

## 11 ENVIRONMENTAL CONDITIONS

### 11.1 Natural Environmental Condition

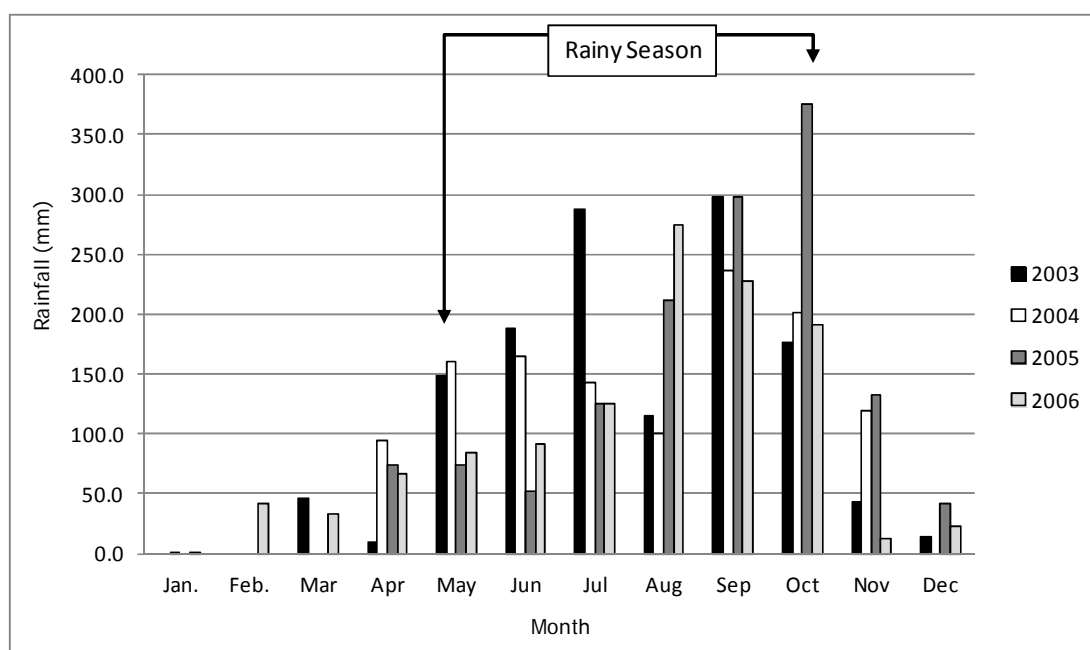
#### 11.1.1 Geographic Features

Cambodia is located in the middle of the Indochina Peninsula and it has an area of approximately 181,035 km<sup>2</sup>. The country shares borders with Thailand, Vietnam and Lao People’s Democratic Republic (PDR). The Mekong River, which flows through central Cambodia from north to south, provides natural resources and contributes to the livelihood of the Cambodian people. Besides, Tonle Sap, which is the largest freshwater lake in Southeast Asia, is also located in central Cambodia and flows as Tonle Sap River into Mekong River at Phnom Penh.

Phnom Penh locates at a corner of the triangle formed by the Mekong Delta and faces a meeting point of two large-sized rivers as explained above. The land is fertile and relatively flat of which altitude ranges from two to four meters above sea level in general.

#### 11.1.2 Climate

Phnom Penh enjoys a tropical monsoonal climate and has two major seasons: rainy season from May to October, and dry season from November to April. Monthly average rainfall of Phnom Penh ranges from 0 to 300 mm in general. The average rainfall from 2003 to 2006 is indicated in the following figure and table.



Source: Statistical Year Book of Cambodia 2008

**Figure 11.1-1 Monthly Average Rainfall in Phnom Penh from 2003 to 2006**

**Table 11.1-1 Monthly Average Rainfall in Phnom Penh from 2003 to 2006 (Unit: mm)**

	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2003	0.0	0.0	46.6	10.1	148.1	188.0	288.0	115.1	298.5	175.8	42.8	13.4	1,326.4
2004	0.4	0.0	0.0	94.8	160.6	164.2	142.7	101.1	237.2	202.1	118.8	0.0	1,221.9
2005	-	-	-	73.7	73.5	52.3	125.2	212.1	298.4	375.1	132.7	42.6	1,385.6
2006	0.1	42.1	32.8	66.4	84.0	92.0	124.8	274.2	228.2	190.9	12.4	23.0	1,170.9

Source: Statistical Year Book of Cambodia 2008

In the rainy season, the temperature tends to go down around 22 degrees Celsius because of the wind from the Gulf of Thailand, while in the dry season the highest temperature reaches 40 degrees Celsius. The average temperature is around 29 degrees Celsius and humidity is high in Phnom Penh.

**Table 11.1-2 Average Temperature of Phnom Penh, 2003-2006 (°Celsius)**

	2003	2004	2005	2006	Average of 4 years
Highest Temp	35.6	35.5	33.8	33.5	34.6
Lowest Temp	22.2	21.8	24.5	24.8	23.3

Source: Statistical Year Book of Cambodia 2008

Under such natural condition including the geography and climate, Phnom Penh sometimes experience flooding in rainy season due to rivers nearby.

### 11.1.3 Conservation Area

Many protected conservation areas of natural and historical resources exist in Cambodia and the Ministry of Environment (MOE) has designated them into the following: as a National Park, a Wildlife Sanctuary, Protected Landscape and Multiple Use Management Area. There are, however, no such conservation areas in Phnom Penh. On the other hand, some wetlands are found in Phnom Penh because of its lowlands. In order to conserve this diverse ecosystem, four wetlands are designated in Phnom Penh.

**Table 11.1-3 Wetlands in Phnom Penh**

Wetland	Type of Wetland	Location	Elevation AV(m) (max)	Area (ha)			Wetland types	Soil types
				Water surface	Marshes	Total		
Prasat Tuyo Lake	Fresh Water	About 57 km East of Phnom Penh	7	7,000	65,000	72,000	Lakes, flooded forest, marshes, rice fields and lotus ponds	Brown alluvial
Boeung Veal Samnap	Fresh Water	About 10 km NE Phnom Penh	9	2,800	8,050	10,850	Lakes, flooded forest and marshes	Clay and alluvial
Boeung Prang	Fresh Water	11 km NE of Phnom Penh	6	1,700	10,900	12,600	Lakes, flooded forest, rice fields and marshes	Clay and alluvial
Chhok Veal Rench	Blackish Water	170 km SW of Phnom Penh	3	na	na	14,500	Mangrove, marshes, rear mangrove and rear fields	Peat, mud and sand

Source: Statistical Yearbook of Cambodia 2008

## 11.2 Social Environmental Condition

### 11.2.1 Population

The population in Phnom Penh reached approximately 13.4 million in 2008, which comprised almost one-tenth of the national population. Compared to the data in 1998 and 2008, annual population growth rates in Phnom Penh reached 2.9% in a decade. This rate is rather higher than the national average, which was 1.6% in the same period. Urbanization contributes to such population growth in Phnom Penh.

**Table 11.2-1 Population in Phnom Penh from 1981 to 2008**

	Area (km <sup>2</sup> )	1981	1994	1998	2004	2008
Cambodia	181,035	6,682	9,752	11,436	12,824	13,389
Phnom Penh	290	329	812	1,000	1,044	1,326
(%)	(0.2%)	(4.9%)	(8.3%)	(8.7%)	(8.1%)	(9.9%)

Source: General Population Census 2008

### 11.2.2 Solid Waste Management

In Phnom Penh Municipality, solid waste management is the responsibility of DPWT. Actually the collection of solid waste is contracted to a private company, a Canadian and Cambodian Joint-Venture (CINTRI), except some specific area<sup>1</sup>. In Phnom Penh, there are two disposal facilities: one is an open dumping site called Stung Mean Chey Disposal Site and the other is a landfill site called Dornng Kor Landfill Site. However, most of the residential areas have not enjoyed full services yet and it caused solid wastes being dumped into rivers and ponds.

## 11.3 Environmental Regulations

### 11.3.1 Environmental Regulations and EIA Procedures in Cambodia

Cambodia enacted the “Law on Environmental Protection and Natural Resources Management (LEPNRM)” on 24 December 1996 for the protection and promotion of natural and social environments. LEPNRM consists of four sub-decrees: Environmental Impact Assessment (EIA) process, water pollution control, solid waste management, and air and noise pollution.

Based on Article 6 of LEPNRM, all of the development projects and activities proposed by any owner either individual, private, joint-venture or public, in the form of government ministry or agency, shall carry out essential environmental screening such as initial environmental assessment (IEIA) or EIA. These assessments will be reviewed by the Ministry of Environment (MOE). The projects will not be approved by the Royal Government without approval of MOE in principal. The process of environment assessments is defined in the sub-decree of EIA.

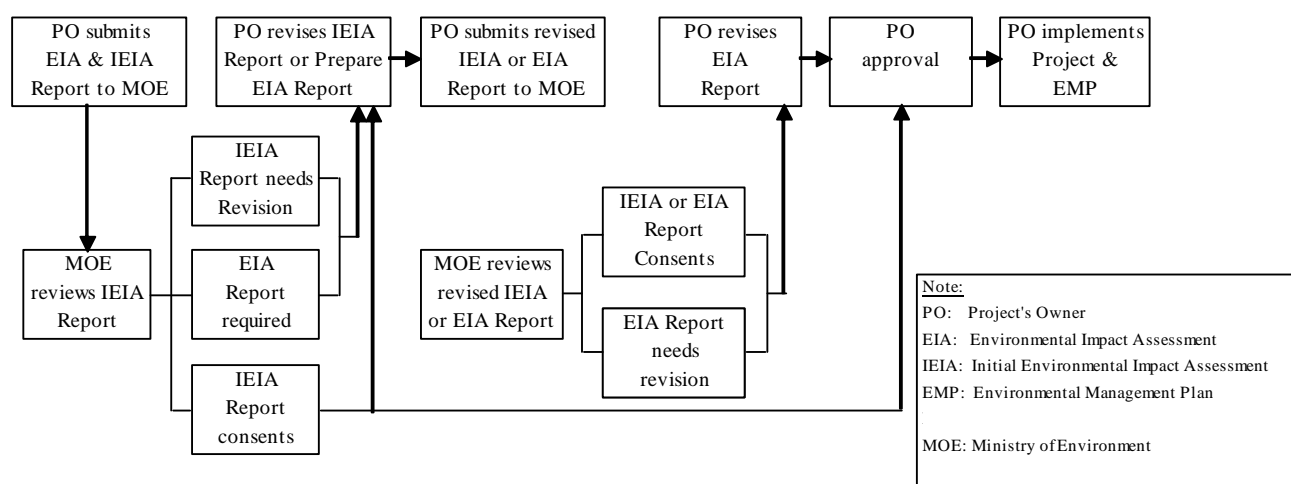
### 11.3.2 IEIA and EIA

As explained above, all the development projects are implemented with the environmental approval by

<sup>1</sup> Neighborhood Improvement Program (NIP) is carried out by Phnom Penh Waste Management (PPWM) under DPWT.

MOE. The process of environmental screening basically takes two steps which are IEIA and full scale EIA.

All project owners (PO) shall conduct IEIA which shall be included in the pre-feasibility study report to be submitted to MOE. MOE reviews the submitted IEIA and appraises the necessity of two things: one is revising the IEIA report and the other is conducting a full-scale EIA. In case that the IEIA report is insufficient, PO will be required to revise and submit it again to MOE. After finalization of IEIA, PO is able to obtain the environmental approval. In case that PO is required to conduct a full-scale EIA, PO will take further steps. Basically, the need of conducting a full-scale EIA will depend upon the size and depth of negative impacts on natural and social environments caused by the project implementation. In case that the project expects to cause large impacts, it is supposed that PO will be asked to carry out the study for full-scale EIA and submit the report to MOE. MOE coordinates with relevant ministries in assisting the appraisal committee, and then the committee will evaluate the submitted EIA. After the evaluation, PO is able to obtain the approval and to start construction. If the EIA is insufficient, MOE and the committee will require PO to revise the EIA report. The general flow of the process is illustrated in the following figure.



Source: Sub-decree on Environmental Impact Assessment Process, No.72 Council of Minister, August 11, 1999

**Figure 11.3-1 General Flow of IEIA and EIA**

The EIA sub-decree states which projects would need an IEIA or/and EIA (see Table 11.3-1). According to this list, infrastructure developments including transport sector are highly expected to undergo the environmental procedure.

**Table 11.3-1 List of the Projects which Need IEIA or/and EIA**

No.	Type and activities of the projects	Size / Capacity
<b>A. Industrial</b>		
I. Foods, Drinks, Tobacco		
1	Food processing and canned	<sup>3</sup> 500 Tons/year
2	All fruit drinks manufacturing	<sup>3</sup> 1,500 Liters / day
3	Fruit manufacturing	<sup>3</sup> 500 tons/year
4	Orange Juice manufacturing	All sizes
5	Wine manufacturing	All sizes
6	Alcohol and Beer brewery	All sizes
7	Water supply	<sup>3</sup> 10,000 Users
8	Tobacco manufacturing	<sup>3</sup> 10,000 Boxes/day

No.	Type and activities of the projects	Size / Capacity
9	Tobacco leaves processing	<sup>3</sup> 350 Tons/ year
10	Sugar refinery	<sup>3</sup> 3,000 Tons / year
11	Rice mill and cereal grains	<sup>3</sup> 3,000 Tons / year
12	Fish, soy bean, chili, tomato sources	<sup>3</sup> 500,000 Liters/ year
II. Leather tanning, Garment and Textile		
1	Textile and dyeing factory	All sizes
2	Garments, washing, printing, dyeing	All sizes
3	Leather tanning, and glue	All sizes
4	Sponge- rubber factory	All sizes
III. Wooden production		
1	Plywood	<sup>3</sup> 100,000m <sup>3</sup> /year(log)
2	Artificial wood	<sup>3</sup> 1,000 m <sup>3</sup> /year (log)
3	Saw mill	<sup>3</sup> 50,000m <sup>3</sup> /year (log)
IV. Paper		
1	Paper factory	All sizes
2	Pulp and paper processing	All sizes
V. Plastic, Rubber and Chemical		
1	Plastic factory	All sizes
2	Tire factory	<sup>3</sup> 500 Tons /year
3	Rubber factory	<sup>3</sup> 1,000 Tons /year
4	Battery industry	All sizes
5	Chemical production industries	All sizes
6	Chemical fertilizer plants	<sup>3</sup> 10,000 Tons /year
7	Pesticide industry	All sizes
8	Painting manufacturing	All sizes
9	Fuel chemical	All sizes
10	Liquid, powder, solid soaps manufacturing	All sizes
VI. Mining production other than metal		
1	Cement industry	All sizes
2	Oil refinery	All sizes
3	Gas factory	All sizes
4	Construction of oil and gas pipeline	<sup>3</sup> 2 Kilometers
5	Oil and gas separation and storage facilities	<sup>3</sup> 1,000,000 Liters
6	Fuel stations	<sup>3</sup> 20,000 Liters
7	Mining	All sizes
8	Glass and bottle factory	All sizes
9	Bricks, roofing, tile manufacturing	150,000 piece /month
10	Flooring tile manufacturing	90,000 piece /month
11	Calcium carbide plants	All sizes
12	Producing of construction materials(Cement)	900 tons/month
13	Cow oil and motor oil manufacturing	All sizes
14	Petroleum study research	All sizes
VII. Metal industries		
1	Mechanical industries	All sizes
2	Mechanical storage factory	All sizes
3	Mechanical and shipyard enterprise	All sizes
VIII. Metal Processing Industrials		
1	Manufacturing of barbed wires, nets	<sup>3</sup> 300 Tons/month
2	Steel mill, Iron, Aluminum	All sizes
3	All kinds of smelting	All sizes
IX. Other Industries		
1	Waste processing, burning	All sizes
2	Wastewater treatment plants	All sizes
3	Power plants	<sup>3</sup> 5 MW
4	Hydropower	<sup>3</sup> 1 MW

No.	Type and activities of the projects	Size / Capacity
5	Cotton manufacturing	<sup>3</sup> 15 Tons/month
6	Animal food processing	<sup>3</sup> 10,000 Tons/year
<b>B. Agriculture</b>		
1	Concession forest	<sup>3</sup> 10,000 Hectares
2	Logging	<sup>3</sup> 500 Hectares
3	Land covered by forest	<sup>3</sup> 500 Hectares
4	Agriculture and agro-industrial land	<sup>3</sup> 10,000 Hectares
5	Flooded and coastal forests	All sizes
6	Irrigation systems	<sup>3</sup> 5,000 Hectares
7	Drainage systems	<sup>3</sup> 5,000 Hectares
8	Fishing ports	All sizes
<b>C. Tourism</b>		
1	Tourism areas	<sup>3</sup> 50 Hectares
2	Golf course	<sup>3</sup> 18 Holes
<b>D. Infrastructure</b>		
1	Urbanization development	All sizes
2	Industrial zones	All sizes
3	Construction of bridge-roads	<sup>3</sup> 30 Tons weight
4	Buildings	Height <sup>3</sup> 12 m or floor <sup>3</sup> 8,000 m <sup>2</sup>
5	Restaurants	<sup>3</sup> 500 Seats
6	Hotels	<sup>3</sup> 60 Rooms
7	Hotel adjacent to coastal area	<sup>3</sup> 40 Rooms
8	National road construction	<sup>3</sup> 100 Kilometers
9	Railway construction	All sizes
10	Port construction	All sizes
11	Airport construction	All sizes
12	Dredging	<sup>3</sup> 50,000 m <sup>3</sup>
13	Dumping site	<sup>3</sup> 200,000 people

Source: Sub-decree on environmental impact assessment process, MOE

## 12 STAKEHOLDER PARTICIPATION

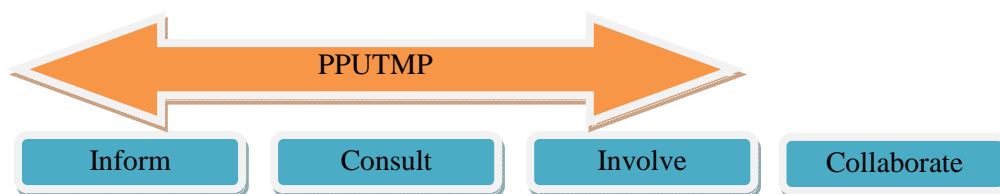
### 12.1 Introduction

Stakeholder participation is an important aspect of development planning. When the citizens are involved in the development planning process, they are able to understand better the situation and options available, and when they understand, they can extend more support and commitment which ultimately builds ownership of the project. Involving the stakeholders in the development planning process is a two-way communication between the planners and the citizens.

Stakeholder participation can be the *means* or the *purpose* of the development planning. In PPUTMP, involvement of the citizens in the process of Master Plan preparation is the *means* to recognize their interest and concerns and to build consensus on the future urban structure in PPCC.

#### 12.1.1 Degree of Stakeholder Participation

Participation can be in varying degrees (see Figure 12.1-1). If the involvement of the stakeholders is limited to a minimal level, they can be simply informed where the specific information is distributed by the Project Team to the citizens. If the stakeholders were to be deeply involved, they can be at the other end of the spectrum where they hold control over the planning process. In PPUTMP, stakeholder participation is promoted in order to obtain opinions of the citizens and to *consult* them on the decisions made as regard to the Master Plan under preparation. At the time of public consultations, the citizens are expected to *be involved* in the process.



Source: PPUTMP Project Team

**Figure 12.1-1 Degree of Stakeholder Participation**

### 12.2 Public Awareness of the Project

In order to promote stakeholder participation, the stakeholders must be aware about the Project. Various communication tools will be used to inform the stakeholders of the Project's progress and its specific activities, and thus expecting the stakeholders' cooperation and active participation particularly at the time of public consultations.

A newsletter is one of the communication tools to spread public awareness of the Project. The first newsletter of the Project was issued in May 2012. It carried information on the outline of the Project including its objectives, the project area and the project framework. It was printed in Khmer and English and was distributed to all Sangkats of Phnom Penh Municipality. The second newsletter was issued towards the end of September to October 2012, informing the public about the progress of the Project and outcome of the stakeholder workshop.

## 12.3 Stakeholder Analysis

Apart from the public awareness activities, the stakeholder workshops are conducted to exchange opinions and to consult the stakeholders on issues related to the Master Plan. The first such workshop was organized in September 2012 to present the tentative urban structure for PPCC in 2035 and to obtain the stakeholders' views and discuss with them some specific areas to be addressed in the Master Plan.

Participation in the workshop involved selected stakeholders, as addressing the entire citizenry of Phnom Penh would be unrealistic and inefficient. To select appropriate stakeholders for workshop participation, stakeholder analysis was conducted prior to the workshop.

The purpose of stakeholder analysis is to understand the characteristics of the stakeholders, to select stakeholders who can actively participate in the Master Plan preparation process, and to consider the effective means of communication with the stakeholders based on the analysis.

### 12.3.1 Stakeholder Interview

Interviews with the stakeholders were conducted to understand the issues people are facing in terms of urban transport and the expectations they have for the future, among other things. The interviewees were selected from the people who represent a large number of citizens and specific interest groups. In order to address stakeholders with various backgrounds and interests, commercial establishments, academic institutions, NGOs, and Phum and/or Sangkat were selected aside from urban transport-related organizations.

When selecting Phum or Sangkat representatives, priority was given to those areas where the representatives have shown interest in PPUTMP during the Person Trip Survey. Since there is no regular platform in Phum or Sangkat where they can share project information with the residents or make announcements, the preferential selection was given to Phum and Sangkat with representatives with keen interest in the Project so as to use them as communication channels to the greater number of citizens.

Table 12.3-1 presents a list of stakeholder organizations interviewed in the Project.

**Table 12.3-1 Interviewed Stakeholders**

<b>Commercial Organizations</b>
Cambodia Chamber of Commerce
Central Market Authority
Cambodia Association of Travel Agents
Canadia Bank
Cambodia Women Entrepreneurs Association
<b>Phum/Sangkat Representatives</b>
Phum Thloru, Sangkat Kouk Roka
Sangkat Tek Laork Ti 3
Phum 6, Sangkat Boen Keng Kang 1
Sangkat Russey Keav
Sangkat Prey Sa
Sangkat Phsar Kondal Ti 2
<b>Urban Transport-Related Organizations</b>
Cambodia Bus Association
Cambodia Trucking Association
Trans-Choice Cambodia Taxi Company



Cambodia for Confederation Development Association (Tuk-tuk Association)
Edisijata
Others
Institute of Technology in Cambodia
Preah Sisowath High School
Eastern Asia Society for Transportation Studies
Handicap International Belgium
Mlup Baitong
Women Information Center (Female garment factory workers)

Source: Stakeholder Interview (2012)

### 12.3.2 Results of the Interviews

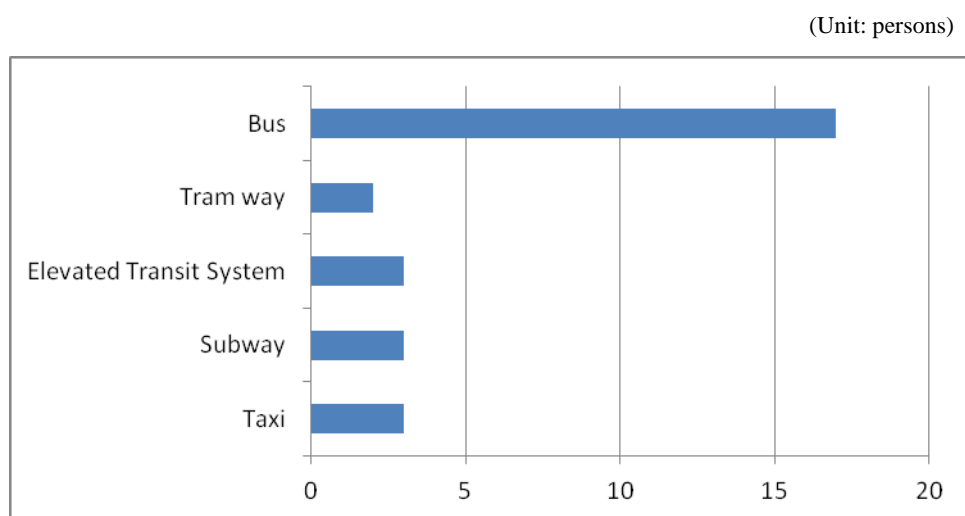
#### (1) Urban Transport-Related Issues

- a) The interviewees were asked what they think are the problems related to urban transport in Phnom Penh. All the interviewees answered “traffic congestion.”<sup>1</sup> Some have pointed out that traffic jams become worse especially when it rains during the monsoon season and the rain overflows onto the street. Other responses include traffic safety and accidents, condition of the road, and narrow streets in the central part of the city.
- b) At the Central Market, the number visitors to the market who come in large tourist buses has increased after the renovation. Since there is not enough parking space for the buses, it has become a problem.
- c) The Cambodia Association of Travel Agents has also pointed out the poor maintenance of road and loss of travel time for tourists due to traffic jams.
- d) The Cambodia Trucking Association expressed concern about container trucks not being able to deliver consignment to their clients on time due to the ban on trucks entering the city during the daytime.
- e) Female garment factory workers are living and working in the suburban areas of Phnom Penh and since they do not have many holidays and feel it is expensive to go to the city center, most of them seem to be disconnected with the urban transport situation.

#### (2) Future Public Transport System

- a) The interviewees were asked whether people in Phnom Penh should continue to use private vehicles or there should be a new public transport system in the future. One person responded that the people should continue to use their own cars while 18 interviewees answered that some kind of new public transport system is required (see Figure 12.3-1). Seventeen said the bus would be an option while taxi (3), metro (3), elevated transit system (3), and tram (2) were also mentioned.
- b) Since the number of registered vehicles is on the rise, one responded that even if a new public transport system is introduced, high income population will continue to use their own vehicles as means of transportation.

<sup>1</sup> Excluding the female garment factory workers interviewed at the Women Information Center.



Source: Stakeholder Interview (2012)

**Figure 12.3-1 Public Transport System for Future Phnom Penh**

### (3) About Public Bus Service

- a) For introducing public bus services, there was high expectation from the respondents for a wide network covering the suburban areas also.
- b) Many interviewees remember about the public consultation in 2000 when the public bus service was introduced. Although they mentioned about the earlier failure due to increasing traffic volume in the city, it was felt essential to re-introduce the bus system.
- c) Interviewees also expected the bus fare to be cheap, in addition to having a wide service network. One responded that if the fleet of buses are new and clean, people would be more keen to use the service.

### (4) About Motorumok Modern (Tuk-Tuk)

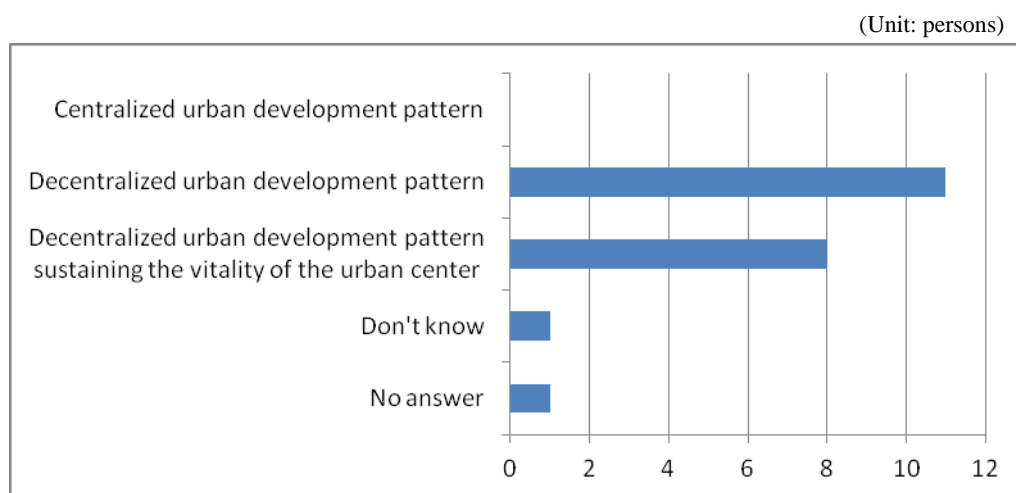
- a) Currently, there are about 20,000 motorumok modern (tuk-tuk) operating in the city.<sup>2</sup> The president of one of the tuk-tuk associations explained that motorumok modern (tuk-tuk) drivers are socially vulnerable and in case of accident involving expensive cars, even if it was the fault of the other driver, motorumok modern (tuk-tuk) drivers are often blamed. At the same time, there have been complaints from a taxi company regarding the driving manners of motorumok modern (tuk-tuk) drivers.
- b) Some of the interviewees suggested that motorumok modern (tuk-tuk) should be restricted in certain parts of the city.
- c) The number of motodop has decreased and some of the motodop drivers have become motorumok modern (tuk-tuk) drivers. Further, as the competition with taxi is getting severe, some of the motorumok modern (tuk-tuk) drivers are changing jobs to become taxi drivers.

### (5) Future Urban Image of Phnom Penh

- a) The interviewees were asked about their preferred urban structure of Phnom Penh using the following 3 different options with graphic representation of each:
  - Centralized urban development pattern;
  - Decentralized urban development pattern; and
  - Decentralized urban development pattern sustaining the vitality of the urban center.

<sup>2</sup> Based on the information provided by the President of Cambodia for Confederation Development Association.

- b) Eighteen interviewees chose either option 2 or 3 (see Figure 12.3-2). The difference between options 2 and 3 appeared to be difficult to understand for most of the interviewees.
- c) In both options 2 and 3, by decentralizing the city, people are expecting the benefits of development to reach suburban areas and reduce the traffic jam.

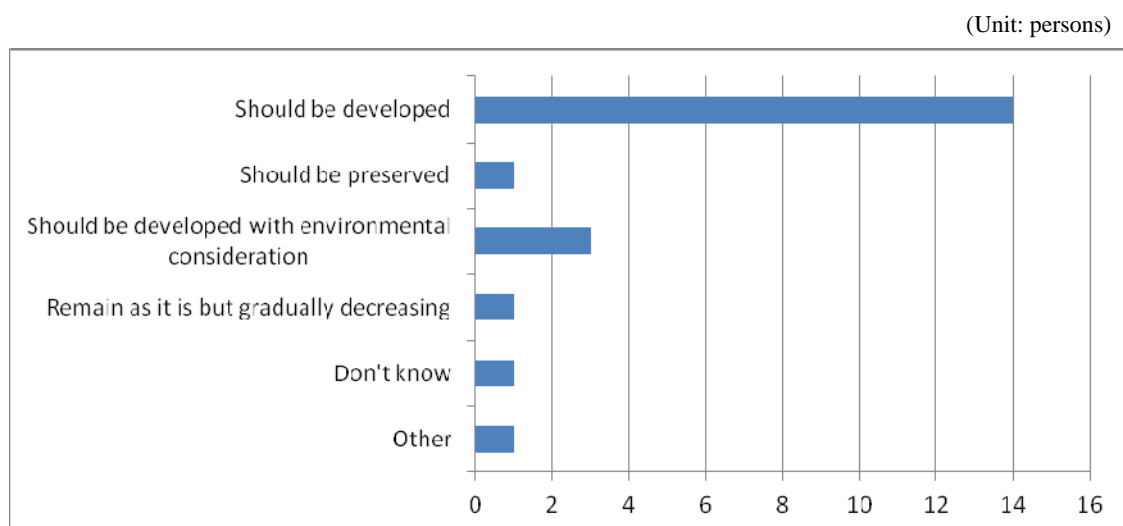


Source: Stakeholder Interview (2012)

**Figure 12.3-2 Future Urban Image of Phnom Penh**

### (6) Agricultural Land and Greenery

Thirteen interviewees supported the development of agricultural land and natural vegetation (see Figure 12.3-3). It appeared that people have expectations for employment opportunities from the establishment of new factories and commercial areas in the suburbs. At the same time, some people have pointed out the importance of having an appropriate development plan that maintains a balance with the conservation of the natural environment.



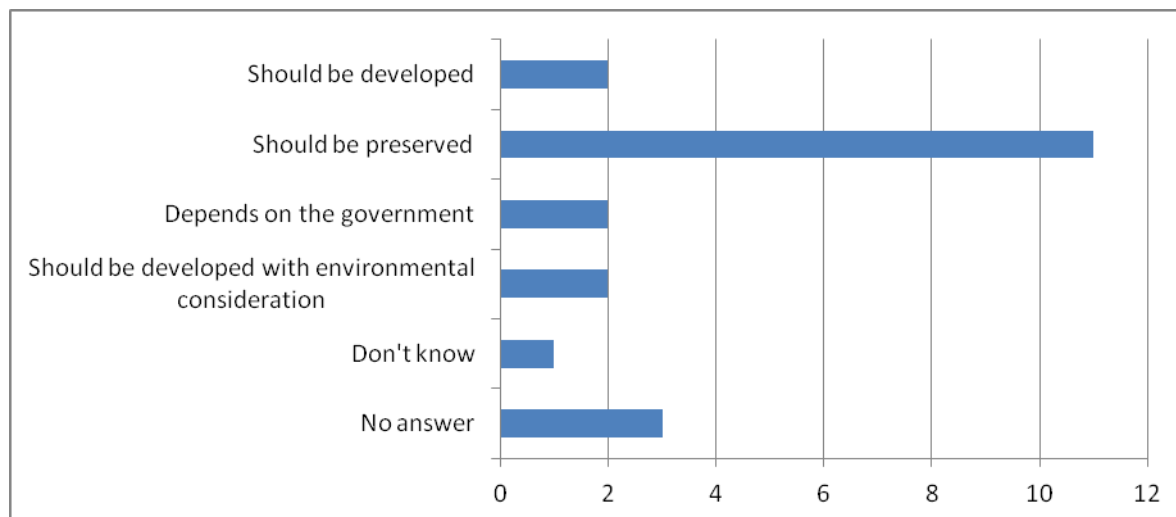
Source: Stakeholder Interview (2012)

**Figure 12.3-3 Opinions on Agricultural Land and Greenery**

## (7) Natural Reservoirs

Eleven interviewees supported the idea of protecting natural reservoirs (see Figure 12.3-4). Many felt it was necessary to protect the natural reservoirs to deal with the flood and also to develop areas around the natural reservoir for people to enjoy the environment. Some opined that since the reservoirs are the property of the government, it is not within people's control to decide whether they should be developed or protected.

(Unit: persons)



Source: Stakeholder Interview (2012)

**Figure 12.3-4 Opinions on Natural Reservoirs**

## (8) Private Development

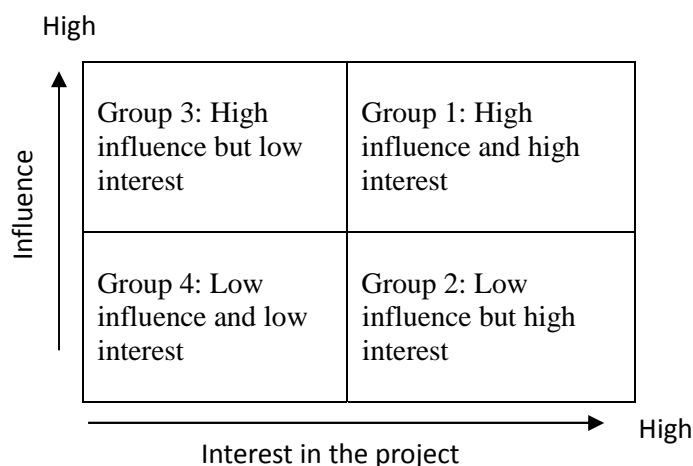
Regarding private development (industrial units, residential areas, etc.) in suburban areas, most of the interviewees felt it is necessary to continue such development with due consideration to the natural environment. Since the population of Phnom Penh is increasing, they felt it is inevitable to develop the suburban areas.

## (9) Stakeholders' Interest in the Project

- a) All the interviewees responded that they would be interested to follow the progress of PPUTMP. However, those living in the suburban areas felt it is difficult to understand the project from the newsletter and some others felt that urban transport is an issue taking place in the central part of the city which is far away from them and, thus, not directly related to them.
- b) Many interviewees suggested using a website, TV and radio as means of communication in addition to the existing newsletter. Especially the young generation uses internet and is able to gather information from the website, while it is more effective to use TV and radio for the older generation and people in the suburban areas as they do not access the internet as often.

### 12.3.3 Stakeholder Analysis

The stakeholders who have been interviewed do not only represent the specific groups of people but also have limited areas of activity either in the central or the suburban areas of the city. Some may be negatively affected in the future depending on the outcome of the Master Plan. Taking into consideration each stakeholder's interest in the project and their influence on the members of their organizations as well as on the larger society, the stakeholders have been categorized into four different groups (see Figure 12.3-5).



Source: PPUTMP Project Team

**Figure 12.3-5 Stakeholder Matrix**

The stakeholders in each group are as follows:

***Group 1: High influence and high interest***

- Cambodia Chamber of Commerce
- Central Market Authority
- Handicap International Belgium

The Cambodia Chamber of Commerce has about 300 organizations as their registered members. The executives of the Chamber of Commerce includes the members of parliament, indicating that they have strong economic and political influence. Since its establishment in 1995, its membership has been increasing and is expected to grow further as it becomes more widely known in the society. The Chamber of Commerce is also attracting foreign investment into the country. Therefore, changes in urban transport situation in Phnom Penh would be of great interest to the members.

There are about 3,000 shops in the Central Market. As they have been struggling with a lack of parking space while the number of visitors to the market is on the rise, the shop owners have a high interest in parking-related issues around the market.

***Group 2: Low influence but high interest***

- Cambodia for Confederation Development Association
- Trans-Choice Cambodia Taxi Company
- Cambodia Bus Association
- Cambodia Trucking Association
- Edisijata
- Institute of Technology Cambodia
- Eastern Asia Society for Transportation Studies (EASTS)
- Phum Thloru, Sangkat Kouk Roka
- Sangkat Russey Keav
- Sangkat Prey Sa
- Sangkat Phsar Kondal Ti 2

For motorumok modern (tuk-tuk) drivers and taxi companies, the changes in the urban transport system may have a huge impact on their survival. The changes can also affect stakeholders like the Cambodia Bus Association, Cambodia Trucking Association, and the company which operates on-street paid parking business. These stakeholders' influence is rather limited within their organizations and their memberships are also not so large. Given these conditions, their influence is low.

Although the interviews of Phum and Sangkat representatives are comparatively small, those living in the suburban areas have a strong interest in the future urban structure of Phnom Penh. Their strong interest is due to expectation for employment opportunities and infrastructure development that may come with the development of the suburban areas. Although there are thousands of residents in each Sangkat, the opportunity to communicate from the Sangkat office to its residents are rather rare and, therefore, their influence cannot be considered high.

***Group 3: High influence but low interest***

No stakeholders were found to be in this category at this time.

***Group 4: Low influence and low interest***

- Cambodia Association of Travel Agents
- Canadia Bank
- Cambodia Women Entrepreneurs Association
- Phum 6, Sangkat Boen Keng Kang 1
- Sangkat Tek Laork Ti 3
- Preah Sisowath High School
- Mlup Baitong
- Women Information Center

In the central part of the city, some of the house owners actually live in the suburbs and in some areas there are high concentrations of foreign residents. Considering that many of the residents are not permanently residing in the area, it may be difficult to obtain cooperation from the residents of these areas. As a result, they have been categorized into Group 4.

## **12.4 Stakeholder Workshop**

The first stakeholder workshop of the Project was conducted on 6 September 2012 with the objective of sharing the urban structure of Phnom Penh for year 2035 with the stakeholders and to think of necessary changes required in order to realize the particular urban structure. The stakeholders who are in Groups 1 and 2 as described above were invited to participate in the workshop.

### **12.4.1 Process of Group Discussion**

On the workshop day, a presentation on the Project and three different alternatives for urban structure targeting 2035 were explained to the participants. Differences among the T-shaped, multi-core and reversed pear structures were explained in detail. The workshop participants were divided into smaller groups for group discussion. The following steps were taken to discuss and identify the measures required to realize the urban structure 2035 for Phnom Penh.

***Step 1: Setting image and identifying urban structure 2035***

The participants came up with some keywords to represent their ideas for the preferred future urban structure of Phnom Penh. Based on these keywords, each group identified the corresponding urban structure which became the basis for further discussion.

***Step 2: Suggest necessary measures to be taken***

The participants suggested improvements or changes that are required in order to realize the urban structure identified in Step 1. Each stakeholder suggested 2 to 3 measures.

***Step 3: Ranking the suggested measures***

Once everyone's suggestions were posted on a white board where others can see, they were asked to rank the suggested measures in order of importance.

***Step 4: Determining specific actions and actors***

When ranking was done, the top 3 ranked measures were selected for further discussion to determine specific actions involved and the people or institutions ("the actors") who need to take action.



**Figure 12.4-1 Group Discussion and Presentation at the Workshop**

### **12.4.2 Results of the Workshop**

The urban structure selected by each discussion group and details of their discussions are as follows:

***Group 1***

The group reached a consensus on taking the reversed pear structure as the ideal urban structure. The participants suggested the following measures:

- Construction of ring road;
- Road construction in newly developed areas;
- Construction of public parking;
- Construction of new road (east-west) to the south of Phnom Penh Airport;
- Provide public transport service;
- Build/improve public facilities such as markets, schools, hospitals and park;
- Tourism development (including shopping mall) by private sector;
- Build resort and amusement facilities in suburban areas;
- Establish factories in suburban areas;
- Promote residential areas in suburban areas; and
- Stop collecting fees from the toll road.

The suggested measures were grouped into similar categories and then ranked in order of priority selected by the participants (see Table 12.4-1). The top three measures selected and actions and actors identified in each measure are as follows:

**Table 12.4-1 Summary of Group Discussion (Group 1)**

Measures	Actions	Actors
1. Build road infrastructure in newly developed areas	<ul style="list-style-type: none"> <li>Seek loan from development agencies</li> </ul>	The Government and private investors
	<ul style="list-style-type: none"> <li>Implement Public- Private Partnership (PPP) for investment in transport</li> </ul>	The Government and private investors
2. Build/Improve public facilities	<ul style="list-style-type: none"> <li>Seek government fund, PPP and private investment</li> </ul>	The Government and private investors
3. Provide public transport service	<ul style="list-style-type: none"> <li>Educate the citizens through public announcement</li> </ul>	MPP
	<ul style="list-style-type: none"> <li>Law enforcement on illegal parking</li> </ul>	Phnom Penh Municipal Police (PPMP)
	<ul style="list-style-type: none"> <li>Seek people's cooperation</li> </ul>	Everyone

Source: PPUTMP Project Team

The main interest of the group was to focus on development in suburban areas. The group also discussed that these three measures needed to be implemented sequentially. First, the newly developed areas will be connected to the city center by building roads including the ring road. Once the link between the city center and other areas are established, public facilities should be developed or improved including markets, hospitals, entertainment areas like parks, etc. Then, the public transport service can be provided to improve the accessibility.

### **Group 2**

The group's urban image for the future was represented by three keywords: good environment, adequate infrastructure, and smart city. Since the differences between multi-core and reverse pear structures are often difficult for the people to understand, the group's selection of urban structure was divided between the two. Nevertheless, since the group agreed on three keywords, the discussion continued around these topics. In the next step, the participants suggested the following necessary measures:

- Enforce traffic laws;
- Improve traffic management;
- More sidewalks and pedestrian-friendly environment;
- Road improvement;
- Introduction of public transport;
- Better traffic demand control;
- Increase car parking;
- Prohibit illegal construction;
- Develop more public parks; and
- Refill the holes in suburbs (made by sand mining).

The top three measures selected and actions and actors identified in each measure are as follows (see Table 12.4-2):

**Table 12.4-2 Summary of Group Discussion (Group 2)**

Measures	Actions	Actors
1. Improve traffic management	<ul style="list-style-type: none"> <li>Synchronize the traffic signals</li> </ul>	DPWT
	<ul style="list-style-type: none"> <li>Capacity building of traffic police</li> </ul>	PPMP
	<ul style="list-style-type: none"> <li>Strengthen people's awareness about traffic laws</li> </ul>	Media (TV, radio)
2. More sidewalks and	<ul style="list-style-type: none"> <li>Regulate private use of sidewalk</li> </ul>	MPP, Khan and Sangkat



Measures	Actions	Actors
pedestrian-friendly environment	<ul style="list-style-type: none"> <li>Widen sidewalks</li> </ul>	MPP and DPWT
	<ul style="list-style-type: none"> <li>Increase green covers along the sidewalk to attract more pedestrians</li> </ul>	MPP and DPWT
3. Increase parking space for vehicles in the city	<ul style="list-style-type: none"> <li>Restrict on-street parking during the peak hours</li> </ul>	MPP
	<ul style="list-style-type: none"> <li>Control street vendors</li> </ul>	PPMP and Sangkat
	<ul style="list-style-type: none"> <li>Increase paid parking space</li> </ul>	MPP and private sector
	<ul style="list-style-type: none"> <li>Construct more parking space</li> </ul>	MPP and private sector

Source: PPUTMP Project Team

Unlike Group 1, the discussion in Group 2 was centered on the measures required in the city center and urban transport-related issues. Also, the participants in Group 1 focused on “how” to achieve the measures and, hence, discussed in great length on funding sources while Group 2 was more interested on “what” has to be done.

During the stakeholder interviews conducted in July 2012, most interviewees pointed out traffic congestion as the main problem regarding urban transport. At the workshop, the issues related to parking seemed to draw the attention of many of the participants in the group discussions. Interestingly, both the discussion groups also felt the necessity to address people’s awareness towards public transportation and traffic laws.

The measures suggested by the participants and the ones selected for detailed discussion are indicated in Table 12.4-3, corresponding to the main areas to be addressed in the Master Plan.

**Table 12.4-3 Suggested Measures by the Stakeholders**

Categories	Suggested Measures
1. Road improvement	<ul style="list-style-type: none"> <li>Construction of ring road</li> <li><u>Road construction in newly developed areas</u></li> <li>Construction of new road (east-west) to the south of Phnom Penh Airport</li> <li>Stop collecting fees from the toll road</li> </ul>
2. Public transport	<ul style="list-style-type: none"> <li><u>Introduction of public transport service</u></li> </ul>
3. Transport planning	<ul style="list-style-type: none"> <li><u>Construction of public parking</u></li> <li>Enforce traffic laws</li> <li><u>Improve traffic management</u></li> <li>Better traffic demand control</li> </ul>
4. Urban planning	<ul style="list-style-type: none"> <li><u>Build/Improve public facilities such as markets, schools, hospitals and park</u></li> <li>Tourism development (including shopping mall) by private sector</li> <li>Build resort and amusement facilities in suburban areas</li> <li>Establish factories in suburban areas</li> <li>Promote residential areas in suburban areas</li> <li><u>More sidewalks and pedestrian-friendly environment</u></li> <li>Prohibit illegal construction</li> <li>Develop more public parks</li> <li>Refill the holes in suburbs (made by sand mining)</li> </ul>

Note: Underlined items are the measures selected for detailed discussions.

Source: Stakeholder Workshop (2012)

The suggestions made in the stakeholder workshop will be presented in the SC. Some of the suggestions made in the workshop are directly related to the Project. The possibility of incorporating some of the suggestions into the Master Plan will be considered. The outcome of the workshop will be published in the next newsletter so the workshop participants and other stakeholders can be updated.

## **12.5 Seminar for Phnom Penh Citizens**

### **12.5.1 Introduction**

In order to share the Urban Transport Master Plan outline with the stakeholders, a seminar was organized when most of the Plan had been prepared. In order to make the Plan a reality, the roles and responsibilities of each stakeholder was explained while their continuous understanding and cooperation was sought. Participants were selected giving due consideration to those from each Khan and various groups of stakeholders.

### **12.5.2 Outline of the Seminar**

The outline of the seminar is described below.

#### **(1) Seminar Title**

Urban Transport Master Plan Seminar for Phnom Penh Citizens

#### **(2) Purpose**

To inform citizens about the Phnom Penh Urban Transport Master Plan

#### **(3) Arrangements**

- Date: 27 August 2014 (08:00 - 14:00)
- Venue: Cambodia Japan Cooperation Center (CJCC)
- Chairperson: H.E. Trac Thai Sieng, Vice Governor of Phnom Penh Capital City (PPCC)
- Total Attendees: 165

#### **(4) Programme**

MC: Mr. Heng Sal Piseth

08:00 – 08:30 : Registration

08:30 – 08:45 : MC welcomes attendees and outlines the seminar programme

08:45 – 09:00 : Opening Remarks by H.E. Trac Thai Seang, Vice Governor of PPCC

09:00 – 09:45 : Outline of the Master Plan (1) by PPUTMP Project Leader

09:45 – 10:00 : Tea Break

10:00 – 10:45 : Outline of the Master Plan (2) by PPUTMP Project Leader

10:45 – 11:30 : Q & A

11:30 – 11:45 : Closing Remarks (JICA Cambodia)

11:45 – 14:00 : Lunch Break (Provided by the seminar)

#### **(5) Seminar Materials Distributed**

- Programme
- Hard copy of PPT Slides (English and Khmer)
- Handbook (English and Khmer)
- Questionnaire
- Bag, JICA notebook, pen, name tag

## (6) Activities During the Seminar

### Q & A Session:

- a) Student from Norton University: How many percent of the road network can serve as public transport corridor in the year 2035?  
→ Koto: In the year 2035, public transportation system will cover almost all the major and secondary roads, but I cannot tell the exact percentage now.
- b) ADB Consultant:
- Q1. Why could you not start most of the traffic management measures in the short-term plan (sidewalk, one way ...)?  
→ Koto: We could not start all the projects at the same time as we have to prioritize them, that is, implement the most important/needed project and then go to the next, and so on.
- Q2. Together with the sidewalk improvement, have you considered about facilities for disabled persons?  
→ Koto: Firstly, our project will start with traffic signal improvement, then sidewalk improvement and intersection improvement; for the next step, we are going to think carefully, together with DPWT, how to improve the facilities for disabled persons.
- Q3. In your master plan, how could you promote a 'smart city'?  
→ Koto: 'Smart city' is a concept that provides sustainable growth in an environmentally friendly way, it is not a project.  
→ H.E. Trac Thai Sieng: Regarding the facilities for the disabled, we used to have sidewalk facilities for them along Monivong quite a long time ago, but people ignored them and some even used these facilities as illegal parking spaces.
- c) Representative from Khan Prek Phnov: Concerning land acquisition for road development or expansion, I would like to know if the government has any solutions or policy for those residents affected by the development.  
→ H.E. Trac Thai Sieng: The government will surely have a solution considering the right-of-way and other relevant regulations.
- d) Phnom Penh Capital City Official: Based on experiences in Japan, what private sector companies are considered to be qualified enough for the investment?  
→ Mr. Ito, JICA Senior Representative: It depends on the type of investment projects, and the qualified private companies should be selected by using experience-based evaluation.
- e) Student from Norton University:
- Q1. Will there be an exclusive lane for motorcycles?  
→ Koto: We could not have separate lanes for motorcycles along major and secondary roads; instead we could use other measures to separate motorcycle traffic from other modes, such as banning motorcycle traffic on some sections along the road or using double stop lines.
- Q2. Regarding parking measures, will the separated parking lots be planned in the future to respond to the parking demand?  
→ Koto: Some private companies have proposed to build underground parking lots under parks in Phnom Penh, and it is a good idea for the city.

**Pictures from the seminar:**



Mr. Koto giving the presentation on Urban Transportation Master Plan by Project Team Leader



A citizen asking a question about social impact of road development



A government official with a question about privatization



A professor asking about road development



A university student posing a question about parking and exclusive lane for motorcycles



JICA Senior Representative giving the closing remarks

**(7) Questionnaire Survey**

A questionnaire survey of participants was conducted for evaluating the seminar. The questionnaire, shown below, was part of the materials given upon registration, and the participants were requested to answer it. The questionnaires were collected at the end of the seminar.

**EVALUATION SURVEY ON URBAN TRANSPORT MASTER PLAN SEMINAR TO PHNOM PENH CITIZEN (27 August 2014)**

1) Your personal information:

Gender:  F  M      Age: \_\_\_\_\_

Occupation:  Government Official     Teacher  
 NGO     Student  
 Private Company Staff                     Seller/Shop Owner  
 Other: \_\_\_\_\_

2) Overall how would you rate the seminar?  
 Excellent  
 Good  
 Neutral  
 Poor

3) Please rate the following aspects of the seminar presentations?

	Excellent	Good	Neutral	Poor	Don't Know
Relevance of the Seminar Topic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Usefulness of information Presented	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of the Presentations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audio-visual aids	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Handouts provided during the seminar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4) Was the presentation too difficult or too easy for you?  
 Too difficult  
 Somewhat difficult  
 Just right  
 Somewhat easy  
 Too easy

5) Please rate the following aspects of the seminar arrangement?

	Excellent	Good	Neutral	Poor	Don't Know
Invitation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Schedule & Timing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Choice of facilities/Venue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Refreshment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6) Based on your experience at this seminar, how likely are you to attend future seminars?  
 Very likely  
 Somewhat likely  
 Not likely

7) What was your interesting topics of the presentation?

8) What was your least interesting topics of the presentation?

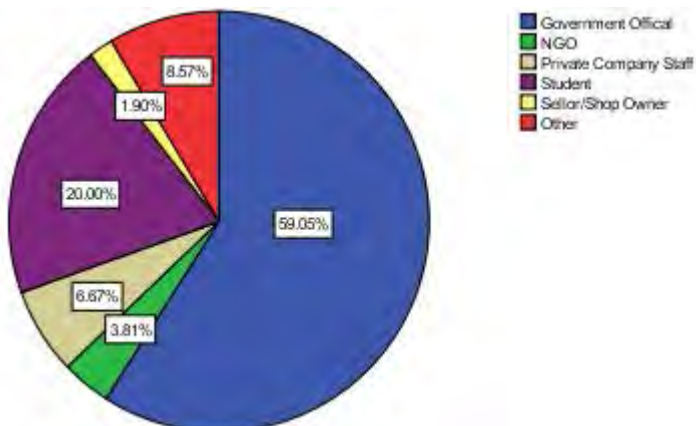
9) Any other suggestions or comments to help us improve future seminars?

*Thank you for attending our seminar!*

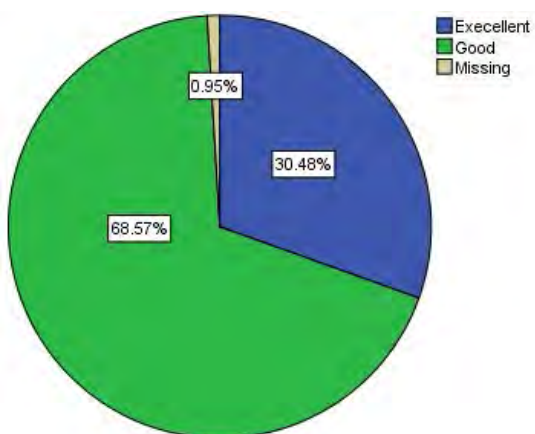
### (8) Seminar Evaluation

The results of the seminar evaluation are shown below.

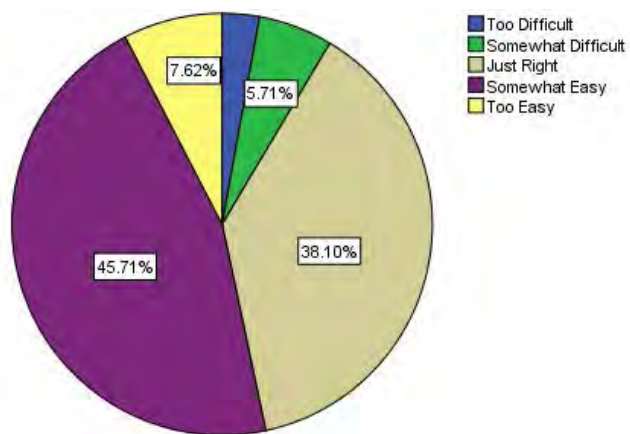
1) Occupation:



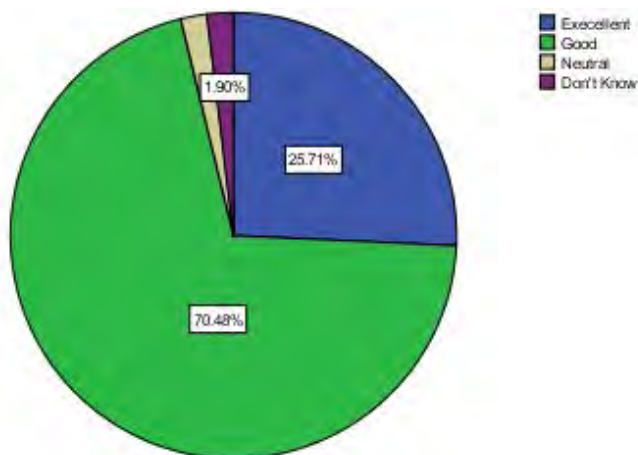
2) Overall Evaluation of the seminar:



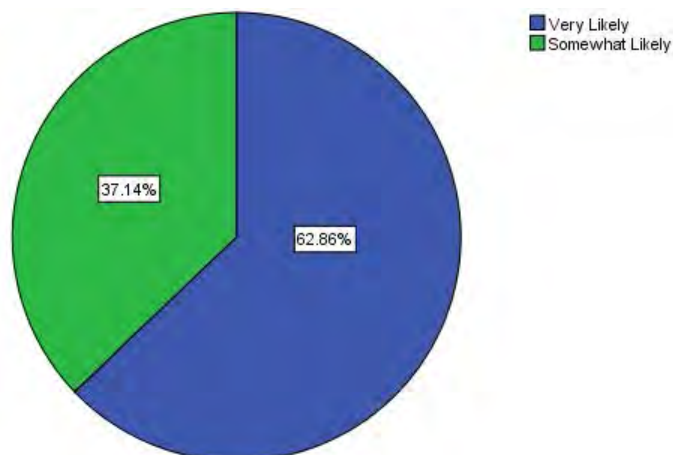
3) Level of understanding of the presentation:



4) Usefulness of the presentation information:

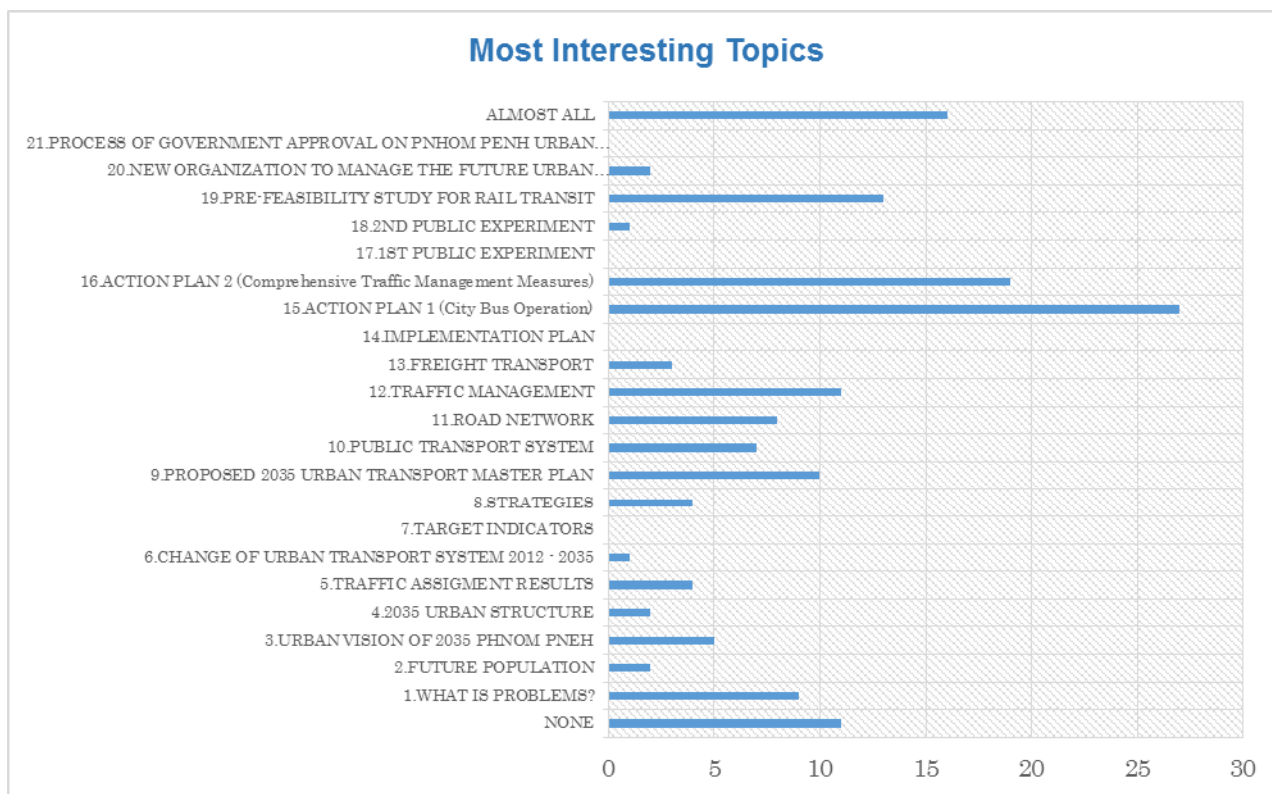


5) Intention to attend the next seminar:

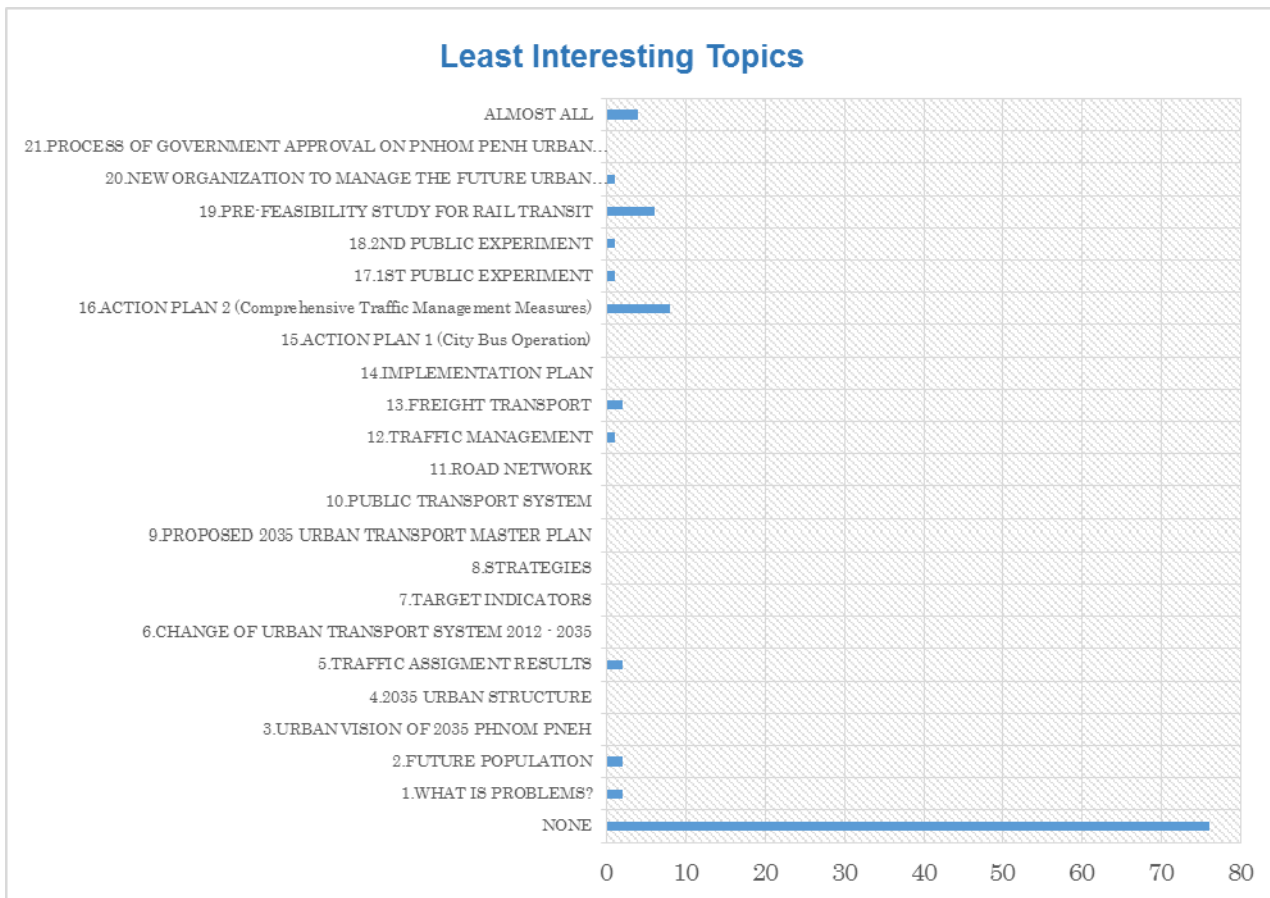


- 6) Suggestions:
- The seminar should be longer next time.
  - Invite more participants from different organizations/institutions/places as much as possible.
  - The seminar should be held frequently.

7) Most interesting topics:



8) Least interesting topics:





## 13 TRANSPORT/TRAFFIC SURVEYS AND ANALYSIS (11 Surveys and Road Inventory Survey)

### 13.1 Overview

#### 13.1.1 General

To understand the present traffic conditions in PPCC, the PPUTMP Project Team conducted comprehensive transport/traffic surveys in the entire project area. The surveys provide fundamental, comprehensive and sufficient information of existing transport demand and road network conditions in order to enable the modeling of the present transport demand. This model is a useful tool to forecast the future transport demand based on which the comprehensive urban transport master plan can be formulated.

Table 13.1-1 shows the list of the traffic surveys with corresponding survey scope and survey methodology for 11 types of traffic surveys and road inventory surveys to be implemented in this Project.

**Table 13.1-1 Scope and Methodology for the Traffic Survey**

Type of Traffic Survey	Scope	Methodology
1) Cordon Line Survey	<ul style="list-style-type: none"> <li>10 locations at the boundary of the project area</li> <li>Airport and ferry port passenger interview</li> </ul>	<ul style="list-style-type: none"> <li>Traffic count by vehicle type and by direction (16/24h)</li> <li>Interview 10~20% sampled vehicles: OD, trip purpose, type of load, vehicle occupants</li> <li>Interview with passengers (on-board and off-board) in the airport and major ferry ports</li> </ul>
2) Screen Line Survey	<ul style="list-style-type: none"> <li>9 locations at screen lines</li> </ul>	<ul style="list-style-type: none"> <li>Traffic count by vehicle type and by direction (16/24h)</li> </ul>
3) Roadside Traffic Count Survey	<ul style="list-style-type: none"> <li>34 locations in PPCC</li> </ul>	<ul style="list-style-type: none"> <li>Target routes are mainly major arterial roads, and some urban roads (16/24h)</li> </ul>
4) Traffic Count at Intersection	<ul style="list-style-type: none"> <li>14 locations at major intersections (including two overpass sites)</li> </ul>	<ul style="list-style-type: none"> <li>Traffic count by vehicle type and by direction (16h)</li> <li>Traffic count by vehicle type and by direction</li> </ul>
5) Travel Speed Survey	<ul style="list-style-type: none"> <li>7 major routes in the city center of PPCC</li> <li>Movements of motorumok modern (tuk-tuk) and motodop are recorded by GPS</li> </ul>	<ul style="list-style-type: none"> <li>Running by floating car method without overrunning and slowing</li> <li>Morning peak hours (07:00-09:00), evening peak hours (17:00-19:00), and noon hours (12:00-14:00) of weekdays</li> <li>Record of the travel speed by modes, the ranges of operation and other information</li> </ul>
6) Parking Condition Survey	<ul style="list-style-type: none"> <li>Parking lot inventory survey on main roads in 5 central areas by blocks</li> <li>Parking user interview (500 samples)</li> </ul>	<ul style="list-style-type: none"> <li>Counting parking vehicles by time and vehicle type: 16 hours (06:00 to 22:00)</li> <li>Vehicle type, parking lot, parking time, purpose, frequency, distance to the final destination</li> </ul>
7) Public Transport Awareness Survey	<ul style="list-style-type: none"> <li>Motorumok modern (tuk-tuk), motodop and cyclo drivers (1,100 samples)</li> </ul>	<ul style="list-style-type: none"> <li>Trip information (purpose, time required, necessary amount of money, number of trips, etc.)</li> </ul>

Type of Traffic Survey	Scope	Methodology
8) Para-transit Driver Interview Survey	<ul style="list-style-type: none"> <li>Motorumok modern (tuk-tuk), motodop and cyclo drivers (600 samples)</li> </ul>	<ul style="list-style-type: none"> <li>Individual attributes (age, address, mode, possession condition, and income)</li> <li>Trip information (trip frequency, trip OD, number of passengers, time required)</li> </ul>
9) Truck Traffic Survey	<ul style="list-style-type: none"> <li>9 main plants, about 3 dry ports/ 2 transit warehouses and Phnom Penh Port</li> <li>Driver interview (500 samples)</li> </ul>	<ul style="list-style-type: none"> <li>Interview of company and drivers</li> <li>Trip information: trip frequency, OD, purpose, load products, load weight, number of passengers</li> <li>Factory information: address, employee number, number of trucks, transit warehouse</li> <li>Port information: address, facility capacity, number of trucks going in and out</li> </ul>
10) Tourism Traffic Activity Survey	<ul style="list-style-type: none"> <li>Tourists (300 samples) at sightseeing spots</li> <li>Hearing to 9 khans who are in charge of tourism</li> </ul>	<ul style="list-style-type: none"> <li>Impressive tourist facilities and the reason of impression</li> <li>Information on accommodations (length of stay, hotel types, etc.)</li> <li>Sightseeing resources survey</li> </ul>
11) Person Trip Survey	<ul style="list-style-type: none"> <li>Entire project area</li> <li>Phnom Penh inhabitants (9,200 households)</li> </ul>	<ul style="list-style-type: none"> <li>Household interview by interviewers</li> <li>Household information (no. of family members, income, no. of vehicles)</li> <li>Individual attributes (sex, age, income, address of work/school)</li> <li>Trip information (place and time of OD, purpose, and travel mode)</li> </ul>
12) Road Inventory Survey	<ul style="list-style-type: none"> <li>About 540 km of road network</li> </ul>	<ul style="list-style-type: none"> <li>By site visit and measurements (width of carriageway, sidewalk, section, etc.)</li> </ul>

Note: OD= Origin-Destination

Source: PPUTMP Project Team

### 13.1.2 Traffic Zones

The traffic zoning map is shown Figure 13.1-1.

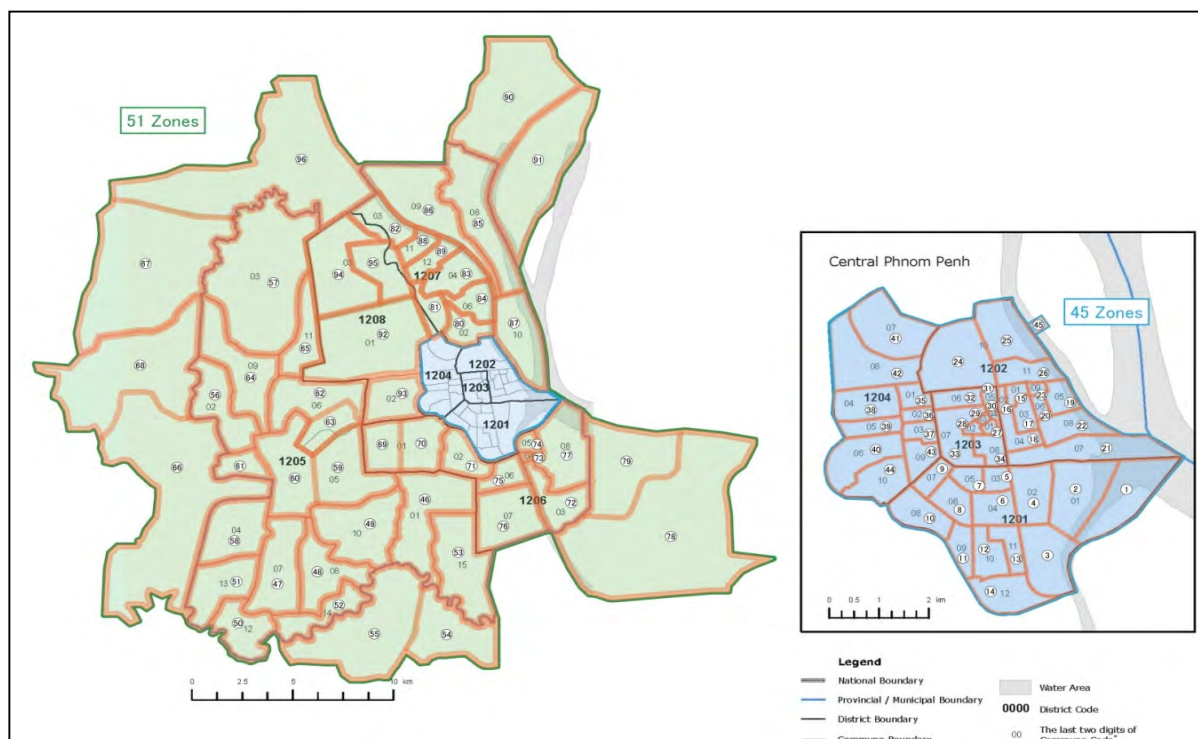
## 13.2 Traffic Survey

### 13.2.1 Cordon Line Survey

#### (1) Outline

The Cordon Line Survey aims to determine the trips to/from the project area made by external residents and to calibrate the OD matrices obtained from the person-trip survey on the project area boundary. To obtain such data/information, a traffic volume count survey and a roadside OD interview survey were conducted on the boundary of the project area. The Cordon Line Survey consists of the following:

- Traffic count survey;
- Roadside OD interview; and
- Airport and ferry port passenger interview.



Source: PPUTMP Project Team

**Figure 13.1-1 Traffic Zoning Map**

## (2) Survey Coverage

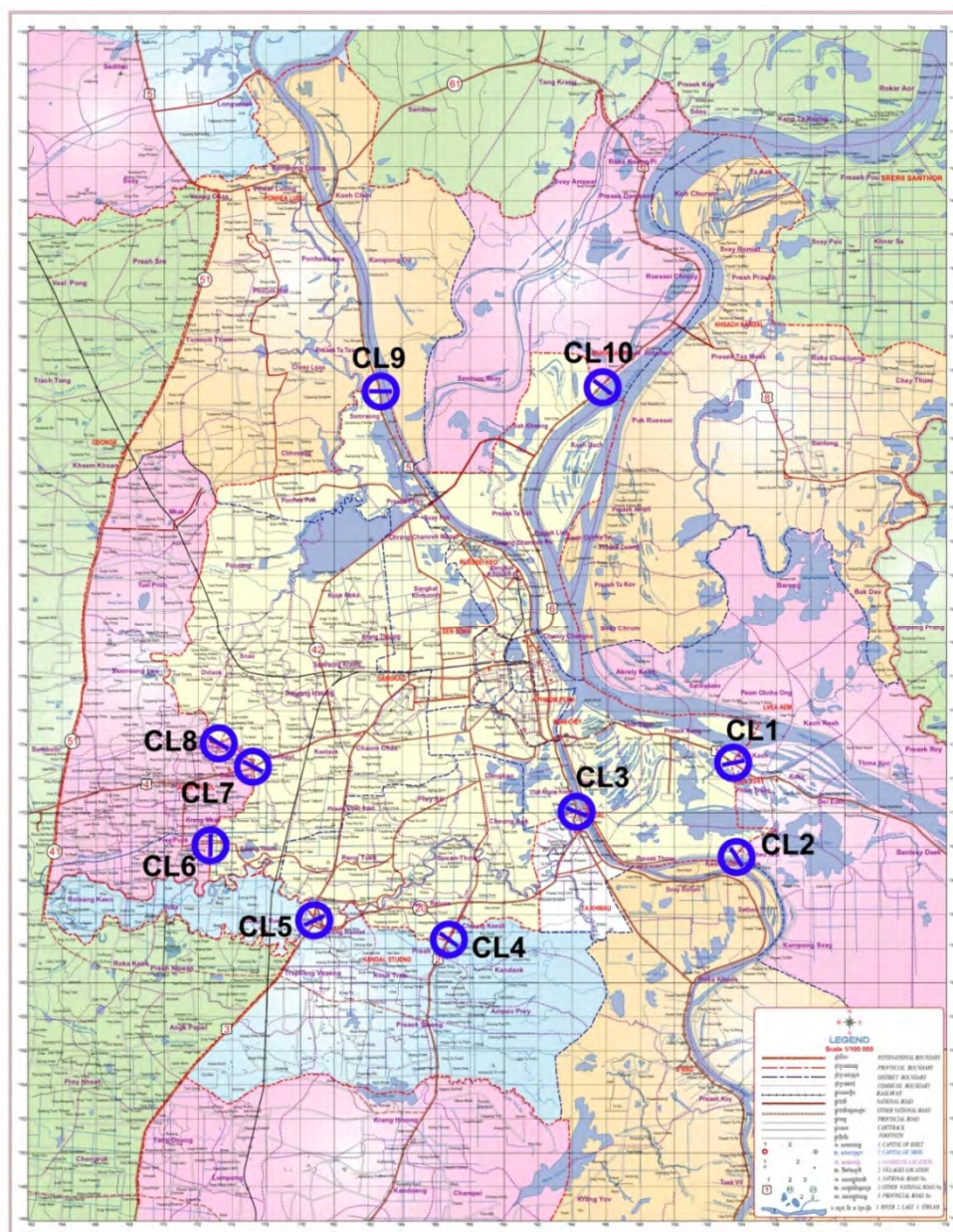
### 1) Traffic Count Survey

- a) The survey was conducted at 10 survey locations on the project area border (PPCC boundary), as shown in the location map. Table 13.2-1 and Figure 13.2-1 show the location of the survey points.

**Table 13.2-1 Cordon Line Survey Points**

Survey Location ID	Location and Road Name	Survey Duration (Hours)
CL01	National Road No. 1 PPCC Boundary (Kien Svay)	24
CL02	Dike Road (Tonle Basak) (Chheu Teal)	16
CL03	Kandal PPCC Boundary	16
CL04	National Road No. 2 PPCC Boundary (Preah Putth)	24
CL05	National Road No. 3 PPCC Boundary (Anlong Romiet)	24
CL06	Prey Puok (Angk Snuol)	16
CL07	National Road No. 4 PPCC Boundary (Baek Chan)	24
CL08	Chhak Chheu Neang (Angk Snuol)	16
CL09	National Road No. 5 PPCC Boundary (Samraong)	24
CL10	National Road No. 6 PPCC Boundary (Mukh Kampul)	24

Source: PPUTMP Project Team



Source: PPUTMP Project Team

**Figure 13.2-1 Location of Cordon Line Survey**

- b) Classified vehicular counting was conducted on both traffic directions at 6 locations for 24 hours from 06:00 to 06:00 and 4 other locations for 16 hours from 06:00 to 22:00 on weekdays (Tuesday through Thursday excluding Saturday, Sunday and public holidays). Also, the type of each vehicle was separately counted and the recorded for every 15-minute interval.
- c) Vehicular classifications are as follows:
- |                               |   |
|-------------------------------|---|
| 1) Motorbike and Motodop      | 6) Mini Bus                                   |
| 2) Motorumok modern (tuk-tuk) | 7) Medium and Large Bus                       |
| 3) Motorumok                  | 8) Light Truck /Pick Up                       |
| 4) Sedan, Wagon, Van          | 9) Truck ( 2 axles)                           |
| 5) Taxi                       | 10) Heavy Truck and Trailer (3 axles or more) |

## 2) Roadside OD Interview Survey

The roadside OD interview was conducted for 12 hours from 07:00 to 19:00 on weekdays (Tuesday through Thursday) during which approximately 10-20% of the traffic were stopped at random in order to interview drivers and passengers. The information collected during the interview is summarized as follows:

- a) Driver Interview (in case of Motodop or Motorumok modern (tuk-tuk), the interview was for the passenger)

- Trip Information:     - Trip Purpose (To home, To work, To school, Private Business, Employers Business, or Private, Social and shopping and Others)  
                               - OD  
 No. of Passengers:   - Passenger counting (including driver)

- b) Driver Interview (for Truck)

- Trip Information:     - Trip Purpose (To home, To work, To school, Private Business, Employers Business, or Private, Social and shopping and Others)  
                               - OD  
                               - Load item  
                               - Load capacity  
                               - Load factor

- c) Bus Passenger Interview (for Bus)

- Trip Information:     - Trip Purpose (To home, To work, To school, Private Business, Employers Business, or Private, Social and shopping and Others)  
                               - OD  
                               - Access mode from Origin point to Bus terminal  
                               - Egress mode from Bus Terminal to Destination point  
 No. of Passengers:   - Passenger count (including driver)

## 3) Passenger Interview at Airport and Ferry Ports

The interviews were conducted for 16 hours from 06:00 to 22:00. Approximately 20% of the passengers were stopped at random for the interview.

- Location:               - Phnom Penh airport (Domestic and International)  
                               - Ferry port stations (8 stations)  
 Sample Size:           - Approximately more than 15% of total passengers  
 Survey Duration:       - 16 hours (6:00-22:00) on weekdays (Tuesday through Thursday) by taking into account the operation time of airport and ferry ports.  
 Trip Information:       - Trip Purpose (To home, To work, To school, Private Business, Employers Business, or Private, Social and shopping and Others)  
                               - OD  
                               - Access mode and Travel Time / Egress mode and Travel Time

### (3) Results of Traffic Count

A summary of the Cordon Line Survey results at 10 locations of major radial roads is shown in Table 13.2-2. Traffic results by location are shown in Figure 13.2-2. Similarly, traffic composition and hourly fluctuation of traffic volume are shown in Figure 13.2-3 and Figure 13.2-4, respectively.

From these summary results, the following are observed:

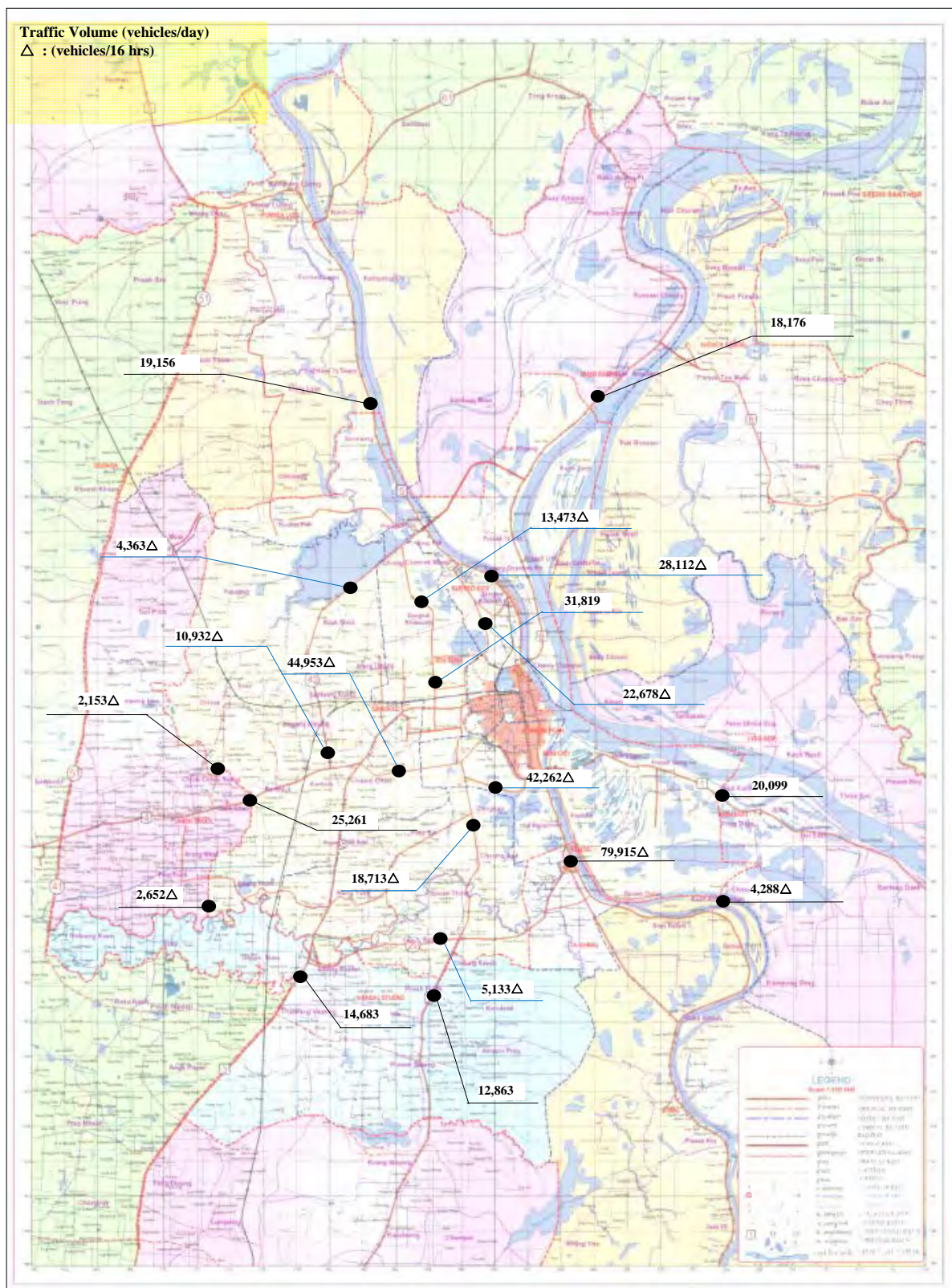
- For the national roads which connect cities, about 10,000-20,000 vehicles were observed.
- The peak rate is around 10%, and the ratio of daily traffic to daytime traffic varies from 1.2 to 1.4.
- Motorbike has the highest share of around 60% on national roads, while sedan car has around 10% share, followed by minibuses and trucks.
- 07:00 to 08:00 is usually a peak hour in the city areas, but the peak hour begins at 06:00 to 07:00 outside the city areas.

**Table 13.2-2 Summary of Cordon Line Survey Results**

Traffic Point	Road No.	Time of Count	Road Name.	Traffic Volume	Peak Ratio	Ratio of Daily Traffic	Motorbike Ratio	Sedan Ratio
Cordon Line	1	24h	National Road No. 1 PPCC Boundary (Kien Svay)	20,099	10.4%	1.32	66.1%	10.5%
	2	16h	Dike Road (Tonle Basak) (Chheu Teal)	4,288	10.8%	1.31	80.0%	2.4%
	3	16h	Kandal PPCC Boundary	79,915	10.0%	1.34	79.2%	8.5%
	4	24h	National Road No. 2 PPCC Boundary (Preah Putth)	12,863	10.0%	1.40	64.2%	8.6%
	5	24h	National Road No. 3 PPCC Boundary (Anlong Romiet)	14,683	11.3%	1.34	57.2%	10.5%
	6	16h	Prey Puok (Angk Snuol)	2,652	15.2%	1.40	78.5%	5.1%
	7	24h	National Road No. 4 PPCC Boundary (Baek Chan)	25,261	10.7%	1.33	56.2%	13.7%
	8	16h	Chhak Chheu Neang (Angk Snuol)	2,153	12.1%	1.33	81.4%	2.7%
	9	24h	National Road No. 5 PPCC Boundary (Samraong)	19,156	16.6%	1.21	58.0%	14.0%
	10	24h	National Road No. 6 PPCC Boundary (Mukh Kampul)	18,176	8.2%	1.25	47.2%	16.3%

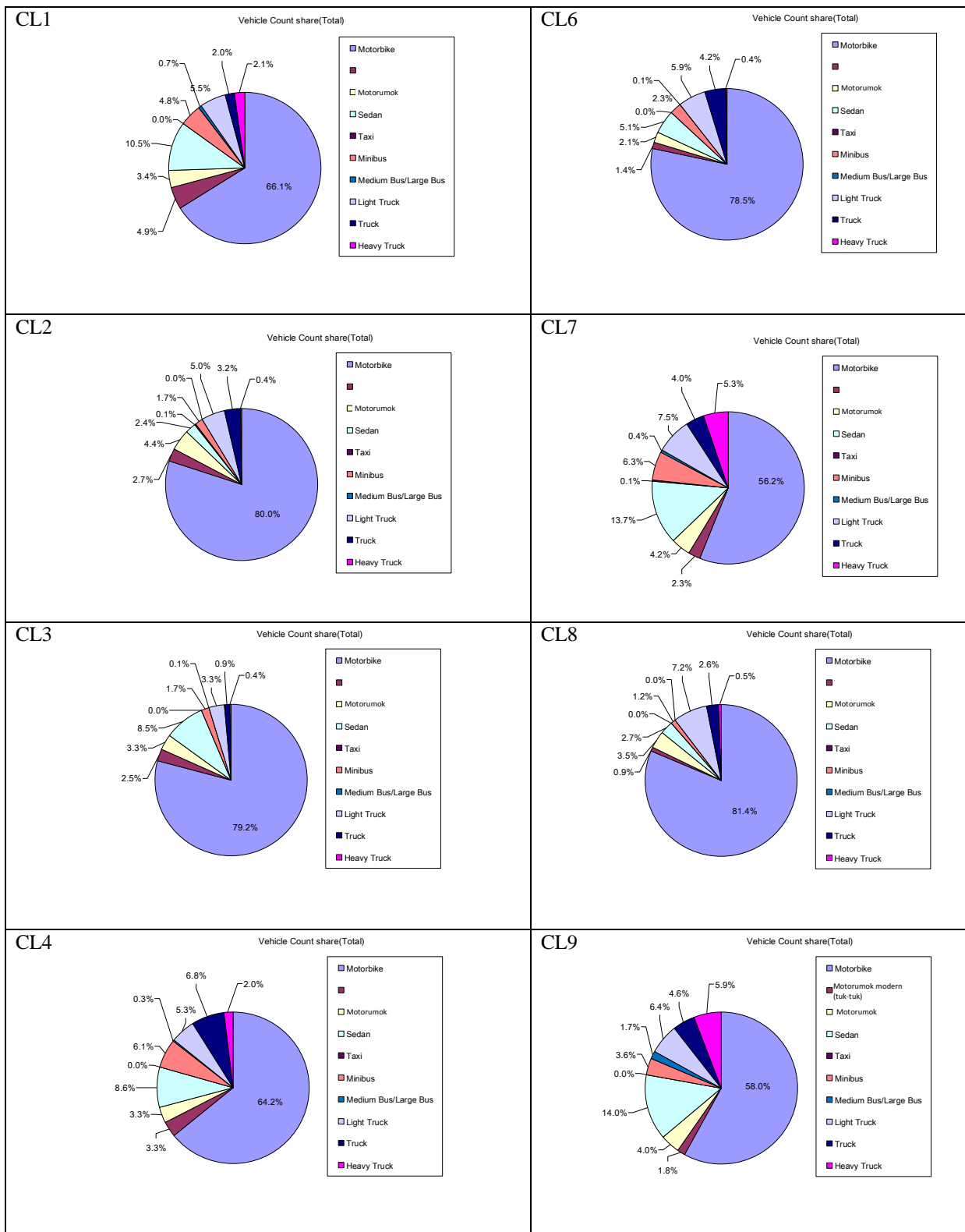
Note: Peak rate is ratio for 24 hours. 16 hours traffic volume is converted into the 24 hours traffic volume based on the survey result of the 24 hours traffic count survey.

