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Ministry of Local Administration
The Syrian Arab Republic

# PREPARATORY SURVEY REPORT
# ON THE PROJECT
# FOR
# IMPROVEMENT OF SOLID WASTE TREATMENT
# IN
# LOCAL CITIES (PHASE 2)
# IN THE SYRIAN ARAB REPUBLIC

JANUARY 2010


**JAPAN INTERNATIONAL COOPERATION AGENCY**

YACHIYO ENGINEERING CO., LTD.


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**The Syrian Arab Republic**

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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 preparatory survey on the Project for Improvement of Solid Waste Treatment in Local Cities (Phase 2) and entrusted the survey to the Japan International Cooperation Agency (JICA).

JICA sent to Syria a survey team from July 3 to July 30, 2009.

The team held discussions with the officials concerned of the Government of Syria, and conducted a field survey at the survey area. After the team returned to Japan, further studies were made. Then, a mission was sent to Syria in order to discuss a draft outline 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.

January, 2010

Kikuo Nakagawa
Director General
Global Environment Department
Japan International Cooperation Agency

January, 2010

# LETTER OF TRANSMITTAL

We are pleased to submit to you the preparatory survey study report on the Project for Improvement of Solid Waste Treatment in Local Cities (Phase 2) in the Syrian Arab Republic.

This survey was conducted by Yachiyo Engineering Co., Ltd., under a contract to JICA, during the period from June, 2009 to February, 2010. In conducting the survey, we have examined the feasibility and rationale of the project with due consideration to the present situation of Syria and formulated the most appropriate outline 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,

Toshio Yano

Project Manager,
Preparatory Survey Team on
The Project for Improvement of Solid Waste
Treatment in Local Cities (Phase 2)
Yachiyo Engineering Co., Ltd.

# SUMMARY

# SUMMARY

The Syrian Arab Republic (hereinafter referred to as “Syria”) is located east of the Mediterranean Sea sharing its borders with Turkey, Iraq, Jordan, Israel and Lebanon and has thrived as an important trading position between east and west worlds. Syria has a population of 19.9 million (as of 2007) and a land area of 185,000 square kilometers with its GDP per capita of approximately 1,570 dollars in 2006.

The Project Target Areas are Homs, Lattakia, Jableh, Qurdaha, Aurbeen, Al-hajjar al-asswadd, Al-tell, Mudamiate al-shamm, Al-dumire, Dariaa, Hama, Idleb, Sweida, Shahba and Salkhad

Although collection and transportation of municipal solid waste in the Project Target Areas are operated by local municipalities, waste collection rate in some of the municipalities is as low as 60% due to short of waste collection and transportation equipment. Even in the municipalities with comparatively high waste collection rate, aged deterioration of the equipment became serious and the waste collection and transportation capacity of the same will also be nearly half of the present capacity in the year 2012. On the other hand, the Project Target Areas have population increase rate as high as 2 to 3 % per annum together with large influx of Iraqi refugees, which result in serious increase of waste generation in the areas. Unless effective measures are taken, the sanitary environment in the municipalities will become more serious and the risk of spread of malodor, infectious disease through pests and smoke and fire in the disposed waste will be increased.

Medical waste collection and transportation in the Project Target Areas are also undertaken by the local municipalities. However, some of the municipalities do not own appropriate medical waste collection equipment, thus the medical waste, which carries infectious disease, in such municipalities is disposed together with municipal solid waste and the health risk to the staff of medical waste collection and transportation is high.

Under such circumstances, in 2007, Syria made a request for grant aid for provision of waste treatment equipment that could not be completed in the Project for Improvement of Solid Waste Treatment in Local Cities in the Syrian Arab Republic (hereinafter referred to as “the Project-1”) and the waste collection and transportation equipment for the governorates of Hama, Dirr El Zor, Sweida and Idleb (hereinafter referred to as “the Project-2”). Later, Syria made an additional request to the Government of Japan (hereinafter referred to as “the GOJ”) to include the municipalities in Rural Damascus governorate which have been affected by the large influx of Iraqi refugees. The GOJ entrusted Japan International Cooperation Agency (hereinafter referred to as “JICA”), the official agency implementing Japanese Government’s technical assistance and expediting proper execution of the Japan’s grant aid, the survey to examine the viability of the request to JICA. In March 2008, JICA conducted the Project Formulation Study for Environmental Conservation Program in terms of Solid Waste Treatment in Local Cities in the Syrian Arab Republic. The

study evaluated the priority of municipalities and based on the study result, Syria made a revised official request to the GOJ in April 2008. In February 2009, JICA conducted a preliminary study in order to prioritize municipalities and components of the Project-2 and narrow these components down to the focal points. As a result, JICA decided to conduct a Preparatory Survey (hereinafter referred to as "the Survey") and sent the survey team (hereinafter referred to as "the Team") to Syria from 3rd July 2009 until 30th July 2009. The Team conducted the field survey, held a series of discussion with the officers concerned in Syria and confirmed the contents of the request made by Syria. On its return to Japan, the Team analysed all of the relevant information. Following this analysis in Japan, JICA sent a team to Syria from 23rd October to 29th October, 2005 to explain and discuss the contents of the outline design with the Syrian side.

The outline design for the requested grant aid project as finalised through these surveys is summarized below.

Outline Design Policy

| | | |
|---|---|---|
| Project Target Area | : | Homs, Lattakia, Jableh, Qurdaha, Aurbeen, Al-hajjar al-asswadd, Al-tell, Mudamiate al-shamm, Al-dumire, Dariaa, Hama, Idleb, Sweida, Shahba and Salkhad |
| Types of target waste | : | municipal waste and medical waste |
| Design target year | : | 2012 |
| Design collection ratio of municipal waste | : | Idleb : 95%, Hama : 90%, Sweida : 95%, Shahba : 90%, Salkhad : 95%, Aurbeen : 90%, Al-hajjar al-asswadd, 90%, Al tell : 85%, Mudamiate al-shamm : 90%, Ad-dumire : 90% and Dariaa : 75% |
| Design collection ratio of medical waste | : | Homs : 100%, Lattakia : 100%, Idleb : 100%, and Sweida : 100% |

Outline of equipment to be procured

New Equipment

| Municipality \ Equipment | | Compactor Truck | | | | Medical Waste Truck | Total |
|---|---|---|---|---|---|---|---|
| | | 16m$^3$ | 12m$^3$ | 8m$^3$ | 4m$^3$ | | |
| Idleb Governorate | Idleb | 2 | 3 | 1 | 2 | | 8 |
| Hama Governorate | Hama | 4 | 6 | | 6 | 1(2t) | 17 |
| Sweida Governorate | Sweida | 1 | 2 | | 4 | 1(1t) | 8 |
| | Shahba | | | | 2 | | 2 |
| | Salkhad | | | | 1 | | 1 |
| Rural Damascus Governorate | Aurbeen | | 1 | | 3 | | 4 |
| | Al-hajjar al-asswadd | | | 1 | 8 | | 9 |
| | Al-tell | | 4 | | 1 | | 5 |
| | Mudamiate al-shamm | 1 | | | 1 | | 2 |
| | Al-dumire | 2 | | | 2 | | 4 |
| | Dariaa | 2 | | | 2 | | 4 |
| Total | | 12 | 16 | 2 | 32 | 2 | 64 |

Unconducted Equipment

| Municipality / Equipment | Homs | Lattakia | Jableh | Qurdaha | Total |
|---|---|---|---|---|---|
| Dump Truck($6m^3$) | – | 4 | 3 | 1 | 8 |
| Medical Waste Truck Type 1 (2ton dump truck) | 2 | – | – | – | 2 |
| Medical Waste Truck Type 2 (1ton van truck) | – | 1 | – | – | 1 |
| Wheel Loader | – | 1 | 1 | 1 | 3 |
| Wash Container | – | 2 | – | – | 2 |
| Mobile Workshop | 1 | 1 | – | – | 2 |
| Mechanical Sweeper | 5 | 3 | — | – | 8 |
| Sprinkler Truck | – | 2 | – | – | 2 |
| Total | 8 | 14 | 4 | 2 | 28 |

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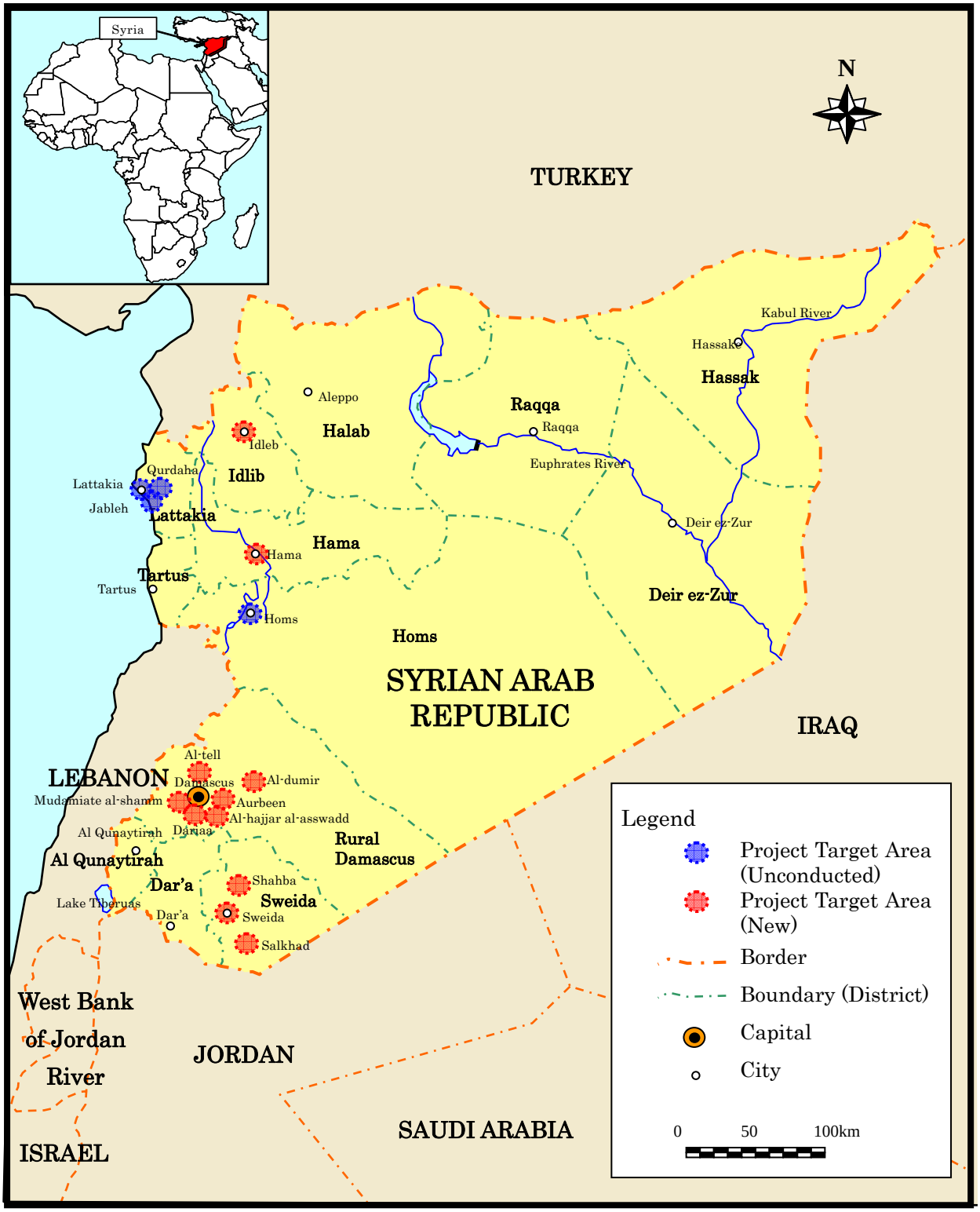


**SYRIAN ARAB REPUBLIC**

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## Abbreviations

| | |
|---|---|
| 3R | Reduce, Reuse, Recycle |
| A/P | Action Plan |
| BOO | Build-Own-Operate |
| BOT | Build-Operate-Transfer |
| E/N | Exchange of Notes |
| EU | European Union |
| EURO | Official currency of EU |
| FOPS | Falling-Object Protective Structure |
| GDP | Gross Domestic Product |
| GOJ | the Government of Japan |
| HP | Horse Power |
| JICA | Japan International Cooperation Agency |
| JPY | Japanese Yen |
| M/D | Minutes of Discussion |
| M/P | Master Plan |
| MOLA | Ministry of Local Administration |
| Mpa | Mega Pascal |
| NGO | Non Governmental Organization |
| Project-1 | the Project for Improvement of Solid Waste Treatment in Local Cities in the Syrian Arab Republic |
| Project-2 | the Project for Improvement of Solid Waste Treatment in Local Cities in the Syrian Arab Republic (Phase 2) |
| ROPS | Roll Over Protective Structure |
| SP | Syrian Pound |
| Survey | Preparatory Survey for the Project-2 |
| SWM | Solid Waste Management |
| Syria | The Syrian Arab Republic |
| Team | Team of Preparatory Survey for the Project-2 |

# CHAPTER 1

# BACKGROUND OF THE PROJECT

# Chapter 1 Background of the Project

## 1.1 Background

The Syrian Arab Republic (hereinafter referred to as "Syria") is located east of the Mediterranean Sea sharing its borders with Turkey, Iraq, Jordan, Israel and Lebanon and has thrived as an important trading position between east and west worlds.

Syria has a population of 19.9 million (as of 2007) and a land area of 185,000 square kilometers with its GDP per capita of approximately 1,570 dollars in 2006. Since Syria has a difficulty in proper Solid Waste Management (hereinafter referred to as "SWM") because of the increase of solid waste generation as the result of development of economic activity and population increase, the uncollected waste in local city areas is adversely affecting the urban environment and daily life of the public.

For the purpose of improvement of treatment and management of solid waste in Syria, the Government of Japan (hereinafter referred to as "GOJ") has extended the following assistance to Syria in the past:

(1) Grant aid project for Development of Environmental Condition in City of Damascus in 1995,
(2) Grant aid project for Improvement of Waste Disposal Equipment in Aleppo City in 1997,
(3) The Study on Solid Waste Management at Local Cities for Homs, Lattakia and three surrounding cities in 2001, and
(4) Grant aid project for Improvement of Solid Waste Treatment in Local Cities of Homs, Lattakia and three surrounding cities (hereinafter referred to as "Project-1"); Phase 1 in 2006 and Phase 2 in 2007 with Lot 2 for Phase 2 unconducted.

However, in other local cities, the demand for solid waste treatment has still been increasing and some wastes are left uncollected.

Under such circumstances, Syria made a request for grant aid for procurement of waste collection and transportation equipment for the governorates of Hama, Dirr El Zor, Sweida and Idleb. However, the request document did not include basic information on the present situation and improvement effect by procurement of equipment. Furthermore, Syria made an additional request to include Rural Damascus Governorate due to increase of waste affected by large influx of Iraqi refugees. In response to this request, the GOJ entrusted the survey to examine the viability of this request to the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency implementing Japanese Government's technical assistance and expediting proper execution of the Japan's grant aid. JICA conducted Project Formulation Study for Environmental Conservation Program in terms of Solid Waste Treatment in Local Cities in

the Syrian Arab Republic (hereinafter referred to as “Project Formulation Study”) in order to reconfirm the priority of local cities, to study the necessity and viability of assistance for SWM in local cities, to summarize middle and long term policies, to collect necessary information and to confirm the contents of the request and target areas. Based on the findings of the Project Formulation Study, in April 2008, Syria made a revised request for grant aid for the Project for Improvement of Solid Waste Treatment in Local Cities (Phase 2) (hereinafter referred to as “the Project-2”) to the GOJ. In February 2009, JICA conducted the Preliminary Study for the Project for Improvement of Solid Waste Treatment in Local Cities (Phase 2) (hereinafter referred to as “Preliminary Study”) in order to prioritize municipalities and components of the Project-2 and narrow these components down to the focal points.

Preliminary Study identified the overlapping of the assistance between EU and Japan in four municipalities in Rural Damascus Governorate. Related parties agreed that assistance to these four municipalities will be conducted by EU. This is mainly because that EU has already committed for assistance to nine municipalities in Rural Damascus Governorate including the above four municipalities to be realized by the end of 2009, and also Preliminary Study by Japan is to prioritize the assistance, is not in a position to commit the provision of equipment and also may not be supplied equipment depending on the priority. Instead of withdrawal of request for four municipalities, Syria made an alternate request to include three municipalities in Sweida Governorate. Preliminary Study confirmed the viability of inclusion of three municipalities in Sweida Governorate. Finally eleven municipalities in four governorates became subject for Preliminary Study and waste collection vehicles, medical waste collection vehicles and road sweepers have been selected for the target equipment for the Study. Preliminary Study confirmed the present budget, conditions of existing equipment, repair system and capability in operation and maintenance of the equipment.

As a result, JICA decided to conduct a Preparatory Survey (hereinafter referred to as “the Survey”) and sent the survey team (hereinafter referred to as “the Team”) to Syria.

Objectives of the Survey is to carry out the outline design appropriate for grant aid assistance, to provide Project Planning and to estimate Project cost applicable for competitive tendering under grant aid scheme.

## 1.2 Outline of the Request for Grant Aid

This Project-2 aims at reinforcement and/or improvement of capability for solid waste collection at the municipalities listed in Table 1-1 by procuring necessary vehicles and equipment for collection and transportation of solid waste.

**Table 1-1 Project Target Areas**

| | Municipalities |
|---|---|
| Unconducted | Homs, Lattakia, Jableh and Qurdaha (4 municipalities) |
| New Request | Damascus Rural Governorate: Aurbeen, Al-hajjar al-asswadd, Al-tell, Mudamiate al-shamm, Al-dumire and Dariaa (6 municipalities) |
| | Hama Governorate: Hama (1 municipality) |
| | Idleb Governorate: Idleb (1 municipality) |
| | Sweida Governorate: Sweida, Shahba and Salkhad (3 municipalities) |

Note: Unconducted means the municipalities related to the unconducted procurement of equipment in Lot 2 of the Project-1.

The main component of the Project-2 is the provision of vehicles for solid waste collection, transportation and operation and maintenance.

Table 1-2 and 1-3 shows the list of vehicles and equipment to be considered in the Survey based on the preliminary evaluation by the Preliminary Study Team.

**Table 1-2 Unconducted (1st Priority)**

| | Homs | Lattakia | Jableh | Qurdaha | Total |
|---|---|---|---|---|---|
| Dump Truck ($6m^3$) | – | 4 | 3 | 1 | 8 |
| Medical Waste Collection Vehicle（2t） | 2 | – | – | – | 2 |
| Medical Waste Collection Vehicle (1t) | – | 1 | – | – | 1 |
| Wheel Loader | – | 1 | 1 | 1 | 3 |
| Wash Container | – | 2 | – | – | 2 |
| Mobile Workshop | 1 | 1 | – | – | 2 |
| Mechanical Sweeper | 5 | 3 | — | – | 8 |
| Sprinkler Truck | – | 2 | – | – | 2 |
| Total | 8 | 14 | 4 | 2 | 28 |

**Table 1-3 New Vehicles (Evaluation by Preliminary Study Team)**

| Governorate | Municipalities | Compactor Truck | | | Medical Waste Collection Vehicle | | Total |
|---|---|---|---|---|---|---|---|
| | | $16m^2$ | $8m^2$ | $4m^2$ | 2t | 1t | |
| Rural Damascus | Aurbeen | 1 | - | 1 | - | - | 2 |
| | Al-hajjar al-asswadd | - | 4 | 5 | - | - | 9 |
| | Al-tell | 3 | 1 | 1 | - | - | 5 |
| | Mudamiate al-shamm | 2 | - | 1 | - | - | 3 |
| | Al-dumire | 2 | - | 2 | - | - | 4 |
| | Dariaa | 3 | - | 2 | - | - | 5 |
| Hama | Hama | 15 | - | 4 | 1 | - | 20 |
| Idleb | Idleb | 3 | - | 1 | - | - | 4 |
| Sweida | Sweida | 4 | - | 3 | - | 1 | 8 |
| | Shahba | 1 | - | 1 | - | - | 2 |
| | Salkhad | - | - | 1 | - | - | 1 |
| Total | | 34 | 5 | 22 | 1 | 1 | 63 |

# CHAPTER 2

# CONTENTS OF THE PROJECT

# Chapter 2 Contents of the Project

## 2-1 Basic Concept of the Project

### 2-1-1 Superior Goal and Project Goals

Syria has compiled and is now implementing the 10th 5-Year National Development Plan for 2006~2010. Within this, environmental policy is described in the Environment & Disaster Sector in Chapter 18, and SWM is recognized as an issue in need of urgent attention. In order to deal with this issue, the following goals are raised in the Strategy and Action Plan.

Goal 1 - Implementation of the Integrated Management Program in all governorates
Goal 2 - Formulation of a Local Environmental Program in all governorates

Meanwhile, Syria requested the Ministry of Local Administration and Environment (hereinafter referred to as "MOLAE") in 2004 to consign preparation of a master plan for SWM in Syria to the French consultant Trivalor Co. The Government of Syria views this as a National Master Plan (hereinafter referred to as "M/P") comprised of the following four stages:

- Stage I: Survey of the current conditions of the SWM works
- Stage II: Policy and implementation methods in the SWM works
- Stage III: Detailed implementation methods
- Stage IV: Outline specifications for tender documents

In line with the basic policy of this M/P, all the governorates including the municipalities targeted for Preparatory Survey for the Project have compiled action plans (hereinafter referred to as "A/P"). According to these, each governorate has divided their service area into integrated SWM areas, and it is planned to construct Integrated SWM centers (sanitary landfill sites, sorting facilities, compost plants and medical waste autoclave facilities) and transfer stations in each area.

The solid waste treatment equipment to be procured in the Project will contribute to the achievement of these superior goal, and the SWM is to be conducted for the appropriate treatment, disposal and recycling of municipal waste and medical waste in the Project Target Areas.

In accordance with these superior plans, the Project goals are 1) to renew and/or increase capability for collection of municipal waste in the Project Target Areas, and 2) to secure the safe separate collection of medical waste in the Project Target Areas.

### 2-1-2 Basic Concept of the Project

The Project is divided into the provision of 1) the component that could not be completed (hereinafter referred to as “the unconducted equipment”) in the Project-1, and 2) the new component (hereinafter referred to as “the new equipment”), and it entails the provision of equipment necessary to improve capacity for the collection and transportation of municipal waste and medical waste, and road sweeping.

There are 15 municipalities in total, i.e. four municipalities targeted for provision of the unconducted equipment and 11 municipalities targeted for provision of the new equipment as shown in Table 1-1.

The unconducted equipment will be procured with a view to complete Project-1. The cleaning works to be performed using the unconducted equipment entails special works such as the collection of solid waste accumulated at the roadsides, collection of medical waste, road sweeping, washing of containers and implementation of equipment repairs on the roads.

Concerning the new equipment, the necessary items will be provided to each municipality. The Project target year for the new equipment shall be the year 2012 and the target waste shall be categorized into municipal waste and medical waste.

## 2-2 Outline Design of the Requested Japanese Assistance

### 2-2-1 Design Policies

#### 1. Basic Policies

The Project aims to supply equipment necessary for achieving the following goals: 1) in the municipalities of Homs, Lattakia, Jableh and Qurdaha, to improve capability for implementing special tasks in solid waste collection using the unconducted equipment, and 2) in the municipalities of Aurbeen, Al-hajjar al-asswadd, Al-tell, Mudamiate al-shamm, Al-dumire, Dariaa, Hama, Idleb, Sweida, Shahba and Salkhad, to renew and/or increase capability for the collection and transportation of solid waste and road sweeping.

The Project target year shall be the year 2012 and the target waste shall be municipal waste and medical waste. Medical waste refers to separated waste which comes from medical treatment facilities and carries risk of imparting infections and other harmful effect to humans, while municipal waste is assumed not to include industrial waste and residual soil from construction. Industrial waste refers to industrial waste which comes from large-scale factories and requires intermediate treatment and/or transportation under the responsibility of the waste generator, while residual soil from construction refers to the residual soil and debris generated in construction and building demolition works.

## 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 unloading 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 Target Areas.

## 3. Policies Regarding Natural Conditions

The natural conditions in the Project Target 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

In the Project Target Areas, residents generally dispose their solid waste at designated places. However, in some places, even though disposal times are specified, residents habitually ignore them and dispose waste whenever they want. There also seems that the residents have a feeling that the responsible authorities should accept this as a matter of course. It is easy to propose Japanese customs such as set-time collections, separated waste collections and cleaning of waste collection places by residents, however, it would take many years of public education in order to execute these measures. Furthermore, if such measures were introduced too quickly, there is fear that this would lead to the increased disposal of inappropriate and uncollectable waste. Accordingly, rather than presupposing Japanese methods for efficient discharge and collection, the equipment that is suited to the existing style of discharge in the Project Target Areas shall be planned.

In order to improve collection efficiency based on public cooperation, it is necessary for the implementing agency to already possess ample experience of set-time collections, a collection rate of almost 100%, waste separation and recycling activities, etc. and for public education to be conducted based on such experience, and this would entail separate technical cooperation other than the grant aid of this Project.

## 5. Policies Regarding Equipment Procurement

Since the equipment planned for supply under the grant aid is unable to be produced in Syria, it will need to be procured in Japan and/or third countries.

Although the procured equipment will be limited to solid waste collection and transportation vehicles that do not require any installation works, it will be necessary to deliver products from multiple manufactures en masse. Accordingly, the Project will be compiled as an equipment supply (no installation) undertaking with the procurement work consigned to a Japanese trading firm, etc.

## 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 O & M stage.

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

## 7. 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 vehicles 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.

## 8. Policies Regarding O & M Capability of Implementing Agencies

As far as the operation of the waste 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 as a result of the progress of withdrawing old deteriorated 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 private workshops. 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 O & M 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.

### 9. 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.

### 10. Policies Regarding Implementation Schedule

The equipment procurement in the Project will require approximately 15 months from the Exchange of Notes (hereinafter referred to as ”E/N”) to the delivery of equipment.

