DATA COLLECTION SURVEY ON OSH CITY ROAD TRANSPORTATION IN THE KYRGYZ REPUBLIC

Final Report

March 2016

JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL

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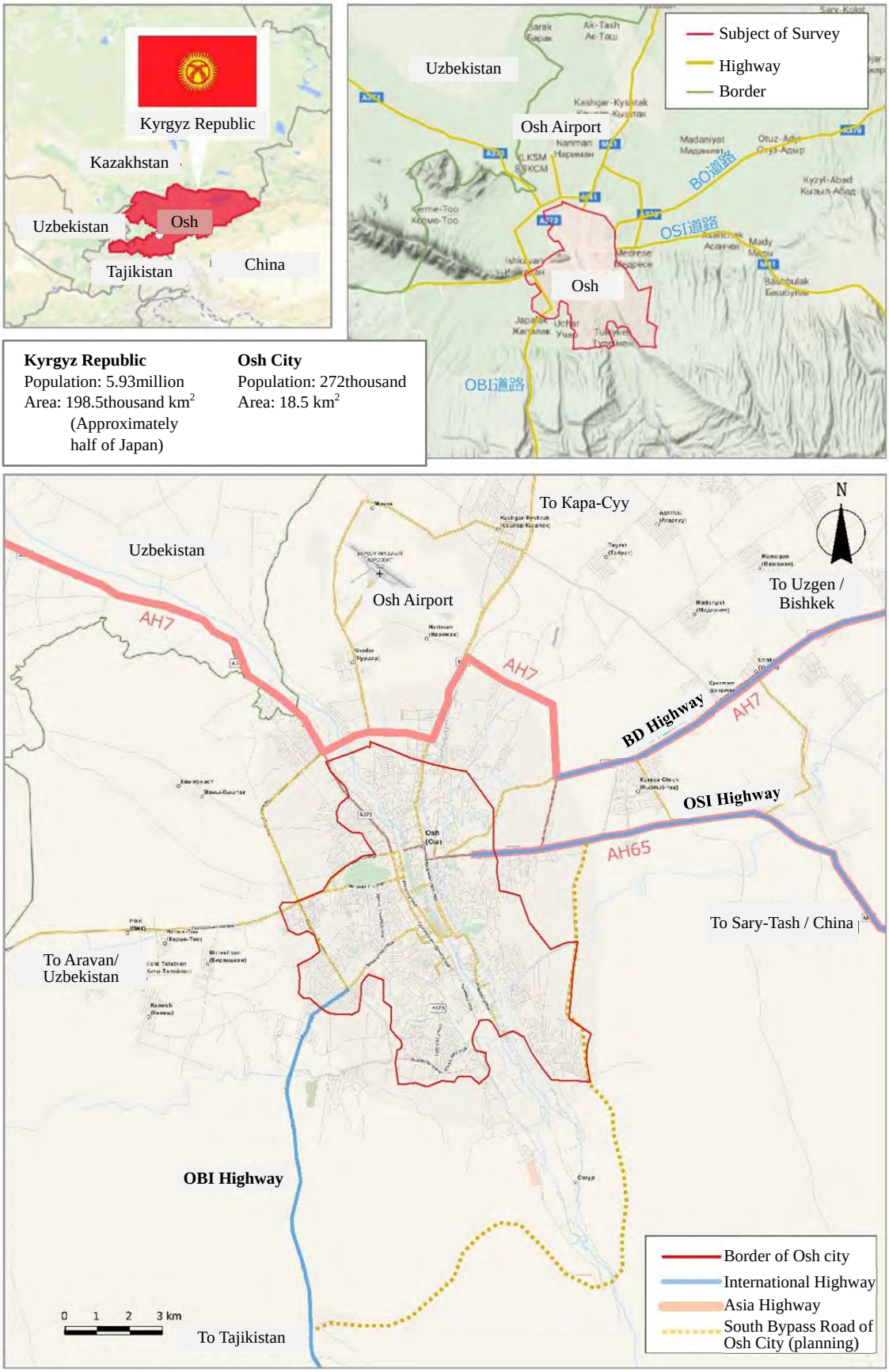
Exchange rate used in this Report

USD 1	*=*	*KGS*	*75.85*
USD 1	*=*	*JPY*	*120.30*
KGS 1	*=*	*JPY*	*1.586*

(As of January, 2016)



LOCATION MAP

Summary

1 OUTLINE OF THE SUMMARY

1.1 Objective

This survey is conducted to collect and sort out information on existing road conditions, road development/ improvement plans, and present transport issues in Osh city and vicinity, in order to ensure safety and smooth traffic on the international corridors passing through Osh city.

1.2 Survey Area

The survey area is Osh city and vicinity, especially international corridors such as Bishkek-Osh Road (BO Road), Osh-Sarytash-Irkeshtam Road (OSI Road) bound for PRC, and Osh-Batken-Isfana Road (OBI Road) bound for Tajikistan.

1.3 Survey Period

The survey period is From October 2015 to March 2016.

1.4 Counterparts

The main counterpart is the Ministry of Transport and Communication (hereinafter referred to as “MOTC”), and Osh city is the co-agency of providing information on road transport.

1.5 Survey Contents

1) Study of Previous Survey Reports and Development Plan
2) Information Collection of Present Road Condition and Road Development Plan of the Kyrgyz
3) Traffic Survey
4) Origin Destination (OD) Interview Survey
5) Future Traffic Demand Forecast
6) Bridge Survey and Plans for Reconstruction and New Construction
7) Topographical and Geometrical Data
8) Information for Procurement
9) Data Collection and Analysis on Environmental and Social Considerations
10) Road Transport Development Plan and Priority
11) Future Assistance

2 PRESENT ROAD SECTOR ISSUES

Identified present issues on road and bridge are shown in following tables.

Table 1 Identified Road Sector Issues

Road Network	Road Condition
1. Traffic congestion on the major streets in the central city 2. International vehicles concentrate on major city roads and pass through Osh city 3. Insufficient capacity of bridge links crossing river	1. Several signalized intersections and partial roundabouts reach excess traffic capacity level 2. High occupancy of on-street parking in the central area and lack of off-street parking facility 3. Lack of a well-developed traffic management system (traffic signal control, channelization with marking, pedestrian facilities, off-street parking facilities with traffic enforcement, bus bay and etc.) 4. Poor road surface condition partially at international and national roads 5. Insufficient road safety system

Table 2 Present Condition of Bridges

・ The Bridge on Kasymbekova St.	Slabs have spalling and rebar exposures. In front of a revetment is damaged.
・ The Bridge on Uch-Kocho St.	Bridge condition is rather good. Slope protection at beside of a revetment is required.
・ The Bridge on Navoi St.	The bridge is newly constructed and in good condition. Expansions are not well constructed and have water leakages.
・ The Bridge on Abdukadirov St.	Spalling and rebar exposures are observed at many places. Slabs should be repaired or reconstructed before falling down.
・ The Bridge on Nurmatov St.	Spalling and rebar exposures are observed at many places. Applied design standard seems old because exposed rebars are round bars, so that enhancement of the bridge by repairs or reinforcement is not able to make it strong enough. Therefore reconstruction is recommended.

3 INFORMATION RELATED TO PROCUREMENT

No major problems are anticipated with regard to the quantity and quality of the equipment and materials, as well as the skill levels of workers, to be procured for the construction of the roads and bridges. Potential risks associated with procurement lie in the transportation of goods.

As a result, of Kyrgyzstan's accession to EEU, tariffs on goods imported from outside the region will be higher. Although this does not affect the equipment and materials that will be exempt from taxation under the grant aid system, other equipment and materials that are taxable will be affected and thus need to be paid attention to. Taxable equipment and materials also need to conform to the unified EEU standards. If conformity certificates are required for such items, they need to be obtained in advance.

4 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

4.1 Environmental and Social Considerations on Project Implementation

The Kyrgyz Republic has an EIA system. Construction works of roads and railways require an EIA procedure, and a project initiator has to acquire an environmental license thorough the EIA procedure. In case that there are project affected persons, a Resettlement Action Plan (RAP) shall be prepared for implementation of the project.

4.2 Pre-Environmental Evaluation on Proposed Projects

(1) Replacement of Nurmatov St. Bridge

Since the vicinity of Nurmatov St. is a developed urban area, the implementation of the project causes few negative impacts on the environment. The widening of the street requires land acquisition of the park and shops. This land acquisition may cause tens of project affected persons. In the next step (F/S stage), the project requires an EIA procedure of the Kyrgyz Republic and the preparation of an abbreviate Resettlement Action Plan (aRAP).

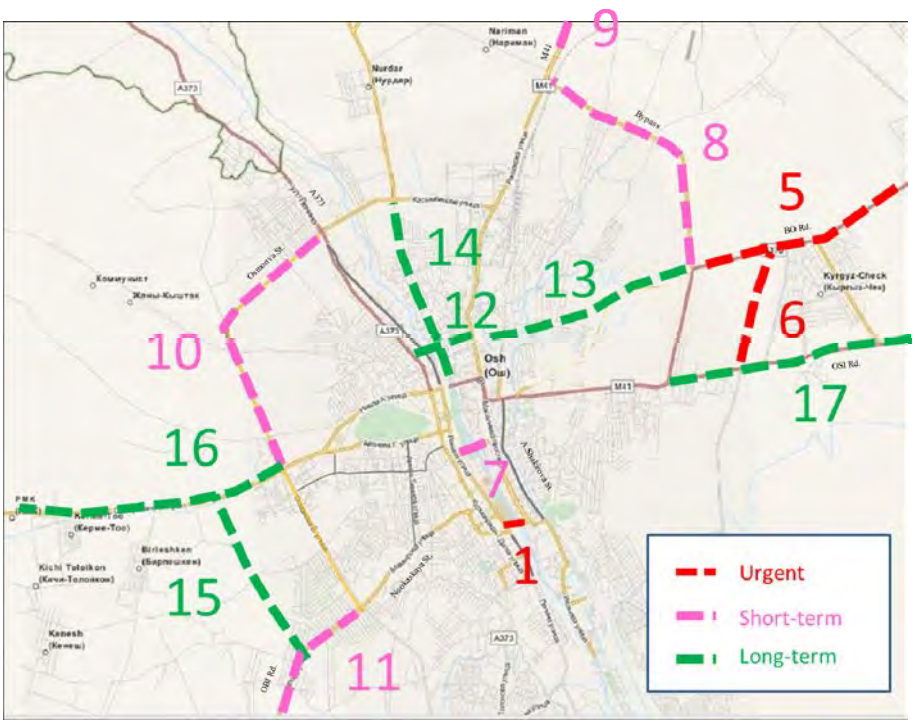
(2) South Bypass Road of Osh City

The South Bypass Road project consists of upgrading existing road and new developing road. The vicinity of the project site is an undeveloped rural area. Upgrading the existing road may cause few negative impacts on the environment, whereas, new developing road may cause some impacts on the environment. The road design alignment should be carefully examined to mitigate environmental impacts otherwise it could cause a large scale resettlement. In the next step (F/S stage), the project requires an EIA procedure of the Kyrgyz Republic and the preparation of a Resettlement Action Plan (RAP) or an abbreviate Resettlement Action Plan (aRAP).

5 STUDY ON ROAD AND BRIDGE DEVELOPMENT

5.1 Road and Bridge Development Project and 9.3 Priority

The Survey team consulted with the departments concerned with road development and the surveyed fields and concludingly identified road and bridge development projects, afterward, prioritized the projects taking into consideration the following points; 1) Urgency, 2) Relevance, 3) Effectiveness, 4) Consensus among concerns, and 5) Social and environmental consideration. Projects are categorized into Urgent, Short-term and Long-term plans as shown in following figure and table.



* Numbers in the figure are corresponding to project numbers in table 3.

Source: JICA Survey Team

Figure 1 Location of Road and Bridge Projects

Table 3 Priority of Road and Bridge Projects

Priority	Project	Organization	Evaluation				
			Urgency	Relevance	Effectiveness	Consensus	Social and Environment
Urgent	1) Reconstruction of Nurmatov St. Bridge	Osh City/ MOTC	A	A	A	A	B
Urgent	2) Improvement of Road Marking and Sign	Minister of Internal Affairs	A	A	B	A	A
Urgent	3) Enhancement of Traffic Management Capacity	Osh City	A	A	B	A	A
Urgent	4) Improvement of Road Safety	Osh City	A	A	A	A	A
Urgent	5) Widening BO Road	MOTC	A	A	A	B	B
Urgent	6) Extension South Bypass to connect OSI and BO Roads (To be included in the South Bypass Project)	MOTC	A	A	A	B	C
Short-term	7) Rehabilitation of Abdukadirov St. Bridge	Osh City	B	A	A	A	A
Short-term	8) Improvement/ Widening of Undeveloped Sections of Ring Road	MOTC	B	A	A	A	B
Short-term	9) Improvement of Osh- Karasuu Road (M41)	MOTC	B	A	A	B	A
Short-term	10) Widening North West part of Ring Road (Osmonova St.)	MOTC	B	A	A	B	B

Priority	Project	Organization	Evaluation				
			Urgency	Relevance	Effectiveness	Consensus	Social and Environment
Short-term	11) Widening OSI Road	MOTC	B	A	A	B	B
Long-term	12) Construction of New Uch Kocho St. Bridge (4 lanes)	Osh City	A	A	B	A	C
Long-term	13) Construction/Upgrading of access road (A370) between BO Road to city center	Osh City	B	A	A	B	B
Long-term	14) Construction/Upgrading of Akburinskaya St. Extension to Osh Airport Access Road	Osh City	B	A	A	B	B
Long-term	15) Construction New road; to connect OBI Road to Osh- Aravan Road to detour heavy vehicles from Ring Road (Osmonova St.)	Osh City	B	A	B	B	B
Long-term	16) Widening Osh-Aravan Road	MOTC	C	A	A	C	C
Long-term	17) Widening OBI Road	MOTC	C	A	A	C	C

Note) A: High, B: Middle, C: Low
Source: JICA Survey Team

6 STUDY ON FUTURE ASSISTANCE FOR OSH CITY AND VICINITY

Followings are concluded as suitable projects for requesting support from donors;

1) Reconstruction of Nurmatov St. Bridge,
2) Improvement of Road Markings and Signs,
3) Enhancement of Traffic Management Capacity, and
4) Improvement of Road Safety.

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LIST OF ABBREVIATIONS

AADT	Annual Average Daily Traffic
ACG	Arab Coordination Group
ADB	Asian Development Bank
AH	Asian Highway
aRAP	abbreviated Resettlement Action Plan
BO	Bishkek-Osh
CAREC	Central Asia Regional Economic Cooperation
CBD	Central Business District
CCTV	Closed-Circuit Television
CMOD	Construction Maintenance and Operation Department
CRBC	China Road and Bridge Corporation
DAC	Development Assistance Committee
DD	Detailed Design
EBRD	European Bank for Reconstruction and Development
EDB	Eurasian Development Bank
EEU	Eurasian Economic Union
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
ES	Environmental Statement
EU	European Union
F/S	Feasibility Study
GDP	Gross Domestic Product
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
GRDP	Gross Regional Domestic Product
HT	Heavy Truck
IC	Inter Change
IDA	World Bank's International Development Association
IDB	Islamic Development Bank
IMF	International Monetary Fund
IMF-CTF	International Monetary Fund, Counter-Terrorist Financing
IPIG	International Project Implementation Group
IsDB	Islamic Development Bank
IUCN	International Union for Conservation of Nature
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
JSC	Joint Stock Company
KGS	Kyrgyz Som
KP	Kilo Post

KR	Kyrgyz Republic
LAR	Land Acquisition and Resettlement
LT	Light Truck
MIA	Ministry of Internal Affairs
MOTC	Ministry of Transport and Communication
MT	Mid-size Truck
NASKR	National Academy of Sciences of the Kyrgyz Republic
NSDS	National Sustainable Development Strategy for the Kyrgyz Republic
OBI	Osh-Batken-Isfana
OD	Origin-Destination
ODA	Official Development Assistance
OSI	Osh-Sarytash-Irkeshtam
PAPs	Project Affected Persons
PAs	Protected Areas
PC	Pre-stressed Concrete
PCE	Passenger Car Equivalent
PCU	Passenger Car Unit
PRC	People's Republic of China
RAP	Resettlement Action Plan
RC	Reinforced Concrete
RMD	Road Maintenance Department
RSDS	Road Sector Development Strategy up to 2025
SAPS	Special Assistance for Project Sustainability
St.	Street
SV	Supervision
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organization
USA	United States of America
USAID	United States Agency for International Development
USD	US Dollar
USSR	Union of Soviet Socialist Republics
VCR	Volume Capacity Ratio
WB	World Bank

CHAPTER 1 OUTLINE OF THE SURVEY

1.1 Background and Objective

1) Background

The Kyrgyz Republic (hereinafter referred to as "Kyrgyz") is a land-locked country surrounded by the Republic of Kazakhstan, the People's Republic of China (PRC), the Republic of Tajikistan, and the Republic of Uzbekistan in the Central Asia. In Kyrgyz, 95% of transport of passengers and commodities owes to land transport by vehicles. The national road network is developed with a total length of about 3,400 km, contributes to people's daily living as well as international transport between Central Asian Countries, PRC and South West Asian Countries.

Osh city is the second biggest city in Kyrgyz next to Bishkek, the capital city. Osh city is located in the Fergana Valley, which spreads across the eastern part of Uzbekistan, Tajikistan and the southern part of Kyrgyz. Osh city has played a major role in agriculture and stock farming on the fertile soil of the Fergana Valley from ancient times onwards. It is also famous for being a trading center along the Silk Road. The Karasuu market, the second largest Bazar in Kyrgyz is dealing with imported commodities from PRC is located in the suburb of Osh city. The Bazar gathers traders of whole sale distributors and shop owners of Kyrgyz and neighboring countries.

The road network around Osh city consists of international corridors as follows; Bishkek - Osh Road (BO Road), which is the most important road connecting Bishkek city and Osh city, Osh-Sarytash-Irkeshtam Road (OSI Road) bound for PRC, and Osh-Batken-Isfana Road (OBI Road) bound for Tajikistan. This circumstance clearly shows that Osh city is the intersection of international and domestic trading. On the other hand, a critical terrain is the Ak-Buura River flowing from south to north in the center of Osh city, which restricts crossing points for vehicles to several bridges. As a result, international or long distance vehicles, especially heavy freight vehicles, pass through the city center frequently, cause traffic congestion and imperil traffic safety. Those conditions will worsen due to the urban expansion to the south of the city and the increase of population and vehicles.

Under this background, this survey is conducted in the view of mitigation for the chronic traffic congestion and securing safety and smooth traffic in Osh city.

2) Objective

This survey is conducted to collect and sort out information on existing road conditions, road development/ improvement plans, and present transport issues in Osh city and vicinity, in order to ensure safety and smooth traffic on the international corridors passing through Osh city.

3) Survey Area

The survey area is Osh city and vicinity, especially international corridors such as BO, OSI and OBI Roads.

4) Counterparts

The main counterpart is the Ministry of Transport and Communication (hereinafter referred to as "MOTC"), and Osh city is the co-agency of providing information on road transport.

1.2 Method of the Survey

The Survey team collects necessary information of road transport in Osh City and vicinity by field survey, consultation with relevant agencies. Based on the facts, the Survey team considers a road transport development plan for ensuring road safety and smooth traffic of international corridors.

1) Study of Previous Survey Reports and Development Plan

Previous survey reports of road transport development relating to the survey area and statistical data are studied and reviewed. Road transport sector development plans and policies of Kyrgyz are also reviewed. International donors such as Japan International Cooperation Agency (JICA), the Asian Development Bank (ADB), and the World Bank (WB) have assisted Kyrgyz in the road transport sector. Such projects relating to the survey area are sorted out.

2) Information Collection of Present Road Condition and Road Development Plan of the Kyrgyz

A field survey is conducted to collect information on present road and bridge conditions. Consultations are conducted with relating departments of Osh city, MOTC and Social Environmental Agencies. Road development plans of Osh city and MOTC in Osh city and vicinity are the main focus of this survey.

3) Traffic Survey

A traffic survey is conducted at about 20 locations. Survey locations are bottlenecks in Osh city and at the boundaries of Osh city on international corridors. Traffic volume on the road side, traffic flow by directions at intersections, queue length at intersections, traffic signal phases and time, and travel condition are surveyed.

4) Origin Destination (OD) Interview Survey

Origin Destination (OD) Interview survey is conducted at 7 locations at the boundaries of Osh city targeting drivers using random sampling procedures.

5) Future Traffic Demand Forecast

Future traffic demand in the survey area is forecasted. Traffic demand is estimated upon traffic survey results, OD interview survey results, and information provided by MOTC and Osh city.

6) Bridge Survey and Plans for Reconstruction and New Construction

Present bridges in Osh city are surveyed in the field and soundness of the bridges is evaluated. Present plans for reconstruction and new construction are collected. Based on that information, necessary rehabilitation and reconstruction projects are studied.

7) Topographical and Geometrical Data

Existing information of topographic and geometric data for new road and bridge design is collected.

8) Information for Procurement

Relevant information on procurement to estimate the rough project costs is collected.

9) Data Collection and Analysis on Environmental and Social Considerations

Relevant materials on EIA are reviewed, and interviews for relevant authorities are conducted to understand the issues on the environmental and social considerations on candidate projects of road and bridge development. Relevant materials on land acquisition and involuntary resettlement are reviewed, and interviews for relevant authorities are conducted.

10) Road Transport Development Plan and Priority

Road and bridge development projects are studied and prioritized into the three (3) categories of urgent, short term and long term projects. Those projects are for both MOTC and Osh city.

11) Future Assistance

The assistance policy of the Government of Japan and the development strategy of Kyrgyz are studied. Following on this study the consistency of past assistances and synergy effects by proposed projects are considered. Taking into consideration the above mentioned analysis and the ability of implementation agencies in terms of budget allocation and maintenance system, the Survey team studies and proposes appropriate projects and schemes for Japanese assistance projects.

1.3 Survey Team Member

The Survey team members are as shown in the following table.

Table 1.3-1 Survey Team Member

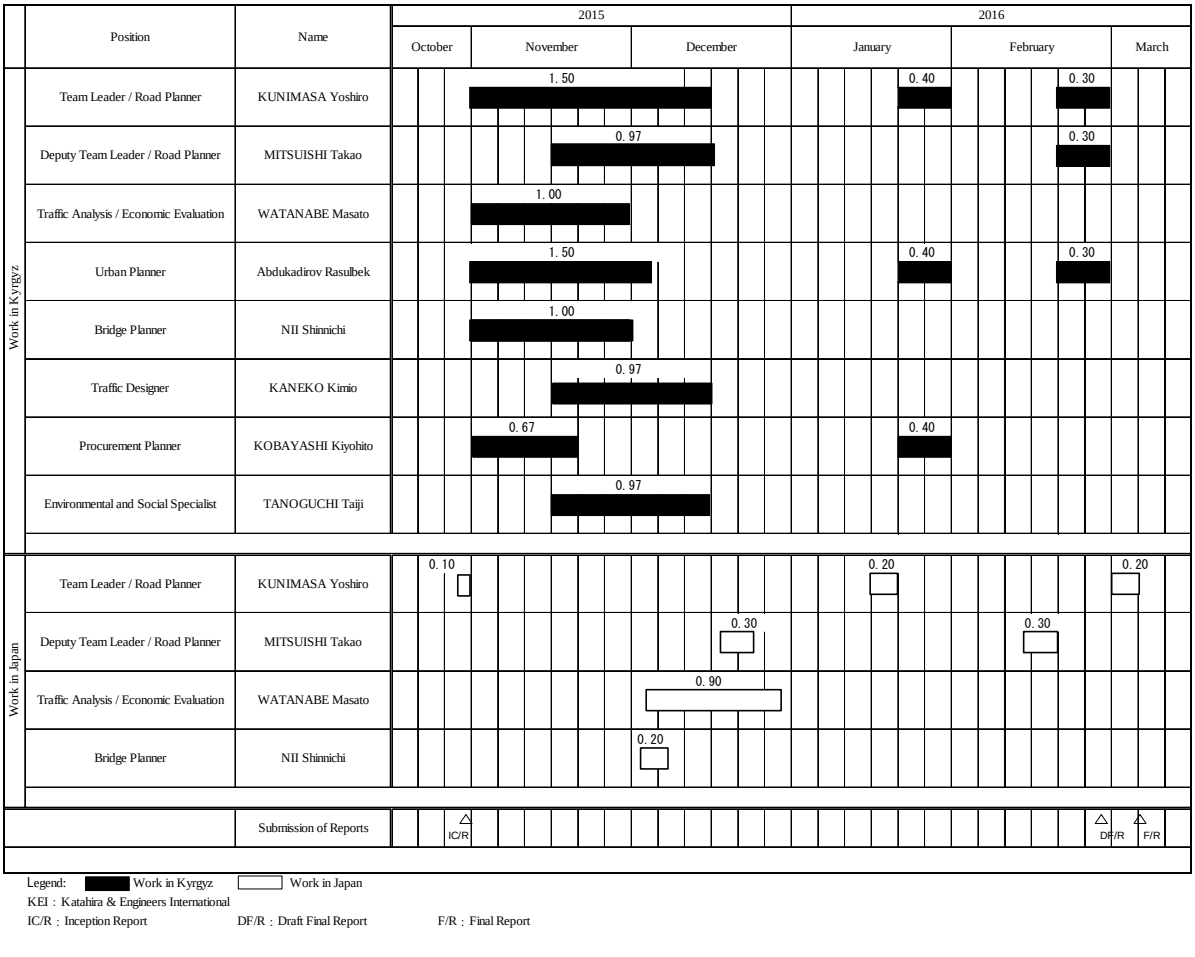
Specialty	Expert
Team Leader / Road Planner	KUNIMASA Yoshiro
Deputy Team Leader / Road Planner	MITSUISHI Takao
Traffic Analysis / Economic Evaluation	WATANABE Masato
Urban Planner	ABDUKADIROV Rasulbek
Bridge Planner	NII Shinnichi
Traffic Designer	KANEKO Kimio
Procurement Planner	KOBAYASHI Kiyohito
Environmental and Social Specialist	TANOGUCHI Taiji

1.4 Survey Schedule and Interviewees

1) Survey Schedule

The survey schedule is shown in the following table.

Table 1.4-1 Survey Schedule



2) Main Interviewees

i) MOTC

- MOTC Deputy minister, Mr.Uezbaev Ulan
- MOTC Road Management Department, Mrs.Nina Aleksandrovna
- IPIG, Head of Unit, Mr.Mamaev Kubanychbek Abdurakhmanovich
- Road Administration Advisor (JICA Expert), TANAKA Takuya
- MOTC OSI UAD, Head of UAD, Mr.Kurmanbekov Ulukbek
- MOTC OSI UAD, DEP21, Head of DEP, Mr. Salomov Abdugani
- MOTC BO UAD, Head of UAD, Mr. Toktomambetov Nurlan
- Road Design Institute, Deputy Director, Mr.Alibegashvili Levan

ii) Osh City

- Vice mayor, Mr. Ormonov Japarbek Turatovich
- City Planning and Architecture Department, Head of Department, Mr.Zholdoshov Azhimurat
- City Planning and Architecture Department, Deputy Head, Mr.Osmonov Asyran
- City Planning and Property Department, Mr. Pirmatov Altynbek Abdimitalipovich
- City Road Management Department, Head of Department, Mr. Junusov Arzybek Sulaymanovich
- City Road Management Department, Deputy Head, Mr. Janibekov Ulugbek
- City Department of Parking, Stops and Garages Management, Mr. Samidimov Talantbek
- City Market Management Department, Deputy Director , Mr. Arypbek
- MIA Osh City Traffic Police, Construction Maintenance and Operation Department, Deputy head Mr.Ajimamatov Azamat
- Private road construction and maintenance company OsOO "CinTash", Head, Mr.Eshaliev Saparbek

iii) JICA Kyrgyz Office

- Resident Representative, Mr. OYAMA Takayuki (as of December 2015)
- Acting Chief Representative, Mr. IMAI Seiju
- Deputy Representative, Ms. MARUYAMA Hitomi

iv) World Bank (IBRD/IDA) Kyrgyz Office

- Operation Officer, Ms. Aidai Bayalieva

v) ADB Kyrgyz Office

- Senior Project Officer, Mr. Mirdin Eshenaliev

CHAPTER 2 OUTLINE OF THE ROAD SECTOR DEVELOPMENT PLAN

2.1 Road Sector Development Plan

2.1.1 Present Road Network

The total length of the road network in Kyrgyz is about 34,000 km, of which 18,585 km are public roads maintained by road enterprises of the Ministry of Transport and Communications of the Kyrgyz Republic (MOTC KR), 15,190 km are maintained by cities, villages, agricultural, industrial and other enterprises. Public roads are classified into international (4,100km), national (5,335km) and local (9,149km) roads depending on their economic and administrative significance. The length of paved public roads is 7,580 km, including 10 km with cement concrete pavement, 5,698 km with asphalt concrete pavement and 1,871 km with black gravel pavement. Gravel roads amount to 9,388 km, and there are still 1,617 km unpaved roads.

2.1.2 National Sustainable Development Strategy (2012-2017)

Kyrgyz has a “National Sustainable Development Strategy for the Kyrgyz Republic (2012-2017)” (hereinafter referred to as “NSDS”), which was approved by the Governmental Decree No. 218 as of 30 April 2013. NSDS focuses mainly on the economic development of the country and transport is one of the particular items.

The NSDS insists on taking measures to turn Kyrgyzstan from a "transport deadlock" into a "transit" country. This will provide additional transport links between the North and the South of the country. It is also envisaged that every year more than 300 km of automobile roads with asphalt/concrete pavement will be constructed and at least 150 km of roads will be repaired, with complete resurfacing of the asphalt.

Under the sector of “Transport and communications”, the following objectives have been set regarding road development;

1) Rehabilitation of five motorways that represent international transport corridors,

2) Preservation and improvement of the network of domestic hard-surface roads, and

3) Ensuring transport independence of the country.

Above mentioned five motorways (Figure2.1-1) consist of:

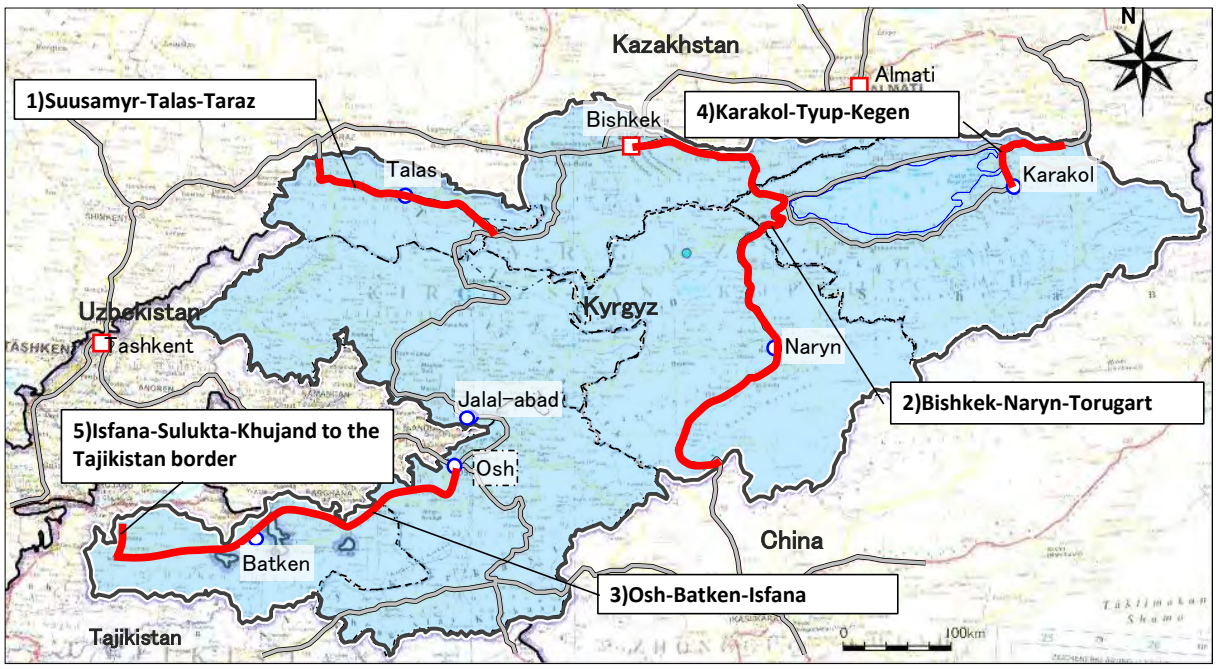
1) Suusamyr – Talas – Taraz (length - 199 km);

2) Bishkek – Naryn – Torugart (length - 539 km);

3) Osh – Batken – Isfana (length - 360 km);

4) Karakol – Tyup – Kegen (length - 76 km);

5) Isfana-Sulukta-Khujand to the Tajikistan border (length – 44 km).



Source: Prepared by JICA Survey Team under the NSDS

Figure 2.1-1 Five Motorways

The NSDS mentions constructing new bypass (detour) roads in order to ensure transport independence of the country transport system. The total lengths of bypass roads will be about 170 km, most of the bypass roads, about 125 km, are to be constructed in the Batken Oblast.

Tourism is regarded as one of the major drive of economic growth for the Kyrgyz. However, the NSDS points out that one of the main hinders of further development of tourism is a lack of quality of road infrastructure and encourages developing them.

Table 2.1-1 Investment Projects in the Transport Sector (2013-2017)

No.	Project Name	Total Estimated Cost (million USD)	Implementation Time Frame
1	Construction and reconstruction of roads in Bishkek (10 items)	30	2013
2	Procurement of road vehicles and equipment: - Graders - 43 units - Loaders - 20 units - Asphalt concrete plants - 3 units - Bulldozers - 3 units	9.6	2013
3	Rehabilitation of the Taraz-Talas-Suusamyr motorway (from 75th to 105th kilometers, Stage III)	22.075	2013-2016
4	Rehabilitation of the Bishkek-Naryn-Torugart motorway (9th to 272nd kilometers, 272nd to 365th kilometers, 365th to 539th kilometers)	154.1	2013-2016
5	Rehabilitation of the Osh-Batken-Isfana motorway (10-28 km, 108-123 km, 220-232 km, 232-248 km, 248-360 km)	148.2	2013-2017
6	Implementation of the rehabilitation project for the Isfana-Sulukta-Khujand motorway (to the Tajikistan border, from 360 to 404 km)	40	2015-2016
7	Rehabilitation of the Bishkek-Osh motorway (Stage IV)	120	-
8	Reconstruction of Batken, Isfana, Jalal-abad airports	10	2014
9	Modernization of the Air Traffic Control System (ATC)	28.5	2013-2014
10	Modernization and acquisition of navigational equipment for the “Manas”, “Osh” and “Issyk Kul” Airports	11.3	2013-2014
11	Feasibility study for a railroad branch that connects the North and the South	3.0	2014
12	Feasibility study on the construction of the "China-Kyrgyzstan-Uzbekistan" railway	3.5	2013
13	Construction of the “China-Kyrgyzstan-Uzbekistan” railway (initial stages)	1500.0	2015-2016

Source: National Sustainable Development Strategy for the Kyrgyz Republic (2013-2017)

2.1.3 Road Sector Development Strategy up to 2025

MOTC is drafting the “Road Sector Development Strategy up to 2025” (hereinafter referred to as “RSDS”) in line with NSDS. The Strategy outlines the road sector development goals, reform policies as well as road investment and maintenance targets.

The main goals are 1) Sustainable operation of the road sector and 2) Ensuring access to markets for goods, labor, and social service. In order to achieve those goals, MOTC plans to develop a road sector reform policy and to change the monitoring and planning system for national and local roads repair and maintenance works.

2.1.4 Recent Road Development and Plan

Road development and rehabilitation projects under MOTC on National Roads are shown in Table 2.1-2.

Table 2.1-2 Recent Road Development and Plan under MOTC

No.	Name of Road	Length (km)	Implementation Schedule	Donor	Project Status	Cost (million USD)
1. Bishkek-Osh						
1.1.	from 9 to 61 km	52	2015-2020	ADB and EDB	ongoing	100.00
1.2.	from 498 to 571 km	73	2015-2020	ADB and EDB	ongoing	60.00
	Sub-total	**125**				**160.00**
3. Bishkek-Naryn-Torugart						
3.1.	from 9 to 272 km	230	2010-2015	EXIM BANK	completed	200.00
3.2.	from 272 to 365 km	93	2014-2018	ACG	ongoing	72.35
3.3.	from 365 to 400 km and from 439 to 479 km	75	2010-2015	ADB	completed	50.00
3.4.	from 400 to 439 km	39	2010-2013	ADB	completed	20.00
3.5.	from 479 to 539 km	60	2013-2018	ADB	ongoing	55.00
3.6.	from 147 to 172 km (Kubaky-Balykchi)	25	2013-2018	EXIM BANK	ongoing	38.37
	Sub-total	**522**				**435.72**
6. Osh-Batken-Isfana						
6.1.	from 10 to 28 km	18	2012-2015	WB	ongoing	16.00
6.2.	28-75	47			planning	120.00
6.3.	75-108	33	2016-2019	IDB	ongoing	23.76
6.4.	from 108 to 123 km	15	2012-2015	EU	ongoing	10.32
6.5.	from 123 to 155 km	32	2010-2013	WB	completed	25.00
6.6.	from 155 to 220 km	60	2010-2013	EBRD	completed	35.00
6.7.	from 248 to 271 km	23	2007-2009	EU	completed	8.20
6.8.	from 220 to 232 km	12	2013-2017	EXIM BANK	ongoing	91.44
6.9.	from 271 to 360 km	89	2013-2017	EXIM BANK	ongoing	
6.10.	from 360 to 402 km	42	2015-2019	WB	planning	54.17
	Sub-total	**371**				**383.89**
Taraz-Talas-Suusamyr						

No.	Name of Road	Length (km)	Implementation Schedule	Donor	Project Status	Cost (million USD)
	from 0 to 52 km	52	2005-2009	IDB	completed	14.55
	from 52 to 73 km	21	2009-2011	IDB	completed	12.77
	from 75 to 105 km	30	2014-2017	IDB	ongoing	22.08
	from 105 to 199 km	94	2016-2021		planning	75.07
	Sub-total	**199**				**124.47**
7. Alternative North-South Road (New)						
7.1.	Phase 1: from 183 to 195 km and from 291 to 433 km, including tunnel with length 3,7 km	154	2014-2019	EXIM BANK	ongoing	400.00
	Phase 2: from 0 to 43 km and from 64 to159 km	96			planning	299.00
	Phase 3: from 159 to 183 km	24			planning	34.00
	Phase 3: from 0 to 43 km and from 64 to 159 km	138			planning	145.00
	from 43 to 64 - Bishkek-Naryn-Torugart road section	21			completed	
	Sub-total	**433**				**878.00**
	TOTAL	**1,650**				**1982.08**

Note)

ACG: Arab Coordination Group
ADB: Asian Development Bank
EBRD: European Bank for Reconstruction and Development
EDB: Eurasian Development Bank
EU: European Union
EXIM BANK: Export-Import Bank of China
IDB: Islamic Development Bank
WB: World Bank

Source: MOTC

2.2 Road Administration

2.2.1 Legal Framework Regulating the Road Sector

The current system of the regulatory and legal framework governing the road sector activities consists of the following normative-legal acts:

- Law on Roads of the Kyrgyz Republic;
- Law on Road Fund of the Kyrgyz Republic;
- Resolution of the Government of the Kyrgyz Republic dated August 8, 2014, №454, and others;
- Common industrial rules of time and cost estimate, the most common in the construction and repair of roads and buildings. Part I. Construction and repair of roads and carriageways. M - 1989;
- ENiR. Collection E17. Construction of highways. M -1989;
- Other technical normative legal acts before 1991;
- Activities related to the procurement of works and services are governed by the Law on Public Procurement

The Law of the Kyrgyz Republic “On Roads” defines the economic, legal foundations and principles of road management activities to be performed by the organizations and enterprises, and it covers and regulates virtually the entire range of issues relating to the road sector. However, not all the rules of the law governing certain road sector activities are being fulfilled due to the absence of some subordinate regulations.

The Law of the Kyrgyz Republic “On Road Fund” defines the legal basis and sources of the Road Fund of the Kyrgyz Republic, its purpose and use. In practice, many provisions of this Law are not implemented. Besides, the amount of funds foreseen in the Road Fund sources is low and subject to revision.

The Resolution of the Government of the Kyrgyz Republic dated August 8, 2014, №454 is aimed at the protection of roads, defines the procedure for allowing vehicles on public roads, sets limits on the general weights, dimensions, sizes and other parameters of vehicles. This Resolution approved a list of weight and dimension control stations.

The Common industrial rules of time and rates are technical normative legal acts issued during the Soviet period, the State Agency for Architecture, Construction and Housing and Communal Services under the Government of the Kyrgyz Republic issues indexation coefficients in order

to convert the rates into current prices. This is obsolete now. An important drawback of the old norms regarding the use of time standards for the types of road works is the mismatch between the capacity of new machinery and equipment. This problem has been remaining unresolved for many years.

Beside above, within RSDS, MOTC is proposing to revise and improve laws and regulations described in Table 2.2-1.

