

**THE BASIC DESIGN STUDY
ON THE PROJECT
FOR
IMPROVEMENT OF SOLID WASTE TREATMENT
IN
LOCAL CITIES
IN THE SYRIAN ARAB REPUBLIC**

MARCH 2005

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

In response to a request from the Government of the Syrian Arab Republic, the Government of Japan decided to conduct a basic design study on the Project for Improvement of Solid Waste Treatment in Local Cities and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Syria a study team from November 20 to December 17, 2004.

The team held discussions with the officials concerned of the Government of Syria, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Syria in order to discuss a draft basic design, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Syrian Arab Republic for their close cooperation extended to the teams.

March, 2005

Seiji Kojima
Vice President

Japan International Cooperation Agency

March, 2005

LETTER OF TRANSMITTAL

We are pleased to submit to you the basic design study report on the Project for Improvement of Solid Waste Treatment in Local Cities in the Syrian Arab Republic.

This study was conducted by Yachiyo Engineering Co., Ltd., under a contract to JICA, during the period from November, 2004 to March, 2005. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Syria and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

Finally, we hope that this report will contribute to further promotion of the project.

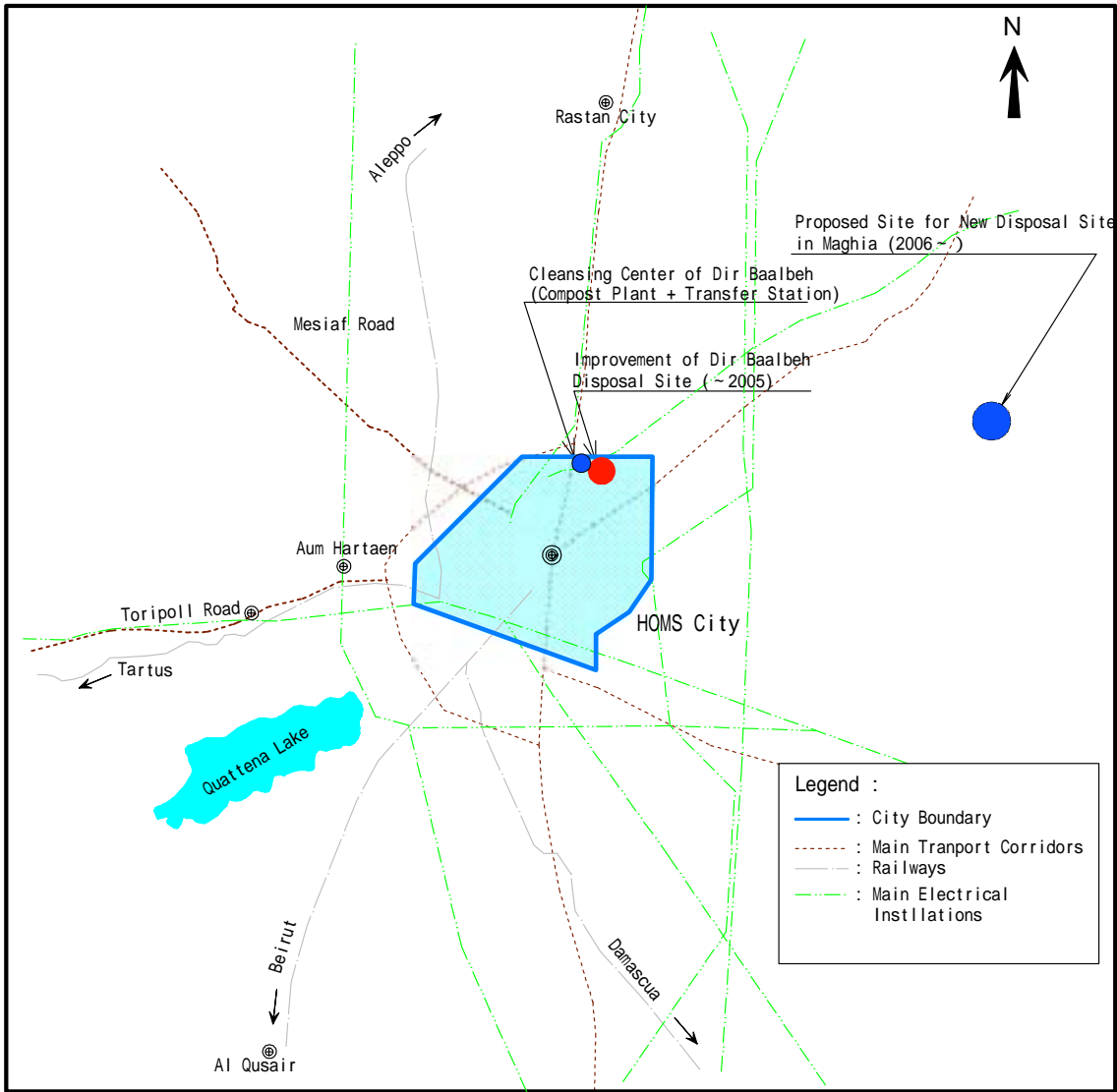
Very truly yours,

Hiroshi Abe

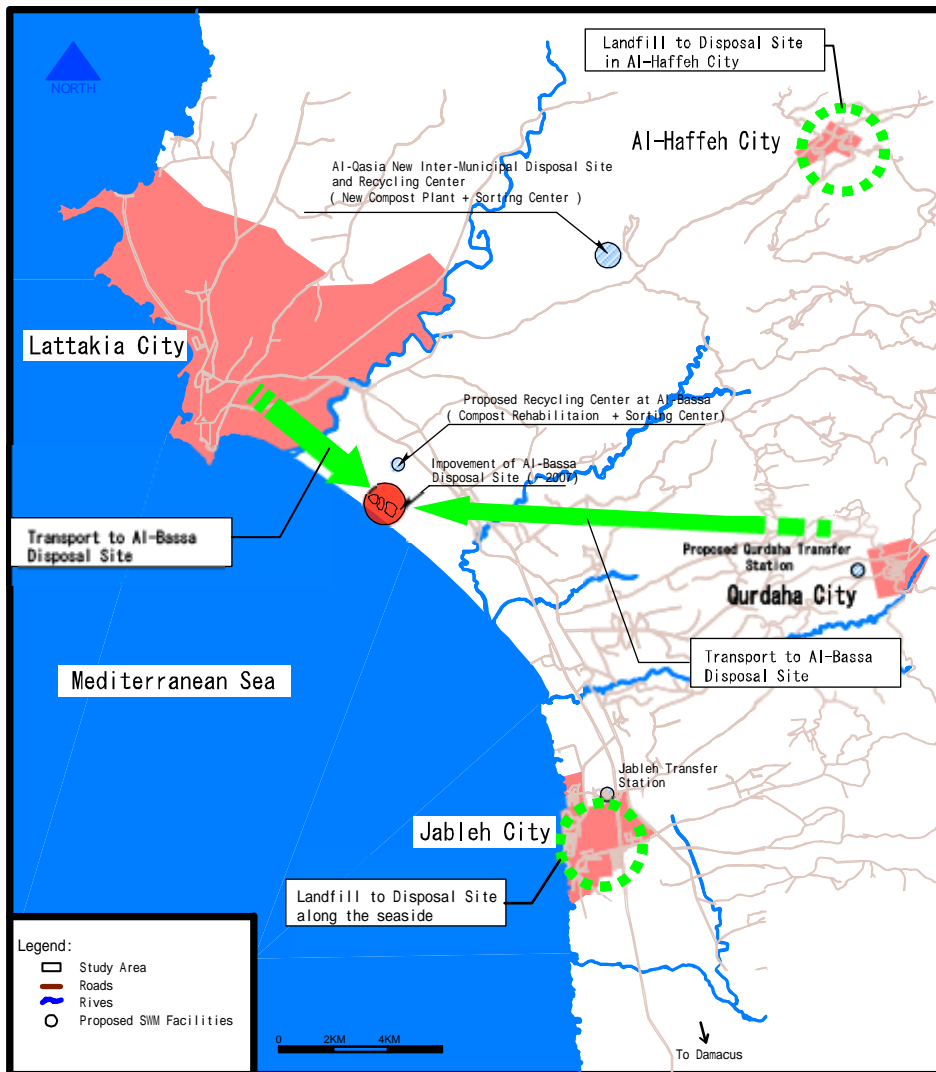
Project Manager,
Basic Design Study Team on
The Project for Improvement of Solid Waste
Treatment in Local Cities
Yachiyo Engineering Co., Ltd.



SYRIAN ARAB REPUBLIC



Location Map of Homs



Location Map of Lattakia and Surrounding Three Cities; Jableh, Al-Haffeh and Qurdaha

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Abbreviations

BOT	Build-Operate-Transfer
DBD	Draft Basic Design Report
E/N	Exchange of Notes
EIA	Environmental Impact Assessment
F/R	Field Report
F/S	Feasibility Study
GDP	Gross Domestic Product
HP	Horse Power
JICA	Japan International Cooperation Agency
M/D	Minutes of Discussion
M/M	Man Month
M/P	Master Plan
MoLAE	Ministry of Local Administration & Environment
Mpa	Mega Pascal
NGO	Non Governmental Organization
O & M	Operation and Maintenance
PCB	Polychlorinated Biphenyl
PDM	Project Design Matrix
ROPS	Roll Over Protective Structure
SP	Syrian Pound
SPC	State Planning Commission
TMS	Time and Motion Study

SUMMARY

SUMMARY

In the Syrian Arab Republic (hereinafter referred to as “Syria”), Homs (population of 1,100 thousand) which is the country’s third largest city in terms of the socioeconomic size and Lattakia (population of 410 thousand) which is the fourth largest city are estimated to generate 900 tons/day and 336 tons/day of solid waste respectively as of 2004. Similarly, three cities near Lattakia, i.e. Jableh with a population of 100 thousand, Al Haffeh with a population of 23 thousand and Qurdaha with a population of 55 thousand, are estimated to generate 70 tons/day, 16 tons/day and 39 tons/day of solid waste respectively.

However, as the collection rate of municipal waste which can be achieved by routine waste collection work in these cities is believed to be approximately 61 – 83% of the generated amount of waste, solid waste has begun to pile up in some areas of these cities.

If this situation is allowed to continue, the collection rate will further decline in the coming years because of the deterioration of equipment and the increased amount of generated solid waste due to population increase, accelerating the piling up of solid waste throughout these cities. Piles of uncollected solid waste not only have adverse impacts on the environment due to spontaneous ignition and the production of smoke and bad odour but also create a very unhygienic situation. Moreover, the risk of fire is also increased. Such an unhygienic situation can lead to the breeding of harmful insects and rats, etc. and the prospect of the spread of disease with these insects and rats acting as intermediaries cannot be negated.

Meanwhile, some 2 tons/day and 1 ton/day of medical waste are believed to be generated in Homs and Lattakia respectively. As infections and other adverse impacts on the human body could result from this type of waste, it is firstly sorted at the source of generation, i.e. at medical institutions. Because of the insufficiency of the exclusive collection of medical waste, however, there is a risk of secondary infection via waste collection vehicles, waste collection workers and collected solid waste.

In 2002, using Japan’s technical cooperation scheme (Development Study: The Study on Solid Waste Management at Local Cities in Syrian Arab Republic), the Government of Syria formulated a master plan and conducted a feasibility study for priority projects to improve solid waste management in Homs, Lattakia and the three surrounding cities of Lattakia for the purposes of improving the general practice of solid waste management to create a recycling society in the future, in addition to solving the problems for solid waste collection and transportation. The priority project proposed by this study had three components: ① procurement of solid waste collection and transportation equipment and road cleansing equipment, ② construction of transfer/intermediate treatment facilities and ③ rehabilitation of existing landfill sites.

Because of the difficulty of project funding due to the severe fiscal situation, the Government of Syria made a request to the Government of Japan in August, 2003 for the provision of grant aid to implement the above-mentioned three components of the priority project and the education of local residents as an additional component. The position of the grant aid request was to realise the priority projects selected in the development study, whose result is a master plan for the area.

In response to this request, the Government of Japan assigned the Japan International Cooperation Agency (JICA) to conduct the Preliminary Study which acted as the pathfinder for the present Basic Design Study. This Preliminary Study confirmed the urgency for the procurement of solid waste collection and transportation equipment as well as mechanical road cleansing equipment and the necessity for Japanese assistance. Meanwhile, the urgency for the construction of transfer/intermediate treatment facilities was judged to be low, the rehabilitation of the existing landfill sites was judged to be implementable based on self-help efforts and the education of local residents was judged to fall under the technical cooperation scheme rather than the grant aid scheme. Consequently, it was recommended that the purpose of the target project of the Basic Design Study should solely focus on the improvement of solid waste collection and transportation.

Based on the recommendation of the Preliminary Study, JICA decided to conduct the Basic Design Study and sent the Basic Design Study Team to Syria from 20th November to 17th December, 2004. This Study Team confirmed the contents of the request through discussions with Syrian officials of the Ministry of Local Administration and Environment and the Homs and Lattakia Municipalities, etc. and conducted a field survey. On its return to Japan, the Study Team analysed all of the relevant information. Following this analysis in Japan, the JICA sent a team to Syria from 25th February to 4th March, 2005 to explain and discuss the contents of the basic design with the Syrian side.

The basic design for the requested grant aid project as finalised through these studies is outlined below.

Basic Design Policy

Project area	: Homs, Lattakia and three surrounding cities of Lattakia (Jableh, Al Haffeh and Qurdaha)
Types of target waste	: municipal waste and medical waste
Design target year	: 2010
Design collection ratio of municipal waste	: Homs : 95%, Lattakia : 90%, Jableh : 80%, Al Haffeh : 90%, Qurdaha : 90%
Design collection ratio of medical waste	: Homs : 100%, Lattakia : 100%

Outline of equipment to be procured

Equipment No.	Type of Equipment	Homs	Lattakia	Jableh	Al Haffeh	Qurdaha	Total
1.	Compactor truck Type 1 (8 m ³)	44	18	3	–	–	65
2.	Compactor truck Type 2 (4 m ³)	12	14	4	3	–	33
3.	Dump truck (6 m ³)	–	4	3	0	1	8
4.	Medical waste truck Type 1 (2 ton dump truck)	2	–	–	–	–	2
5.	Medical waste truck Type 2 (1 ton van truck)	–	1	–	–	–	1
6.	Wheel loader	–	1	1	0	1	3
7.	Container washing truck	–	2	–	–	–	2
8.	Mechanical sweeper	5	3	0	–	–	8
9.	Sprinkler truck	–	2	–	–	–	2
	Total	63	45	11	3	2	124
-	Spare Parts	One set	One set	One set	One set	One set	

Outline of Soft Component Plan

Technical guidance for efficiency promotion of solid waste collection: technical guidance on the development of the system and learning of the method to facilitate the appropriate discharge of solid waste by local residents

The total project cost is estimated approximately as 1.047 billion JPY; cost to be borne by Japanese side through the grant aid: 1,001 million JPY; cost to be borne by Syrian side: 46 million JPY, respectively.

In Homs, Lattakia and Jableh, it is an urgent requirement to promote the municipal waste collection capacity since the waste difficult to collect through usual work reaches at 27 t/day – 150 t/day. In order to cover the mentioned urgent requirement, earlier procurement of Compactor truck Type 1 (8 m³) is effective. Therefore Compactor truck Type 1 (8 m³) is planned to procure earlier as Phase 1 and the others is procured as Phase 2. The outline of each phase is as follows;

Item	Phase 1	Phase 2	Total
Purpose	Promotion of municipal waste collection capacity	Secure of municipal waste collection capacity through expansion of capacity and appropriate arrangement of equipment	
Target Area	Homs, Lattakia and Jableh	Homs, Lattakia, Jableh, Al Haffeh and Qurdaha	
Contents	Compactor truck Type 1 (8m ³): 65 and spare parts	Compactor truck Type 2 (4m ³): 33 Dump truck (6m ³): 8	

Item	Phase 1	Phase 2	Total
	Soft Component: 1 lot	Medical waste truck Type 1 (2 ton dump truck): 2 Medical waste truck Type 2 (1 ton van truck): 1 Wheel loader: 3 Container washing truck: 2 Mechanical sweeper: 8 Sprinkler truck: 2 Spare parts	
Estimated Cost	Japan: 580 million JPY Syria: 34 million JPY Total: 614 million JPY	Japan: 421 million JPY Syria: 12 million JPY Total: 433 million JPY	Japan: 1,001 million JPY Syria: 46 million JPY Total: 1,047 million JPY
Implement Period	Detail Design: 1.5 months Tendering: 2.0 months Procurement: 8.0 months Total: 11.5 months	Detail Design: 0.5 months Tendering: 2.0 months Procurement: 8.0 months Total: 10.5 months	Detail Design: 2.0 months Tendering: 4.0 months Procurement: 16.0 months Total: 22.0 months

The implementation of the project is expected to achieve the following improvements, indicating a great beneficial effect on the improvement of urban hygiene.

- The procurement of new solid waste collection and transportation vehicles will improve the collection rate of municipal solid waste from 61 – 83% (2004) to 80 – 95% (2010). The number of people benefiting from this improvement in 2010 will be 1,226 thousand in Homs, 467 thousand in Lattakia, 118 thousand in Jableh, 29 thousand in Al Haffeh and 66 thousand in Qurdaha, totalling 1,906 thousand.
- Medical waste generated in Homs and Lattakia, of which approximately 25% is collected by dedicated vehicles in 2004, will be almost entirely collected and appropriately disposed of in 2010 (target rate: 100%), reducing the risk of secondary infection, etc. from medical waste through the waste collection service.
- In Lattakia which is a tourist city, the containers in tourist areas will be quickly and systematically cleaned by a container washing vehicle.
- As local residents will dispose of waste in an appropriate manner, the solid waste collection rate will improve. In addition, the need for the deployment of vehicles to deal with solid waste discharged in an appropriate manner will be reduced.

Solid waste management implementing bodies are Homs, Lattakia, Jableh, Al Haffeh and Qurdaha. All of the cities have enough manpower such as further exceeding number of drivers than that of vehicles. Hence, hardly any particular reinforcement of the maintenance staff will be required for utilizing new equipment to be procured by the Project.

In addition, as the procurement of new vehicles under the Project is expected to facilitate the withdrawal of very old vehicles on which tremendous cost is spent for operation and maintenance, expense which can be reduced for withdrawal of vehicles can cover the cost for operation and maintenance for new equipment to be procured. Therefore, there is no particular obstacle for securing manpower or operation and maintenance cost.

It is considered that custom clearance and inland transportation of the procured equipment and procurement of the solid waste collection containers to be used by the planned compactor trucks can be implemented in Syria and obliged to Syrian Government. Therefore, in case that the Project is implemented as grant aid, these obligations are to be carried out by Syrian side.

The intention of the Syrian side to bear the necessary expenses is confirmed by an official document and, therefore, these obligations will be properly met by the Syrian side as planned.

The Syrian side has already rehabilitated the existing landfill sites at Homs and Lattakia to implement sanitary landfill operation based on its self-help efforts and is proceeding with the plan to construct new landfill sites in line with the wide area disposal plan for the future. Accordingly, it is judged that sanitary landfill operation will continue after the completion of the Project.

Based on the above, the Project should prove to be both effective and feasible from the viewpoints of its effects, operation and management and scope, etc. and is highly relevant to the objective of Japan's grant aid scheme because of the great significance of the Japanese assistance.

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CHAPTER 1

BACKGROUND OF THE PROJECT

CHAPTER 1 BACKGROUND OF THE PROJECT

1.1 Background and Outline of the Request for Grant Aid

(1) Components of the Request for Grant Aid

In August 2003, the Government of the Syrian Arab Republic (hereinafter referred to as “Syria”) requested a grant aid to the Government of Japan for the project fund that aims at improving equipment and facility positioned as priority projects during previous JICA development study, for Homs and Lattakia as well as three surrounding cities of Lattakia, i.e. Jableh, Al Haffeh and Qurdaha.

Contents of the request for grant aid are summarized in four components as follows, shown in Table 1.1-1.

- 1) Construction of facilities for intermediate treatment and transfer of solid waste
- 2) Procurement of equipment necessary for rehabilitation and operation and maintenance of existing landfill site
- 3) Procurement of equipment necessary for collection of solid waste and mechanical road cleansing
- 4) Educational activities for local residents

Table 1.1-1 Components of the request for grand aid

Components of the request for grand aid	
Homs city	Lattakia city as well as three surrounding cities of Lattakia, i.e. Jableh, Al Haffeh and Qurdaha
Construction of facilities	Construction of facilities
1. Waste disposal center (1)	1. Recycling center (1)
2. Rehabilitation of existing landfill site (1)	2. Rehabilitation of existing landfill site (1)
3. Medical waste treatment facility (1)	
Procurement of equipment	Procurement of equipment
1. Municipal solid waste collecting truck, mechanical sweeper (59)	1. Municipal solid waste collecting truck, mechanical sweeper (47)
2. Medical waste collecting vehicles (3)	2. Equipment for operation & maintenance for recycling center (6)
3. Equipment for operation & maintenance for waste disposal center (8)	3. Equipment for operation & maintenance for landfill site (3)
4. Equipment for operation & maintenance for landfill site (4)	
Others	Others
1. Educational activities for local residents	1. Educational activities for local residents

(2) Confirmation of Requested Items in the Preliminary Study

In June 2004, JICA conducted a preliminary study and prioritize components of the Project. As a result, JICA proposed implementation of the grant aid of which aim was narrowed down the focus to “procurement of equipment necessary for collection of solid waste and mechanical road cleansing” according to following reasons:

- 1) It would appear that construction of facilities for intermediate treatment and transfer of solid waste is less urgent compared to be with other components.
- 2) It would appear that rehabilitation of existing landfill site can be implemented by self-effort of Syria, in consideration of recent situation of improvement of landfill sites.
- 3) It would appear that educational activities for local residents are difficult to be implemented under the grant aid scheme
- 4) It would appear that procurement of equipment necessary for collection of solid waste and mechanical road cleansing is assuming overriding urgency and the immediate grant aid needs to be implemented

The quantities of equipment originally requested in August, 2003 as necessary for the collection of solid waste and mechanical road cleansing were determined under the previous JICA development study with a target year of 2006. Even if the requested quantities of equipment were to be procured in full under the present grant aid project with the completion of the equipment procurement in 2006, it was believed to be highly likely that a new equipment shortage would occur immediately. Accordingly, the originally requested quantities of equipment were revised.

(3) Confirmation of Request during the Basic Design Study

For the purpose of the present Basic Design, it was confirmed that the scope of the grant aid cooperation would be narrowed down to “the procurement of equipment necessary for the collection of solid waste and mechanical road cleansing” based on the consent reached and recommendations made in the Preliminary Study.

At the time of the Basic Design, an additional request was made by the Syrian side for the procurement and supply of spare parts under the Project. Table 1.1-2 shows the changes of the contents of the Syrian request regarding the procurement of equipment necessary for the collection of solid waste and mechanical road cleansing.

(4) Necessity of Project

For year 2004, amount of generated municipal waste is estimated to be 900 tons/day in Homs, 336 tons/day in Lattakia, 70 tons/day in Jableh, 16 tons/day in Al Haffeh and 39 tons/day in Qurdaha. In each city, generated municipal waste is collected during six days a week except Friday as a holiday. With a central focus on relatively new equipment under the optimum condition, existing equipment is routinely used for two shifts, i.e. day and night shifts. However, due to deterioration and shortage of equipment for collection and transportation of waste, the collection rate of municipal waste in the Project area is approximately 61 – 83% of the generated amount of waste. **That is to say**, it is believed that municipal waste of 150 tons per day in Homs, 126 tons per day in Lattakia, 27 tons per day in Jableh, 4 tons per day in Al-Haffeh, and 9 tons per day in Qurdaha cannot be collected by routine waste collection work. Solid waste has begun to pile up in some areas of these cities.

Meanwhile, some 2 tons/day and 1 ton/day of medical wastes are generated in Homs and Lattakia respectively. These wastes have risks for infections and other adverse impacts on the human body, hence source segregation and exclusive collection are required. But at present, due to shortage of equipment, the collection ratios of medical waste in both Homs and Lattakia are as low as approximately 25%

Because medical waste not collected exclusively is disposed as municipal waste, there is a risk of secondary infection via waste collection vehicles, waste collection workers and collected solid waste.

Accordingly, there is an urgent need to increase the fleet size of the waste collection and transportation vehicles, underlining the strong necessity for the requested Project.

Table 1.1-2 Changes of No. of the equipment requested

Stages of request Equipment	No. of the equipment initially requested (August 2003)						No. of the equipment requested during Preliminary Study (June 2004)						No. of the equipment requested during Basic Design Study (November 2004)						
	City	Homs	Lattakia	Jableh	Al-Haffeh	Qurdaha	Total	Homs	Lattakia	Jableh	Al-Haffeh	Qurdaha	Total	Homs	Lattakia	Jableh	Al-Haffeh	Qurdaha	Total
Compactor truck 8 m ³		39	15	7			61	42	18	3			63	42	18	3			63
Compactor truck 4 m ³		6	7	3	3	1	20	10	10	3	3		26	10	10	3	3		26
Compactor truck 2 m ³									8				8		8				8
Dump truck 8 m ³											1		1				1		1
Dump truck 6 m ³		5	2	2	1	1	11		4	2			6		4	2			6
Medical waste collecting vehicle								2	1				3	2	1				3
Wheel loader			1	1			2		1	1	1	1	4		1	1	1	1	4
Wash container			1				1		3				3		3				3
Mobile workshop								1	1				2	1	1				2
Mechanical sweeper		6					6	10	3	1			14	10	3	1			14
Sprinkler truck		3	2				5		2				2		2				2
Total		59	28	13	4	2	106	65	51	10	5	1	132	65	51	10	5	1	132
Spare parts														1set	1set	1set	1set	1set	

CHAPTER 2

CONTENTS OF THE PROJECT

CHAPTER 2 CONTENTS OF THE PROJECT

2.1 Basic Concept of the Project

The Project aims at improving the waste collection and transportation capacity of such cities in the Syrian Arab Republic (hereinafter referred to as “Syria”) as Homs and Lattakia as well as three surrounding cities of Lattakia, i.e. Jableh, Al Haffeh and Qurdaha.

As the collection rate of municipal waste which can be achieved by routine waste collection work in these cities is believed to be approximately 61 – 83% of the generated amount of waste, solid waste has begun to pile up in some areas of these cities. If this situation is allowed to continue, the collection rate will further decline in the coming years because of the deterioration of equipment and the increased amount of generated solid waste due to population increase, accelerating the piling up of solid waste throughout these cities. Piles of uncollected solid waste not only have adverse impacts on the environment due to spontaneous ignition and the production of smoke and bad odour but also create a very unhygienic situation. Moreover, the risk of fire is also increased. Such an unhygienic situation can lead to the breeding of harmful insects and rats, etc. and the prospect of the spread of disease with these insects and rats acting as intermediaries cannot be negated.

While all of the target cities of the Project plan to reinforce and renew their solid waste collection vehicles to solve these problems, the difficulty of raising the necessary funds means that such plans cannot be sufficiently implemented.

Actually, amount of generated municipal waste is estimated to be 900 tons/day in Homs, 336 tons/day in Lattakia, 70 tons/day in Jableh, 16 tons/day in Al Haffeh and 39 tons/day in Qurdaha for year 2004. And capable amount of collected waste by the routine service is 750 tons/day in Homs, 250 tons/day in Lattakia, 43 tons/day in Jableh, 12 tons/day in Al Haffeh and 30 tons/day in Qurdaha. The amount of municipal waste of which the collection is difficult by the routine waste collection service is, therefore, estimated to be 150 tons/day in Homs, 86 tons/day in Lattakia, 27 tons/day in Jableh, 4 tons/day in Al Haffeh and 9 tons/day in Qurdaha. Given the urgency of preventing the piling up of such solid waste in urban areas, reinforcement and renewal of the collection and transportation equipment are urgently required.

Meanwhile, some 2 tons/day and 1 ton/day of medical waste are believed to be generated in Homs and Lattakia respectively. As infections and other adverse impacts on the human body could result from this type of waste, it is firstly sorted at the source of generation, i.e. at medical institutions. Because of the

insufficiency of the exclusive collection of medical waste, however, there is a risk of secondary infection via waste collection vehicles, waste collection workers and collected solid waste. At present, the collection rate of medical waste in both Homs and Lattakia is as low as approximately 25%, suggesting an urgent need for appropriate collection and disposal through the prompt introduction of exclusive collection vehicles for this type of solid waste.

Both Homs City Council and Lattakia City Council are proceeding with the construction of new sanitary landfill sites, each serving a wide area, for the purposes of eliminating the solid waste collection and transportation capacity shortage and of establishing an efficient solid waste management system. Both city councils plan to develop a wide area solid waste disposal system using the new landfill site as the core facility with a target year of 2008. The scope of this plan includes the improvement of collection and transportation equipment, development of intermediate treatment facilities, introduction of transfer facilities/equipment and construction of disposal sites. The Project discussed in this report caters for the improvement of collection and transportation equipment. The target of the Project is improvement of the collection ratio of municipal waste which is collected by routine collection work to 95% in Homs, 90% in Lattakia, 80% in Jableh, 90% in Al Haffeh and 90% in Qurdaha while increasing the collection ratio of medical waste to 100% in both Homs and Lattakia.

The Project aims at procuring solid waste collection and transportation equipment to conduct collection and transportation work using these vehicles to achieve the above-mentioned goals. The procurement of new equipment under the Project is expected to greatly improve the current solid waste collection and transportation system which is essential to achieve the said goals. The scope of the Japanese assistance is the procurement of solid waste collection and transportation equipment.

2.2 Basic Design of Requested Japanese Assistance

2.2.1 Design Policies

(1) Basic Policies

The Project Areas are Homs, Lattakia and three surrounding cities of Lattakia (Jableh, Al Haffeh and Qurdaha) and the Project intends the procurement of new equipment for the purpose of improving the collection and transportation capacity of solid waste and the road cleansing capacity in these areas.

The design target year is 2010 and the types of target waste of the Project are municipal waste and medical waste. The latter means hazardous waste which is separated by medical institutions from

other types of waste because of its high risk of adversely affecting the human body in the form of infections, etc. while the scope of municipal waste excludes industrial waste and construction debris. The industrial waste in the present context means industrial waste from large factories which are responsible for intermediate treatment and transportation to a final disposal site for such waste. Meanwhile, the construction debris means surplus soil, debris and rubble generated by construction work or building demolition work.

Although Syrian side had requested procurement of mobile workshop, the mobile workshop is used for operation and maintenance of waste collection vehicles which Syrian side should manage on their own responsibility. Therefore, the mobile workshop will be excluded from target of the grant aid.

(2) Policies Regarding Division of Work with Recipient Country

The Project will mainly consist of four elements as listed below. Among these elements, the Japanese side will provide assistance for 1) the procurement of solid waste collection and transportation equipment and 2) the maritime transportation of the procured equipment under Japan's grant aid scheme as these are difficult to implement with the financial resources available in Syria. Meanwhile, the Syrian side will conduct 3) the domestic inland transportation of the equipment and 4) the procurement of collection containers based on its own self-help efforts.

- 1) Procurement of solid waste collection and transportation equipment
- 2) Maritime transportation of the procured equipment
- 3) Inland transportation of the procured equipment in Syria
- 4) Procurement of waste collection containers

The scope of the grant aid covers the procurement of equipment, transportation to a Syrian trading port, such as Port Lattakia or Port Tartus, and landing of the equipment at the ports. Subsequent inland transportation, including customs clearance work, will be undertaken by the Syrian side. The containers required for the collection of solid waste will be procured by the Syrian side at its own expense and will be placed throughout the Project Areas.

(3) Policies Regarding Natural Conditions

The natural conditions in the Project Areas do not demand any special consideration in regard to the design of the requested equipment. Accordingly, no special design will be prepared in connection with the natural conditions.

(4) Policies Regarding Socioeconomic Conditions

The dumping of waste in streets and at vacant plots has become a routine practice for local residents of the Project Areas who appear to take it for granted that it is the responsibility of the municipal authority to clean up this waste. Although it is easy to propose solid waste collection at pre-determined times, separated refuse collection and the cleaning of collection points by local residents which is the case in Japan, the education of local residents over a long period of time is judged to be necessary to actually put such arrangements into practice. The immediate introduction of these arrangements could offend peoples and conduct to increase of the waste amount which is discharged in inappropriate manner and which is difficult to efficiently collect. Accordingly, an equipment plan will be formulated to suit the current waste discharge method employed in the Project Areas.

(5) Policies Regarding Local Procurement Situation and Trade Customs

The existence or non-existence of local agents of equipment manufacturers in Syria significantly affects the ease of maintenance of trucks and construction machinery, including the purchase of spare parts. Accordingly, the equipment plan will be formulated so as to allow the involvement of manufacturers with an agent in Syria as long as the required basic specifications are met.

(6) Policies Regarding Use of Local Companies

As the requested equipment is not manufactured in Syria, the consideration of a local company in connection with manufacture is unnecessary. If equipment of a manufacturer which has an agent in Syria is procured, this agent will be used at the operation and maintenance stage.

For such undertakings by the Syrian side as the inland transportation and manufacture of containers, local companies will be used.

(7) Policies Regarding Operation and Maintenance Capability of Implementing Agencies

As far as the operation of the collection vehicles is concerned, no problems are anticipated in regard to securing a sufficient number of crew members because of the presence of personnel (spare drivers) in excess of the number of vehicles in possession and also because of the progress of withdrawing old vehicles from service in line with the introduction of newly procured vehicles.

In regard to equipment maintenance, difficult maintenance and repair work is almost entirely entrusted to a private garage. Because of the expected continuation of this practice and the common

nature of the requested vehicles, no special consideration is required in regard to the equipment maintenance and repair capability of the implementing agencies. However, the proper operation and maintenance of the equipment will require a funding source which is capable of financing the periodic replacement of parts and repair work necessitated by accidents, etc. and the scale of equipment procurement will match the budget size which can be secured by the Syrian side for the purpose of equipment maintenance and repair.

(8) Policies Regarding Equipment Grades

Based on the policies regarding the various aspects of the Project, no special design is required for the equipment to be procured under the Project. As such, ordinary type of equipment will be procured.

(9) Policies Regarding Procurement Method and Schedule

Even though the equipment to be procured is restricted to solid waste collection and transportation equipment which do not require any installation work, more than one manufacturer will be involved. As equipment of different manufacturers will need to be put together for handing over, the Project will be planned as an equipment procurement (without installation) project under which a Japanese trading firm will be responsible for equipment procurement.

In Homs, Lattakia and Jableh, it is an urgent requirement to promote the municipal waste collection capacity since the waste difficult to collect through usual work is much. In order to cover the mentioned urgent requirement, the Project will be divided into two phases and larger capacity's truck should be procured in the earlier phase.

It is believed that approximately one year will be required for each phase from the signing of the E/N to the final handing over of the equipment to the Syrian side. Therefore, the schedule will be arranged so that the Project is completed as "a single fiscal year project".

2.2.2 Basic Plan

2.2.2.1 Overall Plan

Under the Project, the range of equipment listed below will be procured to improve the capability of the city councils of Homs, Lattakia and three surrounding cities of Lattakia, i.e. Jableh, Al Haffeh and Qurdaha, to collect and transport municipal waste and medical waste and to clean the streets. No

installation work will be involved in view of the fact that all of the equipment consists of vehicles/construction machines.

- (1) Municipal waste collection and transportation equipment
- (2) Medical waste collection and transportation equipment
- (3) Road cleansing equipment
- (4) Container washing equipment

2.2.2.2 Design Conditions

(1) Design Population

The estimated population in the target year of 2010 in each Project Area is shown in Table 2.2.2-1. These population figures will be used as the design population for the Project.

