

(9) Construction Wastes (Mixed Construction Wastes)

Result of Waste Composition Survey in Male  
Construction Wastes - Mixed

Sample No.	37		38		39		Max.	Avg.	Min.	Total	Ratio (%)
	5 Sep.		5 Sep.		6 Sep.						
(unit : grams)											
Organic Waste											
Food Waste	0	0	0	0	0	0	0	0	0	0	0.00
Paper	7,860	4,050	7,450	7,860	6,453	4,050	19,360	1,03			
Cardboard	40,120	21,000	4,650	40,120	22,590	4,650	67,770	3.61			
Subtotal	47,980	27,050	12,100	47,980	29,043	12,100	87,130	4.64			
Plastics	10,300	10,600	26,850	26,850	15,917	10,300	47,750	2.54			
Bottle & Others	1,900	2,200	3,950	3,950	2,683	1,900	8,050	0.43			
PET	200	300	200	300	233	200	700	0.04			
Subtotal	12,400	13,100	31,000	31,000	18,833	12,400	56,500	3.01			
Rubber & Leather	0	380	2,100	2,100	827	0	2,480	0.13			
Textiles	0	260	500	500	253	0	760	0.04			
Yard Waste	0	0	17,450	17,450	5,817	0	17,450	0.93			
Wood	77,340	16,450	52,300	77,340	48,863	16,450	146,590	7.80			
Other Org. Waste	0	0	11,450	11,450	3,817	0	11,450	0.61			
Organic Waste Total	137,720	57,240	127,400	137,720	107,453	57,240	322,360	17.15			
Inorganic Waste											
Glass	0	0	0	0	0	0	0	0.00			
Broken Glass	0	200	600	600	267	0	800	0.04			
Bottle	0	200	600	600	267	0	800	0.04			
Subtotal	0	200	600	600	267	0	800	0.04			
Tin Cans (Steel Cans)	18,050	1,850	0	18,050	6,633	0	19,900	1.06			
Aluminum cans	0	550	300	550	283	0	850	0.05			
Other Metals	3,000	13,500	9,670	13,500	8,723	3,000	26,170	1.39			
Dir. Ash, Sand	180,350	1,221,600	92,100	1,221,600	498,017	92,100	1,494,050	79.51			
Inorganic Waste Total	201,400	1,237,700	102,670	1,237,700	513,923	102,670	1,541,770	82.05			
Hazardous Waste											
Hazardous Waste (Batteries)	0	0	0	0	0	0	0	0.00			
Other Hazardous Waste	0	0	15,000	15,000	5,000	0	15,000	0.80			
Hazardous Waste Total	0	0	15,000	15,000	5,000	0	15,000	0.80			
Total Weight (kg)	339,120	1,294,940	245,070	1,294,940	626,377	245,070	1,879,130	100.00			
Total Waste Volume (lit.)	800	960	720	960	827	720	2,480				
Bulk Density (kg/lit.)	0.424	1.349	0.340	1.349	0.704	0.340	0.758				

Record Sheets (Male Municipality) ( Sheet No. 37 / 39 )

Survey Date : 5 September  
 Generation Source : (I-3)  
 Weather : Cloudy  
 Name of Surveyor : Mr. Ameen

Code A B-1 C-1  
 Residential Area Commercial Area (General) Buildings (Govt. Office)  
 Generation Sources C-2 D E  
 Building (Offices & Shops) Fruits Market & Parks Restaurant & Hotels  
 Code F-3 G I-3  
 Generation Source Home Industry (Others) School Const. Waste (Misc)

Type of Waste	Container Weight 1	Gross Weight 1	Container Weight 2	Gross Weight 2	Container Weight 3	Gross Weight 3	Container Weight 4	Gross Weight 4	Container Weight 5	Gross Weight 5	Net Weight (R)	Ratio(%)
<b>Organic Waste</b>												
Food Waste	0	0									0	0.00
Paper	2,320	7,000	2,320	5,500							7,860	2.32
Cardboard	0	21,000	0	4,800	0	4,700	0	4,920	0	4,700	40,120	11.83
Subtotal	2,320	28,000	2,320	10,300	0	4,700	0	4,920	0	4,700	47,980	14.15
Plastics	1,350	6,000	1,350	7,000							10,300	3.04
Bottle & Others	1,350	2,200	1,350	2,400							1,900	0.56
PET	0	200									200	0.06
Subtotal	2,700	8,400	2,700	9,400	0	0	0	0	0	0	12,400	3.66
Rubber & Leather	0	0									0	0.00
Textiles	0	0									0	0.00
Yard Waste	0	0									0	0.00
Wood	2,520	15,000	2,520	9,000	2,320	27,000	1,350	20,000	1,350	16,000	77,340	22.81
Other Org. Waste	0	0									0	0.00
Organic Waste Total	7,340	51,400	7,340	28,700	2,320	31,700	1,350	24,920	1,350	20,700	137,720	40.61
<b>In-organic Waste</b>												
Glass	0	0									0	0.00
Broken Glass	0	0									0	0.00
Bottle	0	0									0	0.00
Subtotal	0	0	0	0	0	0	0	0	0	0	0	0.00
Tin Cans (Steel Cans)	1,350	11,500	1,350	5,500	1,350	5,100					18,050	5.32
Aluminum cans	0	0									0	0.00
Other Metals	0	3,000									3,000	0.88
Dirt, Ash, Sand	15,650	196,000									180,350	53.18
In-organic Waste Total	17,000	210,500	1,350	5,500	1,350	5,100	0	0	0	0	201,400	59.39
<b>Hazardous Waste</b>												
Hazardous Waste (Batteries)	0	0									0	0.00
Other Hazardous Waste	0	0									0	0.00
Hazardous Waste Subtotal	0	0	0	0	0	0	0	0	0	0	0	0.00
Total Weight (kg) :	24,340	261,900	8,690	34,200	3,670	36,800	1,350	24,920	1,350	20,700	339,120	100.00
Total Waste Volume (lit) :											900	
Bulk Density (kg/lit) :											0.424	

Record Sheets (Male Municipality) ( Sheet No. 38 / 39 )

Survey Date : 5 September  
 Generation Source : (1-3)  
 Weather : Cloudy  
 Name of Surveyor : Mr. Ameen

Code  
 A Residential Area  
 B-1 Commercial Area (General)  
 C-1 Buildings (Govt. Office)

Code  
 C-2 Building (Office & Shops)  
 D Fruits Market & Parks  
 E Restaurant & Hotels

Code  
 F-3 Home Industry (Others)  
 G School  
 I-3 Const. Waste (Mixed)

Type of Waste	Container Weight 1		Gross Weight 1		Container Weight 2		Gross Weight 2		Container Weight 3		Gross Weight 3		Container Weight 4		Gross Weight 4		Container Weight 5		Gross Weight 5		Net Weight (R)	Ratio(%)	
Organic Waste																							
Food Waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
Paper	1,350	4,000	0	1,400	0	10,000	0	6,000	0	6,000	0	6,000	0	0	0	0	0	0	0	0	0	0.31	
Cardboard	0	7,000	0	11,400	0	5,500	0	1,800	0	1,800	0	1,800	0	0	0	0	0	0	0	0	0	1.78	
Subtotal	1,350	11,000	0	11,400	0	5,500	0	1,800	0	1,800	0	1,800	0	0	0	0	0	0	0	0	0	2.09	
Plastics	1,350	6,000	0	2,200	0	300	0	500	0	380	0	260	0	0	0	0	0	0	0	0	0	0.82	
Film	0	2,200	0	300	0	380	0	500	0	380	0	260	0	0	0	0	0	0	0	0	0	0.17	
Bottle & Others	0	300	0	380	0	500	0	380	0	260	0	260	0	0	0	0	0	0	0	0	0	0.02	
PET	0	300	0	380	0	500	0	380	0	260	0	260	0	0	0	0	0	0	0	0	0	0.02	
Subtotal	1,350	8,500	0	1,350	0	1,800	0	1,800	0	1,800	0	1,800	0	0	0	0	0	0	0	0	0	1.01	
Rubber & Leather	0	380	0	260	0	260	0	260	0	260	0	260	0	0	0	0	0	0	0	0	0	0.03	
Textiles	0	260	0	260	0	260	0	260	0	260	0	260	0	0	0	0	0	0	0	0	0	0.02	
Yard Waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
Wood	1,350	7,000	0	1,350	0	6,000	0	7,500	0	1,350	0	7,500	0	0	0	0	0	0	0	0	0	1.27	
Other Org. Waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
Organic Waste Total	4,050	27,140	0	2,700	0	22,900	0	15,300	0	1,350	0	15,300	0	0	0	0	0	0	0	0	0	4.42	
In-organic Waste																							
Glass	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
Broken Glass	0	200	0	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	
Bottle	0	200	0	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	
Subtotal	0	200	0	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.14	
Tin Cans (Steel Cans)	1,350	3,200	0	1,900	0	9,200	0	1,350	0	9,200	0	1,350	0	0	0	0	0	0	0	0	0	0.04	
Aluminum cans	1,350	1,900	0	1,350	0	9,200	0	1,350	0	9,200	0	1,350	0	0	0	0	0	0	0	0	0	1.04	
Other Metals	1,350	7,000	0	1,350	0	9,200	0	1,350	0	9,200	0	1,350	0	0	0	0	0	0	0	0	0	94.34	
Dir. Ash, Sand	59,400	1,281,000	0	1,350	0	9,200	0	1,350	0	9,200	0	1,350	0	0	0	0	0	0	0	0	0	95.58	
In-organic Waste Total	63,450	1,293,300	0	1,350	0	9,200	0	1,350	0	9,200	0	1,350	0	0	0	0	0	0	0	0	0	1.237700	
Hazardous Waste																							
Hazardous Waste (Batteries)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
Other Hazardous Waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
Hazardous Waste Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
Total Weight (kg) :	67,500	1,320,440	0	4,050	0	32,100	0	15,300	0	1,350	0	15,300	0	0	0	0	0	0	0	0	0	100.00	
Total Waste Volume (lit) :																						960	
Bulk Density (kg/lit) :																						1.349	

**Record Sheets (Male Municipality) ( Sheet No. 39 / 39 )**

Survey Date : 6 September  
 Generation Source : (I-3)  
 Weather : Cloudy  
 Name of Surveyor : Mr. Ameen

Code  
 A Residential Area  
 B-1 Commercial Area (General)  
 C-1 Buildings (Govt. Office)

Code  
 C-2 Building (Offices & Shops)  
 D Fruits Market & Parks  
 E Restaurant & Hotels

Code  
 F-3 Home Industry (Others)  
 G School  
 I-3 Const. Waste (Mixed)

Type of Waste	Container Weight 1	Gross Weight 1	Container Weight 2	Gross Weight 2	Container Weight 3	Gross Weight 3	Container Weight 4	Gross Weight 4	Container Weight 5	Gross Weight 5	Net Weight (kg)	Ratio (%)
<b>Organic Waste</b>												
Food Waste	0	0									0	0.00
Paper	50	7,500									7,450	3.04
Cardboard	1,350	6,000									4,650	1.90
Subtotal	1,400	13,500	0	0	0	0	0	0	0	0	12,100	4.94
Plastics	4,050	15,000	4,100	20,000							26,850	10.96
Film	0	300	1,350	5,000							3,950	1.61
Bottle & Others	0	200									200	0.08
PET	0	200									200	0.08
Subtotal	4,050	15,500	5,450	25,000	0	0	0	0	0	0	31,000	12.65
Rubber & Leather	0	2,100									2,100	0.86
Textiles	0	500									500	0.20
Yard Waste	50	17,500									17,450	7.12
Wood	50	3,000	50	15,000	1,350	9,000	4,050	31,500			52,800	21.54
Other Org. Waste	50	11,500									11,450	4.67
<b>Organic Waste Total</b>	<b>5,600</b>	<b>63,600</b>	<b>5,500</b>	<b>40,000</b>	<b>1,350</b>	<b>9,000</b>	<b>4,050</b>	<b>31,300</b>	<b>0</b>	<b>0</b>	<b>127,400</b>	<b>51.99</b>
<b>In-organic Waste</b>												
Glass	0	0									0	0.00
Broken Glass	0	600									600	0.24
Bottle	0	600									600	0.24
Subtotal	0	600	0	0	0	0	0	0	0	0	600	0.24
Tin Cans (Steel Cans)	0	0									0	0.00
Aluminum cans	0	300									300	0.12
Other Metals	1,350	10,000	0	1,020							9,670	3.95
Dirt, Ash, Sand	150	53,500	250	39,000							92,100	37.58
<b>In-organic Waste Total</b>	<b>1,500</b>	<b>64,400</b>	<b>250</b>	<b>40,020</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>102,670</b>	<b>41.89</b>
<b>Hazardous Waste</b>												
Hazardous Waste (Batteries)	0	0									0	0.00
Other Hazardous Waste	0	15,000									15,000	6.12
<b>Hazardous Waste Subtotal</b>	<b>0</b>	<b>15,000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>15,000</b>	<b>6.12</b>
<b>Total Weight (kg) :</b>	<b>7,100</b>	<b>143,000</b>	<b>5,750</b>	<b>80,020</b>	<b>1,350</b>	<b>9,000</b>	<b>4,050</b>	<b>31,300</b>	<b>0</b>	<b>0</b>	<b>245,070</b>	<b>100.00</b>
<b>Total Waste Volume (lit.) :</b>											<b>720</b>	<b>720</b>
<b>Bulk Density (kg/lit.) :</b>												<b>0.340</b>

Result of Waste Composition Survey in Male'

Survey Period : 30 samples  
 Nos. of Samples : 5,659  
 Total Weight of Samples : Kg

Type of Waste	Residential Area - General		Residential Area - Micro Bins		Commercial Area - General		Buildings - Government Offices		Buildings - Private Offices & Shops		Market & Public Areas		Hotels & Restaurants		Schools		Construction Wastes - Mixed			
	Total Weight (g)	Ratio (%)	Total Weight (g)	Ratio (%)	Total Weight (g)	Ratio (%)	Total Weight (g)	Ratio (%)	Total Weight (g)	Ratio (%)	Total Weight (g)	Ratio (%)	Total Weight (g)	Ratio (%)	Total Weight (g)	Ratio (%)	Total Weight (g)	Ratio (%)		
<b>Organic Waste</b>																				
Hood Waste	81,450	10.95	279,900	36.27	91,430	12.83	6,650	4.63	38,100	21.08	137,580	40.27	633,610	82.04	24,590	20.40	0	0.00		
Paper	54,560	7.34	56,080	7.27	112,360	15.76	70,840	49.36	34,250	18.95	18,95	27,010	7.91	12,020	1.57	19,170	15.91	19,360	1.03	
Cardboard	35,260	4.74	37,110	4.81	221,290	31.04	6,030	4.22	52,940	29.24	26,030	7.62	30,530	3.99	17,970	14.91	67,770	3.61		
Subtotal	89,820	12.09	93,190	12.08	333,650	46.81	76,890	53.58	87,190	48.23	55,980	35.52	42,540	5.53	37,140	30.82	87,130	4.64		
Plastics	21,900	2.96	33,530	4.33	41,300	5.81	4,040	2.82	5,680	3.14	18,480	5.41	16,180	2.11	5,600	4.63	47,750	2.54		
Bottle & Others	41,610	5.60	30,740	3.99	18,420	2.58	5,840	4.07	5,270	2.92	6,640	1.94	6,830	0.89	2,750	2.28	8,050	0.43		
PEF	5,320	0.72	3,890	0.50	11,250	1.58	3,500	2.44	1,640	0.91	2,570	0.32	2,870	0.32	900	0.75	700	0.04		
Subtotal	68,920	9.27	48,130	6.24	71,060	9.97	13,340	9.32	12,900	6.86	22,670	8.10	25,480	3.33	9,250	7.68	36,500	3.01		
Rubber & Leather	8,320	1.12	6,680	0.87	8,210	1.15	630	0.44	2,980	1.65	4,650	1.36	0	0.00	0	0.00	2,480	0.13		
Textiles	25,800	3.40	20,140	2.61	19,440	2.72	630	0.44	2,520	1.39	3,740	1.09	3,900	0.51	1,640	1.36	760	0.04		
Yard Waste	112,890	15.19	68,700	8.94	50,350	7.05	35,080	25.14	8,310	4.60	16,820	4.92	3,090	0.40	10,310	8.55	17,450	0.93		
Wood	48,270	6.50	6,130	0.79	8,570	1.20	1,740	1.21	2,570	1.42	11,470	3.26	2,500	0.33	2,720	2.28	140,590	7.80		
Other Org. Waste	64,640	8.97	124,190	16.35	37,970	5.33	2,420	1.69	5,150	2.85	21,410	6.27	2,500	0.33	9,050	7.51	11,450	0.61		
Organic Waste Total	501,610	67.50	647,080	83.86	630,660	87.07	138,420	96.45	139,410	88.18	276,380	80.89	715,600	93.42	94,700	78.58	322,360	17.15		
<b>Inorganic Waste</b>																				
Glass	2,900	0.39	3,750	0.49	2,520	0.35	0	0.00	790	0.41	1,900	0.56	3,490	0.44	1,150	1.12	0	0.00		
Broken Glass	18,410	2.48	13,160	1.71	4,860	0.68	1,850	1.29	2,350	1.24	9,470	2.77	13,090	1.71	2,150	1.78	800	0.04		
Bottle	21,310	2.87	16,910	2.19	7,380	1.04	1,850	1.29	3,000	1.66	11,370	3.33	16,470	2.13	3,500	2.90	800	0.04		
Subtotal	28,490	3.83	18,900	2.45	13,150	1.84	1,850	1.29	3,230	1.78	11,510	3.37	22,910	2.91	9,040	7.28	19,900	1.06		
Tin Cans (Steel Cans)	3,490	0.47	2,960	0.38	5,970	0.84	1,020	0.71	900	0.50	3,140	0.92	2,410	0.31	3,900	3.24	850	0.05		
Aluminum cans	18,760	2.52	4,920	0.64	2,440	0.34	180	0.13	0	0.00	520	0.15	8,030	1.13	2,450	2.03	26,170	1.39		
Other Metals	164,370	22.66	79,120	10.25	59,890	8.40	0	0.00	13,050	7.22	37,390	10.94	0	0.00	5,750	4.71	1,494,050	79.51		
Dir. Ash, Sand	240,420	32.35	122,800	15.91	88,820	12.46	4,890	3.41	20,170	11.16	63,920	18.71	49,820	6.50	25,580	21.22	1,541,770	82.05		
Inorganic Waste Total	240,420	32.35	122,800	15.91	88,820	12.46	4,890	3.41	20,170	11.16	63,920	18.71	49,820	6.50	25,580	21.22	1,541,770	82.05		
<b>Hazardous Waste</b>																				
Hazardous Waste (Batteries)	610	0.08	860	0.11	2,800	0.39	0	0.00	940	0.52	380	0.11	340	0.05	240	0.20	0	0.00		
Other Hazardous Waste	460	0.06	860	0.11	560	0.08	200	0.14	260	0.14	1,000	0.29	220	0.03	0	0.00	15,000	0.80		
Hazardous Waste Total	1,070	0.14	1,740	0.23	3,360	0.47	200	0.14	1,200	0.66	1,380	0.40	600	0.08	240	0.20	15,000	0.80		
Total Waste (Tsp)	743,100	100.00	771,620	100.00	712,840	100.00	143,510	100.00	180,790	100.00	343,680	100.00	766,020	100.00	120,520	100.00	1,879,130	100.00		
Total Waste Volume (lit.)	3,165		2,610		4,780		1,440		1,760		1,720		2,090		860		2,480			
Bulk Density (kg/lit.)	0.231		0.296		0.150		0.100		0.103		0.199		0.364		0.140		0.738			

### 3.5.5 Existing Data

Other than Solid Waste Management Section, Ministry of Construction and Public Works, the existing data were available from the Maldives Water and Sanitation Authority for 5 samples. The samples were taken from 5 different waste sources during the period of 7 to 28 December, 1998. The waste composition of 5 samples indicate that the ratio of each component is different very much and inorganic portion is considerably high ranging from 36 to 64 % except the samples from Cartoon which is about 29 %. It seems that these samples are not representing the common municipal wastes from residential area but it were rather tend to the samples mixing more construction wastes. The following table shows the summary of 5 samples.

#### Summary of Garbage & Solid Waste Monitoring Program

Date: Source:	Waste Composition Ratio (%)				
	7-Dec-93 Dust Bin No. C	13-Dec-93 Container Near Indoor Cricket Area	21-Dec-93 Container near New Harbor Area	27-Oct-93 From the Conglomerati on Area	28-Dec-93 Cartman
<b>Organic Waste</b>					
Coconut Kernel, husk, etc	2.03%	4.74%	1.74%	3.72%	29.95%
Fish waste	11.86%	12.97%	6.70%	2.94%	
Jute sacks/baskets			0.54%	0.98%	3.42%
Nappies & pads	0.07%	0.50%		1.81%	0.20%
Paper cartons	0.17%	0.50%	2.83%	0.88%	6.23%
Plastic bags	3.59%	3.39%	6.43%	4.11%	4.02%
Plastic bottles	0.64%	1.00%	0.54%	0.69%	1.41%
Slippers & Shoes	1.02%	0.25%	0.16%	0.78%	1.41%
Waste clothes	3.39%	7.88%	1.63%	8.81%	
Waste food stuffs	15.92%	12.57%	16.94%	6.75%	19.80%
Waste paper wood	4.74% 0.68%	19.86%	8.99%	4.11%	4.82%
<b>Subtotal</b>	<b>44.11%</b>	<b>63.67%</b>	<b>46.51%</b>	<b>35.58%</b>	<b>71.26%</b>
<b>Inorganic Waste</b>					
Glass bottles, Ceramics, etc	3.05%	1.75%	1.80%	5.78%	1.61%
Gravels	44.72%	22.21%	37.09%	40.53%	14.07%
Metal cans, tins, etc	4.07%	5.39%	4.30%	1.47%	5.83%
Sand	4.07%	6.99%	10.29%	16.64%	7.24%
<b>Subtotal</b>	<b>55.89%</b>	<b>36.33%</b>	<b>53.49%</b>	<b>64.42%</b>	<b>28.74%</b>
<b>Weight of Sample (kg)</b>	<b>147.6</b>	<b>198.9</b>	<b>183.6</b>	<b>102.15</b>	<b>49.75</b>

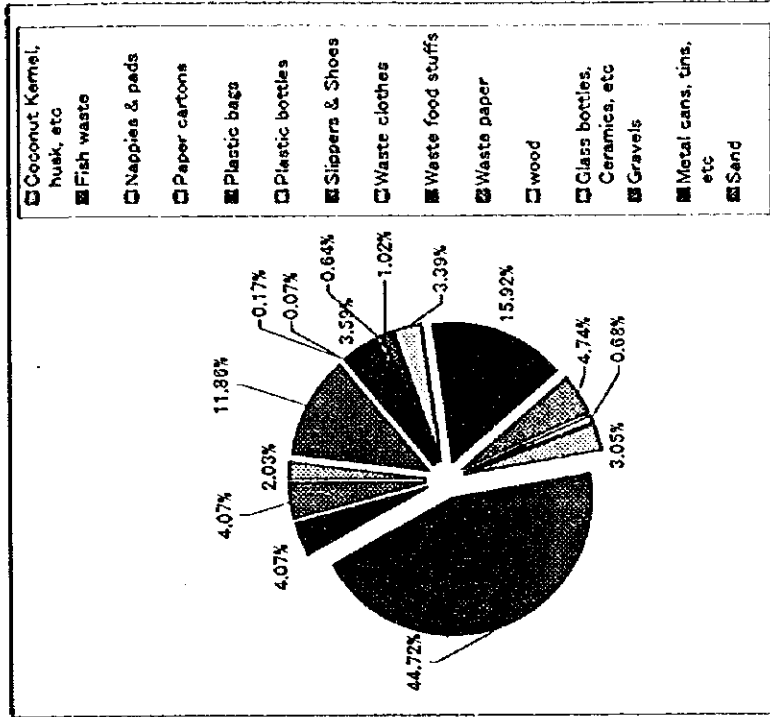
Data Source : Maldives Water and Sanitation Authority

