AZERAVTOYOL STATE COMPANY
THE REPUBLIC OF AZERBAIJAN

NO.

BASIC DESIGN STUDY REPORT ON THE PROJECT FOR TRUNK ROUTE REHABILITATION IN THE REPUBLIC OF AZERBAIJAN

DECEMBER 2000

JAPAN INTERNATIONAL COOPERATION AGENCY
KATAHIRA & ENGINEERS INTERNATIONAL

AZERAVTOYOL STATE COMPANY
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PREFACE

In response to a request from the Government of the Republic of Azerbaijan, the Government of Japan decided to conduct a basic design study on the Project for Trunk Route Rehabilitation and entrusted the study to the Japan International Cooperation Agency (JICA).

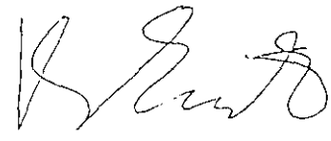
JICA sent to Azerbaijan a study team from July 2 to July 31, 2000.

The team held discussions with the officials concerned of the Government of the Republic of Azerbaijan, and conducted field studies at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Azerbaijan from October 15 to 29, 2000 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 Azerbaijan for their close cooperation extended to the team.

December, 2000



Kunihiko Saito
President
Japan International Cooperation Agency

December, 2000

Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Trunk Route Rehabilitation in the Republic of Azerbaijan.

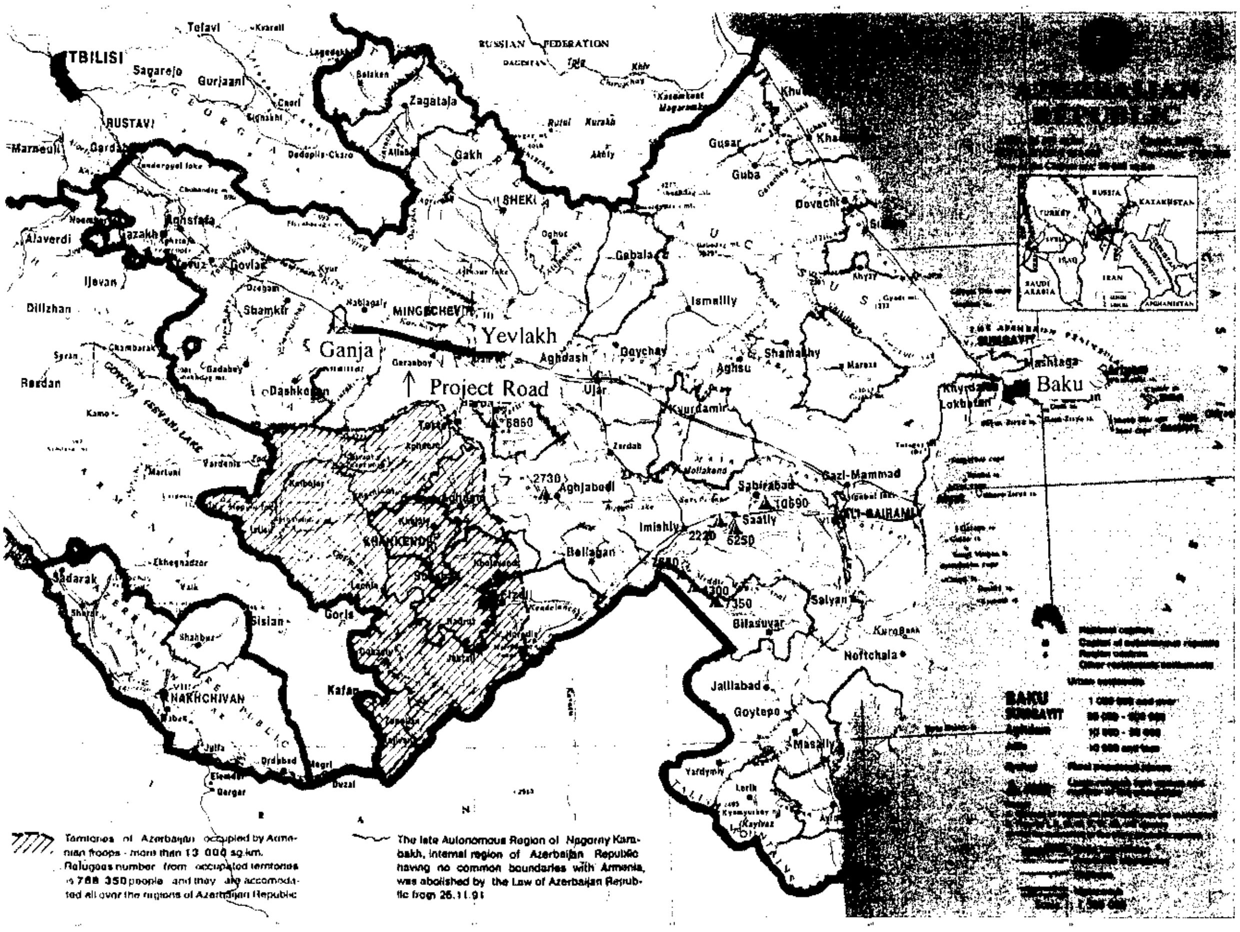
This study was conducted by Katahira & Engineers International, under a contract to JICA, during the period from June 26, 2000 to December 20, 2000. In conducting the study, we have examined the feasibility and rationale of the project, with due consideration to the present situation of Azerbaijan, and 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,

Tadashi Sato

Tadashi Sato
Project Manager,
Basic Design Study Team on the Project for
Trunk Route Rehabilitation
in the Republic of Azerbaijan
Katahira & Engineers International



Location Map

Abbreviation

E B R D	:	European Bank for Reconstruction and Development
E U	:	European Union
J I C A	:	Japan International Cooperation Agency
T A C I S	:	Technical Assistance for CIS
TRACECA	:	Transport Corridor Europe-Caucasus-Asia

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CHAPTER 1

BACKGROUND OF THE PROJECT

CHAPTER 1 BACKGROUND OF THE PROJECT

Azerbaijan is a country in Central Asia bordering Iran, Russia, Georgia and Armenia. Its being land-locked is the major geographic determinant of the Azerbaijan's transport sector. The distances to many of the country's current and potential export and import markets are very great. Meanwhile, the productions centers for most of the foods and commodities are in the country side. Transporting the export goods, food and prime commodities to the capital, Baku City, where 1.7 million people are living, out of 7.6 million, total population of the country is through mostly deteriorated roads. The predominant role of local transport is shifting from railways to improved roads.

Azeravtoyol State Company is the government agency responsible for the development and maintenance of the entire road network, but their capacity for road maintenance and improvement is diminishing because of the shortage of road construction and maintenance equipment.

On the other hand, the deterioration of roads is advancing with time, due to rapidly increasing heavy traffic, and the lack of proper road maintenance.

The maintenance and improvement of the West-East major trunk road (Baku~Alyat~Yevlakh~Georgia) became urgently necessary due to the increasing difficulty in the transportation of foods and various commodities which are essential in the daily life of the people. But the shortage of road construction and maintenance equipment is the major constraint to Azeravtoyol State Company in executing the required works.

Most of the equipment owned by Azeravtoyol State Company have become less efficient due to old age, while the quantity is diminishing as more units became inoperable due to lack of replacement parts. Consequently the Azeravtoyol State Company now needs reinforcement of its depleted and less efficient equipment fleet to enhance its capability for the effective execution of the proper maintenance services so urgently needed.

To remedy such difficult road conditions, the Republic of Azerbaijan planned the Project of trunk route rehabilitation (the Project), giving this a high priority. To implement the Project, the Republic of Azerbaijan requested Japan's grant aid assistance.

In response to the request, the government of Japan conducted the basic design study of the Project. This was done thru the Japan International Cooperation Agency (JICA), which dispatched the Basic Design Study Team from July 2 to July 31, 2000, for the necessary field survey and the series of discussions with the concerned officials of the implementing agency in Azerbaijan.

The Study Team, during its stay in Azerbaijan, confirmed the background, objectives and

contents of the Project, collected relevant data, and surveyed the Project site. After returning to Japan, the Study Team evaluated the Project in respect of actual needs, socioeconomic effects, appropriateness including other relevant factors, and studied a basic design and implementation plan.

As a result, a draft basic design of the procurement of equipment for the road rehabilitation from Ganja to Yevlakh (80 km) was proposed. After a series of discussions, explanations and consultations on the draft basic design with the concerned officials in Azerbaijan, the Basic Design Study of the Project was developed and finalized.

CHAPTER 2

CONTENTS OF THE PROJECT

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2.1 Objectives of the Project

The objective of the Project under Japan's Grant Aid is to supply road construction machinery will strengthen Azeravtoyol State Company work capacity of the road maintenance from Ganja to Yevlakh (80 km) where are located along West-East Trunk Road.

2.2 Basic Concept of the Project

The Study Team investigated to the Project road section (Ganja~Yevlakh) and condition of two maintenance offices (Ganja and Yevlakh) to collect the necessary data to examine the appropriateness and necessity of the Project under Japan's Grant Aid. The Study Team also conducted series of discussions with officials in Azeravtoyol State Company to evaluate the Project.

Socio-economic effects, engineering necessity and appropriateness of the Project as a whole are summarized as follows:

Socio-economic effects

- The national trunk road on which the project section is located connecting the Capital, Baku heading for Turkey through Georgia is mainly used for the transportation of foods and commodities and quite important, urgent to maintain.
- It will be noticed directly by the users of the project road and indirectly by the whole population who will notice the effect of road rehabilitation on their productive activities or on the provision of goods and services.

Engineering necessity

- The Project Road Section has pavement surfaces in a severely deteriorated condition, with many potholes and cracks which has an urgent necessity to be rehabilitated to provide safe and reliable traffic facilities.

Appropriateness

- Urgency and necessity of the project is very high.
- Implementation of the project benefits a great number of ordinary citizens.
- Providing safe and reliable transportation means promotes more employment opportunities and higher income for people in the country.
- No difficulty in implementation of the project is foreseen.
- No similar project under other donor.

2.3 Basic Design

2.3.1 Design Concept

- Equipment Plan
  Equipment plan should be accord with the availability of the management by the Government of Azerbaijan. Equipment types and numbers should be designed, taking into consideration the suitable amount of operation and maintenance costs.

- Implementation and Maintenance Plan
  Implementation and Maintenance Plan of the Project should be considered with the condition of organizations, budget, staff and technical level of Azeravtoyol State Company.

- Technical Assistance
  Necessary technical assistance for smooth implementation of the Project should be considered by the Government of Japan.

2.3.2 Existing Condition of Road Maintenance Work

(1) Existing Condition of the Azeravtoyol State Company Owned Equipment and Personnel

① Azeravtoyol State Company has 47 Road Maintenance Offices in the country. Organization Charts of Ganja and Yevlakh offices are shown in Figure 2.3.2-1 and 2.3.2-2.

② Number of personnel in each office is 109 persons at Yevlakh and 87 persons at Ganja. Both offices has about 20% permanent staff. Operator and mechanic belongs to temporary staff but they work about 200 hours per year. Both offices can provide those staff to the Project.

③ Owned Equipment
Present status of equipment stationed in Ganja and Yevlakh offices are summarized as follows:

Yavlakh

- No. of equipment : 53 units (Vehicles 31 units, heavy equipment 22 units)
- No. of operational equipment: 32 units
  (Vehicles 18 units, heavy equipment 14 units)
- Working ratio : 60% (Vehicles 58%, heavy equipment 64%)

- Average working age of equipment : 15 years
  (Vehicles 17 years, heavy equipment 13 years)
- Country of fabrication of equipment : Former Soviet Union
  (Except one in Germany)
- Others : Asphalt Plant 1 unit, aggregate plant none

Ganja

- No. of equipment : 92 units (Vehicles 51 units, heavy equipment 41 units)
- No. of operational equipment: 51 units
  (Vehicles 34 units, heavy equipment 17 units)
- Working ratio : 50% (Vehicles 67%, heavy equipment 42%)
- Average working age of equipment : 18 years
  (Vehicles 18 years, heavy equipment 16 years)
- Country of fabrication of equipment : Former Soviet Union
  (Except one in Germany)
- Others : Asphalt Plant 2 units, aggregate plant one

Working condition of each equipment stationed in Yevlakh and Ganja offices are shown in Table 2.3.2-1 and 2.3.2-2.