Table 2.2.2-1 Design Population for the Project

Homs	Lattakia	Three Surrounding Cities of Lattakia		
		Jableh	Al Haffeh	Qurdaha
1,226	467	118	29	66

(Unit: 1000)

The above population for each city was estimated in the following manner.

1) Homs

Based on the population census results for 2004 which are currently in the process of being totalled, Homs City Council estimates that the city's population in 2004 is 1,100,000 and that the current population growth rate is 2.3% a year. Homs has many special activity personnel with families and such temporary residents as students, etc. Neither of these categories is included in the said census and their total number is estimated to be 235,000. The above figure of 1,100,000 includes these 235,000 persons. As the target population of the cleansing service must be based on the number of residents regardless of them being temporary residents or not, the target population of the present cleansing service is put at 1,100,000. The estimated population growth based on the current population size and annual population growth rate is shown in Table 2.2.2-2 and the estimated population in 2010 is adopted as the design population for Homs for the Project. No increase of special activity personnel and students, etc. is considered in this estimate as their number has no direct link to the natural increase of the city's population.

Table 2.2.2-2 Estimation of Design Population for Homs

(Unit: 1000)

Year	2004	2005	2006	2007	2008	2009	2010
Population subject to census	865	885	905	926	947	969	991
Population outside the scope of census	235	235	235	235	235	235	235
Total	1,100	1,120	1,140	1,161	1,182	1,204	1,226

The suitability of the above estimate is supported by the population estimate based on 1994 population census data by the JICA development study (the Study on Solid Waste Management at Local Cities in the Syrian Arab Republic; hereinafter referred to as “the previous study”) conducted in 2001 which put the population in 2005 and the annual population growth rate for Homs at 1,131,000 and 3% respectively.

2) Lattakia

The estimated population of Lattakia as of 2004 is 410,000 based on the population census results which are currently in the process of being totalled. The current population growth rate is put at 2.2% a year. There are no special population categories in Lattakia which should be added to the city’s population. While the amount of generated solid waste temporarily increases during the summer because of a large number of tourists visiting and staying in the city, this phenomenon only lasts for a short period of time. As it is believed that the extra amount of solid waste can be sufficiently dealt with by a minor increase of over-time, no special addition is made to the census population data.

The estimated population growth for Lattakia based on the current population size and the annual population growth rate is shown in Table 2.2.2-3. The estimated population is expected to reach 467,000 in 2010 and this figure is used as the design population for the Project.

Table 2.2.2-3 Estimation of Design Population for Lattakia

(Unit: 1000)

Year	2004	2005	2006	2007	2008	2009	2010
Population	410	419	428	437	447	457	467

The suitability of the above estimate is supported by the population estimate based on 1994 population census data of the previous study which put the population in 2005, the population in 2010 and the annual population growth rate for Lattakia at 429,000, 476,000 and 2.7% respectively.

3) Jableh

The population of Jableh as of 2004 estimated by Lattakia and Jableh City Councils based on the 2004 population census results which are currently in the process of being totalled is 100,000 and the current population growth rate is 2.69% a year. This population size includes the population of neighbouring villages of which the integration to Jableh is planned and of which the transportation of solid waste is assisted by Jableh City Council. As the service population of the cleansing service provided by Jableh City Council should include the population of villages, the total service population currently stands at 100,000. The estimated population growth based on the current population size and annual population growth rate is shown in Table 2.2.2-4. As the estimated population is expected to reach 118,000 in 2010, this figure is adopted as the design population for Jableh for the Project.

Table 2.2.2-4 Estimation of Design Population for Jableh

(Unit: 1000)

Year	2004	2005	2006	2007	2008	2009	2010
Population	98	101	104	107	110	113	116
Population of neighbouring villages	2	2	2	2	2	2	2
Total	100	103	106	109	112	115	118

The suitability of the above estimate is supported by the population estimate based on 1994 population census data of the previous study which put the population in 2005, the population in 2010 and the annual population growth rate for Jableh at 116,000, 118,000 and 2.7% respectively.

4) Al Haffeh

The population of Al Haffeh in 2004 estimated by Lattakia City Council and Al Haffeh City Council based on the 2004 population census results which are currently in the process of being totalled is 23,000 and the current population growth rate is 2.69% a year. There are no special population categories in Al Haffeh which should be added to the city's population. While the amount of generated solid waste temporarily increases during the summer because of a large number of tourists visiting and staying in the city, this phenomenon only lasts for a short period of time. As it is believed that the extra amount of solid waste can be sufficiently dealt with by a minor increase of over-time, no special addition is made to the census population data.

The estimated population growth for Al Haffeh based on the current population size and the annual population growth rate is shown in Table 2.2.2-5. The estimated population is expected to reach 29,000 in 2010 and this figure is used as the design population for the Project.

Table 2.2.2-5 Estimation of Design Population for Al Haffeh

	(Unit: 1000)						
Year	2004	2005	2006	2007	2008	2009	2010
Population	23	24	25	26	27	28	29

The suitability of the above estimate is supported by the population estimate based on 1994 population census data of the previous study which put the population in 2005, the population in 2010 and the annual population growth rate for Al Haffeh at 27,000, 30,000 and 2.7% respectively.

5) Qurdaha

The population of Qurdaha as of 2004 estimated by Lattakia and Qurdaha City Councils based on the 2004 population census results which are currently in the process of being totalled is 55,000 and the current population growth rate is 2.69% a year.

The estimated population growth for Qurdaha based on the current population size and the annual population growth rate is shown in Table 2.2.2-6. The estimated population is expected to reach 66,000 in 2010 and this figure is used as the design population for the Project.

Table 2.2.2-6 Estimation of Design Population for Qurdaha

(Unit: 1000)							
Year	2004	2005	2006	2007	2008	2009	2010
Population	55	56	58	60	62	64	66

The suitability of the above estimate is supported by the population estimate based on 1994 population census data of the previous study which put the population in 2005, the population in 2010 and the annual population growth rate for Qurdaha at 56,000, 63,000 and 2.7% respectively.

(2) Design Amount of Generated Municipal Waste

The national average of unit generation rate of municipal waste is calculated as approximately 0.72 kg/person-day from study results for Master Plan of Waste Management in Syrian Arab Republic (hereinafter referred to as “the National M/P”) formulated by the Government of Syria in 2004. At the same time, the National M/P estimates that the major cities in Syria generate solid waste at a rate of 1.2 – 1.4 times higher than the national average. Table 2.2.2-7 shows the current the unit generation rate of municipal waste based on the above estimate and the estimated solid waste generated and amount of solid waste collected in each target city at present. These figures are adopted for the Project as the design unit generation rate of municipal waste.

Table 2.2.2-7 Design Unit Generation Rate of Municipal Waste

Target City	Unit (kg/person-day)
Homs	0.82
Lattakia	0.82
Jableh	0.70
Al Haffeh	0.70
Qurdaha	0.70

Table 2.2.2-8 shows the design generated amount of municipal waste for each city based on the design population and the design unit generation rate.

Table 2.2.2-8 Design Generated Amount of Municipal Waste

Item	Homs	Lattakia	Three Surrounding Cities of Lattakia		
			Jableh	Al Haffeh	Qurdaha
Design population (1000)	1,226	467	118	29	66
Design unit generation rate of municipal waste (kg/person-day)	0.82	0.82	0.70	0.70	0.70
Design generated amount of municipal waste (tons/day)	1,005	383	83	20	46

(3) Design Target Collection Rate of Municipal Waste

The actual amount of municipal waste and the actual collection rate achievable by routine collection work in each city are shown in Table 2.2.2-9.

Table 2.2.2-9 Estimated Current Collection Rate

Target City	Collection Amount (tons/day)	Generated Amount (tons/day)	Collection Rate (%)
Homs	750	900	83
Lattakia	250	336	74
Jableh	43	70	61
Al Haffeh	12	16	75
Qurdaha	30	39	77

If the target collection rate is set well above the current collection rate, remodelling of the operation and maintenance system and a substantial increase of the budget allocation to cover the operation and maintenance costs will be required. The adoption of an over-ambitious collection rate should, therefore, be avoided. The target collection rate for each city under the Project is 95% for a city of which the current collection rate exceeds 80%, 90% for a city of which the current collection rate is in the range of 70% and 80% for a city of which the current collection rate is in the range of 60%. The design target collection rate for each city is shown in Table 2.2.2-10.

Table 2.2.2-10 Design Target Collection Rate of Municipal Waste

Target City	Current Collection Rate (%)	Target Collection Rate (%)
Homs	83	95
Lattakia	74	90
Jableh	61	80
Al Haffeh	75	90
Qurdaha	77	90

(4) Design Target Collection Amount of Municipal Waste

The design target collection amount of municipal waste to be achieved by each city council in the target year is shown in Table 2.2.2-11, taking the above-mentioned design generated amount of municipal waste and the design target collection rate of municipal waste into consideration.

Table 2.2.2-11 Design Target Collection Amount of Municipal Waste

Item	Homs	Lattakia	Three Surrounding Cities of Lattakia		
			Jableh	Al Haffeh	Qurdaha
Design generated amount of municipal waste (tons/day)	1,005	383	83	20	46
Design target collection rate of municipal waste (%)	95	90	80	90	90
Design target collection amount of municipal waste (tons/day)	955	345	66	18	41

(5) Design Transportation Destination of Municipal Waste

The solid waste collected in Homs in the target year of the Project will be transported to the respective new wide-area landfill site, which is currently at the planning stage, for disposal. However, there is a possibility that commencement of construction of the new landfill site will be delayed due to objection against the construction of a land fill site from neighbouring residents. In this case, the solid waste will be transported to the existing landfill site for disposal. The existing landfill site in Homs has enough capacity for disposal of municipal solid waste generated in Homs until the target year. Meanwhile, the solid waste collected in Lattakia in the target year of the Project will be transported to the respective new landfill site, of which is currently at the planning stage, for disposal. Accordingly, the design transportation destination of municipal waste by the equipment procured under the Project will be either a new landfill site or an intermediate treatment facility or transfer station which will be introduced at the same time as the new landfill site. The design transportation destination of municipal waste in each target city is shown in Table 2.2.2-12.

Table 2.2.2-12 Design Transportation Destination of Municipal Waste

Target City	Current Destination (Landfill site)	Design Destination Under the Project		
		Landfill site	Destination	Change from Present Destination
Homs	Inner city landfill site	Existing landfill site or new landfill site	Existing landfill site or transfer station adjacent to the landfill site	No change of the destination
Lattakia	Al Bassa landfill site	Al Qasia new landfill site	Al Qasia new landfill site	No change of the transportation distance
Jableh	Inner city landfill site	Al Qasia new landfill site	Inner city transfer station	No change of the transportation distance
Al Haffeh	Inner city landfill site	Al Qasia new landfill site	Al Qasia new landfill site	Slight increase of the transportation distance (no change of the transportation frequency)
Qurdaha	Al Bassa landfill site	Al Qasia new landfill site	Inner city transfer station	Shorter transportation distance (possible increase of the transportation frequency)

(6) Design Target Collection Amount of Medical Waste

At present, Homs and Lattakia are estimated to generate some 2 tons and 1.2 tons of medical waste respectively per day. The design collection amount of medical waste under the Project is set as shown in Table 2.2.2-13, taking several relevant points as described below into consideration. The medical waste generated by the three surrounding cities of Lattakia where the number of medical institutions is small will not be included in the scope of the Project. Instead, the Syrian side is expected to improve the medical waste transportation and incineration system based on its own efforts.

- 1) Given the total number of beds of some 1,500 in Homs and 1,100 in Lattakia, the unit generation rate of medical waste is calculated to be 1.33 kg/bed-day for Homs and 1.09 kg/bed-day for Lattakia. These figures are similar to the 1.2 kg/bed-day estimated by another study¹⁾ and the 1.05 kg/bed-day estimated by the previous study and are considered to be appropriate as the unit generation rate of medical waste. As such, the estimated amount of generated medical waste of approximately 2 tons/day for Homs and 1.2 ton/day for Lattakia is judged to be appropriate.
- 2) An increase or decrease of the amount of medical waste is believed to be affected by an increase or decrease of the number of sick or injured persons and by the capacity to provide medical care

1) Homs Solid Waste Management Study Interim Report, August, 2000, Mediterranean Environmental Technical Assistance Programme

rather than by an increase or decrease of the population. As no sudden increase or decrease of those elements is expected to take place, the design generated amount of medical waste is set at 2 tons/day for Homs and 1 ton/day for Lattakia which is similar to the current amount.

- 3) Because of the risk of infection, 100% of medical waste must be collected by means of an exclusive collection system. Accordingly, the design target collection rate of medical waste is set at 100%.

Table 2.2.2-13 Design Target Collection Amount of Medical Waste

Target City	Design Collection Amount (tons/day)
Homs	2
Lattakia	1

(7) Design Transportation Destination of Medical Waste

The medical waste collected in Homs in the target year will be transported to a new medical waste disposal facility to be constructed adjacent to the existing landfill site. In the case of medical waste generated in Lattakia, this will be transported to the existing incinerators at either National Hospital or Al Asad University. Accordingly, the design transportation destination of medical waste is as shown in Table 2.2.2-14.

Table 2.2.2-14 Design Transportation Destination of Medical Waste

Target City	Current Destination (Treat/Dispose)	Design Destination Under the Project	
		Destination (Treat/Dispose)	Change from Present Destination
Homs	Inner city landfill site	New treatment facility adjacent to the existing inner city landfill site	No change of the destination
Lattakia	National Hospital and Al Asad University	National Hospital and Al Asad University	No change of the destination

(8) Design Target Roads for Mechanical Cleansing

The design target roads for mechanical cleansing using the new equipment to be provided under the Project are highways and inner city trunk roads of which the manual sweeping is dangerous. The aggregate length of these roads is shown in Table 2.2.2-15 and these figures are adopted as the design lengths of the target roads for mechanical cleansing.

Table 2.2.2-15 Design Lengths of Target Roads for Mechanical Cleansing

City	Type of Road	Total Length (km)	Total Sweeping Length (km)	Notes
Homs	Highway	13	104	Number of medians: 3
	Trunk Road	64	256	Number of medians: 1
Lattakia	Highway	34	136	Number of medians: 1
	Trunk Road	65	260	Number of medians: 1
Jableh	Trunk Road	29	58	Number of medians: 0

(9) Design Containers Subject to Washing

The target cities, except Lattakia, has no container washing equipment and wash containers manually depending on level of odour and local residents' complain. In Lattakia, which is one of the touristic cities receiving a lot of domestic and/or foreign tourists, the City Council is making planned and periodical container washing.

The target containers for mechanical washing to be designed for the Project are, therefore, restricted to some 600 containers placed in the tourist areas of Lattakia.

(10) Design Quality of Solid Waste

A study on the solid waste composition which was conducted as part of the previous study produced the results shown in Table 2.2.2-16. As the ratio of kitchen refuse accounts for more than 70%, this waste is suitable for composting.

Table 2.2.2-16 Composition of Domestic Solid Waste

City	Kitchen Refuse	Paper	Plastics	Metals	Glass	Others	Total
Homs	75.6	7.3	7.4	0.6	1.2	7.9	100.0
Lattakia	72.7	9.2	8.4	1.5	1.2	7.0	100.0

Source: The Study on Solid Waste Management at Local Cities in the Syrian Arab Republic, 2001, JICA

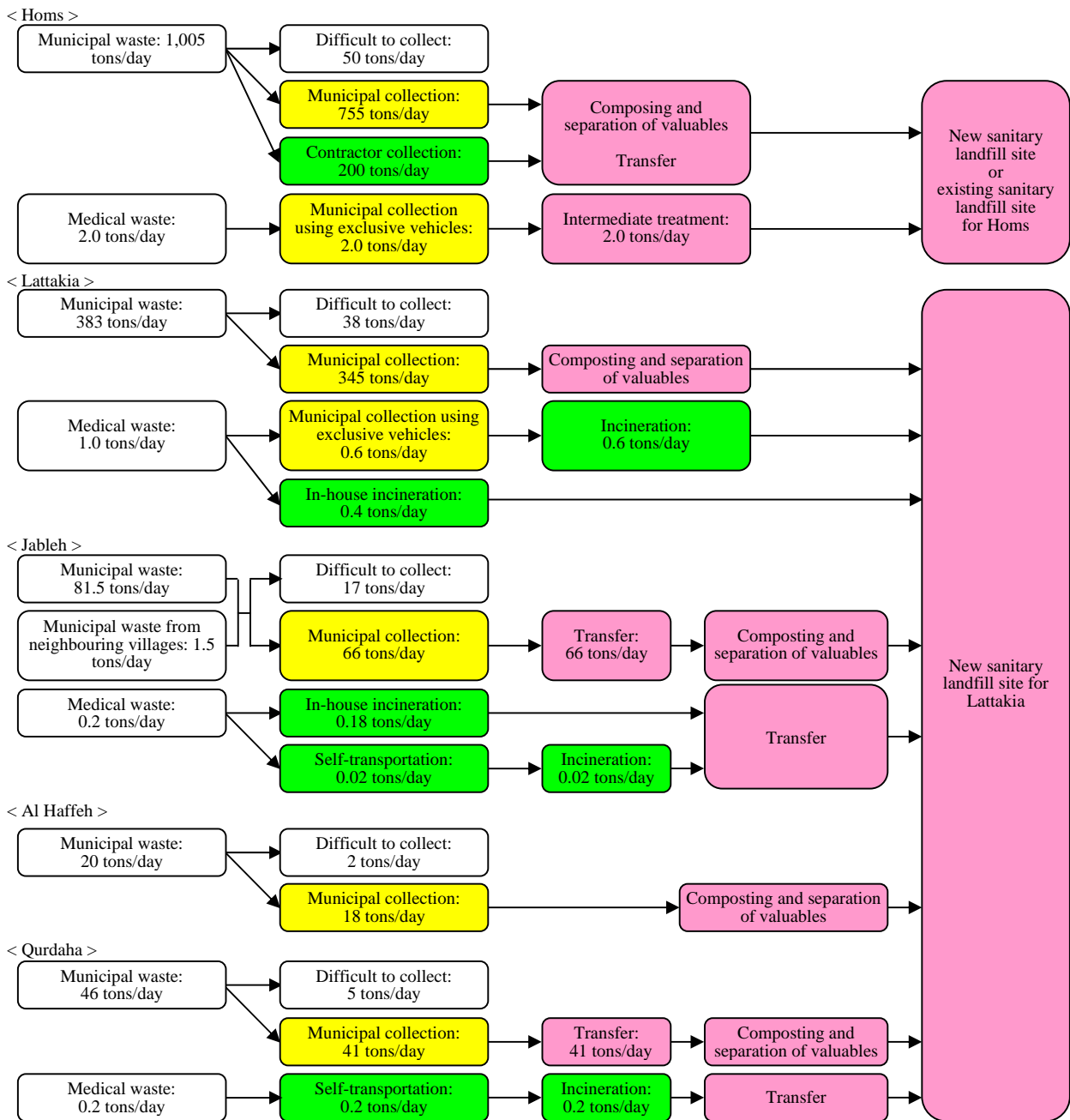
According to the findings of the previous study, the average bulk density of the generated solid waste is inferred to be approximately 0.2 tons/m³. Given this bulk density and quality of the generated solid waste and the situation of solid waste collection and transportation in Homs and Lattakia, the bulk density of solid waste at the time of its collection and transportation can be estimated as shown in Table 2.2.2-17. The bulk density of solid waste given in this table will be adopted as the design bulk density at the time of collection and transportation for the Project.

Table 2.2.2-17 Design Bulk Density of Solid Waste

Timing	Bulk Specific Gravity (tons/m ³)	Remarks
At the time of generation	0.2	No compaction
At the time of collection (by dump truck, etc.)	0.35	Compacted by the own weight of the solid waste
At the time of transportation (by compactor, etc.)	0.5	Mechanically compacted

(11) Design Flow of Solid Waste Disposal

The design flow of solid waste disposal, compiling the above-mentioned design generation amount of solid waste and the design collection amount and disposal flow planned by the Syrian side, is shown in Fig. 2.2.2-1. Since Homs City Council has introduced private contractor collection, its collection amount is included in the Figure.



Notes

- Residuals from intermediate treatment are collected as general urban solid waste.
- That which is unsuitable for composting or not separated for valuables will be disposed of at a sanitary landfill site.
- Facilities for composting and the separation of valuables from solid waste generated in Jableh, Al Haffeh and Qurdaha will be attached to the new sanitary landfill site.
- Although a new hospital is currently being constructed in Al Haffeh, it is not included here because of the non-generation of medical waste at present.

Existing Expansion New

Fig. 2.2.2-1 Design Flow of Solid Waste Disposal

2.2.2.3 Equipment Plan for Collection and Transportation of Municipal Waste

Although much existing equipment being over 20 years old is used for the collection and transportation of municipal waste, some equipment is less than 10 years old and at good conditions. It is remarkable that the Syrian side keeps a certain operation rate through maintenance of older equipment. In general, local administrations of Syria procure solid waste collection and transportation equipment every five to 10 years. In Homs, some part of the solid waste collection and transportation work is contracted to the private sector.

In view of this situation, the procurement of equipment to deal with the amount of waste calculated by subtracting the amounts listed below from the design target collection amount of municipal waste is planned under the Project.

- Design capacity of the existing equipment
- Design capacity of the equipment to be procured based on self-help efforts
- Design collection amount of private contractors

(1) Design Capacity of the Existing Equipment

Although much of the existing equipment is old with a low operation rate, its continued use as much as possible is essential to compensate for the current generally low collection and transportation capacity. The existing equipment has been evaluated in the following manner for the purpose of its continued use.

1) Current Effective Capability of Old Equipment

Among the existing equipment in the Project Areas, that equipment which is some 15 – 20 years old is operated for only approximately one trip per eight hours. As even large compactors are capable of making two trips per eight hours, the effective rate of such old equipment is considered to be around 50%. Meanwhile, equipment of less than 10 years of age can make an average of two trips per eight hours, indicating its adequate operational status.

There are basically two reasons for the decline of the effective rate in the Project Areas as listed below.

- The increased frequency of breakdowns prolongs the time required for maintenance and repair.
- The work load is reduced to reduce the likelihood of breakdowns.

Therefore it is clear that the waste collection and transportation works depending on old equipment runs a risk of causing obstacles for efficiency and replacement of old equipment is necessary.

Definitions of Loading Rate, Operation Rate, Effective Rate in the Report

Loading rate, operation rate and effective rate are defined as follows for the Project.

Loading Rate: Actual loaded amount of waste in case that nominal capacity per trip per vehicle is set as 100%.

$$\text{Loading rate (\%)} = \text{Actual amount per trip per vehicle} / \text{Nominal capacity per trip per vehicle} \times 100$$

Operation Rate: Actual working quantity (or working day) in case that working quantity (or working day) having no day-off, stand-by-day and repair day is set as 100%.

$$\text{Operation rate (\%)} = \text{Actual quantity (or working day)} / \text{Assumed quantity (or working day) having no day-off, stand-by-day and repair day} \times 100$$

Effective Rate: Actual working quantity (or working day) in case that working quantity (or working day) to be made by appropriate loading rate and operation rate, initially planned or estimated, is set as 100%. It is considered as an indicator for equipment utilization. In equipment procurement plan described after, it is planned as 100%. According to decreasing operation rate through equipment aging, the effective rate is also decreasing.

$$\text{Effective rate (\%)} = \text{Actual quantity (or working day)} / \text{Assumed quantity (or working day) under appropriate loading rate and operation rate} \times 100$$

2) Effective Rate Evaluation Method for Existing Equipment

Although there is a risk of obstructing the work efficiency, it is possible to conduct the collection and transportation work in a planned manner by properly evaluating the operational capacity, taking the low effective rate of the old equipment into consideration. For the Project, the capacity of the existing equipment is evaluated in the following manner so that the said equipment can still be used in the target year of the Project. The evaluation results are shown in Table 2.2.2-18.

- The frequency of equipment breakdowns is believed to be relatively low up to an age of 10 years and the equipment is expected to perform at a level of almost original equipment capacity. And those equipments keep actually the appropriate number of trip per day. Accordingly, it is assumed that equipment which will be less than 10 years old in the target year will maintain 100% of effective rate.

- It is believed that equipment which is over 15 years old is actually maintain an effective rate of approximately 50% through repeated repair. Accordingly, it is assumed that equipment which will be 16 years old or more in the target year will maintain an effective rate of 50%.
- It is believed that the operation rate of the equipment will start to decline 10 years after procurement. Accordingly, the effective rate of equipment of which the age in the target year will be 11- 15 years old is assumed to be an average of 75%.
- It is believed that the frequency of breakdowns will become very high, as will the maintenance and repair cost, when the equipment passes the 20 years mark from its original procurement. Given the fact that the procurement of appropriate spare parts is generally difficult for such old equipment, repair work is likely to be a kind of symptomatic treatment rather than full repair. As the operation of possibly imperfect equipment could be dangerous, such equipment should be withdrawn from service.

Table 2.2.2-18 Design Effective Rate of Existing Equipment

Equipment Age in the Target Year	Design Operation Rate (%)
10 years old or less	100% (same as present)
11 years old or more but less than 16 years old	75%
16 years old or more but less than 21 years old	50%
21 years old or more	Withdrawn

3) Capacity of Existing Equipment

Table 2.2.2-19 shows the design capacity of the existing equipment in the target year, calculated based on the design effective rate and number of trips which each equipment should be able to perform when relatively new.

Table 2.2.2-19 Design Capacity of the Existing Equipment

Target City	Current Capacity: 2004 (tons/day)	Design Capacity: 2010 (tons/day)
Homs	615	349
Lattakia	366	110
Jableh	44	16
Al Haffeh	16	4
Qurdaha	32	35

Table 2.2.2-20 Design Capacity of the Existing Equipment for Municipal Waste in Homs

Existing Equipment					Original Capacity		Capacity in 2004		Capacity in 2010		No. of Shifts
No.	Type	Maker	Year of Procurement	Tons/ Trip	Average Trips/ Day	Tons/ Day	Average Trips/ Day	Tons/ Day	Average Trips/ Day	Tons/ Day	
1	Compactor	Zeil	1970	1.5	3	4.5	1	1.5	0	0	1
2	Compactor	Nissan	1973	6	2	12	1	6	0	0	1
3	Compactor	Mercedes	1974	6	2	12	1	6	0	0	1
4	Compactor	Mack	1974	6	4	24	2	12	0	0	2
5	Compactor	Mack	1974	6	4	24	2	12	0	0	2
6	Compactor	Mack	1974	6	4	24	2	12	0	0	2
7	Compactor	Mack	1974	6	4	24	2	12	0	0	2
8	Compactor	Mack	1974	6	4	24	2	12	0	0	2
9	Compactor	Mack	1974	6	4	24	2	12	0	0	2
10	Compactor	Mack	1974	6	4	24	2	12	0	0	2
11	Compactor	Mack	1974	6	4	24	2	12	0	0	2
12	Compactor	Mack	1974	6	4	24	2	12	0	0	2
13	Compactor	Mack	1974	6	4	24	2	12	0	0	2
14	Compactor	Kamaz	1977	6	2	12	1	6	0	0	1
15	Compactor	Toyota	1982	3.5	4	14	2	7	0	0	2
16	Compactor	Toyota	1982	3.5	4	14	2	7	0	0	2
17	Compactor	Toyota	1982	3.5	4	14	2	7	0	0	2
18	Compactor	Toyota	1982	3.5	4	14	2	7	0	0	2
19	Compactor	Toyota	1982	1.5	3	4.5	1	1.5	0	0	1
20	Compactor	Toyota	1982	1.5	3	4.5	1	1.5	0	0	1
21	Compactor	Heil	1996	7	4	28	4	28	3	21	2
22	Compactor	Heil	1996	7	4	28	4	28	3	21	2
23	Compactor	Heil	1996	7	4	28	4	28	3	21	2
24	Compactor	Heil	1996	7	4	28	4	28	3	21	2
25	Compactor	Heil	1996	7	4	28	4	28	3	21	2
26	Compactor	Heil	1996	7	4	28	4	28	3	21	2
27	Compactor	Heil	1996	7	4	28	4	28	3	21	2
28	Compactor	Heil	1996	7	4	28	4	28	3	21	2
29	Compactor	Heil	1996	7	4	28	4	28	3	21	2
30	Compactor	Heil	1996	7	4	28	4	28	3	21	2
31	Compactor	Heil	1996	7	4	28	4	28	3	21	2
32	Compactor	Man	2001	8	2	16	2	16	2	16	1
33	Compactor	Man	2001	8	2	16	2	16	2	16	1
34	Compactor	Man	2001	8	2	16	2	16	2	16	1
35	Compactor	Man	2001	8	2	16	2	16	2	16	1
36	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
37	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
38	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
39	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
40	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
41	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
42	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
43	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
44	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
45	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
46	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
47	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
48	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
49	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
50	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
51	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
52	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
53	Tractor	-----	1996	2	2	4	2	4	1.5	3	1
Total						789.5		614.5		349.0	

Table 2.2.2-21 Design Capacity of the Existing Equipment for Municipal Waste in Lattakia

No.	Existing Equipment				Original Capacity		Capacity in 2004		Capacity in 2010		No. of Shifts
	Type	Maker	Year of Procurement	Tons/ Trip	Average Trips/ Day	Tons/ Day	Average Trips/ Day	Tons/ Day	Average Trips/ Day	Tons/ Day	
1	Compactor	Fiat	1974	3.5	2	7	0.5	1.75	0	0	1
2	Compactor	Fiat	1974	3.5	2	7	1	3.5	0	0	1
3	Compactor	Fiat	1974	3.5	2	7	1	3.5	0	0	1
4	Compactor	Fiat	1974	3.5	2	7	1	3.5	0	0	1
5	Compactor	Fiat	1974	3.5	2	7	1	3.5	0	0	1
6	Compactor	Fiat	1974	3.5	2	7	1	3.5	0	0	1
7	Compactor	Fiat	1974	3.5	2	7	1	3.5	0	0	1
8	Compactor	Fiat	1974	3.5	2	7	1	3.5	0	0	1
9	Compactor	Mack	1978	6	2	12	1	6	0	0	1
10	Compactor	Mack	1978	6	2	12	1	6	0	0	1
11	Compactor	Mack	1978	6	2	12	1	6	0	0	1
12	Compactor	Mack	1978	6	2	12	1	6	0	0	1
13	Compactor	Mack	1978	6	2	12	1	6	0	0	1
14	Compactor	Mack	1978	6	2	12	1	6	0	0	1
15	Compactor	Mack	1978	6	2	12	1	6	0	0	1
16	Compactor	Mack	1978	6	2	12	1	6	0	0	1
17	Compactor	Mack	1978	6	2	12	1	6	0	0	1
18	Compactor	Mack	1978	6	2	12	1	6	0	0	1
19	Compactor	Mack	1978	6	2	12	1	6	0	0	1
20	Compactor	Fiat	1983	6	4	24	2	12	0	0	2
21	Compactor	Fiat	1983	6	4	24	2	12	0	0	2
22	Compactor	Fiat	1983	6	4	24	2	12	0	0	2
23	Compactor	Fiat	1983	6	4	24	2	12	0	0	2
24	Compactor	Fiat	1983	6	4	24	2	12	0	0	2
25	Compactor	Man	1994	5	2	10	2	10	1	5	1
26	Compactor	Man	1994	5	2	10	2	10	1	5	1
27	Compactor	Man	1994	5	2	10	2	10	1	5	1
28	Compactor	Man	1994	5	2	10	2	10	1	5	1
29	Compactor	Man	1994	5	2	10	2	10	1	5	1
30	Compactor	Freight	1996	7	2	14	2	14	1.5	10.5	1
31	Compactor	Freight	1996	7	2	14	2	14	1.5	10.5	1
32	Compactor	Freight	1996	7	2	14	2	14	1.5	10.5	1
33	Compactor	Freight	1996	7	2	14	2	14	1.5	10.5	1
34	Compactor	Man	2001	8	2	16	2	16	2	16	1
35	Compactor	Man	2001	8	2	16	2	16	2	16	1
36	Dump Truck	-----	1983	3	4	12	2	6	0	0	2
37	Dump Truck	-----	1983	3	4	12	2	6	0	0	2
38	Dump Truck	-----	1983	3	4	12	2	6	0	0	2
39	Dump Truck	-----	1983	3	4	12	2	6	0	0	2
40	Dump Truck	-----	1983	3	4	12	2	6	0	0	2
41	Dump Truck	-----	1983	3	4	12	2	6	0	0	2
42	Dump Truck	-----	1983	3	4	12	2	6	0	0	2
43	Tractor	-----	1968	2	2	4	1	2	0	0	1
44	Tractor	-----	1974	2	2	4	1	2	0	0	1
45	Tractor	-----	1974	2	2	4	1	2	0	0	1
46	Tractor	-----	1976	2	2	4	1	2	0	0	1
47	Tractor	-----	1976	2	2	4	1	2	0	0	1
48	Tractor	-----	1976	2	2	4	1	2	0	0	1
49	Tractor	-----	1983	2	2	4	1	2	0	0	1
50	Tractor	-----	1983	2	2	4	1	2	0	0	1
51	Tractor	-----	1983	2	2	4	1	2	0	0	1
52	Tractor	-----	1983	2	2	4	1	2	0	0	1
53	Tractor	-----	1983	2	2	4	1	2	0	0	1
54	Tractor	-----	1999	2	2	4	1	2	0.8	1.6	1
55	Tractor	-----	1999	2	2	4	1	2	0.8	1.6	1
56	Tractor	-----	2000	1	2	2	2	2	2	2	1
57	Tractor	-----	2000	1	2	2	2	2	2	2	1
58	Tractor	-----	2002	1	2	2	2	2	2	2	1
59	Tractor	-----	2002	1	2	2	2	2	2	2	1
Total						590		366.25		110.2	

Table 2.2.2-22 Design Capacity of the Existing Equipment for Municipal Waste in Jableh

Existing Equipment					Original Capacity		Capacity in 2004		Capacity in 2010		No. of Shifts
No.	Type	Maker	Year of Procurement	Tons/ Trip	Average Trips/ Day	Tons/ Day	Average Trips/ Day	Tons/ Day	Average Trips/ Day	Tons/ Day	
1	Compactor	Mack	1978	8	4	32	2	16	0	0	2
2	Compactor	Man	2001	8	2	16	2	16	2	16	1
3	Tractor	-	1975	2	2	4	2	4	0	0	1
4	Tractor	-	1975	2	2	4	2	4	0	0	1
5	Tractor	-	1975	2	2	4	2	4	0	0	1
Total						60		44		16	

Table 2.2.2-23 Design Capacity of the Existing Equipment for Municipal Waste in Al Haffeh

Existing Equipment					Original Capacity		Capacity in 2004		Capacity in 2010		No. of Shifts
No.	Type	Maker	Year of Procurement	Tons/ Trip	Average Trips/ Day	Tons/ Day	Average Trips/ Day	Tons/ Day	Average Trips/ Day	Tons/ Day	
1	Tractor	-	1970	2	4	8	4	8	0	0	2
2	Tractor	-	1990	2	4	8	4	8	2	4	2
Total						16		16		4	

Table 2.2.2-24 Design Capacity of the Existing Equipment for Municipal Waste in Qurdaha

Existing Equipment					Original Capacity		Capacity in 2004		Capacity in 2010		No. of Shifts
No.	Type	Maker	Year of Procurement	Tons/ Trip	Average Trips/ Day	Tons/ Day	Average Trips/ Day	Tons/ Day	Average Trips/ Day	Tons/ Day	
1	Compactor	Freight	1996	7	2	14	2	14	2.5	17.5	1
2	Compactor	Freight	1996	7	2	14	2	14	2.5	17.5	1
3	Tractor	-	1987	2	2	4	2	4	0	0	1
Total						32		32		35	

(2) Design Capacity of the Equipment to be Procured based on Self-help Efforts

In Syria, solid waste collection and transportation equipment greatly required by local administrations is often procured through a blanket deal arranged by the central government. This blanket procurement generally takes place every 5 – 10 years to allow local administrations to procure the types of equipment they need at competitive prices. The latest blanket procurement took place in 2001 and Homs, Lattakia and Jableh procured four, two and one 8 ton class compactor trucks respectively.

