10.3 CORDON LINE SURVEY

10.3.1 Methodology

The objective of this survey is to collect data on the inbound and outbound traffic volumes as well as to establish OD matrices for trips of people and vehicular movements between Nairobi City and other zones. The survey was conducted for classified vehicular counting and roadside OD interview at twelve stations located on main roads used as entrances and exits at Nairobi City borders as shown in Figure 10.1-1(1). The survey was carried out on a typical working day during September 2004. It has two main tasks as follows:

- Classified vehicular counting for 8 stations was conducted on both traffic directions for 12 hours from 06:30 to 18:30 on a weekday excluding holidays, while the remaining 4 stations was conducted for 24 hours from 06:00 to 06:00 of the following day on weekday. And also the type of each vehicle was manually separately counted, the recorded for every 15 minute interval.

- Roadside OD interview was conducted for 12 hours from 06:30 to 18:30 while above mentioned survey is conducted at the same time. Not less than 10 % from the traffic was stopped at random, and then drivers were interviewed. The following information was collected during this survey:

Roadside OD Drivers Interview

- Trip Purpose
- Origin and Destination
- Number of Passengers
- Loading Capacity
- Loading Items, Weight and /or Volume

10.3.2 Survey Results

The breakdown for each survey stations is presented in Section 10.3 of Appendix 10. Figure 10.3-1 summarizes the collected data for each direction on an illustrated sketch-map. The highest traffic volumes were recorded in the northwest on the Uhuru Highway connecting Nairobi with Nakuru about 46,000 vehicles on both directions. It is followed by the road going north to Machakos with a volume of about 31,000 vehicles. Other information that was concluded from this survey includes peak hour factors and occupancy rate for persons in each vehicle category. Table 10.3-1 presents the peak hour factors for each road, while Table 10.3-2 gives the average occupancy rate for each vehicle category.

TABLE 10.3-1 PEAK HOUR FACTORS

Station	To Nairobi		From Nairobi		Total	
	Peak Hour	%	Peak Hour	%	Peak Hour	%
1	7:00-8:00	8.8	17:00-18:00	8.1	17:00-18:00	7.4
2	8:00-9:00	7.2	14:00-15:00	7.9	16:00-17:00	7.2
3	7:00-8:00	7.0	16:00-17:00	7.0	17:00-18:00	7.0
4	7:00-8:00	17.8	18:00-19:00	18.2	18:00-19:00	12.7
5	8:00-9:00	8.7	17:00-18:00	9.5	15:00-16:00	8.2
6	7:00-8:00	10.8	17:00-18:00	8.1	7:00-8:00	13.3
7	7:00-8:00	13.3	17:00-18:00	11.4	7:00-8:00	9.0
8	7:00-8:00	10.2	17:00-18:00	8.3	7:00-8:00	10.5
9	7:00-8:00	7.7	17:00-18:00	12.8	17:00-18:00	10.8
10	7:00-8:00	11.7	17:00-18:00	9.2	17:00-18:00	8.4
11	7:00-8:00	13.4	17:00-18:00	10.2	7:00-8:00	11.1
12	7:00-8:00	15.3	17:00-18:00	11.4	7:00-8:00	14.6

TABLE 10.3-2 OCCUPANCY RATES

P-Car	Pickup/ 4WD	Mini Bus	Bus	Light Truck	Truck 2-axls	Truck 3-axls	Articulated Truck
2.2	2.0	10.2	33.8	2.3	2.2	2.2	2.2

