	2	0	0	0	0	0	0	0	24
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	68	293	90	106	39	413	174	0	83	14	0	28	56	58	0	0	82	76	0	0	127	67	65	0	0	0	0	0	0	1	1840

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	2	60	7	0	21	174	28	103	0	14	0	62	0	273	0	0	208	308	27	0	409	18	103	0	24	0	0	0	0	0	1838
Des	60	280	78	108	29	476	165	0	69	14	0	24	57	69	0	0	69	97	0	0	114	61	67	0	0	0	0	0	0	2	1838

(d) Mode Trips for Mode [3 : Transit2 (Combis)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2	5	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	12
3	2	15	1	2	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	6	0	0	0	0	0	0	0	0	0	31
4	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
5	4	20	1	4	4	21	1	1	0	0	0	0	8	0	1	0	0	0	0	0	26	1	0	0	0	0	0	0	0	0	92
6	6	13	2	6	2	23	8	0	2	0	5	0	2	18	1	0	0	0	27	9	15	2	0	0	0	0	0	0	0	0	141
7	0	8	4	0	4	9	1	0	0	0	2	0	0	0	0	1	0	0	1	0	8	1	0	0	0	0	0	0	0	0	39
8	29	65	11	48	11	159	14	25	1	2	1	4	1	1	5	0	1	0	0	1	56	17	2	0	0	0	4	0	3	1	462
9	2	3	0	0	0	12	0	0	0	6	0	0	4	1	0	2	0	0	0	0	2	1	0	0	0	0	0	0	0	0	33
10	0	4	1	2	2	9	5	0	3	12	0	0	3	0	1	1	0	0	0	0	13	0	0	0	0	0	0	0	0	0	56
11	0	3	2	0	1	15	6	0	1	8	0	2	1	0	1	2	0	0	0	0	11	0	0	0	0	0	0	0	1	0	54
12	1	1	0	0	2	12	3	0	0	1	0	0	2	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	32
13	0	3	1	3	34	47	2	0	1	0	0	0	10	0	1	0	0	0	0	0	31	3	0	0	0	0	0	0	0	0	136
14	11	15	2	9	15	131	5	0	13	8	1	2	31	1	6	2	0	0	0	2	59	5	2	0	0	0	3	0	1	0	324
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	6	4	2	4	4	25	3	0	4	2	0	1	3	0	18	0	5	0	0	0	8	2	1	0	0	0	0	0	0	1	93
17	2	6	2	0	3	23	1	0	2	0	1	1	3	0	2	8	4	0	0	0	5	1	0	0	0	0	1	0	1	1	67
18	4	1	0	0	2	15	2	0	0	0	0	0	1	0	3	2	6	0	0	0	5	2	0	0	0	0	0	0	1	1	45
19	11	6	4	9	6	80	7	1	4	4	0	1	7	1	53	12	7	0	0	3	38	8	0	0	0	0	2	0	4	5	273
20	0	2	0	0	1	7	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
21	16	29	4	6	19	11	3	0	1	0	0	0	14	0	0	1	1	0	0	0	38	59	0	0	0	0	0	0	0	0	202
22	0	1	0	0	1	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	2	0	0	0	0	0	0	0	0	58
23	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	0	0	0	0	0	0	0	0	10
24	20	20	8	27	9	84	10	0	1	2	0	0	7	0	5	0	0	0	0	1	186	43	41	3	0	0	3	0	7	19	496
25	15	14	4	17	9	28	2	0	1	1	1	0	5	1	1	0	0	0	0	0	101	31	1	0	0	0	1	0	0	6	239
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	133	238	54	137	130	724	74	27	34	46	11	11	102	23	101	31	24	0	29	16	674	179	47	3	0	0	14	0	18	34	2914

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	0	12	34	3	92	137	40	463	34	54	50	31	140	328	0	93	63	43	272	18	203	55	11	493	237	0	0	0	0	0	2907
Des	126	222	46	150	133	752	68	22	39	33	12	5	103	26	100	26	7	0	36	19	689	187	34	5	0	0	12	0	12	41	2907

Table 7-8 (3) T-model 2 Simulation Results : Trip Table of "Mode" Trips

(e) Mode Trips for Mode [4 : Walking], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	10	8	5	14	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39
2	15	14	29	12	0	3	5	0	0	0	1	4	4	0	0	0	0	5	0	0	8	0	0	0	0	0	0	0	0	0	100
3	1	12	16	18	0	3	2	0	0	0	2	10	3	0	0	0	0	9	0	0	7	0	0	0	0	0	0	0	0	0	83
4	1	1	1	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	112	0	0	0	0	0	6	0	0	0	0	0	5	0	0	6	0	0	0	0	0	0	0	0	0	129
7	2	1	7	6	0	0	1	0	0	0	4	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	2	1	0	0	0	0	0	8	1	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17
10	0	6	6	5	0	0	9	0	10	19	40	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	108
11	3	2	8	5	0	0	10	0	2	18	157	0	17	0	0	0	0	4	0	0	0	0	2	0	0	0	0	0	0	0	228
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	8	11	14	13	0	3	8	1	2	6	17	14	145	0	0	0	0	38	0	0	9	0	12	0	0	0	0	0	0	0	301
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	4	3	5	0	0	3	1	3	4	10	0	16	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	61
17	0	3	4	4	0	0	2	0	2	2	9	0	10	0	0	0	0	38	0	0	0	0	0	0	0	0	0	0	0	0	74
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	9	10	17	15	0	0	14	0	6	13	27	0	56	0	0	0	0	39	0	0	0	0	0	0	0	0	0	0	0	0	206
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	3	4	7	9	0	0	2	0	0	2	1	0	5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	34
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	3	0	11	0	0	0	0	0	0	0	0	0	1056	0	0	0	0	0	0	0	1070
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	52	76	119	109	0	121	56	3	25	72	272	34	289	0	0	0	0	151	0	0	30	0	1070	0	0	0	0	0	0	0	2479

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	37	100	80	8	0	126	23	0	17	109	230	0	302	0	0	62	75	0	204	0	0	35	0	1069	0	0	0	0	0	0	2477
Des	46	55	93	80	0	134	49	3	18	58	252	65	254	0	0	0	0	188	0	0	49	0	1132	0	0	0	0	0	0	0	2477

(f) Mode Trips for Mode [5 : Others (Mototaxis)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	9	5	0	10	0	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	41
2	6	5	0	4	1	10	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28
3	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
5	11	9	0	7	4	16	5	0	2	0	1	0	26	0	0	1	0	0	0	0	48	0	0	0	0	0	0	0	0	2	132
6	3	5	0	5	1	20	13	0	0	0	32	0	0	0	1	1	0	0	153	0	4	12	0	0	0	0	0	0	0	0	250
7	0	0	0	7	0	8	0	0	0	0	4	0	9	0	0	2	0	0	14	0	37	0	0	0	0	0	0	0	0	0	81
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	1	1	0	1	0	8	0	0	0	0	1	0	7	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	22
10	2	1	0	3	1	26	21	0	0	0	2	0	19	0	0	17	0	0	0	0	39	0	0	0	0	0	0	0	0	0	131
11	4	2	0	3	1	27	12	0	0	0	4	0	5	0	1	4	0	0	1	0	10	0	0	0	0	0	0	0	0	0	74
12	0	2	0	2	1	32	12	0	0	0	1	0	5	0	1	5	0	0	0	0	15	0	0	0	0	0	0	0	0	1	77
13	3	2	0	8	4	16	4	0	0	0	1	0	55	0	2	7	0	0	0	0	87	0	0	0	0	0	0	0	0	0	189
14	15	12	0	14	6	53	14	0	6	0	7	0	57	0	8	15	0	0	4	0	51	1	0	0	0	0	0	0	0	2	265
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	9	4	0	11	1	25	18	0	0	0	9	0	2	0	11	39	0	0	8	0	11	0	0	0	0	0	0	0	0	1	149
18	3	2	0	4	1	9	4	0	1	0	6	0	0	0	2	3	0	0	3	0	2	0	0	0	0	0	0	0	0	1	41
19	15	9	0	19	4	37	23	0	2	0	9	0	16	0	66	75	0	0	13	0	35	2	0	0	0	0	0	0	0	4	329
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	1	2	0	3	0	45	0	0	0	0	0	0	6	0	0	1	0	0	0	0	25	0	0	0	0	0	0	0	0	0	83
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	6	3	0	7	0	5	1	0	1	0	1	0	2	0	0	0	0	0	0	0	12	1	0	0	0	0	0	0	0	1	40
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	91	64	12	108	25	346	130	0	12	0	78	0	209	0	92	171	0	0	196	0	385	16	0	0	0	0	0	0	0	12	1947

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	37	32	11	2	132	251	82	0	20	131	73	74	192	262	0	0	151	41	327	0	0	85	0	0	38	0	0	0	0	0	1940
Des	94	74	11	97	34	360	137	0	7	0	80	0	190	0	98	160	0	0	203	0	361	19	0	0	0	0	0	0	1	15	1940

Table 7-8 (4) T-model 2 Simulation Results : Trip Table of "Mode" Trips

(g) Mode Trips for Mode [All : Sum of Table (b) ~ (f)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	26	21	5	30	0	10	2	0	0	0	0	0	2	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	105
2	31	53	43	27	1	19	15	0	1	0	1	4	4	0	0	0	0	5	0	0	12	0	0	0	0	0	0	0	0	0	216
3	4	37	31	31	0	9	2	0	0	0	2	10	3	0	0	0	0	9	1	0	13	0	0	0	0	0	0	0	0	0	152
4	6	3	4	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	19
5	16	36	3	12	9	42	8	1	2	1	1	0	34	0	1	1	0	0	0	0	75	2	0	0	0	0	0	0	0	2	246
6	9	19	2	14	3	162	21	0	2	0	37	6	2	76	2	1	0	81	180	9	26	14	86	1	0	0	0	0	0	0	753
7	4	31	24	29	4	56	3	0	0	3	10	0	13	0	0	4	1	0	15	0	46	1	0	0	0	0	0	0	0	0	244
8	33	88	25	58	18	168	31	25	4	3	1	8	1	1	5	0	1	0	0	1	63	19	5	0	0	0	4	0	3	1	566
9	3	7	2	4	0	23	1	0	0	15	2	0	17	1	0	4	0	0	0	0	4	2	0	0	0	0	0	0	0	0	85
10	30	50	35	45	8	165	101	0	19	59	42	0	83	0	1	29	6	0	3	0	60	7	2	0	0	0	0	0	0	0	745
11	8	12	11	16	2	78	37	0	3	31	161	2	26	0	2	7	1	4	2	0	21	0	2	0	0	0	0	0	1	0	427
12	8	21	7	23	8	162	45	0	1	6	1	0	10	0	1	9	4	0	0	0	29	6	1	0	0	0	0	0	0	1	343
13	48	63	43	73	56	177	37	1	3	8	18	14	285	0	3	16	3	38	2	0	141	13	15	2	0	0	0	0	0	2	1061
14	49	91	18	33	28	277	50	0	61	11	8	4	216	1	14	17	4	0	4	2	122	12	10	0	0	0	3	0	1	2	1038
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	13	28	11	35	8	57	22	1	7	12	10	1	34	0	18	44	64	12	0	0	14	5	1	1	0	0	0	0	0	4	402
17	12	42	12	27	6	105	63	0	14	4	19	8	15	0	13	47	33	38	8	0	23	4	1	0	0	0	1	0	1	2	498
18	8	23	11	18	7	146	32	0	13	3	6	10	10	0	5	5	52	0	3	0	30	4	2	0	0	0	0	0	1	2	391
19	35	26	21	43	10	117	48	1	12	17	36	1	91	1	119	87	7	39	13	3	85	10	0	0	0	0	2	0	4	9	837
20	3	19	2	25	2	52	16	0	0	4	0	0	11	0	3	12	13	0	12	0	4	8	1	0	0	0	0	0	0	0	187
21	141	224	56	168	46	112	56	0	8	5	0	2	69	0	0	6	2	0	0	0	86	156	13	2	0	0	0	0	0	3	1155
22	21	23	13	44	4	82	6	0	0	2	1	0	15	0	0	2	0	1	0	0	99	24	12	1	0	0	0	0	0	2	352
23	36	60	36	129	11	140	35	0	1	3	0	2	14	0	0	2	3	0	3	0	41	270	65	23	0	0	0	0	0	3	877
24	44	106	29	168	17	546	68	0	1	6	3	0	37	0	5	4	4	0	18	1	217	187	1117	20	0	0	3	0	7	29	2637
25	22	21	7	24	10	38	4	0	2	1	2	1	7	1	1	0	0	0	0	0	119	32	3	0	0	0	1	0	0	7	303
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	610	1104	451	1078	258	2744	703	30	154	194	361	73	999	81	193	297	198	227	264	16	1339	778	1336	50	0	0	14	0	18	69	####

Origin and Destination Trips from Original data

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	95	220	152	16	244	749	245	566	84	743	426	340	1065	1038	0	401	497	391	831	193	1158	351	882	2632	299	0	0	0	0	0	####
Des	579	1034	394	1035	257	2909	675	26	125	165	355	93	929	86	204	288	162	278	295	20	1352	796	1403	52	0	0	12	0	14	80	####

(h) Mode Trips [Defference between Table (a) and (g)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	11	5	1	0	0	3	1	0	0	0	0	0	2	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	12
2	7	9	17	9	3	1	6	0	1	0	1	4	2	1	0	0	0	0	2	0	3	2	3	0	0	0	0	0	0	0	1
3	4	10	8	8	1	4	7	0	0	0	2	8	3	1	0	0	0	5	2	0	11	4	7	0	0	0	0	0	0	0	3
4	2	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	2
5	3	11	5	5	3	4	0	0	0	1	4	0	12	0	0	0	0	1	0	0	38	4	0	0	0	0	0	0	0	2	3
6	1	17	10	0	1	4	2	0	1	3	5	35	5	26	0	1	0	37	54	3	20	4	33	1	0	0	0	0	0	0	5
7	9	11	6	8	2	2	4	0	2	0	0	3	5	2	2	4	0	3	8	0	22	1	7	0	0	0	0	0	0	0	3
8	7	7	11	36	7	14	11	7	2	1	25	5	9	1	0	0	1	3	3	1	40	0	1	2	0	0	3	0	3	1	3
9	1	0	2	0	2	0	3	0	1	2	0	0	6	1	2	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2
10	11	13	22	12	1	25	17	0	20	14	54	1	27	1	4	15	4	1	1	0	2	4	2	1	0	0	1	0	1	1	1
11	3	9	0	1	4	16	17	3	1	13	85	1	4	0	2	3	2	4	2	1	11	4	6	0	0	0	0	0	1	3	4
12	1	1	3	2	1	25	6	0	1	1	18	1	1	0	3	8	3	5	1	0	8	2	2	0	0	0	0	0	0	0	7
13	4	19	17	15	27	28	6	1	7	1	12	7	92	7	3	3	3	22	26	1	33	6	9	0	0	0	1	0	0	4	4
14	21	17	4	19	3	5	9	0	33	8	7	4	39	1	1	7	0	3	2	1	11	9	5	0	0	0	1	0	1	2	1
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	1	1	2	3	0	9	10	1	3	1	3	1	11	0	16	16	23	3	7	2	2	1	1	0	0	0	1	0	0	0	0
17	3	7	1	7	2	3	20	0	7	7	8	6	1	3	2	18	6	4	5	1	3	6	0	1	0	0	1	0	1	1	4
18	2	2	1	6	0	23	6	1	9	3	6	9	9	0	3	18	9	8	8	1	11	5	2	0	0	0	1	0	0	1	0
19	10	24	2	21	3	24	4	0	1	3	20	3	15	1	19	5	23	27	3	3	29	4	5	4	0	0	0	0	4	1	6
20	3	7	4	7	1	5	4	0	4	3	6	0	2	0	11	7	10	6	2	2	6	4	1	1	0	0	2	0	0	2	6
21	28	64	6	1	15	4	19	1	3	0	6	1	10	1	2	1	1	1	0	0	33	50	59	2	0	0	0	0	0	0	4
22	6	0	8	11	0	4	1	0	1	1	1	0	7	0	0	2	0	1	0	0	15	9	14	1	0	0	0	0	0	2	4
23	1	11	6	18	4	4	6	0	1	2	5	1	2	0	1	0	3	0	1	0	71	84	54	2	0	0	0	0	1	5	5
24	16	16	10	24	1	22	16	2	5	2	5	1	33	0	1	2	2	4	7	1	82	14	112	5	0	0	0	0	1	5	9
25	2	14	4	15	1	10	6	0	0	1	1	1	5	1	2	0	2	0	1	0	36	2	5	1	0	0	0	0	0	3	1
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	3	18	32	28	18	34	25	1	11	37	6	0	76	15	34	3	24	6	17	5	8	8	31	3	0	0	1	0	7	15	24

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	95	220	152	16	244	749	245	566	84	743	426	340	1065	1038	0	401	497	391	831	193	1158	351	882	2632	299	0	0	0	0	0	####
Des	579	1034	394	1035	257	2909	675	26	125	165	355	93	929	86	204	288	162	278	295	20	1352	796	1403	52	0	0	12	0	14	80	####

Table 7-9 (1) T-model 2 Simulation Results : Trip Table of "Vehicle equivalent" Trips

(a) Vehicle Eq. Trips for Mode [All : (1) ~ (5)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	11	22	3	22	1	8	4	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	0	0	0	77
2	34	61	17	29	6	16	10	0	0	0	0	0	0	0	0	0	1	0	0	0	9	1	2	0	0	0	0	0	0	0	186
3	10	45	20	25	1	8	5	0	0	0	2	0	1	0	0	0	0	2	4	0	3	1	2	0	0	0	0	0	0	1	130
4	4	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	0	0	0	0	0	0	0	2	15
5	25	77	8	23	12	68	14	5	3	1	0	0	60	0	2	0	0	0	0	0	75	5	1	0	0	0	0	0	0	2	381
6	10	49	13	14	11	117	31	0	5	2	51	10	7	103	2	2	0	116	229	19	33	21	88	0	0	0	1	0	0	1	935
7	8	60	27	23	4	67	9	0	0	5	8	1	8	2	1	1	0	7	10	0	40	6	6	1	0	0	0	0	0	2	296
8	51	168	56	158	21	331	76	45	4	4	16	5	15	1	5	4	2	1	2	1	62	40	6	1	0	0	3	0	0	5	1083
9	2	9	0	6	0	32	6	0	1	14	2	0	18	0	1	1	0	0	0	1	14	1	0	0	0	0	0	0	0	0	108
10	18	35	14	28	14	194	91	0	43	70	51	1	59	0	7	21	2	0	1	0	92	8	1	0	0	0	0	0	1	2	753
11	6	18	4	15	3	101	47	5	4	24	14	3	15	0	1	9	1	0	0	0	28	5	0	2	0	0	0	0	0	1	306
12	10	30	10	27	5	178	73	2	4	3	12	1	9	0	4	4	3	0	1	0	37	6	2	0	0	0	1	0	0	3	425
13	33	81	22	44	120	237	42	1	10	5	2	1	144	4	9	8	3	2	5	1	207	15	10	0	0	0	1	0	0	3	1010
14	45	112	29	71	58	484	68	0	52	21	9	3	286	0	26	29	9	1	4	2	209	33	9	0	0	0	3	0	2	7	1572
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	18	30	8	33	11	88	33	0	13	11	7	2	16	1	53	28	44	1	8	1	23	6	2	1	0	0	2	0	0	3	443
17	16	48	14	40	12	166	56	0	10	12	6	3	14	2	29	81	51	9	11	4	36	12	1	1	0	0	3	0	1	5	643
18	12	35	12	36	10	207	36	0	6	7	5	8	16	1	18	38	64	3	15	3	41	11	3	1	0	0	3	0	2	5	598
19	28	54	20	62	17	218	56	1	14	13	8	5	74	3	149	117	32	2	16	8	99	14	4	1	0	0	6	0	2	9	1032
20	8	12	4	16	6	73	10	1	3	1	2	1	10	0	20	2	6	1	8	0	14	7	0	0	0	0	2	0	0	5	212
21	228	224	52	188	58	158	50	0	8	6	4	1	82	1	7	4	5	0	0	2	120	323	33	4	0	0	1	0	0	7	1566
22	13	21	3	27	5	87	7	0	1	0	1	0	2	0	1	0	0	0	0	0	192	34	11	0	0	0	0	0	1	1	407
23	42	54	26	113	11	155	32	1	1	2	0	2	14	1	4	0	1	0	2	0	190	199	62	22	0	0	0	0	2	10	946
24	73	113	36	175	23	663	62	4	7	5	4	4	50	0	13	3	5	1	9	3	428	195	298	19	0	0	1	0	14	58	2266
25	36	54	13	64	16	58	19	0	5	2	1	0	14	2	4	2	3	0	0	1	192	56	10	1	0	0	0	0	0	6	559
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	741	1414	412	1239	425	3715	837	65	194	208	205	51	914	121	356	354	232	146	325	47	2150	1003	551	54	0	0	27	0	25	138	####

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	76	189	129	13	379	934	302	1081	109	750	311	421	1012	1568	0	444	641	598	1035	211	1565	408	944	2269	558	0	0	0	0	0	####
Des	725	1364	403	1202	417	3890	816	47	183	158	182	56	905	144	333	358	200	165	387	40	2172	1024	539	58	0	0	25	0	26	128	####

(b) Vehicle Eq. Trips for Mode [1 : Private Automobiles], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	7	7	0	6	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	24
2	3	4	2	5	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
3	0	7	1	10	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
4	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	5
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	54	1	0	0	0	0	0	0	59
7	2	15	12	13	0	23	0	0	0	3	0	0	2	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	72
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	3	0	2	0	3	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	13
10	28	39	26	35	5	128	64	0	0	27	0	0	48	0	0	11	6	0	3	0	7	7	2	0	0	0	0	0	0	0	436
11	1	5	1	8	0	36	9	0	0	5	0	0	3	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	71
12	7	17	6	20	4	69	27	0	0	5	0	0	3	0	0	4	3	0	0	0	4	5	0	0	0	0	0	0	0	0	174
13	37	47	28	49	18	111	23	0	0	2	0	0	75	0	0	9	3	0	2	0	14	10	3	2	0	0	0	0	0	2	435
14	20	6	11	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	1	5	3	0	0	0	0	0	0	0	174
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	7	20	6	26	4	32	16	0	0	6	0	0	15	0	0	44	59	0	0	0	6	3	0	1	0	0	0	0	0	3	248
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	3	17	2	25	1	45	15	0	0	4	0	0	11	0	0	12	13	0	12	0	4	8	1	0	0	0	0	0	0	0	173
21	77	96	28	131	14	68	22	0	0	2	0	0	20	0	0	5	0	0	0	0	11	62	5	2	0	0	0	0	0	3	546
22	17	16	5	30	3	24	4	0	0	0	0	0	4	0	0	1	0	0	0	0	18	22	12	1	0	0	0	0	0	1	158
23	33	46	27	117	7	132	27	0	0	3	0	0	14	0	0	2	2	0	3	0	24	247	54	23	0	0	0	0	0	3	764
24	24	86	21	141	8	462	58	0	0	4	0	0	19	0	0	4	4	0	18	0	31	144	20	17	0	0	0	0	0	10	1071
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	266	433	176	618	64	1140	269	0	0	62	0	0	343	0	0	95	92	0	39	0	123	516	154	47	0	0	0	0	0	22	4459

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	19	16	21	3	0	61	72	0	13	436	73	173	432	175	0	247	0	0	0	175	545	158	767	1069	0	0	0	0	0	0	4457
Des	251	428	171	601	59	1207	268	0	0	59	0	0	313	0	0	94	95	0	47	0	122	529	145	47	0	0	0	0	0	20	4457

Table 7-9 (2) T-model 2 Simulation Results : Trip Table of "Vehicle equivalent" Trips

(a) Vehicle Eq. Trips for Mode [2 : Transit 1(Collectibos)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4
2	6	36	18	7	3	7	5	0	1	0	0	1	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	88
3	0	4	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	4	10	2	2	1	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0	0	0	33
6	0	1	0	2	0	8	0	0	0	0	0	0	0	80	0	0	0	116	0	0	0	0	52	0	0	0	0	0	0	0	259
7	0	10	5	2	0	18	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	42
8	4	35	22	18	5	17	26	0	2	2	0	4	0	0	0	0	1	0	0	0	11	6	1	0	0	0	0	0	0	0	154
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	2	0	1	0	5	3	0	7	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	20
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	2	4	4	1	71	6	0	0	2	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	92
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	5	84	15	14	11	135	47	0	60	5	0	5	0	0	0	0	2	0	0	0	17	5	2	0	0	0	0	0	0	1	408
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	5	45	10	16	5	81	62	0	15	4	0	8	0	0	0	0	46	0	0	0	8	4	2	0	0	0	0	0	0	2	313
18	5	28	16	24	6	180	42	0	14	4	0	17	15	0	0	0	70	0	0	0	30	6	3	0	0	0	0	0	0	2	462
19	0	1	0	0	0	0	5	0	0	0	0	0	19	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	40
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	70	154	34	48	16	52	44	0	11	3	0	4	54	0	0	0	2	0	0	0	59	52	10	0	0	0	0	0	0	0	613
22	0	0	1	1	0	11	0	0	0	0	0	0	1	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	27
23	7	17	14	19	4	11	12	0	5	0	0	0	0	0	0	0	0	0	0	0	21	28	17	0	0	0	0	0	0	0	155
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	1	7	3	3	1	5	2	0	1	0	0	1	0	0	0	0	0	0	0	0	6	4	2	0	0	0	0	0	0	0	36
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	107	436	147	163	53	608	263	0	116	20	0	41	89	80	0	0	121	116	0	0	191	107	90	0	0	0	0	0	0	6	2754

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	3	89	10	0	31	261	42	154	0	20	0	93	0	410	0	0	311	462	41	0	614	26	154	0	36	0	0	0	0	0	2758
Des	90	420	118	162	43	714	248	0	103	21	0	36	86	103	0	0	103	145	0	0	171	91	100	0	0	0	0	0	0	4	2758

(d) Vehicle Eq. Trips for Mode [3 : Transit2 (Combis)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	3	10	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	21
3	4	29	8	9	1	5	2	0	0	0	0	0	2	0	0	0	0	0	2	1	4	0	1	0	0	0	0	0	0	0	68
4	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	7
5	10	30	0	9	10	49	3	0	0	0	0	0	16	0	1	0	0	0	0	0	48	5	0	0	0	0	0	0	0	0	181
6	7	24	4	6	9	59	10	0	1	3	13	0	3	32	1	0	0	0	59	14	27	3	0	0	0	0	0	0	0	0	275
7	5	18	0	6	3	14	2	0	0	3	3	0	0	1	0	0	0	0	2	1	20	1	0	0	0	0	0	0	0	0	79
8	59	128	27	94	24	319	27	51	6	3	2	4	8	0	10	0	0	0	0	0	110	37	8	0	0	0	1	0	4	10	932
9	0	5	1	2	4	18	1	0	1	13	0	0	6	1	0	0	0	0	0	1	13	1	0	0	0	0	0	0	0	1	68
10	0	4	0	2	8	20	6	0	4	23	0	0	6	0	1	3	0	0	0	1	28	0	0	0	0	0	0	0	0	0	106
11	1	2	3	4	4	29	10	0	0	18	1	0	4	0	1	3	0	0	0	0	21	1	0	0	0	0	0	0	0	0	102
12	3	3	1	3	2	20	5	2	1	1	0	0	1	0	0	0	0	0	0	1	18	1	0	0	0	0	0	0	0	0	62
13	2	6	11	3	71	90	7	0	1	1	0	0	14	1	1	3	0	0	0	0	65	3	0	0	0	0	0	0	0	1	280
14	19	27	8	19	33	263	9	0	28	9	2	2	61	4	12	6	0	0	0	3	126	16	1	0	0	0	1	0	2	6	657
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	9	11	3	10	5	50	8	0	11	2	0	2	5	0	37	0	7	0	0	1	12	7	1	0	0	0	2	0	0	1	184
17	6	5	1	7	4	44	4	0	0	2	3	0	2	1	7	11	5	0	0	1	18	6	0	0	0	0	1	0	0	2	130
18	2	5	1	2	2	26	2	0	2	1	0	1	3	1	4	1	9	0	0	2	16	1	0	0	0	0	1	0	0	3	85
19	15	20	6	19	12	166	13	0	10	7	1	0	20	3	104	24	5	0	0	10	76	10	1	0	0	0	8	0	5	9	544
20	1	0	0	0	0	21	0	0	0	1	0	0	0	0	1	0	1	0	0	0	7	0	0	0	0	0	1	0	1	0	34
21	25	64	6	11	42	19	5	3	0	1	1	0	26	0	1	2	1	0	0	0	78	118	1	2	0	0	1	0	0	0	407
22	0	2	0	0	0	10	1	1	0	0	0	0	1	0	0	0	0	0	0	0	91	1	2	0	0	0	0	0	1	0	110
23	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	8	12	0	0	0	0	0	0	0	0	23
24	42	39	12	59	19	175	8	1	7	2	0	2	16	1	6	0	1	0	0	0	380	85	68	10	0	0	1	0	9	43	986
25	31	26	5	35	18	51	9	1	2	4	0	0	7	1	5	0	0	0	0	0	199	62	5	1	0	0	2	0	0	7	471
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	248	459	98	303	272	1451	133	59	74	94	26	11	201	46	192	53	29	0	63	36	1369	370	88	13	0	0	19	0	22	83	5812

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	0	23	69	5	183	274	81	926	67	109	99	62	280	656	0	185	126	85	545	36	406	111	23	986	475	0	0	0	0	0	5813
Des	252	444	91	300	267	1503	137	45	79	65	24	11	206	53	199	52	14	0	72	39	1377	374	69	10	0	0	24	0	24	82	5813

Table 7-9 (3) T-model 2 Simulation Results : Trip Table of "Vehicle equivalent" Trips

(a) Vehicle Eq. Trips for Mode [4 : Walking], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	4	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
2	2	4	7	1	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	18
3	1	5	2	4	0	0	0	0	0	0	1	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	17
4	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	23	0	0	0	0	0	3	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	28
7	0	2	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
10	0	0	2	1	0	0	2	0	2	5	7	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23
11	0	0	0	1	0	0	4	0	1	3	33	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	46
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	2	1	3	3	0	1	2	0	1	1	3	2	30	0	0	0	0	6	0	0	1	0	2	0	0	0	0	0	0	0	58
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	2	1	0	0	1	0	0	2	2	0	3	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	13
17	0	1	0	0	0	0	0	0	0	1	4	0	1	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	15
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	2	2	2	3	0	0	3	2	0	2	9	0	8	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	41
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	1	1	1	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	212	0	0	0	0	0	0	0	213
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	12	18	21	17	0	25	12	2	4	18	59	10	54	0	0	0	0	28	0	0	2	0	214	0	0	0	0	0	0	0	496

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	7	20	16	2	0	25	5	0	3	22	46	0	60	0	0	12	15	0	41	0	0	7	0	214	0	0	0	0	0	0	495
Des	9	11	19	16	0	27	10	1	4	12	50	13	51	0	0	0	0	38	0	0	10	0	226	0	0	0	0	0	0	0	495

(f) Vehicle Eq. Trips for Mode [5 : Others (Mototaxis)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	14	8	0	10	0	11	1	0	0	0	0	0	2	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	52
2	10	7	0	3	1	11	4	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	39
3	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5	13	13	0	11	4	21	8	0	1	0	0	0	34	0	0	3	0	0	0	0	54	1	0	0	0	0	0	0	0	1	164
6	6	8	0	3	5	20	16	0	1	0	41	0	2	0	0	0	0	0	188	0	5	18	0	0	0	0	0	0	0	0	313
7	0	0	0	7	0	11	4	0	0	0	7	0	7	0	0	4	0	0	14	0	48	3	0	0	0	0	0	0	0	0	105
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	1	1	0	0	0	10	0	0	0	0	0	0	6	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	21
10	1	3	0	3	1	35	24	0	1	0	4	0	27	0	0	19	0	0	0	0	49	0	0	0	0	0	0	0	0	1	168
11	3	3	0	1	3	32	13	0	2	0	6	0	8	0	0	4	0	0	3	0	12	2	0	0	0	0	0	0	0	1	93
12	1	3	0	2	0	37	14	0	0	0	3	0	6	0	1	2	0	0	0	0	20	0	0	0	0	0	0	0	0	0	89
13	7	2	0	8	4	19	12	0	0	0	1	0	65	0	2	9	0	0	1	0	110	0	0	0	0	0	0	0	0	2	242
14	18	13	0	16	12	64	22	0	4	0	9	0	65	0	11	20	0	0	4	0	64	1	0	0	0	0	0	0	0	4	327
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	9	8	0	12	5	31	18	0	0	0	13	0	4	0	13	47	0	0	12	0	11	0	0	0	0	0	0	0	0	4	187
18	5	3	0	5	0	10	7	0	0	0	3	0	2	0	5	2	0	0	5	0	3	1	0	0	0	0	0	0	0	2	53
19	17	12	0	19	7	46	28	0	2	0	11	0	25	0	82	92	0	0	15	0	43	2	0	0	0	0	0	0	0	6	407
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	3	0	0	3	1	60	3	0	0	0	1	0	6	0	0	1	0	0	0	0	31	0	0	0	0	0	0	0	0	0	109
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	4	4	0	7	2	5	4	0	0	0	1	0	2	0	1	0	0	0	0	0	13	1	0	0	0	0	0	0	1	0	45
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	113	88	12	110	45	423	178	0	11	0	100	0	262	0	116	203	0	0	242	0	473	29	0	0	0	0	0	0	1	21	2427

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	46	40	13	3	165	313	102	0	25	163	92	93	240	328	0	0	189	51	408	0	0	106	0	0	47	0	0	0	0	0	2425
Des	117	92	14	121	43	449	171	0	9	0	101	0	238	0	122	200	0	0	253	0	451	23	0	0	0	0	0	0	1	18	2425

Table 7-9 (4) T-model 2 Simulation Results : Trip Table of "Vehicle equivalent" Trips

(g) Vehicle Eq. Trips for Mode [All : Sum of Table (b) ~ (f)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	25	16	1	18	0	13	3	0	0	1	0	0	2	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	88
2	24	61	27	19	4	22	11	0	1	0	0	3	1	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	182
3	5	45	26	24	1	7	2	0	0	0	1	3	2	0	0	0	0	1	2	1	4	0	1	0	0	0	0	0	0	0	125
4	5	4	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	16
5	27	53	2	22	15	76	14	0	1	0	0	0	50	0	1	3	0	0	0	0	106	7	0	0	0	0	0	0	0	1	378
6	13	33	4	11	14	113	26	0	2	3	54	3	5	112	1	0	0	118	247	14	33	21	106	1	0	0	0	0	0	0	934
7	7	45	17	28	3	66	11	0	0	7	10	0	10	1	0	5	1	0	16	1	69	4	0	0	0	0	0	0	0	1	302
8	63	163	49	112	29	336	53	51	8	5	2	8	8	0	10	0	1	0	0	0	121	43	9	0	0	0	1	0	4	10	1086
9	1	9	1	4	4	31	2	0	1	16	0	0	14	1	1	1	0	0	0	1	15	2	0	0	0	0	0	0	0	1	105
10	29	48	28	42	14	188	99	0	14	55	11	1	85	0	1	33	6	0	3	1	84	7	3	0	0	0	0	0	0	1	753
11	5	10	4	14	7	97	36	0	3	26	40	0	18	0	1	8	1	1	4	0	33	3	0	0	0	0	0	0	0	1	312
12	11	25	11	29	7	197	52	2	1	8	3	0	10	0	1	6	3	0	0	1	43	7	0	0	0	0	0	0	0	0	417
13	48	56	42	63	93	221	44	0	2	4	4	2	184	1	3	21	3	6	3	0	190	13	5	2	0	0	0	0	0	5	1015
14	62	130	34	49	56	462	78	0	92	14	11	7	254	4	23	26	2	0	4	3	208	27	6	0	0	0	1	0	2	11	1566
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	16	31	11	37	9	82	25	0	11	10	2	2	23	0	37	44	66	2	0	1	18	10	1	1	0	0	2	0	0	4	445
17	20	59	11	35	14	156	84	0	15	7	20	8	7	1	20	58	51	8	12	1	37	10	2	0	0	0	1	0	0	8	645
18	12	36	17	31	8	216	51	0	16	5	3	18	20	1	9	3	79	0	5	2	49	8	3	0	0	0	1	0	0	7	600
19	34	35	8	41	19	212	49	2	12	9	21	0	72	3	186	116	5	8	15	10	134	12	1	0	0	0	8	0	5	15	1032
20	4	17	2	25	1	66	15	0	0	5	0	0	11	0	1	12	14	0	12	0	11	8	1	0	0	0	1	0	1	0	207
21	172	314	68	190	72	139	71	3	11	6	1	4	100	0	1	7	3	0	0	0	148	232	16	4	0	0	1	0	0	3	1566
22	21	19	7	36	4	105	8	1	0	0	1	0	13	0	0	2	0	0	0	0	153	23	14	1	0	0	0	0	1	1	410
23	40	63	42	136	12	143	40	0	5	3	0	0	14	0	0	2	2	0	3	0	53	287	71	23	0	0	0	0	0	3	942
24	66	125	33	200	27	637	66	1	7	6	0	2	36	1	6	4	5	0	18	0	411	229	300	27	0	0	1	0	9	53	2270
25	36	37	8	45	21	61	15	1	3	4	1	1	9	1	6	0	0	0	0	0	218	67	7	1	0	0	2	0	1	7	552
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	746	1434	454	1211	434	3647	855	61	205	194	185	62	949	126	308	351	242	144	344	36	2158	1022	546	60	0	0	19	0	23	132	####

Origin and Destination Trips from Original data

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	76	189	129	13	379	934	302	1081	109	750	311	421	1012	1568	0	444	641	598	1035	211	1565	408	944	2269	558	0	0	0	0	0	####
Des	725	1364	403	1202	417	3890	816	47	183	158	182	56	905	144	333	358	200	165	387	40	2172	1024	539	58	0	0	25	0	26	128	####

(h) Vehicle Eq. Trips [Defference between Table (a) and (g)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

O\D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
1	14	6	2	4	1	5	1	0	0	1	0	0	2	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0	0	0	11
2	10	0	10	10	2	6	1	0	1	0	0	3	1	0	0	0	1	0	0	0	0	1	2	0	0	0	0	0	0	0	4
3	5	0	6	1	0	1	3	0	0	0	1	3	1	0	0	0	0	1	2	1	1	1	1	0	0	0	0	0	0	1	5
4	1	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	2	1
5	2	24	6	1	3	8	0	5	2	1	0	0	10	0	1	3	0	0	0	0	31	2	1	0	0	0	0	0	0	1	3
6	3	16	9	3	3	4	5	0	3	1	3	7	2	9	1	2	0	2	18	5	0	0	18	1	0	0	1	0	0	1	1
7	1	15	10	5	1	1	2	0	0	2	2	1	2	1	1	4	1	7	6	1	29	2	6	1	0	0	0	0	0	1	6
8	12	5	7	46	8	5	23	6	4	1	14	3	7	1	5	4	1	1	2	1	59	3	3	1	0	0	2	0	4	5	3
9	1	0	1	2	4	1	4	0	0	2	2	0	4	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	3
10	11	13	14	14	0	6	8	0	29	15	40	0	26	0	6	12	4	0	2	1	8	1	2	0	0	0	0	0	1	1	0
11	1	8	0	1	4	4	11	5	1	2	26	3	3	0	0	1	0	1	4	0	5	2	0	2	0	0	0	0	0	0	6
12	1	5	1	2	2	19	21	0	3	5	9	1	1	0	3	2	0	0	1	1	6	1	2	0	0	0	1	0	0	3	8
13	15	25	20	19	27	16	2	1	8	1	2	1	40	3	6	13	0	4	2	1	17	2	5	2	0	0	1	0	0	2	5
14	17	18	5	22	2	22	10	0	40	7	2	4	32	4	3	3	7	1	0	1	1	6	3	0	0	0	2	0	0	4	6
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	2	1	3	4	2	6	8	0	2	1	5	0	7	1	16	16	22	1	8	0	5	4	1	0	0	0	0	0	0	1	2
17	4	11	3	5	2	10	28	0	5	5	14	5	7	1	9	23	0	1	1	3	1	2	1	1	0	0	2	0	1	3	2
18	0	1	5	5	2	9	15	0	10	2	2	10	4	0	9	35	15	3	10	1	8	3	0	1	0	0	2	0	2	2	2
19	6	19	12	21	2	6	7	1	2	4	13	5	2	0	37	1	27	6	1	2	35	2	3	1	0	0	2	0	3	6	0
20	4	5	2	9	5	7	5	1	3	4	2	1	1	0	19	10	8	1	4	0	3	1	1	0	0	0	1	0	1	5	5
21	56	90	16	2	14	19	21	3	3	0	3	3	18	1	6	3	2	0	0	2	28	91	17	0	0	0	0	0	0	4	0
22	8	2	4	9	1	18	1	1	1	0	0	0	11	0	1	2	0	0	0	0	39	11	3	1	0	0	0	0	0	0	3
23	2	9	16	23	1	12	8	1	4	1	0	2	0	1	4	2	1	0	1	0	137	88	9	1	0	0	0	0	2	7	4
24	7	12	3	25	4	26	4	3	0	1	4	2	14	1	7	1	0	1	9	3	17	34	2	8	0	0	0	0	5	5	4
25	0	17	5	19	5	3	4	1	2	2	0	1	5	1	2	2	3	0	0	1	26	11	3	0	0	0	2	0	1	1	7
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tota	5	20	42	28	9	68	18	4	11	14	20	11	35	5	48	3	10	2	19	11	8	19	5	6	0	0	8	0	2	6	1

Origin and Destination Trips from Original data (Normarized)

Zon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total
Orig	76	189	129	13	379	934	302	1081	109	750	311	421	1012	1568	0	444	641	598	1035	211	1565	408	944	2269	558	0	0	0	0	0	####
Des	725	1364	403	1202	417	3890	816	47	183	158	182	56	905	144	333	358	200	165	387	40	2172	1024	539	58	0	0	25	0	26	128	####

large in comparison with the maximum individual "zone to zone" "mode" trips of 1,005 trips. The maximum difference between the totals of "mode" ODs is 76 attracted trips to zone 13 while the total estimated "mode" trips are 13,619. The maximum difference of individual "zone to zone" trips for "vehicle equivalent" trips, which is 137 trips from zone 24 to 21, is also large in comparison with the maximum "zone to zone" "vehicle equivalent" trips of 1,117 trips. The maximum difference between the totals of "vehicle equivalent" ODs is 68 attracted trips to zone 6 while the total estimated "vehicle equivalent" trips are 15,948. From these facts, it is obvious that there are quite a number of differences in the trip tables between "using a total trip table" and "summing up multiple mode specific trip tables".

Then, the differences between trip types are compared. From Table (h) of Tables 7-7, 7-8 and 7-9, the noticeable differences of individual "zone to zone" trips are observed at the almost common "zone to zone" trip location between the Tables although the absolute values are different because of the trip type differences. Those noticeable zones are zones 1, 2, 3, 4, 6, 7, 9, 10, 13, 15, 21, 22 and 23. Those zones are either activity centers where trips ends or well populated zones from which trips are generated.

In this way, the differences are similarly found in either trip type, and it is considered that the results of applying "person" trips, "mode" trips or "vehicle equivalent" trips commonly have noticeable differences at similar individual "zone to zone" trips between the results of Options (1) and (3), Options (4) and (6), and Options (7) and (9) respectively. The differences of the totals of ODs for each traffic analysis zone, on the other hand, are small for all of those trip types.

7.3.3.3 Travel Time Matrix

Travel time matrix is one of the two outcomes of the assignment. Tables 7-10, 7-11 and 7-12 show the results of "person" trips, "mode" trips and "vehicle equivalent" trips respectively. In each Table 7-10, 7-11 or 7-12, Tables (a) and (g) show the travel time matrixes of "using a total OD table", which are the outcomes of Options 1, 4 or 7 respectively. Tables (b) to (f)

Table 7-10 (1) T-model 2 Simulation Results : Travel Time of "Person" Trips

(a) Person Trips for Mode [All : (1) ~ (5)], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	1.2	1.2	1.8	3.7	4.0	31.0	3.4	5.1	7.4	5.8	6.0	6.5	9.5	10.7	10.9	8.3	8.5	9.6	10.4	12.9	25.7	9.3	9.7	13.3	12.4	19.2	21.5	104.0	19.1	19.2
2	1.1	1.1	1.1	4.2	2.7	29.8	2.7	4.4	6.7	5.1	5.3	5.8	8.3	9.5	10.2	7.6	7.8	8.9	9.7	12.2	26.8	10.3	10.2	13.7	13.5	18.5	20.8	102.7	20.3	18.5
3	2.8	1.7	2.4	3.1	4.3	31.3	2.5	3.4	6.5	4.9	5.1	5.4	9.8	10.2	9.9	7.4	7.6	8.4	9.5	11.9	28.4	9.3	9.1	12.6	15.2	18.0	20.6	103.5	21.9	18.0
4	1.1	2.3	1.6	3.3	5.0	32.1	3.2	4.9	7.3	5.7	5.8	6.4	10.6	11.0	10.7	8.2	8.3	9.4	10.3	12.7	26.8	9.7	9.6	13.1	13.5	19.0	21.4	104.2	20.2	19.0
5	7.7	6.6	7.1	10.2	20.8	31.3	5.9	9.7	4.9	6.3	7.7	9.0	5.5	6.7	9.2	7.3	8.5	10.1	10.4	12.8	31.8	15.4	16.2	19.8	18.6	21.7	19.9	100.0	25.3	21.7
6	7.4	6.3	6.8	9.9	4.1	3.4	2.7	6.8	4.3	4.3	5.2	5.8	6.7	6.1	8.7	6.8	7.7	8.8	9.7	12.1	32.2	15.7	15.9	16.5	18.9	18.4	19.3	99.4	25.6	18.4
7	8.7	7.5	6.3	9.4	8.9	32.0	18.1	4.1	4.0	2.5	2.6	3.2	13.4	7.8	7.5	5.0	5.1	6.2	7.1	9.5	34.2	15.0	14.8	13.9	20.9	15.8	18.2	101.0	27.6	15.8
8	12.2	11.1	9.4	12.2	12.8	39.5	7.5	9.2	10.9	9.3	8.0	7.4	18.3	14.4	13.4	10.8	10.5	10.4	13.0	14.0	34.9	15.7	15.5	18.2	21.6	20.0	24.1	107.6	28.3	20.0
9	15.0	13.9	12.2	15.3	9.9	34.0	6.6	9.0	5.2	1.4	2.8	5.6	9.4	3.7	5.9	4.0	5.2	6.8	7.1	9.5	39.0	19.8	19.7	16.4	25.7	18.3	16.6	97.0	32.5	18.3
10	13.7	12.5	10.9	14.0	11.5	34.0	5.2	7.6	1.6	1.5	1.4	4.3	11.0	5.3	6.0	3.7	3.9	5.5	5.8	8.2	37.7	18.5	18.3	15.0	24.4	16.9	16.6	98.6	31.1	16.9
11	12.2	11.1	9.4	12.5	12.8	34.3	4.3	6.2	2.9	1.3	2.1	2.8	12.3	6.6	6.2	3.6	3.8	4.0	5.7	7.6	36.2	17.0	16.8	13.6	22.9	15.5	16.8	99.9	29.7	15.4
12	14.7	13.5	11.9	15.0	15.2	37.8	7.6	8.0	8.1	6.5	5.2	11.2	17.2	11.5	10.6	7.9	6.1	4.3	9.4	9.6	38.0	18.8	18.6	10.8	24.7	12.6	21.2	104.8	31.4	12.6
13	16.4	15.2	15.8	18.8	8.6	38.2	12.7	16.4	7.4	8.7	10.2	13.0	11.1	9.2	11.7	9.8	11.0	12.6	12.9	15.3	40.5	24.0	24.8	23.7	27.2	25.6	22.4	102.5	33.9	25.6
14	326.1	325.0	323.3	326.4	319.1	327.7	317.7	320.1	311.1	312.5	313.9	316.7	318.6	317.0	315.4	313.5	314.7	316.3	316.6	319.0	327.7	327.7	327.7	327.5	327.7	327.7	326.1	93.3	327.7	327.7
15	20.7	19.6	18.0	21.0	16.9	41.4	12.8	14.4	8.9	8.8	8.5	9.5	16.4	10.8	7.2	3.7	5.2	5.7	3.2	5.6	44.4	25.2	25.0	20.2	31.1	22.1	12.7	104.0	37.9	22.1
16	18.6	17.5	15.8	18.9	14.8	39.3	10.7	12.3	6.8	6.6	6.4	7.0	14.3	8.6	3.5	2.6	1.6	3.3	3.6	6.0	42.3	23.1	22.9	17.8	29.0	19.7	14.2	101.9	35.7	19.7
17	18.1	17.0	15.3	18.4	16.6	40.7	10.7	11.4	8.6	7.8	6.5	5.4	16.1	10.4	5.3	1.8	1.7	1.7	3.9	5.3	41.4	22.2	22.0	16.2	28.1	18.1	16.0	103.7	34.8	18.1
18	17.3	16.2	14.5	17.6	17.8	40.5	10.2	10.6	9.5	7.9	6.6	3.8	17.3	11.7	6.7	3.6	1.8	3.5	5.1	5.3	40.6	21.4	21.2	14.5	27.3	16.4	17.4	104.9	34.0	16.4
19	26.3	25.1	23.5	26.6	23.9	48.4	18.9	19.6	15.9	15.7	14.6	13.6	23.4	17.7	9.0	10.0	9.9	9.9	8.0	6.0	49.6	30.4	30.2	24.4	36.3	26.2	16.1	111.0	43.0	26.2
20	21.6	20.5	18.8	21.9	21.3	44.3	14.3	14.9	12.9	11.3	10.0	9.0	20.8	15.1	6.4	6.8	5.3	5.2	4.9	24.9	45.0	25.8	25.6	19.7	31.7	21.6	17.1	108.4	38.4	21.6
21	11.3	11.9	12.4	13.1	12.5	40.1	14.1	13.6	16.9	16.5	16.7	16.1	18.0	19.2	21.3	19.0	19.2	19.1	21.1	22.7	14.5	6.3	9.1	12.6	6.6	28.7	32.0	112.5	13.3	28.7
22	8.8	9.4	8.8	8.4	10.0	37.6	11.0	8.9	14.4	13.3	12.0	11.4	15.6	16.8	17.4	14.8	14.5	14.4	16.9	18.0	19.2	11.0	2.9	6.4	5.9	24.0	28.0	110.0	12.6	24.0
23	14.0	14.9	13.3	12.9	17.5	44.6	15.4	13.4	19.4	17.8	16.5	15.9	23.1	22.8	21.9	19.3	19.0	18.9	21.4	22.5	27.8	8.6	6.1	3.6	14.5	28.5	32.5	116.1	21.2	28.5
24	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7
25	13.9	14.5	15.1	15.7	15.1	42.7	16.7	16.2	19.5	19.1	19.3	18.7	20.7	21.8	23.9	21.6	21.8	21.7	23.7	25.3	20.9	8.9	11.7	15.2	23.3	31.3	34.6	115.1	6.7	31.3
26	58.3	57.2	55.6	58.6	58.9	81.5	51.3	51.7	51.8	50.2	48.8	43.7	60.9	55.2	54.2	51.6	49.8	48.0	53.1	53.3	81.7	62.5	62.3	11.5	68.4	66.6	64.9	148.5	75.1	1.2
27	31.6	30.5	28.9	31.9	27.8	52.3	23.7	25.3	19.8	19.7	19.4	20.4	27.3	21.7	12.9	14.6	16.1	16.6	12.5	16.2	55.3	36.1	35.9	31.1	42.0	33.0	74.0	114.9	48.8	33.0
28	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	93.3	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7
29	20.6	21.2	21.8	22.4	21.8	49.4	23.4	23.0	26.3	25.9	26.0	25.4	27.4	28.6	30.6	28.4	28.5	28.4	30.5	32.0	27.6	15.6	18.4	21.9	6.7	38.0	41.3	121.8	79.9	38.0
30	58.3	57.2	55.5	58.6	58.9	81.5	51.3	51.6	51.8	50.2	48.8	43.7	60.9	55.2	54.2	51.6	49.8	48.0	53.1	53.3	81.7	62.5	62.3	11.5	68.4	1.2	64.9	148.5	75.1	75.1

F\T : zone from \ zone to

(b) Person Trips for Mode [1 : Private Automobiles], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.5	3.6	2.4	4.2	4.5	4.4	4.6	4.7	5.7	6.4	8.0	6.7	7.0	7.7	8.8	11.2	2.4	2.5	4.8	7.7	5.1	16.2	18.8	99.7	11.8	16.2
2	0.9	0.9	0.9	1.5	1.8	2.9	1.9	3.6	3.8	3.7	4.0	4.1	5.0	5.8	7.4	6.0	6.4	7.2	8.2	10.7	3.2	3.4	5.2	8.1	5.9	16.3	18.1	99.0	12.6	16.3
3	1.6	0.9	1.0	1.0	2.4	3.3	1.7	3.0	4.3	3.7	3.8	3.9	5.6	6.2	7.7	6.0	6.2	7.0	8.0	10.5	4.0	3.6	4.4	7.4	6.7	15.8	18.5	99.4	13.4	15.8
4	0.6	1.5	1.2	2.1	3.0	3.9	2.2	3.9	4.8	4.2	4.4	4.5	6.1	6.7	8.3	6.6	6.8	7.5	8.5	11.0	3.0	3.1	4.5	7.5	5.7	15.9	19.1	100.0	12.4	15.9
5	2.5	1.8	2.4	3.0	2.7	2.4	2.9	4.7	3.7	3.9	4.6	4.7	3.2	4.9	7.2	5.9	7.0	7.7	8.3	10.7	3.7	3.9	6.2	9.1	6.4	16.9	18.0	98.2	13.1	16.9
6	2.9	2.3	2.9	3.4	2.4	2.0	1.7	5.1	2.7	2.6	3.3	3.4	4.5	4.2	6.2	4.8	5.7	6.4	7.2	9.7	4.2	4.3	6.7	9.6	6.9	15.6	17.0	97.5	13.6	15.6
7	2.8	1.9	1.7	2.3	2.9	2.8	3.2	3.6	3.1	2.1	2.2	2.3	5.8	5.6	6.1	4.4	4.6	5.3	6.4	8.8	4.6	4.8	5.7	8.6	7.4	14.5	16.9	98.9	14.1	14.5
8	4.4	3.6	3.0	3.8	4.7	5.5	3.6	5.0	6.4	5.4	4.6	3.9	7.9	8.3	8.9	7.2	7.0	7.0	9.2	10.5	6.5	5.2	6.1	9.0	9.2	16.2	19.7	101.6	15.9	16.1
9	4.5	3.9	4.5	5.1	3.7	2.9	3.2	6.5	3.8	1.1	2.3	3.7	4.1	2.5	4.7	3.3	4.6	6.1	5.7	8.2	5.8	5.9	8.3	11.2	8.5	15.9	15.5	95.8	15.2	15.9
10	4.4	3.8	3.8	4.3	3.9	2.8	2.1	5.5	1.1	1.2	1.2	2.7	5.1	3.6	4.6	3.2	3.5	5.1	5.3	7.7	5.7	5.8	7.7	10.7	8.4	14.9	15.4	96.8	15.1	14.9
11	5.0	4.0	3.8	4.4	4.5	3.5	2.2	4.6	2.3	1.2	1.5	1.8	6.4	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.3	6.5	7.5	10.4	9.0	14.0	15.9	98.1	15.7	14.0
12	5.1	4.2	4.0	4.5	4.6	3.6	2.3	3.9	3.7	2.6	1.8	4.7	7.5	6.2	6.1	4.4	4.2	3.6	6.4	7.7	6.4	6.3	7.2	9.8	9.1	12.2	16.9	99.5	15.9	12.2
13	5.7	5.1	5.7	6.3	3.3	4.2	5.4	8.0	4.1	5.2	6.4	7.0	6.2	5.4	7.7	6.3	7.6	9.1	8.7	11.2	7.0	7.1	9.5	12.4	9.7	19.2	18.5	98.6	16.4	19.2
14	6.4	5.8	6.3	6.9	5.0	4.5	5.7	8.6	2.5	3.6	4.8	6.2	5.3	5.7	6.1	4.7	6.0	7.5	7.1	9.6	7.6	7.8	10.1	13.1	10.4	18.5	16.9	93.3	17.1	18.4
15	8.0	7.4	7.8	8.4	7.2	6.5	6.1	8.9	4.7	4.6	5.1	6.1	7.6	6.1	4.4	2.8	4.1	5.4	2.8	5.3	9.3	9.5	11.8	14.7	12.0	18.4	12.6	99.3	18.7	18.3
16	6.6	6.0	6.1	6.7	5.9	5.1	4.4	7.2	3.3	3.2	3.4	4.4	6.2	4.7	2.8	2.1	1.5	3.1	3.3	5.8	7.9	8.1	10.1	13.0	10.6	16.6	13.6	97.9	17.3	16.6
17	7.4	6.5	6.3	6.9	7.0	5.9	4.6	7.0	4.6	3.5	3.6	4.2	7.5	5.9	4.1	1.5	1.6	1.6	3.5	5.2	8.7	8.9	10.3	13.2	11.4	16.5	14.9	99.2	18.2	16.5
18	8.1	7.2	7.0	7.6	7.7	6.6	5.3	7.0	6.1	5.1	3.8	3.6	9.1	7.5	5.4	3.1	1.6	3.2	4.7	5.1	9.5	9.3	10.2	13.1	12.2	15.8	16.2	100.8	18.9	15.8
19	9.1	8.3	8.1	8.6	8.3	7.5	6.4	9.2	5.7	5.3	5.4	6.4	8.7	7.1	2.8	3.3	3.5	4.7	4.7	4.7	10.3	10.5	12.0	15.0	13.0	18.6	12.5	100.4	19.8	18.6
20	11.5	10.7	10.5	11.1	10.8	10.0	8.9	10.5	8.2	7.8	7.4	7.7	11.1	9.6	5.3	5.8	5.2	5.1	4.7	8.7	12.8	12.9	13.8	16.7	15.5	20.0	16.1	102.8	22.2	20.0
21	3.4	3.9	4.4	4.1	4.5	5.6	5.4	7.1	6.5	6.4	7.1	7.2	7.7	8.4	10.0	8.6	9.5	10.2	11.0	13.5	7.9	2.3	4.7	7.6	4.9	16.1	20.8	101.7	11.6	16.1
22	2.7	3.6	3.3	3.0	4.5	5.6	4.3	6.0	6.5	6.4	6.5	6.6	7.7	8.4	10.0	8.7	8.9	9.6	10.7	13.1	2.3	2.3	2.3	5.3	4.1	13.7	20.8	101.7	10.8	13.7
23	6.1	7.0	6.4	5.8	8.1	9.1	7.5	8.1	10.1	9.6	9.4	9.1	11.2	12.0	13.6	11.9	12.1	12.1	13.9	15.7	6.2	3.9	3.4	2.9	8.0	11.4	24.4	105.2	14.7	11.4
24	18.4	19.2	18.6	18.0	20.3	20.1	18.8	20.3	20.2	19.2	18.3	16.5	23.5	22.7	22.6	20.9	20.8	20.1	22.9	24.2	18.4	16.1	12.5	16.3	20.2	17.5	33.4	116.0	26.9	17.5
25	6.0	6.5	7.0	6.7	7.1	8.2	8.0	9.7	9.1	9.0	9.7	9.8	10.2	11.0	12.6	11.2	12.1	12.8	13.6	16.1	4.9	4.1	6.4	9.4	13.6	17.8	23.4	104.3	6.7	17.8
26	17.3	16.4	16.2	16.8	16.9	15.8	14.5	16.2	15.9	14.9	14.0	12.2	19.7	18.4	18.3	16.6	16.5	15.8	18.6	20.0	18.6	17.9	14.3	10.8	21.4	25.2	29.1	111.7	28.1	1.2
27	18.8	18.2	18.6	19.2	18.0	17.2	16.9	19.7	15.5	15.4	15.9	16.9	18.4	16.8	12.6	13.6	14.9	16.2	12.5	16.1	20.1	20.2	22.6	25.5	22.8	29.1	69.6	110.1	29.5	29.1
28	99.6	99.0	99.6	100.2	98.2	97.8	98.9	101.9	95.8	96.8	98.1	99.5	98.6	93.3	99.3	98.0	99.2	100.8	100.4	102.8	100.9	101.1	103.4	106.3	103.6	111.7	110.1	110.2	110.3	111.7
29	12.7	13.2	13.7	13.4	13.8	14.9	14.7	16.4	15.8	15.7	16.4	16.5	17.0	17.7	19.3	17.9	18.8	19.5	20.3	22.8	11.6	10.8	13.1	16.1	6.7	24.6	30.1	111.0	67.8	24.5
30	17.3	16.4	16.2	16.8	16.9	15.8	14.5	16.1	15.9	14.9	14.0	12.2	19.7	18.4	18.3	16.6	16.5	15.8	18.6	19.9	18.6	17.9	14.3	10.8	21.3	1.2	29.1	111.7	28.1	28.1

F\T : zone from \ zone to

External Zone	Destination	Time (min)	to	How to Calculate
26, 30	Catacaos (18 km), [Chiclayo (200km)]	15	Catacaos	Minimum (time to zone 12 or 23) +15 min
27	Sullana (38 km), Paita (50km)	45	Sullana, (60min to Paita)	Minimum (time to zone 15) +15 min
28	nothing	0	-	0
29	Chulucanas (55km)	60	Chulucanas	Minimum (time to zone 25) +15 min

Table 7-10 (2) T-model 2 Simulation Results : Travel Time of "Person" Trips

(c) Person Trips for Mode [2 : Transit 1 (Collectibos)], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.2	3.1	2.4	4.1	4.2	4.1	4.5	4.7	5.4	6.2	7.7	6.3	6.9	7.7	8.7	11.2	2.3	2.5	4.5	7.4	5.1	15.9	18.5	99.4	11.8	15.9
2	0.9	0.9	0.9	1.5	1.8	2.6	1.8	3.6	3.8	3.7	4.0	4.1	5.0	5.7	7.3	5.9	6.4	7.2	8.2	10.7	3.1	3.3	4.9	7.8	5.8	16.3	18.1	99.0	12.5	16.3
3	1.6	0.9	0.9	0.9	2.4	3.1	1.6	3.0	4.2	3.7	3.8	3.9	5.5	6.2	7.7	6.0	6.2	7.0	8.0	10.5	3.9	3.3	4.2	7.1	6.6	15.6	18.5	99.4	13.3	15.5
4	0.6	1.5	1.2	2.0	2.9	3.6	2.2	3.9	4.7	4.2	4.3	4.4	6.0	6.7	8.2	6.5	6.7	7.5	8.5	11.0	3.0	3.1	4.3	7.2	5.7	15.7	19.0	99.9	12.4	15.6
5	2.3	1.8	2.4	2.9	2.6	2.3	2.9	4.7	3.7	3.8	4.5	4.6	3.1	5.0	7.2	5.9	6.9	7.7	8.3	10.7	3.6	3.8	6.0	8.9	6.3	16.8	18.0	98.2	13.1	16.8
6	2.7	2.2	2.8	3.4	2.3	2.0	1.7	5.1	2.6	2.5	3.3	3.4	4.5	4.3	6.1	4.8	5.7	6.4	7.2	9.6	4.0	4.2	6.4	9.3	6.8	15.6	16.9	97.5	13.5	15.6
7	2.8	1.8	1.6	2.2	2.8	2.4	3.0	3.6	3.1	2.1	2.2	2.3	5.7	5.6	6.1	4.4	4.6	5.3	6.4	8.8	4.5	4.5	5.4	8.3	7.2	14.5	16.9	98.9	13.9	14.5
8	4.2	3.6	3.0	3.6	4.7	5.2	3.6	4.9	6.3	5.5	4.6	3.9	7.7	8.2	8.9	7.2	7.1	7.0	9.2	10.6	6.4	5.0	5.9	8.7	9.1	16.2	19.7	101.5	15.8	16.1
9	4.3	3.8	4.4	4.9	3.7	2.5	3.1	6.5	3.8	1.1	2.3	3.7	4.0	2.5	4.7	3.3	4.5	6.1	5.7	8.2	5.6	5.7	8.0	10.8	8.3	16.0	15.5	95.8	15.0	15.9
10	4.2	3.7	3.7	4.3	3.8	2.4	2.1	5.5	1.1	1.1	1.2	2.7	5.1	3.6	4.6	3.2	3.5	5.1	5.3	7.7	5.5	5.6	7.5	10.4	8.2	14.9	15.4	96.9	14.9	14.9
11	5.0	4.0	3.8	4.4	4.6	3.1	2.2	4.6	2.3	1.2	1.5	1.9	6.3	4.8	5.1	3.4	3.6	3.9	5.4	7.4	6.3	6.3	7.2	10.1	9.0	14.1	15.9	98.1	15.7	14.1
12	5.1	4.2	4.0	4.5	4.7	3.3	2.3	3.9	3.8	2.7	1.8	4.5	7.2	6.3	6.1	4.4	4.3	3.6	6.4	7.8	6.4	6.0	6.9	9.8	9.1	12.2	16.9	99.6	15.8	12.2
13	5.5	5.0	5.5	6.1	3.1	3.9	5.1	7.8	4.0	5.1	6.3	6.8	6.1	5.3	7.6	6.2	7.5	9.1	8.6	11.1	6.8	6.9	9.1	12.0	9.5	19.0	18.4	98.6	16.2	19.0
14	6.6	6.1	6.7	7.2	5.3	4.8	6.0	8.9	2.9	3.9	5.1	6.6	5.6	6.0	6.4	5.0	6.3	7.9	7.5	9.9	7.9	8.1	10.3	13.1	10.6	18.8	17.2	93.3	17.3	18.8
15	7.8	7.3	7.8	8.3	7.3	6.0	6.1	9.0	4.7	4.6	5.1	6.2	7.6	6.1	4.4	2.8	4.1	5.4	2.8	5.3	9.1	9.3	11.5	14.3	11.8	18.4	12.6	99.4	18.5	18.4
16	6.4	5.9	6.1	6.6	5.9	4.6	4.4	7.3	3.3	3.2	3.4	4.5	6.2	4.7	2.8	2.1	1.5	3.2	3.3	5.8	7.7	7.9	9.9	12.7	10.4	16.7	13.6	98.0	17.2	16.7
17	7.4	6.5	6.3	6.8	7.0	5.6	4.6	7.2	4.6	3.5	3.6	4.4	7.5	6.0	4.1	1.5	1.6	1.6	3.5	5.2	8.7	8.8	10.1	12.9	11.4	16.6	14.9	99.3	18.1	16.6
18	8.3	7.4	7.2	7.7	7.9	6.5	5.6	7.2	6.2	5.2	4.0	3.6	9.2	7.7	5.4	3.2	1.7	3.2	4.8	5.2	9.6	9.3	10.2	13.0	12.3	15.8	16.2	100.9	19.0	15.8
19	8.8	8.3	8.1	8.6	8.3	7.0	6.4	9.2	5.7	5.3	5.4	6.5	8.6	7.1	2.8	3.3	3.5	4.8	4.7	4.7	10.1	10.3	11.8	14.7	12.9	18.7	12.5	100.4	19.6	18.7
20	11.3	10.7	10.5	11.1	10.8	9.5	8.9	10.7	8.2	7.8	7.5	7.9	11.1	9.6	5.3	5.8	5.2	5.1	4.7	8.6	12.6	12.8	13.7	16.6	15.3	20.1	16.1	102.9	22.0	20.1
21	3.0	3.5	4.0	3.6	4.0	4.8	4.9	6.7	5.9	5.8	6.5	6.7	7.1	7.9	9.4	8.1	8.9	9.7	10.5	12.9	7.6	2.3	4.6	7.4	4.9	15.9	20.2	101.2	11.6	15.9
22	2.7	3.4	3.3	2.7	3.9	4.7	4.3	5.0	5.8	5.7	6.3	6.0	7.0	7.8	9.3	8.0	8.8	9.1	10.4	12.7	2.3	2.3	2.3	5.1	4.1	13.6	20.1	101.1	10.8	13.6
23	4.2	5.0	4.2	3.6	6.1	6.7	5.3	5.9	7.8	7.3	7.2	6.9	9.3	9.8	11.3	9.7	9.9	10.0	11.6	13.6	4.6	2.3	2.6	2.9	6.3	11.3	22.1	103.1	13.1	11.3
24	7.0	7.9	7.1	6.4	9.0	9.6	8.1	8.7	10.7	10.2	10.1	9.8	12.1	12.6	14.2	12.5	12.7	12.9	14.5	16.4	7.4	5.1	2.9	6.0	9.2	10.7	25.0	105.9	15.9	10.7
25	5.5	5.9	6.4	6.1	6.4	7.3	7.4	9.1	8.4	8.3	9.0	9.1	9.6	10.4	11.9	10.5	11.4	12.2	12.9	15.4	4.9	4.1	6.3	9.2	13.4	17.7	22.7	103.6	6.7	17.7
26	15.5	16.4	15.6	14.9	16.9	15.5	14.6	16.2	16.0	14.9	14.1	12.2	19.5	18.5	18.4	16.7	16.5	15.8	18.6	20.0	15.9	13.6	11.3	10.7	17.7	23.4	29.2	111.8	24.4	1.2
27	18.6	18.1	18.6	19.1	18.0	16.8	16.9	19.8	15.5	15.4	15.9	17.0	18.4	16.9	12.6	13.6	14.9	16.2	12.5	16.1	19.9	20.0	22.3	25.1	22.6	29.2	69.7	110.2	29.3	29.2
28	99.9	99.4	100.0	100.5	98.6	98.1	99.3	102.2	96.1	97.2	98.4	99.9	98.9	93.3	99.7	98.3	99.6	101.2	100.7	103.2	101.2	101.3	103.6	106.4	103.9	112.1	110.5	110.5	110.6	112.1
29	12.2	12.7	13.1	12.8	13.2	14.0	14.1	15.8	15.1	15.0	15.7	15.8	16.3	17.1	18.6	17.3	18.1	18.9	19.7	22.1	11.6	10.8	13.1	15.9	6.7	24.4	29.4	110.4	67.4	24.4
30	15.5	16.4	15.5	14.9	16.9	15.5	14.5	16.1	16.0	14.9	14.0	12.2	19.4	18.5	18.4	16.7	16.5	15.8	18.6	20.0	15.9	13.6	11.3	10.7	17.7	1.2	29.1	111.8	24.4	24.4

F\T : zone from \ zone to

(d) Person Trips for Mode [3 : Transit 2 (Combis)], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	1.0	1.0	1.4	1.2	3.1	8.6	2.6	4.4	5.8	4.8	4.9	5.2	6.6	7.7	9.2	7.2	7.4	8.1	9.2	11.7	14.2	4.8	5.3	8.5	8.3	17.5	19.9	101.0	15.0	17.5
2	1.0	0.9	0.9	1.7	2.2	7.6	2.1	3.9	4.8	4.3	4.4	4.6	5.7	6.7	8.6	6.7	6.8	7.6	8.7	11.2	15.2	5.2	5.8	8.9	9.2	17.0	19.4	100.0	15.9	17.0
3	1.7	1.0	1.0	1.0	3.0	8.5	1.9	3.2	5.2	4.1	4.2	4.4	6.6	7.6	8.4	6.4	6.6	7.4	8.5	10.9	15.4	4.6	5.2	8.3	9.4	16.8	19.2	100.9	16.2	16.7
4	0.7	1.6	1.2	2.4	3.6	9.0	2.4	4.2	5.7	4.6	4.7	4.9	7.1	8.1	9.0	7.0	7.2	7.9	9.0	11.5	14.9	4.6	5.1	8.3	8.9	17.3	19.7	101.4	15.6	17.3
5	3.5	2.6	3.2	4.0	5.4	6.9	3.8	5.6	4.0	5.2	6.0	6.3	3.5	5.6	7.9	6.4	7.6	9.1	8.9	11.4	16.2	7.3	8.1	11.2	10.2	18.6	18.6	98.9	17.0	18.6
6	4.3	3.4	3.9	4.8	3.1	2.5	1.9	5.6	3.3	3.3	4.1	4.3	5.1	4.9	7.2	5.7	6.6	7.3	8.2	10.7	17.9	8.3	8.9	12.0	12.0	16.7	17.9	98.2	18.7	16.7
7	3.6	2.7	2.2	3.0	4.0	8.2	6.0	3.7	3.3	2.2	2.3	2.5	7.5	6.2	6.6	4.6	4.8	5.5	6.6	9.1	17.4	6.6	7.2	10.3	11.4	14.9	17.3	99.5	18.2	14.9
8	7.3	7.3	6.3	6.6	8.6	13.9	5.7	7.3	9.0	7.9	6.7	6.0	12.2	11.9	11.3	9.3	9.1	9.0	11.4	12.6	18.8	8.0	8.6	11.7	12.9	18.4	22.1	105.1	19.6	18.4
9	7.5	6.5	6.3	7.1	4.9	8.8	4.1	7.2	4.2	1.1	2.4	4.3	5.0	2.9	5.0	3.5	4.7	6.2	6.1	8.6	21.1	10.7	11.2	14.4	15.1	16.7	15.8	96.2	21.8	16.7
10	6.6	5.7	5.2	6.0	6.0	8.7	3.0	6.1	1.1	1.2	1.3	3.2	6.2	4.0	4.9	3.4	3.6	5.1	5.4	7.9	20.4	9.5	10.1	13.2	14.4	15.6	15.7	97.3	21.1	15.6
11	6.4	5.4	4.8	5.8	6.8	9.6	2.8	4.8	2.4	1.3	1.6	2.0	7.4	5.3	5.4	3.5	3.6	3.9	5.5	7.4	19.1	8.3	8.9	12.0	13.1	14.3	16.2	98.6	19.9	14.3
12	6.8	5.9	5.1	6.1	7.3	10.4	3.5	4.6	4.7	3.6	2.3	6.0	9.7	7.6	7.0	5.0	4.8	3.7	7.0	8.3	19.3	8.4	9.0	10.1	13.3	12.4	17.7	100.8	20.0	12.3
13	8.6	7.6	8.2	9.0	5.0	9.8	7.0	10.6	5.2	6.4	7.6	9.4	8.1	6.8	9.1	7.6	8.8	10.3	10.1	12.6	21.2	12.3	13.1	16.3	15.3	21.8	19.8	100.1	22.0	21.8
14	61.2	60.2	60.8	61.6	58.2	62.4	58.9	61.8	54.8	55.9	57.1	59.0	58.4	58.5	58.6	57.1	58.3	59.8	59.7	62.1	74.4	65.2	65.8	68.9	68.5	71.3	69.3	93.3	75.2	71.3
15	11.9	11.0	10.5	11.4	9.3	13.4	8.3	10.0	5.8	5.8	6.0	7.1	9.4	7.3	5.2	3.1	4.5	5.5	2.9	5.4	24.7	13.9	14.4	17.2	18.7	19.5	12.6	100.6	25.4	19.5
16	10.1	9.2	8.7	9.6	7.6	11.8	6.5	8.2	4.2	4.2	4.2	5.3	7.8	5.7	3.0	2.3	1.5	3.2	3.4	5.9	22.9	12.1	12.6	15.4	16.9	17.7	13.7	99.0	23.6	17.7
17	9.5	8.6	7.8	8.9	9.1	13.1	6.2	7.3	5.7	4.7	4.0	4.4	9.3	7.2	4.5	1.5	1.6	1.6	3.6	5.2	22.0	11.2	11.7	14.5	16.0	16.8	15.3	100.5	22.7	16.8
18	9.4	8.6	7.7	8.8	9.9	13.0	6.1	7.2	6.3	5.1	3.9	3.6	10.2	8.1	6.1	3.2	1.6	3.2	4.8	5.1	21.9	11.1	11.7	13.7	15.9	16.0	16.9	101.4	22.7	16.0
19	15.4	14.4	14.0	14.8	12.8	16.9	11.8	13.5	9.3	9.3	9.4	10.6	13.0	10.8	5.4	6.6	6.8	7.8	6.9	5.9	28.2	17.3	17.9	20.7	22.2	23.0	12.7	104.1	28.9	22.9
20	13.0	12.1	11.3	12.3	13.4	16.6	9.7	10.8	9.8	8.7	7.4	7.9	13.6	11.5	6.1	6.1	5.2	5.1	4.7	15.1	25.5	14.6	15.2	18.0	19.5	20.3	16.4	104.8	26.2	20.3
21	4.2	4.7	4.9	4.7	5.5	11.0	6.1	7.4	8.2	8.1	8.4	8.6	9.0	10.1	12.0	10.5	10.9	11.6	12.7	15.2	9.1	3.0	5.4	8.5	5.4	19.3	22.8	103.4	12.2	19.3
22	2.8	3.7	3.4	3.1	5.7	11.1	4.5	5.8	7.9	6.7	6.8	7.0	9.2	10.3	11.1	9.1	9.3	10.0	11.1	13.6	10.9	6.6	2.4	5.5	4.9	16.3	21.8	103.5	11.6	16.2
23	5.6	6.4	5.4	5.0	8.2	13.7	7.0	7.2	10.3	9.2	8.6	8.5	11.8	12.8	13.5	11.5	11.5	11.5	13.6	15.0	15.4	4.6	3.8	3.1	9.4	13.9	24.3	106.1	16.2	13.9
24	188.2	187.4	186.5	187.6	188.7	191.8	184.9	186.0	186.1	185.0	183.8	181.4	191.1	189.0	188.4	186.4	186.2	185.1	188.5	189.7	198.9	188.1	183.5	188.2	193.0	180.4	199.2	282.3	199.7	180.4
25	9.0	9.6	9.7	9.5	10.4	15.9	10.9	12.1	13.1	13.0	13.2	13.4	13.9	15.0	16.9	15.4	15.6	16.4	17.5	19.9	13.7	6.5	8.9	12.0	17.4	22.8	27.6	108.2	6.7	22.8
26	21.1	20.2	19.4	20.4	21.5	24.7	17.7	18.9	19.0	17.9	16.6	14.3	23.9	21.8	21.3	19.3	19.0	18.0	21.3	22.5	33.5	22.7	23.3	11.0	27.6	29.8	32.0	115.1	34.3	1.2
27	22.7	21.8	21.3	22.1	20.0	24.2	19.1	20.8	16.6	16.6	16.8	17.9	20.2	18.1	12.7	13.9	15.2	16.3	12.5	16.2	35.5	24.7	25.2	28.0	29.5	30.3	70.8	111.4	36.2	30.3
28	154.5	153.5	154.1	154.9	151.5	155.7	152.1	155.1	148.0	149.1	150.4	152.2	151.7	93.3	151.9	150.3	151.6	153.1	152.9	155.4	167.7	158.5	159.0	162.2	161.7	164.6	162.6	165.5	168.4	164.6
29	15.8	16.3	16.4	16.2	17.1	22.6	17.6	18.9	19.8	19.7	19.9	20.1	20.6	21.7	23.6	22.1	22.4	23.1	24.2	26.6	20.4	13.3	15.6	18.8	6.7	29.5	34.4	115.0	72.2	29.5
30	21.1	20.2	19.4	20.4	21.5	24.7	17.7	18.8	19.0	17.9	16.6	14.3	23.9	21.8	21.3	19.3	19.0	17.9	21.3	22.5	33.5	22.7	23.3	11.0	27.6	1.2	32.0	115.1	34.3	34.3

