3.2 Operation and Maintenance Plan

(1) Basic Principal of Maintenance and Repair

Since most of the collection equipment owned by the implementing agencies at present are tractors, the repair of tractor including engine overhaul is carried out by Engineering department of each local authorities. But each local authority have almost no experience on maintenance of collection vehicles although they have basic capacity for maintenance and repair of collection vehicles. Therefore, staffs of workshop shall be trained for vehicle maintenance by supplier and/or by workshop of Colombo MC.

It is consider that effective operation and maintenance of equipment will be assured through carrying out preventive maintenance equivalent to the system used in Japan. Preventive maintenance system aims to continually preserve vehicles in good working conditions through periodical check and adjustment, and through finding of signs of breakdown and repair in initial stage of damage.

To utilize collection vehicle and equipment effectively, prevent maintenance system shall be introduced and collection vehicle and equipment to be procured in this project shall be maintained according to the maintenance manual provided by manufacturer. Guidance and training on preventive maintenance shall be provide by the Contractor for this purpose.

(2) Contents of Repair and Maintenance Work

Vehicle maintenance in Japan is set out in legal inspection and maintenance guidelines established by the Ministry of Transport. According to these guidelines, inspection and maintenance shall be carried out every month, every three months and every year on specified contents. The contents of maintenance work shall be planned based on these guidelines. However, inspection and maintenance will be carried out according to travel distance instead of time intervals considering differences of the operating conditions in each vehicle.

1) Vehicle Maintenance

The contents of maintenance work to be carried out for compactor trucks, dump trucks and container trucks are indicated in Table 3.2-1.

Table 3.2-1 Contents of Vehicle Maintenance Work

No.	Item	Traveling Distance	Maintenance Contents
1	Minor maintenance	Approx. every 3,000 km	Lubricate and inspect and confirm the functions of power line systems, hydraulic systems, automotive electrical parts and suspension systems. Preventive inspection and maintenance is a particularly important aspect of maintenance work.
2	Medium-scale maintenance	Approx. every 12,000 km	The abrasion, deformation, cracking and breakage, etc. of parts differs according to working conditions, but medium-scale maintenance is required approximately every 12,000 km. Adjust, touch up and replace parts for engines, power transmission systems, all suspension and hydraulic systems. In view of the equipment required for this work, it all needs to be carried out in a repair workshop. It is also necessary to carry out body hydraulic mechanism and plate coating work, etc. according to necessity at this time.
3	Major maintenance	Approx. every 36,000 km	Contents are the same as for medium-scale maintenance, but priority is given to brakes, clutch lining and suspension (especially spring-related points).

2) Maintenance of heavy equipment

Inspection and maintenance shall be carried out every 50 hours and 250 hours of operation concerning wheel loaders and bulldozers in addition to daily checks,

Regarding the lifetime of equipment that will be largely depend on the working conditions, however, it will be necessary to renew at roughly eight-year intervals vehicles and heavy equipment introduced under the Project.

For reference, the standard lifetime of vehicles and construction machinery used in Japan are shown in Table 3.2-2.

Table 3.2-2 Useful Lives of Vehicles and Construction Machinery

Equipment	Useful Life
Wheel loader	6 years
Bulldozer	6 years
Excavator	5 years
Dump truck	5 years
Other vehicles	5 years
Weigh bridge	7 years

(Source: Depreciation Calculation Tables for Construction Machinery, etc.; The Japan Construction Mechanization Association)

(3) Spare Parts Preparation Plan

1) Spare parts will be categorized in two and prepared separately, i.e., (1) spare parts required for preventive maintenance and replaced according to traveling distance and/or time of operation, and (2) spare parts required for special case such as vehicle breakdown. Items and quantity will be prepared based on the requirement of preventive maintenance.

2) Spare parts will be prepared based on the requirement for a traveling distance of 75,000 km for vehicles and for an operation time of 7,500 hours for construction machinery. The Sri Lanka side shall prepare the budget (roughly 5% of the equipment cost per year) to purchase necessary spare parts required for maintenance of equipment after this initial supply.

(4) Estimation of required personnel

1) Existing personnel

Existing staff of solid waste management in each local authority is shown in Table 3.2-3 and as follows.

Table 3.2-3 Existing staff of solid waste management

	Dehiwala	Moratuwa	Kolonna-Wa	Kotte	Maharaga-ma	Total
Medical doctor	1	1	1	1	1	5
Chief health inspector	3	1	1	1	4	10
Health inspector	13	5	1	2	2	23
Overseer	47	6	7	15	3	78
Primary collection worker	189	45	31	85	9	359
Driver	68	11	6	15	9	109
Collection worker	190	61	25	81	25	382
Street sweeper	141	92	32	75	11	351
Other worker	138	0	0	20	0	158
Overseer (disposal)	1	0	0	0	0	1
Worker (disposal)	3	0	0	0	0	3
Chief of Workshop	1	0	1	1	1	4
Clerk	1	0	0	0	1	2
Workshop worker	18	4	2	4	2	30
Total	814	226	107	300	68	1,515

a. Primary collection worker

Kolonnawa and Kotte have many workers for primary collection while Moratuwa and Maharagama have less staff. Number of primary collection worker to collect 1 ton of waste

is 1.7 person (0.6 ton/person) in average. To improve collection service ratio in each local authority, it is necessary to improve efficiency of solid waste collection in future because solid waste amount will be increase. In this view point, it is recommended to introduce direct collection without primary collection around 50% of the area.

b. Collection worker of vehicles

Tractor is operating with 1 driver and 5 collection worker. Compactor vehicle in Moratuwa MC and Kotte MC is operating with 1 driver and 6 collection workers. It may be necessary as far as solid waste discharged without any container or pack. But it is noted that Colombo MC ie collecting with 1 driver and 4 collection workers. Therefore it is recommended to introduce 1 m^3 container and or to improve discharge method. However, required number of personnel will be estimated based above number of collection worker because improvement of primary collection has priority to improve.

c. Street sweeper

Street sweeper is allocated 1.3 km/person in Dehiwala MC and Moratuwa MC while more worker is allocated in Kolonnawa UC and Kotte MC. Therefore, Kolonnawa UC and Kotte MC shall review their allocation of street sweeper to improve efficiency. Maharagama has insufficient number of street sweeper.

d. Other worker

Dehiwala MC has worker for market (51 persons), beach (5 person), park (50 person), cemetery (17 persons) and for drainage (20 person). And Kotte have 20 workers for drainage. It is considered that primary collection worker is carrying out these works in Moratuwa MC, Kolonnawa UC and Maharagama PS. Anyway, these worker will be necessary also in future.

e. Staffs in final disposal site

Dehiwala MC have one overseers and 3 worker for final disposal site but bulldozer is hired together with operator. Other local authorities are not allocated their staffs for final disposal site at present. But it is necessary to allocate staffs specially working for final disposal site to improve existing disposal site and to carry out controlled landfill with soil covering.

f. Staff of workshop

As minimum workshop will be constructed and maintenance equipment will be prepared in this project to maintain new collection vehicles, necessary staff shall be prepared and trained although there are several personnel for maintenance of existing equipment.

2) Require Number of Personnel in each local authority

The project intend to improve solid waste collection in 5 local authorities in CMA, waste amount to be collected and collection equipment will be increase. Therefore, necessary personnel shall be secured for sustainable operation and maintenance in each local authorities. Required number of personnel for operation and maintenance of Phase I is shown in Table 3.2-4. It is estimated based on the conditions shown in Table 3.2-5. Also breakdown of required staffs for final disposal (in Phase I) and workshops (in Phase I and II), and required staffs for removal of accumulated waste (Phase II) are shown Table 3.2-6.

Table 3.2-4 Required personnel for Phase I

	Dehiwala	Moratuwa	Kolonna-Wa	Kotte	Maharaga-ma	Total
Medical doctor	1	1	1	1	1	5
Chief health inspector	3	1	1	1	1 (-3)	8 (-3)
Health inspector	13	5	1	2	2	23
Overseer	47	6	7	15	3	78
Primary collection worker	150 (-39)	101 (56)	34 (3)	91 (6)	43 (34)	419 (60)
Driver	40 (-28)	20 (9)	6	21 (6)	10 (1)	97 (-12)
Collection worker	191 (1)	93 (32)	30 (5)	97 (16)	50 (25)	461 (79)
Street sweeper	146 (5)	93 (1)	25 (7)	50 (-25)	37 (26)	351
Other worker	138	0	0	20	0	158
Overseer (disposal)	1	2 (2)	1 (1)	1 (1)	1 (1)	6 (5)
Worker (disposal)	2 (-1)	4 (4)	2 (2)	2 (2)	2 (2)	12 (9)
Clerk (disposal)	1 (1)	2 (2)	1 (1)	1 (1)	1 (1)	6 (6)
Chief of Workshop	1	1 (1)	1	1	1	5 (1)
Clerk	1	1 (1)	1 (1)	1 (1)	1	5 (3)
Workshop worker	12 (-6)	4	3 (1)	4	4 (2)	27 (-3)
Total	747(-67)	334 (108)	114 (7)	308 (8)	157 (89)	1,660 (145)

Table 3.2-5 Condition for estimation of required personnel

a. Collection workers for each collection vehicle

Type of vehicle	Driver	Collection worker	Remark
(1) Existing equipment			
a. 12 m^3 Compactor	1	6	Same as present
b. 6 m^3 Compactor	1	6	Same as present
c. Tractor	1	5	Same as present
(2) New equipment			
a. 8 m^3 Compactor	1	6	Same as present
b. 4 m^3 Compactor	1	6	Same as present
c. Garbage dump truck	1	6	Same as present
d. 6 m^3 Container truck	1	2	Considering cleansing around container
e. Dump trucke	1	2	For accumulated waste
f. Pick up vehicle	1		For patrol

b. Primary collection

50% of solid waste will be collect directly and remaining 50% will be collected in efficiency of 0.6 ton/person (average at present)

c. Street sweeping

1.3 km/person considering situation in Dehiwala MC and Moratuwa MC.

d. Other workers

Same number of staffs are allocated for Dehiwala MC and Kotte MC. Primary collection will carry out these work in other local authorities.

Table 3.2-6 Required personnel for in Phase I

(1) Final disposal

	Dehiwala	Moratuwa	Kolonna-Wa	Kotte	Maharaga-ma	Total
Supervisor	1	2	1	1	1	6
Clerk	1	2	1	1	1	6
Site worker	2	4	2	2	2	12
Operator	2	2	1	2	1	8
Total	6	10	5	6	5	32

(2) Required personnel for workshop

	Dehiwala	Moratuwa	Kolonna-Wa	Kotte	Maharaga-ma	Total
Supervisor	1	1	1	1	1	5
Clerk	1	1	1	1	1	5
Mechanic	4	2	1	2	1	10
Assistant	8	2	2	2	3	17
Total	14	6	5	6	6	37

(3) Required personnel for removal of accumulated waste and final cover in Phase II

	Dehiwala	Moratuwa	Kolonna-Wa	Kotte	Maharaga-ma	Total
Supervisor	1	1	1	1	1	5
Clerk	0	0	0	0	0	0
Site worker	2	2	2	2	2	10
Operator	2	3	2	2	2	11
Total	5	6	5	5	5	26

3) Western Provincial Council (WPC)

WPC shall have create new section to control of special parts of spare parts which will be stored and controlled as a representative of 5 local authorities and bulldozer which will be used in Dehiwala MC and Kotte MC in Phase I but which will be used for final soil covering of old disposal site in 5 local authorities in Phase II. Required personnel for these control will be as follows:

Engineer	1
Clerk	1
Worker and assistant	3

In Phase II, WPC shall set up Ratmalana transfer station. Planned organization chart and required staffs is shown in Fig.3.2-1.

