PART II

TRAFFIC SURVEY
AND DEMAND FORECAST

CHAPTER 10

TRAFFIC SURVEY
AND ANALYSIS

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10.1   METHODOLOGY

In order to have fundamental understanding of the present traffic pattern and existing problems, and in order to estimate the future traffic demand required for the formulation of the future urban transport plan, the following traffic surveys were conducted in the Nairobi Metropolitan Area (Table 10.1-1).

TABLE 10.1-1 CONTENTS OF TRAFFIC SURVEY

No.	Survey	Purpose	Survey Method	Procedure and Output of Data Processing
1.	Person Trip Survey	To acquire information on the travel behavior of residents of the study area and on traffic demand forecast	• Interview sampled household members • Sampling 10,000 households in Nairobi City	• Travel character of residents • Trip generation and attraction • Modal choice • OD matrixes
2.	Cordonline Survey	To acquire information of trips between Nairobi City and other zones	• Roadside interview survey, traffic count survey and vehicle occupancy survey at 12 locations on the boundary of the study area • 12 hrs traffic count: 8 locations • 24 hrs traffic count: 4 locations	• OD matrixes • Vehicle occupancy
3.	Screenline Survey	To provide information to calibrate OD matrices obtained from the person trip survey	• Traffic count survey at 15 locations on the Nairobi River screenline • 12 hrs traffic count: 10 locations • 24 hrs traffic count: 5 locations	• Traffic volume by vehicle types • Vehicle occupancy
4.	Traffic Count Survey	To provide information to calibrate assigned traffic volume obtained from the person trip survey	• Traffic count survey of 50 locations of road sections and intersections • 12 hrs traffic count: 50 locations	• Traffic volume by vehicle types • Turning movement of traffic volume by intersections
5.	Public Transport Users Survey	To obtain the present public transport users characteristics	• Public transport users interview survey of about 1,500 passengers	• Public transport users characteristics • Public transport transfer situation and problems
6.	Travel Speed Survey	To acquire information of travel speed and to obtain information of the bottlenecks of roads	• Floating car method • 15 routes of main roads	• Travel time and speed by road sections • Bottleneck points
7.	Stated Preference Survey	To obtained perception of various transport users on various transport policy such as vehicle reduction scheme etc.	• Interview selected households of car users, public transport users and NMT users about 2,000 samples	• Perception of various transport policies

The main objective of the survey is to collect necessary data and information in order to comprehend the existing traffic condition and to identify related issues and planning parameters. Traffic survey locations are shown in Figure 10.1-1. For the other traffic surveys, refer to Appendix 10.

10.1.1   Zoning

The zoning system consists of small zones, medium zones and large zones.

(1) Small Zones

The small zones correspond to the sub-locations in Nairobi and the locations in other districts (Thika, Kiambu, Kajiado and Kangundo) in order to facilitate data collection. The total number of small zones is 153.

(2) Medium Zones

The medium zones correspond to the location in Nairobi and the location other districts in order to analysis and forecast the traffic demand (see Chapter 12). The 153 zones were aggregated into 73 zones.