As such self-help efforts to procure new equipment should continue after the planned grant aid, the number of equipment to be procured in this manner should be deducted from the required new

capacity, i.e. number of new equipment, to be added under the Project. While smaller cities often do not procure new equipment for a long period of 10 – 20 years, larger cities tend to procure new equipment every 5 – 10 years. It is, therefore, assumed that Homs and Lattakia which are ranked third and fourth in terms of socioeconomic size among cities in Syria will conduct new procurement based on their own self-help efforts by 2010. The assumed procurement scale is eight 8 ton class compactors as shown in Table 2.2.2-25, representing a 10% increase of the seven similar vehicles purchased by these cities in 2001.

Table 2.2.2-25 Design Capacity of the Equipment to be procured based on Self-help Efforts

City	Procurement in 2001	Design Capacity of Equipment Procured on Self-help Basis in 2010		
		Equipment Procured	Design Average Number of Trips (trips/day)	Design Average Collection and Transportation Amount (tons/day)
Homs	4 x 8 ton class	5 x 8 ton class	2 x 5 = 10	8 tons x 10 = 80 tons/day
Lattakia	2 x 8 ton class	3 x 8 ton class	2 x 3 = 6	8 tons x 6 = 48 tons/day
Jableh	1 x 8 ton class	-	-	-
Total	7 x 8 ton class	8 x 8 ton class		128 tons/day

(3) Design Collection Amount of Private Contractors

At present, Homs City Council contracts the collection and transportation of some 200 tons of solid waste to private contractors in some areas of the city. However, it does not intend to expand the scale of contracting because of its unsteady contracting fund and poorer employment conditions offered by these contractors for their workers than the socially desirable level. Nevertheless, such contracting of the solid waste collection and transportation work is evaluated as a positive attempt by the City Council to supplement its own insufficient capacity at present.

For the planning of the required number of equipment under the Project, the continuation of solid waste collection and transportation work by private contractors at the present level of 200 tons/day is assumed.

(4) Design Capacity for the Equipment to be Procured

The amount of solid waste which is calculated by subtracting the amounts achievable by the design capacity of the existing equipment, the design self-help equipment procurement capacity and the design solid waste collection and transportation capacity of private contractors from the design target collection amount constitutes the shortfall in terms of municipal waste collection and transportation

capacity in the target year. For the present purposes, this shortfall is described as the design capacity for the equipment to be procured by the Project and is shown in Table 2.2.2-26.

Table 2.2.2-26 Design Capacity for the Equipment to be procured for Municipal Waste

(Unit: tons/day)

Item	Homs	Lattakia	Three Surrounding Cities of Lattakia		
			Jableh	Al Haffeh	Qurdaha
Design Target Collection Amount	955	345	66	18	41
Design Capacity of the Existing Equipment	349	110	16	4	35
Design Capacity of the Equipment to be Procured based on Self-help efforts	80	48	0	0	0
Design Collection Amount of Private Contractors	200	0	0	0	0
Design Capacity for the Equipment to be Procured	326	187	50	14	6

(5) Equipment Procurement Plan

The procurement of equipment to achieve the design capacity for the equipment to be procured by the Project shown in the above Table is planned in the following manner.

1) Selection of Equipment Types

Apart from Al Haffeh, all of the target cities of the Project possess large compactors with a holding capacity of some 12 – 16 m³. Accordingly, areas with relatively wide roads will be dealt with by the existing equipment.

Providing a flexible and careful solid waste collection service, which is difficult to be made by the existing equipment, is required in the target cities. And the countermeasures described below is necessary. The procurement of the equipment listed in Table 2.2-27 is, therefore, planned for the Project.

- Applying small collection vehicle for narrow streets area. Required vehicle type is 4 m³ class compactor truck, which has a high loading efficiency.
- Applying medium collection vehicle, which is adaptable to 1 m³ class container and capable to enter into relatively narrow streets area. This kind of equipment can be utilized widely in the cities. Required vehicle type is 8 m³ class compactor truck, which has a high loading efficiency.

- Applying dump truck to be loaded easier by wheel loader for the waste collected on streets and/or semi-transferred waste. Required vehicle type is 6 m³ class refuse dump truck, which has good manoeuvrability.

Table 2.2.2-27 Planned Municipal Waste Collection and Transportation Equipment Under the Project

Target Areas	Planned Work	Type of Equipment
Project Areas in general but areas with medium width streets in particular	Key collection work integrating the advantages of both large and small size vehicles	8 m ³ class compactor which is classified as a medium size vehicle with a high loading efficiency
Areas with narrow streets	Work in areas with narrow streets which large vehicles cannot enter	4 m ³ class compactor which is classified as a small vehicle with a high loading efficiency
Project Areas in general	Flexible response to solid waste accumulated in streets and simple transfer work	6 m ³ class dump truck with good manoeuvrability, enabling quick loading by a wheel loader

2) Collection and Transportation Capacity of Selected Equipment

The design average loading amount is set for each type of equipment as shown in Table 2.2-28 taking the following points into consideration.

- Bulk density after loading : 0.5 tons/m³ for compactor truck
0.35 tons/m³ for dump truck
- Design loading rate : 90% with a 10% margin
- Design operation rate : 86% allowing one day off per week

Table 2.2.2-28 Municipal Waste Collection and Transportation Capacity of Selected Equipment per Trip

Type of Equipment	Compactor		Dump Truck
Loading capacity (m ³)	8	4	6
Bulk density of solid waste after loading (tons/m ³)	0.5	0.5	0.35
Nominal load weight (tons)	4	2	2.1
Design loading rate (%)	90	90	90
Design load weight (tons/trip)	3.6	1.8	1.9
Design operation rate (%)	86	86	86
Design average load weight (tons/trip)	3.1	1.5	1.6

In regard to the number of shifts, operation based on a single shift is planned as two or three shift operation necessitating the replacement of drivers/crew members may lead to careless

operation of the equipment due to lowering of the awareness (and sense of) responsibility among drivers/crew members regarding the equipment.

3) Procurement Number of Equipment

Based on the collection and transportation capacity of the selected equipment, the procurement number of each equipment by city is planned in the following manner.

① Homs

The procurement number for Homs is planned in the following manner. The calculation results are shown in Table 2.2.2-29.

- The total capacity of the existing equipment and the equipment to be procured based on a self-help efforts can deal with some 40% of the design target collection amount of municipal waste. Therefore, the procurement of large compactors is not planned.
- Homs does not employ a collection method whereby solid waste accumulates in the street for loading by a wheel loader, etc. Accordingly, the procurement of dump trucks is not planned.
- As some 20% of the design target collection amount of municipal waste is believed to be generated in areas with narrow streets, an equipment capacity to collect some 200 tons/day in these areas is required. Of this amount, some 100 tons/day is collected by private contractors and an additional 50 tons/day or so can be collected by the existing tractors. Accordingly, the introduction of small (4 m³ class) compactors is planned for the collection of the remaining some 50 tons/day.
- As some 50 tons/day of the design capacity for the equipment to be procured for municipal waste will be dealt with by small compactors (4 m³ class), the remaining some 276 tons/day will be collected by medium size compactors (8 m³ class).
- As the planned transportation destination is either the intermediate treatment facility/transfer station at the side of the existing landfill site, it is believed that the current number of trips per day can be maintained. Accordingly, two trips per day, i.e. the same as at present, are planned for the compactors (8 m³ class) while three trips per day are planned for the small compactors (4 m³ class) because of their shorter collection time per trip.

Table 2.2.2-29 Required Procurement Number of Municipal Waste Collection and Transportation Equipment for Homs

Item	8 m ³ Class Compactor	4 m ³ Class Compactor	6 m ³ Class Dump Truck	Total
Design average load weight (tons/trip)	3.1	1.5	1.6	
Procurement number of equipment	44	12	0	
Design average number of trips	2	3	0	
Design collection and transportation amount of procured equipment (tons/day)	273	54	0	327
Design capacity for the equipment to be procured (tons/day)				> 326

② Lattakia

The procurement number for Lattakia is planned in the following manner. The calculation results are shown in Table 2.2-30.

- The total capacity of the existing equipment and the equipment to be procured based on a self-help efforts can deal with some 43% of the design target collection amount for municipal waste. Therefore, the procurement of large compactors is not planned.
- Lattakia employs a collection method whereby accumulated solid waste along the streets is loaded by a wheel loader, etc. Accordingly, the procurement of four dump trucks is planned based on the current collection situation in the city.
- As some 20% of the design target collection amount of municipal waste is believed to be generated in areas with narrow streets, an equipment capacity to collect some 70 tons/day in these areas is required. Of this amount, some 10 tons/day can be collected by the existing tractors. Accordingly, the introduction of small (4 m³ class) compactors is planned for the collection of the remaining some 60 tons/day.
- As some 13 tons/day and 60 tons/day of the design capacity for the equipment to be procured will be dealt with by dump trucks and small compactors (4 m³ class) respectively, the remaining some 114 tons/day will be collected by medium size compactors (8 m³ class).
- As the planned transportation destination is either the new landfill site or the intermediate treatment facility/transfer station at the side of the new landfill site, the transportation distance will increase from the current some 15 km to some 20 km. This distance, however, will still allow the same number of trips as at present. Accordingly,

two trips per day, i.e. the same as at present, are planned for the compactors (8 m³ class) while three trips per day are planned for the small compactors (4 m³ class) because of their shorter collection time per trip. In the case of dump trucks (6 m³) which are required to wait for the loading of solid waste accumulated in the streets, two trips per day are planned.

Table 2.2.2-30 Required Procurement Number of Municipal Waste Collection and Transportation Equipment for Lattakia

Item	8 m ³ Class Compactor	4 m ³ Class Compactor	6 m ³ Class Dump Truck	Total
Design average load weight (tons/trip)	3.1	1.5	1.6	
Procurement number of equipment	18	14	4	
Design average number of trips	2	3	2	
Design collection and transportation amount of procured equipment (tons/day)	112	63	13	188
Design capacity for the equipment to be procured (tons/day)				> 187

③ Jableh

The procurement number for Jableh is planned in the following manner. The calculation results are shown in Table 2.2.2-31.

- Among the existing equipment, one large compactor can be used. As collection along trunk roads can be dealt with by this compactor, the procurement of large compactors is not planned.
- Jableh employs a simple transfer and collection method whereby solid waste accumulates at the roadside for loading by a wheel loader, etc. Accordingly, the procurement of three dump trucks is planned based on the current collection situation.
- As some 14 tons/day of the design capacity for the equipment to be procured will be dealt with by dump trucks, it is planned to deal with the remaining some 36 tons day using medium size compactors (8 m³ class) and small compactors (4 m³ class) on a 50%/50% basis.
- The transportation destination will change from the inner city landfill site to the inner city transfer station. As this transfer station is situated in the same city, it is expected that the current number of trips can be maintained. Accordingly, two trips per day, i.e. the same as at present, are planned for the compactors (8 m³ class) while three trips per

day are planned for the small compactors (4 m³ class) because of their shorter collection time per trip. In the case of dump trucks (6 m³) which often load solid waste accumulated at the roadside after simple transfer operation, three trips per day are planned.

Table 2.2.2-31 Required Procurement Number of Municipal Waste Collection and Transportation Equipment for Jableh

Item	8 m ³ Class Compactor	4 m ³ Class Compactor	6 m ³ Class Dump Truck	Total
Design average load weight (tons/trip)	3.1	1.5	1.6	
Procurement number of equipment	3	4	3	
Design average number of trips	2	3	3	
Design collection and transportation amount of procured equipment (tons/day)	19	18	14	51
Design capacity for the equipment to be procured (tons/day)				> 50

④ Al Haffeh

The procurement number for Al Haffeh is planned in the following manner. The calculation results are shown in Table 2.2.2-32.

- As the city is situated in a mountainous area with scattered dwelling sites, the use of highly mobile small compactors (4 m³ class) is planned.
- Al Haffeh does not employ the simple transfer and collection method whereby solid waste accumulated at the roadside is loaded by a wheel loader, etc. Accordingly, the procurement of dump trucks is not planned.
- The transportation destination will change from the present inner city landfill site to the new landfill site. Although the transportation distance will be some 15 km, an adequate number of trips per day can still be expected. Accordingly, three trips per day are planned for small compactors (4 m³) as their collection time per trip is short.

Table 2.2.2-32 Required Procurement Number of General Urban Solid Waste Collection and Transportation Equipment for Al Haffeh

Item	8 m ³ Class Compactor	4 m ³ Class Compactor	6 m ³ Class Dump Truck	Total
Design average load weight (tons/trip)	3.1	1.5	1.6	
Procurement number of equipment	0	3	0	
Design average number of trips	0	3	0	
Design collection and transportation amount of procured equipment (tons/day)	0	14	0	14
Design capacity for the equipment to be procured (tons/day)				= 14

⑤ Qurdaha

The procurement number for Qurdaha is planned in the following manner. The calculation results are shown in Table 2.2.2-33.

- The transportation destination will change from the existing landfill site for Lattakia to the new inner city transfer station. As the transportation distance will be reduced from the present some 25 km to several kilometres, an increased number of trips can be expected. Accordingly, the collection capacity of the existing compactor trucks will exceed 85% of the design target collection amount.
- The use of dump trucks (6 m³), the primary work of which is to collect tree branches, etc. pruned in parks and streets and drift wood from mountain areas, will be used to deal with the design capacity for the equipment to be procured of 6 tons/day.
- Given the short transportation distance and the primary work of the loading of solid waste already accumulated at the roadside using a wheel loader, etc., four trips per day are planned for the dump trucks.

Table 2.2.2-33 Required Procurement Number of Municipal Waste Collection and Transportation Equipment for Qurdaha

Item	8 m ³ Class Compactor	4 m ³ Class Compactor	6 m ³ Class Dump Truck	Total
Design average load weight (tons/trip)	3.1	1.5	1.6	
Procurement number of equipment	0	0	1	
Design average number of trips	0	0	4	
Design collection and transportation amount of procured equipment (tons/day)	0	0	6	6
Design capacity for the equipment to be procured (tons/day)				= 6

⑥ Planning of Loading Equipment for Solid Waste Accumulated at Roadside

Dump trucks of which the procurement for Lattakia, Jableh and Qurdaha is planned require equipment to load solid waste on to these trucks. At present, these three cities using wheel loaders with a 0.5 – 2.0 m³ class bucket. However, all of these vehicles are approximately 20 years old. As such, the existing wheel loaders are inefficient in terms of the operation rate and bucket capacity and require replacement. The procurement of suitable equipment to replace the existing wheel loaders is, therefore, planned under the Project.

In short, the procurement of general purpose wheel loaders with a 1.5 m³ class bucket is planned because of (i) their sufficient capacity to load solid waste on to 6 m³ class dump trucks and (ii) their excellent maintainability. The number of wheel loaders shown in Table 2.2.2-34 will be procured and one wheel loader is judged to be required per 3 – 4 dump trucks.

Table 2.2.2-34 Calculation of Required Number of Loading Equipment for Solid Waste Accumulated by Roadside

Item	Lattakia	Jableh	Qurdaha
Dump trucks	4	3	1
Required number of wheel loaders	1	1	1

2.2.2.4 Medical Waste Collection and Transportation Equipment Plan

All of the existing equipment used by Homs and Lattakia City Councils for the collection and transportation of medical waste has been in service for more than 20 years since its procurement. In

addition to the old age of this equipment, necessitating frequent maintenance and repair work, the fact that the applied compactor trucks are unsuitable for the collection and transportation of medical waste makes it difficult to conduct efficient as well as regular collection and transportation work. In view of such conditions of the existing equipment, the procurement of suitable equipment is planned under the Project to replace the existing equipment.

In the three surrounding cities of Lattakia, the amount of generated medical waste is small and in-house incineration at hospitals, etc. has become a popular practice. Accordingly, there is no strong urgency for the procurement of new equipment and it is planned that the Syrian side will consolidate the system of in-house incineration, etc. to meet the demand for the proper disposal of medical waste.

(1) Design Capacity of the Existing Equipment

As described above, it will be difficult to use the existing equipment in the target year. Accordingly, the withdrawal of the existing equipment by the target year is planned.

(2) Design Capacity for the Equipment to be Procured

The shortfall of the medical waste collection and transportation capacity can be calculated by subtracting the amount listed below from the design target collection amount of medical waste. The design capacity for the equipment to be procured for medical waste under the Project is to meet this shortfall and is shown in Table 2.2.2-35.

- Design in-house disposal amount of medical waste by medical institutions possessing an incinerator (Homs: none; Lattakia: 0.5 tons/day)

Table 2.2.2-35 Design Capacity for the Equipment to be procured for Medical Waste

Target City	Design Target Collection Amount (tons/day)	Design In-House Disposal Amount (tons/day)	Design Capacity for the Equipment to be Procured (tons/day)
Homs	2	0	2
Lattakia	1	0.5	0.5

(3) Equipment Procurement Plan

The procurement of equipment to achieve the design capacity for the equipment to be procured for medical waste shown in Table 2.2.2-35 is planned in the following manner.

1) Number of Equipment

At present, Homs and Lattakia have 33 and 21 medical institutions which are the targets for medical waste collection respectively. As collection is conducted at a specific time arranged with each medical institution, it takes approximately 15 – 20 minutes from the arrival of the vehicle and completion of the loading of medical waste on to the vehicle by the staff of the medical institution. Considering the time required for departure from and return to the garage and for transportation to a disposal site or intermediate treatment facility, each collection vehicle can realistically visit some 20 medical institutions per day. Based on these conditions, the procurement of two trucks for Homs (each truck is expected to visit 16 – 17 medical institutions per day) and one truck for Lattakia is planned.

2) Selection of Equipment Type

The collection of medical waste with a high risk of infection means that collection vehicles must be made of a highly anti-corrosive material and must have a closed body to prevent the scattering of medical waste. Compactor trucks are unsuitable as compacted medical waste may cause a leakage of infectious materials. The stacking of waste also carries a risk of collapse or compacting of the waste and, therefore, the ease of loading and loading capacity are more important features than the load weight for vehicles collecting medical waste.

The required truck floor area is calculated to be some 5 m² for the trucks to be provided for Homs and some 2.5 m² for the truck to be provided for Lattakia. From the viewpoint of the load weight and required spatial capacity, the procurement of 2 ton class closed body trucks for Homs and a 1 ton class closed body truck for Lattakia is planned. The trucks for Homs are planned to be dump trucks because of the relatively large transportation amount and possible dumping at a disposal site.

Table 2.2.2-36 Required Floor Area of Medical Waste Trucks

Item	Homs	Lattakia
Design capacity for the equipment to be procured (tons/day)	2	0.5
Number of trucks to be procured	2	1
Design collection amount per truck (tons/trip)	1	0.5
Bulk density of medical waste after loading (tons/m ³)	0.35	0.35
Cubic volume of waste after loading	2.9	1.4
Required bed size (m ² : H = 60 m, flat loading)	4.83	2.33

Based on the above calculation results, the number of medical waste collection and transportation equipment to be procured under the Project is shown in Table 2.2.2-37. Because of the small number of equipment, no correction of the operation rate in consideration of non-operating days is made. Each city council is, therefore, required to introduce a reasonable number of non-operating days for maintenance and other purposes while ensuring a well-balanced collection regime.

Table 2.2.2-37 Required Number of Medical Waste Collection Trucks

Type of Truck	Homs	Lattakia
Closed dump truck (2 ton class)	2	-
Closed truck (1 ton class)	-	1

2.2.2.5 Mechanical Road Cleansing Equipment Plan

The procurement of mechanical road cleansing equipment is made based on the principle that the target roads are highways and inner city trunk roads with a median where manual sweeping is considered to be dangerous. The required number of equipment to be procured under the Project is calculated by subtracting the number of usable existing equipment from the required number of equipment for sufficient operation.

The procurement of the equipment described below under the Project is planned for Homs, Lattakia and Jableh which have requested mechanical road cleansing equipment, including sprinkler trucks.

(1) Capacity of the Existing Equipment

Homs, Lattakia and Jableh currently have 12 mechanical road sweepers and two sprinkler trucks in total. Nine of these vehicles are at least 20 years old and require frequent maintenance and repair, making it difficult for the city councils to implement efficient and regular road cleansing activities. Accordingly, the procurement of appropriate vehicles to replace such old vehicles is planned under the Project. The other vehicles are currently less than 10 years old and their continued use in the target year is planned. Those vehicles which can still be used even in 2010 are listed in Table 2.2.2-38.

Table 2.2.2-38 Existing Mechanical Road Cleansing Equipment
of Which Continued Use is Planned

Target City	Type of Equipment	Year of Procurement	No.
Lattakia	Road sweeper	1994	3
	Sprinkler truck	1996	1
Jableh	Road sweeper	2000	1
Total			5

(2) Equipment Procurement Plan

Taking the target roads for mechanical cleansing and the number of existing equipment into consideration, the equipment to be procured under the Project is planned in the following manner.

1) Number of Equipment

Mechanical road cleansing is planned for the Project based on the conditions listed below. As a result, the number of such equipment shown in Table 2.2.2-39 (including the number of usable existing equipment) will be required for Homs, Lattakia and Jableh.

- Planned sweeping speed of 5 km/hour
- Average working hours per day: one hour to travel from and to the base and seven hours for sweeping (sweeping length: 35 km/day)
- Operation rate of 86% (one day off per week)
- Design average sweeping length per mechanical sweeper of 30 km/day (35 km/day x 86%)
- Introduction of one sprinkler truck per two mechanical sweepers as sprinkler trucks are support vehicles
- Sprinkler truck is procured for only Lattakia whose city council is washing streets as a tourism support activity.
- Planned sweeping frequency: twice every two days for highways and once every three days for inner city trunk roads

Table 2.2.2-39 Required Mechanical Road Cleansing Equipment

Target City	Type of Road	Sweeping Length (km)	Sweeping Frequency (per day)	Sweeping Length per Day (km)	Design Average Sweeping Length (km/truck)	Required Number of Mechanical Sweepers	Required Number of Water Tankers
Homs	Highway	104	2	52	30	2	-
	Trunk road	256	3	85	30	3	
Lattakia	Highway	136	2	68	30	3	3
	Trunk road	260	3	87	30	3	
Jableh	Trunk road	58	3	19	30	1	-

As some of the existing equipment can be utilised as described earlier, the number of equipment to be procured is as shown in Table 2.2.2-40.

Table 2.2.2-40 Number of Road Sweeping Equipment to be Procured

Target City	Mechanical Sweepers			Water Tankers		
	Required Number	Existing Number	Number to be Procured	Required Number	Existing Number	Number to be Procured
Homs	5	0	5	-	-	-
Lattakia	6	3	3	3	1	2
Jableh	1	1	0	-	-	-

2) Selection of Equipment Type

In the case of small mechanical sweepers with a capacity of 3 m³ class, the transportation of collected solid waste to a landfill site every half a day is believed to be necessary. As the distance to a landfill site or transfer station is relatively short in the Project Areas, two trips per day are assumed to be easy to achieve. Accordingly, the procurement of small mechanical sweepers is planned. In the case of sprinkler trucks, the sprinkling volume considerably varies depending on the state of dirtiness of the road surface. Assuming an average sprinkling volume of 60 litres/min, 10,000 litres of water is required for half a days work (approximately three hours). Accordingly, the procurement of 10 m³ class sprinkler trucks is planned.

2.2.2.6 Container Washing Equipment Plan

At present, Lattakia is the only target city of the Project where containers are mechanically washed because of the need of the city council to assist the local tourist industry. The mechanical washing of containers is planned for Lattakia as part of the Project. The target containers are some 600 containers placed in tourist areas and the necessary equipment is planned in the following manner.

(1) Capacity of Existing Equipment

Lattakia City Council has one container washing truck which was procured in 1983, meaning that it is more than 20 years old. As this truck requires frequent maintenance and repair, it is difficult for the city council to conduct the efficient and regular washing of containers. Given this situation, the procurement of appropriate equipment to replace the existing truck is planned under the Project.

(2) Equipment Procurement Plan

In view of the target number of containers described below, the number of container washing trucks to be procured under the Project is planned in the following manner.

1) Number of Trucks

Based on the conditions listed below for the washing of containers, the number of container washing trucks shown in Table 2.2.2-41 will be required to conduct the necessary work. Because the use of the existing truck cannot be expected, the number given in the said table represents the number to be procured under the Project.

- Time required to wash a container: 20 minutes per container, including the travelling time (24 containers per day)
- Operation rate: 86% (one day off per week)
- Design average number of containers washed per day: 20 (24 x 86%)
- Washing frequency: once every 15 days

Table 2.2.2-41 Required Procurement Number of Container Washing Trucks

Target Number of Containers	Washing Frequency	Average Number of Containers to be Washed per Day	Average Number of Containers Washed by Truck	Required Number of Container Washing Trucks
600	15 days	40	20	2

2) Selection of Equipment Type

As described earlier, a container washing truck should be able to wash some 24 containers per working day. The washing of one container is likely to require some 250 litres of water and, therefore, the container washing trucks will have a tank capacity of 6 m³ and a high pressure water gun.

2.2.2.7 Spare parts

Local administrations in Syria list the necessary spare parts in their annual plan, purchase them in a single deal and store them in a warehouse. This practice is believed to be necessary because of the potential difficulty of obtaining spare parts in the domestic market and the need to organize a tender for procurement.

In the case of the present Project, as it is difficult to prepare the necessary spare parts prior to the procurement of equipment, the procurement of spare parts, mainly consumable, which may be required for the operation of the new equipment for a period of approximately one year is planned along with the procurement of equipment.

2.2.2.8 Summary of Equipment to be Procured

The number/item of equipment to be procured under the Project is shown in Table 2.2.2-42.

Table 2.2.2-42 Summary of Equipment to be procured

(Unit: Number)

Equipment No.	Type of Equipment	Homs	Lattakia	Jableh	Al Haffeh	Qurdaha	Total
1	Compactor truck Type 1 (8 m ³)	44	18	3	-	-	65
2	Compactor truck Type 2 (4 m ³)	12	14	4	3	-	33
3	Dump truck (6 m ³)	-	4	3	0	1	8
4	Medical waste truck Type 1 (2 ton dump truck)	2	-	-	-	-	2
5	Medical waste truck Type 2 (1 ton van truck)	-	1	-	-	-	1
6	Wheel loader	-	1	1	0	1	3
7	Container washing truck	-	2	-	-	-	2
8	Mechanical sweeper	5	3	0	-	-	8
9	Sprinkler truck	-	2	-	-	-	2
	Total	63	45	11	3	2	124
-	Spare Parts	One set	One set	One set	One set	One set	

2.2.3 Basic Design Drawings

2.2.3.1 Equipment Specifications

The basic specifications of the equipment to be procured under the Project are planned as follows.

(1) Compactor truck Type 1 (8m³)

- 1) Type: Plate type compactor truck for solid waste collection
- 2) Body Capacity: 8m³ or more
- 3) Payload: 4 ton or more
- 4) Container Lift: Winch on the roof
- 5) Container to be lifted: 1.3 m³ Class
- 6) Hydraulic operation: Mechanical lever manual operation
- 7) Sewage tank: Provided
- 8) Chassis operation: Left hand steering wheel, manual transmission
- 9) Chassis drive system: 4x2 rear drive

(2) Compactor truck Type 2 (4m³)

- 1) Type: Plate type compactor truck for solid waste collection
- 2) Body Capacity: 4m³ or more
- 3) Payload: 2 ton or more
- 4) Container Lift: Winch on the roof
- 5) Container to be lifted: 0.6 m³ Class
- 6) Hydraulic operation: Mechanical lever manual operation
- 7) Sewage tank: Provided
- 8) Chassis operation: Left hand steering wheel, manual transmission
- 9) Chassis drive system: 4x2 rear drive

(3) Dump truck (6m³)

- 1) Type : Refuse dump truck
- 2) Body Capacity: 6m³ or more
- 3) Payload: 3 ton or more
- 4) Chassis operation: Left hand steering wheel, manual transmission
- 5) Chassis drive system: 4x2 rear drive

(4) Medical waste truck Type 1 (2ton dump truck)

- 1) Type: Closed body dump truck
- 2) Body floor area: 5m² or more
- 3) Body height: 1.85m or more

- 4) Body material: Full-stainless steel or steel. Inside to be finished by stainless steel, in case of steel structure.
- 5) Rear door of body: Hinged double doors with manual locking device
- 6) Payload: 2 ton or more
- 7) Chassis operation: Left hand steering wheel, manual transmission
- 8) Chassis drive system: 4x2 rear drive

(5) Medical waste truck Type 2 (1ton van truck)

- 1) Type: Van type truck
- 2) Body floor area: 2.5m² or more
- 3) Body height: 1.85m or more
- 4) Body material: Full-stainless steel or aluminum. Inside to be finished by stainless steel, in case of aluminum.
- 5) Rear door of body: Hinged double doors with manual locking device
- 6) Payload: 1 ton or more
- 7) Chassis operation: Left hand steering wheel, manual transmission
- 8) Chassis drive system: 4x2 rear drive

(6) Wheel loader

- 1) Type: General purpose wheel loader
- 2) Bucket: General purpose bucket, 1.5m³ or more
- 3) Engine output: 95HP or more
- 4) Dumping clearance: 2,500mm or more
- 5) Cab: ROPS steel cab

(7) Container washing truck

- 1) Type: Water tanker with washing water jet device
- 2) Tank capacity: 6m³ or more
- 3) Suction and delivery pump: Discharge Quantity 500litter/min. or more, Discharge pressure 0.2Mpa or more, pump head 20m or more. 1 pump is applied for both suction to tank and delivery to washing device. Installing 2 pumps is allowed if system requires.
- 4) Washing device : Hose 20m or more, diameter of hose 30mm or less, water

- quantity variable nozzle
- 5) Payload: 6 ton or more
 - 6) Chassis operation: Left hand steering wheel, manual transmission
 - 7) Chassis drive system: 4x2 rear drive
- (8) Mechanical sweeper
- 1) Type: Double gutter brooms vacuum street sweeper
 - 2) Payload: 1.7 ton or more
 - 3) Hopper capacity: 3m³ or more
 - 4) Sub engine output: 40ps or more
 - 5) Blower capacity: Min. 130m³/min.
 - 6) Gutter broom: Diameter 600mm or more, approximately 120rpm
 - 7) Water tank capacity: 450litter or more
 - 8) Chassis operation: Left hand steering wheel, manual transmission
 - 9) Chassis drive system: 4x2 rear drive
- (9) Sprinkler truck
- 1) Type: Water tanker with sprinkler device
 - 2) Tank capacity: 10m³ or more
 - 3) Sprinkling pump: Discharge Quantity 500litter/min. or more, Discharge pressure 0.5Mpa or more, pump head 50m or more.
 - 4) Suction pump: Discharge Quantity 500litter/min. or more, Discharge pressure 0.2Mpa or more, pump head 20m or more. It is allowed that sprinkling pump serves for suction, too.
 - 5) Sprinkling nozzle: 2 sets installed in the front or rear of vehicle
 - 6) Payload: 10 ton or more
 - 7) Chassis operation: Left hand steering wheel, manual transmission
 - 8) Chassis drive system: 4x2 or 6x4 rear drive

2.2.3.2 Basic Design Drawings

The basic design drawings for the equipment to be procured under the Project are shown in Fig. 2.2.3-1 through Fig. 2.2.3-9.

