

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 19th November 1997

Vehicle No. KST976

Loading Capacity: 2TON

Researcher's name: Eliud M. Kariuki

No. of Crew: 3

Estimated Volume: 2.25m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	110211		8 : 17			Stopped for fueling at 8:20-8:30
Loading-1	in	110223	12,000	8 : 55	38		
	out			9 : 37		42	
Loading-2	in	110224.5	1,500	9 : 43	6		Route to the loading points -
	out			9 : 47		4	Enterprise Rd, Mombasa Rd,
Loading-3	in	110224.6	100	9 : 48	1		Uhuru highway, Harry Thuku
	out			9 : 58		10	Rd
Loading-4	in	110225.2	600	10 : 2	4		
	out			10 : 56		54	Collection done in City Center
Loading-5	in	110225.4	200	10 : 58	2		
	out			11 : 7		9	Route to dumping site
Loading-6	in	110225.6	200	11 : 9	2		Kenyatta Ave, Koinange St?
	out			11 : 28		19	Muranga Rd, Thika Rd,
Loading-7	in	110226.1	500	11 : 37	9		Komorock Rd to dumping site
	out			12 : 14		37	
Dumping site	in	110240.5	14,400	13 : 12	58		Dandora dumping site
Start dumping				13 : 15	3		
Finish dumping				13 : 30		15	
Dumping site	out	110241.2	700	13 : 43	13		
Reach to workshop	in			:			To the second trip
Total			30,200		136	190	Total min.: 326 min.
Collection			3,100		24	175	
Transportation			26,400		83		
Inside the dumping site			700		16	15	Dumping time.: 31 min.
Idling time					13		

### Time & Motion Study

Organization: BINS      Trip- 2      Date: 19th November 1997  
 Vehicle No. KST976      Loading Capacity: 2TON      Researcher's name: Eliud M. Kariuki  
 No. of Crew: 3      Estimated Volume: 2.25m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	110241.2		13 : 43			from dumping site
Loading-1	in	110255.1	13,900	14 : 30	47		
	out			15 : 0		30	Route from dumping site to
Loading-2	in	110256	900	15 : 9	9		City Center and back to dumping
	out			15 : 45		36	site was - Komorock Rd,
Loading-3	in	110256.3	300	15 : 48	3		Outering Rd, Thika Rd, Muranga
	out			15 : 52		4	Rd, Town Center
Loading-4	in	110257.2	900	16 : 0	8		Route back was the same
	out			16 : 28		28	Note; Too much time wasted
Loading-5	in	110262	4,800	16 : 31	3		in traffic jam
	out			17 : 2		31	
Dumping site	in	110274.1	12,100	17 : 47	45		Dandora dumping site
Start dumping				17 : 50	3		to Workshop - Komorock Rd,
Finish dumping				17 : 56		6	Outering Rd, Mombasa Rd,
Dumping site	out	110276.3	2,200	17 : 57	1		Enterprise Rd, Bins W/shop
Reach to workshop	in	110292.3	16,000	18 : 30	33		
Total			51,100		152	135	Total min.: 287 min.
Collection			6,900		23	129	
Transportation			42,000		125		
Inside the dumping site			2,200		4	6	Dumping time.: 10 min.
Idling time							

### Time & Motion Study

Organization: BINS

Trip- 1 Date: 20th November 1997

Vehicle No. KST976

Loading Capacity: 2TON

Researcher's name: Eliud M. Kariuki

No. of Crew: 3

Estimated Volume: 2.25m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	110292.3		8 : 0			Stopped from 8:05 to 8:21 for
Loading-1	in	110304.3	12,000	8 : 40	40		fueling. (16mins)
	out			8 : 50		10	
Loading-2	in	110305.8	1,500	8 : 57	7		Route to Town Center -
	out			9 : 7		10	Enterprise Rd - Mombasa Rd -
Loading-3	in	110306	200	9 : 10	3		Uhuru highway - Museum Rd
	out			9 : 29		19	Collection area concentrated on
Loading-4	in	110306.5	500	9 : 37	8		Monrovia St, Wabera St,
	out			9 : 42		5	Kaunda St, Standard St,
Loading-5	in	110307.2	700	9 : 47	5		Harambe Ave
	out			10 : 5		18	
Loading-6	in	110307.4	200	10 : 7	2		To dumping site - River Rd
	out			10 : 15		8	Muranga Rd, Thika Rd, Outering
Loading-7	in	110307.7	300	10 : 17	2		Rd, Komarock Rd, - Dandora
	out			10 : 37		20	dumping site
Loading-8	in	110307.8	100	10 : 38	1		
	out			10 : 53		15	
Loading-9	in	110307.9	100	10 : 57	4		
	out			11 : 30		33	
Loading-10	in	110309.9	2,000	11 : 43	13		
	out			11 : 50		7	
Loading-11	in	110311.3	1,400	11 : 55	5		
	out			12 : 17		22	
Loading-12	in	110312.5	1,200	12 : 25	8		
	out			12 : 30		5	
Loading-13	in	110313.4	900	12 : 38	8		
	out			12 : 44		6	
Dumping site	in	110327.7	14,300	13 : 27	43		Dandora dumping site
Start dumping				13 : 31	4		Route to w/shop - Komorock
Finish dumping				13 : 48		17	Outering Rd, Mombasa Rd,
Dumping site	out	110328.4	700	13 : 50	2		Enterprise Rd - Bins w/shop
Reach to workshop	in	110344.4	16,000	14 : 30	40		
Total			52,100		195	195	Total min.: 390 min.
Collection			9,100		66	178	
Transportation			42,300		107		
Inside the dumping site			700		6	17	Dumping time.: 23 min.
Idling time					16		

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 21st November 1997

Vehicle No. KST976

Loading Capacity: 2TON

Researcher's name: Eliud M. Kariuki

No. of Crew: 3

Estimated Volume: 2.25m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	110375.4		8 : 2			Route from w/shop to loading point
Loading-1	in	110387	11,600	8 : 29	27		
	out			9 : 15		46	Enterprise Rd, Mombasa Rd,
Loading-2	in	110388.2	1,200	9 : 20	5		Uhuru highway, Horry thuku Rd,
	out			9 : 24		4	City Center
Loading-3	in	110388.4	200	9 : 30	6		
	out			9 : 55		25	Collection in City Center
Loading-4	in	110388.9	500	9 : 59	4		
	out			10 : 4		5	Route to dumping site -
Loading-5	in	110389.7	800	10 : 7	3		River Rd, Muranga Rd, Thika Rd,
	out			10 : 13		6	Outering Rd, Komorock
Loading-6	in	110390	300	10 : 15	2		
	out			10 : 29		14	
Loading-7	in	110390.1	100	10 : 31	2		
	out			10 : 58		27	
Loading-8	in	110392.1	2,000	11 : 2	4		
	out			11 : 9		7	
Loading-9	in	110393	900	11 : 18	9		
	out			11 : 23		5	
Loading-10	in	110394	1,000	11 : 29	6		
	out			11 : 31		2	
Loading-11	in	110394.1	100	11 : 32	1		
	out			11 : 35		3	
Loading-12	in	110395.6	1,500	11 : 44	9		
	out			11 : 47		3	
Loading-13	in	110395.7	100	11 : 48	1		
	out			11 : 50		2	
Dumping site	in	110410.2	14,500	12 : 36	46		Dandora dumping site
Start dumping				12 : 37	1		Route to w/shop - Komorock R
Finish dumping				12 : 55		18	Outering Rd, Mombasa Rd,
Dumping site	out	110410.4	200	13 : 5	10		w/shop
Reach to workshop	in	110426.6	16,200	14 : 33	88		
Total			51,200		224	167	Total min.: 391 min.
Collection			8,700		52	149	
Transportation			42,300		161		
Inside the dumping site			200		11	18	Dumping time.: 29 min.
Idling time							

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 14th November 1997

Vehicle No. KXF820

Loading Capacity: 6.7TON

Researcher's name: Valerie Mureithi

No. of Crew: 6

Estimated Volume: 4.5m3

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	11576.1		8 : 0			Uhuru highway
Loading-1	in		13,000	8 : 20	20		Elgeyo Rd
	out			8 : 25		5	
Loading-2	in		1,500	8 : 26	1		Kenya Regiment
	out			8 : 28		2	
Loading-3	in			8 : 33	5		5th Ngong Avenue
	out			8 : 38		5	
Loading-4	in			8 : 45	7		Argwings Rd on Ngong Rd
	out			8 : 53		8	
Loading-5	in			8 : 55	2		Kindaruma Lane -E-
	out			9 : 15		20	Rose Ave
Loading-6	in			9 : 20	5		Kambur Drive -E-
	out			9 : 40		20	Marcus Garvey Rd
Loading-7	in			9 : 45	5		Ngong Lane to
	out			9 : 58		13	Kirichwa Lane
Loading-8	in			10 : 0	2		Elgeyo Marakwet
	out			10 : 4		4	
Loading-9	in			10 : 5	1		Kilungu Ndemi Rd to
	out			10 : 20		15	Ole-Odome Rd
Loading-10	in		3,000	10 : 25	5		Riara Rd
	out			11 : 25		60	
Loading-11	in		12,000	11 : 30	5		Naivasha Rd
	out			11 : 45		15	
Loading-12	in		5,000	11 : 46	1		Ndemi Gardens
	out			11 : 55		9	
Loading-13	in		2,000	12 : 0	5		Adams on Suna Rd
	out			12 : 15		15	(Lunch for 10mins)
Loading-14	in		4,000	12 : 30	15		Joseph Kangethe Rd
	out			12 : 40		10	
Loading-15	in			12 : 45	5		Kibera
	out			12 : 57		12	
Loading-16	in			13 : 0	3		Karbanet Lane &
	out			13 : 15		15	Jamuhuri Crescent
Loading-17	in		3,000	13 : 20	5		Mucai Rd
	out			13 : 35		15	
Loading-18	in		4,000	13 : 40	5		Sun view Estate
	out			13 : 44		4	
Loading-19	in		2,000	13 : 45	1		GOI course and
	out			14 : 8		23	Ngumo Estate
Loading-20	in		3,500	14 : 10	2		High View Estate
	out			14 : 20		10	
Loading-21	in		2,000	14 : 30	10		Kirimanjaro Ave & Elgon
	out			14 : 55		25	Kiambere Rd
Loading-22	in		4,000	15 : 0	5		Masaba Rd
	out			15 : 15		15	

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 14th November 1997

Vehicle No. KXF820

Loading Capacity: 6.7TON

Researcher's name: Valerie Mureithi

No. of Crew: 6

Estimated Volume: 4.5m<sup>3</sup>

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Dumping site in		15,000	16 : 15	60		Dandora D/site
Start dumping			16 : 16	1		
Finish dumping			17 : 58		102	Mileage not working
Dumping site out			18 : 0	2		
Reach to workshop in			:			
Total		74,000		178	422	Total min.: 600 min.
Collection		46,000		95	320	
Transportation		28,000		80		
Inside the dumping site Idling time		0		3	102	Dumping time.: 105 min.

### Time & Motion Study

Organization: BINS

Trip- 1 Date: 15th November 1997

Vehicle No. KXF820

Loading Capacity: 6.7TON

Researcher's name: Valerie Mureithi

No. of Crew: 6

Estimated Volume: 4.5m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			9 : 10			
Loading-1	in		14,000	9 : 30	20		Langata Rd
	out			10 : 55		85	Wilson Airport
Loading-2	in		4,000	11 : 0	5		Sunview Estate
	out			11 : 10		10	Mbagathi way
Loading-3	in		4,000	11 : 20	10		Rose Avenue
	out			11 : 30		10	
Loading-4	in		1,000	11 : 35	5		Loit? enterprises
	out			11 : 40		5	
Loading-5	in		2,000	11 : 45	5		Chequered ? on Ngong Rd
	out			11 : 55		10	
Loading-6	in		4,000	12 : 5	10		Valley Rd
	out			12 : 15		10	
Loading-7	in		2,000	12 : 20	5		Fairview Hotel to
	out			12 : 30		10	dumping site
Dumping site	in		15,000	13 : 15	45		Dandora
Start dumping				13 : 20	5		
Finish dumping				14 : 10		50	
Dumping site	out			14 : 15	5		
Reach to workshop	in			:			
Total			46,000		115	190	Total min.: 305 min.
Collection			17,000		40	140	
Transportation			29,000		65		
Inside the dumping site			0		10	50	Dumping time.: 60 min.
Idling time							

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 17th November 1997

Vehicle No. KXF820

Loading Capacity: 6.7TON

Researcher's name: Valerie Mureithi

No. of Crew: 6

Estimated Volume: 4.5m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			9 : 30			
Loading-1	in		18,000	10 : 15	45		Old Muthaiga
	out			10 : 20		5	
Loading-2	in		4,000	10 : 30	10		Gethrudes Hospital
	out			10 : 40		10	
Loading-3	in		2,000	10 : 45	5		Serengeti Lane
	out			11 : 15		30	
Loading-4	in		2,000	11 : 20	5		Muthaiga Rd
	out			11 : 35		15	
Loading-5	in		3,000	11 : 40	5		Red Hill Rd
	out			11 : 45		5	
Loading-6	in		1,000	11 : 50	5		Gigiri
	out			12 : 30		40	
Loading-7	in		3,000	12 : 40	10		
	out			13 : 0		20	Whispers Avenue
Loading-8	in		1,000	13 : 2	2		UN Avenue (lunch )
	out			13 : 55		53	Daisy drive
Loading-9	in		4,000	14 : 5	10		
	out			14 : 15		10	Gigiri
Loading-10	in		2,000	14 : 25	10		Agakhan Rd
	out			14 : 35		10	
Loading-11	in		4,000	14 : 40	5		Parklands Rd
	out			15 : 0		20	to dumping site
Dumping site	in		16,000	16 : 0	60		Dandora
Start dumping				:			
Finish dumping				:			
Dumping site	out			17 : 0	60		
Reach to workshop	in			:			
Total			60,000		232	218	Total min.: 450 min.
Collection			26,000		67	218	
Transportation			34,000		105		
Inside the dumping site			0		60	0	Dumping time.: 60 min.
Idling time							



**Time & Motion Study**

Organization: BINS

Trip-1 Date: 18th November 1997

Vehicle No. KXF820

Loading Capacity: 6.7TON

Researcher's name: Valerie Mureithi

No. of Crew: 6

Estimated Volume: 4.5m<sup>3</sup>

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop			8 : 10			Went to garage
Loading-1		12,000	9 : 0	50		Risa court
			9 : 20		20	
Loading-2		2,000	9 : 35	15		Opal court on State House Rd
			9 : 45		10	
Loading-3		1,500	9 : 50	5		Laikipia Rd
			10 : 0		10	
Loading-4		3,000	10 : 5	5		Kasuku Center on Migori Rd
			10 : 10		5	
Loading-5		500	10 : 12	2		Githunguri, and Kangundo Rd
			10 : 45		33	
Loading-6		5,000	10 : 50	5		Gem and Manderu Lanes
			11 : 20		30	
Loading-7		2,000	11 : 25	5		Siaya Rd, Garundu Close and
			12 : 0		35	Vihiga Rd
Loading-8		2,000	12 : 10	10		Othaya, Mugoiri Hamisi Sugut
			12 : 25		15	Mbooni Rds
Loading-9		4,000	12 : 30	5		Kaptei gardens Oloitoktok and
			12 : 45		15	Mazeras Rd
Loading-10		3,000	12 : 50	5		Muthangari Rd
			:			Vehicle got stuck and due to ra could not be towed.
Dumping site	in		:			
Start dumping			:			
Finish dumping			:			
Dumping site	out		:			
Reach to workshop	in		:			
Total		35,000		107	173	Total min.: 280 min.
Collection		23,000		57	173	
Transportation		12,000		50		
Inside the dumping site		0		0	0	Dumping time.: min.
Idling time						

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 19th November 1997

Vehicle No. KXF820

Loading Capacity: 6.7TON

Researcher's name: Valerie Mureithi

No. of Crew: 6

Estimated Volume: 4.5m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			8 : 17			Went to Lavington to tow the truck with KWP600
Loading-1	in		16,000	8 : 50	33		
	out			15 : 50		420	Spent 7 hours towing two truck
Loading-2	in		3,000	16 : 0	10		Muthangari gardens.
	out			16 : 20		20	
Loading-3	in		4,000	16 : 30	10		Mageta and Tende and Kodi
	out			16 : 50		20	Lane
Loading-4	in		12,000	17 : 0	10		Jacaranda, James Gichuru
	out			17 : 30		30	Returned to workshop
Dumping site	in			:			
Start dumping				:			
Finish dumping				:			
Dumping site	out			:			
Reach to workshop	in			:			
Total			35,000		63	490	Total min.: 553 min.
Collection			19,000		30	490	
Transportation			16,000		33		
Inside the dumping site			0		0	0	Dumping time.: min.
Idling time							

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 20th November 1997

Vehicle No. KXF820

Loading Capacity: 6.7TON

Researcher's name: Valerie Murcithi

No. of Crew: 7

Estimated Volume: 4.5m<sup>3</sup>

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop out			8 : 15			To garage then to dumping site in Dandora
Dumping site in		16,000	9 : 20	65		Dandora D/site
Start dumping			9 : 25	5		
Finish dumping			9 : 50		25	
Dumping site out			9 : 55	5		
Reach to workshop in			:			
<b>Total</b>		16,000		75	25	Total min.: 100 min.
Collection		0		0	0	
Transportation		16,000		65		
Inside the dumping site		0		10	25	Dumping time.: 35 min.
Idling time						

**Time & Motion Study**

Organization: BINS

Trip- 2 Date: 20th November 1997

Vehicle No. KXF820

Loading Capacity: 6.7TON

Researcher's name: Valerie Mureithi

No. of Crew: 7

Estimated Volume: 4.5m<sup>3</sup>

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site			9 : 55			
Loading-1		16,000	10 : 20	25		City Park off Limuru Rd
			10 : 40		20	
Loading-2		4,000	10 : 45	5		Mtama and Mwambao Rd
			11 : 10		25	
Loading-3		1,000	11 : 15	5		Iregi, Wangapala and Mpaka Rd
			12 : 10		55	
Loading-4		6,000	12 : 15	5		Parklands 2nd Avenue
			13 : 0		45	
Loading-5		8,000	13 : 5	5		? Mathenge & Eldama Ravine
			13 : 30		25	Rds
Loading-6		3,000	13 : 35	5		Westlands (Muthithi, Chiromo)
			13 : 50		15	
Loading-7		7,000	14 : 0	10		Graggins college and
			14 : 30		30	Museum Rd
Dumping site		16,000	15 : 0	30		
Start dumping			15 : 5	5		
Finish dumping			15 : 48		43	
Dumping site			15 : 50	2		
Reach to workshop			:			
Total		61,000		97	258	Total min.: 355 min.
Collection		29,000		35	215	
Transportation		32,000		55		
Inside the dumping site		0		7	43	Dumping time.: 50 min.
Idling time						

# Time & Motion Study

Organization: BINS

Trip- 1 Date: 13th November 1997

Vehicle No. KAB441W

Loading Capacity: 4.5TON

Researcher's name: Michael J. Gonda

No. of Crew: 6

Estimated Volume: 9.0m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			8 : 20			From the workshop the truck
Loading-1	in		1,500	8 : 47	27		took to Enterprise Rd,
	out			8 : 48		1	Mombasa Rd, Uhuru-
Loading-2	in		500	8 : 52	4		highway, for operation off
	out			8 : 54		2	Chiromo Rd
Loading-3	in		50	8 : 55	1		
	out			8 : 56		1	
Loading-4	in		100	8 : 59	3		
	out			9 : 2		3	
Loading-5	in		200	9 : 4	2		
	out			9 : 6		2	David osieli Rd
Loading-6	in		50	9 : 9	3		
	out			9 : 11		2	
Loading-7	in		80	9 : 13	2		Westlands Ave
	out			9 : 14		1	
Loading-8	in		100	9 : 15	1		
	out			9 : 18		3	Sports Rd
Loading-9	in		200	9 : 19	1		
	out			9 : 20		1	
Loading-10	in		150	9 : 21	1		Mvuli Rd
	out			9 : 23		2	
Loading-11	in		200	9 : 25	2		
	out			9 : 27		2	
Loading-12	in		200	9 : 28	1		
	out			9 : 32		4	Waiyaki Way
Loading-13	in		500	9 : 36	4		
	out			9 : 38		2	
Loading-14	in		100	9 : 39	1		
	out			9 : 41		2	
Loading-15	in		200	9 : 42	1		
	out			9 : 43		1	
Loading-16	in		150	9 : 44	1		
	out			9 : 46		2	
Loading-17	in		150	9 : 48	2		collection off
	out			9 : 50		2	Rhapta Rd
Loading-18	in		50	9 : 51	1		
	out			9 : 52		1	
Loading-19	in		150	9 : 54	2		
	out			9 : 56		2	
Loading-20	in		200	9 : 57	1		
	out			9 : 59		2	
Loading-21	in		50	10 : 1	2		
	out			10 : 2		1	Church Rd

