

APPENDIX 23-1 PILOT PROJECTS

23-1.1 Traffic Flow Improvement

23-1.1.1 Policy of Traffic Flow Improvement

(1) Background

The current number of vehicle registrations in Bishkek City exceeded 150 thousands, therefore traffic volume on the roads has increased dramatically in recent years. The City is concerned about the solution of congestion at the bottleneck intersections as quick as possible. The pilot project of traffic flow improvement aims to alleviate traffic congestion and improve traffic conditions at the selected intersection and transfer intersection improvement technology to the City Government so that they can adopt similar technique to other intersections. The candidate intersections of the pilot project were proposed by the City and selected through Working Group Meetings with the JICA Study Team and counterparts. The Working Group concluded the issues to be solved at candidate intersections as follows;

- ✓ The size of intersection area is relatively large and there is no road markings at the intersection as of the selection time
- ✓ The drivers do not follow traffic rule under such condition without proper road signs and/or road markings at the intersection

(2) Concept of Traffic Flow Improvement

The road marking is required to provide safe and smooth traffic flow and operation at intersections where conflicts of traffic movements might occur. The basic concepts of traffic flow improvement shall be as follows:

- ✓ To define the relation between major and minor traffic flow
- ✓ To reduce the size of intersection area by shortening distance between stop lines for the traffic approaching from opposite direction
- ✓ To divide the through, left and right turn traffic by road markings and road signs
- ✓ To guide left and right turn traffic by channelization by traffic island and/or road marking installed at the intersection

(3) Condition

The JICA Study Team discussed the pilot project implementation with BCDA. There were 2 conditions to be considered in planning of the implementation schedule.

- ✓ The presidential election was scheduled on 30 October 2011
- ✓ The opening of Ryskulova St.

23-1.1.2 Selection of Pilot Project Site

(1) Candidate Intersections

Fifteen bottleneck intersections were listed and submitted as the candidates of the pilot projects by the Bishkek City Government to JICA through the Preparatory Survey, which was conducted in March 2011. In addition to that list, one more intersection was added by Traffic Safety Department and Construction Mounting Department of Domestic Affairs (hereinafter referred to as CMOD), as the results of discussion with the JICA Study Team.

Therefore, a total of 16 intersections was evaluated. **Figure A 23-1.1-1** shows the location of candidate intersections for Pilot Project.



Figure A 23-1.1-1 Location of Candidate Intersections

(2) Procedure of Pilot Project Site Selection

With regards to the process of selection of the Pilot Project, the impact of the public relation is taken into account in addition to the project implementation impact study.

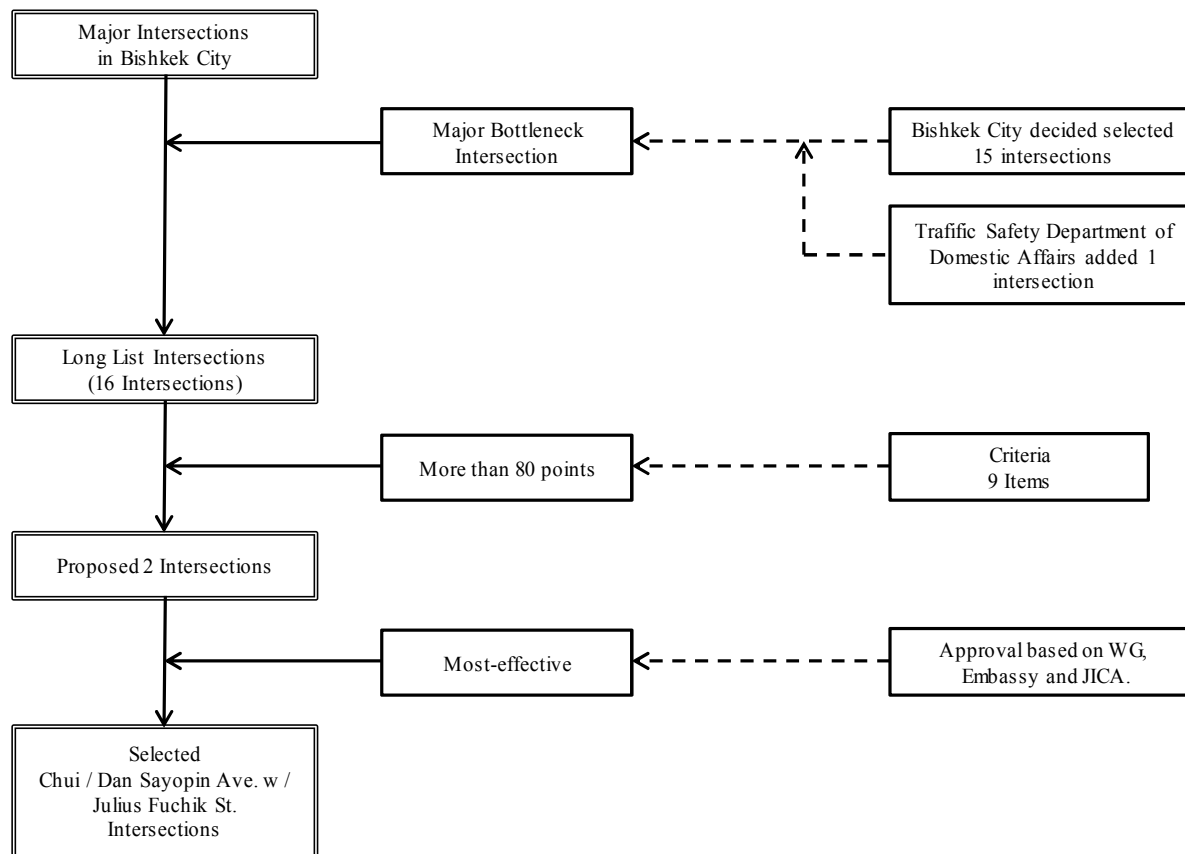


Figure A 23-1.1-2 Procedure of Pilot Project Experiment Pilot Project Site Selection

(3) Evaluation Criteria for Intersections Selection

As for selection of Pilot Projects sites and contents, the JICA Study Team prepared the Evaluation Matrix for the selection of intersections where the Pilot Projects were implemented. The Evaluation Matrix has 9 items to evaluate the intersections from the technical point of view.

The criteria for evaluation of selection of the location for Pilot Projects is shown in **Table A 23-1.1-1**.

Table A 23-1.1-1 Criteria for Selection of the Location of Pilot Project (Traffic Flow Improvement)

Evaluation Points	Location #1	Area (Size) #2	Traffic Signal #3	Number of Entering Lanes or Width of Carriage Way #4	Number of Public Transport Lines #5			Bus Stops #6	Parking Spaces #7	Road Condition #8	Land Use #9	Overall Evaluation #10
					Trolleybus	Midibus	Mimibus					
5	CBD	< 500 sq.m	Lamp Type	3-lane or > 18m	> 5-line	> 5-line	> 50-line	Within 50m	On - Road Parking	Good	Commercial Institute	1 st > 80
4	Urban	< 1,000 sq.m	-	> 15m	4-line	4-line	> 40-line	Within 100m	-	-		2 nd > 70
3	Inner Suburb	< 1,500 sq.m	LED Type (1 st Generation)	2-lane or > 12m	3-line	3-line	> 30-line	Within 150m	Off - Road Parking	Poor	Residential	3 rd > 60
2	Outer Suburb	< 2,000 sq.m	-	> 9m	2-line	2-line	> 20-line	Within 200m	-	-		4 th > 50
1	Exurb	> 2,000 sq.m	LED Type (2 nd Generation)	1-lane or < 9m	1-line	1-line	< 20-line	Over 200m	No - Parking	Bad	Industrial	5 th < 50

(4) Weighing Factor

The JICA Study Team proposed to give priority to the intersections with public transportation routes, in particular, public bus routes operated by Bishkek City, because the City has planned to procure more trolleybuses and renovate power supply systems with assistance from EBRD. Therefore, the JICA Study Team set a weighing factor for the important items in the criteria. Especially, trolleybus route weighs for 3 points while midibus and minibus routes weigh 2 and 1 point, respectively. Other criteria, such as location, area, traffic signal, bus stop and parking space weigh for 2 points each.

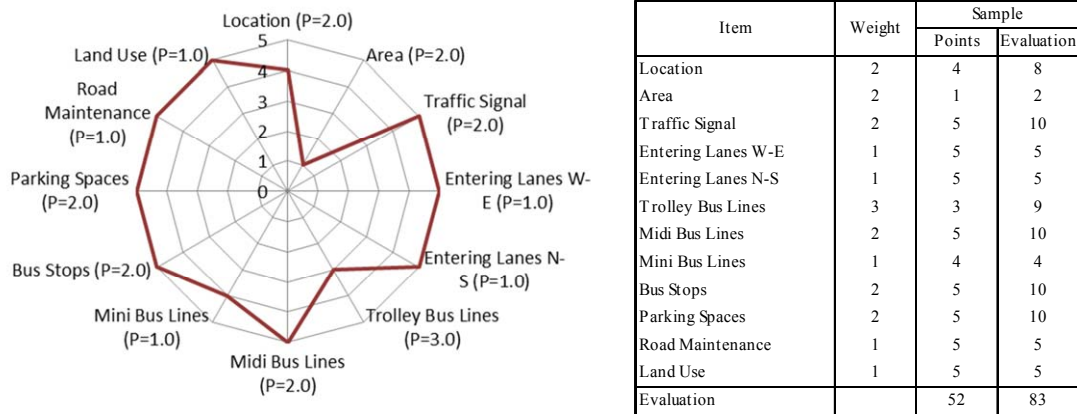


Figure A 23-1.1-3 Sample Evaluation of Score for Selected Intersections

The total score becomes 100 points if all criteria scored 5 points because weighing factor is set fixed. The JICA Study Team categorized the evaluation score into 5 levels of priority as shown below.

(5) Evaluation Score

- > 80 points – 1st priority
- 70 ~ 79 points – 2nd priority
- 60 ~ 69 points – 3rd priority
- 50 ~ 59 points – 4th priority
- < 50 points – 5th priority

(6) Implementation Schedule

The implementation schedule of the Pilot Project for Traffic Flow Improvement was limited due to presidential election of the Kyrgyz Republic which was scheduled on 30 October 2011.