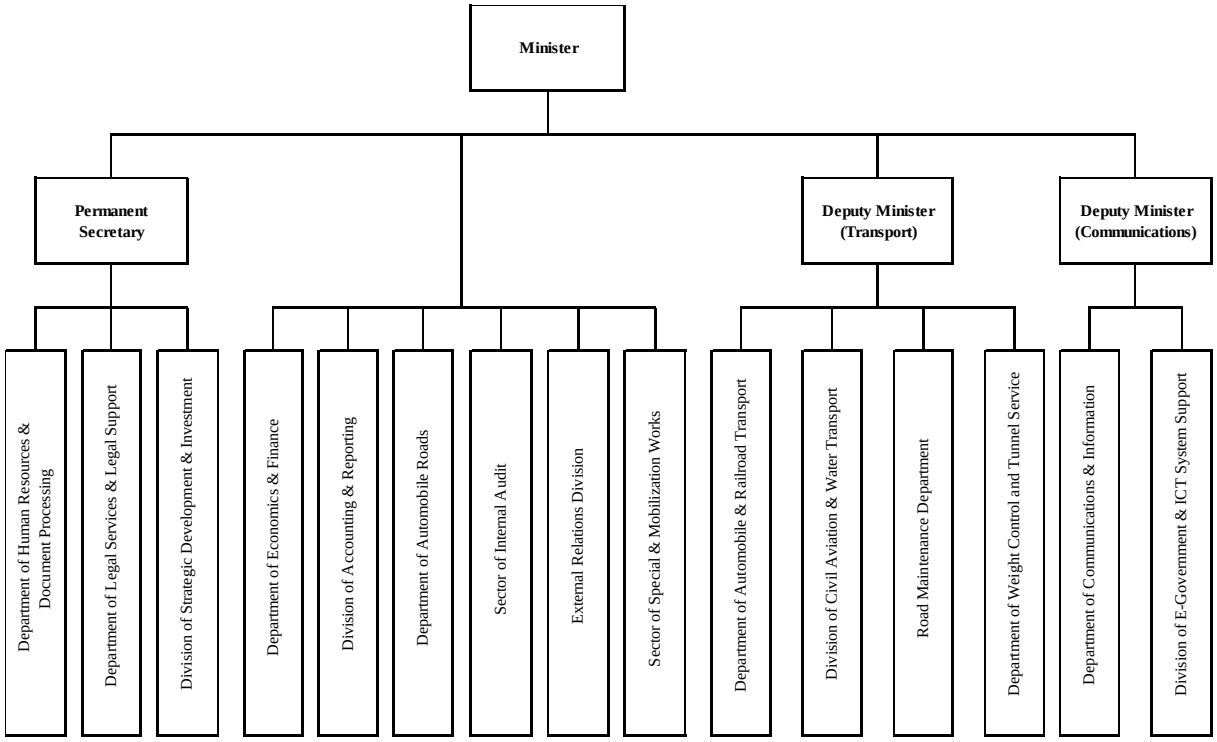
Table 2.2-1 Proposed Revision of Normative Legal Acts

No.	Main Activities	Law of KR	Norm in the Law (GOST, SNIPs etc.)	Proposed Revisions and Improvements
1	Roads classification	Law on Roads	Exists	- The list of international and national roads in the Kyrgyz Republic needs to be updated
2	Road condition monitoring	Law on Roads	No	- A Guidelines for roads condition monitoring with evaluation criteria needs to be developed and approved.
3	Road works planning	Law on Roads	No	- A Provision for road works planning needs to be developed and approved.
4	Roads construction and repair design	Law on Roads	Exists	- "Summary of standard rules for roads construction and repair" needs to be amended and supplemented
5	Roads repair and maintenance	Law on Roads	Partially exists	- Instruction for patching (valid). - Technical normative legal acts need to be developed in line with draft RAMS proposed under the WB Project "Introduction of road asset management system".
6	Ensuring road repair and maintenance quality	Law on Roads	Exists	- Provisions on continuous technical supervision during roads construction, reconstruction, repair, and maintenance. - Payment against a certificate needs to be developed and approved (payment for actual costs) - It is necessary to set the fuel consumption rate for new road machinery.
7	Planning funds for continuous technical supervision	Law on Roads	Exists	- Procedure for calculation of planned funds for continuous technical supervision
8	Road protection policy	Law on Roads	Exists	- Rule of use of public roads, engineering structures, and their protection in the Kyrgyz Republic
9	Organization of the activity of structural subdivisions in the road sector		Exists	It is necessary to amend and supplement the provisions of the Road system department under MoTC, PLUADs, UADs and SD Bishkek-Osh.
10	Making some road sections Toll Roads	Law on Roads	Exists	It is necessary to develop procedures and conditions for operation of tolled public roads

Source: Road Sector Strategy to 2025, MOTC

2.2.2 Organizational Structure of MOTC

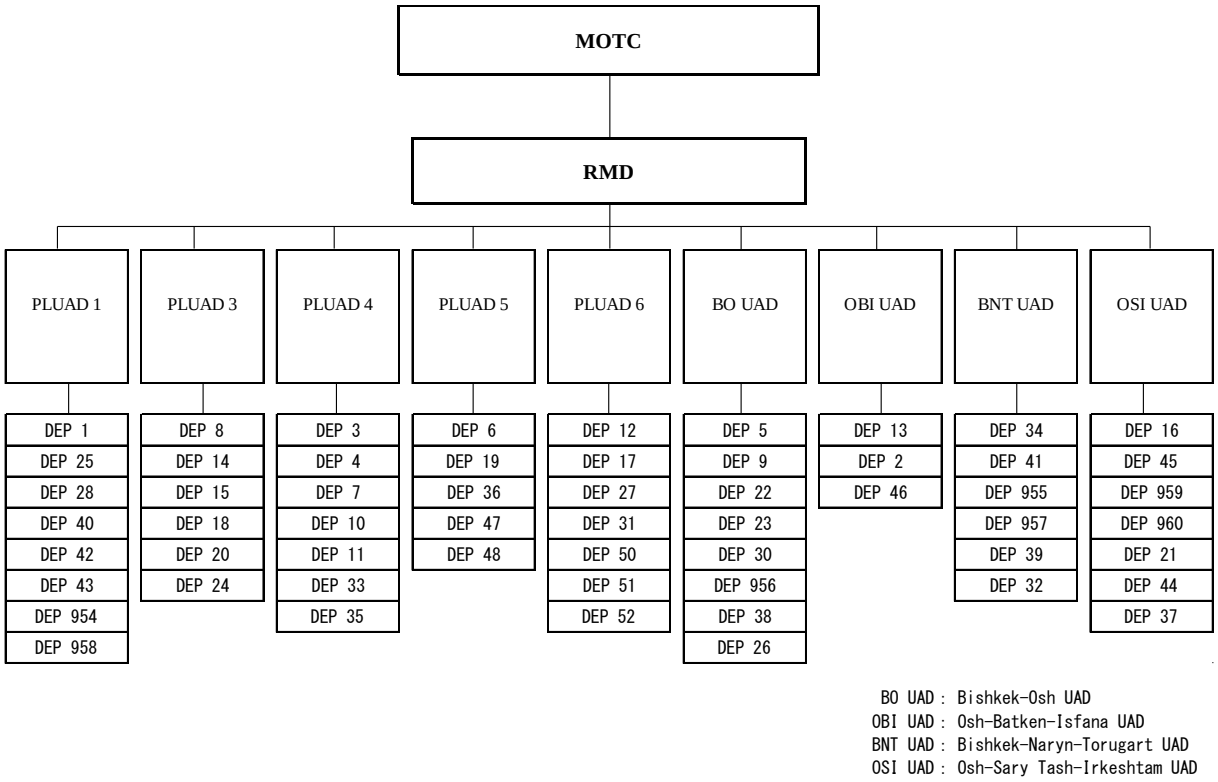
Road Maintenance Department (below as RMD) at the head office of MOTC is the main responsible body for road maintenance planning, budget control and implementing procurement for all roads under MOTC's control. RMD consists of 29 employees (as June, 2014). Below figure shows organizational structure of MOTC.



Source: MOTC

Figure 2.2-1 Organizational Structure of MOTC

There are 9 units PLUAD/UAD and 57 units of DEPs under RMD subordination. Figure 2.2-2 shows organizational structure of RMD.

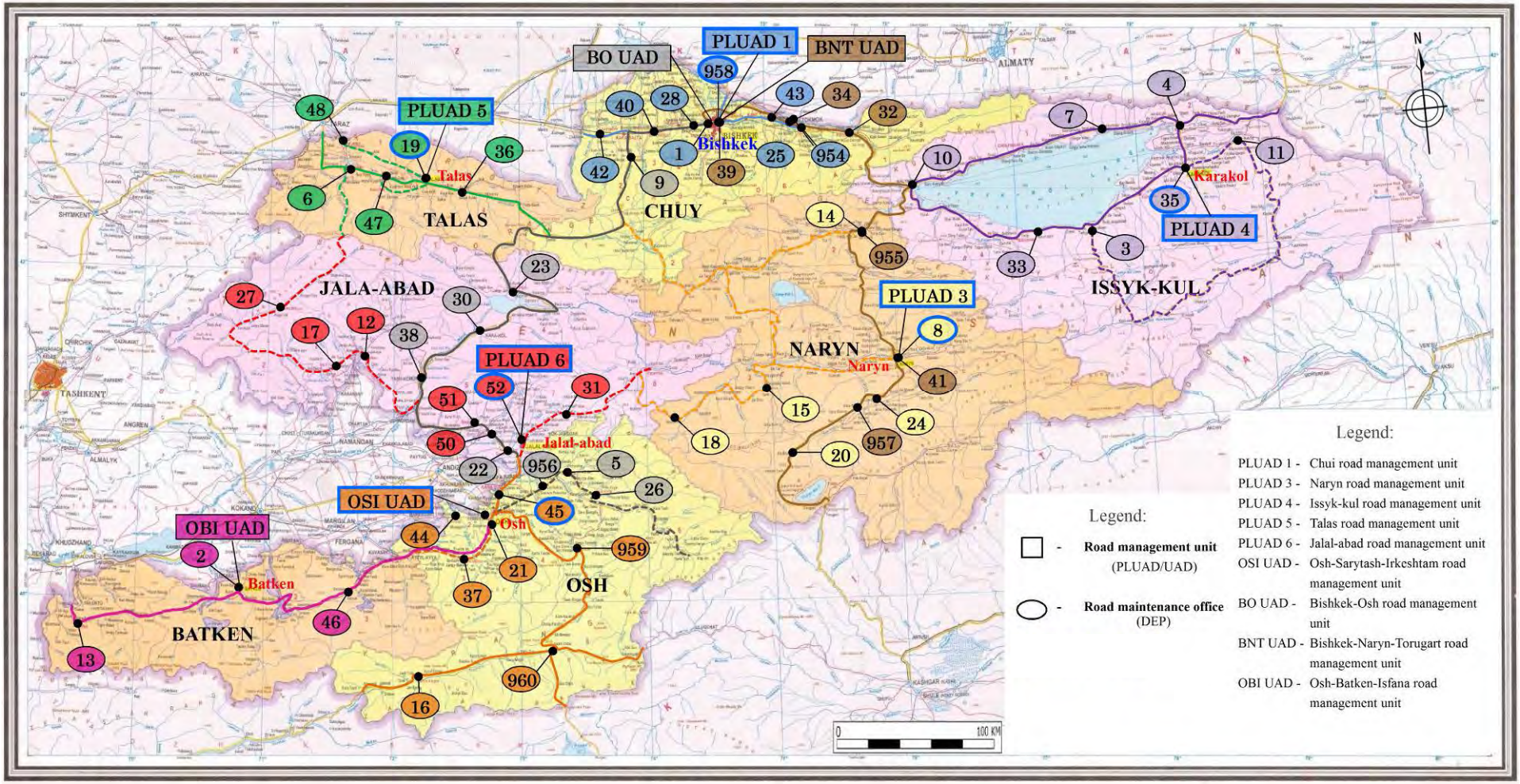


Source: MOTC

Figure 2.2-2 Organizational Structure of RMD

Every PLUAD/UAD employs management and engineering staff, who control the maintenance plan, budget, human resources and equipment of DEPs. Each DEP is responsible for about 200-400 km of roads, maintained by managers, technicians, operators and mechanics, and road workers. Basically, road works are implemented by work groups. DEP with long distance roads usually have 3 or more work groups.

The following map shows roads and areas controlled by PLUAD/UAD and their DEPs.



Source: MOTC

Figure 2.2-3 Roads and Areas Controlled by PLUAD/UAD and of Each DEP

2.2.3 Financing the Road Sector

The financing allocated for the road sector covers in average 40 % to 45% of the needs.

Table 2.2-2 Funds Allocated for Road Maintenance, Million KGS

Years	National budget, in million KGS	Funds for roads maintenance in national budget, in million KGS	Share of road maintenance funding of the national budget, %	$1USD exchange rate to KGS	Funds for roads maintenance, in million USD
2005	16 813,4	221,7	1,32	41,01	5,41
2006	20 478,9	410,2	2,0	40,13	10,22
2007	34 136,7	1 058,8	3,1	37,27	28,41
2008	44 698,6	1 564,5	3,5	36,60	42,75
2009	48 105,8	1 655,1	3,44	42,92	38,56
2010	65 666,0	1 552,5	2,36	46,00	33,75
2011	86 099,6	1 165,3	1,35	46,14	29,09
2012	101 521,7	1 452,3	1,43	47,01	34,76
2013	96 679,7	1 741,3	1,8	48,44	41,73
2014	102 899,2	1 833,1	1,78	53,66	40,08
2015	107 657,3	1 840,8	1,71	61,55	29,91

Source: MOTC, 2016

Since 2012, the physical volumes of road works have increased annually by an average of 20%, while the funding has increased annually by an average of 5% to 15%. The volume of such works as, surface treatment grows annually by 40% to 50%, while the routine works, such as bridge repairs and routine repair of asphalt concrete pavement decrease annually by an average of 10%.

Table 2.2-3 Volumes of Road Repair and Maintenance Works

Type of Repair	2010	2011	2012	2013	2014	Total
Construction of a/c pavement (km)	64.2	63.0	127.1	113.7	136.4	504.4
Construction of black gravel pavement (km)	4.9	2.0	2.0	6.0	14.3	29.2
Resealing (km)	217.6	70.0	119.0	166.5	225.7	798.8
Construction of gravel pavement (km)	151.0	135.0	126.9	88.4	115.6	616.9
Construction of bridges (pcs/)	5	4	8	9	3	29
(l.m)	135	60	145	187	101	628
Repair of bridges (pcs)	15	10	12	13	6	56
(l.m)	350	142	321	293	63	1,169
Patching (thousand m²)	271.1	215	251.2	218.6	215.3	1171.2

Source: MOTC, 2016

Compared to 2005, as of the end of 2014, the number of road machinery and equipment of the road enterprises has increased from 25% to 46.4%. The earmarked financing from the national budget (121 units) and the grant assistance from the Government of Japan had a significant impact on the equipment quantity. The grant funds were used to purchase more than 200 units of road-building machinery and equipment.

CHAPTER 3 GENERAL CONDITIONS OF OSH CITY

3.1 Natural Settings

3.1.1 Climate

The climate of the Kyrgyz Republic is a typical continental type, characterized by cold winters and hot summers. Precipitation is dominantly falling in autumn, winter and spring and it is mostly dry in summer. Osh belongs to the step climate category by the Koeppen Climate Classification. The clear weather exceeds more than 295 days in a year. The mean annual temperature is 12℃, and annual precipitation is 378.7mm. Table 3.1-1 shows general conditions of the climate of Osh City.

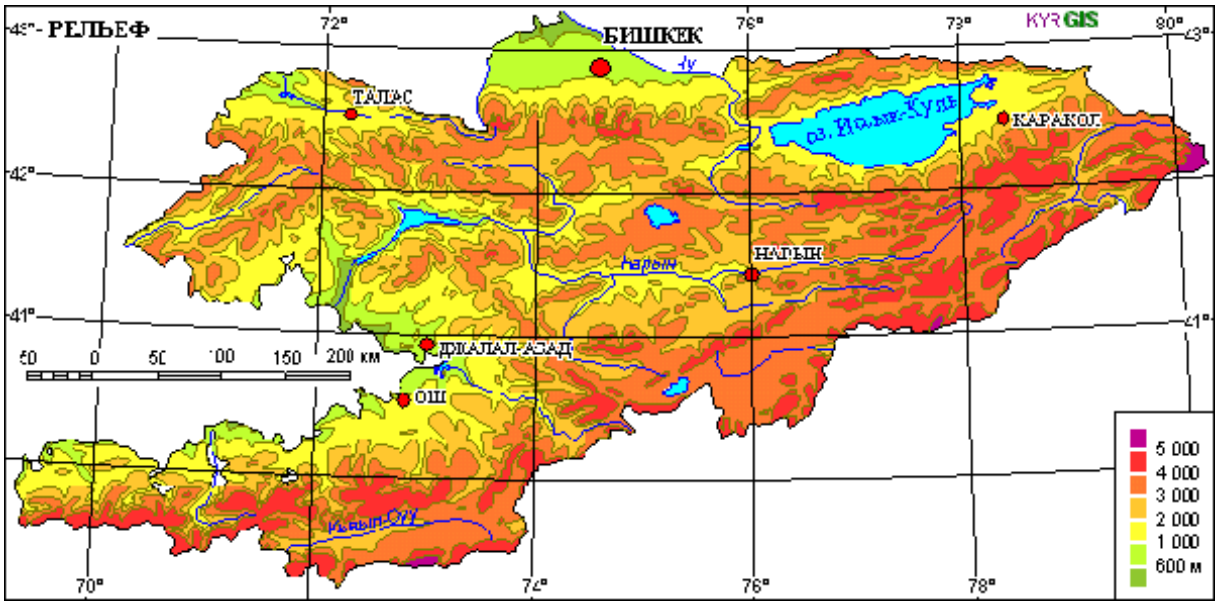
Table 3.1-1 General Climate Information of Osh City

Month	1	2	3	4	5	6	7	8	9	10	11	12	Year
The average temperature (degrees Celsius)	-3.4	-0.7	6.9	14.6	19.4	23.5	25.1	23.3	18.6	12.1	5.2	-0.6	12
Precipitation (mm)	34.4	43.2	58.3	50.2	44.8	19.8	10.7	5.8	6.4	35.1	38.5	31.5	378.7
The number of days with precipitation (days)	6.9	7.3	8.5	7.9	8.2	5.7	3.8	2.5	2.5	4.7	5.4	6	69.4
Average humidity (%)	79	76.5	67.8	58.4	52.2	44.6	46.8	51.5	54.5	62.1	70.8	79.6	62
Average wind speed (km/h)	2.9	3.2	5.4	6.5	6.8	6.8	6.1	5.8	4.7	4.3	3.6	2.9	4.9

Source: http://www.weatherbase.com/weather/weather.php3?s=603161&cityname=Osh-Kyrgyzstan, last viewed on November 11, 2015

3.1.2 Terrain and Topography

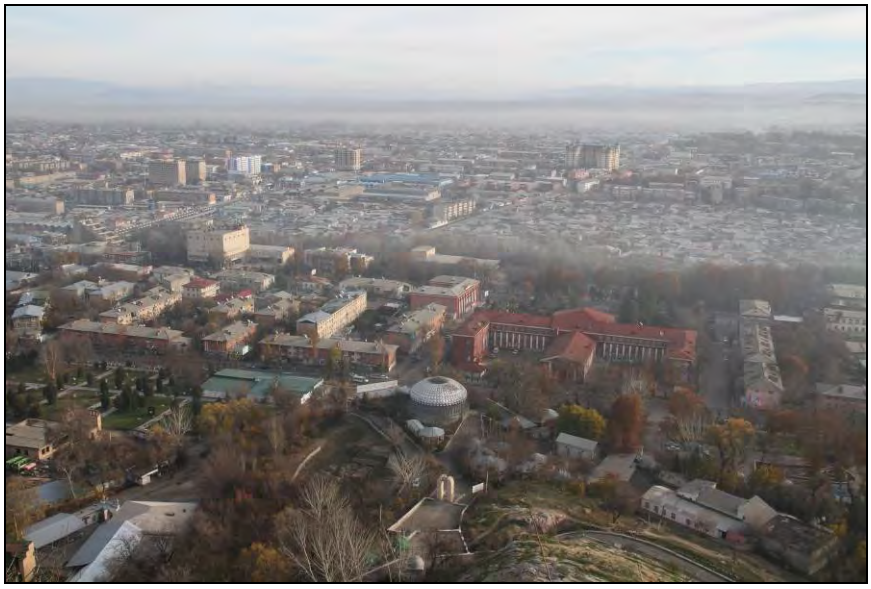
Osh City is located in the south-western side of the Kyrgyz Republic at the boundary to the Republic of Uzbekistan. The territory of the city is situated in an eastern part of Fergana Valley that expands among Kyrgyz, Uzbekistan and Tajikistan. The altitude of the urban area is about 900-1000 m above sea level. Osh City is surrounded by gentle hills on the east and south. These hills run to high mountainous areas, connecting to the boundaries of China and Tajikistan. Figure 3.1-1 shows the topographic condition of the Kyrgyz Republic.



Source: http;//www.nature.kg

Figure 3.1-1 Topographic Condition of Kyrgyzstan

The center of the city is divided by the Ak-Buura River, running through the city from north to south. The terrain of the urban area inclines gently to the river. The Sulaiman-Too, a steep rocky mountain stands on the west side of the urban area. This mountain is a sacred place, which was once a major place of Muslim and pre-Muslim pilgrimage, and now is one of the World Heritage Sites located in the Kyrgyz Republic. (See Figure 3.1-2)



Source: JICA Survey Team

Figure 3.1-2 Urban Area of Osh City (view from the Sulaiman-Too)

3.1.3 Specially Protected Areas (PAs)

In order to maintain natural biodiversity, a network of protected areas is established in the territory of the republic. The total area of these protected areas amounts to 1,200,872 hectares,

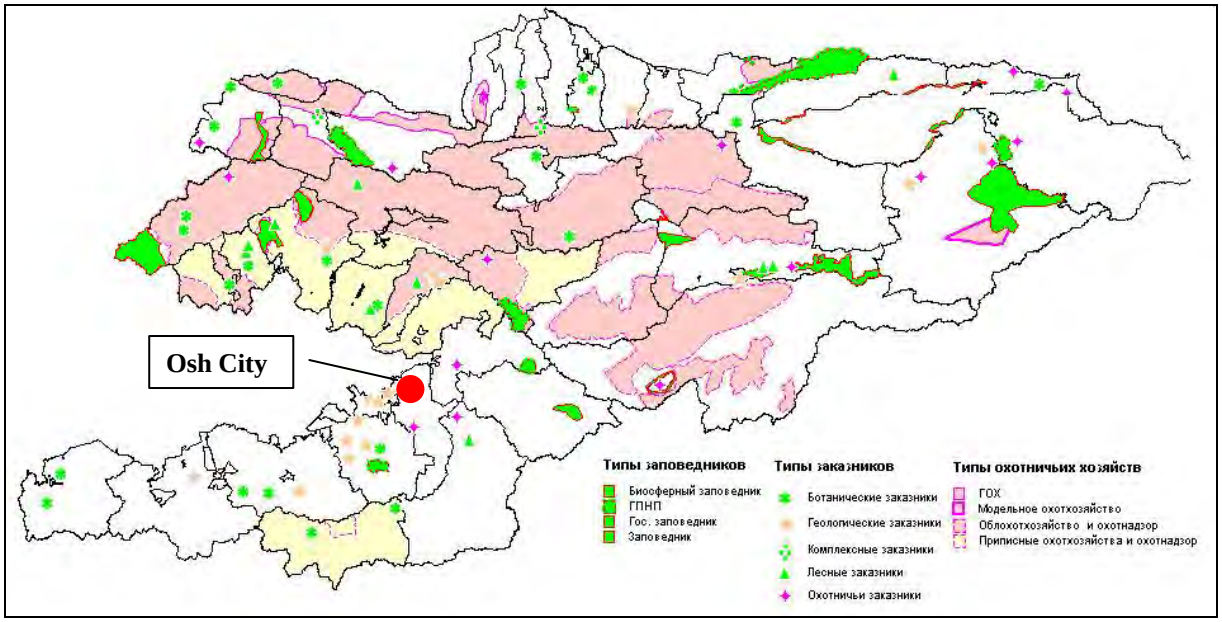
or 6.01% of the total land area of the country. In accordance with the classification adopted by the International Union for Conservation of Nature (IUCN), the protected areas of the republic belong to the following four categories shown in Table 3.1-2.

Table 3.1-2 Category of the Protected Area

Category	Conservation
Category I:	Reserves where any economic or other activity which violates the development of natural systems are prohibited ;
Category II:	National Parks with different range of protection from reserve to recreation ;
Category III:	Natural monuments or geological reserves ;
Category IV:	Reserves that are created for the protection of the individual components of natural systems, and are further subdivided into four categories, namely: forest, botanical, hunting and complex.

Source: http;//www.nature.kg

Figure3.1-3 shows the distribution of specially protected areas in Kyrgyz. In Osh City, there are no natural reserves for the protection of neither woodland nor wildlife. On the other hand, Sulaiman-Too mentioned below is designated as a preserved area.



Source: http;//www.nature.kg

Figure 3.1-3 Distribution of Specially Protected Areas in Kyrgyzstan

Sulaiman-Too

The Sulaiman - Too (“Too” means a “mountain” in Kyrgyz), which is located on the west of the urban area in Osh city, is one of the world heritage sites[1] in the country of Kyrgyzstan. Among the comparatively plain urban area, the steep rocky mountain is naturally a symbolic landmark.

[1] Decision : 33 COM 8B.16, UNESCO Cultural properties - Properties deferred or referred back by previous sessions of the World Heritage Committee - Sulamain-Too Sacred Mountain (Kyrgyzstan)

Source: JICA Survey Team

Figure 3.1-4 Sulaiman-Too

The area of the Sulaiman-Too prohibits acts such as damaging monuments or objects, setting fire and cutting greenery.

Regarding the Sulaiman-Too, the UNESCO mentions as below:

Sulaiman-Too Mountain dominates the surrounding landscape of the Fergana Valley and forms the backdrop to the city of Osh. In medieval times, Osh was one of the largest cities of the fertile Fergana valley at the crossroads of important routes on the Central Asian Silk Roads system, and Sulaiman-Too was a beacon for travelers. For at least a millennium and a half, Sulaiman-Too has been revered as a sacred mountain. Its five peaks and slopes contain a large assembly of ancient cult places and caves with petroglyphs, all interconnected with a network of ancient paths, as well as later mosques. The mountain is an exceptional spiritual landscape reflecting both Islamic and pre-Islamic beliefs and particularly the cult of the horse.[2]

3.1.4 Geological Conditions (on Seismic Matter)

Central Asia is one of the areas of the world most prone to earthquake hazards. Within the last century, most of the capitals of the region have been seriously damaged at last once. Since the biggest fault in Central Asia, the Talas-Fergana Fault stretches from the east to the north of Osh city, the vicinity of Osh city has been suffering from seismic disasters. A seismic zoning map of Kyrgyz, which the Institute of Seismology NAS KR has prepared, is shown in *4.4.3 Geological Characteristic of the Area*.

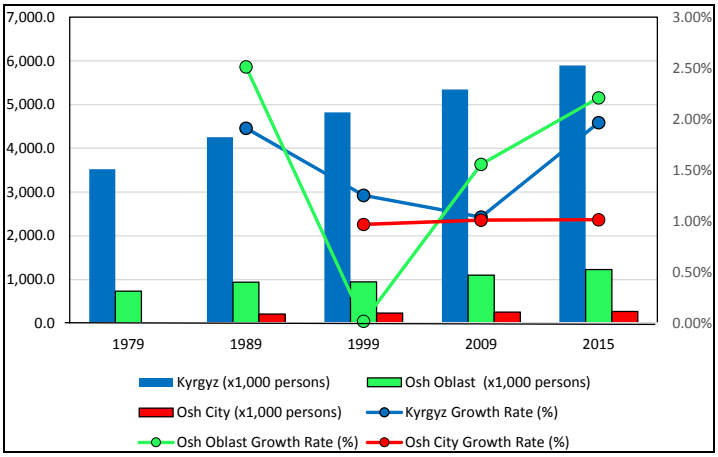
On the 17th of November, 2015 (during the first field survey of this study), an earthquake with 6.7 magnitude also struck the Osh Oblast, causing a wide range of damage in six districts of the province – Karasuu, Alay,Uzgen, Kara-Kuldja, Aravan and Chong-Alay.

[2] UNESCO Website: http://whc.unesco.org/en/decisions/1959

3.2 Socio-economic Conditions

3.2.1 Population Growth in Kyrgyz Republic, Osh Oblast and Osh City

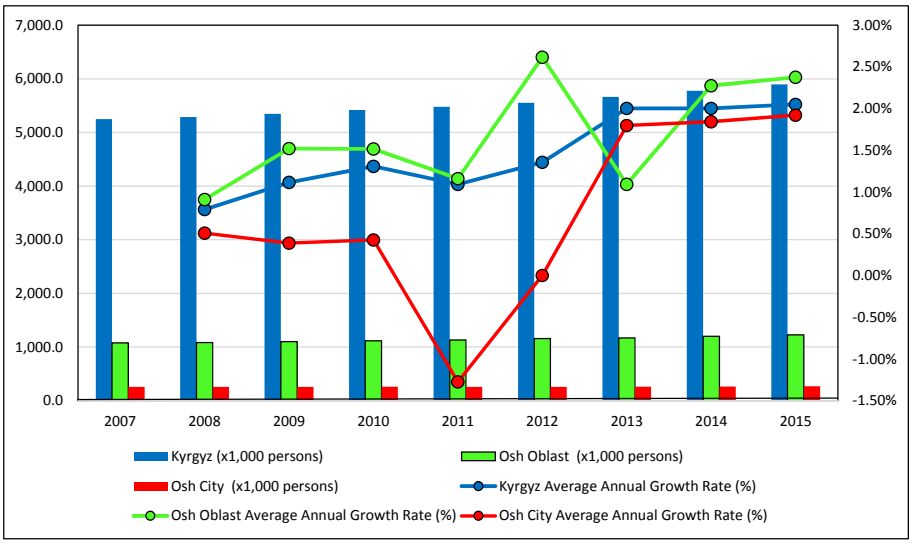
Over the past 25 years (1989-2015), the Kyrgyz national population increased from 4.26 million to 5.90 million, which account for a growth rate of about 1.4 times. Meanwhile, the populations of Osh Oblast and Osh City have increased to 1.3 times both in equal proportion in the same period, which is almost same as the changes of the national population. Figure 3.2-1 shows the changes of the population in a 10 years period from 1979. The growth rate of the national population from 1989 to 2009 (National Census Data) has been unstable between1.97% and 1.04%, due to the transition to a capitalist economy after the Soviet breakup and Russian financial crisis. After that year, the population growth rate increased at around 2.0% during the years of 2009 to 2015. The growth rate of Osh Oblast was also unstable between 2.51% and 0.02%, after a steep decline at in 1999, the growth rate shows a similar rate of national population at 2.2%. On the other hand, the growth rate of Osh City has continued at a stable rate at around 1.0% up to the recent year.



Source: National Statistical Committee of the Kyrgyz Republic, 2015

Figure 3.2-1 Changes of Population by Each 10 Years Period during 1979-2015

In the recent years during 2007 to 2015, the changes of the population of Kyrgyz, Osh Oblast, and Osh City are shown in Table 3.2-1 and Figure 3.2-2. The population of Kyrgyz, Osh Oblast and Osh City in 2015 shows 5.89 million, 1.23 million and 0.27 million respectively. The proportions of Osh Oblast and Osh City to Kyrgyz are constantly at about 20.5%-20.9% and 4.6%-4.9% respectively and show no signs of change at the appearance of population inflow and outflow. The annual growth rate of Kyrgyz increased gradually from 0.79% to 2.05%, Osh Oblast also shows a similar fluctuation. On the other hand, the growth rate of Osh City is unstable between the years 2008 to2012, when growth rates dropped from 0.4 % to 0% during 2011 to 2012, but it increased steadily again to 1.8%-1.9% during 2013 to2015. The growth rate dropped during 2010 and2011 was due to the “South Kyrgyzstan Ethnic Clashes”. In the years of 2009 to2015, based on the National Census, the growth rates of Kyrgyz, Osh Oblast, and Osh City show an increase of 1.64%, 1.84% and 0.78% respectively.



Source: National Statistical Committee of the Kyrgyz Republic, 2015

Figure 3.2-2 Changes of the Population of Kyrgyz Republic, Osh Oblast and Osh City

Table 3.2-1 Changes of the Population of Kyrgyz Republic, Osh Oblast and Osh City

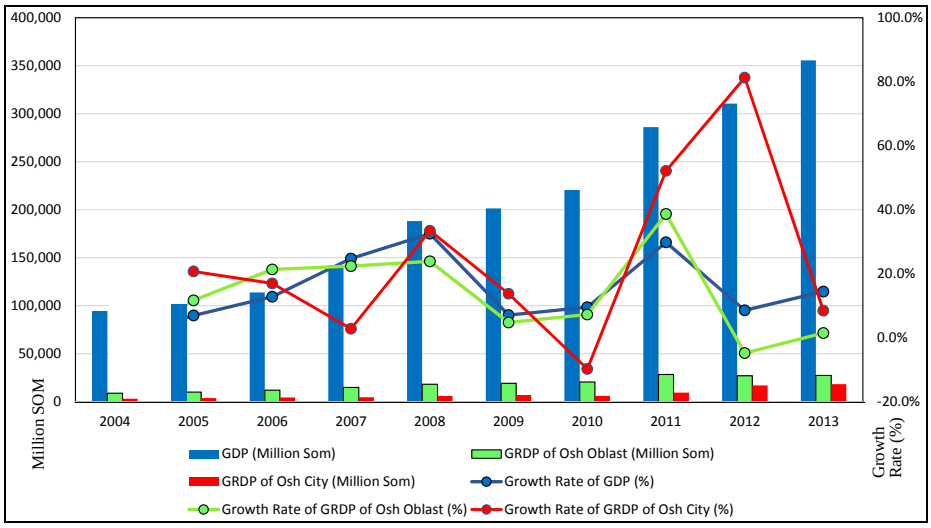
Year	Kyrgyz (x 1,000 persons)	Osh Oblast (x 1,000 persons)	Osh City (x 1,000 persons)	Growth Rate of Kyrgyz (%)	Growth Rate of Osh Oblast (%)	Growth Rate of Osh City (%)	Proportion of Osh Oblast to Kyrgyz (%)	Proportion of Osh City to Kyrgyz (%)
2007	5,247.6	1,074.9	255.7	-	-	-	20.5	4.9
2008	5,289.2	1,084.7	257.0	0.79	0.91	0.51	20.5	4.9
2009	5,348.3	1,101.2	258.0	1.12	1.52	0.39	20.6	4.8
2010	5,418.3	1,117.9	259.1	1.31	1.52	0.43	20.6	4.8
2011	5,477.6	1,130.9	255.8	1.09	1.16	-1.27	20.6	4.7
2012	5,551.9	1,160.5	255.8	1.36	2.62	0.00	20.9	4.6
2013	5,663.1	1,173.2	260.4	2.00	1.09	1.80	20.7	4.6
2014	5,776.6	1,199.9	265.2	2.00	2.28	1.84	20.8	4.6
2015	5,895.1	1,228.4	270.3	2.05	2.28	1.92	20.8	4.6

Source: National Statistical Committee of the Kyrgyz Republic, 2015

3.2.2 Economic Performance of the Kyrgyz Republic, Osh Oblast and Osh City

1) GDP and GRDP in Kyrgyz

Figure 3.2-3 and Table 3.2-2 show the changes of the country's GDP (Gross Domestic Product) and GRDP (Gross Regional Domestic Product) of Osh Oblast and Osh City during 2004 to 2013. The average annual growth rate of GDP rate from 2004 to 2014 was at 15.2%. However, the growth rates range 32.5% to 6.9%, which show unstable fluctuation. In the recent five (5) years during 2009 to2013, the growth rates of GDP and GRDP in Kyrgyz were at 15.3%, in Osh Oblast at 9.5% and in Osh City at 28.2%. In 2013, the GDP of Kyrgyz, the GRDPs of Osh Oblast and Osh City show 355,295 million KGS, 27,334 million KGS and 18,207 million KGS respectively. Figure 3.2-4 shows the share of GRDP by region in 2013. The GRDP of Osh Oblast and Osh City account for 7.9% and 5.3% of the national GDP.



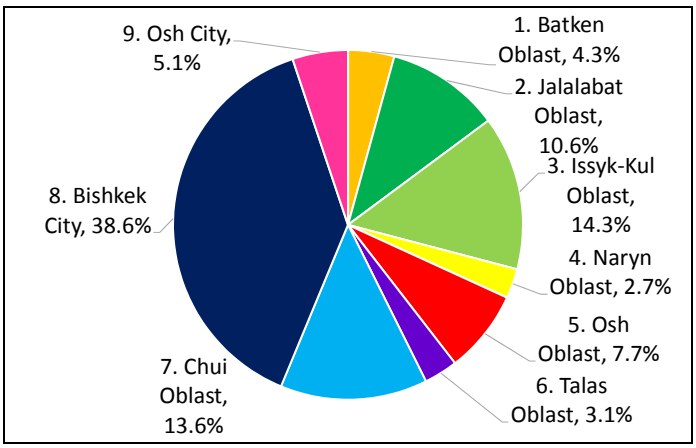
Source: National Statistical Committee of the Kyrgyz Republic, 2014,

Figure 3.2-3 Changes of GDP, GRDP and Annual Average Growth Rate

Table 3.2-2 GDP, GRDP and Annual Average Growth Rate during 2000-2013

Year	Kyrgyz		Osh Oblast		Osh City	
	GDP (Million KGS)	GDP Growth Rate (%)	GRDP (Million KGS)	Growth Rate of GRDP (%)	GRDP (Million KGS)	Growth Rate of GRDP (%)
2004	94,350	-	8,853	-	3,067	-
2005	100,899	6.9	9,887	11.7	3,701	20.7
2006	113,800	12.8	11,993	21.3	4,328	16.9
2007	141,898	24.7	14,674	22.4	4,447	2.8
2008	187,992	32,5	18,174	23.9	5,933	33.4
2009	201,223	7.0	19,038	4.8	6,746	13.7
2010	220,369	9.5	20,410	7.2	6,088	-9.8
2011	285,989	29.8	28,296	38.6	9,263	52.2
2012	310,471	8.6	26,937	-4.8	16,791	81.3
2013	355,295	14.4	27,334	1.5	18,207	8.4

Source: National Statistical Committee of the Kyrgyz Republic, 2014,

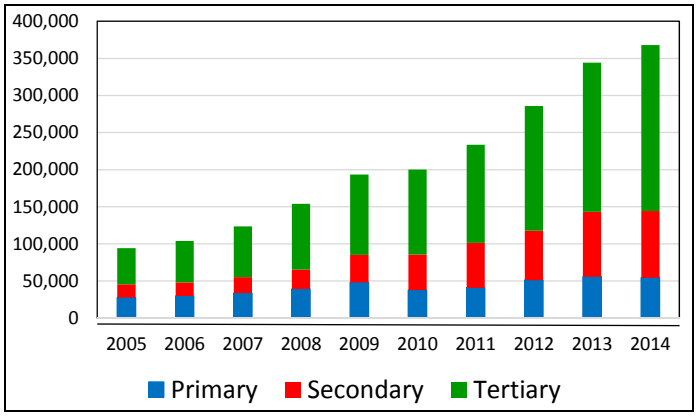


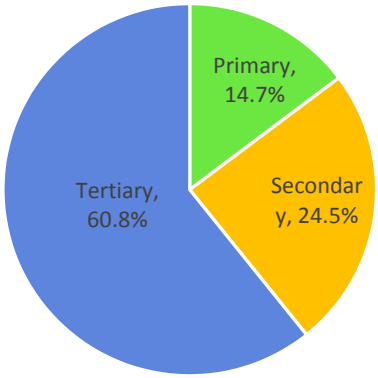
Source: National Statistical Committee of the Kyrgyz Republic, 2014

Figure 3.2-4 Share of GRDP by Region in 2013

2) Contribution of Industries to GDP Growth

For Kyrgyz, the changes of GDP by economic sector during 2005 to 2014 and the share of each sector in 2014 are shown in Figure 3.2-5. The share of the tertiary sector (it mainly consist of trade, transportation & communication and public administration) is the most predominant ranging between 51.7% and 60.8%. The share of the secondary sector (it mainly consist of manufacturing and etc.) is the second highest share ranging between 17.1% and25.9%, and the primary sector (it mainly consist of agriculture and etc.) shows a share of14.7% to 29.3%. The secondary and tertiary sectors show apparently an upward trend in comparison to the primary sector, in particular, the share of the tertiary sector will increase as time advances, depending on the economic growth. The growth rate of each sector in past 10 years from 2005 to 2014 was in the primary sector at 7.0%, in the secondary sector at 17.6% and in the tertiary sector at 14.6% respectively. The share of each sector in 2014 shows the primary sector at 14.7%, secondary sector at 24.5% and tertiary sector at 60.8% respectively.





