

Chapter 5 Travel Speed Survey

5.1 Scope of Work

The travel speed survey was carried out in July 2007 in order to (a) obtain the travel speed data on the major corridors within the study area, (b) identify the bottlenecks on the major corridors, and, (c) assess the existing traffic condition.

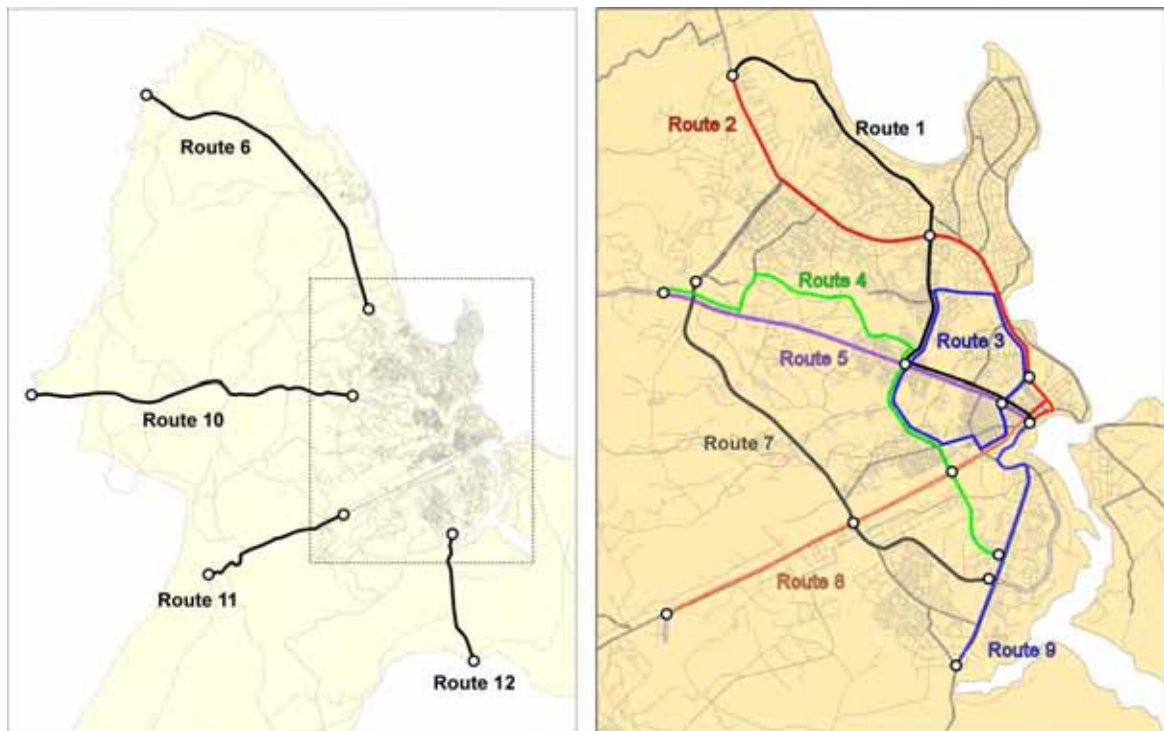
5.1.1 Survey Routes

Twelve route segments were conditionally identified along the major corridors in the study area. The survey routes are specified in Table 5.1.1 and Figure 5.1.1.

Table 5.1.1 Travel Speed Survey Routes

Route	End of Route	Route	End of Route
1	Bagamoyo Rd. – Old Baamoyo Rd. intersection	Old Bagamoyo Rd. – Rashid Kawawa Rd. – Morogoro Rd.	Dar es Salaam City Hall
2	Bagamoyo Rd. – Old Baamoyo Rd. intersection	Bagamoyo Rd. – Ali Hassan Mwinyi Rd. – Ohio St. – Sokoine Drive (Samora St.)	Dar es Salaam City Hall
3	Bibi Titi Mohamed St. – Morogoro Rd. intersection	Bibi Titi Mohamed St. – Nyerere Rd. – Msimbazi St.- Uhuru St. – Rashid Kawawa Rd. – Kinondoni Rd. – Ali Hassan Mwinyi Rd. – Bibi Titi Mohamed St.	Bibi Titi Mohamed St. – Morogoro Rd. intersection
4	Morogoro Rd. (Ubungo bus terminal)	Morogoro Rd. – Shekilango St. Mwinyjuma St. – Rashid Kawawa Rd. -	Kilwa Rd. – Rashid Kawawa Rd. intersection
5	Morogoro Rd. (Ubungo bus terminal)	Morogoro Rd.	Dar es Salaam City Hall
6	Bagamoyo Rd. (Border od DCC)	Bagamoyo Rd.	Bagamoyo Rd. – Old Baamoyo Rd. intersection
7	Sam Nujoma Rd. (Dar es Salaam Univ.)	Sam Nujoma Rd. – Nelson Mandela Rd.	Nelson Mandela Rd. (Kurasini)
8	Nyerere Rd. (Dar es Salaam International Airport)	Nyerere Rd. – Nkrumah St. – Samora Ave. – Morogoro Rd.	Dar es Salaam City Hall
9	Kilwa Rd. – Kichangani St. intersection	Kilwa Rd. – Bandari Rd. – Gerezani St. – Sokoine Drive – Railway St. – Samora Ave.	Dar es Salaam City Hall
10	Morogoro Rd. (Border of DCC)	Morogoro Rd.	Dar es Salaam City Hall
11	Pugu Rd. (Border of DCC)	Pugu Rd.	Dar es Salaam International Airport
12	Kilwa Rd. (Border of DCC)	Kilwa Rd.	Kilwa Rd. – Kichangani St. intersection

Source: JICA Study Team



Source: JICA Study Team

Figure 5.1.1 Travel Speed Survey Routes

5.1.2 Survey Hours

The survey should complete **three round trips** during both the morning (0600-0900) and evening (1600-1900) peak periods, as well as three round-trips during the off-peak (daytime) period (0900-1600). The trip legs may occur on different days due to traffic conditions.

5.1.3 Survey Days

The travel speed survey was performed on normal **weekdays** from Monday through Thursday excluding public holidays. Table 5.1.2 shows the starting time of each survey trip in each survey period by route and direction.

Table 5.1.2 Survey Date and Starting Time

Route	Direction	Trip	Starting Time			Route	Direction	Trip	Starting Time		
			AM Peak	Off Peak	PM Peak				AM Peak	Off Peak	PM Peak
1	1	1	6:17 16-July	11:36 16-July	15:56 16-July	7	1	1	6:40 12-July	10:20 12-July	15:45 12-July
		2	6:27 17-July	15:12 17-July	16:00 18-July			2	7:49 12-July	11:14 12-July	17:36 12-July
		3	6:31 18-July	14:04 18-July	17:33 18-July			3	5:56 16-July	11:59 12-July	16:28 19-July
	2	1	8:38 16-July	13:59 16-July	18:24 16-July		2	1	6:15 12-July	10:46 12-July	16:45 12-July
		2	7:56 19-July	13:45 17-July	16:41 18-July			2	7:09 12-July	11:37 12-July	18:04 12-July
		3	8:09 20-July	14:48 18-July	18:16 18-July			3	8:35 12-July	12:23 12-July	18:21 16-July
2	1	1	6:46 11-July	9:06 11-July	16:34 11-July	8	1	1	7:51 16-July	13:36 16-July	17:35 16-July
		2	6:10 12-July	11:15 11-July	18:03 11-July			2	7:55 17-July	12:05 17-July	17:43 17-July
		3	8:15 12-July	10:27 12-July	15:26 12-July			3	8:17 18-July	13:11 17-July	18:33 17-July
	2	1	7:40 11-July	9:39 11-July	15:59 11-July		2	1	6:45 16-July	12:32 16-July	16:32 16-July
		2	6:45 12-July	11:48 11-July	17:03 11-July			2	6:59 17-July	10:10 17-July	16:02 17-July
		3	9:00 12-July	10:55 12-July	15:52 12-July			3	7:06 18-July	12:39 17-July	18:04 17-July
3	1	1	6:23 11-July	11:43 11-July	15:53 16-July	9	1	1	6:47 18-July	10:20 18-July	17:03 18-July
		2	7:59 11-July	12:25 11-July	16:30 16-July			2	7:45 18-July	11:11 18-July	17:56 18-July
		3	8:37 11-July	13:07 11-July	17:10 16-July			3	8:47 18-July	16:17 18-July	18:36 18-July
	2	1	5:53 11-July	13:49 11-July	16:19 11-July		2	1	6:27 18-July	9:13 18-July	16:39 18-July
		2	6:48 11-July	14:26 11-July	17:09 11-July			2	7:24 18-July	10:49 18-July	17:26 18-July
		3	7:25 11-July	14:58 11-July	17:57 11-July			3	8:23 18-July	11:38 18-July	18:15 18-July
4	1	1	6:10 16-July	11:09 16-July	15:59 16-July	10	1	1	6:36 18-July	10:20 18-July	16:11 18-July
		2	6:01 17-July	13:59 16-July	15:59 17-July			2	7:25 18-July	11:04 18-July	17:01 18-July
		3	6:06 18-July	10:06 17-July	15:59 18-July			3	8:14 18-July	11:50 18-July	18:23 18-July
	2	1	8:03 16-July	12:32 16-July	17:26 16-July		2	1	6:13 18-July	9:44 18-July	15:46 18-July
		2	8:33 17-July	15:18 16-July	17:52 17-July			2	7:01 18-July	10:41 18-July	16:36 18-July
		3	7:50 18-July	11:52 17-July	17:44 18-July			3	7:49 18-July	11:27 18-July	17:27 18-July
5	1	1	7:12 16-July	9:14 16-July	16:33 17-July	11	1	1	7:18 16-July	13:18 16-July	17:15 16-July
		2	8:27 16-July	11:11 16-July	18:01 17-July			2	7:34 17-July	11:03 17-July	16:43 17-July
		3	7:10 17-July	12:26 16-July	15:28 19-July			3	7:59 18-July	11:46 17-July	17:24 17-July
	2	1	6:49 16-July	8:56 16-July	16:02 17-July		2	1	7:00 16-July	12:57 16-July	16:54 16-July
		2	8:01 16-July	9:45 16-July	17:02 17-July			2	7:14 17-July	10:36 17-July	16:23 17-July
		3	6:43 17-July	11:51 16-July	18:27 17-July			3	7:22 18-July	11:25 17-July	17:03 17-July
6	1	1	6:18 11-July	10:36 11-July	14:59 12-July	12	1	1	7:26 16-July	12:09 16-July	17:02 16-July
		2	8:38 11-July	12:58 11-July	16:52 12-July			2	8:01 17-July	14:57 16-July	17:03 17-July
		3	7:38 12-July	9:56 12-July	18:02 12-July			3	7:13 18-July	11:23 17-July	17:12 18-July
	2	1	8:08 11-July	10:04 11-July	16:24 12-July		2	1	7:09 16-July	11:53 16-July	16:46 16-July
		2	7:09 12-July	12:17 11-July	17:24 12-July			2	7:41 17-July	14:41 16-July	16:45 17-July
		3	9:25 12-July	11:21 12-July	18:33 12-July			3	6:55 18-July	11:07 17-July	16:54 18-July

Source: JICA Study Team

5.1.4 Survey Content

Major information items collected for each road segment include:

- Segment departure time and arrival time (clock time).
- Clock time and distance at all intermediate checkpoints.
- Frequency of stops.
- Duration of each stop and/or delay (minutes, seconds).
- Reasons for each stop and/or delay.

5.1.5 Survey Method

The detailed survey method was decided after discussions with the local consultant selected to carry out this survey. However, in principle,

- A passenger car is used for the travel speed survey. A driver and an investigator board the survey car.
- The driver operates the survey car at the same general speed as that of the prevailing traffic condition. The sample car should neither excessively pass, nor fall behind, other vehicles in the traffic stream.

- The investigator records the departure time at begin of route, passing time and distance (odometer reading) at checkpoints (generally intersections), the reason and duration of each stop/delay, and time of arrival at end of route.
- It is noted that the last intersection encountered along the route is considered part of the route, and delays encountered approaching the last intersection should be noted.
- Data by each direction and for each route segment must be recorded separately for the morning peak, evening peak and off-peak periods.

5.1.6 Survey Forms

The English language survey form is prepared. Figure 5.1.2 shows a result of survey as an example.

5.2 Survey Results

5.2.1 GPS Log and Reason of Stops

Figures 5.2.1 to 5.2.48 show the results of travel speed survey by route. Following findings are confirmed.

- Inbound through traffic in morning peak and outbound through traffic in evening peak meet traffic congestion and spend more than 15 minutes sometimes at Ubungo intersection of Morogoro Rd. At this intersection, through-traffic from Nelson Mandela Rd. to Sam Nujoma is also heavy in morning peak.
- Both of the inbound and outbound traffic meet traffic congestion all day at Magomeni intersection of Morogoro Rd. Since straight traffic of Morogoro Rd. is prior to other movement, right turn from city center to Rashid Kawawa Rd. and through traffic of Rashid Kawawa Rd. wait sometimes more than 20 minutes for the traffic lights to change in evening peak. At two intersections of Morogoro Rd. with UN Rd. and Bibi Titi Mohamed Rd. are also congested all day.
- In morning peak, Tazara intersection is heavily congested and spend about 25 minutes sometimes to through it both of inbound traffic on Nyerere Rd. and through traffic for Seaport of Nelson Mandela Rd.
- Chang'ombe intersection of Nyerere Rd. and intersection with Msimbazi St. are also congested all day in both direction. At these two intersections, drivers are required frequently stop and go until passing it.
- On Ali Hassan Mwinyi Rd., intersection with UN Rd. and Kinondoni Rd. are congested sometimes especially outbound direction in evening peak.
- Right turn heavy vehicles entering factories along Nelson Mandela Rd. cause stopping around Tabata sometimes.
- In evening peak period, travel speed reductions are observed at Old Bagamoyo Rd. and Ali Hassan Mwinyi Rd. after passing Morocco intersection. These travel speed reductions are caused by right turn traffic at non-signalized intersection and stop of dala dala.

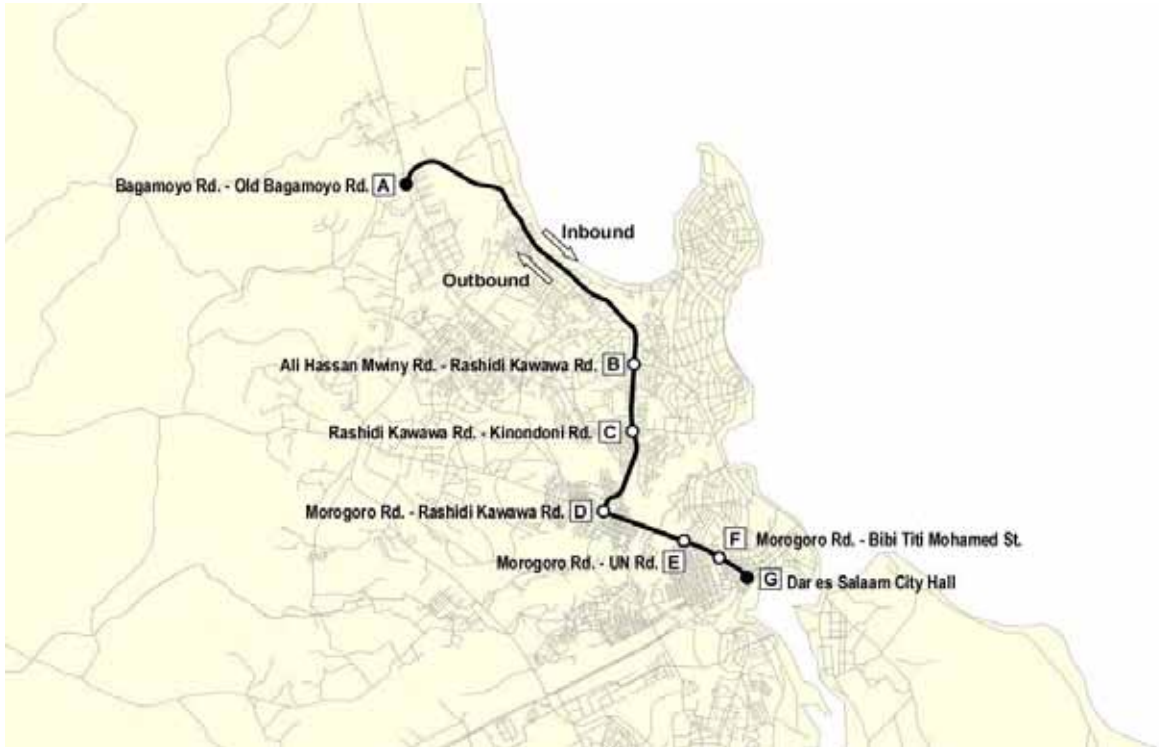
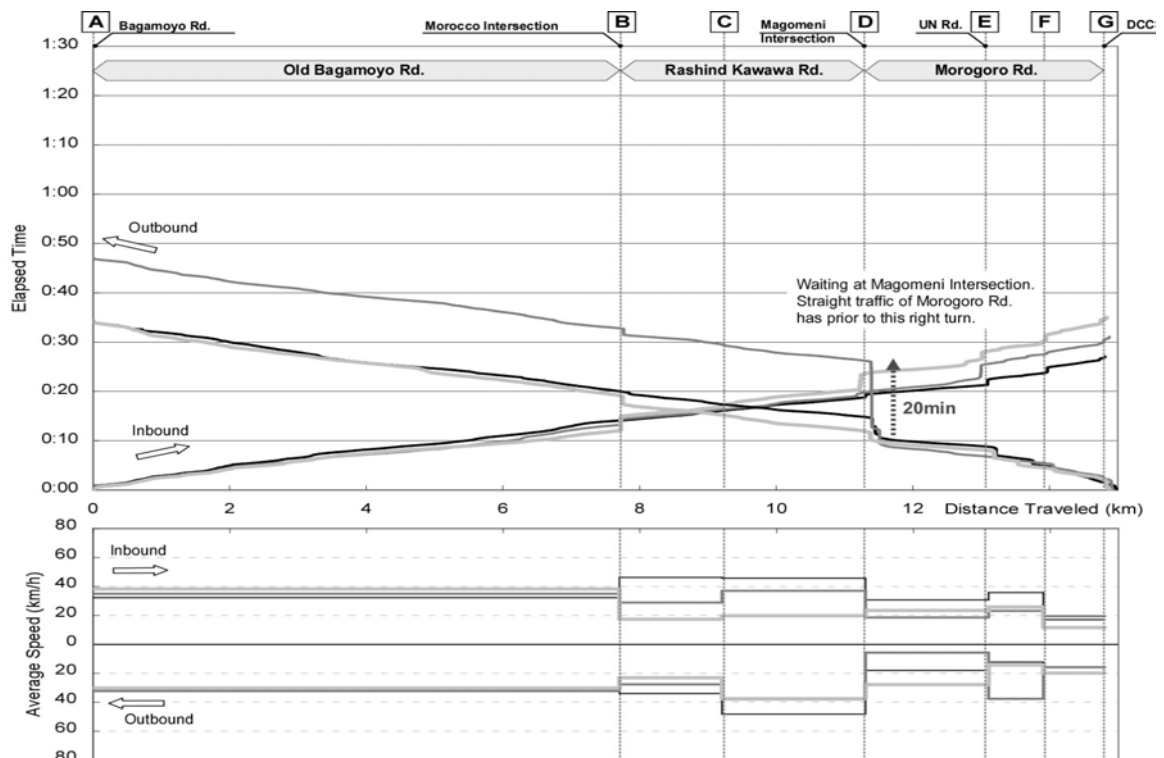


Figure 5.2.1 Travel Speed Survey Route (Route 1)



Source: JICA Study Team

Figure 5.2.2 Travel Speed Survey Results (Route 1 - AM peak)

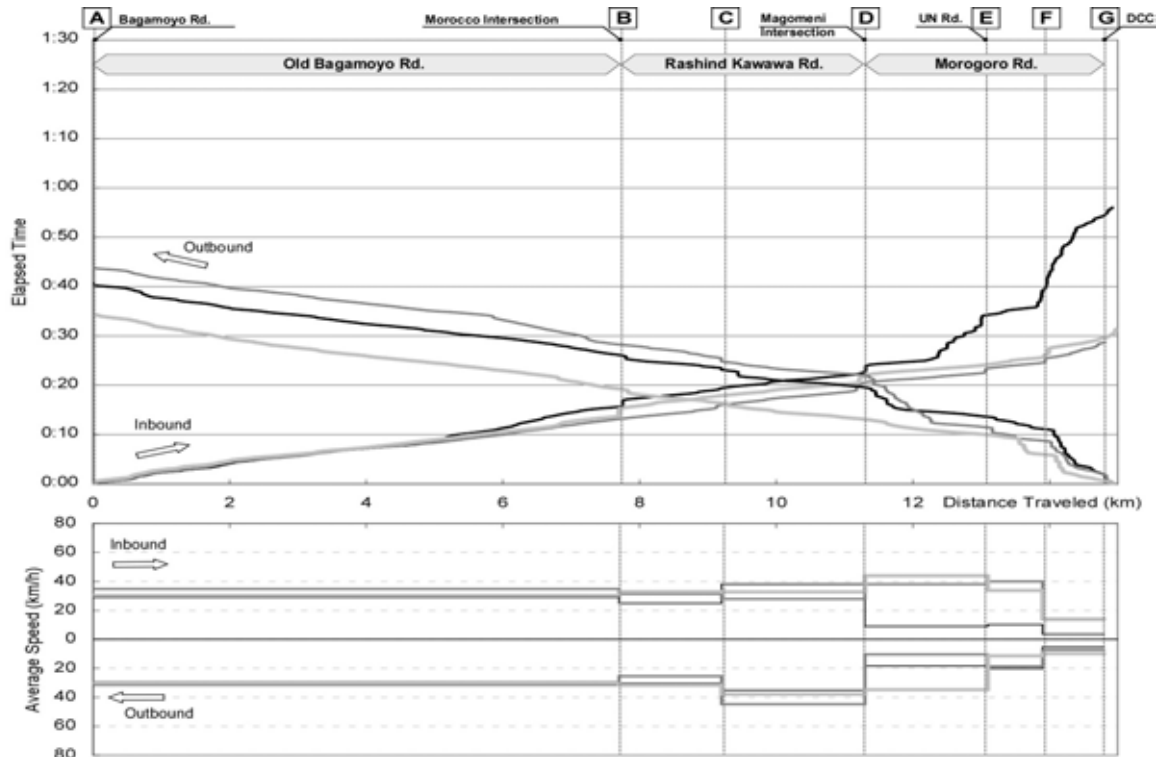


Figure 5.2.3 Travel Speed Survey Results (Route 1- Off peak)