The major work of Pilot Project implementation had to be completed 15 days prior to the election for safety reasons.



Chui / Dan Sayopin Ave. w / Julius Fuchik St.
(East Approach) July 26, 2011



Gorki St. w / Sovetskaya St. (West Approach)
July 28, 2011



Chui Ave. / Almatinskaya St. (West Approach)
July 28, 2011



Lev Tolstoy St / Asanaliev
July 26, 2011

Picture A 23-1.1-1 The High - Priority Intersections

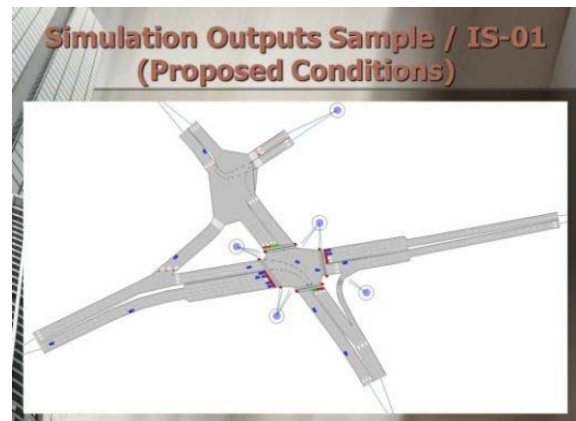
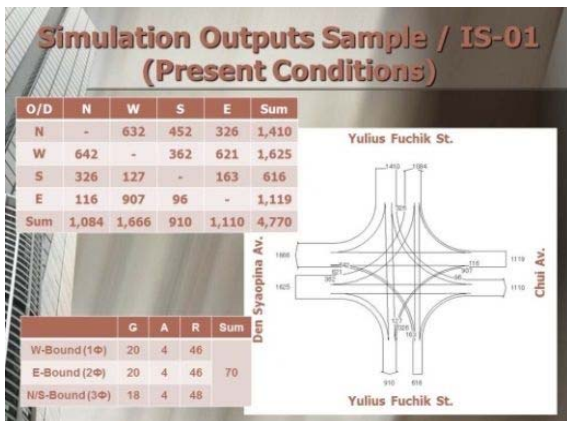
(b) Survey Result & Discussion with Working Group Member (2nd Working Group Meeting)

The JICA Study Team organized the 2nd WG meeting to explain Traffic Flow Improvement activity on 17 August, 2011. The contents of the WG meeting were as follows;

- ✓ The outline of the Pilot Project
- ✓ The method of survey and criteria for assisting priority to the intersections mentioned in the long list
- ✓ Survey result of the Pilot Project
- ✓ Discussion on the proposed design (**Figure A 23-1.1-6, 7**) of Chui / Dan Sayopin Ave. w / Julius Fuchik St. (hereinafter referred to as “IS-01”) and Gorki St. / Sovetskaya St.(hereinafter referred to as “IS-13”)
- ✓ Demonstration of result of sample simulation by using simulation software, Aimsun6

According to the result of survey shown in **Picture A 23-1.1-2** and **Table A 23-1.1-2**, there are intersections scored more than 80 points. Those intersections are IS-01 and IS-13. In the 2nd WG meeting, the JICA Study Team showed the criteria, survey result (refer to **Table A 23-1.1-2**) and sample simulation result of IS-01 and IS-13 to the WG members. As the result of simulation, the traffic flow of IS-01 is confirmed to be more effective than that of IS-13. After the presentation, they discussed

which intersection should be selected for the Pilot Project, and it was concluded that IS-01 is more suitable than IS-13 because IS-01 is the main entrance for the traffic coming from the western part of Bishkek City including from International arterial road and, Osh Road. Furthermore, IS-01 is located near the Osh Market.



Picture A 23-1.1-2 Activity of 2nd WG Meeting

Table A 23-1.1-2 Table of Survey Result for Pilot Project (Traffic Flow Improvement)

#	Intersection Name	Location	Area (Size)	Traffic Signal	Number of Entering Lanes or Width of Carriage Way *4				Number of Public Transport Lines *5			Bus Stops	Parking Spaces	Road Condition	Land Use	Overall Evaluation					
					W-E Axis		N-S Axis		Trolley Bus	Midi Bus	Mini Bus						*6	*7	*8	*9	*10
					1	2	1	1	3	2	1										
	<i>Multipliers</i>	2.0	2.0	2.0	1.0	1.0	1.0	3.0	2.0	1.0	2.0	2.0	1.0	1.0	70						
1	Chui / Dan Savopin Ave. w / Julius Fuchik St.	Urban	2,800	Lamp	5	3-lane	5	3-lane	3	40-line	4	85,162 37,87	5	On-Road	5	Commercial	5	83			
2	Jibek Jolu Ave. w / Julius Fuchik St.	Urban	2,700	Lamp	5	2-lane	3	1-lane	0	3-lane	1	91,177 60	4	On-Road	5	Residential	3	57			
3	Jibek Jolu Ave. w / MolodayaGvardia Blvd.	Urban	8,900	Lamp	5	3-lane	5	3-lane	0	5-lane	2	77,77 58,236	4	On-Road	5	Commercial	5	70			
4	Moskovskaya St. w / Asanaliyev St.	Urban	1,400	Lamp	5	2-lane	3	2-lane	2	5-lane	3	88 26	5	On-Road	5	Commercial	5	75			
5	Sovetskaya St. w / Bayalynov St.	Urban	400	Lamp	5	1-lane	1	2-lane	2	3-lane	2	94	4	Off-Road	3	Residential	3	68			
6	Jibek Jolu Ave. w / Alamedin River	Urban	-	Lamp	5	2-lane	3	2-lane	2	4-lane	2	60	4	On-Road	5	Commercial	5	65			
7	Jibek Jolu Ave. w / Almatinskaya St.	Urban	1,839	Lamp	5	3-lane	5	3-lane	1	6-lane	3	76,160 120	4	On-Road	5	Commercial	5	74			
8	Almatinskaya St. w / Salteva St.	Urban	1,300	Lamp	5	2-lane	3	2-lane	0	4-lane	2	110	3	Off-Road	3	Residential	3	58			
9	Chui Ave. w / Ibraimov St.	Urban	3,000	Lamp	5	3-lane	5	3-lane	1	4-lane	3	38 50,113	5	On-Road	5	Commercial	5	72			
10	Lev Tolstoy St. w / Asanaliyev St.	Urban	950	Lamp	5	3-lane	5	3-lane	2	4-lane	2	100 106	4	On-Road	5	Commercial	5	76			
11	Lev Tolstoy St. w / MolodayaGvardia Blvd.	Urban	1,350	Lamp	5	3-lane	5	3-lane	2	2-lane	0	106	3	Off-Road	3	Commercial	5	66			
12	Lev Tolstoy St. w / Chapayeva St.	Urban	1,050	LED 1st	3	2-lane	3	1-lane	2	3-lane	1	58,60 S	4	Off-Road	3	Commercial	5	61			
13	Gorki St. w / Sovetskaya St.	Urban	1,080	Lamp	5	2-lane	4	3-lane	2	6-lane	3	177 81,73 30	5	On-Road	5	Commercial	5	82			
14	Jukeev-Pudovkina St. w / Akhumbayev St.	Urban	620	Lamp	5	2-lane	3	3-lane	1	2-lane	1	15,118 32	5	Off-Road	3	Commercial	5	66			
15	Jukeev-Pudovkina St. / Suyerkulov St.	Inner Suburb	1,230	Lamp	5	1-lane	1	3-lane	0	3-lane	1	66 150 30	4	On-Road	5	Residential	3	57			
16	Chui Ave. w / Almatinskaya St.	Urban	3,700	Lamp	5	3-lane	5	3-lane	1	9-lane	5	130,137 100	5	On-Road	5	Commercial	5	78			

Remarks: *1: CBD (5), Urban (4), Inner Suburb (3), Outer Suburb (2), Exurb (1) *2: <1,000 sqm (5), <2,000 sqm (3), >2,000 sqm (1) *3: Lamp (5), LED 1st Generation (3), LED 2nd Generation (1) *4: 3-lane (5), 2-lane (3), 1-lane (1) *5: 5-lane (5), 4-lane (4), 3-lane (3), 2-lane (2), 1-lane (1) *6: within <50m (5), within <100m (4), within <150m (3), within <200m (2), within <250m (1) *7: On-Road Parking (5), Off-Road Parking (3), No Parking (1) *8: Good (5), Poor (3), Bad (1) *9: Commercial (5), Residential (3), Industrial (1) *10: 1st (>80), 2nd (>70), 3rd (>60), 4th (>50), 5th (<40)

