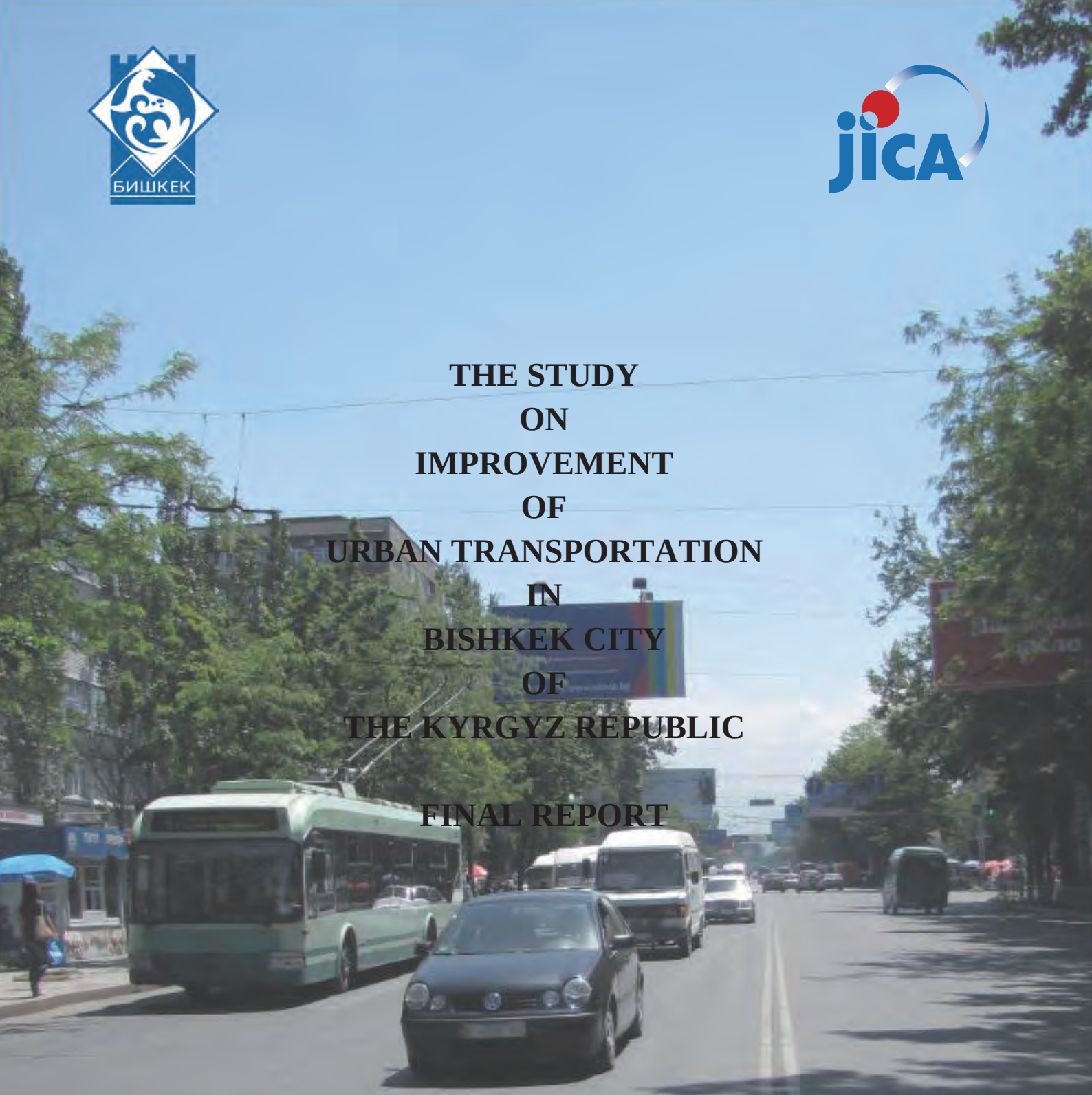

THE STUDY ON IMPROVEMENT OF URBAN TRANSPORTATION IN BISHKEK CITY OF THE KYRGYZ REPUBLIC

FINAL REPORT

OCTOBER 2013

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

KATAHIRA & ENGINEERS INTERNATIONAL

RECS INTERNATIONAL INC.

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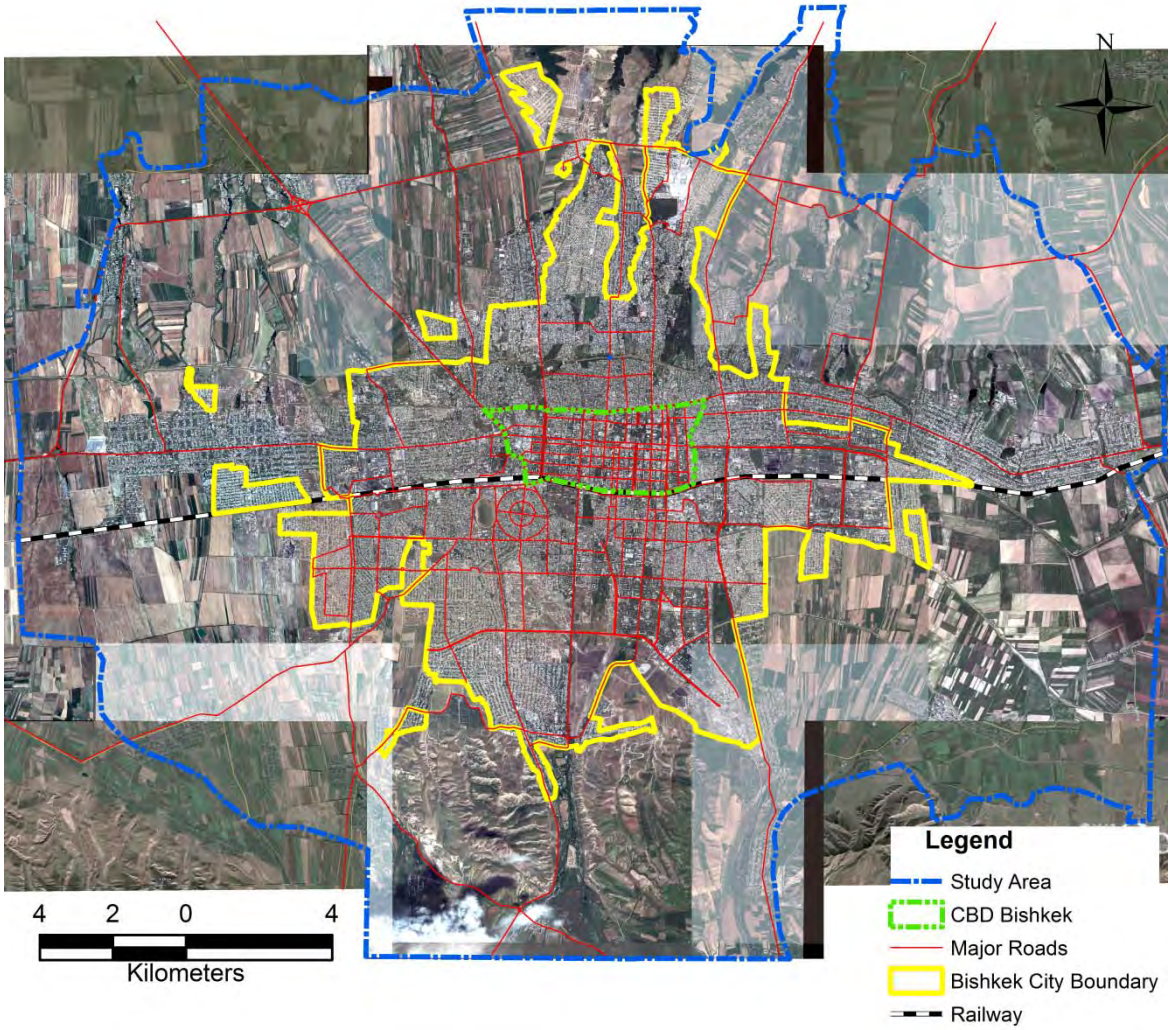
Exchange rate used in this Report

USD 1	=	SOMS	48.29
USD 1	=	JPY	97.84
SOMS 1	=	JPY	2.029

(As of May, 2013)

Central Asia

Kyrgyzstan



Bishkek City

LOCATION MAP

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Abbreviation

AC	Asphalt Concrete
ADB	Asian Development Bank
ATC	Area Traffic Control
BCCD	Bishkek Capital Construction Department
BCDA	Bishkek City Development Agency
BCDS	Bishkek City Development Concept
BCMDA	Bishkek City Main Department of Architecture
BOD_5	Five-day biochemical oxygen demand
BPTE	Bishkek Public Transportation Enterprise
BSDS	Bishkek City Sustainable Development Strategy
BTD	Bishkek Trolleybus Department
CAGR	Compound Annual Growth Rate
CBD	Central Business District
CC	Cement Concrete
CCTV	Closed-circuit Television
CHS	Central Heating Station
CIS	Commonwealth Independence States
CL	Cordon Line
CO	Carbon Oxide
D/D	Detail Design
DEM	Digital Elevation Model
DFI	Direct Foreign Investment Fund
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EST	Environmentally
EV	Electric Vehicle
F/S	Feasibility Study
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GIS	Geographic Information System
GKR	Government of Kyrgyz Republic
GRP	Gross Regional Product
HRD	Human Resource Development
HCOH	Hydroxyl Methylene
HIS	Home Interview Survey

HOA	Home Owners Associations
HV	Hybrid Vehicle
IC/R	Inception Report
ICT	Information Communication & Technology
IRI	International Roughness Index
IEE	Initial Environmental Examination
I/M	Inspection and Maintenance
IMF	International Monetary Fund
I/P	Implementation Program
IS	Intersection
ITC	Information Technology and Communication
ITS	Intelligent Transport System
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
LOS	Level of Service
LTA	Local Territorial Area
MP	Master Plan
MAC	Maximum Allowable Concentrations
MDG	Millennium Development Goal
MOF	Ministry of Finance
MOTC	Ministry of Transportation and Communication
MTA	Municipal Territorial Administrations
NMT	Non-Motorized Transport
NSDS	National Sustainable Development Strategy
NGO	Non-Governmental Organization
NH_3	Tri Hydrogen Nitride
NO	Nitrogen Oxide
NO_2	Nitrogen Dioxide
OECD	Organization for Economic Co-operation and Development
OD	Origin-Destination
PA	Specially Protected Area
PCU	Passenger Car Unit
PK	Parking
PM	Particulate Matters
PPP	Public and Private Partnership
PR	Public Relation
PTI	Public Transportation Improvement
RAP	Resettlement Action Plan

RCCP	Rolled Compacted Cement Pavement
RCP	Renovated capital Program
RD	Record of Discussion
SC	Steering Committee
SME	Small and Medium Enterprise
SEA	Strategic Environmental Assessment
SL	Screen Line
SNIP	Kyrgyz Technical Standards and Regulations
SO_2	Sulfur Dioxide
SRTM	Shuttle Rader Topography Mission
TCS	Traffic Control System Improvement
TDM	Traffic Demand Management
TFC	Traffic Flow Improvement
TOD	Transit Oriented Development
TOR	Terms of References
TRACECA	Transport Corridor Europe - Caucasus - Asia
UNFCCC	United Nations Framework Convention on Climate Change
UPA	Urban Promotion Area
UTD	Urban Transportation Department
VCR	Vehicle per Road Capacity Ratio
VIMS	Vertical Index Measurement System
VOC	Volatile Organic Compound
WB	World Bank
WG	Working Group
WHO	World Health Organization
WTO	World Trade Organization
WWII	World War - II

EXECUTIVE SUMMARY

1. Purpose and Scope of the Study

The study aims to formulate a Master Plan (MP) with a target year of 2023, which is ten years henceforth, limiting the scope to devise plans as follows:

・a public transport plan

・a traffic control system improvement plan

・a traffic flow improvement plan

Additionally, it tackles short and medium-term challenges for which actions need to be taken immediately. Through the study, it was found that car parking was a serious problem. Hence, the MP included a parking improvement plan to examine transportation improvement comprehensively.

Japan International Cooperation Agency (JICA) dispatched a study team (JICA Study Team) formed by Katahira and Engineers International (KEI), Tokyo, Japan as lead consultant, in joint venture with RECS International, Tokyo, Japan. The study began in July 2011 and was completed in October 2013. The study objectives are summarized as follows:

(a) To formulate a simple[1] urban traffic MP of Bishkek with the target year of 2023.

(b) To implement technical transfer for enhancing the executing structure and capacity development related to urban traffic in the city.

2. Study Approach and Outcomes

2.1 Scientific Approach

The study is considered as the first MP of Bishkek City based on a scientific survey and approach. It differs significantly from conventional surveys in three aspects:

・Scientific survey and approach

・Demonstration by social experiment

・Human resource development

With the traffic, land use and population surveys, the study was able to obtain and analyze current detailed geographic situations and measure traffic data as original data. This type of scientific survey and approach is new to Bishkek City and to the country itself.

The traffic survey included a person/trip survey of approximately 4,000 sample home interviews (representing 1.7% of total population), roadside traffic surveys to obtain traffic conditions covering all

[1] The target area is limited originally to the three sectors and the target year is set as 2023, 10 years from now, and short- and mid-term challenges on which action needs to be taken urgently are tackled. The land use is the current city structure in principle.

city urban areas and these data were compiled in the Origin and Destination Table (OD Table) showing traffic circumstances in Bishkek City. In addition, the following detailed surveys were conducted:

- a public transportation with onboard survey,
- bus stop-facilities survey,
- passengers and drivers interview survey,
- parking demands and supply capacity survey,
- based parking survey,
- parking facility survey,
- an on-road (curb) parking survey, and a parking user survey,
- a survey to improve intersections with a traffic volume survey,
- a queue length and residual queue length survey,
- a signal cycle survey,
- a travel speed survey, and
- public interview survey

In the socio-economic survey, various GDP data and population statistics were analyzed. The latest satellite photographs and GIS (Geographical Information System) were used to estimate the existing land use. Estimated population distribution data were used to identify characteristics of populations in each traffic zone. City development trends and traffic in 2023 were studied, based on the population increase. A traffic analytical model applied was called a four-step estimate model, which consists of trip generation and attraction, trip distribution, modal shift, and route assignment. The results in 2013 were shown as “Do Nothing Case (DNC)”, or business as usual, with traffic congestions and bottlenecks. MP proposes a transportation improvement plan after evaluating alternative scenarios based on public transportation, combined with other transportation improvement plans. The results were summarized in the Project Implementation Program in **Table 3**.

As a result of the studies, the existing road network capacity is affordable notwithstanding traffic congestions that occur at different critical areas. It was found that an effective traffic program can be accomplished with proper planning and funding albeit the city budget constraints. The study finds that the present urban planning and public transportation policy seem competent. Since traffic congestions and bottlenecks are set to happen across the city due to traffic volume increase in the near future, preventive measures have to be taken to avoid serious repercussions. It is necessary to take the MP as a comprehensive transport and urban development approach that will work towards easing of traffic bottlenecks, efficient use of traffic network, town preservation and efficient utilization of road, and promotion of Low Carbon and Environmentally Sustainable Transport (EST), considering development as a "Compact City" concept.

2.2 Demonstration through Pilot Projects

The study conducted pilot projects as social experiments as follows:

・Utilization of pedestrian mall method

・Smooth traffic flow by intersection improvement

・traffic signal improvement

・bus stop facility improvement

These experiments achieved the desired results providing innovative ideas under extreme city budget constraints. In particular, the pedestrian mall method was appreciated by the citizenry. This method was learnt and utilized to promote education as initialized by the former president. The details of pilot projects are shown below.

No.	Pilot Project	Project Site	Implementation Schedule
1	Traffic Flow Improvement (I)	Chui-Fuchika intersection	Sep.-Oct. 2011
2	Traffic Flow Improvement (II)	Chui-Fuchika Intersection	Jan.-Oct. 2012
3	Traffic Control System	Chui-Fuchika Siaopina Intersection	Aug.-Oct. 2012
4	Public Transport Facility Improvement	Chui-Fuchika Intersection / Chui Avenue	Jan.- Oct. 2012
5	Pedestrian Mall	Kiyevskaya Street, Bishkek City	Sep. 16, 2012

2.3 Outcome of Human Resources Development Training by BCDA and in Japan

The scientific approach and pilot projects described above were utilized for human resources development. Various programs were provided by BCDA for human resources development and for the organizational competence improvement of BCDA and public employees. BCDA and the city government experienced the Pedestrian Mall method in planning, implementation and evaluation stages. The improvement in competence was remarkable. Utilization of the methods and continuous GIS trainings are expected as JICA has provided software and hardware. Training in Japan was provided in two sessions. The trainees learned advanced examples and Japan's city development strategies. This led to the decision to introduce compact city development, bus location system and bus-only (exclusive) lanes. The implementation of the Pedestrian Mall method was also one of the outcomes of the training.

2.4 Conclusion of the Study

The study concluded as follows:

(i) Albeit financial constraints, Bishkek city can avoid traffic congestions by investing within the time frame as proposed in the MP. Otherwise, the congestions could paralyze the entire city functions in the future.

(ii) It is important to implement small-scale projects and social experiments proposed herein, conduct various surveys for the future projects, utilizing the time before the traffic problems become serious.

3. Generation of Master Plan Components and Alternatives

3.1 Approach

The study results show that the traffic volume in road networks will be 1.0 or less than traffic mandate forecast for as far as 2023. However, local and limited traffic congestions occur during certain time periods -- particularly during peak hours. At specific locations, bottleneck situations occur. Due to roadside conditions, it is difficult to improve the traffic volume by Road Development approach to road widening and elevated intersections because they require new spans of land to expand the right of way.

In general, the road congestion and bottleneck situations are caused by various factors. Transport planning has to consider multiple mechanisms for solutions. The study has to limit its aims or objectives at the specific road and intersections to:

・reduce traffic congestion and

・eliminate traffic flow bottlenecks

Under these conditions, the MP will consider solutions as promoting use of public transportation and traffic management in order to reduce the traffic demands and vehicular trips. As solutions for "supply side" to improve the impeding factors to reduce road traffic volumes should be considered, including repair of damaged roads and conservation of road pavements and transportation facilities, remove of bottleneck situations at intersections, control of illegal road-side parking, and so on.

As shown in **Figure 1**, the MP will formulate alternative scenarios with feasible mechanisms within the time frame and financial capabilities of the City.

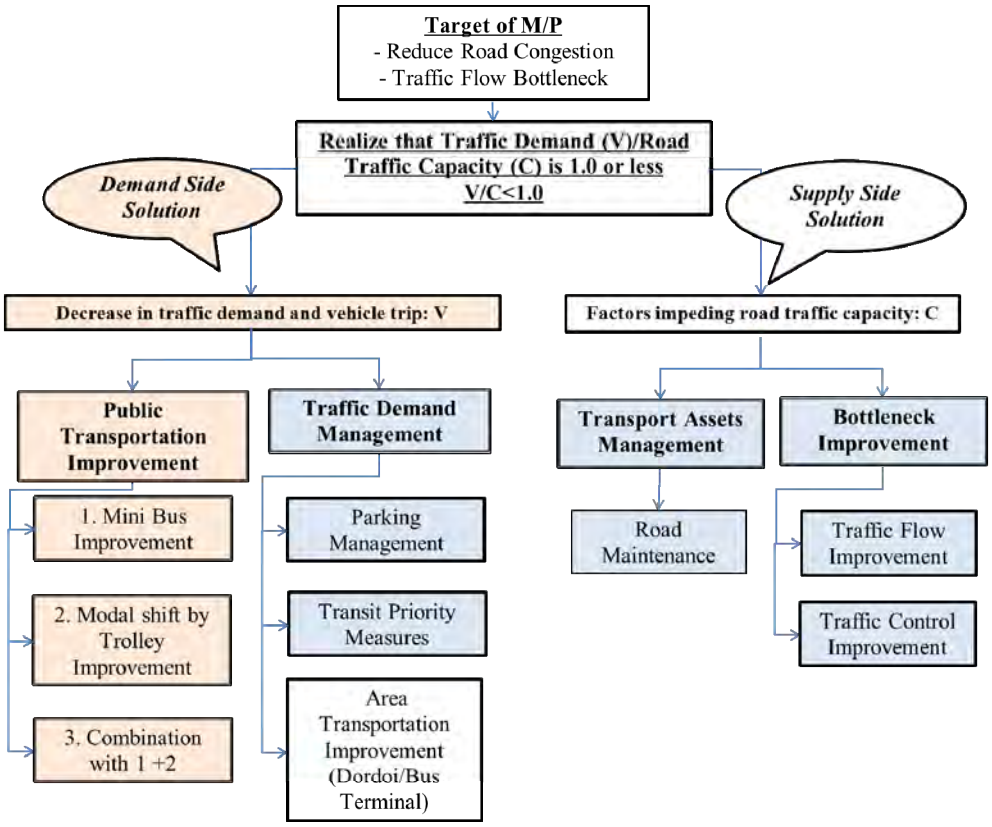


Figure 1 Approach to Generation of Master Plan Components and Alternatives

3.2 Basic Traffic Conditions (Do-Nothing Case)

Table 1 illustrates trip share by mode in 2013. Of the person trips (PT), passenger cars account for 87 percent of the total number of vehicles when the PT rate is 25 percent. Based on the PT and the number of passenger cars, transportation by passenger cars seems inefficient. The PT rate of minibus utilizations is high at 42 percent and accounts for 98 percent of public transportation by vehicle mode. This shows that vehicle congestion is mainly caused by passenger cars. The trolleybus accounts for only three percent of the PT and is below one percent of the number of vehicles. Thus, reduction of the number of trips on passenger cars and alternatively using public transportation were studied. As regards public transportation, since the minibus causes traffic congestions at bus stops and on specified roads (overlapping routes), regulating minibus operations need to be taken.

Table 1 Trip Share by Mode in 2013 (Do-nothing)

Mode	Passenger / Vehicle	Person trip/day (Bishkek City Zone 1-61)			Vehicle trip/day (All Zones 1-98)	
	Passenger	Trip No.	Share	PT Share	Trip No.	(%)
1. Trolleybus	28.2	72,181	3.2%	7.0%	3,194	0.3%
2. Midibus	27	27,750	1.2%	2.6%	8,619	0.9%
3. Minibus	17	934,832	42.0%	90.4%	94,119	9.8%
Total (Public Transport: PT)			46.5%	100.0%		
4. Truck	1.3	3,171	0.1%	-	12,966	1.4%

Mode	Passenger / Vehicle	Person trip/day (Bishkek City Zone 1-61)			Vehicle trip/day (All Zones 1-98)	
	Passenger	Trip No.	Share	PT Share	Trip No.	(%)
5. Passenger Car	1.5	560,234	25.2%	-	839,550	87.6%
6. Walk	-	629,316	28.3%	-		
Total			100.0%	-	958,448	100.0%

Source : JICA Study Team

3.3 Alterative Scenarios

- Scenario 1 is a basic strategy and alternative scenario, a modal shift from passenger car utilization to public transport utilization. Initially, the minibuses operated by private companies must be changed to larger ones, which will reduce the number of vehicles and trips, hence mitigating congestion on the minibus routes. It will entail a big slice of the city's budget and much time until full-scale operations utilizing new trolleybuses can come into consideration. Additionally, the minibus currently overloads or takes passengers way over allowable passenger numbers. Some passengers are forced to stand. Increasing the size of buses would contribute to better service and passenger safety. In Scenario 1, the city government only needs to set regulations and additional expenditure is unnecessary.

- Scenario 2 is set to improve the operational efficiency of new trolleybuses by repairs and extension of its operational routes. A modal shift from passenger cars to trolleybus is to be encouraged. Factors include review of distance between bus stops, punctual operation with use of timetable, an information system or schedule of buses and a park-and-ride scheme. The use of passenger cars will be limited with a control on parking lots, zonal and road spaces - based on time - need to be established. It is necessary to consult with citizens if the passenger car controls will be introduced for the purpose of improvement of public transportation and services. The city government should decide whether to encourage to use them with the proper guidance, or regulate them forcibly, or both.

- Scenario 3: If the trolleybus operation improves and the control on passenger car utilization is implemented, an integrated operation management of public transportation will be needed. It is necessary to underline the functions and roles of each mode, to establish an integrated management organization, to create a fare system with common IC card under the organization, and to guarantee the convenience of bus transfers in terms of improvement of service for users. **Table 2** shows a summary of alterative scenarios in consideration of the issues described above.

Table 2 Summary of Alterative Scenarios

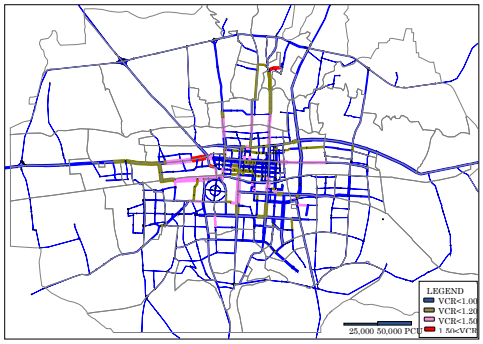
Scenario	Objective	Measures	Effects
Scenario 0	Do-nothing	No	As usual
Scenario 1	Using high occupancy bus for small minibus	25% of small minibus trip share to big ones	Reduce the number of minibus trips
Scenario 2	Modal shift to	10% in vehicle trip share of trolleybus	Increase trolleybus users

Scenario	Objective	Measures	Effects
	trolleybus	10% reduction of passenger car trip	Decrease the number of car use along transit corridor
Scenario 3	Scenario 1 + Scenario 2	Combination of Scenario 1 and 2 ・Measures to improve services ・Establishment of integrated management organization ・IC card introduction, etc.	Combination of effects of Scenario 1 and 2 ・Improvement of convenience ・Increase in users ・Improvement of profitability

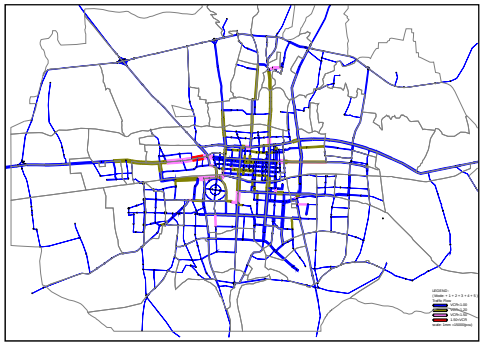
Source: JICA Study Team

1.1 Impacts of Scenarios

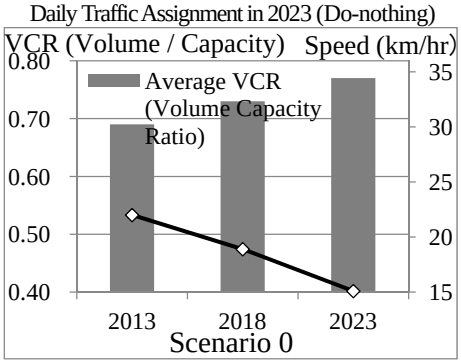
The individual impact of each of the three scenarios above are shown in comparison with daily traffic volume in the "Do-nothing" case in 2023, and peak-time congestion rate and speed. It shows reduction of congestion in road networks. The congestion rate will improve from 0.77 to 0.70 and average speed will improve from 15.1 to 20.4 km/hr. It is therefore necessary to further promote the utilization of public transportation and the modal shifts.



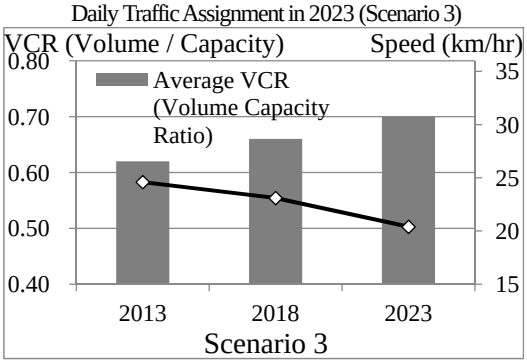
Daily Traffic Assignment in 2023 (Do-nothing)



Daily Traffic Assignment in 2023 (Scenario 3)



VCR and Travel Speed (Peak) in 2023 (Do-nothing)



VCR and Travel Speed (Peak) in 2023 (Scenario 3)

2. Project Implementation Plan

The project implementation period is divided as shown below in consideration of the priority order and budget constraints of the city government[2].

[2] 7.7 million USD is required (8% of 135 million USD of the total budget in 2013).

Table 3 Implementation Program

Unit: million USD

Priority	Project (Project type)	Cost	Urgent	Short	Mid.
			2014-6	2017-9	2020-23
1	3. High occupancy vehicle for minibus: (private)	-	0.0		
2	1. Enhancement of road maintenance and improvement capacity: (equipment procurement + technical assistance (TA))	10.0	10.0		
2	24. Pedestrian mall for vitalization of town economy: (private)	-	0.0		
2	30. Eco-car promotion: (pilot project (PP))	1.0	1.0		
5	31. Pedestrian way rehabilitation: (FS + PP)	1.0	1.0		
6	34. “No car day for commuting” program: (PP)	0.1	0.1		
7	15. East and west bus terminal improvement: (FS + PP)	1.0	1.0		
7	36. Capacity Development of BCDA: (technical assistance (TA))	1.0	1.0		
9	10. Public transport priority system: (FS + PP)	1.0	1.0		
9	11. Bus lane for peak hour: (FS + PP)	0.8	0.8		
11	4. Roadside management for bus stops with tax and car parking (PP + TA)	0.5	0.5		
11	16. Traffic flow improvement at bottleneck intersection: (design (DD) + construction (CW))	15.0	5.0	5.0	5.0
11	17. Traffic signal control improvement: (DD + CW)	15.0	3.0	12.0	
14	12. Bus priority signal installation: (FS + PP)	0.8	0.8		
14	26. Pilot Project for transit corridors improvement: (FS + PP)	1.0		1.0	
14	28. Police community post for tourism promotion: (PP)	0.1		0.1	
14	33. Driving manner improvement program: (PP + traffic police human resources development (HRD))	0.1		0.1	
14	35. Staggered office hours campaign: (PP)	0.1		0.1	
19	6. Bus route network reformation: (PP + TA)	0.3		0.3	
19	7. BRT introduction plan: (PP + TA)	0.5		0.5	
21	13. Bus operation monitoring system: (FS)	0.8		0.8	
21	14. Bus approach information system: (FS + PP)	1.0		1.0	
21	25. Introduction of area traffic management at Dordoi market: (FS + PP)	2.0		2.0	
24	22. Parking information system (PPP): (FS + PP)	1.0			1.0
25	2. Local Road and Pavement Improvement in the Poor Area: (DD + CW)	15.0			15.0
25	23. Promotion of parking and ride (PPP): (FS + PP)	1.0			1.0
25	27. Urban Section of Bishkek-Osh Road improvement (national budget)*: (FS + CW)	(50.0)			(50.0)
25	32. Traffic safety promotion for accident reduction program: (PP + HRD)	1.0			1.0
29	8. ICT ticket for trolleybus (on-going with EBRD)	1.0		1.0	
29	9. ICT ticket for all transit modes: (FS + PP)	1.0		1.0	
31	5. Public transportation management and service improvement: (FS + PP)	0.9		0.9	
31	29. Introduction of bicycle lane for NMT promotion: (PP)	0.2			0.2
33	19. Introduction of parking fee payment card (PPP): (FS + PP)	1.0			1.0
33	21. Parking facility construction (PPP by ADB): (FS)	0.6			0.6
35	18. Illegal parking control at specific areas: (FS + PP)	0.8			0.8
35	20. Integrated parking law and management: (PP)	0.3			0.3
	Total Cost	**76.9**	**25.2**	**25.8**	**25.9**

Note : * The MPWT is in charge of the project for the zone outside Bishkek area. However, the national budget (NB) that is included as it is in the affected area is not included in the total cost of the city budget.

: City revenue increase project

Source : JICA Study Team.

3. Recommendations

Recommendations for Bishkek City

(a) The city government should approve the MP and implement it according to as implementation program.

(b) The city government should organize the utilization of Pedestrian Mall method as there is popular demand from citizens.

(c) The city government should establish an integrated management organization for all public transportation modes.

(d) The city government should introduce funding schemes to involve the private sector in public transport operation.

(e) The city government should establish a new public parking management authority to alleviate the issue of parking.

(f) The city government should promote Compact City and future Smart City concepts as its vision, aiming to develop a Low-Carbon City.

Recommendation of enhancement of BCDA functions

(a) BCDA should improve the functions in planning and implement a city or urban planning and a transportation planning.

(b) BCDA should enhance the coordinating function with the donors and the private investors.

(c) BCDA should independently assume the responsibility for new mandate (i.e. Public-Private Partnership), in which other city departments or agencies will not be involved.

(d) BCDA should improve education and training functions for technical competence of the City staff.

Recommendation of continuation and extension of the social experiments and pilot projects

(a) Development of Pedestrian Mall scheme for the vitalization of the City center and tourism promotion

(b) Expansion of intersection improvement in consideration of traffic safety of pedestrians and universal design

(c) Expansion of outcomes of traffic light improvement

(d) Expansion of outcomes of bus-stop improvement

Urgent policy recommendation for aid or support agencies

(a) Aid or support agencies should establish and promote results, or aid assets, from past technical cooperation.

(b) Government and aid or support agencies should recognize the strategic importance of Urban Development.

(c) Government and aid or support agencies should recognize the importance of technical assistance and ensure continuity.

(d) Government and aid or support agencies should exchange views on aid policies and strategies in urban transport and city development.

Recommendations for urgent action

(a) The city government should act to implement urgent projects based on the MP.

(b) The city government should act to implement the projects that expect to increase city revenues, by utilizing the private sector.

(c) The city government should act to implement the capacity improvement of BCDA including the PPP as city think-tank.

CHAPTER 1 INTRODUCTION

1.1 Background of the Study

The Kyrgyz Republic is located in the north-eastern part of the Central Asia, bound by Uzbekistan to the west, Kazakhstan to the north, Tajikistan to the south, and China to the east. The Kyrgyz Republic is a landlocked mountainous country with total land area of 200,000 square kilometers (km^2) having a population of 5.21 million. Road transportation covers more than 90 percent of freight and passenger transportation, and is the main mode of transportation connecting regions in the central Asia, and southwest Asia. Road transportation also functions as commuter transportation for local residents.

Bishkek is the capital of the Kyrgyz Republic. It has approximately 868 thousands inhabitants. The number of vehicle registrations exceeds 150,000. The city trunk roads are in good condition at present however traffic volume on the roads has increased dramatically in recent years. Therefore, it is anticipated that current capacity of road network cannot accommodate the increased traffic volume in the very near future thereby worsening traffic congestions and traffic safety bottlenecks intersection. A traffic control system introduced in the time of the Soviet Union is still working but performance is low. Due to outdated facilities, the operation of existing traffic signals is unable to control the current traffic volumes and traffic flows. Under these circumstances, Bishkek City suffers badly from traffic congestions, traffic accidents (3,767 cases in January to November 2010), and air pollution caused by vehicle emission gas. These problems are getting serious in the City center.

Public transportation in Bishkek consists of trolleybuses, midibuses, and minibuses. The Bishkek City government prepared a plan entitled Renovated Capital Program of Bishkek Development. The city government introduced and renovated the midibuses and the trolleybuses albeit the city budget constraints. China provided a grant aid for supply of new midibuses in 2008, and European Bank for Reconstruction and Development (EBRD) supplied new trolleybuses with technical assistance of strengthening of operation capacity of trolleybuses through the Bishkek Public Transportation Project". Other donors are also providing assistance for urban transportation improvement in Bishkek.

As there was no traffic survey or traffic demand forecast study since 1970s in Bishkek, a long-term transportation plan has not been prepared based on the engineering data. As a result, countermeasures for improvement of urban transportation have not been prioritized. Hence, the City planned to study the present and future traffic demands, in particular, the public transportation capacity, taking the rapid increase in the population and vehicles into consideration.

To achieve the prepared plan, the city government requested the Government of Japan for technical cooperation for the Study for Comprehensive Urban Transport Master Plan in Bishkek. The aims of the study were to prepare an urban transportation master plan to meet the future traffic demands and launch immediate countermeasures with priority among "soft" and "hard" interventions based on the master plan. In response to the city government request, Japan International Cooperation Agency (JICA) conducted a detailed planning survey from 14 February to 2 March 2011, and agreed to revise the title from the original

request to "the Study on Improvement of Urban Transportation in Bishkek City (Study)" and concluded the Scope of Works with the Bishkek City government by the minutes of meeting signed on 1 March 2011.

Following the minutes of meeting, JICA has dispatched a consortium of Consultants; Katahira & Engineers International (KEI), Tokyo, Japan (as Leading Consultant) in joint venture with RECS International, Tokyo, Japan (JICA Study Team) to carry out the study. The Study started with the explanation of Inception Report in July 2011 and will end in October 2013.

1.2 Objectives of the Study

The objectives of the Study are as follows;

- ✓ To formulate an Urban Transportation Master Plan of Bishkek City
- ✓ To conduct technical transfer to the counterparts in the course of the Study

The Study collected basic data related to various plans in the transportation sector, and to formulate transportation strategy for the short and medium term MP.

1.3 Scope of the Study

The Study followed the Scope of Works signed by JICA and the Bishkek City on 1 March 2011. The scope of the Study includes:

(1) Review and Analysis of the Current Condition

(a) To review existing urban development plan of Bishkek City

(b) To review existing laws, regulations, policies, and institutional arrangement related to urban transport at Bishkek City

(c) To evaluate present conditions of urban development issues of Bishkek City (i.e. socio-economic factors, land use, infrastructure including transportation, etc.)

(d) To review past and on-going studies and development projects, and traffic surveys related to urban transportation of Bishkek City

(2) Traffic and Parking Surveys

(a) To conduct traffic surveys

(b) To estimate future traffic demands

(c) To conduct parking survey

(d) To estimate future parking demand

(e) To identify and analyze transportation problems in the Study area

(3) Implementation of Pilot Projects

(a) To share common recognition with relevant entities on challenges for urban transportation planning tackled in the Study

(b) To select pilot projects based on necessity and proposal from Bishkek City

(c) To design pilot projects

(d) To perform required permission and authorization procedure for the implementation of the pilot projects

(e) To implement the pilot projects

(f) To carry out evaluation of the pilot projects

(4) Formulation of the Urban Transport Master Plan

(a) To formulate public transportation policy

(b) To formulate an improvement plan of Traffic Control System

(c) To formulate an improvement plan of traffic flow

(d) To formulate the Urban Transportation Master Plan

(e) To carry out environmental and social consideration study

(f) To estimate cost of projects under the Urban Transportation Master Plan

(5) Technical / knowledge Transfer

(a) To conduct on-the-job training through implementation of the Study

(b) To conduct workshops on methodologies and procedures to formulate the Urban Transportation Master Plan

(c) To build up an integrated urban transportation database developed through the Study

The target year of the Urban Transportation Master Plan is 2023.

1.4 Study Area

The total area of Bishkek City is approximately 154 km^2 according to the latest administrative map provided by BCDA. Bishkek City consists of 21 Local Territorial Area (LTA) and Chon-Aryk village. The Study area was fixed based on the survey area of General Plan 2006. The Study area covers the current administrative area of Bishkek City (except a part of LTA 14 and LTA 16) and surrounding areas. LTA 14 and LTA 16 are newly developed in the north, 14 km from the city center. The total area of the Study area is approximately 575 square kilometer. Traffic survey was conducted only within the current administrative boundary of the Bishkek City (hereinafter referred to as "the Survey Area"). The Study area and the Survey Area is shown in **Figure 1.4-1**.

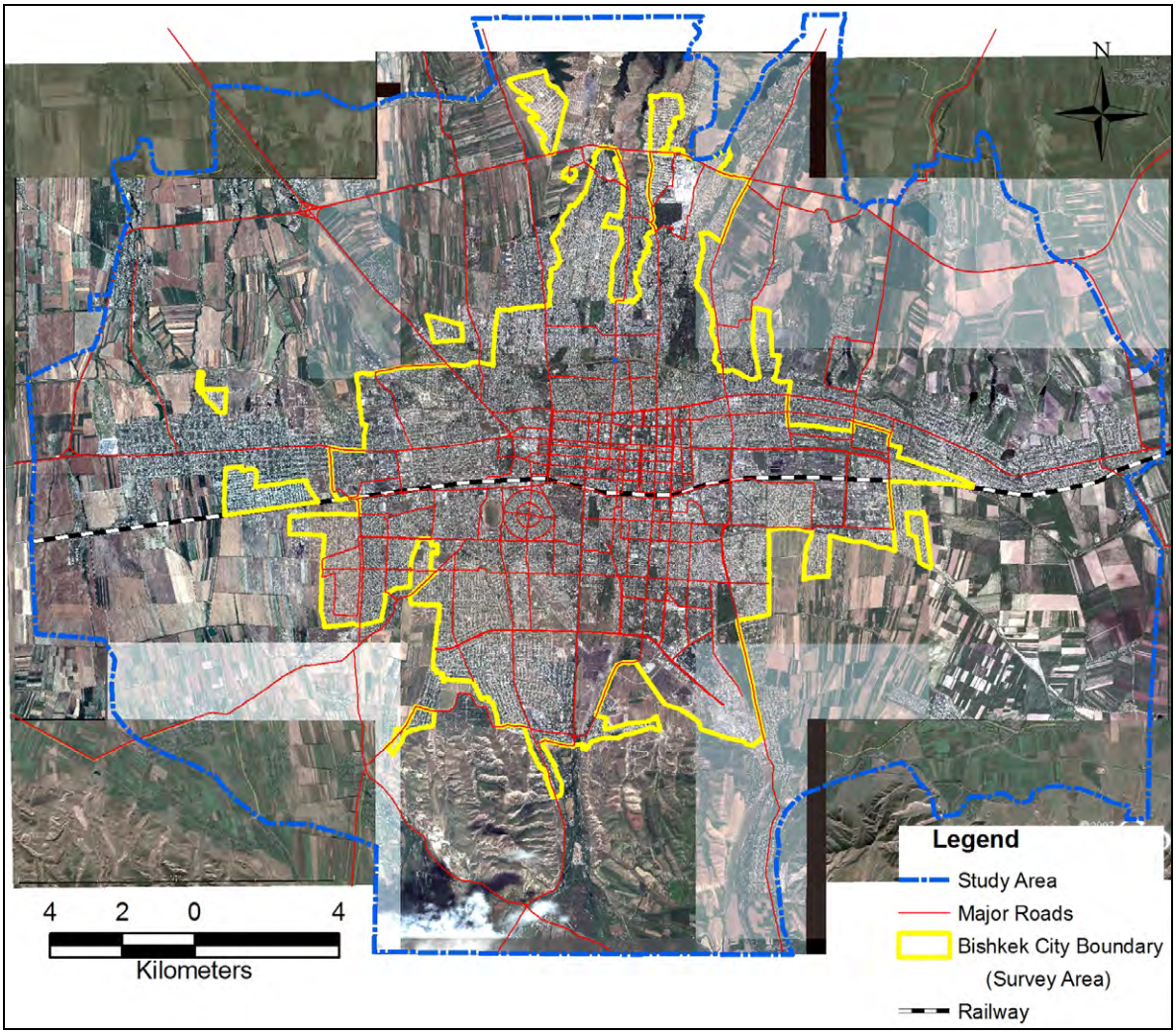


Figure 1.4-1 The Study Area and Survey Area

1.5 Study Schedule

The Study started in July 2011 and ended in October 2013. The total study duration is 28 months.

1.6 Member of the JICA Study Team

No.	Assignment	Name
1	Team Leader / Comprehensive Transportation Policy	Mr. Toda Toshinori
2	Deputy Team Leader / Comprehensive Transportation Plan	Mr. Isomoto Kenji
3	Urban Plan	Mr. Koyama Takashi
4	Land Use Plan / GIS (I)	Mr. Tokura Masaru
5	Public Transportation	Mr. Kunimasa Yoshiro
6	Traffic Control System Improvement Plan	Mr. Matsuoka Seiya
7	Intersection Improvement (I)	Mr. Fujiwara Hidekatsu / Ms. Miyakawa Akiko
8	Intersection Improvement (II)	Mr. Tochinaka Masateru
9	Traffic Survey / Analysis	Mr. Yashiro Shuichi

No.	Assignment	Name
10	Environmental and Social Considerations	Mr. Tanoguchi Taiji
11	Training / Capacity Development	Ms. Mishima Ai
12	GIS (II) /Parking Survey /Analysis (II)	Dr. Pantha Bhoj Raj
13	Parking Facility Plan	Mr. Nishino Ken
14	Parking Survey / Analysis (I)	Mr. Tokura Masaru (Concurrently)
15	Coordination / Traffic Survey and Analysis	Mr. Abdu Kadirov Rasulbek

1.7 Administration Structure of the Study

(1) Responsible Organization

The mayor's office of Bishkek City Government bears the overall responsibility for the administration and implementation of the Study.

(2) Steering Committee

A Steering Committee (SC), chaired by mayor of Bishkek City was established to review and discuss contents of reports at each stage of the Study. Members of the SC are stipulated as follows.

Table 1.7-1 List of Steering Committee Members

Organization	No.	Title	Name
Bishkek City	1	Mayor of Bishkek city	Mr. OMURKULOV Isa Sheishenkulovich
	2	First Vice Mayor, in charge of economic section	Mr. ISMAILOV Murat Amanovich
	3	Vice Mayor, in charge of economic section transportation sector	Mr. IMASHOV Torobek Myrzabekovich
	4	Director of Bishkek City Development Agency (BCDA)	Mr. SHARSHENBAEV Aibek Torokanovich (until April 2012) Mr. DJEEMBAEV Tilek Djanyshovich (since May 2012)
	5	Supervisor, Department of municipal services and life sustaining systems, Bishkek Mayor's office	Ms. IBRAIMOVA Dinara Djumadilovna
	6	Head of Bishkek City Urban Transport Department	Mr. DERBISHEV Malik Abdievich
	7	Head of Bishkek City Trolleybus Department	Mr. MILICKYI Gennadyi Alekseevich
	8	Head of Bishkek Passenger Transport Enterprise	Mr. ATYKANOV Nurlan Kachkynovich (until August 2012) Mr. KAPAKOV Janbolot Sooronbaevich (since June 2013)
	9	Head of Capital Construction Department	Mr. MYIAROV Marat Eshimovich (until March 2013) Mr. AJEKBAEV Kanchoro Abykeevich (since March 2013)
	10	Head of Bishkek City Main Department of Architecture and Urban Construction	Mr. ABDYKAROV Almazbek Akbaralievich

Organization	No.	Title	Name
	11	Head of Main Department of Traffic Safety, Bishkek City State Department of Internal Affairs	Mr. SARKULOV Imanaly Amangeldievich (until April 2012) Mr. Bekitaev Rustam Abdralievich (since April 2012)
MOF	12	Officer of Ministry of Finance (MOF)	Ms. IBRAIMOVA Chinara (information WITHHOLD, after she left her position the post is disestablished)
MOTC	13	Officer of Ministry of Transportation and Communication (MOTC)	Mr OMURBEKOV Kanat (until June 2013, after he left his position the post is vacancy)
Team	14	The JICA Study Team	See 1.12
JICA	15	JICA Kyrgyz Office	Mr. Maruyama Hideaki / Mr. Imai Seiju (until May 2012) Mr. Oyamai Takayuki / Mr. Takemura Yoshimasa : (since June 2012)
Others	16	Other relevant authorities, if any	

(3) Working Group

For effective implementation of the Study, the working groups established in the field of "Public Transportation Plan", "Improvement Plan of Traffic Control System", and "Improvement Plan of Traffic Flow" to discuss and make necessary implementation plan for the pilot projects. Bishkek City government submitted a list of working group members before commencement of the Study[1].

Table 1.7-2 List of Working Group Members Nominated by the City

Working Group	No.	Title	Name
Chair Person	1	Director of Bishkek City Development Agency	Mr. Sharshenbaev Aibek Torokanovich (until April 2012) Mr. Djeembaev Tilek Djanyshovich. (since May 2012)
Public Transportation Plan	2	Bishkek City Development Agency	Mr. Kojokulov Kubat
	3	Urban Transport Department	Mr.Turdumambetova Dilbara
	4	Bishkek Trolleybus Department	Mr.Akimenko Dmitryi
	5	Bishkek Passenger Transport Enterprise	Mr.Vovkodav Sergey Ms. Krovcova Ludmila
Improvement Plan of Traffic Control System	6	Bishkek City Development Agency	Mr. Chokiev Maksat
	7	Urban Transport Department	Ms. Turdumambetova Dilbara
	8	Capital Construction Department	Mr. Apsemetov Aidar Mr. Abdrastitov Musa
	9	Traffic Safety Department	Mr. Julkychiev Akjoltoy Mr. Shergaziev Uzakbek
	10	Public State Department	Mr. Ibraiuklov Jarishkeldi Mr. Medetbek uulu Askat
	11	Const., Mounting & Operation Department (CMOD)	Mr. Kalinin Oleg Mr. Osipov Sergey
Improvement Plan of Traffic Flow	12	Bishkek City Development Agency	Ms. Abdyldaeva Gulnara
	13	Urban Transport Department	Mr. Turdumambetova Dilbara
	14	Others	-

[1] Planning Group was originally considered, but as the members are the same as WG, PG activities were included in the WG.

1.8 Pilot Projects

Bishkek City submitted a proposal of the pilot project list to JICA Kyrgyz at the end of April 2011, to reply to the request at the list in the IC/R explanation meeting of first SC meeting on 5 August 2011. The implementation of pilot projects was started with Bishkek City's proposal. During the study, additional pilot projects were implemented during the study is shown in **Table 1.8-1**.

Table 1.8-1 List of the Pilot Project

No.	Pilot Project	Project Site	Implementation Schedule
1	Traffic Flow Improvement (I)	Chui-Fuchika intersection	Sep to Oct, 2011
2	Traffic Flow Improvement (II)	Chui-Fuchika Intersection	Jan to Oct, 2012
3	Traffic Control System	Chui-Fuchika Siaopina Intersection	August to October, 2012
4	Public Transport Facility Improvement	Chui-Fuchika Intersection / Chui Avenue	Jan to October, 2012
5	Pedestrian Mall	Kiyevskaya Street, Bishkek City	16 September, 2012

1.9 Concept of Environmental and Social Considerations based on JICA's Guidelines

Kyrgyz and JICA should be responsible for the implementation of the basic approaches which consist of the environmental and social considerations, information disclosure and participations of stakeholders based on JICA's Environmental and Social Consideration Guidelines.

Kyrgyz should take a responsibility for the Environmental Screening and Environmental Impact Assessment (EIA) if necessary. JICA is responsible for the data collection and analysis necessary for Environmental Screening and EIA.

All pilot projects did not need EIA in accordance with the Kyrgyz Environmental Regulations.

Table 1.9-1 Project Work and Requirement of EIA of Pilot Project

No.	Pilot Project	Project Work	Requirement of EIA
1	Traffic Flow Improvement	Junction improvement with lane markings and parking spaces on the green belts	No
2	Traffic Flow Improvement (II)	Chui-Fuchika Siaopina Intersection	No
3	Traffic Control System	Traffic signal optimization with CCTV camera and traffic detector equipment	No
4	Public Transport Facility Improvement	Bus stop improvement and its pedestrian crossing	No
5	Pedestrian Mall	Traffic safety awareness and pedestrians rights	No

1.10 Other Relevant Issues

(a) The coordination between the Study and "Public Transportation Project" implemented by European Bank for Reconstruction and Development (EBRD) should be made for the smooth implementation of the Study. For the purpose of the coordination, the progress of the Project of EBRD should be timely reported to JICA Kyrgyz office by the Bishkek City.

(b) The Bishkek City promised to take necessary procedures to set up a traffic survey database for future update and use.

(c) Both sides agreed that some pilot projects need to be started urgently after the commencement of the Study with more effective cooperation.

1.11 Structure of the Report

The report is broadly divided into three (3) parts as Part I, Part II, and Part III. This report consists of twenty five (25) chapters followed by appendixes.

Table 1.11-1 Structure of the Report

Part / Appendix	Chapter No. & Title	Outline
	Chapter 1: Introduction	
PART I Current Conditions	Chapter 2 ~ Chapter 11	Describes the current conditions of socio-economic condition, land use, urban structure, city road network, traffic conditions, public transportation, city parking, traffic flow & control, social and environmental consideration, etc.
PART II Future Socio-Economic Framework, Land Use and Travel Demand Forecast	Chapter 12 ~ Chapter 15	Describes future socio-economic framework, future development directions, future land use plan, traffic demand forecast, etc.
PART III Urban Transportation Improvement MP	Chapter 16 ~ Chapter 25	Describes transportation improvements policy & strategy, MP alternatives, MP evaluation, details of improvement plan for road maintenance, traffic flow and control system, city parking, institutional improvement, implementation program & priority, etc.

PART I: PRESENT CONDITIONS
CHAPTER 2 GENERAL CONDITIONS OF BISHKEK CITY

2.1 Natural Settings

2.1.1 Climate

The climate of Kyrgyz Republic is a typical continental type, characterized by cold winters and hot summers. Conditions are dependent on the elevation above sea level. Precipitation dominates in autumn, winter and spring, while it is mostly dry in summer. Bishkek belongs to the step climate category by the Koeppen Climate Classification. The clear weather exceeds more than 322 days in a year. The mean annual temperature is 11.3℃, and annual precipitation is 453 mm. The average minimum temperature is -7.1℃ in January, while the average maximum temperature is 31.7℃ in July.

Table 2.2-1 shows general conditions of the climate of Bishkek City.