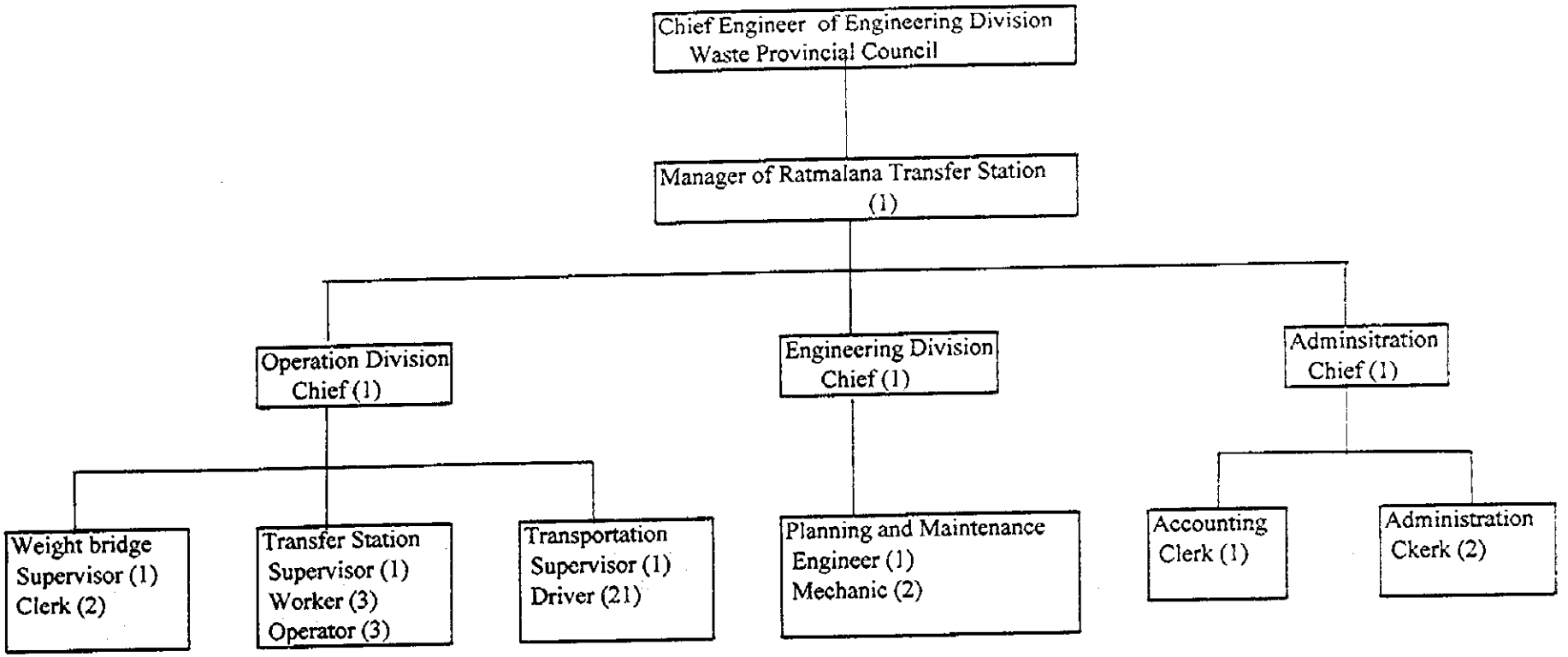


Fig. 3.2-1 Organization Chart of Ratmalana Transfer Station

(5) Operation and Maintenance Expenses

1) Personnel Expenses

Additional personnel will be required in all local authorities except Dehiwala MC for solid waste management when this Project will be implemented. The personnel expenses in each local authorities are estimated as shown in Table 3.2-7.

Table 3.2-7 Changes in Personnel Expenses in Each City at Time of Project Implementation

(Unit: 1000 Rs)

Item	Dehiwala MC	Moratuwa MC	Kolonnawa UC	Kotte MC	Maharagama PS	Total
Phase I	-3,323	+5,598	+443	+493	+4,186	+7,397
Phase II	-3,400	+6,005	+416	+416	+4,859	+8,296

The above personnel expenses have been estimated using annual average personnel expenses including various allowances (1997 prices) as shown in Table 3.2-8.

Table 3.2-8 Annual Average Personnel Expenses

(Unit: Rs)

Job Type	Work Class	Annual Average Personnel Expense (Rs/person)
Superintendent of Public Health	Senior manager	270,000
Chief manager	Mid-class manager	160,000
Public health manager	Junior engineer	89,000
Collection supervisor		
Disposal site manager		
Workshop supervisor		
Disposal site office clerk	Junior office worker	77,000
Workshop office clerk		
Primary collection laborer	Driver/Laborer	50,000
Driver (including machinery operator)		
Vehicle crew		
Road cleaner		
Other laborers		
Disposal site laborer		
Workshop laborer		

2) Operating and Maintenance Expenses

The running expenses and maintenance and repair costs (maintenance expenses) is estimated at 1997 prices as shown in Table 3.2-9.

Table 3.2-9 Running Expenses and Maintenance Expenses of Each Local Authority

(Unit: 1000 Rs)

Item	Dehiwala MC	Moratuwa MC	Kolonnawa UC	Kotte MC	Maharagama PS	Total
Phase I						
Operating expenses	4,998	2,779	871	3,037	1,234	12,938
Maintenance expenses	6,489	4,240	1,290	4,158	1,611	17,787
Total	11,487	7,039	2,160	7,195	2,844	30,725
Phase II						
Operating expenses	4,855	3,229	936	2,771	1,559	13,349
Maintenance expenses	6,369	4,833	1,370	3,918	2,083	18,573
Total	11,224	8,062	2,305	6,689	3,642	31,922

Running expenses include fuel and oil costs and other cost and it will be the expenses of the health departments. Maintenance expenses include the maintenance and repair cost will be the expenses of workshop belong to engineering department. The running and maintenance expenses shown in Table 3.2-9 have been estimated based on the required expense for one unit of equipment shown in Table 3.2-10.

Table 3.2-10 (1) Running and Maintenance Cost for one unit of Equipment

(Unit: 1000 Rs)

	Item	Unit	Existing Tractor	Existing 12 m^3 Compactor	Existing 6 m^3 Compactor	New 8 m^3 Compactor	New 4 m^3 Compactor	New 6 m^3 Garbage Dump Truck	Remarks
(1)	Maintenance Expenses								
(1)-1	Vehicle maintenance cost	(1000 Rs/vehicle/ year)	50.0	200.0	140.0	200.0	140.0	100.0	Approx. 5% of equipment cost
(1)-2	Container maintenance cost (per collection vehicle)	(1000 Rs/vehicle/ year)	0.0	0.0	0.0	0.0	0.0	0.0	Approx. 3% of equipment cost
(1)-3	Vehicle repair cost (accidents, etc.)	(1000 Rs/vehicle/ year)	8.0	32.0	22.4	32.0	22.4	16.0	Approx. 08% of equipment cost
(1)-4	Tire replacement cost	(1000 Rs/vehicle/ year)	22.3	22.3	22.3	22.3	22.3	22.3	8,000 Rs × 2.8 tires
	Subtotal (maintenance expenses)	(1000 Rs/vehicle/ year)	80	254	185	254	185	138	
(2)	Operating Expenses								
(2)-1	Fuel cost	(1000 Rs/vehicle/ year)	52.3	100.4	83.7	100.4	83.7	52.3	
(2)-2	Oil cost	(1000 Rs/vehicle/ year)	10.5	20.1	16.7	20.1	16.7	10.5	20% of fuel cost
(2)-3	Other office overheads, etc.	(1000 Rs/vehicle/ year)	27.9	42.8	38.3	42.8	38.3	34.1	Approx. 5% of maintenance expenses, personnel expenses and fuel cost
	Subtotal (operating expenses)	(1000 Rs/vehicle/ year)	91	163	139	163	139	97	

Table 3.2-10 (2) Running and Maintenance Cost for one unit of Equipment

(Unit: 1000 Rs)

	Item	Unit	New 6 m³ Multi Loader	New 3.5 t Earth Dump Truck	New Pickup	Existing Wheel Loader	New Bulldozer	New Wheel Loader	Remarks
(1)	Maintenance Expenses								
(1)-1	Vehicle maintenance cost	(1000 Rs/vehicle/ year)	175.0	100.0	50.0	250.0	400.0	250.0	Approx. 5% of equipment cost
(1)-2	Container maintenance cost (per collection vehicle)	(1000 Rs/vehicle/ year)	90.0	0.0	0.0	0.0	0.0	0.0	Approx. 3% of equipment cost
(1)-3	Vehicle repair cost (accidents, etc.)	(1000 Rs/vehicle/ year)	28.0	16.0	8.0	0.0	0.0	0.0	Approx. 08% of equipment cost
(1)-4	Tire replacement cost	(1000 Rs/vehicle/ year)	35.7	22.4	16.0	0.0	0.0	0.0	8,000 Rs × 2 8 tires
	Subtotal (maintenance expenses)	(1000 Rs/vehicle/ year)	329	138	74	250	400	250	
(2)	Operating Expenses								
(2)-1	Fuel cost	(1000 Rs/vehicle/ year)	100.4	52.3	41.9	187.0	412.0	187.0	
(2)-2	Oil cost	(1000 Rs/vehicle/ year)	20.1	10.5	8.4	0.0	0.0	0.0	20% of fuel cost
(2)-3	Other office overheads, etc.	(1000 Rs/vehicle/ year)	33.6	21.1	10.8	0.0	0.0	0.0	Approx. 5% of maintenance expenses, personnel expenses and fuel cost
	Subtotal (operating expenses)	(1000 Rs/vehicle/ year)	154	84	61	187	412	187	

3) Soil Covering Cost

Each local authorities shall conduct soil covering at existing disposal site to minimize environmental pollution in surrounding area when equipment for final disposal will be procured in the Project. Therefore, each local authorities shall purchase required volume of covering soil. Although, each local authority carry out soil covering around 50 % of requirement, additional expense will be necessary to carry out soil covering in full extent. Cost of covering soil will be increased and estimated as in Table 3.2-11 until when Phase II will be implemented. When Phase II will be implemented, existing final disposal sites will be closed then the cost of covering soil will no longer be necessary.

Table 3.2-11 Increase of Cover Soil Cost (1997 price)

Items			Dehiwala	Moratuwa	Kolonnawa	Kotte	Maharagama
Actual	①	Collected Waste amount (t/day)	103	59	11	34	19
	②	Necessary soil (m^3/day) ①/0.35x0.5x0.17	25.0	14.3	2.7	8.3	4.6
	③	Covering soil (m^3/day) ②x50%	12.5	7.2	1.3	4.1	2.3
	④	Cost of soil (Rs/day ③x180Rs/m3	2,251	1,290	240	743	415
	⑤	Cost of soil (1000Rs/year) ④x365	822	471	88	271	152
After Phase I	①	Collected Waste amount (t/day)	179.4	121.4	41.1	109.2	51.9
	②	Necessary soil (m^3/day) ①/0.35x0.5x0.17	43.6	29.5	10.0	26.5	12.6
	③	Covering soil (m^3/day) ②x100%	43.6	29.5	10.0	26.5	12.6
	④	Cost of soil (Rs/day ③x180Rs/m3	7,842	5,307	1,797	4,774	2,269
	⑤	Cost of soil (1000Rs/year) ④x365	2,862	1,937	656	1,742	828
Increase	①	Collected Waste amount (t/day)	18.6	15.2	7.3	18.3	8.0
	②	Necessary soil (m^3/day) ①/0.35x0.5x0.17	31.1	22.3	8.6	22.4	10.3
	③	Covering soil (m^3/day)	5,591.1	4,017.3	1,556.2	4,030.5	1,853.5
	④	Cost of soil (Rs/day ③x180Rs/m3	2,041	1,466	568	1,471	677
	⑤	Cost of soil (1000Rs/year) ④x365	2,041	1,466	568	1,471	677

4) Transportation Cost and Final Disposal Cost in Phase II

In Phase II, solid waste collected in each local authority will be carried to transfer stations, from where it will be transported to Hanwella final disposal site using larger transportation vehicles. Dehiwala MC and Moratuwa MC will use the Ratmalana transfer station operated by Western Provincial Council. Kolonnawa UC will use Colombo North transfer station and Kotte MC and Maharagama PS will use Colombo South transfer station. Both transfer station will be constructed as part of CEIP and is planned to be operated by Colombo MC. It is expected to pay the cost of transfer stations and final disposal at Hanwella by each local authorities according to the CEIP.

According to the CEIP, transportation fee will be Rs 300 /ton and disposal fee will be Rs 210 /ton in minimum. The cost of Ratmalana transfer station is estimated to be Rs 297 ton including depreciation of equipment.

Each local authorities shall pay transportation fee and final disposal fee, and these total costs is estimated as shown in Table 3.2-12 using minimum cost expected in CEIP and solid waste amount to be collected in year 2002..