Source: PPUTMP Project Team

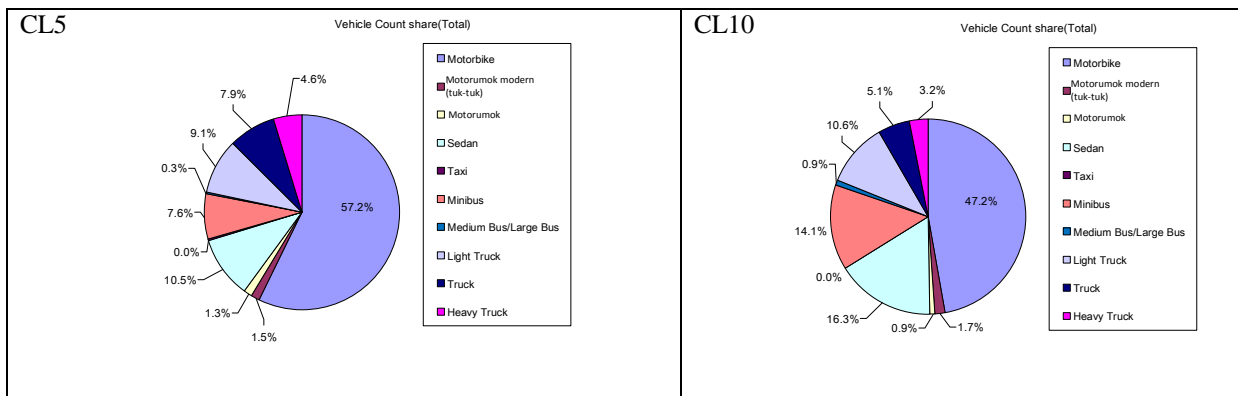


Source: PPUTMP Project Team

Figure 13.2-2 Traffic Count Results

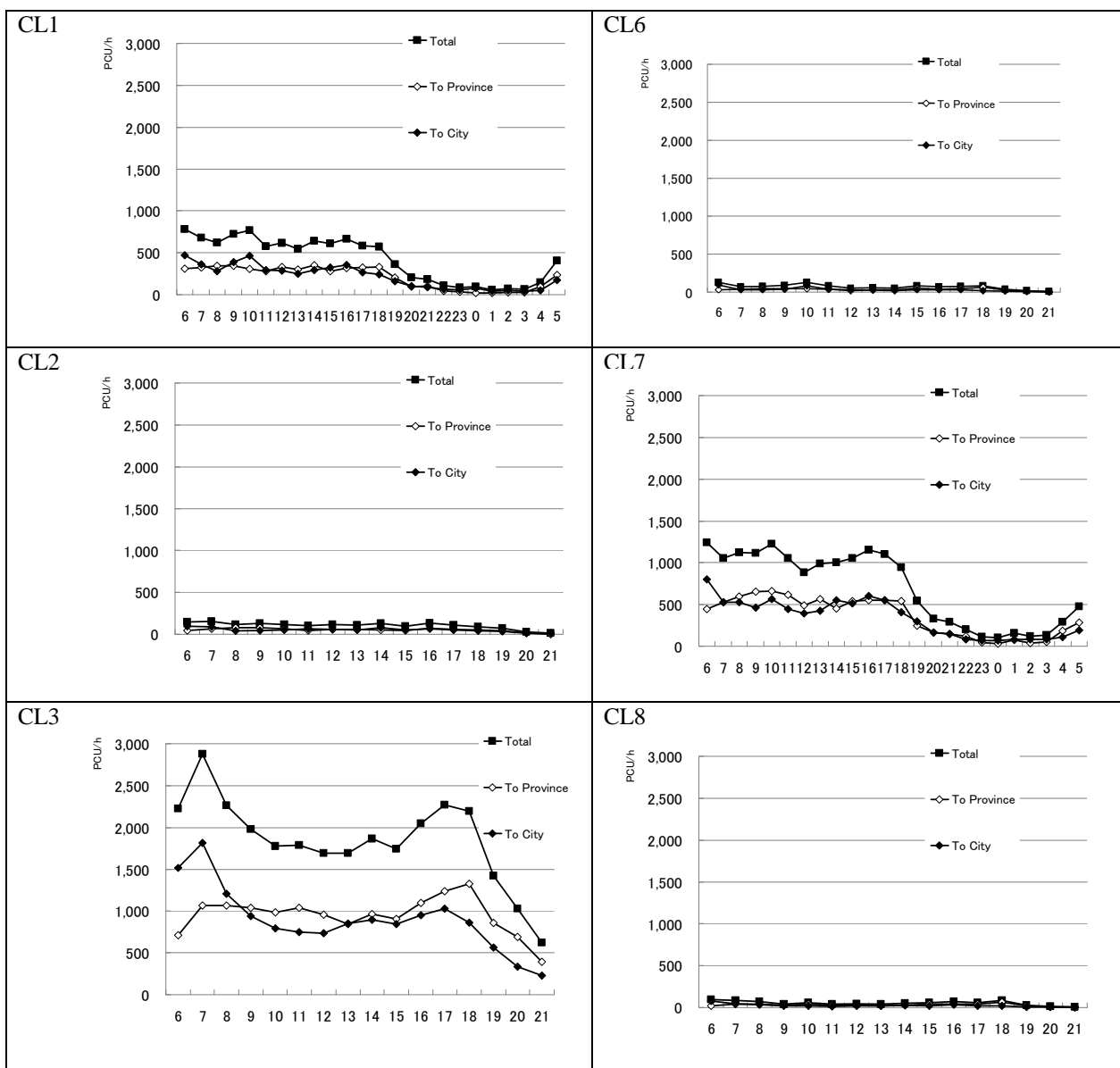


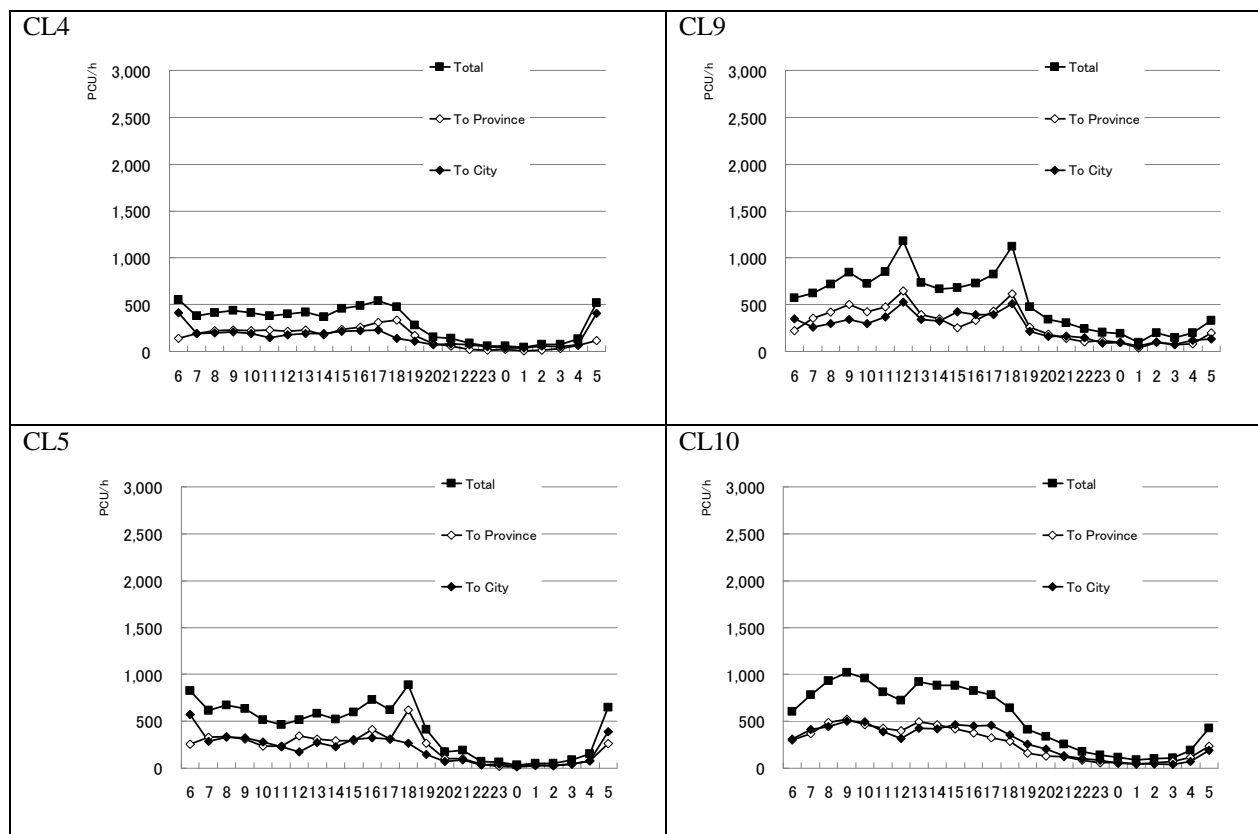




Source: PPUTMP Project Team

Figure 13.2-3 Composition of Vehicles by Station





Note: PCU= Passenger Car Unit

Source: PPUTMP Project Team

**Figure 13.2-4 Hourly Fluctuation by Station**

**(4) Results of Roadside OD Interview Survey**

**1) Driver Interview**

The OD survey was carried out to establish travel patterns (where people are moving to/from). ODs of vehicles were surveyed through roadside interview of the drivers. This method is most commonly practiced. Interviews of vehicle drivers were carried out in 12 hours from 06:00 to 18:00 on 10 stations during the same time that the traffic count survey was conducted. The vehicles were stopped on random sampling basis, and drivers were interviewed.

The following information were collected from the driver interview survey:

- Trip purpose (To home, To work, To school, Business or Private);
- OD;
- Number of passengers (including driver);
- Estimate travel time; and
- Major cargo/ load factor (for truck).

a) Number of Samples and Sampling Rate

The number of samples and sampling rate at each station are shown in Table 13.2-3. The actual samples of all stations exceeded the target of 10%, except station CL3 where the traffic volume is extremely big that the actual sample surveyed was only 8%.

**Table 13.2-3 Number of Samples and Sampling Rate**

Station No.	Traffic Volume (12hrs)	No. of Samples	Sampling Rate
CL1	17,286	2,569	15%
CL2	3,995	724	18%
CL3	71,288	5,578	8%
CL4	10,529	2,140	20%
CL5	12,766	1,880	15%
CL6	2,466	602	24%
CL7	21,771	2,170	10%
CL8	2,017	934	46%
CL9	17,066	2,091	12%
CL10	15,844	2,311	15%

Source: PPUTMP Project Team

## b) Average Passenger Occupancy

The average passenger occupancy by vehicle classification is shown in Table 13.2-4.

**Table 13.2-4 Average Passenger Occupancy**

Motorcycle (MC)			Light Vehicle (LV)			Heavy Vehicle (HV)			
Motorboke/ Motodop	Motorumok modern (tuk-tuk)	Motorumok	Sedan, Wagon	Taxi	Mini Bus	Meduim and Large Bus	Light Truck, Pick up	Truck (2axes)	Heavy Truck and Trailer (3axles)
1.5	3.7	4.6	2.8	3.1	8.9	22.4	5.0	2.4	2.0

Source: PPUTMP Project Team

## c) Major Cargo and Load Factor

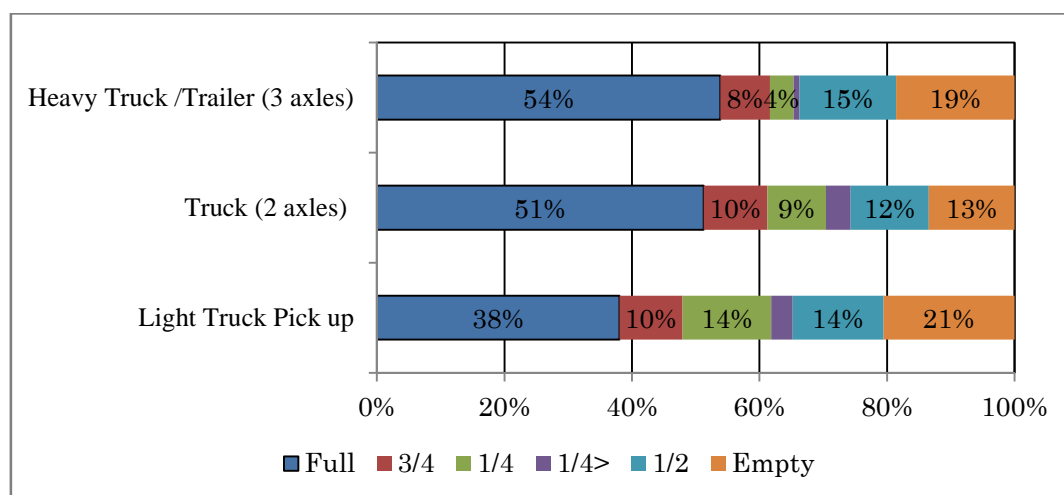
Table 13.2-5 shows the major cargoes carried by truck and trailer truck. Cargoes were classified into 23 categories. Cargo of construction materials accounts for 27% of the total while cargoes of manufactured goods and fruits/vegetables each have a share of 8%.

**Table 13.2-5 Major Cargoes of Trucks**

Cargo	Sample	Share
1. Animal Feed	96	4%
2. Animal Products	78	3%
3. Chemicals	44	2%
4. Construction material	606	27%
5. Fabric	134	6%
6. Fertilizer	42	2%
7. Fruits and Vegetable	174	8%
8. Industrial material (Steel, metal...)	85	4%
9. Manufactured Goods	188	8%
10. Minerals	8	0%
11. Paper	58	3%
12. Petroleum	104	5%
13. Pharmaceutical	12	1%
14. Plant products	59	3%
15. Plastic and Plastic products	41	2%
16. Rice and Grain Product	122	5%
17. Rubber and rubber products	14	1%
18. Seafood	5	0%
19. Sugar and Sugar confectionary	24	1%
20. Mixing	162	7%
21. Machinery	16	1%
22. Brewery	51	2%
23. Workers	159	7%

Source: PPUTMP Project Team

Figure 13.2-5 shows the load factor (percentage of actually loaded cargo against the capacity of the vehicle). Approximately 50% of trucks and heavy truck vehicles and 38% of light truck vehicles are fully loaded.

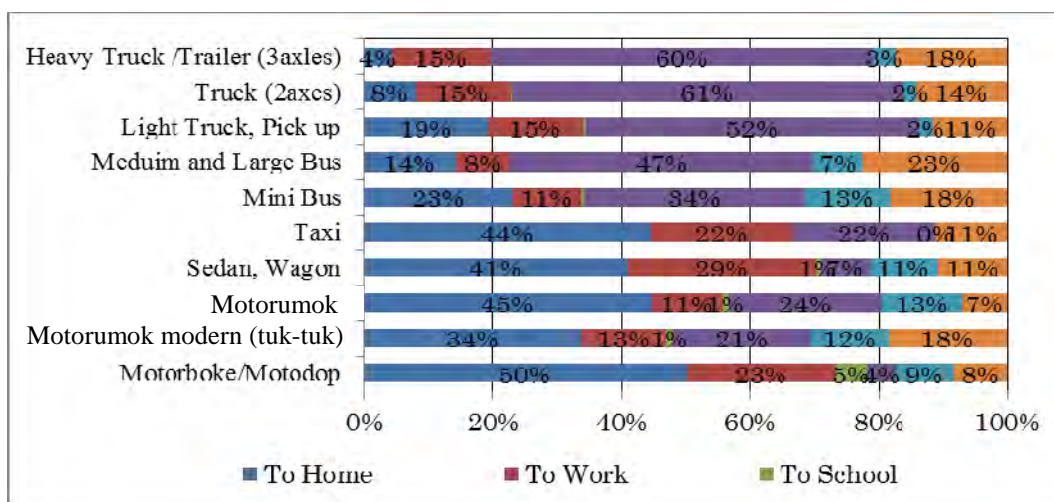


Source: PPUTMP Project Team

**Figure 13.2-5 Load Factor by Vehicle Classification**

d) Trip Purpose

Figure 13.2-6 shows the trip purpose by vehicle classification.

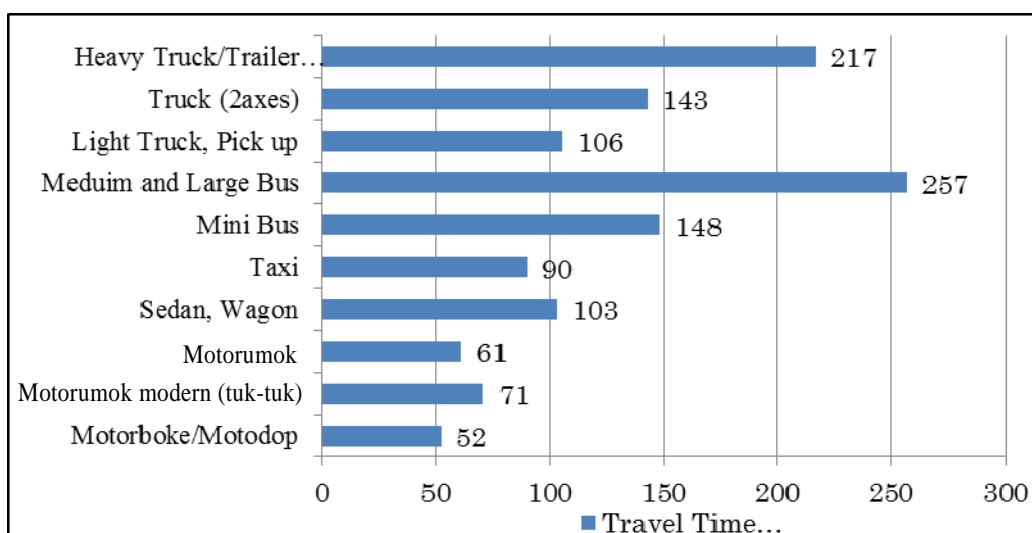


Source: PPUTMP Project Team

Figure 13.2-6 Load Factor by Vehicle Classification

e) Travel Time

Figure 13.2-7 shows the estimated average travel time by vehicle classification. The travel time from origin to destination was calculated based on the driver's estimate. Travel time for medium/ large buses and heavy trucks/ trailers were more than 200 minutes (nearly 4 hours) on average. Smaller vehicles like the motorcycles, motodop and motorumok modern (tuk-tuk) averaged a travel time of about one hour.



Source: PPUTMP Project Team

Figure 13.2-7 Estimated Average Travel Time

## 2) Bus Passenger Interview

The interview of bus passengers calculated their travel time on the bus for each National Road (see Table 13.2-6). When the running speed of the bus is assumed to be 50 km/h, a distance of about 280 km is traveled.

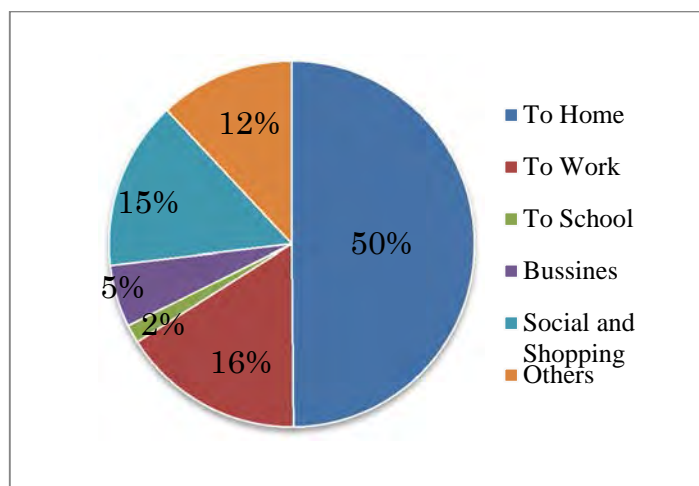
On trip composition by purpose (see Figure 13.2-8), “To Home” trip has the largest share of 50%, followed by “To Work” (16%), "Social and shopping" (15%), “Business” (5%), and Others (12%).

In addition, as means of transportation before and after their ride on the bus, most passengers use the motorbike (32%) and the motodop (20%), while 16% of the passengers walk (see Figure 13.2-9).

**Table 13.2-6 Travel Time by National Road**

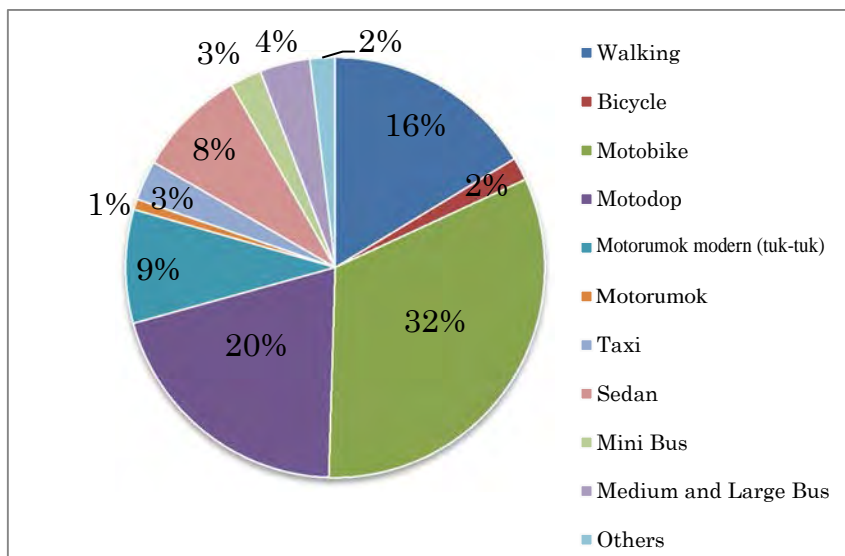
Station ID	National Road	Hours
CL1	NR1	5.6
CL4	NR2	2.3
CL5	NR3	3.2
CL7	NR4	5.5
CL9	NR5	5.9
CL10	NR6	7.8
Average		5.6

Source: PPUTMP Project Team



Source: PPUTMP Project Team

**Figure 13.2-8 Trip Purpose of Bus Passengers**



Source: PPUTMP Project Team

**Figure 13.2-9 Transfer Mode of Bus Passengers**

**(5) Results of Passenger Interview Survey at Airport and Ferry Ports**

**1) Passenger Interview Survey at Airport**

a) Outline of the Survey

**Table 13.2-7 Number of Samples by Passengers Category**

Survey location	Phnom Penh Airport
Survey date	26 July 2012
Number of samples by passenger category	International arrival : 290 samples International departure : 394 samples Domestic arrival : 26 samples Domestic departure : 35 samples Total : 745 samples

Source: PPUTMP Project Team

b) Results of Passenger Count

**Table 13.2-8 No. of Passengers at Airport**

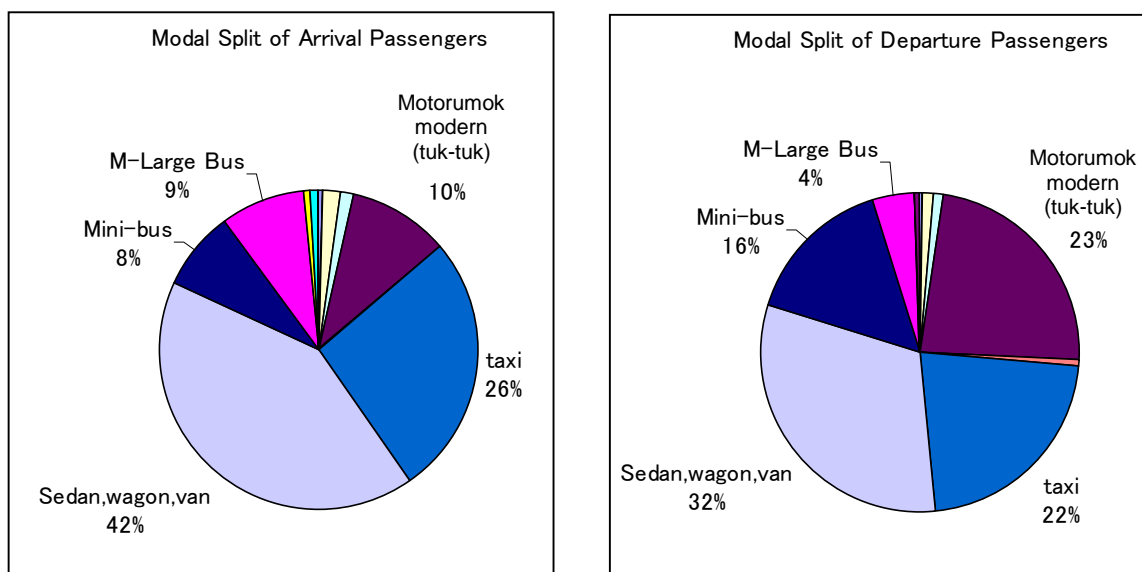
No. of Passengers at Airport (Arrival)				
No.	Time	Flight Name	Passengers on Board	Domestic / International
1	7:35	KUL- PNH	109	International
2	9:05	BKK- PNH	124	International
3	9:10	BKK- PNH	124	International
4	10:20	KUL- PNH	103	International
5	10:25	HKG- PNH	103	International
6	11:35	TPE- PNH	113	International
7	13:15	HAN- PNH	70	International
8	13:30	CAN- PNH	129	International
9	14:50	BKK- PNH	72	International
10	15:55	KUL- PNH	115	International
11	16:10	KUL- PNH	115	International
12	16:35	BKK- PNH	67	International

No. of Passengers at Airport (Arrival)				
No.	Time	Flight Name	Passengers on Board	Domestic / International
13	16:50	HAN- PNH	80	International
14	17:15	SIN- PNH	80	International
15	17:35	SIN- PNH	158	International
16	18:40	BKK- PNH	66	International
17	18:45	HAN- PNH	56	International
18	19:25	BKK- PNH	61	International
19	21:50	BKK- PNH	49	International
20	22:05	ICN- PNH	151	International
21	22:55	ICN- PNH	163	International
Total			<b>2,108</b>	
1	9:25	REP- PNH	66	Domestic
3	12:15	REP- PNH	29	Domestic
4	18:05	REP- PNH	47	Domestic
Total			<b>142</b>	
No. of Passengers at Airport (Departure)				
No.	Time	Flight Name	Passengers on Board	Domestic / International
1	6:30	PNH- BKK	50	International
2	7:30	PNH- CAN	140	International
3	7:50	PNH- KUL	75	International
4	9:30	PNH- BKK	123	International
5	9:45	PNH- BKK	75	International
6	11:00	PNH- KUL	46	International
7	11:15	PNH- HKG	94	International
8	11:45	PNH- SIN	79	International
9	12:15	PNH- TPE	146	International
10	14:30	PNH- CAN	125	International
11	15:30	PNH- BKK	108	International
12	16:00	PNH- KUL	107	International
13	16:40	PNH- KUL	91	International
14	17:10	PNH- HAN	90	International
15	17:45	PNH- SIN	74	International
16	19:20	PNH- HAN	60	International
17	20:30	PNH- BKK	150	International
18	22:59	PNH- ICN	144	International
19	23:45	PNH- ICN	134	International
Total			<b>1911</b>	
1	7:15	PNH- REP	32	Domestic
2	9:55	PNH- REP	65	Domestic
3	16:00	PNH- REP	62	Domestic
Total			<b>159</b>	

Source: PPUTMP Project Team



c) Modal Split Results on Airport Enter/Exit Passengers



Source: PPUTMP Project Team

Figure 13.2-10 Modal Split of Airport Passengers

2) Passenger Interview Survey at Ferry Ports

a) Outline of the Survey

Table 13.2-9 No. of Sampling Interviews and No. of Passengers at Ferry Ports

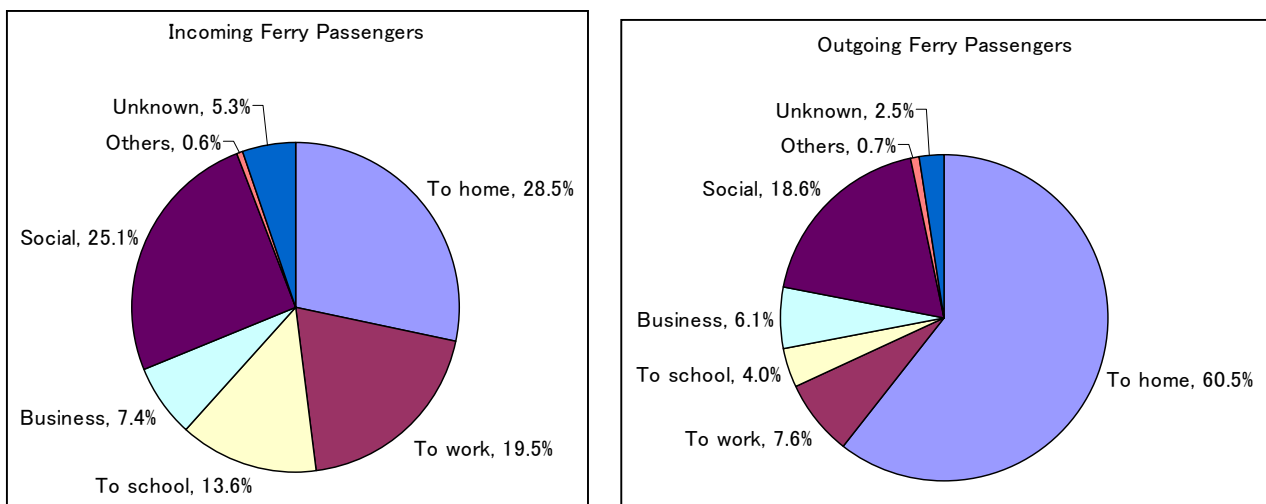
Ferry Port	Survey Date	Sampling No.			No. of Passengers		
		Incoming Passengers	Outgoing Passengers	Total	Incoming to City	Outgoing from City	Total
Svary Chrum	2012/6/21	52	63	115	307	237	544
6A Second Bridge	2012/6/20	13	16	29	35	46	81
Bakhaeng- Koh Dach	2012/6/21	37	41	78	100	128	228
Chrouy Changvar- Svary Chrum	2012/6/20	68	75	143	440	550	940
Khdey Chass- Koh Dach	2012/6/20	48	64	112	155	167	322
Phnom Penh- Arey Khsat	2012/6/20	126	141	267	895	617	1,072
Preak Leap- Koh Dach	2012/6/21	61	74	135	375	445	820
Ta Khmao- Chumpus Khor Aek	2012/6/21	61	60	121	137	168	305
Taprum- Moat Krases	2012/6/21	9	20	29	22	105	127
<b>Total</b>		<b>475</b>	<b>554</b>	<b>1,029</b>	<b>2,466</b>	<b>3,414</b>	<b>4,432</b>

Note: Incoming passengers = Passengers from provinces to the City

Outgoing passengers = Passengers from the City to provinces

Source: PPUTMP Project Team

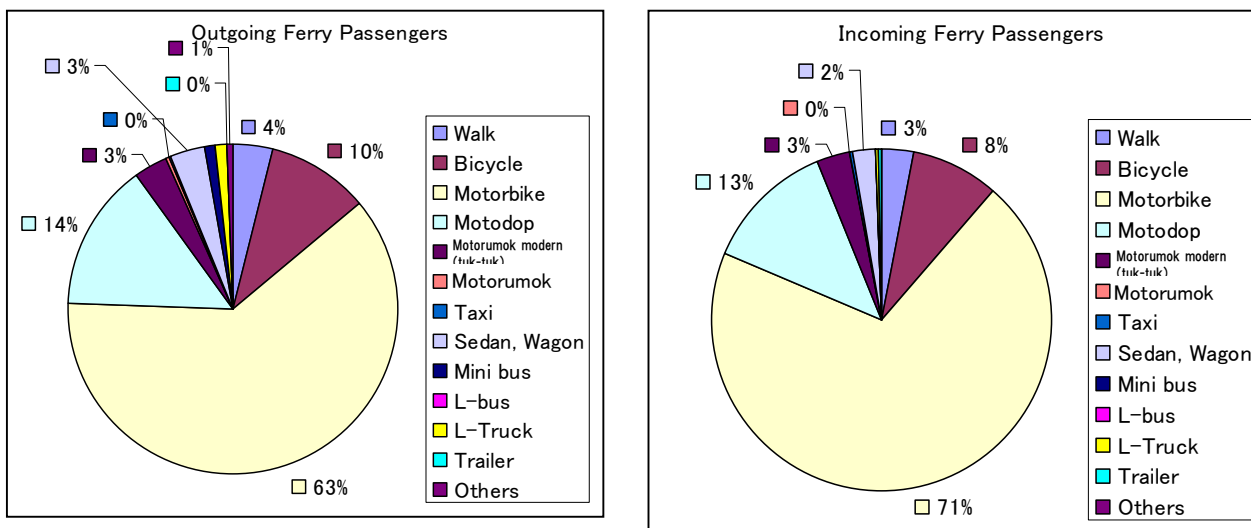
b) Trip Purpose of Ferry Passengers



Source: PPUTMP Project Team

Figure 13.2-11 Trip Purpose of Ferry Passengers

c) Modal Split of Ferry Passengers



Source: PPUTMP Project Team

Figure 13.2-12 Modal Split of Ferry Passengers

13.2.2 Screen Line Survey

(1) Outline

The objective of this survey is to gather information to calibrate the current OD matrices obtained from the person-trip survey in terms of vehicle traffic.

(2) Survey Coverage

- a) The survey was conducted at 9 stations in the project area on screen line (see Table 13.2-10 and Figure 13.2-13).

- b) The classified vehicular counting was conducted on both traffic directions for 24 hours from 06:00 to 06:00 of the following day at 5 locations and for 16 hours from 06:00 to 22:00 at 4 locations on a weekday (Tuesday through Thursday excluding Saturday, Sunday, and public holidays). Also, the type of each vehicle was separately counted and recorded at every 15-minute interval.
- c) Vehicular classification is as follows:
- |                               |   |
|-------------------------------|---|
| 1) Motorbike and Motodop      | 6) Mini Bus                                   |
| 2) Motorumok modern (tuk-tuk) | 7) Medium and Large Bus                       |
| 3) Motorumok                  | 8) Light Truck /Pick Up                       |
| 4) Sedan, Wagon, Van          | 9) Truck (2 axles)                            |
| 5) Taxi                       | 10) Heavy Truck and Trailer (3 axles or more) |

**Table 13.2-10 Screen Line Survey Stations**

Survey Location ID	Road Name	Survey Duration (Hours)
SL01	National Road No. 1	24
SL02	Road No. 369	16
SL03	National Road No. 2	24
SL04	Road TumnopThmei	16
SL05	Road 2004	16
SL06	Russian Blvd.	24
SL07	Road 1986	16
SL08	National Road No. 5	24
SL09	National Road No. 6	24



Source: PPUTMP Project Team

**Figure 13.2-13 Location of Screen Line Survey**

### (3) Survey Results

A summary of the results of the Screen Line Survey conducted at 9 locations along the city boundary is shown in Table 13.2-11. The traffic count results by location are shown in Figure 13.2-14. The traffic composition and hourly fluctuation of traffic volume are shown in Figure 13.2-15 and Figure 13.2-16, respectively.

The following observations can be gleaned from the survey results:

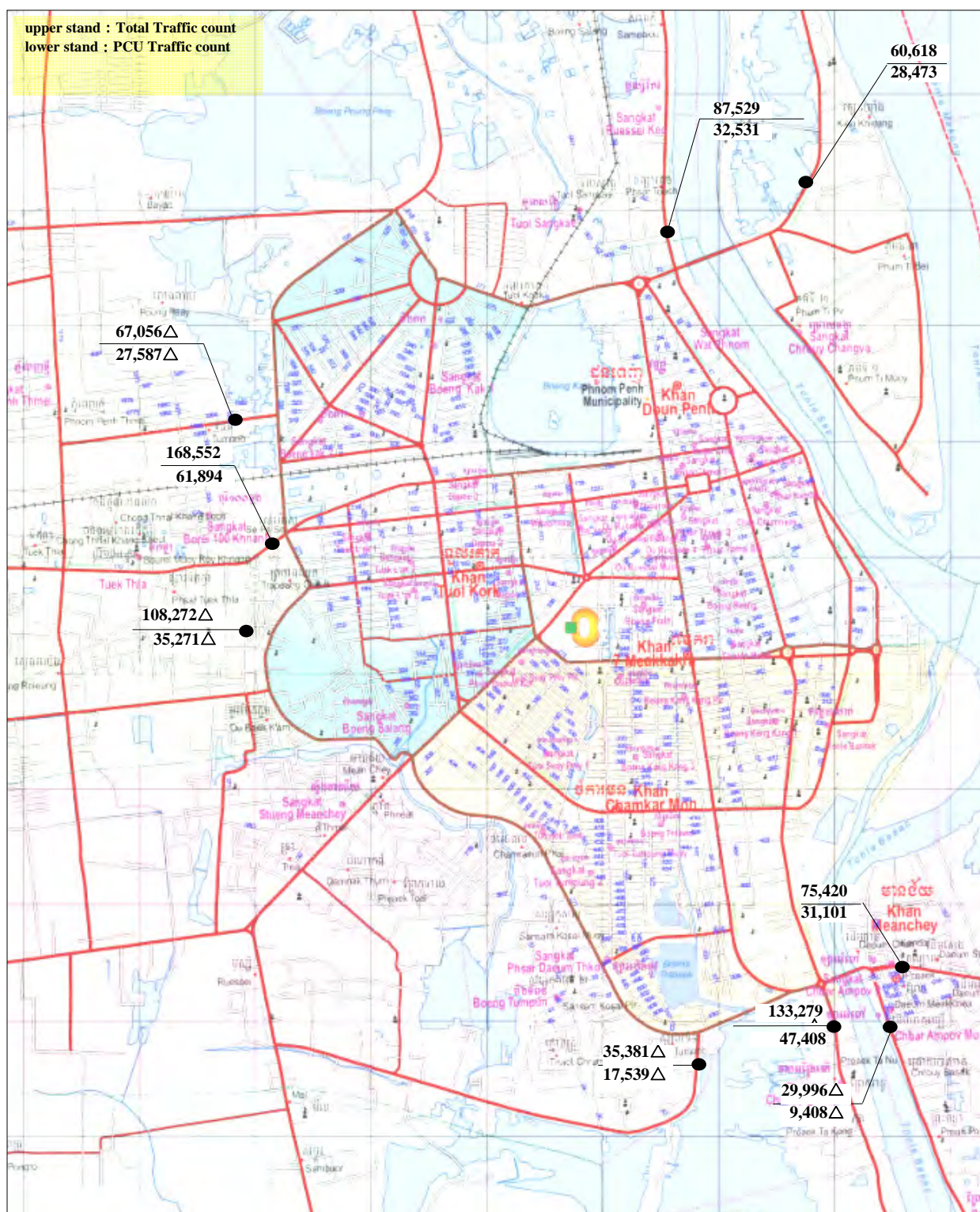
- The highest traffic volume is approximately 168,000 vehicles at Russian Blvd. for East-West bound vehicles, followed by NR2 for the North-South bound vehicles (133,000), and Road 2004 (108,000). Peak hour and ratio of daily traffic to daytime traffic are almost same as in the Cordon Line results.
- The share of motorcycle is slightly higher (70% - 80%) than in the Cordon Line Survey and the share of sedan car is around 10%.
- The peak volume appears conspicuously since it is the urban area. SL2 and SL4 are restricted by road capacity. There are almost no fluctuations.

**Table 13.2-11 Summary of Screen Line Survey Results**

Traffic Point	Road No.	Time of Count	Road Name.	Traffic Volume	Peak Ratio	Ratio of Daily Traffic	Motorbike Ratio	Sedan Ratio
Screen Line	1	24h	NR1	75,420	10.6%	1.30	76.6%	9.3%
	2	16h	Road No.369	29,996	9.9%	1.34	83.3%	6.1%
	3	24h	NR2	133,279	10.8%	1.36	81.6%	7.3%
	4	16h	Road Tumnop Thmei	35,381	9.1%	1.31	71.3%	8.6%
	5	16h	Road 2004	108,272	12.3%	1.32	82.6%	9.6%
	6	24h	Russian Blvd.	168,552	9.6%	1.35	76.8%	13.1%
	7	16h	Road 1986	67,056	11.1%	1.28	74.6%	15.1%
	8	24h	NR5	87,529	9.2%	1.36	78.8%	9.6%
	9	24h	NR6	60,618	7.8%	1.28	67.5%	16.4%

Note: Peak rate is ratio for 24 hours. 16 hours traffic volume is converted into the 24 hours traffic volume based on the results of the 24 hours traffic count survey.

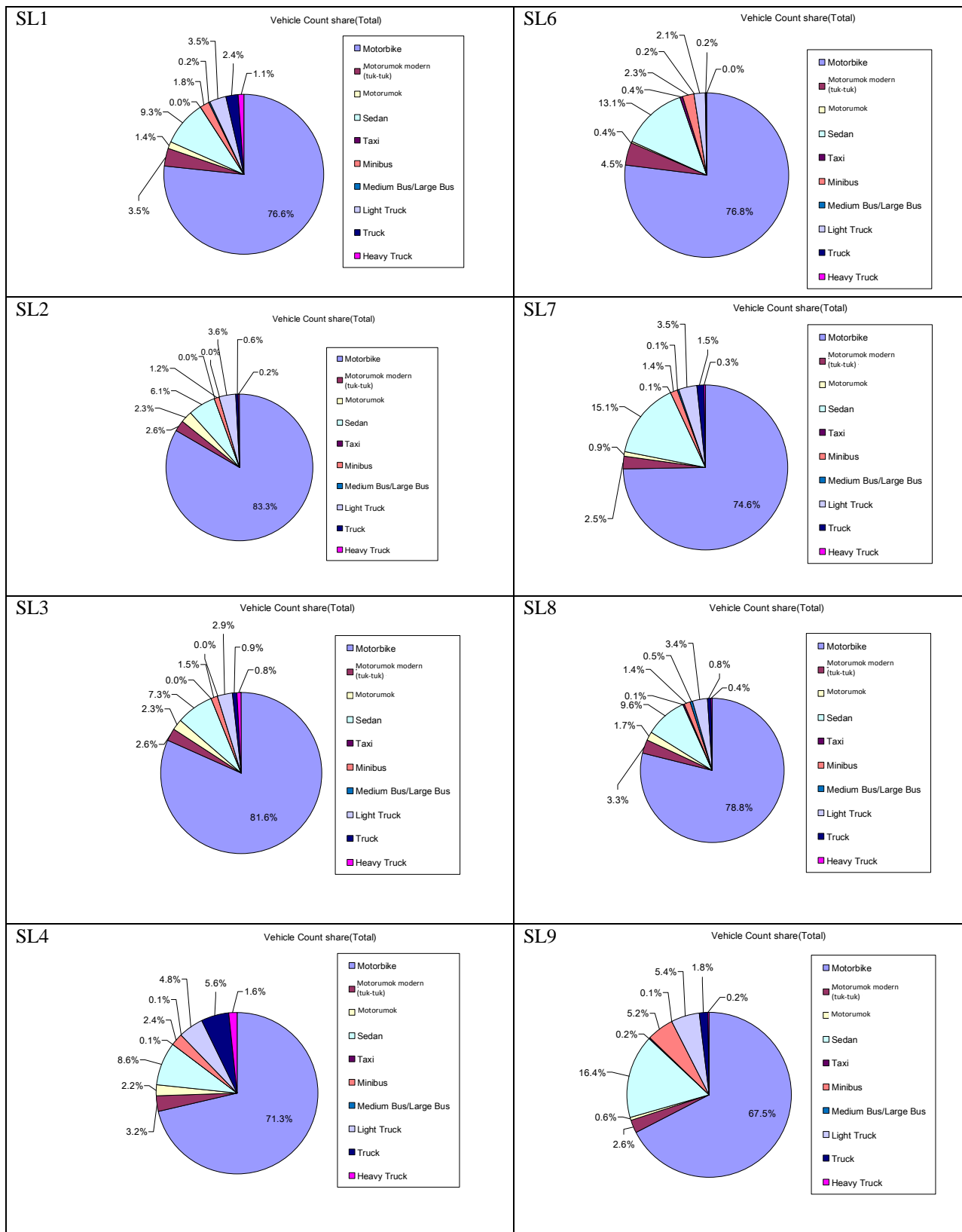
Source: PPUTMP Project Team

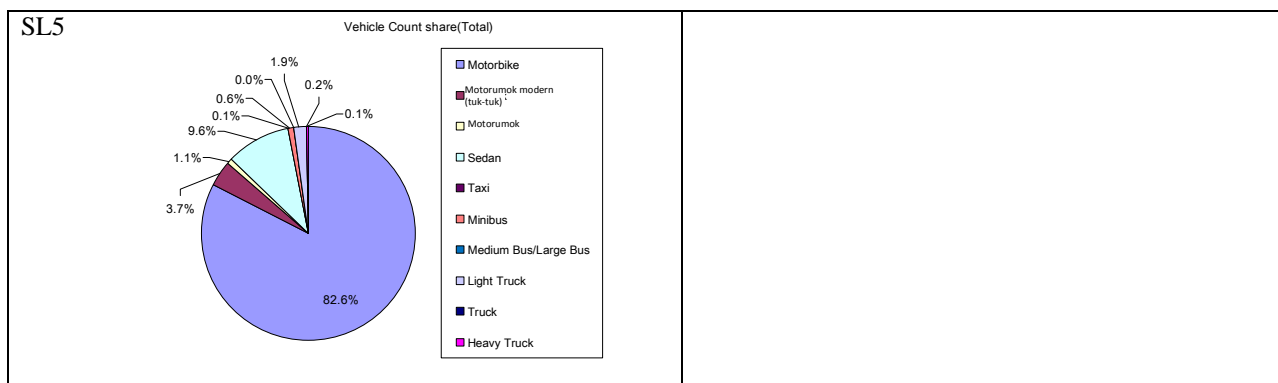


Note: 24hours, △ : Time of Count for 16hours (06:00-22:00)

Source: PPUTMP Project Team

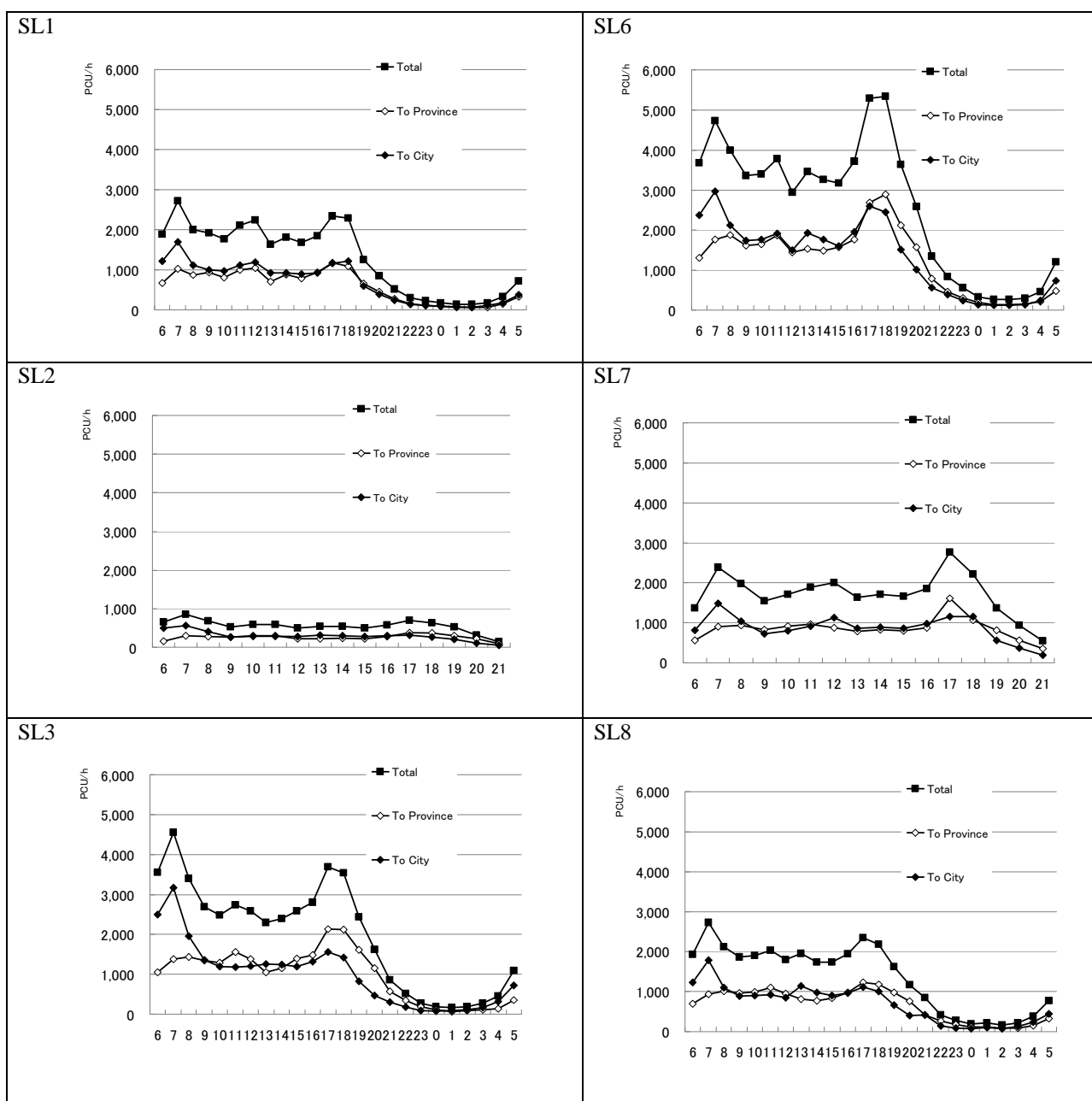
**Figure 13.2-14 Traffic Count Results of Screen Line Survey**

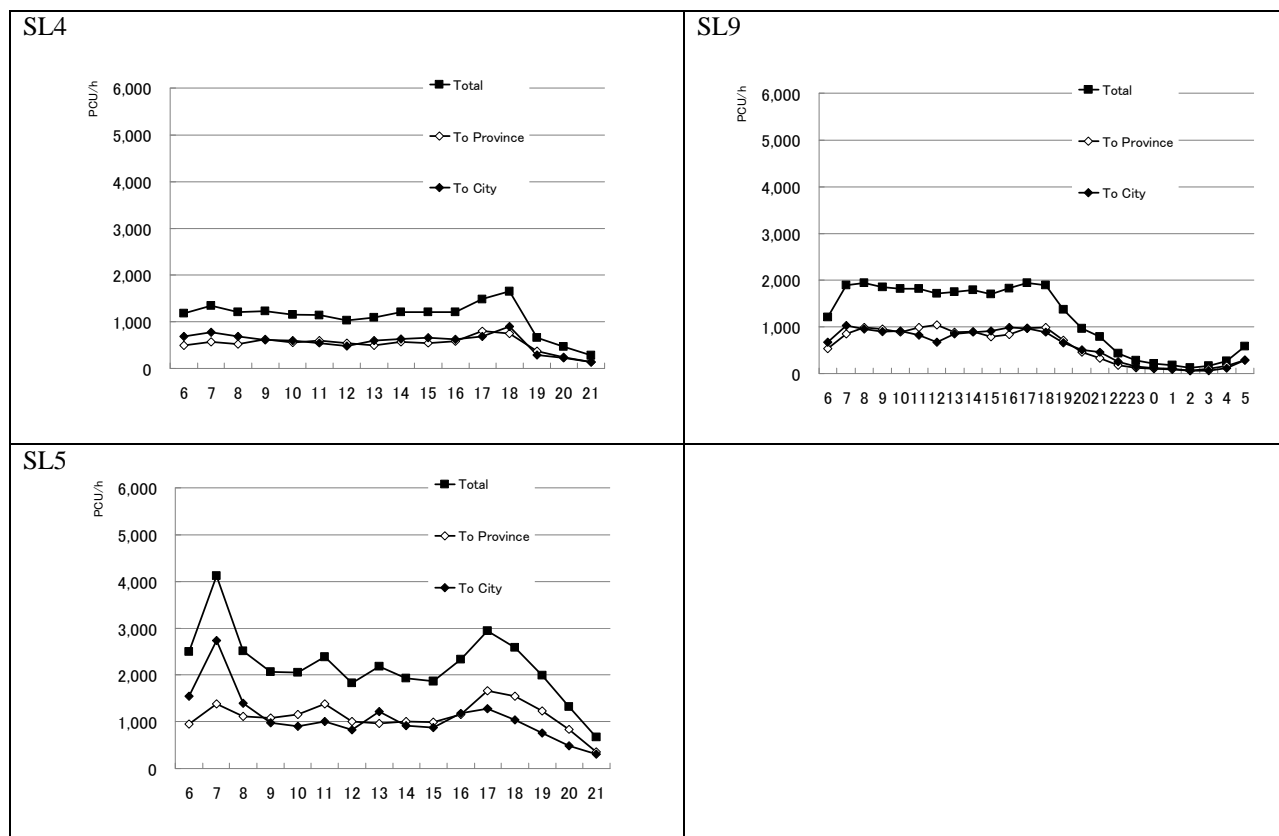




Source: PPUTMP Project Team

**Figure 13.2-15 Composition of Vehicles by Station**





Source: PPUTMP Project Team

**Figure 13.2-16 Hourly Fluctuation by Station**

### 13.2.3 Roadside Traffic Count

#### (1) Outline

The roadside traffic count survey aims to identify the present conditions of traffic on the congested roads sections.

#### (2) Survey Coverage

- a) The survey was conducted at 34 survey locations in PPCC (see Table 13.2-12, Figure 13.2-17 and Figure 13.2-18).
- b) The classified vehicular count was conducted on both traffic directions for 24 hours from 06:00 to 06:00 of the following day at 8 locations and for 16 hours from 06:00 to 22:00 for 24 locations on a weekday (Tuesday through Thursday excluding Saturday, Sunday, and public holidays). The type of each vehicle was separately counted and recorded at every 15-minute interval.
- c) Vehicular classification is as follows:
 

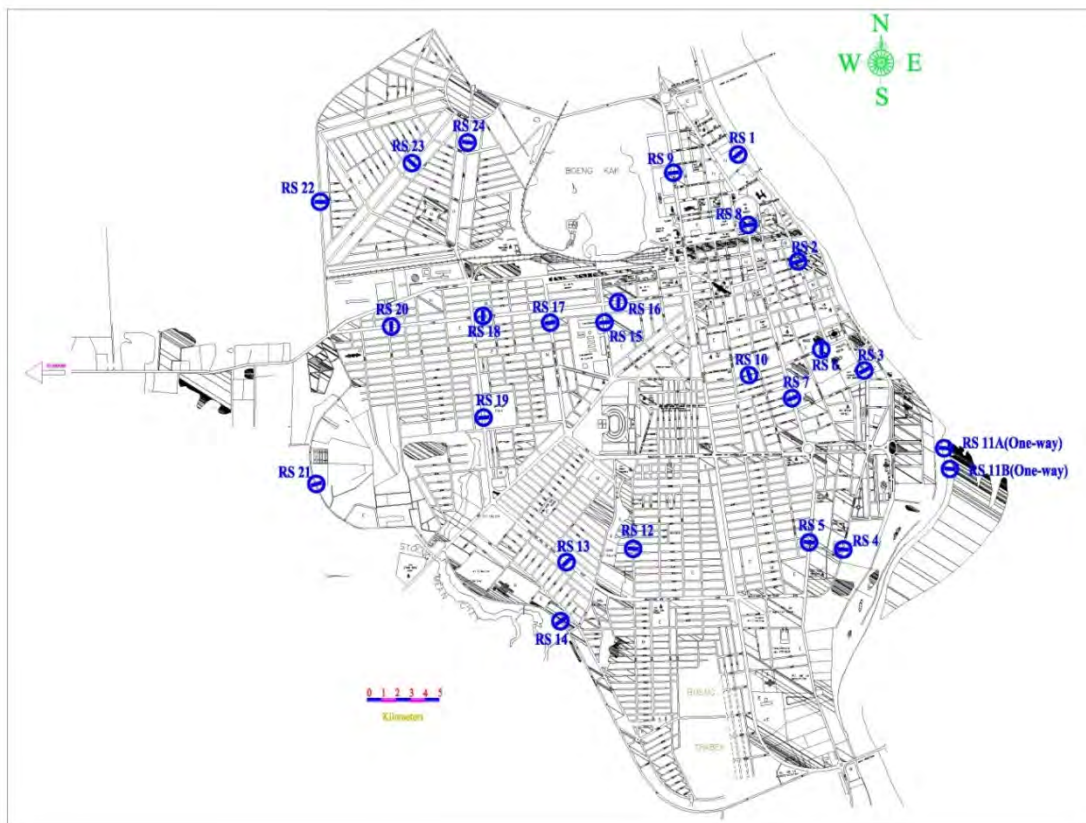
1) Motorbike and Motodop	6) Mini Bus
2) Motorumok modern (tuk-tuk)	7) Medium and Large Bus
3) Motorumok	8) Light Truck /Pick Up
4) Sedan, Wagon, Van	9) Truck (2 axles)
5) Taxi	10) Heavy Truck and Trailer (3 axles or more)



**Table 13.2-12 Roadside Traffic Count Survey Stations**

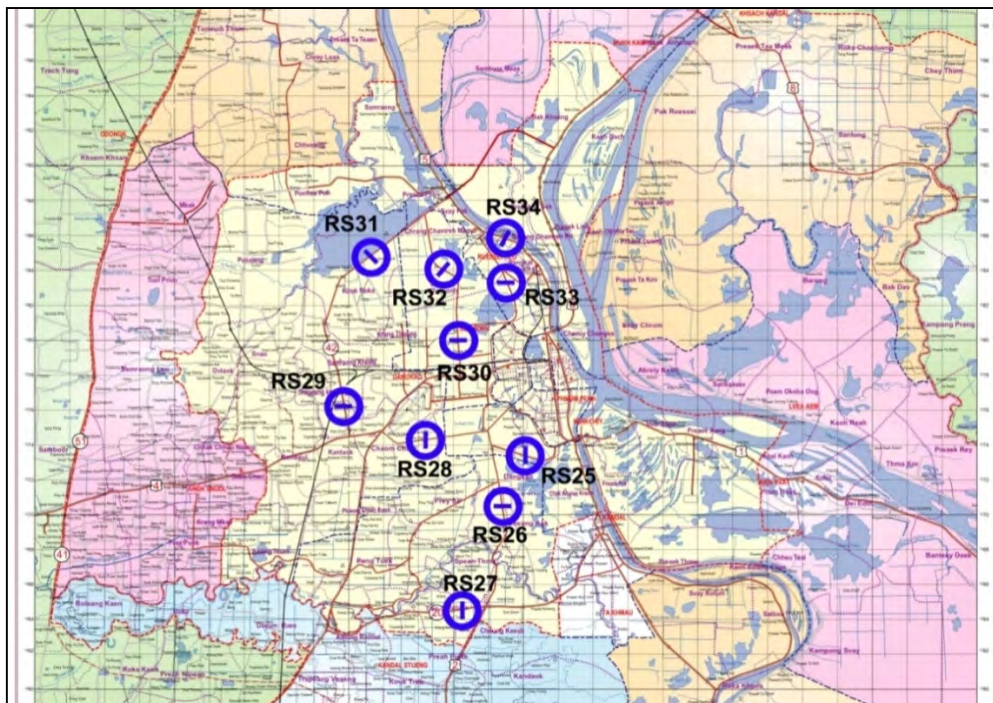
Survey Location ID	Road Name	Survey Duration (Hours)	Remarks
RS 01	Sisowat	<b>24</b>	City Center
RS 02	Road Ang Eng (Rd13)	16	City Center
RS 03	Soshearos (Rd3)	<b>24</b>	City Center
RS 04	Soshearos (Rd3)	16	City Center
RS 05	Norodom (Rd41)	16	City Center
RS 06	Road Keo Chea (Rd184)	16	City Center
RS 07	Norodom (Rd41)	<b>24</b>	City Center
RS 08	Norodom (Rd41)	16	City Center
RS 09	Monivong (Rd93)	<b>24</b>	City Center
RS 10	Road Keo Chea (Rd184)	16	City Center
RS 11	Koh Pech Bridge	16	City Center
RS 12	Road 163	16	City Center
RS 13	Mao Tse Toung (Rd245)	16	City Center
RS 14	Road 271	16	City Center
RS 15	Road Tchecoslovaquie (Rd169)	16	City Center
RS 16	Kampuchea Krom (Rd128)	16	City Center
RS 17	Nerhu (Rd215)	<b>24</b>	City Center
RS 18	Kampuchea Krom (Rd128)	16	City Center
RS 19	Mao Tse Toung (Rd245)	<b>24</b>	City Center
RS 20	Kampuchea Krom (Rd128)	16	City Center
RS 21	Road 271	16	City Center
RS 22	Road 598	16	City Center
RS 23	Road 315	<b>24</b>	City Center
RS 24	Road 289	16	City Center
RS 25	Road Tumnob Thmey	16	Suburban
RS 26	Road Choeung Ek	16	Suburban
RS 27	Road 104 (NR20-Connect NR2 to NR3)	16	Suburban
RS 28	Road Chom Chao	16	Suburban
RS 29	NR42	16	Suburban
RS 30	Road Hanoi	<b>24</b>	Suburban
RS 31	NR42	16	Suburban
RS 32	Road Hanoi	16	Suburban
RS 33	Road 598	16	Suburban
RS 34	NR5	16	Suburban

Source: PPUTMP Project Team



Source: PPUTMP Project Team

**Figure 13.2-17 Roadside Traffic Count Survey Locations (City Center)**



Source: PPUTMP Project Team

**Figure 13.2-18 Roadside Traffic Count Survey Locations (Suburban)**

### (3) Survey Results

A summary of the Roadside Traffic Count Survey results conducted at 34 locations in the City center is shown in Table 13.2-13. The traffic count results by location for the suburban area and City area are shown in Figure 13.2-19 and Figure 13.2-20, respectively. Traffic volumes by vehicle type and their hourly fluctuations are shown in Figure 13.2-21 and Figure 13.2-22, respectively.

From the survey results, the following are the major observations:

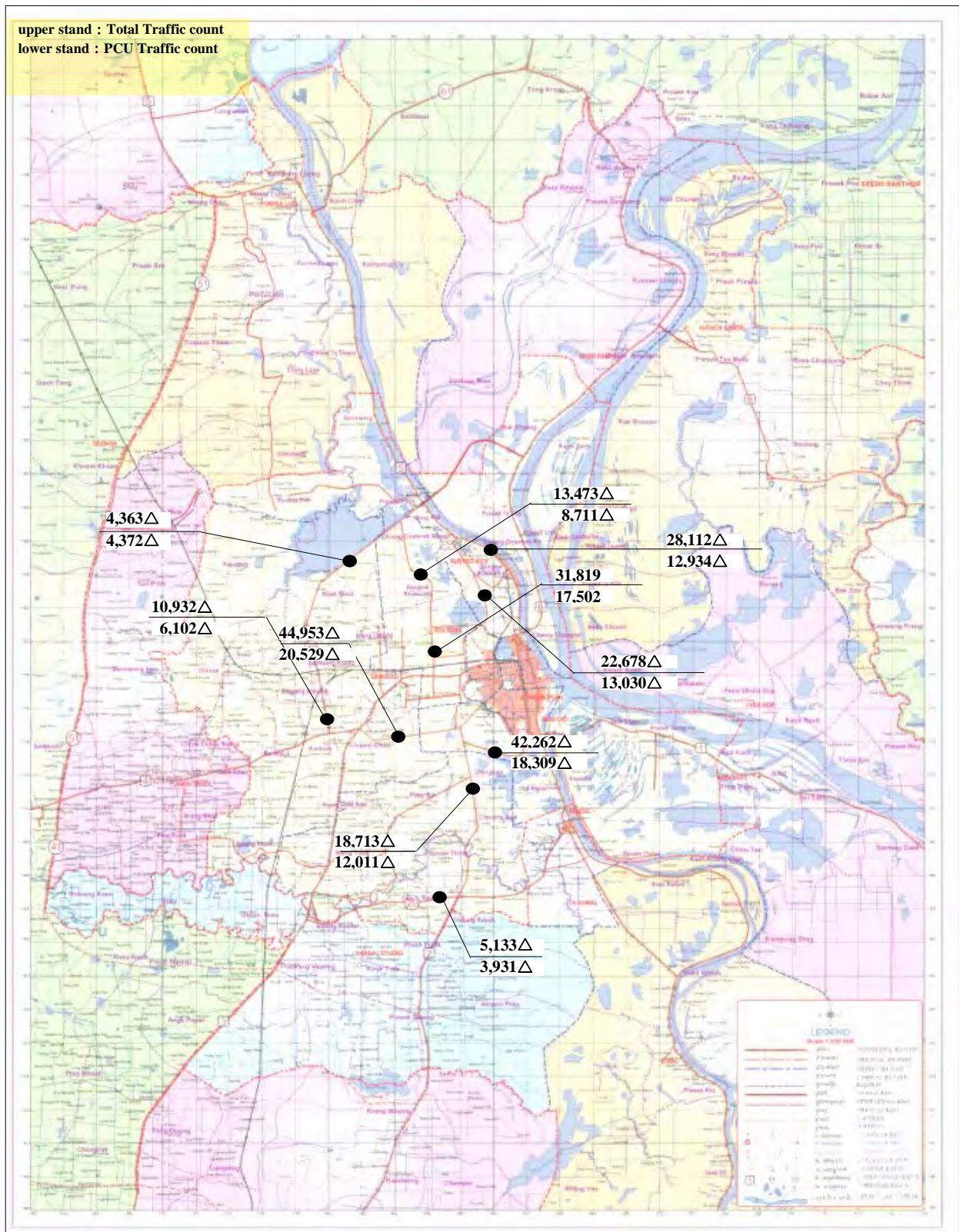
- The highest traffic volume is approximately 133,000 vehicles at Monivong for North-South bound vehicles, followed by Mao Tse Toung (110,000 vehicles) and Road 271/C1 (97,000 vehicles).
- Peak hour ratio is smaller in the suburban area, recorded at 8 to 10 %. The daily traffic to daytime traffic is distributed in the range of 1.2 to 1.4.
- The share of motorcycle is slightly higher (70%-80%) than in the Cordon Line Survey and the share of sedan car is around 10% to 20%.
- The peak hour volumes are between 07:00 and 08:00 in the morning and between 17:00 to 18:00 in the evening.

**Table 13.2-13 Summary of Roadside Traffic Count Results**

Traffic Point	Road No.	Time of Count	Road Name.	Traffic Volume	Peak Ratio	Ratio of daily traffic	Motorbike Ratio	Sedan Ratio
Roadside	1		Sisowat Blvd.	63,328	8.9%	1.30	77.8%	11.7%
	2	16h	Road Ang Eng (Rd13)	30,619	9.3%	1.30	85.2%	6.7%
	3		Soshearos (Rd3)	80,316	8.9%	1.38	74.4%	12.8%
	4	16h	Soshearos (Rd3)	47,927	9.3%	1.31	74.4%	13.6%
	5	16h	Norodom Blvd. (Rd41)	70,829	9.5%	1.30	75.5%	18.7%
	6	16h	Road Keo Chea (Rd184)	12,328	10.2%	1.29	83.0%	9.4%
	7		Norodom Blvd. (Rd41)	80,667	9.0%	1.40	72.0%	23.4%
	8	16h	Norodom Blvd. (Rd41)	49,581	9.2%	1.29	74.9%	18.1%
	9		Monivong Blvd. (Rd93)	133,328	8.5%	1.29	77.5%	13.7%
	10	16h	Road Keo Chea (Rd184)	26,923	8.4%	1.26	81.7%	12.3%
	11	16h	Koh Pech Bridge	19,543/A 11,040/B	19.0%	1.85	84.7%	11.7%
	12	16h	Road 163	41,649	8.3%	1.28	79.8%	12.8%
	13	16h	Mao Tse Toung Blvd (Rd245)	83,708	8.8%	1.30	76.8%	15.4%
	14	16h	Road 271	87,941	9.6%	1.30	78.6%	10.6%
	15	16h	Road Chekoslovaki (Rd169)	78,394	8.9%	1.28	79.1%	13.5%
	16	16h	Kampuchea Krom Blvd. (Rd128)	62,078	9.7%	1.29	76.6%	14.5%
	17		Nerhu (Rd215)	66,730	9.1%	1.27	76.2%	16.2%
	18	16h	Kampuchea Krom Blvd. (Rd128)	73,974	8.3%	1.32	74.9%	17.3%
	19		Mao Tse Toung Blvd (Rd245)	110,197	8.2%	1.33	79.9%	12.2%
	20	16h	Kampuchea Krom Blvd. (Rd128)	63,724	9.1%	1.33	79.4%	13.1%
	21	16h	Road 271	97,996	10.6%	1.29	79.9%	10.5%
	22	16h	Road 598	31,043	9.9%	1.30	71.8%	12.6%
	23		Road 315	35,140	9.5%	1.32	74.0%	14.2%
	24	16h	Road 289	58,960	8.6%	1.33	74.5%	15.8%
	25	16h	Road Tumob Thmey	42,262	9.6%	1.32	76.2%	6.6%
	26	16h	Road Choeung Ek	18,713	10.9%	1.33	62.1%	9.0%
	27	16h	Road 104 (NR20-Connect NR2 to NR3)	5,133	8.8%	1.28	58.8%	7.8%
	28	16h	Road Chom Chao	44,953	11.0%	1.39	73.9%	7.5%
	29	16h	National Road No42	10,932	11.5%	1.36	72.8%	5.9%
	30		Road Hanoi	31,819	8.9%	1.29	65.1%	15.1%
	31	16h	National Road No42	4,363	8.3%	1.25	47.5%	9.1%
	32	16h	Road Hanoi	13,473	10.1%	1.30	65.2%	9.1%
	33	16h	Road 598	22,678	9.6%	1.25	63.8%	16.3%
	34	16h	National Road No5	28,112	9.3%	1.32	72.4%	9.8%

Note: Peak ratio is for 24 hours traffic volume. 16 hours traffic volume is converted into 24 hours traffic volume based on the results of the 24 hours traffic volume survey.

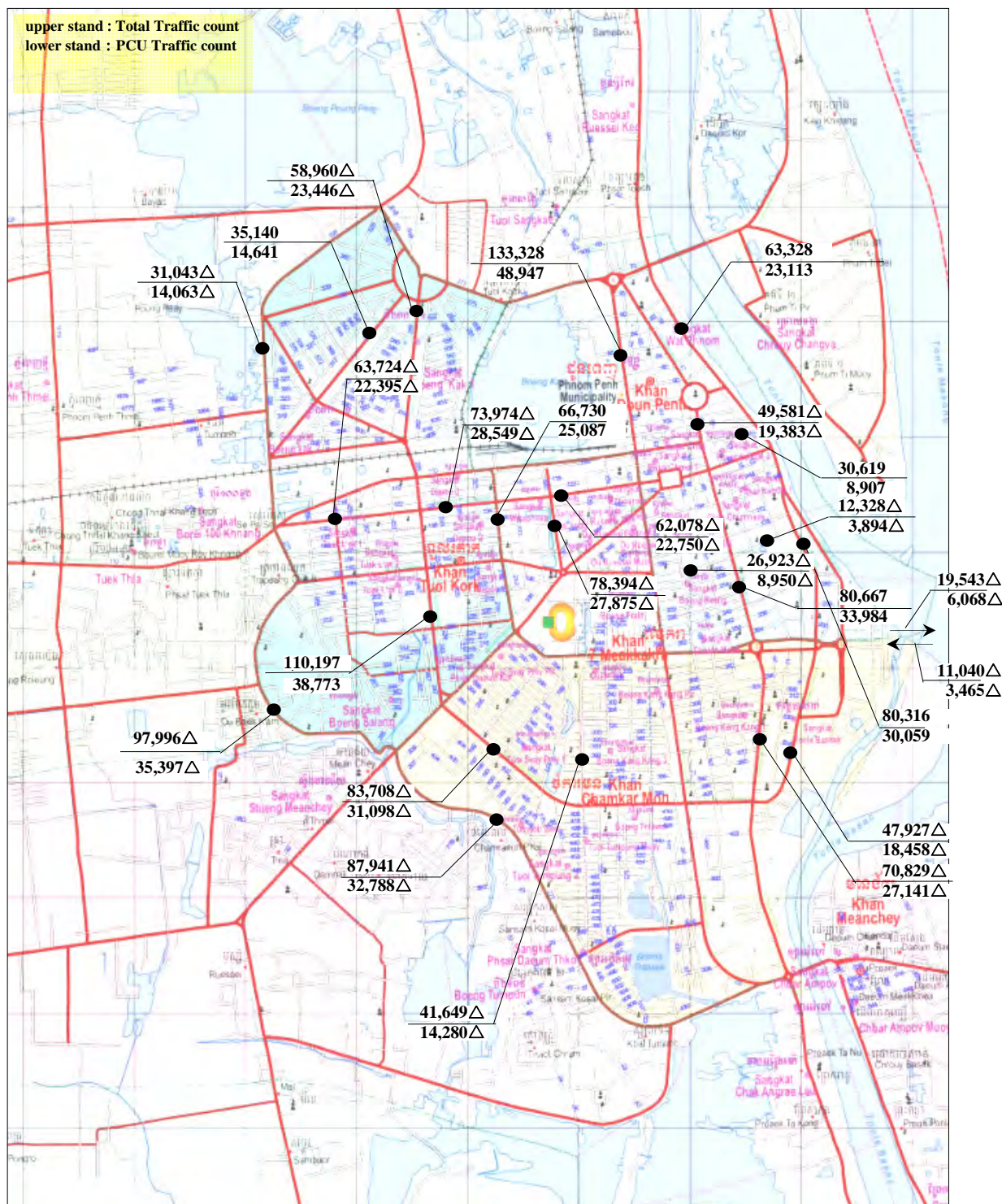
Source: PPUTMP Project Team



Note: 24hours,  $\Delta$  : Time of Count for 16 hours (06:00 ~ 22:00)

Source: PPUTMP Project Team

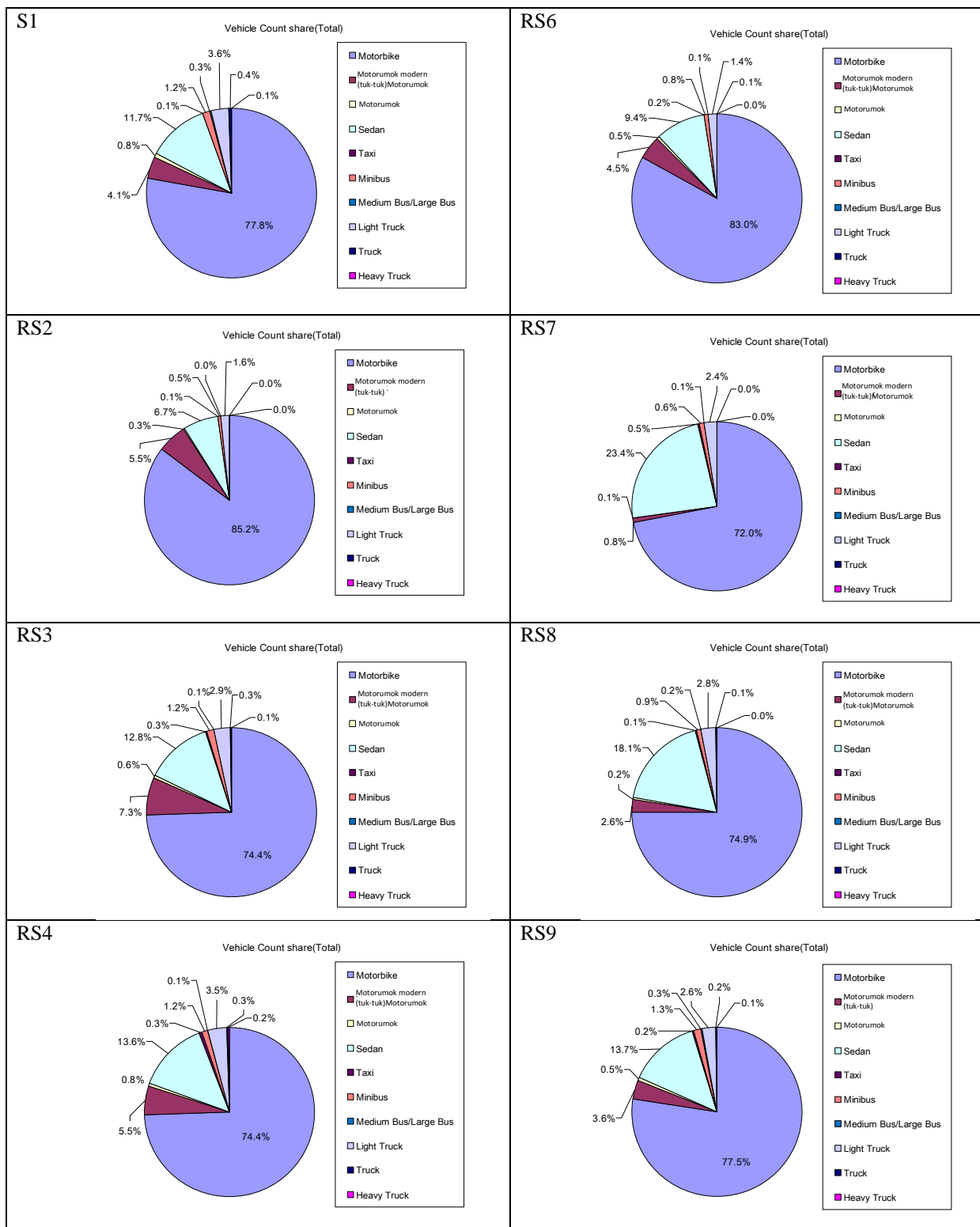
Figure 13.2-19 Traffic Count Results (Suburban Area)

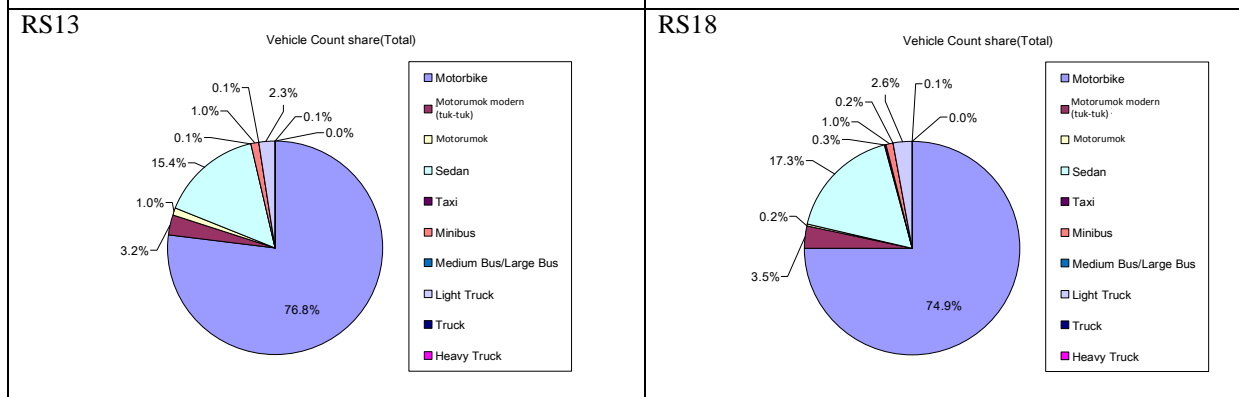
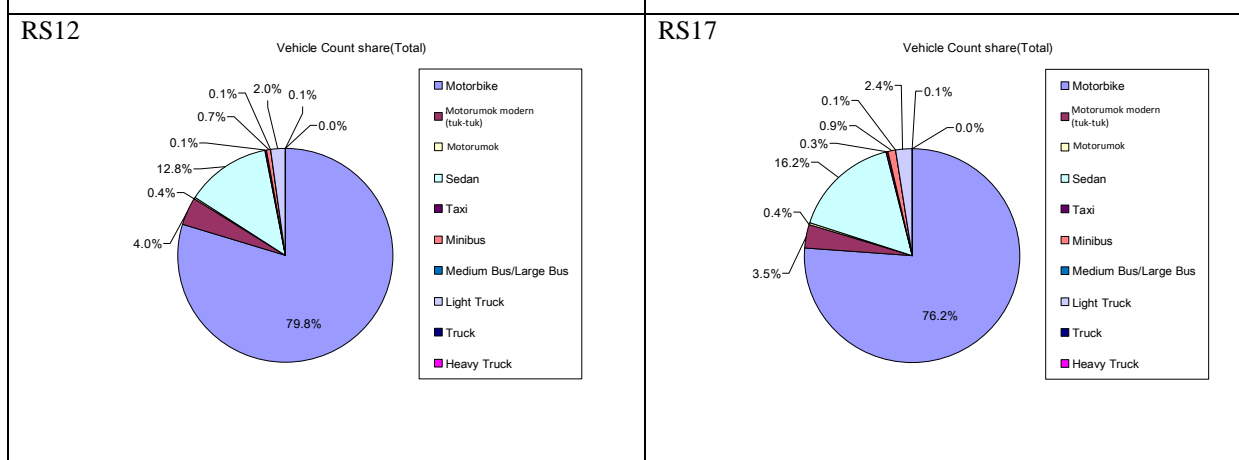
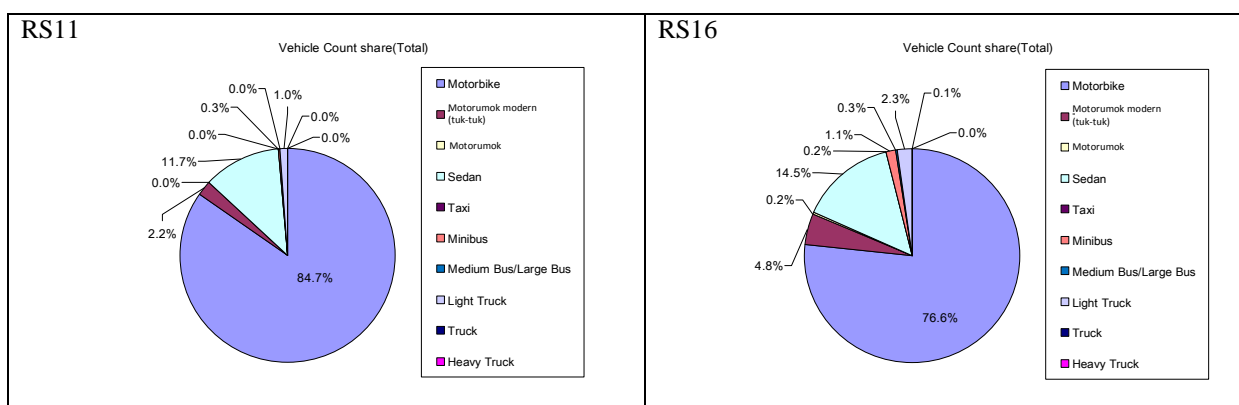
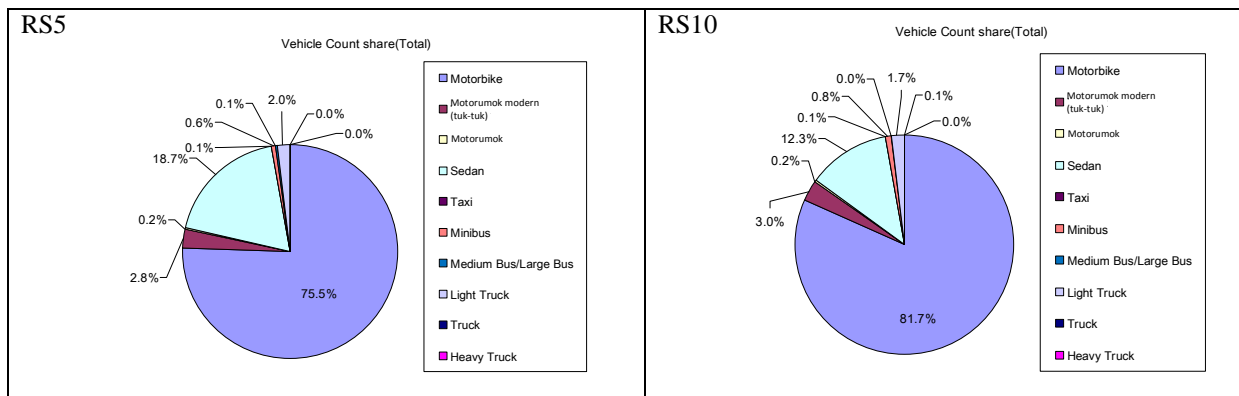


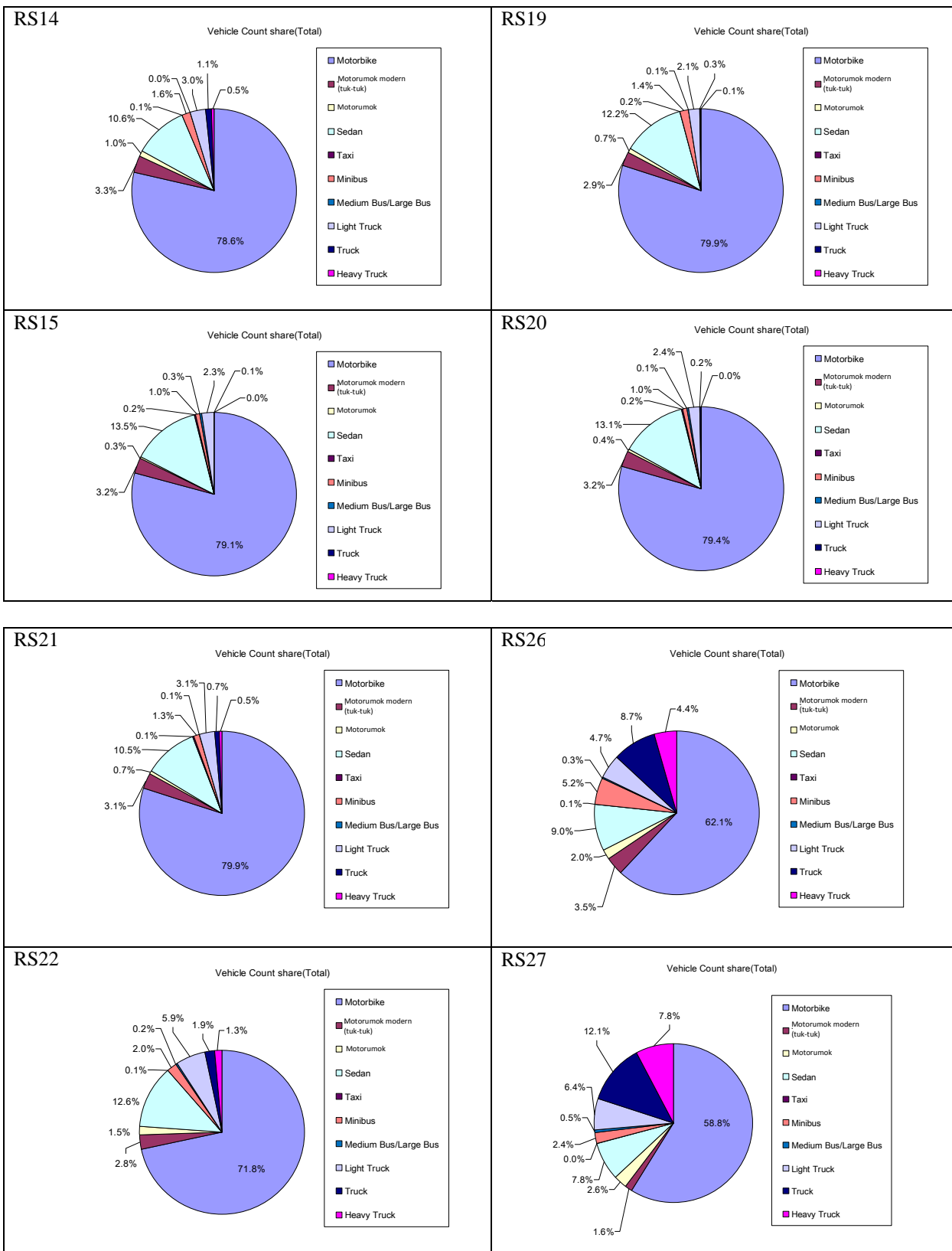
Note: 24hours, △ : Time of Count for 16 hours (06:00 ~ 22:00)

Source: PPUTMP Project Team

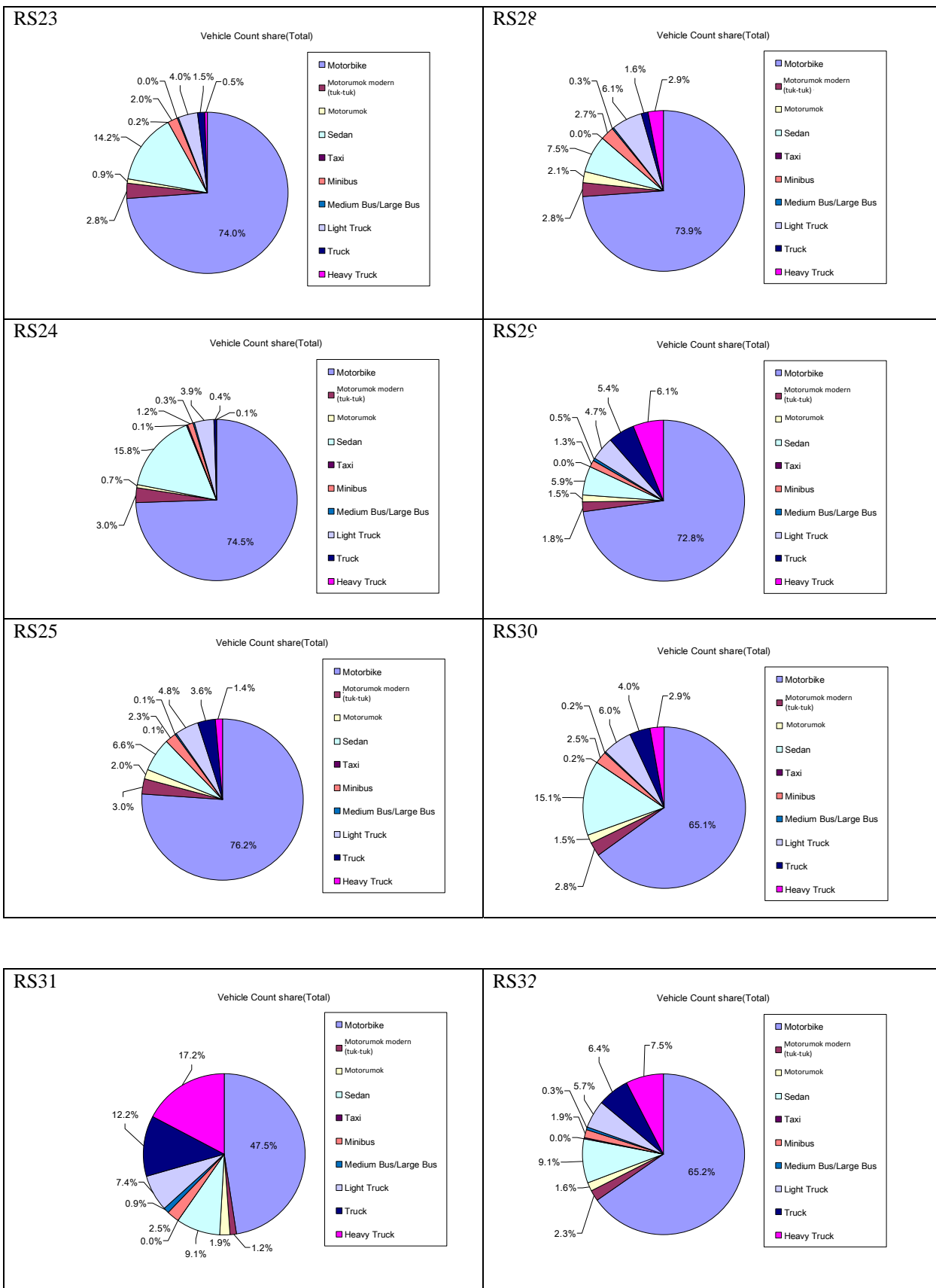
Figure 13.2-20 Traffic Count Results (City Area)

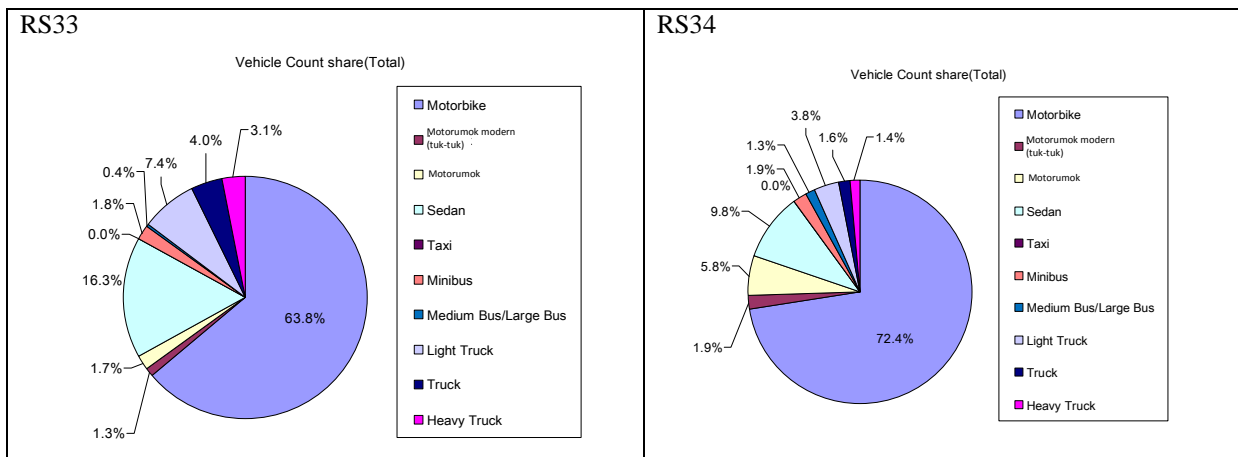






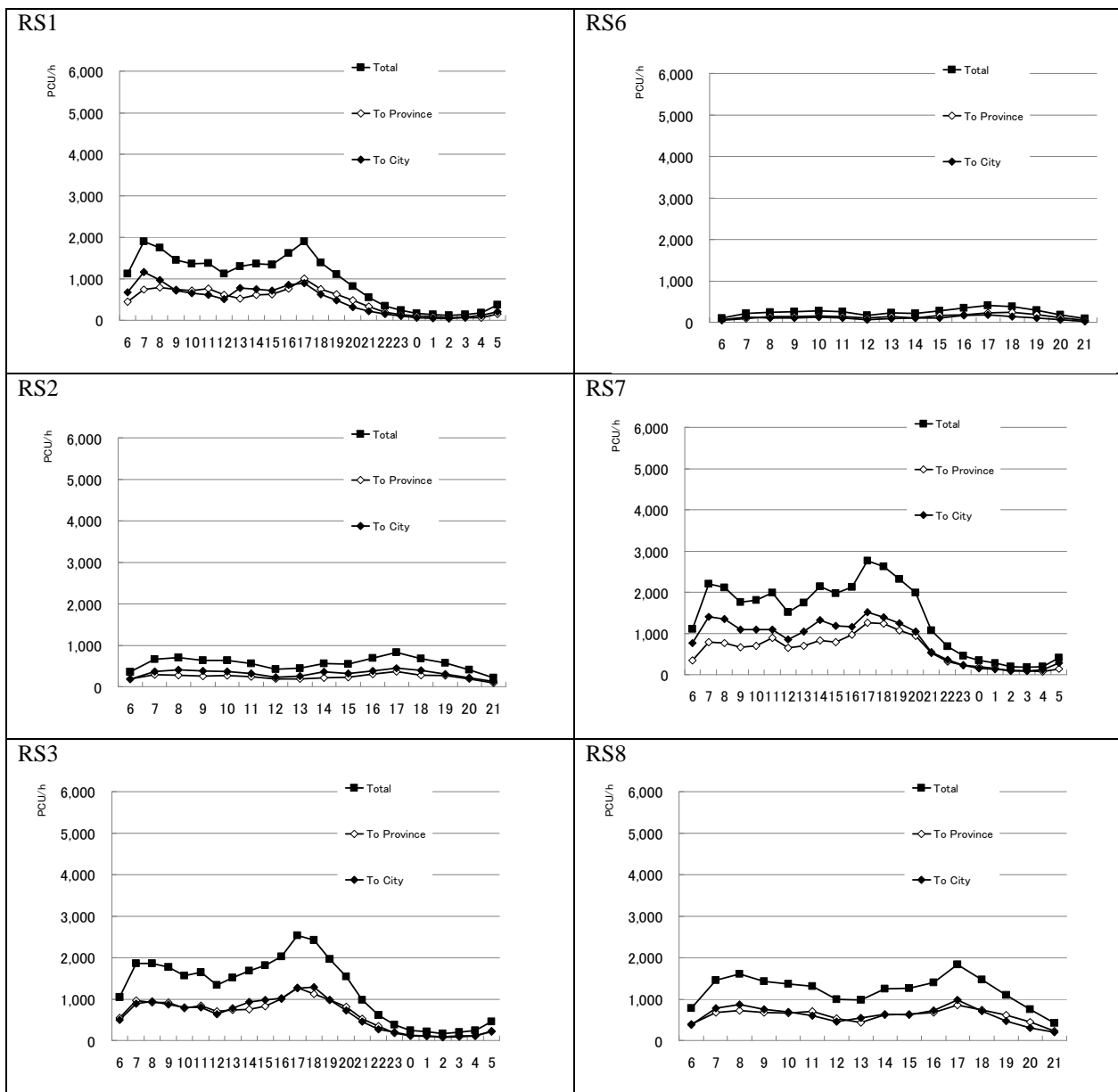




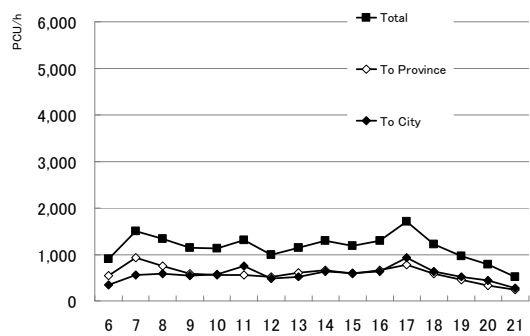


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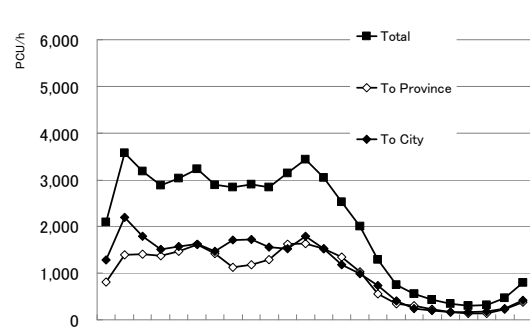
Figure 13.2-21 Composition of Vehicles by Station