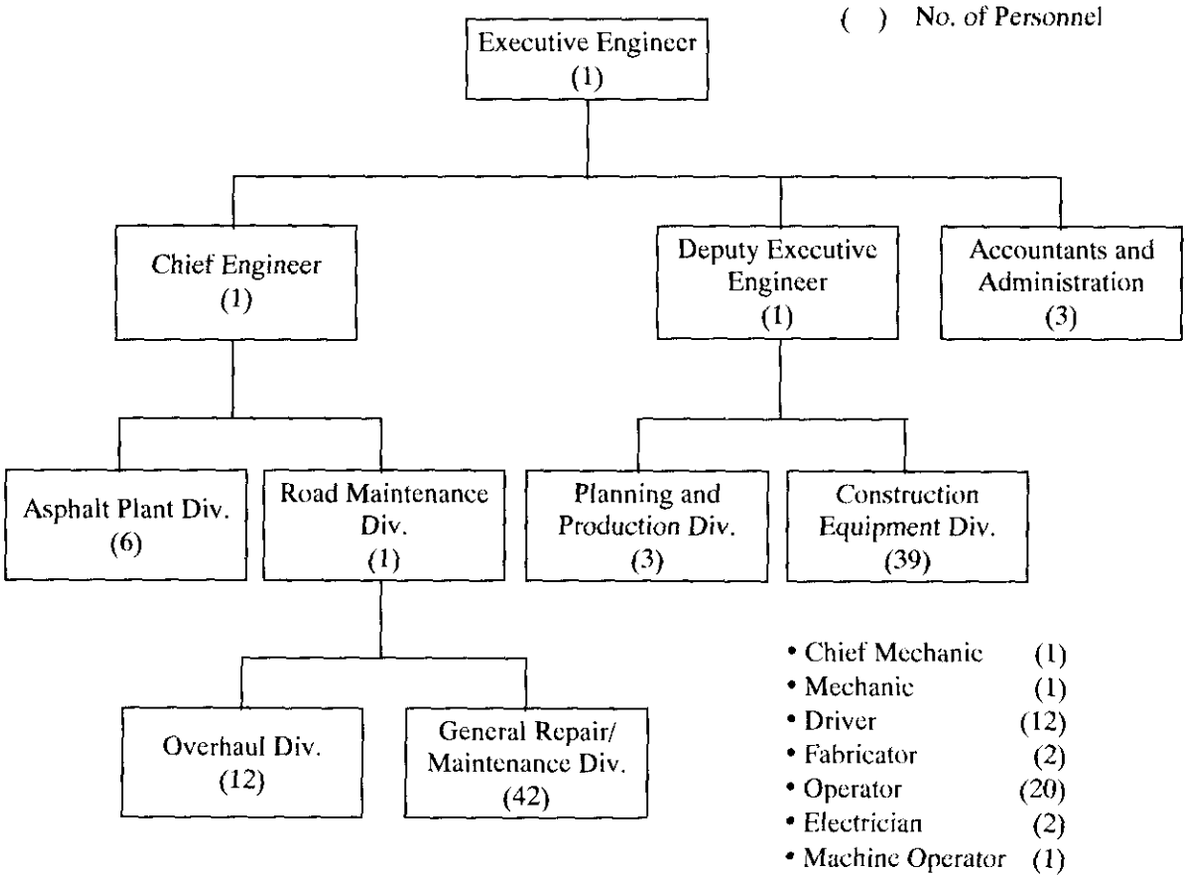


Figure 2.2.1-1 Organization of Yevlakh Office

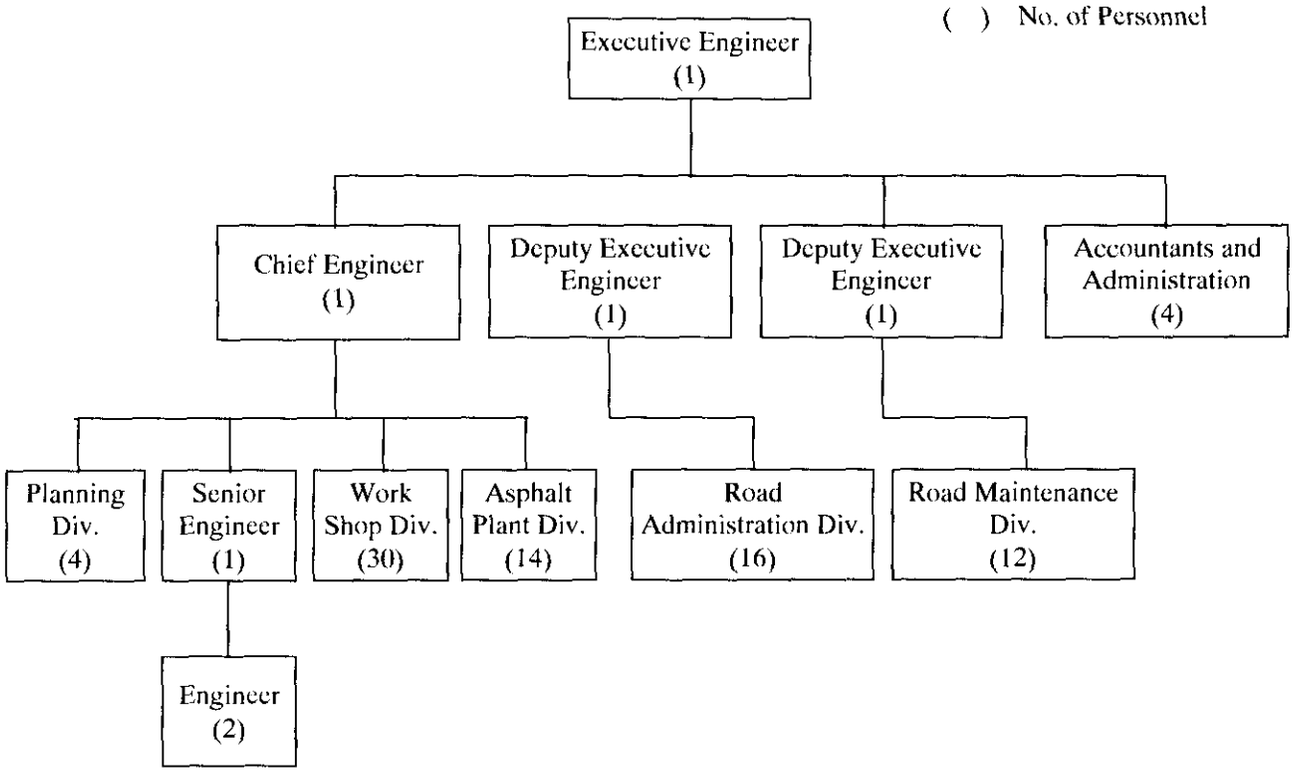


Figure 2.3.2-2 Organization of Ganja Office

Table 2.3.2-1 Working Condition of Equipment Stationed in Yevlakh Office

	Type of Equipment	Specifications	Model Year	Age	Working Condition	No. of Owned	No. of Workable Unit	No. of Un-workable Unit	Working Ratio
Vehicles	Dump truck	5 t	1967	34	poor	22	14	8	64%
			1971	30	poor				
			1975	26	poor				
			1975	26	poor				
			1991	10	poor				
			1991	10	good				
			1992	9	good				
			1992	9	good				
			1992	9	good				
		6 t	1994	7	good				
		7 t	1973	28	good				
		8 t	1967	34	poor				
			1970	31	good				
			1971	30	good				
			1978	23	good				
			1987	14	good				
			1987	14	good				
			1989	12	good				
		10 t	1982	19	good				
		12 t	1979	22	poor				
			1987	14	poor				
			1987	14	good				
	Trailer		1984	17	good	1	1	0	100%
	Fuel tank	4000 ℓ	1984	17	poor	2	1	1	50%
		7000 ℓ	1986	15	good				
	Truck	4 t	1982	19	poor	1	0	1	0%
	Water tank	6 t	1977	24	poor	1	0	1	0%
	Mobile workshop		1978	23	good	2	1	1	50%
			1991	10	poor				
	Bus		1988	13	good	1	1	0	100%
	Light vehicle		1993	8	poor	1	0	1	0%
	Total of vehicles		Average working age 17 years			31	18	13	58%
Construction Equipment	Excavator	0.25m^3	1992	9	good	2	2	0	100%
		0.8m^3	1988	13	good				
	Bulldozer	75 HP	1987	14	poor	4	3	1	75%
			1991	10	good				
			1991	10	good				
		150 HP	1995	6	good				
	Scraper	8m^3	1979	22	good	4	2	2	50%
			1987	14	poor				
			1992	9	poor				
			1992	9	good				
	Motor grader		1986	15	poor	3	1	2	33%
			1988	13	poor				
			1995	6	good				
	Asphalt finisher	W = 4.5m	1975	26	good	2	2	0	100%
			1995	6	good				
	Roller	8 t	1975	26	good	3	2	1	67%
			1981	20	poor				
			1986	15	good				
	Crane	25 t	1984	17	good	1	1	0	100%
	Agricultural tractor		1984	17	good	1	1	0	100%
	Loader	0.3m^3	1985	16	poor	2	0	2	0%
		1.8m^3	1986	15	poor				
	Total of construction equipment		Average working year 13 years			22	14	8	64%
Working condition of whole equipment			Average working year 15 years			53	32	21	60%

Table 2.3.2-2 Working Condition of Equipment Stationed in Ganja Office (1/2)

	Type of Equipment	Specifications	Model Year	Age	Working Condition	No. of Owned	No. of Workable Unit	No. of Un-workable Unit	Working Ratio
Vehicles	Dump truck	5 t	1969	32	good	25	17	8	68%
			1974	27	good				
			1975	26	good				
			1978	23	good				
			1979	22	poor				
			1986	13	good				
			1988	13	good				
			1992	9	good				
			1992	9	good				
			1992	9	good				
			1992	9	good				
		8 t	1970	31	good				
			1975	26	poor				
			1976	25	poor				
			1976	25	poor				
			1976	25	poor				
			1976	25	poor				
			1976	25	good				
			1977	24	good				
			1983	18	poor				
			1984	17	good				
			1986	15	poor				
			1988	13	good				
			1991	10	poor				
			1992	9	good				
	Truck	5 t	1988	13	poor	4	2	2	50%
		10 t	1982	19	good				
			1982	19	poor				
			1982	19	good				
	Trailer		1977	24	good	3	2	1	67%
			1986	15	poor				
			1992	9	good				
	Road sprinkler	5 t	1977	24	good	4	4	0	100%
			1982	19	good				
			1982	19	good				
			1983	18	good				
	Special purpose vehicle	5 t	1979	22	good	3	3	0	100%
			1979	22	good				
			1990	11	good				
	Fuel tank	2000 ℓ	1977	24	poor	3	1	2	33%
		4000 ℓ	1975	26	good				
			1985	16	poor				
	Wagon		1979	22	poor	2	1	1	50%
			1991	10	good				
	Bus		1978	23	good	2	2	0	100%
			1985	16	good				
	Light vehicle		1968	33	poor	5	2	3	40%
			1987	14	poor				
			1988	13	poor				
			1992	9	good				
			1992	9	good				
	Total of vehicles		Average working year 18 years			51	34	18	67%

Table 2.3.2-2 Working Condition of Equipment Stationed in Ganja Office (2/2)

	Type of Equipment	Specifications	Model Year	Age	Working Condition	No. of Owned	No. of Workable Unit	No. of Un-workable Unit	Working Ratio
Construction Equipment	Excavator	0.45m³	1986	15	poor	10	2	8	20%
		0.25m³	1976	25	poor				
			1992	9	good				
			1975	26	poor				
			1991	10	poor				
			1977	24	poor				
			1992	9	poor				
			1991	10	poor				
			1988	13	poor				
			1991	10	poor				
	Motor grader	110 HP	1979	22	good	5	2	3	40%
			1979	22	poor				
			1980	21	poor				
			1984	17	poor				
			1991	10	good				
	Buildozer	75 HP	1983	18	poor	5	3	2	60%
			1983	18	poor				
			1983	18	poor				
			1985	16	good				
			1992	9	good				
	Roller	6 t	1975	26	good	3	2	1	67%
			1988	13	poor				
			1989	12	good				
	Scraper	8m³	1978	23	poor	6	3	3	50%
			1980	21	poor				
			1986	15	good				
			1986	15	good				
			1987	14	good				
			1987	14	poor				
	Asphalt finisher	W = 0.45m	1989	12	good	1	1	0	100%
	Crane	25 t	1982	19	poor	1	0	1	0%
	Agricultural tractor		1980	21	poor				
			1980	21	good				
			1984	17	poor				
			1988	13	poor				
			1989	12	poor				
			1992	9	good				
			1992	9	good				
			1993	8	good				
	Line marker		1987	14	poor	1	0	1	0%
	Spreader		1980	21	poor	1	0	1	0%
	Total of construction equipment		Average working year 16 years			41	17	24	42%
Working condition of whole equipment			Average working year 18 years			92	51	41	55%

2) The Project Road Section

Yevlakh and Ganja offices are in charge of the maintenance work and the roads for their maintenance work are as follows:

Yavlakh Office
- 30 km length for east, 20 km length for west, 30 km length for north and 20 km for south from the City of Yavlakh.
- 64 km length along M-1 route

Total length : 164 km

Ganja Office
- 24 km length in the City of Ganja
- 36 km length along M-1 route
- 17 km length along Ganja Bypass

Total length : 77 km

(2) Existing Condition of the Project Road Section

Natural condition

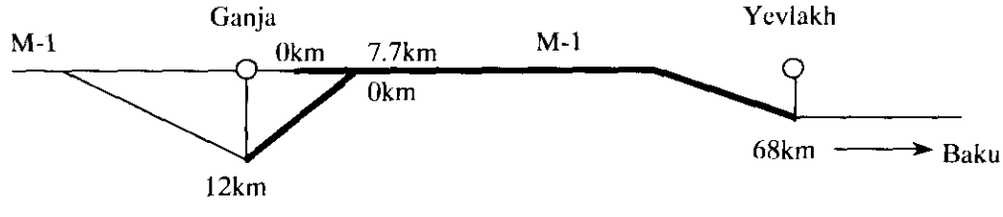
- Geography : Slightly rolling, more than 10 km far distance from mountains
- Altitude : 200 m～300 m
- Geology : Silt or sand and partially cobble gravel
- Road alignment : Straight
- Terrain : Gentle up-gradient from Yevlakh to Ganja

Climate

- Temperature : July 23～26℃, max 37～40℃
  January 1～2℃, min -16～-18℃
- Frost : 200～250 days/year (non frost)
- Rainfall : 250～300 mm/year
- Snow-fall : 5～8 days/year, max 2 cm
- Wind : 2.6～3.6 m/second,
  62～63 days/year (more than 15 m/second)

Condition of roads

- The Project Road Section (Total length : 80 km)
  The project road section for maintenance work under Yevlakh and Ganja Offices are shown as follows:



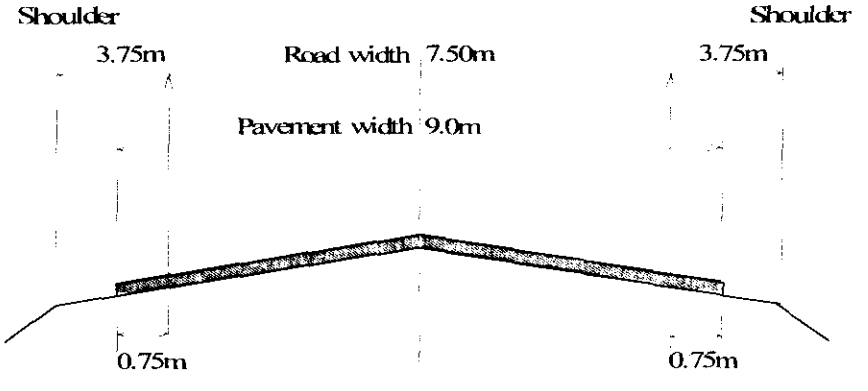
- Road cross section
  The project road section is mostly structured as embankment (1～2m height).

  The road classification of the Project road section is based on Category II (Road Standard of Former Soviet Union) which is summarized as follows:

  - Existing Asphalt Pavement thickness of surface course is 60～120 mm.
  - Roadway width : 3.75 m x 2 lanes = 7.50 m
  - Shoulder width : 3.75 m x 2 = 7.50 m
  - Total road width : 15.00 m
  - Total pavement width : 9.00 m

  * Actual pavement width is 8.0～9.0 m.

Standard Cross Section of Category II



- Condition of damage
  The road surface was paved on 1960～1970 under Former Soviet Union's road standard.
  The road surface is in a severely deteriorated condition, with many potholes and cracks. The results of road inventory survey is attached.

- Maintenance methods
  Existing maintenance methods under Yevlakh and Ganja Offices are ① Patching potholes ② Overlay ③ Asphalt sealing for cracks ④ Asphalt coating.
  There are very limited number of equipment and vehicles in Yevlakh and Ganja Offices for road maintenance work.

- Traffic volume

  The Study Team conducted the traffic account survey on July 13, 2000 at road sides of 14 km from Ganja from 7 AM to 7 PM. Total traffic volume was 3,064 vehicles counted with both lanes and 14% of heavy vehicles.

  The total traffic volume of 24 hours is estimated about 5,000 vehicles because of 30~40% number reduction at night.