Table 3.2-12 Transportation Cost and Final Disposal Cost

(Unit: 1000 Rs)

Item	Dehiwala MC	Moratuwa MC	Kolonnawa UC	Kotte MC	Maharagama PS	Total
I. Relay transportation cost	19,649	15,191	4,496	11,955	6,814	58,105
II. Final disposal cost	13,755	10,634	3,148	8,369	4,770	40,676
Total	33,404	25,825	7,644	20,324	11,584	98,781

5) Current Solid Waste Management Cost and Required Solid Waste Management Cost for Project Implementation

Table 3.2-13 shows the current solid waste management cost and the estimated solid waste management cost required after the Project implementation. It is noted that Dehiwala MC and Maharagama MC put driver expenses on the workshop of Engineering department, and others put driver expenses on the Health department. Since maintenance and repair expenses are divided between the Health department and workshop, the combined totals of health department and workshop expenses is considered as the total of current solid waste management cost.

Table 3.2-13 Estimated Cleansing Work Cost (unit Rs. 1,000)

Items	1997 Budget	Increase Phase-1	Estimated Cost Phase-1	Increase Phase-2	Estimated Cost Phase-2
Dehiwala					
(1)Personnel	37,325	-3,323	34,002	-3,400	33,925
(2)Others					
(2)-1Operation	5,385	6,102	4,998	5,839	4,855
(2)-2Maintenance			6,489		6,369
(2)-3Cover soil	822	2,040	2,862	-822	0
total others	6,207	8,142	14,349	5,017	11,224
(3)Transportation	0	0	0	19,649	19,649
(4)Disposal	0	0	0	13,755	13,755
Total	43,532	4,819	48,351	35,021	78,553
Moratuwa					
(1)Personnel	13,398	5,598	18,996	6,005	19,403
(2)Others					
(2)-1Operation	2,953	4,086	2,799	5,109	3,229
(2)-2Maintenance			4,240		4,833
(2)-3Cover soil	471	1,466	1,937	-471	0
total others	3,424	5,552	8,976	4,638	8,062
(3)Transportation	0	0	0	15,191	15,191
(4)Disposal	0	0	0	10,634	10,634
Total	16,822	11,150	27,972	36,468	53,290
Kolonnawa					
(1)Personnel	8,872	443	9,315	416	9,288
(2)Others					
(2)-1Operation	3,160	-999	871	-854	936
(2)-2Maintenance			1,290		1,370
(2)-3Cover soil	88	568	656	-88	0
total others	3,248	-431	2,817	-942	2,306
(3)Transportation	0	0	0	4,496	4,496
(4)Disposal	0	0	0	3,148	3,148
Total	12,120	12	12,132	7,118	19,238
Kotte					
(1)Personnel	13,362	493	13,855	416	13,778
(2)Others					
(2)-1Operation	2,663	4,532	3,037	4,026	2,771
(2)-2Maintenance			4,158		3,918
(2)-3Cover soil	271	1,471	1,742	-271	0
total others	2,934	6,003	8,937	3,755	6,689
(3)Transportation	0	0	0	11,955	11,955
(4)Disposal	0	0	0	8,369	8,369
Total	16,296	6,496	22,792	24,495	40,791
Maharagama					
(1)Personnel	5,091	4,186	9,277	4,859	9,950
(2)Others					
(2)-1Operation	3,870	-1,025	1,234	-228	1,559
(2)-2Maintenance			1,611		2,083
(2)-3Cover soil	152	676	828	-152	0
total others	4,022	-349	3,673	-380	3,642
(3)Transportation	0	0	0	6,814	6,814
(4)Disposal	0	0	0	4,770	4,770
Total	9,113	3,837	12,950	16,063	25,176

The solid waste management cost is broken down into personnel expenses, other expenses, transportation cost and final disposal cost. the details of each items are as follows.

① Personnel expenses: All personnel expenses related to solid waste management-including those at workshops

② Other expenses: Running expenses, maintenance expenses and cost of covering soil at existing final disposal site.

③ Transportation cost: Cost of transportation to Hanwella final disposal site from transfer stations after implementation of Phase II.

④ Final disposal cost: Cost of final disposal at Hanwella final disposal site after implementation of Phase II.

Table 3.2-13 shows that other expenses in Kolonnawa UC and Maharagama PS will decrease because that all the existing equipment is deteriorated and the current maintenance and repair cost is overly high in Kolonnawa and the maintenance and repair cost was much increased by approximately 1,600,000 Rs in the budget of 1997 compare to budget of 1996 in Maharagama. Personnel expenses of Moratuwa MC and Maharagama PS will greatly increase but others will be almost same as present expenses.

Table 3.2-14 shows the percentage of necessary solid waste management cost with the budget expenditure of all cities in 1997. The percentage of the solid waste management cost after Phase I implementation will be approximately 30%. However, the solid waste management cost will be increase greatly when Phase II will be implemented and percentage to the budget expenditure will become 40% to 60%, except Kotte MC.

It is noted that each local authority's budget scale will increase in line with the growth of GDP. Budgets in 2002 is estimated to be 1.31 times larger than 1997 budget using annual growth rate 5.6% in real terms which is average during 1992 to 1996. In this case, percentage of solid waste management cost will be 34-44% to estimated budget scale in 2002 when Phase II will be implemented as shown in Table 3.2-15.

Concerning the efficiency of solid waste management, Table 3.2-16 expresses unit cost of solid waste collection and disposal and shows that overall efficiency will be greatly improved in Phase I. Also it is noted that unit cost will be similar when Phase II will be implemented although it includes transportation cost and final disposal cost.

Table 3.2-14 Share of Cleansing Works Cost in Overall Expenditure

(Unit: 1,000Rs)

Items	Dehiwala	Moratuwa	Kolonnawa	Kotte	Maharagama
1997 Budget					
Overall Expenditure	156,573	120,789	35,781	155,297	43,822
Cleansing Works Cost	43,532	16,822	12,120	16,296	9,113
Share of Cleansing Works	(28%)	(14%)	(34%)	(10%)	(21%)
Phase I					
Overall Expenditure 1997	156,573	120,789	35,781	155,297	43,822
Cleansing Works Cost	48,351	27,972	12,132	22,792	12,950
Share of Cleansing Works	(31%)	(23%)	(34%)	(15%)	(30%)
Phase II (including Transportation & Disposal Cost)					
Overall Expenditure 1997	156,573	120,789	35,781	155,297	43,822
Cleansing Works Cost	78,553	53,290	19,238	40,791	25,176
Share of Cleansing Works	(50%)	(44%)	(54%)	(26%)	(57%)
Cleansing Works Cost Break-down					
Collection	45,149	27,465	11,594	20,467	13,592
Share in Estimated Expenditure	(29%)	(23%)	(32%)	(13%)	(31%)
Transportation & Disposal	33,404	25,825	7,644	20,324	11,584
Share in Estimated Expenditure	(21%)	(21%)	(21%)	(13%)	(26%)

Table 3.2-15 Share of Cleansing Works Cost in Estimated Budget in 2002 (1997 price)

(Unit : Rs. 1,000)

Items	Dehiwala	Moratuwa	Kolonnawa	Kotte	Maharagama
2002 overall Local Government Expenditure estimated with real economic growth	205,606	158,616	46,986	203,931	57,546
Phase I					
Estimated Expenditure	205,606	158,616	46,986	203,931	57,546
Cleansing Works Cost	48,351	27,972	12,132	22,792	12,950
Share of Cleansing Works	(24%)	(18%)	(26%)	(11%)	(23%)
Phase II (including Transportation & Disposal cost)					
Estimated Expenditure	205,606	158,616	46,986	203,931	57,546
Cleansing Works Cost	78,553	53,290	19,238	40,791	25,176
Share of Cleansing Works	(38%)	(34%)	(41%)	(20%)	(44%)
Cleansing Works Cost Break-down					
Collection	45,149	27,465	11,594	20,467	13,592
Share in Estimated Expenditure	(22%)	(17%)	(25%)	(10%)	(24%)
Transportation & Disposal	33,404	25,825	7,644	20,324	11,584
Share in Estimated Expenditure	(16%)	(16%)	(16%)	(10%)	(20%)

Table 3.2-16 Unit Cost of Cleansing Work

Items		Dehiwara	Moratuwa	Kolonnawa	Kotte	Mharagama	Total
1996 Actual	Total Expenditure of city (1000RS)	141,036	109,860	27,386	108,513	53,348	440,143
	Cleansing works cost (1000RS)	47,120	13,442	9,572	17,158	5,129	92,421
	Cleansing Works Ratio	33%	12%	35%	16%	10%	21%
	Collection amount (t/day)	103	59	11	34	19	226
	collection amount (t/year)	37,595	21,535	4,015	12,410	6,935	82,490
	unit cost (Rs/t)	1,253	624	2,384	1,383	740	1,120
1997 Budget	Total Expenditure of city (1000RS)	156,573	120,789	35,781	155,297	43,822	512,262
	Cleansing works cost (1000RS)	43,532	16,822	12,120	16,296	9,113	97,883
	Cleansing Works Ratio	28%	14%	34%	10%	21%	19%
	Collection amount (t/day)	103	59	11	34	19	226
	collection amount (t/year)	37,595	21,535	4,015	12,410	6,935	82,490
	unit cost (Rs/t)	1,158	781	3,019	1,313	1,314	1,187
Phase-1 planned 1997 price	Total Expenditure of city (1000RS)	156,573	120,789	35,781	155,297	43,822	512,262
	Cleansing works cost (1000RS)	48,351	27,972	12,132	22,792	12,950	124,197
	Increase rate from 1997	111%	166%	100%	140%	142%	127%
	Cleansing Works Ratio	31%	23%	34%	15%	30%	24%
	Collection amount (t/day)	179.4	121.4	41.1	109.2	51.9	503.0
	collection amount (t/year)	65,481	44,311	15,002	39,858	18,944	183,595
	unit cost (Rs/t)	738	631	809	572	684	676
Phase-2 Planned 1997 price	Total Expenditure of city (1000RS)	156,573	120,789	35,781	155,297	43,822	512,262
	Cleansing works cost (1000RS)	78,553	53,290	19,238	40,791	25,176	217,048
	Increase rate from 1997	180%	317%	159%	250%	276%	222%
	Cleansing Works Ratio	50%	44%	54%	26%	57%	42%
	Collection amount (t/day)	179.4	138.7	41.1	109.2	62.2	530.6
	collection amount (t/year)	65,481	50,626	15,002	39,858	22,703	193,669
	unit cost (Rs/t)	1,200	1,053	1,282	1,023	1,109	1,121

6) Financial Source of Solid Waste management after Project Implementation

The solid waste management cost will become too large to each local authorities specially when Phase II will be implemented. Therefore Sri Lanka side shall take necessary measure to secure new financial source for solid waste management.

It is recommended to secure new financial source as follows.

a. Recurrent grant (current transfer from WPC) shall be increased in line with the increase in personnel expenses.
b. Establishment of new financial source to cover transportation cost and final disposal cost which will be required when Phase II will be implemented

Concerning above item a., the recurrent grant is a subsidy to compensate the personnel cost of each local authority, and it is granted by WPC (transferred through WPC). In actual financial situation of the local government, the share of recurrent grant in personnel expenditure is approx. 60 – 100 %. If the same percentage of personnel cost will provided in future, expected increase of recurrent grant will be as shown in Table 3.2-17.

Table 3.2-17 Estimated Increase of Recurrent Grants (Subsidy for personnel cost)

(Unit: 1,000 Rs)

Items	Dehiwala	Moratuwa	Kolonnawa	Kotte	Maharagama
Phase I					
Increase of Personnel Cost	-3,323	5,598	443	493	4,186
Recurrent Grant Rate	60%	57%	84%	80%	100%
Increase of Recurrent Grant	-1,994	3,191	372	394	4,186
Phase II					
Increase of Personnel Cost	-3,400	6,005	416	416	4,859
Recurrent Grant Rate	60%	57%	84%	80%	100%
Increase of Recurrent Grant	-2,040	3,423	349	333	4,859

If the above two income sources can be secured and incorporated into the budget to cover the solid waste management cost, percentage of solid waste management cost will be almost same as at present as shown in Table 2.2-18 and 19. Then the Project can be implemented with sustainable operation and maintenance.

