Republic of Uzbekistan
Uzbekistan Railways

Data Collection Survey on Railway Electrification in the Republic of Uzbekistan

Final Report

July 2013

Japan International Cooperation Agency

Japan Transportation Consultants, Inc.
The Japan Electrical Consulting Co., Ltd.

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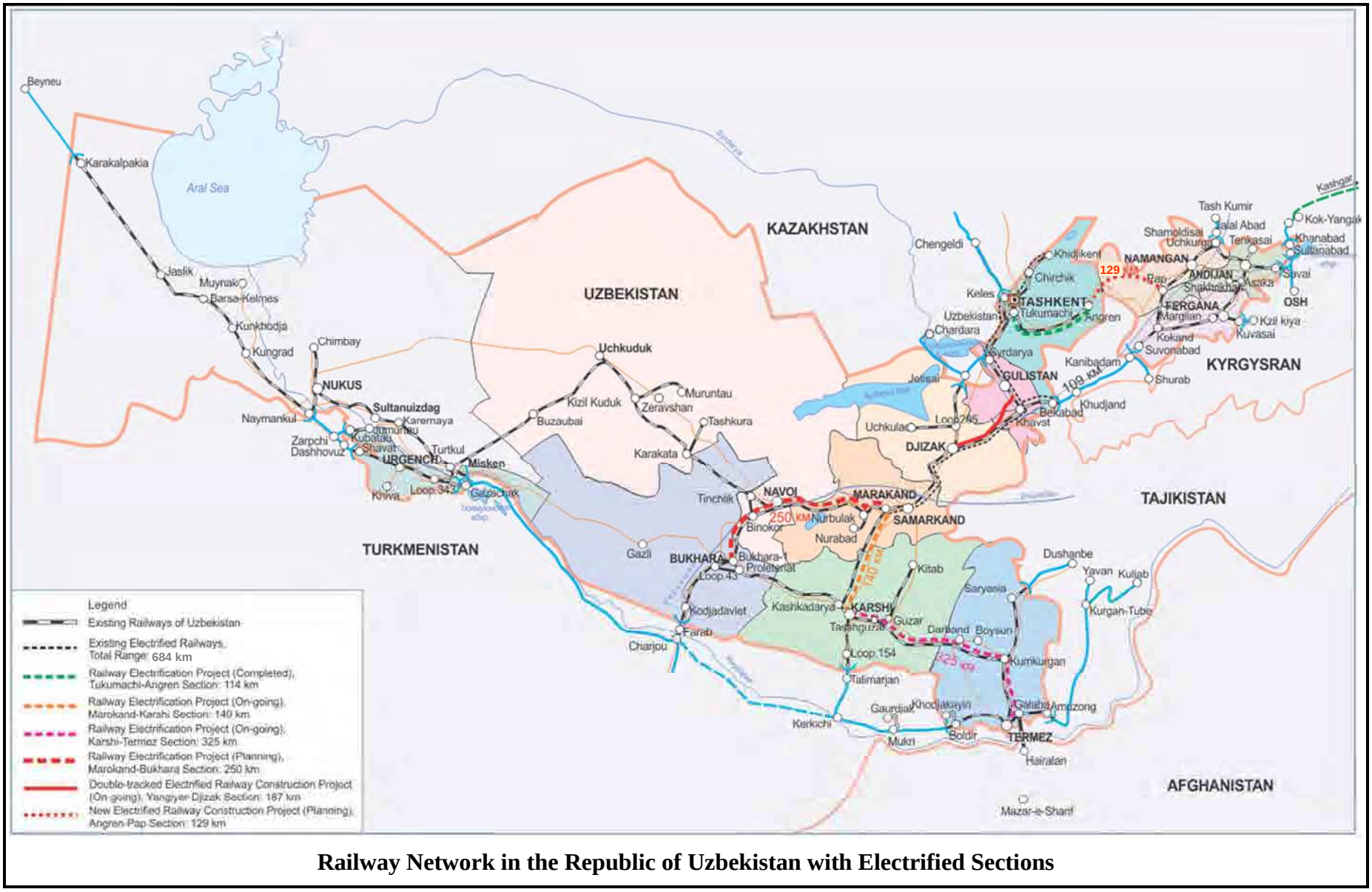

Railway Network in the Republic of Uzbekistan with Electrified Sections

List of Abbreviations

Abbreviation	Description
AC	Alternating Current
ACG	Arabic Coordination Group
ADB	Asian Development Bank
AFC	Automatic Fare Collection system
AT	Auto-transformer
ATC	Auto Train Control
ATO	Auto Train Operation
ATS	Auto Train Stop
B/C	Benefit-Cost Ratio
BOT	Build-Operate-Transfer
BT	Booster Transformer
CAREC	Central Asia Regional Economic Cooperation
CBTC	Communication Based Train Control
CIS	Commonwealth of Independent States
CTC	Centralized Traffic Control
DC	Direct Current
E&M	Electrical & Mechanical
EBRD	European Bank for Reconstruction and Development
EIBC	The Export-Import Bank of China
EIRR	Economic Internal Rate of Return
EPC	Engineering, Procurement & Construction
ES	Engineering Services
EU	European Union
F/S	Feasibility Study
FDI	Foreign Direct Investment
EIBC	The Export-Import Bank of China
FIRR	Financial Internal Rate of Return
FNPV	Financial Net Present Value
FOCL	Fiber Optic Cable Line
FRDU	Fund for Reconstruction and Development of Uzbekistan
GDP	Gross Domestic Product
GM	General Motor
HH Rail	Head Hardened Rail
IBRD	International Bank for Reconstruction and Developmen
IDA	International Development Association

Abbreviation	Description
IDB	Islamic Development Bank
IMF	International Monetary Fund
IRR	Internal Rate of Return
ISO	International Organization for Standardization
JBIC	Japan Bank for International Cooperation
JEC	The Japan Electrical Consulting Co., Ltd
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
JR	Japan Railway Company Group
JTC	Japan Transportation Consultants, Inc.
KFAED	Kuwait Fund for Arab Economic Development
KfW	Kreditanstalt für Wiederaufbau (German government-owned development bank)
L/A	Loan Agreement
LRT	Light Rail Transit
M/P	Master Plan
METI	Ministry of Economy, Trade and Industry
MFERIT	Ministry for Foreign Economic Relations, Investments and Trade of the Republic of Uzbekistan
MRT	Mass Rapid Transit
NPV	Net Present Value
O&M	Operation and Maintenance
OD	Origin-Destination
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
OFID	OPEC Fund for International Development
OJSC	Open Joint Stock Company
PPP	Public–Private Partnership
PRC	People's Republic of China
QCBS	Quality and Cost Based Selection
RRB	Regional Railway Branch
SCADA	Supervisory Control And Data Acquisition
SJSC	State Joint Stock Company
SPV	Special Purpose Vehicle
STEP	Special Terms for Economic Partnership
TOR	Terms of Reference
TRACECA	Transport Corridor Europe–Caucasus–Asia
UAE	United Arab Emirates
UAART	Uzbek Agency of Automobile and River Transport

Abbreviation	Description
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UTY	Uzbekistan Temir Yollari (Uzbekistan Railways)
WB	World Bank
WIS	Welfare Improvement Strategy of the Republic of Uzbekistan
WMO	World Meteorological Organization

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Chapter 1

Survey Background and Objectives

1.1. Survey Background and Objectives

(1) Survey Background

The Republic of Uzbekistan (hereinafter referred to as "Uzbekistan") is a major country in Central Asia with a population of 29 million (2011) and bordered by all Central Asian nations and Afghanistan. Uzbekistan has been realizing huge economic growth at an annual rate of more than 8.5% due to an increase in exports under conditions of strong demand for Uzbekistan's primary export products of cotton and natural resources such as natural gas and gold. In order to secure continuous economic growth, the Government of Uzbekistan has decided on a policy of designating the automobile, textile, food processing and chemical manufacturing industries as strategic fields of advancement and diversity in order to transform the economy and move away from the excessive dependence on natural resources.

Uzbekistan must bear high distribution costs caused by its location as a double landlocked country. Since these costs constrain the development of industry, construction of transport infrastructure is an urgent issue. Although railways play an important role for freight traffic and cover 46% of land transport freight traffic in Uzbekistan (on a ton-km basis in 2011, excluding pipeline traffic), the railway sector needs to be further strengthened because railway freight is expected to further increase with recent rapid economic growth and international assistance for the reconstruction of Afghanistan.

In the national development strategy, titled "Welfare Improvement Strategy," strengthening of the railway sector is assigned the role of contributing to increased productivity in the southern part of Uzbekistan and the construction of a traffic network. However, insufficiently so far, the double tracking ratio is only approximately 15% (681 km) and the electrification ratio is approximately 15% (684 km) of the 4,593 km total railway length in Uzbekistan. In order to strengthen the railway traffic capacity, double tracking and electrification as well as construction of new lines are needed.

In Japan's country assistance program, economic infrastructure renovation and construction (transport and energy sector) is designated as a priority area which also includes the strengthening of railway traffic capacity. JICA is assisting Uzbekistan by implementing the "Karshi–Termez Railway Electrification Project" in the railway sector.

(2) Survey Objectives

The Survey Objectives are as follows:

a) Collection and analysis of data in terms of current conditions and issues in the railway sector in Uzbekistan;
b) Collection and analysis of data in terms of existing and planned railway electrification projects;
c) Collection and analysis of necessary data in order to study how to effectively approach Japan's assistance in terms of planned railway electrification projects in Uzbekistan.

1.2. Survey Team Members

The survey team members are shown in [Table 1.2-1].

[Table 1.2-1] Survey Team Members

Assignment Field	Name	Affiliation
Team Leader/ Railway Sector Analysis	Mr. Hirokazu NISHI	Japan Transportation Consultants, Inc.
Deputy Team Leader	Mr. Shinji SHIBATA	Japan Transportation Consultants, Inc.
Railway Electrification Planning	Mr. Kiyoshi TSUGAWA	The Japan Electrical Consulting Co., Ltd.
Railway Demand Analysis	Mr. Tetsuo WAKABAYASHI	Japan Transportation Consultants, Inc.
Procurement & Contract (1) (Procurement and Contract Method)	Mr. Kei OWADA	Mitsubishi Research Institute, Inc.
Procurement & Contract (2) (Analysis of Railways Enterprises)	Mr. DINH Minh Hung	Mitsubishi Research Institute, Inc.

(Source: Survey Team)

1.3. Survey Schedule in Uzbekistan

The survey schedule in Uzbekistan is shown in [Table 1.3-1].

[Table 1.3-1] Survey Schedule in Uzbekistan

Date	Day	Stay	Contents
10-Feb	Mon	Tashkent	Arriving at Tashkent(Team Leader/ Railway Sector Analyses, Deputy Team Leader, Railway Electrification Planning, Railway Demand Analyses)
11-Feb	Tue	Tashkent	Courtesy call to First Deputy Chairman, UTY.
			Courtesy call to JICA Uzbekistan Office.
12-Feb	Wed	Tashkent	Courtesy call to Japanese Embassy in Uzbekistan.
			Courtesy call to Director of Project Implementation Unit - Electrification, UTY.
			Courtesy call to Director of Investment Department, UTY.
			Explanation and Discussion on Inception Report.
13-Feb	Thu	Bukhara	Drafting questionaire. Moving to Bukhara by Air.
14-Feb	Fri	Samarkand	Survey the railway from Bukhara to Marakand (Moving by specially arrenged train).
15-Feb	Sat	Tashkent	Survey the railway adjacent to Marakand (Moving by car). Moving to Tashkent by High Speed Train.
16-Feb	Sun	Tashkent	Summarizing data and information on Survey.
17-Feb	Mon	Tashkent	Collection of data and information.
18-Feb	Tue	Tashkent	Collection of data and information. Deputy Team Leader leaving Tashkent.
19-Feb	Wed	Tashkent	Collection of data and information. Weekly meeting.
20-Feb	Thu	Tashkent	Collection of data and information.
21-Feb	Fri	Tashkent	Collection of data and information. Observation of the Uzbekistan Depot.
22-Feb	Sat	Tashkent	Summarizing data and information on Survey.
23-Feb	Sun	Tashkent	Summarizing data and information on Survey.
24-Feb	Mon	Tashkent	Collection of data and information.
25-Feb	Tue	Tashkent	Collection of data and information. Team Leader leaving Tashkent.
26-Feb	Wed	Tashkent	Collection of data and information. Weekly meeting with UTY.
27-Feb	Thu	Tashkent	Collection of data and information.
28-Feb	Fri	Tashkent	Collection of data and information.
01-Mar	Sat	Tashkent	Smmarizing data and information on Survey
02-Mar	Sun	Tashkent	Smmarizing data and information on Survey
03-Mar	Mon	Tashkent	Collection of data and information. Deputy Team Leader arriving at Tashkent.
04-Mar	Tue	Tashkent	Collection of data and information. Procurement and Contract (1) arriving at Tashkent.
05-Mar	Wed	Tashkent	Collection of data and information. Weekly meeting.
06-Mar	Thu	Tashkent	Collection of data and information. Observation of the Railway Operation Control Center.
07-Mar	Fri	Tashkent	Summarizing data and information on Survey.(Public Holiday)
08-Mar	Sat	Tashkent	Summarizing data and information on Survey.
09-Mar	Sun	Tashkent	Summarizing data and information on Survey.
10-Mar	Mon	Tashkent	Collection of data and information.
11-Mar	Tue	Tashkent	Collection of data and information. Observation of Chukrusai Freight Station
12-Mar	Wed	Tashkent	Collection of data and information. Weekly meeting.
13-Mar	Thu	Tashkent	Collection of data and information. Visit to Shimizu Corporation, ADB and Marubeni Corporation in Tashkent.
14-Mar	Fri	Tashkent	Collection of data and information.
15-Mar	Sat	Tashkent	Summarizing data and information on Survey.
16-Mar	Sun	Tashkent	Summarizing data and information on Survey.
17-Mar	Mon	Tashkent	Collection of data and information. Visit to KfW. Team Leader/ Railway Sector Analyses arriving at Tashkent.
18-Mar	Tue	Tashkent	Collection of data and information. Visit to CAREC and JETRO. Procurement and Contract (2) arriving at Tashkent.
19-Mar	Wed	Tashkent	Collection of data and information. Weekly meeting.
20-Mar	Thu	Tashkent	Collection of data and information.
21-Mar	Fri	Tashkent	Collection of data and information. Procurement and Contract (1) leaving Tashkent.
22-Mar	Sat	Tashkent	Summarizing data and information on Survey.
23-Mar	Sun	Tashkent	Summarizing data and information on Survey.
24-Mar	Mon	Tashkent	Collection of data and information.
25-Mar	Tue	Tashkent	Collection of data and information. Explanation of Presentation Materials to JICA Uzbekistan Office.
26-Mar	Wed	Tashkent	Presentation of Survey result to UTY.
27-Mar	Thu	Tashkent	Collection of data and information.
28-Mar	Fri	Tashkent	Leaving TashkentTeam Leader/ Railway Sector Analyses, Deputy Team Leader, Railway Electrification Planning, Railway Demand Analyses, Procurement and Contract (2)).

(Source: Survey Team)

Chapter 2

Current Conditions and Issues in the Overall Transport/Railway Sector in Uzbekistan

2.1. Natural Conditions

(1) Location and Area

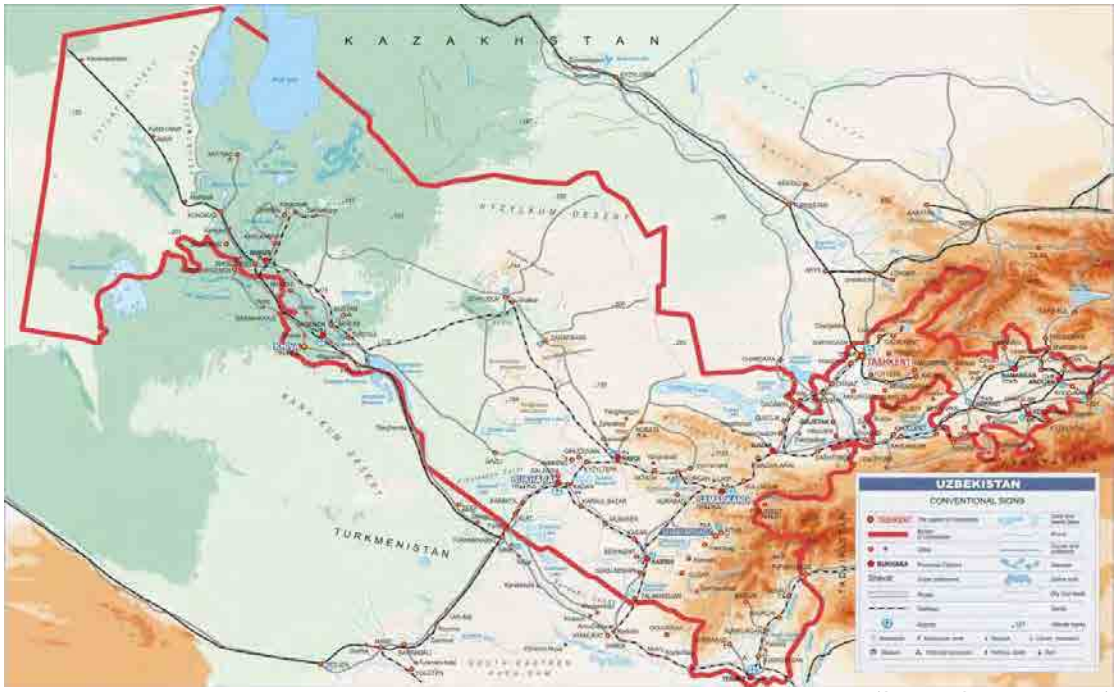
Uzbekistan is located in the eastern part of the Asian Continent and is surrounded by four Central Asian nations (Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan) and Afghanistan. Since these Central Asian nations and Afghanistan are all landlocked countries, Uzbekistan is a double landlocked country. Uzbekistan's land area stretches 1,425 km from west to east and 930 km from north to south. The total area of 447,000 km^2 is 1.2 times larger than Japan and about the same size as France.

The capital, Tashkent, is a historical city located in the north-eastern part of Uzbekistan on the Chirchik River. It prospered as a commercial city and following its industrialization, Tashkent became the center of government, economy and industry. The city has a current population of approximately 2.2 million.

(2) Geography

Uzbekistan is a geographically diverse country. The landscape ranges from desert which occupies 80% of the total area to mountainous regions with peaks reaching heights over 4,500 m (the highest point is Mt. Khazret Sultan 4,643 m above sea level, while the lowest is Sarygamysh Lake 12m below sea level). The south-eastern part consists of the foothills of the Tien Shan Mountains. Kyrgyzstan and Tajikistan, which are part of the Tien Shan Mountains, are both located higher than the neighboring areas in China, thus creating a natural border between Central Asia and China. The flat and low area in the north of Uzbekistan consists of desert and is known as "Red sand."

The most fertile areas are found in Fergana State which is located in the Syr-Darya river basin. The state is a center of agriculture and produces cotton, wheat, rice, maize (corn), vegetables and horticultural crops.



(Source: Sairam Tourism)

[Fig. 2.1-1] Topographical Map of Uzbekistan

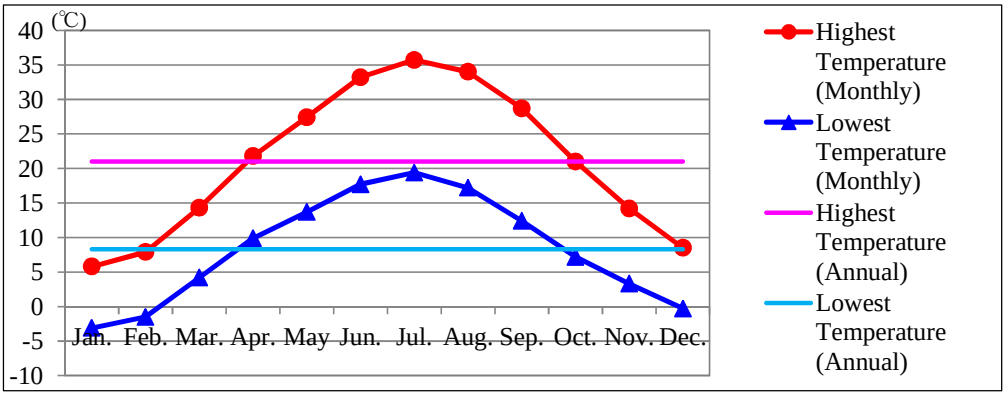
(3) Climate

Uzbekistan has a continental climate with low average rainfall (the yearly average is between 100 ml and 200 ml) and dry weather especially in summer. The monthly average temperature and rainfall are shown in [Table 2.1-1]. The daily highest temperature increases to over 40 degrees Celsius in summer in the hottest areas, and the lowest temperature drops below -20 degrees Celsius in winter, occasionally reaching -40 degrees Celsius. Significant seasonal and daily temperature differences are thus the norm in Uzbekistan.

[Table 2.1-1] Monthly Average Temperature and Rainfall in Uzbekistan

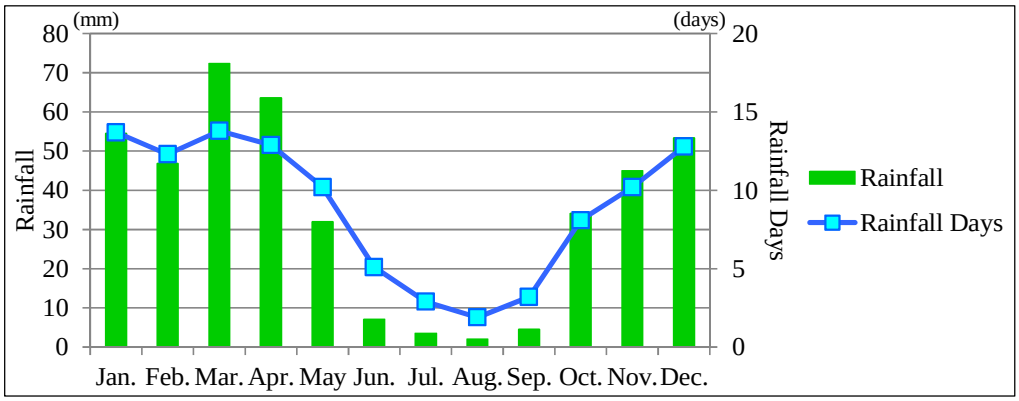
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Yearly
Highest average temperature (°C)	5.8	7.9	14.3	21.8	27.4	33.2	35.7	34.0	28.7	21.0	14.2	8.5	21.0
Lowest average temperature (°C)	-3.1	-1.5	4.2	9.9	13.7	17.7	19.4	17.2	12.4	7.2	3.3	-0.3	8.3
Rainfall (mm)	54.5	46.8	72.3	63.6	32	7.1	3.5	2.0	4.5	34.1	45	53.4	418.8
Number of rainy days	13.7	12.3	13.8	12.9	10.2	5.1	2.9	1.9	3.2	8.1	10.2	12.8	107.1

(Source: WMO)



(Source: WMO)

[Fig. 2.1-2] Monthly Average Temperature in Uzbekistan



(Source: WMO)

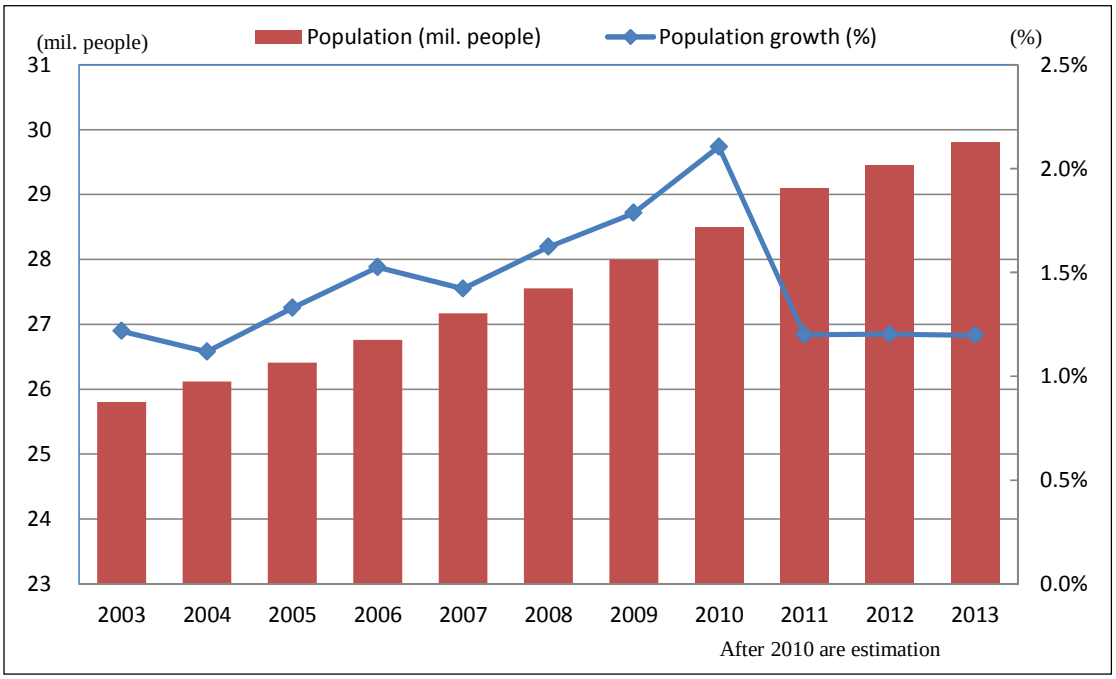
[Fig. 2.1-3] Monthly Average Rainfall in Uzbekistan

2.2. Socio-economic Situation

Here, we analyze the effects on the future railway sector to outline the macro indicators such as population, economy, and trading of Uzbekistan.

(1) Population

As [Fig. 2.2-1] shows, the population of Uzbekistan has been increasing by 1.2% per year during the last decade, and is currently 29.56 million people (estimate for 2012). The demand for railways is expected to increase in proportion to the population increase which is expected to continue after 2010.

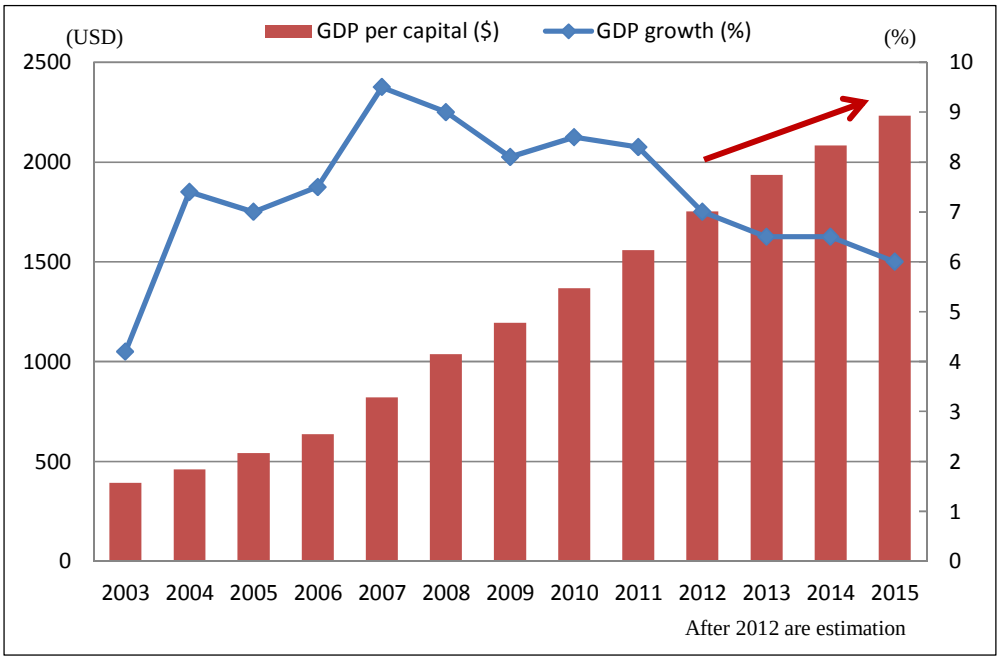


(Source: IMF World Economic Outlook, October 2012)

[Fig. 2.2-1] Uzbekistan's Population and Its Population Growth in Recent Years

(2) Economic Growth

As [Fig. 2.2-2] shows, Uzbekistan recorded a GDP growth rate of 8.3% in 2011. Since the country achieved a growth rate of 9.5% in 2007, it has continued to have a high growth rate of over 8% for 5 years, by keeping the impact of the worldwide economic recession such as the Lehman shock and Europe's debt crisis to a minimum. International organizations have estimated the growth rates for 2012 as follows: IMF and EBRD estimate 7.0%, and WB and ADB estimate 8.0%. Thus, it is assumed that transport volume will keep increasing along with economic expansion, and this will then lead to an increase in demand for the existing logistics network including railways.

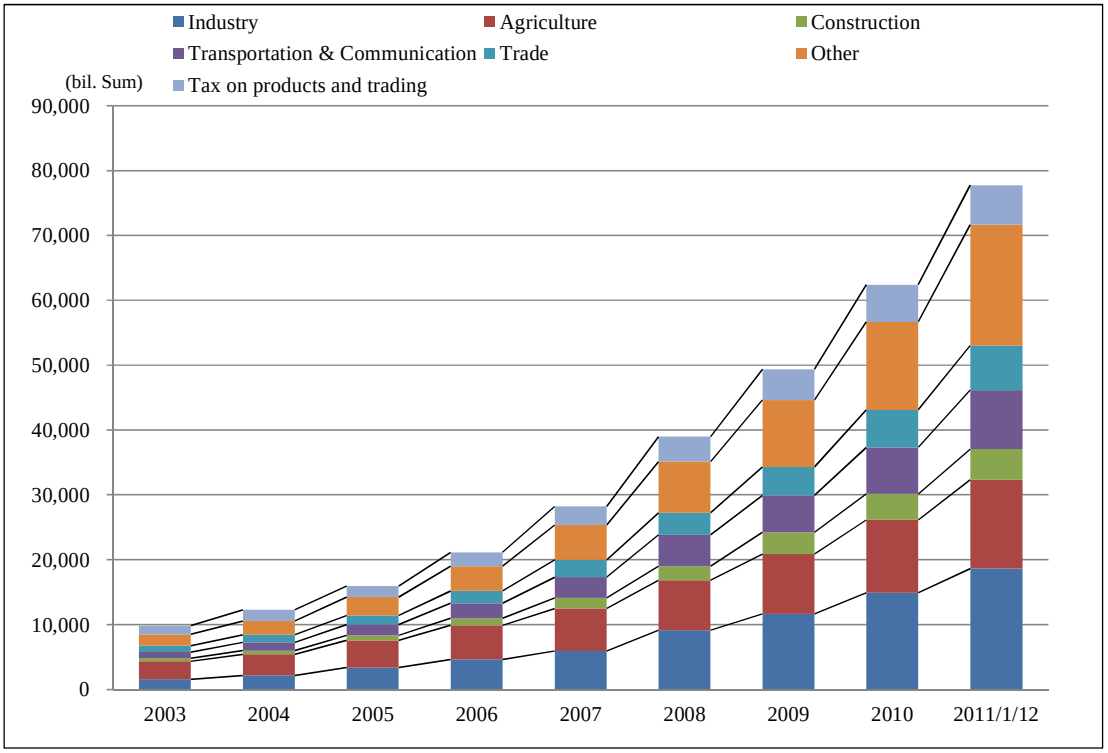


(Source: IMF World Economic Outlook, October 2012)

[Fig. 2.2-2] Uzbekistan's GDP per Capita and GDP Growth Ratio in Recent Years

(3) Industry

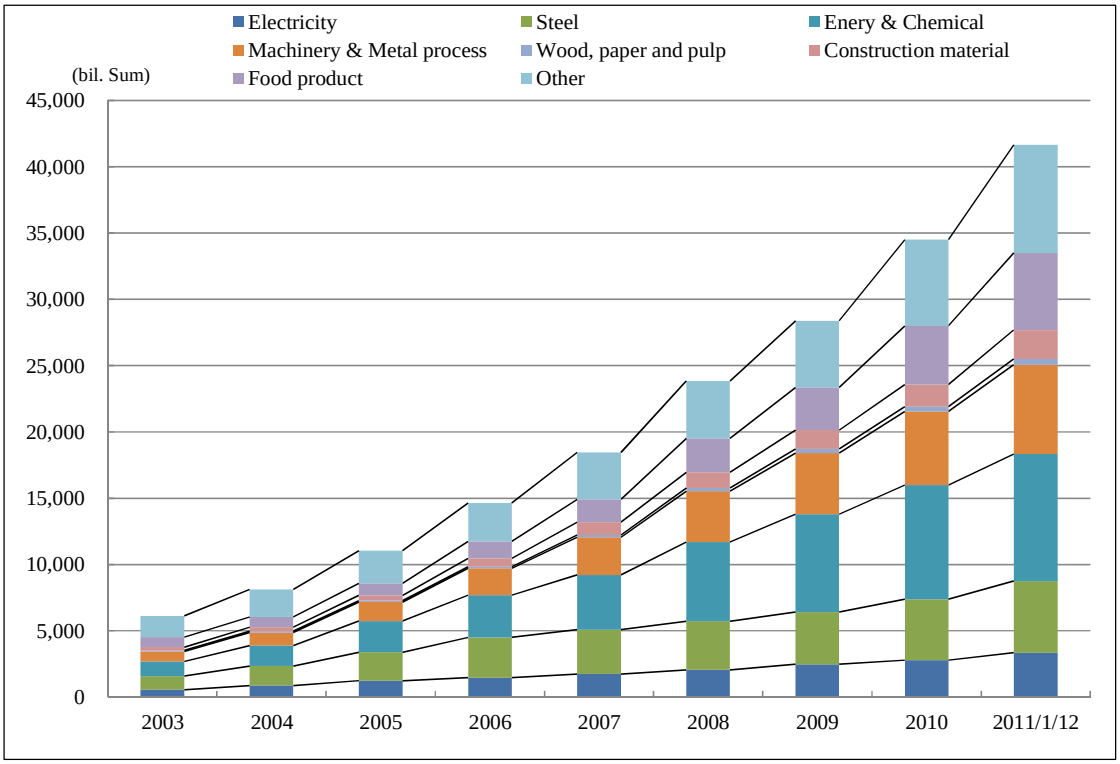
[Fig. 2.2-3] shows the trends in the GDP by industrial sector since 2003. In 2011, high growth rates were sustained by production-related industrial sectors, such as 6.3% growth in mining and manufacturing, 6.6% growth in agriculture, and 8.5% growth in construction.



(Source: State Committee of the Republic of Uzbekistan on Statistics)

[Fig. 2.2-3] Uzbekistan's GDP by Sector from 2003 to 2011

Also, [Fig. 2.2-4] shows the trends in the amount of industrial production from 2003 to 2011. In 2011, the industrial sectors such as energy/chemistry, machinery/metal processing, and reinforcing steel had particularly large shares. The rate of increase for each sector is 11% for energy/chemistry, 21% for machinery/metal processing, and 18% for reinforcing steel, compared with 2010.

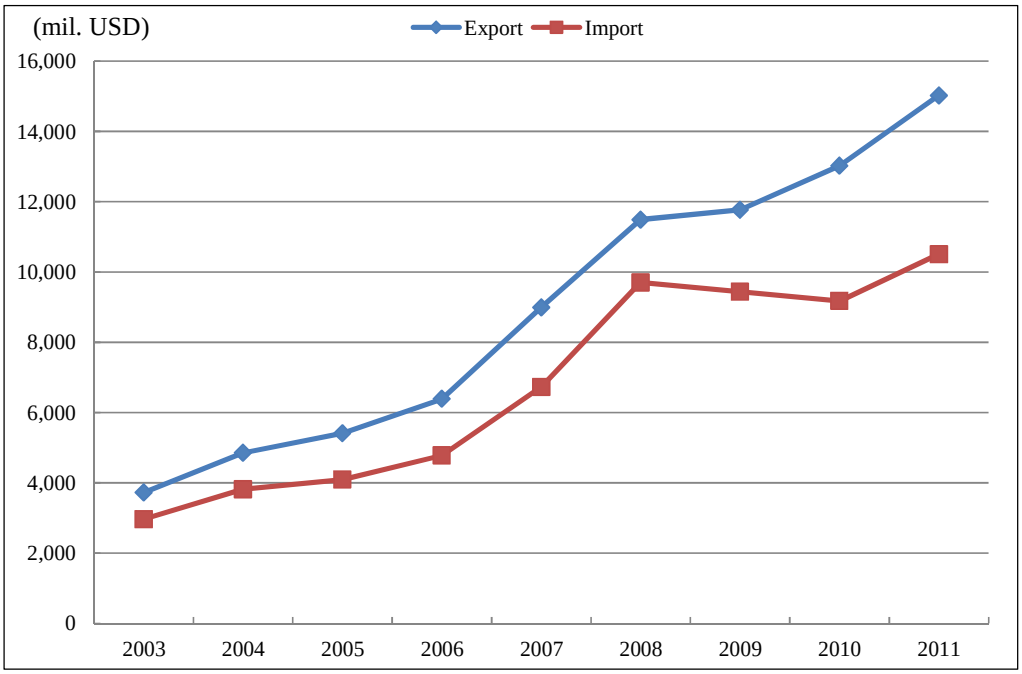


(Source: State Committee of the Republic of Uzbekistan on Statistics)

[Fig. 2.2-4] Uzbekistan's Production Value by Industry from 2003 to 2011

(4) Trading

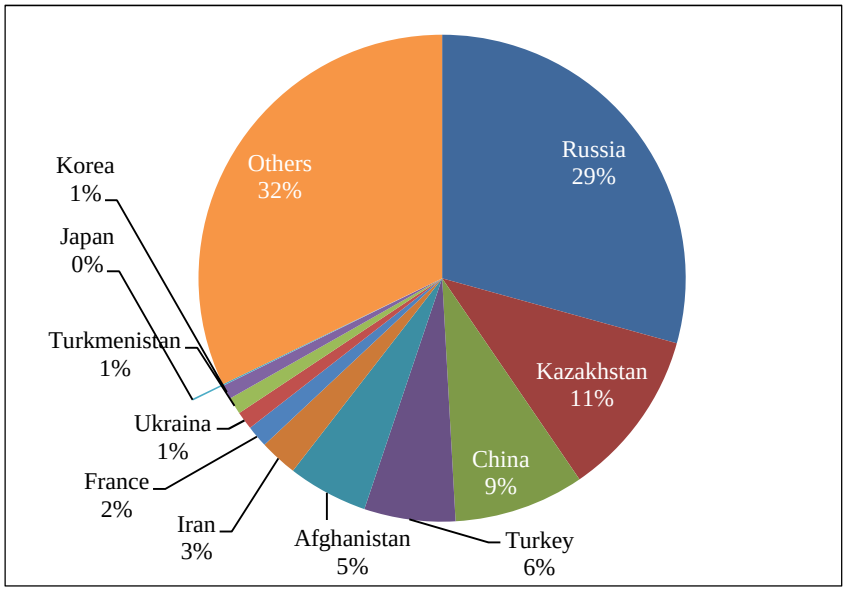
As shown in [Fig. 2.2-5], except for the year 2009 and 2010 after the world financial crisis, Uzbekistan's exports and imports after 2003 have been steadily increasing. In 2011, total exports (including services) were USD 15,027.2 million, a 15.4% increase from the previous year, and total imports were USD 10,509.9 million.



(Source: State Committee of the Republic of Uzbekistan on Statistics)

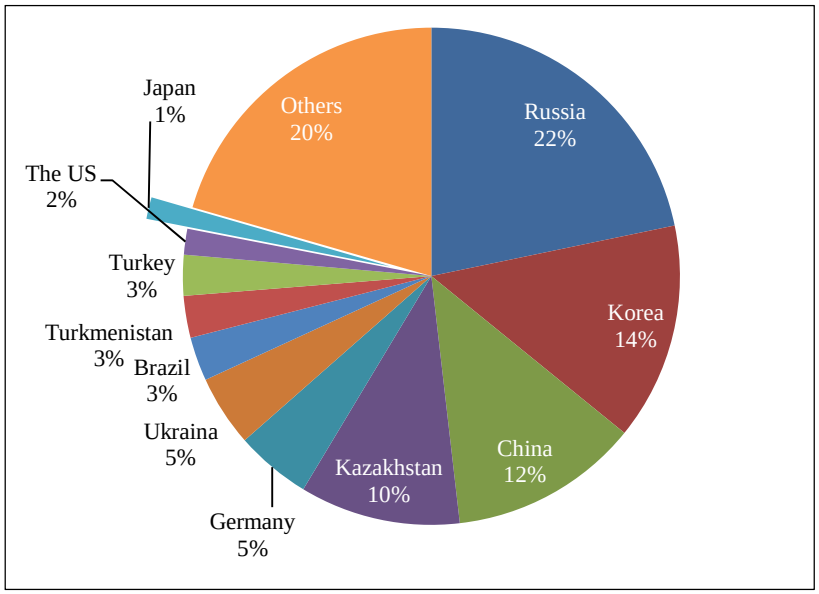
[Fig. 2.2-5] Uzbekistan's Amount of Import and Export in Recent Years

As shown in [Fig. 2.2-6] and [Fig. 2.2-7], Russia has the largest shares of both exports and imports, 29% and 22%, respectively, in terms of share by partner countries. Meanwhile, the amount of exports to Kazakhstan was greatly increased by 88.7% and the total trading amount with Kazakhstan was increased by 47.1%, leading the country to become the second largest trading partner, surpassing China. With a share of 9% of exports and 12% of imports, China ranked in third place for both exports/imports. As for Korea, the country has the share of only 1% of exports but 14% of imports, leading to the second import trading partner after Russia. On the other hand, Japan has a very small share of both exports and imports.



(Source: State Committee of the Republic of Uzbekistan on Statistics)

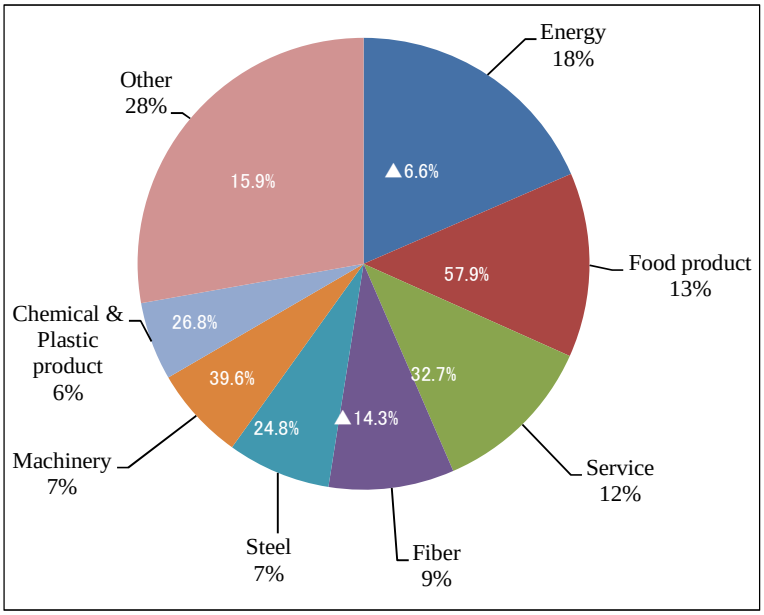
[Fig. 2.2-6] Uzbekistan's Export Volume and Their Changes by Main Export Origin in 2011



(Source: State Committee of the Republic of Uzbekistan on Statistics)

[Fig. 2.2-7] Uzbekistan's Import Volume and Their Changes by Main Import Origin in 2011

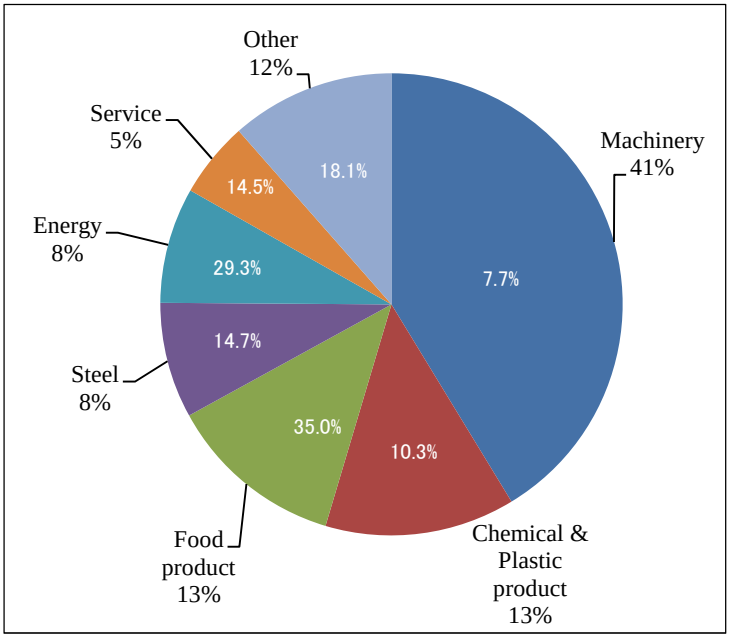
As can be seen from the structure of exported items (see [Fig. 2.2-8]), energy is still the largest of all items exported from the country, accounting for 25% of the total export amount in the previous year. However, the amount of energy exported and its share were decreased along with the reduction of crude oil production by 6.6% and 18.5% respectively, compared with the previous year. In contrast, the exported amount of food products, which production volume was greatly increased in the previous year, has increased by 57.9%, and the share of total exported amount has also expanded to 13.2% from 9.7% in the previous year. The amount of exports of machinery/equipment (including automobiles) exported increased significantly by 39.6% from the previous year.



Note: Numbers inside the pie are change ratios from the previous year.
(Source: State Committee of the Republic of Uzbekistan on Statistics)

[Fig. 2.2-8] Breakdown of Uzbekistan's Export Products in 2011

As for the structure of imported items, it has been dominated by the import of components associated with the automobile industry which is largely supported by the continued increases in domestic consumption and export. The import of machinery/equipment has increased by 7.7% from the previous year and accounted for 41% of total imports (see [Fig. 2.2-9]). Also, the amount of energy imported has shown a growth of 29.3% due to the price of natural gas staying at a high level, and resulted in an increase of its share to 18% of the total amount of imports.

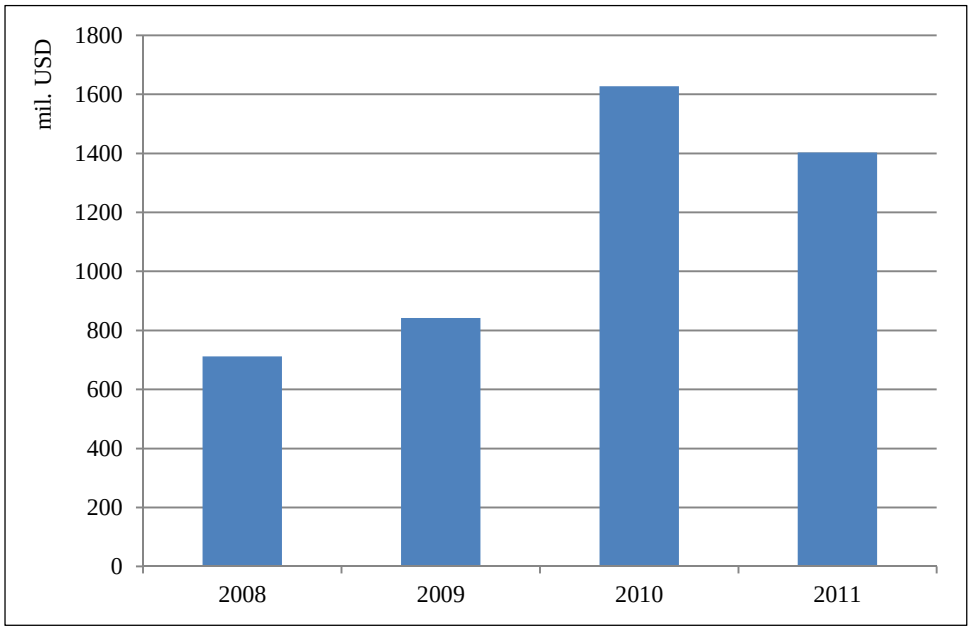


Note: Numbers inside the pie are change ratios from the previous year.
(Source: State Committee of the Republic of Uzbekistan on Statistics)

[Fig. 2.2-9] Breakdown of Uzbekistan's Import Products in 2011

For the period from January through September 2012, the trade balance showed a surplus of USD 1,955 million. The trade volume was USD 19,374 million, with exports of USD 10,665 million and imports of USD 8,709 million. The balance of trade with CIS countries showed a surplus of USD 2,484 million, while the balance of trade with other countries had a deficit of USD 528.4 million.

The changes in the amount of foreign direct investment (FDI) since 2008 are shown in [Fig. 2.2-10]. The reason for the decrease in FDI in 2011 over the previous year is that GM Powertrain continued with the enormous investment (USD 522 million) on the automotive engine manufacturing plant from the previous year.



(Source: EBRD's Transition Report 2011, Data after year 2010 are estimations.)

[Fig. 2.2-10] Uzbekistan's FDI in Recent Years

Uzbekistan's exports and imports with other countries, including Russia, Kazakhstan, and China, continue to show a marked increase every year. For this reason, it is very important for the country to strengthen the transportation infrastructure including railways.

2.3. Current Conditions in the Overall Transport Sector

2.3.1. Transport Network by Mode

(1) Transport Route Map

The main line network of railways and roads in Uzbekistan is shown in [Fig. 2.3-1], and the domestic airway network is shown in [Fig. 2.3-2].

(Source: TRACECA)

[Fig. 2.3-1] Main Line Network of Railways and Roads in Uzbekistan

(Source: Uzbekistan Airways)

[Fig. 2.3-2] Domestic Airway Network

The main line network of railways and roads connects the main cities in Uzbekistan and those in neighboring countries. However, the only railway network in Fergana Valley in the eastern part of Uzbekistan is not connected to the railway network in the rest of Uzbekistan, and it is therefore necessary to use road (automobile) transport between Angren and Fergana Valley for connections with the main cities in Uzbekistan.

The domestic airway network connects Tashkent Airport and the airports of 11 cities in Uzbekistan. The airports in these 11 cities as well as Tashkent Airport all have international services. Tashkent Airport has international services to about foreign 40 cities, and the international services of other 10 airports, except Tashkent Airport consist mostly of connections to Moscow and Saint Petersburg in Russia.

(2) Route Length

The route miles by the end of year by transport mode are shown in [Table 2.3-1] and [Fig. 2.3-3].

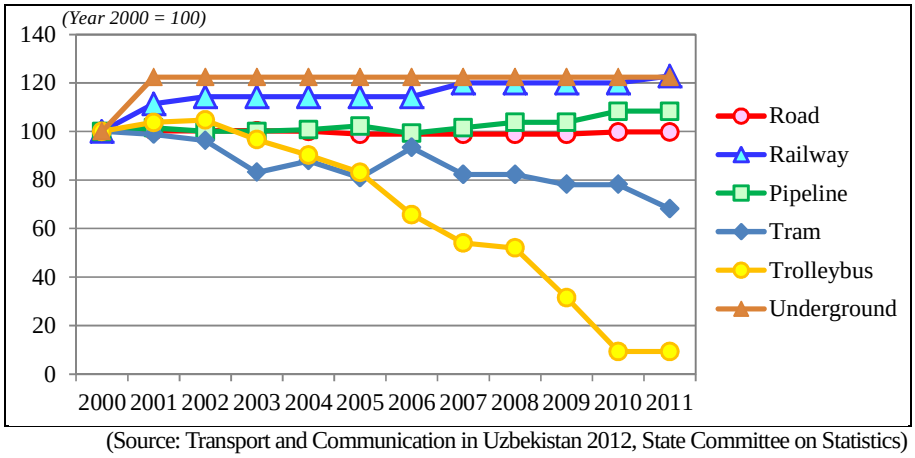
From 2000 to 2011, the length of railway tracks and underground tracks increased about 20%, pipelines increased about 8%, hard-surfaced roads saw little change, tram tracks decreased about 32% and trolleybus lines decreased about 90%.

The route miles of railway tracks increased because of new railway line construction projects on the Navoi–Uchkuduk–Sultanuizdag–Nukus and Tashguzar–Boysun–Kumgurgan sections.

[Table 2.3-1] Route Miles by the End of Year by Transport Mode

Transport Modes	Unit	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2011/2000*
Hard-surfaced Roads	thou. km	42.1	42.2	42.2	42.2	42.1	41.6	41.6	41.6	41.6	41.6	42.0	42.0	–0.2%
Railway Tracks	thou. km	3.5	3.9	4.0	4.0	4.0	4.0	4.0	4.2	4.2	4.2	4.2	4.3	+22.9%
Pipelines (Oil and Gas)	thou. km	13.2	13.4	13.2	13.2	13.3	13.5	13.1	13.4	13.7	13.7	14.3	14.3	+8.3%
Tram Tracks	km	138.9	137.2	133.7	115.4	122.0	112.4	129.6	114.2	114.2	108.5	108.5	94.6	–31.9%
Trolleybus Lines	km	408.5	423.7	427.7	394.8	368.6	339.6	268.4	220.6	212.5	128.7	38.0	38.0	–90.7%
Underground Tracks	km	29.5	36.1	36.1	36.1	36.1	36.1	36.1	36.1	36.1	36.1	36.1	36.1	+22.4%

(Source: Transport and Communication in Uzbekistan 2012, State Committee on Statistics)



(Source: Transport and Communication in Uzbekistan 2012, State Committee on Statistics)

[Fig. 2.3-3] Route Miles by the End of Year by Transport Mode (Year 2000 = 100)

2.3.2. Freight and Passenger Traffic Volume Classified by Transport Mode

(1) Freight Transport

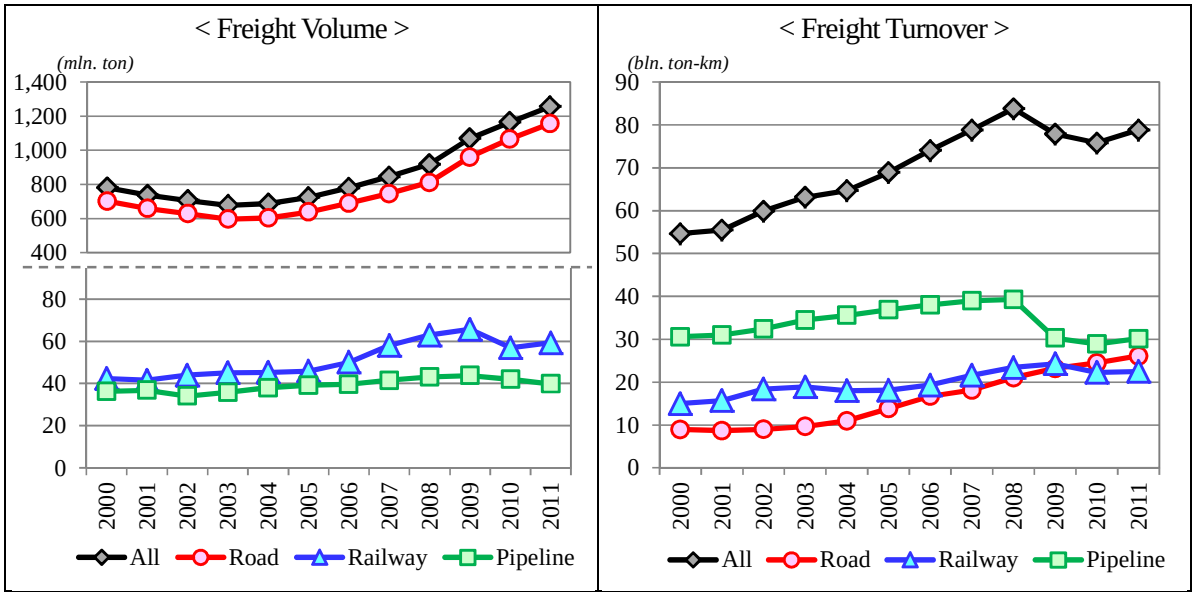
1) Freight Traffic Volume and Turnover by Transport Mode

The freight traffic volume and turnover by transport mode is shown in [Table 2.3-2] and [Fig. 2.3-4], and the modal share of freight transport in 2011 is shown in [Fig. 2.3-5].