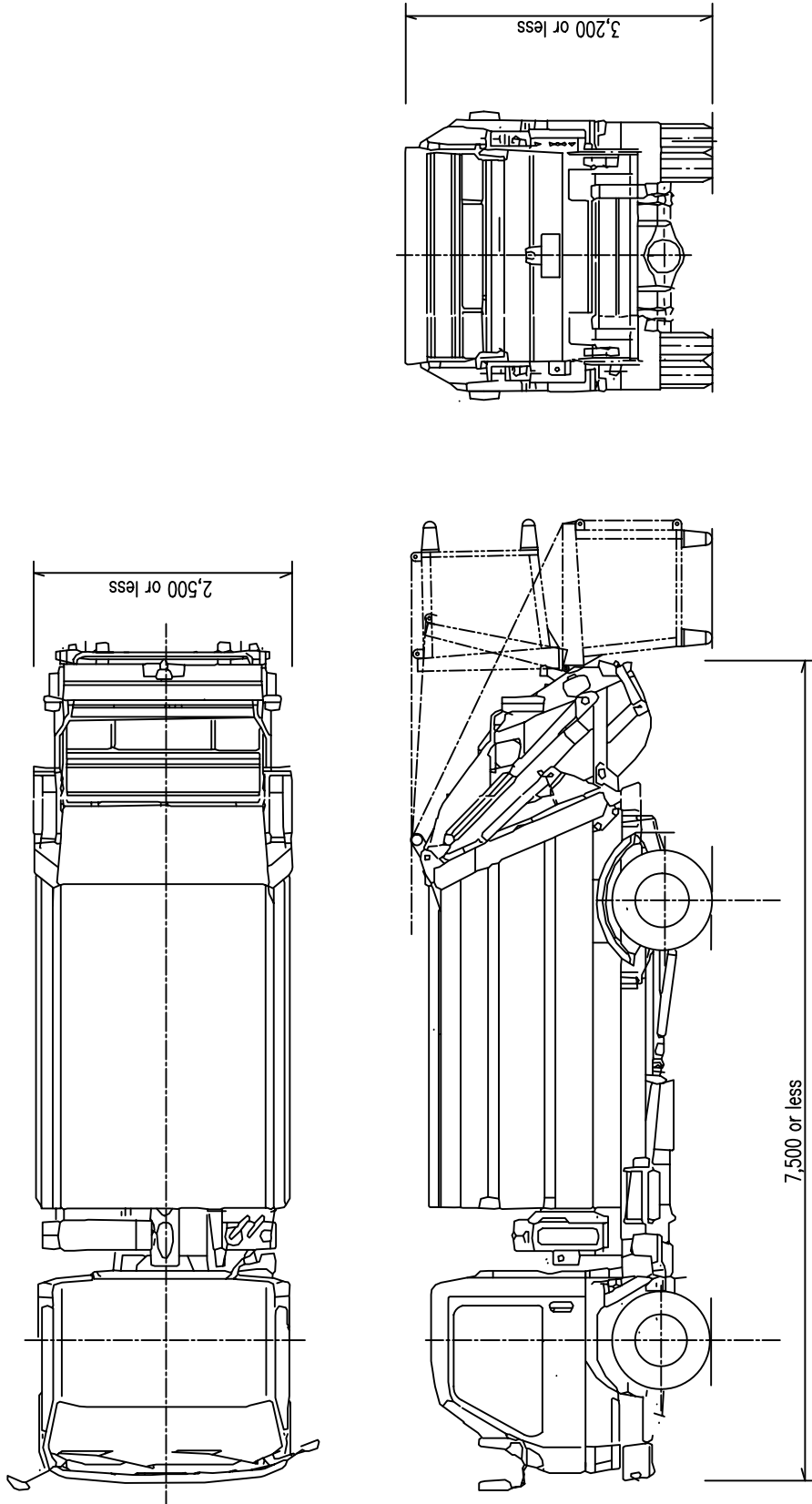


Fig. 2.2.3-1 Compactor truck Type 1 (8m3)

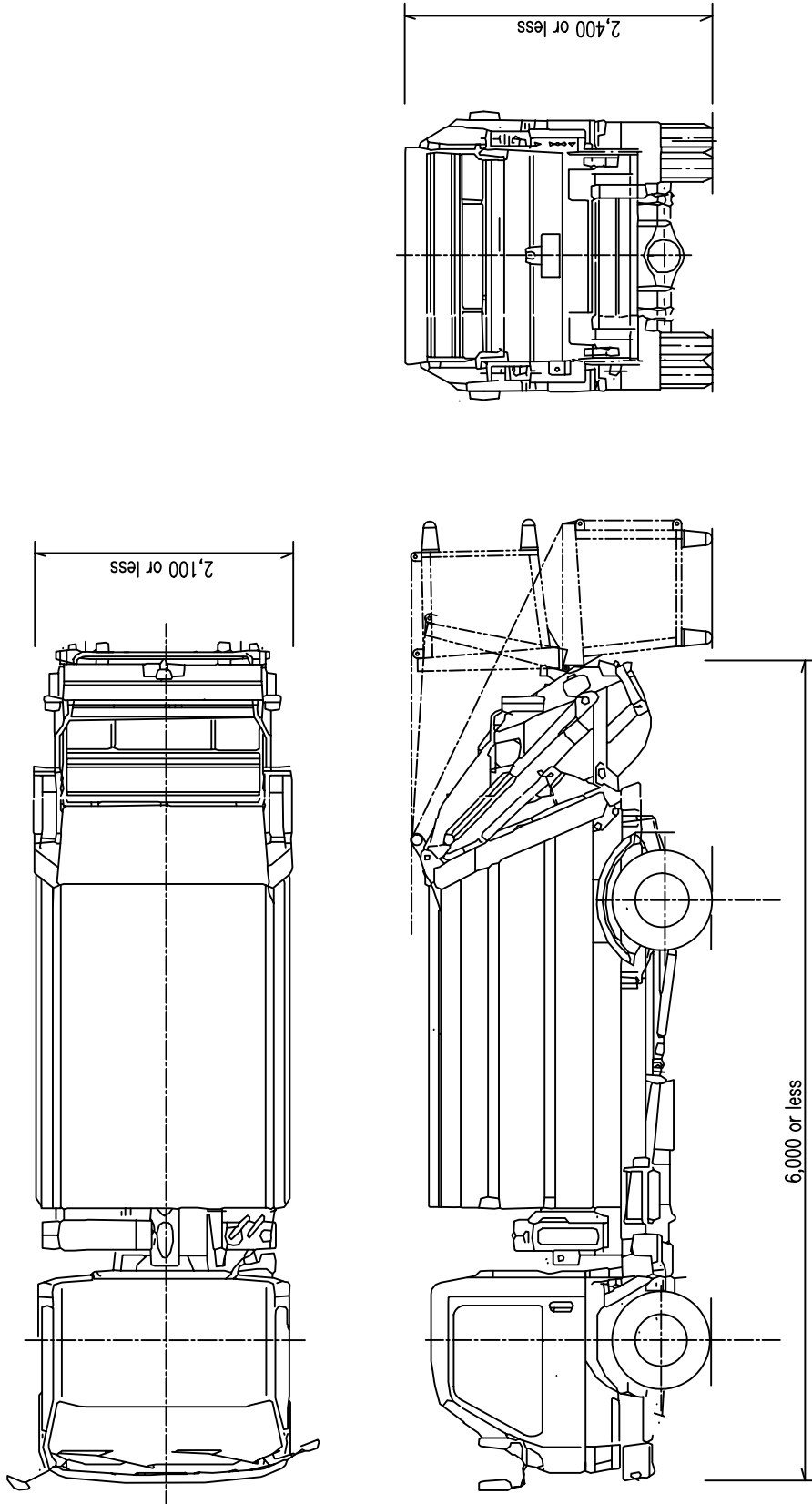


Fig. 2.2.3-2 Compactor truck Type 2 (4m3)

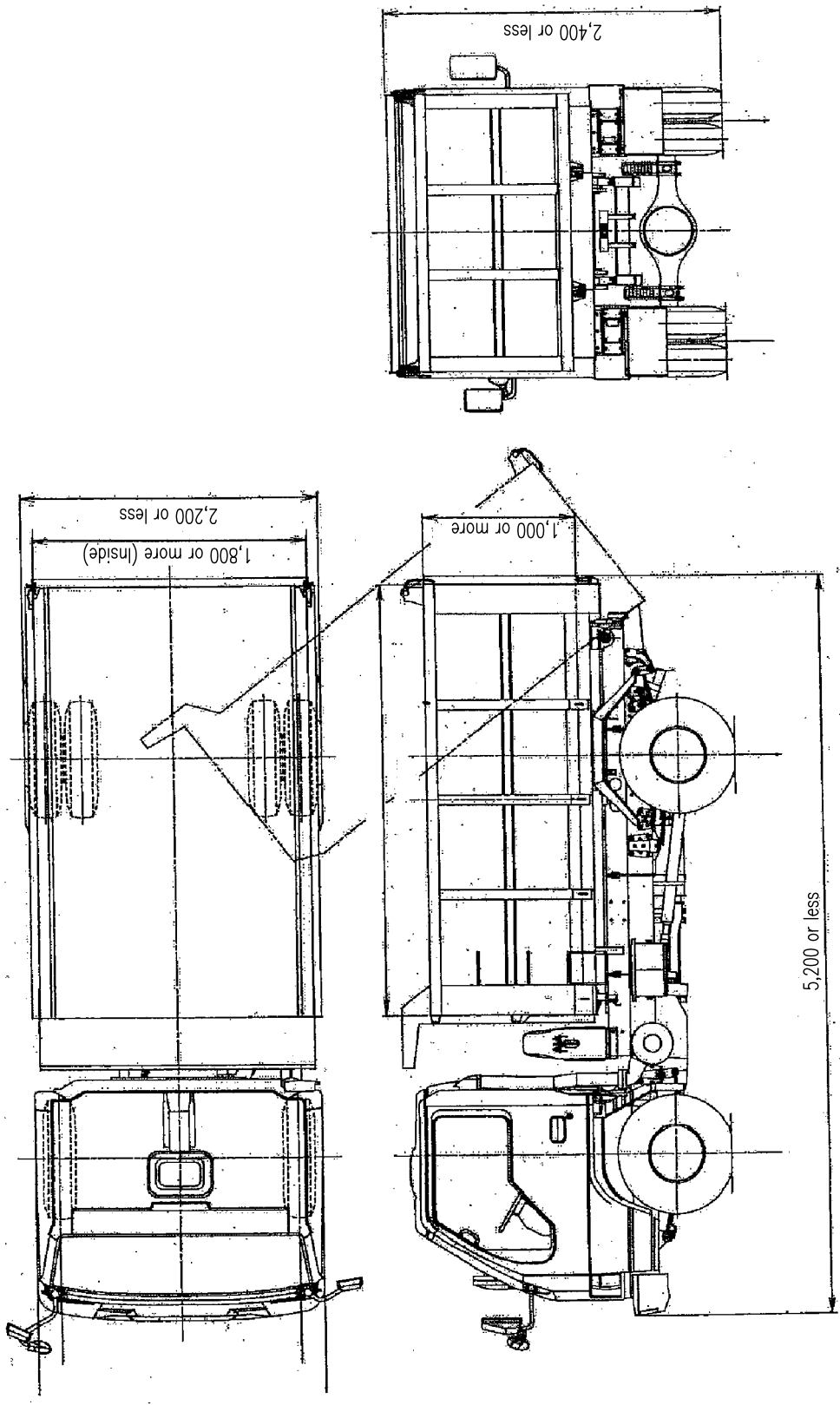


Fig. 2.2.3-3 Dump truck (6m³)

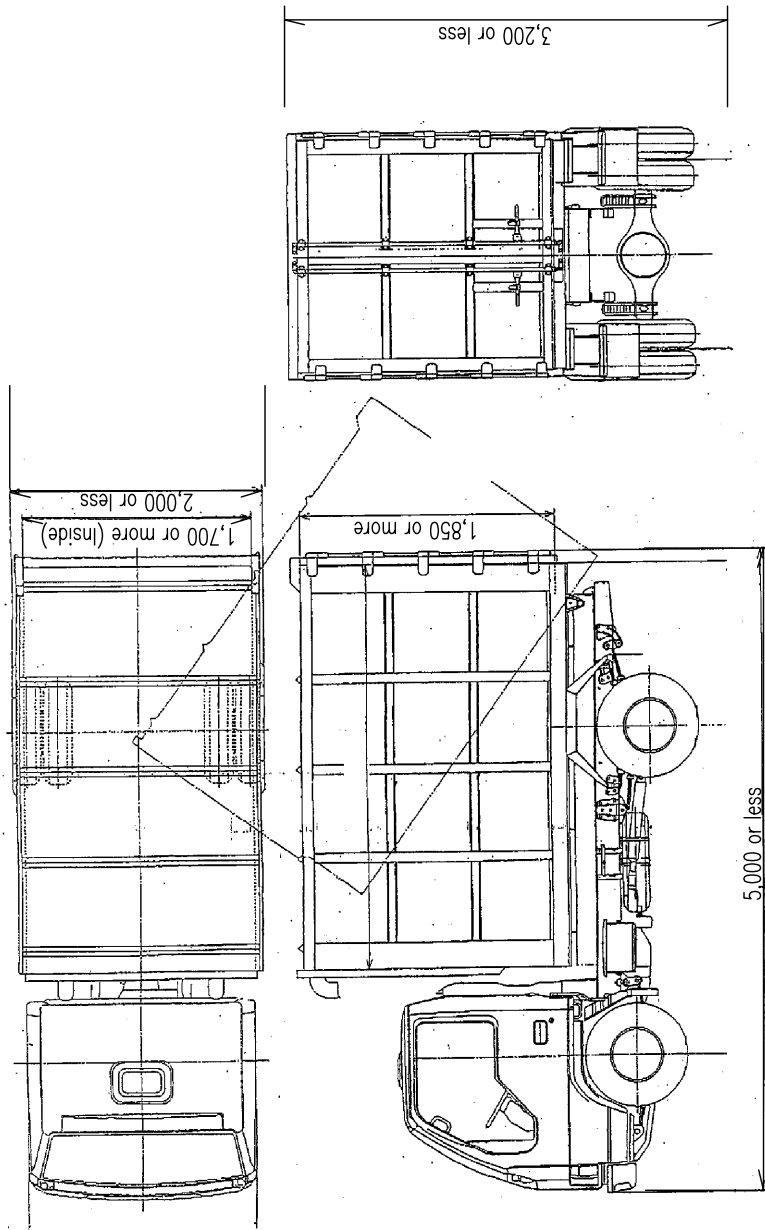


Fig. 2.2.3-4 Medical waste truck Type1 (2ton dump truck)

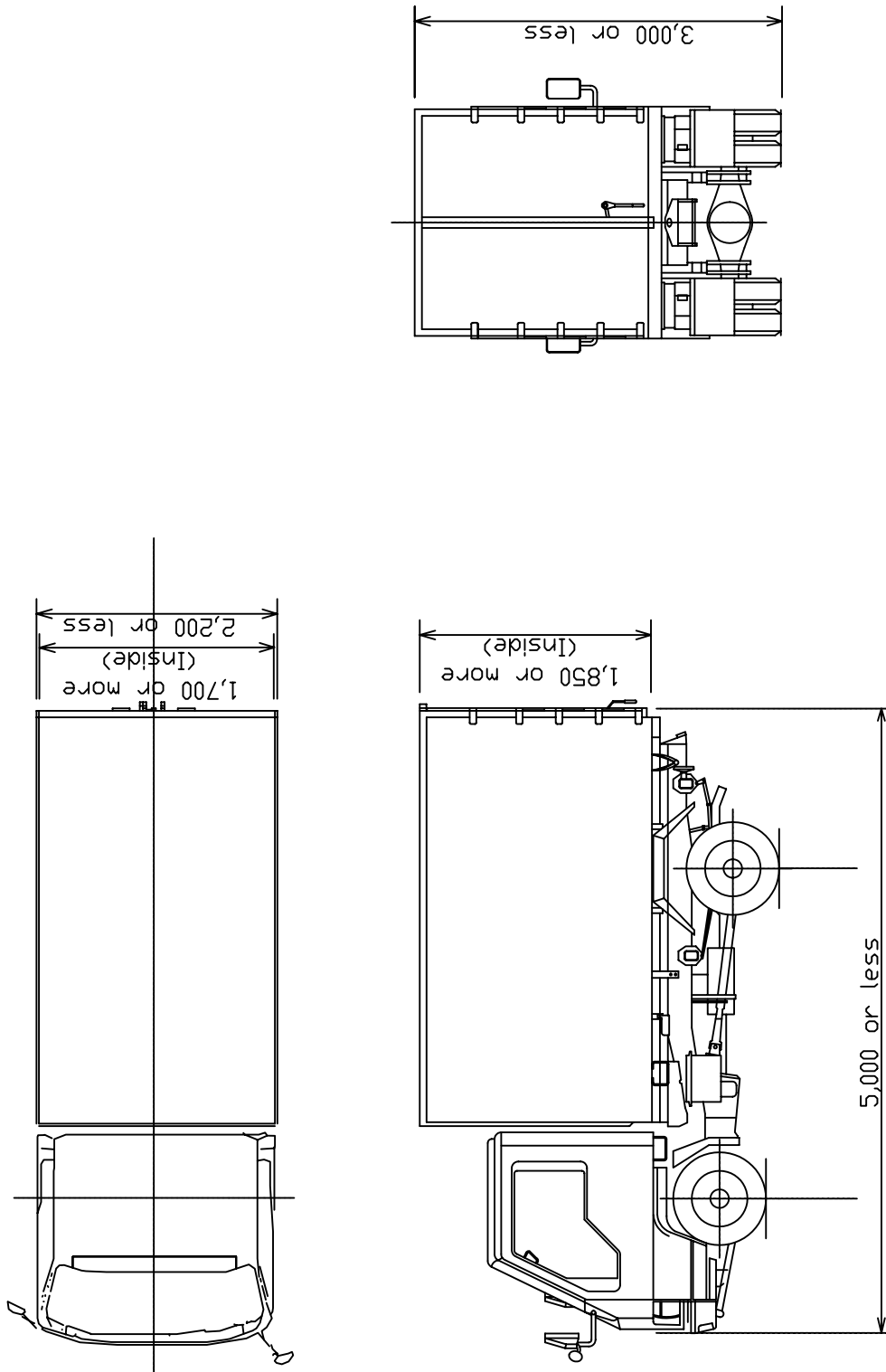


Fig. 2.2.3-5 Medical waste truck Type 2 (1ton van truck)

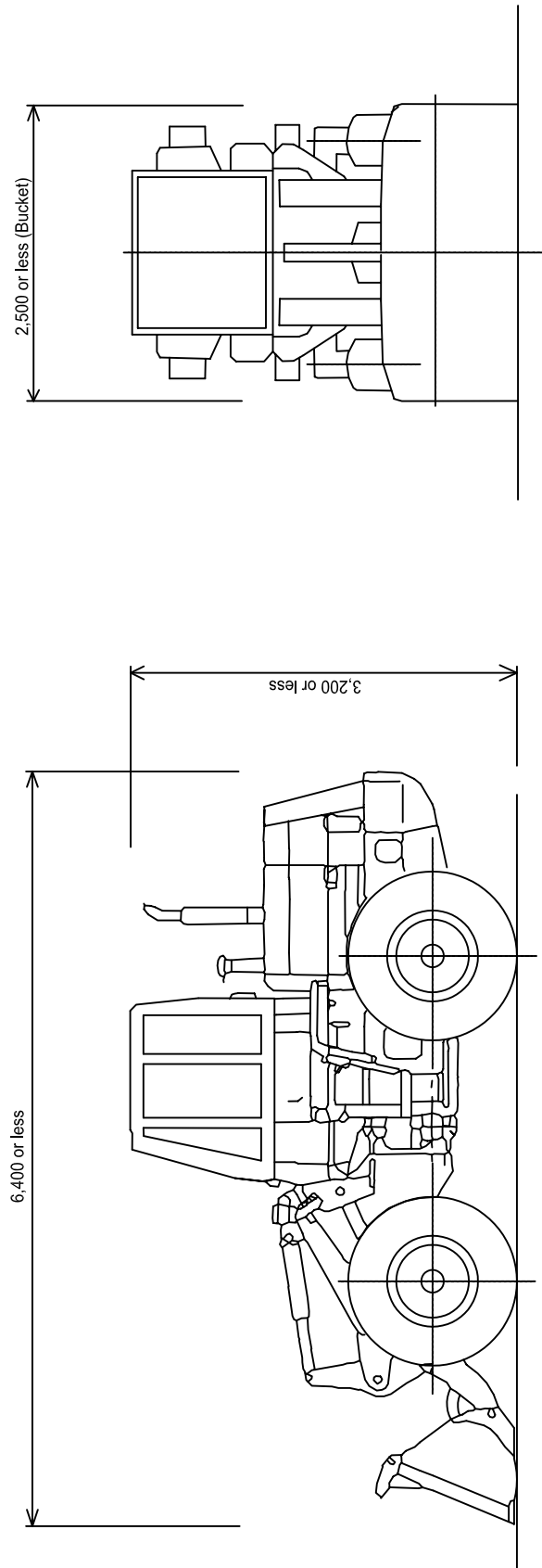


Fig. 2.2.3-6 Wheel loader

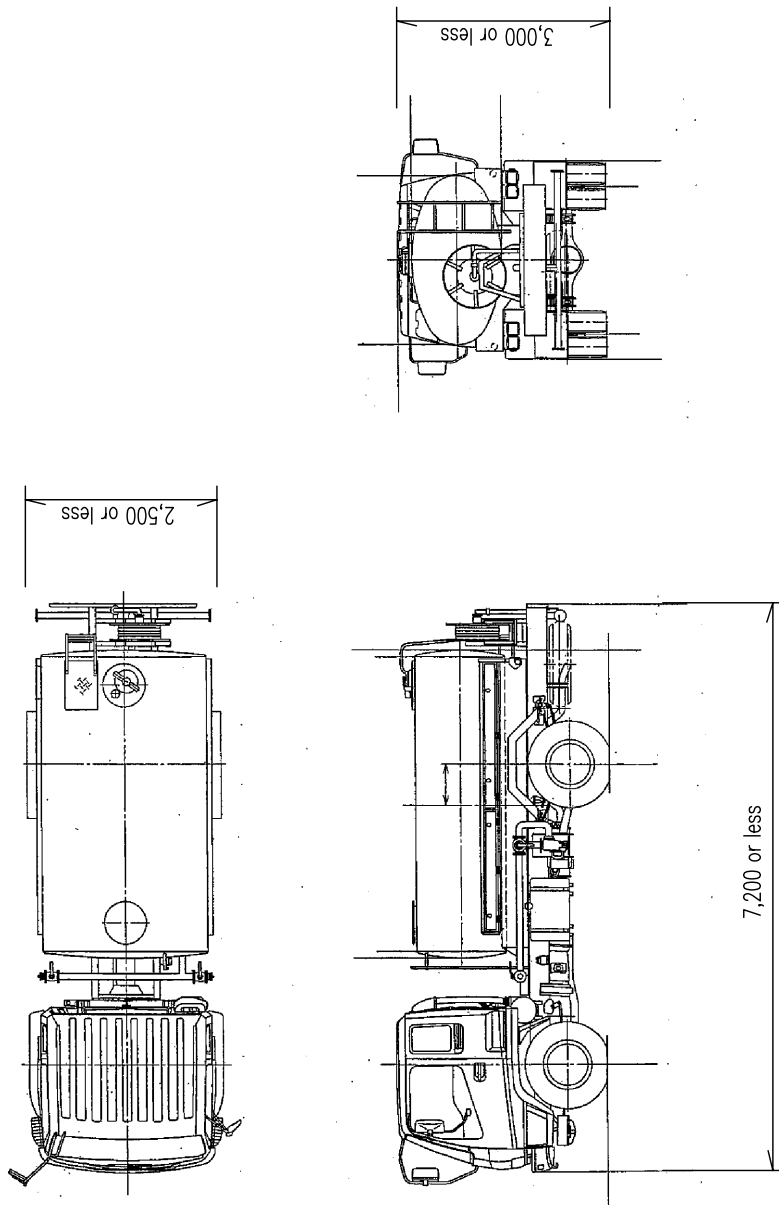


Fig. 2.2.3-7 Container washing truck

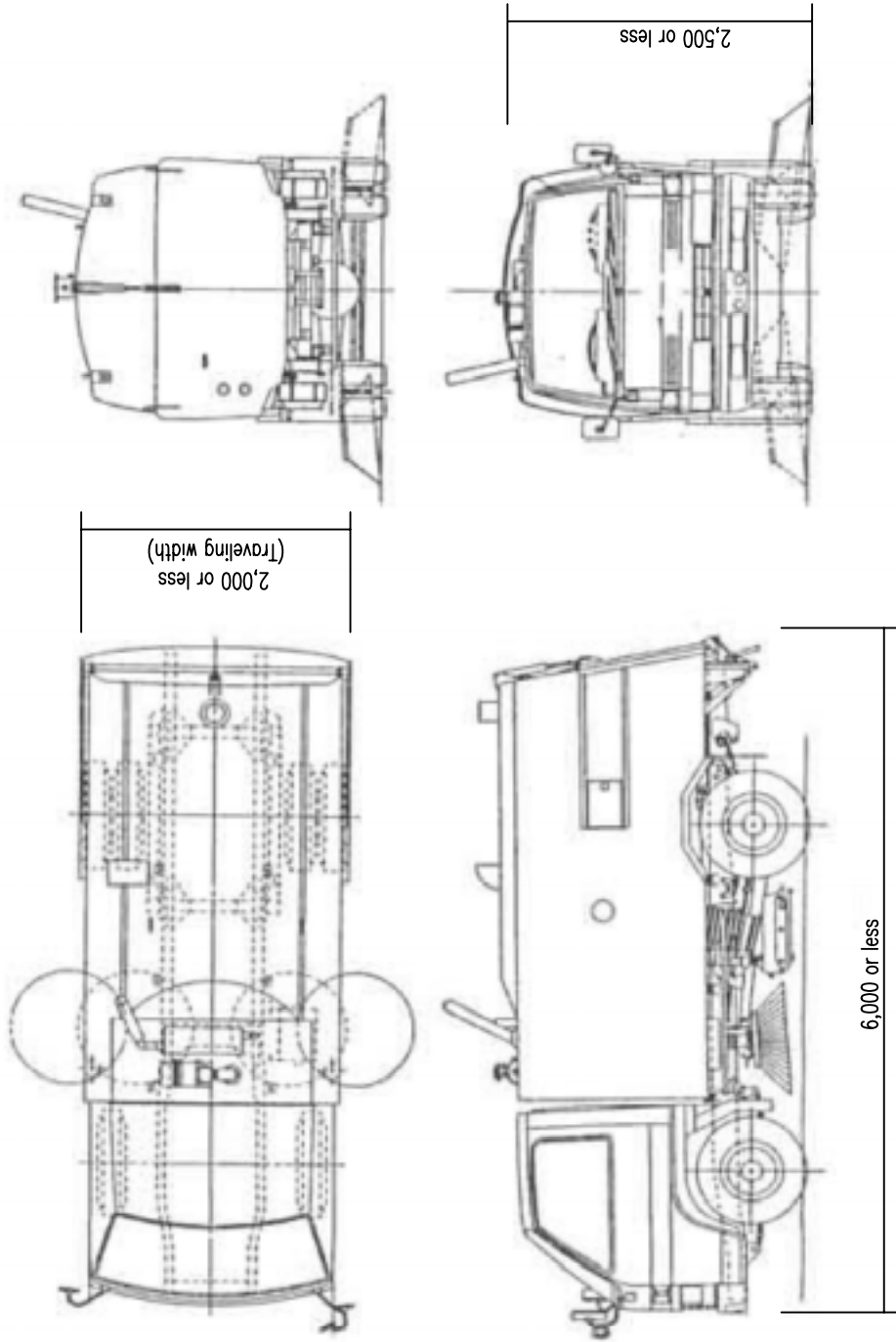


Fig. 2.2.3-8 Mechanical sweeper

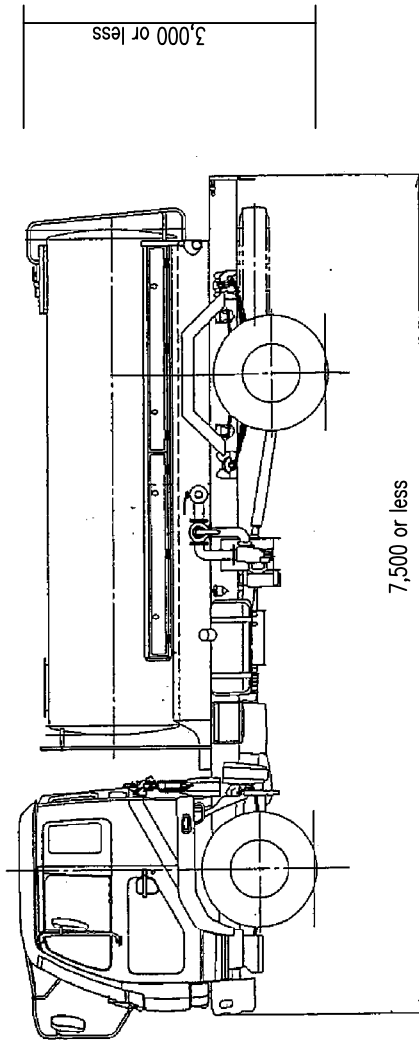
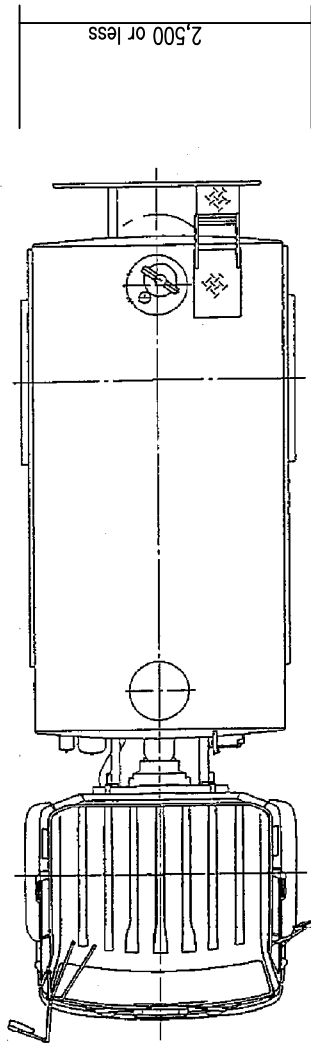


Fig. 2.2.3-9 Sprinkler truck

2.2.4 Implementation Plan

2.2.4.1 Implementation Policy

The Project will be implemented in accordance with the framework of the grant aid scheme of the Government of Japan. The Project will proceed to the implementation stage after its approval by the Government of Japan and the signing of the E/N by the two countries involved. The first step after the said signing will be the selection of a Japanese consultancy firm (the Consultant) by the Government of Syria and the Consultant will conduct the detailed design. After completion of the tender documents based on the detailed design results, a Japanese contractor (the Equipment Supplier) will procure the planned equipment. The basic issues and important points for project implementation are described next.

(1) Project Implementing Agency

The agency responsible for the Project on the Syrian side will be the Ministry of Local Administration & Environment (MoLAE). Under the auspices of the MoLAE, Homs City Council and Lattakia City Council will act as the project implementing agencies. It will be necessary for the Government of Syria to appoint persons responsible for the administration of the Project from the three organizations mentioned above to establish a comprehensive project administration system so that the Project can be smoothly implemented with close liaison and consultation with the Japanese Consultant and the Equipment Supplier. These appointed persons must fully explain the contents of the Project to all other persons concerned and also supervise the activities to assist the Project. In regard to the three surrounding cities of Lattakia, although the three cities manage their solid waste, Lattakia City Council will act as their liaison/representative agency in any dealings with the Japanese side. Meanwhile, the MoLAE will conduct any discussions with the Japanese side regarding the Project and will also administer the agreements/contracts with the Consultant and the Equipment Supplier for the proper implementation of this grant aid project.

The summary of the above description is as follows;

- Responsible Agency: Ministry of Local Administration & Environment (MoLAE)
- Implementing Agency: Homs and Lattakia City Councils
- Liaison Agency for the three surrounding cities of Lattakia: Lattakia City Council
- Solid Waste Management Bodies: Homs, Lattakia, Jableh, Al Haffeh and Qurdaha City Councils

(2) Consultant

For the procurement of the equipment with Japanese grant aid, the Consultant understanding the grant aid rules and procedures, a Japanese firm, will conclude a design and supervision agreement (consultancy agreement) with the Government of Syria and will conduct (i) the detailed design and (ii) the supervision of the equipment procurement.

The Consultant will also prepare the tender documents and will act as the agent for the Syrian side to organize the tender.

(3) Equipment Supplier

A Japanese corporation to be selected by open tender as required by the grant aid scheme of the Government of Japan will procure the planned equipment. Given the need for the provision of such after-services as the supply of spare parts for the procured equipment and an appropriate response to equipment break downs after the handing over of the procured equipment to the Syrian side, the Equipment Supplier must give careful consideration to the establishment of a communication system with the Syrian side in the post-project period.

(4) Necessity for Dispatch of Engineers

The planned grant aid only involves the procurement of equipment for solid waste collection and transportation and no installation work is required. Accordingly, the dispatch of a Japanese engineer in connection with the procurement of equipment will be unnecessary.

2.2.4.2 Implementation Conditions

(1) Local Procurement Potential

The procurement potential of solid waste collection and transportation vehicles and wheel loaders in Syria is described below.

1) Origin of Equipment

None of the planned solid waste collection and transportation vehicles or wheel loaders to be procured under the Project is manufactured in Syria, making their import from Japan or a third country (countries) necessary. Given the fact that Syria prohibits any imports from Israel, Israel should not be listed as an eligible country for equipment supply. Meanwhile, the United states of America (USA) should also be removed for the list of eligible countries as the USA

government's policy of prohibiting exports to Syria as an economic sanction would hinder the smooth procurement of spare parts, etc.

2) Situation of Truck and Construction Machinery Market in Syria

The Government of Syria imported the existing equipment from various sources, including Japan and European countries. The procurement of equipment from abroad should, in principle, be made by means of international tender and there is no practice of appointing a specific country or manufacturer for equipment procurement. As a result, various models of different manufacturers are used. The origins of the solid waste collection and transportation vehicles and wheel loaders currently in use are roughly summarised as follows.

- ① Large compactors : American and European manufacturers
(Mack, Freight Liner, Man and Volvo, etc.)
- ② Medium and small compactors : Japanese manufacturers (Toyota and Isuzu, etc.)
- ③ Wheel loaders : American and European manufacturers
(Case, Volvo and Caterpillar, etc.)

While the manufacturers listed above have been principally selected based on the equipment cost, evaluation of the after-service system and other aspects has not been fully conducted. Therefore, in some cases, purchase of spare parts is difficult after the equipment procurement. Only a small number of manufacturers have a relatively well organized after-service system in terms of the supply of spare parts and repair and it is believed to be desirable to procure the equipment from these manufacturers. For the purposes of the Project, therefore, it will be necessary to promote the procurement of equipment from a manufacturer(s) providing good after-service by means of procurement from a third country (countries) if such manufacturer has an agent in Syria which can supply equipment meeting the required specifications and that the country of origin of the equipment made by the said manufacturer is a third country.

(2) Important Points for Planning of Procurement

Special attention should be paid to the following points when planning the equipment to be procured with grant aid provided by the Government of Japan.

1) Unification of Equipment Specifications

The contract conditions for equipment supply should include (i) the supply of the same model of the same manufacturer for equipment to be procured for use by more than one city council

under the Project, of which the required specifications are the same, so that maintenance know-how concerning the equipment in question can be shared by the city councils in question and (ii) the supply of equipment of the same manufacturer or with similar mechanical systems where possible in order to achieve the sharing of spare parts between different models and the smooth purchase of spare parts.

2) Lots in Equipment Supply Contract

The equipment of which the procurement is planned with the Japanese grant aid consists of solid waste collection and transportation vehicles which are classified in the category of truck and wheel loaders which are classified in the category of construction machinery. Because of the absence of any installation work, etc. under the Project, it is judged to be appropriate for the contractor for equipment procurement, i.e. the Equipment Supplier, to be a trading house involved in the trading of automobiles as well as construction machinery.

Given the facts that the Project is a large-scale project involving the procurement of more than 100 vehicles and that trading houses have their own specialist fields, it will be necessary to divide the equipment supply contract into more than one lot based on the type and cost of the vehicles to ensure the competitiveness of the tender by securing as many bidders as possible.

3) Phasing of Equipment Procurement

In Homs, Lattakia and Jableh, it is an urgent requirement to promote the municipal waste collection capacity since the waste difficult to collect through usual work reaches at 27 t/day – 150 t/day. In order to cover the mentioned urgent requirement, earlier procurement of Compactor truck Type 1 (8 m³) is effective. Therefore Compactor truck Type 1 (8 m³) is planned to procure earlier as Phase 1 and the others is procured as Phase 2. Furthermore the soft component to be described latter of this documents is also planned to be implemented in Phase 1 since it is necessary for efficient solid waste collection.

2.2.4.3 Scope of Work

The scope of the work for the Japanese side and the Syrian side for the Project is described next.

(1) Scope of Work to be Undertaken by Japanese Side

- 1) Procurement of the solid waste collection and transportation equipment
- 2) Maritime transportation to and unloading of the above equipment at a trading port in Syria

- 3) Technical assistance relating to the efficiency promotion of solid waste collection as described later (soft component)

(2) Scope of Work to be Undertaken by Syrian Side

- 1) Customs clearance and inland transportation of the solid waste collection and transportation equipment in Syria
- 2) Procurement of containers which correspond to the equipment procured by the Japanese grant aid assistance
- 3) Deployment of the necessary personnel for the operation of the equipment procured with the Japanese grant aid assistance
- 4) Budgetary arrangements required for the operation and maintenance of the equipment procured with the Japanese grant aid assistance and implementation of solid waste collection and transportation

2.2.4.4 Consultant Supervision

The proposed Project must be implemented within the framework of the grant aid scheme of the Government of Japan and, therefore, its basic policies are to abide by the rules and standards, etc. of the scheme and to procure appropriate equipment to improve the solid waste collection and transportation conditions in the target Project Areas within the framework of the scheme.

(1) Contents of Procurement Supervision

The Consultant must form a consistent project team to conduct the preparation of the tender documents and procurement supervision based on the opinions and concepts expressed in the basic design report in view of the smooth implementation of all of the project-related activities. The Consultant will conduct a range of work so that the proposed procurement of equipment is consistent with the grant aid scheme of the Government of Japan.

Table 2.2.4-1 Work of the Consultant

Stage	Work
Before signing of the equipment supply contract(s)	<ul style="list-style-type: none"> • Preparation of the tender documents • Execution of the tender as the agent • Evaluation of bids • Assistance for the signing of the equipment supply contract(s)
After signing of the equipment supply contract(s)	<ul style="list-style-type: none"> • Supervision of the equipment procurement process and quality control • Verification of the equipment quality • Arrangement of pre-shipment inspection by a third party • Checking of the execution of the work agreed by the Equipment Supplier • Preparation of various reports

To properly perform the work listed above, the Consultant will deploy the personnel listed in Table 2.2.4-2 in line with the progress of the work.