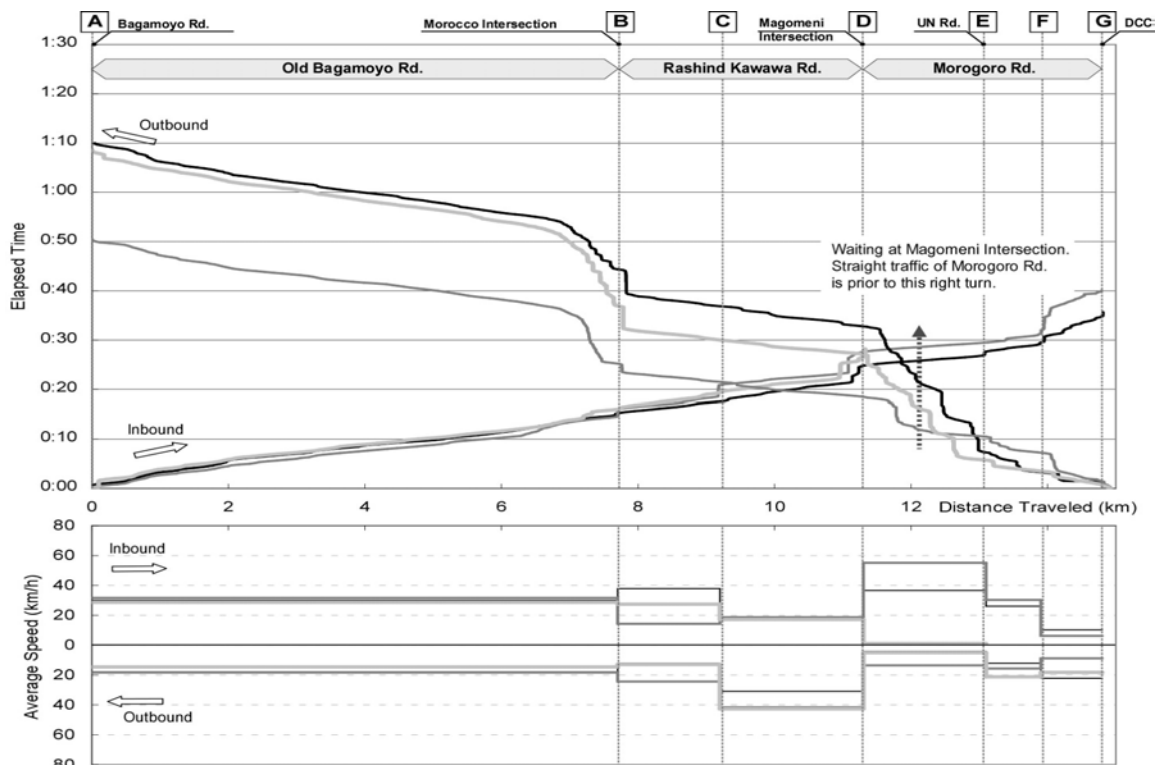


Figure 5.2.4 Travel Speed Survey Results (Route 1- PM peak)

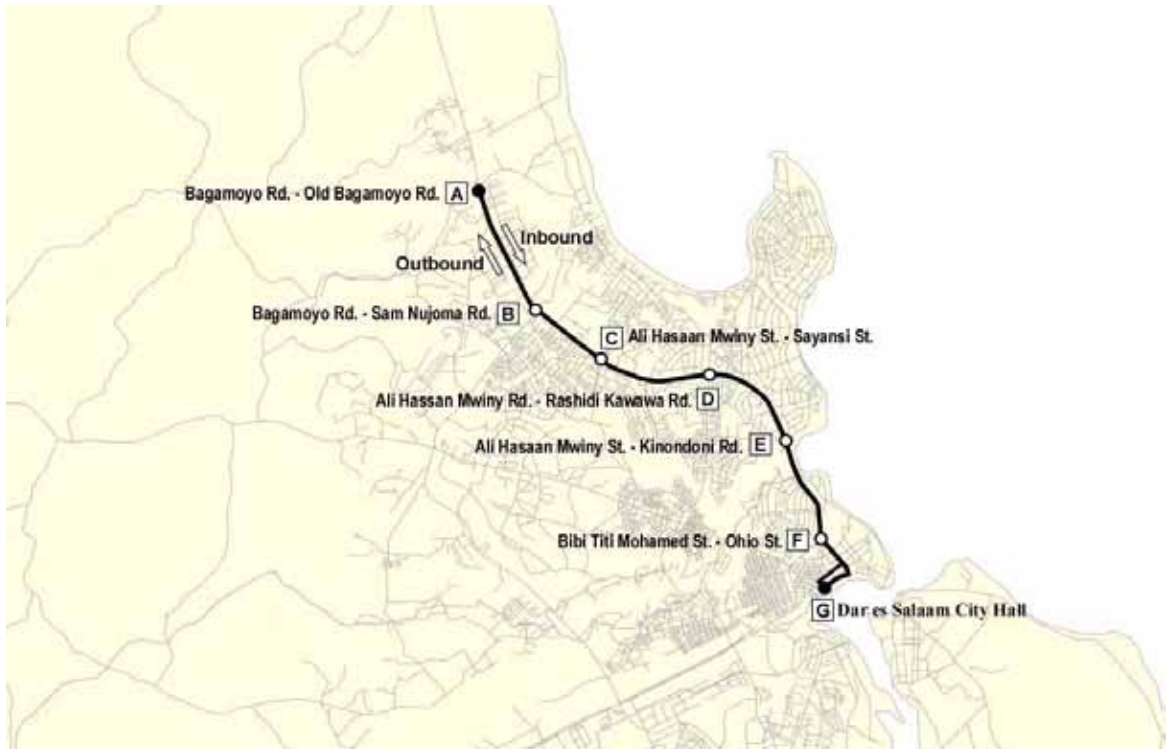


Figure 5.2.5 Travel Speed Survey Route (Route 2)

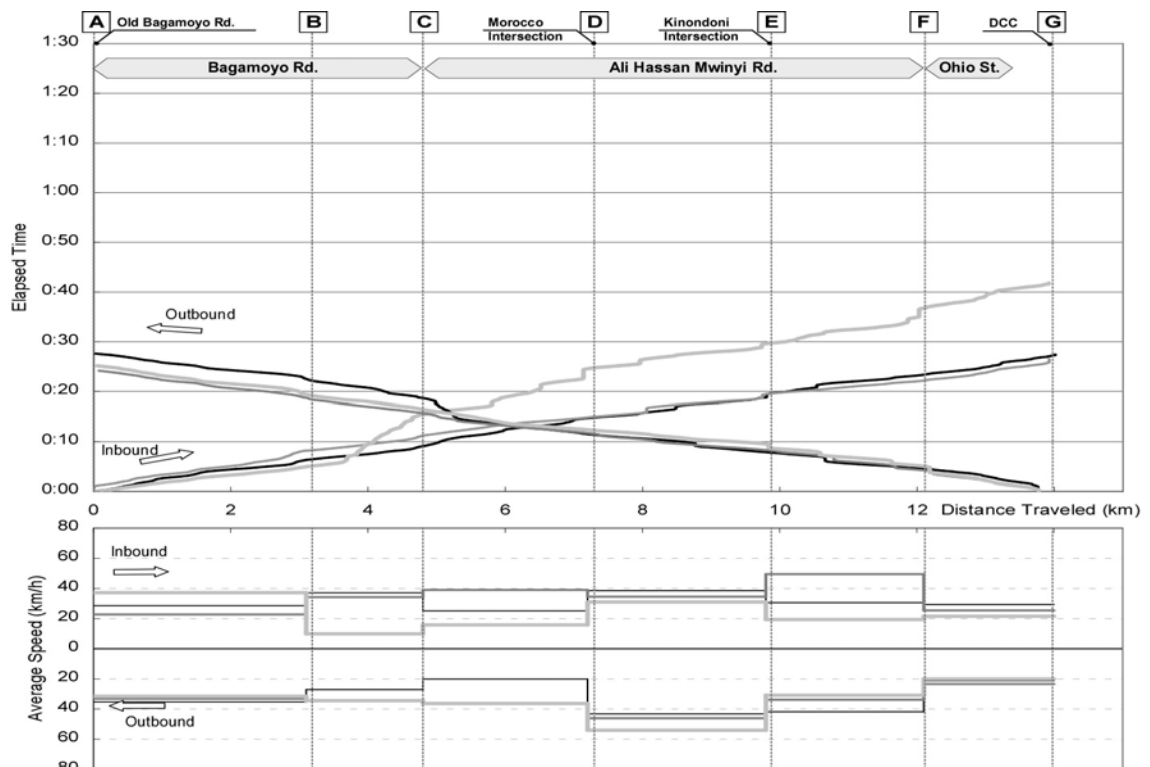


Figure 5.2.6 Travel Speed Survey Results (Route 2 – AM peak)

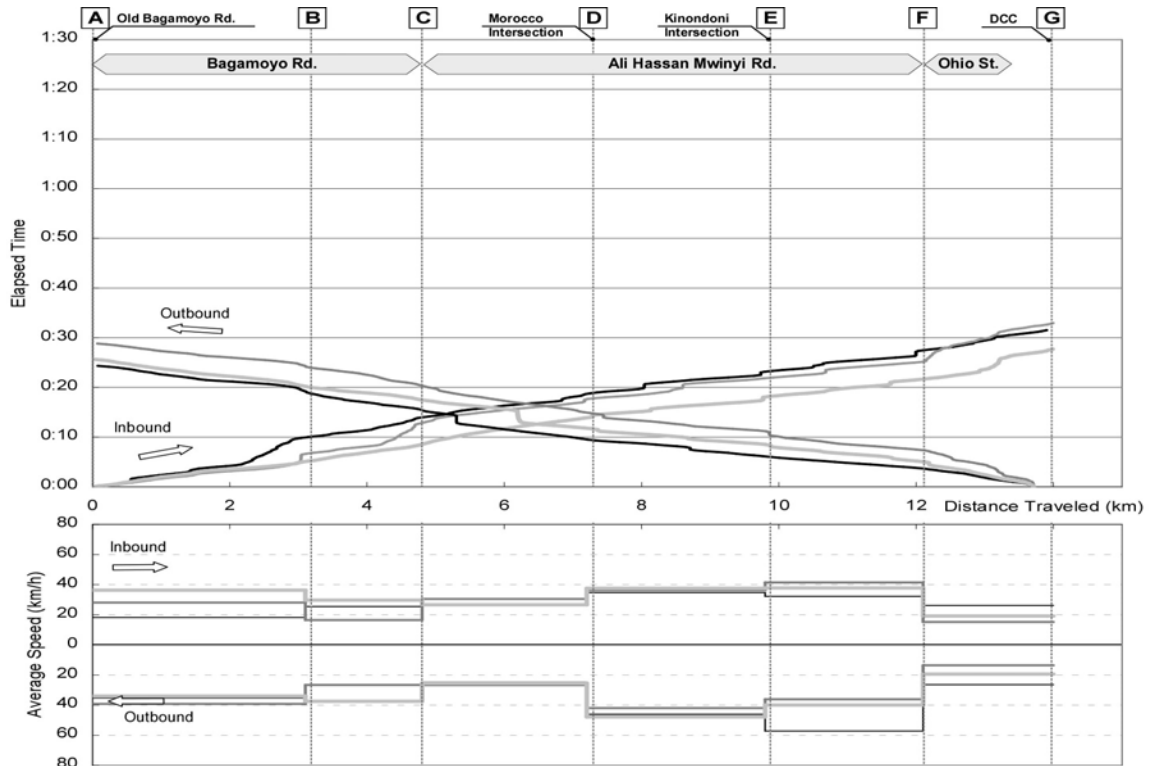


Figure 5.2.7 Travel Speed Survey Results (Route 2 – Off peak)

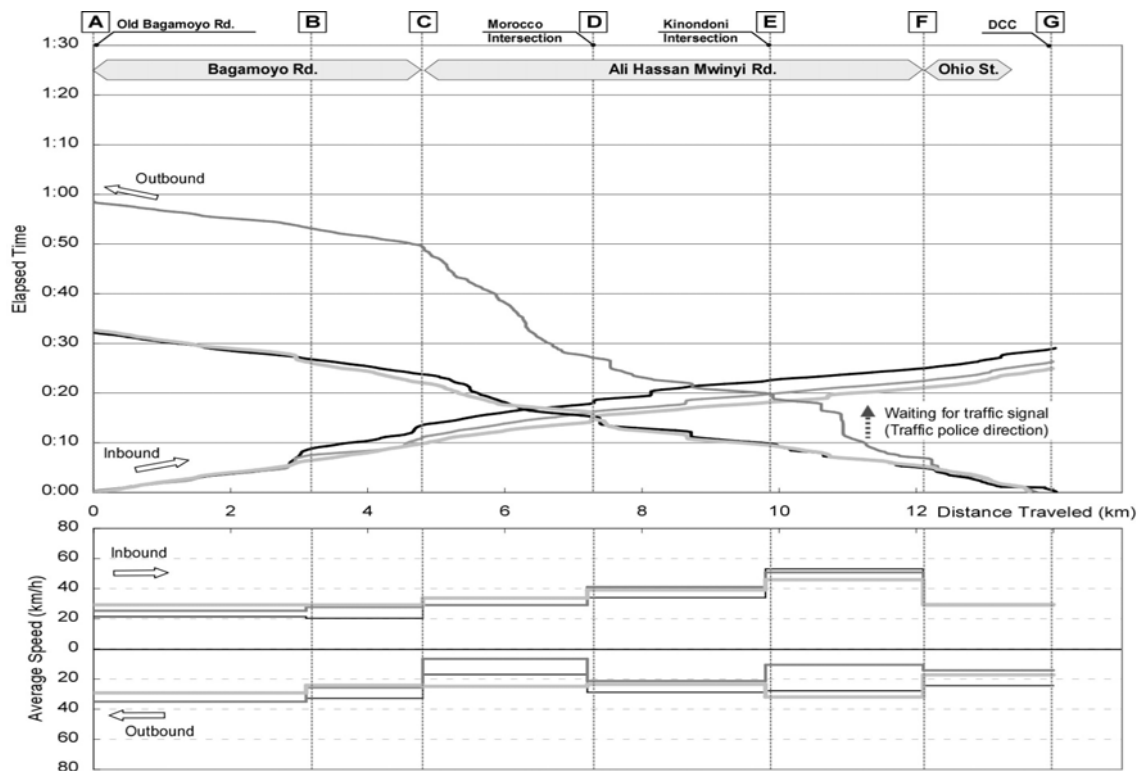


Figure 5.2.8 Travel Speed Survey Results (Route 2 – PM peak)

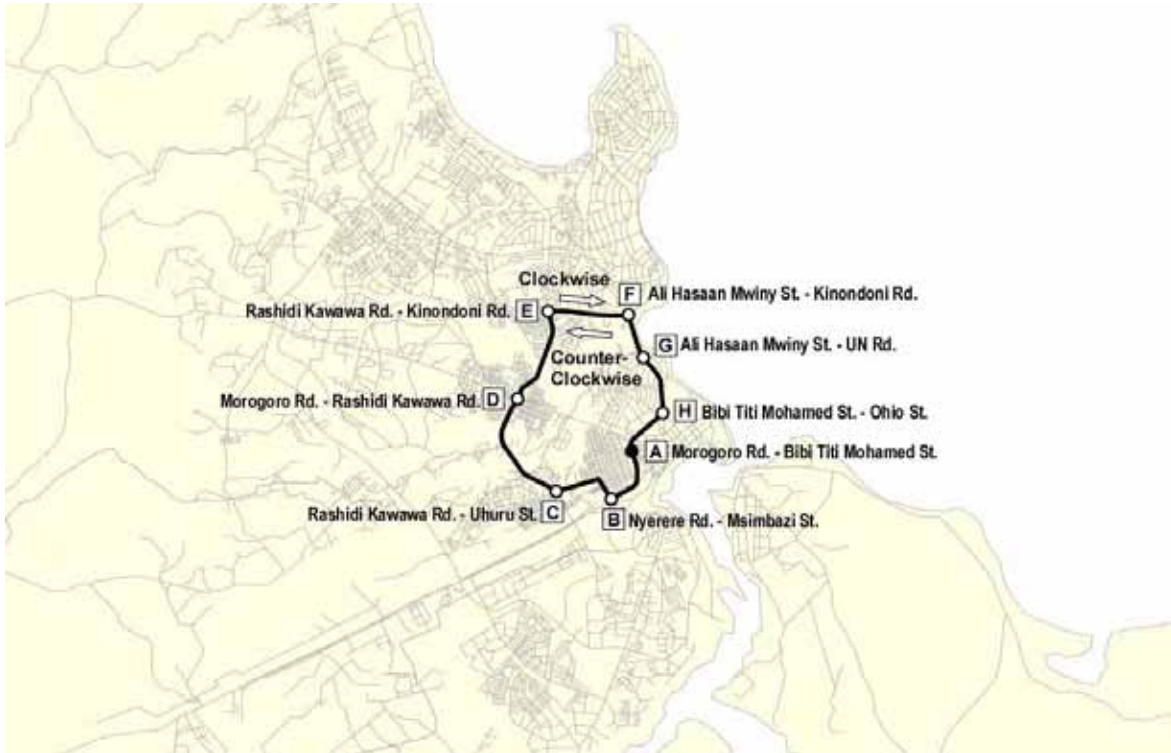


Figure 5.2.9 Travel Speed Survey Route (Route 3)

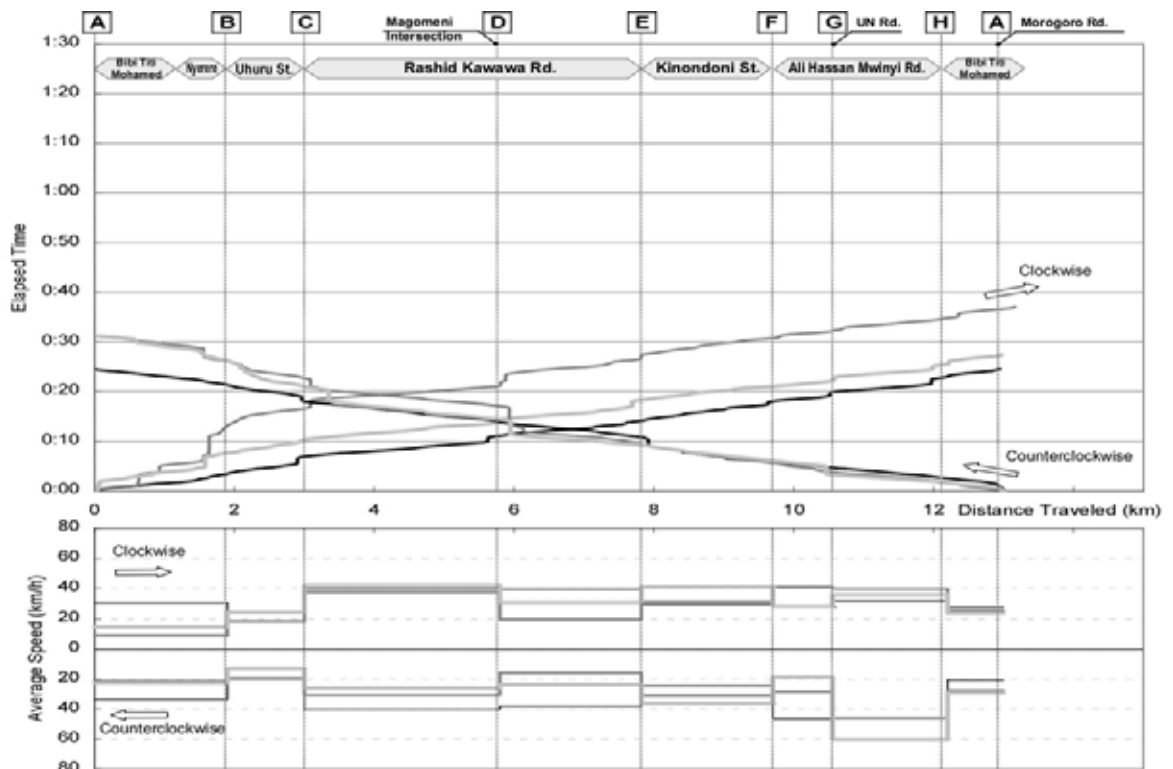


Figure 5.2.10 Travel Speed Survey Results (Route 3 – AM peak)

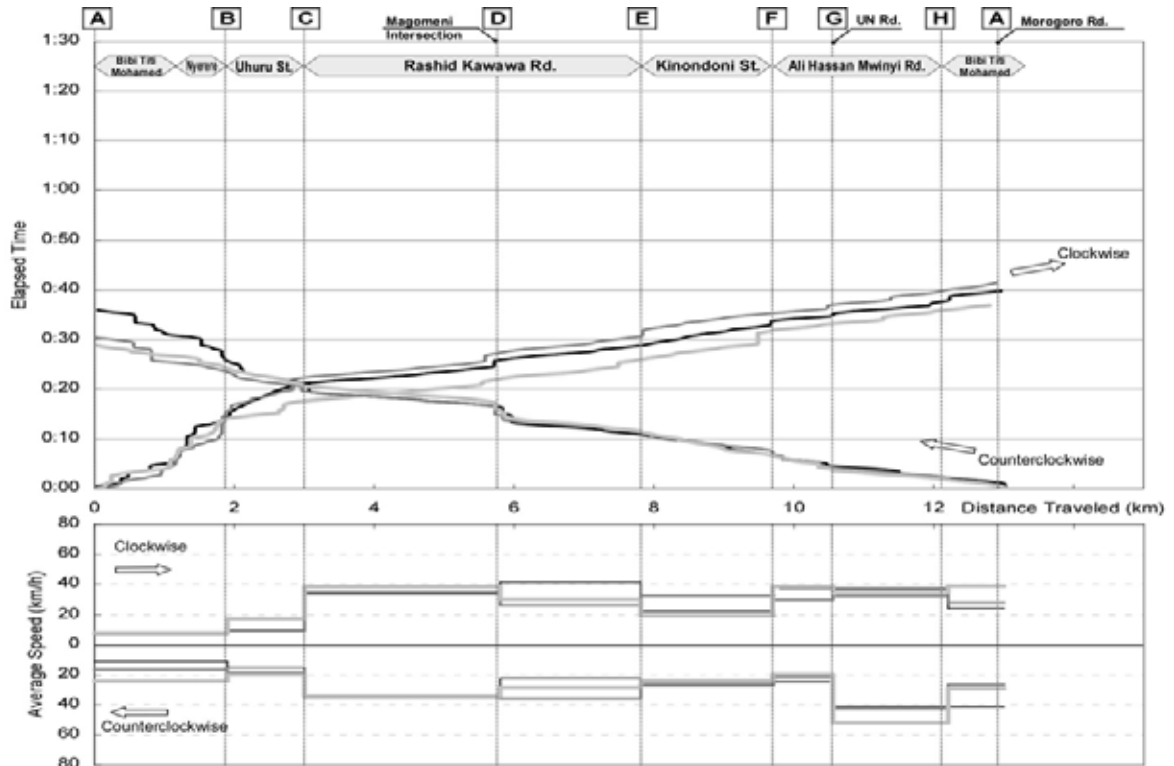


Figure 5.2.11 Travel Speed Survey Results (Route 3 – Off peak)