## 2-2-2 Basic Plan

### 1. Overall Plan

Targeting the municipalities of Idleb, Hama, Sweida, Shahba and Salkhad, Aurbeen, Al-hajjar al-asswadd, Al-tell, Mudamiate al-shamm, Al-dumire, Dariaa, and the municipalities where equipment supply could not be completed in Project-1, i.e. Homs, Lattakia, Jableh and Qurdaha, the Project entails the procurement of the following equipment contents with the objectives of renewing and/or incresing capability for the collection and transportation of municipal waste and medical waste, and road sweeping. All the equipment comprises vehicles and construction machinery that do not require installation work.

1. Municipal waste collection and transportation equipment (new equipment)
2. Medical waste collection and transportation equipment (new equipment and unconducted equipment)
3. Road sweeping equipment (unconducted equipment)
4. Container washing equipment (unconducted equipment)

## 2. Design Conditions

### (1) New Equipment

#### 1) Design Target Population

The population of Project Target Areas is estimated as follows for the year 2012. This population will be used as Design Population.

**Table 2-1 Population in 2012 (Unit: Thousand)**

| | Idleb | Hama | Sweida Governorate | | |
|---|---|---|---|---|---|
| | | | Sweida | Shahba | Salkhad |
| Population in 2012 | 367 | 805 | 147 | 29 | 19 |

| | Rural Damascus Governorate | | | | | |
|---|---|---|---|---|---|---|
| | Aurbeen | Al-hajjar al-asswadd | Al-tell | Mudamiate al-shamm | Al-dumire | Dariaa |
| Population in 2012 | 84 | 188 | 130 | 80 | 53 | 163 |

Note: MOLA and the Team

#### 2) Design Municipal Waste Target Collection Rate

The amount of municipal waste that can be collected by each municipality out of the generated amount can be estimated based on the operating condition of equipment owned by each municipality. The current collection rates were estimated based on the estimated collection rate in each municipality and the condition of uncollected waste in municipalities. Table 2-2 shows the results of estimating the generated amount of waste based on these factors.

**Table 2-2 Current Estimated Solid Waste Collection Rate and Estimated Generated Amount**

| Municipality | Collection Amount (ton/day) | Collection Rate (%) | Generation Amount (ton/day) |
|---|---|---|---|
| Idleb | 187 | 95 % | 197 |
| Hama | 378 | 85 % | 446 |
| Sweida | 106 | 95 % | 111 |
| Shahba | 15 | 80 % | 19 |
| Salkhad | 11 | 95 % | 12 |
| Aurbeen | 58 | 85 % | 68 |
| Al-hajjar al-asswadd | 77 | 85 % | 90 |
| Al-tell | 51 | 75 % | 68 |
| Mudamiate al-shamm | 31 | 80 % | 38 |
| Al-dumire | 25 | 80 % | 32 |
| Dariaa | 60 | 60 % | 100 |

If it is intended to greatly improve the current collection rate, since this will require re-establishement of the O & M setup and major increase in the O & M costs, the target has been separately set at maintaining the status quo in municipalities where the current collection rate is 95%, realizing an increase of 5%~10% in municipalities where it is currently 70%~80%, and increasing the collection rate to 75% in municipalities where it is currently 60%. The target collection rates are indicated in Table 2-3.

**Table 2-3 Design Municipal Waste Target Collection Rate**

| Municipality | Collection Rate in 2009 (%) | Effective Collection Capacity of Existing Equipment | | Targeted Collection Rate in 2012(%) |
|---|---|---|---|---|
| | | 2009 (%) | 2012 (%) | |
| Idleb | 95 | 49 | 30 | 95 |
| Hama | 85 | 48 | 36 | 90 |
| Sweida | 95 | 22 | 21 | 95 |
| Shahba | 80 | 65 | 40 | 90 |
| Salkhad | 95 | 87 | 66 | 95 |
| Aurbeen | 85 | 72 | 53 | 90 |
| Al-hajjar al-asswadd | 85 | 31 | 28 | 90 |
| Al-tell | 75 | 11 | 0 | 85 |
| Mudamiate al-shamm | 80 | 41 | 36 | 90 |
| Al-dumire | 80 | 0 | 0 | 90 |
| Dariaa | 60 | 35 | 31 | 75 |

※Effective capacity is obtained by dividing the collection capacity taking decline caused by deterioration into account by the generated amount of waste.

※As may be gathered from the above table, the current solid waste collection rate far exceeds the current effective capacity of existing equipment, indicating an extremely risky current operating situation in which deteriorated equipment is overworked.

### 3) Design Municipal Waste Collection Amount

Based on the population of each municipality shown in Table 2-1 and the generated amount of solid waste shown in Table 2-2, the base unit of solid waste generation as of 2009 can be obtained. In this study, since the base rate of solid waste generation generally displays a slight increase in line with growth in consumption, the base rate in the year 2012 is estimated as shown in Table 2-4 assuming a rate of increase in all municipalities of 1% per year.

**Table 2-4 Design Base Rate of Municipal Waste Generation**

| Municipality | Unit Generation Rate (kg/capita/day) |
|---|---|
| Idleb | 0.60 |
| Hama | 0.62 |
| Sweida | 0.82 |
| Shahba | 0.68 |
| Salkhad | 0.64 |
| Aurbeen | 0.93 |
| Al-hajjar al-asswadd | 0.55 |
| Al-tell | 0.56 |
| Mudamiate al-shamm | 0.56 |
| Al-dumire | 0.68 |
| Dariaa | 0.64 |

Upon calculating the design generated amount of municipal waste in 2012 based on the above design target population and base rate of municipal waste generation and taking the target collection rate for municipal waste into account, the target amount of municipal waste collection that needs to be achieved by each municipality in the target year is set in the manner shown in Table 2-5.

**Table 2-5 Design Target Municipal Waste Collection Amount**

| Item | Idleb | Hama | Sweida Governorate | | |
|---|---|---|---|---|---|
| | | | Sweida | Shahba | Salkhad |
| Design Population（x 1000） | 367 | 805 | 147 | 29 | 19 |
| Design Municipal Waste Generation Rate(kg/capita/day) | 0.60 | 0.62 | 0.82 | 0.68 | 0.64 |
| Design Municipal Waste Generation Amount(ton/day) | 219 | 483 | 121 | 19 | 12 |
| Design Municiapl Waste Collection Rate(%) | 95% | 90% | 95% | 90% | 95% |
| Design Municipal Collection Amount(ton/day) | 208 | 435 | 115 | 17 | 11 |

| Item | Aurbeen | Al-hajjar al-asswadd | Al-tell | Mudamiate al-shamm | Al-dumire | Dariaa |
|---|---|---|---|---|---|---|
| Design Population（x 1000） | 84 | 188 | 130 | 80 | 53 | 163 |
| Design Municipal Waste Generation Rate(kg/capita/day) | 0.93 | 0.55 | 0.56 | 0.56 | 0.68 | 0.64 |
| **Item** | Aurbeen | Al-hajjar al-asswadd | Al-tell | Mudamiate al-shamm | Al-dumire | Dariaa |
| Design Municipal Waste Generation Amount(ton/day) | 76 | 100 | 72 | 43 | 35 | 101 |
| Design Municiapl Waste Collection Rate(%) | 90% | 90% | 85% | 90% | 90% | 75% |
| Design Municipal Collection Amount(ton/day) | 68 | 90 | 61 | 39 | 31 | 76 |

The amount of waste targeted for collection by the Project equipment shall be the amount obtained upon subtracting the estimated collection and transportation amount of existing equipment and the collection

amount enabled by the Syrian self-help from the design target municipal waste collection amount.

### 4) Design Medical Waste Collection Amount

The amount of medical waste generated in the municipalities that are requesting medical waste collection equipment, i.e. Hama and Sweida, is estimated to be approximately 1.5 t/day and 0.3 t/day, respectively. Since medical waste carries risk of infection, 100% exclusive collection is needed. Accordingly, assuming the design target collection rate for medical waste is 100%, the design waste collection amount is set as shown in Table 2-6.

**Table 2-6 Design Medical Waste Collection Amount**

| Municiaplity | Design Collection Amount (ton/day) |
|---|---|
| Hama | 2 |
| Sweida | 1 |

### 5) Design Municipal Waste Transportation Destinations

According to existing A/Ps in Syria, the solid waste collected in the target year in each municipality is scheduled to be transported to new integrated SWM centers for disposal. Accordingly, the design municipal waste collected by the Project equipment will be transported to the destinations indicated in Table 2-7 while taking intermediate treatment facilities and transfer stations constructed at the same time as new landfill sites into account.

**Table 2-7 Design Transportation Destinations of Municipal Waste**

| Municipality | Current Destination | Design Municipal Waste Destination | |
|---|---|---|---|
| | | Destination | Difference from Present |
| Idleb | Musbin landfill site | Musbin Landfill site | No change in destination |
| Hama | Kassoon Al-Jabal Landfill site | Kassoon Al-Jabal landfill site | No change in destination |
| Sweida | Landfill site in the municipality | Ariqa landfill site | Distance up by approximately 13 km |
| Shahba | Landfill site in the municipality | Ariqa landfill site | Distance up by approximately 7 km |
| Salkhad | Landfill site in the municipality | Salkhad transfer station | No change in distance |
| Aurbeen | Transfer station in the municipality (transportation to Al-Ghazlania landfill site) | Sakha transfer station | Distance up by approximately 14 km |
| Al-hajjar al-asswadd | Subene transfer station in the municipality (transportation to Al-Ghazlania landfill site) | Subene transfer station | No change in distance |
| Al-tell | Landfill site in the municipality | Maruna transfer station | No change in distance |
| Mudamiate al-shamm | Transfer station in the municipality (transportation to Rakhla Landfill site) | Artuz transfer station | Distance up by approximately 8 km |
| Al-dumire | Landfill site in the municipality | Ramadan landfill site | Distance up by approximately 20 km |
| Dariaa | Subene transfer station (transportation to Al-Ghazlania landfill site) | Dariaa transfer station | Distance down by approximately 4 km |

### 6) Design Medical Waste Transportation Destinations

Medical waste from Hama and Sweida in the Project target year will be transported to integrated SWM center in each municipality. Accordingly, the design medical waste transportation destinations will be set as indicated in Table 2-8.

**Table 2-8 Design Medical Waste Transportation Destinations**

| Municipality | Current Destination | Design Medical Waste Destination | |
|---|---|---|---|
| | | Destination | Difference with Present |
| Hama | Kassoon Al-Jabal landfill site | Kassoon Al-Jabal landfill site | No change in distance |
| Sweida | Landfill site in the municipality | Ariqa landfill site (with newly installed autoclave) | Distance up by approximately 13 km |

## (2) Unconducted Equipment

### 1) Design Target Population

Table 2-9 shows the estimated population in 2010 based on the latest survey findings of the Ministry of Local Administration (hereinafter referred to as "MOLA") and each municipality.

**Table 2-9 Design Target Population (Unit: 1000)**

| Year | Homs | Lattakia | Jableh | Qurdaha |
|---|---|---|---|---|
| 2009 | 900 | 619 | 117 | 63 |
| 2010 | 921 | 630 | 124 | 64 |

Source: MOLA and Municipalities

### 2) Target Amount of Municipal Waste Collection by the Unconducted Equipment

The equipment for supplementing waste collection that was targeted by the unconducted equipment comprises dump trucks and wheel loaders. This equipment is planned with the objective of improving collection efficiency of solid waste accumulated at the roadside, i.e. market waste, bulky waste, park and roadside tree cuttings, etc., that cannot be collected by the combination of compactor trucks and containers. The municipalities targeted for this equipment supply are Lattakia, Jableh and Qurdaha.

The target collection rate and collection amount in each municipality was achieved thanks to the equipment supplied in Project-1. The remaining issue concerns how to handle the solid waste accumulated at the roadside that was supposed to be handled by the unconducted equipment. Table 2-10 shows the intended collection burden of this equipment, however, this collection work remains unconducted because the equipment has not yet been supplied. Therefore, this collection burden will be reconfigured as the design target amount of municipal waste collection by the unconducted equipment.

**Table 2-10 Design Target Amount of Municipal Waste Collection by the Unconducted Equipment (Equipment Supply Target Capability)**

| Municipality | Lattakia | Jableh | Qurdaha |
|---|---|---|---|
| Design target amount of municipal waste collection | 13t/day | 14t/day | 6t/day |

Source: Project-1 Basic Design Study Report

### 3) Design Municipal Waste Transportation Destinations

The solid waste collected by the unconducted equipment in 2010 in Homs, Lattakia, Jableh and Qurdaha is scheduled to be transported to new integrated SWM centers for disposal. Accordingly, the design municipal waste collected by the Project equipment will be transported to new landfill sites or new intermediate treatment facilities and/or transfer stations constructed at the same time. Table 2-11 shows the transportation destinations of the design municipal waste in each municipality. In Homs, the location of the new landfill site has been changed since the Project-1 plan was compiled in 2004, however, the transportation destinations for collection and transportation equipment remain the same.

Moreover, as of 2009, the new landfill sites have not yet been completed and there is a possibility that they will be delayed. In that case, waste will be transported to existing landfill sites for disposal. All the existing landfill sites have the capacity to dispose of waste up to the Project target year.

**Table 2-11 Design Municipal Waste Transportation Destinations**

| Municipality | Current Destination (Disposal Destination) | Design Municipal Waste Destination | | |
|---|---|---|---|---|
| | | Disposal Destination | Transportation Destination | Difference with Present |
| Homs | Deir Baalbeh landfill site | Al Floklos landfill site | Transfer station next to the existing landfill site | No change in destination |
| Lattakia | Al Bassa landfill site | Al Qasia landfill site | Al Qasia landfill site | No change in distance |
| Jableh | Al Bassa landfill site | Al Qasia landfill site | Transfer station in the municipality | No change in distance |
| Qurdaha | Al Bassa landfill site | Al Qasia landfill site | Transfer station in the municipality | Distance down (possible trip frequency up) |

### 4) Design Medical Waste Transportation Destinations

The unconducted equipment includes equipment that is intended for use in the collection and transportation of medical waste from Homs and Lattakia. The number of medical institutions targeted for collection is higher than that was originally surveyed in 2004, however, the number of beds has hardly increased at all so the target amount for collection by the unconducted medical waste collection equipment is considered roughly the same. Table 2-12 shows the design target amount of medical waste collection.

The item entitled “Design Private Treatment Amount” refers to the amount of medical waste that does not require municipal collection because of treatment in private incinerators belonging to the medical

institutions.

**Table 2-12 Design Target Amount of Medical Waste Collection**

| Target Municipality | Design Target Collection Amount (t/day) | Design Private Treatment Amount (t/day) | Design Collection and Transportation Amount (t/day) | Target Capacity of Equipment Supply (t/day) |
|---|---|---|---|---|
| Homs | 2 | 0 | 2 | 2 |
| Lattakia | 1.15 | 0.55 | 0.6 | 0.6 |

### 5) Design Medical Waste Transportation Destinations

Medical waste from Homs in the Project target year will be transported to a new medical waste disposal facility that will be constructed next to the existing landfill site. Meanwhile, medical waste from Lattakia will be transported to the existing incineration facilities at the national hospital and Al-Assad University. Accordingly, the design medical waste transportation destinations will be set as shown in Table 2-13. These destinations are the same as were set at the time of the Project-1 planning.

**Table 2-13 Design Medical Waste Transportation Destinations**

| Municipality | Current Destination (treatment facility) | Design Medical Waste Destination | |
|---|---|---|---|
| | | Destination (treatment facility) | Difference with Present |
| Homs | Deir Baalbeh landfill site | Treatment facility next to Deir Baalbeh landfill site | No change in destination |
| Lattakia | National hospital and Al Asad University | National hospital and Al Asad University | No change in destination |

### 6) Design Targeted Roads for Mechanical Sweeping

The roads targeted for mechanical sweeping are expressways and urban truck roads on which it is too dangerous to perform manual sweeping, and road sweeping equipment is planned for supply to Homs and Lattakia. Table 2-14 shows the lengths of the target roads, and these figures are set as the design road length targeted for mechanical sweeping. The target length of roads in Homs is unchanged from the time of Project-1 planning, however, the length in Lattakia has incresed due to expansion of the municipal administration area.

**Table 2-14 Design Length of Roads Targeted for Mechanical Road Sweeping**

| Municipality | Road Type | Road Length (km) | Sweeping Length (km) | Remarks |
|---|---|---|---|---|
| Homs | Expressway | 13 | 104 | Number of medians: 3 |
| | Truck road | 64 | 256 | Number of medians: 1 |
| Lattakia | Expressway | 88 | 352 | Number of medians: 1 |
| | Truck road | 94 | 376 | Number of medians: 1 |

### 7) Design Containers Targeted for Washing

Apart from Lattakia, none of the municipalities possess container washing equipment, and manual washing is carried out in individual cases where odor becomes too awful or complaints too vociferous. Being a city of tourism that attracts numerous tourists from home and abroad, Lattakia conducts regular washing of containers using the same deteriorated container washing vehicle it had at the time of the Project-1. This activity is part of its tourism promotion policy.

Accordingly, the containers targeted for mechanical washing in the Project shall be only those in the tourism city of Lattakia, specifically the approximately 600 containers located in the sightseeing area of the city. This quantity of containers is unchanged from the time of the Project-1 planning.

### 8) Design Waste Composition

Since there are no major differences in the generation and treatment of solid waste linked to the unconducted equipment from the time of the Project-1 planning, the average bulk specific gravity of generated waste and the bulk specific gravity of waste during collection and transportation can be estimated as shown in Table 2-15. In the Project, the figures shown in this table can be used as the design waste bulk specific unit weight at the time of collection and transportation.

**Table 2-15 Design Solid Waste Bulk Specific Unit Weight**

| Condition | Bulk Specific Unit Weight ($t/m^3$) | Remarks |
|---|---|---|
| At generation source | 0.2 | Non-compressed state |
| Transportation time (dump truck, etc.) | 0.35 | When compressed under own weight |
| Transportation time (compactor truck, etc.) | 0.5 | Mechanically compressed state |

## 3. Equipment Procurement Plan

### (1) New Equipment

### 1) Municipal Waste Collection and Transportation Equipment Plan

The existing equipment used in the collection and transportation of municipal waste generally comprises a lot of deteriorated equipment more than 20 years old, although there is also equipment less than 10 years old that is in relatively good condition. Accordingly, it is necessary to make use of existing equipment taking degree of deterioration into account. Moreover, since regional municipalities in Syria purchase solid waste collection and transportation equipment once in every 10 years or so, it is also necessary to take equipment procurement based on such self-help by the target municipalities into account. Therefore, in the Project, it is planned to procure equipment upon deducting the amount of waste handled by existing equipment and

equipment procured via self-help.

(1) Design existing equipment collection capacity

The existing equipment includes a lot of deteriorated vehicles with low operating rates, however, it will be necessary to utilize these as much as possible in order to augment collection and transportation capacity. In the Project, the capacity of existing equipment will be assessed and utilized on a planned basis as described below.

1) Current effective collection capacity of deteriorated equipment

The operating life of vehicles is usually around 10 years, however, in Syria, due to the difficulty in purchasing new vehicles, some vehicles have been in service for more than 20 years. Each municipality implements waste collection using deteriorated vehicles and taking steps such as using alternative vehicles at times of breakdowns and so on.

Deteriorated vehicles that have been in use for 15~20 years need time for repairs and are only able to make around one trip in every eight hours on average. Since even large compactor trucks are thought to be capable of making around 2 trips in every 8 hours on average, the effective operating rate of equipment is around 50%. In contrast, vehicles that were procured less than 10 years ago conduct 2 trips in every eight hours on average and are thought to have an appropriately effective operating rate of 100%.

Decline in the effective operating rate of deteriorated equipment is due to the following 2 reasons:

- Increasing breakdown frequency leads to more time being spent on maintenance and repairs.
- Reduced load operation is carried out in order to reduce the number of breakdowns.

Therefore, since it may be said that collection and transportation work dependent on deteriorated equipment hinders efficient collection and transportation, it is necessary to carry out renewal at appropriate intervals. Table 2-16 summarizes the definitions of capacity indicators for solid waste collection and transportation equipment.

**Table 2-16 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%.<br>Loading rate (%) = Actual amount per trip per vehicle / Nominal capacity per trip per vehicle x 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%.<br>Operation rate (%) = Actual quantity (or working day) / Assumed quantity (or working day) having no day-off, stand-by-day and repair day x 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.<br>Effective rate (%) = Actual quantity (or working day) / Assumed quantity (or working day) under appropriate loading rate and operation rate x 100 |

2) Method for assessing the effective operating rate of existing equipment

Although there is possibility of hindering efficient work, through carrying out appropriate assessment of effective capacity taking low operating rates into account, it is possible to conduct planned collection and transportation operations. In the Project, assessing the capacity of existing equipment in the manner shown below, it is planned to utilize existing equipment in the Project target year. The results are shown in Table 2-17.

- Equipment that is less than 10 years old has low breakdown frequency and can be expected to fully exhibit its capacity. The appropriate number of trips is already secured. Therefore, it is planned that equipment of less than 10 years old can operate at 100% of its effective rate in the Project target year.
- Once equipment goes beyond 10 years from procurement, the operating rate starts to decline. Accordingly, the effective operating rate of equipment aged between 11~15 years is planned to be 75% on average.
- As for equipment that is currently more than 15 years old, the effective operating rate drops to around 50% due to repeated repairs. Accordingly, the effective operating rate of equipment aged 16 years or more is planned to be 50%.
- When equipment becomes 20 years or older, breakdowns become more frequent and maintenance and repair costs become more expensive. Moreover, since it becomes increasingly difficult to find spare parts, repairs tend to become symptomatic and temporary. Since there is a high risk involved in operating vehicles in such an inadequate state, vehicles are withdrawn from service.

**Table 2-17 Design Effective Operating Rate of Existing Equipment**

| Equipment age in the design target year | Design effective operating rate |
|---|---|
| 10 years or less | 100% (same as at present) |
| 11~15 years | 75% |
| 16~20 years | 50% |
| 21 years or older | Scrapping |

3) Collection Capacity of existing equipment

Table 2-18 shows the design capacity of existing collection and transportation equipment in the Project target year calculated from the abovementioned design effective operating rate and assumed possible number of trips. The current effective capacity is 481 t/day, however, due to advancing deterioration, this will decrease to 395 t/day by 2012. Accordingly, the effective collection capacity of existing equipment in 2012 will only cover 35% of the target collection amount of 1,151 t/day, resulting in a capacity shortfall of 749 t/day.

**Table 2-18 Effective Capacity of Existing Equipment (Unit: t/day)**

| Municipality | Year 2009 | Year 2012 |
|---|---|---|
| Idleb | 96 | 67 |
| Hama | 214 | 172 |
| Sweida | 25 | 25 |
| Shahba | 12 | 8 |
| Salkhad | 10 | 8 |
| Aurbeen | 49 | 40 |
| Al-hajjar al-asswadd | 28 | 28 |
| Al-tell | 7 | 0 |
| Mudamiate al-shamm | 16 | 16 |
| Al-dumire | 0 | 0 |
| Dariaa | 35 | 31 |
| Total | 481 | 395 |

(2) Equipment procurement based on self-help

In Syria, MOLA acts as a consolidator and it frequently procures the solid waste collection and transportation equipment for municipalities in greatest need through block purchases. Block purchases are generally made around once in every 10 years, and municipalities procure their required equipment on such occasions.

Since these new equipment procurement efforts shall be continued following even after execution of the grant aid, out of the capacity that needs to be strengthened in the Project, some will be realized on a self-help basis. As an exception, in Idleb, concerning the dump trucks used for transporting bulky waste and tree waste, one truck will continue to be used in spite of some deterioration and the remainder will be procured through self-help.

(3) Necessary waste collection amount by new equipment

As is indicated in Table 2-19, the target collection amount in 2012 is 1,151 t/day in all the target municipalities. The shortfall in capacity of existing collection vehicles secured through renewal and maintenance is 749 t/day and this will need to be covered by newly procured vehicles.

**Table 2-19 Solid Waste Target Collection Amount and Collection Amount by New Equipment**

| Municipality | Generated Amount | Target Collection Rate | Target Collection Amount | Collection Amount by Existing Equipment | Collection Amount by Self-help | Collection Amount by New Equipment |
|---|---|---|---|---|---|---|
| Idleb | 219 | 95 % | 208 | 67 | 1 | 140 |
| Hama | 483 | 90 % | 435 | 172 | 0 | 263 |
| Sweida | 121 | 95 % | 115 | 25 | 3 | 87 |
| Shahba | 19 | 90 % | 17 | 8 | 0 | 9 |
| Salkhad | 12 | 95 % | 11 | 8 | 0 | 3 |
| Aurbeen | 76 | 90 % | 68 | 40 | 0 | 28 |
| Al-hajjar al-asswadd | 100 | 90 % | 90 | 28 | 3 | 59 |
| Al-tell | 72 | 85 % | 61 | 0 | 0 | 61 |
| Mudamiate al-shamm | 43 | 90 % | 39 | 16 | 0 | 23 |
| Al-dumire | 35 | 90 % | 31 | 0 | 0 | 31 |
| Dariaa | 101 | 75 % | 76 | 31 | 0 | 45 |
| Total | 1281 | 90 % | 1,151 | 395 | 7 | 749 |

(4) Collection Capacity of New Equipment

1) Selection of equipment types

The targeted municipalities own large compactor trucks with capacity of around 12~16 $m^3$. Accordingly, in those areas where roads are relatively wide, collection and transportation will be carried out using similar large compactor vehicles. In areas where road widths are relatively restricted, medium-size compactor trucks will be used. As for collection on narrow roads where work is currently performed by tractors, small-size compactor trucks will be planned.

(a) In each municipality, collection work in areas of narrow roads is performed using tractors. Since tractor trailers are open and unhygienic and they are slow and inefficient, small-size compactor trucks which can pass along narrow roads and enter restricted areas will be introduced. Concerning the vehicle type, 4 $m^3$ compactor trucks, which are small but have high loading efficiency, shall be adopted.