Result of Traffic Survey (Date: July 13, 2000 Site: 14 km from Ganja for Yevlakh)

(Number of Vehicles)

Time	for Baku							for Georgia							Total
	Private Car	Bus (small)	Bus (large)	Truck (normal)	Truck (large)	Container Truck	Sub-total	Private Car	Bus (small)	Bus (large)	Truck (normal)	Truck (large)	Container Truck	Sub-total	
7～8	59	3	6	2	10	0	80	51	3	5	5	4	0	68	148
8～9	48	3	13	1	7	0	72	111	4	7	3	6	0	131	203
9～10	89	3	11	8	13	0	124	141	5	11	9	5	0	171	295
10～11	118	2	12	8	8	0	148	139	6	12	6	6	0	169	317
11～12	118	7	14	9	11	0	159	113	1	1	5	18	0	138	297
12～13	133	2	10	12	8	0	165	117	2	12	11	11	0	153	318
13～14	102	6	9	6	4	0	127	71	5	7	3	8	0	94	221
14～15	78	9	14	8	17	0	126	87	5	6	4	12	0	114	240
15～16	115	4	7	4	7	0	137	69	2	15	7	6	0	99	236
16～17	111	4	9	5	13	0	142	81	9	3	2	10	0	105	247
17～18	102	8	9	4	8	1	132	89	6	9	4	2	0	110	242
18～19	120	6	10	5	19	0	160	110	4	6	10	10	0	140	300
Total	1,193	57	124	72	125	1	1,572	1,179	52	94	69	98	0	1,492	3,064

Road Design Standard in Azerbaijan

(Former Soviet Union's Standard)

Category	A D T		Road Class
	Passenger Car Units	Number of Vehicles	
I - a	14,000	7,000	National Road (connecting with foreign country)
I – b	> 14,000	> 7,000	National Road
II	6,000～14,000	3,000～7,000	Main Rural Road
III	6,000～14,000	1,000～3,000	National Road Rural Road
IV	200～6,000	100～1,000	Rural Road Village Road
V	> 200	> 100	Village Road

Conversion Ratio to Passenger Car Unit (PCU)

Private Car	PCU = 1.0
Truck 2 t	PCU = 1.5
Truck 6 t	PCU = 2.0
Truck 8 t	PCU = 2.5
Truck 14 t	PCU = 3.0
Truck > 14 t	PCU = 3.5
Bus	PCU = 2.5

- The criteria for selection of rehabilitation methods and work volume

The criteria for selection of rehabilitation methods

1. The Asphalt Concrete Overlay method was basically adapted for whole sections due to deterioration of 25～30 years aged after pavement work.

2. NO: The road section which Asphalt Concrete Overlay was recently executed. Patching potholes are needed.

3. OL: The road section which needs Asphalt Concrete Overlay due to aged pavement with many potholes and severely cracks.

4. RE: The road section which needs replacing base course and Asphalt Concrete Overlay due to stripping of surface pavement and severely cracks.
(more than 50% of surface pavement damaged)

		Rehabilitation Methods		
		No overlay	Overlay	Reconstruction
Trafficability	VG (Very good)	○		
	G (Good)	○	○	
	F (Fair)	○	○	
	B (Bad)		○	○
	VB (Very bad)			○
Alligator Cracking	NO	○	○	
	AL (Low-severity)	○	○	
	AM (Medium-severity)		○	
	AH (High-severity)		○	○
Potholes etc.	L (Low-severity)	○		
	M (Medium-severity)		○	
	H (High-severity)		○	○

Criteria for removal existing pavement and refilling Asphalt Concrete

AL: One rehabilitation spot per 25 m distance
Rehabilitation Area = Pavement Area x 5%

AM: One rehabilitation spot per 10 m distance
Rehabilitation Area = Pavement Area x 10%

AH: Continuously rehabilitation spot
Rehabilitation Area = Pavement Area x 25 %

- Work volume

1. RE (Rehabilitation)

Length of Rehabilitation Work : L = 5,000 m
Pavement Area : 9.0 m (Road Width) x 5,000 m = 45,000 m^2
Asphalt Concrete Weight : 45,000 m^2 x 0.12 m (Thickness) x 2.30 t/m^3
= 12,420 t

① Removal of existing damaged surface
② Compacting and reshape of base course
③ Asphalt Concrete Overlay

2. OL (Asphalt Concrete Overlay)

Length of Rehabilitation Work : 62,000 m
Pavement Area : 9.0 m (Road Width) x 62,000 m = 558,000 m^2
Asphalt Concrete Weight : 558,000 m^2 x 0.04 m (Overlay Thickness) x 2.30 t/m^3
= 51,333 t

3. Removal existing pavement (thickness 6 cm) and refilling Asphalt Concrete

AL: 40,000 m x 9.0 m x 0.05 (5%) = 18,000 m^2
AM: 16,000 m x 9.0 m x 0.1 (10%) = 14,400 m^2
AH: (15,000m - 5,000 m) x 9.0 m x 0.25 (25%) = 22,5000 m^2
AL + AM + AH = 54,900 m^2

Asphalt Concrete Weight : 54,900 m^2 x 0.06 m (Thickness) x 2.30 t/m^3 = 7,576 t

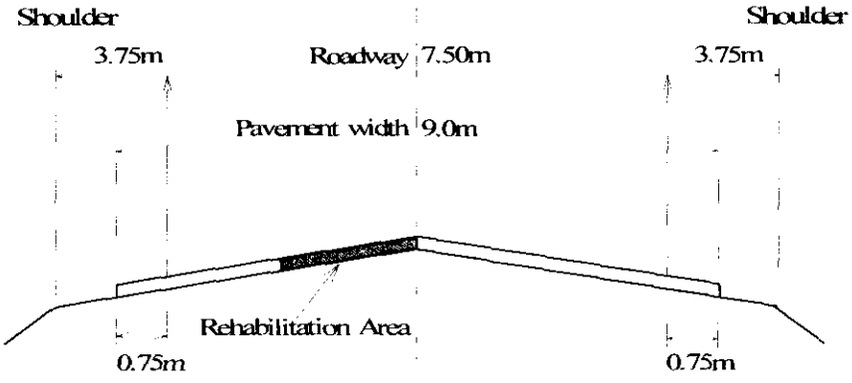
4. Patching Potholes

Number of Potholes : 80,000 m ÷ 1 (pothole)/2 m = 40,000 potholes
* 1 (pothole) per 2 m distance and 0.6 m x 0.6 m size

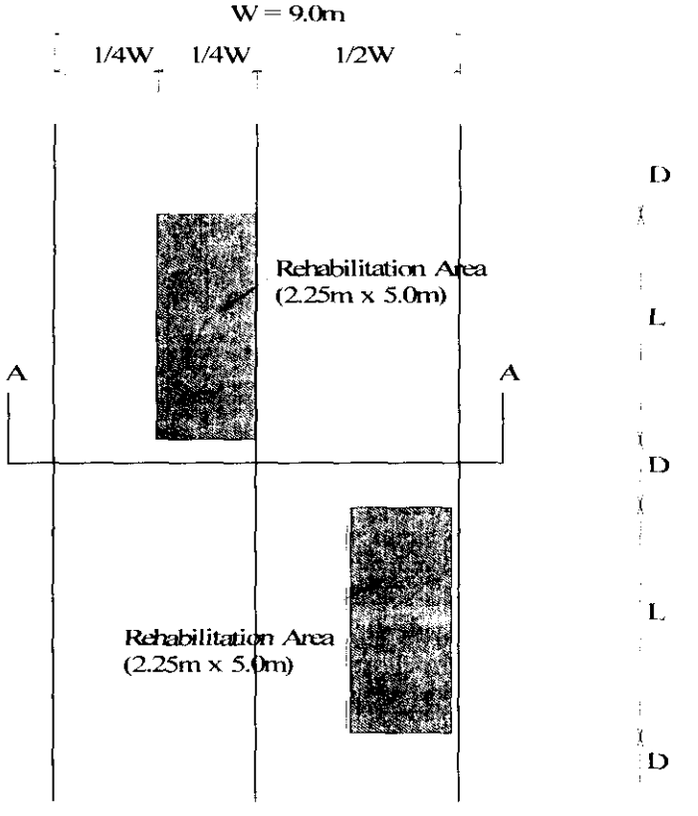
Asphalt Concrete Weight : 0.6 m x 0.6 m/1 (pothole) x 40,000 potholes
x 0.12 m x 2.30 t/m^3 = 3,974 t

Length of cutting pavement : 40,000 potholes x 2.4 m/pothole = 96,000 m

Cross Section (A – A)



Plan



Based on above figure, Rehabilitation Area is estimated as follows based on existing Alligator crack which occurred along axial load area.

AL:	(L≒) 5.0 m x (1/4 W≒) 2.25 m	D≒20.0m → Rehabilitation Area 5%
AM:	(L≒) 5.0 m x (1/4 W≒) 2.25 m	D≒5.0m → Rehabilitation Area 10%
AH:	(L≒) 5.0 m x (1/4 W≒) 2.25 m	D≒0.0m → Rehabilitation Area 25%

Condition of Road Damaged and Rehabilitation Methods (1/2)

Section: Ganja～Yevlakh

AC: Asphalt Concrete

Road Section	Embankment/Cut (B)	(C)	Road Width		A C	Traffi-cability	Deterio-ration	Pothole	Rutting	Rehabilitation Methods		
Km	B/C	Height	Roadway	Whole Width	Thickness					NO	OL	RE
		m	m	m	mm							
1		0	17	26.5		F	L	M	M		OL	
2		0	17	26.5		F	L	M	M		OL	
3	C	8	17	26.5		F	L	M	M		OL	
4	B	1.5	17	26.5		F	L	M	M		OL	
5	B	1	17	26.5		G	L	L	L	NO		
6	B	3	17	26.5		G	L	L	L	NO		
7	B	1	17	26.5		G	L	L	L	NO		
8	B	1	17	26.5		F	L	M	M		OL	
9		0	8	14		F	L	M	M		OL	
10	B	3	8	14		F	L	M	M		OL	
11	B	1	8	14		F	L	M	M		OL	
12	B	1	8	14		F	L	M	M		OL	
13	B	1	8	14		F	L	M	M		OL	
14	B	2	8	14	110	F	L	M	M		OL	
15	B	1.5	9	15		F	M	M	M		OL	
16	B	1.5	9	15		B	H	H	H			RE
17	B	1.5	9	15		F	M	M	M		OL	
18	B	1.5	9	15		F	M	M	M		OL	
19	B	1.5	9	15		B	M	M	M		OL	
20	B	1.5	9	15		F	M	M	M		OL	
21	B	1.5	9	15		F	L	M	M		OL	
22	B	1.5	9	15		F	L	M	M		OL	
23	B	1.5	9	15		F	L	M	M		OL	
24	B	1.5	9	15		G	NO	H	H		OL	
25	B	1.5	9	15		F	L	M	M		OL	
26	B	2	9	15		B	H	H	H			RE
27	B	2	9	15		B	M	M	M		OL	
28	B	2	9	15		F	L	M	M		OL	
29	B	2	9	15	90	F	M	M	M		OL	
30	B	2	9	15		F	M	M	M		OL	
31	B	2	9	15		B	M	M	M		OL	
32	B	2	9	15		B	H	M	M		OL	
33	B	2	9	15		B	M	M	M		OL	
34	B	2	9	15		F	M	M	M		OL	
35	B	2	9	15		F	L	M	M		OL	
36	B	2	9	15		B	H	M	M		OL	
37	B	2	9	15		F	L	M	M		OL	
38	B	2	9	15		B	M	M	M		OL	
39	B	2	9	15		F	L	M	M		OL	
40	B	2	9	15		G	NO	H	H		OL	
41		0	9	15	85	F	L	M	M		OL	
42	B	2	9	15		G	NO	L	L	NO		
43	B	2	9	15		G	NO	L	L	NO		
44	B	2	9	15		G	NO	L	L	NO		
45	B	2	9	15		G	L	H	H		OL	

Condition of Road Damaged and Rehabilitation Methods (2/2)

Road Section	Embankment/Cut (B)	(C)	Road Width		A C	Traffi-cability	Deterio-ration	Pothole	Rutting	Rehabilitation Methods		
Km	B/C	Height	Roadway	Whole Width	Thickness					NO	OL	RE
		m	m	m	mm							
46	B	2	9	15		G	L	H	H		OL	
47	B											
48	B	2	9	15		B	H	M	M		OL	
49	B	2	9	15		B	L	M	M		OL	
50	B	2	16.3	22.3		F	M	M	M		OL	
51	B	1	9	15		G	NO	L	L	NO		
52	B	1	9	15	120	G	NO	L	L	NO		
53		0	9	15		G	NO	L	L	NO		
54		0	9	15		F	L	M	M		OL	
55	B	1	9	15		B	H	H	H			RE
56	B	1	9	15		B	H	M	M		OL	
57	B	1	9	15		B	H	M	M		OL	
58	B	1	9	15	110	B	H	M	M		OL	
59	B	1	9	15		B	H	M	M		OL	
60	B	1	9	15		B	H	M	M		OL	
61	B	1	9	15		F	L	L	L	NO		
62	B	2	9	15		F	L	M	M		OL	
63	B	2	9	15		F	L	M	M		OL	
64	B	2	9	15		F	L	M	M		OL	
65	B	2	9	15		F	M	M	M		OL	
66	B	10	9	15		VB	H	H	H			RE
67	B	5	9	15		VB	H	H	H			RE
68		0	9	15		F	L	M	M		OL	
Total	Length 68 km									10km	53km	5km

Notes:

Trafficability VB: Very Good, G: Good, F: Fair, B: Bad, VB: Very Bad

Deterioration
- H: High-severity Alligator Cracking
- M: Medium-severity Alligator Cracking
- L: Low-severity Alligator Cracking

Pothole
- H: High-severity
- M: Medium-severity
- L: Low-severity

Rutting
- H: High-severity
- M: Medium-severity
- L: Low-severity

Rehabilitation Methods
- NO: Patching Potholes only. (AC Overlay done)
- OL: AC Overlay
- RE: Replacing Base course and AC Overlay

Condition of Road Damaged and Rehabilitation Methods

Section: Ganja Bypass

AC: Asphalt Concrete

Road Section	Embankment/Cut (B)	(C)	Road Width		A C	Traffi-cability	Deterio-ration	Pothole	Rutting	Rehabilitation Methods		
Km	B/C	Height	Roadway	Whole Width	Thickness					NO	OL	RE
		m	m	m	mm							
1	B	1.5	7	13		F	H	M	M		OL	
2	B	1.5	7	13	50	B	H	M	M		OL	
3	C	1.5	7	13		F	L	L	L	NO		
4	B	2	7	13		G	NO	L	L	NO		
5	B	2	7	13		F	L	M	M		OL	
6	B	5	7	13		F	L	M	M		OL	
7	-	0	7	13		F	L	M	M		OL	
8	-	0	7	13		B	L	M	M		OL	
9	-	0	7	13		F	L	M	M		OL	
10	B	8	7	13	70	F	L	M	M		OL	
11	B	0.5	7	13		F	L	L	L	NO		
12	B	2	7	13		F	M	M	M			
Total	Length 12 km									3km	9km	0km

Notes:

Trafficability VB: Very Good, G: Good, F: Fair, B: Bad, VB: Very Bad

Deterioration
- H: High-severity Alligator Cracking
- M: Medium-severity Alligator Cracking
- L: Low-severity Alligator Cracking

Pothole
- H: High-severity
- M: Medium-severity
- L: Low-severity

Rutting
- H: High-severity
- M: Medium-severity
- L: Low-severity

Rehabilitation Methods
- NO: Patching Potholes only. (AC Overlay done)
- OL: AC Overlay
- RE: Replacing Base course and AC Overlay

(3) Road Maintenance Work

Two offices carry out their road maintenance work as follows:

Work Item	Work Methods	Equipment / Crew	Annual Work Volume
Patching Potholes	Potholes are filled by cold mixture without compacting, cutting shape, cleaning and emulsion.	• Agricultural Tractor • Carrier (3t) Operator : 1 person Worker : 10 Tool : Shovels	220 days Total length = 10 km
AC Overlay	Asphalt mixture is paved and compacted without removal of surface and spraying emulsion.	• Asphalt Finisher : 1 • Roller : 2 (3t) • Dump track (8t) : 3 /100m Engineer : 1 person Operator : 1 each Assistant for Finisher : 1 Worker : 2	Working length in 1999 Yevlakh = 400 m Ganja = 0 m

Present methods should be modified as follows:

Patching Potholes

- Compacting works avoid to be scatted materials and penetration of water and dust.
- Keeping surface smoothness by finishing.
- Cleaning inside spot and spraying emulsion makes harder bonding of materials.
- Cutting and reshaping avoid progress of damage.