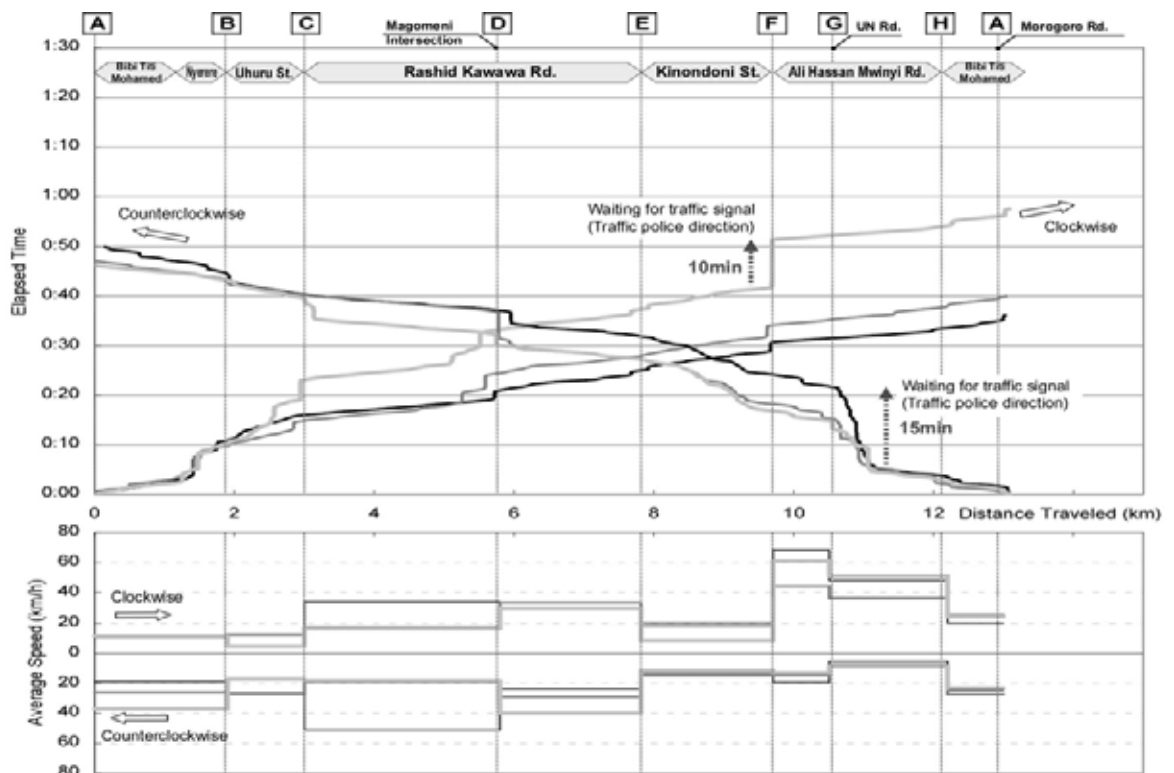


Figure 5.2.12 Travel Speed Survey Results (Route 3 – PM peak)

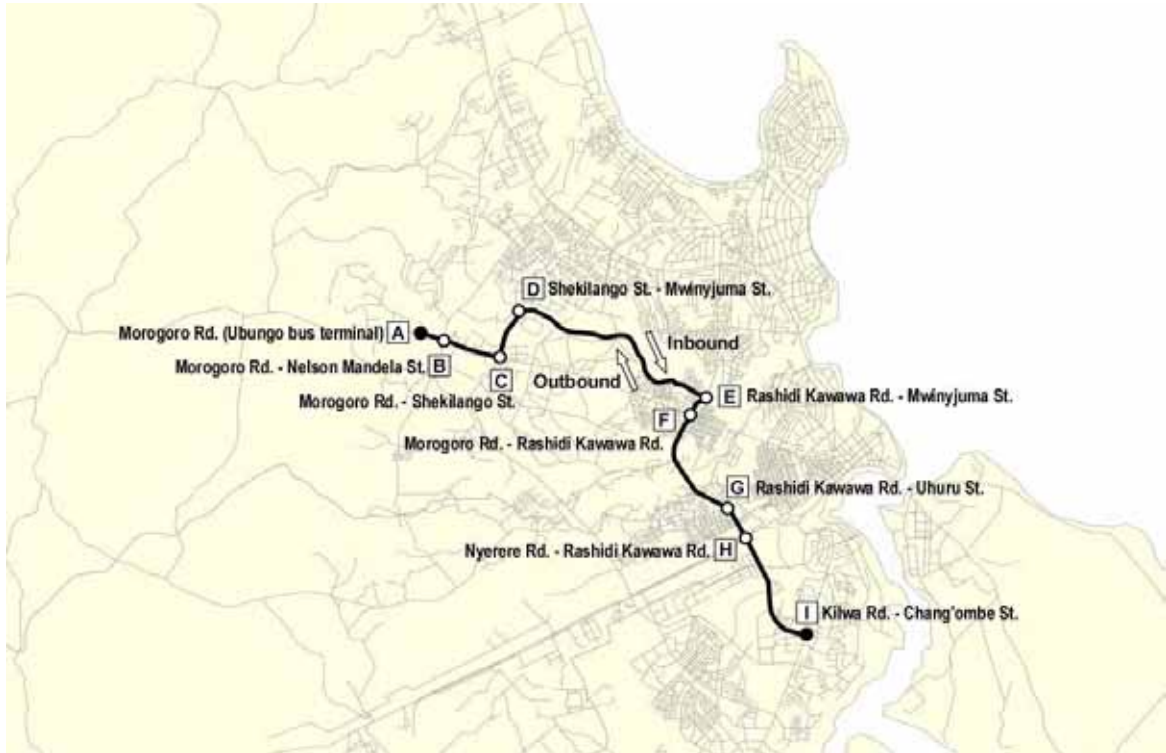


Figure 5.2.13 Travel Speed Survey Route (Route 4)

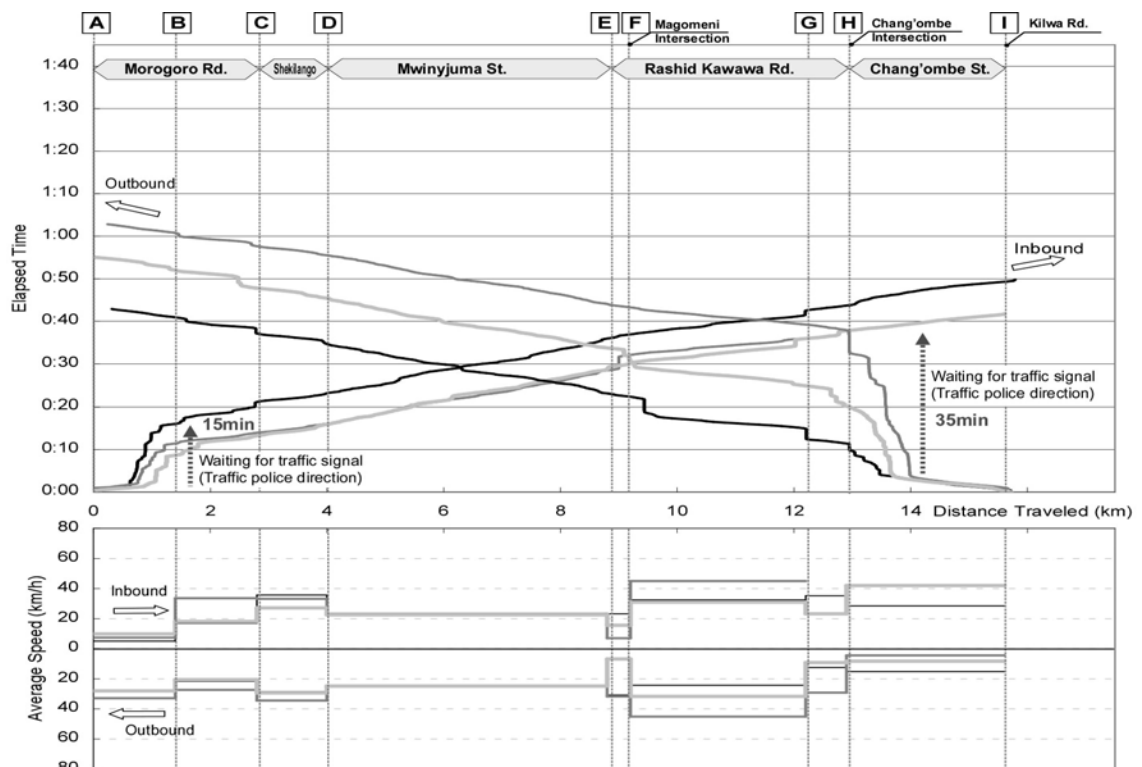


Figure 5.2.14 Travel Speed Survey Results (Route 4 – AM peak)

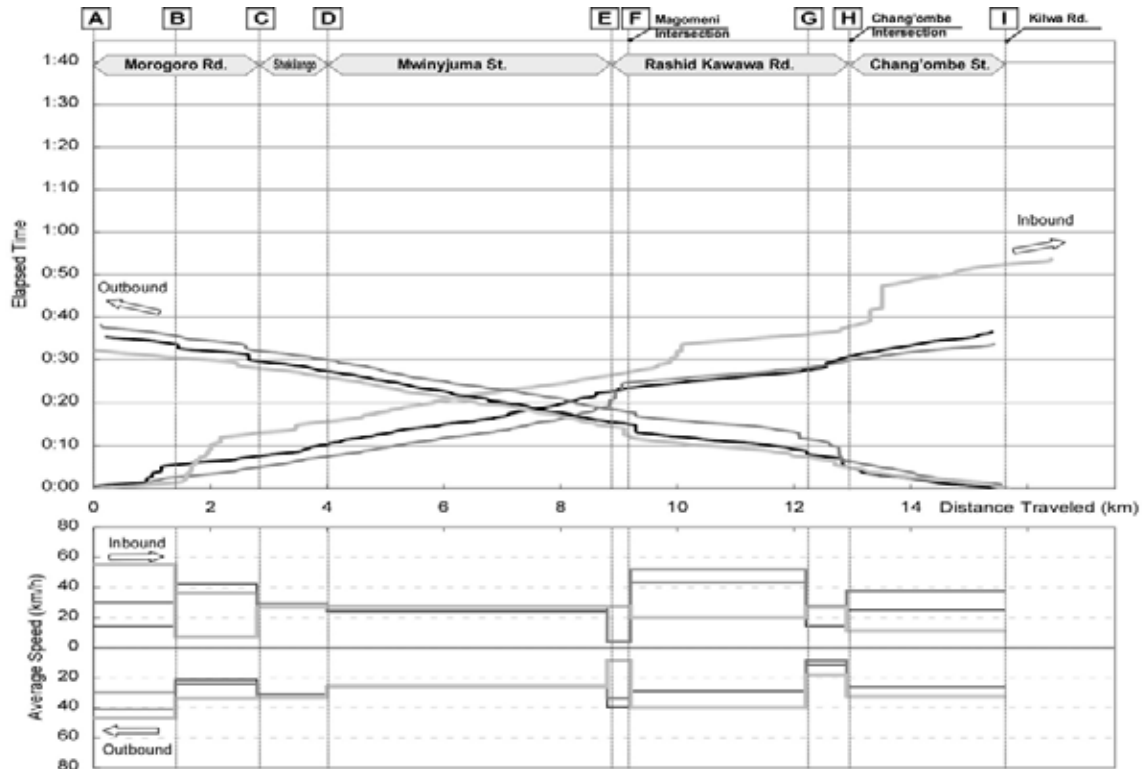


Figure 5.2.15 Travel Speed Survey Results (Route 4 – Off peak)

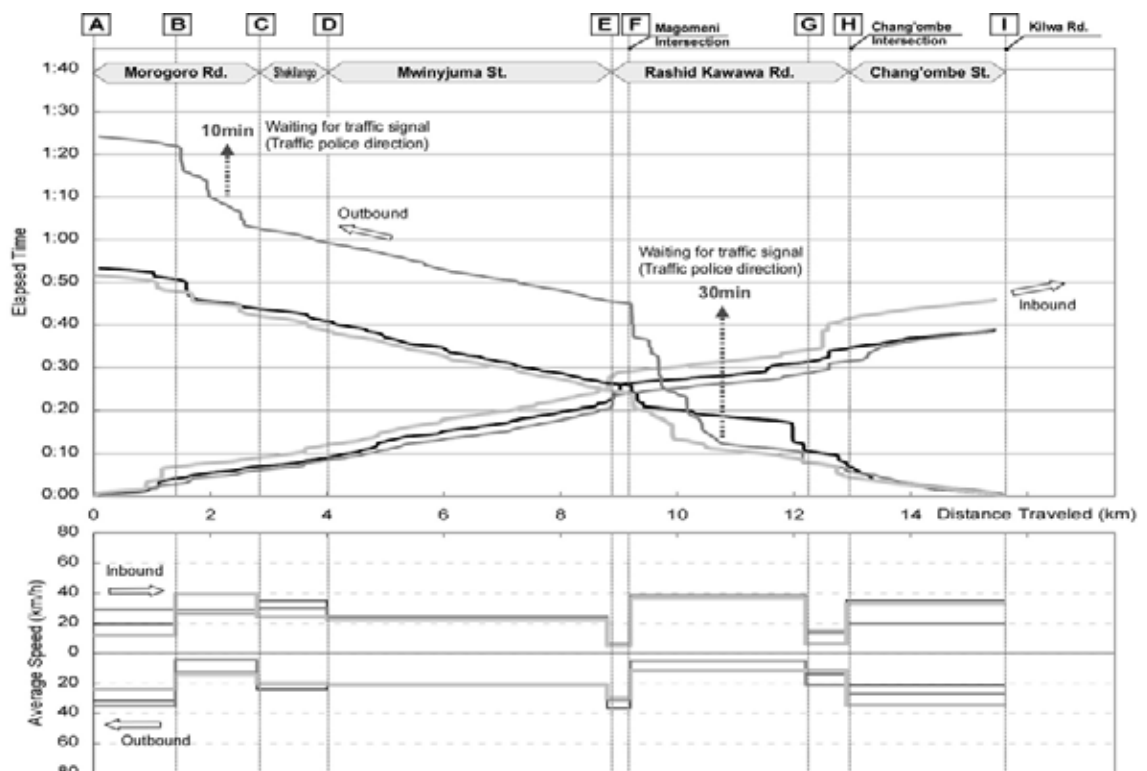


Figure 5.2.16 Travel Speed Survey Results (Route 4 – PM peak)

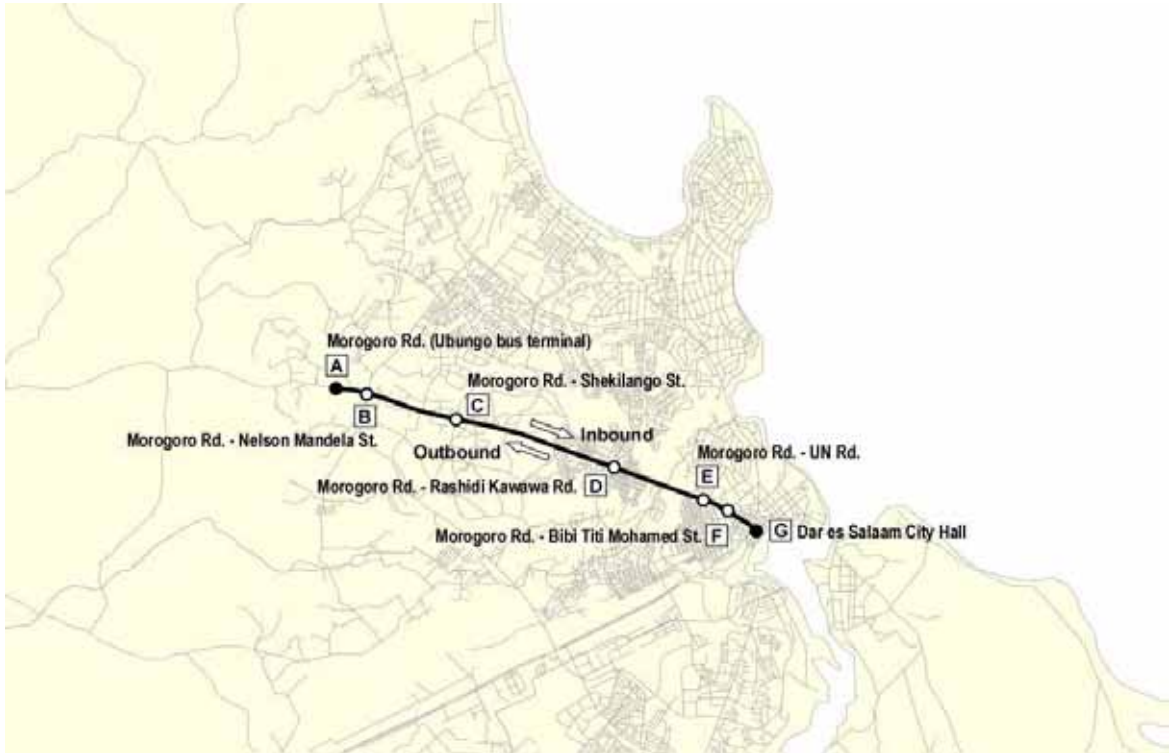


Figure 5.2.17 Travel Speed Survey Route (Route 5)

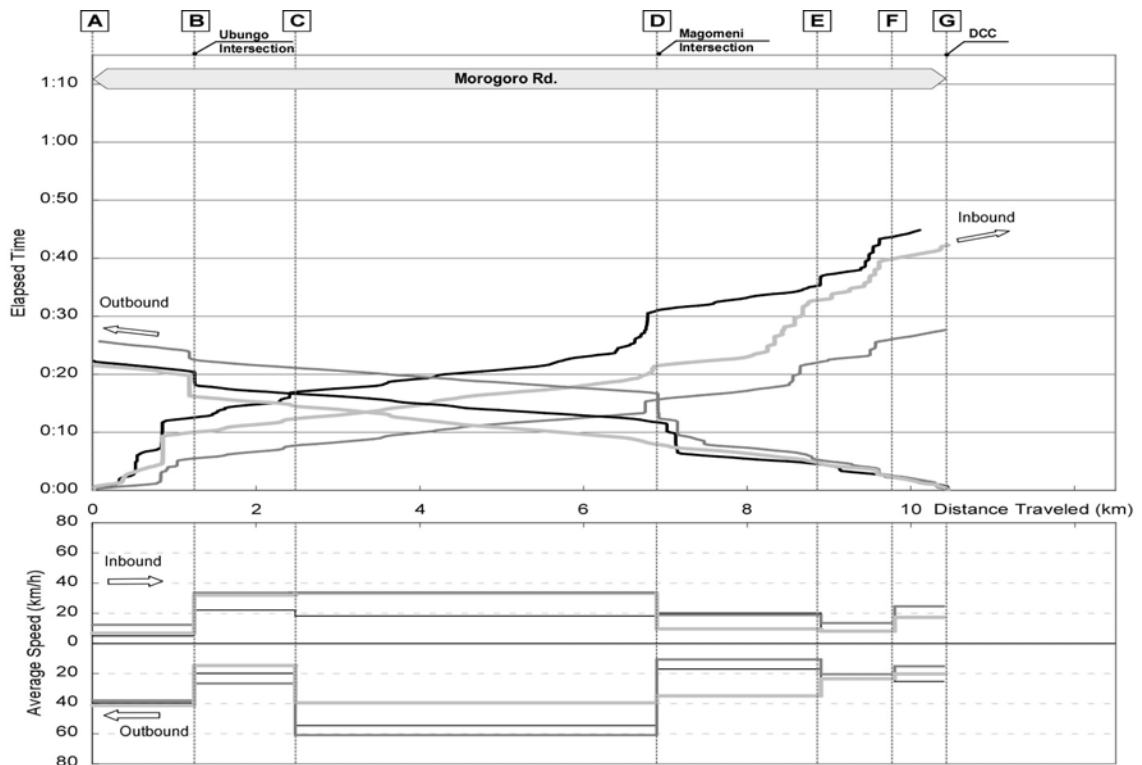


Figure 5.2.18 Travel Speed Survey Results (Route 5 – AM peak)