GARBAGE & SOLID WASTE MONITORING PROGRAM

SOURCE: D/BIN NO. C

DATE: 7-DEC-93

CLASSIFICATION	d>25mm kg	8<d<25mm kg	d<8mm kg	Total kg	%
<b>Organic Waste</b>					
Coconut Kernel, husk, etc	3.00			3.00	2.03%
Fish waste	17.50			17.50	11.86%
Nappies & pads	0.10			0.10	0.07%
Paper cartons	0.25			0.25	0.17%
Plastic bags	5.30			5.30	3.59%
Plastic bottles	0.95			0.95	0.64%
Slippers & Shoes	1.50			1.50	1.02%
Waste clothes	5.00			5.00	3.39%
Waste food stuffs	23.50			23.50	15.92%
Waste paper	7.00			7.00	4.74%
wood	1.00			1.00	0.68%
<b>Subtotal</b>	<b>65.10</b>	<b>0.00</b>	<b>0.00</b>	<b>65.10</b>	<b>44.11%</b>
<b>Inorganic Waste</b>					
Glass bottles, Ceramics, etc	4.50			4.50	3.05%
Gravels	45.00	21.00		66.00	44.72%
Metal cans, tins, etc	6.00			6.00	4.07%
Sand	0.00		6.00	6.00	4.07%
<b>Subtotal</b>	<b>55.50</b>	<b>21.00</b>	<b>6.00</b>	<b>82.50</b>	<b>55.89%</b>
<b>Total</b>	<b>120.60</b>	<b>21.00</b>	<b>6.00</b>	<b>147.60</b>	<b>100.00%</b>
Waste Volume (m <sup>3</sup> )	1.25				
Bulk Density (t/m <sup>3</sup> )	118080.00				

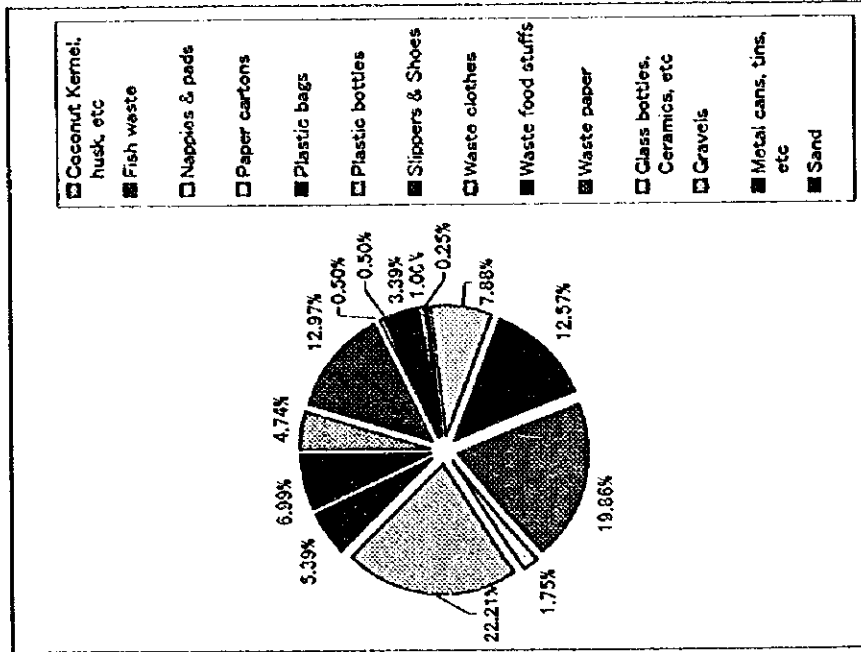


GARBAGE & SOLID WASTE MONITORING PROGRAM

SOURCE: CONTAINER NEAR INDOOR CRICKET AREA

DATE: 13-DEC-93

CLASSIFICATION	d>25mm kg	8<d<25mm kg	d<8mm kg	Total kg	%
<b>Organic Waste</b>					
Coconut Kernel, husk, etc	8.00	1.50		9.50	4.74%
Fish waste	26.00			26.00	12.97%
Nappies & pads	1.00			1.00	0.50%
Paper cartons	1.00			1.00	0.50%
Plastic bags	6.80			6.80	3.39%
Plastic bottles	2.00			2.00	1.00%
Slippers & Shoes	0.50			0.50	0.25%
Waste clothes	10.80	5.00		15.80	7.88%
Waste food stuffs	25.20	0.00		25.20	12.57%
Waste paper	26.80	13.00		39.80	19.86%
<b>Subtotal</b>	<b>108.10</b>	<b>19.50</b>	<b>0.00</b>	<b>127.60</b>	<b>63.67%</b>
<b>Inorganic Waste</b>					
Glass bottles, Ceramics, etc	3.50			3.50	1.75%
Gravels	29.50	15.00		44.50	22.21%
Metal cans, tins, etc	10.80			10.80	5.39%
Sand	0.00		14.00	14.00	6.99%
<b>Subtotal</b>	<b>43.80</b>	<b>15.00</b>	<b>14.00</b>	<b>72.80</b>	<b>36.33%</b>
<b>Total</b>	<b>151.90</b>	<b>34.50</b>	<b>14.00</b>	<b>200.40</b>	<b>100.00%</b>
Waste Volume (m <sup>3</sup> )					2.40
Bulk Density (t/m <sup>3</sup> )					83500.00



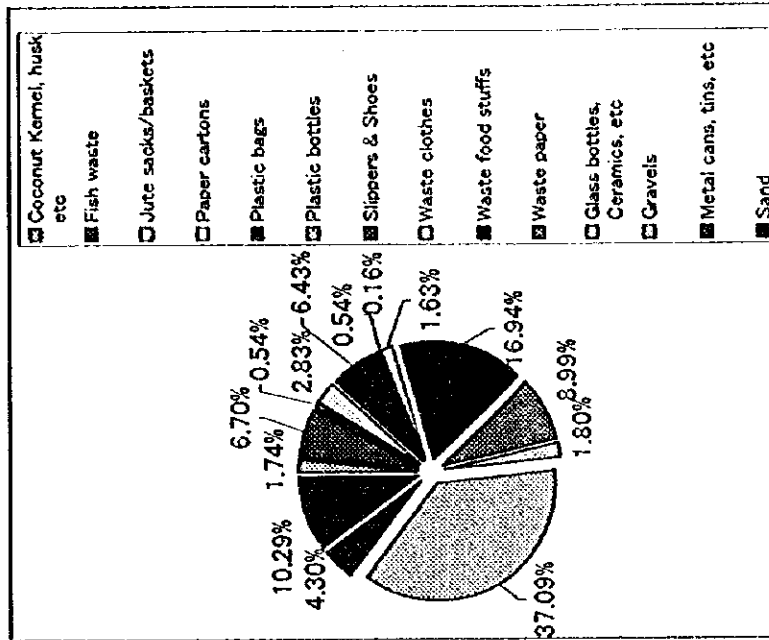


GARBAGE & SOLID WASTE MONITORING PROGRAM

SOURCE: CONTAINER NEAR NEW HARBOR AREA

DATE: 21-DEC-93

CLASSIFICATION	d>25mm kg	8<d<25mm kg	d<8mm kg	Total kg	%
<b>Organic Waste</b>					
Coconut Kernel, husk, etc	3.20			3.20	1.74%
Fish waste	12.30			12.30	6.70%
Jute sacks/baskets	1.00			1.00	0.54%
Paper cartons	5.20			5.20	2.83%
Plastic bags	11.80			11.80	6.43%
Plastic bottles	1.00			1.00	0.54%
Slippers & Shoes	0.30			0.30	0.16%
Waste clothes	3.00	0.00		3.00	1.63%
Waste food stuffs	29.30	1.80		31.10	16.94%
Waste paper	16.50	0.00		16.50	8.99%
<b>Subtotal</b>	<b>83.60</b>	<b>1.80</b>	<b>0.00</b>	<b>85.40</b>	<b>46.51%</b>
<b>Inorganic Waste</b>					
Glass bottles, Ceramics, etc	3.30			3.30	1.80%
Gravels	52.80	15.30		68.10	37.09%
Metal cans, tins, etc	7.90		18.90	26.80	14.24%
Sand			18.90	18.90	10.29%
<b>Subtotal</b>	<b>64.00</b>	<b>15.30</b>	<b>18.90</b>	<b>98.20</b>	<b>53.49%</b>
<b>Total</b>	<b>147.60</b>	<b>17.10</b>	<b>18.90</b>	<b>183.60</b>	<b>100.00%</b>
Waste Volume (m <sup>3</sup> )	1.85				
Bulk Density (t/m <sup>3</sup> )	99243.24				

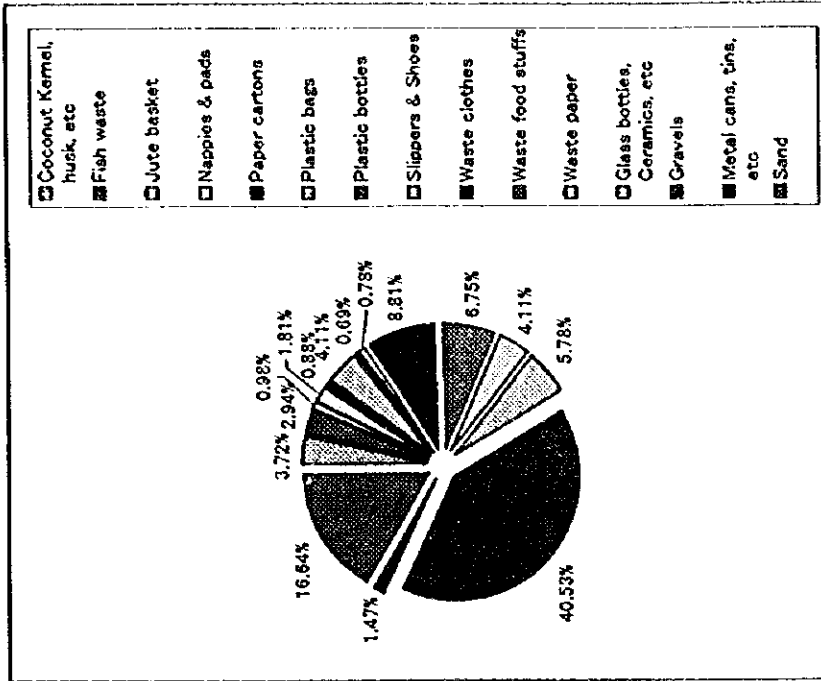


GARBAGE & SOLID WASTE MONITORING PROGRAM

SOURCE: FROM THE CONGLOMERATION AREA

DATE: 27-OCT-93

CLASSIFICATION	d>25mm kg	8<d<25mm kg	d<8mm kg	Total kg	%
<b>Organic Waste</b>					
Coconut Kernel, husk, etc	3.80			3.80	3.72%
Fish waste	3.00			3.00	2.94%
Jute basket	1.00			1.00	0.98%
Nappies & pads	1.85			1.85	1.81%
Paper cartons	0.90			0.90	0.88%
Plastic bags	4.20			4.20	4.11%
Plastic bottles	0.70			0.70	0.69%
Slippers & Shoes	0.80			0.80	0.78%
Waste clothes	8.50	0.50		9.00	8.81%
Waste food stuffs	4.10	2.80		6.90	6.75%
Waste paper	2.70	1.50		4.20	4.11%
<b>Subtotal</b>	<b>31.55</b>	<b>4.80</b>	<b>0.00</b>	<b>36.35</b>	<b>35.58%</b>
<b>Inorganic Waste</b>					
Glass bottles, Ceramics, etc	5.90			5.90	5.78%
Gravels	30.70	10.70		41.40	40.53%
Metal cans, tins, etc	1.50		17.00	18.50	18.17%
Sand			17.00	17.00	16.64%
<b>Subtotal</b>	<b>38.10</b>	<b>10.70</b>	<b>17.00</b>	<b>65.80</b>	<b>64.42%</b>
<b>Total</b>	<b>69.65</b>	<b>15.50</b>	<b>17.00</b>	<b>102.15</b>	<b>100.00%</b>
Waste Volume (m <sup>3</sup> )	1.65				
Bulk Density (t/m <sup>3</sup> )	61909.09				

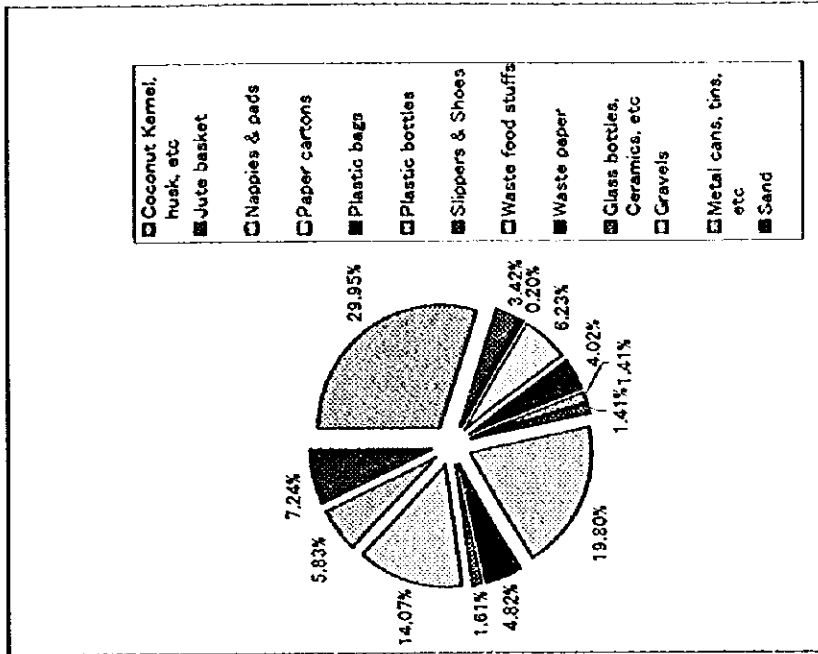


GARBAGE & SOLID WASTE MONITORING PROGRAM

SOURCE: CARTMAN

DATE: 28-DEC-93

CLASSIFICATION	d>25mm kg	8<d<25mm kg	d<8mm kg	Total kg	%
<b>Organic Waste</b>					
Coconut Kernel, husk, etc	14.90			14.90	29.95%
Jute basket	1.70			1.70	3.42%
Nappies & pads	0.10			0.10	0.20%
Paper cartons	3.10			3.10	6.23%
Plastic bags	2.00			2.00	4.02%
Plastic bottles	0.70	0.50		0.70	1.41%
Slippers & Shoes	0.20	0.50		0.70	1.41%
Waste food stuffs	9.80	0.05		9.85	19.80%
Waste paper	1.40	1.00		2.40	4.82%
<b>Subtotal</b>	<b>33.90</b>	<b>1.55</b>	<b>0.00</b>	<b>35.45</b>	<b>71.26%</b>
<b>Inorganic Waste</b>					
Glass bottles, Ceramics, etc	0.80			0.80	1.61%
Gravels	5.00	2.00		7.00	14.07%
Metal cans, tins, etc	2.90			2.90	5.83%
Sand	0.80	0.80	2.80	3.60	7.24%
<b>Subtotal</b>	<b>8.70</b>	<b>2.80</b>	<b>2.80</b>	<b>14.30</b>	<b>28.74%</b>
<b>Total</b>	<b>42.60</b>	<b>4.35</b>	<b>2.80</b>	<b>49.75</b>	<b>100.00%</b>
Waste Volume (m <sup>3</sup> )					2.62
Bulk Density (t/m <sup>3</sup> )					18988.55



## *4. Time and Motion Survey*

## **4. Time and Motion Study (TMS)**

### **4.1 General**

Time and Motion Study (TMS) is an important method to obtain basic data on actual conditions of collection and haulage service. TMS measures the items as following:

- Time spent for each activity including waste loading, haulage, dumping, etc.
- Weights of waste collected and hauled (a truck scale should be used.)
- Number of containers or bins from which waste is collected

Based on data obtained loading efficiency, hauling velocity and efficiency can be calculated. Further more, by combining cost data, cost efficiency also can be estimated. Such indicators are indispensable for evaluating existing collection and hauling systems.

### **4.2 Method of TMS**

#### **1) TMS Team Formation**

TMS team consists of the following members:

1. One team leader
2. One for time measurement and record
3. One for coordination and route record

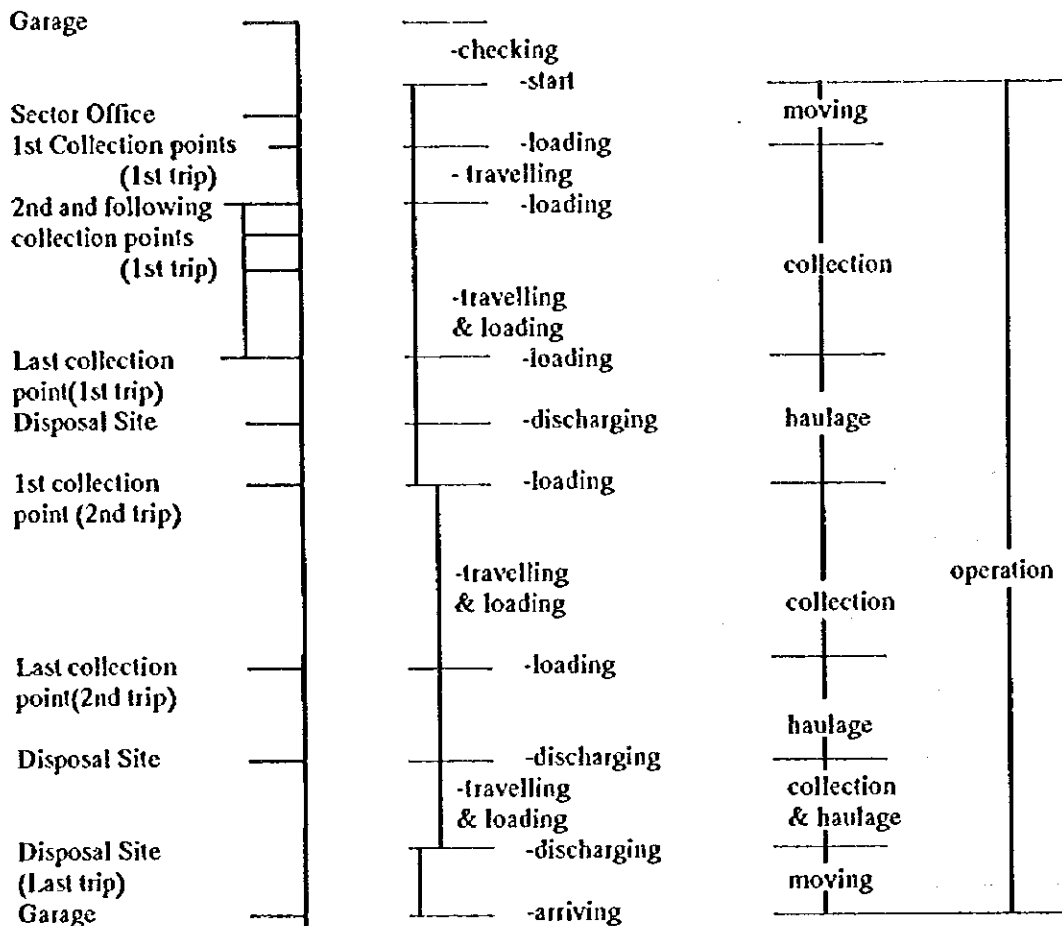
#### **2) Necessary Equipment**

1. One car for study team
2. Watch and Map
3. Record papers
4. Truck scale

### 3) Typical Activities Flow of Collection and Haulage

A time and motion study should cover a collection and haulage activities of a truck for a whole day. A typical flow of the activities is shown the diagram hereto attached (Table 4.2-1).

**Table 4.2-1 Typical Activities Flow of Collection and Haulage**



### 4) Time Schedule

The study schedule of Male' Municipality Area is shown in Table 4.2-2. The two teams carried out the survey, according to the study schedule table. The one team is from Waste Management Section (WMS) of Ministry of Construction and Public Works (MCPW), the other is from Community Service Section (CSS) of Male' Municipality. The survey vehicle is 7 kinds and 13 numbers. Total field study period is 30 days.

Table 4.2-2 Time &amp; Motion Study Schedule

No.	Date		Activities		Number of surveyors & (car)
			Team A (WMS)	Team B (CSS)	
1	28/July	TUE	Preliminary Meeting with CSS&WMS		
2	29	WED	Meeting	-	2
3	30	THR	Ca	-	2(1)
4	31	**FRI	-	-	
5	1/August	*SAT	Ca	-	2(1)
6	2	SUN	Ca	-	2(1)
7	3	MON	Meeting		4
8	4	TUE	Cb-1		4(1)
9	5	WED	Cb-2	Cb-1	4(2)
10	6	THR	Cb-3	Cb-2	4(2)
11	7	**FRI	-	-	
12	8	*SAT		Cb-3	2(1)
13	9	SUN	Meeting	Cb-1	4(1)
14	10	MON	Cd	Cb-2	4(2)
15	11	TUE	Cd	Cb-3	4(2)
16	12	WED	Cd	Meeting	4(1)
17	13	THR	Meeting	Cc	4(1)
18	14	**FRI	-	-	
19	15	*SAT	-	Cc	2(1)
20	16	SUN	Cf	Cc	4(2)
21	17	MON	Cf	Meeting	2(1)
22	18	TUE	Meeting	Cc	4(1)
23	19	WED	Cf	Cc	4(2)
24	20	THR	Cd	Cc	4(2)
25	21	**FRI	-	-	
26	22	*SAT	Cd	-	2(1)
27	23	SUN	Ca	Cb	4(2)
28	24	MON	Ca	Cb	4(2)
29	25	TUE	Cf	Cc	4(2)
30	26	WED	-	Cc	2(1)
Total			44 (17)	38 (16)	82 (33)

©: Car, Each Team is consist of driver and 2 surveyors.

#### Collection

-Male Municipality Vehicles

- a: 4t Capacity Collection Vehicle (2 cars)
- b: Micro-bin Truck (3 vehicles)
- c: Tractor (1 car)

-Private Company

- d: Pick-Up (1 car - JHF)
- e: Hand-cart (3 carts)

Transportation (WMS)

- f: Vessel & 10t track (10 tracks)

## 4.3 Time Record

TMS record sheets used for time recording are shown in the tables hereto attached.