F\T : zone from \ zone to

External Zone	Destination	Time (min)	to	How to Calculate
26, 30	Catacaos (18 km), [Chiclayo (200km)]	15	Catacaos	Minimum (time to zone 12 or 23) +15 min
27	Sullana (38 km), Paita (50km)	45	Sullana, (60min to Paita)	Minimum (time to zone 15) +15 min
28	nothing	0	-	0
29	Chulucanas (55km)	60	Chulucanas	Minimum (time to zone 25) +15 min

Table 7-10 (3) T-model 2 Simulation Results : Travel Time of "Person" Trips

(e) Person Trips for Mode [4 : Walking], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.2	2.8	2.4	4.1	4.1	3.9	4.5	4.6	5.3	6.0	7.6	6.2	6.9	7.7	8.6	11.1	2.3	2.5	4.5	7.4	5.0	15.9	18.4	99.3	11.7	15.9
2	0.9	0.9	0.9	1.5	1.8	2.5	1.8	3.6	3.7	3.6	4.0	4.1	4.9	5.7	7.2	5.8	6.4	7.1	8.2	10.6	3.0	3.2	5.0	7.8	5.7	16.3	18.0	98.9	12.5	16.3
3	1.6	0.9	0.9	0.9	2.4	2.9	1.6	3.0	4.1	3.7	3.8	3.9	5.5	6.1	7.6	6.0	6.2	6.9	8.0	10.4	3.9	3.3	4.2	7.1	6.6	15.6	18.4	99.4	13.3	15.6
4	0.6	1.4	1.2	2.0	2.8	3.4	2.2	3.9	4.7	4.2	4.3	4.4	5.9	6.6	8.2	6.5	6.7	7.5	8.5	11.0	2.9	3.1	4.3	7.2	5.6	15.7	19.0	99.9	12.4	15.7
5	2.3	1.8	2.4	2.9	2.6	2.3	2.9	4.6	3.7	3.7	4.4	4.5	3.1	4.9	7.2	5.9	6.8	7.6	8.3	10.7	3.5	3.7	5.9	8.8	6.3	16.7	18.0	98.2	13.0	16.7
6	2.7	2.2	2.8	3.3	2.3	2.0	1.7	5.0	2.6	2.5	3.2	3.3	4.4	4.2	6.1	4.7	5.6	6.3	7.1	9.6	3.9	4.1	6.3	9.2	6.6	15.5	16.9	97.5	13.4	15.5
7	2.8	1.8	1.6	2.2	2.8	2.2	2.9	3.6	3.1	2.0	2.2	2.3	5.7	5.6	6.1	4.4	4.6	5.3	6.3	8.8	4.4	4.5	5.4	8.3	7.1	14.5	16.9	98.9	13.8	14.5
8	4.2	3.6	3.0	3.6	4.6	5.0	3.6	4.9	6.2	5.4	4.6	3.9	7.7	8.2	8.9	7.2	7.0	7.0	9.2	10.5	6.3	5.0	5.9	8.8	9.0	16.2	19.7	101.4	15.7	16.1
9	4.2	3.7	4.3	4.8	3.7	2.3	3.1	6.5	3.8	1.1	2.3	3.7	4.0	2.5	4.7	3.3	4.5	6.1	5.7	8.2	5.4	5.6	7.8	10.7	8.2	15.9	15.5	95.8	14.9	15.9
10	4.1	3.6	3.7	4.2	3.7	2.2	2.0	5.4	1.1	1.1	1.2	2.6	5.1	3.5	4.6	3.2	3.5	5.1	5.3	7.7	5.3	5.5	7.5	10.3	8.0	14.9	15.4	96.8	14.8	14.9
11	4.8	4.0	3.8	4.3	4.4	2.9	2.2	4.6	2.3	1.2	1.5	1.8	6.3	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.0	6.2	7.2	10.1	8.7	14.0	15.9	98.0	15.5	14.0
12	4.9	4.1	3.9	4.4	4.5	3.0	2.3	3.9	3.7	2.6	1.8	4.4	7.0	6.2	6.1	4.4	4.2	3.6	6.4	7.7	6.1	6.0	7.0	9.8	8.9	12.2	16.9	99.5	15.6	12.2
13	5.4	4.9	5.5	6.0	3.1	3.9	5.1	7.8	4.0	5.1	6.3	6.8	6.0	5.3	7.6	6.2	7.5	9.0	8.6	11.1	6.7	6.8	9.1	11.9	9.4	19.0	18.4	98.5	16.1	19.0
14	6.1	5.7	6.2	6.7	4.9	4.3	5.6	8.5	2.5	3.5	4.8	6.2	5.3	5.7	6.0	4.7	5.9	7.5	7.1	9.5	7.4	7.5	9.8	12.6	10.1	18.4	16.8	93.3	16.8	18.4
15	7.7	7.2	7.7	8.3	7.2	5.8	6.1	8.9	4.7	4.6	5.1	6.1	7.6	6.1	4.4	2.8	4.1	5.4	2.8	5.3	9.0	9.1	11.3	14.2	11.7	18.4	12.6	99.3	18.4	18.3
16	6.3	5.8	6.0	6.5	5.9	4.5	4.4	7.2	3.3	3.2	3.4	4.4	6.2	4.7	2.8	2.1	1.5	3.1	3.3	5.8	7.6	7.7	9.8	12.7	10.3	16.6	13.6	97.9	17.0	16.6
17	7.2	6.4	6.2	6.7	6.8	5.3	4.6	7.0	4.5	3.5	3.6	4.2	7.5	5.9	4.1	1.5	1.6	1.6	3.5	5.2	8.4	8.6	10.0	12.9	11.1	16.5	14.9	99.2	17.9	16.5
18	7.9	7.1	6.9	7.5	7.6	6.0	5.3	7.0	6.1	5.1	3.8	3.6	9.0	7.5	5.4	3.1	1.6	3.2	4.7	5.1	9.2	9.1	10.0	12.9	11.9	15.8	16.2	100.8	18.6	15.8
19	8.7	8.2	8.0	8.5	8.3	6.9	6.3	9.2	5.7	5.3	5.4	6.4	8.6	7.1	2.8	3.3	3.5	4.7	4.7	4.7	10.0	10.2	11.8	14.6	12.7	18.6	12.5	100.4	19.4	18.6
20	11.2	10.6	10.4	11.0	10.7	9.3	8.8	10.5	8.2	7.7	7.4	7.7	11.1	9.6	5.3	5.8	5.2	5.1	4.7	8.6	12.5	12.6	13.5	16.4	15.2	20.0	16.1	102.8	21.9	19.9
21	2.6	3.0	3.6	3.2	3.5	4.2	4.5	6.3	5.4	5.3	6.0	6.1	6.7	7.4	8.9	7.6	8.4	9.2	10.0	12.4	7.4	2.3	4.6	7.5	4.9	15.9	19.7	100.7	11.6	15.9
22	2.7	3.2	3.3	2.7	3.7	4.4	4.3	5.0	5.6	5.5	6.2	6.0	6.8	7.5	9.1	7.7	8.6	9.1	10.1	12.6	2.3	2.3	2.3	5.1	4.1	13.6	19.9	100.8	10.8	13.6
23	4.2	5.0	4.2	3.6	5.9	6.5	5.3	5.9	7.8	7.3	7.2	6.9	9.1	9.7	11.3	9.6	9.8	10.0	11.6	13.5	4.6	2.3	2.6	2.9	6.3	11.4	22.1	103.0	13.1	11.3
24	7.4	8.2	7.4	6.8	9.1	9.7	8.5	9.1	11.0	10.5	10.4	10.0	12.2	12.9	14.5	12.8	13.0	13.2	14.8	16.7	7.8	5.5	3.2	6.4	9.5	10.9	25.3	106.2	16.3	10.9
25	5.3	5.7	6.3	5.9	6.3	6.9	7.2	9.0	8.2	8.0	8.7	8.9	9.4	10.1	11.7	10.3	11.1	11.9	12.7	15.2	4.9	4.1	6.4	9.2	13.5	17.7	22.5	103.4	6.7	17.7
26	15.7	16.3	15.7	15.1	16.7	15.2	14.5	16.2	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	20.0	16.1	13.8	11.5	10.8	17.8	23.5	29.1	111.7	24.6	1.2
27	18.5	18.0	18.5	19.0	18.0	16.6	16.9	19.7	15.5	15.4	15.9	16.9	18.4	16.8	12.6	13.6	14.9	16.2	12.5	16.1	19.7	19.9	22.1	25.0	22.5	29.1	69.6	110.1	29.2	29.1
28	99.4	98.9	99.5	100.0	98.2	97.6	98.8	101.8	95.8	96.8	98.0	99.5	98.5	93.3	99.3	97.9	99.2	100.8	100.4	102.8	100.7	100.8	103.0	105.9	103.4	111.7	110.1	110.1	110.1	111.7
29	12.1	12.5	13.0	12.7	13.0	13.6	13.9	15.7	14.9	14.8	15.5	15.6	16.1	16.8	18.4	17.0	17.9	18.6	19.4	21.9	11.6	10.8	13.1	15.9	6.7	24.4	29.2	110.1	67.3	24.4
30	15.7	16.3	15.7	15.1	16.7	15.2	14.5	16.1	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	19.9	16.1	13.7	11.5	10.7	17.8	1.2	29.1	111.7	24.5	24.5

F\T : zone from \ zone to

(f) Person Trips for Mode [5 : Others], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.2	2.9	2.4	4.1	4.2	4.0	4.5	4.6	5.3	6.1	7.7	6.3	6.9	7.7	8.7	11.2	2.4	2.5	4.5	7.4	5.0	15.9	18.5	99.3	11.8	15.9
2	0.9	0.9	0.9	1.5	1.8	2.5	1.8	3.6	3.8	3.7	4.0	4.1	5.0	5.7	7.3	5.9	6.4	7.1	8.2	10.6	3.2	3.3	4.9	7.8	5.8	16.3	18.1	98.9	12.6	16.3
3	1.6	0.9	0.9	0.9	2.4	2.9	1.6	3.0	4.2	3.7	3.8	3.9	5.6	6.1	7.7	6.0	6.2	6.9	8.0	10.5	3.9	3.3	4.2	7.1	6.6	15.6	18.5	99.4	13.3	15.5
4	0.6	1.4	1.2	2.0	2.8	3.5	2.2	3.9	4.7	4.2	4.3	4.4	6.0	6.6	8.2	6.5	6.7	7.5	8.5	11.0	3.0	3.1	4.3	7.2	5.7	15.7	19.0	99.9	12.4	15.6
5	2.4	1.8	2.4	2.9	2.6	2.3	2.9	4.7	3.7	3.8	4.5	4.6	3.2	4.9	7.2	5.9	6.9	7.6	8.3	10.7	3.7	3.8	6.0	8.9	6.4	16.8	18.0	98.2	13.1	16.8
6	2.8	2.2	2.8	3.4	2.4	2.0	1.7	5.1	2.6	2.5	3.2	3.3	4.4	4.2	6.2	4.8	5.6	6.4	7.2	9.7	4.1	4.2	6.4	9.3	6.8	15.6	17.0	97.5	13.5	15.5
7	2.8	1.8	1.6	2.2	2.8	2.2	2.9	3.6	3.1	2.0	2.2	2.3	5.7	5.6	6.1	4.4	4.6	5.3	6.4	8.8	4.6	4.5	5.4	8.3	7.2	14.5	16.9	98.9	14.0	14.5
8	4.2	3.6	3.0	3.6	4.7	5.0	3.6	4.9	6.3	5.4	4.6	3.9	7.8	8.2	8.9	7.2	7.0	7.0	9.2	10.5	6.4	5.0	5.9	8.7	9.1	16.2	19.7	101.5	15.8	16.1
9	4.3	3.8	4.4	4.9	3.7	2.3	3.1	6.5	3.8	1.1	2.3	3.7	4.0	2.5	4.7	3.3	4.6	6.1	5.7	8.2	5.7	5.8	8.0	10.8	8.3	15.9	15.5	95.8	15.1	15.9
10	4.2	3.7	3.7	4.2	3.8	2.2	2.0	5.4	1.1	1.1	1.2	2.6	5.1	3.6	4.6	3.2	3.5	5.1	5.3	7.8	5.6	5.7	7.5	10.3	8.2	14.9	15.4	96.8	14.9	14.9
11	4.9	4.0	3.8	4.3	4.5	2.9	2.2	4.6	2.3	1.2	1.5	1.8	6.3	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.2	6.3	7.2	10.1	8.9	14.0	15.9	98.1	15.6	14.0
12	5.0	4.1	3.9	4.4	4.6	3.0	2.3	3.9	3.7	2.6	1.8	4.4	7.0	6.2	6.1	4.4	4.2	3.6	6.4	7.7	6.4	6.0	6.9	9.8	9.0	12.2	16.9	99.5	15.7	12.2
13	5.5	5.0	5.5	6.1	3.1	3.9	5.1	7.8	4.0	5.1	6.3	6.8	6.0	5.3	7.6	6.2	7.5	9.0	8.6	11.1	6.8	6.9	9.2	12.0	9.5	19.0	18.4	98.5	16.2	19.0
14	6.3	5.7	6.3	6.9	5.0	4.4	5.6	8.6	2.6	3.6	4.8	6.3	5.3	5.7	6.1	4.7	6.0	7.6	7.2	9.6	7.6	7.7	10.0	12.8	10.3	18.5	16.9	93.3	17.0	18.5
15	7.9	7.3	7.7	8.3	7.2	5.9	6.1	8.9	4.7	4.6	5.1	6.1	7.6	6.1	4.4	2.8	4.1	5.4	2.8	5.3	9.2	9.3	11.5	14.3	11.9	18.4	12.6	99.3	18.6	18.3
16	6.5	5.9	6.0	6.5	5.9	4.5	4.4	7.2	3.3	3.2	3.4	4.4	6.2	4.7	2.8	2.1	1.5	3.1	3.3	5.8	7.8	7.9	9.8	12.6	10.5	16.6	13.6	97.9	17.2	16.6
17	7.3	6.4	6.2	6.7	6.9	5.3	4.6	7.0	4.6	3.5	3.6	4.2	7.5	5.9	4.1	1.5	1.6	1.6	3.5	5.2	8.6	8.8	10.0	12.8	11.3	16.5	14.9	99.2	18.0	16.5
18	8.0	7.1	6.9	7.5	7.6	6.1	5.3	7.0	6.1	5.1	3.8	3.6	9.0	7.5	5.4	3.1	1.6	3.2	4.8	5.1	9.4	9.1	10.0	12.8	12.1	15.8	16.2	100.8	18.8	15.8
19	8.9	8.2	8.0	8.6	8.3	7.0	6.4	9.2	5.8	5.3	5.4	6.4	8.7	7.1	2.9	3.3	3.5	4.8	4.7	4.7	10.3	10.4	11.8	14.7	12.9	18.7	12.5	100.4	19.7	18.7
20	11.4	10.6	10.5	11.0	10.8	9.4	8.8	10.5	8.2	7.8	7.4	7.7	11.1	9.6	5.3	5.8	5.2	5.1	4.7	8.7	12.7	12.6	13.5	16.4	15.4	20.0	16.1	102.8	22.1	19.9
21	2.6	3.1	3.6	3.3	3.6	4.3	4.6	6.3	5.6	5.4	6.1	6.2	6.7	7.5	9.1	7.7	8.5	9.3	10.1	12.6	7.5	2.3	4.6	7.4	4.9	15.9	19.9	100.7	11.6	15.9
22	2.7	3.2	3.3	2.7	3.7	4.5	4.3	5.0	5.7	5.6	6.3	6.0	6.9	7.6	9.2	7.8	8.7	9.1	10.3	12.6	2.3	2.3	2.3	5.1	4.1	13.6	20.0	100.9	10.8	13.6
23	4.2	5.0	4.2	3.6	6.0	6.6	5.3	5.9	7.8	7.3	7.2	6.9	9.1	9.7	11.4	9.6	9.8	10.0	11.6	13.5	4.6	2.3	2.6	2.9	6.3	11.3	22.1	103.0	13.1	11.3
24	7.0	7.9	7.1	6.4	8.8	9.4	8.1	8.7	10.7	10.2	10.1	9.8	12.0	12.6	14.2	12.5	12.7	12.8	14.5	16.4	7.4	5.1	2.9	6.0	9.2	10.7	25.0	105.9	15.9	10.7
25	5.4	5.8	6.3	6.0	6.3	7.0	7.3	9.0	8.3	8.2	8.8	9.0	9.5	10.2	11.8	10.4	11.2	12.0	12.8	15.3	4.9	4.1	6.3	9.2	13.4	17.7	22.6	103.4	6.7	17.7
26	15.5	16.3	15.6	14.9	16.8	15.3	14.5	16.2	15.9	14.9	14.0	12.2	19.2	18.4	18.4	16.6	16.5	15.8	18.6	20.0	15.9	13.6	11.3	10.7	17.7	23.4	29.1	111.7	24.4	1.2
27	18.6	18.1	18.5	19.0	18.0	16.7	16.9	19.7	15.5	15.4	15.9	16.9	18.4	16.8	12.6	13.6	14.9	16.2	12.5	16.1	20.0	20.1	22.3	25.1	22.6	29.1	69.6	110.1	29.4	29.1
28	99.6	99.0	99.6	100.1	98.3	97.7	98.9	101.9	95.8	96.9	98.1	99.5	98.6	93.3	99.4	98.0	99.3	100.8	100.4	102.9	100.9	101.0	103.2	106.1	103.6	111.7	110.2	110.2	110.3	111.7
29	12.1	12.5	13.0	12.7	13.0	13.7	14.0	15.7	15.0	14.9	15.6	15.7	16.2	16.9	18.5	17.1	18.0	18.7	19.6	22.0	11.6	10.8	13.1	15.9	6.7	24.4	29.3	110.2	67.3	24.4
30	15.5	16.3	15.5	14.9	16.8	15.2	14.5	16.1	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	19.9	15.9	13.6	11.3	10.7	17.7	1.2	29.1	111.7	24.4	24.4

F\T : zone from \ zone to

External Zone	Destination	Time (min)	to	How to Calculate
26, 30	Catacaos (18 km), [Chiclayo (200km)]	15	Catacaos	Minimum (time to zone 12 or 23) +15 min
27	Sullana (38 km), Paita (50km)	45	Sullana, (60min to Paita)	Minimum (time to zone 15) +15 min
28	nothing	0	-	0
29	Chulucanas (55km)	60	Chulucanas	Minimum (time to zone 25) +15 min

Table 7-10 (4) T-model 2 Simulation Results : Travel Time of "Person" Trips

(g) Person Trips for Mode [All : (1) ~ (5)], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	1.2	1.2	1.8	3.7	4.0	31.0	3.4	5.1	7.4	5.8	6.0	6.5	9.5	10.7	10.9	8.3	8.5	9.6	10.4	12.9	25.7	9.3	9.7	13.3	12.4	19.2	21.5	104.0	19.1	19.2
2	1.1	1.1	1.1	4.2	2.7	29.8	2.7	4.4	6.7	5.1	5.3	5.8	8.3	9.5	10.2	7.6	7.8	8.9	9.7	12.2	26.8	10.3	10.2	13.7	13.5	18.5	20.8	102.7	20.3	18.5
3	2.8	1.7	2.4	3.1	4.3	31.3	2.5	3.4	6.5	4.9	5.1	5.4	9.8	10.2	9.9	7.4	7.6	8.4	9.5	11.9	28.4	9.3	9.1	12.6	15.2	18.0	20.6	103.5	21.9	18.0
4	1.1	2.3	1.6	3.3	5.0	32.1	3.2	4.9	7.3	5.7	5.8	6.4	10.6	11.0	10.7	8.2	8.3	9.4	10.3	12.7	26.8	9.7	9.6	13.1	13.5	19.0	21.4	104.2	20.2	19.0
5	7.7	6.6	7.1	10.2	20.8	31.3	5.9	9.7	4.9	6.3	7.7	9.0	5.5	6.7	9.2	7.3	8.5	10.1	10.4	12.8	31.8	15.4	16.2	19.8	18.6	21.7	19.9	100.0	25.3	21.7
6	7.4	6.3	6.8	9.9	4.1	3.4	2.7	6.8	4.3	4.3	5.2	5.8	6.7	6.1	8.7	6.8	7.7	8.8	9.7	12.1	32.2	15.7	15.9	16.5	18.9	18.4	19.3	99.4	25.6	18.4
7	8.7	7.5	6.3	9.4	8.9	32.0	18.1	4.1	4.0	2.5	2.6	3.2	13.4	7.8	7.5	5.0	5.1	6.2	7.1	9.5	34.2	15.0	14.8	13.9	20.9	15.8	18.2	101.0	27.6	15.8
8	12.2	11.1	9.4	12.2	12.8	39.5	7.5	9.2	10.9	9.3	8.0	7.4	18.3	14.4	13.4	10.8	10.5	10.4	13.0	14.0	34.9	15.7	15.5	18.2	21.6	20.0	24.1	107.6	28.3	20.0
9	15.0	13.9	12.2	15.3	9.9	34.0	6.6	9.0	5.2	1.4	2.8	5.6	9.4	3.7	5.9	4.0	5.2	6.8	7.1	9.5	39.0	19.8	19.7	16.4	25.7	18.3	16.6	97.0	32.5	18.3
10	13.7	12.5	10.9	14.0	11.5	34.0	5.2	7.6	1.6	1.5	1.4	4.3	11.0	5.3	6.0	3.7	3.9	5.5	5.8	8.2	37.7	18.5	18.3	15.0	24.4	16.9	16.6	98.6	31.1	16.9
11	12.2	11.1	9.4	12.5	12.8	34.3	4.3	6.2	2.9	1.3	2.1	2.8	12.3	6.6	6.2	3.6	3.8	4.0	5.7	7.6	36.2	17.0	16.8	13.6	22.9	15.5	16.8	99.9	29.7	15.4
12	14.7	13.5	11.9	15.0	15.2	37.8	7.6	8.0	8.1	6.5	5.2	11.2	17.2	11.5	10.6	7.9	6.1	4.3	9.4	9.6	38.0	18.8	18.6	10.8	24.7	12.6	21.2	104.8	31.4	12.6
13	16.4	15.2	15.8	18.8	8.6	38.2	12.7	16.4	7.4	8.7	10.2	13.0	11.1	9.2	11.7	9.8	11.0	12.6	12.9	15.3	40.5	24.0	24.8	23.7	27.2	25.6	22.4	102.5	33.9	25.6
14	326.1	325.0	323.3	326.4	319.1	327.7	317.7	320.1	311.1	312.5	313.9	316.7	318.6	317.0	315.4	313.5	314.7	316.3	316.6	319.0	327.7	327.7	327.7	327.5	327.7	327.7	326.1	93.3	327.7	327.7
15	20.7	19.6	18.0	21.0	16.9	41.4	12.8	14.4	8.9	8.8	8.5	9.5	16.4	10.8	7.2	3.7	5.2	5.7	3.2	5.6	44.4	25.2	25.0	20.2	31.1	22.1	12.7	104.0	37.9	22.1
16	18.6	17.5	15.8	18.9	14.8	39.3	10.7	12.3	6.8	6.6	6.4	7.0	14.3	8.6	3.5	2.6	1.6	3.3	3.6	6.0	42.3	23.1	22.9	17.8	29.0	19.7	14.2	101.9	35.7	19.7
17	18.1	17.0	15.3	18.4	16.6	40.7	10.7	11.4	8.6	7.8	6.5	5.4	16.1	10.4	5.3	1.8	1.7	1.7	3.9	5.3	41.4	22.2	22.0	16.2	28.1	18.1	16.0	103.7	34.8	18.1
18	17.3	16.2	14.5	17.6	17.8	40.5	10.2	10.6	9.5	7.9	6.6	3.8	17.3	11.7	6.7	3.6	1.8	3.5	5.1	5.3	40.6	21.4	21.2	14.5	27.3	16.4	17.4	104.9	34.0	16.4
19	26.3	25.1	23.5	26.6	23.9	48.4	18.9	19.6	15.9	15.7	14.6	13.6	23.4	17.7	9.0	10.0	9.9	9.9	8.0	6.0	49.6	30.4	30.2	24.4	36.3	26.2	16.1	111.0	43.0	26.2
20	21.6	20.5	18.8	21.9	21.3	44.3	14.3	14.9	12.9	11.3	10.0	9.0	20.8	15.1	6.4	6.8	5.3	5.2	4.9	24.9	45.0	25.8	25.6	19.7	31.7	21.6	17.1	108.4	38.4	21.6
21	11.3	11.9	12.4	13.1	12.5	40.1	14.1	13.6	16.9	16.5	16.7	16.1	18.0	19.2	21.3	19.0	19.2	19.1	21.1	22.7	14.5	6.3	9.1	12.6	6.6	28.7	32.0	112.5	13.3	28.7
22	8.8	9.4	8.8	8.4	10.0	37.6	11.0	8.9	14.4	13.3	12.0	11.4	15.6	16.8	17.4	14.8	14.5	14.4	16.9	18.0	19.2	11.0	2.9	6.4	5.9	24.0	28.0	110.0	12.6	24.0
23	14.0	14.9	13.3	12.9	17.5	44.6	15.4	13.4	19.4	17.8	16.5	15.9	23.1	22.8	21.9	19.3	19.0	18.9	21.4	22.5	27.8	8.6	6.1	3.6	14.5	28.5	32.5	116.1	21.2	28.5
24	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7
25	13.9	14.5	15.1	15.7	15.1	42.7	16.7	16.2	19.5	19.1	19.3	18.7	20.7	21.8	23.9	21.6	21.8	21.7	23.7	25.3	20.9	8.9	11.7	15.2	23.3	31.3	34.6	115.1	6.7	31.3
26	58.3	57.2	55.6	58.6	58.9	81.5	51.3	51.7	51.8	50.2	48.8	43.7	60.9	55.2	54.2	51.6	49.8	48.0	53.1	53.3	81.7	62.5	62.3	11.5	68.4	66.6	64.9	148.5	75.1	1.2
27	31.6	30.5	28.9	31.9	27.8	52.3	23.7	25.3	19.8	19.7	19.4	20.4	27.3	21.7	12.9	14.6	16.1	16.6	12.5	16.2	55.3	36.1	35.9	31.1	42.0	33.0	74.0	114.9	48.8	33.0
28	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	93.3	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7
29	20.6	21.2	21.8	22.4	21.8	49.4	23.4	23.0	26.3	25.9	26.0	25.4	27.4	28.6	30.6	28.4	28.5	28.4	30.5	32.0	27.6	15.6	18.4	21.9	6.7	38.0	41.3	121.8	79.9	38.0
30	58.3	57.2	55.5	58.6	58.9	81.5	51.3	51.6	51.8	50.2	48.8	43.7	60.9	55.2	54.2	51.6	49.8	48.0	53.1	53.3	81.7	62.5	62.3	11.5	68.4	1.2	64.9	148.5	75.1	75.1

F\T : zone from \ zone to

(h) Person Trips for Mode [All : Sum of Table (b)~(f)], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	1.2	1.2	1.8	3.4	4.0	36.4	3.4	5.2	7.4	5.9	6.0	6.6	9.6	10.7	10.8	8.3	8.5	9.6	10.5	12.9	26.1	9.7	10.0	13.6	13.1	19.2	21.5	104.0	19.8	19.2
2	1.2	1.1	1.1	3.9	2.8	35.2	2.6	4.4	6.6	5.1	5.3	5.8	8.4	9.5	10.0	7.6	7.8	8.9	9.7	12.1	27.2	10.5	10.5	14.1	14.2	18.5	20.7	102.7	20.9	18.4
3	2.9	1.8	2.3	2.8	4.6	36.9	2.4	3.5	6.4	4.9	5.0	5.4	10.1	10.1	9.8	7.4	7.5	8.4	9.5	11.9	28.7	9.4	9.4	13.0	15.1	18.0	20.5	103.4	21.8	18.0
4	1.0	2.2	1.7	3.3	5.0	37.4	3.2	5.0	7.2	5.7	5.9	6.5	10.6	10.9	10.6	8.2	8.4	9.5	10.3	12.7	27.0	9.9	9.9	13.4	14.0	19.1	21.3	104.2	20.8	19.1
5	7.4	6.2	6.8	9.6	22.4	35.3	5.7	9.3	4.9	6.2	7.7	9.0	5.6	6.7	9.1	7.3	8.5	10.1	10.3	12.7	32.0	15.7	16.2	19.7	19.0	21.6	19.8	100.0	25.7	21.6
6	7.6	6.4	7.0	9.8	3.8	3.2	2.7	6.8	4.4	4.3	5.3	5.9	6.7	6.2	8.6	6.8	7.8	8.9	9.7	12.2	32.6	16.2	16.4	16.6	19.6	18.5	19.3	99.4	26.3	18.5
7	8.1	7.0	5.5	8.3	8.4	39.0	21.5	4.1	4.0	2.5	2.6	3.2	13.0	7.7	7.4	5.0	5.1	6.2	7.1	9.5	34.2	14.9	14.9	14.0	20.6	15.8	18.1	101.0	27.3	15.8
8	12.2	11.1	9.3	12.1	13.1	45.4	7.2	8.9	10.7	9.2	7.9	7.4	18.6	14.3	13.2	10.8	10.5	10.4	12.9	14.0	36.0	16.8	16.8	18.1	22.4	20.0	23.9	107.5	29.2	20.0
9	15.2	14.0	12.6	15.4	9.7	40.2	7.1	9.0	5.1	1.3	2.8	5.6	9.0	3.7	5.8	4.0	5.1	6.8	7.0	9.4	40.2	21.0	21.0	16.4	26.6	18.3	16.5	97.0	33.3	18.2
10	13.8	12.7	11.3	14.1	11.1	40.1	5.7	7.6	1.5	1.5	1.5	4.3	10.5	5.2	5.8	3.7	3.9	5.5	5.8	8.3	38.9	19.6	19.6	15.1	25.3	16.9	16.5	98.5	32.0	16.9
11	12.7	11.5	9.9	12.7	12.5	41.5	4.6	6.2	2.8	1.3	2.1	2.8	11.9	6.5	6.0	3.6	3.8	4.0	5.7	7.6	37.4	18.1	18.2	13.6	23.8	15.4	16.7	99.8	30.5	15.4
12	14.2	13.1	11.4	14.2	14.6	45.8	7.0	7.6	8.6	7.1	5.8	11.7	17.5	12.2	11.1	8.0	6.2	4.4	9.5	9.7	38.9	19.6	19.6	10.7	25.3	12.6	21.8	105.4	32.0	12.6
13	15.7	14.5	15.1	17.9	8.3	41.3	11.8	15.9	7.3	8.6	10.1	12.9	11.0	9.1	11.5	9.7	10.8	12.5	12.7	15.1	40.3	23.9	24.5	23.6	27.3	25.5	22.2	102.3	34.0	25.5
14	325.4	324.2	323.1	325.9	318.2	327.7	317.6	319.4	310.5	311.9	313.4	316.1	317.6	316.2	314.7	312.9	314.1	315.7	315.9	318.3	327.7	327.7	327.7	326.9	327.7	327.7	325.4	93.3	327.7	327.7
15	21.3	20.2	18.5	21.3	17.0	47.8	13.5	14.7	9.2	9.0	8.9	9.5	16.4	11.1	7.4	3.8	4.9	5.7	3.2	5.6	46.0	26.7	26.7	20.2	32.3	22.1	12.7	104.3	39.1	22.1
16	19.1	17.9	16.2	19.0	14.8	45.6	11.2	12.4	7.0	6.8	6.6	7.0	14.2	8.9	3.4	2.5	1.6	3.3	3.6	6.0	43.7	24.4	24.4	17.8	30.1	19.6	14.1	102.2	36.8	19.6
17	18.2	17.0	15.3	18.2	16.6	47.4	10.9	11.5	8.7	7.5	6.6	5.4	15.9	10.6	5.1	1.7	1.7	1.7	3.9	5.3	42.8	23.5	23.5	16.2	29.2	18.0	15.8	103.9	35.9	18.0
18	17.7	16.6	14.9	17.7	17.7	48.2	10.5	11.1	9.5	8.0	6.7	3.8	17.1	11.8	6.7	3.6	1.8	3.5	5.1	5.3	42.3	23.1	23.1	14.5	28.7	16.4	17.4	105.1	35.4	16.4
19	26.4	25.2	23.6	26.4	24.3	55.1	19.1	19.7	16.4	15.2	14.6	13.7	23.6	18.3	9.3	9.4	9.6	9.9	8.0	6.1	51.0	31.7	31.8	24.4	37.4	26.3	16.7	111.6	44.1	26.3
20	21.7	20.5	18.9	21.7	21.2	51.6	14.5	15.1	13.0	11.5	10.2	9.0	20.6	15.3	6.4	6.5	5.3	5.2	4.9	25.6	46.3	27.1	27.1	19.7	32.7	21.6	17.1	108.5	39.4	21.6
21	13.1	13.7	14.2	14.4	14.4	47.3	15.8	14.3	18.9	18.3	17.3	16.7	19.9	21.0	22.6	20.1	19.8	19.8	22.3	23.3	14.4	5.4	7.9	11.5	6.7	29.4	33.3	114.3	13.4	29.3
22	8.7	9.9	9.2	9.5	11.5	44.5	10.9	9.3	14.9	13.4	12.3	11.8	17.1	18.2	17.6	15.2	14.8	14.8	17.3	18.3	19.7	11.1	2.5	6.1	6.1	24.4	28.3	111.5	12.8	24.4
23	15.7	16.3	14.5	14.7	19.0	51.4	16.6	14.5	20.4	18.9	17.5	17.0	24.6	23.9	22.8	20.4	20.1	20.0	22.5	23.6	27.9	8.2	5.9	3.5	14.3	29.6	33.5	117.2	21.0	29.6
24	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7
25	16.1	16.7	17.1	17.3	17.4	50.4	18.7	17.1	21.9	21.2	20.1	19.6	23.0	24.1	25.4	23.0	22.7	22.6	25.1	26.2	23.4	7.8	10.4	13.9	23.1	32.2	36.1	117.3	6.7	32.2
26	54.9	53.8	52.1	54.9	55.2	86.5	47.7	48.3	49.3	47.8	46.5	40.7	58.2	52.8	51.7	48.6	46.9	45.1	50.2	50.4	79.5	60.3	60.3	11.5	65.9	64.2	62.4	146.1	72.6	1.2
27	32.2	31.1	29.4	32.2	27.9	58.7	24.4	25.6	20.1	19.9	19.8	20.4	27.3	22.0	12.9	14.7	15.9	16.6	12.5	16.2	56.9	37.6	37.6	31.1	43.3	33.0	74.1	115.2	50.0	33.0
28	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	93.3	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7	327.7
29	22.8	23.4	23.8	24.0	24.1	57.1	25.5	23.9	28.6	27.9	26.9	26.3	29.7	30.8	32.1	29.7	29.4	29.3	31.8	32.9	30.1	14.6	17.1	20.6	6.7	38.9	42.8	124.1	81.5	38.9
30	54.9	53.7	52.1	54.9	55.2	86.4	47.7	48.3	49.3	47.8	46.5	40.7	58.2	52.8	51.7	48.6	46.9	45.1	50.2	50.4	79.5	60.3	60.3	11.4	65.9	1.2	62.4	146.1	72.6	72.6

F\T : zone from \ zone to

External Zone	Destination	Time (min)	to	How to Calculate
26, 30	Catacaos (18 km), [Chiclayo (200km)]	15	Catacaos	Minimum (time to zone 12 or 23) +15 min
27	Sullana (38 km), Paita (50km)	45	Sullana, (60min to Paita)	Minimum (time to zone 15) +15 min
28	nothing	0	-	0
29	Chulucanas (55km)	60	Chulucanas	Minimum (time to zone 25) +15 min

Table 7-10 (5) T-model 2 Simulation Results : Travel Time of "Person" Trips

(i) Travel Time [Original (by Average Vehicle Speed)], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

Z\Z	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.5																													
2	1.0	0.5																												
3	2.0	1.0	0.5																											
4	1.0	2.0	1.0	0.5																										
5	2.7	2.2	2.7	3.2	1.1																									
6	3.2	2.7	3.2	3.7	2.2	0.9																								
7	3.0	2.0	2.0	3.0	4.3	1.8	0.9																							
8	4.2	3.2	2.2	3.2	5.8	5.8	3.7	1.1																						
9	6.7	5.7	6.7	7.7	4.2	3.3	4.2	7.0	0.8																					
10	5.8	4.8	4.8	5.8	6.0	3.2	2.7	6.2	1.5	0.7																				
11	5.8	4.8	4.8	5.8	6.4	3.6	2.7	4.8	2.8	1.3	0.7																			
12	7.0	6.0	5.5	6.5	7.6	4.8	3.8	5.0	5.7	4.2	2.8	1.4																		
13	6.0	5.0	6.0	7.0	2.8	4.2	7.2	8.5	3.7	5.2	6.5	8.8	1.4																	
14	7.8	6.8	7.8	8.8	5.7	5.5	7.3	10.7	3.2	4.7	6.0	8.3	5.2	1.6																
15	10.0	9.0	10.0	11.0	7.7	6.8	6.9	9.3	5.2	5.0	5.6	7.3	7.2	6.7	1.2															
16	10.3	7.6	7.6	10.3	6.6	5.8	5.4	7.8	4.1	3.9	4.1	5.8	6.1	5.6	2.4	0.8														
17	10.4	7.6	7.6	10.3	8.0	6.5	5.6	7.3	5.5	4.3	3.8	5.3	7.5	7.0	3.8	1.5	0.8													
18	9.3	8.3	7.8	8.8	9.0	7.1	6.2	7.2	6.5	5.2	3.8	5.3	8.5	8.0	5.0	3.5	2.0	1.0												
19	10.9	9.9	9.9	10.9	11.5	8.7	7.8	10.2	6.8	6.4	6.4	8.2	8.8	8.3	3.0	3.7	3.8	5.0	1.5											
20	12.5	11.5	11.0	12.0	13.3	10.3	9.3	10.5	9.7	8.3	7.0	8.5	11.7	11.2	5.2	5.8	4.8	5.2	5.2	2.4										
21	3.2	4.2	5.2	4.2	5.5	6.5	6.3	7.5	9.3	9.2	9.0	9.0	8.8	10.5	12.8	10.7	10.9	13.1	13.1	14.7	1.6									
22	4.1	5.1	5.0	4.0	6.4	7.4	6.0	5.7	10.2	8.7	8.7	8.8	9.8	11.0	12.9	11.4	11.3	11.3	13.5	14.5	3.5	1.4								
23	4.8	5.8	4.8	3.8	8.2	8.0	6.2	5.8	10.3	8.8	8.8	9.0	11.3	12.2	13.1	11.6	11.5	11.5	13.7	14.7	6.3	2.8	1.4							
24	8.3	9.3	8.2	7.3	11.6	11.4	9.6	9.3	13.8	12.3	12.3	12.4	14.8	15.6	16.5	15.0	14.9	14.9	17.1	18.1	9.8	6.3	3.4	1.7						
25	6.8	7.8	8.8	7.8	9.1	10.1	9.9	10.8	12.9	12.8	12.6	12.6	12.4	14.1	16.4	14.3	14.5	16.5	16.7	18.3	6.2	5.3	8.2	11.6	2.7					
26	19.8	20.8	19.8	18.8	22.6	19.8	18.8	20.0	20.7	19.2	17.8	16.4	23.8	23.3	22.3	20.8	20.3	20.3	23.2	23.5	21.3	17.8	16.4	18.4	23.2	5.0				
27	55.0	54.0	55.0	56.0	52.7	51.8	51.9	54.3	50.2	50.0	50.6	52.3	52.2	51.7	46.2	47.4	48.8	50.0	48.0	50.2	57.8	57.9	58.1	61.5	61.4	68.8	5.0			
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
29	66.8	67.8	68.8	67.8	69.1	70.1	69.9	70.8	72.9	72.8	72.6	72.6	72.4	74.1	76.4	74.3	74.5	76.5	76.7	78.3	66.2	65.3	68.2	71.6	62.7	84.6	124.1	0.0	5.0	
30	19.8	20.8	19.8	18.8	22.6	19.8	18.8	20.0	20.7	19.2	17.8	16.4	23.8	23.3	22.3	20.8	20.3	20.3	23.2	23.5	21.3	17.8	16.4	18.4	23.2	5.0	68.8	0.0	84.6	5.0

(j) Travel Time [at the Start of Simulation], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.2	2.8	2.4	4.1	4.1	3.9	4.5	4.6	5.3	6.0	7.6	6.2	6.9	7.7	8.6	11.1	2.3	2.5	4.5	7.4	5.0	15.9	18.4	99.3	11.7	15.9
2	0.9	0.9	0.9	1.5	1.8	2.5	1.8	3.6	3.7	3.6	4.0	4.1	4.9	5.7	7.2	5.8	6.4	7.1	8.2	10.6	3.0	3.2	4.9	7.8	5.7	16.3	18.0	98.9	12.5	16.3
3	1.6	0.9	0.9	0.9	2.4	2.9	1.6	3.0	4.1	3.7	3.8	3.9	5.5	6.1	7.6	6.0	6.2	6.9	8.0	10.4	3.9	3.3	4.2	7.1	6.6	15.6	18.4	99.4	13.3	15.5
4	0.6	1.4	1.2	2.0	2.8	3.4	2.2	3.9	4.7	4.2	4.3	4.4	5.9	6.6	8.2	6.5	6.7	7.5	8.5	11.0	2.9	3.1	4.3	7.2	5.6	15.7	19.0	99.9	12.4	15.6
5	2.3	1.8	2.4	2.9	2.6	2.3	2.9	4.6	3.7	3.7	4.4	4.5	3.1	4.9	7.2	5.9	6.8	7.6	8.3	10.7	3.5	3.7	5.9	8.8	6.3	16.7	18.0	98.2	13.0	16.7
6	2.7	2.2	2.8	3.3	2.3	2.0	1.7	5.0	2.6	2.5	3.2	3.3	4.4	4.2	6.1	4.7	5.6	6.3	7.1	9.6	3.9	4.1	6.3	9.2	6.6	15.5	16.9	97.5	13.4	15.5
7	2.8	1.8	1.6	2.2	2.8	2.2	2.9	3.6	3.1	2.0	2.2	2.3	5.7	5.6	6.1	4.4	4.6	5.3	6.3	8.8	4.4	4.5	5.4	8.3	7.1	14.5	16.9	98.9	13.8	14.5
8	4.2	3.6	3.0	3.6	4.6	5.0	3.6	4.9	6.2	5.4	4.6	3.9	7.7	8.2	8.9	7.2	7.0	7.0	9.2	10.5	6.3	5.0	5.9	8.7	9.0	16.2	19.7	101.4	15.7	16.1
9	4.2	3.7	4.3	4.8	3.7	2.3	3.1	6.5	3.8	1.1	2.3	3.7	4.0	2.5	4.7	3.3	4.5	6.1	5.7	8.2	5.4	5.6	7.8	10.7	8.2	15.9	15.5	95.8	14.9	15.9
10	4.1	3.6	3.7	4.2	3.7	2.2	2.0	5.4	1.1	1.1	1.2	2.6	5.1	3.5	4.6	3.2	3.5	5.1	5.3	7.7	5.3	5.5	7.5	10.3	8.0	14.9	15.4	96.8	14.8	14.9
11	4.8	4.0	3.8	4.3	4.4	2.9	2.2	4.6	2.3	1.2	1.5	1.8	6.3	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.0	6.2	7.2	10.1	8.7	14.0	15.9	98.0	15.5	14.0
12	4.9	4.1	3.9	4.4	4.5	3.0	2.3	3.9	3.7	2.6	1.8	4.4	7.0	6.2	6.1	4.4	4.2	3.6	6.4	7.7	6.1	6.0	6.9	9.8	8.9	12.2	16.9	99.5	15.6	12.2
13	5.4	4.9	5.5	6.0	3.1	3.9	5.1	7.8	4.0	5.1	6.3	6.8	6.0	5.3	7.6	6.2	7.5	9.0	8.6	11.1	6.7	6.8	9.1	11.9	9.4	19.0	18.4	98.5	16.1	19.0
14	6.1	5.7	6.2	6.7	4.9	4.3	5.6	8.5	2.5	3.5	4.8	6.2	5.3	5.7	6.0	4.7	5.9	7.5	7.1	9.5	7.4	7.5	9.8	12.6	10.1	18.4	16.8	93.3	16.8	18.4
15	7.7	7.2	7.7	8.2	7.2	5.8	6.1	8.9	4.7	4.6	5.1	6.1	7.6	6.0	4.4	2.8	4.1	5.4	2.8	5.3	8.9	9.1	11.3	14.2	11.7	18.3	12.6	99.3	18.4	18.3
16	6.3	5.8	6.0	6.5	5.9	4.5	4.4	7.2	3.3	3.2	3.4	4.4	6.2	4.7	2.8	2.1	1.5	3.1	3.3	5.8	7.6	7.7	9.8	12.6	10.3	16.6	13.6	97.9	17.0	16.6
17	7.2	6.4	6.2	6.7	6.8	5.3	4.6	7.0	4.5	3.5	3.6	4.2	7.5	5.9	4.1	1.5	1.6	1.6	3.5	5.2	8.4	8.6	10.0	12.8	11.1	16.5	14.9	99.2	17.9	16.5
18	7.9	7.1	6.9	7.5	7.6	6.0	5.3	7.0	6.1	5.1	3.8	3.6	9.0	7.5	5.4	3.1	1.6	3.2	4.7	5.1	9.2	9.1	10.0	12.8	11.9	15.8	16.2	100.8	18.6	15.8
19	8.7	8.2	8.0	8.5	8.3	6.9	6.3	9.2	5.7	5.3	5.4	6.4	8.6	7.1	2.8	3.3	3.5	4.7	4.7	4.7	10.0	10.1	11.8	14.6	12.7	18.6	12.5	100.4	19.4	18.6
20	11.2	10.6	10.4	11.0	10.7	9.3	8.8	10.5	8.2	7.7	7.4	7.7	11.1	9.5	5.3	5.8	5.2	5.1	4.7	8.6	12.4	12.6	13.5	16.4	15.2	20.0	16.1	102.8	21.9	19.9
21	2.6	3.0	3.6	3.2	3.5	4.2	4.5	6.3	5.4	5.3	6.0	6.1	6.7	7.4	8.9	7.6	8.4	9.2	10.0	12.4	7.4	2.3	4.6	7.4	4.9	15.9	19.7	100.7	11.6	15.9
22	2.7	3.2	3.3	2.7	3.7	4.4	4.3	5.0	5.6	5.5	6.2	6.0	6.8	7.5	9.1	7.7	8.6	9.1	10.1	12.6	2.3	2.3	2.3	5.1	4.1	13.6	19.9	100.8	10.8	13.6
23	4.2	5.0	4.2	3.6	5.9	6.5	5.3	5.9	7.8	7.3	7.2	6.9	9.1	9.7	11.3	9.6	9.8	10.0	11.6	13.5	4.6	2.3	2.6	2.9	6.3	11.3	22.1	103.0	13.1	11.3
24	7.0	7.9	7.1	6.4	8.8	9.4	8.1	8.7	10.6	10.2	10.1	9.8	11.9	12.6	14.1	12.5	12.7	12.8	14.5	16.4	7.4	5.1	2.9	6.0	9.2	10.7	24.9	105.8	15.9	10.7
25	5.3	5.7	6.3	5.9	6.3	6.9	7.2	9.0	8.2	8.0	8.7	8.9	9.4	10.1	11.7	10.3	11.1	11.9	12.7	15.2	4.9	4.1	6.3	9.2	13.4	17.7	22.5	103.4	6.7	17.7
26	15.5	16.3	15.6	14.9	16.7	15.2	14.5	16.2	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	20.0	15.9	13.6	11.3	10.7	17.7	23.4	29.1	111.7	24.4	1.2
27	18.5	18.0	18.5	19.0	18.0	16.6	16.9	19.7	15.5	15.4	15.9	16.9	18.4	16.8	12.6	13.6	14.9	16.2	12.5	16.1	19.7	19.9	22.1	25.0	22.5	29.1	69.6	110.1	29.2	29.1
28	99.4	98.9	99.5	100.0	98.2	97.6	98.8	101.8	95.8	96.8	98.0	99.5	98.5	93.3	99.3	97.9	99.2	100.8	100.4	102.8	100.7	100.8	103.0	105.9	103.4	111.7	110.1	110.1	110.1	111.7
29	12.1	12.5	13.0	12.7	13.0	13.6	13.9	15.7	14.9	14.8	15.5	15.6	16.1	16.8	18.4	17.0	17.9	18.6	19.4	21.9	11.6	10.8	13.1	15.9	6.7	24.4	29.2	110.1	67.2	24.4
30	15.5	16.3	15.5	14.9	16.7	15.2	14.5	16.1	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	19.9	15.9	13.6	11.3	10.7	17.7	1.2	29.1	111.7	24.4	24.4

F\T : zone from \ zone to

External Zone	Destination	Time (min)	to	How to Calculate
26, 30	Catacaos (18 km), [Chiclayo (200km)]	15	Catacaos	Minimum (time to zone 12 or 23) +15 min
27	Sullana (38 km), Paita (50km)	45	Sullana, (60min to Paita)	Minimum (time to zone 15) +15 min
28	nothing	0	-	0
29	Chulucanas (55km)	60	Chulucanas	Minimum (time to zone 25) +15 min

Table 7-11 (1) T-model 2 Simulation Results : Travel Time of "Mode" Trips

(a) Mode Trips for Mode [All : (1) ~ (5)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.3	3.3	2.4	4.2	4.3	4.2	4.6	4.7	5.5	6.2	7.9	6.5	7.0	7.7	8.8	11.2	2.4	2.5	4.7	7.6	5.1	16.1	18.7	99.5	11.8	16.1
2	0.9	0.9	0.9	1.5	1.8	2.8	1.9	3.6	3.9	3.8	4.0	4.1	5.0	5.8	7.4	6.0	6.4	7.2	8.2	10.7	3.2	3.3	5.1	8.0	5.9	16.4	18.2	99.0	12.6	16.3
3	1.6	0.9	0.9	1.0	2.4	3.3	1.7	3.0	4.3	3.7	3.8	3.9	5.6	6.2	7.8	6.0	6.2	7.0	8.0	10.5	3.9	3.5	4.4	7.3	6.6	15.8	18.6	99.5	13.4	15.8
4	0.6	1.5	1.2	2.0	2.9	3.8	2.2	3.9	4.8	4.3	4.4	4.5	6.1	6.7	8.3	6.6	6.8	7.5	8.6	11.0	3.0	3.1	4.5	7.4	5.7	15.9	19.1	100.0	12.4	15.9
5	2.4	1.8	2.4	3.0	2.7	2.4	2.9	4.7	3.7	3.9	4.6	4.7	3.2	5.0	7.3	5.9	7.0	7.7	8.3	10.8	3.7	3.9	6.2	9.1	6.4	16.9	18.1	98.3	13.1	16.9
6	2.9	2.3	2.9	3.5	2.4	2.1	1.7	5.2	2.7	2.6	3.3	3.4	4.5	4.3	6.3	4.9	5.7	6.4	7.3	9.8	4.2	4.4	6.7	9.6	6.9	15.6	17.0	97.5	13.6	15.6
7	2.8	1.9	1.7	2.2	2.9	2.7	3.2	3.6	3.1	2.1	2.2	2.3	5.9	5.7	6.1	4.4	4.6	5.3	6.4	8.8	4.7	4.7	5.6	8.5	7.4	14.5	16.9	98.9	14.1	14.5
8	4.3	3.6	3.0	3.7	4.7	5.4	3.6	5.0	6.4	5.5	4.6	3.9	7.9	8.3	8.9	7.2	7.0	7.0	9.2	10.5	6.5	5.1	6.0	9.0	9.2	16.2	19.7	101.6	15.9	16.1
9	4.5	3.9	4.5	5.1	3.7	2.8	3.2	6.5	3.8	1.1	2.3	3.7	4.1	2.5	4.7	3.3	4.6	6.1	5.8	8.2	5.8	6.0	8.3	11.2	8.5	16.0	15.5	95.8	15.3	16.0
10	4.4	3.8	3.8	4.4	3.9	2.7	2.1	5.5	1.1	1.2	1.2	2.7	5.2	3.6	4.6	3.2	3.5	5.1	5.3	7.8	5.7	5.9	7.7	10.6	8.4	14.9	15.4	96.9	15.1	14.9
11	5.0	4.1	3.9	4.4	4.6	3.4	2.2	4.6	2.3	1.2	1.5	1.8	6.4	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.4	6.5	7.4	10.3	9.1	14.0	15.9	98.1	15.8	14.0
12	5.1	4.2	4.0	4.6	4.7	3.5	2.3	3.9	3.7	2.7	1.8	4.7	7.5	6.3	6.2	4.4	4.2	3.6	6.4	7.7	6.5	6.2	7.1	9.8	9.2	12.2	16.9	99.5	15.9	12.2
13	5.7	5.1	5.7	6.3	3.3	4.1	5.4	8.0	4.2	5.2	6.5	7.1	6.2	5.4	7.7	6.4	7.6	9.2	8.8	11.2	7.0	7.1	9.4	12.4	9.7	19.3	18.5	98.7	16.4	19.3
14	6.7	6.1	6.7	7.3	5.3	4.8	6.0	9.0	2.8	3.9	5.1	6.5	5.7	6.0	6.4	5.0	6.3	7.8	7.4	9.9	8.0	8.2	10.5	13.4	10.7	18.8	17.2	93.3	17.4	18.8
15	8.1	7.5	7.8	8.4	7.3	6.4	6.2	9.0	4.7	4.6	5.1	6.2	7.7	6.1	4.5	2.8	4.1	5.4	2.8	5.3	9.4	9.5	11.8	14.7	12.1	18.4	12.6	99.4	18.8	18.4
16	6.7	6.1	6.1	6.7	5.9	5.0	4.5	7.2	3.3	3.2	3.4	4.4	6.3	4.7	2.8	2.2	1.5	3.2	3.3	5.8	8.0	8.2	10.0	13.0	10.7	16.7	13.6	98.0	17.4	16.7
17	7.4	6.5	6.3	6.9	7.1	5.8	4.6	7.0	4.6	3.5	3.6	4.2	7.6	6.0	4.1	1.5	1.6	1.6	3.5	5.2	8.8	9.0	10.2	13.1	11.5	16.5	14.9	99.3	18.3	16.5
18	8.1	7.2	7.0	7.6	7.8	6.5	5.3	7.0	6.1	5.1	3.8	3.6	9.2	7.6	5.4	3.2	1.6	3.2	4.8	5.1	9.5	9.2	10.1	13.0	12.2	15.8	16.2	100.8	19.0	15.8
19	9.2	8.3	8.1	8.7	8.4	7.5	6.5	9.3	5.8	5.4	5.4	6.5	8.8	7.2	2.9	3.4	3.5	4.8	4.7	4.7	10.5	10.6	12.1	15.0	13.2	18.7	12.5	100.5	19.9	18.7
20	11.6	10.8	10.6	11.1	10.8	9.9	8.9	10.5	8.2	7.8	7.4	7.7	11.2	9.6	5.3	5.8	5.2	5.1	4.7	8.8	12.9	12.8	13.7	16.6	15.6	20.0	16.1	102.9	22.3	19.9
21	2.8	3.3	3.8	3.5	3.8	4.8	4.8	6.5	5.8	5.7	6.4	6.5	7.0	7.7	9.4	8.0	8.8	9.6	10.4	12.9	7.6	2.3	4.7	7.6	4.9	16.1	20.2	101.0	11.6	16.1
22	2.7	3.4	3.3	3.0	3.9	4.9	4.3	5.4	6.0	5.9	6.5	6.5	7.1	7.9	9.5	8.1	8.9	9.5	10.6	13.0	2.4	2.3	2.3	5.3	4.1	13.7	20.3	101.1	10.8	13.7
23	5.1	5.9	5.1	4.5	6.8	7.8	6.2	6.8	8.8	8.3	8.1	7.8	10.0	10.7	12.3	10.6	10.8	10.9	12.6	14.4	5.5	3.1	3.0	2.9	7.2	11.4	23.1	104.0	13.9	11.4
24	17.5	18.4	17.6	16.9	19.3	19.8	18.6	19.3	20.0	19.0	18.1	16.3	22.5	22.6	22.5	20.7	20.6	19.9	22.7	24.0	18.1	15.7	13.0	16.4	19.8	17.3	33.3	115.8	26.5	17.3
25	5.5	6.0	6.5	6.1	6.5	7.5	7.5	9.2	8.5	8.4	9.1	9.2	9.7	10.4	12.1	10.7	11.5	12.2	13.1	15.6	4.9	4.1	6.4	9.4	13.6	17.8	22.8	103.7	6.7	17.8
26	17.3	16.4	16.2	16.8	16.9	15.7	14.5	16.2	16.0	14.9	14.0	12.2	19.7	18.5	18.4	16.6	16.5	15.8	18.6	20.0	18.7	17.7	15.0	10.8	21.4	25.3	29.2	111.8	28.2	1.2
27	18.9	18.3	18.6	19.2	18.1	17.2	17.0	19.7	15.5	15.4	15.9	17.0	18.5	16.9	12.6	13.6	14.9	16.2	12.5	16.1	20.2	20.3	22.5	25.5	22.9	29.2	69.7	110.2	29.6	29.2
28	100.0	99.4	100.0	100.5	98.5	98.1	99.2	102.2	96.1	97.1	98.4	99.8	98.9	93.3	99.7	98.3	99.5	101.1	100.7	103.2	101.3	101.4	103.7	106.7	104.0	112.0	110.4	110.6	110.7	112.0
29	12.2	12.7	13.2	12.9	13.2	14.2	14.2	15.9	15.2	15.1	15.8	15.9	16.4	17.1	18.8	17.4	18.2	19.0	19.8	22.3	11.6	10.8	13.1	16.1	6.7	24.6	29.6	110.4	67.5	24.5
30	17.3	16.4	16.2	16.8	16.9	15.7	14.5	16.1	15.9	14.9	14.0	12.2	19.7	18.5	18.4	16.6	16.5	15.8	18.6	19.9	18.7	17.7	15.0	10.8	21.4	1.2	29.2	111.7	28.1	28.1

F\T : zone from \ zone to

(b) Mode Trips for Mode [1 : Private Automobiles], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.2	2.9	2.4	4.1	4.1	4.0	4.5	4.6	5.3	6.0	7.6	6.2	6.9	7.7	8.6	11.1	2.3	2.5	4.6	7.5	5.0	16.0	18.4	99.3	11.7	16.0
2	0.9	0.9	0.9	1.5	1.8	2.6	1.8	3.6	3.7	3.6	4.0	4.1	4.9	5.7	7.2	5.9	6.4	7.1	8.2	10.6	3.0	3.2	5.0	7.9	5.8	16.3	18.0	98.9	12.5	16.3
3	1.6	0.9	0.9	0.9	2.4	3.0	1.6	3.0	4.2	3.7	3.8	3.9	5.5	6.1	7.7	6.0	6.2	6.9	8.0	10.4	3.9	3.4	4.3	7.2	6.6	15.7	18.5	99.4	13.3	15.6
4	0.6	1.4	1.2	2.0	2.8	3.5	2.2	3.9	4.7	4.2	4.3	4.4	5.9	6.6	8.2	6.5	6.7	7.5	8.5	11.0	2.9	3.1	4.4	7.3	5.6	15.8	19.0	99.9	12.4	15.7
5	2.3	1.8	2.4	2.9	2.6	2.3	2.9	4.6	3.7	3.7	4.4	4.6	3.1	4.9	7.2	5.9	6.8	7.6	8.3	10.7	3.5	3.7	6.0	8.9	6.3	16.8	18.0	98.2	13.0	16.8
6	2.7	2.2	2.8	3.3	2.3	2.0	1.7	5.0	2.6	2.5	3.2	3.3	4.4	4.2	6.1	4.7	5.6	6.3	7.2	9.6	3.9	4.1	6.4	9.3	6.7	15.5	16.9	97.5	13.4	15.5
7	2.8	1.8	1.6	2.2	2.8	2.3	2.9	3.6	3.1	2.0	2.2	2.3	5.7	5.6	6.1	4.4	4.6	5.3	6.3	8.8	4.4	4.6	5.5	8.4	7.1	14.5	16.9	98.9	13.8	14.5
8	4.2	3.6	3.0	3.6	4.6	5.1	3.6	4.9	6.3	5.4	4.6	3.9	7.7	8.2	8.9	7.2	7.0	7.0	9.2	10.5	6.3	5.1	6.0	8.8	9.0	16.2	19.7	101.5	15.7	16.1
9	4.2	3.7	4.3	4.8	3.7	2.4	3.1	6.5	3.8	1.1	2.3	3.7	4.0	2.5	4.7	3.3	4.5	6.1	5.7	8.2	5.5	5.6	7.9	10.8	8.2	15.9	15.5	95.8	14.9	15.9
10	4.1	3.6	3.7	4.2	3.7	2.3	2.0	5.4	1.1	1.1	1.2	2.6	5.1	3.5	4.6	3.2	3.5	5.1	5.3	7.7	5.4	5.5	7.5	10.4	8.1	14.9	15.4	96.8	14.8	14.9
11	4.8	4.0	3.8	4.3	4.4	3.0	2.2	4.6	2.3	1.2	1.5	1.8	6.3	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.1	6.2	7.3	10.2	8.8	14.0	15.9	98.0	15.5	14.0
12	4.9	4.1	3.9	4.4	4.6	3.1	2.3	3.9	3.7	2.6	1.8	4.4	7.0	6.2	6.1	4.4	4.2	3.6	6.4	7.7	6.2	6.1	7.0	9.8	8.9	12.2	16.9	99.5	15.6	12.2
13	5.4	4.9	5.5	6.0	3.1	3.9	5.1	7.8	4.0	5.1	6.3	6.8	6.0	5.3	7.6	6.2	7.5	9.0	8.6	11.1	6.7	6.8	9.1	12.0	9.4	19.0	18.4	98.5	16.1	19.0
14	6.2	5.7	6.3	6.8	4.9	4.4	5.6	8.5	2.5	3.5	4.8	6.2	5.3	5.7	6.0	4.7	5.9	7.5	7.1	9.5	7.4	7.6	9.8	12.7	10.1	18.4	16.8	93.3	16.8	18.4
15	7.7	7.3	7.7	8.3	7.2	5.9	6.1	8.9	4.7	4.6	5.1	6.1	7.6	6.1	4.4	2.8	4.1	5.4	2.8	5.3	9.0	9.2	11.4	14.3	11.7	18.4	12.6	99.3	18.4	18.3
16	6.4	5.9	6.0	6.5	5.9	4.5	4.4	7.2	3.3	3.2	3.4	4.4	6.2	4.7	2.8	2.1	1.5	3.1	3.3	5.8	7.6	7.8	9.9	12.7	10.3	16.6	13.6	97.9	17.1	16.6
17	7.2	6.4	6.2	6.7	6.8	5.4	4.6	7.0	4.5	3.5	3.6	4.2	7.5	5.9	4.1	1.5	1.6	1.6	3.5	5.2	8.5	8.6	10.1	12.9	11.2	16.5	14.9	99.2	17.9	16.5
18	8.0	7.1	6.9	7.5	7.6	6.1	5.3	7.0	6.1	5.1	3.8	3.6	9.0	7.5	5.4	3.1	1.6	3.2	4.7	5.1	9.2	9.1	10.1	12.9	11.9	15.8	16.2	100.8	18.6	15.8
19	8.8	8.2	8.0	8.5	8.3	6.9	6.3	9.2	5.7	5.3	5.4	6.4	8.6	7.1	2.8	3.3	3.5	4.7	4.7	4.7	10.0	10.2	11.8	14.7	12.8	18.6	12.5	100.4	19.5	18.6
20	11.2	10.6	10.4	11.0	10.7	9.4	8.8	10.5	8.2	7.7	7.4	7.7	11.1	9.6	5.3	5.8	5.2	5.1	4.7	8.6	12.5	12.7	13.6	16.5	15.2	20.0	16.1	102.8	21.9	19.9
21	2.6	3.0	3.6	3.2	3.6	4.3	4.5	6.3	5.5	5.4	6.1	6.2	6.7	7.4	9.0	7.6	8.5	9.2	10.0	12.5	7.4	2.3	4.6	7.5	4.9	16.0	19.8	100.7	11.6	16.0
22	2.7	3.2	3.3	2.9	3.7	4.5	4.3	5.2	5.6	5.5	6.2	6.2	6.9	7.6	9.2	7.8	8.6	9.2	10.2	12.7	2.3	2.3	2.3	5.2	4.1	13.7	19.9	100.8	10.8	13.6
23	4.8	5.6	4.8	4.2	6.5	7.2	5.9	6.5	8.4	7.9	7.8	7.6	9.6	10.3	11.9	10.3	10.4	10.6	12.2	14.1	5.2	2.9	2.9	2.9	7.0	11.4	22.7	103.6	13.7	11.3
24	8.0	8.8	8.0	7.4	9.7	10.4	9.1	9.7	11.6	11.1	11.0	9.9	12.8	13.5	15.1	13.4	13.6	13.5	15.4	17.3	8.4	6.1	3.2	6.7	10.1	10.9	25.9	106.8	16.9	10.9
25	5.4	5.8	6.3	6.0	6.3	7.0	7.2	9.0	8.2	8.1	8.8	8.9	9.4	10.1	11.7	10.3	11.2	11.9	12.8	15.2	4.9	4.1	6.4	9.3	13.5	17.7	22.5	103.4	6.7	17.7
26	16.3	16.3	16.1	15.7	16.8	15.3	14.5	16.2	15.9	14.9	14.0	12.2	19.3	18.4	18.3	16.6	16.5	15.8	18.6	20.0	16.7	14.4	11.5	10.8	18.5	23.8	29.1	111.7	25.2	1.2
27	18.5	18.0	18.5	19.0	18.0	16.7	16.9	19.7	15.5	15.4	15.9	16.9	18.4	16.8	12.6	13.6	14.9	16.2	12.5	16.1	19.8	19.9	22.2	25.1	22.5	29.1	69.6	110.1	29.2	29.1
28	99.4	98.9	99.5	100.0	98.2	97.6	98.8	101.8	95.8	96.8	98.0	99.5	98.5	93.3	99.3	97.9	99.2	100.8	100.4	102.8	100.7	100.8	103.1	106.0	103.4	111.7	110.1	110.1	110.1	111.7
29	12.1	12.5	13.0	12.7	13.0	13.8	14.0	15.7	14.9	14.8	15.5	15.6	16.1	16.9	18.4	17.1	17.9	18.7	19.5	21.9	11.6	10.8	13.1	16.0	6.7	24.5	29.2	110.1	67.3	24.4
30	16.3	16.3	16.1	15.7	16.8	15.3	14.5	16.1	15.9	14.9	14.0	12.2	19.3	18.4	18.3	16.6	16.5	15.8	18.6	19.9	16.7	14.4	11.5	10.7	18.4	1.2	29.1	111.7	25.2	25.2

F\T : zone from \ zone to

External Zone	Destination	Time (min)	to	How to Calculate
26, 30	Catacaos (18 km), [Chiclayo (200km)]	15	Catacaos	Minimum (time to zone 12 or 23) +15 min
27	Sullana (38 km), Paita (50km)	45	Sullana, (60min to Paita)	Minimum (time to zone 15) +15 min
28	nothing	0	-	0
29	Chulucanas (55km)	60	Chulucanas	Minimum (time to zone 25) +15 min

Table 7-11 (2) T-model 2 Simulation Results : Travel Time of "Mode" Trips

(c) Mode Trips for Mode [2 : Transit 1 (Collectibos)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.2	2.8	2.4	4.1	4.1	3.9	4.5	4.6	5.3	6.0	7.6	6.2	6.9	7.7	8.6	11.1	2.3	2.5	4.5	7.4	5.0	15.9	18.4	99.3	11.7	15.9
2	0.9	0.9	0.9	1.5	1.8	2.5	1.8	3.6	3.7	3.6	4.0	4.1	4.9	5.7	7.2	5.8	6.4	7.1	8.2	10.6	3.0	3.2	4.9	7.8	5.7	16.3	18.0	98.9	12.5	16.3
3	1.6	0.9	0.9	0.9	2.4	2.9	1.6	3.0	4.1	3.7	3.8	3.9	5.5	6.1	7.6	6.0	6.2	6.9	8.0	10.4	3.9	3.3	4.2	7.1	6.6	15.6	18.4	99.4	13.3	15.5
4	0.6	1.4	1.2	2.0	2.8	3.4	2.2	3.9	4.7	4.2	4.3	4.4	5.9	6.6	8.2	6.5	6.7	7.5	8.5	11.0	2.9	3.1	4.3	7.2	5.6	15.7	19.0	99.9	12.4	15.6
5	2.3	1.8	2.4	2.9	2.6	2.3	2.9	4.6	3.7	3.7	4.4	4.5	3.1	4.9	7.2	5.9	6.8	7.6	8.3	10.7	3.5	3.7	5.9	8.8	6.3	16.7	18.0	98.2	13.0	16.7
6	2.7	2.2	2.8	3.3	2.3	2.0	1.7	5.0	2.6	2.5	3.2	3.3	4.4	4.2	6.1	4.7	5.6	6.3	7.1	9.6	3.9	4.1	6.3	9.2	6.6	15.5	16.9	97.5	13.4	15.5
7	2.8	1.8	1.6	2.2	2.8	2.2	2.9	3.6	3.1	2.0	2.2	2.3	5.7	5.6	6.1	4.4	4.6	5.3	6.3	8.8	4.4	4.5	5.4	8.3	7.1	14.5	16.9	98.9	13.8	14.5
8	4.2	3.6	3.0	3.6	4.6	5.0	3.6	4.9	6.2	5.4	4.6	3.9	7.7	8.2	8.9	7.2	7.0	7.0	9.2	10.5	6.3	5.0	5.9	8.7	9.0	16.2	19.7	101.4	15.7	16.1
9	4.2	3.7	4.3	4.8	3.7	2.3	3.1	6.5	3.8	1.1	2.3	3.7	4.0	2.5	4.7	3.3	4.5	6.1	5.7	8.2	5.4	5.6	7.8	10.7	8.2	15.9	15.5	95.8	14.9	15.9
10	4.1	3.6	3.7	4.2	3.7	2.2	2.0	5.4	1.1	1.1	1.2	2.6	5.1	3.5	4.6	3.2	3.5	5.1	5.3	7.7	5.3	5.5	7.5	10.3	8.0	14.9	15.4	96.8	14.8	14.9
11	4.8	4.0	3.8	4.3	4.4	2.9	2.2	4.6	2.3	1.2	1.5	1.8	6.3	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.0	6.2	7.2	10.1	8.7	14.0	15.9	98.0	15.5	14.0
12	4.9	4.1	3.9	4.4	4.5	3.0	2.3	3.9	3.7	2.6	1.8	4.4	7.0	6.2	6.1	4.4	4.2	3.6	6.4	7.7	6.1	6.0	6.9	9.8	8.9	12.2	16.9	99.5	15.6	12.2
13	5.4	4.9	5.5	6.0	3.1	3.9	5.1	7.8	4.0	5.1	6.3	6.8	6.0	5.3	7.6	6.2	7.5	9.0	8.6	11.1	6.7	6.8	9.1	11.9	9.4	19.0	18.4	98.5	16.1	19.0
14	6.1	5.7	6.2	6.7	4.9	4.3	5.6	8.5	2.5	3.5	4.8	6.2	5.3	5.7	6.0	4.7	5.9	7.5	7.1	9.5	7.4	7.5	9.8	12.6	10.1	18.4	16.8	93.3	16.8	18.4
15	7.7	7.2	7.7	8.2	7.2	5.8	6.1	8.9	4.7	4.6	5.1	6.1	7.6	6.0	4.4	2.8	4.1	5.4	2.8	5.3	8.9	9.1	11.3	14.2	11.7	18.3	12.6	99.3	18.4	18.3
16	6.3	5.8	6.0	6.5	5.9	4.5	4.4	7.2	3.3	3.2	3.4	4.4	6.2	4.7	2.8	2.1	1.5	3.1	3.3	5.8	7.6	7.7	9.8	12.6	10.3	16.6	13.6	97.9	17.0	16.6
17	7.2	6.4	6.2	6.7	6.8	5.3	4.6	7.0	4.5	3.5	3.6	4.2	7.5	5.9	4.1	1.5	1.6	1.6	3.5	5.2	8.4	8.6	10.0	12.8	11.1	16.5	14.9	99.2	17.9	16.5
18	7.9	7.1	6.9	7.5	7.6	6.0	5.3	7.0	6.1	5.1	3.8	3.6	9.0	7.5	5.4	3.1	1.6	3.2	4.7	5.1	9.2	9.1	10.0	12.8	11.9	15.8	16.2	100.8	18.6	15.8
19	8.7	8.2	8.0	8.5	8.3	6.9	6.3	9.2	5.7	5.3	5.4	6.4	8.6	7.1	2.8	3.3	3.5	4.7	4.7	4.7	10.0	10.1	11.8	14.6	12.7	18.6	12.5	100.4	19.4	18.6
20	11.2	10.6	10.4	11.0	10.7	9.3	8.8	10.5	8.2	7.7	7.4	7.7	11.1	9.5	5.3	5.8	5.2	5.1	4.7	8.6	12.4	12.6	13.5	16.4	15.2	20.0	16.1	102.8	21.9	19.9
21	2.6	3.0	3.6	3.2	3.5	4.2	4.5	6.3	5.4	5.3	6.0	6.1	6.7	7.4	8.9	7.6	8.4	9.2	10.0	12.4	7.4	2.3	4.6	7.4	4.9	15.9	19.7	100.7	11.6	15.9
22	2.7	3.2	3.3	2.7	3.7	4.4	4.3	5.0	5.6	5.5	6.2	6.0	6.8	7.5	9.1	7.7	8.6	9.1	10.1	12.6	2.3	2.3	2.3	5.1	4.1	13.6	19.9	100.8	10.8	13.6
23	4.2	5.0	4.2	3.6	5.9	6.5	5.3	5.9	7.8	7.3	7.2	6.9	9.1	9.7	11.3	9.6	9.8	10.0	11.6	13.5	4.6	2.3	2.6	2.9	6.3	11.3	22.1	103.0	13.1	11.3
24	7.0	7.9	7.1	6.4	8.8	9.4	8.1	8.7	10.6	10.2	10.1	9.8	11.9	12.6	14.1	12.5	12.7	12.8	14.5	16.4	7.4	5.1	2.9	6.0	9.2	10.7	24.9	105.8	15.9	10.7
25	5.3	5.7	6.3	5.9	6.3	6.9	7.2	9.0	8.2	8.0	8.7	8.9	9.4	10.1	11.7	10.3	11.1	11.9	12.7	15.2	4.9	4.1	6.3	9.2	13.4	17.7	22.5	103.4	6.7	17.7
26	15.5	16.3	15.6	14.9	16.7	15.2	14.5	16.2	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	20.0	15.9	13.6	11.3	10.7	17.7	23.4	29.1	111.7	24.4	1.2
27	18.5	18.0	18.5	19.0	18.0	16.6	16.9	19.7	15.5	15.4	15.9	16.9	18.4	16.8	12.6	13.6	14.9	16.2	12.5	16.1	19.7	19.9	22.1	25.0	22.5	29.1	69.6	110.1	29.2	29.1
28	99.4	98.9	99.5	100.0	98.2	97.6	98.8	101.8	95.8	96.8	98.0	99.5	98.5	93.3	99.3	97.9	99.2	100.8	100.4	102.8	100.7	100.8	103.0	105.9	103.4	111.7	110.1	110.1	110.1	111.7
29	12.1	12.5	13.0	12.7	13.0	13.6	13.9	15.7	14.9	14.8	15.5	15.6	16.1	16.8	18.4	17.0	17.9	18.6	19.4	21.9	11.6	10.8	13.1	15.9	6.7	24.4	29.2	110.1	67.2	24.4
30	15.5	16.3	15.5	14.9	16.7	15.2	14.5	16.1	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	19.9	15.9	13.6	11.3	10.7	17.7	1.2	29.1	111.7	24.4	24.4