Source: Key Indicators for Asia and the Pacific 2015 ADB

Figure 3.2-5 Changes of GDP by Economic Sector during 2005-2014 and Share of Each Sector in 2014

3.2.3 Vehicle Registration

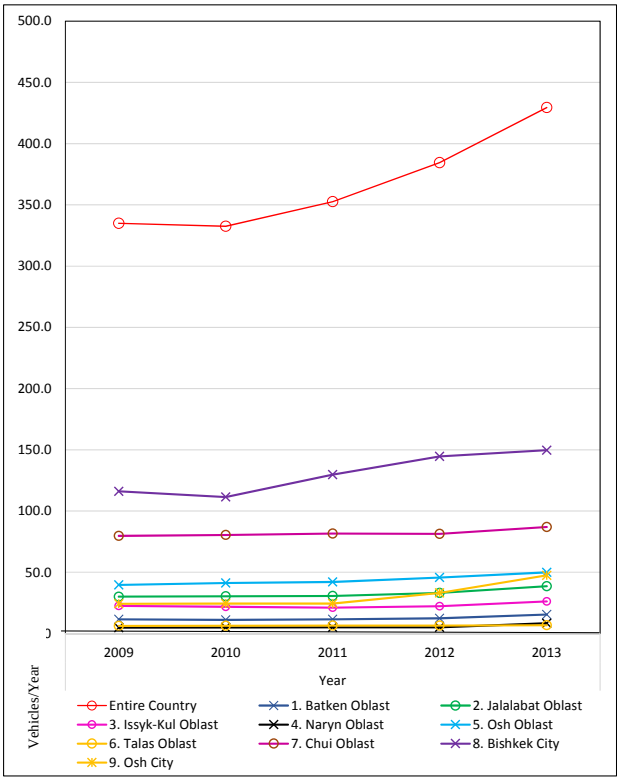
Table 3.2-3 and Figure 3.2-6 show the changes of registered vehicles by the Oblast during 2009 to 2013. The number of registered vehicle in Kyrgyz was 335.0 hundred thousand vehicles in 2009. In 2013, this number increased to 429.5 hundred thousand vehicles, which accounts for an increase of about 1.3 times during 5 years. The number of registered vehicles has been gradually increasing. Annual average growth rate in Kyrgyz was at 6.4% during the recent five (5) years. While, for the Osh Oblast and Osh city in 2013, the number of registered vehicles was 49.9 hundred thousand and 47.4 hundred thousand vehicles respectively. The proportions of Osh Oblast and Osh City to Kyrgyz are 11 % approximately. The number of registered vehicle in Osh city since 2009 increased significantly to an amount about 2.0 times larger in 2013. The growth rates by Oblast range 2.2% to 18.2%, the Osh Oblast and Osh city are at 5.9% and 18.2% respectively. The growth rate in Osh city is high in comparison to other Oblast.

Table 3.2-3 Changes of Vehicle Registration in Kyrgyz

Unit: 1,000 Vehicles

Kyrgyz/Oblast	Year					Average Growth Rate (%)
	2009	2010	2011	2012	2013	
Entire Country	335.0	332.5	352.7	384.5	429.5	6.4
1. Batken Oblast	11.5	11.2	11.6	12.5	15.4	7.6
2. Jalal-abad Oblast	30.1	30.4	30.6	33.1	38.7	6.5
3. Issyk-Kul Oblast	22.6	21.9	21.1	22.3	26.2	3.8
4. Naryn Oblast	4.7	4.9	5.0	5.1	8.4	15.6
5. Osh Oblast	39.7	41.2	42.1	45.8	49.9	5.9
6. Talas Oblast	6.2	6.3	6.5	6.5	6.8	2.3
7. Chui Oblast	79.8	80.5	81.7	81.4	87.0	2.2
8. Bishkek City	116.1	111.5	129.7	144.6	149.7	6.6
9. Osh City	24.3	24.4	24.4	33.2	47.4	18.2

Source: National Statistical Committee, 2014



Source: National Statistical Committee, 2014

Figure 3.2-6 Changes of the Vehicle Registration

3.3 Urban Planning and Land Use Conditions

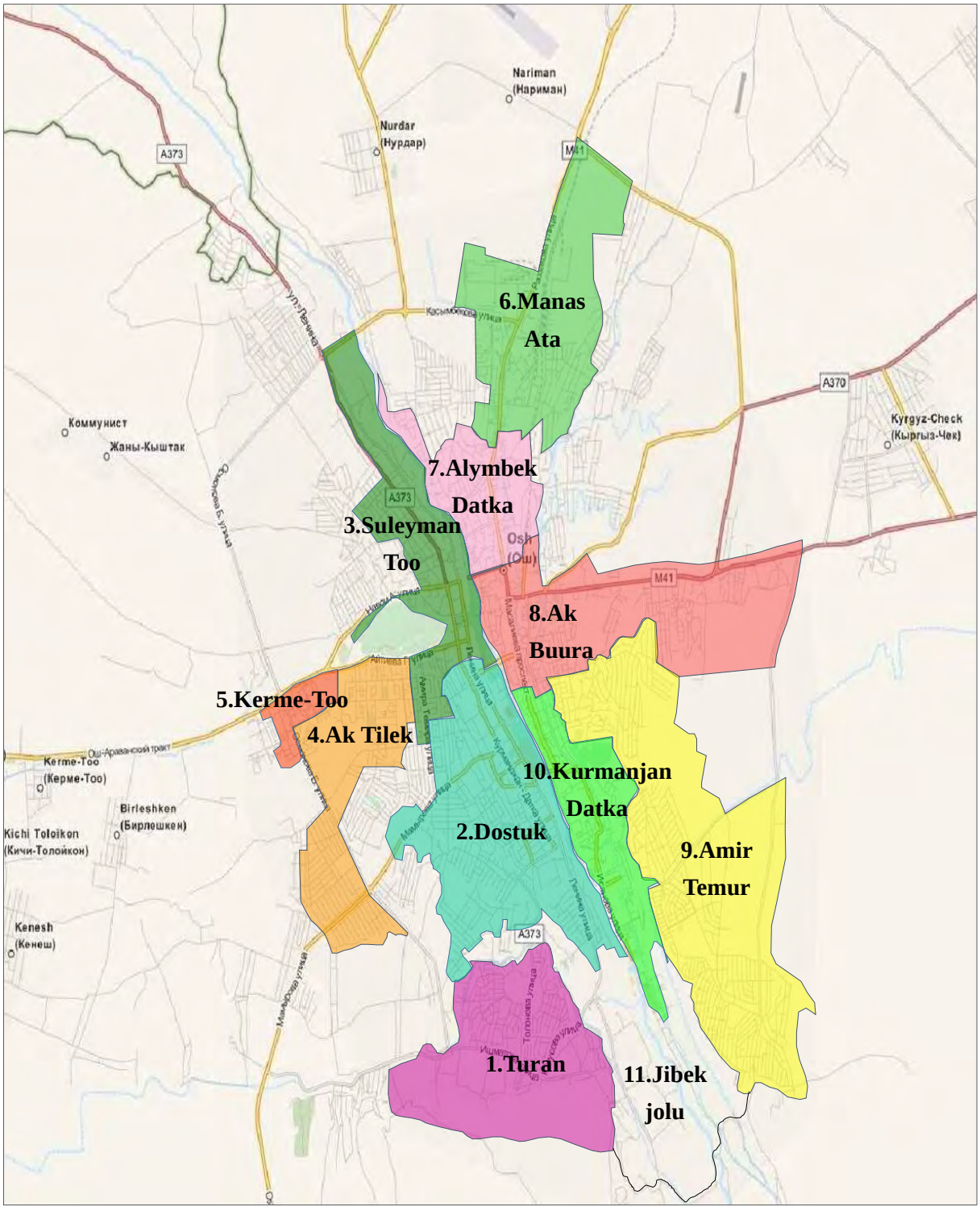
3.3.1 Administrative Division of Osh City

Osh is the city of republican subordination in the Kyrgyz Republic, the administrative center of Osh oblast. The population of the city is 243 300 people (resident population as for January 1, 2015). The total population including suburb areas subordinated to city administration (including 11 suburban villages) is 270 300 person. The city is the second largest as for population scale, officially called "The southern capital". The city is divided into 11 administrative regions called as territorial councils, described in Table 3.3-1 and Figure 3.3 – 1.

Table 3.3-1 Osh City Territorial Councils

No.	Territorial Councils	Population
1	Turan	23240
2	Dostuk	28884
3	Sulaiman-Too	20869
4	Ak-Tilek	22190
5	Kerme-Too	19072
6	Manas Ata	34000
7	Alymbek Datka	22400
8	Ak-Buura	18730
9	Amir Temur	38800
10	Kurmanjan-Datka	20788
11	Jibek-jolu	2270

Source: Osh City



Source: JICA Survey Team prepared based on a map, "Access New World"

Figure 3.3-1 Osh City Territorial Councils

In addition to the city territory, 11 suburban villages (total population of 25 295 people) are subordinated to Osh city administration, described in Table 3.3-2.

Table 3.3-2 Suburban Villages of Osh City

No.	Suburban Villages	Population (as 2014)
1	Kerme-Too	1642
2	Arek	1959
3	Japalak	4035
4	Kenesh	3826
5	Ozgur (partially)	3267
6	Orke	4557
7	Pyatiletka	2243
8	Toloyken (partially)	2873
9	Teeke	1705
10	Gelbaartoloykon	1198
11	Almalyk	866

Source: Osh City

3.3.2 General Plan of Osh City to Year 2025

In 1931, the railroad from Karasuu city connected to Osh city. From this date, Osh city started developing as the "City", where cultural and industrial facilities were built and housing areas emerged. In 1939, Osh city was proclaimed as the administrative center of Osh Oblast. During 1939-1940, the first city plan was created, and in 1949, the General Plan of Osh city was developed by using a scientific approach. Until the USSR demolishment, the General Plan of 1949 was the principle document for city development, and the current city landscape is the result of the General Plan of 1949. In 2003, "Law on Osh city special status" was accepted. According to this law, the new General Plan of Osh city was developed in 2009. The law on Osh city was revised in 2013, and dynamic development of the General Plan of Osh city became the obligation to Mayor's office of Osh city. The General Plan of Osh city should be revised and improved every 5 years. The General Plan of Osh city to the year 2025, equivalent to the master plan of the city, is developed by the State Design Institute of Urban Planning and Architecture (GPI Gradostroitelstva), under the State Agency of Architecture, Construction and Housing Communal Services. Currently, the General Plan is under consideration of City Kenesh (City Parliament) and will be further considered and approved by Zhukorgi Kenesh (Republican Parliament) of the Kyrgyz Republic. The budget and financial plans for the implementation of the General Plan were not disclosed. According to the city chief architect, the plan was formulated taking into account broad attraction of grants and investments, as the city's budget resources are obviously not enough for a full implementation of the General Plan. The General Plan sets the main directions of an urban-planning development of Osh city until the year 2025 and further prospects. The General Plan includes also classified information of a strategic importance. The survey group was presented only publicly open information. The main technical and economic indicators of the plan are described in Table 3.3-3.

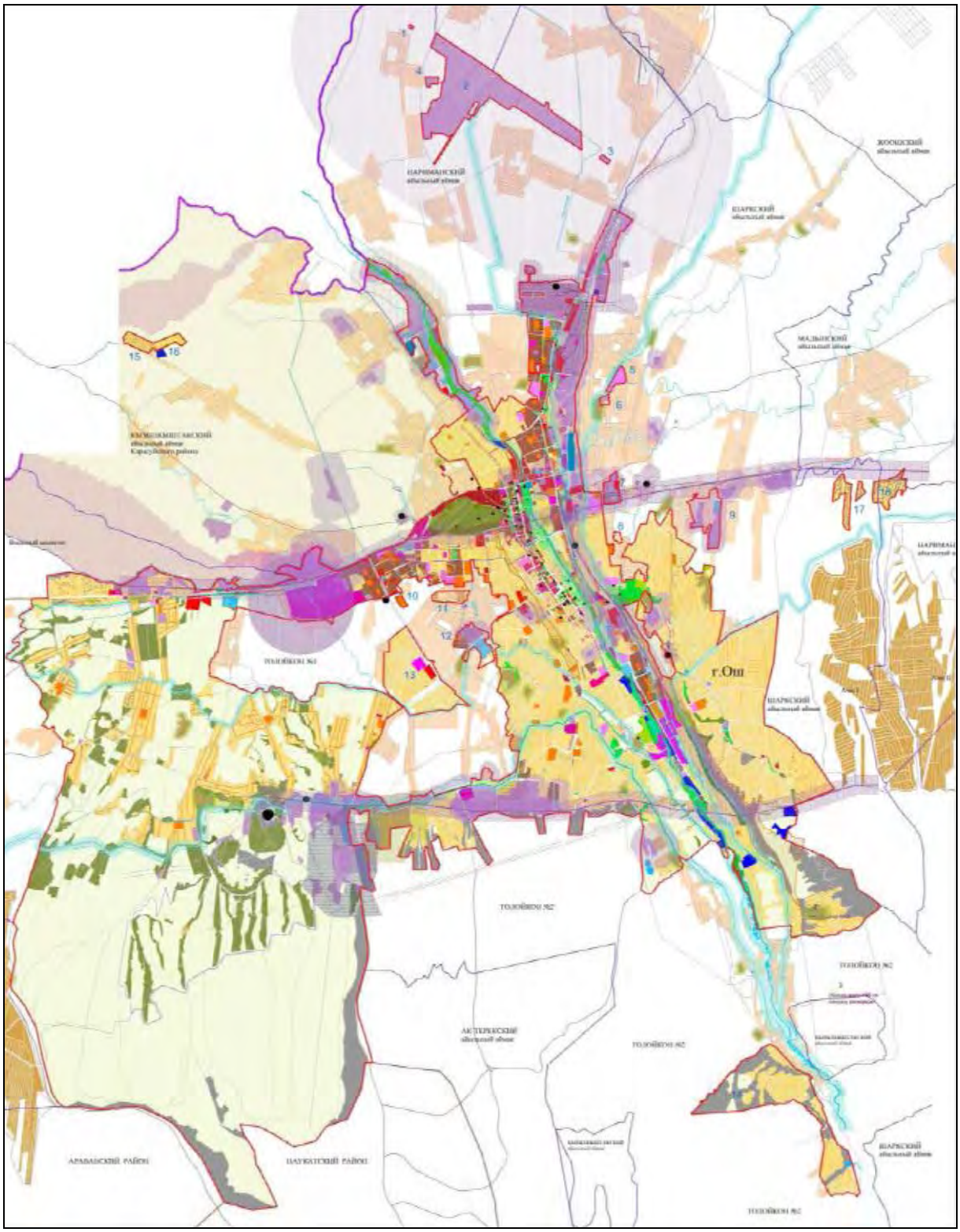
Table 3.3-3 Main Technical and Economic Indicators of the General Plan till 2025

Indicators	Unit	Actual Data as for 2015	Projected Data as for 2025
Land use by Osh city administration within the actual and projected administrative borders for the period till 2025			
Land use by Osh city, in total	ha	16,654.48	20,360.31
includes:			
Outside administrative borders	ha	4,460.94	4,643.57
Lands transferred to Osh city before 2009.	ha	791.79	791.79
Lands of Toguz Bulak and Berksuu	ha	3,581.00	3,581.00
Lands transferred to Osh city after 2009.	ha	88.15	88.15
Widening airport	ha		182.63
Within administrative borders	ha	12,193.54	15,716.74
Residential type	ha	5,705.54	9,357.00
Agrarian type	ha	6,488.00	6,359.74
Suburb area of Osh city till 2025			
Suburb area, in total	ha	0	56,045
includes:			
Residential area	ha	0	17,461
Villages of Karasuu rayon	ha	0	4,900
New areas in village Achi	ha	0	650
Lands transferred to Osh city	ha	0	880
Suburb villages of Osh city	ha	0	6,488
New residential areas of Osh city	ha	0	3,792
includes:			
New constructions	ha	0	2,361
Reconstruction of existing areas	ha	0	1,431
New residential areas in Kenen-Sai of Osh city	ha	0	600
New residential areas in Aravan rayon	ha	0	618
Widening airport	ha	0	183
Natural and agrarian areas	ha	0	38,584
includes:			
Buffer zone for Sulaiman-Too	ha	0	5,255
Reserved areas after 2025	ha	0	3,672
Complex modernization and development of territories of Osh city and suburb areas till 2025			
Territory for complex modernization and development, in total	ha	9,357.00	9,357.00
includes:			
Residential area	ha	5,283.40	5,731.00
Sleeping zone areas	ha	4,474.40	4,396.00
includes:			
Houses	ha	3,970.80	1,669.00
High mansion types (more than 9 floors)	ha		10.40
Mansions (4-8 floors)	ha	484.60	2,409.20
Low mansion types (below 3 floors)	ha	19.00	307.40
Public centres	ha	629.00	764.00
includes:			
International historical cultural centers	ha	0	199.00

Indicators		Unit	Actual Data as for 2015	Projected Data as for 2025
	International Cooperation Centers	ha	0	94.00
	Republican and oblast Centers	ha	0	205.00
	City Centers	ha		266.00
Public parks, squares, and gardens		ha	180.00	571.00
Natural and agrarian zones		ha	1,836.60	1,965.00
	includes:			
	Sulaiman-Too	ha	80.00	80.00
	Forestry and green zones	ha	820.00	1,851.00
	Agrarian lands	ha	843.91	0.00
	Cemetry	ha	92.69	34.00
Industrial and transport service zones		ha	707.00	977.00
	includes:			
	Indusrtial zones	ha	660.00	687.00
	Transport service zones	ha	47.00	290.00

Source: General Plan of Osh City

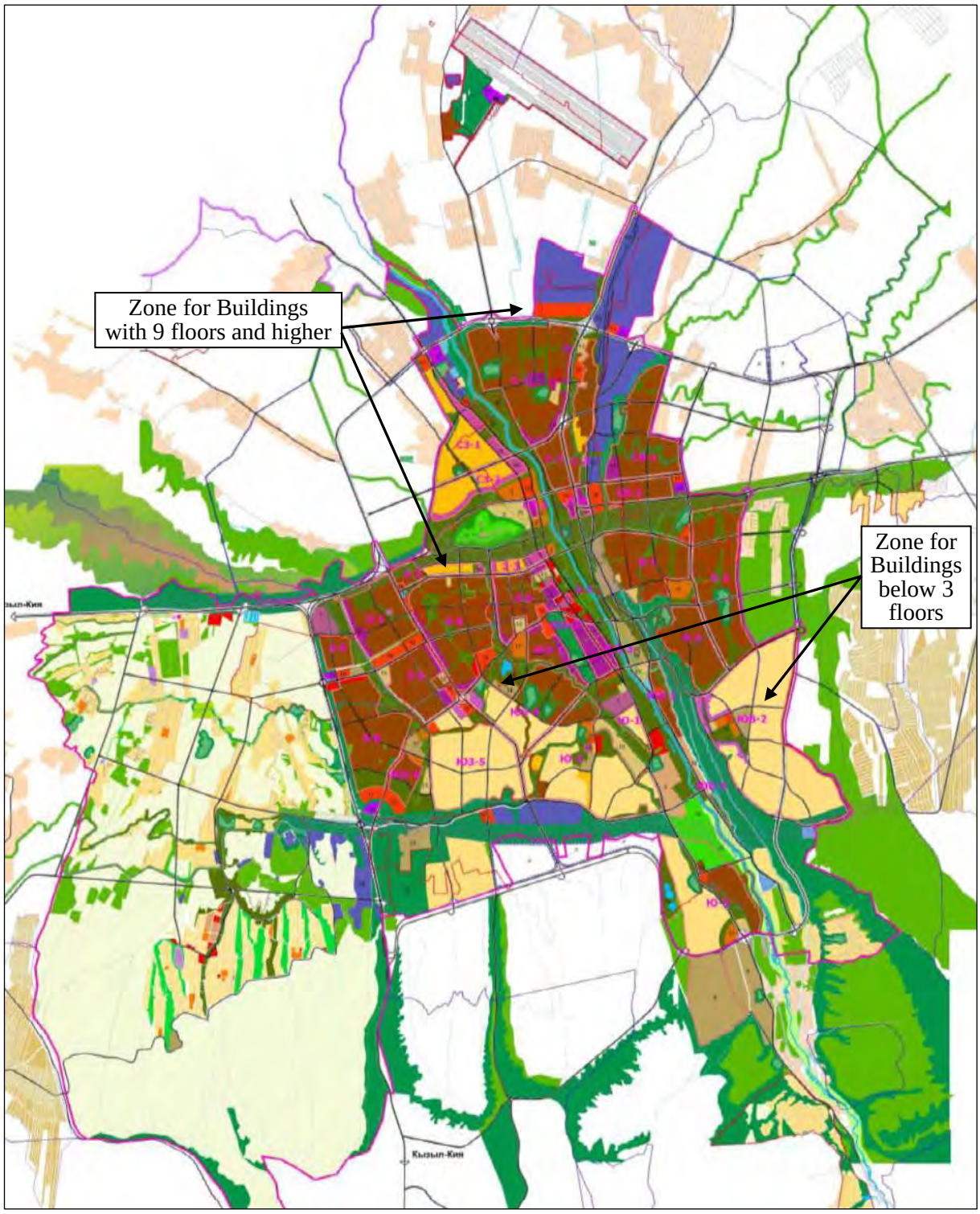
Figure 3.3-2 shows current land use condition in Osh city and Figure 3.3-1 is a land use condition proposed for 2025 in the General Plan of the city.



- Housing areas
- Special control zones
- Agricultural areas
- Natural protected zones

Source: General Plan of Osh City

Figure 3.3-2 Current Land Use Plan of Osh City as of 1st January 2015



- Green zones outside Osh city
- Green zones inside Osh city
- Transport logistic centers
- Low stores housing zone
- High stores buildings (CBT)

Source: General Plan of Osh City

Figure 3.3-3 General Plan of Osh City until 2025

3.3.3 Existing Issues for Urban Development of Osh City

In an interview with specialists of City Planning and Architecture Department of Osh city (the chief architect of the city and the chief engineer of the department), a number of issues were noted in land use and city planning. These problems are also described in the General Plan of the city. The main existing issues are listed below.

1. The main feature of the city is, that it has still agrarian potential. Some territories are occupied by rural population and agricultural farms, which are within the city administrative boundaries. However, the current state of the structural interrelation of the main functional zones of the city, demands serious streamlining, optimization and development.
2. The administrative-territorial land demarcation between Osh city and the Karasuu rayon is not completed. Borders of the residential suburb of Osh city are not clear, purpose and functions of those lands are not defined by the Government of KR. This circumstance will disorganize acting authorities concerning placement of new engineering and industrial constructions in territories, adjacent to the city. It may lead to an irreplaceable reduction of free resources for perspective development and degradation of natural resources of Osh city with its suburb areas.
3. The high level of chaotic growth of residential areas is conducted at the expense of farmlands. This expensive development of territories will create complications in the architectural development and urban planning of the city. These residential areas are premature and not prepared for effective decentralization of utility systems and providing public services, such as transport service. Uncontrolled reduction of valuable arable lands can lead to a decrease in the food security of the urban population.
4. There are many ownerless territories in industrial, municipal and warehouse zones with unexploited buildings and constructions. These available resources should be used to develop engineering and transport infrastructure.
5. The general level of physical and esthetic condition of engineering and industrial building does not meet the modern requirements. The degree of physical obsolescence of engineering and transport infrastructure in Osh city and suburbs is extremely high.
6. Active transformations of the last century and the modern relation to preservation and successive development of the city led to the irrevocable loss of valuable historical heritage.
7. Environmental pollution of soils, air and waters are resulting the degradation of nature resources.
8. Geographic and meteorological factors of the city, weak nature protection activity, decrease of green plantings at continuously growing residential areas and separation of structural landscape and recreational territories, create extremely limited opportunities of self-restoration of the city environment.

9. The considerable part of construction engineering buildings is placed in the influence zone of tectonic breaks with dangerous seismological, engineering-geological and hydrological conditions that can lead to the considerable victims at emergency situations.

3.4 Current Projects by Bilateral Aid and International Aid Organization

The amount of each DAC'c country disbursement is shown in Table 3.4-1. The USA keeps the highest amount of aid for the Kyrgyz. Japan's ODA disburses 3rd or 4th biggest amount.

Table 3.4-1 Disbursement of DAC Countries to the Kyrgyz

Unit: Gross Disbursement, million USD

Year	1st		2nd		3rd		4th		5th	
2008	USA	63.63	Germany	21.32	UK	13.71	Japan	12.35	Switzerland	10.87
2009	USA	52.48	Germany	23.98	Switzerland	18.16	Japan	17.75	UK	8.97
2010	USA	55.96	Germany	25.25	Japan	23.16	Switzerland	17.63	Sweden	9.27
2011	USA	65.03	Germany	32.87	Japan	29.90	Switzerland	23.11	UK	11.90
2012	USA	57.29	Germany	24.99	Switzerland	22.81	Japan	19.98	UK	6.41

Source: Ministry of Foreign Affairs of Japan

The amount of each international aid organization is shown in Table 3.4-2. ADB and IDA stand out with the amounts provided in 2011 and 2012.

Table 3.4-2 Disbursement of International Aid Organization to the Kyrgyz

Unit: Gross Disbursement, million USD

Year	1st		2nd		3rd		4th		5th	
2008	ADB	50.81	IMF-CTF	42.35	IDA	38.52	EU	33.44	GFATM	13.1
2009	ADB	45.88	IDA	38.66	EU	28.72	IMF-CTF	25.68	IDB	9.09
2010	IDA	58.19	IMF-CTF	33.87	ADB	28.19	EU	24.35	IDB	12.97
2011	ADB	105.04	IDA	85.87	EU	38.49	IMF-CTF	30.04	IDB	23.08
2012	ADB	82.03	IDA	68.62	IMF-CTF	29.14	EU	24.32	GFATM	12.02

Note) ADB: ADB Special Fund
GFATM: Global Fund to Fight AIDS
IDA: World Bank's International Development Association
IDB: Islamic Development Bank
IMF-CTF: International Monetary Fund, Counter-Terrorist Financing

Source: Ministry of Foreign Affairs of Japan

The survey team interviewed the Word Bank (WB) Kyrgyz Office and Asian Development Bank (ADB) Kyrgyz Office on project implementation and planning in Osh city and its vicinity. The results are summarized as follows;

- Both WB and ADB have a Country Partnership Strategy for 2013-2017, new project formulation beyond2017 is difficult due to budget limitations.
- WB has conducted the National Road Rehabilitation Project for Osh-Batken-Isfana, which also improved the northwest part of the Osh ring road (Osmonova St.), and Osh airport access

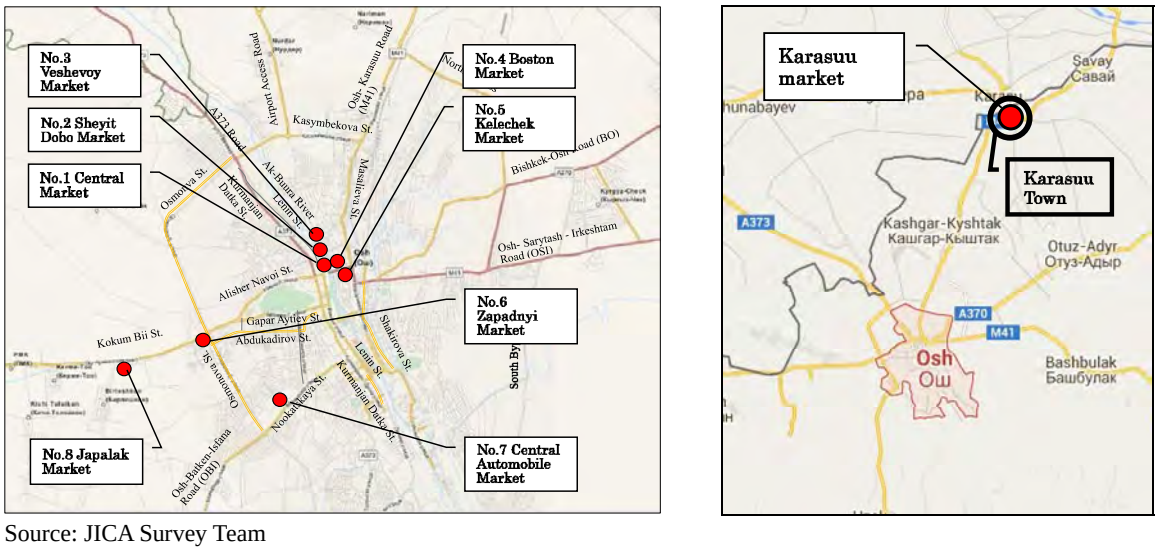
road.

- ADB concentrates on the rehabilitation of CAREC corridors and the North-South alternative road construction, therefore not so willing to conduct urban transport projects in and around Osh ,and
- Both WB and ADB require international standard feasibility studies before implementing projects.

3.5 Freight Transportation in Osh City

3.5.1 Consumer Goods Market in Osh City

The consumer goods related to the freight transportation in Osh is generally traded in a Karasuu market outside the city and eight major (8) markets inside Osh city, as shown in Figure 3.5-1. The Karasuu market is located near the Uzbekistan border,22 km away from Osh city in the northern direction. The Karasuu market in Karasuu town is an important wholesale trade center of Chinese consumer goods into Osh city markets and Southern Kyrgyz, Uzbekistan and Tajikistan. The Karasuu market is the second largest market in Kyrgyz after the Dordoy Market. Whilethe major eight (8) markets inside the city are mainly located in Central Business District (CBD), others are located at around the Barsbek roundabout, along Kokum Bii St. and along Nookatskaya St. Names of the markets and locations are as follows: 1) Central Market, 2) Sheit Bobo Market and 3) Veshevoy Market are along Lenin St. 4) Boston Market and 5) Kelechek Market are along Alisher Navoi St. 6) Zapadny Market is around Barsbek roundabout.7) Central Automobile Market is along Nookatskaya St. 8) Japalak Market is along Kokum Bii St.



Source: JICA Survey Team

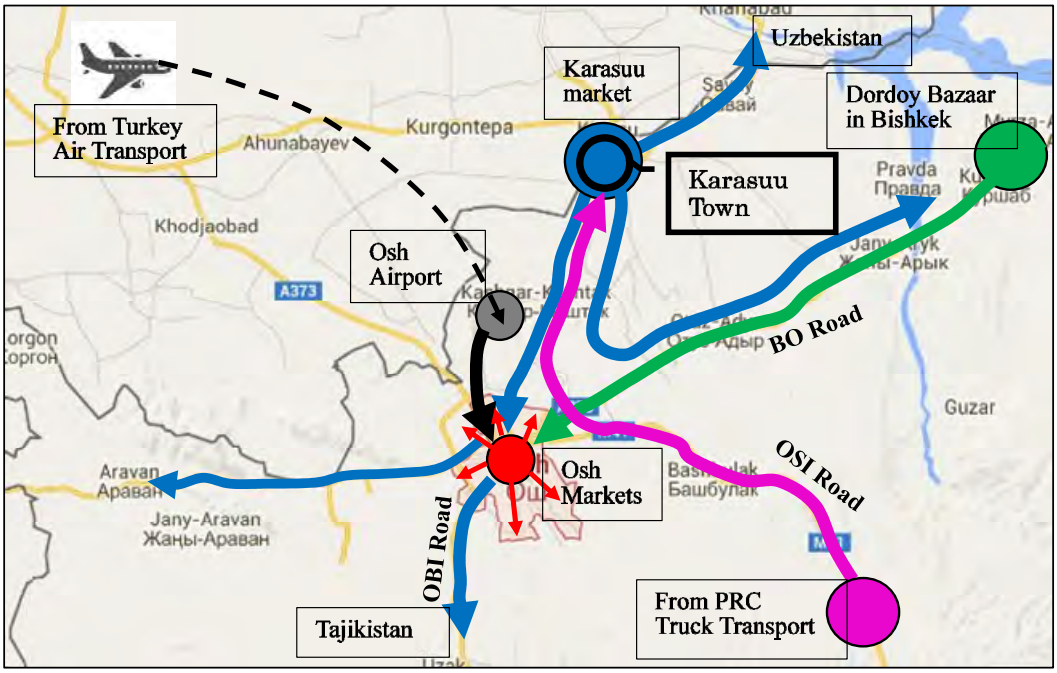
Figure 3.5-1 Karasuu Market and Major Eight (8) Markets inside Osh City

3.5.2 Freight Flow Conditions in Osh City

The international freight to Karasuu market is mainly transported by the two (2) means of air transport from Turkey and land transport from PRC and Dordoy Market in Bishkek. The annual transaction amount in Karasuu market was at about 34,749.1million KGS[3] (600 million US dollars) and about 16,000 people engaged in 2013.The consumer goods in Karasuu market are gathered from PRC and the Dordoy Market, the largest market in Kyrgyz. At the market not only domestic wholesaler's trade, but also international wholesalers who export to Uzbekistan and Tajikistan. The imported consumer goods from PRC are generally transported to Karasuu market by heavy trucks via OSI road, and purchased goods at Karasuu market are generally transported to Osh city by small trucks or vans and neighboring countries by trucks via national highways. In Osh city, the consumer goods in the Central Market are transported from Karasuu market and Bishkek by vehicle transport, and the shares of the consumer goods in those markets are 70-80% and 20-30% respectively. While for the consumer goods from air transport, individual import goods are transported from Turkey to the Central Market or other city markets. The purchased goods at Karasuu market are mainly transferred to the Central Market in bulk by taxies. The goods traded are classified into three (3) categories according to their price: 1) high-priced goods, 2) middle-priced goods and 3) low-priced goods. The high-priced goods and middle-priced goods are mainly traded at Karasuu market and the Central Automobile Market/Japalak Market, and the low-priced goods are mainly traded at Central Market and other city markets.

In this context, the freight transportation in Osh city circulates among PRC, Karasuu market, neighboring countries and Osh city markets, making Osh city an important intermodal point in fright transportation via international roads like the BO road, OSI road and OBI road. Therefore, the international vehicles for the trade pass through Osh city, and concentrate on the major city roads. Besides, there is an issue on the freight transportation on the OSI road and OBI road in the mountain area between PRC/or Tajikistan and Karasuu market, which is often closed for traffic due to snowfall, freeze and snow slides, in winter and early spring seasons. This is one of the important issues of the international freight transportation and, therefore, natural disaster prevention countermeasures should be developed by using the strategies of effective methodologies and a priority order targeting hazardous places.

[3] Source: National Statistical Committee of the Kyrgyz Republic, 2014



Source: JICA Survey Team

Figure 3.5-2 Freight Flow Conditions among Karasuu, Osh City and Neighboring Countries

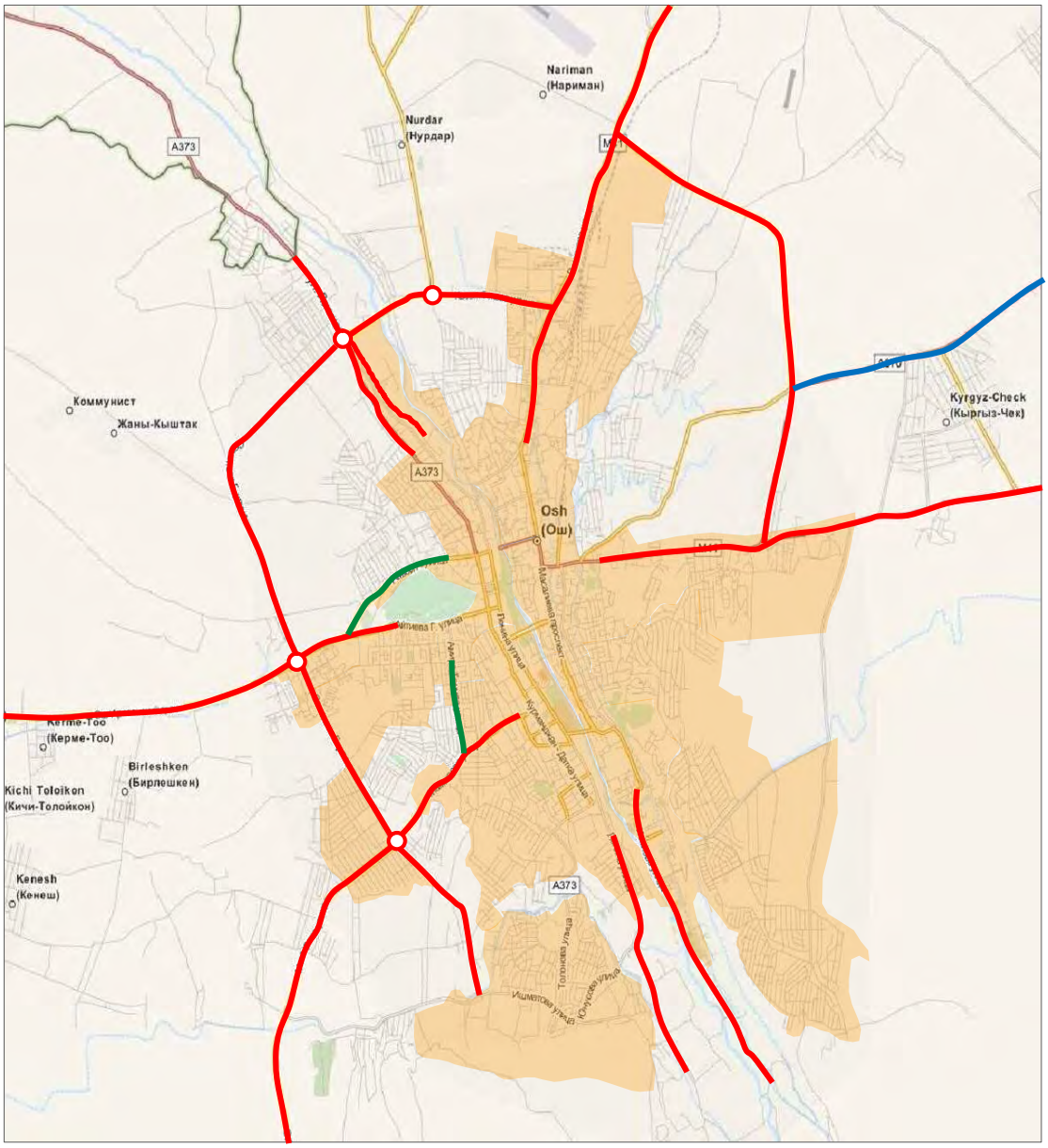
3.6 Road Administration in Osh City

3.6.1 City Road Network and Organization

1) Osh city road network

Basically, roads within Osh city boundaries are administered by Department of city roads. But some of the roads are managed by MOTC and Oblast administration. The reason for this split is that Osh city boundaries widened in the years 2003 and 2013, but roads were not transferred to Osh city. Figure 3.6-1 shows roads in Osh city and suburb areas, maintained by MOTC and other organizations.

The total length of roads in Osh city is 513.3 km; including 313 km of asphalt paved roads and 200.3 km of gravel and ground roads. According to the recent road survey by the Kyrgyz DorTransProekt conducted in 2015, only 42.8 km (8.4%) of roads are in a good condition. The main part of the road network has been constructed 35 to 40 years ago and 70% of them require full reconstruction.



: DEP 21, UAD OSI, MOTC : DEP 956, UAD BO, MOTC : Karasuu Rayon

Source: plotted by JICA Survey team based on information from Department of city roads

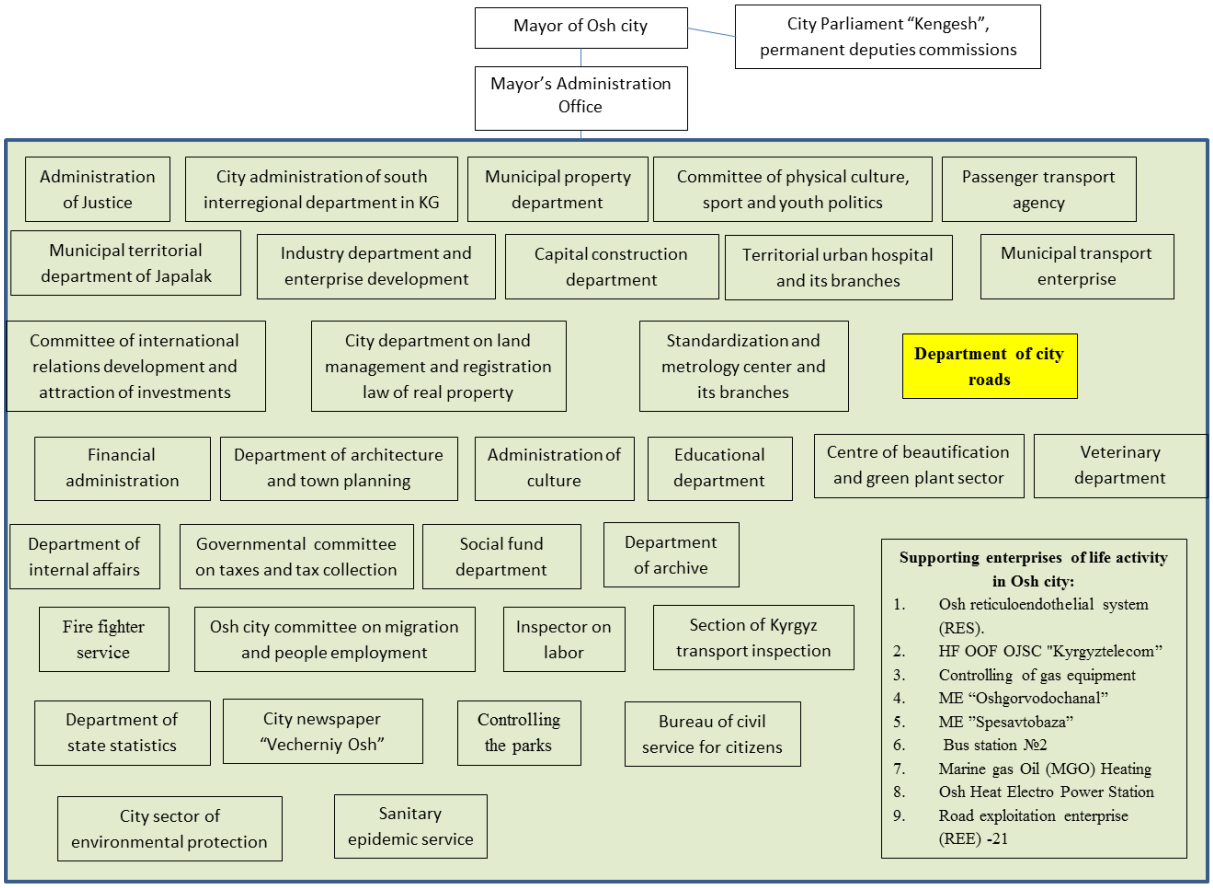
Figure 3.6-1 City and Suburb Roads Controlled by Other State Organizations

2) Road Administration in Osh city

Osh city roads are administered by the Department of City Roads. The Department of City Roads was established in 2008 by the Osh City Mayor's Degree. Before 2008, road construction and maintenance works were implemented by separate departments independently. That was causing inefficiency and time loss in the information sharing and decision-making process. In order to solve these problems, all works related to city roads were merged into one responsible department. Figure 3.6-1 shows the general functional organizational chart of Osh City.