## TMS Record Sheet No.1-1

Date: 30. July, 98

Name: M. Ameen

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1481 T-03	Loaded Track	m3   4 t

## Name of Crew

Driver	Crew (A,B,C,D)
Mr. Thyogenthirn	4 persons (include driver)

## 2) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
5	Central-north	30.7km	-	38

## 3) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Buttery Check		7:00'00"	7:48'00"	
	Preparation		7:48'00"	8:04'00"	
	Start	000	8:04'00"	: ' "	
No.1	Collection	1.60	8:12'30"	8:14'31"	
No.2	Collection	1.80	8:15'14"	8:20'12"	
No.3	Collection	1.85	8:21'00"	8:22'50"	
No.4	Collection	2.00	8:24'10"	8:52'00"	GHAZEE
No.5	Collection	2.20	8:53'30"	8:55'10"	GHAZEE
No.6	Collection	2.40	8:56'52"	9:14'21"	
No.7	Collection	2.70	9:16'38"	9:22'52"	
T. Station	Dumping	4.00	9:27'40"	9:29'25"	
No.8	Collection	4.50	9:31'30"	9:49'10"	
Garage	Moving	4.80	9:50'10"	: ' "	
	Tea Time		9:51'10"	10:34'04"	
	Start	5.50	10:34'04"	: ' "	
No.9	Collection	6.70	10:40'28"	10:42'26"	
No.10	Collection	6.80	10:42'29"	10:43'51"	
No.11	Collection	7.20	10:45'29"	10:47'08"	
No.12	Collection	7.30	10:47'38"	10:50'13"	
No.13	Collection	7.50	10:51'36"	10:58'20"	
No.14	Collection	7.80	10:59'50"	11:02'30"	
No.15	Collection	8.00	11:03'30"	11:05'15"	
T. Station	Dumping	9.50	11:11'11"	11:12'25"	
No.16	Collection	11.50	11:20'31"	11:28'37"	
No.17	Collection	11.60	11:29'09"	11:40'27"	
No.18	Collection	11.70	11:41'28"	11:44'29"	
No.19	Collection	11.90	11:44'30"	11:50'13"	
No.20	Collection	12.60	11:53'12"	11:54'15"	
T. Station	Collection	13.40	11:58'40"	12:00'09"	
Garage	Moving	14.70	12:03'15"		
	Lunch		12:03'15"	13:12'14"	
	Start	17.10	13:12'14"		
No.21	Collection	19.60	13:24'10"	13:26'46"	WHO
No.22	Collection	19.70	13:27'30"	13:29'49"	
No.23	Collection	19.80	13:30'19"	13:31'48"	
No.24	Collection	20.40	13:35'00"	13:35'15"	
No.25	Collection	20.60	13:36'50"	13:40'28"	
No.26	Collection	20.90	13:41'49"	13:44'03"	



Place	Activities	Mileage	Time		Note
			Start	Finish	
No.28	Collection	21.60	13:49'58"	13:51'31"	
No.29	Collection	21.80	13:52'17"	14:12'38"	Park
T. Station	Dumping	23.50	14:19'26"	14:20'20"	
No.31	Collection	25.50	14:30'36"	14:33'06"	
No.32	Collection	25.60	14:34'17"	14:36'14"	
No.33	Collection	26.10	14:38'55"	14:40'25"	
No.34	Collection	26.30	14:42'03"	14:47'28"	Nursery Sch.
No.35	Collection	26.60	14:49'10"	14:59'30"	
No.36	Collection	28.10	15:05'25"	15:11'14"	
No.37	Collection	28.40	15:13'25"	15:15'52"	
No.38	Collection	28.50	15:16'21"	15:24'57"	Kalaaan Sch.
T. Station	Dumping	29.00	15:27'21"	15:28'38"	
Garage		29.80		15:32'16"	Finish

## 4) An Analysis Sheet (No.1)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	4 <sup>th</sup> Trip	5 <sup>th</sup> Trip	total
1) Total Operation Time	1:25'25	1:43'00	50'50	1:08'06	1:11'56	6:19'17
2) Moving Time (to collection point) and Distance	8'30 1.6km	2'05 0.5km	8'06 2.0km	11'56 2.5km	7'30 0.8km	38'07 7.4km
3) Collection Time	1:04'01	36'23	29'12	36'59	40'15	3:26'50
4) Nos. of Collection Points	7	8	5	9	9	38
5) Traveling Time and Distance	6'21 1.1km	12'28 3.0km	4'32 3.1km	11'25 2.2km	16'52 3.2km	51'38 12.6km
6) Haulage time and Distance	4'48 0.5km	5'56 1.5km	4'25 0.8km	6'52 1.7km	2'24 0.5km	24'25 5.0km
7) Dumping Time	1'45	1'14	1'29	0'54	1'17	6'39
8) Moving Time (to garage) and Distance	-	-	3'06 0.7km	-	3'38 0.8km	6'44 1.5km
9) Collected Waste						1.35ton
10) Total Distance	4.0km	4.0km	5.2km	6.4km	6.3km	25.9km
11) Collection Time Efficiency 3)+5)+6)/8) min/ton						210
12) Working Time Efficiency 1)/8) min/ton						281
13) Collection Time min./point	9'06	4'33	5'50	4'06	4'28	5'27
14) Collection Time Velocity 3)+5) Km/h						2.9km/h

## TMS Record Sheet No. 2

Date: 1. Aug., 98

Name: M. Ameen

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1481 T-03	Loafed Track	m3 41

## 2) Name of Crew

Driver	Crew (A,B,C,D)
Mr. Thyogenthira	4 persons (include driver)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
5	Central-north	30.7km	-	38

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		7:00'00"	7:45'12"	
	Start	0.00	7:45'12"	: ' "	
No.1	Collection	0.30	7:47'29"	7:51'31"	
No.2	Collection	0.50	7:53'09"	8:18'22"	
No.3	Collection	0.80	8:20'22"	8:22'11"	
No.4	Collection	0.90	8:23'25"	8:27'22"	
No.5	Collection	1.00	8:28'16"	8:28'58"	
No.6	Collection	1.10	8:33'18"	8:38'05"	
No.7	Collection	1.40	8:40'06"	8:43'28"	
No.8	Collection	1.50	8:44'06"	8:45'44"	
No.9	Collection	1.70	8:48'10"	9:04'03"	
No.10	Collection	1.90	9:04'54"	9:12'35"	
No.11	Collection	2.00	9:13'26"	9:15'24"	
No.12	Collection	2.00	9:15'25"	9:19'20"	
No.13	Collection	2.10	9:19'40"	9:25'26"	
T. Station	Dumping	3.60	9:32'20"	9:33'51"	
No.14	Collection	4.40	9:38'20"	9:41'21"	
No.15	Collection	4.50	9:42'16"	9:46'21"	
No.16	Collection	4.60	9:46'50"	9:52'20"	
No.17	Collection	4.70	9:53'27"	9:58'25"	
Garage	Moving	5.20	10:00'22"	: ' "	
	Tea Time		10:00'22"	10:36'58"	
	Start	5.70	10:36'58"	: ' "	
No.18	Collection	6.70	10:41'50"	10:43'50"	
No.19	Collection	7.10	10:45'30"	10:47'33"	
No.20	Collection	7.20	10:48'42"	10:51'38"	
No.21	Collection	7.30	10:55'30"	11:05'38"	
No.22	Collection	7.40	11:06'31"	11:08'37"	
No.23	Collection	7.50	11:09'00"	11:11'40"	
No.24	Collection	7.50	11:12'06"	11:20'50"	
No.25	Collection	7.60	11:21'10"	11:23'14"	
No.26	Collection	7.80	11:25'00"	11:27'00"	
No.27	Collection	7.90	11:28'00"	11:32'56"	
No.28	Collection	8.10	11:34'20"	11:36'15"	
T. Station	Dumping	10.10	11:44'38"	11:45'28"	
No.29	Collection	11.00	11:49'20"	11:50'43"	
No.30	Collection	11.10	11:51'51"	11:53'30"	
No.31	Collection	11.20	11:54'34"	11:55'27"	
Garage	Moving	13.00	12:08'24"		
	Lunch		12:08'24"	13:23'10"	
	Start	17.70	13:23'10"		
No.32	Collection	19.70	13:33'02"	13:38'29"	W.H.O
No.33	Collection	20.10	13:40'49"	13:42'51"	

Place	Activities	Mileage	Time		Note
			Start	Finish	
No.35	Collection	20.50	13:49'45"	13:52'33"	
No.36	Collection	21.60	14:03'30"	14:06'59"	
No.37	Collection	21.70	14:07'00"	14:13'20"	
No.38	Collection	22.30	14:16'28"	14:20'17"	Post Shop
T. Station	Dumping	22.60	14:22'30"	14:24'12"	
Garage		23.40		14:27'17"	Finish

## 5) An Analysis Table (No.2)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	total
1) Total Operation Time	1:48'39	1:35'01	1:15'44	4:39'24
2) Moving Time (to collection point) and Distance	2'17 0.3km	4'29 0.8km	3'52 0.9km	10'38 2.0km
3) Collection Time	1:20'44	59'24	34'14	2:54'22
4) Nos. of Collection Points	13	15	10	38
5) Traveling Time and Distance	17'23 1.8km	15'06 3.2km	30'43 6.9km	1:03'12 11.9km
6) Haulage time and Distance	6'54 1.5km	8'23 2.0km	2'13 0.3km	17'30 2.0km
7) Dumping Time	1'31	0'50	1'42	4'02
8) Moving Time (to garage) and Distance	-	-	3'05 0.8km	3'05 0.8km
9) Collected Waste				0.81ton
10) Total Distance	3.6km	6.0km	8.6km	18.2km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton				314
12) Working Time Efficiency 1)/8) min/ton				344
13) Collection Time min./point	6'11	3'58	3'25	4'59
14) Collection Time Velocity 3)+5) Km/h				3.0km/h

## TMS Record Sheet No.3

Date: 02. Aug, 98

Name: M. Ameen

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1481 T-03	Loafed Track	m3   4t

## 2) Name of Crew

Driver	Crew (A,B,C,D)
Mr. Thyogenthirn	4 persons (include driver)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
5		26.0km		41

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		7:00'00"	7:11'25"	
	Start	000	7:11'25"	7:15'45"	
			:	:	
No.1	Collection	1.20	7:15'45"	7:20'00"	
No.2	Collection	1.30	7:21'00"	7:30'30"	
No.3	Collection	1.40	7:31'00"	7:34'38"	
No.4	Collection	1.60	7:35'40"	7:55'43"	GHAAZEE
No.5	Collection	1.80	7:56'03"	7:58'20"	GHAAZEE
No.6	Collection	2.00	7:59'24"	8:19'36"	
T. Station	Dumping	4.10	8:25'27"	8:26'58"	
No.7	Collection	5.10	8:31'10"	8:34'26"	
No.8	Collection	5.40	8:35'35"	8:38'17"	
No.9	Collection	5.40	8:38'29"	8:39'06"	
No.10	Collection	5.70	8:41'29"	8:45'28"	
No.11	Collection	6.00	8:46'40"	8:47'35"	
No.12	Collection	6.10	8:48'32"	8:53'15"	
No.13	Collection	6.20	8:54'00"	9:04'30"	
No.14	Collection	6.30	9:04'25"	9:07'14"	
No.15	Collection	6.40	9:08'00"	9:15'35"	
No.16	Collection	7.30	9:18'15"	9:21'00"	
No.17	Collection	7.30	9:21'25"	9:22'30"	
T. Station	Dumping	7.60	9:27'55"	9:29'45"	
No.18	Collection	9.10	9:32'50"	9:39'15"	
No.19	Collection	9.10	9:39'58"	9:45'15"	
No.20	Collection	9.10	9:45'30"	9:52'20"	
Garage	Tea Time	9.40	9:57'45"	10:37'18"	
	Start	10.60	10:37'18"	:	
No.21	Collection	11.90	10:43'33"	10:45'15"	
No.22	Collection	12.30	10:46'50"	10:49'35"	
No.23	Collection	12.40	10:50'22"	10:53'12"	
No.24	Collection	12.50	10:53'40"	10:55'19"	
No.25	Collection	13.00	10:58'19"	10:59'51"	
No.26	Collection	13.60	11:03'02"	11:06'05"	
No.27	Collection	13.60	11:06'25"	11:08'35"	
No.28	Collection	14.40	11:12'09"	11:15'07"	
No.29	Collection	14.60	11:16'15"	11:19'13"	
No.30	Collection	14.70	11:20'04"	11:23'30"	
No.31	Collection	15.30	11:26'25"	11:28'52"	
T. Station	Dumping	17.50	11:39'54"	11:41'24"	
Garage	Lunch Time	18.30	11:44'59"	13:08'38"	
Start		26.70	13:08'38"		
No.32	Collection	27.60	13:12'48"	13:22'24"	School

Place	Activities	Mileage	Time		Note
			Start	Finish	
No.34	Collection	28.20	13:31'50"	13:33'39"	
No.35	Collection	29.40	13:39'03"	13:42'30"	
No.36	Collection	29.90	13:45'00"	14:21'08"	Park
T. Station	Dumping	31.60	14:27'17"	14:30'24"	
No.37	Collection	32.20	14:33'00"	14:34'49"	
No.38	Collection	33.00	14:39'16"	14:40'10"	
No.39	Collection	33.50	14:44'15"	14:49'00"	
No.40	Collection	34.00	14:51'13"	14:53'50"	Radio Maldives
No.41	Collection	34.20	14:55'33"	15:01'00"	School
T. Station	Dumping	34.80	15:04'30"	15:05'47"	
Garage		35.60		15:08'38"	Finish

## 5) An Analysis Table (No.3)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	4 <sup>th</sup> Trip	5 <sup>th</sup> Trip	total
1) Total Operation Time	1:15'23	1:02'47	1:23'54	1:08'06	57'30	5:47'40
2) Moving Time (to collection point) and Distance	4'20 1.2km	4'12 1.0km	3'05 1.5km	4'10 0.9km	2'36 0.6km	18'23 5.2km
3) Collection Time	59'45	40'46	44'02	56'30	15'32	3:36'35
4) Nos. of Collection Points	6	11	14	5	5	41
5) Traveling Time and Distance	5'06 0.8km	10'54 2.2km	20'37 5.0km	11'50 2.3km	13'28 2.0km	1:02'55 12.3km
6) Haulage time and Distance	6'03 2.1km	5'25 1.3km	11'02 2.2km	6'09 1.7km	3'30 0.6km	32'09 8.2km
7) Dumping Time	1'31	1'50	1'30	3'07	1'17	9'15
8) Moving Time (to garage) and Distance	-	-	3'35 0.8km	-	2'49 0.8km	6'24 1.6km
9) Collected Waste						1.35ton
10) Total Distance	4.1km	3.5km	9.5km	4.9km	4.0km	26.0km
11) Collection Time Efficiency 3)+5)+6)/8) min/ton						230
12) Working Time Efficiency 1)/8) min/ton						257
13) Collection Time min./point	9'57	3'42	3'09	11'18	3'06	5'17
14) Collection Time Velocity 3)+5) Km/h						2.6km/h

## TMS Record Sheet No.4

Data: 04. Aug, 98

Name: M. Ameen

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1151 T-04	Micro-bin Truck	m3

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	1 (Sweeper)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
3		57.2km		22

## 4) Kind of Activities and Time

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		5:00'00"	5:16'59"	
	Start	000	5:16'59"		
No.1	Collection	1.70	5:24'53"	5:27'00"	
T. Station	Dumping	3.10	5:33'39"	5:34'40"	
No.2	Collection	4.40	5:42'12"	5:43'38"	
T. Station	Dumping	5.80	5:50'42"	5:51'48"	
No.3	Collection	7.10	5:58'20"	5:59'32"	
T. Station	Dumping	8.40	6:05'28"	6:06'42"	
Depo.	Change	9.10	6:09'52"	6:11'08"	Container
No.4	Collection	10.80	6:18'15"	6:19'43"	
T. Station	Dumping	12.00	6:25'49"	6:26'58"	
No.5	Collection	13.20	6:32'05"	6:33'08"	
T. Station	Dumping	14.30	6:37'50"	6:39'18"	
No.6	Collection	15.40	6:44'00"	6:45'27"	
T. Station	Dumping	16.40	6:50'00"	6:51'10"	
No.7	Collection	17.20	6:54'50"	6:55'55"	
T. Station	Dumping	17.90	6:59'13"	7:00'36"	
No.8	Collection	18.70	7:03'30"	7:04'47"	
T. Station	Dumping	19.40	7:07'27"	7:08'40"	
Depo.	Car Washing	20.00	7:12'12"	7:18'00"	
Garage	Tea Time	20.50	7:21'23"		
				14:24'40"	
Garage	Lunch Time				
	Start	0.00	14:24'40"		
Depo.	Bring Con.	0.40	14:26'24"	14:27'19"	
No.9	Collection	2.30	14:35'09"	14:36'28"	
T. Station	Dumping	3.60	14:43'05"	14:43'35"	
No.10	Collection	5.10	14:50'31"	14:51'42"	
T. Station	Dumping	5.50	14:58'20"	14:58'56"	
No.11	Collection	7.80	15:05'40"	15:07'55"	
T. Station	Dumping	9.10	15:14'10"	15:15'10"	
No.12	Collection	10.50	15:21'23"	15:23'03"	
T. Station	Dumping	11.80	15:28'59"	15:29'43"	
No.13	Collection	12.90	15:34'59"	15:36'28"	
T. Station	Dumping	14.00	15:41'42"	15:42'18"	
No.14	Collection	14.80	15:45'45"	15:46'59"	
T. Station	Dumping	15.50	15:50'02"	15:50'53"	
Dep.	Bring Bin	16.20	15:55'27"	15:56'25"	
Garage		16.60		15:59'54"	
	Start	0.00	19:33'52"		
Dep.	Bring Bin	0.50	19:36'18"	19:37'06"	
No.15	Collection	2.30	19:44'41"	19:46'11"	
T. Station	Dumping	3.70	19:52'11"	19:54'25"	

Place	Activities	Mileage	Time		Note
			Start	Finish	
T. Station	Dumping	6.50	20:09'35"	20:10'15"	
No.17	Collection	7.90	20:16'56"	20:18'47"	
T. Station	Dumping	9.20	20:25'03"	20:25'50"	
No.18	Collection	10.50	20:32'30"	20:33'32"	
T. Station	Dumping	11.80	20:39'53"	20:40'45"	
No.19	Collection	12.90	20:46'10"	20:47'45"	
T. Station	Dumping	14.00	20:52'57"	20:53'44"	
No.20	Collection	15.10	20:59'10"	21:01'01"	
T. Station	Dumping	16.10	21:06'00"	21:06'31"	
No.21	Collection	16.90	21:09'53"	21:11'05"	
T. Station	Dumping	17.50	21:14'03"	21:14'30"	
No.22	Collection	18.30	21:17'40"	21:19'03"	
T. Station	Dumping	19.00	21:22'05"	21:22'55"	
Dep.	Bring Bin	19.70	21:26'21"	21:27'53"	
Garage		20.10		21:30'21"	Finish

## 5) An Analysis Table (No.4)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	total
1) Total Operation Time	2:04'24	1:15'14	1:56'29	5:16'07
2) Moving Time (to collection point) and Distance	7'54 1.7km	10'29 0.4km	2'26 0.5km	20'40 2.6km
3) Collection Time	11'05	9'06	11'26	31'37
4) Nos. of Collection Points	8	6	8	22
5) Traveling Time and Distance	-	-	-	-
6) Haulage time and Distance	1:26'38 18.3km	47'53 15.8km	1:30'01 19.2km	3:44'22 53.3km
7) Dumping Time	9'46	4'17	10'08	24'11
8) Moving Time (to garage) and Distance	3'23 0.5km	3'29 0.4km	2'28 0.4km	9'20 1.3km
9) Collected Waste				9.02ton
10) Total Distance	20.5km	16.6km	20.1km	57.2km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton				28
12) Working Time Efficiency 1)/8) min/ton				35
13) Collection Time min./point	1'23	1'31	1'26	1'26
14) Haulage Time Velocity 6) Km/h				14.2km/h

## TMS Record Sheet No5

Date: 05. Aug., 98

Name: M. Ameen

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1154 T-03	Micro-bin Truck	m3

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	1 (Sweeper)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
3		63.6km		17

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		5:00'00"	5:05'06"	
	Start	000	5:05'06"		
No.1	Collection	0.80	5:07'46"	5:08'42"	
T. Station	Dumping	2.40	5:14'03"	5:34'37"	
Dep.	Bring Cont.	3.10	5:17'40"	5:19'02"	
No.2	Collection	4.40	5:23'18"	5:24'28"	
T. Station	Dumping	6.00	5:29'37"	5:30'40"	
Dep.	Bring Cont.	6.70	5:33'48"	5:34'56"	
No.3	Collection	8.20	5:39'59"	5:40'38"	
T. Station	Dumping	10.00	5:46'31"	5:47'11"	
No.4	Collection	11.80	5:53'02"	5:53'58"	
T. Station	Dumping	13.60	6:00'00"	6:00'46"	
Dep.	Bring Cont.	14.20	6:03'51"	6:05'09"	
No.5	Collection	15.70	6:09'59"	6:10'49"	
T. Station	Dumping	17.50	6:17'00"	6:17'40"	
No.6	Collection	19.30	6:20'30"	6:21'00"	
T. Station	Dumping	20.10	6:31'05"	6:31'35"	
Dep.	Bring Cont.	21.70	6:34'41"	6:36'70"	
No.7	Collection	22.50	6:40'20"	6:41'10"	
T. Station	Dumping	23.70	6:46'41"	6:47'49"	
Dep.	Car Washing	24.40	6:51'20"	6:59'17"	
Garage		24.80		7:01'34"	
Garage	Lunch Time				
	Start	0.00	14:34'18"		
No.8	Collection	0.90	14:37'32"	14:28'02"	
T. Station	Dumping	2.50	14:45'05"	14:45'45"	
No.9	Collection	4.20	14:52'28"	14:53'12"	
T. Station	Dumping	5.90	14:59'55"	15:00'34"	
No.10	Collection	7.60	15:07'55"	15:08'51"	
T. Station	Dumping	9.40	15:17'05"	15:17'38"	
No.11	Collection	11.90	15:25'22"	15:27'31"	
T. Station	Dumping	13.10	15:34'25"	15:35'45"	
Dep.	Bring Bin	14.70	15:43'20"	15:45'50"	
Garage		15.50		15:47'07"	
	Start	0.00	19:46'30"		
No.12	Collection	0.90	19:49'38"	19:50'38"	
T. Station	Dumping	2.50	19:57'31"	19:58'17"	
No.13	Collection	4.10	20:05'25"	20:06'21"	
T. Station	Dumping	5.70	20:13'10"	20:14'08"	
No.14	Collection	7.50	20:22'10"	20:23'41"	
T. Station	Dumping	9.40	20:32'26"	20:33'07"	
No.15	Collection	11.20	20:41'53"	20:43'47"	
T. Station	Dumping	13.60	20:52'30"	20:53'13"	



Place	Activities	Mileage	Time		Note
			Start	Finish	
T. Station	Dumping	16.60	21:13'01"	21:14'02"	
No.17	Collection	18.30	21:20'43"	21:22'00"	
T. Station	Dumping	19.90	21:29'20"	21:30'18"	
		21.50	21:36'53"	21:37'22"	
Dep.	Bring cont.	22.80	21:43'38"	21:44'10"	
Garage		23.30		21:46'21"	Finish

### 5) An Analysis Table (No.5)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	total
1) Total Operation Time	1:56'28	1:12'49	1:59'51	5:09'08
2) Moving Time (to collection point) and Distance	2'40 0.8km	3'24 0.9km	3'08 0.9km	9'12 2.6km
3) Collection Time	5'51	4'19	9'09	19'19
4) Nos. of Collection Points	7	4	6	17
5) Traveling Time and Distance	-	-	-	-
6) Haulage time and Distance	1:41'19 23.6km	1:00'37 13.8km	1:39'18 21.9km	4:21'14 59.3km
7) Dumping Time	4'21	3'12	5'07	12'40
8) Moving Time (to garage) and Distance	2'17 0.4km	1'17 0.8km	3'11 0.5km	6'45 1.7km
9) Collected Waste				6.97ton
10) Total Distance	24.8km	15.5km	23.3km	63.6km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton				40
12) Working Time Efficiency 1)/8) min/ton				44
13) Collection Time min./point	0'50	1'05	1'32	1'08
14) Haulage Time Velocity 6) Km/h				13.6km/h

## TMS Record Sheet No.6

Date: 06. Aug, 98

Name: M. Ameen

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1156 T-03	Micro-bin Truck	m3

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	1 (Sweeper)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
3		43.3km		29