F\T : zone from \ zone to

(d) Mode Trips for Mode [3 : Transit 2 (Combis)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.2	2.8	2.4	4.1	4.1	3.9	4.5	4.6	5.3	6.0	7.6	6.2	6.9	7.7	8.6	11.1	2.3	2.5	4.5	7.4	5.0	15.9	18.4	99.3	11.7	15.9
2	0.9	0.9	0.9	1.5	1.8	2.5	1.8	3.6	3.7	3.6	4.0	4.1	4.9	5.7	7.2	5.8	6.4	7.1	8.2	10.6	3.0	3.2	4.9	7.8	5.7	16.3	18.0	98.9	12.5	16.3
3	1.6	0.9	0.9	0.9	2.4	2.9	1.6	3.0	4.1	3.7	3.8	3.9	5.5	6.1	7.7	6.0	6.2	6.9	8.0	10.4	3.9	3.3	4.2	7.1	6.6	15.6	18.4	99.4	13.3	15.5
4	0.6	1.4	1.2	2.0	2.8	3.4	2.2	3.9	4.7	4.2	4.3	4.4	5.9	6.6	8.2	6.5	6.7	7.5	8.5	11.0	2.9	3.1	4.3	7.2	5.6	15.7	19.0	99.9	12.4	15.6
5	2.3	1.8	2.4	2.9	2.6	2.3	2.9	4.6	3.7	3.7	4.4	4.5	3.1	4.9	7.2	5.9	6.8	7.6	8.3	10.7	3.5	3.7	5.9	8.8	6.3	16.7	18.0	98.2	13.0	16.7
6	2.7	2.2	2.8	3.3	2.3	2.0	1.7	5.0	2.6	2.5	3.2	3.3	4.4	4.2	6.1	4.7	5.6	6.3	7.2	9.6	3.9	4.1	6.3	9.2	6.6	15.5	16.9	97.5	13.4	15.5
7	2.8	1.8	1.6	2.2	2.8	2.2	2.9	3.6	3.1	2.0	2.2	2.3	5.7	5.6	6.1	4.4	4.6	5.3	6.3	8.8	4.4	4.5	5.4	8.3	7.1	14.5	16.9	98.9	13.8	14.5
8	4.2	3.6	3.0	3.6	4.6	5.0	3.6	4.9	6.2	5.4	4.6	3.9	7.7	8.2	8.9	7.2	7.0	7.0	9.2	10.5	6.3	5.0	5.9	8.7	9.0	16.2	19.7	101.4	15.7	16.1
9	4.2	3.7	4.3	4.8	3.7	2.3	3.1	6.5	3.8	1.1	2.3	3.7	4.0	2.5	4.7	3.3	4.5	6.1	5.7	8.2	5.4	5.6	7.8	10.7	8.2	15.9	15.5	95.8	14.9	15.9
10	4.1	3.6	3.7	4.2	3.7	2.2	2.0	5.4	1.1	1.1	1.2	2.6	5.1	3.5	4.6	3.2	3.5	5.1	5.3	7.7	5.3	5.5	7.5	10.3	8.0	14.9	15.4	96.8	14.8	14.9
11	4.8	4.0	3.8	4.3	4.4	2.9	2.2	4.6	2.3	1.2	1.5	1.8	6.3	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.0	6.2	7.2	10.1	8.7	14.0	15.9	98.0	15.5	14.0
12	4.9	4.1	3.9	4.4	4.5	3.0	2.3	3.9	3.7	2.6	1.8	4.4	7.0	6.2	6.1	4.4	4.2	3.6	6.4	7.7	6.1	6.0	6.9	9.8	8.9	12.2	16.9	99.5	15.6	12.2
13	5.4	4.9	5.5	6.0	3.1	3.9	5.1	7.8	4.0	5.1	6.3	6.8	6.0	5.3	7.6	6.2	7.5	9.0	8.6	11.1	6.7	6.8	9.1	11.9	9.4	19.0	18.4	98.5	16.1	19.0
14	6.1	5.7	6.3	6.8	4.9	4.4	5.6	8.5	2.5	3.6	4.8	6.2	5.3	5.7	6.1	4.7	5.9	7.5	7.1	9.6	7.4	7.6	9.8	12.6	10.1	18.4	16.9	93.3	16.8	18.4
15	7.7	7.2	7.7	8.3	7.2	5.8	6.1	8.9	4.7	4.6	5.1	6.1	7.6	6.1	4.4	2.8	4.1	5.4	2.8	5.3	9.0	9.1	11.3	14.2	11.7	18.4	12.6	99.3	18.4	18.3
16	6.3	5.8	6.0	6.5	5.9	4.5	4.4	7.2	3.3	3.2	3.4	4.4	6.2	4.7	2.8	2.1	1.5	3.1	3.3	5.8	7.6	7.7	9.8	12.6	10.3	16.6	13.6	97.9	17.0	16.6
17	7.2	6.4	6.2	6.7	6.8	5.3	4.6	7.0	4.5	3.5	3.6	4.2	7.5	5.9	4.1	1.5	1.6	1.6	3.5	5.2	8.4	8.6	10.0	12.8	11.1	16.5	14.9	99.2	17.9	16.5
18	7.9	7.1	6.9	7.5	7.6	6.0	5.3	7.0	6.1	5.1	3.8	3.6	9.0	7.5	5.4	3.1	1.6	3.2	4.7	5.1	9.2	9.1	10.0	12.8	11.9	15.8	16.2	100.8	18.6	15.8
19	8.7	8.2	8.0	8.5	8.3	6.9	6.3	9.2	5.7	5.3	5.4	6.4	8.6	7.1	2.8	3.3	3.5	4.7	4.7	4.7	10.0	10.2	11.8	14.6	12.7	18.6	12.5	100.4	19.4	18.6
20	11.2	10.6	10.4	11.0	10.7	9.3	8.8	10.5	8.2	7.7	7.4	7.7	11.1	9.6	5.3	5.8	5.2	5.1	4.7	8.6	12.5	12.6	13.5	16.4	15.2	20.0	16.1	102.8	21.9	19.9
21	2.6	3.0	3.6	3.2	3.5	4.2	4.5	6.3	5.4	5.3	6.0	6.1	6.7	7.4	9.0	7.6	8.4	9.2	10.0	12.5	7.4	2.3	4.6	7.4	4.9	15.9	19.7	100.7	11.6	15.9
22	2.7	3.2	3.3	2.7	3.7	4.4	4.3	5.0	5.6	5.5	6.2	6.0	6.8	7.5	9.1	7.7	8.6	9.1	10.2	12.6	2.3	2.3	2.3	5.1	4.1	13.6	19.9	100.8	10.8	13.6
23	4.2	5.0	4.2	3.6	5.9	6.5	5.3	5.9	7.8	7.3	7.2	6.9	9.1	9.7	11.3	9.6	9.8	10.0	11.6	13.5	4.6	2.3	2.6	2.9	6.3	11.3	22.1	103.0	13.1	11.3
24	7.1	7.9	7.1	6.4	8.8	9.4	8.1	8.8	10.6	10.2	10.1	9.8	11.9	12.6	14.2	12.5	12.7	12.8	14.5	16.4	7.4	5.1	2.9	6.0	9.2	10.8	24.9	105.9	15.9	10.7
25	5.3	5.7	6.3	5.9	6.3	6.9	7.2	9.0	8.2	8.0	8.7	8.9	9.4	10.1	11.7	10.3	11.1	11.9	12.7	15.2	4.9	4.1	6.3	9.2	13.4	17.7	22.5	103.4	6.7	17.7
26	15.5	16.3	15.6	14.9	16.7	15.2	14.5	16.2	15.9	14.9	14.0	12.2	19.2	18.4	18.4	16.6	16.5	15.8	18.6	20.0	15.9	13.6	11.3	10.7	17.7	23.4	29.1	111.7	24.4	1.2
27	18.5	18.0	18.5	19.0	18.0	16.6	16.9	19.7	15.5	15.4	15.9	16.9	18.4	16.8	12.6	13.6	14.9	16.2	12.5	16.1	19.7	19.9	22.1	25.0	22.5	29.1	69.6	110.1	29.2	29.1
28	99.4	98.9	99.5	100.0	98.2	97.6	98.9	101.8	95.8	96.8	98.1	99.5	98.5	93.3	99.3	98.0	99.2	100.8	100.4	102.8	100.7	100.8	103.0	105.9	103.4	111.7	110.1	110.1	110.1	111.7
29	12.1	12.5	13.0	12.7	13.0	13.6	13.9	15.7	14.9	14.8	15.5	15.6	16.1	16.8	18.4	17.0	17.9	18.6	19.4	21.9	11.6	10.8	13.1	15.9	6.7	24.4	29.2	110.1	67.2	24.4
30	15.5	16.3	15.5	14.9	16.7	15.2	14.5	16.1	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	19.9	15.9	13.6	11.3	10.7	17.7	1.2	29.1	111.7	24.4	24.4

F\T : zone from \ zone to

External Zone	Destination	Time (min)	to	How to Calculate
26, 30	Catacaos (18 km), [Chiclayo (200km)]	15	Catacaos	Minimum (time to zone 12 or 23) +15 min
27	Sullana (38 km), Paita (50km)	45	Sullana, (60min to Paita)	Minimum (time to zone 15) +15 min
28	nothing	0	-	0
29	Chulucanas (55km)	60	Chulucanas	Minimum (time to zone 25) +15 min

Table 7-11 (3) T-model 2 Simulation Results : Travel Time of "Mode" Trips

(e) Mode Trips for Mode [4 : Walking], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.2	2.8	2.4	4.1	4.1	3.9	4.5	4.6	5.3	6.0	7.6	6.2	6.9	7.7	8.6	11.1	2.3	2.5	4.5	7.4	5.0	15.9	18.4	99.3	11.7	15.9
2	0.9	0.9	0.9	1.5	1.8	2.5	1.8	3.6	3.7	3.6	4.0	4.1	4.9	5.7	7.2	5.8	6.4	7.1	8.2	10.6	3.0	3.2	5.0	7.8	5.7	16.3	18.0	98.9	12.5	16.3
3	1.6	0.9	0.9	0.9	2.4	2.9	1.6	3.0	4.1	3.7	3.8	3.9	5.5	6.1	7.6	6.0	6.2	6.9	8.0	10.4	3.9	3.3	4.2	7.1	6.6	15.6	18.4	99.4	13.3	15.6
4	0.6	1.4	1.2	2.0	2.8	3.4	2.2	3.9	4.7	4.2	4.3	4.4	5.9	6.6	8.2	6.5	6.7	7.5	8.5	11.0	2.9	3.1	4.3	7.2	5.6	15.7	19.0	99.9	12.4	15.7
5	2.3	1.8	2.4	2.9	2.6	2.3	2.9	4.6	3.7	3.7	4.4	4.5	3.1	4.9	7.2	5.9	6.8	7.6	8.3	10.7	3.5	3.7	5.9	8.8	6.3	16.7	18.0	98.2	13.0	16.7
6	2.7	2.2	2.8	3.3	2.3	2.0	1.7	5.0	2.6	2.5	3.2	3.3	4.4	4.2	6.1	4.7	5.6	6.3	7.1	9.6	3.9	4.1	6.3	9.2	6.6	15.5	16.9	97.5	13.4	15.5
7	2.8	1.8	1.6	2.2	2.8	2.2	2.9	3.6	3.1	2.0	2.2	2.3	5.7	5.6	6.1	4.4	4.6	5.3	6.3	8.8	4.4	4.5	5.4	8.3	7.1	14.5	16.9	98.9	13.8	14.5
8	4.2	3.6	3.0	3.6	4.6	5.0	3.6	4.9	6.2	5.4	4.6	3.9	7.7	8.2	8.9	7.2	7.0	7.0	9.2	10.5	6.3	5.0	5.9	8.8	9.0	16.2	19.7	101.4	15.7	16.1
9	4.2	3.7	4.3	4.8	3.7	2.3	3.1	6.5	3.8	1.1	2.3	3.7	4.0	2.5	4.7	3.3	4.5	6.1	5.7	8.2	5.4	5.6	7.8	10.7	8.2	15.9	15.5	95.8	14.9	15.9
10	4.1	3.6	3.7	4.2	3.7	2.2	2.0	5.4	1.1	1.1	1.2	2.6	5.1	3.5	4.6	3.2	3.5	5.1	5.3	7.7	5.3	5.5	7.5	10.3	8.0	14.9	15.4	96.8	14.8	14.9
11	4.8	4.0	3.8	4.3	4.4	2.9	2.2	4.6	2.3	1.2	1.5	1.8	6.3	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.0	6.2	7.2	10.1	8.7	14.0	15.9	98.0	15.5	14.0
12	4.9	4.1	3.9	4.4	4.5	3.0	2.3	3.9	3.7	2.6	1.8	4.4	7.0	6.2	6.1	4.4	4.2	3.6	6.4	7.7	6.1	6.0	7.0	9.8	8.9	12.2	16.9	99.5	15.6	12.2
13	5.4	4.9	5.5	6.0	3.1	3.9	5.1	7.8	4.0	5.1	6.3	6.8	6.0	5.3	7.6	6.2	7.5	9.0	8.6	11.1	6.7	6.8	9.1	11.9	9.4	19.0	18.4	98.5	16.1	19.0
14	6.1	5.7	6.2	6.7	4.9	4.3	5.6	8.5	2.5	3.5	4.8	6.2	5.3	5.7	6.0	4.7	5.9	7.5	7.1	9.5	7.4	7.5	9.8	12.6	10.1	18.4	16.8	93.3	16.8	18.4
15	7.7	7.2	7.7	8.3	7.2	5.8	6.1	8.9	4.7	4.6	5.1	6.1	7.6	6.1	4.4	2.8	4.1	5.4	2.8	5.3	9.0	9.1	11.3	14.2	11.7	18.4	12.6	99.3	18.4	18.3
16	6.3	5.8	6.0	6.5	5.9	4.5	4.4	7.2	3.3	3.2	3.4	4.4	6.2	4.7	2.8	2.1	1.5	3.1	3.3	5.8	7.6	7.7	9.8	12.7	10.3	16.6	13.6	97.9	17.0	16.6
17	7.2	6.4	6.2	6.7	6.8	5.3	4.6	7.0	4.5	3.5	3.6	4.2	7.5	5.9	4.1	1.5	1.6	1.6	3.5	5.2	8.4	8.6	10.0	12.9	11.1	16.5	14.9	99.2	17.9	16.5
18	7.9	7.1	6.9	7.5	7.6	6.0	5.3	7.0	6.1	5.1	3.8	3.6	9.0	7.5	5.4	3.1	1.6	3.2	4.7	5.1	9.2	9.1	10.0	12.9	11.9	15.8	16.2	100.8	18.6	15.8
19	8.7	8.2	8.0	8.5	8.3	6.9	6.3	9.2	5.7	5.3	5.4	6.4	8.6	7.1	2.8	3.3	3.5	4.7	4.7	4.7	10.0	10.2	11.8	14.6	12.7	18.6	12.5	100.4	19.4	18.6
20	11.2	10.6	10.4	11.0	10.7	9.3	8.8	10.5	8.2	7.7	7.4	7.7	11.1	9.6	5.3	5.8	5.2	5.1	4.7	8.6	12.5	12.6	13.5	16.4	15.2	20.0	16.1	102.8	21.9	19.9
21	2.6	3.0	3.6	3.2	3.5	4.2	4.5	6.3	5.4	5.3	6.0	6.1	6.7	7.4	8.9	7.6	8.4	9.2	10.0	12.4	7.4	2.3	4.6	7.5	4.9	15.9	19.7	100.7	11.6	15.9
22	2.7	3.2	3.3	2.7	3.7	4.4	4.3	5.0	5.6	5.5	6.2	6.0	6.8	7.5	9.1	7.7	8.6	9.1	10.1	12.6	2.3	2.3	2.3	5.1	4.1	13.6	19.9	100.8	10.8	13.6
23	4.2	5.0	4.2	3.6	5.9	6.5	5.3	5.9	7.8	7.3	7.2	6.9	9.1	9.7	11.3	9.6	9.8	10.0	11.6	13.5	4.6	2.3	2.6	2.9	6.3	11.4	22.1	103.0	13.1	11.3
24	7.4	8.2	7.4	6.8	9.1	9.7	8.5	9.1	11.0	10.5	10.4	10.0	12.2	12.9	14.5	12.8	13.0	13.2	14.8	16.7	7.8	5.5	3.2	6.4	9.5	10.9	25.3	106.2	16.3	10.9
25	5.3	5.7	6.3	5.9	6.3	6.9	7.2	9.0	8.2	8.0	8.7	8.9	9.4	10.1	11.7	10.3	11.1	11.9	12.7	15.2	4.9	4.1	6.4	9.2	13.5	17.7	22.5	103.4	6.7	17.7
26	15.7	16.3	15.7	15.1	16.7	15.2	14.5	16.2	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	20.0	16.1	13.8	11.5	10.8	17.8	23.5	29.1	111.7	24.6	1.2
27	18.5	18.0	18.5	19.0	18.0	16.6	16.9	19.7	15.5	15.4	15.9	16.9	18.4	16.8	12.6	13.6	14.9	16.2	12.5	16.1	19.7	19.9	22.1	25.0	22.5	29.1	69.6	110.1	29.2	29.1
28	99.4	98.9	99.5	100.0	98.2	97.6	98.8	101.8	95.8	96.8	98.0	99.5	98.5	93.3	99.3	97.9	99.2	100.8	100.4	102.8	100.7	100.8	103.0	105.9	103.4	111.7	110.1	110.1	110.1	111.7
29	12.1	12.5	13.0	12.7	13.0	13.6	13.9	15.7	14.9	14.8	15.5	15.6	16.1	16.8	18.4	17.0	17.9	18.6	19.4	21.9	11.6	10.8	13.1	15.9	6.7	24.4	29.2	110.1	67.3	24.4
30	15.7	16.3	15.7	15.1	16.7	15.2	14.5	16.1	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	19.9	16.1	13.7	11.5	10.7	17.8	1.2	29.1	111.7	24.5	24.5

F\T : zone from \ zone to

(f) Mode Trips for Mode [5 : Others], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.2	2.8	2.4	4.1	4.1	3.9	4.5	4.6	5.3	6.0	7.6	6.2	6.9	7.7	8.6	11.1	2.3	2.5	4.5	7.4	5.0	15.9	18.4	99.3	11.7	15.9
2	0.9	0.9	0.9	1.5	1.8	2.5	1.8	3.6	3.7	3.6	4.0	4.1	4.9	5.7	7.2	5.8	6.4	7.1	8.2	10.6	3.0	3.2	4.9	7.8	5.7	16.3	18.0	98.9	12.5	16.3
3	1.6	0.9	0.9	0.9	2.4	2.9	1.6	3.0	4.1	3.7	3.8	3.9	5.5	6.1	7.7	6.0	6.2	6.9	8.0	10.4	3.9	3.3	4.2	7.1	6.6	15.6	18.4	99.4	13.3	15.5
4	0.6	1.4	1.2	2.0	2.8	3.4	2.2	3.9	4.7	4.2	4.3	4.4	5.9	6.6	8.2	6.5	6.7	7.5	8.5	11.0	2.9	3.1	4.3	7.2	5.6	15.7	19.0	99.9	12.4	15.6
5	2.3	1.8	2.4	2.9	2.6	2.3	2.9	4.6	3.7	3.7	4.4	4.5	3.1	4.9	7.2	5.9	6.8	7.6	8.3	10.7	3.5	3.7	5.9	8.8	6.3	16.7	18.0	98.2	13.0	16.7
6	2.7	2.2	2.8	3.3	2.3	2.0	1.7	5.0	2.6	2.5	3.2	3.3	4.4	4.2	6.1	4.7	5.6	6.3	7.2	9.6	3.9	4.1	6.3	9.2	6.6	15.5	16.9	97.5	13.4	15.5
7	2.8	1.8	1.6	2.2	2.8	2.2	2.9	3.6	3.1	2.0	2.2	2.3	5.7	5.6	6.1	4.4	4.6	5.3	6.3	8.8	4.4	4.5	5.4	8.3	7.1	14.5	16.9	98.9	13.8	14.5
8	4.2	3.6	3.0	3.6	4.6	5.0	3.6	4.9	6.2	5.4	4.6	3.9	7.7	8.2	8.9	7.2	7.0	7.0	9.2	10.5	6.3	5.0	5.9	8.7	9.0	16.2	19.7	101.4	15.7	16.1
9	4.2	3.7	4.3	4.8	3.7	2.3	3.1	6.5	3.8	1.1	2.3	3.7	4.0	2.5	4.7	3.3	4.5	6.1	5.7	8.2	5.4	5.6	7.8	10.7	8.2	15.9	15.5	95.8	14.9	15.9
10	4.1	3.6	3.7	4.2	3.7	2.2	2.0	5.4	1.1	1.1	1.2	2.6	5.1	3.5	4.6	3.2	3.5	5.1	5.3	7.7	5.3	5.5	7.5	10.3	8.0	14.9	15.4	96.8	14.8	14.9
11	4.8	4.0	3.8	4.3	4.4	2.9	2.2	4.6	2.3	1.2	1.5	1.8	6.3	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.0	6.2	7.2	10.1	8.7	14.0	15.9	98.0	15.5	14.0
12	4.9	4.1	3.9	4.4	4.5	3.0	2.3	3.9	3.7	2.6	1.8	4.4	7.0	6.2	6.1	4.4	4.2	3.6	6.4	7.7	6.1	6.0	6.9	9.8	8.9	12.2	16.9	99.5	15.6	12.2
13	5.4	4.9	5.5	6.0	3.1	3.9	5.1	7.8	4.0	5.1	6.3	6.8	6.0	5.3	7.6	6.2	7.5	9.0	8.6	11.1	6.7	6.8	9.1	11.9	9.4	19.0	18.4	98.5	16.1	19.0
14	6.1	5.7	6.2	6.7	4.9	4.3	5.6	8.5	2.5	3.5	4.8	6.2	5.3	5.7	6.1	4.7	5.9	7.5	7.1	9.6	7.4	7.5	9.8	12.6	10.1	18.4	16.8	93.3	16.8	18.4
15	7.7	7.2	7.7	8.3	7.2	5.8	6.1	8.9	4.7	4.6	5.1	6.1	7.6	6.1	4.4	2.8	4.1	5.4	2.8	5.3	9.0	9.1	11.3	14.2	11.7	18.4	12.6	99.3	18.4	18.3
16	6.3	5.8	6.0	6.5	5.9	4.5	4.4	7.2	3.3	3.2	3.4	4.4	6.2	4.7	2.8	2.1	1.5	3.1	3.3	5.8	7.6	7.7	9.8	12.6	10.3	16.6	13.6	97.9	17.0	16.6
17	7.2	6.4	6.2	6.7	6.8	5.3	4.6	7.0	4.5	3.5	3.6	4.2	7.5	5.9	4.1	1.5	1.6	1.6	3.5	5.2	8.4	8.6	10.0	12.8	11.1	16.5	14.9	99.2	17.9	16.5
18	7.9	7.1	6.9	7.5	7.6	6.0	5.3	7.0	6.1	5.1	3.8	3.6	9.0	7.5	5.4	3.1	1.6	3.2	4.7	5.1	9.2	9.1	10.0	12.8	11.9	15.8	16.2	100.8	18.6	15.8
19	8.7	8.2	8.0	8.5	8.3	6.9	6.3	9.2	5.7	5.3	5.4	6.4	8.6	7.1	2.8	3.3	3.5	4.7	4.7	4.7	10.0	10.2	11.8	14.6	12.7	18.6	12.5	100.4	19.4	18.6
20	11.2	10.6	10.4	11.0	10.7	9.3	8.8	10.5	8.2	7.7	7.4	7.7	11.1	9.6	5.3	5.8	5.2	5.1	4.7	8.6	12.5	12.6	13.5	16.4	15.2	20.0	16.1	102.8	21.9	19.9
21	2.6	3.0	3.6	3.2	3.5	4.2	4.5	6.3	5.4	5.3	6.0	6.1	6.7	7.4	9.0	7.6	8.4	9.2	10.0	12.5	7.4	2.3	4.6	7.4	4.9	15.9	19.7	100.7	11.6	15.9
22	2.7	3.2	3.3	2.7	3.7	4.4	4.3	5.0	5.6	5.5	6.2	6.0	6.8	7.5	9.1	7.7	8.6	9.1	10.2	12.6	2.3	2.3	2.3	5.1	4.1	13.6	19.9	100.8	10.8	13.6
23	4.2	5.0	4.2	3.6	5.9	6.5	5.3	5.9	7.8	7.3	7.2	6.9	9.1	9.7	11.3	9.6	9.8	10.0	11.6	13.5	4.6	2.3	2.6	2.9	6.3	11.3	22.1	103.0	13.1	11.3
24	7.0	7.9	7.1	6.4	8.8	9.4	8.1	8.7	10.6	10.2	10.1	9.8	11.9	12.6	14.1	12.5	12.7	12.8	14.5	16.4	7.4	5.1	2.9	6.0	9.2	10.7	24.9	105.8	15.9	10.7
25	5.3	5.7	6.3	5.9	6.3	6.9	7.2	9.0	8.2	8.0	8.7	8.9	9.4	10.1	11.7	10.3	11.1	11.9	12.7	15.2	4.9	4.1	6.3	9.2	13.4	17.7	22.5	103.4	6.7	17.7
26	15.5	16.3	15.6	14.9	16.7	15.2	14.5	16.2	15.9	14.9	14.0	12.2	19.2	18.4	18.4	16.6	16.5	15.8	18.6	20.0	15.9	13.6	11.3	10.7	17.7	23.4	29.1	111.7	24.4	1.2
27	18.5	18.0	18.5	19.0	18.0	16.6	16.9	19.7	15.5	15.4	15.9	16.9	18.4	16.8	12.6	13.6	14.9	16.2	12.5	16.1	19.7	19.9	22.1	25.0	22.5	29.1	69.6	110.1	29.2	29.1
28	99.4	98.9	99.5	100.0	98.2	97.6	98.8	101.8	95.8	96.8	98.0	99.5	98.5	93.3	99.3	97.9	99.2	100.8	100.4	102.8	100.7	100.8	103.0	105.9	103.4	111.7	110.1	110.1	110.1	111.7
29	12.1	12.5	13.0	12.7	13.0	13.6	13.9	15.7	14.9	14.8	15.5	15.6	16.1	16.8	18.4	17.0	17.9	18.6	19.4	21.9	11.6	10.8	13.1	15.9	6.7	24.4	29.2	110.1	67.2	24.4
30	15.5	16.3	15.5	14.9	16.7	15.2	14.5	16.1	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	19.9	15.9	13.6	11.3	10.7	17.7	1.2	29.1	111.7	24.4	24.4

F\T : zone from \ zone to

External Zone	Destination	Time (min)	to	How to Calculate
26, 30	Catacaos (18 km), [Chiclayo (200km)]	15	Catacaos	Minimum (time to zone 12 or 23) +15 min
27	Sullana (38 km), Paita (50km)	45	Sullana, (60min to Paita)	Minimum (time to zone 15) +15 min
28	nothing	0	-	0
29	Chulucanas (55km)	60	Chulucanas	Minimum (time to zone 25) +15 min

Table 7-11 (4) T-model 2 Simulation Results : Travel Time of "Mode" Trips

(g) Mode Trips for Mode [All : (1) ~ (5)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.3	3.3	2.4	4.2	4.3	4.2	4.6	4.7	5.5	6.2	7.9	6.5	7.0	7.7	8.8	11.2	2.4	2.5	4.7	7.6	5.1	16.1	18.7	99.5	11.8	16.1
2	0.9	0.9	0.9	1.5	1.8	2.8	1.9	3.6	3.9	3.8	4.0	4.1	5.0	5.8	7.4	6.0	6.4	7.2	8.2	10.7	3.2	3.3	5.1	8.0	5.9	16.4	18.2	99.0	12.6	16.3
3	1.6	0.9	0.9	1.0	2.4	3.3	1.7	3.0	4.3	3.7	3.8	3.9	5.6	6.2	7.8	6.0	6.2	7.0	8.0	10.5	3.9	3.5	4.4	7.3	6.6	15.8	18.6	99.5	13.4	15.8
4	0.6	1.5	1.2	2.0	2.9	3.8	2.2	3.9	4.8	4.3	4.4	4.5	6.1	6.7	8.3	6.6	6.8	7.5	8.6	11.0	3.0	3.1	4.5	7.4	5.7	15.9	19.1	100.0	12.4	15.9
5	2.4	1.8	2.4	3.0	2.7	2.4	2.9	4.7	3.7	3.9	4.6	4.7	3.2	5.0	7.3	5.9	7.0	7.7	8.3	10.8	3.7	3.9	6.2	9.1	6.4	16.9	18.1	98.3	13.1	16.9
6	2.9	2.3	2.9	3.5	2.4	2.1	1.7	5.2	2.7	2.6	3.3	3.4	4.5	4.3	6.3	4.9	5.7	6.4	7.3	9.8	4.2	4.4	6.7	9.6	6.9	15.6	17.0	97.5	13.6	15.6
7	2.8	1.9	1.7	2.2	2.9	2.7	3.2	3.6	3.1	2.1	2.2	2.3	5.9	5.7	6.1	4.4	4.6	5.3	6.4	8.8	4.7	4.7	5.6	8.5	7.4	14.5	16.9	98.9	14.1	14.5
8	4.3	3.6	3.0	3.7	4.7	5.4	3.6	5.0	6.4	5.5	4.6	3.9	7.9	8.3	8.9	7.2	7.0	7.0	9.2	10.5	6.5	5.1	6.0	9.0	9.2	16.2	19.7	101.6	15.9	16.1
9	4.5	3.9	4.5	5.1	3.7	2.8	3.2	6.5	3.8	1.1	2.3	3.7	4.1	2.5	4.7	3.3	4.6	6.1	5.8	8.2	5.8	6.0	8.3	11.2	8.5	16.0	15.5	95.8	15.3	16.0
10	4.4	3.8	3.8	4.4	3.9	2.7	2.1	5.5	1.1	1.2	1.2	2.7	5.2	3.6	4.6	3.2	3.5	5.1	5.3	7.8	5.7	5.9	7.7	10.6	8.4	14.9	15.4	96.9	15.1	14.9
11	5.0	4.1	3.9	4.4	4.6	3.4	2.2	4.6	2.3	1.2	1.5	1.8	6.4	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.4	6.5	7.4	10.3	9.1	14.0	15.9	98.1	15.8	14.0
12	5.1	4.2	4.0	4.6	4.7	3.5	2.3	3.9	3.7	2.7	1.8	4.7	7.5	6.3	6.2	4.4	4.2	3.6	6.4	7.7	6.5	6.2	7.1	9.8	9.2	12.2	16.9	99.5	15.9	12.2
13	5.7	5.1	5.7	6.3	3.3	4.1	5.4	8.0	4.2	5.2	6.5	7.1	6.2	5.4	7.7	6.4	7.6	9.2	8.8	11.2	7.0	7.1	9.4	12.4	9.7	19.3	18.5	98.7	16.4	19.3
14	6.7	6.1	6.7	7.3	5.3	4.8	6.0	9.0	2.8	3.9	5.1	6.5	5.7	6.0	6.4	5.0	6.3	7.8	7.4	9.9	8.0	8.2	10.5	13.4	10.7	18.8	17.2	93.3	17.4	18.8
15	8.1	7.5	7.8	8.4	7.3	6.4	6.2	9.0	4.7	4.6	5.1	6.2	7.7	6.1	4.5	2.8	4.1	5.4	2.8	5.3	9.4	9.5	11.8	14.7	12.1	18.4	12.6	99.4	18.8	18.4
16	6.7	6.1	6.1	6.7	5.9	5.0	4.5	7.2	3.3	3.2	3.4	4.4	6.3	4.7	2.8	2.2	1.5	3.2	3.3	5.8	8.0	8.2	10.0	13.0	10.7	16.7	13.6	98.0	17.4	16.7
17	7.4	6.5	6.3	6.9	7.1	5.8	4.6	7.0	4.6	3.5	3.6	4.2	7.6	6.0	4.1	1.5	1.6	1.6	3.5	5.2	8.8	9.0	10.2	13.1	11.5	16.5	14.9	99.3	18.3	16.5
18	8.1	7.2	7.0	7.6	7.8	6.5	5.3	7.0	6.1	5.1	3.8	3.6	9.2	7.6	5.4	3.2	1.6	3.2	4.8	5.1	9.5	9.2	10.1	13.0	12.2	15.8	16.2	100.8	19.0	15.8
19	9.2	8.3	8.1	8.7	8.4	7.5	6.5	9.3	5.8	5.4	5.4	6.5	8.8	7.2	2.9	3.4	3.5	4.8	4.7	4.7	10.5	10.6	12.1	15.0	13.2	18.7	12.5	100.5	19.9	18.7
20	11.6	10.8	10.6	11.1	10.8	9.9	8.9	10.5	8.2	7.8	7.4	7.7	11.2	9.6	5.3	5.8	5.2	5.1	4.7	8.8	12.9	12.8	13.7	16.6	15.6	20.0	16.1	102.9	22.3	19.9
21	2.8	3.3	3.8	3.5	3.8	4.8	4.8	6.5	5.8	5.7	6.4	6.5	7.0	7.7	9.4	8.0	8.8	9.6	10.4	12.9	7.6	2.3	4.7	7.6	4.9	16.1	20.2	101.0	11.6	16.1
22	2.7	3.4	3.3	3.0	3.9	4.9	4.3	5.4	6.0	5.9	6.5	6.5	7.1	7.9	9.5	8.1	8.9	9.5	10.6	13.0	2.4	2.3	2.3	5.3	4.1	13.7	20.3	101.1	10.8	13.7
23	5.1	5.9	5.1	4.5	6.8	7.8	6.2	6.8	8.8	8.3	8.1	7.8	10.0	10.7	12.3	10.6	10.8	10.9	12.6	14.4	5.5	3.1	3.0	2.9	7.2	11.4	23.1	104.0	13.9	11.4
24	17.5	18.4	17.6	16.9	19.3	19.8	18.6	19.3	20.0	19.0	18.1	16.3	22.5	22.6	22.5	20.7	20.6	19.9	22.7	24.0	18.1	15.7	13.0	16.4	19.8	17.3	33.3	115.8	26.5	17.3
25	5.5	6.0	6.5	6.1	6.5	7.5	7.5	9.2	8.5	8.4	9.1	9.2	9.7	10.4	12.1	10.7	11.5	12.2	13.1	15.6	4.9	4.1	6.4	9.4	13.6	17.8	22.8	103.7	6.7	17.8
26	17.3	16.4	16.2	16.8	16.9	15.7	14.5	16.2	16.0	14.9	14.0	12.2	19.7	18.5	18.4	16.6	16.5	15.8	18.6	20.0	18.7	17.7	15.0	10.8	21.4	25.3	29.2	111.8	28.2	1.2
27	18.9	18.3	18.6	19.2	18.1	17.2	17.0	19.7	15.5	15.4	15.9	17.0	18.5	16.9	12.6	13.6	14.9	16.2	12.5	16.1	20.2	20.3	22.5	25.5	22.9	29.2	69.7	110.2	29.6	29.2
28	100.0	99.4	100.0	100.5	98.5	98.1	99.2	102.2	96.1	97.1	98.4	99.8	98.9	93.3	99.7	98.3	99.5	101.1	100.7	103.2	101.3	101.4	103.7	106.7	104.0	112.0	110.4	110.6	110.7	112.0
29	12.2	12.7	13.2	12.9	13.2	14.2	14.2	15.9	15.2	15.1	15.8	15.9	16.4	17.1	18.8	17.4	18.2	19.0	19.8	22.3	11.6	10.8	13.1	16.1	6.7	24.6	29.6	110.4	67.5	24.5
30	17.3	16.4	16.2	16.8	16.9	15.7	14.5	16.1	15.9	14.9	14.0	12.2	19.7	18.5	18.4	16.6	16.5	15.8	18.6	19.9	18.7	17.7	15.0	10.8	21.4	1.2	29.2	111.7	28.1	28.1

F\T : zone from \ zone to

(h) Mode Trips for Mode [All : Sum of Table (b)~(f)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.3	3.3	2.4	4.2	4.4	4.2	4.6	4.7	5.5	6.3	7.9	6.5	7.0	7.7	8.8	11.3	2.4	2.5	4.7	7.6	5.1	16.1	18.7	99.5	11.8	16.1
2	0.9	0.9	0.9	1.5	1.8	2.8	1.9	3.6	3.9	3.8	4.0	4.1	5.0	5.8	7.4	6.0	6.4	7.2	8.2	10.7	3.3	3.4	5.1	8.0	6.0	16.4	18.2	99.0	12.7	16.4
3	1.6	0.9	0.9	1.0	2.4	3.3	1.7	3.0	4.3	3.7	3.8	3.9	5.6	6.2	7.8	6.1	6.2	7.0	8.0	10.5	4.0	3.4	4.3	7.3	6.7	15.8	18.6	99.5	13.4	15.7
4	0.6	1.5	1.2	2.1	2.9	3.8	2.2	3.9	4.8	4.3	4.4	4.5	6.1	6.7	8.3	6.6	6.8	7.5	8.6	11.0	3.0	3.1	4.5	7.4	5.7	15.9	19.1	100.0	12.4	15.9
5	2.5	1.8	2.4	3.0	2.7	2.4	3.0	4.7	3.7	3.9	4.6	4.7	3.2	5.0	7.3	5.9	7.0	7.7	8.3	10.8	3.7	3.9	6.2	9.1	6.4	16.9	18.1	98.2	13.1	16.9
6	3.0	2.3	2.9	3.5	2.4	2.1	1.7	5.2	2.7	2.6	3.3	3.4	4.5	4.3	6.3	4.9	5.7	6.4	7.3	9.8	4.3	4.4	6.7	9.7	7.0	15.6	17.0	97.5	13.7	15.6
7	2.8	1.9	1.7	2.2	2.9	2.7	3.1	3.6	3.1	2.1	2.2	2.3	5.8	5.7	6.1	4.4	4.6	5.3	6.4	8.8	4.8	4.7	5.6	8.5	7.5	14.5	16.9	98.9	14.2	14.5
8	4.3	3.6	3.0	3.7	4.7	5.4	3.6	5.0	6.4	5.5	4.6	3.9	7.9	8.3	8.9	7.2	7.0	7.0	9.2	10.5	6.5	5.1	6.0	9.0	9.2	16.2	19.7	101.6	15.9	16.1
9	4.6	3.9	4.5	5.1	3.7	2.8	3.2	6.5	3.8	1.1	2.3	3.7	4.1	2.5	4.7	3.3	4.6	6.1	5.8	8.2	5.9	6.1	8.4	11.3	8.6	16.0	15.5	95.8	15.3	16.0
10	4.5	3.8	3.8	4.4	3.9	2.7	2.1	5.5	1.1	1.2	1.2	2.7	5.2	3.6	4.6	3.2	3.5	5.1	5.3	7.8	5.8	6.0	7.7	10.6	8.5	14.9	15.4	96.9	15.2	14.9
11	5.0	4.1	3.9	4.4	4.6	3.4	2.2	4.6	2.3	1.2	1.5	1.8	6.4	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.5	6.5	7.4	10.3	9.2	14.0	15.9	98.1	15.9	14.0
12	5.1	4.2	4.0	4.6	4.7	3.5	2.3	3.9	3.7	2.7	1.8	4.7	7.5	6.3	6.2	4.4	4.2	3.6	6.4	7.7	6.6	6.2	7.1	9.8	9.3	12.2	16.9	99.5	16.0	12.2
13	5.7	5.1	5.7	6.2	3.2	4.1	5.3	7.9	4.1	5.2	6.4	7.0	6.2	5.4	7.7	6.3	7.6	9.1	8.7	11.2	7.0	7.1	9.4	12.3	9.6	19.2	18.5	98.7	16.4	19.2
14	6.8	6.1	6.7	7.3	5.3	4.8	6.0	9.0	2.8	3.9	5.1	6.5	5.7	6.0	6.4	5.0	6.3	7.8	7.4	9.9	8.1	8.2	10.5	13.5	10.8	18.8	17.2	93.3	17.5	18.8
15	8.1	7.5	7.8	8.4	7.3	6.4	6.2	9.0	4.7	4.6	5.1	6.2	7.7	6.1	4.5	2.8	4.1	5.4	2.8	5.3	9.5	9.6	11.7	14.7	12.2	18.4	12.6	99.4	18.9	18.4
16	6.8	6.1	6.1	6.7	5.9	5.0	4.5	7.2	3.3	3.2	3.4	4.4	6.3	4.7	2.8	2.2	1.5	3.2	3.3	5.8	8.1	8.2	10.0	13.0	10.8	16.7	13.6	98.0	17.5	16.7
17	7.4	6.5	6.3	6.9	7.1	5.8	4.6	7.0	4.6	3.5	3.6	4.2	7.6	6.0	4.1	1.5	1.6	1.6	3.5	5.2	9.0	9.1	10.2	13.1	11.6	16.5	14.9	99.3	18.3	16.5
18	8.1	7.2	7.0	7.6	7.8	6.5	5.3	7.0	6.1	5.1	3.8	3.6	9.1	7.6	5.4	3.2	1.6	3.2	4.8	5.1	9.7	9.2	10.1	13.0	12.3	15.8	16.2	100.8	19.0	15.8
19	9.2	8.3	8.1	8.7	8.4	7.5	6.5	9.3	5.8	5.4	5.4	6.5	8.8	7.2	2.9	3.4	3.5	4.8	4.7	4.7	10.6	10.7	12.0	15.0	13.3	18.7	12.5	100.5	20.0	18.7
20	11.7	10.8	10.6	11.1	10.8	9.9	8.9	10.5	8.2	7.8	7.4	7.7	11.2	9.6	5.3	5.8	5.2	5.1	4.7	8.8	13.0	12.8	13.7	16.6	15.7	20.0	16.1	102.9	22.4	19.9
21	2.9	3.3	3.8	3.5	3.9	4.9	4.8	6.6	5.9	5.8	6.5	6.6	7.1	7.8	9.4	8.1	8.9	9.6	10.5	12.9	7.6	2.3	4.7	7.6	4.9	16.1	20.2	101.1	11.6	16.1
22	2.7	3.4	3.3	3.0	4.0	5.0	4.3	5.4	6.0	5.9	6.5	6.5	7.2	7.9	9.5	8.2	8.9	9.5	10.6	13.0	2.4	2.3	2.3	5.2	4.1	13.7	20.3	101.2	10.8	13.7
23	5.1	5.9	5.1	4.5	6.8	7.8	6.2	6.8	8.8	8.3	8.1	7.8	10.0	10.7	12.4	10.6	10.8	10.9	12.6	14.4	5.4	3.1	3.0	2.9	7.2	11.4	23.1	104.0	13.9	11.4
24	17.7	18.5	17.7	17.0	19.4	19.9	18.7	19.4	20.1	19.0	18.2	16.4	22.6	22.6	22.5	20.8	20.6	19.9	22.8	24.1	18.1	15.8	13.2	16.5	19.9	17.3	33.3	115.9	26.6	17.3
25	5.5	6.0	6.5	6.2	6.5	7.5	7.5	9.2	8.6	8.4	9.1	9.3	9.7	10.5	12.1	10.7	11.6	12.3	13.1	15.6	4.9	4.1	6.4	9.3	13.6	17.8	22.9	103.7	6.7	17.8
26	17.3	16.4	16.2	16.8	16.9	15.7	14.5	16.2	16.0	14.9	14.0	12.2	19.7	18.5	18.4	16.6	16.5	15.8	18.6	20.0	18.8	17.7	15.1	10.8	21.5	25.3	29.2	111.8	28.2	1.2
27	18.9	18.3	18.6	19.2	18.1	17.2	17.0	19.7	15.5	15.4	15.9	17.0	18.5	16.9	12.6	13.6	14.9	16.2	12.5	16.1	20.3	20.4	22.5	25.5	23.0	29.2	69.7	110.2	29.7	29.2
28	100.0	99.4	100.0	100.5	98.5	98.1	99.2	102.2	96.1	97.1	98.4	99.8	98.9	93.3	99.7	98.3	99.5	101.1	100.7	103.2	101.4	101.5	103.8	106.7	104.1	112.0	110.4	110.6	110.8	112.0
29	12.2	12.7	13.2	12.9	13.2	14.2	14.2	15.9	15.3	15.2	15.9	16.0	16.4	17.2	18.8	17.4	18.3	19.0	19.9	22.3	11.6	10.8	13.1	16.1	6.7	24.5	29.6	110.4	67.5	24.5
30	17.3	16.4	16.2	16.8	16.9	15.7	14.5	16.1	15.9	14.9	14.0	12.2	19.7	18.5	18.4	16.6	16.5	15.8	18.6	19.9	18.8	17.7	15.1	10.8	21.5	1.2	29.2	111.7	28.2	28.2

F\T : zone from \ zone to

External Zone	Destination	Time (min)	to	How to Calculate
26, 30	Catacaos (18 km), [Chiclayo (200km)]	15	Catacaos	Minimum (time to zone 12 or 23) +15 min
27	Sullana (38 km), Paita (50km)	45	Sullana, (60min to Paita)	Minimum (time to zone 15) +15 min
28	nothing	0	-	0
29	Chulucanas (55km)	60	Chulucanas	Minimum (time to zone 25) +15 min

Table 7-11 (5) T-model 2 Simulation Results : Travel Time of "Mode" Trips

(i) Travel Time [Original (by Average Vehicle Speed)], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

Z\Z	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.5																													
2	1.0	0.5																												
3	2.0	1.0	0.5																											
4	1.0	2.0	1.0	0.5																										
5	2.7	2.2	2.7	3.2	1.1																									
6	3.2	2.7	3.2	3.7	2.2	0.9																								
7	3.0	2.0	2.0	3.0	4.3	1.8	0.9																							
8	4.2	3.2	2.2	3.2	5.8	5.8	3.7	1.1																						
9	6.7	5.7	6.7	7.7	4.2	3.3	4.2	7.0	0.8																					
10	5.8	4.8	4.8	5.8	6.0	3.2	2.7	6.2	1.5	0.7																				
11	5.8	4.8	4.8	5.8	6.4	3.6	2.7	4.8	2.8	1.3	0.7																			
12	7.0	6.0	5.5	6.5	7.6	4.8	3.8	5.0	5.7	4.2	2.8	1.4																		
13	6.0	5.0	6.0	7.0	2.8	4.2	7.2	8.5	3.7	5.2	6.5	8.8	1.4																	
14	7.8	6.8	7.8	8.8	5.7	5.5	7.3	10.7	3.2	4.7	6.0	8.3	5.2	1.6																
15	10.0	9.0	10.0	11.0	7.7	6.8	6.9	9.3	5.2	5.0	5.6	7.3	7.2	6.7	1.2															
16	10.3	7.6	7.6	10.3	6.6	5.8	5.4	7.8	4.1	3.9	4.1	5.8	6.1	5.6	2.4	0.8														
17	10.4	7.6	7.6	10.3	8.0	6.5	5.6	7.3	5.5	4.3	3.8	5.3	7.5	7.0	3.8	1.5	0.8													
18	9.3	8.3	7.8	8.8	9.0	7.1	6.2	7.2	6.5	5.2	3.8	5.3	8.5	8.0	5.0	3.5	2.0	1.0												
19	10.9	9.9	9.9	10.9	11.5	8.7	7.8	10.2	6.8	6.4	6.4	8.2	8.8	8.3	3.0	3.7	3.8	5.0	1.5											
20	12.5	11.5	11.0	12.0	13.3	10.3	9.3	10.5	9.7	8.3	7.0	8.5	11.7	11.2	5.2	5.8	4.8	5.2	5.2	2.4										
21	3.2	4.2	5.2	4.2	5.5	6.5	6.3	7.5	9.3	9.2	9.0	9.0	8.8	10.5	12.8	10.7	10.9	13.1	13.1	14.7	1.6									
22	4.1	5.1	5.0	4.0	6.4	7.4	6.0	5.7	10.2	8.7	8.7	8.8	9.8	11.0	12.9	11.4	11.3	11.3	13.5	14.5	3.5	1.4								
23	4.8	5.8	4.8	3.8	8.2	8.0	6.2	5.8	10.3	8.8	8.8	9.0	11.3	12.2	13.1	11.6	11.5	11.5	13.7	14.7	6.3	2.8	1.4							
24	8.3	9.3	8.2	7.3	11.6	11.4	9.6	9.3	13.8	12.3	12.3	12.4	14.8	15.6	16.5	15.0	14.9	14.9	17.1	18.1	9.8	6.3	3.4	1.7						
25	6.8	7.8	8.8	7.8	9.1	10.1	9.9	10.8	12.9	12.8	12.6	12.6	12.4	14.1	16.4	14.3	14.5	16.5	16.7	18.3	6.2	5.3	8.2	11.6	2.7					
26	19.8	20.8	19.8	18.8	22.6	19.8	18.8	20.0	20.7	19.2	17.8	16.4	23.8	23.3	22.3	20.8	20.3	20.3	23.2	23.5	21.3	17.8	16.4	18.4	23.2	5.0				
27	55.0	54.0	55.0	56.0	52.7	51.8	51.9	54.3	50.2	50.0	50.6	52.3	52.2	51.7	46.2	47.4	48.8	50.0	48.0	50.2	57.8	57.9	58.1	61.5	61.4	68.8	5.0			
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
29	66.8	67.8	68.8	67.8	69.1	70.1	69.9	70.8	72.9	72.8	72.6	72.6	72.4	74.1	76.4	74.3	74.5	76.5	76.7	78.3	66.2	65.3	68.2	71.6	62.7	84.6	124.1	0.0	5.0	
30	19.8	20.8	19.8	18.8	22.6	19.8	18.8	20.0	20.7	19.2	17.8	16.4	23.8	23.3	22.3	20.8	20.3	20.3	23.2	23.5	21.3	17.8	16.4	18.4	23.2	5.0	68.8	0.0	84.6	5.0

(j) Travel Time [at the Start of Simulation], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.2	2.8	2.4	4.1	4.1	3.9	4.5	4.6	5.3	6.0	7.6	6.2	6.9	7.7	8.6	11.1	2.3	2.5	4.5	7.4	5.0	15.9	18.4	99.3	11.7	15.9
2	0.9	0.9	0.9	1.5	1.8	2.5	1.8	3.6	3.7	3.6	4.0	4.1	4.9	5.7	7.2	5.8	6.4	7.1	8.2	10.6	3.0	3.2	4.9	7.8	5.7	16.3	18.0	98.9	12.5	16.3
3	1.6	0.9	0.9	0.9	2.4	2.9	1.6	3.0	4.1	3.7	3.8	3.9	5.5	6.1	7.6	6.0	6.2	6.9	8.0	10.4	3.9	3.3	4.2	7.1	6.6	15.6	18.4	99.4	13.3	15.5
4	0.6	1.4	1.2	2.0	2.8	3.4	2.2	3.9	4.7	4.2	4.3	4.4	5.9	6.6	8.2	6.5	6.7	7.5	8.5	11.0	2.9	3.1	4.3	7.2	5.6	15.7	19.0	99.9	12.4	15.6
5	2.3	1.8	2.4	2.9	2.6	2.3	2.9	4.6	3.7	3.7	4.4	4.5	3.1	4.9	7.2	5.9	6.8	7.6	8.3	10.7	3.5	3.7	5.9	8.8	6.3	16.7	18.0	98.2	13.0	16.7
6	2.7	2.2	2.8	3.3	2.3	2.0	1.7	5.0	2.6	2.5	3.2	3.3	4.4	4.2	6.1	4.7	5.6	6.3	7.1	9.6	3.9	4.1	6.3	9.2	6.6	15.5	16.9	97.5	13.4	15.5
7	2.8	1.8	1.6	2.2	2.8	2.2	2.9	3.6	3.1	2.0	2.2	2.3	5.7	5.6	6.1	4.4	4.6	5.3	6.3	8.8	4.4	4.5	5.4	8.3	7.1	14.5	16.9	98.9	13.8	14.5
8	4.2	3.6	3.0	3.6	4.6	5.0	3.6	4.9	6.2	5.4	4.6	3.9	7.7	8.2	8.9	7.2	7.0	7.0	9.2	10.5	6.3	5.0	5.9	8.7	9.0	16.2	19.7	101.4	15.7	16.1
9	4.2	3.7	4.3	4.8	3.7	2.3	3.1	6.5	3.8	1.1	2.3	3.7	4.0	2.5	4.7	3.3	4.5	6.1	5.7	8.2	5.4	5.6	7.8	10.7	8.2	15.9	15.5	95.8	14.9	15.9
10	4.1	3.6	3.7	4.2	3.7	2.2	2.0	5.4	1.1	1.1	1.2	2.6	5.1	3.5	4.6	3.2	3.5	5.1	5.3	7.7	5.3	5.5	7.5	10.3	8.0	14.9	15.4	96.8	14.8	14.9
11	4.8	4.0	3.8	4.3	4.4	2.9	2.2	4.6	2.3	1.2	1.5	1.8	6.3	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.0	6.2	7.2	10.1	8.7	14.0	15.9	98.0	15.5	14.0
12	4.9	4.1	3.9	4.4	4.5	3.0	2.3	3.9	3.7	2.6	1.8	4.4	7.0	6.2	6.1	4.4	4.2	3.6	6.4	7.7	6.1	6.0	6.9	9.8	8.9	12.2	16.9	99.5	15.6	12.2
13	5.4	4.9	5.5	6.0	3.1	3.9	5.1	7.8	4.0	5.1	6.3	6.8	6.0	5.3	7.6	6.2	7.5	9.0	8.6	11.1	6.7	6.8	9.1	11.9	9.4	19.0	18.4	98.5	16.1	19.0
14	6.1	5.7	6.2	6.7	4.9	4.3	5.6	8.5	2.5	3.5	4.8	6.2	5.3	5.7	6.0	4.7	5.9	7.5	7.1	9.5	7.4	7.5	9.8	12.6	10.1	18.4	16.8	93.3	16.8	18.4
15	7.7	7.2	7.7	8.2	7.2	5.8	6.1	8.9	4.7	4.6	5.1	6.1	7.6	6.0	4.4	2.8	4.1	5.4	2.8	5.3	8.9	9.1	11.3	14.2	11.7	18.3	12.6	99.3	18.4	18.3
16	6.3	5.8	6.0	6.5	5.9	4.5	4.4	7.2	3.3	3.2	3.4	4.4	6.2	4.7	2.8	2.1	1.5	3.1	3.3	5.8	7.6	7.7	9.8	12.6	10.3	16.6	13.6	97.9	17.0	16.6
17	7.2	6.4	6.2	6.7	6.8	5.3	4.6	7.0	4.5	3.5	3.6	4.2	7.5	5.9	4.1	1.5	1.6	1.6	3.5	5.2	8.4	8.6	10.0	12.8	11.1	16.5	14.9	99.2	17.9	16.5
18	7.9	7.1	6.9	7.5	7.6	6.0	5.3	7.0	6.1	5.1	3.8	3.6	9.0	7.5	5.4	3.1	1.6	3.2	4.7	5.1	9.2	9.1	10.0	12.8	11.9	15.8	16.2	100.8	18.6	15.8
19	8.7	8.2	8.0	8.5	8.3	6.9	6.3	9.2	5.7	5.3	5.4	6.4	8.6	7.1	2.8	3.3	3.5	4.7	4.7	4.7	10.0	10.1	11.8	14.6	12.7	18.6	12.5	100.4	19.4	18.6
20	11.2	10.6	10.4	11.0	10.7	9.3	8.8	10.5	8.2	7.7	7.4	7.7	11.1	9.5	5.3	5.8	5.2	5.1	4.7	8.6	12.4	12.6	13.5	16.4	15.2	20.0	16.1	102.8	21.9	19.9
21	2.6	3.0	3.6	3.2	3.5	4.2	4.5	6.3	5.4	5.3	6.0	6.1	6.7	7.4	8.9	7.6	8.4	9.2	10.0	12.4	7.4	2.3	4.6	7.4	4.9	15.9	19.7	100.7	11.6	15.9
22	2.7	3.2	3.3	2.7	3.7	4.4	4.3	5.0	5.6	5.5	6.2	6.0	6.8	7.5	9.1	7.7	8.6	9.1	10.1	12.6	2.3	2.3	2.3	5.1	4.1	13.6	19.9	100.8	10.8	13.6
23	4.2	5.0	4.2	3.6	5.9	6.5	5.3	5.9	7.8	7.3	7.2	6.9	9.1	9.7	11.3	9.6	9.8	10.0	11.6	13.5	4.6	2.3	2.6	2.9	6.3	11.3	22.1	103.0	13.1	11.3
24	7.0	7.9	7.1	6.4	8.8	9.4	8.1	8.7	10.6	10.2	10.1	9.8	11.9	12.6	14.1	12.5	12.7	12.8	14.5	16.4	7.4	5.1	2.9	6.0	9.2	10.7	24.9	105.8	15.9	10.7
25	5.3	5.7	6.3	5.9	6.3	6.9	7.2	9.0	8.2	8.0	8.7	8.9	9.4	10.1	11.7	10.3	11.1	11.9	12.7	15.2	4.9	4.1	6.3	9.2	13.4	17.7	22.5	103.4	6.7	17.7
26	15.5	16.3	15.6	14.9	16.7	15.2	14.5	16.2	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	20.0	15.9	13.6	11.3	10.7	17.7	23.4	29.1	111.7	24.4	1.2
27	18.5	18.0	18.5	19.0	18.0	16.6	16.9	19.7	15.5	15.4	15.9	16.9	18.4	16.8	12.6	13.6	14.9	16.2	12.5	16.1	19.7	19.9	22.1	25.0	22.5	29.1	69.6	110.1	29.2	29.1
28	99.4	98.9	99.5	100.0	98.2	97.6	98.8	101.8	95.8	96.8	98.0	99.5	98.5	93.3	99.3	97.9	99.2	100.8	100.4	102.8	100.7	100.8	103.0	105.9	103.4	111.7	110.1	110.1	110.1	111.7
29	12.1	12.5	13.0	12.7	13.0	13.6	13.9	15.7	14.9	14.8	15.5	15.6	16.1	16.8	18.4	17.0	17.9	18.6	19.4	21.9	11.6	10.8	13.1	15.9	6.7	24.4	29.2	110.1	67.2	24.4
30	15.5	16.3	15.5	14.9	16.7	15.2	14.5	16.1	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	19.9	15.9	13.6	11.3	10.7	17.7	1.2	29.1	111.7	24.4	24.4

F\T : zone from \ zone to

External Zone	Destination	Time (min)	to	How to Calculate
26, 30	Catacaos (18 km), [Chiclayo (200km)]	15	Catacaos	Minimum (time to zone 12 or 23) +15 min
27	Sullana (38 km), Paita (50km)	45	Sullana, (60min to Paita)	Minimum (time to zone 15) +15 min
28	nothing	0	-	0
29	Chulucanas (55km)	60	Chulucanas	Minimum (time to zone 25) +15 min

Table 7-12 (1) T-model 2 Simulation Results : Travel Time of "Vehicle Equivalent" Trips

(a) Vehicle Eq. Trips for Mode [All : (1) ~ (5)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.4	3.7	2.4	4.2	4.6	4.4	4.6	4.7	5.7	6.5	8.1	6.7	7.0	7.8	8.8	11.3	2.6	2.6	4.7	7.6	5.2	16.1	18.9	99.7	11.9	16.1
2	0.9	0.9	0.9	1.5	1.9	3.2	1.9	3.6	4.0	3.9	4.1	4.2	5.1	5.9	7.5	6.2	6.5	7.2	8.3	10.8	3.5	3.6	5.1	8.0	6.1	16.4	18.3	99.2	12.8	16.4
3	1.6	0.9	1.0	1.0	2.5	3.7	1.7	3.0	4.5	3.8	3.9	4.0	5.7	6.4	7.8	6.1	6.3	7.0	8.1	10.5	4.2	3.5	4.4	7.3	6.8	15.8	18.6	99.7	13.5	15.8
4	0.6	1.5	1.2	2.1	3.0	4.2	2.2	3.9	5.0	4.3	4.4	4.5	6.2	6.9	8.4	6.6	6.8	7.5	8.6	11.1	3.2	3.2	4.5	7.4	5.8	15.9	19.2	100.2	12.5	15.9
5	2.6	1.9	2.5	3.1	2.9	2.7	3.0	4.7	3.7	4.0	4.7	4.8	3.2	5.0	7.3	5.9	7.1	7.9	8.4	10.8	3.9	4.0	6.3	9.2	6.5	17.1	18.1	98.3	13.2	17.0
6	3.2	2.4	3.0	3.6	2.6	2.2	1.8	5.3	2.8	2.7	3.4	3.5	4.6	4.3	6.4	5.0	5.8	6.6	7.4	9.9	4.7	4.8	7.0	9.9	7.3	15.7	17.2	97.6	14.0	15.7
7	2.9	1.9	1.7	2.3	3.0	3.2	3.4	3.6	3.2	2.1	2.2	2.3	6.0	5.7	6.2	4.4	4.6	5.3	6.4	8.9	5.2	4.8	5.6	8.5	7.8	14.5	16.9	99.0	14.5	14.5
8	4.3	3.6	3.0	3.7	4.7	5.8	3.6	5.1	6.6	5.5	4.6	3.9	8.0	8.6	9.0	7.2	7.0	7.0	9.2	10.5	6.7	5.2	6.1	9.0	9.3	16.2	19.8	101.8	16.0	16.1
9	4.9	4.1	4.7	5.3	3.8	3.3	3.2	6.6	3.8	1.1	2.3	3.8	4.2	2.6	4.7	3.3	4.6	6.1	5.8	8.2	6.4	6.5	8.7	11.6	9.0	16.0	15.5	95.8	15.7	16.0
10	4.8	4.0	3.8	4.4	4.1	3.2	2.2	5.5	1.1	1.2	1.2	2.7	5.2	3.6	4.6	3.2	3.5	5.1	5.3	7.8	6.3	6.3	7.8	10.7	8.9	14.9	15.4	96.9	15.6	14.9
11	5.1	4.2	3.9	4.5	4.8	3.9	2.2	4.6	2.3	1.2	1.5	1.8	6.5	4.9	5.2	3.4	3.6	3.8	5.4	7.4	7.0	6.6	7.4	10.3	9.6	14.1	15.9	98.2	16.3	14.0
12	5.2	4.3	4.1	4.6	4.9	4.0	2.4	3.9	3.8	2.7	1.8	4.8	7.9	6.3	6.2	4.4	4.2	3.6	6.4	7.7	7.1	6.3	7.1	9.8	9.7	12.2	17.0	99.6	16.4	12.2
13	5.9	5.2	5.8	6.4	3.3	4.5	5.6	8.0	4.2	5.2	6.5	7.4	6.4	5.5	7.8	6.4	7.6	9.2	8.8	11.3	7.2	7.3	9.6	12.5	9.8	19.6	18.6	98.8	16.5	19.6
14	8.2	7.4	8.0	8.6	6.4	6.4	7.2	10.3	3.9	5.0	6.3	7.7	6.8	7.2	7.5	6.1	7.4	9.0	8.6	11.0	9.7	9.8	12.0	14.9	12.3	19.9	18.3	93.3	19.0	19.9
15	8.5	7.7	7.9	8.5	7.4	6.9	6.2	9.0	4.8	4.7	5.2	6.2	7.8	6.2	4.5	2.8	4.1	5.4	2.8	5.3	10.0	10.0	11.9	14.8	12.6	18.4	12.6	99.4	19.3	18.4
16	7.1	6.3	6.2	6.8	6.0	5.5	4.5	7.3	3.4	3.3	3.4	4.5	6.4	4.8	2.8	2.2	1.5	3.2	3.3	5.8	8.6	8.6	10.2	13.1	11.2	16.7	13.6	98.1	17.9	16.7
17	7.6	6.6	6.4	7.0	7.3	6.4	4.7	7.0	4.6	3.6	3.6	4.3	7.6	6.1	4.2	1.5	1.6	1.6	3.5	5.2	9.4	9.4	10.2	13.1	12.0	16.5	15.0	99.3	18.7	16.5
18	8.3	7.3	7.1	7.7	8.0	7.1	5.4	7.0	6.1	5.1	3.8	3.6	9.2	7.6	5.4	3.2	1.6	3.2	4.8	5.1	10.1	9.3	10.2	13.1	12.7	15.8	16.2	100.9	19.4	15.8
19	9.4	8.5	8.3	8.9	8.5	8.1	6.6	9.3	5.9	5.4	5.5	6.5	8.9	7.3	3.0	3.4	3.6	4.8	4.8	4.7	11.1	11.2	12.2	15.1	13.7	18.8	12.5	100.6	20.5	18.7
20	11.8	10.9	10.7	11.2	10.9	10.5	9.0	10.5	8.3	7.8	7.4	7.7	11.3	9.7	5.4	5.8	5.2	5.1	4.7	9.1	13.5	12.9	13.7	16.6	16.1	20.0	16.1	103.0	22.9	20.0
21	3.1	3.6	4.1	3.8	4.2	5.5	5.1	6.8	6.3	6.2	6.9	7.0	7.4	8.2	9.8	8.4	9.3	10.0	10.9	13.3	7.9	2.4	4.7	7.6	4.9	16.1	20.6	101.5	11.6	16.1
22	2.7	3.6	3.3	3.0	4.2	5.5	4.3	5.5	6.3	6.2	6.5	6.5	7.4	8.3	9.9	8.5	8.9	9.6	10.7	13.1	2.5	2.4	2.3	5.2	4.1	13.7	20.7	101.5	10.9	13.7
23	5.2	6.1	5.2	4.6	7.2	8.4	6.4	6.9	9.2	8.5	8.3	8.0	10.4	11.2	12.6	10.9	11.0	11.0	12.9	14.6	5.9	3.4	3.2	2.9	7.5	11.4	23.4	104.4	14.2	11.4
24	13.4	14.3	13.4	12.8	15.3	16.6	14.6	15.1	17.1	16.1	15.2	13.4	18.6	19.3	19.5	17.8	17.6	16.9	19.8	21.1	14.1	11.6	8.3	12.0	15.7	14.3	30.3	112.6	22.4	14.3
25	5.7	6.2	6.7	6.4	6.8	8.1	7.7	9.4	8.9	8.8	9.5	9.6	10.0	10.8	12.4	11.0	11.9	12.6	13.5	15.9	5.0	4.1	6.5	9.4	13.6	17.8	23.2	104.1	6.7	17.8
26	17.4	16.5	16.3	16.9	17.2	16.2	14.6	16.2	16.0	14.9	14.0	12.2	20.1	18.6	18.4	16.7	16.5	15.8	18.7	20.0	19.0	16.5	13.2	10.8	20.6	24.9	29.2	111.8	27.3	1.2
27	19.3	18.5	18.7	19.3	18.2	17.7	17.0	19.8	15.6	15.4	16.0	17.0	18.5	17.0	12.6	13.6	14.9	16.2	12.5	16.1	20.8	20.8	22.7	25.6	23.4	29.2	69.7	110.2	30.1	29.2
28	101.5	100.7	101.3	101.9	99.7	99.6	100.4	103.6	97.2	98.3	99.5	101.0	100.1	93.3	100.8	99.4	100.7	102.3	101.9	104.3	103.0	103.0	105.2	108.1	105.6	113.2	111.6	111.9	112.3	113.2
29	12.4	12.9	13.4	13.1	13.5	14.8	14.4	16.1	15.6	15.5	16.2	16.3	16.7	17.5	19.1	17.8	18.6	19.3	20.2	22.7	11.8	10.8	13.2	16.1	6.7	24.6	29.9	110.8	67.7	24.6
30	17.4	16.5	16.3	16.9	17.1	16.2	14.6	16.1	16.0	14.9	14.0	12.2	20.1	18.6	18.4	16.6	16.5	15.8	18.6	19.9	19.0	16.5	13.2	10.8	20.6	1.2	29.2	111.8	27.3	27.3