[Table 2.3-2] Freight Traffic Volume and Turnover by Transport Mode

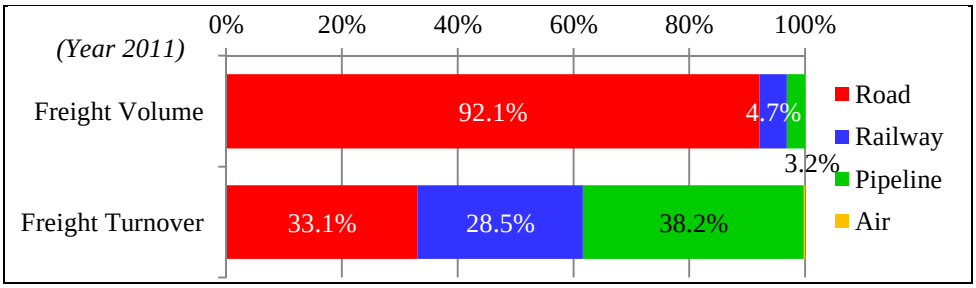
Transport Modes	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2011/2000*
Freight Volume *(million ton)*													
All Transport	**779.9**	**737.0**	**706.0**	**677.2**	**686.5**	**723.8**	**779.4**	**844.7**	**917.2**	**1,068.7**	**1,165.0**	**1,255.4**	**+61.0%**
Road	701.2	658.7	627.9	596.3	603.2	638.8	689.8	745.2	811.2	959.3	1,066.1	1,156.4	+64.9%
Railway	42.4	41.5	44.0	45.1	45.3	45.8	50.0	58.0	62.9	65.6	56.9	59.2	+39.6%
Pipeline	36.3	36.8	34.1	35.8	38.0	39.2	39.6	41.5	43.1	43.8	42.0	39.8	+9.6%
Air *(thou. ton)*	15.2	8.7	9.5	6.0	5.7	6.2	6.6	6.7	6.0	15.9	29.5	30.7	+102.0%
Water *(thou. ton)*	19.2	7.6	2.5	0.3	-	-	-	-	-	-	-	-	-
Freight Turnover *(billion ton-km)*													
All Transport	**54.7**	**55.5**	**59.9**	**63.2**	**64.7**	**68.9**	**74.1**	**78.8**	**83.8**	**77.9**	**75.8**	**78.9**	**+44.3%**
Road	8.9	8.7	9.0	9.7	11.0	13.8	16.7	18.2	21.0	23.2	24.5	26.1	+192.0%
Railway	15.0	15.7	18.4	18.9	18.0	18.1	19.3	21.6	23.4	24.3	22.3	22.5	+50.0%
Pipeline	30.6	31.0	32.4	34.5	35.6	36.9	38.0	39.0	39.3	30.3	28.9	30.1	−1.6%
Air *(mln. ton)*	120.1	96.4	126.4	95.3	117.3	97.8	77.1	76.7	84.0	102.9	168.0	162.5	+35.3%
Water *(mln. ton)*	1.3	0.6	0.3	0.1	-	-	-	-	-	-	-	-	-

(Source: Statistical Yearbook of the Republic of Uzbekistan 2012, State Committee on Statistics)



(Source: Statistical Yearbook of the Republic of Uzbekistan 2012, State Committee on Statistics)

[Fig. 2.3-4] Freight Traffic Volume and Turnover by Transport Mode



(Source: Statistical Yearbook of the Republic of Uzbekistan 2012, State Committee on Statistics)

[Fig. 2.3-5] Modal Share of Freight Transport (year 2011)

The overall freight volume of all transport modes decreased until 2003 and was about 680 million ton in 2003, but then started increasing until 2011 and reached about 1,255 million ton in 2011. The freight volume of road transport is changing as with the freight volume of all transport because it now accounts for over 90% of the total freight volume. In 2011, it increased by about 65% compared with the year 2000. The freight volume of railway and pipeline transport increased until 2009, but then decreased in 2010 compared with the year 2009. In 2011, the freight volume of railway and pipeline transport increased about 40% and 10% compared with the year 2000, respectively. As for the modal share of freight volume in 2011, road transport (92.1%) held the highest share, followed by railway (4.7%) and pipeline transport (3.2%).

The freight turnover of all transport increased until 2008, but decreased in 2009 and 2010 compared with the year before. The decreases in freight turnover of pipeline transport in 2009 and railway transport in 2010 affected this decrease. As for the freight turnover by transport mode, road transport increased by about 192%, railway transport increased about 50%, and pipeline transport decreased about 2% compared with the year 2000. The freight turnover of road transport was higher than that of railway transport in 2010 and had the second largest turnover. As for the modal share of freight turnover in 2011, pipeline transport (38.2%) held the highest share, followed by road transport (33.1%) and railway transport (28.5%). As discussed in the next section, the big difference between the modal share distribution of freight turnover and freight volume is due to the different average transport distance of each transport mode. Specifically, the average transport distance of pipeline and railway transport is much longer than that of road transport.

2) Average Distance of 1 ton of Freight Transport by Transport Mode

The average distance of 1 ton of freight transport by transport mode is shown in [Table 2.3-3] and [Fig. 2.3-6]. The average freight transport distance is calculated by the following formula:

Average Distance of 1 ton of Freight Transport (km)
= Freight Turnover (ton-km) / Freight Volume (ton)

As mentioned in 1), the freight turnover of all transport modes decreased in 2009 and 2010 compared with the year before. On the other hand, the freight volume of all transport modes is increasing, so the average freight transport distance of all transport modes has been decreasing after 2009. It can be understood if the freight volume and turnover are applied to the above formula.

Especially, the decrease of freight turnover in pipeline transport affected the decrease of freight turnover and average freight transport distance of all transport modes.

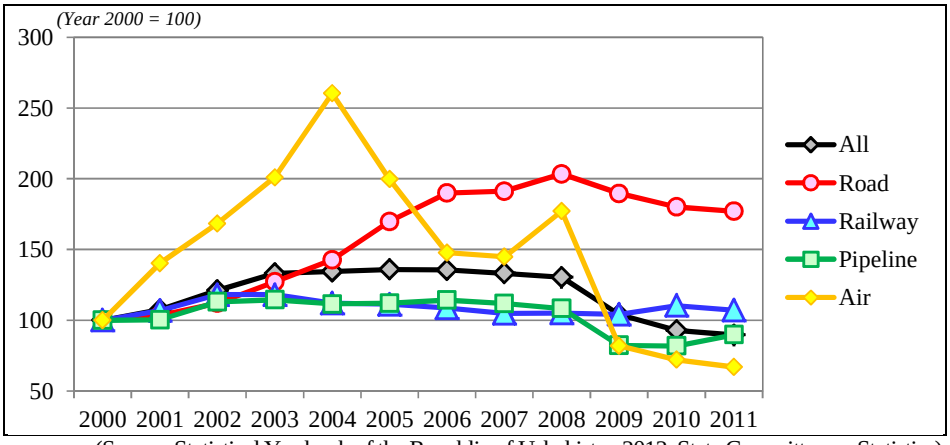
As for the average freight transport distance by mode in 2011, that of road transport was 22.6 km, railway transport was 379.9 km, pipeline transport was 755.0 km, and air transport was 5,293.2 km. From this, as well as the analysis of freight traffic volume and turnover, it can be concluded that pipelines are used to transport oil and gas over long distances, railways to transport commodities other than oil and gas over medium and long distances, and roads to transport various commodities over short dictances. Railway transport therefore clearly plays an important role for freight transport in Uzbekistan.

[Table 2.3-3] Average Distance of 1 ton of Freight Transport by Transport Mode

(Unit: km)

Transport Modes	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*
All Transport	**70.1**	**75.3**	**84.8**	**93.3**	**94.2**	**95.2**	**95.0**	**93.3**	**91.4**	**72.9**	**65.1**	**62.8**
Road	12.7	13.2	14.3	16.2	18.2	21.6	24.2	24.4	25.9	24.2	22.9	22.6
Railway	354.7	379.3	418.8	418.7	397.3	394.7	385.6	372.2	372.8	369.4	391.6	379.9
Pipeline	841.2	843.6	950.6	962.5	937.9	942.4	961.2	940.4	911.1	691.9	688.2	755.0
Air	7,901.3	11,080.5	13,305.3	15,883.3	20,578.9	15,774.2	11,681.8	11,447.8	14,000.0	6,471.7	5,694.9	5,293.2
Water	67.7	78.9	120.0	333.3	-	-	-	-	-	-	-	-

(Source: Statistical Yearbook of the Republic of Uzbekistan 2012, State Committee on Statistics)



(Source: Statistical Yearbook of the Republic of Uzbekistan 2012, State Committee on Statistics)

[Fig. 2.3-6] Average Distance of 1 ton of Freight Transport by Transport Mode (Year 2000 = 100)

(2) Passenger Transport

1) Passenger Traffic Volume and Turnover by Transport Mode

The passenger traffic volume and turnover by transport mode is shown in [Table 2.3-4] and [Fig. 2.3-7], and the modal share of passenger transport in 2011 is shown in [Fig. 2.3-8].

The overall passenger volume of all transport modes saw a slight decrease until 2003 and was about 3,375 million persons in 2003, but then increased until 2011 and amounted to about 6,377 million persons in 2011. The passenger volume of road transport is changing as with the passenger volume of all transport because it now accounts for over 90% of the total passenger volume. In 2011, it increased by about 91% compared with the year 2000. The passenger volume of bus transport and urban

electrified transport decreased until 2011, and the volume in 2011 decreased about 70% compared with the year 2000. The passenger volume of railway transport decreased in 2006 and 2007 compared with the year before, but then increased until 2011 and stayed at the same level in 2011 as in 2000. As for the modal share of passenger volume in 2011, road transport excluding bus transport (89.0%) held the highest share, followed by bus transport (9.5%), urban electrified transport (1.3%) and railway transport (0.2%).

The passenger turnover of all transport increased until 2011 and the passenger turnover of road transport increased as with all transport. On the other hand, the passenger turnover of bus and urban electrified transport decreased until 2011 as with the passenger volume and the turnover in 2011 decreased about 60% compared with the year 2000. The passenger turnover of railway transport increased after 2006 and increased about 36% in 2011 compared with 2000. As for the share of passenger turnover in 2011, road transport excluding bus transport (83.7%) held the highest share, followed by air transport (7.5%), bus transport (4.4%), railway transport (3.6%) and urban electrified transport (0.7%).

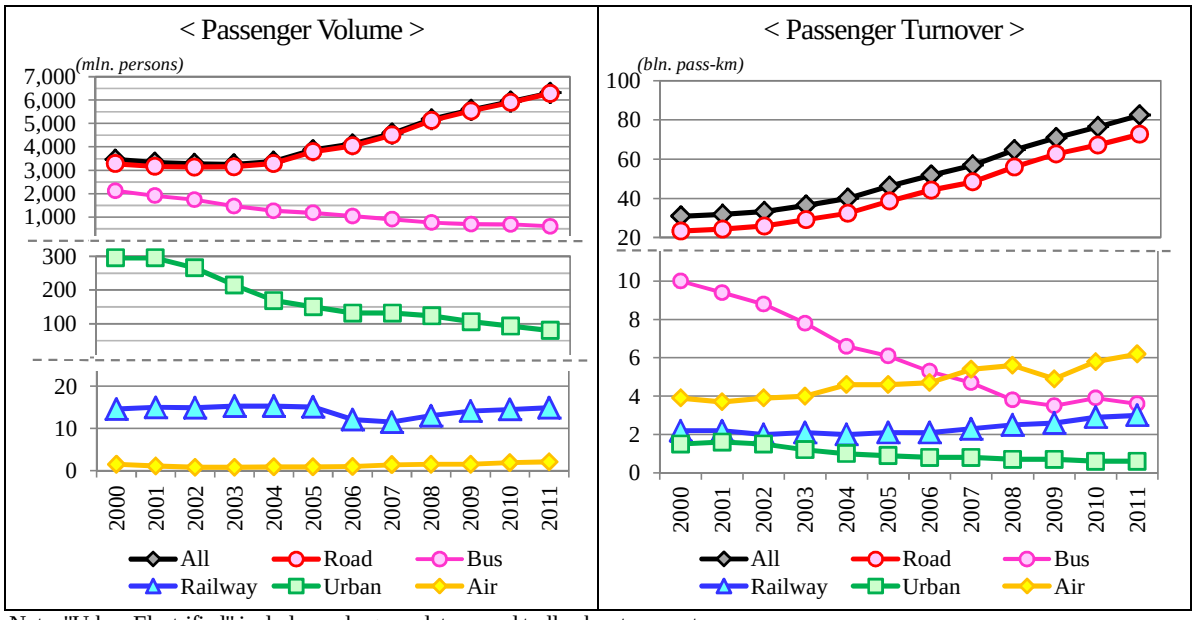
Road transport has a much higher share of passenger transport than of freight transport and the passenger volume and turnover of road transport is also rapidly increasing. The reason for this is considered the creation of new passenger demand by the advance of motorization and the shift from public transport (railway, bus, underground, tram and trolleybus transport) to private automobiles. The passenger volume and turnover of bus and urban electrified transport actually decreased to only 30-40% of the volume and turnover in 2000. Therefore, the share of railway transport in passenger transport is relatively decreasing.

[Table 2.3-4] Passenger Traffic Volume and Turnover by Transport Mode

Transport Modes	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2011/2000*
Passenger Volume *(million pearsons)*													
All Transport	**3,596.0**	**3,475.9**	**3,419.2**	**3,375.4**	**3,477.3**	**3,962.4**	**4,188.4**	**4,652.4**	**5,264.7**	**5,654.5**	**6,008.7**	**6,377.1**	**+77.3%**
Road	3,284.7	3,164.3	3,138.0	3,144.7	3,292.3	3,796.4	4,043.6	4,507.8	5,126.8	5,532.8	5,899.3	6,280.2	+91.2%
among them Bus	2,126.9	1,915.7	1,747.7	1,472.6	1,269.1	1,179.3	1,043.0	905.3	766.5	697.6	689.5	603.3	–71.6%
Railway	14.6	15.0	14.9	15.3	15.3	15.1	12.1	11.5	13.0	14.1	14.5	14.9	+2.1%
Urban Electrified*	295.2	295.5	265.5	214.6	168.8	150.0	131.7	131.7	123.4	106.1	93.0	79.9	–72.9%
Air	1.5	1.1	0.8	0.8	0.9	0.9	1.0	1.4	1.5	1.5	1.9	2.1	+40.0%
Passenger Turnover *(billion pass-km)*													
All Transport	**30.9**	**31.8**	**33.2**	**36.4**	**40.0**	**46.1**	**51.8**	**56.9**	**64.7**	**70.9**	**76.5**	**82.4**	**+167.0%**
Road	23.3	24.3	25.8	29.1	32.4	38.5	44.2	48.4	55.9	62.7	67.2	72.6	+212.1%
among them Bus	10.0	9.4	8.8	7.8	6.6	6.1	5.3	4.7	3.8	3.5	3.9	3.6	–64.0%
Railway	2.2	2.2	2.0	2.1	2.0	2.1	2.1	2.3	2.5	2.6	2.9	3.0	+36.4%
Urban Electrified	1.5	1.6	1.5	1.2	1.0	0.9	0.8	0.8	0.7	0.7	0.6	0.6	–60.0%
Air	3.9	3.7	3.9	4.0	4.6	4.6	4.7	5.4	5.6	4.9	5.8	6.2	+59.0%

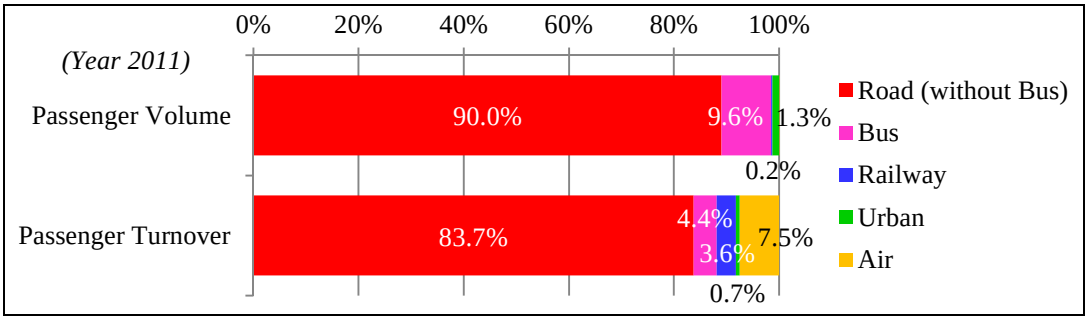
Note: * "Urban Electrified" includes underground, tram and trolley bus transport.

(Source: Statistical Yearbook of the Republic of Uzbekistan 2012, State Committee on Statistics)



Note: "Urban Electrified" includes underground, tram and trolley bus transport.
(Source: Statistical Yearbook of the Republic of Uzbekistan 2012, State Committee on Statistics)

[Fig. 2.3-7] Passenger Traffic Volume and Turnover by Transport Mode



Note: "Urban Electrified" includes underground, tram and trolley bus transport.
(Source: Statistical Yearbook of the Republic of Uzbekistan 2012, State Committee on Statistics)

[Fig. 2.3-8] Modal Share of Passenger Transport (year 2011)

2) Average Distance of 1 Person of Passenger Transport by Transport Mode

The average distance of 1 person of passenger transport by transport mode is shown in [Table 2.3-5] and [Fig. 2.3-9]. The average distance is calculated by the following formula:

Average Distance of 1 Person of Passenger Transport (km)
= Passenger Turnover (pass-km) / Passenger Volume (persons)

The average passenger transport distance of all transport modes increased until 2011. The rate of increase in average passenger transport distance after 2007 was lower than the rate of increase until 2006. The reason for this is because the rate of increase in passenger volume was lower than the rate of increase in passenger turnover until 2006 and the rate of increase in passenger volume increased after 2007 (refer to [Fig. 2.3-7]).

As for the average passenger transport distance by mode in 2011, road transport including bus transport was 11.6 km (only bus transport was 6.0 km), urban electrified transport was 7.5 km, railway

transport was 201.3 km, and air transport was 2,952.4 km. From this and analysis of freight traffic volume and turnover, it can be concluded that railways are used to transport passengers over medium distances as with freight transport but the role of railway transport in passenger transport is minor. This is because road transport has a very high share of passenger transport compared with freight transport.

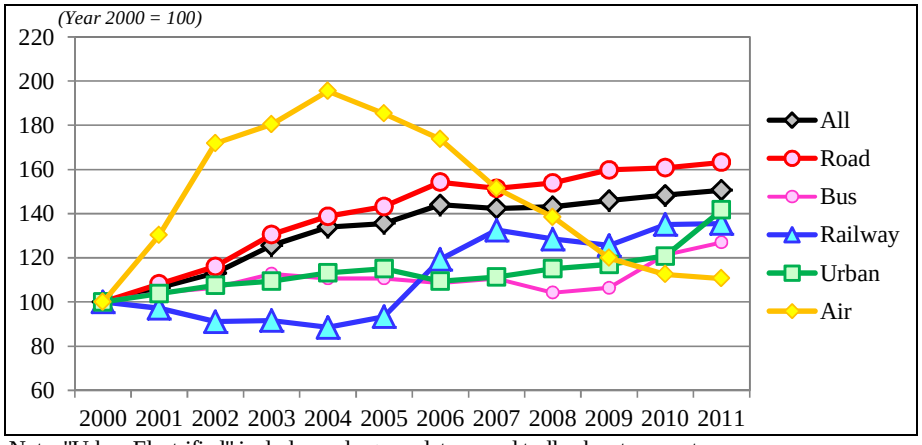
[Table 2.3-5] Average Distance of 1 Person of Passenger Transport by Transport Mode

(Unit: km)

Transport Modes	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*
All Transport	**8.9**	**9.5**	**10.1**	**11.2**	**11.8**	**11.9**	**12.6**	**12.4**	**12.5**	**12.7**	**12.9**	**13.1**
Road	7.1	7.7	8.2	9.3	9.8	10.2	10.9	10.7	10.9	11.3	11.4	11.6
among them Bus	4.7	4.9	5.0	5.3	5.2	5.2	5.1	5.2	4.9	5.0	5.7	6.0
Railway	148.6	144.4	135.4	136.1	131.6	138.7	177.3	196.9	190.9	186.6	200.7	201.3
Urban Electrified*	5.3	5.5	5.7	5.8	6.0	6.1	5.8	5.9	6.1	6.2	6.4	7.5
Air	2,668.3	3,474.7	4,583.1	4,813.6	5,214.9	4,944.5	4,634.0	4,040.0	3,692.7	3,199.6	3,001.5	2,952.4

Note: "Urban Electrified" includes underground, tram and trolley bus transport.

(Source: Statistical Yearbook of the Republic of Uzbekistan 2012, State Committee on Statistics)



Note: "Urban Electrified" includes underground, tram and trolley bus transport.

(Source: Statistical Yearbook of the Republic of Uzbekistan 2012, State Committee on Statistics)

[Fig. 2.3-9] Average Distance of 1 Person of Passenger Transport by Transport Mode (Year 2000 = 100)

2.3.3. Transport Sector Development Plan

In this subsection, the Survey Team has picked up 3 development plans as shown in [Table 2.3-6] as current effective transport sector development plans, and the outlines of these plans are shown below.

[Table 2.3-6] List of Transport Sector Development Plans

No.	Name of Document	Date of Issue	Source(s)
1	Resolution of the President of the Republic of Uzbekistan No. PP-1446; On Accelerating the Development of Infrastructure, Transport and Communication Construction in 2011-2015	December 2010	Executive Office of the President
2	Implementing CAREC 2020: The Wuhan Action Plan	October 2012	CAREC (ADB)
3	TRACECA Priority Projects List 2010 and TRACECA Priority Projects List 2012	December 2010 February 2012	TRACECA

(Source: Survey Team)

(1) Resolution of the President of the Republic of Uzbekistan No. PP-1446

The Resolution of the President of the Republic of Uzbekistan No. PP-1446 dated 21 December 2010, "On Accelerating the Development of Infrastructure, Transport and Communication Construction in 2011-2015," is the only effective infrastructure development plan for the transport sector in Uzbekistan. The main development priorities in this Resolution of the President are as shown below. The total investments of the Resolution by subsector are shown in [Table 2.3-7], and the main projects of the Resolution by subsector are shown in [Table 2.3-8].

The total investments of this Resolution from 2011 to 2015 amount to 6,935.5 million US$. The road transport sector has the highest share of this (48.9% or 3,394.6 million US$), followed by the railway transport sector (23.0% or 1,594.1 million US$) and the air transport sector (9.5% or 658.8 million US$). Foreign investments and credits will make up 46.7% or 3,235.9 million US$ of the financial sources.

The main projects in all subsectors include many rehabilitation and existing infrastructure modernization projects in addition to new construction projects. Implementation of measures against the deterioration of existing infrastructure is therefore urgently required.

< Main Development Priorities in the Resolution of the President >

- Fostering the implementation of projects for the creation of a unified national motor transport system;
- Accelerating the development and modernization of rail transport;
- Further development and strengthening of the material-technical basis of aviation transportation;
- Modernization and accelerated development of modern telecommunication networks and facilities;
- Further improvement of systems for the organization and management of transportation;
- Formation of new transport corridors;
- Implementing construction and rehabilitation of roadside infrastructure and services along national motorways and railways;
- Ensuring procurement of additional modern road construction equipment for the rehabilitation and development of the Uzbek National motorways;
- Expansion of construction, modernization and rehabilitation of engineering-communication networks in the regions of the Republic;
- Continuous decrease in production costs and net costs during construction and operation of the objects of production infrastructure, transport and communications.

[Table 2.3-7] Total Investments of the Resolution of the President by Subsector

(Unit: mln. US$)

Subsector	Project Cost	Invest-ments in 2011-2015	Including by source of financing:				Foreign Partner/ Creditor
			Own Funds	FRDU	Foreign Invest-ments and Credits	State Budget or Funds	
Total of Investments	**8,504.0**	**6,935.5** (100.0%)	**1,304.0** (18.8%)	**461.1** (6.6%)	**3,235.9** (46.7%)	**1,934.5** (27.9%)	-
Road Transport	3,544.0	3,394.6 (48.9%)	97.3	68.3	1,435.1	1,793.9	ADB, IBRD, ACG
Railway Transport	2,146.6	1,594.1 (23.0%)	1,067.9	84.5	441.7	0.0	ADB, JICA, PRC
Air Transport	993.7	658.8 (9.5%)	128.9	283.4	223.7	22.8	Germany, UAE, etc.
Telecommunications and Other Social Infrastructure	1,794.7	1,263.0 (18.2%)	9.9	0.0	1,135.4	117.8	ADB, IDA, PRC, etc.
Urban Electric Transport	24.9	24.9 (0.4%)	0.0	24.9	0.0	0.0	-

(Source: Resolution of the President of the Republic of Uzbekistan No. PP-1446)

[Table 2.3-8] Main Projects of the Resolution of the President by Subsector

Subsector	Main Projects
Road Transport	- Construction and Reconstruction of National Motorways - Development of Regional Motorways - Development of the Roadside Infrastructure and Service, etc.
Railway Transport	- Rehabilitation and Modernization of Railway Infrastructure - Electrification of Railway Lines - Renovation and Modernization of Rolling Stock and Repair Bases, etc.
Air Transport	- Renovation and Unification of the Park of Airplanes - Rehabilitation and Construction of Ground Infrastructure (new airports for local flights, passenger terminals, lighting-signal equipment, etc.)
Telecommunications and Other Social Infrastructure	- Rehabilitation and Construction of Water Supply and Sewage Systems - Expansion of Mobile Communication Systems, etc.
Urban Electric Transport	- Procurement of Trams and Trolleybuses

(Source: Resolution of the President of the Republic of Uzbekistan No. PP-1446)

(2) Implementing CAREC 2020 (The Wuhan Action Plan)

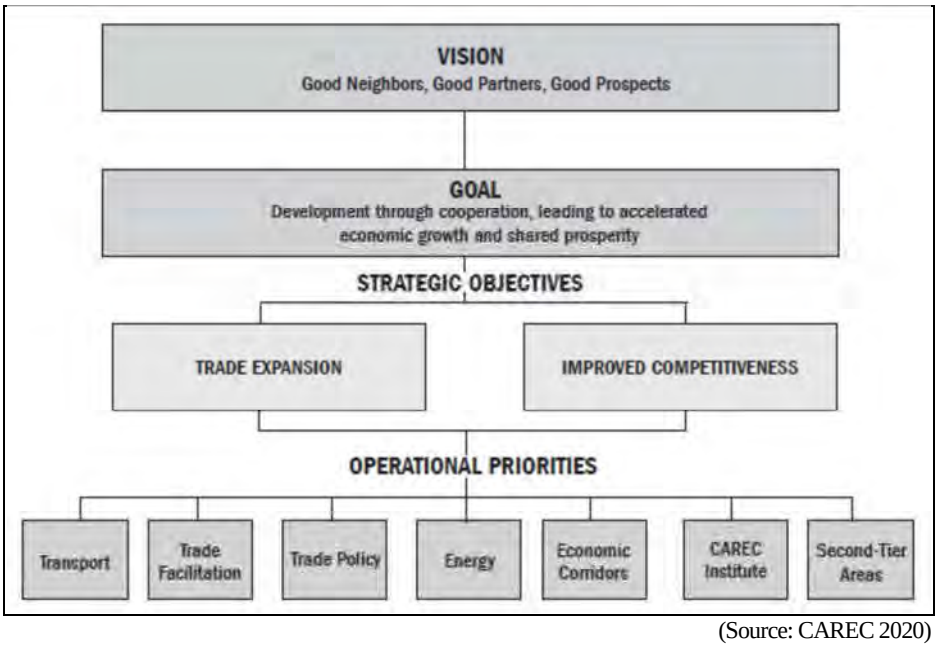
CAREC (Central Asia Regional Economic Cooperation) is a committed partnership of 10 countries in Central Asia, supported by 6 multilateral institutions, working to promote development through cooperation, leading to accelerated economic growth and poverty reduction. The six multilateral institutions consist of the Asian Development Bank (ADB), European Bank for Reconstruction and Development (EBRD), International Monetary Fund (IMF), Islamic Development Bank (IDB), United Nations Development Programme (UNDP) and World Bank (WB). CAREC was established in 2001 and ADB serves as the CAREC Secretariat. CAREC comprises 10 countries: Armenia, Azerbaijan, China, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Tajikistan, Turkmenistan and Uzbekistan. Pakistan and

Turkmenistan joined the partnership in 2010.

The CAREC program's strategy and action plan (Medium Term Priority Projects) for trade expansion and improvement of competitiveness of transport, trade facilitation, trade policy, energy, economic corridors, etc. are formulated and the investments of each project are implemented based on the CAREC Strategic Agenda shown in [Fig. 2.3-10].

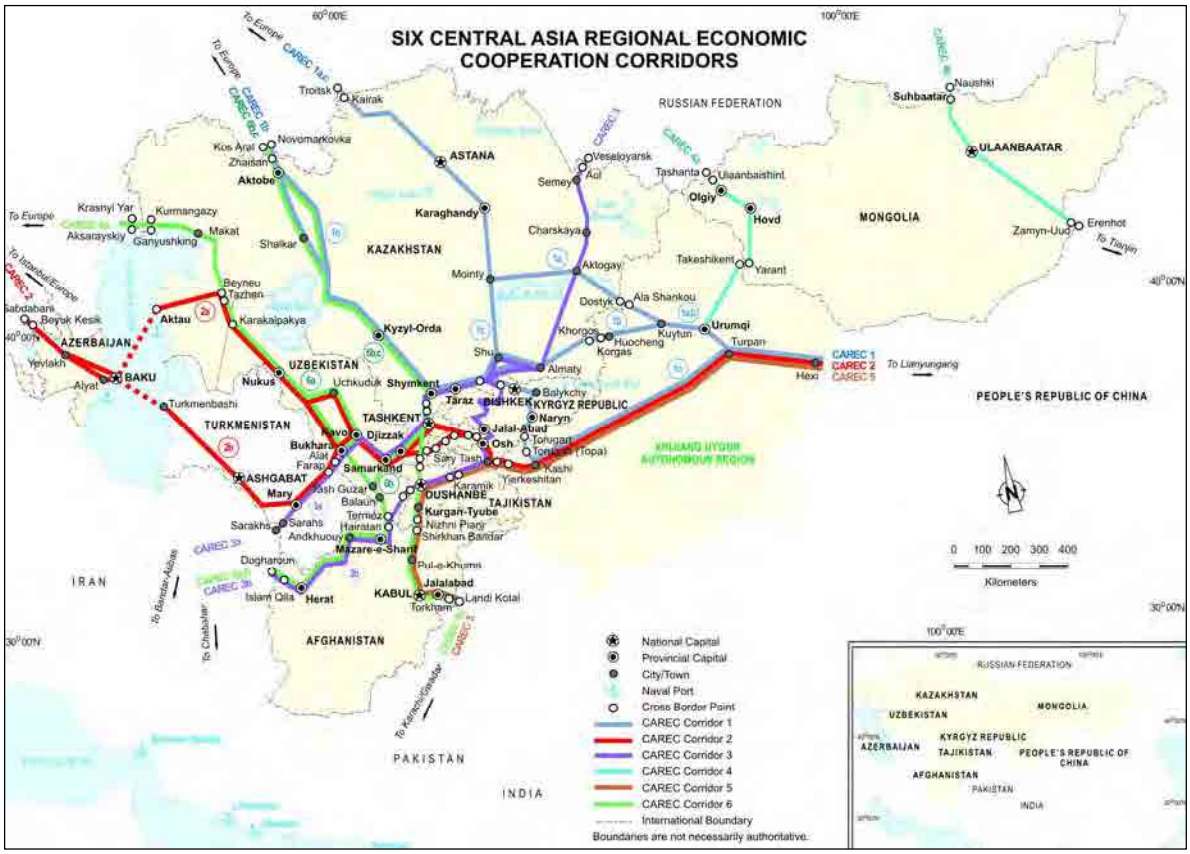
The route map of the six CAREC Corridors through Central Asia is shown in [Fig. 2.3-11], the CAREC Transport and Trade Facilitation Strategy 2008-2017 is shown in [Table 2.3-9], and the list of Medium Term Priority Projects (MTPP) for the transport sector in Uzbekistan under the latest action plan (The Wuhan Action Plan) is shown in [Table 2.3-10]. The CAREC Transport and Trade Facilitation Strategy and CAREC Corridors are currently under medium-term review and will be approved by the governments of the member countries in October 2013. At the same time, the CAREC Corridors, including those of Pakistan and Turkmenistan who joined in 2010, will be revealed.

As shown on the CAREC Corridor route map, there are 3 corridors in Uzbekistan (Corridor 2, Corridor 3 and Corridor 6), and the Medium Term Priority Projects of the transport sector are formulated based on these corridors. There are 20 Medium Term Priority Projects in Uzbekistan with total project costs amounting to 3,411 million US$. The project costs by subsector are 928 million US$ (27%) for 9 aviation projects, 847 million US$ (25%) for 5 road projects and 1,636 million US$ (48%) for 6 railway projects. The railway sector has the largest project costs.



(Source: CAREC 2020)

[Fig. 2.3-10] CAREC Strategic Agenda



(Source: CAREC)

[Fig. 2.3-11] Route Map of CAREC Corridors

[Table 2.3-9] CAREC Transport and Trade Facilitation Strategy 2008-2017

Item	Contents
Overarching Goal	- Establishment of Competitive Transport Corridors across the CAREC Region - Facilitation of Effecient Movement through Corridors and across Borders - Development of Sustainable, Safe, and User-friendly Transport and Trade Networks
Strategic Priorities	- Simplify Cross-border Transport Procedures - Harmonize Transport Regulations - Improve Infrastructure of Transport Corridors - Restructure and Modernize Railways - Improve Sector Funding and Management - Incrementally Liberalize Civil Aviation Subsector

(Source: CAREC 2020)

[Table 2.3-10] List of Transport Sector Medium Term Priority Projects under CAREC 2020 in Uzbekistan

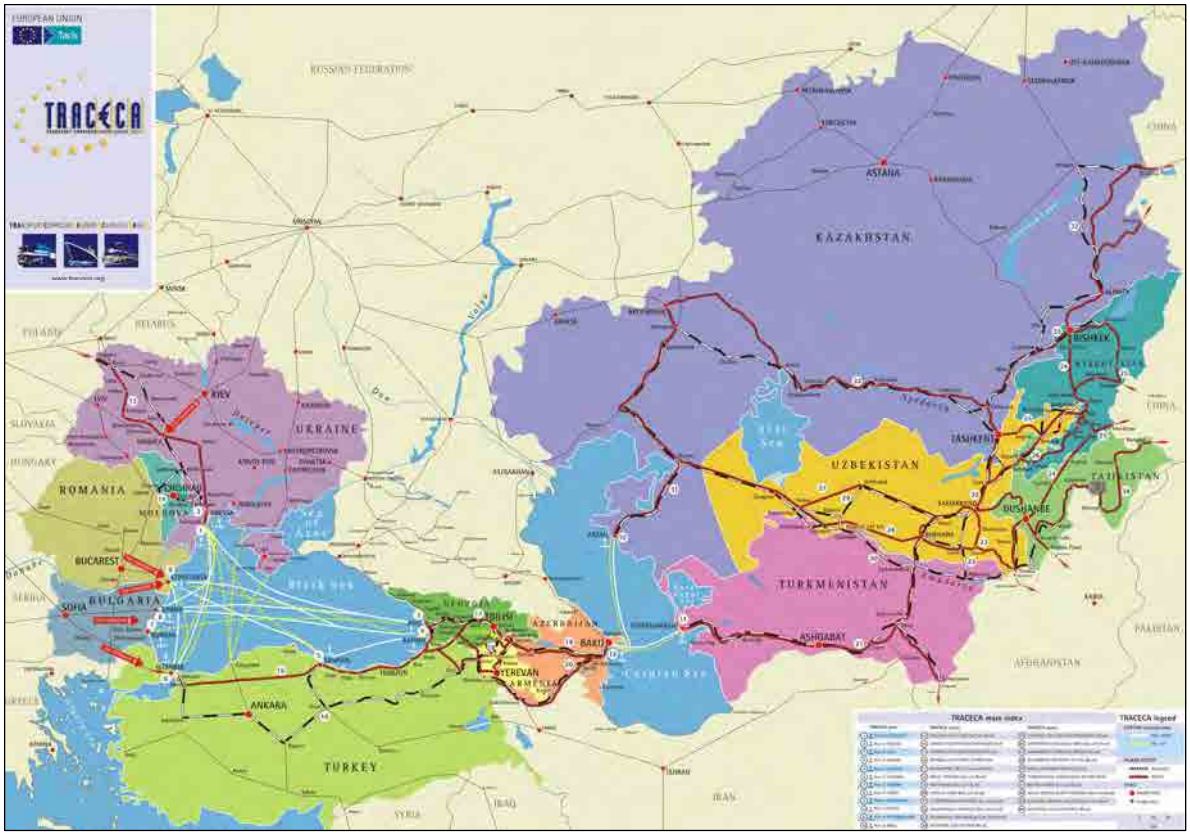
Subsector	Project Title	CAREC Corridor	Implementation Period	Cost (mln. US$)	Foreign Partner/ Creditor
Aviation	Modernization of Lighting System in 'Karshi' Airport	6a	n/a	2.0	-
	Modernization of Lighting System in 'Namangan' Airport	Not applicable	n/a	1.8	-
	Reconstruction and Modernization of 'Navoi' Passenger Terminal	2a, 3a, 6a	2011-2012	5.5	-
	Reconstruction of Landing Strip and Platform in 'Nukus' Airport	6a	2011	7.7	-
	Reconstruction of Landing Strip in 'Andijan' Airport	2	n/a	15.8	-
	Construction of Hangar for Boing-787	Not applicable	2014-2015	40.0	-
	Reconstruction of Airport Complex in 'Termez' Airport	3b, 6a, 6b	2014-2015	5.8	-
	Acquisition and Unification of Uzbekistan Airway Aircraft	Not applicable	2007-2016	814.6	-
	Construction of Centralized Filling Station in 'Navoi' Airport	2b, 3b	2013-2014	35.0	-
				928.2	(27.2%)
Road	Reconstruction and Modernization of M39	6a, 6b	2012-2015	167.2	-
	Reconstruction of P87 'Guzar–Chim Kukdala'	6a, 6b	2011-2014	80.0	-
	CAREC Regional Road Improvement (Phase 1)	2a, 6a	2009-2012	600.0	ADB
	CAREC Regional Road Improvement (Phase 2)	2a, 6a	2010-2015		ADB
	CAREC Regional Road Improvement (Phase 3)	2a, 6a	2012-2015		ADB
				847.2	(24.8%)
Rail	Acquisition of New Cargo and Passenger Locomotives	2, 3, 6	2009-2011/ 2013-2014	125.5	PRC
	Electrification of Karshi–Termez Railway Section	6a, 6b	2012-2017	388.0	JICA
	Construction of Navoi–Uchkuduk–Sultanuizdag–Nukus Section	2a, 6a	1999-2012	149.5	-
	Construction of Double-track Electrified Yangier–Jizak Section	6b, 3a	2009-2013	320.7	-
	Electrification of Marokand–Karshi Railway Section	2a, 2b,6a	2011-2016	208.4	ADB
	Electrification of Marokand–Navoi-Bukhara Railway Section	2a, 2b,6a	2014-2018	443.9	ADB
				1,636.0	(48.0%)
Total				**3,411.4**	(100%)

(Source: The Wuhan Action Plan, CAREC)

(3) TRACECA Priority Projects List 2010 & 2012

TRACECA was established in 1993 with the signing of the Multilateral Agreement on International Transport for the development of transport initiatives (including the establishment and development of a road corridor) between the EU, the Caucasus and Central Asia. TRACECA has a permanent secretariat which was established in March 2000 in Baku, Azerbaijan, which was originally financed by the European Commission. Since 2009 the organisation has been entirely financed by its member countries. The 14 member states of the Eastern European, Caucasian and Central Asian region are Armenia, Azerbaijan, Bulgaria, Georgia, Kazakhstan, Kyrgyzstan, Iran, Moldova, Romania, Tajikistan, Turkey, Turkmenistan, Ukraine and Uzbekistan. The route map of the TRACECA Transport Corridors is shown in [Fig. 2.3-12].

The action plan of TRACECA was formulated based on the TRACECA Strategy shown in [Table 2.3-11], and the priority projects were decided. The TRACECA Priority Projects List 2010 & 2012 in Uzbekistan is shown in [Table 2.3-12]. The number of priority projects is less than in the other development plans, and the Priority Projects List doesn't include any railway projects.



(Source: TRACECA)

[Fig. 2.3-12] Route Map of TRACECA Transport Corridors

[Table 2.3-11] TRACECA Strategy up to 2015

Period	Pillars
Short-term	- Overcoming the Headache of Funding - Making Transport Safer, Secure and Sustainable - Strengthening and Modernising the Institutional Dimensions of Transport
Medium-term	- Integration and Cohesion of Infrastructure Networks - Sound Multi-modal Freight Transport Chains
Long-term	- Exploiting the Full Potential of Air Transport and Boosting Air Passenger Traffic

(Source: TRACECA Action Plan for 2008-2009)

[Table 2.3-12] TRACECA Priority Projects List 2010 & 2012 in Uzbekistan

Year	Subsector	Project Title	Cost (mln. €)
2012	Customs	Centralised Information Web for Customs	15.0
2010	Aviation	Upgrading of Navoi Airport	50.0
	Railway	Installation of Karakalpakistan Railway Optic Fiber Cable	3.0

(Source: TRACECA Priority Projects List 2010 & 2012)

2.4. Current Conditions and Issues in the Railway Sector

2.4.1. Current Conditions in the Railway Sector

Basic information about the railway sector was organized on the basis of the materials collected about the organization of Uzbekistan Temir Yullari Joint-Stock Railway Company (hereinafter referred to as 'UTY') which is the sole company controlling railway transport and the current conditions of railway electrification facilities and equipment, train operation, etc.

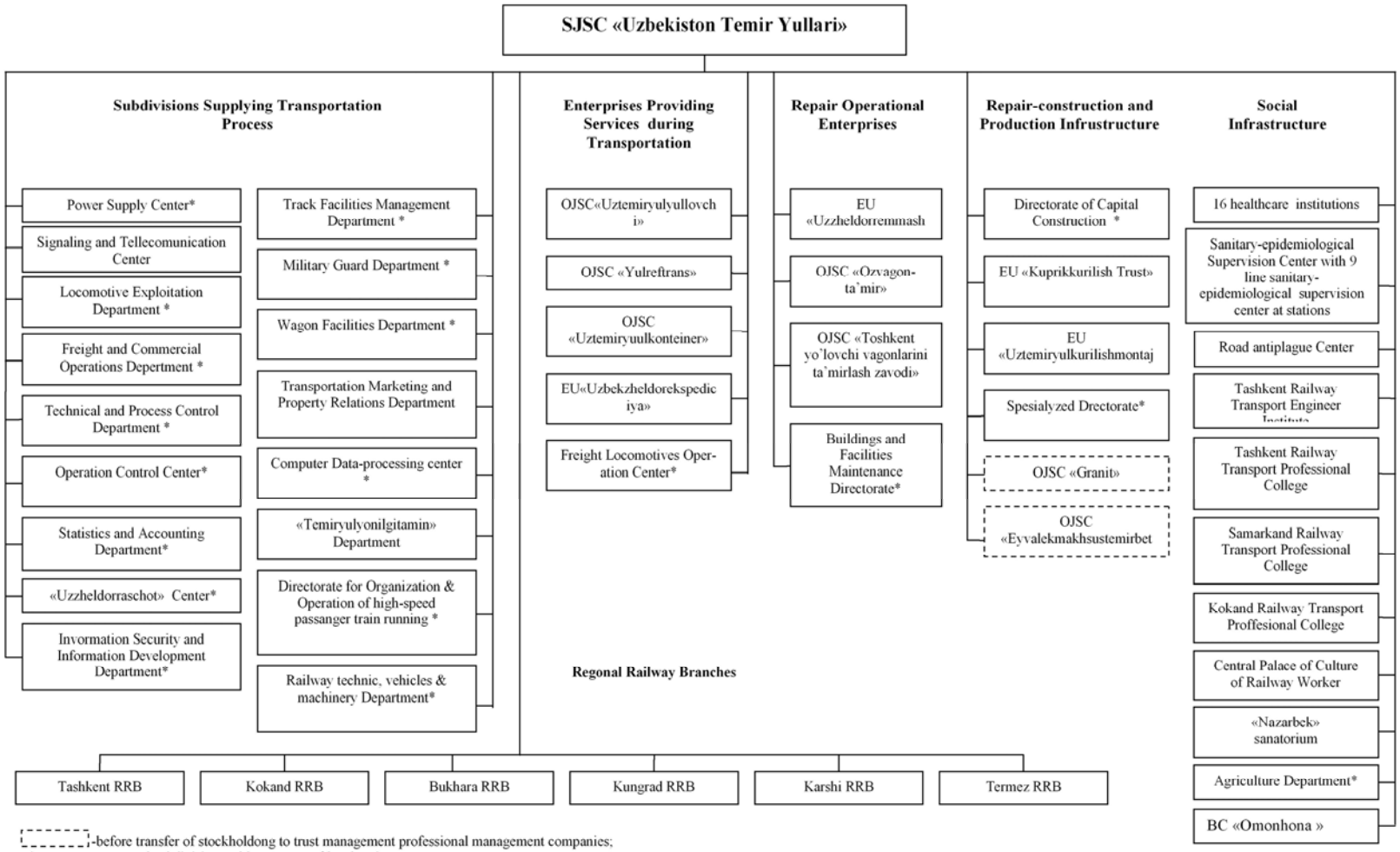
(1) Organization

UTY is a large organization which had a staff of 55,655 in 2011. The executive staff in the Head Office numbers 93 people but the Government has required this to be reduced to 38. UTY has 6 regional railway branch offices (Tashkent, Kokand, Bukhara, Kungrad, Karshi, Termez), 4 unitary enterprises, 24 social infrastructure organizations (health care and sanitation, etc.), as well as 5 Joint-Stock companies.

UTY is managed by an Executive Board, which is managed by the Chairman of UTY's Executive Board, and the supreme management authority of UTY is the Council, which is governed by the Prime Minister. UTY is a joint stock company and an organization independent from the Government. And yet UTY is under the control of the Deputy Prime Minister in charge of the fuel, energy, transport and communication complex of the Government structure because UTY was established with a special law and a Presidential Decree and the Government owns all UTY stock.

UTY's organization, its Executive Board and the Government Structure are shown in [Figure 2.4-1], [Figure 2.4-2] and [Figure 2.4-3] ~ [Figure 2.4-6].

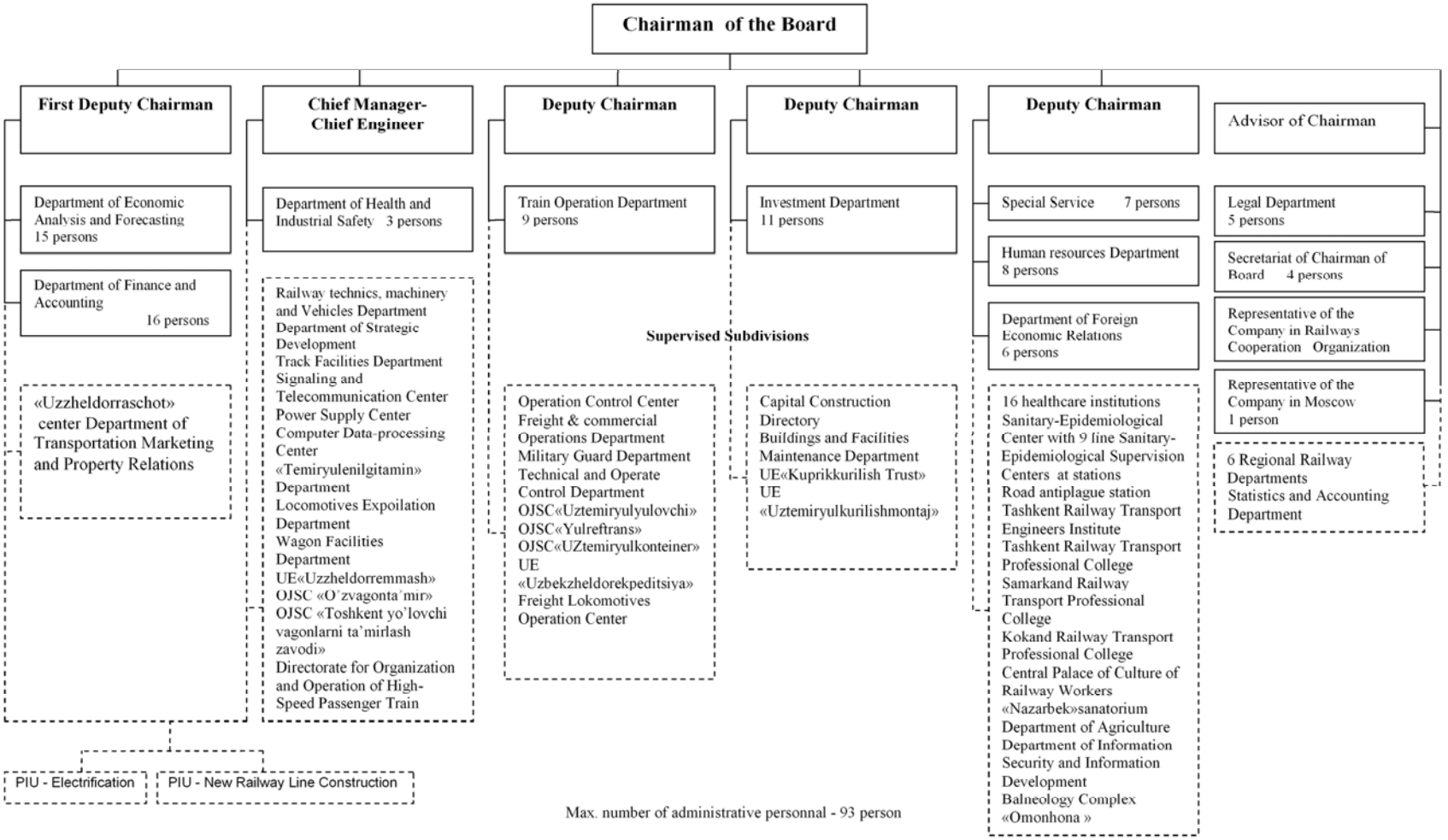
Organization Chart of UTY
as on January 1st, 2013 year



(Source: UTY)

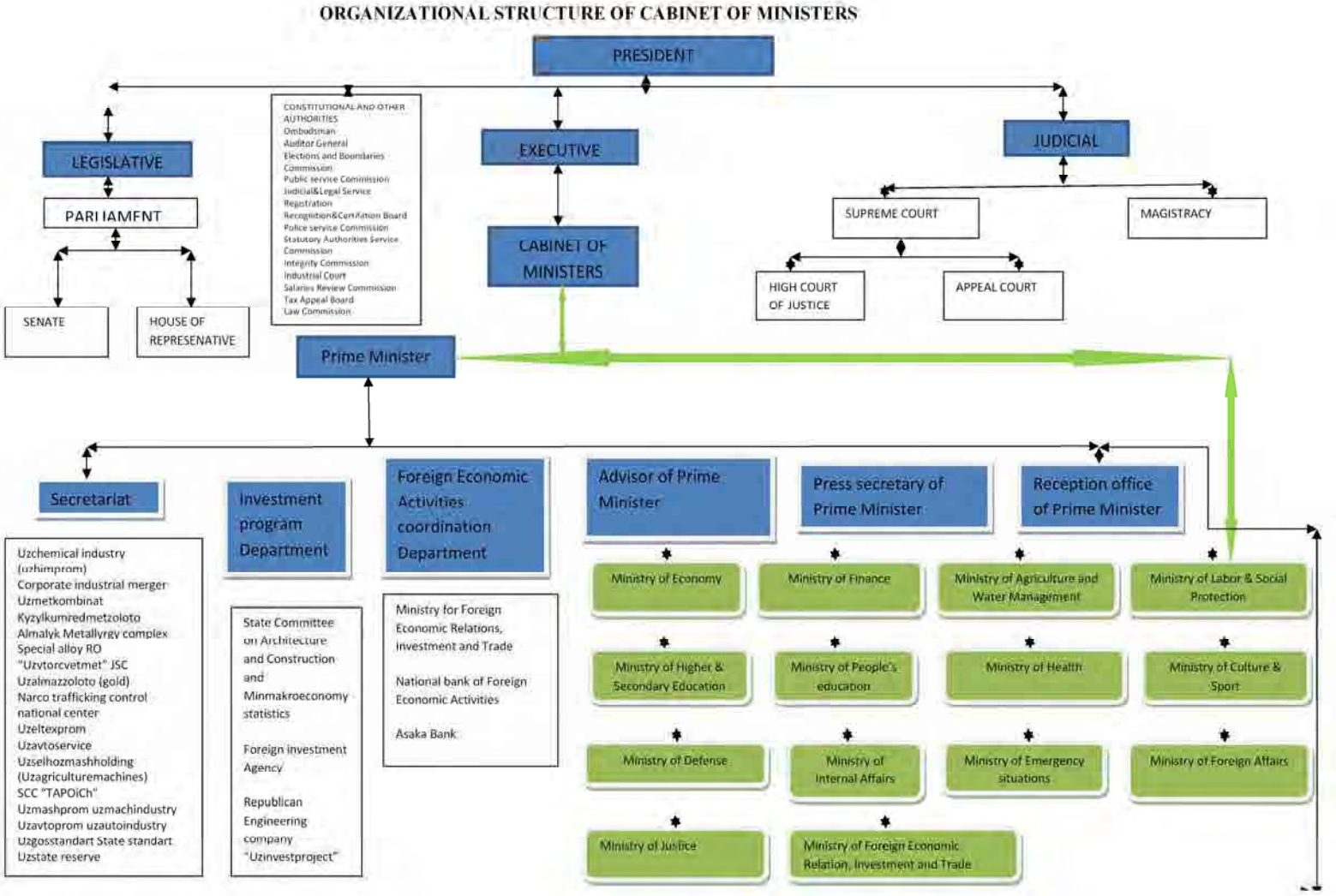
[Fig. 2.4-1] UTY Organization

Stracture of executive administrative apparatus
SJSC "O'zbekiston temir yo'llari" as on 1st January 2013 year



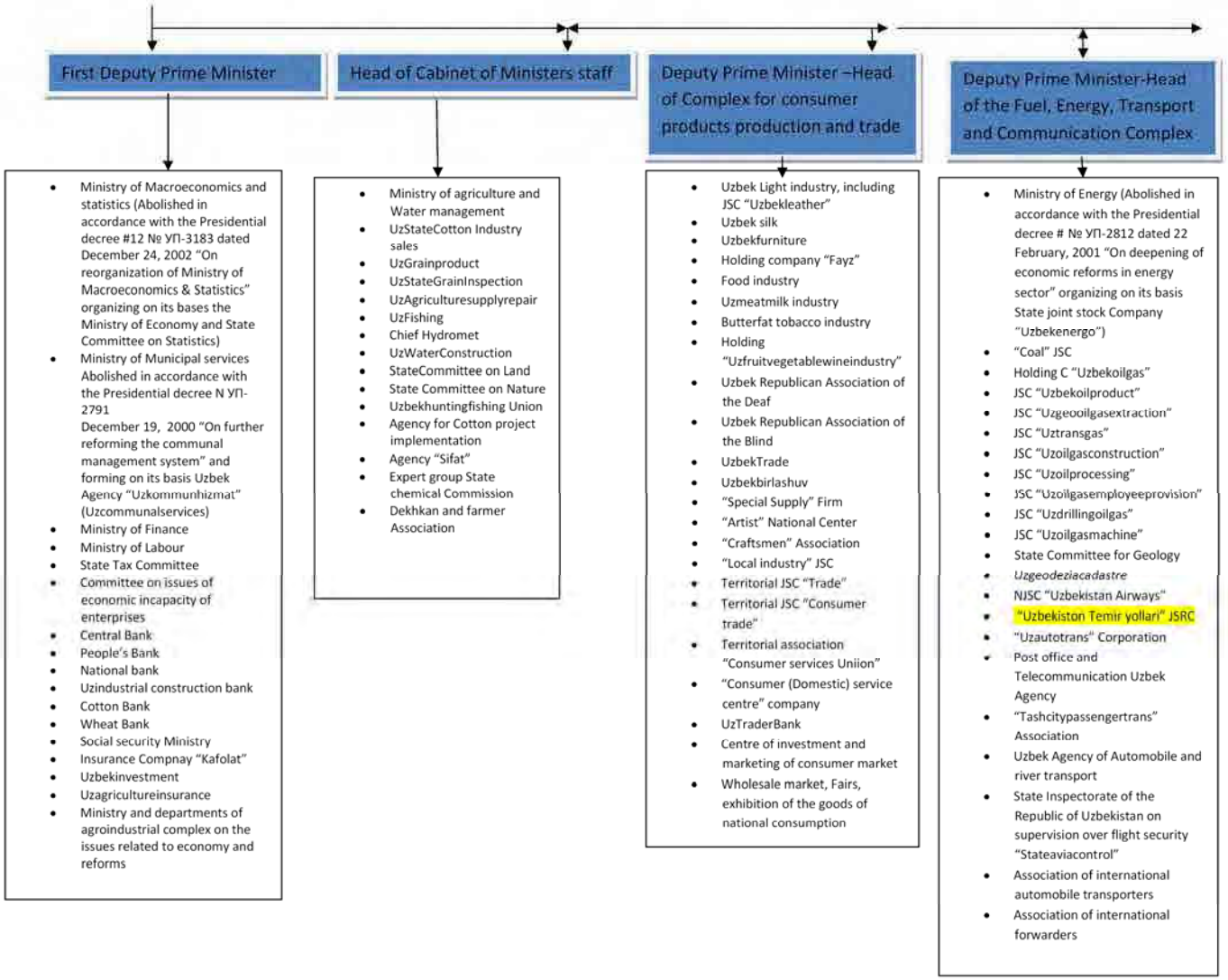
(Source: UTY)