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		5:00'00"	5:11'58"	
	Start	0.00	5:11'58"		
			: ' "	: ' "	
No.1	Collection	0.40	5:13'52"	5:15'04"	
T. Station	Dumping	1.50	5:19'17"	5:20'12"	
Garage	Repair	2.30	5:23'50"	5:27'21"	
No.2	Collection	2.70	5:29'40"	5:30'30"	
T. Station	Dumping	3.90	5:34'41"	5:35'31"	
No.3	Collection	5.00	5:39'38"	5:41'27"	
T. Station	Dumping	6.20	5:45'21"	5:46'56"	
No.4	Collection	6.90	5:48'56"	5:51'35"	
T. Station	Dumping	7.80	5:54'11"	5:55'53"	
Dep.	Bring Cont.	8.20	5:58'59"	6:02'16"	
No.5	Collection	8.40	6:03'50"	6:05'12"	
T. Station	Dumping	9.10	6:08'07"	6:08'37"	
No.6	Collection	9.80	6:11'50"	6:13'11"	
T. Station	Dumping	10.50	6:16'14"	6:16'51"	
No.7	Collection	10.90	6:19'12"	6:20'21"	
T. Station	Dumping	11.30	6:22'41"	6:23'26"	
Dep.	Bring cont.	11.90	6:26'38"	6:28'45"	
No.8	Collection	12.30	6:30'38"	6:32'15"	
T. Station	Dumping	12.70	6:34'50"	6:35'29"	
No.9	Collection	13.00	6:38'00"	6:39'17"	
T. Station	Dumping	13.20	6:41'09"	6:42'09"	
No.10	Collection	13.40	6:43'30"	6:44'51"	
T. Station	Dumping	13.70	6:46'55"	6:47'50"	
Dep.	Bring Bin	14.50	6:52'18"	6:54'41"	
No.11	Collection	15.30	6:58'20"	7:00'32"	
T. Station	Dumping	15.40	7:02'38"	7:03'59"	
Dep.	Car wash	16.20	7:08'20"	7:21'00"	
Garage		16.70		7:23'28"	
	Start	0.00	14:40'11"		
Dep.	Bring Bin	0.50	14:42'24"	14:43'46"	
No.12	Collection	1.30	14:47'24"	14:48'25"	
Place	Activities	Mileage	Time		Note
			Start	Finish	
No.13	Collection	3.50	14:59'53"	15:01'21"	
T. Station	Dumping	4.70	15:06'30"	15:07'11"	
No.14	Collection	5.90	15:12'08"	15:13'47"	
T. Station	Dumping	7.00	15:20'47"	15:21'43"	
No.15	Collection	7.70	15:25'02"	15:26'40"	
T. Station	Dumping	8.50	15:30'02"	15:30'58"	
No.16	Collection	9.10	15:34'00"	15:40'28"	
T. Station	Dumping	9.90	15:43'50"	15:44'48"	

No.17	Collection	10.30	15:47'20"	15:48'51"	
T. Station	Dumping	10.70	15:51'42"	15:51'16"	
No.18	Collection	11.00	15:55'18"	15:56'25"	
T. Station	Dumping	11.70	15:57'30"	15:58'50"	
No.19	Collection	11.90	16:00'19"	16:01'26"	
T. Station	Dumping	12.20	16:03'36"	16:04'22"	
Dep.	Bring Bin	12.80	16:08'10"	16:09'38"	
Garage		13.30		16:12'00"	
	Start	0.00	19:38'02"		
Dep.	Bring Bin	0.50	19:41'10"	16:09'38"	
No.20	Collection	1.30	19:46'15"	19:47'54"	
T. Station	Dumping	2.50	19:53'18"	19:54'16"	
No.21	Collection	3.50	19:59'51"	20:01'42"	
T. Station	Dumping	4.70	20:07'45"	20:08'35"	
No.22	Collection	5.40	20:12'10"	20:13'39"	
T. Station	Dumping	6.20	20:17'36"	20:18'35"	
No.23	Collection	6.80	20:22'21"	20:25'00"	
T. Station	Dumping	7.60	20:28'40"	20:29'28"	
No.24	Collection	8.00	20:32'10"	20:31'06"	
T. Station	Dumping	8.40	20:36'56"	20:37'00"	
No.25	Collection	8.90	20:40'20"	20:42'00"	
T. Station	Dumping	9.30	20:46'04"	20:46'40"	
No.26	Collection	9.50	20:48'11"	20:49'23"	
T. Station	Dumping	9.80	20:51'23"	20:51'59"	
No.27	Collection	10.00	20:53'38"	20:55'12"	
T. Station	Dumping	10.30	20:56'55"	20:57'25"	
No.28	Collection	10.50	20:59'01"	21:00'08"	
T. Station	Dumping	10.70	21:02'22"	21:02'46"	
No.29	Collection	11.40	21:07'10"	21:08'40"	
T. Station	Dumping	12.20	21:12'35"	21:13'20"	
Dep.	Bring Bin	12.90	21:17'20"	21:20'54"	
Garage		13.30		21:22'47"	

## 5) An Analysis Table (No.6)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	total
1) Total Operation Time	2:11'30	1:31'49	1:44'45	5:28'04
2) Moving Time (to collection point) and Distance	1'54 0.4km	2'13 0.5km	2'23 0.5km	6'30 1.4km
3) Collection Time	19'15	16'19	16'37	52'11
4) Nos. of Collection Points	11	8	10	29
5) Traveling Time and Distance	-	-	-	-
6) Haulage time and Distance	1:37'04 15.8km	1:01'43 12.3km	1:16'06 12.4km	3:54'53 40.5km
7) Dumping Time	10'49	9'12	7'00	27'01
8) Moving Time (to garage) and Distance	2'28 0.5km	2'22 0.5km	1'54 0.5km	6'44 1.5km
9) Collected Waste				11.89ton
10) Total Distance	16.7km	13.3km	13.3km	43.3km
11) Collection Time Efficiency 3)+5)+6)/8) min/ton				24
12) Working Time Efficiency 1)/8) min/ton				28
13) Collection Time min./point	1'45	2'02	1'34	2'00
14) Haulage Time Velocity 6) Km/h				10.3km/h

## TMS Record Sheet No.7

Date: 05. Aug., 98

Name: Nasmilla

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1151 T-03	Micro-bio Truck	m3 1

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	1 (Sweeper)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
3		50.9km		18

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		5:00'00"	5:13'12"	
	Start	000	5:13'12"		
			:	:	
No.1	Collection	1.20	5:23'12"	5:25'15"	
T. Station	Dumping	3.10	5:32'18"	5:33'31"	
No.2	Collection	4.20	5:39'26"	5:43'33"	
T. Station	Dumping	5.10	5:50'25"	5:51'07"	
No.3	Collection	7.10	5:56'40"	5:58'11"	
T. Station	Dumping	8.20	6:06'42"	6:07'27"	
No.4	Collection	10.10	6:12'43"	6:15'40"	
T. Station	Dumping	11.10	6:21'19"	6:21'44"	
Dep.	Bring Cont.	12.10	6:24'54"	6:25'50"	
No.5	Collection	13.60	6:32'00"	6:32'59"	
T. Station	Dumping	14.70	6:37'45"	6:38'53"	
Dep.	Bring cont.	15.40	6:42'00"	6:43'05"	
No.6	Collection	16.60	6:47'45"	6:49'20"	
T. Station	Dumping	17.30	6:52'26"	6:53'15"	
No.7	Collection	18.00	6:56'36"	6:58'00"	
T. Station	Dumping	18.80	7:01'10"	7:02'03"	
Dep.	Car Wash	19.70	7:05'25"	7:12'45"	
Garage		19.90		7:15'26"	Finish
	Start	0.00	2:47'37"		
Dep.	Bring Cont.	0.30	2:50'00"	2:51'20"	
No.8	Collection	2.30	2:58'07"	2:59'19"	
T. Station	Dumping	3.70	3:05'53"	3:06'26"	
No.9	Collection	5.10	3:12'44"	3:13'51"	
T. Station	Dumping	6.50	3:20'27"	3:21'10"	
No.10	Collection	7.80	3:27'00"	3:28'10"	
T. Station	Dumping	9.10	3:34'18"	3:35'04"	
No.11	Collection	10.40	3:41'57"	3:43'13"	
T. Station	Dumping	11.60	3:49'35"	3:50'18"	
No.12	Collection	12.70	3:55'22"	3:56'50"	
T. Station	Dumping	13.70	4:01'39"	4:02'14"	
Dep.	Car Wash	15.50	4:11'45"	4:12'54"	
Garage		16.10		4:15'13"	
	Start	0.00	7:49'20"		
Dep.	Bring Bin	0.40	7:51'12"	7:51'52"	
No.13	Collection	1.60	7:56'57"	7:57'41"	
T. Station	Dumping	2.10	8:00'04"	8:01'04"	
No.14	Collection	2.70	8:03'38"	8:04'26"	
T. Station	Dumping	3.20	8:07'16"	8:07'50"	
No.15	Collection	4.50	8:15'05"	8:16'10"	
T. Station	Dumping	5.80	8:22'27"	8:22'59"	

Place	Activities	Mileage	Time		Note
			Start	Finish	
T. Station No.17	Dumping Collection	8.90 9.70	8:37'41"	8:38'21"	
T. Station No.18	Dumping Collection	11.10 12.40	8:53'40"	9:02'34"	
T. Station	Dumping	13.80	9:10'20"	9:10'56"	
Dep.	Bring Bin	14.40	9:15'20"	9:17'10"	
Garage		14.90		9:19'47"	

## 5) An Analysis Table (No.7)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	total
1) Total Operation Time	2:02'14	1:27'36	1:30'27	5:00'07
2) Moving Time (to collection point) and Distance	2'00 1.2km	2'33 0.3km	1'52 0.4km	6'25 1.9km
3) Collection Time	14'46	6'12	6'34	31'37
4) Nos. of Collection Points	7	5	6	18
5) Traveling Time and Distance	-	-	-	-
6) Haulage time and Distance	1:36'52 18.5km	1:13'10 15.2km	1:15'26 14.0km	4:05'28 47.7km
7) Dumping Time	5'55	4'20	3'55	14'10
8) Moving Time (to garage) and Distance	2'41 0.2km	2'19 0.6km	2'37 0.5km	7'37 1.3km
9) Collected Waste				7.38ton
10) Total Distance	19.9km	16.1km	14.9km	50.9km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton				38
12) Working Time Efficiency 1)/8) min/ton				41
13) Collection Time min./point	1'23	1'14	1'05	1'45
14) Haulage Time Velocity 6) Km/h				11.7km/h

## TMS Record Sheet No.8

Data: 06. Aug. 98

Name: Nasnulla

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1155 T-04	Micro-bin Truck	m3 1

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	1 (Sweeper)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
3		53.0km		14

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		5:00'00"	5:12'30"	
	Start	0.00	5:12'30"		
No.1	Collection	0.80	5:14'58"	5:15'44"	
T. Station	Dumping	2.20	5:20'40"	5:21'50"	
No.2	Collection	4.00	5:26'56"	5:28'36"	
T. Station	Dumping	5.60	5:33'58"	5:34'24"	
Dep.	Bring Cont.	6.30	5:37'16"	5:38'30"	
No.3	Collection	7.80	5:43'40"	5:45'05"	
T. Station	Dumping	9.60	5:51'10"	5:51'26"	
Dep.	Bring Cont.	10.20	5:54'29"	5:56'45"	
No.4	Collection	11.20	6:01'25"	6:02'32"	
T. Station	Dumping	13.50	6:08'22"	6:08'55"	
Dep.	Bring Cont.	14.10	6:12'07"	6:13'13"	
No.5	Collection	15.60	6:18'18"	6:19'57"	
T. Station	Dumping	17.40	6:26'08"	6:27'15"	
Dep.	Car Washing	18.10	6:30'10"	6:35'25"	
Garage		18.50		6:37'39"	
	Start	0.00	2:41'20"		
No.6	Collection	0.70	2:44'00"	2:44'27"	
T. Station	Dumping	2.40	2:50'49"	2:51'20"	
No.7	Collection	4.10	2:57'33"	2:58'29"	
T. Station	Dumping	5.80	3:04'58"	3:05'28"	
No.8	Collection	7.60	3:12'40"	3:14'18"	
T. Station	Dumping	9.50	3:22'03"	3:23'01"	
No.9	Collection	11.40	3:30'11"	3:32'42"	
T. Station	Dumping	13.20	3:40'05"	3:41'05"	
Dep.	Car Wash	15.00	3:48'01"	3:49'02"	
Garage		15.90		3:52'03"	Finish
	Start	0.00	7:49'35"		
Dep.	Bring Bin	0.40	7:51'43"	7:52'41"	
No.10	Collection	1.70	7:57'31"	7:59'00"	
T. Station	Dumping	3.50	8:05'18"	8:06'10"	
No.11	Collection	5.00	8:12'25"	8:13'26"	
T. Station	Dumping	6.60	8:20'07"	8:21'10"	
No.12	Collection	8.40	8:28'25"	8:29'52"	
T. Station	Dumping	10.30	8:36'58"	8:37'45"	
No.13	Collection	12.10	8:45'10"	8:46'40"	
T. Station	Dumping	13.90	8:51'20"	8:55'40"	
No.14	Collection	15.70	9:02'22"	9:05'30"	
T. Station	Dumping	17.60	9:12'35"	9:13'52"	
Dep.	Bring Bin	18.10	9:17'14"	9:20'26"	
Garage		18.60		9:23'16"	

5) An Analysis Table (No.8)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	total
1) Total Operation Time	1:33'41	1:10'43	1:33'41	4:18'05
2) Moving Time (to collection point) and Distance	2'28 0.8km	1'40 0.7km	2'08 0.4km	6'16 1.9km
3) Collection Time	6'37	5'32	8'35	20'44
4) Nos. of Collection Points	5	4	5	14
5) Traveling Time and Distance	-	-	-	-
6) Haulage time and Distance	1:14'49 17.7km	58'31 14.3km	1:14'39 17.7km	3:27'59 49.7km
7) Dumping Time	3'22	2'59	5'19	11'40
8) Moving Time (to garage) and Distance	2'14 0.4km	2'01 0.9km	2'50 0.5km	7'05 1.8km
9) Collected Waste				5.74ton
10) Total Distance	18.5km	15.9km	18.6km	53.0km
11) Collection Time Efficiency 3)+5)+6)/8) min/ton				40
12) Working Time Efficiency 1)/8) min/ton				45
13) Collection Time min./point	1'19	1'23	1'43	1'21
14) Haulage Time Velocity 6) Km/h				14.3km/h

## TMS Record Sheet No.9

Date: 08. Aug. 98

Name: Nasmilla

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1156 T-04	Micro-bin Truck	m3

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	1 (Sweeper)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
2		28.2km		21

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		2:30'00"	2:42'28"	
	Start	000	2:42'28"		
			: ' "	: ' "	
No.1	Collection	0.30	2:43'44"	2:45'06"	
T. Station	Dumping	1.00	2:48'05"	2:48'59"	
No.2	Collection	2.20	2:53'57"	2:55'10"	
T. Station	Dumping	3.30	2:59'50"	3:00'53"	
No.3	Collection	4.40	3:05'13"	3:08'55"	
T. Station	Dumping	5.50	3:13'40"	3:15'13"	
Garage	Repair	6.30	3:19'12"	3:24'50"	
No.4	Collection	6.70	3:26'15"	3:27'26"	
T. Station	Dumping	7.40	3:30'44"	3:32'05"	
No.5	Collection	8.10	3:35'02"	3:36'35"	
T. Station	Dumping	8.80	3:40'00"	3:40'58"	
No.6	Collection	9.20	3:43'36"	3:44'59"	
T. Station	Dumping	9.60	3:48'18"	3:49'14"	
No.7	Collection	10.00	3:52'17"	3:53'37"	
T. Station	Dumping	10.40	3:56'25"	3:57'30"	
No.8	Collection	10.70	3:59'40"	4:01'10"	
T. Station	Dumping	10.90	4:03'35"	4:04'34"	
No.9	Collection	11.20	4:06'11"	4:06'50"	
T. Station	Dumping	11.40	4:09'25"	4:10'36"	
No.10	Collection	12.10	4:14'28"	4:15'30"	
Dep.	Bring Cont.	12.30	4:19'40"	4:32'20"	
Garage		12.80		4:34'06"	Finish
Garage	Start	0.00	7:40'22"		
Dep.	Bring Bin	0.40	7:42'20"	7:43'40"	
No.11	Collection	1.20	7:46'59"	7:48'50"	
T. Station	Dumping	2.40	7:53'49"	7:54'30"	
No.12	Collection	3.60	8:00'00"	8:02'32"	
T. Station	Dumping	4.70	8:08'20"	8:09'16"	
No.13	Collection	5.40	8:12'50"	8:15'30"	
T. Station	Dumping	6.00	8:19'17"	8:20'30"	
No.14	Collection	6.70	8:23'41"	8:29'48"	
T. Station	Dumping	7.40	8:33'36"	8:34'40"	
No.15	Collection	7.80	8:37'40"	8:38'58"	
T. Station	Dumping	8.30	8:41'58"	8:43'10"	
No.16	Collection	8.70	8:45'50"	8:49'57"	
T. Station	Dumping	9.10	8:52'51"	8:53'43"	
No.17	Collection	9.30	8:55'27"	8:57'30"	
T. Station	Dumping	9.60	8:59'15"	8:59'56"	
No.18	Collection	9.80	9:01'30"	9:03'13"	
T. Station	Dumping	10.10	9:05'00"	9:05'40"	
No.19	Collection	10.30	9:07'05"	9:09'31"	



Place	Activities	Mileage	Time		Note
			Start	Finish	
No.20	Collection	11.70	9:17'59"	9:19'36"	
T. Station	Dumping	12.90	9:26'16"	9:26'27"	
No.21	Collection	13.60	9:30'20"	9:33'15"	
T. Station	Dumping	14.30	9:36'58"	9:37'40"	
Dep.	Car Washing	14.90	9:41'33"	9:48'02"	
Garage		15.40		9:50'57"	Finish

### 5) An Analysis Table (No.9)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	total
1) Total Operation Time	1:51'38	2:10'35	4:02'13
2) Moving Time (to collection point) and Distance	1'16 0.3km	2'02 0.4km	3'18 0.7km
3) Collection Time	14'54	29'19	44'13
4) Nos. of Collection Points	10	11	21
5) Traveling Time and Distance	-	-	-
6) Haulage time and Distance	1:23'32 12.0km	1:27'22 14.5km	2:50'54 26.5km
7) Dumping Time	10'00	8'54	18'54
8) Moving Time (to garage) and Distance	1'46 0.5km	2'55 0.5km	4'41 1.0km
9) Collected Waste			8.61ton
10) Total Distance	12.8km	15.4km	28.2km
11) Collection Time Efficiency 3)+5)+6)/8) min/ton			25
12) Working Time Efficiency 1)/8) min/ton			28
13) Collection Time min./point	1'29	2'40	2'06
14) Haulage Time Velocity 6) Km/h			9.3km/h

## TMS Record Sheet No.10

Date: 09. Aug. 98

Name: Nasutlla

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1151 T-04	Micro-bin Truck	m3   1

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	1 (Sweeper)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
3		51.6km		20

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		5:00'00"	5:01'13"	
	Start	000	5:01'13"		
			:	:	
No.1	Collection	1.80	5:07'40"	5:11'55"	
T. Station	Dumping	3.10	5:18'36"	5:19'15"	
No.2	Collection	4.50	5:25'24"	5:27'02"	
T. Station	Dumping	5.80	5:32'27"	5:33'02"	
No.3	Collection	7.10	5:38'41"	5:40'48"	
T. Station	Dumping	8.50	5:47'32"	5:48'02"	
Dep.	Bring Cont.	9.10	5:51'25"	5:52'57"	
No.4	Collection	10.80	5:58'56"	6:00'34"	
T. Station	Dumping	12.10	6:06'50"	6:07'19"	
No.5	Collection	13.30	6:12'37"	6:14'05"	
T. Station	Dumping	14.60	6:20'29"	6:21'50"	
Dep.	Bring cont.	15.20	6:24'13"	6:26'21"	
No.6	Collection	16.70	6:32'37"	6:33'56"	
T. Station	Dumping	17.80	6:39'04"	6:40'30"	
No.7	Collection	18.90	6:45'19"	6:46'50"	
T. Station	Dumping	20.00	6:51'46"	6:52'21"	
No.8	Collection	20.70	6:55'26"	6:56'58"	
T. Station	Dumping	21.20	6:59'09"	7:00'21"	
No.9	Collection	21.70	7:02'37"	7:14'45"	
T. Station	Dumping	22.20	7:17'42"	7:18'58"	
Dep.	Car Wash	22.90	7:22'40"	7:28'47"	
Garage		23.40		7:30'57"	Finish
Garage	Start	000	3:00'00"		
Dep.	Pick Cont.	0.50	3:02'21"	3:02'46"	
No.10	Collection	1.60	3:07'06"	3:08'03"	
T. Station	Dumping	2.20	3:10'29"	3:10'58"	
No.11	Collection	3.30	3:15'50"	3:17'07"	
T. Station	Dumping	4.30	3:21'47"	3:22'25"	
No.12	Collection	5.60	3:28'18"	3:29'30"	
T. Station	Dumping	6.90	3:35'30"	3:36'03"	
No.13	Collection	8.20	3:42'50"	3:43'35"	
T. Station	Dumping	9.60	3:49'57"	3:50'17"	
No.14	Collection	10.90	3:56'32"	3:57'41"	
T. Station	Dumping	12.30	4:04'07"	4:04'50"	
Dep.	Car Wash	13.00	4:08'00"	4:08'51"	
Garage		13.40		4:10'56"	
	Start	0.00	7:43'25"		
Dep.	Bring Bin	0.40	7:45'44"	7:46'35"	
No.15	Collection	1.60	7:51'21"	7:52'17"	
T. Station	Dumping	2.10	7:55'03"	7:55'38"	

Place	Activities	Mileage	Time		Note
			Start	Finish	
T. Station	Dumping	3.30	8:02'17"	8:02'59"	
Dep.	Bring Bin	3.80	8:05'43"	8:06'23"	
No.17	Collection	4.40	8:10'31"	8:11'47"	
T. Station	Dumping	5.70	8:17'40"	8:22'27"	
No.18	Collection	7.00	8:28'41"	8:30'01"	
T. Station	Dumping	8.30	8:36'54"	8:37'30"	
No.19	Collection	9.70	8:44'44"	8:46'01"	
T. Station	Dumping	11.00	8:52'43"	8:53'11"	
No.20	Collection	12.40	9:00'04"	9:01'48"	
T. Station	Dumping	13.30	9:15'52"	9:19'43"	
Dep.	Car Washing	14.40	9:23'17"	9:24'02"	
Garage		14.80		9:29'18"	

## 5) An Analysis Table (No.10)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	total
1) Total Operation Time	2:29'44	1:10'56	1:45'53	5:26'33
2) Moving Time (to collection point) and Distance	6'27 1.8km	2'21 0.5km	1'19 0.4km	10'07 2.7km
3) Collection Time	17'34	5'20	7'15	30'09
4) Nos. of Collection Points	9	5	6	20
5) Traveling Time and Distance	-	-	-	-
6) Haulage time and Distance	1:59'16 21.1km	58'30 12.5km	1:21'03 14.0km	4:18'49 47.6km
7) Dumping Time	2'43	2'43	11'00	16'26
8) Moving Time (to garage) and Distance	2'10 0.5km	2'02 0.4km	5'16 0.4km	9'28 1.3km
9) Collected Waste				8.2ton
10) Total Distance	23.4km	13.4km	14.8km	51.6km
11) Collection Time Efficiency 3)+5)+6)/8) min/ton				31
12) Working Time Efficiency 1)/8) min/ton				40
13) Collection Time min./point	1'57	1'04	1'13	1'30
14) Haulage Time Velocity 6) Km/h				11.0km/h

## TMS Record Sheet No.11

Date: 10. Aug. 98

Name: Nasnulla

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1154 T-03	Micro-bin Truck	m3

