

Time & Motion Study

Organization: NCC

Trip- 1 Date: 14th November 1997

Vehicle No. KUE961

Loading Capacity: 4850

Researcher's name: Brendah Dzuya

No. of Crew: 1

Estimated Volume: 4.3m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			9 : 25			From Kaloleni depot to
Loading-1	in		11,000	10 : 4	39		Umoja depot
	out			10 : 6		2	Jogoo Rd - Outering Rd - Kangunda Rd to Umoja
Dumping site	in		6,000	10 : 19	13		Kangunda Rd - Outering Rd
Start dumping				10 : 20	1		
Finish dumping				10 : 22		2	Dandora
Dumping site	out		1,000	10 : 27	5		
Reach to workshop	in			:			
Total			18,000		58	4	Total min.: 62 min.
Collection			0		0	2	
Transportation			17,000		52		
Inside the dumping site			1,000		6	2	Dumping time.: 8 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 2 Date: 14th November 1997

Vehicle No. KUE961

Loading Capacity: 4850

Researcher's name: Brendah Dzuya

No. of Crew: 1

Estimated Volume: 4.5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out			10 : 27			From D/site
Loading-1	in		6,000	10 : 52	25		Kangundo Rd
	out			11 : 2		10	Komorock Estate
Dumping site	in		6,000	11 : 5	3		Kayole route
Start dumping				11 : 14	9		Kangundo Rd
Finish dumping				11 : 15		1	Outering Rd
Dumping site	out		1,000	11 : 17	2		to Dandora
Reach to workshop	in			:			
Total			13,000		39	11	Total min.: 50 min.
Collection			0		0	10	
Transportation			12,000		28		
Inside the dumping site			1,000		11	1	Dumping time.: 12 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 3 Date: 14th November 1997

Vehicle No. KUE961

Loading Capacity: 4850

Researcher's name: Brendah Dzuya

No. of Crew: 2

Estimated Volume: 4.5m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out		11 : 17			From D/site
Loading-1	in	6,000	11 : 34	17		Outering Rd
	out		11 : 36		2	Kangunda Rd
						Komorock Estate
Dumping site	in	6,000	11 : 51	15		Umoja 2nd
Start dumping			11 : 55	4		Kangundo
Finish dumping			11 : 56		1	Outering
Dumping site	out	1,000	12 : 0	4		Damping site
Reach to workshop	in		:			
Total		13,000		40	3	Total min.: 43 min.
Collection		0		0	2	
Transportation		12,000		32		
Inside the dumping site		1,000		8	1	Dumping time.: 9 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 4 Date: 14th November 1997

Vehicle No. KUE961

Loading Capacity: 4850

Researcher's name: Brendah Dzuya

No. of Crew: 2

Estimated Volume: 4.5m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site			12 : 0			From D/site
Loading-1		6,000	12 : 15	15		Outering Rd
			12 : 20		5	Kangundo Rd
						to Komorock Estate
Dumping site		6,000	12 : 35	15		To dumping site
Start dumping			12 : 40	5		Kangundo Rd
Finish dumping			12 : 41		1	Outering Rd
Dumping site		1,000	12 : 46	5		Dandora
Reach to workshop			:			
Total		13,000		40	6	Total min.: 46 min.
Collection		0		0	5	
Transportation		12,000		30		
Inside the dumping site		1,000		10	1	Dumping time.: 11 min
Idling time						

Time & Motion Study

Organization: NCC

Trip- 5 Date: 14th November 1997

Vehicle No. KUE961

Loading Capacity: 4850

Researcher's name: Brenda Dzuya

No. of Crew: 2

Estimated Volume: 4.5m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site			12 : 46			From D/site
Loading-1		6,000	13 : 0	14		Outering Rd
			13 : 5		5	Kangndo Rd
						to Komorock Rd Estate
Dumping site		6,000	13 : 20	15		To dumping site
Start dumping			13 : 29	9		Kangundo Rd
Finish dumping			13 : 30		1	Outering Rd
Dumping site		1,000	13 : 32	2		Dandora
Reach to workshop			:			
Total		13,000		40	6	Total min.: 46 min.
Collection		0		0	5	
Transportation		12,000		29		
Inside the dumping site		1,000		11	1	Dumping time.: 12 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 6 Date: 14th November 1997

Vehicle No. KUE961

Loading Capacity: 4850

Researcher's name: Brenda Dzuya

No. of Crew: 2

Estimated Volume: 4.5m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out		13 : 32			From D/site
Loading-1	in	6,000	13 : 45	13		Outering Rd
	out		13 : 47		2	Kangundo Rd
						Mechanical problem
Dumping site	in	6,000	14 : 20	33		To Umoja
Start dumping			14 : 25	5		Didn't reach to workshop
Finish dumping			14 : 25		0	due to mechanical problem
Dumping site	out	1,000	14 : 30	5		
Reach to workshop	in		:			
Total		13,000		56	2	Total min.: 58 min.
Collection		0		0	2	
Transportation		12,000		46		
Inside the dumping site		1,000		10	0	Dumping time.: 10 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 1 Date: 15th November 1997

Vehicle No. KUE961

Loading Capacity: 4950

Researcher's name: Brenda Dzuya

No. of Crew: 2

Estimated Volume: 4.5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			10 : 40			From Kaloleni to Komorock
Loading-1	in		13,000	11 : 25	45		Jogoo Rd - Outering Rd
	out			11 : 27		2	Kangundo Rd
Dumping site	in		6,000	11 : 50	23		To dumping site
Start dumping				11 : 58	8		
Finish dumping				12 : 0		2	
Dumping site	out		1,000	12 : 5	5		
Reach to workshop	in			:			
Total			20,000		81	4	Total min.: 85 min.
Collection			0		0	2	
Transportation			19,000		68		
Inside the dumping site			1,000		13	2	Dumping time.: 15 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 2 Date: 15th November 1997

Vehicle No. KUE961

Loading Capacity: 4950

Researcher's name: Brendah Chizi

No. of Crew: 2

Estimated Volume: 4.5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out			12 : 5			From dumping site
Loading-1	in		6,000	12 : 32	27		Outering Rd
	out			12 : 35		3	Kangundo Rd
							to Komorock Estate
Dumping site	in		6,000	12 : 56	21		To dumping site
Start dumping				13 : 5	9		
Finish dumping				13 : 5		0	
Dumping site	out		1,000	13 : 7	2		
Reach to workshop	in			:			
Total			13,000		59	3	Total min.: 62 min.
Collection			0		0	3	
Transportation			12,000		48		
Inside the dumping site			1,000		11	0	Dumping time.: 11 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 3 Date: 15th November 1997

Vehicle No. KUE961

Loading Capacity: 4950

Researcher's name: Brendah Chizi

No. of Crew: 2

Estimated Volume: 4.5m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out		13 : 7			From dumping site to
Loading-1	in	6,000	13 : 28	21		Komorock Estate
	out		13 : 33		5	Outering Rd
						Kangundo Rd
Dumping site	in	6,000	13 : 52	19		to D/site
Start dumping			13 : 58	6		Kangundo Rd
Finish dumping			13 : 59		1	Outering Rd
Dumping site	out	1,000	14 : 0	1		to Dandera
Reach to workshop	in		:			
Total		13,000		47	6	Total min.: 53 min.
Collection		0		0	5	
Transportation		12,000		40		
Inside the dumping site		1,000		7	1	Dumping time.: 8 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 1 Date: 18th November 1997

Vehicle No. KUE961

Loading Capacity: 4850

Researcher's name: Brenda Dzuya

No. of Crew: 1

Estimated Volume: 4.5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			8 : 30			From Dagoretti depot
Loading-1	in		9,000	9 : 52	82		Ngong Rd
	out			10 : 0		8	to Community area
Loading-2	in		1,000	11 : 27	87		
	out			11 : 33		6	
Dumping site	in		13,000	12 : 5	32		Ngong Rd - University way
Start dumping				12 : 9	4		Forest Rd - Thika Rd
Finish dumping				12 : 9		0	Outering Rd
Dumping site	out		1,000	12 : 11	2		D/site Dandora
Reach to workshop	in			:			
Total			24,000		207	14	Total min.: 221 min.
Collection			1,000		87	14	
Transportation			22,000		114		
Inside the dumping site			1,000		6	0	Dumping time.: 6 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 2 Date: 18th November 1997

Vehicle No. KUE961

Loading Capacity: 4850

Researcher's name: Brendah Dzuya

No. of Crew: 2

Estimated Volume: 4.5m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out		12 : 11			D/site
Loading-1	in	13,000	12 : 45	34		Outering Rd
	out		12 : 55		10	Thika Rd
						Uhuru highway
						Ngong Rd
Dumping site	in	13,000	13 : 25	30		Ngong Rd
Start dumping			13 : 30	5		Forest Rd
Finish dumping			13 : 30		0	Thika Rd
Dumping site	out	1,000	13 : 37	7		Outering Rd (Dandora)
Reach to workshop	in		:			
Total		27,000		76	10	Total min.: 86 min.
Collection		0		0	10	
Transportation		26,000		64		
Inside the dumping site		1,000		12	0	Dumping time.: 12 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 1 Date: 20th November 1997

Vehicle No. KAE843Q

Loading Capacity: 4850

Researcher's name: Brendah Dzuya

No. of Crew: 4

Estimated Volume: 7TON

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			8 : 55			From Kaloleni
Loading-1	in		6,000	9 : 20	25		Jogoo Rd, Likoni Rd,
	out			9 : 22		2	Lunga Lunga Rd
Dumping site	in		9,000	9 : 52	30		Outering Rd
Start dumping				10 : 0	8		Dandora
Finish dumping				10 : 0		0	
Dumping site	out			10 : 5	5		
Reach to workshop	in			:			
Total			15,000		68	2	Total min.: 70 min.
Collection			0		0	2	
Transportation			15,000		55		
Inside the dumping site			0		13	0	Dumping time.: 13 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 12th November 1997

Vehicle No. KAH013Y

Loading Capacity: 6820

Researcher's name: Alice K Kazungu

No. of Crew: 8

Estimated Volume: 4.5m³

Location		Mileage (kni)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	1521		10 : 30			Jogoo Rd Ngong Rd
Loading-1	in	1535.1	14,100	11 : 15	45		10:55-11:10 depot
	out			11 : 27		12	Elegeyo Marakwet Close
Loading-2	in	1536.1	1,000	11 : 30	3		Elegeyo Marakwet Close
	out			12 : 0		30	
Loading-3	in	1538.3	2,200	12 : 7	7		Arwings Rd
	out			12 : 10		3	
Loading-4	in	1542.2	3,900	12 : 17	7		Galana Rd
	out			12 : 27		10	
Loading-5	in	1542.4	200	12 : 30	3		Woodlands Rd
	out			12 : 35		5	Arwings Khodeck Rd
Loading-6	in	1547	4,600	12 : 55	20		
	out			13 : 28		33	
							Nyerere Rd - University way
							Slip Rd- Muranga - Outering
							Thika Rd - Komorock
							14:01-14:25
							Mechanical Problem
Dumping site	in	1563.3	16,300	14 : 25	57		
Start dumping		1563.6	300	14 : 30	5		
Finish dumping		1563.6	0	14 : 32		2	
Dumping site	out	1564.1	500	14 : 35	3		
Reach to workshop	in			:			
Total			43,100		150	95	Total min.: 245 min.
Collection			11,900		40	93	
Transportation			30,400		63		
Inside the dumping site			800		8	2	Dumping time.: 10 min.
Idling time					39		

Time & Motion Study

Organization: NCC

Trip- 2 Date: 12th November 1997

Vehicle No. KAI1013Y

Loading Capacity: 6820

Researcher's name: Alice K Kazungu

No. of Crew: 8

Estimated Volume: 2m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	1564.1		14 : 35			Komorock
Loading-1	in	1576.6	12,500	14 : 58	23		Nyerere Rd
	out			15 : 0		2	St Andrew's Apartment
Loading-2	in	1576.7	100	15 : 4	4		Nyerere Rd
	out			15 : 7		3	Nairobi Member's club
Loading-3	in	1577.9	1,200	15 : 8	1		Nyerere Rd
	out			15 : 13		5	
Loading-4	in	1580.6	2,700	15 : 23	10		Nyerere Rd, State house Rd
	out			15 : 33		10	Woodland
Dumping site	in			:			Didn't go to D/site due to mechanical problems
Start dumping				:			
Finish dumping				:			15:47 out of depot to garage
Dumping site	out			:			
Reach to depot	in	1586.5	5,900	15 : 45	12		Ngong Rd, Lusaka Rd
Total			22,400		50	20	Total min.: 70 min.
Collection			4,000		15	20	
Transportation			18,400		35		
Inside the dumping site			0		0	0	Dumping time.: min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 13th November 1997

Vehicle No. KUL961

Loading Capacity: 6850

Researcher's name: Alice K Kazungu

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			8 : 35			Jogoo Rd
Loading-1	in			9 : 12	37		Limuru Rd
	out			9 : 43		31	
Loading-2	in			9 : 55	12		Westlands Rd
	out			9 : 59		4	Tauri Lane
Loading-3	in			10 : 5	6		Chiromo Lane
	out			10 : 18		13	Ojjo Rd
Loading-4	in			10 : 21	3		Ring Rd - Mwanzi
	out			10 : 25		4	Mathege grove
Loading-5	in			10 : 40	15		Maba Rd - Limuru Rd
	out			10 : 50		10	Muthaiga - Tchui close
Loading-6	in			10 : 52	2		Seregheti Ave
	out			10 : 55		3	Mua Park Rd
Loading-7	in			10 : 56	1		Mutundu Rd
	out			10 : 59		3	
Loading-8	in			11 : 0	1		Navasha Rd
	out			11 : 9		9	
Loading-9	in			11 : 20	11		Muthaiga Rd
	out			11 : 35		15	
Dumping site	in		24,000	12 : 3	28		Muthaiga Rd - Thika Rd
Start dumping			10,000	12 : 6	3		Outering Rd - Komorock
Finish dumping			0	12 : 7		1	
Dumping site	out		10,000	12 : 9	2		
Reach to workshop	in			:			
Total			44,000		121	93	Total min.: 214 min.
Collection			0		38	92	
Transportation			24,000		49		
Inside the dumping site			20,000		5	1	Dumping time.: 6 min.
Idling time					29		

Time & Motion Study

Organization: NCC

Trip- 2 Date: 13th November 1997

Vehicle No. KUL961

Loading Capacity: 6850

Researcher's name: Alice K Kazungu

No. of Crew: 6

Estimated Volume: 4.5m³

Location		Milage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out			12 : 9			12:10-12:13 lunch break
Loading-1	in		2,000	12 : 38	29		Muthanga Rd in
	out			12 : 42		4	Utheru Lane
Loading-2	in		200	12 : 45	3		Muthanga Rd in
	out			12 : 48		3	Muthanga flats
Loading-3	in		250	12 : 50	2		Muthanga Rd in
	out			12 : 55		5	Road without name
Loading-4	in		15,000	12 : 58	3		Muthanga Rd in
	out			13 : 22		24	Orchard close
Loading-5	in		300	13 : 24	2		Muthanga Rd in
	out			13 : 45		21	Getrude's Hospital
Loading-6	in		306	13 : 50	5		Muthanga Rd in
	out			13 : 58		8	Muthanga Lane
Loading-7	in		14,000	14 : 25	27		Muthanga Rd - Limuru
	out			14 : 35		10	6th Parklands -5th Parklands
							Masari - Muranga Rd
							Thika
							15:25-15:28 3mins Loading
							to depot (Idling time)
Dumping site	in		17,000	16 : 20	105		Komorock - Outering -
Start dumping			1,000	16 : 23	3		Buru Buru - Jogoo Rd
Finish dumping			0	16 : 24		1	
Dumping site	out		1,000	16 : 26	2		
Reach to workshop	in		14,000	16 : 45	19		
Total			65,056		200	76	Total min.: 276 min.
Collection			30,056		42	75	
Transportation			33,000		147		
Inside the dumping site			2,000		5	1	Dumping time.: 6 min.
Idling time						6	

Time & Motion Study

Organization: NCC

Trip- 1 Date: 14th November 1997

Vehicle No. KAH013Y

Loading Capacity: 6820

Researcher's name: Alice K. Kazungu

No. of Crew: 2

Estimated Volume: 3m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	1685.8		9 : 45			Jogoo Rd - Moi Drive
Loading-1	in	1696.9	11,100	10 : 12	27		Kazole Rd 10:05-10:07
	out			10 : 15		3	Idling 2mins (Umoja depot)
Dumping site	in	1702.5	5,600	10 : 24	9		Kayole-Kangundo-Outering
Start dumping		1703.7	1,200	10 : 32	8		Karibangi-Mutarakwa
Finish dumping				10 : 33		1	Komorock-Dandora
Dumping site	out	1704.6	900	10 : 36	3		
Reach to workshop	in			:			
Total			18,800		47	4	Total min.: 51 min.
Collection			0		0	3	
Transportation			16,700		34		
Inside the dumping site			2,100		11	1	Dumping time.: 12 min.
Idling time						2	

Time & Motion Study

Organization: NCC

Trip- 2 Date: 14th November 1997

Vehicle No. KAH013Y

Loading Capacity: 6820

Researcher's name: Alice K. Kazungu

No. of Crew: 2

Estimated Volume: 2.7m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	1704.6		10 : 36			Komorock - Kayole
Loading-1	in	1710.8	6,200	11 : 2	26		Kayole
	out			11 : 5		3	
Dumping site	in	1717.3	6,500	11 : 17	12		Kayole-Kangundo-Outering
Start dumping		1718.3	1,000	11 : 23	6		Komorock-Dandora-Komo-
Finish dumping				11 : 24		1	rock-Mtarakwa-Kariobangi
Dumping site	out	1718.7	400	11 : 26	2		Outering-Kangundo-Kayole
Reach to workshop	in			:			
Total			14,100		46	4	Total min.: 50 min.
Collection			0		0	3	
Transportation			12,700		38		
Inside the dumping site			1,400		8	1	Dumping time.: 9 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 3 Date: 14th November 1997