[Fig. 2.4-2] UTY Executive Board



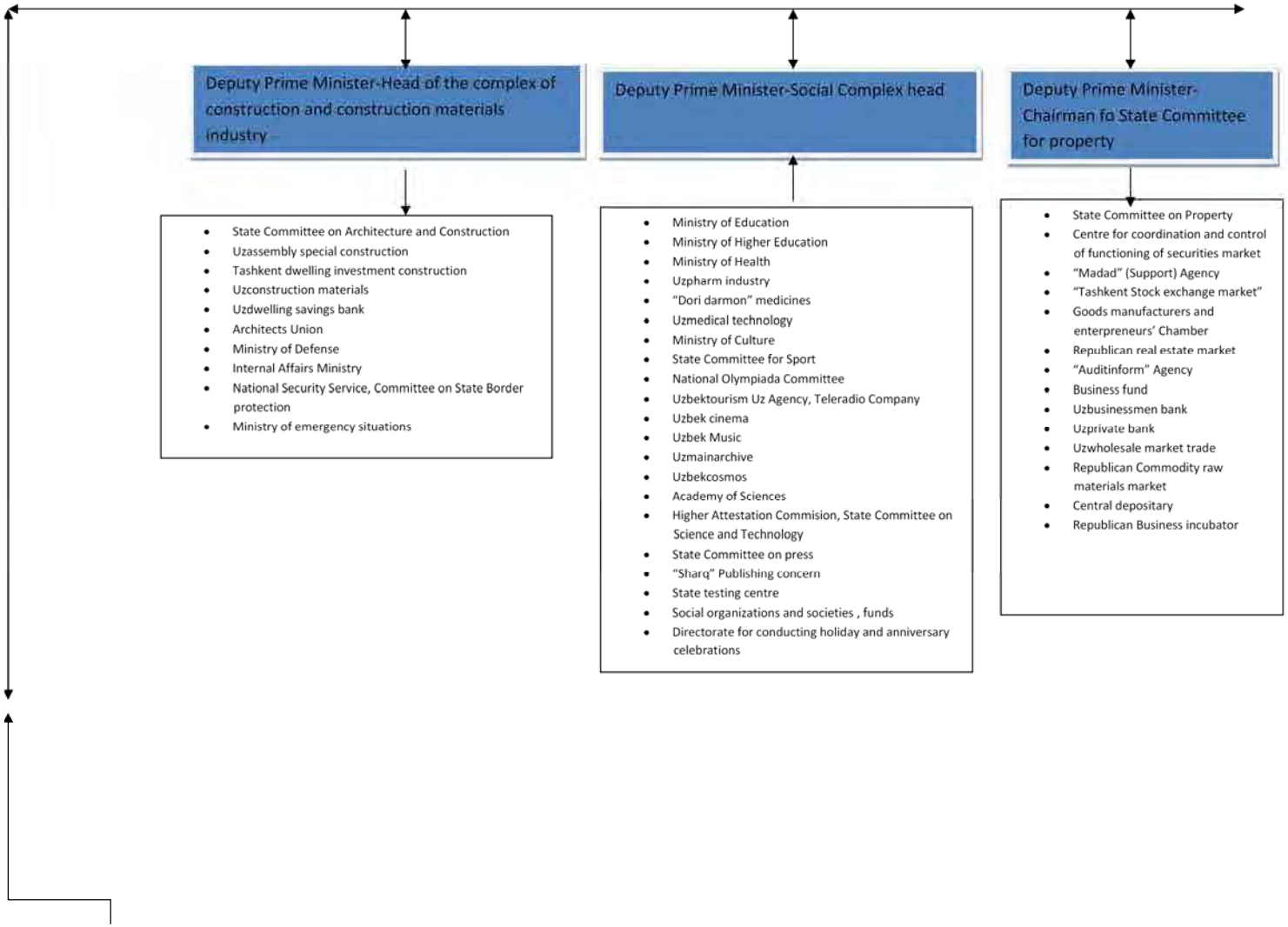
(Source: Drawn by the Survey Team based on Government web site)

[Fig. 2.4-3] Government Structure (Part 1)



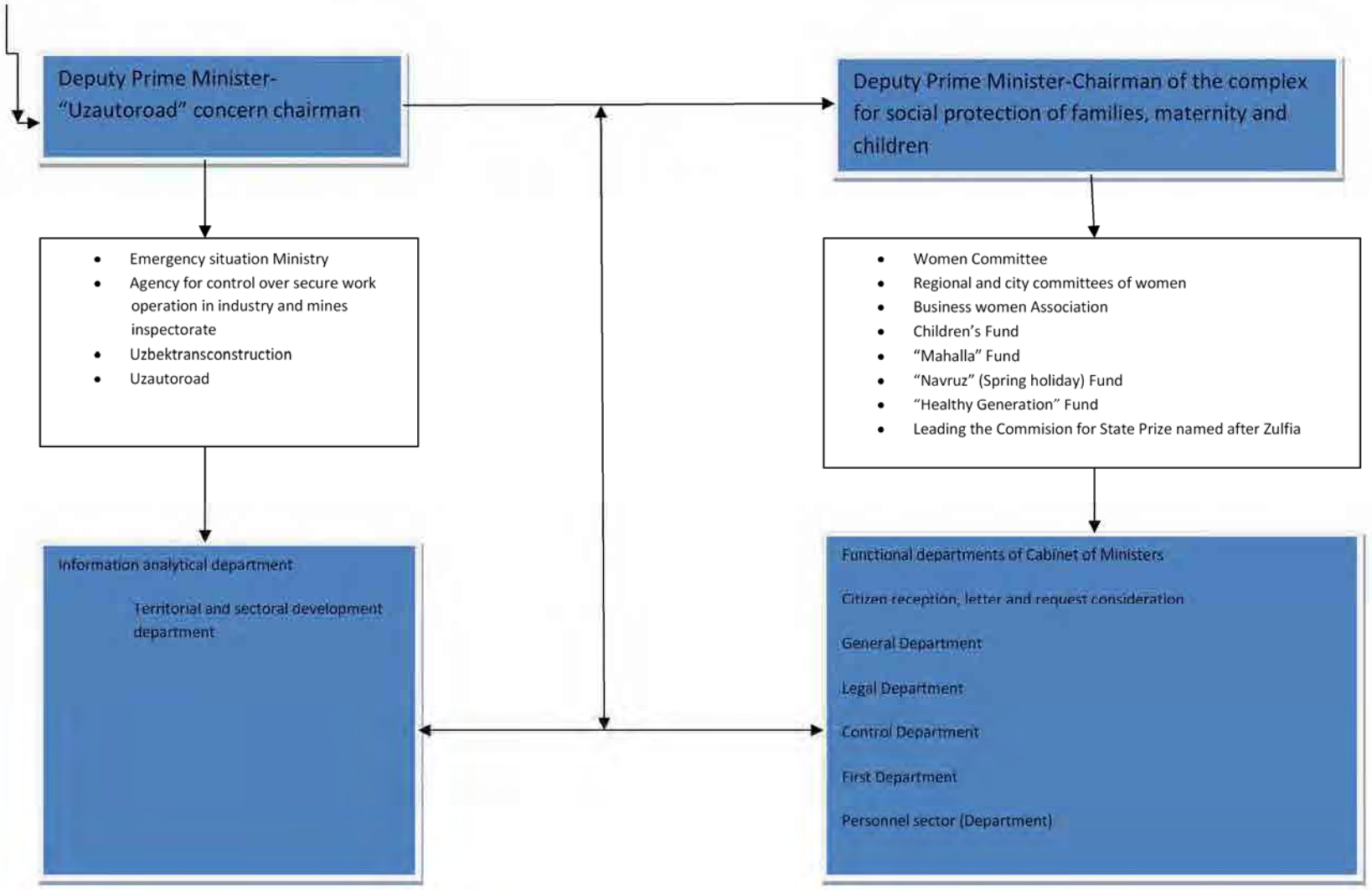
(Source: Drawn by the Survey Team based on Government web site)

[Fig. 2.4-4] Government Structure (Part 2)



(Source: Drawn by the Survey Team based on Government web site)

[Fig. 2.4-5] Government Structure (Part 3)



(Source: Drawn by the Survey Team based on Government web site)

[Fig. 2.4-6] Government Structure (Part 4)

(2) Facilities and Equipment

1) Civil and Track

The summary of civil and track in each regional railway branch is shown in [Table 2.4-1].

Overall railway length is about 4,200 km. Double track sections make up about 10% of the overall length and the rest consists of single track. R-65 type rail is most commonly used and the rail track condition seems to be in good overall condition.

[Table 2.4-1] Summary of Civil and Track

№	Name	Index	Regional Railway Branch						By the road
			Tashkent	Kokand	Bukhara	Kungrad	Karshi	Termez	
1	Length of track in use	km	734.4	529	1032.1	983	544.7	368.6	4191.8
2	Track miles of main track	km	1037.8	532	1222.3	984	521.2	371.4	4668.7
	Including double track		313.5	3	171	0	0	2.8	490.3
3	Track miles of station tracks:	km	569	283.2	397.04	249.9	176.8	157.3	1833.24
	Receiving and departure track		272.9	134.6	207.35	154	109.4	91.2	969.45
	Station yard		81	40.1	44	4.7	20.5	8.9	199.2
4	Track miles by type of rail R-75	km	0	5.5	0	0	0	0	5.5
	R-65		990.6	422.8	1320.4	799	521.2	369.3	4423.3
	R-50		45.2	102.9	21.9	185.4	0	2.1	357.5
	R-43		0	0.8	6.2	0	0	0	7
5	Bridges	unit	300	296	403	174	120	64	1357
6	Pipes, culverts, drain tunnels	unit	806	1104	765	629	504	690	4498
7	Number of technical staff	persons	2068	981	2026	1152	1023	874	8124

(Source: UTY)

2) Signal and Telecommunication

a) Outline of Existing Facilities and Equipment

The Survey Team performed a site survey on the one of the existing non-electrified railway routes – Bukhara–Marakand. According to the information from the Signaling and Communication Center of UTY, fiber optic cable lines for communication on the Keles–Bukhara section including the Marakand–Bukhara section were laid underground under the ADB loan, and was commissioned in 2009.

At each station, the interlocking devices are adjusted in accordance with the station scale. The station staff controls the station railroad yard points based on orders from the train operation center. As for the current conditions, the operating equipment is quite outmoded (refer to [Pic. 2.4-1] and [Pic. 2.4-2]).

Platform at Kattakurgan Sta.

Interlocking Equipment at Kattakurgan Sta.

(Source: Survey Team)

[Pic. 2.4-1] Interlocking Equipment at Kattakurgan Station

Plantform at Nurbulak Sta.

Interlocking Equipment at Nurbulak Sta.

(Source: Survey Team)

[Pic. 2.4-2] Interlocking Equipment at Nurbulak Station

As we studied, the equipment is being carefully used, and nowadays equipment trouble is very rare. However, taking into consideration the current condition where there is not sufficient supply of spare parts, the importance of upgrading the equipment in the near future is obvious.

According to the information from the Strategic Development Department of UTY, communication wires will also be equipped with a fiber optic based system (such as Synchronous Digital Hierarchy) till 2015 with a focus on the non-electrified sections. For this reason, in case of electrification of such sections equipped with fiber optic cables, the internal influence on transmission inductive interference will be small. But on the points where electrified sections have contact with existing normal telecommunication lines, countermeasures against inductive interference must be taken, which makes it necessary to discuss with related organizations beforehand.

As an example, according to collected information on the railway electrification section Tukimachi–Angren for the reason of influence on the telecommunication line between SJSC "Uzbekenergo" and Novo-Angrenskaya TES (New-Angren heat power plant) the line improvement

was requested.

As for the future plan, for electrification of sections located outside metropolitan areas where electrical equipment cannot possibly be affected by inductive interference, it is supposed to be possible to provide measures from telecommunication inductive interference which is equal to measures on operational electrified section.

b) Renewal Plan for Facilities and Equipment

In order to ensure stable communication quality, the installation of fiber optic cable lines (FOCL) is planned for a length of 290 km on the Navoi-Uchkuduk-1 section according to UTY's system modernization plans after 2013. The Uchkuduk–Misken (224 km) and Misken–Nukus (196 km) sections are included in the renewal plan of communication systems. As for the Centralized Traffic Control (CTC) system, the renewal plan covers sections with high speed train operation lines.

Moreover, as for the operation control system, system renewal will most likely consist of adaptation to the electrification of the Marakand–Karshi–Termez and Marakand–Bukhara 1 sections and the renovation of existing PCs. However detailed material on this could not yet be obtained. From hearings during the site survey, it seems that equipment renewal will be performed following existing systems.

3) Electric Power System

a) Power Supply Equipment

Electric power supply equipment for sections which have not yet been electrified, consists of three-phase A.C (refer to [Pic. 2.4−3]) power system operating at 10kV. It was confirmed that the power distribution lines are installed on wooden and reinforced concrete poles along the railway track. Also, though the electricity power is supplied from "Uzbekenergo" electric power company, it is easy to understand that generally the whole electric supply equipment and machinery is getting worn out.

As there are no electric railway transformer substations on non-electrified (diesel traction) sections, its electric power supply equipment is controlled from the UTY head office by sending directions via telephone from the power supply operation center to local control points. Moreover, on electrified sections the electricity is supplied from substations of electric railways on three-phase power source system operating at 10 kV, besides of that three-phase power source system operating at 27.5 kV provides separately.

Poles on Non-Electrified Section

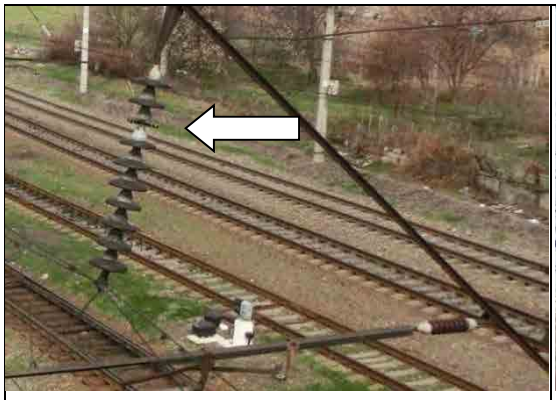
Poles on Electrified Section

(Source: Survey Team)

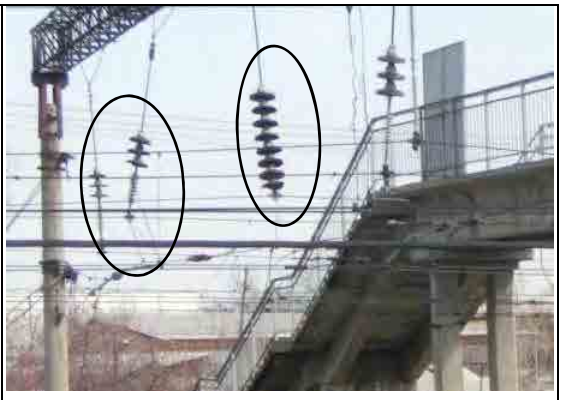
[Pic. 2.4-3] Poles on Non-Electrified and Electrified Sections

b) Catenary Line

As for the catenary wire equipment on electrified railway sections, on some sections polymer insulators are partially used. Also, here are some points on the sections where in case the overhead contact wire insulators have been damaged, the damaged insulators are still used with the addition of polymer or other insulators (refer to [Pic. 2.4−4]). It therefore seems that temporary repairs are carried out according to need instead of relying on major capital repairs.



Insulator Damage



Different Structure of Insulators

(Source: Survey Team)

[Pic. 2.4-4] Examples of Insulator Damage and Different Structure of Insulators

c) Transformer Substations

Transformer substations such as electricity transform facilities started to be used in 1971 during the Soviet era, and until 1991 when the Republic of Uzbekistan become independent, approximately 400 km of track had been electrified.

Originally the electrification started with DC-3kV, later it was unified with the current alternating current system. At present, the 3 transformer substations which were put into operation in 2012 on the railway road section Tukimachi–Angren, are the newest ones to be operated. In addition to that, if the Marakand–Karshi–Termez section is electrified, the specifications and the way of thinking on it will become the standard for future projects.

[Table 2.4-2] Record of Electrification

No.	Start Year	Area of Electrification	Distance (km)
1	1971	Tashkent – Yangiyul	27.0
2	1972	Yangiyul – Chinaz	33.8
3	1973	Chinaz – Sirdsaryinskaya	18.6
4	1974	Tashkent – Khodjikent	65.4
5	1986	Chengeldi – Chukursay	67.0
6	1989	Uzbekistan – Dalaguzar – Keles	40.0
7	1989	Chekursay – Tashkent Freight Terminal – Tukimachi	18.0
8	1990	Uzbekistan – Khavast	120.0
9	1993	Khavast – Bekabad	36.0
10	1993	Khavast – Djizak	85.9
11	1994	Djizak 1 - Djizak 2 – Crossing Loop 10	28.0
12	1997	Djizak 1 – Djambay	98.5
13	1999	Djambay – Samarkand	15.0
14	1999	Samarkand – Marakand	18.0
15	2002	Khodjikent – Chinari	1.2
16	2003	Tukimachi – Sergeli	10.1
17	2004	Sergeli – Kuchluk	21.5
18	2010	Kuchkuk – Angren	84.0
Total			**788.0**

(Source: UTY)

The number of traction substations has increased with the development of railway electrification. There were a total of 13 traction substations in 2012 as shown in [Table 2.4-3].

[Table 2.4-3] Process of Power Feeding System Development

No.	Start Year	Power Feeding Transformer Substation
1	1985	Chukursay - 110/27.5/6 kV, 40MW×2
2	1987	Djalaguzar - 110/27.5/10 kV, 40MW×2
3	1990	Akaltin - 110/27.5/10 kV, 25MW×2
4	1991	Yangiyor - 110/27.5/10 kV, 25MW×2
5	1994	Zarbdar - 220/27.5/10 kV, 40MW×2
6	1997	Bekabad - 220/27.5/10 kV, 40MW×1
7	1997	Bagarnaya (Bobur) - 220/27.5/10 kV, 40MW×2
8	1999	Djambay - 110/27.5/10 kV, 40MW×2
9	2002	Khodjikent - 110/27.5/10 kV, 16MW×2
10	2004	Crossing loop 13 - 110/27.5/10 kV, 25MW×2
11	2010	Crossing loop 35- 110/27.5/10 kV, 16MW
12	2012	Ahangaran - 110/27.5/10 kV, 16MW
13	2012	Angren - 10/27.5/10 kV, 16MW

(Source: UTY)

While visiting the Akhangaran transformer substation on 21 February 2013, we were told that there is generally a five-member staff which provides work operating due to following a shift schedule. As regular maintenance works mainly consist of visual inspections, confirmation of data values and minimal device adjustments, the number of maintenance staff is enough. In case of large scale inspection and repair works, research institutes and manufacturers can support the staff.

[Table 2.4-4] Shift List of UTY Transformer Substation Security Personnel

Workers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A	11	4	8	-	11	4	8	-	11	4	8	-	11	4	8	-
B	-	11	4	8	-	11	4	8	-	11	4	8	-	11	4	8
C	E	OT	11	4	8	-	11	4	8	-	11	4	8	-	11	4
D	4	8	-	11	4	8	-	11	4	8	-	11	4	8	-	11
E	8	-	8	8	E	E	8	8	8	8	8	E	E	8	8	8

Workers	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total (h)	h/D
A	11	4	8	-	11	4	8	-	11	4	8	-	11	4	8	184	5.9
B	-	11	4	8	-	11	4	8	-	11	4	8	-	11	4	176	5.7
C	8	-	11	4	8	-	11	4	8	-	11	4	8	-	11	172	5.5
D	4	8	-	11	4	8	-	11	4	8	-	11	4	8	-	173	5.6
E	8	8	E	E	8	8	8	8	8	E	E	8	8	8	8	176	5.7

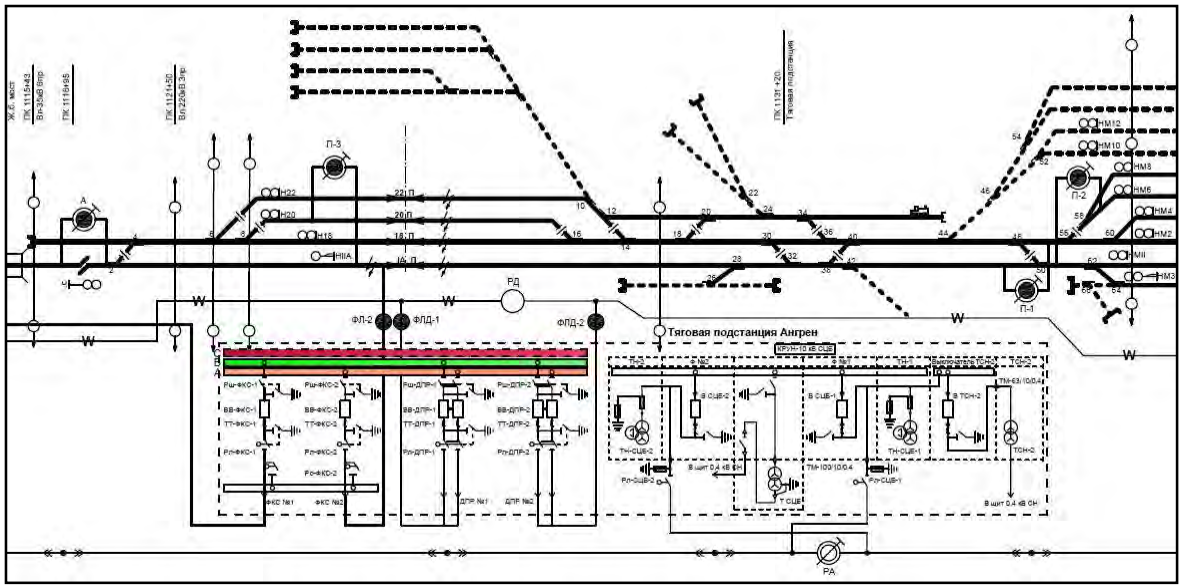
Note: 1) The numbers in the above table show working hours.
2) "E" and "OT" in the above table show paid vacations and training days respectively. (Source: UTY)

Below, the site conditions are simply described. It is possible to say that the structure of equipment of the newly constructed transformer substations is very simple.

- Standard outdoor transformer substation;
- 2 circuits of the electricity receive line, Y shape;
- 2 circuits of the feeder line, one-phase feeder system operating at 27.5 kV on different directions (single phase power feeding);
- 2 circuits of the electricity supply line, one-phase feeder system operating at 27.5 kV on different directions (alongside the rails on three-phase system 3φ);
- 2 circuits of the electricity supply line, stationary and non-stationary electricity supply line 10.0 kV (3φ).

(Source: Survey Team)

[Fig. 2.4-7] Single Track Connection Diagram of Akhangaran Substation



(Source: UTY)

[Fig. 2.4-8] System Diagram of Power Feeding and Electricity Power Supply of Akhangaran Substation

Receive Wire Part

Feeder Part

Extra High Tension Distribution Line

Protective Relay Panel

(Source: Survey Team)

[Pic. 2.4-5] Situation in Akhangaran Substation

[Table 2.4-5] UTY Electric Power Directive Sections and Related Points

№	Electric Power Directive Sections	Departure Station	Arrival Station
1	Tashkent	Tashkent	Hodjikent, Angren, New Chinaz, Keles
2	Khavast	Syrdarya	Djizak, Bekabad, Jettisay
3	Kokand	Suvanabad	Kuvasay, Hanabad, Savay, Uchkurgan
4	Bukhara	Navoi	Buzaubay, Hodjidavlet, Crossing loop-145
5	Karshi	Gumbaz	Akrabod, Crossing loop-146, Crossing loop-154, Kitob
6	Termez	Aknazar	Galaba, Kudukli, Boldyr
7	Samarkand	Crossing loop-13	Crossing loop-33
8	Misken	Dungulyuk	Crossing loop-449, Pitnyak, Beruniy
9	Kungrad	Karauzyak	Karakalpakiya, Chimboy

(Source: UTY)

d) Renewal Plan for Facilities and Equipment

Electrification installation has begun on the Marakand–Karshi (140 km) and Karshi–Termez (325 km) sections as one of the priority items according to UTY's guidelines. The electrical

equipment on these sections will be replaced by new equipment in conjunction with the works. Overhead catenary equipment will be installed to complete the renewal of the Tashkent–Samarkand (334 km) section in 2013.

According to information from UTY, there are renewal plans for the power control system. However, the Survey Team has not yet received any detailed material on this. After hearings, the renewal of the power control system is on-going under the following total measures as shown in [Table 2.4-6]. It seems that the systems to be renewed will follow existing systems.

[Table 2.4-6] Renewal Plan of Power Control System

Step	Major Items of Renewal	Remarks
1	Rail replacement, introduction of Afrosiyob, FO Cable installation	Finished
2	New railway lines, improvement of turnouts	On-going
3	Renewal of power control system (after 2013 once step 2 is completed)	Not fixed

(Source: Survey Team)

4) Stations

There are 6 Railway Regional Branches of UTY in the whole country. The number of stations served, including crossing loops, is 262. Stations classified by size, from largest station "out of class" to smallest station "5 class." The number of UTY stations and crossing loops by regional railway branch is shown in [Table 2.4-7].

[Table 2.4-7] Number of UTY Stations and Crossing Loops by Regional Railway Branch

Classe	Regional Railway Branches (RRB)						Total
	Tashkent	Kokand	Bukhara	Karshi	Termez	Kungrad	
Total	**58**	**35**	**66**	**33**	**24**	**46**	**262**
Stations	52	35	37	28	23	44	219
Crossing Loops	6	0	29	5	1	2	43

(Source: UTY)

Also, stations classified by purpose of use, such as local stations, operated for freight and passenger trains, station yards, providing locomotive coupling, freight stations, where freight loading is operated, intermediate stations for the purpose of train replacement (including crossing loops). These stations are operated according to the traffic diagram from the train operation center, which is located in the head office of UTY. Traffic is regulated by an automatic train operation control system and by telephone dispatches, which are sent from the telephone set located in UTY's head office, based on the information from the databases of an automatic train operation control system and data on train operation taken from automatic railway devices.

The train control center provides 24-hour operation and is operated by 13 sections shown in [Table 2.4-8].

[Table 2.4-8] Dispatched Control Sections of UTY Train Control Center

№	Dispatch Control Section
1	Saryagach–Uzbekistan–Tukumachi–Keles
2	Uzbekistan–Khavast–Djizak
3	Hodjikent–Tashkent–Angren
4	Khavast–Djizak–Marakand
5	Khavast–Kokand–Namangan–Andijan
6	Kokand–Margilan–Andijan
7	Marakand–Bukhara–Farap
8	Tinchlik–Uchkuduk–Misken
9	Kungrad–Nukus–Misken
10	Kungrad–Karakalpakiya
11	Bukhara–Karshi–Kitab–Marakand
12	Tashguzar–Boysun–Kumkurgan
13	Karshi–Termez–Kudukli

(Source: UTY)

(3) Rolling Stock

1) Summary of Rolling Stock

An annual based certificated number of coaches manufactured annually is shown in [Table 2.4-9]. About 740 coaches have been manufactured since 1972, and coaches manufactured in the 1980s make up about 65 percent of them. Coaches have been manufactured every year during the 1980s, and nearly 70 coaches were manufactured at a maximum in a year. In terms of different types of coach manufacturing, Parlor cars were the most common with Compartment coaches following in second place.

The technical characteristics of diesel locomotives are shown in [Table 2.4-10]. It is worth mentioning that the maximum design speed for cargo locomotives is 100 km/h and 160 km/h for passenger locomotives (TEP70BS type).

[Table 2.4-9] On an Annual Based Certificated Coach Manufacture as of 1 March 2013

Manufacture year	Wagon types											Total	
	Sleeper car	Cafeteria car	Compartment coach	Radio compartment coach	Parlor car	Interregional car	Freight (luggage) car	Dining and luncheon carriage	Caboose (Employee's car)	Private technical (maintanance care)	Special squads car		%
1972							5						
1976							10						
1977							1			1			
1978				1	1								
1979	1				16	18			2	1			
Subtotal	**1**		**0**	**1**	**17**	**18**	**16**		**2**	**2**		**57**	**7.7**
1980					25	6				1			
1981	1		8	1	39	20							
1982	9		7		28	20		3		1			
1983			8	6	12	10				8	1		
1984		1	14		28			5		2	1		
1985			1	3	29			4		2			
1986	2		9	1	29	5			1				
1987		7	12		17			4		1	1		
1988	1		30	8	24								
1989			2	2	17								
Subtotal	**13**	**8**	**91**	**21**	**248**	**61**		**16**	**1**	**15**	**5**	**479**	**64.6**
1990	2		6		15			2			1		
1991			17	3	24			3					
1992			19										
1993			11										
1994								5					
Subtotal	**2**		**53**	**3**	**39**			**10**			**1**	**108**	**14.6**
2000	5		15	5									
2003			1		3								
2004			5	1									
2009			7										
20010			3										
2011	7		5		1								
2012	7		10		19					1			
2013			1		1								
Subtotal	**19**		**47**	**6**	**24**					**1**		**97**	**13.0**
Total	**35**	**8**	**191**	**31**	**328**	**79**	**16**	**26**	**3**	**16**	**8**	**741**	**100.0**

(Source: UTY)

[Table 2.4-10] Technical Characteristics of the Locomotives

№	Diesel Locomotive Series	**PKP class SM48**	**ChME3**	**2TE10M**	**UzTE16M2**	**UzTE16M3**	**3TE10M**	**2TE116**	**TEP70BS**
1	Lokomotive's function	Shunting	Shunting	Freight	Freight	Freight	Freight	Freight	Passanger
2	Number of locomotive unit	1	1	2	2	3	3	2	1
3	Axial formula of wheel arrangement	3o-3o	3o-3o	2(3o-3o)	2(3o-3o)	3(3o-3o)	3(3o-3o)	2(3o-3o)	3o-3o
4	Diameter of the leading driving-wheels, mm	1050	1050	1050	1050	1050	1050	1050	1220
5	Adhesive weight of the section, kN	1200	1230	2x1380	2x1380	3x1380	3x1380	2x1380	1350
6	Average axel load, kN	200	205	230	230	230	230	230	225
7	Traction performance of the continuous rating: tangential power	657	715	3220	3400	4830	4830	3400	2220
8	Calculated tractive force, kN	210	230	2x253	2x260	2x260	3x253	2x260	170
9	Speed on the designed hoist, km/h	11.5	11.4	23.4	24	24	23.4	24	48
10	Designed speed, km/h	100	95	100	100	100	100	100	160
11	Section length on the coupler's axels	16970	17220	2x16970	2x18150	2x18150	3x16970	2x18150	21700
12	Gross train weight	120	123	2x138	2x138	3x138	3x138	2x138	135
13	Number of diesels in section	1	1	1	1	1	1	1	1
14	Diesel, type	PD1M	K6S310DR	10D100	1A-9DG-03 (1A-5D49)	1A-9DG-03 (1A-5D49)	10D100	1A-9DG-02 (1A-5D49)	2A-9DG-01 (2A-5D49)
15	Number of cylinders/ arrangement	6P	6	10P	16V	16V	10P	16V	16V
16	Bore of cylinder/stroke	318/330	310/360	207/(2x254)	260/260	260/260	207/(2x254)	260/260	260/260
17	Capacity, kW	880/1200	990/1350	2205/3000	2206/3000	2206/3000	2205/3000	2250/3060	2940/4000
18	Rated speed (of the shaft rotation), rotation per min	750	750	850	850	850	850	1000	1000
19	Type of power feeding	Direct Current	Direct Current	Direct Current	Direct Current	Direct Current	Direct Current	Direct/ Alternating Current	Direct/ Alternating Current
20	Traction generator, type	GP-300B	TD-802	GP-311B	GP-311B	GP-311B	GP-311B	GS-501A	ASTM 2800/ 600-1000
21	Traction motor.type	ED-107; ED118A	TE-006	ED-118A	ED-118B	ED-118B	ED-118B	ED-107A; ED-118A	EDU-133P
22	Traction gear box	68:15=4.53	76:15=5.06	75:17=4.41	75:17=4.41	75:17=4.41	75:17=4.41	75:17=4.41	78:25=3.12

(Source: UTY)

2) Maintenance of Rolling Stock

During the work in Uzbekistan, the Survey Team surveyed the following depots.

a) Locomotive Depot Bukhara

- There is a 10t crane hanging from the ceiling of the repair depot which is used to operate light loads;
- Heavy repair works are not possible in the Bukhara depot. They are conducted in the Tashkent depot;
- Maintenance of wheel surfaces is provided directly on the rails;
- There are 6 lathes and 1 drill machine tool in the machinery room;
- The building was constructed 100 years ago and has become remarkably deteriorated. The local administration also realizes that in case of electrification it will have to be fully reconstructed;
- There are two depots: Bukhara 1 and Bukhara 2. Bukhara 1 is used for freight and passenger locomotives, Bukhara 2 for freight only. These depots are located 10 km from each other;
- Since there is no electric supply room for the depot, it receives electricity by a special line from Bukhara station. The electricity is used in small scale;
- The current number of operating staff is 640 persons;
- The conception of UTY concerning the depot is in of potential demand, which necessitates the number of locomotives in accordance with electrification.

b) Locomotive Depot Tinchlik

- Locomotives maintained in this depot operate on the Samarkand–Navoi–Bukhara and Navoi–Uchkuduk sections. The number of locomotives is 40-45 units;
- The depot, including the Uchkuduk depot, has over 600 staff;
- In order to further increase traffic volume, it is necessary to expand the facilities;
- The depot was enlarged in response to increased traffic volume. The inspection shed for 2 rolling stock is currently being reconstructed to house 3 rolling stock;
- 20-25 rolling stock are inspected in the depot every day;
- The capacity of the ceiling crane in the shed is 10t.

c) Locomotive depot “Uzbekistan”

- Established in 1977 while electrification operates, the facilities cover an area of 27 ha;
- Staff: about 2,500 including 640 locomotive drivers and 40-50 training staff;
- Objects of operation: EL, EC, Talgo, DL (partially);
- Type of maintenance: overhaul inspection. It is possible to hold 3 rolling stock with 3 units each in the car inspection and repair shed;
- A maintenance contract was signed with the Talgo express train maker for a period of 4 years;
- The depot administration does not have data on the times and periods of EC capital refurbishment.
- Axle inspection equipment manufactured by Siemens was introduced for train axle inspection;

- Wheels are machined directly on the rails;
- On the car washing track rolling stock is moved with wire ropes which are stretched along the rails. Also, DLs are used to push-pull the rolling stock in and out of the depot in the final phase;
- Driving EC and EL under its own power to the shed is not considered. For this reason there is no electric overhead contact equipment in any sheds (same as in Bukhara and Tinchlik).
- ELs are manufactured in Latvia (1987);
- Obsolescence of locomotive is evident because of suspension of the rolling stock manufacture;
- Existing equipment can be used during electrification up to Termez, but after the implementation of the project there will likely be a shortage of details and equipment. 20-25 rolling stock are inspected in the depot every day.

3) Age of Rolling Stock

Although UTY has a lot of locomotives, many of them are very old. The number of "Uzbekistan" locomotives has been increasing in recent years, while many repair plans for old locomotives have been scheduled as top priority works. The old diesel locomotive models showed a low net operation ratio 4 years ago (refer to [Table 2.4-11]).

[Table 2.4-11] Conditions of UTY locomotives

Type	Model	Total (units)	No. of units for daily operation	No. of units at depots under maintenance	No. of units available for other needs	No. of units under upgrading or rehabilitation	No. of units under major repair
Diesel Locomotives	Total	190	109	14	6	38	23
	2TE10M	127	74	11	6	24	12
	3TE10M	56	28	3	-	14	11
	4TE10M	7	7	-	-	-	-
Electric Locomotives	3VL80s	32	29	3	-	-	-

(Source: F/S Report on Railway Electrification for Marakand-Karshi-Tashguzar-Boysun-Kumkurgan-Termez, JTC, Oct. 2010)

Moreover, the age of locomotives, passenger coaches and freight wagons as of the year 2012 are shown in [Table 2.4-12] and [Table 2.4-13].

[Table 2.4-12] Age of Locomotives as of the year 2012

Type	Under 10 years	10-20 years	20-30 years	Over 30 years	Total
Electric Locomotives (unit)	27	23	10	26	86
Diesel Locomotives (unit)	8	–	219	11	238
Shunting Locomotives (unit)	–	7	142	107	256
Total (unit)	35	30	371	159	580

(Source: UTY Business Plan)

[Table 2.4-13] Age of Passenger Coaches and Freight Wagons as of the year 2012

Type	Under 10 years	10-20 years	20-30 years	Over 30 years	Total
Passenger Coaches	61	42	469	159	731
Freight Wagons	1,171	551	12,683	10,307	24,712

(Source: UTY Business Plan)

The above data show that locomotives, passenger coaches and freight wagons which are older than 20-30 years comprise more than half of all rolling stock. In order to reinforce UTY's transport capacity, it is important to replace old type rolling stock with new types while at the same time carrying out repairs to extend rolling stock service life.

(4) Technical Standards

Technical standards for each specific field have been established in Uzbekistan. A list of technical standards related to railway construction and electrification is shown in [Table 2.4-14] and [Table 2.4-15]. Design and construction shall be implemented based on these technical standards, and more detailed standards especially for civil engineering structures are stipulated to ensure safety.

[Table 2.4-14] List of Technical Standards related to Railway Construction and Electrification (Part 1)

Standard No.	Description
General Technical Regulations and Requirements (Approved by State Committee of Architecture and Construction Republic of Uzbekistan.)	
Zoning norm and standards (ZNS) 2.01.02-04	Fire safety of buildings and constructions.№ 82 28.12.2004. Instead of Construction Norms and Rules (CNR) 2.01.02-85*.
BA 2.01.03-96	Construction in seismic active regions. № 99 01.12.1995. instead of CNR II-7-81*
BA 2.01.03-96 (including adjustment №1)	Construction in seismic active regions. № 90 30.12.2003.
BA 2.01.05-98	Natural and artificial lightings. № 28 28.03.1998. instead of CNR II-4-79
Civil Structures	
BA 2.03.01-97	Concrete and reinforced concrete constructions.
BA 2.03.02-97	Silicate concrete and silicate reinforced concrete constructions.
BA 2.03.03-97	Armocement structure.
BA 2.03.04-98	Concrete and reinforced concrete constructions designed for elevated and high temperatures.
BA 2.03.05-97	Steel structure. Design regulations.
BA 2.03.06-97	Structural aluminum. Technical design regulations.
BA 2.03.07-98	Stone and carcass structure.
BA 2.03.08-98	Wooden structure.
BA 2.03.09-98	Asbestos concrete structure.
BA 2.03.10-95	Roof and housetop.
BA 2.03.11-96	Structure anticorrosive protection.
Transport Facilities	
BA 2.05.01-96	1520 mm wheel track railway.
BA 2.05.03-97	Bridges and pipes.
BA 2.05.05-96	Railway and road tunnels.
BA 2.05.06-97	Transit pipeline.
CNR 2.05.07-91	Industrial transport.
BA 2.05.10-97	Railway and automobile road bed designing regulations.
Civil Structures	
BA 3.03.01-98	Load carrying and enclosing construction.
BA 3.03.02-98	Metal structure. Work execution and acceptance rules.
BA 3.03.04-98	Prefabricated reinforce concrete structures and products.
BA 3.03.06-99	Production and applying of building mortar.
BA 3.03.07-98	Foam mortar production.
BA 3.03.08-98	Regulation on polymer concrete and polymer concrete manufacture production technology
CNR III-24-75	Industrial furnace and brick pipes
Summary of Element Estimate Norms on the Construction and Refurbishment Works	
ZNS 4.02.01-04	Excavation works.
ZNS 4.02.06-04	Concrete and reinforced concrete cast-in-situ structure.
ZNS 4.02.07-05	Concrete and reinforced concrete fabricated structure.
ZNS 4.02.08-04	Brick and block structure.
ZNS 4.02	Metal structure.
ZNS 4.02	Wooden structure.
ZNS 4.02	Railway roads.
ZNS 4.02	Bridges and pipes.
ZNS 4.02	Power Transmission Lines. Book 1,2.
ZNS 4.02	Communication, radio and television facilities.

(Source: UTY)

[Table 2.4-15] List of Technical Standards related to Railway Construction and Electrification (Part 2)

Standard No.	Description
Constructional Norms for Subdivisions	
Temporary construction norms (TCN) 12-82	Regulations of constructional and erection works execution and acceptance within the railway road implementation electrification (power supply facilities).
TCN 32-81	Regulations of waterproofing of the bridge and pipe structure on the railway, automobile and municipal roads.
TCN 48-65	Technical regulations on joint-free concrete coating of the railway tunnels.
TCN 56-78	Railway stations and railway junction design regulations.
TCN 94-77	Railway bed construction regulations.
TCN 81-80	Production, construction and filling process of fabricated concrete and reinforced concrete culvert pipes.
TCN 85-68	Technical regulations on designing and construction of automobile and municipal road bridge superstructures with concrete carriageway slab without membrane waterproofing.
TCN 98-74	Technical regulations on designing, manufacturing and installation of composite structure due to the length of reinforced concrete bridges.
TCN 116-65	Technical regulations on construction and installation works execution technology (during railway road electrification – power supply facilities).
TCN 127-77	Technical regulations on design and execution of groundwater level recession works during metropolitan tunnels construction.
TCN 129/1-80	Rules of the automatic and tele-automatic equipment installation works execution on the railway transport (SCC).
TCN 132-66	Technical regulation on grouting for tunnel framing works execution.
TCN 141-84	Design norms of railway catenary wire structure.
TCN 143-68	Technical norms on application and enrichment of the extrusive rock crushing out within transport construction.
TCN 144-76	Technology regulations on the high-strength-friction-grip-bolt joint on steel frame of bridge.
TCN 150-68	Technical regulation on increasing of freeze-thaw resistance of the transport facilities concrete.
TCN 162-69	Plugging instruction for exploratory and temporary borehole drilled during engineering and geological metropolitan and mountain tunnels soil survey.
TCN 165-85	Construction of piled foundation bridge (bored pile).
TCN 167-70	Technical regulation on supporting wall design for transport construction.
TCN 173-770	Technical regulations on cantilevered erection of steel superstructure technology.
TCN 176-78	Corrugated metal pipe culvert design and construction instructions.
TCN 183-74	Technical regulations on bank protection structure design.
TCN 186-75	Technical regulations on construction technology of railway road formation, road bed.
TCN 190-78	Instruction on engineering and geological survey for metropolitan, mountain railway roads, automobile road tunnels design and construction.
TCN 196-83	Industry sector standards of lighting design in main producing department of Transport Construction Ministry of USSR plants and factories.
TCN 199-84	Administrative regulations on temporary design and building of transport construction camp.
TCN 202-75	Temporary Drafts and Estimates Design Guide for railway road construction.
TCN 205-87	Railway road geotextile used clay soils formation design.
TCN 206-87	Wind waves conditions influencing on bank protection structures' slope.
TCN 209-90	Administrative regulations on catenary line piles construction and portal construction erection by helicopters.
TCN Passenger Transportation (PT)-86	Administrative construction regulations. Railway stations. Design standards.
TCN PT-87	Administrative construction regulations. Suburb railway stations. Design standards.
TCN 446-N	Construction and erection works execution and acceptance (catenary line construction).
TCN 447-N	Administrative technical regulations on high speed railway road catenary line design
TCN 448-N	Infrastructure of high-speed railway road Tashkent-Samarkand. General technical requirements.
TCN 450-N	Design and construction. 1520 wheel track railway road.

(Source: UTY)

Standards for railway alignment such as gradients, curves, line grades and the effective length of stations [Table 2.4-16] have been set for every route and section in Uzbekistan. According to this, the gradient is 10 ‰ or less except for the mountainous Karshi–Tashguzar section, and the curve radius is more than 600m or 400m. The effective length of the stations related to the maximum train formation is more than 850m on all sections, and corresponding to the long formation.

[Table 2.4-16] Main Parameters of Plan and Profile of Railway Network in Uzbekistan

No.	Section	Length of track (km)	Maximum gradient, (‰)	Minimum curve radius (m)	Number of main line tracks	Effective length of arrival and departure tracks (m)
1. Direction of Kazakhstan border – Tashkent – Bukhara (Kashkadarya) – Turkmenistan border						
1	Keles – Tashkent	18	9.3	500	2	850
2	Tashkent – Uzbekistan	23	9.3	600	2	850
3	Uzbekistan – Mehnat	49	7.3	600	2	850
4	Mehnat – Havast	82	8.9	600	2	850
5	Havast – Djizak	89	8.7	400	1	850
6	Djizak – Marakand	131	9.7	400	1	850
7	Marakand – Ziyovuddin	115	9.1	600	1	850
8	Ziyovuddin – Bukhara 1	116	6.2	600	1	850
9	Bukhara 1 – Jojadavlet (Turkmenistan border)	98	8.5	600	1	850
10	Bukhara – Kashkadarya	145	9.0	600	1	850
2. Direction of Samarkand – Karshi – Termez – Tajikistan border and Afghanistan border						
11	Marakand – Kashkadarya	129	9.0	600	1	850
12	Kashkadarya – Karshi (Turkmenistan border)	12	9.4	500	1	850
13	Karshi – Tashguzar	30	18.5	600	1	850
14	Tashguzar – Kumkurgan	222	10.0	500	1	850
15	Termez – Sariasiya (Tajikistan border)	154	9.5	500	1	850
16	Termez – Amuzang (Tajikistan border)	54	8.0	600	1	850
3. Direction of Havast – Kokand – Andijan – Osh – Kyrgyzstan border across Tajikistan						
17	Havast – Bekabad (Nau)	38	8.5	600	1	350
18	Nau – crossing 136 (across Tajikistan)	104	8.5	600	1	850
19	crossing 136 (Tajikistan border) – Kokand	46	8.4	600	1	850
20	Kokand – Margilan	70	8.4	600	1	850
21	Margilan – Andijan	66	8.0	600	1	850
22	Andijan – Osh (Kirgizstan border)	70	8.5	600	1	850-500
4. Direction of Navoi – Uchkuduk – Nukus – Kungrad – Kazakhstan border						
23	Navoi – Uchkuduk	290	12.2	350	1	1,050 m with reconstruction
24	Uchkuduk – Miskin	224	9.0	350	1	-“-
25	Miskin – Nukus	196	9.0	350	1	-“-
26	Nukus – Naymankul	19	9.0	350	1	-“-
27	Tahiatash (state border) –Kungrad	106	4.0	600	1	-“-
28	Kungrad – Zhaslik	172	4.0	600	1	-“-
29	Zhaslik – Karakalpakiya (Kazakhstan border)	236	4.0	600	1	-“-

(Source: UTY)

(5) Train Operation

The line capacity and the average number of trains per day by section in 2013 are shown in [Table 2.4-17].

[Table 2.4-17] Line Capacity and Average Number of Trains per Day by Section in 2013

	Line Capacity in 2013				Number of Trains in 2013							Occupancy
	Freight	Passenger		Total	Freight	Passenger					Total	
		Long Distance	Suburban	(a)		High-speed	Express	Long Distance	Suburban	Subtotal	(b)	(c=a/b)
Kazakhstan Border												
Keles	96	6	0	102	23	0	0	6	0	6	29	28%
Tashkent (Uzbekistan)	84	10	6	100	18	2	2	6	6	16	34	34%
Gulistan	90	12	0	102	18	2	2	8	0	12	30	29%
Djizak	86	12	2	100	18	2	2	8	2	14	32	32%
Samarkand	86	12	2	100	18	0	2	8	2	12	30	30%
Marakand	11	7	2	20	9	0	1	6	2	9	18	90%
Navoi	20	4	0	24	8	0	1	3	0	4	12	50%
Bukhara	16	0	2	18	8	0	0	0	2	2	10	56%
Khodjadavlet	17	0	0	17	8	0	0	0	0	0	8	47%
Turkmenistan Border												
Marakand	14	3	1	18	8	0	0	3	1	4	12	67%
Karshi	20	1	1	22	8	0	0	1	1	2	10	45%
Tashguzar	8	1	0	9	8	0	0	1	0	1	9	100%
Kumkurgan	17	3	2	22	8	0	0	3	2	5	13	59%
Termez	18	2	0	20	7	0	0	2	0	2	9	45%
Hayraton (Afghanistan)												
Kumkurgan	11	3	2	16	7	0	0	3	2	5	12	75%
Sariasiya	14	2	0	16	5	0	0	2	0	2	7	44%
Tajikistan Border												
Bukhara	23	1	2	26	8	0	0	1	2	3	11	42%
Karshi	19	2	0	21	8	0	0	2	0	2	10	48%
Loop 154	13	2	0	15	8	0	0	2	0	2	10	67%
Turkmenistan Border												
Navoi	10	6	1	17	10	0	0	6	1	7	17	100%
Uchkuduk	4	5	1	10	4	0	0	5	1	6	10	100%
Miskin	6	4	0	10	4	0	0	4	0	4	8	80%
Nukus	18	3	1	22	7	0	0	3	1	4	11	50%
Naymankul												
Turkmenistan Border	10	0	0	10	2	0	0	0	0	0	2	20%
Naymankul	18	3	1	22	7	0	0	3	1	4	11	50%
Kungrad	10	3	0	13	5	0	0	3	0	3	8	62%
Karakalpakiya	10	3	0	13	5	0	0	3	0	3	8	62%
Kazakhstan Border												
Havast	13	3	0	16	10	0	0	3	0	3	13	81%
Bekabad	8	3	0	11	8	0	0	3	0	3	11	100%
Tajikistan Border	-	-	-	-	-	-	-	-	-	-	-	-
Kanibadam (Tajikistan)	12	0	0	12	6	0	0	0	0	0	6	50%
Suvonabad	30	0	0	30	6	0	0	0	0	0	6	20%
Kokand	22	0	1	23	4	0	0	0	1	1	5	22%
Namangan	29	0	1	30	4	0	0	0	1	1	5	17%
Andijan	15	0	0	15	3	0	0	0	0	0	3	20%
Savay	15	0	0	15	3	0	0	0	0	0	3	20%
Kyrgyzstan Border												
Kokand	18	0	1	19	6	0	0	0	1	1	7	37%
Fergana	18	0	1	19	6	0	0	0	1	1	7	37%
Andijan												

(Source: UTY)

The line capacity of the double-track Keles–Marakand section is about 100 trains/day. On the other hand, many of the other sections have a line capacity of only 15-30 trains/day because all sections except the Keles–Marakand section are single-track. For example, of the sections which connect to the Keles–Marakand section, the Marakand–Navoi section has a line capacity of 20 trains/day and the Navoi–Bukhara section a line capacity of 24 trains/day. And there are three sections with a line capacity of under 10 trains/day: Tashguzar–Kumkurgan (9 trains/day) and Uchkuduk–Miskin–Nukus (10 trains/day).

All sections other than the Uchkuduk–Miskin section have more freight trains than passenger trains. The operation pattern of the railway network in Uzbekistan consists of mainly freight trains. About 30

trains/day are operated on the double-track Keles–Marakand section which has a high line capacity. As for the sections which connect to the Keles–Marakand section, 18 trains/day are operated on the Marakand–Navoi section and 12 trains/day on the Navoi–Bukhara section.

There are 7 sections with a percentage of number of trains to line capacity of over 80%: Tashguzar–Kumkurgan (100%), Navoi–Uchkuduk (100%), Uchkuduk–Miskin (100%), Bekabad–Tajikistan border (100%), Marakand–Navoi (90%), Havast–Bekabad (81%) and Miskin–Nukus (80%), and 4 of these sections have a percentage of 100%. IMF estimates that the economic growth rate of Uzbekistan in 2013 and 2014 will be 7.0% and 6.5%, and ADB estimates that it will be 7.5% and 8.0%. It is expected that Uzbekistan's economy will grow steadily. Economic activities will become much brisker which together with economic growth will cause an increase in freight traffic volume. So it is considered that the increase in freight traffic volume together with economic growth will cause those sections to become future bottlenecks.

(6) Traffic Volume

1) Freight Transport

a) Freight Traffic Volume and Turnover by Transport Type

The railway freight traffic distribution in Uzbekistan by transport type in 2012 is shown in [Fig. 2.4-9], and the railway freight traffic volume and turnover in Uzbekistan by transport type is shown in [Table 2.4-18] and [Fig. 2.4-10].

ⅰ) Freight Traffic Volume by Transport Type

As for the share of freight traffic volume by transport type in 2012, local transport (about 65%) held the highest share, followed by transit transport (about 14%), import transport (about 13%) and export transport (about 8%). The overall freight traffic volume of all transport types increased until 2008, and has remained almost constant after 2008. The overall volume in 2012 increased about 60% compared with the year 2002.

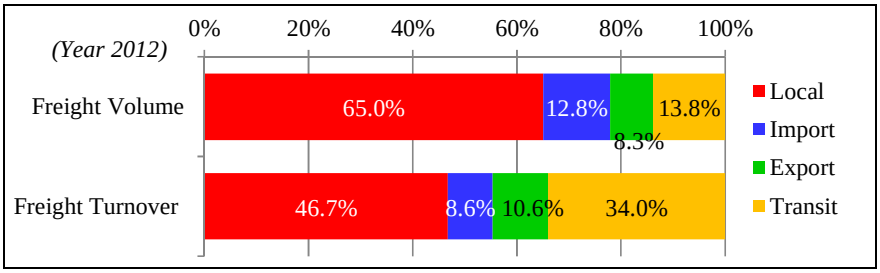
As for the rate of change from 2002 to 2012, import transport increased about 192%, export transport increased about 96%, transit transport increased about 83% and local transport increased about 41%. Especially, import transport increased for the past decade, and export and transit transport also mostly showed a tendency to increase.

ⅱ) Freight Turnover by Transport Type

As for the share of freight turnover by transport type in 2012, local transport (about 47%) held the highest share, followed by transit transport (about 34%), import transport (about 11%) and export transport (about 8%). As compared with the share of freight traffic volume by transport type in 2012, it is characteristic that the share of local transport was low, while that of transit transport was high. It is considered that the main reason for this is that the average transport distance of transit transport is longer than that of local transport. The overall freight turnover of all transport types

increased from 2005 to 2009, decreased in 2010 compared with the year before, and has remained almost constant after 2010. The overall turnover in 2012 increased about 23% compared with the year 2002.

In the rate of change from 2002 to 2012, export transport increased about 78%, import transport increased about 74%, transit transport increased about 69% and local transport only decreased about 7%. The rate of change of freight traffic volume was lower than that of freight turnover for all transport types. From these, it is clear that the average transport distance for all transport types decreased over the past decade.