Table 3.2-18 Phase I, Budget Securing (Considering Recurrent Grant)

(Unit : Rs. 1,000)

No.	Items	Dehiwala	Moratuwa	Kolonnawa	Kotte	Maharagama	Total	Remarks
①	Overall Budget							
①(1)	Actual Budget Sources	156,573	120,789	35,781	155,297	43,822	512,262	1997年予算歳出
①(2)	Increase of Recurrent Grants	-1,994	3,191	372	394	4,186	6,149	
①(3)	New Sources for Transportation & Disposal Cost	0	0	0	0	0	0	
	Total	154,579	123,980	36,153	155,691	48,008	518,411	
②	Necessary Cleansing Works Cost	48,351	27,972	12,132	22,792	12,950	124,197	表2.2.10
	Share of Cleansing Works Cost(②/①%)	31%	23%	34%	15%	30%	24%	
③	Budget Sources of Cleansing Works							
③(1)	Actual budget sources	50,345	24,781	11,760	22,398	8,764	118,048	
③(2)	Increse of recurrent grants	-1,994	3,191	372	394	4,186	6,149	
③(3)	New Sources for Transportation & Disposal Cost	0	0	0	0	0	0	
	Total	48,351	27,972	12,132	22,792	12,950	124,197	
	Share in ①(1)							
	Expenditure from actual source	32%	21%	33%	14%	20%	23%	
	Expenditure from Increse of recurrent grants	-1%	3%	1%	0%	10%	1%	
	Expenditure from New Sources for Transportation & Disposal Cost	0%	0%	0%	0%	0%	0%	
	Total	31%	23%	34%	15%	30%	24%	

Table 3.2-19 Phase II, Budget Securing
(Considering Recurrent Grant and New Financial Source)

(Unit : Rs. 1,000)

No.	Items	Dehiwala	Moratuwa	Kolonnawa	Kotte	Maharagama	Total	Remarks
①	Overall Budget							
①(1)	Actual Budget Sources	156,573	120,789	35,781	155,297	43,822	512,262	1997年予算歳出
①(2)	Increase of Recurrent Grants	-2,040	3,423	349	333	4,859	6,924	
①(3)	New Sources for Transportation & Disposal Cost	33,404	25,825	7,644	20,324	11,584	98,781	
	Total	187,937	150,037	43,774	175,954	60,265	617,967	
②	Necessary Cleansing Works Cost	78,553	53,290	19,238	40,791	25,176	217,048	表2.2.10
	Share of Cleansing Works Cost(②/①%)	50%	44%	54%	26%	57%	42%	
③	Budget Sources of Cleansing Works							
③(1)	Actual budget sources	47,189	24,042	11,245	20,134	8,733	111,343	
③(2)	Increse of recurrent grants	-2,040	3,423	349	333	4,859	6,924	
③(3)	New Sources for Transportation & Disposal Cost	33,404	25,825	7,644	20,324	11,584	98,781	
	Total	78,553	53,290	19,238	40,791	25,176	217,048	
	Share in ①(1)							
	Expenditure from actual source	30%	20%	31%	13%	20%	22%	
	Expenditure from Increse of recurrent grants	-1%	3%	1%	0%	11%	1%	
	Expenditure from New Sources for Transportation & Disposal Cost	21%	21%	21%	13%	26%	19%	
	Total	50%	44%	54%	26%	57%	42%	

Transportation cost and final disposal cost will be the additional expenses of solid waste management when the Phase II will be implemented and it will be Rs 99 million as shown in Table 2-2-8. This amount will be the required income of new financial source. To secure this amount, following three option can be recommended. It is necessary that Sri Lanka side will take necessary process to realize one of these options before the implementation of Phase II.

a. Case A

Central Government including Ministry of Housing and Urban Development which is responsible ministry of CEIP is burdened with 35% of the above cost, WPC is burdened with 35% of the cost and resident of the each local authority is burdened with 30% through waste collection charge.

As a result, the cost borne by the Central Government will be 34,573,000 Rs/year (1997 prices), and the cost borne by Western Provincial Council will be the same, which is equivalent to approximately 1% of the own income of WPC in 1997 (3,298,892,000 Rs). The amount borne by citizens in the form of waste collection charges will be as shown in Table 3.2-20 (1997 prices). Waste collection charge will be Rs 156 - 241 Rs per household per year in average and this amounts will be around 0.5% of household income, assuming the average annual income of household to be Rs 50,000 per year.

Table 3.2-20 Amount to be Collected from Residence : Case A

(Unit : Rs. 1,000)

Items	Dehiwala	Moratuwa	Kolonnawa	Kotte	Maharagama
30% of Transportation & Disposal Cost					
Necessary amount	10,021	7,748	2,293	6,097	3,475
No. of house hold	48,000	47,000	12,500	25,324	22,258
Cost / house hold (RS)	209	165	183	241	156

b. Case B

WPC is burdened with 50% of the cost and the resident of the local authorities is burdened with 50% through waste collection charge. As a result, the cost borne by Western Provincial Council will be 49,391,000 Rs, which is equivalent to approximately 1.5% of own income of WPC in 1997 (3,298,892,000 Rs). The amount borne by citizens in form of waste collection charge will be as shown in Table 3.2-21 (1997 prices). Waste collection charge will be Rs 260 – 401 per household per year in average. This amounts to approximately 0.8% of household income.

Table 3.2-21 Amount to be Collected from Residence : Case B

(Unit : Rs. 1,000)

Items	Dehiwala	Moratuwa	Kolonnawa	Kotte	Maharagama
50% of Transportation & Disposal Cost					
Necessary amount	16,702	12,913	3,822	10,162	5,792
No. of house hold	48,000	47,000	12,500	25,324	22,258
Cost / house hold (RS)	348	275	306	401	260

c. Case C

In case the both of case A and B will not realized, WPC will be burdened with 100% of the cost for implementation of Phase II.

In this case WPC is burdened with Rs 99 million. This case will be also applied when the burden of other agency will be less than expected. In this case, also even if Western Provincial Council has to bear the whole cost, this amount will still be less than 3.0% the own income of WPC in 1997 (3,298,892,000 Rs).

Chapter 4 Project Evaluation and Recommendation

Chapter 4 Project Evaluation and Recommendation

4.1 Project Effect

Although each local authority is providing solid waste collection service in their area, the solid waste collection ratio in the Project area is extremely low, 39% on average, due to rapid urbanization. As a result, uncollected solid waste is accumulated in the area with terrible conditions in terms of environmental sanitation. Solid waste is collected using tractors and work efficiency is low. And the labor conditions of workers are unsanitary. Also, the surrounding environment of existing disposal sites are polluted because collected solid waste is open dumped in low-lying marshy ground. To improve these situations and to improve public sanitation in the Project area, implementation of the Project is urgently required.

For the final disposal of solid waste in Colombo Metropolitan Area, construction of a inter-municipal disposal site at Hanwella is being constructed under the Colombo Environmental Improvement Project (CEIP) with funding from the World Bank. But the construction is several months behind the schedule at present. Therefore, each local authority in CMA has to dispose of waste at their existing disposal sites until Hanwella disposal site commence services. In addition, each local authority in CMA shall establish efficient transportation system of solid waste to cope with distant transportation required to dispose of solid waste at Hanwella.

Therefore, the Project will be implemented over two phases: in Phase 1, solid waste collection and disposal will be improved in the Project area because of extremely urgency, and in Phase 2, efficient transportation system will be established to cope with distant transportation of solid waste.

(1) Benefit of the Project

The benefit of the Project are summarized in Table 4.1-1. The direct benefit to be gained from Project implementation are improvement of the solid waste collection rate and increase in the population that receives collection services in the Project area. As a result, the urban sanitary environment will be improved in the Project area.

The direct beneficiaries of the Project are 820,000 citizens (forecast population in 2002) living in the Project area. The beneficial effect will especially be great for 380,000 citizens who have not been served until now. Also, citizens living in the vicinity of the existing final disposal sites will be greatly benefited.

Through implementation of Phase 1 of the Project, the amount of solid waste collection in the Project area will increase from 226 tons per day to 503 tons per day, representing an increase in the collection rate from 39% to 77%. As a result, the population receiving the solid waste collection service will become 685,000 people by 2002, representing an increase of 378,000 people over the currently served population of 307,000. Improvement in solid waste collection efficiency brought by implementation of Phase 1 is estimated that the unit cost of solid waste management will fall from the current 1,100 rupees per ton to 680 rupees per ton. Following implementation of Phase 2, the solid waste collection rate will rise to 81% and the population served by the collection service will become 724,000 (417,000 more than present). Also, the solid waste that is collected in the Project area will be disposed of at sanitary landfill site at Hanwella. But, solid waste management cost will increase because cost for relay transportation and final disposal is necessary. After Phase II, the percentage of solid waste management cost in each local authority's budget will become high and it will be necessary to secure new financial sources for sustainable solid waste management. However, the solid waste management cost will still be held at 1,100 rupees per ton, which is the same as at present.

In conclusion, it is considered that the Project, which will contribute to improving the solid waste management and public sanitation in the Project area, is highly urgent, significant and appropriate for implementation under the grant aid scheme of the Government of Japan.

Table 4.1-1 Effect of Project Implementation

Current Conditions and Problems	Project Countermeasures	Effect and Degree of Improvement
1. Collection and Haulage Due to insufficient solid waste collection, there are widespread areas that are not served. The collection rate in the five target local authority is only 39%. The solid waste collection that is currently performed by tractors is highly inefficient and makes working conditions very hard for staff.	Procure and supply collection equipment (vehicles) to enhance the collection and haulage setup. Introduce collection vehicles (mainly compactor trucks and also container trucks, etc.).	The solid waste collection rate in the five target local authority will be increased to 77% by the end of Phase 1 and 81% by the end of Phase 2. The introduction of compactor trucks, etc. will increase the efficiency of collection work and improve the working environment in terms of both sanitary conditions and work load.
2. Final Disposal Open dumping is carried out at the existing final disposal sites and this is polluting the surrounding environment.	Erect fences around existing final disposal sites, build guard houses and construct levees to partition disposal sites from the public water body. Provide equipment to enable earth covering to be carried out at the existing final disposal sites.	In addition to preventing the entry of harmful waste products, contamination of the public water body will be mitigated. Implementation of earth covering will reduce the level of pollution caused by the existing final disposal sites on the surrounding environment.
3. Relay Transportation Relay transportation is not currently carried out.	A transfer station shall be constructed and haulage equipment provided to coincide with the opening of the wide-area sanitary landfill disposal site.	Sanitary landfilling of solid waste from the whole metropolitan area will be implemented and the efficient transportation of solid waste will be made possible.

Main indicators of the cost, etc. of solid waste management in the five local autroities are shown in Table 4.1-2.

As was mentioned previously, solid waste collection is currently carried out using tractors and the average unit cost of solid waste management is 1,190 rupees per ton. After implementation of Phase 1, solid waste collection in the Project area will not only be efficient, but also the existing final disposal sites will also be improved. However, after implementation of Phase 2, the additional cost of solid waste relay transportation and final disposal and the absolute increase in the amount of solid waste collected, will be a large burden for each local authority. For this reason, it is necessary for the Sri Lanka side to take necessary measures to secure new financial source for solid waste management in each local authority.

In terms of the solid waste management cost per person of the served population, it will be approximately 410 rupee/person after Phase 1 and 700 rupee/person after Phase 2. Also, number of staff required for served population and/or collected waste amount shows that there is still room for improvement and increase of the efficiency of the solid waste management in the future.