(b) In cities that have relatively many narrow roads, mobile 8 $m^3$ medium-size vehicles will be introduced for collection of 1.5 $m^3$ containers.

(c) In municipalities that have wide roads, 12 $m^3$ compactor trucks will be introduced. As for cities where the generated amount of waste is especially large, 16 $m^3$ compactor trucks will be introduced.

(d) Among the targeted municipalities, collection of solid waste accumulated at the roadside using wheel loaders is only carried out in Idleb and Dariaa. In these municipalities, since solid waste can be managed using the existing equipment, there will be no procurement of dump trucks in the Project. In cases where it is necessary to procure dump trucks, they will be procured under the self-help of the Syrian side.

Table 2-20 summarizes the target collection areas and target work of the municipal collection and transportation equipment planned in the Project as well as the types of equipment.

**Table 2-20 Municipal Waste Collection and Transportation Equipment Planned in the Project**

| Target Collection Areas | Target Work | Equipment Type |
|---|---|---|
| Areas that have wide roads and a lot of generated waste | Collection work starting from collection of 1.5$m^3$ containers | 16$m^3$ compactor trucks |
| Areas that have wide roads | Collection work starting from collection of 1.5$m^3$ containers | 12$m^3$ compactor trucks |
| Areas that mainly have medium-width roads | Collection work starting from collection of 1.5$m^3$ containers | 8$m^3$ compactor trucks |
| Areas that have narrow roads | Collection work in narrow road areas<br>Collection work currently performed by tractors | 4$m^3$ compactor trucks |

2) Collection and transportation capacity of selected equipment types

Considering the following points, the design average load capacity of selected equipment types is set in the manner shown in table 2-20.

- Bulk specific gravity of waste after loading: Compactor truck 0.5t/$m^3$ dump truck 0.35t/$m^3$
- Design loading rate: 90% with 10% allowance
- Design operating rate: 86% assuming 1 rest day per week

Table 2-21 shows the collection and transportation capacity of each equipment type.

**Table 2-21 Collection and Transportation Capacity per Trip of Selected Municipal Waste Collection and Transportation Equipment**

| Equipment Type | Compactor Trucks | | | |
|---|---|---|---|---|
| Body capacity ($m^3$) | 16 | 12 | 8 | 4 |
| Unit loaded weight after loading (t/$m^3$) | 0.5 | 0.5 | 0.5 | 0.5 |
| Loaded weight (t) | 8 | 6 | 4 | 2 |
| Design loading rate (%) | 90% | 90% | 90% | 90% |
| Design loaded amount (t/trip) | 7.2 | 5.4 | 3.6 | 1.8 |
| Design operating rate (%) | 86% | 86% | 86% | 86% |
| Design average collection and transportation amount (t/trip) | 6.2 | 4.6 | 3.1 | 1.5 |
| Daily work capacity in case of 1 shift | | | | |
| Number of trips | 2 | 2 | 3 | 3 |
| Work capacity | 12.4 | 9.3 | 9.3 | 4.6 |
| Daily work capacity in case of 2 shifts | | | | |
| Number of trips | 4 | 4 | 6 | 6 |
| Work capacity | 24.8 | 18.6 | 18.6 | 9.2 |

In Idleb, Hama and Sweida where the governorate seats are located, since two shifts per day are conducted at present, two-shift work will be planned in the Project in order to ensure efficient use of the equipment. In the case of two-shift work, since it is necessary for drivers and crews to switch per shift, the drivers and crews have a weak sense of belonging and responsibility towards vehicles.

As a result, since minor equipment troubles tend to be overlooked and operations tend to become ragged, it will be necessary to implement maintenance bearing these points in mind.

3) Quantities of equipment

Table 2-22 shows the required quantity of vehicles in each municipality, and it can be seen that 62 waste collection vehicles are needed.

**Table 2-22 Necessary Quantities of New Equipment**

| Munidipality | | Compacotr Truck | | | | Total |
|---|---|---|---|---|---|---|
| | | $16m^3$ | $12m^3$ | $8m^3$ | $4m^3$ | |
| Idleb Governorate | Idleb | 2 | 3 | 1 | 2 | 8 |
| Hama Governorate | Hama | 4 | 6 | | 6 | 16 |
| Sweida Governorate | Sweida | 1 | 2 | | 4 | 7 |
| | Shahba | | | | 2 | 2 |
| | Salkhad | | | | 1 | 1 |
| Rural Damascus Governorate | Aurbeen | | 1 | | 3 | 4 |
| | Al-hajjar al-asswadd | | | 1 | 8 | 9 |
| | Al-tell | | 4 | | 1 | 5 |
| | Mudamiate al-shamm | 1 | | | 1 | 2 |
| | Al-dumire | 2 | | | 2 | 4 |
| | Dariaa | 2 | | | 2 | 4 |
| Total | | 12 | 16 | 2 | 32 | 62 |

### 2) Medical Waste Collection and Transportation Equipment Plan

The amount of medical waste generated in Hama and Sweida is estimated to be approximately 1.5 t/day and 0.3 t/day respectively. Since medical waste carries risk of infection, it is necessary to conduct 100% exclusive collections. Accordingly, the design target collection rate for medical waste shall be 100%.

When collecting highly infectious medical waste, it is necessary to have closed-body equipment that is made from anti-corrosive materials and prevents waste from flying off. Since compaction can cause infectious substances to leak, compactor trucks are unsuitable. Moreover, since piling can lead to collapse or compaction of the load, it is necessary to use trucks that give priority to ease of loading and cubic capacity rather than weight.

As is shown in Table 2-23, the necessary loading platform area is calculated as approximately 5 $m^2$ in Hama and 1.5 $m^2$ in Sweida, while in terms of loaded weight and necessary capacity, a 2-ton closed body truck is planned for Hama while a 1-ton closed body truck is planned for Sweida.

Since the transportation amounts in Hama are relatively large and the truck will need to discharge waste at the landfill site, the collection vehicle here will be the dump type. On the other hand, in Sweida, since transportation amounts are small, the collection vehicle will be the flat loading van type.

**Table 2-23 Necessary Loading Platform Area of Medical Waste Collection Vehicles**

| Item | Hama | Sweida |
|---|---|---|
| Design medical waste collection and transportation amount (t/day) | 1.5 | 0.3 |
| Provided equipment quantity (units) | 1 | 1 |
| Design collection amount per collection vehicle (t/trip) | 1.5 | 0.3 |
| Unit volume weight (t/$m^3$) | 0.35 | 0.35 |
| Capacity after loading ($m^3$) | 4.3 | 0.9 |
| Necessary loading platform area ($m^2$: H=60-100cm flat loading) | 7.2-4.3 | 1.5-0.9 |

As a result, the necessary medical waste collection and transportation equipment in the Project is as indicated in Table 2-24. Moreover, since the necessary quantity of vehicles is small, operating rate correction taking into account holidays is not carried out. Therefore, it is necessary for the Syrian side to appropriately provide holidays for vehicle maintenance, etc. and to collect waste at an uniform rate.

**Table 2-24 Necessary Quantity of Medical Waste Collection Vehicles**

| Type | Hama | Sweida |
|---|---|---|
| Closed dump truck (2t) | 1 | - |
| Closed truck (1t) | - | 1 |

### (2) Unconducted Equipment

#### 1) Collection and Transportation Equipment Plan for Solid Waste Accumulated at the Roadside

(1) Dump trucks

There are no changes to the local traffic situation and equipment utilization plans. The ideal combination of equipment is the wheel loader and 6 $m^3$ small garbage dump truck that was proposed in Project-1. The design average loading amount of dump trucks is calculated in the manner shown in Table 2-25.

- Bulk specific gravity of waste after loading: Dump truck 0.35t/$m^3$
- Design loading rate: 90% with 10% allowance
- Design operating rate: 86% assuming 1 rest day per week

**Table 2-25 Capacity of Collection and Transportation Equipment for Solid Waste Accumulated at the Roadside**

| Equipment Type | Dump truck |
|---|---|
| Body capacity ($m^3$) | 6 |
| Unit loaded weight after loading (t/$m^3$) | 0.35 |
| Loaded weight (t) | 2.1 |
| Design loading rate (%) | 90% |
| Design loaded amount (t/trip) | 1.9 |
| Design operating rate (%) | 86% |
| Design average collection and transportation amount (t/trip) | 1.6 |

The number of trips is planned as two per day in Lattakia, where waiting times are long for loading market waste, three per day in Jableh where the work will entail transfer of already collected waste, and four per day in Qurdaha where the municipal area is small and waste is transported to a transfer station in the city.

Table 2-26 shows the results of calculating the necessary quantities of equipment based on the above conditions. The results are the same as in Project-1.

**Table 2-26 Necessary Quantity of 6m$^3$ Dump Trucks**

| Item | Lattakia | Jableh | Qurdaha | Total |
|---|---|---|---|---|
| Design average collection and transportation amount (t/trip) | 1.6 | 1.6 | 1.6 | |
| Procured quantities of equipment (units) | **4** | **3** | **1** | **8** |
| Design average number of trips | 2 | 3 | 4 | |
| Design procured equipment collection and transportation amount (t/day) | 13 | 14 | 6 | 33 |
| Equipment supply capacity (t/day) | 13 | 14 | 6 | 33 |

(2) Wheel loaders

It is necessary to procure equipment for loading solid waste onto the dump trucks planned for procurement in Lattakia, Jableh and Qurdaha. These three municipalities currently use wheel loaders with bucket sizes of 0.5~2m$^3$, however, all the equipment is around 20 years old and deteriorated. In view of the poor operating rates and inefficiency in terms of capacity, equipment renewal is needed. Accordingly, it is planned to procure the appropriate equipment in the Project.

Wheel loaders with a bucket size of 1.5m$^3$, which have ample capacity for loading into 6m$^3$ garbage dump trucks and offer good versatility and easy maintenance, are planned for procurement.

Since one wheel loader is thought to be required for every 3 or 4 dump trucks, the quantity of wheel loaders indicated in Table 2-27 will be procured. The results are the same as in Project-1.

**Table 2-27 Necessary Quantities of Street Waste Loading Equipment**

| Item | Lattakia | Jableh | Qurdaha |
|---|---|---|---|
| Dump truck | 4 | 3 | 1 |
| Wheel loader | **1** | **1** | **1** |

### 2) Medical Equipment Collection and Transportation Plan

The existing equipment used for collecting and transporting medical waste in Homs and Lattakia is more than 20 years old and is in a deteriorated state and not only is the equipment comprised of compactor trucks unsuitable for collection and transportation of medical waste, but also it is difficult to conduct efficient and stable collection and transportation work because of frequent maintenance and repairs. Since procurement of dedicated equipment has been a long-standing issue, the appropriate equipment will be procured in the Project.

(1) Quantities of equipment

The number of medical institutions targeted for collection is 52 in Homs and 32 in Lattakia (however, since this includes small institutions which only require collection every other day, the average number of institutions handled per day is 25). Moreover, since collections are conducted at set times according to the times decided by staff in the medical institutions, it takes around 15~20 minutes from arrival to loading at each institution. Consequently, a single truck can only patrol between 20~25 medical institutions per day. Therefore, two vehicles will be procured for Homs and one for Lattakia. The results are the same as in Project-1.

(2) Selection of equipment type

When collecting highly infectious medical waste, it is necessary to have closed-body equipment that is made from anti-corrosive materials and prevents waste from flying off. Since compaction can cause infectious substances to leak, compactor trucks are unsuitable. Moreover, since piling can lead to collapse or compaction of loads, it is necessary to use trucks that give priority to ease of loading and cubic capacity rather than weight.

As is shown in Table 2-28, the necessary loading platform area is calculated as approximately 5 $m^2$ in Homs and 2.8 $m^2$ in Lattakia, while in terms of loaded weight and necessary capacity, a 2-ton closed body truck is planned for Homs while a 1-ton closed body truck is planned for Lattakia.

Since the transportation amounts in Homs are relatively large and the truck will need to discharge waste at the landfill site, the collection vehicle here will be the dump type.

**Table 2-28 Necessary Loading Platform Area of Medical Waste Collection Vehicles**

| Item | Homs | Lattakia |
|---|---|---|
| Design medical waste collection and transportation amount (t/day) | 2 | 0.6 |
| Provided equipment quantity (units) | 2 | 1 |
| Design collection amount per collection vehicle (t/trip) | 1 | 0.6 |
| Unit volume weight ($t/m^3$) | 0.35 | 0.35 |
| Capacity after loading ($m^3$) | 2.9 | 1.7 |
| Necessary loading platform area ($m^2$: H=60 cm flat loading) | 4.83 | 2.8 |

As a result, the necessary medical waste collection and transportation equipment in the Project is as indicated in Table 2-29. The results are the same as in Project-1. Moreover, since the necessary quantity of vehicles is small, operating rate adjustment taking into account rest days is not carried out. Therefore, it is necessary for the Syrian side to appropriately provide rest days for vehicle maintenance, etc. and to collect waste at an uniform rate.

**Table 2-29 Necessary Quantity of Medical Waste Collection Vehicles**

| Type | Homs | Lattakia |
|---|---|---|
| Closed dump truck (2t) | 2 | - |
| Closed truck (1t) | - | 1 |

### 3) Road Sweeping Equipment Plan

The roads targeted for mechanical sweeping are basically expressways and urban arterial roads with medians where it is too dangerous to perform manual sweeping. The quantities of equipment obtained after deducting the useable existing equipment from the necessary equipment shall be supplied in the Project. In the Project, road sweeping equipment is planned for supply to Homs and Lattakia which were scheduled to receive equipment in Project-1.

(1) Capacity of existing equipment

Homs and Lattakia currently possess 17 road sweeping vehicles comprising 15 road sweepers and 2 road sprinklers. Of these, nine vehicles are more than 20 years old and are deteriorated. Since these vehicles require frequent maintenance and repairs, thereby hindering efficient and stable road sweeping, appropriate equipment shall be procured for renewal in the Project. The remaining equipment is no older than 15 years and can still be used. Table 2-30 shows the existing equipment that can still be used, specifically 8 vehicles in Lattakia.

**Table 2-30 Existing Road Sweeping Equipment Planned for Use**

| Municipality | Equipment Type | Procured/Manufactured Year | Quantity |
|---|---|---|---|
| Lattakia | Road sweeper | 1994 | 3 |
| | Road sweeper | 2005 | 2 |
| | Road sweeper | 2006 | 2 |
| | Road sprinkler | 1996 | 1 |
| Total | | | 8 |

Note: the road sweepers (4 vehicles) procured in 2005 and 2006 were procured in response to expansion of the municipal area.

(2) Procured Equipment Plan

Taking into account the targeted roads for mechanical sweeping in Table 2-14 and the abovementioned quantity of existing equipment, the equipment procured in the Project shall be planned as follows.

1) Quantities of equipment

Mechanical road sweeping in the Project is planned as shown below. As a result, the necessary quantities of equipment (total quantities including existing equipment) required in Homs and Lattakia will be as shown in Table 2-31.

- Speed during cleaning shall be 5 km/h.

- Average work time will consist of 1 hour for transportation to landfill sites and 7 hours for road sweeping (sweeping distance: 35 km/day).
- Operating rate will be 86% (with 1 rest day per week).
- Design average sweeping distance per road sweeper will be 30 km/day (35 km/day x 86%).
- Since road sprinklers are support vehicles for road sweepers, one sprinkler per road sweeper will be procured. Incidentally, road sprinklers will only be supplied to Lattakia, which implements road sweeping in order to boost tourism.
- Sweeping frequency will be planned as once in every 2 days on expressways and once in every three days on urban truck roads.
- Since the length of target roads in Lattakia was increased following expansion of the municipal area in 2008, the necessary quantities of equipment will be supplied according to the old city area and the new expanded area in order to verify the targets and equipment quantities.

**Table 2-31 Necessary Road Sweeping Equipment**

| Municipality | Road Type | Sweeping Length (km) | Sweeping Frequency (days) | Sweeping Distance per Day (km) | Design Average Sweeping Distance (km/vehicle) | Necessary Quantity of Road Sweeping Vehicles | Necessary Quantity of Road Sprinklers |
|---|---|---|---|---|---|---|---|
| Homs | Expressway | 104 | 2 | 52 | 30 | 2 | - |
| | Truck road | 256 | 3 | 85 | 30 | 3 | |
| Lattakia (All areas) | Expressway | 352 | 2 | 176 | 30 | 6 | 6 |
| | Truck road | 376 | 3 | 126 | 30 | 5 | |
| Lattakia breakdown-1 (Old city) | Expressway | 136 | 2 | 68 | 30 | 3 | 3 |
| | Truck road | 260 | 3 | 87 | 30 | 3 | |
| Lattakia breakdown-2 (Expanded area) | Expressway | 216 | 2 | 108 | 30 | 4 | 3 |
| | Truck road | 116 | 3 | 39 | 30 | 1 | |

Since some of the existing equipment can be utilized, the quantities of equipment that need to be procured are as shown in Table 2-32. The results are the same as in Project-1. In Lattakia, the equipment to be procured in the Project will be that required in the old city area for the following reasons.

- Expansion of the municipal area was implemented after compilation of Project-1. Accordingly, Project-1 targeted the old city area, and Lattakia Municipality aims to provide equipment for this area in this Project.
- Lattakia has procured 4 road sweepers for the expanded municipal area through its self effort. These 4 vehicles are regarded as equipment for this area. Since it is calculated that five sweepers are needed for the expanded municipal area, 80% of the required road sweepers have been supplied.

**Table 2-32 Necessary Quantities of Road Sweeping Equipment**

| Municipality | Road Sweeper | | | Road Sprinkler | | |
|---|---|---|---|---|---|---|
| | Necessary road sweepers | Existing equipment | Necessary procurement | Necessary road sweepers | Existing equipment | Necessary procurement |
| Homs | 5 | 0 | 5 | - | - | - |
| Lattakia (old city area) | 6 | 3 | 3 | 3 | 1 | 2 |

2) Selection of equipment type

A small road sweeper with capacity of around $3m^3$ will need to transport collected waste to the landfill site around once in every half day. Since the Project Target Areas in the Project are relatively close to landfill sites and transfer stations, it will be possible for the road sweepers to make 2 trips per day. Accordingly, procurement of small-size road sweepers shall be planned.

In the case of road sprinklers, the amount of water sprinkled varies greatly depending on the state of dirt on the road. In the case where the average sprinkling quantity is 60 liters/minute, the amount of water required for half a day's work (approximately 3 hours) will be 10,000 liters. Accordingly, procurement of road sprinklers with capacity of 10 $m^3$ will be planned. The results are the same as in Project-1.

### 4) 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 sector. 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 above, the number of container washing trucks to be procured under the Project is planned in the following manner: This number of trucks is the same as the number planned in Project-1.

1) Number of Trucks

Based on the conditions listed below for the washing of containers, the number of container

washing trucks shown in Table 2-33 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 in every 15 days

**Table 2-33 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 $m^3$ and a high pressure water gun.

### 5) Mobile Workshop Plan

The Project intends the use of old vehicles of up to 20 years old. As these old vehicles frequently break down on the road, the establishment of a system to quickly deal with such breakdowns is essential. Accordingly, the procurement of a mobile workshop is planned in the following manner:

(1) Capacity of the Existing Equipment

None of the target cities of the Project currently have a mobile workshop and, therefore, there is no existing equipment which can be used under the Project.

(2) Equipment Procurement Plan

1) Number of Equipment

Targeting Homs and Lattakia where some 10 vehicles will begin to deteriorate every 5~10 years, the procurement of one mobile workshop is planned for each city.

2) Selection of Equipment Type

Each truck will carry welding and other equipment required to repair old vehicles and also tools required to replace common parts and components.

## 4. Equipment Specification and Quantity of Equipment

### (1) Equipment Specifications

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

(1) Compactor truck Type 1 ($16m^3$)

| | | |
|---|---|---|
| 1) | Type: | Plate type compactor truck for solid waste collection |
| 2) | Body Capacity: | $15m^3$ or more |
| 3) | Payload: | 8 ton or more |
| 4) | Container Lift: | Winch on the roof |
| 5) | Container to be lifted: | 1.5 $m^3$ 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: | 6x4 rear drive |

(2) Compactor truck Type 2 ($12m^3$)

| | | |
|---|---|---|
| 1) | Type: | Plate type compactor truck for solid waste collection |
| 2) | Body Capacity: | $11m^3$ or more |
| 3) | Payload: | 6 ton or more |
| 4) | Container Lift: | Winch on the roof |
| 5) | Container to be lifted: | 1.5 $m^3$ 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) Compactor truck Type 3 ($8m^3$)

| | | |
|---|---|---|
| 1) | Type: | Plate type compactor truck for solid waste collection |
| 2) | Body Capacity: | $8m^3$ or more |
| 3) | Payload: | 4 ton or more |
| 4) | Container Lift: | Winch on the roof |
| 5) | Container to be lifted: | 1.5 $m^3$ 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 |

(4) Compactor truck Type 4 ($4m^3$)

| | | |
|---|---|---|
| 1) | Type: | Plate type compactor truck for solid waste collection |
| 2) | Body Capacity: | $4m^3$ or more |
| 3) | Payload: | 2 ton or more |
| 4) | Container Lift: | Winch on the roof |
| 5) | Container to be lifted: | 0.6 $m^3$ 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 |

(5) Dump truck ($6m^3$)

| | | |
|---|---|---|
| 1) | Type : | Refuse dump truck |
| 2) | Body Capacity: | $6m^3$ or more |
| 3) | Payload: | 2.7 ton or more |
| 4) | Chassis operation: | Left hand steering wheel, manual transmission |
| 5) | Chassis drive system: | 4x2 rear drive |

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

| | | |
|---|---|---|
| 1) | Type: | Closed body dump truck |
| 2) | Body floor area: | $5m^2$ or more |
| 3) | Body height: | 1.5m 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: | 1.8 ton or more |
| 7) | Chassis operation: | Left hand steering wheel, manual transmission |
| 8) | Chassis drive system: | 4x2 rear drive |

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

| | | |
|---|---|---|
| 1) | Type: | Van type truck |
| 2) | Body floor area: | $2.5m^2$ or more |
| 3) | Body height: | 1.8m 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 |

(8) Wheel loader

| | | |
|---|---|---|
| 1) | Type: | General purpose wheel loader |
| 2) | Bucket: | General purpose bucket, 1.5$m^3$ or more |
| 3) | Engine output: | 90HP or more |
| 4) | Dumping clearance: | 2,500mm or more |
| 5) | Cab: | ROPS steel cab |

(9) Container washing truck

| | | |
|---|---|---|
| 1) | Type: | Water tanker with washing water jet device |
| 2) | Tank capacity: | 6$m^3$ or more |
| 3) | Suction and delivery pump: | Discharge Quantity 500litter/min. or more, Discharge pressure 0.19Mpa or more, pump head 19m 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 |

(10) Mobile workshop

| | | |
|---|---|---|
| 1) | Type: | Van type mobile workshop equipped with repair tools |
| 2) | Body height: | 2.0m or more |
| 3) | Body material: | Aluminum |
| 4) | Major tools to be equipped: | Electric welder, gas welder, jib crane, air compressor, grinder, electric drill, hydraulic press, hydraulic jack, oxygen cylinder, acetylene cylinder, Hydraulic press |
| 5) | Gross vehicle weight: | 9 ton or more |
| 6) | Chassis operation: | Left hand steering wheel, manual transmission |
| 7) | Chassis drive system: | 4x2 rear drive |

(11) Mechanical sweeper

| | | |
|---|---|---|
| 1) | Type: | Double gutter brooms vacuum street sweeper |
| 2) | Payload: | 1.7 ton or more |
| 3) | Hopper capacity: | $3m^3$ or more |
| 4) | Sub engine output: | 40ps or more |
| 5) | Blower capacity: | Min. $130m^3$/min. |
| 6) | Gutter broom: | Diameter 600mm or more, approximately 120rpm |
| 7) | Water tank capacity: | 450litter or more |
| 8) | Chassis operation: | Right or Left hand steering wheel, manual transmission |
| 9) | Chassis drive system: | 4x2 rear drive |

(12) Sprinkler truck

| | | |
|---|---|---|
| 1) | Type: | Water tanker with sprinkler device |
| 2) | Tank capacity: | $10m^3$ or more |
| 3) | Sprinkling pump: | Discharge Quantity 500liter/min. or more, Discharge pressure 0.48Mpa 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) Overview of Equipment Quantities

Table 2-34 and Table 2-35 show the total quantities of the equipment to be procured.

**Table 2-34 Overview of New Equipment Supply Quantities**

| Municipality \ Equipment | | Compacotor Truck | | | | Medical Waste Truck | Total |
|---|---|---|---|---|---|---|---|
| | | 16m$^3$ | 12m$^3$ | 8m$^3$ | 4m$^3$ | | |
| Idleb Governorate | Idleb | 2 | 3 | 1 | 2 | | 8 |
| Hama Governorate | Hama | 4 | 6 | | 6 | 1(2t) | 17 |
| Sweida Governorate | Sweida | 1 | 2 | | 4 | 1(1t) | 8 |
| | Shahba | | | | 2 | | 2 |
| | Salkhad | | | | 1 | | 1 |
| Rural Damascus Governorate | Aurbeen | | 1 | | 3 | | 4 |
| | Al-hajjar al-asswadd | | | 1 | 8 | | 9 |
| | Al-tell | | 4 | | 1 | | 5 |
| | Mudamiate al-shamm | 1 | | | 1 | | 2 |
| | Al-dumire | 2 | | | 2 | | 4 |
| | Dariaa | 2 | | | 2 | | 4 |
| Total | | 12 | 16 | 2 | 32 | 2 | 64 |

**Table 2-35 Overview of Unconducted Equipment Supply Quantities**

| Equipment \ Municipality | Homs | Lattakia | Jableh | Qurdaha | Total |
|---|---|---|---|---|---|
| Dump Truck(6m$^3$) | – | 4 | 3 | 1 | 8 |
| Medical Waste Truck Type 1 (2ton dump truck) | 2 | – | – | – | 2 |
| Medical Waste Truck Type 2 (1ton van truck) | – | 1 | – | – | 1 |
| Wheel Loader | – | 1 | 1 | 1 | 3 |
| Wash Container | – | 2 | – | – | 2 |
| Mobile Workshop | 1 | 1 | – | – | 2 |
| Mechanical Sweeper | 5 | 3 | – | – | 8 |
| Sprinkler Truck | – | 2 | – | – | 2 |
| Total | 8 | 14 | 4 | 2 | 28 |

## 2-2-3 Outline Design Drawings

The outline design drawings for the equipment to be procured under the Project are shown in Fig. 2-1 through Fig. 2-12.