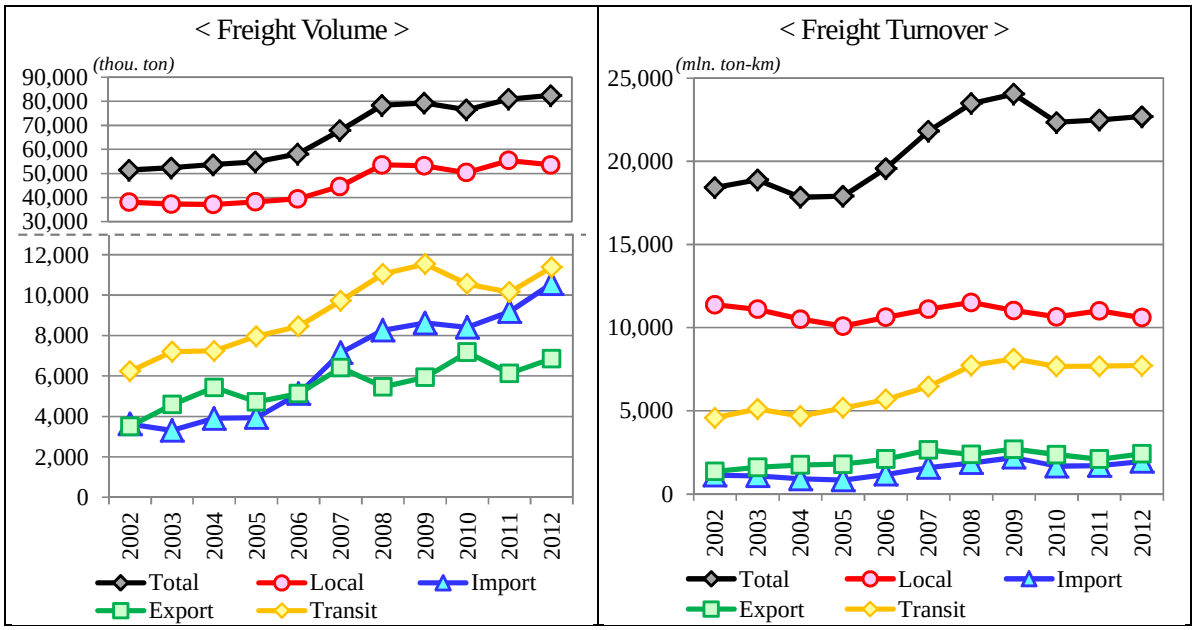
(Source: UTY)

[Fig. 2.4-9] Railway Freight Traffic Distribution by Transport Type in 2012

[Table 2.4-18] Railway Freight Traffic Volume and Turnover by Transport Type

	2002	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2012/2002*
Freight Volume *(thousand ton)*												
Total	**51,404.1**	**52,349.3**	**53,691.3**	**54,810.9**	**58,124.2**	**67,841.1**	**78,315.5**	**79,306.6**	**76,503.7**	**80,909.8**	**82,386.6**	**+60.3%**
Local	38,043.1	37,260.2	37,120.2	38,190.8	39,420.3	44,561.5	53,546.3	53,212.4	50,369.8	55,440.8	53,580.6	+40.8%
Import	3,624.7	3,304.7	3,905.1	3,938.6	5,122.0	7,158.5	8,262.5	8,624.6	8,409.3	9,186.6	10,573.7	+191.7%
Export	3,502.2	4,584.0	5,426.2	4,714.2	5,121.3	6,405.7	5,456.4	5,934.2	7,174.1	6,129.2	6,855.5	+95.7%
Transit	6,234.1	7,200.3	7,239.8	7,967.3	8,460.6	9,715.5	11,050.4	11,535.5	10,550.5	10,153.2	11,376.9	+82.5%
Freight Turnover *(million ton-km)*												
Total	**18,420.8**	**18,885.4**	**17,845.3**	**17,901.5**	**19,562.3**	**21,814.0**	**23,473.8**	**24,046.8**	**22,340.8**	**22,482.0**	**22,686.2**	**+23.2%**
Local	11,366.8	11,099.3	10,505.0	10,086.4	10,614.3	11,108.3	11,511.7	11,021.3	10,642.8	11,008.2	10,601.4	–6.7%
Import	1,124.2	1,087.8	909.5	848.3	1,173.9	1,592.2	1,863.4	2,198.6	1,664.1	1,700.7	1,954.9	+73.9%
Export	1,352.5	1,594.7	1,745.4	1,785.9	2,094.2	2,645.7	2,378.2	2,692.2	2,363.4	2,092.6	2,413.5	+78.4%
Transit	4,577.3	5,103.6	4,685.4	5,180.9	5,679.9	6,467.8	7,720.6	8,134.7	7,670.4	7,680.4	7,716.4	+68.6%

(Source: UTY)



(Source: UTY)

[Fig. 2.4-10] Railway Freight Traffic Volume and Turnover by Transport Type

b) Freight Traffic Volume and Turnover by Commodity

The railway freight traffic distribution in Uzbekistan by commodity in 2012 is shown in [Fig. 2.4-11], and the railway freight traffic volume and turnover in Uzbekistan by commodity is shown in [Table 2.4-19] and [Fig. 2.4-12].

i) Freight Traffic Volume by Commodity

As for the share of freight traffic volume in Uzbekistan by commodity in 2012, other (about 30%) held the highest share, followed by crude oil (about 22%), construction materials (about 13%), fertilizer (about 6%) and ore (about 6%). The top three commodities accounted for about 65% of the overall freight traffic volume. In 2012, the top three commodities which were other, crude oil and construction materials accounted for more than 10 million ton, and the commodities other than the top three commodities accounted for under 5.0 million ton respectively.

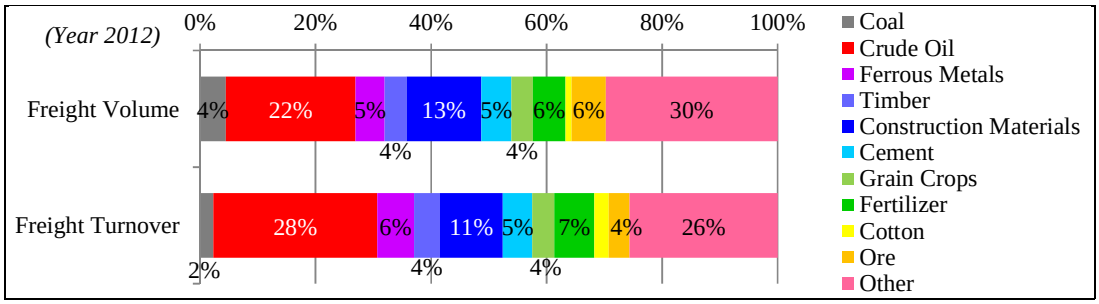
As for the rate of change from 2002 to 2012, three commodities, timber (about 392%), other (about 191%) and ferrous metals (about 160%), increased more than the overall freight traffic volume (about 60%). Timber increased from 2002 to 2008, other increased from 2006 to 2008 and from 2010 to 2012, and ferrous metals increased from 2002 to 2009. The three commodities increased until 2008 together with the overall freight traffic volume. Regarding the rate of change of other commodities, crude oil increased about 30%, construction materials about 35%, and cotton only decreased about 35%.

ii) Freight Turnover by Commodity

As for the share of freight turnover in Uzbekistan by commodity in 2012, crude oil (about 28%) held the highest share, followed by other (about 26%), construction materials (about 11%), fertilizer (about 7%) and ferrous metals (about 6%). The top three commodities accounted for about

65% of the overall freight turnover as with the case of freight traffic volume. As compared with the share of freight traffic volume by commodity, it is characteristic that the share of construction materials and other was low, and the share of crude oil was high. It is considered that the main reason for this is that the average transport distance of crude oil is longer than that of other commodities. In 2012, only two commodities, other and crude oil, accounted for more than five billion ton-km, and five commodities, construction materials, fertilizer, ferrous metals, cement and timber, accounted for more than one billion ton-km.

As for the rate of change from 2002 to 2012, six commodities increased more than the overall freight turnover (about 23%): timber (about 565%), ferrous metals (about 85%), other (about 50%), construction materials (about 35%), coal (about 36%) and cement (about 33%). These commodities increased until 2008 together with the overall freight turnover. Regarding the rate of change of other commodities, crude oil increased about 4%, and grain crops, ore and cotton decreased about 33%, 30% and 17% respectively. As compared with the rate of change of freight traffic volume by commodities, five commodities (timber, coal, construction materials, cement and cotton) were high, and six commodities (other, ore, grain crops, crude oil, ferrous metals and fertilizer) were low.



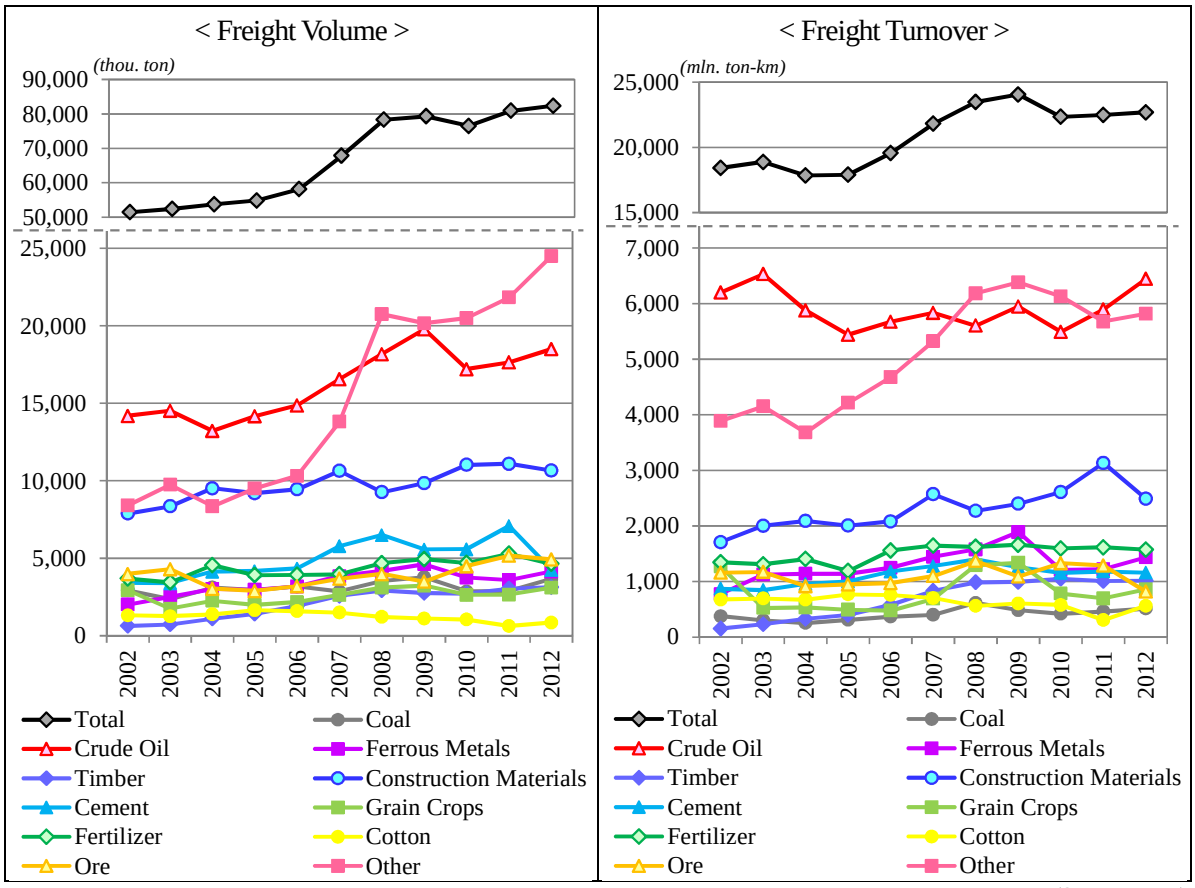
(Source: UTY)

[Fig. 2.4-11] Railway Freight Traffic Distribution by Commodity in 2012

[Table 2.4-19] Railway Freight Traffic Volume and Turnover by Commodity

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2012/2002
Freight Volume *(thousand ton)*												
Total	**51,404.1**	**52,349.3**	**53,691.3**	**54,810.9**	**58,124.2**	**67,841.1**	**78,315.5**	**79,306.6**	**76,503.7**	**80,909.8**	**82,386.6**	**+60.3%**
Coal	2,923.5	2,367.3	3,112.7	2,936.8	3,173.7	2,859.8	3,540.3	3,775.3	2,857.2	2,882.8	3,679.0	+25.8%
Crude Oil	14,202.3	14,520.0	13,224.6	14,175.3	14,863.9	16,557.3	18,176.3	19,789.2	17,210.3	17,649.7	18,503.4	+30.3%
Ferrous Metals	2,009.4	2,515.3	3,015.1	2,973.4	3,176.0	3,845.0	4,181.5	4,616.3	3,752.7	3,591.2	4,141.0	+106.1%
Timber	638.4	728.1	1,097.8	1,415.8	1,916.0	2,578.4	2,925.0	2,758.9	2,716.2	3,029.2	3,140.2	+391.9%
Construction Materials	7,882.3	8,348.0	9,516.2	9,197.3	9,450.1	10,638.2	9,263.1	9,846.2	11,030.7	11,096.8	10,661.0	+35.3%
Cement	3,423.1	3,393.5	4,142.2	4,179.2	4,348.9	5,783.1	6,499.5	5,573.0	5,590.4	7,091.3	4,247.3	+24.1%
Grain Crops	2,929.7	1,738.6	2,249.0	1,985.3	2,172.7	2,630.0	3,101.1	3,225.6	2,631.5	2,651.2	3,100.6	+5.8%
Fertilizer	3,684.3	3,438.9	4,551.4	3,903.2	3,925.7	3,962.2	4,675.1	4,942.2	4,684.5	5,281.1	4,633.3	+25.8%
Cotton	1,311.6	1,257.2	1,382.8	1,647.6	1,581.5	1,487.4	1,210.2	1,111.5	1,040.4	626.2	849.2	–35.3%
Ore	3,987.9	4,300.7	3,045.0	2,894.4	3,200.2	3,684.8	3,991.6	3,499.6	4,492.6	5,176.4	4,932.2	+23.7%
Other	8,411.6	9,741.8	8,354.5	9,502.6	10,315.6	13,814.9	20,751.8	20,168.8	20,497.2	21,833.9	24,499.5	+191.3%
Freight Turnover *(million ton-km)*												
Total	**18,420.8**	**18,885.4**	**17,845.3**	**17,901.5**	**19,562.3**	**21,814.0**	**23,473.8**	**24,046.8**	**22,340.8**	**22,482.0**	**22,686.2**	**+23.2%**
Coal	375.5	299.2	254.0	310.6	367.1	399.3	612.6	484.2	420.1	462.0	512.3	+36.4%
Crude Oil	6,199.7	6,531.2	5,876.3	5,441.6	5,673.3	5,834.4	5,602.7	5,947.9	5,492.9	5,896.4	6,447.3	+4.0%
Ferrous Metals	774.6	1,125.8	1,139.8	1,138.7	1,246.4	1,444.0	1,577.8	1,889.9	1,206.4	1,220.6	1,435.9	+85.4%
Timber	152.3	231.5	327.8	398.1	576.8	830.9	984.7	992.9	1,045.6	1,007.2	1,012.0	+564.6%
Construction Materials	1,708.4	2,002.4	2,089.0	2,004.8	2,081.7	2,571.0	2,269.8	2,399.9	2,610.2	3,132.2	2,487.4	+45.6%
Cement	870.1	843.3	956.8	1,001.7	1,179.5	1,276.5	1,398.2	1,258.3	1,152.8	1,181.2	1,158.8	+33.2%
Grain Crops	1,271.7	524.3	529.9	493.0	475.5	688.8	1,292.7	1,336.5	783.6	696.3	858.6	–32.5%
Fertilizer	1,343.9	1,308.7	1,403.2	1,187.0	1,556.8	1,644.4	1,622.0	1,660.9	1,592.6	1,614.5	1,573.3	+17.1%
Cotton	676.7	694.7	673.2	767.0	757.7	703.0	558.6	603.9	578.6	304.9	562.7	–16.8%
Ore	1,157.6	1,172.2	915.0	945.0	970.7	1,097.4	1,367.6	1,088.9	1,328.8	1,287.9	817.6	–29.4%
Other	3,890.4	4,152.2	3,680.2	4,214.0	4,676.7	5,324.4	6,187.2	6,383.6	6,129.2	5,678.7	5,820.2	+49.6%

(Source: UTY)



(Source: UTY)

[Fig. 2.4-12] Railway Freight Traffic Volume and Turnover by Commodity

2) Passenger Transport

a) Passenger Traffic Volume and Turnover by Train

The railway passenger traffic volume and turnover by train is shown in [Table 2.4-20] and [Fig. 2.4-13], and the passenger traffic distribution by train in 2012 is shown in [Fig. 2.4-14].

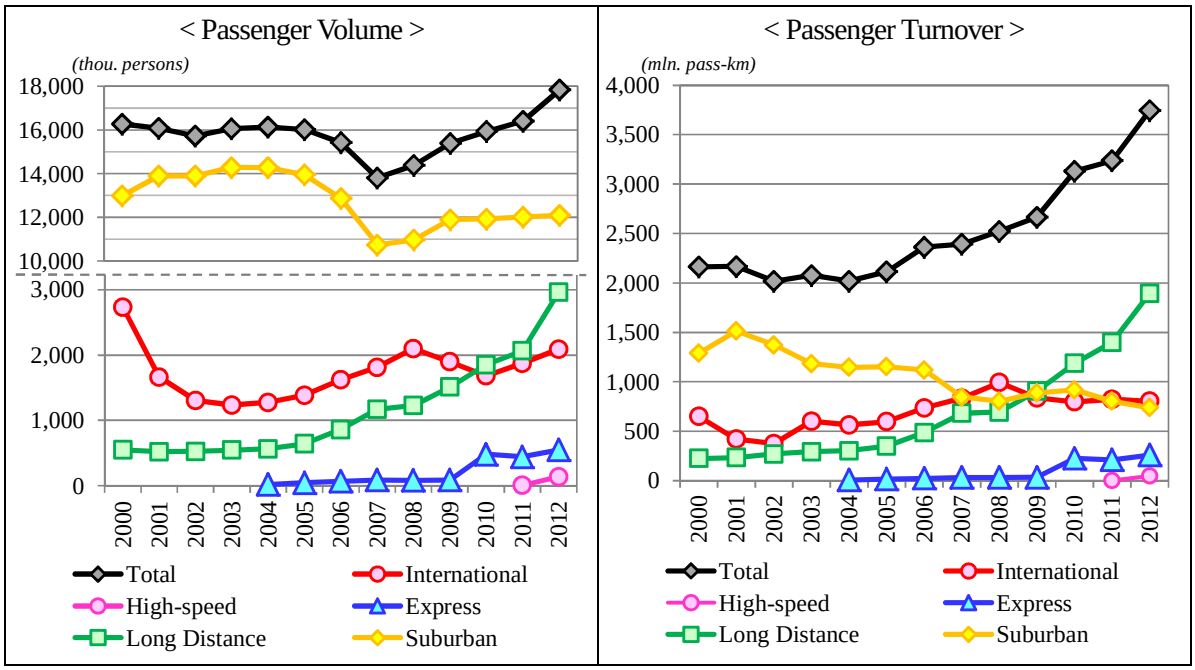
The total passenger volume decreased in 2006 and 2007 compared with the year before, but it has been increasing after 2008. The total volume in 2012 increased about 10% compared with the year 2000. The volume of suburban trains decreased in 2006 and 2007 compared with the year before along with the total volume, and has remained almost constant after 2008. The volume of long distance trains has increased after 2004, and in 2012 it increased over 5 times compared with the year 2000. It hasn't been long since the operation of express and high-speed trains began, but the volume of express and high-speed trains is increasing. Of the share of passenger volume in 2012, the share of suburban trains (68%) was the highest, followed by long distance trains (17%), international trains (12%) and express and high-speed trains (4%).

Total passenger turnover changed little until 2005, but has been increasing from 2006. The total turnover in 2012 increased about 73% compared with the year 2000. The turnover of suburban trains has decreased from 2001. On the other hand, the turnover of long distance trains has increased from 2000 and was already higher than the turnover of suburban trains in 2009. The turnover of long distance and international trains in 2012 increased about 8.5 times and 24% respectively compared with the year 2000, but the turnover of suburban trains decreased about 43% compared with the year 2000. As for the share of passenger turnover in 2012, long distance trains (51%) held the highest share, followed by international trains (21%), suburban trains (20%) and express and high-speed trains (8%).

[Table 2.4-20] Railway Passenger Traffic Volume and Turnover by Train

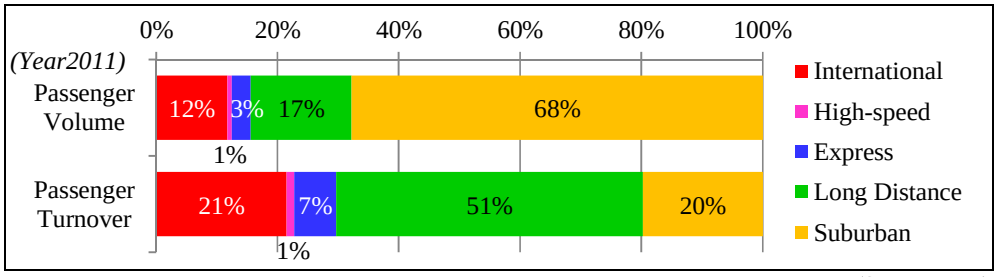
	2000	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2012/2000*
Passenger Volume *(thousand persons)*														
Total	**16,270.3**	**16,080.5**	**15,720.0**	**16,061.0**	**16,132.0**	**16,015.9**	**15,419.6**	**13,804.2**	**14,376.5**	**15,388.1**	**15,932.9**	**16,400.5**	**17,828.1**	**+9.6%**
International Trains	2,732.7	1,663.1	1,305.0	1,235.1	1,274.0	1,384.0	1,621.9	1,811.9	2,098.8	1,898.3	1,683.3	1,873.8	2,090.8	+28.8%
High-speed Train (Afrosiyob)												6.4	136.1	-
Express Train					20.0	43.9	67.9	86.3	82.0	85.6	480.6	442.0	549.5	-
Local Trains (Long Distance)	549.3	520.9	525.0	544.6	565.0	641.0	859.7	1,170.5	1,228.5	1,510.8	1,852.3	2,065.3	2,963.6	+443.9%
Local Trains (Suburban)	12,988.3	13,896.5	13,890.0	14,281.3	14,273.0	13,947.0	12,870.1	10,735.5	10,967.2	11,893.4	11,916.7	12,012.9	12,088.2	–13.9%
Passenger Turnover *(million pass-km)*														
Total	**2,163.0**	**2,166.7**	**2,018.0**	**2,077.1**	**2,018.9**	**2,114.0**	**2,362.7**	**2,393.6**	**2,523.0**	**2,665.5**	**3,130.8**	**3,236.9**	**3,743.9**	**+73.1%**
International Trains	650.0	419.1	375.0	601.0	563.0	597.0	735.9	834.6	993.4	837.9	798.0	823.2	804.1	+66.0%
High-speed Train (Afrosiyob)												2.2	46.7	-
Express Train					6.9	15.0	23.3	32.0	31.8	33.5	226.0	209.4	259.5	-
Local Trains (Long Distance)	223.9	233.6	270.0	292.5	302.0	349.0	484.4	681.3	694.6	906.2	1,187.8	1,398.5	1,893.8	+725.2%
Local Trains (Suburban)	1,289.1	1,514.1	1,373.0	1,183.6	1,147.0	1,153.0	1,119.1	845.7	803.2	887.9	919.0	803.6	739.8	–49.1%

(Source: UTY)



(Source: UTY)

[Fig. 2.4-13] Railway Passenger Traffic Volume and Turnover by Train



(Source: UTY)

[Fig. 2.4-14] Railway Passenger Traffic Distribution by Train in 2012

b) Passenger Volume of Main Stations

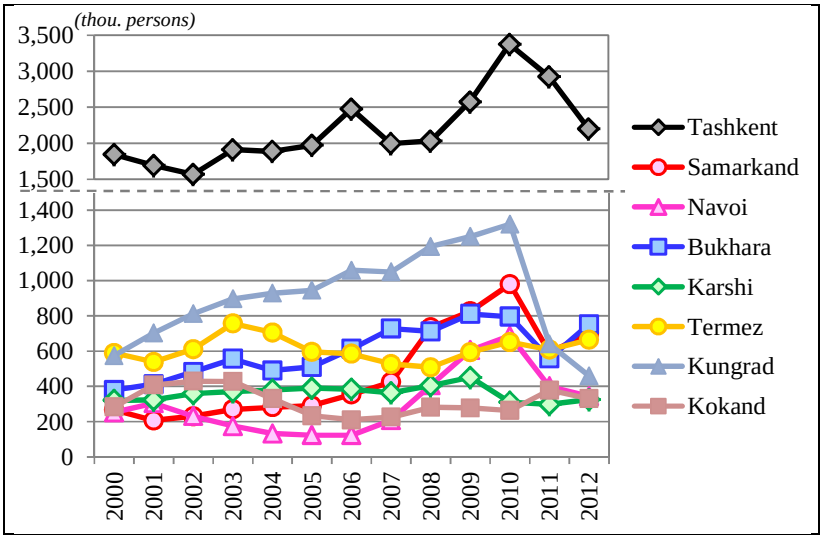
The railway passenger volume of main stations is shown in [Table 2.4-21] and [Fig. 2.4-15].

As for the passenger volume of main stations in 2012, Tashkent Station (2,199 thousand persons) had the largest number of passengers, followed by Bukhara Station (753 thousand persons), Samarkand Station (700 thousand persons), Termez Station (664 thousand persons), Navoi Station (343 thousand persons), etc. In recent years, there were many stations whose number of passengers decreased in 2011 and 2012 compared with the year before. The reason for this is because the suburban trains to the Tashkent, Kungrad, Samarkand, Karshi and Urgench regions were cancelled in order to decrease fuel costs.

[Table 2.4-21] Railway Passenger Volume of Main Stations (Unit: thou. Persons)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2012/2000
Tashkent	1,843.6	1,691.3	1,568.6	1,910.2	1,887.6	1,970.6	2,475.0	1,994.3	2,030.3	2,575.6	3,374.6	2,926.2	2,198.5	+19.3%
Gulistan	225.3	300.8	355.9	338.5	449.3	373.5	160.3	160.1	149.4	130.7	95.9	148.7	336.3	+49.2%
Samarkand	265.6	205.8	229.9	269.1	281.5	290.7	353.4	424.3	735.5	826.3	980.3	593.1	699.9	+163.5%
Navoi	252.0	303.6	230.3	174.1	132.0	123.0	123.0	207.9	406.4	605.3	686.7	399.1	343.0	+36.1%
Bukhara	378.2	411.6	480.7	555.6	489.2	510.0	613.6	728.4	711.9	810.5	795.3	557.7	752.6	+99.0%
Karshi	320.0	322.6	358.8	369.7	379.3	390.3	384.0	364.2	403.6	450.6	310.2	297.6	324.3	+1.3%
Termez	589.0	538.6	610.7	757.0	705.7	595.9	584.7	526.3	507.8	594.1	651.1	608.4	663.8	+12.7%
Nukus	120.3	144.4	150.6	140.7	167.1	190.4	191.3	180.3	172.4	202.6	109.6	120.0	104.5	−13.2%
Kungrad	573.7	702.6	812.6	897.0	928.7	945.7	1,059.7	1,050.5	1,194.1	1,250.9	1,320.7	640.7	459.0	−20.0%
Kokand	282.6	408.0	429.3	427.5	330.5	233.0	209.2	225.5	281.1	277.3	262.5	377.8	330.4	+16.9%
Namangan	55.9	27.2	1.9	3.4	10.1	58.2	103.5	71.7	103.5	78.8	71.3	78.1	112.0	+100.3%
Andijan	102.2	33.3	32.3	29.1	86.7	93.5	57.0	76.8	103.7	94.8	57.1	91.4	98.6	+96.5%

(Source: UTY)



(Source: UTY)

[Fig. 2.4-15] Railway Passenger Volume of Main Stations

2.4.2. Railway Sector Development Plans and Position of Railway Electrification Plans

(1) Resolution of the President of Uzbekistan No. PP-1446

From the Resolution of the President of the Republic of Uzbekistan No. PP-1446 dated 21 December 2010, On Accelerating the Development of Infrastructure, Transport and Communication Construction in 2011-2015, which is discussed in subsection "2.3.3. Transport Sector Development Plan," the total investments of the Resolution by field in the railway sector is shown in [Table 2.4-22], and the main projects and target parameters by field in the railway sector are shown in [Table 2.4-23].

Of the 10 points picked up as "the main priorities of development" in this Resolution of the President, the matter most closely related to the railway sector is "Accelerating the development and modernization of rail transport." To achive this priority, following the reconstruction of railways and the construction of facilities and commissioning for the operation of a high-speed railway line on the Tashkent–Samarkand section, electrifying the railway sections to the cities of Bukhara and Karshi is mentioned as a third measure. And in the breakdown of investments from 2011 to 2015, the investment in railway electrification projects is about 39% of the total investment and has the highest share. Based on this, the priority of railway electrification is considered to be comparatively high in the railway sector.

Specifically, the 3 railway electrification projects of Marakand–Karshi, Karshi–Termez and Marakand–Bukhara are mentioned in this Resolution of the President in [Table 2.4-22]. Of these 3 projects, the Marakand–Karshi and Karshi–Termez railway electrification projects are on-going from 2012 and supported by ADB and JICA respectively.

< Main Development Priorities>

- **Accelerating the development and modernization of rail transport**, carrying out reconstruction of railways, construction of facilities and commissioning for the operation of a high-speed railway line on the Tashkent-Samarkand section, electrifying the railway sections to the cities of Bukhara and Karshi, renovation of rolling stock with modern highly efficient locomotives, cargo and passenger carriages.

[Table 2.4-22] Total Investments of the Resolution of the President by Field in the Railway Sector

(Unit: mln. US$)

Field (Executing Agency)	Project Cost	Invest-ments in 2011-2015	Including by source of financing:				Foreign Partner/ Creditor
			Own Funds	FRDU	Foreign Invest-ments and Credits	State Budget or Funds	
Total of Investments	**2,146.6**	**1,594.1** (100.0%)	**1,067.9** (67.0%)	**84.5** (5.3%)	**441.7** (27.7%)	**0.0** (0.0%)	-
(UTY) Rehabilitation and Modernization of Railway Infrastructure	677.7	464.3 (29.1%)	464.3	0.0	0.0	0.0	-
(UTY) Electrification of Railway Lines	961.3	623.2 (39.1%)	248.4	0.0	374.8	0.0	ADB, JICA
(UTY) Rehabilitation and Modernization of Rolling Stock and Repair Bases	267.5	266.5 (16.7%)	174.9	24.7	66.9	0.0	PRC
(Economic Companies) Rehabilitation and Moder-nization of Approach Lines and Rolling Stock	240.1	240.1 (15.1%)	180.3	59.8	0.0	0.0	-

(Source: Resolution of the President of the Republic of Uzbekistan No. PP-1446)

[Table 2.4-23] Main Projects and Target Parameters by Field in the Railway Sector

Field	Main Projects	Target Parameters	Implementation Period	Partner/ Creditor
(UTY) Rehabilitation and Modernization of Railway Infrastructure				
	Rehabilitation of the Railway Track including the Replacement of Turnouts and Sleepers	1,030 km	2011-2015	
	Construction of Yangiyer-Djizzak Double-track Electrified Line and Yangiyer-Farkhad Single-track Electrified Line	150 km	2009-2011	
	Organization of High-Speed Passenger Train Connection on the Tashkent-Samarkand Section	344 km	2010-2012	
	Completion of the Construction of Objects of Infrastructure of Navoi-Uchkuduk-Misken-Nukus	721 km	2009-2012	
	Development of the Automatization of the Hump in Chukursay Freight Station	5,000 wagons turnover/year	2009-2012	
(UTY) Electrification of Railway Lines				
	Electrification of Marakand-Karshi Section	140 km	2011-2014	ADB
	Electrification of Marakand-Bukhara Section	250 km	2012-2016	ADB
	Electrification of Karshi-Termez Section	325 km	2012-2018	JICA
(UTY) Rehabilitation and Modernization of Rolling Stock and Repair Bases				
	Procurement of High-Speed Passenger Electric Trains	2 units	2010-2011	FRDU
	Procurement of Locomotives	28 units	2011-2015	PRC
	Rehabilitation and Modernization of Locomotives	259 units	2012-2015	
	Construction of Freight Wagons	2,550 units	2011-2015	
	Rehabilitation of Freight Wagons with the Extension of Service Life and Modernization	7,110 units	2011-2015	
	Construction of Passenger Coaches	115 units	2011-2015	
	Rehabilitation and Modernization of Passenger Coaches	78 units	2012-2015	
	Rehabilitation and Upgrading of Emergency-rehabilitation Equipment	8 units	2012-2015	
	Procurement of Equipment and Technology for the Branches of the Company	-	2011-2015	
(Economic Companies) Rehabilitation and Modernization of Approach Lines and Rolling Stock				
	Rehabilitation and Modernization of Approach Lines	267.3 km	2011-2015	FRDU
	Procurement of Locomotives and Wagons	Loco: 39 units Wagon: 385 units		
	Rehabilitation and Modernization of Locomotives and Wagons	Loco: 157 units Wagon: 1,346 units		
	Procurement of Freight Handling Equipment	50 units		

(Source: Resolution of the President of the Republic of Uzbekistan No. PP-1446)

(2) UTY Business Plan 2013

UTY's investments for the year 2013 included in the UTY Business Plan 2013 are shown in [Table 2.4-24], and the main projects and target parameters of UTY investments are shown in [Table

2.4-25].

This investment plan includes the implementation of the Resolution of the President of the Republic of Uzbekistan No. PP-1855 dated 21 November 2012, "On the investment programme of the Republic of Uzbekistan for the year 2013." The total investments will amount to 326.74 million US$. The investment in new construction projects, rehabilitation and upgrading projects and other projects will be 69.62 million US$ (21.3%), 146.58 million US$ (45.2%) and 109.54 million US$ (33.5%), respectively. Rehabilitation and upgrading projects will therefore receive the largest investments. The financial resources which consist of UTY's own funds, foreign investments and FRDU will amount to 284.12 million US$ (87.0%), 32.62 million US$ (10.0%) and 10.00 million US$ (3.0%), respectively. UTY's own funds will in other words cover most of the total investments.

Specifically, the following 4 projects have been designated top priority projects for 2013, and railway track rehabilitation projects as well as rolling stock rehabilitation and upgrading projects have also been positioned as important projects.

< Top Priority Projects for the Year 2013 >

- Construction of Angren–Pap New Electrified Railway Line;
- Electrification of Marokand–Karshi Railway Section and Karshi–Termez Railway Section;
- Development of Rolling Stock Rehabilitation and Reconstruction Facilities;
- Construction of Yangiyer–Djizak Double-track Electrified Railway Section and Organization of High-Speed Passenger Train Connection on the Tashkent–Samarkand Railway Section.

Regarding the railway electrification projects, the railway electrification projects of Marokand–Karshi and Karshi–Termez, which are designated top priority projects for 2013 as shown above, are specifically mentioned as new construction projects. This shows that railway electrification projects have high priority in the investment plan. But the railway electrification project of the Marakand–Bukhara section which is mentioned in the Resolution of the President of the Republic of Uzbekistan No. PP-1446, is not mentioned in the UTY Investment Plan for 2013. On the other hand, the construction project of the Angren-Pap new electrified railway line, which is not mentioned in the Resolution of the President of the Republic of Uzbekistan No. PP-1446, is mentioned in the UTY Investment Plan for 2013.

[Table 2.4-24] UTY Investment Plan for the Year 2013

(Unit: mln. US$)

Classification	Project Cost	Forecasted Implementation of Funds for 2013			
		Total	UTY's Own Funds	FRDU	Foreign Investments
Total	**4,300.19**	**326.74** (100.0%)	**284.12** (87.0%)	**10.00** (3.1%)	**32.62** (10.0%)
New Construction	2,837.46	69.62 (21.3%)	53.14	0.00	16.48
Rehabilitation and Upgrading	973.33	146.58 (45.2%)	137.58	10.0	0.0
Other	489.40	109.54 (33.5%)	93.40	0.0	16.14

(Source: UTY Business Plan 2013)

[Table 2.4-25] Main Projects and Target Parameters of UTY Investment Plan for the Year 2013

No.	Main Projects	Target Parameters		Implementation Period
		Total	In 2013	
New Construction				
1	Construction of Yangier-Djizak Double-track Electrified Line	187 km	-	Stage 1: 2009-2013 Stage 2: 2015-2017
2	Electrification of Marokand-Karshi Section	140 km	-	2011-2016
3	Electrification of Karshi-Termez Section	325 km	-	2012-2017
4	Construction of Angren-Pap New Electrified Line	129 km	-	2013-2017
Rehabilitation and Upgrading				
5	Rehabilitation of Railway Track	1,340 km	240 km	2011-2015
6	Organization of the High-Speed Passenger Train Connection of Tashkent-Samarkand Section	344 km	-	Stage 1: 2009-2011 Stage 2&3: 2012-2015
7	Development of Rolling Stock Rehabilitation and Upgrading Facilities	Manufacture: 1,200 units Rehabilitation: 1,500 units		2009-2013
8	Rehabilitation and Upgrading of Locomotives	259 units	54 units	2012-2015
9	Rehabilitation and Upgrading of Freight Wagons	7,110 units	1,485 units	2011-2015
10	Rehabilitation and Upgrading of Passenger Coaches	78 units	2 units	2011-2013
11	Rehabilitation and Upgrading of Emergency-rehabilitation Equipment	8 units	2 units	2012-2015
Other				
12	Construction of Freight Wagons	2,550 units	550 units	2011-2015
13	Renewal of Passenger Coaches	115 units	30 units	2011-2015
14	Procurement of Locomotives	28 units	7 units	2009-2015
15	Procurement of New Eequipment and Machinery for Company's Departments	Renewal of Company's Technical Facilities		2011-2015

(Source: UTY Business Plan 2013)

2.4.3. Railway Sector Issues

(1) Decrepit facilities

1) Signaling and Communication Facilities

The signaling and communication facilities on non-electrified sections have been operated for more than 45 years over the service life. Meanwhile, the parts of facilities cannot be secured to stabilize future supply.

UTY has a system modernization plan for 2013 and after, which includes the schedule to establish a fiber optic communication network on the Navoi–Uchkuduk–Misken–Nukus section. In order to

provide stable quality of communication network, it is necessary to renew the facilities systematically on the other non-electrified sections.

2) Power Supply System

The necessary power for the power facilities on non-electrified sections has been fed through the supply of the power company "Uzbekenergo." Considering that the power supply facilities will become too old for use as with the signaling and communication facilities, it is necessary to renew the facilities systematically.

3) Power Supply Control System

The power control center has conducted the control work using both remote supervisory and control system called Lisno-4 manufactured in Russia in 1982 and SCADA (made in Latvia) which was introduced at the time of electrification between Tukimachi–Angren. Moreover, adjacent electrified sections have shared necessary common information mainly by telephone.

UTY has informed the Survey Team that it has a renewal plan for the power control system, but the Survey Team has not received any detailed information. Considering the increase in freight traffic and the number of high-speed trains in the future, it will be necessary to quickly renew the systems to increase the number of trains.

4) Traffic Control System

At present, the train control center in UTY headquarters has collectively controlled train operation in the train operation sections over the country. The traffic control center has divided all lines to be controlled over the country into 13 sections. The principal missions are I: securing regular train service, II: transport control and III: import and export control (customs).

At present, as a result of the renewal of 10 years ago, it is apparent that the operation of the existing traffic control system has been much more stable than the existing power control system. However, the traffic control system has adopted a decentralized structure which has been divided into individual in-charge sections. From the viewpoint of mutually sharing the necessary common information, considering increasing freight traffic and increasing the number of high-speed trains in the future, the existing traffic control system will need to take some measures to increase the number of trains.

(2) Technical Transfer and Training

During the Soviet era, the engineers' education in Uzbekistan had been conducted by experts dispatched from Moscow. After independence from the Soviet Union, Tashkent Railroad University, technical colleges, training centers and so on in each province have been conducting the training instead. At the time of the electrification project of the Tukimachi–Angren section, UTY conducted training for about 90 employees two years or so before commissioning the project. Accordingly, as for UTY's employees in charge of maintenance control and repairs, training programs have been utilized and it seems that the programs have worked out for technical transfer and training.

On the other hand, as regards both the works for construction of double-track electrified line and improvement of alignment on Yangiyer–Djizzak section which UTY has independently carried out with Russian technology and materials, UTY has had a good experience. But on the project for railway electrification of the Tukimachi–Angren section which was completed in 2010, Chinese contractors carried out the works for the construction of overhead catenary facilities and substations using the Chinese technology and materials. Therefore, it seems that any important know-how of construction based on actual experience has not been left to Uzbekistan constructors.

From the above, it is necessary to continuously implement technical transfer and training about maintenance works and further improve the technical capabilities for construction works. In order to improve the technical capacity of construction works, it would be effective for Uzbekistan to request railway electrification experts from a country with advanced experience and construction technology to be dispatched to Uzbekistan, railway engineers in Uzbekistan to implement the construction works of railway electrification under guidance from the experts, and for the local engineers to undergo training in the experts' country.

(3) Development of International Railway Network for Strengthening the Competitiveness

Uzbekistan has a big restriction on the industrial development because Uzbekistan is a double landlocked country which is surrounded by landlocked countries. But freight traffic demand will increase together with rapid economic growth and the support for reconstruction of Afghanistan in recent years. Railways play an important role of medium and long distance transport including export, import and transit transport on the freight transport in Uzbekistan. So railways are needed to improve transport capacity for the increase in freight traffic demand.

However, insufficiently so far, the double-tracking ratio and the electrification ratio are still only about 15%, and some sections are using their full line capacity. If the infrastructure of those sections will be improved for the increase of traffic demand in the future, those sections will become a bottleneck on Uzbekistan's railway network.

Moreover, the transport route between Uzbekistan and China is inefficient in terms of travel time and transport costs. The route is long because it runs via Kazakhstan and goes around. And then it is necessary to construct the new railway line in Uzbekistan for the development of an efficient and effective international railway freight network.

From the above, it is necessary to implement the following measures for accelerating the development of the international railway network and strengthening competitiveness.

- Improvement and Modernization of Existing Lines
  (Enhancement of Transport Capacity by Electrification and Double-tracking)
- Construction of New Railway Lines for Solving the Missing Link

2.5. Information of ODA Project in the Railway Sector

2.5.1. Policy/Administration/Laws & Regulations/Budget

(1) Policy

The results of interviews with UTY regarding the transport sector in the national development plan in Uzbekistan are presented below. Although the Welfare Improvement Strategy (WIS: 2012-2015) which is considered a national development plan was not available since it had not yet been approved by the government, the Survey Team conducted interviews and confirmed the maion points of contents to be included in the WIS as follows.

< Information Summary confirmed with UTY >

In order to promote sustainable social and economic development in Uzbekistan, the development of an accessible and sustainable transportation system is necessary. It should provide transportation integrity, self-sufficiency, security and defense capabilities, social and economic development and create an environment for meeting transportation needs. Based on this, the following specific tasks need to be implemented:

1) Reconstruction, upgrading and modernization of railway infrastructure;
2) Enhancement of rolling stock rehabilitation and construction production capabilities aimed at meeting the rolling stock needs of industry;
3) Arrangement of measures to increase the travel speed and service quality of passenger railway transportation;
4) Ensuring transportation quality and safety to satisfy the needs of the population, economy and international standards based on technological and technical development of the railway transportation system;
5) Promotion of investment in the railway sector;
6) Development of a program of measures aimed at increasing train operation safety;
7) Implementation of contemporary mechanisms of transportation arrangement.

Furthermore, Uzbekistan is promoting the modernization of locomotives, freight wagons and passenger coaches on the basis of the related Presidential Decree No. PP-1442, “On industry development priorities in the Republic of Uzbekistan for the period of 2011-2015.” Uzbekistan is also promoting the operation of a high-speed railway line on the Tashkent–Samarkand section, railway electrification of the sections leading to Bukhara and Karshi, and renovation of rolling stock through the procurement of modern highly efficient locomotives, freight wagons and passenger carriages based on Presidential Decree No. PP-1446, “On Accelerating the Development of Infrastructure, Transport and Communication Construction in 2011-2015.”

(2) Administration

UTY was established by Presidential Decree No. PD-982 and its objective is to ensure sustainable and safe operation of the railways in Uzbekistan. Although the supervision of railway transportation safety remains a task of the Uzbekistan Government, UTY is the sole organization responsible for the overall management and operation of railway transportation. Since UTY is also responsible for implementing the policy discussed in subsection (1) above, UTY develops a specific business plan every year in order to implement this policy. UTY's major roles as stipulated in PD-982 and its Business Plan are presented in the sections below. UTY was later re-organized as a Joint Stock Company with 100% of the stock certificates belonging to the Government.

< UTY's major roles as stipulated in Presidential Decree No. PD-982 >

1) To study the freight and passenger railway transportation market conditions, to predict their development and location by taking into account the structural reconstruction of the Republic of Uzbekistan's national economy;
2) To ensure the competitiveness of railway transportation in the transportation services market based on the established multitask sector of services supplied to consumers by railway transportation companies;
3) To develop and implement a package of measures aimed at enhancing operation sustainability and increasing railway network traffic capacity;
4) To organise research as well as technical and investment policy, elaborate and implement new techniques and technologies for comprehensive progress in railway transportation;
5) To have, in established order, a fare policy for freight, passenger, mail and luggage transportation, which takes into account cost reductions and quality increases of services furnished to clients.

< UTY's major roles as mentioned in UTY's Business Plan >

1) Establishment of a united railway transport network;
2) Continued electrification of main railway sections;
3) Railway transport infrastructure development, including railroad modernization and introduction of an optical fiber telecommunication system;
4) Development of an own rolling stock repair base;
5) Rehabilitation and renewal of rolling stock;
6) Search for alternative transport corridors to help access the world market and increase the export potential of the Republic of Uzbekistan.

In terms of governmental railway policy, based on interviews with UTY, UTY draws up a draft policy and submits it to a working group established by the government. After the working group has completed its review and check, the policy is approved by the government.

(3) Legal system

As mentioned above, the railways in Uzbekistan are operated and managed by UTY. The legal base of the establishment, privatization, business plan, etc. related to UTY is as follows.

1) Establishment

- Presidential Decree No. PD-982 dated November 1994, "On establishment of State joint-stock railway company Uzbekistan Temir Yollari (UTY)" (UTY's major roles are discussed in subsection (2) "Administration.")
- Apr, 1999 Railway Transport Law No.766 dated April 1999

  The role of railway transport state administration is as follows:

  · To realise integrated public policy in arranging and performing railway transportation;
  · To approve normative acts related to railway transport and transportation terms and conditions;
  · To promote the formation and development of a transportation services market;
  · To monitor the development and operation of railway transport including approaching railway lines belonging to different public agencies;
  · To implement a policy on railway transport fares;
  · To implement international cooperation in the railway transportation sector;
  · To carry other responsibilities in accordance with the legislation.

2) Privatization and Safety

- Presidential Decree No. PD-2815 dated March 2001, "On Measures for De-monopolisation and Corporization of Railway Transportation"

  Main articles are de-monopolisation based on economic reform and privatization such as transformation of UTY to a joint stock company with 100% of the stock owned by the Government, establishment of enterprises and organizations for freight and passenger transportation and transportation forwarding, establishment of an independent State Inspectorate of the Republic of Uzbekistan for the supervision over railway transportation safety, etc.

3) Business Plan

- Presidential Decree No. PD-1442 dated December 2010, "On industry development priorities in the Republic of Uzbekistan for the period of 2011-2015";
- Presidential Decree No. PD-1446 dated December 2010, "On Accelerating the Development of Infrastructure, Transport and Communication Construction in 2011-2015";
- Presidential Decree No. PD-1623 dated December 2011, "On program of highlight measures on manufacture expansion and development of the new types of competitive products release";
- Presidential Decree No. PD-1590 dated December 2011, "On measures for further enrichment of local manufacturing content of the finished products, component parts and materials on the base on industry cooperation for 2011-2013".

(4) Budget

UTY's budget is presented below; it consists of a routine budget and an investment budget. Foreign investment such as ODA financing is included in the investment budget.

1) UTY Routine Budget

The UTY Routine Budget for 2012 and 2013 is shown in [Table 2.5-1]. Though the status of the 2012 fiscal year (FY) is still listed as 'expected' because it has not yet been finalized, the profit for 2012 was 268.94 billion Uzbek sums which equals 1.34 billion dollars (exchange rate: 1 dollar = 2,000 sums). The total cost of main activities was 200.5 billion Uzbek sums which is approximately 1 billion dollars, and the net income was 650.854 billion Uzbek sums which equals approximately 330 million dollars. The net income is utilized as part of the Investment Budget.

[Table 2.5-1] UTY Routine Budget for 2012 (expected) and 2013 (forecasted)

Index	**Unit**	**Year**	
		Expected in 2012	**Forecasted for 2013**
Profit (total)	mln. Uzbek sums	2,689,400	3,250,000
Incl. from transportation	mln. Uzbek sums	2,218,800	2,962,000
From additional activities	mln. Uzbek sums	470,600	558,000
Costs of main activities			
Operation costs	mln. Uzbek sums	1,344,807	1,611,107
Costs in the period	mln. Uzbek sums	342,201	453,502
Deterioration	mln. Uzbek sums	253,992	279,391
Social costs	mln. Uzbek sums	74,000	90,000
Total	mln. Uzbek sums	2,005,000	2,434,000
Financial activity outcome	mln. Uzbek sums	-10,000	-30,000
Income before taxes paid	mln. Uzbek sums	674,400	786,000
Income tax	mln. Uzbek sums	23,546	57,137
Other income taxes and charges	mln. Uzbek sums		
Net income	mln. Uzbek sums	650,854	728,863

Note: The numbers shown above are the same as in the UTY Business Plan 2013 although the calculation of addition in the index of each cost from main activities does not equal the Total.

(Source: UTY Business Plan 2013)

2) UTY Investment Budget

UTY's Investment Budget in 2013 is 326 million dollars and its own budget covers 280 million dollars of this amount. The Investment Budget is shown in detail in [Table 2.5-2].

[Table 2.5-2] UTY Investment Budget (Part 1)

(Unit: million US$)

Project Title	Capacity	Implementation Period	Total Project Costs	Expected remainder for January 01, 2013	Forecasted Implementation of Funds for 2013			
					Total	Own Funds	FRDU	Foreign Investment secured by Government
UTY					**326.74**	**284.12**	**10.0**	**32.62**
New Construction								
Marokand-Karshi railway section electrification	140 km	2011-2016	208.39	198.04	22.0	18.2		3.8
Yangier-Djizak electrified double-track railway line construction	187 km	I stage 2009-2013 II stage 2015-2017	320.74	176.72	11.88	11.88		
Karshi-Termez railway section electrification	325 km	2012-2017	388.33	375.53	32.74	20.06		12.68
Angren-Pap new electrified railway line construction	129 km	2013-2017	1920.0	1920.0	3.0	3.0		
Upgrade and Modernization								
Railway tracks rehabilitation	1,030 km	2011-2015	301.50	213.21	72.01			
Organisation of Tashkent-Samarkand railway line section high-speed connection	344 km	I stage 2010-2011 II–III stages 2012-2015	366.65	246.97	12.44	12.44		
Locomotive upgrade and rehabilitation	Locomotive 259 units	2011-2015	79.50	44.81	24.5	24.5		
Development of rolling stock rehabilitation and reconstruction facilities, arranging of wagon construction and reconstruction of foundry facilities at the Affiliated Enterprise “Foundry-Mechanical Factory”	Manufacture of 1200 units, Rehabilitation of 1500 units	2009-2013	120.18	12.3	12.3	2.3	10.0	
Rehabilitation, upgrade and reconstruction of wagons with extension of their operation period	Wagon 7,110 units	2011-2015	95.10	59.1	25.44	25.44		

(Source: Extracted from UTY Business Plan 2013 and Investment Program 2012)

[Table 2.5-3] UTY Investment Budget (Part 2)

(Unit: million US$)

Project Title	Capacity	Implementation Period	Total Project Costs	Expected remainder for January 01, 2013	Forecasted Implementation of Funds for 2013			
					Total	Own Funds	FRDU	Foreign Investments secured by Government
Upgrade and rehabilitation of coaches	Coaches 78 units	2011-2013	9.60	0.57	0.57	0.57		
Emergency-rehabilitation service rehabilitation with operation period extension	8 units	2012-2015	0.8	0.8	0.32	0.32		
Other								
Wagon construction	Wagon 2,550 units	2011-2015	273.10	209.33	59.2	59.2		
Renewal of coach fleet	Coaches 115 units	2011-2015	94.90	73.23	23.7	23.7		
Acquisition of new equipment and machinery for Company departments	Renewal of Company's Technical Facilities	2011-2015	26.50	20.84	1.5	1.5		
Locomotive acquisition	Locomotive 28 units	2009-2015	94.9	58.79	25.4	9.0		16.14

(Source: Extracted from UTY Business Plan 2013 and Investment Program 2012)

2.5.2. Policy and Role Sharing between Finance from Foreign Countries as ODA and Own Budget

The sources for UTY's Investment Budget consist of UTY's own budget, funds from FRDU and Foreign Investment including ODA. In accordance with interviews with UTY, UTY's own budget is the first resource when planning projects. When financing from the own budget is not available, funds from the FRDU is the second choice. Furthermore, when FRDU funds are also not available, foreign investment such as ODA is the next choice. Foreign Investment is expected to be used especially for projects which include procurement of equipment and machinery which is not domestically available.

In accordance with UTY's policy, UTY carries out construction work by itself as far as possible and Foreign Investment is utilized for the procurement of equipment and machinery because UTY can independently carry out basic construction work.

2.5.3. Supporting Trend of Other Donor Organizations

Projects financed by donors in last 10 years are shown in [Table 2.5-4]. The donors financing on-going projects (including projects under preparation) are JICA, ADB and China; these projects as well as the CAREC program are shown below. Kfw and EBRD are also former donors to the railway sector in Uzbekistan. The railway sector is at present not a target area of assistance for KfW and it is now focusing on the finance, health and vocational training sectors. EBRD has been stuck in a situation of inconformity with the Government of Uzbekistan regarding EBRD's assistance policy and its assistance has therefore been suspended since 2010.

[Table 2.5-4] Projects Financed by Donors in the Last 10 Years

Donor	Project	Duration	Amount (mln. US$)
ADB	Rehabilitation of Uzbekistan Railways Project	1999-2005	62.67
	Modernization of Uzbekistan Railways Project	2000-2006	70.00
	Marakand–Karshi Electrification Project	2011-2016	100.00
EBRD	Repowering Diesel Locomotive Park (Procurement of Locomotives)	2002-2004	40.00
	Modernization of Diesel Locomotive Park	2004-2010	53.90
EIBC	Procurement of 15 Passenger Train Locomotives	2009-2011	70.11
	Procurement of 11 Passenger Train Locomotives	2012-2014	44.39
	Procurement of 10 Passenger Train Locomotives (under preparation)	2014-2015	44.84
JICA	Tashguzar–Kumkurgan New Railway Construction Project	2005-2014	148.52
	Karshi–Termez Electrification Project	2012-2017	220.60
KfW	Tashkent–Angren Electrification Project	2007-2010	36.48
KFAED			20.89
OFID	Modernization of Uzbekistan Railways Project	2002-2006	5.00

Note: Underlined projects show the railway electrification projects of existing lines including the completed project.

(Source: The Survey team added necessary information to the ADB material)

(1) JICA

- Tashguzar–Kumkurgan New Railway Construction Project (Yen Loan) (2005–2014)
- Karshi–Termez Electrification Project (Yen Loan) (2012–2017)

- Project for Capacity Development on Upgrading Track Maintenance and Train Operation Skills on Tashguzar–Kumkurgan Railway Lines (Technical Cooperation attached to Yen Loan Project) (2011–2013)

(2) ADB

- Marakand–Karshi Electrification Project (Loan) (2011–2016)

(3) China

- Procurement of 11 Passenger Train Locomotives (Loan) (2012 – 2014)
- Procurement of 10 Passenger Train Locomotives 2nd Stage (Loan) (2014 – 2015) (Under preparation)

(4) CAREC Program

As mentioned at in subsection 2.3.3. (2) "Implementing CAREC 2020 (The Wuhan Action Plan)," apart from bilateral donors, a framework of regional development within mainly Central Asian nations (CAREC) has been established. Within this framework, 6 important transport corridors for regional development have been decided on in coordination with the participating countries. Since the regional development view is also important especially in the transport section, it is necessary to consider the relationship with the CAREC transport corridor and the CARC Program is therefore introduced in this chapter.

CAREC was originally a program initiated by ADB to encourage regional development in the Central Asian region. The program now has 10 participating nations and 6 cooperating multilateral assistance organizations. In order to promote the program, there is an institutional framework which includes both a policy level and an operational level. At the policy level, a Ministerial level conference is generally held once a year to decide on the overall strategy and policy. At the operational level, meetings at the senior official level are generally held twice a year to evaluate and study alternatives in terms of effective policy implementation from a regional point of view. The results of these meetings are then reported to the Ministerial level. Coordinating committees participate from all member countries and multilateral assistance organizations are established under the senior official level meetings specifically for each prioritized sector (transportation, energy, trade facilitation, trade policy, etc.) to study the sectoral development plan and to formulate new projects. Furthermore, working groups are also established under the coordination committees in order to implement and monitor projects.