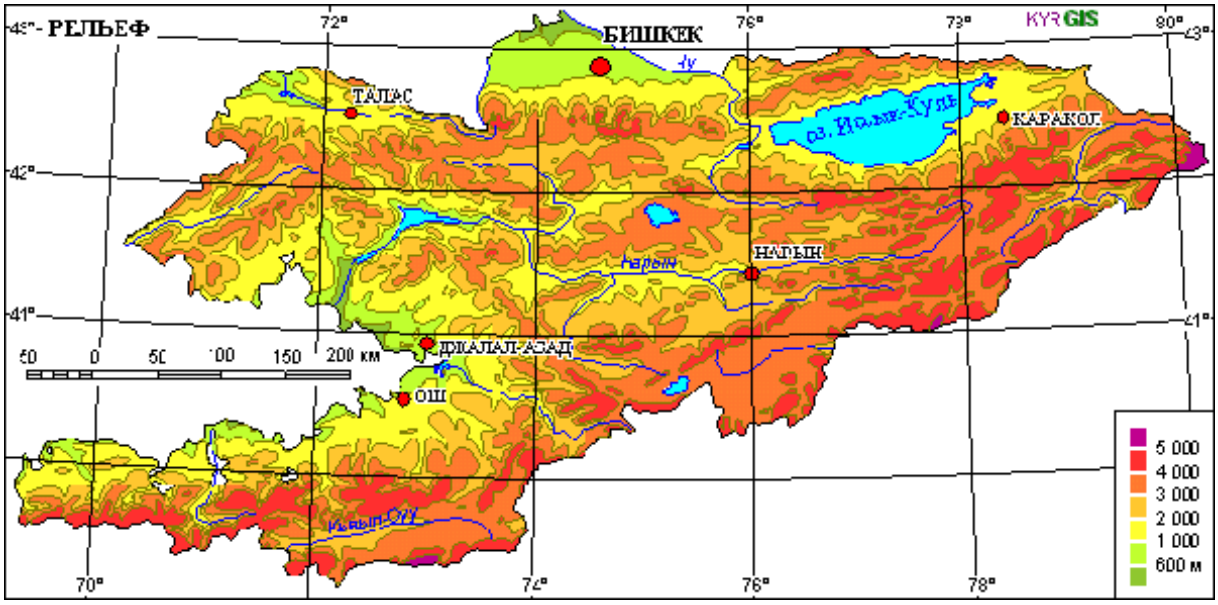
Table 2.1-1 General Climate Information of Bishkek City

Month	1	2	3	4	5	6	7	8	9	10	11	12	Year
The average minimum temperature (degree)	-7.1	-5.2	0.4	6.4	11.1	15.6	17.9	16.4	11.3	5.0	-0.1	-5.1	5.6
The average temperature (degree)	-2.6	-0.8	5.3	12.3	17.4	22.4	24.9	23.8	18.5	11.0	4.7	-0.9	11.3
The average maximum temperature (degree)	3.2	4.9	11.2	18.5	23.6	29	31.7	30.9	25.5	17.8	11.0	5.0	17.7
Precipitation (mm)	26	35	55	67	61	34	21	13	19	45	42	35	453
Humidity (%)	75	75	71	63	60	50	46	45	48	62	70	75	62
Snow cover (days)	21	13	5	0.2	0.1	0	0	0	0	0.5	4	15	60
Snow height (cm)	5	3	1	0	0	0	0	0	0	0	1	3	

Source : http://pogoda.ru.net, last viewed on April 24, 2013

2.1.2 Terrain and Topography

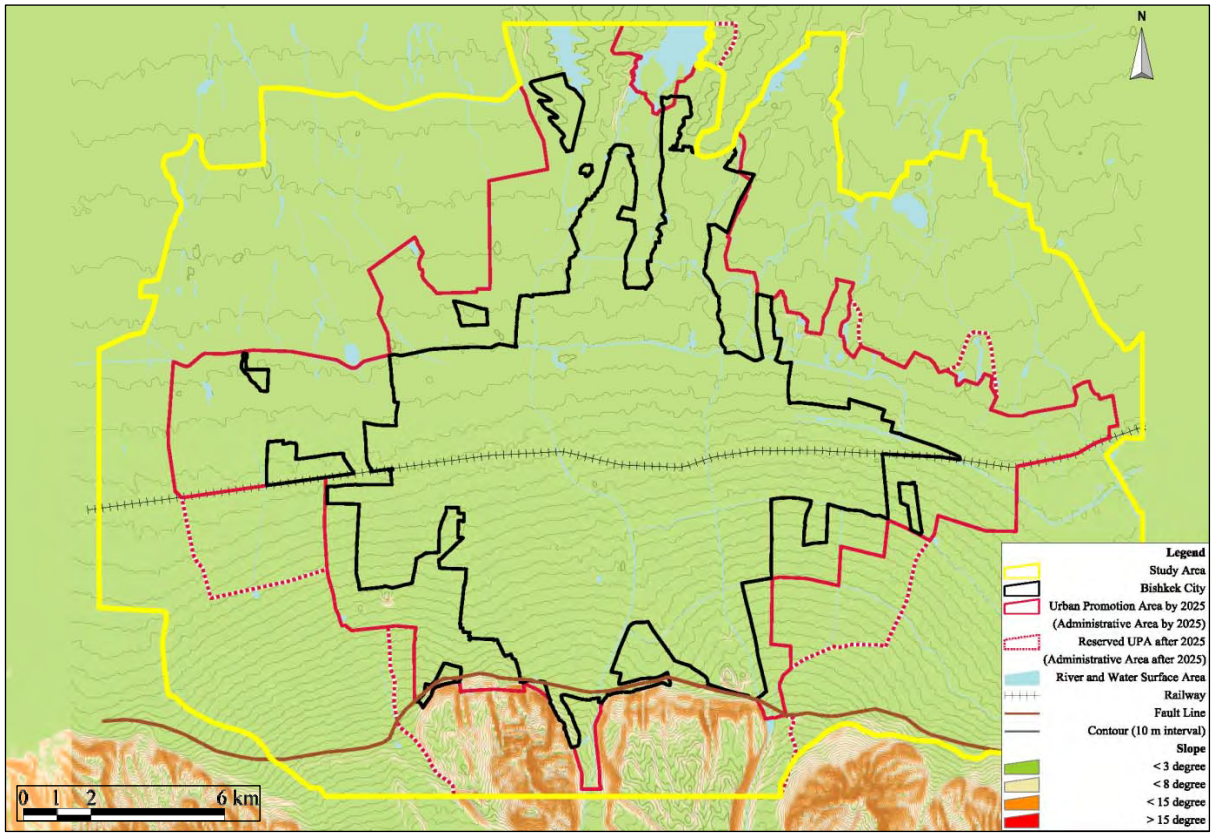
Bishkek City is located in the north central part of the Kyrgyz Republic. The city area is situated at the foot of the Kyrgyz Ala-Too Mountains in the center of the Chui valley at an altitude of around 750 meters above sea level. Bishkek lies in the plain formed by the confluence of rivers such as Ala-Archa and Alamedin. The city is surrounded by hills and mountains ranging from 600 to 4,000 meters above sea level. **Figure 2.1-1** shows topographic condition of Kyrgyz Republic.



Source : http://www.nature.kg

Figure 2.1-1 Elevation of Kyrgyz Republic

Figure 2.1-2 shows topographic condition of Bishkek City and surroundings. The area, with a gentle slope, widely extends throughout the territory of the city, but touches the foot of Kyrgyz Ala-Too Mountains at the southern edge of the city. The slope of the foot of the mountains is more than eight degrees (14%), which is not suitable for urban use.

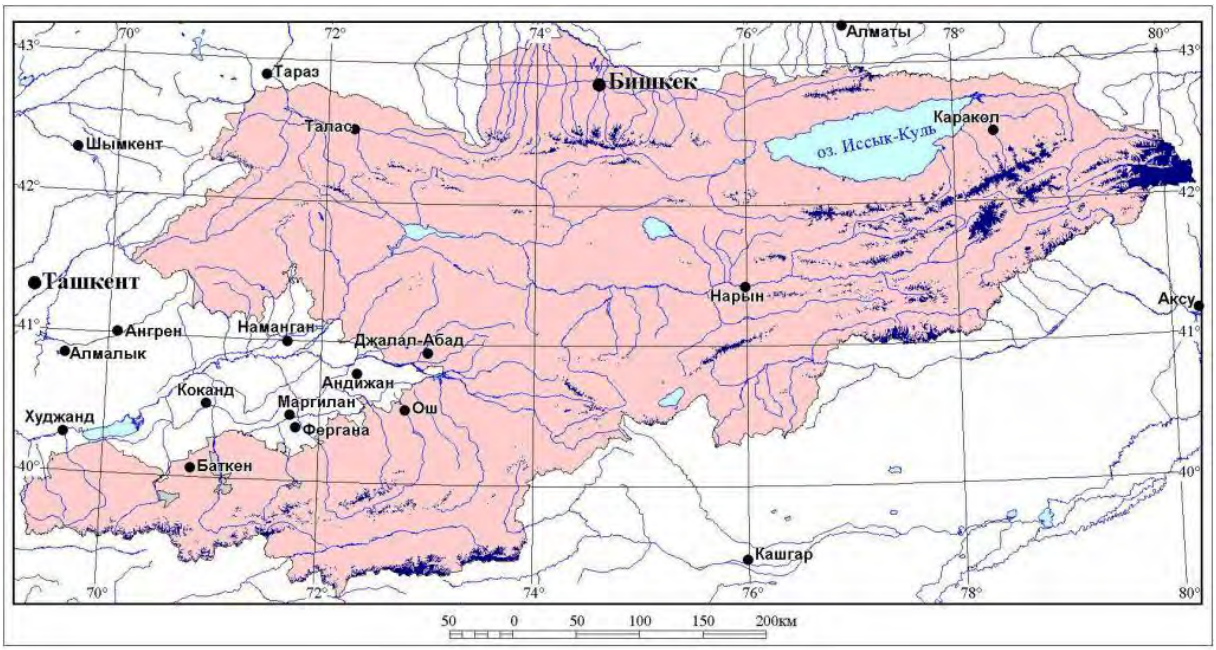


Source : JICA Study Team produced from the Shuttle Rader Topography Mission (SRTM) data.

Figure 2.1-2 Distribution of Steep Slope in and around Bishkek City

2.1.3 Rivers and Glaciers

The territory of Kyrgyz Republic is one of the largest areas having powerful modern glaciation in Central Asia, covering 8,000 square kilometers. The glaciers of the Tien Shan are the main water resource that flow into the rivers running north and central parts of the country. The Kyrgyz Ala-Too Mountains also has glaciers, which are the water sources of Bishkek City running through rivers from south to north. **Figure 2.1-3** shows distribution of glaciers of the country.



Source : National Academy of Sciences of the Republic of Kyrgyz Republic, 2008

Figure 2.1-3 Glaciers of Kyrgyz Republic, 2000

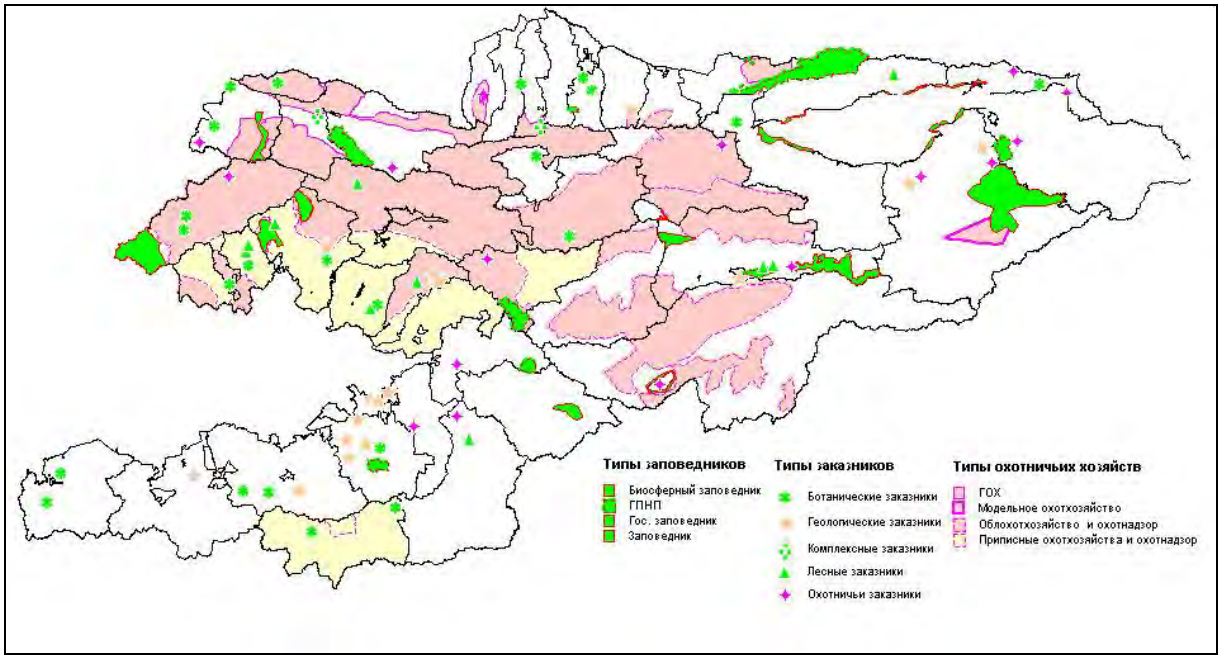
2.1.4 Specially Protected Areas

In order to maintain natural biodiversity, a network of protected areas (PA) is established in the territory of the republic. The total area of these protected areas amounts for 507.4 km^2, or 6.3 percent 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 2.1-2**.

Table 2.1-2 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.

In Bishkek City, there are no natural reserves for protection of neither woodland nor wildlife. There are natural parks on the slope of Kyrgyz Ala-Too Mountains, which are used for recreational purposes by the Bishkek citizens. **Figure 2.1-4** shows distribution of PAs in Kyrgyzstan.



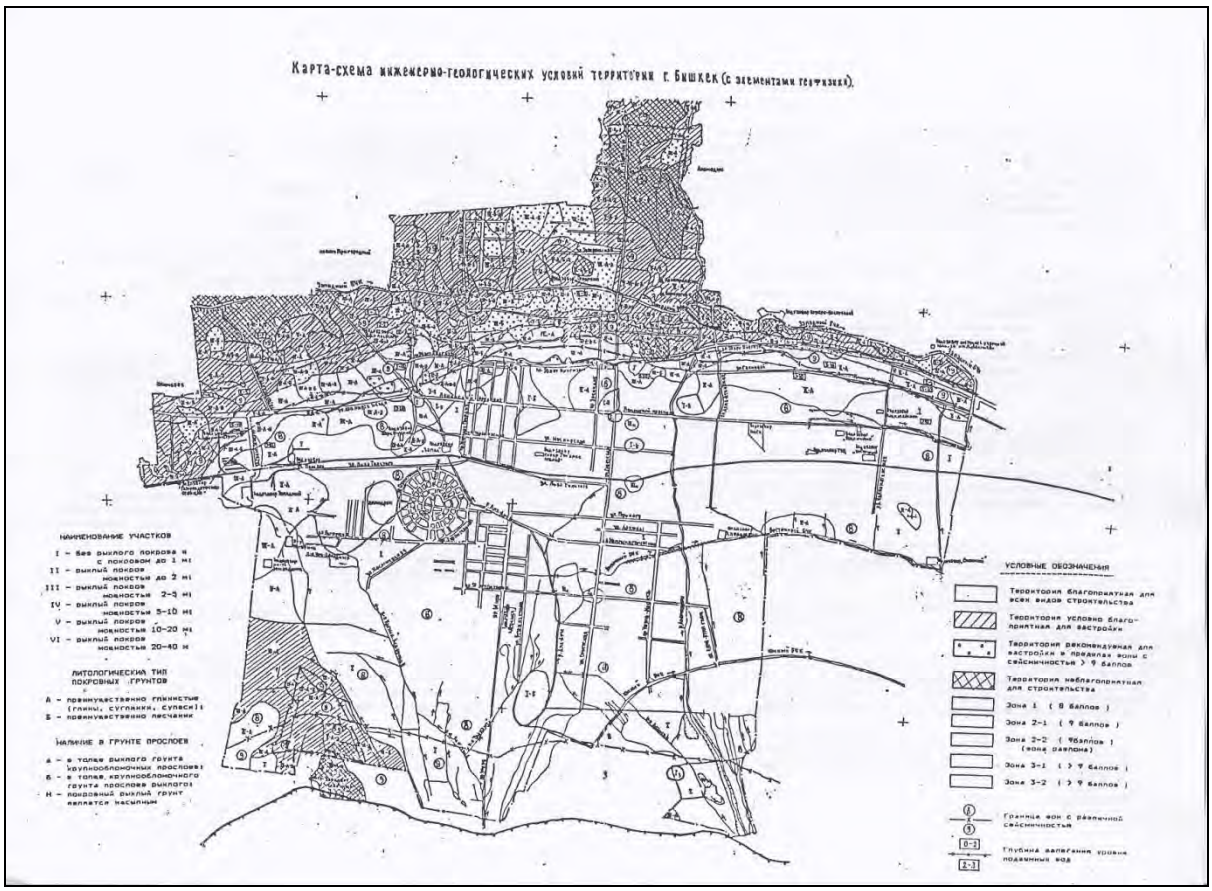
Source : http://www.nature.kg

Figure 2.1-4 Distribution of Specially Protected Areas in Kyrgyzstan

2.1.5 Geological Conditions

An evaluation map of geological conditions of the city was prepared in the course of the planning of the General Plan 2006 of Bishkek City. According to the map, the area in the north of Jibek-Jolu Avenue is mostly classified as less suitable for urban use. The west and southwest parts of the city are also classified as unfavorable, though not reaching to the level of unsuitable for urban living. **Figure 2.1-5** shows the classification map of geological conditions.

The seismically hazardous area was also classified in the planning process of the current General Plan 2006. **Figure 2.1-6** shows a zoning map of seismic conditions in the city. There is a fault line called Issyk-Ata running east-west direction at the southern end of the territory of the city. It also indicates a zone of hazardous areas (level >9) in the north and classifies as an unsuitable land for urbanization.



Source : Main Management Department of Architecture and Infrastructure, Bishkek City

Figure 2.1-5 Geological Map with Evaluation of Land Suitability for Urbanization in Bishkek

Source : Chief Architect Office of Bishkek City

Figure 2.1-6 Zoning Map of Seismically Hazardous Area in Bishkek City

2.2 Socio - Economy

2.2.1 Demography

According to the results of population and household census conducted in 2009, the permanent population of the country was around 3.74 million and that of Bishkek City was around 646,000[1], or 17.3 percent of the republic's population. The population whose mother language is Kyrgyz was 71.4 percent in the entire republic, with 66.2 percent in Bishkek City. It is also noticeable that the native speaker of Russian had much larger share in Bishkek (26.5%) compared to the republic (9.0%). The share of Uzbek speakers in Bishkek was very small at mere 1.2 percent against the Republic's 14.4 percent.

Details of demographic conditions of Bishkek City as well as its surrounding areas (the Study Area) are discussed in **Chapter 4**.

2.2.2 National Macro - economy

(1) Macro - Economic Performance

Immediately after obtaining the independence in 1991, the government of Kyrgyz Republic proceeded transformation to the Market Economy System in a rather radical pace. This brought a severe decline of industrial businesses but helped inviting foreign direct investments (FDI) starting from the mining sector. The agriculture sector in the republic has reasonable competitiveness thanking largely to the availability of water.

The primary industry of Kyrgyzstan is agriculture, combined with agro-industry. These activities have been contributing to the formation of economic base of the country, together with the urban services which has been accelerated by increasing number of urban dwellers.

In spite of political turmoil, the republic achieved over four percent of GDP growth in the last five years as CAGR basis. The per capita GDP as of purchasing power parity has doubled during the last 15 years from 1,003 USD in 1995 to 2,200 USD in 2010. **Table 2.2-1** shows macroeconomic indices of the country.

Table 2.2-1 Major Macroeconomic Indices of Kyrgyz Republic

Year	Unit	1995	2000	2005	2010
Population	Million	4.60	4.92	5.19	5.48
GDP (nominal)	Billion SOMS	16.15	65.36	100.90	212.18
GDP (real)	Billion SOMS	16.15	21.20	25.52	31.19
Deflator	%	100	308.24	395.33	680.39
Real GDP Growth Rate (CAGR)	%		5.59	3.78	4.09
GDP (purchasing power parity)	Billion USD	4.61	6.58	8.89	12.05
Per Capita GDP (purchasing power parity)	USD	1,003.16	1,337.43	1,712.52	2,200.13

Source : World Economic Outlook, IMF (September, 2011)

[1] There are several population census in Bishkek City. The Study examined it in **Chapter 4** based on 2011 data.

Regarding the GDP structure, agriculture accounted 12.5 percent, while industry contributed for 21.5, in the second quarter of the year 2011. These were followed by the trade and repair sector which recorded 15.6 percent. **Table 2.2-2** shows GDP of the second quarter of the year 2011 in current price.

Table 2.2-2 GDP in Current Price by Production, Q2, 2011

Item	Amount (million SOMS)	Share (%)
Agriculture	7,129.40	12.5
Industry	12,260.60	21.5
Construction	2,599.40	4.6
Trade and Repair	8,849.00	15.6
Transport and Communication	5,632.60	9.9
Financial Intermediation	434.00	0.8
Public Administration	3,827.40	6.7
Other Activities	16,173.50	28.4
GDP in Current Prices, by Production Approach	56,905.90	100.0

Source : National Statistic Office

(2) International Trade

The efforts of the liberalization of the economy have enabled integrating the national economy to the international economy. Kyrgyzstan became a member of IMF, the World Bank, and ADB in 1992, and WTO in 1998. The latter fact, together with the geographical location of the republic, has enabled Kyrgyzstan to practice re-exporting Chinese products to the Central Asian countries and beyond. As shown in **Table 2.2-3** to **Table 2.2-5**, the overall trade amount of the republic increased dramatically: from 2005 to 2010, the total export increased by 17.2 percent while import 24 percent. This rapid growth can be attributed to the practice of re-export of Chinese goods, since the growth of trade volume well exceeds the growth of both production and consumption of Kyrgyzstan.

The trade balance is excess of import consistently, although there observed improvement during 1995 to 2000. The trade deficits have been expanding in recent years, implying that the economy of the republic is transforming to the consumption driven type.

Table 2.2-3 Change in Amount of Export

Item	1995	2000	2005	2010
Consumption (Million USD)	128.4	53.3	130.9	351.9
Growth (%)		-16.1	19.7	21.9
Raw Materials (Million USD)	96.4	58.7	43.0	202.4
Growth (%)		-9.4	-6.1	36.3
Interim Goods (Million USD)	119.4	284.6	399.8	778.9
Growth (%)		19.0	7.0	14.3
Investment Goods (Million USD)	19.2	25.3	19.6	37.8
Growth (%)		5.7	-5.0	14.1
Energy Products (Million USD)	45.6	82.5	78.8	117.4
Growth (%)		12.6	-0.9	8.3

Item	1995	2000	2005	2010
Total Export (Million USD)	408.9	504.5	672.0	1,488.4
Growth (%)		4.3	5.9	17.2

Source : International Transactions Reporting System

Table 2.2-4 Change in Amount of Imports

Item	1995	2000	2005	2010
Consumption (Million USD)	105.5	155.0	287.7	1,111.9
Growth (%)		8.0	13.2	31.0
Raw Materials (Million USD)	56.7	52.5	43.2	117.9
Growth (%)		-1.5	-3.8	22.2
Interim Goods (Million USD)	101.9	127.1	308.1	683.7
Growth (%)		4.5	19.4	17.3
Investment Goods (Million USD)	70.1	91.0	148.6	455.4
Growth (%)		5.4	10.3	25.1
Energy Products (Million USD)	188.5	129.1	313.7	854.1
Growth (%)		-7.3	19.4	22.2
Total Import (Million USD)	522.6	554.6	1,101.3	3,223.1
Growth (%)		1.2	14.7	24.0

Source : International Transactions Reporting System

Table 2.2-5 Change in Trade Balance

	1995	2000	2005	2010
Total Trade (Million USD)	931.5	1,059.1	1,773.3	4,711.5
Growth (%)		2.6	10.9	21.6
Total Balance (Million USD)	-113.7	-50.2	-429.3	-1,734.7
Growth (%)		-15.1	53.6	32.2

Source : International Transactions Reporting System

2.2.3 Macro - Economy of Bishkek City

(1) GRDP Structure

Bishkek was one of a manufacturing centers of the former Soviet bloc, accommodating industries of machinery, automobiles assembly, textile, furniture, meat, etc., which was triggered by the evacuation of munitions industry from Moscow during WWII. Most of these large-scale industries have disappeared due to the change of economic system after the collapse of the Soviet Union.

Table 2.2-6 shows composition of industrial output of Bishkek City in the first half of 2011. The Gross Regional Domestic Product (GRDP) of Bishkek City has rapidly grown after the country gained stability of socio-economy. The annual growth of GRDP marked 10 percent or over after 2000, until the international economy stagnated in 2008 by the international financial crisis. The rapid growth of the city's economy has been led by the growth of service sector, backed by the expansion of trade and consumption. The share of service sector GRDP in the first half of 2011 was more than 60 percent, while with the share of employment was 62 percent, according to the economic bulletin of the city. The service

sector GRDP of Bishkek was equivalent to 50 percent of the service sector GDP, revealing the concentration of services to the capital city. This is also true regarding the manufacturing sector: the share of Bishkek's food production amounts 45 percent of the national production. Many manufacturing plants locate in the city, covering confectioneries, beverages, dairy products, tobacco products, and beer.

The growth of manufacturing output of the city was faster than that of national output owing largely to the growth of the following sub-sectors: food and beverages (juices by 1.8 times faster than national averaged outputs, dairy beverages 1.6 times, crumbs 4.4 times, ketchup and sauces 4.4 times, non-alcoholic beverages 1.6 times, beer 13.6 times), cloth and textile (clothing production by 1.7 times), construction materials (cement, concrete, 6.6 times, corrugated asbestos-cement 2.5 times), wood products (construction 1.2 times).

Table 2.2-6 Composition of Industrial Output of Bishkek City in First Half Period, 2011

Unit : million SOMS

	January - June 2011	Share (%)	January - June 2010	Growth (%)
I. Mining Industry	7.9	0.1	15.8	50.0
II. Manufacturing,	9,578.7	69.3	7,435	128.8
1. Process Food, Beverages and Tobacco	3,632.7	26.3	2,745.7	132.3
2. Textileand Textile Products	2,533.3	18.3	1,888.5	134.1
3. Leather, Leather Products and Footwear	24	0.2	17.3	138.7
4. Wood Processing and Production of Wood Products	6.9	0.0	2.8	246.4
5. Pulp and Paper Industry, Publishing	715.3	5.2	595.3	120.2
6. Manufacture of Coke, Refined Petroleum Products and Nuclear Fuel	18.4	0.1	16.5	111.5
7. Chemical Manufacturing	132.5	1.0	170.4	77.8
8. Manufacture of Rubber and Plastic Products	567.9	4.1	395.4	143.6
9. Other Non-metallic Mineral Products	486.8	3.5	497.5	97.8
10. Basic Metals and Fabricated Metal Products	392.8	2.8	235.1	167.1
11. Machinery and Equipment	426.7	3.1	439.6	97.1
12. Manufacture of Electrical and Optical Equipment	145.8	1.1	170.3	85.6
13. Manufacture of Transport Equipment	307.4	2.2	124.4	247.1
14. Other Industries	188.2	1.4	136.2	138.2
Electricity, Gas and Water	4,232.9	30.6	4,153.6	101.9
Industry, Total:	13,819.5	100.0	11,604.4	119.1

Source : Information on session of board of mayor's office of the city of Bishkek concerning « Results of functioning of economy of the city of Bishkek for I half-year and problems for II half-year 2011

(2) Trade

According to the Economic Bulletin issued by the city, the gross trade amount for the period of January to May, 2011 was 1,430 million USD, in current price. This is a growth of 35.4 percent compared to the same period last year. The trade balance was the excess of imports for the amount of 207.2 million USD. Regarding the trade partners, nearly half, 46.8 percent, was to/from CIS countries. Among the goods exported from Bishkek City, gold dominated with the share of 78.9 percent of the total value.

The major imported goods include fossil fuels (30.6%), and pharmaceuticals (11.1%). **Table 2.2-7** shows the composition of trade commodities of Bishkek City, in the second quarter of 2011.

Table 2.2-7 Composition of Trade Commodities of Bishkek City, Q2, 2011

Item	million USD	%
I. Main Imported Products:	590.3	100.0
1) Non-monetary Gold	432.3	78.9
2) Garments	51.2	9.3
3) Oil and Petroleum Products	21.3	3.9
4) Electric Current	18.6	3.4
5) Fruits and Vegetables	7.4	1.4
6) Non-ferrous Metals	5.7	1.0
7) Drinks	3.5	0.6
8) Dairy Products and Bird Eggs	5.2	0.9
9) Skins, Hides and Skins	2.8	0.5
II. The Main Exported Products	548.0	100.0
1) Oil and Petroleum Products	180.4	30.6
2) Medical and Pharmaceutical Products	65.6	11.1
3) Meat and Meat Products	31.2	5.3
4) Iron and Steel	28.0	4.7
5) Electrical Machinery, Apparatus and Appliances	19.7	3.3
6) Cereals	41.9	7.1
7) Coffee, Tea, Cocoa, Spices and Their Products	25.5	4.3
8) Sugar, Sugar Products and Honey	32.5	5.5
9) Instrumentation and Telecommunications Equipment	29.8	5.0
10) Paper and Board	19.7	3.3
11) Vegetable Oils and Fats	17.4	2.9
12) Automobiles	19.3	3.3
13) Natural Gas and Artificial	18.8	3.2
14) Essential Oils, Perfume and Resinous Matter	25.6	4.3
15) Drinks	19.8	3.4
16) Tobacco and Tobacco Products	15.1	2.6

Source : Information on session of board of mayor's office of the city of Bishkek concerning « Results of functioning of economy of the city of Bishkek for I half-year and problems for II half-year 2011 »

(3) Investment

In the first half of 2011, total capital investment in the city accounted for 4,748.2 million SOMS, of which 55.3 percent was made by households directed primarily to the new construction and repair of housings. Enterprises' capital expenditure accounted for 24.5 percent. The share of FDI was 1.4 percent, sharply declined from the same period of the previous year. This is attributable to the international financial crisis of 2008, as well as political turmoil taken place in 2010. The total FDI to Bishkek accounted for 23.9 percent of that to the republic. **Table 2.2-8** will show the structure of capital investments by source of funding. Public investment such as heat and water supply kept rather low at 2.7 percent combining the city and the central government.

Foreign capital investment has increased backed by a stable economic liberalization. Reportedly a large share of the foreign investment heads to long-term projects such as real estate and corporate investment. The FDI portion of the total foreign capital investment was around 26.2 percent, according to the authority of the City.

Table 2.2-8 Structure of Capital Investments by Source of Funding

Capital investments by sources of financing	January - June 2011		January - June 2010	
	mil. SOMS	%	mil. SOMS	%
Households	2,626.0	55.3	1,926.2	51.0
Funds of Enterprises and Organizations	1,166.1	24.5	1,180.1	31.2
Foreign Credit	757.4	16.0	214.9	5.7
Foreign Direct Investment	68.7	1.4	332.8	8.8
Republican Budget	64.2	1.4	32.1	0.9
Local Budget	62.6	1.3	85.5	2.3
Loans to Resident Banks KR (Kyrgyzskie banks give credits)	3.2	0.1	4.1	0.1
Foreign Loans and Humanitarian Aid	-	-	-	-
Total	4,748.2	100.0	3,775.7	100.0

Source : Information on session of board of mayor's office of the city of Bishkek concerning « Results of functioning of economy of the city of Bishkek for I half-year and problems for II half-year 2011 »

Looking at the distribution of FDI headings, the financial investments shared large part (29.9%), although the share of it declined by 2.1 points from the same period of the previous year. FDI to manufacturing, transportation, and real estate also plunged, while investment in trade, repair of motor vehicles, and household goods and personal items showed a higher growth. The share of manufacturing sector was 6.1 percent combining investments in food products, beverages and tobacco, textile and textile products, pulp and paper production, and publishing.

Table 2.2-9 shows distribution of FDI by economic activity in the first quarter of 2011. Comparing to 2010, FDI was reduced at 77 percent.

Table 2.2-9 Distribution of Foreign Direct Investment by Economic Activity

Unit :Million USD

Foreign Direct Investment by Economic Activity	Q1, 2010	Q1, 2011
Financial Activities	32.0	29.9
Trade, Repair of Motor Vehicles, Household Goods and Personal Items	3.7	12.3
Real Estate Transactions	8.6	4.6
Manufacturing	17.4	6.1
Construction	1.3	0.9
Transport and Communications	5.8	0.2
Hotels and Restaurants	1.1	0.6
Healthcare	0.8	0.0
Total	70.5	54.6

Source : Information on session of board of mayor's office of the city of Bishkek concerning « Results of functioning of economy of the city of Bishkek for I half-year and problems for II half-year 2011 »

The largest FDI was made by Kazakhs (17.3 million USD), followed by Russians (11.3 million USD). Other countries include: China (6.4 million USD), Latvia (3.5 million USD), Pakistan (3.3 million USD), Iran (3.0 million USD), and Turkey (1.5 million USD).

(4) Composition of Business Entities

The number of business entities as of July 2011 was around 84.5 thousand, increased by 3.5 percent from the previous year. Among them, the self-employed were the largest with 46.9 percent of the total number. The number of companies with operations in more than 10 years was 5,800 or 6.8 percent, and the number of newly established was 600. **Table 2.2-10** shows composition of business entities in Bishkek City.

Table 2.2-10 Composition of Business Entities in Bishkek City

Type of Entity	Number (thousand)	Share (%)
Self-employed	39.6	46.9
No Signs of Activity	21.6	25.6
Existing Enterprises	9.2	10.9
"Dormant" for over 10 Years	5.8	6.8
"Dormant" until the Year	3.4	4.0
Not Applicable over a Year	3.1	3.6
Newly Established	1.3	1.5
In Liquidation	0.6	0.7
Total	84.6	100

Source：Information on session of board of mayor's office of the city of Bishkek concerning « Results of functioning of economy of the city of Bishkek for I half-year and problems for II half-year 2011 »

CHAPTER 3 LAND USE COMPOSITION OF YEAR 2010

3.1 Urbanization of Bishkek City

3.1.1 History of Urbanization and General Plans

The origin of Bishkek can be traced back to a caravan rest established along one of the branches of the Silk Route in the ancient times. In 19th century, the Tsarist Russian settled a garrison and built a town. The then Russian government promoted immigration of Russian farmers by giving land for cultivation around the garrison.

After the establishment of the socialist regime, the government of the Soviet Union helped formulating the General Plan of Bishkek City. The plan was approved in 1975 and legally enforced until replaced by the new General Plan enacted in 2006. The planning area of the General Plan 1975 covered the most parts of the current administrative area of Bishkek City.

As the General Plan 1975 became outdated after the change of socio-economic system of the country brought by the collapse of the Soviet Union and independence of the Kyrgyz Republic, a new General Plan was formulated for the target year 2025 and the plan was authorized in 2006 (General Plan 2006). The major components of General Plan 2006 includes delineation of the urban growth boundary, land use plan, road development and transportation plan. In General Plan 2006, the urban growth boundary was delineated by covering the land area of 268 km^2. In addition, it designates a set of reserved land for further urban beyond 2025, covering 332 km^2. The major policies shown in the General Plan 2006 can be summarized as follows:

(a) Urbanization is promoted to the east and west directions, as the south is blocked by Ala-Archa Mountains and Issyk-Ata fault, and the north is blocked by high ground water area and forest

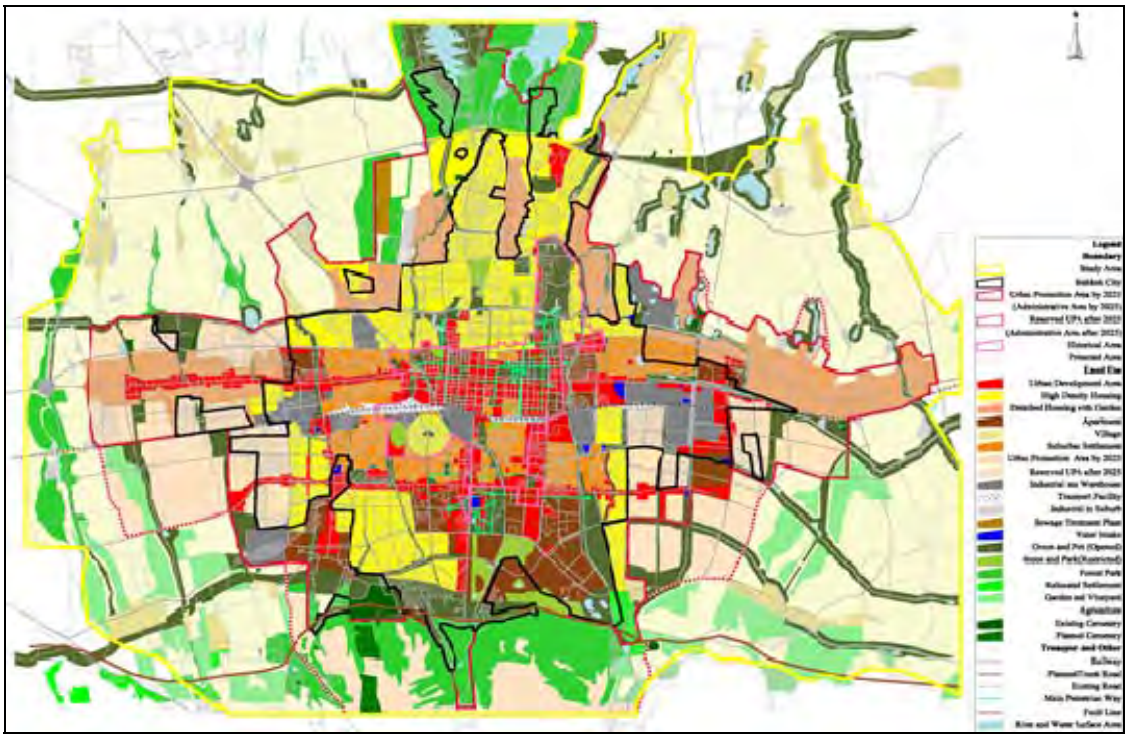
(b) A new urban axis is expected to be developed along Akhumbaev Avenue, adding to the one along Chuy Avenue

(c) The multi-polar form is sought consisting of new public centers along the urban axes and ring roads

(d) The green and open space network will be extended to the forest parks in the north and south end of the city

(e) Several areas are protected from urban use, such as historical monuments and environmentally important areas

Figure 3.1-1 shows the perspective of future land use visualized by the General Plan 2006.

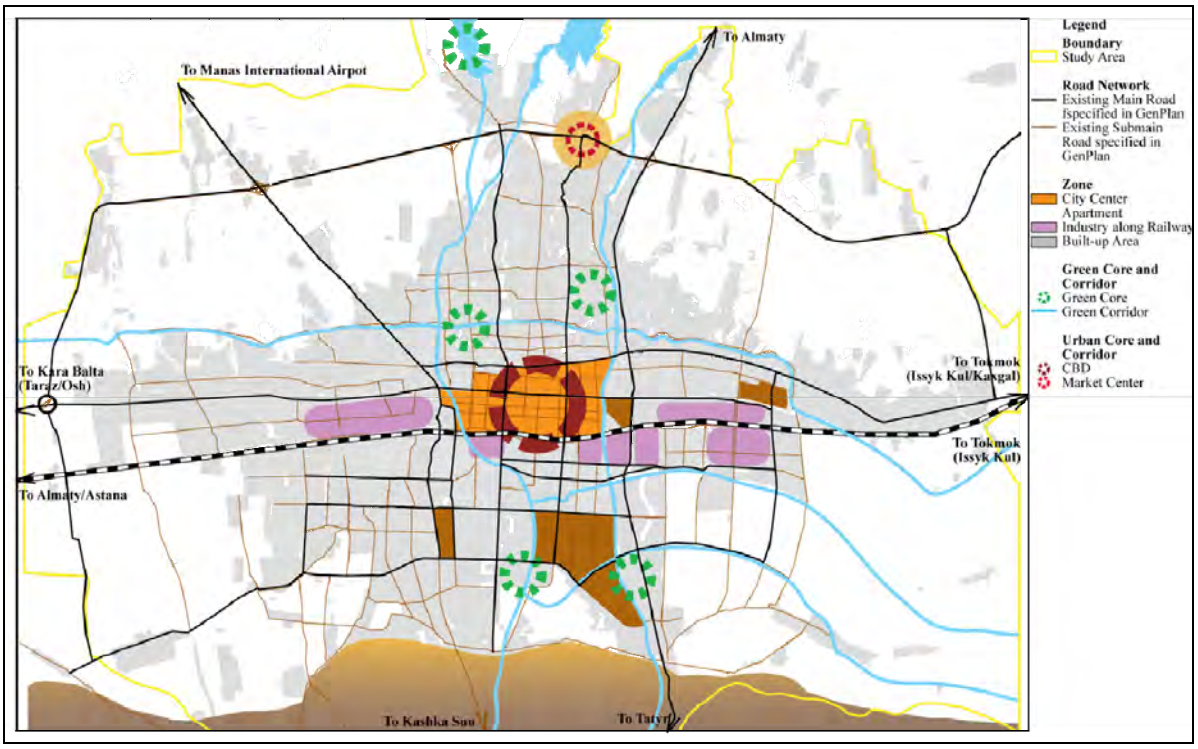


Source : JICA Study Team

Figure 3.1-1 Future Land Use by General Plan 2006

3.1.2 Current Urban Structure

It is noticeable that the city foundation was constructed and largely influenced by the General Plan 1975. The existing urban structure was built on a mono-centric pattern with a relatively large City center and low-rise housing areas around it. It was formed by a grid style road network and land blocks are mostly filled with a set of medium-rise apartments having a common neighborhood playground. The low-rise housing area extends from the City center along the trunk roads such as Den Shaopina and Pobeda avenues in the east-west direction, as well as Mir, Baytik Baartyr, Makhatma Gandi, and Abdrakhmanov avenues in the north-south direction. A railway running east-west direction separates the built-up area into two parts. There are many restoration projects of old apartment buildings funded by private sector developers. There is a large scale development project going on, centering the junction of Mir and Abdrakhmanova Avenues and along these roads. **Figure 3.1-2** shows a conceptual drawing of the current urban structure.



Source : JICA Study Team

Figure 3.1-2 Current Urban Structure of Bishkek City

3.2 Objective and Outline of Land Use Analyses

3.2.1 Objective

The objective of preparing the land use map of year 2010 is to obtain basic information on distribution of population and number of workers and students within the Study area. This information is used as a set of major inputs to the projection and assignment of the transport demands analyses.

3.2.2 Outline of Survey for Land Use of 2010

(1) Area

Bishkek City consists of four districts including Chon-Aryk village. The four districts are further divided into 21 sub-districts which are officially called the Local Territorial Area (LTA). The boundary of these sub-districts was officially defined in 2008.

The area for the land use survey was delineated to cover the area analyzed for the preparation of the General Plan 2006, which includes the administrative area of Bishkek City and surroundings. This area covers most of the conurbation areas except for some parts of LTA 14 and LTA 16. The total land area is estimated to be 579 km^2. This area was defined to be the Study area.

(2) Satellite Imagery

A set of Satellite imagery is used for preparing the land use of 2010. The employed images were

obtained in the period from 25 April to 2 August 2010 by the WorldView-2 Satellite with 50 cm high-resolution pan-sharpen format. The satellite imagery covers an area of 600 km^2 containing the most part of the survey as shown in **Figure 3.2-1**.

(3) Field Survey

The central part of Bishkek City is mostly built with medium-rise buildings (5 to 8 stories) which are used for housing, commercial, and office purposes. On the other hand, conurbation areas in suburbs are largely formed by detached housings, although small complexes of apartments and/or factories can be observed in some specific areas. Taking these characteristics into account, different approaches were taken to obtain the land use composition of 2010.

For the central area, the type of land use was identified for every plot of land based on the field survey conducted by the JICA Study Team, from September to November 2011. The central area was defined as the area bounded by Jibek-Jolu Avenue to the north, Osmankul Street to the east, the railway to the south, and Yulius Fuchik Street to the west. It covers the area of approximately 11 km^2. For conurbation areas located outside the above defined central area, the land use was defined for every block of land consisting of a group of plots and bounded by existing roads, based on the field survey. In case of the block containing land plots of larger than one hectare, the usage of these plots were also identified. These large plots may affect the geographical distribution of population and the number of workers in the future.

(4) Land Use Category

The category of land use types employed for the survey was defined to match the classification used by the land use analysis map prepared in the course of the General Plan 2006.

(5) Mapping

The mapping work was conducted based on the satellite imagery, and then modified by reflecting the results of field surveys. The work was carried out by a subcontracted mapping company.

(6) Software

The GIS software is mainly used for compilation of maps for the land use of 2010, as well as for the analyses and drawing of future land use composition. The latest version of ArcGIS (i.e. ArcView 10) with Spatial Analyst extension has been installed in newly purchased workstation (z400 model) in a project office.

3.2.3 Result of Land Use Mapping for the year 2010

The result of the survey and mapping works is presented in **Figure 3.2-2**.

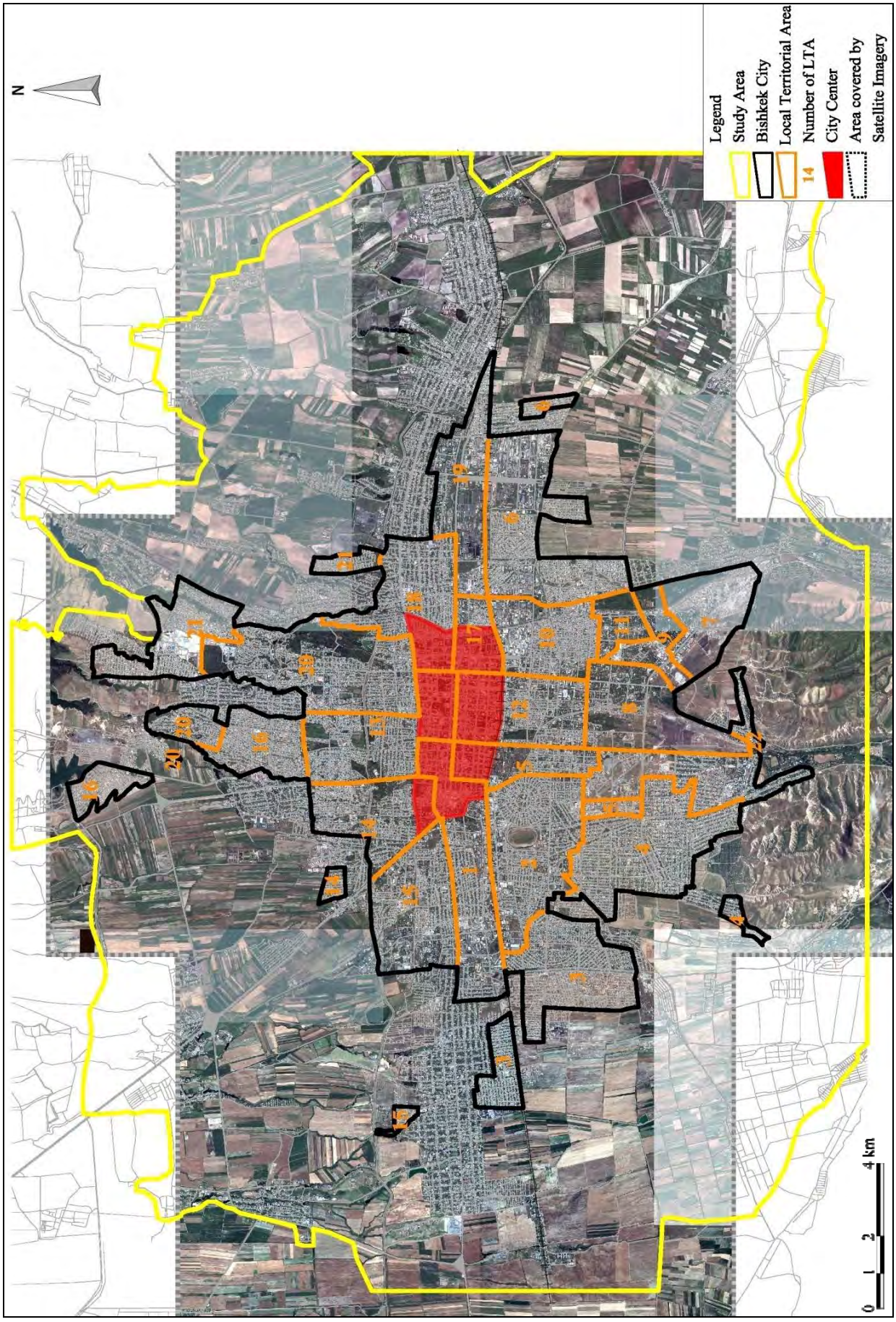
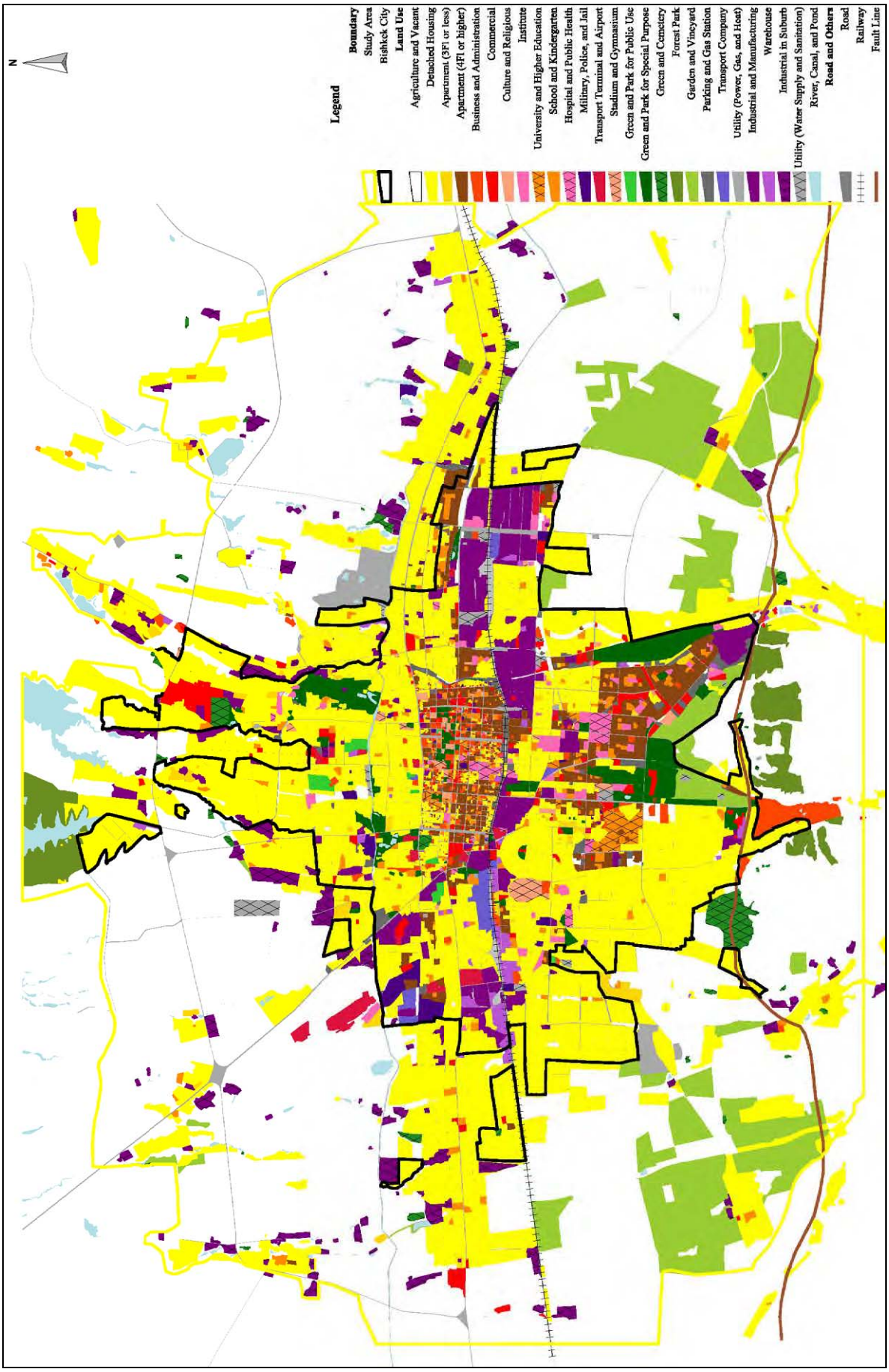


Figure 3.2-1 Boundaries of Study Area, City Area, the City Center, and Collected Satellite Imagery



Source : JICA Study Team

Figure 3.2-2 Land Use Map of 2010

3.3 Land Use Composition of 2010

3.3.1 Land Area by Land Use Category

Table 3.3-1 shows the land area by the land use category measured on the land use map of 2010. Most of the land within Bishkek City was urbanized in 2010 as 90 percent of the total land area within the city's territory was used as residential, commercial, industrial, transport, education, and other facilities purposes. Regarding the remaining 10 percent of the total land area, the parks and the rivers occupy 7.3 percent and 0.9 percent of the city's territory, respectively. Thus, the available land for the new urbanization would be limited to mere 1.8 percent of the city, consisting of the agricultural and vacant lands.

The share of the urbanized area in the Study Area, on the other hand, was much smaller as estimated to be 41.1 percent. The remaining parts include agricultural lands (48.1%), parks (9.0%), and rivers (1.7%) in the Study Area. This implies that there are plenty of spaces to be converted to the urban use for the future urbanization.

Table 3.3-1 Land Area by Land Use Category, 2010

Land Use Category	Bishkek City		Study Area		Note
	Land Area (ha)	(%)	Land Area (ha)	(%)	
Detached Housing	6,647	44.06	12,876	22.25	Including mixed use of housing and other function
Low-rise Apartment (3 floors or less)	165	1.1	271	0.47	Including mixed use of housing and other function
Apartment (4 floors or higher)	1,001	6.64	1,031	1.78	Including mixed use of housing and other function
Business and Administrative	191	1.27	357	0.62	Including private office and government office
Commercial	382	2.53	446	0.77	Including bazaar, market, shopping center, and restaurant
Culture and Religious	47	0.31	48	0.08	Including museum, theatre, church, and mosque
Institute	212	1.4	223	0.39	-
University and Higher Education	131	0.87	131	0.23	-
School and Kindergarten	285	1.89	408	0.7	School for pupils from Grade 1 to Grade 11
Hospital and Public Health Service	109	0.72	111	0.19	-
Military, Police, and Jail	151	1	164	0.28	-
Railway Station, Bus Terminal, and Airport	102	0.67	177	0.31	Including marshalling yard, trolleybus terminal, and cargo yard
Stadium and Gymnasium	91	0.6	94	0.16	-
Park for Public Use	784	5.2	788	1.36	Including square
Park for Special Purpose (Restricted)	64	0.42	67	0.12	Including square
Cemetery	53	0.35	297	0.51	-
Forest Park	4	0.03	749	1.3	-

Land Use Category	Bishkek City		Study Area		Note
	Land Area (ha)	(%)	Land Area (ha)	(%)	
Garden and Vineyard	250	1.66	3,602	6.23	-
Parking Area, Gas Station, and Car Maintenance	214	1.42	233	0.4	-
Transport Company	122	0.81	123	0.21	-
Utility (Power, Gas, and Heat)	9	0.06	288	0.5	-
Industrial and Manufacturing	1,237	8.2	1,285	2.22	-
Warehouse	154	1.02	196	0.34	-
Industrial in Suburb	41	0.27	1,066	1.84	-
Utility (Water Supply and Sanitation)	79	0.52	137	0.24	-
River, Main Canal, and Pond	134	0.89	996	1.72	-
Agriculture	266	1.76	27,825	48.09	-
Road	2,009	13.31	3,653	6.31	-
Railway	142	0.94	191	0.33	-
Unclassified	10	0.07	24	0.04	-
Total	15,087	100	57,857	100	

Note : Bishkek City means its administrative area within the Study Area excluding part of LTA 14 and LTA 16.
Source : JICA Study Team

3.3.2 Distribution of Business and Commercial Areas

Commercial spaces in the central area are mostly developed in the lower floor of apartment buildings. There are still small number of private commercial buildings but the construction of shopping malls is becoming to be popular in 2010. The old style markets are still active in the City Center and the one in the outskirts, or Dordoi Market, is in the process of growth.