Vehicle No. KAH013Y

Loading Capacity: 6820

Researcher's name: Alice K. Kazungu

No. of Crew: 2

Estimated Volume: 2.4m³

Location		Milage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	1718.7		11 : 24			Komorock - Kayole
Loading-1	in	1726.4	7,700	11 : 43	19		Kayole Rd
	out			11 : 46		3	Kayole -Kangundo -Outering
Dumping site	in	1732.5	6,100	12 : 0	14		Komorock-Dandora
Start dumping		1733.7	1,200	12 : 4	4		Komorock -Outering
Finish dumping				12 : 5		1	Kangundo-Kayole
Dumping site	out	1734.3	600	12 : 8	3		
Reach to workshop	in			:			Dandora - Kayole Rd
Total			15,600		40	4	Total min.: 44 min.
Collection			0		0	3	
Transportation			13,800		33		
Inside the dumping site			1,800		7	1	Dumping time.: 8 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 4 Date: 14th November 1997

Vehicle No. KAH013Y

Loading Capacity: 6820

Researcher's name: Alice K. Kazungu

No. of Crew: 2

Estimated Volume: 3m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	1734.3		12 : 8			Dandora - Kayole
Loading-1	in	1741.4	7,100	12 : 40	32		Kayole Rd
	out			12 : 48		8	
							12:27-1240 Idling 13mins wait for others to be loaded
Dumping site	in	1747.5	6,100	13 : 2	14		Kayole-Kangundo-Outering
Start dumping		1748.7	1,200	13 : 8	6		Komorock-Dandora-Komo-
Finish dumping				13 : 9			rock-Outering-Kangundo-
Dumping site	out	1749.3	600	13 : 13	4		Moi drive
Reach to workshop	in			:			
Total			15,000		56	9	Total min.: 65 min.
Collection			0		0	8	
Transportation			13,200		33		
Inside the dumping site			1,800		10	1	Dumping time.: 11 min.
Idling time					13		

Time & Motion Study

Organization: NCC

Trip- 5 Date: 14th November 1997

Vehicle No. KAH013Y

Loading Capacity: 6820

Researcher's name: Alice K. Kazungu

No. of Crew: 2

Estimated Volume: 2.7m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	1749.3		13 : 13			Dandora-Komorock
Loading-1	in	1762.8	13,500	14 : 18	65		Outering Rd-Kangundo
	out			14 : 25		7	Moi Drive
							13:38-13:50 Lunch Break
Dumping site	in	1767.7	4,900	14 : 35	10		Moi Drive-Kangundo
Start dumping		1768.7	1,000	14 : 37	2		Outering Rd-Komorock
Finish dumping				14 : 38		1	Dandora-Komorock
Dumping site	out	1769.8	1,100	14 : 42	4		Outering Rd-Thika Rd
Reach to workshop	in			:			
Total			20,500		81	8	Total min.: 89 min.
Collection			0		0	7	
Transportation			18,400		63		
Inside the dumping site			2,100		6	1	Dumping time.: 7 min.
Idling time					12		

Time & Motion Study

Organization: NCC

Trip- 1 Date: 15th November 1997

Vehicle No. KAH013Y

Loading Capacity: 6820

Researcher's name: Alice K Kazungu

No. of Crew: 2

Estimated Volume: 3m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	1802.9		10 : 35			Moi Drive-Kayole
Loading-1	in	1803.6	700	10 : 44	9		Komorock phase II
	out			:			10:40-10:44 waiting for ??to
Dumping site	in	1811.4	7,800	11 : 5	21		be loaded. 4mins Idling
Start dumping		1812.6	1,200	11 : 9	4		Dandora Mtarakwa Kario-
Finish dumping				11 : 10			1 bangi Outering Kangundo
Dumping site	out	1814.3	1,700	11 : 17	7		Komorock phase II
Reach to workshop	in			:			
Total			11,400		41	1	Total min.: 42 min.
Collection			0		0	0	
Transportation			8,500		26		
Inside the dumping site			2,900		11	1	Dumping time.: 12 min.
Idling time					4		

Time & Motion Study

Organization: NCC

Trip- 2 Date: 15th November 1997

Vehicle No. KAH013Y

Loading Capacity: 6820

Researcher's name: Alice K Kazungu

No. of Crew: 2

Estimated Volume: 2.7m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	1814.3		11 : 17			Komorock phase II
Loading-1	in	1824.3	10,000	11 : 49	32		Komorock phase II
	out			11 : 55		6	
Dumping site	in	1832	7,700	12 : 10	15		Komorock phase II
Start dumping		1832.9	900	12 : 15	5		Kangundo-Outering
Finish dumping		1832.9	0	12 : 16		1	Mutarakuwa-Dandora
Dumping site	out	1834.8	1,900	12 : 22	6		Mutarakuwa
Reach to workshop	in			:			11:40-11:49 waiting for loading Idling time 5mins
Total			20,500		58	7	Total min.: 65 min.
Collection			0		0	6	
Transportation			17,700		42		
Inside the dumping site			2,800		11	1	Dumping time.: 12 min.
Idling time					5		

Time & Motion Study

Organization: NCC

Trip- 3 Date: 15th November 1997

Vehicle No. KAH013Y

Loading Capacity: 6820

Researcher's name: Alice K Kazungu

No. of Crew: 2

Estimated Volume: 4.5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	1834.8		12 : 22			Dandora-Komorock phaseII
Loading-1	in	1842.4	7,600	12 : 42	20		Komorock phase II
	out			12 : 43			1 (Kangundo-Outering Kariobangi-Mtarakwa)
Dumping site	in	1851.4	9,000	13 : 4	21		Dandora-Mtarakwa-
Start dumping		1852.9	1,500	13 : 8	4		Kariobangi-Kangundo-
Finish dumping				13 : 9			1 Komorock phase II
Dumping site	out	1853.8	900	13 : 20	11		
Reach to workshop	in			:			
Total			19,000		56	2	Total min.: 58 min.
Collection			0		0	1	
Transportation			16,600		41		
Inside the dumping site			2,400		15	1	Dumping time.: 16 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 4 Date: 15th November 1997

Vehicle No. KAH013Y

Loading Capacity: 6820

Researcher's name: Alice K Kazungu

No. of Crew: 2

Estimated Volume: 2.4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	1853.8		13 : 30			Komorock phase II
Loading-1	in	1862.2	8,400	13 : 51	21		
	out			:			
							Kangundo-Kariobangi-Mtarakwa
Dumping site	in	1871.9	9,700	14 : 7	16		Dandora
Start dumping		1872	100	14 : 10	3		
Finish dumping				14 : 11		1	
Dumping site	out	1872.5	500	14 : 23	12		
Reach to workshop	in			:			
Total			18,700		52	1	Total min.: 53 min.
Collection			0		0	0	
Transportation			18,100		37		
Inside the dumping site			600		15	1	Dumping time.: 16 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 16th November 1997

Vehicle No. KAH013Y

Loading Capacity: 6820

Researcher's name: Alice K Kazungu

No. of Crew: 2

Estimated Volume: 0m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	1913.3		9 : 35			Jogoo Rd-Landhies Rd
Loading-1	in	1914.7	1,400	9 : 50	15		
	out			:			Mechanical Break Down
Dumping site	in			:			
Start dumping				:			
Finish dumping				:			
Duraping site	out			:			
Reach to workshop	in			:			
Total			1,400		15	0	Total min.: 15 min.
Collection			0		0	0	
Transportation			1,400		15		
Inside the dumping site			0		0	0	Dumping time.: min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 18th November 1997

Vehicle No. KAH013Y

Loading Capacity: 6820

Researcher's name: Alice K Kazungu

No. of Crew: 3

Estimated Volume: 3m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	2036.1		10 : 4			Jogoo
Loading-1	in	2048.7	12,600	10 : 23	19		Ngong Rd
	out			10 : 38		15	
Loading-2	in	2054.9	6,200	10 : 50	12		Ngong Rd
	out			10 : 55		5	Community area
Dumping site	in	2069	14,100	11 : 30	35		Ngong-Kenyatta-Nyerere
Start dumping		2069.2	200	11 : 34	4		University way-SlipRd-Muranga
Finish dumping				11 : 35		1	-Thika-Outering-Komeroock
Dumping site	out	2069.5	300	11 : 37	2		-Dandora-Komeroock-Outering-
Reach to workshop	in			:			Thika-Muranga-Slip-University
							UhuruH.W-Kenyatta Ave-Ngong
Total			33,400		72	21	Total min.: 93 min.
Collection			6,200		12	20	
Transportation			26,700		54		
Inside the dumping site			500		6	1	Dumping time.: 7 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 2 Date: 18th November 1997

Vehicle No. KAI1013Y

Loading Capacity: 6820

Researcher's name: Alice K Kazungu

No. of Crew: 3

Estimated Volume: 3m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	2069.5		11 : 37			Jogoo
Loading-1	in	2084.3	14,800	12 : 18	41		Ngong Rd
	out			12 : 23		5	Community area
							Ngong Rd-Community area
Dumping site	in	2098.9	14,600	12 : 50	27		Ngong-Kenyatta-Muranga-
Start dumping		2099.7	800	12 : 55	5		Thika-Outering-Komorock-
Finish dumping				12 : 56		1	Dandora-Komorock Outering
Dumping site	out	2101.4	1,700	13 : 7	11		Thika-Muranga-Slip-University-
Reach to workshop	in			:			Uhuru H.W-Kenyatta Ave
							Ngong
Total			31,900		84	6	Total min.: 90 min.
Collection			0		0	5	
Transportation			29,400		68		
Inside the dumping site			2,500		16	1	Dumping time.: 17 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 3 Date: 18th November 1997

Vehicle No. KAH013Y

Loading Capacity: 6820

Researcher's name: Alice K Kazungu

No. of Crew: 3

Estimated Volume: 1.5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	2101.4		13 : 7			Komorock-Kenyatta
Loading-1	in	2115.9	14,500	13 : 37	30		Ngong Rd
	out			13 : 50		13	Community area
Dumping site	in	2130.5	14,600	14 : 27	37		
Start dumping		2132.3	1,800	14 : 32	5		
Finish dumping				14 : 33		1	
Dumping site	out	2133.3	1,000	14 : 42	9		
Reach to workshop	in	2143.4	10,100	15 : 7	25		
Total			42,000		106	14	Total min.: 120 min.
Collection			0		0	13	
Transportation			39,200		92		
Inside the dumping site			2,800		14	1	Dumping time.: 15 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 19th November 1997

Vehicle No. KUL989

Loading Capacity: 7850

Researcher's name: Alice K Kazungu

No. of Crew: 4

Estimated Volume: 4.5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	111661.1		10 : 10			Jogoo-Mbagathi way
Loading-1	in	111676.4	15,300	10 : 35	25		Ngong Rd-Riara Rd-
	out			10 : 45		10	Oleudume
Loading-2	in	111677.4	1,000	10 : 50	5		Elegeyo Marakwet Close
	out			10 : 54		4	Kirichwa Gardens-Kirichwa Rd
Loading-3	in	111679.3	1,900	10 : 59	5		Argwings Kodhek Rd
	out			11 : 7		8	
Loading-4	in	111679.4	100	11 : 8	1		Rose Avenue
	out			11 : 25		17	
Loading-5	in	111682.4	3,000	11 : 40	15		Argwings Kodhek Rd
	out			11 : 48		8	Woodlands-Lenana-
							Ralah Bunche-Mlimani
							10:21-10:30 Idling time 9mins (depot)
							Kenyatta Ave-Nyerere-
Dumping site	in	111698.9	16,500	12 : 21	33		University way-Slip Rd
Start dumping		111699	100	12 : 22	1		Muranga-Thika-Outering
Finish dumping				:			Komorock-Dandora
Dumping site	out	111699.2	200	12 : 52	30		
Reach to workshop	in			:			
Total			38,100		115	47	Total min.: 162 min.
Collection			6,000		26	47	
Transportation			31,800		49		
Inside the dumping site			300		31	0	Dumping time.: 31 min.
Idling time					9		

Time & Motion Study

Organization: NCC

Trip- 2 Date: 19th November 1997

Vehicle No. KUL989

Loading Capacity: 7850

Researcher's name: Alice K Kazungu

No. of Crew: 4

Estimated Volume: 2.5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	111699.2		12 : 52			Komorock-Jogoo
Loading-1	in	111720.5	21,300	13 : 41	49		Lusaka-Elegeyo Marakwet
	out			13 : 50		9	close
Loading-2	in	111733.7	13,200	14 : 15	25		Ngong-Nairobi west hospital
	out			14 : 25		10	
Dumping site	in	111751.4	17,700	15 : 21	56		Langata-Lusaka-Jogoo-
Start dumping		111752.5	1,100	15 : 24	3		BuruBuru-Mumias Rd-
Finish dumping				15 : 28		4	Outering-Marakwa-
Dumping site	out	111753.5	1,000	15 : 31	3		Komorock-Dandora
Reach to workshop	in			:			
Total			54,300		136	23	Total min.: 159 min.
Collection			13,200		25	19	
Transportation			39,000		105		
Inside the dumping site			2,100		6	4	Dumping time.: 10 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 12th November 1997

Vehicle No. KUL993

Loading Capacity: 7.98Ton

Researcher's name: Wilfred Kanyugo

No. of Crew: 8

Estimated Volume: 6.75m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	92333		8 : 55			Landhies Rd-Ngara Rd
Loading-1	in	92337	4,000	9 : 35	40		via Limuru-
	out			9 : 46		11	3rd Parklands Ave
Loading-2	in	92343	6,000	9 : 56	10		3rd Parklands Ave
	out			11 : 19		83	Limuru Rd-UNEP(loading)
							9:05-9:30 stopping for allocation of place/route (25mins)
							11:36-11:45 Idlingtime 9mins
Dumping site	in	92360	17,000	11 : 57	38		
Start dumping				11 : 59	2		
Finish dumping				12 : 13		14	
Dumping site	out	92361	1,000	12 : 20	7		
Reach to workshop	in			:			
Total			28,000		97	108	Total min.: 205 min.
Collection			6,000		10	94	
Transportation			21,000		44		
Inside the dumping site			1,000		9	14	Dumping time.: 23 min.
Idling time					34		

Time & Motion Study

Organization: NCC

Trip- 2 Date: 12th November 1997

Vehicle No. KUL993

Loading Capacity: 7.98Ton

Researcher's name: Wilfred Kanyago

No. of Crew: 8

Estimated Volume: 6m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	92361		12 : 22			From dump site (Dandora)
Loading-1	in	92376	15,000	12 : 50	28		Komorock Rd 12:32-12:34
	out			14 : 11		81	(Idling time 2mins)
							Komorock Rd-Outering-Thika -
							Limuru Rd-Muthaiga Rd-UNEP
							Loading (UNEP) full capacity
							spillage
							Limuru Rd-Ngara Est stopped at
							Office (Ngara)14:14-14:17 3min
							Muranga Rd Outering Rd
							(Idling time Komorock Rd
							Dandora est)
							14:35-14:37 2mins
							14:48-14:50 2mins
Dumping site	in	92397	21,000	15 : 24	73		Dandora
Start dumping				15 : 26	2		
Finish dumping				15 : 36		10	
Dumping site	out	92397	0	15 : 38	2		
Reach to workshop	in	92407	10,000	16 : 15	37		
Total			46,000		142	91	Total min.: 233 min.
Collection			0		0	81	
Transportation			46,000		129		
Inside the dumping site			0		4	10	Dumping time.: 14 min.
Idling time						9	

Time & Motion Study

Organization: NCC

Trip- 1 Date: 12th November 1997

Vehicle No. KUL992

Loading Capacity: 7940

Researcher's name: John Alfred Kamau

No. of Crew: 2

Estimated Volume:

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	232076		10 : 36			Lusaka Rd & Langata Rd
Loading-1	in	232085	9,000	11 : 5	29		-No Garbage collected
	out			11 : 15		10	
Loading-2	in	232095	10,000	11 : 39	24		-Kaloleni depot
	out			11 : 52		13	-Enterprise Rd
Loading-3	in	232097	2,000	12 : 13	21		Garage
	out			:			- Mechanical problem
Dumping site	in			:			No garbage collected
Start dumping				:			
Finish dumping				:			
Dumping site	out			:			
Reach to workshop	in			:			
Total			21,000		74	23	Total min.: 97 min.
Collection			12,000		45	23	
Transportation			9,000		29		
Inside the dumping site			0		0	0	Dumping time.: min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 2 Date: 13th November 1997

Vehicle No. KUL995

Loading Capacity: 7TON

Researcher's name: John Alfred Kamau

No. of Crew: 9

Estimated Volume: 5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	100085		14 : 46			Lunga Lunga Rd
Loading-1	in	100089	4,000	15 : 57	71		Enterprise Rd
	out			16 : 16		19	Lusaka-Jogoo Rd-
							Outering Rd
Dumping site	in	100107	18,000	16 : 58	42		Dandora
Start dumping				16 : 59	1		
Finish dumping				17 : 17		18	
Dumping site	out	100107	0	17 : 19	2		
Reach to workshop	in	100112	5,000	17 : 36	17		Kaloleni
Total			27,000		133	37	Total min.: 170 min.
Collection			0		0	19	
Transportation			27,000		130		
Inside the dumping site			0		3	18	Dumping time.: 21 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 13th November 1997