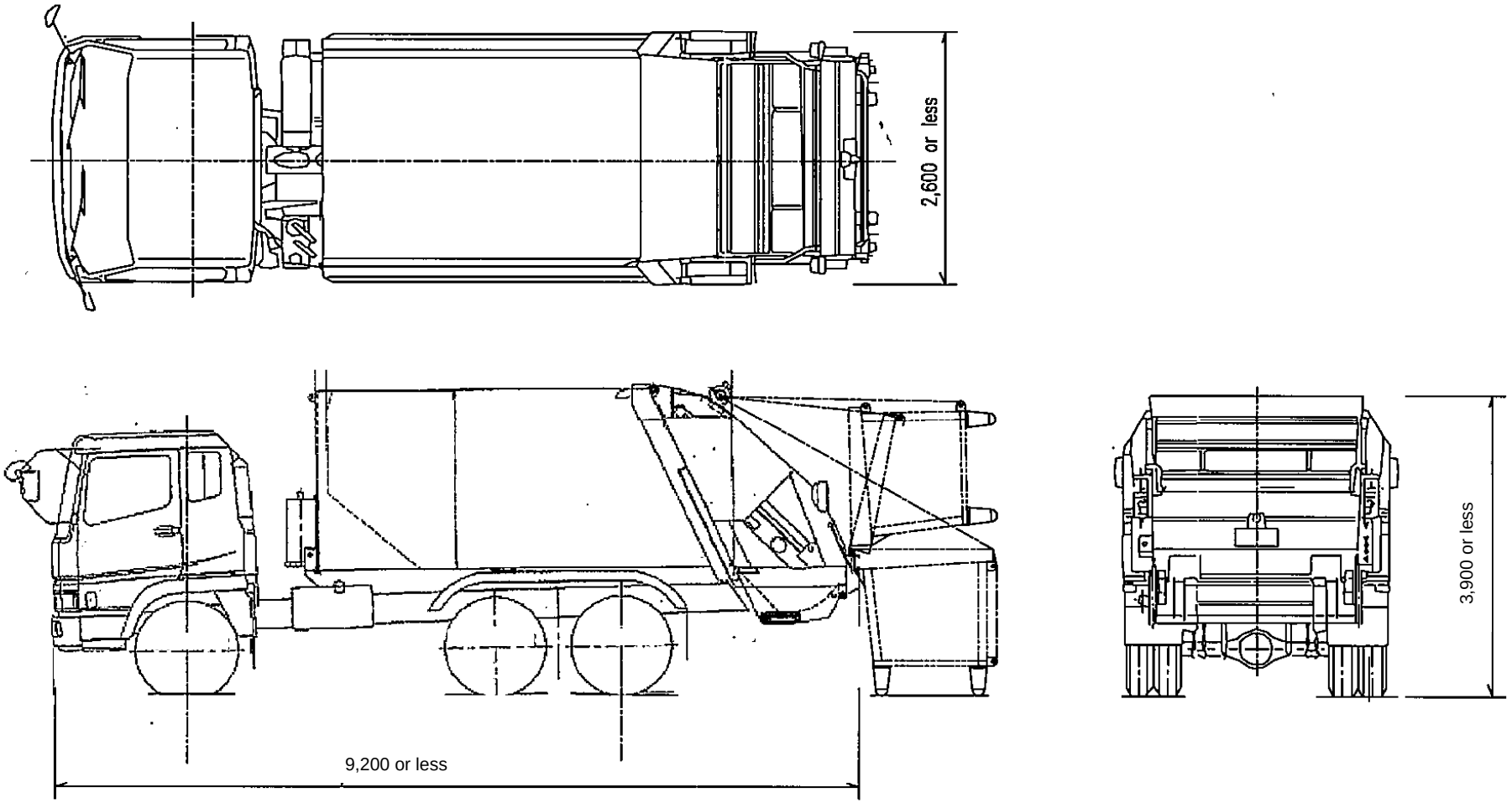



**Fig. 2-1 Compactor Truck (16m$^3$)**

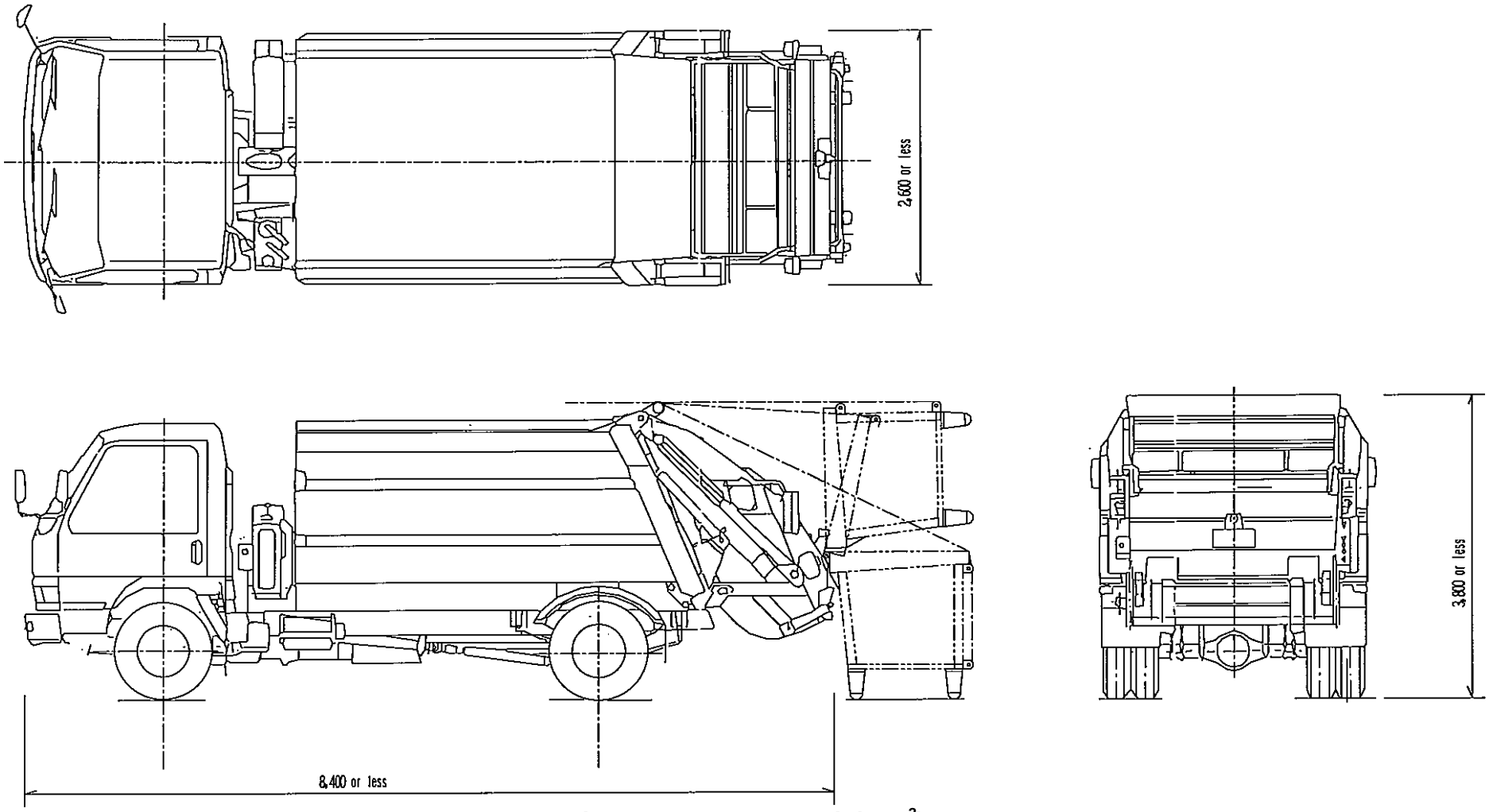



**Fig. 2-2 Compactor Truck (12m$^3$)**

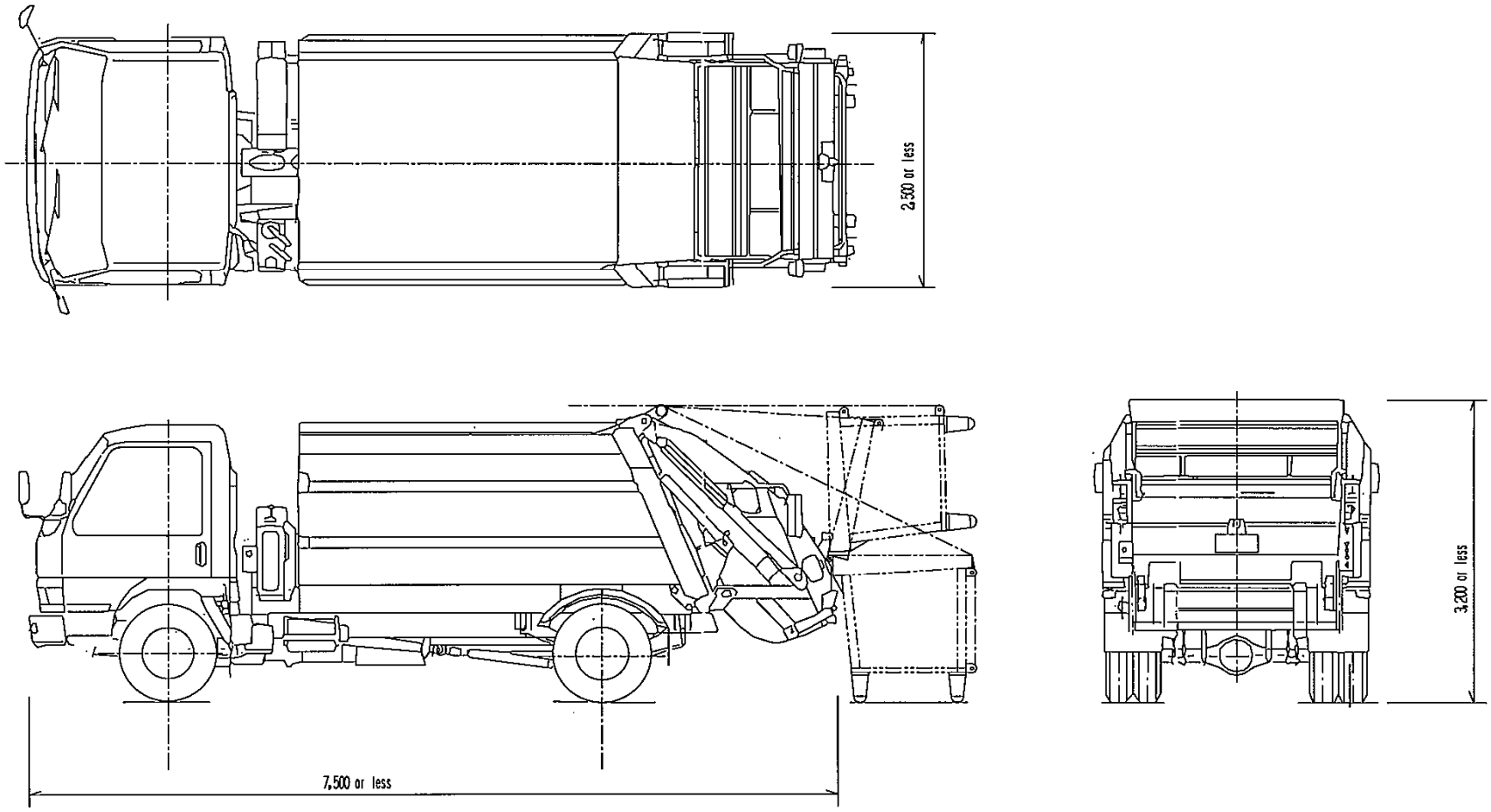



**Fig. 2-3 Compactor Truck (8m$^3$)**

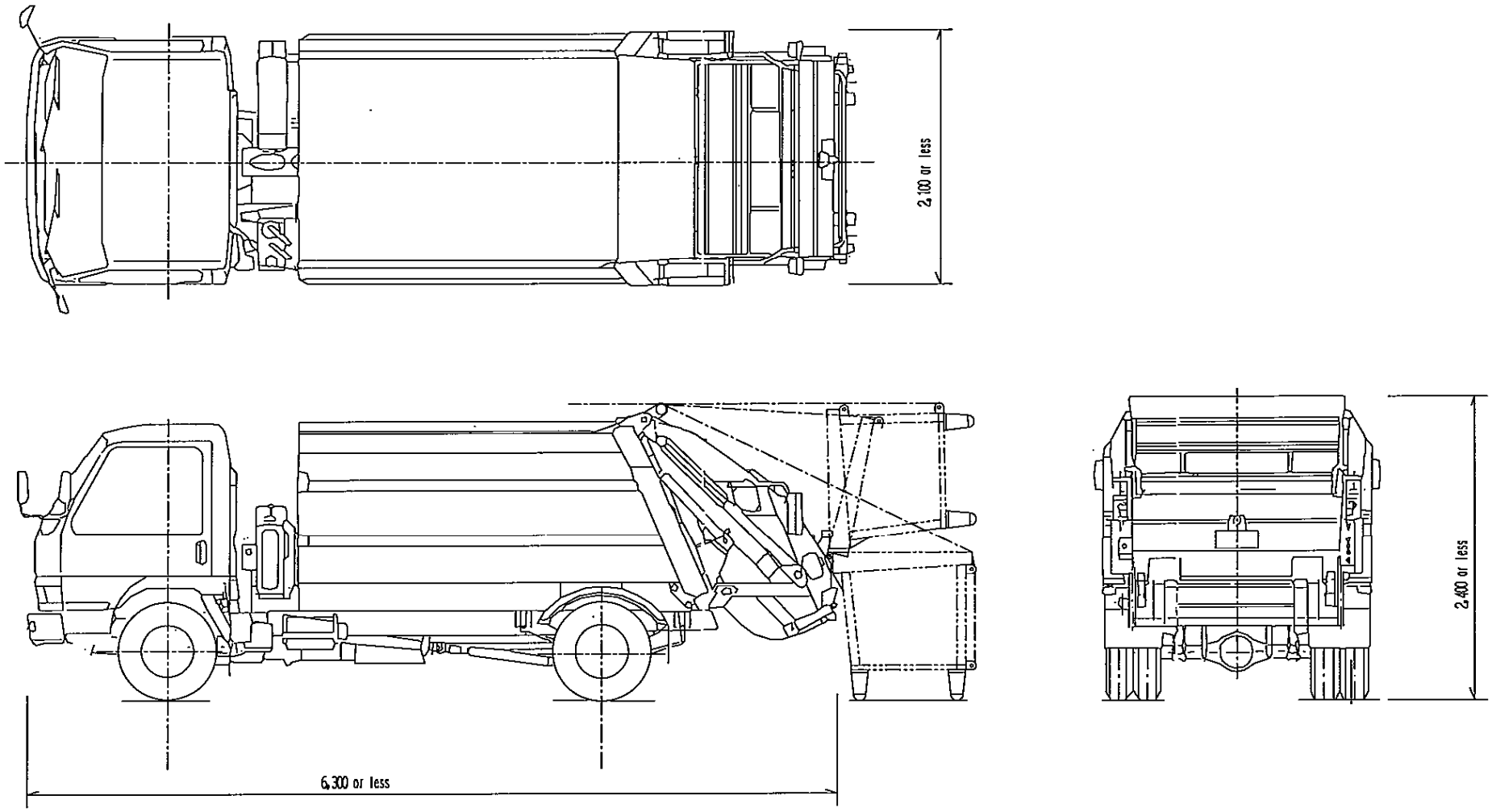



**Fig. 2-4 Compactor Truck (4m$^3$)**

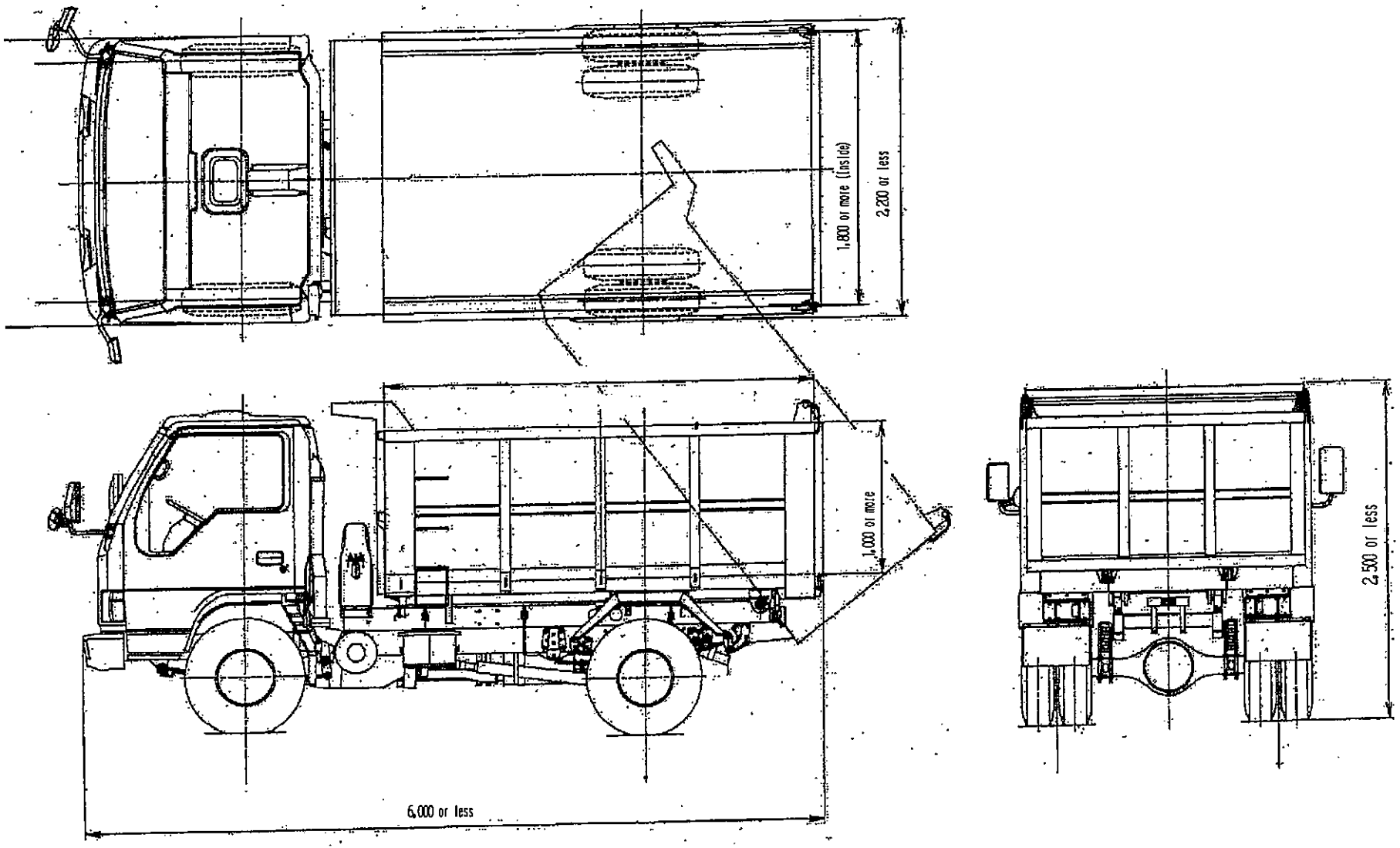



**Fig. 2-5 Dump Truck (6m$^3$)**

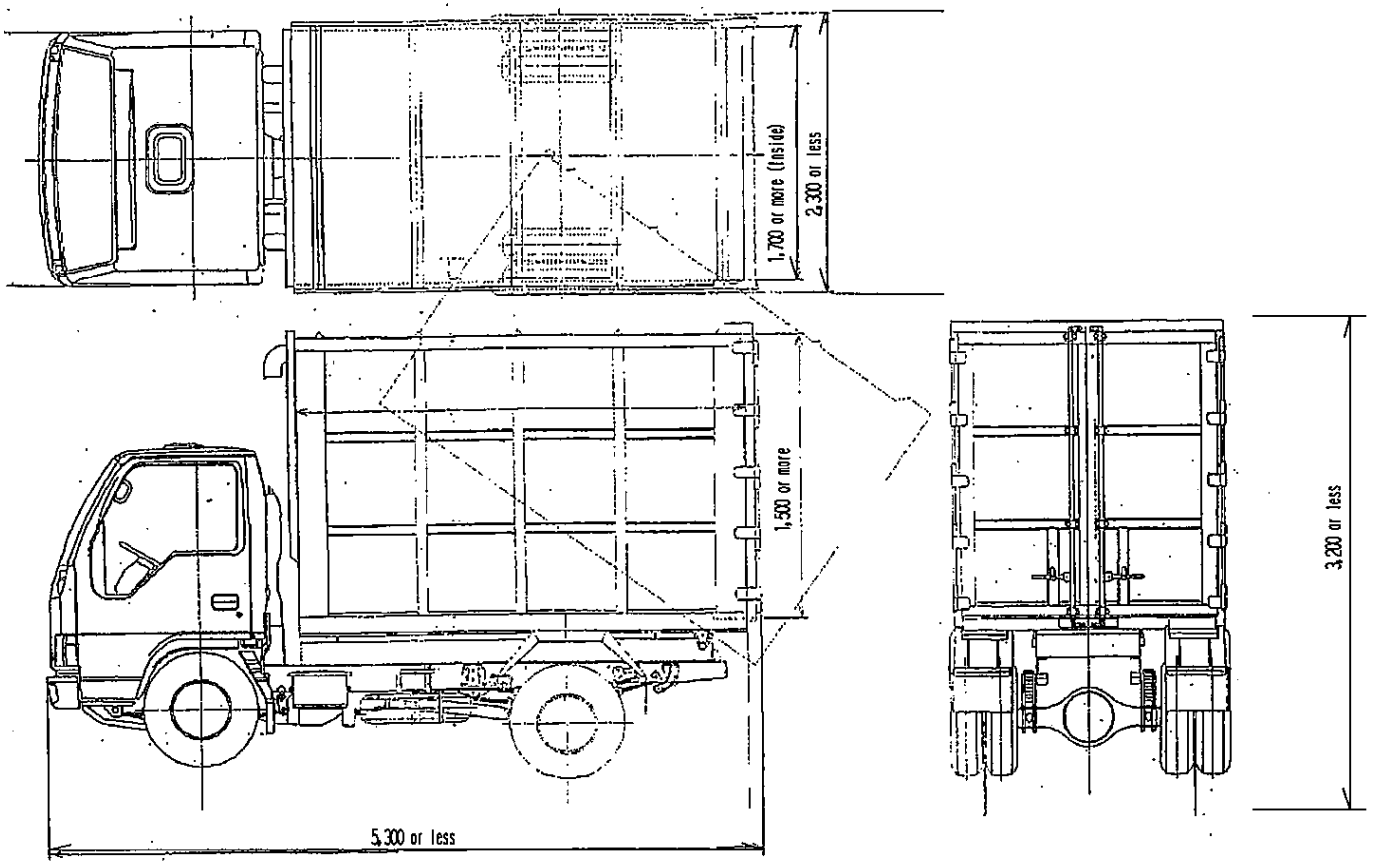



**Fig. 2-6 Medical Waste Truck Type 1 (2ton dump truck)**

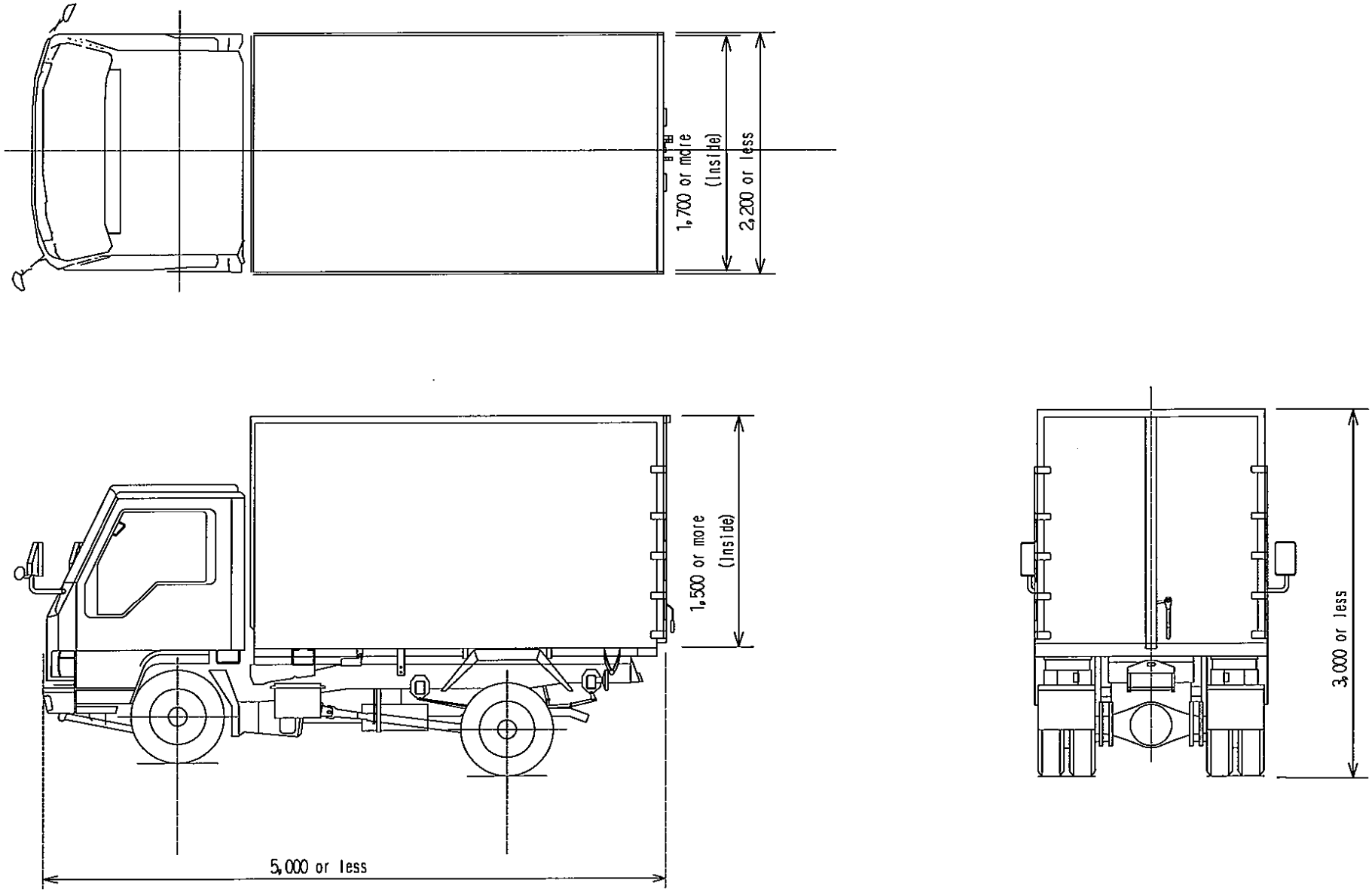



**Fig. 2-7 Medical Waste Truck Type 2 (1ton van truck)**

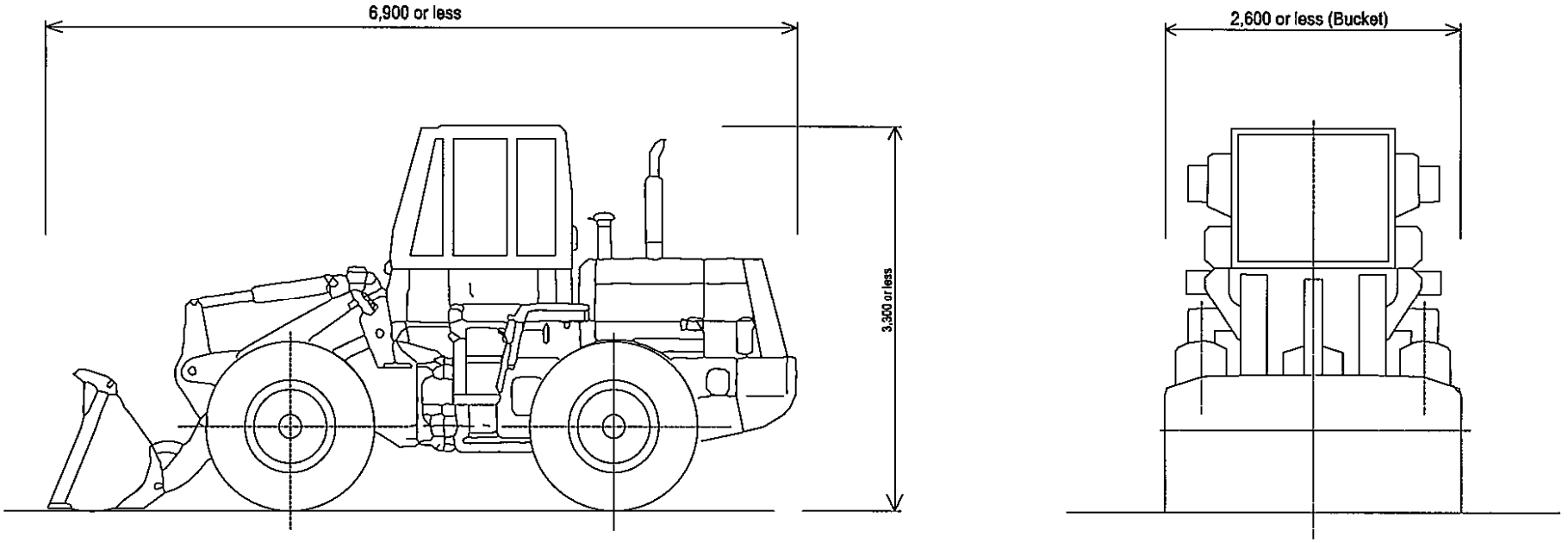



**Fig. 2-8 Wheel Loader**

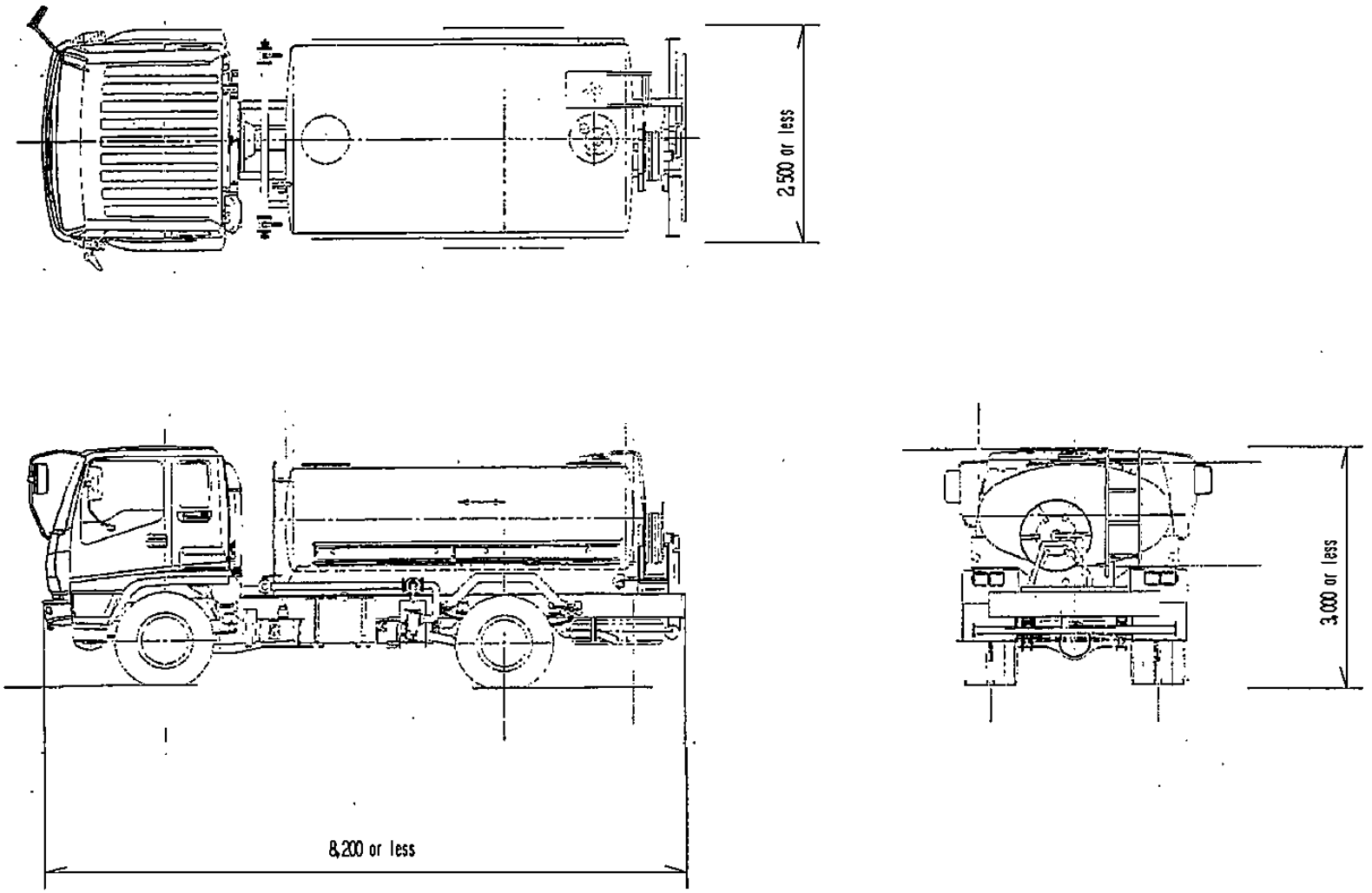



**Fig. 2-9 Wash Containor**

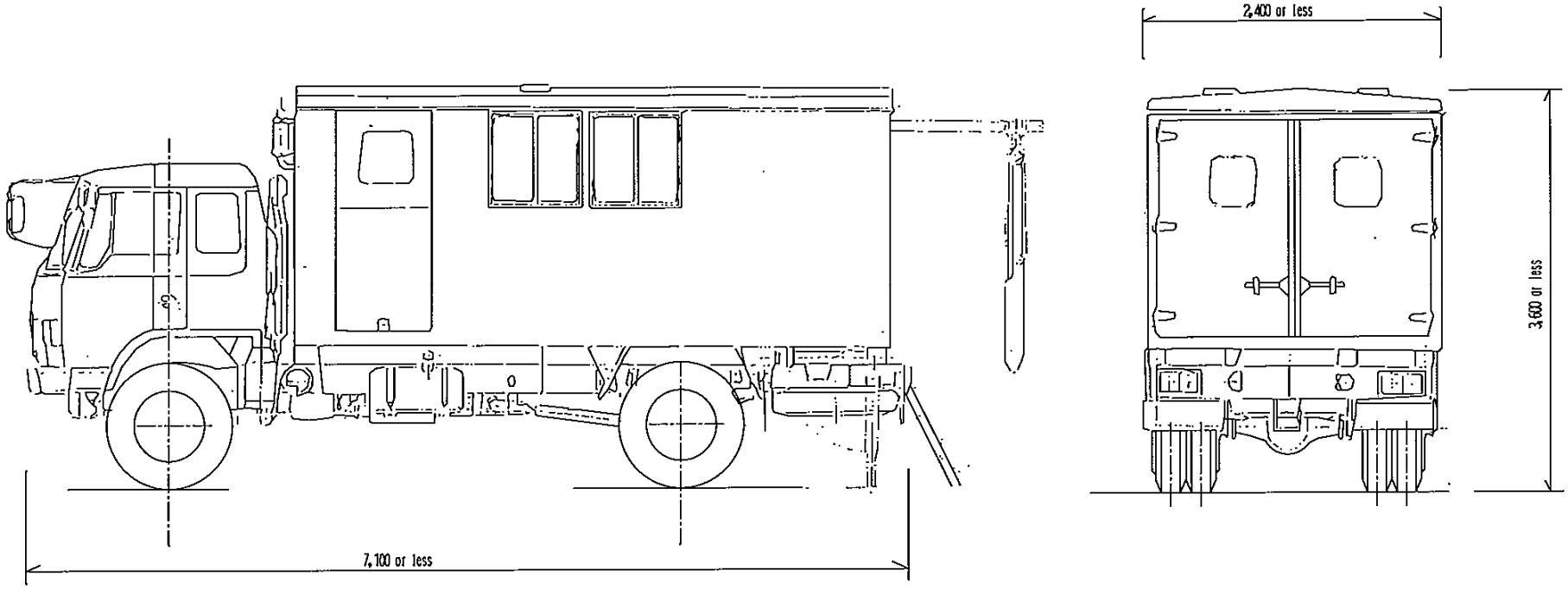



**Fig. 2-10 Mobile Workshop**

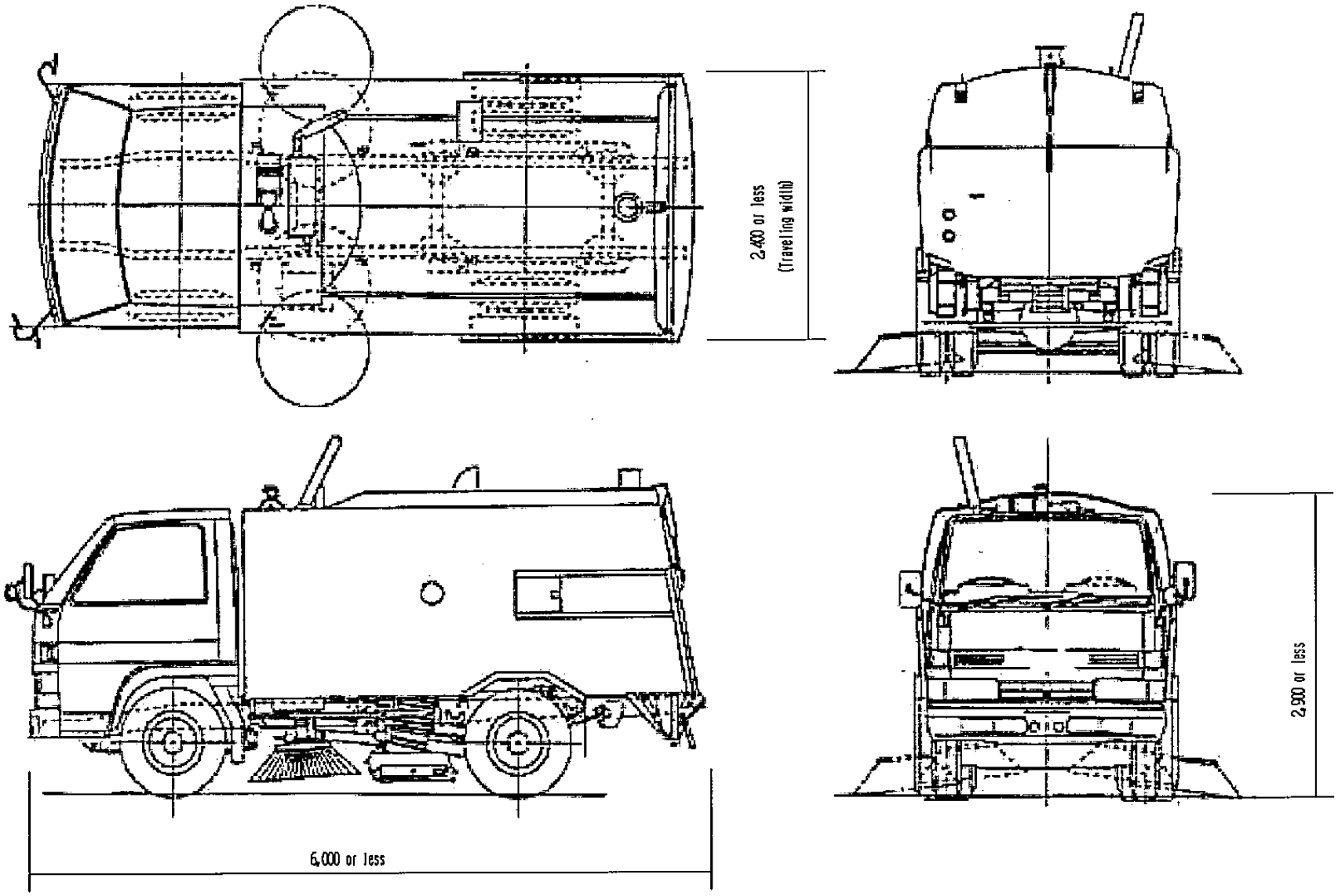



**Fig. 2-11 Mechanical Sweeper**

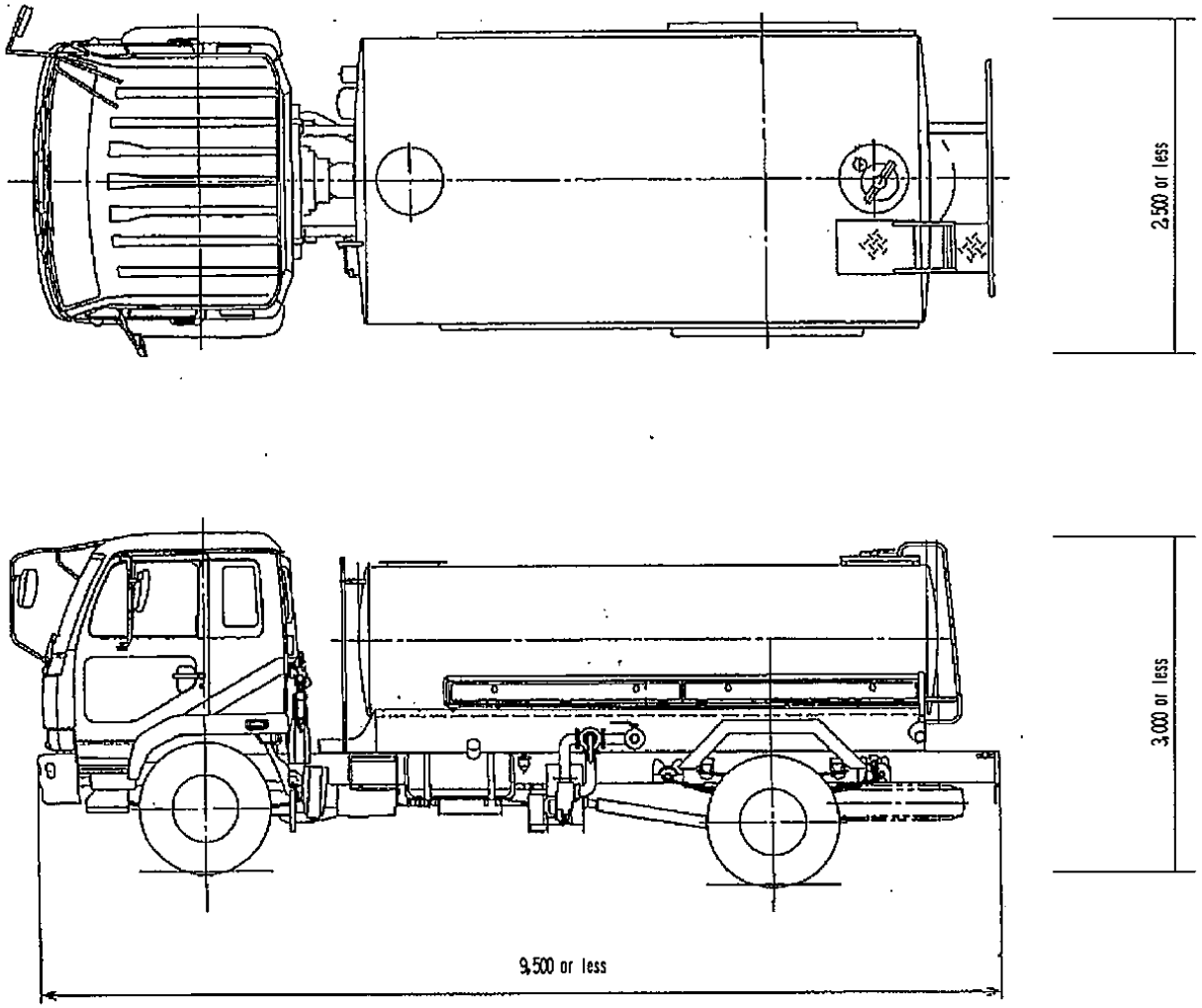



**Fig. 2-12 Sprinkler Truck**

## 2-2-4 Implementation Plan

### 1. Implementation Policy

The Project will be implemented in accordance with the framework of the grant aid scheme of GOJ. The Project will proceed to the implementation stage after its approval by GOJ 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 (hereinafter refered to as "the Consultant") by the Government of Syria and the Consultant will conduct the detailed design. After completion of preparation of the tender documents based on the detailed design results, a Japanese contractor (hereinafter refered to as "the Equipment Supplier") will procure the planned equipment. The basic issues and important points for project implementation are described next.

### (1) Project Implementing Agencies

The responsible agency for the Project on the Syrian side is MOLA. Under the responsibility of this Ministry, the 15 target municipalities will implement the Project as the implementing agencies. In order to maintain close communications and discussions with the Japanese consultant and contractor, MOLA will need to appoint a Project Supervisor. Furthermore MOLA will need to fully explain the contents of the Project to related officials of the implementing agencies and offer guidance on cooperation with the Project.
Since there are many (15) implementing agencies involved in the Project, 2 representative implementing agencies will be selected in north and center areas as shown in Table 2-36. The roles of the representative implementing agencies will be to disucuss with the Japanse consultant and contractor, recieve the procured equipment on behalf of the subsidiary municipalities and carry out coordinating activities among the subsidiary municipalities.

**Table 2-36 Representative Implementing Agencies**

| Representative Agencies | Subsidiary Municipalities |
|---|---|
| Lattakia | Homs, Lattakia, Jableh, Qurdaha<br>Hama, Idleb |
| Rural Damascus Governorate | Aurbeen, Al-hajjar al-asswadd, Al-tell, Mudamiate al-shamm, Al-dumire, Dariaa<br>Sweida, Shahba, Salkhad |

The above contents can be summarized as follows:

- Project responsible agency: MOLA
- Project representative implementing agencies: Lattakia city, Rural Damascus Governorate

### (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 the detailed design and 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 GOJ will procure the planned equipment. Given the need for the provision of such after-sales 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. 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 (hereinafter refered to as “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 | :USA, European and Japanese manufacturers |
| 2) | Medium and small compactors | :USA, European and Japanese manufacturers |
| | | (Low market share for small compactors from USA and Europe) |
| 3) | Wheel loaders | :USA and European manufacturers |

While the manufacturers listed above have been principally selected based on the equipment cost, evaluation of the after-sales 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-sales 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.

(3) Improvement of the procurement system in municipalities

The municipalities in the past required a tender in cases where the procurement amount was 50,000 SP (approximately 100,000 yen) or more, making it difficult to adopt a flexible approach, however, the current system in 2009 has been somewhat improved. Equipment can be procured based on mayor's decision for amounts up to 300,000 SP (approximately 600,000 yen) and by governor's decision for amounts up to 500,000 SP (approximately 1,000,000 yen), and tender is only required in cases greater than that. Therefore, concerning procurement of spare parts, the necessary items can be flexibly procured without undergoing tender procedure in almost all cases.