(3) Large Zones

The boundaries of the large zones correspond to the division boundaries in Nairobi and the division boundaries in the other study area for clear-presentations. There are 15 large zones in total and the zoning systems are shown in Figure 10.1-2.
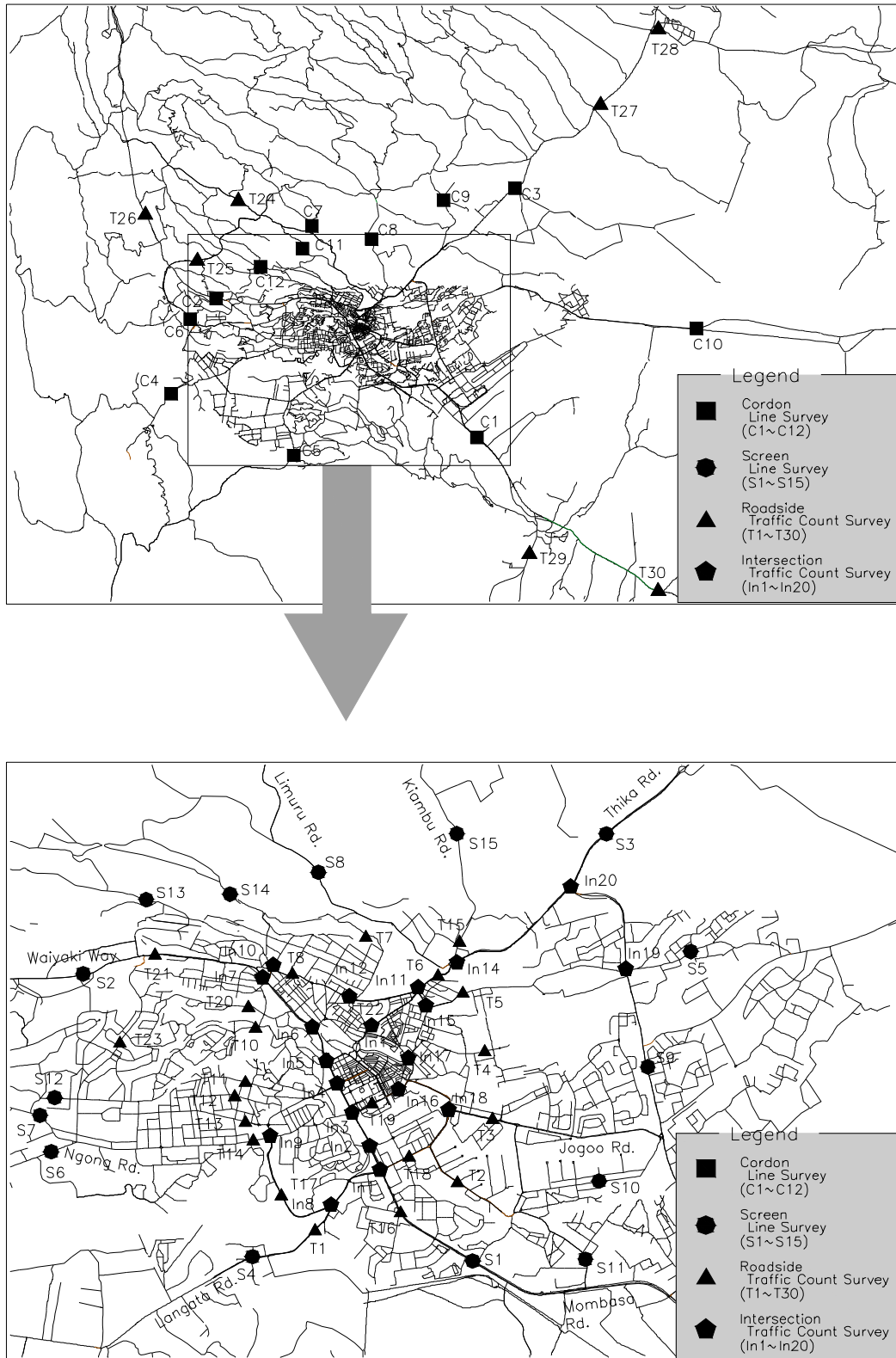
FIGURE 10.1-1 TRAFFIC SURVEY LOCATIONS (CORDON LINE, SCREEN LINE AND TRAFFIC COUNT SURVEY)
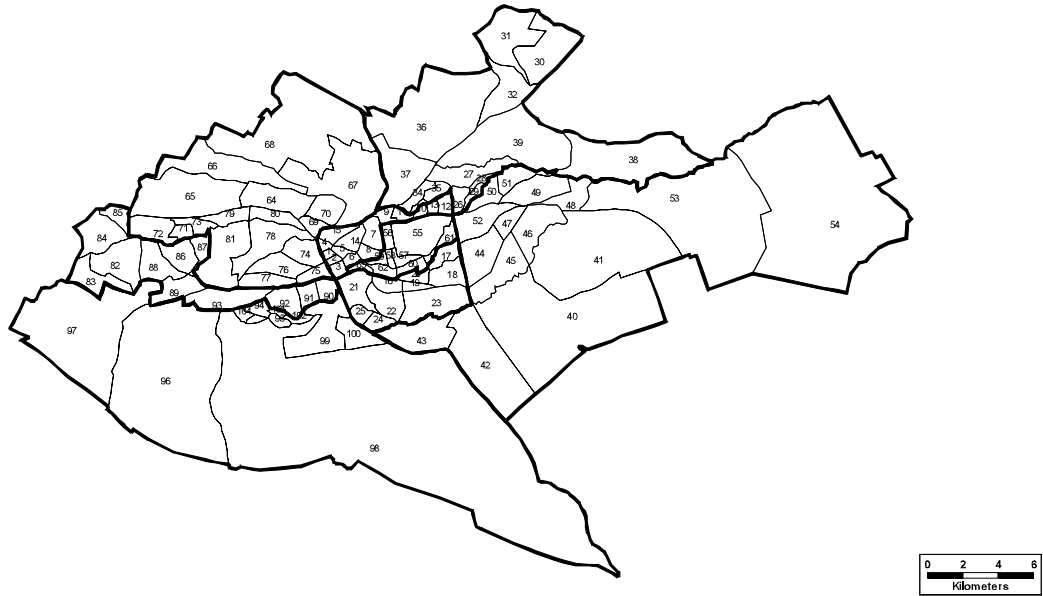
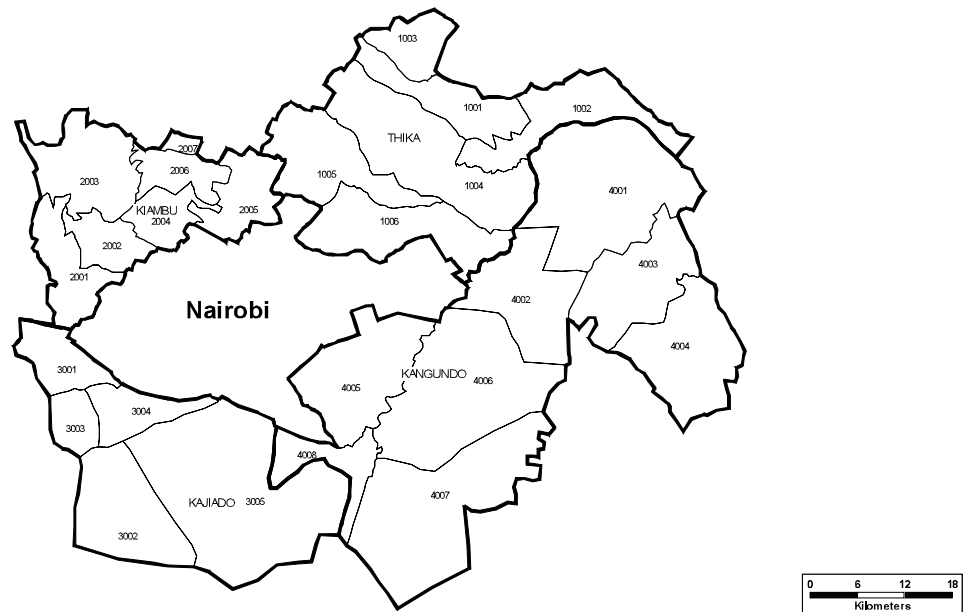**FIGURE 10.1-2(1) ZONING SYSTEM OF THE STUDY AREA (NAIROBI)**