Vehicle No. KUI.995

Loading Capacity: 7TON

Researcher's name: John Alfred Kamau

No. of Crew: 9

Estimated Volume: 8m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	100047		9 : 11			Mworoto-Industrial Area
Loading-1	in	100056	9,000	10 : 5	54		Enterprise Rd
	out			11 : 10		65	Chawgamwe Rd
Loading-2	in	100057	1,000	11 : 15	5		Butere Rd
	out			11 : 52		37	
Loading-3	in	100057	0	11 : 56	4		Butere Rd
	out			12 : 12		16	
Loading-4	in	100057	0	12 : 13	1		Butere Rd
	out			12 : 32		19	
Loading-5	in	100058	1,000	12 : 42	10		Dunga Rd
	out			12 : 56		14	
Dumping site	in	100074	16,000	13 : 44	48		Dumping at Dandora
Start dumping				13 : 46	2		
Finish dumping				14 : 15		29	
Dumping site	out	100074	0	14 : 20	5		Lunga Lunga Rd to
Reach to workshop	in	100085	11,000	14 : 46	26		the next trip
Total			38,000		155	180	Total min.: 335 min.
Collection			2,000		20	151	
Transportation			36,000		128		
Inside the dumping site			0		7	29	Dumping time.: 36 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 14th November 1997

Vehicle No. KAB289Q

Loading Capacity: 16TON

Researcher's name: John Alfred Kamau

No. of Crew: 7

Estimated Volume: 7m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out		11 : 47			Pumwani
Loading-1	in	5,000	12 : 38	51		Eastleigh
	out		13 : 30		52	
Loading-2	in	4,000	13 : 44	14		Kariokor
	out		13 : 56		12	Enterprise Rd
Dumping site	in	13,000	14 : 19	23		Mukuizu Industrial area
Start dumping			14 : 20	1		
Finish dumping			14 : 25		5	
Dumping site	out		14 : 56	31		
Reach to workshop	in		:			Lunga Lunga, Likoni, Jogoo
Total		22,000		120	69	Total min.: 189 min.
Collection		4,000		14	64	
Transportation		18,000		74		
Inside the dumping site		0		32	5	Dumping time.: 37 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 2 Date: 14th November 1997

Vehicle No. KAB289Q

Loading Capacity: 16TON

Researcher's name: John Alfred Kamau

No. of Crew: 7

Estimated Volume: 4m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site out			14 : 56			Jogoo
Loading-1 in		11,000	15 : 15	19		Eastleigh
out			17 : 9		114	
Loading-2 in		500	17 : 23	14		Eastleigh
out			17 : 35		12	
Dumping site in			:			Return to Workshop
Start dumping			:			No dumping
Finish dumping			:			
Dumping site out			:			
Reach to workshop in			:			
Total		11,500		33	126	Total min.: 159 min.
Collection		500		14	126	
Transportation		11,000		19		
Inside the dumping site		0		0	0	Dumping time.: min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 1 Date: 15th November 1997

Vehicle No. KUL313

Loading Capacity: 4TON

Researcher's name: John Alfred Kamau

No. of Crew: 4

Estimated Volume: 4m³

Location		Mileage (kn)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			8 : 34			Landhies Rd-Moi Ave
Loading-1	in		8,000	8 : 55	21		Nairobi University
	out			9 : 13		18	
Dumping site	in		18,000	9 : 35	22		Dandora Dumping site
Start dumping				9 : 39	4		
Finish dumping				9 : 43		4	
Dumping site	out			9 : 45	2		
Reach to workshop	in			:			To the next loading
Total			26,000		49	22	Total min.: 71 min.
Collection			0		0	18	
Transportation			26,000		43		
Inside the dumping site			0		6	4	Dumping time.: 10 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 2 Date: 15th November 1997

Vehicle No. KUL313

Loading Capacity: 4TON

Researcher's name: John Alfred Kamau

No. of Crew: 4

Estimated Volume: 6m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out		9 : 45			Muranga Rd - Park Rd
Loading-1	in	18,000	10 : 19	34		Nairobi University
	out		10 : 33		14	Muranga Rd
Dumping site	in	18,000	11 : 5	32		Dandora
Start dumping			11 : 8	3		
Finish dumping			11 : 15		7	
Dumping site	out		11 : 16	1		
Reach to workshop	in		:			To the next loading point
Total		36,000		70	21	Total min.: 91 min.
Collection		0		0	14	
Transportation		36,000		66		
Inside the dumping site		0		4	7	Dumping time.: 11 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 3 Date: 15th November 1997

Vehicle No. KUL313

Loading Capacity: 4TON

Researcher's name: John Alfred Kamau

No. of Crew: 4

Estimated Volume: 6m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			11 : 16			Outering Rd
Loading-1	in		11,000	11 : 52	36		Airport (JKA)
	out			12 : 48		56	
Dumping site	in		11,000	13 : 28	40		Dandora
Start dumping				13 : 30	2		
Finish dumping				13 : 32		2	
Dumping site	out			13 : 33	1		
Reach to workshop	in		8,000	14 : 7	34		Jogoo Rd, Kaloleni
Total			30,000		113	58	Total min.: 171 min.
Collection			0		0	56	
Transportation			30,000		110		
Inside the dumping site			0		3	2	Dumping time.: 5 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 16th November 1997

Vehicle No. KUL313

Loading Capacity: 4TON

Researcher's name: John Alfred Kamau

No. of Crew: 4

Estimated Volume: 6m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			9 : 15			Katoleni
Loading-1	in		8,000	9 : 30	15		Lunga Lunga
	out			9 : 42		12	
Dumping site	in		8,000	10 : 18	36		Dandora
Start dumping				10 : 20	2		
Finish dumping				10 : 28		8	Muranga Rd to the next
Dumping site	out			10 : 30	2		loading
Reach to workshop	in			:			
Total			16,000		55	20	Total min.: 75 min.
Collection			0		0	12	
Transportation			16,000		51		
Inside the dumping site			0		4	8	Dumping time.: 12 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 2 Date: 16th November 1997

Vehicle No. KUL313

Loading Capacity: 4TON

Researcher's name: John Alfred Kanau

No. of Crew: 4

Estimated Volume: 7m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site			10 : 30			From Dandora dumping site
Loading-1		14,000	11 : 13	43		JKAairport
			11 : 47		34	
Dumping site		14,000	12 : 29	42		Dandora D/site
Start dumping			12 : 30	1		Mechanical problem
Finish dumping			12 : 33		3	
Dumping site			13 : 9	36		
Reach to workshop			:			
Total		28,000		122	37	Total min.: 159 min.
Collection		0		0	34	
Transportation		28,000		85		
Inside the dumping site		0		37	3	Dumping time.: 40 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 1 Date: 18th November 1997

Vehicle No. KWE074

Loading Capacity: 7.7TON

Researcher's name: John Alfred Kamau

No. of Crew: 9

Estimated Volume: 8m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	167874		7 : 48			Kaloleni
Loading-1	in	167892	18,000	10 : 25	157		Waiyaki way
	out			10 : 29		4	
Loading-2	in	167893	1,000	10 : 32	3		
	out			10 : 37		5	
Loading-3	in	167894	1,000	10 : 39	2		
	out			10 : 56		17	
Loading-4	in	167904	10,000	10 : 58	2		
	out			11 : 29		31	
Loading-5	in	167904.3	300	11 : 48	19		
	out			12 : 2		14	
Dumping site	in	167923	18,700	12 : 30	28		Dandora
Start dumping				12 : 32	2		
Finish dumping				13 : 12		40	
Dumping site	out			13 : 15	3		
Reach to workshop	in			:			
Total			49,000		216	111	Total min.: 327 min.
Collection			12,300		26	71	
Transportation			36,700		185		
Inside the dumping site			0		5	40	Dumping time.: 45 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 2 Date: 18th November 1997

Vehicle No. KWE074

Loading Capacity: 7.7TON

Researcher's name: John Alfred Kamau

No. of Crew: 9

Estimated Volume: 6m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out			13 : 15			From dumping site
Loading-1	in	167923		13 : 51	36		Waiyaki way
	out			13 : 52		1	
Loading-2	in	167923	200	13 : 53	1		
	out			13 : 55		2	
Loading-3	in	167924	1,000	13 : 57	2		
	out			13 : 59		2	
Loading-4	in	167925	1,000	14 : 4	5		
	out			14 : 7		3	
Loading-5	in	167928	3,000	14 : 27	20		
	out			:			
Dumping site	in			:			Thika Rd
Start dumping				:			No dumping
Finish dumping				15 : 4		37	mechanical problem(3:04)
Dumping site	out			:			
Reach to workshop	in			:			
Total			5,200		64	45	Total min.: 109 min.
Collection			5,200		28	8	
Transportation			0		36		
Inside the dumping site			0		0	37	Dumping time.: 37 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 19th November 1997

Vehicle No. KUI.994

Loading Capacity: 7TON

Researcher's name: John Alfred Kamau

No. of Crew: 1

Estimated Volume: 0m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out		:			Kaloleni
Loading-1	in	0	10 : 58	658		Langata Rd
	out		11 : 6		8	
Dumping site	in		:			No garbage collected
Start dumping			:			
Finish dumping			:			
Dumping site	out		:			
Reach to workshop	in		:			
Total		0		658	8	Total min.: 666 min.
Collection		0		0	8	
Transportation		0		658		
Inside the dumping site		0		0	0	Dumping time.: min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 1 Date: 13th November 1997

Vehicle No. KWE081

Loading Capacity: 7.98Ton

Researcher's name: Wilfred Kanyugo

No. of Crew: 8

Estimated Volume: 5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	91973.8		11 : 7			Industrial area & back to Majengo
Loading-1	in	91985.2	11,400	11 : 52	45		Pangani Estate
	out			11 : 54		2	to depot
Loading-2	in	91987.4	2,200	12 : 17	23		Pangani Estate
	out			12 : 20		3	(Marie Stopes Hospital)
Loading-3	in	91987.45	50	12 : 22	2		Pangani Estate
	out			12 : 25		3	
Loading-4	in	91987.46	10	12 : 25	0		Pangani Estate
	out			12 : 26		1	
Loading-5	in	91987.47	10	12 : 26	0		Pangani Estate
	out			12 : 26		0	
Loading-6	in	91992.3	4,830	12 : 41	15		Shell petrol Station
	out			12 : 54		13	Thika Rd
Loading-7	in	91995.2	2,900	13 : 1	7		KPLC Thika Rd-
	out			13 : 56		55	Pangani estate Eastleigh
							Mathare, Huruma,
							Komorock Rd, Dandora
							11:24-11:26 Idling 2mins depot
							11:37-11:41 Idling 4mins
							Mathare depot
							11:42-11:44 Idling 2mins depot
							12:01-12:14 Idling 13mins
							12:30-12:32 Idling 2mins
							Mathare depot
							14:14-14:29 Idling 15mins
Dumping site	in	92007	11,800	14 : 43	47		Dandora
Start dumping				14 : 46	3		
Finish dumping				15 : 9		23	
Dumping site	out	92010	3,000	15 : 11	2		
Reach to workshop	in			16 : 2	51		
Total			36,200		195	100	Total min.: 295 min.
Collection			10,000		32	77	
Transportation			23,200		120		
Inside the dumping site			3,000		5	23	Dumping time.: 28 min.
Idling time					38		

Time & Motion Study

Organization: NCC

Trip- 1 Date: 15th November 1997

Vehicle No. KUL994

Loading Capacity: 7.88Ton

Researcher's name: Wilfred Kanyugo

No. of Crew: 8

Estimated Volume: 5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	74181.5		8 : 37			Jogoo Rd - Outering
Loading-1	in	74201.51	20,010	11 : 41	184		Komorock Estate phase II
	out			11 : 50		9	
Loading-2	in	74201.52	10	11 : 50	0		Komorock Estate phase II
	out			11 : 58		8	
Loading-3	in	74201.53	10	11 : 58	0		Komorock Estate phase II
	out			12 : 25		27	
Loading-4	in	74203.9	2,370	12 : 37	12		Komorock Estate phase II
	out			13 : 41		64	
							9:06-9:32 Idling 26mins
							9:43-10:18 Idling 25mins
							10:23-10:48 Idling 25mins
							10:59-11:00 Idling 1min
							11:04-11:06 Idling 2mins
							11:12-11:16 Idling 4mins
							11:22-11:39 Idling 17mins
							13:54-14:06 Idling 12mins
							14:18-14:21 Idling 3mins
							(IFCK Komorock)
							14:28-14:29 Idling 1min
Dumping site	in	74216	12,100	14 : 56	75		Dandora
Start dumping				14 : 58	2		
Finish dumping				15 : 3		5	
Dumping site	out	74217.5	1,500	15 : 5	2		
Reach to workshop	in	74227.5	10,000	16 : 0	55		
Total			46,000		330	113	Total min.: 443 min.
Collection			2,390		12	108	
Transportation			42,110		198		
Inside the dumping site			1,500		4	5	Dumping time.: 9 min.
Idling time					116		

Time & Motion Study

Organization: NCC

Trip- 1

Date: 20th November 1997

Vehicle No. KAB391Q

Loading Capacity: 6.95Ton

Researcher's name: Wilfred Kanyogo

No. of Crew: 5

Estimated Volume: 5m³

Location		Mileage (kn)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	28407.3		9 : 7			Kaloleni
Loading-1	in	28411	3,700	9 : 16	9		Industrial area (Jumbo bisauli)
	out			10 : 35		79	Enterprise Rd, Likoni
							Lunga Lunga Rd
							Outering Rd
Dumping site	in	28423	12,000	11 : 11	36		Dandora
Start dumping				11 : 16	5		Umoja, Outering, Yabai,
Finish dumping				11 : 17		1	Jogoo, Lusaka, Langata Rd
Dumping site	out	28424	1,000	11 : 19	2		
Reach to workshop	in	28433	9,000	11 : 32	13		
Total			25,700		65	80	Total min.: 145 min.
Collection			0		0	79	
Transportation			24,700		58		
Inside the dumping site			1,000		7	1	Dumping time.: 8 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 2 Date: 20th November 1997

Vehicle No. KAB391Q

Loading Capacity: 6.95Ton

Researcher's name: Wilfred Kanyugo

No. of Crew: 6

Estimated Volume: 5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	28443.2		11 : 48			Langata Rd
Loading-1	in	28449.7	6,500	12 : 25	37		Madaraka flats
	out			12 : 57		32	Lusaka, Jogoo, Outering
Dumping site	in	28463.1	13,400	13 : 33	36		Dandora dumping site
Start dumping				13 : 34	1		
Finish dumping				13 : 36		2	
Dumping site	out	28464.1	1,000	13 : 38	2		
Reach to workshop	in			:			
Total			20,900		76	34	Total min.: 110 min.
Collection			0		0	32	
Transportation			19,900		73		
Inside the dumping site			1,000		3	2	Dumping time.: 5 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 17th November 1997

Vehicle No. KAH013Y

Loading Capacity: 6.82Ton

Researcher's name: Wilfred Kanyugo

No. of Crew: 9

Estimated Volume: 5m³

Location		Mileage (kn)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	1965.2		11 : 38			State house Rd
Loading-1	in	1970	4,800	11 : 53	15		YWCA
	out			12 : 0		7	YWCA hostels
Loading-2	in	1971	1,000	12 : 4	4		YWCA hostels
	out			12 : 16		12	
Loading-3	in	1971.5	500	12 : 20	4		State house residential areas
	out			12 : 21		1	
Loading-4	in	1971.53	30	12 : 22	1		
	out			12 : 23		1	
Loading-5	in	1972.7	1,170	12 : 24	1		Thomi's (Residential)
	out			12 : 30		6	
Loading-6	in	1973.4	700	12 : 32	2		Lady Nothey Home
	out			12 : 33		1	
Loading-7	in	1973.7	300	12 : 35	2		State house crescent
	out			12 : 36		1	
Loading-8	in	1973.9	200	12 : 38	2		Georgia mansions
	out			12 : 39		1	
Loading-9	in	1973.91	10	12 : 41	2		Vienna flats
	out			12 : 57		16	Ralph Bunch Rd
Loading-10	in	1974.8	890	13 : 0	3		
	out			13 : 14		14	Milimani Rd
Loading-11	in	1975.2	400	13 : 16	2		State house Rd (residential)
	out			13 : 17		1	
Loading-12	in	1975.4	200	13 : 18	1		Woodland Rd(residential area)
	out			13 : 29		11	Denis Pritt Rd (residential)
Loading-13	in	1976	600	13 : 30	1		Denis Pritt Rd (residential)
	out			13 : 35		5	Denis Pritt Rd (residential)
Loading-14	in	1976.2	200	13 : 36	1		Caledonia shopping center
	out			14 : 14		38	Argwings Kodheck Rd
Loading-15	in	1982.4	6,200	14 : 22	8		Elgeyo Marakwet
	out			:			Ngong Rd Depot
Dumping site	in	1999.3	16,900	15 : 2	40		Dandora
Start dumping				15 : 3	1		
Finish dumping				15 : 5		2	
Dumping site	out	1999.7	400	15 : 6	1		
Reach to workshop	in			:			
Total			34,500		91	117	Total min.: 208 min.
Collection			12,400		34	115	
Transportation			21,700		55		
Inside the dumping site			400		2	2	Dumping time.: 4 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 18th November 1997

Vehicle No. KUL992

Loading Capacity: 7.94Ton

Researcher's name: Wilfred Kanyugo

No. of Crew:

Estimated Volume: 5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	32499.7		9 : 57			Kaloleni
Loading-1	in	32542.8	43,100	12 : 33	156		Umoja II
	out			12 : 48		15	
Loading-2	in	32544.3	1,500	12 : 58	10		Umoja II
	out			12 : 59		1	
Loading-3	in	32544.4	100	13 : 2	3		Umoja II
	out			13 : 4		2	
Loading-4	in	32545.2	800	13 : 15	11		Umoja II
	out			13 : 18		3	
Loading-5	in	32546.2	1,000	13 : 23	5		Umoja II
	out			13 : 44		21	
							10:02-10:14 2mins Idling
							10:25-10:27 2mins Idling
							10:50-10:55 5mins Idling
							11:07-11:13 6mins Idling
							11:19-11:25 6mins Idling
							11:28-11:34 6mins Idling
							12:06-12:09 3mins Idling
Dumping site	in	32552.3	0	14 : 5	21		Dandora
Start dumping				14 : 6	1		
Finish dumping				14 : 45		39	
Dumping site	out	32552.9	600	14 : 46	1		
Reach to workshop	in			:			
Total			47,100		208	81	Total min.: 289 min.
Collection			3,400		29	42	
Transportation			43,100		147		
Inside the dumping site			600		2	39	Dumping time.: 41 min.
Idling time					30		