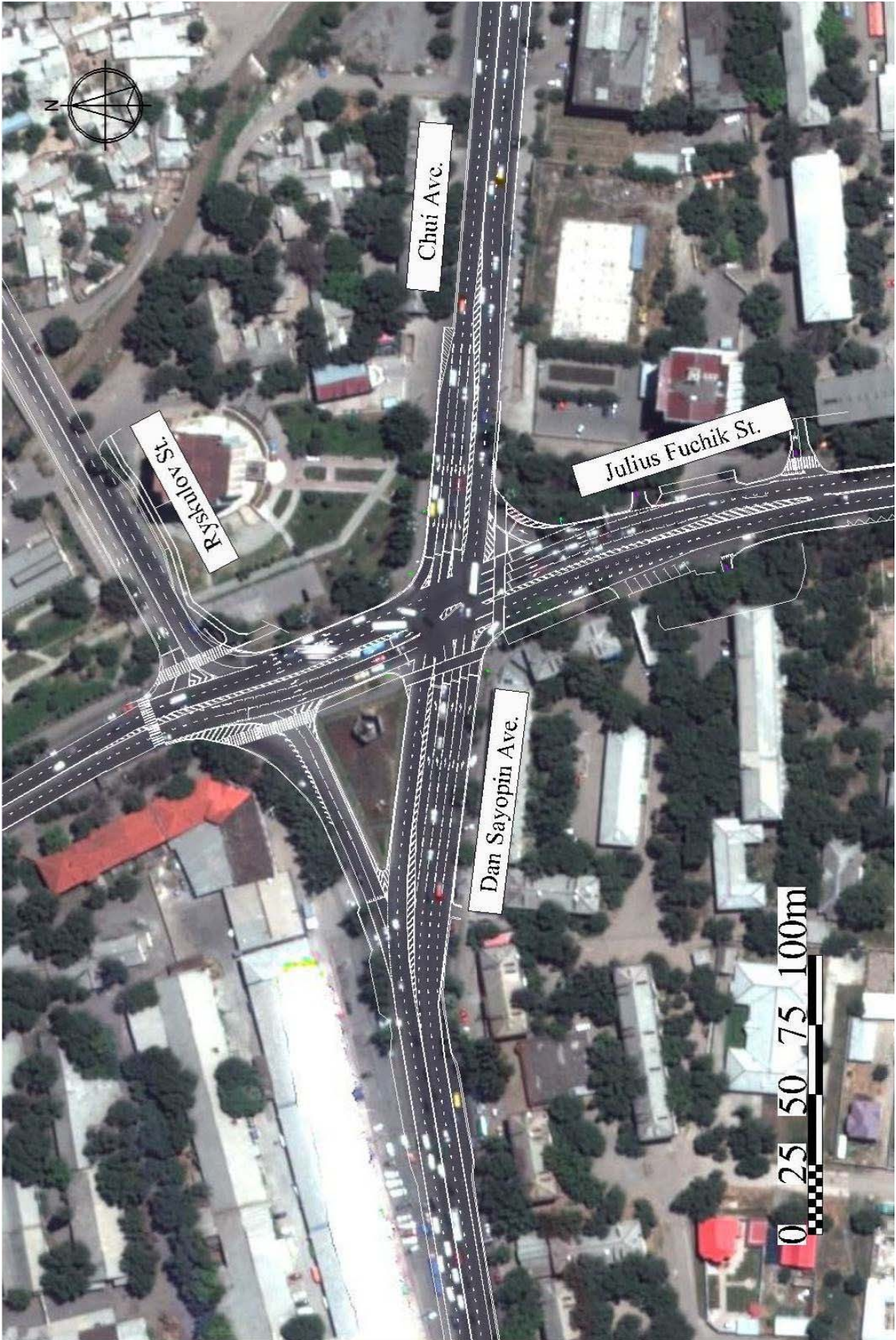


Figure A 23-1.1-6 Chui / Dan Sayopin Ave. w / Julius Fuchik St.

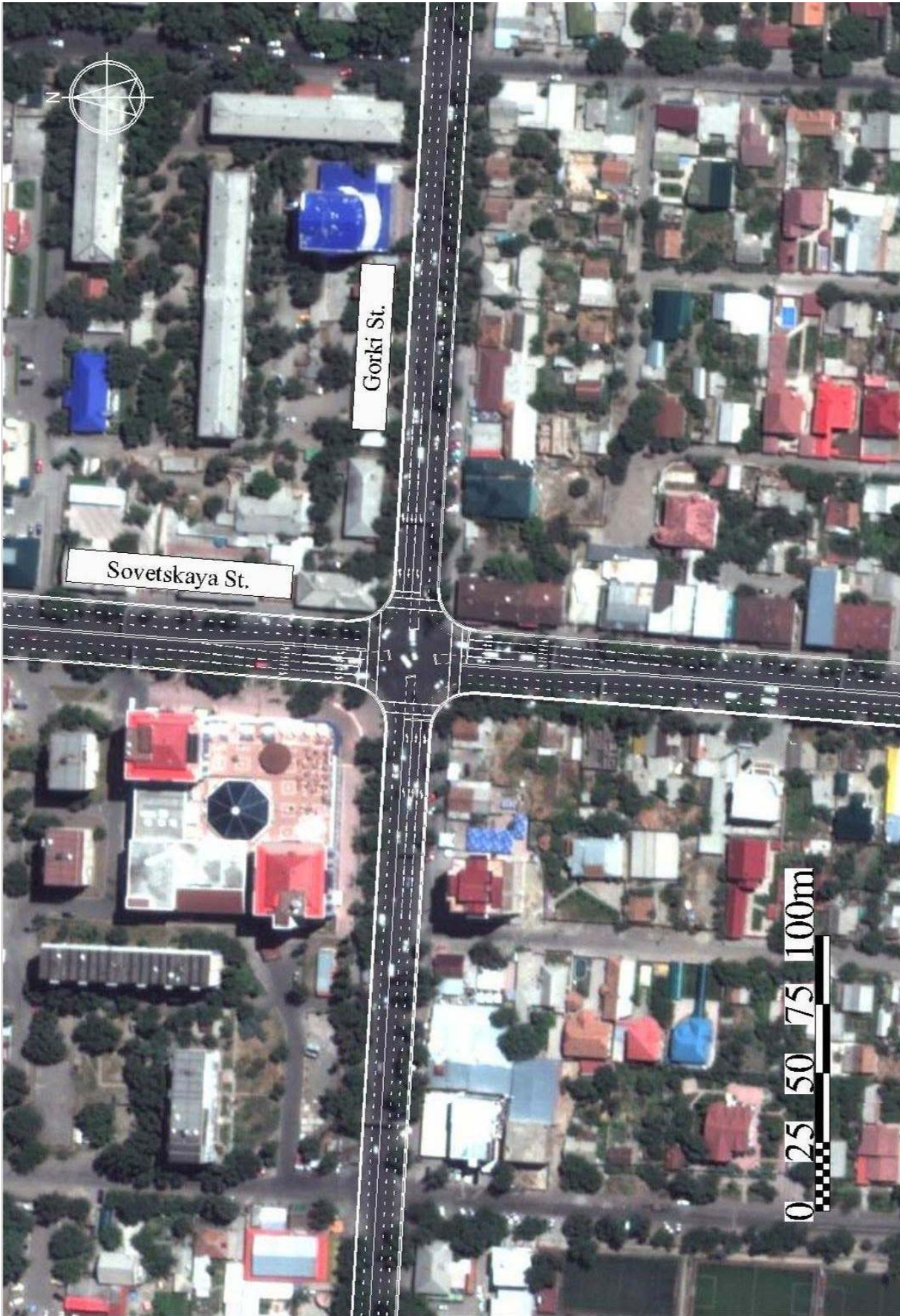






Figure A 23-1.1-7 Gorki St. / Sovetskaya

23-1.1.3 Design of Traffic Flow Improvement

(1) Number of Lane in Each Direction

The number of lanes in the original plan was intended to determine by the result of baseline survey. However, due to delay in opening of the Ryskulova St., it became impossible. Therefore, the number of lanes was determined based on the usage survey of the existing road condition. The result of the usage survey is shown in **Table A 23-1.1-3**.

Table A 23-1.1-3 Result of Usage Survey and Lanes Number of Each Direction

Direction	Usage Condition of Existing Road	Number of Lane
North		Straight lane: 2 lanes Left turn lane: 1 lane Right turn lane: 0 lane Total 3 lanes
South		Straight lane: 2 lanes + 1 lane Left turn lane: 1 lane Right turn lane: 1 lane Total 5 lanes
West		Straight lane: 2 lanes Left turn lane: 2 lanes Right turn lane: 1 lane Total 5lanes
East		Straight lane: 2 lanes Left turn lane: 1 lane Right turn lane: 1 lane Total 4 lanes

(2) Width of Lane

The width of existing carriage way (i.e. distance between the existing concrete curbs) is fixed and arranged above the lanes number. According to SNIP, the minimum width of lane of inner lane and outer lane are 3.0 m and at least 3.5m, respectively. The width of lane in each direction is shown in **Figure A 23-1.1-8**.

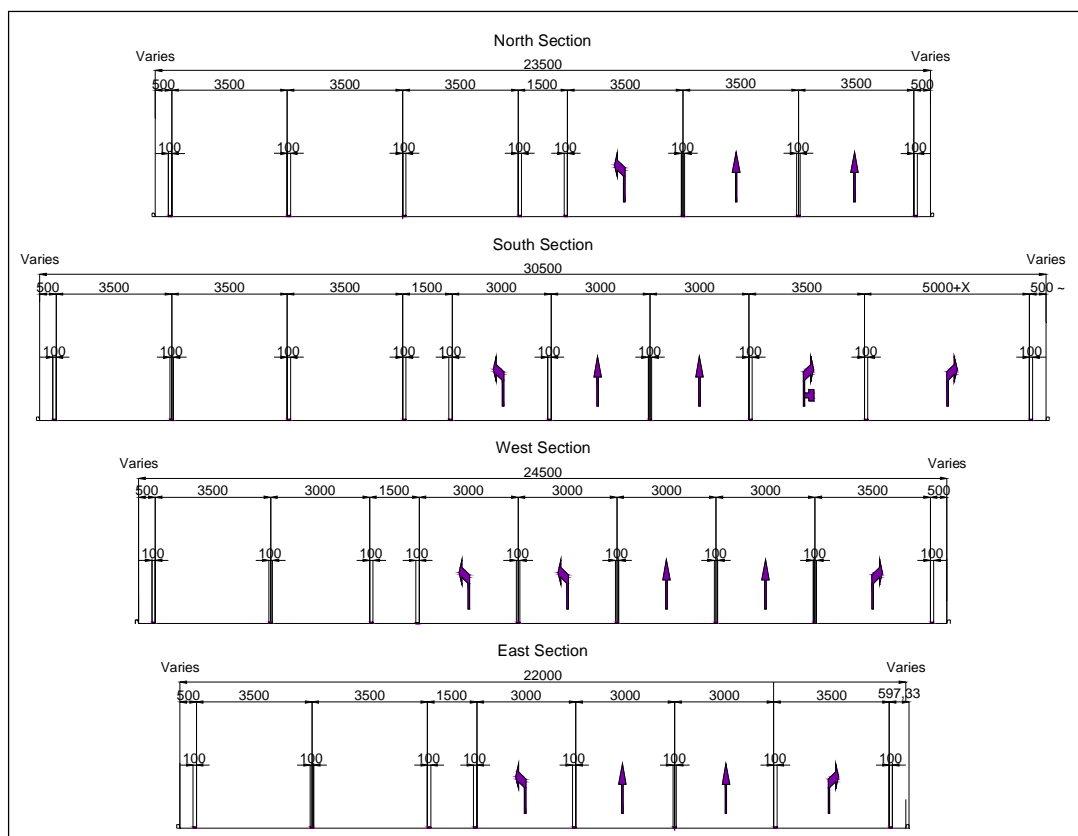


Figure A 23-1.1-8 Lanes Width in Each Directions

(3) Other Project Items

- ✓ Road Marking - Stop line is as close as possible to minimize the size of intersection
- ✓ Road Sign - Overhead hung road signs are relocated in accordance with the road marking in each directions
- ✓ Pedestrian Fence - Pedestrian fence is installed to prevent pedestrians from crossing the street illegally
- ✓ Traffic Island - Traffic Island is installed for pedestrians crossing from safety point of view in the 2nd year
- ✓ Traffic Signal - Traffic signal and the stop lines are relocated in the 2nd year

(4) Discussion with Working Group Meeting (3rd WG Meeting)

The JICA Study Team organized the WG meeting to explain Traffic Flow Improvement activities on 16

September, 2011. The contents of the 3rd WG meeting are as follows;

- ✓ The number of lanes required in each direction and proposed drawing
- ✓ Opening day of Ryskulova St. and starting period of Baseline Survey
- ✓ The road marking materials
- ✓ Usage condition of the existing road was explained by showing photographs and videos. And the number of lanes in each direction required and the drawing were proposed by the JICA Study Team and approved by WG.
- ✓ The JICA Study Team explained that the Baseline Survey would be started on 22 September because the Ryskulova St. was planned to open on 20 September.