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 13th November 1997

Vehicle No. KAB441W

Loading Capacity: 4.5TON

Researcher's name: Michael J. Gonda

No. of Crew: 6

Estimated Volume: 9.0m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-22	in		200	10 : 3	1		
	out			10 : 4		1	
Loading-23	in		500	10 : 6	2		
	out			10 : 7		1	
Loading-24	in		150	10 : 8	1		Mvuli Rd
	out			10 : 10		2	
Loading-25	in		50	10 : 11	1		
	out			10 : 12		1	
Loading-26	in		50	10 : 13	1		
	out			10 : 14		1	
Loading-27	in		150	10 : 15	1		Mimosa Rd
	out			10 : 17		2	
Loading-28	in		200	10 : 19	2		
	out			10 : 20		1	
Loading-29	in		300	10 : 21	1		
	out			10 : 25		4	Off Church Rd
Loading-30	in		200	10 : 35	10		
	out			10 : 42		7	
Loading-31	in		400	10 : 43	1		
	out			10 : 45		2	
Loading-32	in		200	10 : 46	1		
	out			10 : 48		2	
Loading-33	in		200	10 : 50	2		
	out			10 : 51		1	From Loading point 36 at
Loading-34	in		400	10 : 54	3		11:02 am the track took to
	out			10 : 56		2	Chiromo Rd, Musium hill Rd,
Loading-35	in		50	10 : 57	1		Forest Rd, Muranga Rd,
	out			10 : 59		2	Thika Rd, Outering Rd, to
Loading-36	in		100	10 : 59	0		Dandora dumping site
	out			11 : 2		3	
Dumping site	in		15,000	11 : 30	28		Dandora
Start dumping			200	11 : 36	6		
Finish dumping			0	12 : 9		33	
Dumping site	out		200	12 : 12	3		
Reach to workshop	in			:			Mileage not working
Total			23,430		128	104	Total min.: 232 min.
Collection			6,530		64	71	
Transportation			16,500		55		
Inside the dumping site			400		9	33	Dumping time.: 42 min.
Idling time							

**Time & Motion Study**

Organization: BINS

Trip- 2 Date: 13th November 1997

Vehicle No. KAE441W

Loading Capacity: 4.5TON

Researcher's name: Michael J. Gonda

No. of Crew: 6

Estimated Volume: 9.0m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out			12 : 12			From Dandora dumping site
Loading-1	in		15,000	12 : 49	37		the truck went for the
	out			12 : 52		3	second trip collection
Loading-2	in		200	12 : 56	4		through Outering Rd,
	out			12 : 59		3	Thika Rd, Muranga Rd,
Loading-3	in		100	13 : 4	5		Forest Rd, Parklands Rd,
	out			13 : 5		1	Ring Rd, Westlands into
Loading-4	in		400	13 : 6	1		Lantana Rd
	out			13 : 8		2	
Loading-5	in		50	13 : 8	0		
	out			13 : 10		2	David osieli Rd
Loading-6	in		300	13 : 11	1		
	out			13 : 13		2	
Loading-7	in		250	13 : 15	2		
	out			13 : 19		4	
Loading-8	in		100	13 : 20	1		Had a lunch break from
	out			13 : 22		2	13:22 - 13:48 pm (26mins)
Loading-9	in		200	13 : 52	30		
	out			13 : 56		4	
Loading-10	in		400	13 : 59	3		
	out			14 : 4		5	
Loading-11	in		100	14 : 6	2		
	out			14 : 9		3	
Loading-12	in		50	14 : 11	2		
	out			14 : 14		3	
Loading-13	in		100	14 : 16	2		
	out			14 : 18		2	
Loading-14	in		200	14 : 21	3		
	out			14 : 24		3	
Loading-15	in		50	14 : 25	1		
	out			14 : 27		2	
Loading-16	in		100	14 : 31	4		
	out			14 : 32		1	
Loading-17	in		150	14 : 32	0		
	out			14 : 35		3	St Michael's Rd
Loading-18	in		200	14 : 36	1		
	out			14 : 38		2	
Loading-19	in		150	14 : 39	1		Back to Pilipili Rd
	out			14 : 40		1	
Loading-20	in		150	14 : 42	2		
	out			14 : 43		1	
Loading-21	in		50	14 : 44	1		
	out			14 : 46		2	Waiyaki Way

**Time & Motion Study**

Organization: BINS

Trip- 2 Date: 13th November 1997

Vehicle No. KAE441W

Loading Capacity: 4.5TON

Researcher's name: Michael J. Gonda

No. of Crew: 6

Estimated Volume: 9.0m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-22	in		500	14 : 47	1		
	out			14 : 49		2	
Loading-23	in		100	14 : 51	2		Mava Park Estate
	out			14 : 56		5	
Loading-24	in		100	14 : 57	1		
	out			14 : 59		2	
Loading-25	in		50	15 : 4	5		
	out			15 : 6		2	Muguga green Rd
Loading-26	in		400	15 : 8	2		
	out			15 : 12		4	
Loading-27	in		500	15 : 14	2		Brookside Grove
	out			15 : 17		3	
Loading-28	in		200	15 : 19	2		
	out			15 : 21		2	
Loading-29	in		400	15 : 25	4		
	out			15 : 34		9	
Loading-30	in		200	15 : 35	1		
	out			15 : 36		1	
Loading-31	in		100	15 : 37	1		
	out			15 : 40		3	
Loading-32	in		150	15 : 41	1		
	out			15 : 43		2	
Loading-33	in		500	15 : 45	2		
	out			15 : 47		2	Gituamba Lane
Loading-34	in		200	15 : 51	4		
	out			15 : 53		2	
Loading-35	in		100	15 : 54	1		Kyuna Crescent
	out			15 : 55		1	
Loading-36	in		1,500	15 : 57	2		
	out			15 : 57		0	
Loading-37	in		300	15 : 58	1		
	out			15 : 59		1	
Loading-38	in		500	16 : 2	3		Kyuna Rise
	out			16 : 3		1	
Loading-39	in		200	16 : 5	2		
	out			16 : 7		2	
Loading-40	in		150	16 : 9	2		
	out			16 : 10		1	
Loading-41	in		50	16 : 11	1		
	out			16 : 12		1	Kyuna Rd
Loading-42	in		200	16 : 13	1		
	out			16 : 15		2	
Loading-43	in		50	16 : 16	1		
	out			16 : 19		3	



# Time & Motion Study

Organization: BINS

Trip- 2 Date: 13th November 1997

Vehicle No. KAE441W

Loading Capacity: 4.5TON

Researcher's name: Michael J. Gonda

No. of Crew: 6

Estimated Volume: 9.0m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-44	in		200	16 : 21	2		
	out			16 : 23		2	
Loading-45	in		300	16 : 25	2		
	out			16 : 26		1	
Loading-46	in		50	16 : 27	1		
	out			16 : 29		2	
Loading-47	in		300	16 : 30	1		Lower Kabete Rd
	out			16 : 31		1	
Loading-48	in		200	16 : 32	1		
	out			16 : 36		4	
Loading-49	in		200	16 : 37	1		
	out			16 : 39		2	Lower Kabete Rd
Loading-50	in		300	16 : 40	1		
	out			16 : 42		2	
Loading-51	in		50	16 : 45	3		
	out			16 : 47		2	
Loading-52	in		200	16 : 48	1		Shanzu Rd
	out			16 : 49		1	
Loading-53	in		150	16 : 52	3		From Loading point S6 at
	out			16 : 54		2	17:12, the truck stopped the
Loading-54	in		500	16 : 58	4		days operation and back to
	out			17 : 2		4	the workshop through
Loading-55	in		200	17 : 6	4		Parlands Rd, Muthithi Rd,
	out			17 : 7		1	Ngara Rd, Pumwani Rd,
Loading-56	in		50	17 : 9	2		Landhies Rd, Enterprise Rd
	out			17 : 12		3	
Dumping site	in			:			No dumping
Start dumping				:			
Finish dumping				:			
Dumping site	out			:			
Reach to workshop	in		12,000	17 : 48	36		Mileage not working
Total			39,450		207	129	Total min.: 336 min.
Collection			12,450		108	129	
Transportation			27,000		73		
Inside the dumping site			0		0	0	Dumping time.: min.
Idling time					26		

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 14th November 1997

Vehicle No. KAE441W

Loading Capacity: 4.5TON

Researcher's name: Michael J. Gonda

No. of Crew: 6

Estimated Volume: 9.0m<sup>3</sup>

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop out			8 : 12			From the workshop, the truck left for Dandora to dump the previous day's refuse collection
						As from 8:15am to 8:52am, time was wasted at the filling station as awaiting supervisors arrival. (37mins)
						Idling
						David osieli Rd
						Enterprise Rd into Mombasa Rd, Airport North Rd, Outering Rd
						Operation was delayed as from 9:36 to 10:08 am as the crew went off schedule to sell some recyclable waste (32mins Idling)
						Mileage not working
Dumping site in		18,000	10 : 11	119		Dandora
Start dumping		150	10 : 16	5		
Finish dumping		0	10 : 49		33	
Dumping site out		150	10 : 52	3		
Reach to workshop in			:			
Total		18,300		127	33	Total min.: 160 min.
Collection		0		0	0	
Transportation		18,000		50		
Inside the dumping site		300		8	33	Dumping time.: 41 min.
Idling time				69		

### Time & Motion Study

Organization: BINS

Trip- 2 Date: 14th November 1997

Vehicle No. KAB441W

Loading Capacity: 4.5TON

Researcher's name: Michael J. Gonda

No. of Crew: 6

Estimated Volume: 9.0m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out			10 : 52			From dumping site
Loading-1	in		14,000	11 : 36	44		Riverside Gardens
	out			11 : 39		3	Riverside Drive
Loading-2	in		500	11 : 42	3		Riverside Paddocks
	out			11 : 46		4	
Loading-3	in		150	11 : 49	3		
	out			11 : 52		3	Migoiri Rd
Loading-4	in		200	11 : 53	1		
	out			11 : 55		2	
Loading-5	in		80	11 : 59	4		Arboretum Rd
	out			12 : 4		5	David osieli Rd
Loading-6	in		50	12 : 6	2		
	out			12 : 7		1	Mamlaka Rd
Loading-7	in		100	12 : 9	2		
	out			12 : 12		3	Statehouse Crescent
Loading-8	in		500	12 : 16	4		
	out			12 : 18		2	
Loading-9	in		400	12 : 18	0		
	out			12 : 22		4	Kilimani Rd
Loading-10	in		100	12 : 24	2		
	out			12 : 27		3	
Loading-11	in		200	12 : 29	2		
	out			12 : 31		2	
Loading-12	in		200	12 : 36	5		
	out			12 : 39		3	
Loading-13	in		150	12 : 41	2		Ralph Bunch Rd
	out			12 : 46		5	
Loading-14	in		100	12 : 49	3		
	out			12 : 53		4	
Loading-15	in		50	12 : 56	3		Collection off
	out			12 : 58		2	Dennis pritt Rd
Loading-16	in		50	12 : 59	1		
	out			13 : 4		5	
Loading-17	in		50	13 : 7	3		Dennis pritt Rd
	out			13 : 12		5	
Loading-18	in		150	13 : 13	1		
	out			13 : 15		2	
Loading-19	in		250	13 : 16	1		
	out			13 : 22		6	Had a break for a bite from
Loading-20	in		100	13 : 57	35		13:22 - 13:47 (25mins)
	out			13 : 59		2	
Loading-21	in		50	14 : 7	8		
	out			14 : 10		3	

# Time & Motion Study

Organization: BINS

Trip- 2 Date: 14th November 1997

Vehicle No. KAB441W

Loading Capacity: 4.5TON

Researcher's name: Michael J. Gonda

No. of Crew: 6

Estimated Volume: 9.0m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-22	in		500	14 : 13	3		
	out			14 : 15		2	Rose Ave
Loading-23	in		100	14 : 19	4		
	out			14 : 22		3	
Loading-24	in		250	14 : 27	5		
	out			14 : 29		2	
Loading-25	in		300	14 : 34	5		Maalim Joma Rd
	out			14 : 37		3	
Loading-26	in		300	14 : 41	4		
	out			14 : 44		3	
Loading-27	in		100	14 : 46	2		
	out			14 : 51		5	
Loading-28	in		50	14 : 54	3		
	out			14 : 55		1	
Loading-29	in		50	14 : 57	2		
	out			14 : 58		1	
Loading-30	in		100	15 : 2	4		Galana Rd
	out			15 : 6		4	
Loading-31	in		150	15 : 9	3		
	out			15 : 13		4	
Loading-32	in		100	15 : 14	1		
	out			15 : 17		3	
Loading-33	in		100	15 : 21	4		Collection contd on
	out			15 : 24		3	Galana Rd
Loading-34	in		500	15 : 25	1		
	out			15 : 27		2	
Loading-35	in		150	15 : 29	2		Lenana Rd
	out			15 : 29		0	
Loading-36	in		100	15 : 32	3		
	out			15 : 37		5	Wood Ave
Loading-37	in		100	15 : 39	2		
	out			15 : 42		3	
Loading-38	in		50	15 : 45	3		
	out			15 : 47		2	Chaka Rd
Loading-39	in		100	15 : 49	2		
	out			15 : 51		2	
Loading-40	in		400	15 : 51	0		Jabavu Rd
	out			15 : 52		1	
Loading-41	in		400	15 : 58	6		
	out			16 : 5		7	
Loading-42	in		150	16 : 7	2		
	out			16 : 9		2	
Loading-43	in		50	16 : 12	3		
	out			16 : 16		4	

### Time & Motion Study

Organization: BINS

Trip- 2 Date: 14th November 1997

Vehicle No. KAE441W

Loading Capacity: 4.5TON

Researcher's name: Michael J. Gonda

No. of Crew: 6

Estimated Volume: 9.0m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-44	in		100	16 : 19	3		
	out			16 : 22		3	
Loading-45	in		50	16 : 27	5		Husuku Rd
	out			16 : 31		4	
Loading-46	in		50	16 : 36	5		
	out			16 : 39		3	
Loading-47	in		200	16 : 41	2		
	out			16 : 44		3	
Loading-48	in		500	16 : 45	1		
	out			16 : 52		7	
Loading-49	in		250	16 : 55	3		Kasuku Rd
	out			17 : 12		17	
Loading-50	in		50	17 : 14	2		
	out			17 : 16		2	
Loading-51	in		100	17 : 21	5		
	out			17 : 30		9	Argwings Kodhek Rd
Loading-52	in		150	17 : 34	4		
	out			17 : 36		2	From Loading point 53 at
Loading-53	in		200	17 : 41	5		5:41 pm the truck left for the
	out			17 : 41		0	workshop to close the days
Dumping site	in			:			operation to dump the
Start dumping				:			following day.
Finish dumping				:			No dumping
Dumping site	out			:			Mileage not working
Reach to workshop	in		16,000	18 : 12	31		
Total			39,180		259	181	Total min.: 440 min.
Collection			9,180		159	181	
Transportation			30,000		75		
Inside the dumping site			0		0	0	Dumping time.: min.
Idling time					25		

### Time & Motion Study

Organization: BINS

Trip- 1 Date: 15th November 1997

Vehicle No. KAE441W

Loading Capacity: 4.5TON

Researcher's name: Michael J. Gonda

No. of Crew: 6

Estimated Volume: 9.0m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			10 : 47			
Loading-1	in		18,000	11 : 22	35		The truck left the workshop
	out			11 : 24		2	at 10:47am as it was on a
Loading-2	in		200	11 : 27	3		mechanical repair at the
	out			11 : 29		2	workshop
Loading-3	in		150	11 : 36	7		
	out			11 : 39		3	
Loading-4	in		300	11 : 42	3		Enterprise Rd
	out			11 : 49		7	Mombasa Rd
Loading-5	in		400	11 : 58	9		
	out			12 : 7		9	David osieli Rd
Loading-6	in		150	12 : 9	2		Muthaiga Rd in Esso plaza
	out			12 : 12		3	
Loading-7	in		50	12 : 14	2		
	out			12 : 17		3	Thika Rd in
Loading-8	in		100	12 : 19	2		Utalii college
	out			12 : 26		7	
Loading-9	in		100	12 : 34	8		
	out			12 : 39		5	
Loading-10	in		500	12 : 42	3		Thika Rd continued
	out			12 : 48		6	
Loading-11	in		200	12 : 56	8		
	out			13 : 7		11	
Loading-12	in		50	13 : 9	2		
	out			13 : 12		3	Kasarani - ICIPE
Loading-13	in		50	13 : 18	6		
	out			13 : 21		3	From Kasarani, truck went
							to Dandora dumping site
							and back to the workshop at
Dumping site	in		10,000	13 : 49	28		Dandora
Start dumping			400	13 : 57	8		
Finish dumping			0	14 : 31		34	Mileage not working
Dumping site	out		40	14 : 39	8		
Reach to workshop	in		13,000	15 : 41	62		
Total			43,690		196	98	Total min.: 294 min.
Collection			2,250		55	64	
Transportation			41,000		125		
Inside the dumping site			440		16	34	Dumping time.: 50 min.
Idling time							

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 17th November 1997

Vehicle No. KAE441W

Loading Capacity: 4.5TON

Researcher's name: Michael J. Gonda

No. of Crew: 6

Estimated Volume: 9.0m<sup>3</sup>

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out		8 : 23			From the workshop,
Loading-1	in	1,500	8 : 45	22		operation took off with a
	out		9 : 50		65	start along Enterprise Rd
Loading-2	in	200	9 : 52	2		at Kenya Wine Agency
	out		9 : 56		4	LIMITED.
Loading-3	in	100	9 : 56	0		
	out		12 : 36		160	From Loading point the
						truck went to Dandora
						dumping site through
						Enterprise Rd, Jogoo Rd
						David osieli Rd
Dumping site	in	12,000	13 : 2	26		From Dandora, the truck
Start dumping		200	13 : 8	6		took to Thika Rd on its way
Finish dumping		0	13 : 32		24	to Highrise
Dumping site	out	200	13 : 39	7		
Reach to workshop	in		:			Mileage not working
Total		14,200		63	253	Total min.: 316 min.
Collection		300		2	229	
Transportation		13,500		48		
Inside the dumping site		400		13	24	Dumping time.: 37 min.
Idling time						

**Time & Motion Study**

Organization: BINS

Trip- 2 Date: 17th November 1997

Vehicle No. KAE441W

Loading Capacity: 4.5TON

Researcher's name: Michael J. Gonda

No. of Crew: 6

Estimated Volume: 9.0m<sup>3</sup>

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site out			13 : 39			From dumping site
						Had a lunch break from
						13:52-14:19 along Thika Rd
						(21mins idling)
						Had a breakdown on Forest
						Rd, delayed exercise as
						change of the punctured
						tire went to 16:20pm
						David osieli Rd
						From Forest Rd, the day's
						exercise came to an end as
						truck went to workshop
						through Pumwani Rd,
						Landhies Rd, Enterprise Rd,
						Falcon Rd
						Mileage not working
Dumping site in			:			
Start dumping			:			
Finish dumping			:			
Dumping site out			:			
Reach to workshop in		16,000	17 : 41	242		
Total		16,000		242	0	Total min.: 242 min.
Collection		0		0	0	
Transportation		16,000		221		
Inside the dumping site		0		0	0	Dumping time.: min.
Idling time				21		