F\T : zone from \ zone to

(b) Vehicle Eq. Trips for Mode [1 : Private Automobiles], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.2	2.9	2.4	4.1	4.1	4.0	4.5	4.6	5.3	6.0	7.6	6.2	6.9	7.7	8.6	11.1	2.3	2.5	4.6	7.5	5.0	16.0	18.4	99.3	11.7	16.0
2	0.9	0.9	0.9	1.5	1.8	2.6	1.8	3.6	3.7	3.6	4.0	4.1	4.9	5.7	7.2	5.9	6.4	7.1	8.2	10.6	3.0	3.2	5.0	7.9	5.8	16.3	18.0	98.9	12.5	16.3
3	1.6	0.9	0.9	0.9	2.4	3.0	1.6	3.0	4.2	3.7	3.8	3.9	5.5	6.1	7.7	6.0	6.2	6.9	8.0	10.4	3.9	3.4	4.3	7.2	6.6	15.7	18.5	99.4	13.3	15.6
4	0.6	1.4	1.2	2.0	2.8	3.5	2.2	3.9	4.7	4.2	4.3	4.4	5.9	6.6	8.2	6.5	6.7	7.5	8.5	11.0	2.9	3.1	4.4	7.3	5.6	15.8	19.0	99.9	12.4	15.7
5	2.3	1.8	2.4	2.9	2.6	2.3	2.9	4.6	3.7	3.7	4.4	4.6	3.1	4.9	7.2	5.9	6.8	7.6	8.3	10.7	3.5	3.7	6.0	8.9	6.3	16.8	18.0	98.2	13.0	16.8
6	2.7	2.2	2.8	3.3	2.3	2.0	1.7	5.0	2.6	2.5	3.2	3.3	4.4	4.2	6.1	4.7	5.6	6.3	7.2	9.6	3.9	4.1	6.4	9.3	6.7	15.5	16.9	97.5	13.4	15.5
7	2.8	1.8	1.6	2.2	2.8	2.3	2.9	3.6	3.1	2.0	2.2	2.3	5.7	5.6	6.1	4.4	4.6	5.3	6.3	8.8	4.4	4.6	5.5	8.4	7.1	14.5	16.9	98.9	13.8	14.5
8	4.2	3.6	3.0	3.6	4.6	5.1	3.6	4.9	6.3	5.4	4.6	3.9	7.7	8.2	8.9	7.2	7.0	7.0	9.2	10.5	6.3	5.1	6.0	8.8	9.0	16.2	19.7	101.5	15.7	16.1
9	4.2	3.7	4.3	4.8	3.7	2.4	3.1	6.5	3.8	1.1	2.3	3.7	4.0	2.5	4.7	3.3	4.5	6.1	5.7	8.2	5.5	5.6	7.9	10.8	8.2	15.9	15.5	95.8	14.9	15.9
10	4.1	3.6	3.7	4.2	3.7	2.3	2.0	5.4	1.1	1.1	1.2	2.6	5.1	3.5	4.6	3.2	3.5	5.1	5.3	7.7	5.4	5.5	7.5	10.4	8.1	14.9	15.4	96.8	14.8	14.9
11	4.8	4.0	3.8	4.3	4.4	3.0	2.2	4.6	2.3	1.2	1.5	1.8	6.3	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.1	6.2	7.3	10.2	8.8	14.0	15.9	98.0	15.5	14.0
12	4.9	4.1	3.9	4.4	4.6	3.1	2.3	3.9	3.7	2.6	1.8	4.4	7.0	6.2	6.1	4.4	4.2	3.6	6.4	7.7	6.2	6.1	7.0	9.8	8.9	12.2	16.9	99.5	15.6	12.2
13	5.4	4.9	5.5	6.0	3.1	3.9	5.1	7.8	4.0	5.1	6.3	6.8	6.0	5.3	7.6	6.2	7.5	9.0	8.6	11.1	6.7	6.8	9.1	12.0	9.4	19.0	18.4	98.5	16.1	19.0
14	6.2	5.7	6.3	6.8	4.9	4.4	5.6	8.5	2.5	3.5	4.8	6.2	5.3	5.7	6.0	4.7	5.9	7.5	7.1	9.5	7.4	7.6	9.8	12.7	10.1	18.4	16.8	93.3	16.8	18.4
15	7.7	7.3	7.7	8.3	7.2	5.9	6.1	8.9	4.7	4.6	5.1	6.1	7.6	6.1	4.4	2.8	4.1	5.4	2.8	5.3	9.0	9.2	11.4	14.3	11.7	18.4	12.6	99.3	18.4	18.3
16	6.4	5.9	6.0	6.5	5.9	4.5	4.4	7.2	3.3	3.2	3.4	4.4	6.2	4.7	2.8	2.1	1.5	3.1	3.3	5.8	7.6	7.8	9.9	12.7	10.3	16.6	13.6	97.9	17.1	16.6
17	7.2	6.4	6.2	6.7	6.8	5.4	4.6	7.0	4.5	3.5	3.6	4.2	7.5	5.9	4.1	1.5	1.6	1.6	3.5	5.2	8.5	8.6	10.1	12.9	11.2	16.5	14.9	99.2	17.9	16.5
18	8.0	7.1	6.9	7.5	7.6	6.1	5.3	7.0	6.1	5.1	3.8	3.6	9.0	7.5	5.4	3.1	1.6	3.2	4.7	5.1	9.2	9.1	10.1	12.9	11.9	15.8	16.2	100.8	18.6	15.8
19	8.8	8.2	8.0	8.5	8.3	6.9	6.3	9.2	5.7	5.3	5.4	6.4	8.6	7.1	2.8	3.3	3.5	4.7	4.7	4.7	10.0	10.2	11.8	14.7	12.8	18.6	12.5	100.4	19.5	18.6
20	11.2	10.6	10.4	11.0	10.7	9.4	8.8	10.5	8.2	7.7	7.4	7.7	11.1	9.6	5.3	5.8	5.2	5.1	4.7	8.6	12.5	12.7	13.6	16.5	15.2	20.0	16.1	102.8	21.9	19.9
21	2.6	3.0	3.6	3.2	3.6	4.3	4.5	6.3	5.5	5.4	6.1	6.2	6.7	7.4	9.0	7.6	8.5	9.2	10.0	12.5	7.4	2.3	4.6	7.5	4.9	16.0	19.8	100.7	11.6	16.0
22	2.7	3.2	3.3	2.9	3.7	4.5	4.3	5.2	5.6	5.5	6.2	6.2	6.9	7.6	9.2	7.8	8.6	9.2	10.2	12.7	2.3	2.3	2.3	5.2	4.1	13.7	19.9	100.8	10.8	13.6
23	4.8	5.6	4.8	4.2	6.5	7.2	5.9	6.5	8.4	7.9	7.8	7.6	9.6	10.3	11.9	10.3	10.4	10.6	12.2	14.1	5.2	2.9	2.9	2.9	7.0	11.4	22.7	103.6	13.7	11.3
24	8.0	8.8	8.0	7.4	9.7	10.4	9.1	9.7	11.6	11.1	11.0	9.9	12.8	13.5	15.1	13.4	13.6	13.5	15.4	17.3	8.4	6.1	3.2	6.7	10.1	10.9	25.9	106.8	16.9	10.9
25	5.4	5.8	6.3	6.0	6.3	7.0	7.2	9.0	8.2	8.1	8.8	8.9	9.4	10.1	11.7	10.3	11.2	11.9	12.8	15.2	4.9	4.1	6.4	9.3	13.5	17.7	22.5	103.4	6.7	17.7
26	16.3	16.3	16.1	15.7	16.8	15.3	14.5	16.2	15.9	14.9	14.0	12.2	19.3	18.4	18.3	16.6	16.5	15.8	18.6	20.0	16.7	14.4	11.5	10.8	18.5	23.8	29.1	111.7	25.2	1.2
27	18.5	18.0	18.5	19.0	18.0	16.7	16.9	19.7	15.5	15.4	15.9	16.9	18.4	16.8	12.6	13.6	14.9	16.2	12.5	16.1	19.8	19.9	22.2	25.1	22.5	29.1	69.6	110.1	29.2	29.1
28	99.4	98.9	99.5	100.0	98.2	97.6	98.8	101.8	95.8	96.8	98.0	99.5	98.5	93.3	99.3	97.9	99.2	100.8	100.4	102.8	100.7	100.8	103.1	106.0	103.4	111.7	110.1	110.1	110.1	111.7
29	12.1	12.5	13.0	12.7	13.0	13.8	14.0	15.7	14.9	14.8	15.5	15.6	16.1	16.9	18.4	17.1	17.9	18.7	19.5	21.9	11.6	10.8	13.1	16.0	6.7	24.5	29.2	110.1	67.3	24.4
30	16.3	16.3	16.1	15.7	16.8	15.3	14.5	16.1	15.9	14.9	14.0	12.2	19.3	18.4	18.3	16.6	16.5	15.8	18.6	19.9	16.7	14.4	11.5	10.7	18.4	1.2	29.1	111.7	25.2	25.2

F\T : zone from \ zone to

External Zone	Destination	Time (min)	to	How to Calculate
26, 30	Catacaos (18 km), [Chiclayo (200km)]	15	Catacaos	Minimum (time to zone 12 or 23) +15 min
27	Sullana (38 km), Paita (50km)	45	Sullana, (60min to Paita)	Minimum (time to zone 15) +15 min
28	nothing	0	-	0
29	Chulucanas (55km)	60	Chulucanas	Minimum (time to zone 25) +15 min

Table 7-12 (2) T-model 2 Simulation Results : Travel Time of "Vehicle Equivalent" Trips

(c) Vehicle Eq. Trips for Mode [2 : Transit 1 (Collectibos)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.2	2.8	2.4	4.1	4.1	3.9	4.5	4.6	5.3	6.0	7.6	6.2	6.9	7.7	8.6	11.1	2.3	2.5	4.5	7.4	5.0	15.9	18.4	99.3	11.7	15.9
2	0.9	0.9	0.9	1.5	1.8	2.5	1.8	3.6	3.7	3.6	4.0	4.1	4.9	5.7	7.2	5.8	6.4	7.1	8.2	10.6	3.0	3.2	4.9	7.8	5.7	16.3	18.0	98.9	12.5	16.3
3	1.6	0.9	0.9	0.9	2.4	2.9	1.6	3.0	4.1	3.7	3.8	3.9	5.5	6.1	7.6	6.0	6.2	6.9	8.0	10.4	3.9	3.3	4.2	7.1	6.6	15.6	18.4	99.4	13.3	15.5
4	0.6	1.4	1.2	2.0	2.8	3.4	2.2	3.9	4.7	4.2	4.3	4.4	5.9	6.6	8.2	6.5	6.7	7.5	8.5	11.0	2.9	3.1	4.3	7.2	5.6	15.7	19.0	99.9	12.4	15.6
5	2.3	1.8	2.4	2.9	2.6	2.3	2.9	4.6	3.7	3.7	4.4	4.5	3.1	4.9	7.2	5.9	6.8	7.6	8.3	10.7	3.5	3.7	5.9	8.8	6.3	16.7	18.0	98.2	13.0	16.7
6	2.7	2.2	2.8	3.3	2.3	2.0	1.7	5.0	2.6	2.5	3.2	3.3	4.4	4.2	6.1	4.7	5.6	6.3	7.1	9.6	3.9	4.1	6.3	9.2	6.6	15.5	16.9	97.5	13.4	15.5
7	2.8	1.8	1.6	2.2	2.8	2.2	2.9	3.6	3.1	2.0	2.2	2.3	5.7	5.6	6.1	4.4	4.6	5.3	6.3	8.8	4.4	4.5	5.4	8.3	7.1	14.5	16.9	98.9	13.8	14.5
8	4.2	3.6	3.0	3.6	4.6	5.0	3.6	4.9	6.2	5.4	4.6	3.9	7.7	8.2	8.9	7.2	7.0	7.0	9.2	10.5	6.3	5.0	5.9	8.7	9.0	16.2	19.7	101.4	15.7	16.1
9	4.2	3.7	4.3	4.8	3.7	2.3	3.1	6.5	3.8	1.1	2.3	3.7	4.0	2.5	4.7	3.3	4.5	6.1	5.7	8.2	5.4	5.6	7.8	10.7	8.2	15.9	15.5	95.8	14.9	15.9
10	4.1	3.6	3.7	4.2	3.7	2.2	2.0	5.4	1.1	1.1	1.2	2.6	5.1	3.5	4.6	3.2	3.5	5.1	5.3	7.7	5.3	5.5	7.5	10.3	8.0	14.9	15.4	96.8	14.8	14.9
11	4.8	4.0	3.8	4.3	4.4	2.9	2.2	4.6	2.3	1.2	1.5	1.8	6.3	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.0	6.2	7.2	10.1	8.7	14.0	15.9	98.0	15.5	14.0
12	4.9	4.1	3.9	4.4	4.5	3.0	2.3	3.9	3.7	2.6	1.8	4.4	7.0	6.2	6.1	4.4	4.2	3.6	6.4	7.7	6.1	6.0	6.9	9.8	8.9	12.2	16.9	99.5	15.6	12.2
13	5.4	4.9	5.5	6.0	3.1	3.9	5.1	7.8	4.0	5.1	6.3	6.8	6.0	5.3	7.6	6.2	7.5	9.0	8.6	11.1	6.7	6.8	9.1	11.9	9.4	19.0	18.4	98.5	16.1	19.0
14	6.1	5.7	6.3	6.8	4.9	4.4	5.6	8.5	2.5	3.6	4.8	6.2	5.3	5.7	6.1	4.7	5.9	7.5	7.1	9.6	7.4	7.6	9.8	12.6	10.1	18.4	16.8	93.3	16.8	18.4
15	7.7	7.2	7.7	8.3	7.2	5.8	6.1	8.9	4.7	4.6	5.1	6.1	7.6	6.1	4.4	2.8	4.1	5.4	2.8	5.3	9.0	9.1	11.3	14.2	11.7	18.4	12.6	99.3	18.4	18.3
16	6.3	5.8	6.0	6.5	5.9	4.5	4.4	7.2	3.3	3.2	3.4	4.4	6.2	4.7	2.8	2.1	1.5	3.1	3.3	5.8	7.6	7.7	9.8	12.6	10.3	16.6	13.6	97.9	17.0	16.6
17	7.2	6.4	6.2	6.7	6.8	5.3	4.6	7.0	4.5	3.5	3.6	4.2	7.5	5.9	4.1	1.5	1.6	1.6	3.5	5.2	8.4	8.6	10.0	12.8	11.1	16.5	14.9	99.2	17.9	16.5
18	7.9	7.1	6.9	7.5	7.6	6.0	5.3	7.0	6.1	5.1	3.8	3.6	9.0	7.5	5.4	3.1	1.6	3.2	4.7	5.1	9.2	9.1	10.0	12.8	11.9	15.8	16.2	100.8	18.6	15.8
19	8.7	8.2	8.0	8.5	8.3	6.9	6.3	9.2	5.7	5.3	5.4	6.4	8.6	7.1	2.8	3.3	3.5	4.7	4.7	4.7	10.0	10.2	11.8	14.6	12.7	18.6	12.5	100.4	19.4	18.6
20	11.2	10.6	10.4	11.0	10.7	9.3	8.8	10.5	8.2	7.7	7.4	7.7	11.1	9.6	5.3	5.8	5.2	5.1	4.7	8.6	12.5	12.6	13.5	16.4	15.2	20.0	16.1	102.8	21.9	19.9
21	2.6	3.0	3.6	3.2	3.5	4.2	4.5	6.3	5.4	5.3	6.0	6.1	6.7	7.4	8.9	7.6	8.4	9.2	10.0	12.4	7.4	2.3	4.6	7.4	4.9	15.9	19.7	100.7	11.6	15.9
22	2.7	3.2	3.3	2.7	3.7	4.4	4.3	5.0	5.6	5.5	6.2	6.0	6.8	7.5	9.1	7.7	8.6	9.1	10.1	12.6	2.3	2.3	2.3	5.1	4.1	13.6	19.9	100.8	10.8	13.6
23	4.2	5.0	4.2	3.6	5.9	6.5	5.3	5.9	7.8	7.3	7.2	6.9	9.1	9.7	11.3	9.6	9.8	10.0	11.6	13.5	4.6	2.3	2.6	2.9	6.3	11.3	22.1	103.0	13.1	11.3
24	7.0	7.9	7.1	6.4	8.8	9.4	8.1	8.7	10.6	10.2	10.1	9.8	11.9	12.6	14.1	12.5	12.7	12.8	14.5	16.4	7.4	5.1	2.9	6.0	9.2	10.7	24.9	105.8	15.9	10.7
25	5.3	5.7	6.3	5.9	6.3	6.9	7.2	9.0	8.2	8.0	8.7	8.9	9.4	10.1	11.7	10.3	11.1	11.9	12.7	15.2	4.9	4.1	6.3	9.2	13.4	17.7	22.5	103.4	6.7	17.7
26	15.5	16.3	15.6	14.9	16.7	15.2	14.5	16.2	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	20.0	15.9	13.6	11.3	10.7	17.7	23.4	29.1	111.7	24.4	1.2
27	18.5	18.0	18.5	19.0	18.0	16.6	16.9	19.7	15.5	15.4	15.9	16.9	18.4	16.8	12.6	13.6	14.9	16.2	12.5	16.1	19.7	19.9	22.1	25.0	22.5	29.1	69.6	110.1	29.2	29.1
28	99.4	98.9	99.5	100.0	98.2	97.6	98.9	101.8	95.8	96.8	98.1	99.5	98.5	93.3	99.3	98.0	99.2	100.8	100.4	102.8	100.7	100.8	103.0	105.9	103.4	111.7	110.1	110.1	110.1	111.7
29	12.1	12.5	13.0	12.7	13.0	13.6	13.9	15.7	14.9	14.8	15.5	15.6	16.1	16.8	18.4	17.0	17.9	18.6	19.4	21.9	11.6	10.8	13.1	15.9	6.7	24.4	29.2	110.1	67.2	24.4
30	15.5	16.3	15.5	14.9	16.7	15.2	14.5	16.1	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	19.9	15.9	13.6	11.3	10.7	17.7	1.2	29.1	111.7	24.4	24.4

F\T : zone from \ zone to

(d) Vehicle Eq. Trips for Mode [3 : Transit 2 (Combis)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.2	3.0	2.4	4.1	4.1	4.0	4.5	4.6	5.3	6.1	7.7	6.3	6.9	7.7	8.7	11.2	2.3	2.5	4.6	7.4	5.0	15.9	18.4	99.3	11.8	15.9
2	0.9	0.9	0.9	1.5	1.8	2.6	1.8	3.6	3.8	3.6	4.0	4.1	5.0	5.7	7.3	5.9	6.4	7.1	8.2	10.6	3.1	3.3	5.0	7.8	5.8	16.3	18.1	98.9	12.5	16.3
3	1.6	0.9	0.9	0.9	2.4	3.0	1.6	3.0	4.2	3.7	3.8	3.9	5.5	6.1	7.7	6.0	6.2	6.9	8.0	10.4	3.9	3.3	4.3	7.1	6.6	15.6	18.5	99.4	13.3	15.6
4	0.6	1.4	1.2	2.0	2.8	3.5	2.2	3.9	4.7	4.2	4.3	4.4	5.9	6.6	8.2	6.5	6.7	7.5	8.5	11.0	3.0	3.1	4.4	7.2	5.7	15.7	19.0	99.9	12.4	15.7
5	2.3	1.8	2.4	2.9	2.6	2.3	2.9	4.7	3.7	3.8	4.5	4.6	3.1	4.9	7.2	5.9	6.9	7.6	8.3	10.7	3.6	3.8	6.0	8.9	6.3	16.8	18.0	98.2	13.1	16.8
6	2.7	2.2	2.8	3.3	2.3	2.0	1.7	5.1	2.6	2.5	3.2	3.3	4.4	4.2	6.1	4.8	5.6	6.3	7.2	9.6	4.0	4.2	6.4	9.3	6.7	15.5	16.9	97.5	13.5	15.5
7	2.8	1.8	1.6	2.2	2.8	2.3	2.9	3.6	3.1	2.0	2.2	2.3	5.7	5.6	6.1	4.4	4.6	5.3	6.3	8.8	4.5	4.5	5.5	8.3	7.2	14.5	16.9	98.9	13.9	14.5
8	4.2	3.6	3.0	3.6	4.7	5.1	3.6	4.9	6.3	5.4	4.6	3.9	7.7	8.2	8.9	7.2	7.0	7.0	9.2	10.5	6.4	5.0	5.9	8.8	9.1	16.2	19.7	101.5	15.8	16.1
9	4.3	3.8	4.3	4.9	3.7	2.4	3.1	6.5	3.8	1.1	2.3	3.7	4.0	2.5	4.7	3.3	4.5	6.1	5.7	8.2	5.6	5.7	8.0	10.8	8.3	15.9	15.5	95.8	15.0	15.9
10	4.2	3.6	3.7	4.2	3.8	2.3	2.0	5.4	1.1	1.1	1.2	2.6	5.1	3.5	4.6	3.2	3.5	5.1	5.3	7.7	5.5	5.6	7.5	10.4	8.2	14.9	15.4	96.8	14.9	14.9
11	4.9	4.0	3.8	4.3	4.5	3.0	2.2	4.6	2.3	1.2	1.5	1.8	6.3	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.2	6.3	7.3	10.1	8.9	14.0	15.9	98.0	15.6	14.0
12	5.0	4.1	3.9	4.4	4.6	3.1	2.3	3.9	3.7	2.6	1.8	4.4	7.0	6.2	6.1	4.4	4.2	3.6	6.4	7.7	6.3	6.1	7.0	9.8	9.0	12.2	16.9	99.5	15.7	12.2
13	5.5	5.0	5.5	6.1	3.1	3.9	5.1	7.8	4.0	5.1	6.3	6.8	6.0	5.3	7.6	6.2	7.5	9.0	8.6	11.1	6.8	6.9	9.2	12.0	9.5	19.0	18.4	98.5	16.2	19.0
14	6.3	5.7	6.3	6.9	5.0	4.4	5.6	8.6	2.6	3.6	4.8	6.2	5.3	5.7	6.1	4.7	6.0	7.6	7.2	9.6	7.6	7.7	9.9	12.8	10.3	18.5	16.9	93.3	17.0	18.5
15	7.8	7.3	7.7	8.3	7.2	5.9	6.1	8.9	4.7	4.6	5.1	6.1	7.6	6.1	4.4	2.8	4.1	5.4	2.8	5.3	9.1	9.2	11.5	14.4	11.8	18.4	12.6	99.3	18.5	18.3
16	6.4	5.9	6.0	6.5	5.9	4.5	4.4	7.2	3.3	3.2	3.4	4.4	6.2	4.7	2.8	2.1	1.5	3.1	3.3	5.8	7.7	7.9	9.8	12.7	10.4	16.6	13.6	97.9	17.1	16.6
17	7.3	6.4	6.2	6.7	6.9	5.4	4.6	7.0	4.5	3.5	3.6	4.2	7.5	5.9	4.1	1.5	1.6	1.6	3.5	5.2	8.6	8.7	10.0	12.9	11.3	16.5	14.9	99.2	18.0	16.5
18	8.0	7.1	6.9	7.5	7.6	6.1	5.3	7.0	6.1	5.1	3.8	3.6	9.0	7.5	5.4	3.1	1.6	3.2	4.7	5.1	9.3	9.1	10.0	12.9	12.0	15.8	16.2	100.8	18.7	15.8
19	8.9	8.2	8.0	8.5	8.3	7.0	6.4	9.2	5.7	5.3	5.4	6.4	8.6	7.1	2.8	3.3	3.5	4.8	4.7	4.7	10.2	10.3	11.8	14.7	12.9	18.6	12.5	100.4	19.6	18.6
20	11.3	10.6	10.4	11.0	10.7	9.4	8.8	10.5	8.2	7.7	7.4	7.7	11.1	9.6	5.3	5.8	5.2	5.1	4.7	8.6	12.6	12.6	13.6	16.4	15.3	20.0	16.1	102.8	22.0	19.9
21	2.6	3.1	3.6	3.3	3.6	4.4	4.6	6.3	5.5	5.4	6.1	6.2	6.7	7.5	9.1	7.7	8.5	9.3	10.1	12.6	7.4	2.3	4.6	7.5	4.9	16.0	19.8	100.7	11.6	16.0
22	2.7	3.2	3.3	2.7	3.8	4.5	4.3	5.0	5.7	5.6	6.3	6.1	6.9	7.6	9.2	7.8	8.7	9.1	10.3	12.6	2.4	2.3	2.3	5.2	4.1	13.6	20.0	100.9	10.8	13.6
23	4.3	5.1	4.3	3.6	6.0	6.7	5.3	6.0	7.9	7.4	7.3	7.0	9.2	9.8	11.4	9.7	9.9	10.0	11.7	13.6	4.7	2.3	2.6	2.9	6.4	11.4	22.2	103.1	13.1	11.3
24	7.3	8.2	7.4	6.7	9.1	9.8	8.4	9.0	10.9	10.5	10.4	9.9	12.2	12.9	14.5	12.8	13.0	13.1	14.8	16.7	7.8	5.4	3.1	6.3	9.5	10.9	25.3	106.1	16.2	10.9
25	5.4	5.8	6.3	6.0	6.3	7.1	7.3	9.0	8.3	8.1	8.8	9.0	9.5	10.2	11.8	10.4	11.2	12.0	12.8	15.3	4.9	4.1	6.4	9.3	13.5	17.7	22.6	103.4	6.7	17.7
26	15.7	16.3	15.7	15.1	16.8	15.3	14.5	16.2	15.9	14.9	14.0	12.2	19.3	18.4	18.4	16.6	16.5	15.8	18.6	20.0	16.1	13.8	11.4	10.8	17.8	23.5	29.1	111.7	24.6	1.2
27	18.6	18.1	18.5	19.0	18.0	16.7	16.9	19.7	15.5	15.4	15.9	16.9	18.4	16.8	12.6	13.6	14.9	16.2	12.5	16.1	19.9	20.0	22.3	25.1	22.6	29.1	69.6	110.1	29.3	29.1
28	99.5	99.0	99.6	100.1	98.3	97.7	98.9	101.8	95.8	96.9	98.1	99.5	98.6	93.3	99.4	98.0	99.3	100.8	100.4	102.9	100.8	101.0	103.2	106.1	103.5	111.7	110.2	110.2	110.2	111.7
29	12.1	12.5	13.0	12.7	13.0	13.8	14.0	15.8	15.0	14.9	15.6	15.7	16.2	16.9	18.5	17.1	18.0	18.7	19.5	22.0	11.6	10.8	13.1	16.0	6.7	24.5	29.3	110.2	67.3	24.4
30	15.7	16.3	15.7	15.1	16.8	15.3	14.5	16.1	15.9	14.9	14.0	12.2	19.3	18.4	18.3	16.6	16.5	15.8	18.6	19.9	16.1	13.7	11.4	10.7	17.8	1.2	29.1	111.7	24.6	24.6

F\T : zone from \ zone to

External Zone	Destination	Time (min)	to	How to Calculate
26, 30	Catacaos (18 km), [Chiclayo (200km)]	15	Catacaos	Minimum (time to zone 12 or 23) +15 min
27	Sullana (38 km), Paita (50km)	45	Sullana, (60min to Paita)	Minimum (time to zone 15) +15 min
28	nothing	0	-	0
29	Chulucanas (55km)	60	Chulucanas	Minimum (time to zone 25) +15 min

Table 7-12 (3) T-model 2 Simulation Results : Travel Time of "Vehicle Equivalent" Trips

(e) Vehicle Eq. Trips for Mode [4 : Walking], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.2	2.8	2.4	4.1	4.1	3.9	4.5	4.6	5.3	6.0	7.6	6.2	6.9	7.7	8.6	11.1	2.3	2.5	4.5	7.4	5.0	15.9	18.4	99.3	11.7	15.9
2	0.9	0.9	0.9	1.5	1.8	2.5	1.8	3.6	3.7	3.6	4.0	4.1	4.9	5.7	7.2	5.8	6.4	7.1	8.2	10.6	3.0	3.2	4.9	7.8	5.7	16.3	18.0	98.9	12.5	16.3
3	1.6	0.9	0.9	0.9	2.4	2.9	1.6	3.0	4.1	3.7	3.8	3.9	5.5	6.1	7.6	6.0	6.2	6.9	8.0	10.4	3.9	3.3	4.2	7.1	6.6	15.6	18.4	99.4	13.3	15.5
4	0.6	1.4	1.2	2.0	2.8	3.4	2.2	3.9	4.7	4.2	4.3	4.4	5.9	6.6	8.2	6.5	6.7	7.5	8.5	11.0	2.9	3.1	4.3	7.2	5.6	15.7	19.0	99.9	12.4	15.6
5	2.3	1.8	2.4	2.9	2.6	2.3	2.9	4.6	3.7	3.7	4.4	4.5	3.1	4.9	7.2	5.9	6.8	7.6	8.3	10.7	3.5	3.7	5.9	8.8	6.3	16.7	18.0	98.2	13.0	16.7
6	2.7	2.2	2.8	3.3	2.3	2.0	1.7	5.0	2.6	2.5	3.2	3.3	4.4	4.2	6.1	4.7	5.6	6.3	7.1	9.6	3.9	4.1	6.3	9.2	6.6	15.5	16.9	97.5	13.4	15.5
7	2.8	1.8	1.6	2.2	2.8	2.2	2.9	3.6	3.1	2.0	2.2	2.3	5.7	5.6	6.1	4.4	4.6	5.3	6.3	8.8	4.4	4.5	5.4	8.3	7.1	14.5	16.9	98.9	13.8	14.5
8	4.2	3.6	3.0	3.6	4.6	5.0	3.6	4.9	6.2	5.4	4.6	3.9	7.7	8.2	8.9	7.2	7.0	7.0	9.2	10.5	6.3	5.0	5.9	8.7	9.0	16.2	19.7	101.4	15.7	16.1
9	4.2	3.7	4.3	4.8	3.7	2.3	3.1	6.5	3.8	1.1	2.3	3.7	4.0	2.5	4.7	3.3	4.5	6.1	5.7	8.2	5.4	5.6	7.8	10.7	8.2	15.9	15.5	95.8	14.9	15.9
10	4.1	3.6	3.7	4.2	3.7	2.2	2.0	5.4	1.1	1.1	1.2	2.6	5.1	3.5	4.6	3.2	3.5	5.1	5.3	7.7	5.3	5.5	7.5	10.3	8.0	14.9	15.4	96.8	14.8	14.9
11	4.8	4.0	3.8	4.3	4.4	2.9	2.2	4.6	2.3	1.2	1.5	1.8	6.3	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.0	6.2	7.2	10.1	8.7	14.0	15.9	98.0	15.5	14.0
12	4.9	4.1	3.9	4.4	4.5	3.0	2.3	3.9	3.7	2.6	1.8	4.4	7.0	6.2	6.1	4.4	4.2	3.6	6.4	7.7	6.1	6.0	6.9	9.8	8.9	12.2	16.9	99.5	15.6	12.2
13	5.4	4.9	5.5	6.0	3.1	3.9	5.1	7.8	4.0	5.1	6.3	6.8	6.0	5.3	7.6	6.2	7.5	9.0	8.6	11.1	6.7	6.8	9.1	11.9	9.4	19.0	18.4	98.5	16.1	19.0
14	6.1	5.7	6.2	6.7	4.9	4.3	5.6	8.5	2.5	3.5	4.8	6.2	5.3	5.7	6.0	4.7	5.9	7.5	7.1	9.5	7.4	7.5	9.8	12.6	10.1	18.4	16.8	93.3	16.8	18.4
15	7.7	7.2	7.7	8.2	7.2	5.8	6.1	8.9	4.7	4.6	5.1	6.1	7.6	6.0	4.4	2.8	4.1	5.4	2.8	5.3	8.9	9.1	11.3	14.2	11.7	18.3	12.6	99.3	18.4	18.3
16	6.3	5.8	6.0	6.5	5.9	4.5	4.4	7.2	3.3	3.2	3.4	4.4	6.2	4.7	2.8	2.1	1.5	3.1	3.3	5.8	7.6	7.7	9.8	12.6	10.3	16.6	13.6	97.9	17.0	16.6
17	7.2	6.4	6.2	6.7	6.8	5.3	4.6	7.0	4.5	3.5	3.6	4.2	7.5	5.9	4.1	1.5	1.6	1.6	3.5	5.2	8.4	8.6	10.0	12.8	11.1	16.5	14.9	99.2	17.9	16.5
18	7.9	7.1	6.9	7.5	7.6	6.0	5.3	7.0	6.1	5.1	3.8	3.6	9.0	7.5	5.4	3.1	1.6	3.2	4.7	5.1	9.2	9.1	10.0	12.8	11.9	15.8	16.2	100.8	18.6	15.8
19	8.7	8.2	8.0	8.5	8.3	6.9	6.3	9.2	5.7	5.3	5.4	6.4	8.6	7.1	2.8	3.3	3.5	4.7	4.7	4.7	10.0	10.1	11.8	14.6	12.7	18.6	12.5	100.4	19.4	18.6
20	11.2	10.6	10.4	11.0	10.7	9.3	8.8	10.5	8.2	7.7	7.4	7.7	11.1	9.5	5.3	5.8	5.2	5.1	4.7	8.6	12.4	12.6	13.5	16.4	15.2	20.0	16.1	102.8	21.9	19.9
21	2.6	3.0	3.6	3.2	3.5	4.2	4.5	6.3	5.4	5.3	6.0	6.1	6.7	7.4	8.9	7.6	8.4	9.2	10.0	12.4	7.4	2.3	4.6	7.4	4.9	15.9	19.7	100.7	11.6	15.9
22	2.7	3.2	3.3	2.7	3.7	4.4	4.3	5.0	5.6	5.5	6.2	6.0	6.8	7.5	9.1	7.7	8.6	9.1	10.1	12.6	2.3	2.3	2.3	5.1	4.1	13.6	19.9	100.8	10.8	13.6
23	4.2	5.0	4.2	3.6	5.9	6.5	5.3	5.9	7.8	7.3	7.2	6.9	9.1	9.7	11.3	9.6	9.8	10.0	11.6	13.5	4.6	2.3	2.6	2.9	6.3	11.3	22.1	103.0	13.1	11.3
24	7.0	7.9	7.1	6.4	8.8	9.4	8.1	8.7	10.6	10.2	10.1	9.8	11.9	12.6	14.1	12.5	12.7	12.8	14.5	16.4	7.4	5.1	2.9	6.0	9.2	10.7	24.9	105.8	15.9	10.7
25	5.3	5.7	6.3	5.9	6.3	6.9	7.2	9.0	8.2	8.0	8.7	8.9	9.4	10.1	11.7	10.3	11.1	11.9	12.7	15.2	4.9	4.1	6.3	9.2	13.4	17.7	22.5	103.4	6.7	17.7
26	15.5	16.3	15.6	14.9	16.7	15.2	14.5	16.2	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	20.0	15.9	13.6	11.3	10.7	17.7	23.4	29.1	111.7	24.4	1.2
27	18.5	18.0	18.5	19.0	18.0	16.6	16.9	19.7	15.5	15.4	15.9	16.9	18.4	16.8	12.6	13.6	14.9	16.2	12.5	16.1	19.7	19.9	22.1	25.0	22.5	29.1	69.6	110.1	29.2	29.1
28	99.4	98.9	99.5	100.0	98.2	97.6	98.8	101.8	95.8	96.8	98.0	99.5	98.5	93.3	99.3	97.9	99.2	100.8	100.4	102.8	100.7	100.8	103.0	105.9	103.4	111.7	110.1	110.1	110.1	111.7
29	12.1	12.5	13.0	12.7	13.0	13.6	13.9	15.7	14.9	14.8	15.5	15.6	16.1	16.8	18.4	17.0	17.9	18.6	19.4	21.9	11.6	10.8	13.1	15.9	6.7	24.4	29.2	110.1	67.2	24.4
30	15.5	16.3	15.5	14.9	16.7	15.2	14.5	16.1	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	19.9	15.9	13.6	11.3	10.7	17.7	1.2	29.1	111.7	24.4	24.4

F\T : zone from \ zone to

(f) Vehicle Eq. Trips for Mode [5 : Others], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.2	2.8	2.4	4.1	4.1	3.9	4.5	4.6	5.3	6.0	7.6	6.2	6.9	7.7	8.6	11.1	2.3	2.5	4.5	7.4	5.0	15.9	18.4	99.3	11.7	15.9
2	0.9	0.9	0.9	1.5	1.8	2.5	1.8	3.6	3.7	3.6	4.0	4.1	4.9	5.7	7.2	5.8	6.4	7.1	8.2	10.6	3.0	3.2	4.9	7.8	5.7	16.3	18.0	98.9	12.5	16.3
3	1.6	0.9	0.9	0.9	2.4	2.9	1.6	3.0	4.1	3.7	3.8	3.9	5.5	6.1	7.7	6.0	6.2	6.9	8.0	10.4	3.9	3.3	4.2	7.1	6.6	15.6	18.4	99.4	13.3	15.5
4	0.6	1.4	1.2	2.0	2.8	3.4	2.2	3.9	4.7	4.2	4.3	4.4	5.9	6.6	8.2	6.5	6.7	7.5	8.5	11.0	2.9	3.1	4.3	7.2	5.6	15.7	19.0	99.9	12.4	15.6
5	2.3	1.8	2.4	2.9	2.6	2.3	2.9	4.6	3.7	3.7	4.4	4.5	3.1	4.9	7.2	5.9	6.8	7.6	8.3	10.7	3.5	3.7	5.9	8.8	6.3	16.7	18.0	98.2	13.0	16.7
6	2.7	2.2	2.8	3.3	2.3	2.0	1.7	5.0	2.6	2.5	3.2	3.3	4.4	4.2	6.1	4.7	5.6	6.3	7.2	9.6	3.9	4.1	6.3	9.2	6.6	15.5	16.9	97.5	13.4	15.5
7	2.8	1.8	1.6	2.2	2.8	2.2	2.9	3.6	3.1	2.0	2.2	2.3	5.7	5.6	6.1	4.4	4.6	5.3	6.3	8.8	4.4	4.5	5.4	8.3	7.1	14.5	16.9	98.9	13.8	14.5
8	4.2	3.6	3.0	3.6	4.6	5.0	3.6	4.9	6.2	5.4	4.6	3.9	7.7	8.2	8.9	7.2	7.0	7.0	9.2	10.5	6.3	5.0	5.9	8.7	9.0	16.2	19.7	101.4	15.7	16.1
9	4.2	3.7	4.3	4.8	3.7	2.3	3.1	6.5	3.8	1.1	2.3	3.7	4.0	2.5	4.7	3.3	4.5	6.1	5.7	8.2	5.4	5.6	7.8	10.7	8.2	15.9	15.5	95.8	14.9	15.9
10	4.1	3.6	3.7	4.2	3.7	2.2	2.0	5.4	1.1	1.1	1.2	2.6	5.1	3.5	4.6	3.2	3.5	5.1	5.3	7.7	5.3	5.5	7.5	10.3	8.0	14.9	15.4	96.8	14.8	14.9
11	4.8	4.0	3.8	4.3	4.4	2.9	2.2	4.6	2.3	1.2	1.5	1.8	6.3	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.0	6.2	7.2	10.1	8.7	14.0	15.9	98.0	15.5	14.0
12	4.9	4.1	3.9	4.4	4.5	3.0	2.3	3.9	3.7	2.6	1.8	4.4	7.0	6.2	6.1	4.4	4.2	3.6	6.4	7.7	6.1	6.0	6.9	9.8	8.9	12.2	16.9	99.5	15.6	12.2
13	5.4	4.9	5.5	6.0	3.1	3.9	5.1	7.8	4.0	5.1	6.3	6.8	6.0	5.3	7.6	6.2	7.5	9.0	8.6	11.1	6.7	6.8	9.1	11.9	9.4	19.0	18.4	98.5	16.1	19.0
14	6.1	5.7	6.3	6.8	4.9	4.4	5.6	8.5	2.5	3.6	4.8	6.2	5.3	5.7	6.1	4.7	5.9	7.5	7.1	9.6	7.4	7.6	9.8	12.6	10.1	18.4	16.9	93.3	16.8	18.4
15	7.7	7.2	7.7	8.3	7.2	5.8	6.1	8.9	4.7	4.6	5.1	6.1	7.6	6.1	4.4	2.8	4.1	5.4	2.8	5.3	9.0	9.1	11.3	14.2	11.7	18.4	12.6	99.3	18.4	18.3
16	6.3	5.8	6.0	6.5	5.9	4.5	4.4	7.2	3.3	3.2	3.4	4.4	6.2	4.7	2.8	2.1	1.5	3.1	3.3	5.8	7.6	7.7	9.8	12.6	10.3	16.6	13.6	97.9	17.0	16.6
17	7.2	6.4	6.2	6.7	6.8	5.3	4.6	7.0	4.5	3.5	3.6	4.2	7.5	5.9	4.1	1.5	1.6	1.6	3.5	5.2	8.4	8.6	10.0	12.8	11.1	16.5	14.9	99.2	17.9	16.5
18	7.9	7.1	6.9	7.5	7.6	6.0	5.3	7.0	6.1	5.1	3.8	3.6	9.0	7.5	5.4	3.1	1.6	3.2	4.7	5.1	9.2	9.1	10.0	12.8	11.9	15.8	16.2	100.8	18.6	15.8
19	8.7	8.2	8.0	8.5	8.3	6.9	6.3	9.2	5.7	5.3	5.4	6.4	8.6	7.1	2.8	3.3	3.5	4.7	4.7	4.7	10.0	10.2	11.8	14.6	12.7	18.6	12.5	100.4	19.4	18.6
20	11.2	10.6	10.4	11.0	10.7	9.3	8.8	10.5	8.2	7.7	7.4	7.7	11.1	9.6	5.3	5.8	5.2	5.1	4.7	8.6	12.5	12.6	13.5	16.4	15.2	20.0	16.1	102.8	21.9	19.9
21	2.6	3.0	3.6	3.2	3.5	4.2	4.5	6.3	5.4	5.3	6.0	6.1	6.7	7.4	9.0	7.6	8.4	9.2	10.0	12.5	7.4	2.3	4.6	7.4	4.9	15.9	19.7	100.7	11.6	15.9
22	2.7	3.2	3.3	2.7	3.7	4.4	4.3	5.0	5.6	5.5	6.2	6.0	6.8	7.5	9.1	7.7	8.6	9.1	10.2	12.6	2.3	2.3	2.3	5.1	4.1	13.6	19.9	100.8	10.8	13.6
23	4.2	5.0	4.2	3.6	5.9	6.5	5.3	5.9	7.8	7.3	7.2	6.9	9.1	9.7	11.3	9.6	9.8	10.0	11.6	13.5	4.6	2.3	2.6	2.9	6.3	11.3	22.1	103.0	13.1	11.3
24	7.0	7.9	7.1	6.4	8.8	9.4	8.1	8.7	10.6	10.2	10.1	9.8	11.9	12.6	14.1	12.5	12.7	12.8	14.5	16.4	7.4	5.1	2.9	6.0	9.2	10.7	24.9	105.8	15.9	10.7
25	5.3	5.7	6.3	5.9	6.3	6.9	7.2	9.0	8.2	8.0	8.7	8.9	9.4	10.1	11.7	10.3	11.1	11.9	12.7	15.2	4.9	4.1	6.3	9.2	13.4	17.7	22.5	103.4	6.7	17.7
26	15.5	16.3	15.6	14.9	16.7	15.2	14.5	16.2	15.9	14.9	14.0	12.2	19.2	18.4	18.4	16.6	16.5	15.8	18.6	20.0	15.9	13.6	11.3	10.7	17.7	23.4	29.1	111.7	24.4	1.2
27	18.5	18.0	18.5	19.0	18.0	16.6	16.9	19.7	15.5	15.4	15.9	16.9	18.4	16.8	12.6	13.6	14.9	16.2	12.5	16.1	19.7	19.9	22.1	25.0	22.5	29.1	69.6	110.1	29.2	29.1
28	99.4	98.9	99.5	100.0	98.2	97.6	98.9	101.8	95.8	96.8	98.1	99.5	98.5	93.3	99.3	98.0	99.2	100.8	100.4	102.8	100.7	100.8	103.0	105.9	103.4	111.7	110.1	110.1	110.1	111.7
29	12.1	12.5	13.0	12.7	13.0	13.6	13.9	15.7	14.9	14.8	15.5	15.6	16.1	16.8	18.4	17.0	17.9	18.6	19.4	21.9	11.6	10.8	13.1	15.9	6.7	24.4	29.2	110.1	67.2	24.4
30	15.5	16.3	15.5	14.9	16.7	15.2	14.5	16.1	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	19.9	15.9	13.6	11.3	10.7	17.7	1.2	29.1	111.7	24.4	24.4

F\T : zone from \ zone to

External Zone	Destination	Time (min)	to	How to Calculate
26, 30	Catacaos (18 km), [Chiclayo (200km)]	15	Catacaos	Minimum (time to zone 12 or 23) +15 min
27	Sullana (38 km), Paita (50km)	45	Sullana, (60min to Paita)	Minimum (time to zone 15) +15 min
28	nothing	0	-	0
29	Chulucanas (55km)	60	Chulucanas	Minimum (time to zone 25) +15 min

Table 7-12 (4) T-model 2 Simulation Results : Travel Time of "Vehicle Equivalent" Trips

(g) Vehicle Eq. Trips for Mode [All : (1) ~ (5)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.4	3.7	2.4	4.2	4.6	4.4	4.6	4.7	5.7	6.5	8.1	6.7	7.0	7.8	8.8	11.3	2.6	2.6	4.7	7.6	5.2	16.1	18.9	99.7	11.9	16.1
2	0.9	0.9	0.9	1.5	1.9	3.2	1.9	3.6	4.0	3.9	4.1	4.2	5.1	5.9	7.5	6.2	6.5	7.2	8.3	10.8	3.5	3.6	5.1	8.0	6.1	16.4	18.3	99.2	12.8	16.4
3	1.6	0.9	1.0	1.0	2.5	3.7	1.7	3.0	4.5	3.8	3.9	4.0	5.7	6.4	7.8	6.1	6.3	7.0	8.1	10.5	4.2	3.5	4.4	7.3	6.8	15.8	18.6	99.7	13.5	15.8
4	0.6	1.5	1.2	2.1	3.0	4.2	2.2	3.9	5.0	4.3	4.4	4.5	6.2	6.9	8.4	6.6	6.8	7.5	8.6	11.1	3.2	3.2	4.5	7.4	5.8	15.9	19.2	100.2	12.5	15.9
5	2.6	1.9	2.5	3.1	2.9	2.7	3.0	4.7	3.7	4.0	4.7	4.8	3.2	5.0	7.3	5.9	7.1	7.9	8.4	10.8	3.9	4.0	6.3	9.2	6.5	17.1	18.1	98.3	13.2	17.0
6	3.2	2.4	3.0	3.6	2.6	2.2	1.8	5.3	2.8	2.7	3.4	3.5	4.6	4.3	6.4	5.0	5.8	6.6	7.4	9.9	4.7	4.8	7.0	9.9	7.3	15.7	17.2	97.6	14.0	15.7
7	2.9	1.9	1.7	2.3	3.0	3.2	3.4	3.6	3.2	2.1	2.2	2.3	6.0	5.7	6.2	4.4	4.6	5.3	6.4	8.9	5.2	4.8	5.6	8.5	7.8	14.5	16.9	99.0	14.5	14.5
8	4.3	3.6	3.0	3.7	4.7	5.8	3.6	5.1	6.6	5.5	4.6	3.9	8.0	8.6	9.0	7.2	7.0	7.0	9.2	10.5	6.7	5.2	6.1	9.0	9.3	16.2	19.8	101.8	16.0	16.1
9	4.9	4.1	4.7	5.3	3.8	3.3	3.2	6.6	3.8	1.1	2.3	3.8	4.2	2.6	4.7	3.3	4.6	6.1	5.8	8.2	6.4	6.5	8.7	11.6	9.0	16.0	15.5	95.8	15.7	16.0
10	4.8	4.0	3.8	4.4	4.1	3.2	2.2	5.5	1.1	1.2	1.2	2.7	5.2	3.6	4.6	3.2	3.5	5.1	5.3	7.8	6.3	6.3	7.8	10.7	8.9	14.9	15.4	96.9	15.6	14.9
11	5.1	4.2	3.9	4.5	4.8	3.9	2.2	4.6	2.3	1.2	1.5	1.8	6.5	4.9	5.2	3.4	3.6	3.8	5.4	7.4	7.0	6.6	7.4	10.3	9.6	14.1	15.9	98.2	16.3	14.0
12	5.2	4.3	4.1	4.6	4.9	4.0	2.4	3.9	3.8	2.7	1.8	4.8	7.9	6.3	6.2	4.4	4.2	3.6	6.4	7.7	7.1	6.3	7.1	9.8	9.7	12.2	17.0	99.6	16.4	12.2
13	5.9	5.2	5.8	6.4	3.3	4.5	5.6	8.0	4.2	5.2	6.5	7.4	6.4	5.5	7.8	6.4	7.6	9.2	8.8	11.3	7.2	7.3	9.6	12.5	9.8	19.6	18.6	98.8	16.5	19.6
14	8.2	7.4	8.0	8.6	6.4	6.4	7.2	10.3	3.9	5.0	6.3	7.7	6.8	7.2	7.5	6.1	7.4	9.0	8.6	11.0	9.7	9.8	12.0	14.9	12.3	19.9	18.3	93.3	19.0	19.9
15	8.5	7.7	7.9	8.5	7.4	6.9	6.2	9.0	4.8	4.7	5.2	6.2	7.8	6.2	4.5	2.8	4.1	5.4	2.8	5.3	10.0	10.0	11.9	14.8	12.6	18.4	12.6	99.4	19.3	18.4
16	7.1	6.3	6.2	6.8	6.0	5.5	4.5	7.3	3.4	3.3	3.4	4.5	6.4	4.8	2.8	2.2	1.5	3.2	3.3	5.8	8.6	8.6	10.2	13.1	11.2	16.7	13.6	98.1	17.9	16.7
17	7.6	6.6	6.4	7.0	7.3	6.4	4.7	7.0	4.6	3.6	3.6	4.3	7.6	6.1	4.2	1.5	1.6	1.6	3.5	5.2	9.4	9.4	10.2	13.1	12.0	16.5	15.0	99.3	18.7	16.5
18	8.3	7.3	7.1	7.7	8.0	7.1	5.4	7.0	6.1	5.1	3.8	3.6	9.2	7.6	5.4	3.2	1.6	3.2	4.8	5.1	10.1	9.3	10.2	13.1	12.7	15.8	16.2	100.9	19.4	15.8
19	9.4	8.5	8.3	8.9	8.5	8.1	6.6	9.3	5.9	5.4	5.5	6.5	8.9	7.3	3.0	3.4	3.6	4.8	4.8	4.7	11.1	11.2	12.2	15.1	13.7	18.8	12.5	100.6	20.5	18.7
20	11.8	10.9	10.7	11.2	10.9	10.5	9.0	10.5	8.3	7.8	7.4	7.7	11.3	9.7	5.4	5.8	5.2	5.1	4.7	9.1	13.5	12.9	13.7	16.6	16.1	20.0	16.1	103.0	22.9	20.0
21	3.1	3.6	4.1	3.8	4.2	5.5	5.1	6.8	6.3	6.2	6.9	7.0	7.4	8.2	9.8	8.4	9.3	10.0	10.9	13.3	7.9	2.4	4.7	7.6	4.9	16.1	20.6	101.5	11.6	16.1
22	2.7	3.6	3.3	3.0	4.2	5.5	4.3	5.5	6.3	6.2	6.5	6.5	7.4	8.3	9.9	8.5	8.9	9.6	10.7	13.1	2.5	2.4	2.3	5.2	4.1	13.7	20.7	101.5	10.9	13.7
23	5.2	6.1	5.2	4.6	7.2	8.4	6.4	6.9	9.2	8.5	8.3	8.0	10.4	11.2	12.6	10.9	11.0	11.0	12.9	14.6	5.9	3.4	3.2	2.9	7.5	11.4	23.4	104.4	14.2	11.4
24	13.4	14.3	13.4	12.8	15.3	16.6	14.6	15.1	17.1	16.1	15.2	13.4	18.6	19.3	19.5	17.8	17.6	16.9	19.8	21.1	14.1	11.6	8.3	12.0	15.7	14.3	30.3	112.6	22.4	14.3
25	5.7	6.2	6.7	6.4	6.8	8.1	7.7	9.4	8.9	8.8	9.5	9.6	10.0	10.8	12.4	11.0	11.9	12.6	13.5	15.9	5.0	4.1	6.5	9.4	13.6	17.8	23.2	104.1	6.7	17.8
26	17.4	16.5	16.3	16.9	17.2	16.2	14.6	16.2	16.0	14.9	14.0	12.2	20.1	18.6	18.4	16.7	16.5	15.8	18.7	20.0	19.0	16.5	13.2	10.8	20.6	24.9	29.2	111.8	27.3	1.2
27	19.3	18.5	18.7	19.3	18.2	17.7	17.0	19.8	15.6	15.4	16.0	17.0	18.5	17.0	12.6	13.6	14.9	16.2	12.5	16.1	20.8	20.8	22.7	25.6	23.4	29.2	69.7	110.2	30.1	29.2
28	101.5	100.7	101.3	101.9	99.7	99.6	100.4	103.6	97.2	98.3	99.5	101.0	100.1	93.3	100.8	99.4	100.7	102.3	101.9	104.3	103.0	103.0	105.2	108.1	105.6	113.2	111.6	111.9	112.3	113.2
29	12.4	12.9	13.4	13.1	13.5	14.8	14.4	16.1	15.6	15.5	16.2	16.3	16.7	17.5	19.1	17.8	18.6	19.3	20.2	22.7	11.8	10.8	13.2	16.1	6.7	24.6	29.9	110.8	67.7	24.6
30	17.4	16.5	16.3	16.9	17.1	16.2	14.6	16.1	16.0	14.9	14.0	12.2	20.1	18.6	18.4	16.6	16.5	15.8	18.6	19.9	19.0	16.5	13.2	10.8	20.6	1.2	29.2	111.8	27.3	27.3

F\T : zone from \ zone to

(h) Vehicle Eq. Trips for Mode [All : Sum of Table (b)~(f)], Trip type [All : (1) ~ (10)], Hour Period [3 : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.5	3.8	2.4	4.2	4.6	4.5	4.6	4.7	5.7	6.5	8.1	6.7	7.0	7.8	8.8	11.3	2.7	2.7	4.7	7.6	5.2	16.1	18.9	99.8	11.9	16.1
2	0.9	0.9	0.9	1.5	1.9	3.2	1.9	3.6	4.0	3.9	4.1	4.2	5.1	5.9	7.5	6.2	6.5	7.2	8.3	10.7	3.6	3.6	5.1	8.0	6.1	16.4	18.3	99.2	12.9	16.4
3	1.6	0.9	0.9	1.0	2.5	3.7	1.7	3.0	4.5	3.8	3.9	4.0	5.7	6.4	7.8	6.1	6.3	7.0	8.1	10.5	4.2	3.5	4.4	7.3	6.8	15.8	18.6	99.7	13.5	15.7
4	0.6	1.5	1.2	2.1	3.0	4.2	2.2	3.9	5.0	4.3	4.4	4.5	6.2	6.9	8.4	6.6	6.8	7.5	8.6	11.1	3.3	3.3	4.5	7.4	5.8	15.9	19.2	100.2	12.5	15.9
5	2.7	1.9	2.5	3.1	2.9	2.7	3.0	4.7	3.7	4.0	4.7	4.8	3.2	5.0	7.3	5.9	7.1	7.9	8.4	10.8	4.0	4.0	6.3	9.2	6.6	17.1	18.1	98.3	13.3	17.0
6	3.3	2.5	3.0	3.6	2.6	2.2	1.8	5.3	2.8	2.7	3.4	3.5	4.6	4.3	6.4	5.0	5.8	6.6	7.4	9.9	4.9	4.9	7.0	9.9	7.4	15.7	17.2	97.6	14.1	15.7
7	2.8	1.9	1.7	2.3	3.0	3.2	3.4	3.6	3.2	2.1	2.2	2.3	6.0	5.7	6.2	4.4	4.6	5.3	6.4	8.9	5.3	4.8	5.6	8.5	7.8	14.5	16.9	99.0	14.6	14.5
8	4.3	3.6	3.0	3.7	4.7	5.8	3.6	5.1	6.6	5.5	4.6	3.9	8.0	8.6	9.0	7.2	7.0	7.0	9.2	10.5	6.7	5.2	6.1	9.0	9.3	16.2	19.8	101.8	16.0	16.1
9	5.0	4.2	4.8	5.3	3.8	3.3	3.2	6.6	3.8	1.1	2.3	3.8	4.2	2.6	4.7	3.3	4.6	6.1	5.8	8.2	6.6	6.6	8.7	11.6	9.1	16.0	15.5	95.8	15.8	16.0
10	4.9	4.1	3.8	4.4	4.2	3.2	2.2	5.5	1.1	1.2	1.2	2.7	5.2	3.6	4.6	3.2	3.5	5.1	5.3	7.8	6.5	6.5	7.8	10.7	9.0	14.9	15.4	96.9	15.7	14.9
11	5.1	4.1	3.9	4.5	4.8	3.9	2.2	4.6	2.3	1.2	1.5	1.8	6.5	4.9	5.2	3.4	3.6	3.8	5.4	7.4	7.1	6.5	7.4	10.3	9.7	14.1	15.9	98.2	16.4	14.0
12	5.2	4.3	4.0	4.6	5.0	4.0	2.4	3.9	3.8	2.7	1.8	4.8	7.9	6.3	6.2	4.4	4.2	3.6	6.4	7.7	7.2	6.2	7.1	9.8	9.8	12.2	17.0	99.6	16.5	12.2
13	6.0	5.2	5.7	6.3	3.3	4.5	5.6	8.0	4.2	5.2	6.5	7.4	6.4	5.5	7.7	6.4	7.6	9.2	8.8	11.3	7.3	7.3	9.6	12.5	9.8	19.6	18.5	98.7	16.6	19.6
14	8.2	7.4	8.0	8.6	6.4	6.3	7.1	10.3	3.9	5.0	6.2	7.7	6.8	7.1	7.5	6.1	7.4	8.9	8.5	11.0	9.8	9.8	11.9	14.8	12.4	19.9	18.3	93.3	19.1	19.9
15	8.6	7.7	7.9	8.5	7.4	6.9	6.2	9.0	4.8	4.7	5.2	6.2	7.8	6.2	4.5	2.8	4.1	5.4	2.8	5.3	10.2	10.1	11.9	14.8	12.7	18.4	12.6	99.4	19.4	18.4
16	7.2	6.4	6.2	6.8	6.0	5.5	4.5	7.3	3.4	3.3	3.4	4.5	6.4	4.8	2.8	2.2	1.5	3.2	3.3	5.8	8.8	8.8	10.1	13.0	11.3	16.7	13.6	98.1	18.0	16.7
17	7.5	6.6	6.4	7.0	7.3	6.4	4.7	7.0	4.6	3.6	3.6	4.3	7.6	6.1	4.2	1.5	1.6	1.6	3.5	5.2	9.6	9.4	10.2	13.1	12.1	16.5	15.0	99.3	18.9	16.5
18	8.2	7.3	7.1	7.7	8.0	7.1	5.4	7.0	6.1	5.1	3.8	3.6	9.2	7.6	5.4	3.2	1.6	3.2	4.8	5.1	10.3	9.3	10.1	13.1	12.8	15.8	16.2	100.9	19.5	15.8
19	9.4	8.5	8.3	8.8	8.5	8.1	6.6	9.3	5.9	5.4	5.5	6.5	8.9	7.3	2.9	3.4	3.6	4.8	4.8	4.7	11.3	11.3	12.2	15.1	13.8	18.7	12.5	100.6	20.6	18.7
20	11.8	10.9	10.6	11.2	10.9	10.5	9.0	10.5	8.3	7.8	7.4	7.7	11.3	9.7	5.3	5.8	5.2	5.1	4.7	9.2	13.7	12.8	13.7	16.6	16.2	20.0	16.1	103.0	23.0	20.0
21	3.2	3.7	4.2	3.8	4.3	5.6	5.2	6.9	6.4	6.3	7.0	7.1	7.5	8.3	9.9	8.5	9.4	10.1	11.0	13.4	7.9	2.4	4.7	7.6	4.9	16.1	20.7	101.6	11.6	16.1
22	2.7	3.6	3.3	3.0	4.3	5.6	4.3	5.5	6.4	6.3	6.5	6.6	7.5	8.3	9.9	8.6	8.9	9.6	10.7	13.2	2.4	2.4	2.3	5.2	4.1	13.7	20.7	101.6	10.8	13.7
23	5.3	6.1	5.3	4.6	7.2	8.5	6.5	7.0	9.3	8.6	8.3	8.0	10.4	11.2	12.6	10.9	11.1	11.0	12.9	14.6	5.8	3.3	3.1	2.9	7.4	11.4	23.4	104.5	14.2	11.4
24	13.4	14.3	13.4	12.8	15.4	16.6	14.6	15.1	17.1	16.0	15.1	13.3	18.6	19.3	19.5	17.8	17.6	16.9	19.7	21.1	13.9	11.5	8.3	11.9	15.6	14.3	30.3	112.6	22.3	14.3
25	5.8	6.3	6.7	6.4	6.8	8.1	7.7	9.5	8.9	8.8	9.5	9.7	10.0	10.9	12.5	11.1	12.0	12.7	13.5	16.0	5.0	4.1	6.4	9.3	13.6	17.8	23.3	104.1	6.7	17.8
26	17.4	16.5	16.3	16.8	17.2	16.2	14.6	16.2	16.0	14.9	14.0	12.2	20.1	18.6	18.4	16.7	16.5	15.8	18.6	20.0	18.9	16.4	13.2	10.8	20.5	24.9	29.2	111.8	27.3	1.2
27	19.3	18.5	18.7	19.3	18.2	17.7	17.0	19.8	15.6	15.4	16.0	17.0	18.5	17.0	12.6	13.6	14.9	16.2	12.5	16.1	20.9	20.9	22.6	25.6	23.5	29.2	69.7	110.2	30.2	29.2
28	101.5	100.7	101.3	101.9	99.7	99.6	100.4	103.5	97.2	98.2	99.5	100.9	100.1	93.3	100.8	99.4	100.6	102.2	101.8	104.3	103.1	103.1	105.2	108.1	105.6	113.2	111.6	112.0	112.4	113.2
29	12.5	13.0	13.4	13.1	13.5	14.8	14.5	16.2	15.7	15.6	16.3	16.4	16.8	17.6	19.2	17.8	18.7	19.4	20.3	22.7	11.7	10.8	13.2	16.1	6.7	24.5	30.0	110.8	67.7	24.5
30	17.4	16.5	16.3	16.8	17.2	16.2	14.6	16.1	16.0	14.9	14.0	12.2	20.1	18.6	18.4	16.6	16.5	15.8	18.6	19.9	18.9	16.4	13.2	10.8	20.5	1.2	29.2	111.8	27.3	27.3

F\T : zone from \ zone to

External Zone	Destination	Time (min)	to	How to Calculate
26, 30	Catacaos (18 km), [Chiclayo (200km)]	15	Catacaos	Minimum (time to zone 12 or 23) +15 min
27	Sullana (38 km), Paita (50km)	45	Sullana, (60min to Paita)	Minimum (time to zone 15) +15 min
28	nothing	0	-	0
29	Chulucanas (55km)	60	Chulucanas	Minimum (time to zone 25) +15 min

Table 7-12 (5) T-model 2 Simulation Results : Travel Time of "Vehicle Equivalent" Trips

(i) Travel Time [Original (by Average Vehicle Speed)], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

Z\Z	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.5																													
2	1.0	0.5																												
3	2.0	1.0	0.5																											
4	1.0	2.0	1.0	0.5																										
5	2.7	2.2	2.7	3.2	1.1																									
6	3.2	2.7	3.2	3.7	2.2	0.9																								
7	3.0	2.0	2.0	3.0	4.3	1.8	0.9																							
8	4.2	3.2	2.2	3.2	5.8	5.8	3.7	1.1																						
9	6.7	5.7	6.7	7.7	4.2	3.3	4.2	7.0	0.8																					
10	5.8	4.8	4.8	5.8	6.0	3.2	2.7	6.2	1.5	0.7																				
11	5.8	4.8	4.8	5.8	6.4	3.6	2.7	4.8	2.8	1.3	0.7																			
12	7.0	6.0	5.5	6.5	7.6	4.8	3.8	5.0	5.7	4.2	2.8	1.4																		
13	6.0	5.0	6.0	7.0	2.8	4.2	7.2	8.5	3.7	5.2	6.5	8.8	1.4																	
14	7.8	6.8	7.8	8.8	5.7	5.5	7.3	10.7	3.2	4.7	6.0	8.3	5.2	1.6																
15	10.0	9.0	10.0	11.0	7.7	6.8	6.9	9.3	5.2	5.0	5.6	7.3	7.2	6.7	1.2															
16	10.3	7.6	7.6	10.3	6.6	5.8	5.4	7.8	4.1	3.9	4.1	5.8	6.1	5.6	2.4	0.8														
17	10.4	7.6	7.6	10.3	8.0	6.5	5.6	7.3	5.5	4.3	3.8	5.3	7.5	7.0	3.8	1.5	0.8													
18	9.3	8.3	7.8	8.8	9.0	7.1	6.2	7.2	6.5	5.2	3.8	5.3	8.5	8.0	5.0	3.5	2.0	1.0												
19	10.9	9.9	9.9	10.9	11.5	8.7	7.8	10.2	6.8	6.4	6.4	8.2	8.8	8.3	3.0	3.7	3.8	5.0	1.5											
20	12.5	11.5	11.0	12.0	13.3	10.3	9.3	10.5	9.7	8.3	7.0	8.5	11.7	11.2	5.2	5.8	4.8	5.2	5.2	2.4										
21	3.2	4.2	5.2	4.2	5.5	6.5	6.3	7.5	9.3	9.2	9.0	9.0	8.8	10.5	12.8	10.7	10.9	13.1	13.1	14.7	1.6									
22	4.1	5.1	5.0	4.0	6.4	7.4	6.0	5.7	10.2	8.7	8.7	8.8	9.8	11.0	12.9	11.4	11.3	11.3	13.5	14.5	3.5	1.4								
23	4.8	5.8	4.8	3.8	8.2	8.0	6.2	5.8	10.3	8.8	8.8	9.0	11.3	12.2	13.1	11.6	11.5	11.5	13.7	14.7	6.3	2.8	1.4							
24	8.3	9.3	8.2	7.3	11.6	11.4	9.6	9.3	13.8	12.3	12.3	12.4	14.8	15.6	16.5	15.0	14.9	14.9	17.1	18.1	9.8	6.3	3.4	1.7						
25	6.8	7.8	8.8	7.8	9.1	10.1	9.9	10.8	12.9	12.8	12.6	12.6	12.4	14.1	16.4	14.3	14.5	16.5	16.7	18.3	6.2	5.3	8.2	11.6	2.7					
26	19.8	20.8	19.8	18.8	22.6	19.8	18.8	20.0	20.7	19.2	17.8	16.4	23.8	23.3	22.3	20.8	20.3	20.3	23.2	23.5	21.3	17.8	16.4	18.4	23.2	5.0				
27	55.0	54.0	55.0	56.0	52.7	51.8	51.9	54.3	50.2	50.0	50.6	52.3	52.2	51.7	46.2	47.4	48.8	50.0	48.0	50.2	57.8	57.9	58.1	61.5	61.4	68.8	5.0			
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
29	66.8	67.8	68.8	67.8	69.1	70.1	69.9	70.8	72.9	72.8	72.6	72.6	72.4	74.1	76.4	74.3	74.5	76.5	76.7	78.3	66.2	65.3	68.2	71.6	62.7	84.6	124.1	0.0	5.0	
30	19.8	20.8	19.8	18.8	22.6	19.8	18.8	20.0	20.7	19.2	17.8	16.4	23.8	23.3	22.3	20.8	20.3	20.3	23.2	23.5	21.3	17.8	16.4	18.4	23.2	5.0	68.8	0.0	84.6	5.0

(j) Travel Time [at the Start of Simulation], Trip type [All : (1) ~ (10)], Hour Period [(3) : 7:00 am ~ 7:59 am]

F\T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.9	0.9	1.4	1.1	2.2	2.8	2.4	4.1	4.1	3.9	4.5	4.6	5.3	6.0	7.6	6.2	6.9	7.7	8.6	11.1	2.3	2.5	4.5	7.4	5.0	15.9	18.4	99.3	11.7	15.9
2	0.9	0.9	0.9	1.5	1.8	2.5	1.8	3.6	3.7	3.6	4.0	4.1	4.9	5.7	7.2	5.8	6.4	7.1	8.2	10.6	3.0	3.2	4.9	7.8	5.7	16.3	18.0	98.9	12.5	16.3
3	1.6	0.9	0.9	0.9	2.4	2.9	1.6	3.0	4.1	3.7	3.8	3.9	5.5	6.1	7.6	6.0	6.2	6.9	8.0	10.4	3.9	3.3	4.2	7.1	6.6	15.6	18.4	99.4	13.3	15.5
4	0.6	1.4	1.2	2.0	2.8	3.4	2.2	3.9	4.7	4.2	4.3	4.4	5.9	6.6	8.2	6.5	6.7	7.5	8.5	11.0	2.9	3.1	4.3	7.2	5.6	15.7	19.0	99.9	12.4	15.6
5	2.3	1.8	2.4	2.9	2.6	2.3	2.9	4.6	3.7	3.7	4.4	4.5	3.1	4.9	7.2	5.9	6.8	7.6	8.3	10.7	3.5	3.7	5.9	8.8	6.3	16.7	18.0	98.2	13.0	16.7
6	2.7	2.2	2.8	3.3	2.3	2.0	1.7	5.0	2.6	2.5	3.2	3.3	4.4	4.2	6.1	4.7	5.6	6.3	7.1	9.6	3.9	4.1	6.3	9.2	6.6	15.5	16.9	97.5	13.4	15.5
7	2.8	1.8	1.6	2.2	2.8	2.2	2.9	3.6	3.1	2.0	2.2	2.3	5.7	5.6	6.1	4.4	4.6	5.3	6.3	8.8	4.4	4.5	5.4	8.3	7.1	14.5	16.9	98.9	13.8	14.5
8	4.2	3.6	3.0	3.6	4.6	5.0	3.6	4.9	6.2	5.4	4.6	3.9	7.7	8.2	8.9	7.2	7.0	7.0	9.2	10.5	6.3	5.0	5.9	8.7	9.0	16.2	19.7	101.4	15.7	16.1
9	4.2	3.7	4.3	4.8	3.7	2.3	3.1	6.5	3.8	1.1	2.3	3.7	4.0	2.5	4.7	3.3	4.5	6.1	5.7	8.2	5.4	5.6	7.8	10.7	8.2	15.9	15.5	95.8	14.9	15.9
10	4.1	3.6	3.7	4.2	3.7	2.2	2.0	5.4	1.1	1.1	1.2	2.6	5.1	3.5	4.6	3.2	3.5	5.1	5.3	7.7	5.3	5.5	7.5	10.3	8.0	14.9	15.4	96.8	14.8	14.9
11	4.8	4.0	3.8	4.3	4.4	2.9	2.2	4.6	2.3	1.2	1.5	1.8	6.3	4.8	5.1	3.4	3.6	3.8	5.4	7.4	6.0	6.2	7.2	10.1	8.7	14.0	15.9	98.0	15.5	14.0
12	4.9	4.1	3.9	4.4	4.5	3.0	2.3	3.9	3.7	2.6	1.8	4.4	7.0	6.2	6.1	4.4	4.2	3.6	6.4	7.7	6.1	6.0	6.9	9.8	8.9	12.2	16.9	99.5	15.6	12.2
13	5.4	4.9	5.5	6.0	3.1	3.9	5.1	7.8	4.0	5.1	6.3	6.8	6.0	5.3	7.6	6.2	7.5	9.0	8.6	11.1	6.7	6.8	9.1	11.9	9.4	19.0	18.4	98.5	16.1	19.0
14	6.1	5.7	6.2	6.7	4.9	4.3	5.6	8.5	2.5	3.5	4.8	6.2	5.3	5.7	6.0	4.7	5.9	7.5	7.1	9.5	7.4	7.5	9.8	12.6	10.1	18.4	16.8	93.3	16.8	18.4
15	7.7	7.2	7.7	8.2	7.2	5.8	6.1	8.9	4.7	4.6	5.1	6.1	7.6	6.0	4.4	2.8	4.1	5.4	2.8	5.3	8.9	9.1	11.3	14.2	11.7	18.3	12.6	99.3	18.4	18.3
16	6.3	5.8	6.0	6.5	5.9	4.5	4.4	7.2	3.3	3.2	3.4	4.4	6.2	4.7	2.8	2.1	1.5	3.1	3.3	5.8	7.6	7.7	9.8	12.6	10.3	16.6	13.6	97.9	17.0	16.6
17	7.2	6.4	6.2	6.7	6.8	5.3	4.6	7.0	4.5	3.5	3.6	4.2	7.5	5.9	4.1	1.5	1.6	1.6	3.5	5.2	8.4	8.6	10.0	12.8	11.1	16.5	14.9	99.2	17.9	16.5
18	7.9	7.1	6.9	7.5	7.6	6.0	5.3	7.0	6.1	5.1	3.8	3.6	9.0	7.5	5.4	3.1	1.6	3.2	4.7	5.1	9.2	9.1	10.0	12.8	11.9	15.8	16.2	100.8	18.6	15.8
19	8.7	8.2	8.0	8.5	8.3	6.9	6.3	9.2	5.7	5.3	5.4	6.4	8.6	7.1	2.8	3.3	3.5	4.7	4.7	4.7	10.0	10.1	11.8	14.6	12.7	18.6	12.5	100.4	19.4	18.6
20	11.2	10.6	10.4	11.0	10.7	9.3	8.8	10.5	8.2	7.7	7.4	7.7	11.1	9.5	5.3	5.8	5.2	5.1	4.7	8.6	12.4	12.6	13.5	16.4	15.2	20.0	16.1	102.8	21.9	19.9
21	2.6	3.0	3.6	3.2	3.5	4.2	4.5	6.3	5.4	5.3	6.0	6.1	6.7	7.4	8.9	7.6	8.4	9.2	10.0	12.4	7.4	2.3	4.6	7.4	4.9	15.9	19.7	100.7	11.6	15.9
22	2.7	3.2	3.3	2.7	3.7	4.4	4.3	5.0	5.6	5.5	6.2	6.0	6.8	7.5	9.1	7.7	8.6	9.1	10.1	12.6	2.3	2.3	2.3	5.1	4.1	13.6	19.9	100.8	10.8	13.6
23	4.2	5.0	4.2	3.6	5.9	6.5	5.3	5.9	7.8	7.3	7.2	6.9	9.1	9.7	11.3	9.6	9.8	10.0	11.6	13.5	4.6	2.3	2.6	2.9	6.3	11.3	22.1	103.0	13.1	11.3
24	7.0	7.9	7.1	6.4	8.8	9.4	8.1	8.7	10.6	10.2	10.1	9.8	11.9	12.6	14.1	12.5	12.7	12.8	14.5	16.4	7.4	5.1	2.9	6.0	9.2	10.7	24.9	105.8	15.9	10.7
25	5.3	5.7	6.3	5.9	6.3	6.9	7.2	9.0	8.2	8.0	8.7	8.9	9.4	10.1	11.7	10.3	11.1	11.9	12.7	15.2	4.9	4.1	6.3	9.2	13.4	17.7	22.5	103.4	6.7	17.7
26	15.5	16.3	15.6	14.9	16.7	15.2	14.5	16.2	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	20.0	15.9	13.6	11.3	10.7	17.7	23.4	29.1	111.7	24.4	1.2
27	18.5	18.0	18.5	19.0	18.0	16.6	16.9	19.7	15.5	15.4	15.9	16.9	18.4	16.8	12.6	13.6	14.9	16.2	12.5	16.1	19.7	19.9	22.1	25.0	22.5	29.1	69.6	110.1	29.2	29.1
28	99.4	98.9	99.5	100.0	98.2	97.6	98.8	101.8	95.8	96.8	98.0	99.5	98.5	93.3	99.3	97.9	99.2	100.8	100.4	102.8	100.7	100.8	103.0	105.9	103.4	111.7	110.1	110.1	110.1	111.7
29	12.1	12.5	13.0	12.7	13.0	13.6	13.9	15.7	14.9	14.8	15.5	15.6	16.1	16.8	18.4	17.0	17.9	18.6	19.4	21.9	11.6	10.8	13.1	15.9	6.7	24.4	29.2	110.1	67.2	24.4
30	15.5	16.3	15.5	14.9	16.7	15.2	14.5	16.1	15.9	14.9	14.0	12.2	19.2	18.4	18.3	16.6	16.5	15.8	18.6	19.9	15.9	13.6	11.3	10.7	17.7	1.2	29.1	111.7	24.4	24.4

F\T : zone from \ zone to

External Zone	Destination	Time (min)	to	How to Calculate
26, 30	Catacaos (18 km), [Chiclayo (200km)]	15	Catacaos	Minimum (time to zone 12 or 23) +15 min
27	Sullana (38 km), Paita (50km)	45	Sullana, (60min to Paita)	Minimum (time to zone 15) +15 min
28	nothing	0	-	0
29	Chulucanas (55km)	60	Chulucanas	Minimum (time to zone 25) +15 min

show the “mode specific” travel time matrixes, which are the outcomes of Options 2, 5 or 8. Then, Table (h) shows the outcome of Options 3, 6 or 9 which is the results of “summing up multiple mode specific trip Tables (b) to (f) as one total trip table”. Table (i) shows the original travel time matrix, which is obtained from the site investigation, and Table (j) refers to the travel time matrix at the start of the simulation, which is the simple calculation results from distance and design speed. Table (j) and Table (i) can be compared to check the basic travel time setting without the influence from the load volumes.

In Table 7-10, 7-11 and 7-12, the first three sheets of (1) to (3) present the results of the total or “mode specific” assignment. Then, sheet (4) compares the outcomes of Option (1) and (3), Option (4) and (6) and Option (7) and (9) respectively, and sheet (5) compares the outcomes of the original travel time matrix and basic travel time setting in T-model2.

First, two methods, “using a total OD table” and “summing up separated multiple mode specific trip tables”, are compared. by comparing Tables (g) and (h) of Table 7-10, 7-11 or 7-12, it is found that there is almost no difference in travel times between the two methods, despite the differences in trip tables. This shows that the differences in trip volumes do not affect the travel time structure much, and it, in turn, indicates that the general movements between areas, not specific traffic analysis zones, are similar in the two methods. In addition, travel times of “mode specific” trips, shown in Tables (b) to (f), are shorter than travel times of the total trips shown in Tables (g) and (h). This is easily explained by the smaller numbers of “mode specific” trips assigned.

Second, the differences between trip types are compared. As mentioned previously, using “person” trips is not expected to work well because of the network setting, which is based on “vehicle” capacity. This fact is clearly shown in Table 7-10. For example, travel times from traffic analysis zones 14 and 24 are extremely large: most of the travel times to another traffic analysis zone are more than three hundred minutes. This is mostly because the network has only one zone centroid connector link to the zones and because the “vehicle” term capacity for those links is quite easily saturated with the total "person" trips of 60,705, which is approximately four to five times more than the total "mode" trips of 13,615 or "vehicle equivalent" trips of 15,949. Therefore, applying "person" trips to the assignment stage is not reliable enough particularly from the results of travel time matrixes.