Time & Motion Study

Organization: NCC

Trip- 1 Date: 12th November 1997

Vehicle No. KUL313

Loading Capacity: 12TON

Researcher's name: Timothy N Waweru

No. of Crew: 4

Estimated Volume: 6m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop			9 : 16			
Loading-1		12,000	9 : 50	34		Dandora phase II
			9 : 55		5	Dandora Rd off
						Outering Rd
Dumping site		1,000	10 : 0	5		Dandora dumping site
Start dumping			10 : 1	1		Off Outering Rd
Finish dumping			10 : 5		4	
Dumping site		100	10 : 8	3		
Reach to workshop			:			
Total		13,100		43	9	Total min.: 52 min.
Collection		0		0	5	
Transportation		13,000		39		
Inside the dumping site		100		4	4	Dumping time.: 8 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 2 Date: 12th November 1997

Vehicle No. KUL313

Loading Capacity: 12TON

Researcher's name: Timothy N Waweru

No. of Crew: 4

Estimated Volume: 5m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out		10 : 8			
Loading-1	in	10,000	10 : 45	37		UNEP centre Gigiri
	out		11 : 2		17	UNEP centre off
						Muthaiga way
Dumping site	in	10,000	11 : 28	26		Dandora dumping site
Start dumping			11 : 30	2		Off Outer Ring Rd
Finish dumping			11 : 34		4	
Dumping site	out	200	11 : 40	6		
Reach to workshop	in		:			
Total		20,200		71	21	Total min.: 92 min.
Collection		0		0	17	
Transportation		20,000		63		
Inside the dumping site		200		8	4	Dumping time.: 12 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 3 Date: 12th November 1997

Vehicle No. KUL313

Loading Capacity: 12TON

Researcher's name: Timothy N Waweru

No. of Crew: 4

Estimated Volume: 6m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site out			11 : 40			J.K.I Airport, Airport Rd
Loading-1 in		10,000	12 : 40	60		2:15-2:29 mechanical problem
out			13 : 15		35	11:45-12:10 Lunch
Dumping site in		10,000	14 : 38	83		Dandora dumping site
Start dumping			14 : 42	4		Off Outering Rd
Finish dumping			14 : 48		6	
Dumping site out		300	14 : 55	7		
Reach to workshop in			:			
Total		20,300		154	41	Total min.: 195 min.
Collection		0		0	35	
Transportation		20,000		104		
Inside the dumping site		300		11	6	Dumping time.: 17 min.
Idling time				39		

Time & Motion Study

Organization: NCC

Trip- 4 Date: 12th November 1997

Vehicle No. KUL313

Loading Capacity: 12TON

Researcher's name: Timothy N Waweru

No. of Crew: 4

Estimated Volume: m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out		14 : 55			
Loading-1	in	13,000	15 : 25	30		Litter container empty
	out		15 : 26		1	No loading
						Westlands-Uhuru highway
Dumping site	in		:			Didn't go to the D/site
Start dumping			:			Industrial area off
Finish dumping			:			Enterprise Rd
Dumping site	out		:			
Reach to workshop	in	8,000	15 : 45	19		
Total		21,000		49	1	Total min.: 50 min.
Collection		0		0	1	
Transportation		21,000		49		
Inside the dumping site		0		0	0	Dumping time.: min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 1 Date: 13th November 1997

Vehicle No. KUL993

Loading Capacity: 12TON

Researcher's name: Timothy N Waweru

No. of Crew: 7

Estimated Volume: 6m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	192418		8 : 50			8:56-9:19 Idling 23mins
Loading-1	in	192428	10,000	9 : 35	45		Crew appointment
	out			9 : 45		10	Buru Buru phase IV
Loading-2	in	192428.3	300	9 : 48	3		Mumias Rd - Off
	out			10 : 5		17	Outering Rd
Loading-3	in	192429	700	10 : 9	4		BuruBuru Estate phase IV
	out			10 : 14		5	Off Outering Rd, Mumias Rd
Loading-4	in	192429.6	600	10 : 17	3		
	out			10 : 25		8	
Loading-5	in	#####	50	10 : 27	2		
	out			10 : 36		9	
Loading-6	in	#####	30	10 : 37	1		
	out			10 : 40		3	
Loading-7	in	192429.7	20	10 : 43	3		
	out			10 : 46		3	
Loading-8	in	192430	300	10 : 47	1		
	out			10 : 58		11	
Dumping site	in	192437	7,000	11 : 16	18		Dandora dumping site
Start dumping				11 : 20	4		off Outering Rd
Finish dumping				11 : 48		28	Vehicle record (off Dsite)
Dumping site	out	#####	250	11 : 53	5		11:55-12:00
Reach to workshop	in			:			
Total			19,250		89	94	Total min.: 183 min.
Collection			2,000		17	66	
Transportation			17,000		40		
Inside the dumping site			250		9	28	Dumping time.: 37 min.
Idling time					23		

Time & Motion Study

Organization: NCC

Trip- 2 Date: 13th November 1997

Vehicle No. KUL993

Loading Capacity: 12TON

Researcher's name: Timothy N Waweru

No. of Crew: 7

Estimated Volume: 5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	#####		11 : 53			
Loading-1	in	192443	5,750	12 : 10	17		BuruBuru Estate
	out			12 : 20		10	Mumias Rd off
Loading-2	in	192444	1,000	12 : 25	5		Outering Rd
	out			12 : 56		31	
Loading-3	in	192446	2,000	12 : 59	3		
	out			13 : 15		16	
Loading-4	in	192446.3	300	13 : 20	5		
	out			13 : 25		5	
Loading-5	in	192447	700	13 : 28	3		
	out			13 : 35		7	
Loading-6	in	192447.5	500	13 : 36	1		
	out			13 : 46		10	
Loading-7	in	192448	500	13 : 48	2		
	out			13 : 51		3	
Loading-8	in	192449	1,000	13 : 55	4		
	out			14 : 8		13	
Dumping site	in	192457	8,000	14 : 18	10		Dandora dumping site
Start dumping		192457.5	500	14 : 23	5		Off Outering Rd
Finish dumping				14 : 48		25	
Dumping site	out			15 : 20	32		2:49-3:25 mechanical problem
Reach to workshop	in	192473	15,500	15 : 58		38	Industrial area off
							Enterprise Rd
Total			35,750		87	158	Total min.: 245 min.
Collection			6,000		23	133	
Transportation			29,250		27		
Inside the dumping site			500		37	25	Dumping time.: 62 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 14th November 1997

Vehicle No. KUL995

Loading Capacity: 12TON

Researcher's name: Timothy N Waweru

No. of Crew: 9

Estimated Volume: 7m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	100123		8 : 0			8:05-9:50 Idling for fueling
Loading-1	in	100141	18,000	10 : 50	170		Adams Arcade, Ngong Rd
	out			11 : 0		10	
Loading-2	in	100144	3,000	11 : 5	5		Hurlingham:
	out			11 : 15		10	off Argwings Kodhe Rd
Loading-3	in	100145	1,000	11 : 20	5		Salama Annex Hotel
	out			11 : 25		5	Off - State house Rd
Loading-4	in	100145.05	50	11 : 28	3		State house Rd
	out			:			
Loading-5	in	100156	10,950	11 : 58	30		Police Station off Langata
	out			13 : 48		110	Rd, Kungu Karumba Rd
							Dagoretti depot 2:10-2:25
							Ngong Rd -Idling time
Dumping site	in	100194	38,000	15 : 20	92		Dandora
Start dumping		100195	1,000	15 : 25	5		
Finish dumping		100195	0	16 : 0		35	
Dumping site	out	100195	0	16 : 10	10		Industrial area :
Reach to workshop	in	100209	14,000	16 : 55	45		Dares salaam Rd off
							Enterprise Rd
Total			86,000		365	170	Total min.: 535 min.
Collection			15,000		43	135	
Transportation			70,000		247		
Inside the dumping site			1,000		15	35	Dumping time.: 50 min.
Idling time					60		

Time & Motion Study

Organization: NCC

Trip- 1 Date: 15th November 1997

Vehicle No. KUL995

Loading Capacity: 12TON

Researcher's name: Timothy N Waweru

No. of Crew: 8

Estimated Volume: 7m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	100242		9 : 2			Ngong Rd 9:25-9:30 Idling
Loading-1	in	100259	17,000	9 : 40	38		Off Ngong Rd
	out			9 : 43		3	Adams Arcade
Loading-2	in	100259.02	20	9 : 44	1		Lavington Est
	out			9 : 50		6	Off Argwings Kodheck Rd
Loading-3	in	100262	2,980	9 : 53	3		Lavington Est
	out			9 : 56		3	Off Argwings Kodheck Rd
Loading-4	in	100266	4,000	10 : 7	11		Off James Githuru Rd
	out			10 : 30		23	Lavington Est
Loading-5	in	100267	1,000	10 : 35	5		Lavington Est
	out			10 : 38		3	Off James Githuru Rd
Loading-6	in	100267.3	300	10 : 40	2		Lavington Est
	out			10 : 43		3	Off James Githuru Rd
Loading-7	in	100267.6	300	10 : 44	1		Lavington Est
	out			10 : 50		6	Off James Githuru Rd
Loading-8	in	100267.7	100	10 : 52	2		Riverside Gardens
	out			10 : 58		6	Off Jmaes Githuru Rd
Loading-9	in	100268	300	11 : 0	2		Riverside Gardens
	out			11 : 1		1	Off Jmaes Githuru Rd
Loading-10	in	100272	4,000	11 : 3	2		Muthangari
	out			11 : 6		3	Off James Githuru Rd
Loading-11	in	100273	1,000	11 : 15	9		Muthangari
	out			11 : 21		6	Off James Githuru Rd
Loading-12	in	100275	2,000	11 : 25	4		Muthangari
	out			11 : 38		13	Off James Githuru Rd
Loading-13	in	100275.5	500	11 : 40	2		Kianda high school
	out			11 : 48		8	Off Waiyaki way
Loading-14	in	100276	500	11 : 51	3		Waiyaki way
	out			11 : 52		1	Muthangari Est
Loading-15	in	100277	1,000	11 : 55	3		Muthangari Est
	out			11 : 58		3	Off Waiyaki way
Loading-16	in	100278	1,000	12 : 0	2		Muthangari Est
	out			12 : 6		6	Off Waiyaki way
Loading-17	in	100279	1,000	12 : 8	2		Muthangari Est
	out			12 : 10		2	Off Waiyaki way
Loading-18	in	100280	1,000	12 : 15	5		Gilani shopping centre
	out			12 : 35		20	Off Waiyaki way
Loading-19	in	100282	2,000	12 : 40	5		Waiyaki way; ABC place
	out			12 : 44		4	
Loading-20	in	100285	3,000	12 : 46	2		Waiyaki way
	out			13 : 4		18	Westlands apartments
Loading-21	in	100286	1,000	13 : 6	2		Westlands, Waiyaki way
	out			13 : 24		18	

Time & Motion Study

Organization: NCC

Trip- 1 Date: 15th November 1997

Vehicle No. KUL995

Loading Capacity: 12TON

Researcher's name: Timothy N Waweru

No. of Crew: 8

Estimated Volume: 7m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
			:			Mechanical breakdown
			:			at Elgeyo Marakwet Rd off
Dumping site in			:			Ngong Rd 14:10
Start dumping			:			Mileage at 100296
Finish dumping			:			
Dumping site out			:			
Reach to workshop in			:			
Total		44,000		106	156	Total min.: 262 min.
Collection		27,000		68	156	
Transportation		17,000		38		
Inside the dumping site		0		0	0	Dumping time.: min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 1 Date: 17th November 1997

Vehicle No. KUL991

Loading Capacity: 7TON

Researcher's name: Timothy N Waweru

No. of Crew: 9

Estimated Volume: 5m3

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out		12 : 0			
Loading-1	in	2,000	12 : 5	5		Posta Estate ; Likoni Rd ;
	out		12 : 30		25	Off Jogoo Rd
Dumping site	in	10,000	12 : 45	15		Dandora dumping site
Start dumping			12 : 48	3		Off Outering Rd
Finish dumping			12 : 50		2	
Dumping site	out		12 : 52	2		
Reach to workshop	in		:			
Total		12,000		25	27	Total min.: 52 min.
Collection		0		0	25	
Transportation		12,000		20		
Inside the dumping site		0		5	2	Dumping time.: 7 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 2 Date: 17th November 1997

Vehicle No. KUL991

Loading Capacity: 7TON

Researcher's name: Timothy N Waweru

No. of Crew: 9

Estimated Volume: 4m³

Location	Mileage (kn)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out		12 : 52			
Loading-1	in	10,000	14 : 55	123		Posta Estate ; Likoni Rd ;
	out		15 : 15		20	Off Jogoo Rd
						13:10-14:50
						Visit several garbage deposit areas in Industrial area
						running along Enterprise Rd
						Kampol Rd, Kutui Rd
						Lunga Lunga Rd
						No garbage, no loading
Dumping site	in	10,000	15 : 40	25		Dandora dumping site
Start dumping		500	15 : 42	2		Dandora Rd, off Outering Rd
Finish dumping		0	15 : 50		8	
Dumping site	out	0	15 : 55	5		Industrial area,
Reach to workshop	in	15,000	16 : 8	13		Off Enterprise Rd
Total		35,500		168	28	Total min.: 196 min.
Collection		0		0	20	
Transportation		35,000		161		
Inside the dumping site		500		7	8	Dumping time.: 15 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 1 Date: 19th November 1997

Vehicle No. KUL992

Loading Capacity: 8TON

Researcher's name: Timothy N Waweru

No. of Crew: 9

Estimated Volume: 6m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	232623		9 : 5			Embakasi deot 9:25-10:43
Loading-1	in	232650	27,000	10 : 10	65		10km from the workshop
	out			13 : 50		220	(Idling time)
							Embakasi Police station
							Airport North Rd
							Off Outering Rd
Dumping site	in	232669	19,000	14 : 40	50		Dandora dumping site
Start dumping				14 : 43	3		off Outering Rd
Finish dumping				15 : 5		22	
Dumping site	out			15 : 8	3		Industrial area
Reach to workshop	in	232685	16,000	15 : 45	37		Dares salaam Rd off
							Enterprise Rd
Total			62,000		158	242	Total min.: 400 min.
Collection			0		0	220	
Transportation			62,000		74		
Inside the dumping site			0		6	22	Dumping time.: 28 min.
Idling time					78		

Time & Motion Study

Organization: NCC

Trip- 1 Date: 20th November 1997

Vehicle No. KUL991

Loading Capacity: 8TON

Researcher's name: Timothy N Waweru

No. of Crew: 7

Estimated Volume: 6m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out		9 : 15			To Mathare off Muranga Rd
Loading-1	in	20,000	10 : 45	90		then to Madaraka,
	out		13 : 55		190	Langata Rd off Uhuru
						highway 9:15-10:35
						distance 20km
						Madaraka Estate
						off Langata Rd
Dumping site	in	30,000	14 : 48	53		Dandora Dumping site
Start dumping			14 : 50	2		Off Outering Rd
Finish dumping			14 : 53		3	
Dumping site	out		14 : 55	2		
Reach to workshop	in		15 : 50	55		
Total		50,000		202	193	Total min.: 395 min.
Collection		0		0	190	
Transportation		50,000		198		
Inside the dumping site		0		4	3	Dumping time.: 7 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 1 Date: 12th November 1997

Vehicle No. KAH006Y

Loading Capacity: 6.975t

Researcher's name: Joseph Katana

No. of Crew: 8

Estimated Volume: 3m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	15689		10 : 0			Vehicle used for other duties
Loading-1	in	15728	39,000	10 : 47	47		Dagoretti
	out			10 : 49		2	
Loading-2	in	15732	4,000	12 : 0	71		G.S.U camp
	out			12 : 18		18	
Loading-3	in	15734	2,000	12 : 23	5		G.S.U camp
	out			13 : 8		45	
Loading-4	in	15735	1,000	13 : 20	12		Kabarnet Gardens
	out			13 : 25		5	
Loading-5	in	15735.5	500	13 : 35	10		ngong Hills Hotel
	out			14 : 0		25	Big deposits
Loading-6	in	15736	500	14 : 1	1		
	out			14 : 8		7	
Loading-7	in	15738	2,000	14 : 16	8		Silver springs hotel
	out			14 : 30		14	
Dumping site	in	15765	27,000	15 : 23	53		Dandora
Start dumping		15765.5	500	15 : 23	0		The deposition of garbage
Finish dumping				15 : 25		2	may cause hazard. Because
Dumping site	out	15766	500	15 : 25	0		the piles are too close to
Reach to workshop	in	15779	13,000	15 : 55	30		residents.
Total			90,000		237	118	Total min.: 355 min.
Collection			10,000		107	116	
Transportation			79,000		130		
Inside the dumping site			1,000		0	2	Dumping time.: 2 min.
Idling time							

Time & Motion Study

Organization: NCC Trip- 1 Date: 13th November 1997
 Vehicle No. KUL313 Loading Capacity: 12TON Researcher's name: Joseph Katana
 No. of Crew: 2 Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	93635		9 : 0			
Loading-1	in	93645	10,000	9 : 25	25		Mbagathi District Hospital
	out			9 : 30		5	
							It is a container depositer :
							It loads once.
Dumping site	in	93663	18,000	10 : 12	42		Dandora
Start dumping		93663.5	500	10 : 15	3		This garbage is dumped
Finish dumping		93663.5	0	10 : 18		3	carelessly and hence maybe
Dumping site	out	93664	500	10 : 20	2		a life hazard.
Reach to workshop	in			:			
Total			29,000		72	8	Total min.: 80 min.
Collection			0		0	5	
Transportation			28,000		67		
Inside the dumping site			1,000		5	3	Dumping time.: 8 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 2 Date: 13th November 1997