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	1 (Sweeper)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
3		48.4km		13

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		5:00'00"	5:14'36"	
	Start	000	5:14'36"		
No.1	Collection	0.80	5:17'20"	5:19'10"	
T. Station	Dumping	2.20	5:24'04"	5:24'30"	
No.2	Collection	4.10	5:30'07"	5:31'24"	
T. Station	Dumping	5.70	5:37'20"	5:37'56"	
Dep.	Bring Cont.	6.30	5:40'55"	5:42'26"	
No.3	Collection	7.80	5:47'15"	5:48'25"	
T. Station	Dumping	9.60	5:54'28"	5:53'01"	
No.4	Collection	11.30	6:01'16"	6:02'11"	
T. Station	Dumping	13.10	6:08'28"	6:09'09"	
Dep.	Bring Cont.	13.80	6:12'26"	6:13'30"	
No.5	Collection	15.20	6:18'42"	6:19'32"	
T. Station	Dumping	17.00	6:26'06"	6:27'38"	
Dep.	Car Washing	17.60	6:30'57"	6:37'52"	
Garage				6:41'50"	
Garage	Start	000	2:48'09"		
Dep.	Pick Cont.	0.40	2:50'58"	2:51'34"	
No.6	Collection	2.10	2:58'25"	2:59'30"	
T. Station	Dumping	4.00	3:06'41"	3:07'45"	
No.7	Collection	5.80	3:16'11"	3:17'51"	
T. Station	Dumping	7.60	3:25'22"	3:26'36"	
No.8	Collection	9.20	3:33'43"	3:35'46"	
T. Station	Dumping	10.90	3:42'05"	3:42'51"	
Dep.		11.50	3:46'27"	3:48'45"	
Garage		12.00		3:52'20"	
	Start	0.00	7:41'25"		
Dep.	Bring Bin	0.40	7:43'55"	7:44'43"	
No.9	Collection	2.00	7:50'43"	7:51'42"	
T. Station	Dumping	3.80	7:59'44"	8:00'35"	
No.10	Collection	5.60	8:10'29"	8:12'59"	
T. Station	Dumping	7.60	8:21'48"	8:22'43"	
No.11	Collection	9.30	8:35'18"	8:37'30"	
T. Station	Dumping	11.20	8:46'26"	8:47'16"	
No.12	Collection	12.70	8:55'16"	9:02'38"	
T. Station	Dumping	14.40	9:10'03"	9:10'50"	
No.13	Collection	16.00	9:18'14"	9:22'31"	
T. Station	Dumping	17.70	9:29'08"	9:30'36"	
Dep.		18.30	9:34'31"	9:36'40"	
Garage		18.80		9:40'28"	

## 5) An Analysis Table (No.11)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	total
1) Total Operation Time	1:27'14	1:04'11	1:59'03	4:30'28
2) Moving Time (to collection point) and Distance	2'46 0.8km	2'49 0.4km	2'30 0.4km	8'05 1.6km
3) Collection Time	6'02	4'48	17'20	28'10
4) Nos. of Collection Points	5	3	5	13
5) Traveling Time and Distance	-	-	-	-
6) Haulage time and Distance	1:10'40 16.2km	49'55 11.1km	1:29'29 17.9km	3:30'04 48.4km
7) Dumping Time	3'48	3'04	4'51	11'43
8) Moving Time (to garage) and Distance	3'58 0.6km	3'35 0.5km	3'48 0.5km	11'21 1.6km
9) Collected Waste				5.33ton
10) Total Distance	17.6km	12.0km	18.8km	48.4km
11) Collection Time Efficiency 3)+5)+6)/8) min/ton				45
12) Working Time Efficiency 1)/8) min/ton				51
13) Collection Time min./point	1'12	1'36	3'28	2'10
14) Haulage Time Velocity 6) Km/h				13.8km/h

## TMS Record Sheet No.12

Date: 11. Aug, 98

Name: Nasnulla

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1151 T-03	Micro-bin Truck	m3   1

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	1 (Sweeper)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
3		37.3km		26

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		5:00'00"	5:16'06"	
	Start	000	5:16'06"		
No.1	Collection	0.30	5:18'14"	5:19'22"	
T. Station	Dumping	1.20	5:24'40"	5:25'05"	
No.2	Collection	2.50	5:30'22"	5:31'39"	
T. Station	Dumping	3.60	5:37'18"	5:37'40"	
No.3	Collection	4.70	5:43'00"	5:44'28"	
T. Station	Dumping	5.80	5:50'09"	5:50'46"	
No.4	Collection	6.40	5:54'29"	5:55'58"	
T. Station	Dumping	7.10	5:59'19"	5:59'40"	
Dep.	Bring cont.	7.70	6:03'32"	6:04'54"	
No.5	Collection	8.00	6:06'49"	6:07'53"	
T. Station	Dumping	8.70	6:11'20"	6:11'55"	
Dep.	Bring cont.	9.30	6:15'23"	6:16'45"	
No.6	Collection	9.50	6:18'29"	6:19'27"	
T. Station	Dumping	10.20	6:23'10"	6:23'25"	
Dep.	Bring cont.	10.80	6:26'52"	6:28'11"	
No.7	Collection	11.10	6:29'56"	6:30'58"	
T. Station	Dumping	11.50	6:33'25"	6:34'06"	
Dep.	Bring cont.	12.10	6:37'11"	6:38'14"	
No.8	Collection	12.30	6:40'03"	6:40'51"	
T. Station	Dumping	12.70	6:43'30"	6:44'35"	
No.9	Collection	12.90	6:45'50"	6:46'10"	
T. Station	Dumping	13.10	6:47'26"	6:48'01"	
No.10	Collection	13.30	6:49'16"	6:50'03"	
T. Station	Dumping	13.50	6:51'20"	6:52'17"	
No.11	Collection	13.80	6:53'37"	7:04'59"	
T. Station	Dumping	14.00	7:06'51"	7:07'34"	
Dep.	Car Washing	14.60	7:11'29"	7:20'26"	
Garage		15.10		7:23'12"	Finish
Garage	Start	000	2:52'25"		
Dep.	Pick Cont.	0.40	2:53'56"	2:55'04"	
No.12	Collection	1.20	2:57'57"	2:58'36"	
T. Station	Dumping	2.40	3:03'10"	3:03'53"	
No.13	Collection	3.10	3:07'22"	3:08'10"	
T. Station	Dumping	3.80	3:11'09"	3:12'10"	
Garage	Repaire	4.00	3:13'01"	4:01'12"	
No.14	Collection	4.50	4:02'28"	4:05'25"	
T. Station	Dumping	5.20	4:07'42"	4:08'22"	
No.15	Collection	5.60	4:10'47"	4:12'37"	
T. Station	Dumping	6.00	4:14'47"	4:15'31"	
No.16	Collection	6.30	4:16'58"	4:17'40"	
T. Station	Dumping	6.50	4:19'08"	4:19'36"	

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage		7.70		4:27'30"	
	Start	0.00	7:46'21"		
Dep.	Bring Bin	0.40	7:48'46"	7:49'31"	
No.17	Collection	1.30	7:53'50"	7:54'59"	
T. Station	Dumping	2.40	8:00'52"	8:02'01"	
No.18	Collection	3.50	8:07'23"	8:10'29"	
T. Station	Dumping	4.70	8:15'30"	8:16'22"	
No.19	Collection	5.80	8:21'43"	8:23'01"	
T. Station	Dumping	7.00	8:29'33"	8:30'18"	
No.20	Collection	7.70	8:34'13"	8:35'18"	
T. Station	Dumping	8.40	8:39'47"	8:40'56"	
No.21	Collection	9.10	8:44'48"	8:47'21"	
T. Station	Dumping	9.80	8:51'19"	8:52'04"	
No.22	Collection	10.50	8:57'16"	8:58'02"	
T. Station	Dumping	11.00	9:00'45"	9:01'54"	
No.23	Collection	11.40	9:04'59"	9:06'47"	
T. Station	Dumping	11.80	9:09'40"	9:10'22"	
No.24	Collection	12.10	9:11'57"	9:13'07"	
T. Station	Dumping	12.30	9:14'54"	9:15'21"	
No.25	Collection	12.60	9:17'02"	9:18'10"	
T. Station	Dumping	12.80	9:19'49"	9:20'23"	
No.26	Collection	13.00	9:22'13"	9:29'40"	
T. Station	Dumping	13.30	9:31'33"	9:32'28"	
Dep.	Car Washing	14.00	9:36'31"	9:40'32"	
Garage		14.50		9:42'58"	Finish

## 5) An Analysis Table (No.12)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	total
1) Total Operation Time	2:04'58	1:35'05	1:56'37	5:36'40
2) Moving Time (to collection point) and Distance	2'08 0.3km	1'31 0.4km	2'25 0.4km	6'04 1.1km
3) Collection Time	21'43	6'56	21'30	50'09
4) Nos. of Collection Points	11	5	10	26
5) Traveling Time and Distance	-	-	-	-
6) Haulage time and Distance	1:31'45 14.3km	41'58 6.8km	1:21'49 13.6km	3:35'32 34.7km
7) Dumping Time	6'36	3'39	8'27	18'42
8) Moving Time (to garage) and Distance	2'46 0.5km	3'50 0.5km	2'26 0.5km	9'02 1.5km
9) Collected Waste				10.66ton
10) Total Distance	15.1km	7.7km	14.5km	37.3km
11) Collection Time Efficiency 3)+5)+6)/8) min/ton				25
12) Working Time Efficiency 1)/8) min/ton				32
13) Collection Time min./point	1'58	1'23	2'09	1'56
14) Haulage Time Velocity 6) Km/h				9.7km/h

## TMS Record Sheet No.13

Data: 10. Aug, 98

Name: M. Ameen

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1647 T-03	Normal Truck	m3   1.5 t

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	4 (include driver)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
4		2.0km		45

## 4) Kind of Activities and Time

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		8:00'00"	8:06'44"	
	Start	000	8:06'44"		
			: ' "	: ' "	
No.1	Collection	0.00	8:07'35"	8:11'40"	
No.2	Collection	0.01	8:13'00"	8:17'00"	
No.3	Collection	0.02	8:18'24"	8:19'27"	
No.4	Collection	0.04	8:20'51"	8:21'45"	
No.5	Collection	1.30	8:26'34"	8:31'31"	
No.6	Collection	1.40	8:35'05"	8:37'42"	
No.7	Collection	1.80	8:39'56"	8:40'41"	
No.8	Collection	2.00	8:41'48"	8:42'51"	
No.9	Collection	2.20	8:44'45"	8:45'54"	
No.10	Collection	2.30	8:46'33"	8:47'32"	
No.11	Collection	2.80	8:49'41"	8:52'47"	
No.12	Collection	3.20	8:54'35"	9:01'10"	
No.13	Collection	3.80	9:05'15"	9:08'53"	
No.14	Collection	4.00	9:11'44"	9:15'07"	
T. Station	Dumping	4.60	9:18'58"	9:27'58"	
	Car Washing	4.70	9:28'42"	9:31'47"	
No.15	Collection	5.30	9:34'25"	9:35'09"	
Garage	Tea time	5.60	9:37'22"	10:08'39"	
Gus Station	Fuel charge	8.50	10:14'35"	10:18'17"	
No.16	Collection	9.30	10:22'21"	10:24'13"	
No.17	Dumping	9.40	10:25'47"	10:27'08"	
No.18	Collection	9.80	10:29'16"	10:33'10"	
No.19	Collection	10.10	10:35'16"	10:36'56"	
No.20	Collection	10.50	10:39'11"	10:42'10"	
No.21	Collection	10.70	10:43'08"	10:44'45"	
No.22	Collection	10.70	10:45'04"	10:46'25"	
No.23	Collection	10.90	10:50'49"	10:51'51"	
No.24	Collection	11.30	10:54'00"	10:58'16"	
No.25	Collection	11.40	10:58'45"	11:01'07"	
No.26	Collection	11.40	11:01'35"	11:02'35"	
No.27	Collection	11.50	11:03'05"	11:03'59"	
No.28	Collection	11.70	11:05'27"	11:06'31"	
No.29	Collection	11.80	11:07'10"	11:08'33"	
No.30	Collection	12.00	11:09'40"	11:11'57"	
No.31	Collection	12.00	11:12'21"	11:13'45"	
No.33	Collection	12.60	11:20'28"	11:21'50"	
No.34	Collection	12.70	11:22'21"	11:25'40"	
T. Station	Dumping	13.60	11:30'25"	11:38'30"	
	Washing	13.70	11:39'20"	11:42'25"	



Place	Activities	Mileage	Time		Note
			Start	Finish	
	Start	0.00	13:27'40"		
No.35	Dumping	0.00	13:28'12"	13:42'09"	
T. Station	Collection	0.70	13:47'22"	14:01'08"	
No.36	Collection	1.50	14:05'48"	14:09'55"	
No.37	Collection	2.00	14:12'22"	14:15'39"	
No.38	Collection	2.80	14:19'10"	14:29'28"	
No.39	Collection	3.00	14:30'02"	14:33'02"	
No.40	Collection	3.20	14:34'07"	14:39'07"	
No.41	Collection	3.50	14:41'47"	14:41'22"	
No.42	Collection	3.90	14:50'00"	14:56'43"	
No.43	Collection	4.40	14:59'35"	15:05'16"	
No.44	Collection	5.00	15:08'58"	15:16'51"	
T. Station	Dumping	5.40	15:18'45"	15:28'10"	
	Washing	5.50	15:28'59"	15:36'53"	
Garage		6.50		15:44'53"	
	Start	0.00	18:17'22"		
No.45	Collection	0.90	18:30'38"	18:39'49"	
T. Station	Dumping	2.40	18:47'43"	18:49'28"	
No.45	back	3.90	18:56'49"	18:58'03"	
Garage		5.10		19:06'14"	

An Analysis Table(No.13)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	4 <sup>th</sup> Trip	(5 <sup>th</sup> Trip)	total
1) Total Operation Time	1:25'03	25'04	1:20'49	1:43'47	(48'52)	4:54'43
2) Moving Time (to collection point) and Distance	0'51 0.0km	2'38 0.6km	2'08 0.4km	0'00 0.0km	(16'43) (0.9km)	5'37 1.0km
3) Collection Time	39'24	2'37	35'17	51'34	(9'09)	2:08'52
4) Nos. of Collection Points	14	2	17	9	(1)	42
5) Traveling Time and Distance	28'08 4.0km	18'24 3.6km	21'14 2.9km	26'24 5.0km	-	1:34'10 15.5km
6) Haulage time and Distance	3'51 0.6km	1'34 0.1km	4'45 0.9km	1'54 0.4km	(7'54) (1.5km)	12'04 2.0km
7) Dumping Time	9'00	1'21	9'35	9'35	(1'45)	29'31
8) Moving Time (to garage) and Distance	-	-	9'20 1.1km	16'43 1.1km	(16'46) (2.7km)	26'03 2.2km
9) Collected Waste						4.08ton
10) Total Distance	4.7km	4.7km	5.3km	6.5km	(5.1km)	21.2km
11) Collection Time Efficiency 3)+5)+6)/8) min/ton						58
12) Working Time Efficiency 1)/8) min/ton						72
13) Collection Time min./point	2'49	1'18	2'05	4'06	(9'09)	3'04
14) Collection Time Velocity 3)+5) Km/h						4.2km/h

## TMS Record Sheet No.14

Date: 11. Aug., 98

Name: M. Ameen

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1647 T-03	Normal Truck	m3   1.51

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	4 (include driver)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
3		15.3km		38

## 4) Kind of Activities and Time

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		8:00'00"	8:15'40"	
	Start	0.00	8:15'40"		
			:	:	
No.1	Collection	0.00	8:15'58"	8:18'25"	
No.2	Collection	0.00	8:20'02"	8:22'58"	
No.3	Collection	0.10	8:23'59"	8:28'07"	
No.4	Collection	0.20	8:28'50"	8:29'55"	
No.5	Collection	0.70	8:31'47"	8:38'07"	
No.6	Collection	0.80	8:38'38"	8:40'10"	
No.7	Collection	1.20	8:41'51"	8:48'40"	
No.8	Collection	1.40	8:50'19"	8:52'23"	
No.9	Collection	1.70	8:54'35"	8:55'41"	
No.10	Collection	2.10	8:57'26"	8:58'26"	
No.11	Collection	2.70	9:00'19"	9:01'34"	
No.12	Collection	2.80	9:01'58"	9:03'11"	
No.13	Collection	3.10	9:04'36"	9:07'40"	
No.14	Collection	3.20	9:08'13"	9:11'25"	
No.15	Collection	3.90	9:14'49"	9:18'25"	
No.16	Collection	4.50	9:21'31"	9:26'30"	
No.17	Collection	4.70	9:28'16"	9:30'01"	
T. Station	Dumping	5.40	9:34'28"	9:44'34"	
	Car Washing	5.50	9:45'31"	9:56'03"	
Garage	Tea Time	6.20	10:00'01"	10:40'52"	
	Start	0.00	10:40'52"		
No.18		0.40	10:42'48"	10:50'00"	
No.19	Collection	0.60	10:50'50"	10:54'46"	
No.20	Collection	0.70	10:55'13"	10:59'13"	
No.21	Collection	0.80	10:59'49"	11:03'11"	
No.22	Collection	0.90	11:03'54"	11:05'55"	
No.23	Collection	1.00	11:06'30"	11:08'45"	
No.24	Collection	1.20	11:10'09"	11:12'34"	
No.25	Collection	1.40	11:15'00"	11:15'41"	
No.26	Collection	1.70	11:16'35"	11:20'21"	
No.27	Collection	1.80	11:21'18"	11:23'15"	
No.28	Collection	2.20	11:24'26"	11:28'21"	
No.29	Collection	2.80	11:31'16"	11:33'05"	
No.30	Collection	3.70	11:39'30"	11:41'40"	
No.31	Collection	3.80	11:42'50"	11:44'52"	
No.32	Collection	4.10	11:46'21"	11:47'24"	
No.33	Collection	4.70	11:49'33"	11:50'38"	
No.34	Collection	5.10	11:51'57"	12:02'14"	
T. Station	Dumping	5.50	12:04'10"	12:12'50"	

Place	Activities	Mileage	Time		Note
			Start	Finish	
No.35	Collection	6.70	12:18'24"	12:27'50"	
No.36	Collection	6.80	12:28'35"	12:32'35"	
No.37	Collection	6.80	12:32'50"	12:33'20"	
No.38	Collection	7.80	12:37'30"	12:40'20"	
T. Station	Dumping	8.00	12:41'30"	12:46'56"	
Garage		9.10		12:48'10"	Finish

## 5) An Analysis Table (No.14)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	total
1) Total Operation Time	1:44'21	1:31'58	36'40	3:52'59
2) Moving Time (to collection point) and Distance	0'18 0.0km	1'56 0.4km	5'34 1.2km	7'48 1.6km
3) Collection Time	48'31	53'57	16'46	1:59'14
4) Nos. of Collection Points	17	17	4	38
5) Traveling Time and Distance	25'30 4.7km	25'29 3.7km	7'40 1.3km	58'39 9.7km
6) Haulage time and Distance	4'27 0.7km	1'56 0.4km	1'10 0.2km	7'33 1.3km
7) Dumping Time	10'06	8'30	5'26	24'02
8) Moving Time (to garage) and Distance	3'57 0.7km		1'14 1.1km	5'11 1.8km
9) Collected Waste				3.06ton
10) Total Distance	6.2km	5.5km	3.6km	15.3km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton				60
12) Working Time Efficiency 1)/8) min/ton				76
13) Collection Time min./point	2'51	3'10	4'11	3'08
14) Collection Time Velocity 3)+5) Km/h				3.2km/h

## TMS Record Sheet No.15

Date: 12. Aug, 98

Name: M. Ameen

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1647 T-03	Normal Truck	m3   1.5t

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	4 (include driver)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
3		18.3km		39

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		8:00'00"	8:12'00"	
	Start	000	8:12'00"		
			: : "	: : "	
No.1	Collection	0.00	8:12'45"	8:15'45"	
No.2	Collection	0.01	8:16'43"	8:20'25"	
No.3	Collection	0.02	8:21'21"	8:27'30"	
No.4	Collection	0.04	8:29'25"	8:31'33"	
No.5	Collection	1.60	8:37'30"	8:43'20"	
No.6	Collection	1.60	8:43'45"	8:45'50"	
No.7	Collection	2.00	8:47'33"	8:48'17"	
No.8	Collection	2.50	8:51'28"	8:52'44"	
No.9	Collection	3.10	8:55'12"	8:57'18"	
No.10	Collection	3.40	8:58'50"	9:03'28"	
No.11	Collection	4.10	9:06'43"	9:11'49"	
No.12	Collection	4.30	9:12'51"	9:16'50"	
No.13	Collection	4.80	9:18'45"	9:20'20"	
No.14	Collection	4.90	9:20'57"	9:22'08"	
No.15	Collection	5.10	9:23'12"	9:25'25"	
No.16	Collection	5.90	9:28'29"	9:33'30"	
T. Station	Dumping	6.60	9:36'55"	9:46'18"	
	Tea Time	6.70	9:47'10"	10:28'25"	
	Start	0.00	10:28'25"		
Fuel Station	Fuel Charge	1.20	10:34'11"	10:37'14"	
No.17	Collection	2.60	10:43'44"	10:45'45"	
No.18	Collection	2.70	10:46'46"	10:48'11"	
No.19	Collection	3.00	10:50'00"	10:55'40"	
No.20	Collection	3.20	10:56'50"	11:01'20"	
No.21	Collection	3.30	11:02'06"	11:02'55"	
No.22	Collection	3.40	11:03'18"	11:04'47"	
No.23	Collection	3.60	11:05'38"	11:07'06"	
No.24	Collection	3.90	11:11'11"	11:18'30"	
No.25	Collection	4.10	11:19'26"	11:20'59"	
No.26	Collection	4.30	11:22'24"	11:23'52"	
No.27	Collection	4.50	11:25'01"	11:27'25"	
No.28	Collection	4.60	11:27'52"	11:28'54"	
T. Station	Dumping	5.60	11:33'45"	11:41'05"	
Garage	Lunch Time	6.70	11:42'03"	13:35'52"	
	Start	0.00	13:35'55"		
No.29	Collection	0.90	13:42'40"	13:55'15"	
No.30	Collection	1.30	13:57'50"	14:02'15"	
No.31	Collection	1.70	14:04'19"	14:06'47"	
No.32	Collection	2.20	14:08'35"	14:11'08"	
No.33	Collection	2.30	14:11'38"	14:14'54"	
No.34	Collection	2.50	14:16'06"	14:23'20"	

Place	Activities	Mileage	Time		Note
			Start	Finish	
No.36	Collection	2.60	14:27'16"	14:28'01"	
No.37	Collection	2.70	14:28'21"	14:30'15"	
No.38	Collection	2.80	14:31'02"	14:34'36"	
No.39	Collection	3.30	14:36'35"	14:41'30"	
T. Station	Dumping	3.60	14:43'20"	14:51'25"	
	Washing	3.70	14:52'01"	14:57'01"	
Garage		4.90		15:05'01"	

## 5) An Analysis Table (No.15)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	total
1) Total Operation Time	1:35'10	1:13'38	1:29'06	4:17'54
2) Moving Time (to collection point) and Distance	0'45 0.0km	6'30 1.4km	4'45 0.9km	12'00 2.3km
3) Collection Time	50'45	31'08	46'45	2:07'38
4) Nos. of Collection Points	16	12	11	39
5) Traveling Time and Distance	30'00 6.6km	15'00 4.4km	15'11 3.2km	1:00'11 14.2km
6) Haulage time and Distance	3'25 0.7km	4'51 1.0km	1'50 0.4km	10'06 2.1km
7) Dumping Time	9'32	7'20	7'25	24'17
8) Moving Time (to garage) and Distance	0'52 0.1km	0'58 1.1km	8'00 1.2km	9'50 2.4km
9) Collected Waste				1.26ton
10) Total Distance	6.7km	6.7km	4.9km	18.3km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton				157
12) Working Time Efficiency 1)/8) min/ton				205
13) Collection Time min./point	3'10	2'36	4'15	3'16
14) Collection Time Velocity 3)+5) Km/h				4.5km/h