3.3.3 Distribution of Industrial Area

Industrial and manufacturing areas had been developed along the railway during the Soviet time. These areas were filled by munitions factories and key utilities facilities such as power generation and central heating system plants. As the munitions factories were moved out after the independence of the Kyrgyz Republic, the industrial areas became less efficient in terms of land use. At the same time, several new industrial lands are developed in the periphery of built-up areas in a disordered manner and deteriorating the living environment.

Figure 3.3-1 shows the location of industrial areas with the existing factories registered in BCDA.

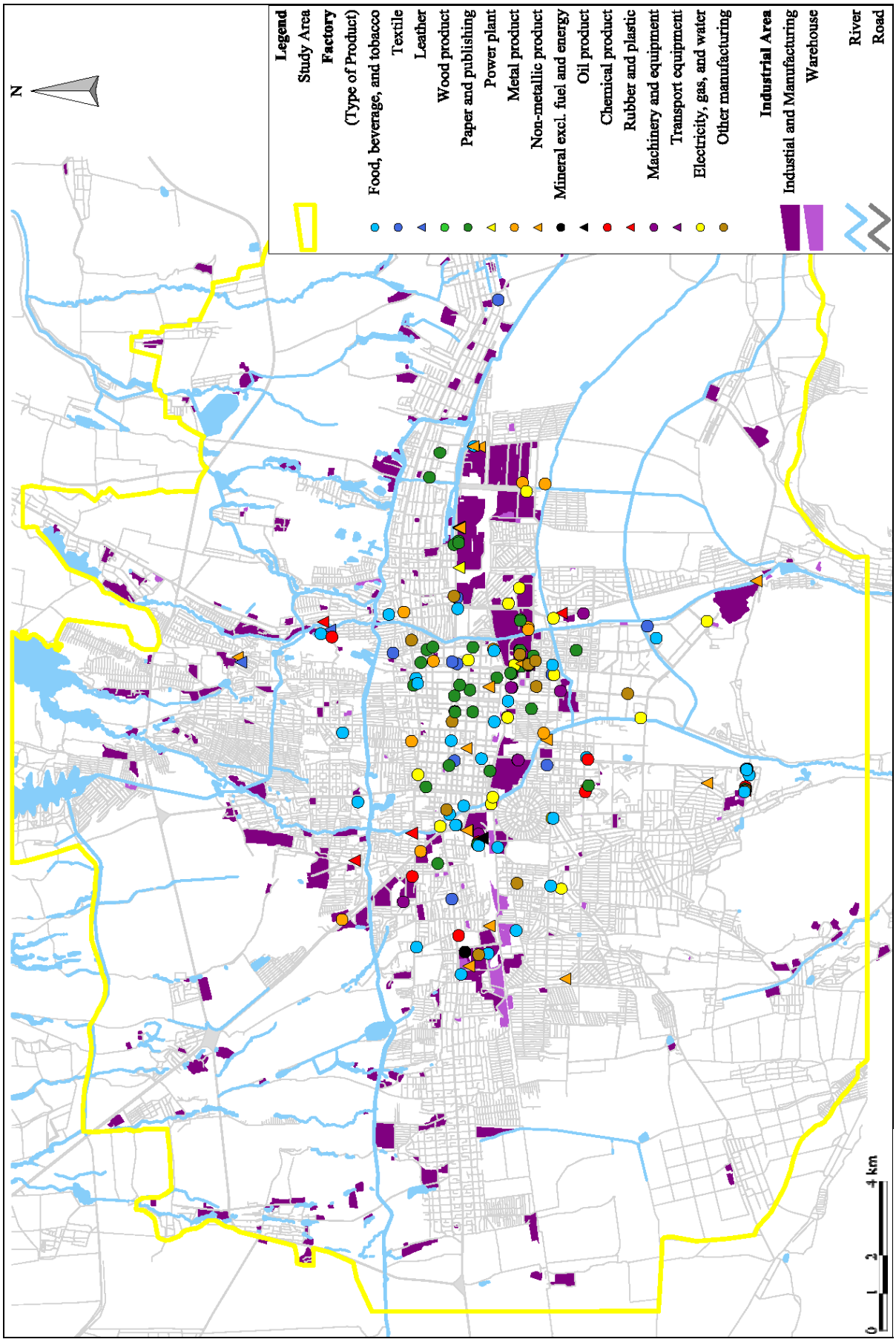


Figure 3.3-1 Distribution of Industrial Area and Factories, 2010

3.3.4 Distribution of Housing Area by Type

(1) Type of Housing Area

Various forms of housing areas spread over the Study Area. Taking the historical background of the urbanization into account, the housing areas were classified into 10 types, after broadly divided into (a) the detached housing area and (b) the apartment area. The characteristics of the 10 types are described below.

(a) Detached Housing Area

D1: Housing Area in the City Center

This is an area which was planned by the General Plan 1975 to accommodate the mixed land use consisting of administrative and housings purposes equipped with public parks. The blocks in this area are typically formed by the grid style urban space.

D2: Planned Housing Area

This is the area developed in accordance with the land use of the General Plan 1975. Blocks in this area are formed by a well-ordered road network in grid and radial manners to comply with the planning standard at the time. This type of the area is located in the south of the City Center across the railway.

D3: Quasi-Planned Housing Area

This is the area designated as the low-rise housing area in the General Plan 1975. Blocks in this area are created in a deformed rectangular shape, implying that the urbanization took place by conversion of agricultural lands into the formal settlement areas by inheriting a road network and a boundary of the spatial fabrications of the villages. This type of area is typically observed at around the City center in north, east, and west directions.

D4: New Housing Area (Novostroyka)

This is the area developed after the formulation of the General Plan 1975. A unit based planning scheme was employed for the urbanization, which did not fully comply with the technical requirements specified in the SNIP.

In the early years of independence, the Kyrgyz authorities began allocating agricultural lands to migrants for individual housing construction as the semi-formal settlements. Creation of such semi-formal settlements continued throughout 1990s and early 2000s at a relatively moderate pace, but accelerated significantly after 2005. Once these semi-formal settlements are approved as a new urban area (Novostroyka), they can be registered as the formal housing areas. Bishkek City approved approximately 50 semi-formal settlements as Novostroyka until 2005. A land owner in Novostroyka can obtain a landlord certificate and other rights which are granted to a land owner in the formal areas. The administrative area of the city is amended to include these newly approved Novostroyka areas.

D5: New Housing Area Excluding Novostroyka

This is the area developed after the formulation of the General Plan 1975 in the same manner as practiced for the area of D4. This area has not been approved as Novostroyka yet, and thus is not recognized as the formal housing area.

D6: Spontaneous Housing Area

This is the area which was spontaneously developed along the trunk roads at the periphery of the housing estate. It forms a conurbation area around the built-up area without any plans.

D7: Garden Housing Area

This is the area located outside the planning area of the General Plan 1975 in the east and west of the City, even though these housing areas already existed at that time. This area is covered by the low-rise housings which are built in large size land plots and typically having gardens.

D8: Rural Housing Area

This is the areas located outside the urban growth boundary specified by the General Plan 2006.

(b) Apartment Area

A1: Micro District

This is the apartment area developed as the typical apartment block according to the SNIP. The block consists of apartment buildings and social service facilities such as schools and playgrounds, and small size commercial facilities. This type of apartment area is located in, but not limited to, the central area, LTA 11, and LTA 9.

A2: Housing Complex

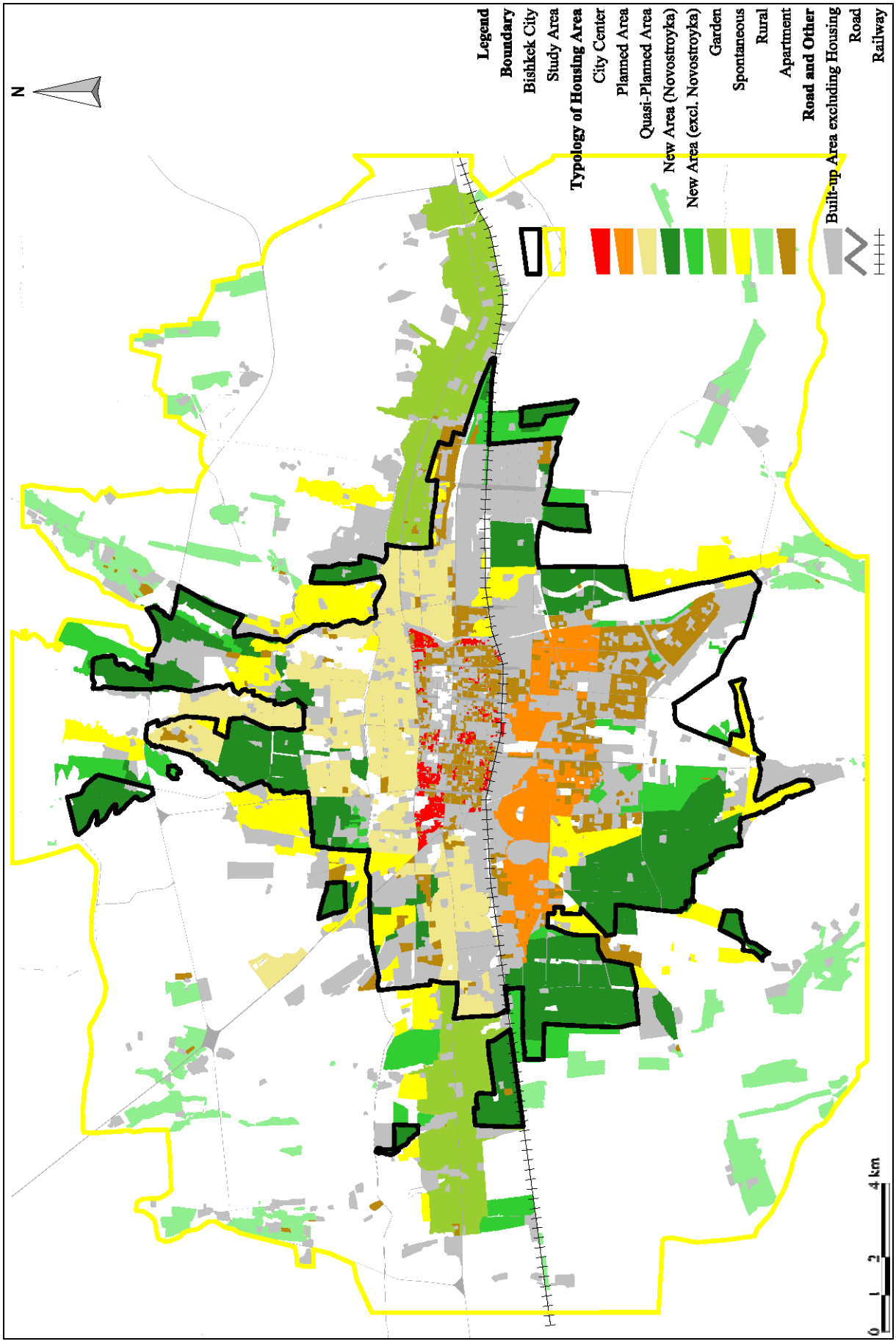
This is the area developed as a larger scale apartment complex, including the functions of commercial, business, and health services typically operated on the ground floor of buildings. This type of areas is observed in the central area only.

Figure 3.3-2 shows a set of satellite imageries which shows example of nine types of housing areas excluding the rural housing area (D7). **Figure 3.3-3** shows the distribution of housing areas according to the classification mentioned above.

 Housing Area in the City Center (D1) Detached housing area formed by a block in a grid manner as specified in General Plan 1975 in the City Center.	 Planned Housing Area (D2) Detached housing area formed in a radial road network in a well-ordered manner in south of the City Center.	 Quasi-Planned Housing Area (D3) Detached housing area in a deformed road network due to low application of planning standard to urbanization on the agricultural lands
 New Area (*novostroyka*) (D4) Detached housing area registered as a formal settlements (or *novostroyka*).	 New Area excl. *novostroyka* (D5) Detached housing area under construction.	 Spontaneous Housing Area (D6) Detached Housing area located on periphery of the conurbation area with an irregular road network.
 Garden Housing Area (D7) Detached housing area in a relatively large plot of a land with a garden.	 Micro District (A1) Apartments planned as a unit with social services and commercial services to create a new housing complex in suburb.	 Housing Complex (A2) Apartments for mixed use of housing, commercial, and business to create the City Center.

Note : Satellite imagery in scale at 1:30,000.
Source : JICA Study Team

Figure 3.3-2 Example of Type of Housing Area



Source : JICA Study Team

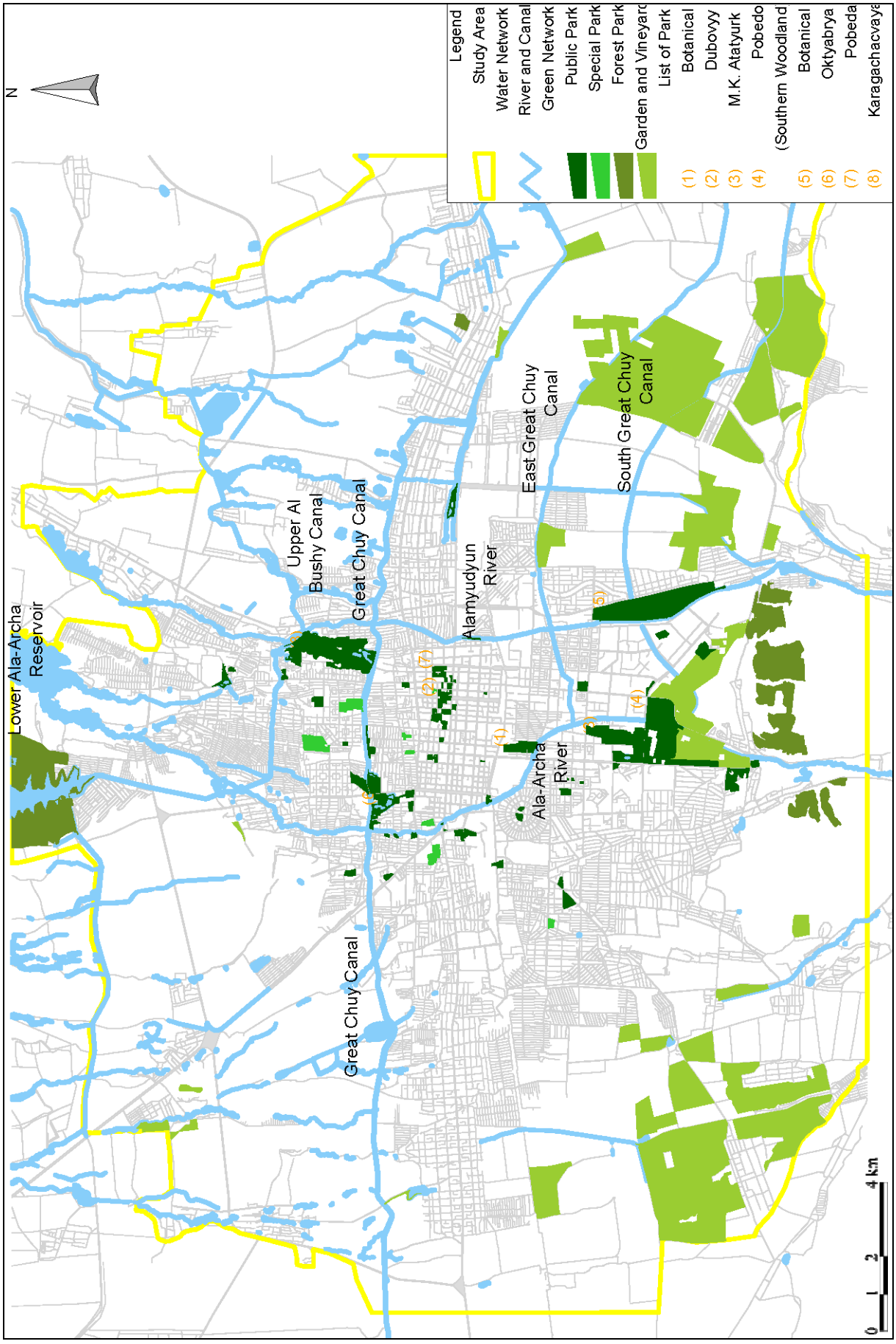
Figure 3.3-3 Distribution of Housing Areas by Type, 2010

3.3.5 Distribution of Open Space

Public parks were provided throughout the central area in a well-ordered manner, in accordance with the Soviet time planning standards. These parks form a part of the city's identity and provide open spaces for the citizens as well as easing the density of the City Center consisting largely of high density apartments. On the contrary, the number of public parks is limited in the newly developed areas or Novostroyka in the suburbs. There are large scale parks in the outskirts of the city, such as M.K. Atatyurk, Pobedo, and the Botanical Garden.

A water network is always recognized as one of the key elements that characterize the features of Bishkek City. Four rivers run across the built-up areas. These rivers are Great Chuy canal in the north, Ala-Archa river in the west, Alamyudyun river in the east, and East Great Chuy canal in the south.

Figure 3.3-4 shows the distribution of open spaces in the Study Area.



Source : JICA Study Team

Figure 3.3-4 Distribution of Open Space, 2010

CHAPTER 4 ESTIMATED POPULATION DISTRIBUTION OF YEAR 2010

4.1 Objective and Outline of Population Estimate for the Year 2010

For the purpose of forecasting transportation demands, it is necessary to figure out the population by traffic zones for the year 2010 as the base year. In the Study, the distribution of population is estimated based on the land use map of 2010 prepared as described in **Chapter 3**. In the following sections, the population and the number of workers and students are estimated in accordance with the traffic zones.

4.2 Population, 2010

4.2.1 Density of Detached Housing Area

The existing housing area was classified into the detached housing area and the apartment area. More than 180 sample blocks in the detached housing areas are, thereafter, selected to estimate the average size of land plots. The occupancy rate was then estimated at sampled blocks by counting the number of both occupied and vacant plots. **Figure 4.2-1** shows an example of sampled land block for counting the land plots.

Note : Blown lines show the boundary of each plot of land of detached housing. A hatched area shows an occupied plot, while a non-hatched area for a vacant plot.
Source : JICA Study Team

Figure 4.2-1 Example of Block to Estimate Occupancy Rate in Housing Area

Figure 4.2-2 shows the estimated average size of the land plots and **Figure 4.2-3** shows the occupancy rate in the detached housing area.

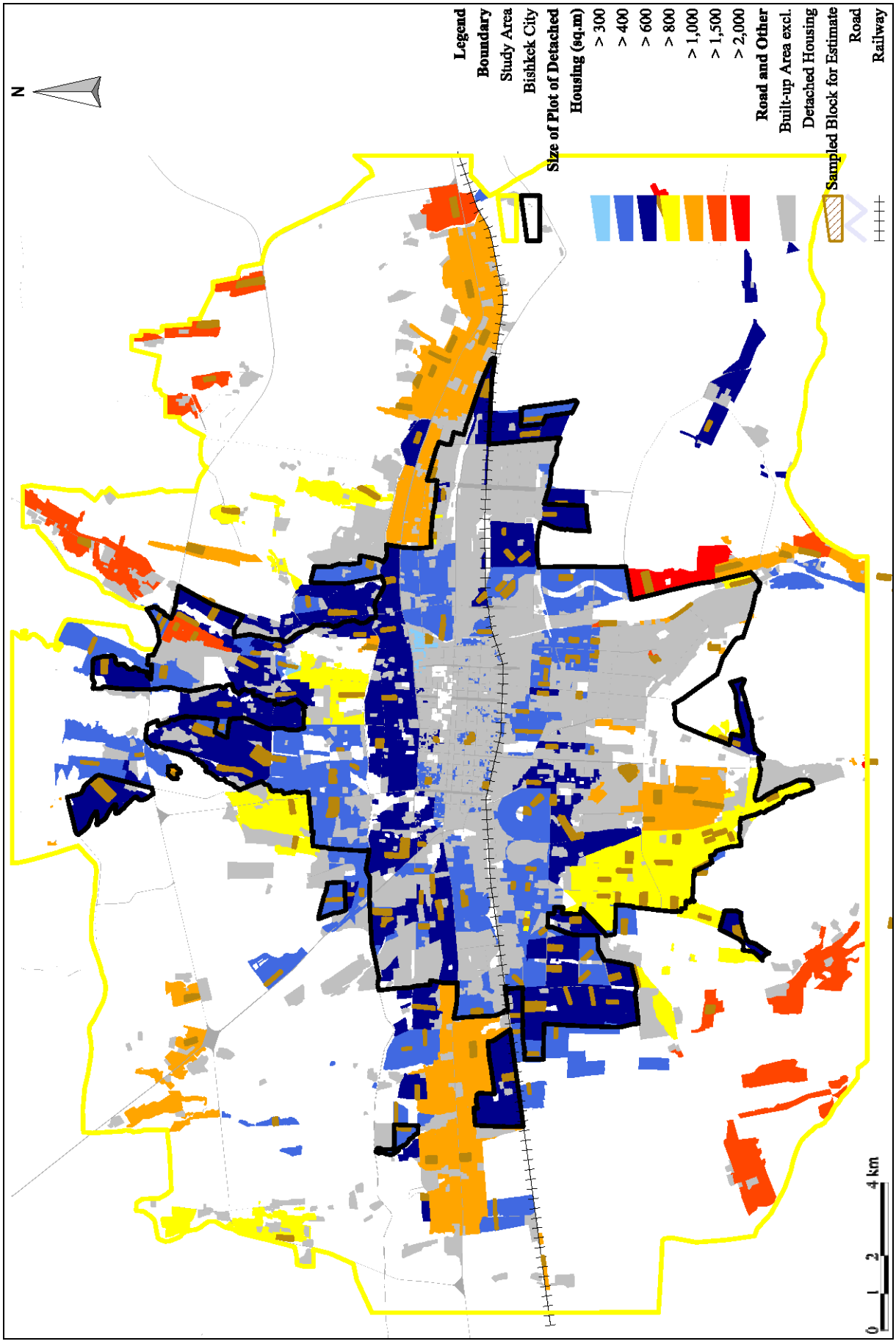


Figure 4.2-2 Estimated Average Size of Land Plots

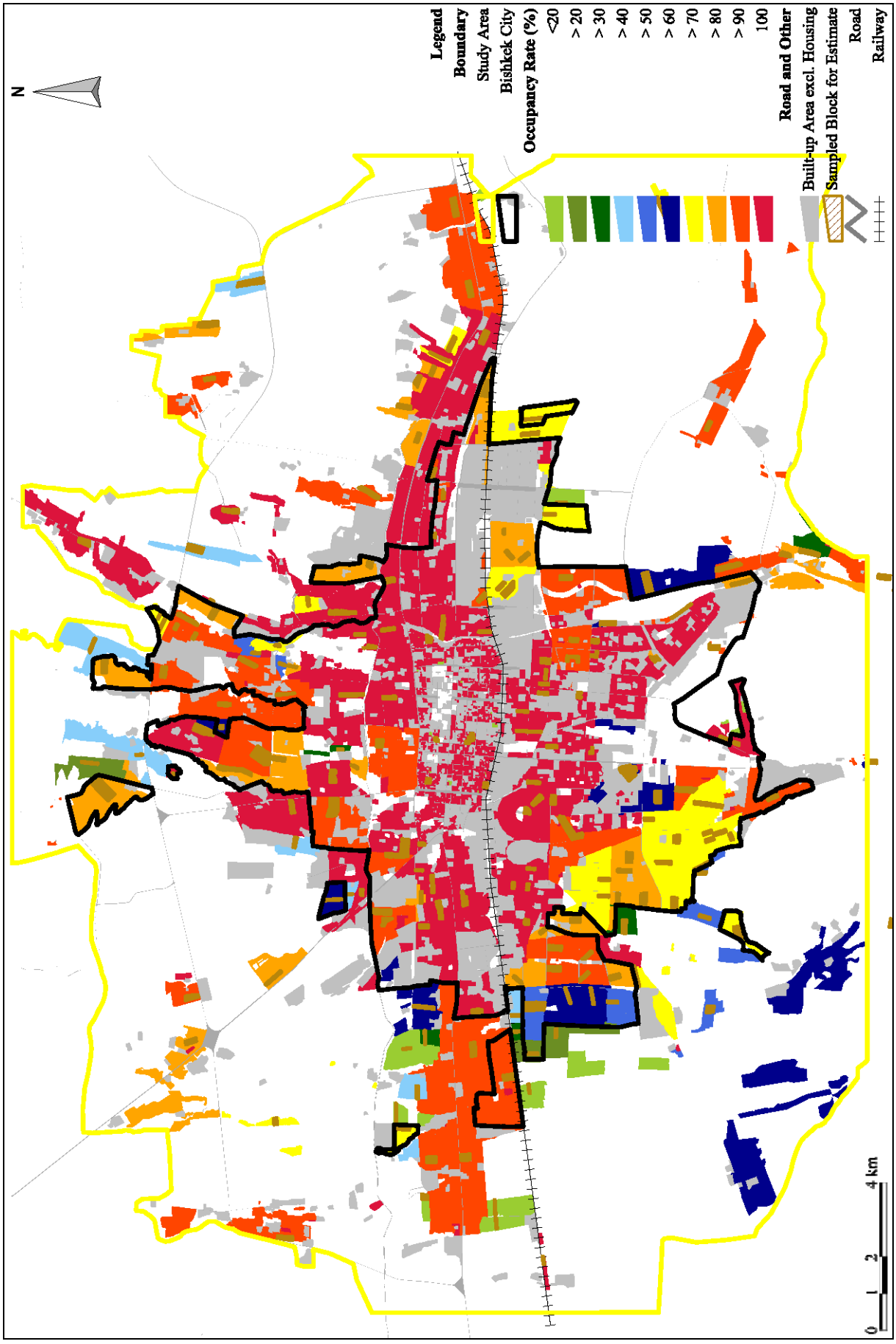


Figure 4.2-3 Occupancy Rate of Detached Housing Area

4.2.2 Density of Housing Unit in Apartment Area

The number of housing units was included as sampled apartment areas located in the City center as well as in the suburbs. The sampled apartment areas are selected to cover the different type of apartments in terms of the floor usage structure, the number of floors, and the location. **Table 4.2-1** shows the density of housing units per hectare in the sampled apartment areas.

Table 4.2-1 Estimated Density of Housing Unit at Sample Apartment Area

Location	Type of Apartment	No of Sample Apartment	Average Density of Housing Unit (housing unit/ha)
City Center	Apartment >=4 floors (Housing Only)	4	259
	Apartment >=4 floors (Mixed Use <50%)	2	229
	Apartment >=4 floors (Mixed Use >50%)	4	184
	Semi-micro District	2	177
	Apartment <=3 floors (Housing Only)	2	126
Suburb	Micro District	5	108

Note : Mixed Use (>50%) means an apartment of which more than a half of total number of floor is used for housing.
Source : JICA Study Team

4.2.3 Population Density in Housing Area and Apartment Area

The population density was estimated by multiplying the average household size with the number of detached houses and the number of housing units in the respective type of housing areas. **Figure 4.2-4** shows the average number of households per hectare by traffic zone. **Figure 4.2-5** shows the estimated population density in the Study Area.

4.2.4 Estimated Population and Number of Households Based on Land Use 2010

The population in 2010 was estimated at 1,117,800 persons in the Study area and 868,556 persons in Bishkek City, respectively (**Table 4.2-2**), based on the land use map of 2010 and associated population density analysis discussed above. The estimated population for the city area was slightly larger than that of the results of Census 2009 by four percentage points. This seems reasonably accurate for use in further works of the transport master planning, as the difference may be marginal after including the population increase from 2009 to 2010 into the census result.

Table 4.2-2 Estimated Population and Number of Household, 2010

LTA	Population	Household	LTA	Population	Household	LTA	Population	Household
1	49,523	12,586	8	44,723	13,811	16	24,429	5,680
2	47,130	12,290	9	30,881	8,724	17	50,372	14,519
3	41,926	9,796	10	28,787	8,018	18	52,265	14,651
4	29,640	7,589	11	29,534	8,415	19	36,439	9,401
5	65,643	17,272	12	65,676	20,872	20	44,555	11,752
6	38,881	9,348	13	44,192	12,882	21	21,808	5,050
7	32,004	9,301	14	24,539	6,060	Chon Aryk	22,595	5,169
						Total in Bishkek City	868,556	233,871
						Total in Study Area	1,117,300	295,819

Note : Chon-Aryk village includes LTA 22 and LTA 23 specified in Census 2009.
Source : JICA Study Team

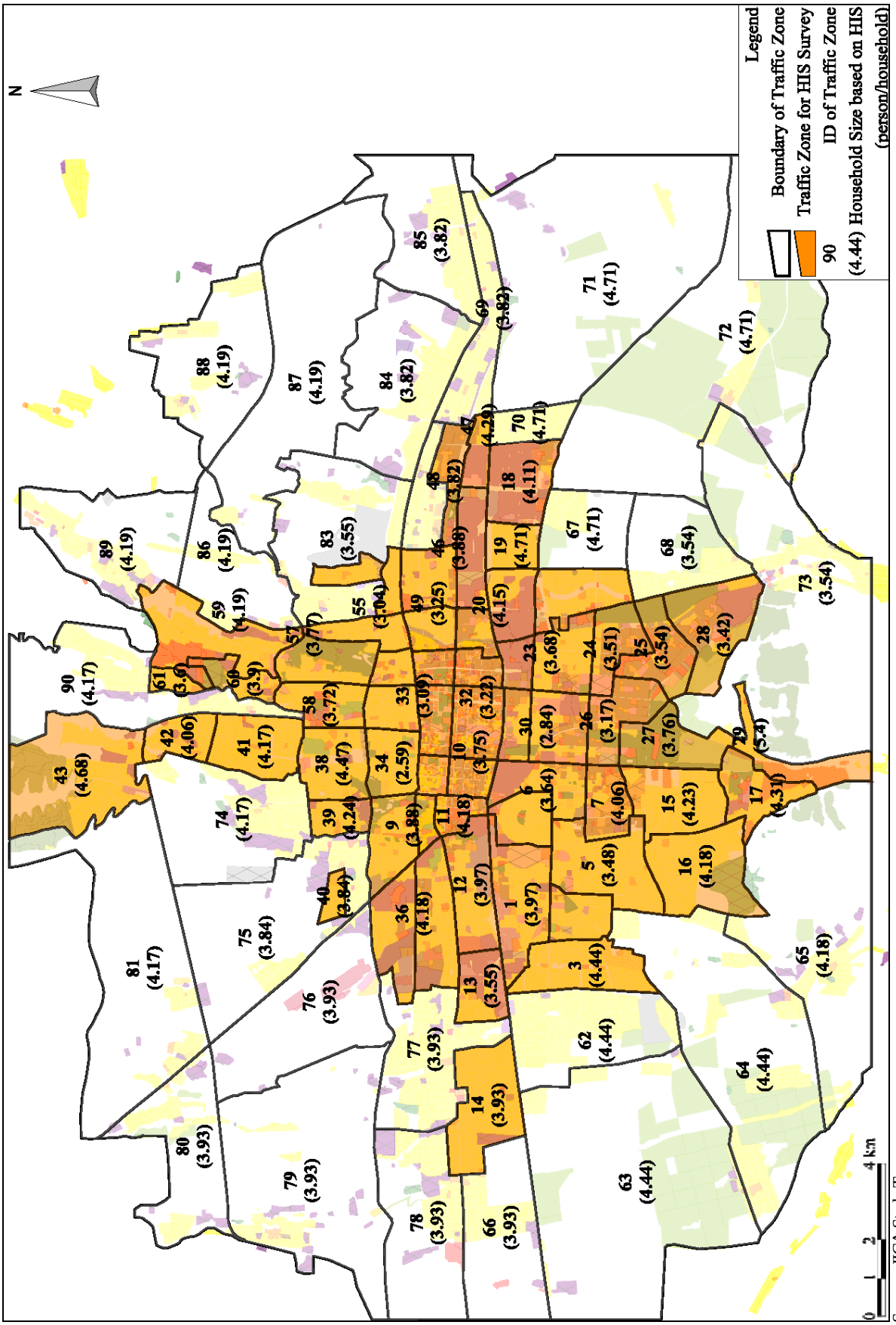


Figure 4.2-4 Average Number of Households per Hectare by Traffic Zone

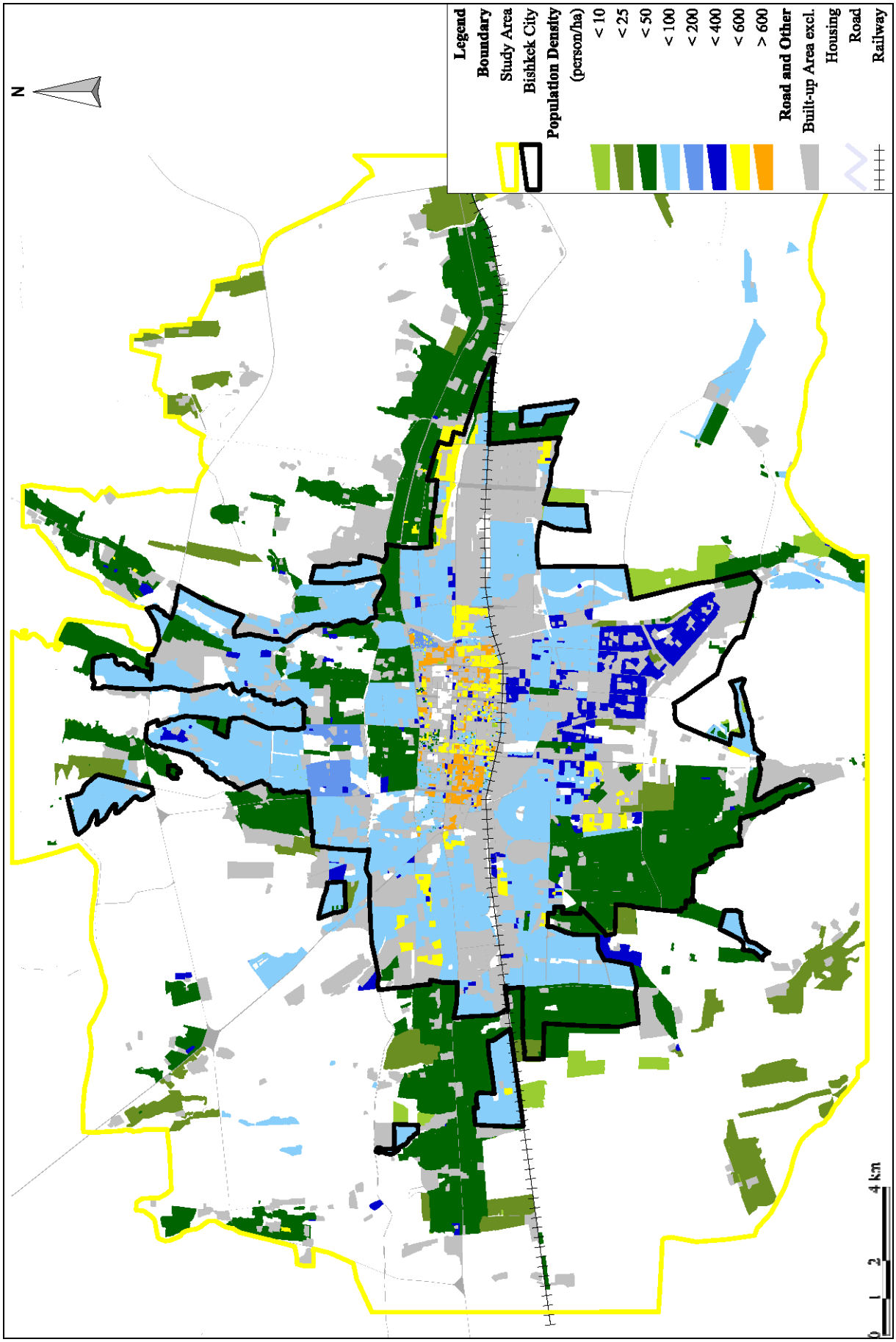


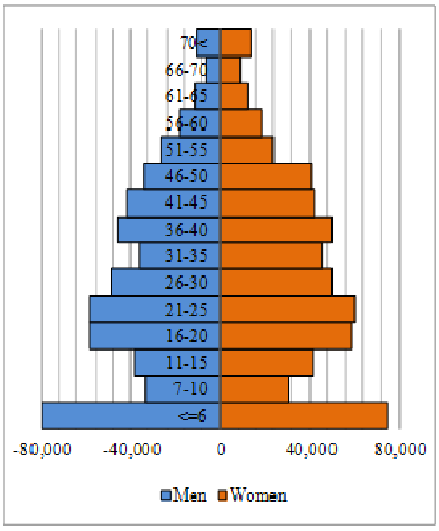
Figure 4.2-5 Estimated Population Density, 2010

4.2.5 Estimated Population by Age Group with Household Survey Results

The Household Interview Survey (HIS) asked the age of every family member of the 4,000 sampled households. The results of the HIS were analyzed to estimate the age structure of the population in each traffic zone. The population by age group was thus established for the year 2010 as shown in **Table 4.2-3**, together with the population pyramid. The shape of the population pyramid is characterized by larger shares in four age groups, namely: i) less than 7 years old; ii) 16 to 20 years old; iii) 21 to 25 years old; and iv) older than 70 years old. These are similarly observed in the age group structure of the results of the Census 2009.

Table 4.2-3 Estimated Population of 2010 by Age Group

Age Group	Population by Age Group (person)						Population Pyramid
	Total	(%)	Men	(%)	Women	(%)	
< = 6	154,760	13.9	79,748	7.1	75,012	6.7	
7 - 10	63,484	5.7	33,255	3.0	30,229	2.7	
11 - 15	79,797	7.1	38,276	3.4	41,521	3.7	
16 - 20	116,992	10.5	58,114	5.2	58,878	5.3	
21 - 25	118,089	10.6	57,735	5.2	60,354	5.4	
26 - 30	99,050	8.9	48,999	4.4	50,051	4.5	
31 - 35	81,638	7.3	36,071	3.2	45,567	4.1	
36 - 40	95,567	8.6	45,615	4.1	49,952	4.5	
41 - 45	83,302	7.5	41,311	3.7	41,991	3.8	
46 - 50	74,864	6.7	33,990	3.0	40,874	3.7	
51 - 55	50,648	4.5	26,633	2.4	24,015	2.1	
56 - 60	37,056	3.3	18,001	1.6	19,055	1.7	
61 - 65	23,069	2.1	10,851	1.0	12,218	1.1	
66 - 70	15,044	1.3	5,982	0.5	9,062	0.8	
70 <	23,940	2.1	10,006	0.9	13,934	1.2	
Total	1,117,300	100.0	544,587	48.7	572,713	51.3	



Source : JICA Study Team

4.3 Estimated Number of Workers, 2010

4.3.1 Economically Active Population and Number of Employment

The economically active population for year 2010 was estimated at 399,805 persons (or 62.1% of the population at 16 years old or over) in Bishkek City and 509,952 persons (or 62.2%) in the Study Area, respectively, together with the employment at 320,339 persons in the city and 405,358 persons in the Study area, respectively, as shown in **Table 4.3-1**.

Table 4.3-1 Estimated Economically Active Population and Employment 2010

Item	Unit	Bishkek City			Study Area		
		Man	Woman	Total	Man	Woman	Total
Economically Active	person	231,413	168,392	399,805	296,194	213,758	509,952
	%	75.1	50.2	62.1	75.3	50.2	62.2
Employment	person	193,400	126,939	320,339	245,891	159,467	405,358
Unemployment	person	38,013	41,453	79,466	50,303	54,291	104,594
	%	16.4	24.6	19.9	17.0	25.4	20.5

Source : JICA Study Team

4.3.2 Estimated Number of Workers by Economic Activity

The Study estimated the number of workers by economic activity consisting of 17 economic sectors with HIS results. As summarized in **Table 4.3-2,** the service industry shared the largest at percent, the manufacturing industry at 9.3 percent and the agriculture industry at 0.7 percent.

Table 4.3-2 Estimated Number of Workers of 2010 by Industry

Item	Unit	Bishkek City			Study Area		
		Man	Woman	Total	Man	Woman	Total
Agriculture	person	1,711	411	2,122	2,324	652	2,976
	%	0.9	0.3	0.7	0.9	0.4	0.7
Manufacturing	person	25,692	3,008	28,700	33,939	3,709	37,648
	%	13.3	2.4	9.0	13.8	2.3	9.3
Service	person	165,997	123,520	289,517	209,628	155,106	364,734
	%	85.8	97.3	90.4	85.3	97.3	90.0
Total	person	193,400	126,939	320,339	245,891	159,467	405,358
	%	100.0	100.0	100.0	100.0	100.0	100.0

Source : JICA Study Team

4.4 Estimated Number of Students, 2010

4.4.1 Estimated Number of Students by Education Level

The education level consists of three groups: i) Compulsory education from Grades 1 to 9 for pupils at the age from seven to 15 years old; ii) Secondary education from Grades 10 to 11 for pupils of 16 and 17 years old; and iii) Higher education for students at 16 years old and over.

The number of students in 2010 was estimated to be 145,171 persons with the enrollment rate at 99.9 percent for the compulsory education in the Study Area (**Table 4.4-1**). The students aged 16 to 20 years old were estimated to be 38,559 persons, including Grades 10 to 11 and higher education with the combined enrolment rate at 86.8 percent. The students at the age of 21 years old and over in higher education was estimated to be 97,930 persons with the enrollment rate at five percent.

Table 4.4-1 Existing Student by Education Level in Bishkek City and Study Area in 2010

Student Group	Unit	Bishkek City			Study Area		
		Man	Woman	Total	Man	Woman	Total
Number of Student							
i) G1 ~ G9	person	54,272	54,440	108,712	71,502	71,669	143,171
ii) G10 ~ G11	person	13,650	17,257	30,907	17,500	21,059	38,559
iii) Higher at 16 ~ 20 Years old	person	25,737	25,158	50,895	32,611	30,436	63,047
iv) Higher > = 21 Years old	person	13,327	15,046	28,373	16,291	18,592	34,883
v) Higher in Total	person	39,064	40,204	79,268	48,902	49,028	97,930
Enrolment Rate							
7 ~ 15 Years old	%	99.9	99.9	99.9	100.0	99.9	99.9
16 ~ 20 Years old	%	87.2	88.4	87.8	86.2	87.5	86.8
> = 21 Years old	%	5.1	5.2	5.2	4.9	5.1	5.0

Source : JICA Study Team

4.5 Distribution of Workers, Students, and Daytime Population by Traffic Zone, 2010

The estimated number of workers and students in the Study Area are assigned to each traffic zone according to the following conditions.

(1) Workers at Living Place

The number of workers in each traffic zone was estimated by the proportion of the economically active population together with the percentage of workers by economic activity.

(2) Workers at Working Place

The number of workers in agriculture industry was assigned proportionate to agricultural land area within the Study Area. It should be noted that the total number of workers in agriculture industry included office workers, and thus, was initially divided into farmers and office workers.

The number of workers in manufacturing industry was modified to include the workers in the transport sector, since the land use related to the manufacturing industry includes warehouses. The modified number of workers in the manufacturing industry was then distributed in proportion to the land area of the related land use.

The workers for the service industry were classified into five types, namely: i)Population based services; ii) Large-scale commercial area; iii) Educational services; iv) Services in apartment areas; and v) Other service activities. The sampling survey was carried out for these workers numbers as show in **Figure 4.5-1**.

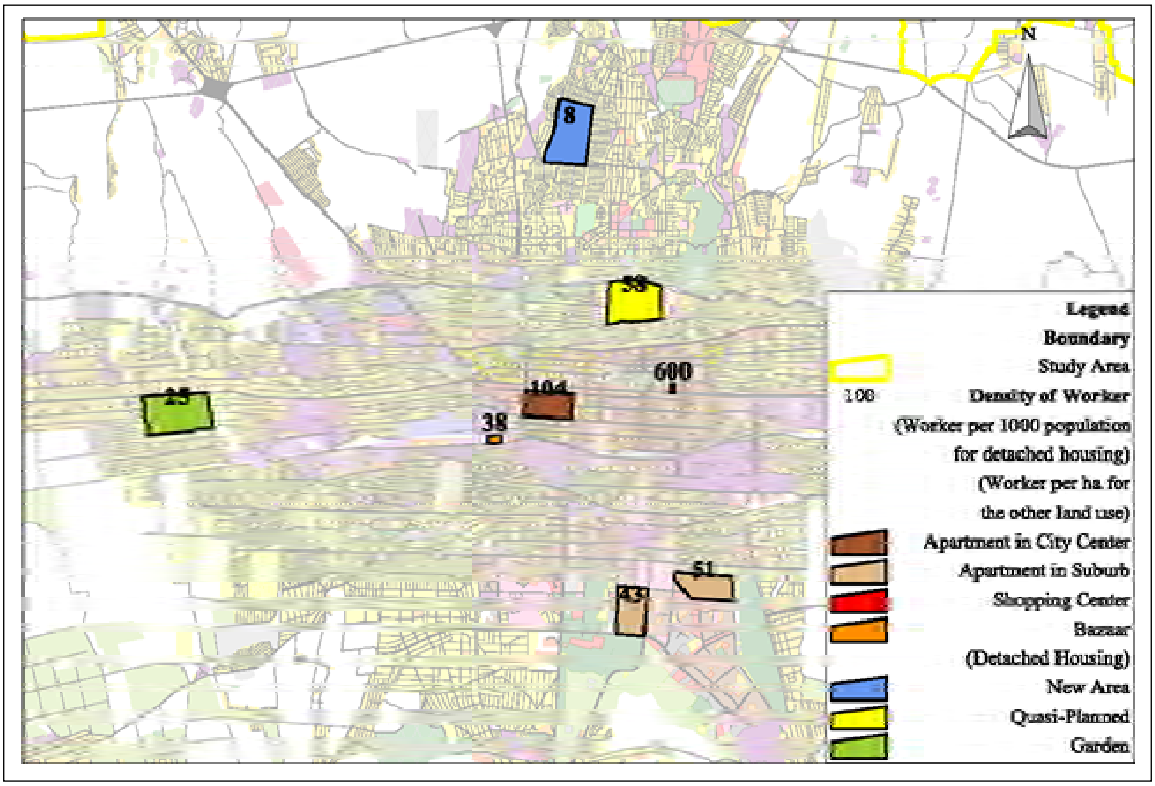
Using the sampling survey results, the total number of workers for those types were distributed by the estimated density of the number of workers. The number of workers for the education services was distributed in proportion to the number of students at school place, while the workers for other service activities were distributed in proportion to the land area of the related land use in the existing land use map.

(3) Students at Living Place and at School Place

The number of students was estimated by multiplying the existing population together with the enrolment rate obtained from the HIS result. The students in the education level from Grades 1 to 11 were divided into two types by the location of the school. The first type covers students who go to school located within the traffic zone of their homes. The second type covers those commute to schools located in different traffic zones. The HIS results were used to estimate the ratio among two these types. The number of students in the former case was proportionally distributed to the number of schools within the traffic zone having larger number of students at school place than that at living place. The number of students in universities and higher education was distributed in proportion to the land area of the university and higher education facilities identified by the land use survey.

(4) Day Time and Night Time Population

Based on the number of workers and students in each traffic zone estimated, the daytime and night-time populations were estimated for each traffic zone as shown in **Figure 4.5-2**.



Source : JICA Study Team

Figure 4.5-1 Location of Sample Area for Counting Number of Worker

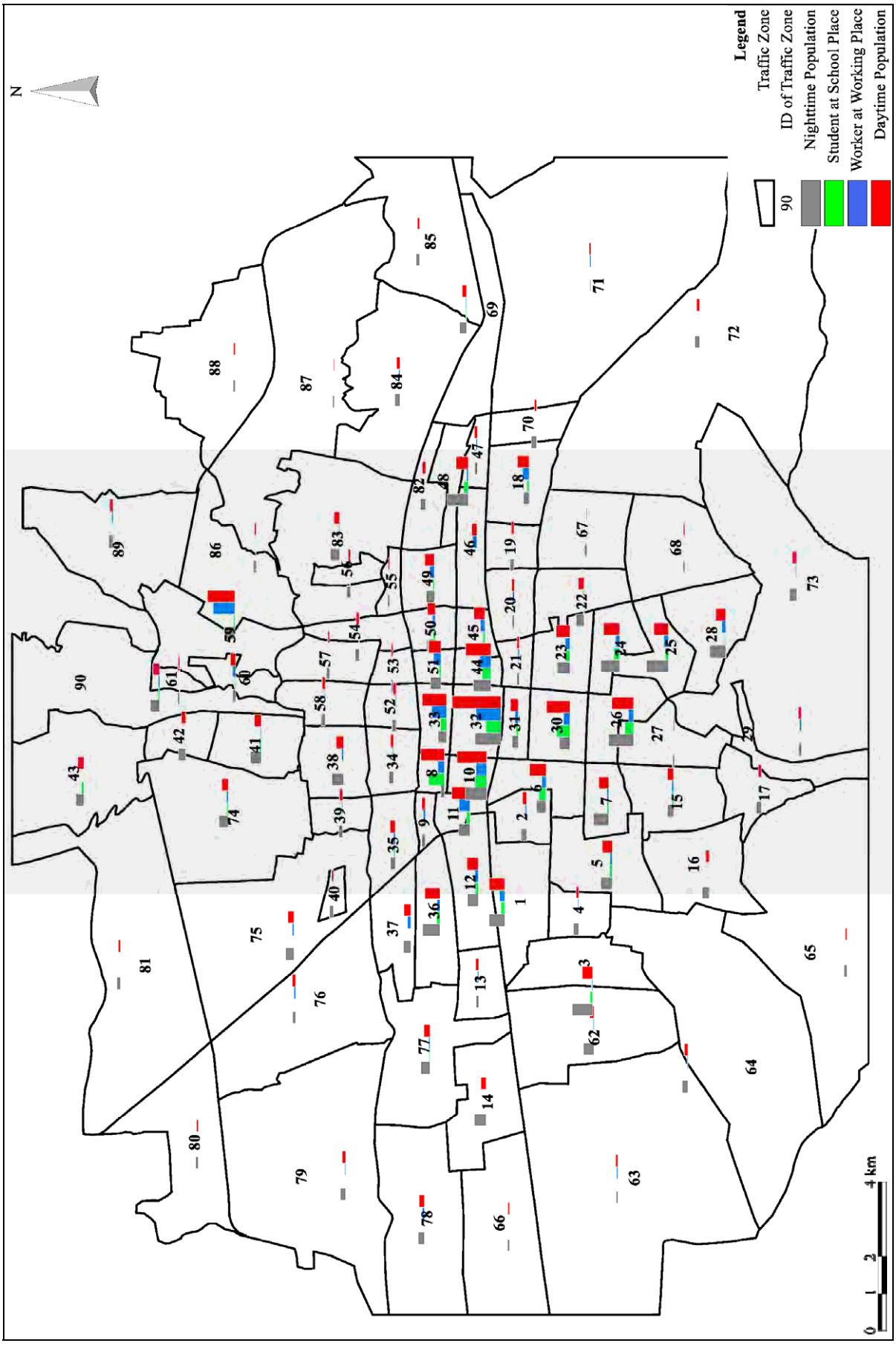


Figure 4.5-2 Nighttime and Daytime Population by Traffic Zone, 2010

CHAPTER 5 CITY ROAD NETWORK

5.1 Roads and Networks

5.1.1 City Road

Road in Bishkek City generally consists of Grid Patten System with six categories of roads and streets.

Table 5.1-1 shows road length by road classification and pavement type in Bishkek City.

Table 5.1-1 Road Length by Classification in Bishkek City

Road Classification	Pavement Type	Length (km)	
Urban Major Arterial (I) & (II)	Asphalt	232.95	721.6
Regional Major Arterial (II) & (III)	Asphalt	488.65	
District Major Collector & Distributor (IV) to (VI)	Asphalt	61.60	534.7
	Gravel	473.10	
Total			1256.3

Source : Kyrgyzdortransporekt, State Design Institute (SDI), 2005

(1) Interregional Road (Category IB)

Inter-regional roads carry long distance through traffic from outside of the City (external traffic) to specific areas in the City. These roads are arranged around 6.4 km (4.0 miles) interval.

Table 5.1-2 Main Interregional Road in Bishkek City

Road Name	Lane Number	Location of cross section	Width (m)	Length (km)
Chui Avenue	4	Fuchika	21.6	15.9
	4	Mol. Gvardiya	14.3	
	4	Almatinskaya	26.7 (11.5 x 4.2* x 11.0)	
	4	Fuchika	21.6	
Fuchik Street	4	Chui Channel	16.4	10.53
	4	Chui	25.3	
	4	Moskovskaya	20.5	
JaiyuBaatyr St. / Tokombaev Avenue	4	Sovetskaya	29.8 (11.2 x 7.2* x 11.4)	10.38
	4	Mir	28.0 (12.0 x 4.0* x 12.0)	
	4	Baha	27.0 (11.5 x 4.0* x 11.5)	
KurmanjanDatka (Almatinskaya) Street	4	Salieva	14.2	26.76
	4	Gorky	32.0 (12.0 x 8.0* x 12.0)	
	4	Ahunbaeva	11.2	

Note : * shows width of medians
Source : JICA Study Team

(2) Major Arterials & Minor Arterials (Category II & III)

Arterials (both major and minor) carry through-traffics between specific areas of the City and higher hierarchy roads. These roads are playing supporting role to the higher hierarchy roads with around 1.6 to 3.2 km (1.0 to 2.0 miles) interval.