Vehicle No. KUL313

Loading Capacity: 12TON

Researcher's name: Joseph Katana

No. of Crew: 2

Estimated Volume: 4m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	93664		10 : 20			
Loading-1	93670	6,000	11 : 12	52		Shauri Moyo Market
			11 : 24		12	
Dumping site	93740	70,000	12 : 8	44		Dandora
Start dumping	93740.5	500	12 : 11	3		
Finish dumping	93740.5	0	:			
Dumping site	93741	500	12 : 15	4		
Reach to workshop			:			
Total		77,000		103	12	Total min.: 115 min.
Collection		0		0	12	
Transportation		76,000		96		
Inside the dumping site		1,000		7	0	Dumping time.: 7 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 3 Date: 13th November 1997

Vehicle No. KUL313

Loading Capacity: 12TON

Researcher's name: Joseph Katana

No. of Crew: 2

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	93741		12 : 15			
Loading-1	in	93780	39,000	12 : 49	34		Industrial area
	out			13 : 0		11	(Aziz Industries)
Dumping site	in	93786	6,000	13 : 36	36		Dandora
Start dumping		93786.5	500	13 : 38	2		
Finish dumping		93786.5	0	13 : 43		5	
Dumping site	out	93787	500	13 : 45	2		
Reach to workshop	in			:			
Total			46,000		74	16	Total min.: 90 min.
Collection			0		0	11	
Transportation			45,000		70		
Inside the dumping site			1,000		4	5	Dumping time.: 9 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 4 Date: 13th November 1997

Vehicle No. KUL313

Loading Capacity: 12TON

Researcher's name: Joseph Katana

No. of Crew: 2

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	93787		13 : 45			
Loading-1	in	93788	1,000	14 : 26	41		Plastic & Rubber
	out			15 : 0		34	Industires
Dumping site	in	93796	8,000	15 : 40	40		Dandora
Start dumping		93796.5	500	15 : 42	2		
Finish dumping				15 : 50		8	
Dumping site	out	93797	500	15 : 55	5		
Reach to workshop	in	93803	6,000	16 : 30	35		
Total			16,000		123	42	Total min.: 165 min.
Collection			0		0	34	
Transportation			15,000		116		
Inside the dumping site			1,000		7	8	Dumping time.: 15 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 14th November 1997

Vehicle No. KWE031

Loading Capacity: 7TON

Researcher's name: Joseph Katana

No. of Crew: 6

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	192022.0		10 : 0			BuruBuru Estate
Loading-1	in	192032.0	10,000	10 : 17	17		phase 3 court
	out			10 : 18		1	Tulima
Loading-2	in	192032.5	500	10 : 28	10		
	out			10 : 35		7	
Loading-3	in	192033.0	500	10 : 36	1		Songon court
	out			10 : 40		4	
Loading-4	in	192033.5	500	10 : 43	3		Sondu court
	out			10 : 47		4	
Loading-5	in	192034.0	500	10 : 50	3		Osoiani court
	out			10 : 57		7	
Loading-6	in	192034.5	500	10 : 58	1		Lena Rd
	out			11 : 0		2	
Loading-7	in	192035.0	500	11 : 3	3		Ngomeni
	out			11 : 10		7	
Loading-8	in	192036.0	1,000	11 : 15	5		Phase 5
	out			11 : 18		3	
Loading-9	in	192036.5	500	11 : 19	1		Katulo court
	out			11 : 45		26	
Loading-10	in	192038.0	1,500	11 : 47	2		Maimahiu court
	out			12 : 0		13	
Loading-11	in	192038.5	500	12 : 1	1		Katulo court
	out			12 : 30		29	
Loading-12	in	192039.0	500	12 : 32	2		Chanda
	out			:			
Loading-13	in	192040.0	1,000	12 : 38	6		Saga
	out						
Dumping site	in	192045.0	5,000	13 : 0	22		Dandora
Start dumping		192045.5	500	13 : 3	3		
Finish dumping		192045.5	0	13 : 35		32	
Dumping site	out	192046	500	13 : 40	5		
Reach to workshop	in			:			
Total			24,000		28	135	Total min.: 163 min.
Collection			8,000		25	103	
Transportation			15,000		39		
Inside the dumping site			1,000		8	32	Dumping time.: 40 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 2 Date: 14th November 1997

Vehicle No. KWE031

Loading Capacity: 7TON

Reseacher's name: Joseph Katana

No. of Crew: 6

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	192046		13 : 40			
Loading-1	in	192050	4,000	14 : 0	20		BuruBuru phase 5
	out			14 : 0		0	
Loading-2	in	192050.5	500	14 : 21	21		Synekh court
	out			14 : 27		6	
Loading-3	in	192051	500	14 : 29	2		Synekh lane
	out			14 : 31		2	
Loading-4	in	192052	1,000	14 : 34	3		Nziu court
	out			14 : 36		2	
Loading-5	in	192052.5	500	14 : 38	2		Bngutu court
	out			14 : 39		1	
Loading-6	in	192053	500	14 : 40	1		Ole kalau court
	out			14 : 43		3	
Loading-7	in	192054	1,000	14 : 45	2		Lena court
	out			14 : 46		1	
Loading-8	in	192055.5	1,500	14 : 47	1		opp BuruBuru high
	out			14 : 48		1	
Loading-9	in	192056	500	14 : 49	1		Sonu court
	out			14 : 52		3	
Loading-10	in	192057	1,000	14 : 56	4		Nongu court
	out			:			
Dumping site	in	192063	6,000	15 : 13	17		Dandora
Start dumping		192063.5	500	15 : 17	4		
Finish dumping				15 : 25		8	
Dumping site	out	192064	500	15 : 30	5		
Reach to workshop	in	192076	12,000	16 : 30	60		
Total			30,000		143	27	Total min.: 170 min.
Collection			7,000		37	19	
Transportation			22,000		97		
Inside the dumping site			1,000		9	8	Dumping time.: 17 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- (1) Date: 15th November 1997

Vehicle No. KWE031

Loading Capacity: 7TON

Researcher's name: Joseph Katana

No. of Crew: 6

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	19281		9 : 0			BuruBuru phase 5
Loading-1	in	19287	6,000	9 : 20	20		KonoKono court
	out			9 : 25		5	
Loading-2	in	19290	3,000	9 : 57	32		Rodention Estate
	out			10 : 0		3	
Loading-3	in	19291	1,000	10 : 16	16		BuruBuru phase 2
	out			10 : 20		4	Batian court
Loading-4	in	19292	1,000	10 : 26	6		
	out			10 : 29		3	Charangani court
Loading-5	in	19293	1,000	10 : 35	6		
	out			10 : 37		2	
Loading-6	in	19294	1,000	10 : 42	5		Pumwani area
	out			10 : 45		3	
Loading-7	in	19300	6,000	11 : 0	15		Karioko Flats
	out			11 : 18		18	
Loading-8	in	19302	2,000	11 : 29	11		Kariako
	out			11 : 53		24	Section1
Loading-9	in	19303	1,000	12 : 37	44		Section2
	out			:			
Dumping site	in	19313	10,000	13 : 37	60		Dandora
Start dumping		19313.5	500	13 : 40	3		
Finish dumping				14 : 12		32	
Dumping site	out	19314	500	14 : 15	3		
Reach to workshop	in	19322	8,000	15 : 0	45		
Total			41,000		266	94	Total min.: 360 min.
Collection			16,000		135	62	
Transportation			24,000		125		
Inside the dumping site			1,000		6	32	Dumping time.: 38 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 16th November 1997

Vehicle No. KWE031

Loading Capacity: 7TON

Researcher's name: Joseph Katana

No. of Crew: 6

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	192130		9 : 0			BuruBuru
Loading-1	in	192137	7,000	9 : 33	33		Legorinyo court
	out			10 : 8		35	Mumiasu court
Loading-2	in	192137.5	500	10 : 29	21		Amasya Grove
	out			10 : 42		13	Ukunda court
Loading-3	in	192138	500	10 : 55	13		Ukunda court
	out			10 : 55		0	Ukunda court
Loading-4	in	192139	1,000	11 : 0	5		Ukunda court
	out			11 : 18		18	Jara courts
Loading-5	in	192140	1,000	11 : 27	9		
	out			11 : 34		7	
Loading-6	in	192141	1,000	11 : 40	6		Faida court
	out			:			
Loading-7	in	192142	1,000	11 : 45	5		Dakabuko court
	out			:			
Dumping site	in	192148	6,000	12 : 12	27		Dandora
Start dumping		192148.5	500	12 : 15	3		
Finish dumping				13 : 0		45	
Dumping site	out	192149	500	13 : 5	5		
Reach to workshop	in	192168	19,000	13 : 37	32		
Total			38,000		159	118	Total min.: 277 min.
Collection			5,000		59	73	
Transportation			32,000		92		
Inside the dumping site			1,000		8	45	Dumping time.: 53 min.
Idling time							

Time & Motion Study

Vehicle No. KUL994

No. of Crew: 8

Organization: NCC

Loading Capacity: 7TON

Estimated Volume: 4m³

Trip- 1 Date: 17th November 1997

Researcher's name: Joseph Katana

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	174359		11 : 47			
Loading-1	in	174362	3,000	11 : 55	8		Jerico
	out			12 : 0		5	
Loading-2	in	174366	4,000	12 : 8	8		Shauri Moyo
	out			12 : 30		22	(10mins Idling)
Loading-3	in	174368	2,000	12 : 39	9		
	out			12 : 45		6	Kariako flats
Loading-4	in	174370	2,000	13 : 0	15		
	out			13 : 12		12	Kariako Market
Loading-5	in	174376	6,000	13 : 45	33		
	out			13 : 55		10	Langata Cemetary
							Vehicle used for other purposes.
Dumping site	in	174386	10,000	14 : 5	10		Dandora
Start dumping		174386.5	500	14 : 15	10		
Finish dumping				14 : 55		40	
Dumping site	out	174387	500	15 : 40	45		Passed through other route
Reach to workshop	in	174401	14,000	16 : 15	35		for staff drop
Total			42,000		173	95	Total min.: 268 min.
Collection			14,000		65	45	
Transportation			27,000		53		
Inside the dumping site			1,000		55	40	Dumping time.: 95 min.
Idling time						10	

Time & Motion Study

Organization: NCC

Trip- 1 Date: 18th November 1997

Vehicle No. KWE064

Loading Capacity: 7TON

Researcher's name: Joseph Katana

No. of Crew: 8

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	27285		8 : 0			
Loading-1	in	27316	31,000	9 : 21	81		1hr21mins were Idling time
	out			9 : 28		7	Msa Rd
Loading-2	in	27321	5,000	9 : 38	10		Msa Rd ; LAB4
	out			10 : 0		22	Allied
Loading-3	in	27322	1,000	10 : 10	10		
	out			10 : 20		10	Nyayo Stadium
Loading-4	in	27324	2,000	10 : 58	38		Sussiness Machines Co., Ltd.
	out			11 : 11		13	
Dumping site	in	27342	18,000	11 : 45	34		Dandora
Start dumping		27342.5	500	11 : 50	5		
Finish dumping				11 : 56		6	
Dumping site	out	27343	500	12 : 0	4		
Reach to workshop	in			:			
Total			58,000		182	58	Total min.: 240 min.
Collection			8,000		58	52	
Transportation			49,000		34		
Inside the dumping site			1,000		9	6	Dumping time.: 15 min.
Idling time					81		

Time & Motion Study

Organization: NCC
 Loading Capacity: 7TON
 Estimated Volume: 4m³

Trip- 2 Date: 18th November 1997
 Researcher's name: Joseph Katana

Vehicle No. KWE064
 No. of Crew: 8

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	27343		12 : 0			From D/site
Loading-1	in	27355	12,000	12 : 40	40		Rubber & Plastics Co., Ltd.
	out			13 : 40		60	
Loading-2	in	27355.5	500	13 : 42	2		Wyco Paints
	out			14 : 12		30	GIL Rd
							Industrial area
							Here we had a big load and we were full board.
Dumping site	in	27360	4,500	15 : 40	88		Dandora
Start dumping		27360.5	500	15 : 45	5		
Finish dumping				15 : 50		5	
Dumping site	out	27361	500	15 : 55	5		
Reach to workshop	in	27367	6,000	16 : 45	50		
Total			24,000		190	95	Total min.: 285 min.
Collection			500		2	90	
Transportation			22,500		178		
Inside the dumping site			1,000		10	5	Dumping time.: 15 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 12th November 1997

Vehicle No. KAB389Q

Loading Capacity: 5TON

Researcher's name: Hellen Wangari

No. of Crew: 8

Estimated Volume: 6m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			9 : 50			From depot (kaloleni)
Loading-1	in		1,000	10 : 39	49		Jogoo Rd
	out			11 : 5		26	Loaded Gliemba
Loading-2	in		2,500	13 : 50	165		Kariakor
	out			14 : 40		50	(Mechanical problem)
Loading-3	in		4,000	15 : 40	60		14:40-15:30 50mins
	out			17 : 2		82	Eastleigh garage loaded
							workshop
Dumping site	in			:			No dumping back to
Start dumping				:			workshop
Finish dumping				:			
Dumping site	out			:			
Reach to workshop	in		4,000	17 : 30	28		
Total			11,500		302	158	Total min.: 460 min.
Collection			6,500		175	158	
Transportation			5,000		77		
Inside the dumping site			0		0	0	Dumping time.: min.
Idling time					50		

Time & Motion Study

Organization: NCC

Trip- 1 Date: 13th November 1997

Vehicle No. KAB389Q

Loading Capacity: 6TON

Researcher's name: Hellen Wangari

No. of Crew: 8

Estimated Volume: 4.5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	21972		8 : 57			From depot Katoleni to
Loading-1	in	21978	6,000	9 : 19	22		Jogoo, Enterprise Rd
	out			9 : 27		8	No loading back to depot
Loading-2	in	21987	9,000	9 : 52	25		9:38-9:44 6min.
	out			10 : 55		63	Britania
Loading-3	in	21988	1,000	11 : 2	7		Kenya uniforms Ltd.,
	out			11 : 10		8	Likoni Rd, Jogoo, Outering to Juja Rd to dumping site
Dumping site	in	22003	15,000	11 : 51	41		Dandora
Start dumping				11 : 52	1		
Finish dumping				11 : 52		0	
Dumping site	out	22004	1,000	11 : 53	1		
Reach to workshop	in			:			
Total			32,000		97	79	Total min.: 176 min.
Collection			10,000		26	79	
Transportation			21,000		63		
Inside the dumping site			1,000		2	0	Dumping time.: 2 min.
Idling time					6		

Time & Motion Study

Organization: NCC

Trip- 2 Date: 13th November 1997

Vehicle No. KAB389Q

Loading Capacity: 6TON

Researcher's name: Hellen Wangari

No. of Crew: 8

Estimated Volume: 5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	22004		11 : 53			From dumping site
Loading-1	in	22016	12,000	12 : 28	35		Outering Rd
	out			12 : 37		9	Jogoo Rd
Loading-2	in	22016.5	500	12 : 41	4		Enterprise Rd
	out			13 : 29		48	Fine bank
Loading-3	in	22020	3,500	13 : 43	14		KCB-Lusaka Rd
	out			13 : 47		4	Tinis Ltd - Enterprise Rd
Loading-4	in	22021	1,000	13 : 53	6		Likoni Rd - Jogoo Rd
	out			14 : 22		29	Outering Rd - Juja Rd
							Dumping site
							Back to workshop
Dumping site	in	22035	14,000	15 : 1	39		Dandora
Start dumping				15 : 3	2		
Finish dumping				15 : 4		1	
Dumping site	out	22036	1,000	15 : 15	11		
Reach to workshop	in	22050	14,000	16 : 10	55		
Total			46,000		166	91	Total min.: 257 min.
Collection			5,000		24	90	
Transportation			40,000		129		
Inside the dumping site			1,000		13	1	Dumping time.: 14 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 14th November 1997

Vehicle No. KAB389Q

Loading Capacity: 6TON

Researcher's name: Hellen Wangari

No. of Crew: 1

Estimated Volume: 7m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			:			Packed at loading point
Loading-1	in	22097	14,000	12 : 22			Start loading Umoja to
	out			12 : 27		5	Komorock Rd
							Outering Rd - Juja Rd to
							dumping site
							back to loading point
							(Umoja) (same route)
Dumping site	in	22105	8,000	12 : 43	16		Dandora
Start dumping				12 : 47	4		
Finish dumping				12 : 48		1	
Dumping site	out	22105.6	600	12 : 57	9		
Reach to workshop	in			:			
Total			22,600		29	6	Total min.: 35 min.
Collection			0		0	5	
Transportation			22,000		16		
Inside the dumping site			600		13	1	Dumping time.: 14 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 2 Date: 14th November 1997

Vehicle No. KAB389Q

Loading Capacity: 6TON

Researcher's name: Hellen Wangari

No. of Crew: 1

Estimated Volume: 7m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	22105.6		12 : 57			From dumping site to
Loading-1	in	22113	7,400	13 : 11	14		loading point (Umoja) to
	out			13 : 16		5	Komorock Rd, Outering Rd, Juja Rd to dumping site
							Back to loading point (Umoja)
Dumping site	in	22121	8,000	13 : 31	15		Dandora
Start dumping				13 : 34	3		
Finish dumping				13 : 35		1	
Dumping site	out	22121.4	400	13 : 36	1		
Reach to workshop	in			:			
Total			15,800		33	6	Total min.: 39 min.
Collection			0		0	5	
Transportation			15,400		29		
Inside the dumping site			400		4	1	Dumping time.: 5 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 3 Date: 14th November 1997