The Department of City Roads is the single road administration organization in Osh city, which

has the authority to contract road works out to private construction companies. All road construction and maintenance works are fully contracted to private companies. Those private companies are listed in Chapter 7. Private companies are selected through competitive bidding, with the exception of small scale works and special technology works, which are contracted directly to preselected companies. In 2008, when the Department of City Roads was established, it employed 15 workers. Currently, only 9 workers are employed by the department (as of 2015).



Source: Osh City Road Management Department

Figure 3.6-2 General Functional Organizational Chart of Osh City

The Traffic Police is responsible for traffic control. The Traffic Police manages traffic signals, road markings, and road signs by using Osh City's budget. There is a special Construction and Maintenance Department (CMOD) under the Traffic Police, which is responsible for the installation and maintenance of Traffic signal equipment, controlling signal cycles, production and installation of road signs, road marking works, and etc. CMOD has 5 branches all over the country, which are located at Bishkek, Talas, Karakol, Jalal-abad and Osh. The CMOD Osh branch takes activities at Osh Oblast and Batken Oblast.

In case the work volume is big, Osh city selects the contractor by competitive bidding. Small works of volume are directly contracted to CMOD Osh branch. Renewal of road signs and traffic signal maintenance are also contracted with CMOD Osh branch. Recently, contractors for traffic signal installation works are also selected by competitive bidding.

3.6.2 Budgeting Condition and Road Works

According to an estimation of Osh City Road Management Department, Osh City would need around $19 million US dollars in total annually until 2025, in order to fully reconstruct the city road network, including:

- daily repair works about $0.68 million US dollars
- reconstruction of existing roads about $6.00 million US dollars
- construction of new roads about $12.20 million US dollars

Although the total budget amount for road works shows a tendency to increase every year, the budget still covers only 10% of the estimated cost of works. Table 3.6 – 1 shows the current annual budget allocated to Osh City Road Management Department.

Table 3.6-1 Annual Budget Allocated for Osh City Roads Maintenance

in thousand KGS (thousand US dollars)

Name of works	2011	2012	2013	2014	2015*
Road repair and construction works	67 300.0 (1 870.0)	106 551.0 (2 960.0)	153 921.0 (4 275.6)	105 000.0 (2 916.6)	64 500.0 (860.0)

Source: Osh City Road Management Department

Nevertheless, during last 5 years, Osh City Road Management Department managed to implement following road works within the limited budget mentioned above.

Table 3.6-2 Road Works in Osh City for 2011-2015

Road works 2011-2015	Total amount
The construction and repair of roads	14.25 km
Pothole repair	55 km (50 853.6 m^2)
Graveling existing ground roads	57 km (3 420 610.0 m^2)
Road marking	27.8 km
Renewal of traffic lights in 20 intersections	142 traffic lights for vehicle 80 traffic lights for pedestrians
Construction of the new road on Monueva St.	0.5 km (1.40 million US dollars)
Construction of the new road on Akburinskaya St.	1.0 km (1.15 million US dollars)

Source: Osh City Road Management Department

CHAPTER 4 ROAD AND BRIDGE CONDITIONS IN OSH CITY AND VICINITY

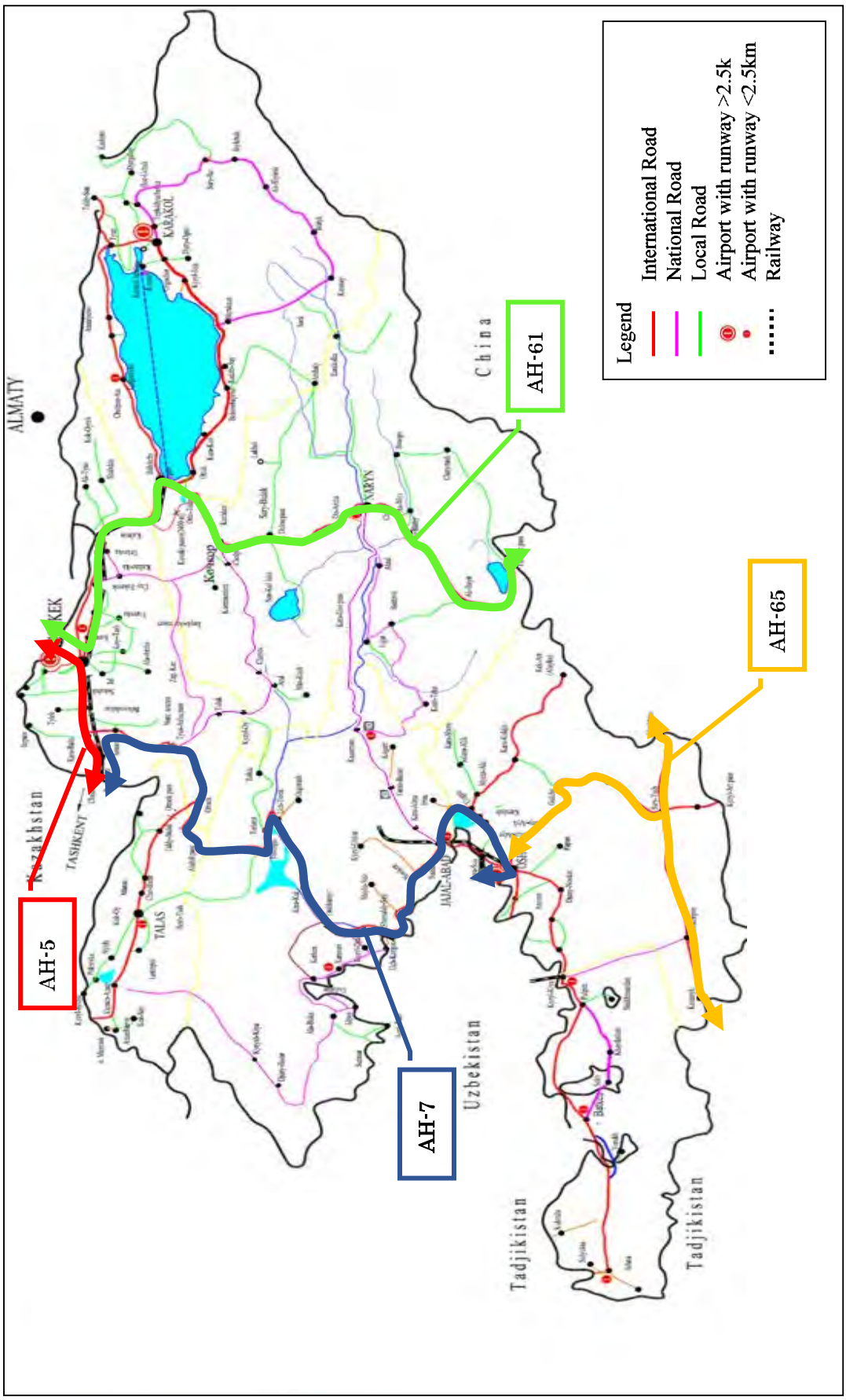
4.1 International Roads in Kyrgyz

The international road network links Kyrgyz to other Central Asian countries at each border gate. The international road network is shown in Figure 4.1-1 and Table 4.1-1. These international roads are as follows: The Asian Highway 5 (AH-5) Chaldovar-Karabalta-Bishkek-Korday Road runs from the Kazakhstan border to the Kazakhstan border in an east-west direction of northern Kyrgyz. The Asian Highway 7 (AH-7) Karasuu-Osh-Jalal-abad-Otmek-Karabalta-Chaldovar Road runs from the Uzbekistan border to the Kazakhstan border in a north-south direction of eastern Kyrgyz. The Asian Highway 61 (AH-61) Korday-Bishkek-Balykchy-Naryn-Atbashy-Torugart Road runs from the Kazakhstan border to the PRC border in a north-south direction of western Kyrgyz. The Asian Highway 65 (AH-65), Irkeshtam-Sarytash-Karamyk Road and Osh-Sarytash Road runs from the PRC border to the Tajikistan border and Osh-Sarytash in a north-south direction of southern Kyrgyz. In addition, the Isfana (Tajikistan border)-Batken-Osh Road aims to connect the Tajikistan border gate and the Chonkapka (Kazakhstan border)-Talas-Otmek Road to the Kazakhstan border gate. The Balykchy-Cholpon Ata-Tyup-Karakol Road and the Balykchy-Barskoon-Karakol Road, which form the circumferential road at the fringe of the Issyk-Kul Lake, is planned to connect to the Kazakhstan border gate. The international roads related to Osh city are AH7, AH65 and Isfana (Tajikistan border)-Batken-Osh Road.

Table 4.1-1 International Road in Kyrgyz

No.	International Road
1	Asian Highway 5 (AH-5) Chaldovar-Karabalta-Bishkek-Korday Road
2	Asian Highway 7 (AH-7) Karasuu-Osh-Jalal-abad-Otmek-Karabalta-Chaldovar Road
3	Asian Highway 61 (AH-61) Korday-Bishkek-Balykchy-Naryn-Atbashy-Torugart Road
4	Asian Highway 65 (AH-65) Irkeshtam-Sarytash-Karamyk Road and Osh-Sarytash Road
5	Isfana (Tajikistan border)-Batken-Osh Road
6	Chonkapka (Kazakhstan border)-Talas-Otmek Road
7	Balykchy-Cholpon Ata-Tyup-Karakol Road
8	Balykchy-Barskoon-Karakol Road

Source: Road Design Institute (DI)



Source: JICA Survey Team, Road Design Institute (DI)

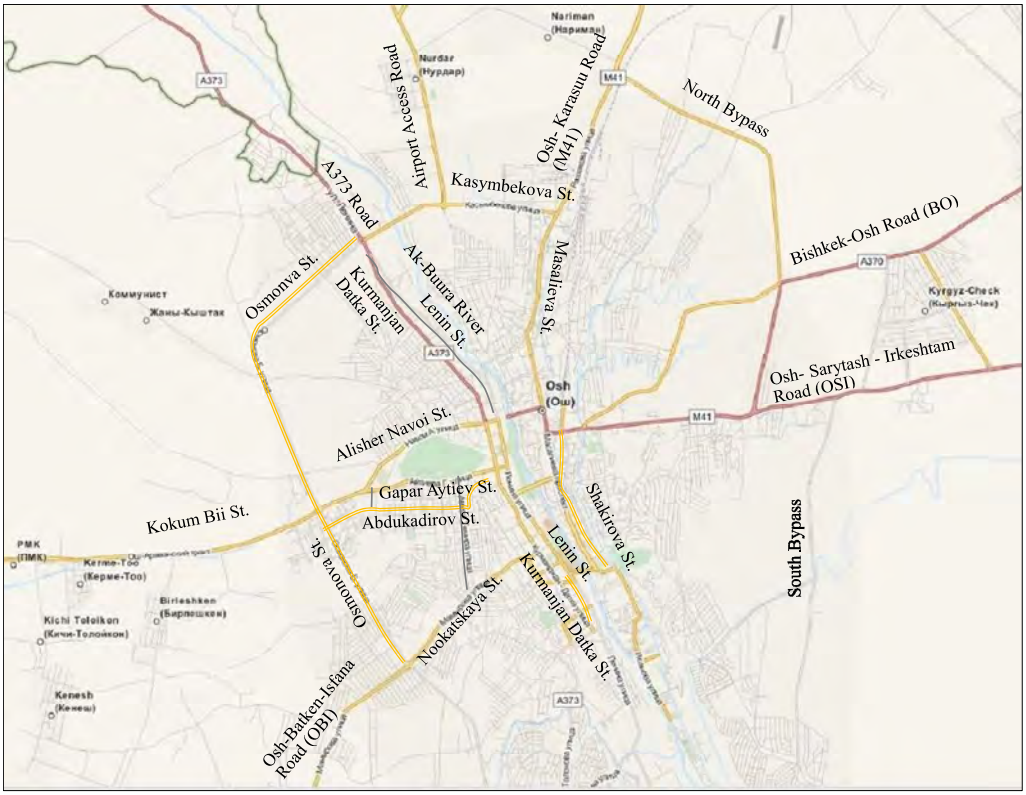
Figure 4.1-1 International Road Network in Kyrgyz

4.2 Road and Traffic Conditions in Osh City and Vicinity

4.2.1 Road Network and Road Conditions

1) Road Network in Osh City and Vicinity

Figure 4.2-1 shows the road network in Osh City and the vicinity. The road network consists of international roads, national roads, and city roads. Five (5) international roads as OSI (Osh-Sarytash-Irkeshtam) Road, OBI (Osh-Batken-Isfana) Road, BO (Osh-Bishkek) Road, M41 (Osh-Karasuu Market) Road and A 373 Road link Osh city to other Central Asia countries at each border and Bishkek city, however, the A373 Road is not functioning for the international roads due to the border closure with Uzbekistan. These international roads are: the OSI Road runs from PRC border to Osh city via Sarytash in the Kyrgyz diagonally, and links to the BO/OBI/M41 Roads. The OBI Road runs from Tajikistan border to Osh city via Batken province in the east-west direction and links to the BO/OSI/M41 Roads in Osh city. The BO Road links Osh city to Bishkek in the north-south direction and links to the OSI/OBI/M41 Roads. The M41 Road travels from Osh city to Kala Ala in the western suburbs of Bishkek and links to the OSI/OBI/OB Roads in Osh city. In this context, the road network in Osh city plays not only an important role of domestic commodity distribution, but also for an international commodity distribution and transit linking to neighboring region of Central Asian countries, PRC and etc.



Source: JICA Survey Team

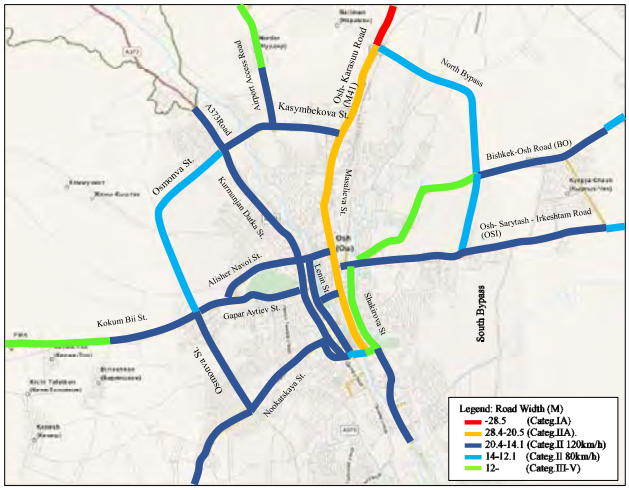
Figure 4.2-1 Road Network in Osh City and Vicinity

For the Osh city road, five (5) radial arterial city roads link the city center to international roads or local roads. They are access segments of the OSI Road to the city, Masalieva St. links to M41 Road, Kurmanjan Datka St. links to A 373 St., Alisher Navoi St./Gapar Aytiev St. links to Kokum Bii St. and Nookatskaya St. links to OBI Road. The access segments of the OSI Road connects to Masalieva St. (major north-south axis), and Masalieva St. is located in eastern city center. Kurmanjan Datka St. runs in the city center parallel to Masalieva St. and Lenin St. links to the northern A 373 Road. Lenin St. and Kurmanjan Datka St. play a functional role as a pair, being part of the arterial one-way system. While, Nookatskaya St. linking to the OBI Road and Alisher Navoi St./Gapar Aytiev St. linking to Kokum Bii St. pass traversing across the western city, both are arterial roads and important access roads across Ak-Buura River via Navoi St. Bridge, Abdukadirov St. Bridge and Nurmatov St. Bridge. Osmonova St. and the North Bypass form a ring road in the northern area, which has a distribution function of inflow/outflow of traffic in the eastern and western parts of the city. The passage route for heavy vehicles is regulated in the city center, and the allowed route is leading from OSI Road to Nookatskaya St. via Nurmatov St. Bridge and Shakirova St., which connects between OSI Road and OBI Road.

2) Road Conditions in Osh City and its Vicinity

i) Road Width Condition

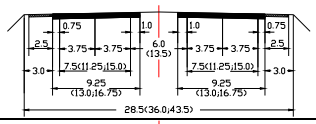
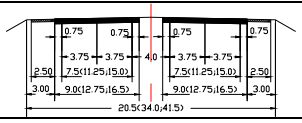
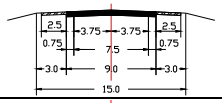
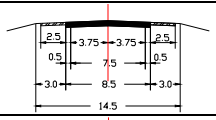
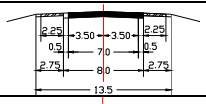
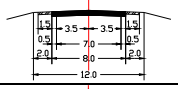
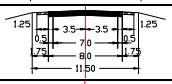
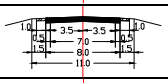
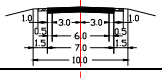
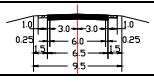
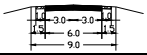
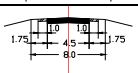
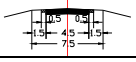
The existing road width of the arterial road network of Osh city is shown in Figure 4.2-2. The road width is classified into five (5) ranks roughly such as above 28.5M (category IA), 28.4-20.5M (category IB), 20.4-14.1M (category II 120km/h), 14-12.1M (category II 80km/h) and under 12M (category III-V) corresponding to the road category of MOTC Road Design Standard in the Kyrgyz. In the international road network, the widest road at 22.5M-30M is seen on the M41 Road, which ranks just about Category IA-IB, and OB Road, OSI Road, OBI Road and A373 Road show between 12M and 20M, as indicating the Category II. While, for the city roads, Masalieva St is the widest at about 23M. Most other city roads range 20.4M to14.1M, which ranks Category II-III. The width of Shakirova St. for access route of heavy vehicles is narrow, indicating the Category III-V by 10M. Table 4.2-1 shows major typical cross-section by road category.



Source: JICA Survey Team

Figure 4.2-2 Existing Road Width in Arterial Road Network of Osh City

Table 4.2-1 Typical Cross-Section by Road Category Based on Road Design Standard in Kyrgyz

Road Category	Number of Lanes	Design Speed (km/h)	Typical Cross Section
IA	4-lane 6-lane 8-lane	140-110	
IB	4-lane 6-lane	120-100	
II	2-lane	120	
II	2-lane	100	
II	2-lane	80	
III	2-lane	100	
III	2-lane	80	
III	2-lane	60	
IV	2-lane	80	
IV	2-lane	60	
IV	2-lane	50	
V	2-lane	60	
V	2-lane	50	

Source: MOTC Road Design Standard（State Construction Standard ДБН В.2.3-4:2007）

ii) Road Surface Condition

A road inventory survey was carried out to identify the existing road surface condition in the survey area. The road surface condition described here is based on the visual observation by the JICA experts. Figure 4.2-3 shows existing road surface condition in the arterial road network of Osh city and vicinity. The surface condition is classified into four (4) ranks, such as 1) Good, 2) Fair, 3) Poor and 4) Bad. The criteria for the rough assessment of road surface condition by visual observation are shown in Table 4.2-2.

Table 4.2-2 Criteria for Assessment of Road Surface Condition by Visual Observation

Rank of Surface Condition	Criteria of Assessment of Road Surface Condition	Surface Condition
Good	Nothing or few surfacing failures as potholes, raveling, rutting, etc. Ensuring smooth driving speed	
Fair	Maintaining for surface failures by proper maintenance or repair Ensuring smooth driving speed	
Poor	Many surfacing failures as potholes, raveling, rutting, etc. Driving with low speed	
Bad	Unpaved surface Driving with low speed	

Source: JICA Survey Team

The conditions of the road surface on the international roads are in the range of good to poor. The road surface conditions of BO Road and OSI Road are good because BO Road and OSI Road were rehabilitated in 2012 and in 2011 respectively. In addition, the surface condition on Osmonova St. between the Airport Access Road and Nookatskaya St. is good, this segment was also recently improved in 2014. In addition, it was seen that the eastern segment on Kokum Bii St is also in a good surface condition. On the other hand, the North Bypass between M41 Road and BO Road shows poor surface condition, indicating the surfacing failures as potholes and ruttings. Other poor conditions are seen at the outside segment on M41 Road between the terminal point of North Bypass and the western segment on Kokum Bii St., caused by surfacing failures like potholes, stripping and aggregate polishing of asphalt pavement. The partial segments in fair road surface condition are observed at outside Northern Ring Road Osmonova St.- Kasymbekova St. on M 41 Road, Airport Access Road, M373 Road and OBI Road, moreover, the segment between M41 Road and Airport Access Road in Kasymbekova St. (Northern Ring Road) is ranked in the category two (fair).

For the road surface condition in the arterial road network of Osh city, most arterial radial roads show a good condition, however, fair conditions are partially observed at segments on Gapar Aytiev St., Nookatskaya St. and Shakirova St. Since Nookatskaya St. and Shakirova St.

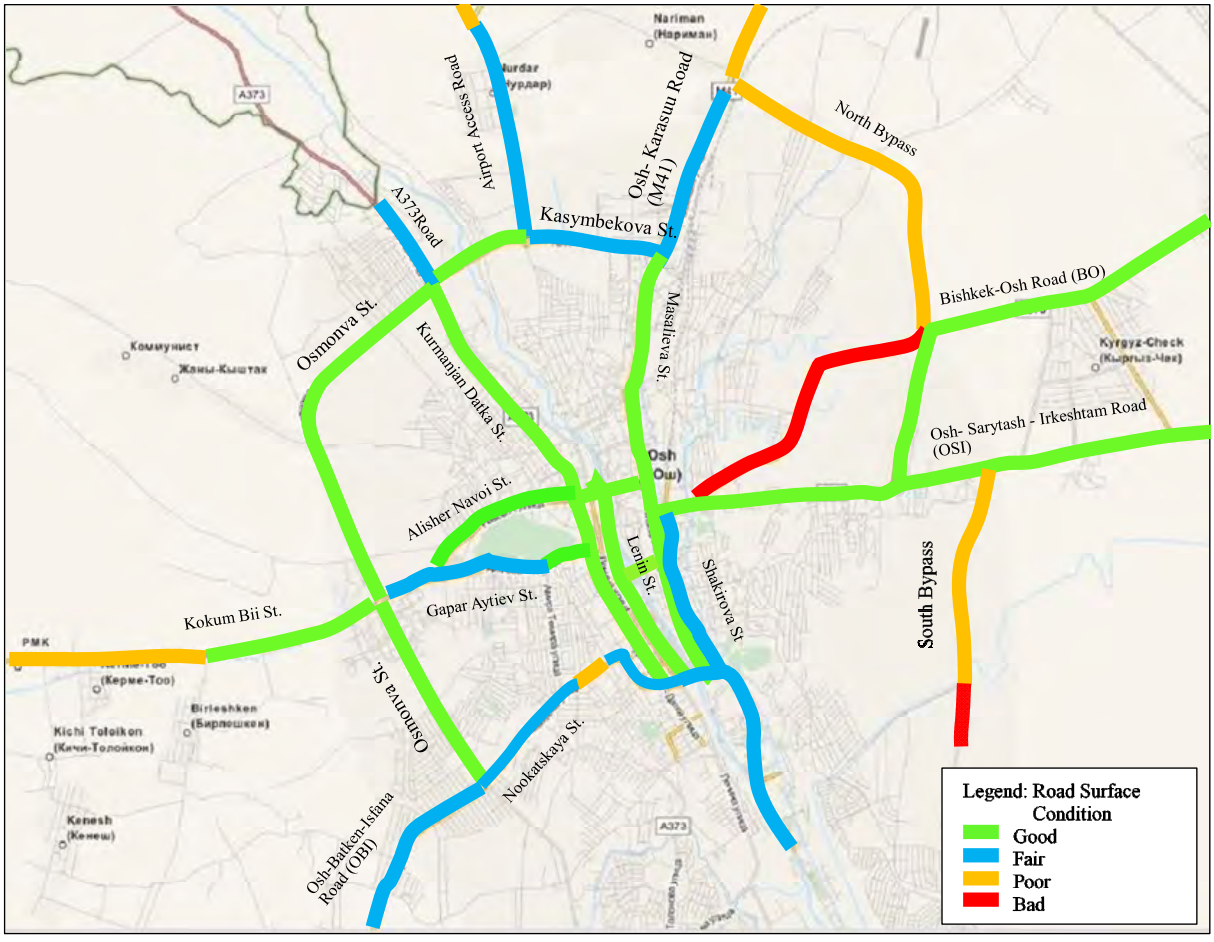
are access routes of heavy vehicles in Osh City, it is necessary that the road surface is maintained at a good condition. Extension segments in the city link to BO Road and the entrance segment of the South Bypass are in a particularly bad surface condition.

Based on the foregoing description of road surface conditions, poor rank segments on international roads of M41 Road, North Bypass and Kokum Bii St. shall be improved to ensure a smooth traffic flow and road safety. In addition, the poor segment of the entrance of the South Bypass should be improved in accordance with the future South Bypass plan.

Table 4.2-3 Segment Identified as Poor and Bad Surface Condition

Road	Surface Condition	Segment
Extension to city of BO Road	Bad	North Bypass-OSI Road
South Bypass	Bad	Northern segment
North Bypass	Poor	M41 Road-Bo Road
M41 Road	Poor	Outside from terminal point of North Bypass
Airport Access Road	Poor	Outside form Airport
Kokum Bii St.	Poor	Western Kokum Bii St.
South Bypass	Poor	Entrance of South Bypass

Source: JICA Survey Team



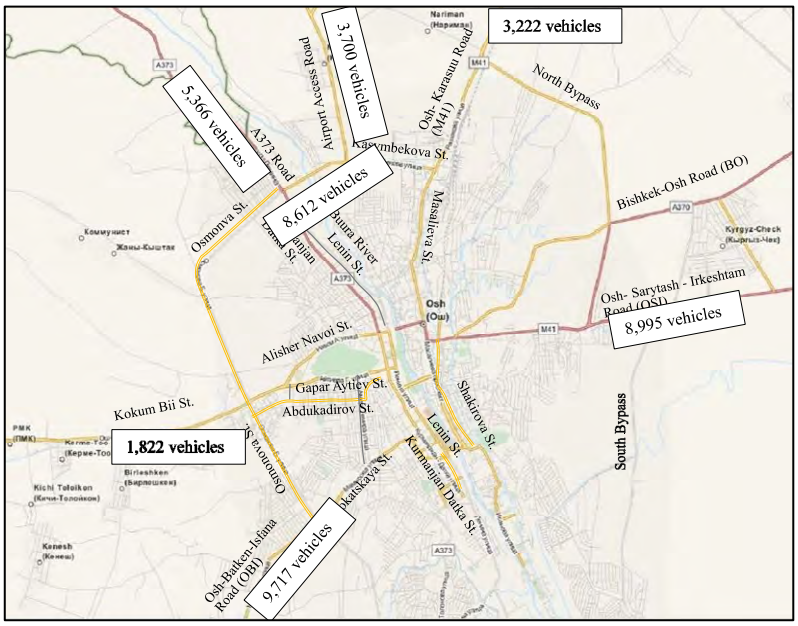
Source: JICA Survey Team

Figure 4.2-3 Existing Road Surface Condition in Arterial Road Network of Osh City and Vicinity

4.2.2 Current Traffic Volume and Changes of Traffic Volume of Osh City and Vicinity

1) Current Traffic Volume in Osh City and Vicinity

The current traffic volume in Osh city and Vicinity is shown in Figure 4.2-4, based on the information on the National Road Rehabilitation (Osh-Batken-Isfana) Project by the World Bank in 2015. The daily traffic volume ranges from 1,800 to 10,000 vehicles approximately. For the major six (6) radial international roads to the city, the highest traffic volume observed was 9,717 vehicles/day on OBI Road (Osh-Isfana KP.6 km), but also the traffic volume on the OSI Road (Osh-Sarytash-Irkeshtam KP.5km) was high, counting8,995 vehicles/day. While, the daily traffic volume on Osh-Karasuu Market Road (KP.2km), Airport Access Road (KP.2km) and A373 Road (KP.1km) was 3,222 vehicles, 3,700 vehicles, and 5,366 vehicles respectively. The daily traffic volume on the national road of Kokum Bii St. was at 1,822 vehicles and the ring road of Osmonova St. shows a traffic volume of 8,612 vehicles/day.



Source: JICA Survey Team

Figure 4.2-4 Current Traffic Volume in Osh and Vicinity

2) Changes of Traffic Volume in Osh City and its Vicinity

The report of the National Road Rehabilitation (Osh-Batken-Isfana) Project granted by the World Bank describes the changes of the traffic volume in and around the survey area from 2008 to 2012, as indicated in Table 4.2-4. In addition, the annual average daily traffic volume (AADT) in the national road network in 2011 was described in the ADB Report of Consulting Services for Preparation of Road and Transportation Sector Master Plan and Strengthening Bishkek Torugart Road Corridor Management. The roads for the assessment of the changes in traffic volume and annual growth rate were selected near to Osh City.

On the Pulgon-Burgandy Road, the annual traffic growth rate during 2008-2012 was 5.8%, while the growth rate on the Nookat Pass indicated at 4.3%. For the Osh-Sarytash-Irkeshtam Road, the annual traffic growth rate during 2011-2015 was low at 2.3%.

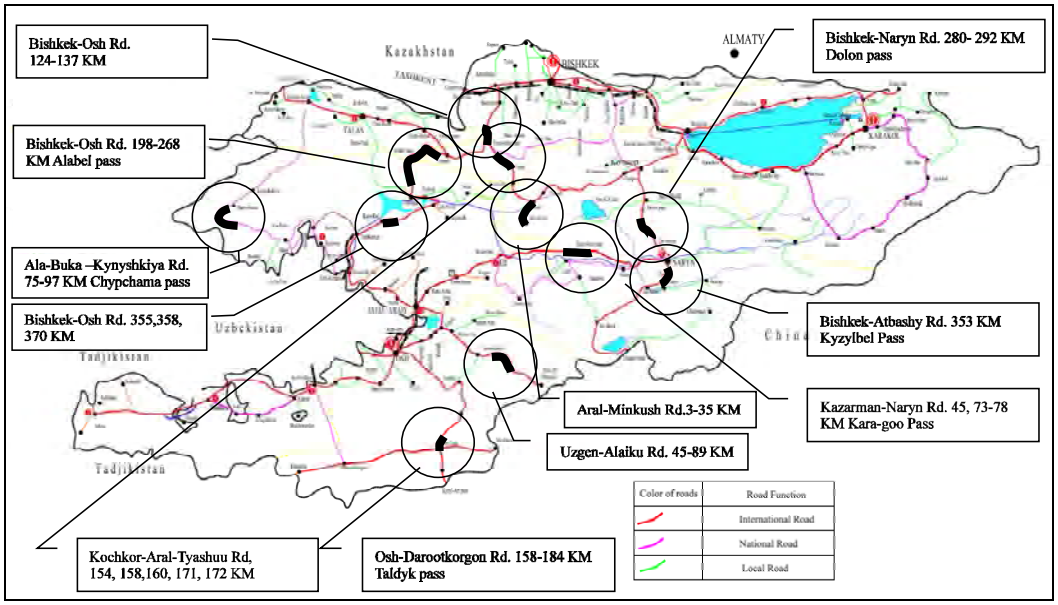
Table 4.2-4 Changes of Traffic Volume and Annual Traffic Growth Rate

Road	Year	AADT (veh./day)	Growth Rate (%)
Pulgon-Burgandy Road (KP133.0)	2008	3,047	5.8%
	2012	3,814	
Nookat Pass(KP 10-28)	2008	5,183	4.3%
	2014	6,687	
Osh-Sarytash-Irkeshtam Road (KP35.0)	2011	7,451	2.3%
	2015	8,155	

Source: JICA Survey Team

4.2.3 Road Disasters

Kyrgyz is susceptible to natural disasters, such as earthquakes, landslides and snow damage in the winter season, because its geography is mountainous with more than three-fourths of its territory being covered by mountains. Kyrgyz is strategically located as an international and regional logistics nexus in Central Asia. The international road network passes through mountains leading to a high incidence of landslides, avalanches, road surface freezing and snow coverage on national roads during all seasons. Figure 4.2-5 shows the hazardous locations on the national highway network in Kyrgyz, based on the past record. The road disasters such as avalanches, road surface freezing, and snow coverage have a great impact on international land transport in the winter season. For example, one of the worst disasters in Kyrgyz that inflicted BO international road was large-scale avalanche in 2012. 10 deaths were caused by the avalanche with human suffering, and it led to a road closure for the period of a week and road closure with a time restriction for the time during restoration works. Such increase of transit time caused by the closure of the national highway road network is an obstacle for the domestic freight and international trade in neighboring countries and a disincentive for economic revitalization in the area. There were no hazardous locations found on the major roads in Osh city and Vicinity, however, looking at international roads linking to Osh city, the segment at 158-184 km on OBI Road and segment at 45-89 km on Uzgen-Alaiku Road outside Osh city were pointed out. These national roads play a role for domestic/international trade between the Osh and neighboring countries. Countermeasures for natural disasters in the winter season will be especially enforced.



Source: Road Design Institute (DI)

Figure 4.2-5 Hazardous Locations of the National Highway Network in Kyrgyz

4.2.4 Road Safety

1) Annual Road Traffic Accident

Road safety is one of the major concerns of the Kyrgyz. The number of traffic accidents per year in Kyrgyz and the Oblast for five (5) years (2009-2013) is shown in Table 4.2-5 and Figure 4.2-6. The number of road traffic accidents in Kyrgyz has continually increased from 4,248 accidents to 7,492 accidents during the time between 2009 and2013, which accounts for 1.76 times with annual average growth rate 15.2%. While, for the traffic accident in Osh city, the traffic accident has also increased, however, the number of traffic accidents in 2013 was 435 accidents, indicating the average growth rate at 3.2% during 2009-2013.

Table 4.2-6 and Figure 4.2-7 shows the number of fatalities from traffic accidents per population 100,000 persons (fatality rate) in Kyrgyz. The fatality rate has gradually decreased from 2008 to 2011, which ranges between 18 and 39 during those four years. Especially, the fatality rate during 2009-2010 shows a substantial fall at 47%, apparently indicating fewer accidents with a low degree of fatality. However, the fatality rates shown are still high by comparison with other countries such as Japan at 3.85, Thailand at 9.6 and China at 16.5. The fatality rate in Osh city was 29.0 in 2009. It shows that the accidents impact heavily on people's lives, which cannot be measured purely in economic terms.

Table 4.2-5 Annual Road Traffic Accidents (2009-2013)

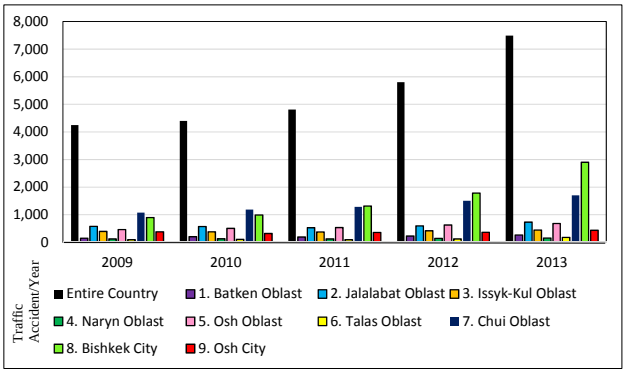
Kyrgyz/Oblast	2009	2010	2011	2012	2013	Growth Rate(%)
Entire Country	4,248	4,402	4,813	5,803	7,492	15.2%
1. Batken Oblast	147	204	190	228	268	16.2%
2. Jalalabat Oblas	581	570	531	600	733	6.0%
3. Issyk-Kul Obla	394	384	375	421	441	2.9%
4. Naryn Oblast	123	132	123	143	155	6.0%
5. Osh Oblast	465	507	537	631	683	10.1%
6. Talas Oblast	91	105	96	125	177	18.1%
7. Chui Oblast	1,074	1,190	1,283	1,506	1,702	12.2%
8. Bishkek City	898	992	1,319	1,785	2,898	34.0%
9. Osh City	384	318	359	364	435	3.2%

Source: MOTC, 2014

Table 4.2-6 Number of Fatalities and Injuries

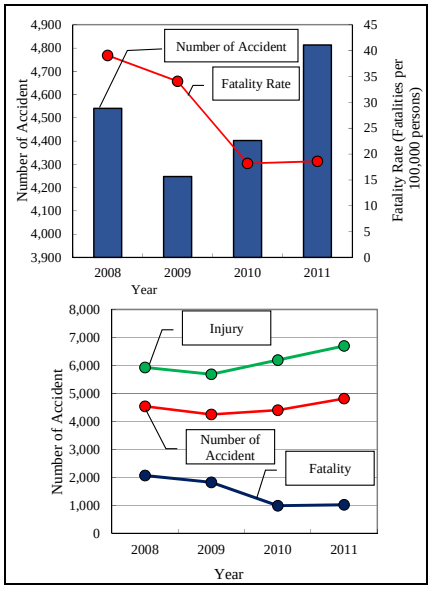
Year	Number of Accidents	Number of Victims		Fatality Rate
		Fatalities	Injuries	Per 100,000 Peoples
2008	4,540	2,066	5,925	39
2009	4,248	1,822	5,680	34
2010	4,402	985	6,192	18
2011	4,813	1,018	6,697	19

Source: UNFPSA, National Statistical Committee, 2012



Source: MOTC, 2014

Figure 4.2-6 Annual Road Traffic Accident (2009-2013)



Source: UNFPSA, National Statistical Committee, 2012

Figure 4.2-7 Number of Fatalities and Injuries

2) Road Traffic Accidents by Collision Type and Causes

The latest collision type and causes in road traffic accident were not found, therefore, the analysis was carried out based on the traffic accident data of the Bishkek-Osh Road (BO Road) in 2011, in order to grasp the qualitative nature. Figure 4.2-8 shows the collision type of traffic accidents. The highest share of collision type was “vehicle to vehicle collision” at 38.5%, and second highest share was “accident involving pedestrians” at 33.9%. Another type of accident caused by “dumping” is highly visible at 15.4%. It should be noted that the share of traffic accidents involving pedestrians is high at 33.9%. It is indicated by the lack of well-developed road safety facilities with “Pedestrian Friendly” structures, such as pedestrian bridges and pedestrian crossings. At the same time, road safety education for drivers and pedestrians is important.

With regards to the causes of accidents, Figure 4.2-9 shows major causes of traffic accidents. It is observed that the highest share at 36.8% is due to speeding, and second highest share are

violations of the rules of maneuvering at 17.3% and violation of overtaking rules at 14.1%. This is due to a lack of compliance with the traffic rules. It is concluded that these accidents in Kyrgyz are mainly caused by the wrong driving manners of road users. It is essential that drivers and pedestrians obey traffic regulations and understand the merits of road safety. Traffic accidents are caused by a combination of various factors. Since traffic accidents generally cannot be attributed to a single cause, effective road safety improvement measures require an approach from the standpoint of the so-called "the three (3) E's" that is 'Engineering', 'Education', and 'Enforcement'. In addition, it is essential that these road safety measures from "the 3 E's" aspects will be implemented at the same time. Figure 4.2-10 shows the current situation of traffic accidents in Osh city.

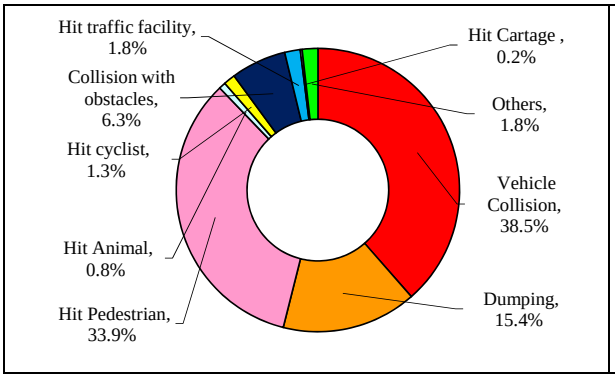


Figure 4.2-8 Collision Type of Traffic Accident

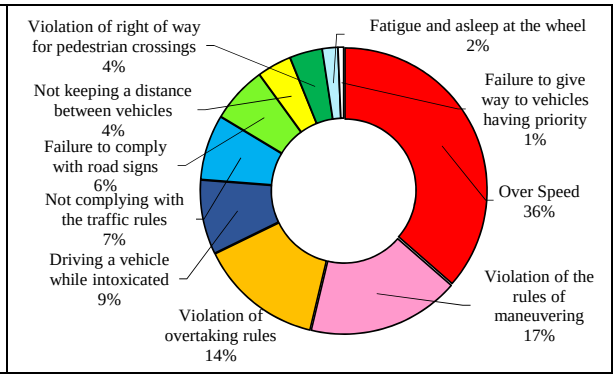


Figure 4.2-9 Major Causes of Traffic Accident

Source: Kyrgyz Republic Road Safety Project, 2011

Side Collision at Intersection

Collision with Objects at Barsbek Roundabout

Source: JICA Survey Team

Figure 4.2-10 Traffic Accident in Osh City

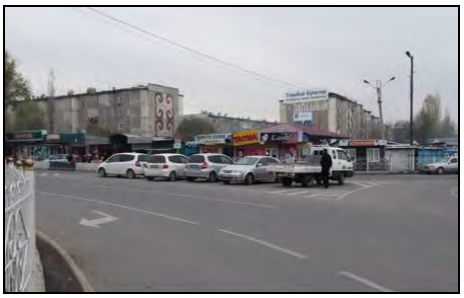
4.2.5 Parking

1) Parking Conditions

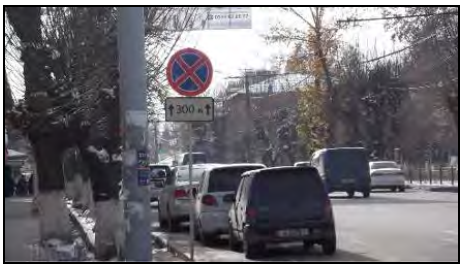
The parking in Osh central area generally depends on roadside space, because proper off-street parking facilities are currently small in capacity. Although at some segments on arterial roads in the commercial area is prohibited to park, drivers can be seen ignoring traffic regulations. One of the reasons that the police enforcement is restricted due to lack of police staff. Unregulated on-street parking is commonly seen at various places, such as at approach of intersections, inside intersections or roundabouts and prohibited areas. Such unregulated on-street parking does not only reduces the traffic capacity of intersection or roundabout but

also induces traffic accidents due to entrance and exit from/to the roadside.