FIGURE 10.1-2(2) ZONING SYSTEM OF THE STUDY AREA (THIKA, KIAMBU, KAJIADO, MACHAKOS)

Note: Zoning Number Table refers to Appendix 10.1.

10.2   PERSON TRIP SURVEY

10.2.1   Methodology

The survey is designed to interview a total of 10,000 households in Nairobi City, which represents 1.5%, as the number of dwelling units in Nairobi City is estimated at 25,000 with a population of about 2,100,000 inhabitants.

The survey is implemented through household visit and direct questioning of adult members with sufficient competence to accurately answer the questions posed. Visits and date covered in questionnaire was on weekdays, i.e. Monday through Friday, excluding holidays. All household members aged 5 years old and above were covered by the interview. The questionnaire was broadly divided into three (3) categories, as follows;

Household attributes

- Home address
- Number of household members
- Household income
- Vehicle ownership
- Ownership of house

Household member attributes

- Address of Home, Office and School
- Age and Gender
- Occupation
- Personnel income
- Driver License

Trip Description

- Trip purpose
- Origin and destination
- Departure and arrival time
- Mode of travel

10.2.2 Survey Results

The sampling rate is about 1.54% which is higher than the target of 1.5% and is considered high enough to produce a reasonable accuracy level. The total number of collected samples is presented in Table 10.2-1. Expansion factors are estimated based on trips per population (aged 5 years old and above) by the division in order to produce present OD tables for people movement per purpose and per transport mode.