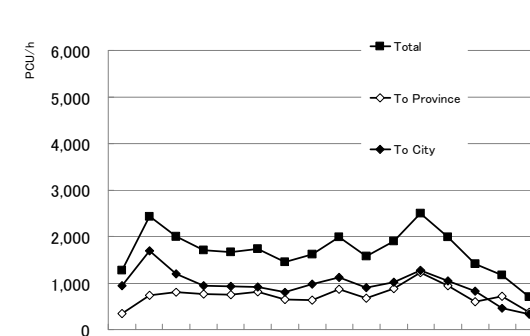
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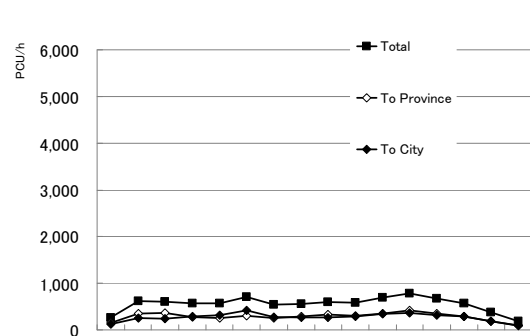
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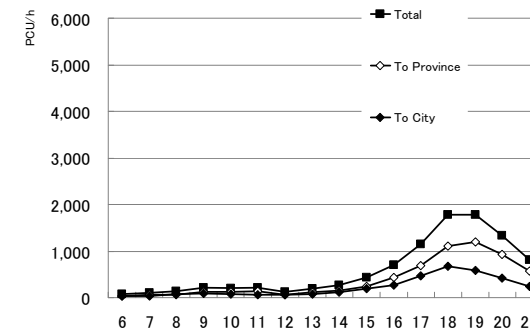
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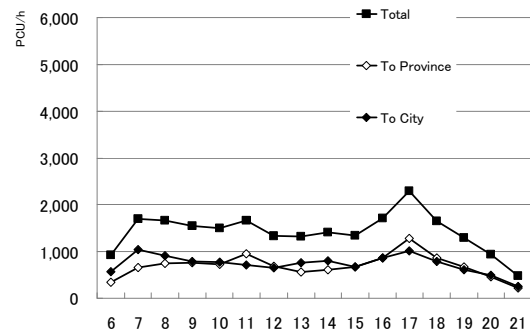
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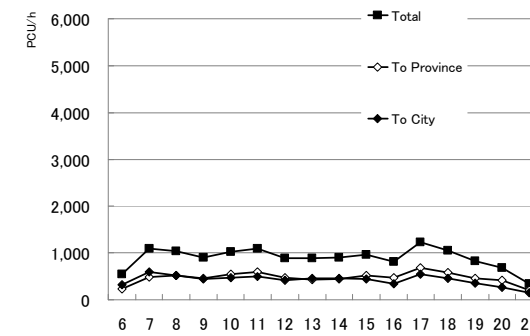
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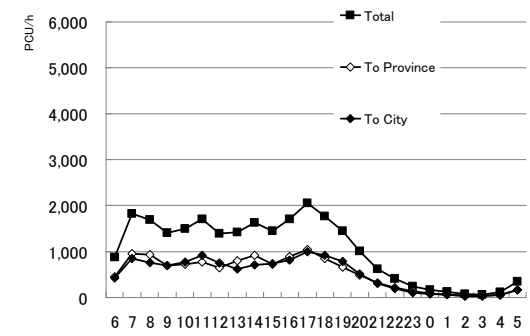
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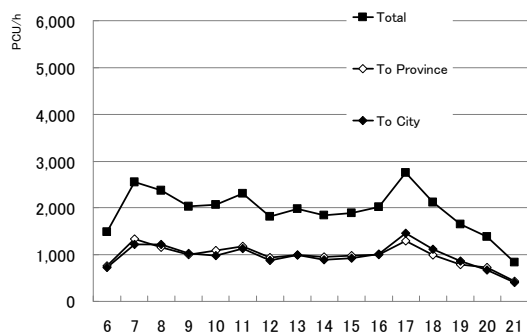
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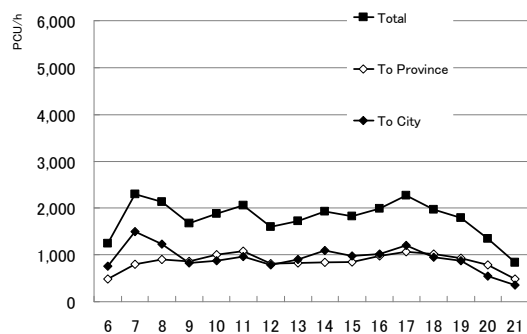
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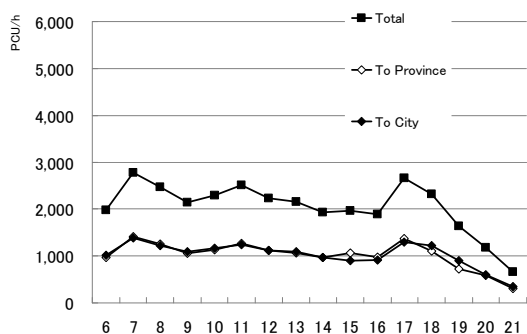
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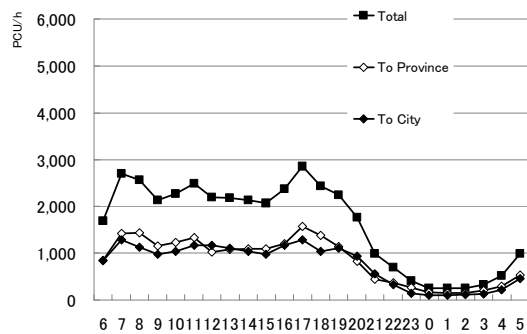
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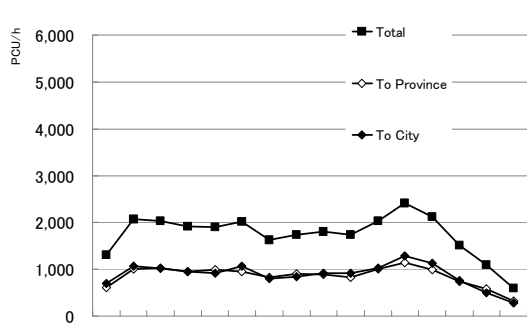
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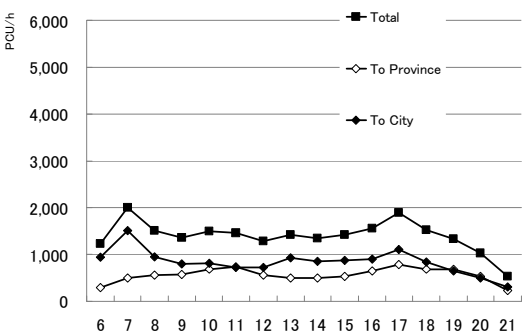
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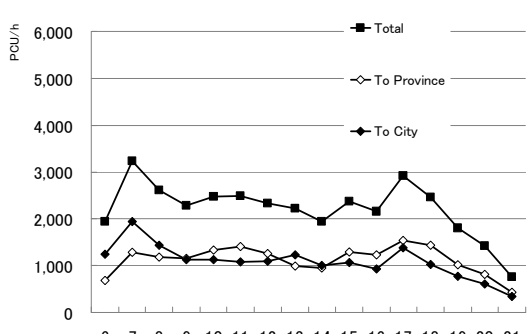
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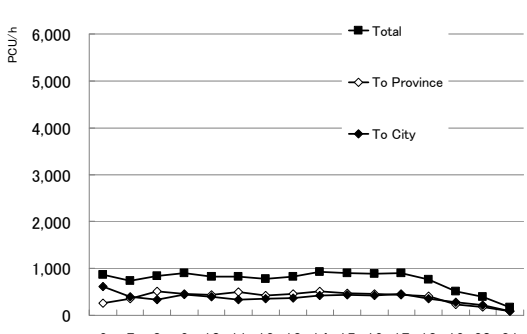
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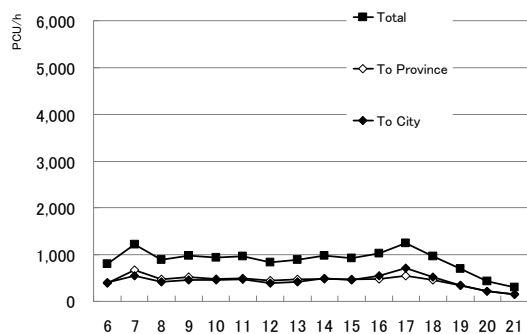
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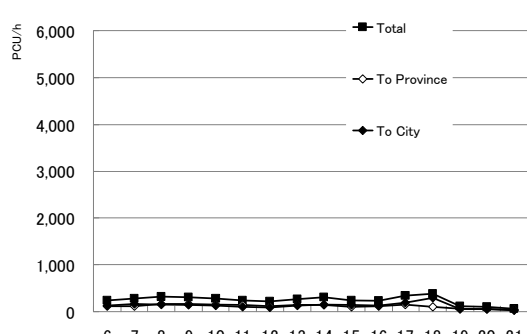
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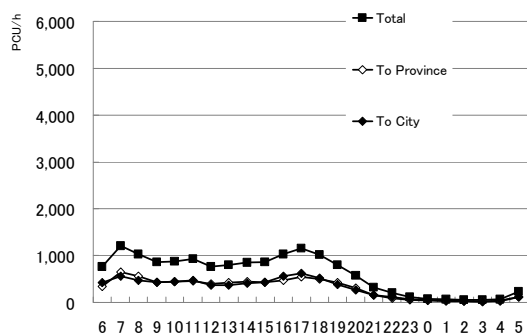
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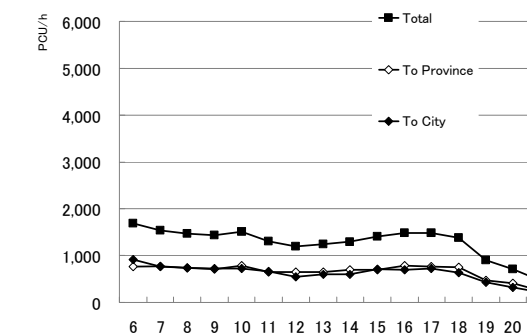
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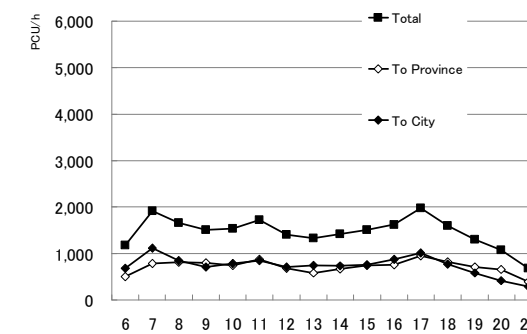
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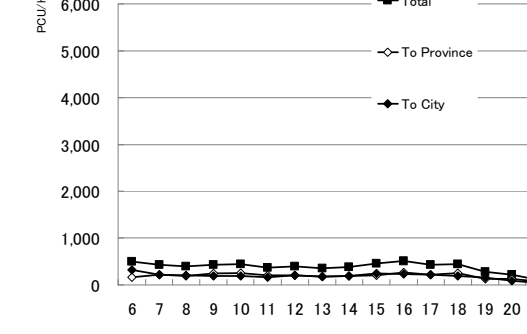
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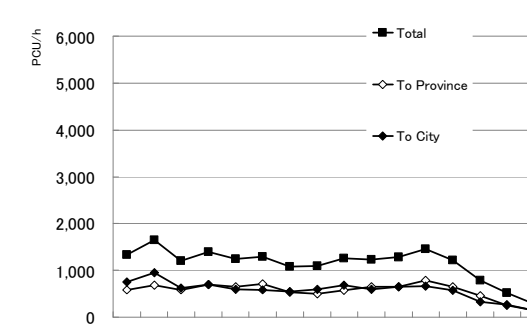
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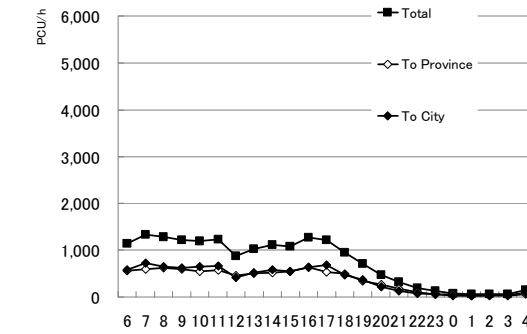
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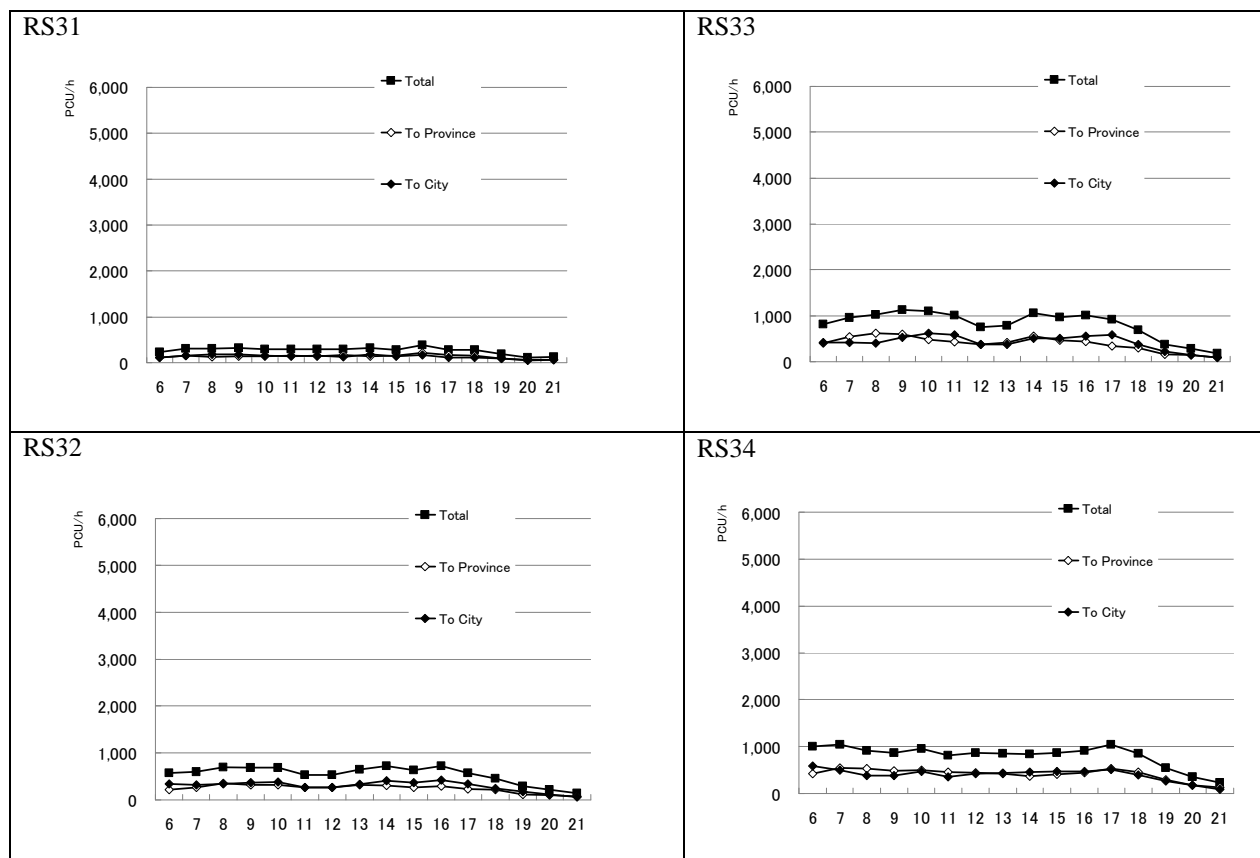


RS25



RS30





Source: PPUTMP Project Team

**Figure 13.2-22 Hourly Fluctuation by Station**

### 13.2.4 Traffic Count Survey at Intersections

#### (1) Outline

The Intersection Traffic Count Survey aims to identify the present conditions of traffic at congested intersections.

#### (2) Survey Coverage

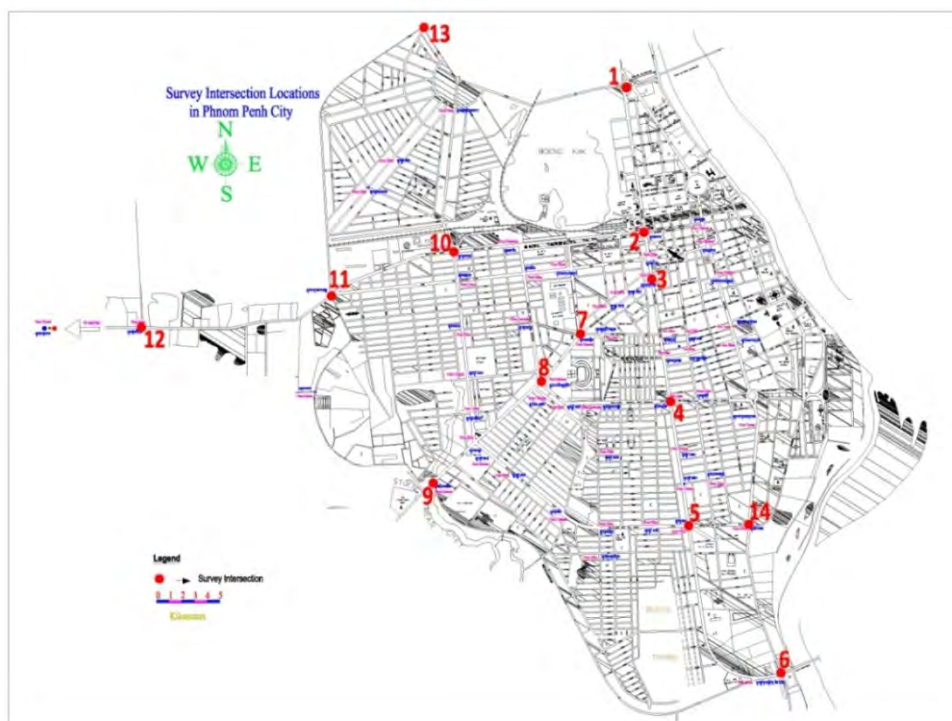
- a) The survey was conducted at 13 intersections in PPCC (see Table 13.2-14 and Figure 13.2-23).
- b) The classified vehicular count was conducted in each direction of traffic flow for 16 hours from 06:00 to 22:00 on a weekday (Tuesday through Thursday excluding Saturday, Sunday, and public holidays). The type of each vehicle was separately counted and recorded at every 15-minute interval.
- c) Vehicular classification is as follows:
 

1) Motorbike and Motodop	6) Mini Bus
2) Motorumok modern (tuk-tuk)	7) Medium and Large Bus
3) Motorumok	8) Light Truck /Pick Up
4) Sedan, Wagon, Van	9) Truck (2 axles)
5) Taxi	10) Heavy Truck and Trailer (3 axles or more)

**Table 13.2-14 Intersection Traffic Count Survey Stations**

Survey Location ID	Road Name
IS01	Roundabout (before Chrouy Changvar Bridge)
IS02	Jct. Russian and Monivong
IS03	Jct. Monivong and Charles de Gaulle (217)
IS04	Jct. Sihanouk and Monivong
IS05	Jct. Monivong and Mao Tse Toung
IS06	Monivong Flyover
IS07	Jct. 182 and Charles de Gaulle (217) (5 legs)
IS08	Jct. Sihanouk and Monireth (217) (5 legs)
IS09	Steung Mean Chey (Jct. C1 and Monireth)
IS10	Toul Kork (Jct. Russian and St 289).
IS11	Pet Lork Sang Flyover
IS12	Jct. Russian and Hanoi Road
IS13	Camko City ( Jct. St 355 and St 598)
IS14	Jct. Norodom and Mao Tse Toung

Source: PPUTMP Project Team



Source: PPUTMP Project Team

**Figure 13.2-23 Intersection Traffic Count Survey Locations**

### (3) Survey Results

A summary of the results of the Intersection Traffic Count Survey conducted at 14 locations in the City center is shown in Figure 13.2-24. The traffic count results by location (schematic view) are shown in Figures 13.2-25 to 13.2-27). The vehicle composition and hourly fluctuation of traffic volumes are shown in Figure 13.2-28 and Figure 13.2-29, respectively.

The major observations derived from the survey results are as follows:

- a) IS01: This intersection is a roundabout (before Chruoy Chongvar Bridge). The highest traffic volume is observed on Road 70 connecting with the West-bound route.
- b) IS02: Since the median strip at Russian Blvd. at the western direction was closed, it has changed traffic flow considerably in 2012 compared with JICAMP2001.
- c) IS07: This intersection has 5 legs. The highest traffic volume is observed on Road 182 connecting with the East-bound route.
- d) IS11: Pet Lork Sang intersection was an at-grade intersection in the past, but it was built as an overpass in 2011 and traffic jams were eliminated. However, it has structure that cannot allow left-turn and, thus, has become a new traffic issue. Kbal Thnol intersection at IS06 also has the same issues.
- e) The results of the vehicular traffic composition and hourly fluctuation of traffic volume are almost similar to the Roadside Traffic Count Survey.



IS-01~IS-04

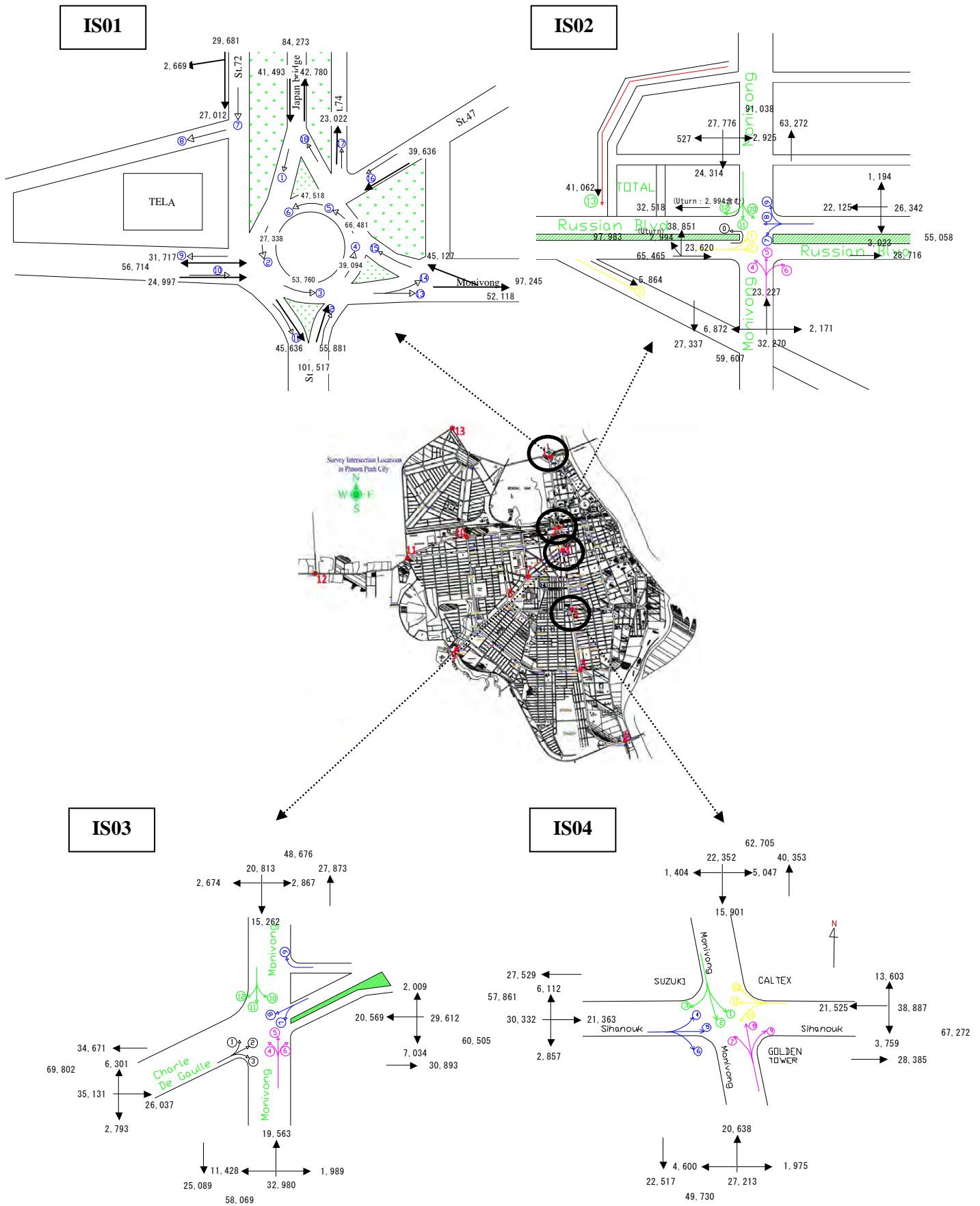
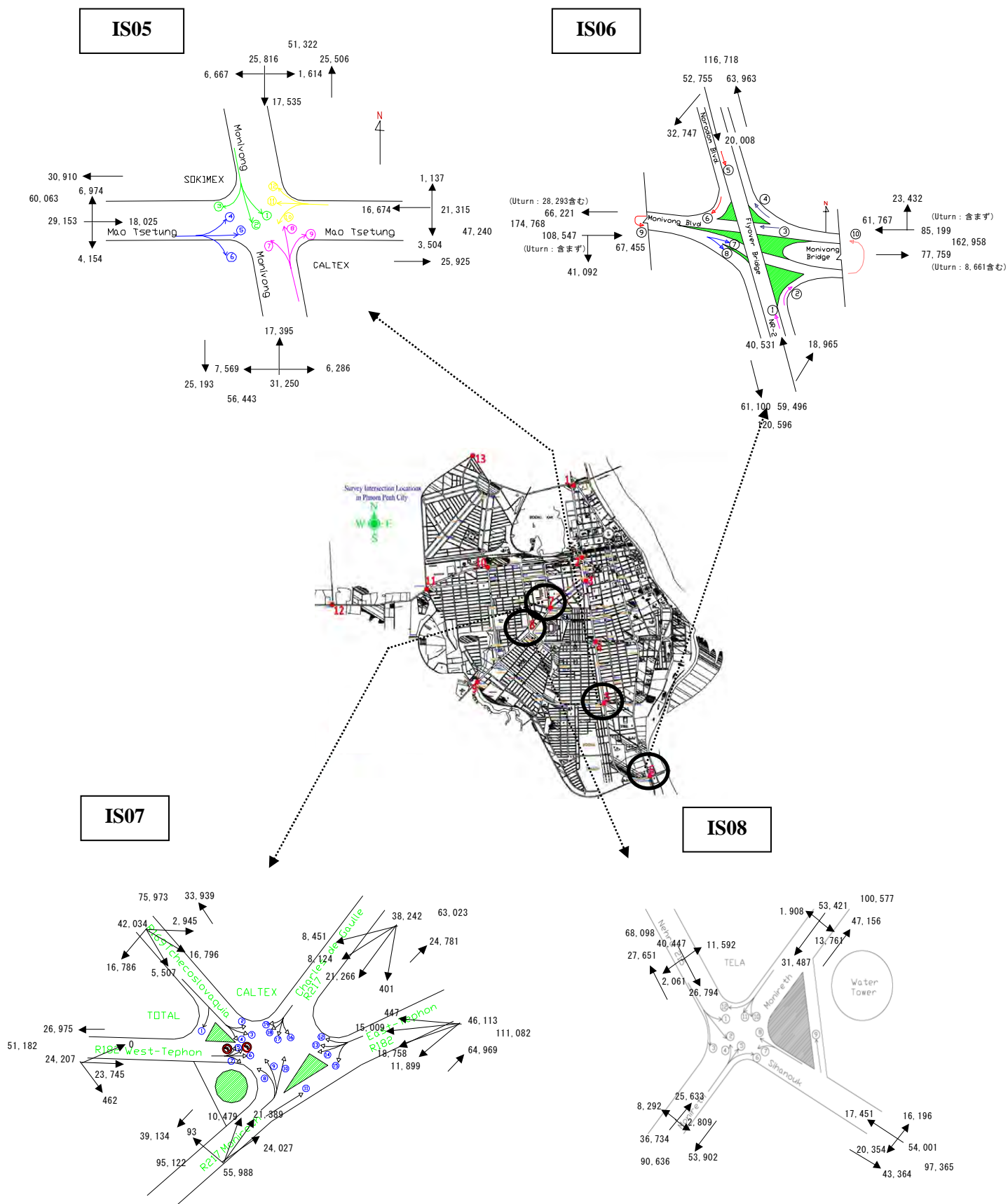


Figure 13.2-24 Traffic Count (PCU) at Intersections (Time of Count for 16 Hours (06:00 ~ 22:00))

■ IS-05~IS-08

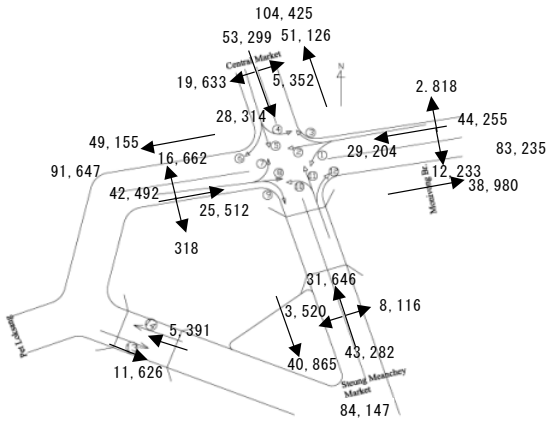


Source: PPUTMP Project Team

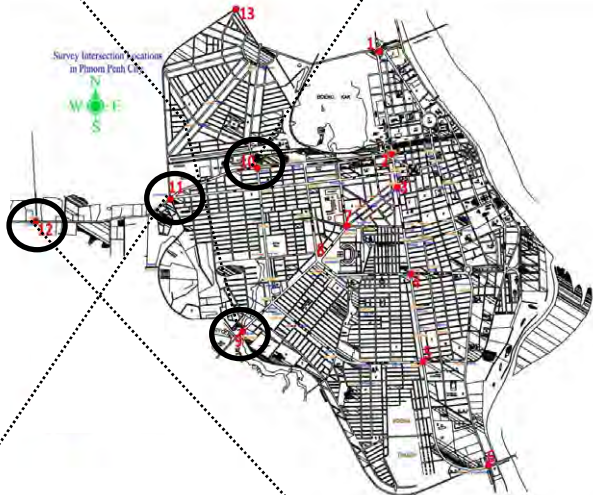
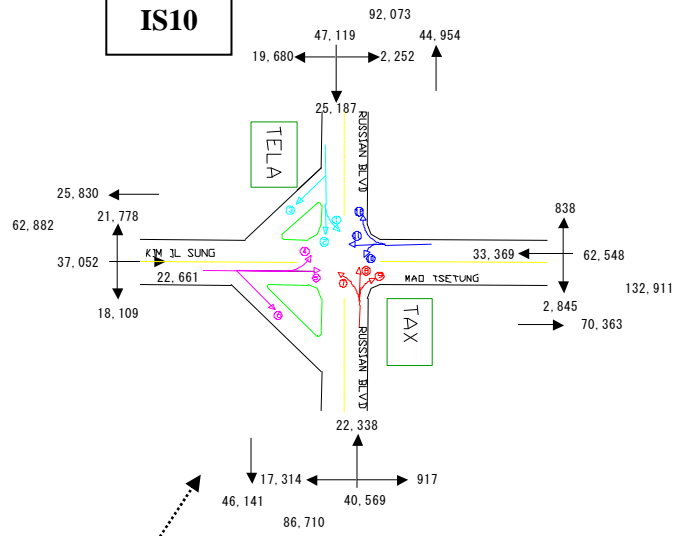
Figure 13.2-25 Traffic Count (PCU) at Intersections (Time of Count for 16 Hours (06:00 ~ 22:00))

■ IS-09~IS-12

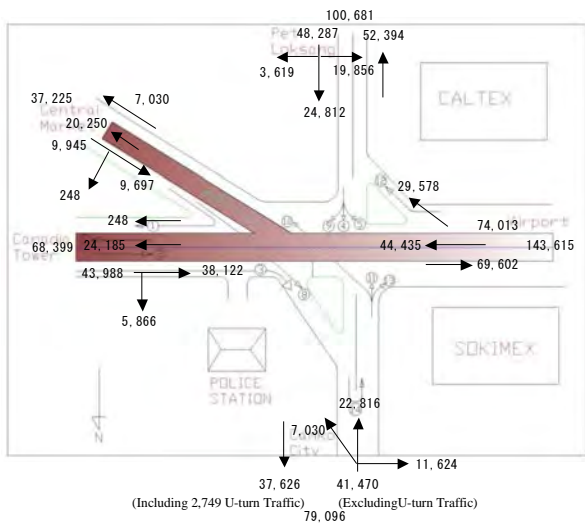
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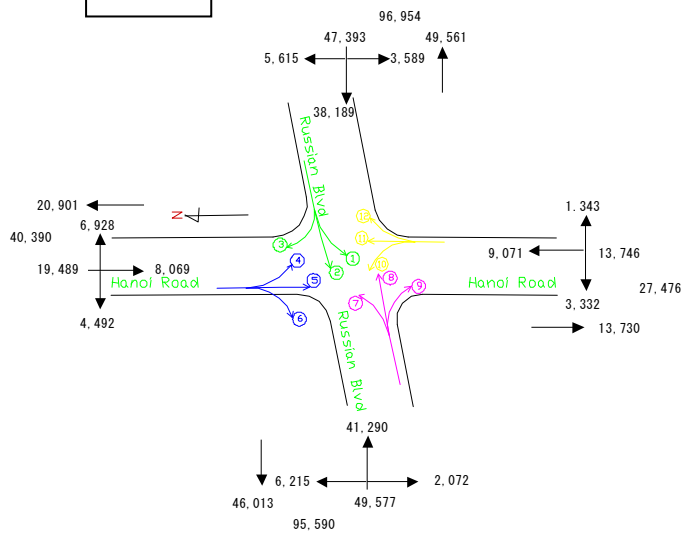
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IS11



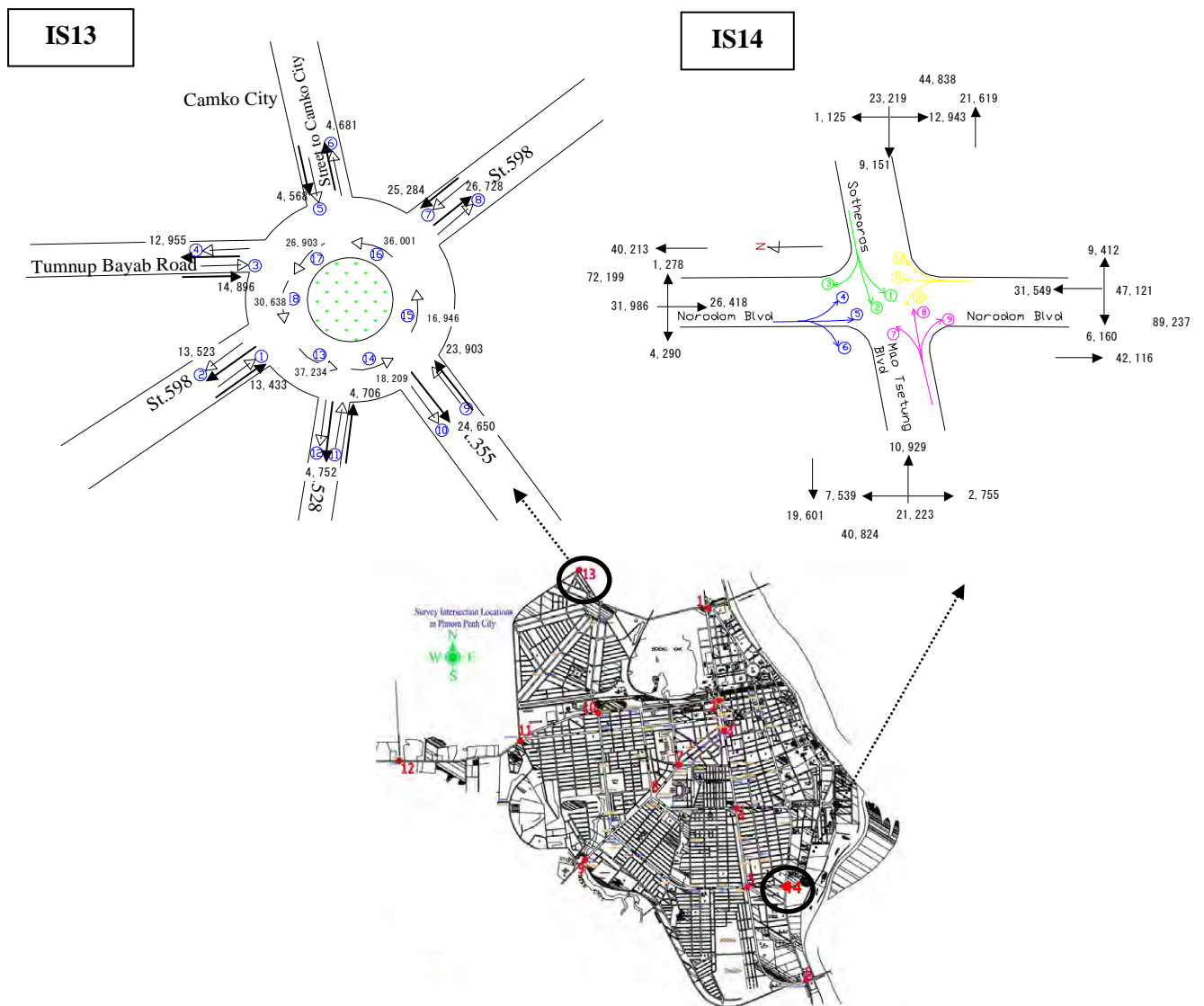
IS12



Source: PPUTMP Project Team

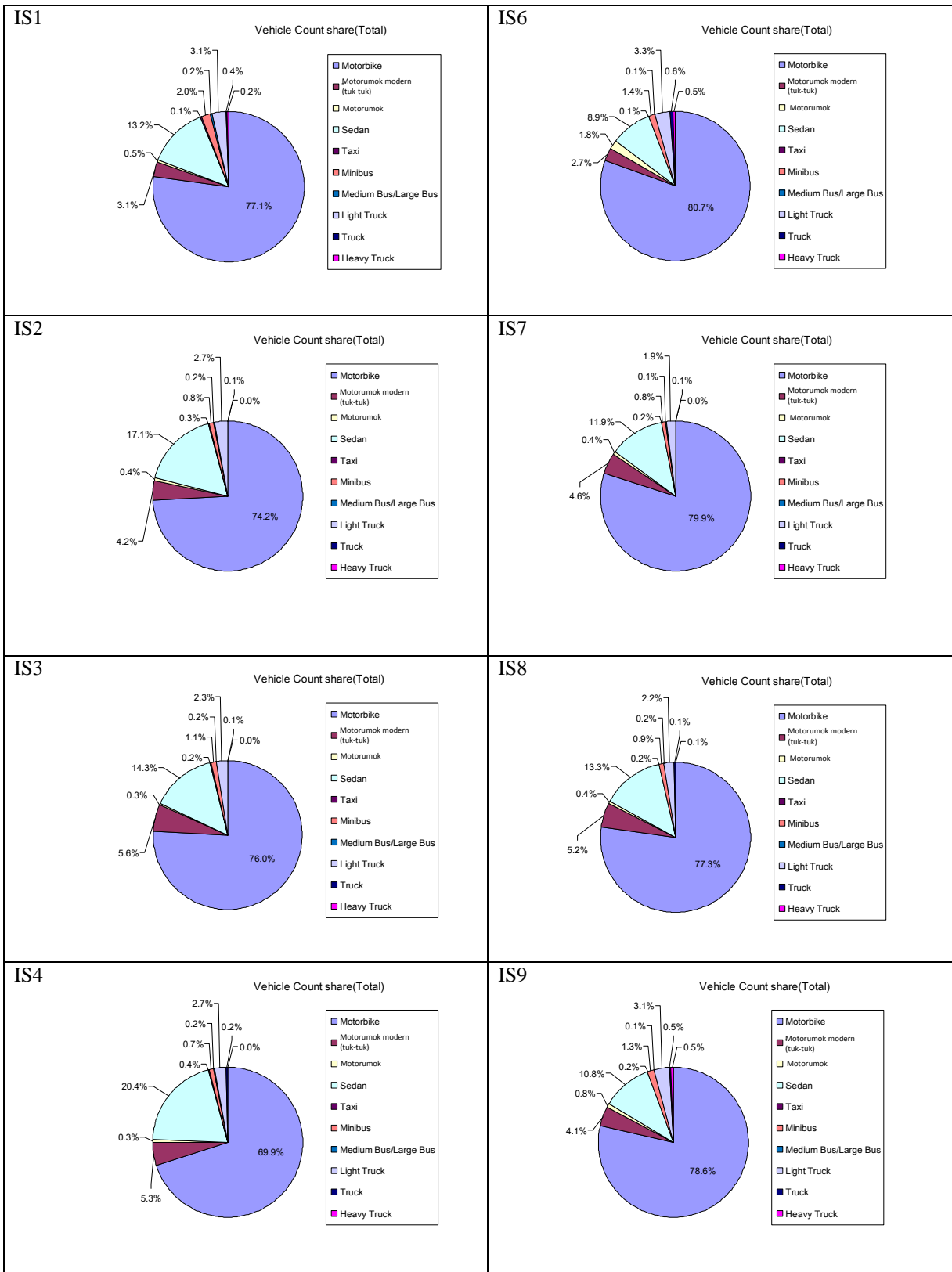
Figure 13.2-26 Traffic Count (PCU) at Intersections (Time of Count for 16 Hours (06:00 ~ 22:00))

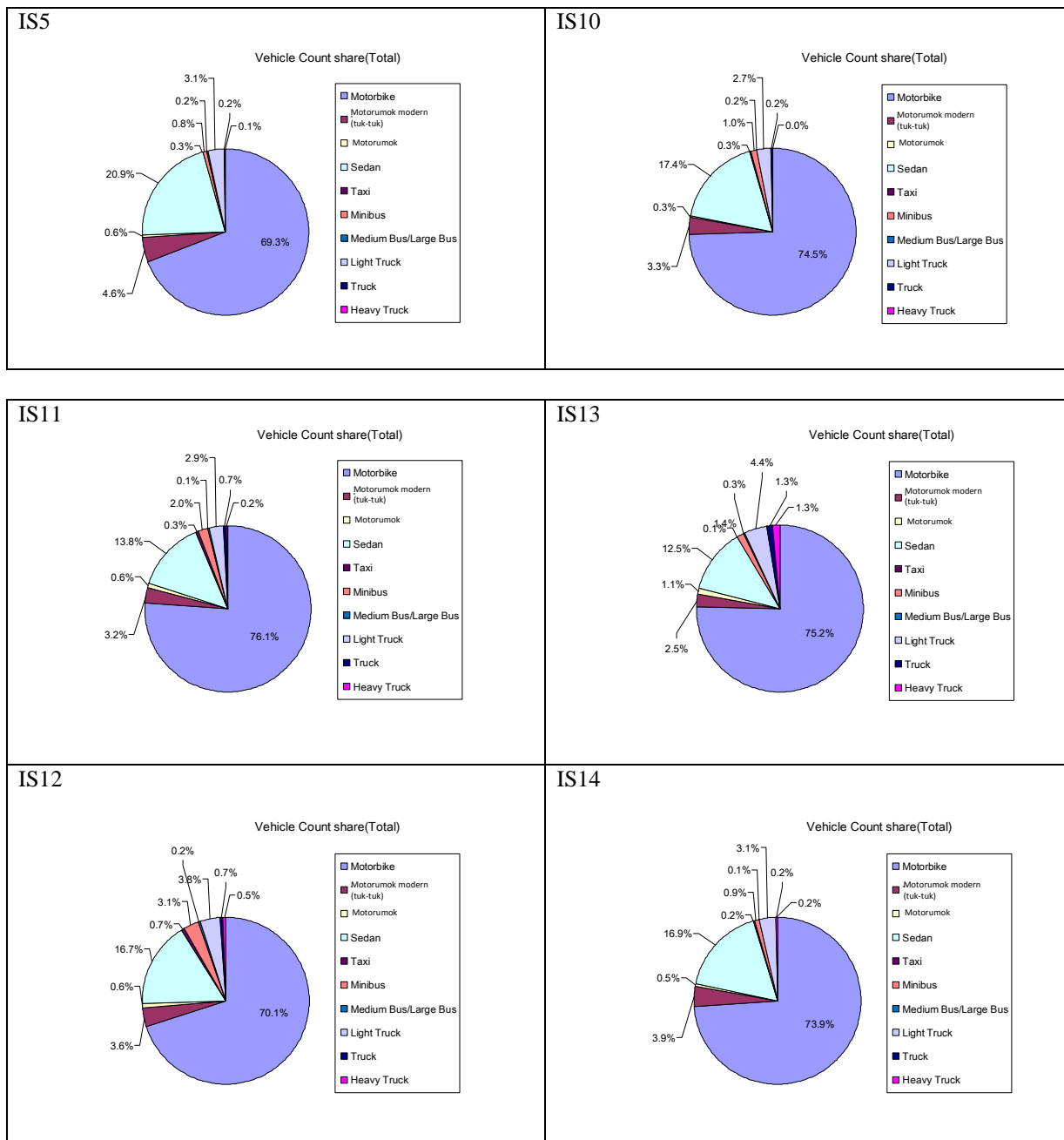
**IS-13~IS-14**



Source: PPUTMP Project Team

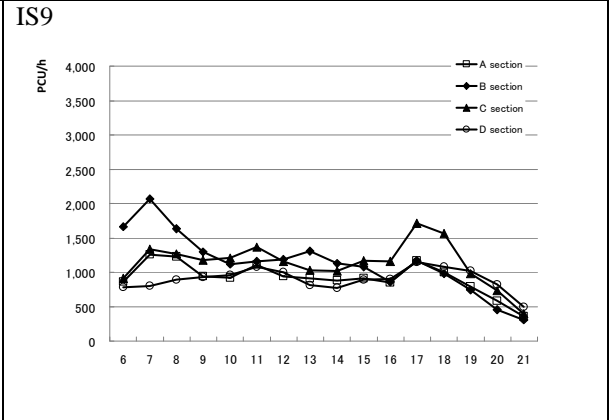
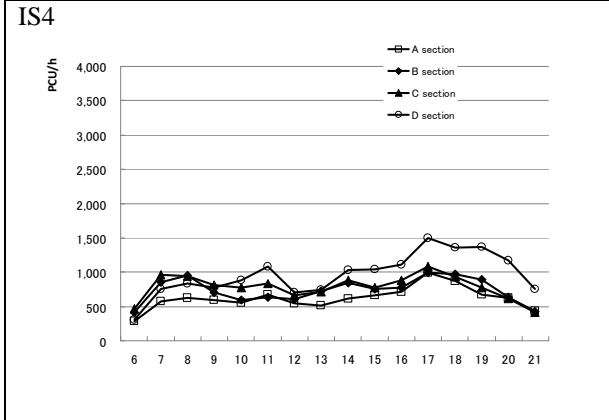
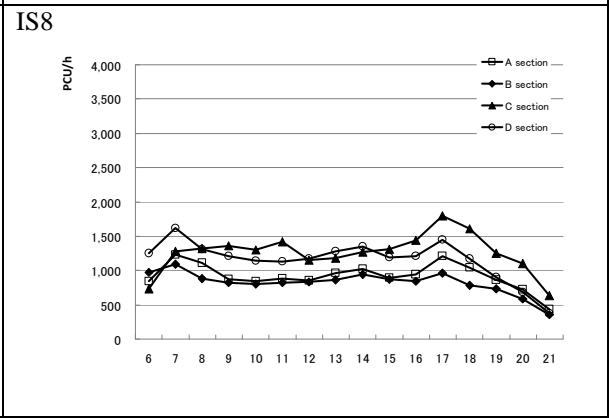
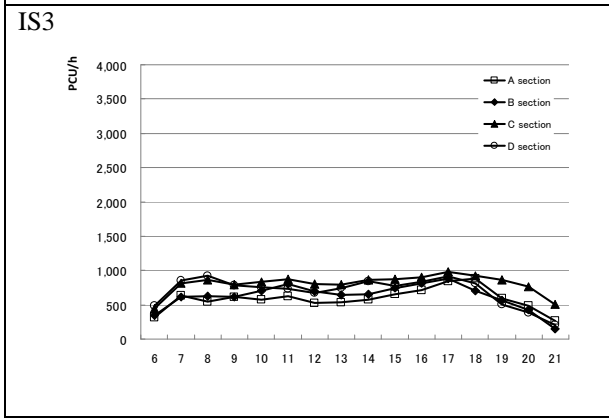
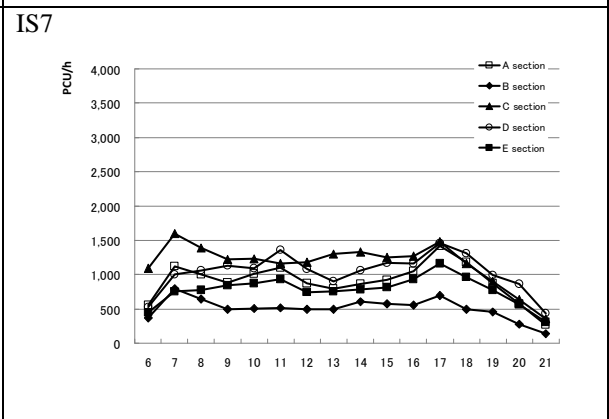
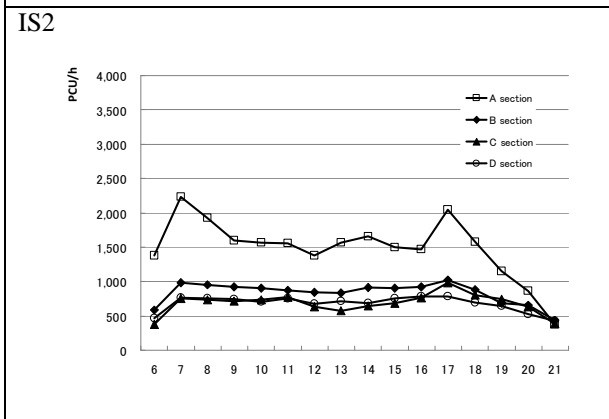
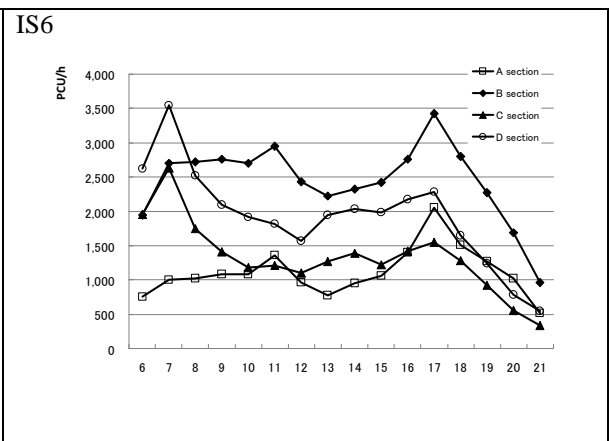
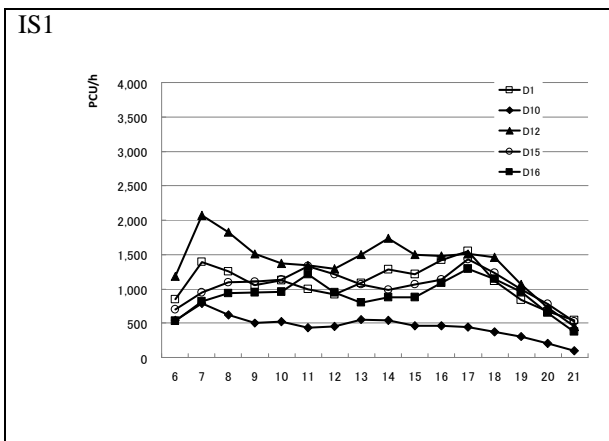
**Figure 13.2-27 Traffic Count (PCU) at Intersections (Time of Count for 16 Hours (06:00 ~ 22:00))**

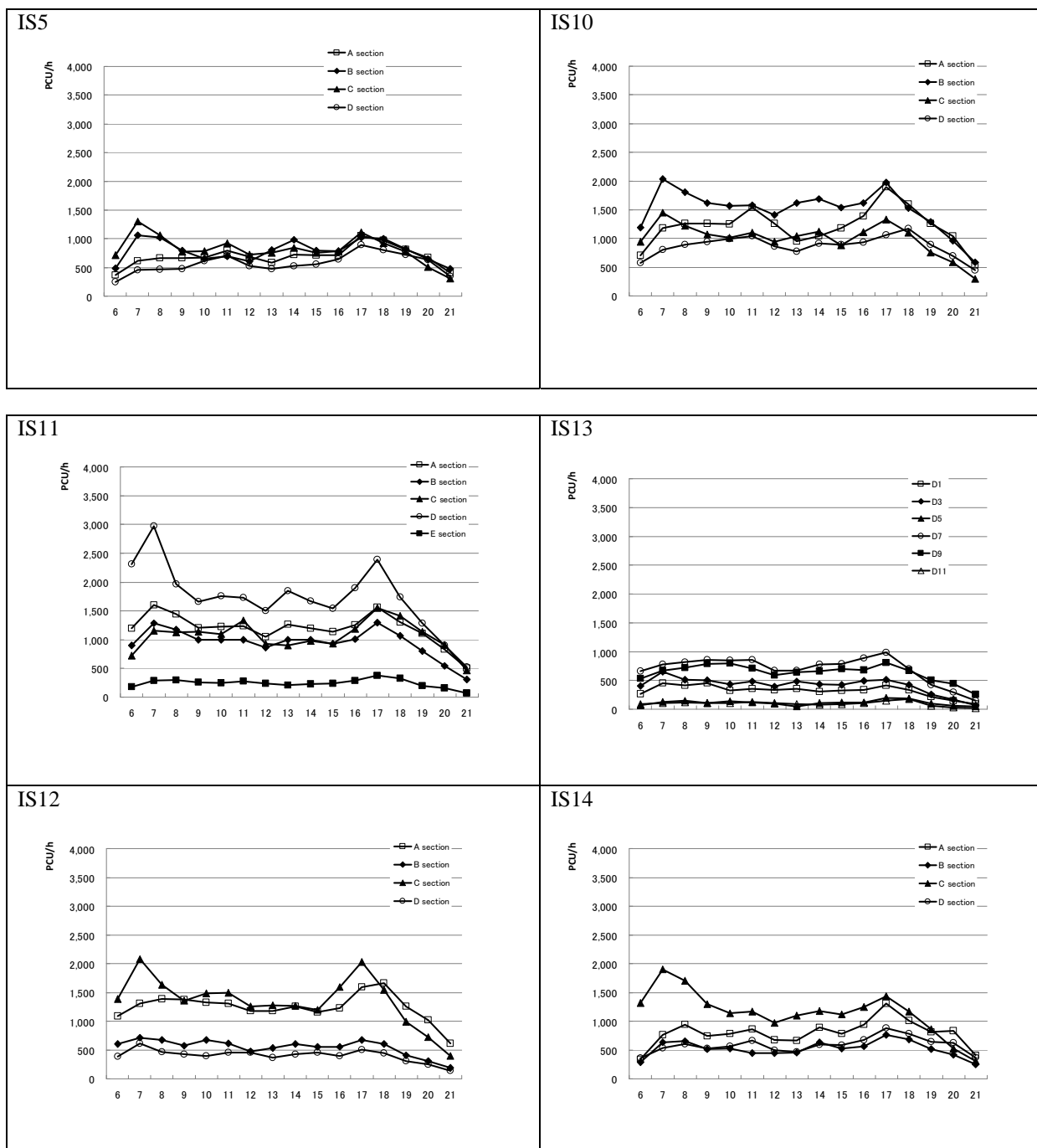




Source: PPUTMP Project Team

Figure 13.2-28 Composition of Vehicles by Station





Source: PPUTMP Project Team

Figure 13.2-29 Hourly Fluctuation by Station



### 13.2.5 Travel Speed Survey

#### (1) Outline

The Travel Speed Survey aims to measure the travel time between the major road sections, with a view to identifying traffic congestion points that need to be addressed. This survey was conducted by the “floating car method” which requires the surveyed vehicle to keep the same position in the traffic flow, i.e., if the surveyed vehicle is overtaken by other vehicles, it should overtake the same number of vehicles.

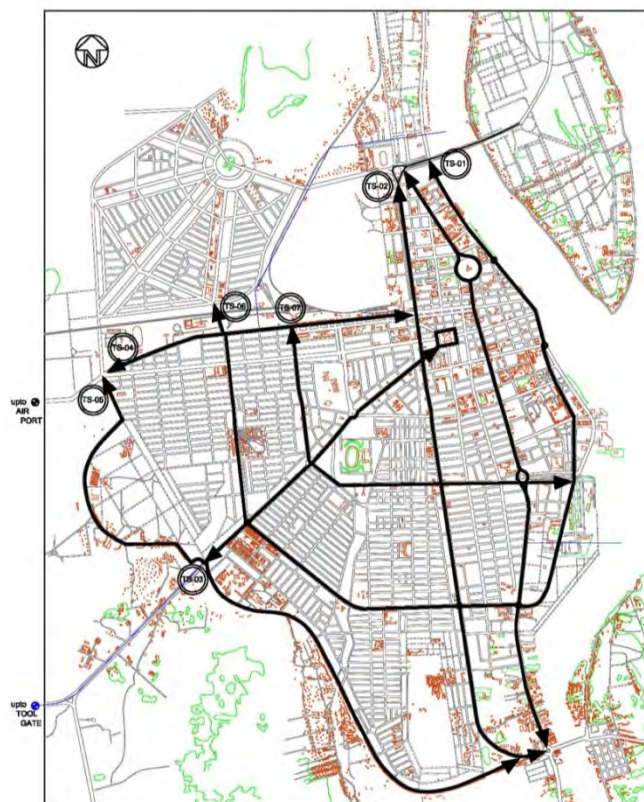
#### (2) Survey Coverage

- f) The survey was conducted along 7 major routes in the City Center of PPCC (see Table 13.2-15 and Figure 13.2-30).
- g) For each road section, the travel speed survey was conducted to/from both directions by using GPS equipment. The survey was conducted in the morning peak hours (07:00-09:00), evening peak hours (17:00-19:00), and noon hours (12:00-14:00) of weekdays. Three round-trips were made to measure the travel speed in each time.
- h) The information recorded during the survey are:
  - a. Time of departure and arrival (start and end points of route);
  - b. Time of passing checkpoints; and
  - c. Time of stop and re-start with reason for stopping.

**Table 13.2-15 Survey Routes for Travel Speed Survey**

Route	Road Name
1	France / Norodom
2	Monivong
3	Charles de Gaulle / Monireth
4	Confederation de la Russie
5	C1
6	Kim Il Sung / Mao Tse Toung / Sisowath
7	Jawaharlal Nerhu / Sihanouk

Source: PPUTMP Project Team



Source: PPUTMP Project Team

**Figure 13.2-30 Survey Routes for Travel Speed Survey**

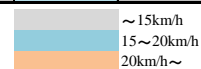
### **(3) Results of Travel Speed Survey**

#### **1) Speed**

The highest travel speed was recorded at the Canada Bank-Tower Pet Loksang Flyover Bridge section of Route No. 4 while the lower speed was recorded at the Central Market-Steung Meanchey section of Route No. 3 (see Table 13.2-16). The highest speed is about 25 km/h on average in the morning, daytime and evening, and the lowest is about 18 km/h.

**Table 13.2-16 Average Travel Speed**

Point	Street Name	Start	End	Unit Km/h			Ave./day
				Morning peak (7:00-9:00)	Noon (12:00-14:00)	Evening peak (17:00-19:00)	
TS 01	France/ Norodom (Rd 47/41)	Chruoy Changvar Roundabout	Monivong Flyover Bridge	17.9	20.8	15.4	18.4
		Monivong Flyover Bridge	Chruoy Changvar Roundabout	16.4	21.0	16.3	18.1
TS 02	Monivong Blvd.	Chruoy Changvar Roundabout	Monivong Flyover Bridge	15.6	17.7	10.7	15.6
		Monivong Flyover Bridge	Chruoy Changvar Roundabout	14.3	17.6	12.8	15.3
TS 03	Charles De Gaulle/Monireth (Rd 217)	Central Market	Steung Meanchey Intersection	13.3	14.6	10.0	12.8
		Steung Meanchey Intersection	Central Market	12.4	14.6	12.3	13.2
TS 04	Russian Blvd.	Canadia Bank Tower	Pet Loksang Flyover Bridge	20.4	24.6	11.8	20.3
		Pet Loksang Flyover Bridge	Canadia Bank Tower	11.6	21.2	11.8	15.6
TS 05	Inner Ring Road (Rd 271)	Pet Loksang Flyover Bridge	Monivong Flyover Bridge	17.6	22.5	17.7	19.5
		Monivong Flyover Bridge	Pet Loksang Flyover Bridge	18.5	22.1	16.8	19.5
TS 06	Sisowath/Sothearos/Mao Tsetung/Kim il Sung (Rd 1/3/245/289)	Toul Kork Roundabout	Chruoy Changvar Bridge	14.3	17.4	11.9	14.8
		Chruoy Changvar Bridge	Toul Kork Roundabout	14.4	16.3	10.0	14.0
TS 07	Sihanouk/Nehru Blvd. (Rd 274/215)	Sihanouk Blvd -Sothearos intersection	Nehru-Russian Blvd. Intersection	15.1	15.9	10.5	14.2
		Nehru-Russian Blvd. Intersection	Sihanouk Blvd -Sothearos intersection	14.0	18.3	11.8	15.2

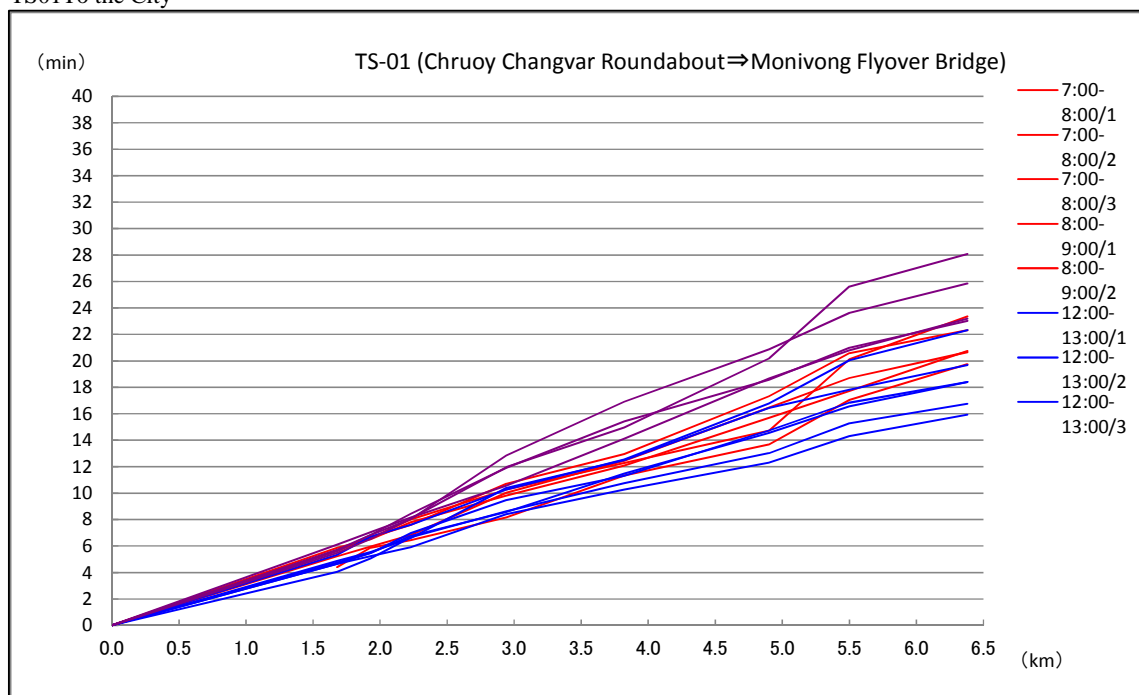


Source: PPUTMP Project Team

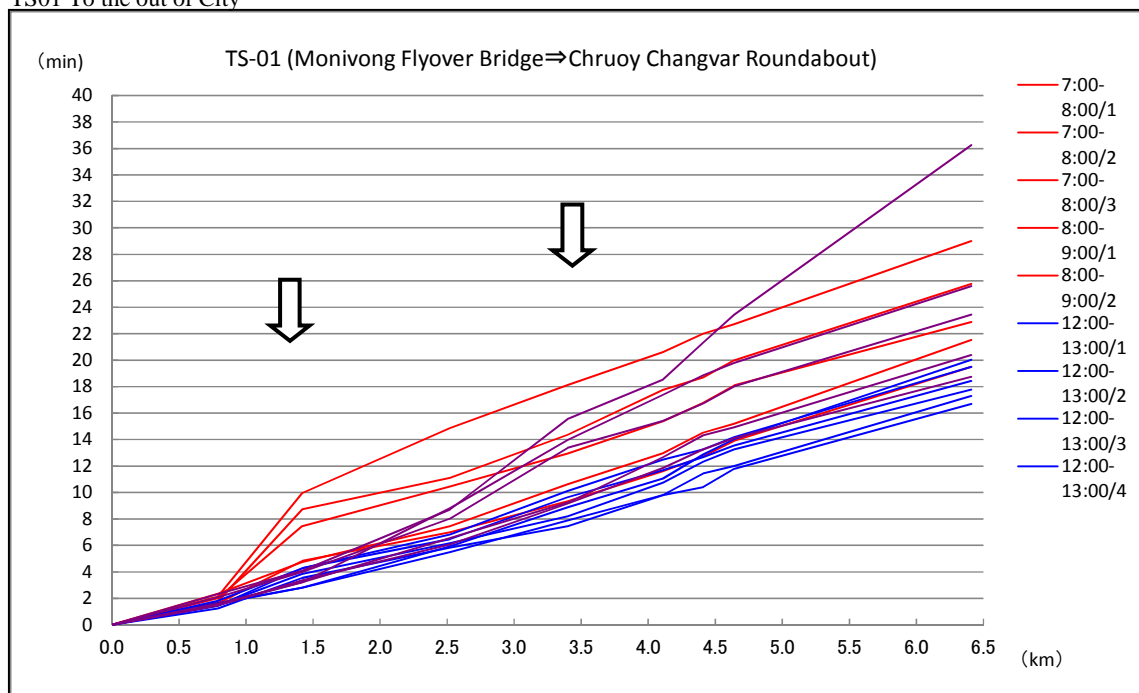
## 2) Congestion Points

Figure 13.2-31 to Figure 13.2-38 plot the changes in travel speed during the day per survey route. The arrows in the figures point to the traffic congestion or bottleneck points. Route No. 1 has two bottleneck points bound for downstream, Route No. 2 has one bottleneck point bound for downstream, and Route No. 4 has one bottleneck point bound for upstream. However, the bottleneck points in the upstream and downstream parts are different.

TS01 To the City



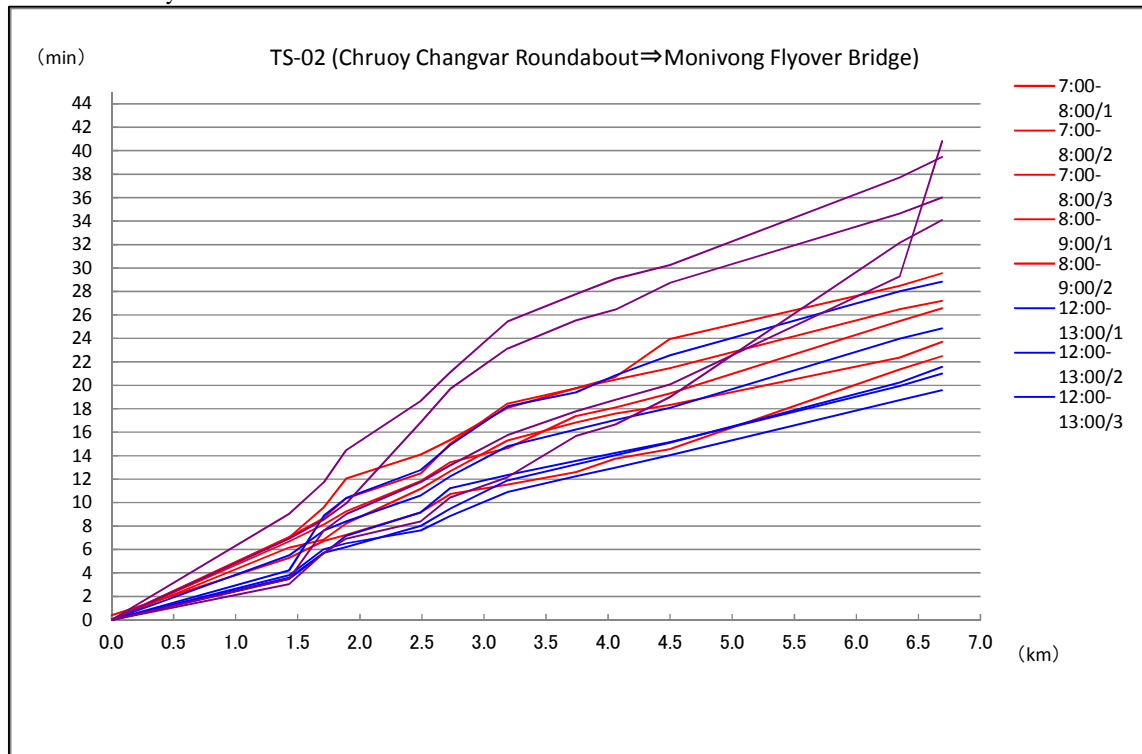
TS01 To the out of City



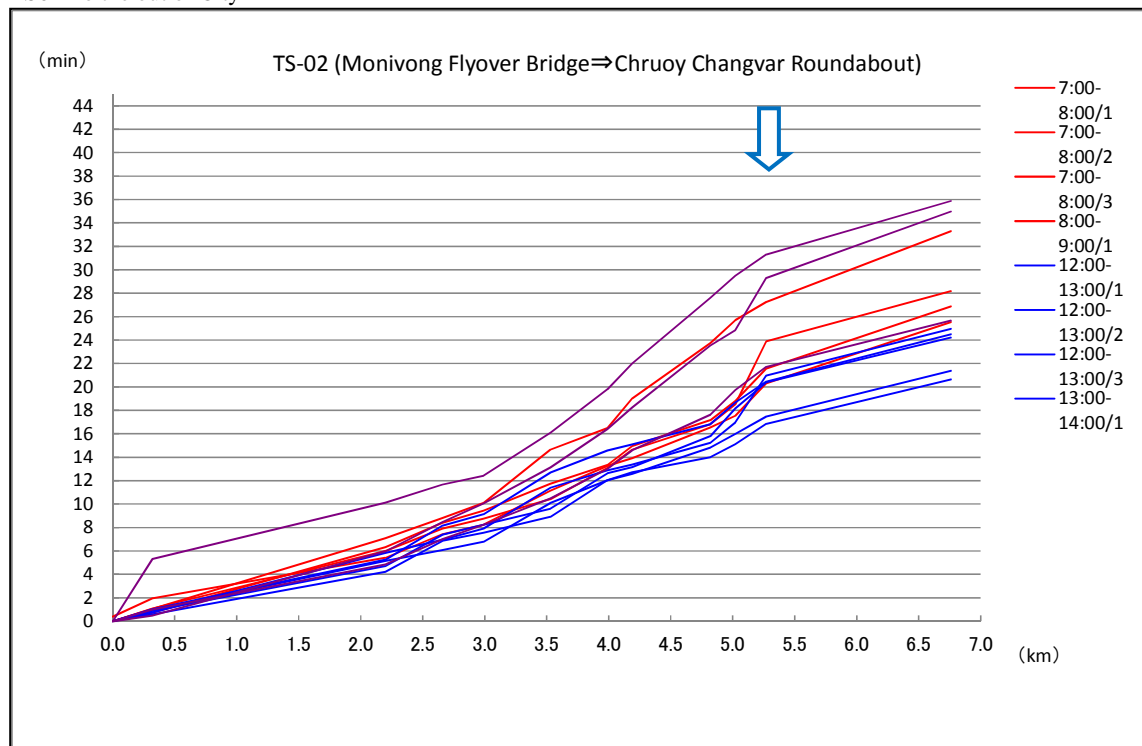
Source: PPUTMP Project Team

Figure 13.2-31 Bottleneck Points (TS01)

TS02 To the City



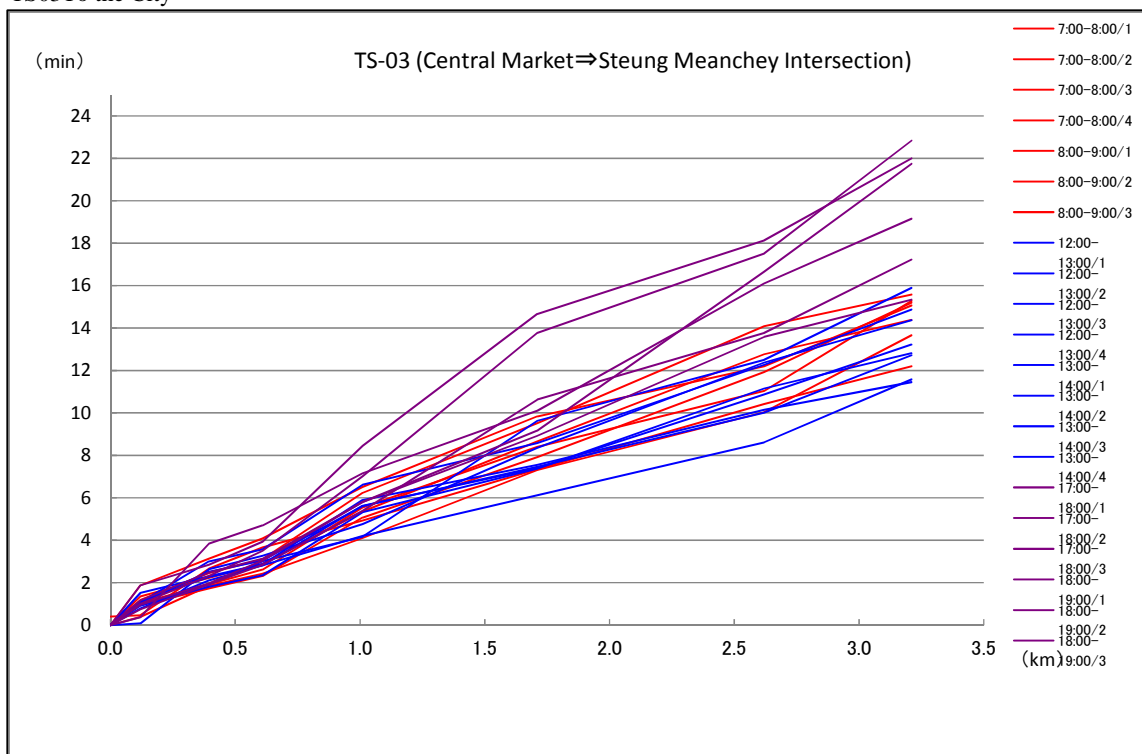
TS02 To the out of City



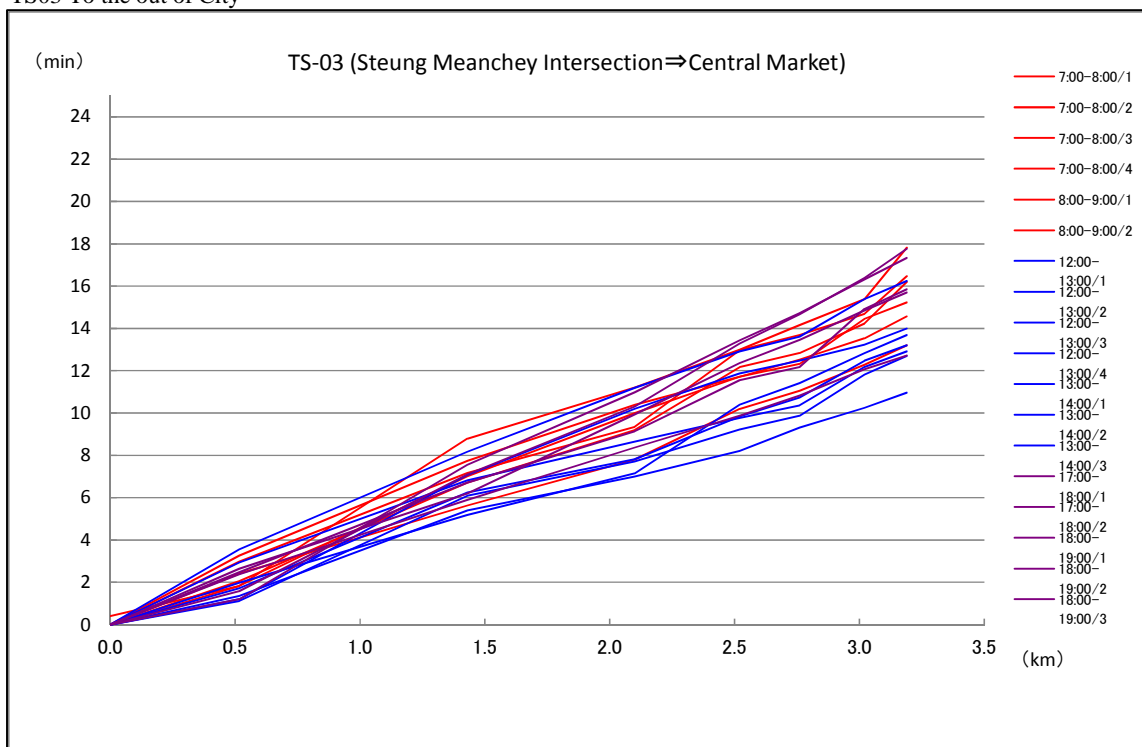
Source: PPUTMP Project Team

Figure 13.2-32 Bottleneck Points (TS02)

TS03To the City



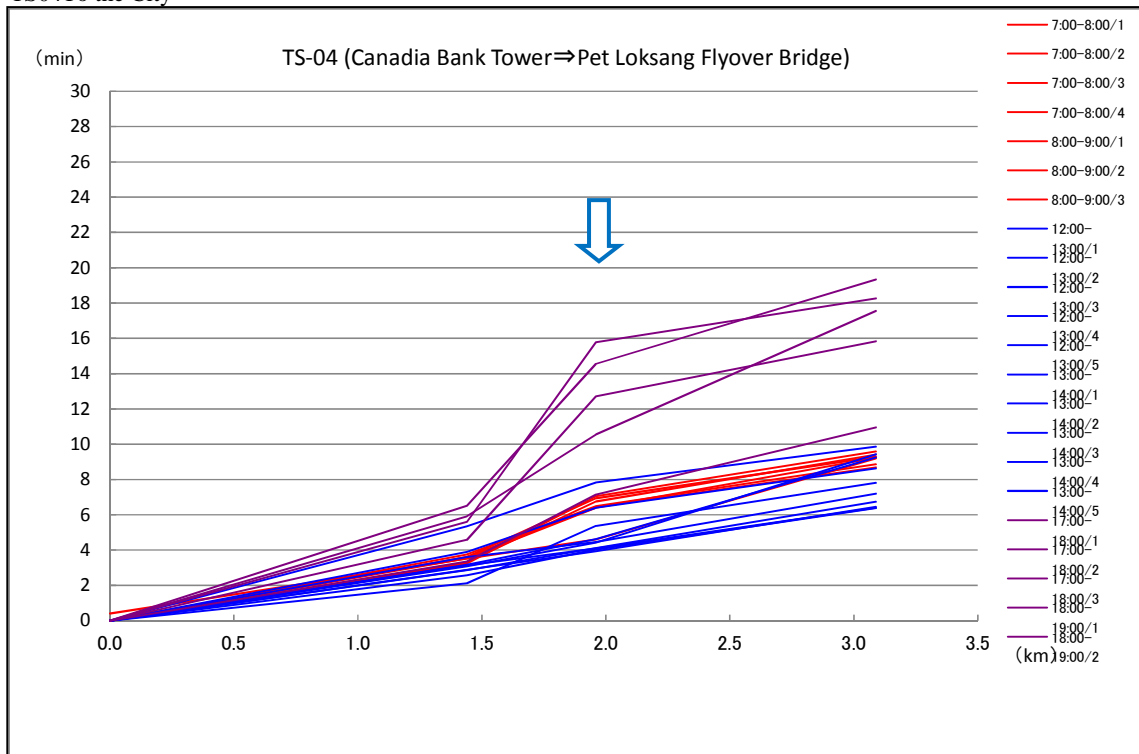
TS03 To the out of City



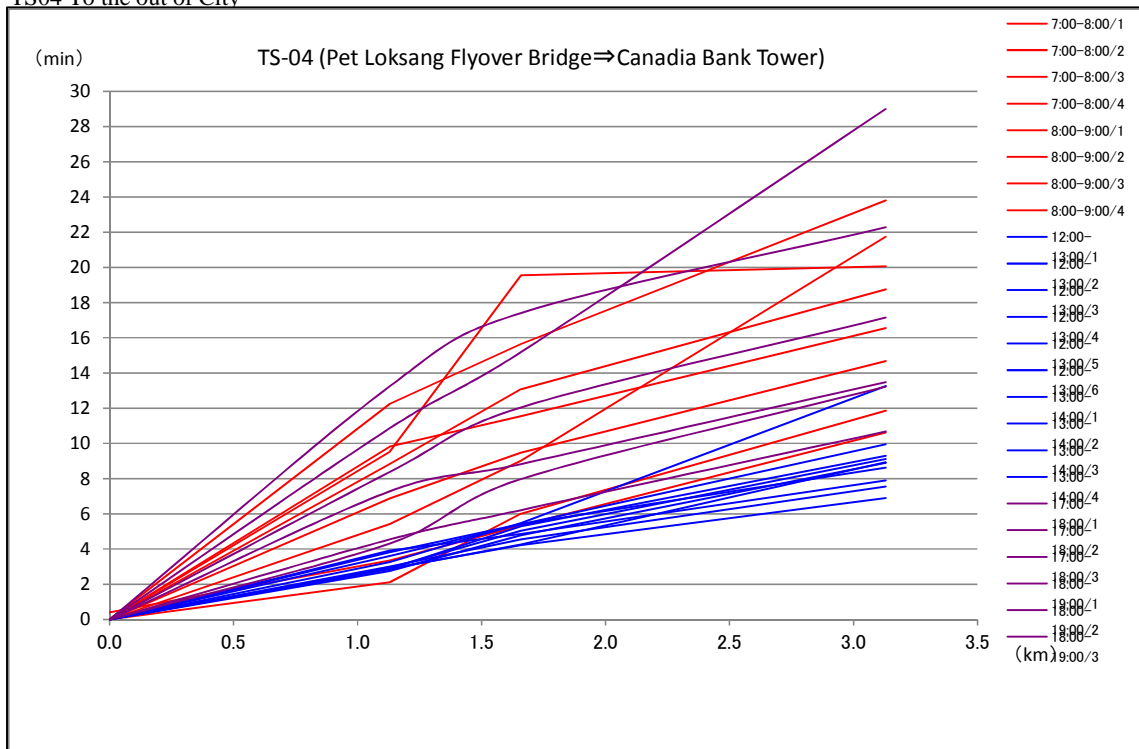
Source: PPUTMP Project Team

Figure 13.2-33 Bottleneck Points (TS03)

TS04To the City



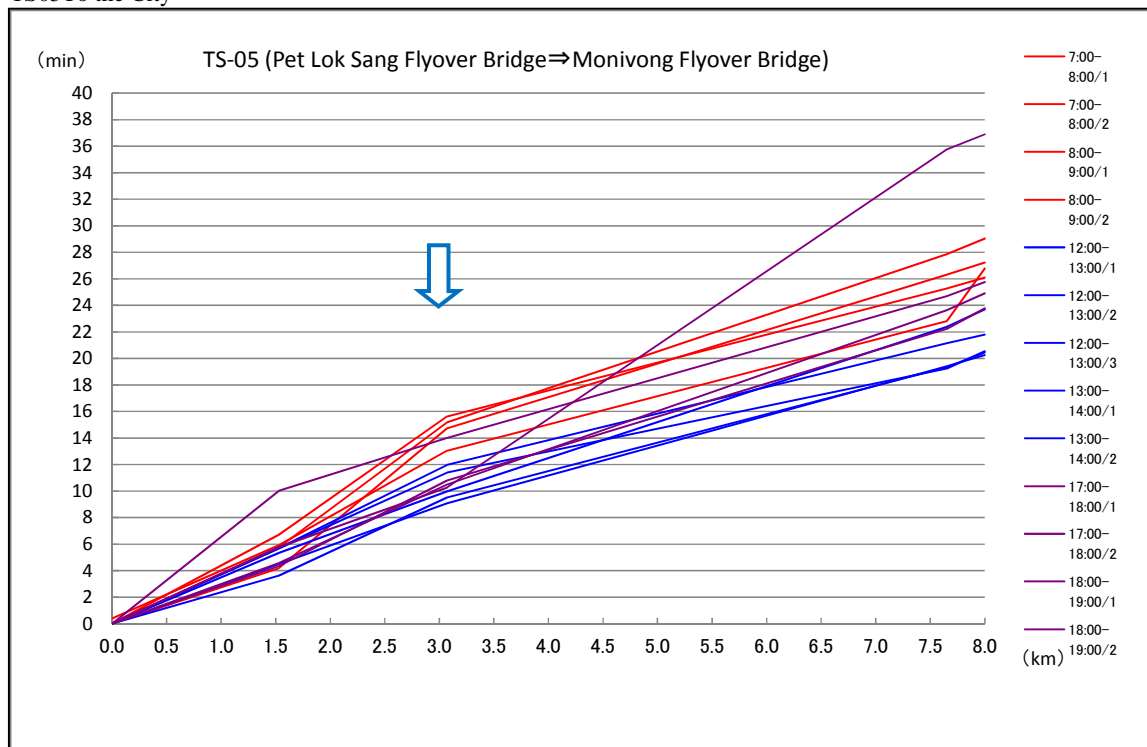
TS04 To the out of City



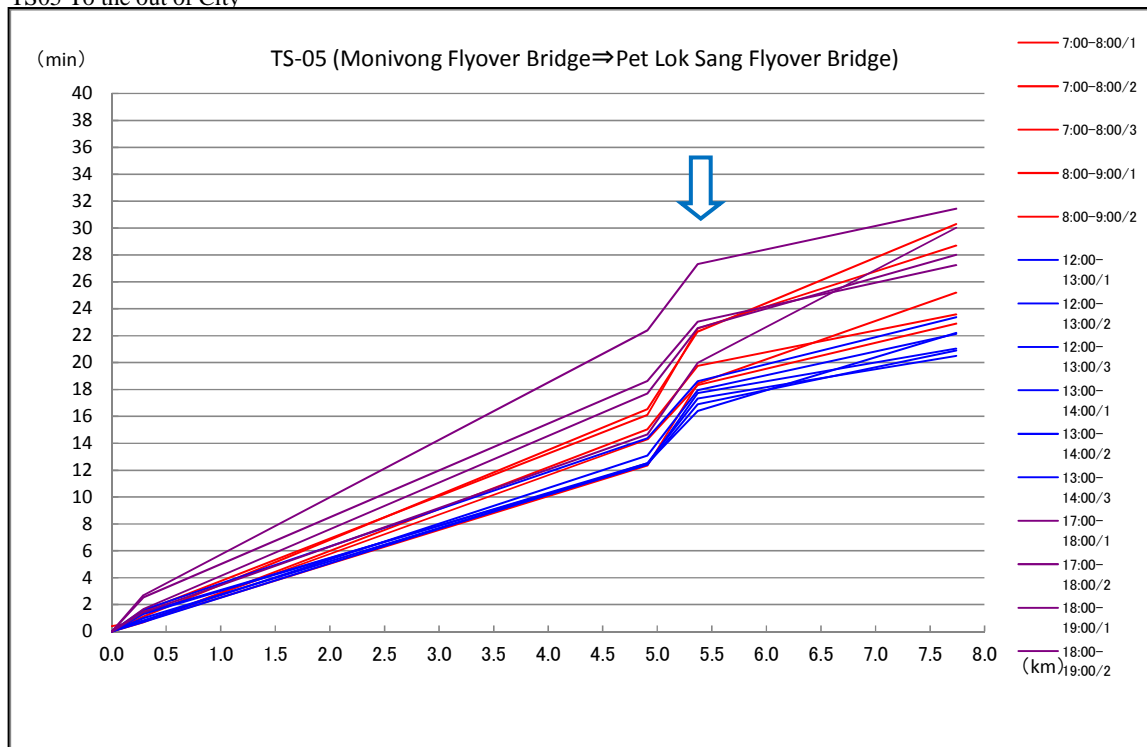
Source: PPUTMP Project Team

Figure 13.2-34 Bottleneck Points (TS04)

TS05 To the City



TS05 To the out of City

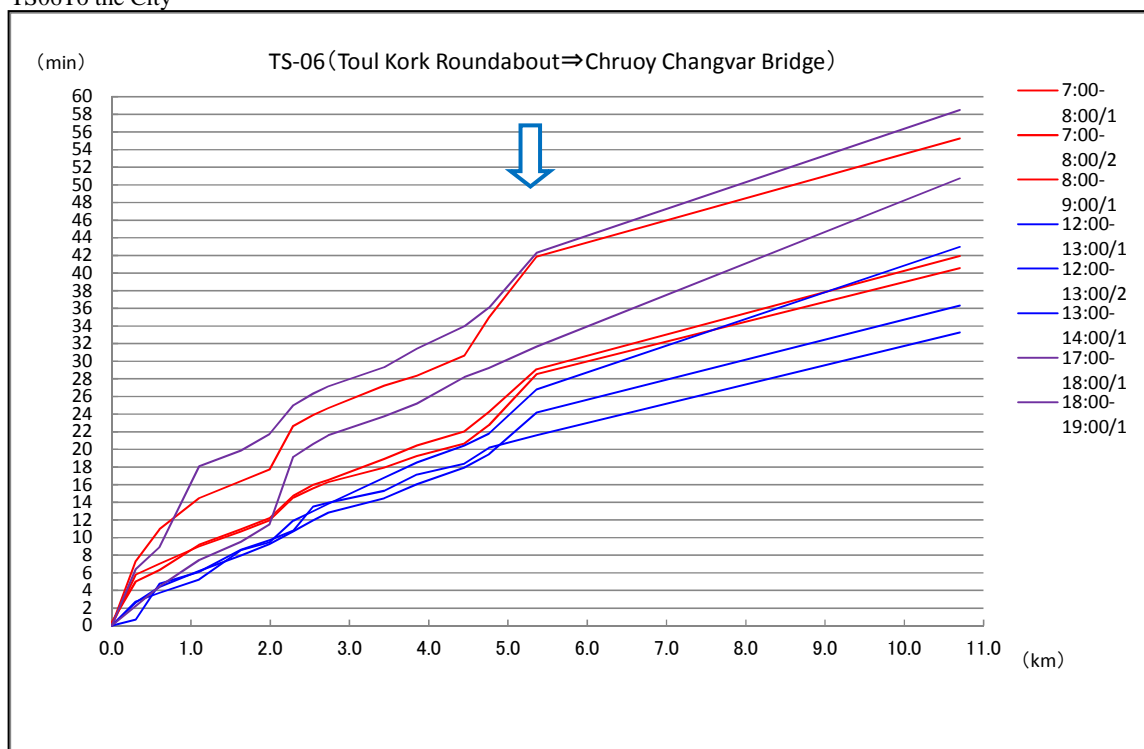


Source: PPUTMP Project Team

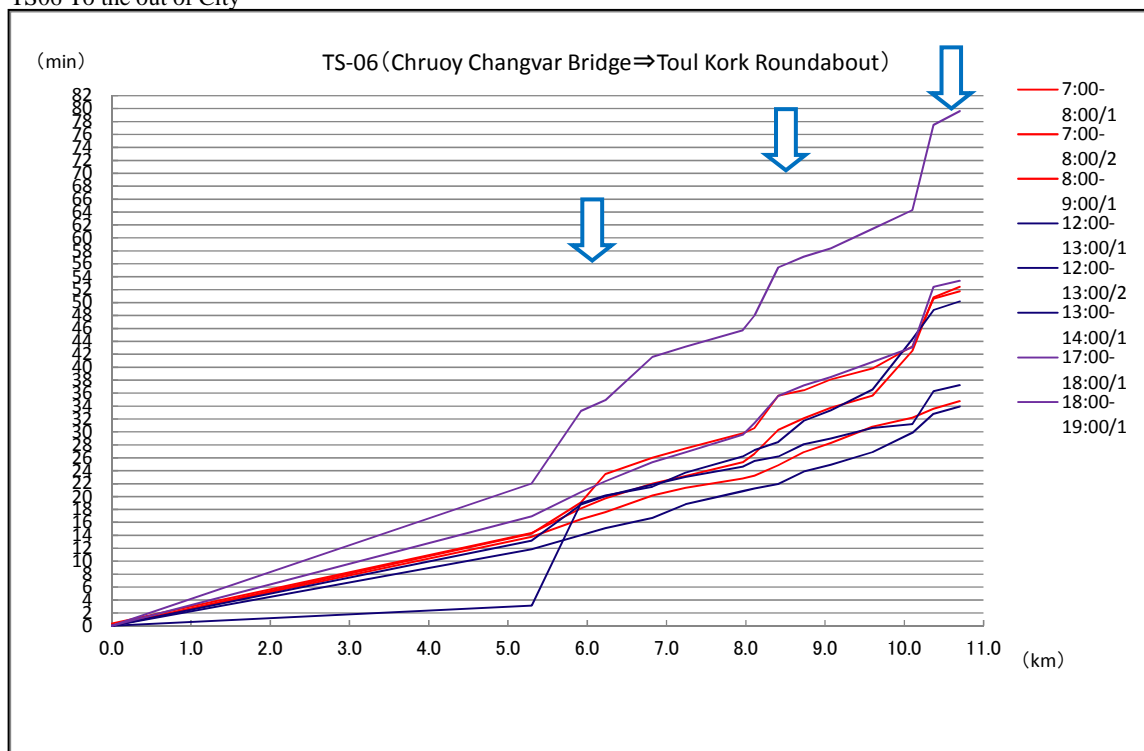
Figure 13.2-35 Bottleneck Points (TS05)



TS06To the City



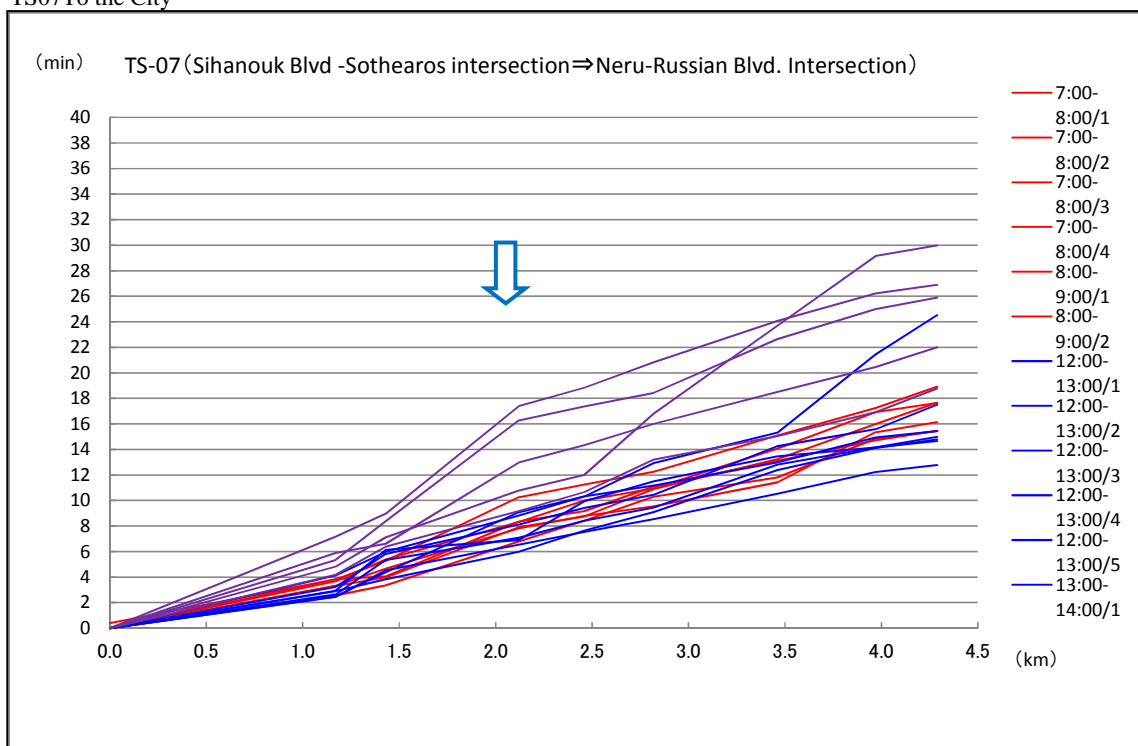
TS06 To the out of City



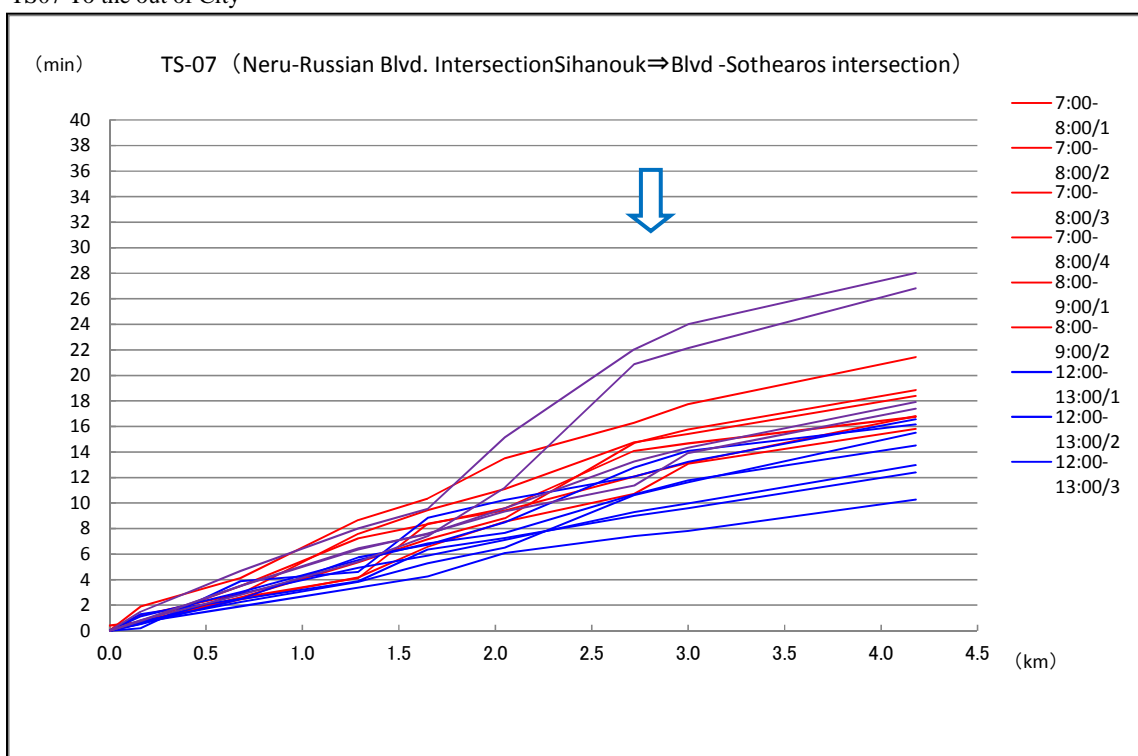
Source: PPUTMP Project Team

Figure 13.2-36 Bottleneck Points (TS06)

TS07To the City



TS07 To the out of City



Source: PPUTMP Project Team

Figure 13.2-37 Bottleneck Points (TS07)

## **(4) Outline of Travel Speed Survey for Para-transit Modes**

### **1) Survey Dates**

The Travel Speed Survey for Para-transit Modes was conducted on the following dates:

- 1<sup>st</sup> week: 6 June 2012 (WED) - 8 June 2012 (FRI)
- 2<sup>nd</sup> week: 11 June 2012 (MON) - 15 June 2012 (FRI)
- 3<sup>rd</sup> week: 18 June 2012 (MON) - 22 June 2012 (FRI)

### **2) Survey Locations**

The survey was conducted at the following 5 locations where para-transit vehicles usually operate:

- Central Market;
- Beung Kang Market;
- Choam Chao Market;
- Russian Market; and
- Russeikeo Market.