# Time & Motion Study

Organization: BINS

Trip- 1 Date: 18th November 1997

Vehicle No. KAE441W

Loading Capacity: 4.5TON

Researcher's name: Michael J. Gonda

No. of Crew: 6

Estimated Volume: 9.0m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			8 : 24			From the workshop, the
Loading-1	in		18,000	8 : 59	35		truck went to the filling
	out			9 : 4		5	station through Falcon Rd
Loading-2	in		200	9 : 10	6		From 8:28 -8:41 (13mins)
	out			9 : 15		5	
Loading-3	in		400	10 : 16	61		
	out			9 : 17		-59	
Loading-4	in		250	9 : 20	3		Waiyaki Way
	out			9 : 22		2	
Loading-5	in		100	9 : 23	1		
	out			9 : 25		2	David osieli Rd
Loading-6	in		50	9 : 29	4		Maua Park Estate
	out			9 : 32		3	
Loading-7	in		150	9 : 33	1		
	out			9 : 35		2	ABC Place
Loading-8	in		300	9 : 38	3		
	out			9 : 39		1	
Loading-9	in		200	9 : 45	6		
	out			9 : 49		4	Msangari Rd
Loading-10	in		100	9 : 56	7		
	out			9 : 58		2	
Loading-11	in		150	9 : 59	1		
	out			10 : 4		5	Mahiga Mairu Rd
Loading-12	in		50	10 : 6	2		
	out			10 : 10		4	
Loading-13	in		50	10 : 14	4		
	out			10 : 15		1	
Loading-14	in		40	10 : 17	2		Muthangari drive
	out			10 : 19		2	
Loading-15	in		120	10 : 19	0		
	out			10 : 22		3	
Loading-16	in		50	10 : 25	3		
	out			10 : 27		2	
Loading-17	in		100	10 : 33	6		Kanjata Rd
	out			10 : 35		2	
Loading-18	in		50	10 : 37	2		
	out			10 : 41		4	
Loading-19	in		150	10 : 42	1		Manyani Rd east
	out			10 : 45		3	
Loading-20	in		400	10 : 47	2		
	out			10 : 47		0	
Loading-21	in		100	10 : 49	2		East tara Rd
	out			10 : 51		2	

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 18th November 1997

Vehicle No. KAE441W

Loading Capacity: 4.5TON

Researcher's name: Michael J. Gonda

No. of Crew: 6

Estimated Volume: 9.0m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-22	in		50	10 : 57	6		
	out			11 : 2		5	
Loading-23	in		150	11 : 5	3		Manyani West Rd
	out			11 : 6		1	
Loading-24	in		50	11 : 8	2		
	out			11 : 9		1	
Loading-25	in		50	11 : 9	0		Ewaso Ngiro Rd
	out			11 : 14		5	
Loading-26	in		100	11 : 17	3		
	out			11 : 19		2	
Loading-27	in		150	11 : 22	3		
	out			11 : 27		5	
Loading-28	in		300	11 : 29	2		Musa Gitau Rd
	out			11 : 32		3	
Loading-29	in		400	11 : 36	4		
	out			11 : 39		3	
Loading-30	in		150	11 : 44	5		
	out			11 : 49		5	
Loading-31	in		200	11 : 54	5		
	out			11 : 58		4	
Loading-32	in		250	11 : 59	1		
	out			12 : 4		5	
Loading-33	in		200	12 : 9	5		Mount Camel Rd
	out			12 : 11		2	
Loading-34	in		150	12 : 16	5		
	out			12 : 17		1	
Loading-35	in		100	12 : 19	2		Maji Mazuri Rd
	out			12 : 24		5	
Loading-36	in		50	12 : 26	2		
	out			12 : 29		3	
Loading-37	in		100	12 : 34	5		
	out			12 : 37		3	Had a lunch break along
Loading-38	in		50	13 : 12	35		Maji Mazuri Rd form 12:40 -
	out			13 : 18		6	13:07 (27mins Idling)
Loading-39	in		150	13 : 21	3		
	out			13 : 24		3	
Loading-40	in		400	13 : 25	1		
	out			13 : 27		2	
Loading-41	in		200	13 : 29	2		
	out			13 : 36		7	
Loading-42	in		150	13 : 39	3		
	out			13 : 42		3	
Loading-43	in		150	13 : 44	2		Mbabane Rd
	out			13 : 48		4	

# Time & Motion Study

Organization: BINS

Trip- 1 Date: 18th November 1997

Vehicle No. KAE441W

Loading Capacity: 4.5TON

Researcher's name: Michael J. Gonda

No. of Crew: 6

Estimated Volume: 9.0m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-44	in		50	13 : 49	1		
	out			13 : 54		5	
Loading-45	in		100	13 : 59	5		
	out			14 : 4		5	
Loading-46	in		200	14 : 6	2		
	out			14 : 9		3	
Loading-47	in		150	14 : 14	5		Isaac Gathanju Rd
	out			14 : 16		2	
Loading-48	in		50	14 : 19	3		
	out			14 : 21		2	
Loading-49	in		500	14 : 28	7		Isaac Gathanju Rd
	out			14 : 31		3	collection continued
Loading-50	in		50	14 : 32	1		
	out			14 : 34		2	
Loading-51	in		100	14 : 37	3		
	out			14 : 39		2	
Loading-52	in		100	14 : 42	3		
	out			14 : 44		2	O'washika Rd
Loading-53	in		200	14 : 46	2		
	out			14 : 49		3	From loading point 56 at
Loading-54	in		150	14 : 49	0		15:06 the truck went to
	out			14 : 51		2	Dandora dumping site and
Loading-55	in		100	14 : 56	5		then back to the workshop
	out			14 : 59		3	through Outering Rd,
Loading-56	in		50	15 : 2	3		Jogoo Rd, Likoni Rd,
	out			15 : 6		4	Enterprise Rd, Falcon Rd
Dumping site	in		14,000	15 : 42	36		
Start dumping			200	15 : 48	6		Mileage not working
Finish dumping			0	16 : 17		29	
Dumping site	out		200	16 : 22	5		
Reach to workshop	in		15,000	17 : 19	57		
Total			55,760		395	140	Total min.: 535 min.
Collection			8,360		229	111	
Transportation			47,000		115		
Inside the dumping site			400		11	29	Dumping time.: 40 min.
Idling time					40		

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 19th November 1997

Vehicle No. KAD794Y

Loading Capacity: 4.5TON

Researcher's name: Michael J. Gonda

No. of Crew: 6

Estimated Volume: 9.0m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			8 : 35			From the workshop, the
Loading-1	in		14,000	9 : 4	29		truck took to Enterprise Rd,
	out			9 : 32		28	Mombasa Rd, Uhuru
Loading-2	in		400	9 : 34	2		highway, for exercise in
	out			9 : 41		7	Maua Park Estate, off
Loading-3	in		500	9 : 44	3		Waiyaki way
	out			9 : 57		13	
Loading-4	in		800	10 : 4	7		
	out			10 : 36		32	From Maua Park Estate at
							Loading point 4 10:36am
							David osieli Rd
							dumping site and later back
							to the workshop, after
							clearing the day's schedule
							Outering Rd, Jogoo Rd,
							Likoni Rd, Enterprise Rd
							Falcon Rd
Dumping site	in		10,000	11 : 7	31		Dandora
Start dumping			400	11 : 19	12		
Finish dumping			0	11 : 41		22	Mileage not working
Dumping site	out		400	11 : 56	15		
Reach to workshop	in		12,000	12 : 57	61		
Total			38,500		160	102	Total min.: 262 min.
Collection			1,700		12	80	
Transportation			36,000		121		
Inside the dumping site			800		27	22	Dumping time.: 49 min.
Idling time							

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 20th November 1997

Vehicle No. KAE953R

Loading Capacity: 3TON

Researcher's name: Michael J. Gonda

No. of Crew: 5

Estimated Volume: 9.0m<sup>3</sup>

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop out			8 : 35			The truck had to dump the previous day's collection before embarking to its days schedule
						Falcon Rd
						Enterprise Rd
						Jogoo Rd
						David osieli Rd
						Landhies Rd
						Pumwani Rd
						Ring Rd, Ngara
						Thika Rd
						Outering Rd
						Komorock Rd and into Dandora dumping site
Dumping site in		14,000	9 : 52	77		Dandora
Start dumping		500	9 : 56	4		
Finish dumping		0	10 : 20		24	
Dumping site out		500	10 : 23	3		
Reach to workshop in			:			
Total		15,000		84	24	Total min.: 108 min.
Collection		0		0	0	
Transportation		14,000		77		
Inside the dumping site		1,000		7	24	Dumping time.: 31 min.
Idling time						

**Time & Motion Study**

Organization: BINS

Trip- 2 Date: 20th November 1997

Vehicle No. KAE953R

Loading Capacity: 3TON

Researcher's name: Michael J. Gonda

No. of Crew: 5

Estimated Volume: 9.0m<sup>3</sup>

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site out			10 : 23			
						Had a break for a mornig bite from 10:32 - 10:44 am and then off to lower Kabete Rd through Komorock Rd (12mins Idling)
						Outering Rd
						Thika Rd
						David osieli Rd
						Muranga Rd
						Forest Rd
						Had a puncture along Parklands Rd at 11:16 am No operation as a spare tyre had to be brought form the workshop and so mechanical repair was through by 14:09 from then the truck went back to workshop by order from the management
						No collection
Dumping site in			:			
Start dumping			:			
Finish dumping			:			
Dumping site out			:			
Reach to workshop in		16,000	15 : 29	306		
Total		16,000		306	0	Total min.: 306 min.
Collection		0		0	0	
Transportation		16,000		121		
Inside the dumping site		0		0	0	Dumping time.: min.
Idling time				185		

# Time & Motion Study

Organization: BINS

Trip- 1 Date: 12th November 1997

Vehicle No. KWP600

Loading Capacity: 7TON

Researcher's name: Purity Wanjiru

No. of Crew: 5

Estimated Volume: 8.5m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	365585		8 : 27			From workshop to Petrol
Loading-1	in	365585.1	100	8 : 45	18		Station 11mins fuelling
	out			8 : 51		6	The truck collected from
Loading-2	in	365585.1	40	8 : 55	4		neighbouring Industries
	out			9 : 1		6	
Loading-3	in	365586.6	1,500	9 : 9	8		
	out			9 : 21		12	
Loading-4	in	365587.3	700	9 : 23	2		Enterprise Rd
	out			9 : 38		15	
Loading-5	in	365589.8	2,500	9 : 45	7		
	out			9 : 51		6	Idling 15mins
Loading-6	in	365592.5	2,700	10 : 22	31		(lunch time)
	out			10 : 27		5	Mombasa Rd
Loading-7	in	365594.3	1,800	10 : 37	10		
	out			10 : 55		18	
Loading-8	in	365598.7	4,400	11 : 8	13		
	out			11 : 29		21	Thika Rd
Loading-9	in	365604.2	5,500	11 : 40	11		
	out			11 : 47		7	
Loading-10	in	365611.6	7,400	12 : 5	18		
	out			12 : 10		5	
Loading-11	in	365612.2	600	12 : 15	5		
	out			13 : 10		55	
Loading-12	in	365612.7	500	13 : 22	12		
	out			13 : 44		22	
Loading-13	in	365613.1	400	13 : 45	1		
	out			14 : 27		42	
							Idling 10mins (tea time)
							Idling 20 mins (unloading)
Dumping site	in	365627.3	14,200	16 : 1	94		Dandora dumping site
Start dumping		365629.5	2,200	16 : 20	19		
Finish dumping		365629.5	0	17 : 24		64	
Dumping site	out	365631.2	1,700	17 : 34	10		
Reach to workshop	in	365650.6	19,400	18 : 30	56		Workshop
Total			65,640		319	284	Total min.: 603 min.
Collection			28,040		107	220	
Transportation			33,700		127		
Inside the dumping site			3,900		29	64	Dumping time.: 93 min.
Idling time					56		

### Time & Motion Study

Organization: BINS

Trip- 1 Date: 13th November 1997

Vehicle No. KWP600

Loading Capacity: 7TON

Researcher's name: Purity Wanjiru

No. of Crew: 5

Estimated Volume: 9.0m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	365650		8 : 27			Petrol Station 10mins
Loading-1	in	365655	5,000	8 : 55	28		Enterprise, Nanyuki, Pata
	out			9 : 7		12	Lunga Lunga, Pata, Lunga
Loading-2	in	365656	1,000	9 : 10	3		Lunga, Idling 20mins
	out			10 : 7		57	Migwani, Enterprise, Lusaka
Loading-3	in	365656.1	100	10 : 13	6		Bunyala, Elgon, Ngong,
	out			10 : 28		15	Naivasha, Ngong, Town,
Loading-4	in	365658	1,900	10 : 56	28		Haile selassie, Bunyala,
	out			11 : 10		14	Enterprise, Idling 20mins
Loading-5	in	365659	1,000	11 : 16	6		Lusaka, Pumwani, Park Rd,
	out			11 : 21		5	David osieli Rd
Loading-6	in	365675	16,000	12 : 38	77		Idling 30mins(lunch break)
	out			13 : 20		42	
Loading-7	in	365689	14,000	14 : 0	40		
	out			14 : 16		16	
Dumping site	in	365708	19,000	15 : 40	84		Dandora
Start dumping		365708.4	400	15 : 48	8		through Thika Rd
Finish dumping		365708.4	0	16 : 28		40	Workshop
Dumping site	out	365708.5	100	16 : 33	5		
Reach to workshop	in	365729	20,500	17 : 54	81		
Total			79,000		366	201	Total min.: 567 min.
Collection			34,000		110	161	
Transportation			44,500		183		
Inside the dumping site			500		13	40	Dumping time.: 53 min.
Idling time					60	20	



**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 14th November 1997

Vehicle No. KWP600

Loading Capacity: 7TON

Researcher's name: Purity Wanjiru

No. of Crew: 5

 Estimated Volume: 9.2m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	365729		8 : 12			From workshop via petrol
Loading-1	in	365740	11,000	9 : 39	87		station we idled for 45mins
	out			10 : 19		40	(Mechanical problem)
Loading-2	in	365740.8	800	10 : 20	1		Through Enterprise, Jogoo,
	out			11 : 4		44	Laadhies, Pumwani,
Loading-3	in	365742	1,200	11 : 10	6		Muranga Rd,
	out			11 : 38		28	Korobot L1 (Stima Plaza)
Loading-4	in	365752	10,000	12 : 7	29		Mushembi Rd, Muranga Rd,
	out			12 : 38		31	L2 Paramunt Bld
Loading-5	in	365752.2	200	12 : 39	1		Likoni Rd, Pata Rd,
	out			14 : 6		87	David osieli Rd
							Unloaded some garbage for
							45mins at Kariobangi
Dumping site	in	365765	12,800	15 : 50	104		Dandora dumping site
Start dumping		365765	0	16 : 0	10		
Finish dumping		365765	0	16 : 37		37	
Dumping site	out	365766	1,000	16 : 40	3		
Reach to workshop	in	365782	16,000	18 : 0	80		Workshop
Total			53,000		321	267	Total min.: 588 min.
Collection			12,200		37	230	
Transportation			39,800		181		
Inside the dumping site			1,000		13	37	Dumping time.: 50 min.
Idling time					90		

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 15th November 1997

Vehicle No. KWP600

Loading Capacity: 7TON

Researcher's name: Purity Wanjiru

No. of Crew: 5

 Estimated Volume: 7.5m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	365787.3		8 : 55			From workshop we passed
Loading-1	in	365791.8	4,500	9 : 22	27		through the petrol station
	out			10 : 29		67	for 5mins - Enterprise Rd,
Loading-2	in	365798.4	6,600	11 : 19	50		Migwani, Mogadishu, Pata,
	out			13 : 10		111	Enterprise, Changanwe Rd,
							(Konya plastic industries)
							Enterprise Rd, Lusaka,
							Landhies, Park Rd, Pumwani,
							Muranga Rd, Thika Rd,
							Outering, 13:57-14:24 idling
							David osieli Rd
							Komorock Rd
Dumping site	in	365815	16,600	14 : 44	94		Dandora dumping site
Start dumping		365815	0	14 : 50	6		
Finish dumping		365815	0	15 : 39		49	
Dumping site	out	365815.9	900	15 : 43	4		
Reach to workshop	in	365842	26,100	17 : 3	80		Workshop
Total			54,700		261	227	Total min.: 488 min.
Collection			6,600		50	178	
Transportation			47,200		169		
Inside the dumping site			900		10	49	Dumping time.: 59 min.
Idling time					32		

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 17th November 1997

Vehicle No. KWP600

Loading Capacity: 7TON

Researcher's name: Purity Wanjiru

No. of Crew: 5

 Estimated Volume: 8.2m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	365842		8 : 0			From workshop via petrol
Loading-1	in	365846	4,000	8 : 21	21		station through Enterprise,
	out			8 : 42		21	Mogadishu, Nanyuki
Loading-2	in	365850	4,000	9 : 27	45		(Tibbets & buttons)
	out			11 : 0		93	Ente, Kampala, Kitui
Loading-3	in	365851	1,000	11 : 10	10		Kitui Rd, Kampala, Enterprise
	out			11 : 14		4	(D.T.Dobie)
Loading-4	in	365854	3,000	11 : 43	29		Commercial St, Bunyala,
	out			12 : 28		45	Uhuru highway, Chiromo Rd,
Loading-5	in	365862	8,000	12 : 52	24		Ring Rd, Westlands,
	out			13 : 33		41	Mwanzi Rd, (Nakumat way)
Loading-6	in	365866	4,000	13 : 53	20		David osieli Rd
	out			15 : 5		72	Kolbot Rd, (Stima plaza)
Dumping site	in	365879	13,000	17 : 0	115		Dandora dumping site
Start dumping		365880	1,000	17 : 2	2		
Finish dumping		365880	0	18 : 15		73	
Dumping site	out	365880	0	18 : 18	3		
Reach to workshop	in	365895	15,000	19 : 25	67		Back to workshop
Total			53,000		336	349	Total min.: 685 min.
Collection			20,000		128	276	
Transportation			32,000		203		
Inside the dumping site			1,000		5	73	Dumping time.: 78 min.
Idling time							

### Time & Motion Study

Organization: BINS

Trip- 1 Date: 18th November 1997

Vehicle No. KWP600

Loading Capacity: 7TON

Researcher's name: Purity Wanjiru

No. of Crew: 5

Estimated Volume: 9.0m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	365895		8 : 29			From workshop petrol
Loading-1	in	365898	3,000	8 : 56	27		station for 13mins
	out			9 : 32		36	Enteprise Rd, Migwani Rd,
Loading-2	in	365900	2,000	9 : 53	21		Ete?, Mogandishu, Nanyuki
	out			10 : 22		29	Pato Rd, Lunga Lunga Rd,
Loading-3	in	365902	2,000	10 : 33	11		Cartor manufacture,
	out			10 : 57		24	Idling 20mins
Loading-4	in	365902.6	600	11 : 10	13		Wundany; Rd, Lunga Lunga
	out			11 : 55		45	Enterprise, Kampala, Kitui,
Loading-5	in	365907	4,400	12 : 38	43		Cooking pot Enter, Isiolo Rd,
	out			13 : 6		28	David osieli Rd
Loading-6	in	365909	2,000	13 : 8	2		Lusaka, Changamwe Rd,
	out			13 : 58		50	Changamwe, (Nation)
Loading-7	in	365912	3,000	14 : 5	7		
	out			14 : 15		10	It was raining heavy so we
Loading-8	in	365914	2,000	14 : 53	38		didn't dump but the truck
	out			15 : 3		10	went back to the workshop
Loading-9	in	365915	1,000	15 : 14	11		
	out			:			
Dumping site	in						No dumping
Start dumping							
Finish dumping							
Dumping site	out						
Reach to workshop	in	365920	5,000	15 : 47	33		Workshop
Total			25,000		206	232	Total min.: 438 min.
Collection			17,000		146	232	
Transportation			8,000		47		
Inside the dumping site			0		0	0	Dumping time.: min.
Idling time					13	20	

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 19th November 1997

Vehicle No. KWP600

Loading Capacity: 7TON

Researcher's name: Purity Wanjiru

No. of Crew: 5

Estimated Volume: 9.0m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	365958		8 : 17			From Workshop to
Loading-1	in	365974	16,000	9 : 10	53		Lavington to town
	out			:			some two trucks arrived 9:10 am Mileage 365974
							It took time so there was no loadings.
							Out of Lavington
							Lastly it was towed out and we left the place at 16:00
							David osieli Rd
							Since is was late the driver headed to dumping site through Valley Rd,
							Kenyatta Ave, University way, Slip way, Muranga way,
Dumping site	in	365990	16,000	16 : 20	430		Dandora dumping site
Start dumping		365990.8	800	16 : 32	12		
Finish dumping		365990.8	0	17 : 18		46	
Dumping site	out	365991.7	900	17 : 25	7		
Reach to workshop	in	366008.7	17,000	18 : 30	65		workshop
Total			50,700		567	46	Total min.: 613 min.
Collection			0		0	0	
Transportation			49,000		548		
Inside the dumping site			1,700		19	46	Dumping time.: 65 min.
Idling time							