Under the CAREC program, 6 major transport corridors have been decided on for regional development and to solve key issues in the transport sector, and the corridor routes are currently being developed by the respective member countries in coordination with CAREC. The corridor routes should improve access to at least 2 large Eurasian markets and they have been decided based on ① current traffic volume, ② economic and traffic growth prospects, ③ capacity to increase connectivity between economic and population centers, ④ potential to mitigate delays and other hindrances such as the number of cross-border points and gauge changes, and ⑤ economic and financial sustainability of infrastructure, management and technology improvement. Some of the 6 multilateral assistance organizations are providing financing to member countries. The member countries and multilateral assistance organizations are as follows:

Member Countries:

- Afghanistan	- Kazakhstan	- Pakistan (as of 2010)	- Uzbekistan
- Azerbaijan	- Kyrgyzstan	- Tajikistan	
- China	- Mongolia	- Turkmenistan (as of 2010)	

Multilateral Assistance Organizations:

- ADB	- IMF	- UNDP	- EBRD	- IDB	- WB

In addition to CAREC, UNESCAP and UNECE have also disclosed a transport network which passes through Central Asia. Since both UNESCAP and UNECE are coordinating with CAREC, their transport network is similar to the CAREC corridor. Because the Marakando–Bukhara Electrification project and the Angren–Pap new electrified railway line construction project in Uzbekistan are located alongside the UNESCAP and UNECE transport network as well as the CAREC corridor, these two projects are considered important for their contribution to the economic development in the region.

2.5.4. Trends and Interests of Japanese Companies and Their Foreign Competitors

(1) Trends and Interests of Japanese Companies

1) Past Records of Orders Received in Uzbekistan

Based on the results of our on-site interviews, we listed the major past records of orders received in Uzbekistan by Japanese companies in [Table 2.5-5].

At this moment, several Japanese companies have secured orders involved in railway projects in Uzbekistan, including one in the field of civil engineering (Shimizu Corporation), three for rolling stock (Marubeni Corporation, Toshiba Corporation, Hitachi Plant Technologies), two for rail track (both Marubeni Corporation), etc.

[Table 2.5-5] Japanese Companies' Track Record of Receiving Railway Project Orders in Uzbekistan

Name of Company	Name of Project	Field
Shimizu Corporation	Tashguzar–Kumkurgan New Railway Construction Project (JICA loan)	Construction (construction of 5 bridges)
Yokokawa Bridge Corp.		
Nippon Steel		
Mitsui & Co.		Signaling and communication equipment
Toshiba Corporation (A Chinese company is the main contractor)	Electrical Locomotive Procurement Project (The Export-Import Bank of China loan) (2013)	Rolling stock (devices)
Hitachi Plant Technologies	Railway Passenger Transport Improvement Project (JICA un-tied loan) (1998)	Depot (including equipment)
Marubeni Corporation	Railway Passenger Transport Improvement Project (JICA un-tied loan) (1998)	Rolling stock and depot (including equipment))
	Modernization of Uzbekistan Railways Project (OFID loan)	Track
	Railway Rehabilitation Project (Samarkand - Bukhara) (ABD loan) (2002)	Track
Nippon Steel	Railway Rehabilitation Project (Samarkand - Bukhara) (ABD loan) (2002)	Track

(Source: Compiled by the Survey Team based on interviews with stakeholders)

2) Trends and Interests of Japanese Companies

Here, we organized the trends and interests of Japanese companies regarding the railways of Uzbekistan, as we heard in interviews with Japanese companies.

a) Overall Trends

For Japanese companies, Uzbekistan is becoming an attractive country having abundant mineral resources (including rare metals such as molybdenum, tungsten, etc.), a population of about 30 million people, a potential for solar power with its fine weather, and natural gas production. Also, with good access to Russia, India, China, and the Middle East, and a location relatively close to Europe, the country has potential for becoming a geographical hub. These factors give Uzbekistan an advantage when Japanese companies consider investment destinations.

However, several issues exist with the country from the point of view of Japanese companies. One of these issues is the quality of labor. Confining the human resources in the railway field, UTY owns a training center (Design Institute) and has developed human resources to some degree. This has created a strong tendency for the country to conduct projects by using an affiliate of UTY to design or implement, and bringing a rigid aspect to the project implementation scheme.

One of the major issues in Uzbekistan is the foreign remittance. Conducting business in Uzbekistan has not been easy, because money transfer to/from overseas is difficult. Thus, it is currently very difficult to take the risk of EPC (including EPC in a railway project) in Uzbekistan. As the original issue, Uzbekistan is not rated highly in the world, and there is an environment that the entry of EPC business from overseas into Uzbekistan is oftentimes difficult to receive approval from

the management of headquarters, including Japanese companies. For the meantime, when thinking about business entry into Uzbekistan, business entry which does not require taking a risk (such as procurement of components/parts) will become the mainstream.

The following are the trends and interests of Japanese companies by each category regarding railway projects.

b) Rail

One of the past records of orders received by Japanese companies is the order for supplying rail received by Nippon Steel Corporation in 2002, for the ADB-funded project which includes rail procurement. This success was made as a result of the reasonable price setting and the technological specification which introduced highly-advanced rail, called HH (Head Hardened) rail.

The interest of Japanese companies regarding rail is relatively high. Japanese railway companies, performing a long-term administrative role, tend to appeal to life cycle costs as a specific selling point. Considering life cycle costs, rail produced by Japanese companies have a distinctive advantage. Another selling point for Uzbekistan is the ability to reduce costs, not just the cost of rail, but also the cost required for exchanging rail. Also, Japanese companies have past delivery records of rail for heavyweight cargo throughout the world, and some Japanese manufacturers have received praise for their products as the world's best in abrasion quality and resistance to damage. Thus, it is expected to increase the entries by Japanese companies, if a bidding system will be introduced where evaluation includes past delivery records in addition to the preliminary review.

Also, Japanese companies can make an appeal for the flatness of Japanese-made rails, if Uzbekistan has a vision of improving the railway speed. If UTY has an increasing need for the rehabilitation of rail as well as growing dissatisfaction with existing rail, such as the rate of breakdown, the introduction of Japanese-made rail can provide plenty of merits to Uzbekistan as well.

c) Rolling Stock

Regarding the procurement of rolling stock, a Japanese company had made a joint bid with a major American company, for the EBRD-funded project (including the procurement of diesel locomotives). A Russian company won the bid as a result. Because the evaluation of the life cycle cost was included in the bidding for this project, a joint venture of Japanese and American companies could seek the possibility for winning the bid.

The business entry by a Japanese manufacturer of rolling stock will be quite difficult, unless it has adopted STEP, or it takes certain measures to ensure the quality at the time of PQ and bidding, or to reduce the excessive price competition, etc.

d) Signaling

The level of interest of Japanese companies is currently not so high, in terms of the field of signaling business in Uzbekistan.

e) Electricity

As we found no indication of Japanese companies that actively conduct electricity-related business in Uzbekistan, the level of interest of Japanese companies is still uncertain as of yet.

In the field of electricity, there are cases where Japanese companies won the E&M package contracts (Electrical & Mechanical) outside Uzbekistan. There are also some past records of receiving orders with the package of substation only or the delivery of individual products.

Since there has not been enough accumulation of past records in the field of electricity in general, the level of interest of Japanese companies for Uzbekistan is not high. For this reason, it will be a realistic form of entry into Uzbekistan that a Japanese syndicate receives an E&M package contract and then partially subcontracts the works to an electric engineering company. In other words, it will be very difficult for an electric engineering company to conduct a project alone, even if it would be led by a trading company.

f) Civil Engineering

Because the works related to the civil engineering are basically conducted with Uzbekistani funds, there are not many cases where civil engineering contracts are packaged with some other field. Also, for the construction conducted with Uzbekistani funds, many civil engineering projects have been conducted by domestic companies, including UTY affiliated companies, with their abundant experience.

There is actually a record in the past that a Japanese company received an order of constructing a steel bridge for the yen-loan project with the STEP scheme. In that case, it could be assumed that Uzbekistan approved the use of the STEP scheme, because advanced techniques were required for the long spans of the superstructure. We consider that the level of interest of Japanese companies for Uzbekistan is high, especially for the development of tunnels and steel bridges which require relatively advanced technology.

g) Depot and Depot-related Equipment

Similar to the field of electricity, Japanese companies do not have much business experience in Uzbekistan in this field. Although there is some indication for the future that Japanese companies might be interested, we did not see any movement to enter the business at this moment.

h) Other fields

As described above, there is a difficult situation for Japanese companies to take risks in conducting business in Uzbekistan. For this reason, even though there may be some projects directly ordered by UTY, the entry by Japanese companies into railway-related projects in Uzbekistan will continue to be difficult in the meantime. In other words, entry by Japanese companies into railway projects in Uzbekistan will be mainly international bidding involved with loans funded by major donors for the time being.

(2) Domestic Companies

In order for Japanese companies to receive orders for railway projects in Uzbekistan in the future, situations of the domestic companies in Uzbekistan will be the primary interest. Thus, we organized the trends and interests of domestic Uzbekistan companies into categories regarding railway projects based on information we received during interviews with Japanese companies.

a) Rail

Most of the rail used in Uzbekistan is produced outside the country and the country is heavily dependent on imports. With regard to rail development, the Track Facilities Department which belongs to UTY, holds a share of about 93% of the rail development in Uzbekistan, while the remaining 7% are conducted by the domestic private companies.

b) Rolling Stock

As for passenger trains, OJSC Toshkent Passenger Coach Repair Factory, an affiliate of UTY, mainly carries out manufacturing and repairs. The company delivers rolling stock to some of the CIS countries as well. It also has experience with tying up with Japanese companies. As for freight trains, UE Uzzheldorremmash, an affiliate of UTY, mainly carries out manufacturing and repairs of locomotives and rolling stock. Under its umbrella, the company has two government-run companies (a casting company and a machinery company) which actually handle the manufacturing of freight vehicles and repair of locomotives. It also delivers rolling stock to some of the CIS countries.

Although the shares of the above two companies are not specified, domestic production of rolling stock is virtually limited to only these two companies.

c) Signaling

The operations related to signaling are conducted mainly by the Special Construction Mounting Train[1] company.

d) Electricity

In the field of domestic electricity, Power Supply Mounting Train No.1 (hereafter called EP1) holds the country's largest market share. The company is the only domestic company which has obtained the international certificate for electric works. Also, EP1 is responsible for the development of contact lines/transmission lines and substations (building only). Most of the company's sales consist of orders from UTY, and its annual sales in 2012 were UZS 75 billion (about JPY 3.5 billion). EP1 is capable of conducting all kinds of electric works, including wiring works, on its own without outsourcing.

The annual construction capacity of EP1 is thought to be about 70km/year as an approximate value, in the case of speeding up (160km/h). When the higher value is required, EP1 will consult with UTY and arrange the operation process. As for the technical assistance from foreign countries,

[1] The corporate name in Russian is as follows: Унитарное предприятие «Специальный Строительно-монтажный поезд-406» (ССМП-406).

EP1 has past experience from technology transfer from Russia and China.

However, since the company has no experience with electric works for maximum speeds of more than 250km/h, in case there is plan to increase speed further, for example to 300km/h, it will become difficult for EP1 to implement electrification work to accommodate this requirement. However, Uzbekistan has already received technical assistance from Russia for speed-up at 250km/h. In the future, when the implementation of electric works on the high-speed sections at a speed higher than 250km/h becomes necessary, EP1 will have to obtain technical assistance from others in some way. (EPI said that they welcome technical assistance from JICA and other sources.)

e) Civil Engineering

The construction works can be sufficiently carried out by domestic construction companies, but it will be difficult if the construction work involves large structures. For example, development of long-span steel bridges seems to be quite difficult.

Almost all construction works involved in railway-related bridges and culvert structures are conducted by a company called UE Kuprilkkurilish Trust. The company is an affiliate of UTY and receives various infrastructure-related construction works from other firms.

The constructions of stations and depots are decided according to each project. There is no construction company that specializes and focuses on the railway business. Besides the railway-related construction works, a company called Trust No. 12 has the largest size and shares among all the domestic construction companies.

The construction works on track substructure are mostly conducted by the following companies: Uztemiryulkurillishmontazh, and Specialized Track Machinery Station[2] (both affiliates of UTY).

(3) Trends and Interests of Foreign Competitors

1) Past Records of Orders Received in Uzbekistan

Based on the results of our on-site interviews, we listed the major past records of orders received in Uzbekistan by foreign companies in [Table 2.5-6].

At this moment, companies of various countries have secured orders involved in the railway projects in Uzbekistan: Two Chinese companies, including one in the field of rolling stock (Zhuzhou; 2 projects) and one for overhead (CNTIC); one Russian company for rolling stock (TransProm); one Spanish company for rolling stock (TALGO); one German company for signaling (InterEng); one Estonian company for rolling stock (Skinest Rail); and one Latvian company for SCADA (Belam Riga).

[2] ≪Специализированная путевая машинная станция≫(СПМС)

[Table 2.5-6] Foreign Countries' Track Record of Receiving Railway Project Orders in Uzbekistan

Name of company	Country	Name of project	Field
China South Locomotive and Rolling Stock Industry (Group) Corporation Zhuzhou	China	Procurement of 15 Passenger Locomotives (The Export-Import Bank of China loan)	Rolling stock
		Repowering Diesel Locomotive Park (Procurement of Locomotives) (EBRD loan)	
Skinest Rail	Estonia	Reconstruction and Development of Engineering and Founding Factory (FRDU loan)	Rolling stock
TransProm	Russia	Modernization of Diesel Locomotive Park (EBRD loan)	Rolling stock
Talgo	Spain	Procurement of 10 Talgo 250 (series 130) trains (Tashkent - Samarkand) (FRDU loan)	Rolling stock
CNTIC	China	Tashkent - Angren Electrification Project (KfW & KFAED co-funding)	Overhead
InterEng	Germany		Signaling & Communication
Belam Riga	Latvia		SCADA

(Source: Compiled by the Survey Team based on interviews with stakeholders)

2) Trends and Interests of Foreign Competitors

The following are trends of activities by foreign companies in Uzbekistan and their interests regarding railway projects, by country.

a) China

China has been making approaches to Uzbekistan aggressively from the 1990s. Through the implementation of loan projects by exercising a top diplomacy approach and using the framework of the Shanghai Cooperation Organization, China has constructed a stepping stone in projects such as tied-loans and has actively accumulated its experience on projects in Uzbekistan.

In the railway field, there was a case where Chinese companies dominated most of the procurement of bridges, signaling, and rail in the project (electrification between Tashkent and Angren) funded by KfW in 2007. (The Chinese companies won the project with 15% ~ 30% lower bidding prices.) Specifically, the signaling work was contracted by ZTE of China while the wiring was contracted by CNTIL of China. At this moment, there has been no significant problem with the quality of either of these works, and these Chinese companies seem to have achieved some reputation from the Uzbekistan side. Using this as a foot step, entries by Chinese companies in the railway field in Uzbekistan has been accelerated. In fact, only Chinese companies placed on the recent two projects, the railway electrification project between Marakand and Karshi (funded by ADB) and the railway electrification project between Karshi and Termiz (funded by JICA), for the construction of manufacturing plant for rolling stock and electric facilities, as well as the procurement of depot-related equipment and maintenance machinery, etc. This shows that China is strongly accelerating its entry into Uzbekistan with its powerful cost-competitive strategy.

b) Korea

Korea historically has a strong relationship with Uzbekistan, and has expanded business in a wide variety of areas such as infrastructure, construction, textiles, finance, etc. in Uzbekistan. A typical example is Daewoo group that started auto production in Uzbekistan in the 1990s, followed by entries of many other Korean companies that support the Daewoo's auto production. Also, summit meetings between the two countries have been held periodically, and there are many cases where projects have been executed after these meetings.

On the other hand, as for railway-related projects, almost no Korean company has received a contract in Uzbekistan.

c) Russia

For Uzbekistan, Russia is the largest trading partner and shares common industry standards, language, and business practices. Also, Russia is able to receive the same level of preferential treatment on tariffs in Uzbekistan as in the other CIS countries. The rise of Russian companies has been significant in the oil/gas sector in Uzbekistan.

As for the railway sector, Russian companies have been involved in projects associated with rail and rolling stock. Although the level of their interest for recent railway projects in Uzbekistan is not certain, we do not see a clear sign of aggressiveness from the bidding situations of international projects.

d) Turkey

Since the independence of Uzbekistan, Turkish companies have expanded their businesses especially in the textile industry. The influence of Turkish companies was quite strong immediately after the independence of Uzbekistan, but has gradually diminished in recent years due to friction with the Uzbekistan side. We do not see signs of active commitment by Turkish companies in the railway sector.

e) Other Western Countries

Spain has shown signs of aggressive attitude toward business expansion into the Uzbekistan market, including the railway sector. Even in other sectors than railways, Spanish companies have made bids for EPC projects, taking substantial risks. For example, a Spanish company won the contract for a highway improvement project in the Fergana valley (funded by ADB). As the Spanish companies are recently experiencing a downturn in the European market, they are facing a situation where they have no choice but to increase their degree of dependence on foreign demand, with the prices also falling. In terms of price setting, Spanish companies have become able to present the price at a certain level so that they can compete especially with highly cost-competitive companies in China.

As for the business activities of other countries, a French resource-related company and a German textile company are currently conducting business in Uzbekistan. However, not many businesses have been involved in infrastructure-related activities, including railways. GE and

Siemens once considered but could not realize their expansion in Uzbekistan. They do not seem to be searching for another business expansion. Bombardier, on the other hand, seems to continue seeking for opportunities in the railway business in Uzbekistan.

Chapter 3

Collection and Analysis of Information on Railway Electrification Projects

3.1. Summary and Effectiveness of Railway Electrification Projects

3.1.1. Selection of Railway Electrification Projects to be Surveyed and Collection of Related Documents

Based on the railway sector development plans and the main documents and materials collected as part of the survey work in Uzbekistan, the railway electrification projects in Uzbekistan including the new electrified railway construction projects are shown in [Table 3.1-1], the main documents related to these railway electrification projects are shown in [Table 3.1-2], and the location map of railway electrification projects in Uzbekistan is shown in [Fig. 3.1-1].

[Table 3.1-1] Railway Electrification Projects in Uzbekistan
including the New Electrified Railway Construction Projects

Category	**No.**	**Project**	**Distance**	**Project Cost *** (mln. US$)	**Financial Source**	**Duration**	**Progress**
Completed	1	Electrification of Tukimachi–Angren Railway Section	116 km	103.6	KfW, KFAED, UTY	2005–2010	Completed
On-going	2	Construction of Yangiyer–Djizak Double-track Electrified Railway Section	187 km	320.7	UTY	2009–2013/ 2015–2017	In Service
	3	Electrification of Marakand–Karshi Railway Section	140 km	207.6	ADB, UTY	2011–2016	
	4	Electrification of Karshi–Termez Railway Section	325 km	380.3	JICA, UTY	2012–2017	
Planned	5	Construction of Angren–Pap New Electrified Railway Line	129 km	1,920.0	Undecided	2013–2019	Under Pre-F/S
	6	Electrification of Marakand–Bukhara Railway Section	250 km	526.6	Undecided	2014–2018	Pre-F/S Completion

Note: * The project cost doesn't include financial costs, taxes, etc.

(Source: Survey Team)

[Table 3.1-2] Main Documents related to the Railway Electrification Projects

No.	Name of Document and Material	Date	Source
1	Summary of Information on the Project of Tukimachi–Angren Railway Section Electrification	Unknown	UTY
2	General Drawing of Master Plan on Yangier–Djizak Section	Unknown	UTY
	Master Plan on Yangier–Dashtabad Section at scale of 1:25000	Unknown	UTY
3	Feasibility Study of the Project for Electrification of Railway Section at Marokand–Karshi: Book 1–Book 7	2011	UTY
4	Feasibility Study of the Project for Electrification of Railway Section at Karshi–Termez: Book 1–Book 9	2011	UTY
5	None	-	-
6	Preliminary Feasibility Study of the Project for Electrification of Railway Section at Marakand–Bukhara 1: Book 1, Book 2, Book 5	2012	UTY

(Source: Survey Team)

(Source: Survey Team)

[Fig. 3.1-1] Location Map of Railway Electrification Projects in Uzbekistan

From [Table 3.1-1], the projects which UTY plans to implement in the future are the construction of the Angren–Pap new electrified railway line and the electrification of the Marakand–Bukhara railway section. The Survey Team also confirmed that there are no railway electrification projects other than these 2 projects including projects at the conceptional stage after hearings with UTY.

From UTY, the Survey Team received the F/S reports or the Pre-F/S reports for Project No. 3 (electrification of the Marakand–Karshi railway section), Project No. 4 (electrification of the Karshi–Termez railway section), and Project No. 6 (electrification of the Marakand–Bukhara section) (refer to [Table 3.1-2]).

However, the Survey Team could not obtain detailed information and documents about Project No. 1 (electrification of the Tukimachi–Angren railway section), Project No. 2 (construction of the Yangiyer–Djizak double-track electrified railway section), and Project No. 5 (construction of the Angren–Pap new electrified railway line). Because Project No. 1 was completed, there was no F/S report available for Project No. 2, and the Pre-F/S for Project No. 5 was implemented as of March 2013. Project No. 2 involves the improvement of an existing railway line and therefore did not require the implementation of an F/S study.

3.1.2. Arrangement of Summary and Effect of Railway Electrification Projects

(1) Electrification Project of Tukimachi–Angren Railway Section

The basic information regarding the electrification project of Tukimachi–Angren Railway Section from UTY documents is shown in [Table 3.1-3], and the structure of project costs by financial sources is shown in [Table 3.1-4].

Of the total project costs which amounted to 105 million US$, KfW's and KFAED's share was about 34% and 21% respectively, and UTY invested the remaining part (about 45%). As for the cost items, the share of construction works and equipment were about 35% and 57% respectively. The implementation period started in 2005 and ended in 2010 when the project was completed. The pay-back period is 20 years with non-discounted calculation and 24 years with discounted calculation.

[Table 3.1-3] Basic Information of Electrification Project of Tukimachi–Angren Railway Section

Item		Contents
Basic Information	Section	Tukimachi–Angren (116 km)
	Project Cost	105.0 mln. US$ (including financial costs, refer to [Table 3.1-4])
	Financial Sources	KfW: 34%, KFAED: 21%, UTY: 45% (refer to [Table 3.1-4])
	Implementation Period	2005~2010 (Completed)
	Project Goals	- Provide Fergana oil refinery plant with raw material and product transportation; - Improve railway transport operation effectiveness in the region; - Reduce national economic transportation costs; - Reduce environmental influence of railway transportation.
Financial Analysis	Pay-back Period	Non-discounted: 20 years, Discounted: 24 years

(Source: Survey Team)

[Table 3.1-4] Structure of Project Costs by Financial Sources of Electrification Project of Tukimachi–Angren Railway Section

(Unit: thous. US$)

Type of Costs	Total	UTY's Own Funds	KfW Loan	KFAED Loan
Capital Investments, including	**103,639.8** (98.7%)	**46,291.8**	**35,709.0**	**21,639.0**
Construction Works	36,818.0 (35.1%)	27,841.0	2,200.0	6,777.0
Imported Materials and Parts	12,170.2	3,193.2	2,200.0	6,777.0
Construction, Installation and Local Materials	24,647.8	24,647.8	-	-
Equipment	59.677.8 (56.9%)	17,356.8	28,508.0	13,813.0
Imported	58,807.6	16,486.6	28,508.0	13,813.0
Local	870.1	870.1	-	-
Other Costs (including contingencies)	7,144.0 (6.8%)	1,094,0	5,001.0	1,049.0
Financial Costs	**1,333.5** (1.3%)	**1,333.5**	**-**	**-**
Tax Holidays (VAT) and Customs Payments, etc.	- (-)	-	-	-
Total Project Cost	**104,973.3** (100.0%)	**47,625.3** (45.4%)	**35,709.0** (34.0%)	**21,639.0** (20.6%)

(Source: Survey Team)

(2) Electrification Project of Marakand–Karshi Railway Section

From the F/S report of the project for electrification project of the Marakand–Karshi railway section, the outline of this project is shown below.

1) Basic Information

The basic information of electrification project of the Marakand–Karshi railway section is shown in [Table 3.1-5].

[Table 3.1-5] Basic Information of Electrification Project of Marakand–Karshi Railway Section

Item	Content
Section	Marakand–Karshi (140 km)
Project Cost	234.9 mln. US$ (including financial costs and taxes, refer to [Table 3.1-11])
Financial Sources	ADB: 43%, UTY: 47%, GoU: 10% (refer to [Table 3.1-11])
Implementation Period	2012~2016
Progress	L/A signing in February 2012, carrying out some bids now.
Project Goals	- Improvement of the competitiveness of railway transport and the quality of the service; - Increase of the extensive role of railway transport for external and internal transport service markets; - Improvement of the freight and carrying capacity of the railway line between Marokand and Karshi; - Strengthening of the Trans-Afghanistan transport corridor; - Collection of surplus income from transit transportation of foreign freight and passengers; - Improvement of the ecology and environment; - Improvement of activities to unify the national railway network of Uzbekistan; - Formulation of favorable conditions for the acceleration of the social and economic development of the region.

(Source: Survey Team)

2) Transport Demand and Operation Plan

The freight and passenger demand forecasts for the Marakand–Karshi section are shown in [Table 3.1-6] and [Table 3.1-7], and the required number of freight and passenger trains on the Marakand–Karshi section based on the demand forecast is shown in [Table 3.1-8].

The freight turnover will increase about 1.4 times in 2030 and about 2.1 times in 2040 compared with 2010. The passenger turnover will increase about 3.0 times in 2030 and about 5.5 times in 2040 compared with 2010.

The required number of freight trains will increase about 1.5 times in 2030 and about 1.9 times in 2040 compared with 2010. The required number of passenger trains will increase about 1.4 times in 2030 and about 1.5 times in 2040 compared with 2010.

[Table 3.1-6] Freight Demand Forecast for Marakand–Karshi Section

Section	2010	2015	2020	2025	2030	2035	2040
Freight Traffic Density per 1 km *(thou. ton net)*							
Total	**7,807.7**	**8,266.7**	**8,975.8**	**9,829.2**	**11,291.2**	**13,203.5**	**16,285.0**
Marakand – Karshi	5,213.2	5,407.1	5,861.8	5,996.8	6,750.4	7,599.5	9,327.6
Karshi – Marakand	2,594.5	2,859.6	3,114.0	3,832.4	4,540.8	5,604.0	6,957.4
Freight Turnover *(mln. ton-km)*							
Total	**1,099.3**	**1,163.9**	**1,263.9**	**1,384.0**	**1,589.9**	**1,859.1**	**2,292.9**
Marakand – Karshi	734.0	761.3	825.4	844.4	950.5	1,070.0	1,313.3
Karshi – Marakand	365.3	402.6	438.5	539.6	639.4	789.1	979.6

(Source: F/S Report of the Project for Electrification of Marakand–Karshi Railway Section, UTY)

[Table 3.1-7] Passenger Demand Forecast for Marakand–Karshi Section

Transport Type	2010	2015	2020	2025	2030	2035	2040
Passenger Traffic Volume *(thou. personss)*							
Total	**459.3**	**619.7**	**712.7**	**1,047.1**	**1,401.4**	**1,874.5**	**2,437.4**
Direct	4.3	5.7	6.6	9.6	12.9	17.3	22.5
Local	90.4	221.8	255.1	374.8	501.6	652.0	847.7
Suburban	364.6	392.2	451.0	662.7	886.9	1,205.2	1,567.2
Passenger Turnover *(mln. pass km)*							
Total	**64.7**	**87.2**	**100.3**	**147.5**	**197.3**	**263.9**	**353.0**
Direct	0.7	0.8	0.9	1.4	1.8	2.4	3.1
Local	12.7	31.2	35.9	52.8	70.6	90.8	119.3
Suburban	51.3	55.2	63.5	93.3	124.9	170.7	230.6

(Source: F/S Report of the Project for Electrification of Marakand–Karshi Railway Section, UTY)

[Table 3.1-8] Required Number of Freight and Passenger Trains on Marakand–Karshi Section

	Train Weight	2010	2015	2020	2025	2030	2035	2040
Number of Freight Trains *(trains/day)*								
Total	**-**	**9.3**	**9.9**	**10.7**	**11.8**	**13.6**	**15.7**	**17.4**
Marakand – Karshi	4,500 ton	5.5	5.7	6.1	6.2	7.0	7.9	8.9
Karshi – Marakand	3,200 ton	3.8	4.2	4.6	5.6	6.6	7.8	8.5
Number of Passenger Trains *(trains/day)*								
Total	**-**	**3.5**	**4.0**	**4.5**	**4.8**	**5.0**	**5.2**	**5.4**
Long Distance	800 ton	2.5	3.0	3.5	3.8	4.0	4.2	4.4
Suburban	800 ton	1.0	1.0	1.0	1.0	1.0	1.0	1.0

(Source: F/S Report of the Project for Electrification of Marakand–Karshi Railway Section, UTY)

3) Facilities Plan

a) Electrification System

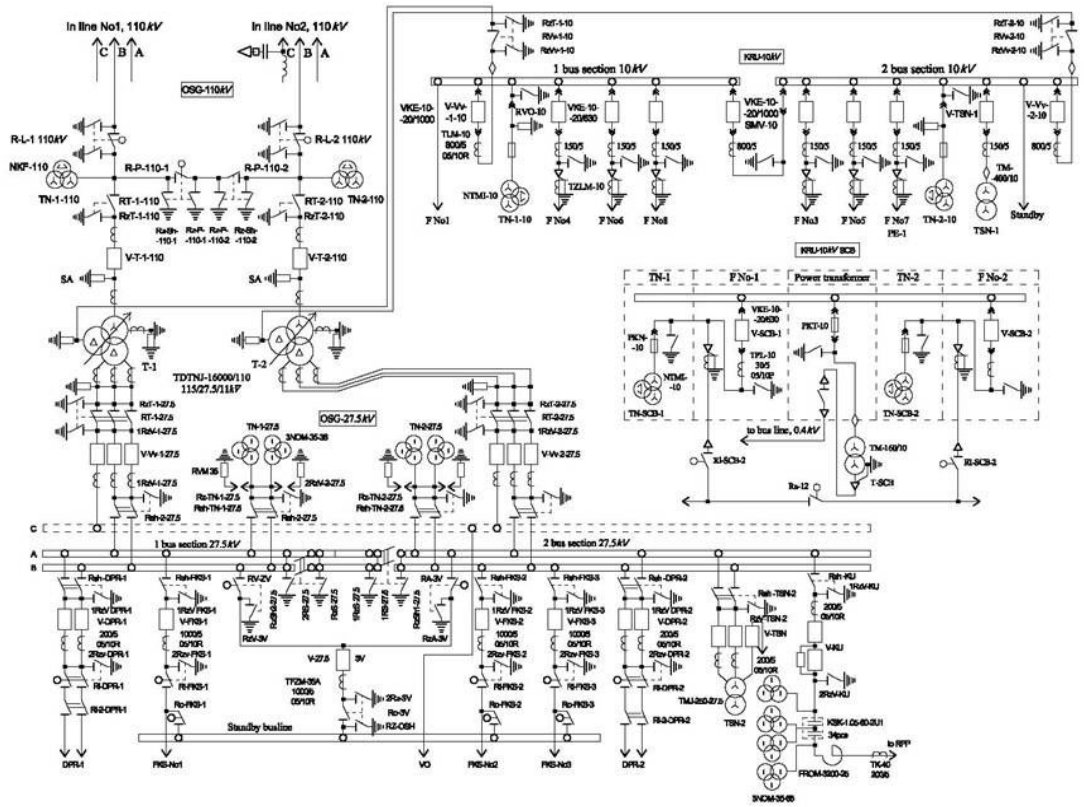
The substation system constitution is shown in [Table 3.1-9], and an example of a substation main circuit connection diagram is shown in [Fig. 3.1-2].

Feeding substations were planned to be provided at 3 locations on the section between Marakand and Karshi. Fundamentally, the traction calculations have been accepted to determine areas covered by feeders, and the distance between each substation has been set to be about 50 km. The sectioning posts have been planned to be installed at the middle points between each substation in order to separate different phase power sources.

[Table 3.1-9] Substation System Constitution

Substation System	Classification of Power Source	Application or Others
Power Receiving System	110kV three-phase 50Hz 2-line receiving	Supplier: "Uzbekenergo" SJSC
Power Feeding System	27.5kV single-phase 50Hz separately-feeding for up and down lines	Direct Feeding System
Power Distributing System	27.5kV three-phase 50Hz	High-voltage Distribution Line for Power
Power Distributing System	10kV three-phase 50Hz	High-voltage Distribution Line for Signal

(Source: Survey Team)



(Source: UTY)

[Fig. 3.1-2] Example of Main Circuit Connection Diagram of Substation

b) Measures against Inductive Disturbance on Telecommunication Lines

In the case of AC electrification systems, inductive disturbance will inevitably take place on adjacent telecommunication lines. As a countermeasure, various systems have been devised and among them, some examples which have been put into practice include the BT feeding system and the AT feeding system. In Japan, the BT feeding system has been mainly applied to conventional railroad lines, and the AT feeding system has been generally applied to Shinkansen high-speed lines.

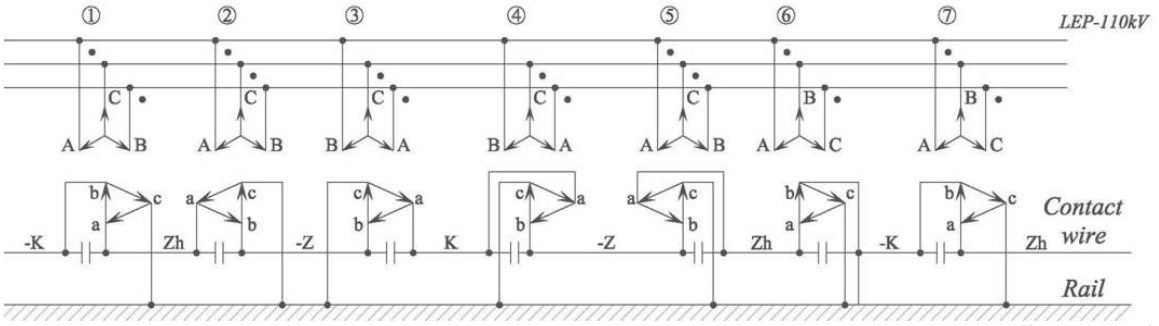
For the electrification of the sections between Markand and Karshi, a directly-feeding system has been adopted in the same way as for the existing electrified sections. In this system, inductive disturbance naturally takes place because electric current flows between the feeder line and rail but it is said that this can be reduced enough by for example replacing telecommunication lines with

fiber-optic cables in some locations where inductive disturbance is expected. Therefore, this electrification system is simply composed because it does not require a special transformer as AT.

c) Measures against Three-phase Unbalance

Generally, when single-phase load for an electric railway is drawn out of a three-phase power source, the three-phase voltage falls unbalanced. This causes the inverse phase component to rise which causes problems. Therefore, in Japan, 3% is used as target for the rate of unbalance in the case of railway load. Special wire wound transformers such as Scott-connection transformers, modified Woodbridge transformers and Roof-delta transformers are used as a countermeasure.

Meanwhile, in UTY, in order to avoid that the whole system falls into unbalance, the allotment of feeder circuits is changed one after the other along the line. Namely, the composition is made so as to balance the whole system. The system is simply composed without any special transformers because the main transformers are covered by ordinary three-phase wire wound transformers only.



(Source: UTY)

[Fig. 3.1-3] Example of Measures against Unbalance in Three-phase Substation

d) Power Control

As for power control, the SCADA system remotely supervises and controls feeding substations and sectioning posts, and moreover, wayside disconnection switches and so on through the power control center in Tashkent. The telecommunication system is of transmission with fiber-optic cable (refer to [Table 3.1-10]).

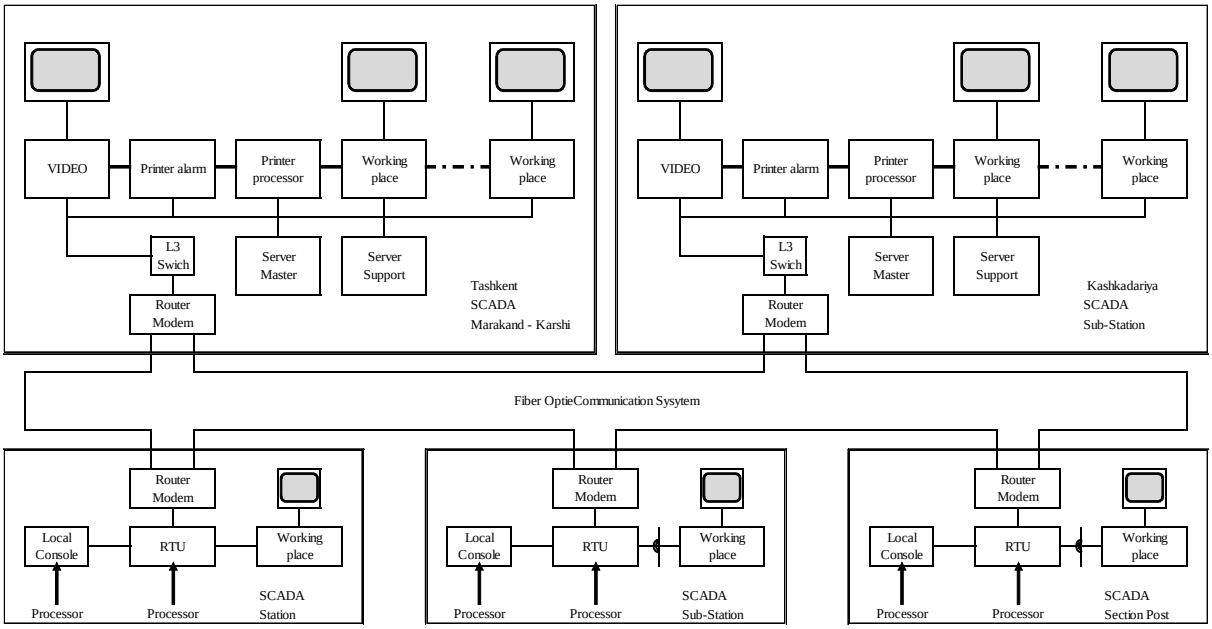
According to the FS referred before, as for the electrification of the section between Marokand and Karshi, it is mentioned that power control is performed by a SCADA system.

After hearings with “Boshtransloyiha” which was in charge of the PreF/S, the Survey Team comfirmed that the detailed specification of the SCADA system will be given by detailed design in the future and was presented with the concept diagram of the SCADA system as shown in [Fig. 3.1-4] below. Regarding the section between Marokand and Karshi, it can be read that UTY has intended to drive into the direction that the power control should be performed by the SCADA system. But it is supposed that the direction is applied only for sections which need electrification.

[Table 3.1-10] Scope of Supervisory and Control by SCADA

Devices to be Supervised and Controlled by SCADA System	Substation	Sectioning post	Station or others
	Overhead-line sectioning DS	27.5kV sectioning DS	10kV sectioning DS

(Source: Survey Team)



(Source: Survey Team)

[Fig. 3.1-4] Outline Diagram of SCADA System

4) Investment Plan

The structure of project costs by financial sources is shown in [Table 3.1-11], and the structure of project costs by each year is shown in [Table 3.1-12].

Of the total project costs which are about 235 million US$, ADB's share is about 43%. As for the cost items, the share of construction works, equipment and other capital investment costs are about 45%, 35% and 8% respectively.

[Table 3.1-11] Structure of Project Costs by Financial Sources of Electrification Project of Marakand–Karshi Railway Section

(Unit: thous. US$)

Name of Costs	Total		UTY's Own Funds	Government of Uzbekistan	ADB Loan
Capital Investments, including	**207,552.4**	(88.4%)	**107,552.4**	**-**	**100,000.0**
Construction Works	105,623.7	(45.0%)	81,198.8	-	24,424,8
Imported Materials and Parts	37,944.4		13,519.5	-	24,424.8
Construction, Installation and Local Materials	67,679.3		67,679.3	-	-
Equipment	82,612.8	(35.2%)	18,287,6	-	64,325.2
Imported	81,232.1		16,907.0	-	64,325.2
Local	1,380.7		1,380.7	-	-
Other Costs	19,316.0	(8.2%)	8,066.0	-	11,250.0
Financial Costs	**3,507.2**	(1.5%)	**3,507.2**	**-**	**-**
Tax Holidays (VAT) and Customs Payments, etc.	**23,835.3**	(10.1%)	**-**	**23.835.3**	**-**
Total Project Cost	**234,895.0**	(100.0%)	**111,059.7** (47.3%)	**23.835.3** (10.1%)	**100,000.0** (42.6%)

(Source: F/S Report of the Project for Electrification of Marakand – Karshi Railway Section, UTY)

[Table 3.1-12] Structure of Project Costs by Each Year of Electrification Project of Marakand–Karshi Railway Section

(Unit: thous. US$)

Name of Costs	Total	2012	2013	2014	2015	2016
Capital Investments, including	**207,552.4**	**6,504.3**	**21,904.0**	**120,970.5**	**31,890.2**	**26,283.5**
Construction Works	105,623.7	2,112.5	10,562.4	63,374.2	15,843.6	13,731.1
Imported Materials and Parts	37,944.4	758.9	3,794.4	22,766.6	5,691.7	4,932.8
Construction, Installation and Local Materials	67,679.3	1,353.6	6,767.9	40,607.6	10,151.9	8,798.3
Equipment	82,612.8	1,652.2	8,261.3	49,567.7	12,391.9	10,739.7
Imported	81,232.1	1,624.6	8,123.2	48,739.3	12,184.8	10,560.2
Local	1,380.7	27.6	138.1	828.4	207.1	179.5
Other Costs (including contingencies)	19,316.0	2,739.5	3,080.3	8,028.7	3,654.7	1,812.8
Financial Costs	**3,507.2**	**120.5**	**310.3**	**1,107.4**	**1,459.5**	**509.4**
Tax Holidays (VAT) and Customs Payments, etc.	**23,835.3**	**476.7**	**2,383.5**	**14,301.2**	**3,575.3**	**3,098.6**
Total Project Cost	**234,895.0**	**7,101.4**	**24,597.8**	**136,379.2**	**36,925.0**	**29,891.5**

(Source: F/S Report of the Project for Electrification of Marakand–Karshi Railway Section, UTY)

5) Procurement Packages

The list of procurement packages is shown in [Table 3.1-13].

The procurement packages are divided into 4 packages which include 8 lots. The selection

methods by package are QCBS for the consulting services, ICB for package No. 1 and No. 2 and the Government procedures in package No. 3.

[Table 3.1-13] List of Procurement Packages of Electrification Project of Marakand–Karshi Railway Section

Lot No.	Description	Amount (mln. US$)	Selection Method [1)]
Consulting Services (CS)			
Lot CS1	Consulting Services for Engineering and Supervision (including preparation of bidding documents for ICB procurement and overall supervision of suppliers and contractors)	5.3	QCBS–Full Proposal
Package № 1[2)]			
Lot 1-1	Supply of Equipment and materials for Electric Locomotives Maintenance and Inspection depot at Karshi	1.4	ICB
Lot 1-2	Supply of Equipment for Maintenance of Overhead Catenary System	42.1	ICB
Lot 1-3	Supply of materials and equipment for construction of overhead catenary system, sectioning posts and 110KV external power supply line	6.1	ICB
Package № 2[2)]			
Lot 2-1	Design, Supply, Installation and commissioning of Signaling system and Telecommunication system complete	47.5	ICB
Lot 2-2	Design, Supply, Installation and commissioning of Three Transformer Substations complete	13.9	ICB
Lot 2-3	Design, Supply, Installation and commissioning of Supervisory Control And Data Acquisition (SCADA) system complete	3.7	ICB
Package № 3			
Various Lots	Civil/ track works associated with signaling, telecommunications, Karshi electric locomotive maintenance depot, Overhead Catenary System, traction substations, SCADA and external power supply.	Financed by UTY	GP

Note: QCBS=Quality and Cost Based Selection, ICB=International Competitive Bidding, GP=Government Procedures

(Source: F/S Report of the Project for Electrification of Marakand–Karshi Railway Section, UTY)

6) Financial Analysis

The results of Financial Analyses of the project are shown in [Table 3.1-14].

The FIRR is significantly higher than the discouted rate, so the financial feasibility of this project will be high.

[Table 3.1-14] Results of Financial Analysis of Electrification Project of Marakand–Karshi Railway Section

Item		Contents
Calculation Period		25 years
Discounted Rate		8%
Financial Internal Rate of Return (FIRR)		19.9%
Payback Period	Not Discounted	8.8 years
	Discounted	10.5 years

(Source: F/S Report of the Project for Electrification of Marakand–Karshi Railway Section, UTY)

(3) Electrification Project of Karshi–Termez Railway Section

From the F/S report of the project for electrification project of Karshi–Termez railway section, the project outlines of this project are shown below.

1) Basic Information

The basic information of the electrification project of the Karshi–Termez railway section is shown in [Table 3.1-15].

[Table 3.1-15] Basic Information of Electrification Project of Karshi–Termez Railway Section

Item	Contents
Section	Karshi–Termez (325 km)
Project Costs	481.8 mln. US$ (including financial costs and taxes, refer to [Table 3.1-19])
Financial Sources	JICA: 46%, UTY: 35%, GoU: 19% (refer to [Table 3.1-19])
Implementation Period	2012~2017
Progress	Signing L/A in February 2012, Carrying out some bids now.
Project Goal	- Improvement of the competitiveness of railway transport and the quality of service; - Increase of the extensive role of railway transport in external and internal transport services markets; - Improvement of the freight and carrying capacity of the railway line between Karshi and Termez; - Strengthening of the Trans-Afghanian transport corridor; - Collection of surplus income from transit transportation of foreign freight and passengers - Improvement of the ecology and environment; - Improvement of activities of unified national railway network of Uzbekistan; - Formulation of favorable conditions for the acceleration of the social and economic development of the region.

(Source: Survey Team)

2) Transport Demand and Operation Plan

The freight and passenger demand forecast for the Karshi–Termez section are shown in [Table 3.1-16] and [Table 3.1-17], and the required number of freight and passenger trains on the Karshi–Termez section based on the demand forecast is shown in [Table 3.1-18].

The freight turnover in 2030 will increase about 1.8 times and the passenger turnover in 2030 will increase about 2.2 times compared with 2010.

The required number of freight trains in 2030 will increase about 1.5 times and the required number of passenger trains in 2030 will increase about 1.4 times compared with 2010.

[Table 3.1-16] Freight Demand Forecast on Karshi–Termez Section

Section	2010	2015	2020	2025	2030
Freight Traffic Density per 1 km *(thou. ton net)*					
Total	**7,176.2**	**8,517.1**	**9,866.8**	**11,424.0**	**13,109.4**
Karshi – Termez	4,268.7	4,928.2	5,756.5	6,690.1	7,764.6
Termez – Karshi	2,907.5	3,588.9	4,110.3	4,733.8	5,344.9
Freight Turnover *(mln. ton-km)*					
Total	**2,331.6**	**2,767.2**	**3,205.7**	**3,711.6**	**4,259.3**
Karshi – Termez	755.4	899.3	1,052.3	1,213.2	1,386.4
Termez – Karshi	1,576.1	1,867.9	2,153.4	2,498.4	2,872.9

(Source: F/S Report of the Project for Electrification of Karshi–Termez Railway Section, UTY)

[Table 3.1-17] Passenger Demand Forecast on Karshi–Termez Section

Transport Type	2010	2015	2020	2025	2030
Passenger Traffic Volume *(thou. personss)*					
Total	**658.7**	**827.4**	**992.9**	**1,190.0**	**1,419.8**
Direct	37.6	47.0	56.5	65.5	73.3
Local	4.2	6.0	7.2	8.4	9.5
Suburban	616.9	774.4	929.2	1,116.1	1,337.0
Passenger Turnover *(mln. pass km)*					
Total	**51.0**	**65.6**	**77.0**	**92.0**	**109.7**
Direct	2.8	3.5	3.6	4.1	5.1
Local	1.1	1.5	1.8	2.1	2.4
Suburban	47.1	59.6	71.6	85.8	102.2

(Source: F/S Report of the Project for Electrification of Karshi–Termez Railway Section, UTY)

[Table 3.1-18] Required Number of Freight and Passenger Trains on Karshi–Termez Section

	Train Weight	2010	2015	2020	2025	2030
Number of Freight Trains *(trains/day)*						
Total	**-**	**9.3**	**9.9**	**10.7**	**11.8**	**13.6**
Karshi – Termez	2,200 ton	4.9	5.8	6.8	7.8	8.9
Termez – Karshi	3,000 ton	7.6	9.0	10.3	11.9	13.7
Number of Passenger Trains *(trains/day)*						
Total	**-**	**3.5**	**4.0**	**4.5**	**4.8**	**5.0**
Long Distance	800 ton	2.5	3.0	3.5	3.8	4.0
Suburban	800 ton	1.0	1.0	1.0	1.0	1.0

(Source: F/S Report of the Project for Electrification of Karshi–Termez Railway Section, UTY)

3) Facilities Plan

The feeding substations were planned to be provided at 6 locations on the section between Karshi and Termez. Fundamentally, the traction calculations have been accepted to determine areas covered by feeders, and the distance between each substation has been set to be about 50 km. The sectioning posts have been planned to be installed at the middle points between each substation in order to separate different phase power sources.

The measures against inductive disturbance on telecommunication lines and the measures against three-phase unbalance, and the power control for this section are in accordance with (2) 3).

4) Investment Plan

The structure of project costs by financial sources is shown in [Table 3.1-19], and the structure of project costs by each year is shown in [Table 3.1-20].

Of the total project costs which are about 482 million US$, JICA's share is about 46%. As for the cost items, the share of construction works, equipment and other capital investment costs are about 35%, 27% and 17% respectively.

[Table 3.1-19] Structure of Project Costs by Financial Sources of Electrification Project of Karshi–Termez Railway Section

(Unit: thous. US$)

Name of Costs	Total		UTY's Own Funds	Government of Uzbekistan	JICA Loan
Capital Investments, including	**388,234.59**	(78.9%)	**167,636.31**	**-**	**220,598.28**
Construction Works	168,988.07	(35.1%)	139,131.57	-	29,856.50
Imported Materials and Parts	29,856.50		0.0	-	29,856.50
Construction, Installation and Local Materials	139,131.57		131,131.57	-	-
Equipment	130,783.42	(27.1%)	15,023.92	-	115,759.50
Imported	115,759.50		0.0	-	115,759.50
Local	15,023.92		15,023.92	-	-
Other Costs	80,482.14	(16.7%)	5,909.13	-	74,573.01
Financial Costs	**7,980.96**	(1.7%)	**7,571.68**	**-**	**-**
Tax Holidays (VAT) and Customs Payments, etc.	**93,524.65**	(19.4%)	**-**	**93,524.65**	**-**
Total Project Cost	**481,759.23**	(100.0%)	**167,636.31** (34.8%)	**93,524.65** (19.4%)	**220,598.28** (45.8%)

(Source: F/S Report of the Project for Electrification of Karshi–Termez Railway Section, UTY)

[Table 3.1-20] Structure of Project Costs by Each Year of Electrification Project of Karshi–Termez Railway Section

(Unit: thous. US$)

Name of Costs	Total	2012	2013	2014	2015	2016	2017
Capital Investments, including	**388,234.6**	**61,298.1**	**77,720.7**	**94,146.4**	**94,899.7**	**36,773.8**	**15,415.0**
Construction Works	168,988.1	9,304.8	36,233.1	51,622.6	49,007.8	20,276.8	2,542.9
Imported Materials and Parts	29,856.5	8,957.0	5,971.3	5,971.3	5,971.3	1,492.8	1,492.8
Construction, Installation and Local Materials	139,131.6	347.8	30,261.8	45,651.3	43,036.5	18,784.0	1,050.1
Equipment	130,783.4	34,727.9	26,908.0	26,907.9	26,907.9	9,544.0	5,788.0
Imported	115,759.5	34,727.9	23,151.9	23,151.9	23,151.9	5,788.0	5,788.0
Local	15,023.9	0.0	3,756.1	3,756.0	3,756.0	3,756.0	0.0
Other Costs (including contingencies)	80,482.1	17,265.4	14,579.6	15,615.9	18,984.0	6,953.0	7,084.1
Financial Costs	**7,981.0**	**414.5**	**1,053.6**	**1,518.2**	**2,019.3**	**2,360.0**	**615.3**
Tax Holidays (VAT) and Customs Payments, etc.	**93,524.6**	**17,501.8**	**19,038.9**	**22,324.1**	**22,474.7**	**8,228.4**	**3,956.7**
Total Project Cost	**481,759.2**	**79,214.4**	**97,813.2**	**117,988.7**	**119,393.7**	**47,362.2**	**19,987.1**

(Source: F/S Report of the Project for Electrification of Karshi–Termez Railway Section, UTY)

5) Procurement Packages

The list of procurement packages is shown in [Table 3.1-21].

The procurement packages are divided into 13 lots. The selection methods by lot are ICB for lots which include procurement of foreign equipment and materials and international consulting services and LCB or direct contract for construction works and local consulting services.

[Table 3.1-21] List of Procurement Packages of Electrification Project of Karshi–Termez Railway Section

Lot No.	Description	Cost of			Bidding Method [1)]
		mln. US$	mln. UZS	mln. JPY	
Lot 01	Procurement of equipment and materials for signaling and telecommunication, points	23.21	36,984.82	1,901.02	ICB
Lot 02	Procurement of equipment and materials for Uztemiryulmashtamir plant, Darband Depot and Termez Depot	29.95	47,721.60	2,452.89	ICB
Lot 03	Construction works for signaling and telecommunication and for Uztemiryulmashtamir plant, Darband Depot and Termez Depot	7.02	11,501.40	575.07	LCB / Direct Contract
Lot 04	Procurement of equipment and materials for traction substations	23.74	37,829.77	1,944.45	ICB
Lot 05	Construction works for traction substations	2.53	4,151.40	2207.57	LCB / Direct Contract
Lot 06	Procurement of equipment and materials for OCS and sectioning posts	31.38	49,997.70	2,569.88	ICB
Lot 07	Construction works for OCS and sectioning posts	45.53	74,578.40	3,728.92	LCB / Direct Contract
Lot 08	Installation of SCADA	10.19	16,231.20	834.28	ICB
Lot 09	Procurement of vehicles and machinery	25.24	40,214.00	2,067.00	ICB
Lot 10	Procurement of equipment and materials for substations and external power supply	40.95	65,257.00	3,354.21	ICB
Lot 11	Construction works for substations and transmission lines	55.57	91,023.80	4,551.19	LCB / Direct Contract
Lot 12	Consulting Services (International)	8.74	14,320.00	716.00	ICB
Lot 13	Consulting Services (Local)	4.65	7,620.20	381.01	Direct Contract

Note 1) ICB=International Competitive Bidding, LCB=Local Competitive Bidding.
2) The lots under ICB will be funded by JICA and the lots under LCB/Direct Contracts will be funded by UTY.
(Source: F/S Report of the Project for Electrification of Marakand–Karshi Railway Section, UTY)

6) Project Effects

The maximum and scheduled speed by traction energy is shown in [Table 3.1-22], and the economic effect from saving expenses for traction energy is shown in [Table 3.1-23].

If the diesel locomotives will be changed into electric locomotives through railway electrification, the maximum speed will increase 10 km/h (+11%) for freight trains and 20 km/h (+20%) for passenger trains, and the scheduled speed will increase 23 km/h (+85%) for freight trains, 20 km/h (+48%) for international passenger trains and 10 km/h (+28%) for suburban passenger trains. So the speedup effect of freight trains will be the highest.

The train operation costs will decrease about 90.6 billion UZ Sum (-48%) by the changing of diesel locomotives into electric locomotives. Especially, the reduction for freight train operations will be large and about 85.9 billion UZ Sum.

[Table 3.1-22] Maximum and Scheduled Speed by Traction Energyof Electrification Project of Karshi–Termez Railway Section

Item		Diesel Traction	Electric Traction	(Electric) – (Diesel)
Maximum Speed	Freight Train	90 km/h	100 km/h	+10 km/h (+11.1%)
	Passenger Train	100 km/h	120 km/h	+20 km/h (+20.0%)
Scheduled Speed	Freight Train	27 km/h	50 km/h	+23 km/h (+85.1%)
	Passenger Train (International)	42 km/h	62 km/h	+20 km/h (+47.6%)
	Passenger Train (Suburban)	36 km/h	46 km/h	+10 km/h (+27.8%)

(Source: F/S Report of the Project for Electrification of Karshi–Termez Railway Section, UTY)

[Table 3.1-23] Economic Effect from Saving Expenses for Traction Energy of Electrification Project of Karshi–Termez Railway Section

(Unit: mln. UZ Sum)

Item	Diesel Traction	Electric Traction	(Electric) – (Diesel)
Freight Transport	179,100.5	93,221.0	-85,879.5 (-48.0%)
Passenger Transport	9,393.8	4,661.8	-4,732.0 (-50.4%)
Total	**188,494.3**	**97,882.8**	**-90,611.5 (-48.1%)**

(Source: F/S Report of the Project for Electrification of Karshi–Termez Railway Section, UTY)

7) Financial Analysis

The results of the Financial Analysis of the project are shown in [Table 3.1-24].