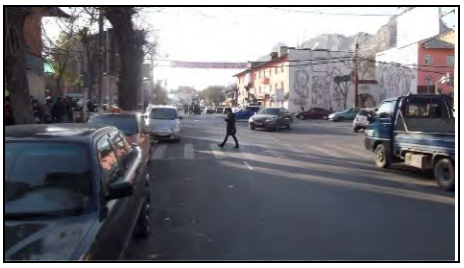
Chronic On-street Parking



Parking inside Roundabout



Parking at Prohibited Area



Parking inside Signalized intersection

Source: JICA Survey Team

Figure 4.2-11 Parking Condition in Osh City

The main cause of chronic on-street parking is the lack of parking space for commuters and visitors to government facilities, hospital, market, and other public facilities. Since the government's political measure for the parking management in urban areas was forestalled, it resulted in the chronic on-street parking.

At the present, the Osh city government implements the following regulation in order to improve the on-street parking condition.

- Obligated parking system for new buildings
- Reinforcement of traffic enforcement by the traffic police

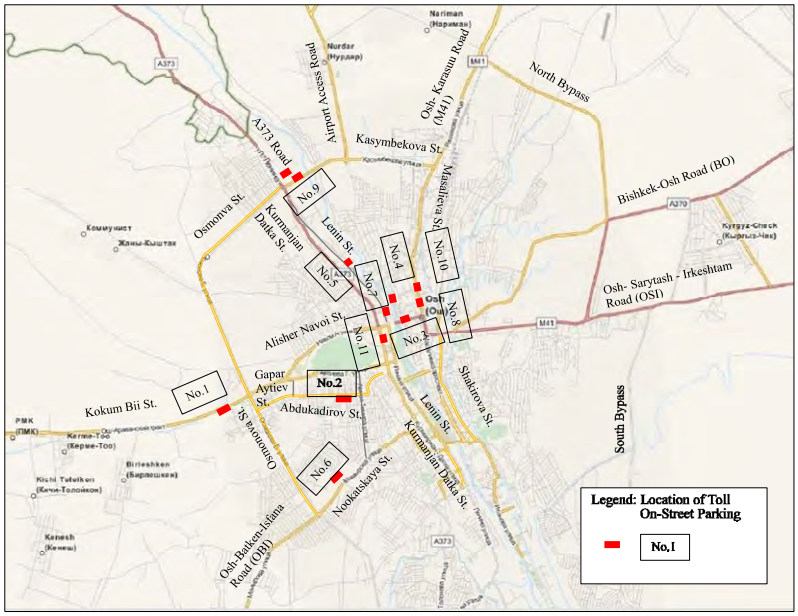
2) Toll On-street Parking Operation

At the moment, "Osh Department of Parking, Stops and Garages Management" manages the toll on-street parking operation on arterial roads in Osh city. The toll on-street parking system is operated at total eleven (11) locations as shown in Table 4.2-7 and Figure 4.2-12. The toll on-street parking is generally located at the approach of intersections and roadsides. The parking inspector patrols the roadsides to collect the fare and to manage the entrance and exit from/to parking space. The parking charge is 10 KGS onetime fee, regardless parking duration, and the operation period is from 8:00 AM to 5:00 PM. Osh city has currently an expansion plan for twenty-seven (27) parking locations.

Table 4.2-7 Outline of Locations for Toll On-street Parking

No.	Name	Name of Road	Length (m)	Capacity (Vehicles)	Location of Toll On-street Parking
1	Central Automobile Market	Kokum bii	160	32	
2	Mominova	Amir Temur-Momnova	60	12	
3	No.21 Said Muhtar	Alisher Navoi-Karasuu	130	26	
4	Muchnoi Market	Karasuu Market-Zainabetdinova	200	40	
5	Sheit Bobo Market	Lenin	80	16	
6	Nookatskaya	Mamyrova-Ashhebadskaya	40	8	
7	No.12 Eco Islamic Bank	Lenin-Navoi	120	24	
8	Masalieva	Masalieva-Raiymbekova	50	10	
9	Kasymbekova	Osmonova-Kasymbekova Kurmanjan Datka -Lenin	50	10	
10	Raiymbekova	Zainabotdinova-Masalieva	180	36	
11	Teshik-Tash	Lenin	230	46	

Source: Osh Department of Parking, Stops and Garages Management



Source: JICA Survey Team

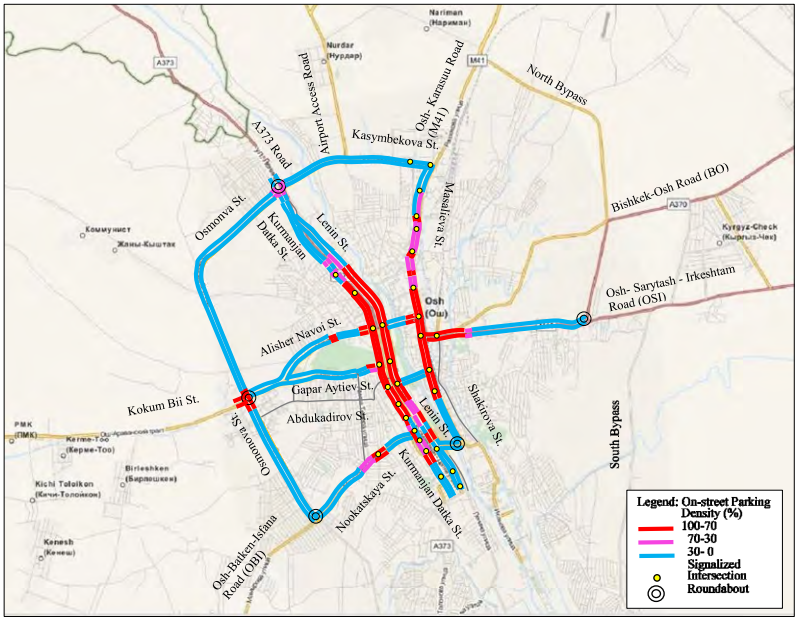
Figure 4.2-12 Locations of Toll On-street Parking System

3) On-street Parking

In order to obtain the on-street parking characteristic during the midday period, parking occupancy survey was carried out based on the visual observation of the JICA experts. Figure 4.2-13 shows parking occupancy of on-street parking along the major arterial roads. The parking occupancy is classified into three (3) ranks such as 1) 100-70%, 2) 70-30% and 3) under 30%.

Osh central area bordered by Shakirova St., Alisher Navoi St., Kurmanjan Datka St. and Abdukadirov St., has high on-street parking occupancy at 70%-100% during business hours.

Especially, on-street parking occupancy along the Kurmanjan Datka St. and Lenin St. between Mamajan St. and Lomonosova St. was almost 100% on both sides, and along Masalieva St. it was also almost 100% on both sides. Another high occupancy at 100% was seen on around Alisher Navoi St.-Masalieva intersection St. and Masalieva St.-OSI Road intersection. In the periphery of Nookatskaya St -Ferghanskaya St. intersection occupation rates were high at 70-100%, which is caused by congestion at small factories and shops. In addition, it was observed that high parking occupancy at Barsbek roundabout and Manas roundabout at 70%-100%, caused by visitors to the market, taxis waiting, and long distance bus terminal. The present level of on-street parking capacity is far from sufficient to meet the parking demand. It is, therefore, highly recommended thatparking spaces should be developed or regulated by various traffic restrictions. It is highly recommended that the off-street parking facilities should be developed, such as underground parking facilities, multilevel car parking towers and a on-street parking ticket system in the above-mentioned congested central areas (see Figure 4.2-14).



Source: JICA Survey Team

Figure 4.2-13 Parking Occupancy of On-street Parking along Major Arterial Road

Underground-Parking

Multilevel Car Parking Tower

On-street Parking Ticket System

Source: Mitsubishi Heavy Industries Mechatronics Systems, LTD

Figure 4.2-14 Illustration of On-street and Off-street Parking Facilities

4) Long Distance Taxi

Long Distance Taxies were waiting for passengers at the intersections around Navoi St. Bridge and disturbing the traffic movement. When Navoi St. Bridge opened, those taxies were moved to the Bus Terminal from the urban area. The bus terminal was also rehabilitated as shown in following figure.

Long distance taxies in the field of bus terminal

Waiting long distance taxies in bus bay

Ticket Booth

Rehabilitating Bus Terminal Building

Source: JICA Survey Team

Figure 4.2-15 Rehabilitating Bus Terminal

4.2.6 Traffic Management Facilities

Traffic management facilities are generally not in place and they are insufficient in number such as traffic signal lights, marking of channelization including center lines, pedestrian crossings, and regulatory and warning traffic signs..

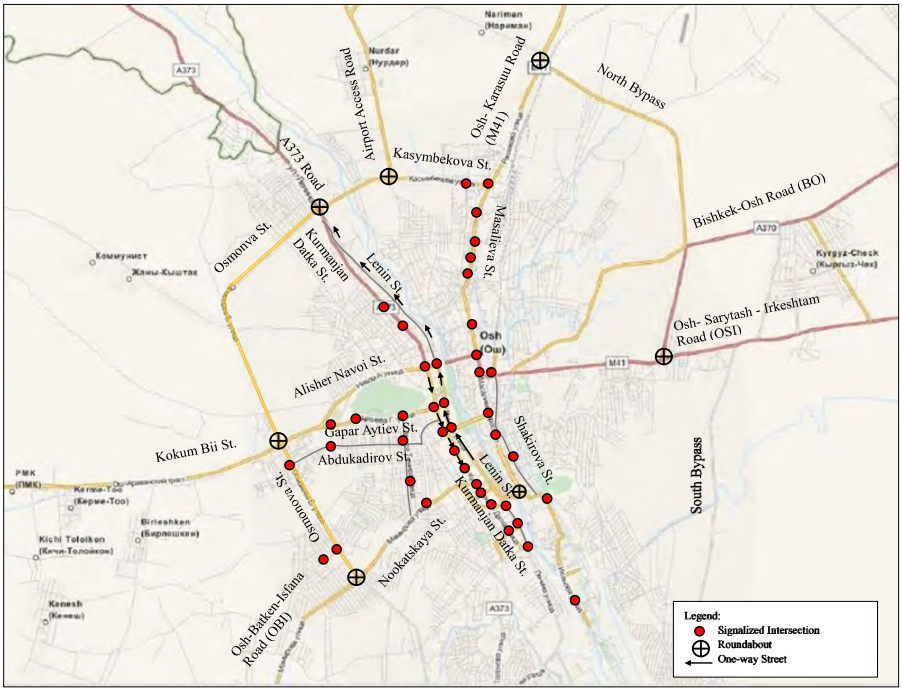
1) Traffic Signal Lights

Figure 4.2-16 shows the location of signalized intersection. Forty-one (41) traffic signal lights in total are installed at important intersections on arterial roads. Especially, traffic signal lights on Kurmanjan Datka St., Lenin St. and Masalieva St were installed in clusters. Of the total signalized intersection, five (5) traffic signalized intersections were granted by the Japan grass-roots grant aid in 2014 and twenty (20) traffic signalized intersections by USAID in 2012.

Existing signal lights show a mixture of old type signals and new type signals. At the moment, traffic signal lights are managed by the Traffic Police (CMOD), which belongs to the Ministry of Interior.

i) Signal Facilities

The traffic signal lights are mostly vertical-type signal heads and both faces type, installed at major intersections. At intersections of old type signals, traffic signal lights are not visible because of low poles which frequently make it difficult for drivers behind large vehicles to see them. While, intersections of new type signals compose of modern equipment, Kasymbekova St.-Masalieva St. signalized intersection granted by Japan installs the multiple CCTV camera monitors. Figure 4.2-17 shows the new type traffic signal light and old type traffic signal lights respectively.



Source: JICA Survey Team

Figure 4.2-16 Locations of Signalized Intersections

New Type Signal Light

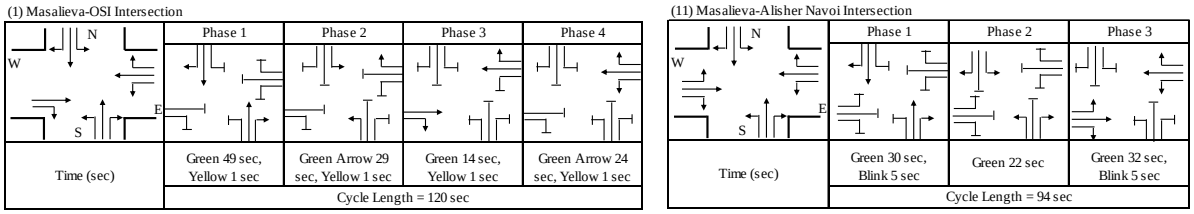
Old Type Signal Light

Source: JICA Survey Team

Figure 4.2-17 Signal Light Types

ii) Signal Phasing and Split Time

The signal phasing and split time generally consists of two (2) types such as simple two phasing and multi-phasing (3 to 4 phasing) with green allow split. The signalized intersection with multi-phasing is mostly located at central area bordered by Masalieva St, Alisher Navoi St., Kurmanjan Datka St. and Abdukadirov St., in order to control the complicated right-to-left traffic flow. However, the most signal lights are controlled by pre-timed operation with a single program, it is difficult to control the change of traffic flow in time. Currently, it is often seen traffic congestion during rush hours, almost all stoppages result from intersection waiting time and spill-back from upstream, due to a lack of traffic capacity. Existing signal control system should be improved by using the method of pre-timed operation with multi-program to respond to the changes of traffic flow and time. In addition, existing independent control systems should be improved by using the method of the coordinated control system, which can be adopted when both or continuous intersections have shorter spacing. In terms of existing signal split in above mentioned multi-phasing signalized intersection, the cycle time length range 50 sec to 120 sec, and green time range 15 sec to 50sec. Signal phasing and a split step diagram at Masalieva St.-OSI Road intersection and Masalieva St.-Alisher Navoi St. intersection are shown in Figure 4.2-18, both of which have a lot of traffic volume in the central area.



Source: JICA Survey Team

Figure 4.2-18 Samples of Signal Phasing and Split Step Diagram

2) Pedestrian Crossing Facility

Pedestrian bridges are generally required to be installed on wide streets with many urban facilities attracting many people, i.e., school, hospitals and other public facilities. In Osh city, there is currently no pedestrian bridge installed anywhere. Meanwhile, pedestrian crossings designated by pavement markings were comparatively well installed at the signalized intersections and also at the roadsides with traffic signs in the central area (see Figure 4.2-19). However, at the national roads in the neighboring city, they are insufficient in number.

Pedestrian Crossing by Marking

Signalized Intersection without Pedestrian Crossing

Source: JICA Survey Team

Figure 4.2-19 Pedestrian Crossing Facility

3) Traffic Signs and Road Markings

Road/traffic signs for regulation and caution are well arranged in central area in comparison to the national road in the neighboring city. Yet there are not enough road guidance signs installed, and even the installed ones are sometimes not visible. Looking at the overall condition of installed road/traffic signs in the national roads outside the city, they are only maintained satisfactory at the rehabilitated roads and are insufficient in number. As for the road markings, which are necessary in order to maintain smooth vehicular traffic flow and to regulate the flows of vehicle and pedestrian against traffic accident inside signalized intersections, there are also some shortcomings In particular, it is noticeable that the channelization with road marking inside signalized intersection is not common. In addition, road marking like a center line or lane and side clearance are an important elements in the control of traffic flow indicating direction indicators. However, it is observed that the road markings at some national roads and some segments of city arterial roads are not sufficient. Figure 4.2-20 shows the example of insufficient road markings at the intersections and national roadsides. The road segments, where road marking will be required are shown in Table 4.2-8.

Table 4.2-8 Roads without Road Marking

International Road /National Road	Osh City Road
A373 Road outside the Osmonova St.	Nookatskaya St.
M41 Road outside the North Bypass	The western segment on Gapar Aytiev St.
North Bypass between M41 Road to BO Road	Shakirova St.
The western segment on Kokum Bii St.	Kasymbekova St.

Source: JICA Survey Team

Wide Intersection without Road Markings

North Bypass without Road Markings

Source: JICA Survey Team

Figure 4.2-20 Insufficient Road Markings

4) Guard Fence and Guard Pipe

It is seen that very few roads in Osh city have a guard fences, ropes, or rails. Guard facilities along the arterial road are necessary in order to divide sidewalk and carriageway, as they are especially efficient at the front and rear of intersections for protecting pedestrians and to regulate disordered pedestrian's jay-walking. On the international road and national road, a guard fence must be installed at hazardous locations such as large-sized ditches and around bridge segments, however, it is observed that they are not sufficient in number. On the other hand, a partial guard fence is installed at the Alisher Navoi St.-Lenin St. signalized intersection, Gapar Aytiev St.-Kurmanjan Datka St. signalized intersection and Gapar Aytiev St.-Lenin St. signalized intersection in the central city area, however, as whole Osh city, they are insufficient in number. Figure 4.2-21 shows the signalized intersections with guard fences.

Guard Fence at Alisher Navoi St.-Lenin St.

Guard Fence at Gapal Aytiev St-Lenin St.

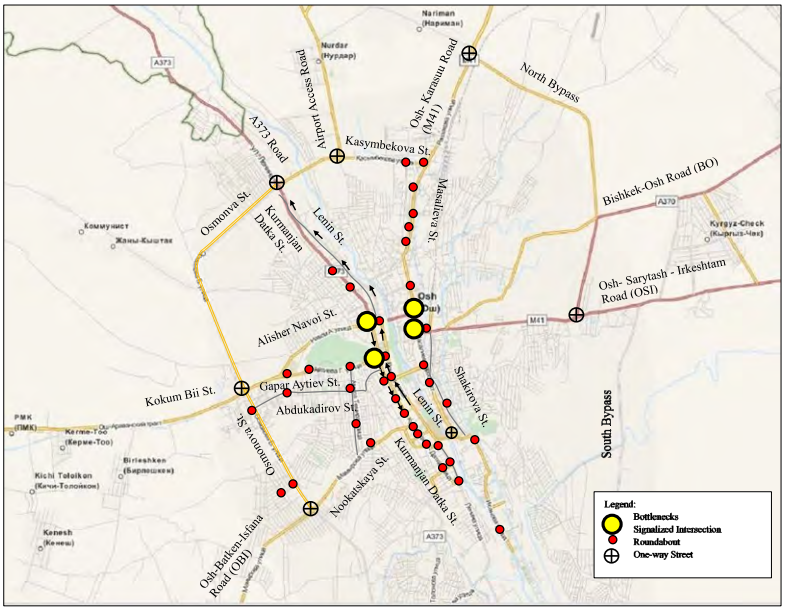
Source: JICA Survey Team

Figure 4.2-21 Signalized Intersections with Guard Fences

4.2.7 Intersection and Roundabouts

1) Intersection

The major intersections in the center of Osh city are operated by traffic signal lights and there are in total forty-one (41) signalized intersections. 65% of traffic signal lights concentrate in Kurmanjan Datka St., Lenin St. and Masalieva St. The signalized intersections in Osh city are comparatively well managed, but optimized at each intersection without synchronizing consecutive intersections in general. From the results of the intersection traffic count survey, queue length measurement survey and travel time survey (survey results are elaborated in Chapter 5), traffic congestion in these signalized intersections becomes very severe during the peak period. Especially, Masalieva St.-Alisher Navoi St. intersection and Masalieva St.-OSI Road intersection show an excess of traffic capacity, these signalized intersections are identified as "Bottlenecks" from the following several parameters (see Figure 4.2-22).



Source: JICA Survey Team

Figure 4.2-22 Major Bottlenecks at Intersection

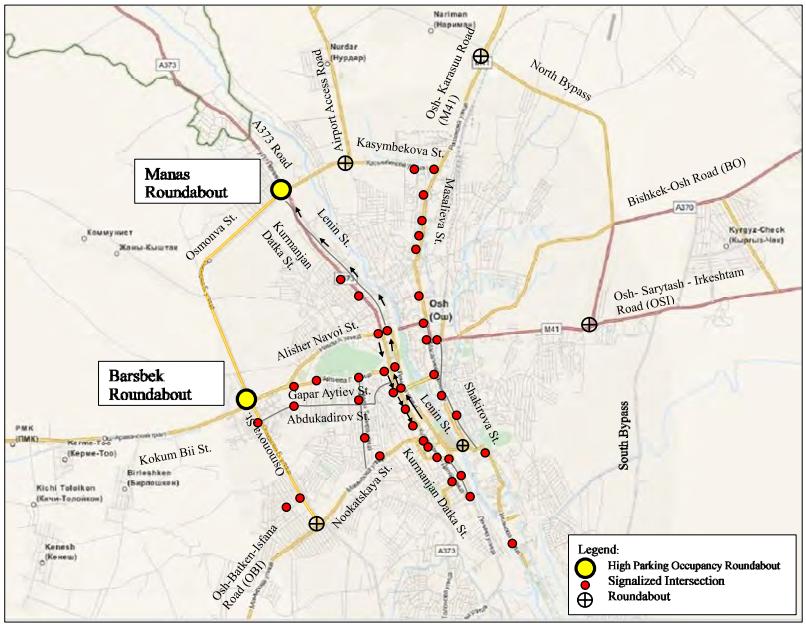
- Masalieva St.-Alisher Navoi St. intersection has high vehicle traffic volume at 3,834 PCU in the morning peak period
- Queue length during morning peak periods ranges from 100m to 300m
- Segments between Masalieva St.-Alisher Navoi St. signalized intersection and Masalieva St.-OSI Road signalized intersection show low travel speed at 8km/h and 10km/h respectively in the evening peak period

The causes of the traffic capacity reduction are assumed to be inadequate car parking in and around the intersection, entrances/exits from/to roadside parking, stops of mini-bus/taxi near intersections, insufficient road markings inside intersections and unsuitable geometric conditions as corner cut and channelization markings. Such congested, signalized intersections were also observed on Kurmanjan Datka St. and Lenin St.

2) Roundabouts

At present, a total of seven (7) roundabouts are located in the survey area. At these roundabouts,

traffic management facilities as channelization markings and guard fences are well installed. While, it was observed that high parking occupancy at Barsbek roundabout, which is at Osh-Aravan Road and Ring Road (Osmonova St.), and Manas roundabout was at 70%-100%, vehicles not only park at the corner cut, but also park in the zebra marking area of channelizing island inside the roundabout (see Figure 4.2-23). Such unregulated behaviors lead to traffic congestion due to conflicts with access vehicles and parking vehicles at approach and exit of the roundabout.



Source: JICA Survey Team

Figure 4.2-23 High Parking Occupancy Roundabout

In this context, Barsbek roundabout is regarded as a bottleneck. Osh City vice mayor is responsible for the task force to alleviate severe congestion at this roundabout with the Osh Road Management Department, Traffic Police, Karasuu rayon and other relating departments. Considered solutions of the task force are as follows;

- Enlarging the roundabout with land acquisition of surrounding area,
- Installing traffic signals at entrance legs of the roundabout, and
- Developing a new access road between OBI Road to Osh- Aravan Road to detour heavy vehicles.

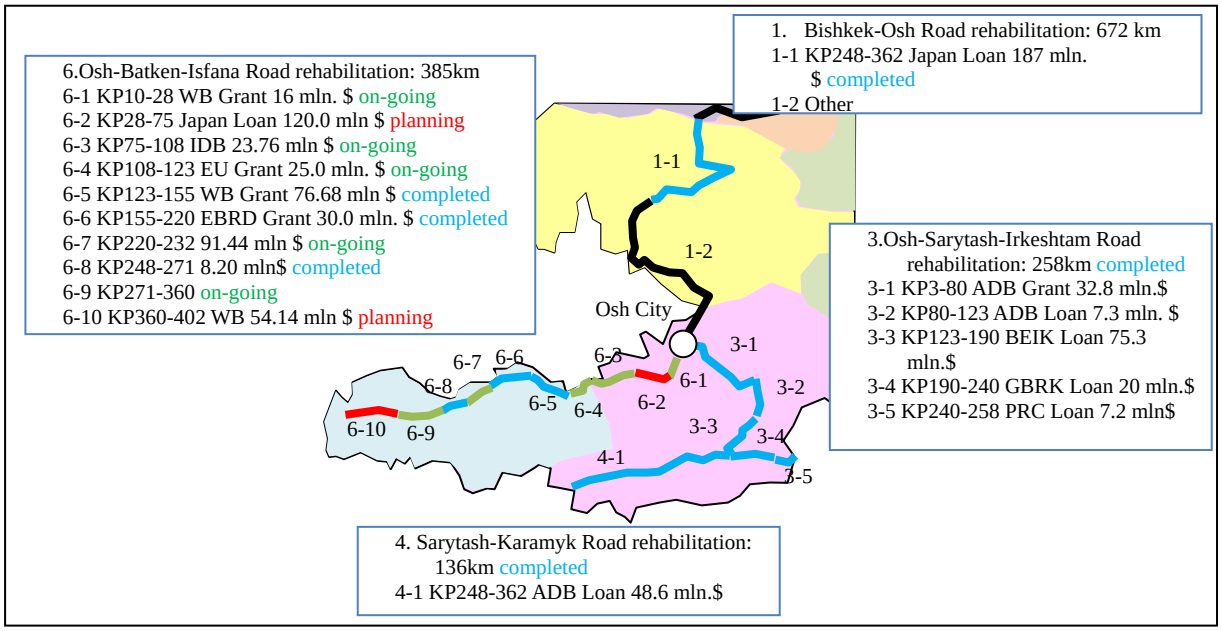
The JICA survey team conducted traffic survey and site survey at Barsbek roundabout and revealed the factors of traffic congestion as follows;

- Traffic spill-back from upstream in the south direction due to pedestrians crossing, stops of mini-busses/taxis near the intersection and merging and diverging from/to non-signalized T intersections,
- Reduction of traffic capacity (only one lane at exit of roundabout) due to on-street parking, and
- Traffic rule at roundabout applies right side priority in the Kyrgyz, therefore, the vehicle in the circular lane has to stop when a vehicle is entering to roundabout from an approach ahead. Under this rule, stopping the vehicle in the circular lanes easily block following entrance legs especially at small diameter roundabout such as the Barsbek roundabout.

4.3 Road and Bridge Development Plan In and Around Osh City

1) MOTC Plan

The development plan of international corridors around Osh city is shown in the following figure. OBI Road, with a total length of 385km, is now being developed with the assistance of the World Bank and the European Bank for Reconstruction and Development (EBRD) as a phase I project of approx. 112 km. The government of Japan is planning to co-finance the phase II project with the World Bank and Islamic Development Bank (IsDB).



Source: JICA Survey Team based on Road Sector Development Strategy up to 2015 (draft, MOTC)

Figure 4.3-1 Development Plan of International Corridors around Osh City (MOTC)

2) Osh City Plan

Osh city plans road and bridge development projects as the “Program for Osh City Road Infrastructure Development to 2030”. On 29th November 2015, Navoi St. Bridge was reconstructed and opened ahead of the construction schedule. In addition, another bridge around Ozgur village is under the bidding process. The fund source of both bridges is provided by a Russian Grant.

Table 4.3-1 Investment Projects in the Transport Sector (2013-2017)

No.	Street / Bridge Name (from-to)	Length (km)	Amount (thousand KGS)	Status
1	Abdukadirov (Osmonova-Zakirov)	3.5	95 000	
2	Shakirov (Monueva-Nurmatov)	2.1	57 000	
3	Navoi (Krumanjan Datka-Aykiev)	2.0	54 000	
4	Masaliev (Razzakova-Nurmatov)	5.5	182 000	
5	Lenigradskaya (Masalieva-Akburinskaya)	0.5	14 000	
6	Tursunbaev (Navoi-Razzakova)	2.2	60 000	
7	Aitiev (Rustavelli-Osmonova)	1.6	50 000	
8	Akburinskaya (Uch kocho-Kasymbekova)	3.0	81 000	
9	Bypass through Amir Timur-Ozgur-Turan-Uchar-Japalak	35.0	950 000	
10	Bridge reconstruction on Nurmatov St. (Nurmatov-Akburinskaya)	80.0 m	80 000	
11	Uch Kocho St. Bridge construction (Akburinskaya-Lenin)	220.0 m	1 200 000	
12	Construction of bridge on Ozgur St. (Ozgur village)	5.00 m	40 000	Tender
	Total :		2 863 000	

Source: JICA Survey Team

4.4 Date Collection Survey on Geodetic and Geological Conditions

In August 2014, the Osh branch JSC KyrgyzGIIZ implemented engineering-geological researches for the project of the bridge and approach roads on Navoi St. of the city of Osh. The total length of the projected area is 760 meters. The surveyed area is located in the administrative territory of Osh city, Osh oblast, the Kyrgyz Republic.

In June 2015, the design institute "Kyrgyzdortransproekt" carried out survey works on the design of the Southern bypass highway of the city of Osh. The total length of the bypass road is 28 km. The surveyed site is located in the administrative territory of Nookatskaya and Karasuu rayon, Osh oblast, the Kyrgyz Republic.

Results of these two surveying works on geodetic and geological conditions are described below.

4.4.1 Landscape

In the geomorphological relation, the survey site is located in the east part of the Fergana hollow, on a right-bank high terrace of Ak-Buura River. A terrace surface is rather plain, with a minor general bias on the northwest.

Absolute elevation marks of the area fluctuate within 870,0-1170,0 meters above sea level. The figure below shows a topographic map of the Osh oblast.

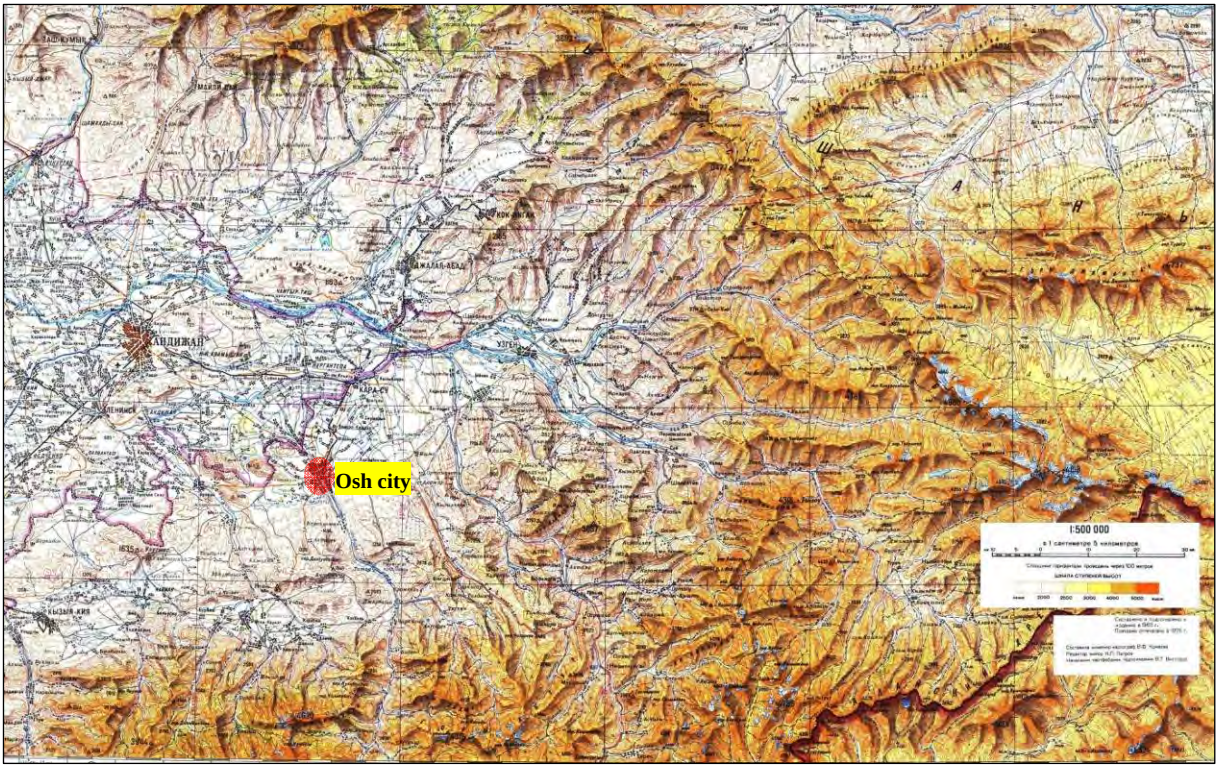


Figure 4.4-1 Topographic Map of Osh Oblast (State Mapping Committee, USSR, 1972)

4.4.2 Hydrography and Hydrogeology

In the hydrogeological relation, the surveyed site belongs to a zone with deep bedding level of underground waters. During the survey period (April – May 2012), underground waters were not found up to the depth of 2,4-4,0 meters. Below in the table, character and moistening degree of a site is described (the area belongs to I type of the ground according to Table B.12 from SNiP KR 32-01:2004 Construction Norms and Regulations).

Ground Type	Moisture Level of the Ground	Freezing Processes and Phenomena	Soil	
			Type	Character
1st	Dry area	Does not exist	largely detrital; sandy	Massive texture; not collapsible or thawed

Source: Table B.12 from SNiP KR 32-01:2004 Construction Norms and Regulations

Plasticity of integumentary loamy soil is caused by their seasonal moistening during the survey period.

The largest waterway in the area is the Ak-Buura River, flowing from the South to the North. The river originates on northern slopes of Alay Mountain ridge. The main source of water is thawing of glaciers and snowings.

4.4.3 Geological Characteristic of the Area

At the sites of Navoi St. Bridge construction, through Ak-Buura River, four wells of 12,0 meters in depth were drilled. The geological structure is presented by the following soil:

1. From an earth surface up to the depth of 3.3 meters, bulk pebble soil with a crushed stone inclusion by loamy filler lies.
2. Pebble soil with sandy filler with the maintenance of boulders to 25%-30%

Ak-Buura River bed is pebble by soil with sandy filler and with the consistence of boulders to 25%-30%.

The most ancient breeds in the surveyed area are the limestones of dark gray color, of carbonic age, which are opened on the left river bank of Ak-Buura River, stretched in the width direction; the layer width is more than 200 meters.

Directly on the site, the ground developed quaternary alluvial to proluvial deposits, presented by pebble and loamy soil. The laver of pebble soil is more than 5,0 m, loamy integumentary soil up to 3,0 m.

By seismic zoning districts of the Kyrgyz Republic territory, the surveyed site belongs to 9 ball seismic zone (Figure 4.4-2, SNiP KR 20-02:2009 Construction Norms and Regulations).

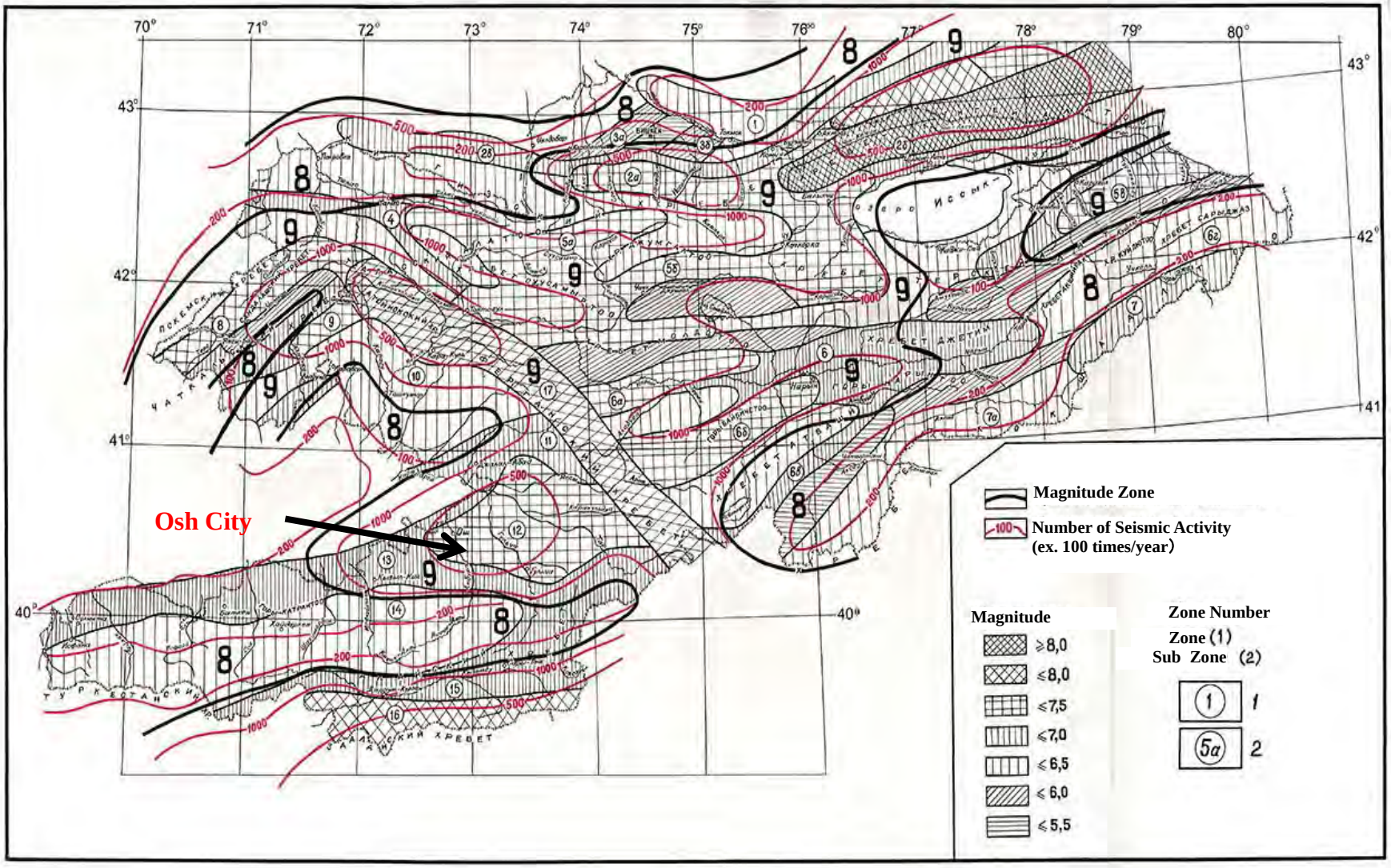


Figure 4.4-2 Map of Magnitude Zoning by Richter Scale, SNiP KR 20-02:2009

4.4.4 Soils and Vegetation

In the surveyed area, the gray soils of Turonian are mostly distributed in the western and southwest parts of Osh city and gray soils of dark Turonian are at the east and northeast parts of Osh city. Gray soils Turonian ordinary lay at the southern parts of Osh city, and the layer is 20-26 cm.

Decorative and fruit trees are widespread (poplar, willow, birch, apple-trees, pears, apricots, etc.).

On the irrigated and arable lands, the cotton breeding and grain is cultivated, long-term herbs are growing. Gardening, backyard farming, and cultivation of grapes are well developed.

Natural vegetation is mainly grassy; characteristic of the zone is as steppes. The soil layer is 10-20 cm.