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 13th November 1997

Vehicle No. KAE341U

Loading Capacity: 5.5ton

Researcher's name: Lennox M. Kadere

No. of Crew: 4

Estimated Volume: 3.5m<sup>3</sup>

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site out	34410		8 : 30			Enterprise Rd,
						There was no dumping in
						the previous day i.e.12/11/97
Dumping site in	34425	15,000	8 : 52	22		Dandora
Start dumping			8 : 53	1		
Finish dumping			9 : 10		17	
Dumping site out			9 : 14	4		Mileage not working
Reach to workshop in			:			
Total		15,000		27	17	Total min.: 44 min.
Collection		0		0	0	
Transportation		15,000		22		
Inside the dumping site		0		5	17	Dumping time.: 22 min.
Idling time						

**Time & Motion Study**

Organization: BINS

Trip- 2 Date: 13th November 1997

Vehicle No. KAE341U

Loading Capacity: 5.5ton

Researcher's name: Lennox M. Kadere

No. of Crew: 4

Estimated Volume: 3.5m<sup>3</sup>

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site out			9 : 14			From dumping site
Loading-1 in		21,000	10 : 20	66		Dandora
out			12 : 50		150	High Rise Estate
						Mbagathi Rd
Dumping site in		21,500	13 : 22	32		Dandora
Start dumping			13 : 24	2		
Finish dumping			13 : 54		30	
Dumping site out			13 : 55	1		
Reach to workshop in			:			Mileage not working
Total		42,500		101	180	Total min.: 281 min.
Collection		0		0	150	
Transportation		42,500		98		
Inside the dumping site		0		3	30	Dumping time.: 33 min.
Idling time						

**Time & Motion Study**

Organization: BINS

Trip- 3 Date: 13th November 1997

Vehicle No. KAE341U

Loading Capacity: 5.5ton

Researcher's name: Lennox M. Kadere

No. of Crew: 4

Estimated Volume: 3.5m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out			13 : 55			From dumping site Dandora
Loading-1	in		7,000	14 : 15	20		Cussons Co.,Ltd.
	out			15 : 47		92	BABA Dogo Rd
Dumping site	in		7,100	16 : 10	23		Dandora
Start dumping			100	16 : 11	1		
Finish dumping				16 : 38		27	
Dumping site	out		100	16 : 40	2		
Reach to workshop	in		16,000	17 : 10	30		Enterprise Rd
							Mileage not working
Total			30,300		76	119	Total min.: 195 min.
Collection			0		0	92	
Transportation			30,100		73		
Inside the dumping site			200		3	27	Dumping time.: 30 min.
Idling time							



### Time & Motion Study

Organization: BINS

Trip- 1 Date: 14th November 1997

Vehicle No. KAE341U

Loading Capacity: 5.5ton

Researcher's name: Lennox M. Kadere

No. of Crew: 5

Estimated Volume: 4m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			7 : 31			Enterprise Rd,
Loading-1	in		19,000	8 : 40	69		Muthaiga Rd,
	out			9 : 1		21	Esso Plaza
Loading-2	in		510	9 : 9	8		Muthaiga Rd,
	out			9 : 12		3	Muthaiga Gardens
Loading-3	in		1,200	9 : 24	12		Village MKT UN
	out			9 : 39		15	Avenuc (Gigiri)
Loading-4	in		900	9 : 50	11		Icraf - Gigiri 4mins
	out			10 : 25		35	Break for tea
Loading-5	in		1,450	10 : 32	7		Muranga Rd
	out			10 : 37		5	Muthaiga View Place
Loading-6	in		1,000	10 : 49	12		Utalii Village Campus
	out			11 : 9		20	
Loading-7	in		1,120	11 : 35	26		Thika Rd - De la rue
	out			11 : 59		24	Kenya
Loading-8	in		50	12 : 1	2		Knya School of
	out			12 : 30		29	Monetary studies
Loading-9	in		50	12 : 31	1		KSMS gate two -
	out			12 : 42		11	staff houses
Loading-10	in		1,250	12 : 59	17		Kenya Utalii
	out			13 : 20		21	College
Loading-11	in		2,500	13 : 25	5		ICIPE - Kasarani
	out			14 : 19		54	
Dumping site	in		14,000	14 : 52	33		Dandora
Start dumping			150	14 : 53	1		
Finish dumping			0	15 : 25		32	
Dumping site	out		150	15 : 27	2		
Reach to workshop	in			16 : 5	38		Enterprise Rd
Total			43,330		244	270	Total min.: 514 min.
Collection			10,030		101	238	
Transportation			33,000		140		
Inside the dumping site			300		3	32	Dumping time.: 35 min.
Idling time						4	

### Time & Motion Study

Organization: BINS

Trip- 1 Date: 15th November 1997

Vehicle No. KZV006

Loading Capacity: 5.5ton

Researcher's name: Lennox M. Kadere

No. of Crew: 5

Estimated Volume: 4m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			8 : 1			Enterprise Rd
Loading-1	in		6,100	8 : 44	43		State House Rd
	out			8 : 47		3	
Loading-2	in		450	8 : 55	8		Kilimani Rd
	out			9 : 0		5	
Loading-3	in		500	9 : 15	15		Milimani Rd
	out			9 : 20		5	
Loading-4	in		700	9 : 27	7		Rose Avenue
	out			9 : 29		2	
Loading-5	in		300	9 : 36	7		Ralph Bunch Rd
	out			9 : 42		6	
Loading-6	in		450	9 : 49	7		Dennis Pritt Rd
	out			9 : 53		4	
Loading-7	in		750	9 : 59	6		Maalim Juma Rd
	out			10 : 4		5	
Loading-8	in		300	10 : 8	4		Galana Rd
	out			10 : 29		21	
Loading-9	in		350	10 : 34	5		Lenana Rd
	out			10 : 42		8	
Loading-10	in		200	10 : 44	2		Wood Ave
	out			10 : 52		8	
Loading-11	in		350	10 : 59	7		Ring Rd
	out			11 : 2		3	
Loading-12	in		150	11 : 4	2		Tigoni Rd
	out			11 : 7		3	
Loading-13	in		450	11 : 13	6		Chaka Rd
	out			11 : 20		7	
Dumping site	in		17,100	11 : 59	39		Dandora
Start dumping			300	12 : 2	3		
Finish dumping				12 : 42		40	
Dumping site	out		300	12 : 45	3		
Reach to workshop	in		16,500	13 : 20	35		Enterprise Rd
							Mileage not working
Total			45,250		199	120	Total min.: 319 min.
Collection			4,950		76	80	
Transportation			39,700		117		
Inside the dumping site			600		6	40	Dumping time.: 46 min.
Idling time							

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 17th November 1997

Vehicle No. KAE341U

Loading Capacity: 5.5ton

Researcher's name: Lennox M. Kadere

No. of Crew: 6

Estimated Volume: 4.5m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			8 : 30			Enterprise Rd
Loading-1	in		17,000	9 : 0	30		Thigiri Ridge Rd
	out			9 : 5		5	
Loading-2	in		50	9 : 6	1		Thigiri Ridge Rd
	out			9 : 7		1	
Loading-3	in		100	9 : 8	1		Thigiri Ridge Rd
	out			9 : 9		1	
Loading-4	in		50	9 : 9	0		Thigiri Ridge Rd
	out			9 : 10		1	
Loading-5	in		200	9 : 12	2		Thigiri Ridge Rd
	out			9 : 15		3	
Loading-6	in		350	9 : 16	1		Thigiri Ridge Rd
	out			9 : 18		2	
Loading-7	in		700	9 : 21	3		Thigiri Ridge Rd
	out			9 : 22		1	
Loading-8	in		950	9 : 25	3		Thigiri Ridge Rd
	out			9 : 26		1	
Loading-9	in		200	9 : 28	2		Thigiri Lane
	out			9 : 29		1	
Loading-10	in		500	9 : 30	1		Thigiri Lane
	out			9 : 30		0	
Loading-11	in		150	9 : 31	1		Thigiri close
	out			9 : 32		1	
Loading-12	in		500	9 : 36	4		Thigiri close
	out			9 : 37		1	
Loading-13	in		250	9 : 38	1		Thigiri Ridge Rd
	out			9 : 39		1	
Loading-14	in		150	9 : 40	1		Thigiri Ridge Rd
	out			9 : 41		1	
Loading-15	in		950	9 : 47	6		Thigiri Grove
	out			9 : 48		1	
Loading-16	in		350	9 : 49	1		Thigiri Grove
	out			9 : 50		1	
Loading-17	in		1,200	10 : 0	10		Thigiri Ridge Rd
	out			10 : 1		1	
Loading-18	in		50	10 : 2	1		Thigiri Rise
	out			10 : 3		1	
Loading-19	in		950	10 : 9	6		Thigiri Ridge Rd
	out			10 : 15		6	
Loading-20	in		40	10 : 15	0		Thigiri Ridge Rd
	out			10 : 16		1	
Loading-21	in		55	10 : 17	1		Rosslyne Estate
	out			10 : 19		2	Off Red Hill Rd

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 17th November 1997

Vehicle No. KAE341U

Loading Capacity: 5.5ton

Researcher's name: Lennox M. Kadere

No. of Crew: 6

Estimated Volume: 4.5m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-22	in		25	10 : 20	1		Rossllyne Estate
	out			10 : 22		2	Off Red Hill Rd
Loading-23	in		400	10 : 24	2		Rossllyne Estate
	out			10 : 26		2	
Loading-24	in		950	10 : 29	3		Red Hill Rd
	out			10 : 39		10	
Loading-25	in		200	10 : 40	1		Red Hill Rd
	out			10 : 41		1	
Loading-26	in		150	10 : 42	1		Red Hill Drive
	out			10 : 43		1	
Loading-27	in		350	10 : 45	2		2nd Rd after Dam
	out			10 : 47		2	Off Red Hill Drive
Loading-28	in		600	10 : 52	5		Road Connecting
	out			10 : 54		2	2nd Rd
Loading-29	in		250	10 : 55	1		2nd Rd after Dam
	out			10 : 56		1	
Loading-30	in		850	11 : 1	5		Last Rd to the Valley
	out			11 : 5		4	
Loading-31	in		300	11 : 6	1		Last Rd to the Valley
	out			11 : 9		3	
Loading-32	in		650	11 : 15	6		Last Rd to the Valley
	out			11 : 19		4	
Loading-33	in		950	11 : 25	6		Red Hill Rd - 1st turn
	out			11 : 29		4	
Loading-34	in		110	11 : 35	6		Red Hill Rd
	out			11 : 36		1	
Loading-35	in		500	11 : 40	4		Red Hill Rd (There was a
	out			11 : 45		5	Lunch break for 33min)
Loading-36	in		200	12 : 18	33		Tri Estate
	out			12 : 19		1	Tri Estate Rd
Loading-37	in		150	12 : 37	18		Tri Estate Rd
	out			12 : 47		10	
Loading-38	in		200	12 : 51	4		Off Mimosa Rd
	out			12 : 52		1	
Loading-39	in		150	12 : 57	5		Off Mimosa Rd
	out			13 : 1		4	
Loading-40	in		180	13 : 8	7		Off Mimosa Rd
	out			13 : 20		12	Runda Estate

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 17th November 1997

Vehicle No. KA834IU

Loading Capacity: 5.5ton

Researcher's name: Lennox M. Kadere

No. of Crew: 6

Estimated Volume: 4.5m<sup>3</sup>

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Dumping site in		19,000	13 : 58	38		Dandora
Start dumping		300	14 : 4	6		
Finish dumping		0	14 : 59		55	
Dumping site out		300	15 : 4	5		
Reach to workshop in			15 : 56	52		Enterprise Rd
Total		51,510		288	158	Total min.: 446 min.
Collection		14,910		157	103	
Transportation		36,000		120		
Inside the dumping site		600		11	55	Dumping time.: 66 min.
Idling time						

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 18th November 1997

Vehicle No. KAE341U

Loading Capacity: 5.5ton

Researcher's name: Lennox M. Kadere

No. of Crew: 5

Estimated Volume: 5m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			7 : 48			Enterprise Rd
Loading-1	in		14,000	8 : 19	31		Nyayo Estate
	out			9 : 51		92	
Loading-2	in		500	9 : 59	8		High Rise Estate
	out			10 : 50		51	
Loading-3	in		950	11 : 1	11		Langata Rd
	out			11 : 57		56	
Loading-4	in		200	12 : 1	4		Langata Rd
	out			12 : 50		49	
Loading-5	in		1,200	13 : 35	45		Langata Rd
	out			14 : 2		27	There was a lunch break of 35min from 14:10 - 14:45 (35mins)
Dumping site	in		16,500	15 : 20	78		Dandora
Start dumping			150	15 : 25	5		
Finish dumping				15 : 59		34	
Dumping site	out		150	16 : 3	4		
Reach to workshop	in		15,000	:			Enterprise Rd
							Mileage not working
Total			48,650		186	309	Total min.: 495 min.
Collection			2,850		68	275	
Transportation			45,500		74		
Inside the dumping site			300		9	34	Dumping time.: 43 min.
Idling time					35		

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 19th November 1997

Vehicle No. KAE34IU

Loading Capacity: 5.5ton

Researcher's name: Lennox M. Kadere

No. of Crew: 7

Estimated Volume: 4.5m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			8 : 5			Enterprise Rd
Loading-1	in		18,000	8 : 59	54		Limuru Rd
	out			9 : 9		10	
Loading-2	in		550	9 : 22	13		
	out			9 : 24		2	
Loading-3	in		450	9 : 37	13		United Nations Avenue
	out			9 : 42		5	
Loading-4	in		400	9 : 51	9		United Nations Avenue
	out			9 : 58		7	
Loading-5	in		300	10 : 2	4		United Nations Avenue
	out			10 : 20		18	
Loading-6	in		950	10 : 51	31		Ruaka Rd
	out			10 : 55		4	
Loading-7	in		250	10 : 58	3		Ruaka Rd
	out			11 : 10		12	
Loading-8	in		450	11 : 15	5		Ruaka Rd
	out			11 : 31		16	
Loading-9	in		550	11 : 39	8		Off Mimosa Rd
	out			11 : 42		3	
Loading-10	in		350	11 : 47	5		Mimosa Rd
	out			11 : 55		8	
Loading-11	in		400	12 : 2	7		Mimosa Rd
	out			12 : 10		8	
Loading-12	in		100	12 : 13	3		Mimosa Rd
	out			12 : 21		8	
Loading-13	in		900	12 : 39	18		Red Hill Rd
	out			12 : 44		5	
Loading-14	in		350	12 : 50	6		Red Hill Rd
	out			12 : 58		8	
Loading-15	in		250	13 : 2	4		Red Hill Rd
	out			13 : 8		6	
Loading-16	in		300	13 : 17	9		Red Hill Rd
	out			13 : 23		6	
Loading-17	in		400	13 : 30	7		Red Hill Rd
	out			13 : 33		3	
Loading-18	in		250	13 : 37	4		Off Red Hill Rd
	out			13 : 42		5	
Loading-19	in		450	13 : 49	7		Red Hill Close
	out			13 : 54		5	
Loading-20	in		350	13 : 59	5		At loading 20, the vehicle
	out			14 : 22		23	had a mechanical problem

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 19th November 1997

Vehicle No. KAE341U

Loading Capacity: 5.5ton

Researcher's name: Lennox M. Kadere

No. of Crew: 7

Estimated Volume: 4.5m<sup>3</sup>

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Dumping site in			:			Thus rendering not
Start dumping			:			operating. I left this loading
Finish dumping			:			point at 14:22 pm
Dumping site out			:			No dumping because of
Reach to workshop in			:			Mechanical problem
Total		26,000		215	162	Total min.: 377 min.
Collection		8,000		161	162	
Transportation		18,000		54		
Inside the dumping site		0		0	0	Dumping time.: min.
Idling time						



**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 20th November 1997

Vehicle No. KWP600

Loading Capacity: 8.0ton

Researcher's name: Lennox M. Kadere

No. of Crew: 6

Estimated Volume: 7.5m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	366009		8 : 19			Enterprise Rd
Loading-1	in	366013.7	4700	8 : 33	14		Nanyuki Rd - East
	out			9 : 5		32	African Industries
Loading-2	in	366014.2	500	9 : 10	5		Ol Kalou Rd -
	out			10 : 15		65	Cadbury (K) LTD.
Loading-3	in	366015.3	1100	10 : 35	20		Sasio Rd - The paper
	out			11 : 5		30	house LTD.
Loading-4	in	366018.4	3100	11 : 19	14		Sinfin Services LTD.
	out			11 : 30		11	Rangwe Rd
Loading-5	in	366021.3	2900	11 : 40	10		Road A - Off Enterprise Rd
	out			12 : 5		25	Thomazen (K) LTD.
Loading-6	in	366021.5	200	12 : 6	1		Road A - Creative
	out			12 : 18		12	Innovation LTD.
Loading-7	in	366021.5	20	12 : 19	1		Road - A - Off Enterprise Rd
	out			12 : 38		19	
Loading-8	in	366021.9	380	12 : 40	2		Road - A - Parklane motors
	out			13 : 9		29	
Loading-9	in	366022	100	13 : 10	1		Road A
	out			13 : 25		15	
Dumping site	in	366040.1	18100	14 : 21	56		Dandora
Start dumping		366040.3	200	14 : 27	6		
Finish dumping		366040.3	0	14 : 51		24	
Dumping site	out	366040.5	200	14 : 58	7		
Reach to workshop	in	366058.5	18000	15 : 52	54		Enterprise Rd
Total			49500		191	262	Total min.: 453 min.
Collection			8300		54	238	
Transportation			40800		124		
Inside the dumping site			400		13	24	Dumping time.: 37 min.
Idling time							

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 12th NOV. 1997

Vehicle No. KAE953R

Loading Capacity: 4TON

Researcher's name: Januarius K. Musyoki

No. of Crew: 4

Estimated Volume: 5.3m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	75253.7		8 : 30			75254.7 Fueling
Loading-1	in	75271.8	18,100	9 : 20	50		Karen & Ongata Rongai
	out			9 : 23		3	Area (Schedule) Mukinduri
Loading-2	in	75274.0	2,200	9 : 25	2		Rd off Langata Rd
	out			9 : 26		1	
Loading-3	in	75274.5	500	9 : 27	1		Residential Estates
	out			9 : 28		1	
Loading-4	in	75275.0	500	9 : 30	2		Residential Estates
	out			9 : 31		1	
Loading-5	in	75276.4	1,400	9 : 33	2		Residential Estates
	out			9 : 34		1	
Loading-6	in	75279.7	3,300	9 : 40	6		Ongata Rongai Rd
	out			9 : 48		8	
Loading-7	in	75280.0	300	9 : 51	3		Residential Estates
	out			9 : 52		1	
Loading-8	in	75280.7	700	9 : 54	2		Residential Estates
	out			9 : 55		1	
Loading-9	in	75283.6	2,900	10 : 10	15		Residential Estates
	out			10 : 11		1	
Loading-10	in	75284.7	1,100	10 : 13	2		Kikeni Lane
	out			10 : 14		1	
Loading-11	in	75284.73	30	10 : 15	1		Residential Estates
	out			10 : 16		1	
Loading-12	in	75285.6	870	10 : 17	1		Residential Estates
	out			10 : 19		2	
Loading-13	in	75286.0	400	10 : 20	1		Residential Estates
	out			10 : 21		1	
Loading-14	in	75287.0	1,000	10 : 24	3		Residential Estates
	out			10 : 25		1	
Loading-15	in	75287.9	900	10 : 27	2		Residential Estates
	out			10 : 28		1	
Loading-16	in	75288.0	100	10 : 29	1		Residential Estates
	out			10 : 30		1	
Loading-17	in	75288.0	0	10 : 32	2		Off Langata
	out			10 : 33		1	
Loading-18	in	75290.0	2,000	10 : 35	2		Road
	out			10 : 36		1	
Loading-19	in	75295.0	5,000	10 : 44	8		Residential Estates
	out			10 : 46		2	
Loading-20	in	75296.6	1,600	10 : 50	4		Residential Estates
	out			10 : 52		2	
Loading-21	in	75297.0	400	10 : 55	3		Residential Estates
	out			10 : 58		3	