The other two trip types, "mode" trips and "vehicle equivalent" trips show quite similar results and work well although the travel times of "vehicle equivalent" trips are somewhat longer than the ones of "mode" trips. This is easily explained by the fact that there are more "vehicle equivalent" trips than "mode" trips assigned. Since these two trip types are basically applicable to the network, which is set based on "automobile" trips, the results should be quite reasonable in terms of "volumes" assigned on the network. The primary and only methods to improve the reliability, in terms of "volumes", is calibrating the better variables for the network setting. Those variables, such as link capacities and delay factors, are also crucial to the loaded link data, which is another outcome of the assignment.

Finally, the reliability of the network setting, in terms of the link connection and the design speeds, is briefly examined by comparing the original travel time matrix from the site investigation and the basic travel time matrix calculated by T-model2. In sheet (5) of Tables 10, 11 and 12, the two travel matrixes, Table (i) for the original and Table (j) for T-model2 results, are shown. Each sheet (5) basically has same numbers because the trip type differences do not affect the basic travel time calculation.

When these tables, Table (i) and (j), are compared, many differences are observed. Mostly, the travel times of the site investigation are longer than the ones calculated by T-model2. This may be the result of somewhat higher settings of design speed on the T-model2 network. The general relationship between traffic analysis zones, however, is quite similar. Moreover, since the travel times of the site investigation is calculated from limited data taken by driving only major arterials around the city, the reliability is somewhat questionable. Therefore, the differences are considered allowable, and, in turn, the basic network setting is considered acceptable. As mentioned above, the only method to improve the reliability of network setting is calibrating better network setting variables. This method, comparing the original travel time matrix of the site investigation and the basic travel time matrix calculated by T-model2, can correct some of the basic network settings, such as link connections and design speed.

7.3.3.4 Loaded Link Data

Another outcome of the assignment stage is loaded link data. This data actually shows the volumes and travel times of each link along with basic settings such as design speed and capacity. Tables 7-13, 7-14 and 7-15 show the results of "person" trips, "mode" trips and "vehicle equivalent" trips respectively. As mentioned, "person" trips are used for Option 1 to 3, "mode" trips are used for Option 4 to 6, and "vehicle equivalent" trips are used for Option 7 to 9. In those tables, Tables (a) to (e) show the data sets of links 1 to 50, 51 to 100, 101 to 150, 151 to 200 and 201 to 243 respectively. The basic data shown for each link are node numbers of link ends, link class, the number of lanes, link capacity, link length and design speed.

In those tables, three new mode categories are identified along with the results of "mode specific" trips for mode 1 to 5. They are "mode 6", "mode 7", and "Sum of 1~5 (or simply Sum)". "Mode 6" represents the results of the "using one total trip OD table throughout simulation" method, which is used in Option 1, 4 and 7. "Mode 7" represents the results of the "summing up mode specific trip tables for only one assignment" method, which is used in Option 3, 6 and 9. "Sum" represents the results of the "using mode specific trip tables for separated assignment" method, which is used in Option 2, 5 and 8, and "Sum" is simply the sum of the "mode specific" results of mode 1 to 5.

As mentioned, using "person" trips is not a preferable choice for the assignment because of the "vehicle" based network settings. However, by applying the much larger total trip volume, links which are often chosen as primary or secondary routes can be found. For

Table 7-13 (1) T-model2 Simulation Results : Loaded Link of "Person" Trips

(a) Trip Type [Person], Mode Type [All : Summary]

< Links Recorded > [243], < One-way Links > [21], < Two-way Links > [222], Total Links > [465]

	node		Link Data					Mode 1		Mode 2		Mode 3		Mode 4		Mode 5		Mode 6		Mode 7		Sum 1~5	
No.	A	B	Class	Lanes	Cap.	Length	Speed	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)
1	31	32	1	1	1500	60	45	0	0	0	0	0	140	0	0	0	0	0	155	0	138	0	140
2	33	34	11	1	800	60	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	42	41	11	1	800	33	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	51	18	11	1	800	45	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	65	64	2	1	1500	68	40	153	12	0	7	1934	202	0	0	0	34	3872	340	3758	274	2087	255
6	140	160	5	1	1400	132	30	1	198	0	0	1	2231	0	0	0	5	17	4179	9	4090	2	2434
7	100	101	9	1	1000	21	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	43	44	9	1	1000	40	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	46	14	9	1	1000	64	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	32	34	11	1	600	37	15	0	0	0	0	0	672	0	0	0	0	0	1280	0	1269	0	672
11	32	37	3	1	1400	113	40	0	0	0	0	627	95	0	0	0	0	1234	109	1224	93	627	95
12	34	35	11	1	600	44	15	0	0	0	0	19	1	0	0	0	0	85	3	78	1	19	1
13	34	19	6	1	1200	56	30	0	0	0	0	0	690	0	0	0	0	0	1362	0	1346	0	690
14	35	36	11	1	800	64	15	0	0	0	0	19	1	0	0	0	0	85	3	78	1	19	1
15	37	38	8	1	1000	35	25	4	172	0	96	466	1516	0	71	389	479	819	1607	833	1637	859	2334
16	37	47	3	1	1400	79	40	174	4	96	0	1518	1129	71	0	281	420	2083	1692	2058	1550	2140	1553
17	38	39	8	1	1000	23	25	0	393	0	0	163	150	39	0	0	12	329	449	357	382	202	555
18	38	49	6	1	1200	79	30	189	70	11	0	1209	86	96	0	343	83	1622	228	1532	242	1848	239
19	39	40	8	1	1000	20	25	0	393	0	0	163	150	39	0	0	12	329	449	357	382	202	555
20	39	17	11	1	800	79	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	40	50	7	1	1200	79	25	42	0	0	0	96	65	39	0	0	12	551	150	567	80	177	77
22	47	16	16	1	1500	18	15	58	230	0	0	82	854	0	27	111	0	173	1430	245	1460	251	1111
23	47	48	4	1	1400	45	35	404	62	96	0	2080	919	98	0	281	531	3070	1422	3171	1448	2959	1512
24	49	17	16	1	1500	22	15	193	0	18	714	48	617	12	36	0	377	287	1574	266	1528	271	1744
25	49	58	6	1	1200	60	30	286	153	725	18	1788	92	154	0	377	55	2556	340	2501	372	3330	318
26	17	50	16	1	1500	22	15	0	48	19	207	157	76	50	0	8	9	459	307	441	335	234	340
27	50	18	16	1	1500	20	15	0	0	306	1178	0	499	151	0	0	100	504	1686	485	1679	457	1777
28	50	61	7	1	1200	79	25	10	16	995	311	645	34	0	62	87	0	2163	428	2200	413	1737	423
29	18	63	9	1	1000	120	20	0	0	54	0	13	0	0	0	3	0	205	12	223	24	70	0
30	48	58	5	1	1400	35	30	12	0	10	40	135	257	38	10	0	17	422	693	459	585	195	324
31	48	55	3	1	1400	79	35	75	33	98	10	593	289	82	38	72	98	1513	805	1451	770	920	468
32	48	57	6	1	1200	64	30	328	40	38	0	1441	462	26	0	223	430	1771	560	1756	588	2056	932
33	58	60	5	1	1400	28	30	1	46	0	31	248	251	85	0	51	24	1013	590	961	542	385	352
34	58	59	6	1	1200	49	30	286	96	716	8	1650	73	97	0	316	38	1785	263	1836	252	3065	215
35	60	61	5	1	1400	21	30	1	41	0	31	233	221	39	0	11	11	622	736	584	717	284	304
36	60	11	9	1	1000	34	20	0	5	0	0	15	30	46	0	40	13	600	63	602	50	101	48
37	61	62	5	1	1400	24	30	11	57	964	311	864	241	1	24	94	7	2413	792	2384	730	1934	640
38	45	44	9	1	800	16	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	44	14	8	1	1000	27	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	14	53	8	1	1000	41	25	439	0	1094	220	3914	279	0	0	657	0	6107	491	6104	491	6104	499
41	53	56	8	1	1000	23	25	439	0	1094	220	3914	279	0	0	657	0	6107	491	6104	491	6104	499
42	56	54	8	1	1000	11	25	439	0	1094	220	3914	279	0	0	657	0	6107	491	6104	491	6104	499
43	54	55	8	1	1000	2	25	439	0	1094	220	3914	279	0	0	657	0	6107	491	6104	491	6104	499
44	55	9	8	1	1000	26	25	10	122	189	0	419	262	25	35	36	77	1222	621	1312	657	679	496
45	55	71	3	2	2800	34	35	635	42	994	221	4165	383	117	63	703	31	6727	1004	6653	1014	6614	740
46	57	10	8	1	1000	19	25	46	678	39	121	273	614	38	50	30	283	651	1528	616	1480	426	1746
47	57	84	6	1	1200	53	30	866	24	56	59	1908	503	22	2	427	389	2971	563	2959	600	3279	977
48	59	89	6	1	1200	36	30	611	107	672	19	1797	254	100	0	373	39	2253	422	2373	394	3553	419
49	71	75	7	1	1200	28	25	125	0	870	220	1924	339	0	0	399	0	2905	791	2828	836	3318	559
50	71	70	3	2	2800	36	35	510	42	124	1	2241	44	117	63	304	31	3895	286	3825	178	3296	181

< Item >

Cap. : One-way capacity
Lanes : One-way or two-way
V(AB) : Volume (A --> B)
V(BA) : Volume (B --> A)

< Mode >

1~5 : Specific Mode 1 ~ 5
6 : Used Total OD Matrix (Option 1)
7 : Used Summed up Trip Table (Option 3)
Sum : Summed up "Mode Specific" Results (Option 2)

Table 7-13 (2) T-model2 Simulation Results : Loaded Link of "Person" Trips

(b) Trip Type [Person], Mode Type [All : Summary]

< Links Recorded > [243], < One-way Links > [21], < Two-way Links > [222], Total Links > [465]

	node		Link Data					Mode 1		Mode 2		Mode 3		Mode 4		Mode 5		Mode 6		Mode 7		Sum 1~5	
No.	A	B	Class	Lanes	Cap.	Length	Speed	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)
51	75	77	7	1	1200	7	25	125	0	870	220	1867	378	0	0	399	0	2371	843	2419	896	3261	598
52	75	76	9	1	1000	18	20	0	0	0	0	96	0	0	0	0	0	608	22	480	11	96	0
53	84	82	6	2	2400	6	30	1340	31	1168	384	4599	600	25	28	830	474	7121	1042	7187	1030	7962	1517
54	84	86	5	1	1400	13	30	7	474	325	1112	97	2691	26	3	85	403	481	4152	430	4228	540	4683
55	82	80	9	1	1000	10	20	1848	0	1217	0	3264	0	6	0	613	0	5175	0	5085	0	6948	0
56	82	83	6	2	2400	5	30	392	931	216	649	2717	1982	25	34	394	651	3493	2589	3745	2673	3744	4247
57	86	89	5	1	1400	30	30	7	416	325	1062	97	2179	26	3	85	382	479	2583	430	2722	540	4042
58	86	88	9	1	1000	26	20	0	58	0	50	0	512	0	0	0	21	2	1569	0	1506	0	641
59	89	90	5	1	1400	21	30	5	680	334	1132	158	2192	61	28	107	386	710	2814	632	2897	665	4418
60	89	88	7	1	1200	14	25	859	89	720	6	1610	115	125	35	367	51	2303	472	2409	457	3681	296
61	90	95	5	1	1400	20	30	5	517	334	1132	64	1814	53	0	11	236	588	2817	502	2947	467	3699
62	90	91	9	1	1000	22	20	0	0	0	0	50	0	2	3	0	0	1516	5	1600	4	52	3
63	95	63	5	1	1400	20	30	9	585	63	247	241	2294	34	0	31	183	413	3793	365	3783	378	3309
64	95	96	5	2	2800	41	30	18	0	26	24	1109	219	1	1	1	0	2942	315	2851	301	1155	244
65	63	12	5	1	1400	6	30	9	585	117	247	254	2294	34	0	34	183	508	3695	466	3685	448	3309
66	12	64	3	1	1400	90	35	12	153	7	0	202	1934	0	0	34	0	340	3872	274	3758	255	2087
67	12	99	11	1	800	35	15	0	0	0	0	0	0	0	0	0	0	1384	0	1294	0	0	0
68	88	91	9	1	1000	20	20	0	0	0	0	4	0	0	0	0	0	0	1019	0	908	4	0
69	88	7	7	1	1200	19	25	859	147	720	56	1606	627	125	35	367	72	2305	1022	2409	1055	3677	937
70	91	92	9	1	1000	19	20	0	0	0	0	54	0	2	3	0	0	911	419	922	234	56	3
71	99	96	11	1	800	39	15	0	0	0	0	0	0	0	0	0	0	1384	0	1294	0	0	0
72	96	97	5	2	2800	8	30	18	0	26	24	1109	219	1	1	1	0	4326	315	4145	301	1155	244
73	77	78	7	1	1200	13	25	134	0	870	0	1886	22	0	0	415	0	2394	20	2439	14	3305	22
74	66	13	8	1	1000	19	25	0	0	0	0	0	19	0	0	0	0	690	1077	715	1062	0	19
75	66	68	11	1	800	57	15	0	0	0	0	19	0	0	0	0	0	1077	690	1062	715	19	0
76	13	67	7	1	1000	53	25	898	643	0	242	1570	1169	156	144	350	394	1986	1888	1929	1876	2974	2592
77	68	67	7	1	1000	19	25	506	381	98	0	780	608	119	88	304	83	1276	735	1174	669	1807	1160
78	68	70	7	1	1200	19	25	381	506	0	98	627	780	88	119	83	304	1692	1846	1676	1834	1179	1807
79	68	69	9	1	1000	21	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80	67	103	9	1	800	21	20	517	137	0	144	962	389	68	25	267	90	1371	732	1315	757	1814	785
81	70	73	7	1	1200	23	25	339	12	0	0	1573	66	25	2	56	34	2777	155	2614	86	1993	114
82	70	103	3	2	2800	31	35	16	0	26	1	553	16	0	0	34	4	843	10	971	10	629	21
83	73	76	7	1	1200	8	25	339	12	0	0	1573	66	25	2	56	34	2777	155	2614	86	1993	114
84	73	74	9	1	600	8	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85	76	78	7	1	1200	11	25	339	12	16	0	1396	45	25	2	99	34	2523	121	2509	62	1875	93
86	76	107	9	1	1000	33	20	0	0	0	16	513	261	0	0	0	43	1079	273	849	299	513	320
87	78	79	7	1	1200	20	25	121	752	375	0	971	667	0	2	229	18	2110	2251	2072	1892	1696	1439
88	78	81	9	1	1000	15	20	1092	0	511	0	2911	0	25	0	269	0	4917	0	4692	0	4808	0
89	79	85	11	1	800	19	20	0	0	0	0	14	0	0	0	0	0	591	0	477	0	14	0
90	79	110	7	1	1200	17	25	121	752	375	0	957	667	0	2	229	18	1519	2251	1595	1892	1682	1439
91	85	7	9	1	1000	39	20	65	0	131	0	118	0	8	0	88	0	541	0	514	0	410	0
92	85	110	6	2	2400	28	30	535	928	364	342	1381	2132	31	9	482	188	1649	2623	1668	2795	2793	3599
93	7	92	9	1	1000	21	20	0	0	0	64	3	650	0	0	0	0	90	1122	100	1130	3	714
94	7	87	7	1	1200	15	25	630	352	462	191	1590	173	105	40	277	30	2335	968	2299	985	3064	786
95	92	94	9	1	1000	5	20	0	0	0	64	43	636	2	3	0	0	503	1043	599	941	45	703
96	94	97	9	1	1000	15	20	0	0	0	64	3	976	0	0	0	0	43	2009	40	1809	3	1040
97	94	93	9	1	1000	15	20	0	0	0	0	380	0	2	3	0	0	1478	52	1529	102	382	3
98	97	98	5	2	2800	15	30	18	0	26	88	763	846	1	1	1	0	2835	790	2794	719	809	935
99	98	93	9	1	1000	20	20	0	0	0	0	697	0	0	0	0	0	1654	0	1579	0	697	0
100	98	133	5	2	2800	19	30	18	0	26	88	66	846	1	1	1	0	1549	1158	1627	1131	112	935

< Item >
Cap. : One-way capacity
Lanes : One-way or two-way
V(AB) : Volume (A --> B)
V(BA) : Volume (B --> A)

< Mode >
1~5 : Specific Mode 1 ~ 5
6 : Used Total OD Matrix (Option 1)
7 : Used Summed up Trip Table (Option 3)
Sum : Summed up "Mode Specific" Results (Option 2)

Table 7-13 (3) T-model2 Simulation Results : Loaded Link of "Person" Trips

(c) Trip Type [Person], Mode Type [All : Summary]

< Links Recorded > [243], < One-way Links > [21], < Two-way Links > [222], Total Links > [465]

	node		Link Data					Mode 1		Mode 2		Mode 3		Mode 4		Mode 5		Mode 6		Mode 7		Sum 1~5	
No.	A	B	Class	Lanes	Cap.	Length	Speed	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)
101	93	87	9	1	1000	25	20	0	0	0	0	65	3	0	0	0	0	1082	0	1009	0	65	3
102	93	132	9	1	1000	19	20	0	0	0	0	1016	1	2	3	0	0	2062	64	2057	60	1018	4
103	87	124	7	1	1200	19	25	630	352	462	191	1651	172	105	40	277	30	3025	576	2996	673	3125	785
104	74	72	9	1	600	8	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	72	104	9	1	600	26	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
106	103	104	8	1	1000	24	25	533	137	26	145	1515	405	68	25	301	94	2214	742	2286	767	2443	806
107	104	107	11	1	800	15	15	0	0	0	0	217	0	0	0	0	0	626	0	690	0	217	0
108	104	105	8	1	1000	13	25	533	137	26	145	1298	405	68	25	301	94	1588	742	1596	767	2226	806
109	107	5	9	1	1000	11	20	0	0	0	16	730	261	0	0	0	43	1705	273	1539	299	730	320
110	105	5	8	1	1000	15	25	533	137	26	145	1298	405	68	25	301	94	1588	742	1596	767	2226	806
111	5	109	8	1	1000	12	25	469	222	64	248	1841	948	68	25	462	54	3052	1238	3021	1378	2904	1497
112	109	111	8	1	1000	27	25	463	222	64	248	781	924	68	25	462	54	1382	1045	1267	1036	1838	1473
113	109	108	9	1	1000	19	20	6	0	0	0	1060	24	0	0	0	0	1670	193	1754	342	1066	24
114	110	111	6	1	1200	11	30	662	984	740	250	2390	854	31	6	807	188	3238	1983	3336	2077	4630	2282
115	124	110	6	1	1200	36	30	702	0	93	0	1997	0	5	0	114	0	2961	0	2683	0	2911	0
116	124	123	7	1	1200	8	25	621	71	461	154	1590	140	103	43	163	30	2854	969	2847	610	2938	438
117	132	124	6	1	1200	25	30	974	0	129	0	1968	0	0	0	0	0	2397	0	2597	0	3071	0
118	132	133	9	1	1000	25	20	0	0	0	57	0	1675	0	0	0	0	0	2107	0	2200	0	1732
119	132	131	6	1	1200	9	30	0	974	0	72	1404	682	2	3	0	0	2930	1222	2927	1327	1406	1731
120	133	134	5	2	2800	6	30	18	0	26	145	66	2521	1	1	1	0	1063	2779	1052	2756	112	2667
121	134	138	16	1	1500	26	15	0	0	0	139	27	2614	1	0	0	0	48	2864	36	2852	28	2753
122	134	135	5	2	2800	5	30	18	0	26	6	202	70	0	1	1	0	1123	23	1171	59	247	77
123	138	8	16	1	1500	12	15	0	0	0	139	27	2614	1	0	0	0	48	2864	36	2852	28	2753
124	8	139	11	1	800	27	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	8	136	16	1	1500	37	15	0	0	275	0	2653	31	0	2	0	0	2837	32	2827	32	2928	33
126	136	135	5	1	1400	5	30	0	0	275	0	2092	221	0	2	0	0	2364	1111	2358	1133	2367	223
127	136	137	11	1	800	26	15	0	0	0	0	751	0	0	0	0	0	1567	15	1614	44	751	0
128	135	131	8	1	1000	27	25	18	0	301	6	2036	33	0	3	1	0	2393	40	2384	47	2356	42
129	131	126	7	1	1200	18	25	0	10	192	8	1601	120	0	2	0	2	2541	166	2453	197	1793	142
130	131	127	6	1	1200	8	30	28	974	117	78	1947	703	2	4	3	0	3007	1321	3021	1340	2097	1759
131	123	117	7	1	1200	16	25	141	154	380	161	1586	454	21	32	61	48	2236	908	2444	947	2189	849
132	123	122	8	1	1000	9	25	361	37	124	32	1447	119	40	32	121	3	2099	865	2104	706	2093	223
133	111	113	0	1	1200	9	30	696	1218	495	527	2163	1160	61	21	1120	191	2683	1589	2671	1720	4535	3117
134	108	115	9	1	1000	31	20	6	0	0	0	1060	0	0	0	0	0	1670	0	1754	0	1066	0
135	116	115	6	1	1200	3	30	344	2091	406	1398	1933	2328	35	25	909	227	1915	3450	1812	3789	3627	6069
136	116	118	9	1	1000	15	20	992	0	546	0	1172	0	34	0	239	0	1695	0	1771	0	2983	0
137	116	114	6	1	1200	7	30	1452	697	951	505	1393	2170	25	69	200	1121	2116	2276	2429	2223	4021	4562
138	115	112	6	1	1200	19	30	355	2086	407	1397	3142	2293	42	23	917	203	3843	3439	3987	3774	4863	6002
139	120	125	9	1	1000	7	20	856	0	340	0	1085	0	80	0	223	0	1990	0	1923	0	2584	0
140	125	129	9	1	1000	20	20	0	0	1	0	18	0	0	0	3	0	128	0	103	0	22	0
141	125	4	9	1	1000	6	20	886	0	346	0	1250	0	106	0	220	0	3036	0	2955	0	2808	0
142	129	130	6	1	1200	6	30	28	1093	118	111	1973	748	2	4	6	0	2556	2021	2555	1971	2127	1956
143	128	130	6	1	1200	6	30	2162	28	239	56	1466	1290	13	2	5	6	3403	2006	3545	2051	3885	1382
144	128	137	11	1	800	31	15	0	0	0	0	0	751	0	0	0	0	15	1567	44	1614	0	751
145	128	152	6	1	1200	19	30	28	2162	56	239	1818	1243	2	13	6	5	3243	3088	3350	3274	1910	3662
146	130	4	9	1	1000	22	20	1069	0	190	0	1401	0	9	0	5	0	1932	0	2078	0	2674	0
147	4	121	9	1	1000	5	20	419	0	80	0	881	0	12	0	5	0	874	0	949	0	1397	0
148	121	1	9	1	1000	14	20	205	0	29	0	753	0	12	0	10	0	1620	0	1474	0	1009	0
149	121	120	9	1	1000	7	20	401	0	53	0	230	0	12	0	2	0	1236	0	1319	0	698	0
150	102	101	3	2	2800	24	35	0	0	0	0	285	0	0	0	0	0	639	0	315	0	285	0

< Item >

Cap. : One-way capacity
Lanes : One-way or two-way
V(AB) : Volume (A --> B)
V(BA) : Volume (B --> A)

< Mode >

1~5 : Specific Mode 1 ~ 5
6 : Used Total OD Matrix (Option 1)
7 : Used Summed up Trip Table (Option 3)
Sum : Summed up "Mode Specific" Results (Option 2)

Table 7-13 (4) T-model2 Simulation Results : Loaded Link of "Person" Trips

(d) Trip Type [Person] , Mode Type [All : Summary]

< Links Recorded > [243] , < One-way Links > [21] , < Two-way Links > [222] , Total Links > [465]

	node		Link Data					Mode 1		Mode 2		Mode 3		Mode 4		Mode 5		Mode 6		Mode 7		Sum 1~5	
No.	A	B	Class	Lanes	Cap.	Length	Speed	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)
151	102	106	7	1	1200	41	25	0	0	0	0	0	285	0	0	0	0	0	639	0	315	0	285
152	101	141	3	2	2800	27	35	0	0	0	0	0	1532	0	0	0	0	0	1922	0	2057	0	1532
153	101	21	7	1	1200	44	25	0	0	0	0	1817	0	0	0	0	0	2561	0	2372	0	1817	0
154	141	143	8	1	1000	45	25	0	0	0	0	0	1532	0	0	0	0	0	1922	0	2057	0	1532
155	106	21	7	1	1200	19	25	113	1133	237	1301	2974	969	30	0	874	0	3241	2480	3507	2555	4228	3403
156	106	112	6	1	1200	49	30	1133	113	1301	237	969	3259	0	30	0	874	2480	3880	2555	3822	3403	4513
157	21	143	7	1	1200	31	25	206	186	171	108	774	2762	0	0	0	86	1985	3265	2002	3311	1151	3142
158	143	142	11	1	600	12	15	0	0	0	0	0	1088	0	0	0	0	1	1542	0	1469	0	1088
159	143	145	6	1	1200	42	30	206	186	171	108	774	3206	0	0	0	86	1984	3645	2002	3899	1151	3586
160	142	144	11	1	600	46	15	0	0	0	0	0	1088	0	0	0	0	1	1542	0	1469	0	1088
161	112	146	6	1	1200	20	30	129	122	25	88	1032	1197	0	12	43	203	1096	1369	1157	1410	1229	1622
162	112	119	8	1	1000	31	25	113	831	145	8	65	1341	12	11	0	0	700	1423	581	1382	335	2191
163	146	145	6	1	1200	20	30	129	111	25	88	1683	1221	0	12	43	203	2203	1884	2394	2310	1880	1635
164	146	148	8	1	1000	35	25	0	11	0	0	43	670	0	0	0	0	747	1339	944	1281	43	681
165	145	144	5	2	2800	45	35	0	0	0	94	698	2320	0	0	0	95	1186	2543	1185	2610	698	2509
166	145	22	6	1	1200	38	30	335	297	207	113	1469	1817	0	12	48	199	2455	2440	1916	2304	2059	2438
167	144	161	4	2	2800	91	35	0	0	0	94	139	2849	0	0	0	95	139	3037	144	3038	139	3038
168	119	121	11	1	800	23	10	187	0	2	0	102	0	12	0	7	0	1982	0	1844	0	310	0
169	119	148	8	1	1000	19	25	0	526	0	2	538	167	0	12	0	7	935	1527	995	1387	538	714
170	119	152	8	1	1000	30	25	113	492	145	8	11	1760	12	11	0	0	183	2296	183	2436	281	2271
171	148	147	8	1	1000	4	25	0	537	0	2	173	429	0	12	0	7	525	1709	449	1178	173	987
172	147	22	8	1	1000	15	25	0	114	0	2	326	141	0	12	0	7	1252	559	1357	441	326	276
173	147	149	8	1	1000	15	25	0	423	0	0	0	441	0	0	0	0	39	1916	0	1645	0	864
174	22	151	6	1	1200	34	30	117	1099	38	155	137	1875	10	0	7	3	733	2513	240	2197	309	3132
175	149	150	8	1	1000	19	25	0	423	0	0	0	441	0	0	0	0	39	1916	0	1645	0	864
176	152	150	6	1	1200	30	30	141	1682	201	247	540	1624	14	24	6	5	1874	2157	1865	2278	902	3582
177	152	155	9	1	1000	30	20	0	972	0	0	0	90	0	0	0	0	44	1719	0	1764	0	1062
178	150	151	6	1	1200	8	30	434	1205	201	247	812	893	14	24	6	5	1621	1269	1349	1325	1467	2374
179	150	157	8	1	1000	77	25	0	1193	0	0	0	1444	0	0	0	0	0	2512	0	2082	0	2637
180	151	153	6	1	1200	30	30	204	1957	203	366	282	2101	14	14	5	0	1309	2737	689	2622	708	4438
181	153	154	9	1	1000	17	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182	153	23	6	1	1200	49	30	204	1957	203	366	282	2101	14	14	5	0	1309	2737	689	2622	708	4438
183	156	157	9	1	1000	19	20	0	972	0	0	0	90	0	0	0	0	44	1719	0	1764	0	1062
184	157	23	9	1	1000	15	20	0	1415	0	0	0	80	0	0	0	0	44	1872	265	1916	0	1495
185	157	158	9	1	1000	32	20	0	750	0	0	0	1454	0	0	0	0	0	2359	0	2195	0	2204
186	23	159	6	1	1200	31	30	94	1699	0	0	62	2236	0	1070	5	0	173	3136	139	3342	161	5005
187	114	108	9	1	1000	29	20	0	0	0	0	24	0	0	0	0	0	193	0	342	0	24	0
188	161	25	2	1	1500	68	40	0	0	0	94	139	2849	0	0	0	95	139	3037	144	3038	139	3038
189	25	163	2	1	1500	58	40	0	0	0	0	139	0	0	0	0	0	141	0	144	0	139	0
190	155	156	9	1	1000	43	20	0	972	0	0	0	90	0	0	0	0	44	1719	0	1764	0	1062
191	159	160	6	1	1200	56	30	94	2449	0	0	62	3690	0	1070	5	0	173	5495	139	5537	161	7209
192	158	159	9	1	1000	13	20	0	750	0	0	0	1454	0	0	0	0	0	2359	0	2195	0	2204
193	160	24	9	1	1000	39	20	80	2632	0	0	24	5882	0	1070	0	0	131	9615	103	9582	104	9584
194	24	162	9	1	1000	33	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
195	1	115	9	1	1000	15	20	10	0	2	0	184	0	9	0	32	0	269	0	436	0	237	0
196	118	120	9	1	1000	13	20	537	0	321	0	359	0	33	0	93	0	746	0	768	0	1343	0
197	118	1	9	1	1500	5	15	450	34	247	5	936	0	37	27	191	38	1861	702	1961	470	1861	104
198	113	114	0	1	1200	12	30	697	1452	505	951	2170	1369	69	25	1121	200	2276	1923	2223	2087	4562	3997
199	117	111	7	1	1200	19	25	4	445	62	400	759	1149	10	38	31	129	1396	1894	1406	1945	866	2161
200	122	120	8	1	1000	18	25	371	453	147	181	764	268	52	17	131	3	1030	1022	1025	1189	1465	922

< Item >

Cap. : One-way capacity
Lanes : One-way or two-way
V(AB) : Volume (A --> B)
V(BA) : Volume (B --> A)

< Mode >

1~5 : Specific Mode 1 ~ 5
6 : Used Total OD Matrix (Option 1)
7 : Used Summed up Trip Table (Option 3)
Sum : Summed up "Mode Specific" Results (Option 2)

Table 7-13 (5) T-model2 Simulation Results : Loaded Link of "Person" Trips

(e) Trip Type [Person], Mode Type [All : Summary]

< Links Recorded > [243], < One-way Links > [21], < Two-way Links > [222], Total Links > [465]

	node		Link Data					Mode 1		Mode 2		Mode 3		Mode 4		Mode 5		Mode 6		Mode 7		Sum 1~5	
No.	A	B	Class	Lanes	Cap.	Length	Speed	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)
201	2	118	16	1	1500	18	15	18	57	21	4	378	255	17	8	22	15	1127	917	1268	780	456	339
202	2	113	16	1	1500	17	15	1	234	10	424	7	209	8	4	1	9	17	758	49	864	27	880
203	2	117	16	1	1500	9	15	4	432	41	598	22	1544	22	39	34	145	551	2377	347	2383	123	2758
204	2	122	16	1	1500	15	15	13	350	67	65	22	1056	41	13	10	0	131	2335	149	2491	153	1484
205	126	123	7	1	1200	7	25	0	239	133	129	1374	364	0	63	0	2	1531	854	1507	849	1507	797
206	127	129	6	1	1200	21	30	28	1093	117	111	1955	748	2	4	3	0	2428	2021	2452	1971	2105	1956
207	3	125	16	1	1500	19	15	30	0	7	0	183	0	26	0	0	0	1174	0	1135	0	246	0
208	3	122	16	1	1500	8	15	17	86	17	145	270	68	41	42	0	0	1282	304	1130	350	345	341
209	3	126	16	1	1500	9	15	0	229	0	180	14	485	0	61	0	0	45	1743	62	1660	14	955
210	3	127	16	1	1500	18	15	0	119	0	33	8	45	0	0	0	0	13	1292	3	1203	8	197
211	80	77	9	1	1000	22	20	9	0	220	0	375	0	0	0	16	0	846	0	902	0	620	0
212	81	85	9	1	1000	10	20	211	0	586	0	923	0	39	0	639	0	1769	0	1795	0	2398	0
213	6	81	16	1	1500	5	15	146	1027	458	383	884	2872	17	3	579	209	1679	4827	1699	4596	2084	4494
214	80	6	16	1	1500	5	15	1839	0	1217	220	3260	371	6	0	599	2	5168	839	5078	895	6921	593
215	83	85	6	2	2400	6	30	392	931	216	649	1017	2587	25	34	394	651	1060	3853	1015	3900	2044	4852
216	6	83	16	1	1000	10	5	0	0	0	0	0	2305	0	0	0	0	88	3785	85	4042	0	2305
217	62	95	5	1	1400	25	30	11	57	927	311	851	264	1	20	86	12	2430	954	2401	824	1876	664
218	11	90	9	1	1000	30	20	163	0	0	0	428	94	30	11	150	96	1600	214	1619	203	771	201
219	59	11	16	1	1500	19	15	0	16	0	37	15	151	58	37	28	13	613	379	616	414	101	254
220	11	62	16	1	1500	19	15	0	0	0	37	10	46	4	0	1	14	81	226	91	168	15	97
221	52	69	9	1	1000	37	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
222	19	38	6	1	1200	56	30	0	106	107	0	2578	392	206	0	788	450	2984	922	3022	953	3679	948
223	15	37	16	1	1500	23	15	2	0	0	0	1	1194	0	0	0	229	3	1525	4	1431	3	1423
224	36	40	11	1	800	49	15	0	0	0	0	0	0	0	0	0	0	159	0	150	0	0	0
225	41	40	11	1	800	19	15	435	0	0	0	218	200	0	0	0	0	552	190	555	193	653	200
226	20	36	16	1	1500	18	15	0	0	0	0	1	19	0	0	0	0	101	24	100	27	1	19
227	20	41	16	1	1500	47	15	435	0	0	0	218	200	0	0	0	0	552	190	555	193	653	200
228	9	57	8	1	1000	24	25	43	121	30	153	548	463	35	53	64	72	1300	980	1247	920	720	862
229	16	49	16	1	1500	17	15	283	76	0	0	292	288	34	0	0	315	540	1005	547	970	609	679
230	10	59	8	1	1000	20	25	350	52	26	118	223	393	78	54	87	16	1206	663	1317	720	764	633
231	164	31	17	1	1500	166	45	0	0	0	0	0	140	0	0	0	0	0	155	0	138	0	140
232	165	164	18	1	1500	359	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
233	27	164	17	1	1500	535	45	0	0	0	0	0	140	0	0	0	0	0	155	0	138	0	140
234	28	43	20	1	1	169	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
235	166	65	17	1	1500	68	45	153	12	0	7	1934	202	0	0	0	34	3872	340	3758	274	2087	255
236	167	166	19	1	1400	116	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
237	166	168	17	1	1500	164	45	12	153	7	0	202	1934	0	0	34	0	340	3872	274	3758	255	2087
238	168	140	18	1	1500	30	40	1	198	0	0	1	2231	0	0	0	5	17	4179	9	4090	2	2434
239	170	168	18	1	1500	412	40	0	56	0	7	0	498	0	0	0	39	0	630	0	597	0	600
240	168	169	17	1	1500	615	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
241	170	26	18	1	1500	38	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
242	170	30	18	1	1500	37	40	56	0	7	0	498	0	0	0	39	0	630	0	597	0	600	0
243	163	29	18	1	1500	400	40	0	0	0	0	139	0	0	0	0	0	141	0	144	0	139	0

< Item >
Cap. : One-way capacity
Lanes : One-way or two-way
V(AB) : Volume (A --> B)
V(BA) : Volume (B --> A)

< Mode >
1~5 : Specific Mode 1 ~ 5
6 : Used Total OD Matrix (Option 1)
7 : Used Summed up Trip Table (Option 3)
Sum : Summed up "Mode Specific" Results (Option 2)

Table 7-14 (1) T-model2 Simulation Results : Loaded Link of "Mode" Trips

(a) Trip Type [Mode], Mode Type [All : Summary]

< Links Recorded > [243], < One-way Links > [21], < Two-way Links > [222], Total Links > [465]

	node		Link Data					Mode 1		Mode 2		Mode 3		Mode 4		Mode 5		Mode 6		Mode 7		Sum 1~5	
No.	A	B	Class	Lanes	Cap.	Length	Speed	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)
1	31	32	1	1	1500	60	45	0	0	0	0	0	14	0	0	0	0	0	15	0	7	0	14
2	33	34	11	1	800	60	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	42	41	11	1	800	33	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	51	18	11	1	800	45	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	65	64	2	1	1500	68	40	0	5	0	0	0	9	0	0	0	11	37	35	28	26	0	25
6	140	160	5	1	1400	132	30	0	17	0	1	0	25	0	0	0	1	0	86	0	76	0	44
7	100	101	9	1	1000	21	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	43	44	9	1	1000	40	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	46	14	9	1	1000	64	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	32	34	11	1	600	37	15	0	0	0	0	0	2	0	0	0	0	0	2	0	1	0	2
11	32	37	3	1	1400	113	40	0	0	0	0	0	12	0	0	0	0	0	13	0	6	0	12
12	34	35	11	1	600	44	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	34	19	6	1	1200	56	30	0	0	0	0	0	2	0	0	0	0	0	2	0	1	0	2
14	35	36	11	1	800	64	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	37	38	8	1	1000	35	25	2	72	0	24	38	229	0	71	157	190	165	567	199	579	197	586
16	37	47	3	1	1400	79	40	72	2	24	0	167	89	71	0	111	170	427	265	437	264	445	261
17	38	39	8	1	1000	23	25	0	159	0	0	14	17	39	0	0	5	28	190	52	172	53	181
18	38	49	6	1	1200	79	30	75	25	5	0	59	5	96	0	139	34	412	70	374	62	374	64
19	39	40	8	1	1000	20	25	0	159	0	0	14	17	39	0	0	5	28	190	52	172	53	181
20	39	17	11	1	800	79	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	40	50	7	1	1200	79	25	14	0	0	0	0	5	39	0	0	5	33	23	59	9	53	10
22	47	16	16	1	1500	18	15	27	93	0	0	6	76	0	27	43	0	62	216	70	199	76	196
23	47	48	4	1	1400	45	35	165	29	24	0	225	77	98	0	111	213	608	292	617	315	623	319
24	49	17	16	1	1500	22	15	76	0	6	172	13	63	12	36	0	151	93	438	115	422	107	422
25	49	58	6	1	1200	60	30	115	54	177	6	102	6	154	0	154	26	706	65	699	96	702	92
26	17	50	16	1	1500	22	15	0	16	7	47	2	9	50	0	1	3	49	74	60	79	60	75
27	50	18	16	1	1500	20	15	0	0	76	295	0	44	151	0	0	40	219	379	220	379	227	379
28	50	61	7	1	1200	79	25	1	3	256	77	35	3	0	62	33	0	309	164	333	143	325	145
29	18	63	9	1	1000	120	20	0	0	10	0	1	0	0	0	1	0	4	6	12	0	12	0
30	48	58	5	1	1400	35	30	3	0	4	9	0	14	38	10	0	4	23	59	45	34	45	37
31	48	55	3	1	1400	79	35	31	14	21	4	26	15	82	38	22	37	170	116	180	108	182	108
32	48	57	6	1	1200	64	30	134	18	12	0	203	52	26	0	91	174	476	178	460	241	466	244
33	58	60	5	1	1400	28	30	3	7	0	9	10	13	85	0	22	12	78	59	121	48	120	41
34	58	59	6	1	1200	49	30	112	44	177	2	89	4	97	0	130	16	628	42	599	58	605	66
35	60	61	5	1	1400	21	30	3	4	0	9	9	10	39	0	4	6	38	42	58	31	55	29
36	60	11	9	1	1000	34	20	0	3	0	0	1	3	46	0	18	6	40	17	63	17	65	12
37	61	62	5	1	1400	24	30	4	7	247	77	43	12	1	24	37	6	309	168	347	130	332	126
38	45	44	9	1	800	16	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	44	14	8	1	1000	27	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	14	53	8	1	1000	41	25	174	0	275	58	323	22	0	0	265	0	1037	66	1039	78	1037	80
41	53	56	8	1	1000	23	25	174	0	275	58	323	22	0	0	265	0	1037	66	1039	78	1037	80
42	56	54	8	1	1000	11	25	174	0	275	58	323	22	0	0	265	0	1037	66	1039	78	1037	80
43	54	55	8	1	1000	2	25	174	0	275	58	323	22	0	0	265	0	1037	66	1039	78	1037	80
44	55	9	8	1	1000	26	25	2	52	47	0	25	9	25	35	18	31	95	94	125	128	117	127
45	55	71	3	2	2800	34	35	257	16	245	58	319	23	117	63	276	13	1178	154	1213	177	1214	173
46	57	10	8	1	1000	19	25	12	276	9	32	20	40	38	50	11	111	96	476	99	517	90	509
47	57	84	6	1	1200	53	30	351	8	15	16	241	55	22	2	171	157	800	181	794	233	800	238
48	59	89	6	1	1200	36	30	236	50	171	4	93	9	100	0	156	16	742	63	754	73	756	79
49	71	75	7	1	1200	28	25	46	0	217	58	240	20	0	0	160	0	634	53	659	78	663	78
50	71	70	3	2	2800	36	35	211	16	28	0	79	3	117	63	116	13	544	101	554	99	551	95

< Item >

Cap. : One-way capacity
Lanes : One-way or two-way
V(AB) : Volume (A --> B)
V(BA) : Volume (B --> A)

< Mode >

1~5 : Specific Mode 1 ~ 5
6 : Used Total OD Matrix (Option 4)
7 : Used Summed up Trip Table (Option 6)
Sum : Summed up "Mode Specific" Results (Option 5)

Table 7-14 (2) T-model2 Simulation Results : Loaded Link of "Mode" Trips

(b) Trip Type [Mode], Mode Type [All : Summary]

< Links Recorded > [243], < One-way Links > [21], < Two-way Links > [222], Total Links > [465]

	node		Link Data					Mode 1		Mode 2		Mode 3		Mode 4		Mode 5		Mode 6		Mode 7		Sum 1~5	
No.	A	B	Class	Lanes	Cap.	Length	Speed	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)
51	75	77	7	1	1200	7	25	46	0	217	58	240	20	0	0	160	0	634	53	659	78	663	78
52	75	76	9	1	1000	18	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	84	82	6	2	2400	6	30	498	10	301	96	367	62	25	28	335	193	1496	405	1528	385	1526	389
54	84	86	5	1	1400	13	30	2	147	80	286	7	126	26	3	36	164	224	696	152	734	151	726
55	82	80	9	1	1000	10	20	1029	0	311	0	504	0	6	0	246	0	1735	0	1712	0	2096	0
56	82	83	6	2	2400	5	30	159	700	55	161	158	357	25	34	158	262	480	1124	545	1114	555	1514
57	86	89	5	1	1400	30	30	2	124	80	270	7	117	26	3	36	156	224	642	152	678	151	670
58	86	88	9	1	1000	26	20	0	23	0	16	0	9	0	0	0	8	0	54	0	56	0	56
59	89	90	5	1	1400	21	30	2	222	81	279	10	103	61	28	42	153	254	808	190	809	196	785
60	89	88	7	1	1200	14	25	329	45	176	1	74	7	125	35	151	20	889	74	868	94	855	108
61	90	95	5	1	1400	20	30	2	162	81	279	2	64	53	0	4	94	198	560	139	622	142	599
62	90	91	9	1	1000	22	20	0	0	0	0	0	0	2	3	0	0	10	10	3	2	2	3
63	95	63	5	1	1400	20	30	5	174	18	60	19	32	34	0	9	76	101	364	89	368	85	342
64	95	96	5	2	2800	41	30	6	0	6	7	3	20	1	1	0	0	28	51	18	27	16	28
65	63	12	5	1	1400	6	30	5	174	28	60	20	32	34	0	10	76	105	370	101	368	97	342
66	12	64	3	1	1400	90	35	5	0	0	0	9	0	0	0	11	0	35	37	26	28	25	0
67	12	99	11	1	800	35	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
68	88	91	9	1	1000	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
69	88	7	7	1	1200	19	25	329	68	176	17	74	16	125	35	151	28	889	128	868	150	855	164
70	91	92	9	1	1000	19	20	0	0	0	0	0	0	2	3	0	0	10	10	3	2	2	3
71	99	96	11	1	800	39	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72	96	97	5	2	2800	8	30	6	0	6	7	3	20	1	1	0	0	28	51	18	27	16	28
73	77	78	7	1	1200	13	25	49	0	217	0	244	2	0	0	165	0	650	3	670	2	675	2
74	66	13	8	1	1000	19	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	66	68	11	1	800	57	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
76	13	67	7	1	1000	53	25	360	268	0	56	126	92	156	144	134	154	872	730	776	713	776	714
77	68	67	7	1	1000	19	25	211	152	21	0	58	51	119	88	120	30	519	358	528	321	529	321
78	68	70	7	1	1200	19	25	152	211	0	21	51	58	88	119	30	120	358	519	321	528	321	529
79	68	69	9	1	1000	21	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80	67	103	9	1	800	21	20	208	57	0	35	75	34	68	25	104	34	514	211	455	185	455	185
81	70	73	7	1	1200	23	25	136	5	0	0	49	5	25	2	20	14	261	32	228	26	230	26
82	70	103	3	2	2800	31	35	5	0	7	0	26	1	0	0	10	3	57	4	52	6	48	4
83	73	76	7	1	1200	8	25	136	5	0	0	49	5	25	2	20	14	261	32	228	26	230	26
84	73	74	9	1	600	8	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85	76	78	7	1	1200	11	25	136	5	5	0	70	5	25	2	36	14	299	32	270	26	272	26
86	76	107	9	1	1000	33	20	0	0	0	5	0	21	0	0	0	16	0	38	0	42	0	42
87	78	79	7	1	1200	20	25	46	2	93	0	104	3	0	2	93	9	323	398	340	396	336	16
88	78	81	9	1	1000	15	20	136	0	129	0	206	0	25	0	103	0	989	0	968	0	599	0
89	79	85	11	1	800	19	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90	79	110	7	1	1200	17	25	46	2	93	0	104	3	0	2	93	9	323	398	340	396	336	16
91	85	7	9	1	1000	39	20	23	0	31	0	15	0	8	0	31	0	105	0	101	0	108	0
92	85	110	6	2	2400	28	30	215	698	91	85	204	313	31	9	188	75	661	782	716	781	729	1180
93	7	92	9	1	1000	21	20	0	0	0	17	0	14	0	0	0	0	0	42	0	32	0	31
94	7	87	7	1	1200	15	25	241	154	111	49	71	19	105	40	114	9	680	203	647	259	642	271
95	92	94	9	1	1000	5	20	0	0	0	17	0	14	2	3	0	0	10	52	3	34	2	34
96	94	97	9	1	1000	15	20	0	0	0	17	0	14	0	0	0	0	0	42	0	32	0	31
97	94	93	9	1	1000	15	20	0	0	0	0	0	0	2	3	0	0	10	10	3	2	2	3
98	97	98	5	2	2800	15	30	6	0	6	24	3	34	1	1	0	0	28	93	18	59	16	59
99	98	93	9	1	1000	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	98	133	5	2	2800	19	30	6	0	6	24	3	34	1	1	0	0	28	93	18	59	16	59

< Item >

Cap. : One-way capacity
Lanes : One-way or two-way
V(AB) : Volume (A --> B)
V(BA) : Volume (B --> A)

< Mode >

1~5 : Specific Mode 1 ~ 5
6 : Used Total OD Matrix (Option 4)
7 : Used Summed up Trip Table (Option 6)
Sum : Summed up "Mode Specific" Results (Option 5)

Table 7-14 (3) T-model2 Simulation Results : Loaded Link of "Mode" Trips

(b) Trip Type [Mode] , Mode Type [All : Summary]

< Links Recorded > [243] , < One-way Links > [21] , < Two-way Links > [222] , Total Links > [465]

	node		Link Data					Mode 1		Mode 2		Mode 3		Mode 4		Mode 5		Mode 6		Mode 7		Sum 1~5	
No.	A	B	Class	Lanes	Cap.	Length	Speed	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)
101	93	87	9	1	1000	25	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
102	93	132	9	1	1000	19	20	0	0	0	0	0	0	2	3	0	0	10	10	3	2	2	3
103	87	124	7	1	1200	19	25	241	154	111	49	71	19	105	40	114	9	680	203	647	259	642	271
104	74	72	9	1	600	8	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	72	104	9	1	600	26	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
106	103	104	8	1	1000	24	25	213	57	7	35	101	35	68	25	114	37	571	215	507	191	503	189
107	104	107	11	1	800	15	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108	104	105	8	1	1000	13	25	213	57	7	35	101	35	68	25	114	37	571	215	507	191	503	189
109	107	5	9	1	1000	11	20	0	0	0	5	0	21	0	0	0	16	0	38	0	42	0	42
110	105	5	8	1	1000	15	25	213	57	7	35	101	35	68	25	114	37	571	215	507	191	503	189
111	5	109	8	1	1000	12	25	190	98	16	66	99	92	68	25	183	15	580	295	558	301	556	296
112	109	111	8	1	1000	27	25	190	98	16	66	99	92	68	25	183	15	540	295	498	301	556	296
113	109	108	9	1	1000	19	20	0	0	0	0	0	0	0	0	0	0	40	0	60	0	0	0
114	110	111	6	1	1200	11	30	261	225	185	64	320	57	31	6	318	75	1014	339	1107	344	1115	427
115	124	110	6	1	1200	36	30	475	0	22	0	271	0	5	0	46	0	871	0	884	0	819	0
116	124	123	7	1	1200	8	25	239	32	110	40	59	11	103	43	68	9	642	105	582	133	579	135
117	132	124	6	1	1200	25	30	595	0	30	0	267	0	0	0	0	0	931	0	945	0	892	0
118	132	133	9	1	1000	25	20	0	0	0	12	0	162	0	0	0	0	0	164	0	173	0	174
119	132	131	6	1	1200	9	30	0	595	0	18	0	105	2	3	0	0	10	777	3	774	2	721
120	133	134	5	2	2800	6	30	6	0	6	36	3	196	1	1	0	0	28	257	18	232	16	233
121	134	138	16	1	1500	26	15	0	0	0	34	1	195	1	0	0	0	5	253	2	227	2	229
122	134	135	5	2	2800	5	30	6	0	6	2	2	1	0	1	0	0	23	4	16	5	14	4
123	138	8	16	1	1500	12	15	0	0	0	34	1	195	1	0	0	0	5	253	2	227	2	229
124	8	139	11	1	800	27	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	8	136	16	1	1500	37	15	0	0	70	0	242	1	0	2	0	0	298	6	313	2	312	3
126	136	135	5	1	1400	5	30	0	0	70	0	242	1	0	2	0	0	298	6	313	2	312	3
127	136	137	11	1	800	26	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
128	135	131	8	1	1000	27	25	6	0	76	2	244	2	0	3	0	0	321	10	329	7	326	7
129	131	126	7	1	1200	18	25	0	3	51	1	146	3	0	2	0	0	153	32	194	3	197	9
130	131	127	6	1	1200	8	30	9	595	26	20	100	106	2	4	0	0	206	783	139	779	137	725
131	123	117	7	1	1200	16	25	56	63	95	47	162	13	21	32	19	8	345	187	358	189	353	163
132	123	122	8	1	1000	9	25	127	8	30	0	15	5	40	32	49	1	313	40	307	58	261	46
133	111	113	0	1	1200	9	30	288	336	125	141	392	126	61	21	457	71	1088	587	1208	601	1323	695
134	108	115	9	1	1000	31	20	0	0	0	0	0	0	0	0	0	0	40	0	60	0	0	0
135	116	115	6	1	1200	3	30	134	684	106	351	326	232	35	25	356	89	812	1268	895	1301	957	1381
136	116	118	9	1	1000	15	20	390	0	127	0	131	0	34	0	114	0	750	0	761	0	796	0
137	116	114	6	1	1200	7	30	448	288	244	126	170	395	25	69	76	457	805	1099	867	1222	963	1335
138	115	112	6	1	1200	19	30	138	683	106	351	332	232	42	23	363	80	863	1261	978	1292	981	1369
139	120	125	9	1	1000	7	20	320	0	81	0	60	0	80	0	105	0	688	0	658	0	646	0
140	125	129	9	1	1000	20	20	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
141	125	4	9	1	1000	6	20	330	0	83	0	70	0	106	0	105	0	734	0	705	0	694	0
142	129	130	6	1	1200	6	30	9	643	26	28	100	115	2	4	0	0	220	852	139	845	137	790
143	128	130	6	1	1200	6	30	1120	9	59	12	182	23	13	2	3	0	1374	100	1423	50	1377	46
144	128	137	11	1	800	31	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
145	128	152	6	1	1200	19	30	9	1120	12	59	23	182	2	13	0	3	100	1374	50	1423	46	1377
146	130	4	9	1	1000	22	20	477	0	45	0	144	0	9	0	3	0	642	0	667	0	678	0
147	4	121	9	1	1000	5	20	194	0	22	0	82	0	12	0	3	0	287	0	307	0	313	0
148	121	1	9	1	1000	14	20	76	0	8	0	59	0	12	0	4	0	157	0	159	0	159	0
149	121	120	9	1	1000	7	20	144	0	15	0	23	0	12	0	0	0	159	0	192	0	194	0
150	102	101	3	2	2800	24	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

< Item >

Cap. : One-way capacity

Lanes : One-way or two-way

V(AB) : Volume (A --> B)

V(BA) : Volume (B --> A)

< Mode >

1~5 : Specific Mode 1 ~ 5

6 : Used Total OD Matrix (Option 4)

7 : Used Summed up Trip Table (Option 6)

Sum : Summed up "Mode Specific" Results (Option 5)

Table 7-14 (4) T-model2 Simulation Results : Loaded Link of "Mode" Trips

(b) Trip Type [Mode], Mode Type [All : Summary]

< Links Recorded > [243], < One-way Links > [21], < Two-way Links > [222], Total Links > [465]

	node		Link Data					Mode 1		Mode 2		Mode 3		Mode 4		Mode 5		Mode 6		Mode 7		Sum 1~5	
No.	A	B	Class	Lanes	Cap.	Length	Speed	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)
151	102	106	7	1	1200	41	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
152	101	141	3	2	2800	27	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
153	101	21	7	1	1200	44	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
154	141	143	8	1	1000	45	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155	106	21	7	1	1200	19	25	39	463	64	327	296	105	30	0	348	0	670	821	780	896	777	895
156	106	112	6	1	1200	49	30	463	39	327	64	105	296	0	30	0	348	821	670	896	780	895	777
157	21	143	7	1	1200	31	25	72	73	43	26	59	340	0	0	0	37	285	608	173	475	174	476
158	143	142	11	1	600	12	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
159	143	145	6	1	1200	42	30	72	73	43	26	59	340	0	0	0	37	285	608	173	475	174	476
160	142	144	11	1	600	46	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
161	112	146	6	1	1200	20	30	36	158	5	21	34	110	0	12	15	80	98	291	87	282	90	381
162	112	119	8	1	1000	31	25	63	62	37	3	2	17	12	11	0	0	95	149	116	119	114	93
163	146	145	6	1	1200	20	30	36	158	5	21	34	110	0	12	15	80	98	291	87	282	90	381
164	146	148	8	1	1000	35	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165	145	144	5	2	2800	45	35	0	0	0	24	18	239	0	0	0	40	11	302	17	302	18	303
166	145	22	6	1	1200	38	30	108	231	50	25	120	256	0	12	17	79	424	649	290	502	295	603
167	144	161	4	2	2800	91	35	0	0	0	24	18	239	0	0	0	40	11	302	17	302	18	303
168	119	121	11	1	800	23	10	26	0	1	0	0	0	12	0	1	0	29	0	44	0	40	0
169	119	148	8	1	1000	19	25	0	26	0	1	0	0	0	12	0	1	0	87	0	91	0	40
170	119	152	8	1	1000	30	25	63	62	37	3	2	17	12	11	0	0	95	91	116	72	114	93
171	148	147	8	1	1000	4	25	0	26	0	1	0	0	0	12	0	1	0	87	0	91	0	40
172	147	22	8	1	1000	15	25	0	26	0	1	0	0	0	12	0	1	0	29	0	44	0	40
173	147	149	8	1	1000	15	25	0	0	0	0	0	0	0	0	0	0	0	58	0	47	0	0
174	22	151	6	1	1200	34	30	54	561	13	37	7	264	10	0	4	0	149	825	85	759	88	862
175	149	150	8	1	1000	19	25	0	0	0	0	0	0	0	0	0	0	0	58	0	47	0	0
176	152	150	6	1	1200	30	30	72	1182	49	62	25	199	14	24	0	3	195	1465	161	1490	160	1470
177	152	155	9	1	1000	30	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
178	150	151	6	1	1200	8	30	72	1039	49	62	25	199	14	24	0	3	275	998	222	1027	160	1327
179	150	157	8	1	1000	77	25	0	143	0	0	0	0	0	0	0	0	0	605	0	571	0	143
180	151	153	6	1	1200	30	30	91	1565	55	92	12	443	14	14	1	0	267	1666	176	1655	173	2114
181	153	154	9	1	1000	17	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182	153	23	6	1	1200	49	30	91	1565	55	92	12	443	14	14	1	0	267	1666	176	1655	173	2114
183	156	157	9	1	1000	19	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
184	157	23	9	1	1000	15	20	0	143	0	0	0	0	0	0	0	0	0	153	0	166	0	143
185	157	158	9	1	1000	32	20	0	0	0	0	0	0	0	0	0	0	0	452	0	405	0	0
186	23	159	6	1	1200	31	30	37	1044	1	0	6	474	0	1070	1	0	53	2090	46	2154	45	2588
187	114	108	9	1	1000	29	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
188	161	25	2	1	1500	68	40	0	0	0	24	18	239	0	0	0	40	11	302	17	302	18	303
189	25	163	2	1	1500	58	40	0	0	0	0	18	0	0	0	0	0	11	0	17	0	18	0
190	155	156	9	1	1000	43	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
191	159	160	6	1	1200	56	30	37	1044	1	0	6	474	0	1070	1	0	53	2542	46	2559	45	2588
192	158	159	9	1	1000	13	20	0	0	0	0	0	0	0	0	0	0	0	452	0	405	0	0
193	160	24	9	1	1000	39	20	30	1054	0	0	0	493	0	1070	0	0	38	2613	29	2618	30	2617
194	24	162	9	1	1000	33	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
195	1	115	9	1	1000	15	20	5	0	0	0	6	0	9	0	16	0	18	0	32	0	36	0
196	118	120	9	1	1000	13	20	217	0	72	0	53	0	33	0	53	0	407	0	401	0	428	0
197	118	1	9	1	1500	5	15	185	14	60	1	80	0	37	27	78	16	444	63	448	62	440	58
198	113	114	0	1	1200	12	30	288	448	126	244	395	170	69	25	457	76	1099	805	1222	867	1335	963
199	117	111	7	1	1200	19	25	0	176	20	107	71	75	10	38	11	36	62	481	109	462	112	432
200	122	120	8	1	1000	18	25	132	173	36	42	15	31	52	17	53	1	352	230	336	271	288	264

< Item >

Cap. : One-way capacity
Lanes : One-way or two-way
V(AB) : Volume (A --> B)
V(BA) : Volume (B --> A)

< Mode >

1~5 : Specific Mode 1 ~ 5
6 : Used Total OD Matrix (Option 4)
7 : Used Summed up Trip Table (Option 6)
Sum : Summed up "Mode Specific" Results (Option 5)

Table 7-14 (5) T-model2 Simulation Results : Loaded Link of "Mode" Trips

(b) Trip Type [Mode], Mode Type [All : Summary]

< Links Recorded > [243], < One-way Links > [21], < Two-way Links > [222], Total Links > [465]

	node		Link Data					Mode 1		Mode 2		Mode 3		Mode 4		Mode 5		Mode 6		Mode 7		Sum 1~5	
No.	A	B	Class	Lanes	Cap.	Length	Speed	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)
201	2	118	16	1	1500	18	15	5	7	5	1	2	0	17	8	6	5	64	26	46	20	35	21
202	2	113	16	1	1500	17	15	0	112	1	103	3	44	8	4	0	5	11	218	14	266	12	268
203	2	117	16	1	1500	9	15	2	171	12	147	1	154	22	39	13	49	41	618	48	570	50	560
204	2	122	16	1	1500	15	15	7	141	17	17	1	35	41	13	4	0	65	188	70	201	70	206
205	126	123	7	1	1200	7	25	0	95	37	29	135	24	0	63	0	0	117	223	173	204	172	211
206	127	129	6	1	1200	21	30	9	643	26	28	100	115	2	4	0	0	217	852	139	845	137	790
207	3	125	16	1	1500	19	15	10	0	2	0	10	0	26	0	0	0	49	0	47	0	48	0
208	3	122	16	1	1500	8	15	9	35	3	39	20	12	41	42	0	0	72	100	67	120	73	128
209	3	126	16	1	1500	9	15	0	92	0	42	0	32	0	61	0	0	0	227	3	225	0	227
210	3	127	16	1	1500	18	15	0	48	0	8	0	9	0	0	0	0	11	69	0	66	0	65
211	80	77	9	1	1000	22	20	3	0	58	0	22	0	0	0	5	0	66	0	87	0	88	0
212	81	85	9	1	1000	10	20	81	0	143	0	105	0	39	0	248	0	628	0	605	0	616	0
213	6	81	16	1	1500	5	15	56	111	112	98	98	199	17	3	230	85	533	894	513	876	513	496
214	80	6	16	1	1500	5	15	1026	0	311	58	502	20	6	0	241	0	1726	57	1702	77	2086	78
215	83	85	6	2	2400	6	30	159	700	55	161	158	357	25	34	158	262	480	1124	545	1114	555	1514
216	6	83	16	1	1000	10	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
217	62	95	5	1	1400	25	30	4	7	232	77	45	13	1	20	30	7	290	214	325	130	312	124
218	11	90	9	1	1000	30	20	60	0	0	0	39	8	30	11	59	38	258	66	190	53	188	57
219	59	11	16	1	1500	19	15	0	8	0	15	1	10	58	37	11	6	120	80	71	77	70	76
220	11	62	16	1	1500	19	15	0	0	0	15	2	1	4	0	0	8	11	76	3	25	6	24
221	52	69	9	1	1000	37	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
222	19	38	6	1	1200	56	30	0	39	29	0	271	29	206	0	316	183	813	231	825	253	822	251
223	15	37	16	1	1500	23	15	0	0	0	0	0	101	0	0	0	92	0	227	0	201	0	193
224	36	40	11	1	800	49	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
225	41	40	11	1	800	19	15	173	0	0	0	14	16	0	0	0	0	191	19	186	16	187	16
226	20	36	16	1	1500	18	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
227	20	41	16	1	1500	47	15	173	0	0	0	14	16	0	0	0	0	191	19	186	16	187	16
228	9	57	8	1	1000	24	25	14	51	5	41	39	24	35	53	25	28	124	183	123	199	118	197
229	16	49	16	1	1500	17	15	111	24	0	0	17	25	34	0	0	128	158	204	161	177	162	177
230	10	59	8	1	1000	20	25	137	27	6	29	11	21	78	54	37	6	271	138	272	138	269	137
231	164	31	17	1	1500	166	45	0	0	0	0	0	14	0	0	0	0	0	15	0	7	0	14
232	165	164	18	1	1500	359	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
233	27	164	17	1	1500	535	45	0	0	0	0	0	14	0	0	0	0	0	15	0	7	0	14
234	28	43	20	1	1	169	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
235	166	65	17	1	1500	68	45	0	5	0	0	0	9	0	0	0	11	37	35	28	26	0	25
236	167	166	19	1	1400	116	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
237	166	168	17	1	1500	164	45	5	0	0	0	9	0	0	0	11	0	35	37	26	28	25	0
238	168	140	18	1	1500	30	40	0	17	0	1	0	25	0	0	0	1	0	86	0	76	0	44
239	170	168	18	1	1500	412	40	0	22	0	1	0	34	0	0	0	12	0	84	0	74	0	69
240	168	169	17	1	1500	615	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
241	170	26	18	1	1500	38	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
242	170	30	18	1	1500	37	40	22	0	1	0	34	0	0	0	12	0	84	0	74	0	69	0
243	163	29	18	1	1500	400	40	0	0	0	0	18	0	0	0	0	0	11	0	17	0	18	0

< Item >

Cap.	One-way capacity
Lanes	One-way or two-way
V(AB)	Volume (A --> B)
V(BA)	Volume (B --> A)

< Mode >

1~5	Specific Mode 1 ~ 5
6	Used Total OD Matrix (Option 4)
7	Used Summed up Trip Table (Option 6)
Sum	Summed up "Mode Specific" Results (Option 5)

Table 7-15 (1) T-model2 Simulation Results : Loaded Link of "Vehicle Equivalent" Trips

(a) Trip Type [Vehicle Eq.], Mode Type [All : Summary]

< Links Recorded > [243], < One-way Links > [21], < Two-way Links > [222], Total Links > [465]

	node		Link Data					Mode 1		Mode 2		Mode 3		Mode 4		Mode 5		Mode 6		Mode 7		Sum 1~5	
No.	A	B	Class	Lanes	Cap.	Length	Speed	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)
1	31	32	1	1	1500	60	45	0	0	0	0	0	19	0	0	0	0	0	27	0	15	0	19
2	33	34	11	1	800	60	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	42	41	11	1	800	33	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	51	18	11	1	800	45	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	65	64	2	1	1500	68	40	0	5	0	6	2	33	0	0	0	21	17	53	6	67	2	65
6	140	160	5	1	1400	132	30	0	17	0	0	0	52	0	0	0	0	0	102	0	70	0	69
7	100	101	9	1	1000	21	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	43	44	9	1	1000	40	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	46	14	9	1	1000	64	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	32	34	11	1	600	37	15	0	0	0	0	0	8	0	0	0	0	0	6	0	6	0	8
11	32	37	3	1	1400	113	40	0	0	0	0	0	11	0	0	0	0	0	21	0	9	0	11
12	34	35	11	1	600	44	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	34	19	6	1	1200	56	30	0	0	0	0	0	8	0	0	0	0	0	6	0	6	0	8
14	35	36	11	1	800	64	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	37	38	8	1	1000	35	25	2	72	0	34	77	466	0	10	193	242	264	804	273	810	272	824
16	37	47	3	1	1400	79	40	72	2	34	0	347	161	10	0	142	209	580	417	591	369	605	372
17	38	39	8	1	1000	23	25	0	159	0	0	32	38	8	0	0	10	38	225	41	197	40	207
18	38	49	6	1	1200	79	30	75	25	6	0	106	16	23	0	168	42	430	82	382	79	378	83
19	39	40	8	1	1000	20	25	0	159	0	0	32	38	8	0	0	10	38	225	41	197	40	207
20	39	17	11	1	800	79	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	40	50	7	1	1200	79	25	14	0	0	0	1	9	8	0	0	10	25	47	35	19	23	19
22	47	16	16	1	1500	18	15	27	93	0	0	14	151	0	5	52	0	67	272	90	243	93	249
23	47	48	4	1	1400	45	35	165	29	34	0	459	136	15	0	142	261	797	429	795	420	815	426
24	49	17	16	1	1500	22	15	76	0	4	257	14	123	2	7	0	185	106	607	97	570	96	572
25	49	58	6	1	1200	60	30	115	54	263	4	205	12	36	0	187	27	813	80	816	95	806	97
26	17	50	16	1	1500	22	15	0	16	10	71	3	11	10	0	4	2	24	114	28	103	27	100
27	50	18	16	1	1500	20	15	0	0	116	443	0	81	28	0	0	51	142	582	143	569	144	575
28	50	61	7	1	1200	79	25	1	3	383	117	66	1	0	10	43	0	467	139	502	135	493	131
29	18	63	9	1	1000	120	20	0	0	19	0	4	0	0	0	2	0	13	1	31	0	25	0
30	48	58	5	1	1400	35	30	3	0	2	15	0	19	6	1	0	7	15	60	9	40	11	42
31	48	55	3	1	1400	79	35	31	14	34	2	52	27	12	6	38	50	172	105	165	100	167	99
32	48	57	6	1	1200	64	30	134	18	15	0	414	97	4	0	110	210	659	313	657	316	677	325
33	58	60	5	1	1400	28	30	3	7	0	15	16	19	23	0	30	12	44	57	72	51	72	53
34	58	59	6	1	1200	49	30	112	44	263	2	186	9	18	0	153	18	755	54	743	74	732	73
35	60	61	5	1	1400	21	30	3	4	0	15	12	15	8	0	6	5	23	46	27	38	29	39
36	60	11	9	1	1000	34	20	0	3	0	0	4	4	15	0	24	7	21	11	45	13	43	14
37	61	62	5	1	1400	24	30	4	7	368	117	74	12	2	4	47	3	470	165	503	147	495	143
38	45	44	9	1	800	16	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	44	14	8	1	1000	27	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	14	53	8	1	1000	41	25	174	0	408	80	653	42	0	0	327	0	1572	121	1559	120	1562	122
41	53	56	8	1	1000	23	25	174	0	408	80	653	42	0	0	327	0	1572	121	1559	120	1562	122
42	56	54	8	1	1000	11	25	174	0	408	80	653	42	0	0	327	0	1572	121	1559	120	1562	122
43	54	55	8	1	1000	2	25	174	0	408	80	653	42	0	0	327	0	1572	121	1559	120	1562	122
44	55	9	8	1	1000	26	25	2	52	71	0	49	22	5	8	19	41	144	94	172	127	146	123
45	55	71	3	2	2800	34	35	257	16	369	80	651	42	20	11	354	17	1631	163	1625	166	1651	166
46	57	10	8	1	1000	19	25	12	276	14	43	45	82	9	10	14	146	123	534	113	560	94	557
47	57	84	6	1	1200	53	30	351	8	22	23	491	116	2	1	211	191	1044	323	1062	332	1077	339
48	59	89	6	1	1200	36	30	236	50	256	6	194	19	20	1	185	18	904	77	922	97	891	94
49	71	75	7	1	1200	28	25	46	0	324	80	490	34	0	0	198	0	1030	108	1032	114	1058	114
50	71	70	3	2	2800	36	35	211	16	45	0	161	8	20	11	156	17	601	55	593	52	593	52

< Item >
Cap. : One-way capacity
Lanes : One-way or two-way
V(AB) : Volume (A --> B)
V(BA) : Volume (B --> A)

< Mode >
1~5 : Specific Mode 1 ~ 5
6 : Used Total OD Matrix (Option 7)
7 : Used Summed up Trip Table (Option 9)
Sum : Summed up "Mode Specific" Results (Option 8)

Table 7-15 (2) T-model2 Simulation Results : Loaded Link of "Vehicle Equivalent" Trips

(b) Trip Type [Vehicle Eq.], Mode Type [All : Summary]

< Links Recorded > [243], < One-way Links > [21], < Two-way Links > [222], Total Links > [465]

	node		Link Data					Mode 1		Mode 2		Mode 3		Mode 4		Mode 5		Mode 6		Mode 7		Sum 1~5	
No.	A	B	Class	Lanes	Cap.	Length	Speed	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)
51	75	77	7	1	1200	7	25	46	0	324	80	490	34	0	0	198	0	1030	108	1032	114	1058	114
52	75	76	9	1	1000	18	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	84	82	6	2	2400	6	30	498	10	437	146	729	132	2	8	412	237	1982	522	2041	529	2078	533
54	84	86	5	1	1400	13	30	2	147	123	415	16	238	7	0	46	201	199	938	197	979	194	1001
55	82	80	9	1	1000	10	20	1029	0	459	0	991	0	1	0	305	0	1997	0	2043	0	2785	0
56	82	83	6	2	2400	5	30	159	700	82	250	320	714	2	9	194	324	755	1292	760	1291	757	1997
57	86	89	5	1	1400	30	30	2	124	123	397	16	224	7	0	46	190	199	871	197	913	194	935
58	86	88	9	1	1000	26	20	0	23	0	18	0	14	0	0	0	11	0	67	0	66	0	66
59	89	90	5	1	1400	21	30	2	222	130	424	27	192	14	5	58	185	226	1011	233	1032	231	1028
60	89	88	7	1	1200	14	25	329	45	272	2	148	16	25	8	175	25	1018	78	1008	100	949	96
61	90	95	5	1	1400	20	30	2	162	130	424	10	117	13	0	8	116	159	786	169	826	163	819
62	90	91	9	1	1000	22	20	0	0	0	0	0	0	0	0	0	0	4	2	1	0	0	0
63	95	63	5	1	1400	20	30	5	174	28	92	38	62	10	0	19	89	83	433	105	424	100	417
64	95	96	5	2	2800	41	30	6	0	10	7	4	30	2	0	1	0	38	51	28	34	23	37
65	63	12	5	1	1400	6	30	5	174	47	92	42	62	10	0	21	89	96	434	136	424	125	417
66	12	64	3	1	1400	90	35	5	0	6	0	33	2	0	0	21	0	53	17	67	6	65	2
67	12	99	11	1	800	35	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
68	88	91	9	1	1000	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
69	88	7	7	1	1200	19	25	329	68	272	20	148	30	25	8	175	36	1018	145	1008	166	949	162
70	91	92	9	1	1000	19	20	0	0	0	0	0	0	0	0	0	0	4	2	1	0	0	0
71	99	96	11	1	800	39	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72	96	97	5	2	2800	8	30	6	0	10	7	4	30	2	0	1	0	38	51	28	34	23	37
73	77	78	7	1	1200	13	25	49	0	324	0	494	2	0	0	206	0	1044	5	1048	3	1073	2
74	66	13	8	1	1000	19	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	66	68	11	1	800	57	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
76	13	67	7	1	1000	53	25	360	268	0	89	266	187	28	24	177	197	866	770	833	770	831	765
77	68	67	7	1	1000	19	25	211	152	34	0	119	105	21	16	152	46	541	333	540	321	537	319
78	68	70	7	1	1200	19	25	152	211	0	34	105	119	16	21	46	152	333	541	321	540	319	537
79	68	69	9	1	1000	21	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80	67	103	9	1	800	21	20	208	57	0	55	161	68	12	3	131	45	533	229	512	230	512	228
81	70	73	7	1	1200	23	25	136	5	0	0	98	12	5	1	33	15	283	33	273	36	272	33
82	70	103	3	2	2800	31	35	5	0	11	0	54	1	0	0	19	4	93	5	89	4	89	5
83	73	76	7	1	1200	8	25	136	5	0	0	98	12	5	1	33	15	283	33	273	36	272	33
84	73	74	9	1	600	8	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85	76	78	7	1	1200	11	25	136	5	6	0	147	12	5	1	54	15	351	33	349	36	348	33
86	76	107	9	1	1000	33	20	0	0	0	6	0	49	0	0	0	21	0	68	0	76	0	76
87	78	79	7	1	1200	20	25	46	2	142	0	218	10	0	1	112	7	511	692	521	679	518	20
88	78	81	9	1	1000	15	20	136	0	188	0	419	0	5	0	140	0	1538	0	1516	0	888	0
89	79	85	11	1	800	19	20	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0
90	79	110	7	1	1200	17	25	46	2	142	0	218	10	0	1	112	7	510	692	519	679	518	20
91	85	7	9	1	1000	39	20	23	0	47	0	26	0	2	0	50	0	109	0	121	0	148	0
92	85	110	6	2	2400	28	30	215	698	137	134	400	622	2	2	239	92	890	897	955	888	993	1548
93	7	92	9	1	1000	21	20	0	0	0	26	0	27	0	0	0	0	0	76	0	54	0	53
94	7	87	7	1	1200	15	25	241	154	172	68	152	35	18	7	136	20	761	244	749	288	719	284
95	92	94	9	1	1000	5	20	0	0	0	26	0	27	0	0	0	0	4	78	1	54	0	53
96	94	97	9	1	1000	15	20	0	0	0	26	0	27	0	0	0	0	0	76	0	54	0	53
97	94	93	9	1	1000	15	20	0	0	0	0	0	0	0	0	0	0	4	2	1	0	0	0
98	97	98	5	2	2800	15	30	6	0	10	33	4	57	2	0	1	0	38	127	28	88	23	90
99	98	93	9	1	1000	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	98	133	5	2	2800	19	30	6	0	10	33	4	57	2	0	1	0	38	127	28	88	23	90

