

**BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR IMPROVEMENT
OF
ROAD MAINTENANCE EQUIPMENT FOR YEREVAN CITY
IN
THE REPUBLIC OF ARMENIA**

MAY 2002

**JAPAN INTERNATIONAL COOPERATION AGENCY
KATAHIRA & ENGINEERS INTERNATIONAL**

PREFACE

In response to a request from the Government of the Republic of Armenia, the Government of Japan decided to conduct a basic design study on the Project for Improvement of Road Maintenance Equipment for Yerevan City and entrusted the study to the Japan International Cooperation Agency (JICA).

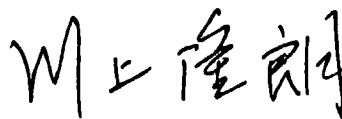
JICA sent to the Republic of Armenia a study team from September 5 to October 12, 2001.

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

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

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

May, 2002



Takao Kawakami
President
Japan International Cooperation Agency

May, 2002

Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Improvement of Road Maintenance Equipment for Yerevan City.

The study was conducted by Katahira & Engineers International under a contract to JICA, during the period from August, 2001 to May, 2002. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of the Republic of Armenia and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

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

Very truly yours,



Minoru Miura

Chief Consultant,

Basic design study team on the Project
for Improvement of Road Maintenance
Equipment for Yerevan City

Katahira & Engineers International



Location Map

Ե Ր Ե Վ Ա Ն
YEREVAN



Crushing Plant

Asphalt
 Mixing Plant

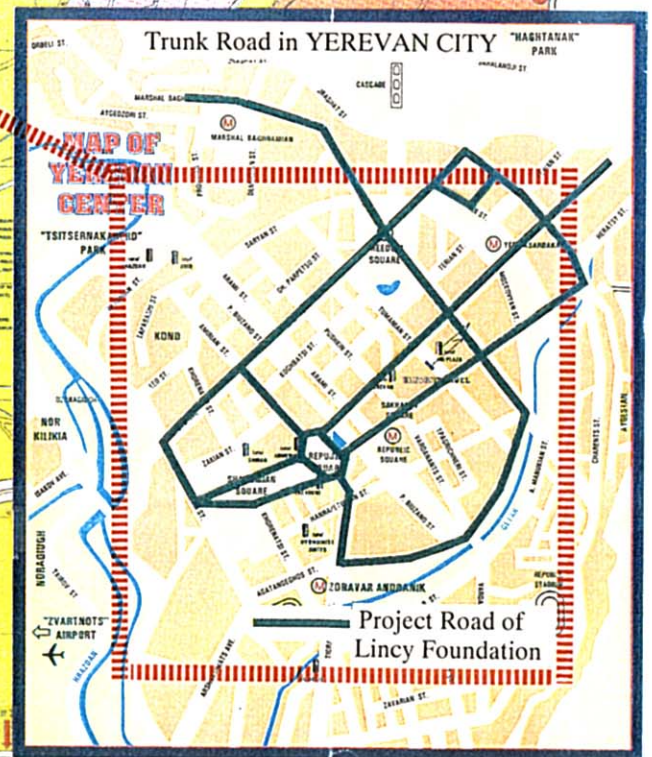
Delivery Yard

Existing Work Shop

782 U.S.U.
 B.C.

Map for Study Area

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List of Figures & Tables

Figure 2-2-2-1	Milling and Overlay Method
Figure 2-2-2-2	In-Place Surface Recycling Method
Figure 2-2-2-3	Patching Method
Figure 2-2-2-4	Conceptual Figure of Asphalt Recycle Plant
Figure 2-2-4-1	Relationship of Each Parties
Figure 2-2-4-2	Delivery Route in Armenia

Table 2-2-2-1	Equipment List for Road Maintenance Methods
Table 2-2-2-2	Evaluation Table by Maintenance Method
Table 2-2-2-3	Necessary Equipment to Procure
Table 2-2-3-1	Basic Specification of the Equipment
Table 2-2-3-2	Specifications for Equipment
Table 2-2-4-1	Implementation Schedule
Table 2-4-1	Annual Operation Cost of Equipment

Abbreviation

E U : Europe Union

J I C A : Japan International Cooperation Agency

SECC : Standard of Estimation for Civil Construction

SUMMARY

The Republic of Armenia is located in the southwest of trans-Caucasus and abuts on the border with the northeast of Turkey in the west, Iran in the south, Azerbaijan in the east and Georgia in the north. Its total land area of some 29,800 km² is the smallest among the states of former Soviet Union and is only approximately 1/13 of that of Japan.