Vehicle No. KAB389Q

Loading Capacity: 6TON

Researcher's name: Hellen Wangari

No. of Crew: 1

Estimated Volume: 5.5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	22121.4		13 : 36			From dumping site to
Loading-1	in	22126	4,600	13 : 56	20		Loading point (Umoja) to
	out			14 : 0		4	Komorock Rd, Outering Rd,
							Juja Rd to Dumping site
							Back to loading point
							(Umoja)
Dumping site	in	22133	7,000	14 : 15	15		Dandora
Start dumping				14 : 18	3		
Finish dumping				14 : 19		1	
Dumping site	out	22133.4	400	14 : 22	3		
Reach to workshop	in			:			
Total			12,000		41	5	Total min.: 46 min.
Collection			0		0	4	
Transportation			11,600		35		
Inside the dumping site			400		6	1	Dumping time.: 7 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 4 Date: 14th November 1997

Vehicle No. KAB389Q

Loading Capacity: 6TON

Researcher's name: Hellen Wangari

No. of Crew: 1

Estimated Volume: 5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	22133.4		14 : 22			From dumping site
Loading-1	in	22139	5,600	14 : 50	28		Loading point same route
	out			14 : 53		3	Umoja, Komorock Rd,
							Outering Rd, Juja Rd to
							dumping site to workshop
Dumping site	in	22154	15,000	15 : 10	17		Dandora
Start dumping				15 : 15	5		
Finish dumping				15 : 16		1	
Dumping site	out	22154.5	500	15 : 18	2		
Reach to workshop	in	22172	17,500	16 : 15		57	
Total			38,600		52	61	Total min.: 113 min.
Collection			0		0	60	
Transportation			38,100		45		
Inside the dumping site			500		7	1	Dumping time.: 8 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 15th November 1997

Vehicle No. KAB389Q

Loading Capacity: 6TON

Researcher's name: Hellen Wangari

No. of Crew: 1

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	22165		9 : 10			From Kaloleni depot to
Loading-1	in	22179	14,000	10 : 40	90		Jogoo Rd, Outering Rd,
	out			10 : 43		3	to Umoja depot 9:35-9:50 to
							Kayole Rd Komorock site
							office 9:59 to 10:35 to loading
							point Kayole, Kayole Rd ,
							Komorock Rd, Outering Rd
							Juja to dumping site
Dumping site	in	22191	12,000	11 : 10	27		Dandora
Start dumping				11 : 12	2		
Finish dumping				11 : 13		1	
Dumping site	out	22191.6	600	11 : 18	5		
Reach to workshop	in			:			
Total			26,600		124	4	Total min.: 128 min.
Collection			0		0	3	
Transportation			26,000		66		
Inside the dumping site			600		7	1	Dumping time.: 8 min.
Idling time					51		

Time & Motion Study

Organization: NCC

Trip- 2 Date: 15th November 1997

Vehicle No. KAB389Q

Loading Capacity: 6TON

Researcher's name: Hellen Wangari

No. of Crew: 1

Estimated Volume: 4.5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	22191.6		11 : 18			From dumping site
Loading-1	in	22203	11,400	11 : 40	22		Juja Rd, Outering Rd,
	out			11 : 46		6	Komorock Rd, Kayole Rd,
							Loaded back to dumping site
							same route
Dumping site	in	22215	12,000	12 : 10	24		Dandora
Start dumping				12 : 14	4		
Finish dumping				12 : 15		1	
Dumping site	out	22215.4	400	12 : 21	6		
Reach to workshop	in			:			
Total			23,800		56	7	Total min.: 63 min.
Collection			0		0	6	
Transportation			23,400		46		
Inside the dumping site			400		10	1	Dumping time.: 11 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 3 Date: 15th November 1997

Vehicle No. KAB389Q

Loading Capacity: 6TON

Researcher's name: Hellen Wangari

No. of Crew: 1

Estimated Volume: 5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	22215.4		12 : 21			From dumping site to
Loading-1	in	22227	11,600	12 : 46	25		Juja Rd, Outering Rd,
	out			12 : 56		10	Komorock, Kayole
							Loaded back to dumping site (same route)
Dumping site	in	22236	9,000	13 : 18	22		Dandora
Start dumping				13 : 22	4		
Finish dumping				13 : 23		1	
Dumping site	out	22237	1,000	13 : 33	10		
Reach to workshop	in			:			
Total			21,600		61	11	Total min.: 72 min.
Collection			0		0	10	
Transportation			20,600		47		
Inside the dumping site			1,000		14	1	Dumping time.: 15 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 4 Date: 15th November 1997

Vehicle No. KAB389Q

Loading Capacity: 6TON

Researcher's name: Hellen Wangari

No. of Crew: 1

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	22237		13 : 33			From dumping site
Loading-1	in	22248	11,000	14 : 0	27		Juja Rd, Outering Rd,
	out			14 : 3		3	Komorock, Kayole,
							loaded back to dumping site to workshop
Dumping site	in	22259	11,000	14 : 36	33		Dandora
Start dumping				14 : 39	3		
Finish dumping				14 : 40		1	
Dumping site	out	22259.8	800	14 : 43	3		
Reach to workshop	in	22277	17,200	16 : 10	87		
Total			40,000		153	4	Total min.: 157 min.
Collection			0		0	3	
Transportation			39,200		147		
Inside the dumping site			800		6	1	Dumping time: 7 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 17th November 1997

Vehicle No. KAB389Q

Loading Capacity: 6TON

Researcher's name: Hellen Wangari

No. of Crew: 8

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	22330		10 : 10			From depot (Kaloleni)
Loading-1	in	22337	7,000	10 : 40	30		Jogoo Rd, Landhies Rd,
	out			11 : 8		28	Ngara Rd, Limuru Rd,
Loading-2	in	22341	4,000	11 : 20	12		2nd Parklands, Avenue
	out			11 : 28		8	Hospital, Casino International,
Loading-3	in	22344	3,000	11 : 34	6		Forest Rd, Outering Rd,
	out			12 : 20		46	Juja Rd, to dumping site to loading site.
Dumping site	in	22360	16,000	13 : 5	45		Dandora
Start dumping				13 : 9	4		
Finish dumping				13 : 10		1	
Dumping site	out	22360.15	150	13 : 15	5		
Reach to workshop	in			:			
Total			30,150		102	83	Total min.: 185 min.
Collection			7,000		18	82	
Transportation			23,000		75		
Inside the dumping site			150		9	1	Dumping time.: 10 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 2 Date: 17th November 1997

Vehicle No. KAB389Q

Loading Capacity: 6TON

Researcher's name: Hellen Wangari

No. of Crew: 8

Estimated Volume: 4.5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	22360.15		13 : 15			From dumping site
Loading-1	in	22374	13,850	13 : 31	16		Juja Rd, Outering Rd,
	out			14 : 30		59	Thika Rd, Forest Rd, Limuru Rd, 3rd Parkland Avenue, Forest Rd, Outering Rd, Juja Rd, dumping site loading site
Dumping site	in	22388	14,000	14 : 55	25		Dandora
Start dumping				14 : 57	2		
Finish dumping				14 : 58		1	
Dumping site	out	22388.1	100	15 : 0	2		
Reach to workshop	in			:			
Total			27,950		45	60	Total min.: 105 min.
Collection			0		0	59	
Transportation			27,850		41		
Inside the dumping site			100		4	1	Dumping time.: 5 min.
Idling time							

Time & Motion Study

Organization: NCC Trip- 3 Date: 17th November 1997
 Vehicle No. KAB389Q Loading Capacity: 6TON Researcher's name: Hellen Wangari
 No. of Crew: 8 Estimated Volume: 5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	22388.1		15 : 0			From dumping site
Loading-1	in	22403	14,900	15 : 26	26		Juja Rd, Outering Rd,
	out			15 : 45		19	Forest Rd, Parklands Rd,
Loading-2	in	22404	1,000	15 : 58	13		Westlands Rd, Outering Rd,
	out			:			Juja Rd,
							Dumping site
							Workshop
Dumping site	in	22423	19,000	17 : 10	72		Dandora
Start dumping				17 : 11	1		
Finish dumping				17 : 12		1	
Dumping site	out	22423.2	200	17 : 14	2		
Reach to workshop	in	22439	15,800	17 : 45	31		
Total			50,900		145	20	Total min.: 165 min.
Collection			1,000		13	19	
Transportation			49,700		129		
Inside the dumping site			200		3	1	Dumping time.: 4 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 18th November 1997

Vehicle No. KAB389Q

Loading Capacity: 6TON

Researcher's name: Hellen Wangari

No. of Crew: 1

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	22441		8 : 57			From depot Kaloleni
Loading-1	in	22460	19,000	9 : 50	53		Jogoo Rd, Lusaka Rd,
	out			10 : 40		50	Langata Rd, Mbagathi way,
							Ngong Rd, to Ngong Rd
							depot(9:17-9:30) Ngong Rd
							Haile selassie Rd, Thika Rd,
							Outering Rd, Juja Rd to
							dumping site
Dumping site	in	22478	18,000	11 : 18	38		Dandora
Start dumping				11 : 19	1		
Finish dumping				11 : 20		1	
Dumping site	out	22478.1	100	11 : 24	4		
Reach to workshop	in			:			
Total			37,100		96	51	Total min.: 147 min.
Collection			0		0	50	
Transportation			37,000		78		
Inside the dumping site			100		5	1	Dumping time.: 6 min.
Idling time					13		

Time & Motion Study

Organization: NCC
 Vehicle No. KAB389Q
 No. of Crew: 1

Loading Capacity: 6TON
 Estimated Volume: 4.5m³

Trip- 2 Date: 18th November 1997

Researcher's name: Hellen Wangari

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	22478.1		11 : 24		From dumping site
Loading-1	in	22496	17,900	12 : 4	40	Juja Rd, Outering Rd,
	out			12 : 8		4 Jogoo Rd, Lusaka Rd, Uhuru highway, Bungara Rd, Ngong Rd, Haile selassie, Jogoo Rd, Outering Rd, Juja Rd to dumping site
Dumping site	in	22513	17,000	12 : 48	40	Dandora
Start dumping				12 : 49	1	
Finish dumping				12 : 50	1	
Dumping site	out	22513.5	500	12 : 56	6	
Reach to workshop	in			:		
Total			35,400		87	5 Total min.: 92 min.
Collection			0		0	4
Transportation			34,900		80	
Inside the dumping site			500		7	1 Dumping time.: 8 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 3 Date: 18th November 1997

Vehicle No. KAB389Q

Loading Capacity: 6TON

Researcher's name: Hellen Wangari

No. of Crew: 1

Estimated Volume: 5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	22513.5		12 : 56			From dumping site
Loading-1	in	22531	17,500	13 : 40	44		Juja Rd, Outering Rd,
	out			15 : 25		105	Jogoo Rd to depot at
							13:18-13:30 mechanical problem
							Lusaka Rd, Uhuru highway
							Bunyalo Rd, Ngong Rd, community,
							Haite Salassie Rd,
							Jogoo Rd, Outering Rd,
							Juja Rd, to dumping site
							Back to workshop
Dumping site	in	22549	18,000	16 : 15	50		Dandora
Start dumping				16 : 20	5		
Finish dumping				16 : 21		1	
Dumping site	out	22549.2	200	16 : 28	7		
Reach to workshop	in	22569	19,800	17 : 5	37		
Total			55,500		143	106	Total min.: 249 min.
Collection			0		0	105	
Transportation			55,300		119		
Inside the dumping site			200		12	1	Dumping time.: 13 min.
Idling time					12		

Time & Motion Study

Organization: NCC

Trip- 1 Date: 19th November 1997

Vehicle No. KAB389Q

Loading Capacity: 6TON

Researcher's name: Hellen Wangari

No. of Crew: 6

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	22569		8 : 45			From depot (Kaloleni)
Loading-1	in	22587	18,000	9 : 30	45		Jogoo Rd, Lusaka Rd,
	out			10 : 10		40	Uhuru highway
Loading-2	in	22587.4	400	10 : 16	6		Haile Selassie Rd,
	out			10 : 25		9	Ngong Rd - depot
Loading-3	in	22589	1,600	11 : 7	42		9:09-9:15 - Community
	out			11 : 30		23	Afya house, YMCA
							Forest Rd, Thika Rd
							Outering, Juja
							Dumping site
Dumping site	in	22608	19,000	12 : 3	33		
Start dumping				12 : 4	1		
Finish dumping				12 : 5		1	
Dumping site	out	22608.5	500	12 : 6	1		
Reach to workshop	in			:			
Total			39,500		128	73	Total min.: 201 min.
Collection			2,000		48	72	
Transportation			37,000		72		
Inside the dumping site			500		2	1	Dumping time.: 3 min.
Idling time					6		

Time & Motion Study

Organization: NCC

Trip- 2 Date: 19th November 1997

Vehicle No. KAB389Q

Loading Capacity: 6TON

Researcher's name: Hellen Wangari

No. of Crew: 6

Estimated Volume: 5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	22608.5		12 : 6			From dumping site.
Loading-1	in	22628	19,500	13 : 0	54		Juja Rd, Outering Rd,
	out			13 : 11		11	Forest Rd, State house Rd,
Loading-2	in	22631	3,000	13 : 31	20		Mihuti court
	out			13 : 45		14	hendrea Ave, Ngong Rd,
							Valley on Forest Rd,
							Thika Rd, Outering Rd,
							Juja Rd, to dumping site.
							to workshop
Dumping site	in	22664	33,000	14 : 25	40		Dandora
Start dumping				14 : 26	1		
Finish dumping				14 : 27		1	
Dumping site	out	22665	1,000	14 : 36	9		
Reach to workshop	in	22683	18,000	15 : 15	39		
Total			74,500		163	26	Total min.: 189 min.
Collection			3,000		20	25	
Transportation			70,500		133		
Inside the dumping site			1,000		10	1	Dumping time.: 11 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 12th November 1997

Vehicle No. KUL 989

Loading Capacity: 7TON

Researcher's name: Samuel Kazungu

No. of Crew: 7

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	110875		9 : 45			Pumwani Maternity
Loading-1	in	110879	4,000	9 : 58	13		
	out			10 : 5		7	
Loading-2	in	110881	2,000	10 : 19	14		Madina Maternity
	out			10 : 24		5	
Loading-3	in	#####	150	10 : 28	4		Mecca Maternity
	out			10 : 35		7	
Loading-4	in	110882	850	10 : 43	8		Marrie Maternity
	out			11 : 3		20	Traffic jam Juja Rd
Loading-5	in	110886	4,000	11 : 26	23		N Mathare Maternity
	out			11 : 30		4	Huruma Rd
Loading-6	in	110888	2,000	11 : 40	10		Huruma Nursing Home
	out			11 : 44		4	Thika, Muthithi Rd,
Loading-7	in	110899	11,000	12 : 12	28		Muilapa Rd, vet
	out			12 : 15		3	Chiromo Rd
Loading-8	in	110900	1,000	12 : 19	4		Chiromo Vet Clinic
	out			12 : 42		23	Waiyaki way
Loading-9	in	110908	8,000	12 : 52	10		St, Austin vet clinic
	out			12 : 58		6	Argwings Rd
Loading-10	in	110912	4,000	13 : 5	7		Lenana Rd. vet clinic
	out			13 : 9		4	
Dumping site	in	110930	18,000	13 : 36	27		Dandora fast in dumping
Start dumping		110931	1,000	13 : 45	9		to Pumwani to return
Finish dumping		110931	0	13 : 54		9	refuse trucks
Dumping site	out	110931.2	200	13 : 55	1		
Reach to workshop	in	110949	17,800	15 : 1	66		
Total			74,000		224	92	Total min.: 316 min.
Collection			33,000		108	83	
Transportation			39,800		106		
Inside the dumping site			1,200		10	9	Dumping time.: 19 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 13th November 1997

Vehicle No. KAB391Q

Loading Capacity: 6950

Researcher's name: Samuel Kazungu

No. of Crew: 5

Estimated Volume: 3m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	27561		9 : 12			To Ngara before going to
Loading-1	in	27597	36,000	11 : 35	143		Loading place
	out			11 : 36			1 Idling time 10:10-11:20 70mins
Loading-2	in	27597.2	200	11 : 38	2		Doing others duties of the
	out			11 : 40			2 supervisor
Loading-3	in	27597.36	160	11 : 41	1		Komorock sector two
	out			11 : 42			1
Loading-4	in	27597.42	60	11 : 43	1		
	out			11 : 44			1
Loading-5	in	27597.58	160	11 : 45	1		
	out			11 : 46			1
Loading-6	in	27597.74	160	11 : 46	0		Central dumping place
	out			11 : 52			6 Loading places near each
Loading-7	in	27597.82	80	11 : 52	0		other
	out			11 : 52			0
Loading-8	in	27597.88	60	11 : 53	1		
	out			11 : 53			0
Loading-9	in	27598	120	11 : 54	1		
	out			11 : 54			0
Loading-10	in	27598.04	40	11 : 55	1		
	out			11 : 56			1
Loading-11	in	27598.08	40	11 : 56	0		
	out			11 : 57			1
Loading-12	in	27598.68	600	11 : 57	0		
	out			11 : 57			0
Loading-13	in	27598.76	80	11 : 58	1		
	out			12 : 1			3
Loading-14	in	27598.88	120	12 : 4	3		
	out			12 : 4			0
Loading-15	in	27598.96	80	12 : 5	1		
	out			12 : 7			2
Loading-16	in	27599.02	60	12 : 7	0		Lorry loaded to capacity
	out			12 : 11			4
Dumping site	in	27606	7,040	12 : 26	15		Dandora
Start dumping		27606	500	12 : 30	4		fast dumping because it's
Finish dumping		27606	0	12 : 30			0 a tiper
Dumping site	out	27607	500	12 : 32	2		
Reach to workshop	in			:			
Total			46,060		177	23	Total min.: 200 min.
Collection			2,020		13	23	
Transportation			43,040		88		
Inside the dumping site			1,000		6	0	Dumping time.: 6 min.
Idling time					70		