CHAPTER 5 TRAFFIC SURVEYS IN OSH CITY

5.1 Introduction

Traffic surveys were conducted to determine the travel patterns within Osh City especially at the critical intersections, road sections, and bridges. The surveys also aim to establish the proportion of vehicles traveling through Osh City, as compared to those who are going to or coming from Osh City. Five types of surveys were conducted on regular weekdays from November 10 to 24, 2015 within and around Osh City. The surveys and their corresponding survey period are given as follows:

Table 5.1-1 Outline of Traffic Survey

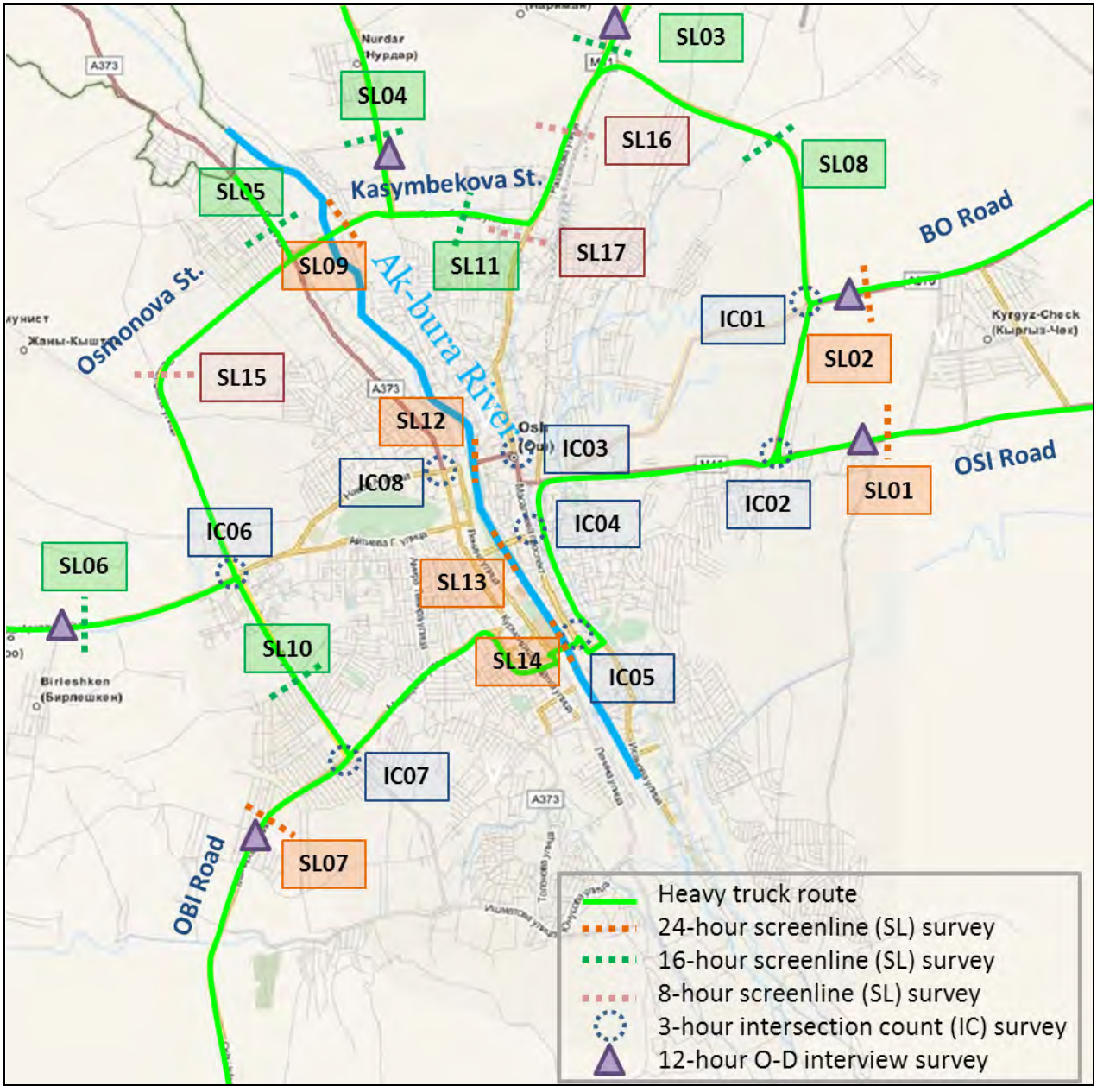
Survey Item	Methodology	Survey Duration/Location	Conducted by:
Screenline Survey	• 24-hour survey: automatic counting by using a thermal camera • 16 and 8-hour survey: manual counting by counters • Counting interval: 15 minutes • Vehicle classification 1) Sedan/Taxi/Van/Pickup 2) Light Truck (<2.0t, L:<5m) 3) Mid-size Truck (<14.0t, L:<9m) 4) Heavy Truck 5) Marshrutka (mini bus used as a public transport mode)/ Bus 6) Trolley Bus (if applicable)	1) 24-hour screenline survey (06:00 – 06:00): 7 locations 2) 16-hour screenline survey (06:00 – 22:00): 7 locations 3) 8-hour screenline survey (12:00 – 20:00): 3 locations	Local Consultant
Intersection Count Survey	• Manual counting at 3 and 4-leg intersections and 3-leg roundabouts • License plate survey at 4-leg roundabouts	1) AM peak (07:30-10:30) : 3 locations 2) PM peak (17:00-20:00): 5 locations Note: Survey duration was decided through the discussion with the road management department of Osh City	
OD Interview Survey	• Interview drivers about the origin, destination, trip purpose, type of commodity transported (for trucks) and travel time at roadside	• Survey duration: 7:00 – 19:00 • 6 locations Note: The actual sampling rate ranges from 3-7%, with an average of 5% while a sampling rate of 10% was initially targeted.	
Signal Phasing Survey	• Signal phasing • Split time • Signal cycle length	15 major intersections in Osh City Note: Only one pattern of signal phasing was observed at each traffic signal	JICA Study Team
Travel Time Survey	• Floating-car method: a surveyor in a test car recorded the travel times at the starting, ending, and intermediate points along the given route.	• 5 routes were selected among major roads, such as the ring roads and the permitted route for heavy trucks • A round trip/ a weekday (17:00～18:00)	

Source: JICA Survey Team

The forms used in the traffic surveys are given in Appendices A, B and C. The total vehicle traffic count data is also converted to passenger car unit (PCU) for each survey location. The

PCU values are based on SNiP 2.05.02-85 Automobile Roads (Kyrgyz Republic Construction Standards).

Figure 5.1-1 shows the location map of the surveys as well as the permitted route of heavy trucks within and around Osh City. All in all, there are 25 stations for the various surveys conducted for this study. Special attention was given to the roads comprising the heavy truck route, given that this route has international importance as a trunk line for goods transport and trade. Survey points (some screenline survey stations and all O-D stations) were also placed at the border of Osh City to establish the traffic volume and travel information of vehicles coming in and out of Osh City. Critical intersections and bridges within the city were also surveyed to examine the urban traffic flow.



Source: JICA Survey Team

Figure 5.1-1 Survey Location Map

Tables 5.1-2 and 5.1-3 outline the names of the survey stations and the corresponding survey type.

Table 5.1-2 Screenline Count and O-D Survey Locations

Station Code	Survey Location	Screenline count			O-D
		24h	16h	8h	
SL01	Osh-Sarytash-Irkeshtam (OSI) Road	✓			✓
SL02	Bishkek-Osh (BO) Road	✓			✓
SL03	Osh-Karasuu Road (around Nariman)		✓		✓
SL04	Airport Access Road		✓		✓
SL05	A373 (to Osh-Tashkent Road)		✓		
SL06	Osh-Aravan Road		✓		✓
SL07	Osh-Batken-Isfana (OBI) Road	✓			✓
SL08	North Bypass		✓		
SL09	Kasymbekova St. (between Osh-Tashkent Road and Airport Access Road)	✓			
SL10	Osmonova St. (between Osh-Aravan Road and OBI Road)		✓		
SL11	Kasymbekova St. (between Airport Access Road and M41)		✓		
SL12	Navoi St. Bridge	✓			
SL13	Abdukadirov St. Bridge	✓			
SL14	Nurmatov St. Bridge	✓			
SL15	Osmonova St. (between Osh-Tashkent Road and Osh-Aravan Road)			✓	
SL16	Razakova St. (between Bypass and Kasymbekova St.)			✓	
SL17	Razakova St. (around Manas-Ata near the intersection)			✓	

Source: JICA Survey Team

Table 5.1-3 Intersection Count Survey Locations

Station Code	Intersection Location	Type of Intersection	Survey period	
			AM peak	PM peak
IC01	BO Road / Bypass	three-leg, unsignalized intersection	✓	
IC02	OSI Road / Bypass	three-leg roundabout		✓
IC03	Alisher Navoi St. / Masalieva St.	four-leg, signalized intersection		✓
IC04	Abdukadirov St. / Masalieva St.	three-leg, signalized intersection		✓
IC05	Nurmatov St. corner Masalieva St.	three-leg roundabout		✓
IC06	Osmonova St. corner Osh-Aravan Road	four-leg roundabout	✓	
IC07	Osmonova St. corner OBI Road	four-leg roundabout		✓
IC08	Alisher Navoi St./Kurmanjan Datka St.	four-leg signalized intersection	✓	

Source: JICA Survey Team

5.2 Screenline Count Surveys

For the 8-hour and 16-hour screenline counts, surveyors manually counted and classified vehicles at designated road sections in both directions every 15 minutes with the aid of handheld counters. On the other hand, the 24-hour screenline count surveys were conducted using a thermal camera (FLIR Thermicam) that automatically counts and classifies vehicles. The device, set-up, and software used are shown in Figure 5.2-1.

Source: JICA Survey Team

Figure 5.2-1 24-Hour Screenline Survey Using a Thermal Camera

Table 5.2-1 presents the vehicle count according to classes, as well as the total number of vehicles and PCU. All 8-hour and 16-hour screenline counts were expanded to 24-hour counts using adjustment factors based on the data at the nearest 24-hour screenline survey station.

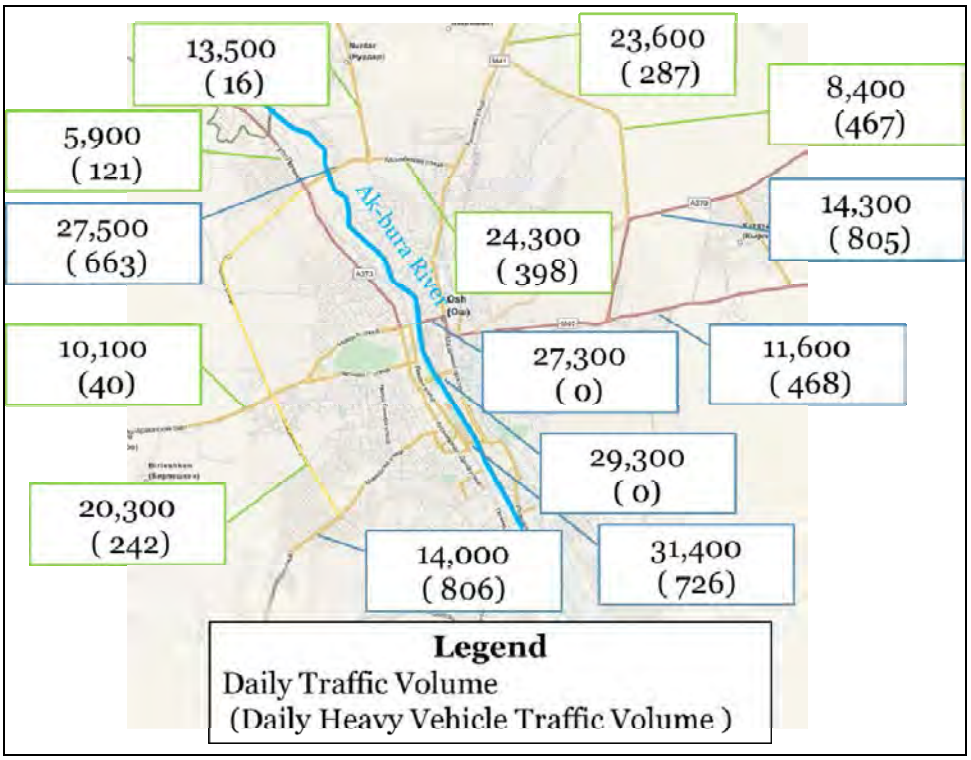
It can be seen from Table 5.2-1 that sedan, taxi, pickups and vans comprise the highest traffic volume for all roads. Marshrutkas and light trucks also have significant traffic volume for most roads. Nurmatov St. Bridge was also found to have the highest traffic volume among all the roads surveyed. However, this bridge only has one lane in each direction, indicating that the capacity may not be adequate for the present and future traffic demand. Meanwhile, the two other bridges surveyed (which both have two lanes in each direction) have lower traffic volume. Other roads with significant traffic volume are Razakova St., Kasymbekova St. and Osh-Karasuu Road.

Table 5.2-1 Results of the Screenline Count Surveys

Station Code	Location	Survey Period (hours)	Vehicle Classes					Total		(Adjusted) 24-hour Total	
			Sedan, Taxi, Pickup/Van	Light Truck (<2.0t, L:<5m)	Mid-size Truck (<14.0t, L:<9m)	Heavy Truck	Marshrutka / Bus	vehicles	PCU	vehicles	PCU
SL01	OSI Road	24	8,833	1,162	544	468	632	11,639	13,471	11,639	13,471
SL02	BO Road	24	10,034	1,255	650	805	1,534	14,278	17,157	14,278	17,157
SL03	Osh-Karasuu Road	16	17,979	1,860	207	241	438	20,725	22,034	23,572	26,720
SL04	Airport Access Road	16	10,664	1,055	97	15	668	12,499	13,186	13,515	15,479
SL05	Osh-Tashkent Road	16	3,945	404	114	109	850	5,422	6,160	5,852	7,433
SL06	Osh-Aravan Road	16	7,897	783	107	36	560	9,383	9,989	10,142	11,733
SL07	OBI Road	24	10,175	1,168	656	806	1,164	13,969	16,680	13,969	16,680
SL08	North Bypass	16	5,261	960	470	393	262	7,346	8,783	8,396	10,813
SL09	Kasymbekova St. (1)	24	20,164	2,463	1,142	663	3,108	27,540	31,563	27,540	31,563
SL10	Osmonova St. (1)	16	15,010	1,321	601	205	1,686	18,823	20,723	20,297	24,759
SL11	Kasymbekova St. (2)	16	17,773	1,557	554	362	2,259	22,505	24,934	24,308	29,372
SL12	Navoi St. Bridge	24	22,763	861	172	-	3,488	27,284	29,075	27,284	29,075
SL13	Abdukadirov St. Bridge	24	23,113	1,712	333	-	4,182	29,340	31,793	29,340	31,793
SL14	Nurmatov St. Bridge	24	23,892	2,247	822	726	3,686	31,373	35,413	31,373	35,413
SL15	Osmonova St. (2)	8	4,973	578	240	158	288	6,237	6,986	10,483	11,742
SL16	Razakova St. (1)	8	10,141	928	364	177	600	12,210	13,321	20,521	22,388
SL17	Razakova St. (2)	8	12,386	567	208	42	1,849	15,052	16,472	25,298	27,684

Source: JICA Survey Team

Figure 5.2-2 shows the traffic volume at the screenline for all vehicles and heavy trucks. It was found that a total of 1,389 heavy trucks cross Ak-Buura River in 24 hours using the bridges at the northern and southern part of the river (Nurmatov St. Bridge and Kasymbekova St. Bridge). The roads with significant heavy truck volume are BO Road, OBI Road, Nurmatov St. and Kasymbekova St.

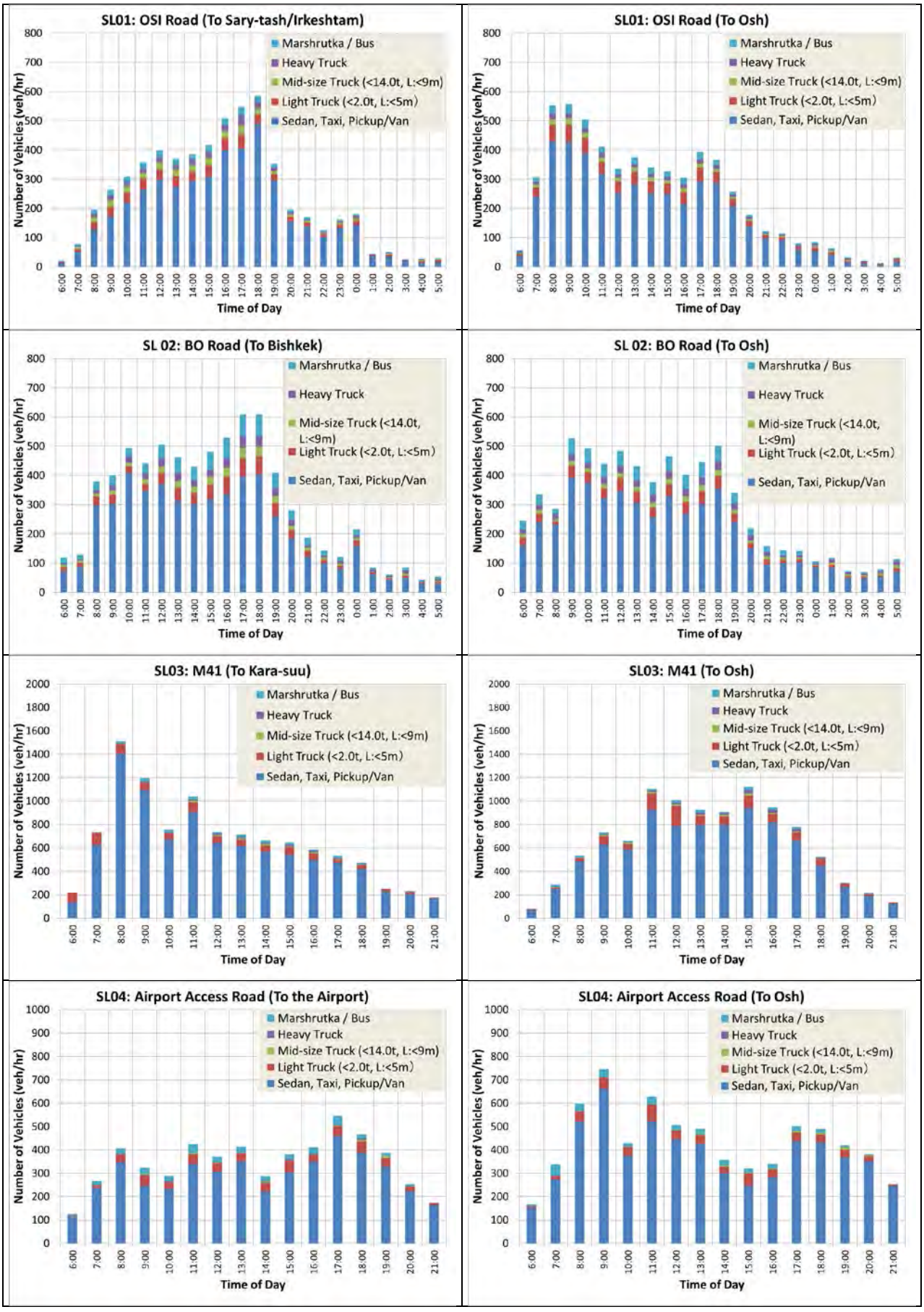


Source: JICA Survey Team

Figure 5.2-2 Traffic Volume at Screenline (Total and Heavy Truck)

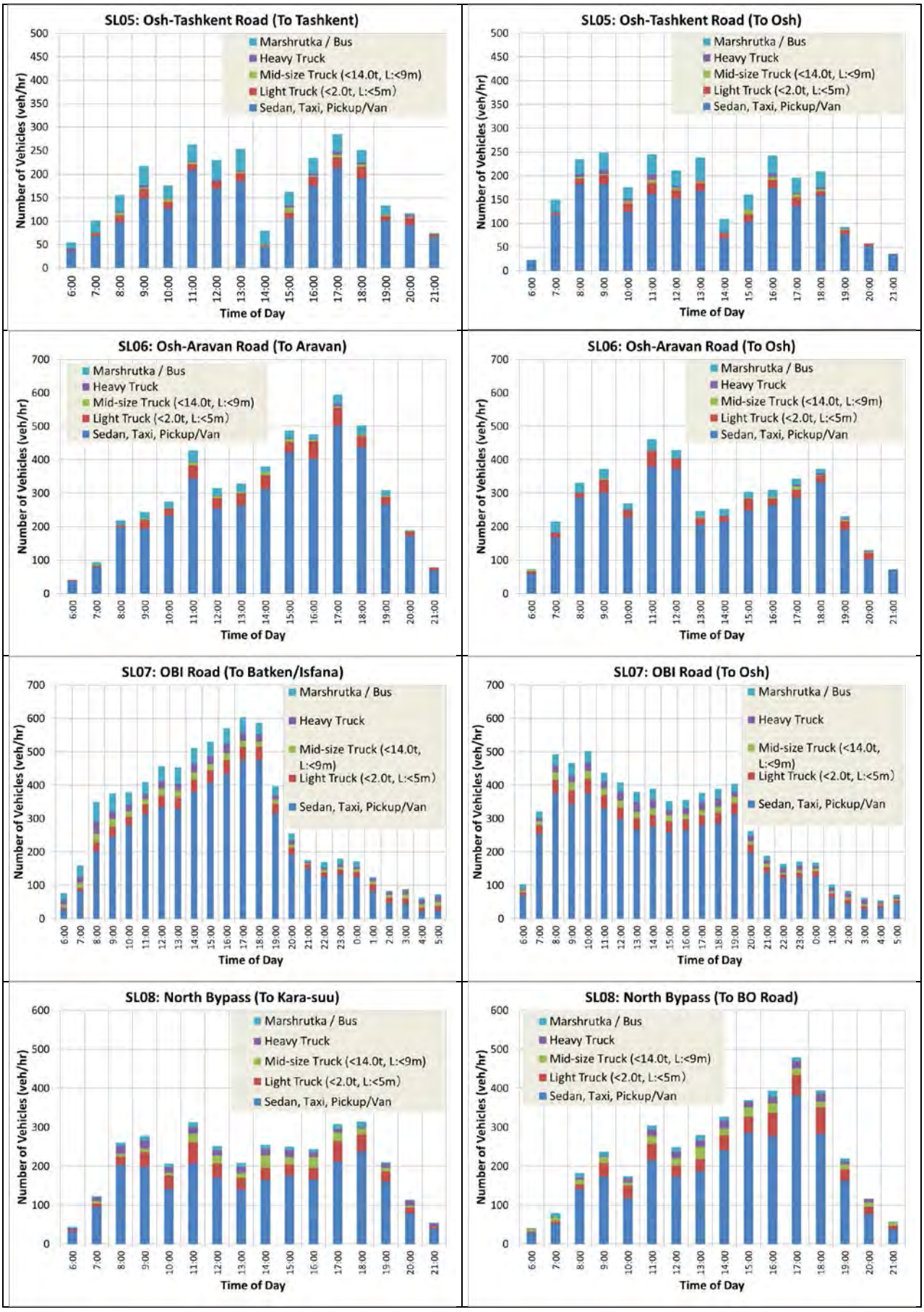
The following graphs in Figures 5.2-3 to 5.2-7 present the hourly traffic volume according to vehicle class and direction. It can be seen in the graphs that there is a distinct evening peak in the outbound direction for the following roads: BO Road (to Bishkek), OSI Road (to Sarytash/Irkeshtam), Osh-Aravan Road (to Aravan), OBI Road (to Batken/Isfana), Kasymbekova St. (to Osh-Tashkent Road) and Osmonova St. (southbound direction). On the other hand, a pronounced morning peak occurs for M41 Osh-Karasuu Road (to Karasuu), OBI Road (to Osh) and the Airport Access Road (to Osh). In addition, there seems to be considerable traffic volume during the daytime until the early evening for the bridges within the city (i.e. Navoi, Abdukadirov and Nurmatov St. Bridges), with slight peaks occurring during the morning and evening peak hours.

The results of the 24-hour survey indicate that traffic volume starts increasing at around 6:00, reaches a peak between 8:00 and 10:00, reduces slightly around late morning and mid-afternoon and experiences another peak between 16:00 and 19:00, then starts reducing at around 20:00 and becomes minimal past midnight until 5:00 am.



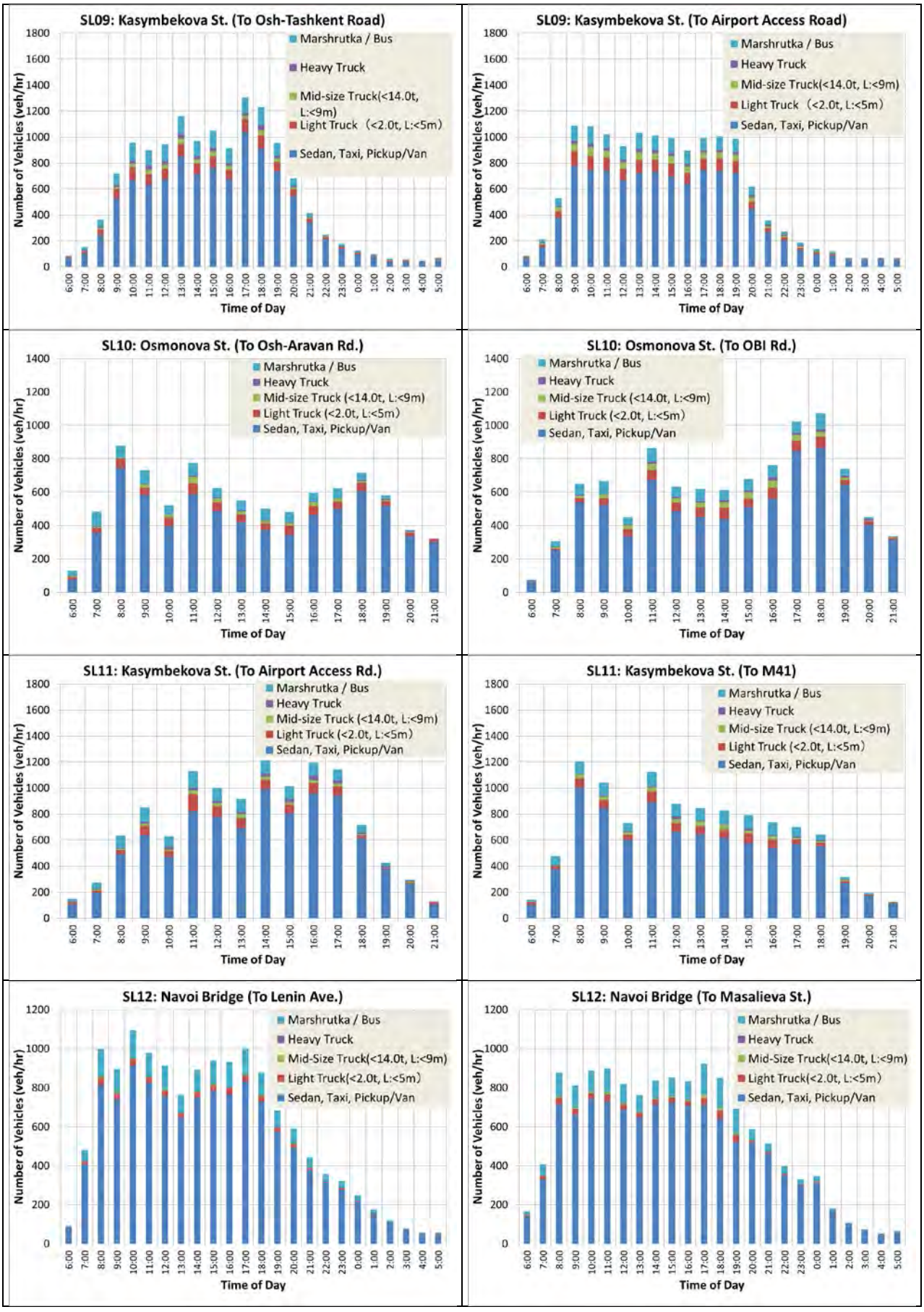
Source: JICA Survey Team

Figure 5.2-3 Hourly Screenline Survey Results according to Vehicle Class (1)



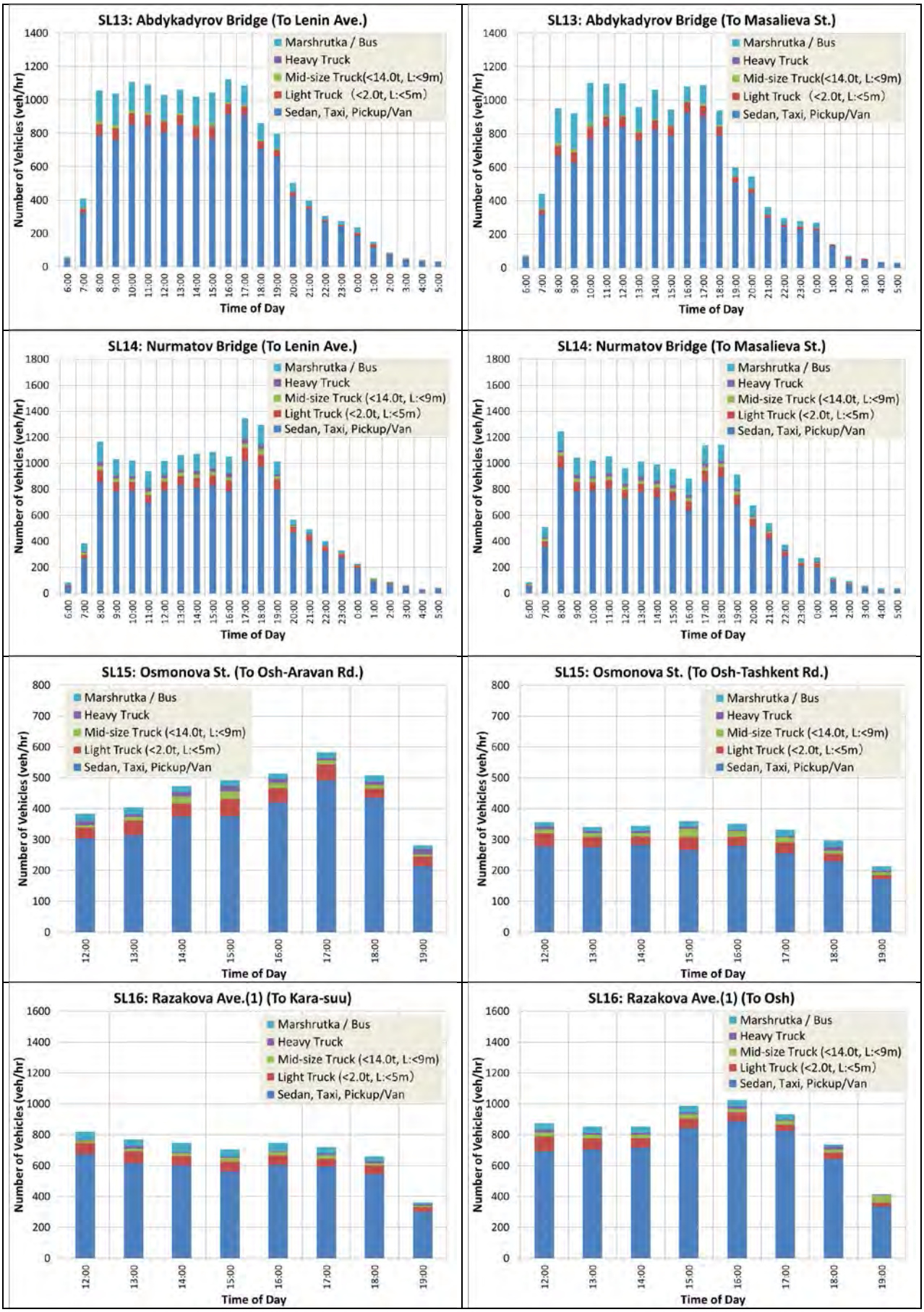
Source: JICA Survey Team

Figure 5.2-4 Hourly Screenline Survey Results according to Vehicle Class (2)



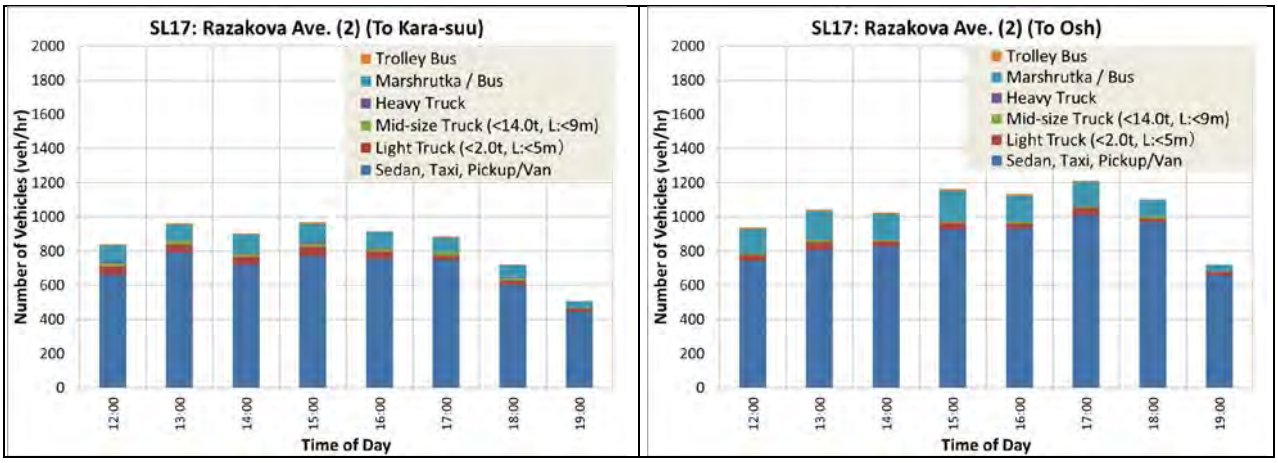
Source: JICA Survey Team

Figure 5.2-5 Hourly Screenline Survey Results according to Vehicle Class (3)



Source: JICA Survey Team

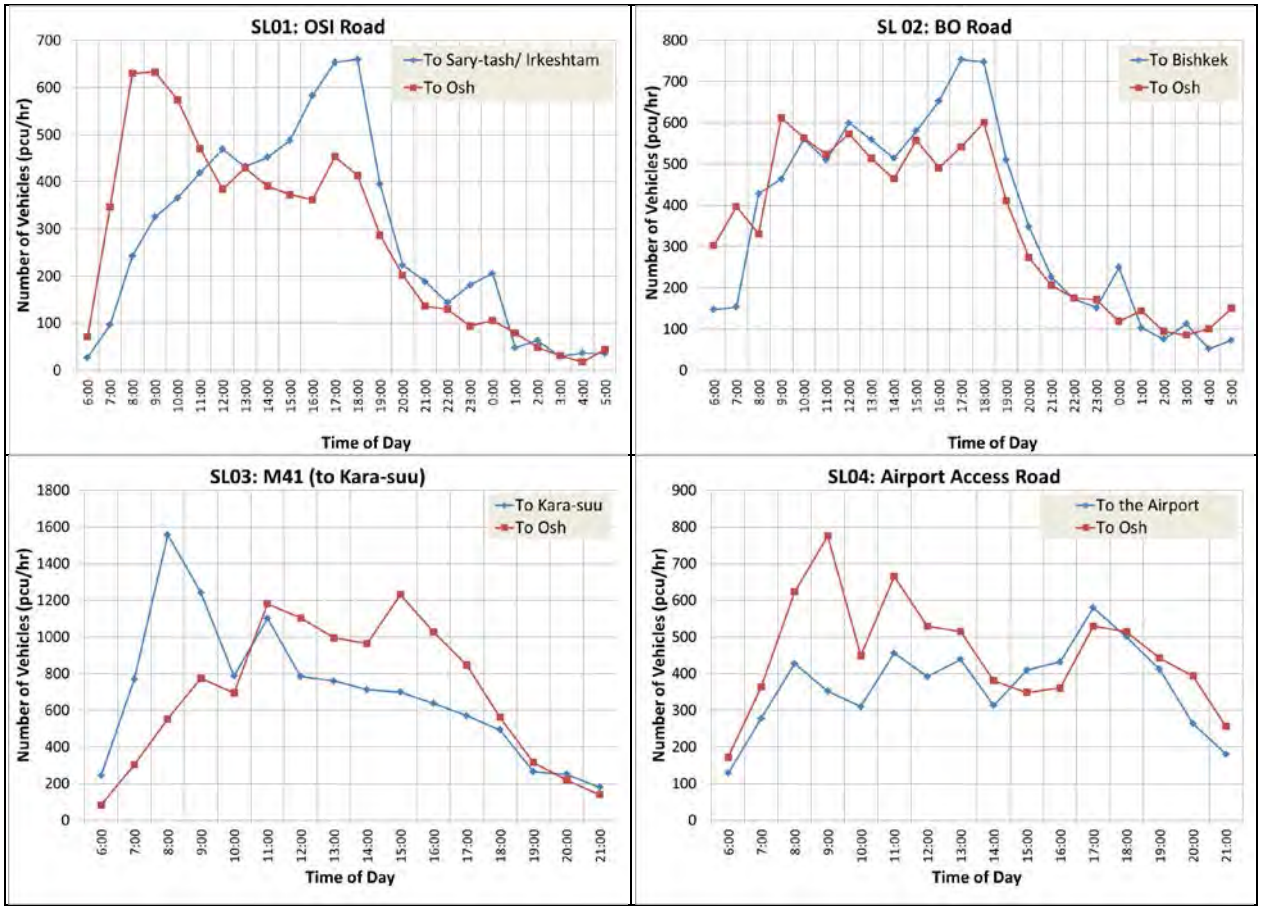
Figure 5.2-6 Hourly Screenline Survey Results according to Vehicle Class (4)



Source: JICA Survey Team

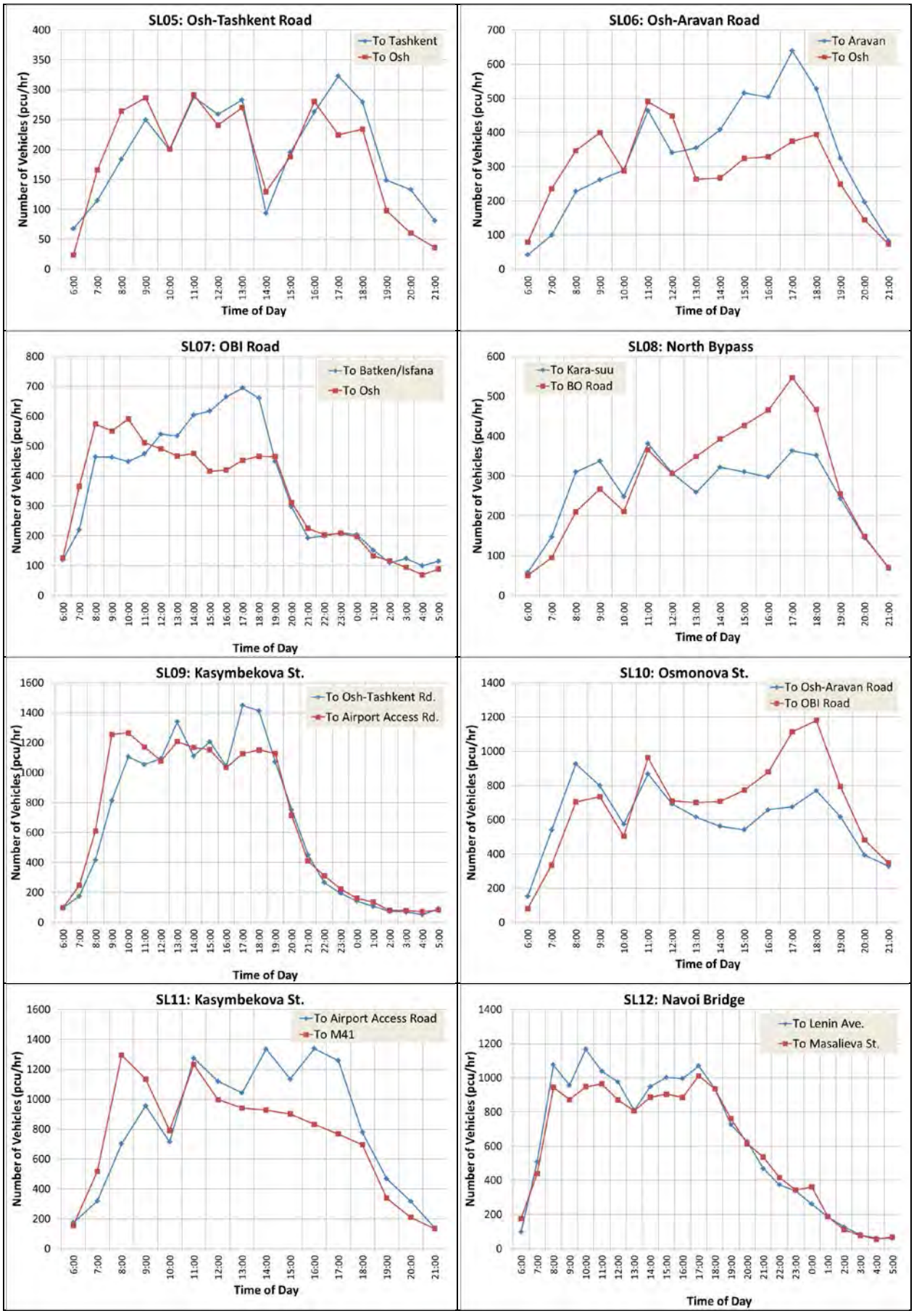
Figure 5.2-7 Hourly Screenline Survey Results according to Vehicle Class (5)

The traffic volume in passenger car units (PCU) was also computed for all screenline count surveys. The following graphs in Figures 5.2-8 to 5.2-10 shows the hourly trend of PCU according to direction. It can be seen that some roads have opposite peak periods (e.g. OSI Road, M41 Osh-Karasuu Road and OBI Road), almost the same patterns (Navoi St. Bridge, Abdukadirov St. Bridge and Nurmatov St. Bridge), or higher volume in one direction (e.g. Razakova St.).



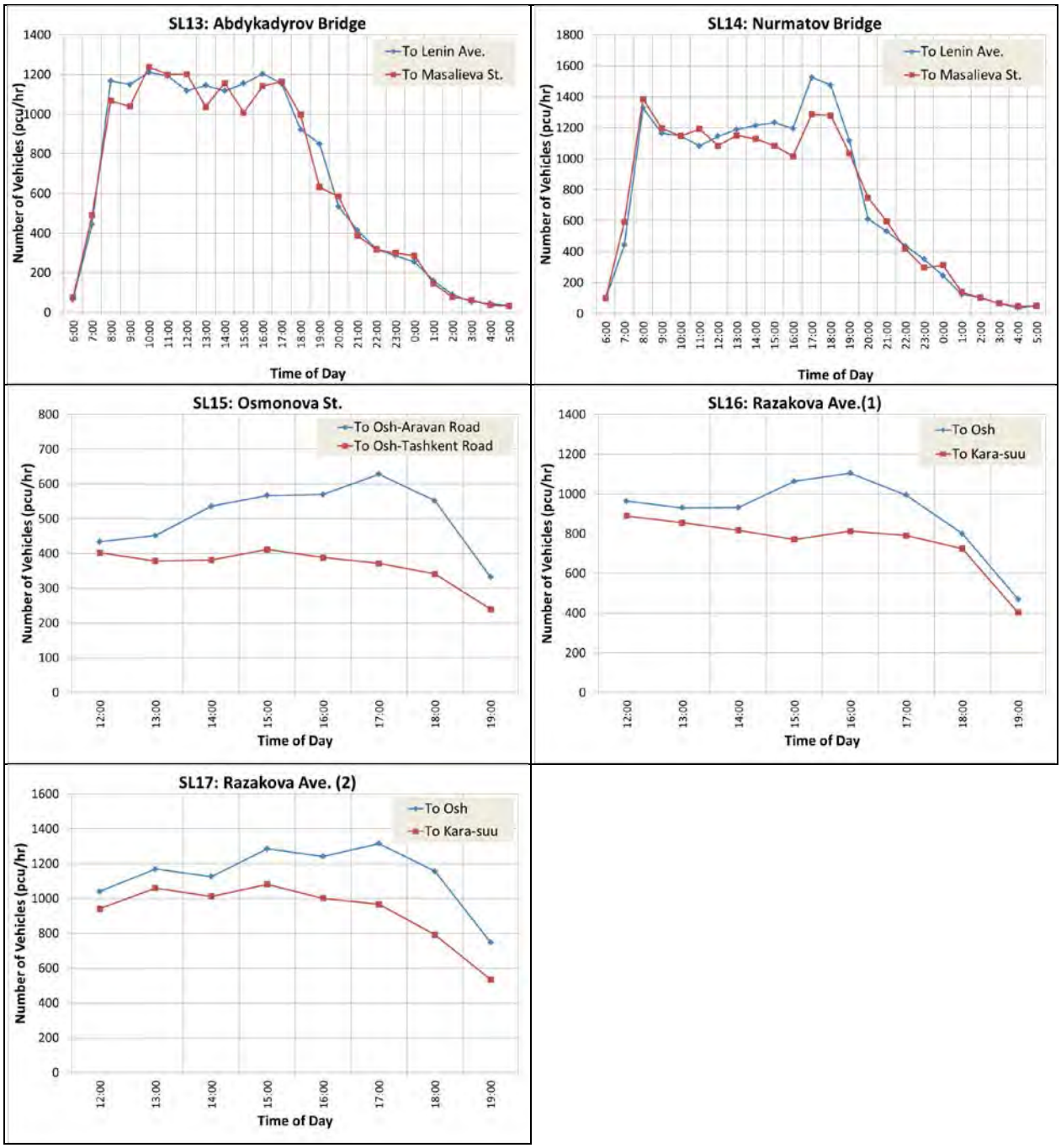
Source: JICA Survey Team

Figure 5.2-8 Hourly Screenline Survey Results in Passenger Car Unit (PCU) (1)



Source: JICA Survey Team

Figure 5.2-9 Hourly Screenline Survey Results in Passenger Car Unit (PCU) (2)



Source: JICA Survey Team

Figure 5.2-10 Hourly Screenline Survey Results in Passenger Car Unit (PCU) (3)

5.3 Intersection Count Surveys

The intersection survey is composed of three parts: (1) vehicle traffic count; (2) pedestrian traffic count; and (3) queue length measurement. The vehicle and pedestrian counts and queue length measurements were recorded at 15-minute intervals for the survey period.