## (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 GOJ:

(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) Lot division of the equipment procurement contract

The equipment planned for procurement under the grant aid consists of solid waste collection and transportation vehicles (trucks) and wheel loaders (construction machinery). Since these items will not require any installation work, etc., it is appropriate to select an equipment supplier that handles the purchase and sale and manufacture of vehicles and construction machinery.

Moreover, in Project-1, the lot classified as unconducted was not fully executed for the following reasons: (i) in cases of compiling small quantities of numerous equipment types, administration costs tend to burgeon and profits are reduced; (ii) at the time of tender, the truck manufacturing and retailing market was prosperous and suppliers tended to avoid manufacturing and retailing numerous equipment types in small quantities; (iii) due to the numerous equipment types, it was difficult matching trading firms with chassis makers and body makers; (iv) since the other lot which proceeded at the same time entailed large quantities of a single equipment type, it was attractive to trading firms and manufacturers, so the unconducted lot tended to be overlooked; and (v) in cases of exporting to Syria, since risks for exporting trading firms are high due to stringent export reviews, measures in cases where exported equipment is used improperly (for military purposes, etc.) and work suspensions in emergencies, etc., it is possible that the trading firm adds on a risk premium to the equipment prices set by the makers.

In the Project, utilizing the above experience, in order to achieve a lot division that is on the whole attractive to bidders while ensuring fair competition, the equipment shall comprise just one lot.

(3) Phase division of equipment procurement work

As was described in (2) above, the Project will not be divided into multiple phases.

## 3. Scope of Works

The scope of the works 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

### (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 O & M of the equipment procured with the Japanese grant aid assistance and implementation of solid waste collection and transportation

## 4. Consultant Supervision

The 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 Target 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 Preparatory Survey 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 GOJ.

**Table 2-37 Work of the Consultant**

| Stage | Work |
|---|---|
| Before signing of the equipment supply contract(s) | ・ Preparation of the tender documents<br>・ Execution of the tender as the agent<br>・ Evaluation of bids<br>・ Assistance for the signing of the equipment supply contract(s) |
| After signing of the equipment supply contract(s) | ・ Supervision of the equipment procurement process and quality control<br>・ Verification of the equipment quality<br>・ Arrangement of pre-shipment inspection by a third party<br>・ Checking of the execution of the work agreed by the Equipment Supplier<br>・ Preparation of various reports |

To properly perform the work listed above, the Consultant will deploy the personnel listed in Table 2-38 in line with the progress of the work.

**Table 2-38 Personnel Deployment Plan of Consultant**

| Work | Personnel to be Deployed |
|---|---|
| Preparation of the tender documents | Project team leader (head engineer) and Engineer responsible for the planning of equipment |
| Execution of the tender as the agent | Project team leader and Engineer responsible for the planning of equipment |
| Evaluation of the bids | Project team leader, Engineer responsible for the planning of equipment and Engineer responsible for the planning of procurement |
| Assistance for tender work | Project team leader |
| Supervision of the equipment procurement process and quality control | Engineer responsible for the supervision of procurement |
| 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 the supervision of procurement |
| Checking of the execution of the work agreed by the equipment supplier | Engineer responsible for the supervision of procurement |
| Preparation of various reports | Engineer responsible for the supervision of procurement |

### (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. 2-13.

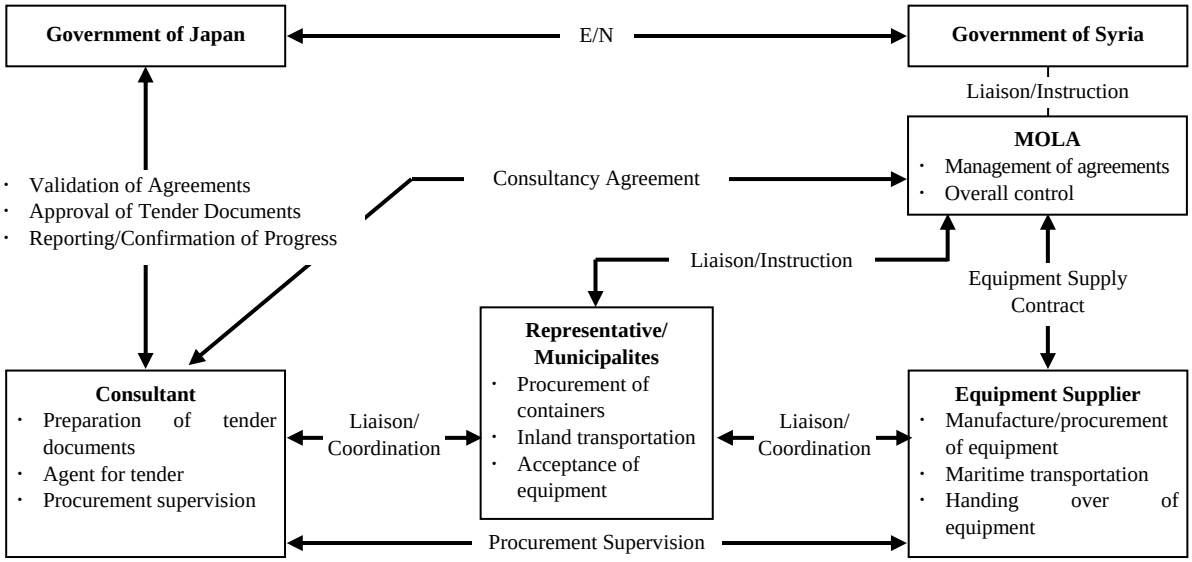



**Fig. 2-13 Project Implementation System at Time of Procurement Supervision**

## 5. Quality Control Plan

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

### (1) 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 outline 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) 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(s). 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 GOJ 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.