Table 5.1-3 Main Major and Minor Arterials in Bishkek City

Road Name	Lane Number	Location of cross section	Width (m)	Length (km)
Akhunbaev Street	4	Kurmanjan Datka	13.5	7.59
	4	Mir	17.0	
	4	Baha	15.5	
Gorky Street	4	Kurmanjan Datka	13.0	9.65
	4	Sovetskaya	17.0	
	4	Mir	19.0	
Jibek-Jolu Avenue	4	Sovetskaya	36.0 (11.5 x 15.1* x 9.4)	11.63
	4	Togolok-Moldo	10.5	
	4	Fuchika	5.2	
Logvinenko Street	4	Jibek-Jolu	5.2	3.7
	4	Chui	11.2	
	2	Rail road	12.0	
Manas / Mir Avenue	4	Jibek-Jolu	13.0	9.23
	4	Gorky	16.2	
	4	Tokombaeva	11.8	
Molodoy Gvardii Avenue	4	Jibek-Jolu	65.5 (9.5 x 44.4* x 11.6)	12
	4	Chui	74.1 (9.2 x 55.3* x 9.6)	
	4	Lev Tolstoi	15.8	
Sovetkaya Street	4	Jibek-Jolu	15.8	19.97
	4	Kulatova	18.0	
	4	Tokombaeva	17.0	

Note : * shows width of medians
Source : JICA Study Team

(3) Collectors & Distributors (Category IV)

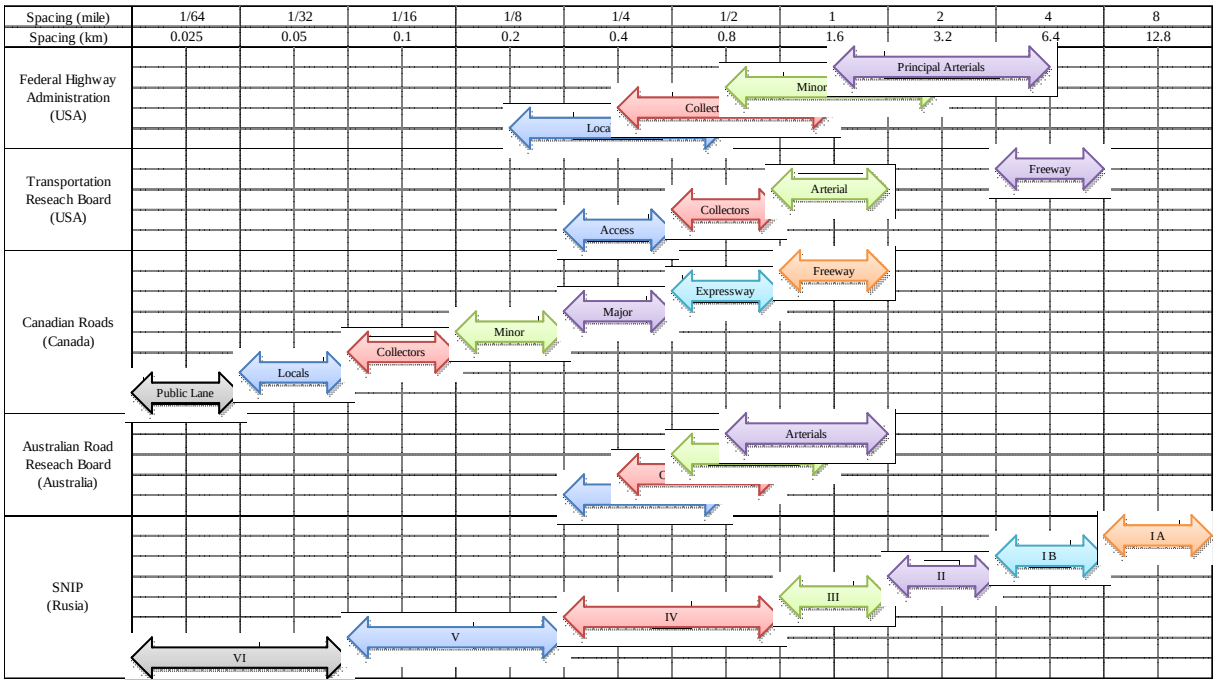
Collectors and distributors provide connectivity between the environmental cells and the traffic carrying roads (such as arterials) and provide access to property (buildings, etc.). These roads are arranged around 0.4 to 0.8 km (1/4 to 1/2 miles) interval. Most of the remaining wider streets are in this category.

(4) Local Streets (Category V)

Local streets provide direct access to property (building, etc.) and arranged around 0.1 to 0.2 km (1/16 to 1/8 miles) interval. Most of the remaining narrow streets fall under this category,

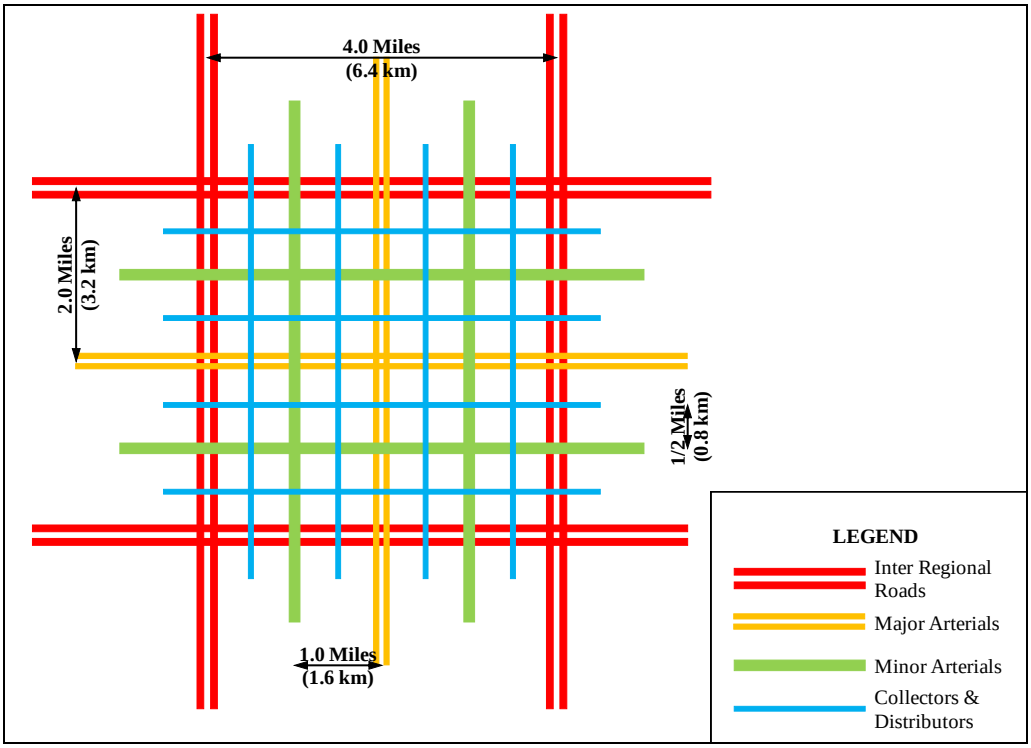
(5) Conceptual Road Network Hierarchy

Figure 5.1-1 and **Figure 5.1-2** show conceptual road network hierarchy obtained from various documents in the developed countries, and **Figure 5.1-3** shows Road Networks in Bishkek City based on above described categories.



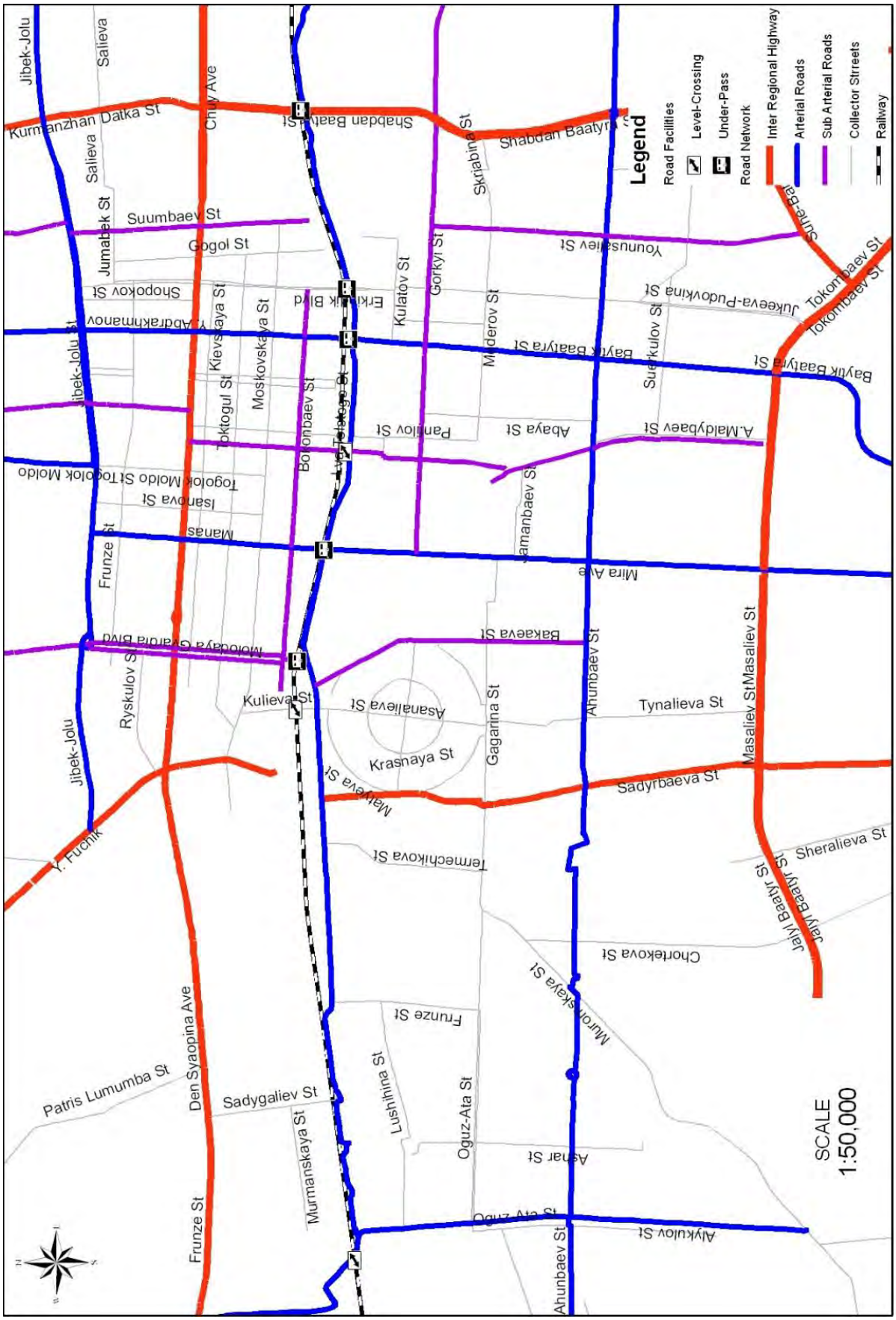
Source : JICA Study Team

Figure 5.1-1 Conceptual Road Network Hierarchy in Developed Countries



Source : JICA Study Team

Figure 5.1-2 Conceptual Road Network Hierarchy in Bishkek City



Source : JICA Study Team

Figure 5.1-3 Road Networks in Bishkek City

5.2 Technical Standards for Road Design

Technical standards for road design elements in the Kyrgyz Republic are stipulated by SNIP 32-01-2003. In SNIP 32-01-2003, roads are categorized into five categories. A road cross-section detail by road category is shown in **Table 5.2-1**.

Table 5.2-1 Parameters of Road Cross - section Profile

Parameters of cross-section profile	Road category					
	IA	IB	II	III	IV	V
1. Number of lanes	4; 6; 8	4; 6; 8	2	2	2	1
2. Width of lane, meter	3.75	3.75	3.75 3.5	3.5	3.0	4.5 4.0
3. Width of carriageway, meter	2x7.5 2x11.25 2x15.0	2x7.5 2x11.25 2x15.0	7.5 7.0	7.0	6.0	4.5 4.0
4. Width of strengthen (treated) lane shoulder, meter	0.75	0.75	0.75 0.5	0.5	0.5 0.25	-
5. Width of shoulders, meter	3.75	3.75	3.75 3.5 3.25	2.5 2.25 2.0	2.0 1.75 1.5	1.75 1.5 1.0
6. Width of separating lane between both traffic direction not less then, meter	6.0	4.0	-	-	-	-
7. Width of edge strengthen (treated) lane on separating lane, meter	1.0	0.75	-	-	-	-

Source : SNIP 32-01-2004, Highway Design (5. Technical Regulations for road Design Elements)

The Law of Kyrgyz Republic About Auto Roads, Article 3 defines Right of Way (ROW) of all categorizes of roads as shown in **Table 5.2-2**.

Table 5.2-2 Width of Right of Way by Road Category

Road Category	Road Type	Width of ROW
IA, IB	International Trunk Road	64 m (32 m from center line in each side)
II	Inter- regional Road	32 m (16 m from center line in each side)
III	Highway	28 m (14 m from center line in each side)
IV	Main Road	26 m (13 m from center line in each side)
V	Sub-main Road	20 m (10 m from center line in each side)

Since most of the roads in Bishkek City were constructed during the Soviet time, width of ROW stipulated in SNIP 32-01-2004 and actual width of ROW in Bishkek City might be different.

5.3 Grade Separation & At - Grade Level Crossing

(1) Grade Separation

The grade separations (underpasses) between railway and major roads are provided at several points in Bishkek City. They are located along the following arterial roads and the railway crosses with them:

Table 5.3-1 Grade Separation Roads for Railway Cross

Extension of Lev Tolstoy Street	Molodoy Gvardii Avenue
Mir / Manas Avenue	Yusup Abdrahmanov Street
Ibraimova Street	Shabdan Baatyr Street
Cholpon-Atinkkaya Street	-

Source : JICA Study Team

Picture 5.3-1 Grade Separations in Bishkek City

(2) At-Grade Level Crossing

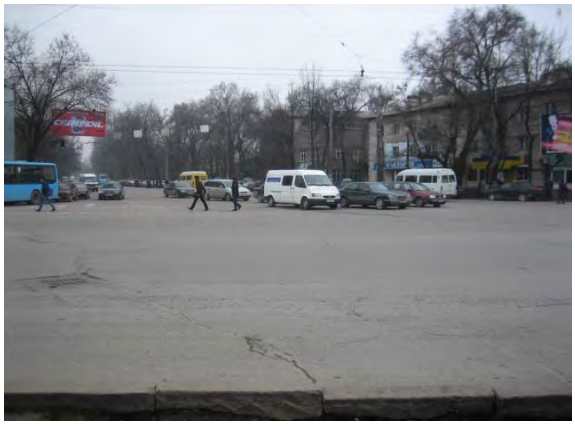
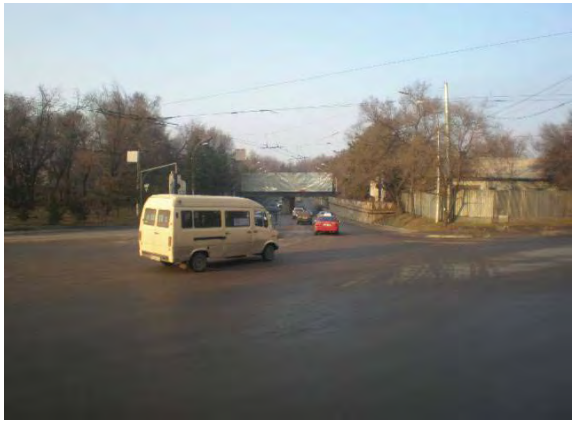
Other major the at-grade level crossing points with railway such as Fuchik Street, Logvinenko Street (one-way, south bound only), Panfilov Street (one-way, north bound only), in the City Center have become bottleneck points not only during peak hours but also off-peak hours once-a-day when passenger trains and/or cargo trains, or locomotive, pass by.

Picture 5.3-2 At-Grade Level Crossings in Bishkek City

5.4 Intersection

As for the intersections of the City, the roundabout type intersections exist at several places. However, most of them are conventional signalized at-grade level intersections.

It is confusing to the road users because there are neither lane markings nor pedestrian crossings at most of the intersections, although the scale of the intersections is generally large. Therefore, smooth traffic flows are obstructed. Also, a lack of traffic flow control facility is one of the reasons why traffic jams or traffic accidents occur on a daily basis. Provision of road markings, such as through, left-turn and right-turn traffic lanes, stop lines, and pedestrian crossing can improve the traffic flow at most of the intersections[1].

Picture 5.4-1 Intersections in Bishkek City

5.5 Sidewalk

The sidewalks with the greenbelts are provided on both sides of the most of major roads in the City. However, pavement of the sidewalk and drainage facilities are not well provided except in the places where private sectors improve frontage spaces in their own interest.

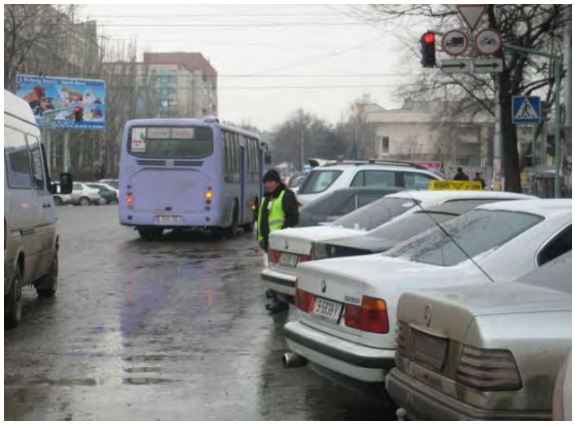

Paved Sidewalk in front of District Office Deteriorated Drainage Facility & Discontinued Pedestrian Crossing

Picture 5.5-1 Sidewalks in Bishkek City

[1] Intersection is relatively large without proper road markings, therefore drivers and pedestrian are confused since there is no guidance to refer where they are supposed to be going or stopping

5.6 Parking Space

Both public and private sectors provide on-street and off-street parking spaces in the City. Particularly, on-street type parking spaces are obstructions for smooth traffic flow, since they are not properly separated from carriageways, and the space of carriageways are basically limited.



Public Sector Managed On-Street Parking Space

Private Sector Managed on-Street Parking Space

Picture 5.6-1 On - Street Parking Spaces in Bishkek City

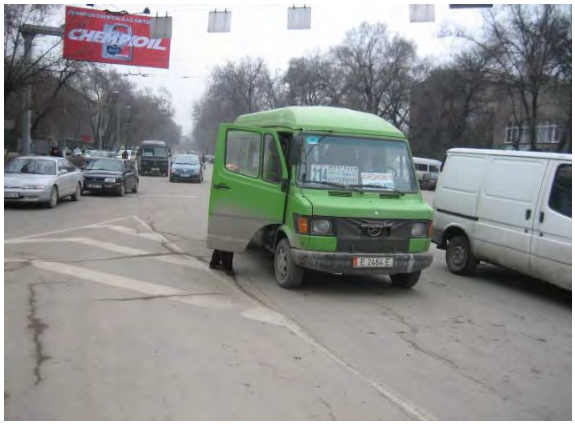
5.7 Traffic Safety Facilities

The issues on traffic safety are observed at most areas of the City and such disorder shall be rectified through proper introduction of law enforcement, education, and engineering ;

(1) Traffic Sign

Traffic signs are installed to control traffic in a significant number of locations in the City. However, minibuses and taxies customarily stop and wait for passengers to get on and off by blocking one or two lanes in nearby intersections, despite prohibition of such activities by traffic regulations, or being clearly indicated by traffic signs. These types of illegal traffic activities cause traffic accidents and bottleneck traffic in the City.

Taxies are waiting for passengers in nearby intersections where such activity is prohibited.



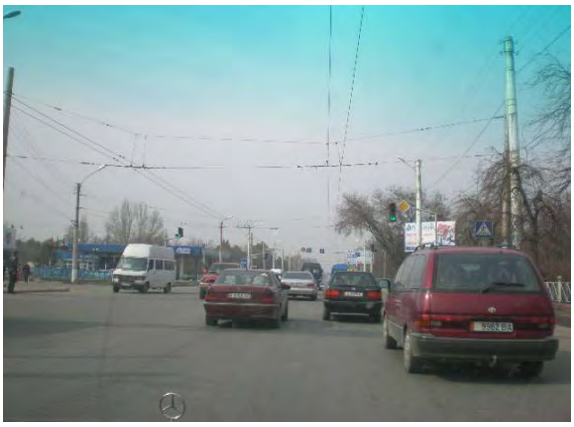
Minibus is allowing passengers to get on and get off in an intersection where such activities are prohibited.

Picture 5.7-1 Traffic Sign

(2) Lane Marking

A center line is basically installed, however lane markings to separate one from others along dual sections or side lines to separate traffic flow from parking spaces are not installed in the City.

Center line is installed, lane marking is not installed

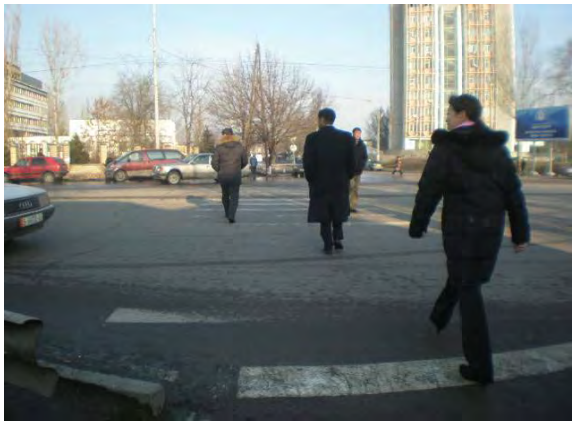


Neither center line nor lane markings are installed

Picture 5.7-2 Lane Marking

(3) Pedestrian Crossing

At the pedestrian crossing point, traffic signs and signals are basically installed, however markings such as zebra and stop lines are not well maintained.



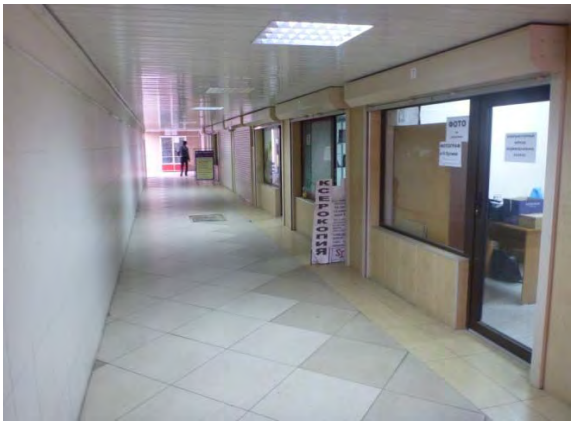
Pedestrian Crossing (Zebra)Marking

Pedestrian Crossing Traffic Sign & Signal

Picture 5.7-3 Pedestrian Crossing (At - Grade Level)

In some locations, underground pedestrian crossings are provided, however such facilities are not well maintained or sometimes vandalized, thereby not well utilized, except where the City arranges underground kiosks for pedestrians.

Not Utilized Underground Pedestrian Crossing



Utilized Underground Pedestrian Crossing

Picture 5.7-4 Pedestrian Crossing (Underground Level)

5.8 Road Improvement and Operation & Maintenance Plan and System

The main element of the road network planning and development strategies are prepared based on the Master Plan of Bishkek City, the Major Directions of Transport System Development in Bishkek until 2025, prepared by Kyrgyz Scientific and Research Town Planning & Design Institute. In addition to the Master Plan, the Law of the Kyrgyz Republic that set forth economic, legal basis and road management principles, types and legal regime of the road networks, territories and adjacent facilities, rights, obligations and responsibilities of owners, agencies supervising the roads and users. The Law further regulates interaction of road administrative bodies of the Ministry of Transport and Communication of the Kyrgyz Republic with state and local authorities. There are also the following:

- Rules of Use of Automobile Roads, Road Facilities and Administrative Bodies thereof in the Territory of the Kyrgyz Republic
- Regulation on the Procedure of Construction (Reconstruction) Works, Repairs of Engineering Networks and Facilities and Restoration of Improvement Elements in Municipal Territory of Bishkek City

The Capital Construction Department (CCD), a department under jurisdiction of Bishkek City Government, is responsible for planning, design and maintenance management of road network in Bishkek City. The CCD is responsible for designing budget plans for road network improvement including regular and periodic maintenance plans. However, due to lack of funds, only main arterials with intensive passenger and traffic flow are currently maintained.

CHAPTER 6 TRAFFIC SURVEY AND ANALYSIS

6.1 Traffic Survey

The traffic surveys were carried out to obtain comprehensive traffic characteristics, existing problems and information necessary for the transportation MP of Bishkek City. There are two components of traffic survey, namely traffic counting and interview survey. The following types of traffic surveys were planned and conducted in the Study. The main objective of this Study is to get the information about the current traffic composition and volume.

6.1.1 Traffic Count Survey

For counting vehicle quantities, vehicle classification was categorized for the survey are as follows:

(i) Car / Pickup / Van / Taxi

(ii) Minibus

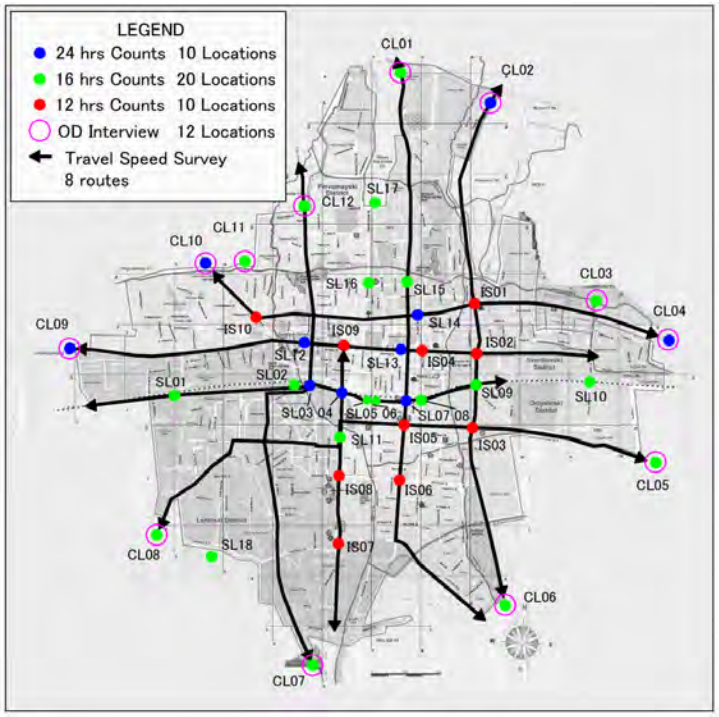
(iii) Midibuses

(iv) Trolleybus / large Bus (i.e. Intercity bus, more than 50 seats)

(v) Light Truck (2-Axle Truck)

(vi) Heavy Truck (>2-Axle Truck) / Trailer.

Figure 6.1-1 shows the map that indicates the traffic survey stations for Screen Line, Cordon Line and Intersection Surveys.



Source : JICA Study Team

Figure 6.1-1 Location Map

6.1.2 Screen Line Survey

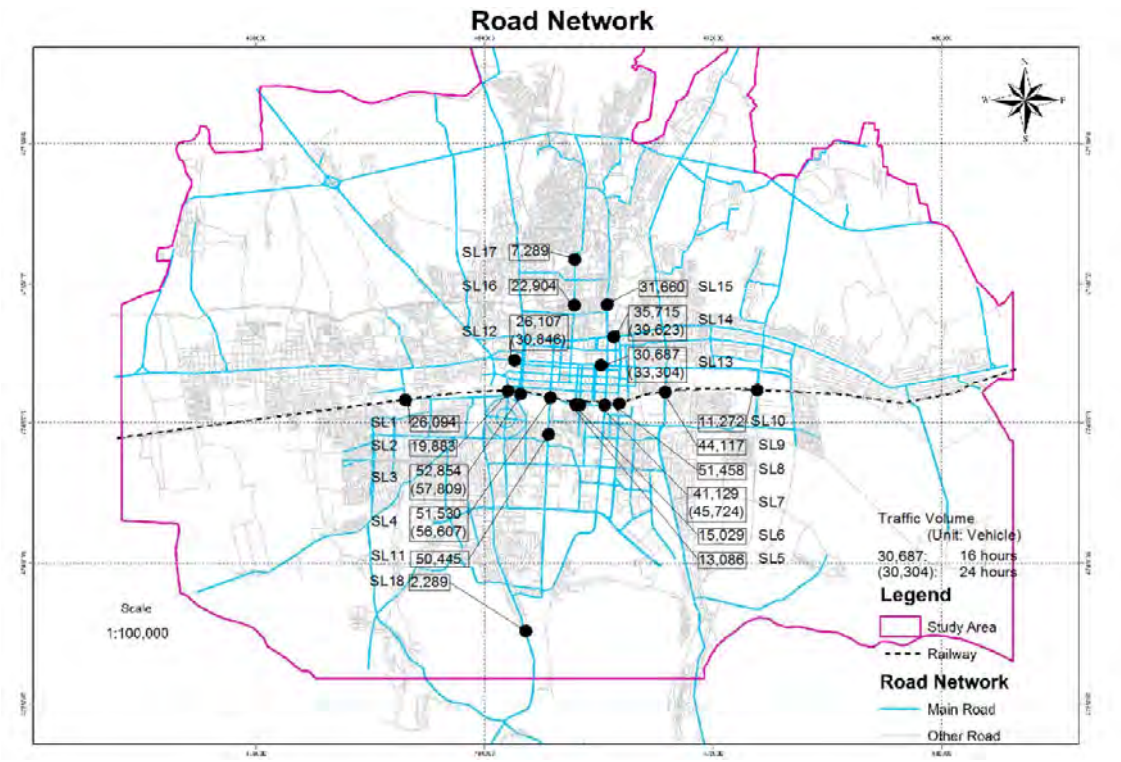
A Screen Line Survey was conducted during the weekdays (Tuesday, Wednesday and Thursday) of 7, 8, 15, and 20 September 2011, and identifies major traffic movements between two areas divided by a screen line. The railway track was considered as the Screen Line. The railway is located along Tolstoy Street, passing from east to west. On the other side, SL11 to SL18 are the Screen Line Survey Stations for the roadside traffic count (Traffic Count). Vehicular traffic volume counting was conducted at 16 Screen Line stations which are located on the main streets of Bishkek City in 2 time periods; 24 hours and 16 hours. The 24-hour counting was conducted from 7:00 A.M. to next day 7:00 A.M. and 16 hours counting was conducted from 7:00 A.M.to 23:00 P.M. The results of Screen Line Survey are shown in **Table 6.1-1** and **Figure 6.1-2**.

Table 6.1-1 Result of Screen Line Survey

Unit : Vehicle

Station No	Road Name	Sedan, Pick up, Van	Minibus	Midibus	Trolleybus / Large Bus	Light Truck (2 axle)	Heavy Truck and Semi - trailer, Trailer	Grand Total	Survey Time Period
SL01	Sadygalieyev Street	21,737	1,866	101	8	1,269	1,113	26,094	16
SL02	Kuliev Street	14,488	4,139	175	0	631	450	19,883	16
SL03	Molodaya Gvardia Bulvard	44,237	6,272	359	212	1,254	520	52,854	16
SL03	Molodaya Gvardia Bulvard	48,818	6,544	363	223	1,312	549	57,809	24
SL04	Mir Avenue	45,386	5,034	502	303	229	76	51,530	16
SL04	Mir Avenue	50,172	5,273	516	317	247	82	56,607	24
SL05	Logvinenko Street	12,509	345	20	0	169	43	13,086	16
SL06	Panfllov Street	14,325	424	29	0	172	79	15,029	16
SL07	Sovetskaya Street	33,237	6,936	535	249	145	27	41,129	16
SL07	Sovetskaya Street	37,576	7,145	554	268	147	34	45,724	24
SL08	Ibraimov Street	48,188	1,908	14	1	835	512	51,458	16
SL09	Alma-Atinskaya Street	37,375	4,912	681	0	726	423	44,117	16
SL10	Cholpon-Atinskaya Street	9,400	915	15	5	659	278	11,272	16
SL11	Mir Avenue	43,898	5,451	476	259	331	30	50,445	16
SL12	Chui Avenue	20,558	4,355	715	225	249	5	26,107	16
SL12	Chui Avenue	24,912	4,663	751	238	273	9	30,846	24
SL13	Chui Avenue	25,285	4,814	431	0	146	11	30,687	16
SL13	Chui Avenue	27,635	5,038	463	1	156	11	33,304	24
SL14	Jibek-Jolu Avenue	28,771	4,940	278	217	917	592	35,715	16
SL14	Jibek-Jolu Avenue	32,328	5,173	309	227	964	622	39,623	24
SL15	Bakinsata str. Togoko	25,363	4,513	505	348	673	258	31,660	16
SL16	Togolok Moldo street	18,920	2,849	193	4	611	327	22,904	16
SL17	Kirgizskaya Street (Belskaya Street)	5,411	1,152	124	0	335	267	7,289	16
SL18	Severnaya Street (Kojoibergenova Street)	1,626	556	5	0	68	34	2,289	16

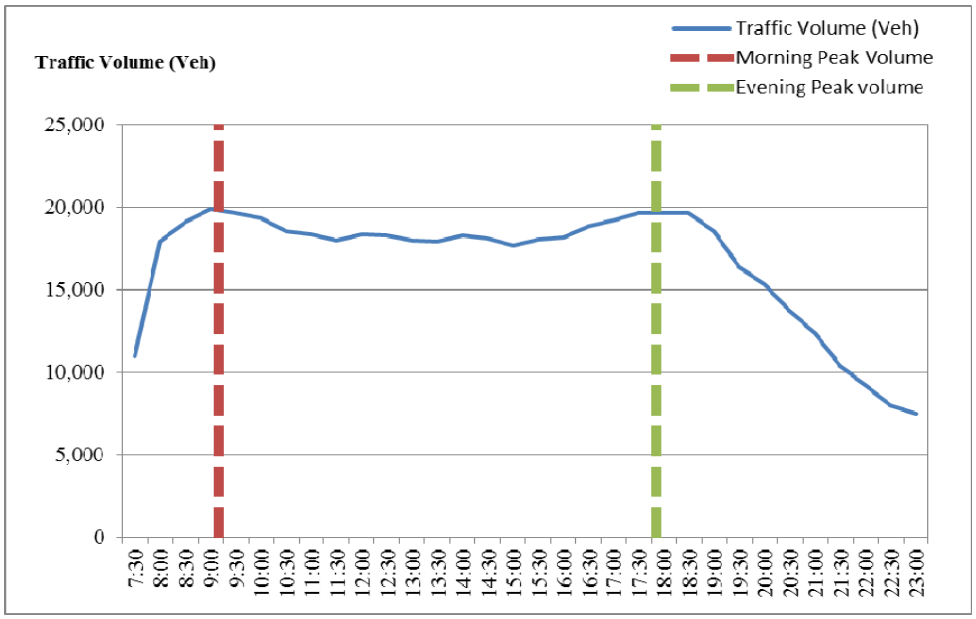
Source : JICA Study Team



Source : JICA Study Team

Figure 6.1-2 Traffic Volume at Screen Line

Figure 6.1-3 shows the accumulated traffic volume of all stations. The figure shows that there are peak hours in the morning (9:00 - 9:30 A.M.) and evening time (17:30 - 18:00 P.M.) and the peak hour traffic was with 20,000 Vehicles.



Note : Accumulated Traffic Volume of All Screen Line Stations
Source : JICA Study Team

Figure 6.1-3 Traffic Volume at 30 min Interval

Passenger Occupancy Survey

The quantity of on-board passengers of the sample vehicles were counted at intersections. This survey was conducted from 7:00 to 8:00 A.M., from 12:00 to 13:00 P.M. and from 17:00 to 18:00 P.M..

Table 6.1-2 Average Passenger Occupancy at Screen Line

Sedan	Sedan / Pickup / Van	Minibus	Midibus	Trolleybus / Largebus
1.50	2.85	17.0	27.0	28.2

6.1.3 Cordon Line Survey

(1) Outline

The Cordon Line (CL) Survey aims to determine the trips to or from the Study area made by external residents and to calibrate the Origin-Destination (OD) matrices obtained from the person trip survey conducted in the Study area boundary. This CL Survey consisted of CL Traffic Volume Count Survey and Roadside OD interview at CL.

The CL Survey was conducted in the boundary of Bishkek City with cooperation of Traffic Police Inspectors to provide the safety and assistance for roadside OD Interview on 13, 14 and 21 September 2011. CL traffic count survey.

The Traffic Count of CL Survey was conducted at twelve survey stations in the Study area. Classified vehicle counting was conducted on both traffic directions for 24 hours from 7:00 to 7:00 A.M. on a weekday excluding Monday, Friday, Saturday, Sunday and public holidays. Vehicle classification for CL Survey was also made similar to Screen Line Survey. Traffic volume was counted by classifying the vehicles into six types.

(2) Survey Result

Average Passenger Occupancy

The average passenger occupancy by vehicle type is shown in the **Table 6.1-3**.

Table 6.1-3 Average Passenger Occupancy at Cordon Line

Sedan / Pick up / Van	Minibus	Midibus	Trolleybus / Largebus	Light Truck
3.2	15.0	21.7	20.5	1.3

Source : JICA Study Team

Number of Samples and Sampling Rate

Roadside OD interview survey conducted for driver for 12 hours from 7:00 to 19:00. The number of sampling target was at random 10 percent of traffic volume. Number of sampling and sampling rate at each station from CL surveys are shown in **Table 6.1-4**.

Table 6.1-4 Number of Sampling and Sampling Rate

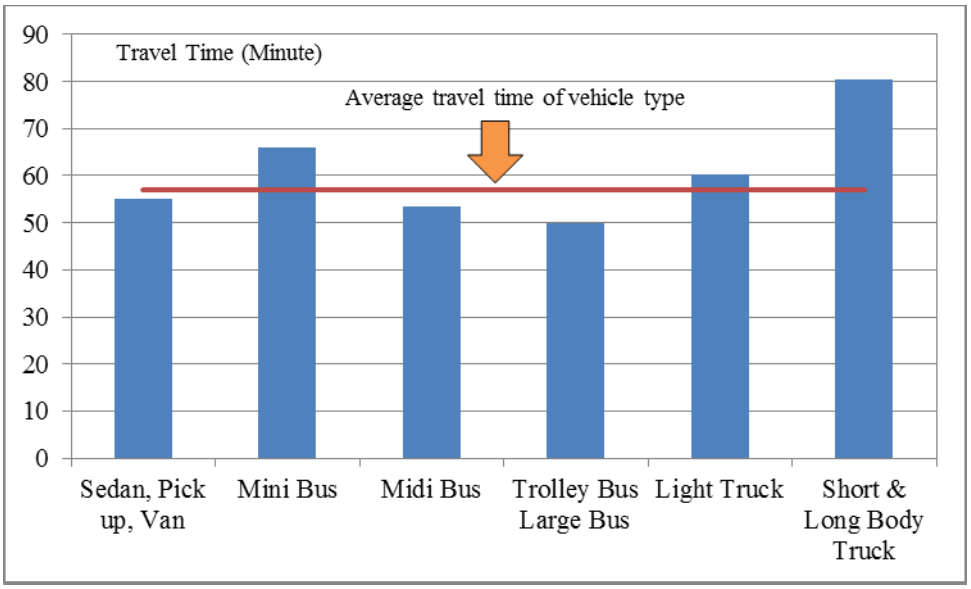
Station No.	Road Name	Traffic Volume Per 12 hours	No. of Sampling	Sampling Rate
CL1	Bakinskaya Street	11,942	1,758	14.7%
CL2	Kurmanjan Datka Street	16,852	1,617	9.6%
CL3	Kalinin Street	8,155	764	9.4%
CL4	Pobeda Street	22,278	2,148	9.6%
CL5	Gorky Street (Bound for Issyk-Ata)	6,265	605	9.7%
CL6	Shabdan Baatyr Street	10,361	971	9.4%
CL7	Dial Village	4,715	465	9.9%
CL8	Kuntuu Village (Dostuk)	4,975	443	8.9%
CL9	Novopavlovka Village	28,113	2,543	9.0%
CL10	Vasiyevskiy Trakt Street	10,571	999	9.5%
CL11	Prigorodnoe Village	4,713	407	8.6%
CL12	Molodaya Gvardia Street	12,947	1,146	8.9%
			Average	9.8%

Source : JICA Study Team

Also, The Survey results of travel time and trip purposes of passengers are based on the roadside interview from CL survey.

Travel Time

Figure 6.1-4 shows the travel time by vehicle type and average travel time. The travel time from origin to destination was calculated based on estimation of driver's sense. Travel time for minibuses and "Short & Long Body Trucks" were more than 60 minutes. Average travel time of all vehicles was around 60 minutes.

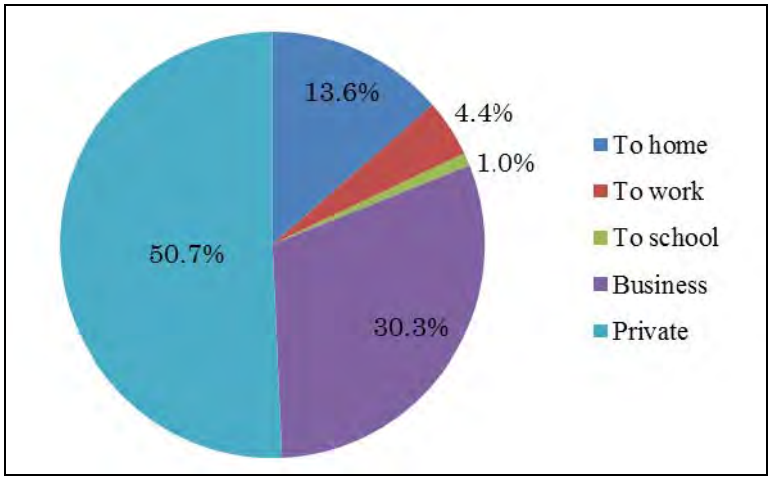


Source : JICA Study Team

Figure 6.1-4 Average Travel Time by Vehicle Type

Trip Purpose of Passenger Car

Figure 6.1-5 shows the trip purpose of passenger cars. Interview with public bus users was not conducted in the Survey. The Private trip purpose was the largest among the five trip purposes.



Source : JICA Study Team

Figure 6.1-5 Trip Purpose of Passenger Car

Traffic Volume at Cordon Line Stations

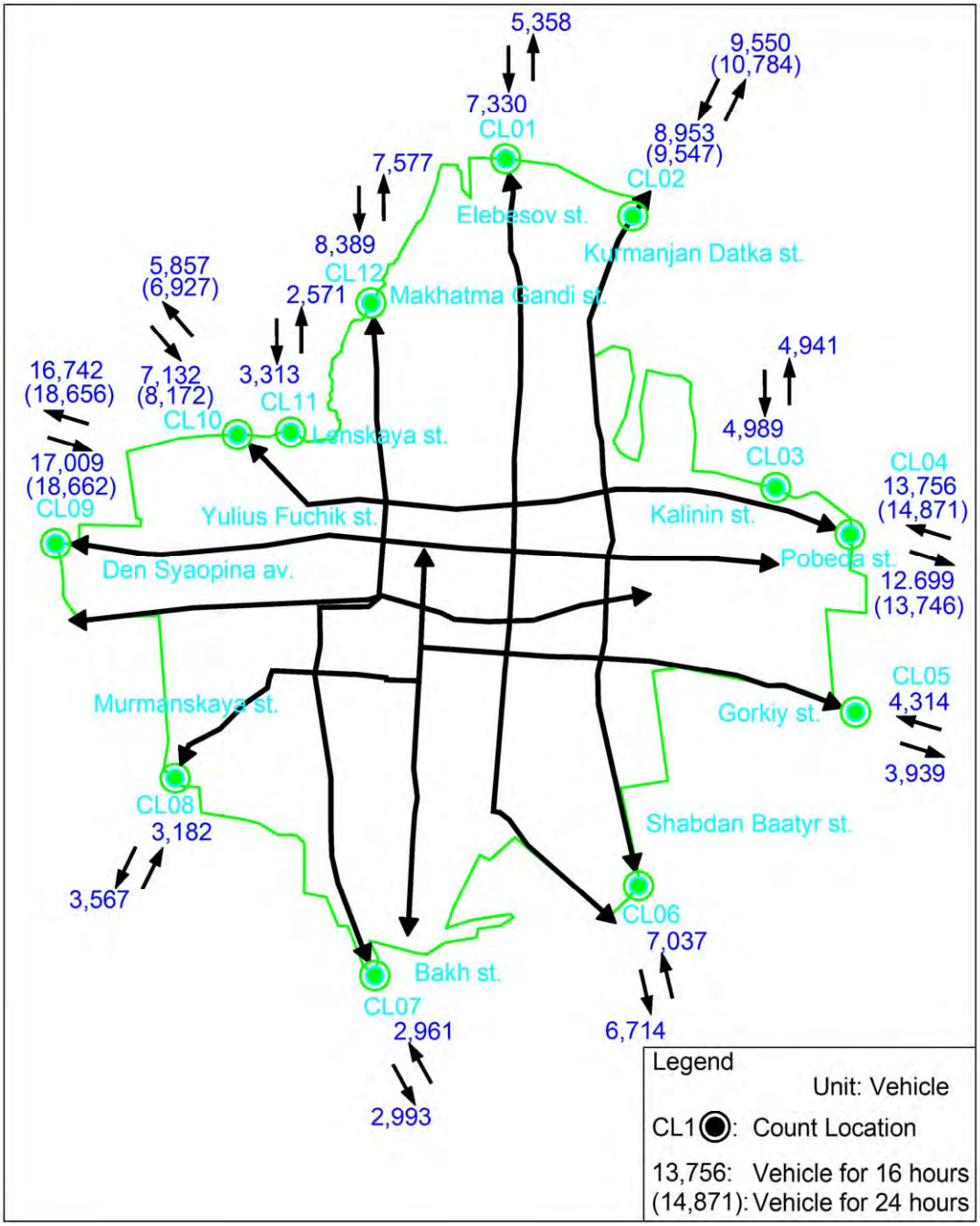
Table 6.1-5 Traffic Volume at Cordon Line Survey Station

Unit : Vehicle/16 hours

Station	Traffic Flow Direction	Traffic Volume	Share (%)	Station	Traffic Flow Direction	Traffic Volume	Share (%)
CL1	In	5,358	42.2%	CL7	In	2,961	49.7%
	Out	7,330	57.8%		Out	2,993	50.3%
	Total	12,688	100.0%		Total	5,954	100.0%
CL2	In	9,950	52.6%	CL8	In	3,182	47.1%
	Out	8,953	47.4%		Out	3,567	52.9%
	Total	18,903	100.0%		Total	6,749	100.0%
CL3	In	4,941	49.8%	CL9	In	16,742	49.6%
	Out	4,989	50.2%		Out	17,009	50.4%
	Total	9,930	100.0%		Total	33,751	100.0%
CL4	In	13,756	52.0%	CL10	In	5,857	45.1%
	Out	12,699	48.0%		Out	7,132	54.9%
	Total	26,455	100.0%		Total	12,989	100.0%
CL5	In	4,314	52.3%	CL11	In	2,571	43.7%
	Out	3,939	47.7%		Out	3,313	56.3%
	Total	8,253	100.0%		Total	5,884	100.0%
CL6	In	7,037	51.2%	CL12	In	7,577	47.5%
	Out	6,714	48.8%		Out	8,389	52.5%
	Total	13,751	100.0%		Total	15,966	100.0%

Source : JICA Study Team

Survey results in **Table 6.1-5** shows that incoming and outgoing traffic volumes were almost equal in each station. The OD interview was conducted along with traffic counting **Figure 6.1-6** shows the results of traffic counting at survey stations. The highest traffic volume (more than 33,000) was recorded at CL9.



Source : JICA Study Team

Figure 6.1-6 Map of Cordon Line and Result of Traffic Volume Counting

6.1.4 Intersection Survey

(1) Outline

The Intersection Survey at selected intersections aims to identify the present condition of traffic flow and level of congestion at each intersection. Felid survey was conducted on weekdays: 22, 27 and 28 of September, 2011. At the same time the JICA Study Team has conducted queue length and traffic signal cycle surveys. The survey was executed at ten intersections of Bishkek City.

Table 6.1-6 Location Name of Intersection Survey

Survey Location	Road Name
IS01	Jct. Jibek - Jolu Avenue and Alma Atinskaya Street
IS02	Jct. Chui Avenue and Alma Atinskaya Street
IS03	Jct. Gorky Street and Shabdan Baatyr Street
IS04	Jct. Chui Avenue and Ibraimov Street
IS05	Jct. Gorky Street and Sovetskaya Street
IS06	Jct. Akhunbaev Street and Sovetskaya Street
IS07	Jct. Southern Arterial Road and Mir Avenue
IS08	Jct. Akhunbaev Street and Mir Avenue
IS09	Jct. Chui Avenue and Manas Avenue
IS10	Jct. Jibek - Jolu Avenue and Fuchik Street

Source : JICA Study Team

(2) Survey Results

Traffic Vehicle Count at Intersection Survey

Traffic vehicle count at intersections was conducted in three directions (i.e. left turn, straight and right turn) by recording data at ten (10) minutes interval. Vehicle classification was same as used in the Screen Line and Cordon Line Surveys. Queue Length and Traffic Signal Cycle measurements were executed concurrently from 7:00 A.M. to 9:00 A.M., 12:00 to 14:00 P.M. and 17:00 P.M. to 19:00 P.M.. The result of traffic volume at intersection for twelve (12) hours is shown in **Figure 6.1-8**.