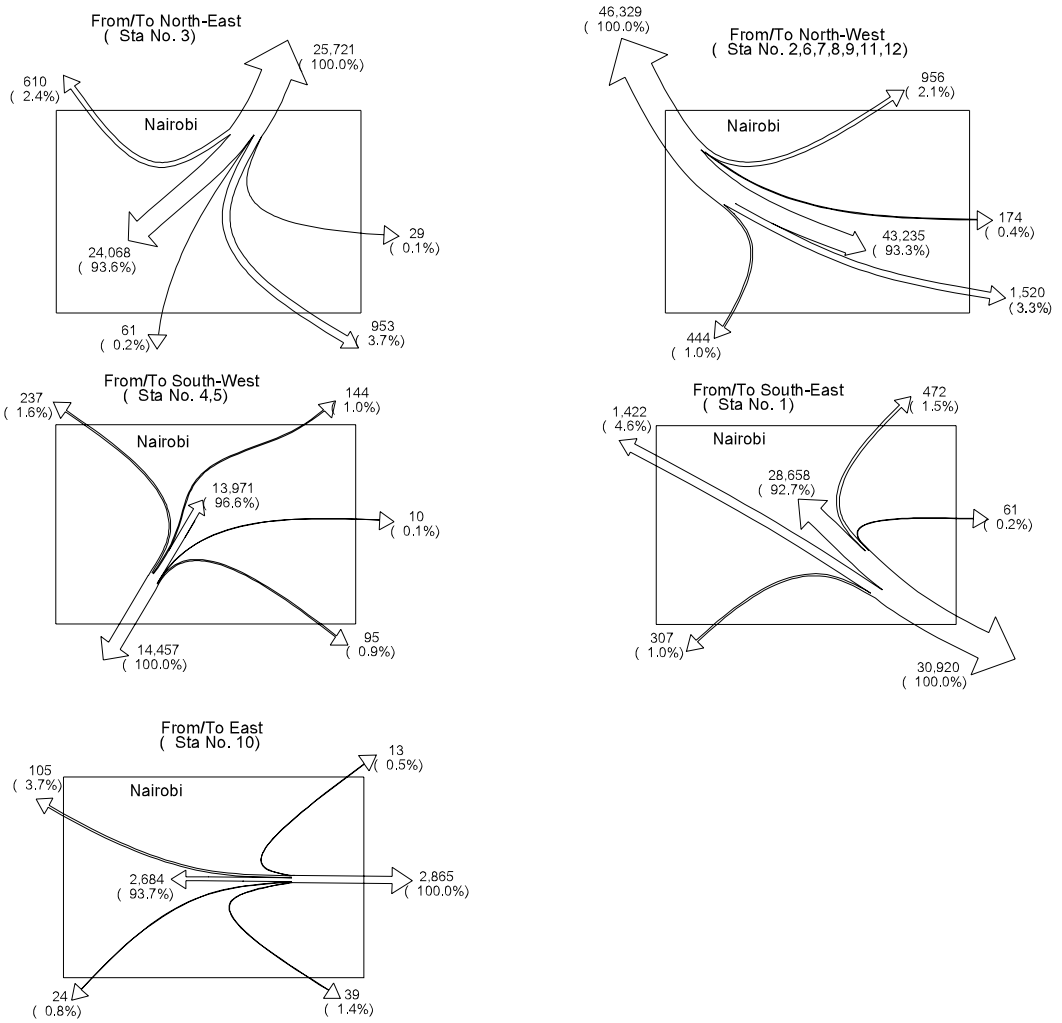

FIGURE 10.3-1 CHARACTERISTICS OF TRAFFIC TO/FROM NAIROBI

10.4 SCREEN LINE SURVEY

10.4.1 Methodology

To grasp the traffic volume from/to urbanized area, the screen line survey was conducted at 15 stations, which are shown in Figure 10.1-1. Classified vehicular counting for 10 stations was conducted on both traffic directions for 12 hours from 06:30 to 18:30 on a weekday excluding holidays while the remaining 5 stations was conducted for 24 hours from 06:00 to 06:00 of the following day on weekday. Also the type of each vehicle crossing the screen line was manually and separately counted, then recorded for every 15-Minute interval on both directions.

10.4.2 Survey Results

The traffic volumes of the 15 survey stations are presented in Section 10.4 of Appendix 10 while Figure 10.4-1 shows only the accumulated values of all the stations. The figure clarifies that there are two peaks in the direction out of the urbanized area to the suburban area, while on the opposite direction to the city center; the demand is almost constant during the daytime hours. The traffic composition at screen line stations is presented in Figure 10.4-2.