## 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 Procurement Sources

As was mentioned earlier, since the equipment planned for supply under the grant aid is not produced in Syria, it will need to be procured in Japan and/or third countries.

The summary of Equipment Procurement Sources is shown in Table 2-39 and the third country procurement shall be considered only for wheel loader and mechanical sweeper. However, since opening the tender to all EU countries would lead to participation by makers that have no agents in Syria and thus hinder realization of the goal, third country procurement shall be made conditional on manufacturers possessing agents or contract stores in Syria.

As for the containers to be procured in the Project, since these are produced in Syria, they can be procured locally.

**Table 2-39 Possible Equipment Procurement Sources**

| Type of Equipment | Supply Source | | | Remarks |
|---|---|---|---|---|
| | Syria | Japan | Third Country | |
| Compactor truck (16 $m^3$) | | O | | These equipment are widespread in Japan and Japanese manufacturers are higly capable in supply. Manufacturers in USA and EU are generally capable in manufacturing large size equipment and their market share of small size equipment are low. In consideration of nature of grant aid projects, which require proper O & M, adequate and timely after-sales service and high quality assurance, equipment from USA and EU will have possibility in facing difficulty in compliance with such requirement. Since Japanese firms will offer their equipment for the Project by engaging single Japanese chassis manufacturer, high competitiveness can be expected due to the above situation. |
| Compactor truck (12 $m^3$) | | O | | |
| Compactor truck (8 $m^3$) | | O | | |
| Compactor truck (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 | | |
| Container washing truck | | O | | |
| Sprinkler truck | | O | | |
| Wheel loader | | O | O | Large share of EU manufacturers. Since standard type of equipment can be used for the Project, Japanese contractors can manage their equipment procurement easily. Some of Japanese manufacturers can not participate in the Project affected by USA's restriction of export of USA products to Syria. |
| Mechanical sweeper | | O | O | There is only one Japanese manufacturer confirmed possibility of export to Syria. |

(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 and a wheel loader, 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.

### (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) 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 lift 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.

## 7. Guidence Plan for Initial Operation Guidance and Maintenance Guidance, etc.

It will be necessary to give explanations on handling and maintaining equipment when handing it over. This shall be planned for implementation by the makers' engineers.

## 8. Soft Component (Technical Assistance) Plan

In the Project, rather than assuming Japanese style efficient discharge and collection methods, it is planned to adopt collection methods (container-based) suited to local waste disposal customs and to procure equipment appropriate to these. Through doing this, the implementing agencies can provide support for the sustained execution of regular and adequate collections. Since providing ordinary guidance on operations and maintenance when handing over the equipment will be sufficient for enabling the implementing agencies to conduct equipment maintenance, there will be no need for a so-called soft component.

Concerning implementation of public education based on set-time collections and ample collection experience, promotion of separate collection and recycling, and introduction of separate and efficient collection based on public cooperation, it is desirable that such activities be implemented as technical cooperation separate from the Project.

## 9. Implementation Schedule

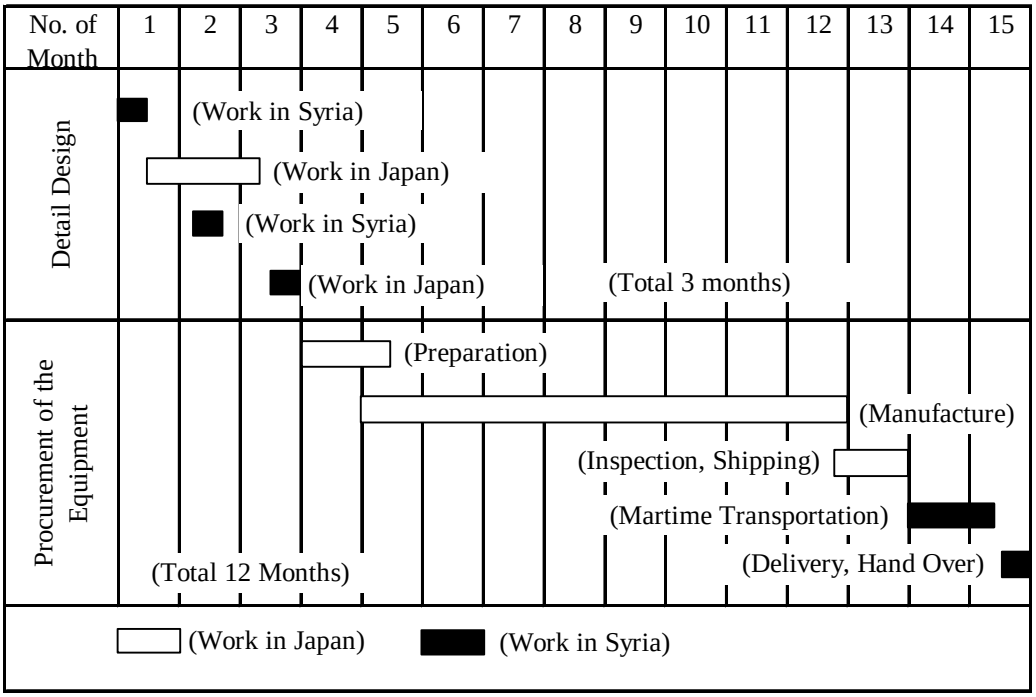
The procurement of equipment will be executed in one phase. The procurement will be commenced after approval of cabinet of the Government of Japan and the E/N between the two Governments.

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 3 months.

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 12 months.

The schedule based on the above conditions is as shown in Table 2-40.

**Table 2-40 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 (hereinafter referred to as “M/D”) for the outline 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 recruitments 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 outline 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 with 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 renewal and/or strengthening the solid waste collection and transportation capacity of the Project Target Areas 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) Complete the transfer stations and new disposal sites for use by the Project Target municipalities and start services by January 2011 as planned. In consideration of the possibility of this being delayed, efficiently utilize existing disposal sites until 2011.

(2) Close existing disposal sites where open dumping is causing negative environmental impacts (Shahba, Salkhad, Al-tell and Al-dumire).

## 2-4 Project Operation and Maintenance Plan

### 2-4-1 Basic Policies

The Project is intended to renew and increase collection and transportation capability, which is a major factor in the SWM works. O & M in the Project is primarily composed of the following 2 components:

- - Planning, management and operation related to collection and transportation
- - Inspection and maintenance work on collection and transportation equipment

In executing the above work, as is shown in Table 2-41, since the quantities of equipment that will be withdrawn from services due to deterioration are greater than quantities of new equipment, there should not be any particular problems concerning the recruitment of drivers and other personnel and establishment of the implementing organization.

**Table 2-41 Quantities of Withdrawn Equipment and New Equipment**

| Target Municipality | 2009 Withdrawn Equipment | 2012 New Equipment |
|---|---|---|
| Idleb | 9 | 8 |
| Hama | 24 | 17 |
| Sweida | 11 | 8 |
| Shahba | 2 | 2 |
| Salkhad | 2 | 1 |
| Aurbeen | 7 | 4 |
| Al-hajjar al-asswadd | 12 | 9 |
| Al-tell | 5 | 5 |
| Mudamiate al-shamm | 3 | 2 |
| Al-dumire | 3 | 4 |
| Dariaa | 12 | 4 |
| Total | 90 | 62 |

However, in terms of the work contents, it is necessary to implement the following items in order to ensure that the Project effect is fully realized.

## 1. Planning, Management and Operation of Solid Waste Collection, Transportation and Road Cleansing

This work should be conducted from the viewpoints of management of (i) routine solid waste collection and transportation work and (ii) solid waste disposal 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, the possible need for the procurement of new equipment and the redeployment of personnel, etc. should be examined in consideration of any excess or shortage of the inputs and the operation rate of the equipment in each area. 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 2 shifts, i.e. day and night shifts. This means that more than one team of driver and workers use the same equipment, resulting in low awareness of ownership of drivers and workers toward the 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) Disposal Management of Residents

Appropriate disposal by residents is essential for achieving efficient collection and transportation. Accordingly, it is necessary to implement sustained public education in order to promote appropriate disposal. Such education cannot adequately be achieved simply through repeating slogans such as “Let’s make our town attractive!” or “Please dispose waste appropriately.” Since inappropriate disposal habits such as littering, etc. have become established, it is necessary to repeatedly inform residents of the need and effects of appropriate discharge through utilizing SWM data. Since such activities cannot solely be conducted by the public relations sector, it is necessary for the SWM sector to take the initiative in conducting education as a necessary means of improving the SWM situation.

In specific terms, it is necessary to conduct periodic campaigns and to distribute pamphlets on an everyday basis.

Also, it is necessary to periodically evaluate appropriate disposal conditions in terms of collection efficiency and based on observations by collection personnel, to advertise the evaluation findings to residents and reflect them in future public education plans.

## 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 detect such signs.

The basic concept of equipment maintenance work is shown in Fig. 2-14. More concrete items of regular inspection and maintenance work are described later in 2-4-3.

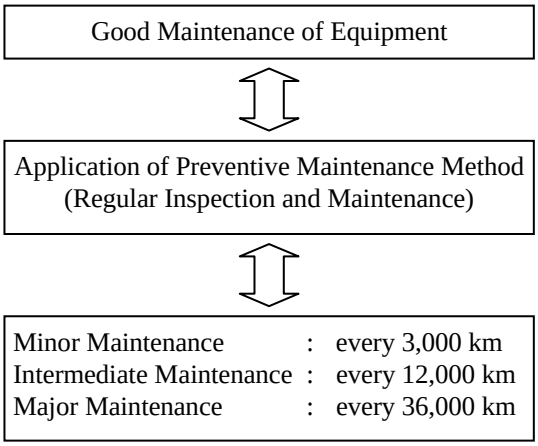



**Fig. 2-14 Basic Concept of Equipment Maintenance Work**

### 2-4-2 O & M Setup

#### 1. Municipalities Receiving New Equipment

#### (1) Idleb and Hama

In Idleb and Hama Municipalities, SWM is carried out by the respective Cleansing Departments, and the equipment to be procured under the grant aid will be utilized by them. The Vehicle Control Departments handles the inspection and maintenance activities for all vehicles owned by the municipalities. These departments have 20 repair staff in Idleb and 13 in Hama, and these are sufficient personnel for performing routine inspection and maintenance work. However, Vehicle Control Department workshops will primarily implement oil changes and simple parts replacements, whereas major repair and maintenance jobs will continue to be consigned to private sector workshops to ensure that equipment is maintained properly.

#### (2) Sweida, Shahba, Salkhad

In Sweida, SWM is carried out by the Cleansing Department, and the equipment to be procured under the grant aid will be utilized by this. The Vehicle Control Department handles the inspection and maintenance activities for all vehicles owned by the municipality. This department has 10 repair staff, and these are sufficient personnel for performing routine inspection and maintenance work. However, the Vehicle Control Department workshop will primarily implement oil changes and simple parts replacements, whereas major repair and maintenance jobs will continue to be consigned to private sector workshops to ensure that equipment is maintained properly.

In Shahba and Salkhad, the Cleansing Sections are responsible for conducting SWM work. Since the scale of administration, solid waste generation amounts and vehicle fleets in these municipalities are small, the Cleansing Sections are also small, although they are considered to possess adequate setups for functioning as operating organizations. However, the existing setups and personnel cannot perform adequate data management which is required for SWM, and they have difficulty in compiling collection and transportation plans that give consideration to operating efficiency. Therefore, it is necessary for MOLA, Sweida Governorate and Sweida City to collaborate and to receive technical support from Damascus City for data management and collection and transportation planning.

Equipment maintenance is managed by the Cleansing Sections and Garage Sections, however, maintenance work including oil changes, etc. will continue to be consigned to private sector workshops to ensure that equipment is maintained properly.

### (3) Municipalities in Rural Damascus Governorate (6 Municipalities)

In the six municipalities of Rural Damascus Governorate, the Cleansing Sections are responsible for conducting SWM work. Since the scale of administration, solid waste generation amounts and vehicle fleets in these municipalities are small, the Cleansing Sections are also small, although they are considered to possess adequate setups for functioning as operating organizations. However, the existing setups and personnel cannot perform adequate data management which is required for SWM, and they have difficulty in compiling collection and transportation plans that give consideration to operating efficiency. Therefore, collaborating with MOLA and working under the initiative of Rural Damascus Governorate, it is necessary for the cities to receive technical support from Damascus City for data management and collection and transportation planning.

Equipment maintenance is managed by the Cleansing Sections, however, maintenance work including oil changes, etc. will continue to be consigned to private sector workshops to ensure that equipment is maintained properly.

## 2. Municipalities receiving Unconducted Equipment

### (1) Homs

SWM work in Homs including the allocation of collection and transportation equipment, etc. is centrally administered by the Cleansing Department. However, the Vehicle Control Department implements the inspection and maintenance of equipment. Accordingly, it is necessary for the Cleansing Department and Vehicle Control Department to collaborate in conducting O & M, to manage SWM costs and budget including cleansing costs and vehicle maintenance costs, and to compile efficient collection and transportation plans that take vehicle maintenance costs into account. Accordingly, in the Vehicle Control Department, it is necessary to separately control the O & M costs incurred in Cleansing Department equipment.

Although the Vehicle Control Department possesses a workshop, it only implements simple maintenance work such as oil changes and simple parts replacements. Specialized repairs are outsourced to private sector workshops. Since it is not feasible to rapidly acquire the technical capacity to conduct specialized repairs, such work will continue to be consigned to private workshops to ensure the appropriate maintenance of equipment.

### (2) Lattakia

In Lattakia, SWM is carried out by the Cleansing Department, and the equipment to be procured under the grant aid will be utilized by the said department. The Vehicle Control Department handles the inspection

and maintenance activities for all vehicles owned by the municipality and it carries out routine inspection and maintenance work. However, the Vehicle Control Department workshop will primarily undertake oil changes and simple parts replacements, whereas major repair and maintenance jobs will continue to be consigned to private sector workshops to ensure that equipment is maintained properly.

### (3) Jableh and Qurdaha

In Jableh and Qurdaha, the Cleansing Sectors are responsible for conducting SWM work. Since the scale of administration, solid waste generation amounts and vehicle fleets in these municipalities are small, the Cleansing Sections are also small, although they are considered to possess adequate setups for functioning as operating organizations. However, the existing setups and personnel cannot perform adequate data management which is required for SWM, and they have difficulty in compiling collection and transportation plans that give consideration to operating efficiency. Therefore, it is necessary for the municipalities to receive technical support from Lattakia City for data management and collection and transportation planning. Equipment maintenance is managed by the Cleansing Sections, however, maintenance work including oil changes, etc. will continue to be consigned to private sector workshops to ensure that equipment is maintained properly.

## 2-4-3 O & M Personnel

Drivers and collection personnel are required in order to operate the Project equipment, however, as is shown in Table 2-41, since deteriorated equipment will be increasingly decommissioned following the procurement of equipment in the Project, it should be possible to operate equipment with the existing personnel. Moreover, concerning maintenance personnel, since the Project equipment does not include any special items and has similar specifications to the existing equipment, and specialized maintenance and repair work will be outsourced to private sector workshops, there will be hardly any need to increse the staff.

## 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 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 SWM 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 2-42.

**Table 2-42 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 workshop because of the need for special equipment; repair to hydraulic line of the body 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 differing from the vehicle's one 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 2-43.

**Table 2-43 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 SWM 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 year's 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 Initial Cost Estimation

The total initial Project cost is estimated approximately as 10.55 billion JPY if the Project is implemented. Breakdown of the total cost, based on the previously described demarcation of works, is estimated as follows: However, this amount does not indicate the aid limit given in the E/N.

### 1. Cost to be borne by the Japanese Side through the Grant Aid

Estimated Project Cost: 985 million JPY

Number of equipments procured for 15 municipalities: 92

| Item | | | Cost（million JPY） | |
|---|---|---|---|---|
| Procurement of Equipments | Homs | Homs | 159.4 | 965.8 |
| | Lattakia | Lattakia | 170.4 | |
| | | Jableh | 26.6 | |
| | | Qurdaha | 17.1 | |
| | Idleb | Idleb | 84.0 | |
| | Hama | Hama | 171.0 | |
| | Sweida | Sweida | 68.4 | |
| | | Shahba | 13.5 | |
| | | Salkhad | 6.7 | |
| | Rural Damasucus | Aurbeen | 32.0 | |
| | | Al-hajjar al-asswadd | 62.5 | |
| | | Al-tell | 53.9 | |
| | | Mudamiate al-shamm | 20.1 | |
| | | Al-dumire | 40.1 | |
| | | Dariaa | 40.1 | |
| Detail design & Procurment Management | Detail design & Procurment Management | | 19.2 | 19.2 |
| | Soft Component | | 0 | |

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: 69,974 thousand JPY (equivalent to 33,804 thousand SP)

(Unit: 1000JPY)

| Recipient Side | | Inland Transportation | Procurement of Container | Total |
|---|---|---|---|---|
| **Governorate** | **Municipality** | | | |
| Homs | Homs | 219 | 0 | 219 |
| Lattakia | Lattakia | 397 | 0 | 397 |
| | Jableh | 124 | 0 | 124 |
| | Qurdaha | 69 | 0 | 69 |
| Idleb | Idleb | 273 | 13,000 | 13,273 |
| Hama | Hama | 465 | 23,714 | 24,179 |
| Sweida | Sweida | 323 | 7,800 | 8,123 |
| | Shahba | 81 | 563 | 644 |
| | Salkhad | 40 | 282 | 322 |
| Rural Damasucus | Aurbeen | 145 | 2,252 | 2,397 |
| | Al-hajjar al-asswadd | 326 | 3,983 | 4,309 |
| | Al-tell | 181 | 5,953 | 6,134 |
| | Mudamiate al-shamm | 72 | 2,186 | 2,258 |
| | Al-dumire | 145 | 2,906 | 3,051 |
| | Dariaa | 145 | 4,330 | 4,475 |
| Total | | 3,005 | 66,969 | 69,974 |

## 3. Condition of the Estimation

1) Estimation Time: July 2009

2) Exchange Rate: 1US$ =96.59JPY (Average of the last 6 months from 30th June 2009)
1EURO=128.89JPY (Average of the last 6 months from 30th June 2009)
1SP=2.07JPY (Average of the last 6 months from 30th June 2009)

3) Procurement Period: As described in Table 2-40.

4) Others: The Project shall be implemented under the Japan's Grant Aid scheme.

### 2-5-2 Operation and Maintenance Cost Estimation

## 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 traveling 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 unnecessary expenses.

In the Survey, the required fuel/oil cost is estimated from ideal working hours per day, which is shown in Table 2-44, 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 SP20.00/liter considering actual purchase cost. The figure shows the

cost based on the vehicle per shift therefore the cost will be double in the case of two shifts.

**Table 2-44 Working Hours for Calculation of Fuel/Oil Consumption per Equipment and Shift**

| The Equipment | Working Hours/day |
|---|---|
| Compactor Truck(16m$^3$) | 8 |
| Compactor Truck(12m$^3$) | 8 |
| Compactor Truck(8m$^3$) | 8 |
| Compactor Truck(4m$^3$) | 8 |
| Dump Truck(6m$^3$) | 5 |
| Medical Waste Truck Type1 (2 ton dump truck) | 5 |
| Medical Waste Truck Type 2 (1 ton van truck) | 5 |
| Wheel Loader | 4 |
| Wash Container | 8 |
| Mobile Workshop | 2 |
| Mechanical Sweeper | 8 |
| Sprinkler Truck | 8 |

## 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 in good conditions, the Perparatory Survey estimates 5% of the purchase cost of the planned equipment as the above mentioned maintenance cost.

Furthermore, the Syrian side shall provide 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 2-45 is supposed to be necessary for the equipment to be procured through the Project. The figure shows the necessary number of staff for the operation per equipment per shift therefore the number will be double in the case of two shifts

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 12,000SP/month/person.

**Table 2-45 Necessary Number of Crew for the Equipment per Shift**

| The Equipments | Number of Crew | | |
|---|---|---|---|
| | Driver | Worker | Total |
| Compactor Truck(16m$^3$) | 1 | 2 | 3 |
| Compactor Truck(12m$^3$) | 1 | 2 | 3 |
| Compactor Truck(8m$^3$) | 1 | 2 | 3 |
| Compactor Truck(4m$^3$) | 1 | 2 | 3 |
| Dump Truck (6m$^3$) | 1 | | 1 |
| Medical Waste Truck Type1 (2 ton dump truck) | 1 | 1 | 2 |
| Medical Waste Truck Type 2 (1 ton van truck) | 1 | 1 | 2 |
| Wheel Loader | 1 | | 1 |
| Wash Container | 1 | 2 | 3 |
| Mobile Workshop | 1 | 1 | 2 |
| Mechanical Sweeper | 1 | | 1 |
| Sprinkler Truck | 1 | | 1 |

## 4. Secure of O & M Cost

O & M costs in 2009 and in the target year 2012 are estimated as shown in Table 2-46. O & M costs in 2012 for 15 municipalities are 106% of those in 2009. O & M costs in 2012 for Lattakia, Hama, Al-tell and Dariaa are lower than those in 2009, while, O & M costs for Idleb, Al-hajjar al-asswadd and Al-dumire in 2012 are higher than those in 2009.

**Table 2-46 O & M Costs Estimation for 15 Municipalities**

| Municipality | 2009 (1000SP/Y) | 2012 (1000SP/Y) | Increase Rate |
|---|---|---|---|
| Homs | 86,516 | 87,365 | 101% |
| Lattakia | 57,813 | 56,092 | 97% |
| Jableh | 8,530 | 9,843 | 115% |
| Qurdaha | 2,732 | 3,327 | 122% |
| Idleb | 19,064 | 26,776 | 140% |
| Hama | 54,793 | 53,697 | 98% |
| Sweida | 12,557 | 15,541 | 124% |
| Shahba | 2,608 | 2,761 | 106% |
| Salkhad | 1,729 | 1,953 | 113% |
| Aurbeen | 7,474 | 8,947 | 120% |
| Al-hajjar al-asswadd | 7,514 | 16,786 | 223% |
| Al-tell | 7,809 | 5,388 | 69% |
| Mudamiate al-shamm | 4,817 | 5,041 | 105% |
| Al-dumire | 3,126 | 4,438 | 142% |
| Dariaa | 11,835 | 9,389 | 79% |
| Total | 288,917 | 307,344 | 106% |

Budget of the Syrian local administrations, such as City Councils, is supervised by MOLA, which is the responsible agency of the Project. Furthermore, presence of governorates is relatively high for the operation of local administrations and local administrations help/assist each other in a same governorate

according to governor's instructions. Therefore, some budget adjustment between local administrations is recommended.

As described in the above clause, the O & M cost for the planned equipment can be mostly covered by abandonment of the old equipment at the total basis. The Syrian side, therefore, is required to allocate appropriate O & M cost adjusting budgets between the mentioned local administrations.

# CHAPTER 3

# PROJECT EVALUATION AND RECOMMENDATIONS

# Chapter 3 Project Evaluation and Recommendations

## 3-1 Project Effect

The current situation and problems of the Project Target Area and the improvement measures and their expected effects are shown in Table 3-1.