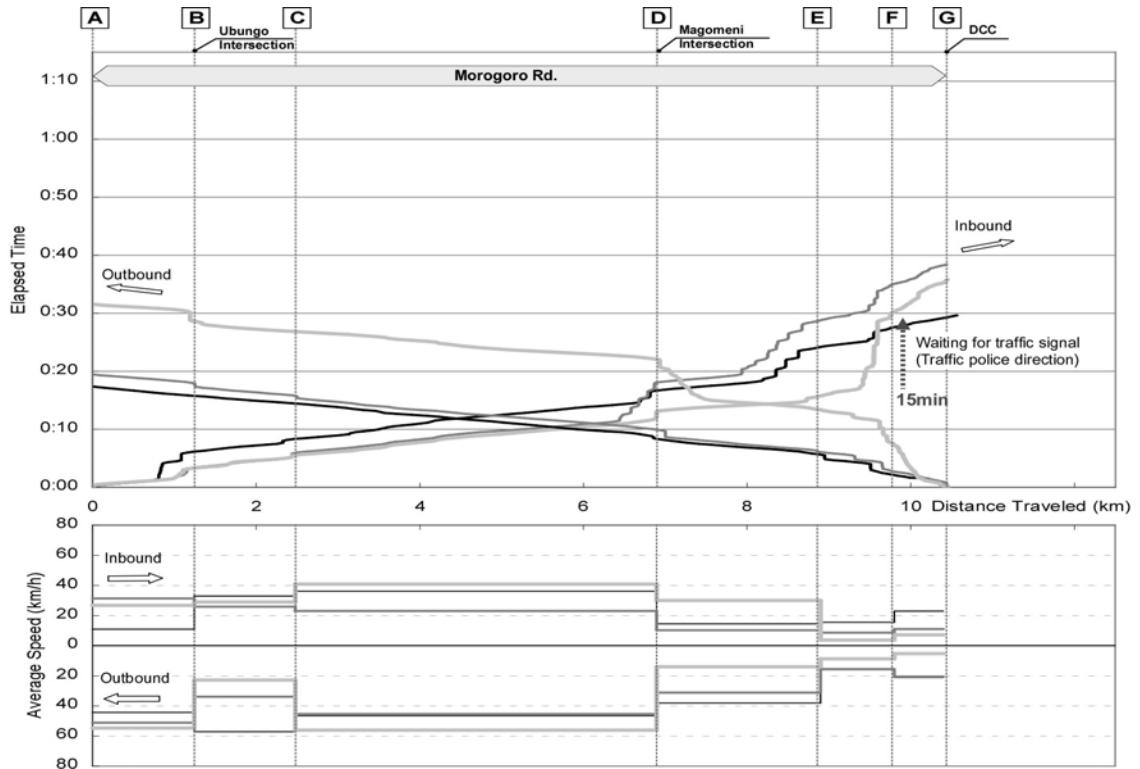


Figure 5.2.19 Travel Speed Survey Results (Route 5 – Off peak)

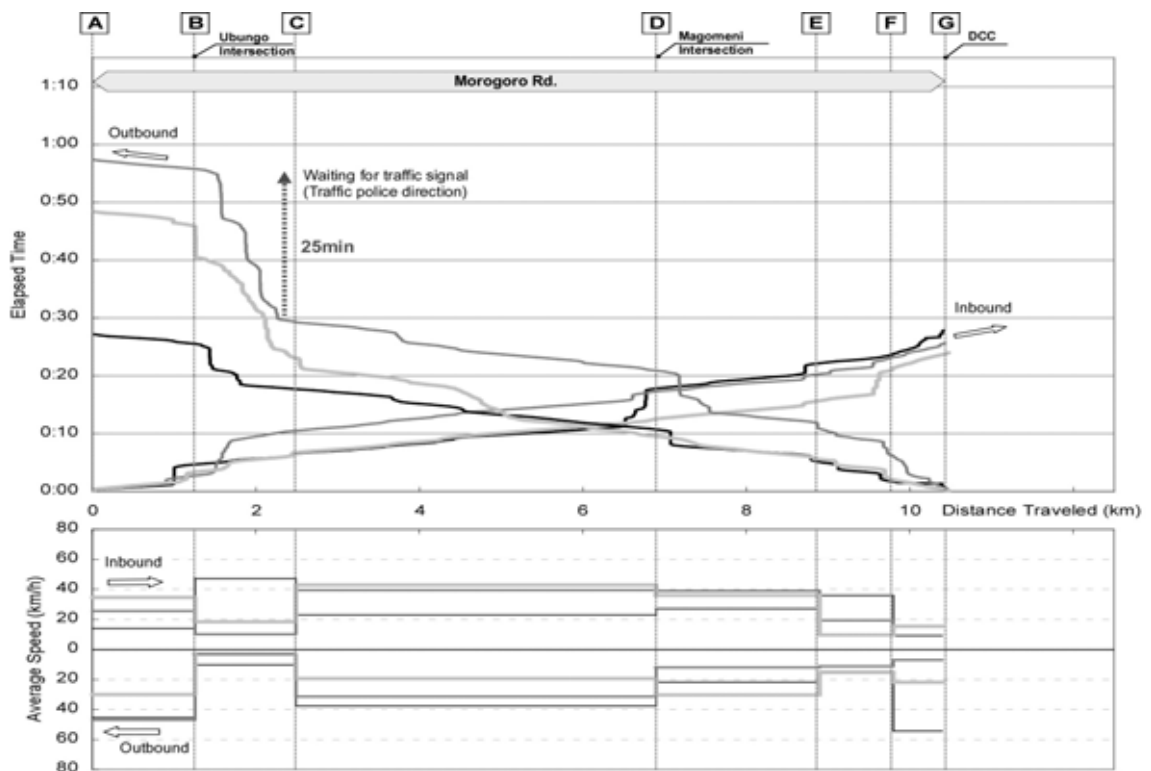


Figure 5.2.20 Travel Speed Survey Results (Route 5 – PM peak)

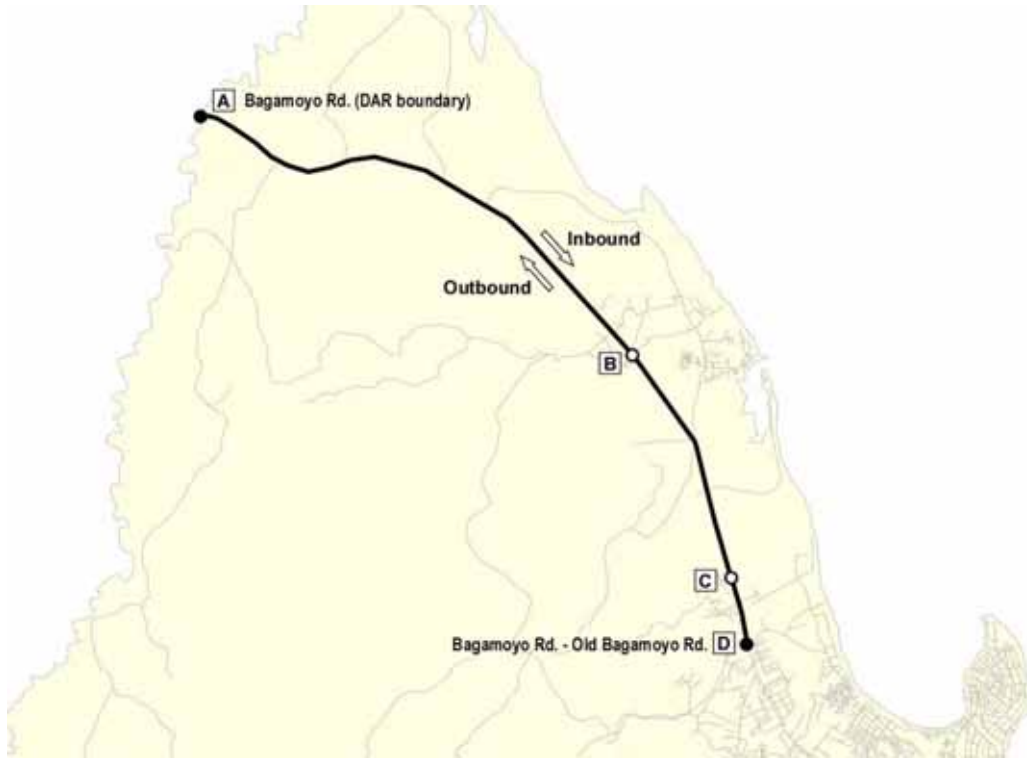


Figure 5.2.21 Travel Speed Survey Route (Route 6)

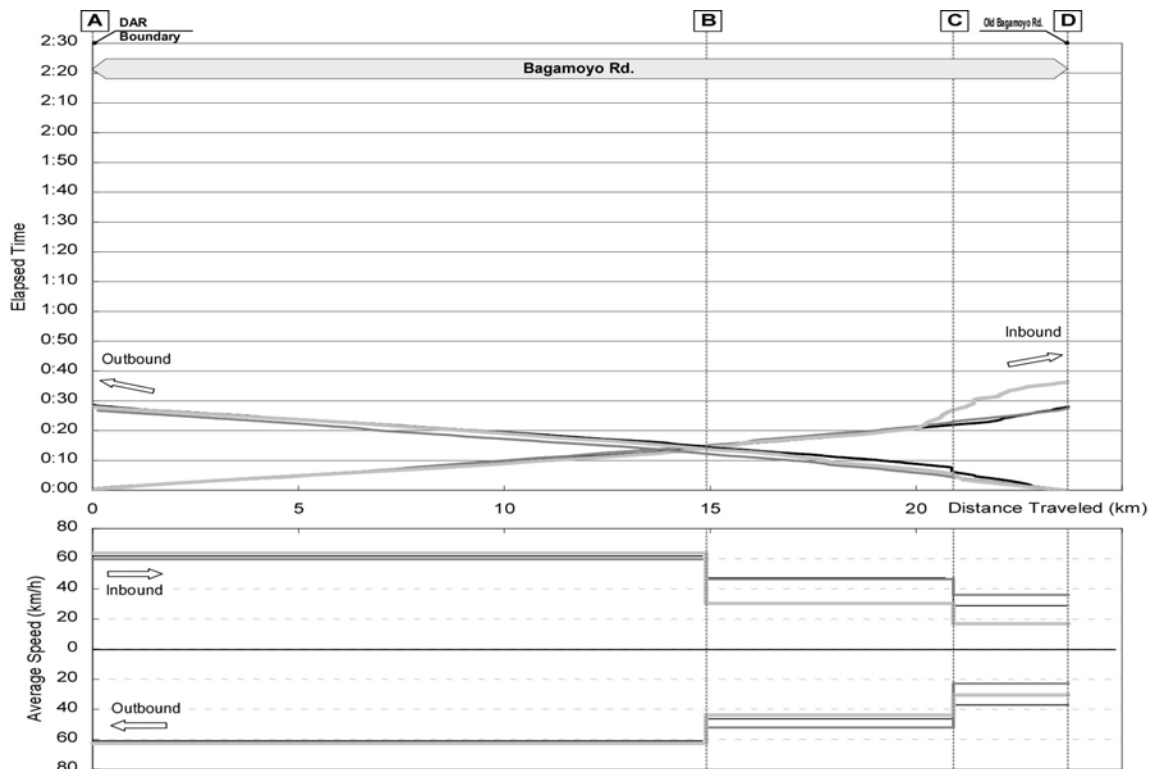


Figure 5.2.22 Travel Speed Survey Results (Route 6 – AM peak)

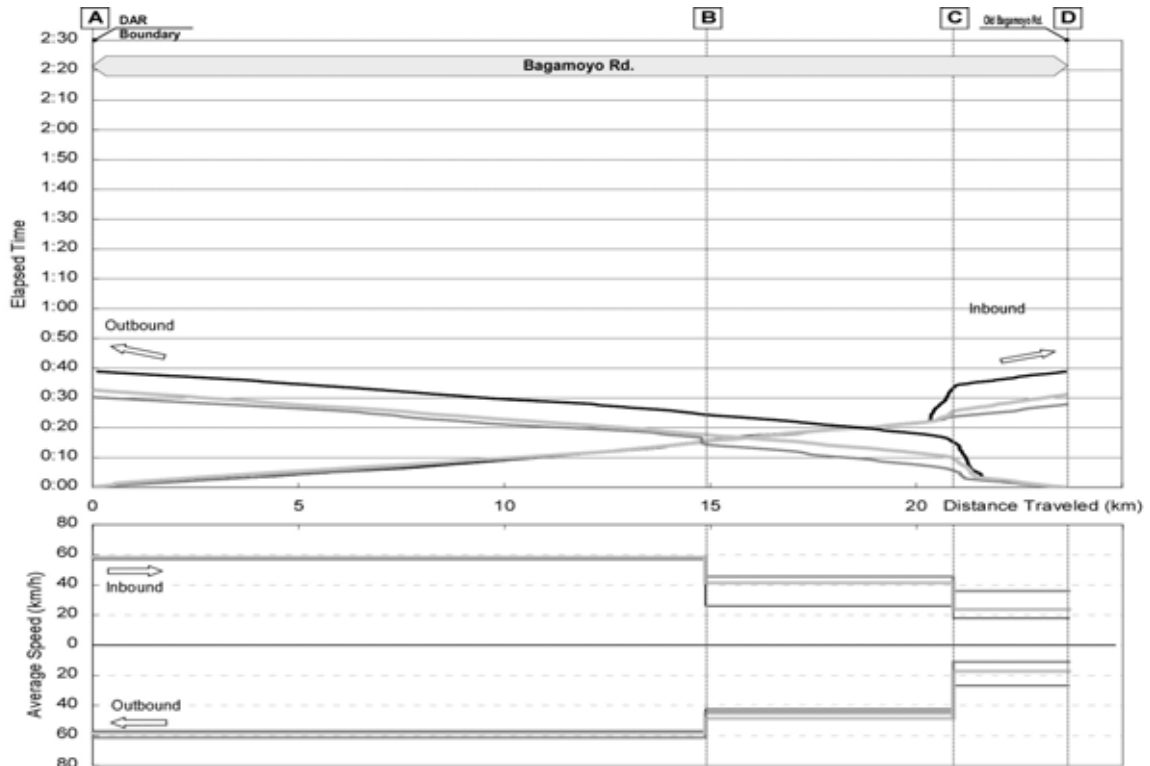


Figure 5.2.23 Travel Speed Survey Results (Route 6 – Off peak)

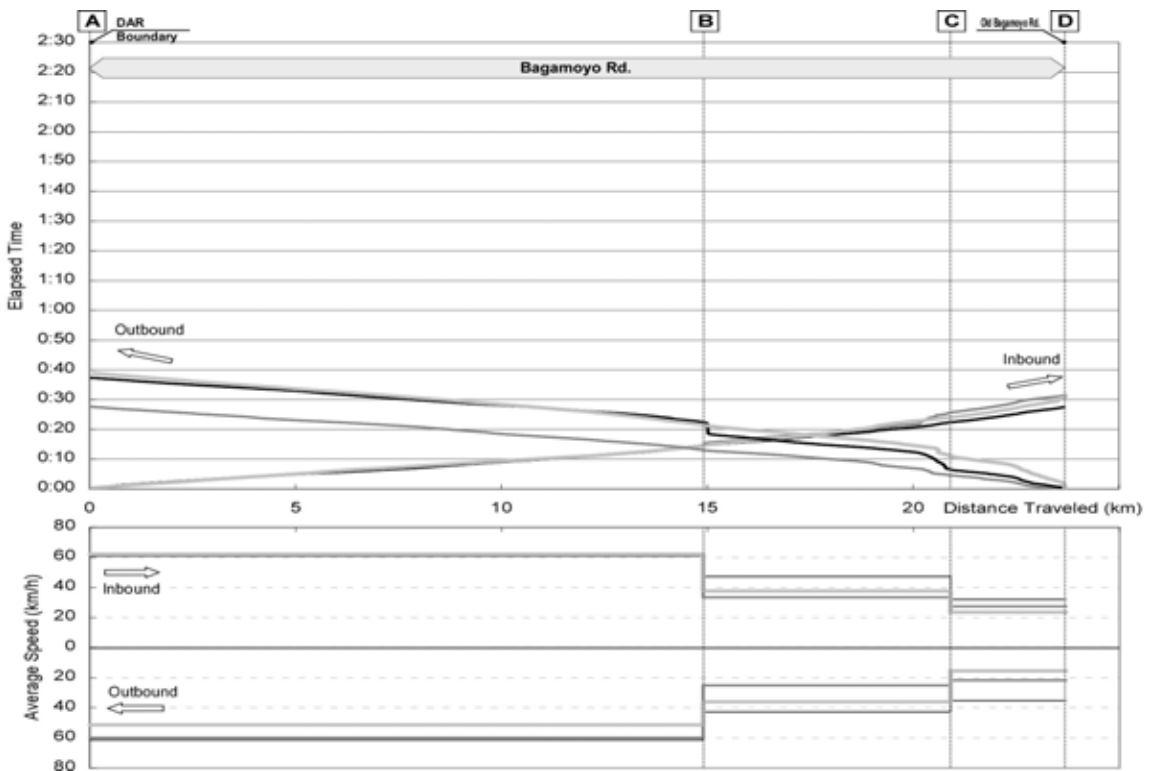


Figure 5.2.24 Travel Speed Survey Results (Route 6 – PM peak)

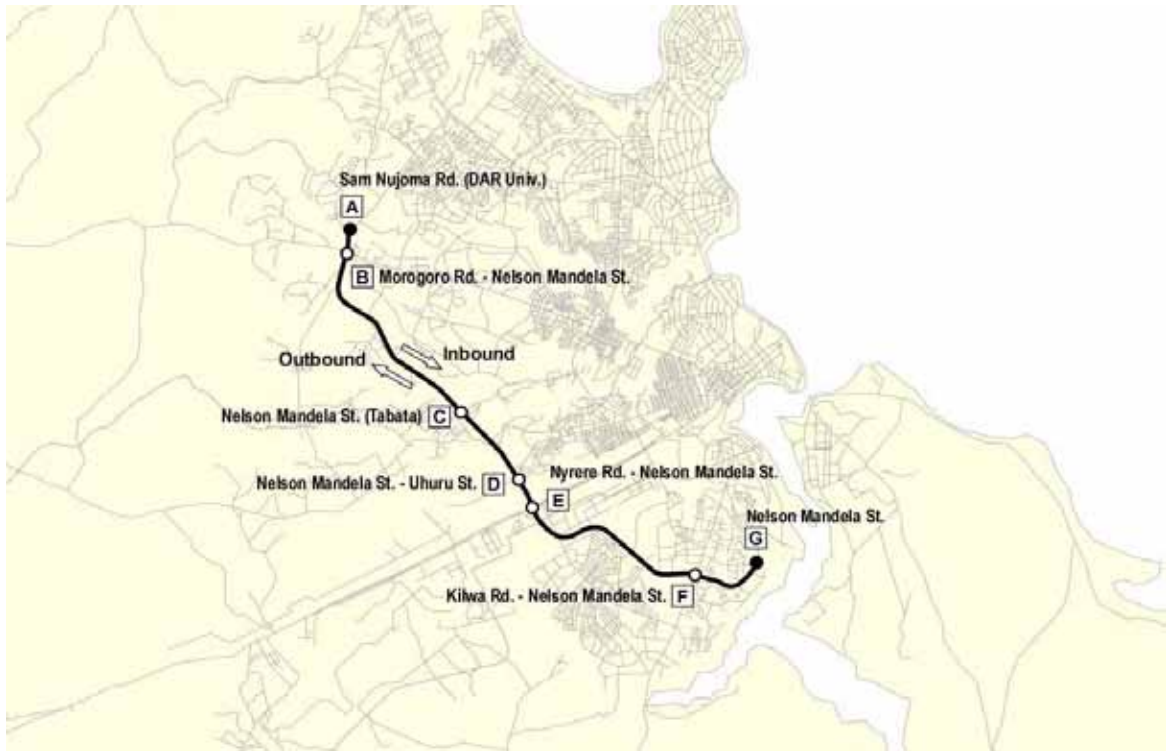


Figure 5.2.25 Travel Speed Survey Route (Route 7)

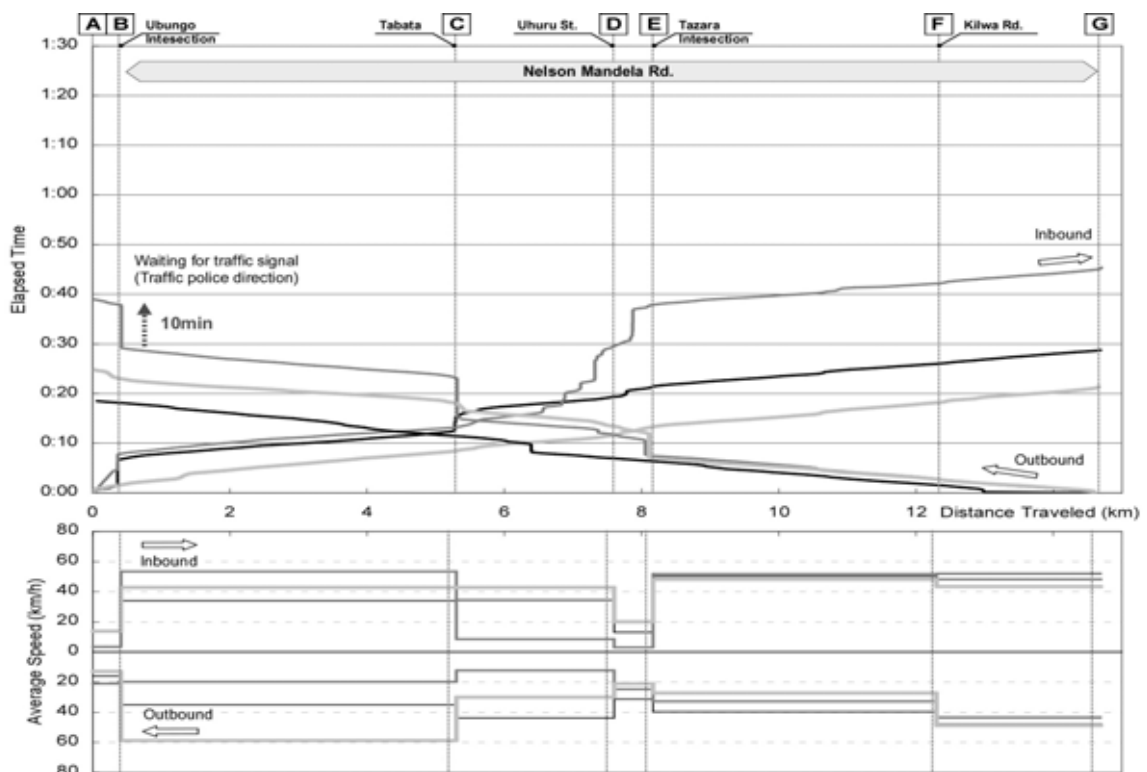


Figure 5.2.26 Travel Speed Survey Results (Route 7 – AM peak)