Asphalt Concrete Overlay

- Spraying emulsion makes harder bonding of materials.
- Cutting damaged portion and reshaping avoid progress of damage under overlay section.
- Several methods of compacting make more compaction and keep life of overlay.

Road maintenance offices hardly perform appropriate methods for maintenance work due to lack of equipment, even they have sufficient skill for maintenance work.

(4) Existing Condition of Maintenance Facilities

① Workshop

Yevlakh and Ganja Offices have their own workshops in their lots. The layout of the workshop is shown in Figure 2.3.2-3 and Figure 2.3.2-4.

Yevlakh and Ganja workshops are in charge of light maintenance of equipment which means periodic maintenance and light repair work. The central workshop in Baku is in charge of heavy maintenance (e.g. over haul). Both workshops have available mechanics, even a few work volume at present.

② Plant for pavement materials

The condition of plants for Asphalt Concrete and crushing stone are summarized as follows:

Yevlakh

- Asphalt Plant : 2 units owned
  Output 50 t/h & 25 t/h, Bitumen Depot $1,000^3$ & $2,000m^3$
- Crushing Plant : none
  The office purchases crushing stone from the crushing plant company at 40 km from Yevlakh.

Ganja

- Asphalt Plant : 2 units owned
  Output 25 t/h & 100 t/h
- Crushing Plant : 1 unit owned
  Output 50 t/h
- Workshop : light maintenance for plant equipment

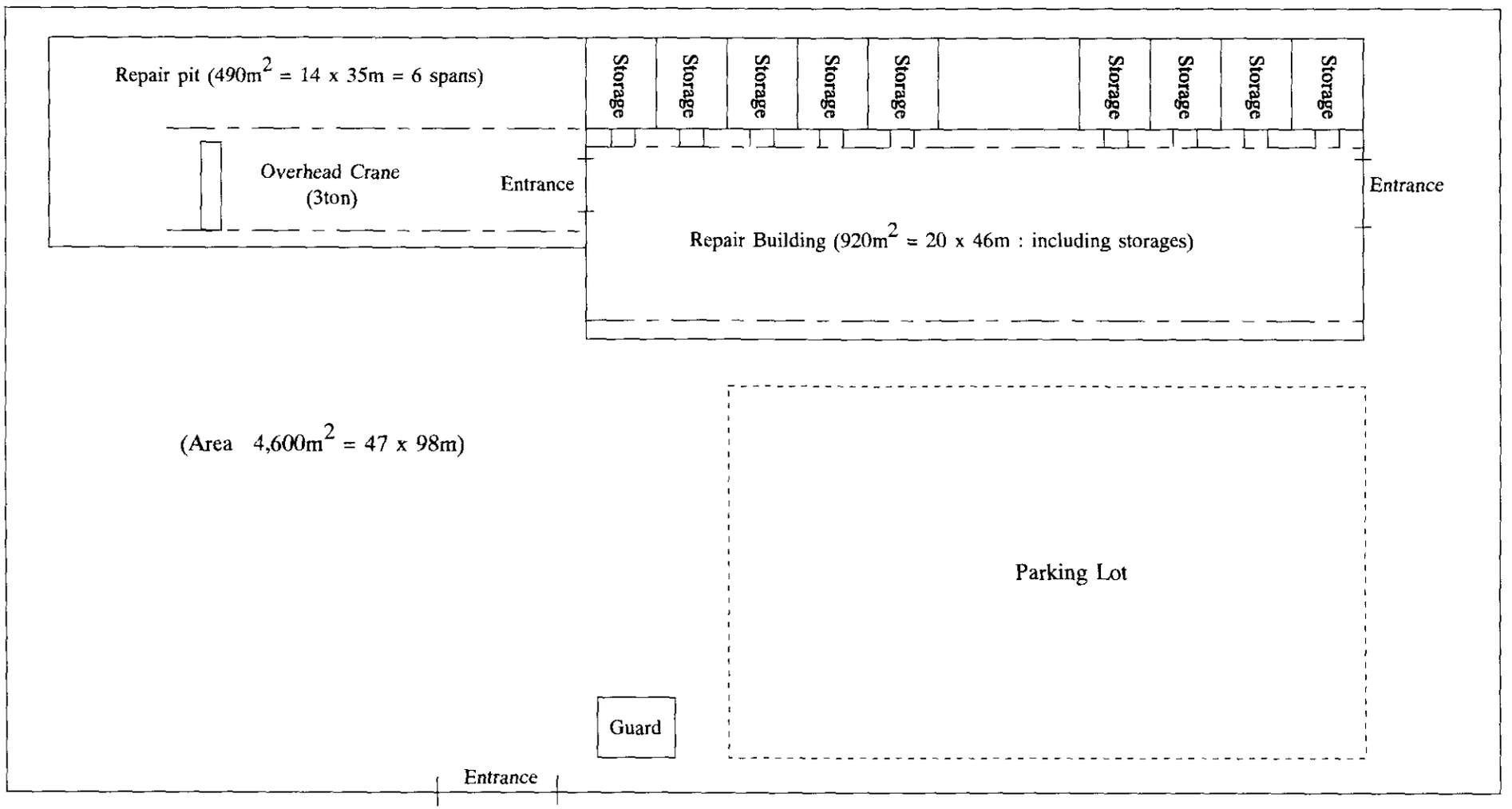


Figure 2.3.2-3 Layout of Yevlakh Workshop

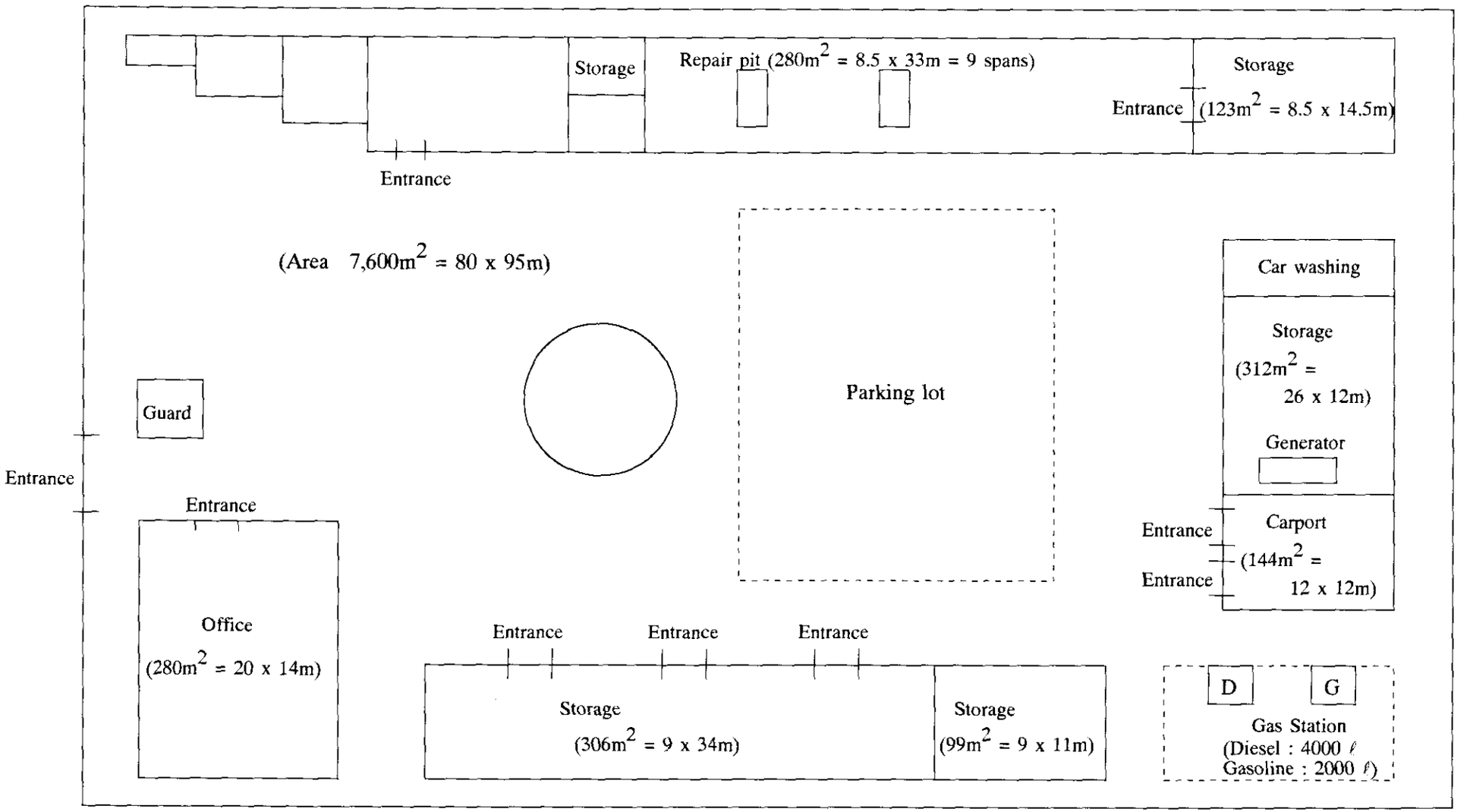


Figure 2.3.2-4 Layout of Ganja Workshop

2.3.3 Study and Examination of Equipment

(1) Requested Equipment by the Government of Azerbaijan

Type of Equipment	Objectives	Requested Specification	Reasons
Asphalt cutter	Trimming and removal of existing pavement	Engine output : 3.7kw Cutting depth : 120 mm	For small scale repair work at pavement
Asphalt milling machine	Milling and leveling of surface pavement	Engine output : 235kw Milling width : 1.2 m Loading height : 3.5m	Milling width (1.2m) is suitable for cutting surface of pavement and easy handling
Excavator	Digging side ditches Digging pavement surface loading material	Engine output : 103kw Operating weight : 21t Bucket : 0.8m^3	Less than 10 times loading for a 6m^3 Dump Truck
Wheel loader	Loading of material	Engine output : 108kw Operating weight : 13t Bucket : 2.5m^3	3 times loading for a 6m^3 Dump Truck
Motor grader	Grading and leveling of material	Engine output : 100kw Operating weight : 11t Blade length : 3.7m	3.7m blade is suitab e for big scale maintenance work.
Vibration roller	Compacting	Engine output : 56kw Operating weight : 7t Width : 1.5m	This capacity is suitable for compacting of subbase and asphalt pavement
Tire roller	Compacting	Engine output : 65kw Operating weight : 8.5t Width : 2.1m	Proper combination with a vibration roller
Asphalt distributor	Spraying of asphalt emulsion	Tank capacity : 6,000ℓ	Tank capacity is suitable for 3,000m^2 maintenance work
Asphalt finisher	Finishing of asphalt concrete pavement	Engine output : 73kw Paving width : 2.5m Max paving width : 6m	2.5m paving width is effective for pavement work.
Truck trailer	Hauling of equipment	Engine output : 213kw Loading capacity : 25t	Loading capacity is suitable for 25t Bulldozer
Mobile workshop	Repair of equipment	Loading capacity : 12t	Quick mobility to site
Bulldozer	Restoration work at disaster Road widening Collecting material	Engine output : 171kw	This type is suitable for digging embankment and collecting muen materials.

(2) Rehabilitation Methods for the Project Road Section

Rehabilitation methods for the Project Road were recommended as follows, based on the results of the investigation for the condition of the road damages.

Patching Potholes

- Estimated length for the work: 80 km (whole road section)
- Work methods:
  - ① Trimming of edges
  - ② Removal of existing surface pavement

③ Reinstating the hole by asphalt materials and compaction

Asphalt Concrete Overlay

- Estimated length for the work: 58 km
- Work methods:
  - ① Patching potholes
  - ② Milling in flat on surface pavement
  - ③ Asphalt Concrete Overlay

Reconstruction

- Estimated length for the work: 5 km
- Work methods:
  - ① Trimming of edges
  - ② Removal of loose material
  - ③ Supplying and placing of approved material
  - ④ Compaction
  - ⑤ Repavement by Asphalt Concrete

(3) Necessary Equipment for Road Rehabilitation Works

Necessary equipment for the rehabilitation work by item are summarized as follows:

Type of Equipment	Rehabilitation Methods		
	Patching Potholes	AC Overlay	Reconstruction
Asphalt cutter	Trimming and removal of existing pavement	-----	Trimming and removal of existing pavement
Excavator	Removal of existing pavement and loading of material	-----	Removal of existing pavement and loading of material
Dump truck	Hauling of unsuitable material and patching material	Hauling of unsuitable surface material and pavement material	Hauling of unsuitable material and patching material
Asphalt sprayer	Spraying of prime coat material	-----	-----
Vibration roller	Compacting	First rolling	Compaction of base course material and first rolling
Asphalt milling machine	-----	Milling and leveling of surface pavement	-----
Asphalt distributor	-----	Spraying of tack coat	Spraying of prime coat
Asphalt finisher	-----	Finishing of asphalt concrete pavement	Finishing of asphalt concrete pavement
Tire roller	-----	Second rolling (compaction)	Second rolling of pavement
Water sprinkler	-----	-----	Moisture control
Motor grader	-----	-----	Grading and leveling of base course material
Truck trailer	Hauling of equipment	Hauling of equipment	Hauling of equipment

2.3.4 Basic Design

(1) Selection of Equipment Type

Requested equipment by the Government of Azerbaijan are reasonable items for the methods of road rehabilitation work, such as patching pothole, Asphalt Concrete Overlay and reconstruction.

The following are the equipment which shall be commonly assigned to each specific use:

- Wheel loader:
  This is used to carry and load materials in the plant area. The capacity of a wheel loader is much bigger than an excavator.

- Mobile Workshop:
  This is used for maintenance and inspection of equipment at the fields to keep equipment in a good condition preventing accident and trouble.

- Bulldozer:
  This is used to remove huge stones at the river where can be obtained for crushing materials. For this purpose, a ripper is attached thereto.

Asphalt sprayer, dump truck and water sprinkler shall be able to be provided for their intended use by the Azeravtoyol State Company.

(2) Specifications of Equipment

The basic policy in the determination of specifications is as follows:

- Fitting to existing road dimension (cross section, width)
- Considering the composition of existing equipment fleet owned by Yevlakh and Ganja Offices.
- Considering the technical level of operators.
- Easy maintenance
- Mobility

The equipment finally proposed and its main intended use are summarized in Table 2.3.4-1 and the detailed specifications are presented in Table 2.3.4-2.