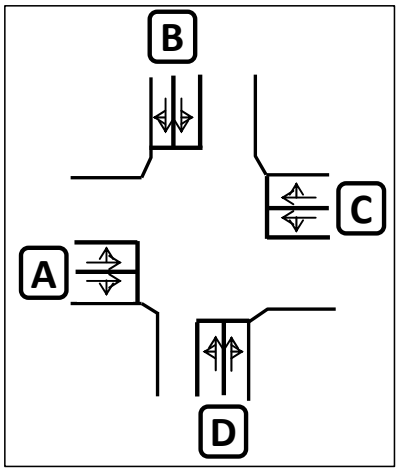


Figure 6.1-7 Schematic of Traffic Flow Direction

IS01 (Jct. Jibek - Jolu Avenue and Alma Atinskaya Street)

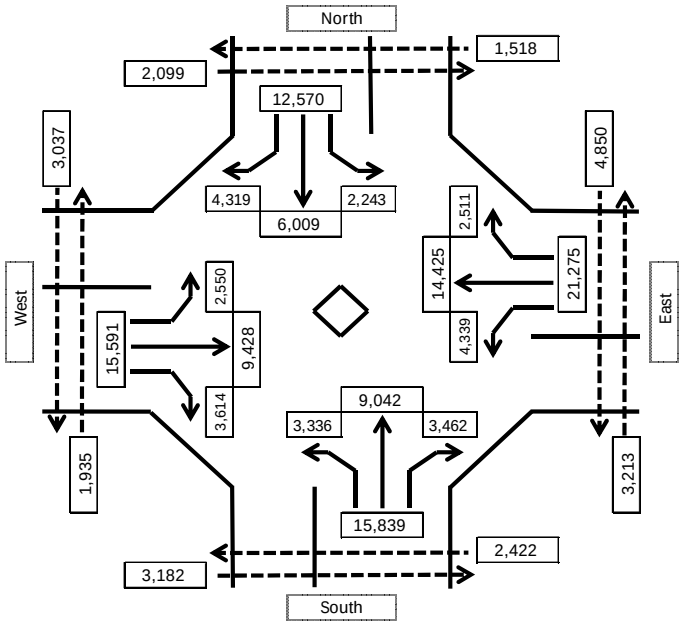
Time 7:00 ~ 19:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		2,243	6,009	4,319	12,570
	E	2,511		4,339	14,425	21,275
	S	9,042	3,462		3,336	15,839
	W	2,550	9,428	3,614		15,591
	Total	14,102	15,132	13,962	22,079	65,274

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		4,850		1,518	6,368
	SE	3,213		2,422		5,635
	SW		3,182		1,935	5,117
	NW	2,099		3,037		5,136
	Total	5,312	8,032	5,459	3,453	22,256



IS02 (Jct. Chui Avenue and Alma Atinskaya Street)

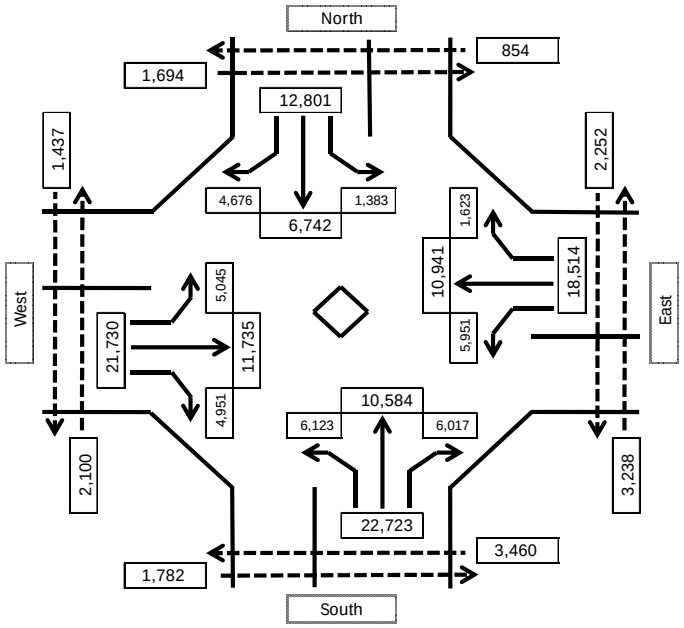
Time 7:00 ~ 19:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		1,383	6,742	4,676	12,801
	E	1,623		5,951	10,941	18,514
	S	10,584	6,017		6,123	22,723
	W	5,045	11,735	4,951		21,730
	Total	17,251	19,135	17,643	21,740	75,768

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		2,252		854	3,106
	SE	3,238		3,460		6,698
	SW		1,782		2,100	3,882
	NW	1,694		1,437		3,131
	Total	4,932	4,034	4,897	2,954	16,817



IS03 (Jct. Gorky Street and Shabdan Baatyr Street)

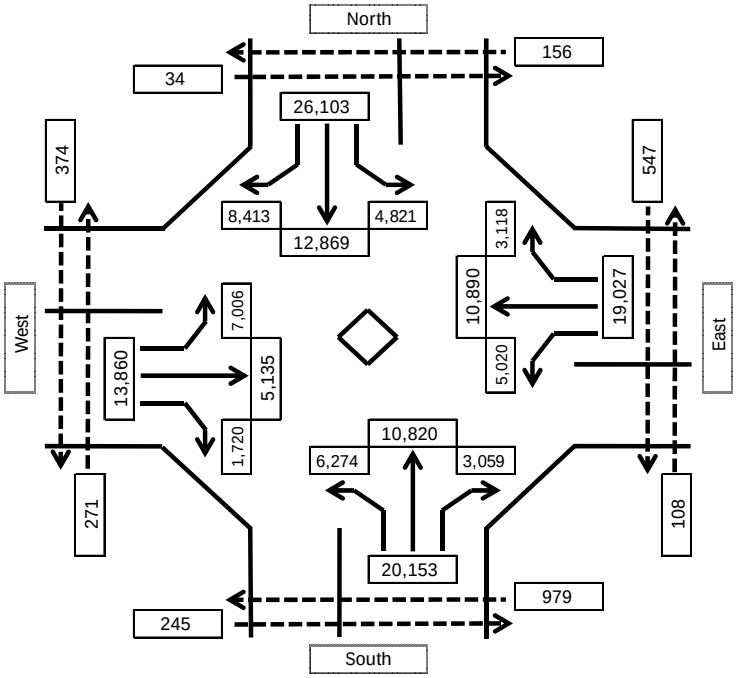
Time 7:00 ～ 19:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		4,821	12,869	8,413	26,103
	E	3,118		5,020	10,890	19,027
	S	10,820	3,059		6,274	20,153
	W	7,006	5,135	1,720		13,860
	Total	20,943	13,014	19,609	25,577	79,143

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		547		156	703
	SE	108		979		1,087
	SW		245		271	516
	NW	34		374		408
	Total	142	792	1,353	427	2,714



IS04 (Jct. Chui Avenue and Ibraimova Street)

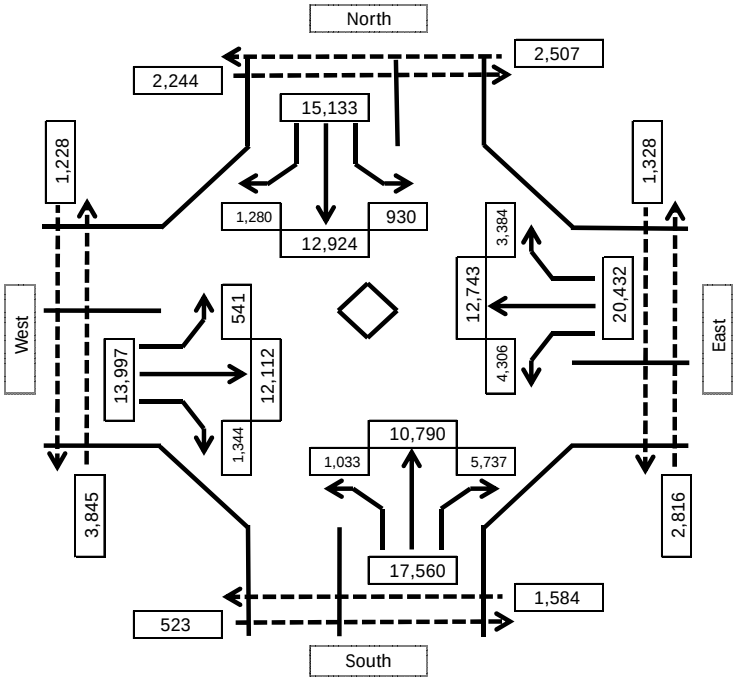
Time 7:00 ～ 19:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		930	12,924	1,280	15,133
	E	3,384		4,306	12,743	20,432
	S	10,790	5,737		1,033	17,560
	W	541	12,112	1,344		13,997
	Total	14,714	18,779	18,573	15,056	67,122

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		1,328		2,507	3,835
	SE	2,816		1,584		4,400
	SW		523		3,845	4,368
	NW	2,244		1,228		3,472
	Total	5,060	1,851	2,812	6,352	16,075



IS05 (Jct. Gorky Street and Sovetskaya Street)

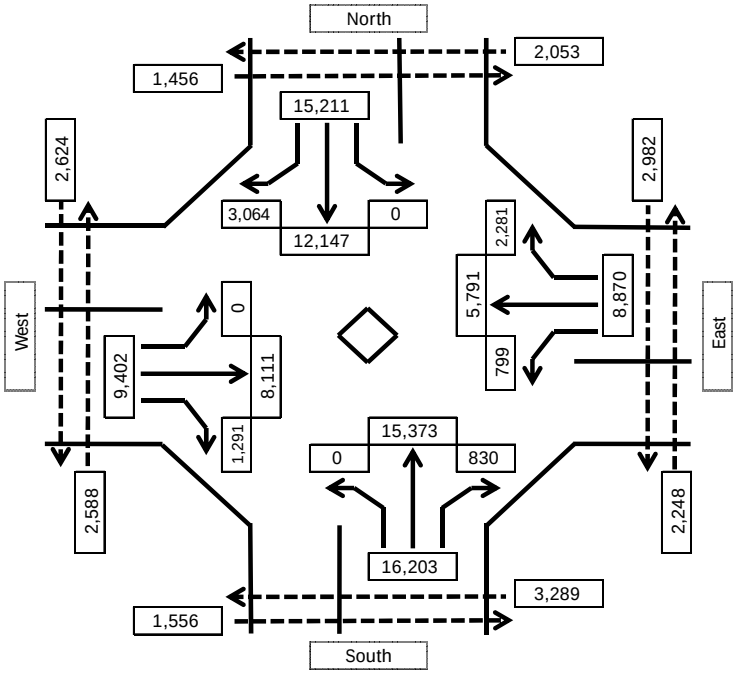
Time 7:00 ～ 19:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		0	12,147	3,064	15,211
	E	2,281		799	5,791	8,870
	S	15,373	830		0	16,203
	W	0	8,111	1,291		9,402
	Total	17,653	8,941	14,237	8,855	49,685

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		2,982		2,053	5,035
	SE	2,248		3,289		5,537
	SW		1,556		2,588	4,144
	NW	1,456		2,624		4,080
	Total	3,704	4,538	5,913	4,641	18,796



IS06 (Jct. Akhunbaev Street and Sovetskaya Street)

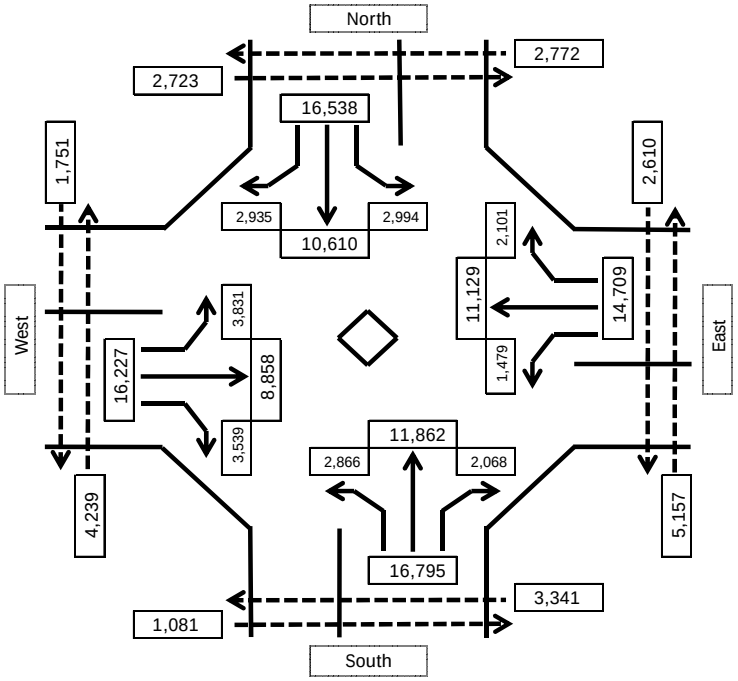
Time 7:00 ～ 19:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		2,994	10,610	2,935	16,538
	E	2,101		1,479	11,129	14,709
	S	11,862	2,068		2,866	16,795
	W	3,831	8,858	3,539		16,227
	Total	17,793	13,919	15,628	16,930	64,269

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		2,610		2,772	5,382
	SE	5,157		3,341		8,498
	SW		1,081		4,239	5,320
	NW	2,723		1,751		4,474
	Total	7,880	3,691	5,092	7,011	23,674



IS07 (Jct. Southern Arterial Road and Mir Avenue)

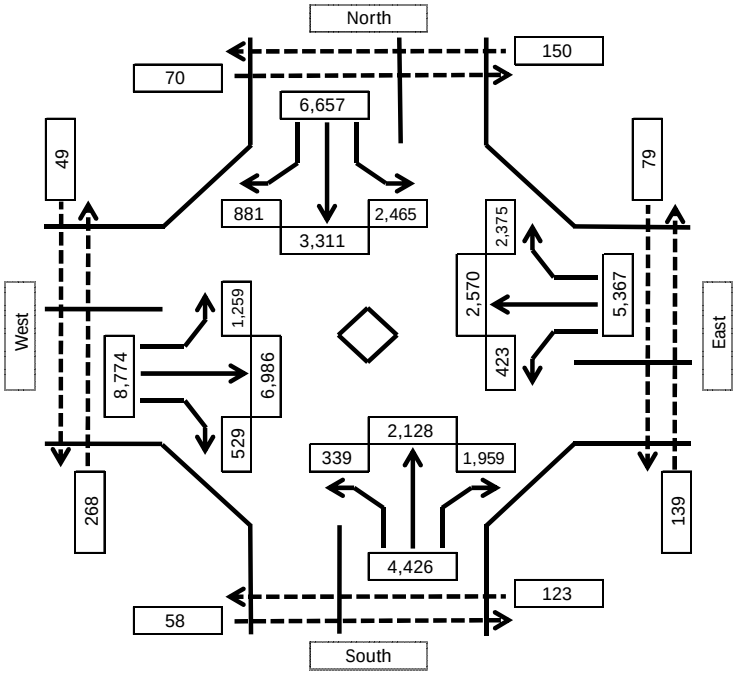
Time 7:00 ~ 19:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		2,465	3,311	881	6,657
	E	2,375		423	2,570	5,367
	S	2,128	1,959		339	4,426
	W	1,259	6,986	529		8,774
	Total	5,762	11,410	4,263	3,789	25,223

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		79		150	229
	SE	139		123		262
	SW		58		268	326
	NW	70		49		119
	Total	209	137	172	418	936



IS08 (Jct. Akhunbaev Street and Mir Avenue)

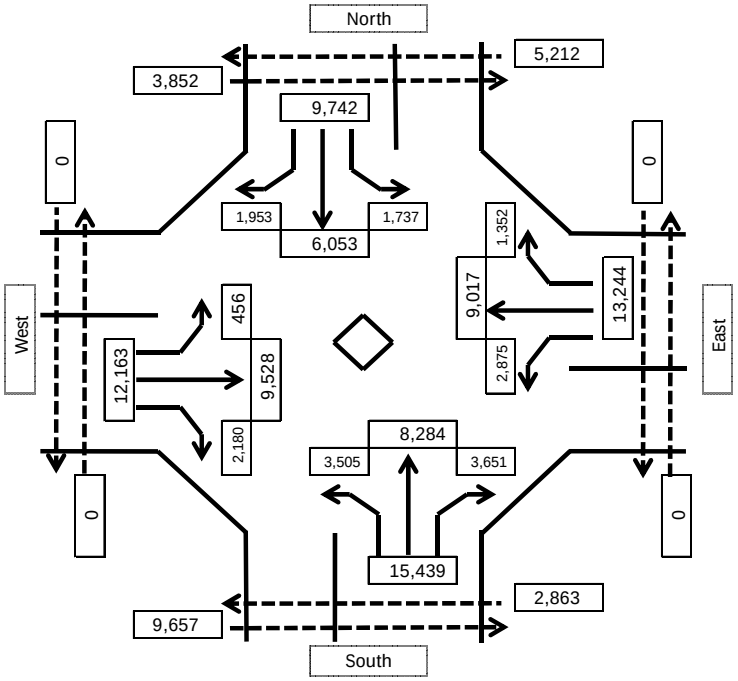
Time 7:00 ~ 19:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		1,737	6,053	1,953	9,742
	E	1,352		2,875	9,017	13,244
	S	8,284	3,651		3,505	15,439
	W	456	9,528	2,180		12,163
	Total	10,091	14,915	11,107	14,474	50,587

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		0		5,212	5,212
	SE	0		2,863		2,863
	SW		9,657		0	9,657
	NW	3,852		0		3,852
	Total	3,852	9,657	2,863	5,212	21,584



IS09 (Jct. Chui Avenue and Manas Avenue)

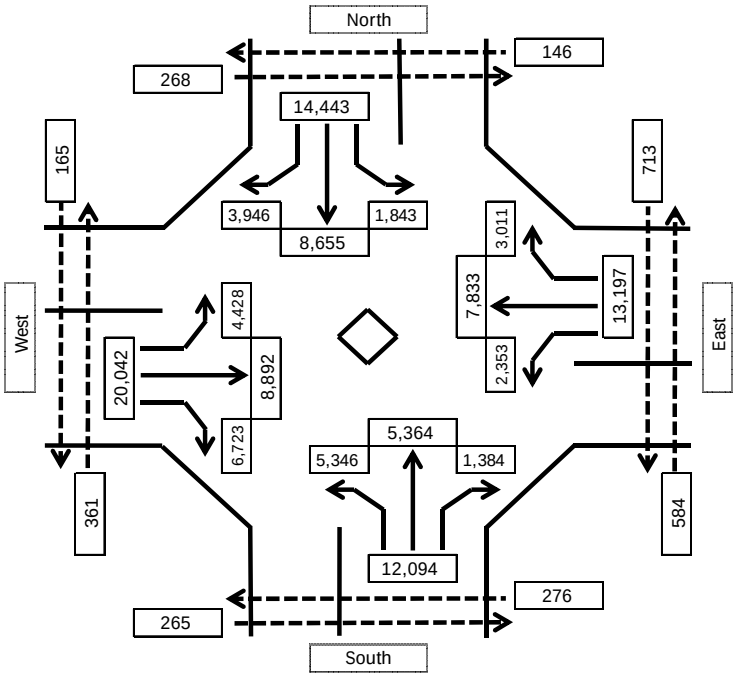
Time 7:00 ~ 19:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		1,843	8,655	3,946	14,443
	E	3,011		2,353	7,833	13,197
	S	5,364	1,384		5,346	12,094
	W	4,428	8,892	6,723		20,042
	Total	12,802	12,118	17,731	17,124	59,775

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		713		146	859
	SE	584		276		860
	SW		265		361	626
	NW	268		165		433
	Total	852	978	441	507	2,778



IS10 (Jct. Jibek - Jolu Avenue and Fuchik Street)

Time 7:00 ~ 19:00

Vehicle Unit : PCU

		Out-Bound				
		N	E	S	W	Total
In-Bound	N		4,656	5,446	-	10,101
	E	4,385		8,454	-	12,839
	S	9,456	2,998		-	12,454
	W	-	-	-		0
	Total	13,841	7,654	13,900	0	35,394

Pedestrian Unit : Person

		Out-Bound				
		NE	SE	SW	NW	Total
In-Bound	NE		153		56	209
	SE	71		423		494
	SW		301		-	301
	NW	179		-		179
	Total	250	454	423	56	1,183

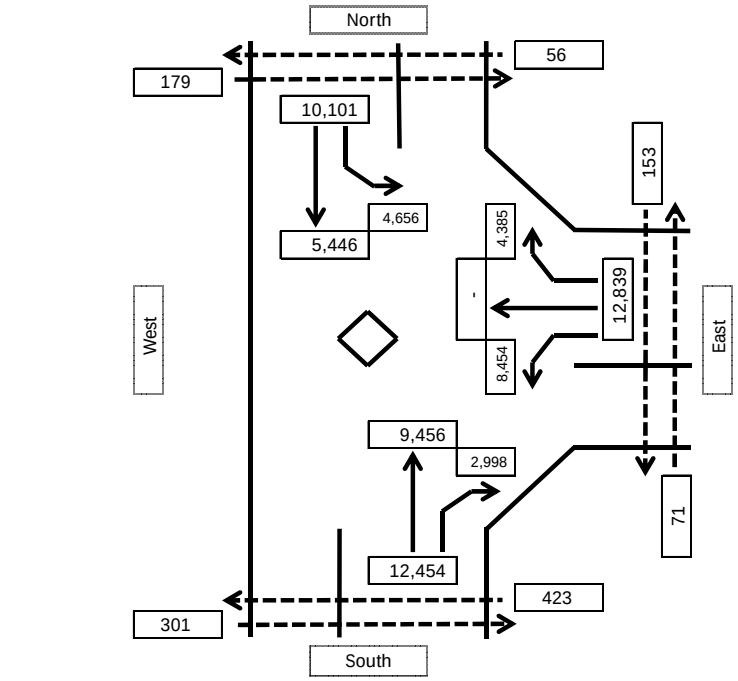


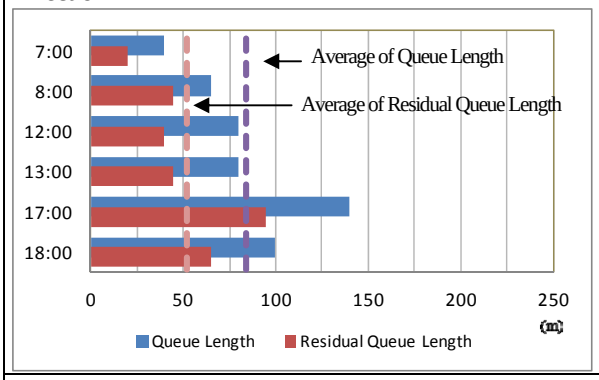
Figure 6.1-8 Traffic Volume for 12 hour at Intersection

Queue Length Survey

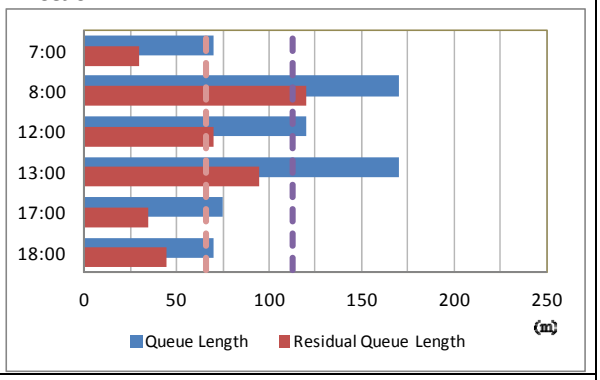
Queue Length Survey at above mentioned intersections was conducted by counting traffic flows and measuring traffic signal cycles. Maximum queue length in each direction of intersection was recorded. The survey result is shown in **Figure 6.1-9**.

IS01: Jct. Jibek - Jolu Avenue and Alma Atinskaya Street

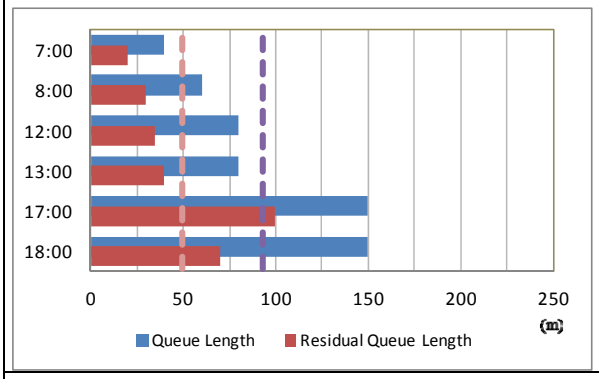
Direction A



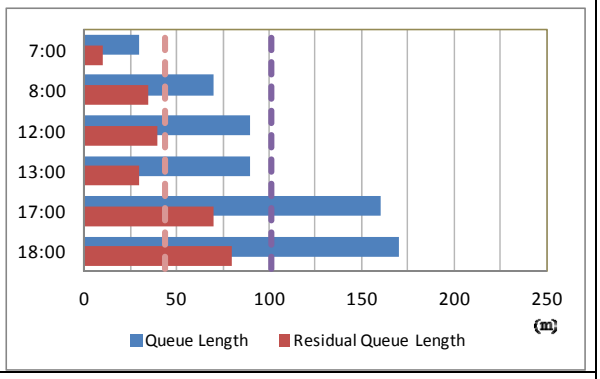
Direction B



Direction C

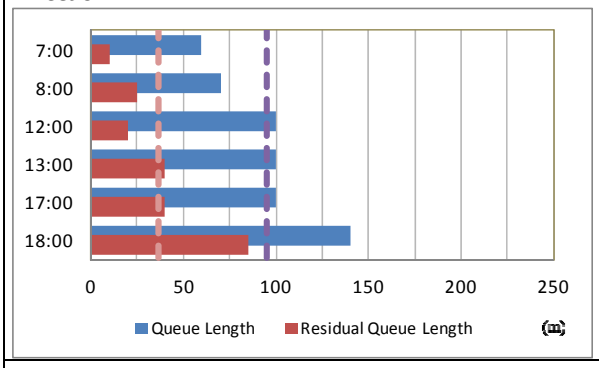


Direction D

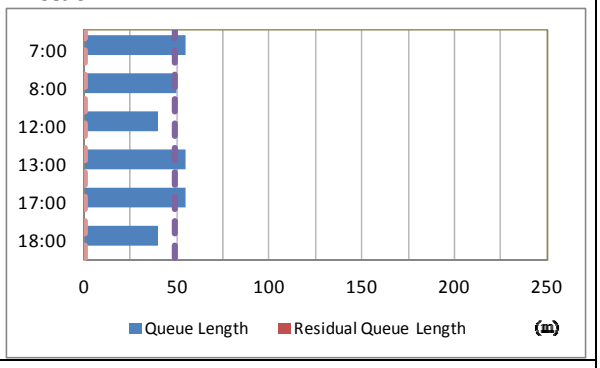


IS02: Jct. Chui Avenue and Alma Atinskaya Street

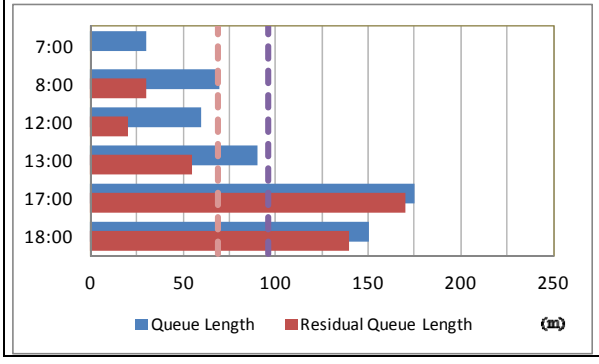
Direction A



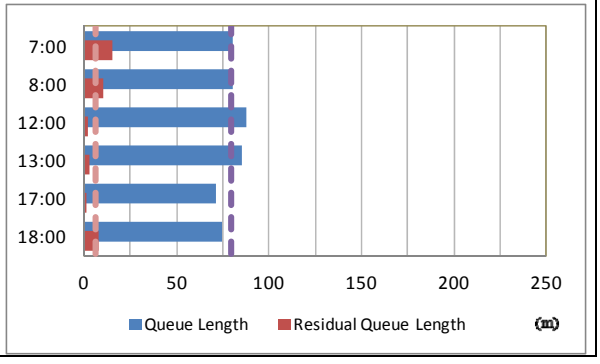
Direction B



Direction C

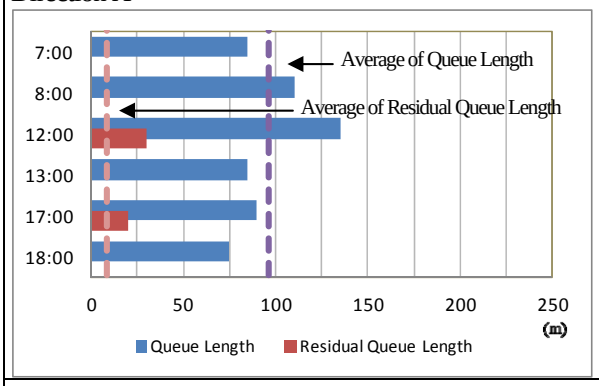


Direction D

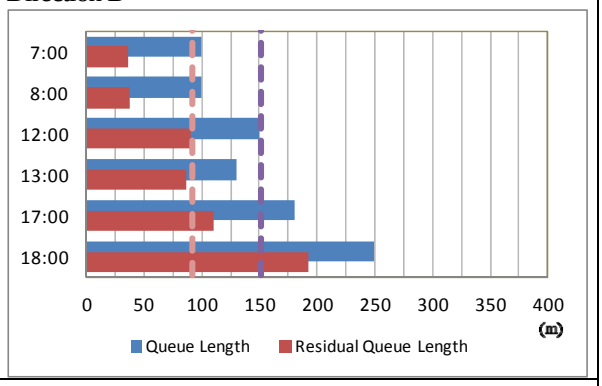


IS03: Gorky Street and Shabdan Baatyr Street

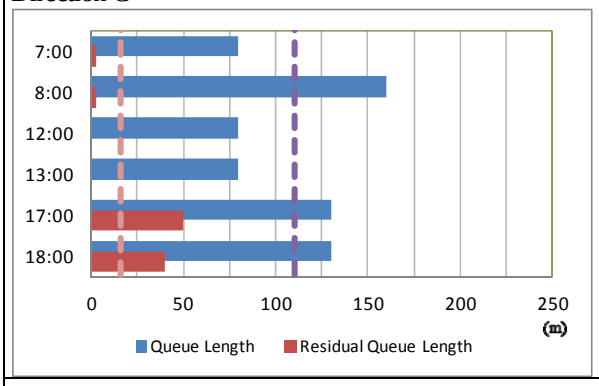
Direction A



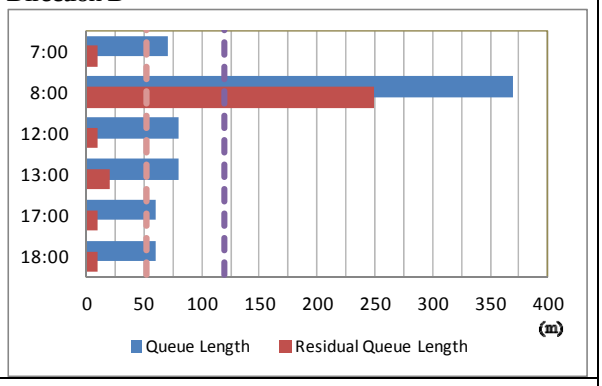
Direction B



Direction C

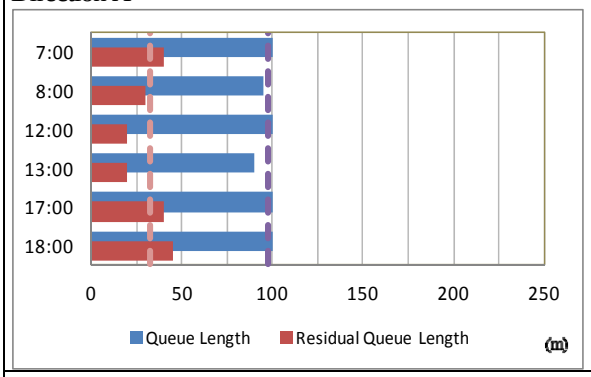


Direction D

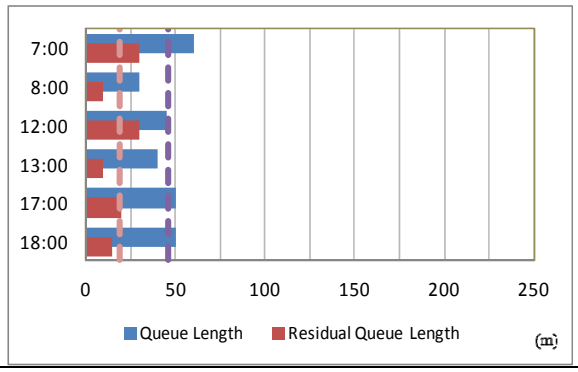


IS04: Jct. Chui Avenue and Ibraimov Street

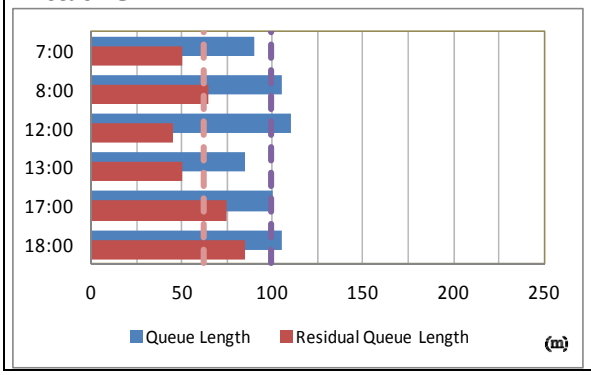
Direction A



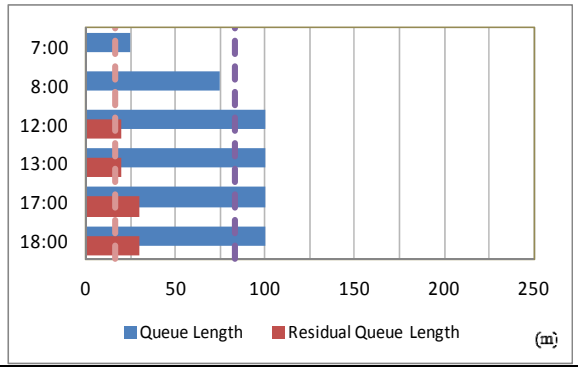
Direction B



Direction C

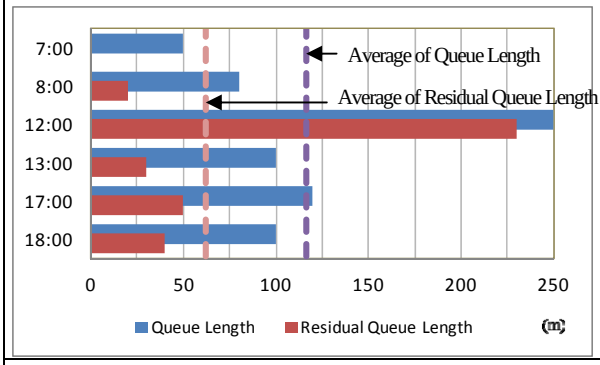


Direction D

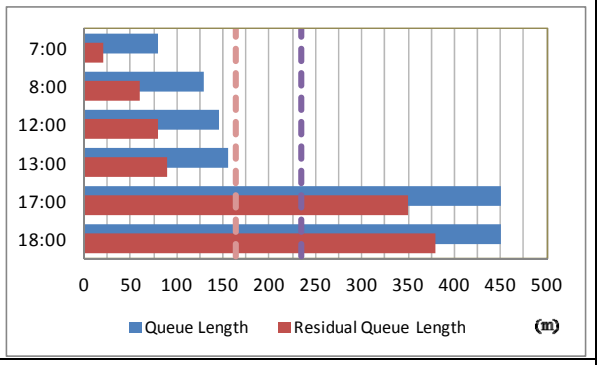


IS05: Jct. Gorky Street and Sovetskaya Street

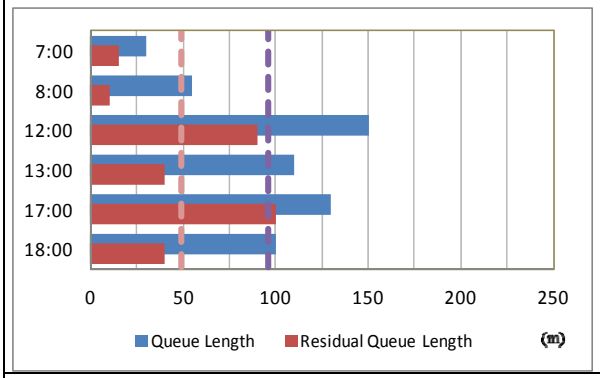
Direction A



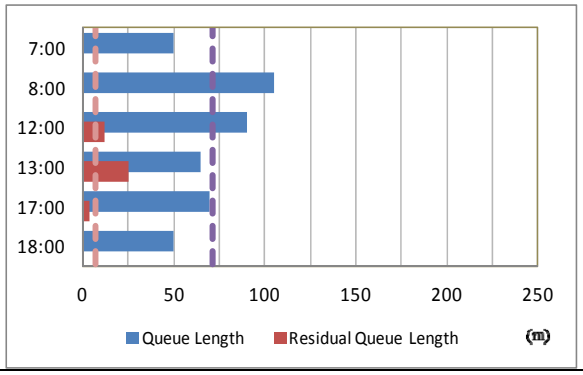
Direction B



Direction C

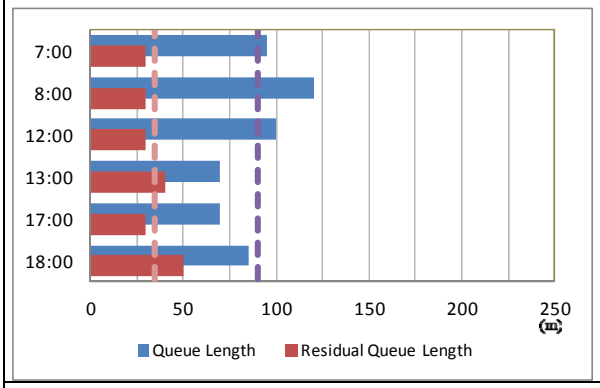


Direction D

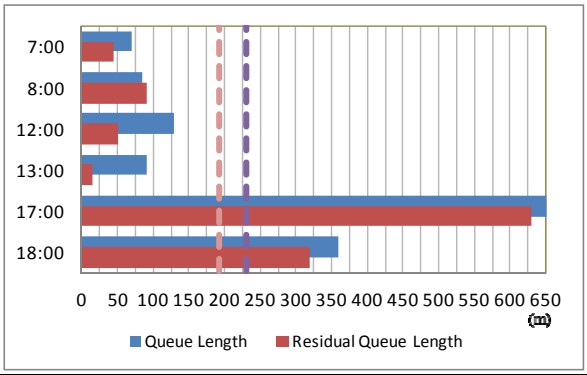


IS06: Jct. Akhunbaev Street and Sovetskaya Street

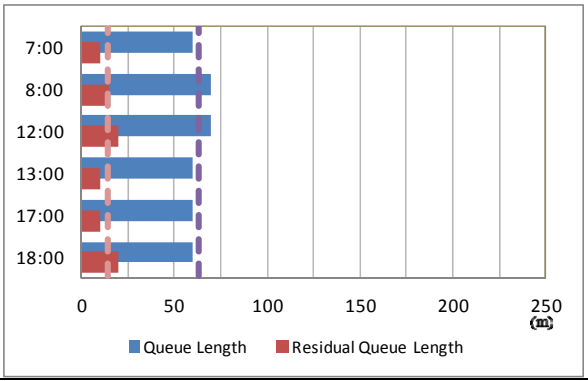
Direction A



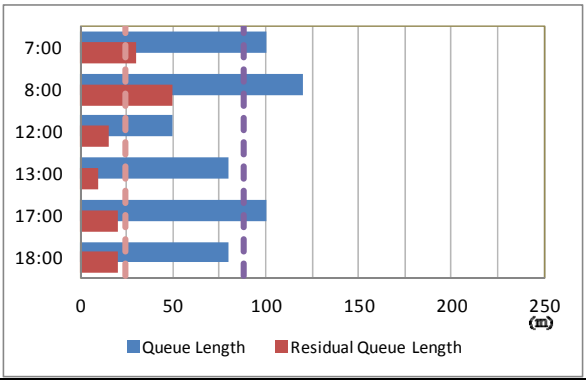
Direction B



Direction C

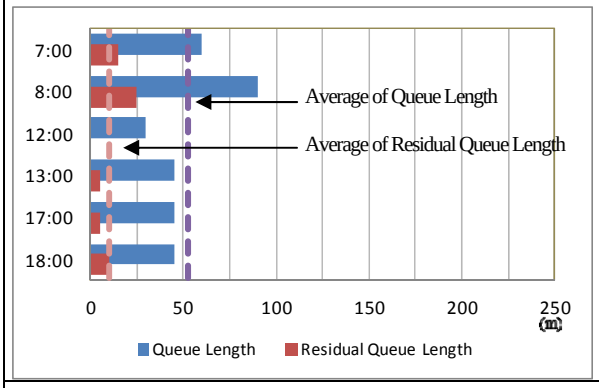


Direction D

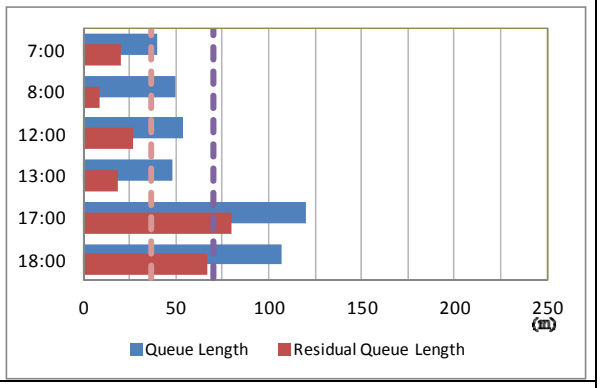


IS07: Jct. Southern Arterial Road and Mir Avenue

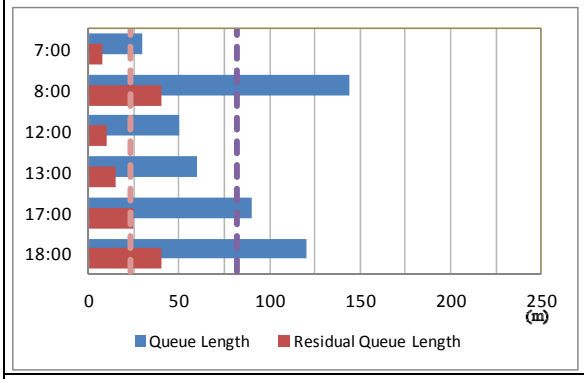
Direction A



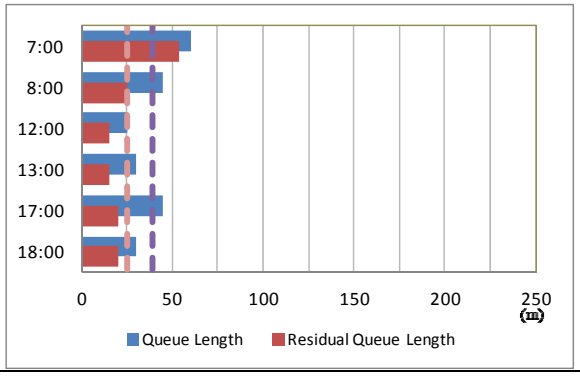
Direction B



Direction C

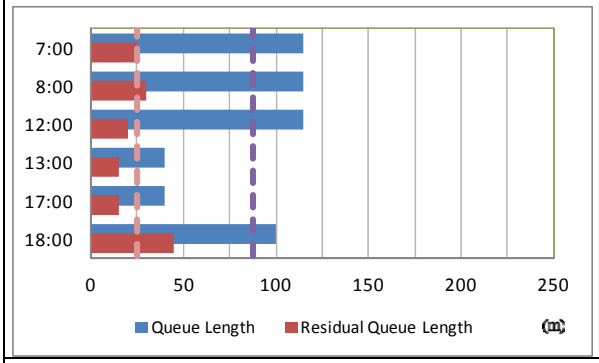


Direction D

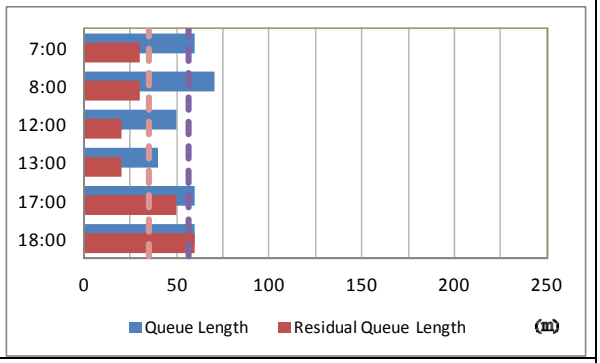


IS08: Akhunbaev Street and Mir Avenue

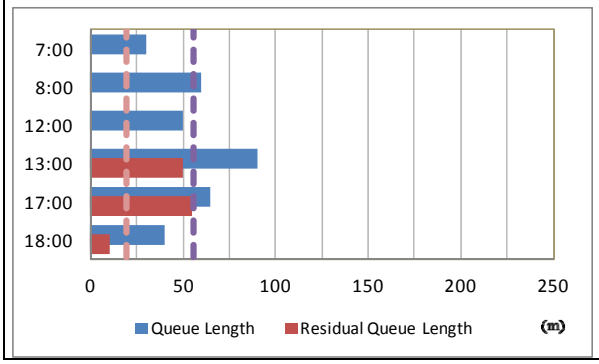
Direction A



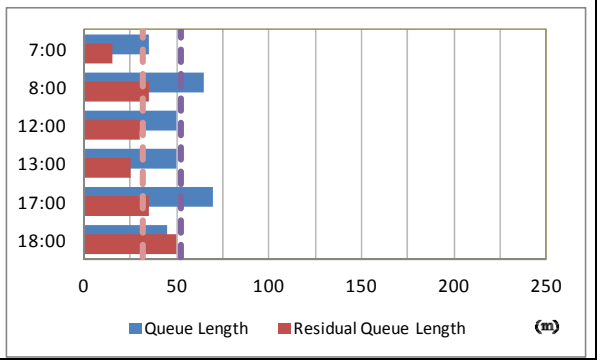
Direction B

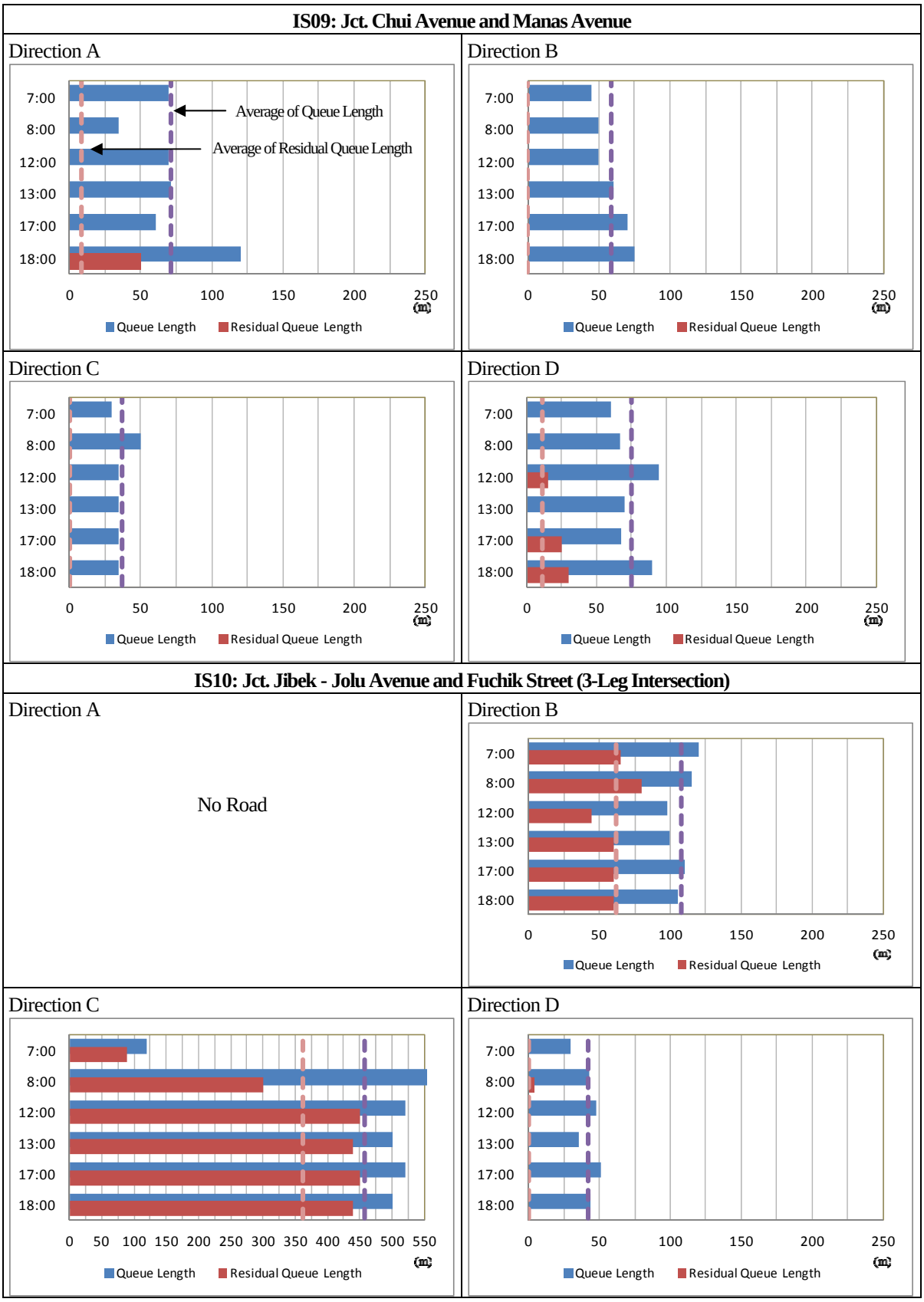


Direction C



Direction D





Source : JICA Study Team

Figure 6.1-9 Result of Queue Length and Residual Length by Direction

Traffic Signal Survey

Traffic Signal Survey was conducted at 10 intersections of Bishkek City to identify the time period for each phase of traffic signal light and general signal cycle. Measurements of time parameters were conducted during day and evening times. As a result of survey, it was found that the phases and signal cycles of traffic lights are fixed and regardless of directional traffic volume. Result of Traffic Signal Survey is shown in **Table 6.1-7**.

Table 6.1-7 Result of Traffic Signal Survey at Intersections (Phase and Cycle)

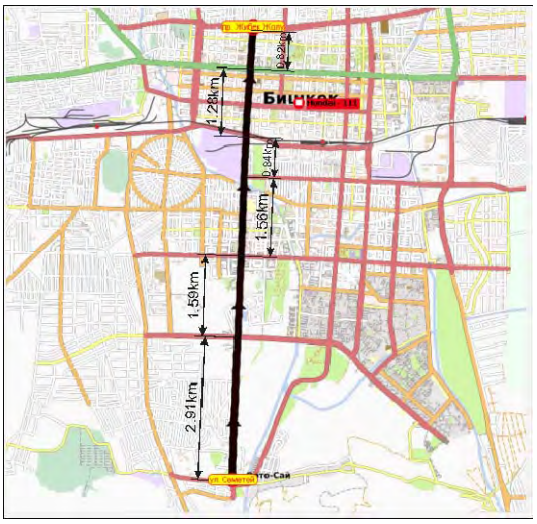
Location		Phase	Green (Sec)	Green Flash (Sec)	Yellow (Sec)	Cycle (Sec)
IS01	Jct. Jibek - Jolu Avenue and Alma Atinskaya Street	1 φ	16	4	3	23
		2 φ	26	4	3	33
		Total	42	8	6	56
IS02	Jct. Chui Avenue and Alma Atinskaya Street	1 φ	20	4	4	28
		2 φ	24	5	4	33
		Total	44	9	8	61
IS03	Jct. Gorky Street and Shabdan Baatyr Street	1 φ	27	5	5	37
		2 φ	14	5	5	24
		3 φ	12	5	5	22
		Total	53	15	15	83
IS04	Jct. Chui Avenue and Ibraimov Street	1 φ	27	5	4	36
		2 φ	27	5	3	35
		Total	54	10	7	71
IS05	Jct. Gorky Street and Sovetskaya Street	1 φ	17	5	5	27
		2 φ	14	5	5	24
		Total	31	10	10	51
IS06	Jct. Akhunbaev Street and Sovetskaya Street	1 φ	28	5	5	38
		2 φ	28	5	5	38
		Total	56	10	10	76
IS07	Jct. Southern Arterial Road and Mir Avenue	1 φ	13	5	4	22
		2 φ	21	5	4	30
		Total	34	10	8	52
IS08	Jct. Chui Avenue and Mir Avenue	1 φ	24	3	3	30
		2 φ	21	4	3	28
		Total	45	7	6	58
IS09	Jct. Chui Avenue and Manas Avenue	1 φ	26	4	3	33
		2 φ	16	4	3	23
		Total	42	8	6	56
IS10	Jct. Jibek - Jolu Avenue and Fuchik Street	1 φ	15	7	4	26
		2 φ	18	7	4	29
		Total	33	14	8	55

Source : JICA Study Team

6.1.5 Travel Speed Survey

(1) Outline

Travel Speed Survey was conducted to analyze the travel time of eight (8) major sections as shown in **Figure 6.1-10**. This survey was conducted by the "floating car method" which requires the survey vehicle to keep the same position in the traffic flow. Global Positioning System (GPS) Locarus-702 was used for recording travel time, stop/start time at intersections and distance.

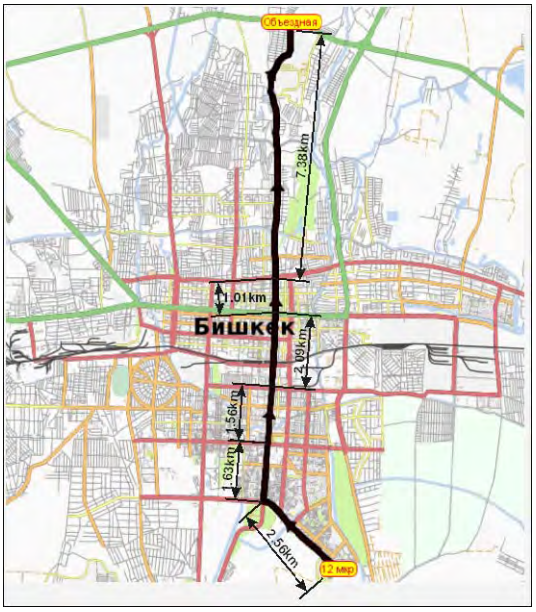


Route 1: from Semetei Street to Jibek - Jolu Avenue

Route 3: from Chodronova Street to Prigorodnaya Street

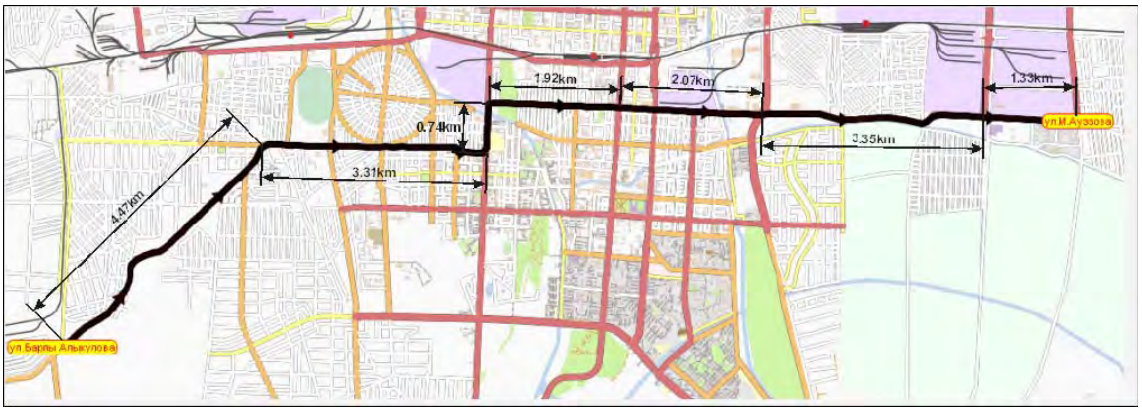
Route 2: from Sadygalieva Street to Pravda Avenue

Route 4: from Fuchik Street to Pobeda Street



Route 5: from 12 m/d to Obezdnaya

Route 6: from Karagul Akmash Street to Obezdnaya



Route 7: from Barbi Alikulova Street to Auezova Street

Route 8: from Alikulova Street to Auezova Street

Source : JICA Study Team

Figure 6.1-10 Location of Survey Route

(2) Survey Result

Travel Speed with Stop Time

Average travel speed with stop times are shown in **Table 6.1-8**. Average travel speed almost exceeded 30 km/h in the City. Average travel time varies from 20 to 30 minutes for one way trips of the sections.

Table 6.1-8 Average Travel Speed with Stop Time

Road name	Section	Distance (km)	Average speed (km/h)			
			Morning peak	Noon	Evening peak	Total
Mir avenue	Semetei street - Jibek-Jolu street	9.0	44.8	37.9	45.0	42.6
	Jibek-Jolu street - Semetei street		49.2	47.2	41.4	45.9
Tolstoy street	Sadigalieva street - Puteprovodnaya street	7.6	41.4	41.3	43.3	42.0
	Puteprovodnaya street - Sadigalieva street		43.3	41.3	45.4	43.3
Baha - Molodaya Gvardiya	Chodronova street - Prigorodnaya street	14.6	47.0	42.3	43.6	44.3
	Prigorodnaya street - Chodronova street		44.7	42.6	39.8	42.4
Jibek-Jolu street	Fuchik street - Pobeda street	13.6	44.2	46.3	43.9	44.8
	Pobeda street - Fuchik street		47.2	45.3	45.9	46.1
Bakinskaya-Sovetskaya Street	12 micro - Obezdnaya	16.2	42.9	39.2	39.6	40.6
	Obezdnaya - 12 micro		44.2	39.3	38.1	40.5
Alma Atinskaya Street	Karagul Akmash street - Obezdnaya	14.9	48.3	48.9	50.8	49.3
	Obezdnaya - Karagul Akmash street		50.9	47.5	45.8	48.1
Muromskaya - Gorky street	Barbi Alykulova - Auezova street	17.2	41.6	42.6	44.9	43.0
	Auezova street - Barbi Alykulova		41.6	43.4	43.5	42.8
Den Syaopin Avenue - Chui avenue	Barbi Alykulova street - Auezova street	15.3	45.3	43.6	43.3	44.1
	Auezova street - Barbi Alykulova street		44.3	40.5	40.2	41.7

Source : JICA Study Team

Travel Speed without Stop Time

Average travel speed without stop time is shown in **Table 6.1-9**. Average travel speed is more than 40 km/h. By comparison of travel speed with and without travel speed, it was found that travel speed without stop time was much faster by 10 km/h.

Table 6.1-9 Average Travel Speed without Stop Time

Road name	Section	Distance (km)	Average speed (km/h)			
			Morning peak	Noon	Evening peak	Total
Mir avenue	Semetei street - Jibek-Jolu street	9.0	30.0	27.8	33.4	30.4
	Jibek-Jolu street - Semetei street		40.0	32.9	27.2	33.4
Tolstoy street	Sadigalieva street - Puteprovodnaya street	7.6	17.3	28.6	37.9	27.9
	Puteprovodnaya street - Sadigalieva street		31.2	23.7	32.7	29.2
Baha - Molodaya Gvardiya	Chodronova street - Prigorodnaya street	14.6	35.2	26.4	37.7	33.1
	Prigorodnaya street - Chodronova street		38.0	28.1	22.0	29.4
Jibek-Jolu street	Fuchik street - Pobeda street	13.6	33.8	35.9	36.6	35.5
	Pobeda street - Fuchik street		33.2	36.6	31.1	33.6
Bakinskaya-Sovetskaya Street	12 micro - Obezdnaya	16.2	36.7	32.2	32.8	33.9
	Obezdnaya - 12 micro		37.1	31.2	26.5	31.6
Alma Atinskaya Street	Karagul Akmash street - Obezdnaya	14.9	39.5	38.9	44.3	40.9
	Obezdnaya - Karagul Akmash street		43.2	27.2	36.2	35.5
Muromskaya - Gorky street	Barbi Alykulova - Auezova street	17.2	35.2	34.0	36.4	35.2
	Auezova street - Barbi Alykulova		36.0	36.7	28.6	33.8
Den Syaopin Avenue - Chui avenue	Barbi Alykulova street - Auezova street	15.3	35.8	31.4	31.7	33.0
	Auezova street - Barbi Alykulova street		35.3	25.6	23.3	28.1

Source : JICA Study Team

6.1.6 Parking Survey

The objective of this survey is to identify the demands of parking places near the central business centers of Bishkek City.