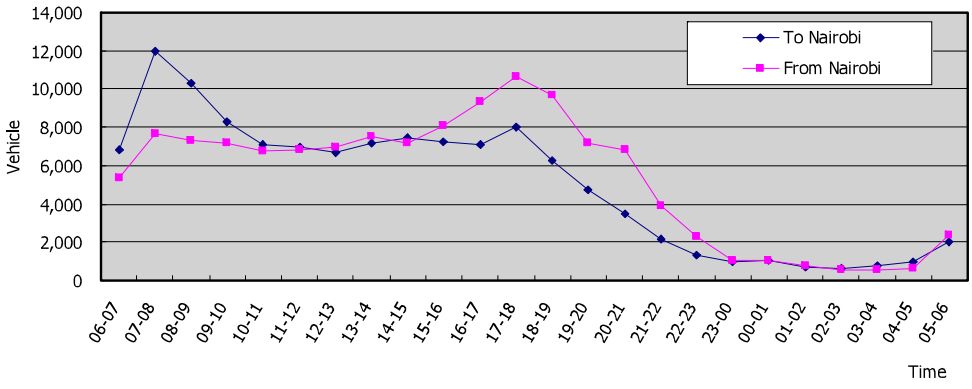

FIGURE 10.4-1 HOURLY DISTRIBUTIONS AT SCREEN LINE STATIONS

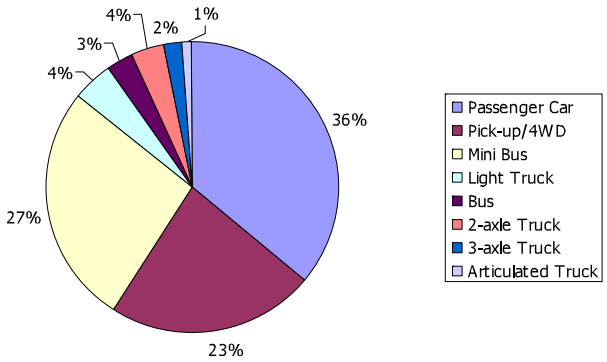

FIGURE 10.4-2 TRAFFIC COMPOSITION AT SCREEN LINE STATIONS

10.5 TRAFFIC COUNT SURVEY

10.5.1 Methodology

Traffic count survey on 20 road sections in the Study Area was conducted in order to provide information to calibrate assigned traffic volume obtained from the person trip survey. Traffic count survey on 30 roundabouts or intersections was also conducted in order to identify the present traffic conditions, which are shown in Figure 10.1-1. Traffic volume by turning directions and each type of vehicles was manually and separately counted, then recorded for every 15 minute interval for 12 hours from 06:30 to 18:30 on a weekday excluding holidays.

10.5.2 Survey Results

Figure 10.5-1 presents the daily traffic volumes of both directions. Roads with high traffic are;

- Jogoo Road 73,000 veh/day
- Thika Road 57,900 veh/day
- Mombasa Road 54,800 veh/day
- Haile Selassie Road 46,800 veh/day
- Mbagathi Road 43,200 veh/day
- Langata Road 42,900 veh/day
- Waiyaki Way 41,700 veh/day

FIGURE 10.5-1 DAILY TRAFFIC VOLUME

10.6 PUBLIC TRANSPORT USERS SURVEY

10.6.1 Methodology

(1) Survey Locations

The survey was conducted at main bus/matatu terminals where passengers are frequently get-into and get-out from buses and matatu. Refer to Section 10.1 of Appendix 10 for the survey locations.

(2) Collected Data

The data collected from the passengers are:

- Trip purpose
- Trip origin and destination
- Opinion on Bus/matatu service
- Opinion on traffic safety

(3) Survey Method

Both waiting and alighting bus/matatu passengers were interviewed.

10.6.2 Result of the Interview Survey

Figure 10.6-1 shows the result of the survey regarding the service offered by each transport mode. All respondents have rated highly the Metro Shuttle service especially in the elements of “On Board Comfort”, “On Board Security”, “Fleet Quality, ”Safety on B/A at Bus Stop”, “Drivers Skills” and ”Staff Behaviors”. Other results of the Interview Survey are presented in Section 10.6 of Appendix 10.