### **3) Number of Samples**

Total sample = 2 modes (Motodop, Motorumok modern (tuk-tuk)) x 10 samples/mode x 5 locations  
= 100

### **4) Survey Method**

The survey was conducted on board by using GPS equipment which encoded the travel log data containing coordinates (latitude, longitude), time, and others. Based on the collected log data, the travel movement of para-transit modes was analyzed and projected in the map.

## **(5) Results of Travel Speed Survey for Para-transit Modes**

### **1) Result on running path of para-transit**

Running path of each sample was estimated by projection transformation from geodetic reference system and drawn in a map by Geographic Information System(GIS) software. The following data sheets (see Figure 13.2-38 to Figure 13.2-47) were prepared to show the overall information on the movement of sample para-transit vehicles, which include two kinds of results:

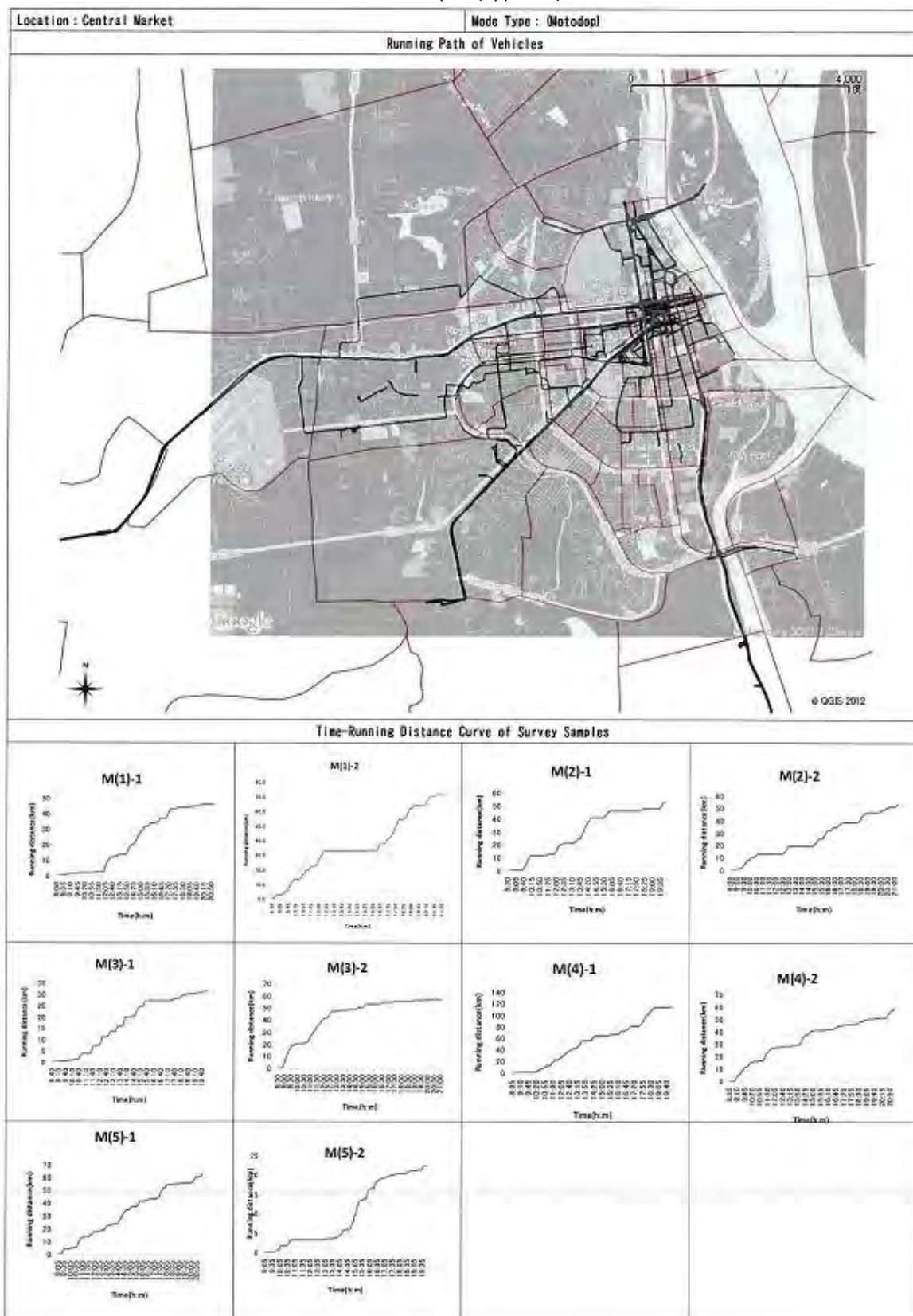
#### **i) Movement Pattern of Para-transit**

The running path of all samples observed at respective survey locations is shown as a line graph by mode type (i.e., Motodop and Motorumok modern (tuk-tuk)).

#### **j) Time-Distance Curve of Samples**

For each sample, a time-running distance graph was produced. The horizontal axis of the graph shows the time period from morning to evening and the vertical axis shows the accumulated distance that each sample was running during the survey.

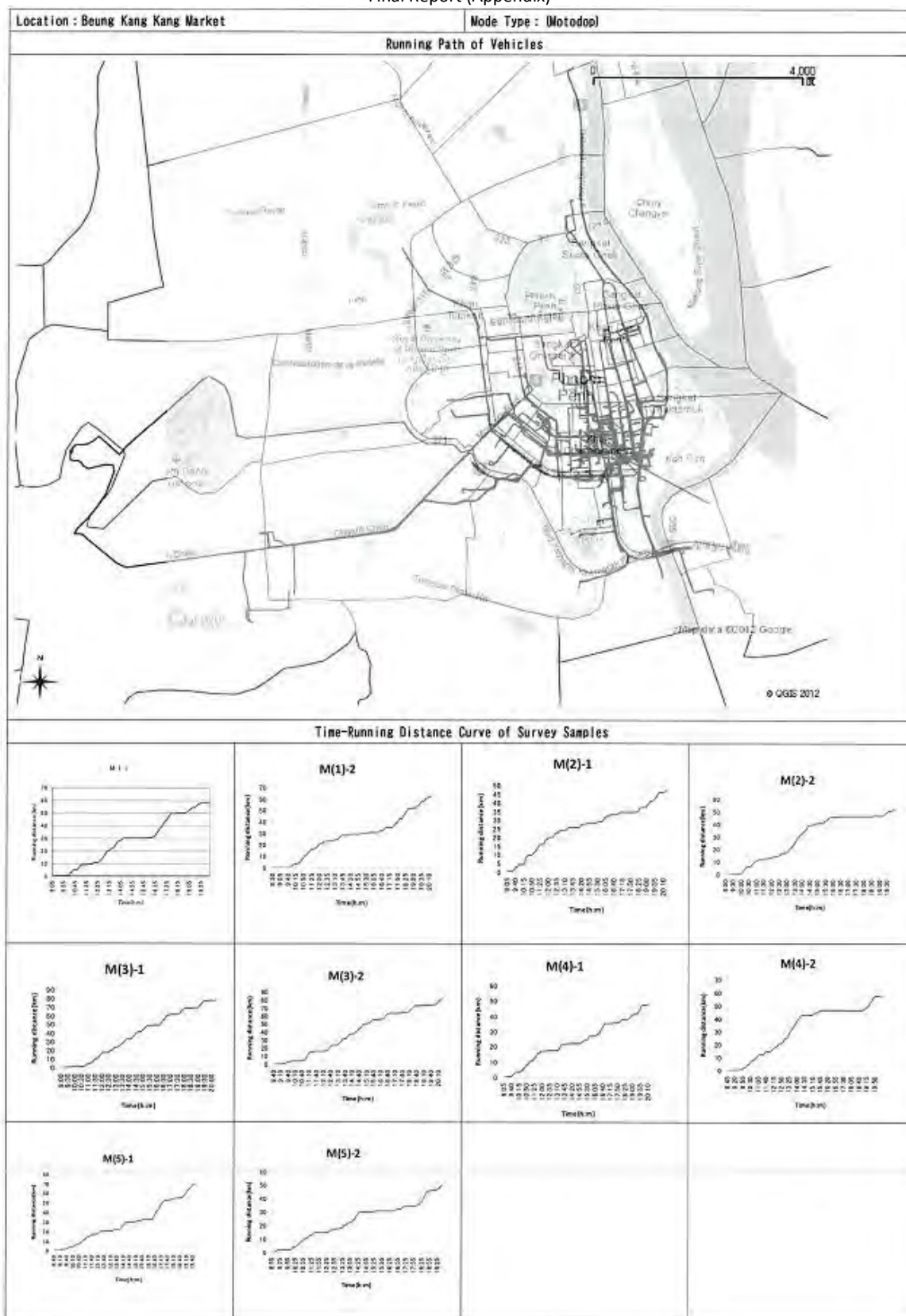
Final Report (Appendix)



Source: PPUTMP Project Team

**Figure 13.2-38 Results of Running Path and Time-Running Distance Survey (Location: Central Market, Mode: Motodop)**

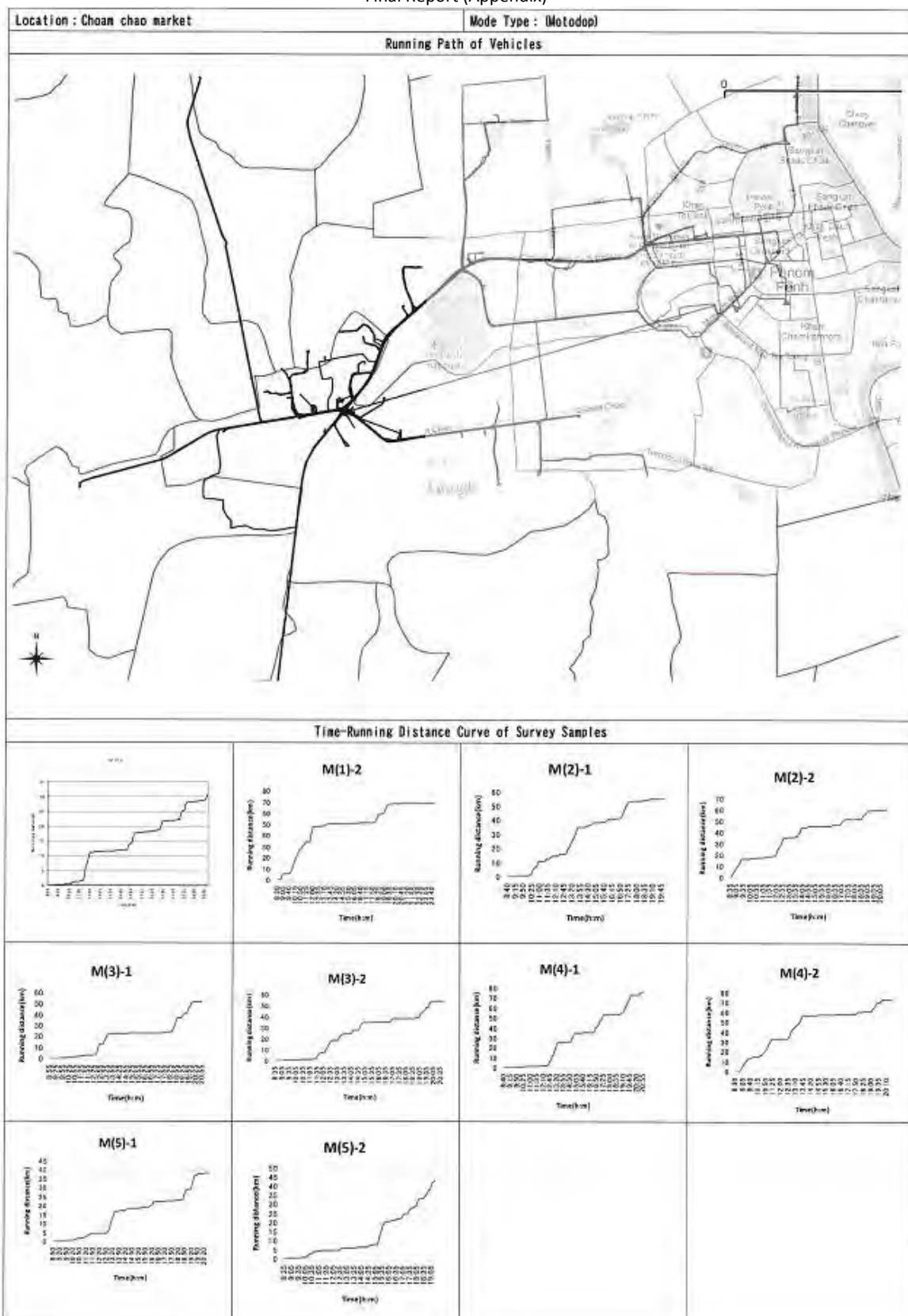
Final Report (Appendix)



Source: PPUTMP Project Team

Figure 13.2-39 Results of Running Path and Time-Running Distance Survey (Location: Beung Kang Market, Mode: Motodop)

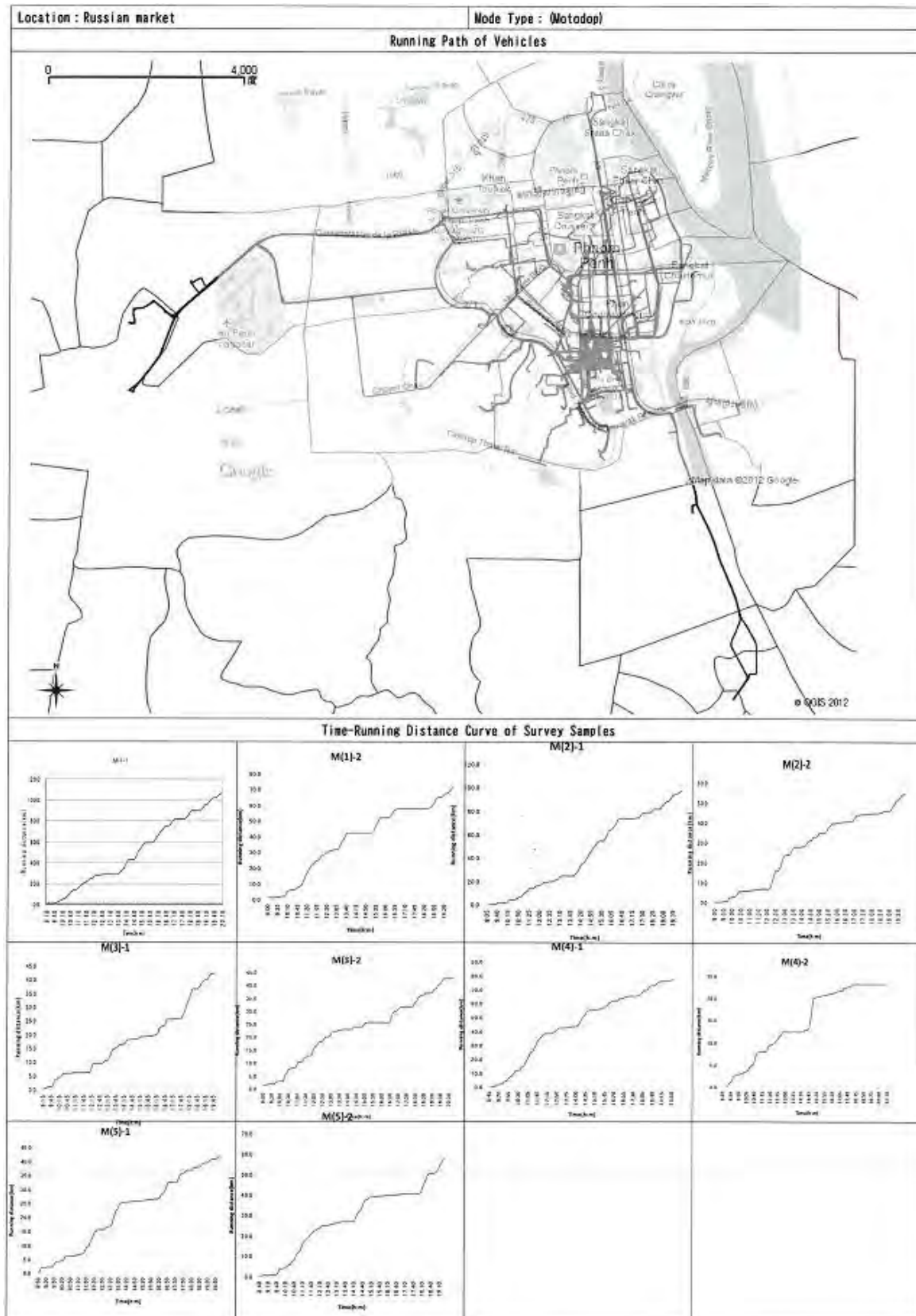
Final Report (Appendix)



Source: PPUTMP Project Team

**Figure 13.2-40 Results of Running Path and Time-Running Distance Survey (Location: Choam Chao Market, Mode: Motodop)**

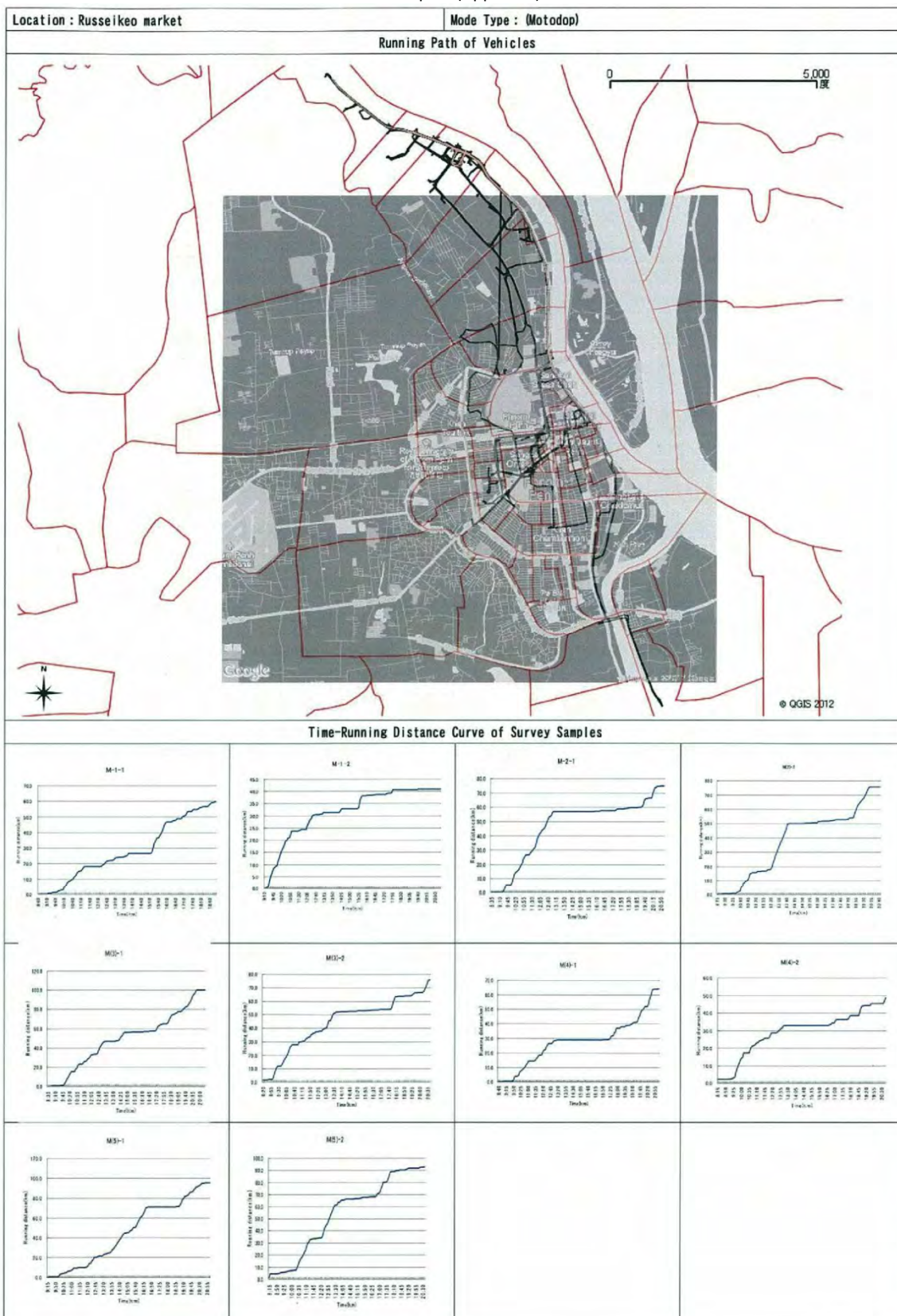
Final Report (Appendix)



Source: PPUTMP Project Team

**Figure 13.2-41 Results of Running Path and Time-Running Distance Survey (Location: Russian Market, Mode: Motodop)**

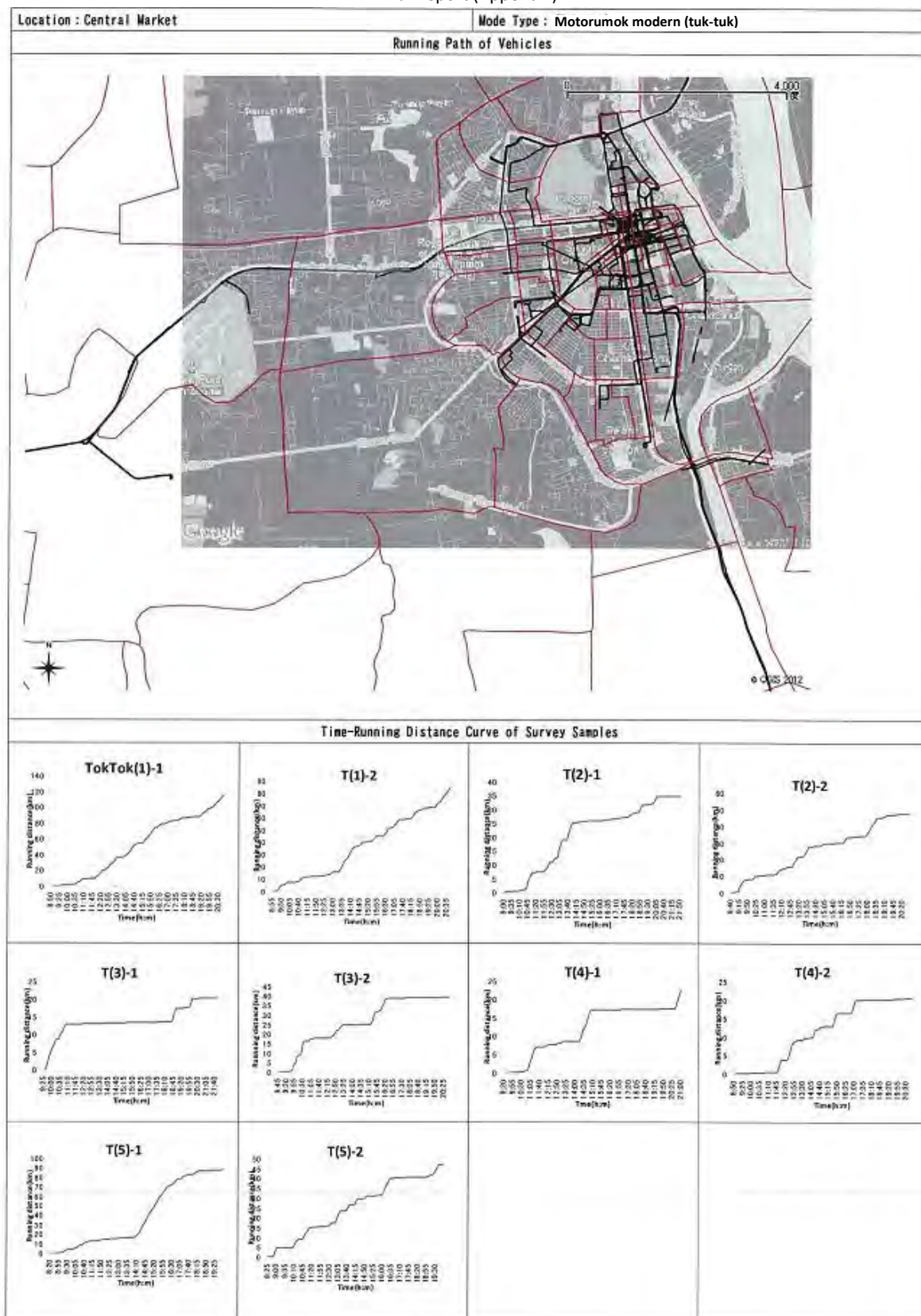
Final Report (Appendix)



Source: PPUTMP Project Team

**Figure 13.2-42 Results of Running Path and Time-Running Distance Survey (Location: Russeikeo Market, Mode: Motodop)**

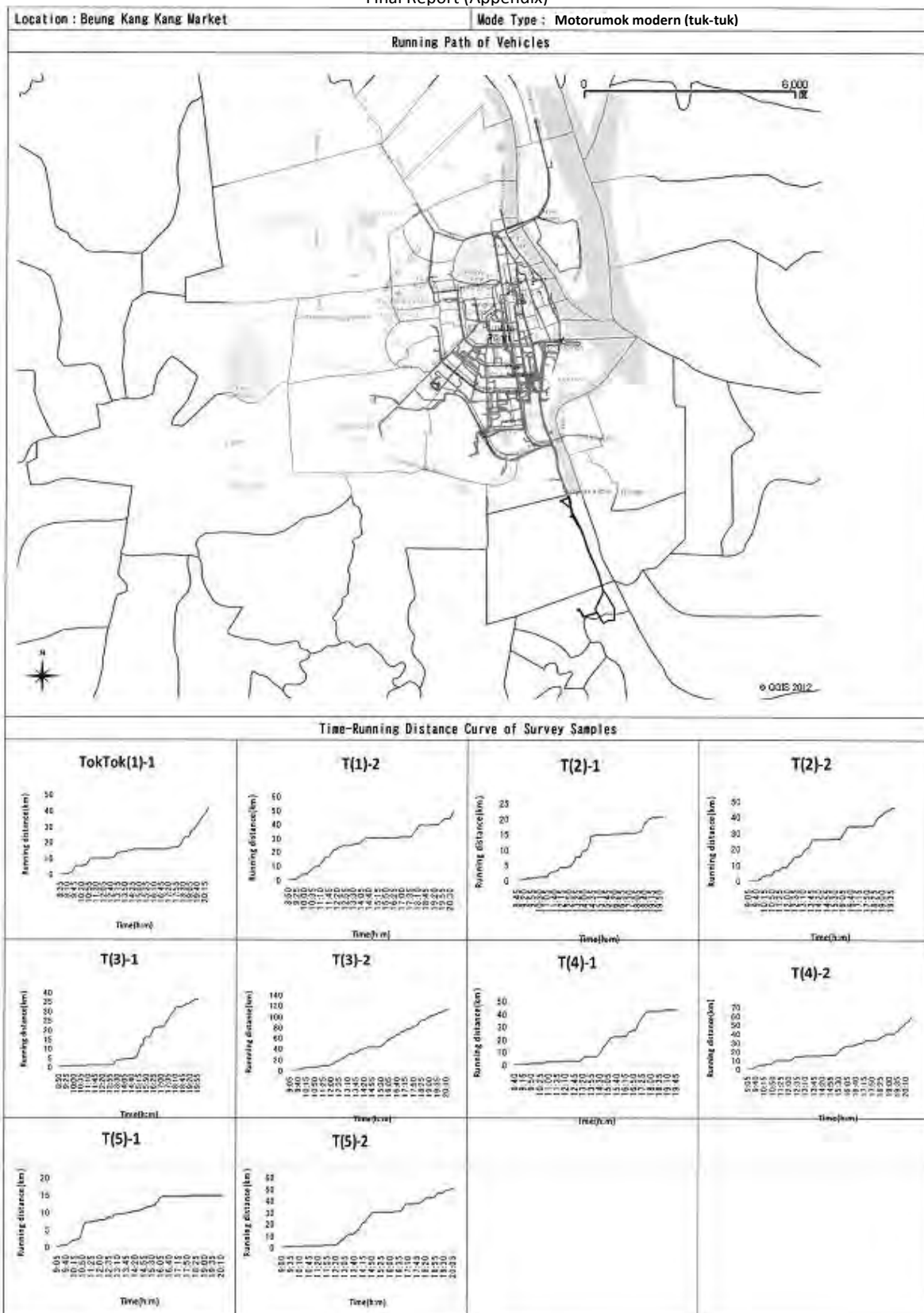




Source: PPUTMP Project Team

**Figure 13.2-43 Results of Running Path and Time-Running Distance Survey (Location: Central Market, Mode: Motorumok modern (tuk-tuk))**

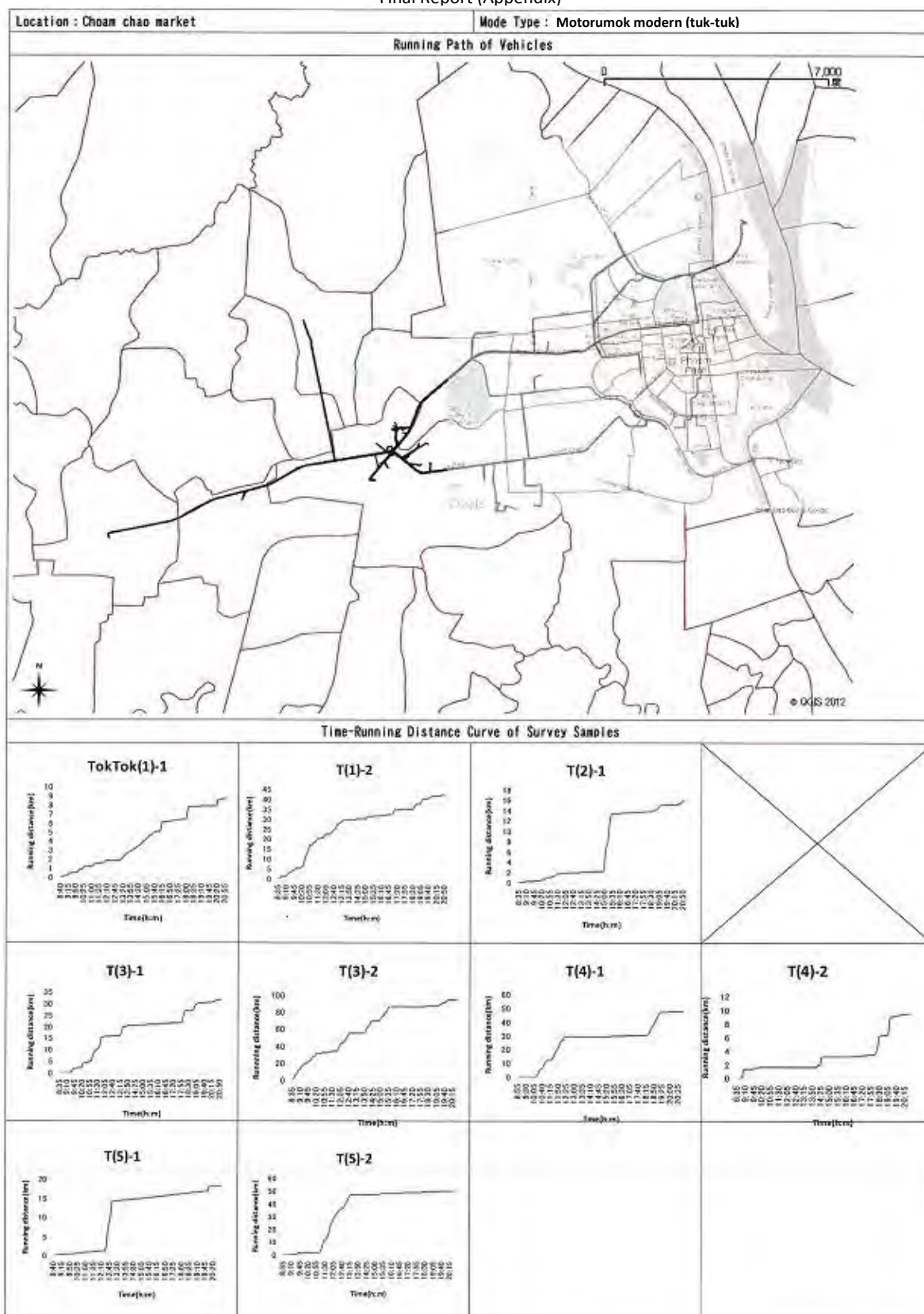
Final Report (Appendix)



Source: PPUTMP Project Team

**Figure 13.2-44 Results of Running Path and Time-Running Distance Survey (Location: Beung Kang Market, Mode: Motorumok modern (tuk-tuk))**

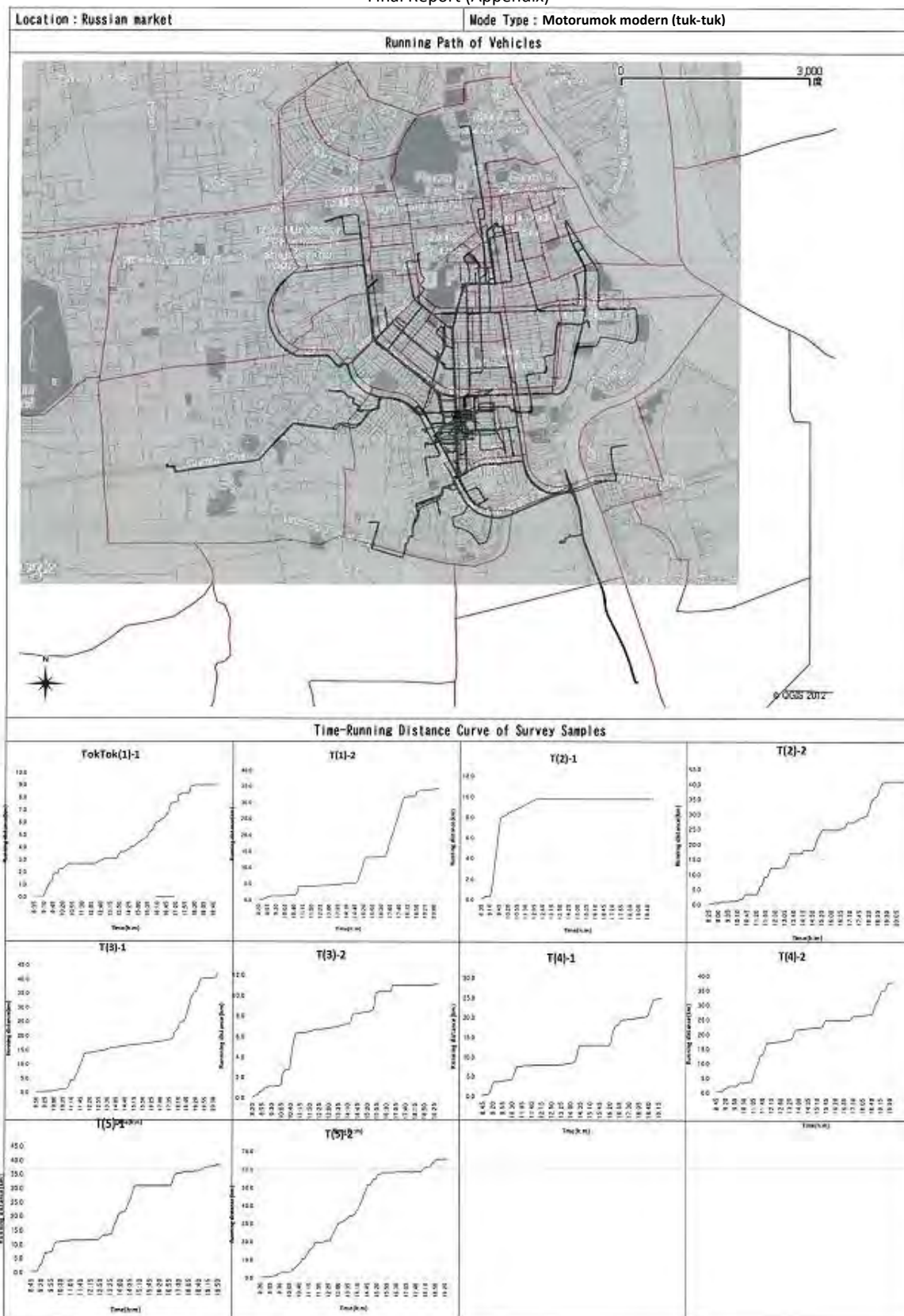
Final Report (Appendix)



Source: PPUTMP Project Team

**Figure 13.2-45 Results of Running Path and Time-Running Distance Survey (Location: Choam Chao Market, Mode: Motorumok modern (tuk-tuk))**

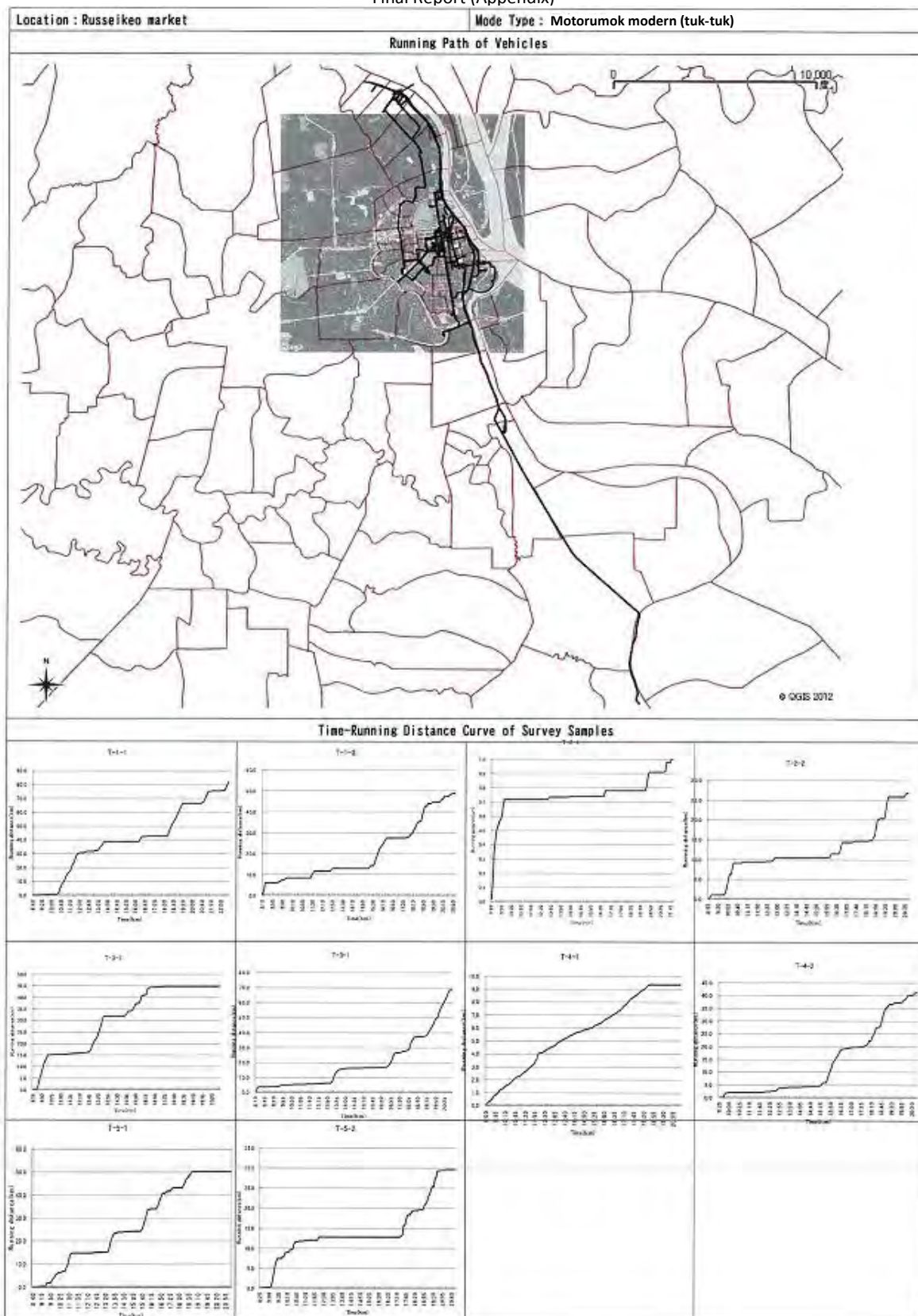
Final Report (Appendix)



Source: PPUTMP Project Team

**Figure 13.2-46 Results of Running Path and Time-Running Distance Survey (Location: Russian Market, Mode: Motorumok modern (tuk-tuk))**

Final Report (Appendix)



**Figure 13.2-47 Results of Running Path and Time-Running Distance Survey (Location: Russeikeo Market, Mode: Motorumok Modern (tuk-tuk))**

## 2) Results of Running Length of Para-transit Modes

Based on the running length of each para-transit, the total running length per day was calculated. At the same time, the mobility and estimated speed of the para-transit was differentiated according to the operation in service and the waiting time for customers. Correspondingly, both the time for service and waiting time were estimated for each sample. The results are shown in Table 13.2-17 and Table 13.2-18.

From these results, the following points are highlighted:

- The total running length varies by sample, with the longest one at more than 100 km and the shortest one at less than 10 km. Compared by mode, the running length of the motodop seems to be longer than the motorumok modern (tuk-tuk). This implies that the motodop is more easily and frequently used than motorumok modern (tuk-tuk).
- Correspondingly, the service operation time, in which vehicles are carrying passengers, also varies by sample. The longest one is more than 7 hours and the shortest is less than 30 minutes.
- Between the two modes, the service operation time of the motodop shows fewer variance among samples, whereas it varies significantly among the motorumok modern (tuk-tuk). This implies that the service characteristic of the motorumok modern (tuk-tuk) is more of a chartered service than a shared service.

**Table 13.2-17 Total Running Length (Motodop)**

Actual Mobility of Motodop

PT	No.	Set	Date (M/D)	Total running length of vehicle (km/day)	Total time			Time composition of service time/idle time	Service speed Est.(km/h)
					in Service H:M	Idle time H:M	waiting H:M		
Central Market	1	1	6/13	46.03	13:00	3:30	9:30		13.2
	1	2	6/15	71.98	13:30	4:50	8:40		14.9
	2	1	6/13	53.17	11:25	3:20	8:05		16.0
	2	2	6/15	52.80	12:45	4:35	8:10		11.5
	3	1	6/13	31.33	11:20	2:10	9:10		14.5
	3	2	6/15	57.42	12:35	3:45	8:50		15.3
	4	1	6/13	115.09	11:25	5:50	5:35		19.7
	4	2	6/15	59.15	12:35	4:40	7:55		12.7
	5	1	6/6	63.00	11:55	4:10	7:45		15.1
	5	2	6/13	22.26	10:45	1:45	9:00		12.7
Beung Kang Market	1	1	6/12	57.87	11:25	4:35	6:50		12.6
	1	2	6/8	62.35	11:45	4:55	6:50		12.7
	2	1	6/12	47.49	11:15	4:00	7:15		11.9
	2	2	6/11	52.39	10:55	4:15	6:40		12.3
	3	1	6/8	77.69	11:15	4:50	6:25		16.1
	3	2	6/11	82.25	11:45	4:45	7:00		17.3
	4	1	6/12	47.71	11:10	4:00	7:10		11.9
	4	2	6/11	57.45	11:30	4:10	7:20		13.8
	5	1	6/11	69.14	11:10	5:20	5:50		13.0
		5	2	6/15	53.24	11:45	4:40	7:05	
Chao market	1	1	6/20	31.19	12:05	1:45	10:20		17.8
	1	2	6/21	69.11	15:25	2:55	12:30		23.7
	2	1	6/20	56.28	12:15	3:20	8:55		16.9
	2	2	6/21	60.28	11:55	2:55	9:00		20.7
	3	1	6/20	51.93	12:00	2:15	9:45		23.1
	3	2	6/21	54.28	12:15	2:40	9:35		20.4
	4	1	6/20	76.13	12:15	3:20	8:55		22.8
	4	2	6/21	73.22	12:00	3:45	8:15		19.5
	5	1	6/20	69.14	11:50	2:00	9:50		34.6
		5	2	6/21	53.24	12:15	2:40	9:35	
Russian Market	1	1	6/14	107.07	11:00	6:45	4:15		15.9
	1	2	6/15	71.76	11:00	4:50	6:10		14.8
	2	1	6/14	97.76	10:55	6:05	4:50		16.1
	2	2	6/15	54.52	11:05	3:35	7:30		15.2
	3	1	6/14	42.27	10:35	3:55	6:40		10.8
	3	2	6/15	42.84	11:15	4:10	7:05		10.3
	4	1	6/14	77.14	11:10	5:35	5:35		13.8
	4	2	6/15	23.28	12:10	2:10	10:00		10.7
	5	1	6/15	42.43	11:15	3:25	7:50		12.4
		5	2	6/22	64.91	11:55	4:40	7:15	
Russeiko Market	1	1	6/18	59.41	10:20	4:20	6:00		13.7
	1	2	6/19	40.90	12:00	2:55	9:05		14.0
	2	1	6/18	74.89	12:30	4:00	8:30		18.7
	2	2	6/19	75.78	12:20	4:00	8:20		18.9
	3	1	6/18	100.23	12:40	5:05	7:35		19.7
	3	2	6/19	75.83	12:25	4:05	8:20		18.6
	4	1	6/18	64.08	12:35	4:20	8:15		14.8
	4	2	6/19	48.77	12:30	3:25	9:05		14.3
	5	1	6/18	95.34	11:50	5:55	5:55		16.1
		5	2	6/19	93.02	12:25	5:00	7:25	

Source: PPUTMP Project Team

**Table 13.2-18 Total Running Length (Motorumok Modern (tuk-tuk))**

Actual Mobility of Motorumok modern (tuk-tuk)

PT	No.	Set	Date (M/D)	Total running length of vehicle (km/day)	Total time			Time composition of service time/idle time				Service speed Est.(km/h)
					in Service H:M	Idle time H:M	Total time H:M	0%	20%	40%	60%	
Central Market	1	1	6/6	114.41	12:00	7:10	4:50					16.0
	1	2	6/7	85.07	11:55	5:55	6:00					14.4
	2	1	6/6	34.78	12:50	2:30	10:20					13.9
	2	2	6/7	47.72	12:10	3:40	8:30					13.0
	3	1	6/6	20.36	12:25	1:45	10:40	waiting				11.6
	3	2	6/7	39.71	12:00	2:55	9:05					13.6
	4	1	6/6	22.33	11:40	1:55	9:45					11.6
	4	2	6/7	20.59	12:00	1:50	10:10					11.2
	5	1	6/13	88.50	11:35	5:05	6:30	in service				17.4
	5	2	6/13	47.31	11:35	3:30	8:05					13.5
Beung Kang Market	1	1	6/11	41.02	11:55	3:45	8:10					10.9
	1	2	6/12	52.54	12:05	4:10	7:55					12.6
	2	1	6/11	20.79	11:20	1:55	9:25					10.8
	2	2	6/11	46.24	10:45	4:10	6:35					11.1
	3	1	6/11	36.13	11:05	2:40	8:25					13.5
	3	2	6/12	114.52	11:15	7:20	3:55					15.6
	4	1	6/11	43.40	11:10	2:30	8:40					17.4
	4	2	6/12	58.21	11:25	4:10	7:15					14.0
	5	1	6/8	14.72	11:10	1:15	9:55					11.8
	5	2	6/11	50.66	11:10	3:50	7:20					13.2
Choam chao market	1	1	6/20	8.7	12:15	0:30	11:45					17.5
	1	2	6/21	41.97	12:15	3:25	8:50					12.3
	2	1	6/20	15.94	12:20	0:55	11:25					17.4
	2	2										#DIV/0!
	3	1	6/20	31.53	12:20	2:20	10:00					13.5
	3	2	6/21	94.50	11:55	4:30	7:25					21.0
	4	1	6/20	47.72	12:00	2:45	9:15					17.4
	4	2	6/21	9.58	12:00	0:45	11:15					12.8
	5	1	6/20	18.26	12:10	0:35	11:35					31.3
	5	2	6/21	49.84	11:55	2:25	9:30					20.6
Russian Market	1	1	6/14	8.974	11:15	0:55	10:20					9.8
	1	2	6/22	38.272	12:35	2:30	10:05					15.3
	2	1	6/14	9.72	11:25	0:40	10:45					14.6
	2	2	6/22	41.098	11:25	3:35	7:50					11.5
	3	1	6/14	41.958	11:55	2:40	9:15					15.7
	3	2	6/22	16.138	12:00	1:30	10:30					10.8
	4	1	6/14	24.834	10:40	1:45	8:55					14.2
	4	2	6/14	37.816	11:15	2:50	8:25					13.3
	5	1	6/14	38.241	11:10	2:35	8:35					14.8
	5	2	6/22	67.577	12:10	5:15	6:55					12.9
Russekeo Market	1	1	6/18	82.02	13:50	4:25	9:25					18.6
	1	2	6/19	48.51	12:45	3:45	9:00					12.9
	2	1	6/18	1.00	12:05	0:00	12:05					#DIV/0!
	2	2	6/19	26.92	11:50	2:00	9:50					13.5
	3	1	6/18	44.78	11:30	2:30	9:00					17.9
	3	2	6/19	68.23	12:40	3:55	8:45					17.4
	4	1	6/18	9.33	11:30	0:10	11:20					56.0
	4	2	6/19	41.31	11:20	3:10	8:10					13.0
	5	1	6/18	50.41	12:35	3:15	9:20					15.5
	5	2	6/19	29.64	12:30	2:20	10:10					12.7

Source: PPUTMP Project Team



### 13.2.6 Parking Condition Survey

#### (1) Outline

The main purpose of the Parking Condition Survey is to obtain basic information about the present parking facilities in the central business and commercial areas of PPCC and their conditions, which will be used for better traffic management and transport planning. The survey consists of the following:

- Parking condition survey;
- Parking inventory survey; and
- Parking interview survey.

#### (2) Survey Coverage

##### 1) Parking Condition Survey

###### k) Survey Method and Survey Days

In this survey, all vehicles parking on streets and sidewalks along the survey roads were counted. The survey area was set at 5 block areas. The counting of parking vehicles was conducted on two sides or one side along the street in each block from 06:00 to 22:00 and recorded at every 30-minute interval.

###### l) Target Roads and Streets

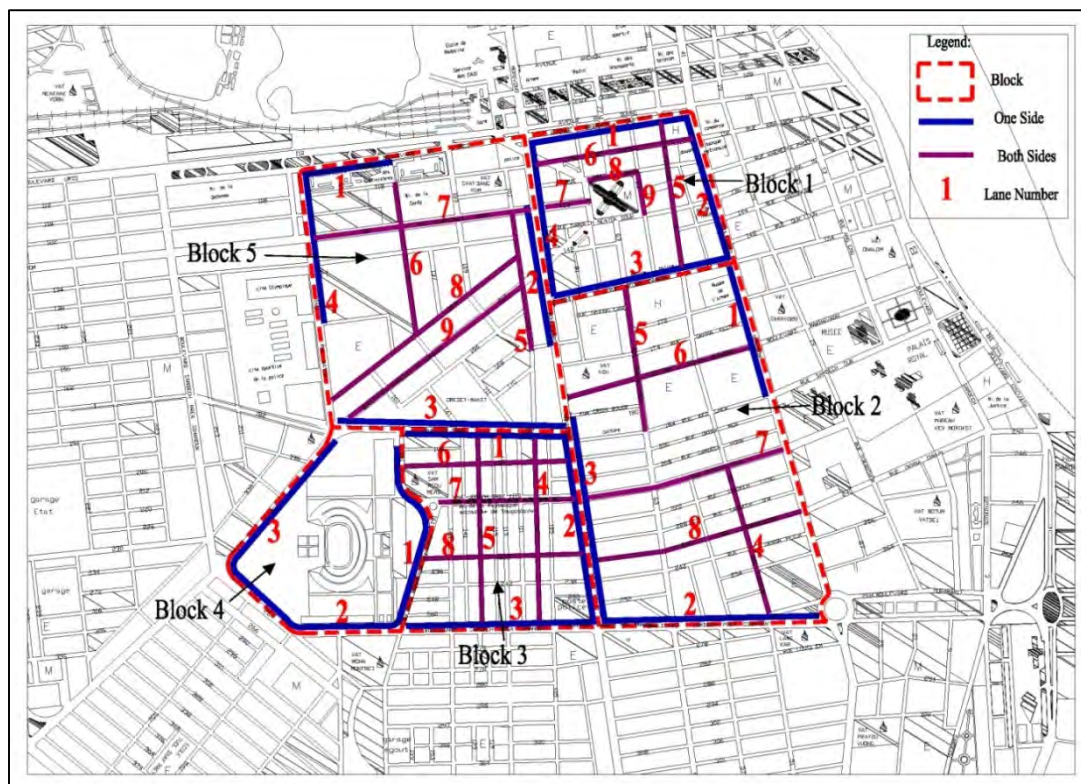
The survey covered 37 street sections in the 5 blocks (see Table 13.2-19 and Figure 13.2-48).

**Table 13.2-19 Parking Survey Locations**

Area	LaneNo.	Street Name	Side	Area	LaneNo.	Street Name	Side	
Block 1	1	Russian (Rd 110)	1	Block 3	5	Rd 125	2	
	2	Norodom	1		6	Rd 198	2	
	3	Rd 154	1		7	Rd 214	2	
	4	Monivong (Rd 93)	1		8	Rd 232	2	
	5	Rd 51	2	Block 4	1	Rd 161 -163	1	
	6	Rd 118	2		2	Sihanouk	1	
	7	Kampuchea Krom (Rd 128)	2		3	Monireth	1	
		8	Central Market (North)	2	Block 5	1	Russian (Rd 110)	1
		9	Central Market (East)	2		2	Monivong (Rd 93)	1
Block 2	1	Norodom	1	3		Rd 184	1	
	2	Sihanouk (Rd 274)	1	4		Tchecoslovaquie (Rd 169)	1	
	3	Monivong (Rd 93)	1	5		Rd 107	2	
	4	Rd 51	2	6	Rd 139	2		
	5	Rd 63	2	7	Kampuchea Krom (Rd 128)	2		

Area	LaneNo.	Street Name	Side	Area	LaneNo.	Street Name	Side
	6	Rd 178	2		8	Rd 164	2
	7	Rd 214	2			Charles De Gaulle (Rd 217)	
	8	Rd 240	2		9	Charles De Gaulle (Rd 217)	2
Block 3	1	Rd 182	1				
	2	Monivong (Rd 93)	1				
	4	Rd 107	2				

Source: PPUTMP Project Team



Source: PPUTMP Project Team

**Figure 13.2-48 Parking Survey Locations**

## 2) Parking Inventory Survey

### m) Survey Method

The Parking Inventory Survey was conducted to determine the number of parking facilities in the survey area (City center) in PPCC. Initially, the Local Consultant contacted Phnom Penh Municipality and collected the latest information on parking facilities. Information on other major parking facilities, such as parking facilities for the markets and shopping centers, was collected by the Local Consultant through a field survey with the concurrence of the PPUTMP Project Team.

The survey items are as follows:

- Location of parking facility;
- Number of parking spaces;
- Type of parking;
- Operation hours;
- Parking fee;
- Type of ownership, such as municipal parking, private or restricted to employees or customers of a particular building; and
- Number of in-parking and out-parking.

n) Target Parking Facilities

Table 13.2-20 and Figure 13.2-49 show the locations of the parking inventory survey.

**Table 13.2-20 Target Parking Facilities for the Survey**

Area	Facility and Place
Block 1	Sorya Shopping Center Off-road Parking Facilities (2 places)
Block 2	Off-road Parking Facilities (3 places)
Block 3	Off-road Parking Facilities (3 places)
Block 4	City Mall Underground Parking Space (Sihanouk) Olympic Stadium
Block 5	Orussey Market Off-road Parking Facilities (2 places)

Source: PPUTMP Project Team

### 3) Parking Interview Survey

o) Survey Method

In the Parking Interview Survey, vehicle users who parked in the survey area were interviewed. The items of survey are parking time, parking fee, purpose, frequency, and walking distance to final destination.

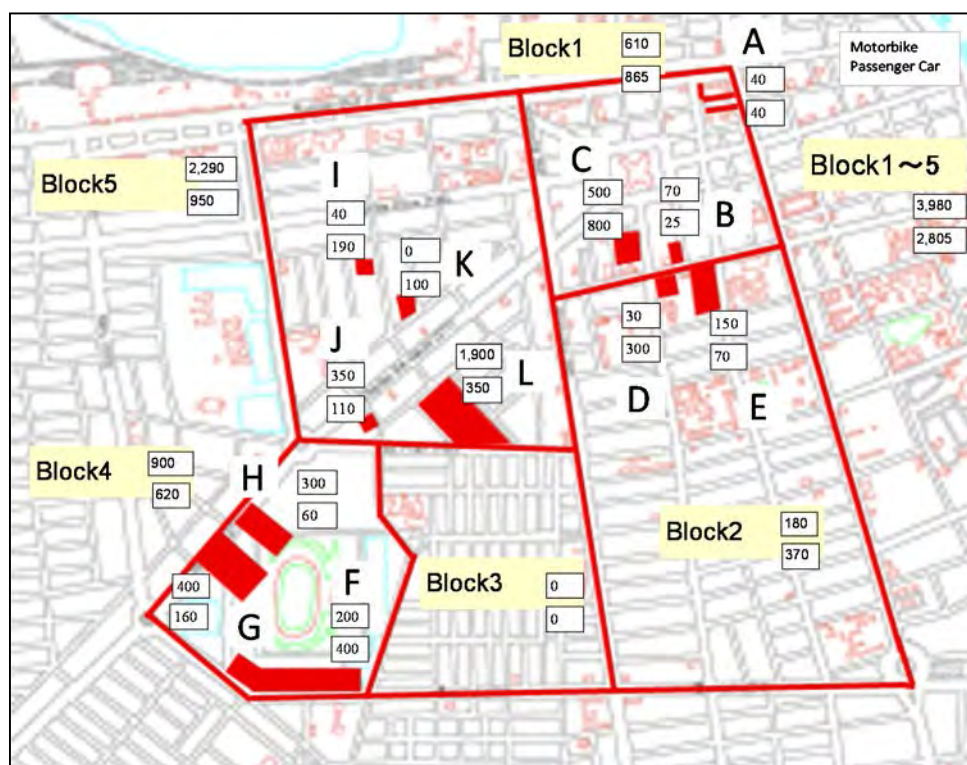
p) Target Sample

Around 500 drivers who parked their vehicles in the five blocks, i.e., 100 from each block, were interviewed.

### (3) Results of Parking Inventory Survey

Table 13.2-21 presents a summary of the results of the parking inventory survey, highlighted by the following:

- q) In the parking spaces of all blocks, the number of parked motorbikes is about 4,000, and for passenger cars is 2,800.
- r) Seven out of 12 parking facilities are open for 24 hours.
- s) In 8 of 11 facilities, parking fee is KHR500 per hour for a motorbike. Similarly, in 4 of 12 facilities, parking fee is KHR1,000 per hour for a car.



Source: PPUTMP Project Team

Figure 13.2-49 Parking Inventory Survey Locations

Table 13.2-21 Results of Parking Survey

	Name of Parking Facility (if any)	Type of Parking 1. At-grade 2. Under ground	Number of Parking Spaces		Operation hours	Parking Fees (1 time) (KHR)		Night Time (after 22:00) 1. Open 2. Closed	Type of Ownership 1. Public 2. Private 3. Company
			Motorbike	Passenger Car		Motorbike	Passenger Car		
A	Ang Duong	1	40	40	16	1,000/time	3,000/time	2	1
B	SN	1	70	25	24	1,500/time	4,000/time	1	2
C	Sorya Shopping Center	1	500	800	12	500/time	1,000/time	2	3

	Name of Parking Facility (if any)	Type of Parking	Number of Parking Spaces		Operation hours	Parking Fees (1 time) (KHR)		Night Time (after 22:00)	Type of Ownership
		1. At-grade 2. Under ground	Motobike	Passenger Car		Motobike	Passenger Car	1. Open 2. Closed	1. Public 2. Private 3. Company
D	Coffee Mondul Kiri	1	30	300	24	1,000/time	5,000/time	1	2
E	Sorya Mall	1	150	70	24	500/ time	4,000/time	1	2
F	Underground Parking	2	200	400	18	500/ time	1,000/time	1	3
G	City Mall	1 & 2	400	160	12	500/time	1,000/time	2	3
H	Olympic Stadium	1	300	60	15	500/time	1,000/time	2	3
I	Chey Thavy	1	40	190	24	500/ time	2,000/time	1	2
J	Home Center	1	350	110	24	500/ time	3,000/time	1	3
K	Serey Pheap	1	0	100	24	-	2,000/time	1	2
L	Ou Russei Market	1	1,900	350	13	500/time	2,000/time	2	3
Total			3,980	2,605					

Source: PPUTMP Project Team

#### (4) Results of Parking Condition Survey

##### 1) Parking Demand Fluctuation for All Types of Vehicles

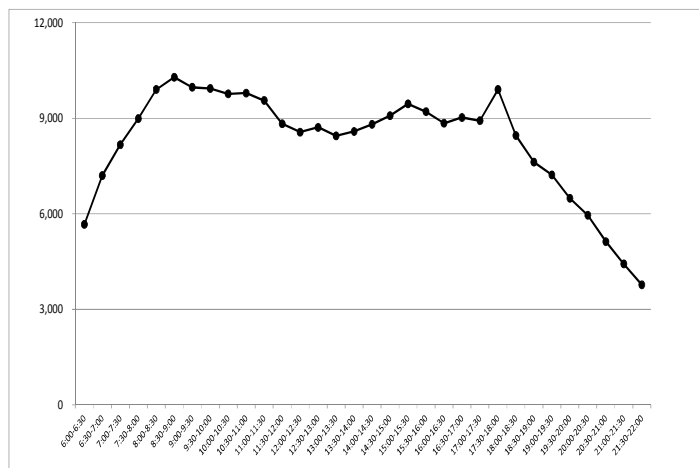
There are no differences in the use fluctuations at noontime (see Figure 13.2-50).

##### 2) Time Variation of Different Vehicle Modes

Figure 13.2-51 shows that the variation among vehicles has the tendency of increasing in the daytime as compared with morning and early evening.

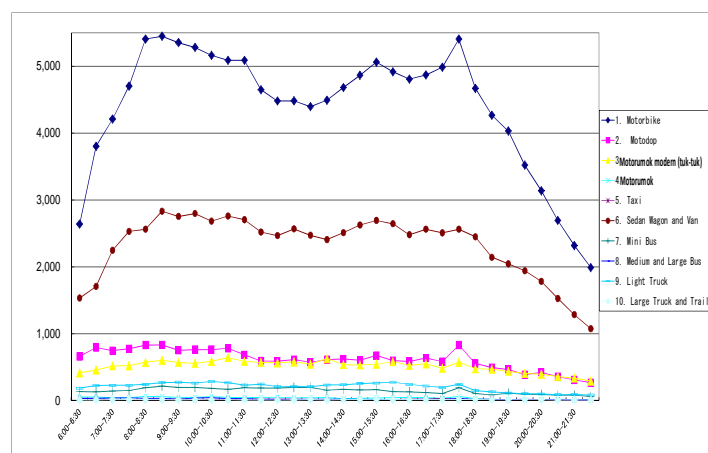
##### 3) Parking Demand by Block

The highest parking demand is 4,000 vehicles at the Block 5 area, followed by Block 2 with 2,400 vehicles, and Block 3 with 1,900 vehicles (see Figure 13.2-52).



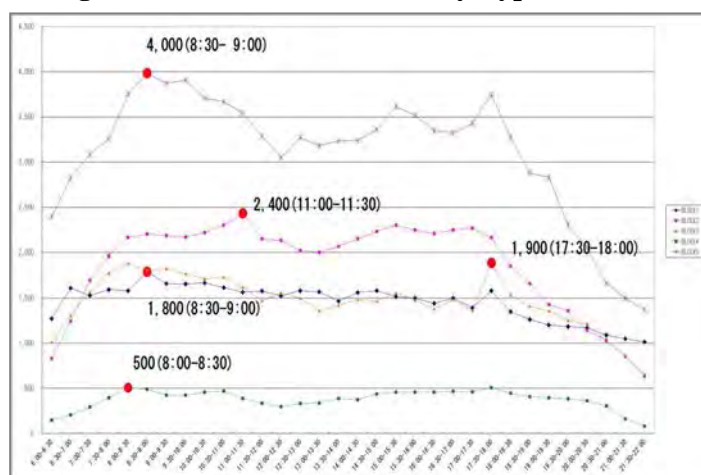
Source: PPUTMP Project Team

Figure 13.2-50 Demand Fluctuation



Source: PPUTMP Project Team

Figure 13.2-51 Time Variation by Type of Vehicle

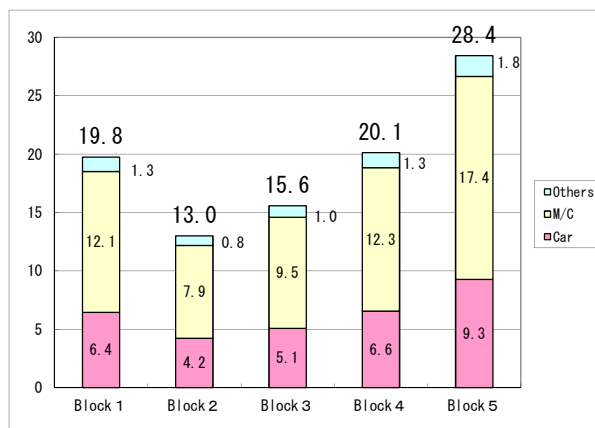


Source: PPUTMP Project Team

Figure 13.2-52 Parking Demand by Block

#### 4) Parking Demand by 100 m

When the trial calculation of parking demand is made per 100 m, Block 5 has the highest demand as 28.4 vehicles (among these, 17.4 motorbikes, 9.3 passenger cars, 1.8 others), followed by Block 4 with 20.1 vehicles (see Figure 13.2-53).



Source: PPUTMP Project Team

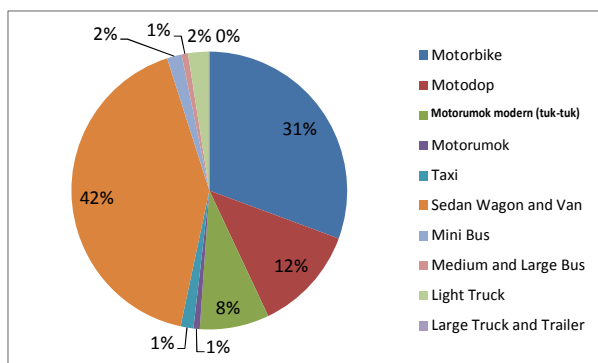
Figure 13.2-53 Parking Demand by 100 m

#### (5) Result of Parking Interview Survey

The results of the Parking Interview Survey regarding vehicle composition, frequency of parking, parking location, trip purpose, parking distance, parking fee, etc. are shown in Figure 13.5-54 to Figure 13.5-61).

##### 1) Type of Vehicle

The passenger car has the highest share of 42%, while the share of motorbike is 31% and motodop is 12%.

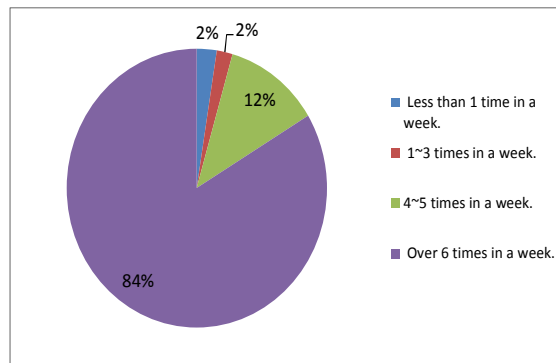


Source: PPUTMP Project Team

Figure 13.2-54 Composition of Type of Vehicle

##### 2) Usage Frequency of Vehicle

84% of people use their vehicles more than 6 times a week.

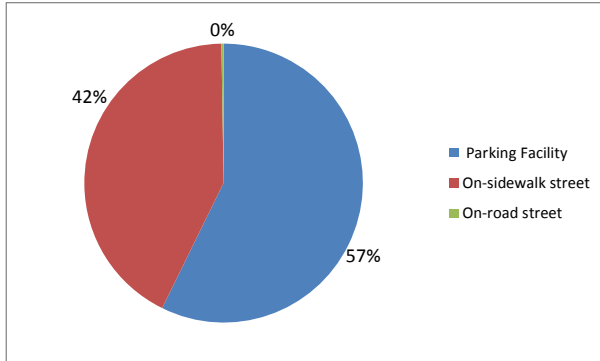


Source: PPUTMP Project Team

Figure 13.2-55 Usage Frequency of Vehicle

**3) Parking Facility**

57% use parking facilities while 42% use sidewalk parking .

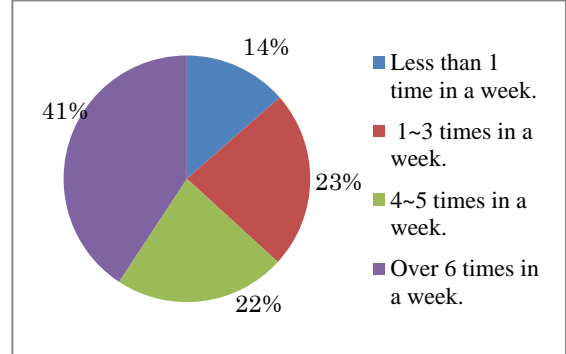


Source: PPUTMP Project Team

**Figure 13.2-56 Satiation of Parking Utilization**

**4) Usage Frequency of Parking Facility**

41% use parking facilities more than 6 times a week.

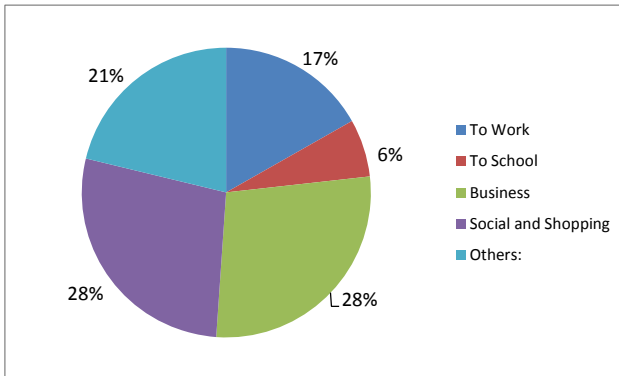


Source: PPUTMP Project Team

**Figure 13.2-57 Usage Frequency of Parking Facility**

**5) Trip Purpose**

Trip purpose for "Business" and for "Social and Shopping" account for 28% each.

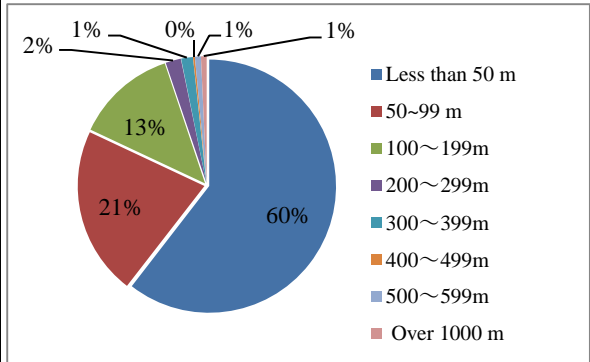


Source: PPUTMP Project Team

**Figure 13.2-58 Trip Purpose**

**6) Distance from Parking Facility to the Destination**

81% said the distance from the parking facility to their destination is 99 m or less.



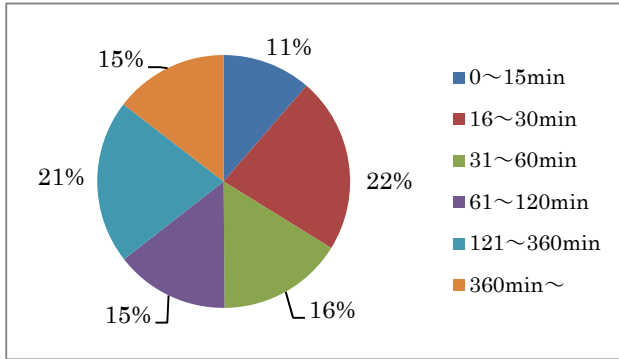
Source: PPUTMP Project Team

**Figure 13.2-59 Distance from Parking Facility to the Destination**



**7) Parking Hour**

The usual parking time is less than 15 minutes (22% share), 16-30 minutes (22%), and 31-60 minutes (16%).

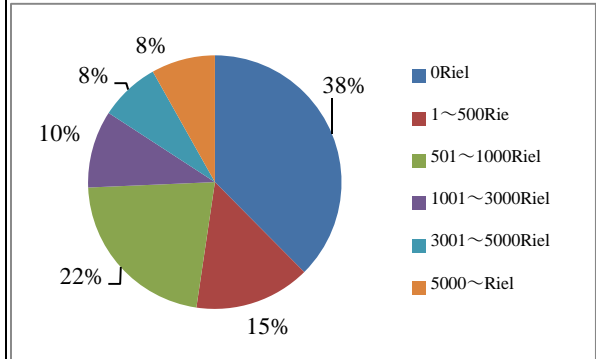


Source: PPUTMP Project Team

**Figure 13.2-60 Parking Hour**

**8) Parking Fee**

Excluding the free parking (KHR0), the parking cost of KHR500-1,000 has a share of 22%, KHR500 or less (15%), and more than KHR1,000 (25%).

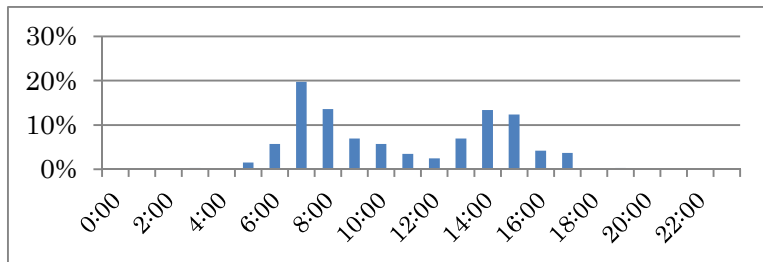


Source: PPUTMP Project Team

**Figure 13.2-61 Parking Fee**

**9) No. of Parked Vehicles by Time**

At 07:00 and 14:00, the number of parking users are relatively high (see Figure 13.2-62).



Source: PPUTMP Project Team

**Figure 13.2-62 No. of Parked Vehicles by Time**

## 13.3 Interview Survey

### 13.3.1 Public Transport Awareness Survey

#### (1) Outline of the Survey

Survey Locations (Number of respondents)

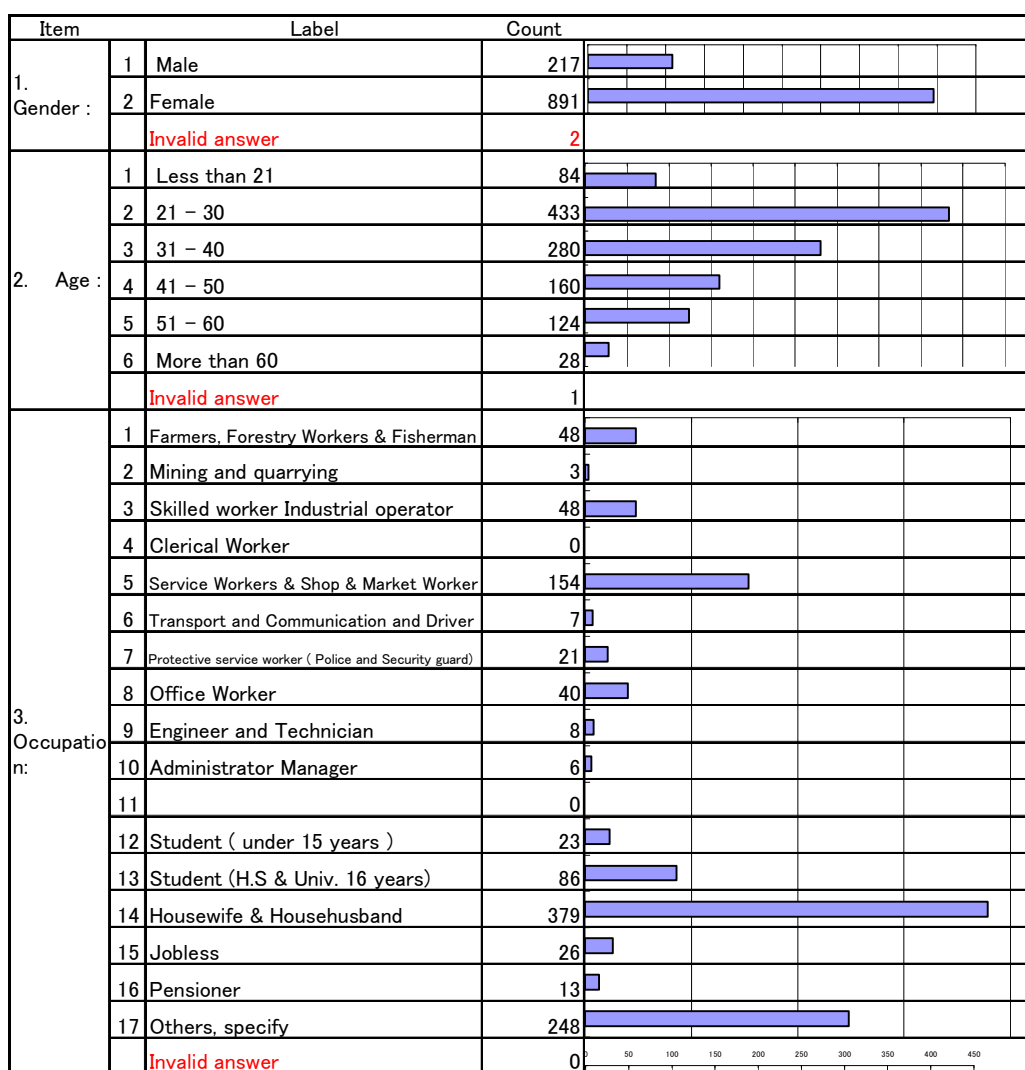
- Central Market (253)
- Sorya Bus terminal (173)
- Boeung Keng Kang Market (107)
- Russian Market (115)
- GST Bus Terminal (110)
- RusseiKeo Market (108)
- Chom Chao Market (119)
- Steaung Maenchey Market (125)

Total number of collected samples: 1,110

Survey date: 5,6,7,12 and 13 of June 2012

#### (2) Survey Results

##### 1) Brief Profile of the Respondents

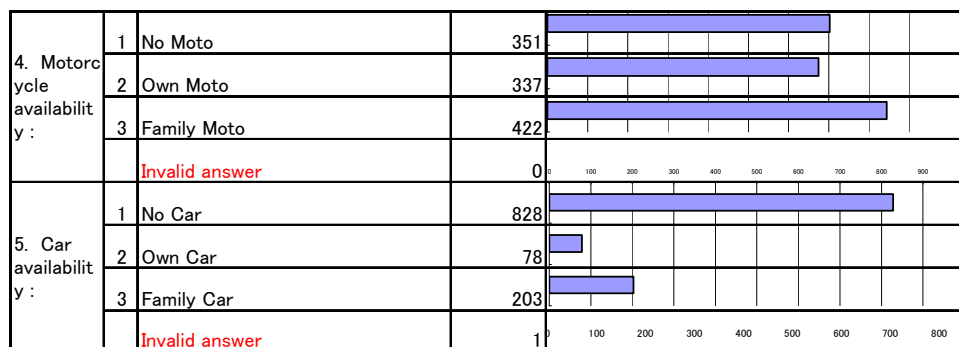


Source: PPUTMP Project Team

Figure 13.3-1 Brief Profile of the Respondents

## 2) Vehicle Availability of Respondents

About 70% of respondents have motorcycles available for their daily use. On the contrary, about 70% of respondents do not have available cars in their household (see Figure 13.3-2).



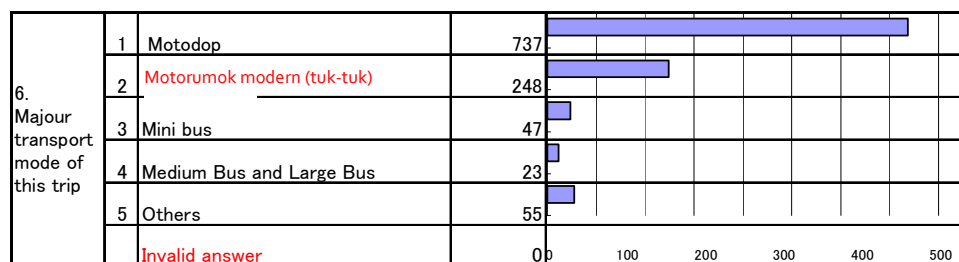
Source: PPUTMP Project Team

**Figure 13.3-2 Vehicles Availability of Respondents**

## 3) Trip/ Mode Characteristics

### t) Selection of Transport Mode

About 66% of respondents selected the motodop for their trips whereas about 22% selected the motorumok modern (tuk-tuk). The remaining 10% of respondents used the mini-bus, standard bus and others (see Figure 13.3-3).



Source: PPUTMP Project Team

**Figure 13.3-3 Selection of Transport Mode of Respondents**

### u) Trip Purpose

About 73% of respondents answered “to home” and “social and shopping” as trip purposes (see Figure 13.3-4). Among other reasons, the survey location may relate to the trip purpose.

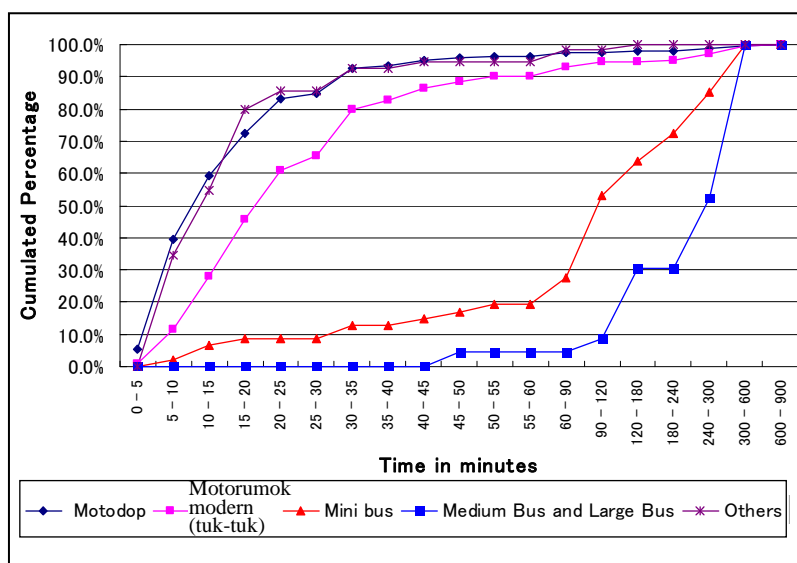
6. Trip purpose :	1	To home	404	
	2	To work	110	
	3	To school	32	
	4	Business(private & firms)	73	
	5	Social and Shopping	409	
	6	Others (Specify)	82	
			Invalid answer	0

Source: PPUTMP Project Team

**Figure 13.3-4 Trip Purpose of Respondents**

v) Trip Time Distribution by Mode

The trip time for 50% of motodop users is around 10 minutes while the trip time for 50% of motorumok modern (tuk-tuk) users is more than 20 minutes (see Figure 13.3-5). On the other hand, the trip time for 50% of mini-bus users is about 120 minutes and that for medium and large bus users reaches 300 minutes.

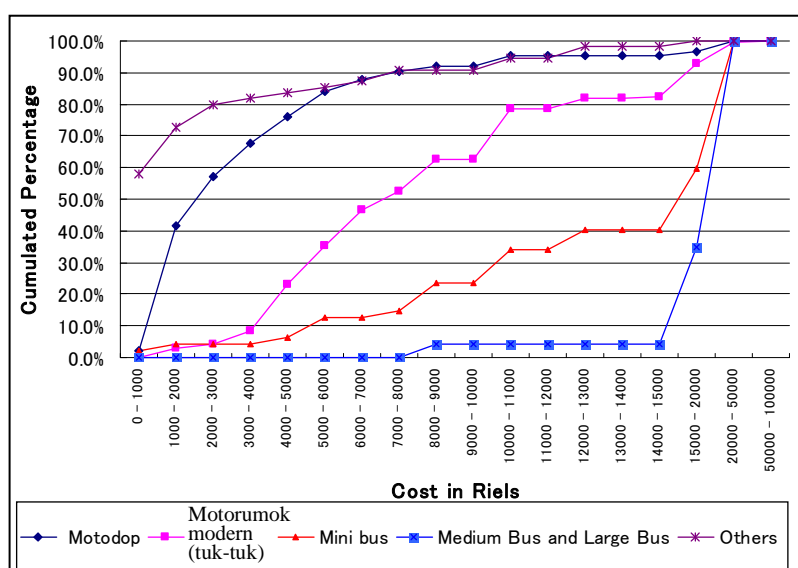


Source: PPUTMP Project Team

**Figure 13.3-5 Trip Time Distribution of Public Transport Users by Mode**

**4) Cost Distribution by Mode**

The average cost for 50% of motodop users is around KHR2,000 to 3,000 while the cost for 50% of motorumok modern (tuk-tuk) users is around KHR7,000 (see Figure 13.3-6). Compared with these para-transit modes, the bus mode, including minibus and large bus, costs KHR15,000 or more.



Source: PPUTMP Project Team

**Figure 13.3-6 Cost Distribution of Public Transport Users by Mode**

### 5) Major Reasons to Select Transport Mode

#### w) Motodop

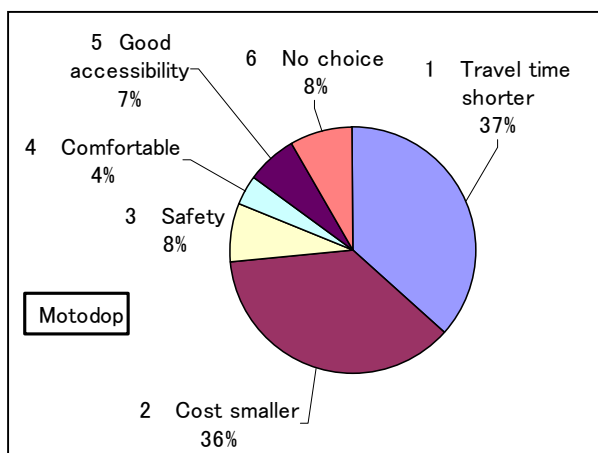
Travel time and cost are the significant reasons for selecting the motodop among 73% of the total interview sample (see Figure 13.3-7).

#### x) Motorumok modern (tuk-tuk)

The main reasons of 60% of respondents for selecting the motorumok modern (tuk-tuk) are its safety and comfort (see Figure 13.3-8). The factors of travel time and cost is less significant, in contrast with that of the motodop mode.

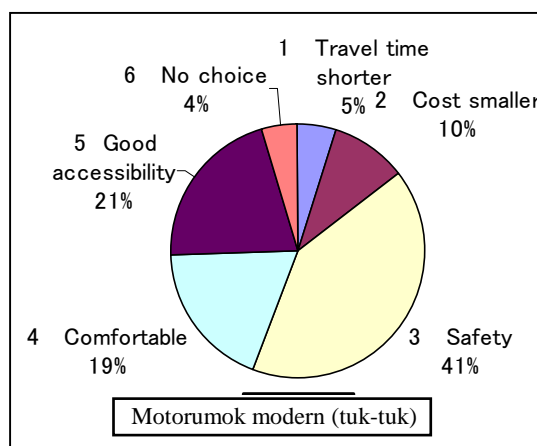
#### y) Bus

The main reasons for selecting medium and large bus are safety and comfort, similar to the choice behavior for the motorumok modern (tuk-tuk) (see Figure 13.3-9).



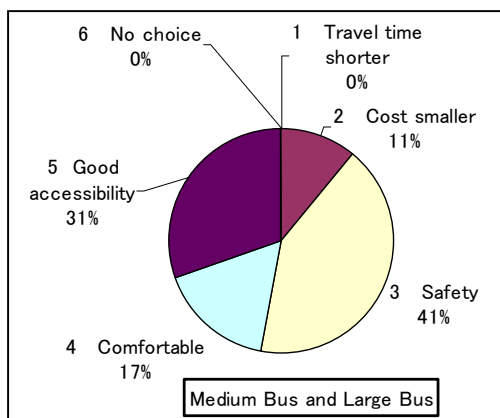
Source: PPUTMP Project Team

**Figure 13.3-7 Major Reasons to Select Transport Mode (Motodop)**



Source: PPUTMP Project Team

**Figure 13.3-8 Major Reasons to Select Transport Mode (Motorumok modern (tuk-tuk))**

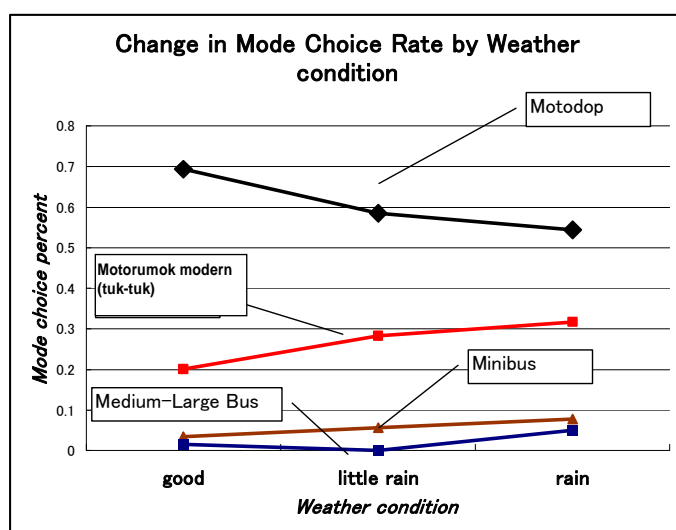


Source: PPUTMP Project Team

**Figure 13.3-9 Major Reasons to Select Transport Mode (Bus)**

## 6) Weather Conditions Affecting Transport Mode Selection

Figure 13.3-10 shows the difference in mode choice rate of the motodop and motorumok modern (tuk-tuk) by weather condition during the survey dates. On a rainy day, the mode choice rate for the motodop decreases by around 10% compared to that on a fine day. In contrast, the rate for the motorumok modern (tuk-tuk) on a rainy day increases by around 10% than during a fine day.



Source: PPUTMP Project Team

Figure 13.3-10 Change in Mode Choice Rate by Weather Condition

### 13.3.2 Para-Transit Awareness Survey

#### (1) Outline of the Survey

The Para-transit Awareness Survey was conducted at 7 locations near popular markets where para-transit vehicles are usually parked (see Table 13.3-1). A total of 626 para-transit drivers were interviewed, of which 624 were effective samples. The survey was conducted on 13, 14 and 19 June 2012.