Table 4.1-2 Main Indicators of the Solid Waste Management Utility in the Target Local authority

Item	Current Situation	Phase 1	Phases 1 and 2
Urban population	787,260	819,135	819,135
Collection population	307,300	685,405	724,860
Collection rate	39%	77%	81%
Number of solid waste management staff	1,515	1,660	1,679
Number of collection trucks and tractors	56	89	93
Number of relay transportation vehicles	0	0	18
Amount of solid waste collection (tons/day)	226.3	502.9	530.6
Utility cost (Rs. 1,000)			
Budget size of 5 target local authority	512,262	672,685	672,685
Cleansing budget, operating cost	97,883	124,197	217,048
Project cost			
Grant aid		246,000	424,000
Sri Lanka burden		36,000	82,000
Number of solid waste management staff			
Per 1,000 of urban population	1.9/1,000 persons	1.9/1,000 persons	1.9/1,000 persons
Per 1,000 of collection population	4.9/1,000 persons	2.4/1,000 persons	2.3/1,000 persons
Collection amount per member of staff	0.15 t/day/person	0.30 t/day/person	0.32 t/day/person
Collection amount per truck	4.0 t/truck	5.7 t/truck	5.7 t/truck
Unit cost of solid waste management	Rs. 1,190/t	Rs. 676/t	Rs. 1,121 /t
Per capita solid waste management cost by collection population	319 Rs./person	Rs. 181/person	Rs. 299/person
Ratio according to per capita regional gross product	0.84%	0.48%	0.79%
Per capita Project cost by collection population		Rs. 411/person	Rs. 698/person
Daily project cost per ton of solid waste		Rs. 560,000	Rs. 954,000
Daily amount of grant aid per ton of solid waste		Rs. 489,000	Rs. 799,000

Note) The per capita regional gross product in 1996 was Rs. 38,000/person.

4.2 Recommendation

(1) Preparation of Solid Waste Management Plan

Each local authority shall secure the necessary personnel, improve the technical level of personnel and provide training for operation and maintenance staff to implement the Project. In order to ensure the efficient utilization of the collection vehicles, etc, each local authority shall also prepare its own solid waste collection plan and operation and maintenance plan and shall secure the necessary budget. For this reason, each local authority shall compile a short-term solid waste management plan including above-mentioned contents and proceed improvement of the solid waste management.

After operation of Hanwella disposal site, solid waste collected in each local authority will be carried into transfer stations and each local authority shall pay the cost of this relay transportation and also final disposal. Therefore, they shall find new sources of funds, such as introduction of charge system for solid waste collection, etc. It is recommended that each local authority shall formulate medium and long-term solid waste management plans to cope with the future conditions to be created by opening of the Hanwella disposal site.

(2) Cooperation of West Provincial Council and Each Local Authority

The main implementing bodies of the Project are West Provincial Council and the five local authorities. The population in each local authority ranges from 60,000 to 240,00 and the budget size and available personnel in each are restricted. Since the collection vehicles that will be owned by each local authority are limited in number, the impact caused by breakdowns of collection vehicles will be relatively large. Cooperation between the local authorities will be required in order to deal with such situations. Regarding spare parts management, which will be supervised by West Provincial Council, a setup for cooperation will need to be formed with the local authority to ensure that the parts provided are used in an effective manner. In order to help build this setup, it is desirable to provide technical advice for West Provincial Council and each of the local authority.

(3) Role of the solid waste management unit of West Provincial Council

West Provincial Council does not currently provide its own solid waste management service, but it has recently set up a new unit in charge of solid waste management to cope with establishment

of inter-municipal disposal site at Hanwella. This new department will be in charge not only to monitor solid waste management in each local authority, but also provide guidance to each local authority. Also, the unit will be in charge to provide and to operate transfer stations and other facilities required for inter-municipal disposal. It is noted that West Provincial Council contains other local authorities in CMA that are also confronted with serious problems in the area of solid waste management. Therefore the role of the new unit is highly important. It is recommended to prepare solid waste management program of WPC and also to make clear the policies and programs for improvement of the solid waste management throughout its whole administrative area.

(4) Improvement of Solid Waste Collection Efficiency through Public Cooperation

The Project aims to improve the efficiency of solid waste collection through minimizing primary collection, whereby handcart worker collect solid waste from each household and carry it to the nearest collection station. In order to reduce primary collection, it is necessary to introduce and expand door-to-door collection using collection vehicles or station collection with citizen's cooperation in which citizens shall bring their waste and discharge at waste stations (collection point). Since door-to-door collection is not so efficient, it is desirable to obtain citizen's cooperation in order to mitigate the need for primary collection.

(5) Introduction of a Charge System

As with any public service such as solid waste management, it is necessary to bear the cost by beneficiaries. If the beneficiaries will not pay the service cost, tax will be used to cover the cost. But with the limited budget of the local authorities, it is likely that solid waste management service will face shortage of fund, which will result in deterioration of services.

Introduction of a charge system for solid waste management service is viable means to cover the cost. In particular, it is desirable to adopt an amount-based charge system for commercial waste to reduce solid waste amount.

After implementation of Phase 2 of the Project, the target local authority will need to secure new funds to cover the cost of relay transportation and final disposal. It is recommended to introduce a charge system in each local authority. As a first step, charges for solid waste discharged from shops and other business establishments shall be introduced, and then for citizens.

Appendix 1

Member List of the Survey Team

Member of the Basic Design Study Team

Name	Assignment	Current Position / Company
Shokichi SAKATA	Leader	First Project Study Division, Grant Aid Project Study Department, JICA
Tooru SANBONGI	Technical Adviser	Osaka Bay Regional Offshore Environmental Improvement Center
Hiroshi ABE	Chief Consultant, Management and Maintenance Planner	Yachiyo Engineering Co. Ltd
Katsuo OKAWARA	Collection and Transportation Planner	Yachiyo Engineering Co. Ltd
Hisashi YAMAUCHI	Disposal Planner, Environmental Analyst	Yachiyo Engineering Co. Ltd
Katsumi FUJII	Procurement Planner, Cost Estimator	Yachiyo Engineering Co. Ltd

Members of the Explanation Team for the Draft Basic Design

Name	Assignment	Current Position / Company
Junichi SHIMADA	Leader	Grant Aid Division, Bureau of Economic Cooperation, Ministry of Foreign Affairs
Tooru SANBONGI	Technical Adviser	Osaka Bay Regional Offshore Environmental Improvement Center
Hiroshi ABE	Chief Consultant, Management and Maintenance Planner	Yachiyo Engineering Co. Ltd
Katsuo OKAWARA	Collection and Transportation Planner	Yachiyo Engineering Co. Ltd

Appendix 2

Survey Schedule

Survey Schedule of Basic Design Study Team (1/3)

No.	Date	Day	Stay	Movement	Contents of Works
1	8 Sept.	Mon.	Colombo	Tokyo 12:00 (SQ 997) Singapore (UL 313) Colombo 21:05	. Depart Japan, (2 Government. member : Sakata, Sanbongi, 3 consultant member : Abe, Okawara, Yamauchi) . Study Team arrive in Colombo
2	9 Sept.	Tue.	Colombo		. Courtesy call and meeting with Japanese Embassy, JICA Sri Lanka Office . Courtesy call and meeting with Department of External Resources and Planning, Ministry of Provincial Councils, West Provincial Council (WPC), World Bank regional office
3	10 Sept.	Wed.	Colombo		. Courtesy call and meeting with Ministry of Housing and Urban Development, CEIP, Colombo MC . Meeting with WPC
4	11 Sept.	Thur.	Colombo		. Courtesy call and site survey at Dehiwala MC . Site survey of Hanwella disposal site
5	12 Sept.	Fri.	Colombo		. Courtesy call and site survey at Kotte MC and Kolonnawa UC . Joint meeting with related authorities including Department of External Resources, CEIP and WPC.
6	13 Sept.	Sat.	Colombo		. Courtesy call and site survey at Maharagama PS and Moratuwa MC
7	14 Sept.	Sun.	Colombo		. Preparation of Minutes of Discussion
8	15 Sept.	Mon.	Colombo		. Discussion of M/D with WPC, Site survey of workshop of Colombo MC
9	16 Sept.	Tue.	Colombo		. Preparation of M/D, . Preparation of field survey of solid waste amount and composition
10	17 Sept.	Wed.	Colombo		. Discussion of M/D . Preparation of field survey of solid waste amount and composition
11	18 Sept.	Thur.	Colombo	Colombo 23:55(SQ401)	. Signing of M/D . Report to Embassy and JICA Office . Departure of Government member (Sakata, Sanbongi)
12	19 Sept.	Fri.	Colombo	Singapore— Tokyo	. Preparation of field survey of solid waste amount and composition
13	20 Sept.	Sat.	Colombo		. Preparation of field survey of solid waste amount and composition
14	21 Sept.	Sun.	Colombo		

Survey Schedule of Basic Design Study Team (2/3)

No.	Date	Day	Stay	Movement	Contents of Works
15	22 Sept.	Mon.	Colombo	Tokyo (11:00) (JL717) Bangkok (CX701) Colombo (20:35)	. Site survey at Moratuwa MC . Preparation of field survey of solid waste amount and composition . Arrival of Fujii
16	23 Sept.	Tue.	Colombo		. Site survey at Dehiwala MC . Preparation of field survey of solid waste amount and composition
17	24 Sept.	Wed.	Colombo		. Site survey at Kolonnawa UC . Preparation of field survey of solid waste amount and composition
18	25 Sept.	Thur.	Colombo		. Site survey at Kotte MC . Preparation of field survey of solid waste amount and composition
19	26 Sept.	Fri.	Colombo		. Site survey at Maharagama PS . Field survey (Solid waste amount and composition)
20	27 Sept.	Sat.	Colombo	Colombo 23:55(SQ401)	. Field survey (Solid waste amount and composition) . Departure of Yamauchi
21	28 Sept.	Sun.	Colombo	Singapore (JL712) Tokyo (15:00)	. Field survey (Solid waste amount and composition)
22	29 Sept.	Mon.	Colombo		. Site survey of private workshop . Field survey (Solid waste amount and composition)
23	30 Sept.	Tue.	Colombo		. Site survey of private workshop . Field survey (Solid waste amount and composition)
24	1 Oct.	Wed.	Colombo		. Site survey of private workshop . Field survey (Solid waste amount and composition)
25	2 Oct.	Thur.	Colombo		. Survey of transportation company . Time and motion study . Field survey (Solid waste amount and composition)
26	3 Oct.	Fri.	Colombo		. Time and motion study . Field survey (Solid waste amount and composition)
27	4 Oct.	Sat.	Colombo		. Analysis of survey result (solid waste amount and composition)
28	5 Oct.	Sun.	Colombo		
29	6 Oct.	Mon.	Colombo		. Time and motion study . Analysis of survey result (solid waste amount and composition)

Survey Schedule of Basic Design Study Team (3/3)

No.	Date	Day	Stay	Movement	Contents of Works
30	7 Oct.	Tue.	Colombo		. Time and motion study . Survey of EIA process . Discussion and confirmation of data collected in this period with WPC and 5 local authorities
31	8 Oct.	Wed.	Colombo		. Discussion and confirmation of data collected in this period with WPC and 5 local authorities . Analysis of survey result (solid waste amount and composition) . Preparation of field report
32	9 Oct.	Thur.	Colombo		. Preparation of field report . Report to JICA office . Analysis of survey result (solid waste amount and composition)
33	10 Oct.	Fri.	Colombo		. Confirmation of field report with WPC . Report to Japanese Embassy
34	11 Oct.	Sat.		Colombo 23:55(SQ401)	. Data filing . Departure of team member (Abe, Okawara, Fijii)
35	12 Oct.	Sun.	Tokyo	Singapore (JL712) Tokyo (15:00)	. Arrival in Tokyo

Survey Schedule of Basic Design Explanation Team

No.	Date	Day	Stay	Movement	Contents of Works
1	8 Dec.	Mon.	Colombo	Tokyo (10:35) (CX501) Hong-Kong (CX 701) Colombo Tokyo (UL 455) Colombo	. Explanation Team arrives in Colombo (Government member : Sanbongi, Consultant member: Abe, Okawara)
2	9 Dec.	Tue.	Colombo		. Meeting with Japanese Embassy and JICA Sri Lanka office . Explanation of Draft report to Department of External Resources, Ministry of Local Government, WPC and 5 local authorities
3	10 Dec.	Wed.	Colombo		. Hearing with World Bank regional office concerning progress of Hanwella disposal site and explanation of Draft report . Explanation of Draft report to Ministry of Housing and Urban Development, CEIP, WPC and 5 local authorities.
4	11 Dec.	Thur.	Colombo	Tokyo (SQ 997) Singapore (SQ 402) Colombo	. Preparation of Minutes of Discussion . Discussion of M/D with WPC . Arrival of Team Leader (Shimada) in Colombo
5	12 Dec.	Fri.	Colombo		. Team meeting and preparation of M/D . Discussion of M/D with WPC
6	13 Dec.	Sat.	Colombo		. Team meeting
7	14 Dec.	Sun.	Colombo		.
8	15 Dec.	Mon.	Colombo		. Signing of M/D at the expanded steering committee of CEIP
9	16 Dec.	Tue.		Colombo (23:55) (SQ401)	. Report to Japanese Embassy and JICA office . Meeting with WPC . Departure of Basic Design Explanation Team (Government member: Shimada, Sanbongi, consultant member: Abe, Okawara)
10	17 Dec.	Wed.	Tokyo	Singapore (SQ984 or JL712) Japan	Arrival in Japan