Table 2.2.4-2 Personnel Deployment Plan of Consultant

Work	Personnel to be Deployed
Preparation of the tender documents	Project team leader (head engineer): engineer responsible for the planning of equipment; engineer responsible for determination of the contract conditions
Execution of the tender as the agent	Project team leader; engineer responsible for cost estimation; engineer responsible for administration of the tender
Evaluation of the bids	Project team leader; engineer responsible for evaluation of the equipment; engineer responsible for administration of the tender
Assistance for tender work	Project team leader; engineer responsible for administration of the tender
Supervision of the equipment procurement process and quality control	Project team leader and engineer responsible for evaluation of the equipment at suitable times during the procurement process
Checking of the equipment quality	Engineer responsible for evaluation of the equipment
Arrangement of the pre-shipment inspection by a third party	Engineer responsible for evaluation of the equipment
Checking of the execution of the work agreed by the equipment supplier	Project team leader; engineer responsible for evaluation of the equipment
Preparation of various reports	Project team leader; engineer responsible for evaluation of the equipment

(2) Project Implementation System at Time of Procurement Supervision

The project implementation system at the time of procurement supervision and the general relationship between the project-related organizations are shown in Fig. 2.2.4-1.

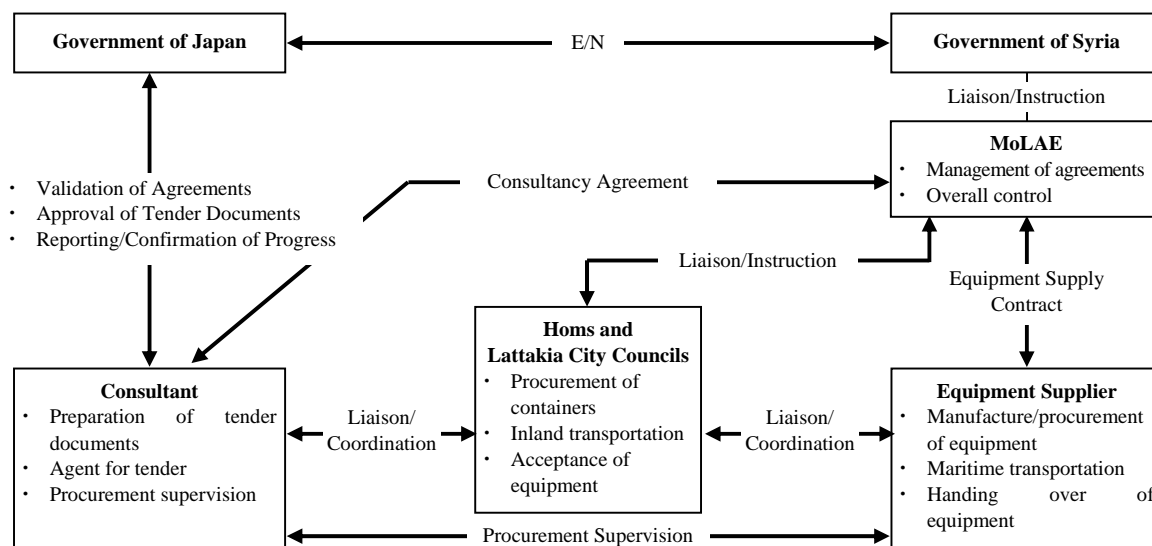


Fig. 2.2.4-1 Project Implementation System at Time of Procurement Supervision

2.2.4.5 Quality Control Plan

The quality control plan for the Project is described below in reference to schedule control and quality control.

(1) Schedule Control

As the proposed grant aid project consists of only the procurement of equipment, the important work to maintain the pre-determined schedule will be the manufacture of the equipment at factories. In principle, control of the manufacturing schedule will be conducted by control of the factories by the Equipment Supplier (suppliers). Meanwhile, the Consultant will check the progress situation relying on reports submitted by the Equipment Supplier and will issue warnings, etc. if necessary. The following work is planned for the Consultant's supervision of the work schedule.

- ① In consideration of the project period stipulated by the grant aid scheme of the Government of Japan and the period assumed to be required for the manufacture of the equipment, the Consultant will establish a necessary and sufficient project implementation schedule and will also prepare a project schedule sheet which will form part of the equipment supply contract. This sheet will be part of the tender documents.

- ② At the time of the tender, the Consultant will check that the schedule indicated by the bidders is appropriate to meet the requirements of the grant aid scheme.
- ③ The Consultant will check the progress situation of the work by comparing the actual progress made by the Equipment Supplier with the planned schedule.
- ④ When the work progress of the Equipment Supplier begins to significantly fall behind the planned schedule, the Consultant will issue a warning to remind the Equipment Supplier of the latter's obligation to meet the original schedule. Moreover, the Consultant will examine and propose measures to maintain the planned schedule as and when necessary.

(2) Quality Control

The equipment to be procured with the planned grant aid assistance will be manufactured at suitable factories. Accordingly, the quality of such equipment will, in principle, be controlled by the Equipment Supplier and the Consultant will verify the equipment quality based on the performance test results, etc. at the time of completion. In addition, the Consultant will conduct the following work related to supervision of the equipment quality.

- ① The Consultant will include the equipment specifications, which are determined based on the basic design, in the tender documents.
- ② The Consultant will verify that the equipment proposed by the bidders at the time of the tender meet the specifications set in the relevant tender documents.
- ③ When judged necessary, the Consultant will check that the specifications of detailed points of the equipment are as specified in the design documents by means of checking the approved documents, etc. of the Equipment Supplier.
- ④ The Consultant will confirm the quality of the equipment prior to its shipment by means of witnessing the quality inspection at the time of completion of equipment manufacture at the factory, reviewing reports on the inspection results or conducting any other appropriate action. If found necessary, the Consultant will instruct the Equipment Supplier to adjust the manufactured equipment.

2.2.4.6 Procurement Plan

(1) Planning of Equipment Procurement

The implementation of equipment procurement in the following manner is planned, taking the difficulty/eases of procuring each type of equipment in Syria and the available after-service provided by potential equipment manufacturers into consideration.

1) Equipment Supply Sources

As described earlier, all of the equipment of which the procurement is planned under the Project is not manufactured in Syria and must be procured in Japan or a third country (countries).

Vehicles which account for most of the equipment to be procured are entirely classified in the category of small to medium size trucks and those manufactured by Japanese car companies have an excellent reputation. European and American manufacturers are more specialised in the manufacture of large trucks and do not have an extensive record of supplying small to medium size trucks. Accordingly, the procurement of these vehicles in Japan is planned.

Meanwhile, in regard to wheel loaders which are classified in the category of construction machinery, manufacturers in European Union (EU) countries have often supplied this type of equipment and have a well-established after-service system. As the wheel loaders to be procured under the Project are general-purpose wheel loaders requiring no new design, they can be manufactured by the existing production lines of potential suppliers. In view of this, it is entirely feasible for a Japanese equipment supplier to control the procurement process of wheel loaders. Accordingly, extension of the eligible countries for equipment supply to third countries is planned. However, if eligibility is extended to all EU countries, those manufacturers with no agent in Syria may respond, making it impossible to achieve the principal purpose of extending the scope of eligible countries. Therefore, the introduction of the condition that an equipment supplier must have an official agent in Syria is planned if wheel loaders are to be procured from a manufacturer in a third country.

In the case of the containers to be procured by the Syrian side as part of the Project, these can be manufactured in Syria and, therefore, will be procured locally.

Based on the above examination of the possible equipment supply sources, the supply sources for the planned equipment under the grant aid are planned as shown in Table 2.2.4-3.

Table 2.2.4-3 Possible Equipment Supply Sources

Type of Equipment	Supply Source			Remarks
	Syria	Japan	Third Country	
Compactor truck Type 1 (8 m ³)		O		
Compactor truck Type 2 (4 m ³)		O		
Dump truck (6 m ³)		O		
Medical waste truck Type 1 (2 ton dump truck)		O		
Medical waste truck Type 2 (1 ton dump truck)		O		
Wheel loader		O	(O)	EU Countries*
Container washing truck		O		
Mechanical sweeper		O		
Sprinkler truck		O		

*Based on the cost estimation of the project, wheel loader shall be procured in Japan because the product with the lowest price is made in Japan. However, concerning products made in European Union (EU) countries of which their equipment suppliers must have official agents in Syria, they satisfies enough specifications and have well-established after-service systems for the project. Therefore, in regard to tender, extension of the eligible countries for equipment supply to third countries is planned.

2) Scope of Spare Parts Procurement

Given the fact that local administrations in Syria procure the necessary spare parts in bulk based on their annual plans, the procurement of spare parts judged to be necessary to ensure the operation of the supplied equipment for approximately one year will be supplied, mainly consumables, under the Project.

The spare parts required for the operation of the equipment in the second year and thereafter and those not included in the scope of the Project must be procured by the self-help efforts of the Syrian side.

3) Equipment Guarantee by Manufacturer

It is generally difficult to identify the causes of the mechanical malfunctioning of equipment after one year. Accordingly, the Equipment Supplier and equipment manufacturers will guarantee free repair or replacement for a period of one year from the handing over of the equipment in regard to any mechanical malfunctioning of the procured equipment except for that caused by inappropriate use, control or accident.

There is a possibility that obtaining spare parts may become difficult in the future because of model changes and other reasons. It is, therefore, judged to be necessary to make it an

obligation for the Equipment Supplier to supply appropriate spare parts on a commercial basis for a period of at least 10 years from the initial supply of equipment.

(2) Transportation Plan

The equipment procured in Japan must be transported from a trading port in Japan to a trading port in Syria by sea. In the case of procurement from a third country in the EU region, the equipment must also be transported from the nearest trading port in the EU region from its country of origin to a trading port in Syria by sea. The leading trading ports in Syria are Port Lattakia and Port Tartus and their respective use must be arranged based on the schedule of transport vessels, etc. The landing and customs clearance of the planned equipment under the Project will be possible at both ports.

The scope of the planned grant aid assistance include the transportation to and unloading of the equipment at a trading port in Syria while the subsequent customs clearance and inland transportation of the equipment will be the responsibility of the Syrian side. Apart from spare parts, all of the equipment to be supplied consists of self-propelled vehicles and it will be possible to drive these vehicles to their respective destinations as the inland transportation method.

The prospective distance for inland transportation by the Syrian side (to the city centre) is shown in Table 2.2.4-4.

Table 2.2.4-4 Inland Transportation Distance of Procured Equipment

(Unit: km)

Unloading Port Destination	Port Lattakia	Port Tartus
Homs	186	96
Lattakia	-	90
Jableh	33	60
Al Haffeh	26	116
Qurdaha	24	90

(3) Installation Plan

All of the equipment will be simply handed over to the Syrian side and no installation work will be necessary.

(4) Adjustment and Test Operation Plan

As all of the equipment to be procured will have been completed at their respective factories prior to loading on to a ship, no on-site adjustment or test operation will be necessary. Even though some parts/components will be detached during their maritime transportation, their re-attachment is considered to be part of the standard delivery work. No special planning will, therefore, be necessary for the re-attachment of parts/components or adjustment of the equipment.

(5) Guidance Plan for Initial Equipment Handling

All of the equipment to be supplied under the Project is general-purpose equipment and the Syrian side is familiar with the handling of this equipment. Although some instructions on use and maintenance will be required at the time of the handing over of the equipment, these instructions are considered to be part of the standard handing over process. Accordingly, there will be no special need for initial guidance on equipment handling.

(6) Operation Guidance Plan

For improvement of the solid waste collection rate which is the purpose of the Project, improvement of the efficiency of solid waste collection work is essential. In particular, the cooperation of local residents regarding their solid waste discharge behaviour is imperative to achieve an improved efficiency of the solid waste collection work. This makes the introduction of educational activities necessary to obtain the effective cooperation of local residents. Technical guidance on the efficiency promotion of solid waste collection as described later will, therefore, be provided as the soft component of the Project.

(7) Inspection Plan

The following inspections, including acceptance inspection, are planned under the Project.

1) Inspections by Equipment Supplier

The Equipment Supplier and manufacturers will conduct the following inspections.

① Factory Inspection

At the factory, inspection will be conducted to verify the quality, shape and performance, etc. of the manufactured equipment. Verification of the proper functioning of the container life of the compactor trucks will be particularly important. Apart from spare parts, this inspection will be 100% inspection. In regard to spare parts, sampling

inspection will be conducted based on the quality assurance system of the manufacturer concerned.

② Pre-Shipment Inspection

Prior to the packing of the equipment for export, inspection will be conducted to check the quantity (types and number) of the equipment.

③ Pre-Loading Inspection

A representative of the Equipment Supplier will prepare the pre-loading inspection by the Consultant which is described later and will witness the inspection.

2) Inspections by Consultant

The Consultant will conduct the following inspections.

① Factory Inspection

The Consultant will verify the factory inspection results of the Equipment Supplier using the documents submitted by the latter, conduct sampling inspection and compare and verify the factory inspection results with the sampling inspection results. At the same time, the Consultant will compare and verify the completed products with the documents, etc. submitted by the Equipment Supplier at the time of the tender and after the signing of the contract.

② Pre-Loading Inspection

The Consultant will entrust a third party to conduct the pre-loading inspection. This inspection will check the quantity and packing conditions of the equipment to ensure that the equipment loaded on to the ship is as specified in the contract.

③ On-Site Delivery Inspection

Following the arrival of the equipment at a trading port in Syria, the Consultant will confirm the delivery of the equipment quantity specified in the agreement. At this time, the Consultant will check for any damage to the equipment during transportation and will issue an instruction for free repair, etc. to the Equipment Supplier if necessary. The Consultant will also confirm the completion of the work to be conducted by the Equipment Supplier, including explanation of the equipment handling.

2.2.4.7 Implementation Schedule

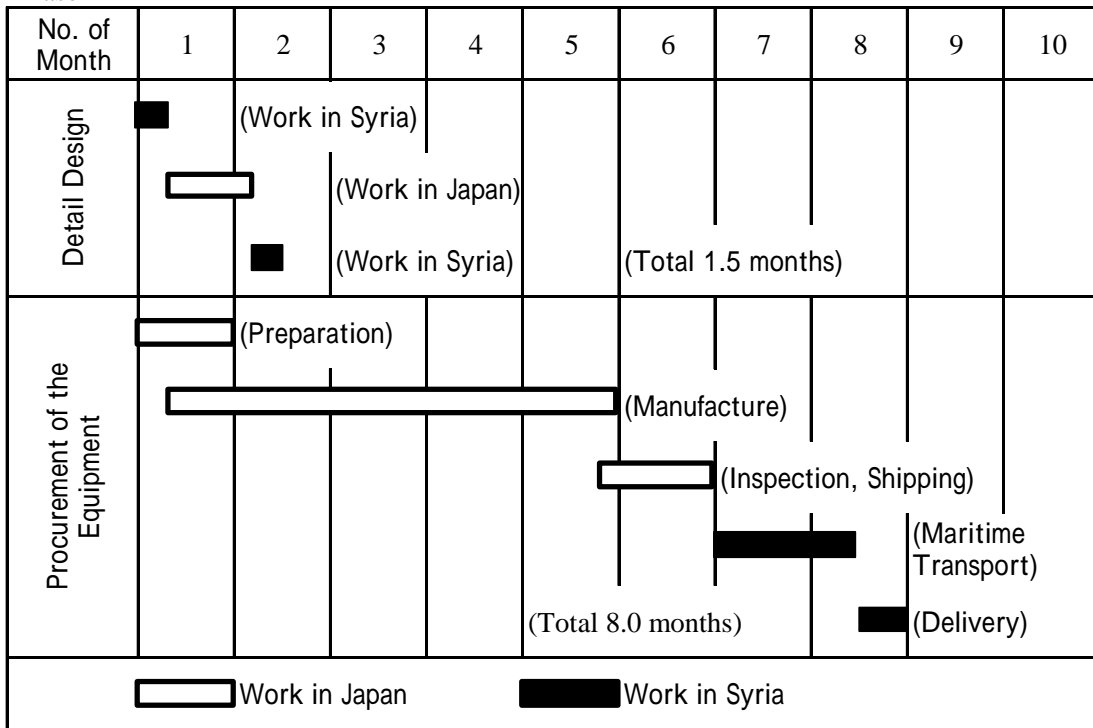
The procurement of equipment will be executed in 2 phases. Each phase will be commenced after approval of cabinet of the Government of Japan and exchange of notes (E/N) between the two Governments.

After the E/N, a consultant firm will conclude the consultancy agreement then the Consultant commences detail design. The detail design includes a preparation of the tender documents in Japan and confirmations of the final contents of the Project and the tender documents. Necessary period for those works is believed to be approximately 1.5 months for Phase 1 and 0.5 months for Phase 2.

After the detail design, equipment supplier(s) will be selected through tendering, then the selected equipment supplier(s) will commence the procurement of equipment. The works consists mainly of manufacture, transportation and delivery and its necessary period is believed to be approximately 8 months for each phase.

The schedule based on the above conditions is as shown in Fig. 2.2.4-3.

Phase 1



Phase 2

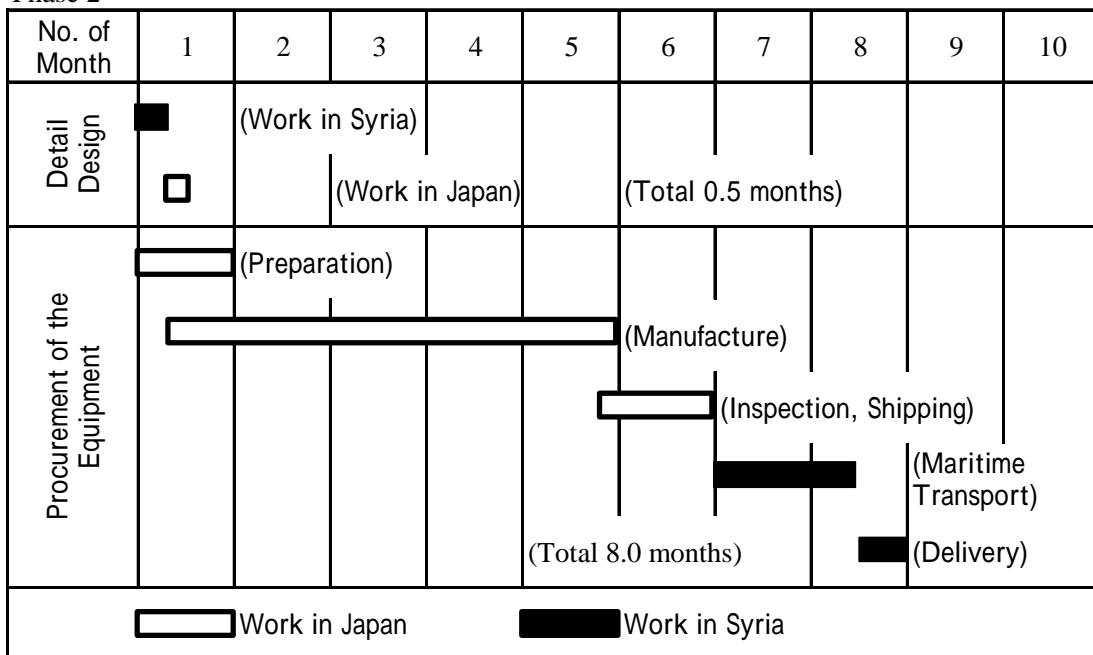


Fig. 2.2.4-3 Project Implementation Schedule

2.3 Obligations of Recipient Country

2.3.1 Obligations of Recipient Country

The obligations of the recipient country, i.e. Syria, under the Project are outlined in this chapter. As the fulfilment of these obligations is essential for the smooth implementation of the Project, the Syrian side must meet each obligation without fail.

(1) Special Obligations

The obligations of the Syrian side which are specially noted in the Minutes of Discussions (M/D) for the basic design are listed below.

- 1) Inland transportation, including customs clearance, of the procured equipment with the provision of the relevant insurance if necessary
- 2) Procurement of the solid waste collection containers to be used by the planned compactor trucks
- 3) New recruitment and/or redeployment of staff members at its own expense to secure the necessary personnel to operate the equipment procured under the Project

(2) General Obligations

The following obligations are confirmed as general obligations of the recipient country to proceed with the grant aid project in the M/D for the basic design.

- 1) To open an account with a Japanese bank for payment to the Consultant and the Equipment Supplier(s) from the grant aid funds provided by the Government of Japan, to issue an irrevocable authorisation to pay (A/P) and to bear all bank commissions
- 2) To ensure the prompt unloading and tax exemption of the equipment to be procured with the Japanese grant aid
- 3) To accord Japanese nationals, whose service may be required in connection for the Project, such facilities as may be necessary for their entry into Syria and stay therein for the performance of their work
- 4) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Syria with respect to the supply of the products and services under the Project
- 5) To maintain and use properly and effectively the equipment procured under the Project

- 6) To bear all the expenses, other than those covered by the Japanese grant aid, which are necessary for the implementation of the Project

2.3.2 Other Obligations

The Project aims at improving the solid waste collection and transportation capacity of the target cities and the Syrian side must dispose of the collected and transported solid waste in an appropriate manner. Accordingly, the Syrian side must fulfil the following obligations without fail.

(1) Obligations Specially Noted in M/D

The M/D at the time of the basic design specially notes the following obligations of the Syrian side.

- 1) The new landfill site to serve Homs will be constructed according to plan. The operation of this landfill site will commence by at least January, 2008. On the grounds that delay of commencement of new landfill site, Homs City try to prolong the life of the existing landfill site until 2010 by effective utilization.
- 2) The new Al Qasia landfill site with a recycling centre to serve Lattakia and its three surrounding cities will be constructed. The operation of this landfill site will commence by at least June, 2008.
- 3) The rehabilitation work for the existing compost plant in Lattakia will be completed by mid-2006.
- 4) The relocation of the equipment garage in Lattakia will be completed in 2005
- 5) The existing disposal site in Jableh should be closed as the disposal method employed of open dumping has adverse impacts on the environment. Solid waste collected in the city and the deposited solid waste at the existing landfill will be transported to the Al Bassa landfill site from 2005. All the deposited solid waste should be moved to by late 2007.
- 6) The disposal method employed at the existing disposal site in Al Haffeh should be improved as the open dumping method used at this site has adverse impacts on the environment. The method of improvement should be the introduction of adequate soil cover to suppress spontaneous combustion and the generation of smoke. The new method will start around March 2005.

(2) Other Requirements

Other requirements to improve the situation of solid waste management in general and the situation of solid waste collection and transportation in particular are described below.

- 1) Homs City Council should complete the construction of a new transfer station adjacent to the existing landfill site by the time when the new landfill site commences operation so that transfer activities to the landfill site can start.
- 2) Both Jableh City Council and Qurdaha City Council should complete the construction of new transfer stations by the time when the new Al Qasia landfill site commences operation so that transfer activities to the Al Qasia landfill site can start.

2.4 Project Operation Plan

2.4.1 Basic Policies

The Project aims at improving collection and transportation activities, including road cleansing, which are the main components of solid waste management work. The operation and maintenance of solid waste management work largely consists of the following two types of work.

- Planning, management and operation of solid waste collection, transportation and road cleansing
- Inspection and maintenance of collection and transportation equipment

While the existing organizational structure and manpower are believed to be sufficient to conduct the above work, there are some points to be addressed for the maximum realisation of the project outcomes in terms of detailed aspects of the work.

(1) Planning, Management and Operation of Solid Waste Collection, Transportation and Road Cleansing

This work should be conducted from the viewpoints of (i) managing routine solid waste collection and transportation work and (ii) management of solid waste discharge by local residents to achieve efficient collection.

1) Management of Routine Collection and Transportation Work

① Work According to Plan

The formulation of a collection, transportation and road cleansing plan for the next year at the end of each year based on the work performance of the year is necessary. At the time of planning, any excess or shortage of the inputs and the operation rate of the equipment in each area should be assessed with a view to examining the possible need for the

procurement of new equipment and the redeployment of personnel, etc. This plan should roughly determine the deployment of equipment and personnel in each area.

Moreover, a detailed operation plan for the next month should be formulated at the end of each month, taking the actual amount of solid waste generated, road conditions and state of equipment maintenance, etc. into consideration. The main features of this monthly plan are the operating hours, number of shifts, number of trips and vehicle deployment. The contents of this plan must reflect the front line situation of collection work and the problems encountered. Special attention should be paid to fluctuations of the generated solid waste amount due to Ramadan, seasons of the year and increase/decrease of the number of tourists.

All plans and performance records must be properly documented so that other staff members can ensure the continuity of the work when the persons responsible for the work are absent.

② Careful Use of Equipment

Drivers and workers should be reminded not to leave any waste behind and to operate the equipment carefully in the course of conducting actual solid waste collection work and road cleansing work. While repeated instructions are necessary, the introduction of a best worker award of the month or similar may also prove to be effective.

Some existing equipment is routinely used for two shifts, i.e. day and night shifts. This means that more than one team of driver and workers use the same equipment, resulting in weak personal links between drivers and workers and particular equipment. Consequently, the sense of responsibility of drivers and workers towards the equipment they use is weak, resulting in their disregard of any signs of malfunctioning and rough driving. It is, therefore, necessary to assign one crew team exclusively to one equipment to develop a sense of responsibility towards this specific equipment. When the collection of an amount of solid waste which exceeds the design collection amount for a day is necessary, arrangement for the same crew to work over-time is necessary instead of deploying another crew team on a second shift.

③ Data Management

The existing system manages data on the collection amount, etc. based on the nominal loading capacity of the collection and transportation equipment and the number of trips made. This limited nature of data management makes it difficult to control the over-loading or under-loading of the equipment. As the data used is nominal data, it is not very accurate. For the proper management of solid waste, the management of accurate data on the collection amount, transportation amount and disposal amount is essential. The load management of individual equipment is also necessary as over-loading can significantly damage the durability of equipment. Despite such importance of load management, any weighing facilities, such as a weigh bridge, are not provided at appropriate places. The introduction of weighing facilities at the new transfer stations and disposal (landfill) sites will be necessary to measure the solid waste amount transported by each equipment so that data can be totalled and analysed for the formulation of an accurate collection and transportation plan.

The existing data management only covers the quantitative aspect of solid waste collection and transportation work and management of the work efficiency is inadequate. It is necessary to regularly conduct time and motion survey, etc. to develop an objective understanding of any inefficiency in terms of collection and transportation for the formulation of an efficient collection and transportation plan.

2) Management of Solid Waste Discharge by Local Residents

Efficient solid waste collection and transportation work demands the discharge of solid waste by local residents in an appropriate manner. Accordingly, resident education to urge local residents to discharge their waste in an appropriate manner must be continually conducted. Education which only involves the repeated emphasis of such slogans as “Let’s keep our town tidy” and “Discharge solid waste in an appropriate manner” is judged to be inadequate. Given the fact that the inappropriate discharge of solid waste in the form of dumping, etc. has become a routine practice among some local residents, these residents must be repeatedly reminded of the necessity for and positive effects of discharging solid waste in an appropriate manner. The public relations sector alone cannot successfully conduct this activity and the solid waste management sector should assume the leadership while regarding this activity as essential for the overall improvement of solid waste management.

To be more precise, the implementation of periodic campaigns and the routine distribution of pamphlets are necessary. These activities should be continually implemented, utilising the techniques learned under the soft component of the Project.

The manner of solid waste discharge should be regularly assessed by collection workers and others to improve the collection efficiency and local residents should be informed of the assessment results which should also be used for planning of the next round of resident education.

(2) Inspection and Maintenance of Collection and Transportation Equipment

Equipment maintenance work is extremely important from the viewpoint of maintaining an adequate equipment operation rate. The current maintenance work, however, does not constitute preventive maintenance except for such simple work as changing of the engine oil and primarily consists of repair work.

To maintain an adequate equipment operation rate, the prevention of breakdowns through the early discovery of any signs of breakdowns and the replacement of parts is essential. Regular inspection and maintenance work is imperative to discover such signs.

The basic concept of equipment maintenance work is shown in Fig. 4.1-1. More concrete items of regular inspection and maintenance work are described later in 4.3.

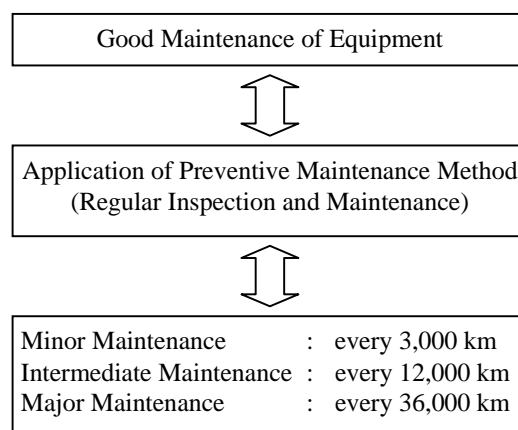


Fig. 2.4.1-1 Basic Concept of Equipment Maintenance Work

2.4.2 Operation and Maintenance Regime

The operation and maintenance regime required for Homs, Lattakia and three surrounding cities of Lattakia is planned below.

(1) Homs

Solid waste management work in Homs is centrally controlled by Cleansing Directorate. Even though this directorate decides the assignment, etc. of collection and transportation vehicles, vehicle inspection and maintenance are conducted by Vehicle Directorate. In view of these arrangements, the following operation and maintenance regime is planned for Homs.

1) Collaboration Between Cleansing and Vehicle Directorates

Cleansing Directorate is composed of the Sweeping and Waste Collection, Waste Treatment, Protection and Insect Elimination, Vehicles, and Administration and Finance Departments. Upgrading from the Cleansing Department of Health Affaires Directorate to become an independent directorate in September, 2004 has made quick decision-making and self-control of the budget possible. Meanwhile, Vehicle Directorate as an independent directorate uses its own budget to maintain all vehicles and construction machinery owned by the city council. As far as personnel management is concerned, drivers belong to the Vehicle Directorate while workers for solid waste collection and transportation vehicles belong to Cleansing Directorate. However, as soon as vehicles depart from the garage, the drivers are under the command of Vehicles Department of Cleansing Directorate.

Although the integration of vehicle maintenance work into the scope of work of Cleansing Directorate can improve the efficiency, such integration would divide the know-how accumulated over the years for equipment maintenance. The division of such sections dealing with tyres, metal processing, mechanical engineering and electrical engineering which have so far dealt with all vehicles and equipment owned by the city council would lower the efficiency of maintenance work for the city. In addition, the new appointment of foreman-class personnel would be required for those sections which cannot be divided. Under the existing regime, as some two-thirds of the maintenance work performed by Vehicle Directorate relates to vehicles used by Cleansing Directorate (estimated on the basis of budget expenditure), the maintenance of vehicles used for solid waste collection and road sweeping is the main work of Vehicle Directorate, suggesting sufficient liaison between the two directorates. Accordingly,

the existing arrangements are inferable to be capable of dealing with the new equipment to be procured under the Project.

Meanwhile, budget management by Vehicle Directorate does not specifically feature vehicles used by Cleansing Directorate and it is difficult to accurately establish the cost related to solid waste management work. As management of the budget for cleansing work inclusive of the cost of vehicle maintenance is necessary for the formulation of a solid waste collection and transportation plan which takes the cost of vehicle maintenance into consideration, Vehicle Directorate should separately manage the operation and maintenance cost of vehicles used by Cleansing Directorate.

2) Vehicle Maintenance

Although Vehicle Directorate has a workshop which also functions as a garage, the actual maintenance work only consists of changing of the oil and the simple replacement of parts. More specialist repair work is contracted to private garages, suggesting that the directorate has a relatively low specialist repair capability.

As rapid development of the specialist repair capability is difficult, it is planned to contract the specialist repair work of vehicles to private garages.

(2) Lattakia

Solid waste management work in Lattakia is divided into planning by the Technical Affairs Directorate, collection and transportation by Cleansing Department of Health Affaires Directorate, recycling and final disposal by Water Treatment Directorate and vehicle maintenance by Vehicle Directorate in terms of organization and budgetary appropriation. In view of these existing arrangements, the new operation and maintenance regime is planned in the following manner.

1) Independence of Cleansing Directorate

As the present solid waste management regime is divided in terms of organization and budgetary appropriation, it is difficult to efficiently utilise the solid waste management resources, including facilities, vehicles and personnel. Lattakia City Council is already aware of this problem and plans to establish Cleansing Directorate following the example of Homs in order to establish a centralised solid waste management regime. In view of the importance of such regime, it will be necessary for the city council to proceed with the planned establishment of Cleansing Directorate as soon as possible. Given the fact that the work related to solid

waste management vehicles accounts for some 60 – 70% of the work load of Vehicle Directorate, the centralization of solid waste management resources to Cleansing and Vehicle Directorates as in the case of Homs should improve the work efficiency.

2) Vehicle Maintenance

Although Vehicle Directorate has a workshop which also functions as a garage as in the case of Homs, the actual maintenance work only consists of changing of the oil and the simple replacement of parts. More specialist repair work is contracted to private garages, again suggesting that the directorate has a relatively low specialist repair capability.

Accordingly, it is planned to contract the specialist repair work of vehicles to private garages as in the case of Homs.

(3) Three Surrounding Cities of Lattakia

In the three surrounding cities of Lattakia, i.e. Jableh, Al Haffeh and Qurdaha, health affaires sector is responsible for solid waste management work. However, the size of the cleansing section is small because of the small scale of the administration, the small amount of solid waste generated and the small number of required vehicles. While the vehicle management section of finance sector or technical affairs sector is responsible for vehicle maintenance, the actual maintenance work, including such simple work as changing of the oil, is contracted to private garages. Given these circumstances, the vehicle operation and maintenance regime for these three cities is planned in the following manner.

1) Solid Waste Management Section

The number of solid waste collection and transportation vehicles required by these three cities ranges from several vehicles to 10 plus vehicles. In Al Haffeh, local landfill of the small amount of solid waste is necessary until the new Al Qasia landfill site is opened. However, as there is no need for any of these three cities to conduct their own solid waste treatment and disposal work in the future, there is no strong need for them to establish a large solid waste management body. The continuation of the present regime is, therefore, believed to be appropriate.

However, the present regime and manpower are insufficient to conduct the necessary data management which is essential for solid waste management work or to formulate a collection and transportation plan which takes the operational efficiency into consideration.

Accordingly, the provision of technical guidance for Lattakia City Council is necessary on data management and the formulation of the said plan. As personal network regarding solid waste management was established between Lattakia and its three surrounding cities through the Project, expansion of this network to create an information exchange network will be necessary to ensure the smooth implementation of solid waste management in all of the cities.

2) Vehicle Maintenance

The main work of the existing vehicle management section is the storage of vehicles and all types of maintenance and repair work, including such simple work as changing of the oil, are currently contracted to private garages. Consequently, the vehicle management section has no existing capability to conduct vehicle inspection and maintenance. It is, therefore, planned to contract vehicle inspection and maintenance work to private garages.

2.4.3 Operation and Maintenance Staff

The newly procured vehicles will obviously require drivers and collection workers. At present, all of the cities have double or three times the required manpower, including the additional manpower required to operate 2 – 3 shifts, to operate the vehicles in their possession. As the procurement of new vehicles under the Project is expected to facilitate the withdrawal of very old vehicles, the present manpower should be sufficient to operate all of the vehicles.

Meanwhile, hardly any reinforcement of the maintenance staff will be required because of (i) the absence of any special vehicles among the vehicles to be procured under the Project, (ii) the similarity of the new vehicles to the existing vehicles and (iii) the planned contracting of specialist maintenance and repair work to private garages.

2.4.4 Contents of Periodic Inspection

In Japan, the Guidelines for Statutory Inspection of Vehicles issued by the Ministry of Land, Infrastructure and Transport set forth the details of the required monthly, three monthly and annual vehicle inspections and maintenance. In view of the fact that the newly procured vehicles under the Project will be used for solid waste management work, which is a public service, vehicle maintenance referring to the said Guidelines will be necessary. However, determination of the inspection frequency based on mileage rather than time passed is desirable because of the different operating conditions for different types of

vehicles. The frequency and contents of the periodic inspection and maintenance work required for the vehicles are shown in Table 2.4.4-1.