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 12th NOV. 1997

Vehicle No. KAE953R

Loading Capacity: 4TON

Researcher's name: Januarius K. Musyoki

No. of Crew: 4

Estimated Volume: 5.3m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-22	in	75300.0	3,000	11 : 0	2		Residential Estates
	out			11 : 2		2	
Loading-23	in	75302.0	2,000	11 : 5	3		Residential Estates
	out			11 : 9		4	
Loading-24	in	75304.7	2,700	11 : 24	15		Hill Crest School
	out			11 : 30		6	
Loading-25	in	75306.0	1,300	11 : 35	5		
	out			11 : 36		1	
Loading-26	in	75306.9	900	11 : 40	4		Ndege Road
	out			11 : 41		1	
Loading-27	in	75307.4	500	11 : 43	2		
	out			11 : 45		2	
Loading-28	in	75308.0	600	11 : 46	1		Quarry Lane
	out			11 : 46		0	
Loading-29	in	75309.0	1,000	11 : 47	1		Residential Estates
	out			11 : 48		1	
Loading-30	in	75310.5	1,500	11 : 50	2		Residential Estates
	out			11 : 52		2	
Loading-31	in	75312.0	1,500	12 : 4	12		Residential Estates
	out			12 : 5		1	
Loading-32	in	75316.7	4,700	12 : 22	17		Residential Estates
	out			12 : 23		1	
Loading-33	in	75318.0	1,300	12 : 30	7		Lamiwia Rd
	out			12 : 31		1	
Loading-34	in	75319.9	1,900	12 : 39	8		Residential Estates
	out			12 : 41		2	
Loading-35	in	75320.7	800	12 : 43	2		Residential Estates
	out			12 : 44		1	
Loading-36	in	75322.0	1,300	12 : 48	4		Milima Rd
	out			12 : 50		2	
Loading-37	in	75323.0	1,000	12 : 52	2		Residential Estates
	out			12 : 54		2	
Loading-38	in	75325.0	2,000	13 : 2	8		Residential Estates
	out			13 : 4		2	
Loading-39	in	75326.0	1,000	13 : 6	2		Koitobos Rd South
	out			13 : 7		1	Langata Rd
Loading-40	in	75327.0	1,000	13 : 13	6		Residential Estates
	out			13 : 15		2	
Loading-41	in	75330.0	3,000	13 : 21	6		Residential Estates
	out			13 : 22		1	
Loading-42	in	75333.0	3,000	13 : 36	14		Residential Estates
	out			13 : 38		2	
Loading-43	in	75336.0	3,000	13 : 44	6		Residential Estates
	out			13 : 45		1	

### Time & Motion Study

Organization: BINS

Trip- 1 Date: 12th NOV. 1997

Vehicle No. KAE953R

Loading Capacity: 4TON

Researcher's name: Januarius K. Musyoki

No. of Crew: 4

Estimated Volume: 5.3m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-44	in	75337.0	1,000	13 : 50	5		Bongani East Rd
	out			13 : 54		4	
Loading-45	in	75338.5	1,500	14 : 5	11		Hotels
	out			14 : 10		5	
Loading-46	in	75339.0	500	14 : 14	4		Hotels
	out			14 : 16		2	
Loading-47	in	75341.0	2,000	14 : 20	4		Tamandani crafts Center
	out			14 : 21		1	
Loading-48	in	75342.0	1,000	14 : 29	8		Devine World Miss.
	out			:			
Loading-49	in	75343.0	1,000	14 : 35	6		Bogami East Rd
	out			14 : 38		3	Off Ushirika Rd
Loading-50	in	75343.1	100	14 : 38	0		Immediately after
	out			14 : 39		1	KBC station
Loading-51	in	75344.3	1,200	14 : 41	2		Tandala Rd
	out			14 : 47		6	
Loading-52	in	75345.0	700	14 : 49	2		Residential Estates
	out			14 : 51		2	
Loading-53	in	75347.0	2,000	15 : 0	9		Residential Estates
	out			15 : 10		10	
Loading-54	in	75348.0	1,000	15 : 14	4		Residential Estates
	out			15 : 15		1	
Loading-55	in	75350.0	2,000	15 : 18	3		Kasuku close
	out			15 : 20		2	
Loading-56	in	75350.1	120	15 : 20	0		Residential Estates
	out			15 : 21		1	
Loading-57	in	75354.0	3,880	15 : 30	9		Residential Estates
	out			15 : 35		5	
Dumping site	in						
Start dumping							
Finish dumping							
Dumping site	out						
Reach to workshop	in	75396.0	42,000	19 : 5	210		
Total			142,300		519	116	Total min.: 635 min.
Collection			82,200		259	116	
Transportation			60,100		260		
Inside the dumping site			0		0	0	Dumping time.: min.
Idling time							

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 13th November 1997

Vehicle No. KAE953R

Loading Capacity: 4TON

Researcher's name: Januarius K. Musyoki

No. of Crew: 4

Estimated Volume: 4.5m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	75396.9		9 : 10			75397.5 Fueling
							From the workshop, we left for dumping through
							Mombasa Rd, Airport North Rd, up to Dandora via
							Outering rd.
Dumping site	in	75412	15,100	9 : 48	38		
Start dumping		75413	1,000	9 : 54	6		
Finish dumping				10 : 45		51	
Dumping site	out	75414	1,000	11 : 5	20		
Reach to workshop	in						
Total			17,100		64	51	Total min.: 115 min.
Collection			0		0	0	
Transportation			15,100		38		
Inside the dumping site			2,000		26	51	Dumping time.: 77 min.
Idling time							

### Time & Motion Study

Organization: BINS

Trip- 2 Date: 13th November 1997

Vehicle No. KAE953R

Loading Capacity: 4TON

Researcher's name: Januarius K. Musyoki

No. of Crew: 4

Estimated Volume: 4m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	75414		11 : 5			Schedule covers Loresho
Loading-1	in	75427	13,000	11 : 30	25		& Kabete (From dumping site
	out			11 : 35		5	we went through Thika Rd
Loading-2	in	75428	1,000	11 : 39	4		Parklands Rd)
	out			11 : 40		1	Peponi Rd
Loading-3	in	75429	1,000	11 : 47	7		
	out			11 : 48		1	
Loading-4	in	75430	1,000	11 : 50	2		Peponi Close
	out			11 : 51		1	
Loading-5	in	75431	1,000	11 : 52	1		Peponi cliff Rd
	out			11 : 53		1	
Loading-6	in	75431.7	700	11 : 54	1		
	out			11 : 55		1	
Loading-7	in	75432.8	1,100	11 : 59	4		Off Peponi Rd
	out			12 : 1		2	
Loading-8	in	75433	200	12 : 3	2		Peopni Rd
	out			12 : 4		1	
Loading-9	in	75433.1	100	12 : 4	0		Mangu gardens
	out			12 : 5		1	Residential houses
Loading-10	in	75433.3	200	12 : 6	1		Mangu gardens
	out			12 : 7		1	Residential houses
Loading-11	in	75436	2,700	12 : 10	3		Mangu gardens
	out			12 : 13		3	Residential houses
Loading-12	in	75437.7	1,700	12 : 15	2		Mangu gardens
	out			12 : 16		1	Residential houses
Loading-13	in	75442	4,300	12 : 25	9		Kitisuru Rd
	out			12 : 28		3	
Loading-14	in	75443	1,000	12 : 29	1		Residential houses
	out			12 : 30		1	
Loading-15	in	75443.7	700	12 : 32	2		Residential houses
	out			12 : 33		1	
Loading-16	in	75444	300	12 : 34	1		Residential houses
	out			12 : 36		2	
Loading-17	in	75444.7	700	12 : 40	4		Kitisuru Rd
	out			12 : 42		2	
Loading-18	in	75445	300	12 : 43	1		Residential houses
	out			12 : 44		1	
Loading-19	in	75445.1	100	12 : 44	0		Residential houses
	out			12 : 45		1	
Loading-20	in	75445.15	50	12 : 45	0		Residential houses
	out			12 : 46		1	
Loading-21	in	75446	850	12 : 47	1		Residential houses
	out			12 : 48		1	

**Time & Motion Study**

Organization: BINS

Trip- 2 Date: 13th November 1997

Vehicle No. KAE953R

Loading Capacity: 4TON

Researcher's name: Januarius K. Musyoki

No. of Crew: 4

Estimated Volume: 4m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-22	in	75447	1,000	13 : 0	12		Residential houses
	out			13 : 4		4	
Loading-23	in	75447.05	50	13 : 4	0		Embassy of Argentina
	out			13 : 5		1	Residence
Loading-24	in	75447.5	450	13 : 6	1		Residential houses
	out			13 : 7		1	
Loading-25	in	75447.8	300	13 : 8	1		Residential houses
	out			13 : 9		1	
Loading-26	in	75448	200	13 : 11	2		Residential houses
	out			13 : 12		1	
Loading-27	in	75449	1,000	13 : 13	1		Residential houses
	out			13 : 14		1	
Loading-28	in	75449.5	500	13 : 16	2		Residential houses
	out			13 : 17		1	
Loading-29	in	75452	2,500	13 : 25	8		Residential houses
	out			13 : 26		1	
Loading-30	in	75453.8	1,800	13 : 28	2		Residential houses
	out			13 : 30		2	
Loading-31	in	75454	200	13 : 32	2		Residential houses
	out			13 : 34		2	
Loading-32	in	75454.7	700	13 : 33	-1		Peponi Rd
	out			13 : 35		2	
Loading-33	in	75454.8	100	13 : 36	1		Peponi Rd
	out			13 : 37		1	
Loading-34	in	75454.9	100	13 : 38	1		Residential houses
	out			13 : 38		0	
Loading-35	in	75455.4	500	13 : 41	3		Residential houses
	out			13 : 42		1	
Loading-36	in	75456	600	13 : 45	3		Residential houses
	out			13 : 47		2	
Loading-37	in	75456.5	500	13 : 49	2		Residential houses
	out			13 : 50		1	
Loading-38	in	75459	2,500	13 : 58	8		Residential houses
	out			14 : 0		2	
Loading-39	in	75462	3,000	14 : 30	30		Residential houses
	out			14 : 31		1	
Loading-40	in	75463	1,000	14 : 32	1		Residential houses
	out			14 : 34		2	
Loading-41	in	75464	1,000	14 : 36	2		Residential houses
	out			14 : 37		1	
Loading-42	in	75466	2,000	14 : 41	4		KHB Loresho
	out			14 : 43		2	Ridge Rd
Loading-43	in	75467	1,000	14 : 45	2		
	out			14 : 48		3	

**Time & Motion Study**

Organization: BINS

Trip- 2 Date: 13th November 1997

Vehicle No. KAE953R

Loading Capacity: 4TON

Researcher's name: Januarius K. Musyoki

No. of Crew: 4

Estimated Volume: 4m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-44	in	75469	2,000	14 : 55	7		Kibagare Lanc
	out			14 : 56		1	
Loading-45	in	75469.6	600	14 : 58	2		Kibagare Way
	out			14 : 59		1	
Loading-46	in	75470	400	15 : 1	2		Mexico Embassy
	out			15 : 5		4	
Loading-47	in	75470.5	500	15 : 6	1		
	out			15 : 7		1	
Loading-48	in	75471	500	15 : 9	2		Zimbabwe high
	out			15 : 10		1	Comm Residence
Loading-49	in	75472	1,000	15 : 13	3		Loresho Grove
	out			15 : 14		1	
Loading-50	in	75472.5	500	15 : 16	2		Residential houses
	out			15 : 18		2	
Loading-51	in	75473	500	15 : 20	2		Residential houses
	out			15 : 23		3	
Loading-52	in	75474	1,000	15 : 29	6		Loresho Rise
	out			15 : 40		11	
Loading-53	in	75474.6	600	15 : 41	1		Residential houses
	out			15 : 42		1	
Loading-54	in	75475	400	15 : 45	3		Residential houses
	out			15 : 48		3	
Loading-55	in	75475.5	500	15 : 55	7		Loresho crescent
	out			15 : 57		2	
Loading-56	in	75476	500	16 : 0	3		Residential houses
	out			16 : 3		3	
Loading-57	in	75476.5	500	16 : 5	2		Residential houses
	out			16 : 9		4	
Loading-58	in	75476.6	100	16 : 10	1		Residential houses
	out			16 : 12		2	
Loading-59	in	75477	400	16 : 15	3		Residential houses
	out			16 : 20		5	
Loading-60	in	75477.5	500	16 : 25	5		Residential houses
	out			16 : 30		5	



**Time & Motion Study**

Organization: BINS

Trip- 2 Date: 13th November 1997

Vehicle No. KAE953R

Loading Capacity: 4TON

Researcher's name: Januarius K. Musyoki

No. of Crew: 4

Estimated Volume: 4m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Dumping site	in	75500	22,500	17 : 30	60		
Start dumping		75501	1,000	17 : 34	4		
Finish dumping				:			
Dumping site	out	75502	1,000	18 : 15	41		
Reach to workshop	in	75516.3	14,300	19 : 15	60		
Total			102,300		375	115	Total min.: 490 min.
Collection			50,500		185	115	
Transportation			49,800		145		
Inside the dumping site			2,000		45	0	Dumping time.: 45 min.
Idling time							

# Time & Motion Study

Organization: BINS

Trip- 1 Date: 14th November 1997

Vehicle No. KAE953R

Loading Capacity: 4TON

Researcher's name: Januarius K. Musyoki

No. of Crew: 4

Estimated Volume: 5.5m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	75516		9 : 55			Schedule covers Loresho &
Loading-1	in	75517	1,000	10 : 0	5		Ind Area
	out			10 : 5		5	BIDCO Co., Ltd.
Loading-2	in	75531	14,000	10 : 45	40		MJA Rd, Uhuru highway
	out			11 : 0		15	Muthithi Rd (Chiromo,
Loading-3	in	75541	10,000	11 : 15	15		Medloinc Centre Naivasha
	out			11 : 16		1	H. way - Loresho Ridge)
Loading-4	in	75541.5	500	11 : 17	1		(Kaumoni Crescent)
	out			11 : 18		1	
Loading-5	in	75542	500	11 : 20	2		Residential houses
	out			11 : 21		1	
Loading-6	in	75542.8	800	11 : 23	2		Residential houses
	out			11 : 24		1	
Loading-7	in	75543	200	11 : 27	3		Residential houses
	out			11 : 29		2	
Loading-8	in	75543.6	600	11 : 30	1		Residential houses
	out			11 : 31		1	
Loading-9	in	75544	400	11 : 35	4		Kapiagai Rd
	out			11 : 36		1	
Loading-10	in	75544.1	150	11 : 36	0		Thogo Lane
	out			11 : 37		1	
Loading-11	in	75544.6	500	11 : 40	3		
	out			11 : 43		3	
Loading-12	in	75545	400	11 : 50	7		Shinyalu Close
	out			11 : 52		2	
Loading-13	in	75546	1,000	11 : 53	1		Residential Estates
	out			11 : 55		2	
Loading-14	in	75546.5	500	12 : 0	5		Residential Estates
	out			12 : 3		3	
Loading-15	in	75547	500	12 : 8	5		Mukabi Grove
	out			12 : 10		2	
Loading-16	in	75547.08	80	12 : 11	1		Mukabi Lane
	out			12 : 13		2	
Loading-17	in	75549	1,920	12 : 18	5		Mountain view Estate
	out			12 : 20		2	
Loading-18	in	75550	1,000	12 : 23	3		Waiyaki way, Chiromo Lane,
	out			12 : 28		5	Ngara Rd, Race course,
Loading-19	in	75552	2,000	12 : 30	2		Landhics Rd, Lusaka Rd
	out			12 : 35		5	
Loading-20	in	75553	1,000	12 : 38	3		
	out			12 : 40		2	
Loading-21	in	75553.1	100	12 : 41	1		To Industrial Area
	out			12 : 43		2	

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 14th November 1997

Vehicle No. KAE953R

Loading Capacity: 4TON

Researcher's name: Januarius K. Musyoki

No. of Crew: 4

Estimated Volume: 5.5m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-22	in	75571	17,900	13 : 30	47		Baricho Rd
	out			13 : 35		5	
Loading-23	in	75573.6	2,600	13 : 45	10		Chongone Rd
	out			13 : 50		5	Dunga Road to
Loading-24	in	75575	1,400	14 : 0	10		Factory Street
	out			14 : 10		10	Di DOBIE
Loading-25	in	75576	1,000	14 : 15	5		Enterprise Rd to Busia Rd
	out			14 : 20		5	(off)
Loading-26	in	75578.7	2,700	14 : 30	10		
	out			14 : 35		5	Kampara Rd
Loading-27	in	75580	1,300	14 : 40	5		to Kitui Rd
	out			15 : 0		20	Enterprise Rd, Likoni to
Loading-28	in	75584	4,000	15 : 30	30		Lunga Lunga Rd
	out			15 : 35		5	
Loading-29	in	75594	10,000	16 : 25	50		Off Enterprise Rd
	out			16 : 30		5	
Dumping site	in			:			
Start dumping				:			
Finish dumping				:			
Dumping site	out			:			
Reach to workshop	in	75595.5	1,500	16 : 35	5		
Total			79,550		281	119	Total min.: 400 min.
Collection			77,050		271	119	
Transportation			2,500		10		
Inside the dumping site			0		0	0	Dumping time.: min.
Idling time							

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 15th November 1997

Vehicle No. KAE953R

Loading Capacity: 4TON

Researcher's name: Januarius K. Musyoki

No. of Crew: 4

Estimated Volume: 4.5m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	75596		8 : 30			P/station (Fueling)
Loading-1	in	75597	1,000	9 : 5	35		Off Enterprise Rd
	out			10 : 0		55	
Loading-2	in	75598	1,000	10 : 12	12		We had a mechanical
	out			10 : 20		8	problem along Enterprise Rd at the bridge before Hillock
							in as from 10:25-13:10 on our way to dumping site
Dumping site	in	75617	19,000	14 : 5	225		
Start dumping		75618	1,000	14 : 10	5		
Finish dumping				15 : 20		70	
Dumping site	out	75619	1,000	15 : 24	4		
Reach to workshop	in			:			
Total			23,000		281	133	Total min.: 414 min.
Collection			1,000		12	63	
Transportation			20,000		95		
Inside the dumping site			2,000		9	70	Dumping time.: 79 min.
Idling time					165		

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 17th November 1997

Vehicle No. KAE953R

Loading Capacity: 4TON

Researcher's name: Januarius K. Musyoki

No. of Crew: 4

 Estimated Volume: 5m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	75740		8 : 15			
Loading-1	in	75749	9,000	8 : 40	25		Off Mombasa Rd
	out			9 : 28		48	
Loading-2	in	75749.7	700	9 : 35	7		
	out			10 : 10		35	
Loading-3	in	75750	300	10 : 14	4		
	out			10 : 20		6	
Loading-4	in	75750.8	800	10 : 28	8		British H. Comm.
	out			11 : 0		32	
Loading-5	in	75752	1,200	11 : 10	10		Israel Embassy
	out			11 : 20		10	
Loading-6	in	75752	50	11 : 40	20		
	out			11 : 41		1	University way to
Loading-7	in	75756	4,000	11 : 55	14		Kijabe Street
	out			12 : 30		35	
Loading-8	in	75760	4,000	12 : 55	25		Off Waiyaki way
	out			13 : 10		15	United Nations
Loading-9	in	75760.7	700	13 : 13	3		Palm court off
	out			:			Waiyaki way
Loading-10	in	75761	300	13 : 15	2		David Osieli Rd
	out			13 : 17		2	
Loading-11	in	75763	2,000	13 : 25	8		ABC Place off Waiyaki way
	out			13 : 32		7	
Loading-12	in	75767	4,000	13 : 55	23		Off Waiyaki way
	out			14 : 0		5	Parklands Rd - Karuna Rd
Loading-13	in	75768	1,000	14 : 5	5		Mpaka Rd
	out			15 : 20		75	
Loading-14	in	75769	1,000	15 : 25	5		Hotels along the road
	out			15 : 30		5	
Loading-15	in	75769.7	700	15 : 40	10		Hotels along the road
	out			15 : 45		5	
Loading-16	in	75770	300	15 : 50	5		Hotels along the road
	out			16 : 0		10	
Dumping site	in	75784	14,000	17 : 45	105		
Start dumping		75785.5	1,500	17 : 50	5		
Finish dumping				18 : 30		40	
Dumping site	out	75786.5	1,000	18 : 35	5		
Reach to workshop	in	75805.5	19,000	19 : 20	45		
Total			65,550		334	331	Total min.: 665 min.
Collection			21,050		149	291	
Transportation			42,000		175		
Inside the dumping site			2,500		10	40	Dumping time.: 50 min.
Idling time							