Table 2.3.4-1 Proposed Basic Specification

Requested Equipment	Requested Specification	Proposed Specification	Reasons
Asphalt cutter	Engine output : 3.7kw Cutting depth : 120 mm	Max cutting depth: more than 120mm	Existing pavement depth is 120mm.
Asphalt milling machine	Engine output : 235kw Milling width : 1.2 m Loading height : 3.5m	Max cutting width: more than 1.5m	One road lane has 4.5m width. Within 3 times operation for one lane needs more than 1.5m cutting width.
Excavator	Engine output : 103kw Operating weight : 21t Bucket : 0.8m^3	• Bucket volume: 0.45m^3 class • Wheel type	Considering sizes of pothole and mobility.
Wheel loader	Engine output : 108kw Operating weight : 13t Bucket : 2.5m^3	Bucket volume: 2.0m^3 class	Loading work per day is 260m^3 at total work volume of less than 50,000m^3.
Motor grader	Engine output : 100kw Operating weight : 11t Blade length : 3.7m	• Blade length: 3.7m with scarify	Considering lane width (4.5m) and scarify unsuitable material.
Vibration roller	Engine output : 56kw Operating weight : 7t Width : 1.5m	• Operating weight: 7t class	Second rolling generally needs 6 ~10t at pavement work.
Tire roller	Engine output : 65kw Operating weight : 8.5t Width : 2.1m	• Operating weight: 8~ 15t	Finishing rolling needs 8~15t by tire roller
Asphalt distributor	Tank capacity : 6,000ℓ	• Tank capacity: 4,000ℓ • Spray width: 2.3~3.6m	Tank capacity (4,000ℓ) is suitable for spray volume (126ℓ/100m^2) and spray area (3,000m^2).
Asphalt finisher	Engine output : 73kw Paving width : 2.5m Max paving width : 6m	• Max paving width: 4.5m • Wheel type	Paving width (4.5m) is good for road lane width (4.5m). Avoiding of damage on road surface needs wheel type.
Truck trailer	Engine output : 213kw Loading capacity : 25t	Loading capacity: 30t class	Hauling of bulldozer needs 30t class trailer.
Mobile workshop	Loading capacity : 12t	Loading capacity: 8t class with crane (Max 3t)	Number of tools for field maintenance needs loading capacity 8t class. Lifting damaged port needs 3t crane.
Bulldozer	Engine output : 171kw	Engine output: 170kw class with ripper	Moving of huge rocks at river for crushing plant

Table 2.3.4-2 Specifications for Equipment (1/3)

MOTOR GRADER		
ENGINE OUTPUT	KW	more than 100
OPERATING WEIGHT	kg	more than 11,500
DIMENSIONS		
·Overall Length	mm	less than 7,900
·Overall Width (without Blade)	mm	less than 2,400
·Overall Height (without Cab)	mm	less than 3,200
·Blade		
Length	mm	more than 3,700
Height	mm	more than 600
·Ground Clearance	mm	more than 350
·Wheel Base	mm	more than 5,700
PERFORMANCE		
·Max. Travel Speed		
Forward－Reverse	km/h	more than 42×43
·Min. Turning Radius	mm	less than 6,700
·Front Axle Oscillation	deg	more than 15
·Blade		
Max. Lift	mm	more than 450
·Articulation	deg	more than 25
ENGINE		
·Type		Water Cooled Diesel
·Displacement	cc	more than 4,800
TIRE		
·Size		more than 13-24-8
ATTACHMENT		
·Scarifier		
No. of Teeth	pcs	more than 9
Width	mm	more than 1,000
·Canopy		ROPS
OPTIONAL GOODS		Head,Stop and Tail, Turn signal,Backup, etc.all Lamps Warning Beacon

WHEEL LOADER		
ENGINE OUTPUT	KW	more than 88
OPERATING WEIGHT	kg	more than 9,900
DIMENSIONS		
·Overall Length	mm	less than 7,200
·Overall Width	mm	less than 2,750
·Overall Height	mm	less than 3,300
·Ground Clearance	mm	more than 350
·Wheel Base	mm	more than 2,800
PERFORMANCE		
·Max. Travel Speed		
Forward－Reverse	km/h	more than 34×21
·Min. Turning Radius	mm	less than 6,500
·Digging Force	kN	more than 90
WORKING RANGE		
·Dumping Clearance	mm	more than 2,600
·Dumping Reach	mm	more than 880
·Digging Depth	mm	more than 50
ENGINE		
·Type		Water Cooled Diesel
·Displacement	cc	more than 5,500
TIRE		
·Size		more than 17.5-25-10
BUCKET		
·Type		General Purpose
·Capacity (heaped)	m^3	more than 1.9
CANOPY		
·Type		ROPS

EXCAVATOR		
ENGINE OUTPUT	KW	more than 57
OPERATING WEIGHT	kg	more than 10,700
DIMENSIONS		
·Overall Length	mm	less than 7,200
·Overall Width	mm	less than 2,500
·Overall Height	mm	less than 3,700
·Ground Clearance	mm	more than 250
·Wheel Base	mm	more than 2,600
PERFORMANCE		
·Max. Travel Speed	km/h	more than 34
·Tail Swing Radius	mm	less than 2,200
·Swing Speed	rpm	more than 11
·Arm Crowd Force	kgf	more than 5,400
·Digging Force	kN	more than 73
WORKING RANGE		
·Max. Digging Depth	mm	more than 4,200
·Max. Dumping Height	mm	more than 5,700
·Max. Vertical Wall Digging Depth	mm	more than 3,500
·Max. Ground Reach	mm	more than 7,000
ENGINE		
·Type		Water Cooled Diesel
·Displacement	cc	more than 4,850
HYDRAULIC SYSTEM		
·Flow	L/min	more than 100
UNDER CARRIAGE		
·Type		Wheel
·Size		more than 9-20-12
·No. of Tire	pcs	8
BUCKET		
·Capacity (heaped)	m^3	more than 0.44
·Width	mm	more than 750

VIBRATION ROLLER		
ENGINE OUTPUT	KW	more than 52
OPERATING WEIGHT	kg	more than 6,500
DIMENSIONS		
·Overall Length	mm	less than 4,400
·Overall Width	mm	less than 1,700
·Overall Height	mm	less than 2,950
·Wheel Base	mm	more than 2,350
PERFORMANCE		
·Max. Travel Speed	km/h	more than 10
·Min. Turning Radius	mm	less than 4,850
·Frequency	Hz	more than 48
·Centrifugal Force	kN	more than 58
ENGINE		
·Type		Water Cooled Diesel
·Displacement	cc	more than 2,700
UNDER CARRIAGE		
·Type		Smooth Steel Drum
Diameter	mm	more than 1,050
Width	mm	more than 1,400
No. of Roller	pcs	2

TIRE ROLLER		
ENGINE OUTPUT	KW	more than 68
WEIGHT		
·Empty Weight	kg	more than 8,450
·Gross Weight	kg	more than 15,000
DIMENSIONS		
·Overall Length	mm	less than 5,200
·Overall Width	mm	less than 2,300
·Overall Height	mm	less than 2,700
·Wheel Base	mm	more than 3,700
PERFORMANCE		
·Max. Travel Speed	km/h	more than 19
·Min. Turning Radius	mm	less than 7,000
·Rolling Width	mm	more than 2,000
ENGINE		
·Type		Water Cooled Diesel
·Displacement	cc	more than 6,000
UNDER CARRIAGE		
·Type		Smooth Tire
Size		more than 9-20-10
No. of Tire	pcs	Front: more than 3
	pcs	Rear: more than 4

Table 2.3.4-2 Specifications for Equipment (2/3)

ASPHALT FINISHER		
ENGINE OUTPUT	KW	more than 44
OPERATING WEIGHT	kg	more than 8,000
DIMENSIONS (transportation)		
・Overall Length	mm	less than 6,450
・Overall Width	mm	less than 2,500
・Overall Height	mm	less than 3,300
UNDER CARRIAGE		
・Type		Wheel
・Size		
Front		more than 18-6-12
Rear		more than 11-20-12
PERFORMANCE		
・Max. Paving Speed	m/min	more than 10
・Capacity of Hopper	ton	more than 8
WORKING RANGE		
・Standard Paving Width	mm	more than 2,450
・Max. Paving Width		
(infinitely variable)	mm	more than 4,500
・Max. Paving Thickness	mm	more than 150
ENGINE		
・Type		Water Cooled Diesel
・Displacement	cc	more than 2,900
BAR FEEDER		
・Max. Speed	m/min	more than 12
SCREW SPREADER		
・Max. Revolution	rpm	more than 50
SCREED		
・Max. Frequency	Hz	more than 36
・Heater		LPG
ATTACHMENT		Canopy

ASPHALT DISTRIBUTOR		
ENGINE OUTPUT	KW	more than 115
WEIGHT		
・Max. Loading Capacity	kg	more than 3,500
・Vehicle Weight	kg	more than 5,500
DIMENSIONS		
・Overall Length	mm	less than 8,000
・Overall Width (without Bar)	mm	less than 2,500
・Overall Height	mm	less than 3,000
・Wheel Base	mm	more than 3,700
・Asphalt Tank Capacity	m^3	more than 4
PERFORMANCE		
・Max. Travel Speed	km/h	more than 90
・Min. Turning Radius	mm	less than 8,000
ENGINE		
・Type		Water Cooled Diesel
・Displacement	cc	more than 6,500
SPRAY SYSTEM		
・Engine Output	KW	more than 6.7
・Max. Spray Width	mm	more than 3,600
・Spraying Capacity	L/min	more than 350
・Nozzle Setting Interval	mm	more than 120
TIRE		
・Size		more than 8.25-16-14
・No. of Tire	pcs	6

ASPHALT MILLING MACHINE			ASPHALT CUTTER		
ENGINE OUTPUT	KW	more than 240	ENGINE OUTPUT	KW	more than 5
OPERATING WEIGHT	kg	more than 22,000	OPERATING WEIGHT	kg	less than 140
DIMENSIONS			DIMENSIONS		
·Overall Length	mm	less than 16,500	·Overall Length	mm	less than 2,000
·Overall Width	mm	less than 2,500	·Overall Width	mm	less than 600
·Overall Height	mm	less than 3,550	·Overall Height	mm	less than 1,100
PERFORMANCE			PERFORMANCE		
·Max. Working Speed	m/min	more than 10	·Blade Size	mm	more than 350
·Cutting Width	mm	more than 1,500	·Max. Cutting Depth	mm	more than 120
·Max. Cutting Depth	mm	more than 150	ENGINE		
·No. of Cutter Bits	pcs	more than 110	·Type		Air Cooled Gasoline
·Conveyer Loading Height	mm	less than 3,900	·Displacement	cc	more than 250
ENGINE			ATTACHMENT		
·Type		Water Cooled Diesel	·Cutter Blade	pcs	5
·Displacement	cc	more than 15,000			
UNDER CARRIAGE					
·Type		Wheel			

Table 2.3.4-2 Specifications for Equipment (3/3)

TRUCK TRAILER						MOBILE WORKSHOP		
TRUCK TRACTOR			SEMI TRAILER			ENGINE OUTPUT	KW	more than 140
ENGINE OUTPUT	KW	more than 210	WEIGHT			WEIGHT		
WEIGHT			・Max. Loading Capacity	kg	more than 30,000	・Max. Loading Capacity	kg	more than 7,000
・Max. Combination Mass	kg	more than 40,000	・Vehicle Weight	kg	more than 7,000	・Vehicle Weight	kg	more than 3,900
・Vehicle Weight	kg	more than 6,400	・Gross Vehicle Weight	kg	more than 37,000	・Gross Vehicle Weight	kg	more than 13,000
・Gross Vehicle Weight	kg	more than 15,500	DIMENSIONS			DIMENSIONS		
DIMENSIONS			・Overall Length	mm	less than 13,500	・Overall Length	mm	less than 8,100
・Overall Length	mm	less than 6,900	・Overall Width	mm	less than 3,200	・Overall Width	mm	less than 2,500
・Overall Width	mm	less than 2,500	・Overall Height	mm	less than 3,000	・Overall Height	mm	less than 3,600
・Overall Height	mm	less than 3,300	・Wheel Base	mm	more than 7,400	・Wheel Base	mm	more than 4,200
・Wheel Base	mm	more than 3,100	・Body			PERFORMANCE		
PERFORMANCE			Length	mm	more than 7,000	・Max. Travel Speed	km/h	more than 85
・Max. Travel Speed	km/h	more than 90	Width	mm	more than 2,950	・Min. Turning Radius	mm	less than 9,900
・Front Fitting Radius	mm	less than 2,750	Height	mm	less than 800	・Gradeability	deg	more than 15
・Gradeability	deg	more than 13	PERFORMANCE			ENGINE		
ENGINE			・Rear Fitting Radius	mm	less than 2,200	・Type		Water Cooled Diesel
・Type		Water Cooled Diesel	TIRE			・Displacement	cc	more than 8,200
・Displacement	cc	more than 12,500	・Size		more than 8.25-16-14	POWER LINE		
POWER LINE			・No. of Tire	pcs	more than 8	・Drive Type		4×4
・No. of Speed		more than 7F-1R	ATTACHMENT			・No. of Speed		more than 5F-1R
TIRE			・Loading Ramp		Manual or Spring	TIRE		
・Size		more than 11-20-14				・Size		more than 7.5-20-12
・No. of Tire	pcs	10				・No. of Tire	pcs	6
						LOADED FACILITY ・Generator ・Welder ・Gas Welder ・Air Compressor ・Workbench ・Mechanic Vise ・Hand Tools ・Manual Drum Pump ・Oil Measure ・Grease Pump and Gun ・Hydraulic Jack ・Wire Sling ・Nylon Sling ・Lever Block ・Fire Extinguisher ・Measuring Tools ・Crane (3t capacity)		

BULLDOZER		
ENGINE OUTPUT	KW	more than 165
OPERATING WEIGHT	kg	more than 27,500
DIMENSIONS		
·Overall Length	mm	less than 7,150
·Overall Width (without Blade)	mm	less than 2,900
·Overall Height	mm	less than 3,600
·Blade		
Length	mm	more than 3,650
Height	mm	more than 1,350
·Ground Clearance	mm	more than 400
·Truck Gauge	mm	more than 1,950
·Truck Length	mm	more than 2,800
PERFORMANCE		
·Max. Travel Speed		
Forward－Reverse	km/h	more than 10×12
·Blade		
Type		Straight Tilt
Max. Lift	mm	more than 1,100
Max. Digging Depth	mm	more than 500
ENGINE		
·Type		Direct Injection Turbocharge
·Displacement	cc	more than 10,500
UNDER CARRIAGE		
·Shoe Type		Single Grouser
·Shoe Width	mm	more than 550
·Ground Pressure	kPa	less than 95
·No. of Roller (carrier/track)	pcs	more than 2／7
ATTACHMENT		
·Canopy		ROPS
·Ripper		
No. of Teeth	pcs	3

(3) Numbers of Equipment

Quantity of rehabilitation work and the combination of necessary equipment are summarized in following tables.