Since FIRR is higher than the discounted rate, the financial feasibility of this project will be high.

[Table 3.1-24] Results of Financial Analysis of Electrification Project of Karshi–Termez Railway Section

Item		Contents
Calculation Period		25
Discounted Rate		8%
Financial Net Present Value (FNPV)		867,903.7 thou.US$
Financial Internal Rate of Return (FIRR)		10.7%
Payback Period	Not Discounted	11.8 year
	Discounted	17.6 year

(Source: F/S Report of the Project for Electrification of Karshi–Termez Railway Section, UTY)

(4) Electrification Project of Marakand–Bukhara Railway Section

From the F/S report of the project for electrification project of the Marakand–Bukhara railway section, the outline of this project is shown below.

1) Basic Information

The basic information of the electrification project of the Marakand–Bukhara railway section is

shown in [Table 3.1-25], and [Table 3.1-26].

After hearings with UTY, the Survey Team confirmed that the Pre-F/S report of the project for electrification of Marakand–Bukhara railway section included the only contents of Step 1.

[Table 3.1-25] Basic Information of Electrification Project of Marakand–Bukhara Railway Section

Item	Contents
Section	< Main Section > Marakand–Bukhara 1: 231.7 km < Other Reconstruction Sections > Samarkand–Marakand: 15.7km Navoi–Tinchlik–Binokor: 9.2km Bukhara l–Kagan–Crossing loop 42: 15.1 km < Total > 271.7km
Project Costs	562.9 mln. US$ (including financial costs, refer to [Table 3.1-33])
Financial Sources	Attracted Funds: 56%, UTY: 56% (refer to [Table 3.1-33])
Implementation Period	2014~2018
Progress	Completion of Pre-F/S in 2012, Calling for a loan to Japanese Government in March 2012
Project Goals	- Improvement of the competitiveness of railway transport and service quality; - Increase of the extensive role of railway transport in external and internal transport services markets; - Improvement of the freight and carrying capacity of the railway line between Marakand and Bukhara 1; - Strengthening of the Eurasian, Trans-Asian and Trans-Afghanistan transport corridors; - Collection of surplus income from transit transportation of foreign freight and passengers; - Improvement of the ecology and environment; - Improvement of activities of unified national railway network of Uzbekistan; - Formulation of favorable conditions for the acceleration of the social and economic development of the region.

(Source: Survey Team)

[Table 3.1-26] Development Steps of Electrification Project of Marakand–Bukhara Railway Section

Step	Contents of Development	Maximum Speed
Step 1: Electrification of Existing Line	- Electrification of Existing Line; - Improvement of Small-scale Alignment.	- Unchanged (Passenger: 120km/h and Freight: 90km/h); - Only in the Improving Section: Passenger trains are up to 160 km/h.
Step 2: Double-tracking	- Double-tracking; - Improvement of Alignment.	- Passenger: Up to 160 km/h; - Freight: Unchanged (90 km/h).
Step 3: High-speed Train	- Installation of High-speed Train (Talgo)	- Passenger: Up to 250 km/h; - Freight: Unchanged (90 km/h).

(Source: Survey Team)

The main characteristics of Samarkand, Navoi and Bukhara, which are the main cities along the Marakand–Bukhara section, are shown in [Table 3.1-27].

Samarkand has the 4th largest and Bukhara the 7th largest population in Uzbekistan. Both cities have central roles in their respective regions. Since the historic centres of both cities have been designated World Heritage Sites by UNESCO, both cities are very famous tourist destinations.

In comparison, the economy of Navoi is developing based on a large stock and deposits of natural resources in Navoi Province which include minerals, natural gas, etc. Moreover, the Navoi Free Industrial Economic Zone and Logistics Center near Navoi Airport was opened in December 2008, and Navoi is aiming to become a transcontinental international hub for the manufacturing industry, logistics, etc. in Central Asia. Since there is a railway branch line to the Free Industrial Economic Zone, the demand for railway freight transport is expected to increase along with the development of the Free Industrial Economic Zone.

[Table 3.1-27] Main Characteristics of Samarkand, Navoi and Bukhara

	Samarkand	Navoi	Bukhara
Population (Ranking)	About 350,000 (4th)	About 160,000 (11th)	About 230,000 (7th)
Main Industries	Manufacturing, Tourism, etc.	Manufacturing, Construction Materials, Chemicals, Textiles, Food, etc.	Natural Gas, Fiber, Textiles, Tourism, etc.
History	- City established at an oasis in the 10th century BC - Capital of Tymule Empire in 14th and 15th century	- City established on the Silk Road - City renamed in 1958 after a person of culture from the Tymule Empire era	- City established at an oasis in the 5th century BC - Capital of the Khanate of Bukhara in the 16th~19th centuries
Other	The historic parts of Samarkand (Samarkand – Crossroad of Cultures) were designated a World Heritage Site by UNESCO in 2001.	The Navoi Free Industrial Economic Zone and Logistics Center in Navoi Airport was opened in December 2008.	The historic centre of Bukhara was designated a World Heritage Site by UNESCO in 1993.

(Source: Survey Team)

2) Transport Demand and Operation Plan

The freight and passenger demand forecast for the Marakand–Bukhara section is shown in [Table 3.1-28] and [Table 3.1-29], and the required number of freight and passenger trains on the Marakand–Bukhara section based on the demand forecast is shown in [Table 3.1-30].

The freight turnover in 2030 will increase about 1.4 times and the passenger turnover in 2030 will increase about 3.2 times compared with 2010.

The required number of freight trains in 2030 will increase about 1.4 times and the required number of passenger trains in 2030 will increase about 1.1 times compared with 2010.

[Table 3.1-28] Freight Demand Forecast on Marakand–Bukhara Section

Sections	2010	2015	2020	2025	2030
Freight Traffic Density per 1 km *(thou. ton net)*					
Total (Marakand – Bukhara 1 Section)	**11,025**	**13,495**	**14,250**	**15,871**	**16,848**
Bukhara 1 - Marakand	6,475	7,785	8,305	9,200	9,752
Marakand - Bukhara 1	4,550	5,710	5,945	6,671	7,096
Marakand - Ziyovuddin Section	**10,395**	**11,385**	**12,900**	**12,716**	**13,659**
Ziyovuddin - Marakand	5,105	5,585	6,300	6,366	6,668
Marakand - Ziyovuddin	5,290	5,800	6,600	6,350	6,991
Ziyovuddin - Bukhara 1 Section	**10,709**	**12,435**	**13,572**	**14,287**	**15,247**
Bukhara 1 - Ziyovuddin	5,787	6,680	7,298	7,777	8,203
Ziyovuddin - Bukhara 1	4,922	5,755	6,274	6,510	7,043
Freight Turnover *(mln. ton-km)*					
Total (Marakand – Bukhara 1 Section)	**2,473.7**	**2,872.7**	**3,135.2**	**3,300.3**	**3,522.0**
Bukhara 1 - Marakand	1,115.5	1,304.6	1,414.5	1,505.7	1,589.5
Marakand - Bukhara 1	1,358.2	1,568.1	1,720.7	1,794.6	1,932.5
Marakand - Ziyovuddin Section	**1,267.9**	**1,552.0**	**1,638.8**	**1,825.2**	**1,937.5**
Ziyovuddin - Marakand	744.6	895.3	955.1	1,058.0	1,121.5
Marakand - Ziyovuddin	523.3	656.7	683.7	767.2	816.0
Ziyovuddin - Bukhara 1 Section	**1,205.8**	**1,320.7**	**1,496.4**	**1,475.1**	**1,584.5**
Bukhara 1 - Ziyovuddin	592.2	647.9	730.8	738.5	773.5
Ziyovuddin - Bukhara 1	613.6	672.8	765.6	736.6	811.0

(Source: Pre-F/S Report of the Project for Electrification of Marakand–Bukhara Railway Section–Book 1, UTY)

[Table 3.1-29] Passenger Demand Forecast on Marakand–Bukhara Section

Transport Types	2010	2015	2020	2025	2030
Passenger Traffic Volume *(thou. personss)*					
Total	**1,190.8**	**1,1598.5**	**2,193.0**	**2,920,0**	**3,794.0**
Direct &Local	**204.8**	**378.5**	**673.0**	**1,035.0**	**1,494.0**
Marakand - Ziyovuddin	21.0	40.0	72.0	130.0	250.0
Ziyovuddin - Bukhara 1	183.8	338.5	601.0	905.0	1,244.0
Suburban	**986.0**	**1,220.0**	**1,520.0**	**1,885.0**	**2,300.0**
Marakand - Ziyovuddin	255.0	316.0	390.0	480.0	590.0
Ziyovuddin - Bukhara 1	731.0	904.0	1,130.0	1,405.0	1,710.0
Passenger Turnover *(mln. pass km)*					
Total	**137.86**	**185.07**	**253.93**	**338.11**	**439.26**
Direct &Local	**23.74**	**43.87**	**78.00**	**119.93**	**173.05**
Marakand - Ziyovuddin	2.42	4.60	8.28	14.95	28.75
Ziyovuddin - Bukhara 1	21.32	39.27	69.72	104.98	144.30
Suburban	**114.12**	**141.20**	**175.93**	**218.18**	**266.21**
Marakand - Ziyovuddin	29.33	36.34	44.85	55.20	67.85
Ziyovuddin - Bukhara 1	84.80	104.86	131.08	162.98	198.36

(Source: Pre-F/S Report of the Project for Electrification of Marakand–Bukhara Railway Section–Book 1, UTY)

[Table 3.1-30] Required Number of Freight and Passenger Trains on Marakand–Bukhara Section

	Train Weight	2010	2015	2020	2025	2030
Number of Freight Trains *(trains/day)*						
Total	**-**	**9.2**	**10.6**	**11.6**	**12.2**	**13.0**
Bukhara 1 – Marakand	5,200 ton	5.1	5.8	6.4	6.8	7.1
Marakand – Bukhara 1	5,500 ton	4.1	4.8	5.2	5.4	5.9
Number of Passenger Trains *(trains/day)*						
Total	**-**	**6.0**	**6.0**	**6.8**	**6.8**	**6.8**
Long Distance	1,200 ton	4.0	4.0	4.8	4.8	4.8
Suburban	800 ton	2.0	2.0	2.0	2.0	2.0

(Source: Pre-F/S Report of the Project for Electrification of Marakand–Bukhara Railway Section–Book 1, UTY)

< Annex > Current Condition of Freight Traffic Volume through Marakand–Bukhara Section

From the data of UTY, the current conditions of freight traffic volume through Marakand–Bukhara section and the relation between the Marakand–Bukhara section and international transport corridors are shown below.

a) Freight Traffic Volume and Turnover by Transport Type

The railway freight traffic volume and turnover through the Marakand–Bukhara section by transport type is shown in [Table 3.1-31] and [Fig. 3.1-5], and the railway freight traffic distribution through this section by transport type in 2012 is shown in [Fig. 3.1-6].

i) Freight Traffic Volume by Transport Type

The overall freight traffic volume of all transport types through the Marakand–Navoi and the Navoi–Bukhara sections decreased in 2010 and 2011 compared with the year before, and increased again in 2012. The overall volume in 2012 through the Marakand–Navoi section decreased about 5% and in 2012 that through the Navoi–Bukhara section increased about 1% compared with the year 2002. The overall volume through the Marakand–Navoi section exceeded that through the Navoi–Bukhara section until 2011, and was almost same as that through the Navoi–Bukhara section in 2012.

As for the rate of change from 2008 to 2012, it is characteristic that transit transport decreased about 36% and export transport decreased about 14% on the Marakand–Navoi section. This was likely the main reason for the about 5% decrease in overall freight traffic volume on this section as mentioned above.

As for the share of freight traffic volume by transport type in 2012 through the Marakand–Navoi and the Navoi–Bukhara sections, local transport held the highest share, followed by transit transport, export transport and import transport. As compared with the share of freight traffic volume by transport type in 2012 in Uzbekistan (refer to [Fig. 2.4-9]), the share of local transport through the Marakand–Navoi section was high, and the share of transit and export transport through the Navoi–Bukhara section was high.

ii) Freight Turnover by Transport Type

The overall freight turnover of all transport types through the Marakand–Navoi section decreased in 2010 and 2011 compared with the year before as with the overall freight traffic volume, and decreased about 9% compared with the year 2008 in 2012. On the other hand, that through the Navoi–Bukhara section decreased in 2010, and increased until 2012 and about 7% compared with the year 2008.

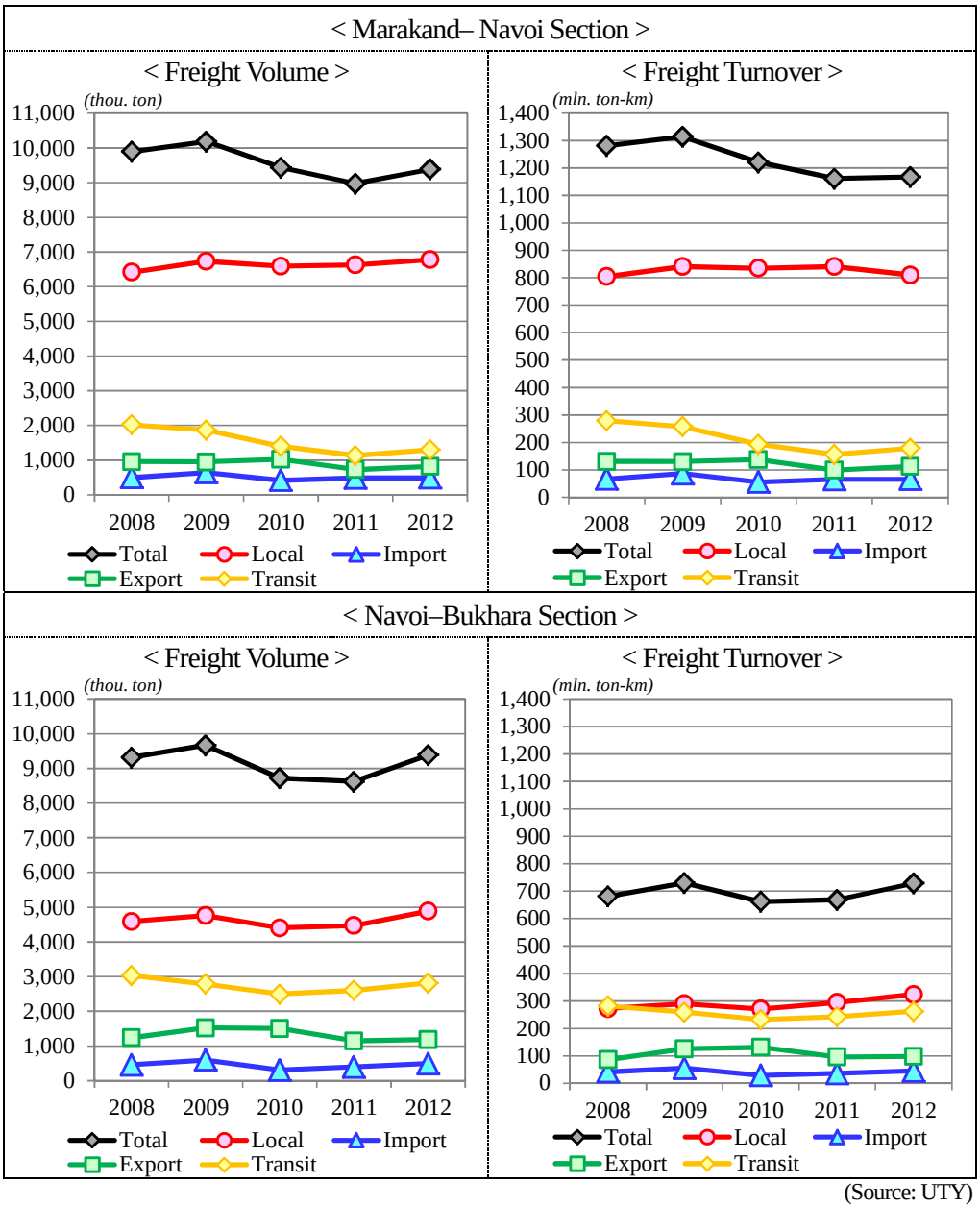
As for the rate of change from 2002 to 2012, it is characteristic that transit transport decreased about 36% and export transport decreased about 14% on the Marakand–Navoi section as with freight traffic volume. This was likely the main reason for the about 9% decrease in overall freight turnover through this section as mentioned above.

As for the share of freight turnover by transport type in 2012 through the Marakand–Navoi and the Navoi–Bukhara sections, local transport held the highest share, followed by transit transport, export transport and import transport as with freight traffic volume. As compared with the share of freight turnover by transport type in 2012 in Uzbekistan (refer to [Fig. 2.4-9]), the share of local transport through the Marakand–Navoi section was high, and the share of transit and import transport through this section was low. On the other hand, there was little difference between the freight traffic distribution by transport type through the Navoi–Bukhara section and that in Uzbekistan in 2012. That the share of local transport through the Marakand–Navoi section was high was the same as the case of freight traffic volume, so this is characteristic of this section. The reason of this is most likely that the freight traffic from Navoi to other regions in Uzbekistan goes thorough the Marakand–Navoi section because Navoi is an industrial center in Uzbekistan as shown in [Table 3.1-27].

[Table 3.1-31] Railway Freight Traffic Volume and Turnover through the Marakand–Bukhara Section by Transport Type

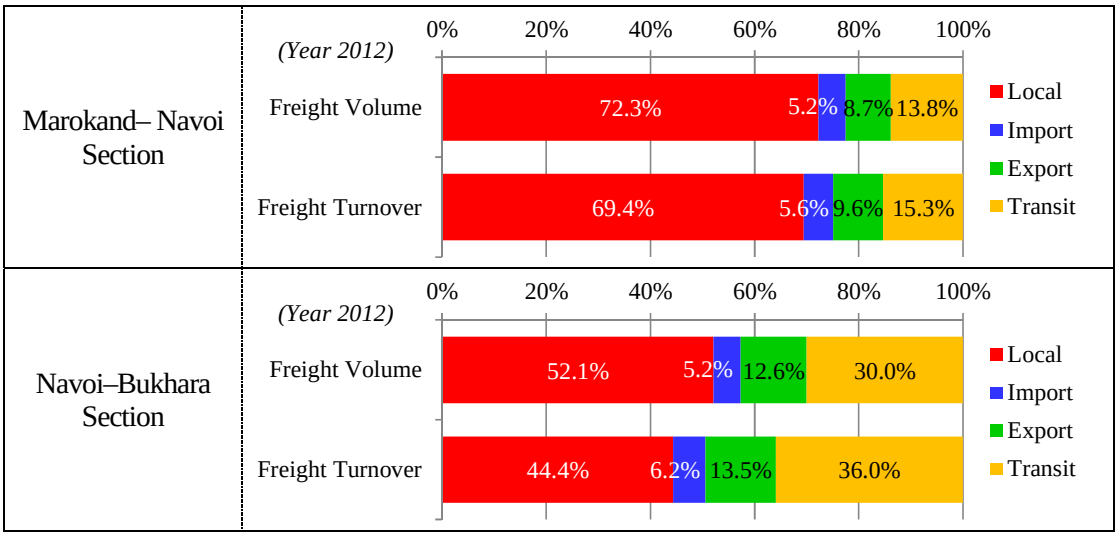
	Freight Volume *(thousand ton)*						**Freight Turnover** *(million ton-km)*					
	2008	*2009*	*2010*	*2011*	*2012*	*2012/2008*	*2008*	*2009*	*2010*	*2011*	*2012*	*2012/2008*
< Marakand–Navoi Section >												
Total	**9,896.3**	**10,185.2**	**9,435.7**	**8,971.2**	**9,383.8**	**–5.2%**	**1,281.0**	**1,314.2**	**1,220.7**	**1,161.0**	**1,167.4**	**–8.9%**
Local	6,422.0	6,733.0	6,594.8	6,628.4	6,780.3	+5.6%	804.4	840.7	834.8	840.9	810.1	+0.7%
Import	497.9	640.5	417.7	483.8	488.6	–1.9%	66.7	86.4	55.5	65.1	65.9	–1.3%
Export	953.4	947.3	1,023.1	727.7	817.8	–14.2%	130.7	129.8	137.3	98.9	112.4	–14.0%
Transit	2,023.0	1,864.4	1,400.2	1,131.3	1,297.1	–35.9%	279.2	257.3	193.2	156.1	179.0	–35.9%
< Navoi–Bukhara Section >												
Total	**9,317.0**	**9,668.3**	**8,720.5**	**8,621.3**	**9,384.4**	**+0.7%**	**681.3**	**730.2**	**662.3**	**668.9**	**728.6**	**+7.0%**
Local	4,590.2	4,758.9	4,406.6	4,474.7	4,889.7	+6.5%	271.9	289.9	270.3	294.7	323.5	+19.0%
Import	458.8	601.7	310.3	394.7	490.6	+6.9%	41.6	55.3	28.3	35.8	45.0	+8.3%
Export	1,238.0	1,520.9	1,505.7	1,146.8	1,186.5	–4.2%	86.0	125.9	131.3	96.1	98.1	+14.1%
Transit	3,030.0	2,786.8	2,497.8	2,605.1	2,817.6	–7.0%	281.8	259.2	232.3	242.3	262.0	–7.0%

(Source: UTY)



(Source: UTY)

[Fig. 3.1-5] Railway Freight Traffic Volume and Turnover through the Marakand–Bukhara Section by Transport Type



(Source: UTY)

[Fig. 3.1-6] Railway Freight Traffic Distribution through the Marakand–Bukhara Section by Transport Type in 2012

b) Freight Traffic Volume and Turnover by Commodity

The railway freight traffic distribution by commodity through the Marakand–Bukhara section in 2012 is shown in [Fig. 3.1-8], and the railway freight traffic volume and turnover through this section by commodity is shown in [Table 3.1-32] and [Fig. 3.1-8].

i) Freight Traffic Volume by Commodity

As for the share of freight traffic volume by commodity in 2012 through the Marakand–Navoi section, other (about 26%) held the highest share, followed by construction materials (about 24%), fertilizer (about 15%), cement (about 10%) and ore (about 7%). As for that through the Navoi–Bukhara section, cement (about 30%) held the highest share, followed by crude oil and other (about 18% respectively), construction materials (about 12%) and fertilizer (about 9%). As compared with the share of freight traffic volume of the top three commodities (other, crude oil and construction materials) in Uzbekistan, it is characteristic that the share of fertilizer through the Marakand–Navoi section and that of cement through the Navoi–Bukhara section were high.

As for the rate of change from 2002 to 2012, ore, construction materials and fertilizer increased 130%, 45% and 5% respectively, and crude oil, timber, ferrous metals and cement decreased 50%, 35%, 33% and 26% respectively on the Marakand–Navoi section. Crude oil, fertilizer, cement and construction materials increased 172%, 12%, 10% and 9% respectively, and ore, coal, grain crops, ferrous metals and cotton decreased 82%, 82%, 54%, 42% and 42% respectively on the Navoi–Bukhara section.

ii) Freight Turnover by Commodity

As for the share of freight turnover by commodity in 2012 through the Marakand–Navoi section, other (about 27%) held the highest share, followed by construction materials (about 23%), fertilizer (about 16%), cement (about 11%) and ferrous metals (about 7%). There was little

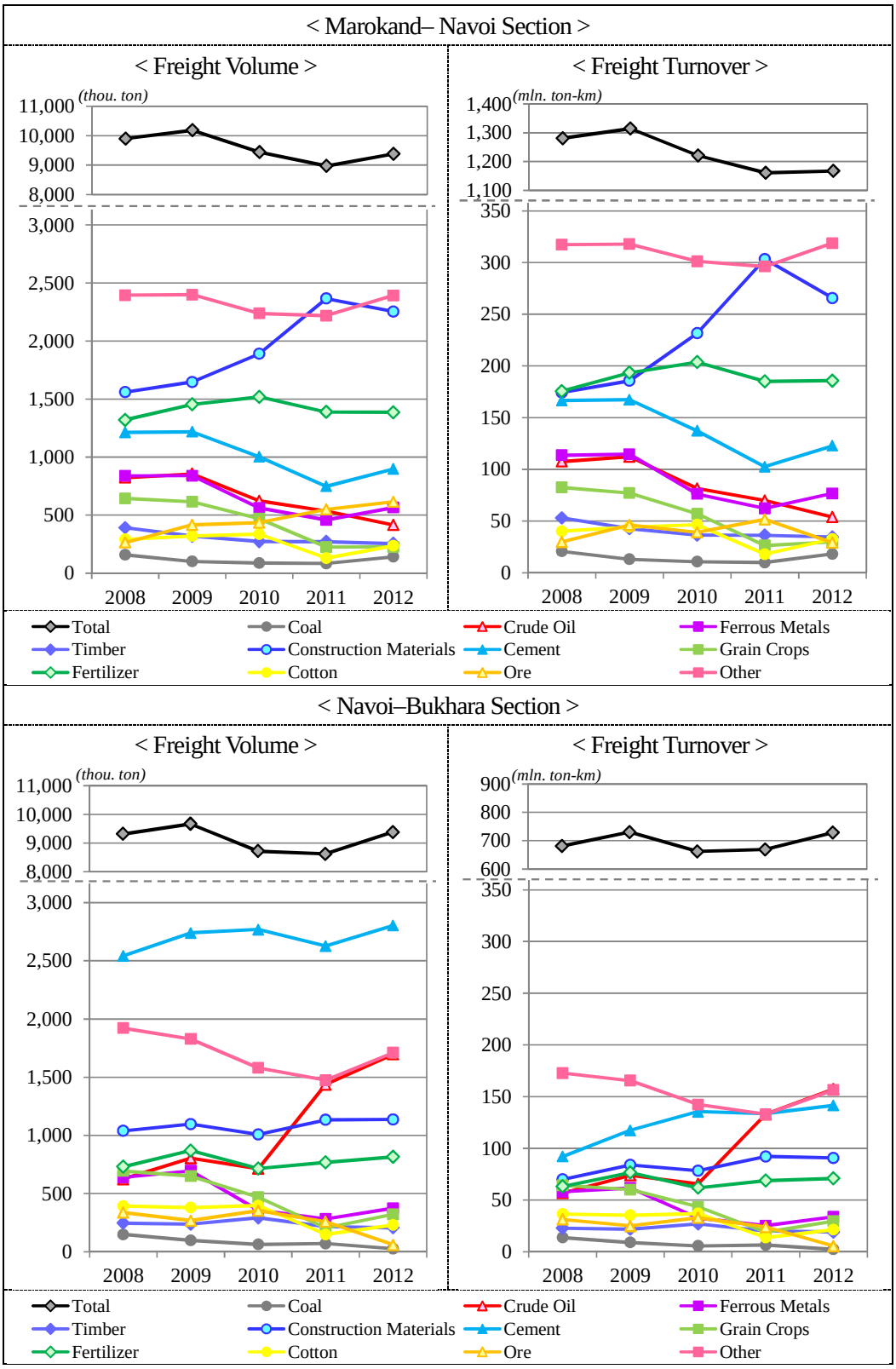
difference between the share of freight turnover and freight traffic volume by commodity in 2012. As for that through the Navoi–Bukhara section, crude oil (about 22%) held the highest share, followed by other (about 21%), cement (about 19%), construction materials (about 12%) and fertilizer (about 10%). Compared with freight traffic volume, the share of cement was low, and the share of crude oil and other were high. As compared with the share of freight turnver of the top three commodities (other, crude oil and construction materials) in Uzbekistan, it is characteristic that the share of fertilizer through the Marakand–Navoi section and that of cement through the Navoi–Bukhara section were high as with freight traffic volume.

As for the rate of change from 2002 to 2012, on the Marakand–Navoi section, construction materials and fertilizer increased 52% and 6%, and crude oil, timber, ferrous metals and cement decreased 50%, 35%, 32% and 26% respectively. On the Navoi–Bukhara section, crude oil, cement, construction materials and fertilizer increased 177%, 54%, 30% and 12% respectively, and ore, coal, grain crops, ferrous metals and cotton decreased 83%, 83%, 54%, 42% and 42% respectively.

[Table 3.1-32] Railway Freight Traffic Volume and Turnover through the Marakand–Bukhara Section by Commodity

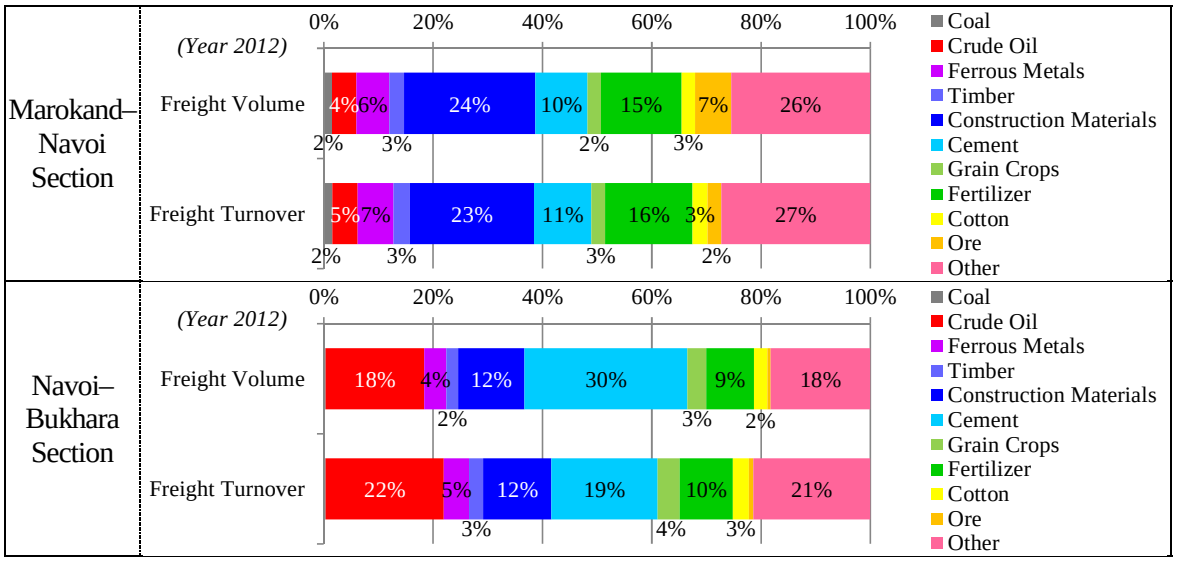
	Freight Volume *(thousand ton)*						**Freight Turnover** *(million ton-km)*					
	2008	*2009*	*2010*	*2011*	*2012*	*2012/2008*	*2008*	*2009*	*2010*	*2011*	*2012*	*2012/2008*
< Marakand–Navoi Section >												
Total	**9,896.3**	**10,185.2**	**9,435.7**	**8,971.2**	**9,383.8**	**–5.2%**	**1,281.0**	**1,314.2**	**1,220.7**	**1,161.0**	**1,167.4**	**–8.9%**
Coal	158.1	101.4	87.1	83.1	141.1	–10.8%	20.6	13.1	10.6	9.8	18.1	–12.2%
Crude Oil	823.7	855.1	622.8	533.9	414.5	–49.7%	107.6	112.2	81.4	69.8	53.8	–50.0%
Ferrous Metals	838.3	839.6	561.4	458.0	564.9	–32.6%	113.5	114.6	76.1	62.2	76.7	–32.4%
Timber	391.1	319.5	272.5	272.0	254.9	–34.8%	52.9	42.7	36.4	36.3	34.5	–34.9%
Construction Materials	1,559.3	1,646.5	1,890.4	2,366.7	2,254.4	+44.6%	174.4	185.6	231.6	303.3	265.6	+52.3%
Cement	1,212.8	1,218.5	1,002.8	747.9	897.8	–26.0%	166.5	167.3	137.3	102.6	122.8	–26.2%
Grain Crops	643.7	614.8	469.7	224.2	226.9	–64.8%	82.5	77.1	57.0	26.3	29.8	–63.9%
Fertilizer	1,320.4	1,454.1	1,518.8	1,388.9	1,385.4	+4.9%	175.6	193.5	203.6	185.1	185.8	+5.8%
Cotton	291.0	319.8	336.2	129.4	236.2	–18.8%	40.2	44.1	46.4	17.9	32.6	–18.8%
Ore	263.1	416.0	435.3	548.6	614.6	+133.6%	29.7	46.1	39.0	51.5	29.1	–2.2%
Other	2,394.7	2,399.9	2,238.6	2,218.6	2,392.9	–0.1%	317.4	317.9	301.2	296.2	318.7	+0.4%
< Navoi–Bukhara Section >												
Total	**9,317.0**	**9,668.3**	**8,720.5**	**8,621.3**	**9,384.4**	**+0.7%**	**681.3**	**730.2**	**662.3**	**668.9**	**728.6**	**+7.0%**
Coal	148.5	97.4	62.6	70.9	26.1	–82.4%	13.8	8.9	5.7	6.5	2.4	–82.8%
Crude Oil	625.2	804.9	714.3	1,438.5	1,698.8	+171.7%	56.9	73.9	65.7	133.0	157.4	+176.5%
Ferrous Metals	639.4	695.5	358.3	280.8	373.7	–41.5%	57.9	61.7	32.6	25.2	33.7	–41.8%
Timber	246.3	236.9	292.1	215.6	205.9	–16.4%	22.7	21.8	26.9	20.0	19.1	–15.9%
Construction Materials	1,038.9	1,096.7	1,007.8	1,133.4	1,136.9	+9.4%	69.9	83.9	78.4	92.1	90.6	+29.6%
Cement	2,543.5	2,740.4	2,770.1	2,628.0	2,805.0	+10.3%	92.2	117.4	135.5	133.6	141.6	+53.5%
Grain Crops	693.2	650.2	468.4	203.8	321.6	–53.6%	64.2	60.1	43.5	18.9	29.7	–53.8%
Fertilizer	730.9	868.8	715.0	768.6	815.4	+11.6%	63.1	76.6	61.9	68.7	70.9	+12.4%
Cotton	392.5	379.6	397.2	148.3	229.3	–41.6%	36.5	35.3	36.9	13.8	21.3	–41.6%
Ore	336.9	268.9	353.8	259.1	60.0	–82.2%	31.3	25.0	32.9	24.1	5.6	–82.2%
Other	1,921.6	1,828.9	1,580.8	1,474.4	1,711.5	–10.9%	172.7	165.4	142.4	132.9	156.4	–9.4%

(Source: UTY)



(Source: UTY)

[Fig. 3.1-7] Railway Freight Traffic Volume and Turnover through the Marakand–Bukhara Section by Commodity



(Source: UTY)

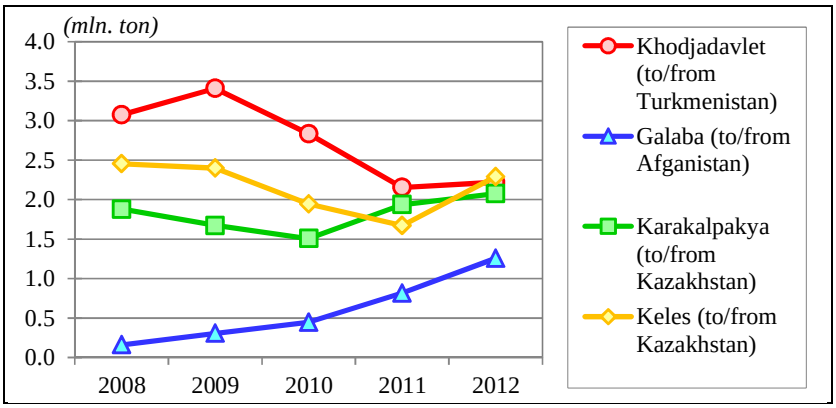
[Fig. 3.1-8] Railway Freight Traffic Distribution through the Marakand–Bukhara Section by Commodity in 2012

c) Freight Traffic Volume through Marokand-Bukhara Section by Cross-border Station

In the railway freight volume on the Marakand–Bukhara section, the railway freight volume through 4 cross-border stations shown in [Fig. 3.1-9], which are Khodjadavlet Station bordering Turkmenistan, Galaba Station bordering Afghanistan, Karakalpakya Station bordering Kazakhstan and Keles Station bordering Kazakhstan, is shown in [Fig. 3.1-10].

(Source: Survey Team)

[Fig. 3.1-9] Location Map of Cross-border Stations



(Source: UTY)

[Fig. 3.1-10] Railway Freight Traffic Volume through Marokand–Bukhara Section by Cross-border Station

In the freight volume through the 4 cross-border stations, Khodjadavlet Station decreased in 2010 and 2011, Keles Station decreased in 2009−2011 and Karakalpakya Station decreased in 2009 and 2010 as compared with the year before. After that 2 stations increased again, Keles Station increased to the level of about -7% and Karakalpakya Station increased to the level of about +11% compared with 2008. On the other hand, Khodjadavlet Station decreased about 28% in 2012 compared with 2008. In 2012, the freight volume of transit transport from/to Turkmenistan increased again but the freight volume of export transport to Turkmenistan was decreasing.

The decrease in 2009 and 2010 was affected by the economic downturn following the Lehman shock in 2008. But Keles Station and Karakalpakya Station which decreased in 2011 were also affected by the decrease of freight volume from Kazakhstan and China especially in transit transport. The reason for this was that there was a lack of container wagons in Kazakhstan because Kazakhstan returned container wagons to the Russian Federation and freight transport was delayed near the border between China and Kazakhstan in 2011 (refer to "The Current Condition of Goods Distribution in Uzbekistan", JETRO, January 2013) . This problem was almost solved in 2012 because Kazakhstan procured open wagons from China. But it is considered that this problem was the main reason for the reduction of freight traffic volume through the Marakand−Bukhara section in 2010 and 2011 (refer to [Table 3.1-31] and [Fig. 3.1-5]).

On the other hand, the freight volume through Galaba Station was only 161 thousand ton in 2008, after that it was increasing until 2012. It was about 1.3 million ton in 2012 and increased about 7.8 times compared with 2008. The operation of the railway line from Hairatan to Mazar-e-Sharif (75km) in Afghanistan connecting to Galaba Station started in December 2011, so the freight traffic flow is expected to increase with Afghanistan's reconstruction.

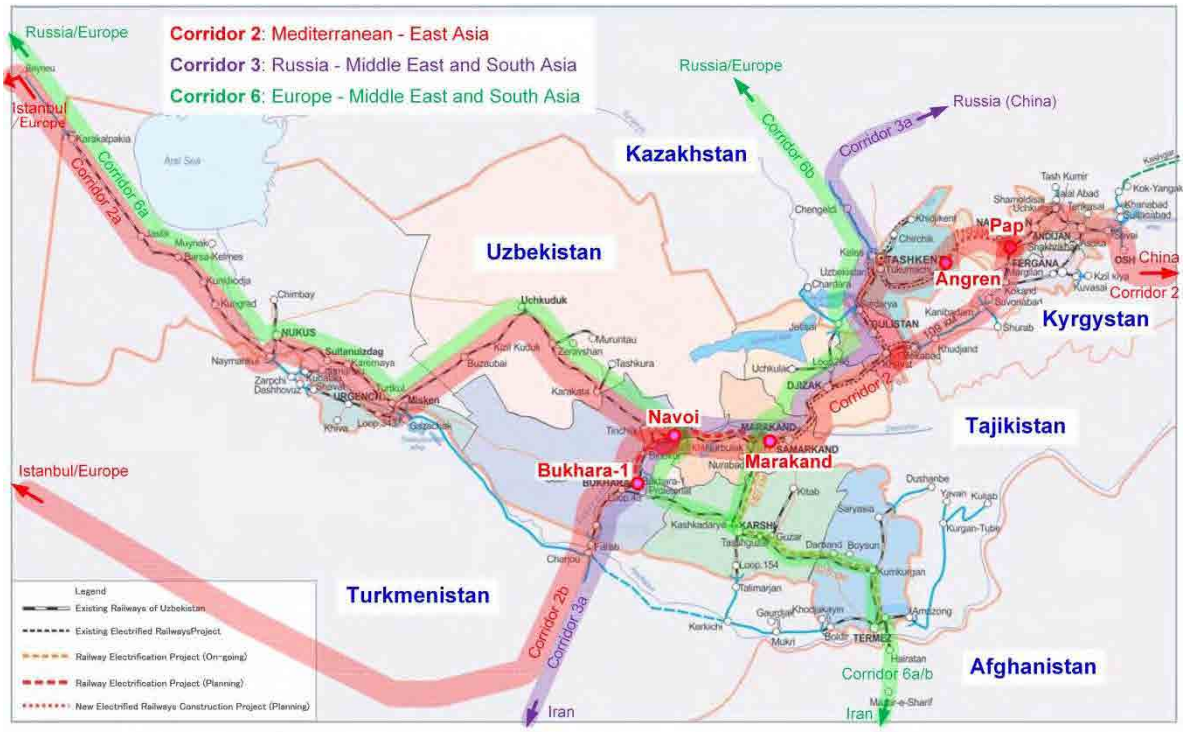
d) Relation between the Marakand–Bukhara section and International Transport Corridors

Taking CAREC corridors (refer to [Fig. 2.3-11]) for example, which are mentioned in section "2.3.3. Transport Sector Development Plan" as international transport corridors through Uzbekistan, the relation between the Marakand–Bukhara section and international transport corridors is shown in [Fig. 3.1-8].

The three CAREC corridors (Corridor 2 (or 2b), Corridor 3a and Corridor 6a) pass through the Marakand–Bukhara section, so this section is an important section which connects Uzbekistan with its neighboring countries, Europe, Russia, Iran, China, etc. According to interviews with ADB staff, the traffic volume of the route to Kazakhstan through Karakalpakstan (Corridor 2a and 6a) and the route to Afghanistan (Corridor 6) has increasing in recent years, and these two routes are increasing in importance. The corridors relating to these two routes pass through the Marakand–Bukhara section, so this section is also increasing in importance. The increase in railway traffic volume of these two routes can be confirmed from [Fig. 3.1-10] as shown in section c) above.

Of the three corridors through the Marakand–Bukhara section, the corridor which impacts the future demand trends of the Marakand–Bukhara section will be Corridor 2. The reason for this is that two new railway line projects, the Angren–Pap new electrified railway line construction project (refer to [Table 3.1-1]) and the new railway line construction project between Kyrgyzstan and China, are planned to be implemented on Corridor 2 and it will thus be easier to transport cargo by railway than at present due to the completion of these two new railway line projects. The project between Kyrgyzstan and China involves the development of a new route from China to Russia and Europe for China. There is therefore a possibility that the future demand on the Marakand–Bukhara section will exceed the forecast of the Pre-F/S report.

The CAREC corridor routes and the Medium-Term Priority Projects (MTPP) are currently under review with the CAREC Transport and Trade Facilitation Strategy 2008~2017, and the CAREC corridor routes and the MTPPs including Turkmenistan and Pakistan who joined in 2010 will be approved by the governments of the member countries in October 2013.



(Source: Survey Team)

[Fig. 3.1-11] Relation between the Marakand–Bukhara section and CAREC Corridors

3) Facilities Plan

The landscape continues to be somewhat undulating for a while near Marakand. Moving westward, it becomes flat and the wide railway land continues up to Bukhara-1 Station (refer to [Pic. 3.1-1]).

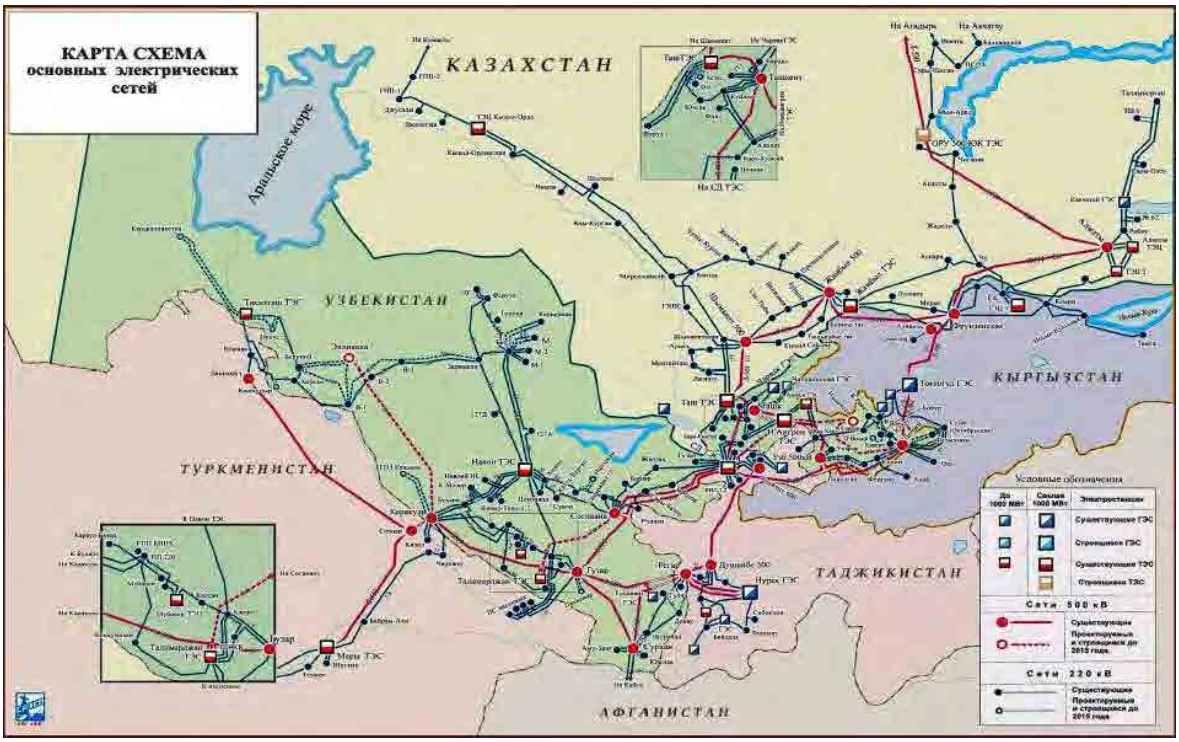
The power supply in Uzbekistan is run by the power transmission lines of "Uzbekenergo" SJSC which are composed of special high-tension power supply of 500kV-220kV-110kV (refer to [Fig. 3.1-12]). In case of railway electrification, it is necessary to receive electric power from transmission line system with large short-circuit capacity, considering the load characteristics of electric railways. From the site survey and transmission line layout drawings, the transmission lines of both 220kV and 110kV are located near the railway line. So if the dedicated transmission line of about 8-18km will be built, the section will be able to receive electric power through it.

The feeding substations have been planned to be provided at 4 locations in the section between Marokand and Bukhara-1 (refer to [Fig. 3.1-13]). However, it is taken into account to build one more substation in case the section adopted double-tracking and the line capacity increased. Furthermore, considering future double-tracking, it is designed that the necessary space should be secured for the land of substations and the space in the building of substations. Fundamentally, the traction calculations have been accepted to determine areas covered by feeders, and the distance between each substation has been set to be about 50 km. The sectioning posts have been planned to be installed at the middle points between each substation in order to separate different phase power sources.

The measures against inductive disturbance on telecommunication lines and the measures against three-phase unbalance, and power control for this section are in accordance with (2) 3).

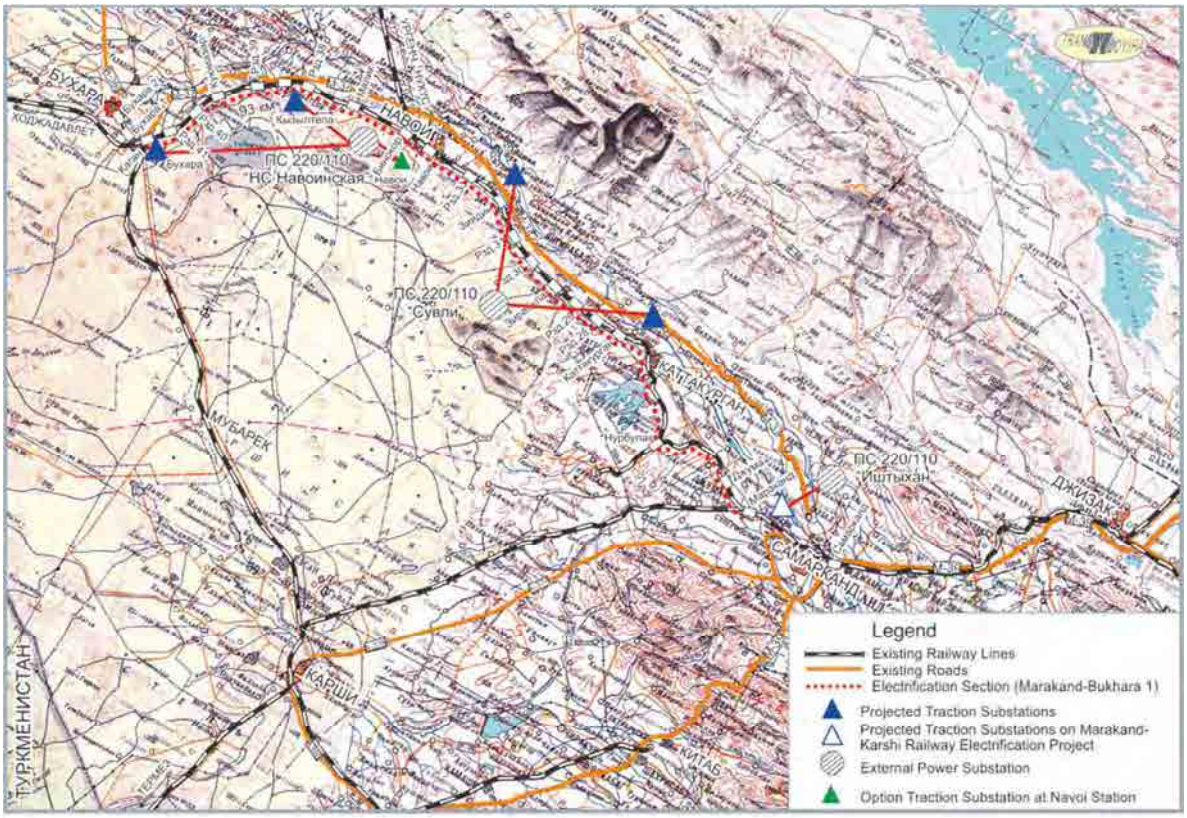
(Source: Survey Team)

[Pic. 3.1-1] Current Condition along Marokand–Bukhara Section



(Source: Uzbekenergo Website)

[Fig. 3.1-12] Transmission line layout drawing of Uzbekenergo



(Source: Pre-F/S Report of the Project for Electrification of Marakand–Bukhara Railway Section–Book 2 Part 1, UTY)

[Fig. 3.1-13] Location of Substations on Marakand–Bukhara Section

4) Investment Plan

The structure of project costs by financial sources is shown in [Table 3.1-33].

Of the total project costs which will be about 587 million US$, the share of attracted funds will be about 42%. As for the cost items, the share of construction works and equipment will be about 62% and 29% respectively.

[Table 3.1-33] Structure of Project Costs by Financial Source of Electrification Project of Marakand–Bukhara Railway Section

(Unit: thous. US$)

Name of Costs	Total		UTY's Own Funds	Attracted Funds
Pre-investment Costs, including	**23,926.5**	(4.1%)	**23,926.5**	**0.0**
Preliminary Feasibility Study Stage	1,659.7	(0.3%)	1,659.7	-
Feasibility Study Stage	2,489.5	(0.4%)	2,489.5	-
Tender Stage	453.3	(0.1%)	453.3	-
Detailed Design Stage	19,323.9	(3.3%)	19,323.9	-
Capital Investments, including	**562,604.5**	(95.9%)	**313,896.3**	**248,708.2**
Construction Works	366,131.0	(62.4%)	291,960.4	74,170.7
Imported Materials and Parts	74,170.7		-	74,170.7
Construction, Installation and Local Materials	287,842.3		287,842.3	-
Field Supervision and	4,118.1		4,118.1	-
Equipment	167,880.9	(28.6%)	21,715.6	146,165.3
Imported	146,165.3		-	146.165.3
Local	21,715.6		21,715.6	-
Contract Supervision and Start-up and Commissioning Works	22,036.2	(3.8%)	-	22,036.2
Customs Clearance	220.3	(0.04%)	220.3	-
Consulting and Engineering Services	6,336.0	(1.1%)	-	6,336.0
Financial Costs	**333.6**	(0.06%)	**333.6**	-
Total Project Cost (excluding taxes and deductions)	**586,864.6**	(100.0%)	**338,156.4** (57.6%)	**248,708.2** (42.4%)

(Source: Pre-F/S Report of the Project for Electrification of Marakand–Bukhara Railway Section–Book 5, UTY)

5) Project Effects

The maximum and scheduled speed by traction energy are shown in [Table 3.1-34], and the economic effect from saving expenses for traction energy is shown in [Table 3.1-35].

If the diesel locomotives will be changed into the electric locomotives by railway electrification, the maximum speed will increase 10 km/h (+11%) for freight trains and 60 km/h (+60%) for passenger trains, and the scheduled speed will increase 17 km/h (+52%) for freight trains, 12 km/h (+17%) for long distance passenger trains and 14 km/h (+39%) for suburban passenger trains. So the speedup effect of freight trains will be the highest.

And the traction energy costs will decrease about 211 million US$ (-67%) and the locomotive

maintenance costs will decrease about 290 million US$ (-81%) by changing the diesel locomotives into electric locomotives. For those cost items, a large cost reduction will be planned.

[Table 3.1-34] Maximum and Scheduled Speed by Traction Energy of Electrification Project of Marakand–Bukhara Railway Section

Item		Diesel Traction	Electric Traction	(Electric) – (Diesel)
Maximum Speed	Freight Train	90 km/h	100 km/h	+10 km/h (+11.1%)
	Passenger Train	100 km/h	160 km/h	+60 km/h (+60.0%)
Scheduled Speed	Freight Train	33 km/h	50 km/h	+17 km/h (+51.5%)
	Passenger Train (Long Distance)	70 km/h	82 km/h	+12 km/h (+17.1%)
	Passenger Train (Suburban)	36 km/h	50 km/h	+14 km/h (+38.9%)

(Source: Pre-F/S Report of the Project for Electrification of Marakand–Bukhara Railway Section–Book 1, UTY)

[Table 3.1-35] Economic Effect from Saving Direct Expenditures of Electrification Project of Marakand–Bukhara Railway Section

(Unit: mln. US$)

Item	Diesel Traction	Electric Traction	(Electric) – (Diesel)
Expenses for Traction Energy	316.26	105.64	-210.62 (-66.6%)
Expenses for Locomotive Maintenance	358.58	68.09	-290.49 (-81.0%)
Total	**674.84**	**173.73**	**-501.11 (-74.3%)**

(Source: Pre-F/S Report of the Project for Electrification of Marakand–Bukhara Railway Section–Book 5, UTY)

6) Economic and Financial Analysis

The results of the Financial Analysis of the project are shown in [Table 3.1-36], and the preconditions of three estimated models on the financial analysis are as follows.

< Preconditions of Three Estimated Models on Financial Analysis >

Case A: Model in the non-inflationary environment;

Case B1: Model taking into consideration the inflationary risks only for the operating part

Case B2: Model taking into consideration the inflationary risks both for the investment and operating parts

[Table 3.1-36] Results of Financial and Economic Analysis of Electrification Project of Marakand–Bukhara Railway Section

Item		Unit	Financial Analysis			Economic Analysis
			Case A	Case B1	Case B2	
Calculation Period		years	28			unknown
Discounted Rate		%	6			unknown
Net Present Value (NPV)		thou.US$	-269,360.4	174,905.2	2,359.2	402.199.1
Internal Rate of Return (IRR)		%	2.4	11.4	8.7	unknown
Payback Period	Not Discounted	years	21.0	8.0	10.4	-
	Discounted	years	51.8	21.6	27.9	-
Return on Investment (ROI)	Not Discounted	-	1.3	3.5	2.7	Less than 1
	Discounted	-	0.5	1.3	1.0	unknown

(Source: Pre-F/S Report of the Project for Electrification of Marakand–Bukhara Railway Section–Book 5, UTY)

Regarding the financial analysis, the FIRR of Case B1 and Case B2 is higher than the discounted rate, so the financial feasibility of this project will be high. But the FIRR of Case A is lower than the discounted rate, so the financial feasibility of this project will be low. In the part of financial analysis in the Pre-F/S report, the result of financial analysis is written that "taking into consideration the importance of the role in transportation infrastructure of Uzbekistan as well as their significance for development of national economy in general, the project was recommended for implementation from the indicators of financial effectiveness."

In developing countries, it is difficult to imagine that there will not be inflation in the future, so the preconditions of Case A are excessively safe. On the other hand, if it is considered that there will be inflation during the construction phase, the preconditions of Case B2 are safer than that of Case B1. Then in the result of financial analysis of Case B2, the FIRR is 2.7% higher than the discounted rate, the payback period is the same as the calculation period, and the discounted return on investment is 1.0.