10.7 TRAVEL SPEED SURVEY

10.7.1 Methodology

The survey was carried out at major fifteen (15) routes as shown in Section 10.1 of Appendix 10 using the floating car method. Under this method, check points (mainly intersections and roundabouts) with some hundred meters intervals within the route are established beforehand. The survey is conducted by a survey vehicle traveling at the average speed of the traffic flow. The survey consists of three runs for each traffic direction. Before conducting the survey, several checkpoints were selected along the routes and confirmed at the site and on location map. A pair of enumerators involved in each survey to read passage time of checkpoints and stopping time, and also to assess causes of stopping and record all information on the survey form.

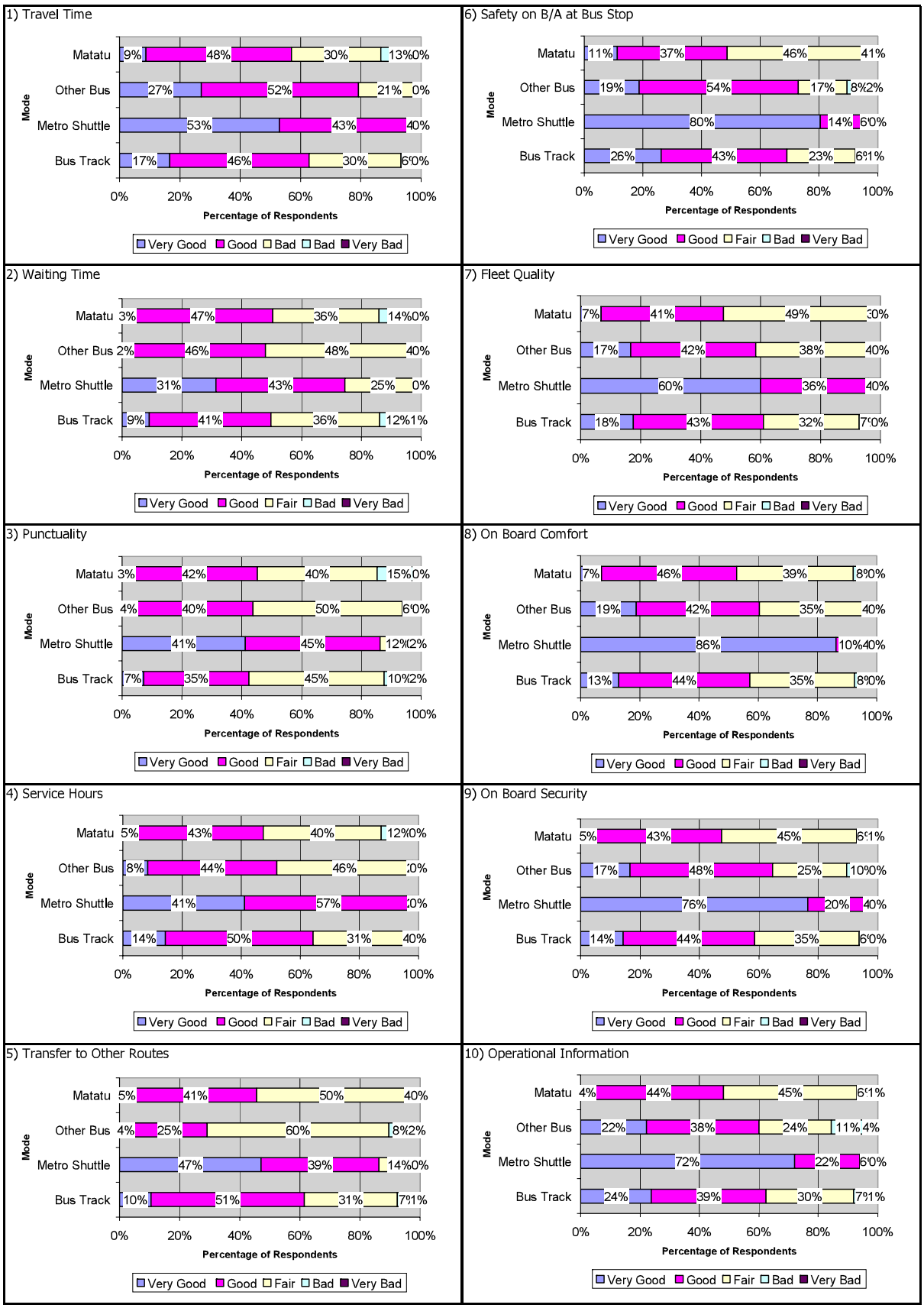

FIGURE 10.6-1(1) RESULT OF INTERVIEW SURVEY (ASSESSMENT OF PRESENT BUS/MATATU SERVICE)