TABLE 10.2-1 NUMBER OF HOUSEHOLDS INTERVIEWED

No	Division	POP 5 & above in 2004	HH in 2004	Accomplishment			HH Size
				Sample of HH	Sample Rate	Sample of POP	
1	Central	234,942	69,958	1,099	1.57%	2,689	2.45
2	Makadara	197,434	58,032	886	1.53%	2,214	2.50
3	Kasarani	338,925	109,149	1,423	1.30%	3,326	2.34
4	Embakasi	434,884	133,472	2,002	1.50%	4,445	2.22
5	Pumwani	202,211	54,801	942	1.72%	2,263	2.40
6	Westlands	207,610	61,258	1,025	1.67%	2,605	2.54
7	Dagoretti	240,509	73,670	1,319	1.79%	3,273	2.48
8	Kibera	286,739	89,086	1,331	1.49%	3,312	2.49
Total		2,143,254	649,426	10,027	1.54%	24,127	2.41

Note POP: population, HH: Household

10.2.3   Characteristics of Person Trip

(1)   Total Number of Trips

The total number of person trips per day is 4,815,457 and the internal trips within the Study Area is 4,754,027. The internal to external zone trips is 30,550 and the external to internal zone trips is 29,331. (See Table 10.2-2 and Figure 10.2-1)

TABLE 10.2-2 TOTAL NUMBER OF PERSON TRIPS

unit: person trips per day

	Study Area	Outside of Study Area	Total
Study Area	4,754,027	30,550	4,784,576
Outside Study Area	29,331	1,550	30,881
Total	4,783,358	32,099	4,815,457
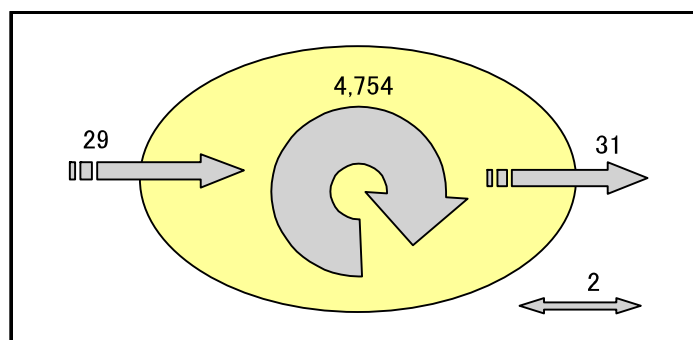
unit : thousand person trips per day

FIGURE 10.2-1 TOTAL NUMBER OF PERSON TRIPS

(2)   Trip Purpose

Trip composition by purpose is presented in Figure 10.2-2, in which the "to Home" (HOME) trips have a share of 47%, to Work (WORK) trips with a relatively high share of 25%, to School (SCHOOL) trips with a share of 10% and Other (OTHERS) trip purpose with a share of 19%.
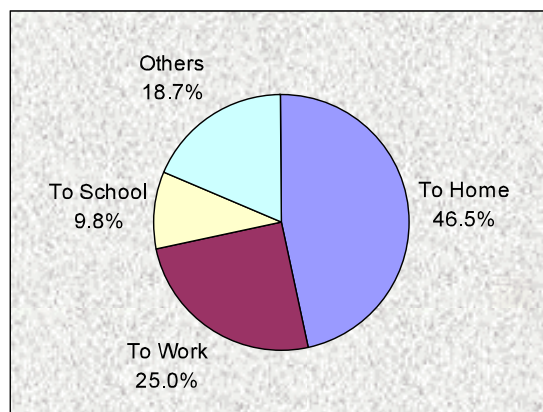