Appendix 3

List of Party Concerned in the Recipient Country

List of Party Concerned in the Recipient Country (1/2)

Name and Organization	Position
Ministry of Finance & Planning	
Department of External Resources	
Mr. M. F. Mohideen	Director General
Mr. J. H. Jayamaha	Director
Department of National Planning (NPD)	
Mrs. S. M. Karunaratne	Director (Human Settlement & Environment)
Ministry of Provincial Councils & Local Government	
Mrs. Padma D. Jayaweera	Additional Secretary
Mr. A. Wijethunga	Senior Asst. Secretary
Ministry of Housing & Urban Development	
Mr. V. K. Nanayakkara	Secretary
Central Environment Authority	
Mr. K. G. D. Bandarathilaka	Deputy Director General (Technical)
Colombo Environmental Improvement Project (CEIP)	
Mr. Roy Jayasinghe	Project Director
Mr. Roshan Boraless	Deputy Director
The World Bank	
Mrs. Nancy Zhao	Senior Operations Specialist
Western Provincial Council (WPC)	
Mr. R. W. Piyasena	Chief Secretary
Mr. D. A. D. Jayawardena	Secretary (Ministry of Agriculture, Animal Production & Health, Irrigation and Lands)
Mr. D. Premasiri Hettiarachchi	Commissioner of Local Government
Mr. W. Dayarante	Director (Planning)
Mr. W. P. Thilakaratue	Director (Revenu)
Mr. G. V. S. Perera	Deputy Secretary (Planning)
Mr. J. A. S. Jayasuriya	Engineer
Colombo Municipal Council (CMC)	
Mr. Deshabandu Karu Jayasuriya	Mayor
Mr. Omar Zuraik Kamil	Deputy Mayor, CMC
Mr. M. A. V. Perera	Municipal Commissioner
Dr. M. Fahmy Ismail	Deputy Municipal Commissioner
Mrs. Visaka Dias	Deputy Municipal Engineer (Works)
Mrs. Thamara Mallawa Arachchi	Superintending Engineer
Mr. Lalith Wickramaratne	Deputy Municipal Engineer (SWM)
Mr. A. P. Gunasantha	Superintending Engineer (SWM))
Dehiwala Mt. Lavinia M.C. (DMMC)	
Mr. Anura Ratnakumara Silva	Deputy Mayor
Mr. Freeson Fernando	Member of Municipal Council (J.P.U.M.)
Mr. Keerthi Singera	Member of Municipal Council (J.P.U.M.)
Mr. W. A. Gunawardene	Municipal Commissioner
Mr. M. B. Sarath Chandra Fernando	Deputy Municipal Commissioner
Mr. H. N. P. Wanigasuriya	Chief Municipal Accountant
Mr. R. L. Gunarathne	Chief Municipal Engineer
Mr. D. N. Jayasooriya	Municipal Engineer
Mr. A. S. M. Perera	Garage Superintend

Name and Organization	Position
Mr. Dayananda Silva	Mayor's Secretary
Moratuwa M.C.	
Mr. A. T. K. Chandradasa	Mayor
Mr. Wirantha Fernando	Deputy Mayor
Mr. A. J. Karunarathna	Municipal Commissioner
Mr. A. J. Rannawahi	Municipal Commissioner
Mr. H. A. C. Pradeepika	Municipal Engineer
Mr. W. D. T. Wimalasiri	Chief Public Health Inspector
Mr. E. M. P. Ekanayaka	Public Health Inspector
Mr. M. H. L. Gunarathna	Technical Staff Assistant
Mr. P. S. Kalubowilla	Officer
Mr. W. S. Piyasena	Officer
Sri Jayawardenapura Kotte M.C.	
Mr. M. P. Perera	Deputy Mayor
Mr. K. S. Wimalaweera	Municipal Commissioner
Mr. H. Gamage	Deputy Municipal Commissioner
Mr. D. C. A. Wanigasekara	Municipal Engineer
Mr. W. A. Ariyadasa	Municipal Treasurer
Mr. D. Kaluarachchi	Officer
Mr. Olbam Perera	Officer
Mr. T. D. Gunawathi	Officer
Mr. W. N. U. Boteju	Officer
Mr. A. H. Gamage	Officer
Mr. W. S. Perera	Officer
Mr. K. H. D. Silva	Chief Public Health Inspector
Mr. H. Jayasekara	Public Health Inspector
Mr. R. W. A. K. K. Wickramasinghe	Public Health Inspector
Kolonnawa U.C.	
Mr. Chandrasiri Dias	Chairman
Mr. T. K. Ratnayaka	Deputy Chairman
Mr. P. Sugathadasa	Secretary
Mr. Y. Wimalasena	Chief Public Health Inspector
Mr. H. L. Sarath Chandra	Superintendent of Work
Mr. R. D. Rannpala	Technical Officer
Mr. L. A. A. Ranasinghe	Technical Officer
Maharagam P.S.	
Mr. Isura Devapriya	Chairman
Mr. D. P. Samarapala Perera	Vice Chairman
Mr. U. D. C. Fernado	Secretary
Mr. G. P. Dharmasir	Superintendent of Work
Mr. K. B. A. Wijeyarathne	Chief Public Health Inspector
Mr. Senaka Kalubowila	Member of Council
Mr. M. D. Buddhipala	Officer
Embassy of Japan	
Mr. Kaname Kanai	First Secretary
JICA Sri Lanka Office	
Mr. Yoshiaki Kana	Resident Representative
Mr. Hideyuki Suzuki	Deputy Resident Representative
Mr. Shinji Yoshiura	Assistant Resident Representative

Appendix 4

Minutes of Discussion

MINUTES OF DISCUSSIONS

BASIC DESIGN STUDY ON THE SOLID WASTE MANAGEMENT PROJECT

FOR COLOMBO METROPOLITAN AREA

IN THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

In response to a request from the Government of the Democratic Socialist Republic of Sri Lanka, the Government of Japan decided to conduct a Basic Design Study on the Solid Waste Management Project for Colombo Metropolitan Area (herein after referred to "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Democratic Socialist Republic of Sri Lanka the basic design study team (herein after referred to "the Team"), which is headed by Mr. Shokichi Sakata, First Project Study Division, Grant Aid Project Study Department, JICA, and is scheduled to stay in the country from September 8 to October 11, 1997.

The Team held discussions with the officials concerned of the Government of the Democratic Socialist Republic of Sri Lanka and conducted a field survey at the study area.

In the course of discussions and survey, both parties have confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Basic Design Study report.

Colombo, September 18, 1997

Mr. Shokichi Sakata
Leader
Basic Design Study Team
JICA

for Mr. J. H. J. Jayamaha
Director
Department of External Resources
Ministry of Finance and Planning

Mrs. Padma D. Jayaweera
Additional Secretary
Ministry of Provincial Councils &
Local Government

Mr. V. K. Nanayakkara
Secretary
Ministry of Housing &
Urban Development

Mr. R. W. Piyasena
Chief Secretary
Western Provincial Council

ATTACHMENT

1. Objective

The objective of the Project is to improve the environmental condition in Colombo Metropolitan Area by procurement of necessary vehicles and equipment.

2. Project Sites

The Project sites are located inside the Colombo Metropolitan Area (Dehiwala Mount Lavinia M.C., Moratuwa M.C., Sri Jayawardenapura Kotte M.C., Kolonnawa U.C. and Maharagama P.S.). The locations of the Project sites are shown in Annex-I.

3. Responsible and Implementing Agencies

(1) Responsible Agencies of the Project

- Ministry of Provincial Councils & Local Government
- Western Provincial Council
- Colombo Environmental Improvement Project Monitoring Committee expanded for the Project

(2) Implementing Agencies of the Project

- Western Provincial Council
- Dehiwala Mount Lavinia M.C.
- Moratuwa M.C.
- Sri Jayawardenapura Kotte M.C.
- Kolonnawa U.C.
- Maharagama P.S.

4. Items requested by the Democratic Socialist Republic of Sri Lanka side.

After discussions with the Team, the items requested by the Democratic Socialist Republic of Sri Lanka side for the realization of the Project were confirmed, as shown in Annex-II. However, final items, quantity and specifications to be procured under Japan's Grant Aid will be decided after further studies.

5. Japan's Grant Aid system

(1) The Government of the Democratic Socialist Republic of Sri Lanka has understood the system of Japanese Grant Aid, described in Annex-III, explained by the Team.

(2) The Government of the Democratic Socialist Republic of Sri Lanka will take the necessary measures, described in Annex-IV, for smooth implementation of the Project on condition that the Grant Aid assistance by the Government of Japan is extended to the Project.

6. Schedule of the study

(1) The Team will proceed to further studies in the Democratic Socialist Republic of Sri Lanka until October 11, 1997.

(2) JICA will prepare the draft report and dispatch a mission to explain it to the Democratic Socialist Republic of Sri Lanka around December, 1997.

(3) If both sides agreed on the contents of the report, JICA will complete the final report and send it to the Government of the Democratic Socialist Republic of Sri Lanka around the end of February, 1998.

7. Other Relevant Issues

(1) The followings are confirmed by both sides.

1) It is urgent and highly required to remove solid waste from urban area and from residential area to maintain living environment in the study area.
A total waste management plan in Colombo metropolitan area is prepared by Colombo Environmental Improvement Project, including construction of Hanwella final disposal site, transfer stations and transportation from the stations to the final disposal site. Implementation schedule of construction of Hanwella disposal site has been finalized. However, there are several months delay at present. And the sites of transfer stations except for Madampitiya and Ratmalana 7th Lane is not identified.
Therefore, intermediate measure is indispensable to achieve above purpose until the total plan is established.

2) The intermediate measure will be executed as a first phase (Phase-I). After Japan side monitor the progress of the total plan and confirmed the construction of the final disposal site and the transfer stations, second phase (Phase-II) will be executed.

a) Phase-I of the Project
Concerning the final disposal, existing and planned disposal sites in each local authority will be used as a intermediate measure. Equipment and vehicles will be procured for solid waste collection and for existing and planned disposal sites in each local authority.

b) Phase-II of the Project
Equipment for the transfer station, named Ratmalana 7th Lane which is decided to be constructed by Western Provincial Council and to be served for Dehiwala Mount Lavinia M.C. and Moratuwa M.C., and transportation vehicles between Ratmalana 7th Lane transfer station and Hanwella disposal site will be procured. Additional collection vehicles for transport to the planned transfer station will be procured also to meet the necessity.

3) As the Project is related to several organizations, Sri-Lanka side expand in order to cover scope of the Project, CEIP steering committee chaired by Secretary of Ministry of Housing & Urban Development to include:

- Secretary of Ministry of Provincial Councils & Local Government
- Secretary of Ministry of Environment & Forestry Resources
- Dehiwala Mount Lavinia M.C.
- Moratuwa M.C.
- Sri Jayawardenapura Kotte M.C.
- Kolonnawa U.C.
- Maharagama P.S.

Existing members of CEIP steering committee are:

- Department of External Resources, Ministry of Finance & Planning
- Department of National Planning, Ministry of Finance & Planning
- Urban Development Authority, Ministry of Housing & Urban Development

- Colombo Environmental Improvement Project, Ministry of Housing & Urban Development
- Western Provincial Council
- National Water Supply & Drainage Board
- Colombo M. C.

4) The committee shall submit the report about the progress of the total plan including construction of Hanwella disposal site and transfer stations to JICA headquarters through JICA Sri-Lanka office.

5) The committee should inform the plan of Madampitiya transfer station which will also serve Kolonnawa U.C., and South Colombo transfer station which will also serve Sri Jayawardenapura Kotte M.C. and Maharagama P.S. including capacity and approximate location to the Team by the end of September, 1997.

(2) Sri-Lanka side confirmed to take the following measures until commencement of Phase-I procurement.