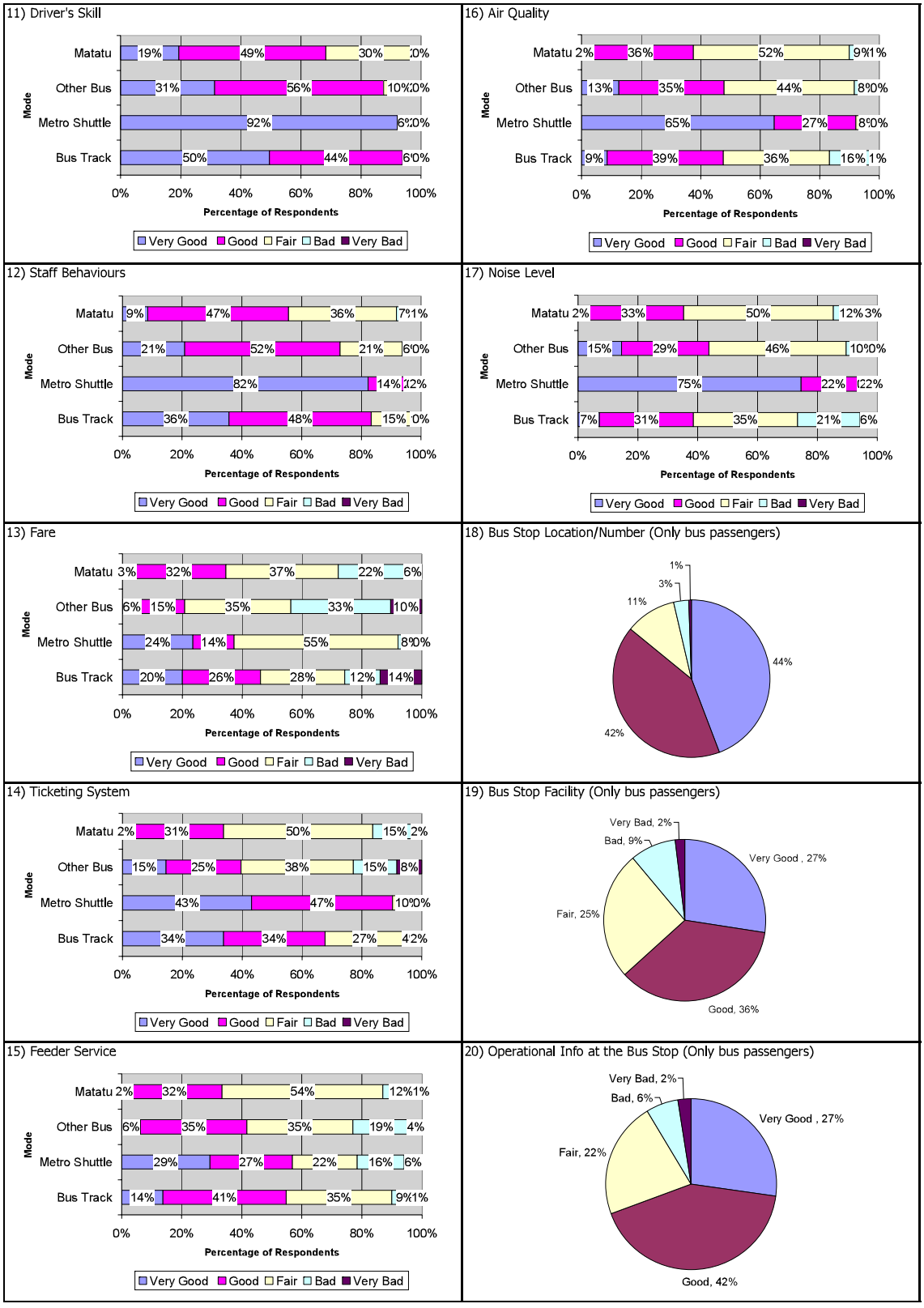

FIGURE 10.6-1(2) RESULT OF INTERVIEW SURVEY (ASSESSMENT OF PRESENT BUS/MATATU SERVICE)

10.7.2 Survey Results

Table 10.7-1 presents the travel speed condition. Many roads in urbanized area of Nairobi such as Outer Ring Rd., Ngong/Naivasha Rd., Juja/Forest/ Waiyaki Rd., Jagoo/Lusaka Rd. and Mbagathi/Valley Rd. have less than 30km/h speed.