## TMS Record Sheet No.16

Data: 13. Aug., 98

Name: Nasrulla

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1275 T-03	Tractor	m3

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	4 (include driver)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
3		15.6km		34

## 4) Kind of Activities and Time

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		5:00'00"	5:15'33"	
	Start	0.00	5:15'33"		
No.1	Collection	0.20	5:18'10"	5:18'46"	
No.2	Collection	0.20	5:19'07"	5:19'39"	
No.3	Collection	0.40	5:21'59"	5:22'13"	
No.4	Collection	0.40	5:22'43"	5:22'54"	
No.5	Collection	0.50	5:23'25"	5:23'39"	
No.6	Collection	0.80	5:26'01"	5:26'34"	
No.7	Collection	1.30	5:29'40"	5:31'35"	
No.8	Collection	1.30	5:31'50"	5:32'59"	
No.9	Collection	1.40	5:34'17"	5:35'54"	
No.10	Collection	1.80	5:39'57"	5:41'18"	
No.11	Collection	2.60	5:46'58"	5:53'37"	
No.12	Collection	2.70	5:54'41"	5:55'39"	
No.13	Collection	2.80	5:56'31"	5:57'24"	
No.14	Collection	2.90	5:58'26"	6:00'57"	
No.15	Collection	3.60	6:05'50"	6:07'31"	
No.16	Collection	4.20	6:11'48"	6:13'41"	
No.17	Collection	5.40	6:21'49"	6:24'25"	
No.18	Collection	5.40	6:25'29"	6:25'49"	
No.19	Collection	5.70	6:27'55"	6:28'30"	
No.20	Collection	6.60	6:36'41"	6:42'23"	
No.21	Collection	7.00	6:45'15"	6:49'16"	
No.22	Collection	7.30	6:52'20"	7:13'30"	
T. Station	Dumping	7.50	7:13'15"	7:17'20"	
Depo.	Washing	8.20	7:21'41"	7:23'19"	
Garage	Lunch Time	8.70	7:23'19"	7:26'40"	
Garage	Start	0.00	19:17'05"		
No.23	Collection	0.20	19:18'30"	19:27'20"	
No.24	Collection	0.60	19:32'00"	19:32'25"	
No.25	Collection	1.00	19:33'48"	19:38'21"	
No.26	Collection	1.30	19:40'40"	19:43'05"	
No.27	Collection	1.60	19:46'45"	19:48'28"	
No.28	Collection	2.00	19:50'19"	19:51'39"	
No.29	Collection	2.10	19:52'09"	20:16'54"	
No.30	Collection	2.20	20:17'57"	20:20'34"	
No.31	Collection	2.30	20:21'24"	20:22'49"	
No.32	Collection	2.40	20:23'50"	20:27'27"	
T. Station	Dumping	4.70	20:42'50"	20:44'34"	
No.33	Collection	5.10	20:49'14"	21:43'58"	
T. Station	Dumping	5.60	21:50'13"	21:53'30"	
No.34	Cleaning	6.60	22:01'06"	22:01'51"	
Garage		6.90		22:05'40"	Finish

5) An Analysis Table (No.16)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	total
1) Total Operation Time	2:11'07	1:27'29	1:21'06	4:59'42
2) Moving Time (to collection point) and Distance	2'37 0.2km	1'25 0.2km	4'40 0.4km	8'42 0.8km
3) Collection Time	57'18	52'40	54'44	2:44'42
4) Nos. of Collection Points	22	10	1	33
5) Traveling Time and Distance	1:02'23 7.1km	16'17 2.2km	-	1:18'40 9.3km
6) Haulage time and Distance	1'45 0.2km	15'23 2.3km	6'15 0.5km	27'23 3.0km
7) Dumping Time	2'05	1'44	3'27	7'16
8) Moving Time (to garage) and Distance	3'21 0.5km	-	12'10 1.3km	15'31 1.8km
9) Collected Waste				3.06ton
10) Total Distance	8.7km	4.7km	2.2km	15.6km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton				88
12) Working Time Efficiency 1)/8) min/ton				98
13) Collection Time min./point	2'36	5'32	54'44	5'00
14) Collection Time Velocity 3)+5) Km/h				2.3km/h

## TMS Record Sheet No.17

Date: 15. Aug, 98

Name: Nasrulla

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1275 T-03	Tractor	m3   1

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	4 (include driver)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
4		16.9km		31

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		5:00'00"	5:20'56"	
	Start	0.00	5:20'56"		
			: ' "	: ' "	
No.1	Collection	0.30	5:23'43"	5:25'00"	
No.2	Collection	0.50	5:26'45"	5:26'58"	
No.3	Collection	0.60	5:27'23"	5:27'39"	
No.4	Collection	0.70	5:28'00"	5:28'56"	
No.5	Collection	1.00	5:31'25"	5:31'40"	
No.6	Collection	1.50	5:35'29"	5:37'23"	
No.7	Collection	1.80	5:39'38"	5:43'03"	
No.8	Collection	2.10	5:47'05"	5:53'58"	
No.9	Collection	2.50	5:57'50"	5:58'19"	
No.10	Collection	2.90	6:01'08"	6:05'46"	
No.11	Collection	3.00	6:06'25"	6:07'50"	
No.12	Collection	3.10	6:08'41"	6:09'45"	
No.13	Collection	3.20	6:10'38"	6:12'00"	
No.14	Collection	4.30	6:20'33"	6:28'15"	
No.15	Collection	4.40	6:29'08"	6:29'43"	
T. Station	Dumping	5.70	6:39'30"	6:45'49"	
No.16	Collection	6.10	6:50'28"	6:52'17"	
No.17	Collection	6.80	6:56'58"	6:58'27"	
No.18	Collection	7.20	7:02'10"	7:05'58"	
No.19	Collection	7.90	7:11'42"	7:26'51"	
T. Station	Dumping	8.20	7:29'07"	7:34'06"	
Garage	Moving	9.00		7:38'36"	
Garage	Start	0.00	19:09'53"		
No.20	Collection	0.90	19:14'34"	19:17'58"	
No.21	Collection	1.00	19:20'32"	19:22'30"	
No.22	Collection	1.30	19:28'06"	19:32'58"	
No.23	Collection	2.10	19:37'54"	19:58'47"	
No.24	Collection	2.20	19:59'50"	20:02'49"	
No.25	Collection	2.30	20:03'38"	20:04'28"	
No.26	Collection	2.40	20:05'16"	20:09'51"	
No.27	Collection	3.40	20:15'39"	20:16'35"	
T. Station	Dumping	4.70	20:27'36"	20:33'41"	
No.28	Collection	5.10	20:38'57"	21:22'29"	
No.29	Collection	5.40	21:25'06"	21:28'34"	
No.30	Collection	6.20	21:34'07"	21:54'53"	
No.31	Collection	6.60	21:57'56"	22:01'23"	
T. Station	Dumping	7.00	22:06'28"	22:09'35"	
Garage		7.90		22:12'39"	Finish



## 5) An Analysis Table (No.17)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	4 <sup>th</sup> Trip	total
1) Total Operation Time	1:18'34	52'47	1:23'48	1:38'58	5:14'07
2) Moving Time (to collection point) and Distance	3'47 0.3km	4'45 0.4km	4'41 0.9km	5'16 0.3km	18'29 1.9km
3) Collection Time	30'46	22'05	21'27	71'17	2:25'35
4) Nos. of Collection Points	15	4	8	4	31
5) Traveling Time and Distance	27'55 4.1km	14'12 1.8km	40'34 2.5km	11'09 1.4km	1:33'50 9.8km
6) Haulage time and Distance	9'47 0.7km	2'11 0.3km	11'01 0.7km	5'05 0.4km	28'04 2.1km
7) Dumping Time	6'19	4'59	6'05	3'07	20'30
8) Moving Time (to garage) and Distance	-	4'30 0.8km	-	3'04 0.9km	7'34 1.7km
9) Collected Waste					4.08ton
10) Total Distance	5.7km	3.3km	4.7km	3.2km	16.9km
11) Collection Time Efficiency 3)+5)+6)/8) min/ton					65
12) Working Time Efficiency 1)/8) min/ton					77
13) Collection Time min./point	2'03	13'12	2'41	17'28	4'42
14) Collection Time Velocity 3)+5) Km/h					2.5km/h

## TMS Record Sheet No.18

Date: 16. Aug. 98

Name: Nasrulla

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1275 T-03	Tractor	m3

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	4 (include driver)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
4		16.7km		28

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		5:00'00"	5:22'15"	
	Start	0.00	5:22'15"		
			: ' "	: ' "	
No.1	Collection	0.60	5:26'19"	5:29'59"	
No.2	Collection	1.00	5:35'48"	5:50'30"	
No.3	Collection	1.50	5:55'24"	5:59'10"	
No.4	Collection	1.80	6:02'05"	6:02'25"	
No.5	Collection	1.90	6:02'56"	6:03'16"	
No.6	Collection	2.00	6:03'52"	6:04'23"	
No.7	Collection	2.80	6:10'10"	6:13'40"	
No.8	Collection	4.00	6:22'20"	6:30'57"	
No.9	Collection	4.10	6:31'55"	6:34'25"	
No.10	Collection	4.20	6:35'06"	6:36'37"	
No.11	Collection	4.30	6:37'26"	6:40'22"	
No.12	Collection	5.00	6:45'02"	6:46'39"	
No.13	Collection	5.60	6:51'22"	6:53'44"	
No.14	Collection	5.70	6:54'35"	6:56'15"	
No.15	Collection	6.40	7:01'55"	7:02'53"	
T. Station	Dumping	6.90	7:06'50"	7:09'04"	
No.16	Collection	7.30	7:13'07"	7:16'25"	
No.17	Collection	7.80	7:19'28"	7:43'28"	
T. Station	Dumping	8.10	7:45'16"	7:49'44"	
Garage	Moving	8.80		7:54'33"	
Garage	Start	0.00	19:12'25"		
No.18	Collection	1.00	19:17'57"	19:21'45"	
No.19	Collection	1.30	19:23'47"	19:25'18"	
No.20	Collection	2.10	19:29'30"	20:07'29"	
No.21	Collection	2.20	20:08'29"	20:09'38"	
No.22	Collection	2.30	20:10'13"	20:11'25"	
No.23	Collection	2.40	20:11'59"	20:15'59"	
No.24	Collection	3.40	20:20'21"	20:22'07"	
No.25	Collection	4.20	20:27'15"	20:28'20"	
T. Station	Dumping	4.70	20:31'35"	20:33'10"	
No.26	Collection	5.10	20:37'42"	21:21'34"	
No.27	Collection	5.30	21:24'08"	21:27'04"	
No.28	Collection	6.40	21:34'28"	21:38'23"	
T. Station	Dumping	7.10	21:42'01"	21:46'07"	
Garage		7.90		21:54'15"	Finish

## 5) An Analysis Table (No.18)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	4 <sup>th</sup> Trip	total
1) Total Operation Time	1:46'49	45'29	1:20'50	1:21'10	5:14'18
2) Moving Time (to collection point) and Distance	4'14 0.6km	4'03 0.4km	5'32 1.0km	3'15 0.4km	18'04 2.4km
3) Collection Time	42'58	27'18	22'30	51'43	2:24'29
4) Nos. of Collection Points	15	2	8	3	28
5) Traveling Time and Distance	50'26 6.3km	1'27 0.5km	48'03 3.2km	13'46 2.0km	1:53'42 12.0km
6) Haulage time and Distance	3'57 0.5km	3'24 0.3km	3'15 0.5km	3'48 0.7km	14'24 2.0km
7) Dumping Time	5'14	4'28	1'30	4'06	15'18
8) Moving Time (to garage) and Distance	-	4'49 0.7km	-	8'08 0.8km	12'57 1.5km
9) Collected Waste					4.08ton
10) Total Distance	6.9km	1.9km	4.7km	3.2km	16.7km
11) Collection Time Efficiency 3)+5)+6)/8) min/ton					67
12) Working Time Efficiency 1)/8) min/ton					77
13) Collection Time min./point	2'52	13'39	2'28	17'14	5'10
14) Collection Time Velocity 3)+5) Km/h					2.8km/h

## TMS Record Sheet No.19

Date: 18. Aug, 98

Name: Nasrulla

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1454	Handcart	m3

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
7		13.8km		49

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage					
	Start	000	5:53'43"		
			:	:	
No.1	Collection	0.10	5:54'44"	5:55'47"	
No.2	Collection	0.10	5:55'50"	5:56'51"	
No.3	Collection	0.20	5:58'10"	5:59'10"	
No.4	Collection	0.20	5:59'50"	6:02'00"	
No.5	Collection	0.20	6:02'50"	6:04'35"	
No.6	Collection	0.30	6:05'40"	6:06'40"	
No.7	Collection	0.40	6:07'31"	6:08'16"	
No.8	Collection	0.40	6:09'00"	6:10'30"	
No.9	Collection	0.40	6:11'30"	6:12'40"	
T. Station	Dumping	1.10	6:22'10"	6:34'30"	
No.10	Collection	1.80	6:43'41"	6:45'08"	
No.11	Collection	1.90	6:47'34"	6:48'59"	
No.12	Collection	2.00	6:50'18"	6:51'27"	
No.13	Collection	2.00	6:51'50"	6:52'10"	
No.14	Collection	2.10	6:54'04"	6:55'43"	
No.15	Collection	2.10	6:55'50"	6:58'33"	
No.16	Collection	2.10	6:58'40"	6:59'30"	
No.17	Collection	2.10	7:00'00"	7:01'50"	
No.18	Collection	2.10	7:02'10"	7:05'30"	
No.19	Collection	2.20	7:06'00"	7:10'10"	
No.20	Collection	2.30	7:12'50"	7:14'30"	
Tea Time	Collection	2.30	7:19'28"	7:43'28"	
T. Station	Dumping	3.00	7:31'46"	7:44'30"	
No.21	Collection	3.90	7:59'44"	8:05'30"	
No.22	Collection	4.00	8:04'40"	8:06'00"	
No.23	Collection	4.00	8:06'30"	8:08'27"	
No.24	Collection	4.10	8:09'30"	8:16'30"	
No.25	Collection	4.10	8:16'35"	8:18'20"	
No.26	Collection	4.10	8:18'40"	8:20'40"	
T. Station	Dumping	4.80	8:30'21"	8:38'21"	
No.27	Collection	6.30	9:05'20"	9:06'10"	
No.28	Collection	6.40	9:07'30"	9:08'30"	
No.29	Collection	6.50	9:10'55"	9:12'00"	
No.30	Collection	6.60	9:14'54"	9:15'29"	
No.31	Collection	6.60	9:17'01"	9:20'36"	
No.32	Collection	6.70	9:22'24"	9:22'58"	
No.33	Collection	6.70	9:24'34"	9:25'30"	
T. Station	Dumping	7.40	9:32'15"	9:38'25"	
Garage		7.90		21:54'15"	Finish
No.34	Collection	8.30	9:56'30"	9:56'59"	
No.35	Collection	8.30	9:57'10"	9:58'30"	

Place	Activities	Mileage	Time		Note
			Start	Finish	
No.36	Collection	8.70	9:59'45"	10:01'53"	
No.37	Collection	8.70	10:02'20"	10:02'54"	
No.38	Collection	8.80	10:04'04"	10:04'45"	
No.39	Collection	8.80		10:07'33"	
No.40	Collection	8.80		10:09'45"	
T. Station	Dumping	9.30	10:21'30"	10:26'21"	
No.41	Collection	10.20	10:38'47"	10:40'10"	
No.42	Collection	10.30	10:42'10"	10:46'53"	
No.43	Collection	10.30	10:48'00"	10:49'03"	
T. Station	Dumping	11.50	11:05'35"	11:13'37"	
Garage	Lunch time	12.10		11:22'31"	
	Start	0.00	12:33'02"		
No.44	Collection	0.50	12:37'20"	12:38'14"	
No.45	Collection	0.50	12:38'30"	12:40'10"	
No.46	Collection	0.50	12:42'19"	12:42'48"	
No.47	Collection	0.60	12:43'40"	12:43'45"	
No.48	Collection	0.60	12:45'58"	12:48'27"	
No.49	Collection	0.90	12:51'18"	12:52'22"	
T. Station	Dumping	1.60	13:02'22"	13:10'50"	
Garage	Lunch time	2.40		13:22'43"	Finish

## 5) An Analysis Table (No.19)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	4 <sup>th</sup> Trip	5 <sup>th</sup> Trip	6 <sup>th</sup> Trip	7 <sup>th</sup> Trip	total
1) Total Operation Time	40'47	1:10'00	53'51	1:15'51	32'07	56'10	49'41	6:18'27
2) Moving Time (to collection point) and Distance	0'59 0.1km	9'11 0.7km	5'14 0.9km	26'55 1.5km	2'15 0.4km	12'26 0.9km	4'18 0.5km	61'08 5.0km
3) Collection Time	11'24	21'33	19'48	8'25	12'12	7'09	7'01	1:27'32
4) Nos. of Collection Points	9	11	6	7	7	3	6	49
5) Traveling Time and Distance	16'34 0.3km	14'14 1.2km	11'08 0.2km	11'46 0.4km	1'04 0.5km	13'07 1.3km	8'01 1.1km	75'54 5.0km
6) Haulage time and Distance	9'30 0.7km	8'18 0.7km	9'41 0.7km	6'45 0.7km	11'45 0.5km	6'35 1.2km	10'00 0.7km	62'34 5.2km
7) Dumping Time	2'20	12'14	8'00	8'00	4'51	7'59	8'28	51'52
8) Moving Time (to garage) and Distance	-	-	-	-	-	8'54 0.6km	11'53 0.8km	20'47 1.4km
9) Collected Waste								0.7ton
10) Total Distance	1.1km	1.9km	1.8km	2.9km	0.9km	2.8km	2.4km	13.8km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton								323
12) Working Time Efficiency 1)/8) min/ton								540
13) Collection Time min./point	1'16	1'58	3'18	4'06	1'45	1'16	1'58	1'15
14) Collection Time Velocity 3)+5) Km/h								1.8km/h

## TMS Record Sheet No.20

Date: 19. Aug. 98

Name: Nasrulla

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
	Handcart	m3 1

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
2		7.4km		30

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage					
	Start	0.00	8:53'11"		
			: ' "	: ' "	
No.1	Collection	0.00	8:53'12"	9:04'40"	
No.2	Collection	0.20	9:09'43"	9:30'18"	
No.3	Collection	0.50	9:31'58"	9:33'55"	
No.4	Collection	0.50	9:34'25"	9:37'52"	
No.5	Collection	0.50	9:38'18"	9:39'23"	
No.6	Collection	0.60	9:40'32"	9:46'22"	
No.7	Collection	0.70	9:48'22"	9:48'58"	
No.8	Collection	0.90	9:50'58"	9:59'39"	
No.9	Collection	1.10	10:03'06"	10:04'17"	
No.10	Collection	1.30	10:07'20"	10:08'10"	
No.11	Collection	1.60	10:11'23"	10:12'52"	
T. Station	Dumping	1.70	10:14'51"	10:30'38"	
Tea Break		2.30	10:36'25"	10:53'07"	
No.12	Collection	2.80	10:58'53"	11:00'07"	
No.13	Collection	2.80	11:00'36"	11:00'44"	
No.14	Collection	2.80	11:01'35"	11:33'30"	
No.15	Collection	3.00	11:34'41"	11:38'10"	
No.16	Collection	3.40	11:42'46"	11:50'31"	
No.17	Collection	3.50	11:50'40"	11:55'00"	
No.18	Collection	3.50	11:55'35"	12:07'30"	
No.19	Collection	3.70	12:09'19"	12:10'38"	
No.20	Collection	3.90	12:13'55"	12:17'40"	
No.21	Collection	4.00	12:19'17"	12:26'37"	
No.22	Collection	4.20	12:30'15"	12:32'29"	
No.23	Collection	4.40	12:35'21"	12:38'48"	
No.24	Collection	4.50	12:39'32"	12:54'59"	
No.25	Collection	5.00	13:02'03"	13:08'20"	
No.26	Collection	5.00	13:08'58"	13:14'37"	
No.27	Collection	5.10	13:14'58"	13:20'58"	
No.28	Collection	5.20	13:23'37"	13:35'00"	
No.29	Collection	5.20	13:35'40"	14:00'01"	
No.30	Collection	5.50	14:05'27"	14:09'33"	
Lunch Break		5.80	14:13'54"	14:42'38"	
Rest		6.30	14:46'46"	14:48'12"	
T. Station	Dumping	6.60	14:54'23"	15:18'00"	
Garage		8.00		15:38'45"	Finish

## 5) An Analysis Table (No.20)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	total
1) Total Operation Time	1:37'27	4:15'28	5:52'55
2) Moving Time (to collection point) and Distauce	0'01 0.0km	5'46 0.5km	5'47 0.5m
3) Collection Time	57'05	2:05'06	2:59'11
4) Nos. of Collection Points	11	19	30
5) Traveling Time and Distance	22'35 1.6km	1:05'44 2.7km	1:28'19 4.3km
6) Haulage time and Distance	1'59 0.1km	14'47 1.1km	16'46 1.2km
7) Dumping Time	15'47	23'27	39'14
8) Moving Time (to garage) and Distance	-	20'45 1.4km	20'45 1.4km
9) Collected Waste			0.2ton
10) Total Distance	1.7km	5.7km	7.4km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton			1420
12) Working Time Efficiency 1)/8) min/ton			1760
13) Collection Time min./point	5'11	6'35	5'58
14) Collection Time Velocity 3)+5) Km/h			1.0km/h

## TMS Record Sheet No.21

Date: 20. Aug., 98

Name: Nasulla

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
	Handcart	m <sup>3</sup>

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
3		11.4km		53

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage					
	Start	0.00	6:24'25"		
No.1	Collection	0.10	6:24'51"	6:36'07"	
No.2	Collection	0.10	6:36'46"	6:38'30"	
No.3	Collection	0.20	6:39'46"	6:41'51"	
No.4	Collection	0.20	6:42'02"	6:42'24"	
No.5	Collection	0.20	6:42'30"	6:45'25"	
No.6	Collection	0.40	6:47'20"	6:51'48"	
No.7	Collection	0.40	6:52'27"	6:54'10"	
No.8	Collection	0.50	6:55'16"	7:05'49"	
No.9	Collection	0.60	7:07'24"	7:18'20"	
No.10	Collection	0.70	7:18'49"	7:27'52"	
No.11	Collection	0.70	7:28'23"	7:30'48"	
No.12	Collection	0.90	7:32'55"	7:34'49"	
T. Station	Dumping	1.90	7:46'17"	7:58'13"	
No.13	Collection	2.30	8:03'07"	8:04'57"	
No.14	Collection	2.50	8:06'37"	8:08'04"	
No.15	Collection	2.70	8:10'21"	8:10'50"	
No.16	Collection	2.70	8:11'22"	8:12'06"	
No.17	Collection	2.70	8:12'31"	8:13'42"	
No.18	Collection	2.80	8:14'14"	8:17'42"	
No.19	Collection	2.90	8:18'59"	8:25'58"	
No.20	Collection	2.90	8:26'09"	8:27'15"	
No.21	Collection	3.10	8:29'24"	8:33'20"	
No.22	Collection	3.20	8:33'50"	8:34'50"	
No.23	Collection	3.30	8:36'12"	8:37'04"	
No.24	Collection	3.30	8:37'20"	8:37'58"	
No.25	Collection	3.30	8:38'41"	8:40'50"	
No.26	Collection	3.30	8:41'43"	8:45'06"	
No.27	Collection	3.40	8:46'30"	8:47'32"	
No.28	Collection	3.40	8:48'19"	8:48'59"	
No.29	Collection	3.60	8:53'38"	9:08'58"	
No.30	Collection	3.80	9:10'48"	9:12'30"	
	Tea Break	4.40	9:17'15"	9:31'31"	
T. Station	Dumping	4.80	9:38'34"	9:46'48"	
No.31	Collection	6.00	10:00'32"	10:00'45"	
No.32	Collection	6.10	10:02'37"	10:05'58"	
No.33	Collection	6.10	10:06'07"	10:10'56"	
No.34	Collection	6.10	10:11'22"	10:13'19"	
No.35	Collection	6.10	10:13'21"	10:15'38"	
No.36	Collection	6.20	10:15'51"	10:17'39"	
No.37	Collection	6.20	10:17'58"	10:18'55"	
No.38	Collection	6.30	10:20'07"	10:23'10"	
No.39	Collection	6.50	10:24'58"	10:28'16"	