**Table 3-1 Project Effects**

| Current Situation and Problems | Improvement Measures Under the Project | Effects and Degree of Improvement Under the Project |
|---|---|---|
| I. Unconducted Equipment | | |
| 1. 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<br>・ Dump truck (6 $m^3$): 8 units<br>・ Wheel loader: 3 units | Transferring works of solid waste collected on roads and collection works in narrow road areas will be improved. |
| 2. 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<br>・ Dump truck (two tons): 2 units<br>・ Truck (one ton): 1 unit | The collection rate of medical waste in 2012 will be improved to 100% in both Homs and Lattakia. |
| 3. In Lattakia, a tourist city, regular washing of the containers is necessary to remove malodour. 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<br>・ Container washer: 2 units | Some 600 containers placed in the tourist areas of Lattakia will be regularly and systematically washed. |
| 4. 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<br>・ Mechanical sweeper: 8 units<br>・ Sprinkler truck: 2 units | 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. |
| II. New Equipment | | |
| 1. At present, the collection amount (rate) of municipal solid waste is at 187 tons/day (95%) in Idleb, 378 tons/day (85%) in Hama, 106 tons/day (95%) in Sweida, 15 tons/day (80%) in Shahba, 11 tons/day (95%) in Salkhad, 58 tons/day (85%) in Aurbeen, 77 tons/day (85%) in Al-hajjar al-asswadd, 51 tons/day (75%) in Al tell, 31 tons/day (80%) in Mudamiate al-shamm, 25 tons/day (80%) in Al-dumair and 60 tons/day (60%) in Dariaa and solid waste has begun to be piled 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<br>・ Compactor (16 $m^3$): 12 units<br>・ Compactor (12 $m^3$): 16 units<br>・ Compactor (8 $m^3$): 2 units<br>・ Compactor (4 $m^3$): 32 units | The collection amount (rate) of municipal solid waste in 2012 will be improved to 208 tons/day (95%) in Idleb, 435 tons/day (90%) in Hama, 115 tons/day (95%) in Sweida, 17 tons/day (90%) in Shahba, 11 tons/day (95%) in Salkhad, 68 tons/day (90%) in Aurbeen, 90 tons/day (90%) in Al-hajjar al-asswadd, 61 tons/day (85%) in Al tell, 39 tons/day (90%) in Mudamiate al-shamm, 31 tons/day (90%) in Al-dumair and 76 tons/day (75%) in Dariaa. |

| Current Situation and Problems | Improvement Measures Under the Project | Effects and Degree of Improvement Under the Project |
|---|---|---|
| 2. Present averaged age of the existing waste collection and transportation equipment after manufacture is at 19.2 years/ton in Idleb, 18.5 years/ton in Hama, 25.1 years/ton in Sweida, 13.4 years/ton in Shahba, 11.1 years/ton in Salkhad, 14.6 years/ton in Aurbeen, 20.6 years/ton in Al-hajjar al-asswadd, 26.5 years/ton in Al tell, 13.8 years/ton in Mudamiate al-shamm, 22.2 years/ton in Al-dumair and 18.7 years/ton in Dariaa with overall averaged age of whole Project Target Areas of 19.4 years/ton. Waste is presently collected roughly with the equipment aged 20 years after manufacture. If such old aged equipment are used further more, frequent breakdown will hinder waste collection and transportation works and incur additiononal O & M costs. | Procurement of the new equipment mentioned in II.1 and withdrawal from service of Equipment with age over 20 years old at the year 2012. | Averaged age of the waste collection and transportation equipment after manufacture in the year 2012 is at 6.3 years/ton in Idleb, 5.4 years/ton in Hama, 1.7 years/ton in Sweida, 5.1 years/ton in Shahba, 6.6 years/ton in Salkhad, 7.2 years/ton in Aurbeen, 2.7 years/ton in Al-hajjar al-asswadd, 1.0 years/ton in Al tell, 4.3 years/ton in Mudamiate al-shamm, 1.0 years/ton in Al-dumair and 6.4 years/ton in Dariaa with overall averaged age of whole Project Target Areas of 4.8 years/ton. Waste will be collected roughly with the new equipment aged 5 years after manufacture. Stable operation can be made and O & M cost will be reduced. |
| 3. Waste collection by tractors is done for the areas with narrow roads. Thus, operators are forced to be engaged in unefficient and non-sanitary working conditions. Waste transportation by tractors to the existing transfer stations or landfill sites is also time consuming due to slow operation and not efficient. | Procurement of the new small compactors (4 $m^3$) as mentioned in II.1 and withdrawal from service of all tractors. | Effective waste collection and transportation in narrow road areas can be made by the new small compactors (4 $m^3$) in stead of tractors, thus the waste collection and transportation works will be improved as sanitary and highly efficient. |
| 4. Medical waste harmful to health of operators is presently collected in 100% by a very old compactor with more than 45 years from manufacture in Hama, however, the equipment is not appropriate for medical waste collection and already fully deteriorated. Medical waste in Sweida city is collected together with municipal solid waste and is infectious to others through vehicles, operators and medical waste itself. | Procurement of the following collection and transportation vehicles exclusively for medical waste<br>・ Dump truck (two tons): 1 unit<br>・ Truck (one ton): 1 unit | The collection rate of medical waste in 2012 will be improved to 100% in both Hama and Sweida. |

The following secondary effect can be expected:

(1) Waste collection efficiency will be improved as a result of provision of new equipment, thus sanitary environment for beneficial population of 3.6 million in the Project Target Areas will be improved.

(2) Sanitary environment of Lattakia City will be improved, thus the Project can contribute to tourism development in Lattakia.

(3) The sanitary environment of Iraqi refugees of approximately 70 thousands in the Project Target Areas will be improved.

## 3-2 Recommendations

### 3-2-1 Tasks and Recommendations regarding Collection and Transportation of Solid Waste

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

(1) Improvement of Collection Rate

The improvement of solid waste collection rate can not be made only by strengthening of the hardware aspect comprising equipment and manpower, etc. and but be achieved with the efficient use of equipment and manpower, etc. backed up with proper planning. 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 required for the Syrian to be introduced as mentioned below. These measures can be implemented through the application of the existing skills possessed by the Syrian side, in particular Damascus City.

- Collection of precise data and information regarding waste amount collected, transported and disposed, accumulation of such data and information with proper documentation and its analysis
- Setting up of a collection and transportation route for each vehicle
- Setting up of 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 residents

(2) Vehicle Maintenance

The project implementing bodies are currently using vehicles with more than 20 years old after manufacture. This can be appreciated as the indication of their self efforts to use the existing vehicles as much as possible under sevire restriction on budgetary allocation. Therefore, it is natural for management of the Project impolementing bodies to take the vehicle maintenance method as symptomatic in that breakdowns are dealt with as they occur and periodic inspection and maintenance work to prevent breakdowns is not sufficiently conducted. However, the adoption of preventive maintenance based on periodic inspection and maintenance work is highly desirable to ensure the good condition of vehicles to be provided under the Project over a long period of time. It is recommended to

carry out the education and training of officers in charge of SWM in each Project Target Area by effectively utilizing the know-how accumulated in MOLA and Damascus City.

In actual waste collection works, repetitive notification to the drivers and workers shall be carried out in terms of conscencious driving and care of the equipment. In particular, in the municipalities where two shift waste collection system shall be adopted to achieve the target waste collection rate, one equipment will be operated by two different operation crews. Such collection system will cause the reduction in sense of responsibility by the crews in taking care of the equipment and will result in failure in timely identification of troubles in the equipment and in careless driving. Therefore, it is recommended to maintain the sense of responsibility in the equipment by limiting the number of crews for one equipment. However, even in the case that 2 shifts system will have to be adopted due to limitation of working hours in a day for workes, maintenance and enhancement of the sense of responsibility of the crews will be recommended by introducing an award of best crew of the month for operation of equipment.

### 3-2-2 Tasks and Recommendations Regarding General Improvement of Solid Waste Management

In the Project Target Areas in general, the allocation of budget for SWM is limited. For the proper execution for security of environmental sanitation, it is essential for the municipalities concerned to carry out SWM based on the appropriate, effective and timely planning. The early completion of projects for construction of related SWM facilities under M/P and A/P is very important for environmental security in the Project Target Areas. The tasks and recommendations regarding general SWM in the Project Target Areas are as follows:

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

Some of the municipalities in the Project Target Areas operate open-dump landfills or do not practice sufficient placement of cover soil over the disposed solid waste. However, the construction of new sanitary landfill sites under A/Ps in the governorates which include the Project Target Areas is in progress and is scheduled to be completed before the arrival of equipment to be provided under the Project. The existing landfill sites shall be closed upon completion of the above porjects.

These construction projects of new sanitary landfill sites are the most pripritized projects in the Syria and the budget for the above has been allocated with high priority. However, since the number of staff with full knowledge on SWM skills is limited in the Project Target Areas, it is essential to provide continuous and objective monitoring and advice on the progress of the projects in terms of control of quality and implementation schedule. For this purpose, it is recommended for MOLA in cooperation

with SWM sectors in the related governorates to promote arrangement of dispatch of experienced staff from Damascus City to the Project Target Areas to provide the above advisory services.

(2) Nationwide Development for Improvement of SWM Methdology and Know-how

The issues on SWM which are being experienced in the Project Target Areas are not unique to the Project Target Areas but are common throughout Syria. Therefore, it is recommended to implement the improvement measures on SWM methodology and know-how through the nationwide exchange of information, including the nationwide spread of knowledge learned from the Project and the application of useful information obtained in other advanced areas such as Damascus City to the Project Target Areas and the nationwide exchange of information and technology transfer by interchange of domestic engineers and specialist in SWM.

Presently, the designated special departments or sections for SWM are under formulation process in MOLA and governorates. This development show that MOLA and governorates are already aware of the necessity and importance of integration of SWM in local municipalities under their jurisdiction and it is expected that such formulation of special SWM departments or sections in all administrative levels in charge of SWM will be promoted in Syria. However, such formulation still can only be materialized through trial and error practices, it is recommended to effectively dispatch the SWM specialists in Damascus City where SWM level is the highest in Syria to governorates as well as MOLA for transfer of technology and to seek advice from the Sinior volunteer dispatched by JICA to MOLA.

Remarcable improvement in sanitary landfilling has been observed in Al-gazlania sanitary landfill site previously operated by Rural Damascus Governorate in 2 to 3 months after handing over the operation and management to Damascus City. This is one of the fruit of the training offered by JICA to the staff in Solid Waste Treatment Plant of Damascus City. It is recommended for MOLA to spread such knowledge gained through training offerd by JICA to governorate and municipality levels as self-efforts by Syria for improvement of SWM.

(3) Establishment of Sustainable 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 sustainable 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 A/Ps. It is also recommended to implement the preparation for source separation and collection in order to effectively use the above recycling facilities.

### 3-3 Concluding Remarks

This Project privides considerable benefit and effect mentioned above to Syria and contributes to the improvement of urban sanitary environment and living environment of the public in the Project Target Areas. This proves the viability of execution of the Project through the grant aid scheme of the GOJ. It is confirmed that Syria can provide sufficient staff and fund for proper operation and maintenance of the equipment to be provided under the Project.

It is hoped that the realization of the Project will contribute effectively further to Syria overall as well as to Project Target Areas through achievement of the following:

- Integrated SWM facilities will be constructed in accordance with A/Ps in the Project Target Areas and proper SWM will be carried out even after the Project Target year.
- SWM integration system will be established in MOLA in order to share and exchange the knowledge and know-how gained in local municipalities and to raise national standard in SWM in Syria.

# APPENDICES

# APPENDIX-1

# MEMBER LIST OF THE SURVEY TEAM

## 1. Members of the Survey Team

(1) Preparatory Survey Team

| Name | Assignment | Current Position / Company |
|---|---|---|
| Mr. Kazuo SUDO | Leader | Japan International Cooperation Agency (JICA) |
| Mr. Noriyuki ITO | Planning Management Officer | Japan International Cooperation Agency (JICA) |
| Mr. Toshio YANO | Chief Consultant / Waste Management Planning | Yachiyo Engineering Co., Ltd. |
| Mr. Hiroshi ABE | Waste Equipment Planning 1 | Yachiyo Engineering Co., Ltd. |
| Mr. Katsumi FUJII | Waste Equipment Planning 2 | Yachiyo Engineering Co., Ltd. |
| Mr. Takatoshi ARAI | Procurement Planning / Cost Estimator | Yachiyo Engineering Co., Ltd. |

(2) Draft Report Explanation Team

| Name | Assignment | Current Position / Company |
|---|---|---|
| Mr. Hideki TANABE | Leader | Senior Representative, Japan International Cooperation Agency (JICA) Syria Office |
| Mr. Noriyuki ITO | Planning Management Officer | Japan International Cooperation Agency (JICA) |
| Mr. Toshio YANO | Chief Consultant / Waste Management Planning | Yachiyo Engineering Co., Ltd. |
| Mr. Takatoshi ARAI | Procurement Planning / Cost Estimator | Yachiyo Engineering Co., Ltd. |

# APPENDIX-2

# SURVEY SCHEDULE

## 2. Survey Schedule：

(1) Preparatory Survey

| Date | | | JICA Coordinator (Mr.Sudo, Mr.Ito) | Consultant A (G1) (Mr.Yano) | Consultant B (G1) (Mr.Abe) | Consultant C (G2) (Mr.Arai) | Consultant D (G2) (Mr.Fujii) |
|---|---|---|---|---|---|---|---|
| 1 | 3-Jul | Fri | Departure from Tokyo | | | | |
| 2 | 4-Jul | Sat | Arrival at Damascus | | | | |
| 3 | 5-Jul | Sun | Meeting with JICA Syria Office<br>Courtesy Call and discussion with MoLA: Consultants to further discuss with MoLA on Arrangement for Site Survey<br>Courtesy Call and discussion with SPC | | | | |
| 4 | 6-Jul | Mon | Explanation and discussion with MoLA on Inception Report and Proposed Itinerary of the Team<br>Meeting with EU | | | Move from Damascus to Hama | |
| 5 | 7-Jul | Tue | Discussion with MoLA on Minutes of Discussion (M/D)<br>Site Survey in Damascus City | | | Site Survey in Hama | |
| 6 | 8-Jul | Wed | Signing of M/D<br>Report to JICA Syria Office and Embassy of Japan | | | Site Survey in Hama | |
| 7 | 9-Jul | Thu | Leave from Damascus | Site Survey in Sweida | | Site Survey in Homs | |
| 8 | 10-Jul | Fri | Arrival at Tokyo | Document Prep., Analysis of collected information | | Document Prep., Analysis of collected information | |
| 9 | 11-Jul | Sat | | Site Survey in Sweida | | Move to Idleb, Site Survey in Idleb | |
| 10 | 12-Jul | Sun | | Discussion with 6 municipalities in Rural Damascus Governorate on Questionnaire | | Site Survey in Idleb | |
| 11 | 13-Jul | Mon | | Site Survey in Al-hajjar al-asswadd, Rural Damascus | | Site Survey in Idleb, Move to Lattakia | |
| 12 | 14-Jul | Tue | | Site Survey in Aurbeen, Rural Damascus | | Site Survey in Lattakia | |
| 13 | 15-Jul | Wed | | Site Survey in Al-dumire, Rural Damascus<br>Team Meeting | | Move to Damascus | |
| 14 | 16-Jul | Thu | | Discussion with 6 municipalities in Rural Damascus Governorate on Questionnaire | | Market Survey | Leave from Damascus |
| 15 | 17-Jul | Fri | | Document Preparation and Analysis of collected information<br>Team Meeting | | | Arrival at Tokyo |
| 16 | 18-Jul | Sat | | Site Survey in Al-tell, Rural Damascus | | Market Survey | |
| 17 | 19-Jul | Sun | | Site Survey in Mudamiate al-shamm, Rural Damascus | | Market Survey | |
| 18 | 20-Jul | Mon | | Site Survey in Dariaa, Rural Damascus | | Market Survey | |
| 19 | 21-Jul | Tue | | Site Survey in Shahba, Sweida<br>Site Survey in Salkhad, Sweida | | Market Survey | |
| 20 | 22-Jul | Wed | | Survey in Rural Damascus Governorate | | Market Survey | |
| 21 | 23-Jul | Thu | | Preparation of F/R and additional survey | | | |
| 22 | 24-Jul | Fri | | Document Preparation and Analysis of collected information<br>Team Meeting | | | |
| 23 | 25-Jul | Sat | | Preparation of F/R and Additional Survey | | | |
| 24 | 26-Jul | Sun | | Preparation of F/R and Additional Survey<br>with MoLA | | Discussion | |
| 25 | 27-Jul | Mon | | Preparation of F/R and Additional Survey<br>with MoLA | | Discussion | |
| 26 | 28-Jul | Tue | | Confirmation of F/R with MoLA<br>Report to JICA Syria Office and Embassy of Japan | | | |
| 27 | 29-Jul | Wed | | Leave from Damascus | | | |
| 28 | 30-Jul | Thu | | Arrival at Tokyo | | | |

(2) Draft Report Explanation

| Date | | | JICA Team Leader (Mr.Tanabe) | JICA Coordinator (Mr.Ito) | Consultant A (G1) (Mr.Yano) | Consultant C (G2) (Mr.Arai) |
|---|---|---|---|---|---|---|
| 1 | 23-Oct | Fri | | Departure from Tokyo | | |
| 2 | 24-Oct | Sat | | Arrival at Damascus | | |
| | | | Internal Meeting | | | |
| 3 | 25-Oct | Sun | Courtesy Call and discussion with MOLA on Draft Report | | | |
| 4 | 26-Oct | Mon | | Site Survey in Al-ghazlanea Landfill Site<br>Discussion with MOLA on Draft Report and M/D | | |
| 5 | 27-Oct | Tue | | Discussion with MOLA on Draft Report and M/D | | |
| | | | Internal Meeting | | | |
| 6 | 28-Oct | Wed | Signing of M/D<br>Report to Embassy of Japan | | | |
| | | | | Leave from Damascus | | |
| 7 | 29-Oct | Thu | | Arrival at Tokyo | | |

# APPENDIX-3

# LIST OF PARTIES CONCERNED

# IN THE RECIPIENT COUNTRY

## 3. List of Parties Concerned in Recipient Country

| Agency and Position | Name |
|---|---|
| **State Planning Commission** | |
| Director General of International Cooperation | Mr. Nader Sheikh Ali |
| Director of Cooperation with Asia, America and Africa | Ms. Hala Imad |
| **Ministry of Local Administration** | |
| Deputy Minister | Eng. M. Sadek Abowatfa |
| Head of Solid Waste Management Department | Eng. Roula Abazeed |
| Head of Solid Waste Management Department | Eng. Ahdab Al-mobayed |
| Director of Vehicle Maintenance | Eng. Ahmed Kssarah |
| **Homs Governorate** | |
| Head of Solid Waste Department | Eng. Hassan Darwish |
| **Homs City** | |
| Mayor | Eng. Nadia Ksaibi |
| Director of Cleaning Directorate | Eng. Mamdouh Al Saleh |
| Head of Cleaning Vehicle Section | Eng. Mofeed Al Bitak |
| Head of Study, Planning and Statistics Section | Eng. Helia Jamila |
| Manager of Fleet and Workshop Department | Eng. Wael Obaid |
| **Lattakia Governorate** | |
| Head of Solid Waste Management Section | Eng. Walio Hsan |
| **Municipality of Lattakia: Lattakia City Council** | |
| Manager of Service and Maintenance Department | Eng. Yahia Masri |
| Manager of Cleaning Department | Eng. Mazen Hussein |
| Head of Follow up and Statistics Unit | Eng. Rima Kharma |
| Technical Assistant of Service and Maintenance Unit | Eng. Elwan Said |
| Deputy Manager of Workshop | Eng. Khaled Al Badri |
| Head of Fleet Distribution and Movement | Eng. Ramez Tarraf |
| Head of Maintenance | Eng. Mohamad Beksrawi |
| **Idleb Governorate** | |
| Director of Technical Service Department | Eng. Ismael Ismael |
| Head of Solid Waste Section | Eng. Manal Mazloum |
| Manager of Building Department | Eng. Basem Eliwi |
| **Idleb City** | |
| Deputy Mayor | Eng. Mohamad Al Deiani |
| Director of Cleaning Directorate | Mr. Haytham Shawi |
| Chief Accountant | Mr. Ezzo Abu Dai |
| Head of Fleet and Workshop Section | Eng. Mohamad Korini |

| Agency and Position | Name |
|---|---|
| **Hama Governorate** | |
| Director of Technical Service Department | Eng. Mohamad Al Meshaal |
| Head of Solid Waste Section | Eng. Basem Eliwi |
| **Hama City** | |
| Director of Cleaning Directorate | Eng. Adnan Abu Rabeieh |
| Workshop Manager | Eng. Sobai Al Bakki |
| **Sweida Governorate** | |
| Director of Solid Waste Management | Eng. Husam Hamed |
| Director of Techinical Service | Eng. Ghassan Qandalafft |
| **Sweida City** | |
| Mayor | Mr. Safunn Abu Saada |
| Director of Cleansing Department | Dr. Imad Al Salama |
| Head of Machinery Workshop Section | Mr. Nehal Hatem |
| **Ministry of Health, Sweida Governorate** | |
| Manager | Dr. Adnan Mak Lad |
| Director of Health | Dr. Amim Budrih |
| **Shahba City** | |
| Head of Shahba City Council | Mr. Imad Al Taweel |
| Director of Technical Affairs | Mr. Rabeea Naseer |
| Head of Cleansing Section | Ms. Sonya Ayasami |
| **Salkhad City** | |
| Head of Salkhad City Council | Eng. Adnan Abu Fawour |
| **Damascus Governorate** | |
| Manager of Solid Waste Management Plant | Eng. Maurice Addad |
| Solid Waste Management Plant | Mhd. Burhan Hafez |
| **Damascus City** | |
| Director of Cleanliness Directorate | Eng. Walid Johai |
| Technical Deputy of Vehicles Department | Eng. Samer Kilani |
| Director of Maintenance (Workshop) | Eng. Ghassan Fraih |
| **Rural Damascus Governorate** | |
| General Manager of Directorate of Technical Services In Rural Damascus | Eng. Lauay Kharita |
| Deputy manager, Directorate of Technical Services<br>Director of Solid Waste Management in Directorate of Technical Services | Eng. Musa Ma'alouleh |
| Directorate of Technical Services | Eng. Fatima Deeb |
| **Aurbeen City** | |
| Head of Aurbeen City Council | Eng. Abdul Kareem Kishkeh |

| Agency and Position | Name |
|---|---|
| Head of cleansing section | Eng. Mahrous Al Shalabi |
| **Al-tell City** | |
| Head of Al-tell City Council | Eng. Kamal Mostafa Aksimi |
| Accountant | Jameel Daher |
| Supervisor of Cleaning Section | Muhamad Hilal |
| **Mudamiate al-shamm City** | |
| Accountant | Bahaa Imad |
| Head of Maintenance section | Eng. Khaled Natouf |
| **Al-hajjar al-asswadd City** | |
| Head of Al-hajjar al-asswadd City Council | Eng. Hasan Ghanem |
| **Al-dumire City** | |
| Head of Al-dumire | Mr. Khaled Abbara |
| Technical Bureau of Al-dumire City Council | Eng. Khaled Sharaf Eddin |
| Accountant | Hair Aldeen Keeldni |
| **Dariaa City** | |
| Head of Dariaa City Council | Eng. Hasa Abu Shnaq |
| Head of Maintenance | Eng. Farouq Ghafeer |
| **European Union** | |
| Program Officer, Crisis Management and Crisis Response | Mr. Urs Fruehauf |
| **Embassy of Japan in Syria** | |
| Second Secretary | Mr. Takayuki Baba |
| **JICA Syria Office** | |
| Resident Representative | Ms. Akiko Tomita |
| Senior Representative | Mr. Hideki Tanabe |
| Representative | Ms. Mayumi Murakami |
| Representative | Mr. Yasuhiro Suhara |
| Program Officer | Mr. Ousama Lazini |
| Program Officer | Mr. Izeldien Oghly |

# APPENDIX-4

# MINUTES OF DISCUSSIONS

**4. Minutes of Discussions (M/D)**

(Preparatory Survey)

MINUTES OF MEETING
PREPARATORY SURVEY
OF THE PROJECT FOR IMPROVEMENT OF SOLID WASTE TREATMENT
IN LOCAL CITIES (PHASE 2)
IN THE SYRIAN ARAB REPUBLIC

In response to a request from the Government of the Syrian Arab Republic (hereinafter referred to as "Syria"), the Government of Japan decided to conduct a Preparatory Survey of the Project for Improvement of Solid Waste Treatment in Local Cities (Phase2) (hereinafter referred to as "the Project-2") and entrusted the Survey to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Syria the Preparatory Survey Team (hereinafter referred to as "the Team"), headed by Mr. Sudo Kazuo, Senior Advisor, JICA, and is scheduled to stay in the country from 4th July 2009 to 29th July 2009.

The Team held a series of discussions with the officials concerned of the Government of Syria and conducted a field survey in the Project area.

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

Damascus, 9th July 2009

| | | |
|---|---|---|
| Mr. Sudo Kazuo<br>Leader<br>Preparatory Survey Team<br>Japan International<br>Cooperation Agency<br>Japan | Hala Imad<br>Representative of<br>State Planning Commission<br>The Syrian Arab Republic | Eng. Sadek Abowatfa<br>Deputy Minister<br>Ministry of Local<br>Administration<br>The Syrian Arab Republic |

## ATTACHMENT

1. Objective of the Project

1-1. Improvement of municipal waste collection

1-2. Improvement of medical waste collection

2. Project sites

2-1. The unconducted Lot-2 of "the Project for Improvement of Solid Waste Treatment in Local Cities" (hereinafter referred to as "the Project-1") is incorporated in the Project-2. Therefore, the municipalities of Homs, Lattakia, Jableh and Qurdaha are included in the Project-2 sites.

2-2. According to the result of the Preliminary Study conducted in January and February 2009, the prioritized municipalities of the Project-2 are shown in Annex-1.

3. Responsible and Implementing Organization

3-1. The Responsible Agency is the Ministry of Local Administration.

3-2. The Implementing Agency is each recipient municipality through the Project-2.

4. Equipment and Vehicles requested by the Government of Syria

4-1. The Project-2 includes the same types and number of equipment and vehicles as the unconducted Lot-2 of the Project-1.

4-2. The Project-2 also includes the equipment and vehicles for municipal waste collection and medical waste collection of the municipalities shown in Annex-1 except Homs, Lattakia, Jableh and Qurdaha . JICA will assess the appropriateness of the request and will recommend the findings to the Government of Japan for approval.

5. Japan's Grant Aid Scheme

5-1. The Syrian side understood the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of Syria explained by the Team, as described in Annex-2 and Annex-3.

5-2. JICA will report to the Syrian side if there are any other undertakings of the Government of Syria based on the result of the preparatory survey.

6. Schedule of the Survey

6-1. Consultant members will proceed to further surveys in Syria until 29th July 2009.

6-2. JICA will prepare the draft report of the survey in English and dispatch a mission to Syria in order to explain its contents around the end of October 2009.

6-3. In case the contents of the draft report are accepted in principle by the Government of Syria, JICA will complete the Basic Design Study Report and send it to the Government of Syria

around February 2010.

6-4. The Team explained that implementation of the preparatory survey is not a commitment of the approval of the Project-2 by the Japanese Government.