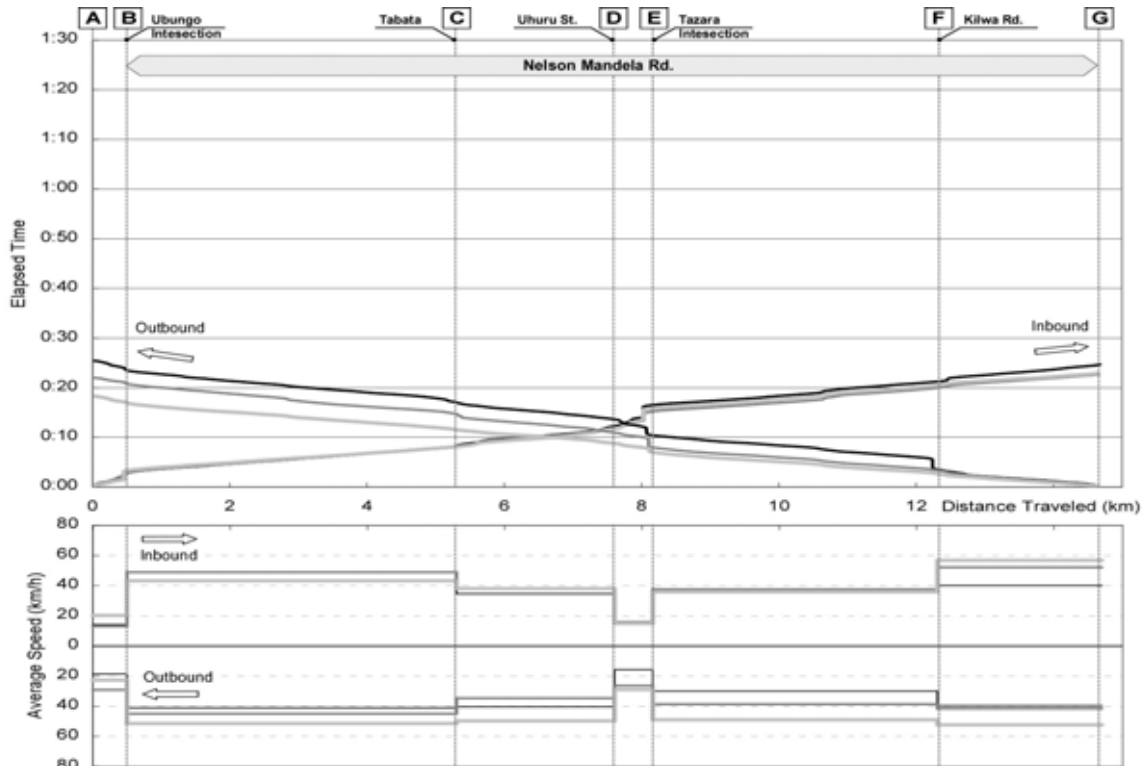


Figure 5.2.27 Travel Speed Survey Results (Route 7 – Off peak)

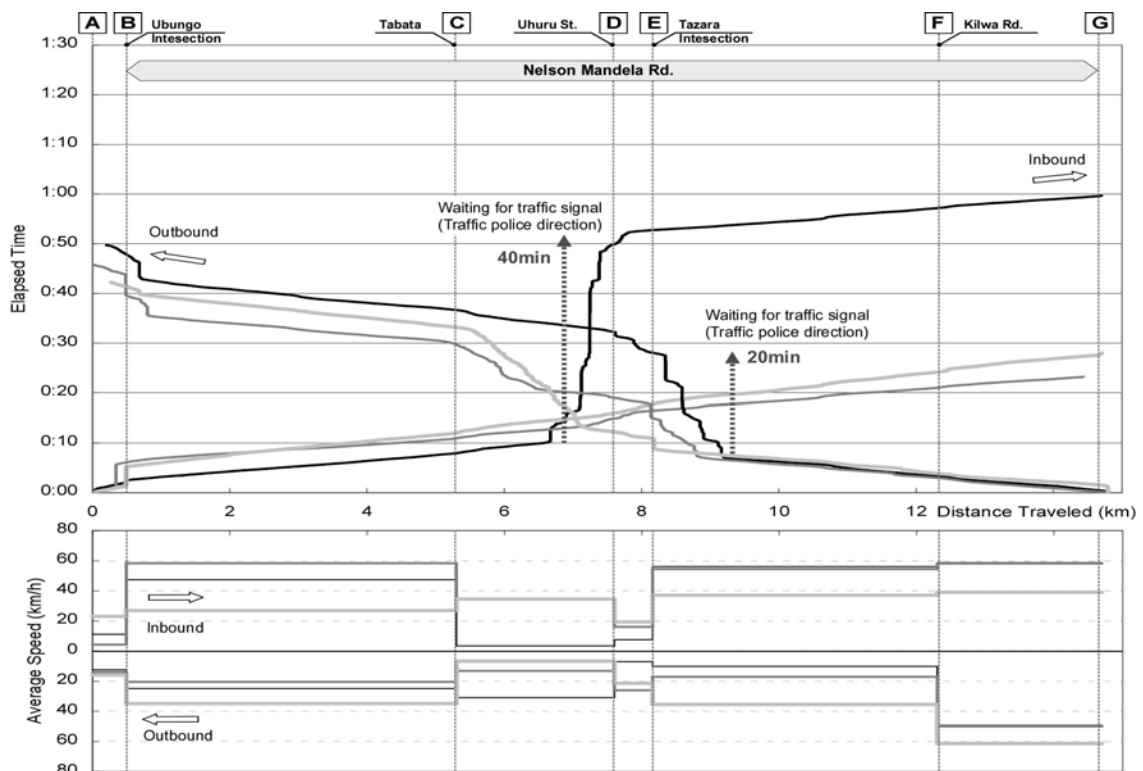


Figure 5.2.28 Travel Speed Survey Results (Route 7 – PM peak)

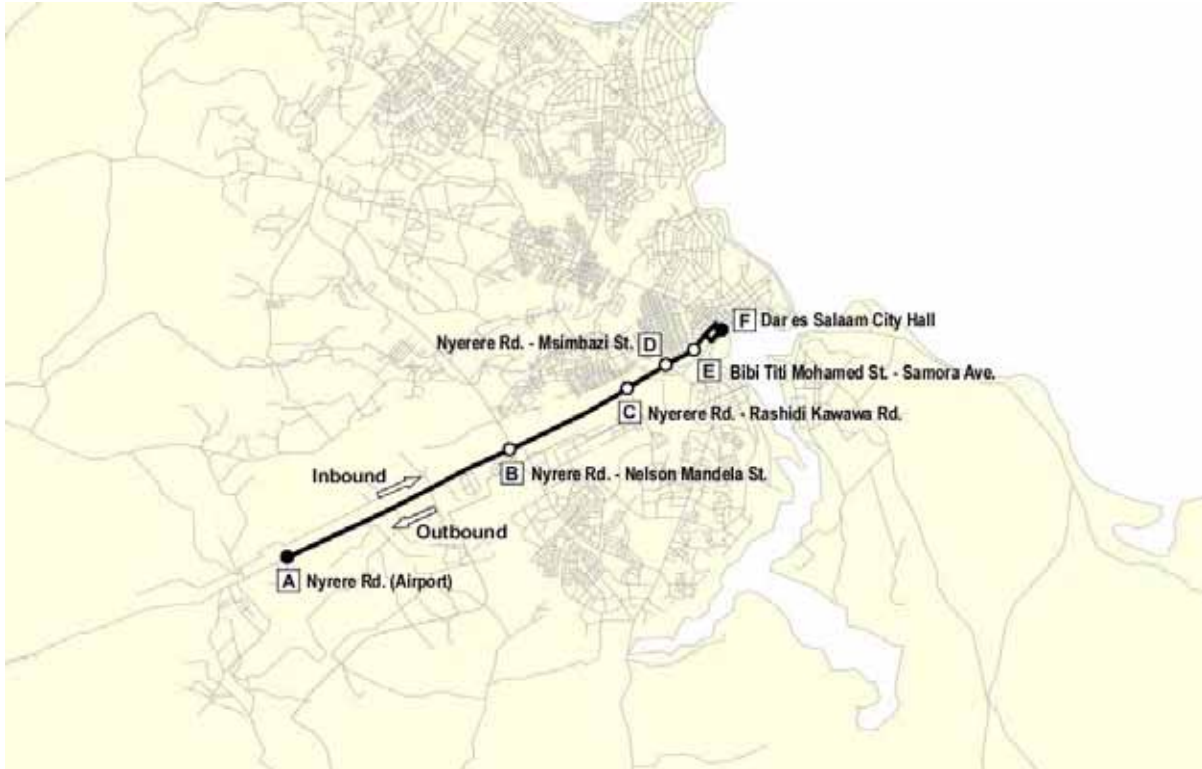


Figure 5.2.29 Travel Speed Survey Route (Route 8)

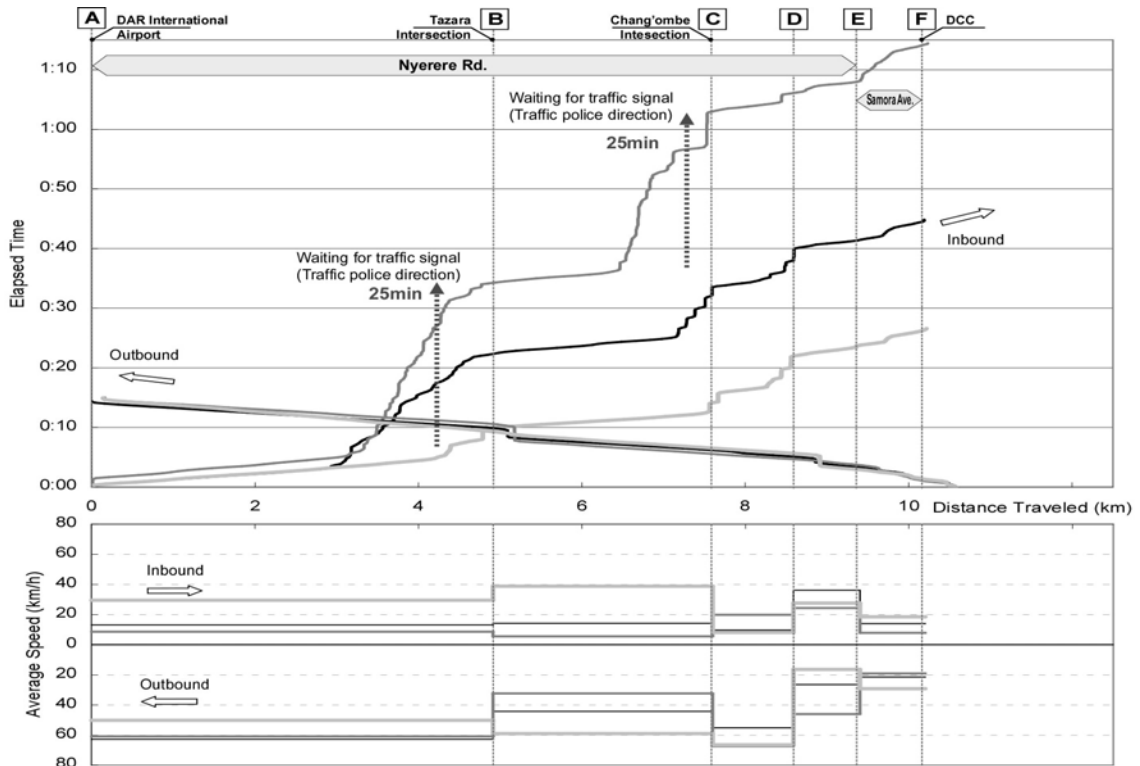


Figure 5.2.30 Travel Speed Survey Results (Route 8 – AM peak)

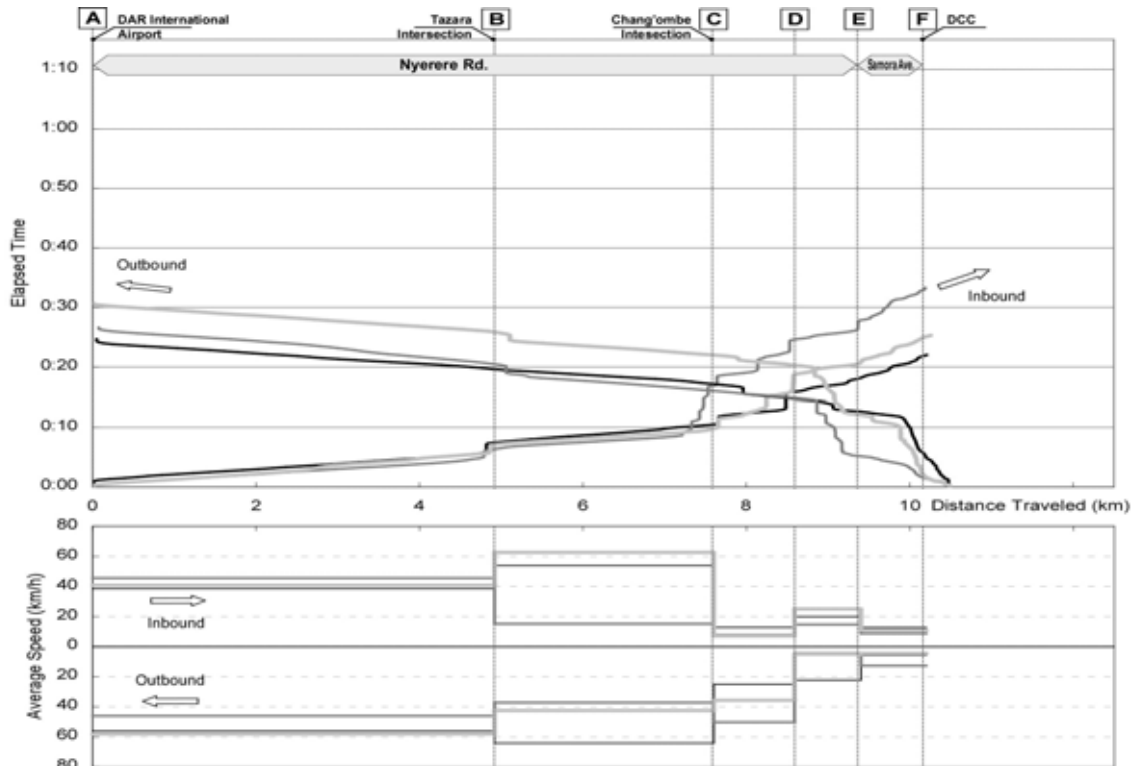


Figure 5.2.31 Travel Speed Survey Results (Route 8 – Off peak)

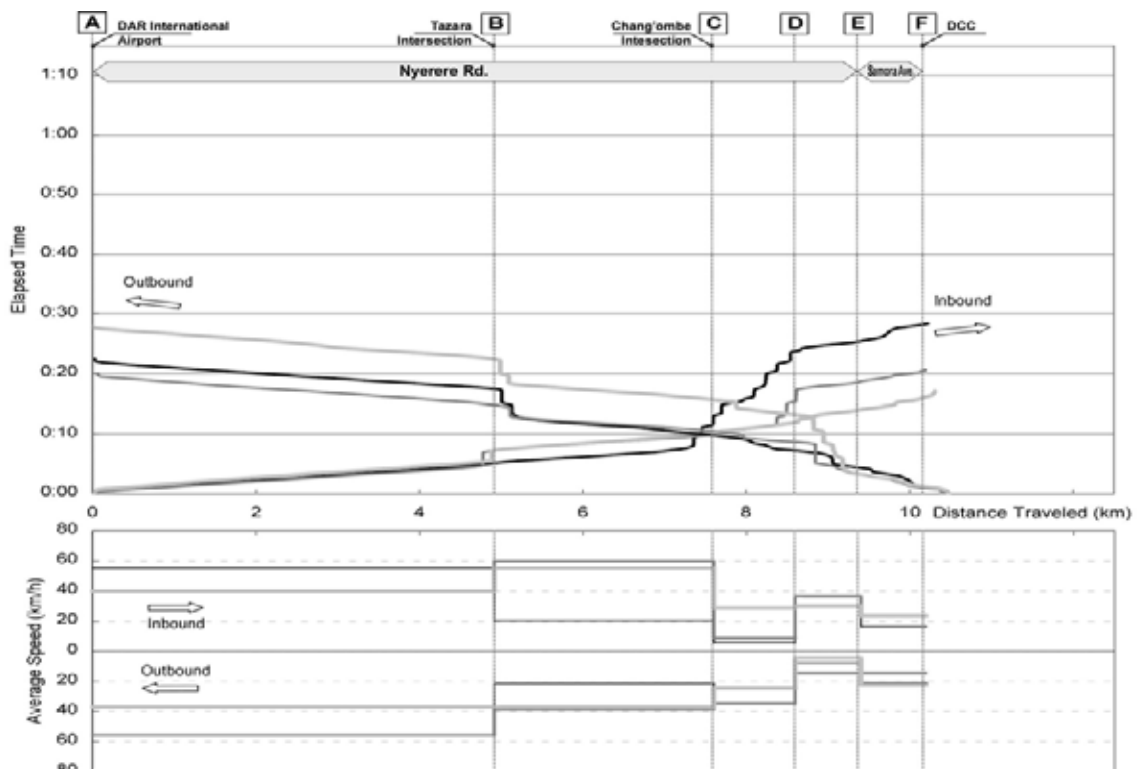


Figure 5.2.32 Travel Speed Survey Results (Route 8 – PM peak)

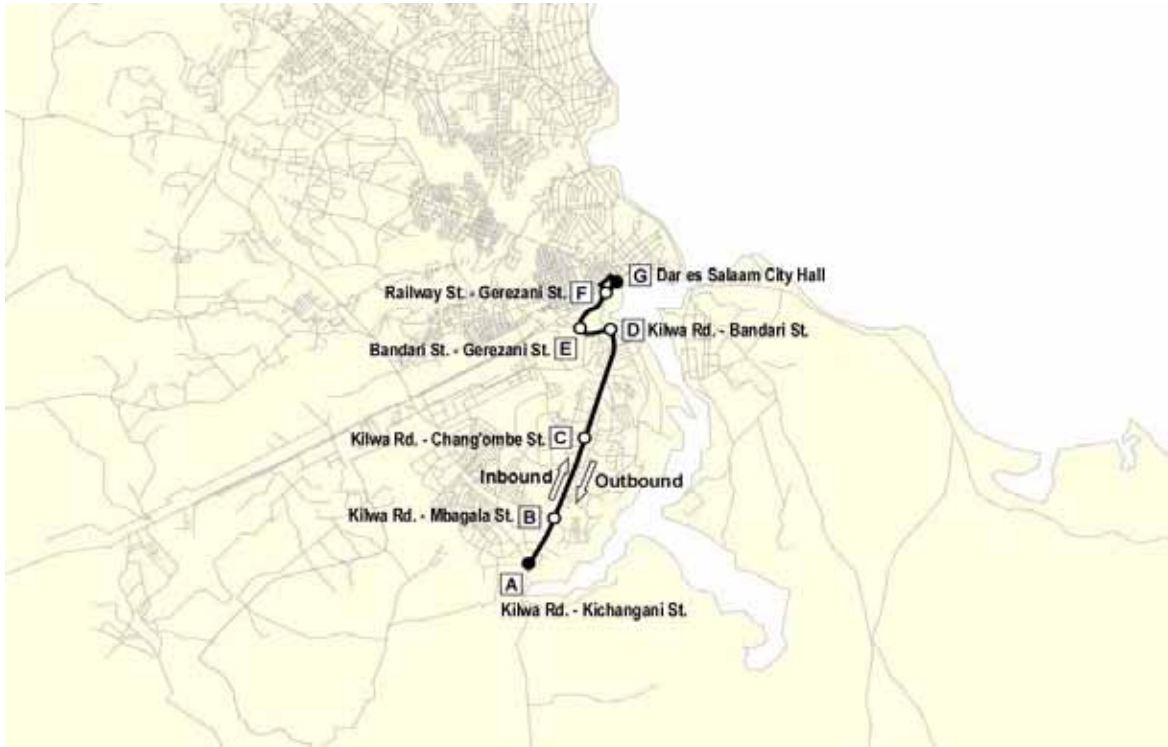


Figure 5.2.33 Travel Speed Survey Route (Route 9)

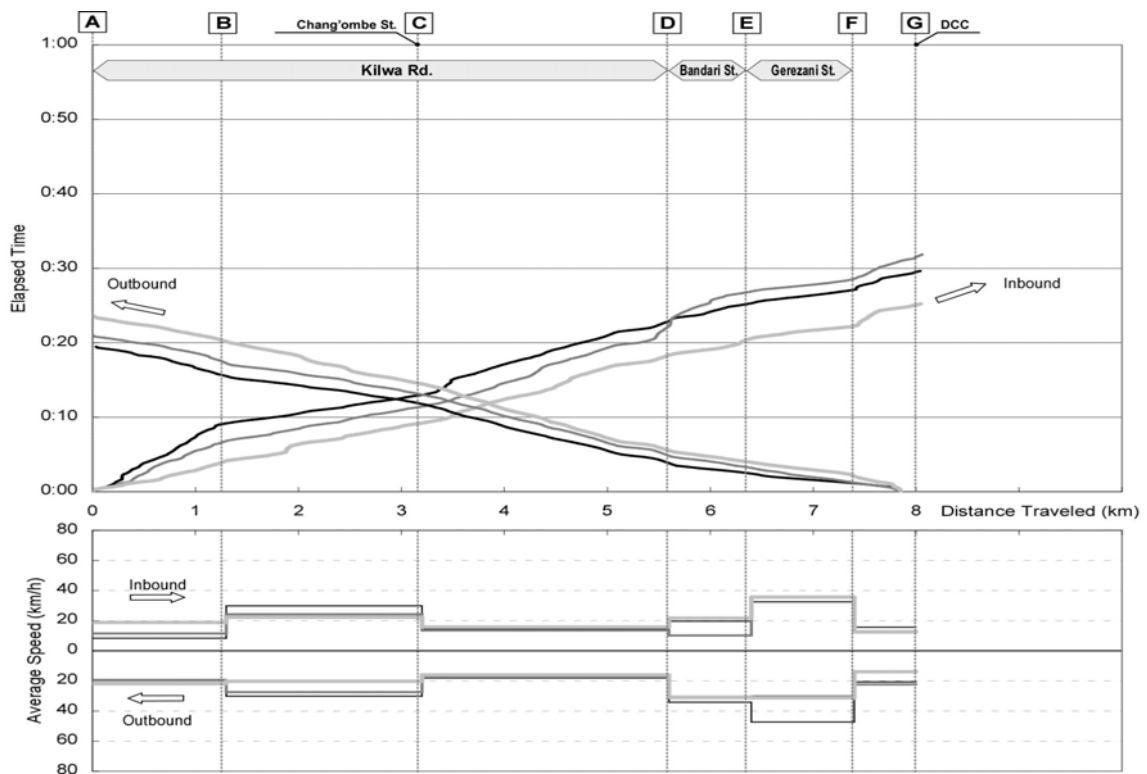


Figure 5.2.34 Travel Speed Survey Results (Route 9 – AM peak)