5.3.1 Vehicle and Pedestrian Traffic Count

For regular intersections and 3-leg roundabout intersections, vehicles were counted and classified in three directions (left turn, through and right turn) for four-leg intersections and in two directions for three-leg intersections. For four-leg roundabout intersections, vehicle number plate survey was used, wherein the number plate and class of each vehicle is recorded for all legs of the intersection and then matched afterward. The number of pedestrians crossing each leg of the intersection was also recorded.

The results for the 3-hour peak period and peak hour are shown for the eight intersections surveyed are shown in Figures 5.3-1 to 5.3-10.

1) IC01: BO Road/ Bypass

The evening peak hour for this intersection occurs between 17:15 to 18:15, wherein most vehicles turn right onto BO Road. It was also found that there are no pedestrians at this intersection.

IC01 (BO Road/Bypass)

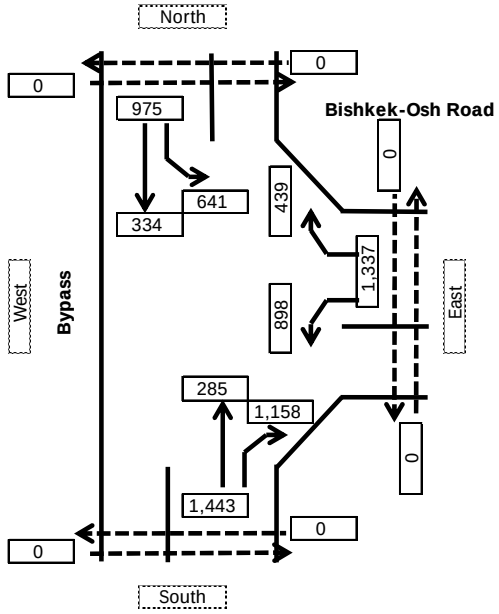
Evening Peak 17:00 ~ 20:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		641	334	-	975
	E	439		898	-	1,337
	S	285	1,158		-	1,443
	W	-	-	-		0
	Total	724	1,799	1,232	0	3,755

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		0		0	0
	SE	0		0		0
	SW		0		0	0
	NW	0		0		0
	Total	0	0	0	0	0



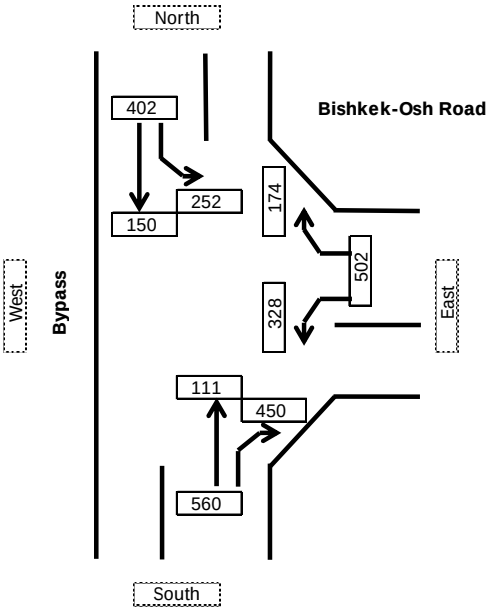
Evening Peak Hour 17:15 ~ 18:15

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		252	150	-	402
	E	174		328	-	502
	S	111	450		-	560
	W	-	-	-		0
	Total	285	702	477	0	1,465

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		0		0	0
	SE	0				0
	SW		0		0	0
	NW	0		0		0
	Total	0	0	0	0	0



Source: JICA Survey Team

Figure 5.3-1 Schematic Diagram for Traffic Flow at IC 01

2) IC02: OSI Road/ Bypass

The results for this intersection show the major traffic movement is from the west to the east along OSI Road (towards Sarytash/Irkeshtam) as well as turning left from OSI Road to the Bypass.

IC02 (OSI Road/Bypass)

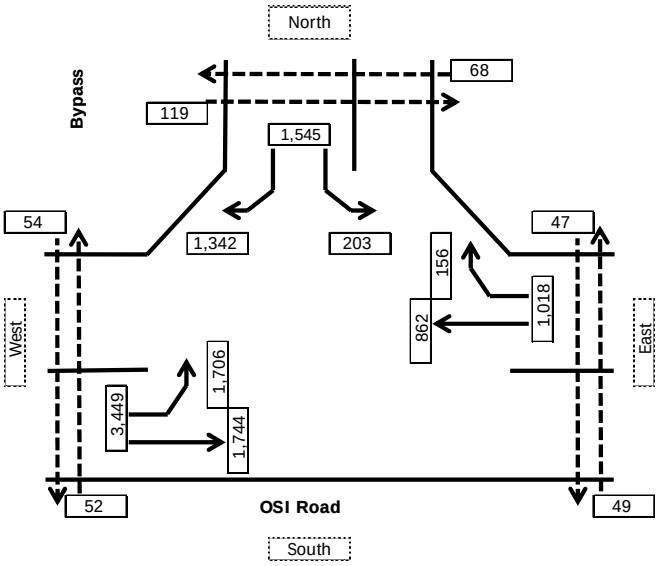
Evening Peak 17:00 ~ 20:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		203	-	1,342	1,545
	E	156		-	862	1,018
	S	-	-		-	-
	W	1,706	1,744	-		3,449
	Total	1,862	1,946	-	2,204	6,012

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NW		47		68	115
	SE	49		-		49
	SW		-		52	52
	NW	119		54		173
	Total	168	47	54	120	389



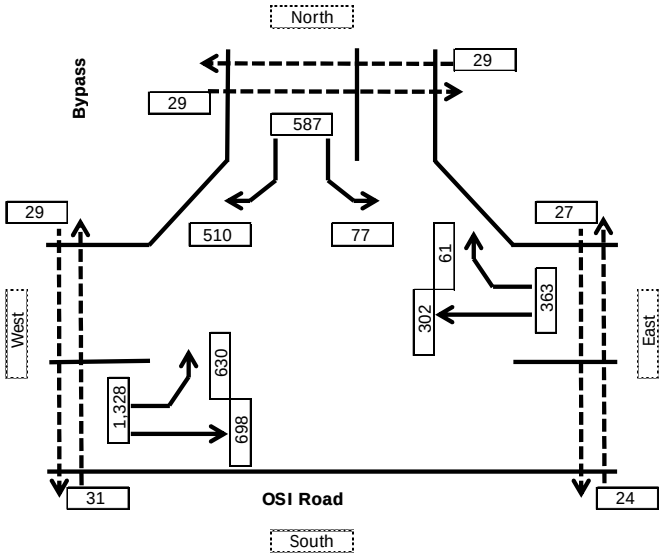
Evening Peak Hour 17:45 ~ 18:45

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		77	-	510	587
	E	61		-	302	363
	S	-	-		-	-
	W	630	698	-		1,328
	Total	691	775	-	812	2,278

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NW		27		29	56
	SE	24		-		24
	SW		-		31	31
	NW	29		29		58
	Total	53	27	29	60	169



Source: JICA Survey Team

Figure 5.3-2 Schematic Diagram for Traffic Flow at IC 02

3) IC03: Alisher Navoi St./ Masalieva St.

It was found for this intersection that Masalieva St. (north leg) has the highest traffic volume. The major traffic movements are along Masalieva St. (towards north and south direction).

All in all, this intersection has the highest vehicle traffic volume in the morning peak period. It also has the highest pedestrian count, given that there are a university and a bazaar in the vicinity.

IC03 (Alisher Navoi St./Masalieva St.)

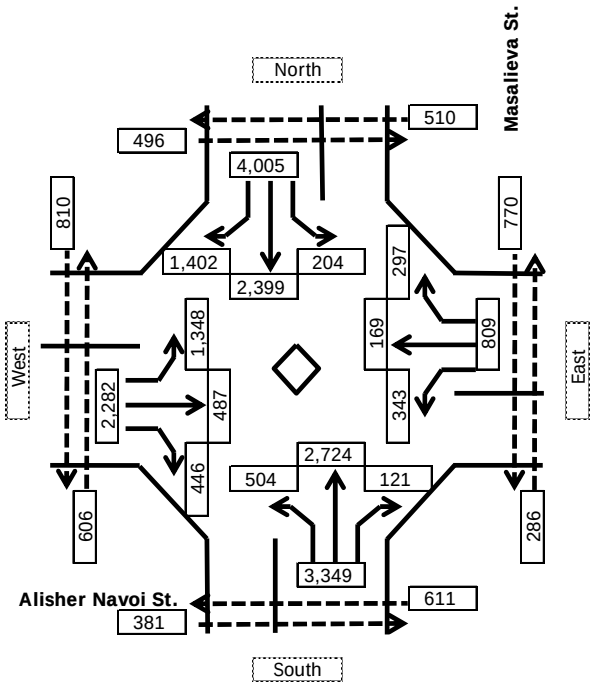
Morning Peak 7:30 ~ 10:30

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		204	2,399	1,402	4,005
	E	297		343	169	809
	S	2,724	121		504	3,349
	W	1,348	487	446		2,282
	Total	4,369	811	3,188	2,075	10,444

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		770		510	1,280
	SE	286		611		897
	SW		381		606	987
	NW	496		810		1,306
	Total	782	1,151	1,421	1,116	4,470



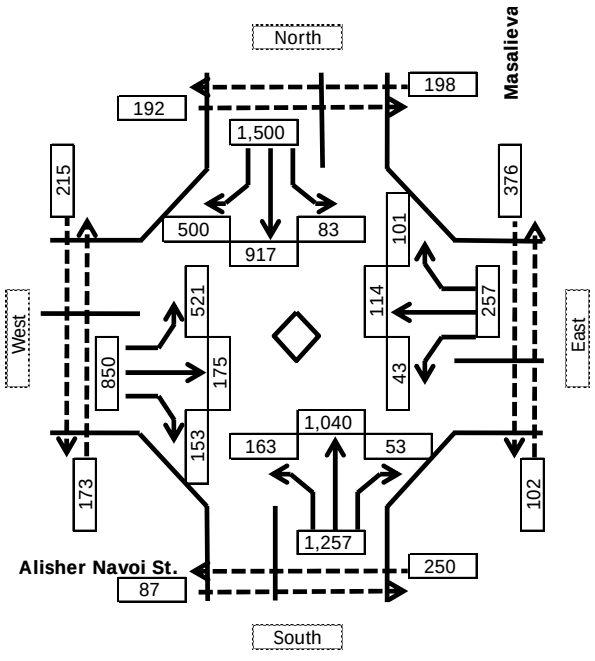
Morning Peak Hour 8:15 ~ 9:15

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		83	917	500	1,500
	E	101		43	114	257
	S	1,040	53		163	1,257
	W	521	175	153		850
	Total	1,662	312	1,113	777	3,864

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		376		198	574
	SE	102		250		352
	SW		87		173	260
	NW	192		215		407
	Total	294	463	465	371	1,593



Source: JICA Survey Team

Figure 5.3-3 Schematic Diagram for Traffic Flow at IC 03

4) IC04: Abdukadirov St. / Masalieva St.

Vehicles turning right from Masalieva St. (north) to Abdukadirov St. as well as vehicles turning left from Abdukadirov St. to Masalieva St. were found to have the highest traffic volume for this intersection.

IC04 (Abdykadyrov St./Masalieva St.)

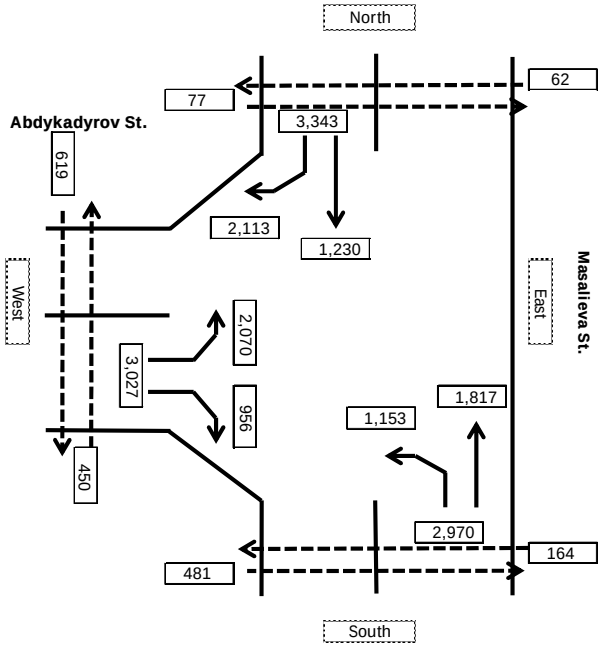
Morning Peak 7:30 ~ 10:30

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		–	1,230	2,113	3,343
	E	–		-	-	-
	S	1,817	-		1,153	2,970
	W	2,070	-	956		3,027
	Total	3,887	-	2,187	3,266	9,339

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		-		77	77
	SE	-		481		481
	SW		164		450	614
	NW	62		619		681
	Total	62	164	1,100	527	1,853



IC04 (Abdykadyrov St./Masalieva St.)

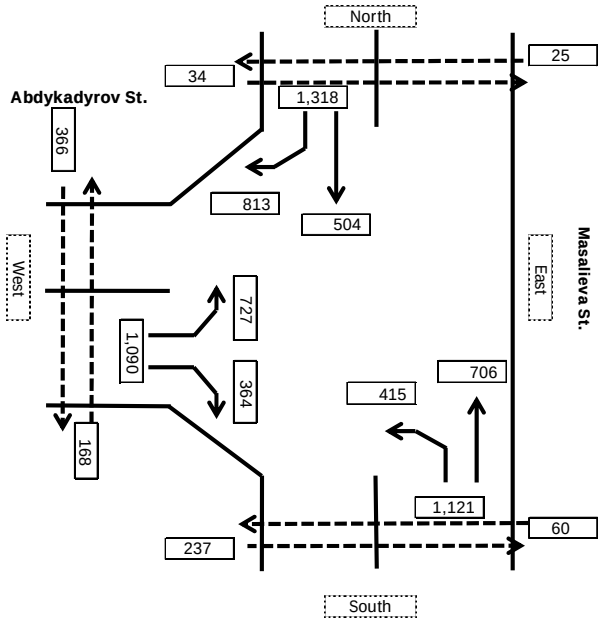
Morning Peak Hour 8:15 ~ 9:15

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		-	504	813	1,318
	E	-		-	-	-
	S	706	-		415	1,121
	W	727	-	364		1,090
	Total	1,432	-	868	1,228	3,528

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		-		34	34
	SE	-		237		237
	SW		60		168	228
	NW	25		366		391
	Total	25	60	603	202	890



Source: JICA Survey Team

Figure 5.3-4 Schematic Diagram for Traffic Flow at IC 04

5) IC05: Nurmatov St. / Masalieva St.

The major traffic movement at this 3-leg roundabout is left turns from Masalieva St. to Nurmatov St. and vehicle traffic originating from Nurmatov St. is also considerable high in volume.

IC05 (Gen. Nurmatov St./Masalieva St.)

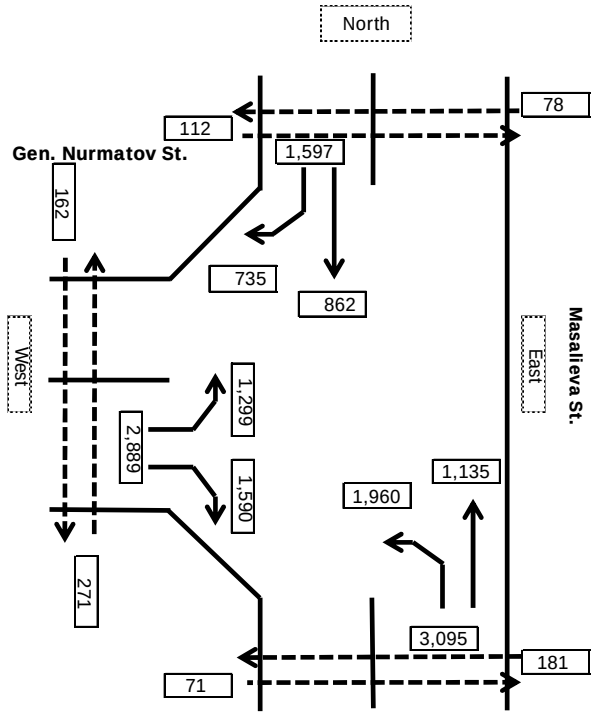
Morning Peak 7:30 ~ 10:30

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		-	862	735	1,597
	E	-		-	-	-
	S	1,135	-		1,960	3,095
	W	1,299	-	1,590		2,889
	Total	2,434	-	2,452	2,695	7,581

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		-		112	112
	SE	-		71		71
	SW		181		271	452
	NW	78		162		240
	Total	78	181	233	383	875



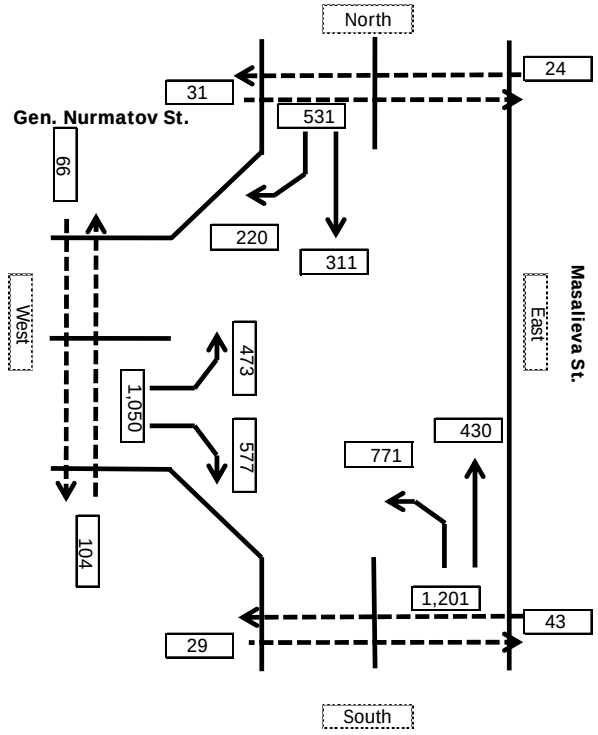
Morning Peak Hour 8:00 ~ 9:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		-	311	220	531
	E	-		-	-	-
	S	430	-		771	1,201
	W	473	-	577		1,050
	Total	903	-	888	991	2,782

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		-		31	31
	SE	-		29		29
	SW		43		104	147
	NW	24		66		90
	Total	24	43	95	135	297



Source: JICA Survey Team

Figure 5.3-5 Schematic Diagram for Traffic Flow at Roundabout IC 05

6) IC08: Alisher Navoi St. / Kurmanjan DatkaSt.

A significant number of vehicles head towards the southern part of Kurmanjan Datka (through and left turn), which is one-way for this portion. The peak hour occurs later in the morning compared to other intersections surveyed within the city.

IC08 (Alisher Navoi St./Kurmanjan-Datka St.)

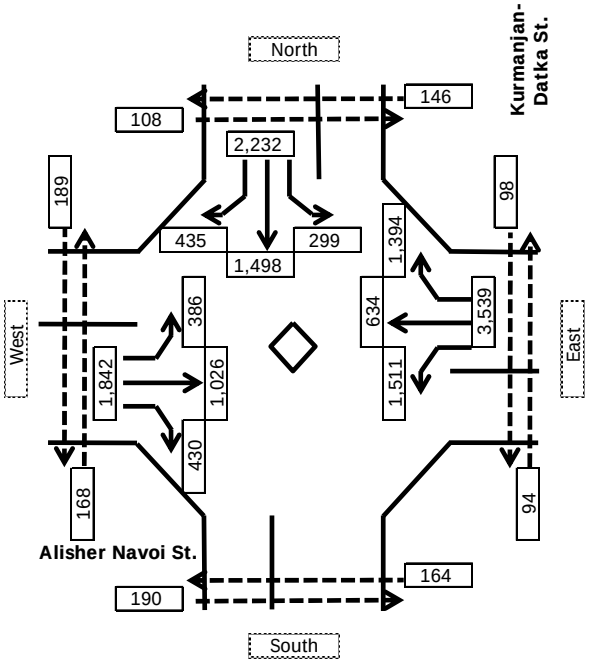
Morning Peak 7:30 ~ 10:30

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		299	1,498	435	2,232
	E	1,394		1,511	634	3,539
	S	-	-		-	0
	W	386	1,026	430		1,842
	Total	1,780	1,326	3,439	1,069	7,614

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		98		146	244
	SE	94		164		258
	SW		190		168	358
	NW	108		189		297
	Total	202	288	353	314	1,157



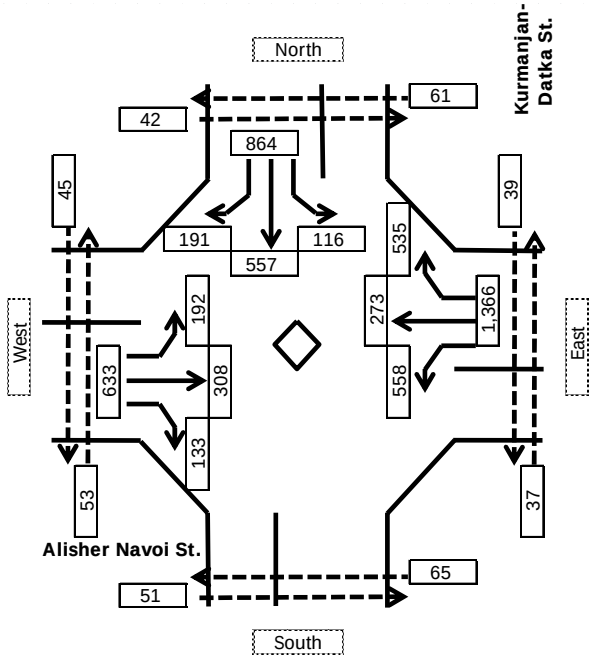
Morning Peak Hour 9:30 ~ 10:30

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		116	557	191	864
	E	535		558	273	1,366
	S	0	0		0	0
	W	192	308	133		633
	Total	728	424	1,247	465	2,864

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		39		61	100
	SE	37		65		102
	SW		51		53	104
	NW	42		45		87
	Total	79	90	110	114	393



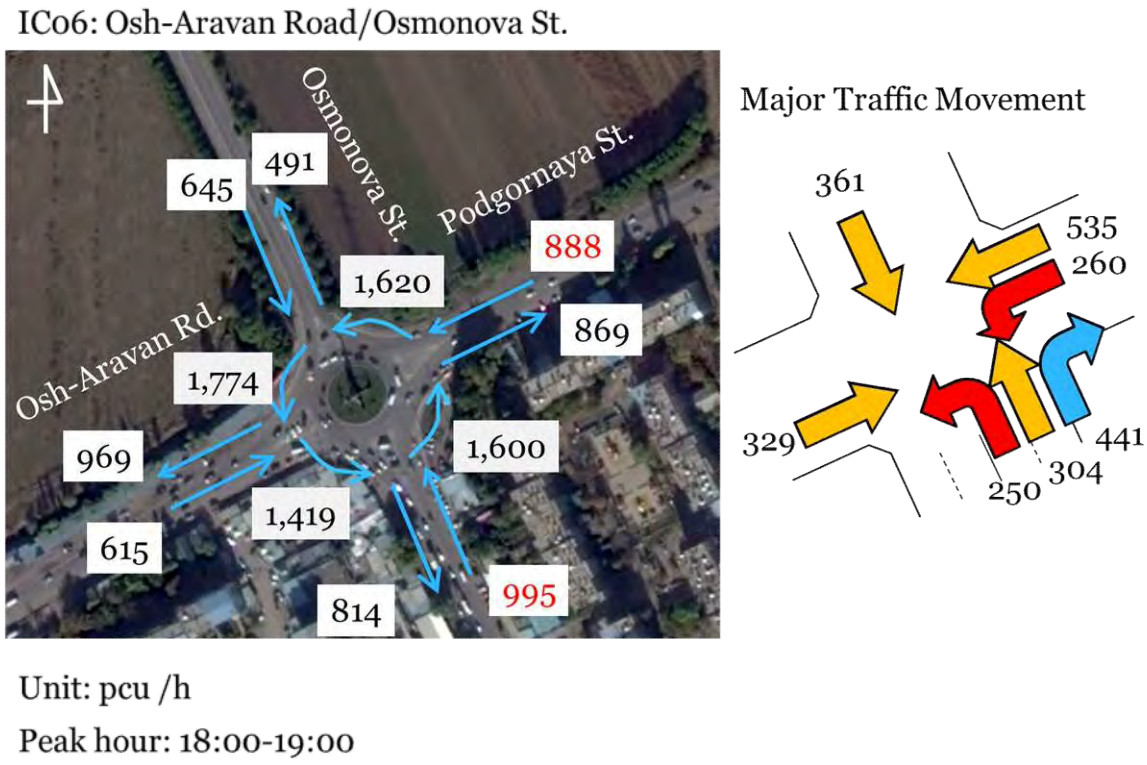
Source: JICA Survey Team

Figure 5.3-6 Schematic Diagram for Traffic Flow at IC 08

7) IC06 & 07: 4-leg Roundabouts

Additional analysis is made for the 4-leg roundabout intersections (IC06 and IC07) to determine the traffic volume at the roundabout itself.

The peak hour of IC 06 within the evening peak period was found to be from 18:00 to 19:00. The most congested part of the roundabout is at the northwest quadrant with 1,774 PCU/h, which is a result of the major traffic movement characteristics at the intersection, as seen in Figure 5.3-7. The main entry points for vehicles are Osmonova St. (south) and Podgornaya St. while the main exit point is Osh-Aravan Road. The straight direction is significant for all intersection legs, with the traffic movement from Podgornaya St. to Osh-Aravan Road having the highest traffic volume.



Source: JICA Survey Team

Figure 5.3-7 Circular Traffic Flow and Major Traffic Movement at Roundabout IC 06

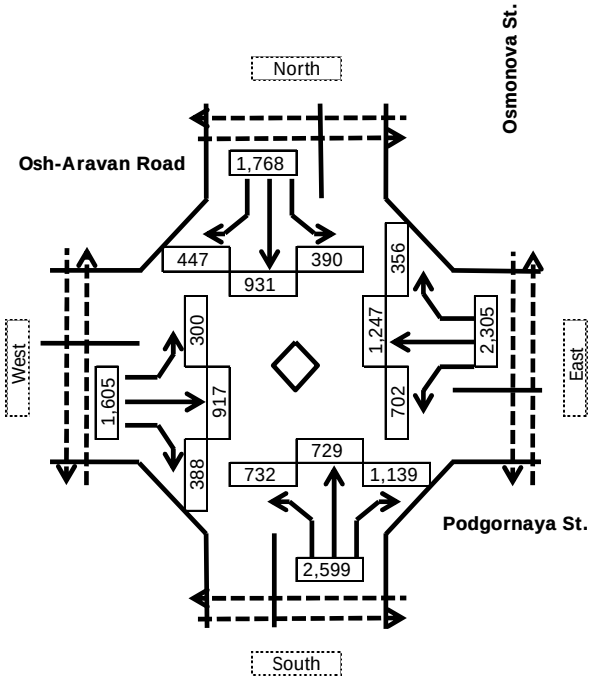
IC06 (Osh-Aravan Road/Osmonova St.)

Evening Peak 17:00 ~ 20:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		390	931	447	1,768
	E	356		702	1,247	2,305
	S	729	1,139		732	2,599
	W	300	917	388		1,605
	Total	1,385	2,445	2,022	2,426	8,278

*Pedestrian count survey was not conducted for this intersection

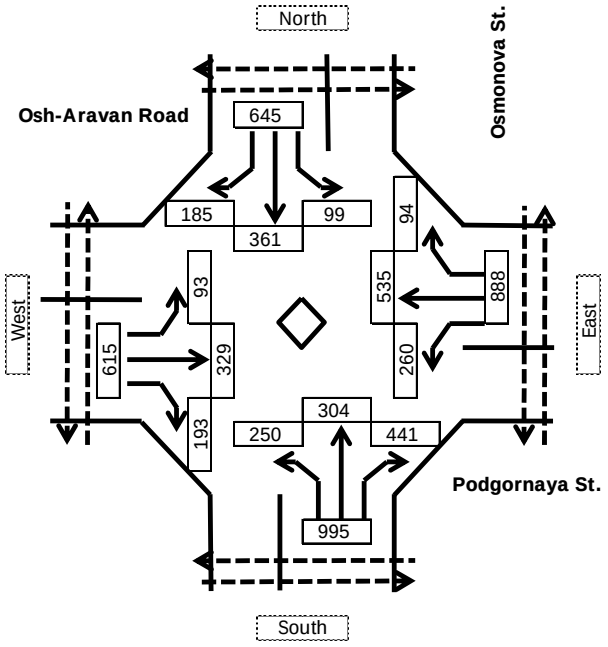


Evening Peak Hour 18:00 ~ 19:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		99	361	185	645
	E	94		260	535	888
	S	304	441		250	995
	W	93	329	193		615
	Total	491	869	814	969	3,143

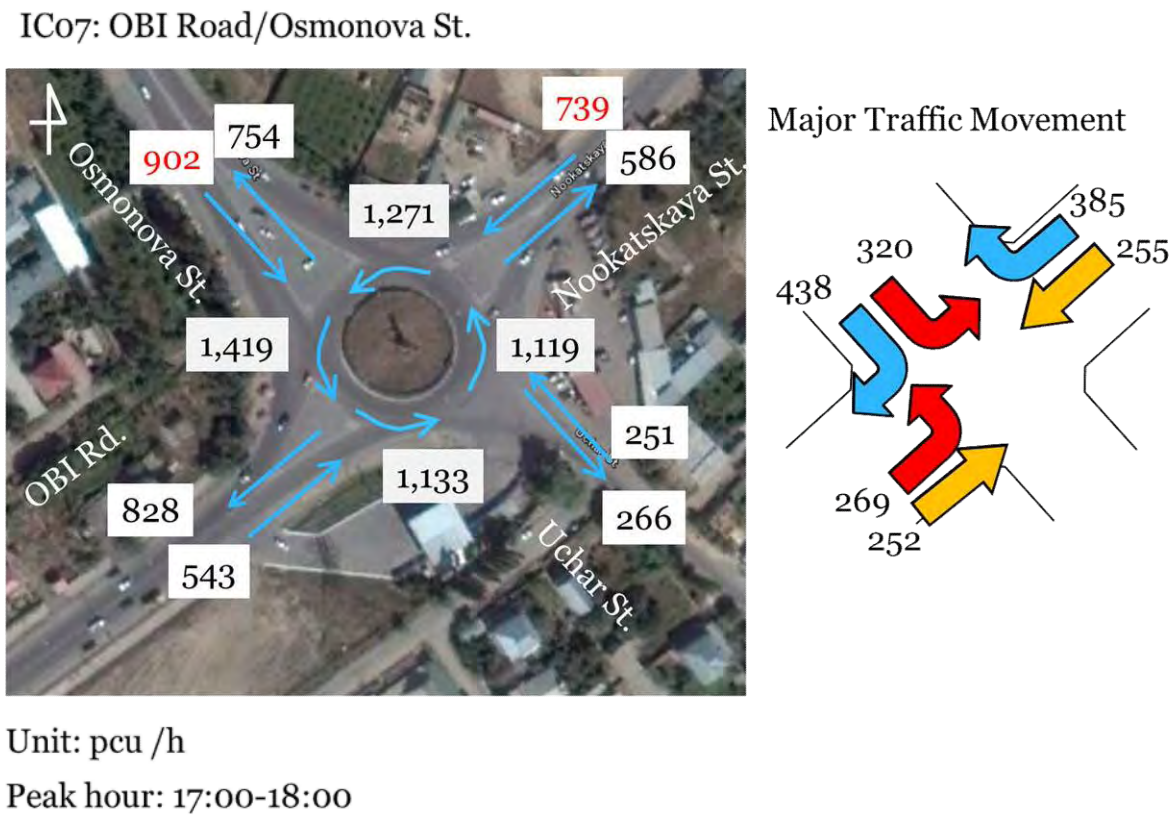
*Pedestrian count survey was not conducted for this intersection



Source: JICA Survey Team

Figure 5.3-8 Schematic Diagram for Traffic Flow at IC 06 (Roundabout)

The peak hour of IC 07 during the evening peak period was found to be from 17:00 to 18:00. The most congested part of the roundabout is at the northwest quadrant with 1,405 PCU/h, which is a result of the traffic movement characteristics at the intersection.



Source: JICA Survey Team

Figure 5.3-9 Circular Traffic Flow and Major Traffic Movement at Roundabout IC 07

IC07 (OBI Road/Osmonova St.)

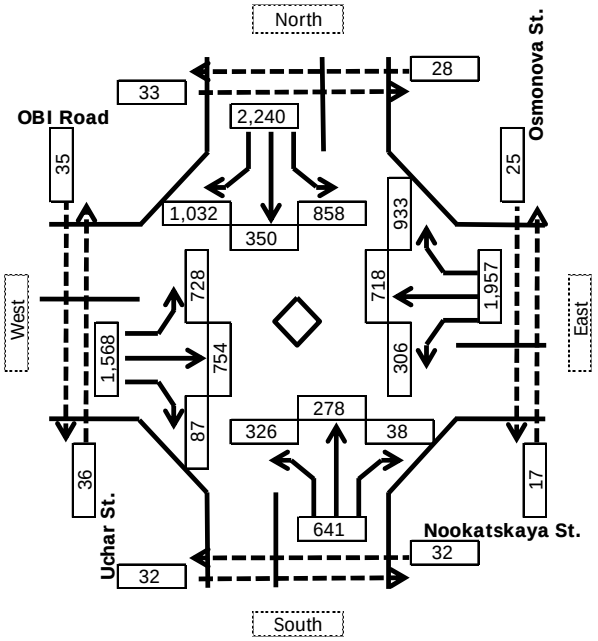
Evening Peak 17:00 ~ 20:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		858	350	1,032	2,240
	E	933		306	718	1,957
	S	278	38		326	641
	W	728	754	87		1,568
	Total	1,938	1,650	742	2,076	6,406

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		25		28	53
	SE	17		32		49
	SW		32		36	68
	NW	33		35		68
	Total	50	57	67	64	238



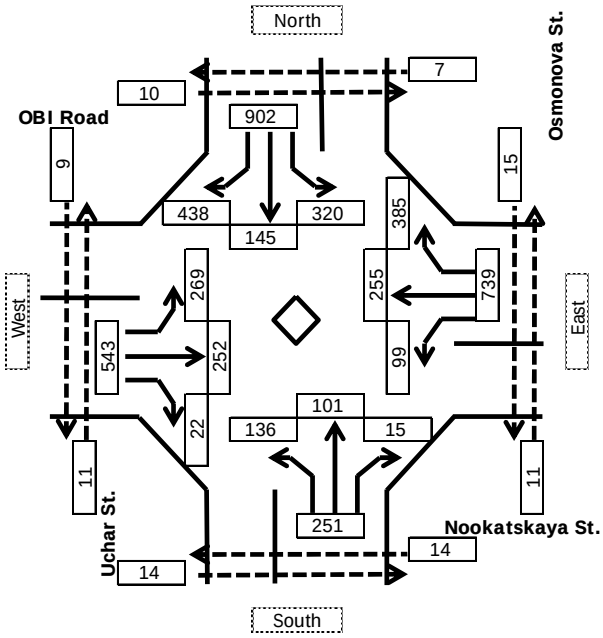
Evening Peak Hour 17:00 ~ 18:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		320	145	438	902
	E	385		99	255	739
	S	101	15		136	251
	W	269	252	22		543
	Total	754	586	266	828	2,435

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		15		7	22
	SE	11		14		25
	SW		14		11	25
	NW	10		9		19
	Total	21	29	23	18	91



Source: JICA Survey Team

Figure 5.3-10 Schematic Diagram for Traffic Flow at IC 07 (Roundabout)

5.3.2 Queue Length Measurement

The queue length at each intersection leg was measured every 15 minutes throughout the survey period. Figure 5.3-12 presents the results of the queue length survey.

It can be seen from the graphs that the queue length is critical at IC03 (Masalieva St./Alisher Navoi St.), where the queues at some legs reach up to 300 m and said that the traffic demand exceeds the traffic capacity at the morning peak hour.

The roundabout at IC06 (Osh-Aravan Road/Osmonova St.) is visibly congested and disorderly, with the maximum queue length reaching up to 300 m. Some factors that contribute to this problem include illegal on-street and intersection parking, loading and unloading of marshrutkas and buses near intersections, crossing pedestrians, and "kiss-and-ride" (shown in Figure 5.3-11).

It is observed that the queue length frequently reaches up to 150 m at Alisher Navoi St. (east leg) of IC08 (Alisher Navoi St./Kurmanjan Datka St.), so there is a need to adjust the signal cycle length and/or split time because the queue length is stable .

At the other intersections, the maximum queue lengths are within 100 m and it can be said that the queues are not due to traffic jams, but are just vehicles waiting for green signals at the signalized intersections or an opportunity to enter the unsignalized intersections.