Time & Motion Study

Organization: NCC

Trip- 2 Date: 13th November 1997

Vehicle No. KAB391Q

Loading Capacity: 6950

Researcher's name: Samuel Kazungu

No. of Crew: 5

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	27607		12 : 32			Idling time 12:33-12:46 13min.
Loading-1	in	27618	11,000	13 : 12	40		Komorocks section two
	out			13 : 14		2	
Loading-2	in	27618.06	60	13 : 16	2		
	out			13 : 16		0	
Loading-3	in	27618.09	30	13 : 16	0		
	out			13 : 17		1	
Loading-4	in	27618.14	50	13 : 17	0		
	out			13 : 17		0	
Loading-5	in	27618.18	40	13 : 18	1		
	out			13 : 18		0	
Loading-6	in	27618.19	10	13 : 18	0		
	out			13 : 20		2	
Loading-7	in	27618.34	150	13 : 21	1		
	out			13 : 22		1	
Loading-8	in	27618.37	30	13 : 23	1		
	out			13 : 23		0	
Loading-9	in	27618.4	30	13 : 23	0		
	out			13 : 23		0	
Loading-10	in	27618.43	30	13 : 24	1		
	out			13 : 24		0	
Loading-11	in	27618.45	20	13 : 24	0		
	out			13 : 24		0	
Loading-12	in	27618.47	20	13 : 25	1		
	out			13 : 25		0	
Loading-13	in	27618.49	20	13 : 25	0		
	out			:			
Loading-14	in	27618.58	90	13 : 27	2		
	out			13 : 27		0	
Loading-15	in	27618.6	20	13 : 27	0		
	out			13 : 28		1	
Loading-16	in	27618.62	20	13 : 28	0		
	out			13 : 28		0	
Loading-17	in	27618.68	60	13 : 29	1		Still at Komorock section2
	out			13 : 29		0	
Loading-18	in	27618.77	90	13 : 30	1		
	out			13 : 30		0	
Loading-19	in	27618.8	30	13 : 31	1		
	out			13 : 31		0	
Loading-20	in	27618.82	20	13 : 31	0		
	out			13 : 32		1	
Loading-21	in	27618.92	100	13 : 32	0		
	out			13 : 33		1	
Loading-22	in	27618.99	70	13 : 33	0		
	out			13 : 33		0	

Time & Motion Study

Organization: NCC

Trip- 2 Date: 13th November 1997

Vehicle No. KAB391Q

Loading Capacity: 6950

Researcher's name: Samuel Kazungu

No. of Crew: 5

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Loading-23	in	27619	10	13 : 35		2	
	out			13 : 35		0	
Loading-24	in	27619.2	200	13 : 36	1		finished loading
	out			13 : 36		0	Komorocks section two
Loading-25	in	27620	800	13 : 43	7		Start of Komorock
	out			13 : 44		1	section I
Loading-26	in	27620.05	50	13 : 45	1		
	out			13 : 49		4	raining (idle) for 3mins
Loading-27	in	27620.11	60	13 : 51	2		
	out			13 : 52		1	
Loading-28	in	27620.14	30	13 : 52	0		
	out			13 : 53		1	
Loading-29	in	27620.16	20	13 : 53	0		
	out			13 : 54		1	
Loading-30	in	27620.36	200	13 : 57	3		
	out			13 : 59		2	
Loading-31	in	27620.46	100	14 : 0	1		
	out			14 : 0		0	
Loading-32	in	27620.51	50	14 : 1	1		
	out			14 : 1		0	
Loading-33	in	27620.71	200	14 : 5	4		sector I
	out			14 : 7		2	
Loading-34	in	27620.76	50	14 : 8	1		few occupants of the estate
	out			14 : 8		0	
Loading-35	in	27620.78	20	14 : 9	1		
	out			14 : 9		0	
Loading-36	in	27620.98	200	14 : 11	2		
	out			14 : 12		1	
Loading-37	in	27621	20	14 : 13	1		
	out			14 : 14		1	
Loading-38	in	27621.5	500	14 : 15	1		
	out			14 : 16		1	
Loading-39	in	27622	500	14 : 27	11		
	out			14 : 28		1	
Loading-40	in	27623	1,000	14 : 30	2		finished the estate
	out			14 : 31		1	
Dumping site	in	27632	9,000	14 : 55	87		Dandora
Start dumping		27633	1,000	15 : 0	5		
Finish dumping		27633	0	15 : 1		1	
Dumping site	out	27633.6	600	15 : 6	5		
Reach to workshop	in	27651	17,400	15 : 47	41		

Time & Motion Study

Organization: NCC
Vehicle No. KAB391Q
No. of Crew: 5

Loading Capacity: 6950
Estimated Volume: 4m³

Trip- 2 Date: 13th November 1997

Researcher's name: Samuel Kazungu

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Total		44,000		231	27	Total min.: 258 min.
Collection		5,000		53	23	
Transportation		37,400		155		
Inside the dumping site		1,600		10	1	Dumping time.: 11 min.
Idling time				13	3	

Time & Motion Study

Organization: NCC

Trip- 1 Date: 14th November 1997

Vehicle No. KUL993

Loading Capacity: 7980

Researcher's name: Samuel Kazungu

No. of Crew: 9

Estimated Volume: 5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	192522		9 : 17			Idling at Ngara 9:29-9:35
Loading-1	in	192528	6,000	9 : 50	33		Westlands Rd
	out			9 : 51		1	to Westlands
Loading-2	in	192529	1,000	9 : 53	2		Mkinbi Rd
	out			9 : 55		2	
Loading-3	in	192531.6	2,600	10 : 3	8		Idling from 10:03-10:05
	out			10 : 14		11	
Loading-4	in	192533	1,400	10 : 25	11		5th Parklands Ave
	out			10 : 30		5	
Loading-5	in	192534.3	1,300	10 : 37	7		High Ridge Flats
	out			10 : 38		1	Loading points
Loading-6	in	192534.7	400	10 : 39	1		near each other
	out			10 : 40		1	
Loading-7	in	#####	20	10 : 40	0		
	out			10 : 41		1	
Loading-8	in	#####	20	10 : 42	1		
	out			10 : 43		1	
Loading-9	in	#####	20	10 : 43	0		
	out			10 : 44		1	
Loading-10	in	#####	20	10 : 45	1		
	out			10 : 46		1	
Loading-11	in	192534.8	20	10 : 47	1		
	out			10 : 48		1	
Loading-12	in	192534.9	100	10 : 49	1		
	out			10 : 50		1	
Loading-13	in	#####	20	10 : 50	0		
	out			10 : 51		1	
Loading-14	in	#####	10	10 : 51	0		
	out			10 : 52		1	
Loading-15	in	#####	10	10 : 52	0		
	out			10 : 53		1	
Loading-16	in	#####	20	10 : 54	1		
	out			10 : 55		1	
Loading-17	in	192535.1	140	10 : 57	2		
	out			10 : 58		1	
Loading-18	in	192541.5	6,400	11 : 12	14		Limuru Rd to UNEP
	out			12 : 16		64	H - Quaters

Time & Motion Study

Organization: NCC

Trip- 1 Date: 14th November 1997

Vehicle No. KUL993

Loading Capacity: 7980

Researcher's name: Samuel Kazungu

No. of Crew: 9

Estimated Volume: 5m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Dumping site in	192556	14,500	12 : 41	25		through Muthmga Rd
Start dumping	192558	1,800	12 : 45	4		Kiambu & Thika Rd
Finish dumping	192558	0	13 : 14		29	to Dandora
Dumping site out	192559	1,200	13 : 19	5		
Reach to workshop in			:			
Total		37,000		117	125	Total min.: 242 min.
Collection		13,500		50	94	
Transportation		20,500		52		
Inside the dumping site		3,000		9	29	Dumping time.: 38 min.
Idling time				6	2	

Time & Motion Study

Organization: NCC

Trip- 2 Date: 14th November 1997

Vehicle No. KUL993

Loading Capacity: 7980

Researcher's name: Samuel Kazungu

No. of Crew: 9

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	192559		13 : 19			Idling 13:20-13:23 Lunch
Loading-I	in	192574.3	15,300	13 : 46	27		Start foirm dumping site
	out			14 : 51		65	(Dandora)
							UNEP H-Quaters
							Idling 15:25-15:54
							Selling papers
Dumping site	in	192589	14,700	16 : 13	82		
Start dumping		192589.5	500	16 : 14	1		
Finish dumping		192589.5	0	16 : 30		16	
Dumping site	out	192590	500	16 : 32	2		
Reach to workshop	in	192608	18,000	17 : 3	31		
Total			49,000		143	81	Total min.: 224 min.
Collection			0		0	65	
Transportation			48,000		108		
Inside the dumping site			1,000		3	16	Dumping time.: 19 min.
Idling time					32		

Time & Motion Study

Organization: NCC

Trip- 1 Date: 15th November 1997

Vehicle No. KUL993

Loading Capacity: 7980

Researcher's name: Samuel Kazungu

No. of Crew: 9

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	192606		8 : 25			To Ngara office 8:40-8:54
Loading-1	in	192611.7	5,700	8 : 55	30		Idling time waiting for crew
	out			8 : 57			2 Ngara, Limuru Rd
Loading-2	in	192613.5	1,800	9 : 24	27		Idling 9:06-9:23
	out			9 : 32			8 Putting pressure
Loading-3	in	192613.7	200	9 : 34	2		
	out			9 : 38			4
Loading-4	in	192614.8	1,100	9 : 42	4		
	out			9 : 46			4
Loading-5	in	192615.7	900	9 : 53	7		Wangapala Flats
	out			9 : 55			2
Loading-6	in	192616.7	1,000	9 : 55	0		
	out			9 : 56			1
Loading-7	in	192616.7	35	9 : 57	1		
	out			9 : 59			2
Loading-8	in	192616.8	100	9 : 59	0		
	out			10 : 2			3
Loading-9	in	192617.4	600	10 : 6	4		
	out			10 : 8			2
Loading-10	in	192617.5	100	10 : 9	1		
	out			10 : 11			2
Loading-11	in	192618.8	1,300	10 : 20	9		Centra dumping place
	out			10 : 36			16
Loading-12	in	192619	200	10 : 37	1		Ist Parklands Ave
	out			10 : 45			8
Loading-13	in	192620.1	1,100	10 : 54	9		Parklands Shade Hotel
	out			11 : 16			22 Legacy Africa Restaurant
Loading-14	in	192620.8	700	11 : 26	10		
	out			11 : 46			20
Loading-15	in	192621.8	1,000	11 : 51	5		MP Shar Hospital
	out			12 : 3			12 Vehicle full to Dandora
							Parklands, Limuru, Thika Rd
							12:14-12:20 Idling for selling
Dumping site	in	192636.9	15,100	12 : 55	52		papers
Start dumping		192637.2	300	12 : 56	1		Dandora
Finish dumping		192637.2	0	13 : 44			48
Dumping site	out	192637.6	400	13 : 46	2		
Reach to workshop	in	192650	12,400	14 : 20	34		
Total			44,035		199	156	Total min.: 355 min.
Collection			10,135		63	108	
Transportation			33,200		96		
Inside the dumping site			700		3	48	Dumping time.: 51 min.
Idling time					37		

Time & Motion Study

Organization: NCC

Trip- 1 Date: 16th November 1997

Vehicle No. KUL993

Loading Capacity: 7980

Researcher's name: Samuel Kazungu

No. of Crew: 8

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	192655		8 : 38			Ngara Idling crew changing
Loading-1	in	192660.9	5,900	9 : 4	26		8:45-9:02
	out			9 : 6		2	Ngara Tea Zone Hotel
Loading-2	in	192661.2	300	9 : 9	3		Musium Rd
	out			9 : 10		1	
Loading-3	in	192663.7	2,500	9 : 16	6		Westlands
	out			9 : 20		4	
Loading-4	in	192666	2,300	9 : 26	6		
	out			10 : 1		35	
Loading-5	in	192667.1	1,100	10 : 5	4		Gurdwar Mosque
	out			10 : 7		2	
Loading-6	in	192668.4	1,300	10 : 15	8		To Dandora Through
	out			10 : 26		11	Waiyaki, Muranga, Thika Rd
							Idling for selling papers
							From 10:41-10:53
Dumping site	in	192685.6	17,200	11 : 1	35		Dandora
Start dumping		192686	400	11 : 4	3		
Finish dumping		192686	0	11 : 19		15	
Dumping site	out	192687.2	1,200	11 : 26	7		
Reach to workshop	in			:			
Total			32,200		98	70	Total min.: 168 min.
Collection			7,500		27	55	
Transportation			23,100		32		
Inside the dumping site			1,600		10	15	Dumping time.: 25 min.
Idling time					29		

Time & Motion Study

Organization: NCC

Trip- 2 Date: 16th November 1997

Vehicle No. KUL993

Loading Capacity: 7980

Researcher's name: Samuel Kazungu

No. of Crew: 8

Estimated Volume: 5m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	192687.2		11 : 26			Start form dumping site
Loading-1	in	192700.9	13,700	11 : 52	26		M.P. Shah Hospital
	out			12 : 40		48	
Loading-2	in	192702.7	1,800	12 : 51	11		Aga Khan Hospital
	out			13 : 28		37	
							Idling for selling papers, bottles form 13:45-14:03
Dumping site	in	192716.1	13,400	14 : 10	42		
Start dumping		192717.2	1,100	14 : 14	4		
Finish dumping		192717.2	0	14 : 30		16	
Dumping site	out	192718.7	1,500	14 : 35	5		
Reach to workshop	in	192720.5	1,800	15 : 4	29		
Total			33,300		117	101	Total min.: 218 min.
Collection			1,800		11	85	
Transportation			28,900		79		
Inside the dumping site			2,600		9	16	Dumping time.: 25 min.
Idling time					18		

Time & Motion Study

Organization: NCC

Trip- 1 Date: 17th November 1997

Vehicle No. KWE081

Loading Capacity: 8TON

Researcher's name: Samuel Kazungu

No. of Crew: 7

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	192175		9 : 50			Makemgo Office
Loading-1	in	192178.6	3,600	10 : 23	33		Idling (waiting for crew
	out			13 : 58		215	9:45-10:15)
							Stage couch garage
							Idling (selling metal 14:20-15:30)
							(had to find a buyen first)?
Dumping site	in	192191.2	12,600	15 : 47	109		Dandora
Start dumping		192191.2	20	15 : 48	1		Road blocked slow in
Finish dumping		192191.2	0	16 : 25		37	dumping (manual)
Dumping site	out	192191.2	20	16 : 28	3		
Reach to workshop	in	192203	11,760	17 : 9	41		
Total			28,000		187	252	Total min.: 439 min.
Collection			0		0	215	
Transportation			27,960		83		
Inside the dumping site			40		4	37	Dumping time.: 41 min.
Idling time					100		

Time & Motion Study

Organization: NCC

Trip- 1 Date: 19th November 1997

Vehicle No. KAH013Y

Loading Capacity: 6950

Researcher's name: Samuel Kazungu

No. of Crew: 8

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	2157		9 : 25			To Dagoretti
Loading-1	in	2172	15,000	9 : 55	30		Dagoretti
	out			10 : 10		15	
Loading-2	in	2176	4,000	10 : 23	13		Community
	out			11 : 30		67	
Loading-3	in	2181	5,000	11 : 52	22		Lenana Rd
	out			12 : 4		12	Idling time (Drivers having lunch 12:10-12:23)
Dumping site	in	2202	21,000	12 : 57	53		First dumping
Start dumping		2202.5	500	13 : 5	8		
Finish dumping		2202.5	0	13 : 6		1	
Dumping site	out	2203	500	13 : 10	4		
Reach to workshop	in			:			
Total			46,000		130	95	Total min.: 225 min.
Collection			9,000		35	94	
Transportation			36,000		70		
Inside the dumping site			1,000		12	1	Dumping time.: 13 min.
Idling time					13		

Time & Motion Study

Organization: NCC

Trip- 2 Date: 19th November 1997

Vehicle No. KAH013Y

Loading Capacity: 6950

Researcher's name: Samuel Kazungu

No. of Crew: 8

Estimated Volume: 3m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	2203		13 : 10		From dumping site
Loading-1	in	2225	22,000	13 : 54	44	through Thika Rd,
	out			14 : 12	18	to Lenana Rd,
Loading-2	in	2228	3,000	14 : 27	15	Kabarnet Gardens
	out			14 : 35	8	
Loading-3	in	2230	2,000	14 : 47	12	Nairobi club
	out			15 : 24	37	
Dumping site	in	2239	9,000	15 : 52	28	Dandora
Start dumping		2239.4	400	15 : 56	4	First dumping to workshop
Finish dumping		2239.4	0	15 : 57	1	through Thika, Muranga Rd
Dumping site	out	2239.8	400	16 : 2	5	
Reach to workshop	in	2259	19,200	16 : 56	54	
Total			56,000		162	64 Total min.: 226 min.
Collection			5,000		27	63
Transportation			50,200		126	
Inside the dumping site			800		9	1 Dumping time.: 10 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 1 Date: 12th November 1997

Vehicle No. KUL994

Loading Capacity: 7880kg

Researcher's name: Alexandrine Nyambura

No. of Crew: 8

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	173914		13 : 10			Ngong Rd
Loading-1	in	173923	9,000	13 : 32	22		
	out			14 : 38		66	
Loading-2	in	173924	1,000	14 : 45	7		Lunch break from
	out			14 : 53		8	15:20-15:37
Loading-3	in	173927	3,000	15 : 0	7		
	out			15 : 37		37	
Dumping site	in			:			No dumping
Start dumping				:			
Finish dumping				:			
Dumping site	out			:			
Reach to workshop	in	173933	6,000	16 : 50	73		
Total			19,000		109	111	Total min.: 220 min.
Collection			4,000		14	94	
Transportation			15,000		95		
Inside the dumping site			0		0	0	Dumping time.: min.
Idling time						17	