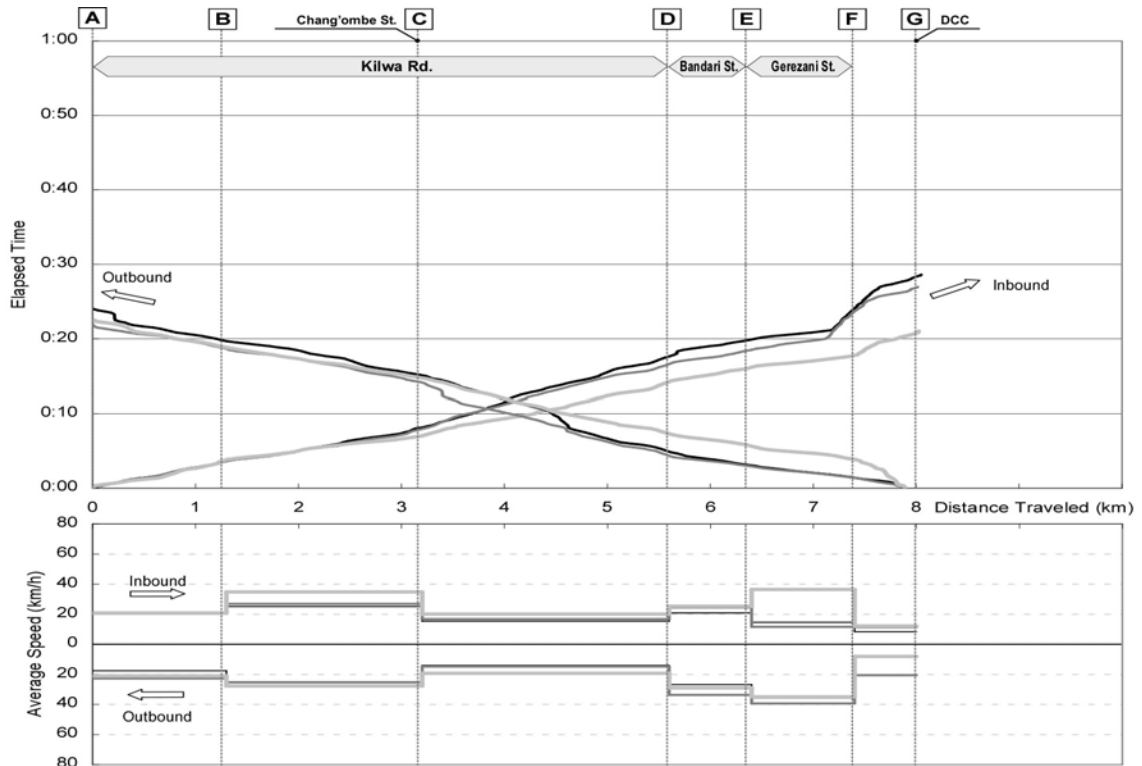


Figure 5.2.35 Travel Speed Survey Results (Route 9 – Off peak)

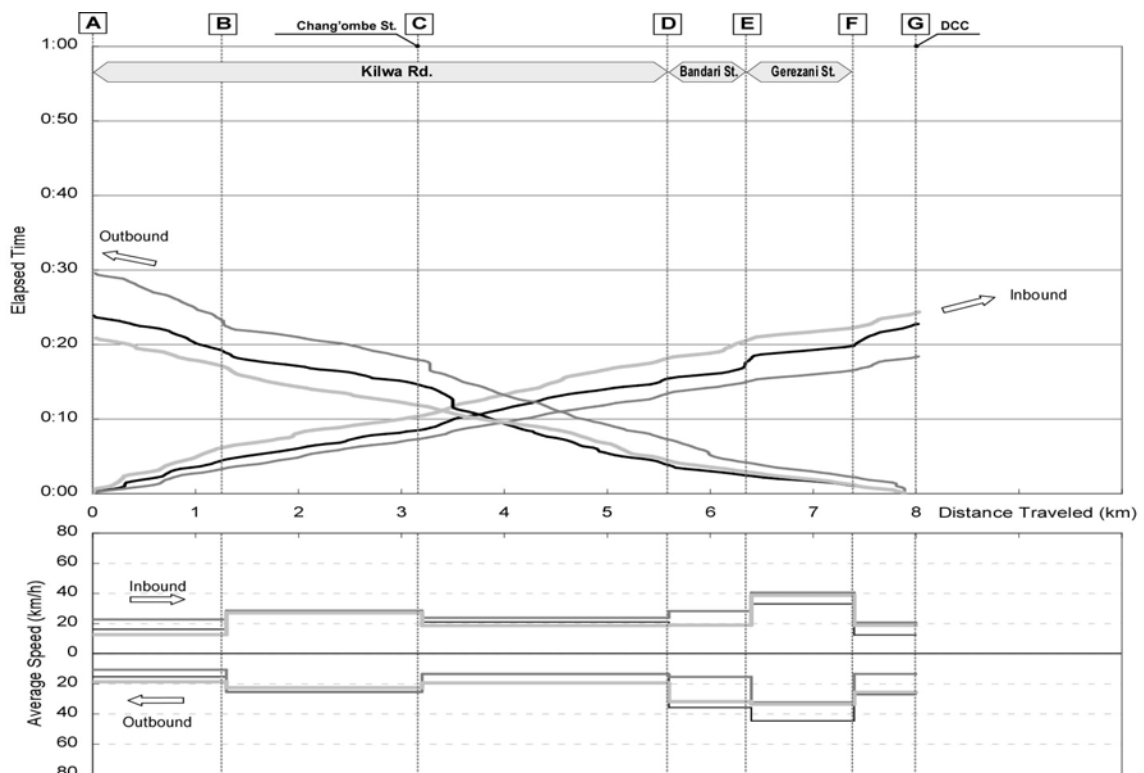


Figure 5.2.36 Travel Speed Survey Results (Route 9 – PM peak)

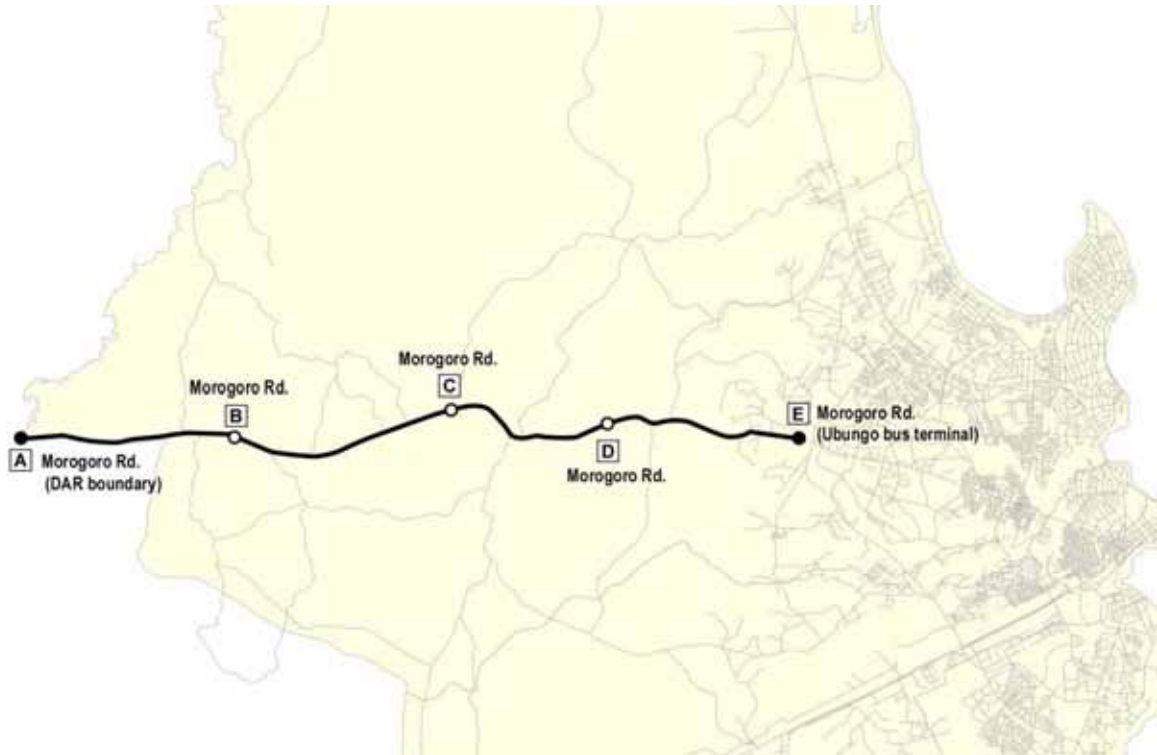


Figure 5.2.37 Travel Speed Survey Route (Route 10)

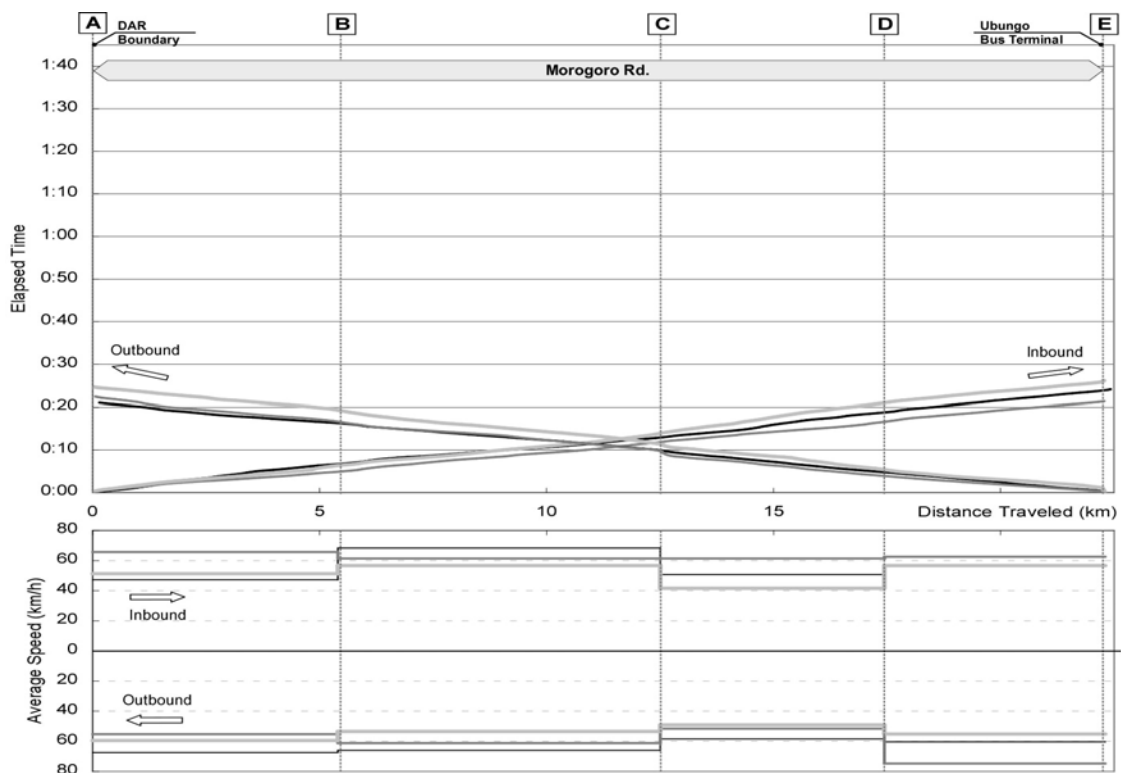


Figure 5.2.38 Travel Speed Survey Results (Route 10 – AM peak)

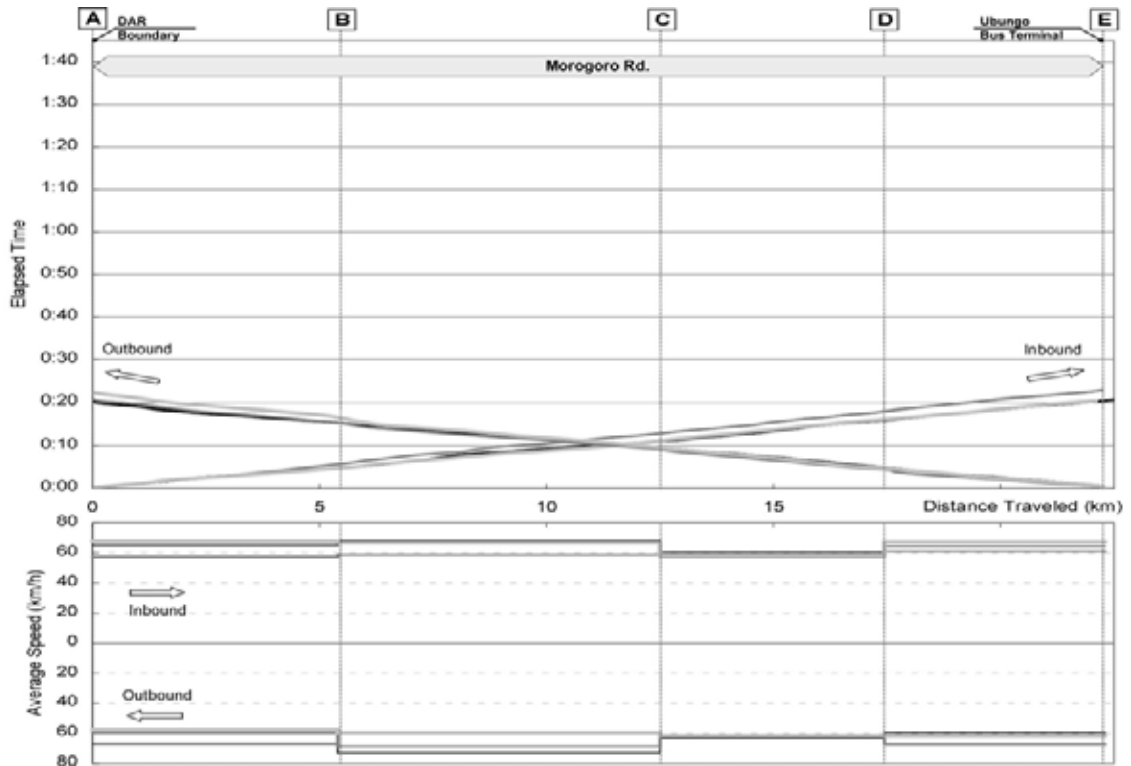


Figure 5.2.39 Travel Speed Survey Results (Route 10 – Off peak)

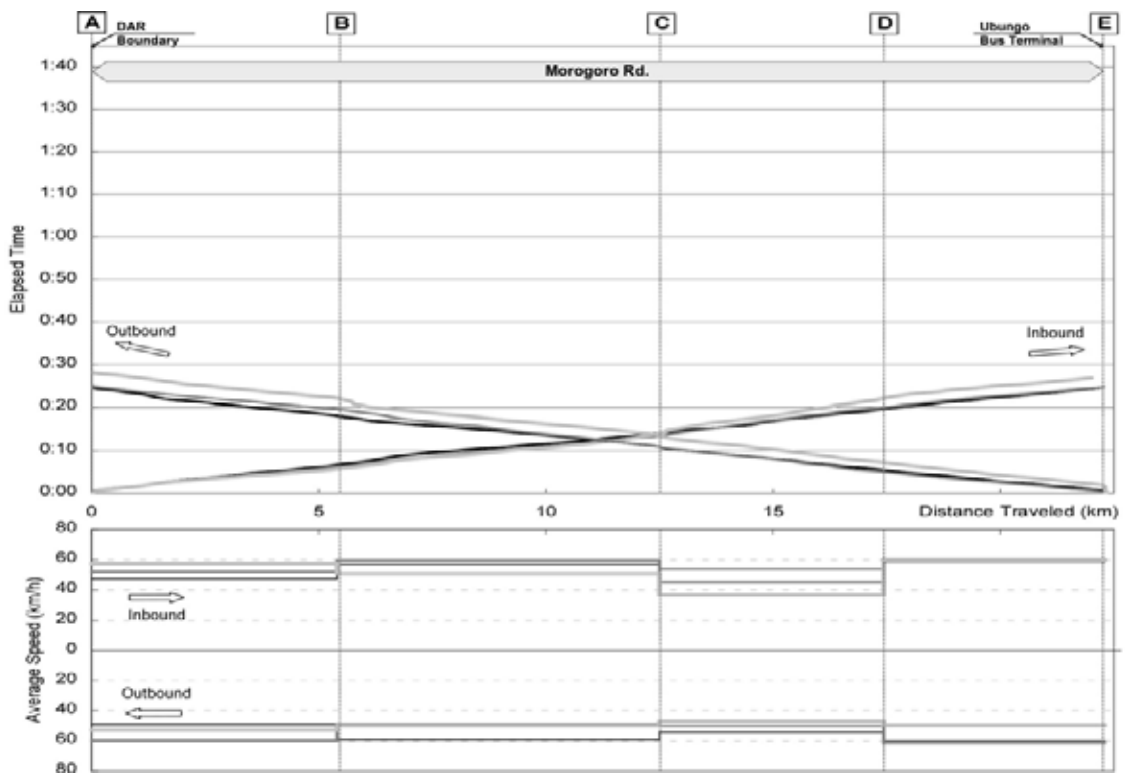


Figure 5.2.40 Travel Speed Survey Results (Route 10 – PM peak)

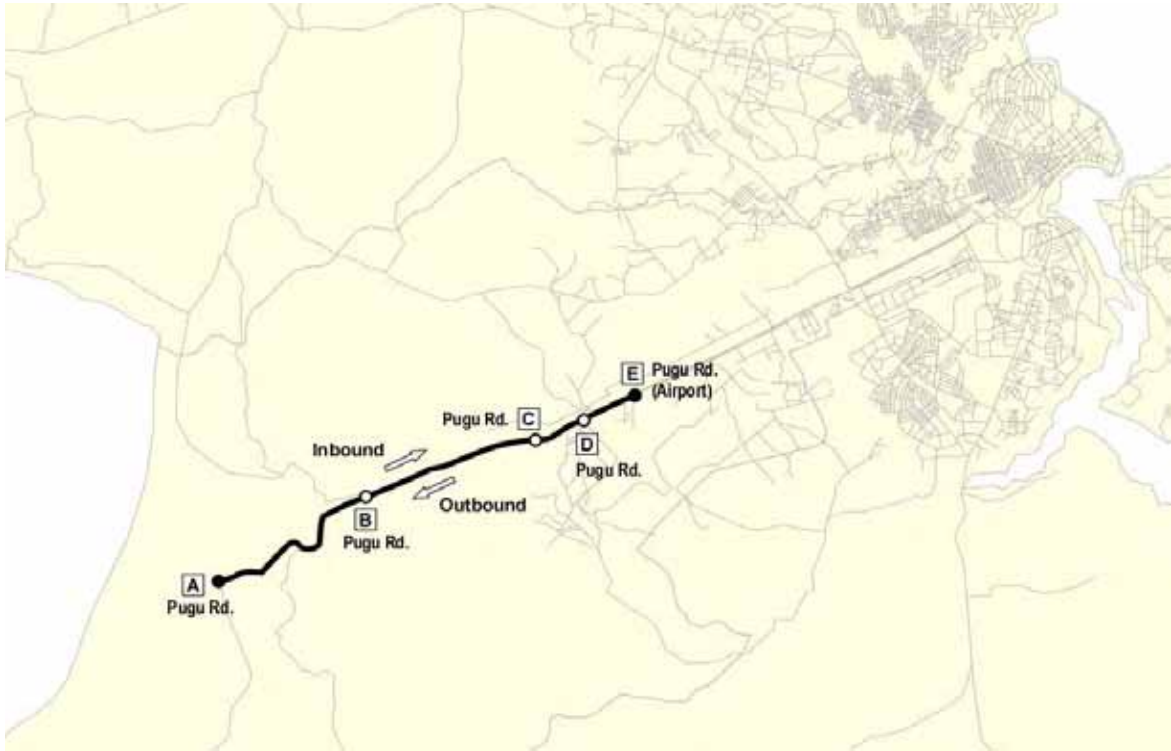


Figure 5.2.41 Travel Speed Survey Route (Route 11)

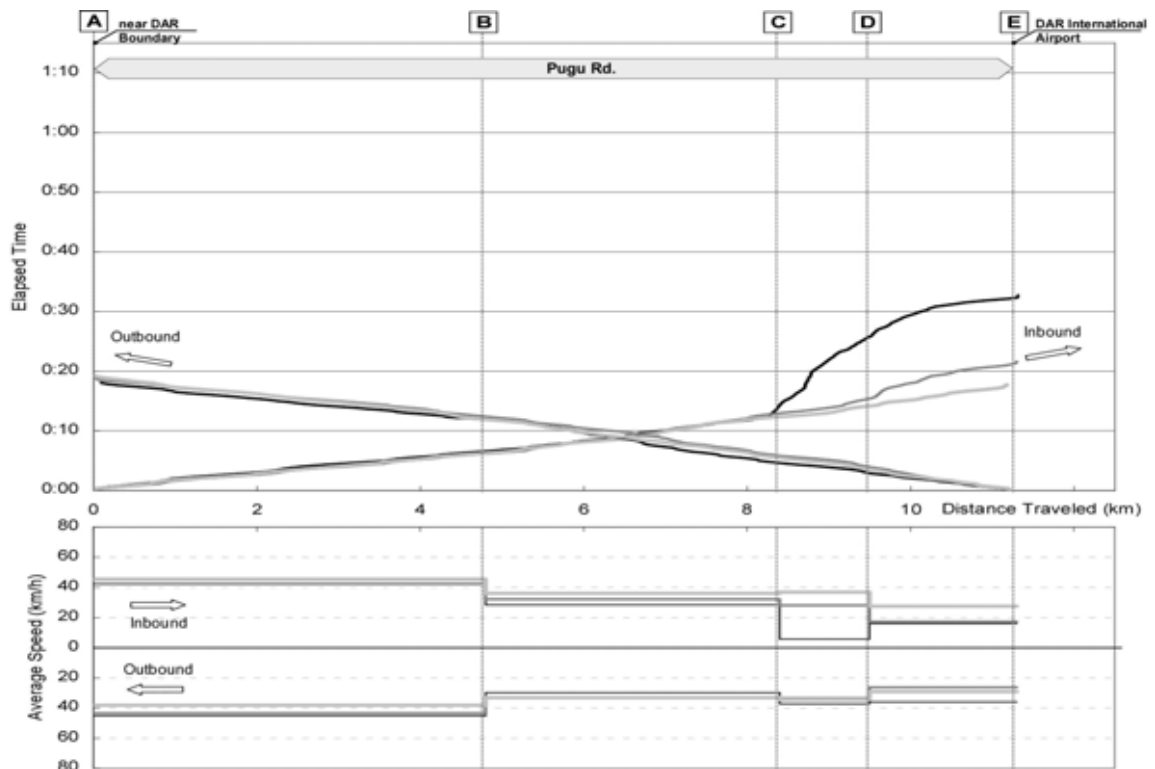


Figure 5.2.42 Travel Speed Survey Results (Route 11 – AM peak)