Table 13.3-1 Outline of Para-Transit Awareness Survey

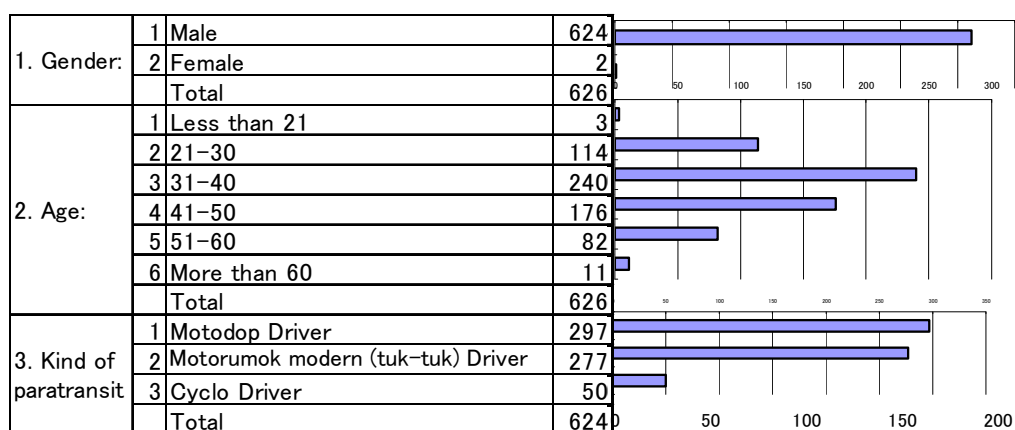
Para-transit	Survey location							Total
	BoeungK enkong Market	Chomchao Market	ChrangC hamreh Market	Central Market	Cyclo Station	Russain Market	StuengMe nchey Market	
Motodop	50	43	50	52	0	53	49	297
Motorumok modern (tuk-tuk)	47	44	39	48	0	48	51	277
Cyclo	0	0	1	1	48	0	0	50
Total	97	87	90	101	48	101	100	624(626)

Source: PPUTMP Project Team

## (2) Survey Results

### 1) Brief Profile of Interviewed Para-transit Drivers

Almost all the interviewed para-transit drivers are male and the number of female drivers is very small (see Figure 13.3-11). Their ages vary from young (below 21 years old) to senior (more than 60). The most dominant age group is middle-aged between 30 and 40 years old. As to para-transit type, around 48% of samples were motodop drivers and 44% were motorumok modern (tuk-tuk) drivers. The rest, though very few, were cyclo drivers.



Source: PPUTMP Project Team

Figure 13.3-11 Brief Profile of Interviewed Para-transit Drivers

### 2) Age Profile of Para-transit Drivers

Motodop and motorumok modern (tuk-tuk) drivers have nearly the same age profile, wherein 60% of them belong to the middle-aged group or younger generation (see Figure 13.3-12). On the other hand, the cyclo drivers are relatively older; 60% of them are more than 40 years old.

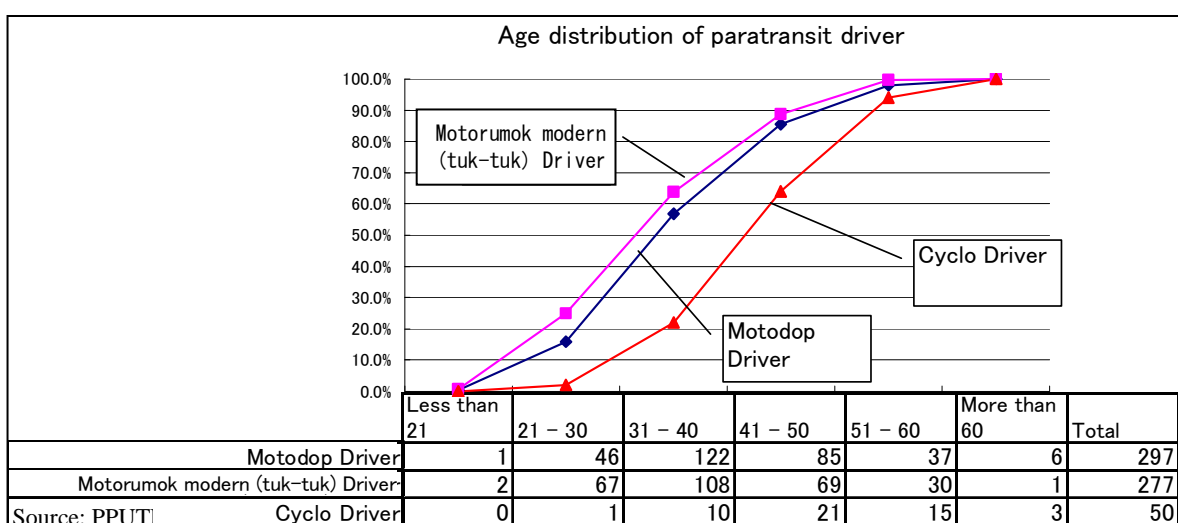
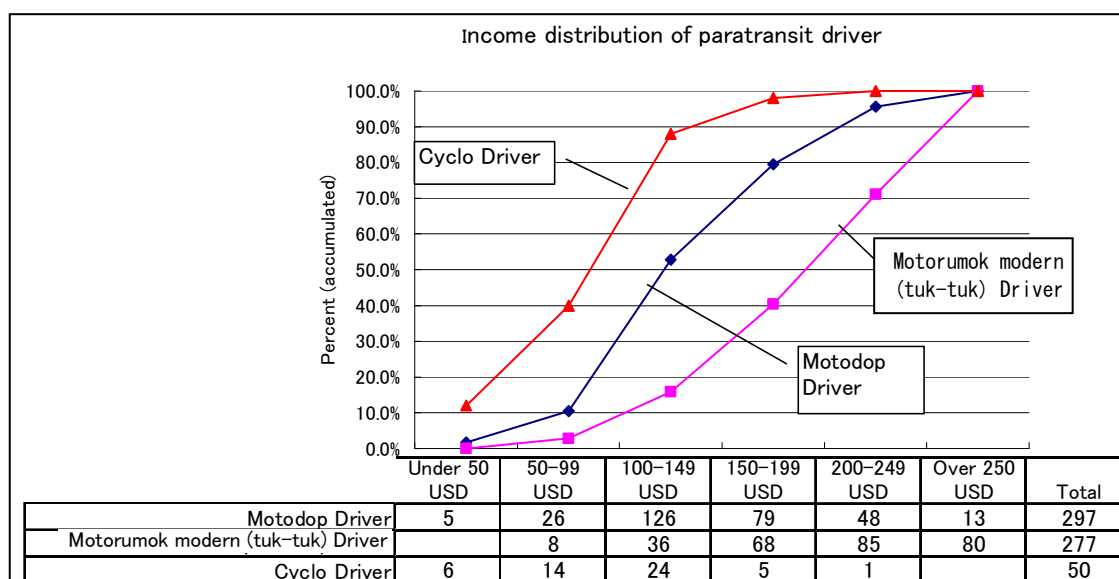


Figure 13.3-12 Age Distribution of Para-transit Drivers



### 3) Income Distribution of Para-transit Drivers

In terms of income, motorumok modern (tuk-tuk) drivers seem to be earning more, with 50% of them earning more than USD200 a month (see Figure 13.3-13). Next to them are the motodop drivers, 50% of whom get less than USD150 a month. The disparity in income is mainly because of the fare difference between the two para-transit modes, and some of the motodop drivers are considered to engage in a second business/job. Compared to drivers of the motorumok modern (tuk-tuk) and motodop, the cyclo drivers earn the least, with 90% of them getting less than USD150 a month.



Source: PPUTMP Project Team

Figure 13.3-13 Brief Profile of Interviewed Para-transit Drivers

### 4) Transport Services Performance of Para-transit Drivers

#### z) Average Trips Per Driver

In terms of transport services provision, the number of trips that drivers serve a day is the most significant. Table 13.3-2 shows the number of daily trips by para-transit type at the different survey locations. Compared to the motorumok modern (tuk-tuk), the motodop averages 15 trips a day, which is 3 times more than the former type.

**Table 13.3-2 Average Trips per Para-transit Driver**

Para-transit	Survey Location							
	Boeung Kenkong Market	Chomchao Market	Chrang Chamreh Market	Central Market	Cyclo Station	Russian Market	Stueng Menchey Market	Total
Motodop	13.2	13.6	21.2	15.3	0.0	14.1	15.4	15.5
Motorumok modern (tuk-tuk)	6.4	3.1	3.0	5.5	0.0	4.2	3.8	4.4
Cyclo	0.0	0.0	8.0	5.0	12.4	0.0	0.0	12.2

Source: PPUTMP Project Team

aa) Average Passenger Occupancy Per Trip

With its bigger capacity, the motorumok modern (tuk-tuk) carries more passengers per trip (average of 2.5) than the motodop (1.2) and the cyclo (1.4) (see Table 13.3-3).

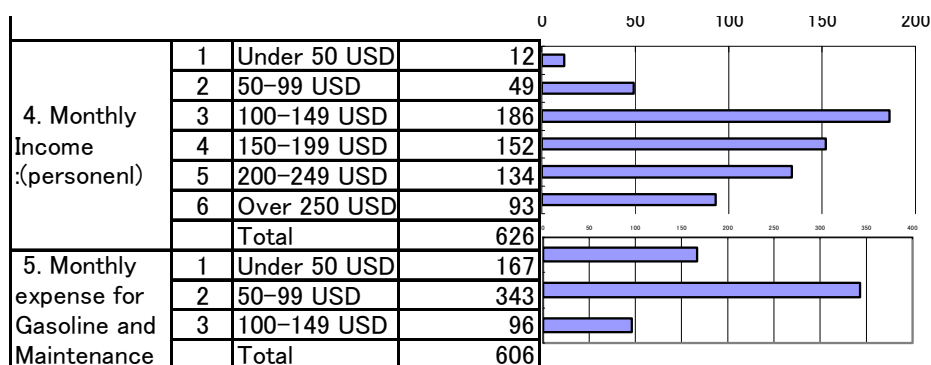
**Table 13.3-3 Average Passenger Occupancy per Trip**

Para-transit	Survey Location							
	Boeung Kenkong Market	Chomchao Market	Chrang Chamreh Market	Central Market	Cyclo Station	Russian Market	Stueng Menchey Market	Total
Motodop	1.2	1.2	1.2	1.1	0.0	1.1	1.3	1.2
Motorumok modern (tuk-tuk)	3.1	2.9	2.5	2.0	0.0	2.3	2.4	2.5
Cyclo	0.0	0.0	0.0	2.4	1.4	0.0	0.0	1.4

Source: PPUTMP Project Team

**5) Revenue-Cost Balance of Para-transit Drivers**

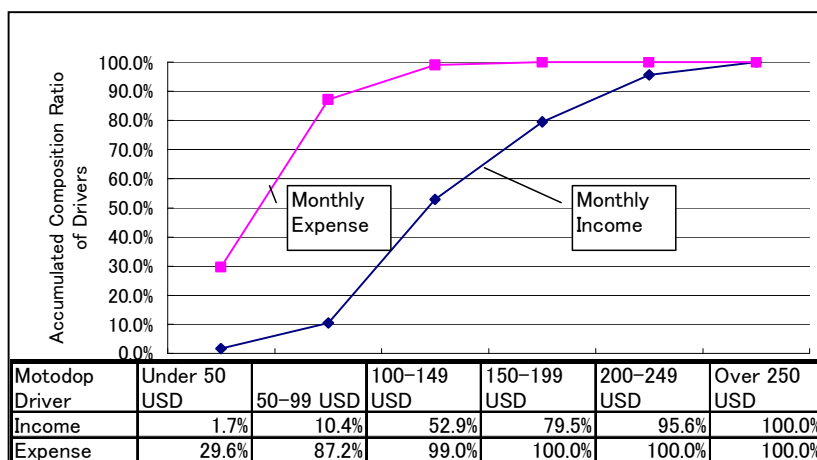
Gasoline and maintenance expenses of their vehicles constitute the major costs of the para-transit driver (see Figure 13.3-14).



Source: PPUTMP Project Team

**Figure 13.3-14 Revenue Cost Balance of Drivers**

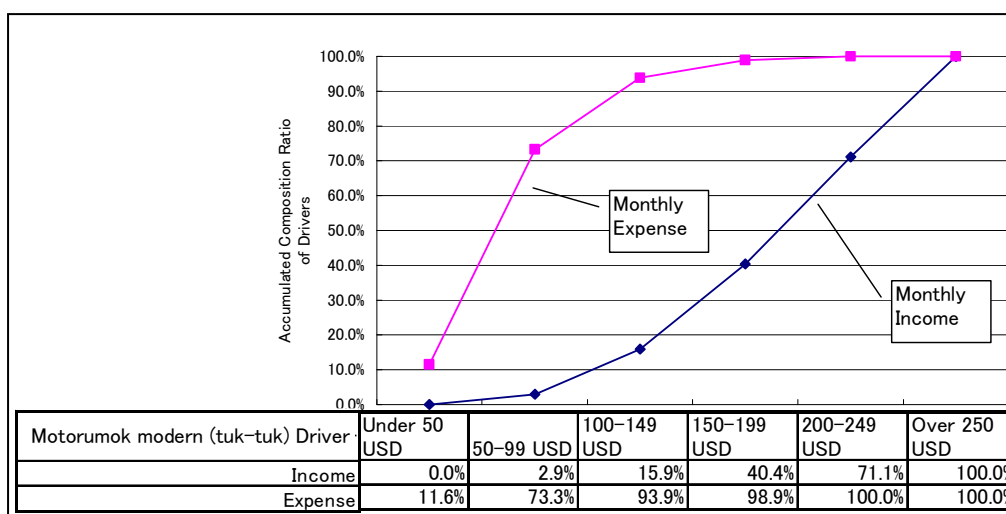
bb) Motodop



Source: PPUTMP Project Team

**Figure 13.3-15 Revenue Cost Balance of Drivers (Motodop)**

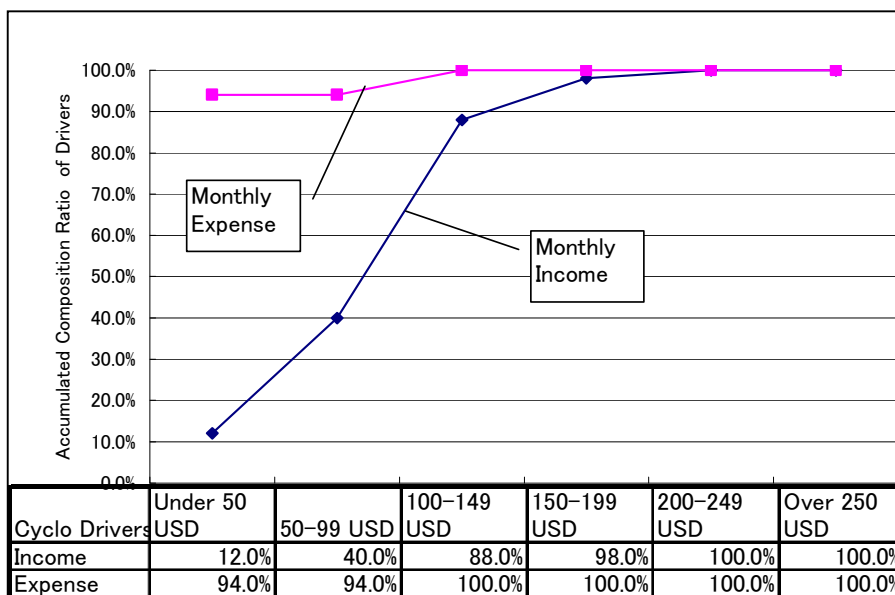
cc) Motorumok modern (tuk-tuk)



Source: PPUTMP Project Team

**Figure 13.3-16 Revenue Cost Balance of Drivers (Motorumok modern (tuk-tuk))**

dd) Cyclo



Source: PPUTMP Project Team

**Figure 13.3-17 Revenue Cost Balance of Drivers (Cyclo)**

### 13.3.3 Truck Traffic Survey

#### (1) Outline of the Survey

The Truck Survey was carried out at major companies that provide trucking services for commodities, or at locations where activities of large trucks are intense. Two types of survey were conducted, one by interviewing the truck company management staff, and the other by interviewing truck drivers. The interview with the management staff was conducted to obtain information related to activities of the company. The interview with drivers was conducted to obtain information on trip conditions.

#### (2) Survey Coverage

ee) Survey Locations

- 10 main factories;
- 4 dry ports/transit warehouses; and
- Phnom Penh Port.

ff) Survey Days

Weekday (Tuesday through Thursday)

### gg) Sampling

After a further review of available information, up to 10 factories were selected within the project area to conduct the survey. The selection of these companies was not at random but based on transport-relevant conditions. The companies were selected from different business sectors including the following:

- Transport, logistics services and packing companies;
- Food and agriculture;
- Heavy industries (including chemical and petroleum sector);
- Construction and construction materials; and
- Wholesale and trading services.

### hh) Interview Items

For Truck Companies

- Factory information:
  - Address, employee number, number of trucks
  - Facility capacity, number of trucks going in and out

For Truck Drivers (500 samples)

- Location at 10 main locations and dry ports/transit warehouses
- Trip information (for Drivers ):
  - Trip frequency
  - OD
  - Trip purpose
  - Load products, load weight, number of passengers

## **(3) Survey Results**

The detailed results of the Truck Survey are explained in Chapter 8.

### **13.3.4 Tourism Traffic Activity Survey**

#### **(1) Outline of the Survey**

The Tourism Traffic Survey conducted interviews of tourists and representatives of tourism areas to understand tourism traffic activities from the viewpoint of urban traffic.

#### **1) Interview of Tourists**

ii) Survey Locations and Target Interview Samples:

- River Side : 50
- Central Market : 50
- Watphnom : 50

- Royal Palace and National Museum: 50
- Toul Sleng Museum : 50
- Killing Fields (Choeung Ek) : 50

Total : 300

jj) Survey Target Persons:

The survey interviewed 300 tourists (foreign only) at the abovementioned tourism spots.

kk) Questions to Tourists

Tourist Information

- Nationality, gender, age
- Length of stay, daily expense, accompanying person
- Accommodation name, place and fee

Trip Information

- OD
- Trip mode

The detailed survey results are discussed in Chapter 8.

## 2) Interview of Representatives of 9 Khans

The interviews of Khan representatives were conducted to obtain information on the potential of promoting tourism in the region at present and in the future. Table 13.3-4 to Table 13.3-8 present the results of interviews of the 9 Khans about their respective tourism resources.

**Table 13.3-4 Tourism Resources (Chamcar Mon and Daun Penh)**

Khan	1) Chamcar Mon	2) Daun Penh
Location of Resources	<ul style="list-style-type: none"> <li>• Toul Sleng Museum</li> <li>• Russian Market – Toung Tompong Market</li> </ul>	<ul style="list-style-type: none"> <li>• Prison Central Market – Phsa Thmey</li> <li>• Wat Phnom – Phnom Daun Penh</li> <li>• Royal Palace</li> <li>• National Museum</li> <li>• Riverside Pleasant View</li> <li>• National Library</li> </ul>
Characteristics of Resources	<p><b>Toul Sleng Museum:</b></p> <ul style="list-style-type: none"> <li>• Primary school during King Sihanouk's regime - 1943.</li> <li>• Prison called Sar 21 in Pol Pot's regime – 1975.</li> <li>• Genocide historical monument where victims of cruelty were punished before they were sent to Choeung Ek to be killed.</li> </ul> <p><b>Russian Market – Toul Tompong Market:</b></p> <ul style="list-style-type: none"> <li>• History of Russian domination – probably in 1981.</li> <li>• It was a high ground, where residents logged when there was flood (over 200 years ago).</li> <li>• Buying cultural souvenirs, foods, coffee break, hotel, restaurant and bars, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Existing building remained from French colonization of Kampuchea; buying souvenirs, clothes, foods, jewelry, etc.</li> <li>• Patrimony and King's reign of Khmer regimes.</li> <li>• Phnom Daun Penh creation; the history of international business/trade, temples for granting wishes, etc.</li> <li>• History recorded, book keeping, and documentation of national library.</li> </ul>

Khan		1) Chamcar Mon	2) Daun Penh
Status of Resources		<p><b>Toul Sleng Museum:</b></p> <ul style="list-style-type: none"> <li>It was abandoned since end of Pol Pot's regime, the same as Choeng Ek's mass graves. But it was conserved by the local people and the Government as a reminder of the violent history of the place.</li> <li>4 old buildings exist and still keep their original identification and records.</li> <li>Relates history of cruel punishment activities, and displays torture equipment such as chains, hammers, knives, bamboo, digging instruments like hoes, spades, grubbing hoes, pincers or tweezers, rope, whips, etc.</li> </ul> <p><b>Russian Market – Toul Tompong Market:</b></p> <ul style="list-style-type: none"> <li>Maintained as shopping area for cultural souvenirs, clothes, foods, drinks, etc.; Around are coffee shops, hotels, restaurants and bars, etc.</li> </ul>	<p><b>Central Market:</b></p> <ul style="list-style-type: none"> <li>Mostly tourists from Asian countries such as Vietnam, China, Thailand, etc, and Western countries.</li> </ul> <p><b>Mekong Delta River:</b></p> <ul style="list-style-type: none"> <li>Good view, with very crowded place; restaurants, food shops, clubs, bars, drink wine, buy souvenirs, night market, relaxing chit-chat, walking around, etc.</li> </ul>
Present Activities		<ul style="list-style-type: none"> <li>There is noted increase in the number of tourists who come to visit and learn about the history of Khmer genocide activities, to shop and buy souvenirs, etc.(no information on the number of tourists).</li> <li>Improving the use of solar panels to reduce electricity cost.</li> <li>Provide training to tourist guides.</li> <li>Provide public awareness to strengthen tourism activities, law, hospitality, charming city and good service in Khan – 2 events per year. The plan is integrated into the tourism plan prepared by Municipality Department of Ministry of Tourism.</li> <li>Integrated with inter-administration offices in Khan to do inspection of night clubs, entertainment bars, etc.</li> </ul>	<ul style="list-style-type: none"> <li>The total number of tourists has increased compared to past years.</li> <li>Presently operating, very popular, with interest from international visitors.</li> <li>Provide public awareness to strengthen tourism activities, law, hospitality, charming city and good service in Khan – 2 events per year. The plan is integrated into the tourism plan prepared by Municipality Department of Ministry of Tourism.</li> <li>Integrated with inter-administration offices in Khan to do inspection of night clubs, entertainment bars, etc.</li> </ul>
Supporting Conditions	Public	<ul style="list-style-type: none"> <li>Toul Sleng Museum, Russian Market - Toul Tompong, Independent monument garden</li> <li>Toul Sleng Museum - Culture Department of PP Municipality</li> <li>Under governance by Government.</li> </ul>	<ul style="list-style-type: none"> <li>Central Market – Phsa Thmey</li> <li>Wat Phnom – Phnom Daun Penh</li> <li>Royal Palace, National Museum, Riverside Pleasant View, National Library- under administration by RGC.</li> </ul>
	Private	N/A	N/A

Source: PPUTMP Project Team

**Table 13.3-5 Tourism Resources (7 Makara and Toul Kork)**

Khan	3) 7 Makara	4) Toul Kork
Location of Resources	<ul style="list-style-type: none"> <li>Olympic Stadium</li> <li>Soun Koma</li> <li>Sampov Meas Pagoda</li> <li>Preah Put Mean Bun Pagoda</li> </ul>	No tourist place set-up in this Khan.
Characteristics of Resources	<ul style="list-style-type: none"> <li>Olympic Stadium was not a natural tourist place. It was designed and constructed by Khmer architecture, Mr. Van Molivan.</li> <li>During King Sihanouk's regime, the establishment of the Olympic stadium got the interest of neighboring countries such as Lao, Thailand, etc and European Union, since 1955.</li> </ul>	N/A
Status of Resources	<ul style="list-style-type: none"> <li>Dancing for exercise has much potential in Olympic Stadium. Presently, people need to pay a fee of KHR500 per person per attendance in exercise program.</li> <li>Football, volleyball, badminton, etc.</li> <li>Olympic Stadium: for pre-championship before going to play with international competitions such as SEA Games.</li> </ul>	N/A

Khan		3) 7 Makara	4) Toul Kork
Present Activities		<ul style="list-style-type: none"> <li>• Provide public awareness to strengthen tourism activities, law, hospitality, charming city and good service in Khan - 2 events per year. The plan is integrated into the tourism plan prepared by Municipality Department of Ministry of Tourism.</li> <li>• Integrated with inter-administration offices in Khan to do inspection of night clubs, entertainment bars, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• No future plan to create tourist place in this Khan.</li> <li>• Provide public awareness to strengthen tourism activities, law, hospitality, charming city and good service in Khan - 2 events per year. The plan is integrated into the tourism plan prepared by Municipality Department of Ministry of Tourism.</li> <li>• Encourage owners of guesthouses, hotels to follow the law, and official registration.</li> </ul>
Supporting Conditions	Public	<ul style="list-style-type: none"> <li>• Olympic Stadium -Koma Garden, supported by PP Municipality.</li> <li>• Creative pleasant site for family relaxing, young, adults, children.</li> </ul>	No tourist place set-up in this Khan.
	Private	<ul style="list-style-type: none"> <li>• Club Town, City Lay Bar: C2</li> <li>• Restaurant and lodging, karaoke, swimming pool, garden playground</li> <li>• Disco/bar, music, dancing, drink, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Few entertainment places individually set-up such as EGYPT Entertainment (Mr. Kheng Tito-Chief Executive of PM, Commander of PP), Royal Palace Hotel (about 70-80% of foreigners stayed in this hotel), Le Preseidant Hotel (about 300 guests per month).</li> <li>• Restaurants, steam sauna, dance, karaoke, drinking, night girls, bar, club, etc.</li> </ul>

Source: PPUTMP Project Team

**Table 13.3-6 Tourism Resources (Dangkor and Mean Chey)**

Khan	5) Dangkor	6) Mean Chey
Location of Resources	<ul style="list-style-type: none"> <li>• Killing Fields - Choeung Ek genocide site.</li> </ul>	<ul style="list-style-type: none"> <li>• Kep Thmey pleasant site</li> <li>• Soun Sobin Garden</li> <li>• Soun Teuk Santepheap Garden (Peaceful Water Garden)</li> <li>• SounTeuk Santepheap</li> </ul>
Characteristics of Resources	<ul style="list-style-type: none"> <li>• Killing Fields - Choeung Ek mass graves: The history of genocide victims during Pol Pot's regime - since 1976. This place was put on conservation by the Government in 1980, and is popular among international visitors especially from Europe.</li> </ul>	<p><b>Kep Thmey pleasant site:</b></p> <ul style="list-style-type: none"> <li>• Established along the edge of Mekong River, called Kep Thmey Water Houses.</li> <li>• Natural pleasant site lying along the site of Mekong River downstream.</li> <li>• Cottages owned by local villagers.</li> <li>• A pleasant place for local families to visit, mostly on Saturdays and Sundays, with delicious local foods such as small fried fish, chicken, etc.</li> </ul> <p><b>Soun Teuk San Tepheap (Peaceful Water Garden):</b></p> <ul style="list-style-type: none"> <li>• Private pleasant place belonging to Mr. Ngoun Veng.</li> <li>• Swimming pools, waterfall, thatched roof cottages, shade trees pleasant for families to sit under, and special food – Prohit Chean.</li> <li>• Gentle staff who provide good service.</li> </ul> <p><b>Soun Sobin Garden:</b></p> <ul style="list-style-type: none"> <li>• A created pleasant place with thatched roof cottages and nice garden</li> <li>• Families visit to fish, swim, and see some kind of wild animals such as Ka Ngouk, ostrich, deer, etc. Most people visit on Saturdays and Sundays and public holidays, with mix of Khmer, Asian, and European visitors.</li> <li>• Kind employees provide good service.</li> </ul>
Status of Resources	<ul style="list-style-type: none"> <li>• The Choeung Ek Killing Fields was abandoned at the end of Pol Pot's regime, but was conserved by local people and the Government as a historical monument.</li> </ul>	<ul style="list-style-type: none"> <li>• Building along the edge of Mekong River - natural pleasant site and created places.</li> <li>• Very good view of green planting farm, looking out from the thatched roof cottages.</li> </ul>



Khan		5) Dangkor	6) Mean Chey
		<ul style="list-style-type: none"> <li>There was no building before.</li> <li>A conical stupa was built in 1985 to put the bones of genocide victims.</li> </ul>	<ul style="list-style-type: none"> <li>Very pleasant for family visits –young people, swimming, sitting, lying, joking, and chitchat.</li> <li>Cool water and fresh air from the river.</li> </ul>
Present Activities		<ul style="list-style-type: none"> <li>Presently operating and very popular with international visitors.</li> <li>A conical stupa with thatched roof for the mass graves, museum, cinema, records, etc.</li> <li>Provide public awareness to strengthen tourism activities, law, hospitality, charming city and good service in Khan - 2 events per year. The plan is integrated into the tourism plan prepared by Municipality Department of Ministry of Tourism.</li> <li>Integrated with inter-administration offices in Khan to do inspection of night clubs, entertainment bars, etc.</li> <li>Plan to improve the mass grave area, with support of JICA.</li> <li>Visitors in 2011: 195,036 persons (foreigners), Cambodians: 47,641 local visitors.</li> </ul>	<ul style="list-style-type: none"> <li>Build more thatched roof cottages, hammocks, offer local foods, different kinds of wild animals, fishing, swimming, etc.</li> <li>Provide public awareness to strengthen tourism activities, law, night entertainment services, in Khan - 2 events per year. The plan is integrated into the tourism plan prepared by Municipality Department of Ministry of Tourism.</li> <li>These places are currently operating well, with many interested local visitors.</li> <li>Encourage the facility owners to follow law, and officially register.</li> </ul>
Supporting Conditions	Public	<ul style="list-style-type: none"> <li>Gun place bong: Located in Bakou Village, Dangkor, under management by military; visitors pay USD40 per person; income goes to the military</li> </ul>	There is no public support.
	Private	<ul style="list-style-type: none"> <li>Choeung Ek Killing Fields, Diamond Night Club - night club entertainment, drink, dancing, and KTV.</li> </ul>	<ul style="list-style-type: none"> <li>Kep Thmey Pleasant Site</li> <li>Soun Sobin Garden</li> <li>Soun Teuk Santepheap Garden (Peaceful Water Garden)</li> <li>Sambath Mean Heng Hotel -Nirout (Mr. ChounSarane)</li> <li>Lae Lack Hotel Resort (Mrs. Net Sokina)</li> <li>Preak Eng, Domrei Sar Guesthouse (Mr. Tou Hach)</li> <li>Kheng Ki Guesthouse -Stueng Mean Chey (Mr. Lay Theng Cheat)</li> <li>Owned by individuals</li> </ul>

Source: PPUTMP Project Team

**Table 13.3-7 Tourism Resources (Russey and Sen Sok)**

Khan	7) Russey	8) Sen Sok
Location of Resources	<ul style="list-style-type: none"> <li>Koh Dach</li> </ul>	<ul style="list-style-type: none"> <li>Phnom Reak (Phnom Praset, Phnom Traiy Treung)</li> </ul>
Characteristics of Resources	<ul style="list-style-type: none"> <li>It was abandoned many decades on/before the Pol Pot regime, but gained the interest of local people in the 2000's. It is presently administered by private sector.</li> <li>Family silver production business, but presently is noted to have decreased its activity due to market constraint on local hand-made products.</li> <li>At the site of the Mekong River Delta - natural pleasant site</li> <li>Delicious local food.</li> <li>People are very friendly and kind.</li> </ul>	<ul style="list-style-type: none"> <li>Historically believed to be an ancient site of the Khmer empire.</li> <li>Has a hilltop Buddhist temple that is believed to be an effective place for making wishes and praying for peaceful, healthy, wealthy, and prosperous life.</li> <li>Ancient history of Angkor Reak during Jayavaraman's regime.</li> <li>Fortune tellers around the area.</li> </ul>
Status of Resources	<ul style="list-style-type: none"> <li>Mekong River Delta - natural pleasant site</li> <li>Very good view of brightly sand field</li> <li>Very pleasant for family visitors –young people, swim, sitting, lying, joking, and chitchat.</li> <li>Cool water and fresh air from the river</li> </ul>	<ul style="list-style-type: none"> <li>Some buildings such as temples of Srey Krob Leak, Preah Vihea, holy mountain of Satmakor (King Dragon), monks, nuns, pagoda in the hill.</li> <li>About 5 thatched roof cottages, hammocks built along the mountain site.</li> <li>Very interesting local foods (grilled chicken and fried snails)</li> <li>Many big trees with cool shade.</li> <li>Presently operational and has increased number of visitors (about 20% on Saturdays and Sundays as compared to the last 5 years).</li> <li>Fresh and cool air from the mountains.</li> </ul>

Khan		7) Russey	8) Sen Sok
Present Activities		<ul style="list-style-type: none"> <li>About 400 small thatched-roof buildings along a site of sand field, local mats, hammocks, etc.</li> <li>1 guesthouse named Villa Koh Dach is operating in this place (not sure about total number of guests).</li> <li>Provide public awareness to strengthen tourism activities in Khan - 2 events per year. The plan is integrated into the tourism plan prepared by Municipality Department of Ministry of Tourism.</li> <li>Total number of tourists in this Khan is 1,168 (local tourists) and 7,243 (foreigners).</li> </ul>	<ul style="list-style-type: none"> <li>Phnom Reak: Very pleasant mountain area visited by families, young people; approximately over 120 visitors per week (10% are foreigners). It is currently administered by the Tourist Department, but there is no development management plan yet.</li> <li>BoeungTumnob Kob Srov and Boeung Taminh: located in Sangkat Khmunh, Sangkat Ponhea Poun, and Sangkat Preak Phnov, Khan Sen Sok. Irrigation water flows down to the Mekong River, waterway flows to rice plantation. This potential place was in the plan, but was postponed due to investment management activities. Tom Nup Kob Srov was rebuilt during Khmer Rouge regime. It is a big water dam to protect against flood in Phnom Penh.</li> <li>Provide public awareness to strengthen tourism activities, law, night entertainment services, in Khan - 2 events per year. The plan is integrated into the tourism plan prepared by Municipality Department of Ministry of Tourism.</li> </ul>
Supporting Conditions	Public	N/A	<ul style="list-style-type: none"> <li>Phnom Reak (Phnom Praset, Phnom Traiy Treung- under the administration of RGC.</li> </ul>
	Private	<ul style="list-style-type: none"> <li>Koh Dach - Before, Koh Dach was under the administration of Mok Kampol District, Kandal Province. But from 2009, it was declared to be under the administration of Khan Rusey Keo.</li> </ul>	<ul style="list-style-type: none"> <li>Dragon Hotel, California Hotel, Water Park in Sangkat Teuk Tla, Chamkar Preong Garden, Boeung Bai Tong</li> <li>Restaurants and lodging, karaoke, swimming pool, garden playground</li> <li>For Saturdays and Sundays, pop music, water play, wishing status (1,000 visitors per week).</li> <li>Chamkar Preong Garden belongs to Oknha Try Heng (France-Khmer), started in 2009. Tickets for car KHR5,000, motor KHR1,000, 1 visitor KHR2,000-3,000.</li> <li>Fishing, food, entertainment, volleyball, fitness, horse riding, swimming, etc.</li> </ul>

Source: PPUTMP Project Team

**Table 13.3-8 Tourism Resources (Por Sen Chey)**

Khan		9) Por Sen Chey
Location of Resources		<ul style="list-style-type: none"> <li>Phnom Reap natural pleasant site</li> </ul>
Characteristics of Resources		<ul style="list-style-type: none"> <li>A natural pleasant mountain with ancient history, recorded during the Khmer empire - Preas Ang Doung regime in the 15th century. It is a high mountain with a good view. It was called Prasat Meas Prak in 1987. Very effective for making wishes and praying for happiness, healthy, wealthy and prosperous life, etc.</li> </ul>
Status of Resources		<ul style="list-style-type: none"> <li>Some buildings such as temples in the compound, monastery where Buddhist monks live. Many big trees with cool shade. Fresh and cool air from the mountains.</li> </ul>
Present Activities		<ul style="list-style-type: none"> <li>Presently operated and has increased in number of visitors especially young people (there are about 50 local visitors who come there on Saturdays and Sundays).</li> <li>There is no draft yet of the future development plan to improve this mountain site.</li> <li>The Phnom Penh Municipality plans to build a concrete road connecting from Prek Phnov, with support of the Ministry of Rural Development.</li> <li>Provide public awareness to strengthen tourism activities, law, hospitality, charming city and good service in Khan - 2 events per year. The plan is integrated into the tourism plan prepared by Municipality Department of Ministry of Tourism.</li> <li>Integrated with inter-administration offices in Khan to do inspection of night clubs, entertainment bars, etc.</li> </ul>
Supporting Conditions	Public	<ul style="list-style-type: none"> <li>Phnom Reap, Sounkoma Pochentong- not yet placed under management of Government or private sector.</li> <li>Supported by PP Municipality.</li> </ul>
	Private	N/A

Source: PPUTMP Project Team

## **13.4 Person Trip Survey**

### **13.4.1 Outline of the Survey**

The Person Trip (PT) Survey was carried out in the JICA2001MP study for the first time in 2000. The number of samples was extracted from the population census data of 1998 based on the number of households and population, and direct interviews were conducted at random at that time. In the PPUTMP Project, the number of samples was also extracted from the population census of 2008 by taking into consideration the number of households and the population.

The PPUTMP Project Team obtained the newly developed village map held by the National Institute of Statistics, Ministry of Planning of Cambodia. The Project Team planned to consider the household sizes and locations of the villages to avoid bias in the survey in the Sangkat places.

The objective of the PT survey is to collect necessary data and information on trips made by each member of the sampled households. These data are to be expanded according to the socioeconomic characteristics to describe and forecast personal trips.

The survey form was designed to cover household and personal characteristics, as well as trip descriptions.

The information collected by the survey are listed in Table 13.4-1 and described below. The questionnaire was prepared in such a way that it can be used for both weekday and weekend home visits.

**Table 13.4-1 Questionnaire Items in PT Survey**

Category	Questionnaire Items
(1) Household Information	<ul style="list-style-type: none"> <li>• Address of Residence</li> <li>• Number of Household Members</li> <li>• Household Income</li> <li>• Vehicle Ownership</li> </ul>
(2) Household Member Attributes (aged 5 years and above)	<ul style="list-style-type: none"> <li>• Relation to Head of Household</li> <li>• Age and Gender</li> <li>• Holding of Driving License (for Motorbike and Vehicle)</li> <li>• Address of Office and School</li> <li>• Occupation and Sector</li> <li>• Personal Income</li> </ul>
(3) Trip Description (for each one-way trip)	<ul style="list-style-type: none"> <li>• Address of OD</li> <li>• Place of OD</li> <li>• Departure and Arrival time</li> <li>• Trip Purpose</li> <li>• Mode of Travel</li> </ul>

Source: PPUTMP Project Team

## 13.4.2 Survey Results

### (1) Number of Interviews and Household Size Zoning Map

The total sample size was 9,200 households and all the members aged 5 years old and above were interviewed (see Table 13.4-2). This sample size secures about 3.0% of the population over 5 years old in the project area, estimated at approximately 150,000 in 2008. Traffic zones in the project area were delineated in accordance with the existing boundary of PPCC. However, some boundaries were adjusted to take into account the division and integration of land use and future development of the area. The PPUTMP Project Team has set up 96 zones in the project area and 21 zones outside of the project area.

The average number of residents per household was estimated at 4.9, of which those over 5 years old were 4.6 per household.

**Table 13.4-2 Number of Households Interviewed**

Zone No.	Sangkat	Census 2008		No. of Sample Households
		Population	Household	
1	Tonle Basak	0	0	0
2	Tonle Basak	16,720	2,533	80
3	Tonle Basak	13,514	3,719	117
4	Boeng Keng Kang Muoy	12,440	2,363	46
5	Boeng Keng Kang Pir	11,202	2,161	68
6	Boeng Keng Kang Bei	22,200	4,219	132
7	Oulampik	9,686	1,709	54
8	Tuol Svay Prey Ti Muoy	13,621	2,479	79
9	Tuol Svay Prey Ti Pir	10,717	1,933	61
10	TumnobTuek	18,169	3,422	108
11	Tuol Tumpung Ti Pir	10,731	2,024	64
12	Tuol Tumpung Ti Muoy	12,375	2,276	72
13	Boeng Trabaek	8,652	1,601	50
14	Phsar Daeum Thkov	21,977	4,227	136
15	Phsar Thmei Ti Muoy	6,411	1,269	40
16	Phsar Thmei Ti Pir	7,387	1,367	43
17	Phsar Thmei Ti Bei	10,320	2,005	63
18	Boeng Reang	7,210	1,295	41
19	Phsar Kandal Ti Mouy	9,427	1,886	59
20	Phsar Kandal Ti Pir	7,334	1,489	47
21	Chakto Mukh	10,312	1,924	61
22	Chey Chummeah	12,372	2,180	68
23	Phsar Chas	7,023	1,469	46
24	Srah Chak	22,930	4,775	77
25	Srah Chak	16,561	3,268	175
26	Voat Phnum	9,263	1,274	41
27	Ou Ruessei Ti Muoy	8,133	1,645	53
28	Ou Ruessei Ti Pir	9,518	1,917	60
29	Ou Ruessei Ti Bei	7,673	1,601	50
30	Ou Ruessei Ti Buon	9,418	1,775	56
31	Monourom	11,227	2,287	72
32	Mittakpheap	10,268	2,152	67
33	Veal Vong	25,489	5,267	165

Zone No.	Sangkat	Census 2008		No. of Sample Households
		Population	Household	
34	Boeng Prolit	10,169	1,869	59
35	Phsar Depou Ti Muoy	10,659	1,959	61
36	Phsar Depou Ti Pir	11,008	2,126	67
37	Phsar Depou Ti Bei	8,254	1,666	52
38	Tuek L'ak Ti Muoy	13,493	2,815	88
39	Tuek L'ak Ti Pir	13,122	2,428	76
40	Tuek L'ak Ti Bei	25,869	4,761	149
41	Boeng Kak Ti Muoy	15,147	2,762	87
42	Boeng Kak Ti Pir	29,171	5,468	171
43	Phsar Daeum Kor	14,542	2,757	86
44	Boeng Salang	29,935	6,354	199
45	Phnom Penh Port	0	0	0
46	Dangkao	16,302	2,977	93
47	Pong Tuek	7,899	1,468	46
48	Preyveaeng	5,455	1,119	36
49	Prey Sa	8,439	1,845	58
50	Krang Pongro	3,018	592	19
51	Prateaah Lang	4,557	1,030	32
52	Sak Sampov	2,588	538	27
53	Cheung Aek	7,194	1,508	47
54	Prek Kampeus	8,167	1,618	30
55	Kong Noy	1,689	334	87
	Rolous	2,878	662	
	Spean Thmor	2,904	628	
	Tien	2,197	479	
56	Trapeang Krasang	12,707	2,520	79
57	Kouk Roka	10,833	2,440	77
58	Phleung Chheh Roteh	5,284	1,120	35
59	Chaom Chau	28,118	6,246	195
60	Chaom Chau	28,208	4,999	158
61	Chaom Chau	6,326	1,274	40
62	Kakab	35,149	6,278	197
63	Kakab	0	0	0
64	Samraong Kraom	6,193	1,182	37

Zone No.	Sangkat	Census 2008		No. of Sample Households
		Population	Household	
65	Krang Thnong	4,957	973	31
66	Boeung Thom	7,312	1,508	115
	Kambol	8,604	1,612	
	Kantork	12,511	2,458	
67	Ovleok	3,746	723	58
68	Pon sang	9,192	1,880	57
	Snor	5,297	1,035	
69	Stueng Mean Chey	6,012	2,481	110
70	Stueng Mean Chey	82,578	15,523	351
71	Boeng Tumpun	57,495	10,968	347
72	Preaek Pra	17,856	3,500	110
73	Chhbar Ampov Ti Muoy	8,848	1,739	108
74	Chhbar Ampov Ti Pir	24,879	5,090	160
75	Chak Angra Leu	22,223	4,491	141
76	Chak Angra Kraom	26,328	5,515	173
77	Nirouth	20,646	4,032	127
78	Kbal Koh	18,058	3,709	60
	Prek Thmei	17,117	3,427	
79	Prek Eng	15,791	3,080	263
	Veal Sbov	9,501	1,878	
80	Tuol Sangkae	29,422	5,971	215
81	Toul Sangkae (Camko City)	23,146	4,309	108
82	Svay Pak	16,446	3,402	107
83	Kilomaetr Lakh Prammuoy	17,266	3,327	104
84	Ruessei Kaev	24,960	5,007	157
85	Preaek Lieb	14,814	2,706	85
86	Preaek Ta Sek	5,499	1,159	36
87	Chrouy Changvar	19,512	4,022	126
88	Chrang Chamreh Ti Muoy	9,948	1,801	57
89	Chrang Chamreh Ti Pir	14,282	2,671	84
90	Bakkeng	9,153	1,837	58
91	Kosh Dach	12,236	2,728	86
92	Phnom Penh Thmei	38,657	7,831	328
93	Tuek Thla	61,595	11,966	375

Zone No.	Sangkat	Census 2008		No. of Sample Households
		Population	Household	
94	Khmuonh	17,921	3,862	93
95	Khmuonh	2,406	510	45
96	Pongea Pon	6,753	1,289	225
	Prek Phnov	12,743	2,532	
	Samrong	7,792	1,473	
Total		1,501,256	295,358	9,239

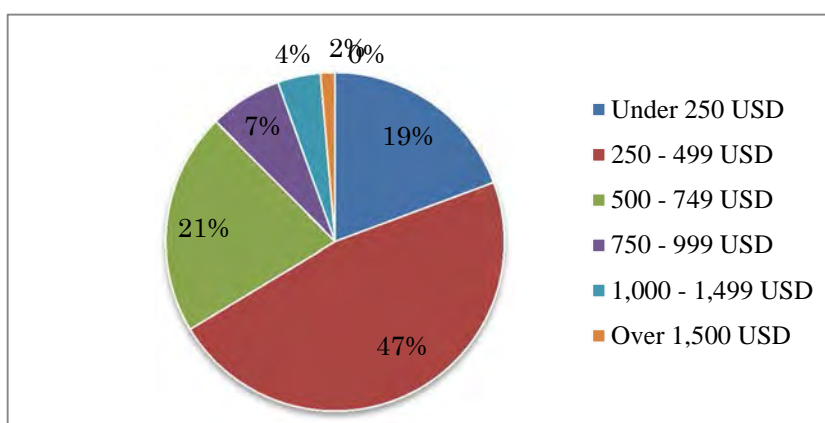
Source: PPUTMP Project Team

## (2) Zoning Map

The traffic zoning map is previously shown in Section 13.1.2.

## (3) Household Income

Figure 13.4-1 shows the composition of the different levels of monthly income of the households. More than 66% of households have a monthly income of less than USD500, with the highest concentration (47%) in the USD250-499 category. Only 6% of households have a monthly income over USD1,000.



Source: PPUTMP Project Team

**Figure 13.4-1 Household Monthly Income**



#### (4) Motorbike and Car Ownership

Approximately 80% of households whose income is less than USD500 a month own only a motorbike (and no car) while at least 40% of households whose income is more than USD750 own both a motorbike and a car (see Table 13.4-3).

**Table 13.4-3 Household Income Level and Vehicle Ownership**

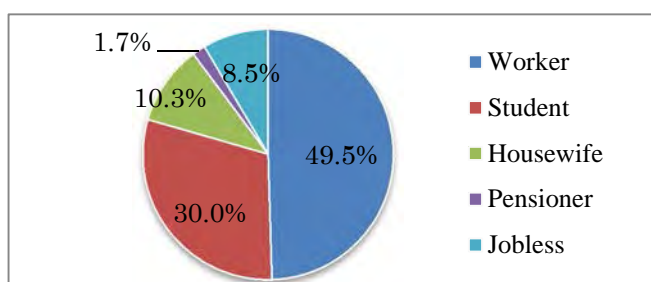
Income Range	No Motorbike and No Car	Motorbike Only and No Car	Motorbike and Car	Total
Under 250 USD	15.8%	77.5%	6.8%	100%
250 - 499 USD	7.7%	79.8%	12.4%	100%
500 - 749 USD	4.6%	67.3%	28.1%	100%
750 - 999 USD	2.5%	58.5%	39.0%	100%
1,000 - 1,499 USD	1.6%	46.2%	52.3%	100%
Over 1,500 USD	3.1%	32.3%	64.6%	100%

Source: PPUTMP Project Team

#### (5) Occupation and Sector

##### Occupation

There are 16 occupation categories in the survey sheets (see person trip survey sheet in Section 13.6). These categories were integrated into 5 categories, namely: Worker, Student, Housewife, Pensioner, and Jobless (see Figure 13.4-2). The occupation with the highest number of household members is "Worker," with a share of 50%.

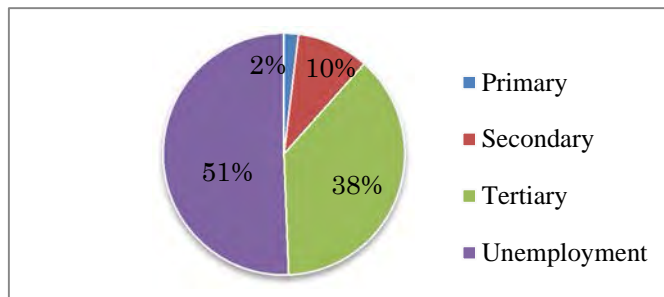


Source: PPUTMP Project Team

**Figure 13.4-2 Occupation Type**

**Sector**

The highest sector is “Unemployment” with a share of 51% (see Figure 13.4-3). However, this number also includes “Student.”

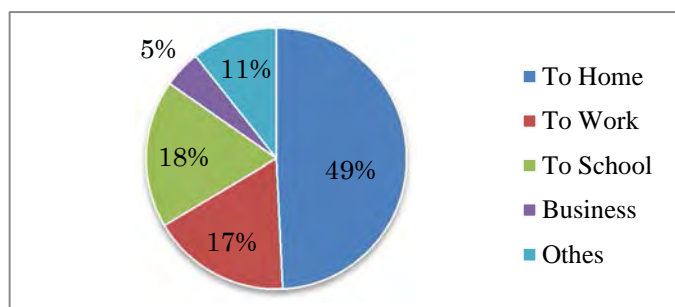


Source: PPUTMP Project Team

**Figure 13.4-3 Sector Type**

**(6) Trip Purpose**

Trip composition by purpose is shown in Figure 13.4-4. Most household members (49% of samples) make “To Home” trips, followed by trips “To Work” (17%), “To School” (18%), “Business” (5%), and Others (11%).

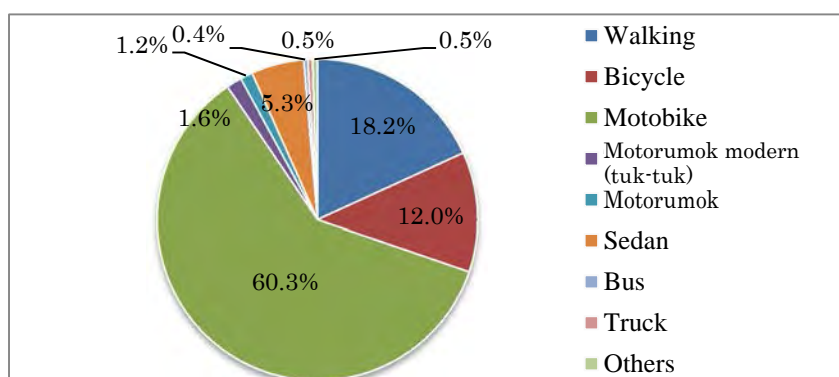


Source: PPUTMP Project Team

**Figure 13.4-4 Trip Purpose**

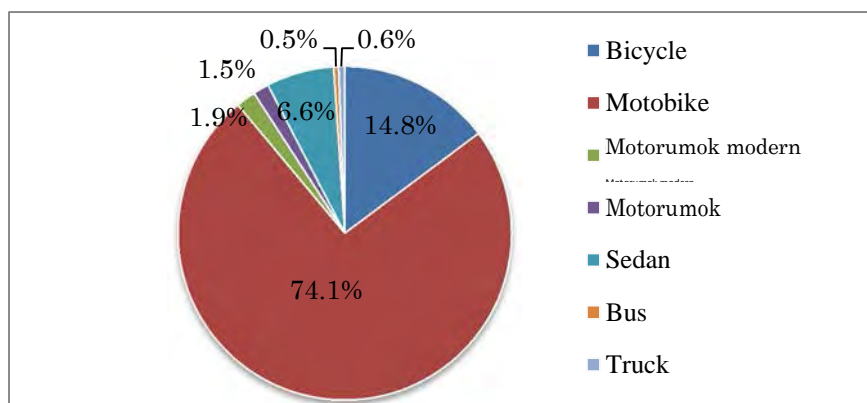
**(7) Travel Mode**

Nine types of travel modes were used in the survey. Trip composition by travel mode is summarized in Figure 13.4-5 and Figure 13.4-6. Trips by “Motorbike” has the highest share of 60%, while the share of “Walking” trips is 18.0%. Figure 13.4-6 shows the trip mode excluding walking and others. Among vehicular trips, the “Motorbike” has a modal share of 74.0% while “Sedan” trip has a 6.6% share. This corresponds to the households' vehicle ownership where majority own motorbikes.



Source: PPUTMP Project Team

**Figure 13.4-5 Travel Mode**



Source: PPUTMP Project Team

**Figure 13.4-6 Travel Mode (Excluding Walking and Others)**

## 13.5 Road Inventory Survey

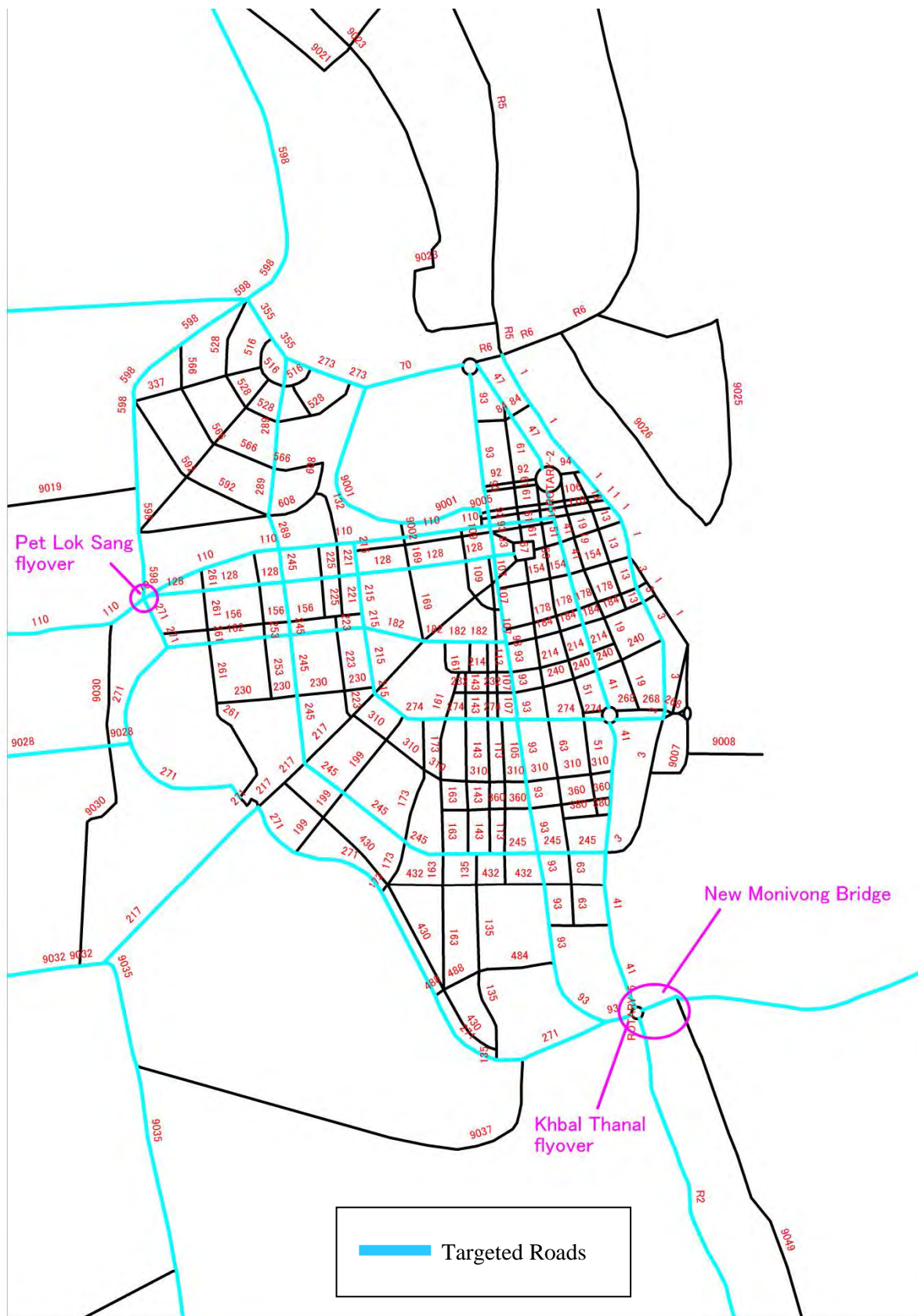
### 13.5.1 Outline of the Survey

To investigate the road conditions, the Road Inventory Survey was conducted in July 2012. The surveyed roads included all roads in the project area (see Figure 13.5-1 and Figure 13.5-2). The objectives of this survey are as follows:

- ll) To collect data on the present conditions of the existing roads; and
- mm) To compile the collected data and prepare a road inventory of the road network in the project area.

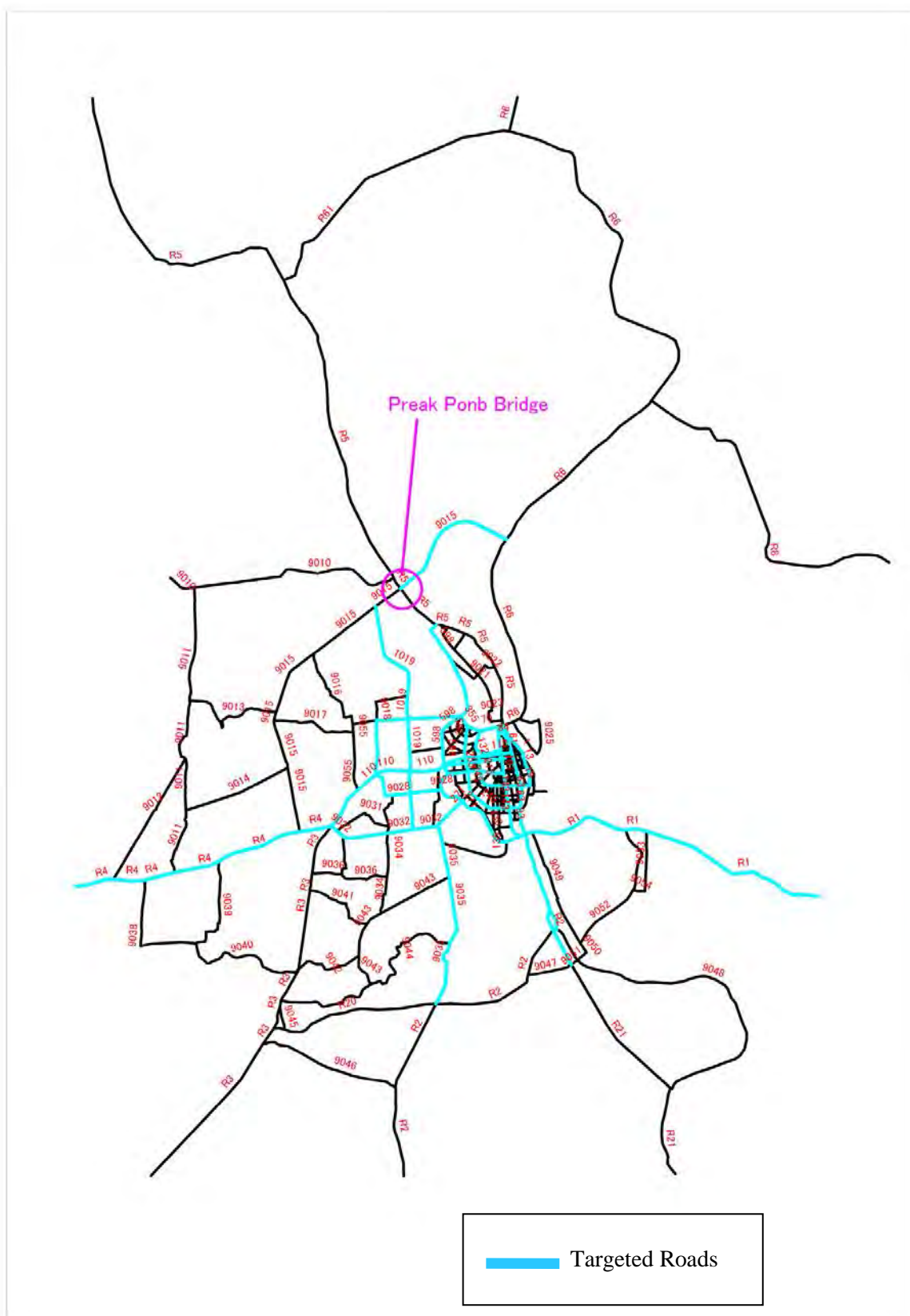
### 13.5.2 Survey Results

The detailed results of the Road Inventory Survey are discussed in Chapter 5.



Source: PPUTMP Project Team

**Figure 13.5-1 Road Inventory Surveyed Roads (City Area)**



Source: PPUTMP Project Team

**Figure 13.5-2 Road Inventory Surveyed Roads (Suburban Area)**

### 13.6 Survey Forms

#### 13.6.1 Traffic Count Survey Form (Cordon Line, Screen Line, Roadside, and Traffic Count at Intersection Surveys)

**Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City**

**APPENDIX 2-A: TRAFFIC COUNT**

**HOUR TRAFFIC**

Name of surveyor: \_\_\_\_\_  
 Phone No. \_\_\_\_\_  
 Name of supervisor: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 Name of encoder: \_\_\_\_\_

Survey Location: \_\_\_\_\_  
 Traffic Direction: \_\_\_\_\_  
 Day: \_\_\_\_\_  
 Weather: \_\_\_\_\_

GPS Location: \_\_\_\_\_

UP \_\_\_\_\_ To \_\_\_\_\_  
 To \_\_\_\_\_ Down \_\_\_\_\_

TIME OF COUNT	1. Motorbike / Mozodop		2. Tuk-Tuk		3. Sedan, Wagon and Van		4. Taxi		5. Mini Bus		6. Medium Bus / Large Bus		7. Light Truck Pick Up		8. Truck (2 Axes)		9. Heavy Truck and Trailer More than 3-axes		
	U	D	U	D	U	D	U	D	U	D	U	D	U	D	U	D	U	D	
06:00 - 07:15																			
07:15 - 07:30																			
07:30 - 07:45																			
07:45 - 08:00																			
08:00 - 08:15																			
08:15 - 08:30																			
08:30 - 08:45																			
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09:15 - 09:30																			
09:30 - 09:45																			
09:45 - 10:00																			
10:00 - 10:15																			
10:15 - 10:30																			
10:30 - 10:45																			

### 13.6.2 Roadside Interview Form

#### Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City

Survey Title	OD Interview Survey (Vehicle Users)			
Survey Station	Road Name:	Survey Execution	Date:	
			Whether:	
Direction	From:		Name of surveyor:	
	To:		Name of supervisor:	

	1	2	3	4	5																				
1. Survey Time																									
2. Vehicle Type																									
<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">1) Motorbike / Motodop</td> <td style="width: 50%;">6) Mini Bus</td> </tr> <tr> <td>2) Motorumok modern (tuk-tuk)</td> <td>7) Medium and large Bus</td> </tr> <tr> <td>3) Motorumok</td> <td>8) Light Truck Pick up</td> </tr> <tr> <td>4) Sedan, Wagon</td> <td>9) Truck (2 axles)</td> </tr> <tr> <td>5) Taxi</td> <td>10) Heavy Truck and Trailer (3 axles)</td> </tr> </table>	1) Motorbike / Motodop	6) Mini Bus	2) Motorumok modern (tuk-tuk)	7) Medium and large Bus	3) Motorumok	8) Light Truck Pick up	4) Sedan, Wagon	9) Truck (2 axles)	5) Taxi	10) Heavy Truck and Trailer (3 axles)															
1) Motorbike / Motodop	6) Mini Bus																								
2) Motorumok modern (tuk-tuk)	7) Medium and large Bus																								
3) Motorumok	8) Light Truck Pick up																								
4) Sedan, Wagon	9) Truck (2 axles)																								
5) Taxi	10) Heavy Truck and Trailer (3 axles)																								
3. No. of Passengers on Board (incl. driver)																									
4. Major Commodity (Vehicle Type 8,9 and 10 only)																									
<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">1. Animal Feed</td> <td style="width: 50%;">11. Paper</td> </tr> <tr> <td>2. Animal Products</td> <td>12. Petroleum</td> </tr> <tr> <td>3. Chemicals</td> <td>13. Pharmaceutical</td> </tr> <tr> <td>4. Construction material</td> <td>14. Plant products</td> </tr> <tr> <td>5. Fabric</td> <td>15. Plastic and Plastic products</td> </tr> <tr> <td>6. Fertilizer</td> <td>16. Rice and Grain products</td> </tr> <tr> <td>7. Fruits and Vegetable</td> <td>17. Rubber and rubber products</td> </tr> <tr> <td>8. Industrial material (Steel, metal)</td> <td>18. Seafood</td> </tr> <tr> <td>9. Manufactured Goods</td> <td>19. Sugar and Sugar confectionary</td> </tr> <tr> <td>10. Minerals</td> <td></td> </tr> </table>	1. Animal Feed	11. Paper	2. Animal Products	12. Petroleum	3. Chemicals	13. Pharmaceutical	4. Construction material	14. Plant products	5. Fabric	15. Plastic and Plastic products	6. Fertilizer	16. Rice and Grain products	7. Fruits and Vegetable	17. Rubber and rubber products	8. Industrial material (Steel, metal)	18. Seafood	9. Manufactured Goods	19. Sugar and Sugar confectionary	10. Minerals						
1. Animal Feed	11. Paper																								
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4. Construction material	14. Plant products																								
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8. Industrial material (Steel, metal)	18. Seafood																								
9. Manufactured Goods	19. Sugar and Sugar confectionary																								
10. Minerals																									
5. Load Factor (Vehicle Type 8,9 and 10 only)																									
<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">1) Full</td> <td style="width: 50%;">4) 1/4</td> </tr> <tr> <td>2) 3/4</td> <td>5) 1/4&gt;</td> </tr> <tr> <td>3) 1/2</td> <td>6) Empty</td> </tr> </table>	1) Full	4) 1/4	2) 3/4	5) 1/4>	3) 1/2	6) Empty																			
1) Full	4) 1/4																								
2) 3/4	5) 1/4>																								
3) 1/2	6) Empty																								
6. Origin	Sangkat City/District Province	Sangkat City/District Province	Sangkat City/District Province	Sangkat City/District Province	Sangkat City/District Province																				
7. Destination	Sangkat City/District Province	Sangkat City/District Province	Sangkat City/District Province	Sangkat City/District Province	Sangkat City/District Province																				
8. Trip Purpose																									
<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">1) To Home</td> <td style="width: 50%;">4) Business</td> </tr> <tr> <td>2) To Work</td> <td>5) Social and Shopping</td> </tr> <tr> <td>3) To School</td> <td>6) Others</td> </tr> </table>	1) To Home	4) Business	2) To Work	5) Social and Shopping	3) To School	6) Others																			
1) To Home	4) Business																								
2) To Work	5) Social and Shopping																								
3) To School	6) Others																								
9. Estimated Travel Time (Hours)																									

### 13.6.3 Passenger Interview at Airport and Ferry Ports

#### Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City

Survey Title	OD Interview Survey ( Airport and Ferry Port)		
Survey Station	Airport or Ferry Port	Survey Execution	Date:
	Road Name (only Bus):		Whether:
Direction	From:		Name of surveyor:
	To:		Name of supervisor:

1. No. of Bus Passengers on Board (including driver)

2. Individual attribution

Person	1	2	3	4	5	
1. Origin	Sangkat	Sangkat	Sangkat	Sangkat	Sangkat	
	Kahn	Kahn	Kahn	Kahn	Kahn	
	Province	Province	Province	Province	Province	
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
2. Destination	Sangkat	Sangkat	Sangkat	Sangkat	Sangkat	
	Kahn	Kahn	Kahn	Kahn	Kahn	
	Province	Province	Province	Province	Province	
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
3. Estimated Travel Time (Hours)						
4. Trip Purpose						
						<table border="1"> <tr> <td>1) To Home</td> <td>4) Business</td> </tr> <tr> <td>2) To Work</td> <td>5) Social and Shopping</td> </tr> <tr> <td>3) To School</td> <td>6) Others</td> </tr> </table>
1) To Home	4) Business					
2) To Work	5) Social and Shopping					
3) To School	6) Others					
6. Access Mode and Egress Mode Access mode to the Terminal:						
7. Access Mode and Egress Mode Egress mode from Terminal:						

**Select access Mode and Egress Mode**

- |                               |                             |
|-------------------------------|-----------------------------|
| 1. Walking                    | 8. Sedan, Wagon and Van     |
| 2. Bicycle                    | 9. Mini Bus                 |
| 3. Motorbike                  | 10. Medium and Large Bus    |
| 4. Motodop                    | 11. Light Truck             |
| 5. Motorumok modern (tuk-tuk) | 12. Large Truck and Trailer |
| 6. Motorumok                  | 13. Others                  |
| 7. Taxi                       |                             |



### 13.6.4 Travel Speed Survey Form

#### Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City

Survey Title	Travel Time Survey		
Survey Route	Road Name:	Survey Execution	Date:
	Road No:		Weather:
Direction	From:		Surveyor:
	To:		Supervisor:

Check Point (Intersection etc.)	Time Started/ Passed	Delay 1			Delay 2			Delay 3			Delay 4		
		D C	Stop Time	Restart Time	D C	Stop Time	Restart Time	D C	Stop Time	Restart Time	D C	Stop Time	Restart Time
1.													
2.													
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													
11.													
12.													
13.													
14.													
15.													

SYMBOLS OF DELAY CAUSE:

LT—Left Turns	BTP—Bus or Truck Loading or unloading	TS—Traffic signals	CO—Construction
RT—Right Turns	FL — Flooding	SS—Stop Sign	GC—General Congestion
PED—Pedestrians	AC— Accident	PC—Parked Cars	OT—Others(pls. specify)

### 13.6.5 Parking Condition Survey Form

Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City

**Parking condition survey (On-Road Parking)**

Block No. \_\_\_\_\_

Date : \_\_\_\_\_

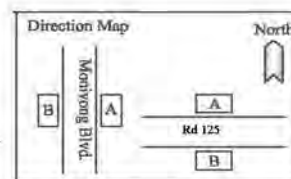
Line No. \_\_\_\_\_ \*Direction: A or B

Weather : \_\_\_\_\_

Street No./ Name \_\_\_\_\_

Surveyor : \_\_\_\_\_ Phone no: \_\_\_\_\_

Start Time 6:00



Time	Vehicle Classification									
	Motorbike	Motodop	Motorumok modem (tuk-tuk)	Motorumok	Taxi	Sedan Wagon and Van	Mini Bus	Medium and Large Bus	Light Truck	Large Truck and Trailer
6:00 - 6:30										
6:30 - 7:00										
7:00 - 7:30										
7:30 - 8:00										
8:00 - 8:30										
8:30 - 9:00										
9:00 - 9:30										
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19:30 - 20:00										
20:00 - 20:30										
20:30 - 21:00										
21:00 - 21:30										
21:30 - 22:00										

### 13.6.6 Parking Inventory Survey Form

**Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City**

**Parking Inventory Survey (Facilitated parking)**

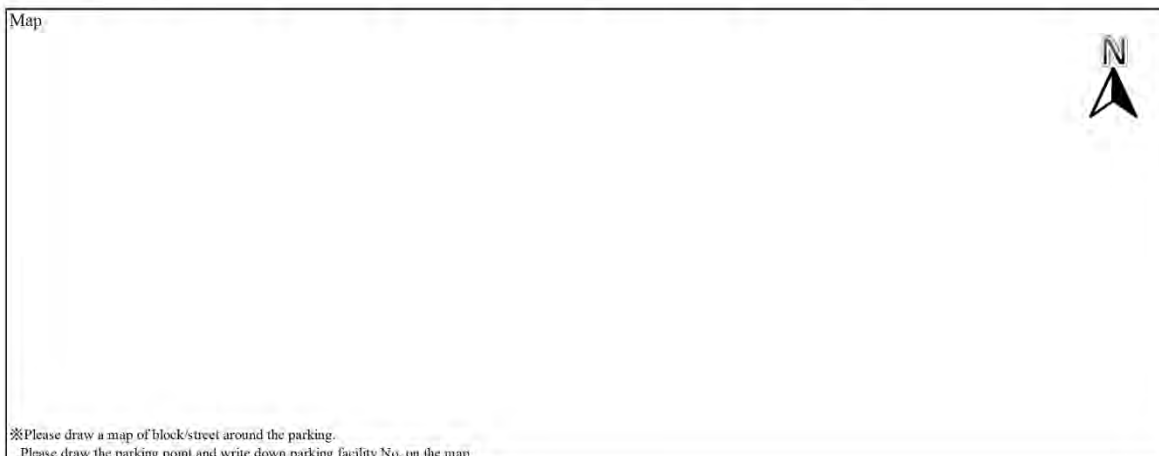
Date : \_\_\_\_\_ Block No. \_\_\_\_\_

Surveyor : \_\_\_\_\_ Street No. \_\_\_\_\_

Phone no: \_\_\_\_\_

Block No.	No.	Name of parking Facility (if any)	Type of Parking 1. At grade 2. Under ground	Number o parking space		Operatio n hours	Parking fees (1 time)		Night time (after 22:00) 1. Open 2. Close	Type pf ownership 1. Public 2. Private 3. Company
				Motorbike	Passenger Car		Motorbike	Passenger Car		
	1									
	2									
	3									
	4									
	5									

Map



※Please draw a map of block/street around the parking.  
Please draw the parking point and write down parking facility No. on the map

### 13.6.7 Parking Interview Survey Form

#### Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City

#### Parking Interview Survey

Date : \_\_\_\_\_

Location : \_\_\_\_\_

Surveyor : \_\_\_\_\_

Phone no : \_\_\_\_\_

1	2	3	4	5	6	7	8	9	10
Motorbike	Motodop	Motorumok modern (tuk-tuk)	Motorumo	Taxi	Sedan Wagon and Van	Mini Bus	Medium and Large Bus	Light Truck	Large Truck and Trailer

1 How often do you use your car?

(1) Less than 1 time in a week.	(2) 1~3 times in a week.
(3) 4~5 times in a week.	(4) Over 6 times in a week.

2 Where did you park your car?

(1) Parking Facility (Parking facility number : _____)
(2) On-sidewalk street ( 1. Regal 2. Illegal ) (Street number : _____)
(3) On-road street ( 1. Regal 2. Illegal ) (Street number : _____)

3 How often do you use this parking space?

(1) Less than 1 time in a week.	(2) 1~3 times in a week.
(3) 4~5 times in a week.	(4) Over 6 times in a week.

4 What is your trip purpose?

(1) To Work	(2) To School
(3) Business	(4) Social and Shopping
(5) Others: _____	

5 How long did/will you walk from the parking space to your trip purpose place?

(1) Less than 50 m	(2) 50~99 m
(3) 100~199 m	(4) 200~299 m
(5) 300~399 m	(6) 400~499 m
(7) 500~999 m	(8) Over 1000 m

6 What time did you park today?

1) AM \_\_\_\_\_ :

2) PM \_\_\_\_\_ :

7 How many minute did you park?

\_\_\_\_\_ min.

8 How much did/will you pay for parking?

\_\_\_\_\_ Riel



9. Estimated trip travel cost: ..... Riel		
10. Estimated trip travel time: ..... mins ( From origin to destination, including waiting time)		
<b>C. Opinion on Modal Choice</b>		
11. Why do you choose the selected mode? (Multiple Answer)		
<input type="checkbox"/> 1	Travel time shorter	<input type="checkbox"/> 2
<input type="checkbox"/> 4	Comfortable	<input type="checkbox"/> 3
<input type="checkbox"/> 7	Other (specify) .....	<input type="checkbox"/> 5
		<input type="checkbox"/> 6
		<input type="checkbox"/> 7

**(2) Para-Transit Driver Interview**

PROJECT FOR COMPREHENSIVE URBAN TRANSPORT PLAN IN THE PHNOM PENH CAPITAL CITY  
**PARA-TRANSIT DRIVER INTERVIEW**

Location: \_\_\_\_\_

Day: \_\_\_\_\_

Date: \_\_\_\_\_

Supervisor: \_\_\_\_\_

Surveyor: \_\_\_\_\_

<b>D. Operator Attribute:</b>			
1. Gender :	<input type="checkbox"/> 1	Male	<input type="checkbox"/> 2
			Female
2. Age :	<input type="checkbox"/> 1	Less than 21	<input type="checkbox"/> 2
			21 – 30
	<input type="checkbox"/> 3	31 – 40	<input type="checkbox"/> 4
			41 – 50
	<input type="checkbox"/> 5	51 - 60	<input type="checkbox"/> 6
			More than 60
3. Occupation:	<input type="checkbox"/> 1.	Motodop Driver	<input type="checkbox"/> 2.
			Motorumok modern (tuk-tuk) Driver
	<input type="checkbox"/> 3	Cyclo Driver	
4. Monthly Income : (Personal)	<input type="checkbox"/> 1	Under 50 USD	<input type="checkbox"/> 2
			50-99 USD
	<input type="checkbox"/> 3	100-149 USD	<input type="checkbox"/> 4
			150-199 USD
	<input type="checkbox"/> 5	200-249 USD	<input type="checkbox"/> 6
			Over 250 USD
5. Monthly expense for Gasoline and Maintenance ( Excluding Cyclo driver)	<input type="checkbox"/> 1	Under 50 USD	<input type="checkbox"/> 2
			50-99 USD
	<input type="checkbox"/> 3	100-149 USD	<input type="checkbox"/> 4
			150-199 USD
	<input type="checkbox"/> 5	200-249 USD	<input type="checkbox"/> 6
			Over 250 USD
<b>E. Trip Information:</b>			
6. Average no. of Tripper day:	_____	Per	7. Average no.ofriding _____
	day		passenger per day
			day
			Per

### 13.6.9 Truck Traffic Survey From

#### (1) For Company

#### Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City

#### TRUCK TRAFFIC SURVEY (COMPANY)

Company Name: \_\_\_\_\_ Zone No : \_\_\_\_\_  
 Day: \_\_\_\_\_ Supervisor: \_\_\_\_\_  
 Date: \_\_\_\_\_ Surveyor: \_\_\_\_\_

F. Company Information:	
12. Address of Company :	House No: _____
	Street number / Street name : _____
	Sangkat: _____
	Kahn : _____
	Name of Contact Person _____
Telephone: _____	
13. Location:	<input type="checkbox"/> 1 Factory <input type="checkbox"/> 2 Transit warehouse <input type="checkbox"/> 3 Dry port <input type="checkbox"/> 4 Phnom Penh Port
14. No of Employee of the Company: persons	15. No of Driver: persons
16. Area of Business place (Square meter :m2)      m2	17. Parking Capacity of Truck: trucks
18. No of coming and going of Trucks	Coming :      trucks Going:      trucks
7. Number of Trucks (Including company truck and Outsourcing)	8. Average Number of Trucks Operation Per day (Including company truck and Outsourcing)
<input type="checkbox"/> 1 Pickup Truck <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> 1 Pickup Truck <input type="text"/> <input type="text"/> <input type="text"/>
<input type="checkbox"/> 2 Axles Truck <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> 2 Axles Truck <input type="text"/> <input type="text"/> <input type="text"/>
<input type="checkbox"/> 3 More than 3 Axles Truck <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> 3 More than 3 Axles Truck <input type="text"/> <input type="text"/> <input type="text"/>
<input type="checkbox"/> 4 Trailer <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> 4 Trailer <input type="text"/> <input type="text"/> <input type="text"/>
<input type="checkbox"/> 5 Others <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/> 5 Others <input type="text"/> <input type="text"/> <input type="text"/>

9. Type of Industry <span style="float: right;">□ □</span>	
1. Transport company 2. Foods 3. Beverage , tobacco and feed products 4. Textile and closing manufacture 5. Wood and wood products 6. Paper and paper products 7. Chemical, petroleum and Plastic products 8. Leather products 9. Rubber products	10. Pottery, soil and stone products 11. Steel Industry 12. Non metal products 13. Metal products 14. Machinery and appliances manufacturing 15. Electric, electric device and communication equipment products 16. Other Manicuring

**(2) For Driver**

**Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City**

**Truck Interview Survey Form (for Driver)**

Survey Place	<input type="checkbox"/> 1 Factory	<input type="checkbox"/> 2 Transit warehouse	Date:										
	<input type="checkbox"/> 3 Dry port	<input type="checkbox"/> 4 Phnom Penh Port	Name of surveyor: Telephone:										
Company Name			Name of supervisor:										
			1	2	3								
1. Survey Time													
2. Tuck Trailer Type <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">1) Truck (2 axle)</td> <td style="width: 50%;">5) Damp Truck</td> </tr> <tr> <td>2) Heavy Truck (3 axles more)</td> <td>6) Tanker</td> </tr> <tr> <td>3) Semi-Trailer</td> <td>7) Others</td> </tr> <tr> <td>4) Full-trailer</td> <td></td> </tr> </table>			1) Truck (2 axle)	5) Damp Truck	2) Heavy Truck (3 axles more)	6) Tanker	3) Semi-Trailer	7) Others	4) Full-trailer				
1) Truck (2 axle)	5) Damp Truck												
2) Heavy Truck (3 axles more)	6) Tanker												
3) Semi-Trailer	7) Others												
4) Full-trailer													
3. Major Commodity <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">                     1. Animal Feed                      2. Animal Products                      3. Chemicals                      4. Construction material                      5. Fabric                      6. Fertilizer                      7. Fruits and Vegetable                      8. Industrial material (Steel, metal)                      9. Manufactured Goods                      10. Minerals                 </td> <td style="width: 50%;">                     11. Paper                      12. Petroleum                      13. Pharmaceutical                      14. Plant products                      15. Plastic and Plastic products                      16. Rice and Grain products                      17. Rubber and rubber products                      18. Seafood                      19. Sugar and Sugar confectionary                 </td> </tr> </table>			1. Animal Feed 2. Animal Products 3. Chemicals 4. Construction material 5. Fabric 6. Fertilizer 7. Fruits and Vegetable 8. Industrial material (Steel, metal) 9. Manufactured Goods 10. Minerals	11. Paper 12. Petroleum 13. Pharmaceutical 14. Plant products 15. Plastic and Plastic products 16. Rice and Grain products 17. Rubber and rubber products 18. Seafood 19. Sugar and Sugar confectionary									
1. Animal Feed 2. Animal Products 3. Chemicals 4. Construction material 5. Fabric 6. Fertilizer 7. Fruits and Vegetable 8. Industrial material (Steel, metal) 9. Manufactured Goods 10. Minerals	11. Paper 12. Petroleum 13. Pharmaceutical 14. Plant products 15. Plastic and Plastic products 16. Rice and Grain products 17. Rubber and rubber products 18. Seafood 19. Sugar and Sugar confectionary												
4. Type of Packing <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">1) Empty</td> <td style="width: 50%;">3) Tank</td> </tr> <tr> <td>2) Container</td> <td>4) Bulk and Others (ex. Box Case)</td> </tr> </table>			1) Empty	3) Tank	2) Container	4) Bulk and Others (ex. Box Case)							
1) Empty	3) Tank												
2) Container	4) Bulk and Others (ex. Box Case)												



<p>5. Container Type (if select above Container)</p> <table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">1) 20ft</td> <td style="width: 50%;">4) 1/4</td> </tr> <tr> <td>2) 40ft</td> <td>5) 1/4&gt;</td> </tr> <tr> <td>3) More than 40t</td> <td>6) Empty</td> </tr> </table>	1) 20ft	4) 1/4	2) 40ft	5) 1/4>	3) More than 40t	6) Empty			
1) 20ft	4) 1/4								
2) 40ft	5) 1/4>								
3) More than 40t	6) Empty								
<p>6. Load Factor</p> <table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">1) Full</td> <td style="width: 50%;">4) 1/4</td> </tr> <tr> <td>2) 3/4</td> <td>5) 1/4&gt;</td> </tr> <tr> <td>3) 1/2</td> <td>6) Empty</td> </tr> </table>	1) Full	4) 1/4	2) 3/4	5) 1/4>	3) 1/2	6) Empty			
1) Full	4) 1/4								
2) 3/4	5) 1/4>								
3) 1/2	6) Empty								
<p>7. Howmuch tons? ton</p>									
<p>6. Origin</p>	<p>Sangkat  Kahn  Province  <input type="text"/><input type="text"/><input type="text"/></p>	<p>Sangkat  Kahn  Province  <input type="text"/><input type="text"/><input type="text"/></p>	<p>Sangkat  Kahn  Province  <input type="text"/><input type="text"/><input type="text"/></p>						
<p>7. Destination</p>	<p>Sangkat  Kahn  Province  <input type="text"/><input type="text"/><input type="text"/></p>	<p>Sangkat  Kahn  Province  <input type="text"/><input type="text"/><input type="text"/></p>	<p>Sangkat  Kahn  Province  <input type="text"/><input type="text"/><input type="text"/></p>						
<p>2.No of trips</p>									
<p>8.Estimated Travel Time Cost (USD per month) - Including Gasoline, oil and Maintenance</p>									
<p>9.Estimated Travel Time (Hours) Ex) 7h 15 min : 7.25 7h 30 min: 7:50</p>									

### 13.6.10 Person Trip Survey Form

**JICA(Japan International Cooperation Agency) Project Team**  
**Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City**

**FORM 1: HOUSEHOLD INFORMATION**

OFFICIAL USE			
Name of surveyor			Phone:
Name of supervisor			Phone:
Name of coder			Phone:
Name of encoder			Phone:
Date of survey (dd:mm)	<input type="text"/>	<input type="text"/>	<input type="text"/>
Date of trips surveyed (dd:mm)	<input type="text"/>	<input type="text"/>	<input type="text"/>
Household No.	<input type="text"/>	<input type="text"/>	<input type="text"/>

**INSTRUCTION: To be completed by HEAD of HOUSEHOLD**

(1) ADDRESS OF HOUSEHOLD

House / Apartment No.: ..... Street number: .....

Street name: .....

Village: .....

Sangkat(Commune): .....

Kahn(District): .....

**Traffic Zone**

<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------

(2) HOW MANY PEOPLE RESIDE IN YOUR HOUSEHOLD?

	Under 4 yrs. old	5 yrs. and above	Household Helpers (ex. Maid)
Male	<input type="text"/>	<input type="text"/>	<input type="text"/>
Femal	<input type="text"/>	<input type="text"/>	<input type="text"/>
Total	<input type="text"/>	<input type="text"/>	<input type="text"/>

(3) WHAT IS THE TOTAL MONTHLY HOUSE-HOLD INCOME? (pls. check one)

<input type="checkbox"/>	1. Under 250 USD
<input type="checkbox"/>	2. 250 - 499 USD
<input type="checkbox"/>	3. 500 - 749 USD
<input type="checkbox"/>	4. 750 - 999 USD
<input type="checkbox"/>	5. 1,000 - 1,499 USD
<input type="checkbox"/>	6. 1,500 - 1,999 USD
<input type="checkbox"/>	7. Over 2,000 USD

(4) HOW MANY VEHICLES ARE OWNED BY HOUSEHOLD

TYPE	NO. OF UNITS	TYPE	NO. OF UNITS
1.MOTOR BIKE	<input type="text"/>	4.CAR/4WD	<input type="text"/>
2.Motorumok moderm(tuk-tuk)	<input type="text"/>	5.TRUCK	<input type="text"/>
3.MOTORUMO	<input type="text"/>	6.OTHERS	<input type="text"/>

**FORM 2: HOUSEHOLD MEMBER INFORMATION**

<b>OFFICIAL USE</b>	HOUSEHOLD No.	Mem. No.

**INSTRUCTION: To be completed for every HOUSEHOLD MEMBER aged 5yrs, and above**

(1) Name \_\_\_\_\_ (2) Relationship to Head of Household

1: Head <input type="checkbox"/>	2: Wife /Husband <input type="checkbox"/>
3: Son /Daughter <input type="checkbox"/>	4: Father/Mother <input type="checkbox"/>
5: Grand child <input type="checkbox"/>	6: Other Relative <input type="checkbox"/>
7: Non Relative <input type="checkbox"/>	

(3) AGE \_\_\_\_\_ (4) SEX:(pls check) Male  Female

(5) Driver License ( for motorbike) 1:Yes  2: No

(6) Driver License ( for Vehicle) 1:Yes  2: No

**(7) WORK ADDRESS**

House / Apartment	Street No.	Street name	
Village	Sangkat	Kanh	Province
<input style="width: 40px; height: 15px;" type="text"/>	<input style="width: 40px; height: 15px;" type="text"/>	<input style="width: 40px; height: 15px;" type="text"/>	<input style="width: 40px; height: 15px;" type="text"/>

**Traffic Zone**

--	--	--

**(8) SCHOOL ADDRESS**

House / Apartment	Street No.	Street name	
Village	Sangkat	Kanh	Province
<input style="width: 40px; height: 15px;" type="text"/>	<input style="width: 40px; height: 15px;" type="text"/>	<input style="width: 40px; height: 15px;" type="text"/>	<input style="width: 40px; height: 15px;" type="text"/>

**Traffic Zone**

--	--	--

**(9) OCCUPATION  
(Pls Encircle)**

<ol style="list-style-type: none"> <li>1. Farmers, Forestry Workers &amp; Fisherman</li> <li>2. Mining and quarrying</li> <li>3. Skilled worker Industrial operator</li> <li>4. Clerical Worker</li> <li>5. Service Workers &amp; Shop &amp; Market Workers</li> <li>6. Transport and Communication and Driver</li> <li>7. Protective service worker ( Police and Security guard)</li> <li>8. office Worker</li> <li>9. Engineer and Technician</li> <li>10. Administrator Manager</li> <li>11. Student ( under 15 years )</li> <li>12. Student (H.S &amp; Univ. 16 years)</li> <li>13. Housewife &amp; Househusband</li> <li>14. Jobless</li> <li>15. Pensioner</li> <li>16. Others, specify</li> </ol>
--

**(10) EMPLOYMENT SECTOR  
(Pls Encircle)**

<ol style="list-style-type: none"> <li>1. Agriculture, Hunting &amp; Forestry</li> <li>2. Fishery</li> <li>3. Construction</li> <li>4. Mining &amp; Quarrying</li> <li>5. Manufacturing</li> <li>6. Wholesales trade and Retail trade</li> <li>7. Financial, Insurance and Real estate</li> <li>8. Transport &amp; Communication</li> <li>9. Electricity, Gas &amp; Water Supply</li> <li>10. Services</li> <li>11. Official service</li> <li>12. Unemployment</li> <li>13. Others (Please Specify)</li> </ol>
--

**(11) MONTHLY INCOME  
(Pls Encircle)**

<ol style="list-style-type: none"> <li>1. Under 50 USD</li> <li>2. 50 - 99 USD</li> <li>3. 100- 250 USD</li> <li>4. 250- 499 USD</li> <li>5. 500- 749 USD</li> <li>6. 750- 999 USD</li> <li>7. Over 1,000 USD</li> </ol>
--

**FORM 3: TRIP INFORMATION**

*INSTRUCTION: To be completed for every HOUSEHOLD MEMBER aged 5yrs, and above*

OFFICIAL USE	HOUSEHOLD No.	Mem. No.
	<input type="text"/>	<input type="text"/>

Personal No.

- ORIGIN AND DESTINATION**
- Residence (Home)
  - Office / Bank
  - Public administrative office
  - Factory / warehouses
  - School / Universities Educational
  - Medical and Welfare
  - Religious and Social
  - Wholesale and Retail Shop
  - Restaurant / Entertainment
  - Park / River side
  - Others

- TRIP PURPOSE**
- To Home
  - To Work
  - To School
  - Business (Private and Firms)
  - Social and Shopping
  - Others

- MODE of TRAVEL**
- Walking
  - Bicycle
  - Motorbike
  - Motodop
  - Motorumok modern (tuk-tuk)
  - Motorumok
  - Sedan, Wagon and Van
  - Taxi
  - Mini Bus
  - Medium and Large Bus
  - Light Truck / Phodap
  - Truck (> axles)
  - Heavy Truck and Trailer
  - Ship and Ferry
  - Airplane
  - Others

TRIP INFORMATION	1st TRIP	2nd TRIP	3rd TRIP	4th TRIP	5th TRIP
(1) ORIGIN Where did this trip begin? <small>(Give address/land mark, famous bldg. nearby)</small>	No. / Street Name  Sangkat  Kanh a. <input type="text"/> Traffic Zone	INFORMATION IS  AS IN  OF 1st TRIP	INFORMATION IS  AS IN  OF 2nd TRIP	INFORMATION IS  AS IN  OF 3rd TRIP	INFORMATION IS  AS IN  OF 4th TRIP
(2) ORIGIN PLACE	b. <input type="checkbox"/>	b. <input type="checkbox"/>	b. <input type="checkbox"/>	b. <input type="checkbox"/>	b. <input type="checkbox"/>
(3) TIME STARTED	c. <input type="text"/> AM <input type="text"/> Hours Minutes PM <input type="text"/>	c. <input type="text"/> AM <input type="text"/> Hours Minutes PM <input type="text"/>	c. <input type="text"/> AM <input type="text"/> Hours Minutes PM <input type="text"/>	c. <input type="text"/> AM <input type="text"/> Hours Minutes PM <input type="text"/>	c. <input type="text"/> AM <input type="text"/> Hours Minutes PM <input type="text"/>
(4) TIME of ARRIVAL	d. <input type="text"/> AM <input type="text"/> Hours Minutes PM <input type="text"/>	d. <input type="text"/> AM <input type="text"/> Hours Minutes PM <input type="text"/>	d. <input type="text"/> AM <input type="text"/> Hours Minutes PM <input type="text"/>	d. <input type="text"/> AM <input type="text"/> Hours Minutes PM <input type="text"/>	d. <input type="text"/> AM <input type="text"/> Hours Minutes PM <input type="text"/>
(5) DESTINATION PLACE	e. <input type="checkbox"/>	e. <input type="checkbox"/>	e. <input type="checkbox"/>	e. <input type="checkbox"/>	e. <input type="checkbox"/>
(6) DESTINATION Where did this trip end? <small>(Give address/land mark, famous bldg. nearby)</small>	No. / Street Name  Village  Sangkat  Kanh  Province f. <input type="text"/> Traffic Zone	No. / Street Name  Village  Sangkat  Kanh  Province f. <input type="text"/> Traffic Zone	No. / Street Name  Village  Sangkat  Kanh  Province f. <input type="text"/> Traffic Zone	No. / Street Name  Village  Sangkat  Kanh  Province f. <input type="text"/> Traffic Zone	No. / Street Name  Village  Sangkat  Kanh  Province f. <input type="text"/> Traffic Zone
(7) TRIP PURPOSE	g. <input type="checkbox"/>	g. <input type="checkbox"/>	g. <input type="checkbox"/>	g. <input type="checkbox"/>	g. <input type="checkbox"/>
(8) MODE of TRAVEL	Original Mode TRANSFER POINT 1st Transfer Next Mode	Original Mode TRANSFER POINT 1st Transfer Next Mode	Original Mode TRANSFER POINT 1st Transfer Next Mode	Original Mode TRANSFER POINT 1st Transfer Next Mode	Original Mode TRANSFER POINT 1st Transfer Next Mode
(9) TRANSFER If you transferred to another vehicle / mode of travel during the trip, state the mode you changed to and the place. (Give street, intersection/ famous bldg. or land mark).	2nd Transfer Next Mode 3rd Transfer Next Mode 4th Transfer	2nd Transfer Next Mode 3rd Transfer Next Mode 4th Transfer	2nd Transfer Next Mode 3rd Transfer Next Mode 4th Transfer	2nd Transfer Next Mode 3rd Transfer Next Mode 4th Transfer	2nd Transfer Next Mode 3rd Transfer Next Mode 4th Transfer

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## APPENDIX 2 1<sup>st</sup> PUBLIC EXPERIMENT

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## ABBREVIATIONS

BAU	Bureau of Urban Affairs
DPWT	Department of Public Works and Transport
JICA	Japan International Cooperation Agency
PE	Public Experiment
PPCC	Phnom Penh Capital City
PPCH	Phnom Penh City Hall
PPUTMP	Project for Comprehensive Urban Transport Plan in Phnom Penh Capital City

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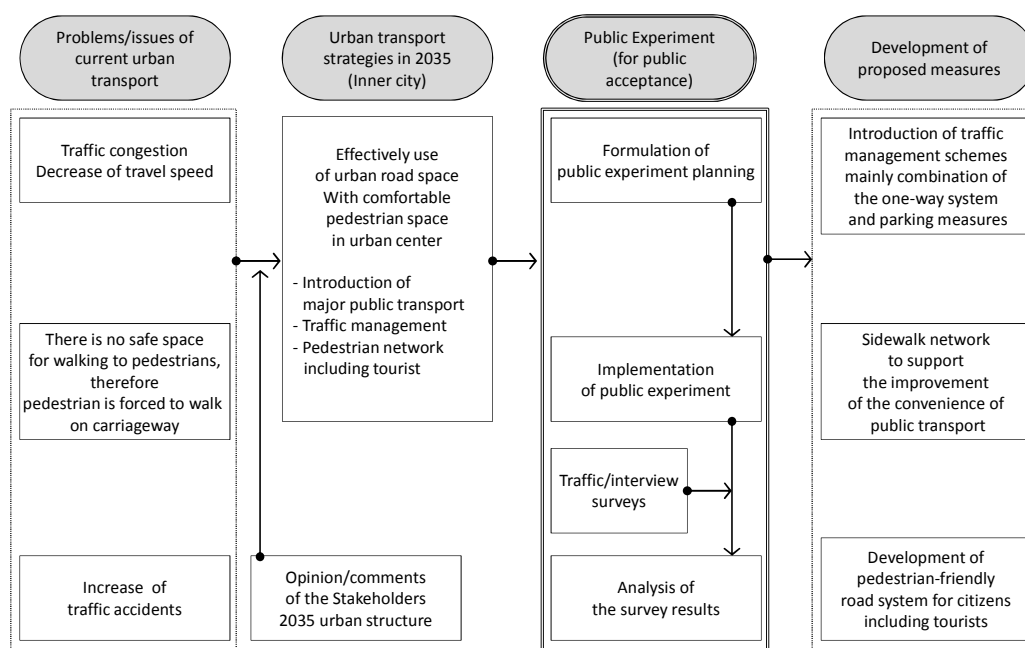


# 1 OUTLINE OF THE 1<sup>st</sup> PUBLIC EXPERIMENT

## 1.1 Objective of the Experiment

Phnom Penh Capital City (PPCC) is currently facing a series of urban transport problems. Severe traffic congestion has resulted in a general decline of travel speeds. Unlawful parking of vehicles on pedestrian sidewalks has forced the pedestrians to use the roadways instead. Hence, not only is there no safe walking space for pedestrians but such situation has greatly increased the possibility of traffic accidents in PPCC.