Table 2.4.4-1 Contents of Maintenance Work

No.	Type	Mileage	Contents of Maintenance Work
1	Minor maintenance	approx. every 3,000 km	Inspection of the functions of the power lines, hydraulic devices, electrical equipment, suspension and tyres, etc. and maintenance, including lubrication; preventive maintenance is a particularly important part of the maintenance work.
2	Intermediate maintenance	approx. every 12,000 km	Intermediate maintenance at an approximately mileage of 12,000 km although the abrasion, deformation, cracks and damage of various sections of a vehicle are not uniform depending on the actual working conditions; adjustment, repair or exchange of parts of the engine, transmission, suspension and hydraulic lines to be conducted by a private garage because of the need for special equipment; body repair and/or repainting may be necessary
3	Major maintenance	approx. every 36,000 km	Same maintenance contents as intermediate maintenance but with special emphasis on the brake and clutch linings and suspension (particularly the springs)

In the case of wheel loaders, inspection and maintenance work after a set number of hours of operation will be conducted in addition to daily inspection. This inspection and maintenance work will follow the maintenance manual for wheel loaders. More detailed contents of the inspection and maintenance work for wheel loaders are given in Table 2.4.4-2.

Table 2.4.4-2 Contents of Wheel Loader Maintenance Work

No.	Item	Contents of Inspection and Maintenance Work
1	Daily inspection and maintenance	Inspection, adjustment, cleaning, replenishment of the fuel and cooling water and lubrication by the operator at the end of the day's operation
2	Weekly inspection and maintenance (approx. every 50 hours of operation)	Inspection, adjustment, replacement of the oil and oil element and lubrication, etc. which are beyond the scope of the daily inspection and maintenance
3	Monthly inspection and maintenance (approx. every 250 hours of operation)	Inspection, adjustment and the replacement of parts and consumables which are not conducted by the weekly inspection and maintenance

The expected life of the equipment can be significantly affected by various operational conditions. In general, the solid waste management bodies should prepare for the renewal of both the vehicles and wheel loaders in approximately 10 years time.

2.4.5 Spare Parts Plan

The supply of the quantity of regular replacement parts required for one years' operation of the procured equipment is planned under the Project. Accordingly, it will be necessary for the Syrian side to procure spare parts for the operation of the equipment procured under the Project from the second year onwards on the basis of its own self-help efforts. While the types of spare parts to be stocked must be planned based on the situation of equipment operation and the actual consumption of each type of spare part, it will be necessary for the Syrian side to set aside a spare parts procurement budget which should be at least 5% of the equipment cost.

2.5 Project Cost Estimation

2.5.1 Cost Estimation for the Project

The total Project cost is estimated approximately as 1.047 billion JPY if the Project is implemented. Breakdown of the total cost, based on the previously described demarcation of works, is estimated as follows.

(1) Cost to be borne by the Japanese Side through the Grant Aid

Estimated Project Cost: 580 million JPY for Phase 1; 421 million JPY for Phase 2 and 1,001 million JPY

Items		Project Cost (million JPY)					
		Phase 1		Phase 2		Total	
Procurement of the Equipment	For Homs	377.6	557.8	151.4	411.4	529.0	969.2
	For Lattakia	154.5		186.7		341.2	
	For Jableh	25.7		43.1		68.8	
	For Al Haffeh	-		19.0		19.0	
	For Qurdaha	-		11.2		11.2	
Detail Design and Procurement Supervision	Detail Design and Procurement Supervision	13.8	22.4	9.7	9.7	23.5	32.1
	Soft Component	8.6		-		8.6	

Remark: This cost estimation is provisional and would be further examined by the Government of Japan for the approval of the Grant.

(2) Cost to be borne by the Recipient Side

Estimated Project Cost: 15,948 thousand SP for Phase 1, 5,495 thousand SP for Phase 2 and 21,443 thousand SP (equivalent to 46 million JPY)

City	Items	Phase 1		Phase 2		Total	
		Cost (thousand SP)		Cost (thousand SP)		Cost (thousand SP)	
Homs	Inland transportation of the Equipment	739	10,799	325	1,925	1,064	12,724
	Procurement of Container	10,060		1,600		11,660	
Lattakia	Inland transportation of the Equipment	302	4,412	515	2,379	817	6,791
	Procurement of Container	4,110		1,864		5,974	
Jableh	Inland transportation of the Equipment	47	737	141	677	188	1,414
	Procurement of Container	690		536		1,226	
Al Haffeh	Inland transportation of the Equipment	0	0	58	458	58	458
	Procurement of Container	0		400		400	
Qurdaha	Inland transportation of the Equipment	0	0	56	56	56	56

(3) Condition of the Estimation

- 1) Estimation Time: December 2004
- 2) Exchange Rate: 1US\$ =110.16JPY (Average of the last 6 months from 30th November 2004)
1SP=2.13JPY (Average of the last 6 months from 30th November 2004)
- 3) Procurement Period: As described in the Section 2.2.4.7.
- 4) Others: The Project shall be implemented under the Japan's Grant Aid scheme.

2.5.2 Operation and Maintenance Cost Estimation

Yearly operation and maintenance (O&M) cost per vehicle, which is planned to be procured through the Project, is estimated as shown in Table 2.5.2-1.

Table 2.5.2-1 Yearly O&M Cost per Vehicle to be procured

The Equipment	Fuel/Oil 1000 SP/Y	Maintenance 1000 SP/Y	Operation 1000 SP/Y	Total (O&M) 1000 SP/Y
Compactor truck Type 1 (8m ³)	128	191	360	679
Compactor truck Type 2 (4m ³)	81	147	360	588
Dump truck (6m ³)	40	74	120	234
Medical waste truck Type 1	32	75	240	347
Medical waste truck Type 2	32	67	240	339
Wheel loader	94	174	120	388
Container washing truck	145	150	360	655
Mechanical Sweeper	81	310	120	511
Sprinkler truck	102	219	120	441

Therefore, the Syrian side shall secure yearly the shown operation and maintenance cost in Table 2.5.2-2 at least.

Table 2.5.2-2 Required Yearly O&M Cost by City

The Equipment	O&M cost	O&M cost for Homs		O&M cost for Lattakia		O&M cost for Jableh	
	1000 SP/Y/unit	No of Equip.	1000 SP/Y	No of Equip.	1000 SP/Y	No of Equip.	1000 SP/Y
Compactor truck Type 1 (8m ³)	679	44	29,876	18	12,222	3	2,037
Compactor truck Type 2 (4m ³)	588	12	7,056	14	8,232	4	2,352
Dump truck (6m ³)	234			4	936	3	702
Medical waste truck Type 1	347	2	694				
Medical waste truck Type 2	339			1	339		
Wheel loader	388			1	388	1	388
Container washing truck	655			2	1,310		
Mechanical Sweeper	511	5	2,555	3	1,533		
Sprinkler truck	441			2	882		
Total		63	40,181	45	25,842	11	5,479
The Equipment	O&M cost	O&M cost for Al Haffeh		O&M cost for Qurdaha		Total	
	1000 SP/Y/unit	No of Equip.	1000 SP/Y	No of Equip.	1000 SP/Y	No of Equip.	1000 SP/Y
Compactor truck Type 1 (8m ³)	679					65	44,135
Compactor truck Type 2 (4m ³)	588	3	1,764			33	19,404
Dump truck (6m ³)	234			1	234	8	1,872
Medical waste truck Type 1	347					2	694
Medical waste truck Type 2	339					1	339
Wheel loader	388			1	388	3	1,164
Container washing truck	655					2	1,310
Mechanical Sweeper	511					8	4,088
Sprinkler truck	441					2	882
Total		3	1,764	2	622	124	73,888

Remarkable points on the operation and maintenance cost and particular points for the above estimation are described below.

(1) Cost for Fuel/Oil

The procured Equipment is supposed to consume fuel/oil for operation, including stops/slow driving for collection/work, more than for travelling between garage and work sites. Therefore, the Syrian side shall manage operation and cost data and operate the Equipment at the most effective way to avoid useless cost as well as possible.

In the Basic Design Study, the required fuel/oil cost is estimated from ideal working hours per day, which is shown in Table 2.5.2-3, and engine output. The calculation is done according to the cost and quantity of diesel oil and applied unit cost of the diesel oil is SP7.00/liter considering actual purchase cost of Homs and Lattakia City Councils.

Table 2.5.2-3 Working Hours for Calculation of Fuel/Oil Consumption

Equipment	Working Hours/day
Compactor truck Type 1 (8m ³)	8
Compactor truck Type 2 (4m ³)	8
Dump truck (6m ³)	5
Medical waste truck Type 1	5
Medical waste truck Type 2	5
Wheel loader	4
Container washing truck	8
Mechanical Sweeper	8
Sprinkler truck	8

Assumption: Engine should be stopped during standby for work.

(2) Maintenance Cost

Necessary maintenance cost depends on maintaining level and age of equipment. Therefore, the Syrian side shall secure enough budgets in accordance with conditions and age of equipment.

Since 5% of equipment purchase cost is generally required per year as the maintenance cost to keep the equipment conditions in safe, the Basic Design Study estimates 5% of the purchase cost of the planned equipment as the above mentioned maintenance cost.

Furthermore, the Syrian side shall prepare budget to replace the equipment after 10 years in order to keep safe operation conditions.

(3) Operation Cost

The Syrian side shall secure budget for staffing crews for the planned equipment, such as driver and waste collection worker. Considering the purpose of the equipment and actual staffing conditions, crews shown in Table 2.5.2-4 is supposed to be necessary for the equipment to be procured through the Project.

In order to keep the equipment condition properly, exclusive crews shall be allocated to the equipment.

The above mentioned operation cost is estimated from the number of crew and average worker's salary at 10,000SP/month/person.

Table 2.5.2-4 Necessary Number of Crew for the Equipment

The Equipment	Number of Crew		
	Driver	Worker	Total
Compactor truck Type 1 (8m ³)	1	2	3
Compactor truck Type 2 (4m ³)	1	2	3
Dump truck (6m ³)	1		1
Medical waste truck Type 1	1	1	2
Medical waste truck Type 2	1	1	2
Wheel loader	1		1
Container washing truck	1	2	3
Mechanical Sweeper	1		1
Sprinkler truck	1		1

(4) Secure of Operation and Maintenance Cost

In consideration of disposal of deteriorated vehicles, the Syrian side shall secure the operation and maintenance cost as follows.

Considering the actual cost and calculating in same way as the above described cost for the planned equipment, necessary operation and maintenance cost for old equipment to be abandoned would be as shown in Table 2.5.2-5. Operation and maintenance cost which might be economized on by disposal of deteriorated vehicles is estimated at 73,164 thousand SP per year.

Therefore, as a whole of the project, above economized cost obtained by disposal of deteriorated vehicles can be appropriated to operation and maintenance cost for procurement of equipment.

Table 2.5.2-5 Possible Cost to Save by Abandonment of Old Equipment

City/Equipment	No of Equip.	Operation and Maintenance Cost per Vehicle				Possible Cost to be Saved			
		Fuel/Oil 1000 SP/Y	Maintenance 1000 SP/Y	Operation 1000 SP/Y	Total (O&M) 1000 SP/Y	Fuel/Oil 1000 SP/Y	Maintenance 1000 SP/Y	Operation 1000 SP/Y	Total (O&M) 1000 SP/Y
Homs									
Compactor truck (1.5ton)	4	81	250	360	691	324	1,000	1,440	2,764
Compactor truck (3.5ton)	4	128	300	360	788	512	1,200	1,440	3,152
Compactor truck (6ton)	13	221	400	360	981	2,873	5,200	4,680	12,753
Mechanical Sweeper	6	81	700	120	901	486	4,200	720	5,406
Total	27	511	1,650	1,200	3,361	4,195	11,600	8,280	24,075
Lattakia									
Compactor truck (3.5ton)	8	128	300	360	788	1,024	2,400	2,880	6,304
Compactor truck (6ton)	16	221	400	360	981	3,536	6,400	5,760	15,696
Dump truck (3ton)	7	40	200	120	360	280	1,400	840	2,520
Tractor	11	35	200	360	595	385	2,200	3,960	6,545
Wheel loader	10	94	700	120	914	940	7,000	1,200	9,140
Mechanical Sweeper	2	81	700	120	901	162	1,400	240	1,802
Sprinkler truck	1	102	300	120	522	102	300	120	522
Container washing truck	1	166	250	360	776	166	250	360	776
Total	56	867	3,050	1,920	5,837	6,595	21,350	15,360	43,305
Jableh									
Compactor truck (8ton)	1	221	400	360	981	221	400	360	981
Tractor	3	35	200	360	595	105	600	1,080	1,785
Wheel loader	1	94	700	120	914	94	700	120	914
Total	5	350	1,300	840	2,490	420	1,700	1,560	3,680
Al Haffeh									
Tractor	1	35	200	360	595	35	200	360	595
Total	1	35	200	360	595	35	200	360	595
Qurdaha									
Tractor	1	35	200	360	595	35	200	360	595
Wheel loader	1	94	700	120	914	94	700	120	914
Total	2	129	900	480	1,509	129	900	480	1,509
Grand Total									
	91	1,892	7,100	4,800	13,792	11,374	35,750	26,040	73,164

To be more precise, as shown in Table 2.5.2-6, 99% of the necessary operation and maintenance cost for the planned equipment is supposed to be covered by the abandonment of the old equipment. As for Lattakia and Qurdaha, the cost for the planned equipment is possible to be covered by the saved.

Table 2.5.2-6 Capability to Cover the Operation and Maintenance Cost by Abandonment of Old Equipment

City	Saved O&M cost 1000 SP/Y	Necessary O&M cost 1000 SP/Y	Balance 1000 SP/Y	Covering Rate
Homs	24,075	40,181	-16,106	60%
Lattakia	43,305	25,842	17,463	168%
Jableh	3,680	5,479	-1,799	67%
Al Haffeh	595	1,764	-1,169	34%
Qurdaha	1,509	622	887	243%
Total	73,164	73,888	-724	99%

2.6 Soft Component Plan

(1) Planning Background for Soft Component

The background necessitating the planning of the soft component of the Project is summarised below.

1) Connection to Project Goal

The Project intends to improve the capacity of the city councils of Homs, Lattakia and three surrounding cities of Lattakia (Jableh, Al Haffeh and Qurdaha) to collect and transport the solid waste generated in these Project Areas. The collection amount (rate) of municipal waste which can be collected and transported by routine collection work, which is a typical indicator for the collection and transportation capacity, is currently rather low in the Project Areas at approximately 750 tons/day (83%) in Homs, 250 tons/day (74%) in Lattakia, 43 tons/day (61%) in Jableh, 12 tons/day (75%) in Al Haffeh and 30 tons/day (77%) in Qurdaha. The target collection rate of the Project in 2010 through the procurement of equipment with grant aid of the Government of Japan is approximately 955 tons/day (95%) in Homs, 345 tons/day (90%) in Lattakia, 66 tons/day (80%) in Jableh, 18 tons/day (90%) in Al Haffeh and 41 tons/day (90%) in Qurdaha.

The purpose of the Project is arranging necessary structure to achieve the above target. The structure to be arranged consists mainly of arrangement of hardware such as equipment and software to utilize the equipment. The arrangement of software, therefore, is necessary to achieve the target.

2) Inputs and Activities for the Project

The collection rate of municipal waste, which is an indicator for the Project target, is managed by the amount of generated and collected waste. Securing planned amount of collected waste, therefore, is required to achieve the goal. Since the collected amount is calculated by multiplying number of equipment trips/day by capacity of equipment per trip, both number of trips and capacity per trip must be secured as plan.

In other words, the Project inputs the equipment securing the capacity per trip and utilizes the equipment efficiently to secure the planned trips in order to achieve the goal. Among those activities, the equipment input will be utilized the grant aid as a hardware arrangement and the

necessary capacity will be secured. On the other hand, the software arrangement is required as the arrangement is difficult through the equipment procurement.

3) Necessary Activities for the Project

The basic design sets the planned trips in a range of 2 — 4 trips/day, which may be possible in conditions of capacity of the planned equipment and transport distance and through efficient operations. The number of equipment to be procured is planned from the planned trips. The Syrian side, therefore, secure the planned number of trips. If the planned number of trips is not met, the equipment capacity will not be fully utilised, possibly resulting in the insufficient achievement of the target collection rate.

4) Impediments for Efficient Collection and Transport

The number of trips can be said as a representative indicator of efficiency and securing the planned number of trips can be said as securing appropriate efficiency. Forecasted impediments for efficient collection and transport are summarized below.

- ① Unstable deployment of equipment and staff
- ② Route of collection and transportation, which includes much useless operation
- ③ Consuming unproductive time such as traffic congestion
- ④ Collection of improperly discharged waste

Among the above, ① and ② shall be coped with by improvement/restructure of equipment deployment, collection route etc. through operation data analysis by solid waste management bodies. Although a new detail operation plan must be prepared for the new equipment to be procured, it is capable to be coped with by the Syrian side as such planning is ordinary work of the target city councils.

③ is arrived by a external condition. However it is capable to be coped with by the Syrian side through some countermeasures such as working in night.

Cause of ④ is improper waste discharge of local residents. Although it can be said as a external condition, management of residents' discharge and education of local residents can be taken in the Project as an activity of solid waste management bodies. As there is no existing activity for promotion of appropriate discharge of local residents, the implementing agencies of

the Project do not have necessary information and experience. The Syrian side, therefore, should tackle newly the promotion of appropriate discharge of local residents.

5) Actual Situation and Task on Appropriate Discharge

Actual situation and task on appropriate discharge, which should be newly tackled, are as follows.

① Situation and Problem on Inappropriate Discharge

It has become almost a standard practice for some local residents in the Project Areas to dump their rubbish in the street or on empty land. The problematic behaviour of these residents, including the non-use of containers even when containers are available at the roadside, the dumping of rubbish at the doorways of their own homes or on empty land when containers are unavailable nearby and the dumping of large pieces of metal, tyres and rubbles, etc. in containers, thereby damaging the compactors, is commonplace, preventing efficient solid waste collection work.

The solid waste management bodies, therefore, are placed in conditions to collect the scattered waste and/or the waste improperly discharged/thrown. Such irresponsible behaviour on the part of some local residents is obstacles for efficient collection and transportation works as follows.

- Lengthening the time required for collection vehicles to stop at each collection point to collect waste which is scattered outside the container
- Making slow collection practice for stopping at each household to collect rubbish
- Lengthening the time required for collection vehicles to stop at each collection point to remove waste which is not appropriate for compactor truck

② Tasks

Since local administrations are responsible to collect solid waste, the city councils of Homs, Lattakia and three surrounding cities of Lattakia have believed up to the present that the solution to this problem lies with an increased collection capacity, capable to deal inappropriately discharged waste, in the hard aspect of collection work. It is, therefore, said that the city councils have been responding to the problems only by means of increasing the number of equipment and the number of workers for manual collection.

However, it is financially difficult to respond to the ever increasing amount of solid waste by simply increasing the physical input to collection work. Given the fact that the problem is principally caused by the inappropriate discharge of solid waste by local residents, it is essential to change the way local residents discharge solid waste to improve the collection efficiency. If local residents discharge solid waste in an appropriate manner, efficient collection will be possible with the minimum physical input. In short, the impending task to solve the problem is believed to be the securing of the cooperation of local residents to discharge solid waste in an appropriate manner and to take promotion of appropriate discharge in activities for solid waste management.

Detailing the above task taking actual solid waste management into account, it is summarized as follows.

- To arrange the residents education structure to promote appropriate discharge
- To learn ways to inform widely necessity of appropriate discharge to local residents
- To educate continuously local residents and to manage the education results and/or appropriate discharge

6) Necessity for Soft Component

The Syrian side must arrange software necessary to promote the solid waste collection rate in parallel with equipment procurement. Technical assistance on the efficiency promotion of solid waste collection is useful as well as financial assistance on equipment procurement.

The necessary software is countermeasures to the above mentioned impediments. Among the impediments, countermeasures to the equipment deployment, the route selection, the working time selection etc. are believed to be capable by the existing techniques in Syria. However, technical guidance for promotion of appropriate discharge is necessary since it is new activity to be tackled, rare activity in Syria and the Syrian side has less information and experience necessary to the activity.

(2) Goals of Soft Component

The goals of the soft component of the Project are set in the following manner.

1) Targets of Soft Component

The implementation of the proposed soft component of the Project is planned for Homs City Council and Lattakia City Council, both of which are the implementing agencies of the Project.

2) Goals of Soft Component

A technical guidance (soft component) for the arrangement of necessary software is planned for the Project, aiming the efficiency promotion of solid waste collection. The target software is focused to the promotion of appropriate discharge.

It is difficult to have residents' cooperation of appropriate discharge only from on-side instruction made by laws/regulations and/or local administration. Repeated residents education, which informs widely necessity of appropriate discharge and necessary cooperation, is required. The educational effects on local residents will not emerge very quickly and will only emerge when local residents recognise the positive results of continual education and efforts of the administrations to improve the solid waste collection service and understand the need for their cooperation and the likely results of such cooperation.

Since the visible effect of the promotion of appropriate discharge can not be expected during the period of soft component, the goal of the soft component of the Project is set as "the learning of techniques by Homs and Lattakia City Councils to promote appropriate discharge so that they continually spread the proper manner of solid waste discharge to local residents".

As neither of the project implementing agencies has ever provided promotion of appropriate discharge for local residents, the first attempt of promotion activity will be implemented in the soft component period. Given the strong need of these two city councils to organize a public campaign, it is believed to be appropriate for the said first attempt to be made in the form of the distribution of leaflets accompanied by an official campaign. This strategy is supported by the fact that a similar public campaign conducted under the previous study attracted the attention of many people.

3) Contents of Request for Cooperation of Local Residents During Soft Component Implementation Period

The physical input in the form of the provision of new equipment under the Project will certainly improve the overall equipment capacity for solid waste collection. Accordingly, it will be possible for both Homs City Council and Lattakia City Council to publicise the visible

efforts and results of the solid waste collection and transportation service using the newly procured equipment. As a result, the efforts of the administration will be recognised by local residents, resulting in understanding of the significance of the discharge of solid waste in an appropriate manner by local residents who will become aware of the importance of their proper behaviour. Such education of local residents, including publicity of the improved service, must be regularly and continually implemented.

The ideal cooperation of local residents for the solid waste collection service has many components, including discharge at a predetermined time, the separation of various types of solid waste, change of the discharge point from the doorstep to a collection station (point) and the tidying up of scattered rubbish around containers and collection stations. However, as such cooperation on the part of local residents hardly exists at present, the rapid introduction of a new regime could result in the possible resistance of local residents, creating an obstacle to not only appropriate discharge promotion activities but also to the overall improvement of solid waste management work. The ideal cooperation of local residents will only be achieved through improvement of the solid waste collection service and the provision of promotion activities over a long period of time. Furthermore, necessity of promotion of separated discharge etc. is low for the time.

In view of this prospect, the planned appropriate discharge as part of the soft component should include the following contents which are not detached from the current situation and which promise the effect of improving the collection efficiency. In the future, the city councils should expand the scope of education in line with the overall progress of the spread of resident cooperation as well as that of the solid waste collection service.

- Use of containers for the discharge of solid waste when such containers available
- Discharge of solid waste at nearby collection stations which are established at certain intervals along roads in those areas where doorstep collection is currently conducted
- Termination of the practice of dumping waste at roadsides or empty land

(3) Expected Outputs of Soft Component

Upon its completion, the proposed soft component is expected to produce the following outcomes.

- 1) Homs City Council and Lattakia City Council will prepare the regime for the activities of appropriate discharge promotion.

- 2) The relevant officials of Homs City Council and Lattakia City Council will understand the contents and method of education and publicity for local residents for appropriate discharge promotion.
- 3) The relevant officials of Homs City Council and Lattakia City Council will understand the methods to collect and analyse data, etc. which should be publicised for appropriate discharge promotion.
- 4) The relevant officials of Homs City Council and Lattakia City Council will learn publicity and education methods targeting local residents and will begin publicity and educational activities targeting local residents for appropriate discharge promotion.

(4) Method to Confirm Outcomes

The achievement of the expected outcomes listed above can be confirmed in the following manner.

- 1) Creating the regime for appropriate discharge promotion (names of persons in charge; number of staff members)
- 2) Appropriate discharge promotion manual; number of days on which seminars are held; number of participants in seminars
- 3) List of publicity data (documents for internal management)
- 4) Campaign programme, number of visitors to campaign events, various pamphlets/leaflets distributed; number of pamphlets/leaflets distributed

(5) Activities Under Soft Component (Input Plan)

Technical guidance on the appropriate discharge promotion is planned as an activity under the soft component and this will be conducted in both Homs and Lattakia.

1) Preparation of Appropriate Discharge Promotion Manual

The indicators for solid waste management will be identified as it is necessary to publicise such indicators for local residents to understand the necessity to discharge solid waste in an appropriate manner. Matters which require the cooperation of local residents will also be identified based on the current situation of solid waste discharge and analysed in the basic design study. Using the solid waste management indicators relevant to the present situation, a model flow to explain the usefulness of residents' cooperation for the residents themselves will then be examined. All of these will be compiled in the form of a draft appropriate discharge promotion manual, referring to examples of data publicity and resident education by local

public bodies in Japan. This draft manual will be prepared in English in Japan and will then be translated to Arabic in Syria.

The contents of this draft manual will include a campaign method for the effective distribution of pamphlets and a supporting method using mass media. The scope of this manual will not be restricted to the first extension activity for which a campaign will be organized but will also include a structural plan of necessary regime and a regular publicity activity plan. This work to prepare the draft manual will commonly serve both Homs and Lattakia.

① Period

0.33 months (10 days) for the preparation of the draft appropriate discharge promotion manual in Japan and one week for its translation into Arabic in Syria is planned.

② Japanese Inputs

The involvement of two Japanese engineers is planned. These will consist of an instructor on the analysis of solid waste management indicators and an instructor on resident education methods.

③ Target Groups in Syria

Although there are no direct targets at this stage, the main users of the manual will be solid waste management, environment and public relations managers of Homs City Council and Lattakia City Council.

④ Outputs

The output of this work will be the draft appropriate discharge promotion manual. The final output, however, will incorporate the revisions referred to later in (5)-3).

2) Training on Time and Motion Surveys (TMS)

A TMS will check the time, location and travelling distance of all types of work conducted by a waste collection vehicle, including travelling from and returning to the garage and stoppage for actual collection work. This survey is important to determine the level of the solid waste collection efficiency and will allow local residents to easily understand such efficiency based on the survey results. The survey results produced during the soft component implementation period will be a base data for comparison of the situation in the post-promotion period.

Training on TMS will be necessary as neither Homs City Council nor Lattakia City Council has any technical expertise to analyse data based on its own surveys. This training will be conducted in the form of practical training for those responsible for the assignment of solid waste collection vehicles. This practical training will consist of five field surveys featuring different areas and collection methods and a session on data analysis.

① Period

5 days each is planned for each city, totalling 0.47 months (14 days) including travelling days.

② Japanese Inputs

The dispatch of one Japanese engineer to provide instruction on the analysis of solid waste management indicators is planned. One technical assistant who is familiar with solid waste management technologies will be employed in Syria as an Arabic-English interpreter.

③ Target Groups in Syria

Those responsible for the assignment of solid waste collection vehicles in Homs and Lattakia will be targeted.

④ Outputs

The output of this work will be a TMS result sheet which will form part of the publicity data list mentioned earlier in (4)-3).

3) Appropriate Discharge Promotion Seminar

An appropriate discharge promotion seminar will be held in both Homs and Lattakia using the draft appropriate discharge promotion manual prepared in (5)-1). Rather than a one-sided lecture throughout, a Q & A session will be included in this seminar when judged necessary to encourage the participants to put forward their own opinions and ideas. If necessary, the contents of the draft appropriate discharge promotion manual will be revised to develop a manual which corresponds to the reality in Homs and Lattakia.

Discussions should focus on such issues as (i) structure of appropriate discharge promotion regime, (ii) disclosable indicators which are effective to develop a sense of crisis on the part of

local residents, (iii) disclosable indicators which are effective to stimulate a sense of cooperation on the part of local residents, (iv) methods to disclose indicators, referring to examples in Japan, (v) activities of the city council designed to obtain the trust of local residents and (vi) effective and realistic publicity methods, referring to actual examples.

Through these seminars, both Homs City Council and Lattakia City Council will create the structure of appropriate discharge promotion regime, learn the flow of resident education, solid waste management indicators and data to be publicised and the contents of the required cooperation of local residents, etc. and will be able to commence the work to collect and analyse solid waste management data and the work to numerically evaluate the reasons for and effects of each component of the desirable cooperation of local residents. The work to analyse the basic data should be completed in approximately one week.

① Period

5 days in each city is planned to complete the work, totalling 0.4 months (12 days) including travelling days.

② Japanese Inputs

The dispatch of two Japanese engineers is planned, consisting of an instructor on the analysis of solid waste management indicators and an instructor on resident education methods. In addition, one technical assistant who is familiar with solid waste management technologies will be employed in Syria as an Arabic-English interpreter.

③ Target Groups in Syria

The target personnel will be solid waste management, environment and public relations managers of Homs City Council and Lattakia City Council. When necessary, local residents and staff members of NGOs providing assistance for the administration in Homs or Lattakia will be invited to participate.

④ Outputs

The output of this work will be the appropriate discharge promotion manual incorporating the necessary revisions.

4) Practical Guidance on Preparation of Pamphlets

Based on the various types of data collected and analysed and the appropriate discharge promotion manual completed in (5)-3), practical guidance will be provided on the work to relate the publicity data to the desirable cooperation of local residents. Using the results of this work, further practical guidance will be provided to (i) prepare a draft pamphlet designed to stimulate a sense of crisis as well as a sense of cooperation among local residents and (ii) prepare an effective education programme for the first extension activity on the appropriate discharge of solid waste (campaign and distribution of pamphlets, including supporting activities using mass media). After the training session mentioned above, both Homs City Council and Lattakia City Council will commence the printing of pamphlets, negotiations with mass media and preparations for the campaign.

① Period

5 days in each city is planned to complete the work, totalling 0.5 months (15 days) including travelling days.

② Japanese Inputs

The dispatch of two Japanese engineers is planned, consisting of an instructor on the analysis of solid waste management indicators and an instructor on resident education methods. In addition, one technical assistant who is familiar with solid waste management technologies will be employed in Syria as an Arabic-English interpreter.

③ Target Groups in Syria

The target personnel will be the selected ones in charge of appropriate discharge promotion and solid waste management, environment and public relations managers of Homs City Council and Lattakia City Council. When necessary, local residents and staff members of NGOs providing assistance for the administration in Homs or Lattakia will be invited to participate.

④ Outputs

The outputs of this work will be the list of publicity data, the draft pamphlets and the draft education programme.

5) Execution of Campaign and Distribution of Pamphlets

The Syrian side prints the pamphlets prepared in 5)-④ and execute the public campaign and distribution of the pamphlets according to the prepared education programme. Those activities shall be done by self-help efforts of the Syrian side.

① Period

To execute according to the education programme. Several days for implementation is believed to be necessary at each city.

② Japanese Inputs

No input is planned as soft component. A member of the Consultant, who examine/confirm the equipment delivery, will attend the public campaign and distribution of the pamphlets and make a evaluation of soft component and suggestion toward continuous promotion.

③ Implementation Bodies of the Syrian Side

Implementation bodies of the Syrian side are solid waste management, environment and public relations sectors of Homs City Council and Lattakia City Council, conducted by the selected ones in charge of appropriate discharge promotion. When necessary, local residents and staff members of NGOs providing assistance for the administration in Homs or Lattakia will be invited to participate.

④ Outputs

The outputs of this work will be the campaign programme and the pamphlets to be distributed.

6) Summary of Activity Plan

The planned activities (work) under the soft component are summarised in Table 2.6-1 and the project design matrix (PDM) indicating the status of the soft component is shown in Table 2.6-2.