The calculation period in the financial analysis of this project is not short compared with the payment period of loan of on-going railway electrification projects which is 25 years for the Marakand–Karshi railway electrification project and 30 years for the Karshi–Termez railway electrification project. To better evaluate the financial feasibility of this project, it is necessary that the demand of the case in which this project will be implemented is better appropriately forecasted by taking account of the difference of the transport capacity, the level of transport service, etc. between the with case and the without case. This is also necessary to better evaluate the economic feasibility.

3.2. Contents of Assistance with Japan's Superiority on the Development of Railway Infrastructure

3.2.1. Current Situation of Japanese Companies Advancing in Uzbekistan

(1) Overall Trend

1) Overview

There are 18 Japanese companies which are operating in Uzbekistan as of 2012 (refer to [Table 3.2-1]). More than half of these companies are trading companies, and the rest are companies in logistics, communication, automobiles, sales of construction machines, etc. In general, many of these companies are doing businesses related to projects funded by Japanese loans.

[Table 3.2-1] Japanese Companies Operating in Uzbekistan

Category	Business domain	Name of company
Representative office	Trading	Itochu Corporation, Sumitomo Corporation, Marubeni, Mitsui & Co. Ltd, Mitsubishi Corporation, Toyota Tsusho Corporation
	Construction	Shimizu Corporation
	Electricity	NEC Corporation
	Consulting	Japan Transporation Consultants, Inc.
	Other	Overseas Merchandise Inspection Co. Ltd., Eurasia Koueki
Local company	Logistics	ITS Nippon Ltd. ITS Nippon Ltd.
	Construction machines	Marukomu Kuririsshu Tefunika
Joint-venture company	Communication	East Telecom Ltd., Super Imax
	Manufacturing	Samu Oto

(Source: Compiled by the Survey Team based on JETRO material)

Looking at the economic ties between Japan and Uzbekistan, in 2001 direct flights between the two countries started, and an investment pact came into effect in September 2009. Besides, Uzbekistani people relatively trust the quality of Japanese products, especially products made in Japan.

2) Challenges for Japanese Companies Operating in Uzbekistan

Uzbekistan ranks at number 177 of 183 countries in terms of corruption perception according to a survey by Transparency International in December 2011, 164 of 179 countries in terms of economic freedom according to a survey by the Heritage Foundation in January 2012, and 166 of 183 countries in terms of business difficulty according to a survey by the World Bank in June 2011. It can be considered that Uzbekistan is not an easy country for foreign companies to expand their business.

Besides, according to a questionnaire survey conducted by the Uzbekistan government in early 2012 which targeted approximately 5000 foreign companies, including Japanese companies, diplomatic groups, and international organizations etc., some challenges for business have been identified as follows:

- Finance-related challenges (difficulty with banking transactions (difficulty to exchange between Sum and other currencies, the existence of multiple exchange rates, and weak banking system for money transfers, etc.), difficulty in receiving loans)
- Infrastructure-related challenges (stable supply of gas and electricity, etc.)

Under these circumstances, it is considered that in the near future, Japanese will have to continue to rely on donor-funded projects or to collaborate with local companies. On the other hand, as Uzbekistan is located in a strategic location and has the potential to be a base for Japanese companies in the long term, it is important from a Japanese viewpoint to promote its companies' continuous business in Uzbekistan through Japanese loan projects. As new measures such as newly setting up a special economic zone or relaxation of applying range for preferential treatment to investors are being considered, it can be considered that in the long run, more and more Japanese companies will advance their businesses in Uzbekistan.

(2) Necessary Conditions for Japanese Companies to Enter Uzbekistan's Railway Sector

Regarding Uzbekistan's railway sector, looking at the amount of loans from donors, the ranking is Japan, China, Asia Development Bank and Europe. It is a fact that although Japan is extending many loans to Uzbekistan's railways, there haven't been many cases where Japanese companies could receive orders from those yen-loan projects. Common requirements from Japanese companies for railway projects in Uzbekistan in the future can be summarized as follows:

1) It is necessary to generate possibilities for local business expansion.

At the moment, as Japanese companies are expressing a certain amount of caution about Uzbekistan's system for foreign currency transfer, it is extremely difficult to implement projects on local currency basis. Therefore, it has become difficult for Japanese companies to receive orders from non-donor projects. As a result, even if Japanese companies can receive orders from donor projects, because there is no prospect for business expansion, Japanese companies haven't been able to create project value above those donor projects. From a long-term viewpoint, it is desirable that yen-loan projects can create a basis for Japanese companies to continuously keep their businesses running in the long run.

2) It is necessary for Uzbekistan to put more emphasis on technology.

Compared to Japan, it appears that while procuring for railways projects in Uzbekistan, more emphasis is put on short-term financial benefits. Therefore, it can be seen that the technology aspect in procurement is still not highly evaluated.

On the other hand, it is the general perception of Japanese companies that, considering aspects such as the rise of demand for railways, the increase of freight, safety improvement of railway transport, speed-up of railway service etc., in the future, Uzbekistan should put more emphasis on the technical aspect when evaluating procurement projects.

The overall trend in the international arena is that, in procurement bidding for railway projects, the emphasis is more on the technical aspects than on the price. The reason is because the trending perception has become that, even if railway projects are procured with heavy emphasis on the price, users and operators of the projects will not sufficiently experience long-term benefits generated from such projects. In other words, people are more and more recognizing that, in procurement is carried out with heavy emphasis on price, it will be difficult to procure products and components that contribute to ensuring mid- to long-term quality service (components that come with advanced technology that contribute to speed-up or safety guarantee), or products and components that contribute to mid-to-long term improvement of railway projects (inexpensive technology from the viewpoint of life cycle costs).

3) It is necessary to strengthen collaboration with local partners.

Regarding Uzbekistan's railway sector, local companies, including UTY's affiliates, with know-how about railway projects in each expertise area have been identified. Normally, it is essential that Japanese companies implement overseas railway projects in collaboration with local partners. However, it is possible that the current situation of local partners has not been fully understood. In the future, for Japanese companies to actively advance into Uzbekistan's railway sector, it is considered that they need to understand the technical strengths of local partners and form partnership relationships with local partners (refer to section 2.5.4 (2) for details).

3.2.2. Analysis of Priority Order of New Railway Electrification Projects

In this section, perspectives about priority order of railway projects in Uzbekistan are organized, and with consideration about aspects such as evaluation standards for Japanese yen loan projects, priority of the country's future railway projects in case Japanese loans are applied are considered.

(1) Perspectives about Prioritized Projects in Uzbekistan

Results from interviews conducted by the survey team with UTY's investment department indicate that detailed project plans in the railway sector in Uzbekistan are determined by UTY's business plan. This plan was compiled in accordance with presidential decrees as well as the country's general policies. According to this business plan, the presidential decrees, which were mentioned in details as an upper policy in this document, are "Prioritization of industry development in Uzbekistan from 2011 to 2015" (Presidential decree number 1442, issued on December 15, 2010) and "Promotion of construction of infrastructure, transportation, communication facilities from 2011 to 2015" (Presidential decree number 1446, issued on December 21, 2010).

In these presidential decrees and the aforementioned business plan, although there is no mention about direct methods for determination of prioritization of projects, however, the documents touched on reasons to prioritized projects. This section reviews the aforementioned presidential decrees are business plan, and makes clear Uzbekistan's perspectives when making plans for railway-related projects.

1) Perspectives on Prioritized Projects in the Presidential Decrees

In the Presidential Decree No. PP-1442, "Prioritization of industry development in Uzbekistan from 2011 to 2015" (issued on December 15, 2010), projects are planned based on the following perspectives:

- Establish an industry structure basis and concretize long-term goals
- Enhance domestic industry, reduce economical growth's dependence on foreign countries, expand and develop regulations and tax system, etc.
- Evolve the structuring of energy, chemicals, textiles industries etc. which directly link to rapid economic growth
- Accomplish significant modernization of technology and human resources
- Accomplish sustainable growth of the export industry
- Enhance collaboration among industries
- Continued improvement of productivity through improvement of labor efficiency or reduced use of raw materials etc.
- Ensure international competitiveness

The Presidential Decree No. PP-1442 "Prioritization of industry development in Uzbekistan from 2011 to 2015" states the main policies regarding industrial development, and stops at mentioning the importance of investment in the railway sector in order to improve productivity or modernization of the country's industries.

On the other hand, in Presidential decree No. PP-1442, "Prioritization of industry development in Uzbekistan from 2011 to 2015" (issued on December 15, 2010), projects are planned based on the following perspectives:

- Develop modern and attractive transportation, communication system and infrastructures etc. to attract domestic and foreign investment
- Promote projects that contribute to the integration of a domestic road system that is not inferior to international standards
- Promote modernization of the domestic railway sector that includes expansion of railway facilities, increasing the speed between Tashkent and Samarkand, electrification between Bukhara and Karshi, modernization of rolling stock, etc.
- Enhance air transportation including modernization of aircrafts and ensure the safety of passengers
- Modernize and accelerate the development of communication-related facilities including improvement of communication environment
- Develop a new transportation network that contributes to the export of domestic products and the development of international transportation networks
- Develop and improve facilities and services along roads and railway routes
- Procure equipment that contributes to the upgrading of domestic roads
- Modernize and upgrade water supply and sewage systems and the electricity sector with the focus on rural areas

- Sustainably reduce costs related to development and utilization of infrastructure (transportation, communication etc.) by methods such as introducing new energy

It can be gathered from Presidential decree number 1446 that the focus is on the modernization of the infrastructure sector including railway facilities. In addition, regarding the railway sector, the speed-up of rail services between Tashkent and Samarkand and the electrification between Bukhara and Karshi are specified as prioritized projects, and can be considered as focused projects in upper policies.

2) Descriptions about Project Prioritization in the Business Plan

In the Business Plan which was published in 2013 by UTY, concrete projects that need to be promoted are specified in accordance with the presidential decrees.

a) Overall

Issues that need to be addressed in the railway sector are as follows:

- Develop a unified network
- Continue electrification of major sections
- Modernize the road systems, develop the communication network and expand a consistent railway network
- Develop the railway sector based on maintenance of existing rolling stock
- Refurbish and upgrade rolling stock
- Develop an alternative transportation network that supports access to international markets and contributes to promote Uzbekistan's exports

b) Upgrade of Rolling Stock

Regarding the upgrade of rolling stock, it is important to consider the following points:

- Formulate a stable transportation system that can satisfy economic growth and transportation demand
- Develop, improve and renovate railway infrastructure
- Increase the number of rolling stock to meet the increase in demand
- Increase the speed of passenger railways
- Improve railway safety
- Introduce state-of-the-art technology

c) Rolling Stock Refurbishment

UTY recognizes the needs to refurbish their rolling stock in order to cope with the increase in demand, to shorten the time required to unload freight and to shorten the time required to maintain freight wagons.

d) Track

The plan states that track maintenance must be implemented in accordance with existing rules,

in order for the track to meet safety standards and ensure continuous operation under stable speed.

e) Electrification

The main object of electrification is to cope with the increase in demand and to reduce transportation costs. In addition, contribution to environment mainly by preventing air pollution is also considered to be an objective of electrification.

f) Signaling and Communication

It is stated that in order to ensure smooth and safe operation, signaling and communication facilities need to be improved.

g) Formulation of an International Network

It is stated that from the viewpoint of improving Uzbekistan's international competitiveness, it is extremely important to formulate a railway network with Uzbekistan at its center.

3) Answer from UTY's Investment Department

According to UTY's Investment Department, UTY considers the following aspects when actually considering the priority of projects:

- Contribution to the unification of network in Uzbekistan
- Railway electrification
- Modernization of signaling, interlocking and communication devices
- Maintenance of railway and tracks
- Procurement of new rolling stock (electric locomotives and freight wagons)
- Improvement of the communication environment by using optic fiber

In addition, from the viewpoint of the investment effect, the following items are considered important by the Investment Department:

- Increase in transportation volume
- Increase in weight of freight wagons and passenger coaches
- Speed increase
- Operation cost reduction
- Freight and passenger cost reduction
- Environment conditions improvement
- Modernization of communication and energy sources
- Ensure operational safety

Besides, it was learnt that UTY considers the following financial elements when considering about the possibility of investment in projects:

- Payout time (both before and after discount)
- Average return

- Discounted present value
- Earnings-related indicators
- Internal rate of return

(2) Evaluation axis as Compared to Japanese Loan Standards

The following aspects are reviewed when requests for Japanese loans are considered. In practice, through means such as preparatory surveys, the feasibility of yen loan projects will be judged based the following items for each particular project:

- Project background
- Economy and development policy of the borrowing country
- Necessity of the project
- Project plan
- Project budget and financial plan
- Project's implementation, operation and maintenance plan
- Financial evaluation
- Economic evaluation
- Operating and effect indicators
- Confirmation of environmental and social considerations
- Considerations to social developmental aspect
- Administrative precautions

(3) Standards to be Considered when Deciding Project Priority

From (1) and (2), the following items should be considered in a way that suits the policies of both Japan and Uzbekistan when deciding the priority among railway-related projects that can be applied for Japanese loans:

1) Economic Development

How much does the project in question contribute to Uzbekistan's economic growth including industrial development? Besides, how much does it contribute to the improvement of Uzbekistan's international competitiveness?

2) Enhancement of Transportation Infrastructure

How much does the project in question contribute to the enhancement of Uzbekistan's domestic network, including transportation infrastructure unrelated to railways?

3) Modernization of Railway Sector

How much does the project in question contribute to modernization including safety improvement of Uzbekistan's domestic railway sector etc. from various viewpoints including technology, human resources, etc.?

4) Improvement of UTY's Management

In the long term, how much does the project in question contribute to the improvement of UTY's management from the financial viewpoint?

5) Environmental Improvement Related to Railways

How much does the project in question contribute to environmental improvement such as reduction of greenhouse gas emissions?

6) Improvement of Convenience for Railway Users

How much does the project in question contribute to the improvement of convenience for railway users including shortened travel time?

7) Importance in View of Uzbekistan's Policy

How important is the project in question from the viewpoint of Uzbekistan government policy?

(4) Priority of Railway Electrification Projects

Based on the Presidential decrees, UTY's Business Plan 2013 and results from the field survey conducted by the survey team, among projects that will be implemented after 2013 (including on-going projects), the following 2 projects are identified as the railway electrification projects that need loans from foreign donors, but the source for loans haven't yet been determined:

- Marakand–Bukhara Railway Electrification Project
- Angren–Pap New Railway Line Construction Project

[Table 3.2-2] shows the evaluation of these 2 projects from the aforementioned perspectives. Regarding the Marakand–Bukhara railway electrification project, it is considered that instead of making it simply an electrification project, its project effect would be much increased if the project could be further advanced by measures such as combining construction of a control center with improving safety etc. with a view of modernizing the railway sector. On the other hand, regarding the Angren–Pap new railway line construction project, although economic effect are to be expected, it is believed that there needs to be more consideration in the future about the project justification from the financial viewpoint. Although at this moment, it is still difficult to simply put a priority on these 2 projects, however, considering factors such as Uzbeksitan's government's clear statement about the importance of the Marakand–Bukhara railway electrification project in its policies, its project budget which is not too large, and the high possibility that the project justification will be approved, this project should be prioritized for consideration from viewpoint of supplier of Japanese loan.

[Table 3.2-2] Evaluation of Railway Electrification Projects that are being considered in Uzbekistan

	Marakand–Bukhara Railway Electrification Project	Angren–Pap New Railway Line Construction Project
1) Economic Development	It is considered that the project will contribute at a certain level to the social-economic development of the areas alongside the railway route by improving railway transportation, which is realized by increasing transportation volume, increasing speed, and reducing operation costs as a result of electrification.	By constructing a railway connecting Tashkent and the eastern part of Uzbekistan, as the railway line would not only contribute to enhance Uzbekistan's domestic network, but also to the international railway network, therefore the project would have very big economic effect.
2) Enhancement of Transportation Infrastructure	If this project was positioned simply as an electrification project, from the viewpoint of enhancement of the transport network, its contribution would not be very high.	It is considered that the project would contribute to enhance the network between Tashkent and the eastern part of Uzbekistan.
3) Modernization of Railway Sector	If this project was positioned simply as an electrification project, it would not lead to significant modernization of Uzbekistan's railways. Therefore, in view of safety improvement, it necessary that enhancement of soft aspects such as human capacity development or system development is considered.	(Regarding the new construction, the bottom line is to what extent modernization elements would be considered.)
4) Improvement of UTY's Management	Although the amount of investment would be relatively small compared to new construction since the project is about upgrading the existing line, its financial contribution to income increase is still unclear. It is considered that more review needs to be done regarding the provision of yen loans.	As it is expected that the project would require a huge amount of investment, sufficient investment decision would be required.
5) Environmental Improvement Related to Railway	It is expected that railway electrification will help reduce air pollution.	As the travel distance of rail freight etc. that are bypassing Uzbekistan is expected to be shortened, the project is considered to be able to generate considerable benefit.
6) Improvement of Convenience for Railway Users	It is necessary to decide whether speed-up can be realized with this electrification project.	It would be possible to shorten the travel time for users between Tashkent and the eastern part of Uzbekistan.
7) Project's Importance in View of Uzbekistan's Policy	As the implementation of this project has already been mentioned clearly in the Presidential decrees, this project is very highly positioned in the policy of Uzbekistan's government.	Although the project is not clearly mentioned in the Presidential decrees, discussions in order to start the project have already begun. Therefore, this project is considered important for Uzbekistan.

(Source: Survey Team)

(5) Relationship with Other Donors

As previously mentioned in section 2.5.2, donors which are assisting Uzbekistan in its railway electrification projects are JICA, ADB and China. From discussions with UTY, it is understood in the future, those donors will continue to be the main players to assist Uzbekistan in this area. Concrete projects for electrification are the aforementioned Marakand–Bukhara railway electrification project and

the Angren–Pap new railway line construction project. The Marakand–Bukhara railway electrification was initially listed as a project in ADB's Country Operations Business Plan (COBP). However, due to a request from the Uzbekistan government to the Japanese government, the project was removed from the list in November 2012. ADB is having a positive stance towards the railway sector as it considers that assistance to the railway sector will have a good effect on the environment. ADB is also showing interest in the Angren–Pap project. Besides, ADB is also open to collaboration with other donors, as is being demonstrated in the on-going Marakand–Karshi and Karshi–Termez projects, in which JICA and ADB are splitting their loans. This type of collaboration can be one possibility for future projects.

From discussions with UTY, China is showing interest in the Angren–Pap project, as it forms part of the railway route that connects China to Uzbekistan's Fergana province through Kyrgyzstan. UTY is internally considering this project, and China is emerging as one of the possible providers of loans for this project. (Other candidates are Japan, France and Spain, etc.)

Japan has been continuously organizing ministerial meetings with Central Asian countries using the "Central Asia + Japan" dialogue framework (the last time was in November 2012 in Japan). It is necessary for Japan to focus on the economic development of the Central Asian region as a whole, not only on the benefit of Uzbekistan. As railway projects have benefits that cross country borders and form networks within the Central Asian region, when considering railway projects, their compliance to regional cooperating programs such as CAREC are important to consider. In this context, since both the Marakand–Bukhara project and the Angren–Pap project are located in the corridors listed in the CAREC program, they basically match with CAREC's policy.

3.2.3. Procurement Packages and Contract Styles Adopted in International Competitive Biddings

Here, we organize the basic information necessary for considering the bidding process, procurement packages or contract style that is more effective for the Uzbekistan side and has a utilization possibility of Japanese technologies. In particular, we focus on the procurement packages and contract styles that are proven internationally, and the bidding processes that are actually used in Uzbekistan.

(1) Procurement Packages and Contract styles Normally Used for Railway Projects

There are two different ways of procurement packages for urban railways: Fragmented Approach where subsystems such as civil works, track, electrical works, signal & communications, rolling stock, AFC (Automatic Fare Collection), and depot are procured as individual packages; and Integrated Approach where subsystems are combined and procured as a whole package. The Integrated Approach can be divided into two types depending on the degree of integration: Semi-Integrated Approach and Fully-Integrated Approach. In addition, the system where the whole of the above-mentioned subsystems are combined with maintenance and train operation together with fund procurement is called PPP (Public-Private Partnership).

In terms of contract styles, there are varied styles, such as Design/Build Separation, Design-Build Combined, E&M Turnkey, Full-Turnkey, and PPP, depending on the way how packages of Design, Construction/Manufacturing, Commissioning/Testing, Maintenance, and Train Operation are procured.

A detailed explanation of each style is given below.

1) Fragmented Approach

Subsystems are procured separately (see [Figure 3.2-1]). Contract styles of each package are either Design/Build Separation or Design-Build Combined in the area of civil works and track & depot, while Design-Build Combined is usually adopted for other packages. There are cases where subsystems are further divided into smaller segments than those illustrated in the Figure. The cases include the separation of civil works in line with the construction sections, and the separation of signal and communications, for example.

Generally, the cost for the employer in the Fragmented Approach is smaller than in other approaches. The reasons for this could include:

- The overhead cost for package integration is not necessary in the procurement cost since the employer bears the risks of integration.
- Bidders have to "fight" each other based on the specifications given by the employer, and therefore the competition among them is prone to be serious.
- The limited technical scope for bidders tends to increase the number of bidders.
- Bidders can concentrate on specific areas with their strong technical merits. This reduces the risks to be borne by bidders, and allows them to bid with a lower price.

Scope / Package	Design	Construction/ Manufacturing	Commissioning /Test	Maintenance	Train Operation
Civil	Design	Build			
Track	Design-Build				
Substation / OHE	Design-Build				
Signal & Comm.	Design-Build				
Rolling Stock	Design-Build				
AFC	Design-Build				
Depot	Design	Build			

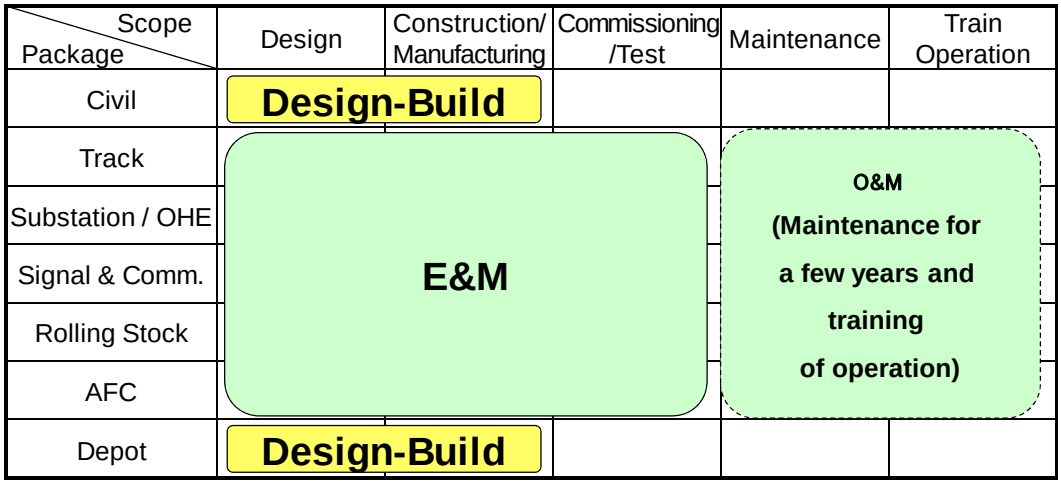
(Source: Survey Team)

[Fig. 3.2-1] Fragmented Approach

2) Semi-Integrated Approach

E&M subsystems are procured as a single turnkey package, while civil works and depot are usually purchased in the Design-Build style. In some cases, the O&M package is combined with the E&M procurement for the provision of initial training and operation for a few years.

While the employer does not bear the risks of package integration, they have to incur overhead cost. In other words, as the organization of the employer does not need the integration works, no large scale organization, compared to the case of Fragmented Approach, is required at least at the initial stage of the project.

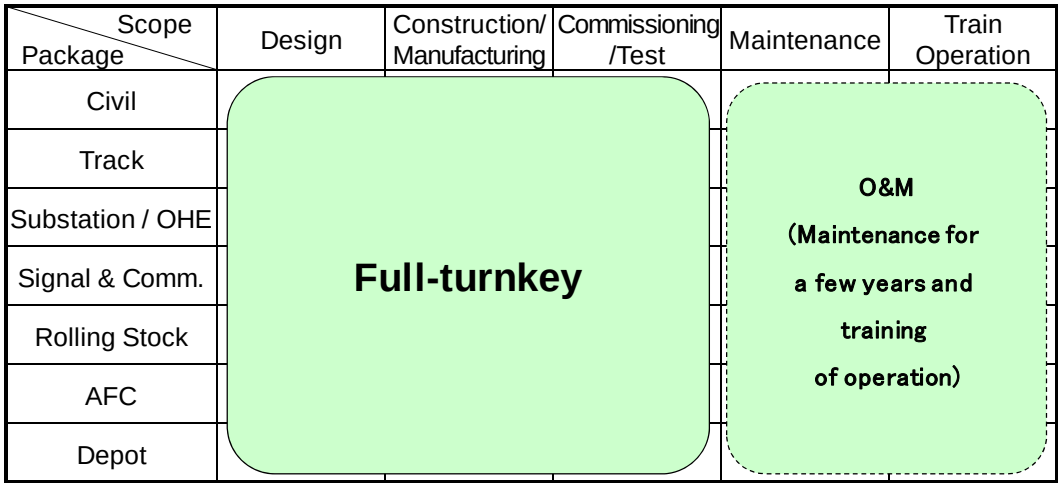


(Source: Survey Team)

[Fig. 3.2-2] Semi-Integrated Approach

3) Fully-Integrated Approach

E&M subsystems as well as civil works and depot are all procured in one full-turnkey basis. As in the case of the Semi-Integrated Approach, there are cases of provision of maintenance and training for the initial few years.



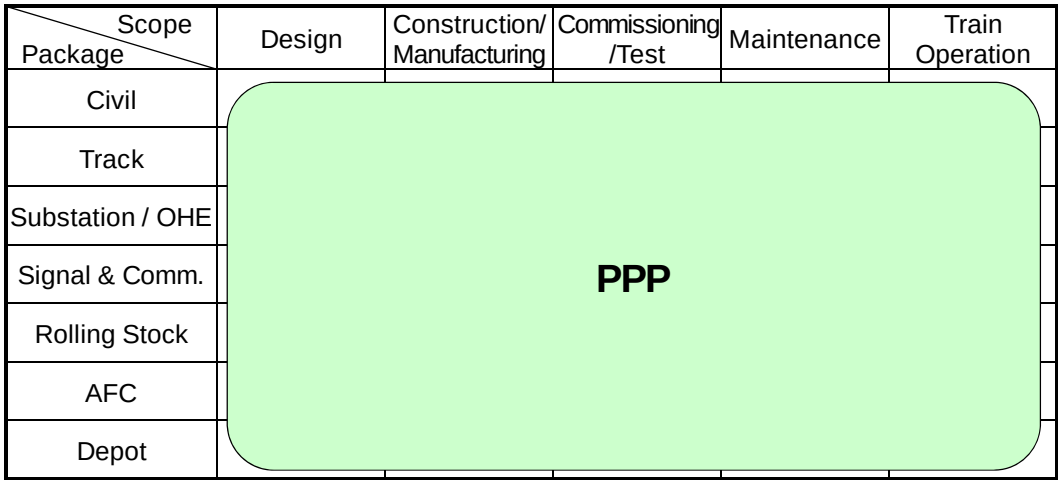
(Source: Survey Team)

[Fig. 3.2-3] Full-Integrated Approach

4) PPP

This is an all-in-one package of subsystems including Design, Construction/Manufacturing, Commissioning/Testing, Maintenance and Train Operation. The fund procurement is also undertaken by the contractor. PPP here basically means BOT. However, PPP includes various types such as Vertical Separation and Lease System, etc. Therefore, PPP does not necessarily mean the fully integrated subsystem purchase.

Generally, the employer neither takes the risks of integration including civil works and E&M nor bears the cost of Maintenance, Train Operation, not to mention the fund procurement risk.



Note: 1) BOT is considered in this Figure.
2) Funding is also included.

(Source: Survey Team)

[Fig. 3.2-4] PPP

(2) Bidding Processes Normally Used for Railway Projects

In the cases where railway projects are implemented alone by the government of Uzbekistan or UTY, a bidding process is adopted in accordance with the domestic rules on the Uzbekistan government procurement, and it varies from the one used as the international standard. In this study, we have not included projects that are procured alone by the government of Uzbekistan or UTY as a subject of analysis, for the following reasons: They are not expected to be large in size; the level of interests of foreign companies, including Japanese companies, is not expected to increase in the future; and it is expected to be led by domestic companies.

Here, we organize the bidding processes that are recently used by financial donors which provide funding for the railway sector in Uzbekistan.

1) JICA

According to the standard bidding guidelines used for JICA yen-loan projects, either "One-Envelope Bidding" or "Two-Envelope Bidding" procedures can be adopted. In both cases, the lowest price bidder is selected among the bidders who have passed technical evaluation. Regardless of adopting either of these two procedures, JICA clearly mentions in this document that "the lowest evaluated substantially responsive bid may or may not necessarily be the lowest price bid." As is stated in the interpretation of Clause 5.06 in 'Guidelines for Procurement under Japanese ODA Loans,' this means that among the bids which conform to the technical specifications, the bid with the lowest evaluated cost, not necessarily the lowest submitted price shall be selected for award. The lowest evaluated cost is different from the lowest submitted price. In the lowest evaluated cost factors other than price should be taken into account, including the payment schedule, time of construction completion or delivery, operating costs, efficiency and compatibility of the equipment, consumption (energy) efficiency, availability of service and spare parts, reliability of the quality control methods (including construction methods) proposed, safety, environmental benefits, and minor deviations, if any.

To the extent practicable, these non-price factors shall be expressed in monetary terms according to criteria specified in the bidding documents, and non-price factors can be reflected to the bidding price. Also, the interpretation of Clause 5.06 mentions that 'In principle, price-quality evaluation method in which the bidder with highest combined score of price and technical will be the winner is not accepted under Japanese ODA loan.' The reason is that objective or impartial method of scoring allocation between price and technical factors has yet been established, and thus, it is inevitable that the evaluation becomes subjective. This guideline requests the borrower to prepare definite technical specifications, and to compare and evaluate the bidders' prices which meet these technical specifications. Therefore, price-quality evaluation method is not applicable for the project under the JICA yen-loan in principle.

Also, pre-qualification for the bidding can be conducted on a voluntary basis, to examine the basic information of applicants, such as nationality, financial status, business experience, etc.

2) ADB

According to the standard bidding guidelines used for projects financed by ADB, a "Two-Stage Bidding" procedure is to be adopted. In principle, a winning bidder is expected as the one with the lowest price, but there are some cases where the bidders with lowest prices have not been selected.

Also, pre-qualification for the bidding can be conducted on a voluntary basis, to examine the basic information of applicants, such as nationality, financial status, business experience, etc.

3) KfW

According to the standard bidding guidelines used for projects financed by KfW, "Two-Stage Bidding," a procedure where pre-qualification and price evaluation will be conducted, and "Two-Envelope Bidding," a procedure where technical and price evaluations will be simultaneously conducted, are to be adopted. A winning bidder will not necessarily be the one submitted with the lowest price, but can be selected in a comprehensive manner by considering the bidder's technical elements such as experience.

Beside these "Two-Stage Bidding" and "Two-Envelope Bidding," other bidding procedures can be adopted as well, including multi-stage bidding, designated competitive bidding, etc.

4) EBRD

According to the standard bidding guidelines used for projects financed by EBRD, a "One-Envelope Bidding" procedure is to be adopted. A winning bidder is specified as "the lowest price bidder that satisfied the previously designated conditions." Including the price-quality evaluation method, other bidding processes which allow the selection of a winning bidder in the balance of both technical and price evaluations are not accepted.

Also, pre-qualification for the bidding can be conducted on a voluntary basis, to examine the basic information of applicants, such as track record and experience.

(3) Bidding Processes, Procurement Packages, and Contract Styles Adopted in Uzbekistan

Basically, "Fragmented Approach" is adopted for projects, including international competitive

bidding, in Uzbekistan. This is due to the fact that the country has a strong tendency to have project works (including civil engineering and track works) conducted by domestic companies as much as possible, and it does not actively accept schemes like full-turnkey basis, where foreign companies conduct the procurement of businesses to the areas where domestic companies are capable of. In other words, Uzbekistan has a basic policy to basically use the assistance by financial donors and procure the areas where domestic companies are not technically capable of from foreign companies with the fragmented approach.

For the bidding process, when a project is funded by a donor, the country adopts the standard bidding process that is designated by each donor.

We summarize the bidding situations of the projects in Uzbekistan that are funded by donors, as follows.

1) Tashkent-Angren Electrification Project

The project is jointly financed by KfW and KFAED. KfW funded the electricity works, while KFAED funded the development of signals and bridges. The overall evaluation bidding method was adopted, with the weights of technical and price evaluations by 80% and 20%, respectively. Out of a total of 28 companies that showed interest, 5 companies placed a bid. As a result, the following companies received contracts: CNTIC of China (for wiring and external supply of electricity), BELAM RIGA of Latvia (for SCADA), and INTERENG of Germany (for signal/communications). The remaining two companies, Siemens and a local company, were not selected for their low price scores.

2) Modernization Project of Diesel Railcar Depot

The project is financed by EBRD. In selecting a winning bidder, EBRD evaluated not just the bidding price but also the technical aspects from the perspective of life-cycle costs. Two companies placed a bid. TRANSPROM RESERVES of Russia received the contract, with the superiority in price score over another bidder, a joint venture of Marubeni and GE.

3) Samarkand-Karshi Electrification Project

The project is financed by ADB. Of the procurement divided into two tenders, the 1st tender was announced in 2012. A winning bidder was selected through the "One-Envelope Bidding" procedure, among the two Chinese companies that placed a bid. The 2nd tender is planned to be announced in 2013.

4) Karshi-Termez Electrification Project

The project is financed by a JICA ODA loan. Of the procurement divided into two tenders, the 1st tender was announced in 2012. Following JICA's standard bidding guidelines, the "Single-Stage, Two-Envelope Bidding Procedure" was adopted, where the lowest bidder is selected among the bidders who have passed the technical evaluation. The 1st tender of the procurement consisted of plant for rolling stock in Tashkent, renewal of depot facilities and related-equipment in Termez and Darband, and maintenance vehicles and machines required for railway electrification. The tender was divided into

two lots and both lots were contracted by Chinese companies. Although pre-qualification and bidding are usually not conducted simultaneously for JICA ODA loan projects, they were done at the same time, due to the strong desire of UTY.

5) Tashguzar-Kumkurgan New Railway Construction Project

The project is financed by a JICA ODA loan and the STEP scheme was adopted. As a result, Japanese companies participated in the procurement of bridges, rail, and signals. The rate of procurement by Japanese companies accounted for 30% of the total. The standard bidding process for JICA ODA loan projects was adopted.

(4) Major examples in the World

For the foreign railway projects that could be identified from existing documents and reports, we summarize the current situations with the bidding processes, procurement packages, and contract styles, and develop the implications when procuring railway projects in Uzbekistan.

1) Bid Evaluation Method

a) BART (Bay Area Rapid Transit) (San Francisco)

As for the overall procurement of BART, it has various types of contracts including two-step sealed bidding and competitively negotiated contracts. However, for the procurement of electronic and specialized rail transit equipment or rehabilitation of transit vehicles, BART applies competitive negotiation policies and procedures. This decision was made by the Board of the BART District that standard competitive bidding was not applicable for this procurement, and that it cannot meet the requirements of BART. The evaluation procedure was as follows:

- Receive the 1st step proposal from the participants, and make a decision on the competition criteria. Then, conduct negotiations with the participants, and request and receive the BAFO (Best and Final Offer).
- Proposal Evaluation Committee, consisting of a price evaluation sub-committee and a technical evaluation sub-committee, conducts the evaluation.
- Technical evaluation items and scoring methods are specified in detail in the RFP (Request for Proposal).
- After technical evaluation, the price evaluation sub-committee conducts a financial evaluation. (When a technical proposal is not accepted by the technical evaluation sub-committee, then the price proposal is returned unopened to the bidder.)
- Sum up the technical score and financial score, and select the bidder with the highest overall score as the contractor.
- The weights of price and technical evaluations are set for each procurement package. In one case, the evaluation weights were set as follows: price at 33%, track record and experience at 25%, design details at 20%, and others at less than 10%.
- Evaluation procedure is performed in the following sequence: Evaluating technical proposal,

opening technical proposal, opening financial proposal, and conducting price-quality evaluation.

b) Macau Light Rail Transit System (LRT)

The winning bidder was decided through the bidding process of overall evaluation, as follows.

- Evaluation weights of Price and Technical are 55% and 45%, respectively.
- Weight of price evaluation consists of 29% for system, rolling-stock, design & build of bridges, 11% for 10-year maintenance service, and 15% for the necessary options of capacity improvement.
- Weight of technical evaluation consists of 15% for justifications reports, 8% for rolling-stock and systems description, 7% for methodology and organization, 6% for tenderer's experience, another 6% for solution for the bridge's improvement works, and 3% for preliminary technical plans.
- From the competitive bidding by 3 companies of Bombardier, Siemens, and Mitsubishi Heavy Industry (MHI), MHI was selected.
- Bid price of MHI was at the 2nd place for main parts (initial investment parts) behind Bombardier. However, MHI was at the 1st place for both "10-year maintenance services options" and "additional trains batch options" necessary for capacity increase. Consequently, it won the 1st place for the overall evaluation of both price and quality.

[Table 3.2-3] Result of the Price Bidding in Macau Light Rail Transit System (LRT)

No.	Tenderer	Basic Proposal Lump-sum Price (MOP)	Optional Works Lump-sum Price (MOP)	
			Maintenance 2014-2019 and 2020-2024	2 Additional Train Batches Fulfilling Year 2020 Line Capacity
1	Siemens-CCECC Consortium	$ 6,281,592,632.00	$ 2,018,215,398.00	$ 2,637,841,167.00
2	Mitusbishi Heavy Industries, Ltd.	$ 4,688,000,000.00	$ 792,810,000.00	$ 1,510,540,000.00
3	BT CRBC LRT Consortium	$ 4,567,143,775.07	$ 1,662,066,540.17	$ 1,792,431,706.79

(Source: Macau Light Rail Transit)

c) Kuala Lumpur MRT Rolling Stock Procurement

The winning bidder was decided through the bidding process of overall evaluation in the following 4 stages:

- Stage 1: To make evaluation on basic information necessary for bidding.
- Stage 2: To reconfirm the technical solution and competence, and the strength of financial ground presented at the prequalification phase, and evaluate the legal aspects (for example, to reject a company with an experience of a trial for its low product quality or delay in contract). (Especially, evaluate the experience of similar projects involving with the use of driverless vehicles.)

- Stage 3: To make evaluations on commercial submission and offset program submission. Evaluations are based on the possibilities of Malaysian companies to promote development of new markets, technology transfer, etc. through the implementation of this project.
- Stage 4: The evaluations of technical submission, commercial submission, and offset program submission, from a comprehensive standpoint.
- Officially, the evaluation of legal submission is clarified as Stage 4, and the overall evaluation based on the total score is clarified as Stage 5.

In addition, the sufficient level of experience with the delivery of driverless vehicles and the top-level technical capability were required as qualifications.

For the "technical solution and competency" as stated in Stage 2, life-cycle operation, O&M cost, implementation of the management plan, system assurance (RAMS), risk management, preliminary work plans, productive resources including subcontractors, quality, on-site security, security in terms of health and environment, etc. were evaluated.

As a result of prequalification for tender package of electric and rolling stock systems procurement, the following 6 companies were qualified: Kawasaki Heavy Industries Ltd; consortium of Bombardier (Malaysia) Sdn Bhd-Bombardier Sifang (Qingdao) Transportation Ltd-Scomi Rail Bhd; Changchun Railways Vehicles Co Ltd (CNR); Siemens AG and Siemens (M) Sdn Bhd; Hyundai Rotem Company; and CSR Zhuzhou Electric Locomotive Co Ltd. Afterwards, 3 companies including Kawasaki Heavy Industries Ltd. retracted their proposals, and eventually, Siemens AG and Siemens (M) Sdn Bhd won the contract.

2) Procurement Package and Contract Style

a) Fragmented Approach

The fragmented approach has been a basic procurement package and contract style for the various operating bodies. For example, it was adopted by Delhi Metro, Hong Kong MTR West Rail (procurement was made individually for civil works, rolling stock, signals, AFC, and platform doors), New York Metro (single procurement package of rolling stock), etc. In fact, there are opinions that the Delhi Metro project in India could achieve the cost reduction of 40% by adopting a fragmented approach, instead of adopting a semi-integrated approach.

b) Semi-Integrated Approach

One of the examples of semi-integrated approach is the development project of Hochimin Metro Line 1 undertaken by the government of Vietnam. The procurement package is composed of 3 civil-work packages and E&M package. As for the bidding situation, the consortium of Sumitomo Co. and CIENCO6 placed a bid for civil works (elevation and depot) and won the contract in May 2012 as the sole bidder. For E&M package, the following 4 Japanese groups placed a bid: Mitsubishi Heavy Industries and Sumitomo Co.; Kawasaki Heavy Industries and Itochu; Marubeni and Toshiba; and Hitachi and Hitachi Plant Technologies. Hitachi group has gained the right of first negotiation.

c) Fully-Integrated Approach

The Fully-Integrated Approach has been adopted by Mumbai Monorail in India and Dubai Monorail in UAE. In the Mumbai Monorail project, two groups - a consortium of L&T (India) and Scomi (Malaysia), and another consortium of Reliance Infrastructure (India) and Hitachi (Japan) - submitted their proposals in 2008, and L&T/Scomi eventually received the order. L&T/Scomi satisfied the employer's condition with the time of delivery of 3 years, while Reliance/Hitachi proposed 5 years. In Dubai Monorail project, Japanese technologies were widely adopted. Marubeni received the order as the prime contractor, with other Japanese companies as subcontractors: 1) Hitachi for rolling stock, electrical works, operation management, communications, and platform doors; 2) Nippon Signal for signaling facilities; 3) Omron for AFC; 4) JV of Obayashi & Oriental Construction for civil works; and 5) Tonichi Consultant & Tostem for design management.

d) PPP

PPP Approach has been adopted by Seoul Metro 9 in Korea and Manila MRT3 in the Philippines.

Inaugurated in 2009, Seoul Metro 9 is a BOT project involving operation and maintenance for 30 years. They adopted the Vertical Separation with the substructures (civil works) by the public sector, and the superstructures (E&M) by PPP. The prime contractor is the SPV (subscribed by Hyundai Rotem, Macquarie, Veolia Transport). The SPV also procured EPC, while outsourcing the railway operation. The details of subcontractors are as follows. (1) Operation for 10 years subcontracted by Seoul Line 9 (Veolia Transport Korea 80%, Hyundai Rotem 20%); (2) Rolling stock maintenance subcontracted by a rolling stock maintenance firm (Veolia Transport Korea 20%, Hyundai Rotem 80%); and (3) Maintenance for other E&M facilities subcontracted by Seoul Line 9.

Similarly, the project of Manila MRT 3 was undertaken by the Philippine government (DOTC) with PPP-BLT (Build, Lease and Transfer) approach. Although the initial stock holder of the MRTC (SPV) was local industries, the current major stock holders are DBP and LBP, both of which are Philippine banks. MRTC procured fixed price EPC packages and outsourced the maintenance work in the contract with Sumitomo Co. The concession to develop stations was also combined. The PPP scheme was adopted for the project of Manila MRT 3, with the intention of using the know-how on funding, railway operation and maintenance, station development business, etc.

(5) Compatibilities of Japanese Companies

In light of the trends and interests of Japanese companies specified in 2.5.4, we describe the compatibilities of Japanese companies for the bidding processes, procurement packages, and contract styles as below.

1) Bidding Process

Given the situations of Japanese companies with the bids in Uzbekistan, it seems that the higher the possibility of a low-price bidder to win, the more they become inactive to the bids. In contrast, as

indicated by the Macau LRT project, they seem to positively consider making a bid if it involves cost evaluation based on technology and O&M. This suggests that the consideration of technical elements in the selection of the winning bidder is at least very important for Japanese companies to participate in railway projects in Uzbekistan.

2) Procurement Packages and Contract Style

For the procurement packages, participation of Japanese companies will be limited to the field where they have superiority if the fragmented approach is adopted. In contrast, those Japanese companies with technical superiority in some areas or price-competitiveness will be ambitious to participate if the semi-integrated or fully-integrated approach is adopted, because a procurement package will consist of the combination of various fields and technologies.

As for the contract style, Japanese companies do not have much interest with the contract style consisting from maintenance to train operation. Thus, the contract style consisting of the design & build, commissioning & testing, and commissioning, will be desired.

3.2.4. Consideration of Procurement Packages and Contract Methods to Increase the Possibility of Receiving Orders for Japanese Companies

Here, under the assumption that a railway project is funded by a Japanese Yen-loan, procurement packages and contract styles which make it more possible that Japanese companies can succeed in participating in the project are considered. Also, on the basis of interviews with those who are concerned with the Uzbekistan railway sector, the following points are assumed:

- Since no PPP-related laws are enacted in Uzbekistan, it is rarely possible that PPP is adopted to any projects.
- Also, it is almost impossible to adopt the Semi-integrated approach or Fully-integrated approach. Basically, UTY is willing to implement railway projects with utilizing any domestic resources.
- ”STEP Yen-loan” might be adopted. However, there are some discreet opinions on “STEP Yen-loan” from UTY.
- If there is accountability particularly in terms of cost, UTY will introduce advanced railway technologies.

(1) Bidding Processes

1) Tightening Prequalification Criteria

Totally, Japanese companies have huge superiorities in terms of the reliability of railway technologies. Meanwhile, if the track record in the railway sector is heavily evaluated in a prequalification of a bidding process, a company with good competitiveness in price but no superiorities in terms of quality and security will hesitate to participate in the bidding. As a result, it is supposed to be more possible that Japanese companies whose advantages are quality and security

succeed in winning the bidding.

Concretely, the below items should be considered in the prequalification criteria: “track record of similar projects where certain quality is secured”, “the capability to supply a product which have passed several tests” or “no experience of a serious incident”. With these prequalification criteria, Uzbekistan government can mitigate the risk which results from shoddy works.

2) Emphasis on Technological Evaluation

Like 1), a bidding process where technological evaluation is more important should be applied when a successful bidder is decided because Japanese companies can bring out their superiorities in the bidding process. As the above mention, Japanese companies tend to avoid a bidding process where initial cost is more significant. Generally, Japanese companies desire a bidding process where evaluation on technology is more emphasized than that of price.

Concretely, “price-quality evaluation method” or “competitive negotiation policies and procedures”, which become popular in international bidding processes, are considered. If adopted, Uzbekistan government can relish such merits as the mid-and-long term financial merit because Uzbekistan government can succeed in procuring advanced technologies for adequate value.

However, the situation that the sufficient accountability is asked for might be occurred if a successful bidder which tender with both high price and high technology is decided. Therefore, when the above bidding systems are applied, sufficient quantitative information should be comprehended in the evaluation table.

3) Consideration on Life-cycle Cost

Railway technologies which Japanese companies have are emphasized on a mid and long-term stability of the railway system. This is a superiority of Japanese railway technologies. Therefore, life-cycle costs which reflect the superiority should be taken into account in the evaluation of applicants. In other words, Japanese companies are willing to take part in a bidding process if an evaluation for selecting a successful bidder is based on not only initial costs but also operating and maintenance costs ten years after completion of the project. From the viewpoint of the Uzbekistan government, it can securely operate its railway sector in the mid and long-term and completely relish the merit brought in by Japanese technologies.

(2) Procurement Packages

1) Combination with areas where advanced technologies are necessary.

While eluding such an extensive procurement as Semi-integrated approach, a procurement package which consists of only technologies among which a high affinity is acknowledged is adopted. For instance, a renewal of power control center or operation control center can be combined into a railway electrification project because of their affinity. Particularly, if a project requires such “soft components” as systems for power control center and operation control center, Japanese companies can avoid extreme price competition for the project. In short, a procurement package consisting of both

technologies where Japanese companies have their superiority and railway electrification should be used.

2) Procurement of technologies getting along with Uzbekistan priorities.

In Uzbekistan, railway electrification, speed-up of railway, handling of increase of future demand, stable management of railway operation and so on are prioritized. Adequate technologies should be incorporated in a specification of a project in order to achieve these priorities. Accordingly, Japanese railway technologies are highly preferred since advanced technologies which are useful for railway electrification, speed-up of railway, handling of increase of future demand, stable management of railway operation and so on are required. For instance, it can be considered to add the installation of rail for high-speed operation to a project.

(3) Combination of Assistance Schemes

In addition, for the purpose of enhancing the capability of Uzbekistan's railway sector, it might be beneficial to offer a scheme in which technical assistance programs and loans are combined. For instance, the Japanese government offers a technical assistance program for developing technologies which are needed for high-speed railways. As a result of the project, Uzbekistan engineers can be familiar with Japanese railway technologies. Finally, it is more possible that a specification of a project funded by a Japanese Yen-loan will partially call on Japanese technologies, which Uzbekistan engineers know well.

Chapter 4

Study of Japanese Assistance for Railway Electrification Projects

4.1. Development Plan for Railway Electrification

(1) The Future of Railway Electrification in UTY

The electrification of both sections between Marakand and Karshi and between Karshi and Termez has just started, but it is the present status that only several particular companies are expected as tenderers. The causes are beyond the framework for electrification, but it is certain that one of the causes exists in the required system composition for which it is not easy to completely utilize Japanese railway technology.

Moreover, as for the electrification which is to be carried out in the future for both sections between Marakand and Karshi and between Karshi and Termez, if the electrification system to be planned is the same as the one mentioned above, the situation will not change for the better.

(2) Advantages and Disadvantages of Japanese High-Speed Railways

The following is that from the viewpoint of export of systems, the advantages and disadvantages of Japanese high-speed railways have been itemized and ordered clearer, in place of conventional lines.

[Table 4.1-1] Advantages and Disadvantages of Japanese High-Speed Railways (Part 1)

Advantage		Opportunity	
1	Actual achievement of no fatal accidents in 49 years	1	Worldwide momentum to return to railway use due to problems with global warning
2	High-density and accurate operation	2	Growing tendency of railway construction in developing countries including Asia
3	On-site morale supporting the above-mentioned advantages	3	Signs of promoting railway export cooperation between the government and private sector
4	Safety system by fully-dedicated rail tracks	4	Supply record of E2 type to Chinese railways
5	Sophisticated traffic control system	5	Supply record of Taiwan High-Speed Rail
6	Sophisticated signaling and safety system		
7	Comfortable ride quality		
8	Safe maintenance system by closing rail tracks in the night-time		
9	Sophisticated seat-ticketing control system (issuing massively, rapidly and precisely)		
10	Electric car system=lightweight, light axle load, ample accommodation capacity and extensive use of electric brakes		
11	Technology for environmental measures (noise, vibration, pneumatic pressure)		
12	Technology for disaster prevention (earthquake countermeasures, etc.)		
13	Technological capability of railway operators for total adjustment and plan		
14	System of quality assurance and maintenance of manufacturers		
15	Requirement of users for high quality		

(Source: JREA Vol.54 No.5, 2011)

[Table 4.1-2] Advantages and Disadvantages of Japanese High-Speed Railways (Part 2)

Disadvantage		Threat	
1	Heavy and large infrastructure	1	Rising of Chinese and Korean manufacturers
2	Rigid security and safety system	2	Thrust of major European manufacturers
3	Practical maximum speed of up to 320km/h	3	Joint sales promotion by public and private sectors of Europe, China and Korea
4	System closed by totally-dedicated rail tracks	4	Progress of global standardization of European standards
5	Design criteria dissociated from European standards	5	Declining superiority of Japan due to new technology of information and telecommunication (IT) (cloud, CTBC, etc.)
6	Clear division of roles between railway operators and manufacturers	6	Infesting of foreign consulting companies
7	Lack of engineers familiar with deployment overseas		

(Source: JREA Vol.54 No.5, 2011)

The following two items which are considered important matters from the point of view of disadvantages for existing railway lines in UTY are shortly analyzed.

Disadvantage 1: Heavy and large infrastructure

Japan is characterized by heavily concentrated metropolitan areas which require stable and safe high-frequency train services as well as countermeasures against typhoons, earthquakes, salt water damage, vibration and noise. Since these conditions require complicated and expensive equipment and facilities, Japanese advanced technology cannot be utilized by UTY without first taking also the design philosophy and local conditions of other countries into consideration.

Disadvantage 2: Rigid security and safety systems

Based on extensive past experience, Japan has developed and put into practical use many advanced safety systems such as ATS, ATC and ATO. However, in recent years the moving block system has become the norm when electrifying railway lines in most other countries.

Since moving block systems have so far been introduced on very few railway lines in Japan, there is still little experience in this field and it is therefore very difficult to submit technical proposals for the system.

Accordingly, it is considered that advantages No. 2 (High density and accurate operation), No. 5 (Sophisticated traffic control system) and No. 9 (Sophisticated seat-ticketing control system (massive, rapid and precise issuance of tickets)) deserve most attention when considering future railway electrification in Uzbekistan.

(3) Approach as System

As mentioned above, it has entered the difficult situation that the superiority of Japan should be secured in the field of manufacturing and installing individual equipment and so forth, and then, the recent

business on railway electrification in Uzbekistan has been in the same situation.

Since railways are total systems, especially power control and traffic control are important to railway electrification. These systems have a close relation with hardware of electrification and the relationship with each other is like two sides of the same coin. Drawing and revising traffic diagrams which are at present handled by experts will be automated. Also, high-standard transmission systems such as SDH systems using fiber-optic cables will become indispensable because transmission capacity has been dramatically increased following the recent increase in the number of items in supervisory and control (including the increase of video signal).

It might therefore be a good idea regarding incoming electrification projects, aiming at the end form of both power control system and traffic control system with a backbone of communication facilities specified with high standards, the sections concerned with the above should be included in the scope of the construction and the expandability to other railway divisions should be secured as well.

Moreover, it is also very important that with both systems integrated in one place, the quality of efficient and safe railway transportation should be secured in the condition of the increase of the number of trains following the increase in carrying capacity, and also the mixed traffic system of both high-speed trains and freight trains. For that is required the proposal not only which describes the section concerned with electrification but also which is aware of the total system coping with the recent problems of replacement of both decrepit control systems.

1) Point of Renewal of Power Control System

The newly electrified section, whatever the system, would be commissioned after manufacturing, installing and testing were completed. But as for the already-electrified section, both new and old power control systems have to be prepared in parallel, and in every certain range, things to be controlled have to be transferred from the old facilities to the new facilities.

Fundamentally, the expenditure for these works has a high degree of possibility to be included in the construction expenditure provided by railway operators. If the newest system covering both IT technology and abundant control technique which Japan excels at had been introduced in advance to any electrified section, the system would have a high degree of possibility to be asked by the side of users at an appropriate time.

Moreover, plenty of know-how with system renewal has been accumulated by JR-affiliated constructors and heavy electric machinery companies because Japan already experienced similar periods of renewal as well. Even so, considering that it is impossible to replace the system at a time for the railway division to be concerned, the renewal of the power control system does not have that much time left.

2) Point of Renewal of Traffic Control System

Except newly-operated railway sections, electrified or non-electrified, the traffic control has already been performed via CTC. Therefore, at the time of electrification, the replacement of decrepit facilities is immediately required.

Of course, as upgrading of the communication network is to be carried out, foreseeing the future in

a series of electrification projects and corresponding to what is going on are very important. For that point, it can be said that traffic control has higher necessity than power control. Regarding the system renewal in prospect of all railway divisions, about 10 years have passed since the present system started to operate, and it can be thought that the renewal of the traffic control can secure some margin for time.

4.2. Possibility of Japanese Assistance and Recommendation of Concrete Assistance Program

As mentioned in section 3.2.2, there are only two projects for which the Uzbekistan government needs overseas assistance, namely the "Marakand–Bukhara Railway Electrification Project" and the "Angren–Pap New Railway Line Construction Project". At the moment, it is mostly impossible that the Uzbekistan government will request Japanese Yen-loans for railway projects except the above two projects. Therefore, it has been clarified by this project that the above two projects are the only projects in which the Japanese government may assist. In short, the projects which the Japanese government should be concerned about have already been specified. Thus, in this section, three points to consider are mentioned with consideration for the current situation of the Uzbekistan railway sector, the participation in the Uzbekistan railway sector of Japanese companies and the enhancement of possibility of Japanese assistance to the Uzbekistan railway sector.