In response to these problems, the city government has adopted a development direction that encompasses various urban transport measures in support of the future structural needs of the city by the year 2035. One of the strategies is to improve the road transport environment by utilizing the city's limited road traffic space in a most effective manner while ensuring a pedestrian friendly urban center. Based on such a development direction aimed at overcoming the various existing urban transport problems, the implementation of many new countermeasures by the city government has become inevitable. Such future countermeasures would surely include, among others, 'a traffic management plan for PPCC that centers on the implementation of a city-wide one-way traffic circulation system', 'development of a pedestrian network to further enhance the convenience and usage of the public transport system', and 'a pedestrian network system in response to the increase in tourists in the city'. However, such countermeasures would most likely produce significant city-wide social impacts. Therefore, prior to implementing such countermeasures, it is essential that they are tested for their possible impacts and effectiveness at specific locations and time periods with the participation of the local residents. Notwithstanding the fact that these countermeasures are aimed at solving the urban transport problems of PPCC, the objective of this test or 'Public Experiment' is therefore to assist the authorities and local residents in deciding whether to fully implement such countermeasures.



Source: Project for Comprehensive Urban Transport Plan in Phnom Penh Capital City (PPUTMP) Project Team

**Figure 1.1-1 Outline of the 1<sup>st</sup> Public Experiment**

### **1.1.1 Contents of the Public Experiment**

As a first step toward the implementation of the new countermeasure with its objective in solving the urban transport problems, it is necessary to define the contents for 1<sup>st</sup> Public Experiment.

< Contents of 1<sup>st</sup> Public Experiment >

**“One-way traffic operation + Enforcement on illegal parking on sidewalks + Designating a pedestrian network”**

## **1.2 Considerations for the Experiment Dates**

Initially, the 1<sup>st</sup> Public Experiment was planned to be conducted from the second half of January to the beginning of February 2013. However, this date had to be rescheduled due to the passing of King Sihanouk on 15 October 2012, the official national burial scheduled on 4 February 2013 and the Chinese New Year celebration from 10 to 12 February.

Since the traffic situations within these periods are also considered to be abnormal, they are best avoided. Consequently, the 1<sup>st</sup> Public Experiment was rescheduled to the second half of February, 2013.

Furthermore, it is also necessary to consider the fact that traffic pattern is different between normal working days and weekends; the experiment period therefore was carefully picked to include 3 normal working days and 2 weekend days.

With these considerations, the time period for the 1<sup>st</sup> Public Experiment was finally fixed for 27 February 2013 (Wednesday) - 3 March 2013 (Sunday) for a total of 5 days.

## **1.3 Coverage Area for the Public Experiment**

From the perspective on a need to form a tourist pedestrian network, the eastern section of the major arterial road of Norodom was selected for the experimental implementation of ‘a one-way traffic operation’ (yellow colored area shown in Figure 1.3-1). The selected road sections run in an east-west direction and they directly link up with Sisowath within the Riverside district which is very popular with many foreign tourists.

In principle, one-way traffic operation is most suitable for any pair of parallel roads that are close to each other and which have serious traffic congestions. However, if such pair of roads is too far apart, then the detour distances become too long. In general, if the separating distance between the roads is about 300 m, and the directions of travel are not in conflict with any existing one-way circulation system, then such pairs of roads can be selected for the operation of one-way traffic measure.

As a result of such considerations, the following road sections are selected for the Public Experiment on one-way traffic operation.

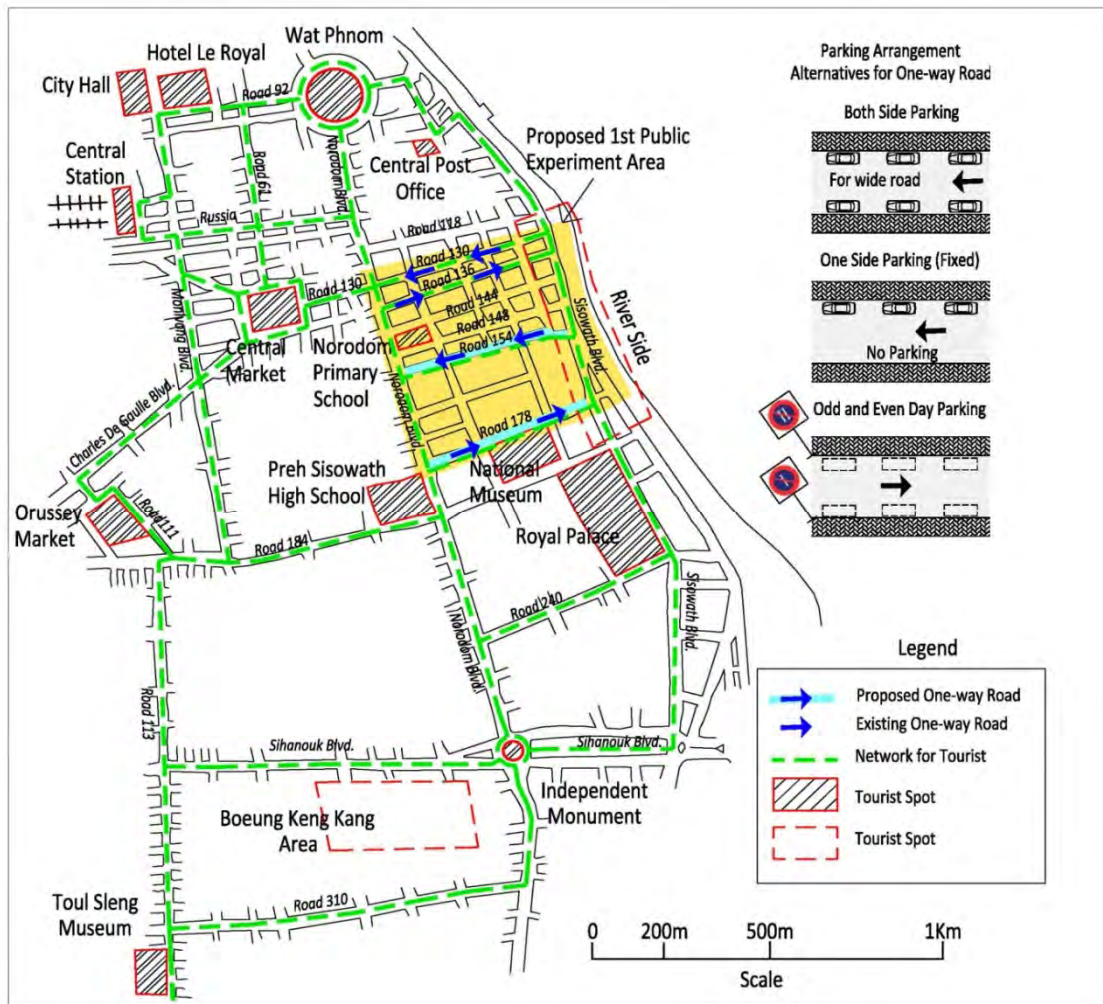
**Table 1.3-1 One-way Traffic Experimental Routes and Directional Flow**

St. No.	One way direction	Section
St.130	WEST←EAST	Sothearos-Norodom
St.136	WEST→EAST	Norodom-Sothearos
St.154	WEST←EAST	Sothearos-Norodom
St.178	WEST→EAST	Norodom-Sothearos East

Source: PPUTMP Project Team

In addition, for the convenience of tourists who move around on foot, pedestrian sidewalks that link up the major tourist spots forming a network (as indicated by the green dash lines in Figure 1.3-1) are first identified. Such a network was then selected and publicly announced specifying that portions of these sidewalk spaces were to be vacated as pedestrian walking spaces for the Public Experiment.

The coverage area for the 1<sup>st</sup> Public Experiment on traffic countermeasures is shown in the figure below.



Source: PPUTMP Project Team

**Figure 1.3-1 1<sup>st</sup> Public Experiment Coverage Area**

## 2 IMPLEMENTING ORGANIZATION AND TIME SCHEDULE FOR THE 1<sup>ST</sup> PUBLIC EXPERIMENT

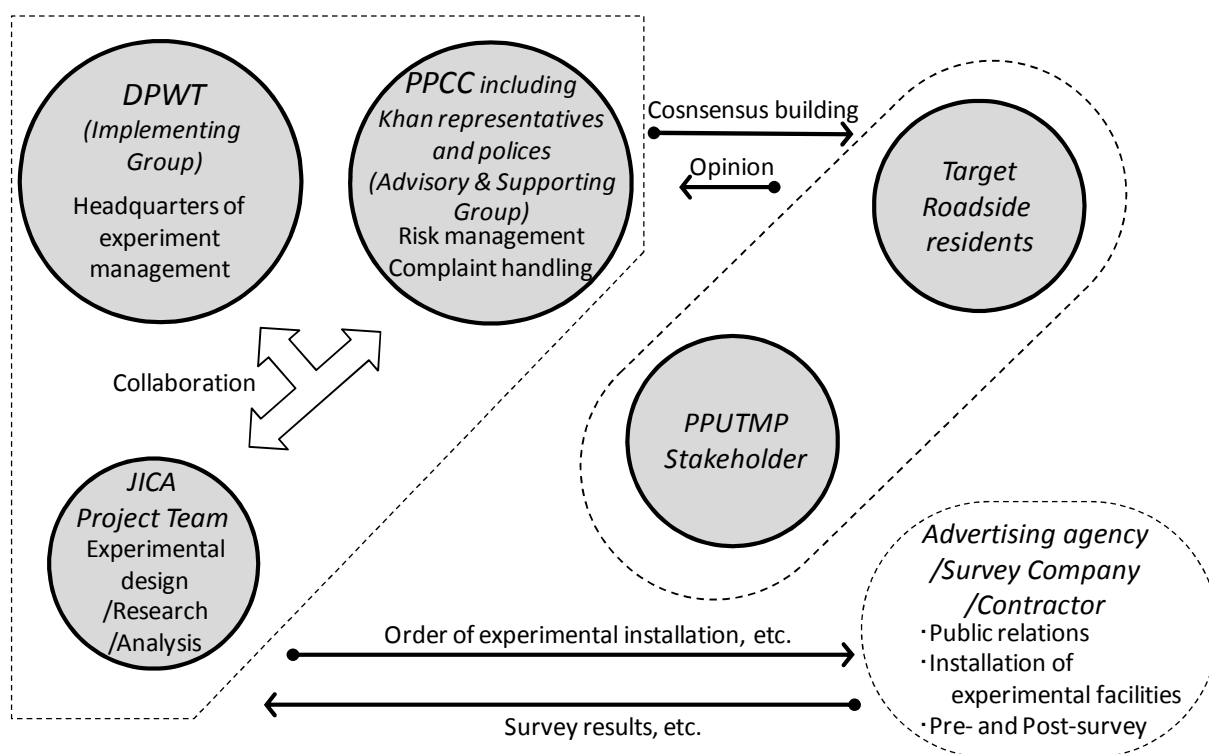
### 2.1 Implementing Organization

The 1<sup>st</sup> Public Experiment was conducted directly under the Department of Public Works and Transport (DPWT) with an operation headquarters set up under this department. The Public Experiment was also carried out in close collaboration with PPCC, which gave various suggestions and support for the Plan.

Furthermore, the PPUTMP Project Team provided much needed technical support to these two governmental organizations in terms of overall planning, survey implementation and analyses of the results of this Experiment.

Finally, residents along the selected areas and routes were also involved. They played the roles of the stakeholders in giving their own views and perspectives on the Experiment and eventually on the efforts of the Government in solving the future urban transport problems. Such public involvement was essential in ensuring the smooth conduct of the Experiment.

The implementing organization chart for the Experiment is shown in Figure 2.1-1 below.



Note: JICA= Japan International Cooperation Agency  
Source: PPUTMP Project Team

**Figure 2.1-1 Implementing Organization Chart**

## 2.2 Time Schedule for the Public Experiment

The time schedule for planning the 1<sup>st</sup> Public Experiment is shown in Table 2.2-1 below. The planning was first carried out in December 2012, while negotiations with all the related parties and explanations to local residents were completed by January 2013. From the end of January, public announcements on the Experiment began. As soon as the Chinese New Year was over in February, preparatory works and installation of signages for the Experiment were carried out.

**Table 2.2-1 Time Schedule for the 1<sup>st</sup> Public Experiment**

■ Schedule for 1st Public Experiment																															Remark									
December			January								February																			March										
3	10	17	31	4	14	15	20	21	31	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	1	2
Mon	Mon	Mon	Mon	Mon	Tue	Tue	Mon	Mon	Mon	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Formulation of Public Experiment Planning																																								
Coordination and Approval with Relevant Agencies																																								
Explanation and Coordination to Roadside Residents																																								
Awareness of Public Experiment before Implementation																																								
Traffic and Interview Pre-survey																																								
Installation of Road Marking and Signage, etc.																																								
Implementation of the Public Experiment																																								
Traffic & Interview Survey during the Experiment																																								
Analyzing and Presenting the result of Public Experiment																																								

Source: PPUTMP Project Team

### 3 DETAILED PLANNING FOR THE 1<sup>ST</sup> PUBLIC EXPERIMENT

#### 3.1 Traffic Patterns on the Selected One-way Traffic Road Sections

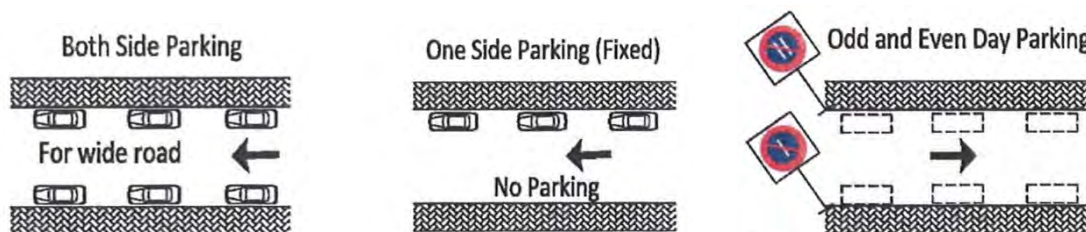
##### 3.1.1 Basic Considerations

This Public Experiment on traffic management encompasses the implementation of a one-way traffic operation, enforcement of illegal parking on sidewalks and designating a network of pedestrian sidewalks. The illegally parked vehicles shall be redirected to curbside parking strips along roadways and to off-street parking facilities.

If the width of the roadways is sufficiently wide, then curbside parking on both sides of the roads may be possible. However, if the width is too narrow, then parking on only one side will be allowed. Currently, parking restrictions are being enforced on some road sections, depending on road sections and 'odd/even' scheme. However, such restrictions have not produced satisfactory results. In conjunction with this 1<sup>st</sup> Public Experiment, such restrictions can be further reviewed and incorporated into the Experiment with the objective of heightening the awareness of illegal parking among the public.

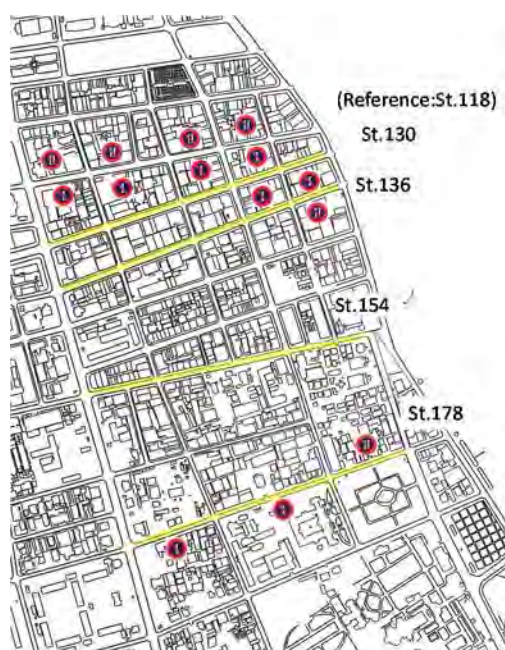
On the other hand, along the designated one-way traffic road sections in this Experiment, the fundamental roadway usage patterns are designated as below (see Figure 3.1-1):

- Parallel curbside parking pattern on both sides of roadways (road sections having sufficient road width)
- Parallel curbside parking pattern on one side of roadways (road sections having limited road width)
- Parallel curbside parking pattern on 'odd' or 'even' days (part of the existing parking restriction road sections)



Source: PPUTMP Project Team

**Figure 3.1-1 Traffic Patterns on the Selected One-way Road Sections**



Source: PUTMP Project Team

**Figure 3.1-2 Locations of Existing Signage for ‘Odd/Even’ Parking Restrictions within the Experimental Area**

### 3.1.2 Roadway Operation for Each Block

The selected roadways for implementing the experimental one-way traffic operation can be basically subdivided into ‘blocks’ based on actual measurements of road widths taken on site. These roadways are found to have a standard width of either 8.0 m or 11.0 m.

Currently, the west bound one-way road of St.130 is a two-lane road with sufficient width for providing curbside parking strips on both sides of the entire roadway. The traffic pattern on this roadway, for instance, shall be maintained as it is. In addition, the parking strip on this roadway of 2.25 m (as measured on site) shall be adopted as the standard width for curbside parking strips on other road sections in this Experiment.

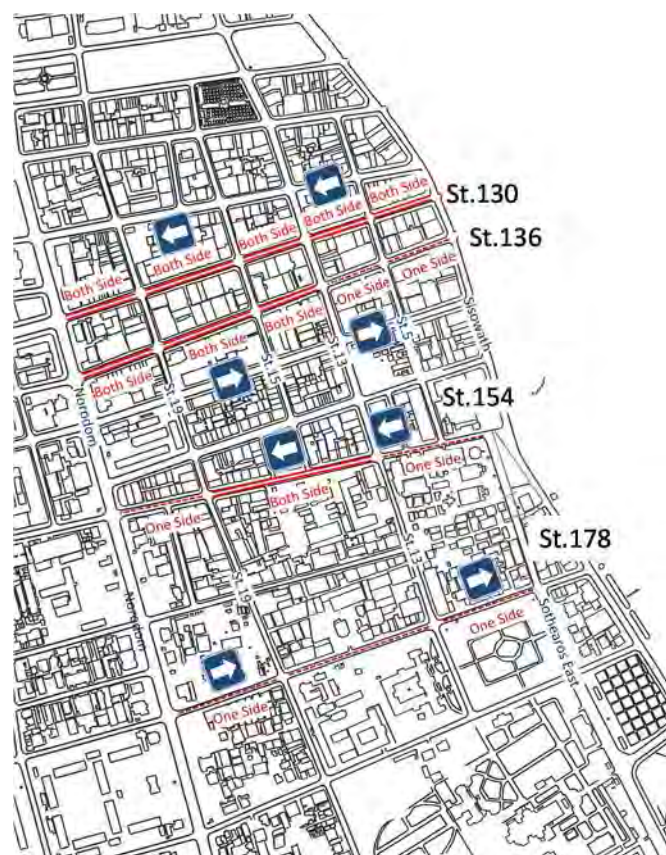
In the case of a one-lane, one-way traffic road section, one has to consider the needs for emergency parking for vehicles in trouble. A minimum width of 5.5 m is hence necessary made up of 3.0 m wide roadway and 2.5 m road shoulders.

Therefore, if curbside parking spaces are to be permitted on one side of the roadway, then an additional 2.25 m is needed, giving rise to a total width calculated as follows:  $7.75 \text{ m} \cong 8.0 \text{ m}$ . Hence, for road sections having a total width of 8.0 m, curbside parking will be permitted on one side of the road only.

On the other hand, for road sections with two lanes operating a one-way traffic flow and curbside parking spaces provided on both sides of the roadway, then the calculation of total road width necessary would be as follows:  $2.25 \text{ m} + 3.0 \text{ m} \times 2 \text{ lanes} + 2.25 \text{ m} = 10.5 \text{ m} \cong 11.0 \text{ m}$ . Hence, for road sections having a total width of 11.0 m, curbside parking will be permitted on both sides of the road.

Thus, for road sections with a width of 8.0 m, curb parking on one side would be permitted; and for road sections with a width of 11.0 m, curb parking on both sides would be permitted.

Using the above basic principles and considering the continuity of the road sections, the roadway operation by block is illustrated in the figure below.



Source: PPUTMP Project Team

**Figure 3.1-3 Roadway Operation by Block**

After careful consideration of the roadway operation, the road cross-sections by routes and streets were designed as shown in the following three examples (see Figures 3.1-4 to 3.1-6):



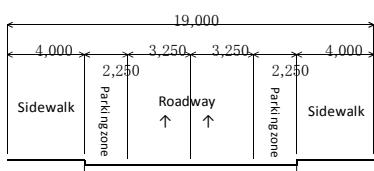
■ Current

St. No.	One-way direction	Section name	Left sidewalk(m)	Roadway(m)	Right sidewalk(m)	Full width(m)
St. 136	WEST→EAST	Norodom-St.19	4.0	11.0	4.0	19.0
St. 136	WEST→EAST	St.19-St.15	4.0	11.0	4.0	19.0
St. 136	WEST→EAST	St.15-St.13	4.5	11.0	4.5	20.0
St. 136	WEST→EAST	St.13-St.5	5.5	8.0	5.5	19.0
St. 136	WEST→EAST	St.5-Sisowath	6.0	8.0	6.0	20.0

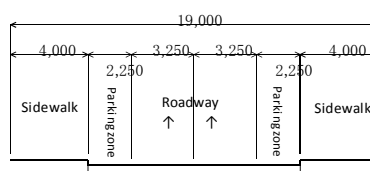
■ Public Experiment

St. No.	One-way direction	Section name	Left sidewalk(m)	Parking zone (m)	RSt.way(m)	Parking zone (m)	Right sidewalk(m)	Full width(m)
St. 136	WEST→EAST	Norodom-St.19	4.0	2.25	6.5	2.25	4.0	19.0
St. 136	WEST→EAST	St.19-St.15	4.0	2.25	6.5	2.25	4.0	19.0
St. 136	WEST→EAST	St.15-St.13	4.5	2.25	6.5	2.25	4.5	20.0
St. 136	WEST→EAST	St.13-St.5	5.5	0.25	5.5	2.25	5.5	19.0
St. 136	WEST→EAST	St.5-Sisowath	6.0	0.25	5.5	2.25	6.0	20.0

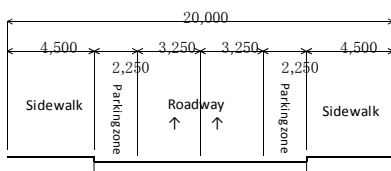
St.136(Norodom-St.19)



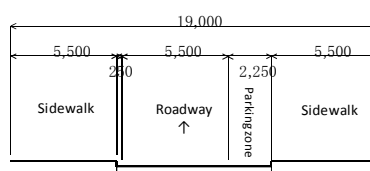
St.136(St.19-St.15)



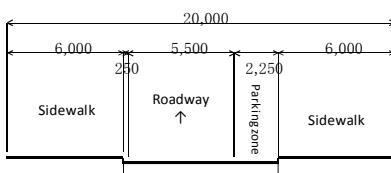
St.136(St.15-St.13)



St.136(St.13-St.5)



St.136(St.5-Sisowath)



Unit: mm

Source: PPUTMP Project Team

Figure 3.1-4 Road Cross Sections by Block for St.136

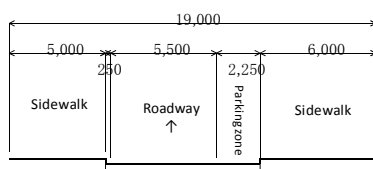
■ Current

St. No.	One-way direction	Section name	Left sidewalk(m)	Roadway(m)	Right sidewalk(m)	Full width(m)
St. 154	WEST←EAST	Sisowath-St.5	5.0	8.0	6.0	19.0
St. 154	WEST←EAST	St.5-St.13	5.0	8.0	6.0	19.0
St. 154	WEST←EAST	St.13-St.15	4.5	11.0	4.5	20.0
St. 154	WEST←EAST	St.15-St.19	4.5	11.0	4.5	20.0
St. 154	WEST←EAST	St.19-Norodom	6.0	8.0	6.0	20.0

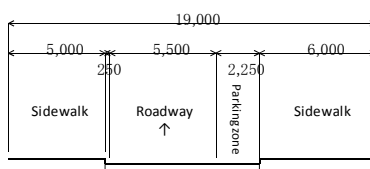
■ Public Experiment

St. No.	One-way direction	Section name	Left sidewalk(m)	Parking zone (m)	RSt.way(m)	Parking zone (m)	Right sidewalk(m)	Full width(m)
St. 154	WEST←EAST	Sisowath-St.5	5.0	0.25	5.5	2.25	6.0	19.0
St. 154	WEST←EAST	St.5-St.13	5.0	0.25	5.5	2.25	6.0	19.0
St. 154	WEST←EAST	St.13-St.15	4.5	2.25	6.5	2.25	4.5	20.0
St. 154	WEST←EAST	St.15-St.19	4.5	2.25	6.5	2.25	4.5	20.0
St. 154	WEST←EAST	St.19-Norodom	6.0	0.25	5.5	2.25	6.0	20.0

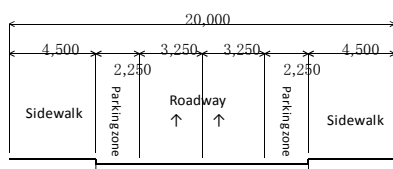
St.154(Sothearos-St.5)



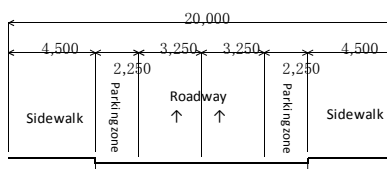
St.154(St.5-St.13)



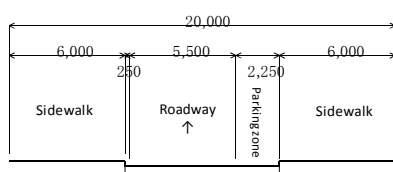
St.154(St.13-St.15)



St.154(St.15-St.19)



St.154(St.19-Norodom)



Unit: mm

Source: PPUTMP Project Team

Figure 3.1-5 Road Cross Sections by Block for St.154

### 1) St.178

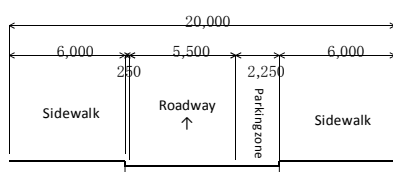
■ Current

St. No.	One-way direction	Section name	Left sidewalk(m)	Roadway(m)	Right sidewalk(m)	Full width(m)
St. 178	WEST→EAST	Norodom-St.19	6.0	8.0	6.0	20.0
St. 178	WEST→EAST	St.19-St.13	6.0	8.0	6.0	20.0
St. 178	WEST→EAST	St.13-Sothearos	6.0	7.0	6.0	19.0

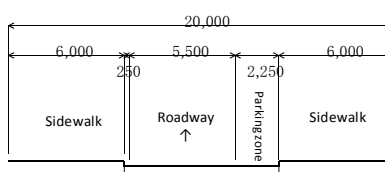
■ Public Experiment

St. No.	One-way direction	Section name	Left sidewalk(m)	Parking zone (m)	RSt.way(m)	Parking zone (m)	Right sidewalk(m)	Full width(m)
St. 178	WEST→EAST	Norodom-St.19	6.0	0.25	5.5	2.25	6.0	20.0
St. 178	WEST→EAST	St.19-St.13	6.0	0.25	5.5	2.25	6.0	20.0
St. 178	WEST→EAST	St.13-Sothearos	6.0	0.0	5.5	2.25	5.2	19.0

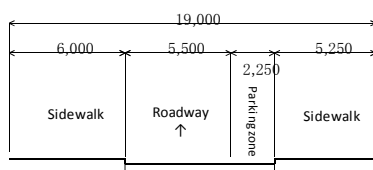
St.178(Norodom-St.19)



St.178(St.19-St.13)



St.178(St.13-Sothearos)



Unit: mm

Source: PPUTMP Project team

**Figure 3.1-6 Road Cross Sections by Block for St.178**

## 3.2 Pedestrian Sidewalk Design

### 3.2.1 Basic Concept

Sidewalks on the existing roads are largely being used as parking spaces by the adjoining shop owners, or as storage spaces for their motorcycles, or as their terrace seating or display spaces for their merchandise and even as work space. Due to these reasons, pedestrians are forced to walk on the roadway instead.

All the target roads in this Public Experiment are linked to the popular tourist area of Riverside District. A pedestrian network that lacks continuity would surely affect the safety of tourists. It also does not offer a comfortable walking environment nor present itself as a tour circuit for the foreign visitors.

In this Public Experiment, the following design concepts or principles are selected based on the desire to allow the proper usage of certain road facilities while removing illegally parked vehicles and at the same time ensuring a safe and contiguous walking space for the pedestrians.

- Irrespective of what building usage was along the target route, the local residents were requested to clear out a 2.0 m wide corridor adjoining the edge of the roadway in allowing pedestrians sufficient space to move about comfortably,
- However, in cases where such space could not be secured due to various unavoidable reasons such as the presence of unmovable objects or ongoing sidewalk construction works, sections of the curbside parking strip were substituted as the pedestrian space.

The following photos show two examples of loss of pedestrian walking spaces to other uses and two examples of preservation of pedestrian walking spaces:



An example of pedestrian sidewalk being used as work space (near intersection of St.154 and St.17)



An example of pedestrian sidewalk being used as terrace seating area bordered with potted plants (near intersection of St.118 and St.13)



An example of pedestrian walking space being preserved in spite that a portion is used as a Café terrace seating (beside FCC on St.178)



An example where continuous walking space is possible as there are no parked vehicles on the sidewalk (in front of National Museum on St.178).

**Figure 3.2-1 Examples of Existing Pedestrian Sidewalk Spaces**

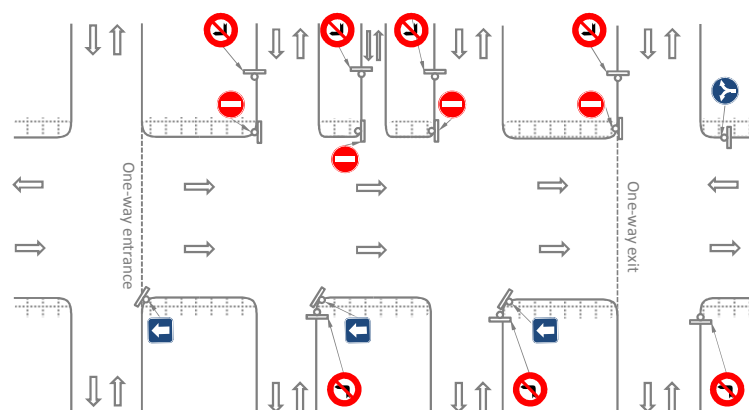
Source: PPUTMP Project team

### 3.3 Installation Planning of Traffic Signs and Road Markings

#### 3.3.1 Planning for the Installation of One-way Traffic Signs

Basic concepts on installation of traffic signs are as follows (see Figure 3.3-1):

- Traffic signs indicating **'One Way Traffic'** should be installed at the entry points to the one-way traffic road sections as well as at the right-hand corners of entry points of intersecting roads; whereby drivers traveling toward the one-way direction can easily recognize the designated direction of traffic flow;
- Traffic signs indicating **'No Entry'** should be installed at the exit points of the one-way traffic road sections as well as at the right-hand corners of exit points of intersecting roads, whereby drivers traveling from the opposite direction to the one-way traffic flow can recognize the prohibitive entry to the traffic flow;
- Traffic signs indicating **'No Left Turn'** or **'No Right Turn'** should be installed at the right-hand corners of entry points of intersecting roads such that drivers traveling toward the one-way traffic road section can recognize the prohibitive directions of traffic flow toward either the left or right; and
- Traffic signs indicating **'Left Turn'** or **'Right Turn'** should be installed at the right-hand corners of entry points of roadways operating in the opposite direction and connecting to the exit points of the one-way traffic road sections.



Source: PPUTMP Project Team

**Figure 3.3-1 Conceptual Image of Traffic Signs Installation for the One-way Traffic Operation**

#### 3.3.2 Planning for the Installation of Road Markings

Basic concepts on installation of road markings are as follows (see Figure 3.3-2):

- (Parallel Parking) Parking Bays Markings,
- Center line markings on a two-lane roadway,
- Vehicle lane outer markings (as pedestrian sidewalk's borderline marking) in the case where a section of roadway was substituted as the sidewalk, and
- Pedestrian crosswalk markings at the intersections of 2-lane roadways, in view of the necessity in protecting the safety of pedestrians and to ensure continuity of pedestrian sidewalks.
-



Source: PPUTMP Project Team

**Figure 3.3-2 Installation Concept of Road Markings (image)**

These road markings have to be installed to encourage proper parking, regulate traffic flows and ensure the smooth and safe implementation of the Public Experiment.

### 3.3.3 Planning Summary of Traffic Signs and Road Markings Installation

Upon discussions with the relevant counterpart organizations as well as local residents on the above basic design concepts and installation planning, the following additional suggestions were taken into account:

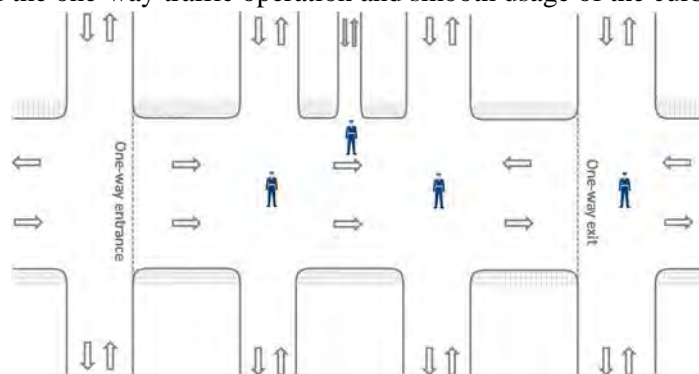
- With reference to examples on other roadways in the city, it was suggested that the designated curbside parking strips be left without any dividing bay markings; and
- Parking facility was to be installed on St.178 without following the existing parking restrictions on Odd/Even parking regulation.

Together with these suggestions, the final installation plan on traffic signs and road markings for the Public Experiment was produced and shown in the Figure 3.3-4.

### 3.3.4 Assignment Plan for Assisting Staff for the Public Experiment

Concept in assigning aides for the Experiment:

- For this Public Experiment which involves the experimental implementation of one-way traffic operation along selected routes and during specific time periods, even with the careful planning and installation of appropriate traffic signs and markings as well as public announcements, it was foreseeable that some confusion may still occur during the Experiment.
- For this reason, it was suggested that a group of trained assisting staff be assigned along the selected road sections to provide assistance or guidance to the road users, thus ensuring the observance of the one-way traffic operation and smooth usage of the curbside parking facility.



Source: PPUTMP Project Team

**Figure 3.3-3 Assignment Plan of Assisting Staff for the Public Experiment**



Source: PPUTMP Project Team

Figure 3.3-4 Planning Summary of Traffic Signs and Road Markings Installation

## 3.4 Traffic Survey Planning

### 3.4.1 Vehicular Traffic Volume Survey

A cross-sectional traffic volume survey by vehicle type by direction was conducted according to the following factors:

#### (1) Time and Date (Pre-Experiment Survey and During Experiment Survey)

Pre-Experiment and during Experiment Surveys both on a normal weekday and weekend were planned. A total of 4 times of this traffic volume survey was conducted according to the following schedules.

**Table 3.4-1 Schedule of Traffic Volume Survey**

	Pre-Experiment Traffic Survey	On-Experiment Day Traffic Survey
Weekday	21/Feb/2013 (Thu.)	1/Mar/2013 (Fri.)
Weekend	24/Feb/2013(Sun.)	4/Mar/2013(Sun.)

Source: PPUTMP Project Team

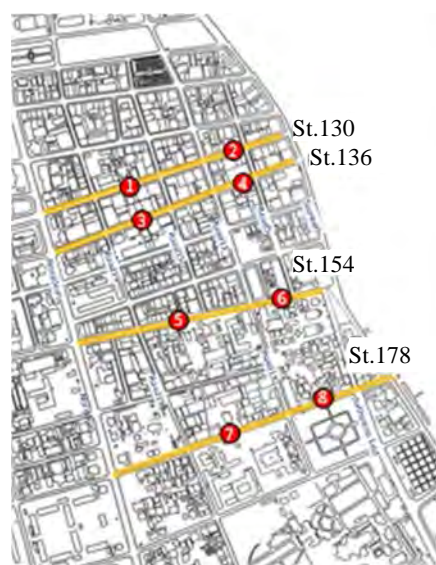
#### (2) Survey Location

The traffic volume surveys by vehicle type were conducted at two selected locations on each of the target 4 routes, giving a total of 8 survey locations.

#### (3) Types of Vehicles

Traffic volumes were counted by the following categories of vehicles:

1. Passenger Car/Taxi
2. Bus
3. Truck
4. Motorbike/Motodop
5. Motorumok modern (tuk-tuk)
6. Others



Source: PPUTMP Project Team

**Figure 3.4-1 Vehicular Traffic Volume Survey Locations**

### 3.4.2 Pedestrian Volume Survey

A survey of the pedestrian volume was also conducted during the Public Experiment to gauge the effect of the experimental implementation of a continuous pedestrian network on any changes to the pedestrian demand and pattern.

#### (1) Date and Time

The pedestrian volume survey was conducted prior to the Experiment (on 26 February (Tuesday)) and during the Experiment (on 1 March, (Friday)). The survey was conducted between 10:00 to 11:00.



## (2) Survey Location

The survey was conducted at one selected location on each of the 4 target routes, for a total of 4 locations.



Source: PPUTMP Project Team

**Figure 3.4-2 Pedestrian Traffic Volume Survey Locations**

### 3.4.3 Interview Survey

#### (1) Survey Date and Time (Survey on Experiment Day)

The interview survey was conducted twice on the same day as the traffic volume survey, i.e., on a weekday and weekend as shown below:

**Table 3.4-2 Schedule of Interview Survey**

	Date
Weekday	1/Mar/2013 (Fri.)
Weekend	4/Mar/2013(Sun.)

Source: PPUTMP Project Team

#### (2) Target Persons

The interview survey targeted the pedestrians (both tourists and locals), residents along the target routes and vehicle drivers.

#### (3) Survey Method

The target persons were directly interviewed by interviewees.

#### (4) Interview Contents

The interview survey contents are shown in the survey forms below:

**For Residents/ Shop Owners:**

**Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City**  
Public Experiment along Roads 130, 138, 154 and 178  
Questionnaire Survey  
(For Resident/Shop Owner)

Date: \_\_\_\_\_ Place: \_\_\_\_\_ Surveyor: \_\_\_\_\_

1. Gender : a Male b Female

2. Age : a Below 19 b 20 – 29 c 30 – 39  
d 40 –49 e 50 -59 f 60 & above

3. Occupation: a. Student b.Company/Government staff c.Shop owner d.Housewife e.Jobless f.Other: Please specify \_\_\_\_\_

4. Which floor do you live? a. Ground Floor b. Other: Please specify \_\_\_\_\_

5. How do you feel about the sidewalk conditions along the public experiment section?

5-1 Before PE a. Difficult to walk because of the illegal on-sidewalk parking  
b. Difficult to walk because of the many street vendors  
c. Difficult to walk because of the deteriorated pavement  
d. Difficult to walk because of the difference in level of sidewalk  
e. Difficult to walk because of the scattered trash on the sidewalk.  
f. No problem

5-2 During PE a. Better than before because of comfort of walk  
b. Better than before because of safety of walk  
c. No change  
d. Worse than before because of inconvenience

5-3 After PE a. To be continued  
b. Better to continue if some conditions can change  
f. No problem

6. If answer to above is (b.), what is that condition/s?

7. Car Parking

7-1. Where did you park before PE?  
a. Sidewalk b. Carriageway c. Off-road Parking d. Other: Please specify \_\_\_\_\_

7-2. Where did you park during PE?  
a. Sidewalk b. Carriageway c. Off-road Parking d. Other: Please specify: \_\_\_\_\_

7-3. What do you think about the on-street parking measures in the future?  
a. To be continued  
b. Better to continue if some conditions can change  
c. No need to continue

8.If answer to above is (b.), what is that condition/s?

9. Motorcycle Parking

9-1. Where did you park before PE?  
a. Sidewalk b. Carriageway c. Off-road Parking d. Other: Please specify \_\_\_\_\_

9-2. Where did you park during PE?  
a. Sidewalk b. Carriageway c. Off-road Parking d. Other: Please specify \_\_\_\_\_

9-3. What do you think about the on-street parking measures in the future?  
a. To be continued  
b. Better to continue if some conditions can change  
c. No need to continue

10.If answer to above is (b.), what is that condition/s?

11. Answers Freely Given:



## For Drivers:

**PPUTMP**  
Interview Survey  
(For Driver)

Date: \_\_\_\_\_ Place: \_\_\_\_\_ Surveyor: \_\_\_\_\_

1. Gender: a. Male b. Female

2. Age: a. Below 19 b. 20 – 29 c. 30 – 39  
d. 40 – 49 e. 50 – 59 f. 60 & above

3. Occupation: a. Student b. Company/Government staff c. Shop owner d. Housewife e. Jobless f. Other: Please specify \_\_\_\_\_

4. Trip purpose: a. To Work/School b. Business c. Shopping d. Eating/Drinking e. Entertainment  
f. To Visit g. Other: Please specify \_\_\_\_\_

5. Vehicle Driven: a. Car b. Motorcycle c. Motoromok modern (tuk-tuk) d. Cyclo e. Other: Please specify: \_\_\_\_

6. About one-way traffic system

6-1. Before PE

a. Smoothness of traffic flow	Good	Fair	Bad
b. Safety of driving	Good	Fair	Bad
c. Convenience of driving	Good	Fair	Bad

6-2. During PE

a. Smoothness of traffic flow	Good	Fair	Bad
b. Safety of driving	Good	Fair	Bad
c. Convenience of driving	Good	Fair	Bad

6-3. After PE

a. To be continued  
b. Better to continue if some conditions can change  
c. To be continued with the expansion to other areas  
d. No need to continue

7. If answer to above is (b.), what is that condition/s?

8. About Parking Space

8-1. Where did you park before PE?  
a. Sidewalk b. Carriageway c. Off-road Parking d. Other: Please specify \_\_\_\_\_

8-2. Where did you park during PE?  
a. Sidewalk b. Carriageway c. Off-road Parking d. Other: Please specify \_\_\_\_\_

8-3. What do you think about the on-street parking measures in the future?  
a. To be continued  
b. Better to continue if some conditions can change  
c. No need to continue

9. If answer to above is (b.), what is that condition/s?

10. Freely Given Answers:

### 3.4.4 Vehicle Parking Survey

A vehicle parking survey was conducted to count the number of parked vehicles before and during the Experiment in order to gauge the effect on parking demand by the new parking countermeasures.

#### (1) Survey Date and Time

The parking survey was conducted three times at 6:00, 12:00 and 19:00 on two days, one day prior to the Experiment date (26 February (Tues.)) and during the Experiment (3 March (Sun.)).

#### (2) Survey Location

The parking survey targeted the entire area under the Experiment. The survey aggregated the number of parked vehicles by road sections between intersections of all the targeted routes.

## 4 PREPARATORY WORKS FOR THE PUBLIC EXPERIMENT

### 4.1 Public Announcement before the Experiment

Announcement of the Experiment to the local residents was done in the form of banners, posters, flyers and city website (see Figures 4.1-1 to 4.1-3). Posters displayed along roads were in Khmer Language.



Source: PPUTMP Project Team


**Figure 4.1-1 Display of Banners and Posters**



Source: PPUTMP Project Team

**Figure 4.1-2 Hand to hand Distribution of Flyers**

## PUBLIC EXPERIMENT FOR ONE-WAY ROAD IMPLEMENTATION, PARKING AND SIDEWALK ARRANGEMENT IN DAUN PENH!



**Experimental Map**

Proposed One-way Road  
Existing One-way Road  
Reserved Sports Market for Tourist  
Tourist Space  
Tourist Space

**One-way road will be implemented along 4roads starting from Norodom Blvd. to Sisowath Blvd.**

1. Road 130 with length of 570m (Existing One-way Road)
2. Road 178 with length of 578m (Existing One-way Road)
3. Road 154 with length of 577m
4. Road 178 with length of 645m

Schedule for February and March 2013


February																												March		
10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	1	2	3									
Road marking and traffic sign installation																	Road Experiment													

**The experiment will be conducted from 27th of February to 03rd of March 2013**


- One-way road
- Sidewalk for pedestrian
- Parking

**Expected result of the experiment**


- Reduce traffic congestion
- Provide an arranged on-street car parking
- Provide safe sidewalk for pedestrian
- Make city more attractive for tourists



Arranged parking space with safety for pedestrians






Sidewalk with safe space for pedestrian



Green, clean, and tourist friendly

Department of Public Work and Transport in Phnom Penh  
Street 211 Sangkhat Vealvong Khan Prampir Markara  
Te : +(855)23 881 550  
Email : [pputmp@gmail.com](mailto:pputmp@gmail.com)  
Website : <http://www.phnompenh.gov.kh>

Source: PPUTMP Project Team

Figure 4.1-3 Poster and Flyer Designs

## 4.2 Stakeholder Meetings

### 4.2.1 Minutes of Meeting (1)

A kick-off meeting for the 1st Public Experiment was conducted at the DPWT Meeting Room 2 from 15:00 to 17:00 of 4 January 2013 (photos and attendance list are shown in Figure 4.2-1 and Table 4.2-1, respectively). The minutes of the meeting are as follows:

#### (1) Opening of Meeting

The meeting was presided over by Mrs. Bopha Phanny, Deputy Director of DPWT. The chairperson gave opening remarks and welcomed the meeting attendees.

#### (2) Presentation of Activities

Mr. Masato Koto explained the implementation of one-way system, parking and sidewalk management along Sts.130, 136, 154 and 178 from Norodom to Sisowath. He presented the following items:

- a) Outline of the plan
- b) Outline of the 1<sup>st</sup> Public Experiment
- c) Implementation Organization
- d) Implementation Schedule – proposed dates of 20 February 2013 to 24 February 2013.
- e) Posters for 1<sup>st</sup> Public Experiment

#### (3) Q & A Session

- Mr. Ek Khun Doeun suggested reconsidering the one-way system implementation along St.154 since this might create the difficulty for citizens to travel to river side, and it might disappoint the citizens and resident over there. Moreover, he proposed to implement one-way system along St.144 and St.148. Importantly, he shared useful information that the new night market will be constructed in front of Phnom Penh Post Office in the future. Furthermore, he suggested that the Project Team provide information about the 1<sup>st</sup> Public Experiment to residents over there directly, and he mentioned that it is good to have public forum about the 1<sup>st</sup> Public Experiment at those areas. Lastly, he suggested that the Team provide posters about this plan to relevant authorities and residents who live in those areas.
- Mr. Sor Phara was concerned about the vehicle parking along those streets as there are no parking measures for those who park their cars for a long period of time. Moreover, he suggested that the Team change the title of this experiment to “The project of one-way system, parking and sidewalk management” in order to make the plan more understandable for the citizens.
- Mrs. Bopha Phanny responded that according to the traffic law, the vehicle users are able to park their cars for 24 hours along the street that is allowed for parking; however, if they park more than 24 hours, the traffic police have the right to fine them.
- Mr. Ou Thun Sal agreed with the Project Team about the 1<sup>st</sup> Public Experiment proposal.
- All participants agreed to allow parking on both sides of those 4 streets if the carriageway width is 11.0 m and to allow odd/even parking if the width of carriageway is less than 11.0 m.

#### (4) Close of Meeting:

The meeting ended at 17:00 with mutual understanding reached by all the attendees.



Source: PPUTMP Project Team

**Figure 4.2-1 Photos of the Meeting (1)**



**Table 4.2-1 List of Attendees**

No.	Name	Title	Tel.
1	Bopha Phanny	Deputy Director of DPWT	090 908 888
2	Preng Savun	Deputy Chief of Sangkat Phsar Kandal II	012 893 231
3	AmRong Soben	Khan Daun Penh Deputy Police Inspector	012 994 919
4	Sam Rithy	Deputy Chief of Sangkat Chey ChumNeas	012 662 222
5	Mao Kol Marady	Deputy Director of the Department of Urbanization, PPCH	011 812 234
6	Sor Phara	Chief of Development, Management and Construction Office, PPCH	011 776 662
7	Lemahieu Charlotte	Trainee in the urban sector	088 304 639
8	Masato Koto	PPUTMP Team Leader	016 313 906
9	Keo Leng	Commune Member	011 218 010
10	Teav Sunpheak	PPUTMP Member	012 733 753
11	Moeung Sophan	DPWT	012 936 563
12	Prom Kampoul	DPWT	016 368 185
13	Ek Khun Doeun	Deputy Governor of Khan Daun Penh	011 991 996
14	Ou Thun Sal	DPWT	012 993 639
15	Tear Kun	Vice Chief of Administrative Office, DPWT	
16	Sophan Phatan	PPUTMP Member	012 889 455



Note: PPCH= Phnom Penh City Hall  
Source: PPUTMP Project Team

## 4.2.2 Minutes of Meeting (2)

A second meeting on the implementation of the 1st Public Experiment Project was held at the Phnom Penh Capital Hall (Room 3) on 31 January 2013, 10:00 - 11:20 (attendance list and photos are shown in Table 4.2-2 and Figure 4.2-2, respectively). The minutes are as follows:

### (1) Opening of Meeting

The meeting was chaired by Mr. TIV Piseth, Chief of administration office, PPCH. To start, Mr. Piseth briefly explained the purpose of the meeting and then handed over to Mr. Chou Kimtry, Deputy Director of DPWT the task of explaining the details of the 1<sup>st</sup> public experiment.

### (2) Outcome of Meeting

After the explanation and discussions, the following decisions were reached:

- The meeting with roadside residents for the public awareness of the experiment will be rescheduled for 15 February 2013 and the actual implementation of the public experiment will be conducted from 26 February to 3 March 2013.
- Phnom Penh Capital Hall will handle media for the experiment.
- Khan Daun Penh has to find a place for the roadside resident meeting. And during the experiment, Daun Penh Police have to provide support for public order in the target areas.
- The Project Team will have to submit the final content of the flyer, banner and poster to PPCH for approval. On 20 March 2013, DPWT and the Team are to present the results of the experiment to PPCH.

### (3) Close of Meeting

The meeting ended at 11:20 with mutual understanding of the items discussed.

**Table 4.2-2 List of Attendees**

No.	Name	Position	Phone Number
1	Mao Kolmardy	Deputy Director of BAU Office	011 812 234
2	Chou Kimtry	Deputy Director of DPWT	012 891 056
3	Moeung Sophan	DPWT	012 936 563
4	Prum Kampoul	DPWT	095 222 531
5	Lim Hong	Vice Chief of Daun Penh Police	011 838 115
6	Masato Koto	PPUTMP Team Leader	016 313 906
7	Teav Sunpheak	PPUTMP Member	012 733 753
8	Hem Botom	Deputy Director of Daun Penh District	012 629 943
9	Dor Samphors	Deputy Chief of International Relation Office	017 662 223
10	So Phara	Chief of Construction Management Office	011 776 662
11	Leng Thida	Officer of Construction Management Office	011 737 490

Note: BAU= Bureau of Urban Affairs

Source: PPUTMP Project Team



Source: PPUTMP Project Team

**Figure 4.2-2 Photos of the Meeting (2)**

### 4.2.3 Minutes of Meeting (3)

The meeting with residents that will be affected by the public experiment took place on 15 February 2013, 8:30 - 11:00, at Sangkat Chey Chum Neas (St.130, 136, 154). They discussed the One-way Road System, Parking and Sidewalk Arrangements in Daun Penh District. Photos taken of the meeting and the attendance list are shown in Figures 4.2-3 and Table 4.2-3, respectively.

#### (1) Opening of Meeting

- Mr. Ek KhunDuen, Deputy Governor of Khan Daun Penh, welcomed the resident to this very important meeting. He made a brief introduction of the public experiment that will be implemented from 27 February 2013 until 3 March 2013, and informed the residents that they will not have to pay for anything for the conduct of the public experiment. Therefore, the residents should not be concerned about this issue.
- Mr. Sam Piseth, Director of the Department of Public Works and Transport, welcomed all the participants and explained the objectives of this public experiment as follows:
  - To decrease the traffic congestion in the city; and
  - To fulfill the citizens' demand for better traffic environment.Furthermore, he requested the cooperation of the residents in order to make the public experiment effective. He also informed them that DPWT is going to propose to Phnom Penh Capital Hall to install light poles along St.136.

#### (2) Presentation of Activities

Mr. Chou KimTri, Deputy Director of DPWT, introduced the public experiment that includes implementation of one-way system, parking and sidewalk management along St.130, 136, 154 and 178 from Norodom to Sisowath, The sequence of his presentation is as follows:

- a) Introduction
- b) Objectives of Public Experiment
- c) Outline of Public Experiment
- d) One-way system map in Khan Daun Penh
- e) Schedule of Public Experiment implementation
- f) Sample flyers and posters of the Experiment.

#### (3) Close of Meeting

Mr. Ek Kun Duen appreciated the attendance of the residents who spent their valuable time to participate in this resident meeting. The meeting ended at 11:00 with mutual understanding of the items discussed.

#### (4) Q & A Session

- A resident would like DPWT to clarify if there are any parking arrangements for the motorcycle and motorumok modern (tuk-tuk) along the roadside. DPWT responded that all kinds of vehicles including motorcycles, cars, motorumok modern (tuk-tuk) and cyclo are required to park on the roadside where there are signs allowing parking.
- Another resident expressed her delight at the introduction of the public experiment and her strong support for it because the traffic congestion and illegal parking occur quite often in her community, and she wanted her community to have a better traffic situation.





Source: PPUTMP Project Team

**Figure 4.2-3 Photos of the Meeting (3)**

**Table 4.2-3 List of Attendees**

No.	Name	Title
1	Mr. Ek Khun Deun	Deputy Governor of Khan Daun Penh
2	Mr. Sam Piseth	Director of Department of Public Works and Transport
	Mr. Chou KimTry	Deputy Director of Department of Public Works and Transport
3	Traffic Police Authority	
4	Sangkat Chey Chum Neas Chief and Officials	
5	Sangkat Phsar Kon Dal I Representative and Officials	
6	Sangkat Phsar Kon Dal II Representative and Officials	
7	Sangkat Phsar Chas Representative and Officials	
8	200 Residents from 4 Sangkats:	
	- Sangkat Chey Chum Neas	
	- Sangkat Phsar Kon Dal I	
	- Sangkat Phsar Kon Dal II	
	- Sangkat Phsar Chas	
9	Mr. Masato Koto	PPUTMP Team Leader
10	Mr. Teav SunPheak	PPUTMP Member
11	Ms. Sophan Phatan	PPUTMP Member



Source: PPUTMP Project Team

#### 4.2.4 Minutes of Meeting (4)

Another meeting with the residents to discuss the one-way road system, parking and sidewalk arrangements in Daun Penh District was held at a hall at the Royal University of Fine Arts (St.178) on 15 February 2013, 15:00 - 16:30 (photos and attendance list are shown in Figure 4.2-4 and Table 4.4-4, respectively). The minutes are as follows:

##### (1) Opening of Meeting

- Sangkat Chey Chum Neas Chief expressed her sincere appreciation to the Royal University of Fine Arts for providing a very nice hall for this important meeting, and she also thanked all the residents who participated in this meeting.
- Mr. Masahiko Egami also expressed his gratitude to the participants and requested their strong cooperation for the public experiment implementation.

##### (2) Presentation of Activities

Mr. Chou Kimtry, Deputy Director of DPWT, presented the 1<sup>st</sup> Public Experiment regarding the implementation of one-way system, parking and sidewalk management along St.130, 136, 154 and 178 from Norodom to Sisowath. He presented the items as follows:

- a) Introduction
- b) Objectives of Public Experiment
- c) Outline of Public Experiment
- d) One-way system map in Khan Daun Penh
- e) Schedule of Public Experiment implementation
- f) Sample flyers and posters of the Experiment.

##### (3) Q & A Session

- A resident requested DPWT to further clarify the sidewalk arrangements. It was not clear to her whether the road is going to be extended or if there are other arrangements to be made. And she wanted to know what measures are to be taken concerning the road vendors who run business on the sidewalk. She requested that the vendors be allowed to continue to do business on the sidewalk as usual.
- Mr. Moeung Sophan responded that the road will not be extended, but only that at least 2.0 m of the sidewalk will be cleared for the pedestrians.
- Concerning issues along St.178, another resident requested that the right-hand side of the road be reserved for parking since there are many free spaces on the right-hand side of St.178; whereas, the vehicles should not be allowed to park on the left-hand side of the road because there are many residential houses at that side.
- Mr. Moeung Sophan's response to that request is as follows:

From Norodom to St.19 and from St.19 to St.13, arrangements will be made for parking spaces at the road edge of public buildings such as pagodas and schools, and there will be no 'odd/even' regulation at that location.

However, 'odd/even' regulation will be enforced from Sothearos to Sisowath because there are residential houses on both sides of the road. Police authorities strongly agreed with this implementation.



**(4) Close of Meeting:**

Mrs. Bopha Phanny expressed her sincere gratitude to Khan Representative, relevant authorities and residents for attending the meeting. She showed her concern regarding the increasing number of traffic accidents in Phnom Penh as well as requested the strong cooperation from residents in this public experiment. The meeting ended at 16:30 with mutual understanding of the issues discussed.





Source: PPUTMP Project Team

**Figure 4.2-4 Photos of the Meeting (4)**

**Table 4.2-4 List of Attendees**

No.	Name	Title
1	Mr. Masahiko Egami	Representative of JICA
2	Mr. Masato Koto	PPUTMP Team Leader
3	Mr. Masayuki Ishiya	PPUTMP Study Team
4	Mr. Yoshiyuki Arita	PPUTMP Study Team
5	Mr. Teav Sunpheak	PPUTMP Member
6	Ms. Sophan Phatan	PPUTMP Member
7	Mrs. Bopha Phanny	Deputy Director of DPWT
8	Mr. Meoung Sophan	Advisory Committee
9	Mr. Chou Kimtry	Deputy Director of DPWT
10	Khan Daun Penh Deputy Police Inspector	
11	Khan Authority	
12	Sangkat Chey Chum Neas Chief and Officials	
13	100 Residents from Sangkat Chey Chum Neas	



Source: PPUTMP Project Team

### 4.3 Training of the Assisting Staff

A group of people were deployed as assisting staff at every target route to provide guidance and assistance to the road users, to ensure compliance with the one-way traffic operation rules and to direct parking of vehicles at the designated spaces. These people were given necessary training prior to the Experiment to ensure that they are very familiar with the regulations and rules, procedures, safety measures and emergency contact numbers.

A classroom training was conducted for the staff at the PPUTMP office on 25 February (Monday, from 10:00 onwards), followed by an on-site training and rehearsal (see Figure 4.3-1).



Source: PPUTMP Project Team

**Figure 4.3-1 Assisting Staff Training in Progress**

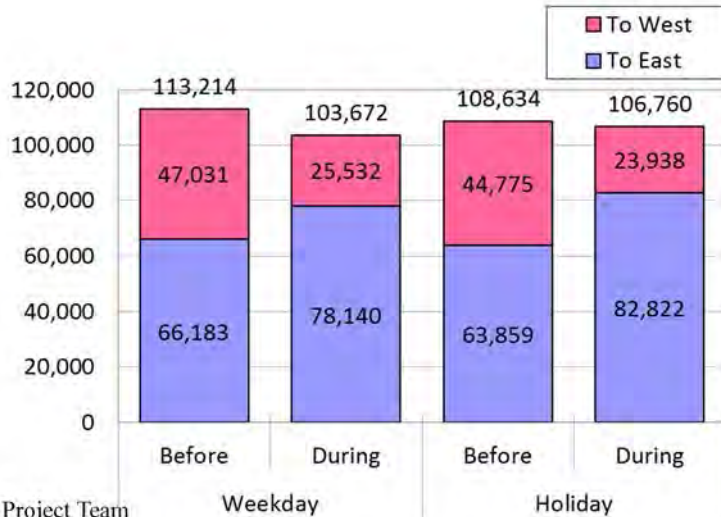
## 5 RESULTS OF THE PUBLIC EXPERIMENT

### 5.1 Results of Vehicular Traffic Volume Survey

#### 5.1.1 Traffic Volume

Compared to Pre-Experiment traffic volumes, traffic volumes on the Experiment days, both during the weekday and weekend, actually show a slight decrease in total numbers. However, the Experiment has no major adverse effects on the traffic conditions.

Unit: vehicle/14 hours



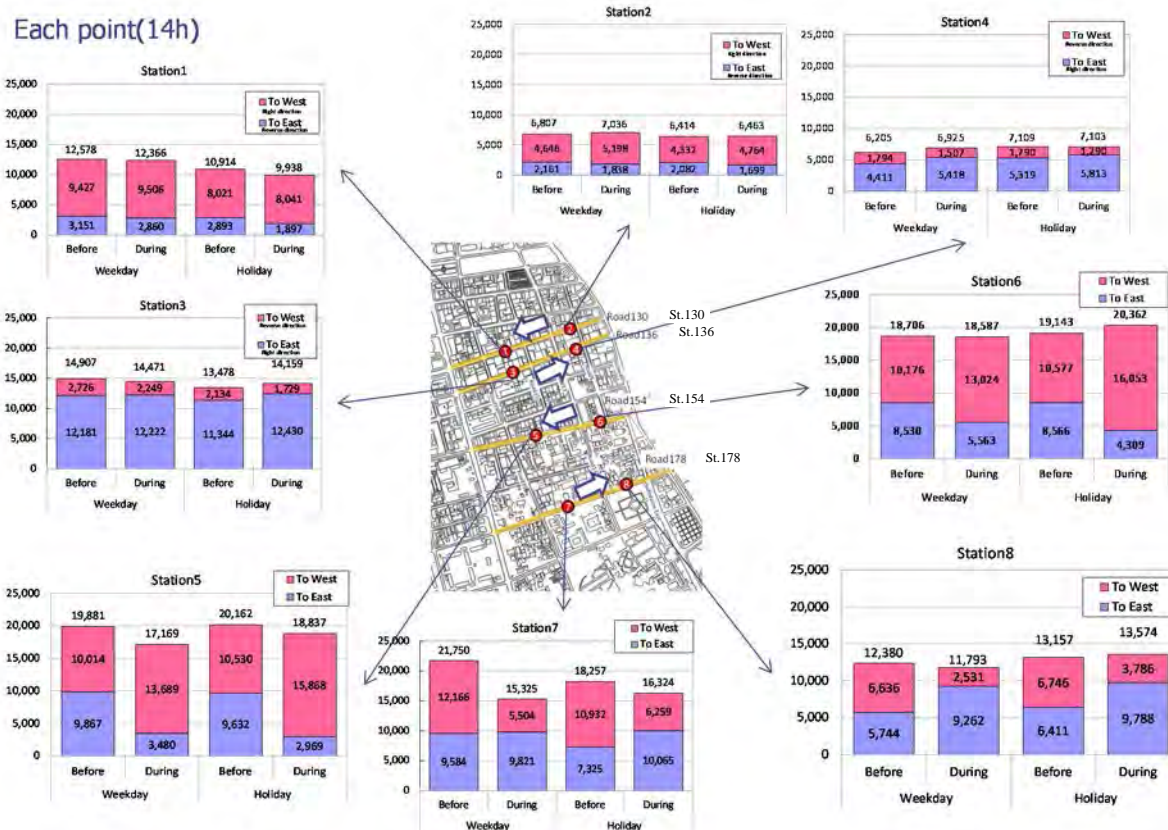
Source: PPUTMP Project Team

Figure 5.1-1 Results of Traffic Volume Survey (Total for all Routes)



Source: PPUTMP Project Team

Figure 5.1-2 Traffic Counters During Traffic Volume Survey

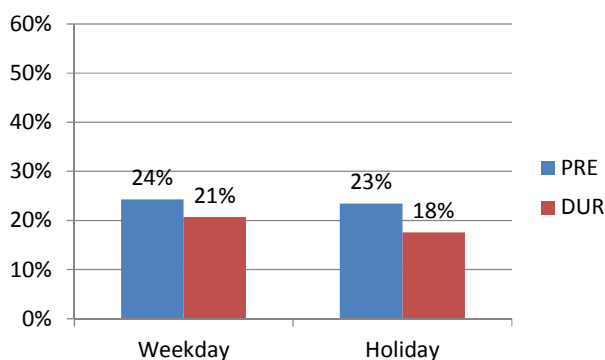


Source: PPUTMP Project Team

Figure 5.1-3 Results of Traffic Volume Survey (By route)

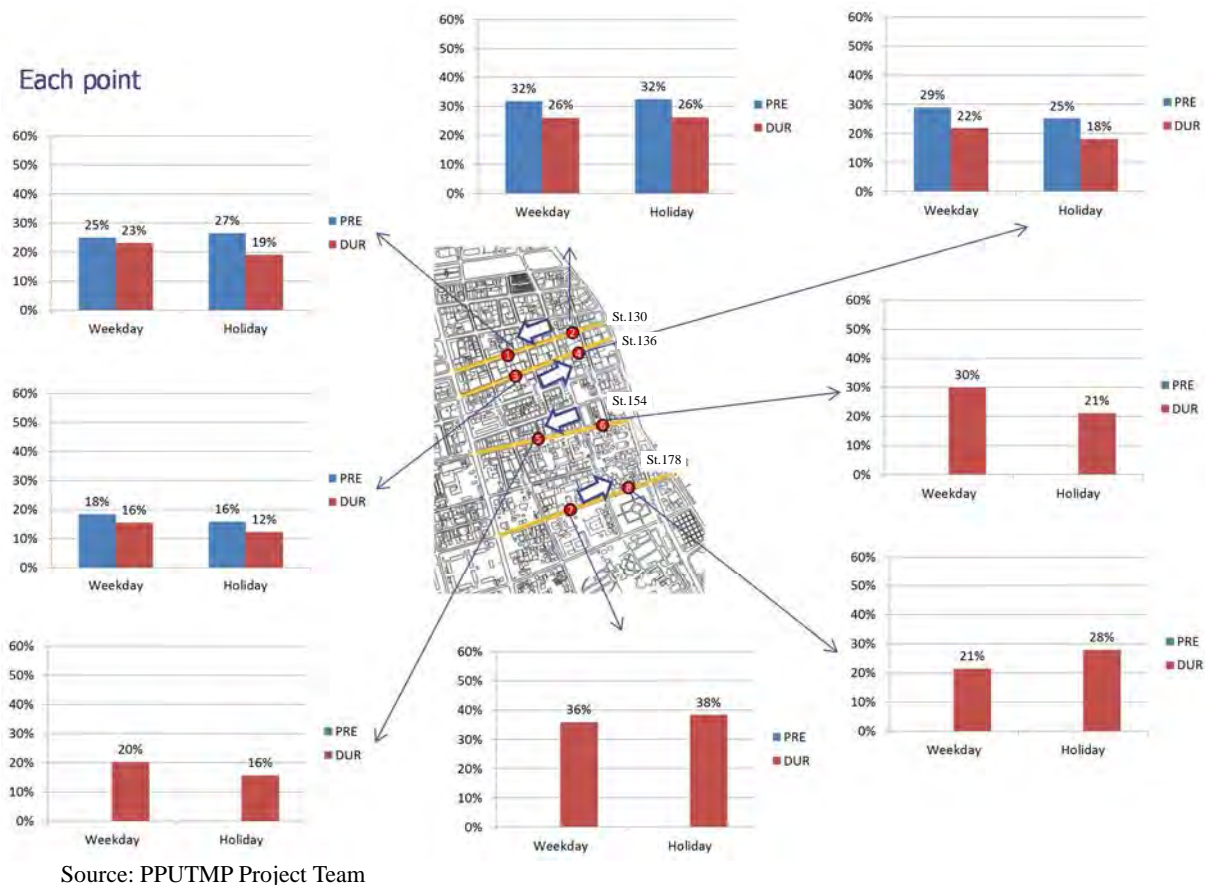
### 5.1.2 Vehicles that Defied the One-Way Traffic Rule

In analyzing the percentage of vehicles that defied the one-way traffic rule as against the total traffic volumes on both St.130 and St.136, which are both under the existing one-way traffic operation system, there was a slight decrease during the Experiment when compared to the Pre-Experiment situation. Nevertheless, there was still a fairly high percentage of close to 20% of vehicles that defied the rule on these two routes.



Source: PPUTMP Project Team

Figure 5.1-4 Comparison of Rates of Vehicles that Defied the One-way Traffic Rule Before and During the Experiment



**Figure 5.1-5 Comparison of Rates of Vehicles that Defied the One-way Traffic Rule Before and During the Experiment (By route)**

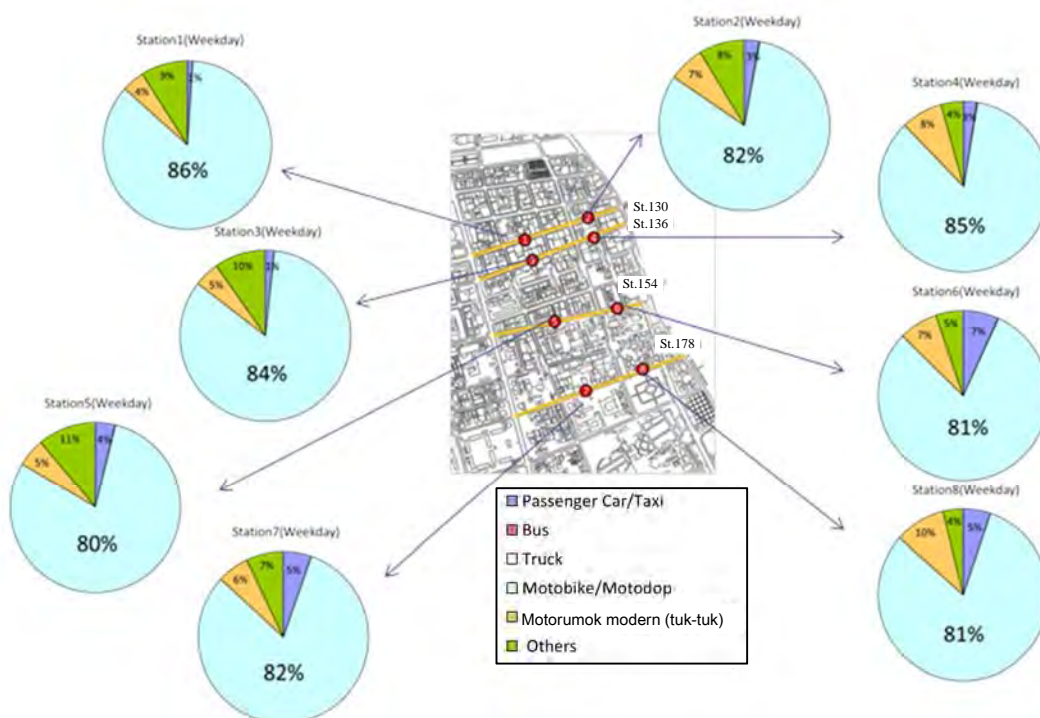


Source: PPUTMP Project Team

**Figure 5.1-6 Assisting Staff Giving Guidance on One-Way Traffic Operation to Road User**

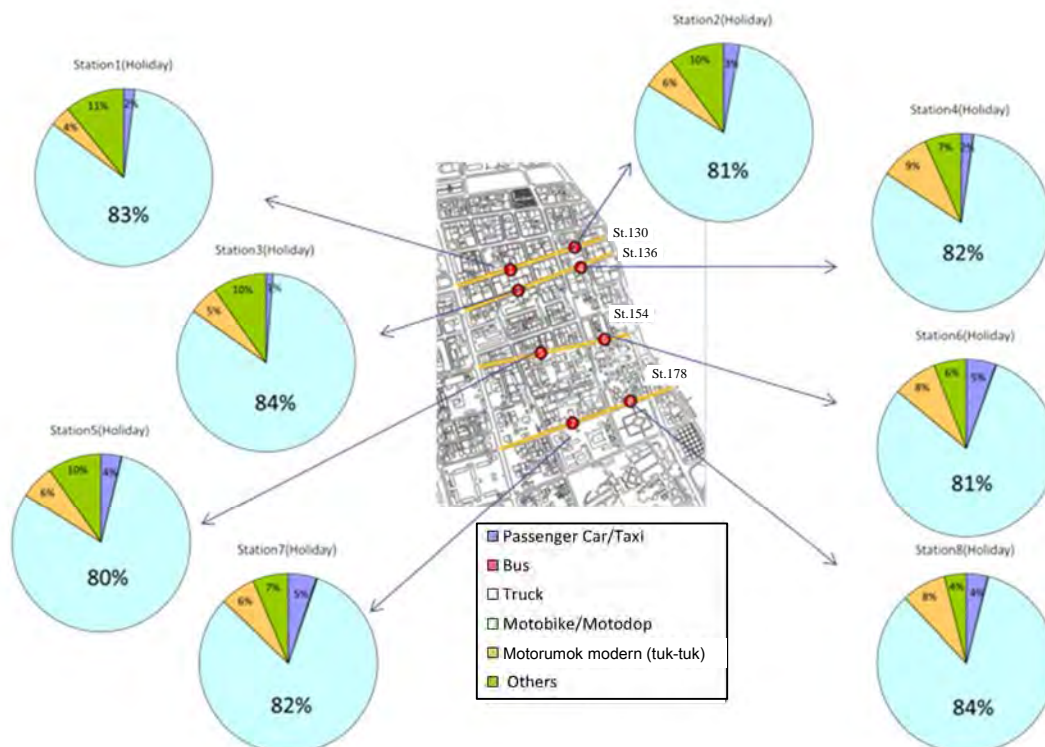
### 5.1.3 Composition of Vehicles that Defied the One-way Traffic Rule

As illustrated in the figures below, 80% of the vehicles that defied the one-way traffic rule are motorbike/motodop rides on all the routes both on weekday and on weekend.



Source: PPUTMP Project Team

**Figure 5.1-7 Composition of Vehicles that Defied the One-way Traffic Rule (Weekday)**

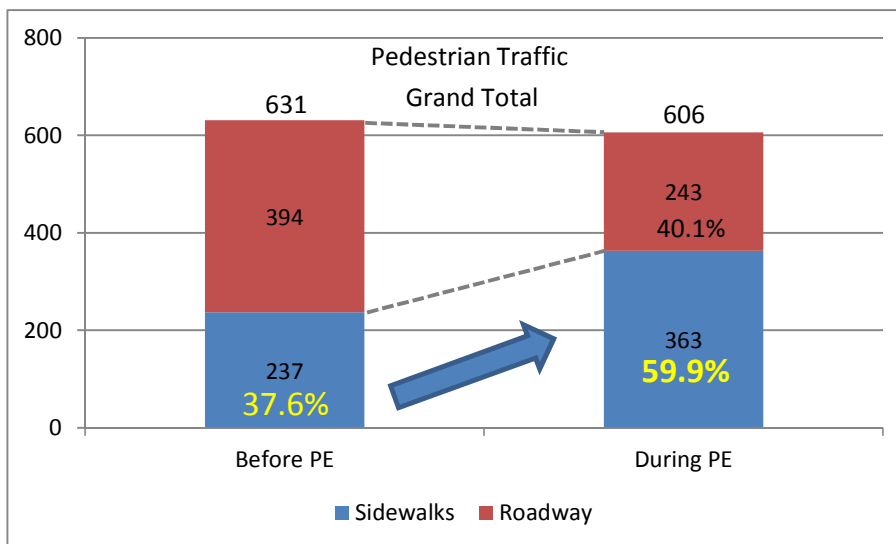


Source: PPUTMP Project Team

**Figure 5.1-8 Composition of Vehicles that Defied the One-way Traffic Rule (Weekend)**

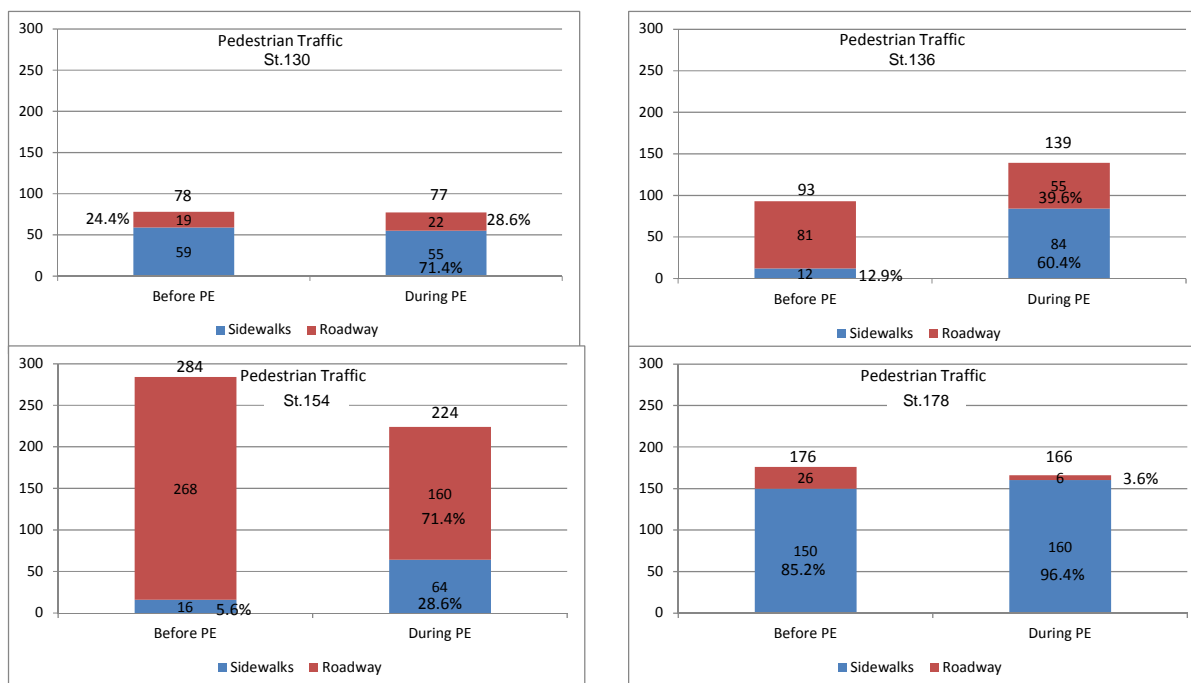
## 5.2 Results of Pedestrian Traffic Volume Survey

The results of the pedestrian traffic volume survey on all the experimental 4 routes showed that while 37.6% of the total pedestrian volume used the sidewalks before the Experiment, this rate has increased to 59.9% during the Experiment. The positive effect on the usage of pedestrian sidewalks by the countermeasure was thus verified by these results on account of the fact that a sidewalk network with a better continuity was made available to the users.



Source: PPUTMP Project Team

**Figure 5.2-1 Increase in Usage of Pedestrian Sidewalks (Total on All Routes)**



Source: PPUTMP Project Team

**Figure 5.2-2 Usage of Pedestrian Sidewalks by Route**

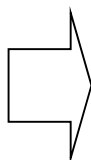


### 5.3 Preservation of Pedestrian Space

With an official letter from PPCH in hand, the need to provide pedestrian walking space on the Experimental Routes was explained to the local residents in each Khan on 26 February 2013, to seek their cooperation. Each Khan Head, together with representatives from DPWT, visited the concerned areas to request the clearance of a 2.0 m wide corridor space from each and every adjoining businesses or residents (see Figures 5.31 (1) and (2)).



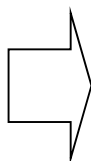
Before: Sidewalk is blocked by potted plants.



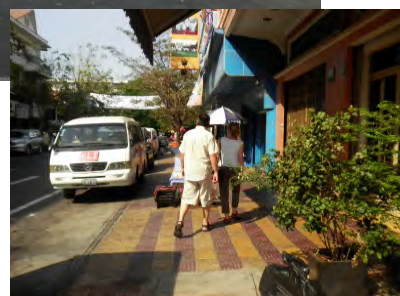
After: Sidewalk space is opened up for pedestrians.



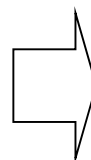
Before: Perpendicular parking, thus blocking the sidewalk



After: By parking parallel on the parking strip, sidewalk space is opened up for use by foreign tourists.



Before: Difficulty in walking through such a blocked sidewalk



After: Wide pedestrian walking space is now provided by removing the haphazardly parked motorcycles.

Source: PPUTMP Project Team

**Figure 5.3-1 Examples of Preserving the Pedestrian Sidewalk Space (1)**



On request from DPWT, white spray paint was used to clearly demarcate the 2.0 m wide walking space on the sidewalks.



Foreign tourists are seen here in these pictures using the wide and comfortable pedestrian sidewalks.



The preserved pedestrian sidewalk spaces are also essential for ensuring the safety of children.

Source: PPUTMP Project Team

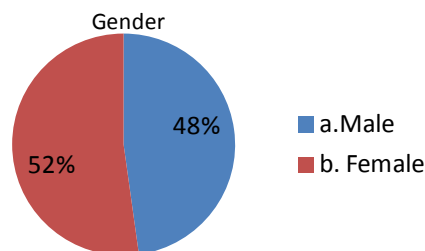
**Figure 5.3-2 Examples of Preserving the Pedestrian Sidewalk Space (2)**

## 5.4 Results of Interview Survey

### 5.4.1 Residents and Shop owners

The results of the interview survey are graphically shown as follows:

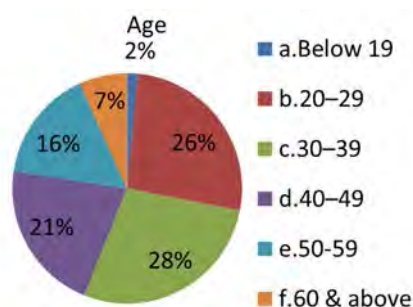
Q-1: Gender: There were more female respondents than male respondents at 52% and 48%, respectively.



Source: PPUTMP Project Team

**Figure 5.4-1 Gender**

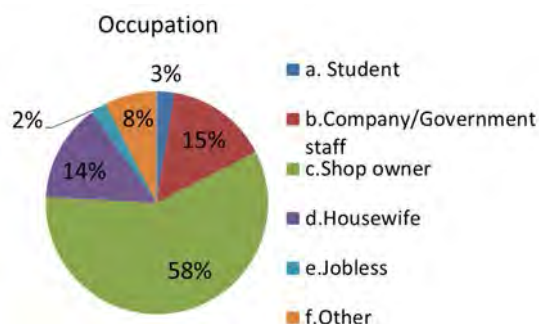
Q-2: Age: Respondents' ages are broken down as follows: 2% are below the age of 19; 26% are in the 20-29 age group; 28% belong to ages 30-39; 21% are 40-49 years old, 16% are in the 50-59 age group, and 7% are 60 years old and above



Source: PPUTMP Project Team

**Figure 5.4-2 Age**

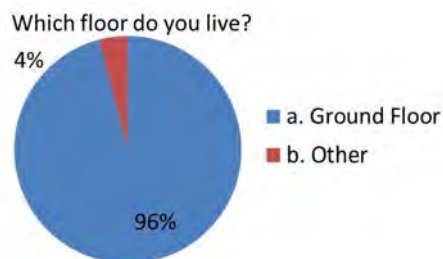
Q-3: Occupation: The breakdown is as follows: 3% Student, 15% Company/Government staff, 58% Shop owner, 14% Housewife, 2% Jobless, and 8% Other



Source: PPUTMP Project Team

**Figure 5.4-3 Occupation**

Q-4: Which floor do you live? Ground floor dwellers are 96%; those living in other floors comprise 4%.

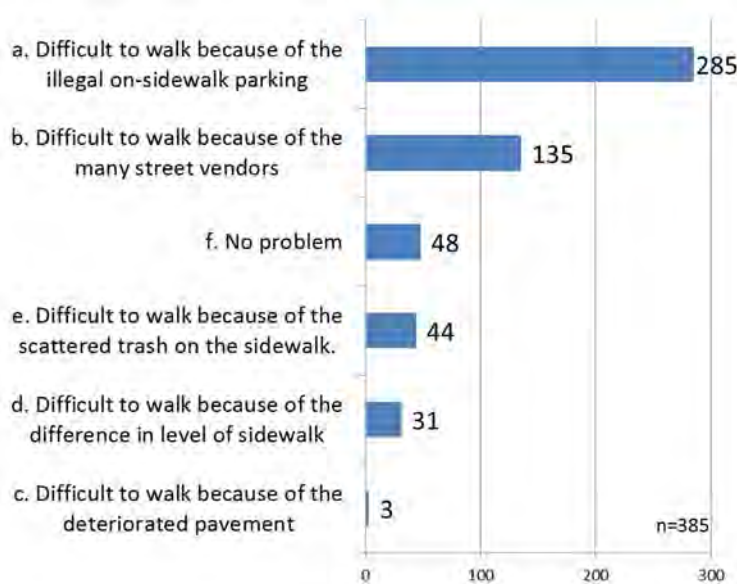


Source: PPUTMP Project Team

**Figure 5.4-4 Which Floor Respondent Lives**

Q-5: How do you feel about the sidewalk conditions along the public experiment section?

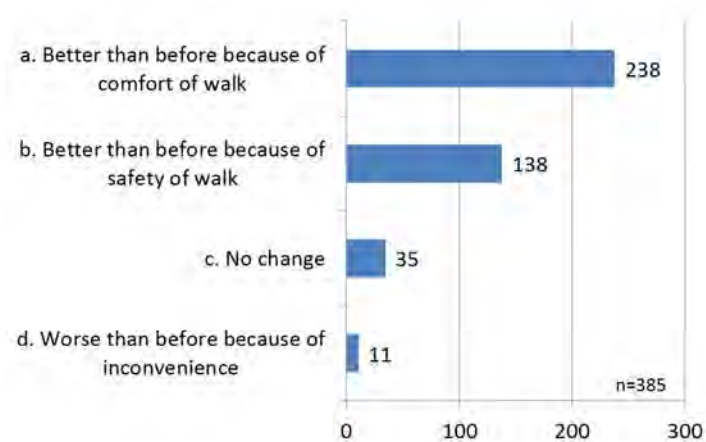
**Before the Public Experiment (PE):** 285 of respondents said it was “difficult to walk because of the illegal on-sidewalk parking”; 135 said “many street vendors”; 48 said “no problem”; 44 chose “scattered trash on the sidewalk”; 31 said “difference in level of sidewalk” and 3 respondents said “deteriorated pavement”.



Source: PPUTMP Project Team

**Figure 5.4-5 Sidewalk Condition Before PE**

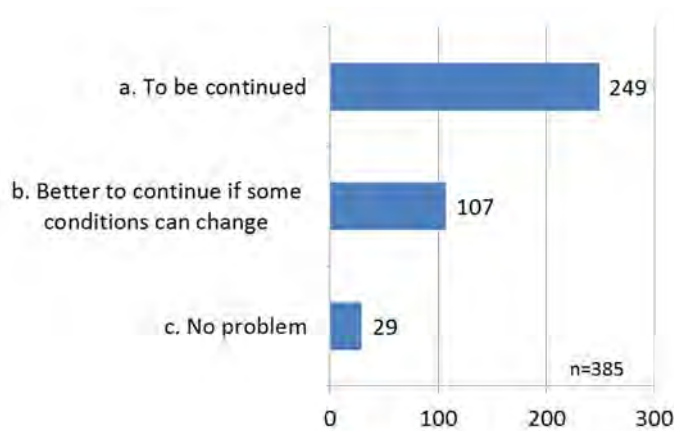
**During PE:** A majority of respondents answered “Better than before because of comfort of walk” (238), followed by “Better than before because of safety of walk” (138), then “No change” (35) and “Worse than before because of inconvenience” (11)



Source: PPUTMP Project Team

**Figure 5.4-6 Sidewalk Condition During PE**

**After PE:** Those who answered “To be continued” numbered 249, “better to continue if some conditions can change”, 107, “No problem”, 29.



Source: PPUTMP Project Team

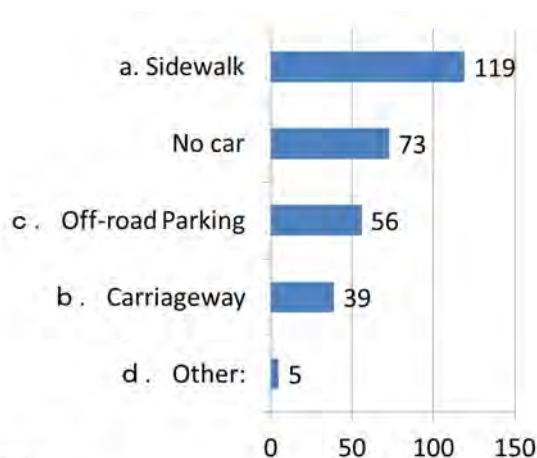
**Figure 5.4-7 Sidewalk Condition After PE**

Q-6: If answer to above is (b.), what is that condition/s? The following are what the respondents said:

- All people agree to keep sidewalk at same level
- Allow trade signs on sidewalk
- Angle parking lot
- More comfortable than this
- Better managed than this
- Build parking facilities
- Build safe parking spaces
- Vendors to occupy only 1m of sidewalk
- Do not park vehicles along the road
- Do the same in whole city, not this road only
- Equal implementation
- Having controller
- If all residents say ok with it
- If there is no effect to residents
- Implement it all without discrimination
- Keep as before experiment
- Makes changes to sidewalk use for orderliness
- Keep parking order
- Keep parking space for customers.
- Keep space for selling
- Larger parking spaces
- Larger sidewalks
- Make it the same way as neighboring countries'
- Do not construct sidewalk with different levels
- Clear sidewalks and make orderly
- More strictly implement than this time
- No need odd/even parking day
- Do not allow cars to park long
- Not effect to business
- Do it only on congested areas
- Respect it together
- Road widening

### Car Parking

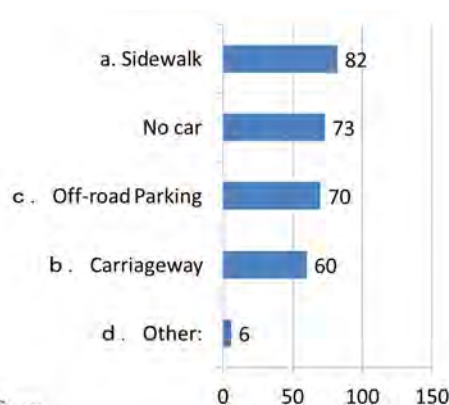
Q-7-1: Where did you park before PE? “Sidewalk” is mostly what respondents answered (119), followed by Off-road parking (56), Carriageway (39), and Other (5). Meanwhile, there were also those who answered “No car” (73).



Source: PPUTMP Project Team

**Figure 5.4-8 Parking Place Before PE**

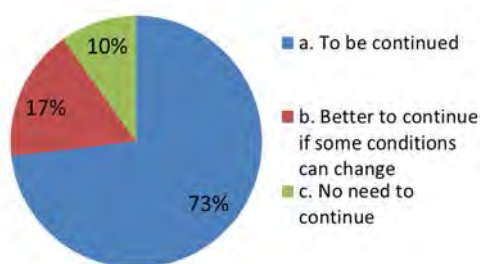
Q-7-2: Where did you park during PE? “Sidewalk” once again came first (82), followed by “Off-road parking” (70), “Carriageway” (60), and “Other” (6). Those who answered “No car” numbered 73,



Source: PPUTMP Project Team

**Figure 5.4-9 Parking Place During PE**

Q-7-3: What do you think about the on-street parking measures in the future? A percentage of 73% answered “To be continued”, 17%, “Better to continue if some conditions can change”, and 10% said “No need to continue”.



Source: PPUTMP Project Team

**Figure 5.4-10 Whether PE is to be Continued or Not**

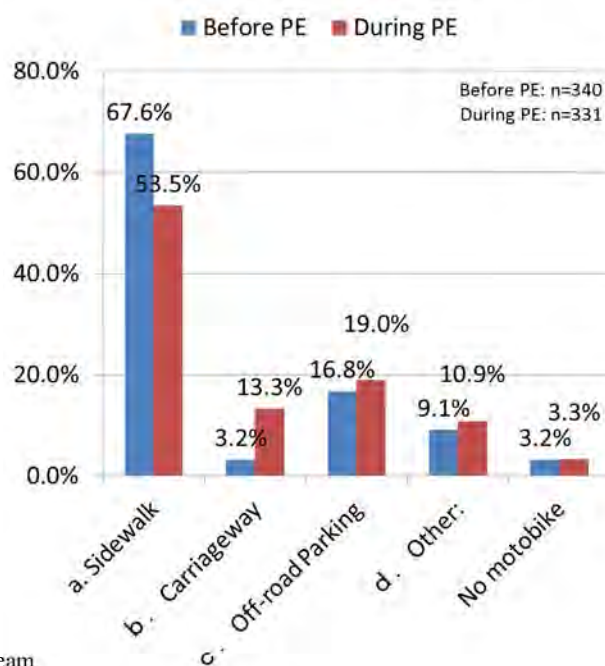
Q-8: If answer to above is (b.), what is that condition/s? These conditions, as stated by respondents, are as follows:

- Adding more traffic signs
- Angle parking lot
- Keeping space for motorcycles
- Better prepared parking spaces
- Find and develop parking facilities
- Continue to control it
- Do not affect residents' houses
- Keep parking space for customers.
- Larger parking spaces
- Do not allow cars to park a long time
- Free Parking
- Parking space for motorcycles
- Release car break and have controller take over
- Smaller sidewalk

### Motorcycle Parking

Q-9-1: Where did you park before PE? These are the shares of the answers: 67.6% Sidewalk, 3.2% No motorbike, 16.8% Off-road parking, 3.2% Carriageway, 9.1% Other.