C/P recommended that it was better to wait 1 week so that drivers could get used to the new route. Therefore, the Baseline Survey was planned to start on 27 September. However, Ryskulova St. was opened only on 30 September, 2011.

- ✓ The road marking materials were agreed on thermoplastic.



Picture A 23-1.1-3 3rd WG Meeting

(5) Design Authorization

Drawing approved by the 3rd WG meeting which was held on 16 September, 2011 was submitted from Bishkek City Development Agency to Traffic Safety Department of Domestic Affairs and the Office of Mayor on 19 September, 2011 and then authorized. The Authorized Drawing is shown in **Figure A 23-1.1-9**.

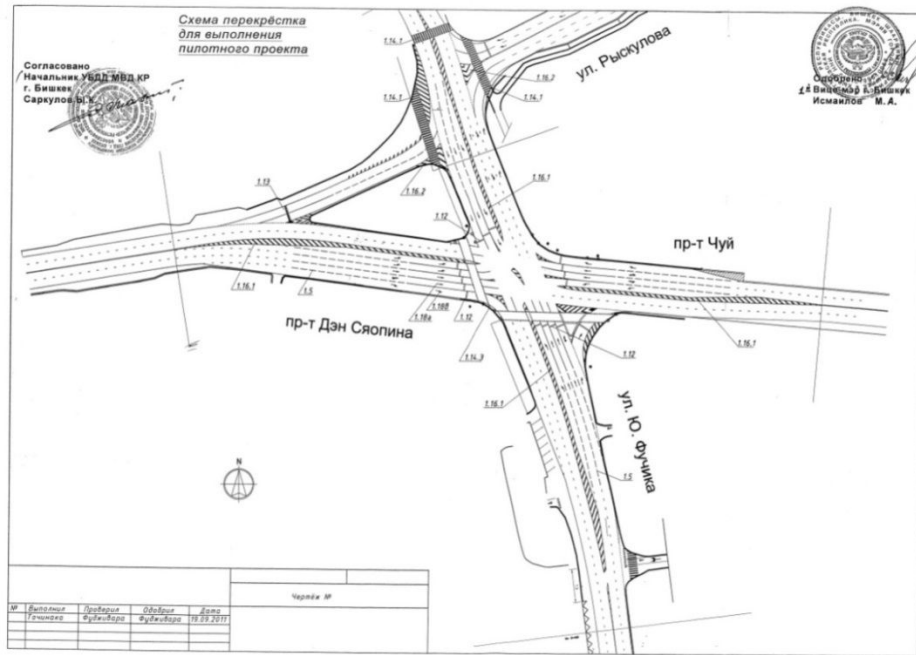


Figure A 23-1.1-9 Authorized Drawing / Design



Chui / Dan Sayopin Ave. w / Julius Fuchik St.



Chui / Dan Sayopin Ave. w / Julius Fuchik St.



Road markings



Traffic signal and the stop line relocated



Chui / Dan Sayopin Ave. w / Julius Fuchik St.



Road sign installed



Billboard installed



Traffic Cone installed

Picture A 23-1.1-4 Various Activities Related to Traffic Flow Improvement

23-1.1.4 Environmental Scoping and Environmental Impact Assessment

The Steering Committee, which was organized on 5 August, 2011, discussed whether the Environmental Impact Assessment (hereinafter referred to as “EIA”) is necessary or not for the Pilot Project. In case of the Project, the SC concluded that no EIA is necessary because only minor improvement and repair works such as road markings signal installation and bus stop renovation will be needed.

23-1.1.5 Project Implementation I (1st Year)

(1) Baseline Survey

The JICA Study Team implemented the Baseline Survey subcontracted to a Local Consultant between 29 September and 30 September, 2011. The Baseline Survey was implemented in 2 days, because Bishkek City Government informed that Ryskulova St. was scheduled to open from 29 September, 2011. However, the opening of Ryskulova St. was at 11 o'clock on 30 September, behind the schedule.

(2) 1st-Monitoring and 2nd-Monitoring Survey

The JICA Study Team implemented the 1st-Monitoring and 2nd-Monitoring Survey on 20 October and 17

November, 2011 respectively. The survey was carried out by subcontracting to a Local Consultant. Survey date was decided considering the duration required for the road users of IS-01 for getting used to the intersection with new road markings. In order to evaluate the effect of the improvement correctly, 2 surveys were carried out.

The contents of Baseline and 2nd-Monitoring Survey are as follows;

- (a) Traffic Count by Direction
- (b) Traffic Queue Length
- (c) Travel Speed Survey
- (d) Signal Cycle Survey
- (e) Public Opinion Survey

The contents of 1st-Monitoring Survey are as follows;

- (a) Traffic Count by Direction
- (b) Traffic Queue Length

(3) Traffic Count by Direction

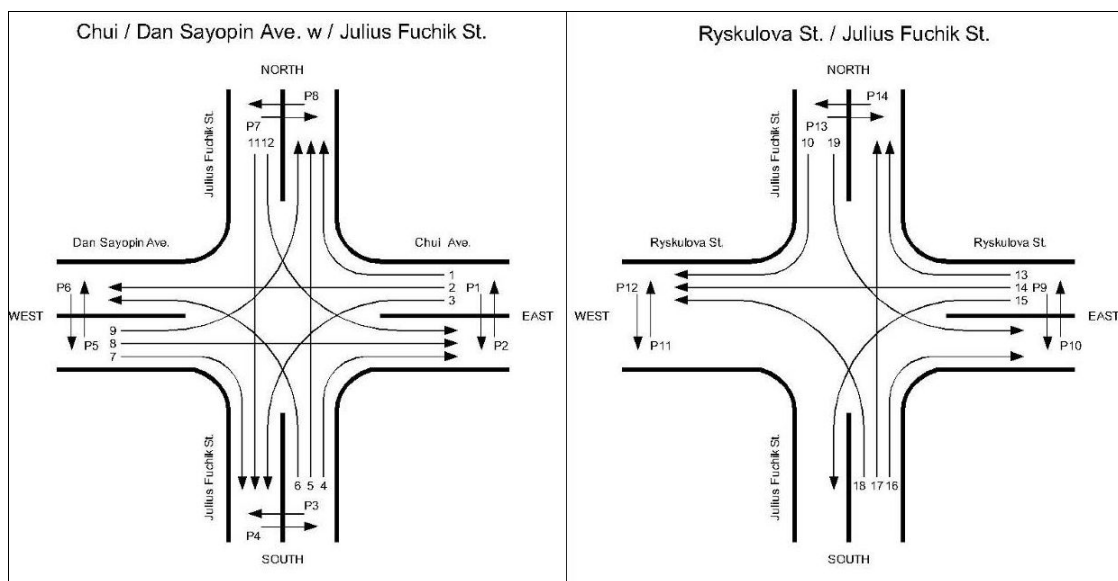


Figure A 23-1.1-10 Traffic Count by Direction

(4) Passenger Car Unit

The Passenger Car Unit (hereinafter referred to as “PCU”) of major vehicle type under the SNIP is shown as below;

Table A 23-1.1-4 PCU Equivalent Under the SNIP

Vehicle	Sedan, Pick-up, Mini Van	Mini Bus	Midi Bus	Trolley Bus, Big Bus	Light Truck	Heavy Truck
PCU	1.0	1.5	2.0	3.0	2.0	3.0

(5) Peak Hour Traffic Volume

The peak hour was considered 3 times a day; Morning Peak Hour (7:00-11:00), Daytime Peak Hour (11:00-15:00) and Evening Peak Hour (15:00-19:00).