Place	Activities	Mileage	Time		Note
			Start	Finish	
No.40	Collection	6.60	10:29'41"	10:30'14"	
No.41	Collection	6.80	10:32'16"	10:34'36"	
No.42	Collection	6.80	10:34'43"	10:35'12"	
No.43	Collection	6.90	10:36'27"	10:45'11"	
No.44	Collection	6.90	10:45'20"	10:47'12"	
No.45	Collection	7.10	10:48'21"	10:48'55"	
No.46	Collection	7.10	10:42'32"	10:50'58"	
No.47	Collection	7.10	10:51'10"	10:51'45"	
No.48	Collection	7.20	10:52'27"	10:55'22"	
No.49	Collection	7.40	10:57'48"	11:02'03"	
No.50	Collection	7.70	11:05'06"	11:07'57"	
No.51	Collection	8.00	11:11'20"	11:12'19"	
No.52	Collection	8.20	11:13'55"	11:15'54"	
No.53	Collection	8.40	11:18'23"	11:20'26"	
T. Station	Dumping	9.30	11:30'18"	11:50'10"	
	Lunch time	9.70	11:58'41"	12:29'52"	
Garage		10.40		12:45'55"	Finish

## 5) An Analysis Table (No.21)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	total
1) Total Operation Time	1:33'48	1:48'35	2:20'31	5:42'54
2) Moving Time (to collection point) and Distance	0'26 0.1km	4'54 0.4km	7'03 1.2km	12'23 1.7km
3) Collection Time	59'24	48'06	60'18	2:47'48
4) Nos. of Collection Points	12	28	23	63
5) Traveling Time and Distance	10'44 0.8km	24'20 1.9km	25'52 2.4km	1:00'56 5.1km
6) Haulage time and Distance	11'18 1.0km	8'45 1.0km	9'52 0.9km	29'55 2.9km
7) Dumping Time	11'56	8'14	19'52	40'02
8) Moving Time (to garage) and Distance	-	-	14'34 2.0km	14'34 2.0km
9) Collected Waste				0.3ton
10) Total Distance	1.9km	2.9km	6.6km	11.4km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton				860
12) Working Time Efficiency 1)/8) min/ton				1143
13) Collection Time min./point	4'57	1'43	2'28	2'40
14) Collection Time Velocity 3)+5) Km/h				1.3km/h

## TMS Record Sheet No.22

Date: 23. Aug., 98

Name: Nasmilla

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1151 T-04	Micro-bin Truck	m <sup>3</sup>   t

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	1 (Sweeper)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
1		10.8km		4

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		2:30'00"	2:40'08"	
	Start	0.00	2:40'08"		
Dep.		0.40	2:41'53"	2:42'34"	
No.1	Collection	1.30	2:46'03"	2:46'39"	
T. Station	Dumping	2.40	2:51'05"	2:52'17"	
No.2	Collection	3.70	2:56'29"	2:57'14"	
T. Station	Dumping	4.90	3:02'38"	3:07'23"	
No.3	Collection	6.00	3:11'50"	3:12'26"	
T. Station	Dumping	7.20	3:15'16"	3:17'58"	
No.4	Collection	7.90	3:20'38"	3:21'50"	
T. Station	Dumping	8.70	3:24'54"	3:25'42"	
No.5	Collection	9.40	3:29'36"	3:30'47"	
T. Station	Dumping	10.10	3:34'18"	3:34'57"	
No.6	Collection	10.60	3:38'20"	3:39'10"	
T. Station	Dumping	11.10	3:41'43"	3:42'23"	
No.7	Collection	11.30	3:43'33"	3:44'38"	
T. Station	Dumping	11.60	3:46'12"	3:46'50"	
No.8	Collection	11.80	3:47'57"	3:48'43"	
T. Station	Dumping	12.00	3:50'03"	3:51'10"	
No.9	Collection	12.30	3:52'28"	3:53'40"	
T. Station	Dumping	12.50	3:54'58"	3:55'17"	
Dep.	Bring Cont.	13.20	4:00'10"	4:00'28"	
	Arrange	13.50	4:02'10"	4:02'34"	
Garage		13.90	4:00'10"	4:05'05"	Finish

## 5) An Analysis Table (No.22)

Item	1 <sup>st</sup> Trip	total
1) Total Operation Time	1:24'57	1:24'57
2) Moving Time (to collection point) and Distance	1'45 - 0.4km	1'45 - 0.4km
3) Collection Time	8'08	8'08
4) Nos. of Collection Points	9	9
5) Traveling Time and Distance	-	-
6) Haulage time and Distance	50'26 - 12.3km	50'26 - 12.3km
7) Dumping Time	14'50	14'50
8) Moving Time (to garage) and Distance	9'48 - 1.4km	9'48 - 1.4km
9) Collected Waste		3.69
10) Total Distance	13.9km	13.9km
11) Collection Time Efficiency 3)+5)+6)/8) min/ton		16
12) Working Time Efficiency 1)/8) min/ton		23
13) Collection Time min./point	0'54	0'54
14) Haulage Time Velocity 6) Km/h		14.6km

## TMS Record Sheet No.23

Date: 24. Aug., 98

Name: Nasmla

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1154 T-04	Micro-bin Truck	m3

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	1 (Sweeper)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
1		8.4km		19

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		2:30'00"	2:41'15"	
	Start	0.00	2:41'15"		
Dep.		0.40	2:43'25"	2:44'06"	
No.1	Collection	2.40	2:51'07"	2:52'36"	
T. Station	Dumping	3.70	2:58'17"	2:58'57"	
No.2	Collection	5.10	3:05'29"	3:06'40"	
T. Station	Dumping	6.40	3:12'26"	3:13'23"	
No.3	Collection	7.50	3:18'43"	3:20'05"	
T. Station	Dumping	9.10	3:28'04"	3:29'09"	
No.4	Collection	9.60	3:31'20"	3:22'01"	
Dep.		10.30	3:35'29"	3:36'00"	
Garage		10.80		3:38'03"	Finish

## 5) An Analysis Table (No.23)

Item	1 <sup>st</sup> Trip	total
1) Total Operation Time	56'48	56'48
2) Moving Time (to collection point) and Distance	9'52 2.4km	9'52 2.4km
3) Collection Time	5'43	5'43
4) Nos. of Collection Points	4	4
5) Traveling Time and Distance	-	-
6) Haulage time and Distance	33'29 7.2km	33'29 7.2km
7) Dumping Time	2'42	2'42
8) Moving Time (to garage) and Distance	5'02 1.2km	5'02 1.2km
9) Collected Waste		1.64
10) Total Distance	10.8km	10.8km
11) Collection Time Efficiency 3)+5)+6)/8) min/ton		24
12) Working Time Efficiency 1)/8) min/ton		35
13) Collection Time min./point	1'26	1'26
14) Haulage Time Velocity 6) Km/h		12.9km

## TMS Record Sheet No.24

Date: 25. Aug., 98

Name: Nasulla

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1275 T-03	Tractor	m3

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	4 (include driver)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
1		8.4km		19

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		5:00'00"	5:38'28"	
	Start	0.00	5:38'28"		
No.1	Collection	0.30	5:41'20"	5:41'55"	
No.2	Collection	0.30	5:42'21"	5:45'28"	
No.3	Collection	0.50	5:47'44"	5:48'00"	
No.4	Collection	0.50	5:48'27"	5:48'44"	
No.5	Collection	0.60	5:49'15"	5:49'23"	
No.6	Collection	1.40	5:55'19"	5:55'46"	
No.7	Collection	1.90	5:59'39"	6:00'28"	
No.8	Collection	2.70	6:05'27"	6:09'54"	
No.9	Collection	2.80	6:10'34"	6:11'55"	
No.10	Collection	2.90	6:12'44"	6:13'39"	
No.11	Collection	3.00	6:14'40"	6:16'03"	
No.12	Collection	3.90	6:21'59"	6:22'33"	
No.13	Collection	5.10	6:29'41"	6:35'10"	
No.14	Collection	5.10	6:35'50"	6:42'47"	
No.15	Collection	5.60	6:49'13"	6:51'43"	
No.16	Collection	6.20	6:56'52"	7:00'33"	
No.17	Collection	6.20	7:01'04"	7:01'32"	
No.18	Collection	6.60	7:05'18"	7:07'31"	
No.19	Collection	7.30	7:12'31"	7:31'57"	
T. Station	Dumping	7.60	7:34'12"	7:44'49"	
Garage	Lunch Time	8.40		7:58'50"	Finish

## An Analysis Table (No.24)

Item	1 <sup>st</sup> Trip	total
1) Total Operation Time	2:20'22	2:20'22
2) Moving Time (to collection point) and Distance	2'52 - 0.3km	2'52 - 0.3km
3) Collection Time	55'13	55'13
4) Nos. of Collection Points	19	19
5) Traveling Time and Distance	55'24 - 7.0km	55'24 - 7.0km
6) Haulage time and Distance	2'15 - 0.3km	2'15 - 0.3km
7) Dumping Time	10'37	10'37
8) Moving Time (to garage) and Distance	14'01 - 0.8km	14'01 - 0.8km
9) Collected Waste		1.02
10) Total Distance	8.4km	8.4km
11) Collection Time Efficiency 3)+5)+6)/8) min/ton		110
12) Working Time Efficiency 1)/8) min/ton		137
13) Collection Time min./point	2'54	2'54
14) Collection Time Velocity 3)+5) Km/h		3.8km

## TMS Record Sheet No.25

Date: 26. Aug., 98

Name: Nasrulla

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1275 T-03	Tractor	m3 t

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	4 (include driver)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
1		7.2km		16

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		5:00'00"	5:32'15"	
	Start	0.00	5:32'15"		
No.1	Collection	0.20	5:36'56"	5:39'25"	
No.2	Collection	0.30	5:41'24"	5:47'30"	
No.3	Collection	0.40	5:48'36"	5:48'44"	
No.4	Collection	0.50	5:49'37"	5:49'46"	
No.5	Collection	1.30	5:55'07"	6:07'17"	
No.6	Collection	1.80	6:10'06"	6:12'17"	
No.7	Collection	2.10	6:14'27"	6:14'58"	
No.8	Collection	2.60	6:17'47"	6:23'18"	
No.9	Collection	2.70	6:24'00"	6:25'36"	
No.10	Collection	2.80	6:26'17"	6:27'28"	
No.11	Collection	2.90	6:28'10"	6:30'17"	
No.12	Collection	3.80	6:34'58"	6:39'02"	
No.13	Collection	4.00	6:40'50"	6:42'35"	
No.14	Collection	4.90	6:49'24"	6:50'15"	
No.15	Collection	4.90	6:50'59"	6:53'20"	
No.16	Collection	5.20	6:55'47"	7:17'00"	
T. Station	Dumping	5.40	7:19'15"	7:24'58"	
Dep.	Washing	6.80	7:37'28"	8:00'28"	
Garage	Lunch Time	7.20		8:03'00"	Finish

## 5) An Analysis Table (No.25)

Item	1 <sup>st</sup> Trip	total
1) Total Operation Time	2:30'15	2:30'15
2) Moving Time (to collection point) and Distance	4'41 - 0.2km	4'41 - 0.2km
3) Collection Time	67'13	67'13
4) Nos. of Collection Points	16	16
5) Traveling Time and Distance	42'21 - 5.0km	42'21 - 5.0km
6) Haulage time and Distance	2'15 - 0.2km	2'15 - 0.2km
7) Dumping Time	5'43	5'43
8) Moving Time (to garage) and Distance	5'02 - 1.8km	5'02 - 1.8km
9) Collected Waste		1.02
10) Total Distance	7.2km	7.2km
11) Collection Time Efficiency 3)+5)+6)/8) min/ton		110
12) Working Time Efficiency 1)/8) min/ton		147
13) Collection Time min./point	4'12	4'12
14) Collection Time Velocity 3)+5) Km/h		2.7km

## TMS Record Sheet No.26

Date: 20. Aug., 98

Name: M. Ameen

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1647 T-03	Normal Truck	m3 1.5 t

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	4 (include driver)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
2		10.2km		24

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		8:00'00"	8:20'35"	
	Start	0.00	8:20'35"		
			:	:	
No.1	Collection	0.00	8:21'10"	8:23'35"	
No.2	Collection	0.20	8:26'55"	8:31'15"	
No.3	Collection	0.20	8:32'09"	8:34'25"	
No.4	Collection	0.40	8:35'08"	8:36'38"	
No.5	Collection	0.90	8:38'42"	8:44'18"	
No.6	Collection	1.00	8:45'00"	8:46'19"	
No.7	Collection	1.40	8:47'38"	8:54'19"	
No.8	Collection	1.60	8:56'06"	8:57'10"	
No.9	Collection	1.70	8:59'22"	8:59'59"	
No.10	Collection	2.30	9:02'51"	9:04'15"	
No.11	Collection	2.80	9:05'58"	9:06'35"	
No.12	Collection	3.00	9:08'22"	9:09'40"	
No.13	Collection	3.30	9:11'11"	9:12'18"	
No.14	Collection	3.30	9:12'40"	9:13'55"	
No.15	Collection	3.40	9:14'13"	9:16'59"	
No.16	Collection	3.60	9:18'26"	9:21'00"	
No.17	Collection	4.10	9:22'51"	9:25'31"	
No.18	Collection	4.60	9:28'03"	9:34'00"	
T. Station	Dumping	6.50	9:50'55"	9:52'00"	
Tea Time		6.90	9:55'50"	11:07'30"	
Garage	Start	0.00	11:07'30"		
No.19	Collection	0.50	11:09'35"	11:11'33"	
No.20	Collection	0.70	11:12'35"	11:16'45"	
No.21	Collection	1.00	11:18'18"	11:20'35"	
No.22	Collection	1.20	11:21'18"	11:23'25"	
No.23	Collection	1.40	11:25'05"	11:26'05"	
No.24	Collection	2.00	11:28'53"	11:30'17"	
T. Station	Dumping	2.60	11:32'50"	11:41'30"	
	Washing	2.80	11:42'00"		

## 5) An Analysis Table (No.26)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	total
1) Total Operation Time	1:35'15	56'20	2:31'35
2) Moving Time (to collection point) and Distance	0'35 - 0.0km	2'15 - 0.5km	2'50 - 0.5km
3) Collection Time	43'26	12'56	56'22
4) Nos. of Collection Points	18	6	24
5) Traveling Time and Distance	29'24 - 4.6km	8'06 - 2.1km	37'30 - 6.7km
6) Haulage time and Distance	16'55 - 1.9km	2'33 - 0.6km	19'28 - 2.5km
7) Dumping Time	1'05	8'40	9'45
8) Moving Time (to garage) and Distance	3'50 - 0.4km	4'20 - 0.6km	8'10 - 1.0km
9) Collected Waste			0.84ton
10) Total Distance	6.9km	3.2km	10.2km
11) Collection Time Efficiency $\frac{3}{5} + \frac{6}{8}$ min/ton			135
12) Working Time Efficiency $\frac{1}{8}$ min/ton			180
13) Collection Time min./point	2'25	2'09	2'21
14) Collection Time Velocity $\frac{3}{5} + \frac{6}{8}$ Km/h			4.3km/h

## TMS Record Sheet No.27

Date: 22. Aug., 98

Name: M. Ameen

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1647 T-03	Normal Truck	m3   1.51

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	4 (include driver)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
2		8.4km		28

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		8:00'00"	8:18'15"	
	Start	0.00	8:18'15"		
No.1	Collection	0.00	8:19'10"	8:21'00"	
No.2	Collection	0.00	8:21'41"	8:23'30"	
No.3	Collection	0.10	8:24'40"	8:25'42"	
No.4	Collection	0.20	8:26'17"	8:29'14"	
No.5	Collection	0.30	8:29'40"	8:33'37"	
No.6	Collection	0.60	8:35'25"	8:35'50"	
No.7	Collection	1.30	9:29'27"	9:32'04"	
No.8	Collection	1.50	9:33'07"	9:34'33"	
No.9	Collection	1.70	9:35'14"	9:38'14"	
No.10	Collection	1.80	9:38'50"	9:42'27"	
No.11	Collection	2.00	9:44'12"	9:45'10"	
No.12	Collection	2.30	9:46'30"	9:47'34"	
No.13	Collection	2.60	9:48'34"	9:52'58"	
No.14	Collection	3.10	9:55'25"	10:05'33"	
No.15	Collection	3.20	10:06'07"	10:14'50"	
T. Station	Dumping	4.40	10:19'43"	10:29'28"	
Tea Time		4.50	10:30'18"	11:00'00"	
		0.00	11:00'00"		
No.16	Collection	0.20	11:02'17"	11:05'28"	
No.17	Collection	0.30	11:06'16"	11:07'10"	
No.18	Collection	0.40	11:07'44"	11:03'37"	
No.19	Collection	0.60	11:09'38"	11:14'08"	
No.20	Collection	0.70	11:14'50"	11:16'59"	
No.21	Collection	0.90	11:18'03"	11:19'53"	
No.22	Collection	1.10	11:20'55"	11:22'08"	
No.23	Collection	1.40	11:23'28"	11:26'28"	
No.24	Collection	1.50	11:28'02"	11:30'25"	
No.25	Collection	1.70	11:31'19"	11:39'35"	
No.26	Collection	1.80	11:40'09"	11:41'40"	
No.27	Collection	1.90	11:42'12"	11:47'19"	
No.28	Collection	2.00	11:47'50"	11:51'08"	
T. Station	Dumping	2.80	11:54'42"	12:04'02"	
	Washing	2.90	12:04'41"	12:07'38"	
Garage	Lunch Time	3.90	12:13'41"		



## 5) An Analysis Table (No.27)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	total
1) Total Operation Time	2:12'03	1:13'41	3:25'44
2) Moving Time (to collection point) and Distauce	0'55 0.0km	2'17 0.2km	3'12 0.2km
3) Collection Time	47'57	42'52	1:30'49
4) Nos. of Collection Points	15	13	28
5) Traveling Time and Distance	67'34 3.2km	7'22 2.2km	74'56 5.4km
6) Haulage time and Distance	4'57 1.2km	3'34 0.8km	8'31 2.0km
7) Dumping Time	9'45	9'20	19'05
8) Moving Time (to garage) and Distauce	0'55 0.1km	2'17 0.2km	3'12 0.3km
9) Collected Waste			0.84ton
10) Total Distance	4.5km	3.9km	8.4km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton			207
12) Working Time Efficiency 1)/8) min/ton			244
13) Collection Time min./point	3'12	3'12	3'14
14) Collection Time Velocity 3)+5) Km/h			1.4km/h

## TMS Record Sheet No.28

Date: 23. Aug., 98

Name: M. Ameen

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1481 T-03	Loafed Track	m3   41

## 2) Name of Crew

Driver	Crew (A,B,C,D)
Mr. Thyogenthira	4 persons (include driver)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
3		16.8km		30

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		7:00'00 "	7:16'25"	
	Start	0.00	7:16'25 "	:	
No.1	Collection	1.20	7:21'38 "	7:25'20"	
No.2	Collection	1.30	7:26'05 "	7:33'16"	
No.3	Collection	1.40	7:33'25 "	7:36'05"	
No.4	Collection	1.60	7:37'25 "	7:54'14"	
No.5	Collection	1.80	7:55'28 "	7:56'50"	
No.6	Collection	2.50	7:59'55 "	8:18'55"	
No.7	Collection	3.10	8:21'08 "	8:25'58"	
T. Station	Dumping	4.10	8:30'05 "	8:34'15"	
No.8	Collection	4.80	8:37'07 "	8:37'59"	
No.9	Collection	5.20	8:39'31 "	8:41'14"	
No.10	Collection	5.80	8:43'25 "	8:45'50"	
No.11	Collection	6.00	8:47'00 "	8:48'31"	
No.12	Collection	6.20	8:48'48 "	8:53'50"	
No.13	Collection	6.30	8:54'35 "	9:02'54"	
No.14	Collection	6.40	9:03'45 "	9:06'17"	
No.15	Collection	6.60	9:06'53 "	9:13'10"	
No.16	Collection	7.10	9:15'14 "	9:17'40"	
No.17	Collection	7.20	9:18'12 "	9:20'00"	
No.18	Collection	7.80	9:22'55 "	9:24'15"	
T. Station	Dumping	9.60	9:31'55 "	9:33'00"	
Garage	Tea Time	10.50		9:36'08"	
Garage		0.00	10:32'40 "		
No.19	Collection	1.50	10:44'46 "	10:49'19"	
No.20	Collection	1.90	10:51'20 "	10:54'40"	
No.21	Collection	2.10	10:56'15 "	10:58'00"	
No.22	Collection	2.20	10:58'52 "	11:00'20"	
No.23	Collection	2.30	11:00'50 "	11:04'30"	
No.24	Collection	2.30	11:05'04 "	11:06'12"	
No.25	Collection	3.10	11:10'50 "	11:13'35"	
No.26	Collection	3.50	11:16'00 "	11:18'20"	
No.27	Collection	3.60	11:19'11 "	11:23'05"	
No.28	Collection	3.80	11:23'55 "	11:25'54"	
No.29	Collection	4.90	11:30'21 "	11:37'05"	
No.30	Collection	4.90	11:37'17 "	11:42'30"	
T. Station	Dumping	5.50	11:44'57 "	11:56'50"	
Garage	Lunch Time	6.30		11:58'10"	

5) An Analysis Table (No.28)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	total
1) Total Operation Time	1:17'50	1:01'53	1:25'30	3:45'13
2) Moving Time (to collection point) and Distance	5'13 1.2km	2'52 0.7km	12'06 1.5km	20'11 3.4km
3) Collection Time	54'34	35'45	38'49	2:09'08
4) Nos. of Collection Points	7	11	12	30
5) Traveling Time and Distance	9'46 1.9km	11'23 3.0km	18'55 3.4km	40'04 8.3m
6) Haulage time and Distance	4'07 1.0km	5'56 1.5km	2'27 0.6km	12'30 3.1km
7) Dumping Time	4'10	1'05	11'53	16'08
8) Moving Time (to garage) and Distance	-	3'08 0.9km	3'06 0.7km	6'14 1.6km
9) Collected Waste				0.81ton
10) Total Distance	4.1km	6.4km	6.3km	16.8km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton				225
12) Working Time Efficiency 1)/8) min/ton				278
13) Collection Time min./point	7'47	3'15	3'14	4'18
14) Collection Time Velocity 3)+5) Km/h				2.9km/h

## TMS Record Sheet No.29

Date: 24. Aug., 98

Name: M. Amcen

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
1481 T-03	Loafed Track	m3   4t

## 2) Name of Crew

Driver	Crew (A,B,C,D)
Mr. Thyogenthirn	4 persons (include driver)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
3		14.6km		32