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 18th November 1997

Vehicle No. KAE953R

Loading Capacity: 4TON

Researcher's name: Januarius K. Musyoki

No. of Crew: 4

Estimated Volume: 4.2m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	75805.5		9 : 30			Msa Rd to Diamond
Loading-1	in	75810	4,500	9 : 45	15		Off Bunyala Rd
	out			9 : 50		5	
Loading-2	in	75810.1	100	10 : 0	10		Kiambore Rd
	out			10 : 3		3	
Loading-3	in	75813	2,900	10 : 15	12		Coconut Restaurant
	out			10 : 25		10	
Loading-4	in	75813.05	50	10 : 30	5		Off Hospital Rd
	out			10 : 45		15	Waiyaki way, Ring Rd
Loading-5	in	75819	5,950	11 : 10	25		Westlands - Rapta Rd
	out			11 : 35		25	
Loading-6	in	75826	7,000	11 : 40	5		
	out			11 : 45		5	
Loading-7	in	75832	6,000	12 : 0	15		J. Gichuru Rd
	out			12 : 5		5	(Mzima Springs)
Loading-8	in	75832.1	100	12 : 6	1		
	out			12 : 7		1	
Loading-9	in	75834	1,900	12 : 8	1		River side Drive
	out			12 : 9		1	
Loading-10	in	75834.15	150	12 : 10	1		
	out			12 : 12		2	
Loading-11	in	75834.3	150	12 : 17	5		
	out			12 : 19		2	
Loading-12	in	75834.5	200	12 : 24	5		
	out			12 : 25		1	
Loading-13	in	75835	500	12 : 35	10		
	out			12 : 39		4	
Loading-14	in	75835.7	700	12 : 41	2		
	out			12 : 42		1	
Loading-15	in	75835.75	50	12 : 43	1		
	out			13 : 0		17	
Loading-16	in	75836	250	13 : 5	5		
	out			13 : 8		3	
Loading-17	in	75837	1,000	13 : 12	4		River side Drive
	out			13 : 13		1	
Loading-18	in	75837.7	700	13 : 15	2		
	out			13 : 16		1	
Loading-19	in	75838	300	13 : 20	4		
	out			13 : 21		1	
Loading-20	in	75838.7	700	13 : 22	1		
	out			13 : 23		1	
Loading-21	in	75839	300	13 : 28	5		
	out			13 : 34		6	

**Time & Motion Study**

Organization: BINS

Trip- 1 Date: 18th November 1997

Vehicle No. KAE953R

Loading Capacity: 4TON

Researcher's name: Januarius K. Musyoki

No. of Crew: 4

Estimated Volume: 4.2m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-22	in	75839.5	500	13 : 36	2		
	out			13 : 40		4	Mechanical problem from
Loading-23	in	75839.9	400	14 : 41	61		13:45-14:40 (idling)
	out			14 : 42		1	
Loading-24	in	75840	100	14 : 43	1		River side Lane
	out			14 : 44		1	
Loading-25	in	75840.5	500	14 : 46	2		
	out			14 : 50		4	
Loading-26	in	75841	500	14 : 52	2		
	out			14 : 55		3	
Loading-27	in	75841.9	900	15 : 0	5		Riverside banks
	out			15 : 5		5	
Loading-28	in	75842	100	15 : 10	5		
	out			15 : 12		2	
Loading-29	in	75842.4	400	15 : 20	8		
	out			15 : 22		2	
Loading-30	in	75844	1,600	15 : 40	18		Gard on Road 1
	out			15 : 52		12	20mins breakdown
Dumping site	in	75853	9,000	16 : 30	38		
Start dumping		75854	1,000	16 : 33	3		
Finish dumping				17 : 40		67	
Dumping site	out			17 : 45	5		
Reach to workshop	in	75872	18,000	18 : 55	70		
Total			66,500		354	211	Total min.: 565 min.
Collection			34,000		168	144	
Transportation			31,500		103		
Inside the dumping site			1,000		8	67	Dumping time.: 75 min.
Idling time					75		

# Time & Motion Study

Organization: BINS

Trip- 1 Date: 19th November 1997

Vehicle No. KAE953R

Loading Capacity: 4TON

Researcher's name: Januarius K. Musyoki

No. of Crew: 4

Estimated Volume: 3.9m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	75940		9 : 0			MSA Rd, Uhuru highway
Loading-1	in	75949	9,000	9 : 20	20		Off Ngong Rd
	out			9 : 30		10	
Loading-2	in	75953	4,000	9 : 45	15		
	out			9 : 55		10	
Loading-3	in	75954	1,000	10 : 0	5		
	out			10 : 6		6	
Loading-4	in	75960	6,000	11 : 30	84		Mechanical breakdown
	out			12 : 20		50	
Loading-5	in	75961	1,000	12 : 21	1		
	out			12 : 28		7	
Loading-6	in	75963	2,000	12 : 30	2		Mbagathi Rd
	out			12 : 31		1	
Loading-7	in	75965	2,000	12 : 35	4		From Hotels &
	out			12 : 40		5	Residential houses
Loading-8	in	75969	4,000	12 : 47	7		From Hotels &
	out			12 : 49		2	Residential houses
Loading-9	in	75970	1,000	12 : 52	3		From Hotels &
	out			12 : 55		3	Residential houses
Loading-10	in	75972	2,000	12 : 59	4		From Hotels &
	out			13 : 3		4	Residential houses
Loading-11	in	75974	2,000	13 : 9	6		From Hotels &
	out			:			Residential houses
Dumping site	in	76004	30,000	14 : 15	66		To workshop
Start dumping		76005	1,000	14 : 19	4		
Finish dumping				14 : 54		35	
Dumping site	out	76006	1,000	14 : 57	3		
Reach to workshop	in	76026	20,000	15 : 20	23		
Total			86,000		247	133	Total min.: 380 min.
Collection			25,000		81	98	
Transportation			59,000		109		
Inside the dumping site			2,000		7	35	Dumping time.: 42 min.
Idling time					50		stuck in mud 50mins (when?)





***CITY BINS***



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**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 12th November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 3

Estimated Volume: 12m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	5586.2		8 : 31			Shimo La Tewa Rd
Loading-1	in	5595.9	9700	9 : 3	32		1st Ave Parklands
	out			9 : 8		5	
Loading-2	in	5596.1	200	9 : 9	1		1st Ave Parklands
	out			9 : 9		0	
Loading-3	in	5596.5	400	9 : 11	2		Masari Rd
	out			9 : 12		1	
Loading-4	in	5596.7	200	9 : 13	1		Bhanderi Rd
	out			9 : 13		0	
Loading-5	in	5596.8	100	9 : 14	1		Bhanderi Rd
	out			9 : 15		1	
Loading-6	in	5597	200	9 : 16	1		2nd Ave Parklands
	out			9 : 16		0	
Loading-7	in	5597.1	100	9 : 17	1		2nd Ave Parklands
	out			9 : 17		0	
Loading-8	in	5597.4	300	9 : 18	1		2nd Ave Parklands
	out			9 : 18		0	
Loading-9	in	5598	600	9 : 21	3		2nd Ave Parklands
	out			9 : 23		2	
Loading-10	in	5598.1	100	9 : 23	0		2nd Ave Parklands
	out			9 : 24		1	
Loading-11	in	5598.3	200	9 : 26	2		2nd Ave Parklands
	out			9 : 27		1	
Loading-12	in	5598.5	200	9 : 29	2		2nd Ave Parklands
	out			9 : 33		4	
Loading-13	in	5598.8	300	9 : 38	5		2nd Ave Parklands
	out			9 : 41		3	
Loading-14	in	5599.3	500	9 : 44	3		2nd Ave Parklands
	out			9 : 50		6	
Loading-15	in	5599.4	100	9 : 51	1		Off 2nd Ave Parklands
	out			9 : 51		0	
Loading-16	in	5599.5	100	9 : 52	1		Ndovu Ahamed Lane
	out			9 : 54		2	
Loading-17	in	5599.6	100	9 : 56	2		Ndovu Ahamed Lane
	out			9 : 56		0	
Loading-18	in	5599.7	100	9 : 59	3		Ndovu Ahamed Lane
	out			10 : 0		1	
Loading-19	in	5599.8	100	10 : 0	0		Ndovu Ahamed Lane
	out			10 : 1		1	
Loading-20	in	5600.1	300	10 : 4	3		Msanaka Rd
	out			10 : 4		0	
Loading-21	in	5600.3	200	10 : 5	1		Msanaka Rd
	out			10 : 5		0	

**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 12th November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 3

Estimated Volume: 12m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-22	in	5600.4	100	10 : 6	1		Off Msanaka Rd
	out			10 : 7		1	
Loading-23	in	5600.5	100	10 : 9	2		Off Msanaka Rd
	out			10 : 11		2	
Loading-24	in	5600.51	10	10 : 13	2		Msanaka Rd
	out			10 : 13		0	
Loading-25	in	5600.52	10	10 : 13	0		Msanaka Rd
	out			10 : 19		6	
Loading-26	in	5600.6	80	10 : 19	0		2nd Ave Parklands
	out			10 : 21		2	
Loading-27	in	5600.7	100	10 : 21	0		2nd Ave Parklands
	out			10 : 21		0	
Loading-28	in	5601	300	10 : 24	3		2nd Ave Parklands
	out			10 : 26		2	
Loading-29	in	5601.2	200	10 : 28	2		2nd Ave Parklands
	out			10 : 29		1	
Loading-30	in	5601.5	300	10 : 30	1		2nd Ave Parklands
	out			10 : 34		4	
Loading-31	in	5601.9	400	10 : 35	1		Second Parklands Avenue
	out			10 : 40		5	
Loading-32	in	5602.8	900	10 : 43	3		First Parklands Avenue
	out			10 : 48		5	
Loading-33	in	5602.9	100	10 : 49	1		2nd Ave Parklands
	out			10 : 49		0	
Loading-34	in	5603	100	10 : 50	1		2nd Ave Parklands
	out			10 : 52		2	
Loading-35	in	5603.6	600	10 : 54	2		5th Ave Parklands
	out			10 : 54		0	
Loading-36	in	5603.8	200	10 : 55	1		5th Ave Parklands
	out			10 : 56		1	
Loading-37	in	5603.82	20	10 : 58	2		5th Ave Parklands
	out			10 : 58		0	
Loading-38	in	5603.9	80	10 : 58	0		6th Ave Parklands
	out			10 : 59		1	
Loading-39	in	5603.93	30	10 : 59	0		6th Ave Parklands
	out			10 : 59		0	
Loading-40	in	5604	70	11 : 0	1		6th Ave Parklands
	out			11 : 0		0	
Loading-41	in	5604.5	500	11 : 2	2		6th Ave Parklands
	out			11 : 3		1	
Loading-42	in	5604.6	100	11 : 4	1		6th Ave Parklands
	out			11 : 6		2	
Loading-43	in	5605.6	1000	11 : 10	4		Limuru Rd
	out			11 : 11		1	

**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 12th November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 3

Estimated Volume: 12m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-44	in	5606.6	1000	11 : 13	2		Limuru Rd
	out			11 : 15		2	
Loading-45	in	5606.7	100	11 : 15	0		Limuru Rd
	out			11 : 17		2	
Loading-46	in	5606.74	40	11 : 17	0		Limuru Rd
	out			11 : 18		1	
Loading-47	in	5606.8	60	11 : 19	1		Limuru Rd
	out			11 : 19		0	
Loading-48	in	5607.1	300	11 : 23	4		Limuru Rd
	out			11 : 23		0	
Loading-49	in	5607.15	50	11 : 26	3		Limuru Rd
	out			11 : 27		1	
Loading-50	in	5607.8	650	11 : 29	2		Limuru Rd
	out			11 : 31		2	
Loading-51	in	5608.1	300	11 : 32	1		Limuru Rd
	out			11 : 33		1	
							Idling Time 11:49-11:59
							10mins
							Idling Time 12:10-12:11
							1min
							Idling Time 12:15-12:18
							3mins
Dumping site	in	5621.9	13800	12 : 19	46		Komorok Rd
Start dumping		5622.1	200	12 : 21	2		
Finish dumping		5622.2	100	13 : 16		55	
Dumping site	out	5623	300	13 : 19	3		Komorok Rd
Reach to workshop	in			:			
Total			36300		160	128	Total min.: 288 min.
Collection			12200		77	73	
Transportation			23500		64		
Inside the dumping site			600		5	55	Dumping time.: 60 min.
Idling time					14		

### Time & Motion Study

Organization: City Bins

Trip- 2 Date: 12th November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 3

Estimated Volume: 14m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	5622.5		13 : 19			Komorok Rd
Loading-1	in	5631.1	8600	13 : 36	17		Lunga Lunga Rd
	out			13 : 52		16	
Loading-2	in	5635.6	4500	14 : 1	9		Enterprise Rd
	out			14 : 5		4	Idling Time 14:05-14:27 22min
Loading-3	in	5635.61	10	14 : 28	23		Enterprise Rd
	out			15 : 8		40	
Loading-4	in	5636.5	890	15 : 16	8		Enterprise Rd
	out			15 : 22		6	
Dumping site	in	5651.5	15000	15 : 52	30		Komorok Rd
Start dumping		5651.8	300	15 : 55	3		
Finish dumping		5651.8	0	16 : 10		15	
Dumping site	out	5652	200	16 : 13	3		
Reach to workshop	in	5665.6	13600	16 : 40	27		Shimo La Tewa
Total			43100		120	81	Total min.: 201 min.
Collection			5400		18	66	
Transportation			37200		74		
Inside the dumping site			500		6	15	Dumping time.: 21 min.
Idling time					22		

**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 13 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 3

 Estimated Volume: 10m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	5665.6		8 : 32			Shimo La Tewa Rd
Loading-1	in	5667.5	1900	8 : 38	6		Masaba Rd
	out			8 : 40		2	
Loading-2	in	5667.7	200	8 : 42	2		Masaba Rd
	out			8 : 43		1	
Loading-3	in	5668.7	1000	8 : 46	3		Masaba Rd
	out			8 : 48		2	
Loading-4	in	5668.9	200	8 : 48	0		Masaba Rd
	out			8 : 49		1	
Loading-5	in	5669.3	400	8 : 50	1		Masaba Rd
	out			8 : 50		0	
Loading-6	in	5669.4	100	8 : 50	0		Masaba Rd
	out			8 : 51		1	
Loading-7	in	5669.41	10	8 : 51	0		Masaba Rd
	out			8 : 53		2	
Loading-8	in	5669.7	290	8 : 54	1		Masaba Rd
	out			8 : 54		0	
Loading-9	in	5670	300	8 : 55	1		Masaba Rd
	out			8 : 55		0	Idling time 8:55-8:58 3mins
Loading-10	in	5675	5000	9 : 6	11		Mbagathi Way
	out			9 : 6		0	
Loading-11	in	5675.6	600	9 : 10	4		Mbagathi Way
	out			9 : 14		4	
Loading-12	in	5675.7	100	9 : 14	0		Mbagathi Way
	out			9 : 15		1	
Loading-13	in	5675.8	100	9 : 16	1		Mbagathi Way
	out			9 : 17		1	
Loading-14	in	5675.9	100	9 : 18	1		Mbagathi Way
	out			9 : 19		1	
Loading-15	in	5676.1	200	9 : 21	2		Mbagathi Way
	out			9 : 22		1	
Loading-16	in	5676.2	100	9 : 26	4		Mbagathi Way
	out			9 : 27		1	
Loading-17	in	5677.2	1000	9 : 31	4		Bagamoyo Rd
	out			9 : 33		2	
Loading-18	in	5677.4	200	9 : 33	0		Loginye Rd
	out			9 : 35		2	
Loading-19	in	5677.8	400	9 : 36	1		Mbaruk Rd
	out			9 : 37		1	
Loading-20	in	5678.9	1100	9 : 40	3		Ngong Rd
	out			9 : 43		3	
Loading-21	in	5679	100	9 : 43	0		Ngong Rd
	out			9 : 44		1	



**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 13 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 3

Estimated Volume: 10m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-22	in	5680.2	1200	9 : 47	3		Woodlands Rd
	out			9 : 48		1	
Loading-23	in	5680.9	700	9 : 49	1		Lenana Rd
	out			9 : 49		0	
Loading-24	in	5683.7	2800	9 : 54	5		Statehouse Rd
	out			9 : 55		1	
Loading-25	in	5685.3	1600	9 : 59	4		Riverside Rd
	out			10 : 0		1	
Loading-26	in	5686.5	1200	10 : 5	5		Garden Rd
	out			10 : 5		0	
Loading-27	in	5687.1	600	10 : 8	3		Chiromo Access Rd
	out			10 : 17		9	
Loading-28	in	5688.2	1100	10 : 21	4		Chiromo Access Rd
	out			10 : 23		2	
Loading-29	in	5688.9	700	10 : 26	3		Riverside Rd
	out			10 : 29		3	
Loading-30	in	5689.1	200	10 : 30	1		Riverside Rd
	out			10 : 33		3	
Loading-31	in	5689.3	200	10 : 35	2		Riverside Rd
	out			10 : 40		5	
Loading-32	in	5689.7	400	10 : 43	3		Riverside Rd
	out			10 : 46		3	
Loading-33	in	5690.2	500	10 : 49	3		Riverside Rd
	out			10 : 49		0	
Loading-34	in	5690.7	500	10 : 52	3		Riverside Rd
	out			10 : 54		2	
Loading-35	in	5691.5	800	10 : 58	4		Riverside Garden
	out			10 : 58		0	
Loading-36	in	5692	500	11 : 0	2		Riverside Garden
	out			11 : 1		1	
Loading-37	in	5694.6	2600	11 : 4	3		Riverside Garden
	out			11 : 5		1	
Loading-38	in	5695.2	600	11 : 8	3		Riverside Garden
	out			11 : 10		2	
Loading-39	in	5695.7	500	11 : 13	3		Mandera Rd
	out			11 : 15		2	
Loading-40	in	5696.5	800	11 : 18	3		Mandera Rd
	out			11 : 19		1	
Loading-41	in	5698	1500	11 : 23	4		Gichugu Rd
	out			11 : 26		3	
Loading-42	in	5698.7	700	11 : 30	4		Mandera Rd
	out			11 : 40		10	
Loading-43	in	5699	300	11 : 41	1		Mandera Rd
	out			11 : 44		3	

**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 13 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 3

Estimated Volume: 10m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-44	in	5699.01	10	11 : 44	0		Mandera Rd
	out			11 : 44		0	
Loading-45	in	5699.1	90	11 : 46	2		Mandera Rd
	out			11 : 48		2	
Loading-46	in	5700.3	1200	11 : 51	3		Dik Dik Garden
	out			11 : 53		2	
Loading-47	in	5701	700	11 : 55	2		Mandera Rd
	out			11 : 56		1	
Loading-48	in	5701.4	400	11 : 57	1		Mandera Rd
	out			11 : 59		2	
Loading-49	in	5701.9	500	12 : 1	2		Mandera Rd
	out			12 : 5		4	
Loading-50	in	5702.8	900	12 : 11	6		Makueni Rd
	out			12 : 11		0	
Loading-51	in	5703.5	700	12 : 13	2		Makueni Rd
	out			12 : 15		2	
Loading-52	in	5703.8	300	12 : 18	3		Makueni Rd
	out			12 : 19		1	
Loading-53	in	5705.2	1400	12 : 22	3		Ole Odome Rd
	out			12 : 22		0	
Loading-54	in	5705.4	200	12 : 23	1		Ole Odome Rd
	out			12 : 27		4	
Loading-55	in	5706.5	1100	12 : 30	3		Kingara Rd
	out			12 : 31		1	
Loading-56	in	5706.7	200	12 : 35	4		Kingara Rd
	out			12 : 38		3	
Loading-57	in	5707.9	1200	12 : 43	5		Kingara Rd
	out			12 : 44		1	
Loading-58	in	5708.2	300	12 : 46	2		Muringa Rd
	out			12 : 48		2	Idling time 13:05-13:35 30min
Dumping site	in	5731.7	23500	14 : 8	80		Komorock Rd
Start dumping		5731.7	0	14 : 8	0		
Finish dumping		5731.9	200	14 : 49		41	
Dumping site	out	5732.1	200	14 : 50	1		
Reach to workshop	in	5749.9	17800	15 : 25	35		Shimo La Tewa Rd
Total			84300		267	146	Total min.: 413 min.
Collection			40700		142	105	
Transportation			43200		91		
Inside the dumping site			400		1	41	Dumping time.: 42 min.
Idling time					33		