(1) Outline

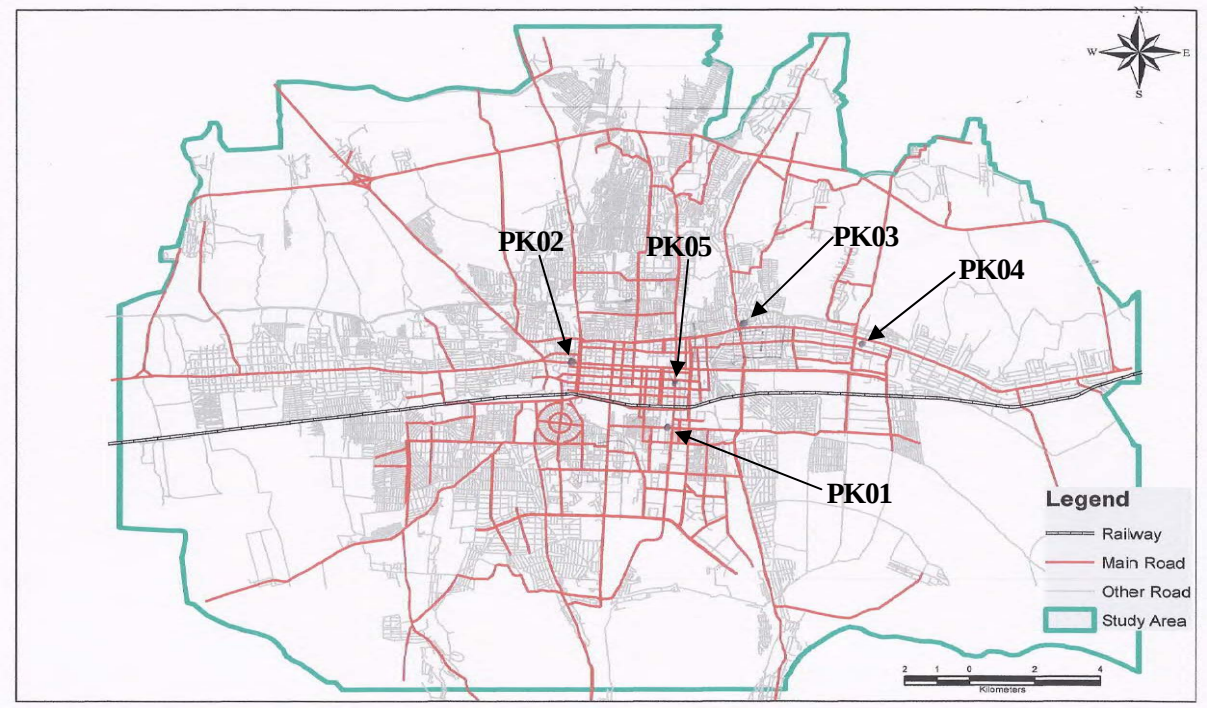
The survey stations for Parking Survey were decided after discussion with Traffic Police Department of Bishkek City because this issue was directly related to Traffic Police Department. The survey was executed two times (on weekday and weekend) for each location to compare the capacity and occupancy of parking places. The following five parking locations were chosen for this survey.

Parking areas are located on the following streets:

Table 6.1-10 Location of Parking Place

Location	Road Name and Section
PK01	Gorky Street from Tynystanova to Baitik Baatyra Street (VEFA Center)
PK02	Chui Avenue from Beishenalieva Street to Molodaya Gvardiya Boulevard
PK03	Shabdan Baatyr Street near by the Alamedin Market
PK04	Auezova Street from Lenina Avenue to Kolbaeva Street
PK05	Abdyrakhmanova Street from Moskovskaya Street to Bokonbayeva Street

Source : JICA Study Team



Source : JICA Study Team

Figure 6.1-11 (1) Survey Stations for Parking Survey

Parking places is shown below on the schematic map of Bishkek City.

PK01:
Parking on Gorky Street between Tynystanova Street and BaitikBatira Street (VEFA Center)

PK02:
Parking on Chui Avenue between Molodaya Gvardiablvd and Beishenalieva Street (near Osh Market)

PK03:
Parking on Alma Atinskaya Street between Djalila Street and Jibek - Jolu Avenue (Alamedin Market)

PK04:
Parking on Auezova Street (Alamedin-1 district)

PK05:
Parking on Sovetskaya (Abdirahmanova) Street between Bokonbaeva Street and Moskovskaya Street

Source : JICA Study Team

Figure 6.1-11 (2) Survey Stations for Parking Survey

All parking areas were limited. Drivers prefer to park vehicles along the road on the right lane, which were designed for public transport only. Parking fee was 10 SOMS and it is fixed regardless of parking duration. It is necessary to set definite time of parking and introduce hourly parking rate. The following graphs and tables show the results of parking survey of mentioned parking locations. The average parking time of the Study locations was 20 to 22 minutes.

(2) Survey Result

The summary of Parking Survey result is shown in **Table 6.1-11** and **Table 6.1-12**.

Table 6.1-11 Average Parking Time on Weekday

No	Parking area	Street name	Parking type	No of Vehicles												Total	Average parking time hh:mm:ss
				1. Passenger car	Average parking time hh:mm:ss	2. Taxi	Average parking time hh:mm:ss	3. Mini bus	Average parking time hh:mm:ss	4. Midi bus	Average parking time hh:mm:ss	5. Small truck	Average parking time hh:mm:ss	6. Heavy truck	Average parking time hh:mm:ss		
PK01	legal	Gorky street	on-road	146	0:22:38	50	0:19:59	8	0:22:53	1	0:11:00	3	0:15:20	1	0:26:00	209	0:19:38
	illegal		on-road	155	0:17:57	26	0:18:37	5	0:22:24							186	0:19:39
PK02	legal	Chui Avenue	on-road	238	0:18:50	40	0:17:45	14	0:13:33			5	0:40:24			297	0:22:38
	illegal		on-road	241	0:22:52	14	0:15:40	9	0:24:00			3	0:39:40			267	0:25:33
PK03	legal	Alma-Atinskaya street	on-road	284	0:19:14	40	0:20:10	16	0:33:30			8	0:23:07	2	0:11:30	350	0:21:30
	illegal		on-road	222	0:13:58	86	0:14:44	25	0:14:32	15	0:10:00	5	0:11:12	5	0:08:12	358	0:12:06
PK04	legal	Auezova street	on-road	182	0:18:06	66	0:17:59	12	0:16:45			8	0:17:50	2	0:02:00	270	0:14:32
	illegal		on-road	140	0:16:45	15	0:12:30	14	0:21:05			2	0:05:00	1	0:10:00	172	0:13:04
PK05	legal	Sovetskaya street	on-road	193	0:15:25	23	0:16:55	1	0:53:00			1	0:07:00			218	0:23:05
	legal		on-road	390	0:12:16	67	0:10:44	8	0:04:34							465	0:09:11

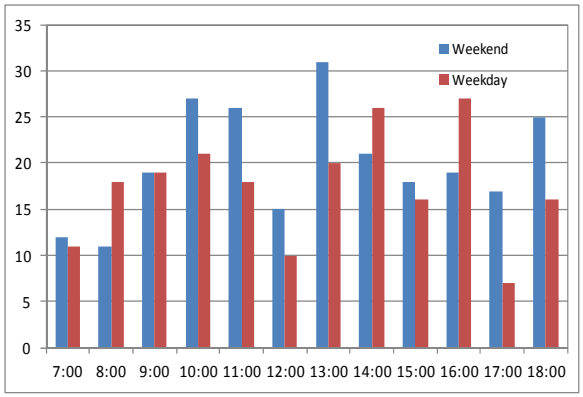
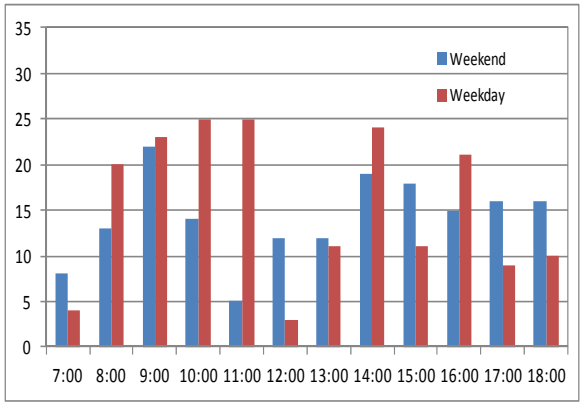
Source : JICA Study Team

Table 6.1-12 Average Parking Time on Weekend

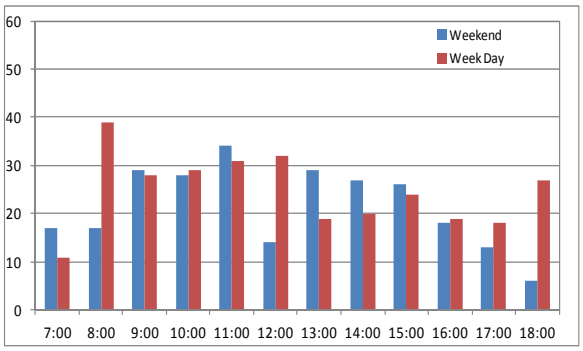
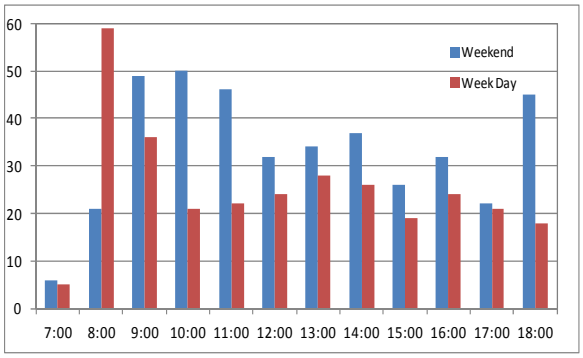
No	Parking area	Street name	Parking type	No of Vehicles												Total	Average parking time hh:mm:ss
				1. Passenger car	Average parking time hh:mm:ss	2. Taxi	Average parking time hh:mm:ss	3. Mini bus	Average parking time hh:mm:ss	4. Midi bus	Average parking time hh:mm:ss	5. Small truck	Average parking time hh:mm:ss	6. Heavy truck	Average parking time hh:mm:ss		
PK01	legal	Gorky street	on-road	186	0:18:55	46	0:14:42	8	0:13:26	1	0:07:00	1	0:28:00			241	0:16:25
	illegal		on-road	122	0:19:45	42	0:15:22	4	0:14:00			2	0:32:00			170	0:20:17
PK02	legal	Chui Avenue	on-road	224	0:16:51	18	0:14:42	9	0:15:33			1	1:05:00			251	0:28:01
	illegal		on-road	342	0:17:25	35	0:18:15	20	0:18:56			4	0:39:30			401	0:23:32
PK03	legal	Alma-Atinskaya street	on-road	266	1:30:49	29	0:25:51	18	0:26:15			3	1:02:00			316	0:51:14
	illegal		on-road	264	0:24:28	86	0:31:12	22	0:20:17			1	0:11:00			373	0:21:44
PK04	legal	Auezova street	on-road	184	0:16:28	142	0:16:13	14	0:20:09	2	0:12:13	2	0:33:00	3	0:30:20	347	0:21:24
	illegal		on-road	224	0:19:14	24	0:23:13	10	0:02:00			7	0:23:00	1	0:33:00	266	0:20:05
PK05	legal	Sovetskaya street	on-road	290	0:17:48	37	0:22:07	3	0:16:20			2	0:06:30			332	0:15:41
	legal		on-road	335	0:10:38	52	0:08:00	7	0:14:20			3	0:15:20			397	0:12:05

Source : JICA Study Team

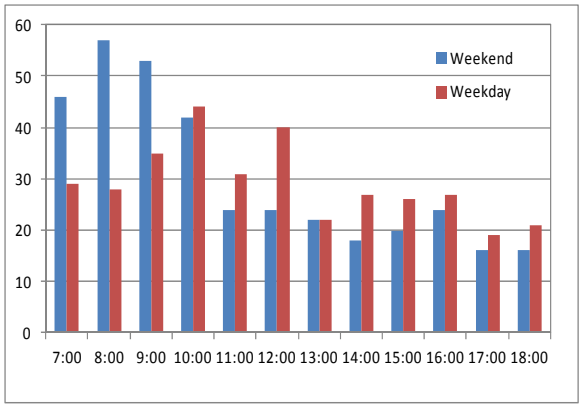
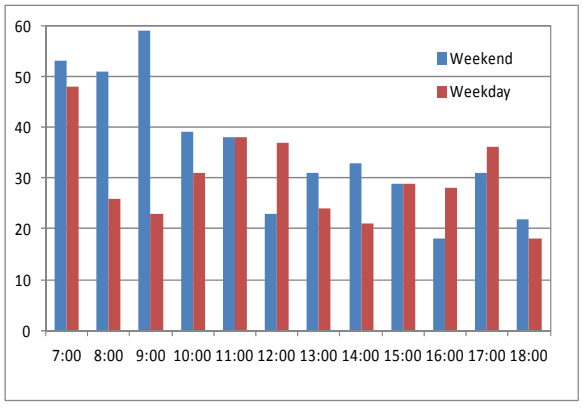
PK01 : Gorky Street

Legal Parking	Illegal Parking
	

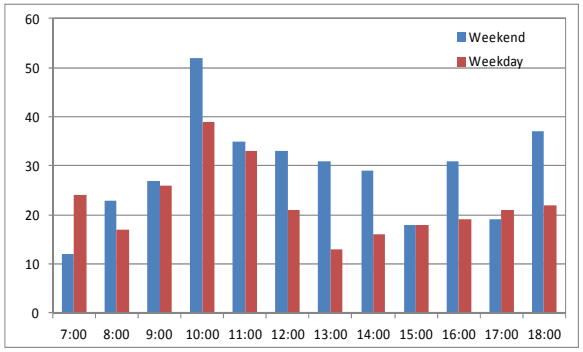
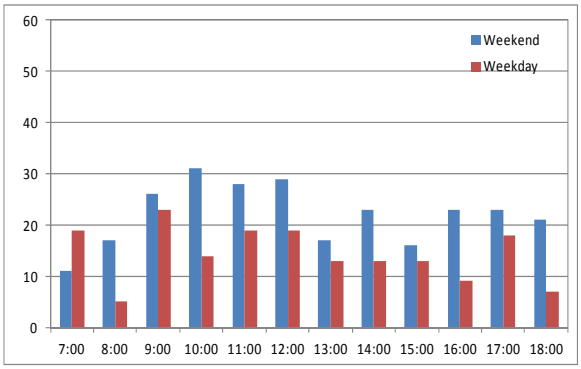
PK02 : Chui Avenue

Legal Parking	Illegal Parking
	

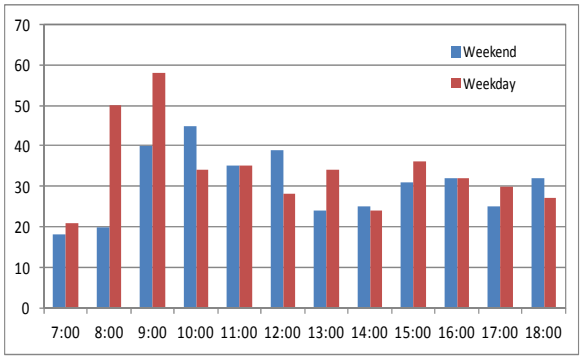
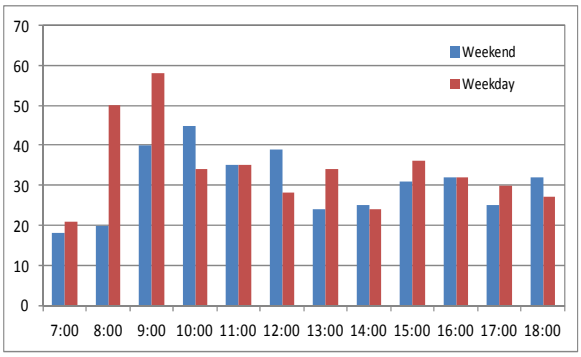
PK03 : Almaatinskaya Street

Legal Parking	Illegal Parking
	

PK04 : Auezova Street

Legal Parking	Illegal Parking
	

PK05 : Sovetskaya Street

Legal Parking	Illegal Parking
	

Source : JICA Study Team

Figure 6.1-12 Hourly Distributions at Parking Place

6.2 Interview Survey

The main objectives of this survey are to acquire information and understanding on daily traffic records on typical weekdays and socio-economic characteristics of Bishkek City residents. This survey conducted two types of interview survey, i.e., Household Interview Survey (HIS) and Transport User Survey.

6.2.1 Household Interview Survey (HIS)

(1) Outline

The HIS was implemented through household visits and direct interviews with adult members who could answer the questions with relative accuracy. The questionnaire was delivered and explained during the first visit. The second visit was made for the interview and collection of answers on the questionnaire on the next day of the questionnaire delivered. Home visits were made for delivering of questionnaire, explanation of questionnaire, interviewing householders, and collection of the filled questionnaires. Considering that it would help for confidence conversation. All family members

seven years old and over including students, were interviewed.

The questionnaire was designed to cover household and personal characteristics, as well as trip descriptions. The data was collected according to the questionnaire designed as below:

Table 6.2-1 Questionnaire Items in HIS

Category	Questionnaire Items
Household Information	・Number of household members ・Household income ・Vehicle ownership ・Ownership of house and land/rental fee ・Length of stay
Household Member Attributes	・Address of home, office and school ・Age and gender ・Occupation ・Personnel income
Trip Description (for each one-way trip)	・Trip purpose ・Origin and destination ・Departure and arrival time ・Mode of travel

Source : JICA Study Team

(2) Survey Result

Number of Interviews and Zoning Map

The sample quantity was 4,000 households and all the members aged seven years old and over were interviewed. It is about 1.7 percent of the population aged over seven years in the Study area. The total population of the Study area is approximately 884,000. Traffic zones in the Study area were delineated in accordance with existing boundary of Bishkek City. There are 61 zones within the administrative boundary of Bishkek City and 29 zones out of current administrative boundary of Bishkek City and regional areas.

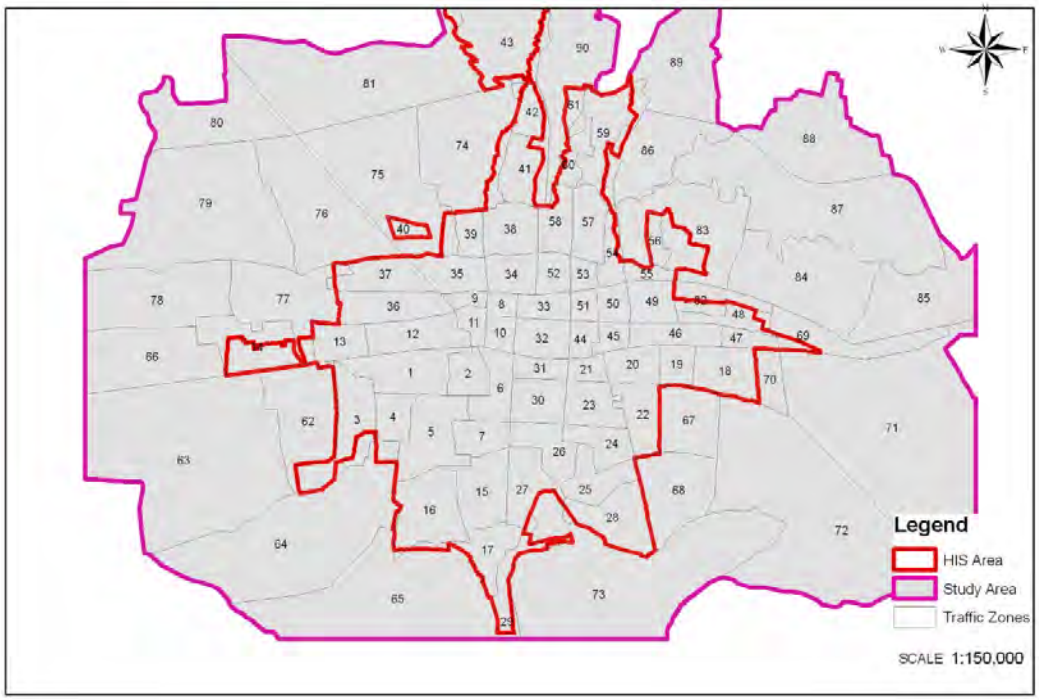
Table 6.2-2 Number of Households Interview

Zone	District	Census Pop2009	Sample HH	No. of Sample Interview			Family Composition							Avg. of Family No.
							Under 6			Over 7			Total	
				Male	Female	Total	Male	Female	Sub Total	Male	Female	Sub Total		
1	Hippodrome	44,015	216	383	342	725	70	60	130	345	382	727	857	3.97
2	"Workers settelelment"	19,046	94	165	146	311	26	21	47	151	161	312	359	3.82
3	Ak-Orgo	14,204	70	137	132	269	18	24	42	132	137	269	311	4.44
4	Archa Beshik	6,934	34	66	53	119	6	7	13	52	67	119	132	3.88
5	Djal	17,644	87	146	121	267	21	15	36	122	145	267	303	3.48
6	Lenin plant	12,482	61	92	103	195	14	13	27	102	93	195	222	3.64
7	Turk University	9,817	48	85	70	155	14	17	31	78	86	164	195	4.06
8	National University	1,639	9	12	12	24	4	3	7	14	10	24	31	3.44
9	Ryskulov	1,531	8	12	14	26	2	3	5	14	12	26	31	3.88
10	Oktyabr'	2,345	12	20	23	43	2	0	2	23	20	43	45	3.75
11	Osh market	2,173	11	20	24	44	0	2	2	24	20	44	46	4.18
12	Kyzyl-Asker	7,378	36	66	52	118	14	8	22	54	67	121	143	3.97
13	Kyrgyz Temir	4,499	22	36	30	66	6	6	12	30	36	66	78	3.55
14	Ala-Too settelment	17,575	86	153	154	307	17	12	29	152	157	309	338	3.93
15	US Embassy	18,981	93	175	170	345	18	26	44	169	180	349	393	4.23
16	Orok	19,287	95	171	167	338	29	28	57	167	173	340	397	4.18
17	State residency	9,717	48	83	90	173	16	16	32	88	87	175	207	4.31
18	Tunguch	14,826	73	132	120	252	26	22	48	115	137	252	300	4.11
19	Kara-Djigach	6,873	34	67	55	122	19	19	38	55	67	122	160	4.71
20	Dasmiya	9,351	46	70	89	159	11	14	25	85	81	166	191	4.15
21	Matrosova	9,625	47	68	64	132	5	10	15	66	69	135	150	3.19
22	Kok-Djar	12,868	63	96	97	193	18	20	38	96	97	193	231	3.67
23	Ulan	25,299	124	219	184	403	25	27	52	188	216	404	456	3.68
24	3, 4, 5 micro-districts	33,186	163	273	251	524	31	17	48	251	273	524	572	3.51
25	6, 7 micro districts	46,454	228	382	328	710	38	57	95	330	383	713	808	3.54
26	8 micro-district	22,671	111	172	164	336	8	7	15	168	169	337	352	3.17
27	Sovmin	26,332	129	215	209	424	32	29	61	209	215	424	485	3.76
28	Asanbai, 11, 12 micro-districts	30,844	152	225	230	455	37	28	65	231	224	455	520	3.42
29	Orto-Say - Seiil	4,111	20	46	51	97	6	5	11	50	47	97	108	5.40
30	Polytechnical University	16,475	81	111	94	205	14	11	25	94	111	205	230	2.84
31	Vefa center	8,069	40	63	53	116	11	11	22	54	63	117	139	3.48
32	National Hospital	14,626	72	100	95	195	19	17	36	97	99	196	232	3.22
33	Central square	9,414	46	60	52	112	11	19	30	52	60	112	142	3.09
34	Faiza	5,560	27	27	27	54	8	8	16	26	28	54	70	2.59
35	Western Bus terminal	5,818	29	56	45	101	14	10	24	44	57	101	125	4.31
36	Gazgorodok	8,063	40	74	63	137	19	11	30	63	74	137	167	4.18
37	District 110	6,839	34	62	47	109	9	8	17	47	62	109	126	3.71
38	Traffic police	7,822	38	72	62	134	17	18	35	62	73	135	170	4.47
39	Bayat	3,484	17	30	29	59	4	9	13	30	29	59	72	4.24
40	Prigorodnoe	18,455	91	148	127	275	36	37	73	127	149	276	349	3.84
41	Nijnyaya Ala-Archa 1	27,036	133	230	203	433	65	56	121	202	231	433	554	4.17
42	Nijnyaya Ala-Archa 2	9,733	48	91	80	171	10	13	23	80	92	172	195	4.06
43	Kalys-Ordo	5,000	25	47	44	91	18	7	25	45	47	92	117	4.68
44	Dordoi Plaza	23,335	115	168	161	329	16	29	45	159	177	336	381	3.31
45	Vostok 5	22,937	113	176	192	368	29	21	50	194	177	371	421	3.73
46	Heating Plant	11,450	56	94	92	186	15	12	27	95	95	190	217	3.88
47	Uchkun	27,763	136	255	240	495	45	43	88	244	251	495	583	4.29
48	Alamedin 1	19,189	94	180	145	325	13	21	34	144	181	325	359	3.82
49	Alamedin bazar	15,308	75	97	109	206	14	24	38	109	97	206	244	3.25
50	Bishkek City	9,299	46	84	72	156	21	15	36	71	85	156	192	4.17
51	Tsum	6,389	31	62	38	100	6	4	10	39	61	100	110	3.55
52	Church	9,397	46	71	66	137	12	12	24	66	71	137	161	3.50
53	Goin	5,593	27	46	28	74	5	0	5	29	45	74	79	2.93
54	Shoro	11,260	55	86	86	172	9	14	23	86	86	172	195	3.55
55	Veterinary clinic	5,630	28	37	35	72	6	7	13	34	38	72	85	3.04
56	Bakai-Ata	2,909	14	35	31	66	3	2	5	32	37	69	74	5.29
57	Elm grove	7,064	35	63	56	119	6	7	13	56	63	119	132	3.77
58	Ak-Tilek 2	14,039	69	108	103	211	23	23	46	102	109	211	257	3.72
59	Enesai	13,811	68	99	114	213	37	35	72	115	98	213	285	4.19
60	Dordoi market	8,390	41	69	73	142	8	10	18	70	72	142	160	3.90
61	Kelechek	2,053	10	17	17	34	1	1	2	18	16	34	36	3.60
Total		813,918	4,000	6,705	6,224	12,929	1,057	1,031	2,088	6,247	6,745	12,992	15,080	3.77

Source : JICA Study Team

Zoning Map

The zoning map is shown in **Figure 6.2-1**.

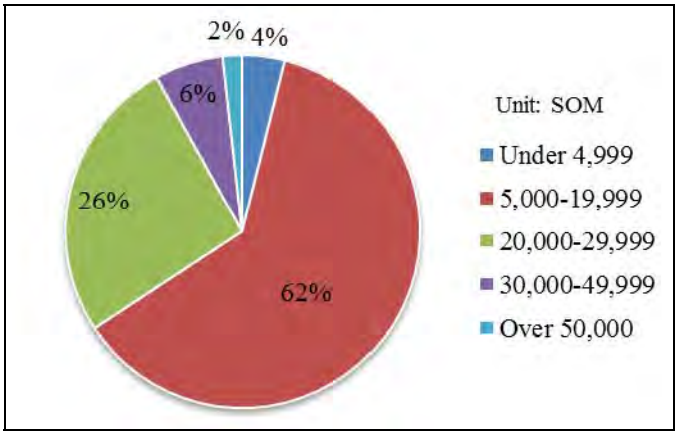


Source : JICA Study Team

Figure 6.2-1 Zoning Map

Household Income

According to the interview results, **Figure 6.2-2** shows the composition of different levels of monthly income of the households. **Figure 6.2-2** shows that more than 92 percent of households have monthly income of less than 30,000 SOMS. Only two percent of households have monthly incomes of over 50,000 SOMS. The share of monthly income between 5,000 SOMS and 19,999 SOMS is 62 percent; the highest among the income level categorizes shown in **Figure 6.2-2**.

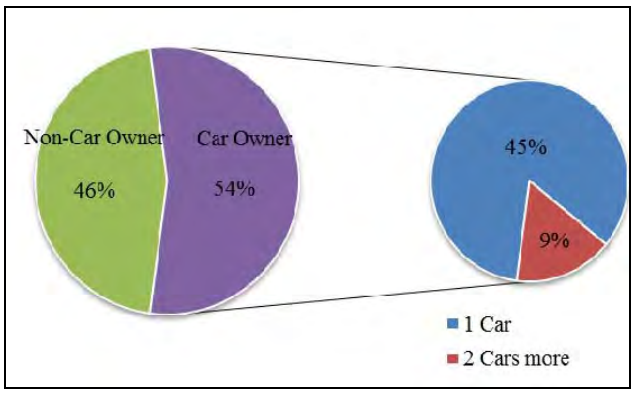


Source : JICA Study Team

Figure 6.2-2 Household Monthly Income

Number of Owned Cars

Out of surveyed households 2,168 of 4,000 owned cars (excluding motorcycles) or approximately 54 percent of total surveyed. About nine percent of households owned two or more cars. Car registrants were 1.19 million in 2010 and 1.52 million in 2011.

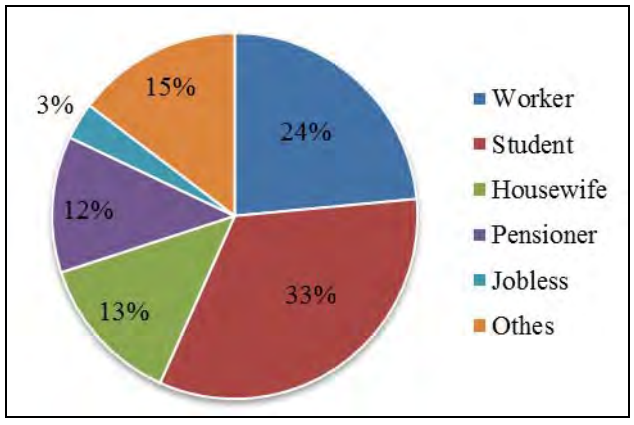


Source : JICA Study Team

Figure 6.2-3 Number of Owned Car

Occupation Type

Except "Others" in the *16 occupation categories in the survey, (see Box below). 15 were incorporated into six occupation types (Worker, Student, Housewife, Pensioner, Jobless and Others) as shown in **Figure 6.2-4**.



Source : JICA Study Team

Figure 6.2-4 Occupation Type

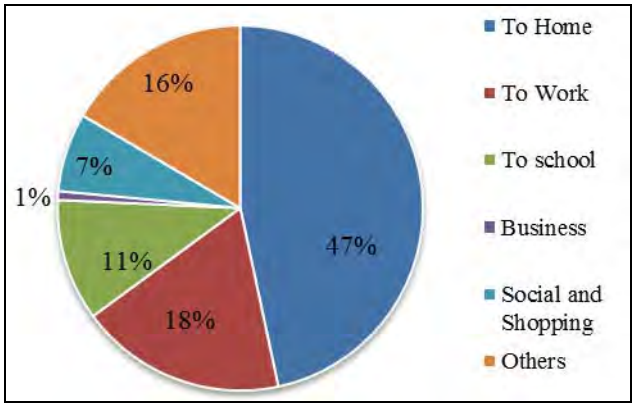
*16 occupation categories : 1. Officials of Govt. & Special Interest Org., Corporate Exec., Mangers, Managing
2. Professionals and Technical
3. Transport / Communication, driver of bus and Taxi
4. Clerical Worker
5. Service Workers & Shop & Market Workers
6. Farmers, Forestry Workers & Fisherman
7. Traders & Related Workers
8. Plant & Machine Operators & Assemblers
9. Laborers & Unskilled Workers
10. Teacher & School Workers
11. Student (Elem.)
12. Student (H.S. & Univ.)
13. Housewife
14. Pensioner
15. Jobless
16. Others, specify

Person Trip Rate

There was an average of 2.8 trips per person daily.

Trip Purpose

Trip composition by purpose is shown in **Figure 6.2-5**, in which the "To Home" trips have a share of 47 percent, "To Work" 18 percent and "To School" 11 percent, and "Social and Shopping" seven percent, and Others 16 percent. "Eat a meal" , To Church", "Medical" and so on belongs to "Other".

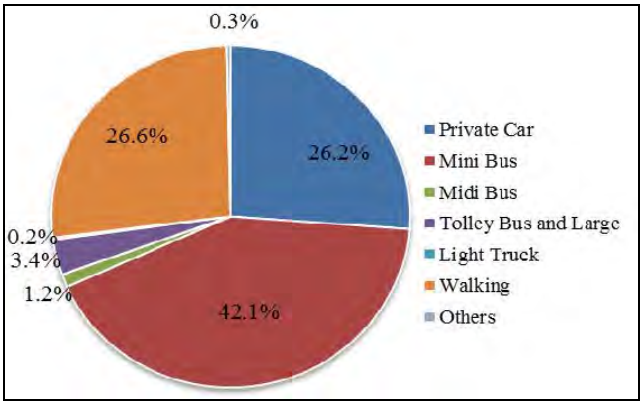


Source : JICA Study Team

Figure 6.2-5 Trip Purpose

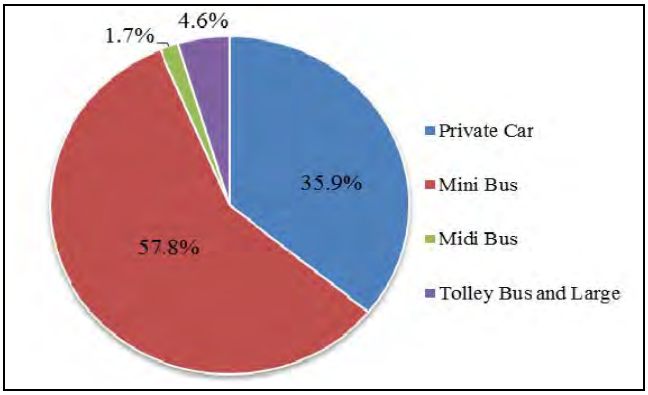
Travel Mode

Seven types of travel modes were used in the survey. Trip composition by travel mode is shown in **Figure 6.2-6** and **Figure 6.2-7**. Trip by minibuses has the highest share of 42 percent, while the share of walking trips is 27 percent. **Figure 6.2-7** shows the trip modes excluding light truck, walking, and others. The use of minibuses was 58 percent while private cars, 36 percent.



Source : JICA Study Team

Figure 6.2-6 Share of Travel Mode



Source : JICA Study Team

Figure 6.2-7 Trip Mode (Excluding Walking, Truck and Others)

6.2.2 Transport User Survey

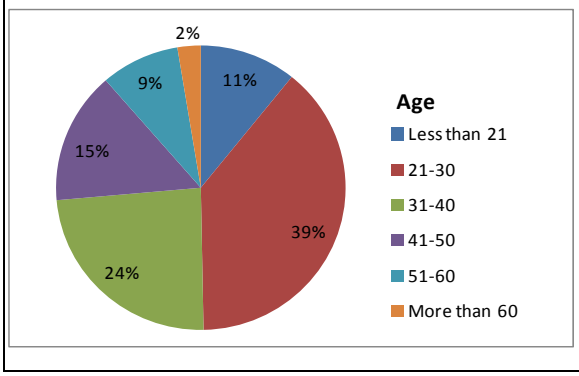
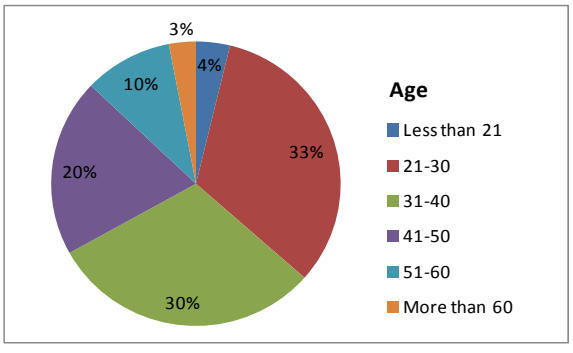
(1) Outline

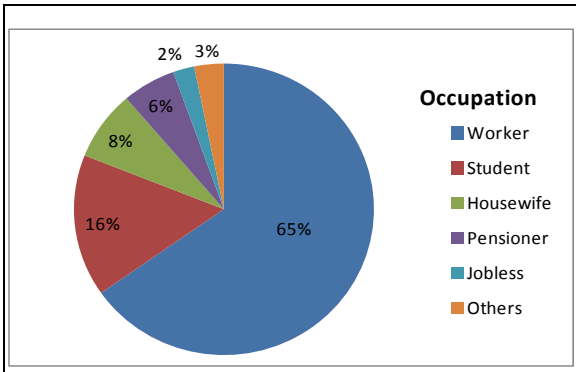
A total of 2,000 persons were interviewed at major commercial complexes such as CUM, Osh Market, Alamedin Market, Orto Sai Market, and Alamedin1 District. The interviewees were private car drivers and public transport users.

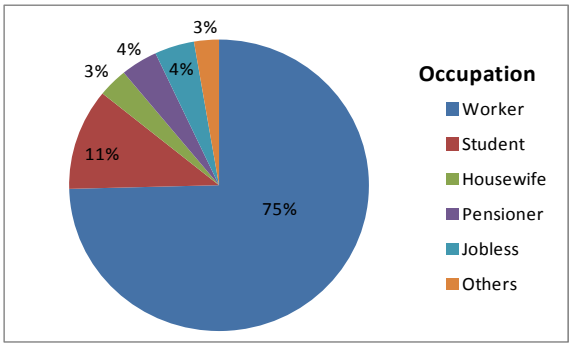
(2) Survey Results

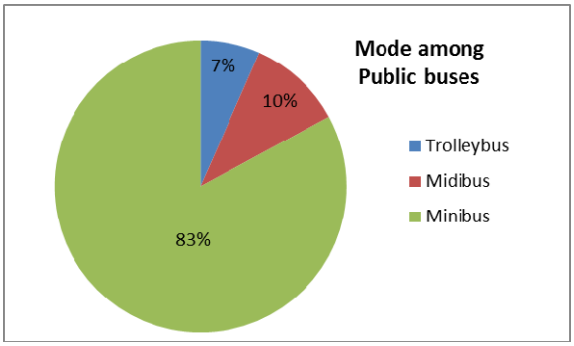
The results of Transport User Surveys are shown in figures below.

The shares of trip purpose are as “To Work” for public transport user and private transport user 31 percent and 23 percent respectively. On the other hands, the share of trip purpose as “Personal Business” for private car user is higher than for public transport user.

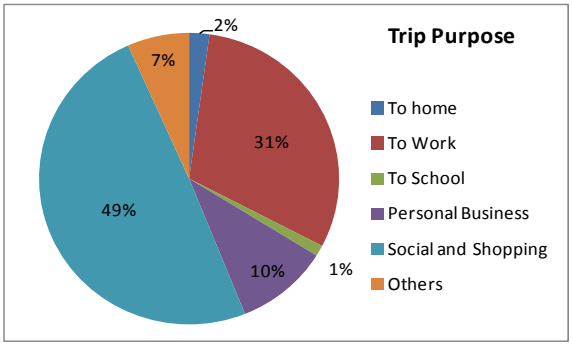
For Public Transport User	For Private Transport User
	

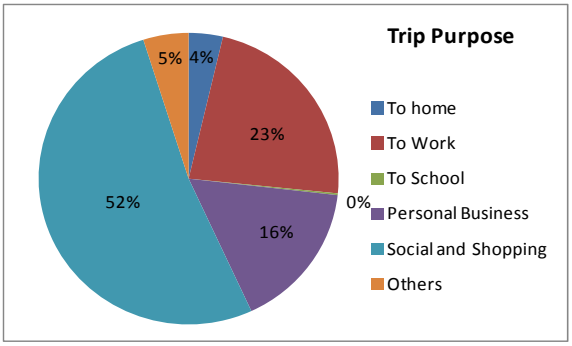






Most of habitants of Bishkek City prefer the Minibus as major transport, only 7% and 10% of residents use tolleybuses and midibus respectively.

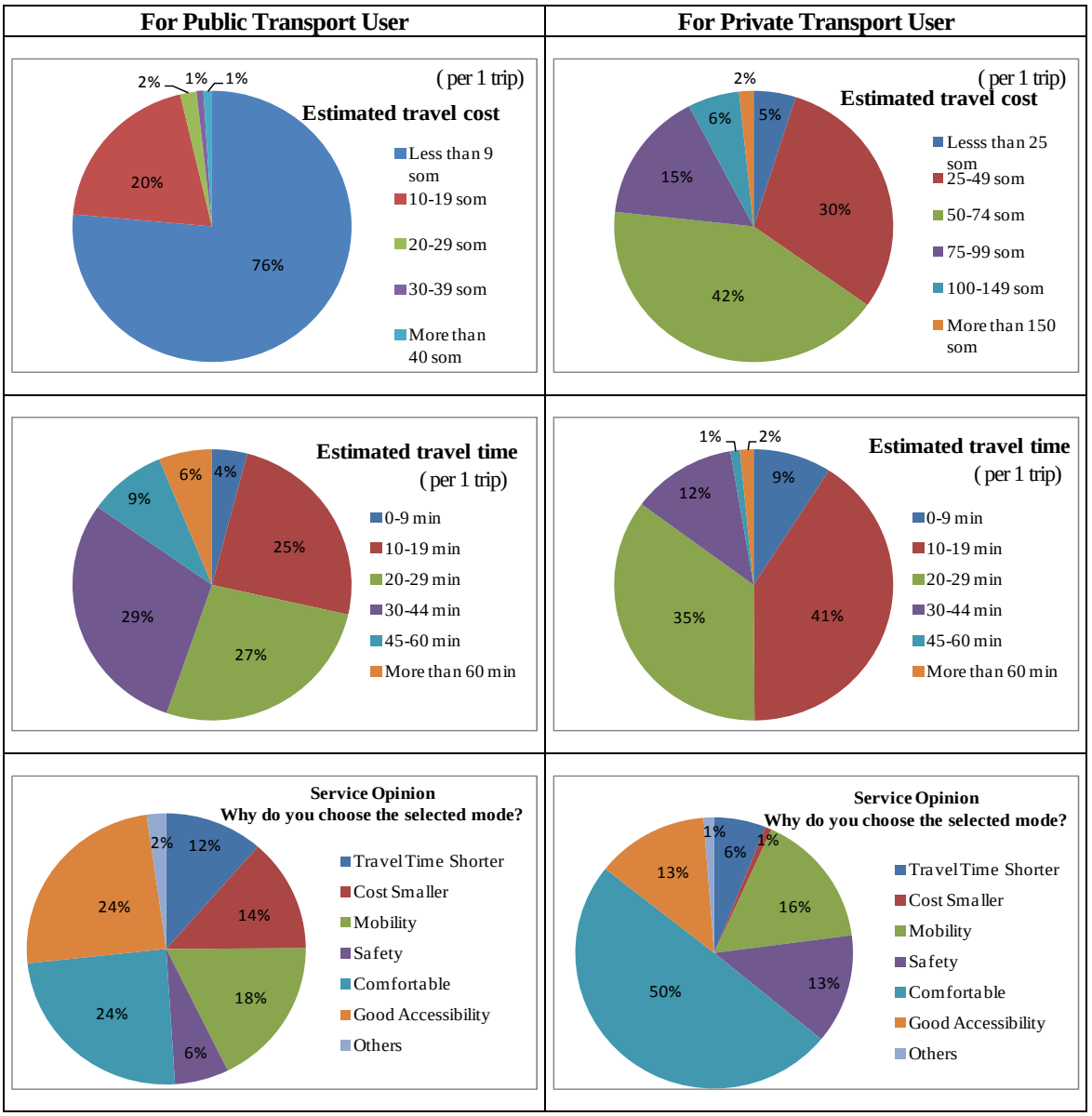




76 percent of public users are traveling at nine SOMS or less. On the other hand, private car users answered that 42 percent of cars require 50 - 74 SOMS as the travel cost of their cars.

The survey result shows that the share of travel time for public transport users for travel time less than nine minutes" "10-19 minutes" "20-29 min" are four percent, 25 percent and 27 percent respectively whereas the share of travel time for private car user for the same travel time (i.e. "less than nine min","10-19 min" and 20-29 min") are nine percent, 41 percent and 35 percent respectively.

The result of service opinion on "reason of choosing the selected transport mode" for public transport user shows that "Comfortable" and "Good Accessibility" have the equal share of 24 percent. On the other hand, private cars user answered that "Comfortable" is the reason of choosing the selected mode with the highest share of 50 percent.

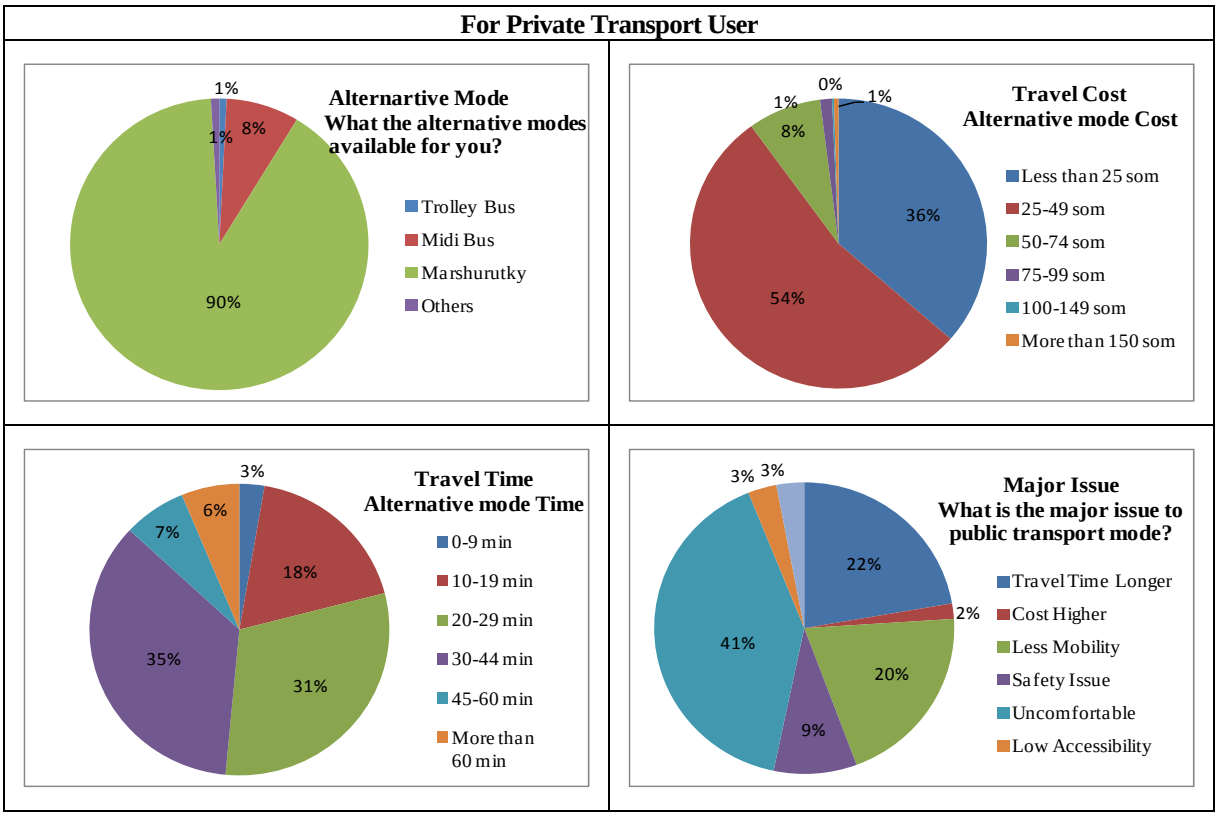


Source : JICA Study Team

Figure 6.2-8 Summary of Answer for Private and Public Transport User

The survey results show that 90 percent of private car users prefer minibuses as alternative transport mode. The costs of travel vary from 25 - 49 SOMS for most transport users. Cost of travel on varies from 25 - 49 SOMS.

The average travel time on alternative transport mode is 30 minutes. As to comfort or ease, 41 percent of private transport users consider public transport mode uncomfortable.



Source : JICA Study Team

Figure 6.2-9 Answer of Alternative Transport for Private Car User

6.3 Major Findings and Issues

Traffic Condition

- ✓ Morning peak hours are observed from 9:00 A.M. to 9:30 A.M. notwithstanding the fact that most of the offices, schools and universities start from 8:00 A.M.. Therefore, the morning peak hours are not due to trips made by students and workers. The reasons for shifting morning peak hours are not clearly known.
- ✓ The average occupancy rate of minibuses are 1.50 (i.e., number of actual passengers / number of seats available averagely). The average passenger occupancy rates of midibuses are 1.05 percent and trolleybuses are 0.80 percent. Average occupancy rate of trolleybus is 0.80, meaning there are vacant seats available on tolleybuses. To make trolleybuses more preferable or profitable, trolleybus services or facilities have to be improved.
- ✓ Travel time of minibus is longer than other modes and it is because of the scattered location of origin and destination (i.e., longer trip length).
- ✓ There are equal quantities of incoming and outgoing traffic volume along the CL and the largest volume is observed in the west of the City. The volume of traffic incoming and outgoing from the east and west direction of the City is larger in comparison to the traffic incoming / outgoing from the north and south. Further, the volume of traffic from north to the City center is larger than that from the south. The most

possible reason might be the locations of the bazaar and arterial road. This trend of traffic distribution should be considered during traffic demand forecasting.

Traffic Management

- ✓ In all surveyed intersections, there were significant residual queue lengths which reveal that there are inappropriate signal cycles and signal phasing. Signal phasing and signal cycles at intersections are fixed, regardless of directional traffic volume.
- ✓ Average travel speed with stop time is approximately 35 km/hr which is relatively higher in urban areas. This result is taken as reference while defining travel speed of road link in the JICA STRADA (traffic simulation software).
- ✓ The quantities of legal and illegal parking are almost equal. Bus stops assigned for public transportation are frequently occupied by other vehicles (i.e. non-public transportation). Also, there is no parking penalty or fine on the illegal parking and this does not discourage illegal parking. It also causes problems for public transportation users, since public transportation vehicles are forced to stop in inappropriate locations. More parking spaces are necessary to accommodate parking.
- ✓ Parking time on the weekends are relatively longer than that on the weekdays.

Public Transport

- ✓ The share of minibuses are approximately 42 percent among the various travel modes and reveals that minibuses are the main mode of public transportation. Therefore, while replacing or restricting entrance of minibuses in the City center, the matter shall be handled carefully otherwise strong protest may arise from minibuses operator.
- ✓ Public transportation users have responded that the reasons of choosing public transportation are "comfortable" and "good accessibility". However, private transportation users have responded that the reason of not using public transportation is "uncomfortable". Therefore, the main reason supposed to be good accessibility because minibuses use to collect and drop passengers from any places along the route (i.e. regardless of bus stop) and relatively provide the nearest door to door service.
- ✓ Private car users responded that the alternate mode of transportation available for them is minibuses. Therefore, to discourage using private car and minibuses, the midibuses and trolleybuses operation should be made more regular and have good accessibility.

Others

- ✓ Vehicle ownership was approximately 54 percent of total sampled households. However, most of the vehicles are either second-hand (used) or aged vehicles which might cause serious environmental problem in the future.
- ✓ From the HIS, it was revealed that current number of students are more than current number of workers which reveals that there are sufficient number of working forces for the future.

CHAPTER 7 URBAN PUBLIC TRANSPORTATION

7.1 Urban Public Transportation in Bishkek

7.1.1 General

The trolleybus has been one of the historical transportation modes in Bishkek since 1951. After independence from the former Soviet Union, the public transport service provided by public enterprises of the City was almost defunct and private minibus companies started transportation services to cover inefficiency of the service and rapidly increased the number of routes. **Table 7.1-1** shows service indices of public transportation between 1989 and 2009.

Although the trolleybus was a main transportation mode in Bishkek during the Soviet era, the quantity of users decreased due to a weakened operation system with old vehicles. In 2003, the Government of Japan provided 33 trolleybuses to Bishkek City. The trolleybus used to run on 18 routes. Since August 2012, only seven routes run. The midibuses ran on 48 routes in the City initially. However, only two routes were left running since 2005. In 2008, The Chinese Government provided approximately 200 bus units with grants aid and the Bishkek City bought approximately additional 260 units with their own budget. Operative routes were then recovered to 23 in March 2012.

After the franchise system of minibus routes was introduced in 2008, passengers were able to travel directly without transferring buses. In 2011, 121 routes were registered (See in **Appendix 7.2)**. However, it decreased from 124 in March 2012 to 118 in August 2012 due to route changes by franchise contracts with Bishkek City and private companies. Meanwhile, more than 30 route franchises were given to the private companies for the same routes as the trolleybus and the midibus operating in the City center. This caused serious traffic congestions and modal competition between the public and the private vehicles. Many passengers selected the minibus for its convenience, thereby reducing passengers for the trolleybus and midibus.

Table 7.1-1 Service Indices of Public Transportation

	1989	1995	2000	2005	2009
Number of Inhabitants, in Millions	0.65	0.7	0.95	0.97	1.23
Number of Private Car per Thousand Inhabitants	61	63	63	78	105
1. Trolleybus (the City operate)					
Number of Routes	18	18	12	12	9
Number of Trolleybus Units	165	166	161	104	76
Number of Passengers, in Millions	71	52	63	42	19
2. Midibus (the City opearate)					
Number of Routes	48	23	12	2	16
Number of Bus Units	452	242	114	20	261
Number of Passengers, in Millions	195	73	49	4	41
3. Minibus (the Private operate)					
Number of Routes	20	28	122	178	118
Number of Minibuses	450	750	1,150	3,046	2,262
Number of Passengers, in Millions	28	51	79	208	140

Source : EBRD

7.1.2 Public Transport Modes

(1) Trolleybuses

Urban public transportation in Bishkek City consists of trolleybuses, midibuses and minibuses (Marshrutka). The trolleybuses and the midibuses are operated by the City, while the minibuses are operated by private bus companies. Private taxis also provide additional service for the public.

The Bishkek Trolleybus Department (BTD), under Bishkek City Mayor's Office operates trolleybuses, having seven routes with 87 units on the main streets where passenger demand is high. There are 10 to 16 units serving one route with an average distance of 10 to 12 km and an average operational speed of 17 km/hr.

The trolleybus is eco-friendly and environmentally sustainable because it uses electricity, mainly generated by hydro-power and does not directly have CO_2 emissions. For these reasons, the City and the European Bank for Reconstruction and Development (EBRD) promote usage of trolleybuses (See 7.2).

(2) Midibus

The Bishkek Passenger Transportation Enterprise (BPTE), an independent company owned by the Bishkek City, operates the midibuses on 17 routes with 283 units in the City center, which include connecting routes to Novostroyka, a new residential area. There are five to 25 units that run a route having the distance of nine to 29 km/hr and average operational speed of 16.8 to 18 km/hr.

The BPTE is required to operate new routes connecting to the areas where public transportation is not provided, and replace minibus service in the City center in order to mitigate traffic congestion. The BPTE estimates a necessity of 600 midibuses. However, the BPTE had only about 460 buses as of 1 January 2012.

(3) Minibus

Forty-one (41) private companies operate on 118 routes and registered approximately 3,800 minibuses in Bishkek City in August 2012. The average number of minibuses in daily operation varies by season. About 2,000 units operate in peak season between spring to autumn and 1,700 off-peak during winter. Both the Bishkek-registered minibuses and other minibuses registered in suburban areas run across the City center, thereby causing worsened traffic congestion.

The private company sub-contracts drivers who have their own vehicles. The driver pays a fixed monthly amount from the fare collection to the companies due to the sub-contract. In this system, the driver is inclined to get more passengers, neglecting observance of driving rules. In addition, the drivers tend to work over long periods of time[1]. Traffic safety and regulations should be given primary attention and observance.

[1] A driver works 5.6 days per week and 12 hours per day in average, as the results of "Public transportation interview survey on minibus drivers", conducted in Feb, 2012.