Table 2.6-1 Summary of Planned Activities Under Soft Component

No.	Activity (Work)	Target Group	Output(s)	Method	Required Input(s)	
1	Preparation of draft appropriate discharge promotion manual	Homs and Lattakia City Councils • Solid waste management managers • Environment managers • Public relations managers	• Draft manual (in English) • Arabic version of the above manual	Instructor on analysis • Preparation of a draft manual (in English) • Translation of the above into Arabic	One Japanese engineers x 0.33 months (0.33 M/M in Japan) (10 days)	Japanese engineers Japan: 0.66 M/M Syria: 2.34 M/M Local assistants Syria: 1.23 M/M
				Survey of Japanese Pick up appropriate indicators Pick up necessary residents' help Study for explanation flow Preparation of draft manual	2 days 1 day 2 days 2 days 3 days	
				Instructor on resident education • Preparation of a draft manual (in English) • Translation of the above into Arabic	One Japanese engineers x 0.33 months (0.33 M/M in Japan) (10 days)	
				Survey of Japanese Pick up appropriate indicators Preparation draft campaign plan Preparation of draft pamphlet Study for explanation flow Preparation of draft manual	2 days 1 day 1 day 1 day 2 days 3 days	
2	Training on time and motion survey (TMS)	Homs and Lattakia City Councils • Section responsible for vehicle assignment in the solid waste management sector	• TMS results sheet prepared through practical training	Transfer of TMS Techniques • Explanation of the TMS method • Practical training on TMS • Training on data analysis	One Japanese engineer x 0.47 months (0.47 M/M in Syria) (14 days)	
				Homs 1 day x 5 times =5 days Lattakia 1 day x 5 times =5 days Travel 2 days + 2 days =4 days	5 days 5 days 4 days	
					One local assistant x 0.4 months (0.4 M/M in Syria) (12 days)	

No.	Activity (Work)	Target Group	Output(s)	Method	Required Input(s)
3	Appropriate discharge promotion seminar	Homs and Lattakia City Councils • Solid waste management managers • Environment managers • Public relations managers	• Revised manual • Arabic version of the above manual	Instructor on analysis • Arrangement of appropriate organization • Explanation of the draft manual • Lecture on the contents of the public campaign and disclosable indicators • Lecture on the publicity methods • Revision of the draft manual	One Japanese engineers x 0.4 months (0.4 M/M in Syria) (12 days)
				Explanation/discussion: Homs Forming organization: Homs Explanation/discussion: Lattakia Forming organization: Lattakia Travel	3 days 2 days 3 days 2 days 2 days
				Instructor on resident education • Arrangement of appropriate organization • Explanation of the draft manual • Lecture on the contents of the public campaign and disclosable indicators • Lecture on the publicity methods • Revision of the draft manual	One Japanese engineers x 0.47 months (0.47 M/M in Syria) (14 days)
				Explanation/discussion: Homs Forming organization: Homs Explanation/discussion: Lattakia Forming organization: Lattakia Travel	3 days 2 days 3 days 2 days 4 days
					One local assistant x 0.4 M/M in Syria) (12 days)
4	Practical guidance on preparation of pamphlets	Homs and Lattakia City Councils • Selected persons in charge of promotion • Solid waste management managers • Environment managers • Public relations managers	• Publicity data list • Draft pamphlets • Draft education programme	Instructor on analysis • Lecture on the compilation of publicity data • Lecture on the preparation of pamphlets • Lecture on the preparation of an education programme	One Japanese engineers x 0.5 months (0.5 M/M in Syria) (15 days)

No.	Activity (Work)	Target Group	Output(s)	Method	Required Input(s)
				Preparation publicity data: Homs Utilization data: Homs Preparation publicity data:Lattakia Utilization data: Lattakia Travel	3 days 2 days 3 days 2 days 5 days
				Instructor on resident education • Lecture on the compilation of publicity data • Lecture on the preparation of pamphlets • Lecture on the preparation of an education programme	One Japanese engineers x 0.5 months (0.5 M/M in Syria) (15 days)
				Relation with resident: Homs Preparation pamphlet: Homs Education program: Homs Relation with resident: Lattakia Preparation pamphlet: Lattakia Education program: Lattakia Travel	1 day 3 days 1 day 1 day 3 days 1 day 5 days
					One local assistant x 0.43 M/M in Syria) (13 days)
5	Execution of campaign and distribution of pamphlets	Homs and Lattakia City Councils <ul style="list-style-type: none"> Selected persons in charge of promotion Solid waste management managers Environment managers Public relations managers 	<ul style="list-style-type: none"> Pamphlets for distribution Campaign programme 	Execution of campaign and distribution of pamphlets <ul style="list-style-type: none"> Pre-publication of campaign Execution of campaign Distribution of pamphlets 	--

Table 2.6-2 Project Design Matrix (PDM) for Soft Component

Summary of the Project	Indicators	Means to Obtain Indicator Data	External Conditions				
<p><u>Project goal</u></p> <ul style="list-style-type: none"> Sufficient solid waste collection and transportation capacity in Homs, Lattakia and three neighbouring cities of Lattakia (Jableh, Al Haffeh and Qurdaha) 	<p>Target collection rate</p> <ul style="list-style-type: none"> Homs: 95% Lattakia: 90% Jableh: 80% Al Haffeh: 90% Qurdaha: 90% 	<ul style="list-style-type: none"> Records of the collected amount of solid waste (collection and transportation equipment operation logs) Calculation results of the generated amount of solid waste (based on population data and the unit generation rate of solid waste) 	<ul style="list-style-type: none"> No population increase which is substantially higher than the forecast increase No substantial expansion of the administrative area No substantial increase of the unit generation rate of solid waste 				
<p><u>Goal of soft component</u></p> <ul style="list-style-type: none"> Capability of both Homs and Lattakia City Councils to promote appropriate discharge for efficient collection and transportation 	<ul style="list-style-type: none"> Number of pamphlets distributed Number of campaign events (once during the implementation period of the soft component) Number of visitors to campaign events Number of references to the promotion by mass media 	<ul style="list-style-type: none"> Pamphlets for distribution Pamphlet distribution records Campaign records Copies of publicity in mass media 	<ul style="list-style-type: none"> No political interference regarding the disclosure of information 				
<p><u>Outputs of soft component</u></p> <ul style="list-style-type: none"> Both Homs and Lattakia City Councils arrange the regime for appropriate discharge promotion The officials concerned of both Homs and Lattakia City Councils understand the contents and methods of publicity/education The officials concerned of both Homs and Lattakia City Councils understand how to collect and analyse data for publicity The officials concerned of both Homs and Lattakia City Councils commence public relations and educational activities 	<ul style="list-style-type: none"> Number of persons in charge of promotion Preparation of a resident education manual Number of days for resident education seminars Number of participants in resident education seminars List of publicity data Pamphlets and education programme prepared 	<ul style="list-style-type: none"> Records of resident education seminars Campaign records 					
<p><u>Activities under soft component</u></p> <ul style="list-style-type: none"> Technical guidance for officials of Homs and Lattakia City Councils on appropriate discharge promotion 	<p><u>Inputs</u></p> <table border="0"> <tr> <td>[Japanese Side]</td> <td>[Syrian Side: each of Homs and Lattakia City Councils]</td> </tr> <tr> <td> <ul style="list-style-type: none"> Japanese engineers Japan: 0.66 M/M Syria: 2.34 M/M Local assistants Syria: 1.23 M/M </td> <td> <ul style="list-style-type: none"> Two solid waste management managers One environment manager Two public relations officials Two persons responsible for vehicle assignment in the solid waste management sector 20 staff members for campaign management 30 staff members for the distribution of the pamphlets </td> </tr> </table>	[Japanese Side]	[Syrian Side: each of Homs and Lattakia City Councils]	<ul style="list-style-type: none"> Japanese engineers Japan: 0.66 M/M Syria: 2.34 M/M Local assistants Syria: 1.23 M/M 	<ul style="list-style-type: none"> Two solid waste management managers One environment manager Two public relations officials Two persons responsible for vehicle assignment in the solid waste management sector 20 staff members for campaign management 30 staff members for the distribution of the pamphlets 		<p><u>Preconditions</u></p> <ul style="list-style-type: none"> All of the target persons, including the counterparts for the Project, will cooperate with the soft component. The Syrian side will bear the cost of the printing of the pamphlets, campaign events and public relations activities.
[Japanese Side]	[Syrian Side: each of Homs and Lattakia City Councils]						
<ul style="list-style-type: none"> Japanese engineers Japan: 0.66 M/M Syria: 2.34 M/M Local assistants Syria: 1.23 M/M 	<ul style="list-style-type: none"> Two solid waste management managers One environment manager Two public relations officials Two persons responsible for vehicle assignment in the solid waste management sector 20 staff members for campaign management 30 staff members for the distribution of the pamphlets 						

(6) Procurement Method of Resources to Implement Soft Component

Because of the lack of any previous resident education activities similar to those planned under the soft component, the use of local resources will be difficult. Accordingly, direct implementation by the Japanese Consultant by means of the dispatch of Japanese engineers is appropriate.

(7) Implementation Schedule for Soft Component

The planned implementation schedule of the soft component is shown in Fig. 2.6-1.

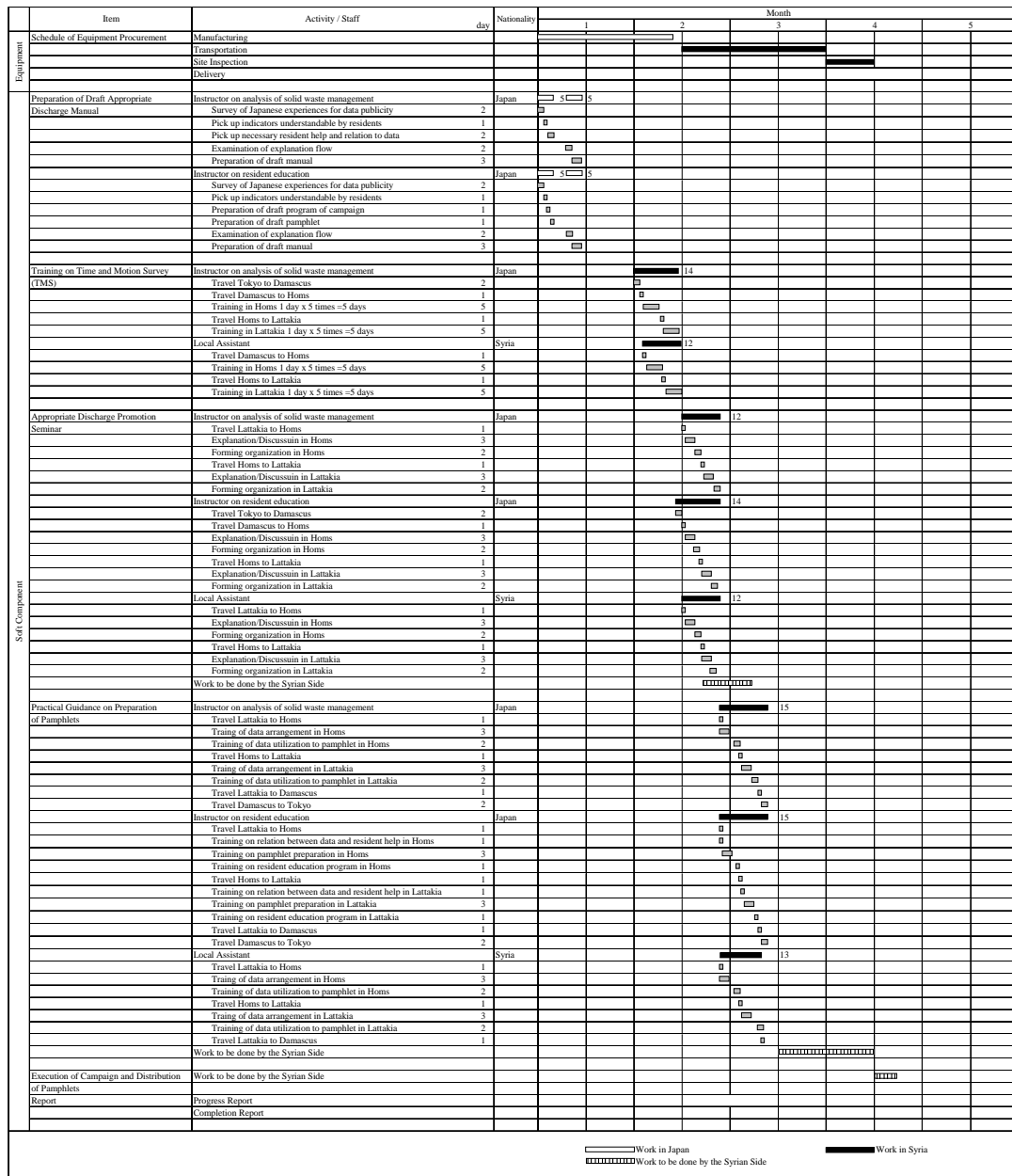


Fig. 2.6-1 Planned Implementation Schedule of Soft Component

(8) Products of Soft Component

The products of the soft component by type of activity (work) are shown in Table 2.6-3.

Table 2.6-3 Products of Soft Component

Activity (Work)	Products	Other Reference Materials
1. Preparation of draft appropriate discharge promotion manual	<ul style="list-style-type: none"> • Draft appropriate discharge promotion manual (in English) • Arabic version of the above 	
2. Training on TMS	<ul style="list-style-type: none"> • TMS results sheet (part of the publicity data list mentioned below) 	<ul style="list-style-type: none"> • Training records (list of the participants and training schedule, etc.) • Field notes during the TMS • Location map of the TMS sites
3. Appropriate discharge promotion seminar	<ul style="list-style-type: none"> • Appropriate discharge promotion manual (revised version in English) • Arabic version of the above • Table of selected persons for appropriate discharge promotion 	<ul style="list-style-type: none"> • Training records (list of the participants and seminar schedule, etc.)
4. Practical guidance on preparation of pamphlets	<ul style="list-style-type: none"> • Publicity data list • Draft pamphlet • Draft education programme 	<ul style="list-style-type: none"> • Practical guidance records (list of participants and guidance schedule, etc.)
5. Execution of campaign and distribution of pamphlets	<ul style="list-style-type: none"> • Pamphlets for distribution • Campaign programme 	<ul style="list-style-type: none"> • List of visitors to the campaign (event) • Pamphlet distribution records (number of pamphlets distributed, places of pamphlet distribution and distribution method, etc.) • Copies of publicity results in mass media, including broadcasting
General	<ul style="list-style-type: none"> • Progress report • Completion report 	

(9) Estimated Cost of Soft Component

The required cost for the implementation of the soft component is estimated to be approximately 8.6 million yen.

(10) Obligations of Implementing Agencies in Recipient Country

The goal of the proposed soft component of the Project is to give both Homs City Council and Lattakia City Council the capability to continually promote the appropriate discharge to local residents. For activities design to continually promote such manner, the continuous provision of education for local residents utilising the outcomes of the soft component will be required. The

feasibility, impediments and necessary measures relating to such continual efforts of the city councils are discussed next.

1) Feasibility

Up to the present, both Homs City Council and Lattakia City Council have responded to the inappropriate discharge of solid waste by local residents by means of increasing the physical collection and transportation capacity through the deployment of extra equipment and the recruitment of new workers. However, the scale of the necessary funding to meet the cost of extra equipment and workers has been substantially increasing following the increased amount of generated solid waste.

Reduction of the scale of the necessary funding is possible by shifting the focus from an increase of the physical capacity to the discharge of solid waste by local residents in an appropriate manner. As this approach is considered to have a high cost-benefit performance, its feasibility is high.

2) Impediments

Even though the feasibility of the new approach is believed to be high, there are several impediments. Both Homs City Council and Lattakia City Council should prepare suitable measures to deal with such impediments.

① Cost of Educating Residents until Appropriate Discharge is Achieved

It is highly likely that the effects of resident education on solid waste management will not quickly emerge. Accordingly, repetition of the same educational activities until the desirable effects are achieved will be necessary.

When the effects begin to emerge, the funding for physical inputs can be diverted to meet the cost of resident participation. In the interim period until such time when the desirable effects begin to emerge, however, resident education should be conducted while maintaining the physical inputs, increasing the overall amount required for solid waste management.

② Political Instruction on Disclosure of Information

Publicity of the present poor situation will be required to effectively induce a sense of crisis and sense of cooperation on the part of local residents regarding solid waste management. As the administration must be bold to publicise such poor situation, an instruction may be issued for the suspension of such disclosure of information by senior

officials of local public bodies in the Homs and Lattakia areas, including those of the relevant governorates.

3) Necessary Measures

Tentative measures which are required to deal with the above-mentioned impediments are discussed below.

① Cost of Educating Residents

Firstly, efforts to reduce the cost of educating residents should be implemented. In addition to wages for administrative staff, a major cost item is the preparation of pamphlets. This cost can be reduced by the use of a PC by staff members to prepare the draft pamphlet and by the use of ordinary paper for printing, etc. In the case of the pamphlet distribution cost, while the distribution of pamphlets in the street and to each household has a relatively high personnel cost, some of this distribution work can be substituted by entrusting schools and display at railway stations and bus terminals.

Secondly, funding must be secured from the long-term viewpoint that the amount of physical input will be reduced in the coming years. As resident education will be required for recycling and the collection of sorted waste, both of which are expected to be implemented in the future, the creation of a budgetary item of “resident education” is desirable.

② Political Instruction

Officials of Homs City Council and Lattakia City Council must use similar methods as those used for resident education to explain to senior officials of higher administrative organizations that the cooperation of local residents will enable a reduction of various costs and will improve the environment in these cities.

CHAPTER 3

PROJECT EVALUATION AND RECOMMENDATIONS

CHAPTER 3 PROJECT EVALUATION AND RECOMMENDATIONS

3.1 Project Effects

The current situation and problems of the Project Area and the improvement measures and their expected effects are shown in Table 3.1-1.

Table 3.1-1 Project Effects

Current Situation and Problems	Improvement Measures Under the Project	Effects and Degree of Improvement Under the Project
1. At present, the collection amount (rate) of municipal solid waste is low at 750 tons/day (83%) in Homs, 250 tons/day (74%) in Lattakia, 43 tons/day (61%) in Jableh, 12 tons/day (75%) in Al Haffeh and 30 tons/day (77%) of Qurdaha and solid waste has begun to pile up in some areas of these cities. The rate is expected to fall further in the coming years because of the aging of equipment and population increase, exacerbating the piling up of solid waste.	Procurement of the following solid waste collection and transportation vehicles <ul style="list-style-type: none"> • Compactor (8 m³): 65 • Compactor (4 m³): 33 	The collection amount (rate) of municipal solid waste in 2010 will have improved to 955 tons/day (95%) in Homs, 345 tons/day (90%) in Lattakia, 66 tons/day (80%) in Jableh, 18 tons/day (90%) in Al Haffeh and 41 tons/day (90%) in Qurdaha.
2. The simple transfer work of solid waste accumulated at the side of roads, collection work in areas with narrow roads and the collection work of pruned branches of street trees, etc. are not sufficiently conducted due to the deterioration and shortage of equipment and some of the places for initial accumulation have become like disposal sites.	Procurement of the following solid waste collection and transportation vehicles <ul style="list-style-type: none"> • Dump truck (6 m³): 8 • Wheel loader: 3 	
3. While medical waste which has a risk of infection or other adverse impacts on the human body is separated at medical institutions, the exclusive collection capacity in Homs and Lattakia only covers some 25% (0.8 tons/day) of the waste amount. This leads to the mixed collection of medical waste and solid waste, causing a risk of secondary infection via the collection vehicles, workers or collected waste.	Procurement of the following collection and transportation vehicles exclusively for medical waste <ul style="list-style-type: none"> • Dump truck (two tons): 2 • Truck (one ton): 1 	The collection rate of medical waste in 2010 will have improved to 100% (3 tons/day) in both Homs and Lattakia.
4. In Lattakia, a tourist city, regular washing of the containers is necessary to remove bad odour. However, sufficient washing is not conducted due to the deterioration and shortage of equipment, making the maintenance of an appropriately hygienic environment difficult.	Procurement of the following vehicles <ul style="list-style-type: none"> • Container washer: 2 	Some 600 containers placed in the tourist areas of Lattakia will be regularly and systematically washed.
5. While the mechanical cleansing of highways and trunk roads is desirable for worker safety, manual cleansing is currently conducted because of the deterioration and shortage of equipment.	Procurement of the following equipment <ul style="list-style-type: none"> • Mechanical sweeper: 8 • Sprinkler truck: 2 	Highways and trunk roads with a median strip where normal cleansing is dangerous in Homs and Lattakia will be regularly mechanically cleansed in a systematic manner.

3.2 Recommendations

3.2.1 Tasks and Recommendations Regarding Collection and Transportation of Solid Waste

The tasks which are necessary to achieve the objective of the Project, i.e. improvement of the solid waste collection and transportation situation, are described below together with the relevant recommendations.

(1) Improvement of Collection Rate

The solid waste collection rate can be improved by strengthening of the hard aspect comprising equipment and manpower, etc. and the efficient use of equipment and manpower, etc. While the number of equipment required to achieve the target collection rate in each city will be procured under the Project, the efficient use of this equipment will require self-help efforts on the Syrian side. For this reason, the introduction of some soft measures will be necessary for the effective use of the equipment and for efficient solid waste collection and transportation work. There are several soft measures of which the introduction by the Syrian side is required. These measures can be materialised through the application of the existing skills possessed by the Syrian side and also of the results of the implementation of the soft component under the Project.

- Setting up a collection and transportation route for each vehicle
- Setting up a collection and transportation time (daytime or night time, etc.) for each vehicle
- Deployment of vehicles in accordance with the collection/transportation routes and times
- Implementation of activities to promote the appropriate discharge of solid waste by local residents

Activities to promote the appropriate discharge of solid waste by local residents, which are the target activities of the soft component of the Project, are essential for the future improvement of solid waste management and can be copied by other cities. The continuation of these activities is, therefore, important to accumulate the relevant know-how.

(2) Vehicle Maintenance

The project implementing body currently used vehicles with are 15 – 20 years old, indicating its efforts to use the existing vehicles as much as possible. However, its vehicle maintenance method is symptomatic in that breakdowns are dealt with as they occur and periodic inspection and maintenance work to prevent breakdowns is not sufficiently conducted. The adoption of

preventive maintenance based on periodic inspection and maintenance work is highly desirable to ensure the good condition of vehicles over a long period of time.

The project implementing body currently uses private garages to conduct the maintenance of its vehicles and the adoption of preventive maintenance will require fresh funding. However, as preventive maintenance reduces the volume of repair work, the repair cost and the preventive maintenance cost are inferred to have a trade-off relationship. Accordingly, the pending task for the Syrian side at present is the establishment of a preventive inspection and maintenance regime as soon as possible using this trade-off relationship between the repair cost and the preventive maintenance cost.

3.2.2 Tasks and Recommendations Regarding General Improvement of Solid Waste Management

The proper implementation of such related work as final disposal and recycling is essential for the administration to gain the trust of local residents. The positive results of such work should lead to the cooperation of local residents for the solid waste collection and transportation work. Accordingly, the proper implementation of solid waste management, including such related work as final disposal and recycling, is important to achieve a higher efficiency of the solid waste collection and transportation work. The tasks regarding general solid waste management in the Project Area are described below together with the relevant recommendations.

(1) Continuation of Sanitary Landfill Operation and Securing of Future Landfill Sites

The continuation of sanitary landfill operation is extremely important for the administration to gain the trust of local residents. It is estimated that the existing landfill sites in Homs and Lattakia will be full by 2010. Therefore, the completion of new landfill sites, each serving a wide area, which the Syrian side is proceeding with a target opening in 2008, is the most urgent task.

As the projects to construct new landfill sites in Homs and Lattakia are included in the national M/P formulated in 2004, they constitute important projects which are officially acknowledged by the Government of Syria. As such, the priority of these projects in terms of budget allocation is high. The provision of objective advice and monitoring of the progress of these projects by experts on solid waste management are desirable, suggesting the effectiveness of using a policy advisor as described in (2) below.

(2) Nationwide Extension of Improvement of Solid Waste Management Infrastructure

The problems of solid waste management which are being experienced in the Project Area are not unique to the Project Area but are common throughout Syria. It is, therefore, necessary to improve the solid waste management infrastructure throughout the country by means of the nationwide exchange of information, including the nationwide spread of knowledge learned from the Project and the application of useful information obtained in other areas to the Project Area.

One of the urgent tasks at present is for the Ministry of Local Administration and Environment, which is the responsible organization for the Project, to establish an internal system which is capable of fully controlling local public bodies. Even though the said ministry has recently begun the control of solid waste management by local public bodies through the enactment of the Solid Waste Management Law and the formulation of the National M/P, both in 2004, it is still in the trial and error process because of the short history of such control.

Given the necessity for not only the central control of the Project but also for the establishment of the priority order of projects identified in the National M/P, monitoring of the progress of these projects and the provision of technical advice for local public bodies, the dispatch of an expert as a policy advisor to the Ministry of Local Administration and Environment from Japan or another aid organization should prove highly effective.

(3) Establishment of Recycling Society

The Project aims at improving solid waste collection and transportation and does not include the introduction of a system to re-use or recycle waste in its scope. Accordingly, the Project alone will not make a sufficient contribution to the establishment of a recycling society, which is now demanded internationally, leaving the development of recycling facilities, etc. as a further task for the Syrian side. These facilities should be completed by the Syrian side as soon as possible as envisaged by the M/P and others.

APPENDICES

APPENDIX-1

MEMBER LIST OF THE STUDY TEAM

1. Members of the Study Team

(1) Basic Design Study Team

Name	Assignment	Current Position / Company
Mr. Kazuhide NAGASAWA	Leader	Resident Representative Japan International Cooperation Agency (JICA) Syria Office
Mr. Shigeyuki MATSUMOTO	Planning Management	Water and Sanitation Team Project Management Group I Grant Aid Management Department Japan International Cooperation Agency (JICA)
Mr. Katsumi FUJII	Chief Consultant / Waste Collection Planning	Yachiyo Engineering Co., Ltd.
Mr. Kiyoshi SHIMIZU	Environmental & Social Consideration / Waste Treatment Planning	Ditto
Mr. Takuro NUKAZAWA	Machinery & Procurement Planning / Cost Estimator	Ditto

(2) Draft Report Explanation Team

Name	Assignment	Current Position / Company
Mr. Shigeru OTAKE	Leader	Deputy Resident Representative Japan International Cooperation Agency (JICA) Syria Office
Mr. Hiroshi ABE	Chief Consultant / Waste Collection Planning	Yachiyo Engineering Co., Ltd.
Mr. Kiyoshi SHIMIZU	Environmental & Social Consideration / Waste Treatment Planning	Ditto

APPENDIX-2

STUDY SCHEDULE

2. Study Schedule :

(1) Basic Design Study

Date	Movement	Accommodation	Activity		
			Activity A (Planning Management)	Activity B (Consultant)	Activity C (Consultant)
Nov. 20 (Sat)	Arrival at Damascus	Damascus	-Arrival at Damascus		
Nov. 21 (Sun)		Damascus	-Confirmation of actual situation of Damascus City in solid waste management (Operation and maintenance) -Courtesy call on JICA Syria Office and Embassy of Japan		
Nov. 22 (Mon)		Damascus	-Meeting with Syrian related authorities and project implementing organization		
Nov. 23 (Tue)		Damascus	-Meeting with Syrian related authorities and project implementing organization on Minutes of Discussion		
Nov. 24 (Wed)		Damascus	-Signing of Minutes of Discussion		
			-Report to Embassy of Japan		
Nov. 25 (Thu)	Departure from Damascus	Damascus	-Departure from Damascus	-Equipment market survey in Damascus,	
Nov. 26 (Fri)	Arrival at Tokyo Damascus - Homs	Homs	-Arrival at Tokyo	-Departure from Damascus, arrival at Homs -Documents preparation	
Nov. 27 (Sat)		Homs		- Meeting with Homs City - Courtesy call on Homs Governor - Confirmation of actual situation of Dir Baalba existing landfill site	
Nov. 28 (Sun)		Homs		-Site visit to Maglia new landfill candidate site -Survey for operation & maintenance of equipment in Homs -Confirmation of actual situation of medical waste in Homs	
Nov. 29 (Mon)		Homs		-Confirmation of actual situation of collection of waste in Homs	
Nov. 30 (Tue)		Homs		-Cooperation plan survey in Homs	
Dec. 1 (Wed)	Homs - Aleppo	Aleppo		-Meeting for Field Report (F/R) with Homs City -Departure from Homs, arrival at Alepo	
Dec. 2 (Thu)		Aleppo		-Confirmation of actual situation of Aleppo City in solid waste management (operation & maintenance of equipment, transfer station (T/S), landfill site)	
Dec. 3 (Fri)	Aleppo - Lattakia	Lattakia		-Departure from Aleppo, arrival at Lattakia -Formulation of Cooperation Plan -Documents preparation	

Date	Movement	Accommodation	Activity		
			Activity A (Planning Management)	Activity B (Consultant)	Activity C (Consultant)
Dec. 4 (Sat)		Lattakia		-Confirmation of actual situation of compost plant -Confirmation of actual situation of Al Bassa existing landfill site -Confirmation of actual situation of Jableh City in solid waste management	
Dec. 5 (Sun)		Lattakia		-Confirmation of actual situation of Al Qasia new landfill site -Confirmation of actual situation of Al-Haffeh City in solid waste management -Confirmation of actual situation of Qurdaha City in solid waste management -Courtesy call on Lattakia Governor -Confirmation of actual situation of Lattakia City in solid waste management	
Dec. 6 (Mon)	Lattakia - Damascus	Lattakia / Damascus		-Confirmation of situation of Jableh City in solid waste management	-Departure from Lattakia, arrival at Damascus -Equipment market survey
Dec. 7 (Tue)		/ Damascus		-Equipment plan survey in Lattakia	-Equipment market survey
Dec. 8 (Wed)		Lattakia / Damascus		-Study for cooperation plan	-Equipment market survey
Dec. 9 (Thu)		Lattakia / Damascus		-Meeting for F/R with Lattakia City	-Equipment market survey
Dec.10 (Fri)	Lattakia - Damascus	Damascus		-Departure from Lattakia, arrival at Damascus	-Documents preparation
Dec.11 (Sat)		Damascus		-Confirmation of situation of Damascus City in solid waste management (Compost Plant, Landfill Site)	
Dec.12 (Sun)		Damascus		-Meeting with MoLAE	-Equipment market survey
Dec.13 (Mon)		Damascus		-Preparation of F/R	-Equipment market survey
Dec.14 (Tue)		Damascus		- Meeting on F/R with MoLAE	
Dec.15 (Wed)		Damascus		-Confirmation and submission of F/R to MoLAE	
Dec.16 (Thu)		Damascus		-Report to JICA Syria Office and Embassy of Japan	
Dec.17 (Fri)	Departure from Damascus			-Departure from Damascus	

(2) Draft Report Explanation

Date	Movement	Accommodation	Activity	
			Activity A (Official)	Activity B (Consultant)
Feb.25 (Fri)	Arrival at Damascus	Damascus		-Arrival at Damascus
Feb.26 (Sat)		Damascus		-Delivering Draft Basic Design report (DBD) to MoLAE - Brief explanation of contents of DBD
Feb.27 (Sun)		Damascus	-Meeting for explanation strategy in JICA Syria	
			-Courtesy call on Embassy of Japan and meeting on DBD	
			-Courtesy call on SPC	
Feb.28 (Mon)		Damascus	-Meeting for explanation of contents of DBD with Syrian related Authorities and Project Implementing Organization	
Mar. 1 (Tue)		Damascus	-Meeting for explanation of contents of DBD with Syrian related Authorities and Project Implementing Organization	
			-Discussion on Minutes with Syrian related Authorities and Project Implementing Organization	
Mar. 2 (Wed)		Damascus	-Discussion on Minutes with Syrian related Authorities and Project Implementing Organization	
			-Confirmation of actual situation of Dir Baalba existing landfill site	
Mar. 3 (Thu)		Damascus	-Signing of Minutes of Discussion (M/D)	
			-Report to Embassy of Japan	
Mar. 4 (Fri)	Departure from Damascus			-Departure from Damascus

APPENDIX-3

LIST OF PARTIES CONCERNED

IN THE RECIPIENT COUNTRY

3. List of Parties Concerned in Recipient Country

(1) Basic Design Study Period

Agency and Position	Name
Ministry of Local Administration & Environment	
Minister Deputy Minister Head of Solid Waste Management Department Director of Water Safety Directorate Accounting Manager	Mr. Hilal Al Atrash Mr. Sadeq Abo Watfeh Eng. Roula Abazeed Eng. Abed Rabboh Mr. Saleh Issa
Homs Governorate	
Governor	Mr. Sobhi Hamida
Municipality of Homs: Homs City Council	
Mayor Vice Mayor Director of the Cleansing Directorate Manager of the Machine Directorate Manager of Environment Division Head of the Studies Section of the Cleansing Directorate Engineer of the Studies Section of the Cleansing Directorate Engineer of the Studies Section of the Cleansing Directorate Engineer of Operation and Management Section of the Cleansing Directorate	Dr. Eng. Bahajat Al-Jandali Eng. Mohammad Ahmad Eng. Hassan Darwish Eng. Wael Abead Eng. Abdulhadi Najjar Eng. Bushra Muhammad Eng. Sukker Dvoubi Eng. Maha Taiyara Eng. Jamal Khoushfee
Al Nahda Al Arabia Hospital	
Hospital Director	Mr. Dr. Hamed Ma'rouf
Lattakia Governorate	
Governor Director of Environment Directorate Member of Lattakia Governorate Executive Bureau	Mr. Zahed Itaj Mousa Ms. Lama Ahmad Eng. Eisa Junaidi
Municipality of Lattakia: Lattakia City Council	
Mayor Deputy Director of Technical Affairs Manager of Collection Department Manager of Public Relation Department Manager of Vehicles Department Manager of Compost Plant Manager of Landfill Project Environment Department	Mr. M. H. Azhari Mr. Yahia Masri Mr. Ammar Esmaeil Ms. Nada Sabec Mr. Yahia Shriba Mr. Mohsen Shriba Eng. Nazih Hamdan Mr. Jawdat Narachly
National Hospital Lattakia	
Hospital Director	Mr. Dr. Ammar Ghanuam

Agency and Position	Name
Municipality of Jableh	
Mayor Director of Vehicle Directorate Director of Services Directorate	Mr. Ahmad Jazah Eng. Mostapha Al A'ihar Eng. Muhammad Qassab
Municipality of Al Haffeh	
Mayor	Mr. Zakaria Al Absi
Municipality of Qurdaha	
Mayor	Mr. Noai Touzi
Damascus Governorate	
Cleanliness Director Assistant to Cleanliness Director (Mechanical Engineering) Director of Vehicles and Workshops Department Assistant to Vehicle Director (Mechanical Engineering) Director of Solid Waste Treatment Electric Engineer of Solid Waste Treatment Plant	Eng. Amir Al Boukhari Mr. Abdulsalam Al Khatib Eng. Sami AL Dibs Mr. Samer Kilani Eng. Riad Kabekly Mhd. Burhan Hafez
Municipality of Aleppo	
Head of Cleansing Department, Directorate of Health Affairs Head of Cleansing Machinery Department, Directorate of Health Affairs Director of Machinery Department	Mr. Khalil Haddad Eng. Yahia Dow Eng. Showkat Shehade
State Planning Commission	
Deputy Head	Mr. M. Bassam Al Tibai
Embassy of Japan in Syria	
Second Secretary	Mr. Takeshi Okuda
JICA Syria Office	
Resident Representative Deputy Resident Representative Project Formulation Advisor Health & Environment Sector Advisor Health & Environment Sector Public Relation Advisor	Mr. Kazuhide Nagasawa Mr. Shigeru Otake Mr. Naoki Takechi Dr. Bachar Ibrahim Eng. Mohammed Aldoubosh

(2) Draft Report Explanation Period

Agency and Position	Name
Ministry of Local Administration & Environment	
Minister Deputy Minister Head of Solid Waste Management Department Director of Technical Affairs	Mr. Hilal Al Atrash Mr. Sadeq Abo Watfeh Eng. Roula Abazeed Eng. M. Eyad Al-Chamaa
Municipality of Homs: Homs City Council	
Vice Mayor Director of the Cleansing Directorate Head of Waste Treatment Division Manager of Environment Division	Eng. Mohamed Alahmad Eng. Hassan Darwish Eng. Mamdouh Saleh Eng. Abdulhadi Najjar
Municipality of Lattakia: Lattakia City Council	
Deputy Director of Technical Affairs Manager of Equipment Department Manager of Collection Department	Mr. Yahia Masri Mr. Jehad Durgam Mr. Ammar Esmaeil
Municipality of Jableh	
Mayor Director of Services Directorate	Mr. Ahmad Jazah Eng. Muhammad Qassab
Municipality of Qurdaha	
Engineer	Mr. Akram Mahfoud
Damascus Governorate	
Cleanliness Director	Eng. Amir Al Boukhari
State Planning Commission	
Deputy Head	Mr. M. Bassam Al Tibai
Embassy of Japan in Syria	
Second Secretary	Mr. Takeshi Okuda
JICA Syria Office	
Resident Representative Deputy Resident Representative Project Formulation Advisor Health & Environment Sector Advisor Health & Environment Sector	Mr. Kazuhide Nagasawa Mr. Shigeru Otake Mr. Naoki Takechi Dr. Bachar Ibrahim

APPENDIX-4

MINUTES OF DISCUSSIONS

MINUTES OF DISCUSSIONS
ON THE BASIC DESIGN STUDY
ON THE PROJECT FOR IMPROVEMENT OF
SOLID WASTE TREATMENT IN LOCAL CITIES
IN THE SYRIAN ARAB REPUBLIC

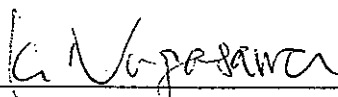
Based on the results of the Preliminary Study, the Government of Japan decided to conduct a Basic Design Study on the Project for Improvement of Solid Waste Treatment in Local Cities in the Syrian Arab Republic (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to the Syrian Arab Republic (hereinafter referred to as "the Syria") the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Kazuhide Nagasawa, Resident Representative, JICA Syria office, and is scheduled to stay in the country from November 20th to December 17th, 2004.

The Team held discussions with the officials concerned of the Government of Syria and will conduct a field survey at the study area.

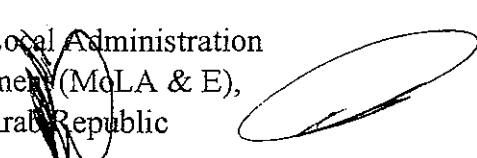
In the course of discussions, both parties confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Basic Design Study Report.

Damascus, 24th November 2004



Mr. Kazuhide Nagasawa,
Leader,
Basic Design Study Team,
Japan International Cooperation Agency,
Japan

Eng. Hilal Al Atrash,
Minister,
Ministry of Local Administration
and Environment (MoLA & E),
The Syrian Arab Republic



ATTACHMENT

1. Objective of the Project

The objective of the Project is to improve the capacity for solid waste management through supplying equipment for smooth collection and transportation of solid waste in Homs city, Lattakia city, Jableh city, Al Haffeh city and Qurdaha city.