(1) Modernization of Uzbekistan Railway Sector

The facilities owned by UTY are totally deteriorating. In the near future, these aging facilities may be a bottleneck in advancing the development plans which the Uzbekistan government formulates. For example, the power control center and the operation control center which UTY is using are older than those in Japan and any other major countries. Under these circumstances, UTY might not deal with a few issues like the increase of the demand and the advancement of security. As mentioned above, from the viewpoints of both passenger and freight, the importance of the Uzbekistan railway sector is the highest among Uzbekistan's transportation sectors. It is highly important that UTY renew its old facilities for the purpose of not only just renewal but also enhancing the capability of Uzbekistan's railway sector which can clearly take a major role in the mid- and long-term economic growth of Uzbekistan. To summarize, the Uzbekistan government should improve its railway facilities and implement any projects considering that UTY continues to upgrade its facilities and then achieve the modernization of the railway sector similar to Japan and European countries in the mid and long-term. The Uzbekistan government should implement projects on the basis of not initial costs but life-cycle costs including any external costs. As a result, UTY is willing to install advanced technology which will bring high effectiveness in the mid- and long-term. Hereafter, when the Japanese government provides assistance projects for the railway sector to the Uzbekistan government, the Japanese government should take into account the modernization of Uzbekistan's railway sector.

(2) Accomplishment of Uzbekistan Higher Policy

The development of the railway sector is often stipulated in presidential decrees, etc. To be specific, speed-up of railway, handling of increase in future demand, railway electrification and so on are political challenges in the railway sector. Cost minimization in the short term is still not enough to achieve these goals of the Uzbekistan government. For example, if technologies of signaling and telecommunication which can adapt only to current low-frequency operation, the technologies will not adapt to the future high-frequency operation. In conclusion, UTY will not be able to provide high-frequency operation

because of the capability shortage. Specifically, if a technology is selected on the basis of only its cost, it will become more difficult to accomplish Uzbekistan's higher political targets. In other words, the Uzbekistan government should introduce technologies which will help it to achieve its targets.

(3) Direction on Bidding Processes, Procurement Packages and Contract Styles in Uzbekistan's Railway Sector

Thinking of the mention in 3.2.4., the points below regarding bidding methods and procurement packages should be taken into account for both the "Marakand–Bukhara Railway Electrification Project" and the "Angren–Pap New Railway Line Construction Project". In this regard, both stable railway service delivery in Uzbekistan and the increased possibility to succeed in winning the tender should be taken into account.

[Table 4.2-1] Main Points which should be considered in Bidding Processes, Procurement Packages and so on (Draft)

	"Marakand–Bukhara Railway Electrification Project"	"Angren–Pap New Railway Line Construction Project"
Bidding Process	- Prequalification of companies with security and quality - Decision on a successful bidder on the basis of evaluation of both quality and price - Quality evaluation with consideration for life-cycle cost	- Prequalification of companies with security and quality - Decision on a successful bidder on the basis of evaluation of both quality and price - Quality evaluation with consideration for life-cycle cost
Procurement Package	- Procurement of not only facilities for electrification but also power control center or operation control center - Procurement of advanced rail with consideration for future speed-up	- Procurement of advanced rail with consideration for future speed-up - Bulk procurement of technologies which are imported from overseas countries (e.g. tunnels)
Others	- (In case a Japanese Yen-loan is provided for a project) Simultaneous requests of technical assistance for the modernization of the railway sector - Application of "STEP" style for power control center and operation control center	- Application of "STEP" style for advanced technologies

(Source: Survey Team)

Appendix

Appendix 1 List of Main Interviewees and Destinations

No.	Date	Main Interviewees and Destinations
1	12 Feb. 2013 (Tue)	Courtesy Visit: First Deputy Chairman, UTY
2	Ditto	Courtesy Visit: Chief Representative of Uzbekistan Office, JICA
3	13 Feb. 2013 (Wed)	Courtesy Visit: First Secretary, Embassy of Japan in Uzbekistan
4	Ditto	Courtesy Visit: Head of PIU-Electrification, UTY
5	Ditto	Courtesy Visit: Head of Investments Dept., UTY
6	Ditto	Kick-off Meeting with UTY (Explanation of Inception Report)
7	15 Feb. 2013 (Fri)	Site Survey: Bukhara Locomotive Depot, UTY
8	Ditto	Site Survey: Bukhara–Tinchlik Section, UTY
9	Ditto	Site Survey: Tinchlik Locomotive Depot, UTY
10	Ditto	Site Survey: Kattakurgan Station, UTY
11	Ditto	Site Survey: Nurbullak Station, UTY
12	Ditto	Site Survey: Marakand Locomotive Depot, UTY
13	20 Feb. 2013 (Wed)	First Regular Meeting with UTY
14	Ditto	Site Survey: Power Supply Centre, UTY
15	21 Feb. 2013 (Thu)	Site Survey: Ahangaran Substation, UTY
16	22 Feb. 2013 (Fri)	Site Survey: Uzbekistan Locomotive Depot, UTY
17	27 Feb. 2013 (Wed)	Second Regular Meeting with UTY
18	6 Mar. 2013 (Wed)	Third Regular Meeting with UTY
19	7 Mar. 2013 (Thu)	Site Survey: Operation Control Center, UTY
20	11 Mar. 2013 (Mon)	Head of Operation Control Center, UTY
21	12 Mar. 2013 (Tue)	Chief Engineer of Train Operation Dept., UTY
22	Ditto	Site Survey: Chukursay Freight Station, UTY
23	13 Mar. 2013 (Wed)	Head of Office, Statistics and Accounting Dept., UTY
24	Ditto	Fourth Regular Meeting with UTY
25	14 Mar. 2013 (Thu)	Head of PIU-Electrification, UTY
26	Ditto	Senior Transportation Specialist, Uzbekistan Resident Mission, ADB
27	Ditto	Head of Capital Construction Dept., UTY
28	15 Mar. 2013 (Fri)	Team Leader, Office of Karshi–Termez Railway Electrification Project
29	18 Mar. 2013 (Mon)	Chief Engineer of Train Operation Dept., UTY
30	Ditto	Tashkent Office, KfW (German government-owned development bank)
31	19 Mar. 2013 (Tue)	Deputy Head of Power Supply Centre, UTY
32	Ditto	Senior Regional Cooperation Specialist, Uzbekistan Resident Mission, ADB
33	Ditto	Chief Representative of Tashkent Office,JETRO
34	20 Mar. 2013 (Wed)	Head of Statistic Dept., Uzjeldorpass (Passenger Train Operater which is an affiliate of UTY)

(Source: Survey Team)

No.	Date	Main Interviewees and Destinations
35	20 Mar. 2013 (Wed)	Chief Engineer of Wagon Facilities Dept., UTY
36	Ditto	First Depty Head of Track Facilities Dept., UTY
37	Ditto	Fifth Regular Meeting with UTY
38	Ditto	Chief Engineer of Capital Construction Dept., UTY
39	22 Mar. 2013 (Fri)	Director of Boshtransloyiha
40	Ditto	Depty Head of PIU-Electrification, UTY
41	Ditto	Depty Head of Investments Dept., UTY
42	25 Mar. 2013 (Mon)	Director of LLC Incomproject
43	Ditto	Depty Head of Investments Dept., UTY
44	26 Mar. 2013 (Tue)	Head of Department, Power Supply Mounting Train #1
45	27 Mar. 2013 (Wed)	Deputy Head of Power Supply Centre, UTY
46	Ditto	Principal Banker of Tashkent Office, European Bank for Reconstruction and Development (EBRD)
47	Ditto	Report Meeting of Survey Results with UTY
48	29 Mar. 2013 (Fri)	Executive Director, Fund for Reconstruction and Development of Uzbekistan (FRDU)

(Source: Survey Team)

Appendix 2 Record of Regular Meetings with UTY (Summary)

(1) First Regular Meeting with UTY

Agenda	Performed Works in Last Week and Planned Works for This Week	**Date/Time**	20 February 2013	16:00 – 16:45
		Place	JICA Survey Team Office in UTY HQ	

1. Report on performed works from Mr. Nishi.
   a. Site Survey the railway from Bukhara to Marakand (Feb. 14-16).
      – Observation of the depot at Bukhara, Tinchlik and Marakand stations.
      – Observation of the train operations at Kattakurgan and Nurbulak stations.
      – Observation of the rail line inside of the Coach.
   b. Data collection.
      – Part of the requested data was collected.

2. Plans for this week.
   a. February 20 (Wed), after meeting: visit to Electric power feeding control center of UTY.
   b. February 21 (Thu): visit to locomotive depot "Uzbekistan" located 30 km from Tashkent. Departure at 10:00.
   c. February 22 (Fri): visit to Electric power substation of "Tukimachi" station located 50 km from Tashkent. Departure at 10:00.

3. Remarks on questionnaire.
   a. During this week translators will make translation of documents. From next week survey team will start meeting with UTY officers responsible for questionnaire.
   b. Mr. Jalalov said, that UTY can submit the English language version of feasibility study of "Marakand-Karshi section electrification project", "Karshi-Termez section electrification project" and "Marakand-Bukhara electrification project" to survey team for reference.
   c. Data outside Bukhara and Marakand was requested by Survey team.
   d. The data except UTY's data will be received starting from this week.

4. Others.

   Survey team members Mr. Shibata and Mr. Nishi's schedule was announced.
   – Mr. Shibata is leaving on Feb. 19 and arriving on Mar. 4.
   – Mr. Nishi is leaving on Feb. 26 and arriving on Mar. 19.

ATTENDANT LIST

Date: 20 February 2013 Time 16:00 – 16:45

Place: The Office of JICA Survey Team in UTY Headquarters

Agenda: Performed Works in Last Week and Planned Works for This Week

No.	Name	Position/Assignment	Depertment/Division	Organization/Instance
1	Nazarov D.T.	Deputy Head	Investment Department	Uzbekistan Temir Yollari
2	Djalolov F.S.	Head	Project Implementation Unit of Electrification	Uzbekistan Temir Yollari
3	Kayumkhodjaev Shukhrat A.	Acting Deputy Head	Foreign Economic Relations Department	Uzbekistan Temir Yollari
4	Kaybushev V.R.	Assistant of the Chief Manager - Chief Engineer	Strategic Development Department	Uzbekistan Temir Yollari
5	Kodirov B.	Chief Specialist	Train Operation Department	Uzbekistan Temir Yollari
6	Makhmudov Aziz	Deputy Head	Statistics and Accounting Department	Uzbekistan Temir Yollari
7	Khamidov Aziz Nigmatullaevich	Deputy Head	Power Supply Centre	Uzbekistan Temir Yollari
8	Isaev S.R.	Chief Engineer of the Board	Capital Construction Department	Uzbekistan Temir Yollari
9	Hirokazu Nishi	Team Leader	JICA Survey Team	JTC
10	Kiyoshi Tsugawa	Railway Electrification Planning	JICA Survey Team	JEC
11	Tetsuo Wakabayashi	Railway Demand Analyses	JICA Survey Team	JTC
12	Kurbanov U. N.	Coordinator	JICA Survey Team	JTC

(2) Second Regular Meeting with UTY

Agenda	Performed Works in Last Week and Planned Works for This Week	**Date/Time**	27 February 2013	16:15 – 16:35
		Place	JICA Survey Team Office in UTY HQ	

1. Introduction of members attending a meeting.
   Introduction of survey team members and officials of UTY.

2. Report on performed works from Mr. Tsugawa.
   a. Site survey was performed. The following sites were visited.
      – Electric power feeding control center of UTY.
      – Ahangaran electric power substation.
      – "Uzbekistan" depot.
   b. Data collection.
      – Part of the requested data was collected.

3. Plans for this week.
   a. Data collection, review and study of collected data.
   b. Selection of information required for the survey.

4. Remarks on data collection.
   a. Data outside Bukhara and Marakand was requested by Survey team.
   b. Main point (titles and tables) of large documents were translated.
   c. A lot of information was received. This information will be studied. To get more detailed information survey team will discuss UTY officers responsible for questionnaire.
   d. To receive data except UTY's data JICA has sent a letter to MFERIT.

5. Questions and comments from meeting attendants.
   a. UTY officials: if survey team members have any questions, they can call to appropriate department any time, make an appointment and discuss this question during the same day.
   b. MFERIT representative: if survey team members want to meet with MFERIT officials, they should inform MFERIT about this beforehand and make an appointment (day and time).
   c. Mr. Wakabayashi said, he wanted to talk with representative of MFERIT and representative of Train Operation Department after the meeting.

ATTENDANT LIST

Date: 27 February 2013 Time 16:15 – 16:35

Place: The Office of JICA Survey Team in UTY Headquarters

Agenda: Performed Works in Last Week and Planned Works for This Week

No.	Name	Position/Assignment	Depertment/Division	Organization/Instance
1	Erkin Saliev	Specialist	Investment and Project Development Department	MFERIT
2	Khamidov Aziz Nigmatullaevich	Deputy Head	Power Supply Centre	Uzbekistan Temir Yollari
3	Asrorov Sandjar	Chief Engineer	Train Operation Department	Uzbekistan Temir Yollari
4	Ismailov D.Sh	Technical Department Head	Capital Construction Directorate	Uzbekistan Temir Yollari
5	Dusmatov G.Sh	Deputy Head	Strategic Development Department	Uzbekistan Temir Yollari
6	Djuraev K. M.	Leading Engineer	Investment Department	Uzbekistan Temir Yollari
7	Umarov M. M.	Specialist	Project Implementation Unit of Electrification	Uzbekistan Temir Yollari
8	Kiyoshi Tsugawa	Railway Electrification Planning	JICA Survey Team	JEC
9	Tetsuo Wakabayashi	Railway Demand Analyses	JICA Survey Team	JTC
10	Kurbanov U. N.	Coordinator	JICA Survey Team	JTC

(3) Third Regular Meeting with UTY

Agenda	Performed Works in Last Week and Planned Works for This Week	**Date/Time**	06 March 2013	16:05 – 16:45
		Place	JICA Survey Team Office in UTY HQ	

1. Introduction of new Survey team member.
   New survey team member, Mr. Owada (Contract/Procurement (1)) was introduced to meeting attendants.

2. Remarks on data collection from Mr. Djalalov.
   Mr. Djalalov: The survey started more than 3 weeks ago, but the survey team members have not started meeting with UTY officers responsible for questionnaire.
   Mr. Shibata: The meetings with UTY officers responsible for questionnaire are planned from next week. The list of UTY officers responsible for questionnaire is ready.
   Mr. Djalalov: The delegation of representatives of Japanese companies arrived in Tashkent. UTY members have met with them and informed about railway electrification project of Marakand-Bukhara. Japanese side showed interest in this project.

3. Report on performed works from Mr. Shibata.
   a. Data collection.
      – Part of the requested data was collected.
   b. Request for additional detail data and information.
      – Survey Team submitted 9 letters to Mr. Djalalov.
      – Survey Team received some replies.

4. Plans for this week.
   a. Observation of traffic control center and centralized traffic control system.
      Traffic control center is situated in UTY Headquarters. Visit is planned on March 7 (Thu) or March 11 (Mon).
   b. Observation of the freight station in Tashkent.
      Visit to Chukursay freight station is planned on March 12 (Tue). Chukursay freight station is located 15 km North from Tashkent.

5. Remarks on data collection.
   a. Data requested through MFERIT has not been received yet. UTY is requested to remind MFERIT. It is very important to receive data from MFERIT.
      Mr. Djalalov: UTY will assist in this issue.
   b. Confirmation of availability of the F/S (Pre-F/S) report or the completion report on the railway electrification project of Tukimachi - Angren, the railway improvement project of Tashkent - Samarkand for high-speed train, and the new electrical railway line project of Angren-Pap.

Mr. Djalalov: F/S report of the new electrical railway line project of Angren-Pap has not been finished yet. No F/Sreport has been prepared on railway improvement project of Tashkent – Samarkand for high-speed train. There is no F/S report on the railway electrification project of Tukimachi - Angren. But UTY can provide other documents related to some of these projects.

c. Another plan or strategy of railway electrification after Marakand - Bukhara, if any.

Mr. Djalalov: we have no other plans of railway electrification except for Angren - Pap and Marakand - Navoi - Bukhara sections electrification.

6. Schedule of Survey team members.
   - Mr.Shibata (Deputy Team Leader) arrived on March 4.
   - Mr.Owada (Contract Procurement(1)) arrived on Mar 5 and leaving on March 22.
   - Mr. Dinh (Contract Procurement(2)) will arrive on March 18.
   - Mr. Nishi (Team Leader) will arrive on March 19.

7. Overall schedule.
   - March 27: Explanation of survey result to UTY.
   - March 29: Leaving Tashkent.

ATTENDANT LIST

Date: 06 March 2013 Time 16:05 – 16:45

Place: The Office of JICA Survey Team in UTY Headquarters

Agenda: Performed Works in Last Week and Planned Works for This Week

No.	Name	Position/Assignment	Depertment/Division	Organization/Instance
1	Djalolov F. S.	Head	Project Implementation Unit of Electrification	Uzbekistan Temir Yollari
2	Korpenko G. M.	Development Engineer	Train Operation Department	Uzbekistan Temir Yollari
3	Khamidov Aziz Nigmatullaevich	Deputy Head	Power Supply Centre	Uzbekistan Temir Yollari
4	Kayumkhodjaev Shukhrat A.	Acting Deputy Head	Foreign Economic Relations Department	Uzbekistan Temir Yollari
5	Makhmudov A. B.	Deputy Head	Statistics and Accounting Department	Uzbekistan Temir Yollari
6	Radjabova I. V.	Head of Office	Statistics and Accounting Department	Uzbekistan Temir Yollari
7	Djuraev K. M.	Development Engineer	Investment Department	Uzbekistan Temir Yollari
8	Umarov M. M.	Specialist	Project Implementation Unit of Electrification	Uzbekistan Temir Yollari
9	Shinji Shibata	Deputy Team Leader	JICA Survey Team	JTC
10	Kiyoshi Tsugawa	Railway Electrification Planning	JICA Survey Team	JEC
11	Tetsuo Wakabayashi	Railway Demand Analyses	JICA Survey Team	JTC
12	Kei OWADA	Contract Procurement (1)	JICA Survey Team	MRI
13	Kurbanov U. N.	Coordinator	JICA Survey Team	JTC

(4) Fourth Regular Meeting with UTY

Agenda	Performed Works in Last Week and Planned Works for This Week	**Date/Time**	13 March 2013	16:15 – 16:45
		Place	JICA Survey Team Office in UTY HQ	

1. Brief explanation of visit to Chukursai station from Mr. Mansur.
   Survey team visited Chukursai freight station on March 12 and observed arrival/departure lines, marshalling lines, container yard and other facilities.

2. Performed Works in Last Week.
   1) Performed Works in Last Week.
      a. Data collection about the questionnaire.
      b. Request for additional detail data and information.
      c. Observation of traffic control center and centralized traffic control system.
      d. Observation of Chukursai freight station.

   2) Obtained Major Materials
      a. Data collection about the questionnaire
         – Part of the requested data was collected.
      b. Request for additional detail data and information
         – Survey Team submitted 5 letters (14letters since the beginning) to Mr. Djalalov.
         – Survey Team received some replies.

3. Planned Works for This Week
   a. Data collection and review
   b. Interview to firms and organizations or its branch offices in Uzbekistan related to Japan.
      Mr. Shibata: Nowadays Karshi-Termez Electrification Project financed by Japan's Yen loan is being implemented. Chinese companies participate in this project, but none of Japanese companies participate. Survey team received directions from JICA to make interviews with firms and organizations or its branch offices in Uzbekistan related to Japan. It is necessary in order to understand their conditions for participation in railway electrification projects. JICA and Government of Japan would like Japanese companies to participate in railway electrification projects in Uzbekistan.

4. Remarks.
   1) Data collection and request for additional detail data and information.
      – Continuous data provision is requested.
      – Data requested through MFERIT has not been received yet. UTY's investment department received letter, which informed that Cabinet of Ministers ordered to all related ministries to reply to the request from MFERIT related to data collection by

Survey team. Survey team will stay in Uzbekistan only till March 29, therefore Survey team wants to receive whole information from MFERIT during next week.

- Survey Team requested meeting with relevant departments to clarify and confirm the received data and required data.
- UTY is requested to support the Survey Team for obtaining further additional data and information without letters for improving efficiency.
- Confirming the date and time of Explanation of survey result to UTY. It will be held on March 27, starting from 16:00, instead of weekly meeting.
- Mr. Murakami, officer in charge of JICA HQ, is supposed to attend the Explanation session.

2) Schedule of Survey team members.
   - Mr. Dinh (Contract Procurement (2)) will arrive on March 18.
   - Mr. Nishi (Team Leader) will arrive on March 19.
   - Mr. Murakami, officer in charge JICA HQ, is supposed to be arrived on Mar 27 in the afternoon.

3) Remarks from Mr. Owada.

   He received letters of response informing that it is impossible to receive tender documents. He would like to know, if it is possible to receive part of documents, or obtain access to tender documents and just read them or make a meeting with any of bidders.

   Mr. Mansur: We can arrange a meeting with the deputy head of PIU-Electrificationfor discussing these questions.

4) Others.

   Mr. Shibata: We would like to have a meeting with Mr. Djalalov and discuss some points and results of today's meeting.

   Mr. Mansur: We will arrange the meeting with Mr. Djalalov today after regular meeting or tomorrow in the morning.

ATTENDANT LIST

Date: 13 March 2013 Time 16:15 – 16:45

Place: The Office of JICA Survey Team in UTY Headquarters

Agenda: Performed Works in Last Week and Planned Works for This Week

No.	Name	Position/Assignment	Depertment/Division	Organization/Instance
1	Umarov M. M.	Specialist	Project Implementation Unit of Electrification	Uzbekistan Temir Yollari
2	Asrorov Sandjar	Chief Engineer	Train Operation Department	Uzbekistan Temir Yollari
3	Kayumkhodjaev Shukhrat A.	Acting Deputy Head	Foreign Economic Relations Department	Uzbekistan Temir Yollari
4	Makhmudov A. B.	Deputy Head	Statistics and Accounting Department	Uzbekistan Temir Yollari
5	Djuraev K. M.	Leading Engineer	Investment Department	Uzbekistan Temir Yollari
6	Shinji Shibata	Deputy Team Leader	JICA Survey Team	JTC
7	Kiyoshi Tsugawa	Railway Electrification Planning	JICA Survey Team	JEC
8	Tetsuo Wakabayashi	Railway Demand Analyses	JICA Survey Team	JTC
9	Kei OWADA	Contract Procurement(1)	JICA Survey Team	MRI
10	Kurbanov U. N.	Coordinator	JICA Survey Team	JTC

(5) Fifth Regular Meeting with UTY

Agenda	Performed Works in Last Week and Planned Works for This Week	**Date/Time**	20 March 2013	16:10 – 17:00
		Place	JICA Survey Team Office in UTY HQ	

1. Introduction from Mr. Mansur.

   Today's meeting is the last meeting. Mr. Dihn joined the Survey Team on Tuesday. Mr. Nishi came back from Japan on Tuesday.

2. Introduction from Mr. Nishi.

   Survey Team will stay in Tashkent till Friday next week. Survey has entered the final stage. Mr. Nishi thanked UTY officers for assistance in obtaining information and requested for further support and assistance. Presentation of the survey result will be made on Wednesday next week.

3. Performed Works in Last Week.

 1) Performed Works in Last Week.

  a. Data collection about the questionnaire.
  b. Request for additional detail data and information.
  c. Observation of traffic control center and centralized traffic control system.
  d. Observation of Chukursai freight station.

 2) Obtained Major Materials

  a. Data collection about the questionnaire
    – Part of the requested data was collected.
  b. Request for additional detail data and information
    – Survey Team submitted 16 letters since the beginning to Mr. Djalalov.
    – Survey Team received some replies.

4. Planned Works for This Week

  a. Meeting with relevant departments in terms of collected data and continuous data collection.
  b. Checking data obtained from relevant ministries and organization.
  c. Explanation session of the survey result.

5. Remarks.

 1) Confirmation.

  a. Confirmation to the contents and effect of Marokand-Bukhara Electrification Project.

     Mr. Shibata: “Boshtransloyiha” informed us, that Marokand-Bukhara Electrification Project doesn’t include laying of new rails and sleepers. Does this project include construction of the second track?

UTY: Marokand-Bukhara Electrification Project includes only electrification of existing railway line. Replacement of rails will be performed by other project ("Rehabilitation of railway tracks"). Construction of the second track will also be performed within other project.

Mr. Shibata: As a result of Marakand-Bukhara Electrification Project, on which sections traffic volume (local, export, import or transit traffic volume) is expected to increase?

UTY: Our railway lines are not divided into local, export, import or transit railway lines. Local, export, import and transit traffic is carried out by the same railway line.

Mr. Wakabayashi: Is it necessary to increase capacity of Marakand-Bukhara section?

UTY: According to pre-F/S, in future, the capacity is expected to increase from 8 to 14 pairs of freight trains and from 6 to 9 passenger trains.

Mr. Wakabayashi: Is the electrification necessary for this? Why is it not necessary to construct the second track?

UTY: The construction of the second track is expensive. The traffic volume and production growth in this region is limited. Therefore one track is enough.

b. Total volume of freight in Uzbekistan has not been obtained. (Mr. Djalalov discussed with Director of Statistics and Accounting Depertment.)

Mr. Shibata: The information of total freight volume in Uzbekistan has not been obtained. Is it possible to obtain it?

UTY: We provided the information of freight volume on Marokand-Bukhara section through the cross-border stations by communication type.

Mr. Wakabayashi: JICA gave us the mission to collect information on the railway sector of Uzbekistan and analyze it.

UTY: We will consider, if we can or not.

Mr. Shibata: Mr. Djalalov discussed this issue with Head of Statistics and Accounting Depertment.

Mr. Nishi: Our Survey Team will return to Japan on Friday next week. So, please provide us this information as soon as possible.

2) Opinion from the UTY.

a. Secure the whole operation safety by centralized total control system including power supply coping with increasing traffic volume.

Mr. Shibata: The traffic volume is increasing. Therefore securing operation safety will become an issue. What kinds of measures are implemented to secure operation safety? What does UTY think about the introduction of computer-controlled centralized control system for providing train operation?

UTY: According to Presidential Decree № 1446, rehabilitation of railway tracks, replacement of switches, and track repair are performed every year. Modernization of communication and centralized operation control system, microprocessor-based

interlocking and measures for securing power supply are planned to perform according to pre-F/S.

Mr. Shibata: Are there any plans to establish centralized control system (special department) for controlling power supply and train operation?

UTY: We will consider this issue in the future.

b. Including a condition to the tenders financed by Yen Loan which is Technical Assistance to UTY affiliated company for strengthening its engineering ability.

Mr. Shibata: UTY affiliated companies take part in tenders. What about their engineering ability level?

UTY: “Boshtransloyiha” has the international certificate.

Mr. Shibata: What about other organizations (construction companies)?

UTY: We can't answer.

Mr. Shibata: What does UTY think about including a condition to the tenders financed by Yen Loan which is Technical Assistance to UTY affiliated company for strengthening its engineering ability? Is it necessary?

UTY: Actually, there are some complex engineering processes, which require technical assistance. We should discuss this issue later in details. In case of the introduction of latest technology, it will be necessary.

c. Introducing Life Cycle Cost into the tenders.

Mr. Shibata: Will the tenders include not only construction cost, but also operating, maintenance and repair cost (Life Cycle Cost)?

UTY: Such conditions are included into the tenders of existing projects. For example, the expenses for maintenance of bridges, rails are included into the tenders.

3) Others.

Mr. Shibata: We would like to have a meeting with Mr. Djalalov and discuss some points and results of today's meeting.

Mr. Nishi: Please arrange the appropriate room for making a presentation on Wednesday next week.

Mr. Mansur: We will arrange the meeting with Mr. Djalalov today after regular meeting or tomorrow in the morning and the appropriate room for making a presentation.

ATTENDANT LIST

Date: 20 March 2013 Time 16:10 – 17:00

Place: The Office of JICA Survey Team in UTY Headquarters

Agenda: Performed Works in Last Week and Planned Works for This Week

No.	Name	Position/Assignment	Depertment/Division	Organization/Instance
1	Umarov M. M.	Specialist	Project Implementation Unit of Electrification	Uzbekistan Temir Yollari
2	Kalomhodjaev SH. A.	Acting Head	Foreign Economic Relations Department	Uzbekistan Temir Yollari
3	Kornenko G. M.	Senior Engineer	Train Operation Department	Uzbekistan Temir Yollari
4	Makhmudov A. B.	Deputy Head	Statistics and Accounting Department	Uzbekistan Temir Yollari
5	Khamidov A. N.	Deputy Head	Power supply Center	Uzbekistan Temir Yollari
6	Isaev S. R.	Chief Engineer	Capital Construction Directorate	Uzbekistan Temir Yollari
7	Kunanbaev B. B.	1 Deputy Chairman	Track Facilities Department	Uzbekistan Temir Yollari
8	Khushbakov S. K.	Deputy Head	Wagon Facilities Department	Uzbekistan Temir Yollari
9	Djuraev K. M.	Leading Engineer	Investment Department	Uzbekistan Temir Yollari
10	Hirokazu Nishi	Team leader	JICA Survey Team	JTC
11	Shinji Shibata	Deputy Team Leader	JICA Survey Team	JTC
12	Kiyoshi Tsugawa	Railway Electrification Planning	JICA Survey Team	JEC
13	Tetsuo Wakabayashi	Railway Demand Analyses	JICA Survey Team	JTC
14	Kei OWADA	Contract Procurement(1)	JICA Survey Team	MRI
15	Dinh Minh Hung	Contract Procurement(2)	JICA Survey Team	MRI
16	Kurbanov U. N.	Coordinator	JICA Survey Team	JTC

(6) Report Meeting of Survey Results with UTY

Agenda	Explanation of the Summary of Survey Results	**Date/Time**	27 March 2013	16:00 – 17:30
		Place	PIU-Electrification Meeting Room in UTY HQ	

1. Introduction from Mr. Nishi.

   Mr. Nishi thanked UTY officials for support and assistance for data collection. Survey team started data collection on 11th of February, 2013. Explanation of Survey results will be made today. Survey team will explain results of data collection from UTY, international donor organizations and Japan companies' branches in Uzbekistan.

2. Explanation of Data collection survey results.
   a. Current Situation.
   b. Marokand – Bukhara Railway Electrification Project.
   c. The Latest Situation of Angren - Pap New Railway Construction Project.
   d. Survey Results.
   e. Others.

3. Discussion of Survey results.

   Mr. Djalalov: Thank you for presentation of Survey results. Unfortunately, we couldn't provide Survey team all necessary data and information. We will provide it later, so that you could include it to Final report. Regarding explanation of Survey results, there was not so much information concerning Marokand – Bukhara Railway Electrification.

   Mr. Nishi: The purpose of our Survey is data collection not only on Marakand-Bukhara section, but also on whole railway sector of Uzbekistan. Within the data collection we received information on electrification projects in Uzbekistan (for example, Marakand-Karshi, Karshi-Termez, Marakand-Bukhara, Angren-Pap, etc.). We received a lot of information on Marokand – Bukhara Railway Electrification Project. We will include it in Final report.

   UTY: Regarding comparison of Marakand-Karshi and Karshi-Termez electrification projects, you should have shown amount of capital investment. You should have specified the amount without customs duties, as no customs duties are imposed.

   Mr. Nishi: We showed general information in this table. Detailed information will be presented in Final report.

   UTY: Will Yen loan be granted only on condition of STEP?

   Mr. Shibata: STEP will increase possibility of participation of Japan companies in this project.

   UTY: F/S of the project was designed on base of usual terms, without consideration of STEP.

   Mr. Shibata: STEP is not compulsory condition for yen loan. The loan-receiving country considers what kinds of Japan's advanced technologies are necessary and whether to apply STEP or not. The Survey team doesn't insist on application of STEP.

   Mr. Murakami: I am representative of JICA HQ, Tokyo. We will consider conditions of yen loan on base of Survey results. Japanese government will decide whether to provide loan or not. JICA can recommend government to provide loan. It is important for government to know, if Japanese companies will participate in project or not. If STEP is applied,

Japanese companies will be able to participate in project as a prime consultant and prime contractors. Application of STEP will increase possibility of yen loan finance. Though STEP is not applied, Japanese government may positively consider about yen loan finance, if tender will contain competitive package for Japanese companies. Important point about STEP is that Uzbekistan will decide which of Japan's advanced technologies are necessary.

Why freight turnover by railway and pipeline in Uzbekistan began declining in 2008 and 2009? Is it expected to increase?

UTY: This data shows freight turnover of Marakand-Bukhara section only, but not whole Uzbekistan.

Mr. Murakami: Reduction in freight turnover after 2009 is a result of crisis or are there other factors?

UTY: There are some other factors. Regarding reduction of freight volume of Marakand-Bukhara section, the reason is reduction of transit volume through Khojadavlet cross-border station. Formerly, transit freight was transported to Bekabad and passed further to Tajikistan. At the same time transit from China and Kazakhstan to Iran decreased. Transit from these countries passed through Sariagach station to Khojadavlet.

Mr. Murakami: Is it expected to increase in future?

UTY: Yes, turnover will increase. The decline is a result of crisis.

Mr. Djalalov: Thank you for presentation. We are waiting for Final report.

ATTENDANT LIST

Date: 27 March 2013 Time 16:00 – 17:30

Place: PIU-Electrification Meeting Room in UTY Headquarters

Agenda: Explanation of the Summary of Survey Results

No.	Name	Position/Assignment	Depertment/Division	Organization/Instance
1	Nazarova D.T.	Deputy Head	Investment Department	Uzbekistan Temir Yollari
2	Djalolov F.S.	Head	Project Implementation Unit of Electrification	Uzbekistan Temir Yollari
3	Kayumkhodjaev Shukhrat A.	Acting Deputy Head	Foreign Economic Relations Department	Uzbekistan Temir Yollari
4	Kaybushev V. R.	Assistant of the Chief Manager - Chief Engineer	Strategic Development Department	Uzbekistan Temir Yollari
5	Asrorov Sandjar	Chief Engineer	Train Operation Department	Uzbekistan Temir Yollari
6	Makhmudov Aziz	Deputy Head	Statistics and Accounting Department	Uzbekistan Temir Yollari
7	Khamidov Aziz Nigmatullaevich	Deputy Head	Power Supply Centre	Uzbekistan Temir Yollari
8	Isaev S. R.	Chief Engineer of the Board	Capital Construction Department	Uzbekistan Temir Yollari
9	Djuraev K. M.	Leading Engineer	Investment Department	Uzbekistan Temir Yollari
10	Umarov M. M.	Specialist	Project Implementation Unit of Electrification	Uzbekistan Temir Yollari
11	Satoshi Murakami	Deputy Director	Central Asia and Caucasus Division	JICA
12	Yuko Furuichi	Representative	Uzbekistan office	JICA
13	Sharipov	Interpriter	Uzbekistan office	JICA
14	Hirokazu Nishi	Team Leader	JICA Survey Team	JTC
15	Shinji Shibata	Deputy Team Leader	JICA Survey Team	JTC
16	Kiyoshi Tsugawa	Railway Electrification Planning	JICA Survey Team	JEC
17	Tetsuo Wakabayashi	Railway Demand Analyses	JICA Survey Team	JTC
18	Dinh Minh Hung	Contract Procurement(2)	JICA Survey Team	MRI
19	Hirotaka Tobita	Representative	JTC Project Office	JTC
20	Kurbanov U. N.	Coordinator	JICA Survey Team	JTC

Appendix 3 Pictures of Site Survey

(1) Current Condition of Bukhara–Marakand Section (15 February 2013)

Bukhara–Tinchlik Section (Part 1)

Bukhara–Tinchlik Section (Part 2)

Tinchlik–Kattakurgan Section

Kattakurgan–Nurbullak Section

Nurbullak–Juma Section

Yard of Marakand Station

(2) Bukhara Locomotive Depot (15 February 2013)

Outside of Inspection and Repair Shed

Inside of Inspection and Repair Shed

Repair Machines and Tools

Wheel-tread Grinding Machine

Sand Supply Facility

Refueling Facility

(3) Tinchlik Locomotive Depot (15 February 2013)

Outside of Existing Inspection and Repair Shed

Inside of Existing Inspection and Repair Shed

Wheel-tread Grinding Machine

Actual Loading Test Equipment

Outside of New Inspection and Repair Shed

Inside of New Inspection and Repair Shed

(4) Marakand Locomotive Depot (15 February 2013)

Outside of Inspection and Repair Shed

Inside of Inspection and Repair Shed

New Type Electric Locomotive"Uzbekistan"

Service Line to Marakand Locomotive Depot

(5) Special Train for Site Survey of Bukhara–Marakand Section (15 February 2013)

Special Coach

Meeting Room in the Special Coach

(6) Power Supply Centre (20 February 2013)

Tukimachi–Angren Section:
Indicator Panel of the Power Supply System

Tukimachi–Angren Section:
Operator Console

Tukimachi–Angren Section: Desplay of SCADA
and Telephone System for Power Supply Control

Tashkent–Djizak Section:
Indicator Panel of the Power Supply System

Tashkent–Djizak Section: Operator Console

Tashkent–Djizak Section: Operating Switches Panel

(7) Ahangaran Substation (21 February 2013)

Building of Substation

Receive Wire Part

Feeder Part

Extra High Tension Distribution Line

Protective Relay Panel

Extra High Tension Distribution Panel

(8) Uzbekistan Locomotive Depot (22 February 2013)

Outside of Inspection and Repair Shed
for Electric Locomotive

Inside of Inspection and Repair Shed
for Electric Locomotive

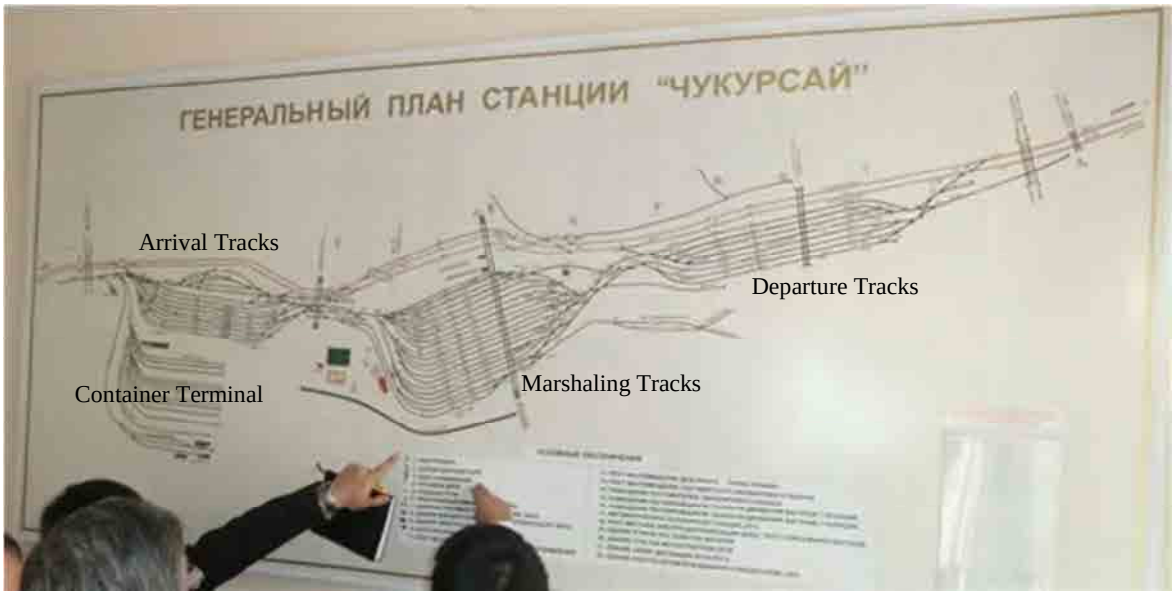
Wheel-tread Grinding Shed

Wheel-tread Grinding Machine

Outside of Inspection and Repair Shed
for High-Speed Train “Afrosiyob”

Inside of Inspection and Repair Shed
for High-Speed Train “Afrosiyob”

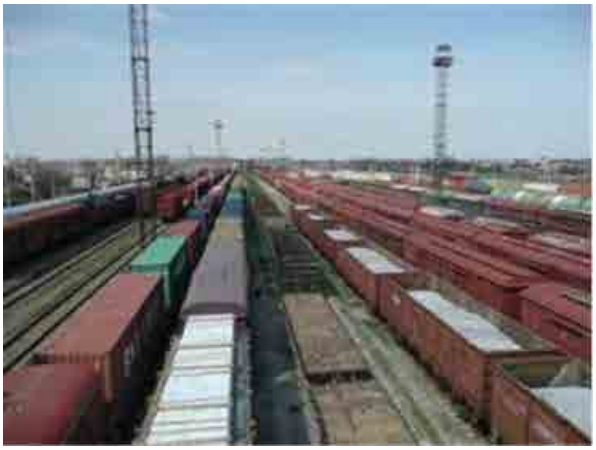
(9) Chukursay Freight Station (12 March 2013)



Track Layout of Chukursay Freight Station

Arrival Tracks

A Hump between Arrival Tracks and Marshaling Tracks



Marshaling Tracks

Container Terminal

Appendix 4 List of Collected Documents and Data

(1) General Information of Uzbekistan

Title	Date of Issue	Issuing Authority	Data Format
Statistical Yearbook of the Republic of Uzbekistan 2010	May 2012	The State Committee of the Republic of Uzbekistan on Statistics	book
Statistical Yearbook of Uzbekistan Regions 2011	Mar. 2012		book
Population of Uzbekistan 2011	Mar. 2012		book
Finance of Uzbekistan 2011	May 2012		book
Industry of Uzbekistan 2012	Dec. 2012		book
World Economic Outlook 2012	Oct. 2012	IMF	pdf
Transition Report 2011	Nov. 2012	EBRD	pdf

(2) Current Situation on Overall Transport Sector in Uzbekistan

Title	Date of Issue	Issuing Authority	Data Format*
1) Transport Network and Traffic Volume			
CAREC Corridors Network of All Corridors	unknown	CAREC	gif
CAREC Corridors Network of Corridor 2, Coridor 3 and Corridor 6	unknown	CAREC	bmp
TRACECA Routes Maps of Railway, Roads and All	unknown	TRACECA	png
TRACECA Routes Maps in Uzbekistan	unknown	TRACECA	png
Railway Network in Uzbekistan	unknown	UTY	paper (pdf)
Railway Network and Regional Railway Branch Area in Uzbekistan	unknown	UTY	
List of Intersity and Inter-region Bus Route in Uzbelistan	unknown	UAART	paper (xls)
Domestic Airway Network in Uzbekistan	unknown	Uzbekistan Airways	paper (pdf)
Transport and Communication in Uzbekistan 2012	Dec. 2012	The State Committee of the Republic of Uzbekistan on Statistics	book
Transport and Communication in Uzbekistan 2011	Dec. 2011		book
Transport and Communication in Uzbekistan 2006	Dec. 2008		book
Transport and Communication in Uzbekistan 2005	Dec. 2008		book
Transport and Communication in Uzbekistan 2002	Dec. 2002		book
Main Indexes of Automobile Transport Activity of Uzbekistan as on 2000–2012	unknown	UAART	paper (xls)
Passenger and Freight Traffic Volume of Aviation by Route	unknown	Uzbekistan Airways	paper (xls)

Note: * The data formats in "( )" show the formts of translated documents and data.

Title	Date of Issue	Issuing Authority	Data Format*
2) Development Plan of Tranport Sector			
Resolution of the President of the Republic of Uzbekistan No. PP-1446: On Accelerating the Development of Infrastructure, Transport and Communication Construction in 2011–2015	Dec. 2010	President of the Republic of Uzbekistan	paper (doc)
CAREC 2020: Strategic Framework for CAREC Program 2011–2020	Feb. 2012	CAREC	pdf
Implementing CAREC 2020: The Wuhan Action Plan	Oct. 2012	CAREC	pdf
Strategy of the Intergovernmental Commission TRACECA for Development of the International Transport Corridor "Europe–the Caucasus–Asia" for the period up 2015	May 2006	TRACECA	pdf
Action Plan for 2008–2009 for Implementation of the Strategy of the Intergovernmental Commission TRACECA	Apr. 2007	TRACECA	pdf
TRACECA Priority Projects List 2010 and TRACECA Priority Projects List 2012	Dec. 2010 Feb. 2012	TRACECA	pdf

Note: * The data formats in "( )" show the formts of translated documents and data.

(3) Current Situation on Railway Sector in Uzbekistan

Title	Date of Issue	Issuing Authority	Data Format*
1) Basic Information of Railway Sector			
a) Organization			
Organizational Structure of Cabinet of Ministers	Unkown	GoU	doc
Organisational Structure of UTY as on 1st Jan. 2013	Jan. 2013	UTY	doc
Organizational Structure of Uzjeldorpass as on 1st Jan. 2013	Jan. 2013	UTY	paper (doc)
b) Facilities and Equipments			
(Civil and Track)			
Data of Main Technical Facilities and Equipment of Civil and Track and Number of Rail Sleepers on Track Facilities by RRB	Mar. 2013	UTY	paper (doc)
List of Bridges and Embankment Length on Marakand–Bukhara Section	Feb. 2013	UTY	paper (doc)
List of Constructional Works on Marokand–Bukhara Section	Feb. 2013	UTY	paper (doc)
(Signal and Telecommunication)			
List of Interlocking Devices by Station and Automatic Control Equipment by Section on Marakand–Bukhara Section	Feb. 2013	UTY	paper (doc)

Note: * The data formats in "( )" show the formts of translated documents and data.

Title	Date of Issue	Issuing Authority	Data Format*
b) Facilities and Equipments (continued)			
(Electric Power System)			
Electric Power Directive Section and Related Points of UTY	Feb. 2013	UTY	paper (doc)
System Diagram of Power Feeding and Electricity Power Supply on Tukimachi–Angren Section	Unknown	UTY	dwg
(Stations)			
List of UTY Stations as on 1st Jan. 2013	Jan. 2013	UTY	paper (xls)
Existing Track Layout on Marakand–Bukhara Section	Unknown	UTY	paper (doc)
c) Rolling Stock			
Specification of Main Locomotive Types and Number of Locomotives by Type in Tinchlik and Bukhara Depot	Feb. 2013	UTY	paper (xls)
List of Existing Buildings and Constructions, and Maintenance Period of Locomotives by Inspection in Tinchlik and Bukhara Depot	Feb. 2013	UTY	paper (doc)
Number of Coaches by Type and Year of Manufacture of Uzjeldorpass	Mar. 2013	Uzjeldorpass	paper (doc)
d) Technical Standerds			
Applicable Technical Standards related to the Design and Construction of Railway Infrastructure	Feb. 2013	UTY	paper (doc)
e) Train Operation			
Calculation Method of Line Capacity on Marakand–Bukhara Section	Feb. 2013	UTY	paper (doc)
Line Capacity and Number of Trains by Section in 2013	Mar. 2013	UTY	paper (xls)
Freight Train Formation Plan of UTY for 2012–2013	2012	UTY	book (doc)
Passenger Train Schedule on Marakand–Bukhara Section	Mar. 2013	UTY	paper (doc)
Passenger Train Schedule of Uzjeldorpass	Mar. 2013	UTY	

Note: * The data formats in "( )" show the formts of translated documents and data.

Title	Date of Issue	Issuing Authority	Data Format*
f) Traffic Volume			
Freight Traffic Volume and Turnover by Commodity and by Transport Type in Uzbekistan for 2002–2012	Mar. 2013	UTY	paper (xls)
Freight Traffic Volume and Turnover by Commodity and by Transport Type on Marakand–Bukhara Section for 2008–2012	Mar. 2013	UTY	paper (xls)
Freight Traffic Volume by Transport Type on Marokand–Bukhara Section through Cross-border Stations for 2008–2012	Mar. 2013	UTY	paper (xls)
Passenger Traffic Volume and Turnover by Train in Uzbekistan for 2000–2012	Mar. 2013	UTY	paper (xls)
Passenger Volume of Main Stations in Uzbekistan for 2000–2012	Mar. 2013	UTY	paper (xls)
2) Development Plan of Railway Sector			
Resolution of the President of the Republic of Uzbekistan No. PP-993: On the Implement the "SJSRC "Uzbekistan Temir Yollar" Passenger Locomotives Renewal	Nov. 2008	President of the Republic of Uzbekistan	paper (doc)
Resolution of the President of the Republic of Uzbekistan No. PP-1074: On the Comprehensive Program of Development and Modernization of Railway Sector for 2009–2013	Mar. 2009	President of the Republic of Uzbekistan	paper (doc)
UTY Business Plan 2013	2012	UTY	paper (doc)

Note: * The data formats in "( )" show the formts of translated documents and data.

(4) Information of ODA Projects in Railway Sector

Title	Date of Issue	Issuing Authority	Data Format
1) Policy/Administration/Laws & Regulations/Budget			
Resolution of the President of the Republic of Uzbekistan No. PD-982: On Establishment of State Joint-Stock Railway Company "Uzbekistan Temir Yollari"	Nov. 1994	President of the Republic of Uzbekistan	doc
Railway Transport Law of the Republic of Uzbekistan No. 766	Apr. 1999	President of the Republic of Uzbekistan	doc
Resolution of the President of the Republic of Uzbekistan No. PD-2815: On the Measures for De-monopolisation and Corporization of Railway Transportation	Mar. 2001	President of the Republic of Uzbekistan	doc

Note: * The data formats in "( )" show the formts of translated documents and data.

Title	Date of Issue	Issuing Authority	Data Format
1) Policy/Administration/Laws & Regulations/Budget (continued)			
Resolution of the President of the Republic of Uzbekistan No. PD-1623: On the Program of Highlight Measures on Manufacture Expansion and Development of the New Types of Competitive Products Release	Dec. 2011	President of the Republic of Uzbekistan	doc
Resolution of the President of the Republic of Uzbekistan No. PP-704: On the Investment Program of the Republic of Uzbekistan for the year 2008	Oct. 2007	President of the Republic of Uzbekistan	pdf (doc)
Resolution of the President of the Republic of Uzbekistan No. PP-969: On the Investment Program of the Republic of Uzbekistan for the year 2009	Oct. 2008	President of the Republic of Uzbekistan	pdf (doc)
Resolution of the President of the Republic of Uzbekistan No. PP-1213: On the Investment Program of the Republic of Uzbekistan for the year 2010	Oct. 2009	President of the Republic of Uzbekistan	pdf (doc)
Resolution of the President of the Republic of Uzbekistan No. PP-1455: On the Investment Program of the Republic of Uzbekistan for the year 2011	Dec. 2010	President of the Republic of Uzbekistan	doc
Resolution of the President of the Republic of Uzbekistan No. PP-1668: On the Investment Program of the Republic of Uzbekistan for the year 2012	Dec. 2011	President of the Republic of Uzbekistan	doc
Resolution of the President of the Republic of Uzbekistan No. PP-1855: On the Investment Program of the Republic of Uzbekistan for the year 2013	Nov. 2012	President of the Republic of Uzbekistan	pdf (doc)
UTY financial indexes for the period of 2008–2013 years	Feb. 2013	UTY	paper (doc)
2) Supporting Trend of Other Donor Organization			
Report and Recommendation of the President to the Board of Director of ADB, Proposed Loan to Marakand–Karshi Railway Electrification Project	Sep. 2011	ADB	pdf
Information on the Project of "Renewal of Locomotive Procurement of 11 units of Electric Freight Locomotives"	Jul. 2011	UTY	paper (doc)
Information on the Project of "Renewal of Locomotive Procurement of 10 units of Freight Locomotives (2nd Stage)"	Jun. 2012	UTY	paper (doc)

Note: * The data formats in "( )" show the formts of translated documents and data.

Title	Date of Issue	Issuing Authority	Data Format
3) Tends and Concerns of Japanese and Foreign Campanies			
List of the Legal and Regulatory Normative Acts of Foreign Investments in the Republic of Uzbekistan	Mar. 2013	MFERIT	paper (doc)
Resolution of the President of the Republic of Uzbekistan No. PP-927: On the Measures of Foreign Investment and Loan Attracting and Implementation Process Improvement	Jul. 2008	President of the Republic of Uzbekistan	paper (doc)

Note: * The data formats in "( )" show the formts of translated documents and data.

(5) Summary and Effectiveness of Railway Electrification Projects

Title	Date of Issue	Issuing Authority	Data Format*
1) Electrification of Tukimachi–Angren Railway Section			
Project Outline of Electrification of Tukimachi–Angren Railway Section	unknown	Toshtemiryol	paper (doc)
2) Construction of Yangiyer–Djizak Double-track Electrified Railway Section			
General Diagram of Yangier–Djizak Section	unknown	Toshtemiryol	paper (pdf)
Detail Diagram of Yangier–Dashtabad Section at scale of 1:25000	unknown	Toshtemiryol	
3) Electrification of Marakand–Karshi Railway Section			
Feasibility Study Report on the Project of Electrification of Marakand–Karshi Railway Section			
Book 1: General Characteristics of the Project, Financial Analysis and Marketing Research	2011	UTY, ADB, Boshtrans	doc
Book 2: Genaral Expalanatory Note	2011	UTY, Boshtrans	doc
Book 3: Construction Cost Estimation	2011	UTY, Boshtrans	doc
Book 4: Financial and Economic Estimation of the Project	2011	UTY, Boshtrans, RCIKTR & EIPP	doc
Book 5: Scheme of External Power Transmission Networks	2011	UTY, Boshtrans	doc
Book 6: Documentation of ADB's MOU	2011	UTY, Boshtrans	doc
Book 7: Initial Environmental Examination	2011	UTY, Boshtrans	doc

Note: * The data formats in "( )" show the formts of translated documents and data.

Title	Date of Issue	Issuing Authority	Data Format*
4) Electrification of Karshi–Termez Railway Section			
Feasibility Study Report on the Project of Electrification of Karshi–Termez Railway Section			
Book 1: General Characteristics of the Project and Marketing Research	2011	UTY, Boshtrans	doc
Book 2: Genaral Expalanatory Note	2011	UTY, Boshtrans	doc
Book 3: Ecology, Impact to the Environment	2011	UTY, Boshtrans	doc
Book 4: Project Cost Estimation	2011	UTY, Boshtrans	doc
Book 5: Financial and Economic Estimation of the Project	2011	UTY, Boshtrans, RCIKTR & EIPP	doc
Book 6: Documentation of Evaluation Mission of JICA	2011	UTY, Boshtrans	doc
Book 7: Scheme of External Power Supply (Karshi–Kumkurgan)	2011	UTY, Boshtrans	doc
Book 8: Scheme of External Power Supply (Kumkurgan–Termez)	2011	UTY, Boshtrans	doc
Book 9: Main Project Indicators	2011	UTY, Boshtrans	doc
5) Electrification of Marakand–Bukhara Railway Section			
Feasibility Study Report on the Project of Electrification of Marakand–Bukhara Railway Section (Russian)			
Book 1: General Characteristics of the Project and Marketing Research	2011	UTY, Boshtrans	doc
Book 2-Part 1: Genaral Expalanatory Note of Electrification	2012	UTY, Boshtrans	doc
Book 2-Part 2: Genaral Expalanatory Note of High-speed Running	2012	UTY, Boshtrans	doc
Book 5: Financial and Economic Estimation of the Project	2012	UTY, Boshtrans, Incomproject	doc

Note: * The data formats in "( )" show the formts of translated documents and data.

Title	Date of Issue	Issuing Authority	Data Format*
5) Electrification of Marakand–Bukhara Railway Section (continued)			
Feasibility Study Report on the Project of Electrification of Marakand–Bukhara Railway Section (English)			
Book 1: General Characteristics of the Project and Marketing Research	2011	UTY, Boshtrans	paper (pdf)
Book 2-Part 1: Genaral Expalanatory Note of Electrification	2012	UTY, Boshtrans	paper (pdf)
Book 5: Financial and Economic Estimation of the Project	2012	UTY, Boshtrans, Incomproject	paper (pdf)
Planning Track Layout of Marakand–Bukhara Railway Section Electrification	Apr. 2012	UTY, Boshtrans	dwg
Model Form of Investment Offer for Marakand–Navoi–Bukhara Railway Section Electrification	2012	UTY	paper (doc)
Project Costs of Marakand–Bukhara Railway Section Electrification	2012	UTY	paper (xls)

Note: * The data formats in "( )" show the formts of translated documents and data.

(6) Contents of Assistance with Japan's Superiority on the Development of Railway Infrastructure

Title	Date of Issue	Issuing Authority	Data Format*
Information of Investment Criteria (Standards) of UTY	Mar. 2013	UTY	doc
Resolution of the Cabinet of Ministries of the Republic of Uzbekistan No. 110: On Approval of Instructions on Development, Appraisal and Approval of Documentation related to Investment Projects	Jun. 2007	Cabinet of Ministries	doc

Note: * The data formats in "( )" show the formts of translated documents and data.