**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 14 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 3

Estimated Volume: 14m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	5749.9		8 : 35			Shimo La Tewa
Loading-1	in	5750.4	500	8 : 50	15		2nd Ave Eastleigh
	out			8 : 50		0	
Loading-2	in	5751.3	900	9 : 7	17		6th street Eastleigh
	out			9 : 9		2	
Loading-3	in	5752.5	1200	9 : 15	6		Juja Rd
	out			9 : 18		3	
Loading-4	in	5752.8	300	9 : 20	2		Kipanga Athani St
	out			9 : 20		0	
Loading-5	in	5753	200	9 : 21	1		Kipanga Athani St
	out			9 : 23		2	
Loading-6	in	5753.4	400	9 : 25	2		Juja Rd
	out			9 : 26		1	
Loading-7	in	5753.6	200	9 : 27	1		Muratina St
	out			9 : 28		1	
Loading-8	in	5754.3	700	9 : 31	3		North View Rd
	out			9 : 36		5	
Loading-9	in	5754.7	400	9 : 39	3		North View Rd
	out			9 : 40		1	
Loading-10	in	5755	300	9 : 41	1		North View Rd
	out			9 : 43		2	Idling time 9:45-10:03 18mins
Loading-11	in	5755.6	600	10 : 3	20		Agoi Rd
	out			10 : 6		3	
Loading-12	in	5755.9	300	10 : 7	1		Agoi Rd
	out			10 : 8		1	
Loading-13	in	5756.1	200	10 : 8	0		Pamba Rd
	out			10 : 9		1	
Loading-14	in	5756.4	300	10 : 11	2		Pareto Rd
	out			10 : 13		2	
Loading-15	in	5756.5	100	10 : 15	2		Pareto Rd
	out			10 : 31		16	
Loading-16	in	5758.2	1700	10 : 37	6		Old Race Course Rd
	out			10 : 39		2	
Loading-17	in	5758.5	300	10 : 40	1		Old Race Course Rd
	out			10 : 40		0	
Loading-18	in	5759.3	800	10 : 44	4		Kombo Munyui Rd
	out			10 : 56		12	
Loading-19	in	5760.8	1500	11 : 2	6		Kinshasa Rd
	out			11 : 3		1	
Loading-20	in	5761	200	11 : 4	1		Park Rd
	out			11 : 4		0	
Loading-21	in	5761.5	500	11 : 6	2		Muranga Rd
	out			11 : 7		1	

**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 14 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 3

Estimated Volume: 14m<sup>3</sup>

Location		Mileage (kn)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-22	in	5761.52	20	11 : 8	1		Muranga Rd
	out			11 : 8		0	
Loading-23	in	5761.6	80	11 : 9	1		Muranga Rd
	out			11 : 10		1	
Loading-24	in	5761.7	100	11 : 12	2		Muranga Rd
	out			11 : 14		2	
Loading-25	in	5761.9	200	11 : 14	0		Muranga Rd
	out			11 : 21		7	
Loading-26	in	5761.95	50	11 : 21	0		Okoth Aura Rd
	out			11 : 23		2	
Loading-27	in	5762	50	11 : 23	0		Okoth Aura Rd
	out			11 : 25		2	
Loading-28	in	5762.5	500	11 : 28	3		Desai Rd
	out			11 : 30		2	
Loading-29	in	5762.6	100	11 : 30	0		Desai Rd
	out			11 : 32		2	
Loading-30	in	5763.1	500	11 : 33	1		Muranga Rd
	out			11 : 36		3	
Loading-31	in	5763.7	600	11 : 38	2		Kolobot Rd
	out			11 : 40		2	
Loading-32	in	5763.9	200	11 : 41	1		Kolobot Rd
	out			11 : 42		1	
Loading-33	in	5764	100	11 : 43	1		Mushembi Rd
	out			11 : 43		0	
Loading-34	in	5764.4	400	11 : 45	2		Ngara Rd
	out			11 : 47		2	
Loading-35	in	5764.6	200	11 : 48	1		Ngara Rd
	out			11 : 48		0	
Loading-36	in	5764.6	0	11 : 49	1		Ngara Rd
	out			11 : 49		0	
Loading-37	in	5764.7	100	11 : 50	1		Mushembi Rd
	out			11 : 51		1	
Loading-38	in	5765.1	400	11 : 52	1		Mushembi Rd
	out			11 : 53		1	
Loading-39	in	5765.2	100	11 : 53	0		Mushembi Rd
	out			11 : 57		4	
Loading-40	in	5765.3	100	11 : 58	1		Mushembi Rd
	out			11 : 58		0	
Loading-41	in	5765.8	500	12 : 0	2		Ngara Rd
	out			12 : 0		0	
Loading-42	in	5766.1	300	12 : 2	2		Ngara Rd
	out			12 : 5		3	
Loading-43	in	5766.4	300	12 : 6	1		Kolobot Rd
	out			12 : 8		2	

**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 14 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 3

Estimated Volume: 14m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-44	in	5766.5	100	12 : 9	1		Kolobot Rd
	out			12 : 10		1	
Loading-45	in	5766.8	300	12 : 11	1		Forest Rd
	out			12 : 15		4	
Loading-46	in	5767.2	400	12 : 16	1		Parklands Rd
	out			12 : 21		5	
Loading-47	in	5767.3	100	12 : 23	2		Parklands Rd
	out			12 : 30		7	
Loading-48	in	5767.6	300	12 : 32	2		Wambugu Rd
	out			12 : 32		0	
Loading-49	in	5767.8	200	12 : 33	1		Wambugu Rd
	out			12 : 33		0	
Loading-50	in	5767.9	100	12 : 34	1		Wambugu Rd
	out			12 : 34		0	
Loading-51	in	5768.1	200	12 : 34	0		Wambugu Rd
	out			12 : 35		1	
Loading-52	in	5768.11	10	12 : 36	1		Wambugu Rd
	out			12 : 36		0	
Loading-53	in	5768.14	30	12 : 37	1		Wambugu Rd
	out			12 : 38		1	
Loading-54	in	5768.3	160	12 : 38	0		Wambugu Rd
	out			12 : 44		6	
Loading-55	in	5768.5	200	12 : 49	5		Wambugu Rd
	out			13 : 6		17	
Loading-56	in	5769	500	13 : 11	5		Wambugu Rd
	out			13 : 17		6	
Loading-57	in	5769.4	400	13 : 23	6		1st Parklands Ave
	out			13 : 30		7	
Loading-58	in	5769.5	100	13 : 31	1		1st Parklands Ave
	out			13 : 32		1	
Loading-59	in	5769.8	300	13 : 35	3		1st Parklands Ave
	out			13 : 39		4	
Loading-60	in	5770.4	600	13 : 44	5		1st Parklands Ave
	out			13 : 47		3	
Loading-61	in	5770.6	200	13 : 49	2		2nd Parklands Ave
	out			13 : 50		1	
Loading-62	in	5770.8	200	13 : 51	1		2nd Parklands Ave
	out			13 : 54		3	
Loading-63	in	5771.3	500	13 : 56	2		Batu Batu Rd
	out			13 : 58		2	
Loading-64	in	5771.4	100	13 : 59	1		Batu Batu Rd
	out			14 : 6		7	
Loading-65	in	5771.5	100	14 : 7	1		1st Parklands Rd
	out			14 : 8		1	

**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 14 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 3

Estimated Volume: 14m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-66	in	5771.6	100	14 : 10	2		1st Parklands Rd
	out			14 : 10		0	
Loading-67	in	5771.9	300	14 : 11	1		1st Ave Parklands
	out			14 : 16		5	
Loading-68	in	5772.2	300	14 : 17	1		1st Ave Parklands
	out			14 : 18		1	
Loading-69	in	5772.25	50	14 : 18	0		1st Ave Parklands
	out			14 : 18		0	
Loading-70	in	5772.8	550	14 : 23	5		1st Ave Parklands
	out			14 : 25		2	
Loading-71	in	5773.1	300	14 : 27	2		Bhanderi Rd
	out			14 : 31		4	
Loading-72	in	5773.2	100	14 : 32	1		Bhanderi Rd
	out			14 : 33		1	
Loading-73	in	5773.3	100	14 : 34	1		Bhanderi Rd
	out			14 : 36		2	
Loading-74	in	5773.6	300	14 : 38	2		Mpaka Rd
	out			14 : 39		1	
Loading-75	in	5774.3	700	14 : 41	2		Mpaka Rd
	out			14 : 43		2	
Loading-76	in	5774.6	300	14 : 47	4		Mpaka Rd
	out			14 : 48		1	
Loading-77	in	5774.8	200	14 : 49	1		Mpaka Rd
	out			14 : 51		2	
Loading-78	in	5774.9	100	14 : 52	1		Mpaka Rd
	out			14 : 53		1	
Loading-79	in	5775.1	200	14 : 54	1		Mpaka Rd
	out			14 : 55		1	
Loading-80	in	5776.3	1200	15 : 1	6		2nd Parklands Ave
	out			15 : 1		0	
Loading-81	in	5776.4	100	15 : 2	1		2nd Parklands Ave
	out			15 : 3		1	
Loading-82	in	5776.5	100	15 : 5	2		2nd Parklands Ave
	out			15 : 8		3	
Loading-83	in	5776.6	100	15 : 8	0		2nd Parklands Ave
	out			15 : 9		1	
Loading-84	in	5776.61	10	15 : 10	1		2nd Parklands Ave
	out			15 : 11		1	
Loading-85	in	5776.8	190	15 : 14	3		2nd Parklands Ave
	out			15 : 16		2	
Loading-86	in	5776.85	50	15 : 17	1		2nd Parklands Ave
	out			15 : 19		2	
Loading-87	in	5777.3	450	15 : 20	1		Msanaka Rd
	out			15 : 21		1	

### Time & Motion Study

Organization: City Bins

Trip- 1 Date: 14 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 3

Estimated Volume: 14m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-88	in	5777.5	200	15 : 22	1		Msanaka Rd
	out			15 : 23		1	
Loading-89	in	5777.6	100	15 : 27	4		2nd Parklands Ave
	out			15 : 28		1	
Loading-90	in	5778	400	15 : 34	6		2nd Parklands Ave
	out			15 : 36		2	
Loading-91	in	5778.2	200	15 : 37	1		Masari Rd
	out			15 : 37		0	
Loading-92	in	5778.4	200	15 : 38	1		2nd Parklands Ave
	out			15 : 39		1	
Loading-93	in	5778.5	100	15 : 39	0		2nd Parklands Ave
	out			15 : 39		0	
Loading-94	in	5779.1	600	15 : 41	2		2nd Parklands Ave
	out			15 : 44		3	
Loading-95	in	5779.9	800	15 : 46	2		2nd Parklands Ave
	out			15 : 47		1	
Loading-96	in	5780.1	200	15 : 48	1		5th Parklands Ave
	out			15 : 49		1	
Loading-97	in	5780.2	100	15 : 50	1		5th Parklands Ave
	out			15 : 51		1	
Loading-98	in	5780.3	100	15 : 51	0		5th Parklands Ave
	out			15 : 53		2	
Loading-99	in	5780.7	400	15 : 55	2		6th Parklands Ave
	out			15 : 55		0	
Loading-100	in	5780.9	200	15 : 57	2		6th Parklands Ave
	out			15 : 59		2	
Loading-101	in	5781	100	16 : 0	1		6th Parklands Ave
	out			16 : 1		1	
Loading-102	in	5781.1	100	16 : 2	1		6th Parklands Ave
	out			16 : 2		0	Idling time 16:04-16:21 17mins
Loading-103	in	5781.7	600	16 : 24	22		6th Parklands Ave
	out			16 : 25		1	
Loading-104	in	5782.7	1000	16 : 29	4		Limuru Rd
	out			16 : 30		1	
Loading-105	in	5783.7	1000	16 : 32	2		Limuru Rd
	out			16 : 33		1	
Loading-106	in	5783.9	200	16 : 35	2		Limuru Rd
	out			16 : 41		6	
Loading-107	in	5783.95	50	16 : 42	1		Limuru Rd
	out			16 : 42		0	
Loading-108	in	5784.7	750	16 : 45	3		Limuru Rd
	out			16 : 45		0	
Loading-109	in	5785	300	16 : 46	1		Limuru Rd
	out			16 : 48		2	

**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 14 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 3

Estimated Volume: 14m<sup>3</sup>

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Dumping site in						
Start dumping						
Finish dumping						
Dumping site out						
Reach to workshop in	5793.4	8400	17 : 8	20		No dumping took place
Total		43500		282	231	Total min.: 513 min.
Collection		34600		212	231	
Transportation		8900		35		
Inside the dumping site		0		0	0	Dumping time.: min.
Idling time				35		



**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 15 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 3

Estimated Volume:

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	5793.4		8 : 51			Shimo La Tewa
Loading-1	in	5799.9	6500	9 : 18	27		Pate Rd
	out			9 : 22		4	
Loading-2	in	5800.5	600	9 : 25	3		Lunga Lunga Rd
	out			9 : 31		6	
Dumping site	in	5809.8	9300	10 : 9	38		Komorok Rd
Start dumping		5809.9	100	10 : 12	3		
Finish dumping		5810	100	10 : 55		43	
Dumping site	out	5810.1	100	10 : 58	3		Komorok Rd
Reach to workshop	in			:			
Total			16700		74	53	Total min.: 127 min.
Collection			600		3	10	
Transportation			15800		65		
Inside the dumping site			300		6	43	Dumping time.: 49 min.
Idling time							

**Time & Motion Study**

Organization: City Bins

Trip- 2 Date: 15 November 1997

Vehicle No. KAB636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 4

Estimated Volume: 10m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	5810.1		10 : 58			Komorok Rd
Loading-1	in	5823.6	13500	11 : 28	30		Dunga Rd
	out			11 : 33		5	
Loading-2	in	5824.2	600	11 : 35	2		Dunga Rd
	out			11 : 36		1	
Loading-3	in	5825.4	1200	11 : 42	6		Aoko Rd
	out			11 : 44		2	
Loading-4	in	5825.7	300	11 : 46	2		Aoko Rd
	out			11 : 46		0	
Loading-5	in	5826.2	500	11 : 49	3		Aoko Rd
	out			11 : 51		2	
Loading-6	in	5826.3	100	11 : 51	0		Aoko Rd
	out			11 : 52		1	
Loading-7	in	5826.4	100	11 : 52	0		Mombasa Rd
	out			11 : 53		1	
Loading-8	in	5826.41	10	11 : 53	0		Mombasa Rd
	out			11 : 54		1	
Loading-9	in	5828.9	2490	12 : 0	6		Off Mombasa Rd
	out			12 : 0		0	
Loading-10	in	5829.5	600	12 : 3	3		Mombasa Rd
	out			12 : 5		2	
Loading-11	in	5834.1	4600	12 : 16	11		Mombasa Rd
	out			12 : 16		0	
Loading-12	in	5834.7	600	12 : 20	4		Mombasa Rd
	out			12 : 21		1	
Loading-13	in	5835.5	800	12 : 26	5		Mombasa Rd
	out			12 : 29		3	
Loading-14	in	5836.2	700	12 : 36	7		Off Mombasa Rd
	out			12 : 36		0	
Loading-15	in	5836.6	400	12 : 37	1		Off Mombasa Rd
	out			12 : 38		1	
Loading-16	in	5836.7	100	12 : 38	0		Off Mombasa Rd
	out			12 : 39		1	
Loading-17	in	5836.8	100	12 : 41	2		Kaisugur Rd
	out			12 : 45		4	
Loading-18	in	5836.9	100	12 : 45	0		Kaisugur Rd
	out			12 : 46		1	
Loading-19	in	5837	100	12 : 46	0		Kaisugur Rd
	out			12 : 47		1	
Loading-20	in	5837.1	100	12 : 48	1		Oluvimu Rd
	out			12 : 48		0	
Loading-21	in	5837.12	20	12 : 48	0		Oluvimu Rd
	out			12 : 49		1	

**Time & Motion Study**

Organization: City Bins

Trip- 2 Date: 15 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 4

Estimated Volume: 10m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-22	in	5837.2	80	12 : 52	3		Oluvimu Rd
	out			12 : 52		0	
Loading-23	in	5837.3	100	12 : 53	1		Oluvimu Rd
	out			12 : 55		2	
Loading-24	in	5837.5	200	12 : 55	0		Mohoho Ave
	out			12 : 56		1	
Loading-25	in	5837.6	100	12 : 57	1		Mohoho Ave
	out			12 : 59		2	
Loading-26	in	5837.7	100	13 : 0	1		Mohoho Ave
	out			13 : 0		0	
Loading-27	in	5837.8	100	13 : 1	1		Mohoho Ave
	out			13 : 1		0	
Loading-28	in	5837.85	50	13 : 2	1		Mukarati Rd
	out			13 : 2		0	
Loading-29	in	5837.9	50	13 : 3	1		Mukarati Rd
	out			13 : 3		0	
Loading-30	in	5838.2	300	13 : 4	1		Mukarati Rd
	out			13 : 9		5	
Loading-31	in	5838.5	300	13 : 12	3		Ndekuwa Ave
	out			13 : 15		3	
Loading-32	in	5838.8	300	13 : 16	1		Rumi Rd
	out			13 : 16		0	
Loading-33	in	5839.1	300	13 : 17	1		Ndekuwa Ave
	out			13 : 20		3	
Loading-34	in	5839.15	50	13 : 20	0		Ndekuwa Ave
	out			13 : 22		2	
Loading-35	in	5839.4	250	13 : 24	2		Mufulu Ave
	out			13 : 24		0	
Loading-36	in	5839.8	400	13 : 26	2		Mufulu Ave
	out			13 : 28		2	
Loading-37	in	5839.9	100	13 : 28	0		Mufulu Ave
	out			13 : 29		1	
Loading-38	in	5840.1	200	13 : 29	0		Mufulu Ave
	out			13 : 30		1	
Loading-39	in	5840.2	100	13 : 34	4		Mufulu Ave
	out			13 : 34		0	
Loading-40	in	5840.4	200	13 : 36	2		Ole Shapara Ave
	out			13 : 37		1	
Loading-41	in	5840.6	200	13 : 38	1		Mtelo Road
	out			13 : 38		0	
Loading-42	in	5840.7	100	13 : 38	0		Mtelo Road
	out			13 : 39		1	
Loading-43	in	5840.8	100	13 : 40	1		Mtelo Road
	out			13 : 41		1	

**Time & Motion Study**

Organization: City Bias

Trip- 2 Date: 15 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 4

Estimated Volume: 10m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-44	in	5840.9	100	13 : 44		3	Mtelo Road
	out			13 : 46		2	
Loading-45	in	5841.3	400	13 : 53		7	Mtelo Road
	out			14 : 3		10	
Loading-46	in	5841.4	100	14 : 5		2	Mtelo Road
	out			14 : 15		10	
Loading-47	in	5841.6	200	14 : 17		2	Mtelo Road
	out			14 : 17		0	
Loading-48	in	5842	400	14 : 19		2	Ole Shapara Ave
	out			14 : 21		2	
Loading-49	in	5842.3	300	14 : 22		1	Ole Shapara Ave
	out			14 : 22		0	
Loading-50	in	5842.6	300	14 : 24		2	Ole Shapara Ave
	out			14 : 24		0	
Loading-51	in	5842.8	200	14 : 25		1	Ole Shapara Ave
	out			14 : 27		2	
Loading-52	in	5842.9	100	14 : 28		1	Ole Shapara Ave
	out			14 : 29		1	
Loading-53	in	5843	100	14 : 30		1	Ole Shapara Ave
	out			14 : 32		2	
Loading-54	in	5843.2	200	14 : 32		0	Ole Shapara Ave
	out			14 : 33		1	
Loading-55	in	5843.25	50	14 : 34		1	Ole Shapara Ave
	out			14 : 37		3	
Loading-56	in	5843.3	50	14 : 38		1	Ole Shapara Ave
	out			14 : 38		0	
Loading-57	in	5843.4	100	14 : 39		1	Ole Shapara Ave
	out			14 : 39		0	
Loading-58	in	5844	600	14 : 42		3	Ole Shapara Ave
	out			14 : 44		2	
Loading-59	in	5844.2	200	14 : 45		1	Muhoho Ave
	out			14 : 46		1	
Loading-60	in	5844.4	200	14 : 47		1	Muhoho Ave
	out			14 : 47		0	
Loading-61	in	5844.7	300	14 : 52		5	Mai Mahiu
	out			14 : 54		2	
Loading-62	in	5844.9	200	14 : 55		1	Mai Mahiu
	out			14 : 57		2	
Loading-63	in	5845.1	200	14 : 59		2	Thogolo Rd
	out			15 : 0		1	
Loading-64	in	5845.4	300	15 : 0		0	Mai Mahiu
	out			15 : 2		2	
Loading-65	in	5845.7	300	15 : 6		4	Kodi Road 1
	out			15 : 6		0	