< Item >

Cap. : One-way capacity
Lanes : One-way or two-way
V(AB) : Volume (A --> B)
V(BA) : Volume (B --> A)

< Mode >

1~5 : Specific Mode 1 ~ 5
6 : Used Total OD Matrix (Option 7)
7 : Used Summed up Trip Table (Option 9)
Sum : Summed up "Mode Specific" Results (Option 8)

Table 7-15 (3) T-model2 Simulation Results : Loaded Link of "Vehicle Equivalent" Trips

(b) Trip Type [Vehicle Eq.], Mode Type [All : Summary]

< Links Recorded > [243], < One-way Links > [21], < Two-way Links > [222], Total Links > [465]

	node		Link Data					Mode 1		Mode 2		Mode 3		Mode 4		Mode 5		Mode 6		Mode 7		Sum 1~5	
No.	A	B	Class	Lanes	Cap.	Length	Speed	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)
101	93	87	9	1	1000	25	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
102	93	132	9	1	1000	19	20	0	0	0	0	0	0	0	0	0	0	4	2	1	0	0	0
103	87	124	7	1	1200	19	25	241	154	172	68	152	35	18	7	136	20	761	244	749	288	719	284
104	74	72	9	1	600	8	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	72	104	9	1	600	26	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
106	103	104	8	1	1000	24	25	213	57	11	55	215	69	12	3	150	49	626	234	601	234	601	233
107	104	107	11	1	800	15	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108	104	105	8	1	1000	13	25	213	57	11	55	215	69	12	3	150	49	626	234	601	234	601	233
109	107	5	9	1	1000	11	20	0	0	0	6	0	49	0	0	0	21	0	68	0	76	0	76
110	105	5	8	1	1000	15	25	213	57	11	55	215	69	12	3	150	49	626	234	601	234	601	233
111	5	109	8	1	1000	12	25	190	98	26	96	195	189	12	3	228	29	649	369	653	415	651	415
112	109	111	8	1	1000	27	25	190	98	26	96	195	189	12	3	228	29	542	369	499	415	651	415
113	109	108	9	1	1000	19	20	0	0	0	0	0	0	0	0	0	0	107	0	154	0	0	0
114	110	111	6	1	1200	11	30	261	225	280	99	641	104	2	2	399	92	1439	453	1536	453	1583	522
115	124	110	6	1	1200	36	30	475	0	36	0	551	0	1	0	55	0	1175	0	1176	0	1118	0
116	124	123	7	1	1200	8	25	239	32	171	56	129	28	17	7	81	20	712	128	675	147	637	143
117	132	124	6	1	1200	25	30	595	0	47	0	535	0	0	0	0	0	1242	0	1243	0	1177	0
118	132	133	9	1	1000	25	20	0	0	0	19	0	333	0	0	0	0	0	345	0	351	0	352
119	132	131	6	1	1200	9	30	0	595	0	28	0	202	0	0	0	0	4	899	1	892	0	825
120	133	134	5	2	2800	6	30	6	0	10	52	4	390	2	0	1	0	38	472	28	439	23	442
121	134	138	16	1	1500	26	15	0	0	0	52	2	390	2	0	0	0	9	469	2	439	4	442
122	134	135	5	2	2800	5	30	6	0	10	0	2	0	0	0	1	0	29	3	26	0	19	0
123	138	8	16	1	1500	12	15	0	0	0	52	2	390	2	0	0	0	9	469	2	439	4	442
124	8	139	11	1	800	27	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	8	136	16	1	1500	37	15	0	0	102	0	491	6	0	0	0	0	569	11	596	3	593	6
126	136	135	5	1	1400	5	30	0	0	102	0	491	6	0	0	0	0	569	11	596	3	593	6
127	136	137	11	1	800	26	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
128	135	131	8	1	1000	27	25	6	0	112	0	493	6	0	0	1	0	598	14	622	3	612	6
129	131	126	7	1	1200	18	25	0	3	73	3	293	7	0	0	0	3	299	37	323	34	366	16
130	131	127	6	1	1200	8	30	9	595	42	28	203	204	0	0	4	0	334	907	331	892	258	827
131	123	117	7	1	1200	16	25	56	63	137	72	327	45	5	5	29	16	541	235	542	245	554	201
132	123	122	8	1	1000	9	25	127	8	47	1	53	14	6	5	49	4	357	53	351	74	282	32
133	111	113	0	1	1200	9	30	288	336	188	213	784	249	10	4	564	97	1401	757	1518	789	1834	899
134	108	115	9	1	1000	31	20	0	0	0	0	0	0	0	0	0	0	107	0	154	0	0	0
135	116	115	6	1	1200	3	30	134	684	155	533	672	454	4	5	447	112	1127	1657	1197	1720	1412	1788
136	116	118	9	1	1000	15	20	390	0	196	0	227	0	7	0	130	0	887	0	916	0	950	0
137	116	114	6	1	1200	7	30	448	288	374	192	341	786	5	11	101	566	1054	1411	1133	1526	1269	1843
138	115	112	6	1	1200	19	30	138	683	156	532	678	454	4	3	453	99	1247	1648	1369	1704	1429	1771
139	120	125	9	1	1000	7	20	320	0	124	0	141	0	11	0	107	0	753	0	711	0	703	0
140	125	129	9	1	1000	20	20	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0
141	125	4	9	1	1000	6	20	330	0	125	0	158	0	16	0	107	0	787	0	744	0	736	0
142	129	130	6	1	1200	6	30	9	643	42	42	204	217	0	0	4	0	342	969	331	969	259	902
143	128	130	6	1	1200	6	30	1120	9	86	20	357	51	2	0	3	4	1558	133	1622	154	1568	84
144	128	137	11	1	800	31	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
145	128	152	6	1	1200	19	30	9	1120	20	86	51	357	0	2	4	3	133	1558	154	1622	84	1568
146	130	4	9	1	1000	22	20	477	0	66	0	293	0	2	0	3	0	798	0	830	0	841	0
147	4	121	9	1	1000	5	20	194	0	28	0	155	0	4	0	1	0	361	0	378	0	382	0
148	121	1	9	1	1000	14	20	76	0	11	0	115	0	3	0	4	0	200	0	204	0	209	0
149	121	120	9	1	1000	7	20	144	0	18	0	41	0	3	0	3	0	194	0	221	0	209	0
150	102	101	3	2	2800	24	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

< Item >

Cap. : One-way capacity
Lanes : One-way or two-way
V(AB) : Volume (A --> B)
V(BA) : Volume (B --> A)

< Mode >

1~5 : Specific Mode 1 ~ 5
6 : Used Total OD Matrix (Option 7)
7 : Used Summed up Trip Table (Option 9)
Sum : Summed up "Mode Specific" Results (Option 8)

Table 7-15 (4) T-model2 Simulation Results : Loaded Link of "Vehicle Equivalent" Trips

(b) Trip Type [Vehicle Eq.], Mode Type [All : Summary]

< Links Recorded > [243], < One-way Links > [21], < Two-way Links > [222], Total Links > [465]

	node		Link Data					Mode 1		Mode 2		Mode 3		Mode 4		Mode 5		Mode 6		Mode 7		Sum 1~5	
No.	A	B	Class	Lanes	Cap.	Length	Speed	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)
151	102	106	7	1	1200	41	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
152	101	141	3	2	2800	27	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
153	101	21	7	1	1200	44	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
154	141	143	8	1	1000	45	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155	106	21	7	1	1200	19	25	39	463	92	492	613	208	2	0	429	0	1028	1079	1179	1163	1175	1163
156	106	112	6	1	1200	49	30	463	39	492	92	208	613	0	2	0	429	1079	1028	1163	1179	1163	1175
157	21	143	7	1	1200	31	25	72	73	62	40	121	678	0	0	0	44	367	1002	257	832	255	835
158	143	142	11	1	600	12	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
159	143	145	6	1	1200	42	30	72	73	62	40	121	678	0	0	0	44	367	1002	257	832	255	835
160	142	144	11	1	600	46	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
161	112	146	6	1	1200	20	30	36	158	10	36	64	210	0	2	24	99	133	425	131	410	134	505
162	112	119	8	1	1000	31	25	63	62	54	4	1	36	2	1	0	0	100	158	103	175	120	103
163	146	145	6	1	1200	20	30	36	158	10	36	64	210	0	2	24	99	133	425	131	410	134	505
164	146	148	8	1	1000	35	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165	145	144	5	2	2800	45	35	0	0	0	36	22	471	0	0	0	44	25	559	27	552	22	551
166	145	22	6	1	1200	38	30	108	231	78	46	248	502	0	2	25	100	565	958	454	783	459	881
167	144	161	4	2	2800	91	35	0	0	0	36	22	471	0	0	0	44	25	559	27	552	22	551
168	119	121	11	1	800	23	10	26	0	1	0	1	0	2	0	6	0	33	0	47	0	36	0
169	119	148	8	1	1000	19	25	0	26	0	1	0	1	0	2	0	6	0	113	0	116	0	36
170	119	152	8	1	1000	30	25	63	62	54	4	1	36	2	1	0	0	100	78	103	106	120	103
171	148	147	8	1	1000	4	25	0	26	0	1	0	1	0	2	0	6	0	113	0	116	0	36
172	147	22	8	1	1000	15	25	0	26	0	1	0	1	0	2	0	6	0	33	0	47	0	36
173	147	149	8	1	1000	15	25	0	0	0	0	0	0	0	0	0	0	0	80	0	69	0	0
174	22	151	6	1	1200	34	30	54	561	13	62	19	534	2	0	3	4	92	1114	78	1074	91	1161
175	149	150	8	1	1000	19	25	0	0	0	0	0	0	0	0	0	0	0	80	0	69	0	0
176	152	150	6	1	1200	30	30	72	1182	74	90	52	393	2	3	4	3	219	1574	213	1552	204	1671
177	152	155	9	1	1000	30	20	0	0	0	0	0	0	0	0	0	0	0	48	0	132	0	0
178	150	151	6	1	1200	8	30	72	1039	74	90	52	393	2	3	4	3	564	1095	559	1148	204	1528
179	150	157	8	1	1000	77	25	0	143	0	0	0	0	0	0	0	0	0	904	0	819	0	143
180	151	153	6	1	1200	30	30	91	1565	73	138	30	886	2	1	0	0	221	1774	195	1780	196	2590
181	153	154	9	1	1000	17	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182	153	23	6	1	1200	49	30	91	1565	73	138	30	886	2	1	0	0	221	1774	195	1780	196	2590
183	156	157	9	1	1000	19	20	0	0	0	0	0	0	0	0	0	0	0	48	0	132	0	0
184	157	23	9	1	1000	15	20	0	143	0	0	0	0	0	0	0	0	0	498	0	504	0	143
185	157	158	9	1	1000	32	20	0	0	0	0	0	0	0	0	0	0	0	454	0	447	0	0
186	23	159	6	1	1200	31	30	37	1044	0	0	10	931	0	213	0	0	62	1718	52	1738	47	2188
187	114	108	9	1	1000	29	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
188	161	25	2	1	1500	68	40	0	0	0	36	22	471	0	0	0	44	25	559	27	552	22	551
189	25	163	2	1	1500	58	40	0	0	0	0	22	0	0	0	1	0	25	0	28	0	23	0
190	155	156	9	1	1000	43	20	0	0	0	0	0	0	0	0	0	0	0	48	0	132	0	0
191	159	160	6	1	1200	56	30	37	1044	0	0	10	931	0	213	0	0	62	2172	52	2185	47	2188
192	158	159	9	1	1000	13	20	0	0	0	0	0	0	0	0	0	0	0	454	0	447	0	0
193	160	24	9	1	1000	39	20	30	1054	0	0	3	976	0	213	0	0	35	2247	40	2243	33	2243
194	24	162	9	1	1000	33	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
195	1	115	9	1	1000	15	20	5	0	2	0	6	0	2	0	19	0	22	0	34	0	34	0
196	118	120	9	1	1000	13	20	217	0	108	0	96	0	5	0	56	0	449	0	451	0	482	0
197	118	1	9	1	1500	5	15	185	14	96	2	139	0	6	3	95	19	537	51	522	38	521	38
198	113	114	0	1	1200	12	30	288	448	192	374	786	341	11	5	566	101	1411	1054	1526	1133	1843	1269
199	117	111	7	1	1200	19	25	0	176	27	163	144	152	1	4	13	52	102	617	151	589	185	547
200	122	120	8	1	1000	18	25	132	173	54	56	56	52	7	4	52	4	388	278	369	330	301	289

< Item >

Cap. : One-way capacity
Lanes : One-way or two-way
V(AB) : Volume (A --> B)
V(BA) : Volume (B --> A)

< Mode >

1~5 : Specific Mode 1 ~ 5
6 : Used Total OD Matrix (Option 7)
7 : Used Summed up Trip Table (Option 9)
Sum : Summed up "Mode Specific" Results (Option 8)

Table 7-15 (5) T-model2 Simulation Results : Loaded Link of "Vehicle Equivalent" Trips

(b) Trip Type [Vehicle Eq.] , Mode Type [All : Summary]

< Links Recorded > [243] , < One-way Links > [21] , < Two-way Links > [222] , Total Links > [465]

	node		Link Data					Mode 1		Mode 2		Mode 3		Mode 4		Mode 5		Mode 6		Mode 7		Sum 1~5	
No.	A	B	Class	Lanes	Cap.	Length	Speed	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)	V(AB)	V(BA)
201	2	118	16	1	1500	18	15	5	7	6	0	8	0	2	1	10	8	70	22	63	44	31	16
202	2	113	16	1	1500	17	15	0	112	4	161	2	92	1	1	2	4	10	297	8	344	9	370
203	2	117	16	1	1500	9	15	2	171	17	218	3	293	3	6	17	69	33	854	42	777	42	757
204	2	122	16	1	1500	15	15	7	141	25	21	3	69	8	6	3	0	48	216	45	237	46	237
205	126	123	7	1	1200	7	25	0	95	51	55	266	46	0	9	0	3	248	222	277	231	317	208
206	127	129	6	1	1200	21	30	9	643	42	42	204	217	0	0	4	0	338	969	331	969	259	902
207	3	125	16	1	1500	19	15	10	0	1	0	17	0	5	0	0	0	38	0	33	0	33	0
208	3	122	16	1	1500	8	15	9	35	4	56	42	11	10	10	0	0	63	89	60	106	65	112
209	3	126	16	1	1500	9	15	0	92	0	74	0	66	0	9	0	0	5	241	4	247	0	241
210	3	127	16	1	1500	18	15	0	48	0	14	1	13	0	0	0	0	4	62	0	77	1	75
211	80	77	9	1	1000	22	20	3	0	80	0	36	0	0	0	8	0	117	0	127	0	127	0
212	81	85	9	1	1000	10	20	81	0	218	0	198	0	9	0	327	0	789	0	802	0	833	0
213	6	81	16	1	1500	5	15	56	111	171	141	181	402	5	1	291	104	708	1457	701	1415	704	759
214	80	6	16	1	1500	5	15	1026	0	459	80	990	35	1	0	299	2	1990	110	2034	118	2775	117
215	83	85	6	2	2400	6	30	159	700	82	250	320	714	2	9	194	324	651	1339	720	1336	757	1997
216	6	83	16	1	1000	10	5	0	0	0	0	0	0	0	0	0	0	0	151	0	85	0	0
217	62	95	5	1	1400	25	30	4	7	350	117	71	14	2	3	45	6	459	195	482	150	472	147
218	11	90	9	1	1000	30	20	60	0	0	0	75	17	5	1	69	50	229	69	207	64	209	68
219	59	11	16	1	1500	19	15	0	8	0	18	2	25	10	7	14	10	64	56	24	70	26	68
220	11	62	16	1	1500	19	15	0	0	0	18	0	5	1	0	1	6	9	50	1	25	2	29
221	52	69	9	1	1000	37	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
222	19	38	6	1	1200	56	30	0	39	40	0	536	63	41	0	392	227	1010	309	1011	327	1009	329
223	15	37	16	1	1500	23	15	0	0	0	0	0	192	0	0	0	116	0	356	0	306	0	308
224	36	40	11	1	800	49	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
225	41	40	11	1	800	19	15	173	0	0	0	34	36	0	0	0	0	212	47	207	35	207	36
226	20	36	16	1	1500	18	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
227	20	41	16	1	1500	47	15	173	0	0	0	34	36	0	0	0	0	212	47	207	35	207	36
228	9	57	8	1	1000	24	25	14	51	11	56	76	55	6	10	29	41	168	204	160	218	136	213
229	16	49	16	1	1500	17	15	111	24	0	0	33	39	8	0	0	151	143	259	157	212	152	214
230	10	59	8	1	1000	20	25	137	27	12	41	21	46	15	11	46	10	252	118	255	145	231	135
231	164	31	17	1	1500	166	45	0	0	0	0	0	19	0	0	0	0	0	27	0	15	0	19
232	165	164	18	1	1500	359	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
233	27	164	17	1	1500	535	45	0	0	0	0	0	19	0	0	0	0	0	27	0	15	0	19
234	28	43	20	1	1	169	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
235	166	65	17	1	1500	68	45	0	5	0	6	2	33	0	0	0	21	17	53	6	67	2	65
236	167	166	19	1	1400	116	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
237	166	168	17	1	1500	164	45	5	0	6	0	33	2	0	0	21	0	53	17	67	6	65	2
238	168	140	18	1	1500	30	40	0	17	0	0	0	52	0	0	0	0	0	102	0	70	0	69
239	170	168	18	1	1500	412	40	0	22	0	6	0	83	0	0	0	21	0	138	0	131	0	132
240	168	169	17	1	1500	615	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
241	170	26	18	1	1500	38	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
242	170	30	18	1	1500	37	40	22	0	6	0	83	0	0	0	21	0	138	0	131	0	132	0
243	163	29	18	1	1500	400	40	0	0	0	0	22	0	0	0	1	0	25	0	28	0	23	0

< Item >

Cap. : One-way capacity

Lanes : One-way or two-way

V(AB) : Volume (A --> B)

V(BA) : Volume (B --> A)

< Mode >

1~5 : Specific Mode 1 ~ 5

6 : Used Total OD Matrix (Option 7)

7 : Used Summed up Trip Table (Option 9)

Sum : Summed up "Mode Specific" Results (Option 8)

instance, from Table 7-13 (1), the forward volume of link 5, which is from node 65 to 64, is much larger when the total "person" trips are used for the assignment. The volumes for "mode 6" or "mode 7" are 3,872 and 3,758 respectively while the one of "Sum" is only 2,087. This means that when other routes become saturated, this link becomes the next or secondary choice. On the other hand, the forward volume of links 25, from node 49 to node 58, is much smaller when the total "person" trips are used. The volumes for "mode 6" and "mode 7" are 2,556 and 2,501 respectively while the volume of "Sum" is 3,330. This means that as long as the capacity allows, this link is the primary one for trip makers.

When the results of "mode 6", "mode 7" and "Sum" of "mode" trips and "vehicle equivalent" trips are compared, it is observed that the results are quite similar to each other while small differences are clearly observed between "performing only one total assignment" and "performing separated mode specific assignments". This fact may be because the link capacity setting is so big that most trips are assigned on only primary routes even when the total trips are applied for one assignment. While the link volumes, particularly the total volumes as "mode 6" or "mode 7", are used for calibrating network setting, the differences between one assignment results and multi-assignment results can also be used for proper capacity setting by considering the priority of routes change and volume shifts between links when links become saturated.

7.3.3.5 Screen Line Analysis Data (1)

Screen line analysis is one of the calibration methods to correct network settings. Those "screens" are often set between large geographical areas, and literally separate the areas. The travel movements between them are quantified as trips and used for calibration by comparing them with actual counting data or other available sources. In this section, the T-model2 simulation results are compared with the estimated results from survey, then the next section performs comparison between the T-model2 simulation results and actual counting data.

For this analysis, three screens are used. Those screens are set primarily to separate Central Piura from other areas. Figure 7-10 shows the geographical setting of the screens. Screen A is set along Rio Piura, separating the district Piura and Castilla. Screen B is set between the North and Northwest Piura and the Central Piura. Then, Screen C is set between the West and South Piura and the Central Piura. Table 7-16, 7-17 and 7-18 summarize the loaded volumes on these screens by T-model2 simulation for "person" trips, "mode" trips and "vehicle equivalent" trips respectively. Table (a) and (b) of each Table show the summary of volumes into and from Central Piura respectively. Figure (c), which shows rough travel movements between areas from the survey analysis, is attached for the comparison. Further, Table 7-19 summarizes those results and compares them with the survey data. Screen A is used as an indicator of travel movement between Piura and Castilla while Screen B and C are summed up to represent travel movement between Central Piura and Suburban Piura. The differences in Table 7-19 represent the proportional differences of the T-model2 simulation results, "mode 6", "mode 7" and "Sum", to the survey results.

First, the outcomes of "person" trip simulations, which are shown in Table 7-16, are compared with the survey results, and summarized in Table 7-19 (1). For the movement into Central Piura, shown in 7-19 (1)-(A), the differences between the T-model2 simulation results and the survey results for two individual screen line sets, "A" and "B +C", are relatively large with between 15.2% and 33.5%, but total movements into Piura becomes much closer between 6.7% for "Sum" and 9.1% for "mode 7".

For Screen A, which is the easiest to compare, the T-model2 results are 8,509 for "mode 6", 8,892 for "mode 7" and 9,974 for "Sum" while 11,765 trips are going into Central or Suburban Piura from the survey. The differences in trip numbers are approximately 1,800 to 3,200 trips smaller for the T-model2 results. For the sum of Screen B and C, shown as "B+C", the T-model2 results are 22,559 for "mode 6", 33,391 for "mode 7" and 20,604 for "Sum" while the survey results show that 16,904 trips are going into Central Piura. The differences in trip numbers are approximately 3,700 to 5,700 trips larger for T-model2

Figure 7-10 Screen Line Setting

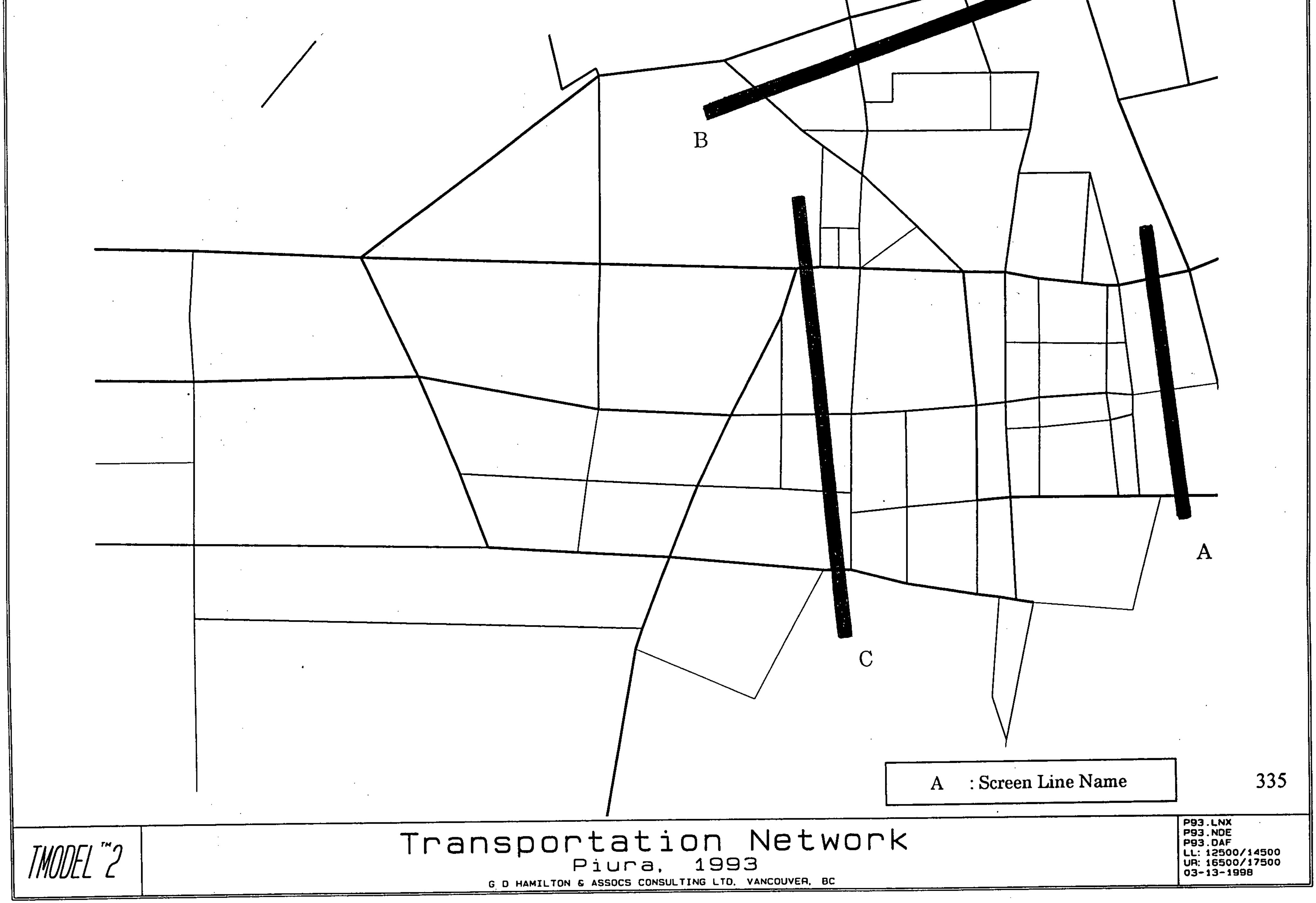


Table 7-16 T-model2 Simulation Results : Screen Line Analysis of "Person" Trips

Trip Type [Person] , Mode Type [All : Summary]

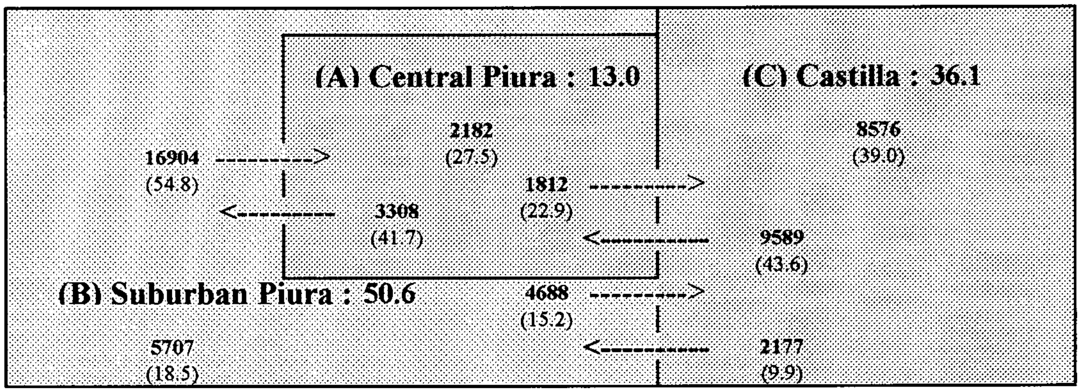
(A) Into Central Piura

Screen Line	Link No.	Node From	Node to	Mode Number 1	2	3	4	5	All mode 6	Sum up mode 7	Sum of (1)~(5)
A	138	115	112	2086	1397	2293	23	203	3439	3774	6002
	145	128	152	2162	239	1243	13	5	3088	3274	3662
	168	121	119	187	2	102	12	7	1982	1844	310
Sub-T				**4435**	**1638**	**3638**	**48**	**215**	**8509**	**8892**	**9974**
B	53	82	84	1340	1168	4599	25	830	7121	7187	7962
	69	7	88	859	720	1606	125	367	2305	2409	3677
	70	92	91	0	0	54	2	0	911	922	56
	72	97	96	18	26	1109	1	1	4326	4145	1155
Sub-T				**2217**	**1914**	**7368**	**153**	**1198**	**14663**	**14663**	**12850**
C	49	75	71	125	870	1924	0	399	2905	2828	3318
	81	73	70	339	0	1573	25	56	2777	2614	1993
	106	104	103	533	26	1515	68	301	2214	2286	2443
Sub-T				**997**	**896**	**5012**	**93**	**756**	**7896**	**7728**	**7754**
Total				**7649**	**4448**	**16018**	**294**	**2169**	**31068**	**31283**	**30578**

(B) From Central Piura

Screen Line	Link No.	Node From	Node to	Mode Number 1	2	3	4	5	All mode 6	Sum up mode 7	Sum of (1)~(5)
A	138	115	112	355	407	3142	42	917	3843	3987	4863
	145	128	152	28	56	1818	2	6	3243	3350	1910
	168	121	119	0	0	0	0	0	0	0	0
Sub-T				**383**	**463**	**4960**	**44**	**923**	**7086**	**7337**	**6773**
B	53	82	84	31	384	600	28	474	1042	1030	1517
	69	7	88	147	56	627	35	72	1022	1055	937
	70	92	91	0	0	0	3	0	419	234	3
	72	97	96	0	24	219	1	0	315	301	244
Sub-T				**178**	**464**	**1446**	**67**	**546**	**2798**	**2620**	**2701**
C	49	75	71	0	220	339	0	0	791	836	559
	81	73	70	12	0	66	2	34	155	86	114
	106	104	103	137	145	405	25	94	742	767	806
Sub-T				**149**	**365**	**810**	**27**	**128**	**1688**	**1689**	**1479**
Total				**710**	**1292**	**7216**	**138**	**1597**	**11572**	**11646**	**10953**

(C) Roufh OD Matrix from Survey



Total Trips (Trips from and to Area D included) 60955

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

Table 7-17 T-model2 Simulation Results : Screen Line Analysis of "Mode" Trips

Trip Type [Mode] , Mode Type [All : Summary]

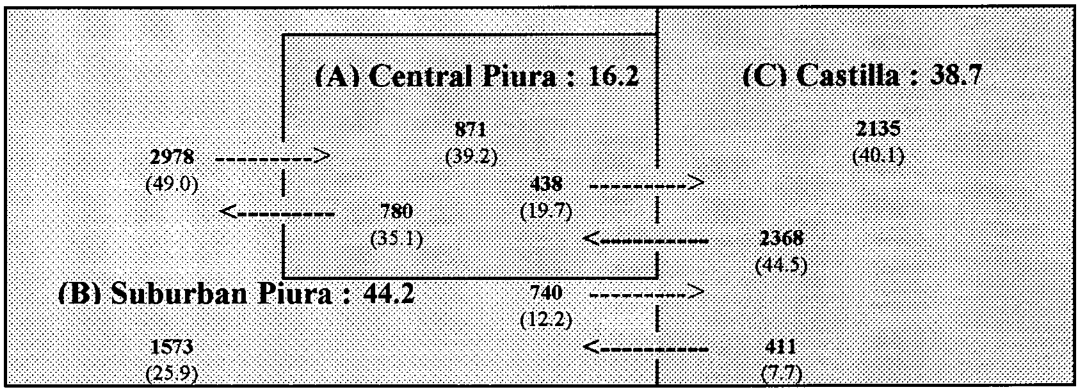
(A) Into Central Piura

Screen	Link	Node		Mode Number					All	Sum up	Sum of
Line	No.	From	to	1	2	3	4	5	mode 6	mode 7	(1)~(5)
A	138	115	112	683	351	232	23	80	1261	1292	1369
	145	128	152	1120	59	182	13	3	1374	1423	1377
	168	121	119	26	1	0	12	1	29	44	40
Sub-T				**1829**	**411**	**414**	**48**	**84**	**2664**	**2759**	**2786**
B	53	82	84	498	301	367	25	335	1496	1528	1526
	69	7	88	329	176	74	125	151	889	868	855
	70	92	91	0	0	0	2	0	10	3	2
	72	97	96	6	6	3	1	0	28	18	16
Sub-T				**833**	**483**	**444**	**153**	**486**	**2423**	**2417**	**2399**
C	49	75	71	46	217	240	0	160	634	659	663
	81	73	70	136	0	49	25	20	261	228	230
	106	104	103	213	7	101	68	114	571	507	503
Sub-T				**395**	**224**	**390**	**93**	**294**	**1466**	**1394**	**1396**
Total				**3057**	**1118**	**1248**	**294**	**864**	**6553**	**6570**	**6581**

(B) From Central Piura

Screen	Link	Node		Mode Number					All	Sum up	Sum of
Line	No.	From	to	1	2	3	4	5	mode 6	mode 7	(1)~(5)
A	138	115	112	138	106	332	42	363	863	978	981
	145	128	152	9	12	23	2	0	100	50	46
	168	121	119	0	0	0	0	0	0	0	0
Sub-T				**147**	**118**	**355**	**44**	**363**	**963**	**1028**	**1027**
B	53	82	84	10	96	62	28	193	405	385	389
	69	7	88	68	17	16	35	28	128	150	164
	70	92	91	0	0	0	3	0	10	2	3
	72	97	96	0	7	20	1	0	51	27	28
Sub-T				**78**	**120**	**98**	**67**	**221**	**594**	**564**	**584**
C	49	75	71	0	58	20	0	0	53	78	78
	81	73	70	5	0	5	2	14	32	26	26
	106	104	103	57	35	35	25	37	215	191	189
Sub-T				**62**	**93**	**60**	**27**	**51**	**300**	**295**	**293**
Total				**287**	**331**	**513**	**138**	**635**	**1857**	**1887**	**1904**

(C) Roufh OD Matrix from Survey



Total Trips (Trips from and to Area D included) 13758

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

Table 7-18 T-model2 Simulation Results : Screen Line Analysis of "Vehicle Equivalent" Trips

Trip Type [Vehicle Eq.] , Mode Type [All : Summary]

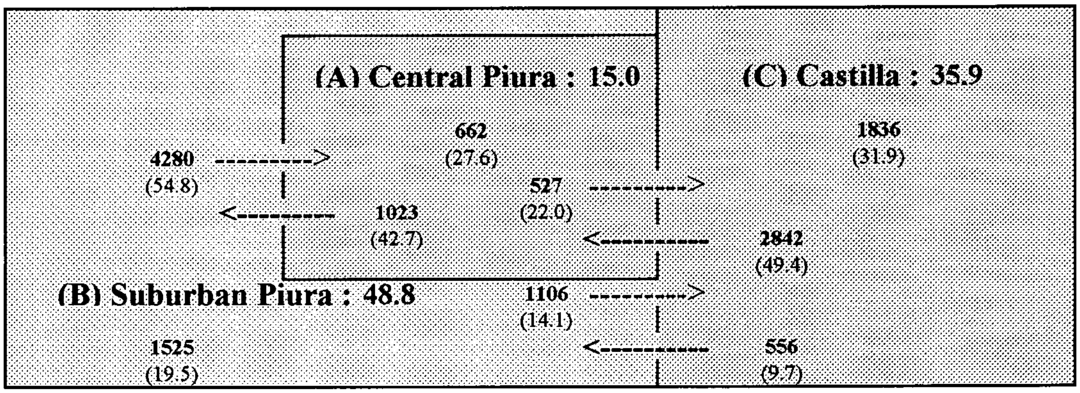
(A) Into Central Piura

Screen Line	Link No.	Node		Mode Number					All mode 6	Sum up mode 7	Sum of (1)~(5)
		From	to	1	2	3	4	5			
A	138	115	112	683	532	454	3	99	1648	1704	1771
	145	128	152	1120	86	357	2	3	1558	1622	1568
	168	121	119	26	1	1	2	6	33	47	36
Sub-T				**1829**	**619**	**812**	**7**	**108**	**3239**	**3373**	**3375**
B	53	82	84	498	437	729	2	412	1982	2041	2078
	69	7	88	329	272	148	25	175	1018	1008	949
	70	92	91	0	0	0	0	0	4	1	0
	72	97	96	6	10	4	2	1	38	28	23
Sub-T				**833**	**719**	**881**	**29**	**588**	**3042**	**3078**	**3050**
C	49	75	71	46	324	490	0	198	1030	1032	1058
	81	73	70	136	0	98	5	33	283	273	272
	106	104	103	213	11	215	12	150	626	601	601
Sub-T				**395**	**335**	**803**	**17**	**381**	**1939**	**1906**	**1931**
Total				**3057**	**1673**	**2496**	**53**	**1077**	**8220**	**8357**	**8356**

(B) From Central Piura

Screen Line	Link No.	Node		Mode Number					All mode 6	Sum up mode 7	Sum of (1)~(5)
		From	to	1	2	3	4	5			
A	138	115	112	138	156	678	4	453	1247	1369	1429
	145	128	152	9	20	51	0	4	133	154	84
	168	121	119	0	0	0	0	0	0	0	0
Sub-T				**147**	**176**	**729**	**4**	**457**	**1380**	**1523**	**1513**
B	53	82	84	10	146	132	8	237	522	529	533
	69	7	88	68	20	30	8	36	145	166	162
	70	92	91	0	0	0	0	0	2	0	0
	72	97	96	0	7	30	0	0	51	34	37
Sub-T				**78**	**173**	**192**	**16**	**273**	**720**	**729**	**732**
C	49	75	71	0	80	34	0	0	108	114	114
	81	73	70	5	0	12	1	15	33	36	33
	106	104	103	57	55	69	3	49	234	234	233
Sub-T				**62**	**135**	**115**	**4**	**64**	**375**	**384**	**380**
Total				**287**	**484**	**1036**	**24**	**794**	**2475**	**2636**	**2625**

(C) Roufh OD Matrix from Survey



Total Trips (Trips from and to Area D included) **16020**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

Table 7-19 T-model2 Simulation Results : Summary of Screen Line Analysis

(1) Person Trips (Options 1~3)

(A) Into Central Piura

Screen Line	All mode 6	Sum up mode 7	Sum of (1)~(5)	From Survey	Differences (%)		
					mode 6	mode 7	Sum
A	8509	8892	9974	11765	27.7%	24.4%	15.2%
B + C	22559	22391	20604	16904	33.5%	32.5%	21.9%
Total	31068	31283	30578	28669	8.4%	9.1%	6.7%

(B) From Central Piura

Screen Line	All mode 6	Sum up mode 7	Sum of (1)~(5)	From Survey	Differences (%)		
					mode 6	mode 7	Sum
A	7086	7337	6773	6500	9.0%	12.9%	4.2%
B + C	4486	4309	4180	3308	35.6%	30.2%	26.3%
Total	11572	11646	10953	9808	18.0%	18.7%	11.7%

(2) Mode Trips (Options 4~6)

(A) Into Central Piura

Screen Line	All mode 6	Sum up mode 7	Sum of (1)~(5)	From Survey	Differences (%)		
					mode 6	mode 7	Sum
A	2664	2759	2786	2779	4.1%	0.7%	0.2%
B + C	3889	3811	3795	2978	30.6%	28.0%	27.4%
Total	6553	6570	6581	5757	13.8%	14.1%	14.3%

(B) From Central Piura

Screen Line	All mode 6	Sum up mode 7	Sum of (1)~(5)	From Survey	Differences (%)		
					mode 6	mode 7	Sum
A	963	1028	1027	1178	18.3%	12.8%	12.9%
B + C	894	859	877	780	14.6%	10.1%	12.5%
Total	1857	1887	1904	1958	5.2%	3.6%	2.8%

(3) Vehicle Equivalent Trips (Options 7~9)

(A) Into Central Piura

Screen Line	All mode 6	Sum up mode 7	Sum of (1)~(5)	From Survey	Differences (%)		
					mode 6	mode 7	Sum
A	3239	3373	3375	3397.3	4.7%	0.7%	0.7%
B + C	4981	4984	4981	4280.3	16.4%	16.4%	16.4%
Total	8220	8357	8356	7677.6	7.1%	8.8%	8.8%

(B) From Central Piura

Screen Line	All mode 6	Sum up mode 7	Sum of (1)~(5)	From Survey	Differences (%)		
					mode 6	mode 7	Sum
A	1380	1523	1513	1632.1	15.4%	6.7%	7.3%
B + C	1095	1113	1112	1023.1	7.0%	8.8%	8.7%
Total	2475	2636	2625	2655.2	6.8%	0.7%	1.1%

Note (1) : "Mode 6" is the results of one distribution and one assignment execution. (Option 1,4 and 7)
Note (2) : "Mode 7" is the results of multiple distribution and one assignment execution. (Option 3, 6 and 9)
Note (3) : "Sum of (1) ~(5)" or "Sum" is the sum of multiple distribution and assignment executions. (Option 2, 5 and 8)
Note (4) : Data from Survey is of the Table (c) of Table 7-16 to 7-18.
Note (5) : Survey data for screen A is the total trips between Piura and Castilla.
Note (6) : The total of screen B and C is used for the trips between Central and Suburban Piura.
Note (7) : The percentages are always the results of T-model2 data divided by Survey data.

results. Moving to the total of Screen A, B and C, which means total trips into Central Piura, the T-model2 results are 31,068 for “mode 6”, 31,283 for “mode 7” and 30,578 for “Sum” while 26,359 trips are coming into Central Piura from the survey results. The absolute differences are approximately 1,900 to 2,600 trips more for the T-model2 results.

Moving to the movements from Central Piura, which are summarized in Table 7-19 (1)-(B), the differences for Screen A become much smaller, but not for the other two screens, B and C. For Screen A, the T-model2 results are 7,086 for “mode 6”, 7,337 for “mode 7” and 6,773 for “Sum” while 6,500 trips are going into Castilla from the survey results. The absolute differences are 586, 837 and 273 trips, and their proportional differences are 9.0%, 12.9% and 4.2% larger for the T-model2 results of “mode 6”, “mode 7” and “Sum” respectively than the survey results.

For the sum of Screen B and C, the T-model2 results are 4,486 for “mode 6”, 4,309 for “mode 7” and 4,180 for “Sum” while the survey results show that 3,308 trips are going into Castilla. The differences are approximately between 870 and 1,180 trips or between 26.3% and 35.6% proportionally more for the T-model2 results than the survey results. The differences of the total of Screen A, B and C are 11,572, 11,646 and 10,953 trips or 18.0%, 18.7% and 11.7% more for the T-model2 results of “mode 6”, “mode 7” and “Sum” respectively than the survey results.

As mentioned previously, for “person” trips, the result of Option 2, “the sum of separated mode specific assignment”, is likely the closest to the real situation among the three options because of the network setting based on “vehicle” term. In fact, the results of Option 2 are the closest to the survey results among Options 1 to 3. The proportional differences of Screen A, B plus C and the total of them are 15.2%, 21.9% and 6.7% for inbound trips to Piura and 4.2%, 26.3% and 11.7% for outbound trips from Piura respectively, and those differences are not too large for a prototype model although some refinements are still needed.

Second, the results of "mode" trips, which are the results of Options 4 to 6, are compared. Table 7-17 and Table 7-19 (2) summarize the results and compare them with the survey results. For the travel movements into Central Piura, shown in 7-19 (2)-(A), the proportional differences of Screen A between the T-model2 results and the survey results are very small, ranging between 0.2% and 4.1%. For the other two screen sets, "B+C" and "total", those differences are relatively larger, ranging between 13.8% and 30.6%.

For Screen A, the T-model2 results are 2,664, 2,759 and 2,786 for "mode 6", "mode 7" and "Sum" respectively while 2,779 trips are going into Piura according to the survey results. For the sum of Screen B plus C, the T-model2 results are 3,889, 3,811 and 3,795 for "mode 6", "mode 7" and "Sum" respectively while, according to the survey results, 2,978 trips are going into Piura. The absolute differences range between 7 and 120 trips for Screen A and between 817 and 911 for Screen B plus C. The proportional differences range between 0.2% and 4.1% for Screen A and between 27.4% and 30.6% for Screen B plus C For the total of Screen A, B and C, the T-model2 results are 6,553, 6,570 and 6,581 for "mode 6", "mode 7" and "Sum" respectively while 5,757 trips are going into Central Piura from the survey results. The absolute and proportional differences are approximately 800 trips and 14% respectively for all the options.

As for the movement from Central Piura, shown in Table 7-19 (2)-(B), the differences of Screen A become somewhat larger than the results of "person" trips, but the results of the other two screen sets, "B+C" and "total", become much smaller. For Screen A, the T-model2 results are 963, 1,028 and 1,027 trips for "mode 6", "mode 7" and "Sum" respectively while 1,178 trips are going into Castilla from the survey results. The approximate differences are between 150 and 210 trips or proportionally between 12.8% and 18.3% smaller for the T-model2 results than the survey results.

For the sum of Screen B and C, the T-model2 results are 894, 859 and 877 for "mode 6", "mode 7" and "Sum" while 780 trips are going into Castilla from the survey. The absolute differences are approximately between 80 and 110 trips, and the proportional differences range between 10.1% and 14.6% larger for T-model2 results than the survey results. The total of Screen A, B and C of the T-model2 results are 1,857, 1,887 and 1,904 trips or 5.2%, 3.6% and 2.8% smaller than the survey results for “mode 6”, “mode 7” and “Sum” respectively.

For “mode” trips, the results of “mode 6”, “mode 7” and “Sum” become closer each other than the ones for “person” trips. This in turn means that performing separated distribution and/or assignment does not affect the results as much as “person” trips do although there are certainly some differences observed. This is most likely because the assigned volumes on links are not too saturated or close to the link capacity, which is based on “automobile” term, even when the total “mode” trips are used for one assignment.

As for the individual results, the ones of “Screen A into Piura” and “the total from Piura” of T-model2 show quite close results to the survey results. For “mode 7”, for instance, the proportional differences of “Screen A into Piura” and “the total from Piura” by T-model2 are only 0.7% and 3.6% respectively from the survey results respectively. These results are obviously close enough for a prototype transportation model.

Further, among the three options, “mode 6”, “mode 7” and “Sum”, “mode 7”, which is the results of separated distribution and one assignment, is likely the best choice for “mode” trips when the results and concepts of assignment are considered.

Third, the results of “vehicle equivalent” trips, which are the results of Options 7 to 9, are compared. Table 7-18 and Table 7-19 (3) summarize the results and compare them with the survey results. The results of applying “vehicle equivalent” trips, both into and from Piura, show much smaller differences from the survey results than the other two trip types, “person” and “mode,” in general.

Starting from the travel movement into Central Piura, shown in 7-19 (3)-(A), the proportional differences of Screen A between the T-model2 results and the survey results are again very small, ranging between 0.7% and 4.7%. For the other two Screen sets of "B+C and "total", the proportional differences are larger than the ones of Screen A, but much smaller than the results of the other two trip types, ranging between 7.1% and 16.4%. For Screen A, the T-model2 results are 3,239, 3,373 and 3,375 trips for "mode 6", "mode 7" and "Sum" respectively while 3,398 trips are going into Piura according to the survey results. The absolute differences are only 23 to 160 trips, and the proportional differences are 0.7% to 4.7%.

For the sum of Screen B and C, the T-model2 results are 4,981, 4,984 and 4,981 trips for "mode 6", "mode 7" and "Sum" respectively while 4,280 trips are going into Piura based on the survey results. The differences are approximately 700 trips or 16.4% proportionally for all options. For the total of Screen A, B and C, the T-model2 results are 8,220, 8,357 and 8,356 trips for "mode 6", "mode 7" and "Sum" respectively while 7,678 trips are going into Central Piura from the survey results. The differences are less than 700 trips or 7.1% to 8.8% of the proportional differences for the three options.

As for the movement from Central Piura, shown in Table 7-19 (3)-(B), the differences for all screen results become smaller than the results of the other two trip types. For Screen A, the T-model2 results are 1,380, 1,523 and 1,513 trips for "mode 6", "mode 7" and "Sum" respectively while 1,632 trips are going into Castilla from the survey results. The approximate absolute differences are between 110 and 250 trips, and the proportional differences range between 6.7% and 7.3% smaller than the survey results.

For the sum of Screen B and C, the T-model2 results are 1,095, 1,113 and 1,112 trips for "mode 6", "mode 7" and "Sum" while 1,023 trips are going into Castilla from the survey results. The absolute differences are approximately between 70 and 90 trips, and the proportional differences range between 7.0% and 8.8% larger than the survey results. The total of Screen A, B and C of the T-model2 results are 2,475, 2,636 and 2,625 trips or 6.8%, 0.7% and 1.1% smaller proportionally than the survey results for "mode 6", "mode 7" and "Sum" respectively.

In general, the results of "vehicle equivalent" trips show the best results among three trip types for all three methods represented as "mode 6", "mode 7" and "Sum". For "mode 7", for instance, five of six proportional differences end up less than 9%, and two of the five are even less than 1%. Even the maximum of 16.4% is the minimum for the specific result among the 9 Options. These results are good enough for the simplified prototype modeling. Moreover, as for the individual screen line results, the ones of "Screen A into Piura" and the "total ones from Piura" of "mode 7" show the closest results to the survey results. The differences of them are only 0.7% which is also small enough for the prototype model.

Among the three options, "mode 7", which is the results of separated distribution and one assignment, is likely the best simulation option for "vehicle equivalent" trips as well as for "mode" trips.

In conclusion, among the three trip types, "person", "mode" and "vehicle equivalent" trips, the best choice for the simulation for estimating the total travel movement would be using "vehicle equivalent" trips. This trip type is also the best particularly for the assignment stage because of its simplicity and standardized mode differences in the process, which can ease the complicated network settings such as link capacity, particularly when compared with using separated "mode specific" networks.

The other two trip types do also show acceptable results, and can be used for specific purposes such as the examination of mode specific movements for "mode" trips or overall travel movements for "person" trips. One note would be when "person" trips are used, it would be better to perform separated assignments based on each mode or to set the network setting factors, particularly link capacity, to accommodate to the characteristics of the total "person" trips.

7.3.3.6 Screen Line Analysis Data (2)

Another type of screen line analysis is performed in this section. The comparison is made between the loaded link data of T-model2 simulation results and actual counting data from a study done by the city. The counting was held in November 1993 so that the traffic situation at the time should be close to the base year of this study.

This screen analysis is only done for specific links of Screen A, all of which are bridges between Piura and Castilla. these links are represented as "Rio Piura crossings". Table 7-20 summarizes the counting data. Table 7-20 (1) shows the counting data which are the averages of two to eight sampling days. The small Tables of (a) to (i) summarize the counting data of six types of modes defined by the city officials. Tables (a) and (b) show the results of Sanches Cerro bridge from Piura to Castilla and from Castilla to Piura for the morning peak hour respectively, and Tables (c) and (d) show ones for Bolognesi bridge. Tables (e) to (h) show the same ones as Tables (a) to (d) for the afternoon peak hour, and Table (i) shows the results of another small bridge, Viejo bridge, during the evening time. The link number of 138, 145 and 168, the specific links of Screen A, represent Sanches Cerro bridge, Bolognesi bridge and Viejo bridge respectively.

While this type of comparison is usually an effective calibration method, there are two difficulties to apply it to this study. First, the quality of data is somewhat questionable. While this section focuses on the morning peak hour, the data for the period is not accurate. The missing data is for Bolognesi bridge from Castilla to Piura and Viejo bridge from Piura to Castilla. For the morning peak period, particularly, the missing data for Bolognesi bridge is crucial. The second difficulty is the setting of mode types. The mode types shown in Table 7-20 are only major motorized vehicles, and are different from the ones defined in the survey. For instance, there is no walking and other modes such as bicycles. Moreover, there are no

Table 7-20 (1) Screen Line Analysis : Rio Piura Crossing (Counting Data)

(a) Puente. Sanches Cerro (from Piura to Castilla)

Type	7:30~	7:45~	8:00~	8:15~8:30	VTV	VE-Vol	Per.Trips
Auto	212	215	211	195	833	833	1249
Mtaxi	65	76	75	75	290	363	580
OMP	18	19	20	19	76	95	379
OMM	9	8	10	10	37	55	366
OMG	4	4	4	4	15	31	381
CAM.	1	1	1	2	4	9	9
Total	308	322	320	305	1255	1384	2964

(b) Puente. Sanches Cerro (from Castilla to Piura)

Type	7:30~	7:45~	8:00~	8:15~8:30	VTV	VE-Vol	Per.Trips
Auto	204	209	214	194	821	821	1231
Mtaxi	64	62	61	69	256	320	512
OMP	18	17	18	17	71	89	356
OMM	6	6	7	5	24	36	241
OMG	1	1	1	1	5	10	122
CAM.	1	1	0	1	3	5	5
Total	294	295	302	288	1179	1280	2467

(c) Puente. Bolognesi (from Piura to Castilla)

Type	7:30~	7:45~	8:00~	8:15~8:30	VTV	VE-Vol	Per.Trips
Auto	157	160	140	134	591	591	887
Mtaxi	62	65	58	61	246	307	491
OMP	10	10	12	10	41	52	206
OMM	7	8	8	6	28	43	284
OMG	4	5	4	3	17	33	414
CAM.	6	5	7	7	26	51	51
Total	246	253	229	221	949	1077	2334

(d) Puente. Bolognesi (from Castilla to Piura)

Type	7:30~	7:45~	8:00~	8:15~8:30	VTV	VE-Vol	Per.Trips
Auto	0	0	0	0	0	0	0
Mtaxi	0	0	0	0	0	0	0
OMP	0	0	0	0	0	0	0
OMM	0	0	0	0	0	0	0
OMG	0	0	0	0	0	0	0
CAM.	6	5	6	8	25	51	51
Total	6	5	6	8	25	51	51

* note : Whole data was not able to obtained.

(e) Puente. Sanches Cerro (from Piura to Castilla)

Type	12:30~	12:45~	13:00~	13:15~30	VTV	VE-Vol	Per.Trips
Auto	203	207	218	220	848	848	1272
Mtaxi	110	79	98	89	376	470	752
OMP	21	16	16	21	74	93	370
OMM	7	5	8	5	25	38	250
OMG	5	3	2	3	13	26	325
CAM.	1	1	1	1	4	8	8
Total	347	311	343	339	1340	1482	2977

(f) Puente. Sanches Cerro (from Castilla to Piura)

Type	12:30~	12:45~	13:00~	13:15~30	VTV	VE-Vol	Per.Trips
Auto	112	130	124	120	486	486	729
Mtaxi	45	62	46	48	201	251	402
OMP	9	7	12	14	42	53	210
OMM	9	10	11	8	38	57	380
OMG	3	2	1	4	10	20	250
CAM.	3	6	9	3	21	42	42
Total	181	217	203	197	798	909	2013

(g) Puente. Bolognesi (from Piura to Castilla)

Type	12:30~	12:45~	13:00~	13:15~30	VTV	VE-Vol	Per.Trips
Auto	140	157	169	187	654	654	981
Mtaxi	69	70	71	75	286	358	572
OMP	6	7	6	8	28	35	139
OMM	6	8	7	10	31	47	313
OMG	2	3	2	3	10	20	246
CAM.	7	7	10	11	35	70	70
Total	231	252	266	294	1044	1183	2321

(h) Puente. Bolognesi (from Castilla to Piura)

Type	12:30~	12:45~	13:00~	13:15~30	VTV	VE-Vol	Per.Trips
Auto	112	116	108	116	453	453	679
Mtaxi	55	49	45	37	185	231	370
OMP	8	13	11	10	42	53	210
OMM	8	9	13	11	41	62	410
OMG	4	4	2	3	12	25	308
CAM.	3	5	5	8	22	43	43
Total	190	196	185	184	755	866	2021

(i) Puente. Viejo (only from Piura to Castilla)

Type	18:30~	18:45~	19:00~	19:15~30	VTV	VE-Vol	Per.Trips
Auto	65	55	53	46	219	219	328
Mtaxi	40	43	43	39	164	204	327
OMP	0	0	0	0	0	0	0
OMM	0	0	0	0	0	0	0
OMG	0	0	0	0	0	0	0
CAM.	0	0	0	0	0	0	0
Total	105	97	96	85	382	423	655

Morning (7:30 ~ 8:30)	VTV	VE-Vol	Per. Trip
(a) Puente. Sanches Cerro (from Piura to Cas	1255	1384	2964
(b) Puente. Sanches Cerro (from Castilla to P	1179	1280	2467
(c) Puente. Bolognesi (from Piura to Castilla	949	1077	2334
(d) Puente. Bolognesi (from Castilla to Piura	(25)	(51)	(51)
Afternoon (12:30 ~ 13:30)			
(e) Puente. Sanches Cerro (from Piura to Cas	1340	1482	2977
(f) Puente. Sanches Cerro (from Castilla to P	798	909	2013
(g) Puente. Bolognesi (from Piura to Castilla	1044	1183	2321
(h) Puente. Bolognesi (from Castilla to Piura	755	866	2021
Evening (18:30 ~ 19:30)			
(i) Puente. Viejo (only from Piura to Castilla	382	423	655

Occupancy Rate

	Auto	Mtaxi	OMP	OMM	OMG	CAM.
Mornin	1.5	2	5	10	25	2
Aftern	1.5	2	5	10	25	2
VEF	1	1.25	1.25	1.5	2	2

VEF : Vehicle Equivalent Factor
VTV : Actual Vehicle Trip Volume
VE-Vol : Vehicle Equivalent Volume

Auto : Automobile
Mtaxi : Motor Taxi
OMP : Small Omni-bus
OMM : Mediam Omni-bus
OMG : Large Omni-bus
CAM. : Truck

Table 7-20 (2) Screen Line Analysis : Rio Piura Crossing (Vehicle Eq. Trip)

(a) Morning (7:30 ~ 8:30)

	VTV	VEV	VEV			VEV				VEV		
(Piura to Castilla)		Base	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Puente. Sanches Cerro	1255	1384	1291	1309	1317	1338	1357	1382	1390	1408	1437	1463
(2) Puente. Bolognesi	949	1077	992	1002	1011	1038	1048	1071	1079	1086	1118	1140
(3) Puente. Viejo	-	-	-	-	-	-	-	-	-	-	-	-
Total	2203	2461	2283	2312	2328	2375	2405	2453	2469	2494	2554	2603
(Castilla to Piura)												
(1) Puente. Sanches Cerro	1179	1280	1197	1215	1218	1231	1249	1263	1266	1294	1315	1330
(2) Puente. Bolognesi	-	-	-	-	-	-	-	-	-	-	-	-
(3) Puente. Viejo	-	-	-	-	-	-	-	-	-	-	-	-
Total	1179	1280	1197	1215	1218	1231	1249	1263	1266	1294	1315	1330

(b) Afternoon (12:30 ~ 13:30)

	VTV	VEV	VEV			VEV				VEV		
(Piura to Castilla)		Base	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Puente. Sanches Cerro	1340	1482	1368	1386	1393	1407	1426	1445	1451	1499	1526	1545
(2) Puente. Bolognesi	1044	1183	1087	1094	1099	1132	1139	1159	1164	1186	1215	1236
(3) Puente. Viejo	-	-	-	-	-	-	-	-	-	-	-	-
Total	2384	2665	2454	2480	2491	2539	2564	2604	2615	2685	2741	2781
(Castilla to Piura)												
(1) Puente. Sanches Cerro	798	909	838	848	853	883	893	917	922	922	948	972
(2) Puente. Bolognesi	755	866	798	809	815	846	857	884	890	882	909	936
(3) Puente. Viejo	-	-	-	-	-	-	-	-	-	-	-	-
Total	1553	1775	1636	1657	1668	1729	1750	1801	1812	1804	1858	1908

(c) Evening (18:30 ~ 19:30)

	VTV	VEV	VEV			VEV				VEV		
(Piura to Castilla)		Base	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Puente. Sanches Cerro	-	-	-	-	-	-	-	-	-	-	-	-
(2) Puente. Bolognesi	-	-	-	-	-	-	-	-	-	-	-	-
(3) Puente. Viejo	382	423	382	382	382	382	382	382	382	423	423	423
Total	382	423	382	382	382	382	382	382	382	423	423	423
(Castilla to Piura)												
(1) Puente. Sanches Cerro	-	-	-	-	-	-	-	-	-	-	-	-
(2) Puente. Bolognesi	-	-	-	-	-	-	-	-	-	-	-	-
(3) Puente. Viejo	-	-	-	-	-	-	-	-	-	-	-	-
Total	0	0	0	0	0	0	0	0	0	0	0	0

\ Rate setting Type \	VEV	VEF			VEF				VEF		
	Base	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Auto	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Mtaxi	1.25	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.25	1.25	1.25
OMP	1.25	1.00	1.25	1.25	1.25	1.50	1.50	1.50	1.25	1.5	1.5
OMM	1.5	1.5	1.5	1.5	2.0	2.0	2.5	2.5	2.0	2.0	2.5
OMG	2.0	2.0	2.0	2.5	2.5	2.5	3.0	3.5	2.5	3.0	3.5
CAM.	2.0	1.5	1.5	1.5	2.0	2.0	2.0	2.0	1.5	2.0	2.0

Mode description in Questionnaire		VEF	OR
1	Driving a Car	1	2.5
2	Passenger in a Car	1	2.5
3	Taxi (Collectibo)	1.5	4
4	Public transit (combi)	2	12
5	School bus	2	12
6	Others	1.25	2.5
7	Walking	0.2	1
8	no indication	1.25	2.5

VTV : Actual Vehicle Trip Volume
VEV : Vehicle Equivalent Volume
PT : Person Trip
VEF : Vehicle Equivalent Factor
OR : Occupancy Rates
- : Data is not available

Table 7-20 (3) Screen Line Analysis : Rio Piura Crossing (Person Trips)

(a) Morning (7:30 ~ 8:30)

	VTV	PT	PT				PT				PT			
(Piura to Castilla)		Base	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Puente. Sanches Cerro	1255	2964	2741	3035	3642	3718	3899	4468	4506	4727	5111	5483	5975	6693
(2) Puente. Bolognesi	949	2334	2116	2337	2797	2839	2990	3410	3451	3615	3857	4174	4511	5029
(3) Puente. Viejo	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	2203	5298	4856	5371	6439	6556	6889	7877	7957	8342	8968	9657	10486	11721
(Castilla to Piura)														
(1) Puente. Sanches Cerro	1179	2467	2313	2560	3091	3163	3315	3820	3846	4045	4422	4695	5177	5802
(2) Puente. Bolognesi	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(3) Puente. Viejo	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1179	2467	2313	2560	3091	3163	3315	3820	3846	4045	4422	4695	5177	5802

(b) Afternoon (12:30 ~ 13:30)

	VTV	PT	PT				PT				PT			
(Piura to Castilla)		Base	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Puente. Sanches Cerro	1340	2977	2722	3034	3624	3698	3911	4474	4501	4763	5098	5477	5975	6662
(2) Puente. Bolognesi	1044	2321	2111	2344	2797	2825	2999	3403	3452	3622	3865	4165	4520	5014
(3) Puente. Viejo	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	2384	5298	4833	5378	6421	6523	6910	7877	7953	8385	8963	9642	10495	11676
(Castilla to Piura)														
(1) Puente. Sanches Cerro	798	2013	1852	2071	2454	2496	2635	2970	3018	3161	3383	3662	3947	4400
(2) Puente. Bolognesi	755	2021	1856	2072	2454	2496	2630	2960	3011	3146	3363	3652	3920	4374
(3) Puente. Viejo	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1553	4034	3708	4143	4908	4992	5264	5929	6029	6306	6746	7314	7867	8774

(c) Evening (18:30 ~ 19:30)

	VTV	PT	PT				PT				PT			
(Piura to Castilla)		Base	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Puente. Sanches Cerro	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(2) Puente. Bolognesi	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(3) Puente. Viejo	382	655	573	655	764	764	846	955	955	1037	1064	1146	1255	1365
Total	382	655	573	655	764	764	846	955	955	1037	1064	1146	1255	1365
(Castilla to Piura)														
(1) Puente. Sanches Cerro	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(2) Puente. Bolognesi	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(3) Puente. Viejo	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0

\ Rate setting Type \	Occupancy Rates (OR)					Occupancy Rates (OR)				Occupancy Rates (OR)			
	Base	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Auto	1.5	1.5	1.5	2	2	2	2.5	2.5	2.5	3	3	3.5	4
Mtaxi	2	1.5	2	2	2	2.5	2.5	3	3	3	3	3	3
OMP	5	5	6	7	8	8	9	9	10	11	12	13	15
OMM	10	10	12	13	13	14	14	15	15	16	18	18	20
OMG	25	20	20	25	25	25	30	30	30	30	35	35	40
CAM.	2	1.5	1.5	2	2	2	2	2.5	2.5	2.5	3	3	3

Mode description in Questionnaire		VEF	OR
1	Driving a Car	1	2.5
2	Passenger in a Car	1	2.5
3	Taxi (Collectibo)	1.5	4
4	Public transit (combi)	2	12
5	School bus	2	12
6	Others	1.25	2.5
7	Walking	0.2	1
8	no indication	1.25	2.5

VTV : Actual Vehicle Trip Volume
VEV : Vehicle Equivalent Volume
PT : Person Trip
VEF : Vehicle Equivalent Factor
OR : Occupancy Rates
- : Data is not available

differences between private vehicles, taxis and Collectibos. This difficulty affects the estimation of the total trips, particularly "person" trips while some vehicle volumes are easily transformed to "vehicle equivalent" terms.

Knowing the problems above, the comparison is made for the number of estimated "vehicle equivalent" trips and "person" trips between the counting data and the T-model2 results. Table 7-20 (2) and (3) show the estimation of "vehicle equivalent" trips and "person" trips from counting data respectively. For "vehicle equivalent" trip comparison, 10 different sets of "vehicle equivalent factors" are examined while 12 different sets of occupancy rates are applied for "person" trip comparison. The morning peak period is focused on for the comparisons while the trip estimation from the counting data is also done for the other two periods, afternoon and evening.

First, for "vehicle equivalent" trips, Screen A of the T-model2 results, shown in Table 7-18, and the morning peak volumes of the counting data, shown in Table 7-20 (2)-(1), are compared. The most noticeable finding from this comparison is the large number of vehicle volumes going "out" from Central Piura in the counting data. While the going "out" vehicle equivalent trips from Central Piura are 1,523 for "mode 7" of the T model2 results, the estimated "vehicle equivalent" volume from the counting data is between 2,283 and 2,603, which is 49.9% to 70.9% bigger than the T-model2 results, depending on vehicle equivalent factor settings. For coming "in" trips to Piura, on the other hand, the volumes of Sanches Cerro bridge, the only link where the counting data was available, vary between 1,197 and 1,330 trips while the "mode 7" result of T-model2 is 1,704 trips. For this case, the counting data is 21.9% to 29.8% smaller than the T-model2 results. Moreover, as for the volumes on Sanches Cerro bridge from the counting data, the numbers of trips going out from Piura, which vary between 1,291 and 1,463 trips, are more than the numbers of trips coming into Piura, which are between 1,197 and 1,330. That is, the volumes of going "out" trips are larger than coming "in" trips to Piura, and this fact contradicts with the survey results.

This mismatch between the counting fact and the survey results is difficult to explain because the survey clearly shows the major travel movements during morning period, which are coming into Central Piura. In fact, the total estimated "vehicle equivalent" volumes of coming into and going out from Piura in the survey results are 3,397 and 1,632 respectively as shown in Table 7-20 (3). The possible reasoning for this mismatch would be the combination of the two following assumptions:

① the use of public transportation modes, particularly taxis and Mototaxis, are common, and these modes simply go back to Castilla after unloading passengers to find next ones with a few or no passenger on board, and

② the traffic going into Piura during the morning peak was already saturated at the time for the counting while the other direction was moving well, and the counting data, as a result, could not show the proper travel movement because of the difference of the flow speed.

If the assumptions above are applicable, the reliability of the counting data becomes much questionable. This in turn means that using the data for calibration likely causes misconstruction of modeling. While the city conducted an extensive counting study in 1993, it is recommended that the counting methods including condition settings should be more refined.

Second, for "person" trips, Screen A of T-model2, shown in Table 7-16, and the morning peak volumes of the counting data, shown in Table 7-20 (3)-(1), are compared. One of the major findings from the counting data is, like the results of "vehicle equivalent" trips, the large number of trips going "out" from Central Piura. The difference is that the large number of "person" trips is explainable with either the T-model2 results or the survey results. While the total going "out" person trips from Central Piura are 7,337 for "mode 7" of the T-model2 results and 6,500 for the survey results, the estimated trips from the counting vary between 4,856 and 11,721, depending on the occupancy rate settings. Then, by applying the occupancy rate settings of (3), (4) or (5), all of which are medium packed occupation rate settings, the estimated "person" trips from the counting data become 6,439, 6,556, and 6,889 respectively.

Obviously, either one of them seems to be reasonable with respect to the T-model2 and survey results.

The other movement, coming into Central Piura, can only be able to examined by the volumes on Sanches Cerro bridge because of the lack of data. The estimated "person" trip volumes from the counting data are between 2,313 and 5,802 while the "mode 7" of the T-model2 results is 3,774. This is also explainable with the occupancy rate settings of (5), (6) or (7), all of which are medium packed rates and also higher than the rates for the travel movement of the other direction, "going out" from Piura.

While the occupancy rate settings become a crucial factor for this type of calibration, the proper rate values for each mode are not obtained. Despite the extensive occupancy study conducted by the city in 1996, two following primary problems are addressed:

① the focus of the occupancy study was only on Combis, and the occupancy rates for other modes were not investigated, and

② the direction of traffic at the observed intersections were not specified, making it difficult to apply the results of the occupancy study to the calibration.

Because of these problems, the applicability of the study results is limited, and, as a result, performing a calibration for "person" trip movement is only done by applying the several candidates of the occupancy rate settings to the trip estimation from the counting data, and then by discussing the reasonability of the occupancy rate settings.

In conclusion, the possible occupancy rate settings are reasonable according to the limited data from the occupancy study and the survey results. The estimated "person" trip volumes by the T-model2 results or the survey results are well fit to the range estimated from the counted data by applying several occupancy rate settings. The possible occupancy rate settings are also high enough as peak time occupancy and higher for the trips coming into Piura. However, if the occupancy rates are more properly obtained for "person" trip estimation from the counting data, this calibration method by using "person" trip movements will become more workable.

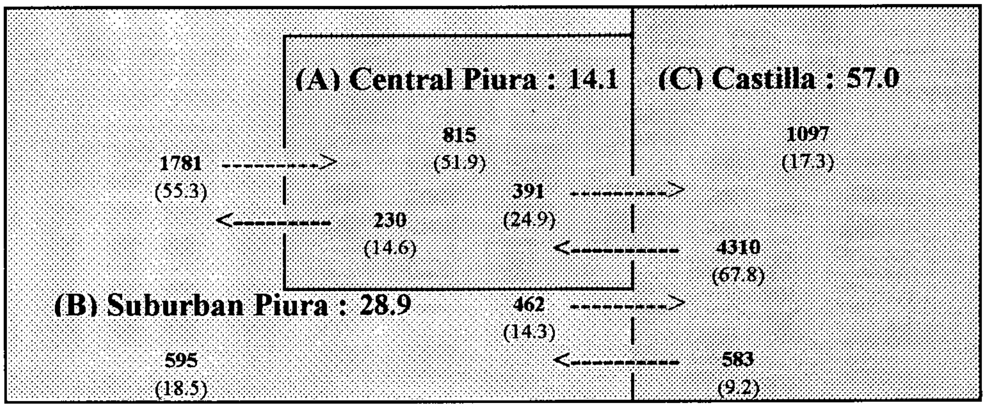
In addition to the data presented, the mode specific rough OD matrixes of traffic areas during the morning peak hour from the survey results are attached at the end of this chapter as Tables 7-21 to 23 and Figures 7-11 to 7-13. Tables 7-21, 7-22 and 7-23 summarize the OD data of "person", "mode" and "vehicle equivalent" trips respectively, and Figures 7-11, 7-12 and 7-13 visualize them respectively. Tables and Figures (a) to (f) show the data of five specific modes and their total respectively. These detailed data can help to understand the survey results of the mode specific movements when the screen line analysis are conducted.