The peak hour traffic volume recorded in the 1st-Monitoring and 2nd-Monitoring Survey is presented below;

Table A 23-1.1-5 Peak Hour Traffic Volume (PCU) by Baseline Survey

Survey Date: 29 September, 2011 (Thursday)

Time Zone	Classification	Sedan, Pickup, Minivan	Minibus	Midibus	Trolleybus, Big Bus	Light Truck	Heavy Truck	Total in VEH	Total in PCU	Proportion
	PCU	1.0	1.5	2.0	3.0	2.0	3.0			
Morning	7:10-8:10	4188	2043	165	81	132	13	6622	8132	1.18
Daytime	14:00-15:00	3064	1702	88	27	144	8	5033	6189	0.90
Evening	15:00-16:00	3285	1551	94	25	193	10	5158	6294	0.92
Average		3512	1765	116	44	156	10	5604	6872	1.00

Survey Date: 30 September, 2011 (Friday)

Time Zone	Classification	Sedan, Pickup, Minivan	Minibus	Midibus	Trolleybus, Big Bus	Light Truck	Heavy Truck	Total in VEH	Total in PCU	Proportion
	PCU	1.0	1.5	2.0	3.0	2.0	3.0			
Morning	10:00-11:00	3264	1723	76	30	79	11	5183	6285	0.87
Daytime	13:00-14:00	3819	2077	62	27	108	11	6104	7391	1.02
Evening	17:40-18:40	4325	2190	65	26	94	15	6715	8054	1.11
Average		3803	1997	68	28	94	12	6001	7243	1.00

By the 1st-Monitoring and 2nd-Monitoring Survey, the peak hour traffic volume is given below;

Table A 23-1.1-6 Peak Hour Traffic Volume (PCU) by 1st-Monitoring & 2nd-Monitoring Survey

Survey Date: 20 October, 2011 (Thursday)

Time Zone	Classification	Sedan, Pickup, Minivan	Minibus	Midibus	Trolleybus, Big Bus	Light Truck	Heavy Truck	Total in VEH	Total in PCU	Proportion
	PCU	1.0	1.5	2.0	3.0	2.0	3.0			
Morning	8:10-9:10	3739	1176	79	26	107	69	5196	6164	1.03
Daytime	14:00-15:00	3535	1145	64	18	116	74	4952	5891	0.99
Evening	18:00-19:00	3742	1033	64	15	123	43	5020	5842	0.98
Average		3672	1118	69	20	115	62	5056	5966	1.00

Survey Date: 17 November, 2011 (Thursday)

Time Zone	Classification	Sedan, Pickup, Minivan	Minibus	Midibus	Trolleybus, Big Bus	Light Truck	Heavy Truck	Total in VEH	Total in PCU	Proportion
	PCU	1.0	1.5	2.0	3.0	2.0	3.0			
Morning	10:00-11:00	3555	1226	74	23	142	53	5073	6058	0.95
Daytime	11:40-12:40	3812	1234	75	20	115	77	5333	6338	0.99
Evening	17:50-18:50	4336	1286	54	17	92	48	5833	6756	1.06
Average		3901	1249	68	20	116	59	5413	6384	1.00

There are 2 major findings obtained by comparing Baseline Survey and Monitoring Surveys. The findings are described below.

- ✓ The traffic volume of minibus has decreased by 500 - 600 vehicles in each peak hour
- ✓ The traffic volume of heavy truck has increased 5 times than in the Baseline Survey

The JICA Study Team asked about the minibus route to Public Transport Department, and they mentioned that 16 minibus routes i.e. 134, 135, 136, 148, 164, 166, 173, 185, 192, 220, 223, 224, 238, 254, 258 and 263, used Chui Ave. instead of Ryskulova St. According to the investigation, 40 routes of minibus passed through the IS-01. While Ryskulova St. was under the construction, 16 minibus routes as indicated above also used Chui Ave.

(6) Vehicle Movement

As shown in the **Figure A 23-1.1-12 to 14**, there are relatively large vehicle movements from west and east sides. Traffic volume from these directions is relatively higher in the Baseline Survey data. There are massive movements mainly of Sedan, Pickup, Minivan and minibus.

It is found that the traffic flow from west side even in the evening peak hour account for more than 30 % of total traffic volume.

IS-01 is located west part of Bishkek City. In general, if the road users enter from west to east in the morning, these road users go out from center part or east side to west in the evening.

By comparison of traffic volume at the intersection based on the Baseline Survey and Monitoring Surveys data, it is found that the traffic volume is decreasing at the intersection. The decrease in traffic volume might be either of the Pilot Project or retuning of minibuses to their original routes because many minibuses were using this intersection as a temporary route while Ryskulova St. was under the construction. Therefore, further investigation is required to identify the exact reason.

In IS-01, the following issues are observed during the first survey;

Vehicles

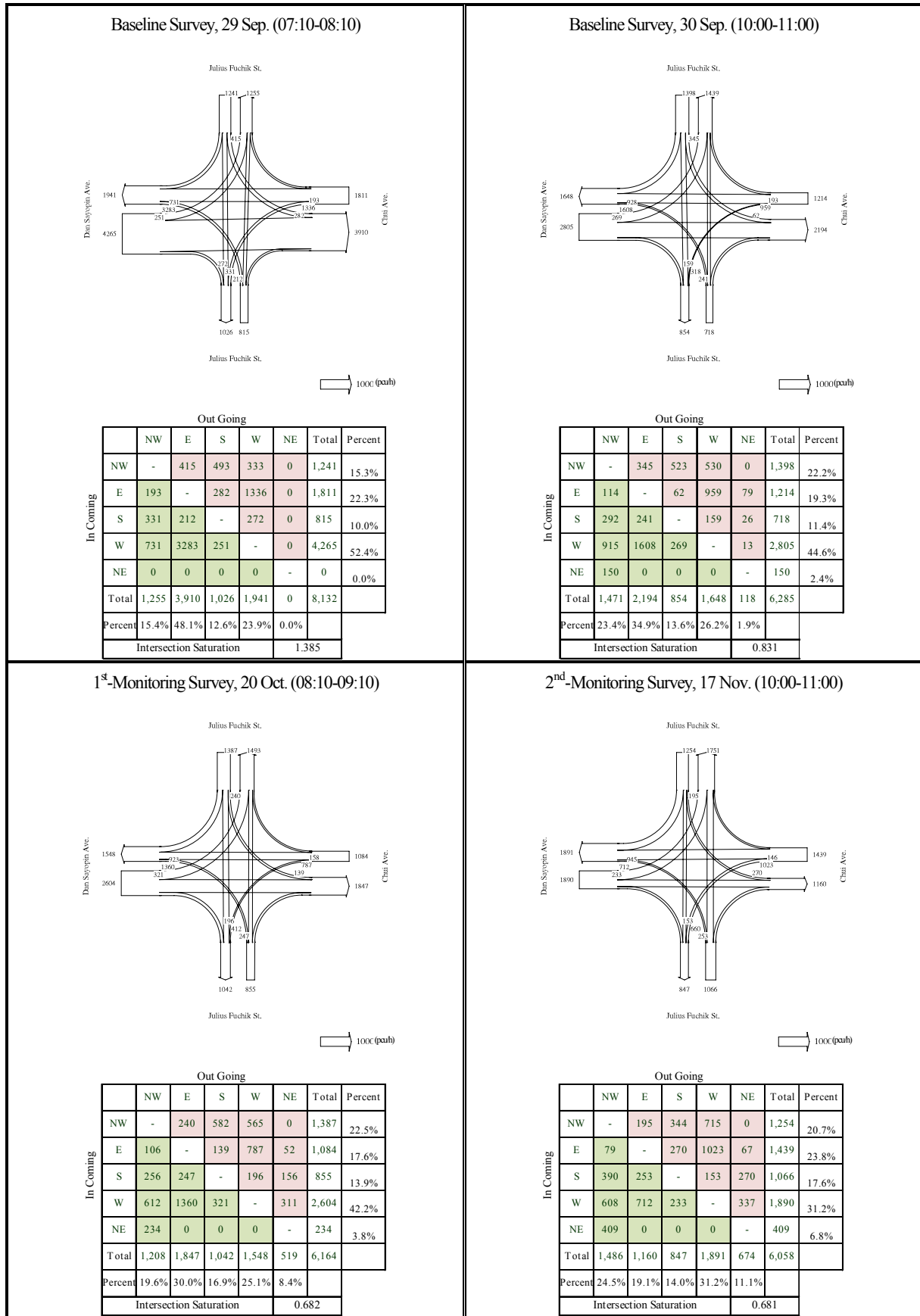
- ✓ Drivers tend to ignore lanes which are not clearly marked especially when they make their turns, such as making right or left lanes, or make left turn from mid or right lanes.
- ✓ Minibuses tend to allow their passengers to get off from or get on to their buses whenever and wherever buses slow down or stop even when buses are in the second or third lanes from the left.
- ✓ The carriageways are blocked by illegal parking vehicles and/or taxi, especially along the south approach.

In **Figure A 23-1.1-12 to 14**, “NW” shows from / to Julius Fuchik St. and “NE” shows that of Ryskulova St.

The vehicle movements at IS – 01 each peak hour traffic volume are given below;