**Time & Motion Study**

Organization: City Bins

Trip- 2 Date: 15 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 4

 Estimated Volume: 10m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-66	in	5845.8	100	15 : 7	1		Kodi Road 1
	out			15 : 8		1	
Loading-67	in	5845.9	100	15 : 8	0		Kodi Road 1
	out			15 : 8		0	
Loading-68	in	5846	100	15 : 9	1		Kodi Road 1
	out			15 : 9		0	
Loading-69	in	5846.1	100	15 : 10	1		Kodi Road 1
	out			15 : 10		0	
Loading-70	in	5846.2	100	15 : 10	0		Kodi Road 1
	out			15 : 10		0	
Loading-71	in	5846.3	100	15 : 10	0		Kodi Road 1
	out			15 : 11		1	
Loading-72	in	5846.35	50	15 : 12	1		Kodi Road 1
	out			15 : 14		2	
Loading-73	in	5846.6	250	15 : 15	1		Kodi Road 1
	out			15 : 18		3	
Loading-74	in	5846.7	100	15 : 20	2		Kodi Road 1
	out			15 : 26		6	
Loading-75	in	5847.2	500	15 : 26	0		Muhoho Ave
	out			15 : 27		1	
Loading-76	in	5847.4	200	15 : 29	2		Bukani Rd
	out			15 : 29		0	
Loading-77	in	5847.8	400	15 : 32	3		Bukani Rd
	out			15 : 33		1	
Loading-78	in	5848	200	15 : 34	1		Kodi Rd
	out			15 : 34		0	
Loading-79	in	5848.2	200	15 : 36	2		Kodi Rd
	out			15 : 36		0	
Loading-80	in	5848.6	400	15 : 37	1		Kodi Rd
	out			15 : 38		1	
Dumping site	in	5863.1	14500	16 : 7	29		Komorok Rd
Start dumping		5863.5	400	16 : 9	2		
Finish dumping		5864	500	16 : 32		23	
Dumping site	out	5864.3	300	16 : 39	7		
Reach to workshop	in	5877.8	13500	17 : 9	30		Shimo La Tewa Rd
Total			67700		236	135	Total min.: 371 min.
Collection			25000		138	112	
Transportation			41500		89		
Inside the dumping site			1200		9	23	Dumping time.: 32 min.
Idling time							

**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 17 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 4

Estimated Volume: 14m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	5877.8		8 : 43			Shimo La Tewa Rd
Loading-1	in	5879.6	1800	8 : 50	7		Masaba Rd
	out			8 : 58		8	
Loading-2	in	5879.8	200	9 : 0	2		Masaba Rd
	out			9 : 3		3	
Loading-3	in	5880	200	9 : 4	1		Masaba Rd
	out			9 : 6		2	
Loading-4	in	5881	1000	9 : 8	2		Masaba Rd
	out			9 : 8		0	
Loading-5	in	5881.1	100	9 : 9	1		Masaba Rd
	out			9 : 9		0	
Loading-6	in	5881.2	100	9 : 9	0		Masaba Rd
	out			9 : 10		1	
Loading-7	in	5881.25	50	9 : 10	0		Masaba Rd
	out			9 : 10		0	
Loading-8	in	5881.6	350	9 : 11	1		Masaba Rd
	out			9 : 11		0	
Loading-9	in	5881.7	100	9 : 12	1		Masaba Rd
	out			9 : 13		1	
Loading-10	in	5881.75	50	9 : 13	0		Masaba Rd
	out			9 : 14		1	
Loading-11	in	5882	250	9 : 15	1		Matumbatu Rd
	out			9 : 15		0	
Loading-12	in	5882.4	400	9 : 17	2		Matumbatu Rd
	out			9 : 17		0	
Loading-13	in	5883.4	1000	9 : 21	4		Longon St Rd
	out			9 : 25		4	
Loading-14	in	5887.9	4500	9 : 36	11		Bagamoyo Rd
	out			9 : 36		0	
Loading-15	in	5888.5	600	9 : 40	4		Bagamoyo Rd
	out			9 : 40		0	
Loading-16	in	5888.6	100	9 : 41	1		Bagamoyo Rd
	out			9 : 44		3	
Loading-17	in	5888.8	200	9 : 45	1		Bagamoyo Rd
	out			9 : 48		3	
Loading-18	in	5888.85	50	9 : 48	0		Bagamoyo Rd
	out			9 : 48		0	
Loading-19	in	5889	150	9 : 49	1		Bagamoyo Rd
	out			9 : 49		0	
Loading-20	in	5889.05	50	9 : 50	1		Bagamoyo Rd
	out			9 : 54		4	
Loading-21	in	5889.1	50	9 : 55	1		Bagamoyo Rd
	out			9 : 58		3	

# Time & Motion Study

Organization: City Bins

Trip- 1 Date: 17 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 4

Estimated Volume: 14m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-22	in	5890	900	10 : 1	3		Mbaruk Rd
	out			10 : 1		0	
Loading-23	in	5890.1	100	10 : 1	0		Mbaruk Rd
	out			10 : 2		1	
Loading-24	in	5890.3	200	10 : 3	1		Loginye Rd
	out			10 : 5		2	
Loading-25	in	5890.7	400	10 : 6	1		Mbaruk Rd
	out			10 : 6		0	
Loading-26	in	5891	300	10 : 7	1		Mucai Drive
	out			10 : 7		0	
Loading-27	in	5891.8	800	10 : 9	2		Ngong Rd
	out			10 : 12		3	Idling time 10:15-10:16 1 min
Loading-29	in	5893.4	1600	10 : 18	6		Woodlands Rd
	out			10 : 18		0	
Loading-30	in	5893.8	400	10 : 20	2		Woodlands Rd
	out			10 : 22		2	
Loading-31	in	5894.3	500	10 : 24	2		Lenana Rd
	out			10 : 24		0	
Loading-32	in	5894.4	100	10 : 25	1		Lenana Rd
	out			10 : 26		1	
Loading-33	in	5896.8	2400	10 : 31	5		Nyerere Rd
	out			10 : 43		12	
Loading-34	in	5898.3	1500	10 : 46	3		State House Rd
	out			10 : 48		2	
Loading-35	in	5899.9	1600	10 : 51	3		Laikidia Rd
	out			10 : 53		2	
Loading-36	in	5901.1	1200	10 : 56	3		Ring Rd Riverside Drive
	out			10 : 56		0	
Loading-37	in	5901.7	600	10 : 59	3		Chiromo Access Rd
	out			11 : 2		3	
Loading-38	in	5902.4	700	11 : 11	9		Riverside Drive
	out			11 : 11		0	
Loading-39	in	5902.5	100	11 : 12	1		Garden Rd
	out			11 : 13		1	
Loading-40	in	5902.8	300	11 : 18	5		Garden Rd
	out			11 : 22		4	
Loading-41	in	5903.5	700	11 : 23	1		Riverside Drive
	out			11 : 24		1	
Loading-42	in	5903.7	200	11 : 27	3		Riverside Drive
	out			11 : 28		1	
Loading-43	in	5903.9	200	11 : 33	5		Riverside Drive
	out			11 : 34		1	
Loading-44	in	5904.2	300	11 : 35	1		Riverside Drive
	out			11 : 38		3	

**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 17 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 4

Estimated Volume: 14m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-45	in	5904.8	600	11 : 39	1		Riverside Drive
	out			11 : 42		3	
Loading-46	in	5905.4	600	11 : 43	1		Riverside Drive
	out			11 : 47		4	
Loading-47	in	5906.1	700	11 : 48	1		Riverside Drive
	out			11 : 50		2	
Loading-48	in	5906.5	400	11 : 50	0		Riverside Drive
	out			11 : 50		0	Idling time 11:54-11:57 3mins
Loading-50	in	5909.1	2600	11 : 59	9		Mandera Rd
	out			12 : 0		1	
Loading-51	in	5909.4	300	12 : 2	2		Githungori Rd
	out			12 : 4		2	
Loading-52	in	5909.5	100	12 : 4	0		Githungori Rd
	out			12 : 5		1	
Loading-53	in	5909.9	400	12 : 6	1		Kangundo Rd
	out			12 : 8		2	
Loading-54	in	5910.1	200	12 : 9	1		Kangundo Rd
	out			12 : 11		2	
Loading-55	in	5910.8	700	12 : 14	3		Kangundo Rd
	out			12 : 16		2	
Loading-56	in	5911.3	500	12 : 18	2		Kangundo Rd
	out			12 : 18		0	
Loading-57	in	5911.4	100	12 : 19	1		Kangundo Rd
	out			12 : 19		0	
Loading-58	in	5912.3	900	12 : 23	4		Gichugu Rd
	out			12 : 26		3	
Loading-59	in	5913.1	800	12 : 31	5		Mandera Rd
	out			12 : 37		6	
Loading-60	in	5913.3	200	12 : 38	1		Mandera Rd
	out			12 : 40		2	
Loading-61	in	5913.4	100	12 : 40	0		Mandera Rd
	out			12 : 43		3	
Loading-62	in	5914.7	1300	12 : 47	4		Mandera Rd
	out			12 : 49		2	
Loading-63	in	5915.2	500	12 : 50	1		Mandera Rd
	out			12 : 51		1	
Loading-64	in	5915.3	100	12 : 51	0		Mandera Rd
	out			12 : 51		0	
Loading-65	in	5915.7	400	12 : 53	2		Mandera Rd
	out			12 : 54		1	
Loading-66	in	5916.1	400	12 : 56	2		Gatundo
	out			13 : 1		5	
Loading-67	in	5917.8	1700	13 : 6	5		Makueni Rd
	out			13 : 7		1	



**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 17 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 4

Estimated Volume: 14m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-68	in	5918.1	300	13 : 9	2		Makueni Rd
	out			13 : 10		1	
Loading-69	in	5919.6	1500	13 : 14	4		Ole Odome Rd
	out			13 : 14		0	
Loading-70	in	5919.7	100	13 : 15	1		Ole Odome Rd
	out			13 : 16		1	
Loading-71	in	5920.8	1100	13 : 22	6		Korosho Rd
	out			13 : 33		11	
Loading-72	in	5921.1	300	13 : 35	2		Hendieds Ave
	out			13 : 37		2	
Loading-73	in	5921.2	100	13 : 38	1		Hendieds Ave
	out			13 : 39		1	
Loading-74	in	5922.2	1000	13 : 43	4		Kingara Rd
	out			13 : 43		0	
Loading-75	in	5922.5	300	13 : 44	1		Kingara Rd
	out			13 : 45		1	
Loading-76	in	5923.4	900	13 : 46	1		Riara Rd
	out			13 : 47		1	
Loading-77	in	5923.6	200	13 : 48	1		Riara Rd
	out			13 : 53		5	
Loading-78	in	5923.7	100	13 : 53	0		Riara Rd
	out			13 : 55		2	
Loading-79	in	5923.72	20	13 : 55	0		Riara Rd
	out			13 : 57		2	
Loading-80	in	5924.5	780	14 : 1	4		Riara Lane
	out			14 : 3		2	
Loading-81	in	5924.55	50	14 : 4	1		Riara Lane
	out			14 : 5		1	
Loading-82	in	5924.9	350	14 : 7	2		Riara Rd
	out			14 : 8		1	
Loading-83	in	5924.95	50	14 : 8	0		Riara Rd
	out			14 : 13		5	
Loading-84	in	5925	50	14 : 13	0		Riara Rd
	out			14 : 15		2	
Loading-85	in	5925	0	14 : 16	1		Riara Rd
	out			14 : 18		2	
Loading-86	in	5925.4	400	14 : 22	4		Riara Rd
	out			14 : 22		0	
Loading-87	in	5926	600	14 : 24	2		Ngong Rd
	out			14 : 27		3	
Loading-88	in	5926.4	400	14 : 29	2		Ngong Rd
	out			14 : 30		1	
Loading-89	in	5926.8	400	14 : 31	1		Ngong Rd
	out			14 : 33		2	

**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 17 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 4

Estimated Volume: 14m<sup>3</sup>

Location		Mileage (kn)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-90	in	5926.9	100	14 : 33	0		Ngong Rd
	out			14 : 36		3	
Loading-91	in	5927.6	700	14 : 45	9		Joseph Kangethe Rd
	out			14 : 49		4	
Loading-92	in	5928.2	600	14 : 51	2		Kiboro Rd
	out			14 : 51		0	Idling time 14:51-15:15 24min
Loading-94	in	5928.7	500	15 : 17	26		Suna Rd
	out			15 : 17		0	
Loading-95	in	5929.1	400	15 : 19	2		Ngong Rd
	out			15 : 20		1	
Loading-96	in	5929.2	100	15 : 21	1		Ngong Rd
	out			15 : 22		1	
Loading-97	in	5929.4	200	15 : 23	1		Ngong Rd
	out			15 : 25		2	
Loading-98	in	5929.45	50	15 : 25	0		Ngong Rd
	out			15 : 25		0	
Loading-99	in	5929.7	250	15 : 28	3		Ngong Rd
	out			15 : 29		1	
Loading-100	in	5929.8	100	15 : 30	1		Ngong Rd
	out			15 : 30		0	
Loading-101	in	5930	200	15 : 32	2		Ngong Rd
	out			15 : 33		1	
Loading-102	in	5930.05	50	15 : 34	1		Ngong Rd
	out			15 : 34		0	
Loading-103	in	5930.8	750	15 : 37	3		Kindaruma Rd
	out			15 : 38		1	
Loading-104	in	5931	200	15 : 41	3		Kindaruma Rd
	out			15 : 43		2	
Loading-105	in	5931.05	50	15 : 44	1		Kindaruma Rd
	out			15 : 45		1	
Loading-106	in	5931.4	350	15 : 47	2		Kamburu Drv
	out			15 : 48		1	
Loading-107	in	5931.45	50	15 : 51	3		Kamburu Drv
	out			15 : 51		0	
Loading-108	in	5931.8	350	15 : 53	2		Kabarnet Rd
	out			15 : 54		1	
Loading-109	in	5932.2	400	15 : 56	2		Ngong Rd
	out			15 : 58		2	
Loading-110	in	5932.4	200	15 : 58	0		Kamburu Drv
	out			15 : 58		0	
Loading-111	in	5932.7	300	16 : 0	2		Kindaruma Rd
	out			16 : 2		2	
Loading-112	in	5933.1	400	16 : 2	0		Kindaruma Rd
	out			16 : 3		1	

**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 17 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 4

Estimated Volume: 14m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-113	in	5933.2	100	16 : 4	1		Kindaruma Rd
	out			16 : 4		0	
Loading-114	in	5933.25	50	16 : 6	2		Kindaruma Rd
	out			16 : 6		0	
Loading-115	in	5933.7	450	16 : 11	5		Kindaruma Rd
	out			16 : 12		1	
Loading-116	in	5933.8	100	16 : 12	0		Kindaruma Rd
	out			16 : 12		0	
Loading-117	in	5934.1	300	16 : 14	2		Marcus Garvey Rd
	out			16 : 14		0	
Loading-118	in	5934.4	300	16 : 16	2		Marcus Garvey Rd
	out			16 : 16		0	
Loading-119	in	5934.6	200	16 : 17	1		Marcus Garvey Rd
	out			16 : 20		3	
Loading-120	in	5934.8	200	16 : 21	1		Marcus Garvey Rd
	out			16 : 21		0	
Loading-121	in	5934.9	100	16 : 22	1		Marcus Garvey Rd
	out			16 : 22		0	
Loading-122	in	5935	100	16 : 23	1		Marcus Garvey Rd
	out			16 : 25		2	
Loading-123	in	5935.1	100	16 : 26	1		Marcus Garvey Rd
	out			16 : 37		11	
Dumping site	in	5955	19900	17 : 22	45		Komorok Rd
Start dumping		5955.2	200	17 : 24	2		
Finish dumping		5955.3	100	18 : 14		50	
Dumping site	out	5955.7	400	18 : 16	2		
Reach to workshop	in	5969.1	13400	18 : 46	30		Shimo La Tewa Rd
Total			91300		351	252	Total min.: 603 min.
Collection			55500		237	202	
Transportation			35100		82		
Inside the dumping site			700		4	50	Dumping time.: 54 min.
Idling time					28		

**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 18 November 1997

Vehicle No. KAE6361H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 3

Estimated Volume: 12m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	5969.1		8 : 24			Shimo La Tewa Rd
Loading-1	in	5974.5	5400	8 : 36	12		2nd Ave Eastleigh
	out			8 : 36		0	
Loading-2	in	5974.6	100	8 : 37	1		2nd Ave Eastleigh
	out			8 : 38		1	
Loading-3	in	5975.4	800	8 : 45	7		6th Ave Eastleigh
	out			8 : 45		0	
Loading-4	in	5976.6	1200	8 : 49	4		Kipanga Athumani St
	out			8 : 53		4	
Loading-5	in	5976.8	200	8 : 55	2		Kipanga Athumani St
	out			8 : 56		1	
Loading-6	in	5976.9	100	8 : 56	0		Kipanga Athumani St
	out			8 : 57		1	
Loading-7	in	5977	100	8 : 57	0		Kipanga Athumani St
	out			8 : 58		1	
Loading-8	in	5977.5	500	9 : 0	2		Muratina St
	out			9 : 2		2	
Loading-9	in	5977.7	200	9 : 5	3		Muratina St
	out			9 : 6		1	
Loading-10	in	5978.4	700	9 : 13	7		Northview Rd
	out			9 : 18		5	
Loading-11	in	5978.7	300	9 : 20	2		Northview Rd
	out			9 : 21		1	
Loading-12	in	5979.1	400	9 : 23	2		Northview Rd
	out			9 : 24		1	
Loading-13	in	5979.7	600	9 : 26	2		Kihara Kihiu Rd
	out			9 : 27		1	
Loading-14	in	5980	300	9 : 29	2		Mbono Rd
	out			9 : 30		1	
Loading-15	in	5980.2	200	9 : 30	0		Mbono Rd
	out			9 : 31		1	
Loading-16	in	5980.5	300	9 : 33	2		Chai Rd
	out			9 : 36		3	
Loading-17	in	5982.2	1700	9 : 42	6		Old Racecourse
	out			9 : 43		1	
Loading-18	in	5982.5	300	9 : 44	1		Old Racecourse
	out			9 : 44		0	
Loading-19	in	5982.55	50	9 : 47	3		Old Racecourse
	out			9 : 48		1	
Loading-20	in	5983.3	750	9 : 52	4		Munyiri Rd
	out			10 : 8		16	
Loading-21	in	5984.8	1500	10 : 14	6		Kinshasa Rd
	out			10 : 15		1	

**Time & Motion Study**

Organization: City Bins

Trip- 1 Date: 18 November 1997

Vehicle No. KAE636H

Loading Capacity: 7TON

Researcher's name: Masha Mapenzi

No. of Crew: 3

Estimated Volume: 12m<sup>3</sup>

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-22	in	5985.5	700	10 : 18	3		Muranga Rd
	out			10 : 20		2	
Loading-23	in	5985.6	100	10 : 20	0		Muranga Rd
	out			10 : 23		3	
Loading-24	in	5985.7	100	10 : 24	1		Muranga Rd
	out			10 : 29		5	
Loading-25	in	5985.8	100	10 : 30	1		Muranga Rd
	out			10 : 33		3	
Loading-26	in	5985.9	100	10 : 33	0		Okoth Aura Rd
	out			10 : 34		1	
Loading-27	in	5986	100	10 : 34	0		Okoth Aura Rd
	out			10 : 36		2	
Loading-28	in	5986.2	200	10 : 38	2		Forest Rd
	out			10 : 45		7	
Loading-29	in	5986.7	500	10 : 47	2		Desai Rd
	out			10 : 49		2	
Loading-30	in	5986.8	100	10 : 49	0		Desai Rd
	out			10 : 51		2	
Loading-31	in	5987.3	500	10 : 53	2		Muranga Rd
	out			10 : 55		2	
Loading-32	in	5987.8	500	10 : 57	2		Kolbot Rd
	out			10 : 58		1	
Loading-33	in	5988.1	300	10 : 59	1		Mushembi Rd
	out			11 : 0		1	
Loading-34	in	5988.2	100	11 : 1	1		Mushembi Rd
	out			11 : 1		0	
Loading-35	in	5988.6	400	11 : 6	5		Ngara Rd
	out			11 : 7		1	
Loading-36	in	5988.8	200	11 : 8	1		Ngara Rd
	out			11 : 9		1	
Loading-37	in	5989.4	600	11 : 12	3		Mushembi Rd
	out			11 : 14		2	
Loading-38	in	5989.6	200	11 : 15	1		Mushembi Rd
	out			11 : 15		0	
Loading-39	in	5990	400	11 : 17	2		Kipkabas Rd
	out			11 : 17		0	
Loading-40	in	5990.3	300	11 : 20	3		Munai Rd
	out			11 : 22		2	
Loading-41	in	5990.5	200	11 : 23	1		Munai Rd
	out			11 : 23		0	
Loading-42	in	5990.6	100	11 : 23	0		Munai Rd
	out			11 : 24		1	
Loading-43	in	5990.66	60	11 : 24	0		Munai Rd
	out			11 : 24		0	