Table 7-21 (a) Rough OD-Matrix : The Numbers of Mode Specific "Person" Trips

Trip Type [Person]
Hour Period [3 : 7:00 am ~ 7:59 am]
Mode [1 : Private Automobile]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	**A**	(4)	(5)	(6)	(7)	**B**	(8)	(9)	(10)	**C**	(11)	(12)	**D**	
(1)	3	3	3	**8**	67	0	0	0	**67**	0	0	0	**0**	47	27	**73**	148
(2)	8	0	0	**8**	0	0	0	0	**0**	0	0	137	**137**	0	8	**8**	153
(3)	427	273	100	**799**	55	0	0	109	**164**	100	45	109	**254**	0	55	**55**	1271
A	**437**	**275**	**102**	**815**	**121**	**0**	**0**	**109**	**230**	**100**	**45**	**246**	**391**	**47**	**89**	**136**	**1572**
(4)	240	0	240	**480**	360	0	0	0	**360**	120	219	0	**339**	0	339	**339**	1517
(5)	108	294	170	**571**	0	0	0	0	**0**	0	0	0	**0**	0	46	**46**	617
(6)	0	0	17	**17**	17	0	0	0	**17**	0	0	0	**0**	0	0	**0**	34
(7)	712	0	0	**712**	0	0	0	218	**218**	62	0	62	**123**	0	0	**0**	1054
B	**1060**	**294**	**427**	**1781**	**377**	**0**	**0**	**218**	**595**	**182**	**219**	**62**	**462**	**0**	**385**	**385**	**3223**
(8)	637	0	91	**728**	364	0	0	0	**364**	0	182	0	**182**	0	91	**91**	1365
(9)	0	71	0	**71**	0	0	0	219	**219**	0	106	0	**106**	0	0	**0**	395
(10)	1221	2154	137	**3512**	0	0	0	0	**0**	0	672	137	**809**	0	274	**274**	4596
C	**1858**	**2225**	**228**	**4310**	**364**	**0**	**0**	**219**	**583**	**0**	**960**	**137**	**1097**	**0**	**365**	**365**	**6355**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
D	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total	3355	2793	758	**6906**	862	0	0	546	**1408**	281	1224	445	**1950**	47	839	**886**	**11150**

Figure 7-11 (a) Rough Movement of Mode Specific "Person" Trips



Total Trips (Trips from and to Area D included) **11150**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas
note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

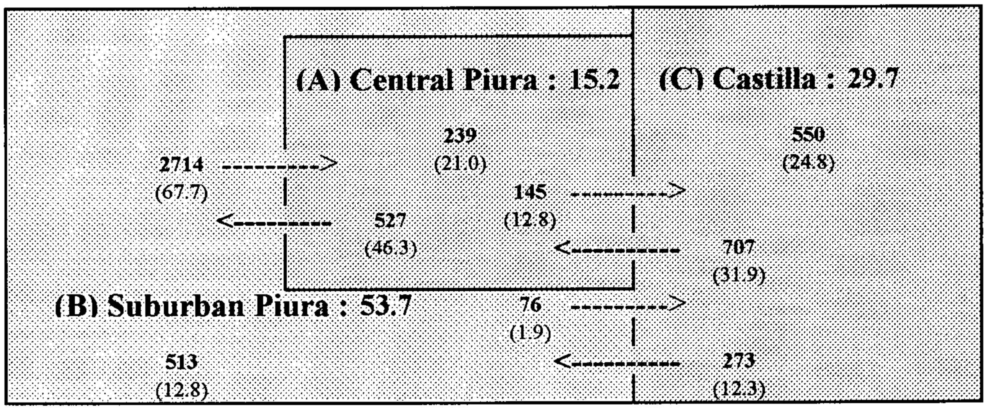
Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A	(1) City Centre	1,2,3,4	C	(8) North Castilla	21,25,(31)
Central	(2) Market	6	Castilla	(9) Central Castilla	22
Piura	(3) Central Piura	7,10		(10) South Castilla	23,24
	(4) North Piura	5,13,14,(32)		(11) Externals	26,27,28,29,30
B	(5) South Piura	8,11,12	D	(12) No destination	33
Suburban	(6) Industrial Area	9,15	Else	(12) No indication	34
Piura	(7) West Piura	16,17,18,19,20			

Table 7-21 (b) Rough OD-Matrix : The Numbers of Mode Specific "Person" Trips

Trip Type	[	Person	]
Hour Period	[3	: 7:00 am ~ 7:59 am	]
Mode	[2	: Public Transit 1 (Collectibo)	]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	A	(4)	(5)	(6)	(7)	B	(8)	(9)	(10)	C	(11)	(12)	D	
(1)	9	47	0	**56**	0	0	0	0	**0**	0	0	0	**0**	0	219	**219**	275
(2)	16	0	0	**16**	219	0	0	308	**527**	0	8	137	**145**	8	0	**8**	695
(3)	0	68	100	**168**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	168
A	**25**	**114**	**100**	**239**	**219**	**0**	**0**	**308**	**527**	**0**	**8**	**137**	**145**	**8**	**219**	**227**	**1138**
(4)	301	219	0	**520**	0	0	219	219	**437**	0	0	0	**0**	0	219	**219**	1176
(5)	268	392	0	**660**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	660
(6)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(7)	719	562	254	**1534**	0	76	0	0	**76**	0	0	76	**76**	0	486	**486**	2172
B	**1288**	**1172**	**254**	**2714**	**0**	**76**	**219**	**219**	**513**	**0**	**0**	**76**	**76**	**0**	**705**	**705**	**4007**
(8)	364	91	182	**637**	273	0	0	0	**273**	364	186	0	**550**	0	273	**273**	1733
(9)	0	35	35	**71**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	71
(10)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	411	**411**	411
C	**364**	**126**	**217**	**707**	**273**	**0**	**0**	**0**	**273**	**364**	**186**	**0**	**550**	**0**	**684**	**684**	**2215**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	103	0	**103**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	103
D	**0**	**103**	**0**	**103**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**103**
Total	1677	1515	571	**3763**	492	76	219	527	**1312**	364	194	213	**771**	8	1608	**1616**	**7462**

Figure 7-11 (b) Rough Movement of Mode Specific "Person" Trips



Total Trips (Trips from and to Area D included) 7462

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

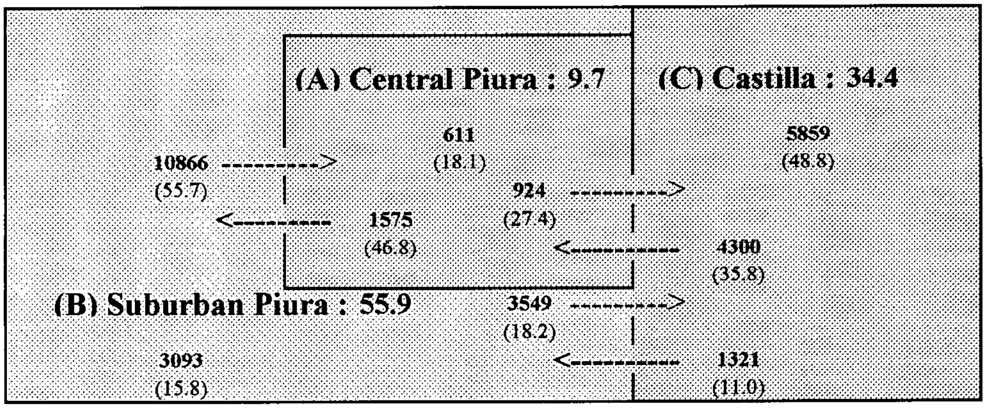
Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A Central Piura	(1) City Centre	1,2,3,4	C Castilla	(8) North Castilla	21,25,(31)
	(2) Market	6		(9) Central Castilla	22
	(3) Central Piura	7,10		(10) South Castilla	23,24
B Suburban Piura	(4) North Piura	5,13,14,(32)	D Else	(11) Externals	26,27,28,29,30
	(5) South Piura	8,11,12		(12) No destination	33
	(6) Industrial Area	9,15		(12) No indication	34
	(7) West Piura	16,17,18,19,20			

Table 7-21 (c) Rough OD-Matrix : The Numbers of Mode Specific "Person" Trips

Trip Type	[	Person	]
Hour Period	[3	: 7:00 am ~ 7:59 am	]
Mode	[3	: Public Transit2 (Combi)	]

\ To From \	Central Piura (1)	(2)	(3)	Sub-T A	Suburban Piura (4)	(5)	(6)	(7)	Sub-T B	Castilla (8)	(9)	(10)	Sub-T C	others (11)	(12)	Sub-T D	Total
(1)	8	204	104	**316**	8	46	0	49	**103**	167	0	0	**167**	0	0	**0**	586
(2)	94	16	31	**140**	467	108	24	651	**1249**	47	16	0	**63**	128	63	**191**	1644
(3)	55	100	0	**154**	177	46	0	0	**223**	572	45	77	**694**	46	23	**69**	1140
A	**157**	**319**	**135**	**611**	**652**	**200**	**24**	**700**	**1575**	**786**	**61**	**77**	**924**	**174**	**86**	**260**	**3370**
(4)	1280	1520	82	**2881**	1419	0	602	0	**2021**	957	219	0	**1176**	0	640	**640**	6718
(5)	1168	2770	452	**4390**	124	252	62	46	**484**	298	474	268	**1040**	412	206	**618**	6532
(6)	34	1	34	**68**	84	0	84	17	**185**	50	0	0	**50**	17	84	**101**	405
(7)	959	2382	185	**3526**	62	0	137	204	**403**	750	471	62	**1283**	0	656	**656**	5868
B	**3440**	**6673**	**753**	**10866**	**1688**	**252**	**885**	**267**	**3093**	**2056**	**1163**	**330**	**3549**	**429**	**1586**	**2015**	**19523**
(8)	942	756	182	**1881**	591	0	91	0	**682**	1691	851	0	**2542**	0	186	**186**	5291
(9)	0	71	71	**141**	35	0	0	35	**71**	35	35	35	**106**	137	212	**349**	666
(10)	1605	672	0	**2278**	0	0	569	0	**569**	3211	0	0	**3211**	0	0	**0**	6057
C	**2548**	**1499**	**252**	**4300**	**626**	**0**	**660**	**35**	**1321**	**4937**	**887**	**35**	**5859**	**137**	**398**	**535**	**12014**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
D	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total	6145	8492	1140	**15776**	2966	452	1569	1003	**5989**	7779	2111	442	**10332**	740	2070	**2809**	**34907**

Figure 7-11 (c) Rough Movement of Mode Specific "Person" Trips



Total Trips (Trips from and to Area D included) **34907**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

\ To From \	Central Piura (1)	(2)	(3)	Sub-T A	Suburban Piura (4)	(5)	(6)	(7)	Sub-T B	Castilla (8)	(9)	(10)	Sub-T C	others (11)	(12)	Sub-T D	Total

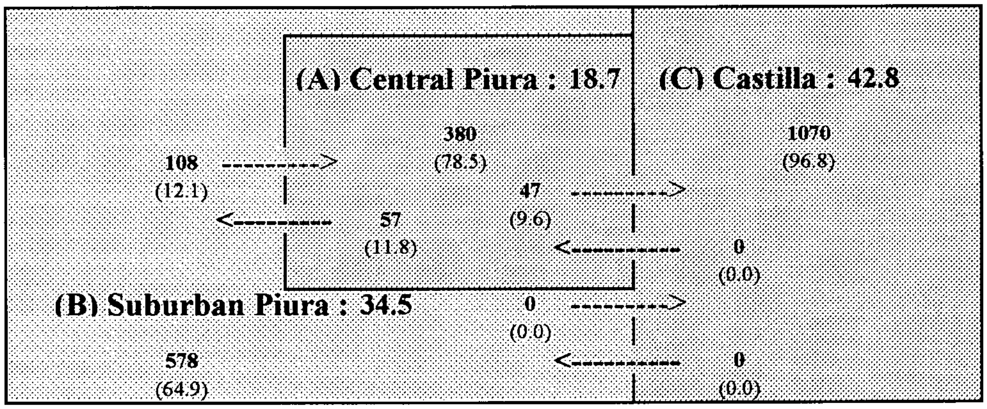
Central Piura	(2)	Market	6	Castilla	(9)	Central Castilla	22
	(3)	Central Piura	7,10		(10)	South Castilla	23,24
B Suburban Piura	(4)	North Piura	5,13,14,(32)	D Else	(11)	Externals	26,27,28,29,30
	(5)	South Piura	8,11,12		(12)	No destination	33
	(6)	Industrial Area	9,15		(12)	No indication	34
	(7)	West Piura	16,17,18,19,20				

Table 7-21 (d) Rough OD-Matrix : The Numbers of Mode Specific "Person" Trips

Trip Type	[	Person	]
Hour Period	[3	: 7:00 am ~ 7:59 am	]
Mode	[4	: Walking	]

\ AZ	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
AZ \	(1)	(2)	(3)	A	(4)	(5)	(6)	(7)	B	(8)	(9)	(10)	C	(11)	(12)	D	
(1)	176	0	0	176	0	3	0	0	3	47	0	0	47	0	0	0	225
(2)	0	127	0	127	0	0	0	0	0	0	0	0	0	0	0	0	127
(3)	23	0	55	77	0	55	0	0	55	0	0	0	0	0	0	0	132
A	199	127	55	380	0	57	0	0	57	47	0	0	47	0	0	0	484
(4)	0	0	0	0	240	62	0	0	302	0	0	0	0	0	0	0	302
(5)	0	0	46	46	0	184	0	0	184	0	0	0	0	0	0	0	230
(6)	0	0	0	0	0	0	17	0	17	0	0	0	0	0	0	0	17
(7)	62	0	0	62	0	0	0	76	76	0	0	0	0	0	204	204	342
B	62	0	46	108	240	246	17	76	578	0	0	0	0	0	204	204	890
(8)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(9)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	35	35
(10)	0	0	0	0	0	0	0	0	0	0	0	1070	1070	0	0	0	1070
C	0	0	0	0	0	0	0	0	0	0	0	1070	1070	0	35	35	1106
(11)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(12)	0	0	0	0	0	0	0	103	103	0	0	0	0	0	0	0	103
D	0	0	0	0	0	0	0	103	103	0	0	0	0	0	0	0	103
Total	260	127	100	487	240	303	17	178	738	47	0	1070	1117	0	240	240	2582

Figure 7-11 (d) Rough Movement of Mode Specific "Person" Trips



Total Trips (Trips from and to Area D included) 2582

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

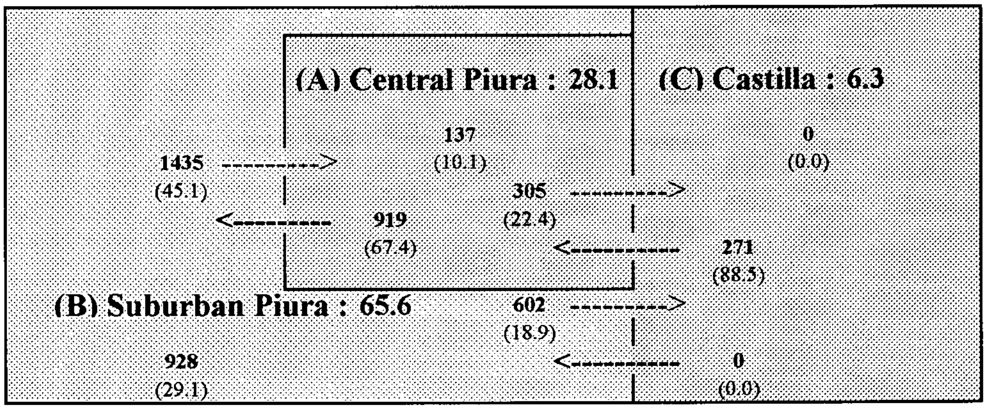
Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A	(1) City Centre	1,2,3,4	C	(8) North Castilla	21,25,(31)
Central	(2) Market	6	Castilla	(9) Central Castilla	22
Piura	(3) Central Piura	7,10		(10) South Castilla	23,24
	(4) North Piura	5,13,14,(32)		(11) Externals	26,27,28,29,30
B	(5) South Piura	8,11,12	D	(12) No destination	33
Suburban	(6) Industrial Area	9,15	Else	(12) No indication	34
Piura	(7) West Piura	16,17,18,19,20			

Table 7-21 (e) Rough OD-Matrix : The Numbers of Mode Specific "Person" Trips

Trip Type	[	Person	]
Hour Period	[3	: 7:00 am ~ 7:59 am	]
Mode	[5	: Others (mototaxis)	]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	**A**	(4)	(5)	(6)	(7)	**B**	(8)	(9)	(10)	**C**	(11)	(12)	**D**	
(1)	97	9	0	**107**	57	0	29	0	**87**	0	9	0	**9**	3	0	**3**	205
(2)	0	8	0	**8**	0	92	0	409	**501**	83	35	0	**119**	0	0	**0**	627
(3)	0	23	0	**23**	231	100	0	0	**332**	177	0	0	**177**	0	0	**0**	531
A	**97**	**40**	**0**	**137**	**289**	**192**	**29**	**409**	**919**	**260**	**45**	**0**	**305**	**3**	**0**	**3**	**1364**
(4)	202	219	219	**640**	202	0	0	0	**202**	405	0	0	**405**	0	219	**219**	1466
(5)	62	108	108	**278**	46	0	0	0	**46**	46	0	0	**46**	0	0	**0**	370
(6)	17	17	0	**34**	0	0	17	0	**17**	0	0	0	**0**	0	0	**0**	50
(7)	280	204	0	**484**	0	0	204	458	**662**	151	0	0	**151**	0	0	**0**	1298
B	**561**	**548**	**327**	**1435**	**248**	**0**	**221**	**458**	**928**	**602**	**0**	**0**	**602**	**0**	**219**	**219**	**3183**
(8)	0	95	0	**95**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	95
(9)	0	176	0	**176**	0	0	0	0	**0**	0	0	0	**0**	35	0	**35**	212
(10)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
C	**0**	**271**	**0**	**271**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**35**	**0**	**35**	**307**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
D	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total	658	859	327	**1844**	537	192	251	867	**1847**	862	45	0	**907**	38	219	**257**	**4854**

Figure 7-11 (e) Rough Movement of Mode Specific "Person" Trips



Total Trips (Trips from and to Area D included) **4854**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

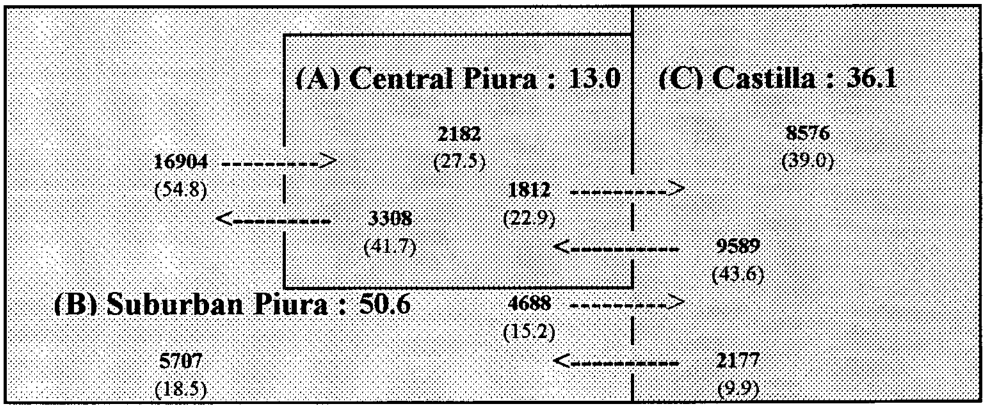
Area	Area Zones (AZ)		Traffic Zones	Area	Area Zones (AZ)		Traffic Zones
A Central Piura	(1)	City Centre	1,2,3,4	C Castilla	(8)	North Castilla	21,25,(31)
	(2)	Market	6		(9)	Central Castilla	22
	(3)	Central Piura	7,10		(10)	South Castilla	23,24
B Suburban Piura	(4)	North Piura	5,13,14,(32)	D Else	(11)	Externals	26,27,28,29,30
	(5)	South Piura	8,11,12		(12)	No destination	33
	(6)	Industrial Area	9,15		(12)	No indication	34
	(7)	West Piura	16,17,18,19,20				

Table 7-21 (f) Rough OD-Matrix : The Numbers of Mode Specific "Person" Trips

Trip Type [Person]
Hour Period [3 : 7:00 am ~ 7:59 am]
Mode [6 : Total (mode 1~5)]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	**A**	(4)	(5)	(6)	(7)	**B**	(8)	(9)	(10)	**C**	(11)	(12)	**D**	
(1)	294	262	107	**663**	132	49	29	49	**259**	213	9	0	**223**	49	245	**295**	1439
(2)	118	150	31	**299**	685	200	24	1368	**2276**	131	59	274	**464**	136	71	**207**	3246
(3)	504	463	254	**1221**	463	201	0	109	**773**	848	90	186	**1125**	46	77	**123**	3241
A	**915**	**875**	**391**	**2182**	**1280**	**449**	**53**	**1526**	**3308**	**1192**	**159**	**460**	**1812**	**231**	**394**	**625**	**7927**
(4)	2023	1957	541	**4521**	2221	62	821	219	**3323**	1482	437	0	**1919**	0	1416	**1416**	11179
(5)	1606	3564	775	**5945**	170	436	62	46	**713**	344	474	268	**1086**	412	252	**664**	8408
(6)	50	18	51	**119**	101	0	118	17	**236**	50	0	0	**50**	17	84	**101**	506
(7)	2732	3148	439	**6319**	62	76	342	956	**1435**	963	471	199	**1633**	0	1347	**1347**	10733
B	**6411**	**8687**	**1806**	**16904**	**2554**	**573**	**1342**	**1238**	**5707**	**2839**	**1382**	**467**	**4688**	**429**	**3099**	**3527**	**30826**
(8)	1943	942	455	**3341**	1228	0	91	0	**1319**	2055	1219	0	**3274**	0	550	**550**	8484
(9)	0	353	106	**458**	35	0	0	254	**289**	35	141	35	**212**	172	247	**419**	1378
(10)	2826	2826	137	**5790**	0	0	569	0	**569**	3211	672	1207	**5091**	0	686	**686**	12135
C	**4770**	**4121**	**698**	**9589**	**1263**	**0**	**660**	**254**	**2177**	**5301**	**2033**	**1243**	**8576**	**172**	**1483**	**1655**	**21997**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	103	0	**103**	0	0	0	103	**103**	0	0	0	**0**	0	0	**0**	205
D	**0**	**103**	**0**	**103**	**0**	**0**	**0**	**103**	**103**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**205**
Total	12096	13786	2895	**28777**	5096	1022	2055	3120	**11294**	9333	3573	2170	**15076**	832	4975	**5807**	**60955**

Figure 7-11 (f) Rough Movement of Mode Specific "Person" Trips



Total Trips (Trips from and to Area D included) **60955**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas
note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

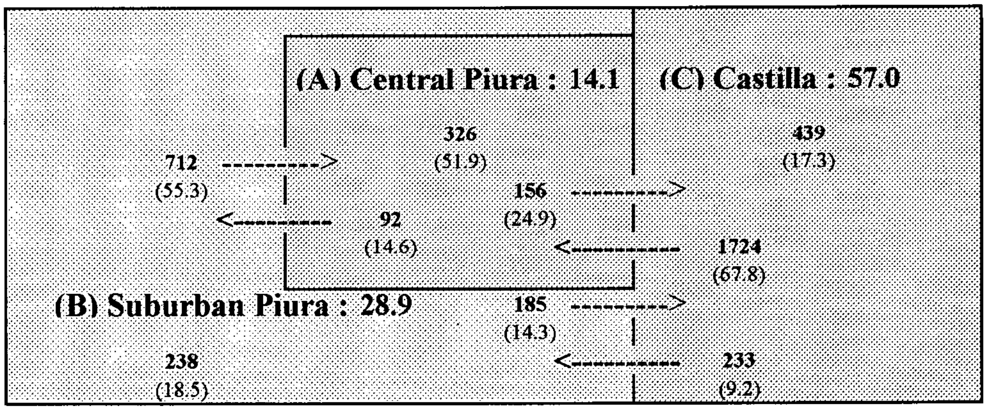
Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A	(1) City Centre	1,2,3,4	C	(8) North Castilla	21,25,(31)
Central	(2) Market	6	Castilla	(9) Central Castilla	22
Piura	(3) Central Piura	7,10		(10) South Castilla	23,24
	(4) North Piura	5,13,14,(32)		(11) Externals	26,27,28,29,30
B	(5) South Piura	8,11,12	D	(12) No destination	33
Suburban	(6) Industrial Area	9,15	Else	(12) No indication	34
Piura	(7) West Piura	16,17,18,19,20			

Table 7-22 (a) Rough OD-Matrix : The Numbers of Mode Specific "Mode" Trips

Trip Type [Mode]
Hour Period [3 : 7:00 am ~ 7:59 am]
Mode [1 : Private Automobile]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	A	(4)	(5)	(6)	(7)	B	(8)	(9)	(10)	C	(11)	(12)	D	
(1)	1	1	1	**3**	27	0	0	0	**27**	0	0	0	**0**	19	11	**29**	59
(2)	3	0	0	**3**	0	0	0	0	**0**	0	0	55	**55**	0	3	**3**	61
(3)	171	109	40	**320**	22	0	0	44	**65**	40	18	44	**102**	0	22	**22**	508
A	**175**	**110**	**41**	**326**	**48**	**0**	**0**	**44**	**92**	**40**	**18**	**98**	**156**	**19**	**36**	**54**	**629**
(4)	96	0	96	**192**	144	0	0	0	**144**	48	87	0	**135**	0	135	**135**	607
(5)	43	117	68	**229**	0	0	0	0	**0**	0	0	0	**0**	0	18	**18**	247
(6)	0	0	7	**7**	7	0	0	0	**7**	0	0	0	**0**	0	0	**0**	14
(7)	285	0	0	**285**	0	0	0	87	**87**	25	0	25	**49**	0	0	**0**	422
B	**424**	**117**	**171**	**712**	**151**	**0**	**0**	**87**	**238**	**73**	**87**	**25**	**185**	**0**	**154**	**154**	**1289**
(8)	255	0	36	**291**	146	0	0	0	**146**	0	73	0	**73**	0	36	**36**	546
(9)	0	28	0	**28**	0	0	0	87	**87**	0	42	0	**42**	0	0	**0**	158
(10)	488	862	55	**1405**	0	0	0	0	**0**	0	269	55	**324**	0	110	**110**	1838
C	**743**	**890**	**91**	**1724**	**146**	**0**	**0**	**87**	**233**	**0**	**384**	**55**	**439**	**0**	**146**	**146**	**2542**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
D	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total	1342	1117	303	**2763**	345	0	0	218	**563**	113	490	178	**780**	19	336	**354**	**4460**

Figure 7-12 (a) Rough Movement of Mode Specific "Mode" Trips



Total Trips (Trips from and to Area D included) **4460**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas
note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

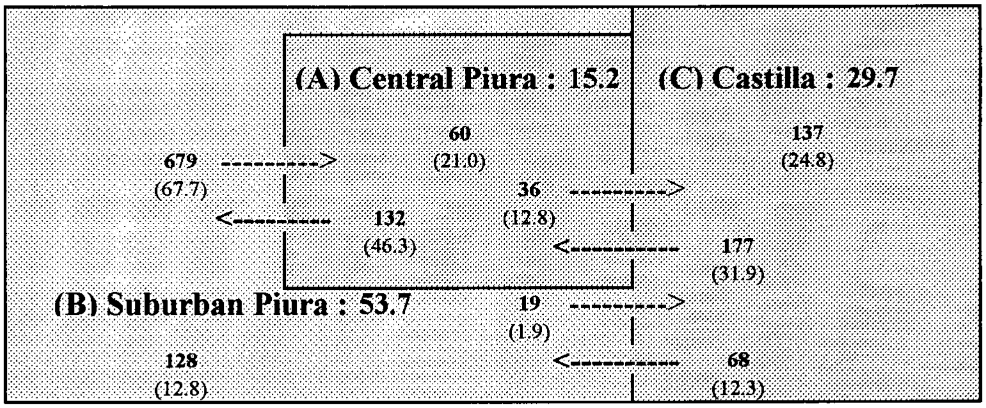
Area	Area Zones (AZ)		Traffic Zones	Area	Area Zones (AZ)		Traffic Zones
A Central Piura	(1)	City Centre	1,2,3,4	C Castilla	(8)	North Castilla	21,25,(31)
	(2)	Market	6		(9)	Central Castilla	22
	(3)	Central Piura	7,10		(10)	South Castilla	23,24
B Suburban Piura	(4)	North Piura	5,13,14,(32)	D Else	(11)	Externals	26,27,28,29,30
	(5)	South Piura	8,11,12		(12)	No destination	33
	(6)	Industrial Area	9,15		(12)	No indication	34
	(7)	West Piura	16,17,18,19,20				

Table 7-22 (b) Rough OD-Matrix : The Numbers of Mode Specific "Mode" Trips

Trip Type	[	Mode	]
Hour Period	[3	: 7:00 am ~ 7:59 am	]
Mode	[2	: Public Transit 1 (Collectibo)	]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	A	(4)	(5)	(6)	(7)	B	(8)	(9)	(10)	C	(11)	(12)	D	
(1)	2	12	0	**14**	0	0	0	0	**0**	0	0	0	**0**	0	55	**55**	69
(2)	4	0	0	**4**	55	0	0	77	**132**	0	2	34	**36**	2	0	**2**	174
(3)	0	17	25	**42**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	42
A	**6**	**29**	**25**	**60**	**55**	**0**	**0**	**77**	**132**	**0**	**2**	**34**	**36**	**2**	**55**	**57**	**284**
(4)	75	55	0	**130**	0	0	55	55	**109**	0	0	0	**0**	0	55	**55**	294
(5)	67	98	0	**165**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	165
(6)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(7)	180	140	63	**384**	0	19	0	0	**19**	0	0	19	**19**	0	122	**122**	543
B	**322**	**293**	**63**	**679**	**0**	**19**	**55**	**55**	**128**	**0**	**0**	**19**	**19**	**0**	**176**	**176**	**1002**
(8)	91	23	45	**159**	68	0	0	0	**68**	91	47	0	**137**	0	68	**68**	433
(9)	0	9	9	**18**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	18
(10)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	103	**103**	103
C	**91**	**32**	**54**	**177**	**68**	**0**	**0**	**0**	**68**	**91**	**47**	**0**	**137**	**0**	**171**	**171**	**554**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	26	0	**26**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	26
D	**0**	**26**	**0**	**26**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**26**
Total	419	379	143	**941**	123	19	55	132	**328**	91	48	53	**193**	2	402	**404**	**1866**

Figure 7-12 (b) Rough Movement of Mode Specific "Mode" Trips



Total Trips (Trips from and to Area D included) **1866**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

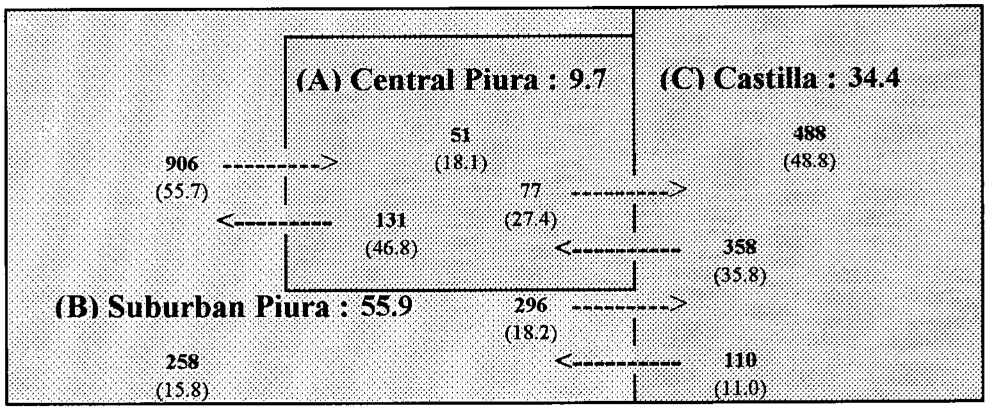
Area	Area Zones (AZ)		Traffic Zones	Area	Area Zones (AZ)		Traffic Zones
A	(1)	City Centre	1,2,3,4	C	(8)	North Castilla	21,25,(31)
Central	(2)	Market	6	Castilla	(9)	Central Castilla	22
Piura	(3)	Central Piura	7,10		(10)	South Castilla	23,24
	(4)	North Piura	5,13,14,(32)		(11)	Externals	26,27,28,29,30
B	(5)	South Piura	8,11,12	D	(12)	No destination	33
Suburban	(6)	Industrial Area	9,15	Else	(12)	No indication	34
Piura	(7)	West Piura	16,17,18,19,20				

Table 7-22 (c) Rough OD-Matrix : The Numbers of Mode Specific "Mode" Trips

Trip Type	[	Mode]
Hour Period	[3	: 7:00 am ~ 7:59 am]
Mode	[3	: Public Transit2 (Combi)]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	A	(4)	(5)	(6)	(7)	B	(8)	(9)	(10)	C	(11)	(12)	D	
(1)	1	17	9	**26**	1	4	0	4	**9**	14	0	0	**14**	0	0	**0**	49
(2)	8	1	3	**12**	39	9	2	54	**104**	4	1	0	**5**	11	5	**16**	137
(3)	5	8	0	**13**	15	4	0	0	**19**	48	4	6	**58**	4	2	**6**	95
A	**13**	**27**	**11**	**51**	**54**	**17**	**2**	**58**	**131**	**65**	**5**	**6**	**77**	**14**	**7**	**22**	**281**
(4)	107	127	7	**240**	118	0	50	0	**168**	80	18	0	**98**	0	53	**53**	560
(5)	97	231	38	**366**	10	21	5	4	**40**	25	40	22	**87**	34	17	**52**	544
(6)	3	0	3	**6**	7	0	7	1	**15**	4	0	0	**4**	1	7	**8**	34
(7)	80	199	15	**294**	5	0	11	17	**34**	63	39	5	**107**	0	55	**55**	489
B	**287**	**556**	**63**	**906**	**141**	**21**	**74**	**22**	**258**	**171**	**97**	**27**	**296**	**36**	**132**	**168**	**1627**
(8)	79	63	15	**157**	49	0	8	0	**57**	141	71	0	**212**	0	16	**16**	441
(9)	0	6	6	**12**	3	0	0	3	**6**	3	3	3	**9**	11	18	**29**	56
(10)	134	56	0	**190**	0	0	47	0	**47**	268	0	0	**268**	0	0	**0**	505
C	**212**	**125**	**21**	**358**	**52**	**0**	**55**	**3**	**110**	**411**	**74**	**3**	**488**	**11**	**33**	**45**	**1001**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
D	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total	512	708	95	**1315**	247	38	131	84	**499**	648	176	37	**861**	62	172	**234**	**2909**

Figure 7-12 (c) Rough Movement of Mode Specific "Mode" Trips



Total Trips (Trips from and to Area D included) **2909**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	A	(4)	(5)	(6)	(7)	B	(8)	(9)	(10)	C	(11)	(12)	D	

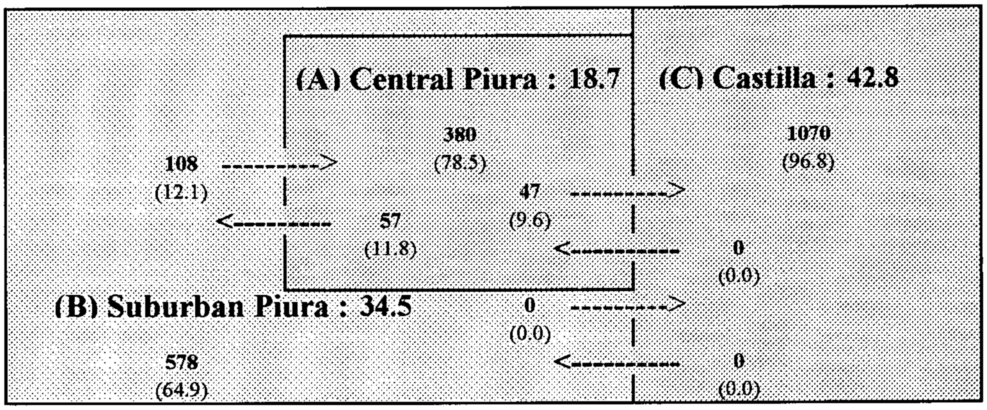
Central Piura	(2)	Market	6	Castilla	(9)	Central Castilla	22
	(3)	Central Piura	7,10		(10)	South Castilla	23,24
B Suburban Piura	(4)	North Piura	5,13,14,(32)	D Else	(11)	Externals	26,27,28,29,30
	(5)	South Piura	8,11,12		(12)	No destination	33
	(6)	Industrial Area	9,15		(12)	No indication	34
	(7)	West Piura	16,17,18,19,20				

Table 7-22 (d) Rough OD-Matrix : The Numbers of Mode Specific "Mode" Trips

Trip Type	[	Mode	]
Hour Period	[3	: 7:00 am ~ 7:59 am	]
Mode	[4	: Walking	]

\ AZ	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
AZ \	(1)	(2)	(3)	**A**	(4)	(5)	(6)	(7)	**B**	(8)	(9)	(10)	**C**	(11)	(12)	**D**	
(1)	176	0	0	**176**	0	3	0	0	**3**	47	0	0	**47**	0	0	**0**	225
(2)	0	127	0	**127**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	127
(3)	23	0	55	**77**	0	55	0	0	**55**	0	0	0	**0**	0	0	**0**	132
A	**199**	**127**	**55**	**380**	**0**	**57**	**0**	**0**	**57**	**47**	**0**	**0**	**47**	**0**	**0**	**0**	**484**
(4)	0	0	0	**0**	240	62	0	0	**302**	0	0	0	**0**	0	0	**0**	302
(5)	0	0	46	**46**	0	184	0	0	**184**	0	0	0	**0**	0	0	**0**	230
(6)	0	0	0	**0**	0	0	17	0	**17**	0	0	0	**0**	0	0	**0**	17
(7)	62	0	0	**62**	0	0	0	76	**76**	0	0	0	**0**	0	204	**204**	342
B	**62**	**0**	**46**	**108**	**240**	**246**	**17**	**76**	**578**	**0**	**0**	**0**	**0**	**0**	**204**	**204**	**890**
(8)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(9)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	35	**35**	35
(10)	0	0	0	**0**	0	0	0	0	**0**	0	0	1070	**1070**	0	0	**0**	1070
C	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1070**	**1070**	**0**	**35**	**35**	**1106**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	0	0	**0**	0	0	0	103	**103**	0	0	0	**0**	0	0	**0**	103
D	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**103**	**103**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**103**
Total	260	127	100	**487**	240	303	17	178	**738**	47	0	1070	**1117**	0	240	**240**	**2582**

Figure 7-12 (d) Rough Movement of Mode Specific "Mode" Trips



Total Trips (Trips from and to Area D included) **2582**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

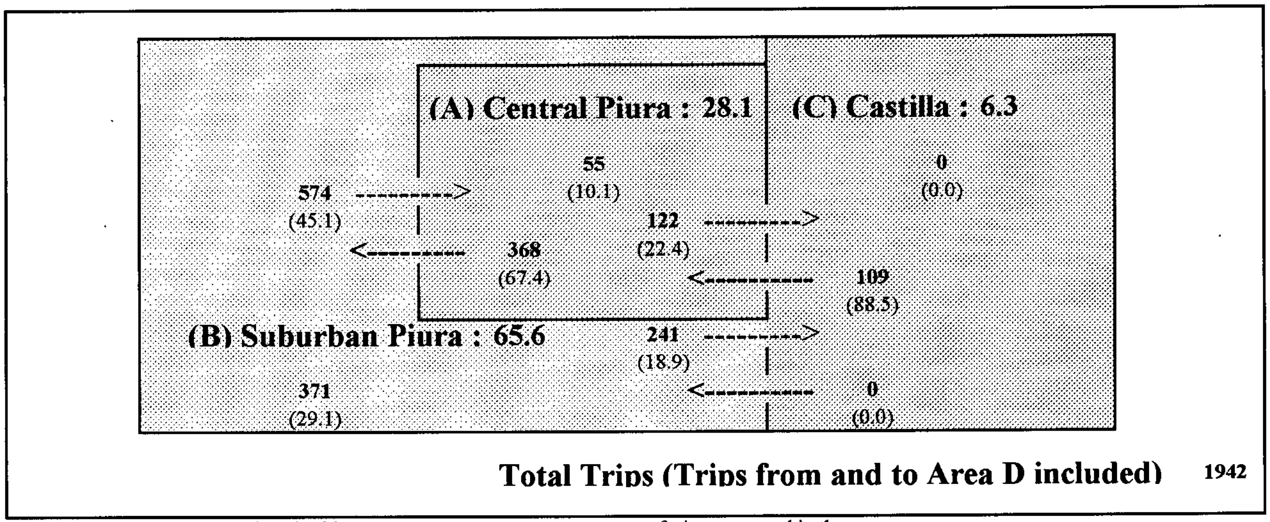
Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A Central Piura	(1) City Centre	1,2,3,4	C Castilla	(8) North Castilla	21,25,(31)
	(2) Market	6		(9) Central Castilla	22
	(3) Central Piura	7,10		(10) South Castilla	23,24
B Suburban Piura	(4) North Piura	5,13,14,(32)	D Else	(11) Externals	26,27,28,29,30
	(5) South Piura	8,11,12		(12) No destination	33
	(6) Industrial Area	9,15		(12) No indication	34
	(7) West Piura	16,17,18,19,20			

Table 7-22 (e) Rough OD-Matrix : The Numbers of Mode Specific "Mode" Trips

Trip Type [Mode]
Hour Period [3 : 7:00 am ~ 7:59 am]
Mode [5 : Others (mototaxis)]

\ To From \	Central Piura (1)	(2)	(3)	Sub-T A	Suburban Piura (4)	(5)	(6)	(7)	Sub-T B	Castilla (8)	(9)	(10)	Sub-T C	others (11)	(12)	Sub-T D	Total
(1)	39	4	0	**43**	23	0	12	0	**35**	0	4	0	**4**	1	0	**1**	82
(2)	0	3	0	**3**	0	37	0	164	**200**	33	14	0	**47**	0	0	**0**	251
(3)	0	9	0	**9**	93	40	0	0	**133**	71	0	0	**71**	0	0	**0**	212
A	**39**	**16**	**0**	**55**	**115**	**77**	**12**	**164**	**368**	**104**	**18**	**0**	**122**	**1**	**0**	**1**	**546**
(4)	81	87	87	**256**	81	0	0	0	**81**	162	0	0	**162**	0	87	**87**	586
(5)	25	43	43	**111**	18	0	0	0	**18**	18	0	0	**18**	0	0	**0**	148
(6)	7	7	0	**13**	0	0	7	0	**7**	0	0	0	**0**	0	0	**0**	20
(7)	112	82	0	**194**	0	0	82	183	**265**	60	0	0	**60**	0	0	**0**	519
B	**224**	**219**	**131**	**574**	**99**	**0**	**88**	**183**	**371**	**241**	**0**	**0**	**241**	**0**	**87**	**87**	**1273**
(8)	0	38	0	**38**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	38
(9)	0	71	0	**71**	0	0	0	0	**0**	0	0	0	**0**	14	0	**14**	85
(10)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
C	**0**	**109**	**0**	**109**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**14**	**0**	**14**	**123**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
D	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total	263	344	131	**738**	215	77	100	347	**739**	345	18	0	**363**	15	87	**103**	**1942**

Figure 7-12 (e) Rough Movement of Mode Specific "Mode" Trips



note 1 : Numbers besides Area-names represent percentages of trips generated in the areas
note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

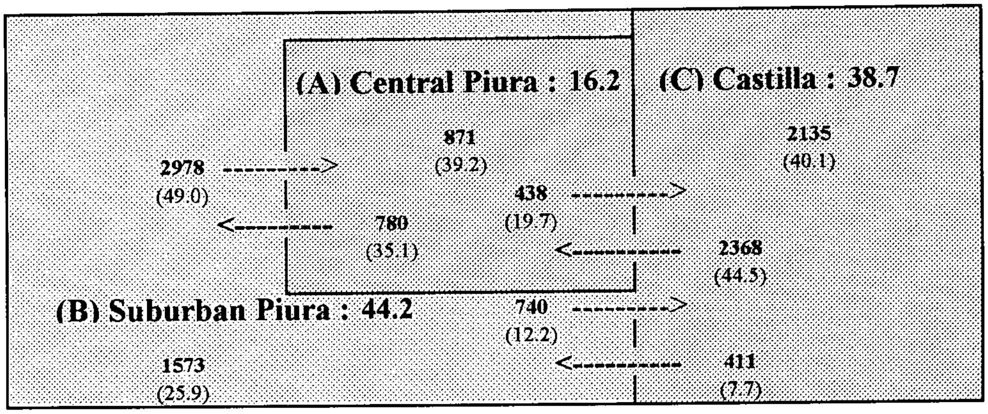
Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A	(1) City Centre	1,2,3,4	C	(8) North Castilla	21,25,(31)
Central	(2) Market	6	Castilla	(9) Central Castilla	22
Piura	(3) Central Piura	7,10		(10) South Castilla	23,24
	(4) North Piura	5,13,14,(32)		(11) Externals	26,27,28,29,30
B	(5) South Piura	8,11,12	D	(12) No destination	33
Suburban	(6) Industrial Area	9,15	Else	(12) No indication	34
Piura	(7) West Piura	16,17,18,19,20			

Table 7-22 (f) Rough OD-Matrix : The Numbers of Mode Specific "Mode" Trips

Trip Type	[	Mode	]
Hour Period	[3	: 7:00 am ~ 7:59 am	]
Mode	[6	: Total (mode 1~5)	]

\ To From \	Central Piura (1)	(2)	(3)	Sub-T A	Suburban Piura (4)	(5)	(6)	(7)	Sub-T B	Castilla (8)	(9)	(10)	Sub-T C	others (11)	(12)	Sub-T D	Total
(1)	219	33	10	**262**	50	7	12	4	**73**	61	4	0	**64**	20	65	**85**	484
(2)	15	131	3	**149**	94	46	2	295	**436**	37	17	89	**144**	13	8	**21**	750
(3)	198	143	119	**461**	129	99	0	44	**271**	158	22	50	**230**	4	24	**28**	989
A	**432**	**308**	**132**	**871**	**273**	**151**	**14**	**342**	**780**	**256**	**43**	**139**	**438**	**36**	**97**	**134**	**2223**
(4)	359	269	190	**818**	583	62	105	55	**805**	290	106	0	**395**	0	331	**331**	2349
(5)	232	489	195	**916**	29	205	5	4	**242**	43	40	22	**105**	34	36	**70**	1334
(6)	10	7	10	**26**	14	0	31	1	**46**	4	0	0	**4**	1	7	**8**	84
(7)	718	421	79	**1218**	5	19	93	363	**480**	148	39	49	**236**	0	381	**381**	2314
B	**1319**	**1186**	**474**	**2978**	**631**	**286**	**234**	**423**	**1573**	**485**	**184**	**71**	**740**	**36**	**754**	**790**	**6081**
(8)	424	124	97	**645**	263	0	8	0	**271**	232	190	0	**422**	0	120	**120**	1458
(9)	0	113	15	**128**	3	0	0	90	**93**	3	45	3	**51**	26	53	**78**	351
(10)	622	918	55	**1595**	0	0	47	0	**47**	268	269	1125	**1662**	0	213	**213**	3516
C	**1046**	**1155**	**167**	**2368**	**266**	**0**	**55**	**90**	**411**	**502**	**504**	**1128**	**2135**	**26**	**386**	**411**	**5325**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	26	0	**26**	0	0	0	103	**103**	0	0	0	**0**	0	0	**0**	128
D	**0**	**26**	**0**	**26**	**0**	**0**	**0**	**103**	**103**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**128**
Total	2797	2674	772	**6243**	1170	436	302	959	**2867**	1243	732	1338	**3313**	97	1237	**1335**	**13758**

Figure 7-12 (f) Rough Movement of Mode Specific "Mode" Trips



Total Trips (Trips from and to Area D included) 13758

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

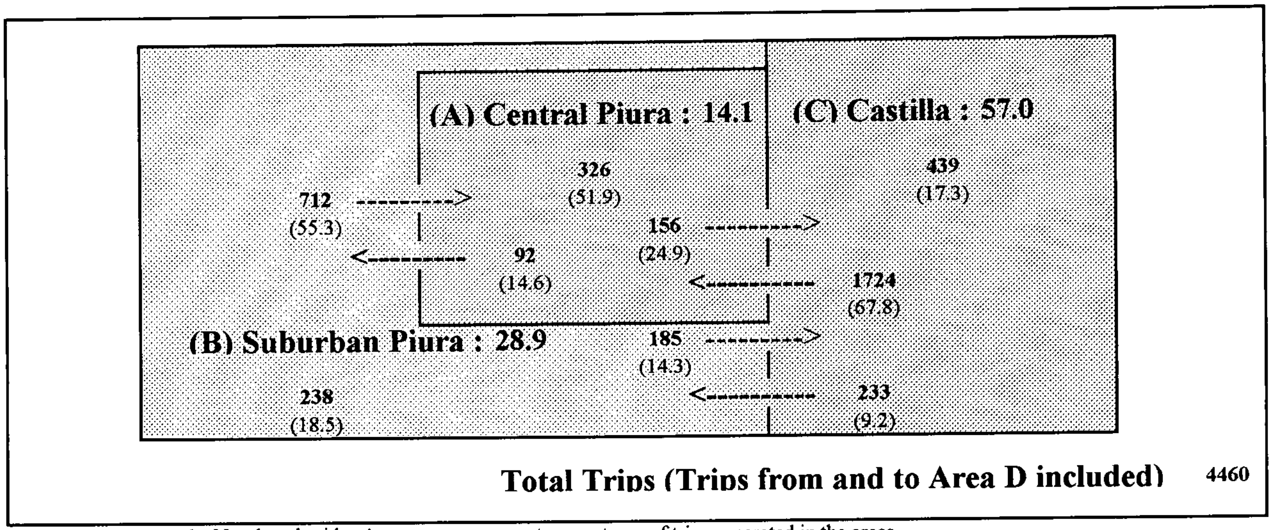
Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A	(1) City Centre	1,2,3,4	C	(8) North Castilla	21,25,(31)
Central	(2) Market	6	Castilla	(9) Central Castilla	22
Piura	(3) Central Piura	7,10		(10) South Castilla	23,24
	(4) North Piura	5,13,14,(32)		(11) Externals	26,27,28,29,30
B	(5) South Piura	8,11,12	D	(12) No destination	33
Suburban	(6) Industrial Area	9,15	Else	(12) No indication	34
Piura	(7) West Piura	16,17,18,19,20			

Table 7-23 (a) Rough OD-Matrix : The Numbers of Mode Specific "Vehicle Eq." Trips

Trip Type [Vehicle Eq.]
Hour Period [3 : 7:00 am ~ 7:59 am]
Mode [1 : Private Automobile]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	A	(4)	(5)	(6)	(7)	B	(8)	(9)	(10)	C	(11)	(12)	D	
(1)	1	1	1	**3**	27	0	0	0	**27**	0	0	0	**0**	19	11	**29**	59
(2)	3	0	0	**3**	0	0	0	0	**0**	0	0	55	**55**	0	3	**3**	61
(3)	171	109	40	**320**	22	0	0	44	**65**	40	18	44	**102**	0	22	**22**	508
A	**175**	**110**	**41**	**326**	**48**	**0**	**0**	**44**	**92**	**40**	**18**	**98**	**156**	**19**	**36**	**54**	**629**
(4)	96	0	96	**192**	144	0	0	0	**144**	48	87	0	**135**	0	135	**135**	607
(5)	43	117	68	**229**	0	0	0	0	**0**	0	0	0	**0**	0	18	**18**	247
(6)	0	0	7	**7**	7	0	0	0	**7**	0	0	0	**0**	0	0	**0**	14
(7)	285	0	0	**285**	0	0	0	87	**87**	25	0	25	**49**	0	0	**0**	422
B	**424**	**117**	**171**	**712**	**151**	**0**	**0**	**87**	**238**	**73**	**87**	**25**	**185**	**0**	**154**	**154**	**1289**
(8)	255	0	36	**291**	146	0	0	0	**146**	0	73	0	**73**	0	36	**36**	546
(9)	0	28	0	**28**	0	0	0	87	**87**	0	42	0	**42**	0	0	**0**	158
(10)	488	862	55	**1405**	0	0	0	0	**0**	0	269	55	**324**	0	110	**110**	1838
C	**743**	**890**	**91**	**1724**	**146**	**0**	**0**	**87**	**233**	**0**	**384**	**55**	**439**	**0**	**146**	**146**	**2542**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
D	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total	1342	1117	303	**2763**	345	0	0	218	**563**	113	490	178	**780**	19	336	**354**	**4460**

Figure 7-13 (a) Rough Movement of Mode Specific "Vehicle Equivalent" Trips



note 1 : Numbers besides Area-names represent percentages of trips generated in the areas
note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

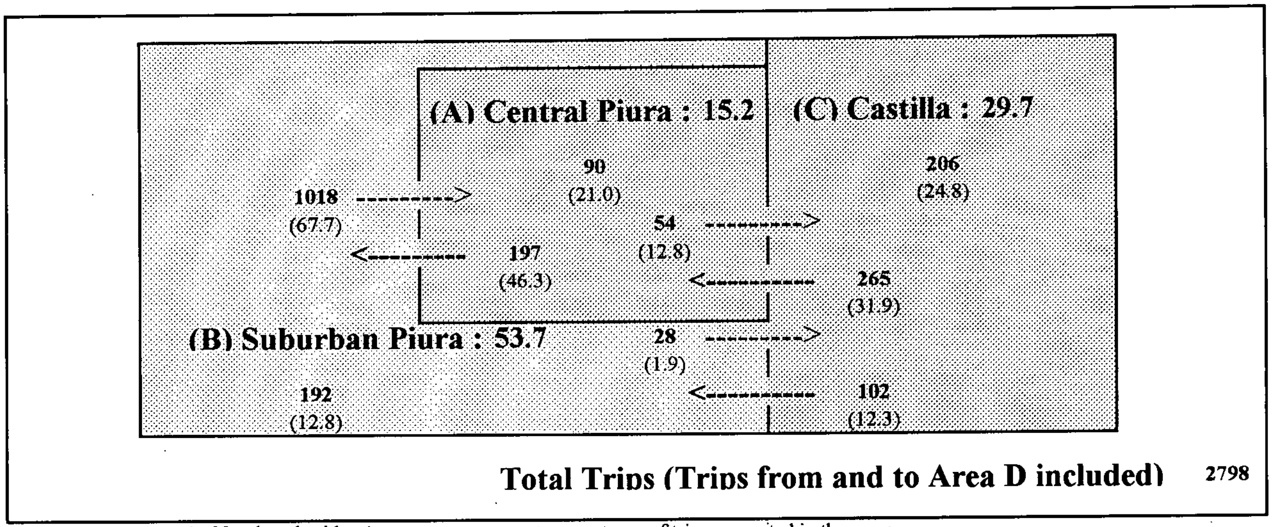
Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A Central Piura	(1) City Centre	1,2,3,4	C Castilla	(8) North Castilla	21,25,(31)
	(2) Market	6		(9) Central Castilla	22
	(3) Central Piura	7,10		(10) South Castilla	23,24
B Suburban Piura	(4) North Piura	5,13,14,(32)	D Else	(11) Externals	26,27,28,29,30
	(5) South Piura	8,11,12		(12) No destination	33
	(6) Industrial Area	9,15		(12) No indication	34
	(7) West Piura	16,17,18,19,20			

Table 7-23 (b) Rough OD-Matrix : The Numbers of Mode Specific "Vehicle Eq." Trips

Trip Type	[	Vehicle Eq.	]
Hour Period	[3	: 7:00 am ~ 7:59 am	]
Mode	[2	: Public Transit 1 (Collectibo)	]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	**A**	(4)	(5)	(6)	(7)	**B**	(8)	(9)	(10)	**C**	(11)	(12)	**D**	
(1)	3	17	0	**21**	0	0	0	0	**0**	0	0	0	**0**	0	82	**82**	103
(2)	6	0	0	**6**	82	0	0	115	**197**	0	3	51	**54**	3	0	**3**	261
(3)	0	25	37	**63**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	63
A	**9**	**43**	**37**	**90**	**82**	**0**	**0**	**115**	**197**	**0**	**3**	**51**	**54**	**3**	**82**	**85**	**427**
(4)	113	82	0	**195**	0	0	82	82	**164**	0	0	0	**0**	0	82	**82**	441
(5)	100	147	0	**247**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	247
(6)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(7)	270	211	95	**575**	0	28	0	0	**28**	0	0	28	**28**	0	182	**182**	814
B	**483**	**440**	**95**	**1018**	**0**	**28**	**82**	**82**	**192**	**0**	**0**	**28**	**28**	**0**	**264**	**264**	**1503**
(8)	136	34	68	**239**	102	0	0	0	**102**	136	70	0	**206**	0	102	**102**	650
(9)	0	13	13	**26**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	26
(10)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	154	**154**	154
C	**136**	**47**	**81**	**265**	**102**	**0**	**0**	**0**	**102**	**136**	**70**	**0**	**206**	**0**	**257**	**257**	**831**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	38	0	**38**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	38
D	**0**	**38**	**0**	**38**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**38**
Total	629	568	214	**1411**	184	28	82	197	**492**	136	73	80	**289**	3	603	**606**	**2798**

Figure 7-13 (b) Rough Movement of Mode Specific "Vehicle Equivalent" Trips



note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

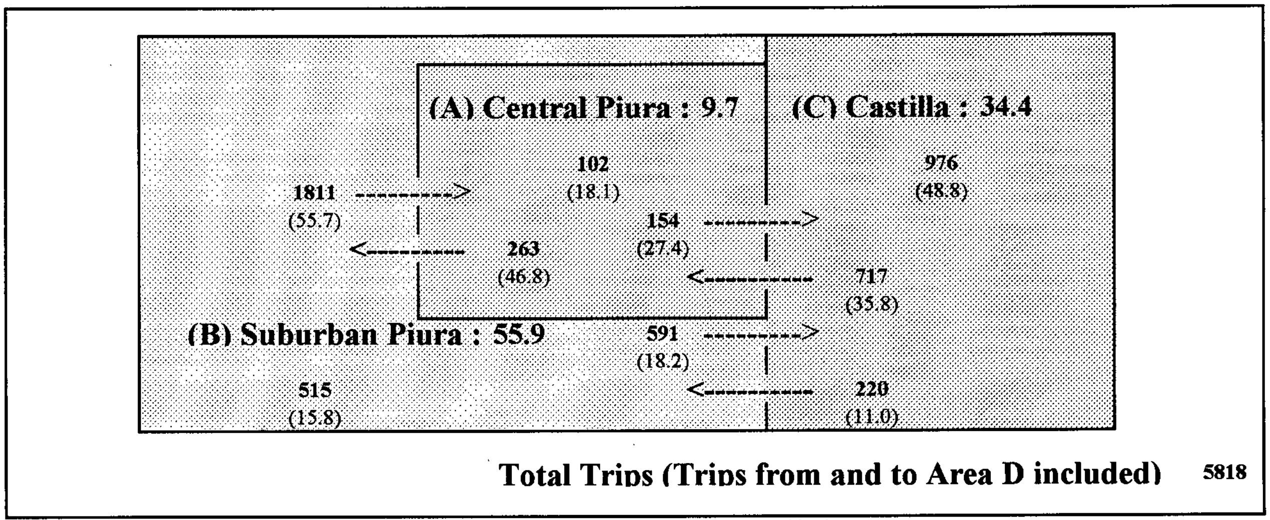
Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A Central Piura	(1) City Centre	1,2,3,4	C Castilla	(8) North Castilla	21,25,(31)
	(2) Market	6		(9) Central Castilla	22
	(3) Central Piura	7,10		(10) South Castilla	23,24
B Suburban Piura	(4) North Piura	5,13,14,(32)	D Else	(11) Externals	26,27,28,29,30
	(5) South Piura	8,11,12		(12) No destination	33
	(6) Industrial Area	9,15		(12) No indication	34
	(7) West Piura	16,17,18,19,20			

Table 7-23 (c) Rough OD-Matrix : The Numbers of Mode Specific "Vehicle Eq." Trips

Trip Type	[	Vehicle Eq.	]
Hour Period	[3	: 7:00 am ~ 7:59 am	]
Mode	[3	: Public Transit2 (Combi)	]

\ To From \	Central Piura (1)	(2)	(3)	Sub-T A	Suburban Piura (4)	(5)	(6)	(7)	Sub-T B	Castilla (8)	(9)	(10)	Sub-T C	others (11)	(12)	Sub-T D	Total
(1)	1	34	17	**53**	1	8	0	8	**17**	28	0	0	**28**	0	0	**0**	98
(2)	16	3	5	**23**	78	18	4	108	**208**	8	3	0	**11**	21	11	**32**	274
(3)	9	17	0	**26**	29	8	0	0	**37**	95	8	13	**116**	8	4	**11**	190
A	**26**	**53**	**22**	**102**	**109**	**33**	**4**	**117**	**263**	**131**	**10**	**13**	**154**	**29**	**14**	**43**	**562**
(4)	213	253	14	**480**	236	0	100	0	**337**	160	36	0	**196**	0	107	**107**	1120
(5)	195	462	75	**732**	21	42	10	8	**81**	50	79	45	**173**	69	34	**103**	1089
(6)	6	0	6	**11**	14	0	14	3	**31**	8	0	0	**8**	3	14	**17**	67
(7)	160	397	31	**588**	10	0	23	34	**67**	125	78	10	**214**	0	109	**109**	978
B	**573**	**1112**	**125**	**1811**	**281**	**42**	**148**	**45**	**515**	**343**	**194**	**55**	**591**	**71**	**264**	**336**	**3254**
(8)	157	126	30	**313**	98	0	15	0	**114**	282	142	0	**424**	0	31	**31**	882
(9)	0	12	12	**24**	6	0	0	6	**12**	6	6	6	**18**	23	35	**58**	111
(10)	268	112	0	**380**	0	0	95	0	**95**	535	0	0	**535**	0	0	**0**	1010
C	**425**	**250**	**42**	**717**	**104**	**0**	**110**	**6**	**220**	**823**	**148**	**6**	**976**	**23**	**66**	**89**	**2002**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
D	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total	1024	1415	190	**2629**	494	75	261	167	**998**	1296	352	74	**1722**	123	345	**468**	**5818**

Figure 7-13 (c) Rough Movement of Mode Specific "Vehicle Equivalent" Trips



note 1 : Numbers besides Area-names represent percentages of trips generated in the areas
note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

\ To From \	Central Piura (1)	(2)	(3)	Sub-T A	Suburban Piura (4)	(5)	(6)	(7)	Sub-T B	(8)	Castilla (9)	(10)	Sub-T C	others (11)	(12)	Sub-T D	Total

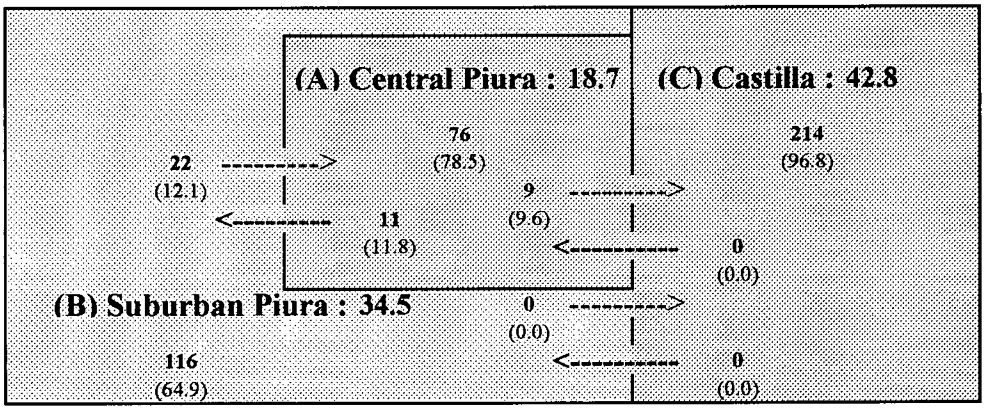
Central Piura	(2)	Market	6	Castilla	(9)	Central Castilla	22
	(3)	Central Piura	7,10		(10)	South Castilla	23,24
B Suburban Piura	(4)	North Piura	5,13,14,(32)	D Else	(11)	Externals	26,27,28,29,30
	(5)	South Piura	8,11,12		(12)	No destination	33
	(6)	Industrial Area	9,15		(12)	No indication	34
	(7)	West Piura	16,17,18,19,20				

Table 7-23 (d) Rough OD-Matrix : The Numbers of Mode Specific "Vehicle Eq." Trips

Trip Type	[	Vehicle Eq.	]
Hour Period	[3	: 7:00 am ~ 7:59 am	]
Mode	[4	: Walking	]

\ AZ	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
AZ \	(1)	(2)	(3)	**A**	(4)	(5)	(6)	(7)	**B**	(8)	(9)	(10)	**C**	(11)	(12)	**D**	
(1)	35	0	0	**35**	0	1	0	0	**1**	9	0	0	**9**	0	0	**0**	45
(2)	0	25	0	**25**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	25
(3)	5	0	11	**15**	0	11	0	0	**11**	0	0	0	**0**	0	0	**0**	26
A	**40**	**25**	**11**	**76**	**0**	**11**	**0**	**0**	**11**	**9**	**0**	**0**	**9**	**0**	**0**	**0**	**97**
(4)	0	0	0	**0**	48	12	0	0	**60**	0	0	0	**0**	0	0	**0**	60
(5)	0	0	9	**9**	0	37	0	0	**37**	0	0	0	**0**	0	0	**0**	46
(6)	0	0	0	**0**	0	0	3	0	**3**	0	0	0	**0**	0	0	**0**	3
(7)	12	0	0	**12**	0	0	0	15	**15**	0	0	0	**0**	0	41	**41**	68
B	**12**	**0**	**9**	**22**	**48**	**49**	**3**	**15**	**116**	**0**	**0**	**0**	**0**	**0**	**41**	**41**	**178**
(8)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(9)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	7	**7**	7
(10)	0	0	0	**0**	0	0	0	0	**0**	0	0	214	**214**	0	0	**0**	214
C	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**214**	**214**	**0**	**7**	**7**	**221**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	0	0	**0**	0	0	0	21	**21**	0	0	0	**0**	0	0	**0**	21
D	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**21**	**21**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**21**
Total	52	25	20	**97**	48	61	3	36	**148**	9	0	214	**223**	0	48	**48**	**516**

Figure 7-13 (d) Rough Movement of Mode Specific "Vehicle Equivalent" Trips



Total Trips (Trips from and to Area D included) **516**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas

note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

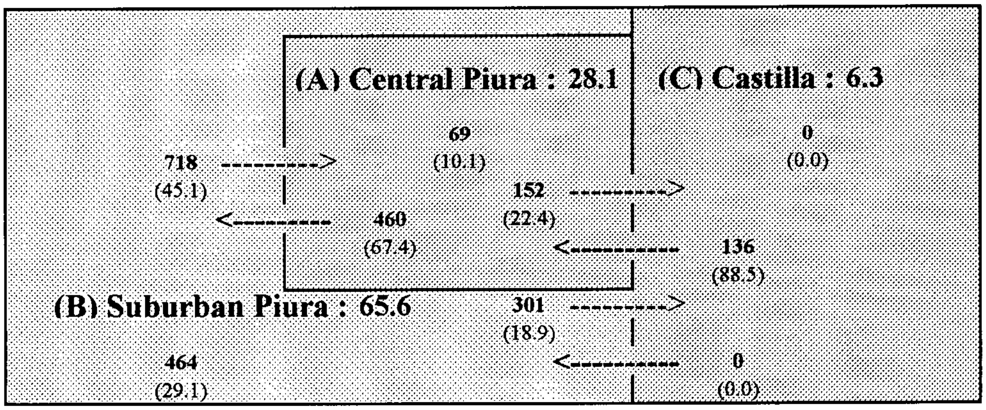
Area	Area Zones (AZ)		Traffic Zones	Area	Area Zones (AZ)		Traffic Zones
A	(1)	City Centre	1,2,3,4	C	(8)	North Castilla	21,25,(31)
Central	(2)	Market	6	Castilla	(9)	Central Castilla	22
Piura	(3)	Central Piura	7,10		(10)	South Castilla	23,24
	(4)	North Piura	5,13,14,(32)		(11)	Externals	26,27,28,29,30
B	(5)	South Piura	8,11,12	D	(12)	No destination	33
Suburban	(6)	Industrial Area	9,15	Else	(12)	No indication	34
Piura	(7)	West Piura	16,17,18,19,20				

Table 7-23 (e) Rough OD-Matrix : The Numbers of Mode Specific "Vehicle Eq." Trips

Trip Type [Vehicle Eq.]
Hour Period [3 : 7:00 am ~ 7:59 am]
Mode [5 : Others (mototaxis)]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	A	(4)	(5)	(6)	(7)	B	(8)	(9)	(10)	C	(11)	(12)	D	
(1)	49	5	0	**53**	29	0	15	0	**43**	0	5	0	**5**	1	0	**1**	103
(2)	0	4	0	**4**	0	46	0	204	**250**	42	18	0	**59**	0	0	**0**	314
(3)	0	11	0	**11**	116	50	0	0	**166**	88	0	0	**88**	0	0	**0**	266
A	**49**	**20**	**0**	**69**	**144**	**96**	**15**	**204**	**460**	**130**	**22**	**0**	**152**	**1**	**0**	**1**	**682**
(4)	101	109	109	**320**	101	0	0	0	**101**	202	0	0	**202**	0	109	**109**	733
(5)	31	54	54	**139**	23	0	0	0	**23**	23	0	0	**23**	0	0	**0**	185
(6)	8	8	0	**17**	0	0	8	0	**8**	0	0	0	**0**	0	0	**0**	25
(7)	140	102	0	**242**	0	0	102	229	**331**	76	0	0	**76**	0	0	**0**	649
B	**281**	**274**	**163**	**718**	**124**	**0**	**111**	**229**	**464**	**301**	**0**	**0**	**301**	**0**	**109**	**109**	**1592**
(8)	0	48	0	**48**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	48
(9)	0	88	0	**88**	0	0	0	0	**0**	0	0	0	**0**	18	0	**18**	106
(10)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
C	**0**	**136**	**0**	**136**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**18**	**0**	**18**	**153**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
D	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total	329	429	163	**922**	268	96	125	433	**923**	431	22	0	**453**	19	109	**128**	**2427**

Figure 7-13 (e) Rough Movement of Mode Specific "Vehicle Equivalent" Trips



Total Trips (Trips from and to Area D included) **2427**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas
note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

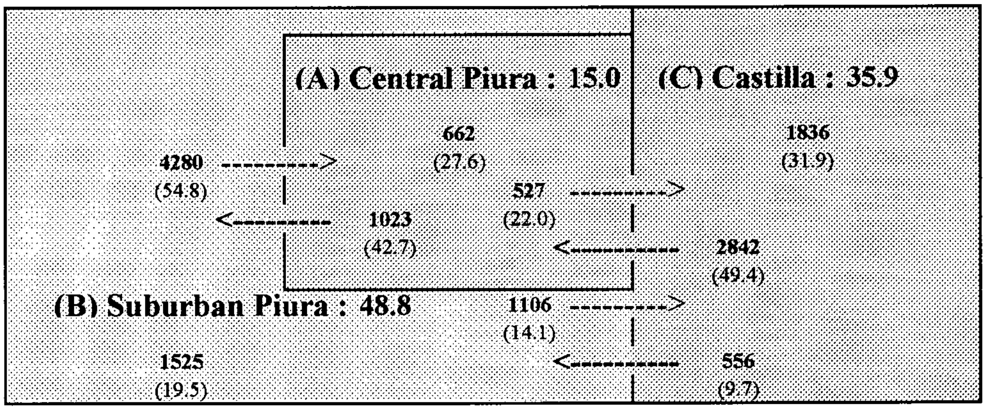
Area	Area Zones (AZ)	Traffic Zones	Area	Area Zones (AZ)	Traffic Zones
A	(1) City Centre	1,2,3,4	C	(8) North Castilla	21,25,(31)
Central	(2) Market	6	Castilla	(9) Central Castilla	22
Piura	(3) Central Piura	7,10		(10) South Castilla	23,24
	(4) North Piura	5,13,14,(32)		(11) Externals	26,27,28,29,30
B	(5) South Piura	8,11,12	D	(12) No destination	33
Suburban	(6) Industrial Area	9,15	Else	(12) No indication	34
Piura	(7) West Piura	16,17,18,19,20			

Table 7-23 (f) Rough OD-Matrix : The Numbers of Mode Specific "Vehicle Eq." Trips

Trip Type [Vehicle Eq.]
Hour Period [3 : 7:00 am ~ 7:59 am]
Mode [6 : Total (mode 1~5)]

\ To	Central Piura			Sub-T	Suburban Piura				Sub-T	Castilla			Sub-T	others		Sub-T	Total
From \	(1)	(2)	(3)	A	(4)	(5)	(6)	(7)	B	(8)	(9)	(10)	C	(11)	(12)	D	
(1)	90	57	18	**165**	57	8	15	8	**88**	37	5	0	**42**	20	93	**113**	408
(2)	25	32	5	**62**	160	64	4	428	**656**	50	23	106	**179**	24	14	**38**	935
(3)	184	162	88	**435**	167	69	0	44	**279**	224	26	56	**306**	8	26	**33**	1053
A	**299**	**251**	**112**	**662**	**383**	**141**	**19**	**480**	**1023**	**310**	**54**	**163**	**527**	**52**	**132**	**184**	**2396**
(4)	523	445	219	**1187**	530	12	182	82	**806**	410	124	0	**534**	0	433	**433**	2961
(5)	369	780	206	**1356**	44	79	10	8	**140**	73	79	45	**196**	69	53	**121**	1814
(6)	14	9	13	**35**	21	0	26	3	**49**	8	0	0	**8**	3	14	**17**	110
(7)	867	710	126	**1702**	10	28	125	366	**529**	225	78	63	**367**	0	333	**333**	2931
B	**1773**	**1943**	**564**	**4280**	**604**	**119**	**344**	**458**	**1525**	**716**	**281**	**108**	**1106**	**71**	**833**	**904**	**7815**
(8)	548	208	135	**891**	346	0	15	0	**362**	418	284	0	**703**	0	170	**170**	2125
(9)	0	141	25	**166**	6	0	0	93	**99**	6	48	6	**60**	40	42	**83**	408
(10)	756	974	55	**1784**	0	0	95	0	**95**	535	269	269	**1073**	0	264	**264**	3216
C	**1304**	**1323**	**215**	**2842**	**352**	**0**	**110**	**93**	**556**	**959**	**602**	**275**	**1836**	**40**	**476**	**517**	**5750**
(11)	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**	0
(12)	0	38	0	**38**	0	0	0	21	**21**	0	0	0	**0**	0	0	**0**	59
D	**0**	**38**	**0**	**38**	**0**	**0**	**0**	**21**	**21**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**59**
Total	3376	3556	890	**7823**	1340	260	472	1052	**3125**	1986	936	545	**3468**	164	1441	**1605**	**16020**

Figure 7-13 (f) Rough Movement of Mode Specific "Vehicle Equivalent" Trips



Total Trips (Trips from and to Area D included) **16020**

note 1 : Numbers besides Area-names represent percentages of trips generated in the areas
note 2 : Numbers under actual trip numbers represent percentages of trips generated within the areas.

- Zone Classification -

Area	Area Zones (AZ)		Traffic Zones	Area	Area Zones (AZ)		Traffic Zones
A	(1)	City Centre	1,2,3,4	C	(8)	North Castilla	21,25,(31)
Central	(2)	Market	6	Castilla	(9)	Central Castilla	22
Piura	(3)	Central Piura	7,10		(10)	South Castilla	23,24
	(4)	North Piura	5,13,14,(32)		(11)	Externals	26,27,28,29,30
B	(5)	South Piura	8,11,12	D	(12)	No destination	33
Suburban	(6)	Industrial Area	9,15	Else	(12)	No indication	34
Piura	(7)	West Piura	16,17,18,19,20				

7.4 Conclusion

The software application and the analysis of the transportation system in Piura is performed in this chapter. T-model2 is used as the transportation modeling tool, and several simple prototype transportation models are constructed. Calibration for the models are also performed in order to examine and improve their workability.

The major difficulty of applying the transportation modeling tool for a city in a developing country is the treatment of modal split. This is primarily caused by the mixed use of a variety of modes, which is different from the situation in most developed countries where private vehicles predominate the modal share as the primary transportation mode.

Along with the modal split, the treatment of "person" trips and "vehicular" trips becomes another crucial factor for transportation modeling. Since the variety of modes have different characteristics and relationships to "person" trip movements, the complexity of a transportation structure of the city creates a difficulty for modeling its transportation system. It is very difficult to model networks for each specific mode used in the city with respect to the travel movements.

In this study, "vehicle equivalent" trips are applied to model a simplified transportation system in order to standardize the differences caused by the various types of modes. From the simulation and calibration results, it is found that the results of using this trip type is the closest to the survey results. That is, the workability of applying "vehicle equivalent" trips is proved. Moreover, the results of the other trip types, "person" trips and "mode" trips, are also not too bad, and can be used for examining the performance of trip type specific or mode specific movements.

By going through the modeling process, simulation and calibration, those processes for constructing a prototype transportation model are performed reasonably well. This study has certainly contributed to recognize problems to apply "automobile" oriented transportation planning tools to the city in developing country and also suggest possible options to overcome the difficulties. In this way, one of the two major purposes of this study has been achieved. However, while the prototype transportation system modeling is successfully done in this study, the models still need refining. Further research with more calibration and more reliable and useful data are necessary.

Chapter 8

Conclusion

8.1 Conclusion

This study has been conducted as a case study of transportation system analysis for a city in a developing country. The primary purposes of this project were two-fold:

(1) to increase the understanding of human activities and trip characteristics in the city of Piura, and

(2) to construct a prototype transportation planning model for Piura.

The analysis were done based on the available data, such as the household survey, city plan reports and the interviews with city officials. For the first purpose, the statistical data, household travel characteristics, and individual travel characteristics were analyzed. For the second purpose, the transportation system analysis tool, T-model2, was applied in order to construct a prototype transportation planning model. The conclusions for these two modules follow.