Figure A 23-1.1-11 Intersection with Directions



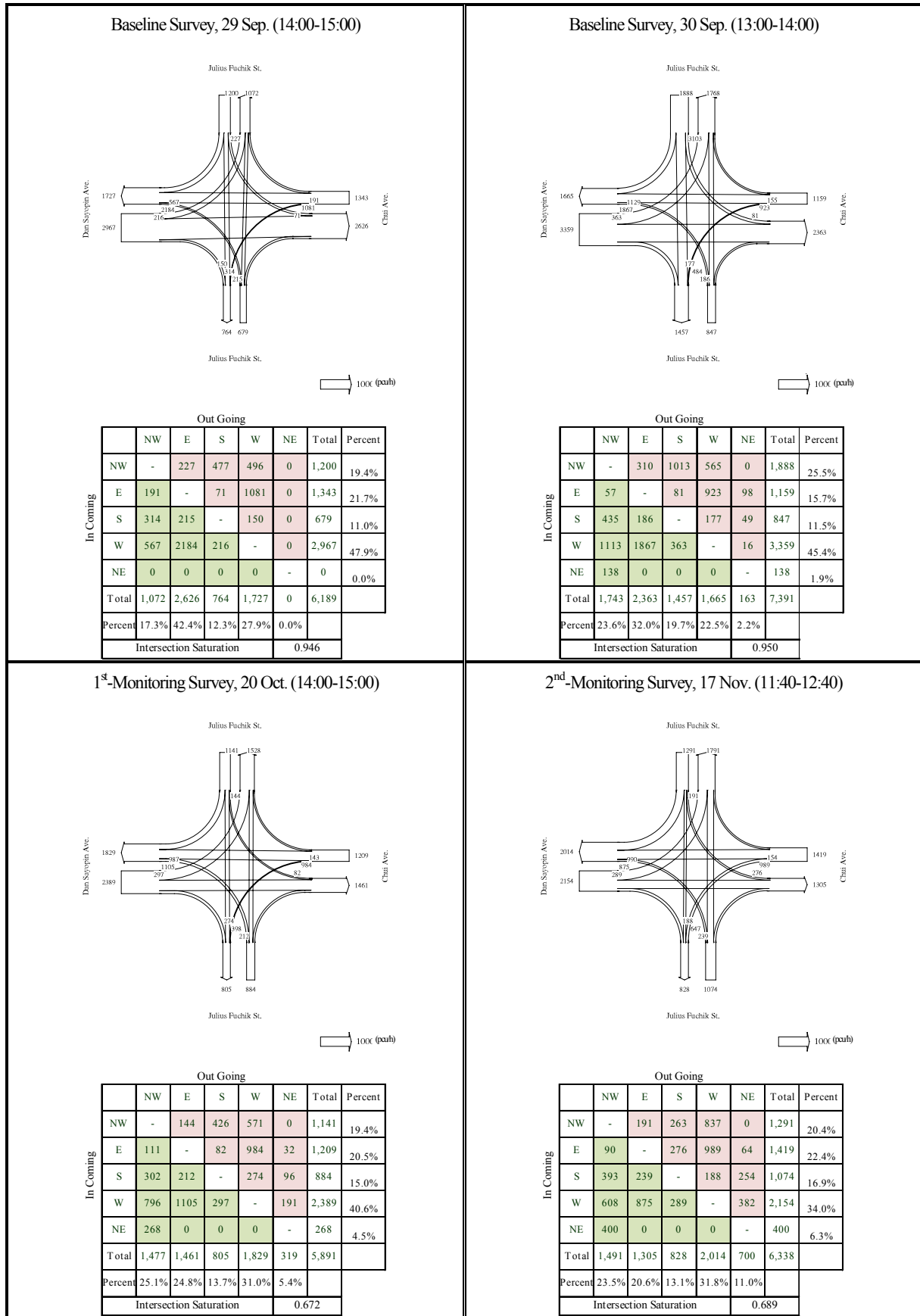
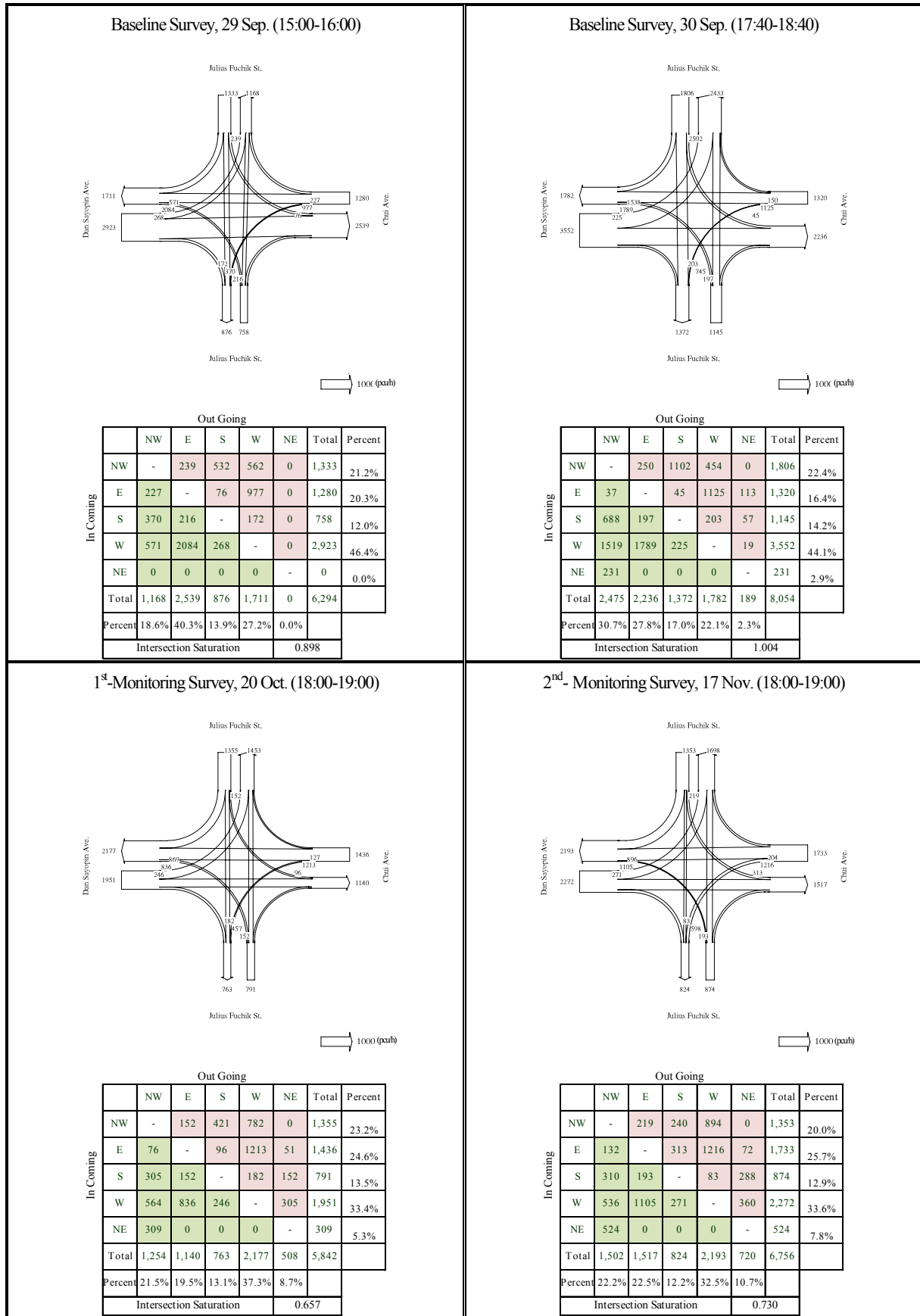


Figure A 23-1.1-13 Vehicle Movement at IS - 01 for Daytime Peak Hour



(7) Pedestrian Movement

There were not pedestrian signals at IS-01. Therefore, pedestrians are free to take their own decision when crossing the road even though there are a hospital, Osh Market, a mercantile store such as money changer supermarket and others commercial around IS-01. In this situation, they are at risk of accidents and left-turning vehicles are blocked by them. On the other hand, there is a pedestrian underpass along the east side of IS-01. However, the condition of pedestrian underpass was not good because of bad smell, lack of lighting system and poor maintenance.



Cleaning the Pedestrian Underpass



Road Sign Changed

Picture A 23-1.1-5 Pedestrian Underpass

In this intersection, the following issues were observed during the first field survey of the JICA Study Team;

Pedestrians

- ✓ Pedestrians tend to cross even many vehicles run at the intersection and less preference for use of pedestrian underpass when they need to cross the streets and/or intersection
- ✓ Pedestrians tend to jump on to or off from public busses whenever and wherever buses slow down or stop even when buses are in the second or third lanes from the left

The pedestrian movements at IS-01 in each peak hour traffic volume are presented below;