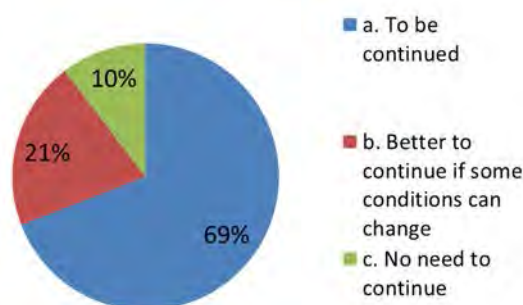
Q-9-2: Where did you park during PE? These are the shares of the answers: 53.5% Sidewalk, 3.3% No motorbike, 19.0% Off-road parking, 13.3% Carriageway, 10.9% Other.



Source: PPUTMP Project Team

**Figure 5.4-11 Parking Place Before and During PE**

Q-9-3: What do you think about the on-street parking measures in the future? Regarding this matter, 69% answered “To be continued”, 21%, “Better to continue if some conditions can change”, and 10%, “No need to continue”.



Source: PPUTMP Project Team

**Figure 5.4-12 Whether PE is to be Continued or Not**



Q-10: If answer to above is (b.), what is that condition/s? These are what respondents answered:

- Keeping space for motorcycles
- Better management of parking
- Find and develop parking facilities
- Having controller for controlling traffic order
- Do not affect residents' houses by sidewalk expansion
- Divide park space equally
- Equal implementation
- Keeping parking reserved for guest
- Keeping "motormork" parking in order
- Keeping space for house/shop owners
- Keeping space for vendors
- Larger and comfortable sidewalks
- Safe parking for motorcycles
- Keeping parking order

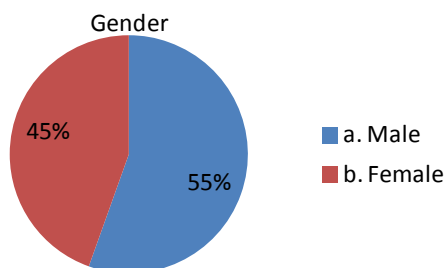
Q-11: Answers Freely Given

- Affecting my business
- Appeal for drivers not to park on sidewalk
- Appeal for cleaning road
- Equal implementation along pilot road
- Arrange suitable parking for motodop, "tuk- tuk" and taxis
- Build more parking facilities
- Car park on street disturbs my business
- Cannot do business if cars are not allowed to park on street
- Cars and motorcycles are not parked properly on sidewalk. Cleaning shall be done because of untidiness.
- Drivers should respect each other
- Do whatever needs to be done to avoid traffic jams and make sidewalks safe to walk; and construct more flyover bridges.
- Do not want to have parking space along the road
- Expansion of one-way system in the other areas
- Manage it strictly. Install traffic signs in the corner.
- Educate drivers not to park outside markings for smooth walk on sidewalk.
- Expansion of sidewalk space more 1m to the building side
- Flower pots should not be put on the road
- Good but is still lacks preparation
- Good, it is better to continue
- Implement this plan effectively
- In the future, this measure should not be carried out.
- Install lighting and organize vendors not selling in front of house
- It is better, but motorcycle and "tuk- tuk" parking shall be enforced according to traffic law.
- It is difficult for vendors to find parking space for guests, and there is no controller for parking causing decreasing guests.
- It is difficult to drive the car out of the house if vehicles are allowed to park along the road.
- It is comfortable but it needs to take measure on ceremony holding in front of houses,
- It is nice to see this condition.
- It seems good but guests decreased.
- Reserve parking space for shop owners. Keep order of "motormork"
- Larger parking spaces and sidewalks are desirable.
- Luxury car drivers should obey traffic law too.
- Make roads clean, orderly, and pleasing to the eye
- Make sidewalk of same level
- Making sidewalks affect my business. Two-way system is better.
- Making good roads will reduce traffic accidents
- Making sidewalks smaller

- “Motormork” parking in front of shops should not be allowed.
- Motorcycles should be penalized when parked on sidewalks.
- Motorcycles should not park on the corner of crosswalk; noise disturbance from night bar.
- Need to keep parking space for customers in front of shop
- Need to keep space for selling and penalize those who sell on sidewalk.
- Need to strictly control it.
- No change is better.
- Need parking space for “tuk-tuk” and motorcycles
- Odd/even parking is not necessary.
- One-way system is good to reduce traffic accidents
- Ought to have road cleaners
- Organize it more or road widening
- Parking facilities is better
- Parking in good order and not give up on the implementation
- Police control of traffic is needed and road cleanliness should be considered.
- Pedestrian bridge should be built.
- Phnom Penh municipality should explain to residents to understand the need to have order in selling.
- Road users should cooperate.
- Road should be widened more.
- Measures should be taken regarding rubbish on sidewalks.
- Road users should park vehicles properly considering house owner.
- Request not to park car too long.
- Shop owners should have the right to keep their customers' parking space. If not, it will harm business.
- This measure can be continued but keep space for vendors.
- Want to have traffic policemen.
- Two-way road is better because there is no decrease in customers.

#### 5.4.2 Pedestrians

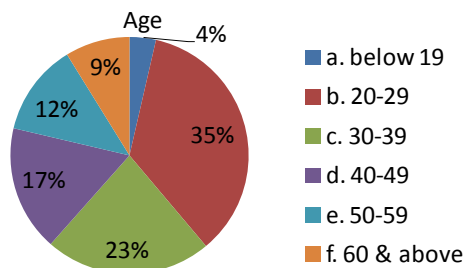
Q-1: Gender: There were 55% female and 45 male respondents.



Source: PPUTMP Project Team

**Figure 5.4-13 Gender**

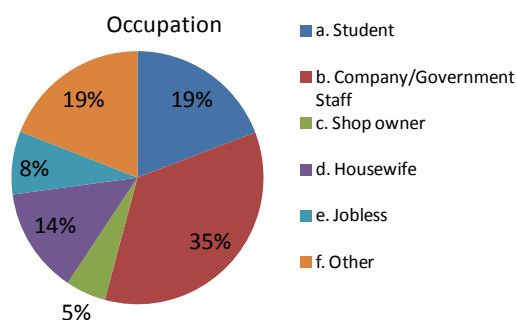
Q-2: Age: Respondents' age distribution is as follows: 4% below 19, 35% 20-29, 23% 30-39, 17% 40-49, 12% 50-59, and 9% 60 and above.



Source: PPUTMP Project Team

**Figure 5.4-14 Age**

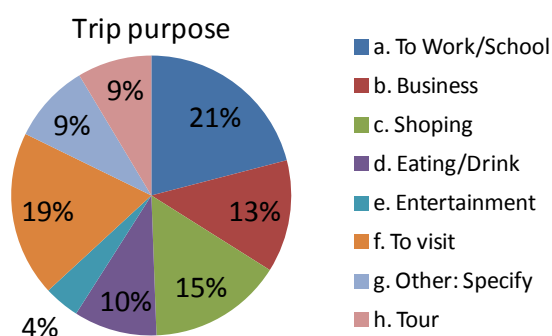
Q-3: Occupation: Respondents' occupation is distributed as follows: 19% Student, 35% Company/Government Staff, 5% Shop owner, 14% Housewife, 8% Jobless, and 19% Other.



Source: PPUTMP Project Team

**Figure 5.4-15 Occupation**

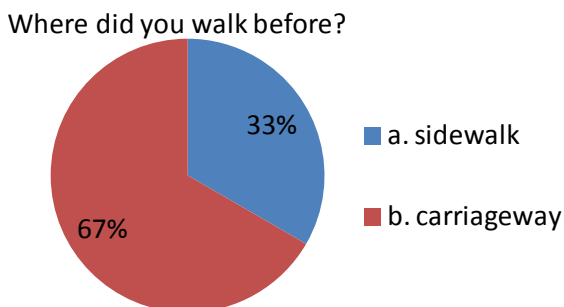
Q-4: Trip purpose: Trip purpose distribution is as follows: 21% To Work/School, 13% Business, 15% Shopping, 10% Eating/Drinking, 4% Entertainment, 19% To Visit, 9% Other, and 9% Tour.



Source: PPUTMP Project Team

**Figure 5.4-16 Trip Purpose**

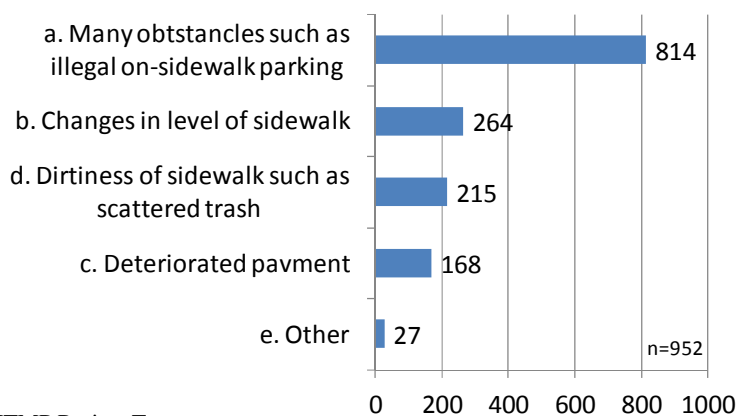
Q-5: Where did you walk before? About 33% of respondents answered “sidewalk” and “67%” answered “carriageway”.



Source: PPUTMP Project Team

**Figure 5.4-17 Walking Place**

Q-6: Why did you not walk on the sidewalk? Respondents answered that there were many obstacles such as illegal on-sidewalk parking (814), changes in level of sidewalk (264), dirtiness of sidewalk such as scattered trash (215), deteriorated pavement (168), and Other (27).



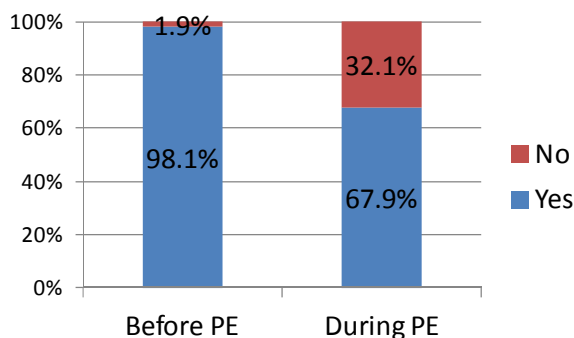
Source: PPUTMP Project Team

**Figure 5.4-18 Reasons for Walking on the Sidewalk**

**How do you feel when you walk on this sidewalk?**

Q-7-1: a) Difficulty of walking due to illegal parking

**Before PE:** Yes 98.1%, No 1.9%, **During PE:** Yes 67.9%, No 32.1%

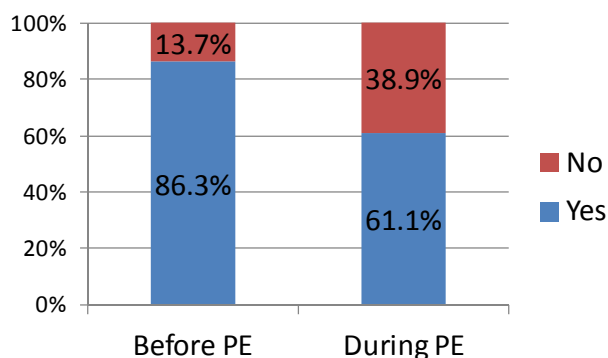


Source: PPUTMP Project Team

**Figure 5.4-19 Sidewalk Condition (Illegal Parking)**

Q-7-2: b) Difficulty of walking due to on-street vendors

**Before PE:** Yes 86.3%, No 13.7%, **During PE:** Yes 61.1%, No 38.9%

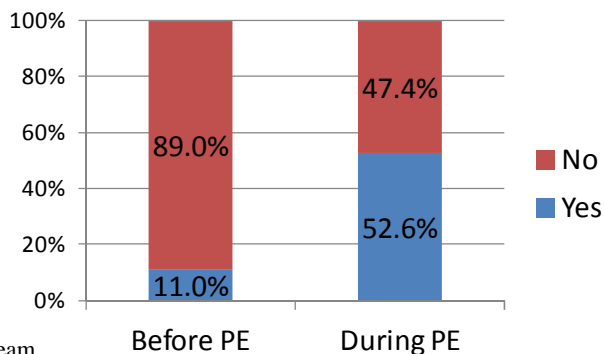


Source: PPUTMP Project Team

**Figure 5.4-20 Sidewalk Condition (Vendors)**

Q-7-3: c) Security of walking safely

**Before PE:** Yes 11.0%, No 89.0%, **During PE:** Yes 52.6%, No 47.4%

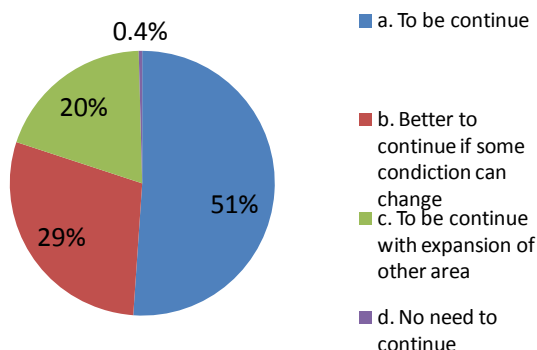


Source: PPUTMP Project Team

**Figure 5.4-21 Sidewalk Condition (Safety)**

## Q-8: What do you think about the on-street parking measures in the future?

About 51% wants them “To be continued”, 29% answered “Better to continue if some conditions can change”, 20% said “To be continued with expansion of other areas”, and 0.4%, “No need to continue”.



Source: PPUTMP Project Team

**Figure 5.4-22 Whether PE is to be Continued or Not**

## Q-9: If answer to above is (b.), what is that condition/s? Respondents' answers are as follows:

- Obstacle changes
- Wider roads, no parking
- More clean up. Action against dirty streets
- Cars parking facilities
- Very dirty; broken footpath blocked by vehicles
- More security by traffic controller
- Clear sidewalk and widen
- Keep sidewalk clean and safe
- Remove parking /vendors from sidewalk
- Improve sidewalk condition
- Clear division of carriageway, car park, sidewalk
- Develop parking facilities
- Limit space (line) for vendor/shop
- Shop/vendor respect the dividing line and keep sidewalk for pedestrian
- Provide different parking space for cars and motorbikes
- Shops should not put stuff on sidewalk
- Limit space for vendors, no car park, no vendors on sidewalk
- Install more traffic signs
- Widen carriageway, but keep reserved space on sidewalk for vendors and good parking
- Widen carriageway and limit time for parking
- Parking system
- Make clear lines, and remove deteriorated pavement
- Parking building
- Make sidewalks no different in level and motorcycle parking should not be allowed on sidewalks
- Car parking change
- Widen sidewalk to 2.0 m
- Make sidewalks in 2.5 m width
- Penalty on illegal parking on sidewalk
- One-way system respected
- Broader space for car parking
- More policy on motorbike/car drivers
- Should have parking for “tuk-tuk”
- Sidewalks should be clean and wider; repair broken sidewalks.
- Cambodian people should understand where they can park their cars or motorbikes and not park on sidewalks.
- Some motorbikes are still parking on sidewalks.
- The gov't should have laws concerning sidewalks.
- Want expansion on both sides of St. 178
- To respect traffic law

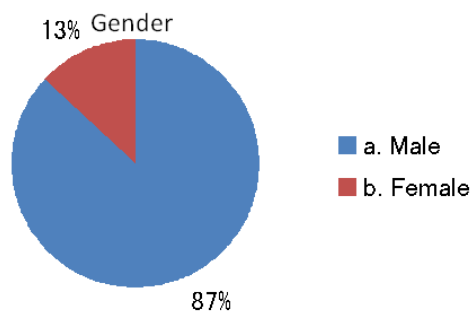
Q-10: Freely Given Answers

- One-way system should be continued to other roads in the city.
- Public awareness about one-way system
- Resident/shop owners should respect traffic law and good parking.
- Please improve sidewalk condition and no parking on sidewalk.
- Enforce traffic law and penalize illegal parking, and develop parking facility.
- Public awareness about one-way system through leaflets, radio, and television.
- Conditions will not get any better if residents do not respect the one-way system.
- Improve for smooth traffic and develop parking facilities
- We should respect the one-way system and have traffic controller
- Install more traffic signs and clear traffic line
- One-way system is good, but some drivers do not respect traffic signs
- Make sidewalks wider and remove vendors if they come back.
- Streetwalk cluttered
- Cambodia should do that, because I want Cambodian citizens' safety.
- It's good, we should do it soon.
- Clear sidewalk, keep safety, and no long hour parking.
- Clear deteriorated pavement of sidewalk
- Good idea to improve traffic flow in the city
- Phnom Penh has no problem.
- Building owner should not park car long hours on sidewalk
- Good idea, because I can sit and walk easily, safely
- Pay more attention when driving
- Plant trees and flowers, and have more green but keep them clean
- Keep sidewalk clean and maintain it
- Difficult to walk on sidewalk due to parking cars - Better build pedestrian bridge
- Driving slows down when I see people crossing the road
- Make wide the cross section; install traffic sign, and traffic light
- Make clear division of sidewalk and carriageway
- Cars/motorbikes should not park in carriageway
- Government enforcement in this place to avoid traffic jam
- Authorities should control all vehicles parking in the road, remove vendors, and keep sidewalk clean
- Please properly park cars/motorbikes along the road
- Shop/vendor should respect the municipality declaration on traffic
- Develop parking facility, keep road clean, make road wider
- Arrange proper parking space and sidewalk which will reduce traffic accident
- Municipality should enforce proper dividing line between sidewalk and parking
- Parking facilities with low service charge. The government should build carpark building and charge small parking fee.
- Some streets have no sidewalk or it is not used due to construction; make an alternate walkway to use during construction.
- Should have traffic light everywhere.
- Divide clearly line of sidewalk and car parking space
- Phnom Penh municipality should enforce traffic law system to avoid traffic jam, and arrange proper sidewalk.
- To be continued and keep sidewalk safety for walking, and do not allow car parking for long hours
- Vendors should reserve space on sidewalk for pedestrians, and remove parking from it
- It's better not to do anything.
- Force to implement in terms of experiment with transparency
- Municipality can do something if necessary

- Traffic legal enforcement especially on vendors, drivers
- Too many “tuk-tuk” and motorbike drivers park all day and disturb tourists
- The government will find it difficult to change things because there are a lot of people in the city
- Lack of proper street parking affecting sidewalk, lack of proper 'control'; therefore, people still continue to go in wrong direction
- If the cars want to come to riverside area, they must pay tax for driving and parking
- Driver should respect traffic signs and should park at the side of carriageway
- Public announcement, and keep no illegal parking on sidewalk
- To widen sidewalk to 3.0 m and keep no illegal parking
- Should not allow residents/shop owners to use sidewalk for individual benefits
- Make broader carriageway, and don't allow vendor to use sidewalk for business
- Government should study about negative impact. The one-way system should be expanded to other areas in the City
- Good but please turn direction of this road (St. 154) from Norodom to Sothearos
- Street trees are nice, but the “tuk-tuk” is a problem
- When there is construction, make sure there is walkway for pedestrians
- Government should actually do what was promised
- Make sidewalks wider and arrange proper parking space
- Prepare parking place and sidewalk and clear scattered trash
- Please keep direct contact with residents before implementing. Please widen this road if residents agreed.

### 5.4.3 Drivers

Q-1: Gender: 87% of interviewees were male, 13% were female.

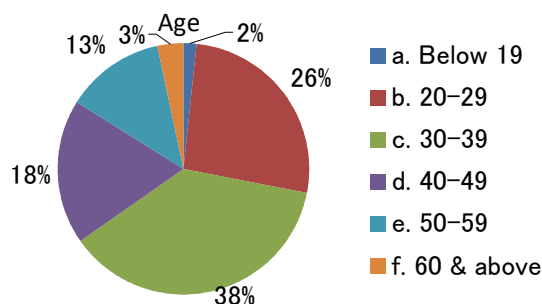


Source: PPUTMP Project Team

**Figure 5.4-23 Gender**



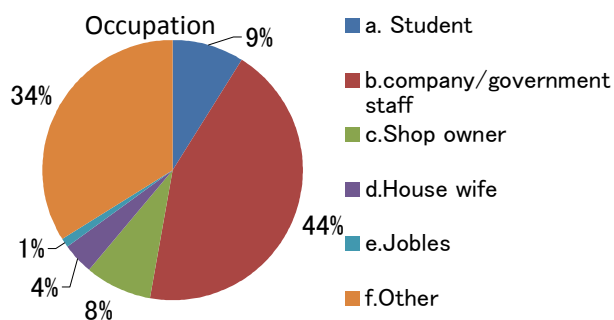
Q-2: Age: Age distribution of respondents is as follows: 2% below 19, 26% 20-29, 38% 30-39, 18% 40-49, 13% 50-59, and 3% 60 and above



Source: PPUTMP Project Team

Figure 5.4-24 Age

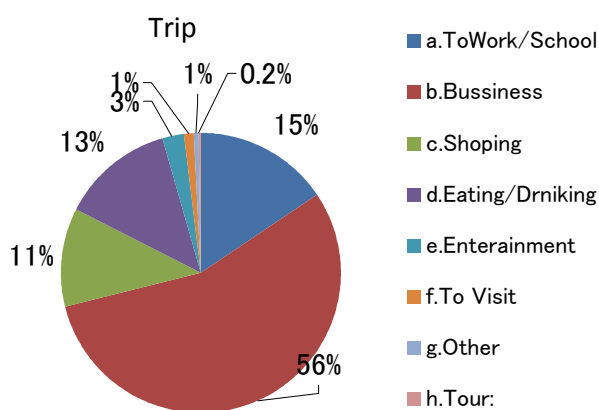
Q-3: Occupation: Occupation distribution of respondents is as follows: 9% Student, 44% Company/Government Staff, 8% Shop owner, 4% Housewife, 1% Jobless, and 34% Other.



Source: PPUTMP Project Team

Figure 5.4-25 Occupation

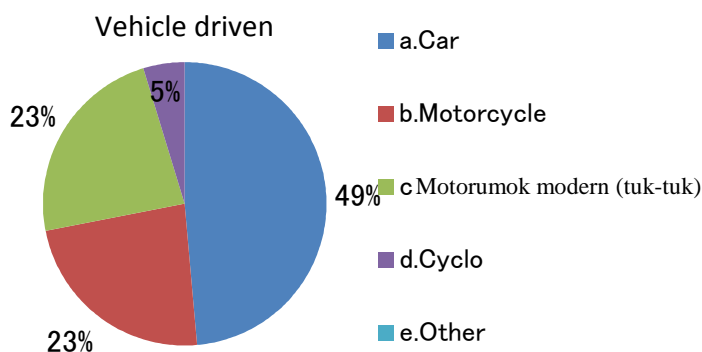
Q-4: Trip purpose: Trip purpose distribution of respondents is as follows: 15% To Work/School, 56% Business, 11% Shopping, 13% Eating/Drinking, 3% Entertainment, 1%, To Visit, 1% Other, and 0.2% Tour.



Source: PPUTMP Project Team

Figure 5.4-26 Trip Purpose

Q-5: Vehicle driven: Almost half of respondents drive a car (49%), followed by motorcycles and motorumok modern (tuk-tuk) (both at 23%) and cyclo (5%).



Source: PPUTMP Project Team

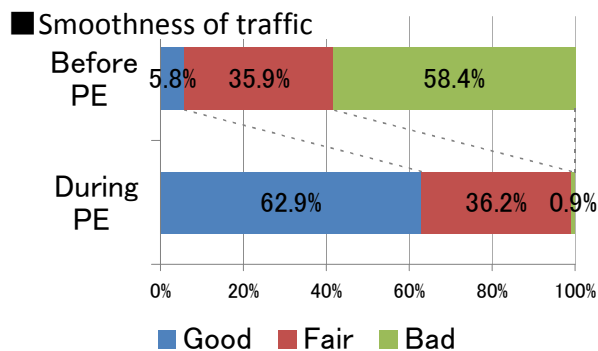
Figure 5.4-27 Vehicle Driven

Q-6: About one-way traffic system

a) Smoothness of traffic flow

**Before PE:** 5.8% Good, 35.9% Fair, 58.4% Bad

**During PE:** 62.9% Good, 36.2% Fair, 0.9% Bad



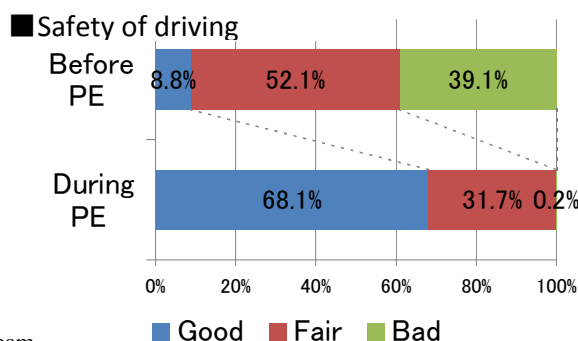
Source: PPUTMP Project Team

Figure 5.4-28 Smoothness of Traffic Flow

b) Safety of driving

**Before PE:** 8.8% Good, 52.1% Fair, 39.1% Bad

**During PE:** 68.1% Good, 31.7% Fair, 0.2% Bad



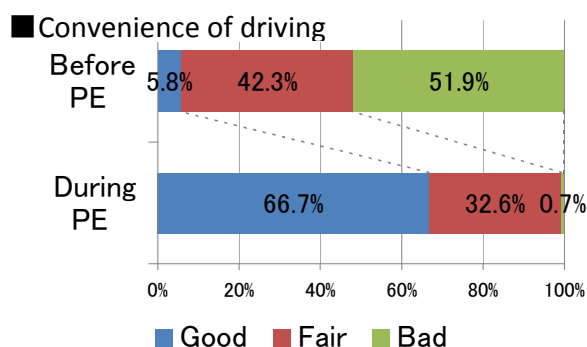
Source: PPUTMP Project Team

**Figure 5.4-29 Safety of Driving**

c) Convenience of driving

**Before PE:** 8.8% Good, 52.1% Fair, 39.1% Bad

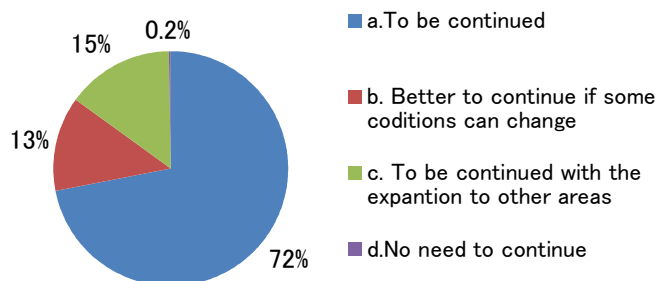
**During PE:** 68.1% Good, 31.7% Fair, 0.2% Bad



Source: PPUTMP Project Team

**Figure 5.4-30 Convenience of Driving**

Q-7: What do you think about the on-street parking measures in the future? Answers are 72% “To be continued”, 13% “Better to continue if some conditions can change”, 15% “To be continued with expansion of other areas”, 0.2% “No need to continue”.



Source: PPUTMP Project Team

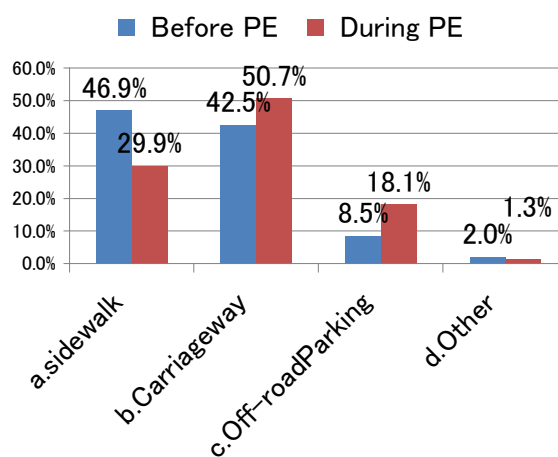
**Figure 5.4-31 Whether PE is to be Continued or Not**

Q-8: If answer to above is (b.), what is that condition/s? Answers of respondents are as follows:

- Install proper traffic signs, traffic lights at a cross section, parking signs, and road lights
- Develop parking facilities
- Respect one-way system
- Traffic controller and install more proper one-way signs
- Limit time for parking
- Install more one-way signs with Khmer words
- Can park both sides, and no odd/even regulation
- Traffic controller, and enforce traffic rules
- Keep sidewalks clean
- Arrange proper parking space/line on this road
- Keep reserve space of sidewalk for shops/vendors but no illegal parking on sidewalk
- Make carriageway wider and widen sidewalk
- Traffic controller
- Divide different parking space for cars, “tuk-tuk”, motorcycles
- Make proper parking space for car, and no driving the wrong way
- Arrange parking space along the road
- Traffic controller, and install one-way traffic signs
- Divide clearly parking space for car/motorcycles
- Develop parking facilities
- Make this road and sidewalk widen
- Remove shop's stuff from sidewalk
- Keep sidewalks clean, and no driving the wrong way
- Install more traffic signs
- Keep reserved space of sidewalk and enforce proper parking

Q-9: About Parking Space

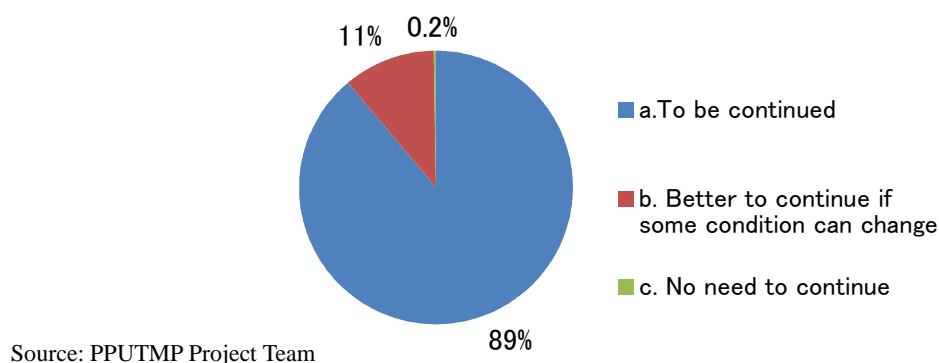
**Before PE:** 46.9% Sidewalk, 42.5% Carriageway, 8.5% Off-road parking, 2.0% Other  
**During PE:** 29.9% Sidewalk, 50.7% Carriageway, 18.1% Off-road parking, 1.3% Other



Source: PPUTMP Project Team

**Figure 5.4-32 Parking Place**

Q-10: What did you think about the on-street parking measures in the future? About 89% answered “To be continued”, 11% said “Better to continue if some conditions can change”, and 0.2%, “No need to continue”.



**Figure 5.4-33 Whether PE is to be Continued or Not**

Q-11: If answer to about is (b), what is that condition/s? Answers given are as follows:

- Install more traffic signs, signs of one-way
- Develop parking facilities
- Parking on one side of the road but with service charge
- Divide different parking spaces for motorcycles, “tuk-tuk”, and cars
- Traffic controller
- Develop parking facilities, and one-way is good for this road but no service charge
- Keep sidewalk clean
- Arrange parking on both sides, and no odd/even regulation
- Keep reserved space of side walk for shops/vendors
- Make wide parking space along the road
- Arrange proper parking space/line on road, and fine illegal parking
- Install more odd/day regulation signs
- Make this road wider
- Limit parking hours along the road
- Traffic controller
- Make clear parking space/line for cars, and install parking signs
- Arrange more parking spaces for cars
- Everyone should respect one-way rule and proper parking based on space arranged
- No illegal parking on sidewalk especially cars
- Develop parking facilities, make them safe, and install more proper traffic signs
- Develop parking facilities with less service fees
- Install more signs of one-way system
- Make this road wider

## Q-12: Freely Given Answer

- Drivers should respect the traffic rules, one-way system, signs of one-way, and no driving the wrong way to avoid traffic jam and accident.
- One-way system is good; please enforce and expand to other areas
- It's good if all the roads are one-way
- Drivers should properly park cars/motorbike within space/line
- Install more traffic signs in proper place that are easy to see; more road lights, and cut-off some tree branches along the road
- Conduct public awareness raising about one-way system; traffic signs to reduce traffic jam and accidents
- Traffic law enforcement, and penalize those who violate traffic rules
- Develop proper parking facilities
- Make the roads wider and keep clean
- Traffic controllers
- Arrange proper parking space on the road and no parked on sidewalk
- Please improve the roads for safe driving
- Bad traffic flow on this road because of too many "tuk-tuk". Conduct awareness raising about traffic rules to "tuk-tuk" drivers.
- Please keep reserved space on sidewalk for parking
- Schools located along this road should prepare proper parking space for their owner's vehicles and students' vehicles.
- Good idea to do public experiment of one-way, but some drivers are still driving the wrong way.
- Many obstacles due to illegal parking at cross-section; flower pots on sidewalk
- Good to park along the road, but must respect the line arranged
- Arrange clearly parking lines along the road
- Difficult to walk due to many obstacles such as shop's stuff, rubbish, bars, and those driving the wrong way.
- People have less respect for traffic law/and driving direction
- Install proper traffic signs (parking/no parking)
- Please assist us to turn into one-way system other roads around central market
- Please arrange both sides parking, traffic controller, fine to illegal driving behavior, and install more signs in Khmer words
- Directly inform shop owners/vendors about sidewalk, and parking based on declaration by municipality
- Arrange time limit for parking and install such signs for parking vehicles
- Please conduct public awareness raising, especially for shop owners/vendors; if possible remove shops/vendors from this road
- Equal penalty for violators based on traffic law
- One-way system has a bit of impact to residents along the roads, and shops/vendors should park properly
- There are some drivers who are still not aware about the one-way being implemented for this road so it's good if it is continued and make this road wider
- Traffic flow on this road is a bit better during public experiment
- Cannot make this road wider (St.154) due to many impacts, but can arrange proper space/make clearly line for parking
- Enforce one-way system with transparency
- Divide different spaces for cars/motorcycles/bicycles
- Please do not allow big vans to enter this road which causes traffic jam
- I want one-way, proper parking, but I would not park where service fee is charged
- Continue to do one-way but drivers should properly park
- Please don't penalize those who park properly
- Thanks to JICA for supporting the one-way system

- One-way system is good and needs to expand to other areas, especially the road along riverside
- Everyone should respect traffic rules and traffic signs
- Please improve the road for safety
- One-way system is good to reduce accident and traffic jam
- Everyone should respect the rule of one-way
- Police should strictly fine those who drive the wrong way
- Install more traffic signs
- Please arrange proper parking space on the one-way road
- Traffic law enforcement should be equal for poor and rich alike
- Prepare proper parking spaces, no to driving the wrong way, and no to parking on sidewalk
- Traffic controller and install more one-way signs
- Develop parking facilities, install slow-down signs and must respect traffic law
- Traffic law enforcement; and one-way system is good and needs to continue
- Install traffic signs and conduct public awareness raising about one-way system
- Install more traffic signs, divide different parking spaces along the road (car, motorcycles, “tuk-tuk”, Tri-cycles, sidewalk) and everyone should respect the law
- Government should reinforce the traffic law and put traffic controller
- No parking on sidewalk. Shops should keep sidewalk free for pedestrians
- Please keep all streets clean
- One-way system is good, but the big thing is that residents/shop owners should be respectful and friendly
- Everyone should respect the one-way system, and human rights
- Please park based on odd/even rule
- Install traffic lights to avoid traffic accident
- No parking on sidewalk especially at the shops/restaurants
- Enforce traffic rules and strictly no illegal parking and driving the wrong way
- Make sidewalk smaller
- Traffic controller, install more traffic signs at cross road and drivers should respect them altogether
- Don't park cars along the road too long time
- Make this road and sidewalk wider
- Directly inform residents about one-way along this road
- Widen parking space/place and vendors/shop owners should remove stuff from sidewalk
- Public experiment about one-way should be conducted on public holiday

### 5.5 Results of Vehicle Parking Survey

The survey showed that along the 8.0 m wide road sections with a single side parking strip, the number of parked vehicles during peak hour was higher than the actual capacity (see Figure 5.5-1). This showed that vehicles were still being parked on both sides of the road sections or on the sidewalks. In addition, a large number of motorbikes which tend to concentrate in front of canteens were commonly seen during the survey (see Figure 5.5-2).

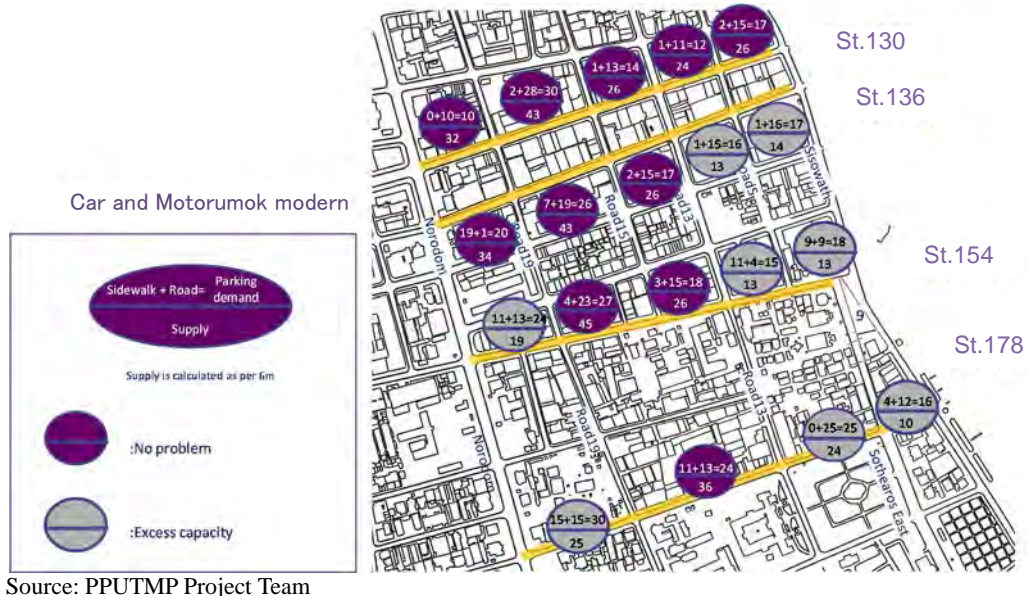


Figure 5.5-1 Results of Parking Survey (Passenger Car and Motorumok modern (Tuk-tuk))

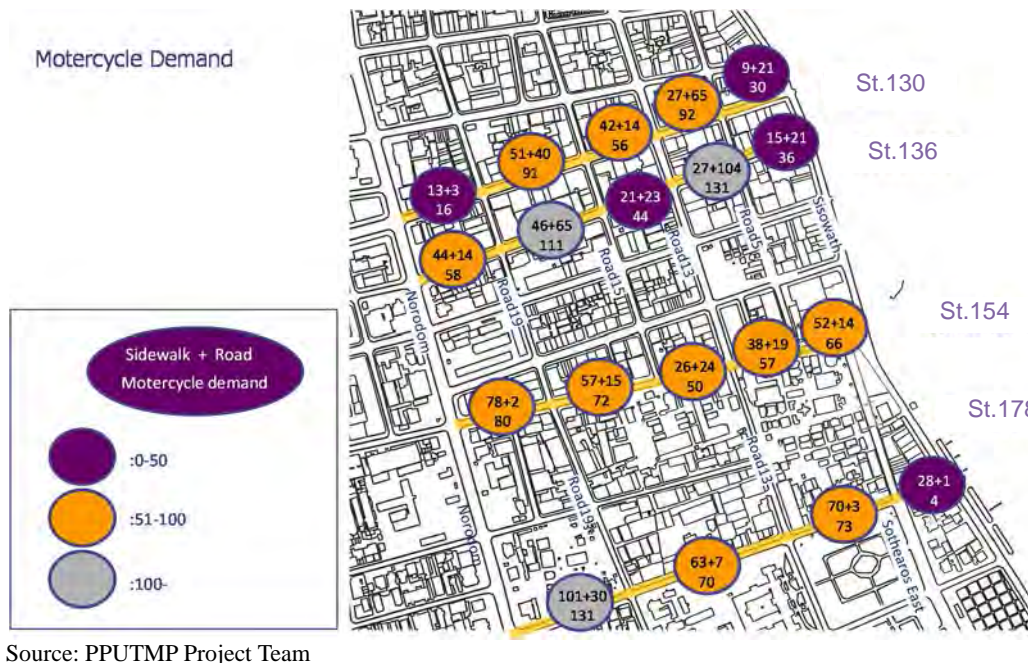


Figure 5.5-2 Results of Parking Survey (Motorcycles)



## **6 SUMMARY**

### **6.1 One-way System**

This public experiment of one-way system was conducted for the smooth traffic flow in the local roads. Traffic volume of 1.5 times than before was observed along St.154 because of increase of road capacity by one-way system.

More than 70% of drivers answered that the one-way system should be continued.

On the other hand, 20% of total traffic was driving the wrong way and 80% of this was motorcycles. It is necessary to disseminate information about the one-way system to drivers, in cooperation with local residents and traffic police, for a period of time and in a consistent manner.

The expansion of one-way system to the other local roads in the city center is necessary.

### **6.2 Parking Regulation**

Measures were carried out for the purpose of appropriate parking arrangements and securing the pedestrian space.

Many on-sidewalk parked cars moved to arranged on-road and off-road parking spaces in collaboration with roadside residents.

More than 70% of roadside residents answered that it is necessary to continue this parking arrangement.

Demand > capacity sections can be observed especially narrow road width sections ( $w = 8$  m).

It is necessary to develop comprehensive parking measures to cope with the expected increase in parking demand in the future.

### **6.3 Pedestrian Space**

Continuous sidewalk network ( $w = 2.0$  m) can be secured for the creation of safe and comfortable pedestrian spaces for roadside residents and tourists.

Many interviewees answered that walking on the street has become safer than before because of the removal of illegally parked cars and vendors.

It is expected that, as an offshoot of this public experiment, the city will realize the need to develop safe and comfortable pedestrian spaces for foreign tourists and introduce public transport, if the city is to join the ranks of international tourist destinations.

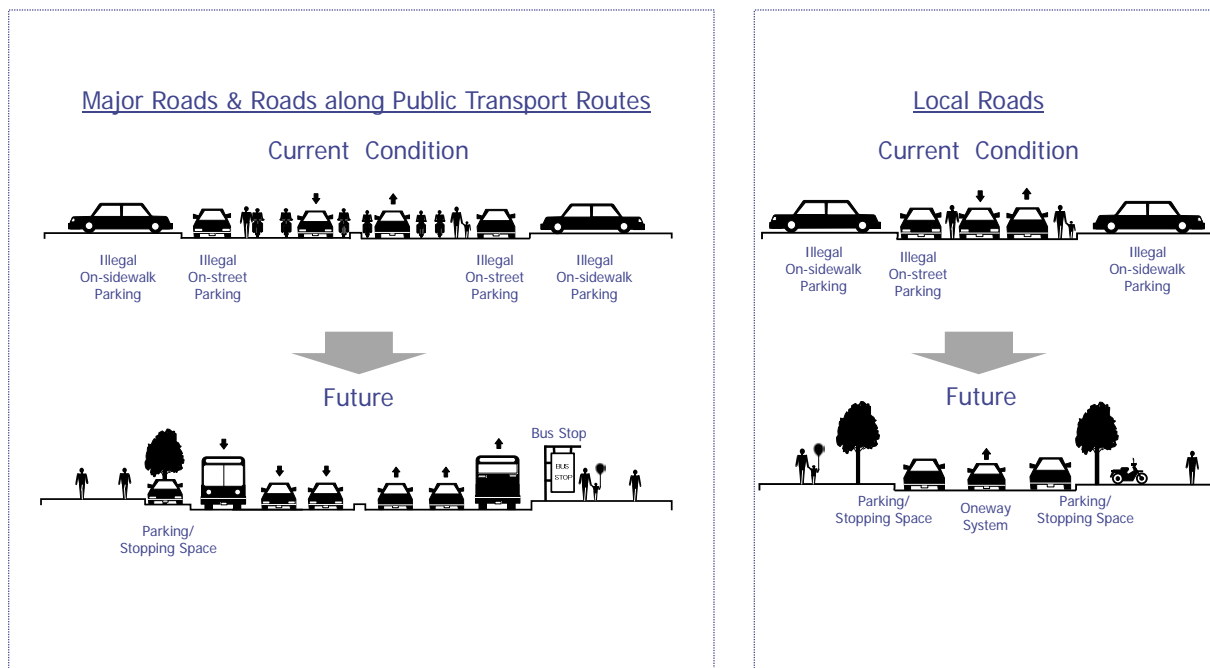
## 7 RECOMMENDATIONS

Most road users including roadside residents accept these countermeasures.

How to effectively use local road space is the key to solving traffic problems especially in the busy city center.

Local road space is required to cater not only to vehicular traffic and pedestrians but also to parking needs.

These measures of public experiment including one-way system, parking and sidewalk arrangements are effective and acceptable to the public. Therefore, expansion of these measures to other areas based on carefully conducted surveys is essential for a better urban environment.



Source: PPUTMP Project Team

**Figure 7.1-1 Road Space Usage**

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APPENDIX 3    2<sup>nd</sup> PUBLIC EXPERIMENT

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## Abbreviations

CBD	Central Business District
DPWT	Department of Public Works and Transport
GPS	Global Positioning System
JICA	Japan International Cooperation Agency
PPCC	Phnom Penh Capital City
PPUTMP	Project for Comprehensive Urban Transport Plan in Phnom Penh Capital City
PTMD	Public Transport Management Division
SMS	Short Message Service

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# 1 PLANNING FOR THE IMPLEMENTATION OF BUS OPERATION AS THE 2<sup>ND</sup> PUBLIC EXPERIMENT

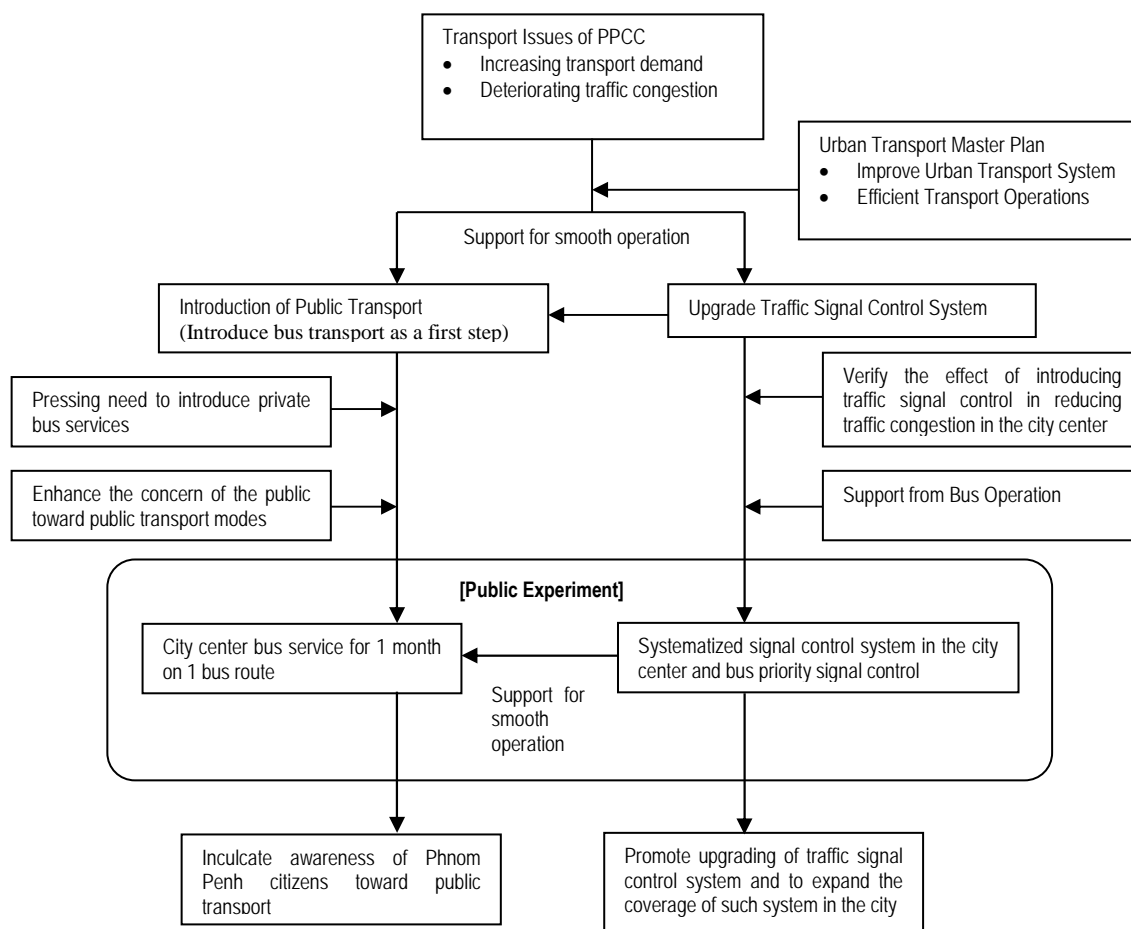
## 1.1 Public Experiment on Bus Operation

### 1.1.1 Objective

Traffic congestion in Phnom Penh is deteriorating by the day and a solution is badly needed to resolve this serious urban transport problem. The introduction of a public transport mode that is capable of moving a large volume of travelers at any one time is the most promising way to solve this problem.

This Public Experiment is aimed at assessing the possibility of any major impacts on the society when a new transport measure may be introduced in the near future. Hence, this Experiment is carried out to test out the new transport measures over a specific time and at a location to gauge the actual impacts of these measures on the public.

The introduction of a new public transport mode to a city is likely to bring about major impacts on the society. Hence, a bus operation experiment is proposed and implemented to enhance the acceptance and concerns of the general public on a new public transport system. The main objective of this Public Experiment is therefore to introduce a bus service as the first step in preparing the public of Phnom Penh in accepting a major transformation of the city's public transportation system.



Note: PPCC= Phnom Penh Capital City

Source: Project for Comprehensive Urban Transport Plan in Phnom Penh Capital City (PPUTMP) Project Team

Figure 1.1-1 Outline of the 2<sup>nd</sup> Public Experiment

### **1.1.2 Schedule of the 2<sup>nd</sup> Public Experiment**

The Experiment was scheduled for one month from 5 February 2014 (Wed.) to 4 March 2014. However, training of bus drivers and bus conductors run was carried out several days prior to the above dates.

### **1.1.3 Contents of the Experiment**

The bus operation Public Experiment was conducted on one bus route on Monivong for a period of one month.

- Why the bus route on Monivong?

Monivong is a heavily trafficked major thoroughfare in the city. It is also one of the city's most congested roads. Furthermore, Monivong is located within the future main public transport corridor of PPUTMP. With this background and the obvious demand for bus transport, the bus route on this road is expected to yield favorable results in reducing the current traffic congestion. The selection of this route is the first step for the introduction of a future public transport system. In addition, this 2<sup>nd</sup> Public Experiment is linked to the future traffic signals improvement program where scheduled improvements to traffic signals at three junctions are all located along this route.

- Why for a period of one month?

Since this Public Experiment is to arouse the keen interest and concerns of the general public on the city's future public transport system, it is therefore essential that the bus operation be implemented continuously over a fixed time period. As a general measure in gauging the extent of bus usage by the public, a time period of one month is deemed appropriate.

#### **(1) General Outline of Bus Operation**

##### **1) Target Bus Route: one route on Monivong (Japanese Bridge North to Monivong Bridge East = a distance of about 7km)**

The public experiment on bus operation is concentrated on one single route along one of the major public transport corridors in the proposed 2035 Master Plan. It is also one of the most congested roads and hence improvement to the level of congestion can be expected.

Essential data were gathered for future traffic signal improvement program along this road, i.e., to systematize control of the traffic signals at 3 major traffic intersections along this road,

##### **2) Bus Operation Interval: 10 min. interval during peak hours, 15 min. at other times**

The intervals were designed considering the level of convenience as well as waiting times under the hot sun or during rainy conditions.

##### **3) Bus coach: air-conditioned minibus (seating capacity: 35 persons)**

This is aimed at offering a comfortable, cool and well sheltered mode of travel. At this moment, standing passengers are not allowed on the experimental bus. All passengers are to be seated (35 persons) with only one door access. The more efficient 2-door coaches for 50 - 60 passengers will be considered in the future.



#### **4) Bus stops: About 40 locations (both directions)**

Bus stops were designated at 300 - 500 m intervals. Approximately 36 locations in both directions were selected with main considerations of proximity to schools, hospitals, public amenities and shops with relatively less traffic.

#### **5) Bus fare: Free or equivalent to the relatively cheap fare of a motodop**

There were free rides to encourage modal shift from private to public transport mode by the low income group. Meanwhile, the fares set were as follows: 1,000 Riel during the 1st or 2nd week; 1,500 Riel during the 3<sup>rd</sup> or 4th week.

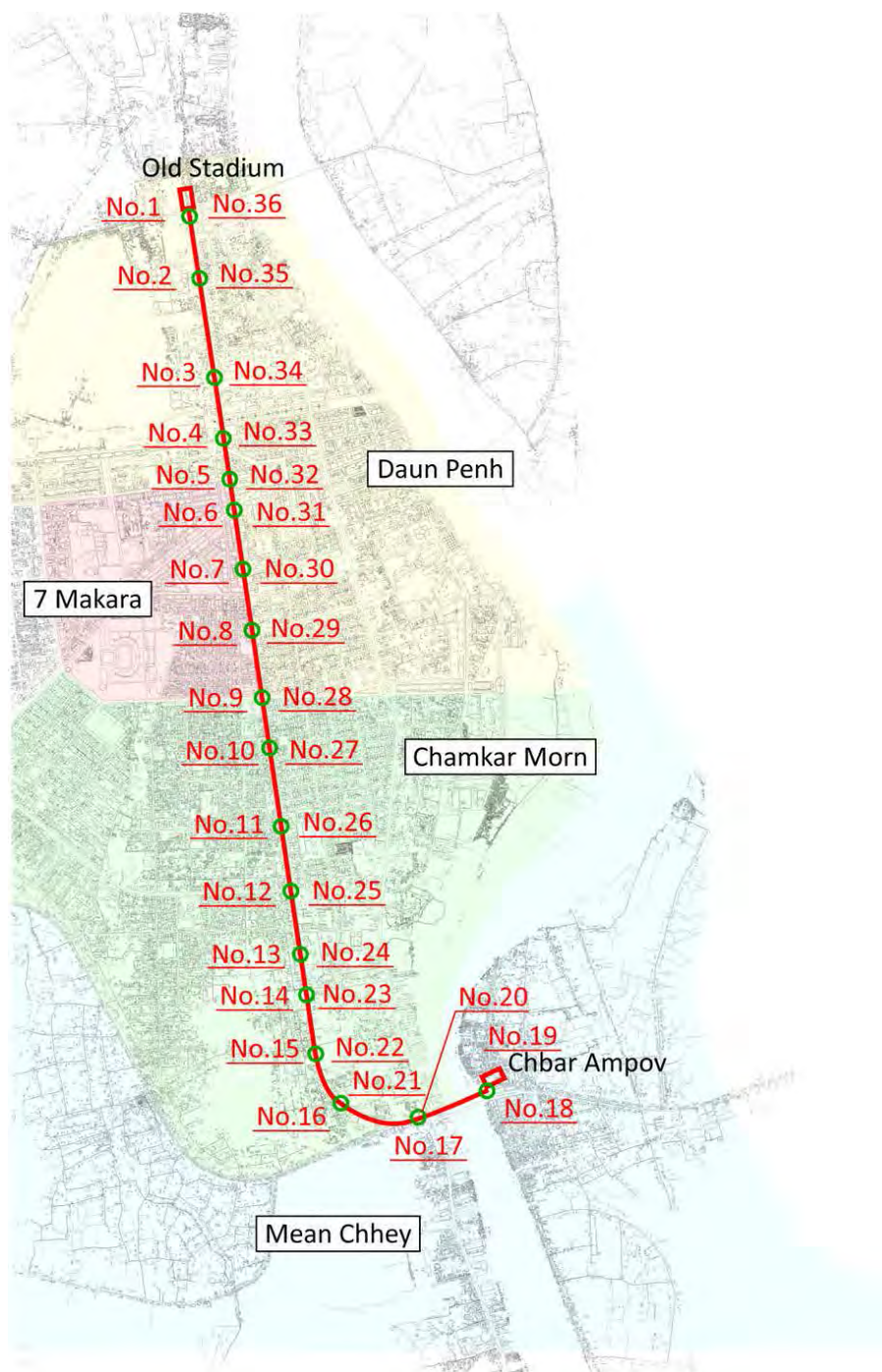
A passenger interview survey was conducted to find out the passengers' ability and willingness to pay and the elasticity of the set fares.

#### **6) Systematized signal control and Bus Priority Signal: 3 major intersections within Central Business District (CBD) area along Monivong**

During the Public Experiment, signal control at 3 intersections (Russian, Kampuchea Krom and Charles de Gaulle) was brought under a systematized control system. A simple bus priority signal control was implemented at the central section (at Kampuchea Krom Intersection). As a bus approached the intersection, a button was manually pressed to lengthen the green signal or truncate (shorten) the red signal times,

#### **(2) Bus Route**

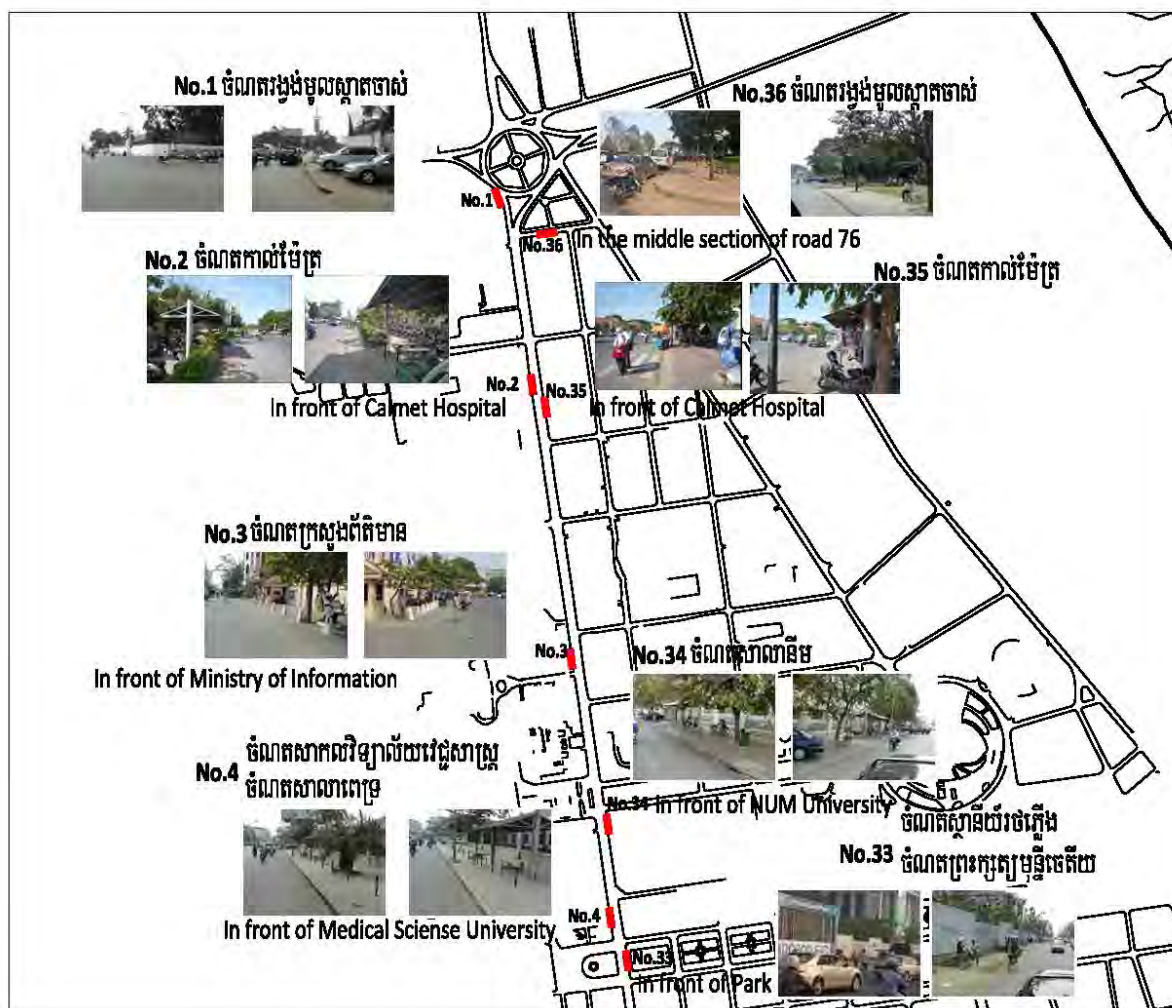
The bus route for the Public Experiment is the section from in front of the Old Stadium (ChoroChanwan Roundabout) along Monivong and beyond to Chbar Ampov Terminal, a distance of about 7 km (see Figure 1.1-2).



Source: PPUTMP Project Team

**Figure 1.1-2 Bus Route for the Public Experiment**

Bus stops locations were selected as shown in Figures 1.1-3 (1) to 1.1-6 (4). The selection was based on whether there are parked vehicles nearby and other road usage conditions that might affect their use.



Source: PPUTMP Project Team

Figure 1.1-3 Selected Bus Stop Locations (1)



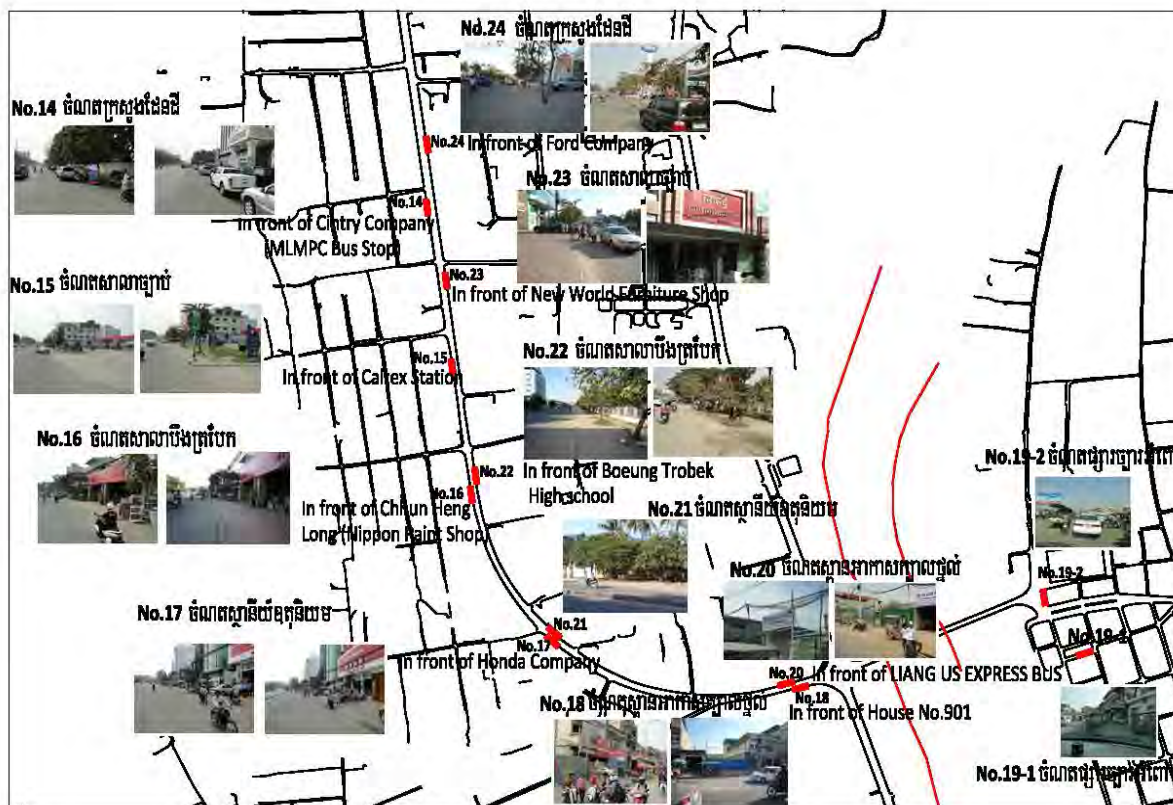
Source: PPUTMP Project Team

Figure 1.1-4 Selected Bus Stop Locations (2)



Source: PPUTMP Project Team

Figure 1.1-5 Selected Bus Stop Locations (3)



Source: PPUTMP Project Team

Figure 1.1-6 Selected Bus Stop Locations (4)

### (3) Bus Stops

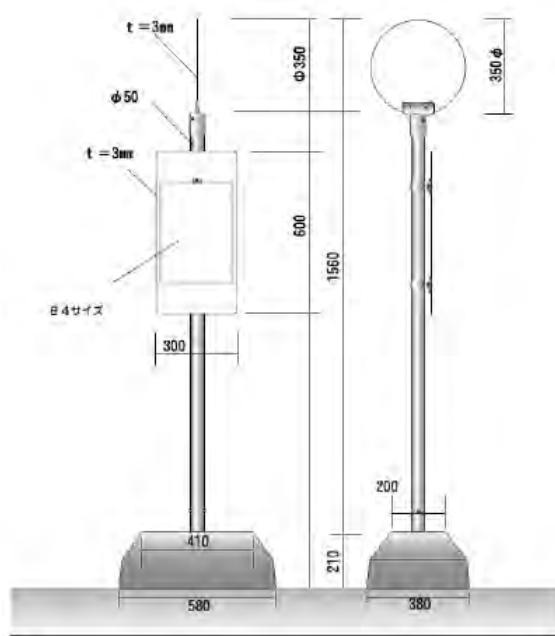
#### 1) Bus Stop Design

The following is an image of the proposed bus stop design. Upon approval of this design by PPCC, a local manufacturer was contracted to make them for the Experiment.



Source: PPUTMP Project Team

**Figure 1.1-7 Image of the Proposed Bus Stop Design**

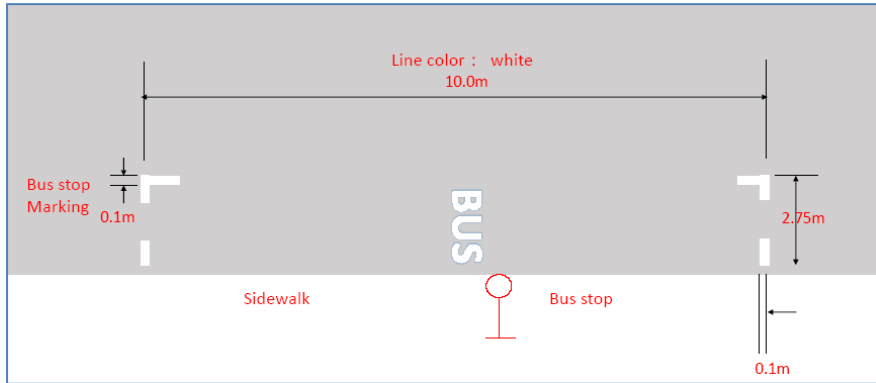


Source: PPUTMP Project Team

**Figure 1.1-8 Specifications of the Proposed Bus Stop Design**

## 2) Road Markings at Bus Stops

Road markings in relation to the proposed bus stops are shown in the figure below.



Source: PPUTMP Project Team

Figure 1.1-9 Image of Road Markings at Proposed Bus Stops

## (4) Media of Information Dissemination

The following means of information dissemination about the city bus operation were utilized:

- Putting up posters and distributing pamphlets in schools, government offices, hotels, etc.
- Broadcasting of the TV and radio spots
- Advertising in newspapers
- Putting up banners
- Using social media through JICA Cambodia's Facebook page

### ◆ Pamphlet



### ◆ TV Spot



### ◆ Newspaper Advertisement



Source: PPUTMP Project Team

Figure 1.1-10 Image of Advertisement Designs



## (5) Bus Operation Organization

For this 2<sup>nd</sup> Public Experiment, the Public Transport Management Division (PTMD) set up in the Department of Public Works and Transport (DPWT) was the Experiment Headquarters and was directly responsible in managing the bus operation, with the close cooperation from PPCC, which provided suggestions and support as well as managed the collection of bus fares. The PPUTMP Project Team, on the other hand, provided the necessary technical support in terms of carrying out the planning for the implementation of the Experiment, Survey Planning and analyses of the survey results.

An Operation Team was formed by the bus operators to operate the bus service during the Experiment. It consists of a Supervisor, Dispatchers, Conductors and Drivers.

The division of responsibilities among the different entities for the 2<sup>nd</sup> Public Experiment is shown in Table 1.1-1 below.

**Table 1.1-1 Bus Operation Structure and Division of Responsibilities**

Organization	Division of Responsibilities	
PTMD	<ul style="list-style-type: none"> <li>Experiment Headquarters: Information sharing</li> <li>Bus Operation Management</li> </ul>	
PPCC	<ul style="list-style-type: none"> <li>Fare Collection Management</li> <li>Suggestions and support to PTMD</li> </ul>	
PPUTMP Project Team	<ul style="list-style-type: none"> <li>Implementation Planning</li> <li>Survey Planning and Analyses of survey results</li> </ul>	
Bus Operator	Supervisor	Responsible for the bus operation. Constant monitoring of the operational conditions. Trouble shooting. Take actions to adjust the operational service intervals if necessary.
	Dispatcher	Carry out adjustments to the service intervals as instructed. Request for standby bus if necessary to the Supervisor.
	Conductor	Fare collection and issuance of tickets. Announce the name of next bus stop. Ensure passenger boarding and alighting safety.
	Driver	Drive the bus according to the prepared schedule and intervals.

Source: PPUTMP Project Team

## (6) Coordination between Related Organizations and Staff Training

### 1) Confirmation of the bus stop location among traffic police and counterparts

Safety measures for bus operation such as removal of the illegal parking vehicles were confirmed by related organizations.

### 2) Conduct of staff training

A 4-day training for bus operation was conducted for supervisors, drivers and conductors including on-board training.

Photos of the above activities are shown in Figure 1.1-11.



Source: PPUTMP Project Team

**Figure 1.1-11 Confirmation of the Site (left) and Staff Training (right)**

#### **(4) Effectiveness Assessment Survey**

##### **1) Travel Speed Survey (Bus)**

a) Survey dates and times

The Travel Speed Survey was conducted on 12, 19 and 26 February (a total of 3 days). Survey times were from 5:30 to 20:30 (from start of first bus to the end of last bus).

b) Objective

Through the use of survey results (times the bus passes through an observation point), the travel speed of buses is computed. With this result, a distance-time map can be prepared in revealing the congested section of the route and reasons for such congestions. Such kinds of information are the basic data essential in composing the bus service scheduling timetables when the service is to be officially launched in the future.

c) Survey Method

A Global Positioning System (GPS) gadget is attached to each bus. Using this gadget, the bus location and time are gathered and recorded. Survey personnel will set the GPS at the start of the first bus service in the morning and retrieve the gadget at the end of the service of the last bus at night.

##### **2) Interview Survey**

The following 3 types of interview surveys were conducted:

- Bus Users Detailed Interview Survey
- Bus Users Simple Opinion Survey
- Enroute Residents Opinion Survey

a) Survey Dates and Times

- Bus Users Detailed Interview Survey : 1 - 7 February (7 days)
- Bus Users Simple Opinion Survey: From 8 February until the target 1,000 samples are collected.
- Enroute Residents Opinion Survey : 17 - 24 February (8 days)

All bus user surveys were conducted from 5:30 - 20:30 (from the first bus service to the last bus service). For the residents opinion survey, however, the survey was conducted during the day time.

b) Target Survey Samples

Target samples are as follows:

- Bus Users Detailed Interview Survey : 1,000 samples
- Bus Users Simple Opinion Survey : 1,000 samples
- Enroute Residents Opinion Survey : 320 samples

c) Objectives

These surveys are aimed at collecting basic information on the bus users which are needed to understand their various needs, set the necessary level of service and analyze any related issues when the actual bus transport service is introduced. More specifically, the objective of each survey is as follows:

- Bus Users Detailed Interview Survey: To understand the particular needs of users regarding the bus service.
- Bus Users Simple Opinion Survey: To understand the user's needs of a larger segment of the public by the use of a limited number of questions.
- Enroute Residents Opinion Survey: To know the opinions of those living along the bus routes and understand their needs for public transport.

d) Survey Methods

- Bus Users Detailed Interview Survey:  
Surveyors are organized into 4 groups with 2 members in each group. They are to interview the bus users taking care to avoid any biases such as age group, gender and time periods when conducting such interviews. They are to target about 150 effective samples a day.
- Bus Users Simple Opinion Survey:  
Survey forms are placed on buses. During their rides, users are asked to fill in the survey forms. These forms are collected in the buses. The target is 1,000 samples. Survey will continue throughout the day until this target is met.
- Enroute Residents Opinion Survey:  
Surveyors are to visit the residents along the bus routes and conduct interviews with the residents. The surveyors are organized into 4 pairs. Each pair is to interview at least 10 residents a day for a period of 8 days. Thus the minimum target is 320 samples.

e) Survey Forms

The survey forms for the abovementioned surveys are shown in Figures 1.1-12 to 1.1-13.



**Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City**  
Questionnaire  
(For Bus user )

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Surveyor: \_\_\_\_\_

1. How do you think about the traffic condition of the current Phnom Penh Capital City

	1.Very good	2.Good	3.Medium	4.bad	5.Very bad
a Congestion	1.	2.	3.	4.	5.
b Noise pollution	1.	2.	3.	4.	5.
c Exhaust gas	1.	2.	3.	4.	5.

*Read the following comment, Please answer the following questions*

Every Phnom Penh citizens really want the solution of serious traffic congestion in the city. It is expected that the introduction of the public transport (city bus service) which can transport many people at one time is the most suitable solution in the Phnom Penh's traffic congestion.

2. Do you think that it is the most necessary for future public transport?

- a Speed
- b Cost
- c Safety
- d Comfort
- e Avoid Rain and Sunshine
- f Others(\_\_\_\_\_)

3. IF public transport was introduced, what kind of thing do you want to solve in your life?

- a To school
- b To work
- c Shopping action
- d Private
- e Go to hospital
- f Others(\_\_\_\_\_)

4.How did you know about city bus?

- a Tv spot
- b Radio
- c Newspaper
- d Banner
- e pamphlet
- f Poster
- g Others(\_\_\_\_\_)

**Figure 1.1-13 Bus Users Simple Opinion Survey Form**

**Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City**  
Interview Survey  
(For Residents )

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Surveyor: \_\_\_\_\_

1. How do you think about the traffic condition of the current Phnom Penh Capital City?

	1.Very good	2.Good	3.Medium	4.bad	5.Very bad
a Congestion	1.	2.	3.	4.	5.
b Noise pollution	1.	2.	3.	4.	5.
c Exhaust gas	1.	2.	3.	4.	5.

*Read the following comment, Please answer the following questions*

Every Phnom Penh citizens really want the solution of serious traffic congestion in the city. It is expected that the introduction of the public transport (city bus service) which can transport many people at one time is the most suitable solution in the Phnom Penh's traffic congestion.

2. Do you think that it is the most necessary for future public transport?

- a Speed
- b Cost
- c Safety
- d Comfort
- e Avoid Rain and Sunshine
- f Others(\_\_\_\_\_)

3. IF public transport was introduced, what kind of thing do you want to solve in your life?

- a To school
- b To work
- c Shopping action
- d Private
- e Go to hospital
- f Others(\_\_\_\_\_)

4. How do you think about a bus stop being installed by near home?

1.Very good	2.Good	3.Medium	4.bad	5.Very bad
-------------	--------	----------	-------	------------

5. Why do you think so? , please write it freely.

**Figure 1.1-14 Enroute Residents Opinion Survey**

### (3) Bus Stop Boarding and Alighting Passenger Survey

#### 1) Survey Dates and Times

Considering the different fares applied for weekdays and on a weekend, the survey was conducted for 4 days on 9 February (Sunday), 12 (Wednesday), 23 (Sunday) and 26 (Wednesday). The survey was conducted from 5:30 to 20:30 (start of the first bus to end of last bus of the day).

#### 2) Objective

The objective was to gather basic information needed to plan the number of bus runs a day as well as the bus stop allocation plan.

#### 3) Survey Method

Surveyors were organized into 2 groups with 2 members in each group. One group boarded the first bus of the day starting from 5:30 at Old Stadium. At each stop, one surveyor counted and recorded the total number of passengers getting off the bus while the other person did the same for passengers boarding the bus. The group worked for a period of 3 hours as one shift on the same bus. After 3 hours, the next group took over and boarded the same bus at Old Stadium.

**Table 1.1-2 Example: Allocation of Survey Shifts**

<b>5:30</b>	<b>8:10</b>	<b>11:00</b>	<b>14:00</b>	<b>17:00</b>	<b>19:45</b>
<b>Group.1</b>		<b>Group.1</b>		<b>Group.1</b>	
	<b>Group.2</b>		<b>Group.2</b>		<b>Group.2</b>

Source: PPUTMP Project Team

#### 4) Survey Form

The survey form is shown in Figure 1.1-15.

Project for Comprehensive Urban Transport Plan in Phnomn Penh Capital City  
Passenger Count Sheet

Date: \_\_\_\_\_ Bus No: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Name \_\_\_\_\_


In	Out	Bus Stop Number	In	Out
		1		
		2      36		
		3      35		
		4      34		
		5      33		
		6      32		
		7      31		
		8      30		
		9      29		
		10     28		
		11     27		
		12     26		
		13     25		
		14     24		
		15     23		
		16     22		
		17     21		
		18     20		
		19		

Figure 1.1-15 Survey Form for Bus Stop Passenger Boarding and Alighting Survey



**(4) Others**

Besides the various surveys as described above, the Bus Operator and personnel (conductors, supervisors, etc.) were required to record various incidents, their contents and any actions taken as well as the total number of tickets issued a day using the following prepared forms.

Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City Stuff Daily Report	
Date: _____	Bus No: 1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 9 , 10 / Supervisor
Name _____	
Content of the case concerned	Time: _____
	
Processing result	

**Figure 1.1-16 Daily Report by Bus Operator**

Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City Bus Ticket Count Sheet					
Bus No.		1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 9 , 10			
Date		Ticket No.		Total	Surveyor Name
		Start	End		
1-Feb	Sat				
2-Feb	Sun				
3-Feb	Mon				
4-Feb	Tue				
5-Feb	Wed				
6-Feb	Thu				
7-Feb	Fri				
8-Feb	Sat				
9-Feb	Sun				
10-Feb	Mon				
11-Feb	Tue				
12-Feb	Wed				
13-Feb	Thu				
14-Feb	Fri				
15-Feb	Sat				
16-Feb	Sun				
17-Feb	Mon				
18-Feb	Tue				
19-Feb	Wed				
20-Feb	Thu				
21-Feb	Fri				
22-Feb	Sat				
23-Feb	Sun				
24-Feb	Mon				
25-Feb	Tue				
26-Feb	Wed				
27-Feb	Thu				
28-Feb	Fri				

**Figure 1.1-17 Ticket Sales Record Book**

## 1.2 Systematized Traffic Signal Control and Bus Priority Signal Control Experiment

### 1.2.1 Objective of Experiment

Many of the traffic signal equipment in Phnom Penh are installed by various donor countries. Therefore, there is no consistency in their technical specifications. These signals are also not linked to function as a system. They are all stand-alone signal controls. In addition, there are many other shortcomings such as the incapability in changing the splits to cater to changing traffic demand since they are working with only one single control pattern.

Under this current situation, the objective of this Experiment is to verify the effects of more efficient signal equipment that are appropriately linked to form a system in mitigating the traffic congestion. Furthermore, improvement to signal control in support of the Bus Operation Public Experiment can also be tested out.

### 1.2.2 Experiment Dates and Times

The dates and times for the experiment were as follows:

- Systematized Signal Control : 5 February 2014 (Wed.) to 4 March 2014 (Tues.)
- Bus Priority Signal Control : 12 February 2014 (Wed.), 19 February 2014 (Wed.), and 26 February 2014 (Wed.).

### 1.2.3 Contents of Experiment

#### (1) Systematized Control

The following 3 intersections were targeted for this experiment (see Figure 1.2-1):

- Intersection of Monivong and Russian
- Intersection of Monivong and Kampuchea Krom
- Intersection of Monivong and Charles de Gaulle

The above three intersections are situated in the city center. There is no significant difference in the high traffic volume in both directions during both the morning and evening peak hours. Therefore, they are ideal to try out the simultaneous offset system of control.



Source: PPUTMP Project Team

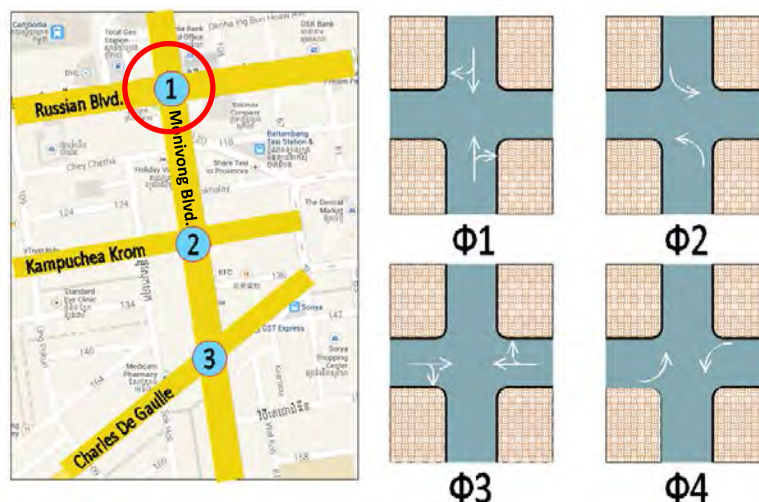
**Figure 1.2-1 Systematized Signal Control Experiment along Monivong at 3 Intersections (+ Traffic Management by traffic police at related but non signalized intersections)**

## (2) Improvement of the Traffic Signal Phasing

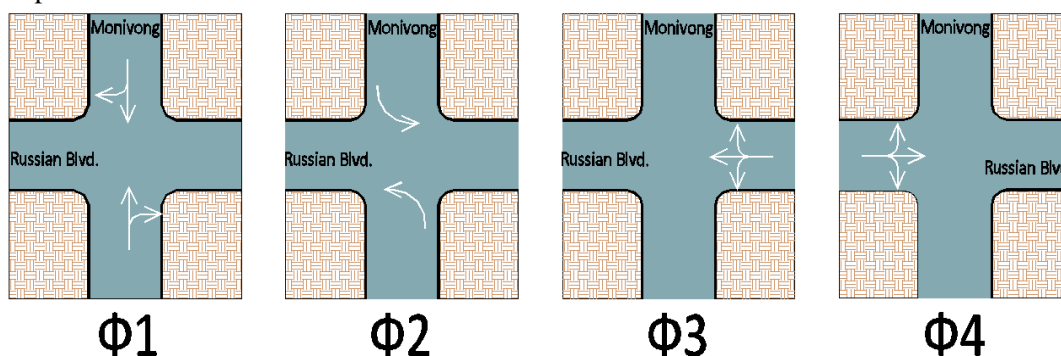
The inflow traffic volume during morning peak hour is 3,300 vehicles/hour and number of lanes is 4 lanes from the Airport (western side) at Monivong/Russian Intersection. On the other hand, for the eastern side, inflow peak hour traffic volume and number of lanes are 1,000 vehicles/hour and 2 lanes, respectively.

To improve this unbalanced directional traffic volume, the individual phasing pattern is introduced for securing the smooth traffic flow at this intersection (refer to Figure 1.2-2).

Before Improvement



After Improvement



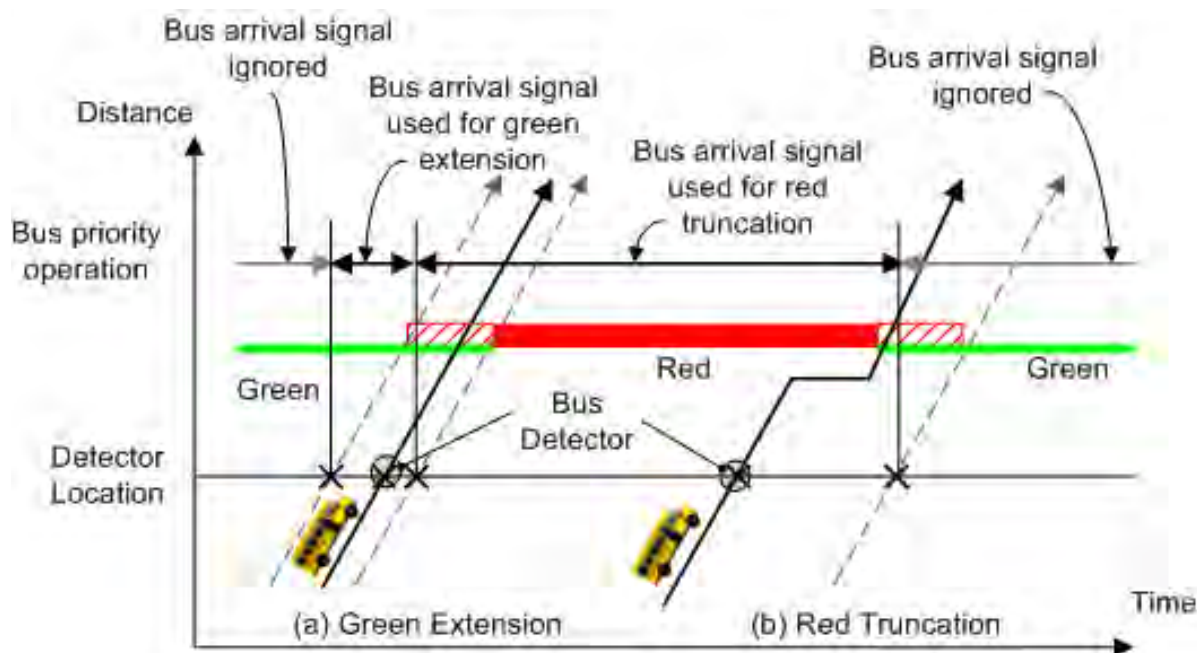
Source: PPUTMP Project Team

Figure 1.2-2 Improvement of Traffic Signal Phasing at Monivong/Russian Intersection

## (3) Bus Priority Signal Control

This bus priority signal control is based on the use of detector to activate the signal control function. When a bus passes through a fixed location, a button is manually pressed to send a signal to the signal control equipment. This announcement of the arrival of a bus will activate the signal control equipment to either lengthen the 'green time' or shorten (truncate) the 'red time' or to ignore such signal message, depending on the current traffic signal display at the time, thus allowing the bus to pass through the intersection without stopping, i.e., reducing delays (see Figure 1.2-3).

Results of traffic volume survey before the experiment and the site conditions are information needed in order to set the various control patterns.



Source: PPUTMP Project Team

**Figure 1.2-3 Organization Setup for the Implementation of Systematized Signal Control and Bus Priority Signal Control**

#### (4) Systematized Signal Control and Bus Priority Control Experiment

For the 2<sup>nd</sup> Public Experiment, DPWT’s Lighting Division was designated as the headquarters for the management of the signal-related public experiment. The division worked closely with PPCC, which provided various advice and support. The PPUTMP Project Team, on the other hand, provided assistance and support in terms of drafting the implementation plan, survey plan and analyses of the survey results. Furthermore, technicians from the signal control equipment manufacturer provided the necessary on-site training for the Lighting Division personnel in operating the signal control equipment.

**Table 1.2-1 Organization Setup and Share of Responsibilities for the Systematized Signal Control and Bus Priority Control Experiment**

Organization	Share of Responsibilities
Lighting Division	<ul style="list-style-type: none"> <li>Experiment Headquarters : sharing of information</li> </ul>
PPCC	<ul style="list-style-type: none"> <li>Provides advice and support to Lighting Division</li> </ul>
PPUTMP Project Team	<ul style="list-style-type: none"> <li>Implementation Planning</li> <li>Survey Planning &amp; Analyses of Survey Results</li> </ul>
Signal Equipment Manufacturer	<ul style="list-style-type: none"> <li>On-site training on signal control operation for Lighting Division’s personnel</li> </ul>

Source: PPUTMP Project Team

## **(5) Effects Assessment Survey**

### **1) Traffic Volume Survey**

a) Survey Date and Time

This survey was conducted on a weekday before the commencement of the Experiment from 6:00 to 20:00, a period of 14 hours.

b) Objective

The objective of the survey was to gather traffic volume data necessary for the setting of signal control parameters when the systematized signal control is applied.

c) Survey Method

Traffic volume was counted visually and classified into vehicle type using manual counters by surveyors stationed on site.

d) Survey Location

The survey locations were the 3 intersections of Monivong /Russian, Monivong/Kampuchea Krom, and Monivong/Charles de Gaulle.

e) Vehicle Classification

The vehicle classification is similar to that used during the survey in this Project in 2012:

- |                               |   |
|-------------------------------|---|
| 1. Motorbike / Motodop        | 6. Mini Bus                                 |
| 2. Motorumok modern (tuk-tuk) | 7. Medium and Large Bus                     |
| 3. Motorumok                  | 8. Light Truck/Pickup                       |
| 4. Sedan, wagon, van          | 9. Truck (2 axles)                          |
| 5. Taxi                       | 10. Heavy Truck & Trailer (3 axles or more) |

f) Survey Form

The survey form used is shown in Figure 1.2-4.

(Part 1)

APPENDIX 2-D: INTERSECTION SURVEY

**Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City**  
Traffic Count at Intersection

Start: 6:00

Supervisor: \_\_\_\_\_ Date: \_\_\_\_\_ Name of Intersection: \_\_\_\_\_ Key Map for \_\_\_\_\_  
 Surveyor: \_\_\_\_\_ Weather: \_\_\_\_\_ Direction / From: \_\_\_\_\_ To: \_\_\_\_\_

Vehicle Type	1. Motorcycle / Motodop	2. Motoromok modern (tuk-tuk)	3. Motoromo	4. Sedan, Wagon, Van and Taxi	5. Taxi	6. Mini Bus	7. Medium and Large Bus	8. Light Truck / Pick up	9. Truck (2 axle)	10. Heavy Truck and Trailer (3 axle more)
6:00 - 6:15										
6:15 - 6:30										
6:30 - 6:45										
6:45 - 7:00										
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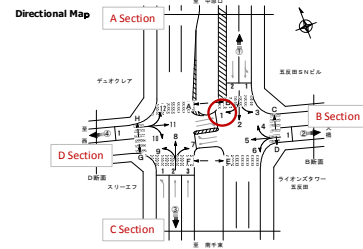
Figure 1.2-4 Survey Form for Traffic Count at Intersection

(Part 2)

**Project for Comprehensive Urban Transport Plan in the Phnom Penh Capital City**  
Traffic Count at Intersection

Start 6:00

Date : \_\_\_\_\_  
 Number of Intersections : \_\_\_\_\_  
 Name of Intersections : \_\_\_\_\_  
 Weather : \_\_\_\_\_



Direction		1										Total	
Type	MC			LV			LVB	HVB	LVT	9. LVT2	HV		
	1. Motobike / Motodop	2. Motoromok modern (tuk-tuk)	3. Motorumo	Total	4. Sedan, Wagon, Van and Taxi	5. Taxi	Total	6. Mini Bus	7. Medium and Large Bus	8. Light Truck /Pick up	9. Truck (2 axes)		10. Heavy Truck and Trailer (3 Axles more)
6:00 - 6:15													0
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21:15 - 21:30													0
21:30 - 21:45													0
21:45 - 22:00													0
Total													0

Direction		2										Total	
Type	MC			LV			LVB	HVB	LVT	9. LVT2	HV		
	1. Motobike / Motodop	2. Motoromok modern (tuk-tuk)	3. Motorumo	Total	4. Sedan, Wagon, Van and Taxi	5. Taxi	Total	6. Mini Bus	7. Medium and Large Bus	8. Light Truck /Pick up	9. Truck (2 axes)		10. Heavy Truck and Trailer (3 Axles more)
6:00 - 6:15													0
6:15 - 6:30													0
6:30 - 6:45													0
6:45 - 7:00													0
7:00 - 7:15													0
7:15 - 7:30													0



## 2) Travel Speed Survey (for Signal Control Experiment)

a) Survey Dates and Times

The survey was conducted on 29 January (Wed.) and 26 February (Wed.) from 6:00 - 9:00; 11:00 - 13:00; 16:00 - 18:00.

b) Objective

The objective was to evaluate the effects of the systematized signal control experiment in improving the travel speeds of vehicles.

c) Survey Method

A GPS equipped passenger car was used as a survey vehicle. The survey vehicle was then used to travel along with the traffic stream during the time periods as stated above and through the three intersections mentioned earlier in both direction runs. The GPS recorded the location and times of the survey vehicle as it traveled through the road section.

d) Survey Location

The survey section was between the Monivong/Russian intersection to Monivong/Charles de Gaulle Intersection.

## 3) Bus Priority Signal Control Survey

a) Survey Dates and Times

The survey was conducted on 17 February (Mon), before the bus priority signal control is applied and on 19 February (Wed), the day when the bus priority signal control is applied. Survey period was from 6:00 to 20:00.

b) Objective

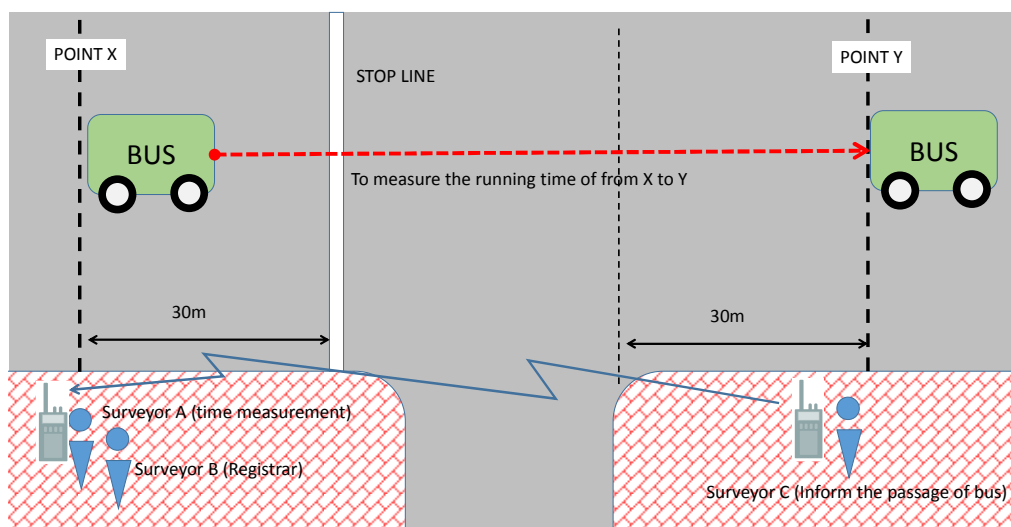
Using the times when the buses passed through certain predetermined points, the travel speeds of buses with the priority signal control in effect were computed (with the signals at the intersection being under the systematized signal control mode). By plotting a distance-time map, any improvements to the service level of the bus transport could then be determined (reduction of delay time).

c) Survey Method

Four surveyors were organized into 2 pairs (inclusive of one person as replacement in case of emergency). One pair was responsible for the inbound run and the other pair, for the outbound run. The time in seconds for the Experiment Bus to pass through two predetermined points before and after the survey intersection was recorded to compute for the travel speed of the bus.