Illegal Parking at the Intersection

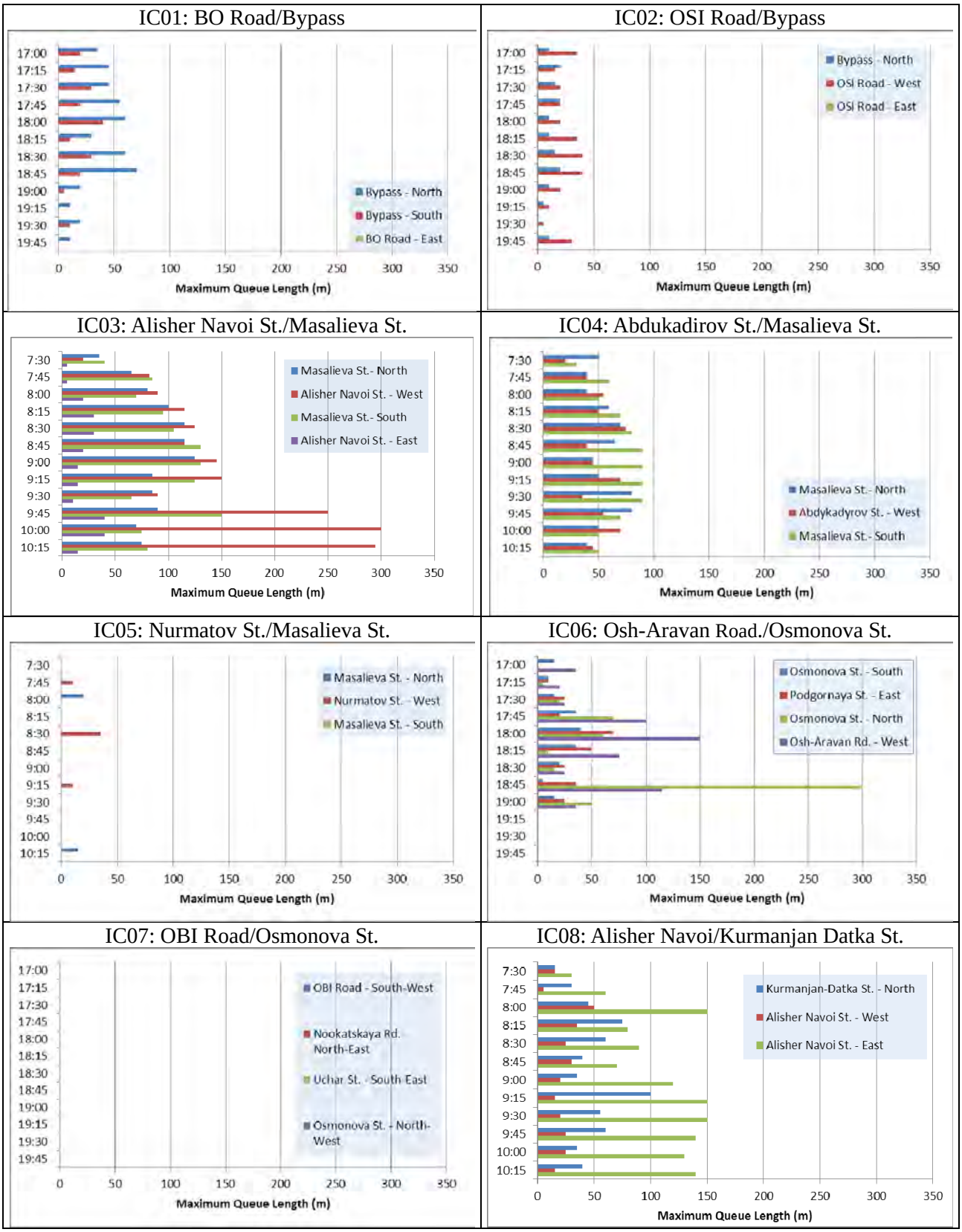
Pedestrians Crossing

Marshrutkas Loading and Unloading Passengers

Commuters Waiting on the Road (Kiss-and-Ride)

Source: JICA Survey Team

Figure 5.3-11 Major Causes of Congestion at IC 06



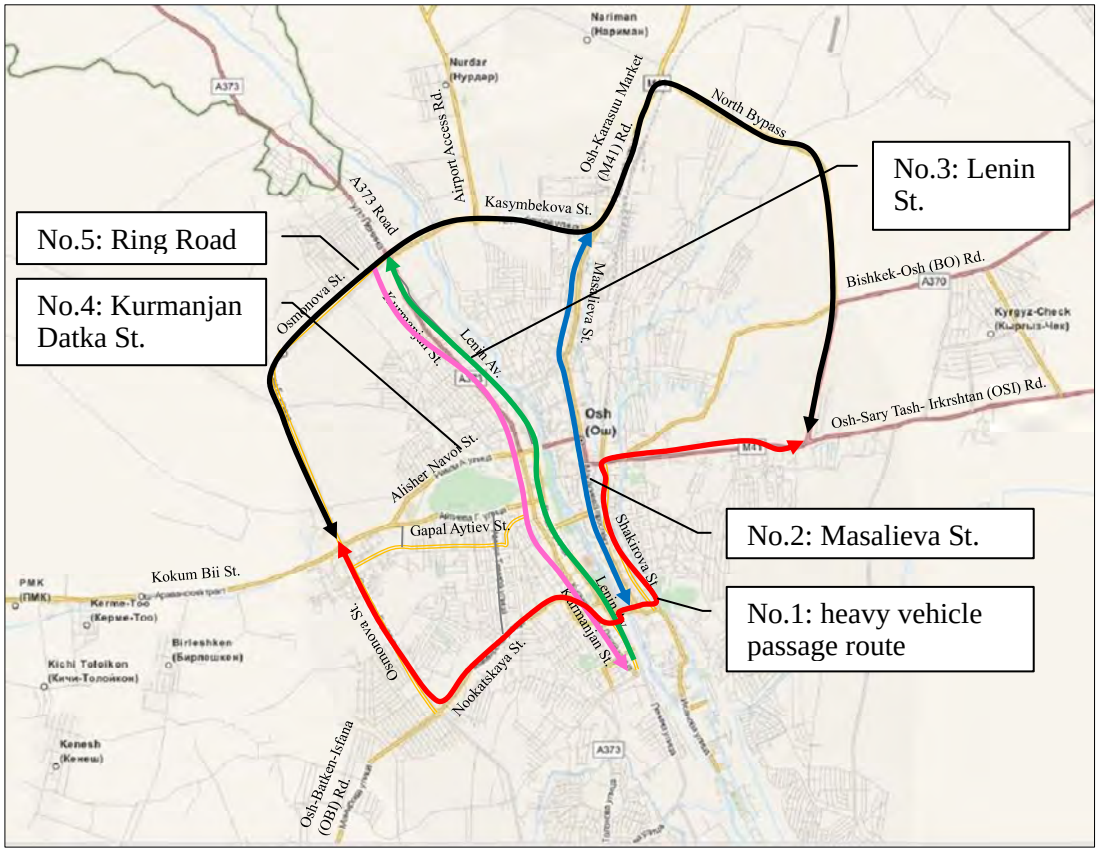
Source: JICA Survey Team

Figure 5.3-12 Results of the Maximum Queue Length Survey

5.4 Travel Time Survey

5.4.1 Survey Description

A travel time survey was carried out to obtain the information of travel time of vehicles running in the study area. The information should be helpful to identify traffic flow characteristics and traffic congestion. The travel time survey was conducted to record the passing time at the check points by using a test car and the "Floating-car Technique". The check points were generally set at the main intersection of the survey routes. Information regarding the round trip was recorded during the evening peak hour at about 17:00-18:00. The survey routes were five (5) major routes in the Osh central city as shown in Figure 5.4-1.



1. Heavy vehicle passage route in the city: Osmonova St.-Nookatskaya St.- Nurmatov St. Bridge-Shakirova St.- OSI (Osh-Sarytash Irkeshtam) Road, 12.48km
2. Masalieva St.: Kasymbekova St.- Shakirova St. roundabout, 6.07km
3. Lenin St.: Osmonova St.-Kurmanjan Datka St, 7.79km
4. Kurmanjan Datka St.: Osmonova St.-Lenin St., 7.49km
5. Ring Road: Barsbek roundabout-OSI Road, 18.8km

Source: JICA Survey Team

Figure 5.4-1 Travel Time Survey Routes

5.4.2 Average Travel Speed Conditions

Figure 5.4-2 shows the average travel speed by check point by direction. In the evening peak period, the area surrounded by the Abdukadirov St. Bridge -Kurmanjan Datka St,-Alisher Navoi St.-Masalieva St./Shakirova St. shows a low travel speed at 10-20km/h or less. The causes of low travel speed were attributed to five (5) items: 1) waiting for traffic lights to change, 2) entrance and exit from/to roadside parking, 3) stops of mini-bus/taxi at near intersection, 4) pedestrian crossing and 5) reduction of traffic capacity due to on-street parking.

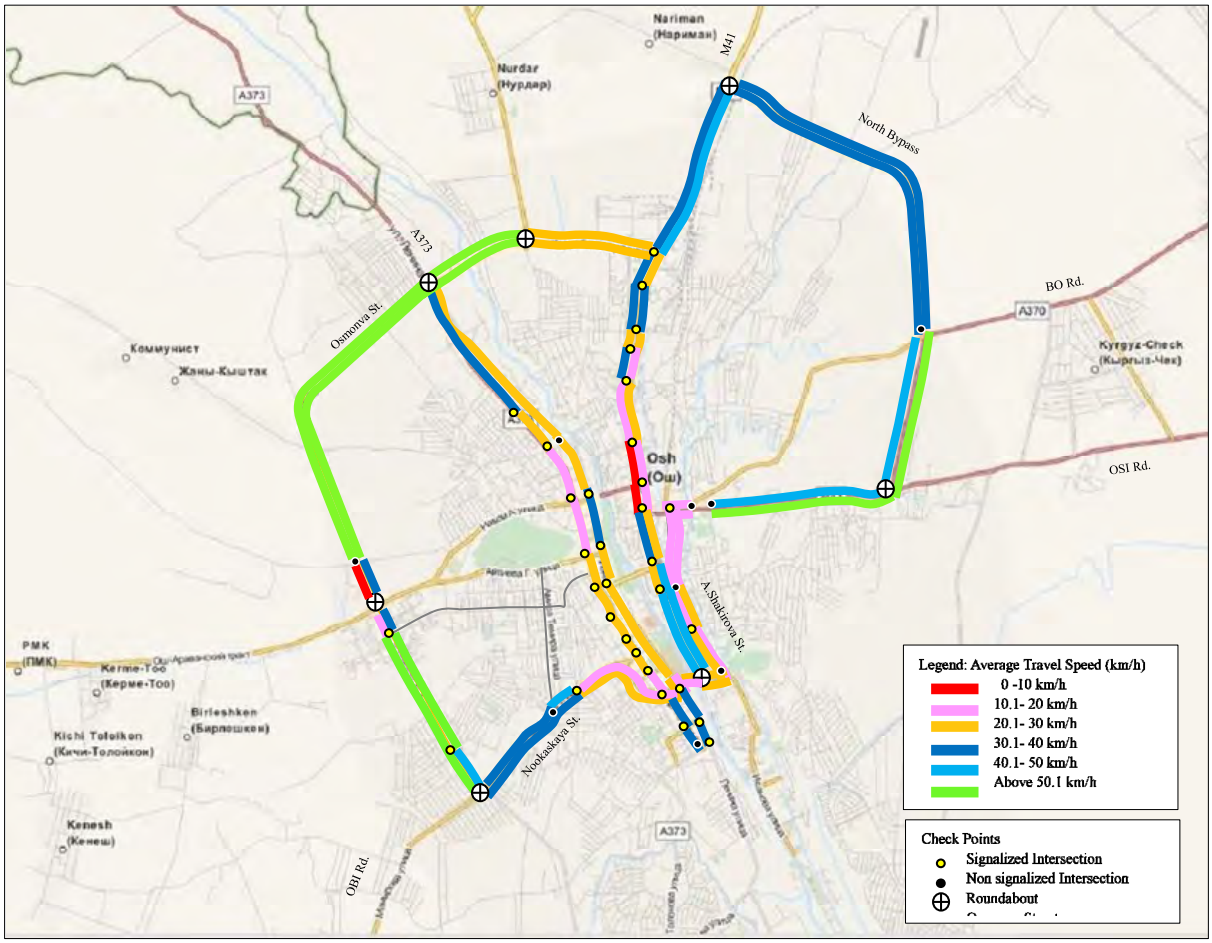
For the heavy vehicle passage route, low travel speed at 10-20km/h was seen around the segments between Barsbek roundabout (IC06) and the next signalized intersection, which is mainly caused by the multiple conflicts such as pedestrian crossing, stops of mini-bus/taxi at near roundabout and entrance and exit from/to roadside parking. In addition, low travel speed at 10-20km/h in the segments of signalized intersections around Lenin St. on Nookatskaya St. and non-signalized intersection around Nurmatov St. Bridge-Shakirova St. was seen due to waiting for traffic lights to change/or passing at a non-signalized intersection. Besides, the segments at signalized or non-signalized intersections on Shakirova St. were also was seen low travel speed of 10-20km/h, it is necessary to improve or install the signal light control.

As for Masalieva St., a low travel speed of 10-20km/h was observed at segments between Masalieva St.-Zainabetdinova St. signalized intersection and Masalieva St.-OSI Road signalized intersection, which is caused by the multiple conflicts such as waiting for traffic lights to change, traffic spill-back from upstream, pedestrian crossing, stops of mini-bus/taxi at near intersection and entrance and exit from/to side road parking. Particularly, the segments between Masalieva St.-Alisher Navoi St. signalized intersection and Masalieva St.-OSI Road signalized intersection show low travel speed at 8km/h and 10km/h respectively due to an excess of traffic capacity, which are identified as “bottlenecks”. Furthermore, it was seen that the on-street parking occupancy is at 100% along both roadsides, which is a key cause of lack of traffic capacity.

On the arterial one-way of Lenin St. in the northern direction, the travel speed was observed to be at 20-30km/h. This street has also seen a decrease in traffic capacity due the high on-street parking occupancy at 100% along both roadsides. Kurmanjan Datka St, which is a one-way arterial in the southern direction, has low speed as well. In particular, the segment between 8th of March St. and Nookatskaya St.-Nurmatov St. Bridge was observed to have a speed of 10-30km/h, which is also caused by the multiple conflicts such as waiting for traffic lights to change, pedestrian crossing, stops of mini-bus/taxi at near intersections, and entrance and exit from/to side road parking, especially, the segments between Mamajan St. and Gapar Aytiev St. show a low travel speed at 10-20km/h.

The travel speed along the ring road (Osmonova St.-Kasymbekova St.-Osh-Karasuu

Road-North Bypass-OSI Road) ranges approximately from 30km/h to 50km/h, except in a partially congested segment. This segment is located along Osmonova St. at the section approaching the Barsbek roundabout in the northern direction. It experiences a low travel speed below 10km/h due to the lack of traffic capacity and traffic spill-back from upstream. The traffic queue length reaches up to 300 m in the north approach of the roundabout.



Source: JICA Survey Team

Figure 5.4-2 Average Travel Speed by Segment and Direction (17:00 to 18:00)

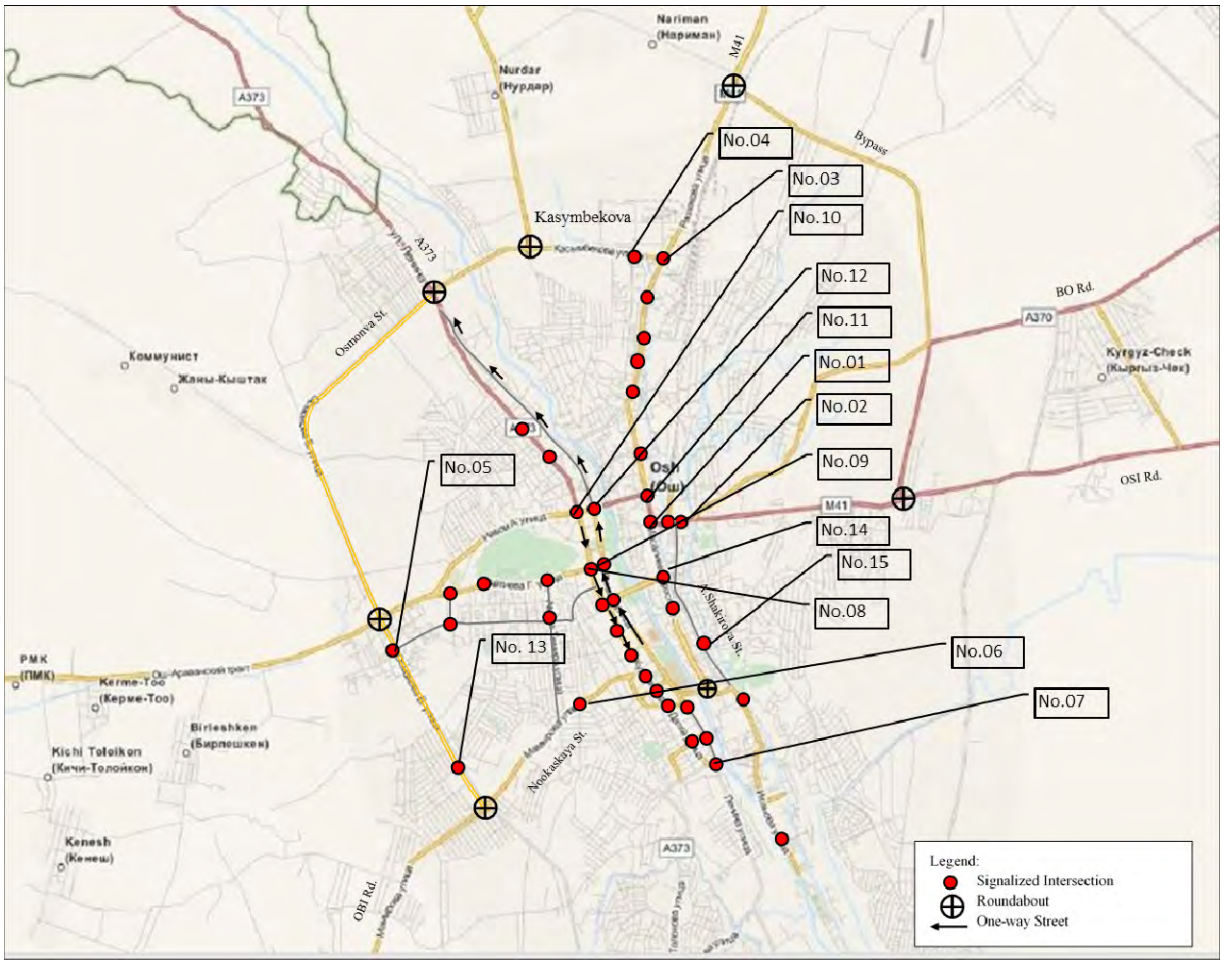
5.5 Traffic Signal Phasing Survey

Figure 5.5-1 shows the location of the signalized intersections, roundabouts, and one-way streets within Osh City. It can be seen that the roundabouts are concentrated along the Ring Road and heavy truck route while the majority of the signalized intersections are located within inner roads.

A traffic signal phasing survey was conducted for 15 out of 41 signalized intersections, in which the most critical intersections were chosen. Traffic signals within Osh City are not synchronized with nearby signalized intersections, and the traffic signal phasing is constant throughout the day. As such, the signals are not optimized according to traffic volume which typically changes according to the time of day. Moreover, the traffic signals run on different

systems (e.g. some have flashing green time instead of amber time; some have amber time and all red time). Most signals also provide a countdown timer to inform motorists about the remaining number of seconds before the traffic signal light changes color.

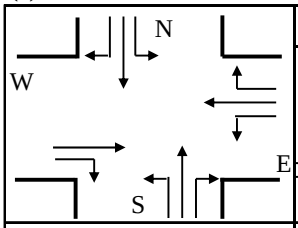
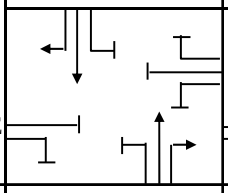
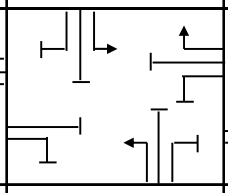
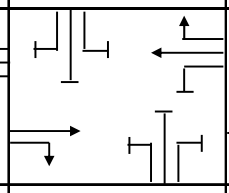
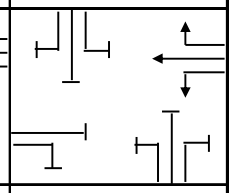
Figures 5.5-2 to 5.5-5 outline the results of the traffic signal phasing survey for 15 intersections.



Source: JICA Survey Team

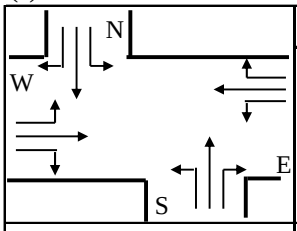
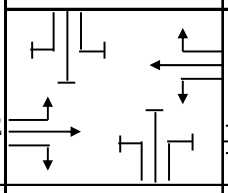
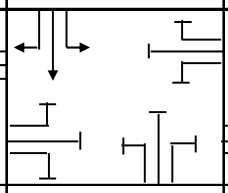
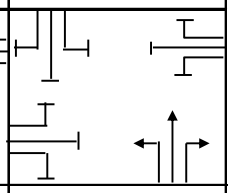
Figure 5.5-1 Location Map of Signalized Intersections and Roundabouts

(1) Masalieva-OSI Intersection

	Phase 1	Phase 2	Phase 3	Phase 4
				
Time (sec)	Green 49 sec, Yellow 1 sec	Green Arrow 29 sec, Yellow 1 sec	Green 14 sec, Yellow 1 sec	Green Arrow 24 sec, Yellow 1 sec
	Cycle Length = 120 sec			

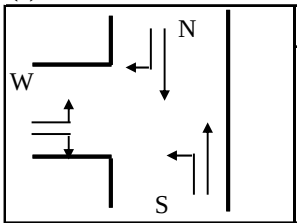
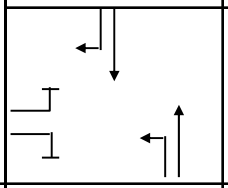
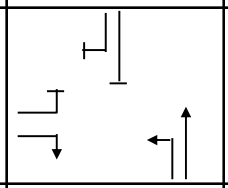
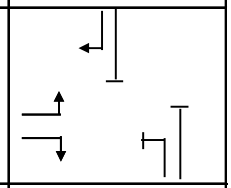
Source: JICA Study Team

(2) Shakirova-OSI Intersection

	Phase 1	Phase 2	Phase 3
			
Time (sec)	Green 29 sec, Yellow 3 sec	Green 21 sec, Yellow 3sec	Green 21 sec, Yellow 3 sec
	Cycle Length = 80 sec		

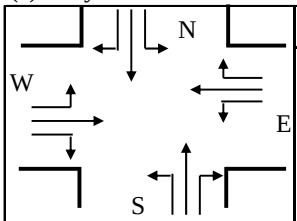
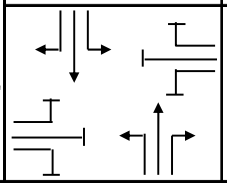
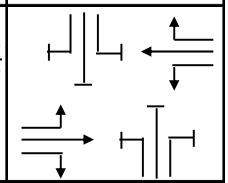
Source: JICA Study Team

(3) M41-Osmonova Intersection

	Phase 1	Phase 2	Phase 3
			
Time (sec)	Green 36 sec, Yellow 0 sec	Green 25 sec, Yellow 0 sec	Green 30 sec, Yellow 1 sec
	Cycle Length = 92 sec		

Source: JICA Study Team

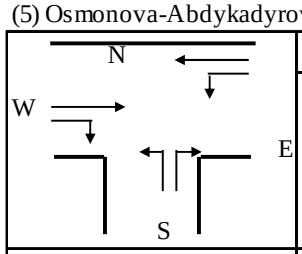
(4) Kasymbekova-Salieva Intersection

	Phase 1	Phase 2
		
Time (sec)	Green 16 sec, Yellow 3 sec	Green 20 sec, Yellow 3 sec
	Cycle Length = 42 sec	

Source: JICA Study Team

Figure 5.5-2 Traffic Signal Phasing Survey Results (1)

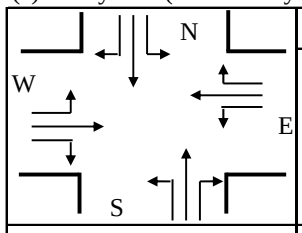
(5) Osmonova-Abdykadyrova Intersection



	Phase 1	Phase 2
Time (sec)	Green 20 sec, Yellow 3 sec	Green 16 sec, Yellow 3 sec
	Cycle Length = 42 sec	

Source: JICA Study Team

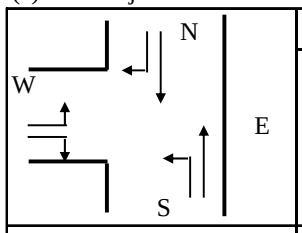
(6) Mamyrova (Nookatskaya)-Sankt-Peterbury Intersection



	Phase 1	Phase 2
Time (sec)	Green 40 sec, Yellow 3 sec	Green 17 sec, Yellow 3 sec
	Cycle Length = 63 sec	

Source: JICA Study Team

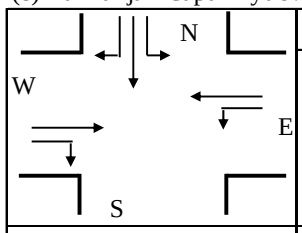
(7) Lenin-Ojinah Intersection



	Phase 1	Phase 2
Time (sec)	Green 29 sec, Yellow 2 sec	Green 24 sec, Yellow 3 sec
	Cycle Length = 58 sec	

Source: JICA Study Team

(8) Kurmanjan-Gapal Aytiev Intersection

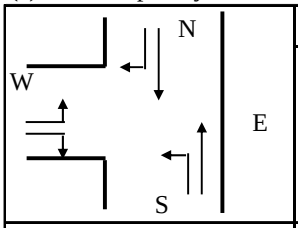
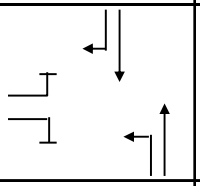
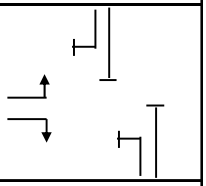


	Phase 1	Phase 2
Time (sec)	Green 21 sec, Blink 4 sec	Green 21 sec, Blink 4 sec
	Cycle Length = 50 sec	

Source: JICA Study Team

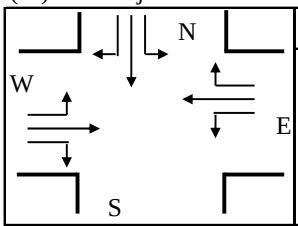
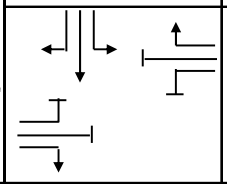
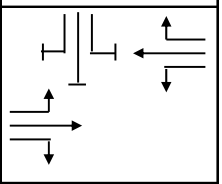
Figure 5.5-3 Traffic Signal Phasing Survey Results (2)

(9) Lenin-Gapal Aytiev Intersection

	Phase 1	Phase 2
		
Time (sec)	Green 21 sec, Blink 4 sec	Green 21 sec, Blink 4 sec
	Cycle Length = 50 sec	

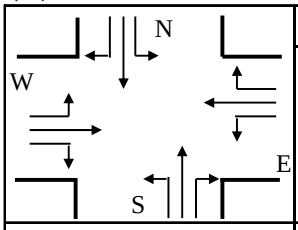
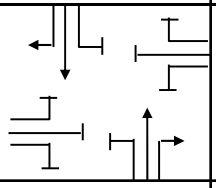
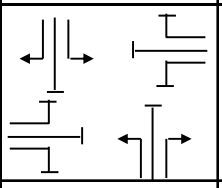
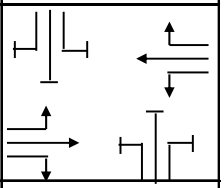
Source: JICA Study Team

(10) Kurmanjan-Alisher Navoi Intersection

	Phase 1	Phase 2
		
Time (sec)	Green 20 sec, Blink 4 sec	Green 20 sec, Blink 4 sec
	Cycle Length = 48 sec	

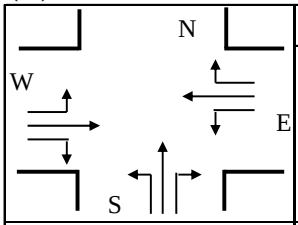
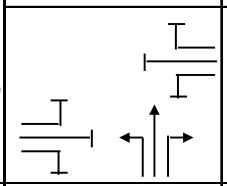
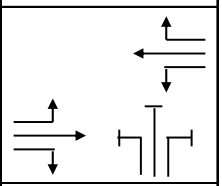
Source: JICA Study Team

(11) Masalieva-Alisher Navoi Intersection

	Phase 1	Phase 2	Phase 3
			
Time (sec)	Green 30 sec, Blink 5 sec	Green 22 sec	Green 32 sec, Blink 5 sec
	Cycle Length = 94 sec		

Source: JICA Study Team

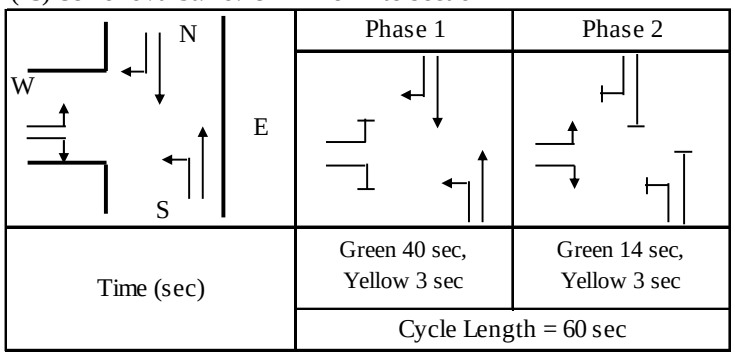
(12) Lenin-Alisher Navoi Intersection

	Phase 1	Phase 2
		
Time (sec)	Green 31 sec, Blink 4 sec, Yellow 1 sec	Green 26 sec, Blink 4 sec, Yellow 1 sec
	Cycle Length = 67 sec	

Source: JICA Study Team

Figure 5.5-4 Traffic Signal Phasing Survey Results (3)

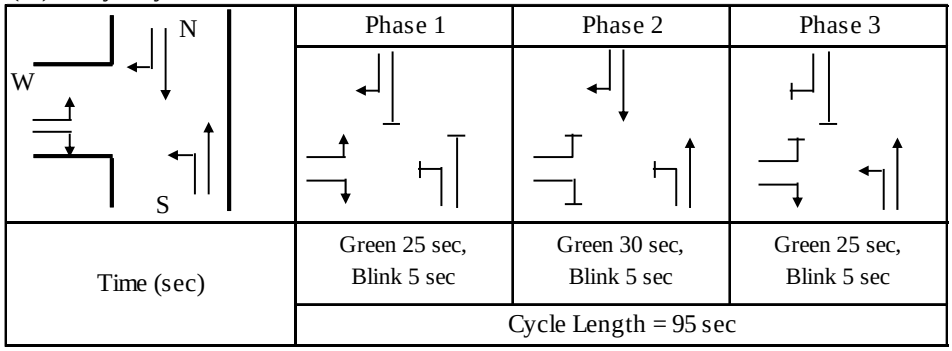
(13) Osmonova-St.No.28Ak-Tilek Intersection



	Phase 1	Phase 2
Time (sec)	Green 40 sec, Yellow 3 sec	Green 14 sec, Yellow 3 sec
	Cycle Length = 60 sec	

Source: JICA Study Team

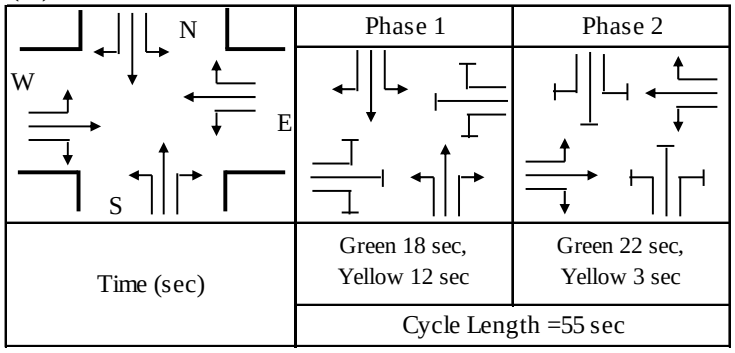
(14) Abdykadyrov-Masalieva Intersection



	Phase 1	Phase 2	Phase 3
Time (sec)	Green 25 sec, Blink 5 sec	Green 30 sec, Blink 5 sec	Green 25 sec, Blink 5 sec
	Cycle Length = 95 sec		

Source: JICA Study Team

(15) Shakirova-Jumabaeba Intersection



	Phase 1	Phase 2
Time (sec)	Green 18 sec, Yellow 12 sec	Green 22 sec, Yellow 3 sec
	Cycle Length =55 sec	

Source: JICA Study Team

Figure 5.5-5 Traffic Signal Phasing Survey Results (4)

5.6 O-D Interview Survey

1) Outline

The O-D interview survey aims to establish travel information of vehicles coming in and out of Osh City (such as origin, destination, trip purpose, type of commodity transported (for trucks) and travel time. The survey was conducted from 07:00 to 19:00 at six locations around the border of Osh City. The location of the survey stations is shown in Figure 5.1-1.

A sampling rate of 10% was initially targeted for the O-D interview survey, so roughly every ten vehicles were stopped and interviewed at the roadside. However, due to data screening and

refusals, the actual sampling rate ranges from 3-7%, with an average of 5% for all survey stations, as shown in Table 5.6-1. Vehicles were classified into six types (sedan, taxi, light truck, mid-sized truck, heavy truck, bus, and others).

Table 5.6-1 O-D Interview Sampling Rate

Station No.	Road Section	Direction	No. of Samples	Traffic Volume	Sample Rate
SL01	OSI Road.	Inbound	258	4,412	6%
		Outbound	246	3,833	6%
SL02	BO Road	Inbound	231	4,690	5%
		Outbound	231	4,863	5%
SL03	Osh-Karasuu Road	Inbound	325	9,007	4%
		Outbound	311	9,115	3%
SL04	Airport Access Road	Inbound	213	5,259	4%
		Outbound	259	4,122	6%
SL06	Osh-Aravan Road	Inbound	234	3,539	7%
		Outbound	238	3,842	6%
SL07	OBI Road	Inbound	230	4,486	5%
		Outbound	264	4,803	5%
Total/Average			3,040	61,971	5%

Source: JICA Survey Team

2) Origin and Destination

The respondents' respective origin and destination were asked. If the vehicle is headed to or originating from within Kyrgyzstan, the province name is asked. Furthermore, if their origin or destination is within Osh City/Province, the specific district is asked. **Table 5.6-2** presents the origin and destination for inbound and outbound directions for each survey station. It can be seen that majority of inbound vehicles (86%) originate from other districts within Osh Province. Moreover, most inbound vehicles (81%) have Osh City as their last destination, while 17% of vehicles are headed to another district within Osh province. Only a few inbound vehicles (2-4%) are headed to or originating from other Kyrgyz provinces while an even smaller number (less than 0.5%) have international origins and destinations. As for outbound vehicles, Table 5.6-2 shows that majority of vehicles (85%) are coming from Osh City, and 86% are heading to other districts within Osh province. The number of outbound vehicles traveling to and from other Kyrgyz provinces and other countries is minimal, which is similar to the pattern seen in outbound vehicles. Based on these results, it can be deduced that more than 80% of vehicles travel to or from Osh City, and the rest are merely passing through Osh City.

Table 5.6-2 Origin and Destination

Station No.	Direction	Origin					Destination				
		Osh City	Osh Province	KGZ	Foreign	Total	Osh City	Osh Province	KGZ	Foreign	Total
SL01	Inbound	0	5,836	0	0	5,836	4,827	1,009	0	0	5,836
SL02	Inbound	0	5,503	1,487	12	7,002	6,288	658	43	12	7,002
SL03	Inbound	0	11,727	0	0	11,727	9,367	2,226	134	0	11,727
SL04	Inbound	0	7,558	0	0	7,558	5,996	1,178	384	0	7,558
SL06	Inbound	948	3,842	0	0	4,790	3,495	1,249	47	0	4,790
SL07	Inbound	3,155	2,939	466	153	6,714	5,546	1,012	147	9	6,714
Inbound Total		4,103	37,405	1,953	166	43,627	35,519	7,332	755	21	43,627
		9%	86%	4%	0.40%	100%	81%	17%	2%	0.05%	100%
SL01	Outbound	4,917	740	96	49	5,803	0	5,748	0	55	5,803
SL02	Outbound	6,110	1,147	19	0	7,276	0	5,489	1,787	0	7,276
SL03	Outbound	9,807	1,873	165	0	11,845	0	11,845	0	0	11,845
SL04	Outbound	5,389	436	106	26	5,957	0	5,957	0	0	5,957
SL06	Outbound	4,670	662	19	0	5,351	1,045	4,306	0	0	5,351
SL07	Outbound	5,997	734	524	0	7,255	2,205	3,984	1,008	59	7,255
Outbound Total		36,889	5,593	930	75	43,487	3,250	37,329	2,795	114	43,487
		85%	13%	2%	0.20%	100%	7%	86%	6%	0.30%	100%

Note:
- Osh Province (all districts except Osh City)
- KGZ (Kyrgyz provinces other than Osh province)
- Foreign (other countries)

Source: JICA Survey Team

3) Route

Respondents were asked about the route that they use when traveling within Osh City. Table 5.6-3 shows the percentage of vehicles using the Ring Road depending on the origin and destination. It can be seen from the said table that 100% of vehicles use the Ring Road for shorter distances, and this decreases as the distance between the origin and destination increases. As an example, only 6% of vehicles traveling from OSI Road to OBI Road (from northeast to southwest of Osh City) use the Ring Road.

Table 5.6-3 Usage of Ring Road as the Travel Route According to Origin and Destination

			Destination					
			SL01	SL02	SL03	SL04	SL06	SL07
Origin	SL01	OSI Road	-	100%	100%	93%	16%	6%
	SL02	BO Road	-	-	100%	93%	48%	46%
	SL03	Karasuu Market	-	-	-	100%	97%	40%
	SL04	Airport	-	-	-	-	100%	92%
	SL06	Aravan	-	-	-	-	-	100%
	SL07	OBI Road	-	-	-	-	-	-

Source: JICA Survey Team

4) Trip Purpose

The trip purpose was also inquired (going home, going to work, going to school, working or on business, or on a private trip). As shown in Table 5.6-4, most respondents are on their way home while a substantial number of respondents are going to work, on business or on private trips.

Table 5.6-4 Trip Purpose

Station No.	Direction	Vehicle Type	Trip Purpose					
			Home	Work	School	Business	Private	Total
			1	2	3	4	5	
SL01	Inbound	All	1,580	1,209	39	1,164	1,844	5,836
SL02	Inbound	All	1,755	1,250	0	1,726	2,271	7,002
SL03	Inbound	All	4,098	2,515	0	2,486	2,628	11,727
SL04	Inbound	All	2,395	2,300	175	874	1,813	7,558
SL06	Inbound	All	1,369	868	53	1,032	1,468	4,790
SL07	Inbound	All	1,496	1,805	0	1,613	1,800	6,714
Inbound Total			12,693	9,948	267	8,895	11,824	43,627
			29%	23%	1%	20%	27%	100%
SL01	Outbound	All	2,489	948	0	1,342	1,025	5,803
SL02	Outbound	All	3,332	1,058	0	1,958	928	7,276
SL03	Outbound	All	2,801	2,542	0	2,064	4,438	11,845
SL04	Outbound	All	2,121	1,551	0	969	1,316	5,957
SL06	Outbound	All	2,477	874	30	905	1,065	5,351
SL07	Outbound	All	3,826	545	0	1,896	987	7,255
Outbound Total			17,046	7,519	30	9,133	9,760	43,487
			39%	17%	0.1%	21%	22%	100%

Source: JICA Survey Team

5) Vehicle Occupancy

The vehicle occupancy (including the driver) was also noted. Table 5.6-5 shows that sedans and taxis have average vehicle occupancy rates of 2.4 and 3.0, respectively. Meanwhile, trucks have the lowest vehicle occupancy rates, with only one or two people. As expected, public transport modes (marshrutka/buses) have the highest occupancy levels. Moreover, those traveling to school or on business generally have higher vehicle occupancy rates.

Table 5.6-5 Vehicle Occupancy

Trip Purpose		Vehicle Type						
		Sedan	Taxi	Light Truck	Middle Truck	Heavy Truck	Marshrutka/ Bus	Total
		1	2	3	4	5	6	
1	Home	2.3	2.8	1.8	1.7	1.6	2.8	2.1
2	Work	2.1	1.9	1.7	1.8	1.6	4.2	2.0
3	School	3.4	3.0	-	-	-	-	3.4
4	Business	2.6	3.4	1.7	1.7	1.6	11.2	4.2
5	Private	2.7	2.9	2.0	1.8	1.3	5.0	2.5
All		2.4	3.0	1.8	1.7	1.6	10.2	

Source: JICA Survey Team

6) Major Commodity

In addition, truck drivers were asked about the commodity type they are transporting, as indicated in Table 5.6-6. Empty trucks comprise more than 40% of all trucks surveyed for both inbound and outbound directions. Usually, these trucks have just finished delivery or are on the way to pick up goods. Excluding empty trucks, the most commonly transported commodities are agricultural products, chemical products, minerals and other materials.

Table 5.6-6 Major Commodity Transported by Trucks

Station No.	Direction	Vehicle Type	Major Commodity												
			Agriculture	Foodstuff	Animal Feed	Forest	Mineral	Stone	Metal	Machinery	Chemical	Light Industry	Others	Empty	Total
			1	2	3	4	5	6	7	8	9	10	11	12	
SL01	Inbound	Trucks	123	8	49	0	214	107	0	16	65	8	8	483	1,083
SL02	Inbound	Trucks	97	88	39	44	45	104	96	26	204	87	38	429	1,297
SL03	Inbound	Trucks	211	109	26	66	119	53	26	27	66	108	145	503	1,459
SL04	Inbound	Trucks	40	26	26	13	0	0	13	26	77	38	244	148	648
SL06	Inbound	Trucks	46	13	44	7	13	13	0	0	27	13	31	242	450
SL07	Inbound	Trucks	133	58	0	16	34	100	9	8	51	48	49	809	1,314
Inbound Total			649	302	185	145	424	377	144	103	490	303	515	2,613	6,251
			10%	5%	3%	2%	7%	6%	2%	2%	8%	5%	8%	42%	100%
SL01	Outbound	Trucks	88	6	13	42	75	25	0	6	53	37	91	656	1,091
SL02	Outbound	Trucks	174	86	36	18	154	69	27	27	144	83	101	496	1,413
SL03	Outbound	Trucks	48	77	26	90	71	64	87	46	153	80	115	339	1,196
SL04	Outbound	Trucks	10	20	10	41	10	51	30	10	42	51	84	246	606
SL06	Outbound	Trucks	39	23	23	39	128	19	31	8	29	16	27	163	545
SL07	Outbound	Trucks	100	64	61	12	31	58	52	43	204	51	121	518	1,316
Outbound Total			458	276	168	241	468	286	228	141	625	317	540	2,418	6,167
			7%	4%	3%	4%	8%	5%	4%	2%	10%	5%	9%	39%	100%

Source: JICA Survey Team

5.7 Summary of Major Findings and Issues

- According to the screenline and intersection surveys, the morning peak period occurs sometime between 8:00 and 10:00 (depending on the intersection) while the evening peak period happens between 16:00 and 19:00. For most of the survey locations, the evening peak period tends to be longer and have a higher traffic volume than the morning peak period.
- Nurmatov St. Bridge has the highest traffic volume among all screenline survey locations. Given that it only has one lane per direction and that heavy vehicles pass through it, it is imperative to improve it so that it can serve the existing and future traffic demand.
- The roundabout intersection between Osh-Aravan Road and Osmonova St. (IC06; Barsbek monument) is the most critical intersection in Osh City, given that there is a significant bottleneck in this intersection and that it is part of the heavy truck route. This was also confirmed in the travel time survey.
- The intersection between Alisher Navoi St. and Masalieva St. has the highest traffic volume for both vehicles and pedestrians among the intersections surveyed. Queuing is also a problem in the morning peak period.
- On-street parking and loading/unloading passengers at intersections reduce road and intersection capacity as well as travel speed.
- Forty-one (41) intersections within Osh City are signalized. Traffic signal phasing for intersections is not synchronized with each other, and constant throughout the day.
- The O-D Interview Survey showed that majority of travelers (more than 80%) are going to or coming from Osh City itself. The rest are traveling between other districts in Osh Province, with a small number traveling to and from other Kyrgyz provinces or other countries.
- Agricultural products, chemical products, minerals and other products are commonly transported by trucks. However, a significant number of trucks are traveling empty.