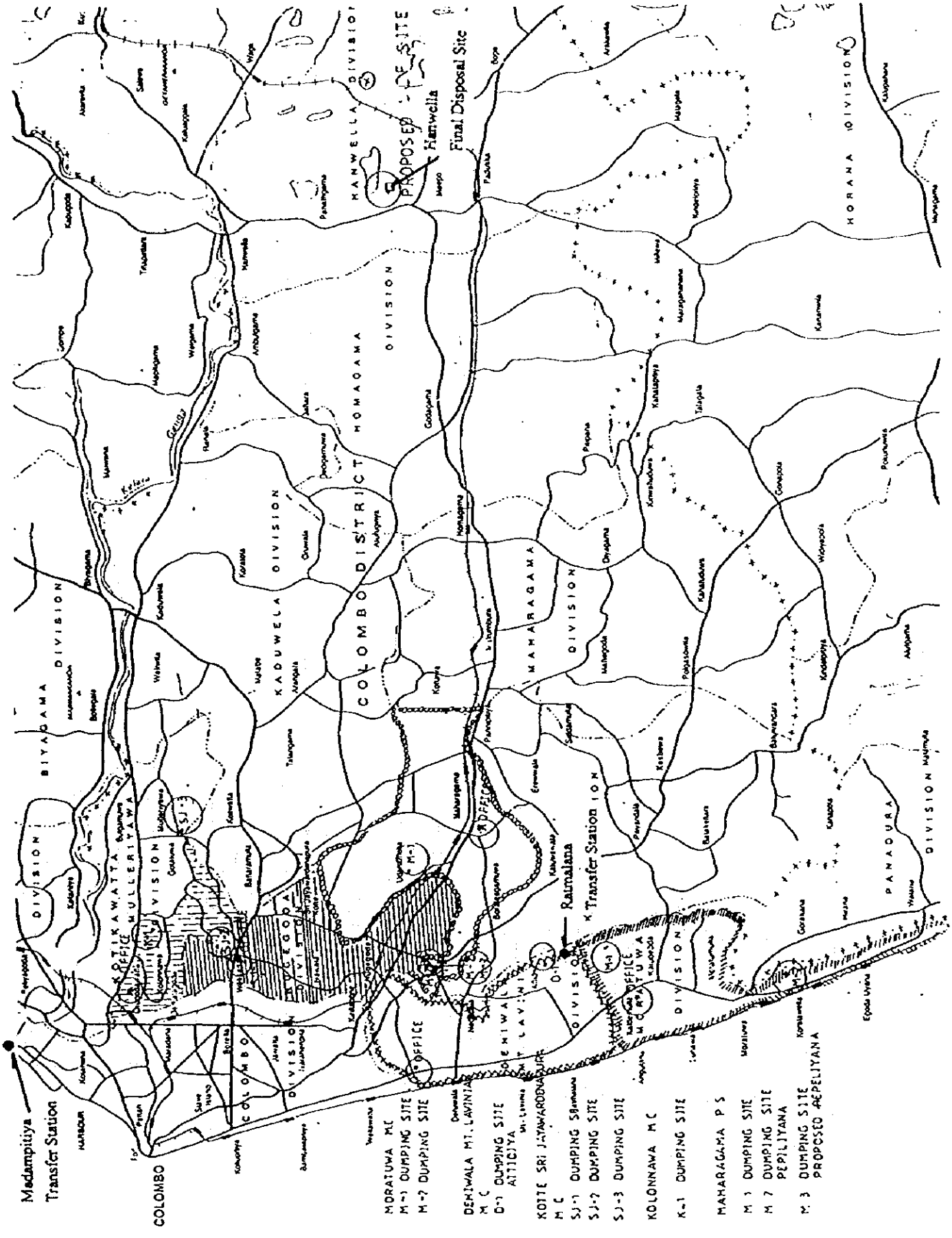
1) To prepare workshop buildings and garages in each local authority.
2) To take necessary measures, such as construction of fences, inspection houses, embankment, etc. for existing and planned disposal sites in each local authority.
3) To prepare the necessary budget and staffs for operation and maintenance.
4) To secure the disposal sites at least for 5 years operation, in each local authority. These disposal sites should be well managed and operated. Dehiwala Mount Lavinia M.C. shall take necessary measures to expand the existing site. Sri Jayawardenapura Kotte M.C. should take necessary measures to prevent pollution at the planned site through examination of environmental effects.
5) To train the workshop staffs in each local authority through full support of Colombo Municipal Council.

(3) Sri-Lanka side confirmed to take the following measures until commencement of Phase-II procurement which will be started after Japan side monitor the progress of the total plan and confirmed the construction of the final disposal site and the transfer stations.

1) To built Ratmalana 7th Lane transfer station and improvement of access road.
2) To set-up necessary organization for operation and maintenance of Ratmalana 7th Lane transfer station.
3) To prepare the necessary budget and staffs for operation and maintenance.

(4) Sri-Lanka side requested to dispatch the experts to advice the necessary measures for the establishment of the total plan, for the improvement of existing/planned disposal site, for the construction of the transfer station and for the establishment of collection and transport plan in the Project area.

Annex- I Project Site



Annex- II Items Requested by the Government of the Democratic Socialist Republic of Sri Lanka

Equipment list	Dehiwla	Moratuwa	Kolonnawa	Kotte	Maharagam	Total
Phase I						
1. Collection equipment						
(1) Compactor 8 m3	7	7	3	3	3	23
(2) Compactor 4 m3	7	0	0	3	0	10
(3) Tipper truck 6 m3	4	2	1	1	2	10
(4) Detachable container truck	2	2	0	1	0	5
(5) Container 6 m3	12	12	0	6	0	30
2. Other equipment						
(1) Dump truck	2	0	0	0	0	2
(2) Wheel loader	1	0	1	1	1	4
(3) Bulldozer	1	0	0	1	0	2
(4) Double cab pick up	1	0	0	1	0	2
3. Spare parts of above (set)	1	1	1	1	1	
4. Maintenance tool (set)	1	1	1	1	1	
Phase II						
1. Transfer station equipment						
(1) Weigh-bridge	1					1
(2) Wheel loader	2					2
(5) Washing equipment	1					1
(6) Vacuume truck	1					
2. Transportation equipment						
(1) Detachable Container truck 20m³	15					15
(2) Container 20 m3	24					24
3. Collection equipment						
(1) Compactor 8 m3		1			1	2
(2) Compactor 4 m3						0
(3) Tipper truck 6 m3		1			1	2
4. Spare parts of above (set)	1	1			1	

Annex- III JAPAN'S GRANT AID PROGRAM

1. Japan's Grant Aid Procedures

(1) The Japan's Grant Aid Program is executed by the following procedures.

- **Application** (request made by a recipient country)
- **Study** (Preliminary Study / Basic Design Study conducted by JICA)
- **Appraisal & Approval** (Appraisal by the Government of Japan and Approval by the Cabinet of Japan)
- **Determination of Implementation** (Exchange of Notes between both Governments)
- **Implementation** (Implementation of the Project)

(2) Firstly, an application or a request for a project made by the recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to see whether or not it is suitable for Japan's Grand Aid. If the request is deemed suitable, the Government of Japan entrusts a study on the request to JICA (Japan International Cooperation Agency).

Secondly, JICA conducts the Study (Basic Design Study), using a Japanese consulting firm. If the background and objective of the requested project are not clear, a Preliminary Study is conducted prior to a Basic Design Study.

Thirdly, the Government of Japan appraises to see whether or not the Project is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA and the results are then submitted for approval by the Cabinet.

Fourthly, the Project approved by the Cabinet becomes official when pledged by the Exchange of Notes signed by both Governments.

Finally, for the implementation of the Project, JICA assists the recipient country in preparing contracts and so on.

2. Contents of the Study

(1) Contents of the Study

The purpose of the Study (Preliminary Study / Basic Design Study) conducted on a project requested by JICA is to provide a basic document necessary for appraisal of the project by the Japanese Government. The contents of the Study are as follows:

a) to confirm background, objectives, benefits of the project and also institutional capacity of agencies concerned of the recipient country necessary for project implementation,
b) to evaluate appropriateness of the Project for the Grant Aid Scheme from a technical, social and economical point of view,
c) to confirm items agreed on by both parties concerning a basic concept of the project,
d) to prepare a basic design of the project,
e) to estimate cost involved in the project.

Final project components are subject to approval by the Government of Japan and, therefore may differ from an original request.

Implementing the project, the Government of Japan requests the recipient country to take necessary measures involved which are itemized on Exchange of Notes.

(2) Selecting (a) Consulting Firm(s)

For smooth implementation of the study, JICA uses (a) consulting firm(s) registered. JICA selects (a) firm(s) through proposals submitted by firms which are interested. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference made by JICA.

The consulting firm(s) used for the study is(are) recommended by JICA to a recipient country after Exchange of Notes, in order to maintain technical consistency and also to avoid possible undue delay in implementation caused if a new selection process is repeated.

(3) Status of a Preliminary Study in the Grant Aid Program

A Preliminary Study is conducted during the second step of a project formulation & preparation as mentioned above.

A result of the study will be utilized in Japan to decide if the Project is to be suitable for a Basic Design Study.

Based on the result of the Basic Design Study, the Government would proceed to the stage of decision making process (appraisal and approval).

It is important to notice that at the stage of Preliminary Study, no commitment is made by the Japanese side concerning the realization of the Project in the scheme of Grant Aid Program.

3. Japan's Grant Aid Scheme

(1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non reimbursable funds needed to procure facilities, equipment and services for economic and social development of the country under the following principles in accordance with relevant laws and regulations of Japan. The Grant Aid is not in a form of donation or such.

(2) Exchange of Notes (E/N)

The Japan's Grant Aid is extended in accordance with the Exchange of Notes by both Governments, in which the objectives of the Project, period of execution, conditions and amount of the Grant, etc. are confirmed.

(3) "The period of the Grant Aid" means one Japanese fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedure such as Exchange of Notes, concluding a contract with (a) consulting firm(s) and (a) contractor(s) and a final payment to them must be completed.

(4) Under the Grant, in principle, products and services of origins of Japan or the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant may be used for the purchase of products or services of a third country origin.

However the prime contractors, namely, consulting, contractor and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons.)

(5) Necessity of the "Verification"

The Government of the recipient country or its designated authority will conclude into contracts in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. The "Verification" is deemed necessary to secure accountability to Japanese tax payers.

(6) Undertakings required to the Government of the recipient country

In the implementation of the Grant Aid, the recipient country is required to undertake necessary measures such as the following:

a) to secure land necessary for the sites of the project and to clear and level the land prior to commencement of the construction work,
b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,
c) to secure buildings prior to the installation work in case the Project is providing equipment,
d) to ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid,
e) to exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts,
f) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified Contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

(7) Proper Use

The recipient country is required to maintain and use facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for their operation and maintenance as well as to bear all expenses other than those to be borne by the Grant Aid.

(8) Re-export

The products purchased under the Grant Aid shall not be re-exported from the recipient country.

(9) Banking Arrangement (B/A)

a) The Government of the recipient country or its designated authority shall open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by Government of the recipient country or its designated authority under the contracts verified.
b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to pay issued by the Government of the recipient country or its designated authority.

Annex- IV Necessary measures to be taken by the Government of the Democratic Socialist Republic of Sri Lanka on condition that Japan's Grant Aid is extended.

1. To bear commissions to the Japanese foreign exchange bank to execute the banking services based upon the banking arrangement.
2. To ensure prompt unloading and customs clearance at port of disembarkation in the Democratic Socialist Republic of Sri Lanka and facilitate internal transportation therein of the products purchased under the Grant.
3. To ensure the customs clearance at the port, inland transportation from the port to each local auganization with the Democratic Socialist Republic of Sri Lanka's expense, and to bear the cost for bonded storage at the port.
4. To exempt Japanese nationals from custom duties, internal taxes and other fiscal levies which may be imposed in the Democratic Socialist Republic of Sri Lanka with respect to the supply of the products and services under the verified contracts. And to take necessary measures for such tax exemption.
5. To accord Japanese nationals, whose services may be required in connection with the supply of products and services under the verified contracts, such facilities as may be necessary for their entry into the Democratic Socialist Republic of Sri Lanka and stay therein for the performance of their work.
6. To use and maintain properly and effectively all the equipment purchased under the Grant.
7. To bear all the expenses other than those covered by the Grant, necessary for the execution of the Project.
8. To provide necessary data and information for the Project.
9. To assign exclusive counterpart engineers and technicians for the Project.