8.1.1 Understanding of the Transportation Activity

This study has contributed to the increased understanding of the transportation related interaction of the city. The travel behaviour of the city was analyzed from various point of view. The review of the available statistics summarized the framework of the transportation system of the city. The analysis of the household travel characteristics contributed to clarify the relationships between social economic characteristics and household travel behaviours. Then, the analysis of individual travel characteristics certainly demonstrated the travel movements for various travel characteristics, such as trip purpose, time of the day, mode, OD matrix and rough OD matrix. The primary findings from those analysis follows:

8.1.1.1 Trip Type and Time of the Day

Figure 6-4 summarizes the basic travel characteristics of the city, based on trip type and time of the day. The primary finding are:

① Two peak periods are observed in a day. "Work (44.9%)," "school (22.8%)" and "shopping (13.5%)" trips are primarily responsible for the busiest morning peak period while "home (85.4%)" is the major trip type for the second busiest, early afternoon peak period.

② The busiest time period between 6 and 9 a.m. and the busiest hour period between 7 and 8 a.m. are responsible for 32.8% and 16.8% of the total daily trips respectively.

③ The second busiest time period between 12 and 3 p.m. and the hour period between 1 and 2 p.m. are responsible for 21.0% and 11.4% of the total daily trips respectively.

④ Besides "home" trips, "work" trips are the most frequent trips with 23.8% of the total daily trips. Approximately two third of "work" trips (66.9%) occur in the morning peak period between 6 and 9 a.m., and approximately half (8.4% of the total daily trips) occur in the peak hour period between 7 to 8 a.m..

⑤ "Home" trips account for 47.3% of the total daily trips. This high share shows the fairly simple travel pattern, which is mostly "going out and coming back only once a day". "Home" trips most frequently occur during the early afternoon peak between 12 and 3 p.m. (37.8% of the daily "home" trips).

⑥ The third and forth most frequent trip types are "school" and "shopping" trips, accounting for 10.7% and 8.6% of the total daily trips respectively. The fraction of daily "school" and "shopping" trips that occur during the morning peak time period are 68.4% and 50.1% respectively.

⑦ The primary travel pattern of "going to work, school and shopping" occurs in the morning period and of "coming back home" during the early afternoon peak. There is a strong relationship between travel behaviour and people's life style, as mentioned in Section 3.2.4.

8.1.1.2 OD matrix and rough OD matrix

The OD matrixes shows the physical travel movements of the city. The primary findings are:

① The major origins are the traffic analysis zones which have large populations.

② The major destinations are the city centre and the central market traffic analysis zones. They respectively account for 20.0% and 22.6% of the total attracted trips during the morning peak time period.

③ The share of the generated trips in Central Piura, Suburban Piura and Castilla are almost even with 30.8%, 34.0% and 30.4% of the total daily trips.

④ The within-area trips of Central Piura, Suburban Piura and Castilla account for 13.1%, 27.0% and 50.6% of the total trips generated in those traffic area respectively. Approximately half of the trips generated in Castilla end up within Castilla while only one in eight trips generated in Central Piura ends up within that traffic area.

⑤ More than 85% of trips attracted to Central Piura are from outside of the area (56.9% from Suburban Piura and 29.7% from Castilla).

⑥ The share of the trips generated in the Suburban Piura that are attracted to Central Piura is 50.4%. This simply means that the major destinations for people who live in Suburban Piura are in Central Piura.

⑦ For "work" trips, the major origins are zones 8, 14, 16, 19, 21, 23, 24 and 25. The major destinations are the city centre and the central market, which attract 31.6% and 17.4% of the total "work" trips respectively. Other noticeable destinations are Central and North Castilla.

⑧ For "work" trips, the Central Piura attracts to 55.1% and 55.8% of trips generated in Suburban Piura and Castilla respectively.

⑨ During the morning peak period, 54.5% of trips generated in Suburban Piura and 43.6% of trips generated in Castilla head to Central Piura. These two together account for 43.3% of the total generated trips while only 8.4% of the total trips are going out from Central Piura.

⑩ During the afternoon peak, 51.2% and 38.4% of Central Piura generated trips head for Suburban Piura and Castilla respectively. These two together account for 34.8% of the total trips generated while only 9.0% of the total trips are going into Central Piura

⑪ Only 13% of the total trips are generated in Central Piura in the morning peak while 38.8% of the total afternoon peak trips are generated in the area.

⑫ The movement of going into Central Piura in the morning peak and going out from Central Piura in the afternoon peak is easily observed.

8.1.1.3 Mode

The morning peak period between 6 to 9 a.m. is used for the analysis of "mode" travel characteristics. The major findings are:

① "Combis" are the most frequently used mode with 57.3% of the total estimated trips, followed by "automobiles (18.3%)" and "Collectibos (12.2%)".

② The three motorized modes, Combis, automobiles and Collectibos, together are responsible for 87.8% of the total estimated trips while the two primary public transportation modes, Combis and Collectibos, account for 67.5% of the total trips.

③ For "work" trips, 53.9% of them are made by Combis, followed by "private cars (20.4%)" and "Collectibos (14.6%). The two public transit modes, Combis and Collectibos, together are responsible for 68.5% of "work" trips.

④ For the second most frequent travel, "school" trips, the top three modes account for 62.8% (Combis), 12.0% (private cars), and 10.3% (others) of the total.

⑤ For "personal business" and "shopping" trips, the third most frequent trip type, the three primary modes are Combis (56.2%), private cars (27.6%) and Collectibos (11.0%). The modal share of private cars (27.6%) is the highest among the six trip types.

⑥ The modal share of "Combis" for "home" trips is only 36.3%, which is the smallest among the six trip types.

⑦ Combis are frequently used for "work" trips (47.0%), for "school" trips (25.0%), and for "personal business" and "shopping" trips (17.0%). The modal share structure of Combi is close to the average and Combis are regularly used for all the six trip types.

⑧ Private automobiles, the second most highly used mode, are used for "work" trips (55.8%), for "personal business" and "shopping" trips (26.2%) and for "school" trips (15.0%). This mode is used more for "work", "personal business" and "shopping" trips while less for the "school" trips than the average. This indicates that the majority of automobile users are non-students who usually work or do domestic works.

⑨ "Collectibos", the third most highly used mode with a modal share of 12.2%, has a similar trip share structure to the one for "automobiles". The shares are 59.5% for "work" trips, 15.6% for "personal business" and "shopping" trips, and 10.6% for "school" trips.

⑩ 49.7% of "walking" trips are "school" trips, which is the top purpose for that mode. This is likely because (1) the majority of "school" trip makers are students who usually do not have many mode choice and (2) the travel distances of "school" trips are often short because of the well-distributed locations of primary and secondary schools.

⑪ Combis, are used evenly all over the city during the morning peak

⑫ About 55.9% of "Combi" trips are generated in Suburban Piura. This fact indicates that the Combis are used most by those who live in Suburban Piura.

⑬ The share of "Combi" trips generated in Central Piura (9.7%) is smaller than the ones of the average (13.0%). This indicates that people who live outside of Central Piura use Combis more than those who live in the area.

⑭ The share of Castilla generated "automobile" trips (57.0%) is much larger than the average (36.1%). This indicates that people in Castilla use automobiles more frequently than people in Piura.

⑮ The share of "automobile" trips generated in Suburban Piura (28.9%) is much smaller than average (50.6%). This fact indicates that people in Suburban Piura much less likely to use the mode than people who live in other parts of Piura.

⑯ An estimated 67.8% of the "automobile" trips generated in Castilla head for Central Piura. This number is much higher than the average (43.6%), and this indicates that the major destination of the automobile users in Castilla is Central Piura.

⑰ The share of "walking" trips generated in Central Piura (18.7%) is larger than the average (13.0%). This is likely the result of shorter travel distances to the major activity centres.

⑱ Most of the "walking" trips are the "within-area" trips for all the three traffic areas, accounting for 78.5% in Central Piura, 64.9% in Suburban Piura and 96.8% in Castilla. This simply shows that "walking" is more used for shorter distance trips.

8.1.2 Constructing a Prototype Transportation Model

The second purpose of this study was to construct a prototype transportation planning model for the city. The study did achieve a model , however, it was not a very effective model. The study found that there are difficult problems to apply "automobile" oriented transportation planning tools to this city in a developing country. The study also developed possible options to overcome the difficulties.

The primary problem was the existence of various modes which share limited infrastructures. This difficulty, which is common in most developing countries, was examined in order to find applicable methods to apply the transportation planning tool, T-model2. Several possible options were suggested, and simulations were also performed in order to examine some of the suggested options. The results certainly showed the applicability of the options although further research is necessary in order to increase the reliability and the workability of the prototype transportation planning model. The summaries of the issues for application, the application setting, and the results follow.

8.1.2.1 The Issues for Application

The issues of the application were the treatment of (1) modal split, (2) separated "mode specific" assignment, and (3) trip type differences of "person" or "vehicular" trips. Since the transportation planning tool, T-model2, is "automobile" traffic oriented, modeling the complex transportation activity caused by the use of various modes becomes a major task. The primary approaches to tackle the issues are:

(1) to simplify the model as much as possible,
(2) to perform only one assignment run for all mode trips using only one "standardized vehicular" network based on "vehicle equivalent" trips, and
(3) to preferably perform one gravity model distribution for the total "person" trips.

Then, the following five options are considered:

(1) integrating all the "mode specific" trip tables to one "total" trip table after distribution, and using only one "standardized" network,
(2) treating all the trips as "vehicle equivalent" trips from the trip generation,
(3) transforming all the "mode specific vehicular" trips to "vehicle equivalent" trips, and performing only one distribution and assignment,
(4) designing a "person" trip network based on "person" trip volumes, and use the "person" trips for only one distribution and assignment, and
(5) integrating the modal split into the assignment run.

Figure 7-5 summarizes the flow charts of the suggested five approaches along with the two traditional modal split methods available in T-model2. The treatment of trip types, "person", "vehicular" or "vehicle equivalent", should be carefully looked at in each simulation stage.

The common advantages and disadvantages of these options are caused by the simplicity. Standardizing all the "mode specific" trips to either "person" trips or "vehicle equivalent" trips certainly eases the simulation steps. It also accommodates with the explanation of the modal complexity. On the other hand, the standardization likely cause errors, reducing the effects of the "mode specific" characteristics.

The most preferable method, in terms of a construction point of view, would be option (1) after considering the advantages and disadvantages of each option. The reasons for this preference are:

① There are as many assignment runs required as modes exist if one of the traditional mode split methods available in T-model2 is used.

② When pre-distribution modal split is executed, there are also as many gravity model distributions as modes that exist.

③ "Person" trips, rather than "vehicular" or "vehicle equivalent" trips, are better to be used with respect to the concept of trip generation and gravity model distribution.

④ Avoiding using separated "mode specific" assignment is the priority.

8.1.2.2 Application Setting

The application was done in two steps. First, trip generation models were constructed. Then, the simulations by T-model2 were performed. The following nine options were used for the T-model2 simulation:

(1) using one total "person" trip OD table throughout simulation,
(2) using mode specific "person" trip tables for separated assignments,
(3) summing up mode specific "person" trip tables for assignment,
(4) using one total "mode" trip OD table throughout simulation,
(5) using mode specific "mode" trip tables for separated assignments,
(6) summing up mode specific "mode" trip tables for assignment,
(7) using one total "vehicle equivalent" trip OD table throughout simulation,
(8) using mode specific "vehicle equivalent" trip tables for separated assignments, and
(9) summing up mode specific "vehicle equivalent" trip tables for assignment.

The analysis of the simulation results were performed for gravity model parameter calibration, trip tables, travel time matrix, loaded link data, and screen line analysis. The primary findings of those analysis along with the findings of the trip generation are summarized in the next section.

8.1.2.3 Results

(Trip Generation Models)

Trip generation models were constructed based on the total daily "person" trips.

The construction was performed away from T-model2 because of the difference of the modeling concept. The trip generation models for trip production worked well enough by using simple population variables, such as the estimated populations and the family unit numbers. The trip attraction models, on the other hand, still need more work to improve the reliability.

(Gravity Model Parameter Calibration)

Gravity model parameter calibration was performed for the exponent α while other parameters, exponent β and constant K, were set as zero. The α was set for all six trip types independently. As a result of the calibration, the α values were set as 2.0 2.1, 3.6, 2.2, 2.5 and 3.5 for the trip types 1 to 6, defined in Section 6.4.1, respectively. With these α values, the simulation results were fairly good. The maximum destination error became less than 1 % within ten iterations, and the maximum absolute errors were less than two for the all six trip types when the total trips of 60,940 was used.

(Trip Tables)

Trip tables are the outcome of the gravity model distribution. When two methods, "using a total OD table" and "summing up multiple mode specific trip tables", were compared, it was obvious that there were many differences between the two resultant trip tables. The differences of individual "zone to zone" trips were observed in most part of the tables, and the maximum difference in a absolute number was fairly large with respect to the maximum values of the individual "zone to zone" trips. Those noticeable zones were zones 1, 2, 3, 4, 6, 7, 9, 10, 13, 15, 21, 22 and 23, all of which were either activity centers or well populated traffic analysis zones. In addition, the differences of the total ODs for each traffic analysis zone, on the other hand, were small.

The "zone to zone" differences were similarly found in either trip type. The results of applying "person" trips, "mode" trips or "vehicle equivalent" trips commonly had noticeable differences at similar individual "zone to zone" trips. The differences of the total ODs for each traffic analysis zone, again, were small for all of those trip types.

(Travel Time Matrix)

The travel time matrix is one of the two outcomes of the assignment. When two methods, "using a total OD table" and "summing up separated multiple mode specific trip tables", were compared, it was found that, unlike the trip tables, there were almost no difference in travel times between the two methods. This shows that the OD differences do not affect the travel time structure and general travel movements much. In addition, the travel times of "mode specific" trips were shorter than the travel times of the total trips because of the smaller numbers of "mode specific" trips dealt with.

As for the differences of results between the trip types, applying "person" trips to the assignment stage was, as expected, not reliable enough, particularly from the results of travel time matrixes because of the network setting, which was based on "automobile" capacity. The other two trip types, "mode" trips and "vehicle equivalent" trips, on the other hand, worked well and showed quite similar results although the travel times of "vehicle equivalent" trips were somewhat longer than the ones of "mode" trips because of the larger number of "vehicle equivalent" trips dealt with. Since the results were quite reasonable in terms of "volumes" assigned on the network, these two trip types were basically applicable to the network,.

In addition to the summaries above, the reliability of the network setting, in terms of the link connection and the design speeds, can be examined by comparing the basic travel time matrix calculated by T-model2 to the original travel time matrix from the site investigation.

(Loaded Link Data)

Loaded link data is another outcome of the assignment. This is the data which actually shows the volumes and travel times of each link along with basic settings such as design speed and capacity. When the results of the three optional methods were compared, it was observed that the results were quite similar to each other while small differences were clearly observed between "performing only one total assignment" and "performing separated mode specific assignments". This fact might be because the link capacity setting was so big that most trips were assigned on only primary routes even when the total trips were applied for one assignment.

While the total link volumes, particularly the results of only one assignment, are used for calibrating network setting, the differences between one assignment results and multi-assignment results can also be used for the proper capacity settings by considering the priority of route changes and volume shifts between links when links become saturated.

In addition, while using "person" trips is not a preferable choice for the assignment, by applying the much larger total trip volume, the priority of routes and volume shifts can be found.

(Screen Line Analysis with Survey Data)

Screen line analysis is one of the calibration methods to correct network settings. The first type of screen line analysis was done by comparing T-model2 results with the survey data. In general, the results of "vehicle equivalent" trips showed the best results among three trip types for all three methods. Those results were good enough for the simplified prototype modeling. Then, among the three methods, the "separated distribution and one assignment", were likely the best simulation method according to the comparison. In addition, the best value of the proportional difference between the results of "separated distribution and one assignment" with "vehicle equivalent" trips and the survey results was only 0.7%, which is acceptable for a prototype model.

In addition, the other two trip types, "person" and "mode" trips, also showed acceptable results, and can be used for specific purposes such as examinations of mode specific movements for "mode" trips or of overall travel movements for "person" trips. One note would be when "person" trips are used, it would be better to perform separated assignments based on each mode or to set network setting, particularly link capacity, to accommodate the number of the total "person" trips.

(Screen Line Analysis with Counting Data)

The second type of screen line analysis was performed by comparing T-model results with the counting results. Because of the low reliability of available data, the analysis was performed only as an examination of applying the several candidates of occupancy rates to discuss the reasonability of those settings. As a conclusion, the possible occupancy rate settings were reasonable according to the limited data from the occupancy study and the survey results. The estimated "person" trip volumes fit the range estimated by several occupancy rate settings, and those possible occupancy rate settings were high enough at peak time occupancy.

8.2 Recommendations

While this study has achieved its primary purposes, there were difficulties throughout this project. The documentation of those difficulties are important in order to establish systematic data structure and data processing procedure, both of which will be used for systematic transportation planning. That is, the documentation of experiences is necessary for further research, which is expected for more understanding of the transportation system and development of more effective transportation models.

This section refers to those difficulties, and suggests recommendations towards the problems. The difficulties are summarized in two categories. The first group is "survey data organization". They are further summarized as (1) survey methods, (2) sampling design, (3) survey instrument design, and (4) data processing procedures. The second category is "software application". They are also summarized as (1) the recognition of the target, (2) data management, and (3) data processing and calibration for the application. The explanations of these groups follow.

8.2.1 Survey Data Organization

The main difficulty during this project was the lack of applicable and reliable data. The household survey, the primary information source, also had several problems, particularly in terms of reliability, mainly because there was no survey documentation. That is, while the survey itself seemed to be reasonably well conducted, the details of the survey were unknown, causing the difficulties for processing and analyzing the data and for designing a next survey. It is therefore strongly recommended to document all the survey details for the next survey by referring to the guidance shown in Appendix C. The following notes describe some of the problems.

(Survey Method)

The survey method was not documented. That is, there were no records of survey objectives, definition of terms, administrative details nor selection of the survey. This situation made it difficult to understand how the survey was designed and conducted. In this study, the only sources for this information were meetings with city officials. From this point, documenting the survey details, at least the details of fundamental information, is crucial and strongly recommended.

(Sampling Design)

There was no documentation of sampling design. That is, there was no information on sampling methods nor selection of sample sizes. This study did examine the preferable sample sizes for each traffic zone in the reliability analysis. The existence of sampling bias was also confirmed in the analysis. These results should be considered for the next survey design in order to increase the reliability of survey. In addition, Appendix E can be used for the sample size calculation for the next survey.

(Survey Instrument Design)

While the response rate of survey was quite high, several incomplete survey forms were identified during the data processing stage. Some completed only the page for household information while others omitted some details of questions. While the survey instrument design was not responsible for all of these problems, there were certainly traces of misunderstanding of terms or inconsistency by respondents. In order to increase the accuracy of what the questions intend to ask, the survey instrument design should be examined once more with respect to the purposes of each questions.

(Survey Data Processing Procedure)

The most noticeable difficulty was inconsistency of data classifications. This is particularly for the definition of modes. Because of the existence of various travel modes in the city, the definitions and classification of modes, particularly of Collectibos, taxis, Mototaxis, motorbikes and bicycles, are important. As mentioned in the analysis, unclear definitions cause confusions. The improper classification or treatment of those data also directly causes difficulties for processing, analyzing and translating the data, reducing the reliability. Since "the existence of various modes" is the primary problem for the city, this point should be the first priority to be considered. In addition, those definitions should also be applied for other related research such as traffic counts and occupancy studies.

Besides the treatment of various modes, some of the definitions, classification and/or treatment of trip attributes in the processing stage were also unclear. The problems caused by these should be documented. For instance, the treatment of destination when the destination was an intersection, which is on the border of traffic analysis zones, was a problem. In this study, the priority of the distribution of trips to those traffic analysis zones on borders was decided by the ratio of populations of those corresponding traffic analysis zones.

8.2.2 Software Application

The most important difficulty of the software application for the city was the "existence of various modes". Since this characteristic is not seriously considered in T-model2, which was developed in a developed country where "automobiles" predominate the modal share, the treatment of this characteristics, particularly in the modal split and assignment stages, becomes crucial for the application. In order to deal with this characteristics, the development of new application methods is necessary. Since the options for software application mentioned in this study were basically trials of new methods and just the start of the development, further research for this matter is strongly expected. The notes of some problems with the computer program follows.

(Recognition of the Target)

While the primary objective of the software application is the development of effective transportation planning modeling tools, the target is not the movement of "automobiles" but the movement of "people". Since transportation is a "derived demand", the relationship between land use, human activities and travel behaviours should be considered carefully. Simultaneously, any specific mode should not be treated specifically. Unlike the situation where "automobiles" predominate the modal share, the roles of every mode in Piura are unique and important to human activities, and they are also closely interrelated to each other. Therefore, the treatment of those modes with respect to "people's" movement become crucial to the software application, and, as discussed in Chapter 7, both "people's" and "vehicular" movements should be carefully looked at.

(Data Management)

The data for the software application should be documented in detail. The definition and classification of data, the format of data, the treatment and settings of simulation variables and constants, and the consistency of those data with any other related or available information sources are important for an effective data management. For instance, the data for simulation runs should be compatible with the data of traffic counts or with the mode definitions in the survey in order to perform more effective model calibration.

(Data Processing and Calibration)

Calibrating a transportation model requires numerous repetition of simulation runs and analysis. In order to ease those steps, the data processing methods and procedures should also be documented for each data and each step. For instance, the details of each simulation run such as gravity model parameters, trip type settings and network settings should be specified each time in order to avoid confusion of calibration data, which usually becomes enormous.

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Appendix A

Zonificacion

"Zonificacion" is one of two land use classification methods used in the city of Piura. The "zonificacion" is based on specific-land uses. Their geographical size is small, and a sector consequently consists of several those specific uses.

Zonificacion has eight specific land uses. Seven of the land uses are specific and the other is the mixed use of specific ones (also called the city centre). The classification of those land uses is primarily based on the National Urban System Standard, which are used in many other cities in the country. The brief explanations seven primary specific land uses follow.

(1) Residential

The primary land use in the city, and they are further classified into two categories: conventional and non-conventional. The former consists of other land use characteristics such as economic activities, and the area is fairly urbanized. This land use is identified at central, north and west Piura, and north and east Castilla. The latter is primarily used only residential use, and a little other land use activities are identified.

(2) Commercial

This specific land use is further classified into two categories; central and local. The former is literally located in central area, and it consists of two major activity centres; the city centre and the central market. The latter is found in other parts of the city. They are usually localized market areas, but their size, both geographically and economically, is much smaller than the former.

(3) Industrial

This land use is primarily found at the north of Sánchez Cerro Avenue and mostly in West Piura. This land use is literally the centre of industrial activities, and the agricultural industry is particularly noticeable.

(4) Education

"Education", "health" and "recreation" are classified as necessary land uses for human activities. Education is further classified into five categories; initial, primary, secondary, post-secondary and special training institutes. The first three are well distributed all over the city, while special training institutes are mostly found in the central area. The primary post-secondary institutes are two universities; the National University of Piura and the University of Piura. The former is public and the latter is private.

(5) Health

Hospitals and clinics are the primary land use for this specific land use. There are two major hospitals, 11 clinics and two sanitary centres in the city.

(6) Recreation

This specific land use is for recreational and social purposes. Two stadiums, two coliseums, parks and clubs are the primary uses.

(7) Others

Other land uses include areas for forestation, agricultural areas, urban reserves, institutional and administrative services and other specific uses. Other necessary land uses for human activities such as cemeteries, transportation terminals and the airport are also included in this category.

Appendix B : Conversion Ratio of Traffic Analysis Zones

(1) Shares of Sectors to Traffic Analysis Zones

Traffic Zone No.	Population	Land Size (ha)	Share from Sectors (Sub-Sectors)					
			Sector No.	Share	Sector No.	Share	Sector No.	Share
1	1146	11	1-A	12.5%				
2	1591	18	1-A	12.5%	1-B	4.2%		
3	1591	18	1-A	12.5%	1-B	4.2%		
4	1146	11	1-A	12.5%				
5	11316	98	1-A	25.0%	1-B	16.7%	4-C	75.0%
6	1335	32	1-B	12.5%	3-A	12.5%		
7	5339	86	1-B	50.0%				
8	19414	140	1-A	25.0%	1-B	12.5%	1-C	75.0%
9	2415	75	3-A	87.5%	4-C	25.0%		
10	10491	76	2-A	24.0%				
11	6994	51	2-A	16.0%				
12	12016	72	1-C	25.0%	2-B	14.3%		
13	30687	377	4-B	100%				
14	19243	311	4-A	100%				
15	0	82	3-B	100%				
16	10491	76	2-A	24.0%				
17	15736	114	2-A	36.0%				
18	27015	159	2-B	57.1%				
19	31090	160	2-C	50.0%				
20	13508	80	2-B	28.6%				
21	22205	275	5-A	83.3%	5-B	33.3%		
22	8327	74	5-A	16.7%	6-A	50.0%		
23	26624	170	6-A	50.0%	6-B	100%		
24	37706	164	6-C	100%				
25	17691	131	5-B	66.7%				
26	-	-	-	-				
27	-	-	-	-				
28	-	-	-	-				
29	31090	160	5-B	50.0%				
30	-	-	-	-				
Total	366206	3023	-	-				

(1) Shares of Traffic Analysis Zones in Sectors

Sector No.	Sub-Sector No.	Population (person)	Land Size (ha)	Portion to Traffic Zones					
				Zone No.	Share	Zone No.	Share	Zone No.	Share
	A	9,167	89.00	1	12.5%	2	12.5%	3	12.5%
				4	12.5%	5	25.0%	8	25.0%
1 -	B	10,678	171.00	2	4.2%	3	4.2%	5	16.7%
				6	12.5%	7	50.0%	8	12.5%
	C	21,050	129.00	8	75.0%	12	25.0%		
Sub Total (by sector)		40,895	389.00						
	A	43,711	318.00	10	24.0%	11	16.0%	16	24.0%
				17	36.0%				
2 -	B	47,277	279.00	12	14.3%	18	57.1%	20	28.6%
	C	62,180	319.50	19	50.0%	29	50.0%		
Sub Total (by sector)		153,168	916.50						
3 -	A	-	68.00	6	12.5%	9	87.5%		
	B	-	82.00	15	100.0%				
Sub Total (by sector)		-	150.00						
	A	19,243	311.00	14	100.0%				
4 -	B	30,687	376.50	13	100.0%				
	C	9,660	63.00	5	75.0%	9	25.0%		
Sub Total (by sector)		59,590	750.50						
5 -	A	16,032	251.50	21	83.3%	22	16.7%		
	B	26,536	197.00	21	33.3%	25	66.7%		
Sub Total (by sector)		42,568	448.50						
	A	11,310	65.00	22	50.0%	23	50.0%		
6 -	B	20,969	137.50	23	100.0%				
	C	37,706	164.00	24	100.0%				
Sub Total (by sector)		69,985	366.50						
Sub Total : Piura		253,653	2206.00						
Sub Total : Castilla		112,553	815.00						
Total		366,206	3021.0						

Appendix C

Survey Documentation

Conducting a travel survey should follow a series of logical, interconnected steps. The stages of a typical sample survey are shown in Figure 5-1. The following outline provides a useful means of the survey documentation based on the stages. This outline is suggested by A. Richardson et al. (1995).

I. Preliminary Planning

- ◊ Administrative Details of the Survey
  - – the name of the survey?
  - – who sponsored the survey?
  - – who designed the survey?
  - – who collected the survey data?
  - – who analyzed the survey data?
  - – was there an Advisory Committee or Panel?
  - – dates and duration of the survey?
- ◊ Overall Study Objectives
  - – what were the objectives of the project to which this survey contributed?
  - – why was a survey needed?
- ◊ Specific Survey Objectives
  - – what were the specific objectives of this survey?
- ◊ Review of Existing Information
  - – what prior information was available?

  - what secondary information was available for sample expansion?

- ◊ Formation of Hypotheses
  - what specific hypotheses, if any, were to be tested?

- ◊ Definition of Terms
  - what definitions are being used by the survey team for key items such as trip, household, mode, income, etc. (as relevant to the specific survey)?

- ◊ Determination of Survey Resources
  - what time was available for completion of the survey?
  - how much money was available for the survey?
  - what people were available to work on the survey?

II. Selection of Survey Method

- ◊ Selection of Survey Time Frame
  - was the survey cross-sectional or time-series (and why)?

- ◊ Selection of Survey Technique
  - what methods were considered for the survey technique?
  - what testing was performed on the different methods?
  - what methods was finally selected (and why)?

III. Sample Design

- ◊ Definition of Target Population
  - what was the population for the survey?
  - how was this population defined and identified?

- ◊ Sampling Units
  - what unit was used for sampling?

- ◊ Sampling Frame

  - what sampling frame was used?
  - where was the sampling frame obtained from?
  - how was the sampling frame obtained?
  - why was the sampling frame first compiled?
  - how did the sampling frame perform in term of:
    - accuracy
    - completeness
    - duplication
    - adequacy
    - up-to-dateness

- ◊ Sampling Method
  - what sampling methods were considered?
  - what sampling method was finally chosen (and why)?
  - was the selected sample representative of the population?
    - if not, how will this be corrected later?
  - what was the specific sampling procedure (full details)?

- ◊ Consideration of Sampling Bias
  - what sources of sampling bias were considered?
  - how serious were these biases considered to be?
  - what steps were taken to overcome these sources of biases?

- ◊ Sample Size and Composition
  - what was the final sample size?
  - what stratifications were used in the sample design?
  - how was the sample size calculated?
    - what were the key variables considered?
    - what was the variability of these variables?
    - what confidence limits were used?

    - ∗ what levels of confidence were used

- ◊ Estimation of Parameter Variances
  - – how are parameter variances to be estimated in the data analysis?
- ◊ Conduct of Sampling
  - – what procedure was used in selecting the samples?
  - – was random sampling used at all stages of sampling?

IV. Survey Instrument Design

- ◊ Question Content
  - – what are types of information being sought in the survey?
- ◊ Trip Recording Techniques
  - – how are trips and activities being sought from respondents?
- ◊ Physical Nature of Forms
  - – what is the physical nature of the survey forms?
    - ∗ what paper size and weight was used?
    - ∗ what colors and printing methods were used?
- ◊ Question Types
  - – what classification questions were asked?
    - ∗ where did the classification categories come from?
  - – what attribute questions were asked?
    - ∗ what testing was performed on the attribute scales?
- ◊ Question Format
  - – which questions were asked as open questions (and why)?
  - – which questions were asked as closed questions (and why)?
    - ∗ where did the closed question categories come from?
- ◊ Question Wording

- how has the question wording been tested for:
  - simple vocabulary
  - words appropriate to the audience
  - length of questions
  - ambiguous questions (get someone else to read them)
  - double-barrelled questions
  - vague words
  - loaded questions
  - leading questions
  - double negatives
  - stressful questions
  - grossly hypothetical questions
  - the effect of response styles
  - periodicity questions

◊ Question Ordering

- what reasons are there for the question ordering?

◊ Question Instructions

- what instructions were provided for respondents/ interviewers?

V. Pilot Survey(s)

◊ Description of Pilot Surveys

- what pilot testing was performed?
- if no pilot testing was done, why not?

◊ Size of the Pilot Survey

◊ Lessons from the Pilot Survey

- how adequate was the sampling frame?

  - what was the variability within the survey population?
  - what response rate was achieved?
  - how suitable was the survey method?
  - how well did the questionnaire perform?
  - how effective was the interviewer training?
  - did the coding, data entry, editing and analysis procedures work satisfactorily?
- ◊ Cost and Duration of Pilot Surveys

VI. Survey Administration

- ◊ Survey Procedures
  - Self-Completion Questionnaires
    - pre-contact procedures
    - mail-out procedures
    - response receipt procedures
    - phone enquiry procedures
    - postal reminder regime
    - telephone follow-ups
    - validation interviews
    - non-response interviews
  - Personal Interviews
    - pre-contact procedures
    - call-back procedures
    - maintenance of survey logs
    - interviewer payment methods
    - field supervisor tasks
    - work distribution procedures
  - Telephone Interviews
    - sampling procedures

    - dealing with non-response
    - use of CATI systems
  - Intercept Surveys
    - procedures for obtaining respondents
    - distribution of surveys
    - collection of surveys
  - In-depth Interview Surveys
    - pre-contact procedures
    - call-back procedures
    - maintenance of survey logs
    - recording methods
    - transcription methods
    - interpretation of responses

VII. Data Processing (Coding)

- ◊ Selection of Coding Method
  - what physical method was used for data coding?
- ◊ Preparation of Code Format
  - what coding frame was used? (provide full coding frame in Appendix.)
  - what location-coding method was used?
- ◊ Development of Data Entry Programs
  - what special data entry programs were developed?
    (provide screen-shots of data entry screens in Appendix.)
- ◊ Coder and Data Entry Training
  - what training was provided for coders and data enterers?
    (provide training manual in Appendix.)

◊ Coding Administration

- how was the coding administrated?
- what quality control procedures were implemented?
- how were changes made to coding frames?

VIII. Data Editing

◊ Initial Questionnaire Editing

- what in-field checking was done by interviewer / supervisor?
- what checking was done on receipt in survey office?

◊ Verification of Data Entry

- was data entry verified for accuracy?

◊ Development of Editing Computer Programs

- were special data editing programs developed?

◊ Consistency and Range Checks

- what permissible range checks were applied?
  (provide full list of checks in Appendix.)
- what logic checks were applied?
  (provide full list of checks in Appendix.)

IX. Data Correction and Expansion

◊ Editing Check Corrections

- what procedures were used for office edits?

◊ Secondary Data Comparisons

- what secondary data was used for sample expansion?
- what variables were used for expansion purposes?
- was expansion based on cross-tabulations or marginal totals?

  - what were the final expansion factors?
  - how are they to be applied when using the data?

- ◊ Corrections for Internal Biases
  - what recognition was there of non-reported data?
  - were non-reporting factors calculated?
  - if so, how are they to be applied to the data?
  - what recognition was there of non-response?
  - what non-response factors calculated?
  - if so, how are they to be applied to the data?

X. Data Analysis

- ◊ Exploratory Data Analysis
  - what EDA methods were used?
- ◊ Model Building
  - is the data to be used to build specific models?
- ◊ Interpretation of Results
  - are any limitations on the data clearly stated?
  - how is the sampling error expressed?
- ◊ Database Management
  - is the structure of the data files clearly described?
  - are the relationships between data files clear?
- ◊ Provision of Data Support Services
  - what support is available for users of the data?
  - is it clear where such support can be obtained?

XI. Presentation of Results

- ◊ Presentation of Results of Analysis
  - – are the major descriptive results presented:
    - ∗ in a clear visual manner?
    - ∗ with accompanying written explanations?
    - ∗ with appropriate interpretations?
    - ∗ and with clear statement of any qualifications?
- ◊ Publication of Results
  - – are the results of the survey or the survey methodology written up in concise form, and available in the general literature?

XII. Tidying-up

- ◊ Storage and Archival of Data
  - – where is the data stored?
  - – who is the contact person?
  - – are telephone, fax and e-mail numbers provided?
  - – is this documentation stored electronically with the data?
  - – has the data been lodged with any other archival service?
- ◊ Completion of Administrative Duties
  - – have all survey staff been fully paid?
  - – have all outstanding bills been paid?
  - – what arrangements have been made for destroying original questionnaires?

Appendix D

Questionnaire Form

The questionnaire forms are presented in this appendix. Only the forms translated in English is attached, but the form is exactly same as the original form written in Spanish. The form consists of four pages. The contents are:

<English Form>

(1) domestic reports,
(2) household data,
(3) trip diary, and
(4) trip report to work.

1
Domestic
Report

All members of your household are required to complete this form.
All answers will be confidential and used only for the study.
It is not necessary to supply names or signatures.

Zone No.
Identification No.

A. How many people live in this house? (Do not include visitors.)
B. How many children under the age of five live in this house?
C. How many domestic employees in this house?

D. How many cars are owned by persons at this house ? (Include station wagon, jeeps, etc.)
E. How many cars kept at this address are on loan or borrowed? (Include station wagon, jeeps, etc.)
F. How many trucks or pick-up trucks are kept at this address?

G. List all persons 5 years or above that live at this address. Include domestic employees. List all visitors that live outside of the neighbourhood but are temporarily living this address.

Personal ID No.	Personal Identification (e.g. father, mother, ..)	Check if inter-viewed	Sex (Check)		Age Group (See coding below.)	Possession of driver's license		Do you make trips? (See section 3.)			Occupation (What do you do? Public Employee, private activity, retired, student, unemployed, etc.)	Place of Work (In what type of industry do you work? Public company, ministry, factory, etc.)
			M	F		yes	no	yes	no	don't know		
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												

< Age Group Coding >

1	2	3	4	5	6	7	8	9
5-10	11-15	16-20	21-25	26-35	36-45	46-55	56 - 65	over 65 ~

2
Household
Data

To be completed by the head of household.
All answers will be completely confidential and only be used for the study.

Zone No. ☐
Identification No. ☐

1. What type of residence do you live in now?

(Circle the applicable category.)

	Circle
1. A single family unattached house	1
2. A single family attached house	2
3. An apartment in a multi-family building	3
4. An apartment in a residential hotel or building	4
5. A retirement home	5
6. A company house	6

2. Rank the importance of each of the following reasons for choosing the location of your house:

(Circle the applicable grade of importance.)

	Very important		Important		not important		not at all
1. Good price or rent for the house.	1	*	2	*	3	*	4
2. Good neighbourhood.	1	*	2	*	3	*	4
3. Easy access to major road.	1	*	2	*	3	*	4
4. Good schools nearby.	1	*	2	*	3	*	4
5. Accessibility to public transit.	1	*	2	*	3	*	4
6. Close to work. Reasonable trip time.	1	*	2	*	3	*	4
7. Close to local central commercial area.	1	*	2	*	3	*	4
8. Close to principal commercial area.	1	*	2	*	3	*	4
9. Close to family and friend.	1	*	2	*	3	*	4
10. Close to church.	1	*	2	*	3	*	4
11. Others (Please specify.)	1	*	2	*	3	*	4

3. How long have you lived at this address? .... years .... months.

4. Where did you live before? .... (No. , Street, Area, District, Province)

5. What is the address of your place of work? .... (No. , Street, Area, District, Province)

6. How long have you worked there? .... years .... months.

7. What is the address of your working place previously? .... (No. , Street, Area, District, Province)

8. What is the approximate monthly income of your entire household? (Circle the applicable category.)

1. Less than ~ S/. 132
2. S/. 132 ~ S/. 300
3. S/. 300 ~ S/. 600
4. S/. 600 ~ S/. 1200
5. S/. 1200 ~ S/. 2400
6. S/. 2400 ~ S/. 4000
7. More than S/. 4000 ~

3
Trip
Diary

Each person over the age of 5 must report all trips that are made over a 24 hour period, starting at 4:00 AM in Piura or Castilla. Members of the household or domestic employees that are not live in, soldiers or visitors that are not from the neighbourhood must complete an individual form by each. If making more than 6 trips in a 24 hour period, please use another form.

Zone No. ☐
Identification No. ☐
Personal No. ☐

TRIP is the record of a journey from one point to another for a singular time period. The time period is considered to be the finish of one trip and the beginning of another.
Do not include stops that are not important: for example, stopping to drop letters, stopping to get gasoline, parking or transferring from one form of public transit to another.
Do not report trip made on foot, unless you walk to and from work.

How many days a week do you make trips? ____________

Pick a typical day from Monday to Friday, and fill in the following information:

Personal Identification ______________ (Please use the same identification as was used in Section 1.)

Trip No.	I started this trip at :				Walking Minutes to start the trip.	I ended this trip at :				Walking Minutes to finish the trip.	Type of property which is the trip destination	(A) Trip Purpose Circle an appropriate trip purpose	(B) Mode Circle a No.	How many transfers	Only for car drivers						
															Stationing of car at the end of trip						
	Address (Street, lot or property)	Time				Address (Street, lot or property)	Time								No. of persons in a car.	(C) Type of parking (Circle)	Duration of parking		Cost		(D) Payment method (Circle)
		Hr.	Min.	AM or PM			Hr.	Min.	AM or PM								Hr.	Min.	S/.	C	
1				AM or PM					AM or PM			from 1 2 3 4 5 6 7 8 9 to 1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8			1 2 3 4 5 6 7 8 9					M 1 D 2 DP 3
2				AM or PM					AM or PM			from 1 2 3 4 5 6 7 8 9 to 1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8			1 2 3 4 5 6 7 8 9					M 1 D 2 DP 3
3				AM or PM					AM or PM			from 1 2 3 4 5 6 7 8 9 to 1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8			1 2 3 4 5 6 7 8 9					M 1 D 2 DP 3
4				AM or PM					AM or PM			from 1 2 3 4 5 6 7 8 9 to 1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8			1 2 3 4 5 6 7 8 9					M 1 D 2 DP 3
5				AM or PM					AM or PM			from 1 2 3 4 5 6 7 8 9 to 1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8			1 2 3 4 5 6 7 8 9					M 1 D 2 DP 3
6				AM or PM					AM or PM			from 1 2 3 4 5 6 7 8 9 to 1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8			1 2 3 4 5 6 7 8 9					M 1 D 2 DP 3

(A)
1. Work
2. Personal Business
3. Shopping
4. Social
5. Recreation
6. School
7. Waiting for a ride
8. Changing modes
9. Home

(B)
1. Driving a car
2. Passenger in a
3. Passenger in a t
4. Public transit (Combi, omnibus)
5. School bus
6. Others
7. Walking

(C)
1. Free on a street
2. Parking metre (street)
3. Free
4. Paid
5. Free parking garage
6. Paid parking garage
7. Maintenance garage
8. Residential
9. Patrolled parking

(D)
M : Monthly
D : Daily
DP : Parking period

4 Trip Report to Work

To be completed by persons who work daily and who go to work either by driving a car or using public transit.
Please fill in either section (1) or (2) for each trip recorded in section 3.

Zone No. ☐
Identification No. ☐
Personal No. ☐

Section (1) For drivers only
(Fill out only if you drive to work.)

A. Rank the importance of the following reasons for using your car.

(Circle the applicable number.)	Very important		Important		Not much important		Not at all
1. I need a car to work. (For example, sales man, doctor, etc.)	1	*	2	*	3	*	4
2. The travel time by a car. - Time on a car? .... minutes - Time out of a car? .... minutes	1	*	2	*	3	*	4
3. The daily cost for traveling by a car. - Money spent (including parking cost). .... S/. per day - Money wasted (including parking cost). .... S/. per day	1	*	2	*	3	*	4
4. Using a car is more convenient.	1	*	2	*	3	*	4
5. Too far to walk to take public transit. - How long would you spend walking to take public transit? .... minutes - How long would you spend walking to reach your working place? .... minutes	1	*	2	*	3	*	4
6. Too much waiting time to take public transit. - How long do you spend waiting for public transit? .... minutes	1	*	2	*	3	*	4
7. Many transfers if I take public transit. - How many transfers? .... times	1	*	2	*	3	*	4
8. Public transit is not comfortable.	1	*	2	*	3	*	4
9. Others. (Please specify.)	1	*	2	*	3	*	4

B. Briefly describe the route you use to travel from home to work place.

C. Why did you chose this route and not another?	yes		no		neither
1. The trip duration is short.	1	*	2	*	3
2. The trip distance is short.	1	*	2	*	3
3. The traffic is not congested.	1	*	2	*	3
4. The scenery is nice on the route.	1	*	2	*	3
5. Necessary to pick up (drop off) passengers.	1	*	2	*	3
6. Others. (Please specify.)	1	*	2	*	3

Section (2) For public transit users only
(Fill out only if you use public transit to work.)

A. Rank the importance of the following reasons for taking public transit.

(Circle the applicable number.)	Very important		Important		Not much important		Not at all
1. I do not own my own car.	1	*	2	*	3	*	4
2. I do not have a driver's license.	1	*	2	*	3	*	4
3. The car is driven by other people.	1	*	2	*	3	*	4
4. The trip time for public transit. - Riding time? .... minutes - Waiting time? .... minutes	1	*	2	*	3	*	4
5. The daily cost for taking public transit. - Money spent (including parking cost). .... S/. per day - Money wasted (including parking cost). .... S/. per day	1	*	2	*	3	*	4
6. Public transit is safer than driving a car.	1	*	2	*	3	*	4
7. Public transit is more convenient.	1	*	2	*	3	*	4
8. Too far to walk from the parking lot to work. - How long is the walk from parking to work? .... minutes	1	*	2	*	3	*	4
9. Others .(Please specify.)	1	*	2	*	3	*	4

B. Briefly describe the route you use to travel from home to work place.

C. Why did you chose this route and not another?	yes		no		neither
1. The trip duration is short.	1	*	2	*	3
2. The trip distance is short.	1	*	2	*	3
3. There are free seats.	1	*	2	*	3
4. There are no transfers.	1	*	2	*	3
5. The service is frequent.	1	*	2	*	3
6. The scenery is nice on the route.	1	*	2	*	3
7. Others. (Please specify.)	1	*	2	*	3

Appendix E

Sample Size Calculation

The theory, which is at the heart of sample size estimation, is the "Central Limit Theorem." This theorem states that estimates of the mean of sample tend to become normally distributed as the sample size *n* increase. This normality of sample means applies irrespective of the distribution of the population from which the samples are drawn provided that the sample size is of reasonable size (n>30). For small sample sizes, the theorem still applies provided that the original population distribution is appropriately bell-shaped.

The basics of this theorem follows. Assume that a continuous variable (x), such as income, is defined. The distribution of this variable may be of any form. Then, assume that the population is of size N, and that the population distribution for the variable (x) has some true value μ and a true standard deviation σ as shown in Figure E-1.

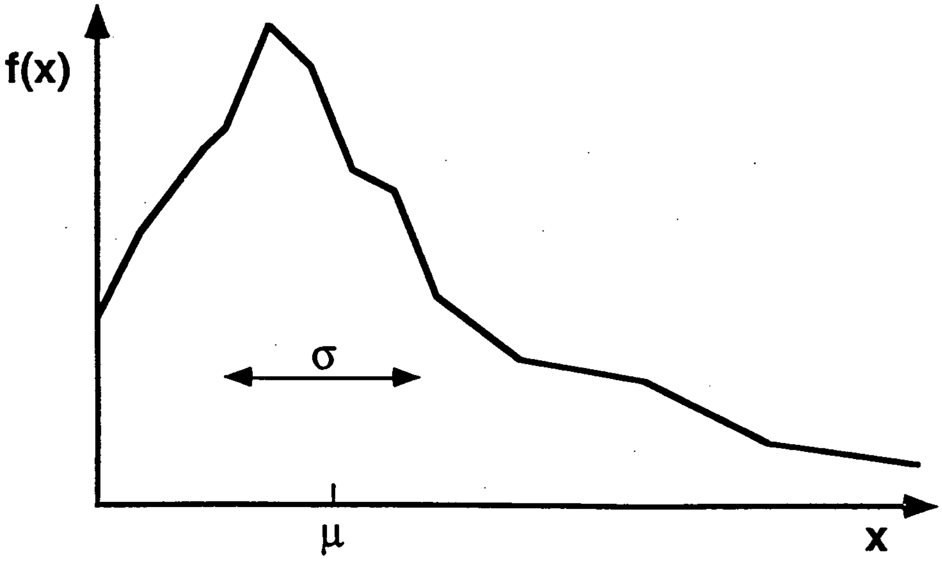

Figure E-1 Distribution of the Parametre in the Population

Source: A. Richardson et al. (1995), *Survey Methods for Transport Planning*

Assume that the variable (x) is income. When a sample of size *n* is drawn from this population, the mean income for that sample as m_1 and standard deviation for that sample as S_1 can be calculated. Then, by drawing *x* samples, a frequency distribution of the values m_1, m_2, m_3, ...m_x is constructed. The Central Limit Theorem states that this distribution is normally distributed with mean *m* (which is an unbiased estimate of the population mean μ .) as shown in Figure E-2.

The standard deviation of this distribution of sample means, which is referred to as the standard error of the mean (*s.e.(m)*), is given by:

$$s.e.(m) = \sqrt{\left(\frac{N - n}{N}\right) \times \left(\frac{\sigma^2}{n}\right)} \qquad \text{(E.1)}$$

The above discussion has been based on taking repeated samples from a population. This, however, is not possible in general, and, therefore, it is

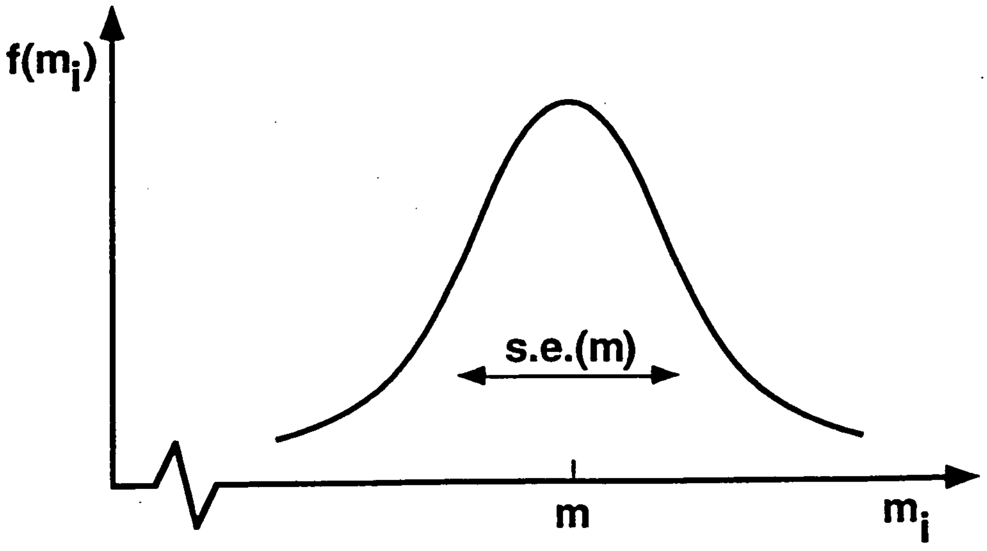

Figure E-2 Distribution of the Means of Independent Samples

Source: A. Richardson et al. (1995), *Survey Methods for Transport Planning*

necessary to make some estimates based on a single sample of size *n*. in such a situation, the best estimate of μ is given by m_1 and similarly the best estimate of σ is given by S_1 (referred to as *S*). Therefore, on the basis of a single sample, the standard error of the mean is estimated as:

$$s.e.(m) = \sqrt{\left(\frac{N-n}{N}\right) \times \left(\frac{S^2}{n}\right)} \qquad \text{(E.2)}$$

where S = a standard deviation for a sample

The standard error is a function of three variables: (1) the variability of the parametre in the population (represented by the true standard deviation of σ), (2) the sample size (*n*), and (3) the population size (*N*). However, for large populations and small sample sizes (which is often the case in transport surveys), the finite population correction factor (*N-n*)/*N* is very close to unity. In such situations, the equation for standard error of the mean may be reduced to the more familiar form of:

$$s.e.(m) = \sqrt{\frac{S^2}{n}} = \frac{S}{\sqrt{n}} \qquad \text{(E.3)}$$

This equation highlights the most important aspect of sample size determination. That is, as sample size increases, the standard error of the mean will decrease but only in proportional to the square root of the sample size. Thus, quadrupling the sample size will only halve the standard error of the mean. Increasing sample size is, therefore, a clear case of diminishing marginal returns with respect to decreases in standard error of the mean.

Reference to the properties of the normal distribution, dictated by the Central Limit Theorem, also enables an estimate to be made of the accuracy of the sample mean *m* as a reflection of the true population mean μ. Such estimates are calculated using the concept of confidence limits associated with the normal distribution. Thus, some 95% of all sample means (from sample of size *n*) would lie within two standard errors on either side of the true mean, so that there is a probability of only about one in twenty that the deviation between a sample mean and the true mean will exceed a value greater than twice the standard error.

Given the foregoing discussion, the required sample size can be estimated by solving for n in equation (E.2). This is most easily done in stages by first solving for n in equation (E.3) such that:

$$n* = \frac{S^2}{(s.\ e.\ (m))^2} \qquad \text{(E.4)}$$

$$s.e.(m) = s.e.(\mu) = \frac{C}{z} \qquad \text{(E.5)}$$

where $n*$ = the calculation result for n in equation (E.3)

μ = true mean value,

C = Confidence limit

z = a value for a level of confidence

Then, correcting for the finite population effect, if necessary, such that:

$$n = \frac{n*}{1 + \frac{n*}{N}} \qquad \text{(E.6)}$$

In addition, in the case for a 95% level of confidence, a value which corresponds to this level of confidence is 1.96, and the confidence limit is calculated by:

$$C = 0.05 \times m \qquad \text{(E.7)}$$

For the recalculation of sample sizes, newly obtained values for the mean and standard deviation used for the calculation above.

Appendix F

Calculations for T-model2 Simulation

This section follows the calculation methods of the eight simulation steps according to Figure 7-5. The steps are :

① Total Trip Estimation

② Total Vehicle Trip Estimation

③ Pre-distribution Modal Split

④ Trip Type Transformation (1)

⑤ Gravity model Distribution

⑥ Post-distribution Modal Split

⑦ Trip Type Transformation (2)

⑧ Assignment

1. Total Trip Estimation

"Total trip estimation" is the stage which is equivalent to the trip generation. In fact, those trip generation models in this study are constructed based on these estimated total trips. Since the quality of the trip generation models are relatively low, the estimated trips explained in this section are also used for T-model2 simulation. The outcome of this stage is OD sets of each traffic analysis zone (hereafter simply called zone).

(Estimated Zonal Trips)

Among the four types of multiplication factors (population expansion factors),
PPL3 has been chosen as the most reliable multiplication factor. The multiplication factor is based on both the difference between the number of household members and the estimated population in a traffic analysis zone and the portion between the number of people who make trips and people who were interviewed. The factor and the total estimated trips from zone *Z* are calculated by :

$$M_z = \left(\frac{P_z}{P_c^z}\right) \times \left(\frac{I_{nst} + I_{st}}{I_{st}}\right)$$
$$T_z = M_z \times TC_z = \left(\frac{P_z}{P_c^z}\right) \times \left(\frac{I_{nst} + I_{st}}{I_{st}}\right) \times TC_z \qquad (1), (2)$$

where M_z = Multiplication factor PPL3 for zone Z

P_z = Estimated total population for zone Z

P_c^z = The total number of people counted from zone Z

I_{nst} = The total number of people who make trips, but did not answer for trip diary (from zone Z)

I_{st} = The total number of people who make trips and answered for trip diary (from zone Z)

T_z = Estimated total trips generated from zone Z

TC_z = Total number of counted trips generated from zone Z

(Estimated Total Trips)

TC_z is easily given by summing specifically attracted trips from zone i to zone j. Therefore, T_z and the estimated total trips generated from all zones are calculated by following:

$$T_z = M_z \times TC_z = M_z \times \sum_j \sum_i OT_{ij}^z$$
$$ETT = \sum_z T_z = \sum_z (M_z \times TC_z) = \sum_z (M_z \times \sum_j \sum_i OT_{ij}^z) \qquad (3), (4)$$

where ETT = Estimated total trips from all zones

OT_{ij}^Z = The number of observed attracted trips from zone i to zone j, which are generated from zone Z

When the specific trips are considered, each OT_{ij}^z has attributes of trip types, time periods, and modes. Therefore, TC_z and ETT are expressed by:

$$TC_z = \sum_k \sum_t \sum_m \{\sum_j \sum_i OT_{ij}^z(k,t,m)\}$$

$$ETT = \sum_z (M_z \times TC_z) = \sum_z \left[M_z \times \{\sum_k \sum_t \sum_m \sum_j \sum_i OT_{ij}^z(k,t,m)\} \right] \qquad (5), (6)$$

where k = Trip type (trip purpose) k

t = Time period t

m = Mode m

For the specific case with trip type k_1, time period t_1 and mode m_1, the specific $TCz(k_1, t_1, m_1)$ and $ETT(k_1, t_1, m_1)$ are expressed by :

$$TC_z(k_1,t_1,m_1) = \sum_j \sum_i OT_{ij}^z(k_1,t_1,m_1)$$

$$ETT(k_1,t_1,m_1) = \sum_z \{M_z \times TC_z(k_1,t_1,m_1)\} = \sum_z \left[M_z \times \{\sum_j \sum_i OT_{ij}^z(k_1,t_1,m_1)\} \right] \qquad (7),(8)$$

(Origin and Destination)

The estimated origin and destination trips are calculated by :

$$EOT_i = \sum_z (M_z \times \sum_j OT_{ij}^z) = \sum_z \left[M_z \times \sum_k \sum_t \sum_m \{\sum_j OT_{ij}^z(k,t,m)\} \right]$$

$$EDT_j = \sum_z (M_z \times \sum_i OT_{ij}^z) = \sum_z \left[M_z \times \sum_k \sum_t \sum_m \{\sum_i OT_{ij}^z(k,t,m)\} \right] \qquad (9), (10)$$

where EOT_i = Estimated total origin trips from zone i

EDT_j = Estimated total destination trips to zone j

k, t, m = Trip attributes (trip type, time period, mode)

For the specific case with trip type k_1, time period t_1 and mode m_1, the specific $EOT_i(k_1, t_1, m_1)$ and $EDT_j(k_1, t_1, m_1)$ are expressed by :

$$EOT_i(k_1,t_1,m_1) = \sum_z \left[M_z \times \{\sum_j OT_{ij}^z(k_1,t_1,m_1)\} \right]$$
$$EDT_j(k_1,t_1,m_1) = \sum_z \left[M_z \times \{\sum_i OT_{ij}^z(k_1,t_1,m_1)\} \right] \qquad (11), (12)$$

(Estimated Total Trips for Hour Period)

Since "time" periods are not divided by "hour" periods and since T-model2 modeling requires "hour" period trips as input, it is necessary to convert trips of "time" period to trips of "hour" period. In the setting for the analysis, "time" periods are set as a series of "hour" periods. That is one "time" period consists, never shares, several "hour" periods. When time period t_q consists n hour periods h_p ($p=p_1...p_n$), the estimated total trips for the hour period h_p is given by taking the share of estimated total trip for time period t_q. The share is easily given by assuming that the share of estimated trips is the same as the share of counted trips. That is, the observed trip generation rates of hour periods within a time period is unique in total and applicable to estimate the estimated total trips regardless of any other land use or travel characteristics. The relationship is :

$$ETT(t_q) = \sum_p HETT(h_p)$$
$$H(h_p,t_q) = \frac{HETT(h_p)}{ETT(t_q)} = \frac{HETT(h_p)}{\sum_p HETT(h_p)} \cong \frac{TC(h_p)}{TC(t_q)} = \frac{TC(h_p)}{\sum_p TC(h_p)} \qquad (13), (14)$$

where $ETT(t_q)$ = Estimated total trips during "time" period t_q

$HETT(h_p)$ = Estimated total trips during "hour" period h_p

$H(h_p,t_q)$ = Hour period factor for "hour" period h_p in "time" period t_q

$TC(t_q)$ = The number of counted trips during "time" period t_q

$TC(h_p)$ = The number of counted trips during "hour" period h_p

Then, $HETT(h_p)$ is calculated by :

$$HETT(h_p) = H(h_p,t_q) \times ETT(t_q) = H(h_p,t_q) \times \sum_z \left[M_z \times \{ \sum_k \sum_m \sum_i \sum_j OT_{ij}^z(k,t_q,m) \} \right] \quad (15)$$

For the specific case with trip type k_1 and mode m_1, the specific $HETT(h_p{:}k_1,m_1)$ is expressed by :

$$HETT(h_p{:}k_1,m_1) = H(h_p,t_q) \times ETT(k_1,t_q,m_1) = H(h_p,t_q) \times \sum_z \left[M_z \times \{ \sum_i \sum_j OT_{ij}^z(k_1,t_q,m_1) \} \right] \quad (16)$$

(Origin and Destination for Hour Period)

The estimated origin and destination trips for hour period are calculated by :

$$HEOT_i(h_p) = H(h_p,t_q) \times \sum_z \left[M_z \times \sum_k \sum_m \{ \sum_j OT_{ij}^z(k,t_q,m) \} \right]$$

$$HEDT_j(h_p) = H(h_p,t_q) \times \sum_z \left[M_z \times \sum_k \sum_m \{ \sum_i OT_{ij}^z(k,t_q,m) \} \right] \quad (17), (18)$$

where $HEOT_i(h_p)$ = Estimated generated trips from zone i during hour period h_p

$HEDT_j(h_p)$ = Estimated attracted trips to zone j during hour period h_p

k, t_q, m = Trip attributes (trip type, time period, mode)

For the specific case with trip type k_1 and mode m_1, the specific $HEOT_i(h_p{:}k_1,m_1)$ and $HEDT_j(h_p{:}k_1,m_1)$ are expressed by :

$$HEOT_i(h_p{:}k_1,m_1) = H(h_p,t_q)\times\sum_z\left[M_z\times\{\sum_j OT_{ij}^z(k_1,t_q,m_1)\}\right]$$
$$HEDT_j(h_p{:}k_1,m_1) = H(h_p,t_q)\times\sum_z\left[M_z\times\{\sum_i OT_{ij}^z(k_1,t_q,m_1)\}\right] \quad (19), (20)$$

The morning peak period hour of h_3, which is included in time period t_1, is focused for the T-model2 simulation. Therefore, origin and destination trips for this specific hour period is expressed as :

$$HEOT_i(k_1,m_1) = H_3\times\sum_z\left[M_z\times\{\sum_j OT_{ij}^z(k_1,t_1,m_1)\}\right]$$
$$HEDT_j(k_1,m_1) = H_3\times\sum_z\left[M_z\times\{\sum_i OT_{ij}^z(k_1,t_1,m_1)\}\right] \quad (21), (22)$$

where $HEOT_i(k_1,m_1)$ = Estimated origin trips with trip type k_1 and mode m_1 from zone i for peak hour period h_3

$HEDT_j(k_1,m_1)$ = Estimated destination trips with trip type k_1 and mode m_1 from zone j for peak hour period h_3

H_3 = $H(h_3, t_1)$, hour period factor for "hour" period h_3 (h_3 =0.525: 52.5% of time period t_1)

2. Total Vehicle Trip Estimation

This stage is required in Option 2 in Figure 7-5 because trip generation models based on "mode (or actual vehicular)" trips or "vehicle equivalent" trips are not constructed in this study. There are two methods for this stage. The first is transforming the estimated total "person" trips to "vehicle equivalent" trips, and the second is using "vehicle equivalent transfer (VET) factors", which work just as multiplication factors, to directly estimate "vehicle equivalent" trips from original survey data. For Option 2 of Chapter 7, the first method is applied.

(Transformation from "Person" Trips to "Vehicle Equivalent" Trips)

The first method is simply transform the estimated total "person" trips to "vehicle equivalent" trips. "Mode" trips and "vehicle equivalent" trips are transformed from the estimated total (or mode specific) "person" trips by using occupancy rates (OCC) and vehicle equivalent factors (VEF). First, the mode specific "person" trips by mode *m* from zone *Z* are estimated by:

$$MT_z(m) = M_z \times TC_z(m)$$
$$T_z = M_z \times TC_z = \sum_m \{M_z \times TC_z(m)\} = \sum_m MT_z(m) \qquad (23), (24)$$

where $TC_z(m)$ = Counted trips by mode *m* originated from zone *Z*

$MT_z(m)$ = Estimated "person" trips by mode *m* from zone *Z*

Then, "mode" trips are calculated by using occupancy rates, and then "vehicle equivalent" trips are calculated by using vehicle equivalent factors. The vehicle equivalent factors are set to standardize each specific mode to regular "automobile" terms.

$$MVT_Z(m) = \frac{MT_Z(m)}{OCC_m}$$

$$MVT_Z = \sum_m MVT_Z(m) = \sum_m \frac{MT_Z(m)}{OCC_m} \qquad (25), (26)$$

$$EVET_z(m) = MVT_z(m \times VEF_m = \{\frac{MT_z(m)}{OCC_m}\} \times VEF_m = MT_z(m) \times (\frac{VEF_m}{OCC_m})$$

$$EVET_z = \sum_m EVET_z(m) = \sum_m \{\frac{MT_z(m)}{OCC_m} \times VEF_m\} = \sum_m \{MT_z(m) \times (\frac{VEF_m}{OCC_m})\} \qquad (27), (28)$$

where $MVT_z(m)$ = "mode" trips by mode *m* from zone *Z*

MVT_z = Total "mode" trips from zone *Z*

OCC_m = Occupancy rates for mode *m*

$EVET_z(m)$ = Estimated vehicle equivalent trips by mode *m* from zone *Z*

$EVET_z$ = Estimated total vehicle equivalent trips from zone *Z*

VEF_m = Vehicle equivalent factor for mode *m*

Then, the estimated total vehicle equivalent trips (*ETVT*) are calculated by:

$$ETVT = \sum_Z EVET_Z = \sum_Z \{\sum_m \{MT_Z(m) \times (\frac{VEF_m}{OCC_m})\} = \sum_Z \{\sum_m \{M_Z \times TC_Z(m) \times (\frac{VEF_m}{OCC_m})\} \qquad (29)$$

where ETVT = Estimated total vehicle equivalent trips

(Application of vehicle equivalent transfer factors)

The second method is using "vehicle equivalent transfer (VET) factors". These VET factors are "zone-specific", and work just as multiplication factors. By using these VET factors, the total "vehicle equivalent" trips are directly estimated from the original "person" trip survey data.

Those original VET factors, $(VET_Z)_0$, are given simply by comparing two different types of the total estimated zonal trips, "person" trips and "vehicle equivalent" trips, both of which are mentioned in the first method, as:

$$(VET_Z)_0 = \frac{T_Z}{EVET_Z} = \frac{\sum_m MT_Z(m)}{\sum_m \{MT_Z(m) \times (\frac{VEF_m}{OCC_m})\}} = \frac{TC_Z}{\sum_m \left\{TC_Z(m) \times \left(\frac{VEF_m}{OCC_m}\right)\right\}} \qquad (30)$$

where $(VET_Z)_0$ = Original vehicle equivalent transfer factor for zone Z

Then, the estimated total vehicle equivalent trips, *ETVT*, are expressed as:

$$ETVT = \sum_Z EVET_Z = \sum_Z \left\{\frac{T_Z}{(VET_Z)_0}\right\} = \sum_Z \left[\left\{\frac{M_Z}{(VET_Z)_0}\right\} \times TC_Z\right] \qquad (31)$$

where ETVT = Estimated total vehicle equivalent trips

Since the multiply factors can be included in the original VET factors, the finalized VET factors, VET_Z, and the estimated total vehicle equivalent trips are expressed as:

$$VET_Z = \frac{M_Z}{(VET_Z)_0} = \frac{M_Z \times \sum_m \left\{TC_Z(m) \times \left(\frac{VEF_m}{OCC_m}\right)\right\}}{TC_Z}$$

$$ETVT = \sum_Z \left[\left\{\frac{M_Z}{(VET_Z)_0}\right\} \times TC_Z\right] = \sum_Z (VET_Z \times TC_Z) = \sum_Z \left[M_Z \times \sum_m \left\{TC_Z(m) \times \left(\frac{VEF_m}{OCC_m}\right)\right\}\right]$$

(32), (33)

where VET_Z = Finalized vehicle equivalent transfer factor for zone Z

As shown in Equation (33), the required variables for calculating the estimated total vehicle equivalent trips are multiply factors, “mode specific” counted trips, occupancy rates, and vehicle equivalent factor. Since VET factors are zone specific, both occupancy rates and vehicle equivalent factors, can also be set zone specifically. That is, the different uses of specific modes of each traffic analysis zone, which are the results of the travel characteristics of the specific zone, can be considered in the trip estimation.

(Vehicle Equivalent Origin and Destination)

By applying the results above, the “vehicle equivalent” origin and destination trips of hour period h_p are calculated in two way as :

$$VHOT_i(h_p) = H(h_p,t_q) \times \sum_Z \left[M_Z \times \sum_k \sum_m \left\{ \left(\frac{VEF_m}{OCC_m} \right) \times \sum_j OT_{ij}^z(k,t_q,m) \right\} \right]$$

$$VHDT_j(h_p) = H(h_p,t_q) \times \sum_Z \left[M_Z \times \sum_k \sum_m \left\{ \left(\frac{VEF_m}{OCC_m} \right) \times \sum_i OT_{ij}^z(k,t_q,m) \right\} \right]$$

(34), (35)

or

$$VHOT_i(h_p) = H(h_p,t_q) \times \sum_z \left[VET_Z \times \sum_k \sum_m \{ \sum_j OT_{ij}^z(k,t_q,m) \} \right]$$

$$VHDT_j(h_p) = H(h_p,t_q) \times \sum_z \left[VET_Z \times \sum_k \sum_m \{ \sum_i OT_{ij}^z(k,t_q,m) \} \right]$$

(36), (37)

where $VHOT_i(h_p)$ = Vehicle origin trips from zone i during hour period h_p

$VHDT_j(h_p)$ = Vehicle destination trips from zone j during hour period h_p

3. Pre-distribution Modal Split

Pre-distribution modal split in T-model2 requires the number of origin and destination trips of each trip type. (In T-model2 six trip types are allowed to be used.) By using modal share equation function (MSE) and land use or zone characteristics, this function derives origin and destination sets for each mode and each trip type. The input and output equations are below :

(Input)

$$HEOT_i(k) = H_3 \times \sum_z \left[M_z \times \sum_m \{ \sum_j OT_{ij}^z(k,t_1,m) \} \right]$$
$$HEDT_j(k) = H_3 \times \sum_z \left[M_z \times \sum_m \{ \sum_i OT_{ij}^z(k,t_1,m) \} \right] \qquad (38), (39)$$

(Output)

$$OND_i(k,m) = HEOT_i(k) \times \sum_{x:1\sim 4} \{ MSE(k,m,x) \times LU_{ix} \}$$
$$DEST_j(k,m) = HEDT_j(k) \times \sum_{x:5\sim 8} \{ MSE(k,m,x) \times LU_{jx} \} \qquad (40), (41)$$

where $OND_i(k,m)$ = Adjusted origin of type k and mode m from zone i
$DEST_j(k,m)$ = Adjusted destination of type k and mode m from zone i
$MSE(k,m,x)$ = Modal share Equation factor for type k, mode$m$ and land use characteristics x
LU_{ix} = Land use characteristics x for zone i (x: 1~4 for origin, and 5~8 for destination)

The output origin and destination can be based on either "person" trips or "vehicular" trips, depending on the setting of MSEs. Because of the low reliability of data for MSE setting, this method is not used for this study. Instead, the estimated zonal vehicular trips, calculated by Equation (25) to (28), are used for the simulations after re calculated to hourly term.

4. Trip Type Transformation (1)

This trip type formation, which is used in option (3), is performed after pre-distribution modal split is executed. This transformation creates only one OD set by summing up "mode specific" OD sets. For this purpose, trips have to be standardized to "vehicle equivalent" trips. The input trips can be either "person" trips or "vehicular" trips, depending on the setting of MSE in the per-distribution modal split stage. The input OD sets and the output OD set are expressed as:

(Input)

$$\begin{aligned} OND_i(k,m) &= HEOT_i(k) \times \sum_{x:1\sim 4} \{MSE(k,m,x) \times LU_{ix}\} \\ DEST_j(k,m) &= HEDT_j(k) \times \sum_{x:5\sim 8} \{MSE(k,m,x) \times LU_{jx}\} \end{aligned} \qquad (42), (43)$$

(Output)

$$\begin{aligned} VEO_i(k) &= \sum_m \left\{ OND_i(k,m) \times \left(\frac{VEF_m}{OCC_m} \right) \right\} \\ VED_j(k) &= \sum_m \left\{ DEST_j(k,m) \times \left(\frac{VEF_m}{OCC_m} \right) \right\} \end{aligned} \qquad (44), (45)$$

where $VEO_i(k,m)$ = "Vehicle equivalent" origin of type k and mode m from zone i

$VED_j(k,m)$ = "Vehicle equivalent" destination of type k and mode m from zone j

Since pre-distribution modal split is not used in this study, the results of the "vehicle equivalent" trip estimation, shown in Equations (34) and (35), are directly used for the simualtion.

5. Gravity model Distribution

The gravity model distribution in T-model2 is fairly flexible. It can work with either "person" trips, "mode specific person" trips, "mode specific vehicular" trips or "vehicle equivalent" trips. Because of this characteristics, the input OD set(s) varies, depending on the trip type dealt with.

In either case, the input of one gravity model distribution run is an OD set. Here, the estimated total morning peak hour origin and destination trips are used as an example. The input is :

$$HEOT_i = H_3 \times \sum_z \left[M_z \times \sum_k \sum_m \{ \sum_j OT_{ij}^z (k, t_1, m) \} \right]$$

$$HEDT_j = H_3 \times \sum_z \left[M_z \times \sum_k \sum_m \{ \sum_i OT_{ij}^z (k, t_1, m) \} \right] \quad (46), (47)$$

where $HEOT_i$ = Estimated total morning peak hour origin from zone i

$HEDT_j$ = Estimated total morning peak hour destination to zone j

Then, the model calculates estimated trips from zone i to zone j, the outcome of distribution, by applying the $HEOT_i$ and $HEDT_j$ as "production" and "attraction."

$$T_{ij} = \frac{\dfrac{P_i A_j}{\left\{ (D_{ij})^{\beta} + K (D_{ij})^{\alpha} \right\}}}{\sum \dfrac{A_j}{\left\{ (D_{ij})^{\beta} + K (D_{ij})^{\alpha} \right\}}} \quad (48)$$

where T_{ij} = trips between zones i to j

Pi = productions (origins) at zone i

Aj = attractions (destination) at zone j

Dij = distance between zones i and j

K = constant

α, β = exponents

6. Post-distribution Modal Split

Post distribution modal split is executed when total "person" trips are applied to the gravity model distribution. That is, the input, the distributed trips T_{ij}, should be based on "person" trips. The output trips for mode *m*, $T_{ij}(m)$ is also basically "person" trips. The calculation is done by using modal share percentage (MS_m).

$$MS_m = \frac{\{I_{ij}(m)\}^b}{\sum \{I_{ij}(m)\}^b} \times 100$$

$$T_{ij}(m) = T_{ij} \times \frac{MS_m}{100} = T_{ij} \times \left[\frac{\{I_{ij}(m)\}^b}{\sum \{I_{ij}(m)\}^b} \right] \qquad (49), (50)$$

where MS_m = Modal share percentage for mode *m*
$I_{ij}(m)$ = Modal impedance of zonal interchange i to j for mode *m*
b = Exponent for the trip type being considered
$T_{ij}(m)$ = Mode specific trips from zone *i* to zone *j*

As mentioned, the output is "mode specific person" trip tables. The trip tables are easily converted to "mode specific vehicular" trip tables by dividing them by occupancy rates. Thus, the outcome of this method can be either mode specific "person" trip tables or mode specific "vehicular" trip tables.

Same as pre-distribution modal split, this method is not used for the simulations in this study because of the low reliability of data for MS_m setting. In order to use this method, the reliable modal share data, for which quite extensive research is required, is necessary.

7. Trip Type Transformation (2)

This trip type transformation is used in Option (1). This method is applied after post-distribution modal split is executed. This transformation transforms the outcome of post-distribution modal split, mode specific "person" trip tables or mode specific "vehicular" trip tables, to a total "vehicle equivalent" trip table. When the input trips are "person" trips, the calculations are :

$$VT_{ij}(m) = T_{ij}(m) \times \frac{VEF_m}{OCC_m}$$

$$VT_{ij} = \sum_m \{VT_{ij}(m)\} = \sum_m \left\{ T_{ij}(m) \times \frac{VEF_m}{OCC_m} \right\} \qquad (51), (52)$$

where $VT_{ij}(m)$ = Vehicle equivalent trips from zone i to zone j for mode m

VT_{ij} = Vehicle equivalent trips from zone i to zone j

As mentioned, the output of this method is one "vehicle equivalent" trip table.

8. Assignment

In this study, all the assignment runs are performed by T-model2. That is, only the method used in T-model2 is applied. The explanations are omitted in this section because the detailed explanations of simulation procedure have already done in Section 7.1.