Throughout the country, the mountain range and the highlands are spread, mostly at altitude of over 500m, except a part of Araks riverside that is surrounded by high mountains.

Regarding the social environment, smelting of copper and zinc and production of cement are developed in the industry. However energy resources are not available in the country and entirely depended on other republics of the former Soviet Union. In agriculture, growing fruits such as grapes and oranges are the main products. After the independent, the government has actively wrestled with market economy and structural reform, but during 1991 to 1993 GDP had reduced 60%. It has still continued to face difficult situations such as an aftereffect of big earthquake in 1988, prolonged Nagorno-Karabakh conflict, and involving economic blockage by neighbor countries.

After the cease-fire agreement of Nagorno-Karabakh conflict, accompanied with stabilized political situation, the economic cooperation by international agencies and donor countries became active, and economy also turned around (GDP has been developed 5% in annual average after 1994).

Among those difficult situations, the government has enforced reforms such as price liberalization and privatization of enterprises. As a result, the country is thought highly by donor countries as the most privatized country among Commonwealth of Independent States.

There isn't a National Development Plan at present to be the high rank base plan for this study. Instead of this, the government prepared the Public Investment Program (PIP) and selected 4 priority sectors, i.e. energy, local service & housing, transport, and mineral resources & irrigation. However, most of the necessary funds of the program depend on foreign aid. The contents of the program are also lacking a concrete measure. Regarding the development of infrastructure mentioned in the program, it does not prioritize the newly construction projects, but the rehabilitation of existing facilities.

The trunk roads in Yerevan municipality are extended 802km at present while the total length of feeder roads is 320km. Municipal trunk road network is composed of the roads connecting the main trunk roads, which are the traverse roads for north-south and east-west with 2 circling roads, in addition to feeder roads extended from the trunk roads.

The maintenance of the municipal roads is executed by the Department of Improvement & Construction, the Government of Yerevan Municipality (DIC). Their retained equipment is remarkably superannuated due to the suspension of the newly procurement of the equipment due to financial difficulties, and all equipment are necessary to be renewed.

DIC has continued simple repair works on the road network by these retained equipment with frequent

repairing. But they could maintain only 1.9% per year of the 15.9 million m² of total road surface area in Yerevan municipality due to the insufficient number of the equipment and its lower operating ratio. Therefore the road condition has been worsened.

To cope with these situations, the government of Armenia requested Japan's Grant Aid for the procurement of road maintenance equipment to improve the road condition of municipal roads of capital Yerevan.

In response to the request, the basic design study was conducted from September 2001, and it studied the contents of the Grant Aid, which be possible for indispensable management by Yerevan Municipality as the implementing agency, through the consideration of its technical ability and implementing system.

This project is to procure road maintenance equipment that directly support the improvement of road condition in capital Yerevan.

Under this project, the equipment plan with over-lay method for the road maintenance is studied. However, the equipment for patching method is included in the procurement list because the repair of potholes on the vehicle lane and rail zone of streetcar prior to the construction of over-lay is effective to provide longer life span for the pavement. On the concerned roads, surface elevation exceeds much its design by the repeated repairs, and it is necessary to adjust the level first by milling surface course then to construct the over-lay.

In the results of the field survey on the present damaged level and the past maintenance works on the municipal roads of Yerevan, recommended future maintenance methods are the following three types.

- 1) Milling & over-lay method (with new asphalt concrete)
- 2) Milling & over-lay method (with recycled asphalt concrete)
- 3) In place surface recycling method

The request of the equipment by DIC is based on the over-lay by In place surface recycling method through the consideration of its affects on the environment and the reduction of the construction cost.

The necessary equipment for the execution of the above 3 road maintenance methods is selected for each methods, then the equipment which already retained and/or possible to procure by DIC, the implementing agency of this project, are excluded. Based on the result of the studies on the workability, economy, environment, etc., it was judged that the most suitable method is the Milling & over-lay method with recycled asphalt concrete.