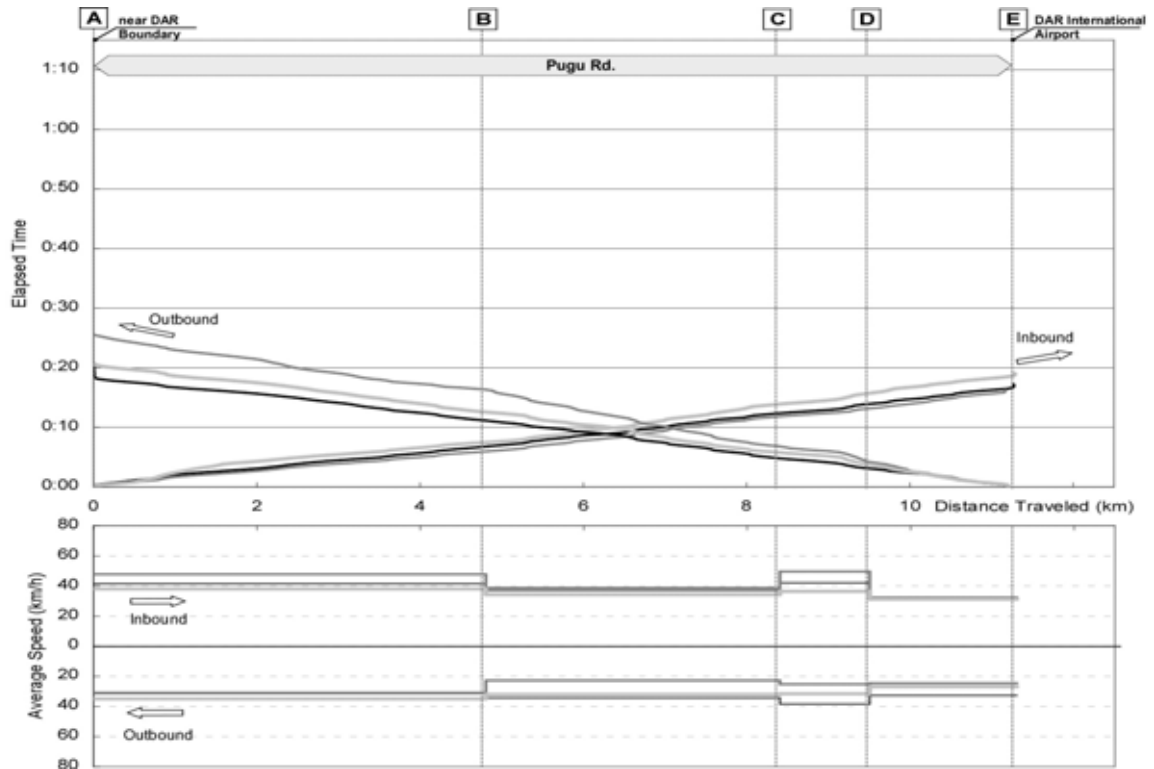


Figure 5.2.43 Travel Speed Survey Results (Route 11 – Off peak)

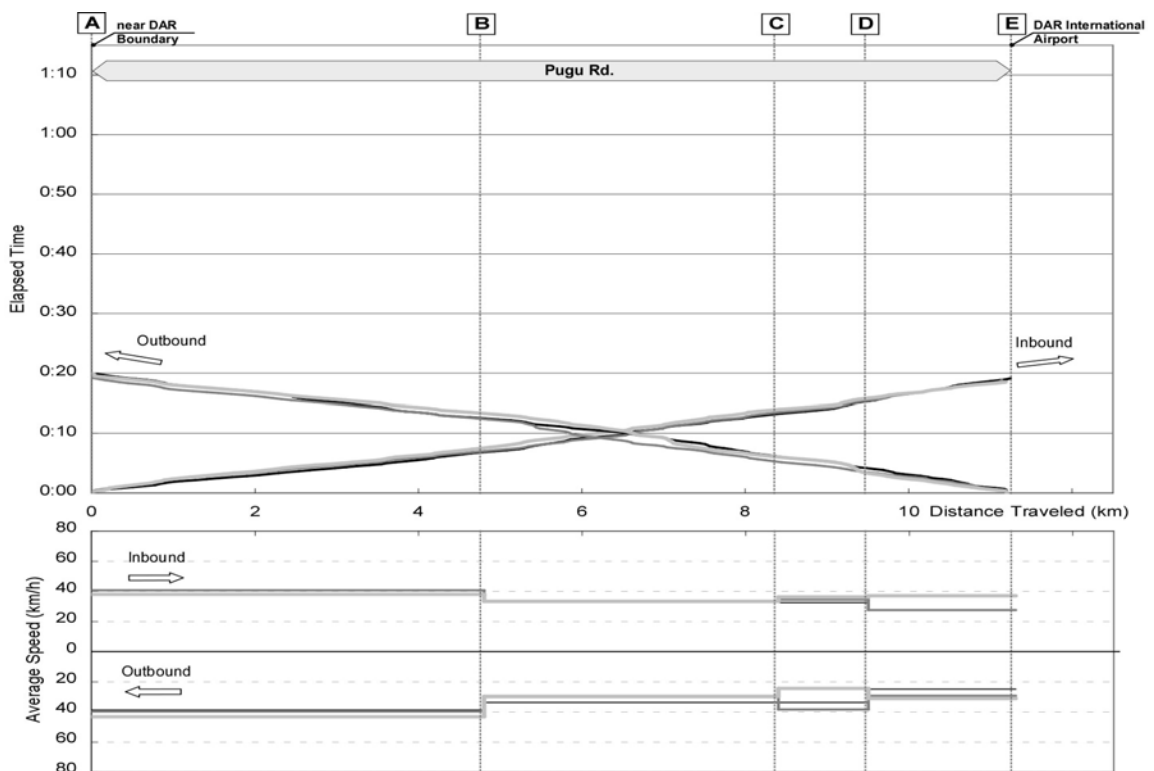


Figure 5.2.44 Travel Speed Survey Results (Route 11 – PM peak)

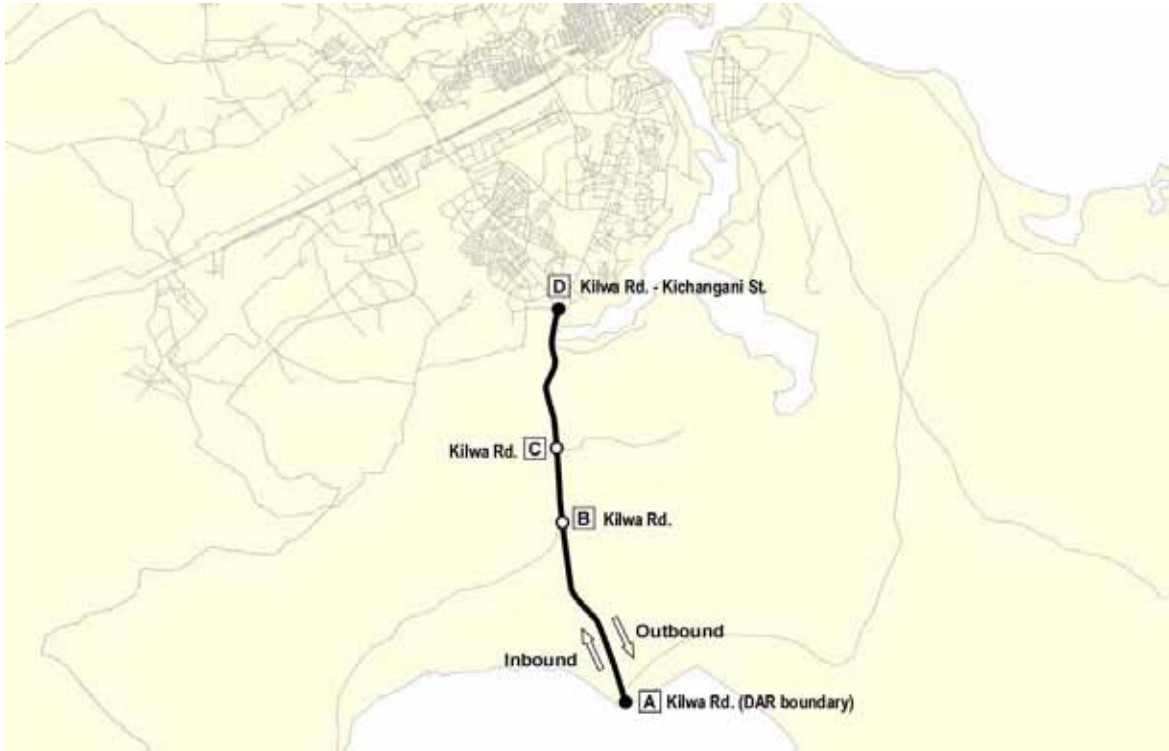


Figure 5.2.45 Travel Speed Survey Route (Route 12)

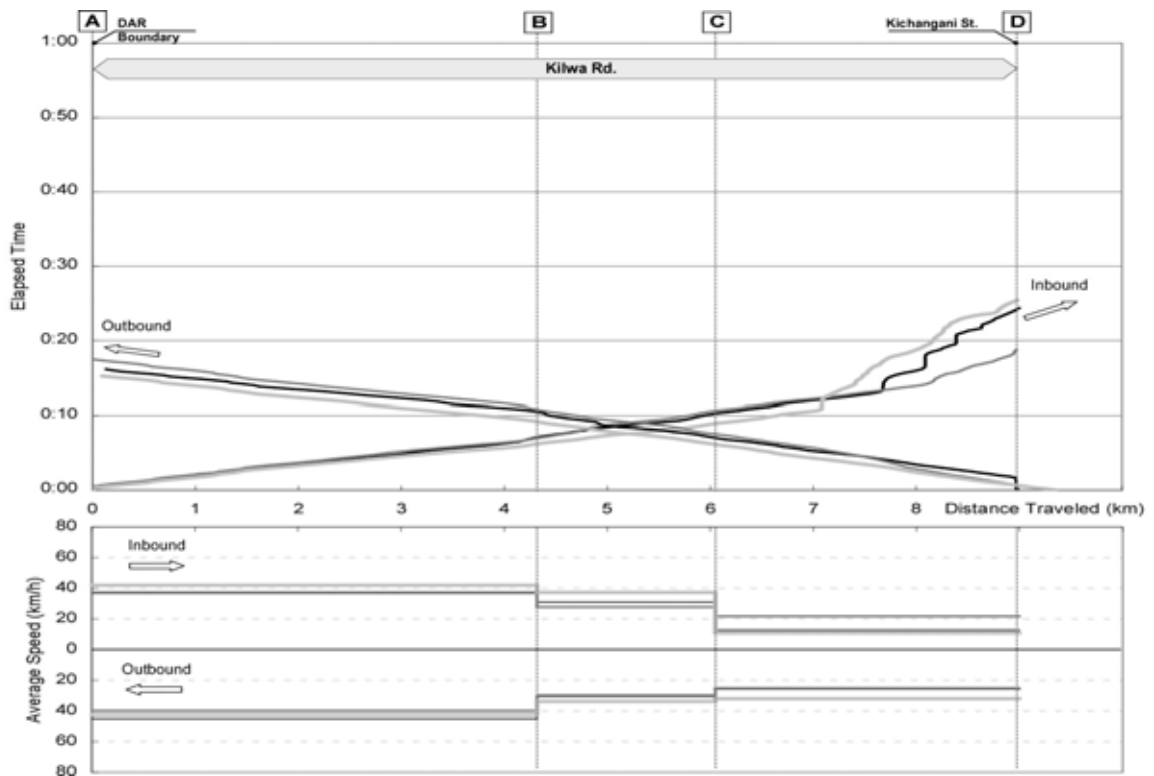


Figure 5.2.46 Travel Speed Survey Results (Route 12 – AM peak)

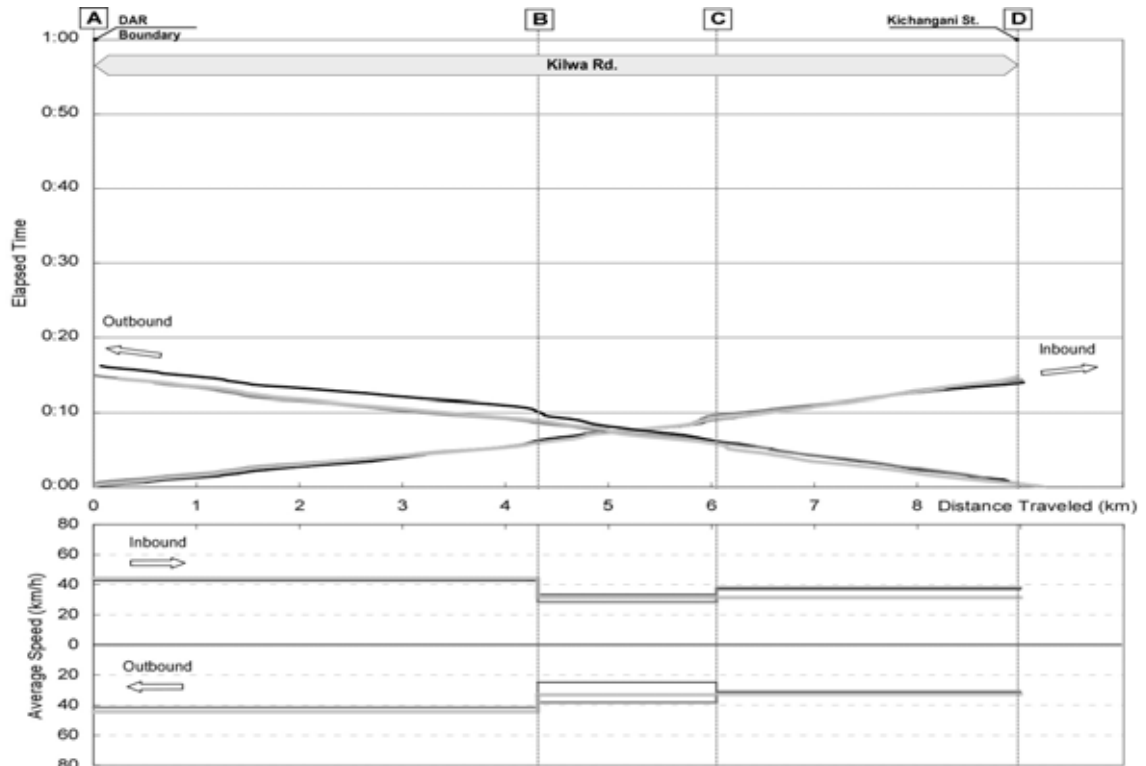


Figure 5.2.47 Travel Speed Survey Results (Route 12 – Off peak)

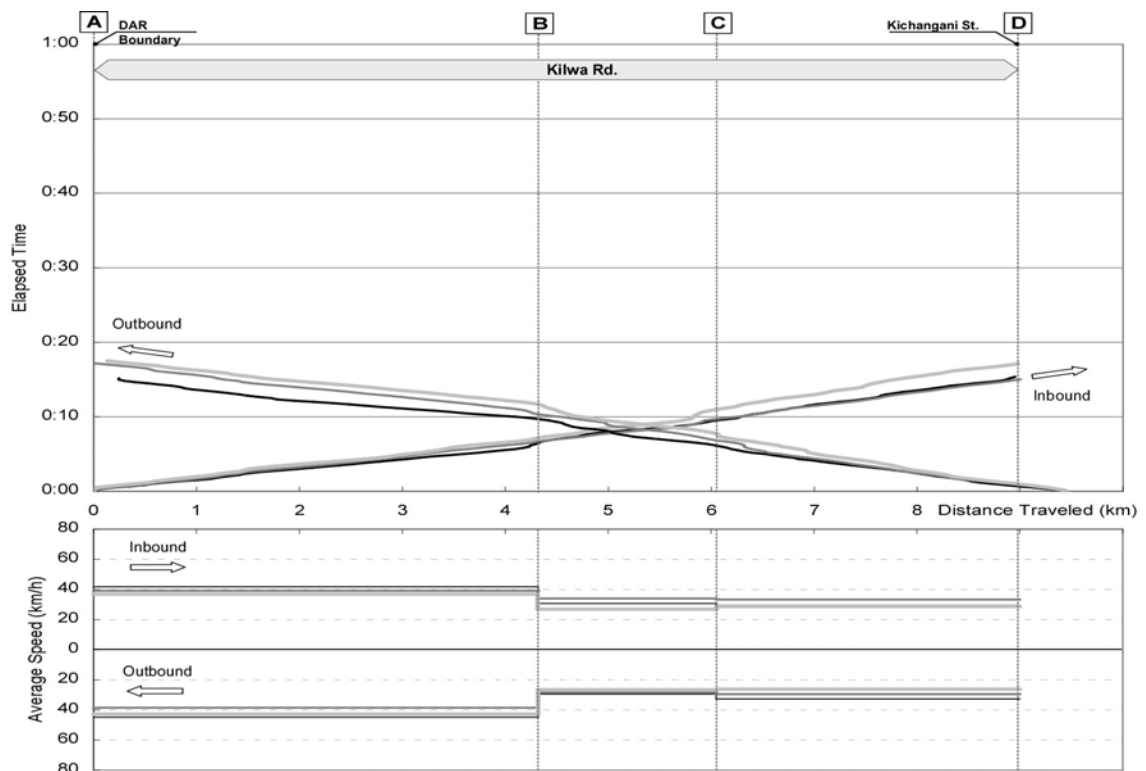


Figure 5.2.48 Travel Speed Survey Results (Route 12 – PM peak)

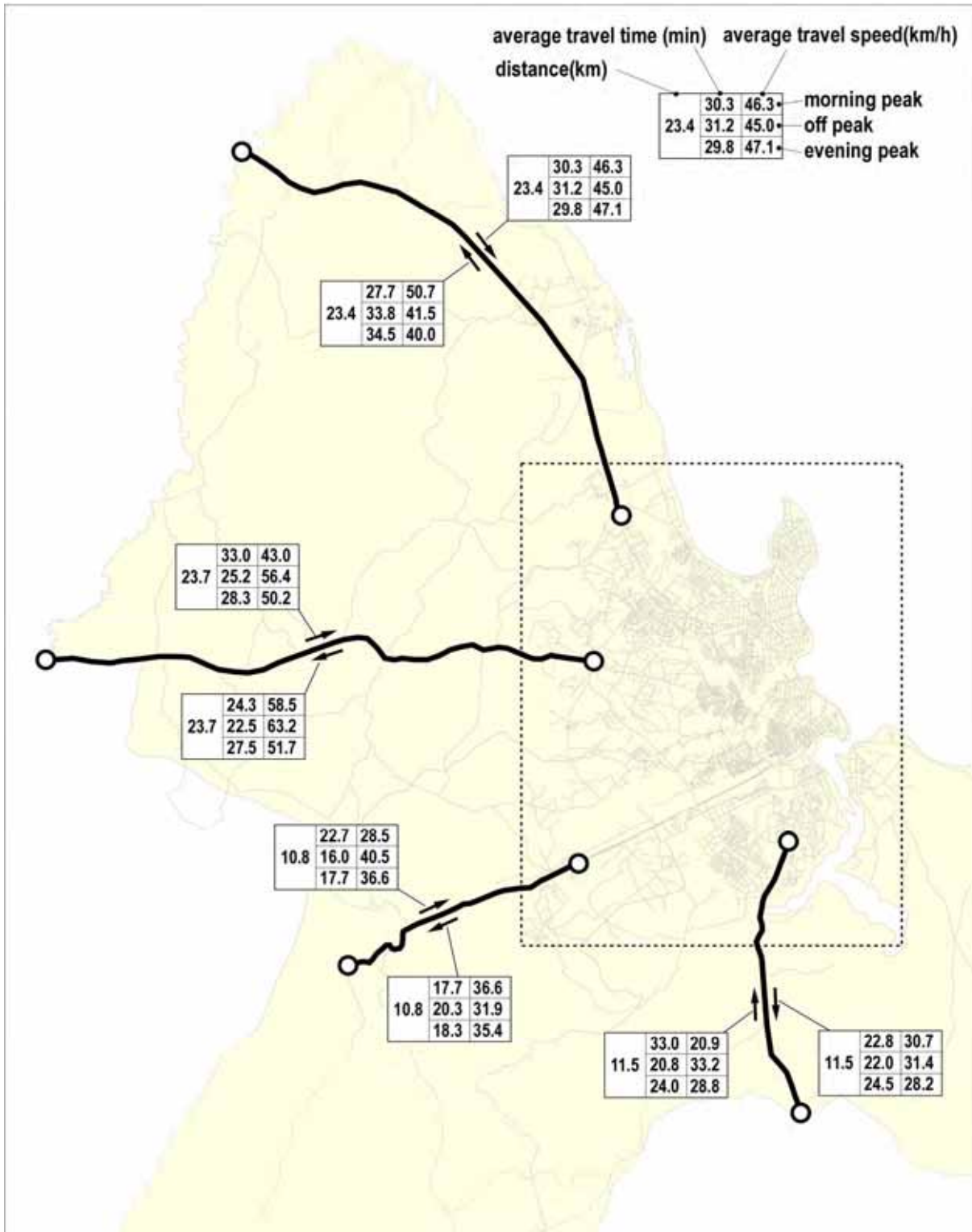
5.2.2 Average Travel Speed

Figure 5.2.49 and 5.2.50 show the average travel time and travel speed of major road segments in the study area in each survey period, and Figure 5.2.51, 5.2.52 and 5.2.53 show the average travel speed in smaller segments in each survey period.