MINUTES OF DICUSSIONS FOR
BASIC DESIGN STUDY ON
THE SOLID WASTE MANAGEMENT PROJECT FOR
COLOMBO METROPOLITAN AREA IN
THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

(Consultation on Draft Final Report)

In September 1997, Japan International Cooperation Agency (JICA) dispatched a Basic Design Study Team on Solid Waste Management Project for Colombo Metropolitan Area (CMA) in the Democratic Socialist Republic of Sri Lanka (hereinafter referred as "the Project") to the Democratic Socialist Republic of Sri Lanka (hereinafter referred as "Sri Lanka"), and through discussions, field survey, and technical examination in Japan, has prepared the draft report of the study.

In order to explain and consult the Sri Lanka side, on the components of the draft report, JICA sent to Sri Lanka a team, which is headed by Mr. Junichi Shimada, Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs, and scheduled to stay in the country from December 8 to December 16, 1997.

As a result of discussion, both parties confirmed the main items described on the attached sheets.

Colombo, December 15,1997

Mr. Junichi Shimada
Grant Aid Division,
Economic Cooperation Division
Ministry of Foreign Affairs

Mr. J. H. J. Jayamaha
Director, Department of External Resources
Ministry of Finance and Planning

Mrs. Padma D. Jayaweera
Additional Secretary
Ministry of Provincial Council and Local Government

Mr. V. K. Nanayakkara
Secretary, Ministry of Housing and Urban Development

Mr. R. W. Piyasena
Chief Secretary, Western Provincial Council

Attachment

1. Components of the Draft Report

The Government of Sri Lanka has agreed and accepted the components of the Draft Report proposed by the Team in principle.

2. Japan's Grant Aid System

(1) The Government of Sri Lanka has understood the system of Japanese Grand Aid explained by the Team in Annex I.

(2) The Government of Sri Lanka will take necessary measures, described in Annex - II, for smooth implementation of the Project on condition that the Grant Aid assistance by the Government of Japan is extended to the Project.

3. Further Schedule

The team will make the Final Report in accordance with the confirmed items, and send it to the Government of Sri Lanka by the end of February, 1998.

4. Other Relevant Issues

The following items were confirmed by both side.

(1) General

The Project will be implemented dividing to two phases. Phase I will be implemented as it is urgently necessary and is requested by all concerned authorities to remove solid waste from urban and residential area and dispose of them as an intermediate measure until the Hanwella disposal site will be started to operate. Phase II will be started after careful monitoring by Japanese side on construction of Hanwella disposal site, construction of planned transfer stations and institutional set up of new financial source for the solid waste management.

(2) Phase I

a. The Team explained that the construction of workshop and garage, and improvement of existing disposal sites are the condition for implementation of Phase I. Sri Lanka side imply that all of 5 local authority has fully understood and has prepared the necessary budget in fiscal year 1998.

b. Sri Lanka side has confirmed that each local authority will prepare the budget for construction of workshop and garage, and improvement of existing disposal site and finish to construct them within budget year of 1998, for implementation of Phase I.

c. Sri Lanka side has confirmed that necessary personnel and budget for sustainable operation and maintenance will be prepared for implementation of Phase I.

(3) Phase II

a. As mentioned above, Phase II will be implemented after careful monitoring by Japanese side .

After analysis and examination in Japan based on the collected data by the Basic Design Study Team, it was discovered that, after completion of Phase II of the Project, the cost required for appropriate solid waste management including transportation and disposal fees will be a big burden for the each local authorities concerning their financial capabilities. The Team has concluded that for a sustainable operation of solid waste management after Phase II, it is indispensable to take necessary measures to secure a new financial source in each local authorities.

b. Sri Lanka side also has agreed to find new financial source and/or system to maintain sustainable service of solid waste management in each local authority to cover the cost. Sri Lanka side will find out and will implement a necessary measures including financial support of the Central Government of Sri Lanka.

c. In order to execute the Phase II of the Project, the Sri Lanka side shall submit the report about the progress of construction on Hanwella disposal site and transfer stations and also financial measures which will be taken by the Central Government of Sri Lanka and also by WPC and by each local authority. The report shall be submitted to JICA headquarters through JICA Sri Lanka office.

Annex- I

JAPAN'S GRANT AID PROGRAM

1. Japan's Grant Aid Procedures

(1) The Japan's Grant Aid Program is executed by the following procedures.

- **Application** (request made by a recipient country)
- **Study** (Preliminary Study / Basic Design Study conducted by JICA)
- **Appraisal & Approval** (Appraisal by the Government of Japan and Approval by the Cabinet of Japan)
- **Determination of Implementation** (Exchange of Notes between both Governments)
- **Implementation** (Implementation of the Project)

(2) Firstly, an application or a request for a project made by the recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to see whether or not it is suitable for Japan's Grand Aid. If the request is deemed suitable, the Government of Japan entrusts a study on the request to JICA (Japan International Cooperation Agency).

Secondly, JICA conducts the Study (Basic Design Study), using a Japanese consulting firm. If the background and objective of the requested project are not clear, a Preliminary Study is conducted prior to a Basic Design Study.

Thirdly, the Government of Japan appraises to see whether or not the Project is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA and the results are then submitted for approval by the Cabinet.

Fourthly, the Project approved by the Cabinet becomes official when pledged by the Exchange of Notes signed by both Governments.

Finally, for the implementation of the Project, JICA assists the recipient country in preparing contracts and so on.

2. Contents of the Study

(1) Contents of the Study

The purpose of the Study (Preliminary Study / Basic Design Study) conducted on a project requested by JICA is to provide a basic document necessary for appraisal of the project by the Japanese Government. The contents of the Study are as follows:

a) to confirm background, objectives, benefits of the project and also institutional capacity of agencies concerned of the recipient country necessary for project implementation,
b) to evaluate appropriateness of the Project for the Grant Aid Scheme from a technical, social and economical point of view,
c) to confirm items agreed on by both parties concerning a basic concept of the project,
d) to prepare a basic design of the project,
e) to estimate cost involved in the project.

Final project components are subject to approval by the Government of Japan and therefore may differ from an original request.

Implementing the project, the Government of Japan requests the recipient country to take necessary measures involved which are itemized on Exchange of Notes.

(2) Selecting (a) Consulting Firm(s)

For smooth implementation of the study, JICA uses (a) consulting firm(s) registered. JICA selects (a) firm(s) through proposals submitted by firms which are interested. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference made by JICA.

The consulting firm(s) used for the study is(are) recommended by JICA to a recipient country after Exchange of Notes, in order to maintain technical consistency and also to avoid possible undue delay in implementation caused if a new selection process is repeated.

(3) Status of a Preliminary Study in the Grant Aid Program

A Preliminary Study is conducted during the second step of a project formulation & preparation as mentioned above.

A result of the study will be utilized in Japan to decide if the Project is to be suitable for a Basic Design Study.

Based on the result of the Basic Design Study, the Government would proceed to the stage of decision making process (appraisal and approval).

It is important to notice that at the stage of Preliminary Study, no commitment is made by the Japanese side concerning the realization of the Project in the scheme of Grant Aid Program.

3. Japan's Grant Aid Scheme

(1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non reimbursable funds needed to procure facilities, equipment and services for economic and social development of the country under the following principles in accordance with relevant laws and regulations of Japan. The Grant Aid is not in a form of donation or such.

(2) Exchange of Notes (E/N)

The Japan's Grant Aid is extended in accordance with the Exchange of Notes by both Governments, in which the objectives of the Project, period of execution, conditions and amount of the Grant, etc. are confirmed.

(3) "The period of the Grant Aid" means one Japanese fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedure such as Exchange of Notes, concluding a contract with (a) consulting firm(s) and (a) contractor(s) and a final payment to them must be completed.

(4) Under the Grant, in principle, products and services of origins of Japan or the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant may be used for the purchase of products or services of a third country origin.

However the prime contractors, namely, consulting, contractor and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons.)

(5) Necessity of the "Verification"

The Government of the recipient country or its designated authority will conclude into contracts in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. The "Verification" is deemed necessary to secure accountability to Japanese tax payers.

(6) Undertakings required to the Government of the recipient country

In the implementation of the Grant Aid, the recipient country is required to undertake necessary measures such as the following:

a) to secure land necessary for the sites of the project and to clear and level the land prior to commencement of the construction work,

b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,

c) to secure buildings prior to the installation work in case the Project is providing equipment,

d) to ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid,

e) to exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts,

f) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified Contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

(7) Proper Use

The recipient country is required to maintain and use facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for their operation and maintenance as well as to bear all expenses other than those to be borne by the Grant Aid.

(8) Re-export

The products purchased under the Grant Aid shall not be re-exported from the recipient country.

(9) Banking Arrangement (B/A)

a) The Government of the recipient country or its designated authority shall open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by Government of the recipient country or its designated authority under the contracts verified.

b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to pay issued by the Government of the recipient country or its designated authority.

Annex II

Necessary measures to be taken by the Government of Sri Lanka in case that Japan's Grant Aid is extended

1. To secure the sites for the project.
2. To clear, level and reclaim the sites prior to commencement of the construction.
3. To undertake incidental outdoor works such as gardening, fencing, gates and exterior lighting in and around the sites.
4. To construct the access road to the sites prior to commencement of the construction.
5. To provide facilities for distribution electricity, water supply, telephone, drainage, sewage and other incidental facilities to the Project sites.
6. To bear commissions to the Japanese foreign exchange bank to execute the banking services based upon the banking arrangement.
7. To exempt taxes and to take necessary measures for customs clearance of the materials and equipment brought for the Project at the port of disembarkation.
8. To accord Japanese nationals, whose services may be required in connection with the supply of products and services under the verified contracts, such facilities as may be necessary for their entry into Sri Lanka and stay therein for the performance of their work.
9. To use and maintain properly and effectively all the equipment purchased under the Grant.
10. To bear all expenses other than those covered by the Grant, necessary for the execution of the Project. Such as transportation and installation of the equipment purchased under the Grant.

Appendix 5

Cost Estimation Borne by the Recipient Country

Cost Estimation Borne by the Recipient Country

No.	Items	Specifications	Quantity	Unit	Unit Cost (Rs)	Cost (Rs)	Remark
I	Phase I						
I-1	Dehiwara MC						
(1)	Construction of Workshop		1	item		5,000,000	
(2)	Construction of Garage Roof		1	item		2,760,000	
(3)	Improvement of Attidiya disposal site		1	item		1,057,120	
	Total of Dehiwara MC					8,817,120	
I-2	Moratuwa MC						
(1)	Construction of Workshop		1	item		3,100,000	
(2)	Construction of Garage Roof		1	item		1,320,000	
(3)	Improvement of Thelawale disposal site		1	item		1,690,400	
(4)	Improvement of Koralawella disposal site		1	item		638,480	
	Total of Moratuwa MC					6,748,880	
I-3	Kolonawa MC						
(1)	Construction of Workshop		1	item		3,100,000	
(2)	Construction of Garage Roof		1	item		480,000	
(3)	Improvement of Meethotamulla disposal site		1	item		2,310,400	
	Total of Kolonawa MC					5,890,400	
I-4	Kotte MC						
(1)	Construction of Workshop		1	item		3,100,000	
(2)	Construction of Garage Roof		1	item		1,080,000	
(3)	Improvement of Moragasmulla disposal site		1	item		498,820	
(4)	Improvement of Thuduwa disposal site		1	item		712,800	
	Total of Kotte MC					5,391,620	
I-5	Maharagama MC						
(1)	Construction of Workshop		1	item		3,100,000	
(2)	Construction of Garage Roof		1	item		600,000	
(3)	Improvement of Kimbulawalla disposal site		1	item		3,027,000	
	Total of Maharagama MC					6,727,000	
I-6	Spare Parts Store in WPC						
(1)	Construction of Spare Parts Store		1	item		2,000,000	
	Grand Total for Phase I					35,575,020	
II	Phase II						
II-1	Construction of Ratmalana Trasfer Station		1	item		46,000,000	
	Grand Total for Phase II					46,000,000