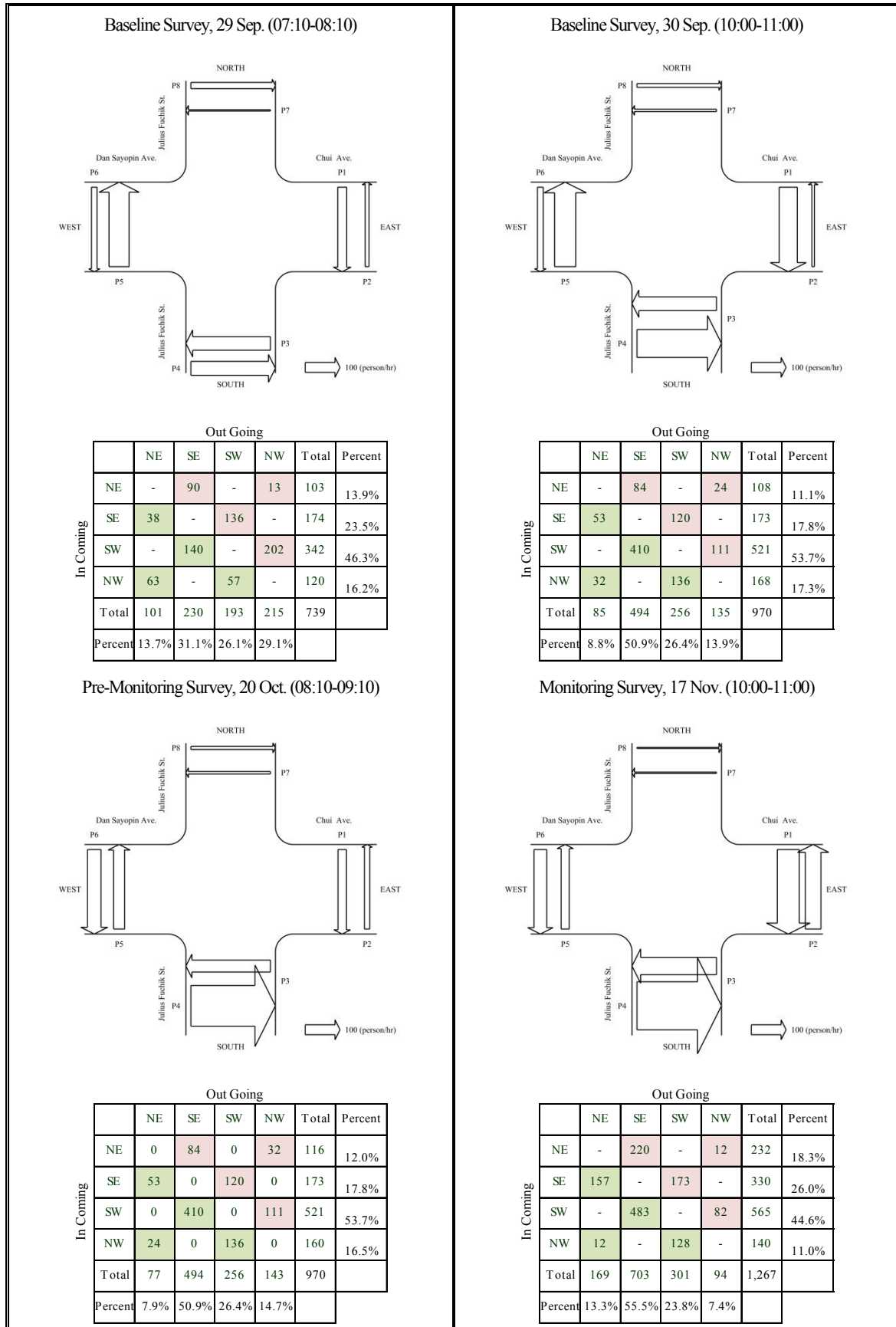


Figure A 23-1.1-15 Pedestrian Movement at IS - 01 for Morning Peak Hour

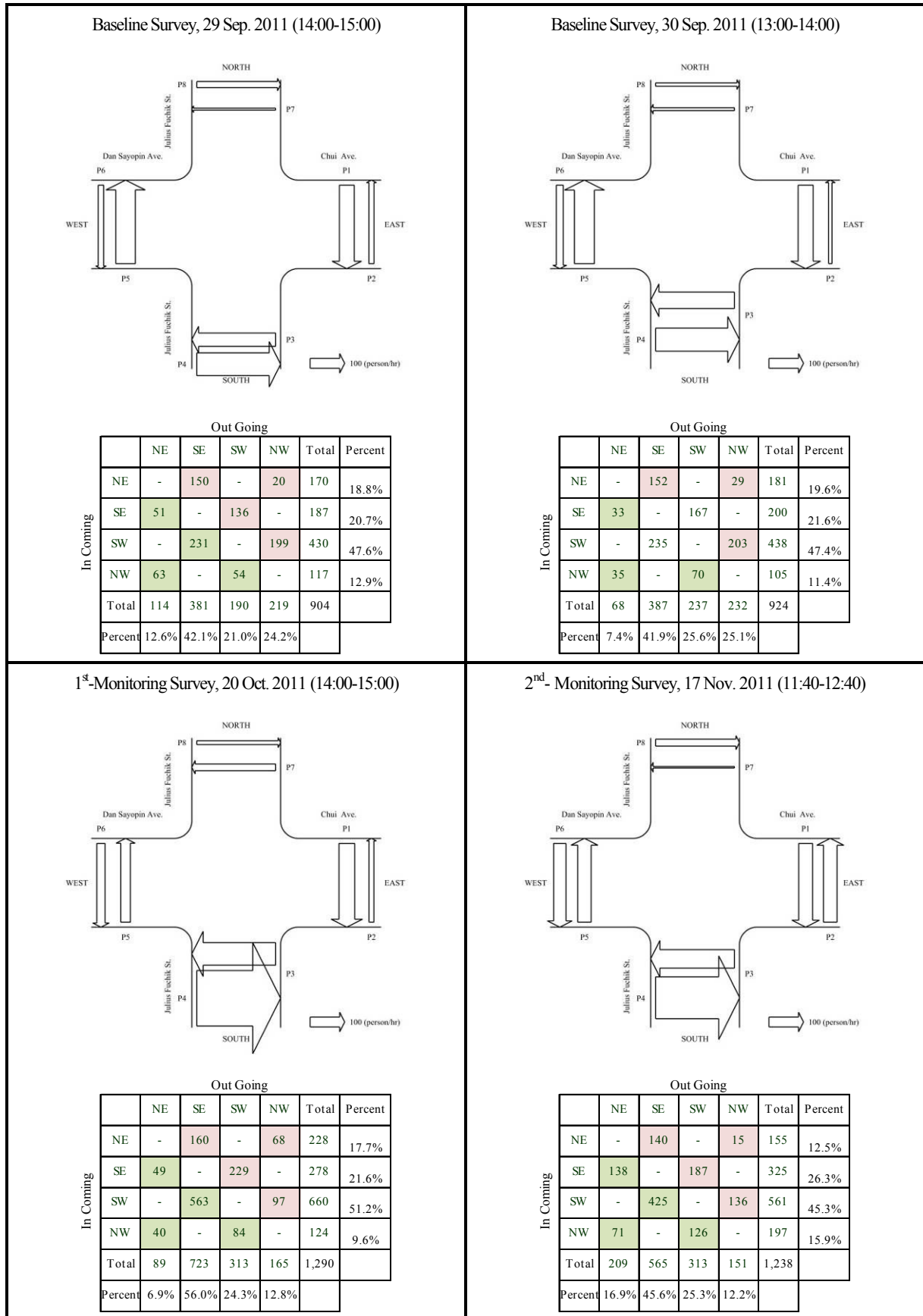


Figure A 23-1.1-16 Pedestrian Movement at IS - 01 for Daytime Peak Hour

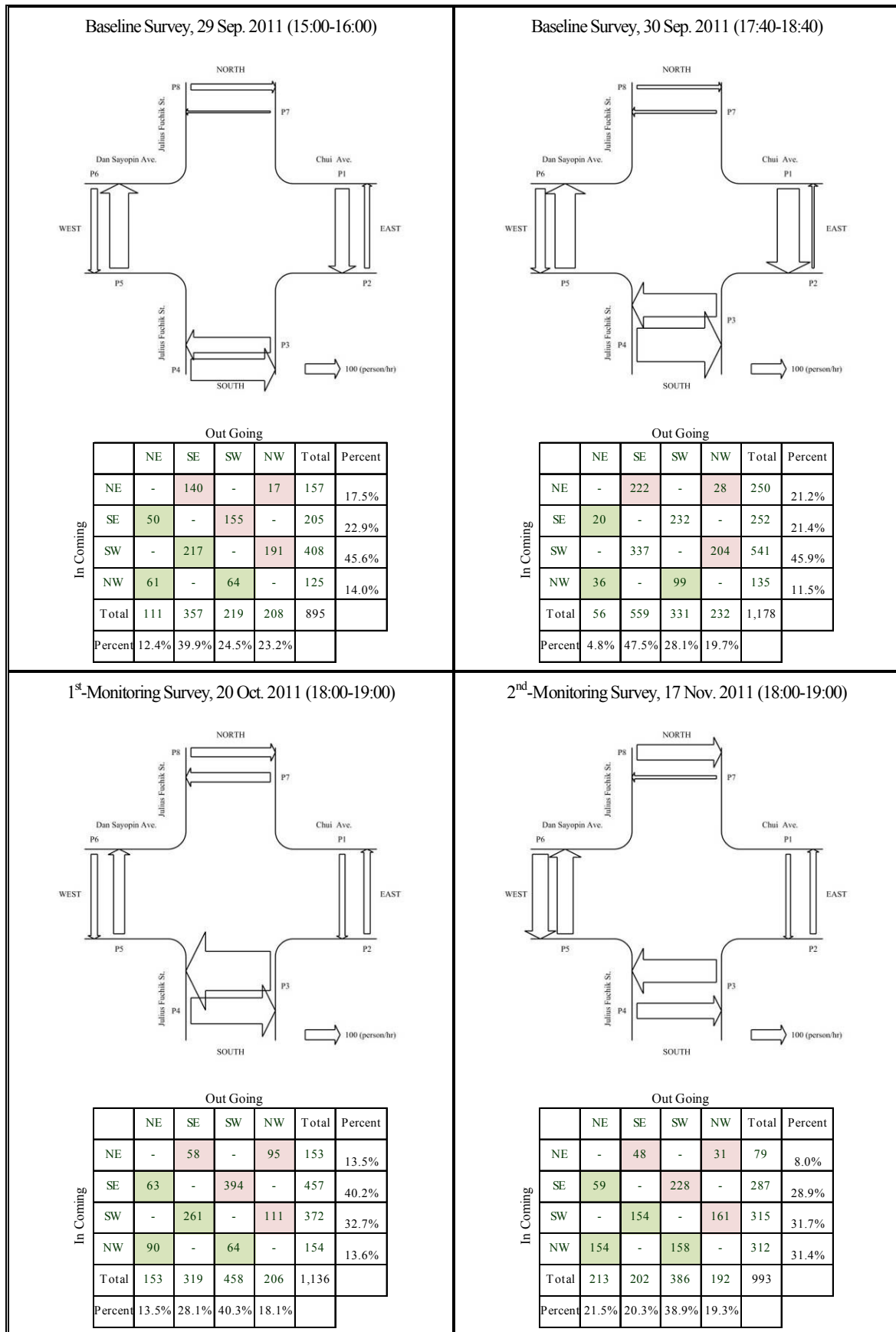


Figure A 23-1.1-17 Pedestrian Movement at IS - 01 for Evening Peak Hour

(8) Traffic Queue Length

Figure A 23-1.1-18 to 21 show the queue and residual length by the max length of each survey hour. According the following figures, a significant difference could be seen between before and after the Pilot Project implementation.

In **Figure A 23-1.1-18 to 21**, there are blue and red vertical dashed lines. A blue vertical dashed line is the average of queue length and a red vertical dashed line is the average of queue residual length.

About along the west approach, there is difference in the data of the average residual length between Baseline and Monitoring Surveys. The average of max residual length is increased after the implementation of Pilot Project. It is supposed that before the implementation of Pilot Project, the road users were stopped their vehicles freely during the red signal period by cramming their vehicles into the intersection.



Before the making of road marking
along the West Approach

After the making of road marking
along the West Approach

Picture A 23-1.1-6 Before and After the Traffic Flow Improvement

The Traffic Queue Length at IS-01 is presented below;