2. Project sites

The sites of the Project are

- (1) Homs city
- (2) Lattakia, Jableh, Al Haffeh and Qurdaha city

3. Responsible and Implementing Agency

3-1. The Responsible Agency: Ministry of Local Administration and Environment

3-2. The Implementing Agency:

- (1) Homs city council
- (2) Lattakia city council

4. Items requested by the Government of Syria

After discussions with the Team, the items described in Annex-1 were requested by the Syrian side based on the result of the Preliminary Study and the request from the Syrian side to include procurement of spare parts for equipment in the Project. JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval.

5. Japan's Grant Aid Scheme

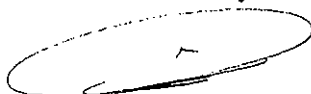
The Syrian side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of Syria as explained by the Team and described in Annex-1 and Annex-2 of the Minutes of Discussions signed by both parties on 30th June 2004.

6. Schedule of the Study

6-1. The consultants will proceed to further studies in Syria until December 17th, 2004.

6-2. JICA will prepare the draft report in English and dispatch a mission in order to explain its contents in February 2005.

6-3. In case that the contents of the report are accepted in principle by the Government of Syria, JICA will complete the final report and send it to the Government of Syria by April 2005.



7. Other relevant issues

7-1. Overall policy framework for solid waste management

The Syrian side explained that the formulation of Syrian Solid Waste Management Master Plan had finished Phase III and Phase IV, the last phase, would be completed by December 2004. The Syrian side agreed to provide the reports of Phase III and Phase IV (after completion) for the Team.

The Syrian side also explained that “the Law of General Cleanliness for Administrative Units and its Beauty”, which would regulate solid waste management, was on the final stage of Parliament deliberation. The Syrian side agreed to provide the draft law for the Team.

7-2. Target year

Both sides agreed that the target year of the Project should be 2010. Therefore design population and design generated waste amount for the Project shall be set for the year 2010.

7-3. Target types of waste

Both sides agreed that the target types of waste in the Project should be municipal and medical waste.

With respect to the foregoing, the municipal waste is defined as solid waste excluding medical waste, construction debris and industrial waste which is inappropriate to be collected/transported as public service, such as waste from large scale factories.

7-4. Design waste collection ratio

Both sides confirmed that the requested items shown in Annex-1 were decided based on the following design waste collection ratio in the target year:

- (1) 95% for Homs city, and
- (2) 90% for Lattakia city.

The details shall be further investigated and discussed in the course of the Basic Design Study.

7-5. Implementation structure

Both sides agreed that in case the Project would be implemented, a contracting agency of the Syrian side should be the Ministry of Local Administration and Environment as the Syrian side representative. However Homs city and Lattakia city agreed that the cities would have

responsibility for implementation of the Project and Lattakia city should play a role of liaison/representative agency for Jableh, Al Haffeh and Qurdaha cities.

7-6. Staffing

The Syrian side explained that drivers for the vehicles to be procured should be secured by redeployment of existing staff or new employment by own budget.

7-7. Construction schedule of the new landfill sites and related facilities

The Syrian side explained construction schedules of the new landfills and related facilities in the cities as shown in Annex-2.

7-8. Undertakings of the Syrian side

The Syrian side should be responsible for inland transportation, including insurance, from the custom clearance up to the Project sites. The Japanese side should transport the equipment to be procured through the Project at CIF Syrian port (Lattakia and/or Tartus) basis.

The Syrian side should be also responsible for procurement of containers.

7-9. Attendants

A list of the attendants is shown in Annex-3.



Annex-1 Items requested by the Government of Syria

Items	Homs	Lattakia	Jableh	Al-Haffeh	Qurdaha	Total
Compactor truck 8m ³	42	18	3	-	-	63
Compactor truck 4m ³	10	10	3	3	-	26
Compactor truck 2m ³	-	8	-	-	-	8
Dump truck 8m ³	-	-	-	1	-	1
Dump truck 6m ³	-	4	2	-	-	6
Medical waste collecting vehicle	2	1	-	-	-	3
Wheel loader	-	1	1	1	1	4
Wash container	-	3	-	-	-	3
Mobile workshop	1	1	-	-	-	2
Mechanical sweeper	10	3	1	-	-	14
Sprinkler truck	-	2	-	-	-	2
Total	65	51	10	5	1	132
Spare parts for the above equipment	1 lot	1 lot	1 lot	1 lot	1 lot	

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(Signature)

Annex-2 The construction schedules of the new landfills and related facilities

Homs city:

(1) Maghlia new landfill site

Land use / Groundwater survey	Remote sensing and boundary demarcation complete
Topographic / Geological survey , EIA	Tender in October 2004
Facility design	From the 4 th quarter of 2005
Land acquisition	Initial agreement was formulated
Construction	Middle of 2005 – End of 2006
Operation	January 2007 (January 2008 at the latest)

Lattakia city:

(1) Al Qasia new landfill site and recycle center

Preliminary study for EIA	Ongoing (due to finish in the beginning of 2005)
Topographic / Geological survey	Early 2005
EIA	Early 2005
Facility design	July 2005
Land acquisition	Early 2006
Construction	June 2006 – April 2008
Operation	June 2008

(2) Rehabilitation of the existing compost plant

Construction	Middle of 2005 – Middle of 2006
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(3) New garage

Relocation from the present site	2005
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Annex-3 Attendants List

The Syrian Side

Ministry of Local Administration and Environment)

Mr. Hilal Al Atrash, Minister

Mr. M.Sadek Abo Watfa, Deputy Minister

Ms. Roula Abazeed, Head of Solid Waste Management Department

Damascus City Council

Mr. Amir Alboukhari, Cleanliness Director

Homs City Council

Mr. Mohammad Ahmad, Vice Mayor

Mr. Abulhadi Najjar, Manager of Environment Division

Lattakia City Council

Mr. M.H.Azhari, Mayor

Mr. Yahia Masri, Head of Counterpart of this Project

The Japanese Side

Basic Design Study Team

Mr. Kazuhide Nagasawa, Leader

Mr. Shigeyuki Matsumoto

Mr. Katsumi Fujii

Mr. Kiyoshi Shimizu

Mr. Takuro Nukazawa

Mr. Mohammed Al-Doubosh

JICA Syria Office

Mr. Naoki Takechi



**MINUTES OF DISCUSSIONS
ON THE BASIC DESIGN STUDY ON THE PROJECT
FOR IMPROVEMENT OF SOLID WASTE TREATMENT IN LOCAL CITIES
IN THE SYRIAN ARAB REPUBLIC
(EXPLANATION ON DRAFT REPORT)**

In December 2004, Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Basic Design Study Team on the Project for Improvement of Solid Waste Treatment in Local Cities in the Syrian Arab Republic (hereinafter referred to as "the Project") to the Syrian Arab Republic (hereinafter referred to as "Syria"), and through discussions, field survey in Syria and technical examination of the results in Japan, JICA prepared a draft report of the study.

In order to explain and to consult with Syria on the components of the draft report, JICA sent to Syria the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. Shigeru OTAKE, Deputy Resident Representative of JICA in Syria, from February 25 to March 4, 2005.

As a result of discussions, both parties have confirmed the main items of the Project as described on the attached sheets.

Damascus, March 3, 2005

大竹 茂

Mr. Shigeru OTAKE
Leader
Basic Design Study Team
Japan International Cooperation Agency (JICA)
Japan



Eng. Hilal Al Atrash
Minister
Ministry of Local Administration
and Environment (MoLA&E)
Syrian Arab Republic

ATTACHMENT

1. Components of the Draft Report

The Government of Syria agreed and accepted in principle the components of the draft report explained by the Team.

(1) Under the Project, the range of equipment listed below will be procured to improve the capability of the city councils of Homs, Lattakia and three surrounding cities of Lattakia i.e. Jableh, Al Haffeh and Qurdaha, to collect and transport municipal waste and medical waste and to clean the streets.

- 1) Municipal waste collection and transportation equipment
- 2) Medical waste collection and transportation equipment
- 3) Road cleaning equipment
- 4) Mobile repair equipment for broken-down equipment in streets

The number/item of equipment to be procured under the Project is shown in Annex-I.

(2) Technical guidance on the appropriate discharge promotion is planned as an activity under the soft component and this will be conducted in both Homs and Lattakia.

- 1) Preparation of Appropriate Discharge Promotion Manual
- 2) Training on Time and Motion Surveys (TMS)
- 3) Appropriate Discharge Promotion Seminar
- 4) Practical Guidance on Preparation of Pamphlets
- 5) Execution of Campaign and Distribution Pamphlets

2. Minutes of Discussions (November 24, 2004)

Both sides read and confirmed again all the contents of the previous Minutes of Discussions signed by both parties on November 24, 2004.

Concerning the Maghlia landfill site, Homs City Council has faced severe difficulties related to the neighborhood objection to the landfill location which was not evidently illustrated in earlier stages. Homs City Council explained the measures to overcome this situation that:

a. Taking into consideration the standing difficulties, Homs City council has started to define the maximum capacity of the Dier Baalba site based on the available spaces and the heights. It is estimated that current landfill site has a capacity to fulfill waste disposal up to target year. Homs City Council will operate this site carefully and efficiently to use this site as long as possible.

b. In spite of the available capacity of the current landfill site, Homs City Council will continue his best effort to satisfy all the requirements with special care to satisfy people demands near Maghlia landfill site and to prepare the new landfill site.

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3. Japan's Grant Aid Scheme

The Syrian side has understood Japan's Grant Aid System and the necessary measures to be taken by the Government of Syria as explained by the Team and described in Annex-1 and Annex-2 of the Minutes of Discussions signed by both parties on June 30, 2004 (Annex-II).

4. Schedule of the Study

JICA will complete the final report in accordance with the items confirms and send it to Syria around May, 2005.

5. Other Relevant Issues

- (1) The Syrian side has understood the schedule of the Project after the Exchange of Notes (E/N).
- (2) The Syrian side has agreed to undertake the works described in Annex-III for the implementation of the Project.
- (3) The Syrian side has agreed to secure the necessary personnel to operate the equipment to be procured under the Project through new recruitment and/or redeployment of staff members at its own expense.
- (4) The Syrian side has agreed to improve the conditions of existing landfill sites for Jableh and Al Haffeh under the following schedule.

For Jableh: A special contract to transport the solid waste collected in Jableh and disposed at the existing landfill site in Jableh is prepared to start on May 2005 and will continue one year. The Jableh landfill site will be closed completely upon receiving the equipment to be procured under the Grant Aid. All waste will be transferred to Al Bassa landfill site by the end of year 2007. The special contract document is submitted to the Team.

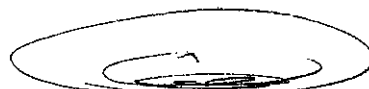
For Al Haffeh: To start covering the disposed waste with soil periodically by the end of March, 2005. To submit the detail working plan, such as covering frequency, ways to provide machinery and soil, budget allocation plan, to the Government of Japan by the end of March, 2005.

- (5) The Syrian side has agreed to undertake the works described in Annex-IV for the development of solid waste management as the related works to the Project.
- (6) The Syrian side has agreed to appoint necessary staff members, as counter parts/trainees, for the soft component and hold the first campaign and distribution of pamphlets for appropriate discharge promotion at their own cost.
- (7) Attendants

A list of the attendants is shown in Annex-V

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Annex-I: Summary of Equipment to be Procured

The number/item of equipment to be procured under the Project is shown in the following table.

Summary of Equipment to be Procured

(Unit: Number)

Equipment No.	Type of Equipment	Homs	Lattakia	Jableh	Al Haffeh	Qurdaha	Total
1	Compactor truck Type 1 (8 m ³)	44	18	3	-	-	65
2	Compactor truck Type 2 (4 m ³)	12	14	4	3	-	33
3	Dump truck (6 m ³)	-	4	3	0	1	8
4	Medical waste truck Type 1 (2 ton dump truck)	2	-	-	-	-	2
5	Medical waste truck Type 2 (1 ton van truck)	-	1	-	-	-	1
6	Wheel loader	-	1	1	0	1	3
7	Container washing truck	-	2	-	-	-	2
8	Mobile workshop	1	1	-	-	-	2
9	Mechanical sweeper	5	3	0	-	-	8
10	Sprinkler truck	-	2	-	-	-	2
	Total	64	46	11	3	2	126
-	Spare Parts	One set	One set	One set	One set	One set	

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Annex-II

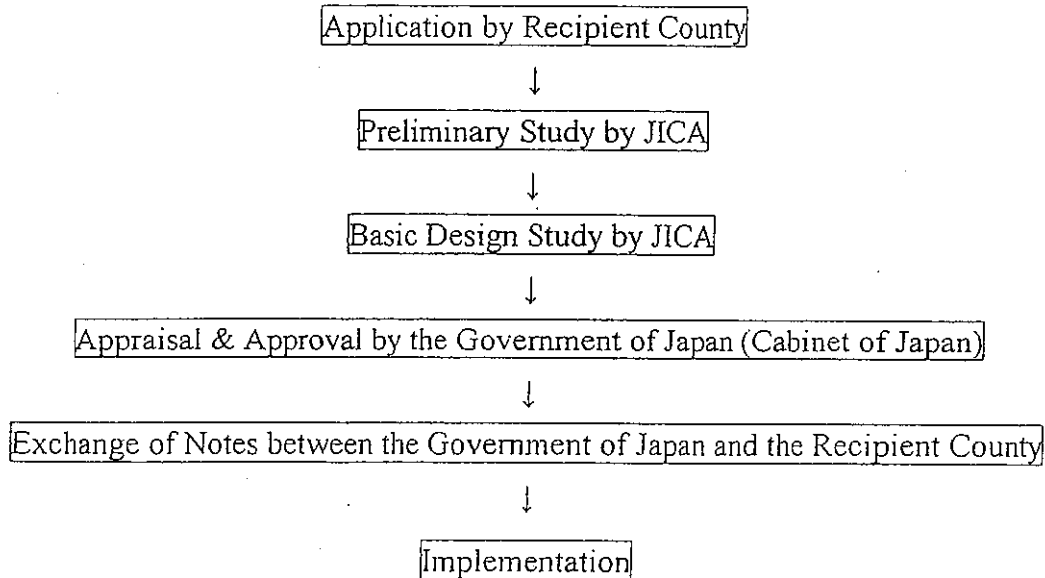
Annex-1

Japan's Grant Aid

The Grant Aid scheme provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1.1 Grant Aid Procedures

Japan's Grant Aid Scheme is executed through the following procedures.



Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Ministry of Foreign Affairs, the Government of Japan to determine whether or not it is eligible for the Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA to conduct a study on the request.

Secondly, JICA conducts the Basic Design Study, using a Japanese firm.

Thirdly, The Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid program, based on a report of the Basic Design Study prepared By JICA, the results are then submitted to the Cabinet of Japan for an approval.

Fourthly, the project once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Government of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such manner as preparing tenders, contracts and so on.

1.2 Basic Design Study

1.2.1 Contents of the Study

The aim of the Basic Design Study (hereinafter referred to as "the Study") conducted by JICA on a requested project (hereinafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows;

- Confirmation of the background, objectives, and benefits of the requested project and also institutional capacity of agencies concerned of the recipient country necessary for implementation of the Project.
- Evaluation of the appropriateness of the project to be implemented under the Grant Aid Scheme from a technical, social and economical point of view.
- Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- Preparation of a basic design of the Project.
- Estimation of costs of the Project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design Study of the Project is confirmed considering the guideline of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the project. Such measures must be guaranteed even though they may fall outside of jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

1.2.2 Selection of Consultants

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

The consultant firm(s) used for the Study is recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency and also to avoid any undue delay in implementation should the selection process be repeated.

1.3 Japan's Grant Aid Scheme

(1) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditioned and amount of the Grant Aid, etc., are confirmed.

(2) "The period of the Grant Aid" means the one fiscal year which the Cabinet approves the project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s), and (b) contractor(s) and final payment to them must be completed. However, in case of delay in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

(3) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

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

However the prime contractors, namely consulting constructing and procurement firms, are limited to "Japanese nationals". (The terms "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

(4) Necessary "Verification"

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

(5) Undertakings required on the part of the Government of the Recipient Country

In the implementation of the Grant Aid project, the recipient country is requested to undertake such necessary measures as the followings;

- 1) To secure land necessary for the sites of the project and to clear level and reclaim the land prior to commencement of the construction.
- 2) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites.
- 3) To secure buildings prior to the procurement in case the installation of the equipment.
- 4) 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.

- 5) 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.
- 6) 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 the work.

(6) "Proper Use"

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

(7) "Re-Export"

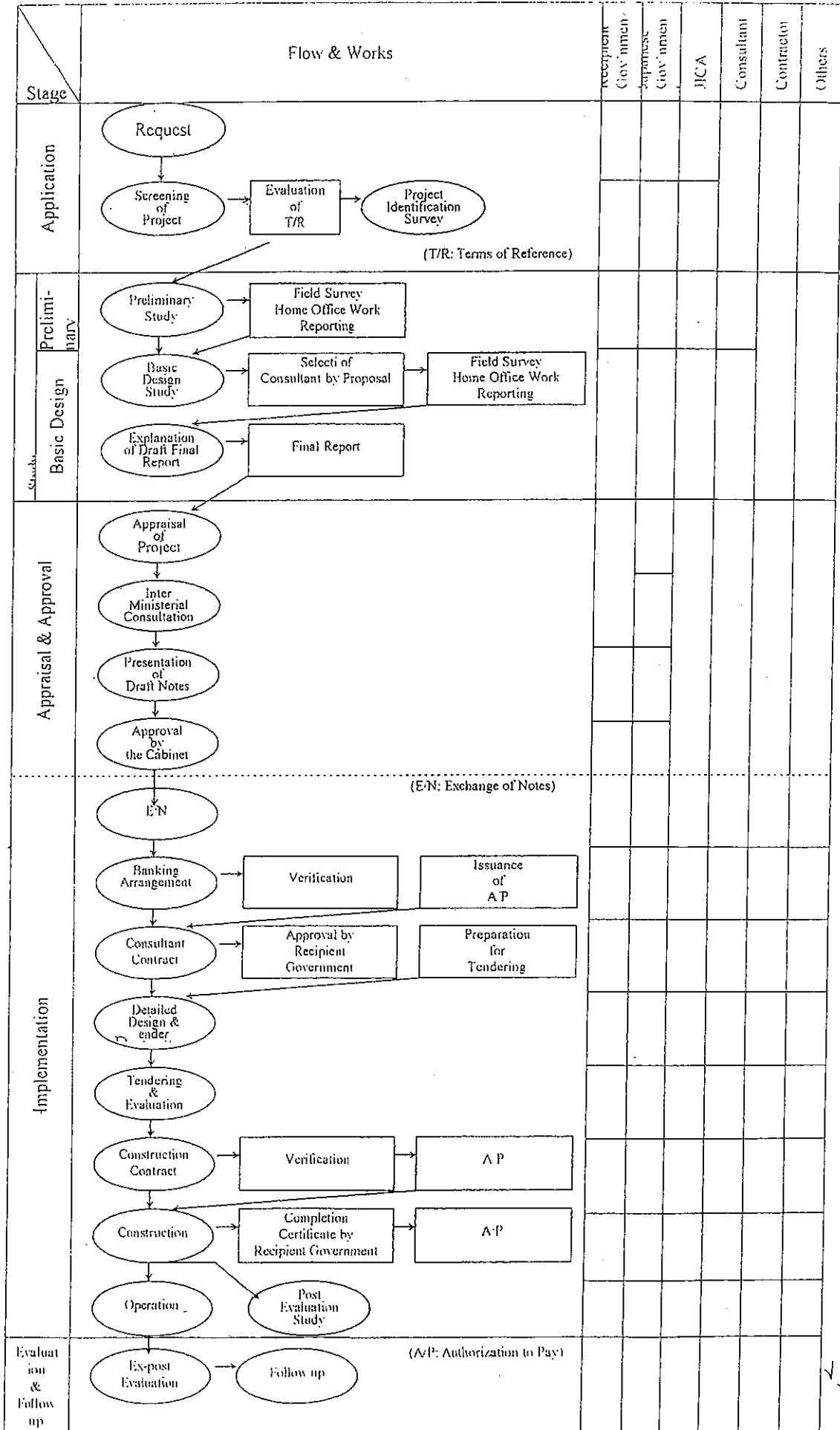
The products purchased under the Grant Aid should not be re-exported from the recipient country.

(8) Banking Arrangement (B/A)

- a) The Government of the recipient country or its designated authority should 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 "Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under verified contracts.
- b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.



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Annex-2

Table 0-1: Major Undertakings to be taken by Each Government (Equipment)

No	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To bear the following commissions to the Japanese bank for banking services based upon the B/A 1) Advising commission of A/P 2) Payment commission		• •
2	To ensure unloading and customs clearance at port of disembarkation in recipient country 1) Marine (Air) transportation of the products from Japan to the recipient 2) Tax exemption and custom clearance of the products at the port of disembarkation 3) Internal transportation from the port of disembarkation to the project site	• (•)	 • (•)
3	To accord Japanese nationals, whose service may be required in connection with the supply of the products and the services under the verified contract, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		•
4	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts		•
5	To maintain and use properly and effectively the facilities contracted and equipment provided under the Grant Aid		•
6	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for the transportation and installation of the equipment		•

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Major Undertakings to be taken by Each Government (Construction)

NO	Items	To be covered by Grant Aid	To be covered by Recipient side
1	To secure land		•
2	To clear, level and reclaim the site when needed		•
3	To construct gates and fences in and around the site		•
4	To construct the parking lot	•	
5	To construct roads		
	1) Within the site	•	
	2) Outside the site		•
6	To construct the building	•	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1) Electricity		
	a. The distributing line to the site		•
	b. The drop wiring and internal wiring within the site	•	
	c. The main circuit breaker and transformer	•	
	2) Water Supply		
	a. The city water distribution main to the site		•
	b. The supply system within the site (receiving and/or elevated tanks)	•	
	3) Drainage		
	a. The city drainage main (for storm, sewer and others) to the site		•
	b. The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	•	
	4) Gas Supply		
	a. The city gas main to the site		•
	b. The gas supply system within the site	•	
	5) Telephone System		
	a. The telephone trunk line to the main distribution frame / panel (MDF) of the building		•
	b. The MDF and the extension after the frame / panel	•	
	6) Furniture and Equipment		
	a. General furniture		•
	b. Project equipment	•	
8	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		•
	2) Payment commission		•
9	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the products from Japan to the recipient country	•	
	2) Tax exemption and customs clearance of the products at the port of disembarkation		•
	3) Internal transportation from the port of disembarkation to the project site	(•)	(•)

10	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		•
11	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the		•
12	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		•
13	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		•

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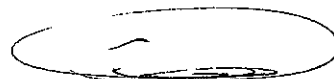
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Annex-III: Works to be undertaken by the Syrian Side for the Project

- 1 To undertake inland transportation, including customs clearance, of the equipment to be procured through the Project, with the provision of the relevant insurance if necessary.
- 2 To procure the solid waste collection containers to be used by the compactor trucks procured through the Project.
- 3 To open an account with a Japanese bank for payment to the Consultant and the Equipment Supplier(s) from the grant aid funds to be provided by the Government of Japan, to issue an irrevocable authorisation to pay (A/P) and to bear all bank commissions.
- 4 To ensure the prompt unloading and tax exemption of the equipment to be procured with the Japanese grant aid.
- 5 To accord Japanese nationals, whose service may be required in connection for the Project, such facilities as may be necessary for their entry into Syria and stay therein for the performance of their work.
- 6 To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Syria with respect to the supply of the products and services under the Project.
- 7 To maintain and use properly and effectively the equipment procured under the Project.
- 8 To bear all the expenses, other than those covered by the Japanese grant aid, which are necessary for the implementation of the Project.

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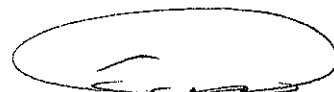


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Annex-IV: Works to be undertaken by the Syrian Side for the development of solid waste management

- 1 To construct the new landfill site to serve Homs and to commence the operation of this landfill site by at least January, 2008.
- 2 To construct a new transfer station by the time when the new landfill site commences operation so that transfer activities to the new landfill site can start.
- 3 To construct the new Al Qasia landfill site with a recycling centre to serve Lattakia and its three surrounding cities and to commence the operation of this landfill site by at least June, 2008.
- 4 To complete the rehabilitation work for the existing compost plant in Lattakia by mid-2006.
- 5 To complete the relocation of the equipment garage in Lattakia in 2005.
- 6 To construct new transfer stations for Jableh and Qurdaha by the time when the new Al Qasia landfill site commences operation so that transfer activities to the Al Qasia landfill site can start.

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Annex-V: Attendants List

The Syrian side

Ministry of Local Administration and Environment

Mr. Hilal Al Atrash, Minister

Mr. M. Sadek Abo Watfa, Deputy Minister

Ms. Roula Abazeed, Head of Solid Waste Management Department

Damascus City Council

Mr. Amir Alboukhari, Cleanliness Director

Homos City Council

Mr. Mohamed Alahmad, Vice Mayor

Mr. Hassan Darwich, Director of Cleansing Directorate

Mr. Mamdouh Saleh, Head of Waste Treatment Division

Mr. Abulhadi Najjar, Manager of Environmental Division

Lattakia City Council

Mr. Yahia Masri, Head of Counterpart of Solid Waste Management

Mr. Jihad Durgam, Manager of Equipment Department

Mr. Ammar Esmail, Directorate Lattakia

Jableh City Council

Mr. Ahamad Jazeh, Mayor

Mr. Mouhamad Kassab, Head of Service Department

Qurdaha

Mr. Akram Mahfoud, Engineer

The Japanese Side

Basic Design Study Team

Mr. Shigeru Otake, Leader

Mr. Hiroshi Abe

Mr. Kiyoshi Shimizu

Mr. Nart Anjouk

JICA Syria Office

Mr. Naoki Takechi

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APPENDIX-5

COST ESTIMATION BORNE

BY THE RECIPIENT COUNTRY

5. Cost Estimation Borne by the Recipient Country

Organization	No.	Item	Phase 1				Phase 2				Total			
			Quantity	Unit	Unit Cost (SP)	Cost (SP)	Converted Cost (JPY)	Quantity	Unit	Unit Cost (SP)	Cost (SP)	Converted Cost (JPY)	Cost (SP)	Converted Cost (JPY)
1. Homs	1-1	Inland Transportation												
	1-1-1	Custom Clearance Commission	44	vehicle	6,000.00	264,000.00	562,320	20	vehicle	6,000.00	120,000.00	255,600	384,000.00	817,920.00
	1-1-2	Vehicle Transportation (Category 1)	44	vehicle	10,600.00	466,400.00	993,432	19	vehicle	10,600.00	201,400.00	428,982	667,800.00	1,422,414.00
	1-1-3	Vehicle Transportation (Category 2)	0	vehicle	29,100.00	0.00	0	0	vehicle	29,100.00	0.00	0	0.00	0.00
	1-1-4	Spare Part Transportation 64 lots	11.0	F/T	800.00	8,800.00	18,744	5.0	F/T	800.00	4,000.00	8,520	12,800.00	27,264.00
		Sub Total				739,200.00	1,574,496				325,400.00	693,102	1,064,600.00	2,267,598.00
	1-2	Procurement of Containers												
	1-2-1	1.0m ³ class Containers	1,006	container	10,000.00	10,060,000.00	21,427,800	0	container	10,000.00	0.00	0	10,060,000.00	21,427,800.00
	1-2-2	0.5m ³ class Containers	0	container	8,000.00	0.00	0	200	container	8,000.00	1,600,000.00	3,408,000	1,600,000.00	3,408,000.00
		Sub Total				10,060,000.00	21,427,800				1,600,000.00	3,408,000	11,660,000.00	24,835,800.00
		Total for Homs				10,799,200.00	23,002,296				1,925,400.00	4,101,102	12,724,600.00	27,103,398.00
2. Lattakia	2-1	Inland Transportation												
	2-1-1	Custom Clearance Commission	18	vehicle	6,000.00	108,000.00	230,040	28	vehicle	6,000.00	168,000.00	357,840	276,000.00	587,880.00
	2-1-2	Vehicle Transportation (Category 1)	18	vehicle	10,600.00	190,800.00	406,404	24	vehicle	10,600.00	254,400.00	541,872	445,200.00	948,276.00
	2-1-3	Vehicle Transportation (Category 2)	0	vehicle	29,100.00	0.00	0	3	vehicle	29,100.00	87,300.00	185,949	87,300.00	185,949.00
	2-1-4	Spare Part Transportation 46 lots	4.5	F/T	800.00	3,600.00	7,668	7	F/T	800.00	5,600.00	11,928	9,200.00	19,596.00
		Sub Total				302,400.00	644,112				515,300.00	1,097,589	817,700.00	1,741,701.00
	2-2	Procurement of Containers												
	2-2-1	1.0m ³ class Containers	411	container	10,000.00	4,110,000.00	8,754,300	0	container	10,000.00	0.00	0	4,110,000.00	8,754,300.00
	2-2-2	0.5m ³ class Containers	0	container	8,000.00	0.00	0	233	container	8,000.00	1,864,000.00	3,970,320	1,864,000.00	3,970,320.00
		Sub Total				4,110,000.00	8,754,300				1,864,000.00	3,970,320	5,974,000.00	12,724,620.00
		Total for Lattakia				4,412,400.00	9,398,412				2,379,300.00	5,067,909	6,791,700.00	14,466,321.00
3. Jableh	3-1	Inland Transportation												
	3-1-1	Custom Clearance Commission	3	vehicle	6,000.00	18,000.00	38,340	8	vehicle	6,000.00	48,000.00	102,240	66,000.00	140,580.00
	3-1-2	Vehicle Transportation (Category 1)	3	vehicle	9,400.00	28,200.00	60,066	7	vehicle	9,400.00	65,800.00	140,154	94,000.00	200,220.00
	3-1-3	Vehicle Transportation (Category 2)	0	vehicle	25,900.00	0.00	0	1	vehicle	25,900.00	25,900.00	55,167	25,900.00	55,167.00
	3-1-4	Spare Part Transportation 11 lots	0.8	F/T	900.00	720.00	1,534	2	F/T	900.00	1,800.00	3,834	2,520.00	5,368.00
		Sub Total				46,920.00	99,940				141,500.00	301,395	188,420.00	401,335.00
	3-2	Procurement of Containers												
	3-2-1	1.0m ³ class Containers	69	container	10,000.00	690,000.00	1,469,700	0	container	10,000.00	0.00	0	690,000.00	1,469,700.00
	3-2-2	0.5m ³ class Containers	0	container	8,000.00	0.00	0	67	container	8,000.00	536,000.00	1,141,680	536,000.00	1,141,680.00
		Sub Total				690,000.00	1,469,700				536,000.00	1,141,680	1,226,000.00	2,611,380.00
		Total for Jableh				736,920.00	1,569,640				677,500.00	1,443,075	1,414,420.00	3,012,715.00

5. Cost Estimation Borne by the Recipient Country

Organization	No.	Item	Phase 1				Phase 2				Total			
			Quantity	Unit	Unit Cost (SP)	Cost (SP)	Converted Cost (JPY)	Quantity	Unit	Unit Cost (SP)	Cost (SP)	Converted Cost (JPY)	Cost (SP)	Converted Cost (JPY)
4. Al Haffeh	4-1	Inland Transportation												
	4-1-1	Custom Clearance Commission	0	vehicle	6,000.00	0.00	0	3	vehicle	6,000.00	18,000.00	38,340	18,000.00	38,340.00
	4-1-2	Vehicle Transportation (Category 1)	0	vehicle	13,000.00	0.00	0	3	vehicle	13,000.00	39,000.00	83,070	39,000.00	83,070.00
	4-1-3	Spare Part Transportation 3 lots	0.0	F/T	1,000.00	0.00	0	0.8	F/T	1,000.00	800.00	1,704	800.00	1,704.00
		Sub Total				0.00	0				57,800.00	123,114	57,800.00	123,114.00
	4-2	Procurement of Containers												
	4-2-1	0.5m ³ class Containers	0	container	8,000.00	0.00	0	50	container	8,000.00	400,000.00	852,000	400,000.00	852,000.00
		Sub Total				0.00	0				400,000.00	852,000	400,000.00	852,000.00
		Total for Al Haffeh				0.00	0				457,800.00	975,114	457,800.00	975,114.00
5. Qurdaha	5-1	Inland Transportation												
	5-1-1	Custom Clearance Commission	0	vehicle	6,000.00	0.00	0	2	vehicle	6,000.00	12,000.00	25,560	12,000.00	25,560.00
	5-1-2	Vehicle Transportation (Category 1)	0	vehicle	11,800.00	0.00	0	1	vehicle	11,800.00	11,800.00	25,134	11,800.00	25,134.00
	5-1-3	Vehicle Transportation (Category 2)	0	vehicle	32,300.00	0.00	0	1	vehicle	32,300.00	32,300.00	68,799	32,300.00	68,799.00
	5-1-4	Spare Part Transportation 2 lots	0.0	F/T	1,000.00	0.00	0	0.5	F/T	1,000.00	500.00	1,065	500.00	1,065.00
		Sub Total				0.00	0				56,600.00	120,558	56,600.00	120,558.00
		Total for Qurdaha				0.00	0				56,600.00	120,558	56,600.00	120,558.00
		Grand Total				15,948,520.00	33,970,348				5,496,600.00	11,707,758	21,445,120.00	45,678,106

Remark: Vehicle Category 1: Compactor truck, Dump Truck, Medical Waste truck, Mechanical Sweeper and Container Washing truck, Vehicle Category 2: Mobile Workshop, Water Tanker and Wheel Loader.
1 lot of Spare Part is estimated around 0.25F/T.

APPENDIX-6

REFERENCE

6. References

References

Name of Study: The Basic Design Study on the Project for Improvement of Solid Waste Treatment in Local Cities in the Syrian Arab Republic

No.	Name of reference	Form book, video, map, photo, etc.	Original/Copy	Name of government office to be approached or name of issuing government office	Year of publication
1	Mater Plan of Waste Management in Syria Arab Republic Phase 3	CD	Copy	Minister of Local Administration and Environment	2004
2	Mater Plan of Waste Management in Syria Arab Republic Phase 4 (Draft)	Data	Copy	Minister of Local Administration and Environment	2004
3	Law No. 50 (Unofficial Translation)	Data	Copy	Minister of Local Administration and Environment	2002
4	Law of General Cleanliness for Administration Units and Its Beauty (Unofficial Translation)	Electronic File	Copy	Minister of Local Administration and Environment	2004
5	Preliminary Study for Defining the Final Location of the Sanitary Landfill within Al-Maghlia Site	Data	Copy	Homs City Council	2001
6	TOR for Existing Landfill Site Operation City (Arabic)	Data	Copy	Homs City Council	2002
7	Road Map of Homs City	Map	Copy	Homs City Council	2004
8	Road Map of Lattakia City	Map	Copy	Lattakia City Council	2004
9	Drawing of Existing Container of Homs City (1.3 m ³)	Drawing	Copy	Homs City Council	1999
10	Drawing of Existing Container of Homs City (0.9 m ³)	Drawing	Copy	Homs City Council	1999
11	Drawing of Existing Container of Homs City (0.6 m ³)	Drawing	Copy	Homs City Council	1999
12	Drawing of Existing Container of Lattakia City (1.2 m ³)	Drawing	Copy	Lattakia City Council	1999
13	Drawing of Existing Container of Lattakia City (0.6 m ³)	Drawing	Copy	Lattakia City Council	1999
14	Public Awareness Material Lattakia City (Arabic)	Brochure	Original	Lattakia City Council	2004