(4) Taxi

Over 35 legal entities operate taxi services with 2,000 taxicabs in total at Bishkek City. However, numerous illegal private passenger carriers operate in the streets of the City. Countless taxi drivers park and wait for passengers near intersections and bus stops, causing interrupting traffic flow and causing traffic safety problems.

Picture 7.1-1 Trolleybus (41)

Picture 7.1-2 Trolleybus (30)

Picture 7.1-3 Public Midibus (22)

Picture 7.1-4 Minibus (10 - 15)

Note : Numbers in brackets ( ) shows seat number.

Picture 7.1-5 Passengers inside Midibus

Picture 7.1-6 Passengers inside Minibus

7.1.3 Public Transportation System

7.1.3.1 Public Transport Administration

(1) Mayor's Office

The Vice-Mayor, under the Mayor's office is in charge of public transportation in Bishkek City. The Urban Transportation Department (UTD) of Bishkek City mayor's office, BTD and BPTE are all under the direction of the Vice-Mayor[2]. UTD is authorized to form an urban transportation network in Bishkek City.

(2) Bishkek Urban Transport Department (UTD)

The Urban Transportation Department of Bishkek City Mayor's Office (UTD) was established in 2008 and has the responsibility for management of public transportation in Bishkek City. The mandates include forming and reviewing an urban public transportation network, granting urban public transportation license to operators of the public and private sectors. UTD has two other public transportation operators under the same Vice-Mayor. To the private companies, UTD issues route franchises on the basis of competitive tender bids. **Figure 7.1-1** shows UTD administration of public transportation and Organization Structure of UTD. Detailed organization structure is described in **Appendix 24-2.1.4**.

The tasks of UTD are shown as follows[3]:

(a) To develop priority transportations for the citizens (i.e. public transportation)

(b) To create preferable environment to attract investments, including investment into new transportation sectors and solutions of transportation issues

(c) To ensure sustainable small and medium business development by attracting into the transportation area

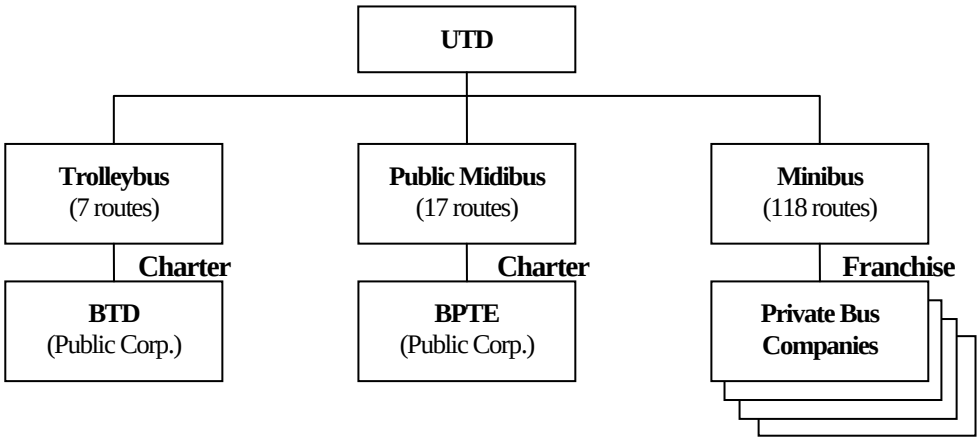
(d) To improve professional skills of transport officials and managers

(e) To create a competitive environment

(f) To solve environmental issues

(g) To streamline regulatory framework of public transportation

[2] As of May 2012, Mr. Imashov Torobek is the Vice-Mayor.
[3] Decree No.205 of Bishkek City Mayor's Office dated May 15, 2008. In April 2012, decree No.102 was promulgated to reorganize UTD. According to the decree, staffs of UTD are to be decreased.



Source : JICA Study Team

Figure 7.1-1 Administration of Public Transport in Bishkek City

(3) Demarcation of Other Departments

Administrative demarcation of public transportation in Bishkek City from the standpoints of fare, route and infrastructure is shown in **Table 7.1-2**. Fares of urban public transportations in Bishkek City are determined by the Bishkek Mayor's Office and the City Council.

Minibus private companies are controlled by franchise contracts with UTD. However, minibus private companies have no official authority to discuss with Bishkek City about public transportation operations, much less work with any associations.

Table 7.1-2 Administration of Public Transportation

Organization / Company		City Council	Bishkek City			BTD (Trolleybus)	BPTE (Midibus)	Private (Minibus)
			Mayor's Office	Const. Dep.	UTD			
Fare	Plan		X(3)*		X(2)*		X(1)*	
	Approval	X						
	Fare Collection					X	X	X
Route	Plan				X		X	
	Approval		X					
	Operation					X	X	X
Infra.	Plan		X					
	Financing		X					
	Construction			X				

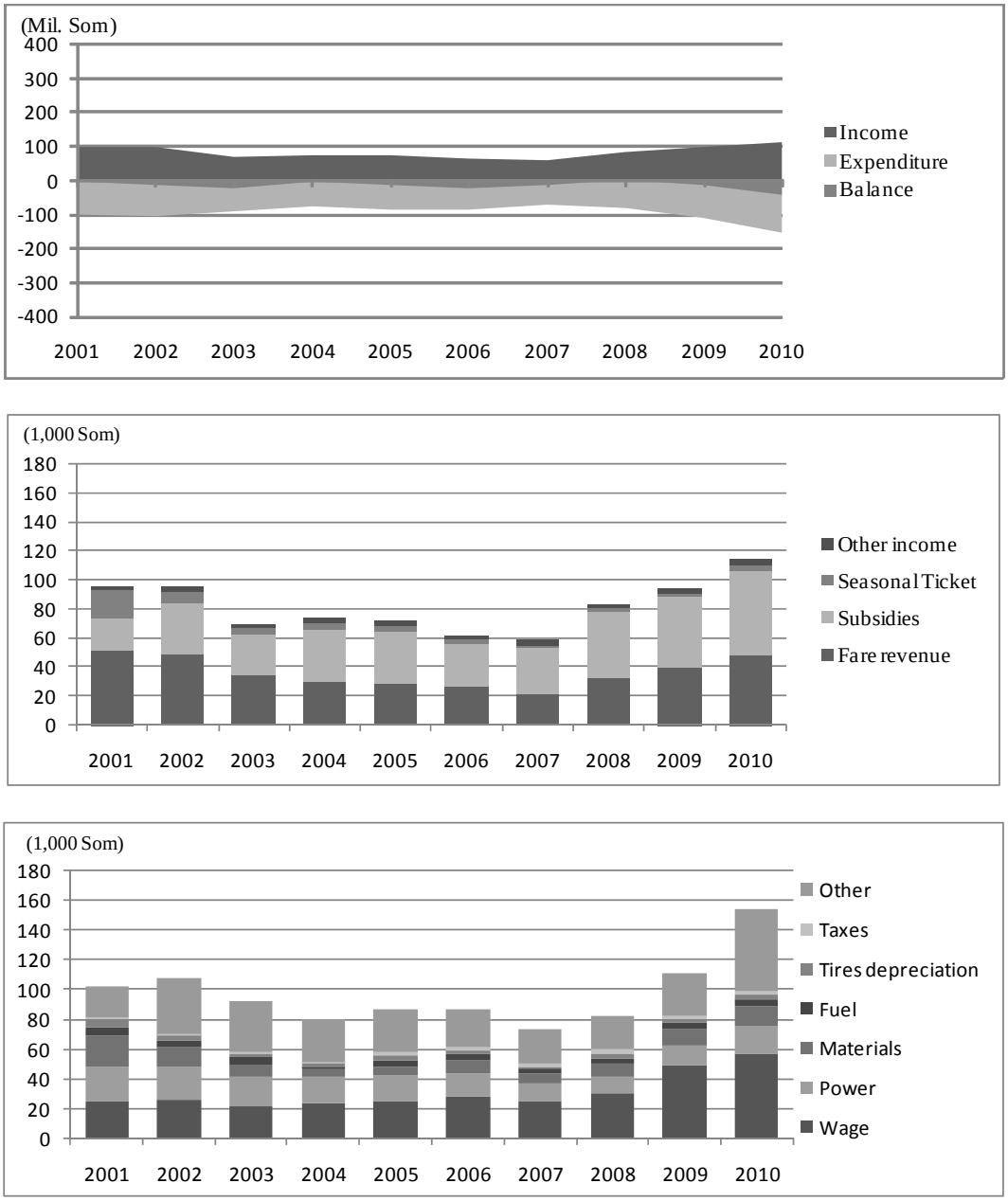
*Numbers in brackets ( ) show order of the planning process

Source : JICA Study Team

7.1.4 Public Transportation Operator

7.1.4.1 Bishkek Trolleybus Department (Trolleybus)

The income and expenditures of BTD are summarized in **Figure 7.1-2**. The income and expenditures have been increasing slightly since 2008, although balance has been decreasing. The balance has been recorded continuously as a negative value. The breakdown of income and expenditures are shown in **Appendix 7.3**.



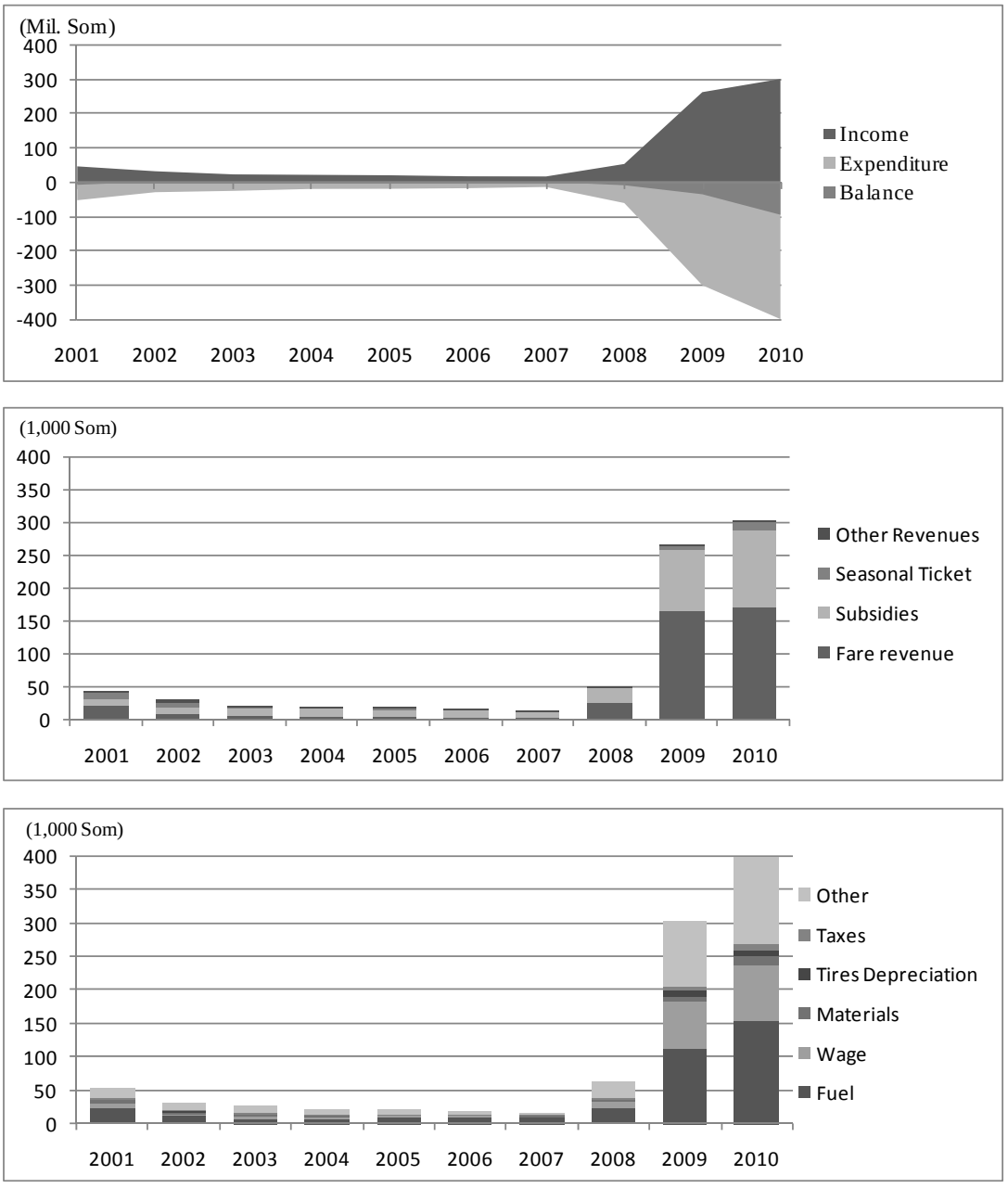
Source : JICA Study Team based on BTD Provided Data

Figure 7.1-2 Annual Income and Expenditures of BTD (2001 - 2010)

7.1.4.2 Bus Public Transportation Enterprise (Midibus)

The income and expenditures of BPTE are shown in **Figure 7.1-3**. The income and expenditures have been steeply increasing since 2008 and balance is decreasing. The balance has been a continuous negative value. Breakdowns of income and expenditures are shown in **Appendix 7.3**.

Revenue is a critical issue to BPTE. BPTE has experienced three months arrears in wages to its staff, due to decrease in revenues. According to Vice-Mayor, BPTE has a debt of 100 million SOMS and the Ministry of Finance and Social Fund is considering possible ways on resolving the issue.

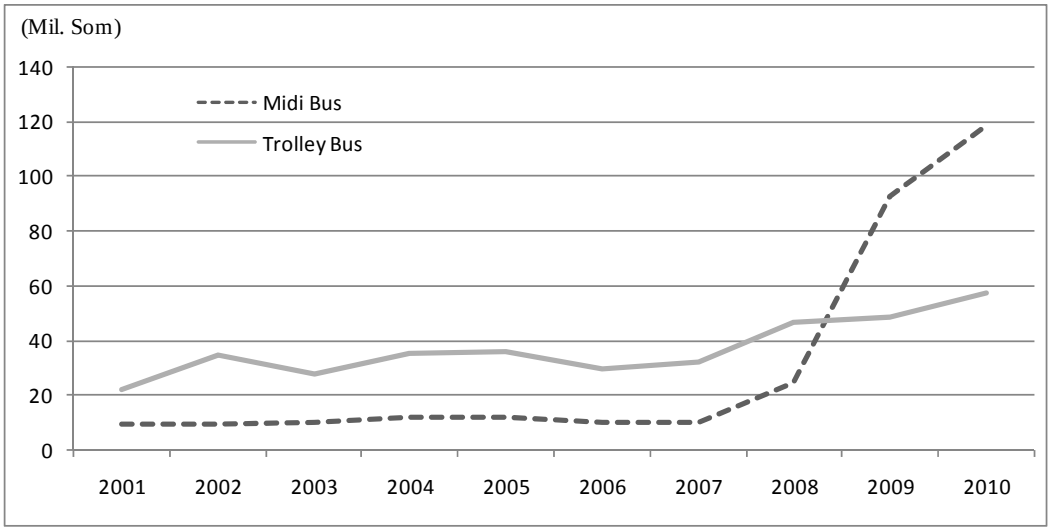


Source : JICA Study Team based on BTD Provided Data

Figure 7.1-3 Annual Income and Expenditures of BPTE (2001 - 2010)

7.1.4.3 Subsidies to Public Transportation Companies

Bishkek City subsidizes BTD and BPTE, to compensate exempted fares of pensioners, disabled persons and children less than seven years of age. Annual subsidies are shown in **Figure 7.1-4**. The amount of subsidies are increasing, especially that of midibuses which shows steep increase since 2008, corresponding to the increase of bus units and operations. About 180 million SOMS are allocated from municipal budget to subsidies public transportation sector for fare exemptions in 2010. However, according to UTD, the subsidy does not fully cover the actual ridership of exempted passengers.



Source : JICA Study Team based on BTD and BPTE Provided Data

Figure 7.1-4 Annual Subsidies to BTD and BPTE for Fare Exemptions

7.1.4.4 Income from Minibus Franchise

Minibus companies pay for monthly tariffs to Bishkek City in accordance with number of vehicles and their categories. In August 2012, income of Bishkek City from minibus franchise was estimated at 1.98 million SOMS per month. Registered vehicles as of the same time by category are shown in **Table 7.1-3**.

Table 7.1-3 Income from Minibus Franchise in August 2012

Category	Tariff (SOMS / Month)	Number of Vehicle	Income (1,000 SOMS / Month)
I	983	1,752	1,722
II	578	350	202
III	347	172	60
Total		2,274	1,984

* Income was estimated by JICA Study Team based on UTD data

Source : JICA Study Team, UTD

7.1.5 Bus Fare System

7.1.5.1 Bus Fare

The public transportation fares in Bishkek City were hiked on 1st of May, 2012. The fares of urban public transportation are defined by Decree of Bishkek City, "Tariffs for passenger and luggage transportation in a public transport in Bishkek" April 26, 2012 No.312. Followings are present tariffs and previous tariffs.

Mode	Fare (Present)	Fare (Previous)
Trolleybus	8 SOMS	5 SOMS
Midibus	8 SOMS	6 SOMS
Minibus (from 6 am to 9 pm)	10 SOMS	8 SOMS
-ditto- (from 9 pm to 12 am)	12 SOMS	10 SOMS
Express minibus (to suburban area)	12 ~ 17 SOMS	10 ~ 17 SOMS
The fare for the carriage of one piece of luggage with weight over 40 Kg or with size 50 × 60 × 100 m^3	8 SOMS	
Monthly Tickets for trolleybus	225 SOMS	
Monthly Tickets for trolleybus and midibus	495 SOMS	
Monthly Tickets for Student	175 SOMS	

Operating cost per passenger calculated by BTD and BPTE is eight SOMS/person for trolleybus operation by BTD and 10 SOMS/person for midibus operation[4] by BPTE. Meanwhile, most Bishkek citizens consider public transport as a city service which has to be provided very cheaply or even free. Any fare increase will not easily be accepted.

Fare collection is done manually by drivers, thus sometimes BPTE and BTE are criticized in that fare collection is not appropriately made. To control fare collection, BPTE sets monthly norm for drivers based on actual fare collection. However, BPTE admits that the effect of this method is limited and adjustment of the norm in proper way is not easy job. BTD and BPTE have other income such as advertisements., although the amount is very small compared with the fare revenue.

7.1.5.2 Fare Exemption

The decree of Monetization of Reduced Fare and Tariffs for Transportation of Passengers by Public Transport in the City of Bishkek defines five categories of citizens who are entitled to free rides on municipal public transport. This fare exemption does not apply to minibuses because minibuses are operated by private companies. To compensate for the fare exemptions, Bishkek City has to subsidize BTD and BPTE according to the amount of free rides.

(a) Bishkek City's pensioners or retirees

(b) Disabled persons

[4] Operation costs divided by number of passengers simply.

(c) People with disabled children

(d) Children below 7 years old

(e) Postmen of the state postal company "Kyrgyzpochtasy" on duty

7.1.6 Public Transportation Network

(1) Network Summary

The number of routes, total lengths and the number of vehicles of each mode are shown in **Table 7.1-4**.

Table 7.1-4 Route Length and Number of Vehicles of Public Transportation

Transportation Mode	Operator	Number of Routes	Length	Number of Vehicles
Trolleybus	BTD (Public)	7	104 km	87
Midibus	BPTE (Public)	21	418 km	460
Minibus	Private Companies	121	4,300 km	About 3,800

Source : UTD as of 2011

The public transportation network in Bishkek City is shown in **Figure 7.1-5**. Public transportation networks by each mode of traffic are shown in **Appendix 7.1**.

(2) Change of the Routes

The trolleybus routes have not changed in recent years. According to operations records of UTD, the number of midibus routes has decreased from 23[5] during 2011 to 17 as of August 2012. The number of minibus routes has been frequently changing. Four routes were added, while two routes removed from December 2011 to March 2012. Two routes were added, while five routes removed as of August 2012.

Table 7.1-5 Route Change of Public Transportation

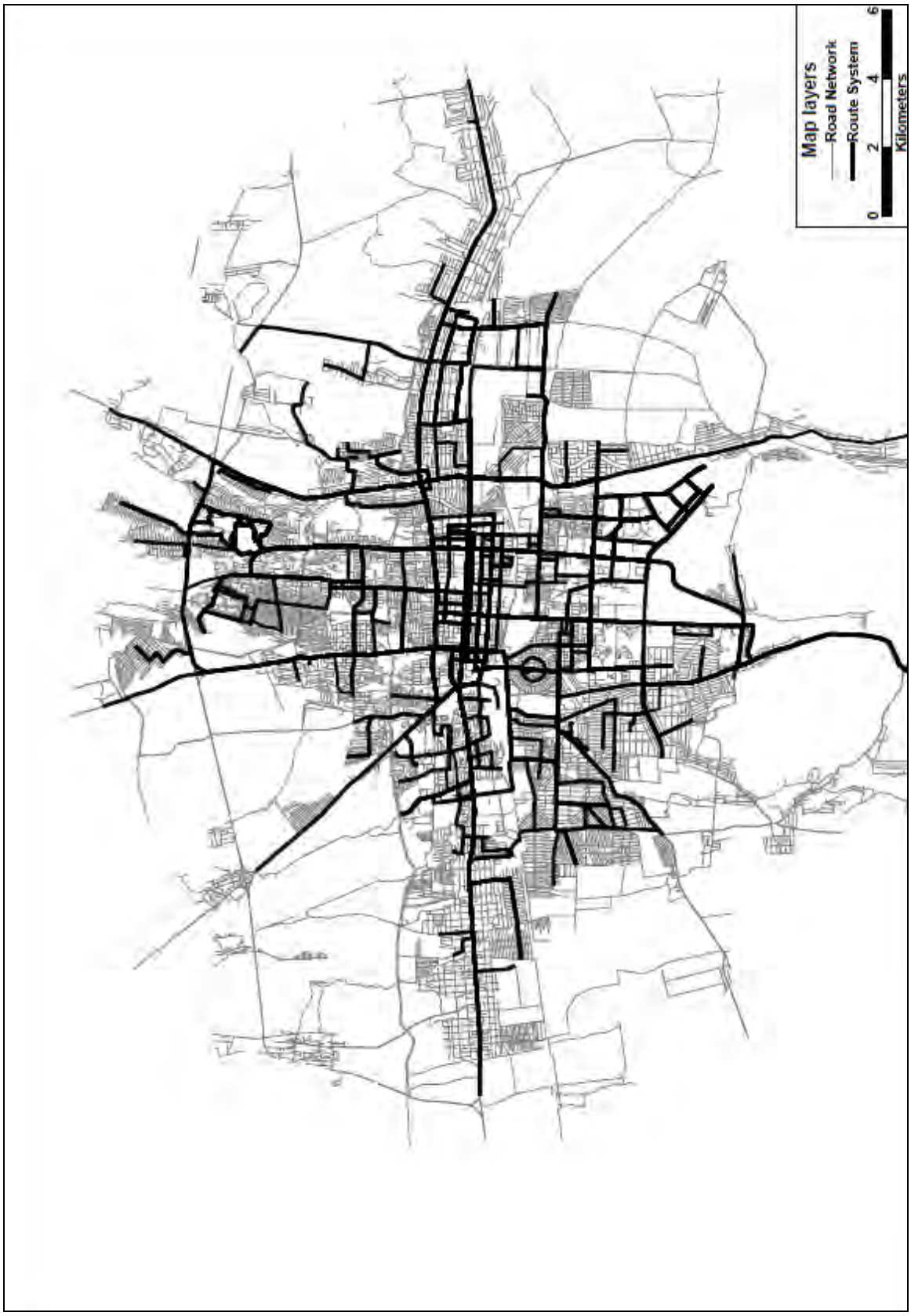
Transportation Mode	Dec 2011	Route Change		Mar 2012	Route Change		Aug 2012
	Number of Routes	Added	Abolished	Number of Routes	Added	Abolished	Number of Routes
Trolleybus	7	No change		7	No change		7
Midibus	23	No change		23	-	1,5,10,33,37,48	17
Minibus	118	105,120,171, 219,221	250,271	121	236,290	14a,105,134, 143,157	118

Source : JICA Study Team based on UTD provided information

(3) Route Duplication

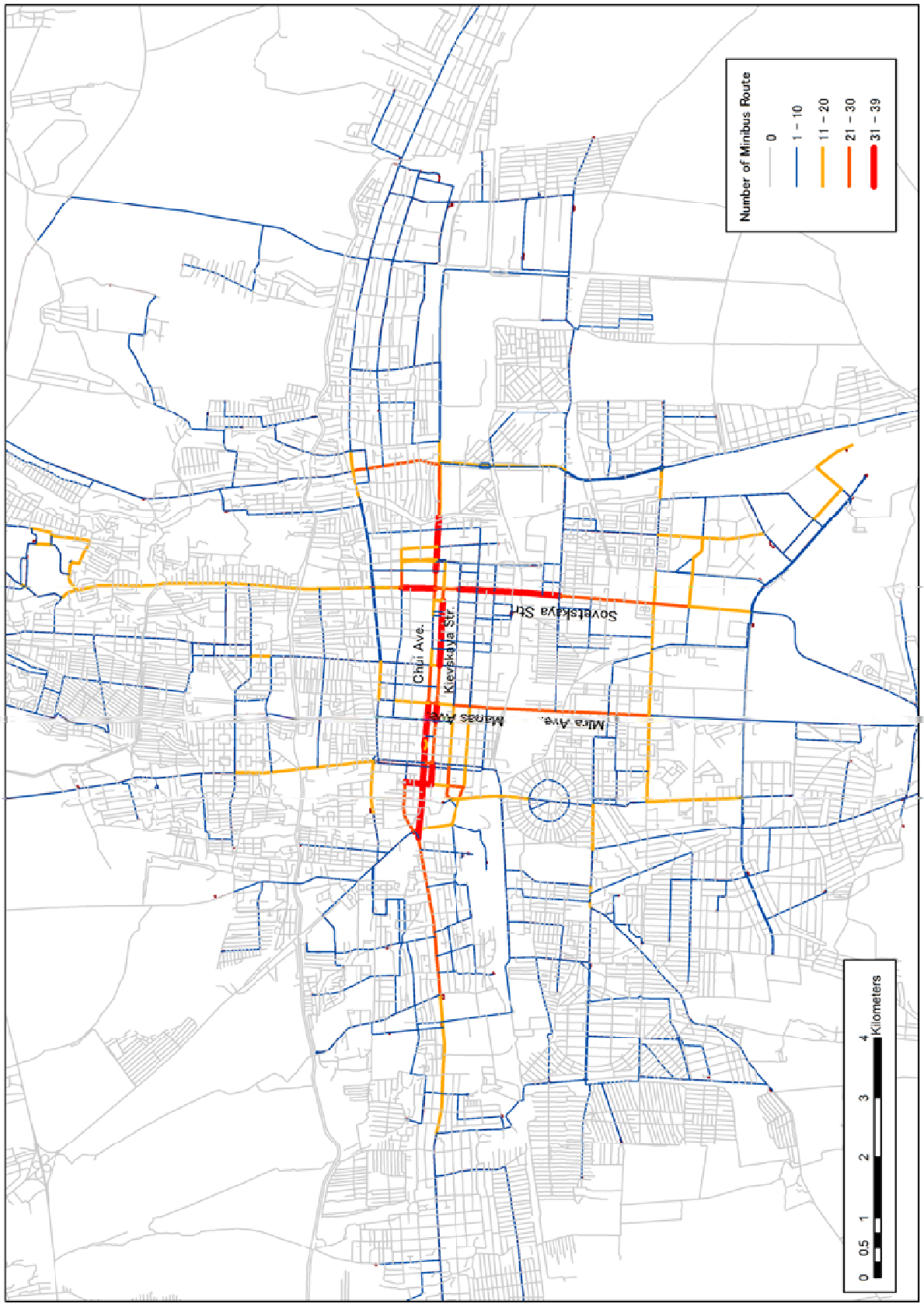
Numerous route franchises within the same route of networks in the City center are being given to the different companies. As shown in **Figure 7.1-6**, more than 30 minibus routes are registered on Chui Avenue, Kievskaya street and Sovetskaya street.

[5] Actual operation route of midibus was 21 according to operational information provided by BPTE to JICA Study Team in September 2011.



Source : JICA Study Team

Figure 7.1-5 Public Transportation Network (Trolleybus + Midibus + Minibus)



Source : JICA Study Team, as of 2011

Figure 7.1-6 Minibus Route Duplication

7.1.7 Public Bus Operation

The scheduled running intervals of trolleybuses and midibuses are shown in **Table 7.1-6** and **Table 7.1-7**, respectively. The trolleybus runs mainly in the evening from 19:00 to 21:00 while the midibus runs mainly in the morning from 9:00 to 11:00 and in the evening from 19:00 to 21:00. Scheduled running intervals of minibuses are determined by the number of vehicles designated on the franchise contracts. Detailed minibus routes information is shown in **Appendix 7.2**.

UTD manages the bus operation by working records as shown in **Figure 7.1-7** and **Figure 7.1-8**. Bus operators are required to report to UTD the actual number of operating vehicles every day. However, this is an honor system with no way of verification.

The assigned number can be changed upon approval of UTD, to adapt to seasonal variation.

Table 7.1-6 Scheduled Intervals of Trolleybus

Route No.	Origin- Destination	Planned Vehicle Number	Turnaround Length (km)	Scheduled Intervals (minutes by Operation Time Frame)					
				0600 ~ 0900	0900 ~ 1100	1100 ~ 1500	1500 ~ 1800	1800 ~ 1900	1900 ~ 2100
4	Meat Factory - Leather Factory	16	23.3	7-8	5-6	5-6	7-8	9-12	12
8	Ak-Orgo - Lermontov Street	13	32.3	10-12	10-11	10-11	10-11	10-15	15
9	Farming Institute - Alamedin	13	40.0	12-15	10-11	12-14	10-11	12-14	20
10	Meat Factory - Asanabai	11	25.0	9-10	9-10	8-9	8-9	9-13	15
11	Micro-District 6 - Eastern Bus Station	13	29.3	10-8	8-9	8-9	8-9	12-15	15
14	Jal - Kirkomstroi	11	28.3	8-10	10-8	8-9	8-9	8-9	10
17	Micro-District 6 - Leather Factory	10	26.1	9-13	9-13	9-11	9-11	9-15	20
	Total	87							

Average duration of driver's shift = 6.6 hour
Average duration of trolleybus operation = 12.9 hour
Source : BTD

Table 7.1-7 Scheduled Intervals of Midibus

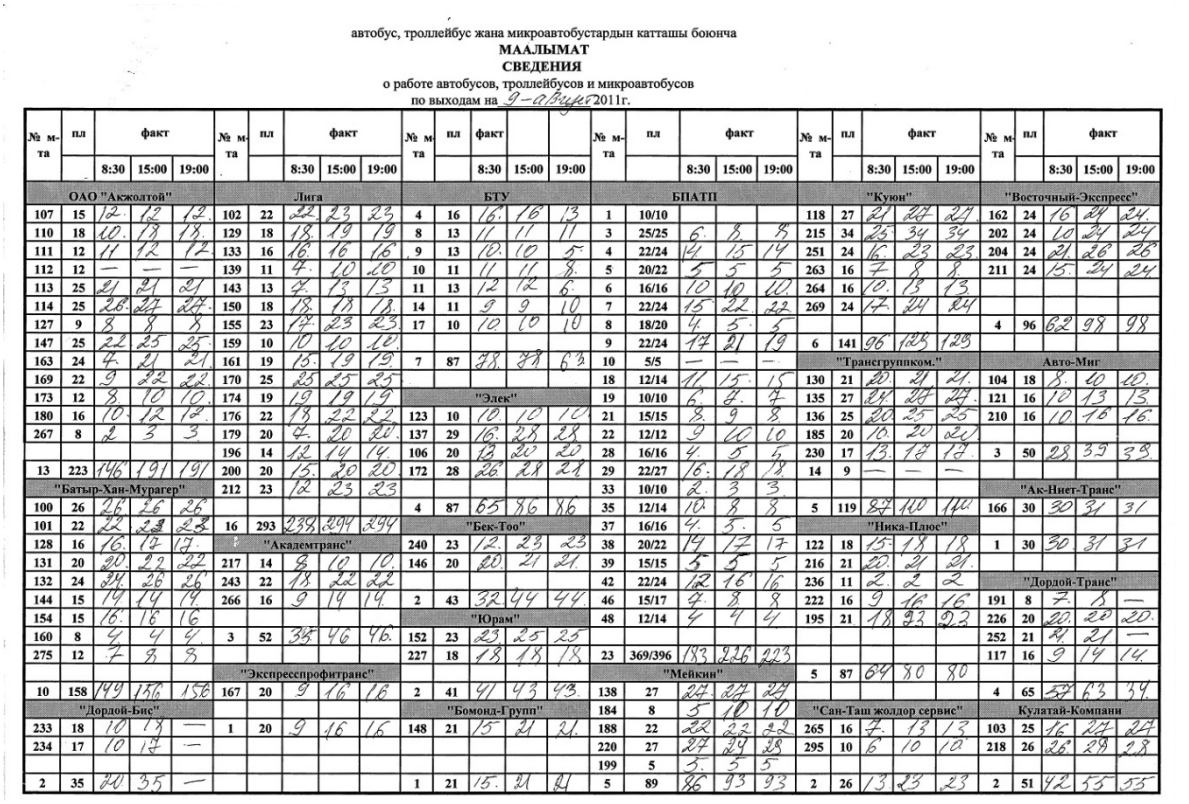
Route No.	Origin-Destination	Planned Vehicle Number	Turnaround Length (km)	Scheduled Intervals (minutes by Operation Time Frame)					
				0600 ~ 0900	0900 ~ 1100	1100 ~ 1500	1500 ~ 1800	1800 ~ 1900	1900 ~ 2100
3	12 Micro-region	24	45	6-7	8-9	6-7	6-7	6-7	8-9
	Dordoi	24		6-7	8-10	6-7	6-7	6-7	8-10
4	Ak-Orgo	22	52	7-8	9-11	7-8	7-8	7-8	9-11
	Jilgorodok	20		8-9	10-12	8-9	8-9	8-9	10-12
~~5~~	~~12 Micro-region~~	~~20~~	~~40~~	~~7-8~~	~~9-12~~	~~7-8~~	~~7-8~~	~~7-8~~	~~9-13~~
	~~Maevka~~	~~18~~		~~8-9~~	~~10-12~~	~~8-9~~	~~8-9~~	~~8-9~~	~~10-12~~
~~6~~	Ak-Orgo	14	30	7-8	9-11	7-8	7-8	7-8	9-12
	Kok-Jar	14		7-8	9-12	7-8	7-8	7-8	9-13
7	Alamedin-1	24	42	6-7	8-9	6-7	6-7	6-7	8-9
	Dachi	22		6-7	8-10	6-7	6-7	6-7	8-10
8	Chon-Aryk	20	56	8-9	10-12	8-9	8-9	8-9	10-12
	Nooruz	18		9-10	12-14	9-10	9-10	9-10	12-14
9	Azamat	22	48	7-8	9-11	7-8	7-8	7-8	9-12
	12 Micro-region	22		7-8	9-11	7-8	7-8	7-8	9-12
18	Maevka	16	45	9-10	12-14	9-10	9-10	9-10	12-14
	Kuntuu	14		11	13-15	11	11	11	13-15
19	Jenish	10	32	14	16-18	14	14	14	16-18
	Archa-Beshik	10		14	16-18	14	14	14	16-19
21	Birindik	15	28	8-9	8-9	8-9	8-9	8-9	10-12
	Bakai-Ata	15		8-9	8-9	8-9	8-9	8-9	10-12
22	Dyikan	12	40	11-12	13-15	11-12	11-12	11-12	13-15
	Dordoi	12		11-13	13-16	11-12	11-12	11-12	13-16
28	Kok-Jar	14	37	10	12-14	10	10	10	12-14
	Kolmo	14		10	12-14	10	10	10	12-14
29	Archa-Beshik	22	49	8-9	10-12	8-9	8-9	8-9	10-12
	Reemstma	22		8-9	10-12	8-9	8-9	8-9	10-12
~~33~~	~~12 Micro-region~~	~~10~~	~~27~~	~~11 12~~	~~13 18~~	~~11 12~~	~~11 12~~	~~11 12~~	~~13 18~~
	~~Dyikan~~	~~8~~		~~14 15~~	~~16 20~~	~~14 15~~	~~14 15~~	~~14 15~~	~~16 20~~
35	Western Bus Terminal	14	18	5-6	7-8	5-6	5-6	5-6	7-8
		12		6-7	8-9	6-7	6-7	6-7	8-9
~~37~~	~~Chon Aryk~~	~~14~~	~~43~~	~~10 11~~	~~12 14~~	~~10 11~~	~~10 11~~	~~10 11~~	~~12 14~~
	~~Steklo Zavod~~	~~14~~		~~10 11~~	~~12 14~~	~~10 11~~	~~10 11~~	~~10 11~~	~~12 14~~
38	Alamedin	20	59	7-8	9-10	7-8	7-8	7-8	9-10
	110 Block	17		6-7	8-9	6-7	6-7	6-7	8-9
~~39~~	~~Ala Too~~	~~16~~	~~36~~	~~9 10~~	~~12 14~~	~~9 10~~	~~9 10~~	~~9 10~~	~~12 14~~
	~~12 Micro-region~~	~~14~~		~~10 11~~	~~12 14~~	~~10 11~~	~~10 11~~	~~10 11~~	~~12 14~~
42	Ala-Too	24	36	7-8	9-12	7-8	7-8	7-8	9-13
	Naberejnaya	22		8-9	10-12	8-9	8-9	8-9	10-12
46	Enesai	17	44	7-8	7-8	7-8	7-8	7-8	8-10
	Chon-Aryk	14		9-10	9-10	9-10	9-10	9-10	10-11
~~48~~	~~Western Bus Terminal~~	~~12~~	~~50~~	~~6 7~~	~~8 9~~	~~6 7~~	~~6 7~~	~~6 7~~	~~8 9~~
		~~12~~		~~6 7~~	~~8 9~~	~~6 7~~	~~6 7~~	~~6 7~~	~~8 9~~
	Total	700							

Average duration of driver's shift = 7.65 hour

Average duration of midibus operation = 15.3 hour

As of August 2012, Route No.5, 33, 37, 39, 48 are abolished. Information of those routes arer shown with strikethrough.

Source : BPTE

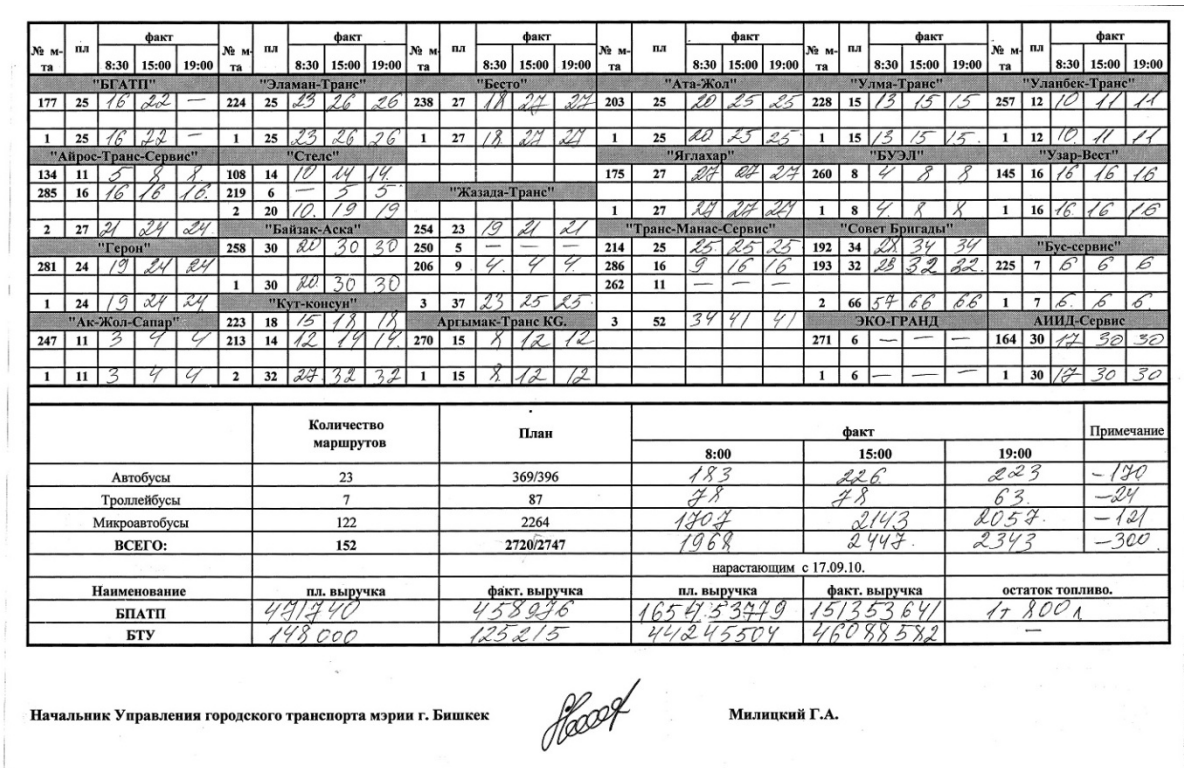


автобус, троллейбус жана микроавтобустардын катташы боюнча
МААЛЫМАТ
СВЕДЕНИЯ
о работе автобусов, троллейбусов и микроавтобусов
по выходам на 9-октябрь 2011г.

№ м-та	пл	факт 8:30	факт 15:00	факт 19:00	№ м-та	пл	факт 8:30	факт 15:00	факт 19:00	№ м-та	пл	факт 8:30	факт 15:00	факт 19:00	№ м-та	пл	факт 8:30	факт 15:00	факт 19:00	№ м-та	пл	факт 8:30	факт 15:00	факт 19:00	№ м-та	пл	факт 8:30	факт 15:00	факт 19:00
ОАО "Акжолтой"					Лига					БТУ					БПАТП					"Куюн"					"Восточный-Экспресс"				
107	15	12	12	12	102	22	22	23	23	4	16	16	16	13	1	10/10				118	27	27	27	27	162	24	16	24	24
110	18	10	18	18	129	18	18	19	19	8	13	11	11	11	3	25/25	6	8	8	215	34	25	34	34	202	24	10	24	24
111	12	11	12	12	133	16	16	16	16	9	13	10	10	5	4	22/24	14	15	14	251	24	16	23	23	204	24	21	26	26
112	12	—	—	—	139	11	4	10	20	10	11	11	11	8	5	20/22	5	5	5	263	16	7	8	8	211	24	15	24	24
113	25	21	21	21	143	13	7	13	13	11	13	12	12	6	6	16/16	10	10	10	264	16	10	13	13					
114	25	28	27	27	150	18	18	18	18	14	11	9	9	10	7	22/24	15	22	22	269	24	17	24	24					
127	9	8	8	8	155	23	17	23	23	17	10	10	10	10	8	18/20	4	5	5						4	96	62	98	98
147	25	22	25	25	159	10	10	10	10						9	22/24	17	21	19	6	141	96	125	125					
163	24	4	21	21	161	19	15	19	19	7	87	78	88	63	10	5/5	—	—	—	"Трансгрупком."					Авто-Миг				
169	22	9	22	22	170	25	25	25	25						18	12/14	11	15	15	130	21	20	21	21	104	18	8	10	10
173	12	8	10	10	174	19	19	19	19	"Элек"					19	10/10	6	8	7	135	27	27	28	27	121	16	10	13	13
180	16	10	12	12	176	22	13	22	22	123	10	10	10	10	21	15/15	8	9	8	136	25	20	25	25	210	16	10	16	16
267	8	2	3	3	179	20	4	20	20	137	29	16	28	28	22	12/12	9	10	10	185	20	10	20	20					
					196	14	12	14	14	106	20	13	20	20	28	16/16	4	5	4	230	17	13	18	17	3	50	28	33	33
13	223	146	191	191	200	20	15	20	20	172	28	26	28	21	29	22/27	16	18	18	14	9	—	—	—					
"Батыр-Хан-Мурагер"					212	23	12	23	23						33	10/10	2	3	3						"Ак-Ниет-Транс"				
100	26	26	26	26						4	87	65	86	86	35	12/14	10	8	8	5	119	87	110	110	166	30	30	31	31
101	22	22	23	23	16	293	294	294	294	"Бек-Тоо"					37	16/16	4	5	5	"Ника-Плюс"									
128	16	16	17	17	"Академтранс"					240	23	12	23	23	38	20/22	14	17	17	122	18	15	18	18	1	30	30	31	31
131	20	20	22	22	217	14	9	10	10	146	20	20	21	21	39	15/15	5	5	5	216	21	20	21	21					
132	24	24	26	26	243	22	18	22	22						42	22/24	12	16	16	236	11	2	2	2	"Дордой-Транс"				
144	15	14	14	14	266	16	9	14	14	2	43	32	44	44	46	15/17	7	8	8	222	16	9	16	16	191	8	7	8	—
154	15	16	16	16						"Юрам"					48	12/14	4	4	4	195	21	18	22	22	226	20	20	20	20
160	8	4	4	4	3	52	35	46	46	152	23	23	25	25											252	21	21	21	—
275	12	7	8	8						227	18	18	18	18	23	369/396	183	226	223						117	16	9	14	14
					"Экспресспрофитранс"										"Мейкин"					5	87	64	80	80					
10	158	149	156	156	167	20	9	16	16	2	41	41	43	43	138	27	27	27	29						4	65	57	63	34
"Дордой-Бис"										"Бомонд-Групп"					184	8	5	10	10	"Сан-Таш жолдор сервис"					Кулатай-Компани				
233	18	10	17	—	1	20	9	16	16	148	21	15	21	21	188	22	22	23	22	265	16	7	13	13	103	25	16	27	27
234	17	10	17	—											220	27	27	29	28	295	10	6	10	10	218	26	26	28	28
															199	5	5	5	5										
2	35	20	35	—						1	21	15	21	21	5	89	86	93	93	2	26	13	23	23	2	51	42	55	55

Source : UTD

Figure 7.1-7 Vehicle Operation Record (1)



№ м-та	пл	факт 8:30	факт 15:00	факт 19:00	№ м-та	пл	факт 8:30	факт 15:00	факт 19:00	№ м-та	пл	факт 8:30	факт 15:00	факт 19:00	№ м-та	пл	факт 8:30	факт 15:00	факт 19:00	№ м-та	пл	факт 8:30	факт 15:00	факт 19:00	№ м-та	пл	факт 8:30	факт 15:00	факт 19:00
"БГАТП"					"Эламан-Транс"					"Бесто"					"Ата-Жол"					"Улма-Транс"					"Уланбек-Транс"				
177	25	16	22	—	224	25	23	26	26	238	27	18	27	27	203	25	20	25	25	228	15	13	15	15	257	12	10	11	11
1	25	16	22	—	1	25	23	26	26	1	27	18	27	27	1	25	20	25	25	1	15	13	15	15	1	12	10	11	11
"Айрос-Транс-Сервис"					"Стелс"										"Яглахар"					"БУЭЛ"					"Узар-Вест"				
134	11	5	8	8	108	14	10	14	14						175	27	27	27	27	260	8	4	8	8	145	16	16	16	16
285	16	16	16	16	219	6	—	5	5	"Жазада-Транс"																			
					2	20	10	19	19						1	27	27	27	27	1	8	4	8	8	1	16	16	16	16
2	27	21	24	24	"Байзак-Аска"					254	23	19	21	21	"Транс-Манас-Сервис"					"Совет Бригады"									
"Герон"					258	30	20	30	30	250	5	—	—	—	214	25	25	25	25	192	34	28	34	34	"Бус-сервис"				
281	24	19	24	24						206	9	4	4	4	286	16	9	16	16	193	32	28	32	32	225	7	6	6	6
					1	30	20	30	30						262	11	—	—	—										
1	24	19	24	24	"Кут-консун"					3	37	23	25	25						2	66	57	66	66	1	7	6	6	6
"Ак-Жол-Сапар"					223	18	15	18	18	Аргымак-Транс KG.					3	52	34	41	41	ЭКО-ГРАНД					АИИД-Сервис				
247	11	3	4	4	213	14	12	14	14	270	15	8	12	12						271	6	—	—	—	164	30	17	30	30
1	11	3	4	4	2	32	27	32	32	1	15	8	12	12						1	6	—	—	—	1	30	17	30	30

	Количество маршрутов	План	факт 8:00	факт 15:00	факт 19:00	Примечание
Автобусы	23	369/396	183	226	223	-170
Троллейбусы	7	87	78	78	63	-24
Микроавтобусы	122	2264	1707	2143	2057	-121
ВСЕГО:	**152**	**2720/2747**	1968	2447	2343	-300
			нарастающим с 17.09.10.			
Наименование	**пл. выручка**	**факт. выручка**	**пл. выручка**	**факт. выручка**	**остаток топливо.**	
БПАТП	491740	458096	16543779	15135364	17 800 л	
БТУ	148000	125215	44245504	46088582	—	

Начальник Управления городского транспорта мэрии г. Бишкек **Милицкий Г.А.**

Source : UTD

Figure 7.1-8 Vehicle Operation Record (2)

7.1.7.1 Minibus Company and Franchise of Minibus Routes

Table 7.1-8 List of Minibus Operating Private Companies as of 2011

#	Business Name (LLC)	Number of Fleet	Category	Number of Routes	Routes Numbers
1	Kuyun	240	IV	6	118, 215, 251, 263, 264, 269
2	Ulma-Trans	20	I	1	228
3	Ata-Zhol	46	I	1	203
4	Sovet-Brigady	117	III	2	193, 192
5	Airus-Trans	55	II	2	134, 285
6	Baizak-Aska	53	II	1	258
7	Zhazada-Trans	53	II	3	254, 299, 250
8	Ak-Niet-Trans	52	II	1	166
9	Yuram	80	II	2	152, 227
10	Geroi	33	I	1	281
11	Akademtransservice	87	II	3	217, 243, 266
12	Batyr-Khan-Murager	287	IV	10	154, 275, 100, 128, 131, 144, 101, 110, 160, 132
13	Avtomig	85	II	3	104, 121, 210
14	Bek-Too	82	II	2	240, 146
15	Vostochnyi Express	152	III	4	162, 202, 204, 211
16	Liga	518	V	16	102, 129, 133, 139, 143, 155, 159, 161, 170, 174, 176, 196, 200, 212, 150, 179
17	Ellada-Plus	170	III	5	122, 216, 236, 195, 222
18	Dordoi-Bis	44	I	2	233, 234
19	Transgroupcommunication	170	III	5	122, 216, 236, 195, 222
20	Yaglakhar	64	II	2	151, 175
21	Meikin	172	III	5	138, 184, 188, 220, 271
22	Stele	27	I	2	219, 108
23	AIID-Service	47	I	1	164
24	Ak-Zholtoi	264	IV	10	107, 127, 147, 163, 169, 173, 111, 112, 113, 114
25	Kulatai	87	II	2	103, 118
26	Union-Plast	20	I	1	199
27	BGATP	37	I	1	177
28	Besto	40	I	1	238
29	Bomond-Group	51	II	1	148
30	Maaniker-Trans	12	I	1	262
31	Elek	154	III	4	106, 123, 137, 172
32	Expressprofitrans	33	I	1	167
33	Buel	13	I	1	260
34	Trans-Manas-Service	73	II	2	286, 214
35	Elaman-Trans	43	I	1	224
36	Dordoi-Trans	89	II	4	191, 226, 252, 117
37	Ulanbek-Trans	21	I	1	257
38	Veteran	7	I	1	298
39	Santash-Zholdor-Service	46	I	2	295, 265
40	Kut-Konsun	53	II	2	223, 273
41	Uzar-Vest	27	I	1	145
42	Bus-Service	16	I	1	225
43	Arkhat-Trans	9	I	1	14
44	Ak-Zhol-Sapar	11	I	1	261
45	Argymak-Trans-Co	22	I	1	270
46	Service-Taxi	29	I	1	180

Note : Category I= ~ 50, II = 51 ~ 100, III = 101 ~ 200, IV = 201 ~ 400, and V = 401 ~ (Classified by JICA Study Team)
Source : JICA Study Team based on UTD provided data

Table 7.1-8 shows a list of minibus operating private companies as of 2011. In 2008, franchise for minibus routes was introduced by UTD. UTD was assigned as the organization to manage minibus routes, a public transportation network and tenders for minibus routes for five-year franchise. The franchise tariff is earmarked for subsidies to public transportation companies. The monthly tariffs are:

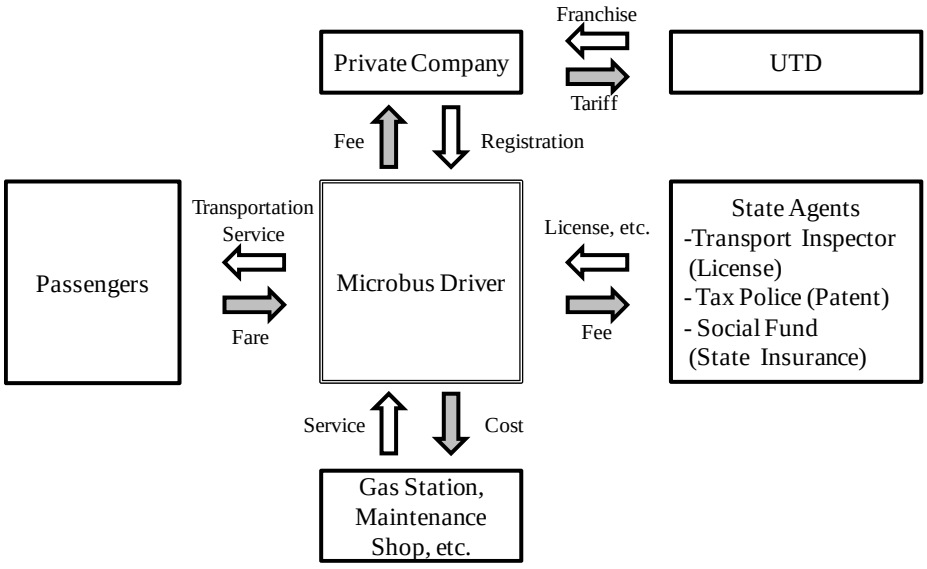
(a) Category 1 983 SOMS

(b) Category 2 578 SOMS

(c) Category 3 347 SOMS

The information including route / bus stops, length of route, required minimum frequency, and planned number of buses is open to the public when the route is tendered.

Usually, the owner of minibuses is the driver. A driver contracts with bus companies as committed minibus operator. There is one exception where one company[6] owns buses and leases them to drivers. It is the responsibility of bus companies to line up sufficient bus vehicles in applying for the franchise tender, but there is no regulation as to whether the owner should be the driver or a company. In case a driver changes the registered route, the driver should renew the contract with the company or arrange with other companies and the revised registration should be submitted to Bishkek City. Drivers' incomes are derived from passengers' fares. Their monthly expenses are estimated from 4,000 to 5,000 SOMS, equivalent to 500 to 630 passengers' fares[7]. A company provides support to drivers for car insurance, tax payments, information about designated training, and consulting services in case of traffic accident. **Figure 7.1-9** shows structure of the minibus driver's expenses.