TABLE 10.7.1(1) TRAVEL SPEED CONDITIONS (TO NAIROBI)

Unit; km/hr

No.	Road	Section(Start - End)	Morning	Noon	Evening
1	Thika Rd.	Thika - Muthaiga R.A.	56.2	60.1	68.6
2	Kamulu/Kangundo Rd.	Kamulu - Umoja Est.	34.0	51.1	51.8
3	Mombasa Rd.	Athi River - Haile Selassie R.A.	37.0	36.0	27.4
4	Magadi/Langata/Enterprise Rd.	Kiserian - Enterprise	42.5	39.8	39.2
5	Ngong Rd./James Gichuru	Ngong - Waiyaki/James Gichuru R.A.	49.3	46.4	41.8
6	Uhuru/Waiyaki/Naivasha Rd.	Limuru - Haile Selassie R.A.	38.0	56.4	49.4
7	Muthaig/ Limuru Rd.	Limuru- Muthaiga	60.4	65.2	59.4
8	Kiambu/Muranga Rd.	Kiambu- Railway Sta.	28.0	37.8	22.9
9	Outerring Rd.	City Cabanas- Ruaraka	**16.0**	22.1	**15.2**
10	Ngong/Naivasha Rd.	Uthiru- Haile Selassie R.A.	22.2	26.3	23.7
11	Juja/ Forest/Waiyaki Rd.	Komarock -West lands	**18.9**	25.9	26.3
12	Langata Rd.	Kikuyu - Bomas	54.4	48.3	47.4
13	Kikuyu Rd./ C63	Riruta - Karuri	36.2	37.4	36.1
14	Jagoo/Lusaka Rd.	Doonholm - Nyayo National Stadium	31.3	28.4	28.0
15	Mbagathi/Valley Rd.	Kenyatta RA- Langata/Mbagathi R.A.	25.7	21.0	**19.8**

TABLE 10.7.1(2) TRAVEL SPEED CONDITIONS (FROM NAIROBI)

Unit; km/hr

No.	Road	Section(Start - End)	Morning	Noon	Evening
1	Thika Rd.	Muthaiga RA.-Thika	68.7	81.1	77.5
2	Kamulu/Kangundo Rd.	Umoja Est.-Kamulu	53.9	46.7	52.5
3	Mombasa Rd.	Haile Selassie RA- Athi River	54.6	49.0	36.3
4	Magadi/Langata/Enterprise Rd.	Enterprise - Kiserian	43.0	46.4	38.8
5	Ngong Rd./James Gichuru	Waiyaki/James Gichuru RA - Ngong	45.6	45.5	43.3
6	Uhuru/Waiyaki/Naivasha Rd.	Haile Selassie RA - Limuru	66.6	67.6	54.5
7	Muthaig/ Limuru Rd.	Muthaiga -Limuru	52.1	60.3	59.3
8	Kiambu/Muranga Rd.	Railway Sta. - Kiambu	44.6	41.9	23.5
9	Outerring Rd.	Ruaraka - City Cabanas	23.9	**15.0**	**16.9**
10	Ngong/Naivasha Rd.	Haile Selassie RA -Uthiru	32.7	30.8	26.3
11	Juja/ Forest/Waiyaki Rd.	West lands - Komarock	24.5	30.5	24.3
12	Langata Rd.	Bomas - Kikuyu	53.3	50.3	46.8
13	Kikuyu Rd./ C63	Karuri - Riruta	35.2	35.4	33.0
14	Jagoo/Lusaka Rd.	Nyayo National Stadium - Doonholm	27.8	20.2	25.7
15	Mbagathi/Valley Rd.	Langata/Mbagathi RA - Kenyatta RA	21.2	21.4	**16.7**