In addition, the facilities of the equipment workshop are included in the procurement list because it is insufficient at present.

The equipment procured under this project is as follows;

Model		unit	Model		unit
1	Asphalt cutter	2	10	Asphalt finisher	1
2	Pneumatic hand breaker	2	11	Road roller	1
3	Compressor (for dig, cleaning)	2	12	Water tank truck	1
4	Asphalt sprayer	1	13	Tire roller	1
5	Vibration roller (hand guide)	1	14	Trailer truck	1
6	Vibration compactor	2	15	Asphalt recycle plant	1
7	Asphalt milling machine	1	16	Wheel loader	2
8	Dump truck (10 ton)	6	17	Workshop facilities	1
9	Asphalt distributor	1			

To secure the smooth implementation of road repair work and design by Armenian side, it is necessary to provide the following technical support by the introduction of soft component.

- To prepare the manuals regarding the maintenance management of equipment and supervising of maintenance work.
- To prepare the working plan of road maintenance equipment and repair works.
- To conduct a seminar.
- To conduct a training at job sites regarding equipment management and maintenance works.
- Technical assistance in utilizing recycled asphalt concrete.

For the implementation of this project, a total of 18 months are required including 4 months for the execution of soft component.

The project cost borne by Armenian side is estimated at US\$ 15,600.

(Note : Exchange rate used for this calculation is JP• 127.99/US\$)

This project aims to support directly the maintenance works of municipal roads of capital Yerevan in Armenia by the procurement of necessary road maintenance equipment. Beneficiary is Yerevan municipality and its population of 1.25 million (2000). The following direct effects by this project are expected;

- The procurement of new equipment under this project will improve the capacity of the road maintenance work.

	Over-lay Method	Patching Method
2000 (result record)	0.3 km/year	10,000 m ² /year
After procured (projected)	20 km/year	27,000 m ² /year

While, expected indirect effects are as follows;

- To reduce the distribution cost and activate the commercial activities and the physical and human exchange by the improvement of the intercity access and the reduction of the traffic obstacles
- To secure the continuous traffic flow by the rehabilitation of damaged road sections and the promotion of development on other road sections
- To promote the activation of the economy not only for Yerevan municipality, but also for the whole nation through the improvement of municipal roads condition in Yerevan city that accommodates 1.25 million people corresponding 1/3 of the national population and is the core of the political, cultural and commercial activities as the capital of Armenia

It is concluded that the project is appropriate to be implemented under Japan's Grant Aid which will be expected above great effects.

Otherwise, to secure the appearance of project effect and its durability on road maintenance work with procured equipment by Armenian side, it is necessary to secure the appropriate budget, skilled manpower and suitable materials of road maintenance work with sufficient maintenance organization and systems.

CONTENTS

Preface

Letter of Transmittal

Location Map/Perspective

List of Figures & Tables

Abbreviations

Summary

	<u>Page</u>
Chapter 1 BACKGROUND OF THE PROJECT	1-1
Chapter 2 CONTENTS OF THE PROJECT	
2-1 Basic Concept of the Project	2-1
2-2 Basic Design Study of the Requested Japanese Assistance	2-2
2-2-1 Design Policy	2-2
2-2-2 Basic Plan (Construction Plan/Equipment Plan)	2-3
2-2-3 Basic Design Specifications.....	2-13
2-2-4 Implementation Plan	2-20
2-2-4-1 Implementation Policy	2-20
2-2-4-2 Implementation Conditions.....	2-21
2-2-4-3 Scope of Works	2-21
2-2-4-4 Consultant Supervision.....	2-21
2-2-4-5 Procurement Plan.....	2-23
2-2-4-6 Quality Control Plan.....	2-26
2-2-4-7 Implementation Schedule	2-26
2-3 Obligations of Recipient Country	2-28
2-4 Project Operation Plan	2-29
2-5 Implementation Plan of Soft Component.....	2-31
Chapter 3 PROJECT EVALUATION AND RECOMMENDATIONS	
3-1 Project Effect.....	3-1
3-2 Recommendations	3-1

Appendices

1. Member List of the Study Team
2. Survey Schedule
3. List of Parties Concerned in Armenia
4. Minutes of Discussions
5. Cost Estimation Borne by the Recipient Country

CHAPTER 1

BACKGROUND OF THE PROJECT

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