Quantity of rehabilitation work by item

	Unit	Patching Pothole	Removal and repaved of existing pavement	Reconstruction	AC Overlay	Total
Length of work	m	Whole of the Project road section	Whole of the Project road section	5,000	62,000	67,000
Pavement area	m^2	14,400	54,900	45,000	558,000	672,300
Weight of AC	ton	4,000	7,600	12,450	51,350	75,400
Length of pavement cutting	m	96,000	0	5,018	0	101,018
Milling area	m^2	0	54,900	0	0	54,900
Volume of excavation	m^3	1,750	3,300	23,400	0	28,450

Composition of an equipment fleet for rehabilitation work

	Annual working day	Annual working hour	Patching Pothole	Removal and repaved of existing pavement	Reconstruction	AC Overlay
Asphalt cutter	70	350	◎		◎	
Asphalt milling machine	70	380		◎		
Excavator	130	750	◎		◎	
Motor grader	90	470		◎	◎	
Vibration roller	80	410		◎	◎	◎
Tire roller	90	450			◎	◎
Asphalt distributor	110	440		◎	◎	◎
Asphalt finisher	70	440			◎	◎
Wheel loader	120	540	○	○	○	○
Truck trailer	120	700	○	○	○	○
Mobile workshop	160	910	○	○	○	○
Bulldozer	120	790	○	○	○	○

Estimated year of road rehabilitation work for the Project road

- Work volume of Asphalt Concrete Overlay: 1,050 m^2/day
  * Average of cutting depth is less than 6cm.
    Single pavement a day.
- Annual working area: 1,050 m^2/day x 70 days/year = 73,500 m^2/year
  * Minimum working days per year is 70 days.
- Total length of pavement working: 73,500 m^2/year ÷ 9m = 8.17 km/year
  * Road width is 9m for 2 lanes.
- Necessary year for rehabilitation work (Asphalt Concrete Overlay + Reconstruction): 67 km ÷ 8.17 km/year = 8.2 year
  * Road length (Asphalt Concrete Overlay + Reconstruction) is 67 km.

The road rehabilitation work for the Project road section shall be taken for 8.2 year by an equipment fleet. Life cycle of Asphalt Concrete Overlay is generally about 8~10 year.

Necessary numbers of equipment shall be decided based on the working term (4 years) which is taking into consideration the Asphalt Concrete Overlay's life cycle.

The followings are summarized by an estimation for necessary numbers of equipment.

① Asphalt Cutter

Work volume of 15 cm cutting depth: 0.49 day for 100 m cutting length

Necessary days of cutting of 101,018 m length:
(101,018 m x 0.49 day ÷ 100 m) = 495 days

Necessary number of equipment:
495 days ÷ (70 days x 4 year) = 1.77 unit ∴2 units
* Working Term 4 years, Annual working days 70 days

② Excavator

Volume of excavation: Patching Pothole 1,750 m^3,
Reconstruction 23,400 m^3

Necessary number of excavator for Patching Pothole:
(3.33 m^3/day x 130 day/year x 4 years) = 1.01 unit
* Loading material into a bucket by manpower is 6 persons/10 m^3
Work volume by 2 persons:
(10 m^3 ÷ 6 persons) x 2 persons = 3.33 m^3/day

Necessary number of excavator for reconstruction:
23,400 m^3 ÷ (11 m^3/h x 750 hours/year x 4 years) = 0.71 unit
* Work volume of excavator: 11 m^3/h (pavement thickness is 10~15 cm)

Total necessary number of excavator: 1.01 unit + 0.71 unit = 1.72 unit ∴2 units

③ Asphalt Milling Machine

Necessary number of equipment:
54,900 m^2 ÷ (1,050 m^2/day x 70 days/year x 4 years) = 0.19 unit
∴1 unit
* Work volume per day: 1,050 m^2/day (milling depth 6 cm)

④ Equipment for Pavement

Total pavement area: 558,000 m^2 + (45,000 m^2 x 3 layers) = 693,000 m^2

* Work volume of Asphalt Finisher:
  1,900 m^2/day・one layer (pavement width : 4.5 m)

Asphalt Concrete Overlay: Single layer, Reconstruction: 3 layers
Necessary number of equipment:
693,000 m^2 ÷(1,900 m^2 x 70 days x 4 years) = 1.30 unit ∴2 unit

Number of pavement equipment was estimated based on the performance of Asphalt Finisher in the composition (Motor Grader, Vibration Roller, Tire Roller, Asphalt Distributor, Asphalt Finisher).

⑤ Wheel Loader

Volume of loading materials:
75,400 t÷2.3 t/m^3 = 32,800 11 m^3/h ÷2 plants = 16,400 m^3

* Work volume of Wheel Loader: 11.34 m^3/h

Necessary number of wheel loader:
16,400 m^3÷(11.34 m^3/h x 540 hours/year x 4 years) = 0.67 unit
∴1 unit / plant (Total 2 units)

⑥ Others

Truck Trailer: 1 unit

* Hauling of equipment shall be done only at the beginning and ending of work among 80 km Project road.

Mobile workshop: 1 unit

* Travel time shall be few hours among 80 km Project road. One unit can cover the Project Road.

Bulldozer: 1 unit

* The objective of a bulldozer is to remove huge rocks at a crushing plant in Ganja.

Proposed number of equipment is summarized in the following table.

Type of Equipment	Proposed Number (unit)	Station Office	
		Yevlakh Office	Ganja Office
Asphalt Cutter	2	1	1
Asphalt Milling Machine	1	1	--
Excavator	2	1	1
Wheel Loader	2	1	1
Motor Grader	2	1	1
Vibration Roller	2	1	1
Tire Roller	2	1	1
Asphalt Distributor	2	1	1
Asphalt Finisher	2	1	1
Truck Trailer	1	1	--
Mobile Workshop	1	1	--
Bulldozer	1	--	1

(4) Spare Parts

In principal, costs of maintenance and repair for equipment shall be taken by the Government of Azerbaijan.

Some consumable parts which shall be used for the Project term (4 years) will be selected and included under the Grant Aid, such as edge, booth and bit.

CHAPTER 3

IMPLEMENTATION PLAN

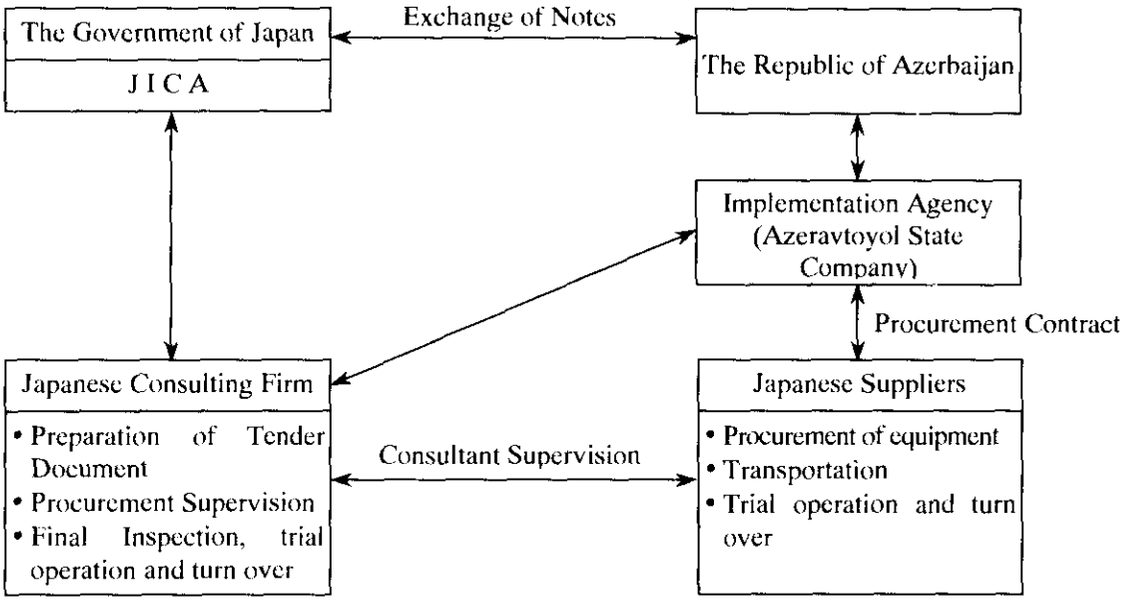
CHAPTER 3 IMPLEMENTATION PLAN

3.1 Procurement Plan

3.1.1 Implementation Concept

(1) Project Organization

The Organization for the Project is summarized as follows:



This project, if approved, will be implemented in accordance with the provisions of Japan's Grant Aid Program, after the signing of the Exchange of Notes between the Governments of Japan and the Republic of Azerbaijan.

(2) Consultant

Detailed design, tenders and procurement supervision of the Project will be undertaken by a Japanese consulting firm, in accordance with a contract between the Azeravtoyol State Company and the consultant.

(3) Suppliers

The procurement of equipment will be undertaken by the Japanese tenderers (suppliers) who are awarded the contract by the Azeravtoyol State Company.

3.1.2 Consultant Supervision (Equipment Procurement)

A Japanese consultant will supervise the implementation of the project on behalf of the Government of Azerbaijan. The consultant will carry out the detailed design, assist in tendering and supervise the procurement work, in accordance with the consultant contract concluded between the Government of Azerbaijan and the consultant.

Detailed Design

Major works in the detailed design to be carried out by the consultant are as follows:

- Procurement Schedule and Cost Estimates
- Preparation of Tender Documents
- Preparation of Final Specifications of Equipment and Spare Parts

The necessary time for the detailed design is 2.0 months.

Assistance in Tendering

- The consultant will render the following services during the period from tender publication to construction contract.
- Tender publication
- Tendering
- Tender evaluation
- Contract facilitation

The necessary time for assistance in tendering is 2.0 months.

Procurement Supervision

The consultant will carry out supervision of the procurement work, which will be executed by the supplier. The main work items are as follows:

- Evaluation of procurement and transportation plan
- Progress control
- Inspection of pre-shipping
- Final inspection, trial operation and turn-over

3.1.3 Procurement Plan of Equipment

The equipment is planned to be basically procured from Japan, taking into consideration the quality, the supply of spare parts and the delivery time, in the cases of Azerbaijan, Europe and Japan.

3.1.4 Transportation Plan for Equipment

Transportation routes from Japan to Azerbaijan are evaluated in the Table 3.1.1-1.

Route 1 (via Poti) and Route 3 (via Russia) are recommended as the results of evaluation.

Table 3.1.1-1 Comparison of Transportation Route from Japan to Azerbaijan

Route	via	Advantage	Disadvantage	Evaluation
Route 1 Japan→ Poti, Georgia → by Train→ Baku	Japan Georgia Azerbaijan	1. Shortest distance by land transportation 2. Flat terrain, few snow in winter 3. High reliability 4. Direct transportation from the Port to Baku by train	1. No regular service shipping from Japan to Poti 2. Time consuming to make a reservation	○
Route 2 Japan→Dubai, United Arab Emirates→ Bandar Abbas, Iran→ Astara→ Baku	Japan United Arab Emirates Iran Azerbaijan	1. Weekly shipping from Japan to Dubai	1. Time consuming to a custom clearance at Iran 2. Limited number of truck trailer 3. Difficult trace at land transport	X
Route 3 Japan→Nakhodka, Russia→ by Train → Baku	Japan Russia Azerbaijan	1. Weekly shipping from Japan to Nakhodka 2. Available subdividing of freight 3. Easy trace at railway transportation 4. Direct transportation from Nakhodka to Baku	1. Limited size of freight due to many tunnels	○
Route 4 Japan→Mediterranean Sea→ Rostov-na-Donu→ Caspian Sea→ Baku	Japan Italy or Turkey Russia Azerbaijan	1. Available shipping from Japan to an international port in Mediterranean Sea 2. Economy cost	1. Freezing of a shipping canal in winter 2. Transportation of a exclusive canal ship at an international port in Mediterranean Sea	X

3.1.5 Delivery Sites

Equipment will be delivered at Ganja and Yevlakh offices by the Japanese suppliers and turned over to the Government of Azerbaijan.

3.1.6 Technical Assistance

The Government of Azerbaijan is responsible for executing maintenance work in the Project road after the delivery of the equipment.

For smooth implementation of the Project, the following technical assistance by the Government of Japan shall be considered at the delivery of the equipment.

① Trial operation and handling by the suppliers
② Training in Japan as counterparts
③ Translation into Russian for operation manuals etc.

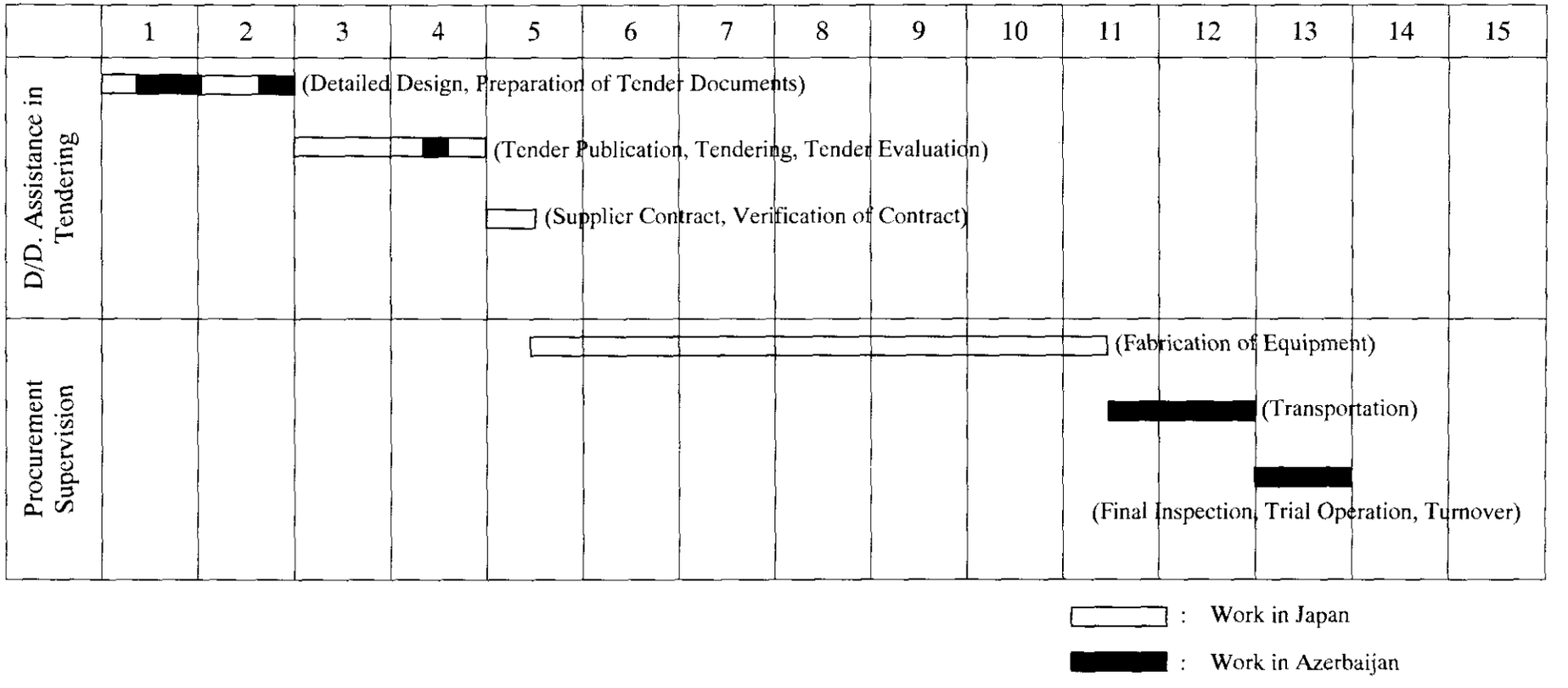
After the delivery of the equipment, dispatching experts from Japan shall be considered for the following fields.