As illustrated in Figure 1.2-5 below, a point X is marked approximately 30 m before the stop-line of the intersection. As soon as the Experiment Bus passes through point X, the surveyor 'A' will read out the time in seconds and the bus number to surveyor 'B' who will then record these data in the prepared survey form.

Consequently, as the Experiment Bus passes through the point Y about 30 m downstream from the intersection, the third surveyor 'C' stationed there shall call surveyor 'A' using a wireless communication set, announcing that the bus has 'now passed through' together with the bus number. Surveyor 'A' then will note the time in seconds and communicate with 'B' the time for him to record.



Source: PPUTMP Project Team

**Figure 1.2-5 Bus Priority Signal Control Survey Method**

This survey is conducted before and after the application of the bus priority signal control and therefore the predetermined points X and Y must be carefully marked and are not shifted for the two surveys.

d) Survey Location

This survey was conducted at Monivong with Charles de Gaulle Intersection.

e) Survey Form

The survey form is shown in Figure 1.2-6.

**Bus Priority Signal Survey**  
- Bus Count Time Sheet -

Date:     /     /2014

Signal Control:   On / Off

Surveyor's Name: \_\_\_\_\_

Time: 5:00 AM~6:00 AM

Seq.	Bus No.	Arrival Time at Intersection Entrance (X)			Arrival Time at Intersection Exit (Y)			X⇒Y Passing Time at Intersection	
		h	m	s	h	m	s	m	s
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
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37									

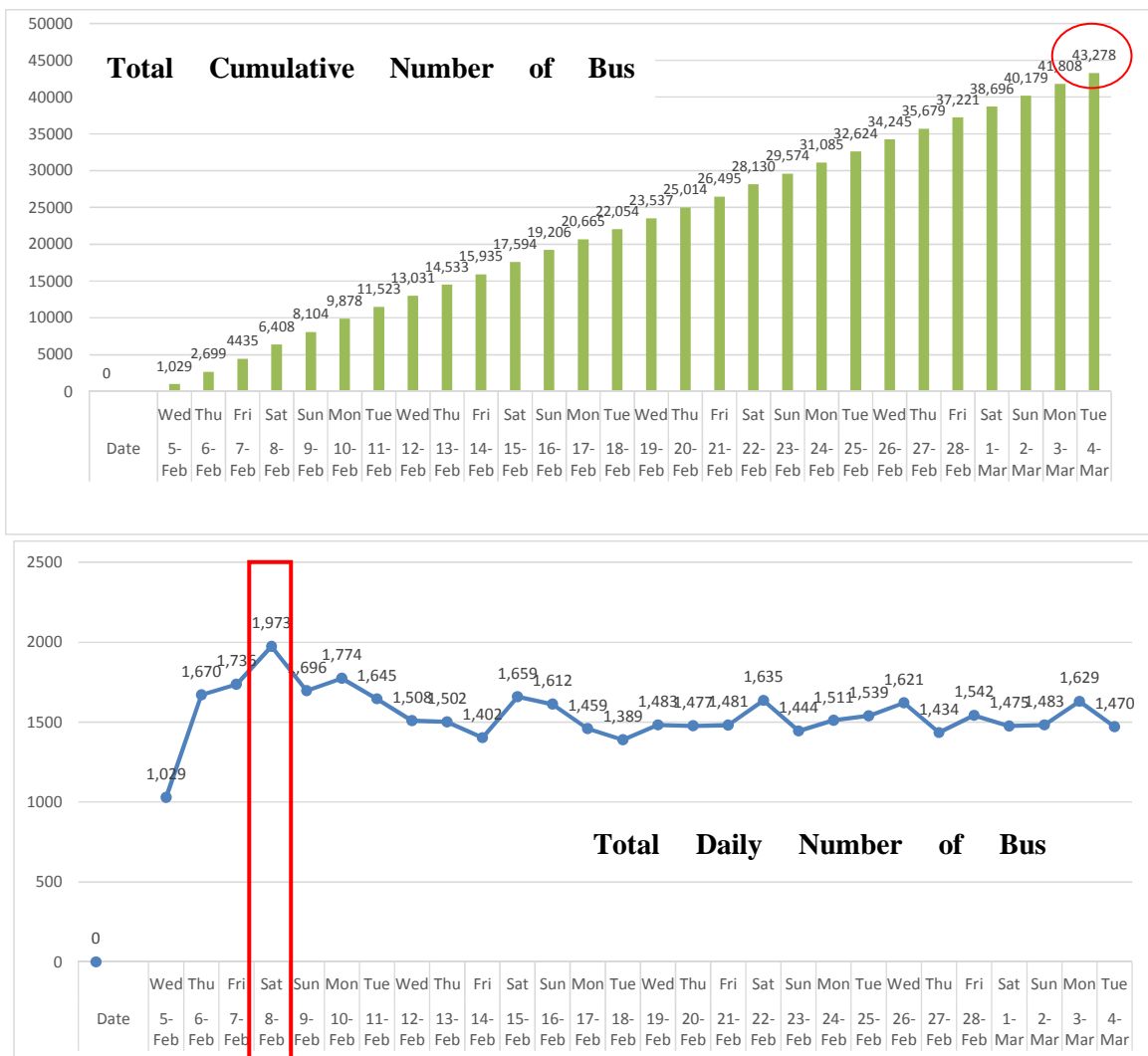
Figure 1.2-6 Bus Priority Signal Survey Form

## 2 RESULTS OF THE EXPERIMENT

### 2.1 Bus Usage Situation

#### 2.1.1 Bus Passenger Numbers

The total cumulative number of bus passengers over the entire Experiment period from 5 February to 4 March was 43,278 persons. The average daily number of bus passengers was 1,546 persons/day. Assuming 1 person/vehicle, there was therefore a reduction of daily traffic volume by about 1,500 vehicles. The highest number of daily passengers was recorded on the first weekend after the Public Experiment started. On 8 February (Saturday), the total number of passengers tallied was 1,973 persons (see Figure 2.1-1)

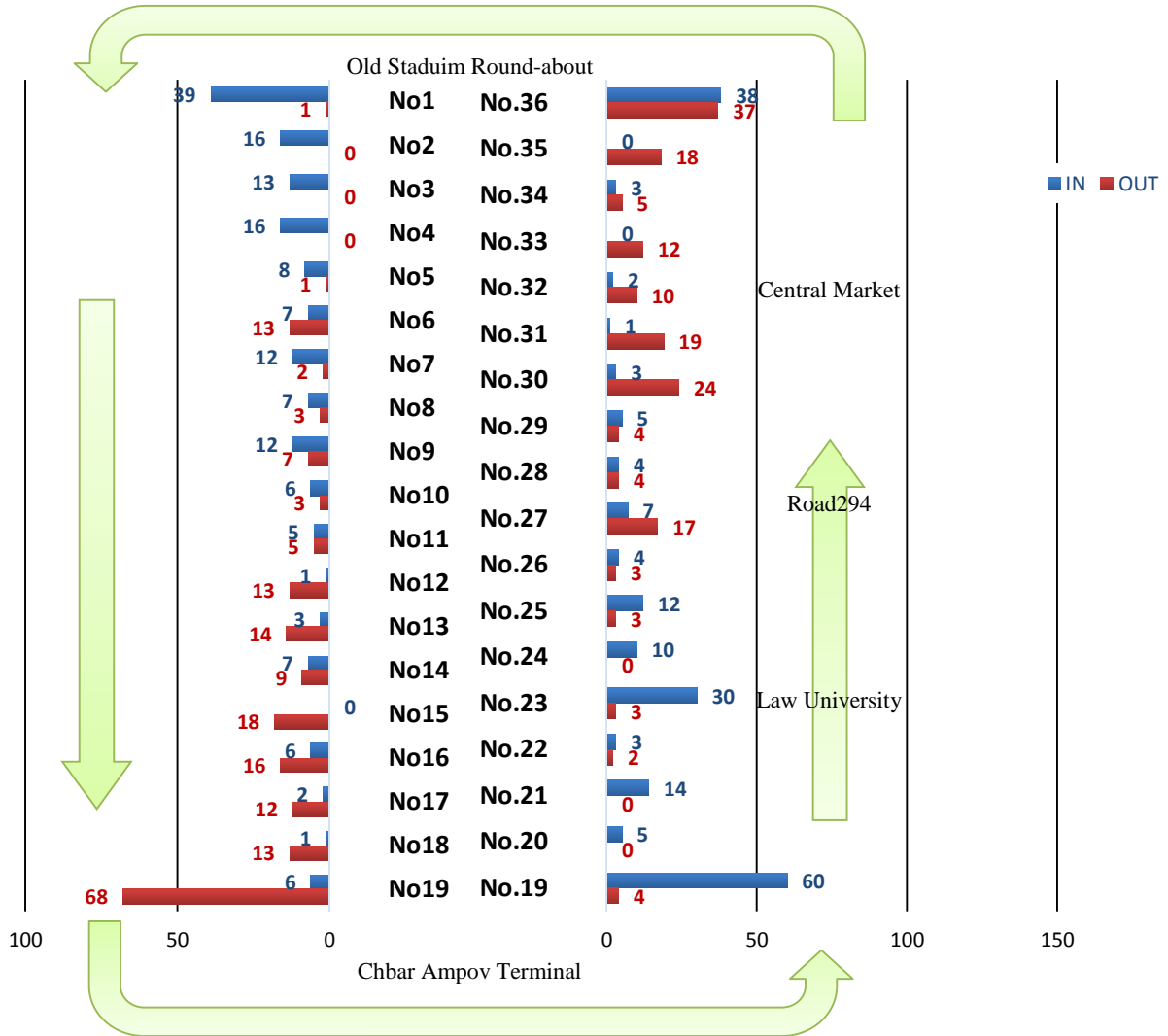


Source: PPUTMP Project Team

**Figure 2.1-1 Total Number of Bus Passengers  
(Upper: Cumulative Number; Lower: Daily Number)**

**(1) Weekday**

High numbers of alighting or boarding passengers were recorded at both ends of the terminal stops. Many residents from the suburban area used motodop to get to the terminal stops and then transferred to the bus to get to their destinations in the city center.

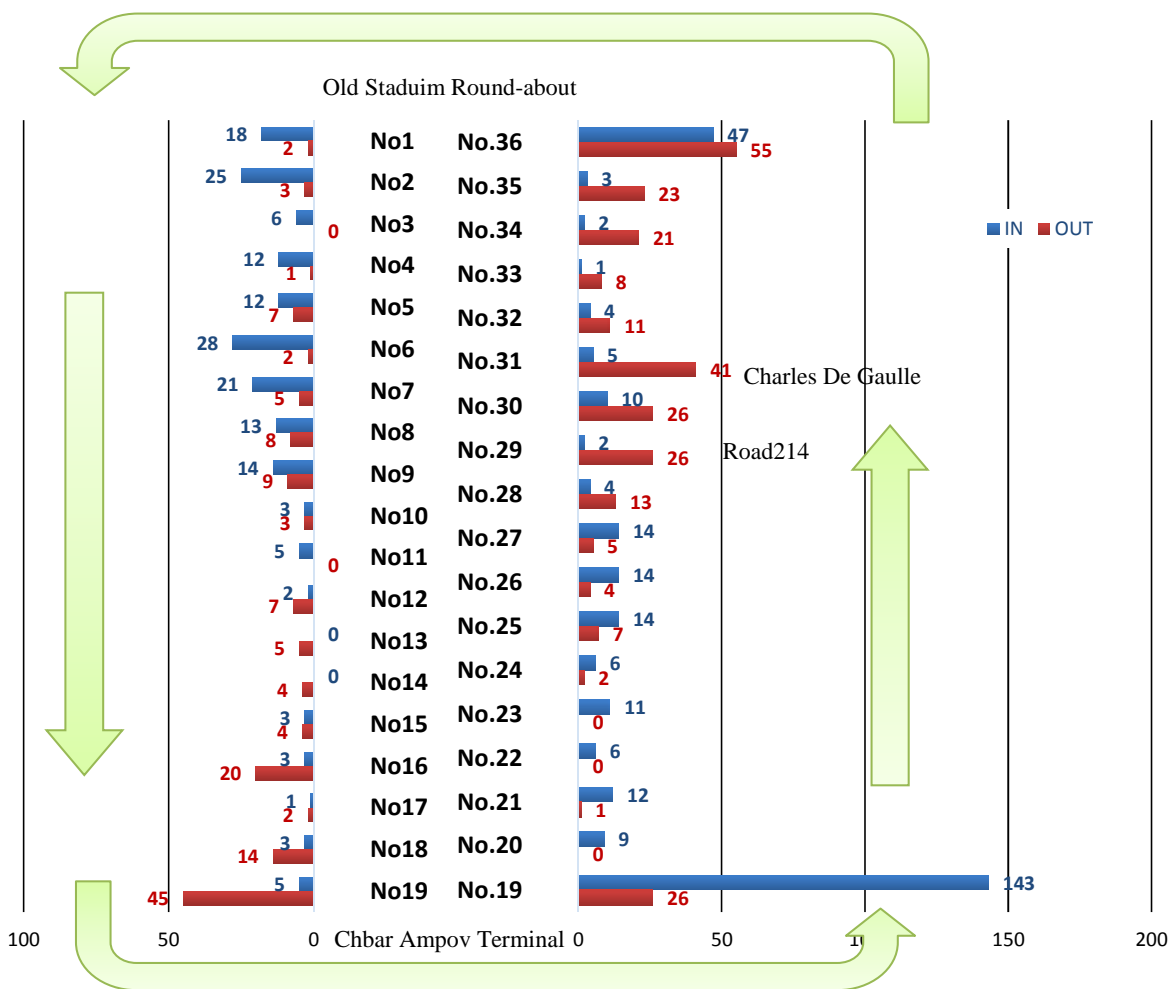


Source: PPUTMP Project Team

**Figure 2.1-2 Number of Boarding and Alighting Bus Passengers by Bus Stop (Weekday)**

## (2) Weekend

Over the weekend, large numbers of passengers were recorded for boarding the bus at Stop No.19 (Chbar Ampov). Many bus passengers were also seen alighting near the Central Market. Hence, it is observed that many residents from the southern suburban area are using the bus to go shopping in the city center.



Source: PPUTMP Project Team

**Figure 2.1-3 Number of Boarding and Alighting Bus Passengers by Bus Stop (Weekend)**

## 2.2 Travel Time and Travel Speed Survey Results

### 2.2.1 Travel Time Survey (Effects from systematization of traffic control signals at 3 intersections in the city center)

In comparing the travel times before and after the traffic control signals at the 3 intersections were systematized, there were savings of about 1.33 minutes for southbound traffic and 1.07 minutes for northbound traffic during the morning peak hours. On the other hand, there were savings of 1.31 minutes for southbound traffic and 0.64 minutes for northbound traffic in the evening peak hours (see Figure 2.2-1).

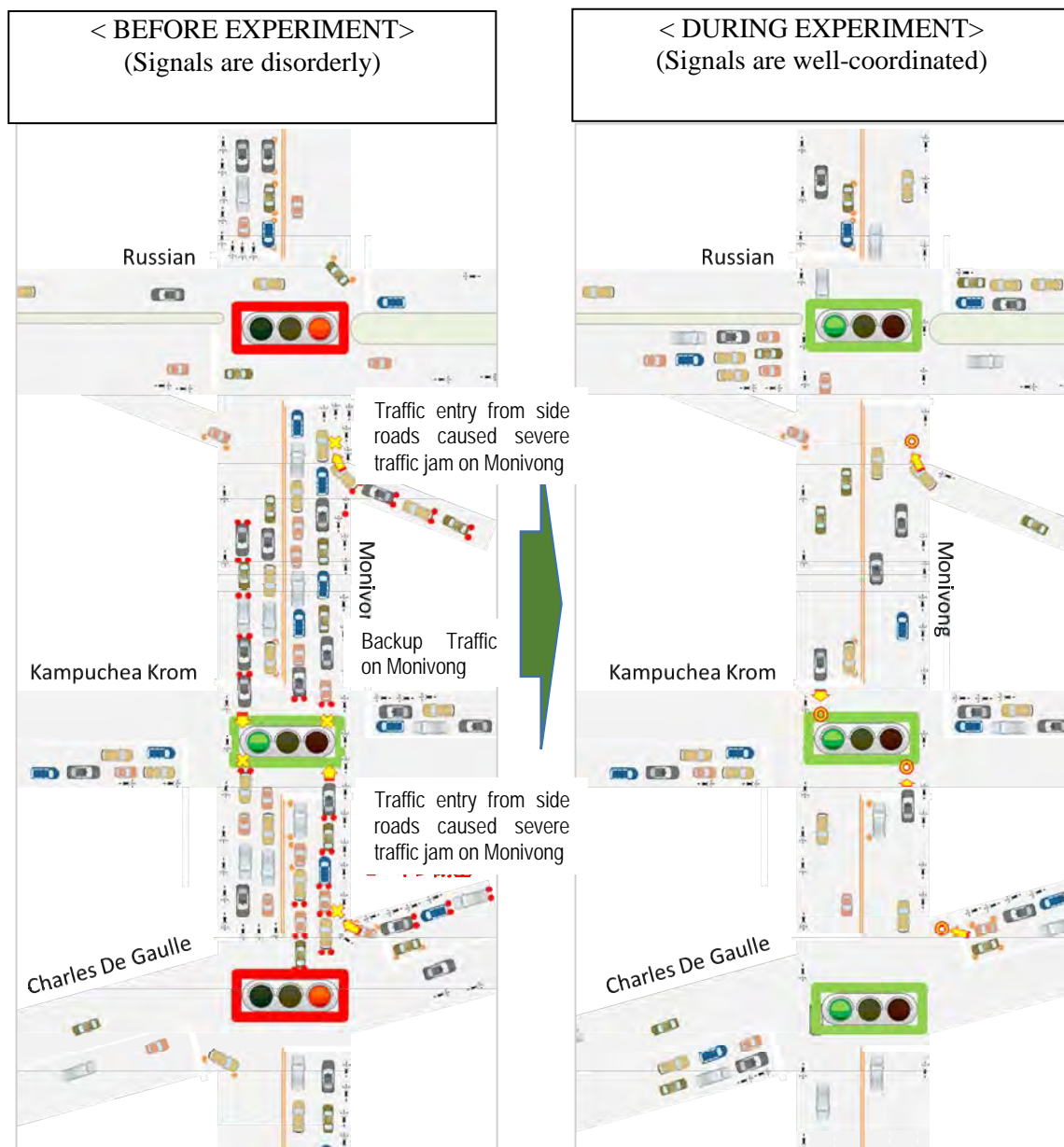


Source: PPUTMP Project Team

**Figure 2.2-1 Travel Times Survey Route and Location of the 3 Systematized Traffic Control Signals Intersections**

### 2.2.2 Effects of Systematization of Traffic Control Signals

With the systematization of traffic control signals at the 3 intersections, traffic flow on Monivong has significantly improved. Traffic flow became smoother with the coordinated 'green wave' operation which resulted in a reduction of backup vehicles on Monivong and traffic entering from the intersecting side streets (see Figure 2.2-2).



Source: PPUTMP Project Team

**Figure 2.2-2 Positive Effects from Systematization of Traffic Control Signals**



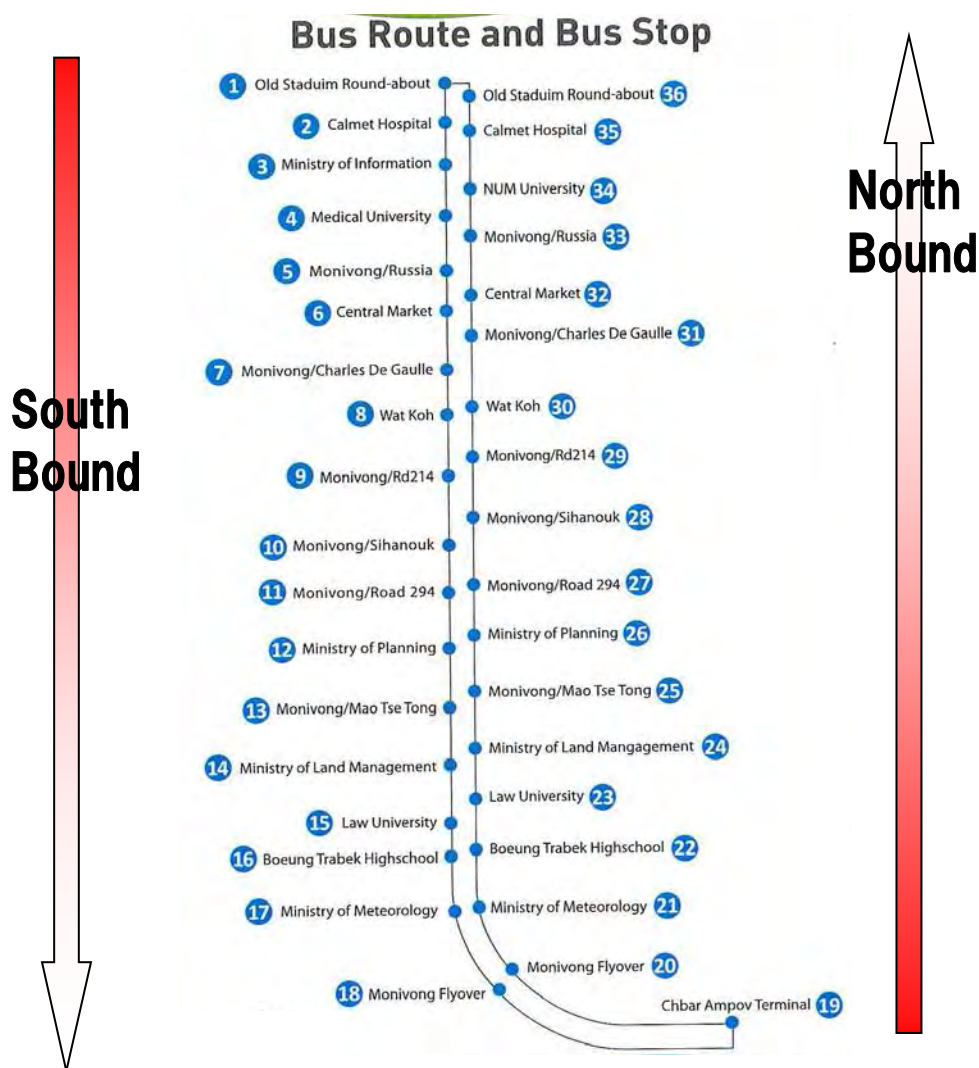
### 2.2.3 Travel Speed Survey (Bus)

#### Southbound

- With the systematization of traffic control signals at the 3 intersections in the city center, there was a certain amount of savings in travel times. However, examining the overall bus route, there was still a decline in travel speed at the central 3 intersections and St.182.
- Furthermore, bus travel speed was reduced at the South Terminal (Chbar Ampov). This may be due to the fact that the bus had to make a U-turn on Monivong which caused other vehicles to stop temporarily. To overcome this, it is suggested that the bus travel to a side street 1 block further south from the Terminal to make the turn around. In this manner, the U-turn would be smoother and less disruptive to other vehicles. A bus stop can be set up in between to facilitate the adjustment of the bus scheduled running times.

#### Northbound

- Similar to Southbound, reduction of the bus travel speed was observed at the city center. Considerable time was needed to pass through the Monivong/Russian intersection. One of the possible reasons could be the disruption of northbound traffic by heavy traffic crossing Monivong from the Railway Station side of the street to the north of this intersection.

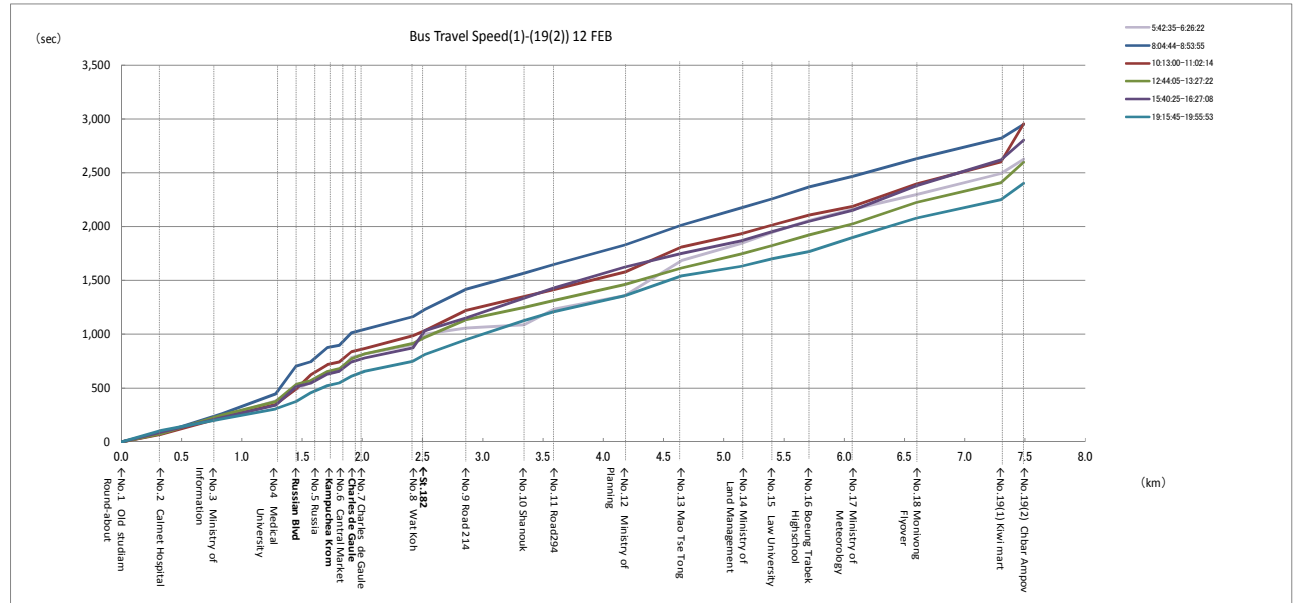


Source: PPUTMP Project Team

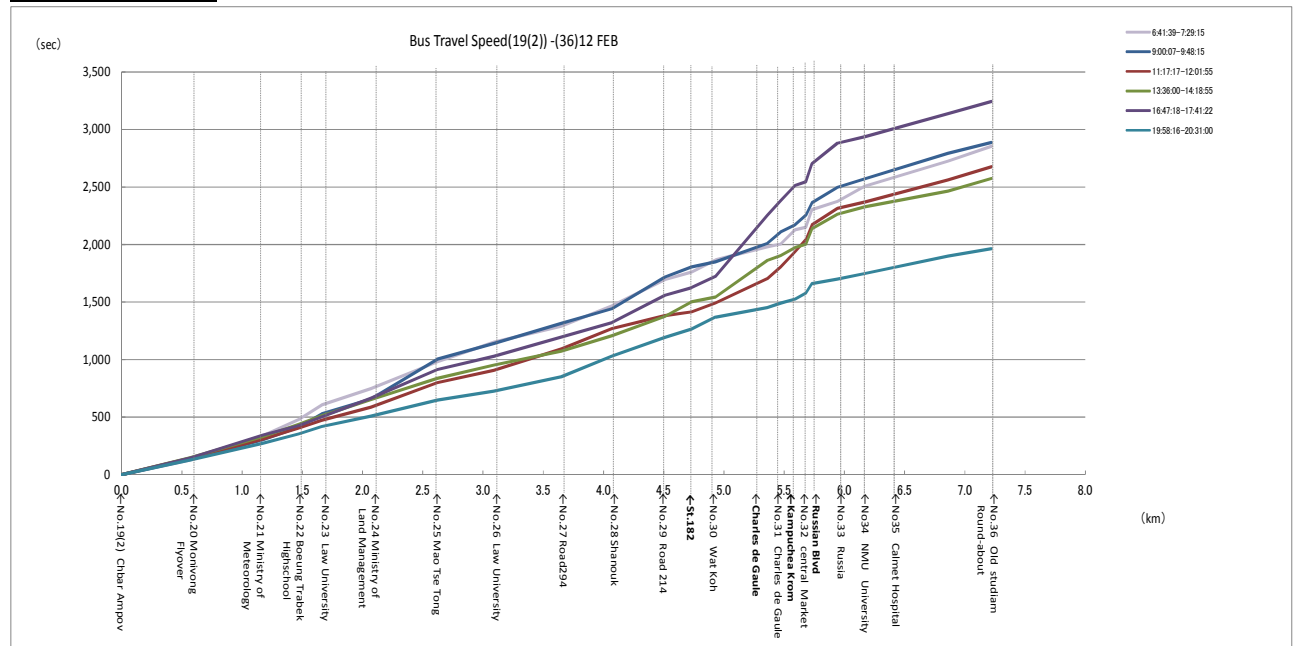
Figure 2.2-3 Bus Operation Route Map

Survey date : 12.Feb/2014

**Southbound**



**Northbound**

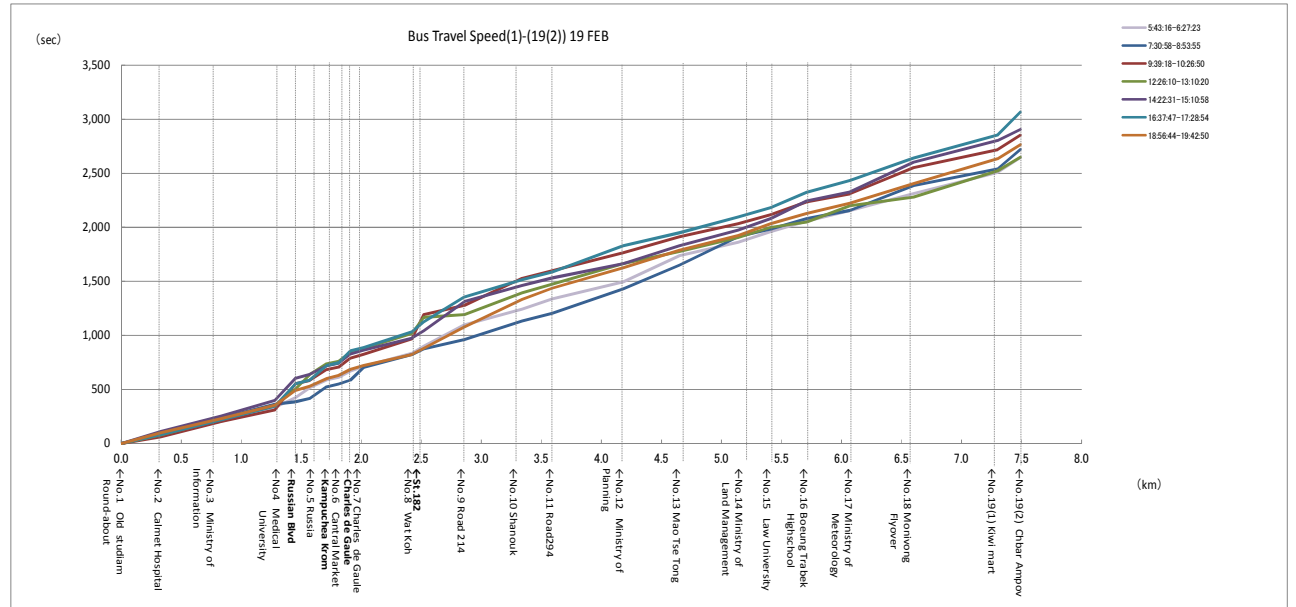


Source: PPUTMP Project Team

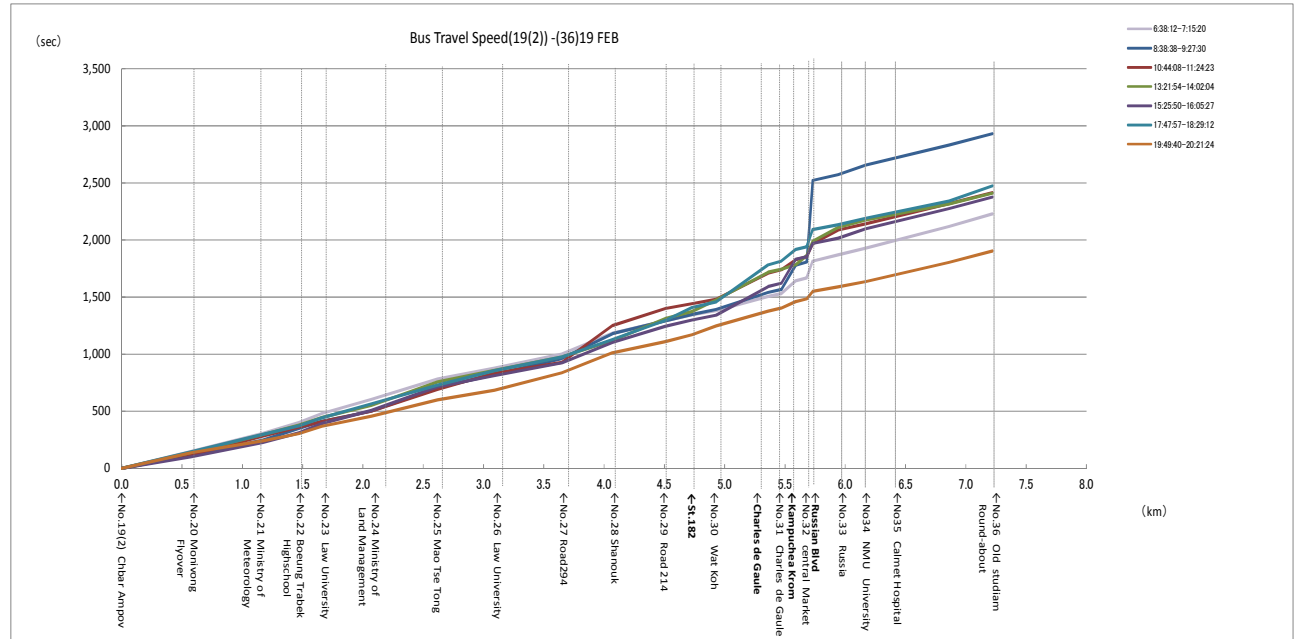
**Figure 2.2-4 Bus Time-Distance Map (Survey on 12 February 2014)**

Survey date : 19.Feb/2014

**Southbound**



**Northbound**

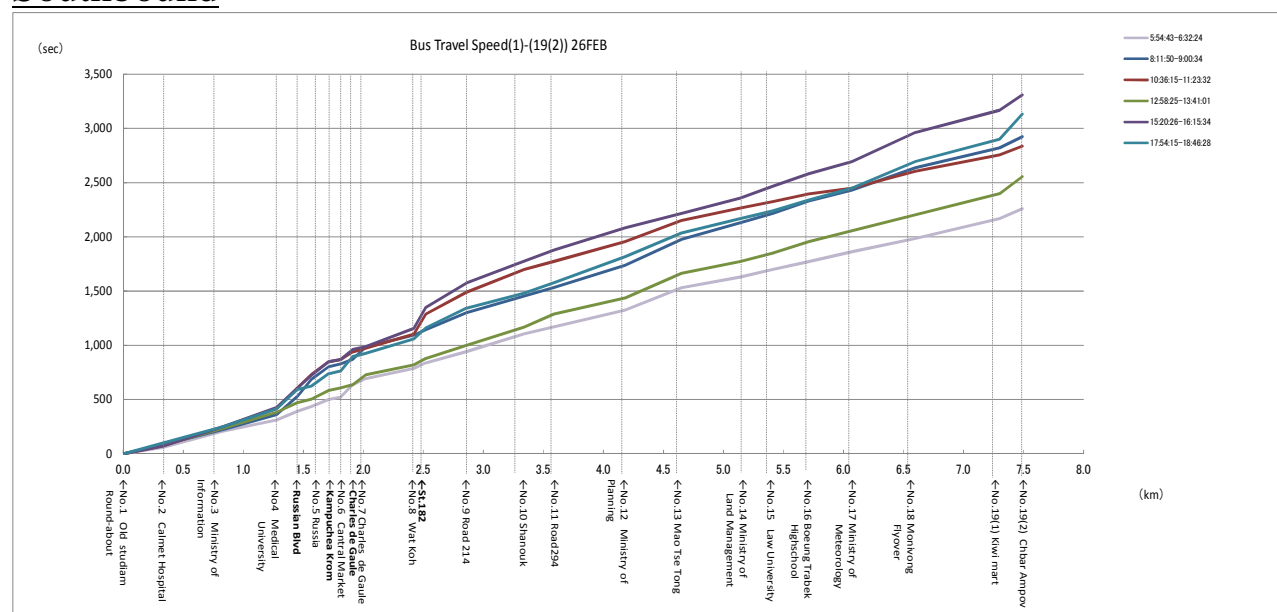


Source: PPUTMP Project Team

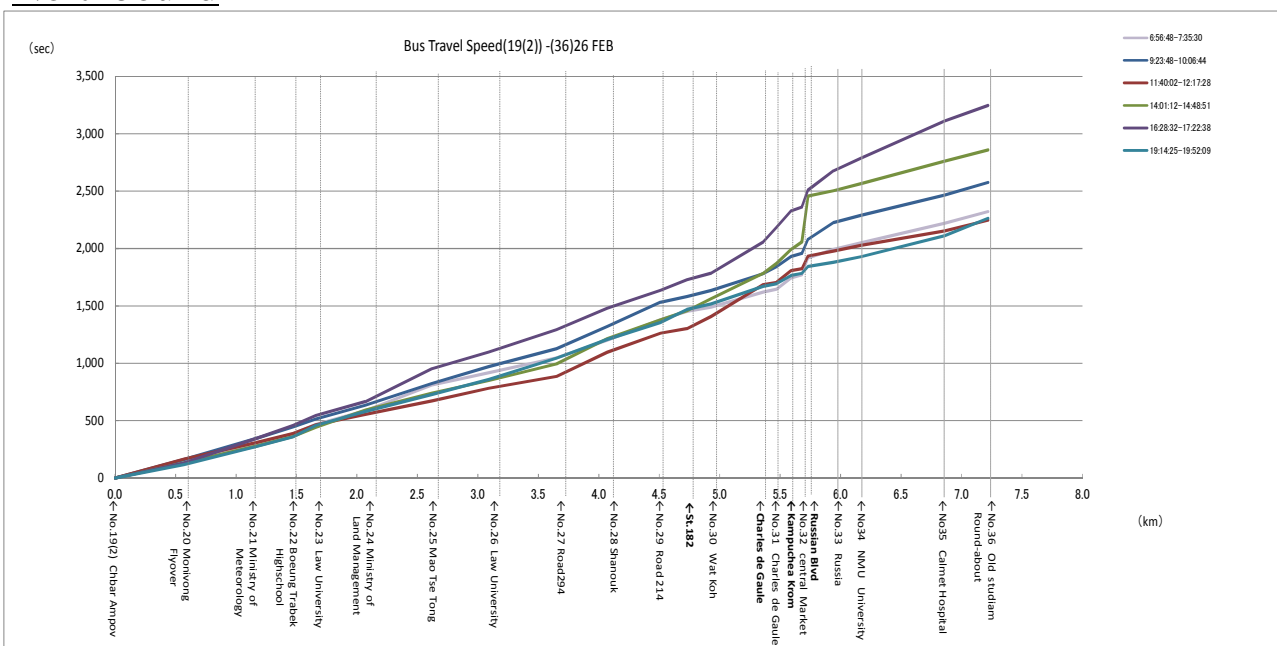
**Figure 2.2-5 Bus Time-Distance Map (survey on 19 February 2014)**

Survey date : 26.Feb/2014

### Southbound



### Northbound



Source: PPUTMP Project Team

Figure 2.2-6 Bus Time-Distance Map (Survey on 26 February 2014)

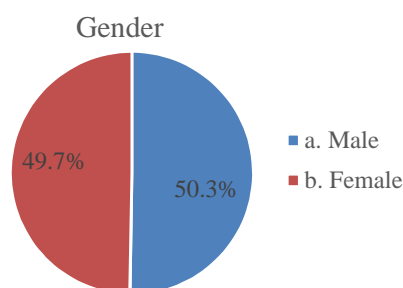
## 2.3 Interview Surveys

### 2.3.1 Detailed Bus Users Interview Survey

#### (1) Q1. Gender

There were 50.3% male respondents and 49.7% female respondents (see Figure 2.3-1).

Sex:		%
a. Male	553	50.3%
b. Female	547	49.7%
Total		1,100 100.0%



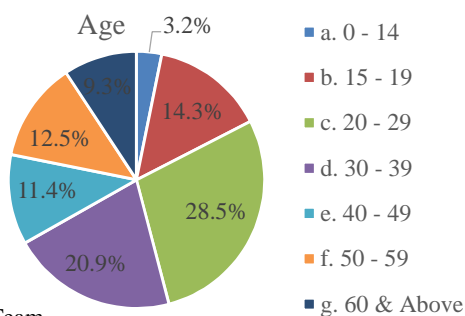
Source: PPUTMP Project Team

**Figure 2.3-1 Gender of Respondents**

#### (2) Q2. Age

The age group of “20 - 29” was the highest (28.5%), followed by “30 - 39” age group at 20.9%. Hence, the population in PPCC is mainly comprised youths in their 20s and 30s (see Figure 2.3-2).

Age:		
a. 0 - 14	35	3.2%
b. 15 - 19	157	14.3%
c. 20 - 29	313	28.5%
d. 30 - 39	230	20.9%
e. 40 - 49	125	11.4%
f. 50 - 59	138	12.5%
g. 60 & Above	102	9.3%
Total		1,100 100.0%



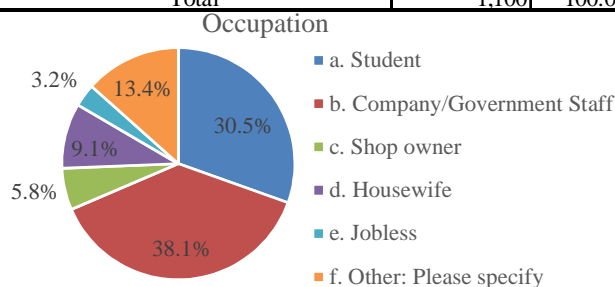
Source: PPUTMP Project Team

**Figure 2.3-2 Age Group Distribution of Respondents**

### (3) Q3. Occupation

By occupation, “Company/Government Staff” was the highest group at 38.1%, followed by “Student” at 30.5% (see Figure 2.3.3).

Occupation:		
a. Student	335	30.5%
b. Company/Government Staff	419	38.1%
c. Shop owner	64	5.8%
d. Housewife	100	9.1%
e. Jobless	35	3.2%
f. Other: Please specify	147	13.4%
Total	1,100	100.0%



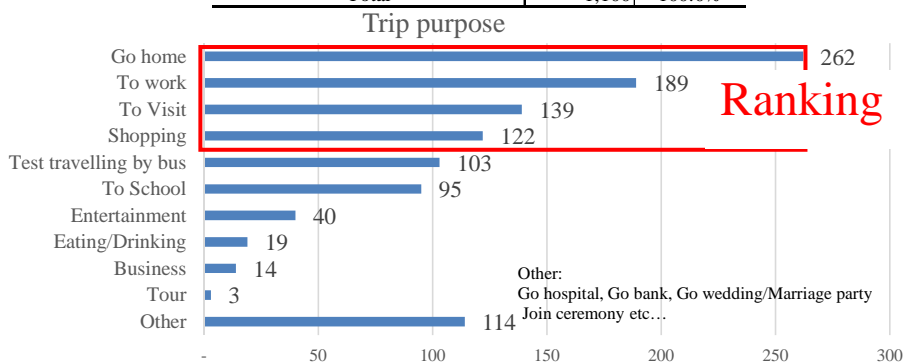
Source: PPUTMP Project Team

**Figure 2.3-3 Occupation Distribution of Respondents**

### (4) Q4. Trip Purpose

“To Work” garnered the highest share (17.2%) followed by “To Visit” at 12.6% and “Shopping” at 11.1% (see Figure 2.3-4). This showed that the public bus was widely used by the local residents for a myriad of trip purposes.

Trip purpose		
Go home	262	23.8%
To work	189	17.2%
To Visit	139	12.6%
Shopping	122	11.1%
Test travelling by bus	103	9.4%
To School	95	8.6%
Entertainment	40	3.6%
Eating/Drinking	19	1.7%
Business	14	1.3%
Tour	3	0.3%
Other	114	10.4%
Total	1,100	100.0%



Source: PPUTMP Project Team

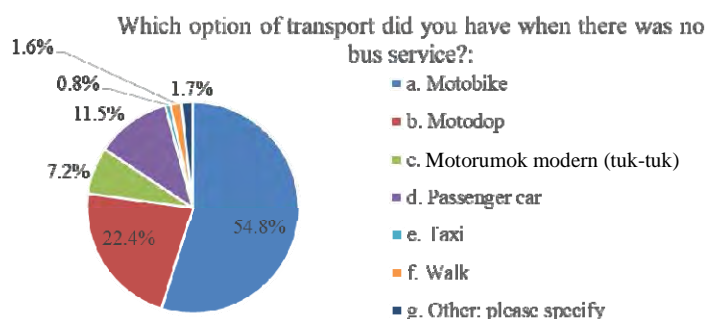
**Figure 2.3-4 Trip Purpose of Respondents**

**(5) Q5. Which option of transport did you have when there was no bus service?**

“Motorbike” was the most prevalent mode of transport with a share of 54.8%. The next was motorbike taxi or “Motodop” with 22.4%. Share of “Motorumok modern (tuk-tuk)” was only less than 10%. Hence, mode transfer may be expected from the 2-wheelers (see Figure 2.3-5).

**Which option of transport did you have when there was no bus service?**

a. Motobike	603	54.8%
b. Motodop	246	22.4%
c. Motorumok modern (tuk-tuk)	79	7.2%
d. Passenger car	126	11.5%
e. Taxi	9	0.8%
f. Walk	18	1.6%
g. Other: please specify	19	1.7%
<b>Total</b>	<b>1,100</b>	<b>100.0%</b>



Source: PPUTMP Project Team

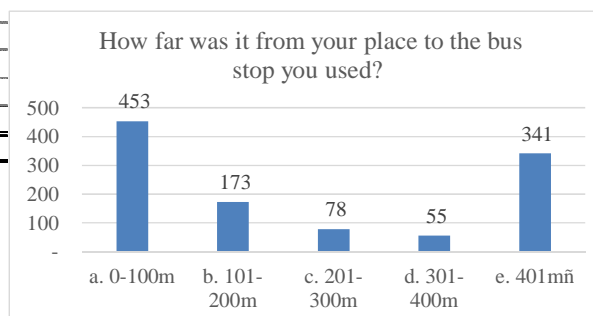
**Figure 2.3-5 Type of Transport Modes Used When There was No Bus Service**

**(6) Q6. How far is your place to the bus stop you used?**

Most respondents lived below 100 m from the nearest bus stops: 41.2% stated they lived within “0 - 100 m” followed by “101 - 200 m” at 15.7%. There was as many as 30% who lived “more than 401 m” away from the nearest bus stop (see Figure 2.3-6). From these results, more than half of the respondents lived up to 200 m away from the bus stop. This is the distance between bus stops in the urban areas in this Public Experiment. Hence, a bus stop interval of 300 m is considered most appropriate. Suburban users living beyond the terminals transferred to the bus as its fare is cheaper than motodop’s. This showed that extension of the bus route to the suburbs will be effective.

**How far was it from your place to the bus stop you used?**

a. 0-100m	453	41.2%
b. 101-200m	173	15.7%
c. 201-300m	78	7.1%
d. 301-400m	55	5.0%
e. 401mñ	341	31.0%
<b>Total</b>	<b>1,100</b>	<b>100.0%</b>



Source: PPUTMP Project Team

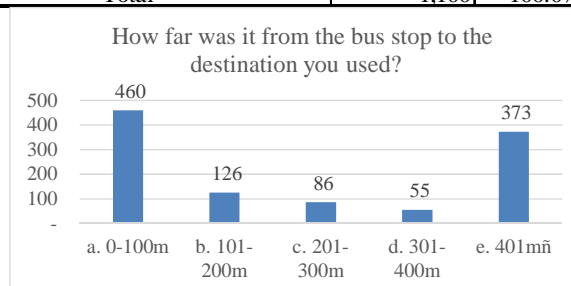
**Figure 2.3-6 Distance to the Nearest Bus Stop**

**(7) Q7. How far is the bus stop you used to your destination?**

A distance of “0 - 100 m” was the highest category answered by the respondents with 41.8%, followed by “101 - 200 m” with 11.5%. However, a strong 33.9% indicated their destinations were “more than 401 m” away (see Figure 2.3-7). The results showed that there was no significant difference in the access and egress distances.

**How far was it from the bus stop to the destination you used?**

a. 0-100m	460	41.8%
b. 101-200m	126	11.5%
c. 201-300m	86	7.8%
d. 301-400m	55	5.0%
e. 401mñ	373	33.9%
<b>Total</b>	<b>1,100</b>	<b>100.0%</b>



Source: PPUTMP Project Team

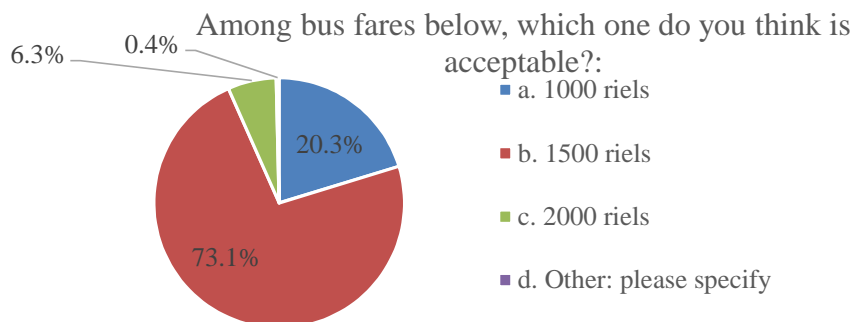
**Figure 2.3-7 Distance from Bus Stop to Destinations**

**8) Q8. Acceptable Bus Fare**

A fare of “1500 riels” has the support of most respondents with 73.1%. This was followed by 20.3% who thought “1000 riels” was more acceptable. The results showed that a bus fare of up to 1500 riels (equivalent to Japanese Yen 40) was the most acceptable level (see Figure 2.3-8). This fare level as set in this Public Experiment was well received by the local residents.

**Among bus fares below, which one do you think is acceptable?**

a. 1000 riels	223	20.3%
b. 1500 riels	804	73.1%
c. 2000 riels	69	6.3%
d. Other: please specify	4	0.4%
<b>Total</b>	<b>1,100</b>	<b>100.0%</b>



Source: PPUTMP Project Team

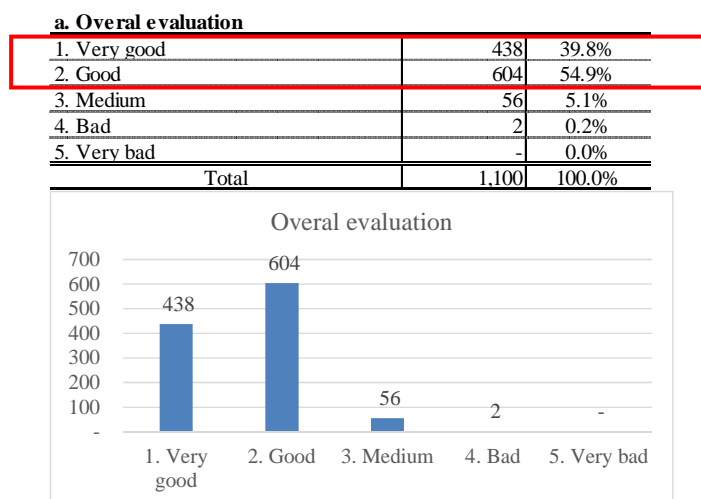
**Figure 2.3-8 Acceptable Level of Bus Fare**



## (9) Q9. Level of satisfaction on the Bus Service

### 1) Overall Evaluation

Most of the respondents evaluated the overall bus service as “Good” with a share of 54.9% while 39.8% rated it as “Very good” (see Figure 2.3-9). Hence, more than 90% of the respondents have rated the overall bus service as good to very good in this Experiment, indicating their high level of satisfaction of such a service.

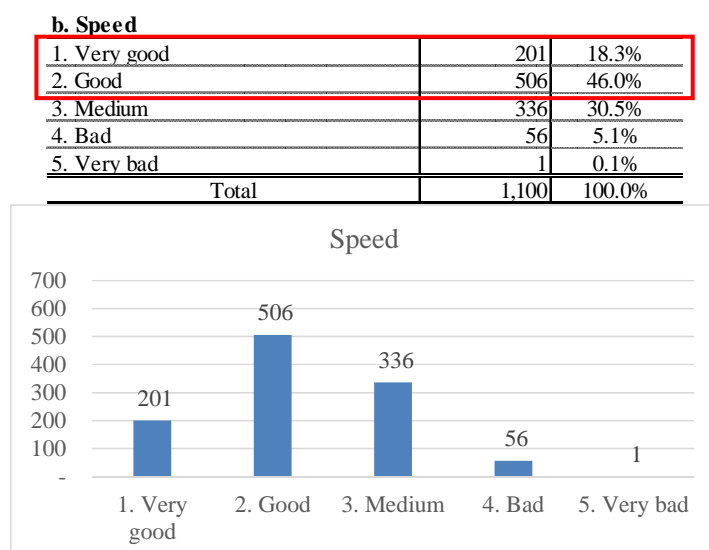


Source: PPUTMP Project Team

**Figure 2.3-9 Level of Satisfaction on the Use of Bus Service**

### 2) Speed

Bus speed was rated “Good” by 46.0% of the respondents and another 18.3% rated it as “Very good”. This means 64.3% of the respondents were satisfied with the speed (see Figure 2.3-10).



Source: PPUTMP Project Team

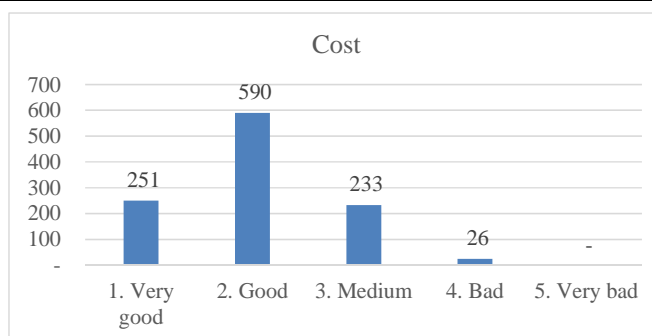
**Figure 2.3-10 Level of Satisfaction on the Bus Travel Speed**

### 3) Cost

Regarding cost, 53.6% of the respondents thought it was “Good” and another 22.8% thought it was “Very good” (see Figure 2.3-11).

#### c. Cost

1. Very good	251	22.8%
2. Good	590	53.6%
3. Medium	233	21.2%
4. Bad	26	2.4%
5. Very bad	-	0.0%
<b>Total</b>	<b>1,100</b>	<b>100.0%</b>



Source: PPUTMP Project Team

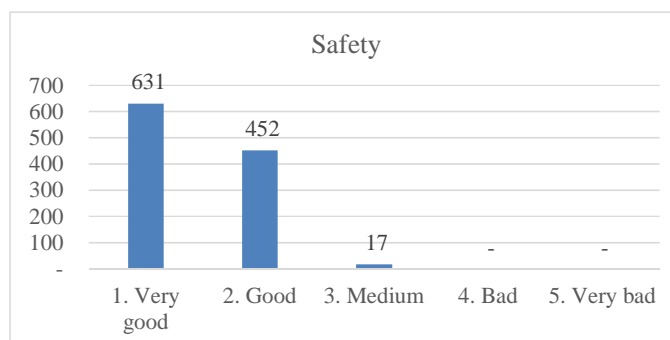
**Figure 2.3-11 Level of Satisfaction on the Bus Service Cost**

### 4) Safety

A high percentage of the respondents (57.4%) felt that the level of safety was “Very good” while another 41.1% felt it was “Good” (see Figure 2.3-12). Overall, a huge majority, 98.5% of the respondents, felt it was a safe transport service. This ‘safety’ feature has received the highest score of satisfaction among all the other items.

#### d. Safety

1. Very good	631	57.4%
2. Good	452	41.1%
3. Medium	17	1.5%
4. Bad	-	0.0%
5. Very bad	-	0.0%
<b>Total</b>	<b>1,100</b>	<b>100.0%</b>



Source: PPUTMP Project Team

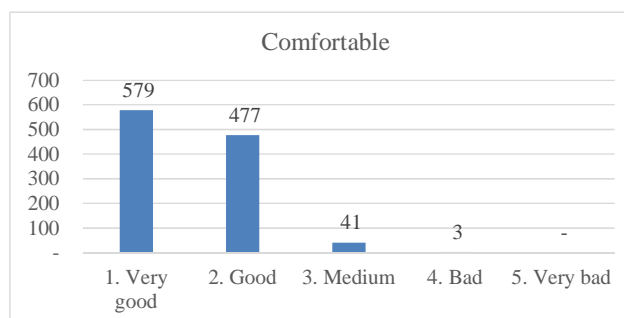
**Figure 2.3-12 Level of Satisfaction on the Safety of Bus Service**

### 5) Comfort

On the level of comfort of the bus service, 52.6% of the respondents felt it was “Very good” while another 43.4% felt it was “Good” (see Figure 2.3-13). Together, 96.0% of the respondents felt the bus service was very comfortable to comfortable. It was a very favorable evaluation by the users.

#### e. Comfortable

1. Very good	579	52.6%
2. Good	477	43.4%
3. Medium	41	3.7%
4. Bad	3	0.3%
5. Very bad	-	0.0%
<b>Total</b>	<b>1,100</b>	<b>100.0%</b>



Source: PPUTMP Project Team

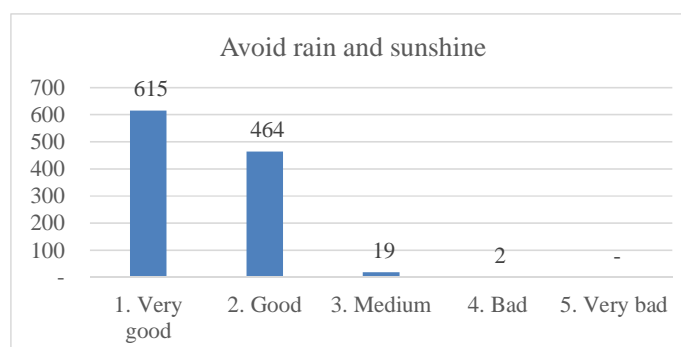
**Figure 2.3-13 Level of Satisfaction on the Comfort Level of Bus Service**

### 6) Shelter from Rain and Shine

On this item, 55.9% of the respondents felt it was “Very good” while another 42.2% felt it was “Good” (see Figure 2.3-14). Together, 98.1% of them felt it was satisfactory.

#### f. Avoid rain and sunshine

1. Very good	615	55.9%
2. Good	464	42.2%
3. Medium	19	1.7%
4. Bad	2	0.2%
5. Very bad	-	0.0%
<b>Total</b>	<b>1,100</b>	<b>100.0%</b>



Source: PPUTMP Project Team

**Figure 2.3-14 Level of Satisfaction on Sheltering from Rain and Shine**

**(10) Q10. Overall Opinions (Free Answers)**

From the various free answers given by the respondents, various kinds of requests or demand can be listed. Among them are: “provide shelter and chairs at bus stops”, “pedestrian crossing to facilitate going to the bus stop at the opposite side of the road”, “student passes and other discounts are necessary”, “provide bus stop at university and schools”, “display advertisement on buses”, and others.

**. If there is any opinion, please write if freely.**

- City bus should continue to operate on this route , all main road and other road.
- Install shelter and chairs at bus stop.
- City bus should operate permanently and fix price the same as experiment.
- Develop Bus running line for increasing speed.
- City bus should operate until suburb area such as Takhmao city.
- Marking pedestrian cross at bus stop for going to other side bus stop.
- Develop a good timetable and bus driver should respect it.
- City bus should have ring bell or announcement for each bus stop and holding-hand for standing.
- City bus fare should have special price for student and membership card or monthly payment card.
- Making regulation in bus
- Parking at bus stop should not be allowed.
- Some people said there are many bus stops while a few said it is far from one bus stop to the other.
- Install bus stop at school and university
- More advertisement on city bus to all people
- City bus should be bigger than now.

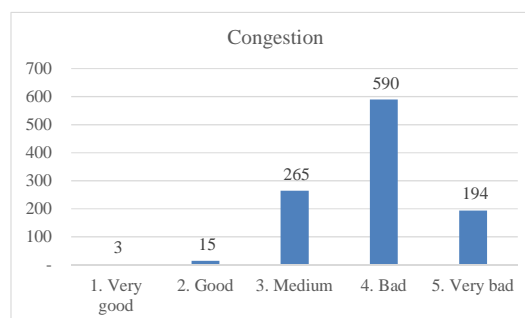
**2.3.2 Results of Bus Users Opinion Survey**

**(1) Q1. What is your opinion regarding the current traffic conditions in Phnom Penh City?**

**1) Congestion**

More than half (55.3%) of the respondents felt the congestion level in PPCC was “Bad”while 18.2% felt it was “Very bad” (see Figure 2.3-15). These results showed that citizens of Phnom Penh were very aware of the traffic congestion situation in the city. The introduction of public transport is thus fundamentally an important measure to combat the traffic congestion problem in PPCC.

<b>a. Congestion</b>		<b>%</b>
1. Very good	3	0.3%
2. Good	15	1.4%
3. Medium	265	24.8%
4. Bad	590	55.3%
5. Very bad	194	18.2%
<b>Total</b>	<b>1,067</b>	<b>100.0%</b>

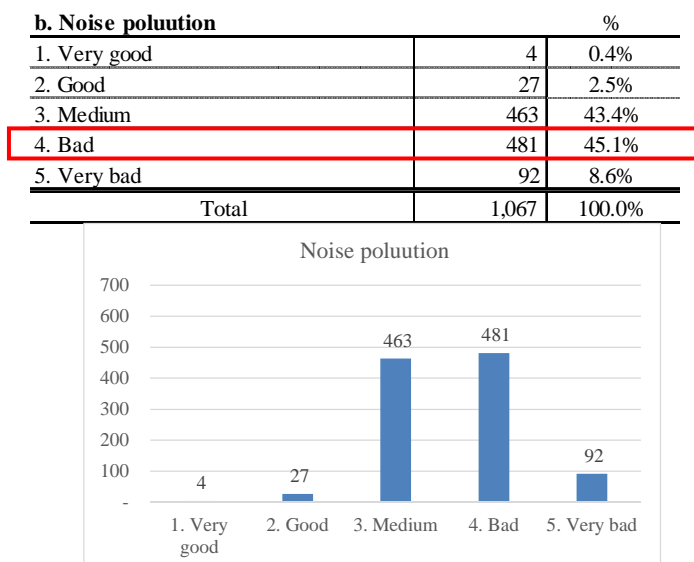


Source: PPUTMP Project Team

**Figure 2.3-15 Opinion on the Traffic Congestion Level in PPCC**

## 2) Noise Pollution

Almost half (45.1%) of the respondents felt that the noise pollution level in PPCC was “Bad”, and Another 8.6% felt it was “Very bad” (see Figure 2.3-16). Together, 53.7% of them felt the level was bad to very bad.

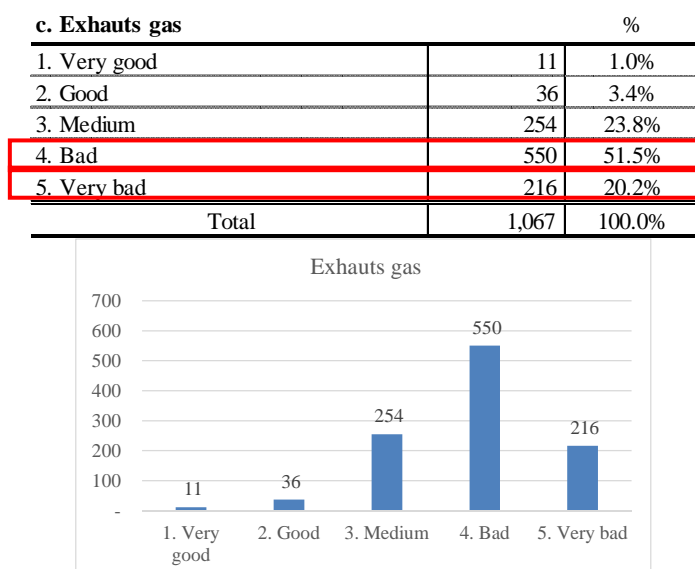


Source: PPUTMP Project Team

**Figure 2.3-16 Opinion on the Traffic Noise Pollution Level in PPCC**

## 3) Air Pollution (Exhaust Gases)

More than half (51.5%) of the respondents felt the exhaust gases from traffic was “Bad” and another 20.2% said it was “Very bad” (see Figure 2.3-17). Thus a collective 71.7% of respondents felt the air pollution level in PPCC was bad to very bad.

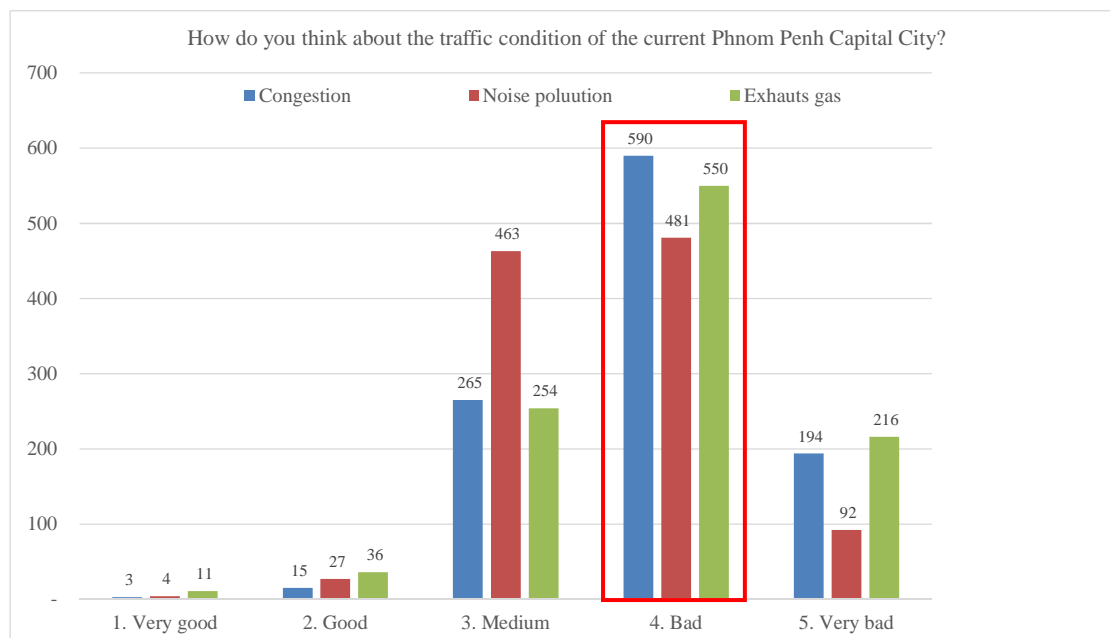


Source: PPUTMP Project Team

**Figure 2.3-17 Opinion on the Air Pollution Level from Traffic in PPCC**

#### 4) Q1 (a) - (c) Summary

As a summary, many respondents felt the levels of congestion, noise and air pollution were “Bad” in PPCC, although some also felt noise pollution was somewhat tolerable (see Figure 2.3-18).



Source: PPUTMP Project Team

**Figure 2.3-18 Opinion on the Traffic Conditions in PPCC (Summary)**

#### (2) Q2. What do you think should be the most important feature of Public Transport in future?

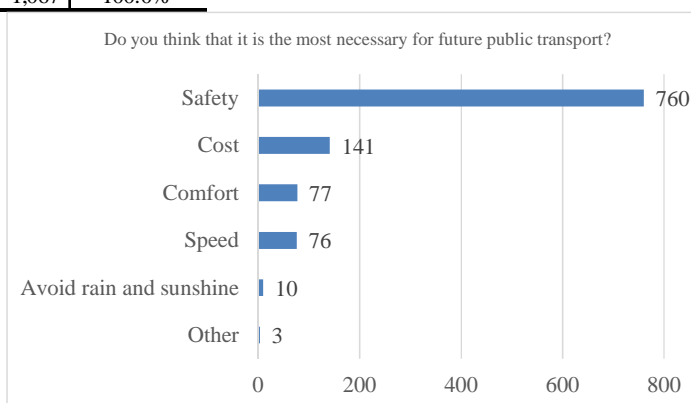
Out of the 6 features listed in the survey, “Safety” emerged as the most important feature given by the respondents (71.2%). This reflected the desire of the residents to have a safer transport mode compared to the motorbike, which is the current most prevalent mode of transport. This was followed by “Cost” at 13.2%. This reflected the concern for public transport that is affordable to low income groups and students (see Figure 2.3-19).

**Do you think that it is the most necessary for future public transport?**

a. Speed	76	7.1%
b. Cost	141	13.2%
c. Safety	760	71.2%
d. Comfort	77	7.2%
e. Avoid rain and sunshine	10	0.9%
f. Other (specify):	3	0.3%
Total	1,067	100.0%

Source: PPUTMP Project Team

**Figure 2.3-19 The Most Important Features of Future Public Transport in PPCC**



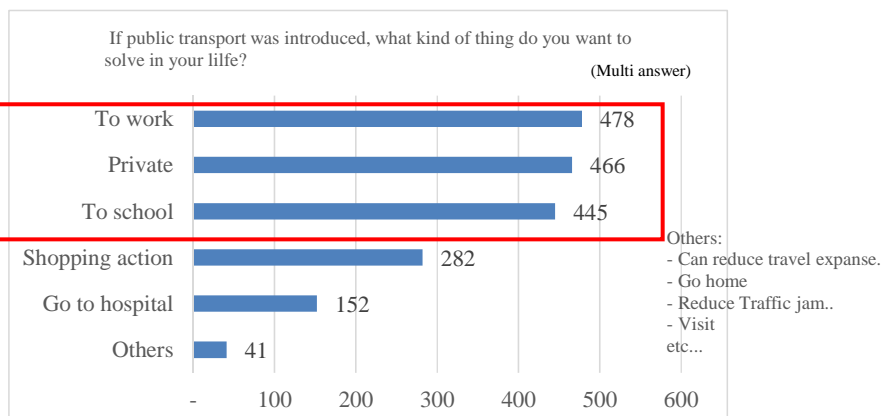
**(3) Q3. If public transport is introduced, what kind of daily issues you hope it can help you resolve? (Multiple answers)**

“To work” (44.8%), “Private” (43.7%) and “To school” (41.7%) were the top 3 issues mentioned by the respondents (see Figure 2.3-20).

**If public transport was introduced, what kind of thing do you want to solve in your life?**

	(Multi answer)	%
a. To school	445	41.7%
b. To work	478	44.8%
c. Shopping action	282	26.4%
d. Private	466	43.7%
e. Go to hospital	152	14.2%
f. Others (specify):	41	3.8%
Total	1,864	100.0%

**TOP3**



Source: PPUTMP Project Team

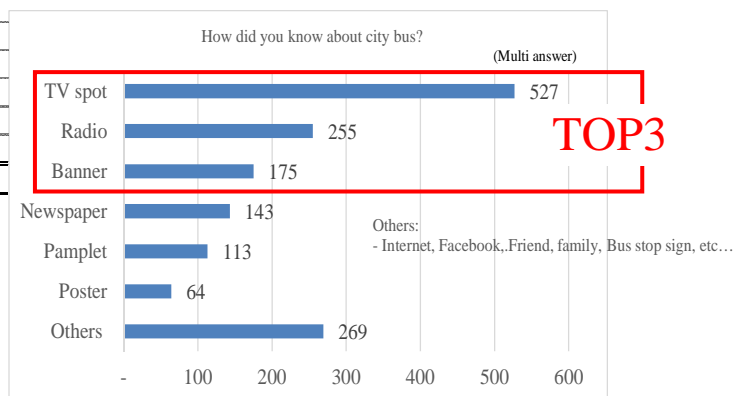
**Figure 2.3-20 Daily Issues that Respondents Hope Public Transport Can Help to Resolve**

**(4) Q4. How did you come to know about the City Bus Service?**

Residents came to know about the service mainly through “TV spot” commercial at 49.4%, followed by “Radio” at 23.9% and then “Banner” at 16.4% (see Figure 2.3-21).

How did you know about city bus?

	(Multi answer)	%
a. TV spot	527	49.4%
b. Radio	255	23.9%
c. Newspaper	143	13.4%
d. Banner	175	16.4%
e. Pamphlet	113	10.6%
f. Poster	64	6.0%
g. Others (specify):	269	25.2%
<b>Total</b>	<b>1,546</b>	<b>100.0%</b>



Source: PPUTMP Project Team

**Figure 2.3-21 How Did You Come to Know About the City Bus Service**

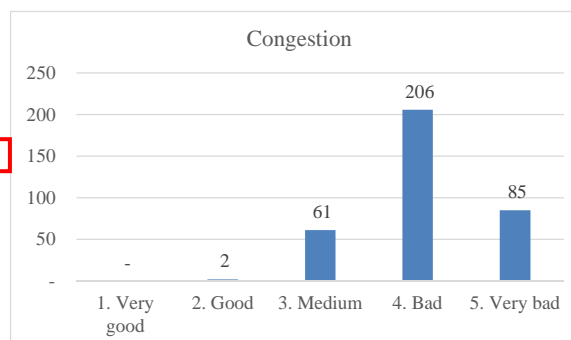
**2.3.3 Enroute Residents Opinion Survey**

**(1) Q1. What is your opinion regarding the current traffic conditions in Phnom Penh City?**

**1) Congestion**

More than half (58.2%) of the residents along the bus route felt that the current traffic congestion level was “Bad” and another 24.0% felt it was “Very bad” (see Figure 2.3-22). The enroute residents have similar opinions as the bus users, with more than 70% of them feeling that the traffic conditions in PPCC were bad to very bad.

<b>a. Congestion</b>		%
1. Very good	-	0.0%
2. Good	2	0.6%
3. Medium	61	17.2%
<b>4. Bad</b>	<b>206</b>	<b>58.2%</b>
5. Very bad	85	24.0%
<b>Total</b>	<b>354</b>	<b>100.0%</b>



Source: PPUTMP Project Team

**Figure 2.3-22 Opinion on the Traffic Congestion Level in PPCC**



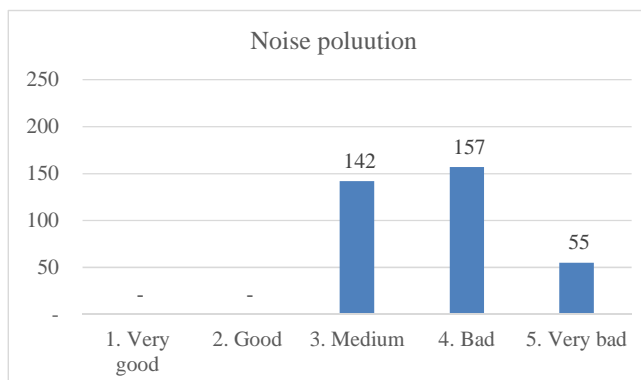
## 2) Noise Pollution

Almost half (44.4%) of the enroute residents interviewed felt that the noise pollution level in the city was “Bad” (see Figure 2-3-23).

### b. Noise pollution

1. Very good	-	0.0%
2. Good	-	0.0%
3. Medium	142	40.1%
4. Bad	157	44.4%
5. Very bad	55	15.5%
Total	354	100.0%

Source: PPUTMP Project Team



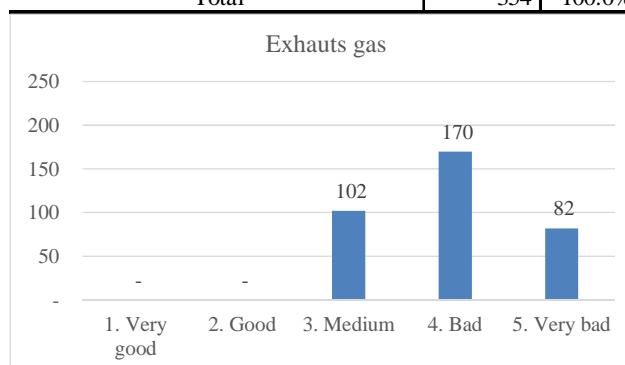
**Figure 2.3-23 Opinion on the Traffic Noise Pollution Level in PPCC**

## 3) Air Pollution (Exhaust Gases)

Almost half (48.0%) of the enroute residents interviewed felt the exhaust gases from traffic were “Bad” and another 23.2% said they were “Very bad” (see Figure 2.3-24). Together, 71.2% felt the air pollution level in PPCC was bad to very bad.

### c. Exhausts gas

1. Very good	-	0.0%
2. Good	-	0.0%
3. Medium	102	28.8%
4. Bad	170	48.0%
5. Very bad	82	23.2%
Total	354	100.0%

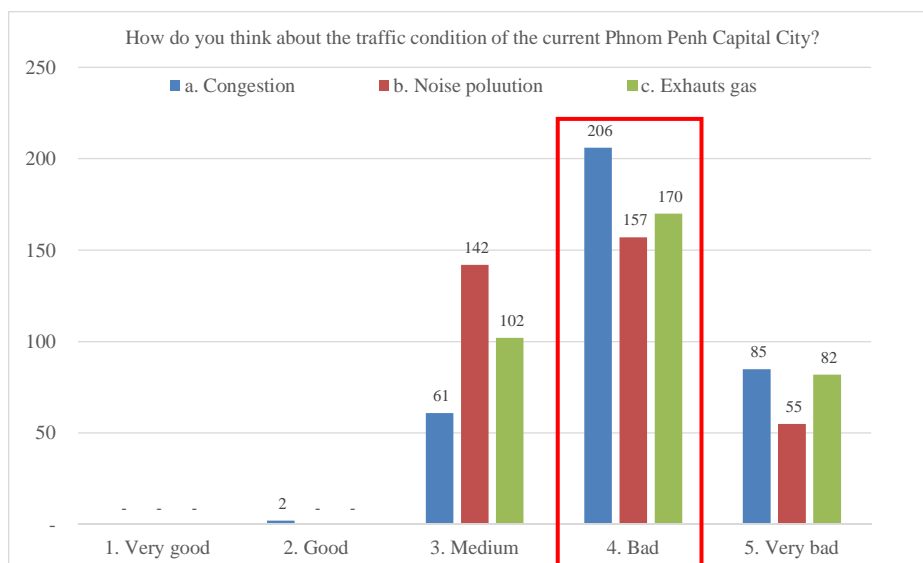


Source: PPUTMP Project Team

**Figure 2.3-24 Opinion on the Air Pollution Level from Traffic in PPCC**

**4) Reference: Q1 (a) – (c) Summary**

As a summary, many enroute residents also felt the levels of traffic congestion, noise and air pollution were “Bad” in PPCC, although some also felt that the air pollution problem was not too serious (see Figure 2.3-25).



Source: PPUTMP Project Team

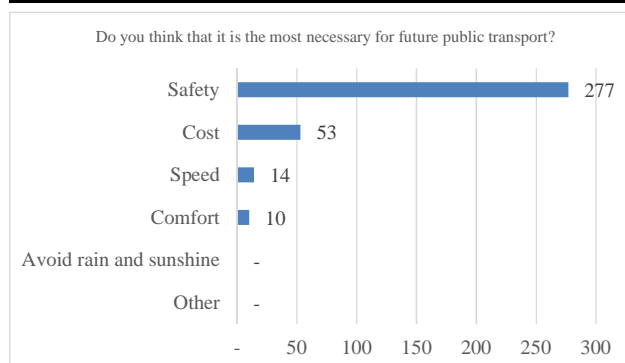
**Figure 2.3-25 Opinion on the Traffic Conditions in PPCC (Summary)**

**(2) Q2. What do you think should be the most important feature of the Public Transport in future?**

“Safety” was regarded as the most important feature by the residents interviewed with 78.2%, followed by “Cost” at 15.0% (see Figure 2.3-26). These opinions concurred with those expressed by the bus users respondents.

**Do you think that it is the most necessary for future public transport?**

a. Speed	14	4.0%
b. Cost	53	15.0%
c. Safety	277	78.2%
d. Comfort	10	2.8%
e. Avoid rain and sunshine	-	0.0%
f. Other (specify):	-	0.0%
<b>Total</b>	<b>354</b>	<b>100.0%</b>



Source: PPUTMP Project Team

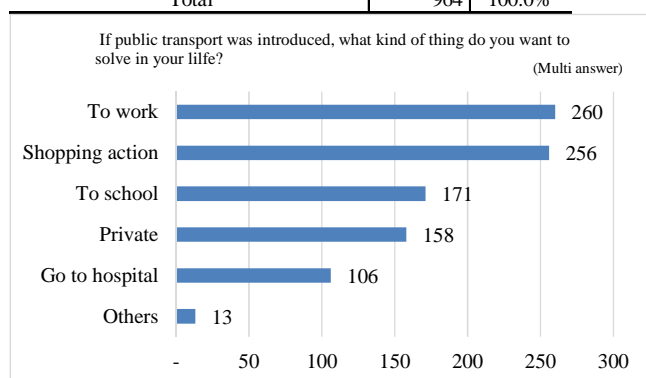
**Figure 2.3-26 The Most Important Feature of Future Public Transport in PPCC**

**(3) Q3. If public transport is introduced, what kind of daily issues you hope it can help you resolve? (Multiple answers)**

“To work” (73.4%) was the most prevalent answers followed by “Shopping action” at 72.3% (see Figure 2.3-27). The introduction of a transport system that meets the morning and evening commuting needs as well as support shopping activities was therefore the most desired by the residents.

**If public transport was introduced, what kind of thing do you want to solve in your life?**

	(Multi-Answer)	
a. To school	171	48.3%
b. To work	260	73.4%
c. Shopping action	256	72.3%
d. Private	158	44.6%
e. Go to hospital	106	29.9%
f. Others (specify):	13	3.7%
<b>Total</b>	<b>964</b>	<b>100.0%</b>



Source: PPUTMP Project Team

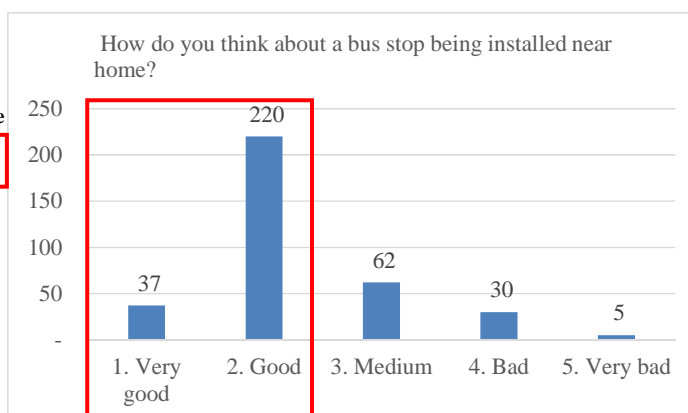
**Figure 2.3-27 Daily Issues that Residents Hope Public Transport Can Help to Resolve**

**(4) Q4. What do you think if a bus stop is set up near your home?**

To this query, 62.1% of the residents interviewed felt it would be “Good” and another 10.5% felt it would be “Very good”. Hence, more than 70% of the residents interviewed showed favorable responses to such a proposal (see Figure 2.3-28).

**How do you think about a bus stop being installed near home?**

1. Very good	37	10.5%
2. Good	220	62.1%
3. Medium	62	17.5%
4. Bad	30	8.5%
5. Very bad	5	1.4%
<b>Total</b>	<b>354</b>	<b>100.0%</b>



Source: PPUTMP Project Team

**Figure 2.3-28 Opinions of Residents if Bus Stops are to be Installed near their Homes**

## 2.4 Response to the Public Experiment

### From Local and International Media

- Besides a local Phnom Penh newspaper and television channels, international news media such as the New York Times and the Australian News have also reported on the introduction of the new bus service in Phnom Penh (see Figures 2.4-1 and 2.4-2).

### From Local Residents

- Residents have indicated their approval for the bus service with some saying ‘my makeup would be messed up while riding the motorbike, but with bus it is alright!’ or ‘I can do some study sitting in the bus’. On the other hand, some comments about the bus stops being dark and dangerous at night were noted and efforts to improve them will be taken in future.



Source: The Phnom Penh Post

Figure 2.4-1 City Bus Operation News Article in the Front Page of “The Phnom Penh Post”



Source: The CAMBODIA DAIRY

Figure 2.4-2 City Bus Operation News Article in “The Cambodia Daily”



ASIA

5 February 2014 Last updated at 09:06

## Cambodia's Phnom Penh tests public bus system

Cambodia has started a trial run of a public bus system in the capital for the first time in over a decade in a bid to reduce traffic jams.

The trial in Phnom Penh has 10 buses operating on a single route across the city centre for one month.

The city tried to introduce public buses in 2001, but the service was scrapped after a few weeks because of a lack of public interest.

People have been using motorbike taxis, locally known as moto-dup.

Officials say there are more than a million motorbikes in the capital, in addition to more than 30,000 cars on the streets.

"Public buses can help reduce the traffic jams," senior City Hall official Koeut Chhe told the Associated Press news agency.

"We want to change the attitude of Cambodian people and convince people to use public transportation."

The air-conditioned buses will make 36 stops in the city. A bus ticket costs 1,500 riels (35 cents, 23 pence)

"I think the price is suitable for students and also ordinary people, and using this bus service reduces a lot of traffic jams," student Long Sipheng told Reuters news agency.

The bus programme is funded by a Japanese government agency, as was the 2001 trial.

Source: BBC NEWS

**Figure 2.4-3 BBC News Report on the City Bus Operation in Phnom Penh**

### ◇Users' voices on Facebook

- "The bus to be operated should be standard with full facilities like those in other countries, especially Cambodia's neighbors, even though it is a trial run."
- "Busway maintenance should be conducted, and parking regulations must be strictly enforced by the traffic police department, because nowadays bus route is interrupted by illegally parked vehicles causing long waiting time for passengers."
- "Bus poles are too small and not even reflective, and there are no waiting sheds for passengers to use during night time. Thus, passengers do not feel safe while waiting for the bus."



Source: PPUTMP Project Team

**Figure 2.4-4 Facebook Comments on the Public Experiment**

### **3 THE FUTURE OF PUBLIC TRANSPORT**

#### **3.1 Current Plan on the Bus Operation**

##### **3.1.1 Extension of the Experiment Bus Service for Another Month**

On the following day after the Experiment on the public bus service ended, PPCC commissioned a private enterprise called Global Company to continue operating the same bus service on the same route and fare for another month, that is, from 5 March (Wednesday) to 4 April (Friday).

##### **3.1.2 Steps Toward Introduction of Public Transport**

By June of this year, PPCC plans to extend the current bus service toward the north and south directions. Furthermore, it also plans to start a new circular bus service route on Mao Tse Toung.

Following that, plans are in place to further expand the bus routes in stages. The present bus coaches will also be slowly replaced by the 2-door coaches in 3 - 4 months' time.

## 3.2 Estimation of Travel Cost Per Passenger

### 3.2.1 Setting of Alternative Case Study

With the experience gained from the Public Experiment, the following 3 alternative cases of possible continuation of the public bus service by the city were set up for a comparative analysis.

Case 1: Bus service to continue with exactly the same conditions as in the Public Experiment  
 Case 2: Bus coaches to be supplied by the City (bus depreciation cost excluded)  
 Case 3: Bus coaches to be supplied by the City (bus depreciation cost included)

### 3.2.2 Estimation of Operation Costs

Based on the actual unit costs incurred during the Public Experiment, operation costs for each of the 3 alternative case studies outlined above were estimated. The results showed that for Case 1, the monthly operation cost was estimated at 47,460 USD; for Case 2, the monthly operation cost was estimated at 24,550 USD; and for Case 3, the monthly operation cost was 33,350 USD.

Details of cost estimation by case are given below, indicating the unit costs and quantities by items.

#### (1) Monthly Operational Cost of Case 1: Bus service to continue with exactly the same conditions as in the Public Experiment

**Table 3.2-1 Estimated Operation Cost of Case 1: Bus Service to Continue with Exactly the Same Conditions as in the Public Experiment**

Item	Unit Cost (USD)	Quantity	Cost (USD)
Bus Rental	3,800	10	38,000
Conductor Cost	210	20	4,200
Supervisor Cost	250	4	1,000
Publicity (20,000 pamphlets)	2,000	1	2,000
Others (5%)			2,260
<b>Total</b>			<b>47,460</b>

Source: PPUTMP Project Team

#### (2) Monthly Operational Cost of Case 2: Bus coaches to be supplied by the City (bus depreciation cost excluded)

**Table 3.2-2 Estimated Operation Cost of Case 2: Bus Coaches to be Supplied by the City (bus depreciation cost excluded)**

Item	Unit Cost (USD)	Quantity	Cost (USD)
Gasoline cost	1,125	10	11,250
Driver cost	250	20	5,000
Conductor cost	210	20	4,200
Supervisor cost	250	4	1,000
Publicity (20,000 pamphlets)	2,000	1	2,000
Others (5%)			1,100
<b>Total</b>			<b>24,550</b>

Note: Gasoline cost is estimated based on actual usage during the Public Experiment (see table below).

Source: PPUTMP Project Team



**Table 3.2-3 Estimation of Gasoline Cost**

Item	Contents
Bus Type	Medium size bus with 35 seats
Route Length . . . A	15 km
Gasoline Consumption Rate (bus fuel) . . . B	3.5 km/liter
Total number of trips/bus/day . . . C	7 trips
Unit cost of Gasoline . . . D	1.25 USD/ liter
Gasoline cost = A/B*C*D*30days	1,125 USD/month

Note: Monthly Operational Cost of Case 3: Bus coaches to be supplied by the City (bus depreciation cost included)

Source: PPUTMP Project Team

**Table 3.2-4 Estimated Operation Cost of Case 3: Bus Coaches to be Supplied by the City (Bus depreciation cost included)**

Item	Unit Cost (USD)	Quantity	Cost (USD)
Bus (depreciation cost)	830	10	8,300
Gasoline Cost	1,125	10	11,250
Driver cost	250	20	5,000
Conductor cost	210	20	4,200
Supervisor cost	250	4	1,000
Publicity (20,000 pamphlets)	2,000	1	2,000
Others (5%)			1,600
Total			33,350

Note: Depreciation cost of one bus per month is estimated by a simple method as indicated below.

$$\begin{aligned} \text{Depreciation cost of 1 bus/month} &= \text{bus purchase cost (JPY 5 million)} \div \text{depreciation period (5 years)} \div 12 \text{ months} \\ &= \text{JPY } 83,000 \approx \text{USD } 830. \end{aligned}$$

Source: PPUTMP Project Team

### 3.2.3 Computation of Transport Cost Per Person And Total Monthly Operational Cost Deficit by Case

Based on the various costs estimation described in section (2) above and assuming the same total monthly bus passenger transported during the Public Experiment, the cost of providing the bus transport to one passenger can be computed for all the 3 alternative cases against the revenue collected from bus fare. The monthly total was then computed and compared.

The results of this computation showed that for Case 2, which has the cheapest monthly operation cost, there would still be a deficit of 8,400 USD a month. This deficit would have to be covered from other revenue sources such as advertisements on the bus and others.

**Table 3.2-5 Transport Cost Per Person And Total Monthly Operational Cost Deficit by Case**

	Operation Cost (USD/Month)	Total Monthly Passengers Transported (Person)	Transport Cost per person (USD)	Difference of Fare and Cost per person (deficit)	Deficit per month (USD)
	A	B	C=A/B	E=C-D	F=E*B
Case 1: Bus service to continue with exactly the same conditions as in the Public Experiment	47,460	43,278	1.10	0.72	31,300
Case 2: Bus coaches to be supplied by the City (bus depreciation cost excluded)	24,550	43,278	0.57	0.19	8,400
Case 3: Bus coaches to be supplied by the City (bus depreciation cost included)	33,350	43,278	0.77	0.40	17,200

Note: Bus fare per person = 1,500 Riel = 0.375 USD

Source: PPUTMP Project Team

### 3.3 Profile of the Bus Users

The bus user profile together with the changes over the years is analyzed based on the various surveys in this experiment and the comparison between this public experiment and that conducted in 2001 (see Table 3.3-1).

**Table 3.3-1 Profile of the Bus Users**

	Public Experiment in 2001	Public Experiment in 2014
Passenger Characteristics	Workers + Students (mainly high school) 20%+ 50%	Workers + Students (University, college and vocational) 44%+ 30% ※50% of 20 to 29 age group is students
Bus route	2 routes (Monivong and Sihanouk/Norodom) • Many high schools locate along Norodom Blvd.	1 route (Monivong) • Universities, colleges, hospital and business district along Monivong Blvd. • Many transfer passengers to/from Motodop at terminals.
Operational interval	6 to 10 minutes	10 to 15 minutes
Number of passengers	50,790 passengers/month (Monivong route) 1,693 passengers/day (Monivong route) • There were transfer passengers between two routes.	46,380 passengers/month 1,546 passengers/day • Number of weekend passengers dropped latter half of the experiment period
Bus fare	800Riel	1500Riel (2014/2001 = 1.9 times)
(Minimum charge of motodop)	500Riel	2000Riel (2014/2001 = 4.0 times)
Household income from Person trip survey	322USD/month	464USD/month (2014/2001 = 1.4 times)
How people know about bus service	TV spots (54% out of total)	TV spots (49% out of total) (It can be observed that bus operation information was shared through Facebook among young workers and students.)

Source: PPUTMP Project Team

### 3.4 How to Cover the Operating Deficit of the Bus Operation

The key to the sustainable bus operation is how to cover the operating deficit of the bus operation. Based on the data and survey analysis of the experiment and others, the following suggestions are made:

◆ Increase bus passengers

- Introduce seasonal tickets to workers and students (many requests from bus users)
- Expand and increase bus routes
- Improve transfer system at terminals
- Make boarding/alighting of passengers smooth and convenient by introducing two-door bus fleet
- Take measures to ensure that bus services on weekends and holidays match the demand
- Make effective use of TV spots and Short Message Service (SMS)

◆ Increase income but without increasing bus fare

- Accept advertisements on the bus body (rapping bus)
- Accept advertisements for bus stop poles, bus shelters and bus terminals
- Work out terminal development rights with bus operator, etc.

◆ Increase of bus fare

- Bus fare alone cannot cover the bus operational cost; the increase of bus fare is just one of the measures. However, the increase of bus fare without any advantages to the bus users will result in decrease of bus passengers. With bus routes expansion and increase of routes, there will be an increase in convenience for bus users, which may make them more accepting of a fare increase.

### 3.5 Current Situation of the City Bus Operation

On the day following the end of the Public Experiment, the City of Phnom Penh commissioned a private enterprise called Global Company to continue operating the same bus service on the same route with the same fare for another month, that is, from 5th March to 4th April in 2014. By June 2014, PPCH has extended the current bus service towards the north and south directions.

Then in September 2014, the Public Transport Management Authority (PTMA) was established to operate and manage the city bus in collaboration with PPCH and DPWT. With the establishment of PTMA, the number of bus routes has been increased from one (1) to three (3) routes plying not only the north and south but also the west and east covering major transport corridors in PPCC. Forty-three (43) second-hand buses from Korea are operated and 6,930 (average of 1 - 15 December 2014) daily passengers are served. PTMA plans to expand bus service to cover 10 routes with bus fleet of 200 in 2020.