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		7:00'00"	7:40'50"	
	Start	0.00	7:40'50"	: " "	
No.1	Collection	1.30	7:45'49"	7:50'35"	
No.2	Collection	1.60	7:52'10"	7:55'03"	
No.3	Collection	1.70	7:55'25"	8:03'21"	
No.4	Collection	1.80	8:04'19"	8:18'17"	
No.5	Collection	2.10	8:19'41"	8:21'40"	
No.6	Collection	2.70	8:24'20"	8:38'56"	
T. Station	Dumping	4.30	8:45'00"	8:50'59"	
No.7	Collection	5.40	8:55'35"	8:57'40"	
No.8	Collection	5.60	8:58'40"	9:02'30"	
No.9	Collection	6.10	9:06'03"	9:09'19"	
No.10	Collection	6.20	9:10'27"	9:12'00"	
No.11	Collection	6.40	9:13'56"	9:18'12"	
No.12	Collection	6.70	9:19'58"	9:22'50"	
No.13	Collection	6.90	9:25'15"	9:27'50"	
No.14	Collection	7.00	9:29'00"	9:32'30"	
No.15	Collection	7.10	9:33'20"	9:34'30"	
No.16	Collection	7.20	9:37'05"	9:38'50"	
No.17	Collection	7.30	9:39'25"	9:40'42"	
No.18	Collection	7.40	9:40'55"	9:48'47"	
No.19	Collection	7.80	9:50'00"	9:51'10"	
Garage	Tea Time	8.20	9:55'10"	10:43'09"	
Garage	Start	0.00	10:43'09"		
T. Station	Dumping	0.70	10:47'45"	10:49'59"	
No.20	Collection	1.50	10:53'13"	10:54'12"	
No.21	Collection	1.70	10:55'20"	10:56'23"	
No.22	Collection	1.80	10:57'00"	10:57'42"	
No.23	Collection	2.10	10:59'43"	11:02'42"	
No.24	Collection	2.20	11:04'22"	11:07'49"	
No.25	Collection	2.60	11:09'23"	11:11'22"	WHO
No.26	Collection	2.70	11:11'47"	11:12'48"	
No.27	Collection	2.80	11:13'07"	11:14'41"	
No.28	Collection	3.00	11:17'00"	11:18'59"	
No.29	Collection	3.60	11:22'35"	11:23'53"	
No.30	Collection	3.70	11:24'50"	11:27'07"	
No.31	Collection	3.80	11:28'38"	11:30'00"	Post Shop
No.32	Collection	4.00	11:31'49"	11:36'13"	
T. Station	Dumping	5.60	11:42'51"	11:44'44"	
Garage		6.40		11:48'20"	Finish

## 5) An Analysis Table (No.29)

Item	1 <sup>st</sup> Trip	2 <sup>nd</sup> Trip	3 <sup>rd</sup> Trip	total
1) Total Operation Time	1:10'09	1:11'09	58'34	3:19'52
2) Moving Time (to collection point) and Distance	4'59 1.3km	9'36 0.9km	3'14 0.8km	17'49 3.0km
3) Collection Time	46'05	37'11	25'04	1:48'20
4) Nos. of Collection Points	6	13	13	32
5) Traveling Time and Distance	7'02 1.4km	13'31 2.4km	18'06 2.5km	38'39 6.3km
6) Haulage time and Distance	6'04 1.6km	4'36 0.7km	6'38 1.6km	17'18 3.9km
7) Dumping Time	5'59	2'15	1'53	10'07
8) Moving Time (to garage) and Distance	-	4'00 0.4km	3'36 0.8km	7'36 1.2km
9) Collected Waste				0.81ton
10) Total Distance	4.3km	4.6km	5.7km	14.6km
11) Collection Time Efficiency 3)+5)+6)/8) min/ton				201
12) Working Time Efficiency 1)/8) min/ton				235
13) Collection Time min./point	7'40	2'52	1'56	3'23
14) Collection Time Velocity 3)+5) Km/h				2.6km/h

## TMS Record Sheet No.30

Data: 16. Aug., 98

Name: M. Anceu

## Record of Activities

## 1) Specification of the Transportation Vehicle

Car No.	Type	Capacity
5 trucks	Dump truck	m3 10.0 t

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	1

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
8	-	-	-	-

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		6:00'00"	6:11'30"	
	Start	0.00	6:11'30"		
T. Station	Loading	0.60	6:15'47"	7:25'18"	5 trucks
	Transport	2.20	7:25'18"	7:31'50"	
Harbor	Waiting		7:31'50"	7:53'17"	
T. Station	Move to TS	3.60	7:53'17"	8:02'00"	
	Loading		8:09'20"	8:51'35"	
Harbor	Transport	5.20	8:51'35"	9:01'22"	
	Waiting		9:01'22"	9:12'45"	
T. Station	Move to TS	6.70	9:12'45"	9:20'28"	
	Waiting		9:20'28"	9:24'40"	
Harbor	Loading		9:24'40"	9:05'18"	
	Transport	8.60	10:05'18"	10:17'43"	
Harbor	Waiting		10:17'43"	10:41'30"	
T. Station	Move to TS	10.20	10:41'30"	10:48'48"	
	Loading	0.00	10:48'48"	11:25'45"	
Harbor	Transport	1.60	11:25'45"	11:33'14"	
	Waiting		11:33'14"	12:12'05"	
T. Station	Move to TS	3.30	12:12'05"	12:16'10"	
	Waiting		12:16'10"	12:18'15"	
Harbor	Loading		12:18'15"	13:13'11"	
	Transport	5.00	13:13'11"	13:20'35"	
Harbor	Waiting		13:20'35"	13:58'50"	
T. Station	Move to TS	6.70	13:58'50"	14:07'00"	
	Loading		14:07'00"	15:02'05"	
Harbor	Transport	8.20	15:02'05"	15:08'17"	
	Waiting		15:08'17"	15:16'13"	
T. Station	Move to TS	9.70	15:16'13"	15:25'02"	
	Waiting		15:25'02"	15:26'02"	
Harbor	Loading		15:26'02"	16:05'30"	
	Transport	11.30	16:05'30"	16:15'35"	
Harbor	Waiting		16:15'35"	16:38'57"	
T. Station	Move to TS	12.90	16:38'57"	16:47'26"	
	Waiting		16:47'26"	16:49'10"	
Harbor	Loading		16:49'10"	17:22'24"	
	Move to Gar	13.40	17:22'24"	17:26'35"	Finish
Harbor	Move to Gar	0.90	18:24'18"	18:29'11"	Finish

TMS Record Sheet No.30'

Date: 16, Aug., 1998

Name: \_\_\_\_\_

## Record of Activities

## 1) Specification of the Collection Vehicle

Car No.	Type	Capacity
UFULI III		m3

## 2) Name of Crew

Driver	Crew (A,B,C,D)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
8				

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Harbor			6:30'	7:05'	Thilafushe
Thilafushe			7:19'	7:52'	Harbor
Harbor			8:00'	8:29'	Thilafushe
Thilafushe			8:40'	9:20'	Harbor
Harbor			9:23'	9:52'	Thilafushe
Thilafushe			10:09'	10:39'	Harbor
Harbor			10:48'	11:17'	Thilafushe
Thilafushe			11:38'	12:07'	Harbor
Harbor			12:21'	12:52'	Thilafushe
Thilafushe			13:26'	13:55'	Harbor
Harbor			14:04'	14:35'	Thilafushe
Thilafushe			14:45'	15:14'	Harbor
Harbor			15:20'	15:52'	Thilafushe
Thilafushe			16:07'	16:37'	Harbor
Harbor			16:42'	17:15'	Thilafushe
Thilafushe			17:53'	18:20'	Harbor

## TMS Record Sheet No.31

Date: 17. Aug., 98

Name: M. Ameen

## Record of Activities

## 1) Specification of the Transportation Vehicle

Car No.	Type	Capacity
5 trucks	Dump truck	m3   10.01

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	1

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
6	-	-	-	-

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation				
	Start	0.00	5:55'10"		
T. Station	Waiting	0.60	6:03'18"	6:08'15"	5 trucks
	Loading		6:08'15"	6:48'45"	
	Transport	2.10	6:48'45"	6:59'25"	
Harbor	Waiting		6:59'25"	8:00'19"	
T. Station	Move to TS	3.80	8:00'19"	8:09'56"	
	Loading		8:09'56"	8:40'45"	
	Waiting		8:40'45"	8:54'19"	
Harbor	Transport	5.30	8:54'19"	9:01'15"	
	Waiting		9:01'15"	9:20'20"	
T. Station	Move to TS	6.80	9:20'20"	9:28'09"	
	Waiting		9:28'09"	9:28'50"	
	Loading		9:28'50"	10:05'46"	
Harbor	Transport	8.50	10:05'46"	10:14'40"	
	Waiting		10:14'40"	11:04'45"	
T. Station	Move to TS	10.10	11:04'45"	11:11'22"	
	Loading		11:11'22"	11:34'26"	
	Transport	11.60	11:34'26"	11:40'47"	
Harbor	Waiting		11:40'47"	12:28'23"	
Garage	Move to G		12:28'23"	12:30'00"	
	Lunch Time	12.50	12:28'23"	13:05'05"	
T. Station	Move to TS	13.10	13:05'05"	13:09'15"	
	Loading		13:09'15"	13:38'02"	
	Transport	14.60	13:38'02"	13:45'00"	
Harbor	Waiting		13:45'00"	13:55'35"	
T. Station	Move to TS	16.20	13:55'35"	14:04'07"	
	Waiting		14:04'07"	14:11'22"	
	Loading		14:11'22"	14:40'08"	
Harbor	Transport	17.70	14:40'08"	14:49'35"	
	Waiting		14:49'35"	16:05'55"	
T. Station	Move to TS	19.20	16:05'55"	16:15'13"	
	Waiting		16:15'13"	16:19'03"	
	Loading		16:19'03"	16:39'34"	
Garage	Move to Gar	11.30	16:39'34"	16:45'06"	
				16:45'06"	Finish



## TMS Record Sheet No.32

Date: 19. Aug, 98

Name: M. Ameen

## Record of Activities

## 1) Specification of the Transportation Vehicle

Car No.	Type	Capacity
		m3   1.5 t

## 2) Name of Crew

Driver	Crew (A,B,C,D)

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
4	-	-	-	-

## 4) Kind of Activities and Time

Place	Activities	Mileage	Time		Note
			Start	Finish	
Garage	Preparation		6:00'00"	6:05'51"	
	Start	0.00	6:05'51"		
			: : "	: : "	
T. Station	Move to T.S	0.60	6:05'51"	6:11'30"	
	Waiting		6:11'31"	6:24'19"	
	Loading		6:24'19"	6:49'06"	5 trucks
	Transport	2.10	6:49'06"	6:57'49"	
Harbor	Waiting		6:57'49"	7:52'50"	
	Move to TS	3.60	7:52'50"	7:59'28"	
T. Station	Waiting		7:59'28"	8:03'00"	
	Loading		8:03'00"	8:37'17"	
	Transport	5.20	8:38'18"	8:47'30"	
Harbor	Waiting		8:47'30"	9:25'43"	
	Move to TS	6.70	9:25'43"	9:33'42"	
T. Station	Waiting				
	Loading		9:33'42"	9:58'42"	
	Transport	8.70	9:58'42"	10:08'26"	
Harbor	Waiting		10:08'26"	13:26'00"	
		0.00			
	Move to TS	1.50	13:26'00"	13:32'31"	
	Waiting		13:32'11"	14:10'26"	
T. Station	Loading	0.00	14:10'26"	14:25'11"	3 trucks
	Transport	3.00	14:25'11"	14:33'59"	
Harbor	Waiting		14:33'59"	15:01'26"	
	Move to TS	4.50	15:01'26"	15:10'11"	
	Waiting				
T. Station	Loading		15:10'11"	15:47'50"	
	Transport	5.00	15:47'50"	15:55'51"	To Garage
			16:20'35"	16:58'50"	Finish

## TMS Record Sheet No.33

Date: 25. Aug., 98

Name: T. Goto

## Record of Activities

## 1) Specification of the Transportation Vehicle

Car No.	Type	Capacity
T03 2598	Dump Truck	m3 10.0 t

## 2) Name of Crew

Driver	Crew (A,B,C,D)
1	1

## 3) Trip Contents

Trip No	Collection Area	Mileage	Fuel consumption	Collected points (container)
1	-	-	-	-

## 4) Time Record

Place	Activities	Mileage	Time		Note
			Start	Finish	
T. Station	Arrive	000	8:16'00"		
	Waiting		8:16'00"	8:17'32"	
	Loading		8:17'32"	8:26'00"	
	Waiting		8:26'00"	8:40'01"	
	Transport		8:40'01"	8:51'15"	
Harbor	Waiting		8:51'15"		
	Arrive			9:32'38"	
	Riding Out		9:32'38"	9:34'19"	
	Riding In		9:35'59"	9:39'00"	
	Start		9:41'10"		
	Moving		9:41'10"	10:11'12"	
TbiraFushi	Arrive			10:11'12"	
	Riding out		10:11'12"	10:13'58"	
	Move to Site		10:13'58"	10:16'15"	
	Dumping		10:16'15"	10:17'40"	
	Moving		10:17'40"	10:19'53"	
	Waiting		10:19'53"	10:25'42"	
	Riding on		10:25'42"	10:27'38"	
	Start		10:29'50"		
	Moving		10:29'50"	10:59'55"	
	Arrive			10:59'55"	
Harbor	Riding out		10:59'55"	11:01'23"	
T. Station	Moving	3.00	11:01'23"	11:08'58"	
	Waiting		11:08'58"	11:17'35"	
	Loading		11:17'35"	11:22'45"	
	Waiting		11:22'45"	11:24'42"	
	Transport		11:24'42"	11:28'08"	To Garage
Garage	Lunch Time		11:28'08"		

#### 4.4 Data Arrangement

The analysis data of TMS study is summarized as in the tables hereto attached.

**Summarized Sheet No.1 T03-1481 (Municipality Collection Vehicle)**

Item	30, July	1, Aug.	2, Aug.	Avg.
1) Total Operation Time	6:19'17	4:39'24	5:47'40	5:15'27
2) Moving Time (to collection point) and Distance	38'07 7.4km	10'38 2.0km	18'23 5.2km	22'23 4.9km
3) Collection Time	3:26'50	2:54'22	3:36'35	3:19'16
4) Nos. of Collection Points	38	38	41	39
5) Traveling Time and Distance	51'38 12.6km	1:03'12 11.9km	1:02'55 12.3km	1:00'21 12.3km
6) Haulage time and Distance	24'25 5.0km	17'30 2.0km	32'09 8.2km	24'41 5.1km
7) Dumping Time	6'39	4'02	9'15	6'39
8) Moving Time (to garage) and Distance	6'44 1.5km	3'05 0.8km	6'24 1.6km	5'24 1.3km
9) Collected Waste	1.35ton	0.81ton	1.35ton	1.17
10) Total Distance	25.9km	18.2km	26.0km	23.4km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton	210	314	230	251
12) Working Time Efficiency 1)/8) min/ton	281	344	257	294
13) Collection Time min./point	5'27	4'59	5'17	5'14
14) Collection Time Velocity 3)+5) Km/h	2.9km/h	3.0km/h	2.6km/h	2.8km

**Summarized Sheet No.2 (Micro-bin Truck)**

Item	04, Aug.	05, Aug.	06, Aug.	05, Aug.	06, Aug.	09, Aug.
1) Total Operation Time	5:16'07	5:09'08	5:28'04	5:00'07	4:18'05	5:26'33
2) Moving Time (to collection point) and Distance	20'40 2.6km	9'12 2.6km	6'30 1.4km	6'25 1.9km	6'16 1.9km	10'07 2.7km
3) Collection Time	31'37	19'19	52'11	31'37	20'44	30'09
4) Nos. of Collection Points	22	17	29	18	14	20
5) Traveling Time and Distance	-	-	-	-	-	-
6) Haulage time and Distance	3:44'22 53.3km	4:21'14 59.3km	3:54'53 40.5km	4:05'28 47.7km	3:27'59 49.7km	4:18'49 47.6km
7) Dumping Time	24'11	12'40	27'01	14'10	11'40	16'26
8) Moving Time (to garage) and Distance	9'20 1.3km	6'45 1.7km	6'44 1.5km	7'37 1.3km	7'05 1.8km	9'28 1.3km
9) Collected Waste	9.02ton	6.97ton	11.89ton	7.38ton	5.74ton	8.2ton
10) Total Distance	57.2km	63.6km	43.3km	50.9km	53.0km	51.6km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton	28	40	24	38	40	31
12) Working Time Efficiency 1)/8) min/ton	35	44	28	41	45	40
13) Collection Time min./point	1'26	1'08	2'00	1'45	1'21	1'30
14) Haulage Time Velocity 6) Km/h	14.2km/h	13.6km/h	10.3km/h	11.7km/h	14.3km/h	11.0km/h

## Summarized Sheet No.2 (Micro-bin Truck) continue

Item	10, Aug.	11, Aug.				Avg.
1) Total Operation Time	4:30'28	5:36'40				5:04'54
2) Moving Time (to collection point) and Distance	8'05 1.6km	6'04 1.1km				9'10 2.0km
3) Collection Time	28'10	50'09				33'00
4) Nos. of Collection Points	13	26				20
5) Traveling Time and Distance	-	-				-
6) Haulage time and Distance	3:30'04 48.4km	3:35'32 34.7km				3:52'18 47.1km
7) Dumping Time	11'43	18'42				17'04
8) Moving Time (to garage) and Distance	11'21 1.6km	9'02 1.5km				8'25 1.5km
9) Collected Waste	5.33ton	10.66 t				8.15ton
10) Total Distance	48.4km	37.3km				50.7km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton	45	25				34
12) Working Time Efficiency 1)/8) min/ton	51	32				40
13) Collection Time min./point	2'10	1'56				1'40
14) Haulage Time Velocity 6) Km/h	13.8km/h	9.7km/h				12.3km/h

## Summarized Sheet No.3 T03-1647 (IHF)

Item	10, Aug.	11, Aug.	12, Aug.	Avg.
1) Total Operation Time	4:54'43	3:52'59	4:17'54	4:21'52
2) Moving Time (to collection point) and Distance	5'37 1.0km	7'48 1.6km	12'00 2.3km	8'28
3) Collection Time	2:08'52	1:59'14	2:07'38	2:05'15
4) Nos. of Collection Points	42	38	39	40
5) Traveling Time and Distance	1:34'10 15.5km	58'39 9.7km	1:00'11 14.2km	1:11'10 13.1
6) Haulage time and Distance	12'04 2.0km	7'33 1.3km	10'06 2.1km	9'54 1.8km
7) Dumping Time	29'31	24'02	24'17	25'57
8) Moving Time (to garage) and Distance	26'03 2.2km	5'11 1.8km	9'50 2.4km	13'41 2.1km
9) Collected Waste	4.08ton	3.06ton	1.26ton	2.80ton
10) Total Distance	21.2km	15.3km	18.3km	18.3km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton	58	60	157	92
12) Working Time Efficiency 1)/8) min/ton	72	76	205	118
13) Collection Time min./point	3'04	3'08	3'16	3'07
14) Collection Time Velocity 3)+5) Km/h	4.2km/h	3.2km/h	4.5km/h	4.0km/h

## Summarized Sheet No.4 (Tractor)

Item	13, Aug.	15, Aug.	16, Aug.	Avg.
1) Total Operation Time	4:59'42	5:14'07	5:14'18	5:09'22
2) Moving Time (to collection point) and Distance	8'42 0.8km	18'29 1.9km	18'04 2.4km	15'05 1.7km
3) Collection Time	2:44'42	2:25'35	2:24'29	2:31'35
4) Nos. of Collection Points	33	31	28	31
5) Traveling Time and Distance	1:18'40 9.3km	1:33'50 9.8km	1:53'42 12.0km	1:35'24 10.4km
6) Haulage time and Distance	27'23 3.0km	28'04 2.1km	14'24 2.0km	23'17 2.4km
7) Dumping Time	7'16	20'30	15'18	14'21
8) Moving Time (to garage) and Distance	15'31 1.8km	7'34 1.7km	12'57 1.5km	12'01 1.7km
9) Collected Waste	3.06ton	4.08ton	4.08ton	3.74ton
10) Total Distance	15.6km	16.9km	16.7km	16.4km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton	88	65	67	73
12) Working Time Efficiency 1)/8) min/ton	98	77	77	84
13) Collection Time min./point	5'00	4'42	5'10	4'57
14) Collection Time Velocity 3)+5) Km/h	2.3km/h	2.5km/h	2.8km/h	2.5km/h

## Summarized Sheet No.5 (Hand-Cart)

Item	18, Aug.	19, Aug.	20, Aug.	Avg.
1) Total Operation Time	6:18'27	5:52'55	5:42'54	5:58'05
2) Moving Time (to collection point) and Distance	61'08 5.0km	5'47 0.5m	12'23 1.7km	26'26 2.4km
3) Collection Time	1:27'32	2:59'11	2:47'48	2:24'50
4) Nos. of Collection Points	49	30	63	47
5) Traveling Time and Distance	1:15'54 5.0km	1:28'19 4.3km	1:00'56 5.1km	1:15'03 4.8km
6) Haulage time and Distance	62'34 5.2km	16'46 1.2km	29'55 2.9km	36'25 3.1km
7) Dumping Time	51'52	39'14	40'02	44'03
8) Moving Time (to garage) and Distance	20'47 1.4km	20'45 1.4km	14'34 2.0km	18'42 1.6km
9) Collected Waste	0.7ton	0.2ton	0.3ton	0.4ton
10) Total Distance	13.8km	7.4km	11.4km	10.9km
11) Collection Time Efficiency 3)+5)+6)/ 8) min/ton	323	1420	860	868
12) Working Time Efficiency 1)/8) min/ton	540	1760	1143	1148
13) Collection Time min./point	1'15	5'58	2'40	3'18
14) Collection Time Velocity 3)+5) Km/h	1.8km/h	1.0km/h	1.3km/h	1.4km/h

#### 4.5 Comparison of Different Collection/Haulage Systems

There are five (5) types of collection system in Male', the collection efficiency of each system is analyzed and shown in following table.

##### Summarized Sheet

Item	M.C.V. (Door to door collection System)	Micro-bin (Container System)	HF (Door to door collection System)	Tractor (Container System)	Hand-cart (Door to door collection System)
1) Total Operation Time	5:15'27	5:04'54	4:21'52	5:09'22	5:58'05
2) Moving Time (to collection point) and Distance	22'23 4.9km	9'10 2.0km	8'28	15'05 1.7km	26'26 2.4km
3) Collection Time	3:19'16	33'00	2:05'15	2:31'35	2:24'50
4) Nos. of Collection Points	39	20	40	31	47
5) Traveling Time and Distance	1:00'21 12.3km	-	1:11'10 13.1	1:35'24 10.4km	1:15'03 4.8km
6) Haulage time and Distance	24'41 5.1km	3:52'18 47.1km	9'54 1.8km	23'17 2.4km	36'25 3.1km
7) Dumping Time	6'39	17'04	25'57	14'21	44'03
8) Moving Time (to garage) and Distance	5'24 1.3km	8'25 1.5km	13'41 2.1km	12'01 1.7km	18'42 1.6km
9) Collected Waste	1.17	8.15ton	2.80ton	3.74ton	0.4ton
10) Total Distance	23.4km	50.7km	18.3km	16.4km	10.9km
11) Collection Time Efficiency $\frac{3)+5)+6)/}{8}$ min/ton (/person)	251 (1004)	34 (64)	92 (368)	73 (292)	868 (868)
12) Working Time Efficiency $\frac{1)/8}$ min/ton	294 (1176)	40 (80)	118 (472)	84 (336)	1148 (1148)
13) Collection Time min./point	5'14	1'40	3'07	4'57	3'18
14) Haulage Time Velocity $\frac{6)}{6}$ Km/h	2.8km	12.3km/h	4.0km/h	2.5km/h	1.4km/h