In morning peak hour, travel speed reduction is observed at the major intersections of arterial roads such as Magomeni intersection (Morogoro Rd. and Rashid Kawawa St.), Morogoro Rd. - Bibi Titi Mohamed St. intersection, Tazara intersection (Nyerere Rd. and Nelson Mandela Rd.) and Chang'ombe intersection (Nyerere Rd. - Rashid Kawawa St.). A speed reduction at the Kilwa Rd. is caused by the under construction or current road surface condition.

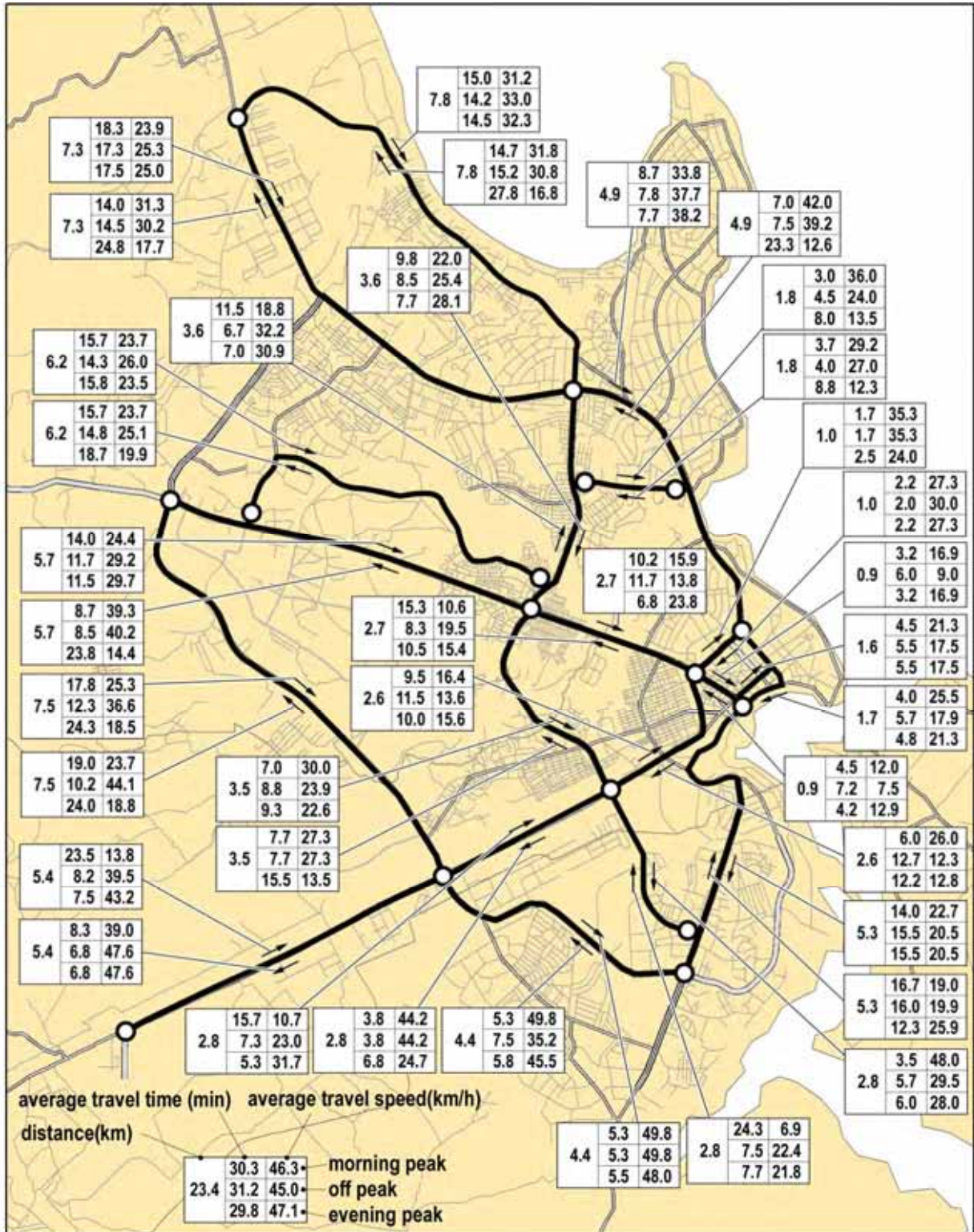
In evening peak hour, as well as morning peak, travel speed decreases at major intersection such as Morocco intersection (Ali Hassan Mwinyi St. - Rashid Kawawa St.), Selanda Bridge (Ali Hassan Mwinyi Rd. - UN Rd.), Magomeni intersection (Morogoro Rd. - Rashid Kawawa St.), Ubungo intersection (Morogoro Rd. - Nelson Mandela St.) and Tazara intersection (Nyerere Rd. -Rashid Kawawa Rd.).

In off peak hour, travel speed reduction is mainly observed in the city center and its surrounding area bounded by Rashid Kawawa Rd.



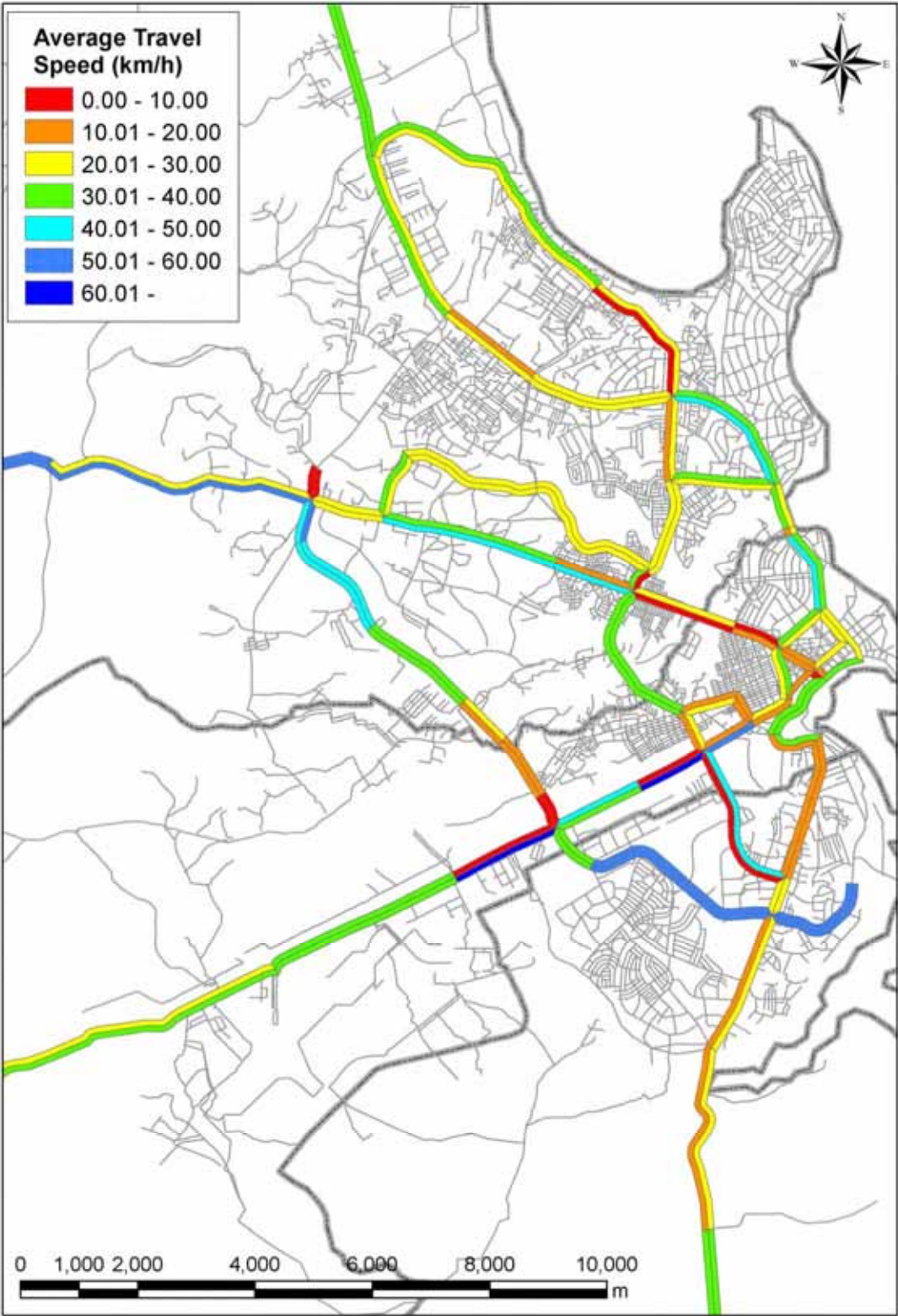
Source: JICA Study Team

Figure 5.2.49 Average Travel Time and Travel Speed (Suburban Area)



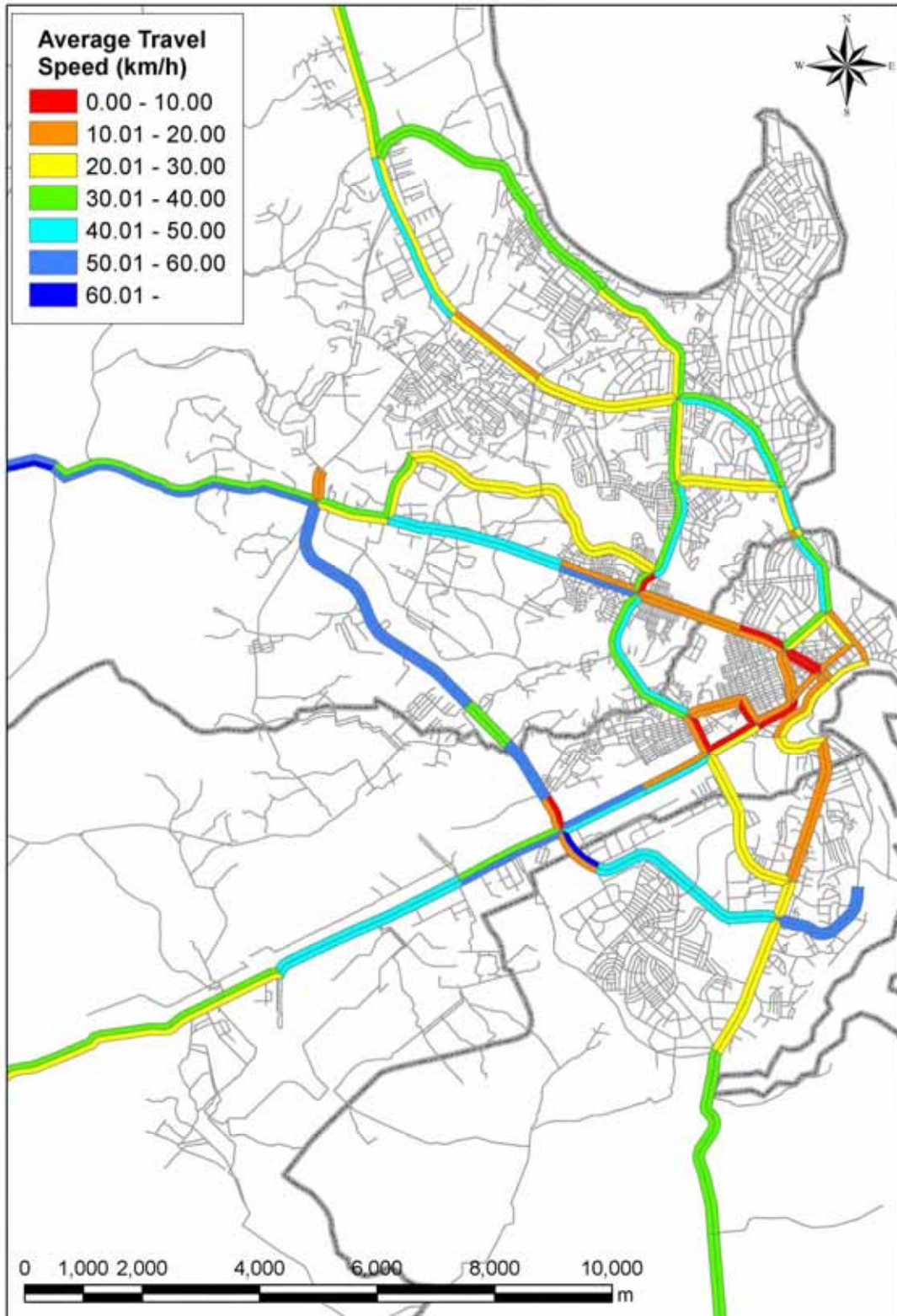
Source: JICA Study Team

Figure 5.2.50 Average Travel Time and Travel Speed



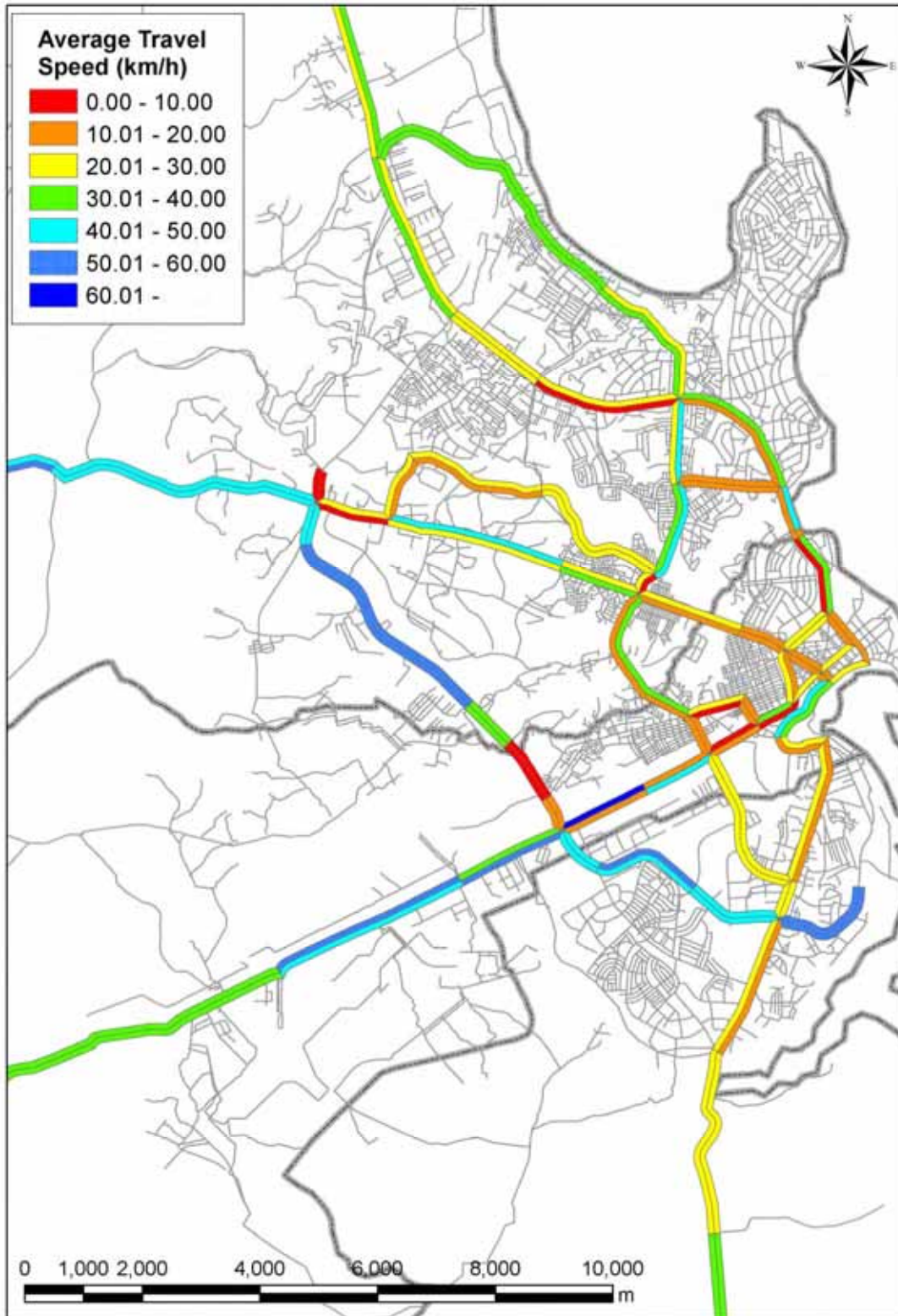
Source: JICA Study Team

Figure 5.251 Average Travel Speed (AM Peak)



Source: JICA Study Team

Figure 5.2.52 Average Travel Speed (Off Peak)



Source: JICA Study Team

Figure 5.2.53 Average Travel Speed (PM Peak)

5.2.3 Major Congestion Points, Segments and Causes of Delay

The travel speed survey suggests that, nine (9) intersections and four (4) road segments shown in Figure 5.2.54 should be focused as the congestion points to be improved in an early stage.

(1) Signalized intersections

Traffic signals have been installed at these intersections, however, without fine-tuning to meet the current traffic flow. Accordingly, traffic polices controls the traffic flow at these intersections in peak period at present.

(2) Non-signalized intersection

Outbound traffic congestion in evening peak hour observed at the Ali Hassan Mwinyi Rd. near the Morocco intersection is caused by the design of Sayansi intersection that is non-signalized intersection without right turn lane.

(3) Side friction and dala dala stop

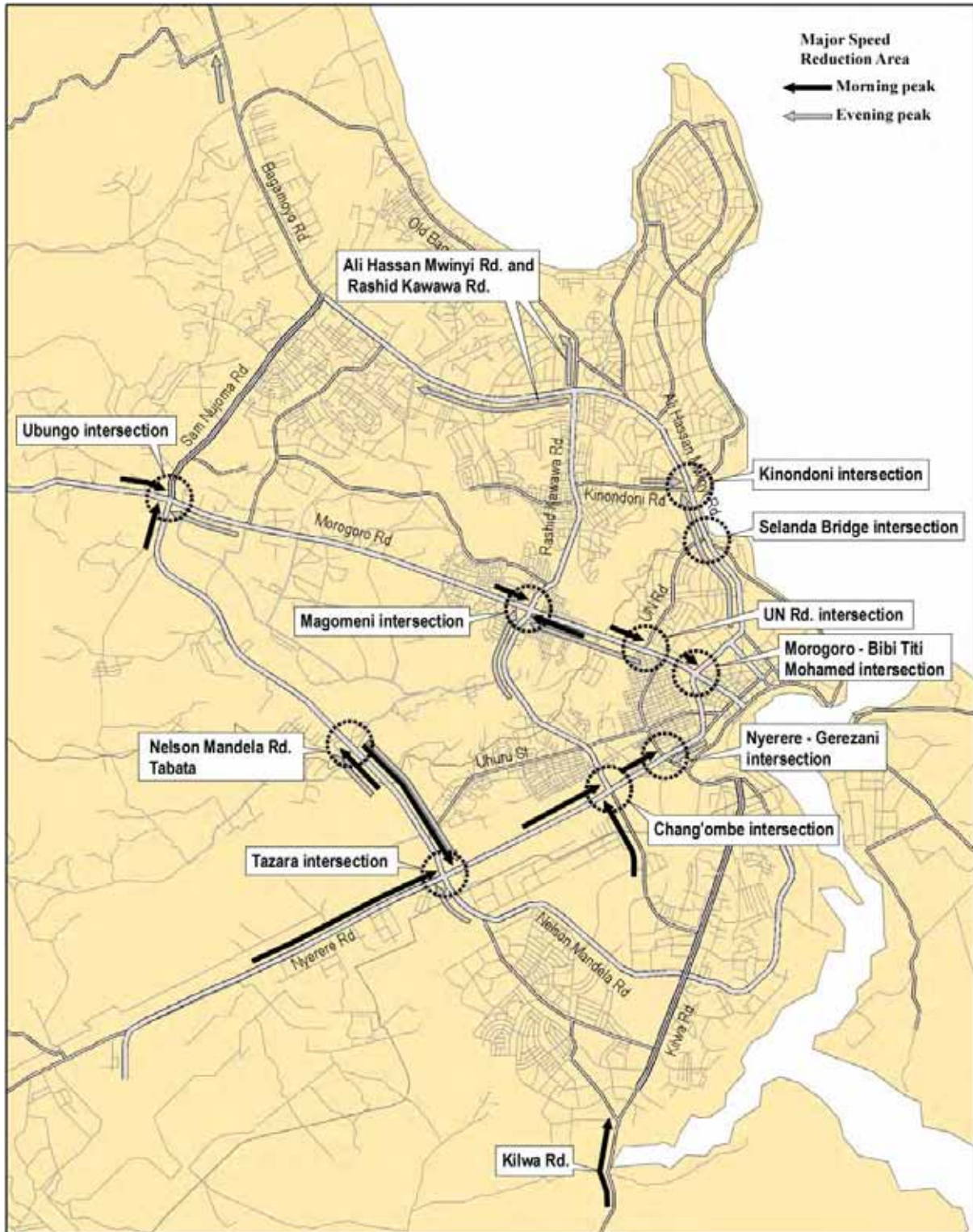
Traffic congestion at the Rashid Kawawa Rd and Old Bagamoyo Rd. near the Morocco intersection is caused by Dala dala at the bus stop and right turn traffic at the Shoppers Plaza.

(4) Heavy vehicle

Traffic congestion at Tabata of Nelson Mandela Rd. is mainly caused by right turn heavy vehicle entering to factories along the Nelson Mandela Rd.

(5) Geometric design

Inbound traffic congestion in morning peak at the Kilwa Rd. near the Tandika is due to the gradient and narrow road shoulder. Not a few heavy vehicles and non-motorized vehicle such as bicycle are observed and speed reduction caused by these mixed traffic at the upslope.



Source: JICA Study Team

Figure 5.2.54 Major Congestion Point