① Road maintenance plan
② Pavement rehabilitation work plan
③ Supervising of pavement rehabilitation work

3.1.7 Implementation Schedule

Implementation schedules for the equipment procurement by the Government of Japan are shown in Table 3.1.7-1.

Table 3.1.7-1 Implementation Schedule



3.1.8 Obligations of the Government of Azerbaijan

The following necessary measures should be taken by the Government of Azerbaijan on condition that the Grant Aid by the Government of Japan is extended to the Project.

(1) To bear commissions to the Japanese foreign exchange bank for its banking services, based upon the Banking Arrangement, namely the advising commission of the "Authorization to Pay" and payment commission.

(2) To ensure prompt unloading, tax exemption, customs clearance at the port of disembarkation in Azerbaijan and prompt internal transportation of the materials and equipment for the Project purchased under the Grant Aid.

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

(4) To provide necessary permissions, licenses and other authorizations for implementing the Project, if necessary.

3.2 Project Cost Estimation

Project cost borne by the Government of Azerbaijan is customs clearance fee.

3.3 Operation Cost for the Project

Annual operation cost of equipment is estimated as follows:

Type of equipment	① Output (PS)	② Base price (1,000 Yen)	③ Annual working hours (h)	④ Annual repair ratio (%)	⑤ Annual handling ratio (%)	⑥ Fuel and oil consumption (ℓ/PS・h)
A: Asphalt cutter	8.2	361	350	7.50	7.0	0.231
B: Asphalt milling machine	237	28,900	380	3.77	9.0	0.145
C: Excavator	120	9,090	750	6.25	9.0	0.188
D: Wheel loader	124	14,200	540	5.91	9.0	0.156
E: Motor grader	156	14,100	470	3.39	9.0	0.110
F: Vibration roller	75	8,070	410	3.77	9.0	0.155
G: Tire roller	97	7,240	450	3.69	9.0	0.102
H: Asphalt distributor	154	8,140	440	4.81	9.0	0.094
I: Asphalt finisher	52	23,100	440	4.17	9.0	0.155
J: Truck trailer	320	17,000	700	3.68	9.0	0.076
K: Mobile workshop	269	9,640	910	4.40	12.0	0.054
L: Bulldozer	232	32,800	790	6.44	9.0	0.188

Type of equipment	⑦ Handling cost (1,000 Yen)	⑧ Maintenance cost ②x④ (1,000 Yen)	⑨ Fuel & oil ⑥x①x③ x 0.017 (1,000 Yen)	⑩ Annual labor cost (1,000 Yen)	⑪ Equipment operation cost ⑦+⑧+⑨+⑩ (1,000 Yen)	⑫ No. of unit	⑬ Total equipment operation cost ⑪x⑫ (1,000 Yen)
A:	25	27	26	53	131	2	262
B:	2,601	1,090	222	53	3,966	1	3,966
C:	818	568	288	53	1,727	2	3,454
D:	1,278	839	178	53	2,348	2	4,696
E:	1,269	478	137	53	1,937	2	3,874
F:	726	304	81	53	1,164	2	2,328
G:	652	267	76	53	1,048	2	2,096
H:	733	392	108	53	1,286	2	2,572
I:	2,079	963	60	53	3,155	2	6,310
J:	1,530	626	289	53	2,498	1	2,498
K:	1,157	424	225	53	1,859	1	1,859
L:	2,952	2,112	586	53	5,703	1	5,703
Total	23,400	11,928	3,230	1,060	39,618	20	39,618
	(Total units including Bulldozer)					1,621 million Manat	

Notes:

- Annual operation cost of equipment means as insurance, tax and storage fee.
- Repair ratio means maintenance and repair cost to keep equipment good condition.
- Fuel and oil costs mean Diesel (700 manat) and Gasoline (1,600 manat).
- Labor cost means $40/month for equipment operator.

Material Cost

Necessary material for road rehabilitation from Ganja to Yevlakh (80 km) is estimated as follows:

- Asphalt Concrete Overlay
  Thickness of pavement (m) x Road width (m) x Work length (m)
  = 0.04 x 9 x 58,000
  = 20,880 (m^3)
  Materials: 34,000 (manat/m^3) x 20,880 (m^3) = 710 million manat
  Bitumen: 450,000 (manat/t) x 20,880 x 2.35 (t/m^3) x 0.06
  = 1,325 million manat
  * Asphalt weight : 2.35 (t/m^3), Bitumen ratio : 6%

- Reconstruction
  Thickness of pavement (m) x Road width (m) x Work length (m)
  = 0.12 x 9 x 5,000
  = 5,400 (m^3)
  Materials: 34,000 (manat/m^3) x 5,400 (m^3) = 184 million manat
  Bitumen: 450,000 (manat/t) x 5,400 x 2.35 (t/m^3) x 0.06
  = 343 million manat

- Base course
  Thickness (m) x Road width (m) x Work length (m)
  = 0.15 x 9 x 5,000
  = 6,750 (m^3)
  Materials: 34,000 (manat/m^3) x 6,750 (m^3) = 230 million manat

  Total volume is:
  Materials : 33,030 m^3
  Bitumen : 3.710 t

  Estimated annual cost for rehabilitation work is 2,792 million manat.

CHAPTER 4

PROJECT EVALUATION AND RECOMMENDATION

CHAPTER 4 PROJECT EVALUATION AND RECOMMENDATION

4.1 Project Effect

This Project aims to provide safe and reliable transportation facilities (road condition) to promote social and economic development along West-East trunk road which is the priority road in Azerbaijan, connecting Baku, major cities and neighbor countries.

The Project road has a high priority among West-East trunk road because damages of road pavement are often observed and reduce speed of vehicles. Present Traffic Volume is counted at about 5,000 vehicles per day at Ganja.

The Project road section will be rehabilitated by the Government of Azerbaijan with equipment procured under Japan's Grant Aid.

The major effects of implementing the Project are as follows:

- Improvement of Road Rehabilitation Capacity with new equipment procured by the Project.

	Patching Potholes	AC Overlay
1999 (results record)	10 km	0.4 km
After procured (projected)	20 km/year	14 km/year

4.2 Recommendation

Since the Project will greatly contribute to improve socio-economic development and traffic conditions along the trunk road, and the implementation organization is considered to have sufficient capacity to manage the Project, it is concluded that it is appropriate to implement this Project under Japan's grant aid. However, smooth operation of the plan will become difficult if the following points are not considered;

- To carry out routine inspection / maintenance and repair works of equipment.
- To secure the budget and manpower.

APPENDICES

APPENDIX 1

MEMBER LIST OF THE STUDY TEAM

APPENDIX – 1 MEMBER LIST OF THE STUDY TEAM

1. The Field Study in the Republic of Azerbaijan

Mr. NAKANO Satoshi	Leader	Deputy Director, Grant Aid Management Department, JICA
Mr. SATO Tadashi	Chief Consultant / Road Maintenance Planner	Katahira & Engineers International
Mr. KOGAWA Satoshi	Equipment Planner	Katahira & Engineers International
Mr. MIYASAKA Goichi	Procurement Planner / Cost Estimator	Katahira & Engineers International
Mr. MURAI Yoshiyuki	Interpreter (Russian – Japanese)	Katahira & Engineers International

2. Explanation of Summary of the Study in the Republic of Azerbaijan

Mr. NAITO Tomoyuki	Leader	Third Project Management Div., Grant Aid Management Dept., JICA
Mr. SATO Tadashi	Chief Consultant / Road Maintenance Planner	Katahira & Engineers International
Mr. KOGAWA Satoshi	Equipment Planner	Katahira & Engineers International
Mr. MURAI Yoshiyuki	Interpreter (Russian – Japanese)	Katahira & Engineers International

APPENDIX 2

STUDY SCHEDULE

APPENDIX – 2 STUDY SCHEDULE

1. The Field Study (July 2, 2000 to July 31, 2000)

No.	Date	Activities
1	Jul. 2 (Sun)	• Messrs. Nakano, Sato, Kogawa, Miyasaka and Murai left Tokyo and arrived at Moscow.
2	Jul. 3 (Mon)	• Courtesy Call to Embassy of Japan
3	Jul. 4(Tue)	• Above 5 members left Moscow and arrived at Baku.
4	Jul. 5 (Wed)	• Courtesy Call to Embassy of Japan, Cabinet of Ministers and Ministry of Foreign Affairs. • Discussion with Azeraftayol
5	Jul. 6 (Thu)	• Discussion with Azeraftayol
6	Jul. 7 (Fri)	• Signature of Minutes of Discussions • Report to Embassy of Japan
7	Jul. 8 (Sat)	• Mr. Nakano left Baku for Georgia
8	Jul. 9 (Sun)	• Preparation for Field Survey
9	Jul. 10 (Mon)	• Discussion with Azeraftayol
10	Jul. 11 (Tue)	• Baku ~ Yevlakk ~ Ganja • Discussion with Yevlakh Office
11	Jul. 12 (Wed)	• Interview and Data Collection at Ganja Office • Road Inventory Survey (Ganja ~ Yevlakh)
12	Jul. 13 (Thu)	• Interview and Data Collection at Yevlakh Office • Traffic Survey
13	Jul. 14 (Fri)	• Data Collection • Ganja ~ Baku
14~15	Jul. 15, 16	• Data Analysis
16	Jul. 17 (Mon)	• Discussion with Azeraftayol • Data Collection at agents of equipment
17	Jul. 18 (Tue)	• Data Collection (Maps, etc.)
18	Jul. 19 (Wed)	• Interview and Data Collection at Baku Workshop • Discussion with World Bank
19	Jul. 20 (Thu)	• Discussion with EBRD
20	Jul. 21 (Fri)	• Discussion with Azeraftayol
21~22	Jul. 22, 23	• Data Analysis
23	Jul. 24 (Mon)	• Discussion with Azeraftayol, TACIS
24	Jul. 25 (Tue)	• Collection of Topo. Maps • Interview and Data Collection at European agent
25	Jul. 26 (Wed)	• Data Collection at TACIS, Meteorological Office & Ministry of Finance
26	Jul. 27 (Thu)	• Discussion with Azeraftayol, UNDP
27	Jul. 28 (Fri)	• Report to Embassy of Japan
28	Jul. 29 (Sat)	• Messrs. Sato, Kogawa, Miyasaka and Murai left Baku and arrived at Zurich
29	Jul. 30 (Sun)	• Above 5 members left Zurich
30	Jul. 31 (Mon)	• Arrived at Tokyo

2. Explanation of Summary of the Study in the Republic of Azerbaijan

No.	Date	Activities
1	Oct. 15 (Sun)	• Messrs. Naito, Sato and Kogawa left Tokyo and arrived at Frankfurt
2	Oct. 16 (Mon)	• Above 3 members left Frankfurt and arrived at Baku. (Mr. Murai joined the Team)
3	Oct. 17 (Tue)	• Courtesy Call to Embassy of Japan, Azeraftayol
4	Oct. 18 (Wed)	• Internal Meeting
5	Oct. 19 (Thu)	• Submission and explanation of Summary of the Study to Azeraftayol
6	Oct. 20 (Fri)	• Signature of Minutes of Discussions • Report to Embassy of Japan
7	Oct. 21 (Sat)	• Mr. Naito left Baku for Georgia
8	Oct. 22 (Sun)	• Baku ~ Ganja
9	Oct. 23 (Mon)	• Road Inventory Survey (Ganja ~ Georgia Border)
10	Oct. 24 (Tue)	• Discussion with Ganja and Yevlakh Offices
11	Oct. 25 (Wed)	• Report to Cabinet of Ministries, Azeraftayol
12	Oct. 26 (Thu)	• Report to Embassy of Japan
13	Oct. 27 (Fri)	• Discussion with World Bank • Messrs. Sato, Kogawa left Baku for Istanbul
14	Oct. 28 (Sat)	• Above 2 members left Istanbul
15	Oct. 29 (Sun)	• Arrived at Tokyo

APPENDIX 3

LIST OF PARTIES CONCERNED IN THE REPUBLIC OF AZERBAIJAN

APPENDIX 3 LIST OF PARTIES CONCERNED IN THE REPUBLIC OF AZERBAIJAN

- Cabinet of Ministers

Dr. Eng. Nail S. Fataliev	Deputy Head of Division
Rovshan Sh. Suleymanov	Advisor

- Azeraftayol State Company

Novruzov Yushif Ismikhan	President of Azeraftayol
Azad Azadaltiyev	Chief of the Transport, Energy and Supply
I. Mamedov	Deputy Chief of the Transport, Energy and Supply
Miri Mirjavadov	Chief of Technical and Foreign Relations Department
Novruzov Akif Tagi	Chief of Road Operation and Maintenance Office of Ganja
Kurbanaliev Chingiz Midkhat	Chief of Road Construction Office of Ganja
Balazade Sharaf Gusif	Chief of Road Operation and Maintenance Office of Yevlakh
Makhtarov Natig Ali	Chief Engineer of Yevlakh Office

- Ministry of Finance

Adalet N. Aliyev	Main Foreign Economic Relations Department

- State Hydrometeorological Committee

Kerimov Seyfulla	Vice-Chairman

- Ministry of Foreign Affairs

Kanan J. Murtuzov	Division of International Bilateral Economic Relations

APPENDIX 4

MINUTES OF DISCUSSIONS

MINUTES OF DISCUSSIONS

BASIC DESIGN STUDY
ON THE PROJECT FOR TRUNK ROUTE REHABILITATION
IN THE AZERBAIJAN REPUBLIC

Based on the results of the Preparatory Study, the Government of Japan decided to conduct a Basic Design Study on the Project for Trunk Route Rehabilitation (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA") .

JICA sent to the Azerbaijan Republic (hereinafter referred to as "Azerbaijan") the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Satoshi Nakano, Deputy Director, Third Project Management Division, Grant Aid Management Department, JICA, and is scheduled to stay in the country from July 4, 2000 to July 29, 2000.

The Team held discussions with the officials concerned of the Government of Azerbaijan and conducted a field survey at the study area.

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

Baku, July 7, 2000

Satoshi Nakano
Leader
Basic Design Study Team
Japan International Cooperation Agency

Novruzov Yushif
President
Azeravtoyol State Company
the Azerbaijan Republic

ATTACHMENT

1.Objective of the Project

The objective of the Project is that the Trunk Route between Yevlakh and Ganja (80km) will be properly rehabilitated and maintained through consolidating construction machinery of the Azeravtoyol State Company.