7. Other relevant issues

7-1. The unconducted Lot-2 of the Project-1

Both sides agreed that the unconducted Lot-2 of the Project-1 would be given the first priority in the Project-2.

7-2. In the case of exceeding the expected budget

The necessary types and numbers of equipment and vehicles for each municipality will be estimated after the survey conducted until 29th July 2009. When the total project cost for all equipment and vehicles estimated by the Team is more than the limitation of expected budget in the Japanese side, both sides agreed the types and numbers will be reduced in order from the least prioritized municipality through close consultation between both sides.

However, the Syrian side strongly requested that all of the municipalities of the Project-2 shown in Annex-1 should qualify for supply of at least one (1) vehicle.

7-3. Road Sweeping

The Syrian side requested the road sweeper to be considered in the Project-2.

The Team will conduct the survey on road sweeping. Accordingly, in case the total project cost is within the expected budget in Japanese side, the road sweepers might be included in the Project-2.

7-4. Target year for the Project-2

If the implementation of the Project-2 is determined by the Government of Japan by the end of 2009, the Project-2 is expected to be completed in 2011. Therefore, both sides agreed that the target year for the Project-2 will be 2012.

7-5. Population of the Syrian residents in each municipality

Both sides agreed that the population of the target year for the Project-2 will be estimated basically based on the data authorized in writing by the Ministry of Local Administration.

7-6. Population of the Iraqi refugees

The Syrian side promised to provide the numbers of the Iraqi refugees to the Team. The Team will discuss the issue with the Syrian side and reach agreement on the numbers of the refugee population to be covered.

7-7. Solid waste amount generated per day per capita (hereinafter referred to as "Unit generation rate")

The Syrian side agreed to provide the Unit generation rates according to the data in the National Master Plan and the Action Plans on solid waste management made by each governorate. The

Team requests documents of supporting information on the Unit generation rate from the Syrian Authorities concerned. Both sides will discuss the issue and reach agreement on Unit generation rates.

7-8. Provision of containers

The Syrian side promised to be responsible for provision of containers.

7-9. Tax exemption

The Government of Syria shall take necessary measures to exempt Japanese nationals who will be engaged in the Project-2 from all duties and related fiscal charges which may be imposed in Syria with respect to the import and local procurement of equipment and services supplied under the verified contract.

7-10. Internal transportation

The Government of Syria shall take the responsibility of internal transportation of equipment from the port of disembarkation to the project sites.

7-11. Overlapping with other projects

The Syrian side explained that the Project-2 would not be overlapped with any other projects supported by other foreign donors, NGOs and domestic official organizations.

7-12. Environmental and Social Consideration

The Syrian side explained that Environmental Impact Assessment (hereinafter referred to as "EIA") is not necessary for the implementation of the Project-2.

Annex-1: The prioritized municipalities of the Project-2
Annex-2: Japan's Grant Aid
Annex-3: Major Undertakings to be taken by Each Government

**Annex-1**

## The prioritized municipalities of the Project-2

| Priority | Municipality |
|---|---|
| 1st | Homs |
| | Lattakia |
| | Jableh |
| | Qurdaha |
| 2nd | Aurbeen |
| 3rd | Al-hajjar al-asswadd |
| 4th | Al-tell |
| 5th | Idleb |
| 6th | Sweida |
| 7th | Hama |
| 8th | Mudamiate al-shamm |
| 9th | Al-dumire |
| 10th | Dariaa |
| 11th | Shahba |
| 12th | Salkhad |

## JAPAN'S GRANT AID

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as part of this realignment, JICA was reborn on October 1, 2008. After the reborn of JICA, following the decision of the Government of Japan (hereinafter referred to as "the GOJ"),Grant Aid for General Project is extended by JICA.

Grant Aid is non-reimbursable fund to a recipient country 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. Grant Aid Procedures

Japanese Grant Aid is conducted as follows-

・Preparatory Survey (hereinafter referred to as "the Survey")
- the Survey conducted by JICA

・Appraisal &Approval
-Appraisal by The GOJ and JICA, and Approval by the Japanese Cabinet

・Determination of Implementation
-The Notes exchanged between the GOJ and a recipient country

・Grant Agreement (hereinafter referred to as "the G/A")
-Agreement concluded between JICA and a recipient country

・Implementation -Implementation of the Project on the basis of the G/A

### 2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide a basic document necessary for the appraisal of the Project by JICA and the GOJ. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the implementation of the Project.

- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic 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 by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of the Japan's Grant Aid scheme.

JICA 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 the 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.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA uses (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

The Report on the Survey is reviewed by JICA, and after the appropriateness of the Project is confirmed, JICA recommends the GOJ to appraise the implementation of the Project.

**3. Japan's Grant Aid Scheme**

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the E/N will be singed between the GOJ and the Government of the recipient country to make a plead for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

The consultant firm(s) used for the Survey Will be recommended by JICA to the recipient country to also work on the Project's implementation after the E/N and the G/A, in order to maintain technical consistency.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

(4) Necessity of "Verification"

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

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex.

(6) "Proper Use"

The Government of recipient country is required to maintain and use the facilities constructed and the 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) "Export and Re-export"

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

(8) Banking Arrangements (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 a bank in Japan (hereinafter referred to as "the Bank"). JICA 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 the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to JICA 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.

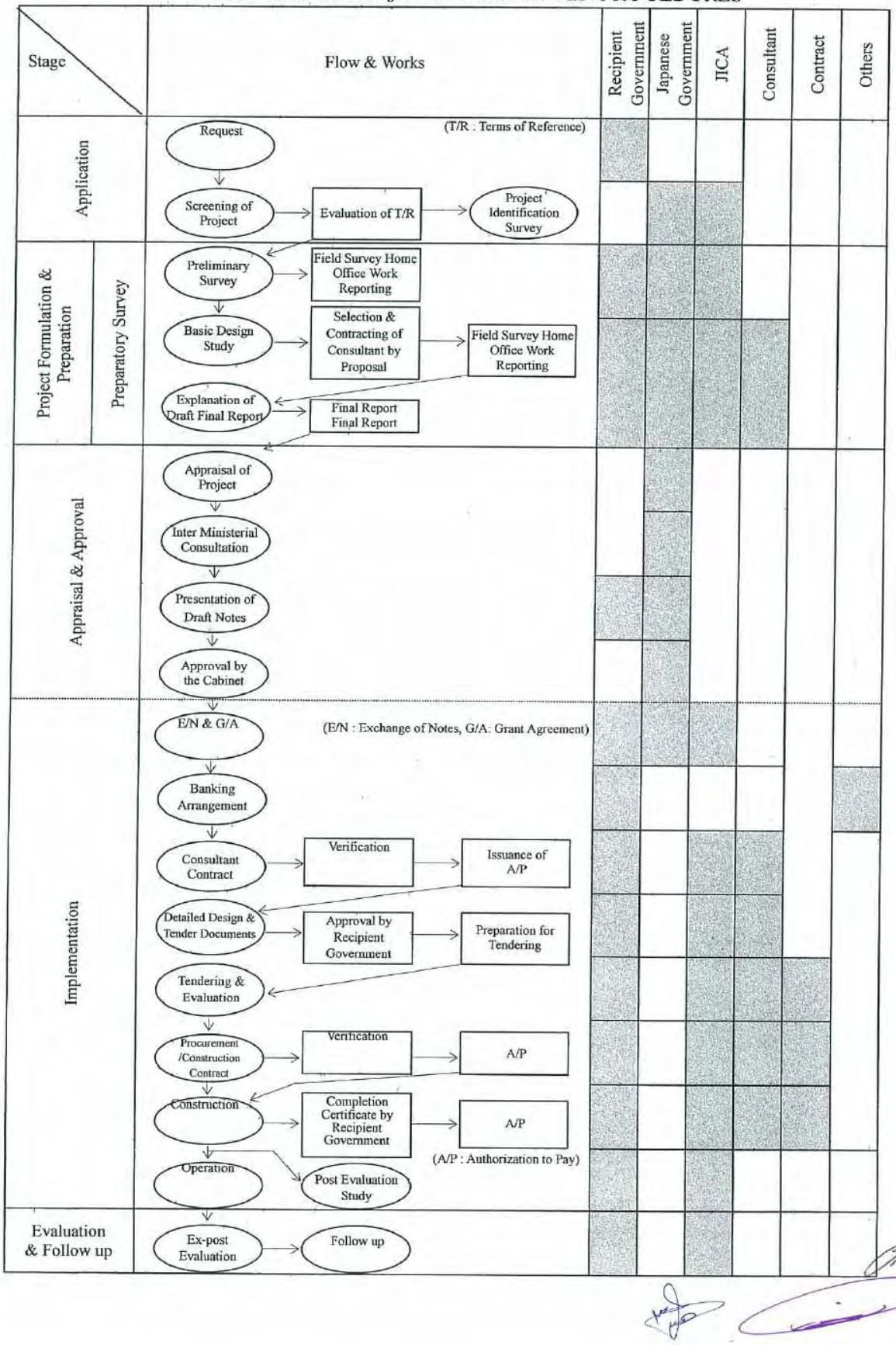
(10) Social and Environmental Considerations

A recipient country must ensure the social and environmental considerations for the Project and must follow the environmental regulation of the recipient country and JICA socio-environmental guideline.

(End)

Attachment 1

# FLOW CHART OF JAPAN's GRANT AID PROCEDURES



Annex-3

Major Undertakings to be taken by Each Government

| NO | Items | To be covered by the Grant | To be covered by Recipient side |
|---|---|---|---|
| 1 | 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 | | ● |
| 2 | 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 custom clearance of the products at the port of disembarkation | | ● |
| | 3) Internal transportation from the port of disembarkation to | | ● |
| 3 | 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 | | ● |
| 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 contract | | ● |
| 5 | To maintain and use properly and effectively the facilities constructed 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 | | ● |

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

(Draft Report Explanation)

**MINUTES OF DISCUSSIONS**
**ON THE BASIC DESIGN STUDY**
**ON THE PROJECT FOR IMPROVEMENT OF SOLID WASTE TREATMENT**
**IN LOCAL CITIES (PHASE 2)**
**IN THE SYRIAN ARAB REPUBLIC**
**(EXPLANATION ON DRAFT REPORT)**

In July 2009, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Preparatory Survey Team on the Project for Improvement of Solid Waste Treatment in Local Cities (phase2) (hereinafter referred to as "the Project-2") to Syria and through discussion, field survey, and technical examination of the results in Japan, JICA prepared a draft report of the study.

In order to explain and to consult with the Government of 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. Tanabe Hideki, Senior Representative, JICA Syria Office, from October 24th to 28th 2009.

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

Damascus, 28th October 2009

| | | |
|---|---|---|
| Mr. Tanabe Hideki<br>Leader<br>Preparatory Survey Team<br>Japan International<br>Cooperation Agency<br>Japan | Representative of<br>State Planning Commission<br>The Syrian Arab Republic | Eng. Sadek Abowatfa<br>Deputy Minister<br>Ministry of Local<br>Administration<br>The Syrian Arab Republic |

ATTACHMENT

1. Components of the Draft Report

The Government of Syria agreed and accepted in principle the components of the Draft Preparatory Survey Report explained by the Team. The components of the project are shown in Annex-1.

2. 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-3.

3. Schedule of the Study

JICA will complete the final report in accordance with the confirmed item and send it to the Government of Syria by February 2010.

4. Other relevant issues

4-1. Undertakings of the Syrian side

The Team requested and the Government of Syria agreed on the following undertakings in addition to the major undertakings described in Annex-3 of the Minutes:

(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 recruitments and/or redeployment of staff members at its own expense to secure the necessary personnel to operate the equipment procured under the Project.
(4) Complete the transfer stations and new disposal sites for use by the Project Target municipalities and start services by January 2011 as planned. In consideration of the possibility of this being delayed, efficiently utilize existing disposal sites until 2011.
(5) Close existing disposal sites where open dumping is causing negative environmental impacts (Shahba, Salkhad, Al-tell and Al-dumire).

4-2. Representative Implementing Municipalities

Since there are fifteen(15) implementing municipalities involved in the Project, two(2) representative implementing municipalities will be selected in north and center areas as shown in Table below. The roles of the representative implementing municipalities will be to discuss with the

Japanese consultant and contractor, receive the procured equipment on behalf of the subsidiary municipalities and carry out coordinating activities among the subsidiary municipalities.

**Representative implementing Agencies**

| Representative | Subsidiary Municipalities |
|---|---|
| Lattakia | Homs, Lattakia, Jableh, Qurdaha<br>Hama, Idleb |
| Rural Damascus Governorate | Aurbeen, Al-hajjar al-asswadd, Al-tell, Mudamiate al-shamm, Al-dumire, Dariaa<br>Sweida, Shahba, Salkhad |

The above contents can be summarized as follows:

- Project responsible agency: MOLA
- Project representative implementing agencies: Lattakia city, Rural Damascus Governorate

4-3. Project Cost estimation

The team explained to the Syrian side the Project cost estimation as described in Annex-2. The team and the Syrian side agreed that the Project cost estimation should never be duplicated or released to any outside parties before signing of all the Contract(s) for the Project.

The Government of Syria understood that the Project cost estimation attached as Annex-2 is not final and is subject to change.

4-4. Overlapping with other projects

The Syrian side explained that the project would not be overlapped with other projects supported by foreign and/or international donors, NGOs and Domestic official organizations.

4-5. "Equipment Procurement Plan" and "Project Operation and Maintenance Plan"

The Syrian side agreed to follow the "Equipment Procurement Plan" and "Project Operation and Maintenance Plan" that the Team explained in the Preparatory (Basic Design) Survey Report.

The Syrian side also agreed that the old existing vehicles, which are more than 20 years after manufacture in the target year 2012, and all existing tractors for municipal Solid Waste Collection in the Project Target Areas shall be withdrawn from service and be replaced with the new vehicles to be procured under the Project-2 in accordance with the Basic Design of the Requested Japanese Assistance for the Project-2.

Annex-1: Components of the project
Annex-2: Project Cost Estimation
Annex-3: Japan's Grant Aid Scheme

Annex-1 : Components of the project

**(1) Equipment Supply Quantities for the 11 Municipalities beside the unconducted Lot-2 of the Project-1**

| Municipality \ Equipment | | Compactor Truck | | | | Medical Waste Truck | Total |
|---|---|---|---|---|---|---|---|
| | | 16m³ | 12m³ | 8m³ | 4m³ | | |
| Idleb Governorate | Idleb | 2 | 3 | 1 | 2 | | 8 |
| Hama Governorate | Hama | 4 | 6 | | 6 | 1(2t) | 17 |
| Sweida Governorate | Sweida | 1 | 2 | | 4 | 1(1t) | 8 |
| | Shahba | | | | 2 | | 2 |
| | Salkhad | | | | 1 | | 1 |
| Rural Damascus Governorate | Aurbeen | | 1 | | 3 | | 4 |
| | Al-hajjar al-asswadd | | | 1 | 8 | | 9 |
| | Al-tell | | 4 | | 1 | | 5 |
| | Mudamiate al-shamm | 1 | | | 1 | | 2 |
| | Al-dumire | 2 | | | 2 | | 4 |
| | Dariaa | 2 | | | 2 | | 4 |
| Total | | 12 | 16 | 2 | 32 | 2 | 64 |

**(2) Equipment Supply Quantities for the 4 Municipalities of the unconducted Lot-2 of the Project-1**

| Equipment \ Municipality | Homs | Lattakia | Jableh | Qurdaha | Total |
|---|---|---|---|---|---|
| Medical Waste Truck Type 1 (2ton dump truck) | 2 | – | – | – | 2 |
| Medical Waste Truck Type 2 (1ton van truck) | – | 1 | – | – | 1 |
| Dump Truck(6m³) | – | 4 | 3 | 1 | 8 |
| Wheel Loader | – | 1 | 1 | 1 | 3 |
| Wash Container | – | 2 | – | – | 2 |
| Mobile Workshop | 1 | 1 | – | – | 2 |
| Mechanical Sweeper | 5 | 3 | – | – | 8 |
| Sprinkler Truck | – | 2 | – | – | 2 |
| Total | 8 | 14 | 4 | 2 | 28 |

Annex-2 : Project Cost Estimation

**(1) Japan's Grand Aid**

Number of equipments procured for 15 municipalities: 92

| Item | | | Cost(million JPY) | |
|---|---|---|---|---|
| Procurement of Equipments | Homs | Homs | 159.4 | 965.8 |
| | Lattakia | Lattakia | 170.4 | |
| | | Jableh | 26.6 | |
| | | Qurdaha | 17.1 | |
| | Idleb | Idleb | 84.0 | |
| | Hama | Hama | 171.0 | |
| | Sweida | Sweida | 68.4 | |
| | | Shahba | 13.5 | |
| | | Salkhad | 6.7 | |
| | Rural Damasucus | Aurbeen | 32.0 | |
| | | Al-hajjar al-asswadd | 62.5 | |
| | | Al-tell | 53.9 | |
| | | Mudamiate al-shamm | 20.1 | |
| | | Al-dumire | 40.1 | |
| | | Dariaa | 40.1 | |
| Detail design & Procurment Management | Detail design & Procurment Management | | 19.2 | 19.2 |
| | Soft Component | | 0 | |

The cost estimate is provisional and will be further examined by the Government of Japan for the approval of the Grant.

According to the Syrian tax system, VAT and import customs, etc. on equipment and materials procured by grant aid are exempted from tax of the Government of Syria.

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**(2) Undertakings by the Government of Syria**

Estimated Project Cost: 69,974 thousand JPY (equivalent to 33,804 thousand SP)

(Unit: 1000JPY)

| Recipient Side | | Inland Transportation | Procurement of Container | Total |
|---|---|---|---|---|
| **Governorate** | **Municipality** | | | |
| Homs | Homs | 219 | 0 | 219 |
| Lattakia | Lattakia | 397 | 0 | 397 |
| | Jableh | 124 | 0 | 124 |
| | Qurdaha | 69 | 0 | 69 |
| Idleb | Idleb | 273 | 13,000 | 13,273 |
| Hama | Hama | 465 | 23,714 | 24,179 |
| Sweida | Sweida | 323 | 7,800 | 8,123 |
| | Shahba | 81 | 563 | 644 |
| | Salkhad | 40 | 282 | 322 |
| Rural Damasucus | Aurbeen | 145 | 2,252 | 2,397 |
| | Al-hajjar al-asswadd | 326 | 3,983 | 4,309 |
| | Al-tell | 181 | 5,953 | 6,134 |
| | Mudamiate al-shamm | 72 | 2,186 | 2,258 |
| | Al-dumire | 145 | 2,906 | 3,051 |
| | Dariaa | 145 | 4,330 | 4,475 |
| Total | | 3,005 | 66,969 | 69,974 |

Annex-3 Japan's Grant Aid Scheme

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as part of this realignment, JICA was reborn on October 1, 2008. After the reborn of JICA, following the decision of the Government of Japan (hereinafter referred to as "the GOJ"),Grant Aid for General Project is extended by JICA.

Grant Aid is non-reimbursable fund to a recipient country 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. Grant Aid Procedures

Japanese Grant Aid is conducted as follows-

・Preparatory Survey (hereinafter referred to as "the Survey")
- the Survey conducted by JICA

・Appraisal &Approval
-Appraisal by The GOJ and JICA, and Approval by the Japanese Cabinet

・Determination of Implementation
-The Notes exchanged between the GOJ and a recipient country

・Grant Agreement (hereinafter referred to as "the G/A")
-Agreement concluded between JICA and a recipient country

・Implementation -Implementation of the Project on the basis of the G/A

## 2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide a basic document necessary for the appraisal of the Project by JICA and the GOJ. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.

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- 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 by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of the Japan's Grant Aid scheme.

JICA 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 the 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.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA uses (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

The Report on the Survey is reviewed by JICA, and after the appropriateness of the Project is confirmed, JICA recommends the GOJ to appraise the implementation of the Project.

**3. Japan's Grant Aid Scheme**

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the E/N will be singed between the GOJ and the Government of the recipient country to make a plead for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

The consultant firm(s) used for the Survey will be recommended by JICA to the recipient country to also work on the Project's implementation after the E/N and the G/A, in order to maintain

technical consistency.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

(4) Necessity of "Verification"

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

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex.

(6) "Proper Use"

The Government of recipient country is required to maintain and use the facilities constructed and the 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) "Export and Re-export"

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

(8) Banking Arrangements (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 a bank in Japan (hereinafter referred to as "the Bank"). JICA 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 the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to JICA

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.

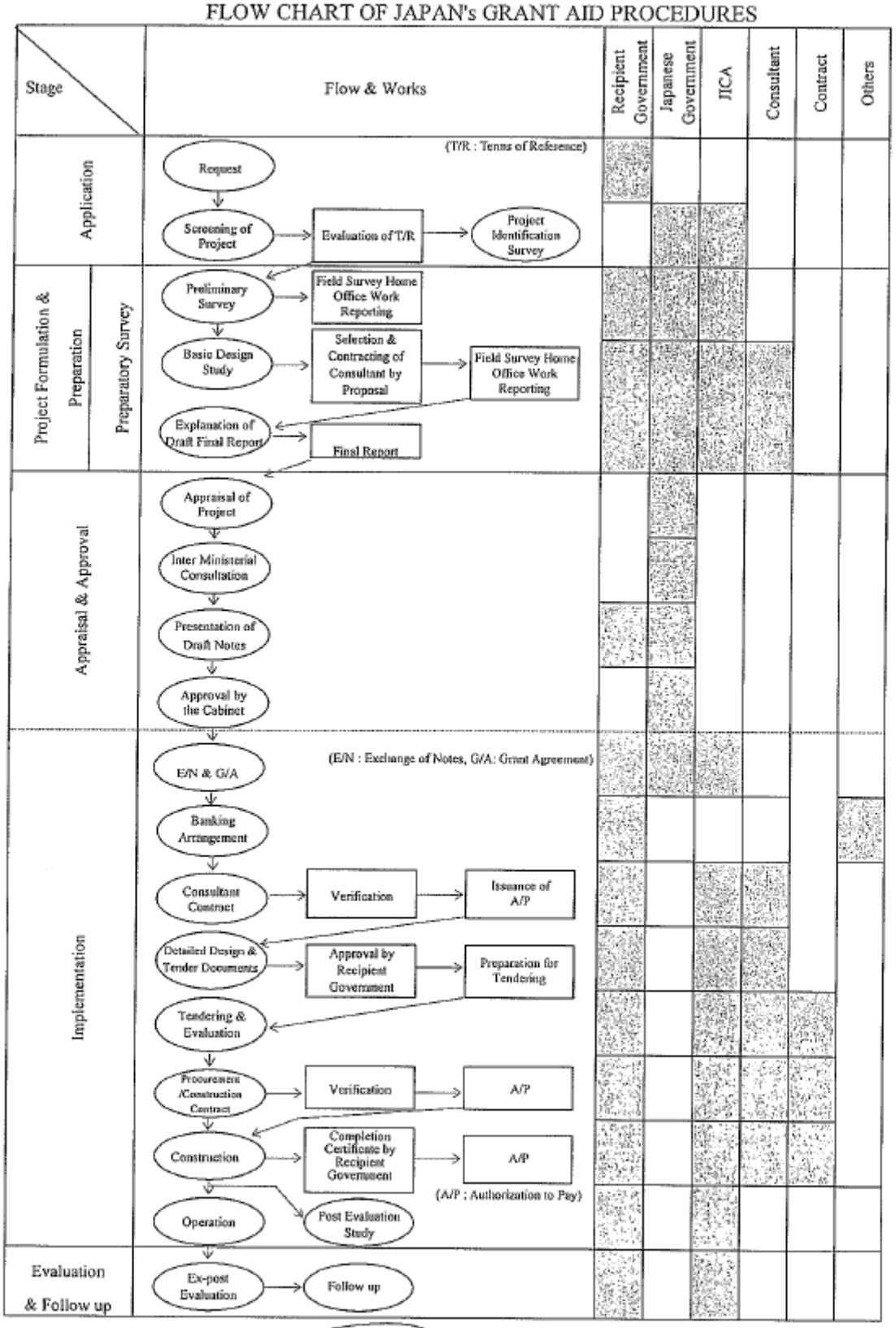
(10) Social and Environmental Considerations

A recipient country must ensure the social and environmental considerations for the Project and must follow the environmental regulation of the recipient country and JICA socio-environmental guideline.

(End)

Attachment 1

FLOW CHART OF JAPAN's GRANT AID PROCEDURES

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Major Undertakings to be taken by Each Government

| NO | Items | To be covered by | To be covered by Recipient |
|---|---|---|---|
| 1 | 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 | | • |
| 2 | 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 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 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 | | • |
| 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 contract | | • |
| 5 | To maintain and use properly and effectively the facilities constructed 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 | | • |

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

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# APPENDIX-5

# REFERENCES

## 5. References

# References

Name of Survey: The Preparatory Survey on the Project for Improvement of Solid Waste Treatment in Local Cities (Phase 2) 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 | Service in Al-hajjar al-asswadd (Al-hajjar al-asswadd Report) | Document（Arabic, English） | Copy | Al-hajjar al-asswadd | 2009/07 |
| 2 | City Plan Drawing((Al-hajjar al-aAsswadd, Al-dumire) | Drawing | Copy | Al-hajjar al-asswadd (1 sheet), Al-dumire (2 sheets) | -- |
| 3 | City Plan Drawing（Sweida, Shahba, Salkad） | Drawing | Copy | Sweida (1 sheet), Shahba(3 sheets), Salkad (5 sheets) | -- |
| 4 | Map of Rural Damascus Governorate | Drawing | Original | Rural Damascus Governorate | 2004/1/2 |
| 5 | Google Map (Al-dumire) | Map | Copy | | -- |
| 6 | Kanaker Landfill site | Drawing | Copy | Sweida Governorate | -- |
| 7 | City Plan Drawing（Hama） | Drawing | Copy | Hama | |
| 8 | Design Drawings of Kasoon al-Jabal landfill site | Drawing | Copy | Hama | |
| 9 | City Plan Drawing（Lattakia） | Drawing | Copy | Lattakia | |