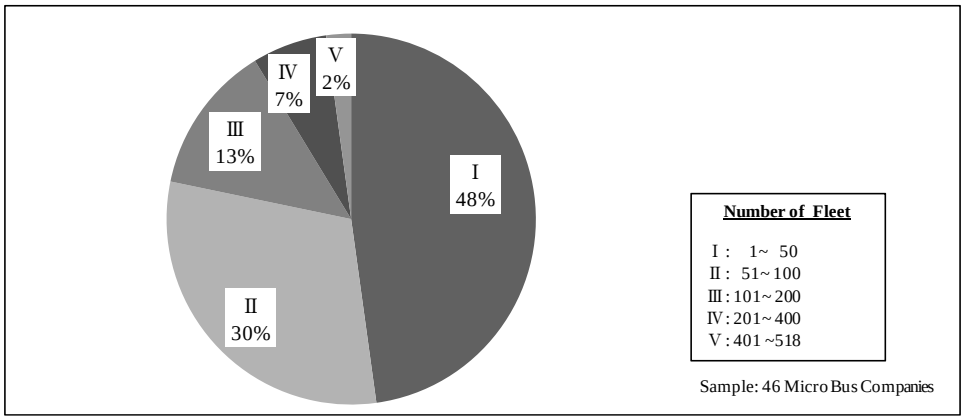


Source : JICA Study Team

Figure 7.1-9 Structure of Minibus Driver's Income and Expenses

[6] The bus company "Ak-Zholtoi" owns buses by itself.
[7] Public transportation interview survey on 200 minibus drivers, JICA Study Team, Jan-Feb,2012

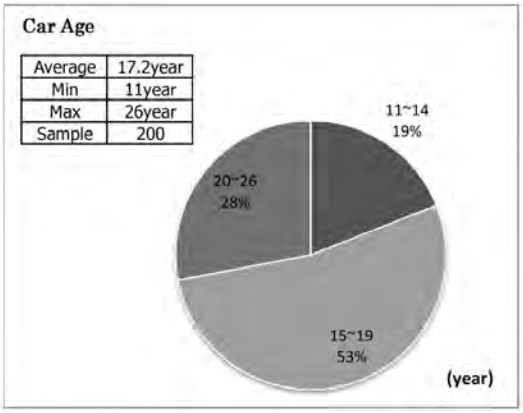
46 private companies operate minibus as shown in **Table 7.1-8** in previous page. As **Figure 7.1-10** shows, small companies with less than 50 vehicles are almost half of all companies.



Source : JICA Study Team

Figure 7.1-10 Percentage Distribution of Minibus Company by Registered Fleet Category

According to minibus drivers' interview shown in **Figure 7.1-11**, the age of minibuses range from 11 to 26 years and the average is 17.2 years, and 81 percent of minibuses are 15 years of age or over.



Source : JICA Study Team, minibus Driver's Interview in January 2012

Figure 7.1-11 Vehicle Age of Minibus

7.2 Public Transportation Surveys

7.2.1 Methodology

The Public Transportation Surveys were conducted in winter, January to February 2012 and in summer, June 2012, respectively. **Table 7.2-1** shows the results of the public transportation survey.

Table 7.2-1 Contents of Public Transportation Survey

Component	Survey Item
1. Public Transportation Survey in winter time Duration : January - February , 2012	1. Bus Stop Location Survey - Objective : To identify actual location and condition of bus stops - Targets : 7 trolleybus and 20 midibus routes 2. On Board Survey - Objective : To identify actual boarding and alighting conditions of bus - Targets : 7 trolleybus and 7 midibus routes - Survey Hours :7:00 - 19:00 (12 hours) - Survey Days : 2 weekdays 3. Public Transportation Interview Survey - Objective : To identify characteristics of passengers and working condition of minibus drivers - Targets : 1,200 passengers and 200 minibus drivers 4. Travel Speed Survey - Objective : To measure travel speed on the road of bus routes in winter time - Targets : 8 routes (same as traffic survey conducted in 2011) - Survey Hours :7:00 - 19:00 (12 hours) - Survey Day : 1 weekday
2. Public Transportation Survey in summer time Duration : June, 2012	1. Public Transportation Vehicle Count & Occupancy Survey - Objective : To estimate number of passengers on the road and capacity of public transportation in operation - Targets : 36 bus stops - Survey Hours : 6:00 - 22:00 (16 hours) - Survey Days : 1 weekday and 1 weekend 2. On Board Survey - Objective : To identify actual boarding and alighting condition of bus - Targets : 7 trolleybus routes - Survey Hours : 6:00 - 22:00 (16 hours) - Survey Days : 2 weekdays

Source : JICA Study Team

Detailed survey results are attached to **Appendix 7.4**.

7.2.2 Characteristics of Public Transportation in Bishkek City

The public transportation survey revealed characteristics of public transportation[8] in Bishkek City as shown in **Table 7.2-2**. **Picture 7.2-1** to **Picture 7.2-4** shows public transportation survey.

Table 7.2-2 Public Transportation Surveys Results

1. Public Transportation Users' Character ・92 percent of public transportation users has no option to use car ・18 percent of public transportation users is exempted from fare
2. Share of Public Transportation Mode ・Occupancy survey estimates composition ratios of passengers: trolleybus 10 percent, midibus 20 percent and minibus 70 percent ・Composition ratios of operation number are: trolleybus 4 percent, midibus 9 percent and minibus 87 percent ・Occupancy ratios are: trolleybus 45 percent, midibus 53 percent and minibus 117 percent
3. Minibus ・Average car age of minibus is 17.2 years ・Drivers work 5.6 days a week and 12 hours a day in average ・Average profits of drivers is about 13,300 SOMS/month
4. Bus Stops ・There are some bus stops equipped with no facility.
5. Trolleybus users ・Revision of tariffs of public transportation, which came into force on 1st of May, 2012, caused declining of the number of trolleybus users

Picture 7.2-1 Passenger Interview

Picture 7.2-2 On Board Survey

Picture 7.2-3 Vehicle Count / Occupancy

Picture 7.2-4 Driver Interview

[8] Besides, a traffic survey, including a house hold interview and a transportation user survey, was also conducted in 2011. (See **Chapter 6)** Main findings in characteristics of public transportation users are i) 54% of household owns vehicles, and ii)a total share of public transportation trips in all trips is 46.5%, consisting of 3.2% of trolleybus, 1.2% of midibus and 42.0% of minibus. Modal shares in public transportation are: 7% of trolleybus, 2.6% of midibus and 90.4% of minibus.

7.3 Level of Service in Public Transportation

7.3.1 Users Request

Table 7.3-1 summarizes users' requests to improve public transportation by the public transport users' survey. The most important request was driving manners of the drivers. In particular, trolleybus users request increased speed as the more important one, while midibus and minibus users demand for bigger-sized buses. Bus location information was highly requested by all bus users.

Table 7.3-1 User Request on Public Transportation Service Improvement

	Trolleybus	Ratio	Midibus	Ratio	Minibus	Ratio
1	Drive gently	29%	Drive gently	48%	Drive gently	33%
2	Increase bus speed	18%	Bigger bus	14%	Bigger bus	26%
3	Bigger bus	18%	Increase bus speed	11%	Bus location information	14%
4	Safety ensuring at bus stop	10%	Bus location information	7%	Safety ensuring at bus stop	12%
5	Bus location information	9%	Safety ensuring at bus stop	7%	Increase bus speed	8%
6	Low-floor bus	8%	Low-floor bus	5%	Low-floor bus	4%
7	Bus shelter improvement	5%	Bus shelter improvement	4%	Bus shelter improvement	3%
8	Other	3%	Other	4%	Other	1%
Total		100%		100%		100%

Source : JICA Study Team, Public transportation user survey conducted in January 2012.

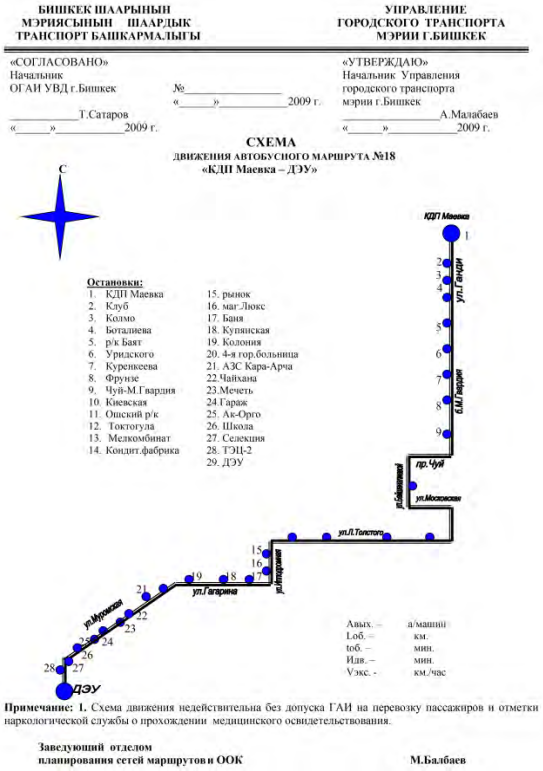
7.3.2 Security / Safety

All citizens including young women, families with children and elderly people using public transportation felt relatively safe. However, pickpocket incidents were frequently reported.

7.3.3 Public Information of Public Transportation

The trolleybuses, the midibus and the minibus display their respective destination and route number upfront. The trolleybuses and the midibuses show their schematic route maps inside the buses but the minibuses do not post any schematic route map. Information can be heard either from drivers or other passengers but not shown at bus stops or elsewhere. Comprehensive public transportation information is not provided to the citizens officially.

Picture 7.3-1 Destination Displayed on Minibus Window



Picture 7.3-2 Sample of Schematic Route Map Shown in Trolleybus and Midibus

7.3.4 Frequency of Bus Operation

The service frequency survey was conducted at 36 bus stops in June 2012. Actual bus service frequency for trolleybuses and midibuses in comparison with the schedules are shown in **Table 7.3-3** and **Table 7.3-4**, respectively.

The routes frequently operated by trolleybuses were No.4 and No.11, while the midibuses were on No.7 and No.38. Scheduled running intervals (headway) of the midibuses are planned as shorter than that of the trolleybuses. However, according to surveys of actual operation, two modes had no difference and the trolleybuses were shorter than the midibus. Their average running intervals are less than 12 minutes almost all day. Generally, the trolleybuses adhere to the schedules more than the midibuses.

Table 7.3-2 Actual Operation and Intervals of Trolleybus

Route No.	Origin - Destination	Schedule / Survey date	Intervals (minutes by Operation Time Frame)					
			0600 ~ 0900	0900 ~ 1100	1100 ~ 1500	1500 ~ 1800	1800 ~ 1900	1900 ~ 2100
4	Meat Factory - Leather Factory	Schedule	7-8	5-6	5-6	7-8	9-12	12
		6 June	7-11	10-12	8-10	8-9	11-14	
8	Ak-Orgo - Lermontov Street	Schedule	10-12	10-11	10-11	10-11	10-15	15
		7 June	13-17	11-13	16-21	12	15-20	
9	Farming Institute - Alamedin	Schedule	12-15	10-11	12-14	10-11	12-14	20
		5 June	14-15	11-17	15-16	16-22	24-25	

Route No.	Origin - Destination	Schedule / Survey date	Intervals (minutes by Operation Time Frame)					
			0600 ~ 0900	0900 ~ 1100	1100 ~ 1500	1500 ~ 1800	1800 ~ 1900	1900 ~ 2100
10	Meat Factory-Asanabai	Schedule	9-10	9-10	8-9	8-9	9-13	15
		6 June	10-12	17-19	16-22	10-14	18-31	
11	Micro-District 6-Eastern Bus Station	Schedule	10-8	8-9	8-9	8-9	12-15	15
		6 Jun	7-9	8-10	9-11	11-12	18-21	
14	Jal-Kirkomstroi	Schedule	8-10	10-8	8-9	8-9	8-9	10
		4 Jun	10-11	12	16-17	12	14-16	
17	Micro-District 6-Leather Factory	Schedule	9-13	9-13	9-11	9-11	9-15	20
		20 Jun	16-28	11-16	16-17	12	14-16	

Source : JICA Study Team, survey in June 2012

Table 7.3-3 Actual Operation and Intervals of Midibus

Route No.	Origin - Destination	Schedule / Survey date	Intervals (minutes by Operation Time Frame)					
			0600 ~ 0900	0900 ~ 1100	1100 ~ 1500	1500 ~ 1800	1800 ~ 1900	1900 ~ 2100
3	12 Micro region-Dordoi	Schedule	6-7	8-10	6-7	6-7	6-7	8-10
		19 Jun	12-18	16-20	26-34	14-19	16-39	
4	Ak-Orgo-Jilgorodok	Schedule	7-9	9-12	7-9	7-9	7-9	9-12
		5 Jun	14	14	15-18	20-25	17-26	
6	Ak-Orgo-Kok-Jar	Schedule	7-8	9-12	7-8	7-8	7-8	9-13
		21 Jun	11-19	13-14	15-34	15-23	15-17	
7	Alamedin-1-Dachi	Schedule	6-7	8-10	6-7	6-7	6-7	8-10
		4 Jun	6-7	8	7-8	7	8-10	
8	Chon-aryk-Nooruz	Schedule	8-10	10-14	8-10	8-10	8-10	10-14
		19 Jun	16-17	24-26	21-25	21-24	28-29	
9	Azamat-12 micro-region	Schedule	7-8	9-11	7-8	7-8	7-8	9-12
		13 Jun	9-11	14-15	9-12	9-11	11-15	
18	Maevka-Kuntuu	Schedule	9-11	12-15	9-11	9-11	9-11	12-15
		7 Jun	10-15	12-14	12-14	12-13	13-14	
19	Jenish-Archa-beshik	Schedule	14	16-18	14	14	14	16-19
		4 Jun	13-17	15-17	18-20	14-15	13-18	
21	Birindik-Bakai-ata	Schedule	8-9	8-9	8-9	8-9	8-9	10-12
		20 Jun	9-10	13-14	12	13-16	13-18	
22	Dyikan-Dordoi	Schedule	11-13	13-16	11-12	11-12	11-12	13-16
		4 Jun	11-15	17-18	16-17	8-15	29-31	
28	Kok-Jar-Kolmo	Schedule	10	12-14	10	10	10	12-14
		4 Jun	17-21	23-44	40	29-33	32-76	
29	Archa-beshik-Reemstma	Schedule	8-9	10-12	8-9	8-9	8-9	10-12
		5 Jun	10-23	11-12	11-12	12	12-15	
35	Western Bus terminal (Circle)	Schedule	5-7	7-9	5-7	5-7	5-7	7-9
		4 Jun	14	12	24	11	16	
38	Alamedin-110 block	Schedule	6-8	8-10	6-8	6-8	6-8	8-10
		5 Jun	9-12	7-10	7-8	8	10	
42	Ala-Too-Naberejnaya	Schedule	7-9	9-12	7-9	7-9	7-9	9-12
		4 Jun	9-10	7-10	11-14	12-14	15-18	
46	Enesai-Chon-aryk	Schedule	7-10	7-10	7-10	7-10	7-10	8-11
		19 Jun	12-19	13-14	16-25	18-21	20-87	

Source : JICA Study Team, survey in June 2012

7.3.5 Occupancy Ratio

(1) Nominal Vehicle Capacity

The maximum vehicle capacity of a trolleybuses and a midibuses are defined by the number of maximum passengers sitting on seats plus standing, whereas the capacity of a minibus are only by the number of seats. UTD defined the capacity of three types of minibuses with its seat number, short (10), medium (12), and long (15), although a bigger-sized minibus with 20 to 30 passengers has been introduced recently. Numerous minibuses run with a pack of standing passengers in fact, although traffic laws prevent standing passengers on board. The capacities by type of transportation are shown in **Table 7.3-4**.

Table 7.3-4 Nominal Vehicle Capacity of Public Transportation Mode

PT Mode	Type	Seats	Vehicle Capacity (pax)	Remarks
Trolleybus	311y-9b 9GI-21	30 41	100 126	A 9GI-21 is a low floor type, made in Belarusian
Midibus	JS6811GH JS6851H1	22 27	51 59	All buses are made in China
Minibus	Short Medium Long	10 12 15	(10) (12) (15)	Traffic law shows seat numbers as vehicle capacity.

Source : BTD, BPTE and UTD information

(2) Occupancy Ratio

Actual passenger occupancy of all public transportation modes is shown in **Table 7.3-5**. The cordon line survey was conducted at 12 survey locations on the perimeter of Bishkek City in 2011. The additional onboard survey was conducted at all seven trolleybus routes and seven midibus routes in February 2012. Surveyors on board counted boarding and alighting passengers at each bus stop on these routes. The maximum riding passengers onboard were calculated based on the survey results.

Table 7.3-5 Passenger Occupancy of Public Transportation

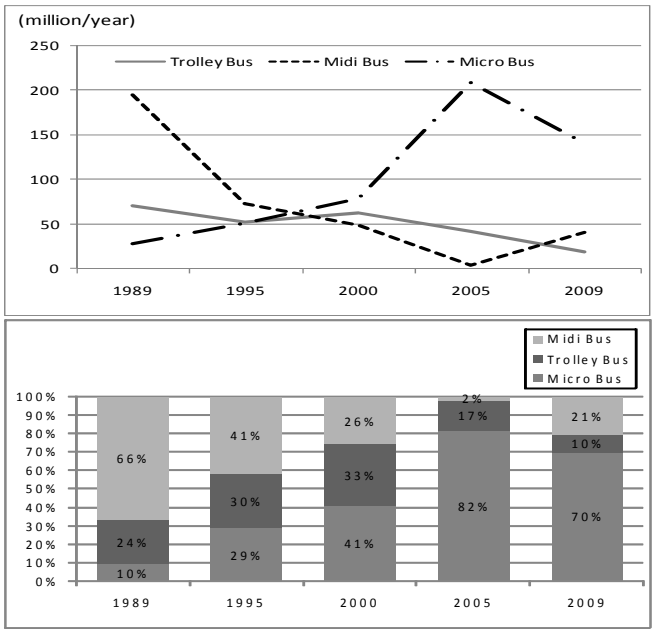
Transportation Mode	Cordon Line Survey (2011) Average passengers	Onboard Survey (Feb. 2012) Maximum passengers
Trolleybus	20.5	74.6
Midibus	21.7	58.1
Minibus	15.0	Not Surveyed

Source : JICA Study Team

(3) Ridership

According to the Household Interview conducted in 2011, 67 percent of daily trips are done by public transportation such as trolleybus, midibus and minibus. Public transportation survey conducted in 2012 revealed that 92 percent of public transportation users cannot use private cars.

Figure 7.3-1 shows the annual change of ridership of public transportations by mode, the passenger of the minibus has increased drastically from 2000 to 2005. On the contrary, the trolleybus and the midibus lost their users. However, the midibus recovered the number of their users in 2005 after introduction of new units granted by Chinese Government and purchased by their own budget.



Source : JICA Study Team based on EBRD data

Figure 7.3-1 Ridership of Public Transportation by Mode

(4) Present Load (Onboard Survey Result)

On board surveys of the trolleybuses were conducted both in the winter and the summer time. Between these surveys, public transportation fare hiked and comparison between before and after fare hike revealed that the number of passengers of trolleybuses decreased as shown in **Table 7.3-6**. The average passengers per vehicle[9] decreased up to 65 percent. The number of passenger of trolleybuses at peak loading also decreased from 102 to 79 on route No.8, for example.

On board survey of the midibus on selected 7 routes was conducted in winter time as shown in **Table 7.3-7**. Comparison between the trolleybuses and the midibus indices in winter time revealed their characteristics as follows: average travel speed of the trolleybus was from 14.6 to 18.8 whereas that of the midibus was 16.1 to 19.6, median of occupancy rate of the trolleybus was from 8.8 to 18.5 percent whereas that of the midibus was from 14.5 to 32.9 percent. To sum up, the midibus was faster and more crowded than the trolleybuses.

[9] Total number of passengers on board from starting station to arrival station

Table 7.3-6 Load of Trolleybus

Upper : Survey in Winter
Bottom : Survey in Summer

Route	Ave. Travel Speed (km/h)	Ave. Passenger per Vehicle (pax)	Peak Loading per Vehicle (pax)	Median of Occupancy Rate (%)
T4	16.6 16.6 (0)	77 70 (91%)	93 71 (76%)	13.9% 12.5% (-1.4)
T8	16.6 17.6 (+1.0)	94 90 (96%)	102 79 (78%)	18.5% 20.1% (+1.6)
T9	15.5 19.0 (+3.5)	55 50 (91%)	49 48 (98%)	10.2% 8.0% (-2.2)
T10	14.6 15.5 (+0.9)	65 52 (80%)	69 61 (88%)	8.8% 10.1% (+1.3)
T11	18.8 19.7 (+0.9)	75 54 (72%)	73 58 (80%)	15.0% 11.8% (-3.2)
T14	17.6 19.1 (+1.5)	68 46 (68%)	75 64 (85%)	15.8% 9.6% (-6.2)
T17	17.7 20.3 (+2.6)	58 40 (69%)	61 42 (69%)	13.4% 9.7% (-3.7)

*Survey in Winter Survey in Summer
Survey Period : January - February 2012 Survey Period : June 2012
Survey Hour : 7:00- 19:00 (12 hours) Survey Hour : 6:00- 22:00 (16 hours)
Survey Days : 2 days of weekday Survey Days : 2 days of weekday
Source : JICA Study Team

Table 7.3-7 Load of Midibus

	Ave. Travel Speed (km/h)	Ave. Passenger per Vehicle (pax)	Peak Loading per Vehicle (pax)	Median of Occupancy Rate (%)
B3	19.6	67	61	28.1%
B5	18.8	65	46	19.1%
B9	18.6	80	57	31.7%
B33	16.8	34	34	14.5%
B35	16.1	75	73	24.9%
B38	18.1	95	74	31.8%
B42	18.2	98	62	32.9%

*Survey Period : January - February 2012
Survey Hour : 7:00- 19:00 (12 hours)
Survey Days : 2 days of weekday
Source : JICA Study Team

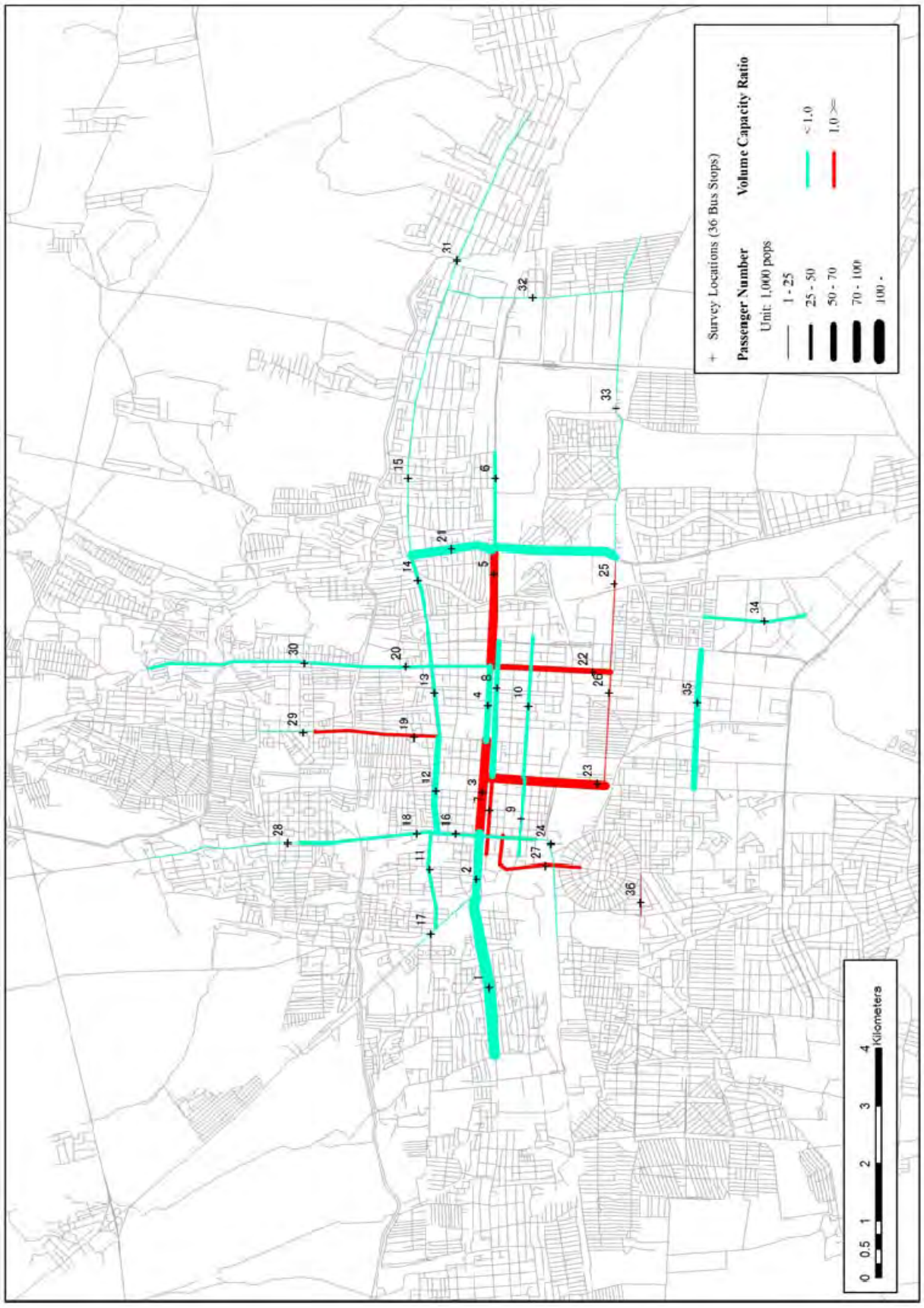
(5) Daily Passengers (Bus Occupancy Survey Result)

Daily passengers observed at each survey location are shown in **Table 7.3-8**. Locations where passenger capacity ratios are over 1.0 require more capacity of bus units in terms of capacity of each bus fleet and / or frequency. Passenger volume and passenger capacity ratio of each survey location is shown in **Figure 7.3-2**. The figure shows that Chui Avenue., Sovetskaya Street, Manas Avenue and Mir Avenue are overcrowded on weekdays.

Table 7.3-8 Daily Passengers and Capacity of Public Transportation

Survey Location	Name of Bus Stop	Weekday			Weekend		
		Passenger (1,000 pax)	Capacity (1,000 pax)	Passenger Capacity Ratio	Passenger (1,000 pax)	Capacity (1,000 pax)	Passenger Capacity Ratio
1	Shlagbaum	114	132	0.86	107	132	0.81
2	Oshskii rk. / z-d Setun'	72	99	0.73	78	99	0.79
3	KMYuA / Akademiya nauk	92	91	1.01	85	91	0.93
4	k-t Rossiya	66	69	0.96	51	69	0.74
5	Vostok-5	86	81	1.06	83	81	1.02
6	TEC / Mejevaya	34	52	0.65	22	52	0.42
7	k-t Oktyabr'	38	37	1.03	30	37	0.81
8	Voentorg / Beta-Stores	62	65	0.95	32	65	0.49
9	Shevchenko	37	55	0.67	32	55	0.58
10	skver Togolok Moldo	30	52	0.58	24	52	0.46
11	Zap. Avtovokzal	32	45	0.71	31	45	0.69
12	Cerkov' / Isanova	54	56	0.96	45	56	0.80
13	Panfilova	46	47	0.98	30	47	0.64
14	Vostochnyi avtovokzal	39	46	0.85	41	46	0.89
15	Alamedinskii r-k	18	33	0.55	30	33	0.91
16	Frunze	45	58	0.78	49	58	0.84
17	Lenskaya	20	28	0.71	17	28	0.61
18	pr.Jibek-Jolu	30	37	0.81	30	37	0.81
19	Tashkentskaya / Cerkov'	28	24	1.17	17	24	0.71
20	Kurenkeeva	41	50	0.82	32	50	0.64
21	Poliklinika	73	74	0.99	49	74	0.66
22	Yubileinaya / Yug-2	59	55	1.07	31	55	0.56
23	Gosregistr	91	82	1.11	52	82	0.63
24	Staryi gorod / AZS	19	40	0.48	17	40	0.43
25	Alma-Atinskaya	17	15	1.13	14	15	0.93
26	SSh No.29 / Vefa	15	14	1.07	12	14	0.86
27	Akun / Nekrasova	32	27	1.19	27	27	1.00
28	Botalieva / Mojaiskogo	21	27	0.78	18	27	0.67
29	Mechet'	23	33	0.70	21	33	0.64
30	Vitebskaya	44	54	0.81	42	54	0.78
31	Most BChK	16	21	0.76	13	21	0.62
32	Gorodok Stroitelei	18	21	0.86	10	21	0.48
33	Gorodok. Katok	11	20	0.55	9	20	0.45
34	5 mkr-on-2/7 mkr-on No.1	38	52	0.73	26	52	0.50
35	BGTS	61	70	0.87	29	70	0.41
36	Nekrasova / Baha	24	23	1.04	18	23	0.78
Total		1,546	1,785	0.87	1,254	1,785	0.70

*Survey Period : June 2012
Survey Hour : 6:00- 22:00 (16 hours)
Survey Days : one weekday and one weekend
Source : JICA Study Team



Source : JICA Study Team

Figure 7.3-2 Daily Passengers and Volume Capacity Ratio on Weekday

(6) Share and Occupancy Ratio (Bus Occupancy Survey Result)

Bus occupancy survey revealed public transportation user distribution ratios in **Table 7.3-9**. The minibus is 73 percent, the midibus is 17 percent and the trolleybus is 10 percent. To see the occupancy ratio, the trolleybus is 46 percent and the lowest among public transportation modes, whereas the minibus carries passengers in overcrowded condition of 117 percent on average. It can be said that higher capacity mode of transportation carries passengers in non-crowded conditions while lower capacity modes carry passengers in crowded conditions but more frequent operations.

Table 7.3-9 Share of Public Transportation Modes and Average Occupancy Ratio

	Share of Vehicle Number			Share of Passengers		
	Trolleybus	Midibus	Minibus	Trolleybus	Midibus	Minibus
Weekday	3.5%	9.1%	87.4%	10.2%	16.6%	73.1%
Weekend	3.5%	9.8%	86.6%	9.9%	17.4%	72.7%
	Share of Capacity			Occupancy ratio		
	Trolleybus	Midibus	Minibus	Trolleybus	Midibus	Minibus
Weekday	12.2%	16.9%	70.9%	46%	54%	117%
Weekend	12.3%	17.8%	69.9%	44%	53%	117%

*1 : Number shows total of 36 stations
*2 : Capacity of trolleybus and midibus followed definition provided by UTD. Trolleybuses are 100 or 126 paxs, midibuses are 51 or 59 paxs and minibuses are 10, 12 or 15 paxs
Source : JICA Study Team

7.4 Bus Facilities

7.4.1 Intercity and International Bus Terminals

Bishkek City has two bus terminals for intercity and international passengers at east and west on Jubek Jol Street. The east bus terminal is used for minibuses bound for eastern cities in Kyrgyz and abroad. The west bus terminal is used for midibuses and minibuses for western cities. Both terminals have terminal buildings, but unused at present. Bus terminal restoration is a candidate project for PPP.

The connections between the terminals and city bus network are not well established. The route connecting two bus terminals does not exist. Each terminal has only two routes registered as city bus route respectively. **Picture 7.4-1** to **Picture 7.4-12** show conditions of two bus terminals.

Picture 7.4-1 East Bus Terminal View from Road Side (East)

Picture 7.4-2 Midibus at Bus Shelter (East)

Picture 7.4-3 Time Table (East)

Picture 7.4-4 Bus Stop Outside of Terminal (East)

Picture 7.4-5 One of the Entrance (West)

Picture 7.4-6 Ticket Booth (West)

Picture 7.4-7 Minibus bound to Karakol (West)

Picture 7.4-8 Midibus bound to Karakol (West)

Picture 7.4-9 Building and Area (West)

Picture 7.4-10 Waiting Space in the Building (West)

Picture 7.4-11 Bus Shelter (West)

Picture 7.4-12 Time Table (West)

Picture 7.4-13 In the Terminal Area, Outside of Bus Shelter (West)

Picture 7.4-14 Bus Stop Outside of Terminal (West)

7.4.2 Bus Stop

(1) Bus Stop Facility

The result of bus stop location survey conducted in January 2012 summarized in **Table 7.4-1** for improvement of bus stops. There are no trolleybus stop facilities on Saliyev Street (TR 9). Midibuses have plenty of bus stoppages without proper bus stop facility as shown in **Figure 7.4-1**.

Since 2012, Bishkek City has introduced a new mechanism to reconstruct and to maintain bus stops. Using this mechanism, new bus stops are increasing in the City center. The mechanism is as shown below:

(a) Municipal Property calls tender of private companies or persons who want to get the right of providing advertising space on bus stops for 5 years.

(b) The private company or any person who wins the contract (hereinafter referred to as "Bus Stop owner") with Municipal Property has to install bus shelter at its own expense.

(c) Bus Stop owner has to maintain its bus stop during contract period. For instance, if a bus shelter is damaged by anyone, the Bus Stop owner has to repair it.

(d) Constructed bus shelter is transferred to Municipal Property. The Bus Stop owner has right to install advertisement on the bus stop and responsibility on bus stop maintenance.

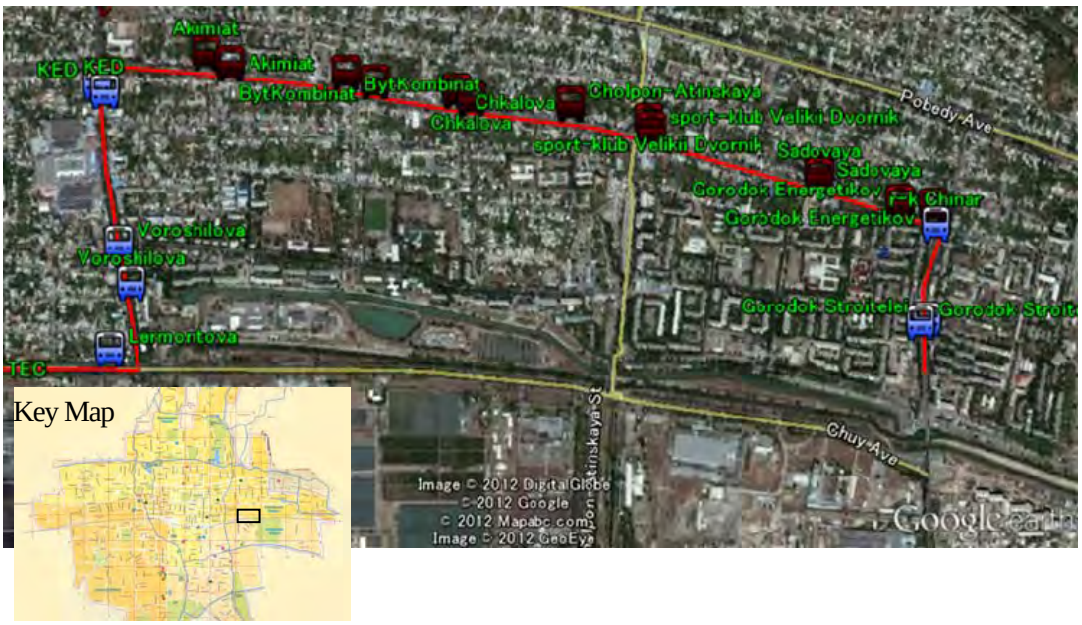
(e) Bus Stop owners can contract with advertiser using the space of bus shelter on its own responsibility. Profit of Bus Stop owner comes from this contract.

(f) Bus Stop owner pays rental cost for land use of each bus shelter unit which is about 1,000 SOMS/month.

(g) General regulations on advertisement are applied to the advertisement on the bus shelter. Information & Advertisement Dept. Under Bishkek City mayor's office is in charge of this regulation.

(h) About 200 bus stops in the City center are the target of this scheme. The tendering process is ongoing as of August, 2012.

(i) If nobody applies to the tender, Bishkek City maintains the bus stop.



Source : JICA Study Team

Figure 7.4-1 Not Facilitated Bus Stops on Trolleybus (TR9)

Picture 7.4-15 Old Type Bus Stop with Kiosk

Picture 7.4-16 New Type Bus Stop with Advertisement

Table 7.4-1 List of Bus Stops to be Improved

Transportation mode	Route No.	From / To	Number of not equipped bus stop	
			Upward	Downward
Trolleybus	TR9	Institut zemledeliya/ Gorodok Stroitelei	Akimiat, BytKombinat, Chkalova, sport-klub Velikii Dvornik, Sadovaya, Gorodok Energetikov	Akimiat, BytKombinat, Chkalova, sport-klub Velikii Dvornik, Sadovaya, Gorodok Energetikov
Midibus / Minibus	MD3	12 mkr / j/m Dordoi	Vostochnaya, Djunhai, per.Krymskii, TC, mkr. Ulan, Poliklinika, Karalaeva,	Suhe Batora, per. Krymskii, Djunhai, Vostochnaya
	MD4	j/m Ak-Orgo / Krasnyi stroitel	Tendik, Koshoi-Ata, Koshoi-Ata 2, Ak-Saiskii, Transformator, Buharskaya, Krivorojskaya, mag. Asel, Nurekskaya, Nij. Ala-Archa 2, Nij. Ala-Archa, Don Karleone, Per. Sovetskii, mag. Erbol, Chapaeva	Gagarina, Aini, Don Karleone, Nij. Ala-Archa, Nij. Ala-Archa 2, mag. Sabina, j/m Tendik
	MD5	12 mkr / Maevka	Tuleberdieva, AbuS, AZS, Manasa, prof. Zimy, Isanova N., Scherbakova, Poliklinika, Karalaeva	Suhe Batora, Isanova N., prof. Zimy, Manasa, AZS, Tuleberdieva
	MD6	j/m Ak-Ordo / j/m Kok-Jar	Hirurg.centr, Chapaeva, z/d Koka Kola, Hlebzavod	Chapaeva, Hirurg.centr, Doneckaya
	MD7	Alamedin 1 / Dachi	Altyn Ordo	
	MD18	s.Kun-Tuu / Maevka	BTS, Arka, Centr, mag.Meerim, Shkola, mag.Koka-Kola, Selekciya, Hutor, AZS ShNOS, Podstanciya, DEU, Shalta	Podstanciya, AZS ShNOS, Hutor, Selekciya, mag.Koka-Kola, Shkola, mag.Meerim, Centr, Arka, BTS
	MD19	j/m Archa-Beshik / j/m Jenish	Berdibaeva	Berdibaeva, Sheralieva, Repina,
	MD21	j/m Birimdik / j/m Bakai-Ata	Er-Toshtuk, Polevaya, Gagarina, Slavyanskaya, Dzerjinskogo, Musorskogo, Orozbekova, Saadaeva, Chui 59,Chui 56, Chui 18	Chui 17,Chui 56,Chui 59, Orozbekova, Musorskogo, Dzerjinskogo, Slavyanskaya, Gagarina, Polevaya, Er-Toshtuk
	MD22	r-k Dyikan / Dordoi	Kelechek, r-k Skotskii	r-k Skotskii, Per. Sovetskii,mag. Erbol, Aul'naya
	MD28	j/m Kolmo / Gospital	Gospital, AZS, mag. Nazar,kafe Tort-Kul, Mel'nica, Bil'yard, SapatKom, Zolotaya Bochka, Panfilova, Bokonbaeva, Moskovskaya, Kievskaya, Licei, Torgovyi center	Torgovyi centr, Moskovskaya, BKAMS, Panfilova, TC, mkr. Ulan, Zolotaya Bochka, SapatKom, Bil'yard, Mel'nica, kafe Tort-Kul', mag. Nazar, AZS, Gospital
	MD29	j/m Archa-Beshik / Reemstma	Gorodok Energetikov, Sadovaya,sport-klub Velikii Dvornik, Chortekova	Chortekova, Sheralieva, Repina, sport-klub Velikii Dvornik, Sadovaya, Gorodok Energetikov
	MD35	Zap. Avtovokzal / Vostochnyi avtovokzal	Mechet	Mechet
	MD37	Kar'ernaya / r-k Altyn-Too	Kelechek, mag. Kanykei,mag. Kanykei, Turk. licei, Turk. licei, Steklozavod, Steklozavod, mag. Ajar, STO Amantur, ShNOS, j-m Yntymak, SEZ	SEZ, j-m Yntymak, ShNOS, STO Amantur, mag. Ajar, Kelechek
	MD38	j/m 110 kvartal / Alamedin 1	mag. Aureki	mag. Aureki
	MD39	j/m Ala-Too / 10 mkr	Sovetskaya, Shkola No.62, KGUSTA, Lesosklad, Ala-Too, Ala-Too2, Ala-Too3, Mechet, Ala-Too4	Mechet, Ala-Too2, Lesosklad, KGUSTA, Shkola No.62, Doneckaya
	MD42	j/m Ala-Too / 12 mkr	Suhe Batora, Ala-Too, Ala-Too2, Ala-Too3, Mechet, Ala-Too4	Mechet, Ala-Too2, Poliklinika, Karalaeva
	MD46	j/m Ene-Sai / s.Chon-Aryk	Gidrostroitel'naya, Orhon	Orhon, Gidrostroitel'naya, TC, mkr. Ulan

Source : JICA Study Team, survey in January 2012.

7.4.3 Accessibility of Bus Stop

(1) Loading Area of Bus Stop

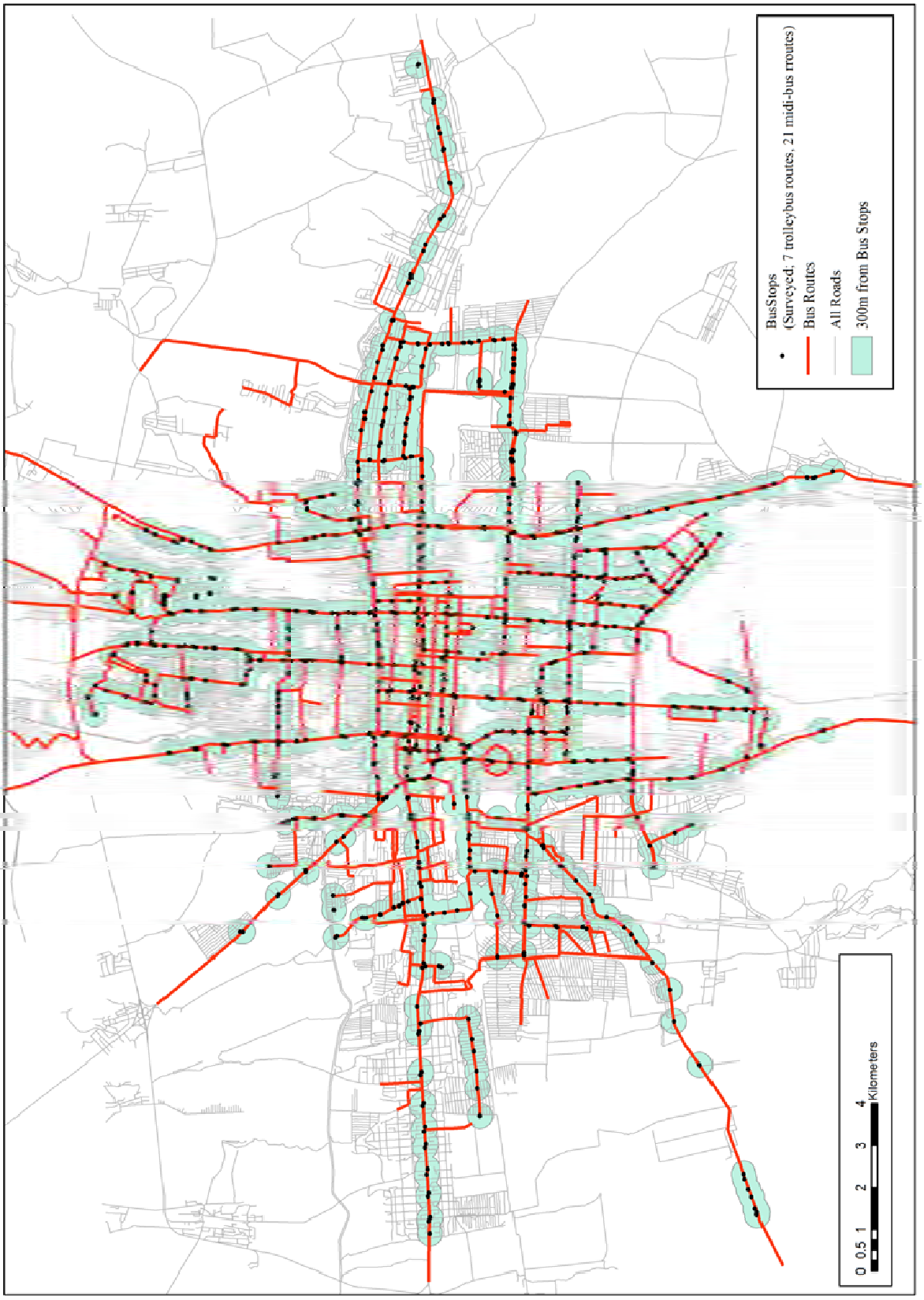
The bus location survey conducted in January 2012, and identified approximately 400 bus stops of the trolleybus and the midibus in Bishkek City as shown in **Figure 7.4-2**. The JICA Study Team defined the loading area of the bus stop as 300 m in radius, which is walking distance for 5 minutes in general. The bus loading area covers 100 km^2 which is 60 percent of Bishkek City area.

(2) Boarding and Alighting

The trolleybus, the midibus and the minibus use same bus stop. Therefore, at the bus stops, congestions of trolleybuses, midibuses and minibuses occur. Since a minibus can turn in a small radius but a trolleybus cannot, the trolleybus tends to be obstructed by minibuses and cannot operate smoothly. Regarding the ease of passengers for boarding and alighting the bus units, passengers are often forced to walk on the carriageway because bus units do not always stop close enough to board or alight at the curb of bus stops. The drivers' trainings will be the solution of improvement on this issue. Furthermore, adjoining type bus stops could be recommended to ease passengers.

Picture 7.4-17 Passengers Boarding to the Trolleybus from Carriageway

Picture 7.4-18 A Minibus Disturbs a Trolleybus Stopping at Bus Stop



Source : JICA Study Team

Figure 7.4-2 Bus Stops and Cover Area

7.5 Relevant Studies and Development Projects for Public Transportation

7.5.1 The Past Study and Project

(1) Kyrgyz Urban Transport Project (WB 2005)

The World Bank (WB) conducted the Kyrgyz Urban Transport Project from 1999 to 2005. The objectives of the project were:

(a) Restoring selected urban roads

(b) Taking the first steps to develop a reliable source of financing for urban road maintenance and rehabilitation

(c) Certain assistance to urban passenger services reforms

Target cities were Bishkek, Osh and Jalalabad. In this project, franchise system for minibus was recommended.

(2) Bishkek Public Transport - Technical Due Diligence (EBRD 2011)

In order to restore the public transportation capability, the Bishkek City initially requested EBRD financial assistance in procurement of 60 low-floor trolleybuses with spare parts, maintenance equipment for trolleybuses and bus depots, investment in trolleybus power supply infrastructure, and procurement of 80 midibuses as shown in **Table 7.5-1**. The EBRD sought to mobilize technical cooperation to assist the Bishkek City in selection of an electronic ticketing system operator as PPP and implementation of the project. The feasibility study for public service contract was added to the tasks. In this regard, EBRD conducted a technical due diligence to formulate financing package of up to 15 million USD, consisting of both loan and grant components. Finally, a scope of investment was revised and investment package was formulated as follows.

・Revised Investment Scope

・Acquiring a total number of trolleybuses which meet the minimum technical specifications

・Rehabilitating and improving the electrical power supply infrastructure and maintenance equipment

Table 7.5-1 Investment Package for Trolleybus Services

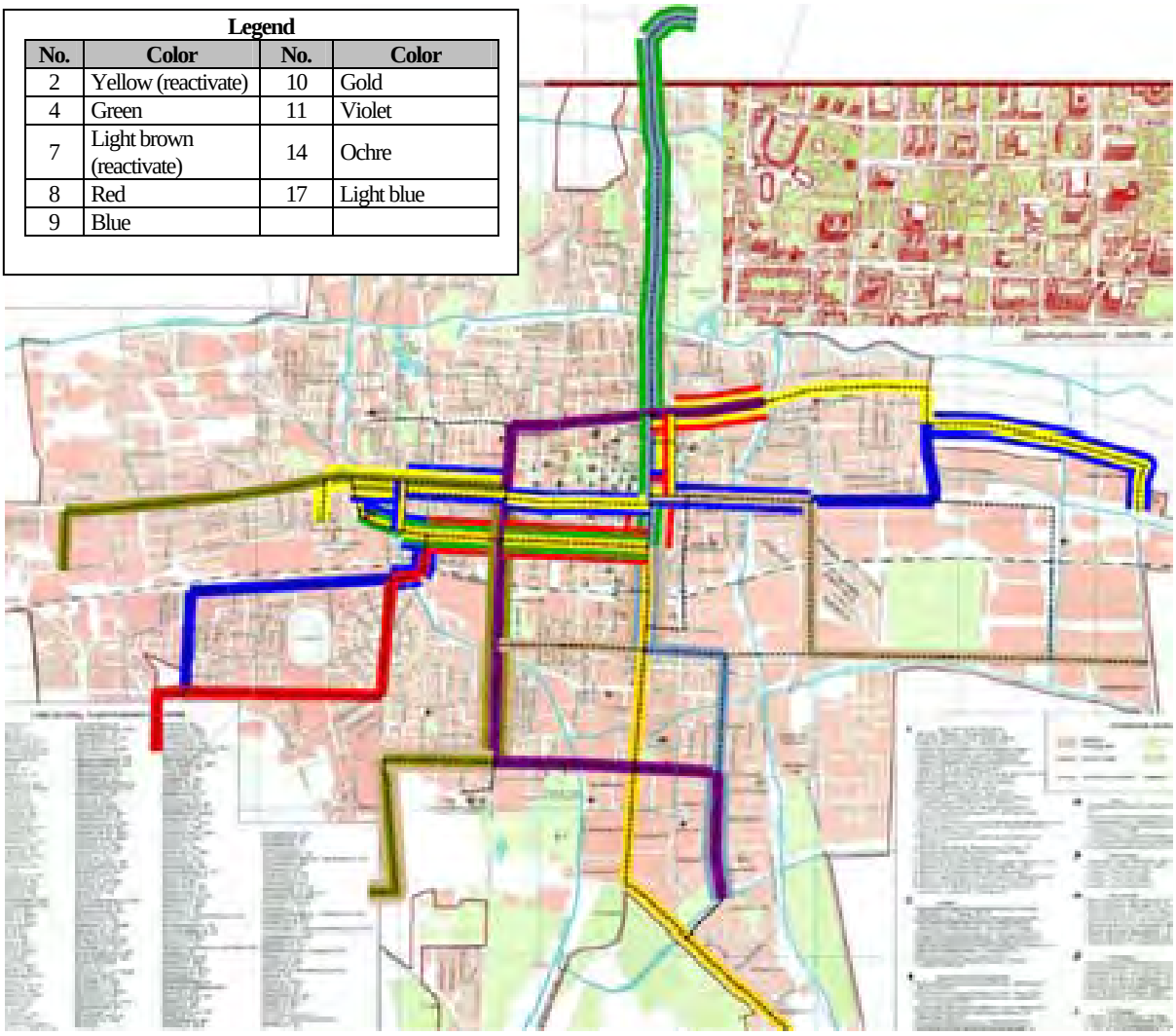
Items	Unit	Units	Unit Price (USD)	Total Price (USD)
Low Floor Trolleybus (Lot 1)	Vehicle	32	200,000	6,400,000
High Floor Trolleybus (Lot 2)	Vehicle	44	140,000	6,160,000
Supply and Installation AC 3 x 150 Feeder Cables	m	7,436	90.4	672,214
Trolleybus Network Infrastructure	Set	1	1,023,845	1,023,845
Maintenance Machinery	Set	1	360,000	360,000
Electrical Substation Rehabilitation Equipment	Set	1	991,300	991,300
Total	-	-	-	15,607,359

Source : Bishkek Public Transport - Technical Due Diligence (EBRD, 2011)

The technical due diligence proposed the project to divide the project into two phases as follows:

- Phase 1: Reinforcement of the existing trolleybus routes, and
- Phase 2: Reactivation of the two most important former trolleybus routes, i.e., Routes 2 and 7.

The proposed future trolleybus network is shown in **Figure 7.5-1**.



Source : Bishkek Public Transport - Technical Due Diligence (EBRD, 2011)

Figure 7.5-1 Future Trolleybus Routes Proposed by EBRD

7.5.2 Development Project

(1) Public Transportation Project in Bishkek by EBRD

The EBRD is in the process of providing a loan up to 10.1 million USD, and a grant up to 5.5 million USD by the EBRD shareholder special fund. The negotiation between the Ministry of Finance (MOF) and EBRD started on September and loan agreement was concluded in October 2011.

A consultant service for procurement and implementation support, and enhancement of BTD are conducted. Consultant service started at the beginning of 2012. Another consultant service was

launched to prepare terms of references (TOR) for E-ticketing system for public transportation in April 2013. The E-ticketing system will be developed by outsourcing using PPP.

(2) Enhancement of Public Transportation

Under the framework of the Program Renewed Capital for 2009 to 2012 (Step 3 - From 1 July, 2010 to 31 December 2010), 161 bus units were purchased. According to UTD, it is necessary to procure 500 Large Bus units, or 700 midibus units and 100 trolleybus units to replace entire minibus routes in the Center of Bishkek City. As an initial step, minibus transportation should be limited to running on the streets of Chui, Manas, Abdrahmanova and Gorky.

7.6 Problems and Issues to Consider

The problems in urban public transportation in Bishkek are identified as shown in the succeeding sections.

7.6.1 Physical Extension / Improvement

(a) Bus routes are duplicated and excessive competition between public and private sectors, even among private companies is occurring.

(b) Entire bus route information and bus operation frequency are not sufficiently provided to citizens.

(c) Fare collection system is inefficient due to manual collection method.

(d) Transportation terminals are not well designed with the standpoint of connectivity to the City center, their and facilities are not well designed for transfers.

(e) It is necessary to improve bus service speed.

7.6.2 Institutional / Law & Regulation Improvement

(a) Minibus drivers are inclined to get as many passengers as possible rather than obey traffic rules and regulations.

(b) Minibus operation is controlled by planned vehicle quantities and reported actual operating vehicle quantities from private companies, thus, actual operation records, such as frequencies, are not reported to UTD.

(c) Financial conditions of BTD and BPTE are in continuously deficit.

(d) Revision of tariffs of public transportation, which came into force on 1 May 2012 caused the decline of trolleybus users.

(e) Cheap fare rates and fare exemptions affect profitability on public transportation revenue.

(f) UTD is authorized to form the urban transportation networks in Bishkek City. However, UTD is parallel to two other public companies and does not work as a comprehensive transportation planning bureau.