FIGURE 10.2-2 TOTAL NUMBER OF PERSON TRIPS

(3) Modal Share

Trip composition by travel mode is presented in Figure 10.2-3. Walking trips has the highest share of 47%, while trips by private vehicles (Car and Taxi) are 15%. Matatu and Bus, which may represent the public transport share, handle about 29% and 4% respectively.
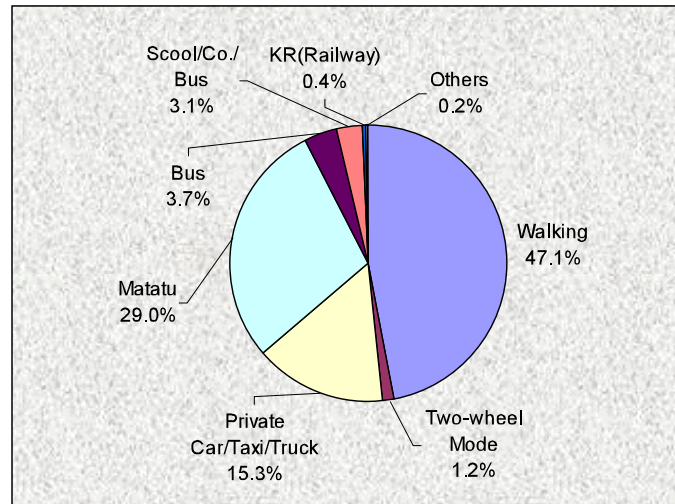

FIGURE 10.2-3 MODAL SHARE

(4) Trip Distribution

Figure 10.2-4 shows the total trip distribution pattern by the spider network assignment method. The main trip flows concentrate into the central area from the west area (WESTLANDS) and the east area (KASARANI and EMBAKASI).
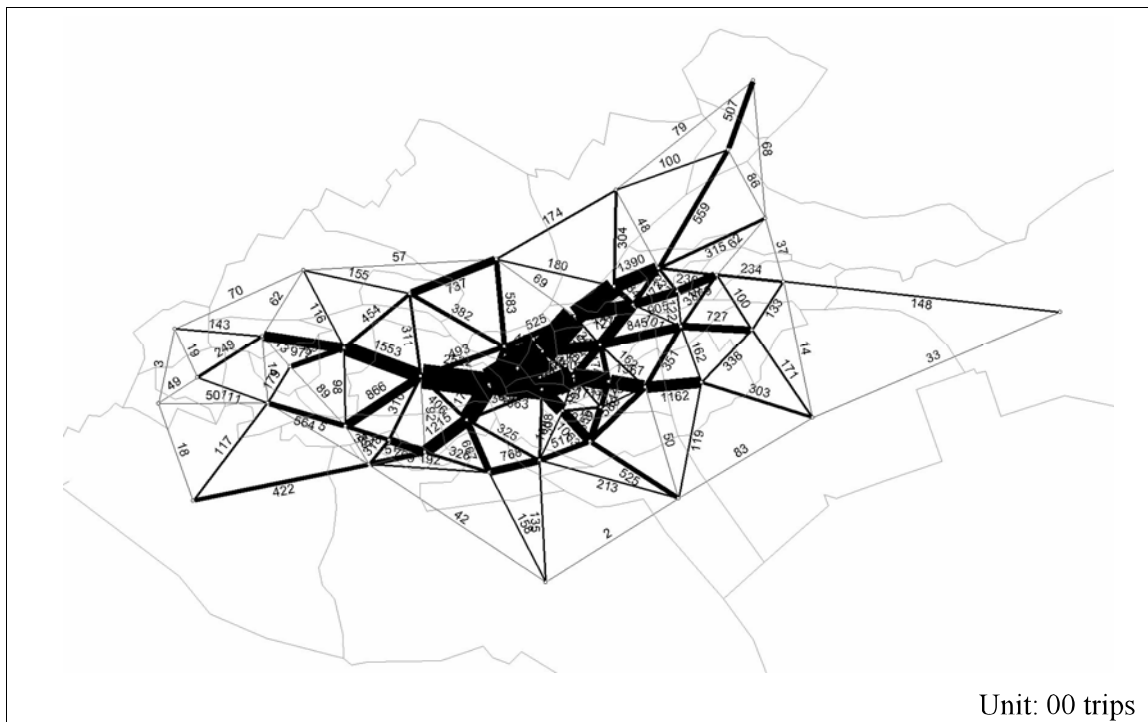

Unit: 00 trips

FIGURE 10.2-4 TRIP DISTRIBUTION OF ALL TRIPS