Time & Motion Study

Organization: NCC

Trip- 1 Date: 13th November 1997

Vehicle No. KAH006Y

Loading Capacity: 6TON

Researcher's name: Alexandrine Nyambura

No. of Crew: 9

Estimated Volume: 6m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	15806		8 : 40			To Kibira for repair &
Loading-1	in	15823	17,000	9 : 44	64		then to Dagoretti
	out			9 : 58		14	Risa court
Loading-2	in	15825	2,000	10 : 10	12		Ndemi Lane
	out			10 : 54		44	
Loading-3	in	15826	1,000	10 : 58	4		Ngong Rd
	out			11 : 8		10	To Dandora through
							Kenyatta Ave-
							Muranga Rd-
							Outering
Dumping site	in	15846	20,000	11 : 44	36		Dandora
Start dumping		15847	1,000	11 : 49	5		
Finish dumping		15847	0	11 : 50		1	
Dumping site	out	15848	1,000	11 : 52	2		
Reach to workshop	in			:			for another trip
Total			42,000		123	69	Total min.: 192 min.
Collection			3,000		16	68	
Transportation			37,000		100		
Inside the dumping site			2,000		7	1	Dumping time.: 8 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 2 Date: 13th November 1997

Vehicle No. KAH006Y

Loading Capacity: 6TON

Researcher's name: Alexandrine Nyambura

No. of Crew: 9

Estimated Volume: 8m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	15848		11 : 52			Via Outering - Muranga Rd-
Loading-1	in	15864	16,000	12 : 30	38		Kenyatta Ave to Ngaong Rd
	out			13 : 20		50	Yaya center to Kawangware via Githanga Rd
Dumping site	in	15868	4,000	13 : 30	10		Kawangware
Start dumping		15869	1,000	13 : 31	1		
Finish dumping		15869	0	13 : 32		1	
Dumping site	out	15870	1,000	13 : 33	1		
Reach to workshop	in			:			Back at yaya centre
Total			22,000		50	51	Total min.: 101 min.
Collection			0		0	50	
Transportation			20,000		48		
Inside the dumping site			2,000		2	1	Dumping time.: 3 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 3 Date: 13th November 1997

Vehicle No. KAH006Y

Loading Capacity: 6TON

Researcher's name: Alexandrine Nyambura

No. of Crew: 9

Estimated Volume: 6m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	15870		13 : 33		From Kawangware
Loading-1	in	15875	5,000	13 : 45	12	
	out			14 : 50		65
Dumping site	in	15876	1,000	14 : 53	3	Elegeyo Marakwet Rd
Start dumping		15876	0	14 : 54	1	due to puncture
Finish dumping		15876	0	14 : 55		1
Dumping site	out	15876	0	14 : 56	1	
Reach to workshop	in			:		
						Back at Yaya center
Total		6,000		17	66	Total min.: 83 min.
Collection		0		0	65	
Transportation		6,000		15		
Inside the dumping site		0		2	1	Dumping time.: 3 min.
Idling time						

Time & Motion Study

Organization: NCC Trip-4 Date: 13th November 1997
 Vehicle No. KAH006Y Loading Capacity: 6TON Researcher's name: Alexandrine Nyambura
 No. of Crew: 9 Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	15876		14 : 56			From Elegeyo Marakwet Rd
Loading-1	in	15877	1,000	15 : 0	4		to Yaya centre
	out			15 : 36		36	To the dumping site through Ngara Rd
Dumping site	in	15879	2,000	15 : 48	12		Jamuhuri Rd ?
Start dumping		15879	0	15 : 50	2		
Finish dumping		15879	0	15 : 51		1	
Dumping site	out	15880	1,000	15 : 53	2		
Reach to workshop	in	15901	21,000	16 : 30	37		
Total			25,000		57	37	Total min.: 94 min.
Collection			0		0	36	
Transportation			24,000		53		
Inside the dumping site			1,000		4	1	Dumping time.: 5 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 15th November 1997

Vehicle No. KWE245

Loading Capacity: 16TON

Researcher's name: Alexandrine Nyambura

No. of Crew: 10

Estimated Volume: 8m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			8 : 25			To Makandara depot
Loading-1	in		10,000	8 : 40	15		BuruBuru Estate &Maringo
	out			9 : 10		30	
Loading-2	in		10,000	9 : 25	15		BuruBuru Estate &Maringo
	out			10 : 3		38	
Loading-3	in		7,000	10 : 15	12		BuruBuru Estate &Maringo
	out			10 : 40		25	
Loading-4	in		6,000	10 : 50	10		BuruBuru Estate &Maringo
	out			11 : 50		60	
Loading-5	in		4,000	12 : 0	10		BuruBuru Estate &Maringo
	out			13 : 5		65	
Loading-6	in		2,000	13 : 10	5		BuruBuru Estate &Maringo
	out			14 : 6		56	
Dumping site	in		4,000	14 : 25	19		Dandora
Start dumping			100	14 : 30	5		
Finish dumping			0	14 : 40		10	
Dumping site	out		100	15 : 30	50		
Reach to workshop	in			:			
Total			43,200		141	284	Total min.: 425 min.
Collection			29,000		52	274	
Transportation			14,000		34		
Inside the dumping site			200		55	10	Dumping time.: 65 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 16th November 1997

Vehicle No. KWE245

Loading Capacity: 16TON

Researcher's name: Alexandrine Nyambura

No. of Crew: 7

Estimated Volume: 8m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out		8 : 45			To mathare depot
Loading-1	in	4,000	9 : 25	40		Mathare North
	out		12 : 45		200	
Dumping site	in	8,000	13 : 40	55		Dandora
Start dumping		1,000	13 : 48	8		
Finish dumping		0	13 : 52		4	
Dumping site	out	1,000	14 : 0	8		
Reach to workshop	in		:			
Total		14,000		111	204	Total min.: 315 min.
Collection		0		0	200	
Transportation		12,000		95		
Inside the dumping site		2,000		16	4	Dumping time.: 20 min.
Idling time						

Time & Motion Study

Organization: NCC

Trip- 1 Date: 17th November 1997

Vehicle No. KWE245

Loading Capacity: 16TON

Researcher's name: Alexandrine Nyambura

No. of Crew:

Estimated Volume: m³

Location	Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop			11 : 45			To Makadara depot
Loading-1		14,000	12 : 33	48		then to Garage
			12 : 40		7	
Loading-2		500	12 : 45	5		BuruBuru Estate
			12 : 58		13	
Loading-3		100	13 : 2	4		BuruBuru Estate
			13 : 30		28	
Loading-4		100	13 : 35	5		BuruBuru Estate
			13 : 40		5	
Loading-5		200	13 : 50	10		BuruBuru Estate
			14 : 5		15	
Loading-6		400	14 : 8	3		BuruBuru Estate
			15 : 13		65	
Dumping site		800	15 : 40	27		Dandora
Start dumping		200	15 : 50	10		
Finish dumping		0	15 : 53		3	
Dumping site		200	16 : 3	10		
Reach to workshop			16 : 30			
Total		16,500		122	136	Total min.: 258 min.
Collection		1,300		27	133	
Transportation		14,800		75		
Inside the dumping site		400		20	3	Dumping time.: 23 min.
Idling time						

Time & Motion Study

Organization: NCC Trip-1 Date: 18th November 1997
 Vehicle No. KWE245 Loading Capacity: 16TON Researcher's name: Alexandrine Nyambura
 No. of Crew: Estimated Volume: 8m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			8 : 58			To Makadara depot
Loading-1	in		2,000	9 : 18	20		Maringo
	out			9 : 35		17	
Loading-2	in		2,000	9 : 52	17		BuruBuru Estate
	out			10 : 36		44	
Loading-3	in		4,000	11 : 10	34		BuruBuru Estate
	out			12 : 36		86	
Loading-4	in		1,000	12 : 44	8		BuruBuru Estate
	out			13 : 7		23	
Loading-5	in		10,000	13 : 46	39		BuruBuru Estate
	out			14 : 20		34	
Dumping site	in		3,000	14 : 50	30		Dandora
Start dumping			200	14 : 54	4		
Finish dumping			0	14 : 56		2	
Dumping site	out		200	15 : 0	4		
Reach to workshop	in			:			
Total			22,400		156	206	Total min.: 362 min.
Collection			17,000		98	204	
Transportation			5,000		50		
Inside the dumping site			400		8	2	Dumping time.: 10 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 19th November 1997

Vehicle No. KWE245

Loading Capacity: 16TON

Researcher's name: Alexandrine Nyambura

No. of Crew: 10

Estimated Volume: 8m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out			9 : 0			To Pumwani depot
Loading-1	in		5,000	9 : 20	20		Pumwani Estate
	out			10 : 10		50	
Loading-2	in		0	10 : 14	4		Pumwani Estate
	out			12 : 0		106	
Loading-3	in		100	12 : 2	2		Pumwani Estate
	out			12 : 17		15	
Loading-4	in		600	12 : 48	31		Ushirika Estate
	out			13 : 28		40	
Loading-5	in		1,000	13 : 44	16		
	out			13 : 58		14	
Dumping site	in		5,000	14 : 10	12		Dandora
Start dumping			1,000	14 : 16	6		
Finish dumping			0	14 : 18		2	
Dumping site	out		1,000	14 : 25	7		
Reach to workshop	in			:			
Total			13,700		98	227	Total min.: 325 min.
Collection			1,700		53	225	
Transportation			10,000		32		
Inside the dumping site			2,000		13	2	Dumping time.: 15 min.
Idling time							

Time & Motion Study

Organization: NCC
 Vehicle No. KUL989
 No. of Crew: 8

Loading Capacity: 7880kg
 Estimated Volume: 3m³

Trip- 1 Date: 13th November 1997
 Researcher's name: Jullie Etsabo

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	110993		9 : 0			Jogoo-Kimathi Est-Eastleigh
Loading-1	in	111002	9,000	9 : 25	25		Pumwani Maternity house
	out			10 : 0		35	
Loading-2	in	111004	2,000	10 : 5	5		Madina Nursing home
	out			10 : 10		5	Eastleigh
Loading-3	in	111004.55	550	10 : 15	5		Mecca medical clnc
	out			10 : 20		5	Eastleigh
Loading-4	in	111006	1,450	10 : 30	10		Radiant Medical clinic-
	out			10 : 32		2	Juja Rd
Loading-5	in	111010	4,000	10 : 47	15		Huruma Nursing home
	out			10 : 55		8	Outering Rd-Jogoo Rd
Loading-6	in	111024	14,000	11 : 25	30		Lusaka-NairobiWest Hospital
	out			11 : 50		25	Mbagathi Rd-Ngong Rd
Loading-7	in	111030	6,000	12 : 0	10		Kenyatta -N Hospital
	out			12 : 15		15	
Loading-8	in	111036	6,000	12 : 30	15		Ngong veterinary clinic
	out			12 : 30		0	No loading Naivasha Rd
Loading-9	in	111040	4,000	12 : 38	8		Nyina wa mumb Maternity
	out			12 : 45		7	Hospital - James Gichuru Rd
Loading-10	in	111044	4,000	12 : 55	10		St Austin veterinary
	out			12 : 55		0	No loading
Dumping site	in	111066	22,000	13 : 37	42		Dandora then returned bins
Start dumping		111066	0	13 : 39	2		to pumwani mat hospital
Finish dumping		111066	0	13 : 45		6	Outering - Jogoo Rd
Dumping site	out	111068	2,000	13 : 50	5		
Reach to workshop	in	111083	15,000	14 : 55	65		
Total			90,000		247	108	Total min.: 355 min.
Collection			42,000		108	102	
Transportation			46,000		132		
Inside the dumping site			2,000		7	6	Dumping time.: 13 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 1 Date: 14th November 1997

Vehicle No. KUL989

Loading Capacity: 7TON

Researcher's name: Jullie Etsabo

No. of Crew: 4

Estimated Volume: 4m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	111154		9 : 30			Jogoo-Makadara
Loading-1	in	111158	4,000	9 : 40	10		Pumwani maternity Hospital
	out			9 : 55		15	
Loading-2	in	111164	6,000	10 : 5	10		Jogoo Rd-Makadara
	out			10 : 10		5	Health centre
Loading-3	in	111171	7,000	10 : 30	20		Alice Nursing home
	out			10 : 33		3	Kariobangi
Loading-4	in	111173	2,000	10 : 40	7		Huruma Nursing Home
	out			10 : 45		5	
Loading-5	in	111176	3,000	10 : 55	10		Alpha medical home
	out			11 : 0		5	Juja Rd
Loading-6	in	111177	1,000	11 : 7	7		Marie stopes clinic
	out			11 : 10		3	Eastleigh
Loading-7	in	111178	1,000	11 : 20	10		Madian Nursing home
	out			11 : 27		7	Eastleigh
Loading-8	in	111188	10,000	11 : 55	28		Lenana Rd, Veterinary clinic
	out			11 : 57		2	
Loading-9	in	111192	4,000	12 : 5	8		St Austin Veterinary
	out			12 : 7		2	No loading
Loading-10	in	111199	7,000	12 : 18	11		Chiromo Veterinary clinic
	out			12 : 28		10	Westlands
Loading-11	in	111199.1	100	12 : 31	3		Chiromo medical clinic
	out			12 : 33		2	Chiromo lane
Loading-12	in	111200	900	12 : 35	2		Mpaka Rd, veterinary clinic
	out			12 : 40		5	Forest Rd,
Loading-13	in	111202	2,000	12 : 45	5		Kahawa west medical clinic
	out			12 : 50		5	
Loading-14	in	111217	15,000	13 : 10	20		Thika Rd, Ruaraka
	out			13 : 16		6	
Dumping site	in	111231	14,000	13 : 48	32		Dandora returned bins to
Start dumping				13 : 49	1		Pumwani maternity hospital
Finish dumping				13 : 55		6	
Dumping site	out	111233	2,000	14 : 0	5		
Reach to workshop	in	111248	15,000	14 : 53	53		
Total			94,000		242	81	Total min.: 323 min.
Collection			59,000		141	75	
Transportation			33,000		95		
Inside the dumping site			2,000		6	6	Dumping time.: 12 min.
Idling time							

Time & Motion Study

Vehicle No. KUL989

No. of Crew: 9

Organization: NCC

Loading Capacity: 7880kg

Estimated Volume: 5.5m³

Trip- 1 Date: 15th November 1997

Researcher's name: Jullie Etsabo

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	111314		9 : 0			Jogoo - Lusaka Rd
Loading-1	in	111317	3,000	9 : 8	8		Nairobi west-Baricho Rd
	out			9 : 30		22	Uhuru Highway
Loading-2	in	111318	1,000	9 : 35	5		Pelican signs
	out			9 : 50		15	Langata Rd
Loading-3	in	111319	1,000	9 : 55	5		Nairobi west estate
	out			9 : 57		2	
Loading-4	in	111319.1	100	10 : 10	13		Nairobi west hospital
	out			10 : 17		7	
Loading-5	in	111319.18	80	10 : 20	3		Equator Nursing home
	out			10 : 22		2	Nairobi west
Loading-6	in	111319.30	120	10 : 35	13		Nairobi west estate
	out			10 : 35		0	
Loading-7	in	111321	1,700	11 : 3	28		South C Estate
	out			11 : 5		2	
Dumping site	in	111337	16,000	11 : 50	45		Dandora
Start dumping		111337	0	11 : 53	3		
Finish dumping		111337	0	12 : 32		39	
Dumping site	out	111339	2,000	12 : 43	11		
Reach to workshop	in			:			
Total			25,000		134	89	Total min.: 223 min.
Collection			4,000		67	50	
Transportation			19,000		53		
Inside the dumping site			2,000		14	39	Dumping time.: 53 min.
Idling time							

Time & Motion Study

Organization: NCC

Trip- 2 Date: 15th November 1997

Vehicle No. KUL989

Loading Capacity: 7880kg

Researcher's name: Jullie Etsabo

No. of Crew: 9

Estimated Volume: 6m³

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from dumping site	out	111339		12 : 43			Dandora dumping site
Loading-1	in	111355	16,000	13 : 15	32		Mugoya Estate
	out			13 : 17		2	
Loading-2	in	111356	1,000	13 : 30	13		Mugoya IV Estate
	out	111358		14 : 15		45	
Dumping site	in	111377	21,000	15 : 10	55		Dandora
Start dumping		111377	0	15 : 15	5		
Finish dumping		111377	0	15 : 45		30	
Dumping site	out	111379	2,000	15 : 55	10		
Reach to workshop	in	111388	9,000	16 : 20	25		
Total			49,000		140	77	Total min.: 217 min.
Collection			1,000		13	47	
Transportation			46,000		112		
Inside the dumping site			2,000		15	30	Dumping time.: 45 min.
Idling time							

Time & Motion Study

Vehicle No. KUI.989

No. of Crew: 8

Organization: NCC

Loading Capacity: 7880kg

Estimated Volume: 7m³

Trip- 1 Date: 16th November 1997

Researcher's name: Jullie Etsabo

Location		Mileage (km)	Distance (m)	Time	Moving time (min.)	Loading time (min.)	Remarks (route)
Start from workshop	out	111395		9 : 20			Jogoo-Lusaka-Enterprise
Loading-1	in	111402	7,000	9 : 40	20		Lunga Lunga Rd
	out			9 : 43		3	No loading
Loading-2	in	111406	4,000	9 : 55	12		KPLC Co. Isiolo Rd
	out			10 : 0		5	
Loading-3	in	111409	3,000	10 : 10	10		Dunga Rd
	out			10 : 27		17	
Loading-4	in	111409	0	10 : 30	3		Vinyl Mart Emulsion
	out			11 : 20		50	Dunga Rd-Lusaka Rd- Jogoo Rd
Dumping site	in	111423	14,000	12 : 0	40		Dandora
Start dumping		111423	0	12 : 2	2		
Finish dumping		111423	0	12 : 30		28	
Dumping site	out	111424	1,000	12 : 35	5		
Reach to workshop	in			:			
Total			29,000		92	103	Total min.: 195 min.
Collection			7,000		25	75	
Transportation			21,000		60		
Inside the dumping site			1,000		7	28	Dumping time.: 35 min.
Idling time							