2.Project site

The site of the Project is shown in Annex-1.

3.Responsible and Implementing Organization

The Responsible and Implementing Organization is Azeravtoyol State Company (hereinafter referred to as "ASC").

The organization chart of the Organization is shown in Annex-2.

4.Items requested by the Government of Azerbaijan

After discussions with the Team, the items described in Annex-3 were finally requested by Azerbaijani side. JICA will assess the appropriateness of the request from the viewpoint of the technical necessity and others, and will recommend to the Government of Japan for approval.

5.Japan's Grant Aid Scheme

The Azerbaijani side understands the Japan's Grant Aid and the necessary measures to be taken by the Government of Azerbaijan as explained by the Team and described in Annex-4 and Annex-5, which signed by both sides in the Minutes of Discussions on February 14, 2000.

6.Schedule of the Study

6-1. The consultants will proceed to further studies in Azerbaijan until July 29, 2000.

6-2. JICA will prepare the draft report in English and its executive summary in Russian, and dispatch a mission in order to explain its contents around October 2000.

6-3. In case that the contents of the report is accepted in principle by the Government of Azerbaijan, JICA will complete the final report and send it to the Government of Azerbaijan by January 2001.

7.Other relevant issues

7-1. Privatization of the Implementing Organization

The Azerbaijani side confirmed that ASC will not be privatized based on the Azerbaijani law. Even though ASC will not be privatized, the leasing of the Equipment procured under Japan's Grant Aid (hereinafter referred to as " the Equipment") to private companys is not allowed from the viewpoint of the " Proper Use ".

7-2. Operation and maintenance for new equipment

The Azerbaijani side confirmed that the Equipment will be distributed to Yevlakh and Ganja road maintenance offices in charge of the section of the Project site and will be used only for the purpose of its rehabilitation and maintenance. Also,

ASC shall allocate the necessary budget and personnel for executing the Project.

7-3. Necessity of technical cooperation

For the sake of technology transfer on sustainable operation and maintenance of the Equipment, the Team confirmed that the engineers from the manufacturing company of the Equipment will be dispatched to Azerbaijan when delivered and the technical training of counterpart personnel will also be held in Japan.

7-4. Internal transportation

The Azerbaijani side requested the Team that the internal transportation of the Equipment from the port of disembarkation to the delivery sites shall be covered by Grant Aid.

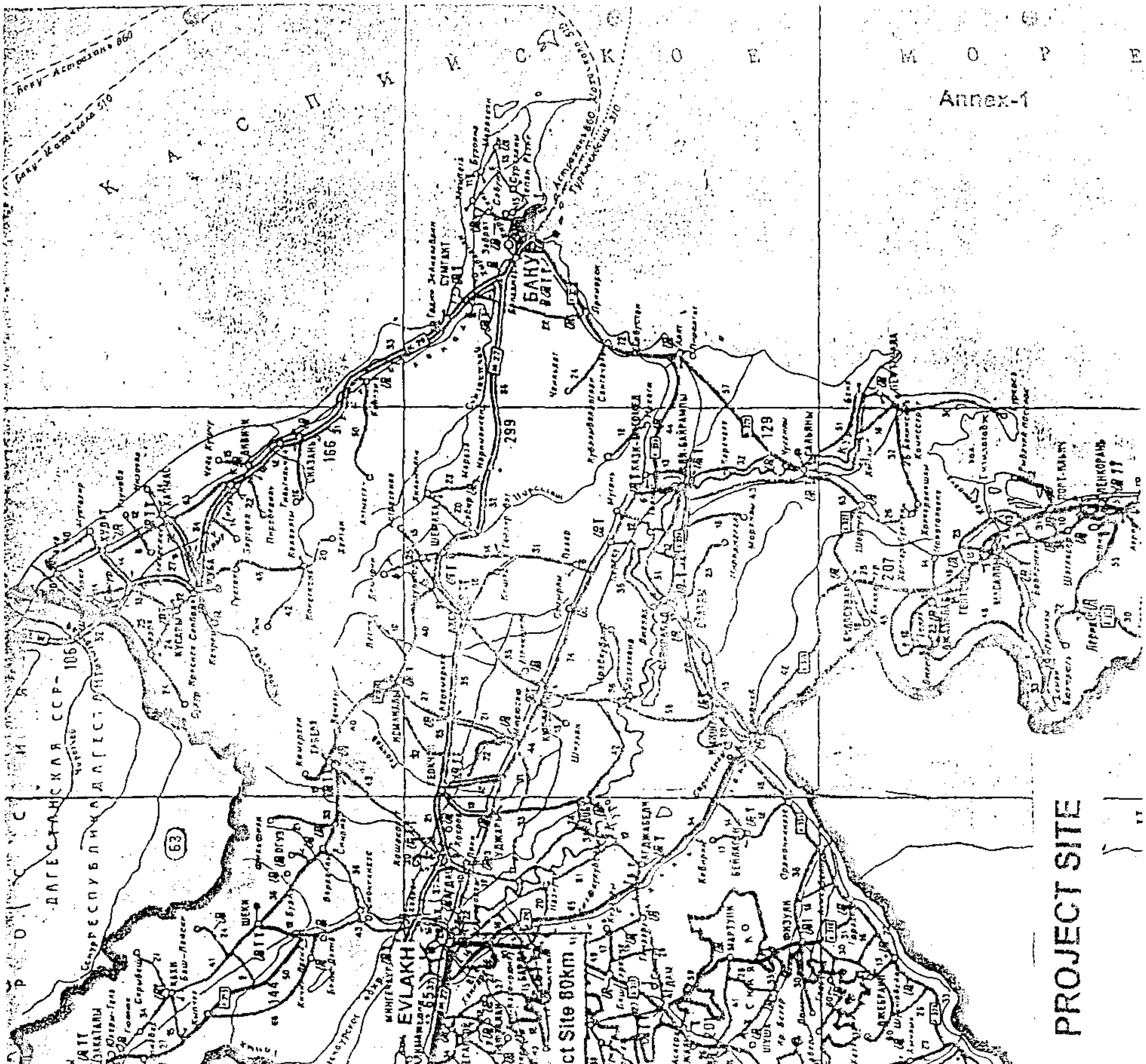
7-5. Tax exemption

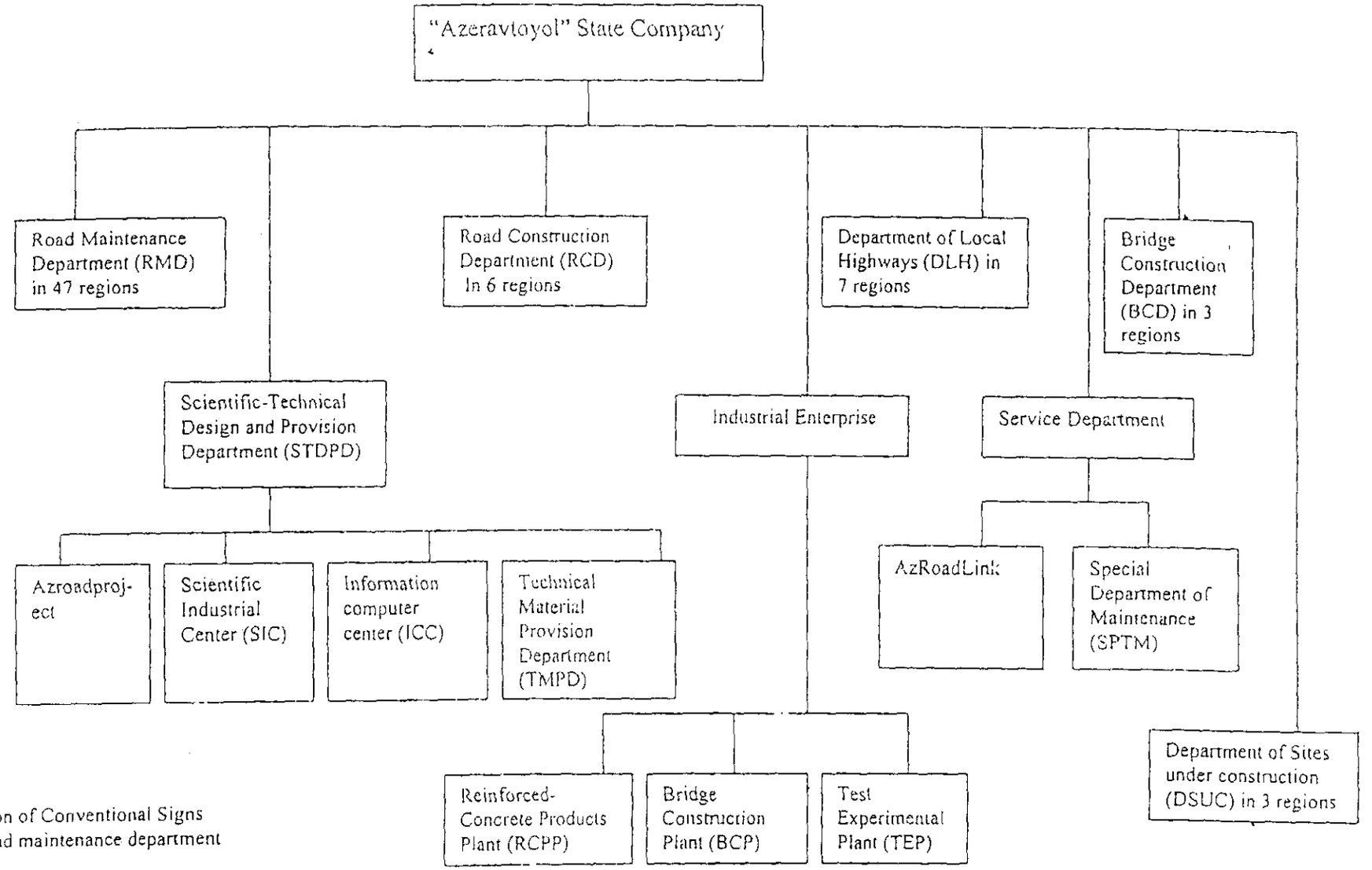
The Azerbaijani side confirmed that ASC shall take necessary measures necessary for tax exemption and customs clearance.

7-6. The relationship with the other donor's projects

The Azerbaijani side confirmed that there is no duplication of the Project with the other donor's projects.

Annex-1


PROJECT SITE
Project Site 80km
EVLAKH
GYANJA
БАКУ
КАСПИЙСКОЕ МОРЕ



Explanation of Conventional Signs
RMD –road maintenance department

Organization Chart of Azeravtoyol State Company

A 4 – 5

Annex-2

Items requested by the Government of Azerbaijan

Items	Specification	Number and Station of Equipment	
		Ganja Office	Yevlakh Office
1 Saw Cutter		1	1
2 Milling Machine		1	
3 Excavator	0.7 m^3	1	1
4 Wheel Loader	2.0 m^3	1	1
5 Motor Grader	W = 6m	1	1
6 Vibrating Roller	7 ton	1	1
7 Tire Roller	10 ton	1	1
8 Asphalt Distributor	W = 6m	1	1
9 Asphalt Finisher	W = 6m	1	1
10 Trailer Truck	25 ton class	1	
11 Mobile Workshop		1	
12 Bulldozer	25 ton class	1	

Japan's Grant Aid Scheme

1 Grant Aid Procedures

1) Japan's Grant Aid project is executed through the following procedures:

Application	:	Request made by a recipient country
Study	:	Basic Design Study conducted by JICA
Appraisal & Approval	:	Appraisal by the Government of Japan and Approval by Cabinet
Determination of Implementation	:	The Notes exchanged between the Governments of Japan and the recipient country

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

Secondly, JICA conducts the study (Basic Design Study), using (a) Japanese consulting firm(s).

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

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

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

2 Basic Design Study

1) Contents of the Study

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

a) Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.
b) Evaluation of the appropriateness of the Project to be implemented under the Grant Aid scheme from a technical, social and economic point of view.
c) Confirmation of items agreed on by both parties concerning the basic concept of the project.
d) Preparation of a basic design of the Project.
e) Estimation of costs of the Project.

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

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of 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 Study, JICA uses (a) registered consultant firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA. The consulting firm(s) used for the Study is (are) recommended by JICA to the recipient country to

also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency.

3 Japan's Grant Aid Scheme

1) What is Grant Aid?

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

2) Exchange of Notes (E/N)

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

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

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

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

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

Sant

5) 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 the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

6) Undertakings required of 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 the following:

(1) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction.

(2) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites.

(3) To secure buildings prior to the procurement in case of the installation of the equipment.

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

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

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

(7) "Proper Use"

The recipient country is required to maintain and use 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.

(8) "Re-export"

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

(9) 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"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

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

(10) To bear an advising commission of an Authorization to Pay (A/P) and payment commissions to the Bank, with which the Government of the recipient country opens an account for the Project.

Attachment-3) Major Undertakings to be Taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Country
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 port of disembarkation in the Recipient Country.		
	1) Marine (Air) transportation of the products from Japan or third country to the Recipient Country.	○	
	2) Tax exemption and custom clearance of the products at the port of disembarkation		○
	3) Internal transportation from the place 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 contracts.		○
5	To maintain and use properly and effectively the 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 including the operation and maintenance costs.		○

(B/A: Banking Arrangement, A/P: Authorization to Pay)

MINUTES OF DISCUSSIONS

BASIC DESIGN STUDY
ON THE PROJECT FOR TRUNK ROUTE REHABILITATION
IN THE REPUBLIC OF AZERBAIJAN
(Explanation on Draft Report)

In July 2000, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Basic Design Study Team on the Project for Trunk Route Rehabilitation (hereinafter referred to as "the Project") to the Republic of Azerbaijan (hereinafter referred to as "Azerbaijan"), and through discussion with the Azerbaijan side, 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 the Azerbaijan side on the components of the draft report, JICA sent to Azerbaijan the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed Mr. Tomoyuki Naito, staff, Third Project Management Division, Grant Aid Department, JICA, from October 16 to October 27, 2000.

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

Baku, October 20, 2000.

Tomoyuki Naito
Leader
Basic Design Study Team
Japan International Cooperation Agency

Novruzov Yushif
President
Azeravtoyol State Company
the Republic of Azerbaijan

ATTACHMENT

1. Components of the Draft Report

The Azerbaijan side agreed and accepted in principle the components of the draft report explained by the Team.

2. Japan's Grant Aid Scheme

The Azerbaijan side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Azerbaijan side as explained by the Team and described in Annex-4 and Annex-5 of the Minutes of Discussions signed by both parties on July 7, 2000.

3. Schedule of the Study

JICA will complete the final report in accordance with the confirmed item and send it to the Azerbaijan side by the end of February 2001.

4. Other relevant issues

(1) Internal Transportation

Both sides confirmed that internal transportation for the scheduled equipment, from the port of disembarkation to the delivery sites, shall be covered by Japanese side's Grant Aid.

(2) The Azerbaijan side will ensure the tax exemption including VAT according to the procurement schedule presented by the Team.

(3) The Azerbaijan side will allocate the budget for the implementation of the trunk road rehabilitation in conformity with the overall schedule which was suggested by the Team.

(4) The Azerbaijan side will take necessary measures for the safety and security of the Project in order to secure smooth implementation of the Project.