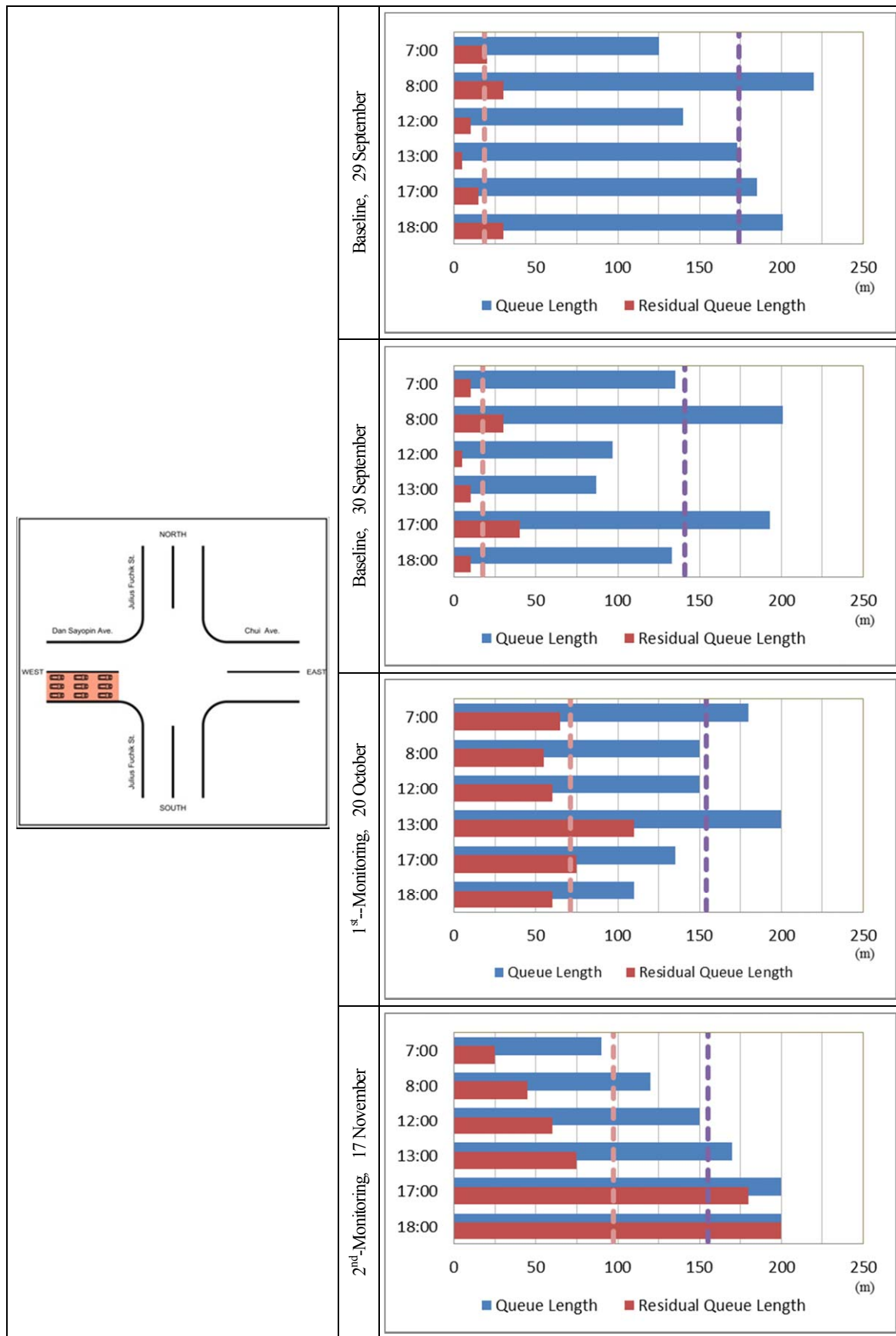


Figure A 23-1.1-18 Traffic Queue Length along the West Approach

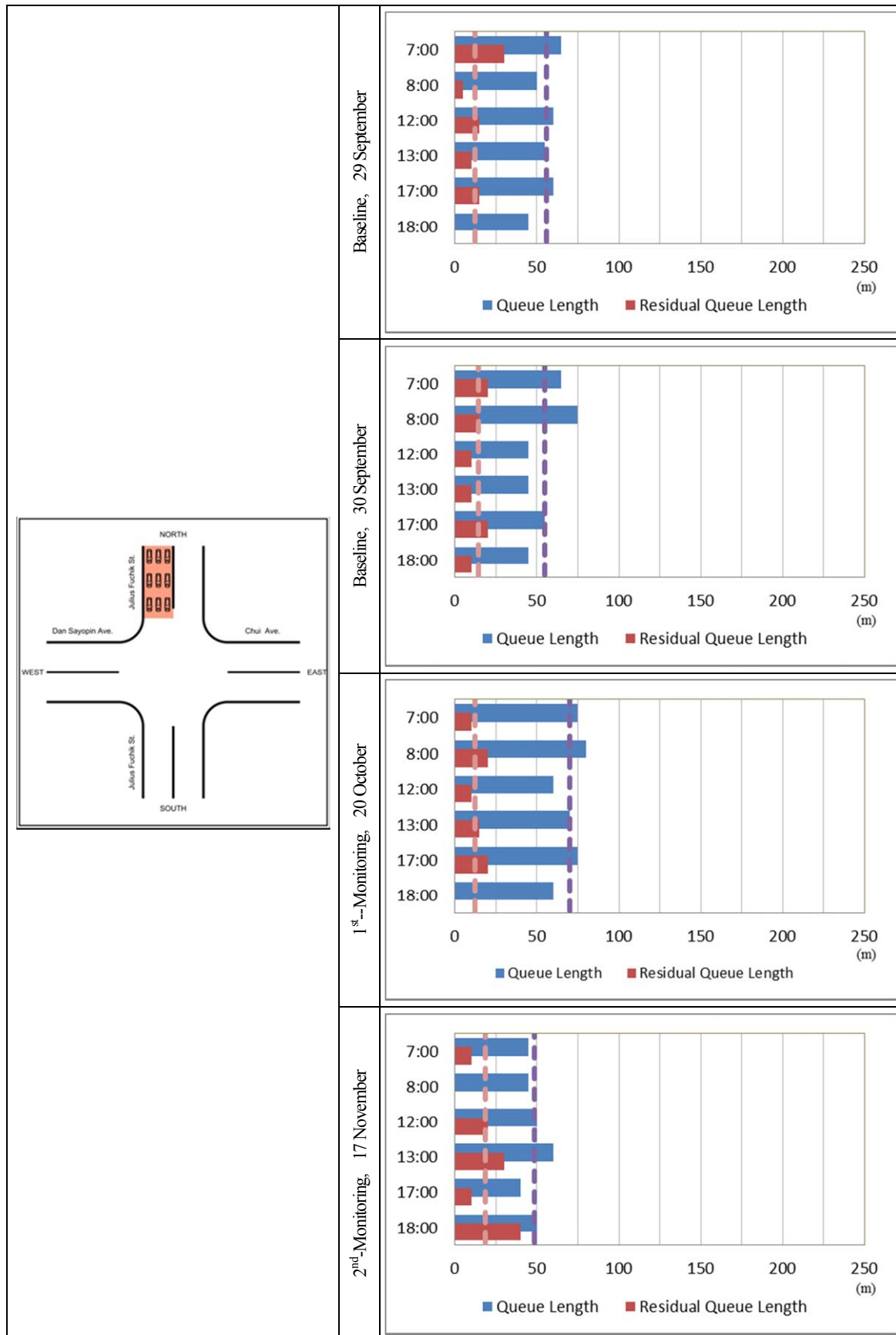


Figure A 23-1.1-19 Traffic Queue Length along the North Approach

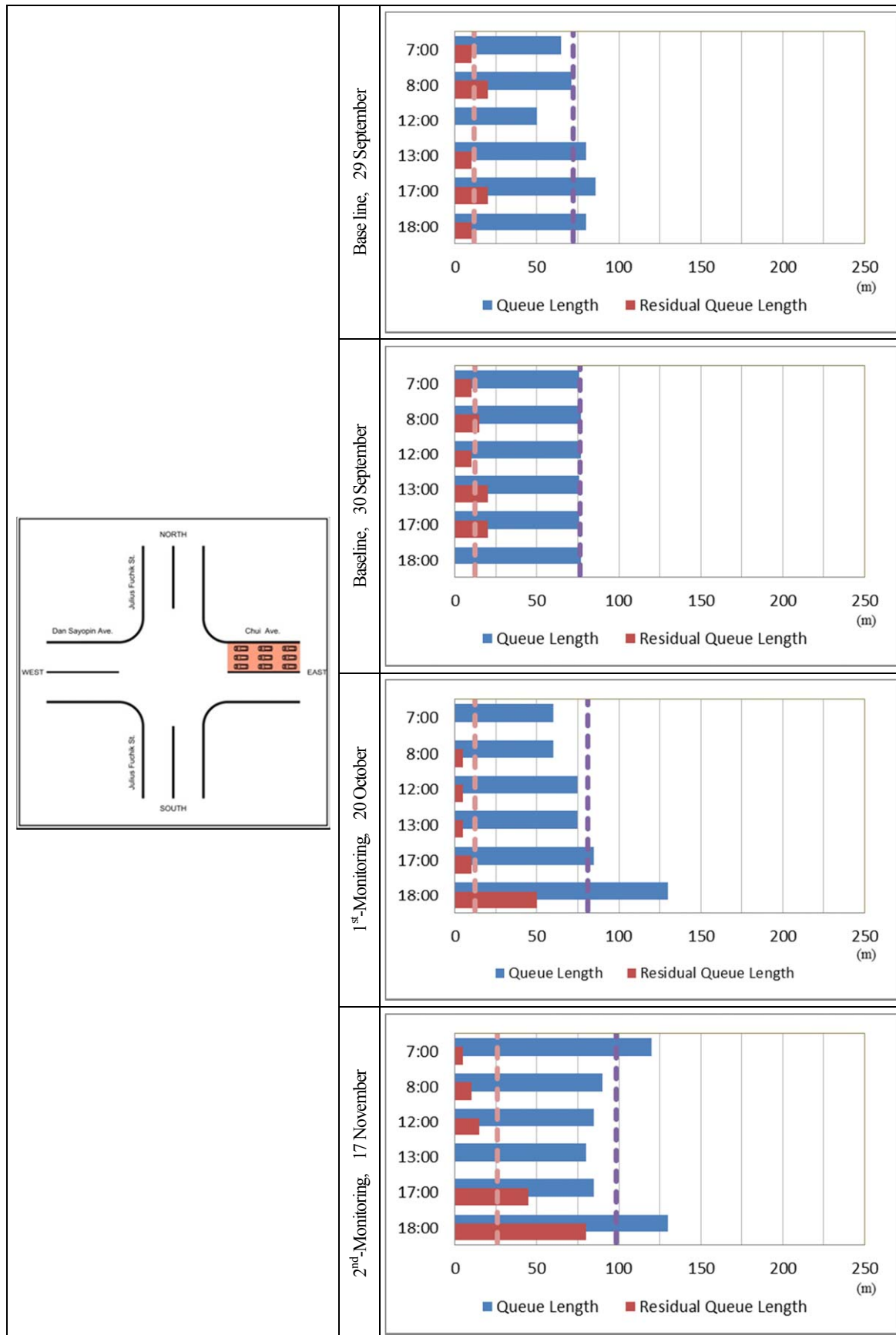


Figure A 23-1.1-20 Traffic Queue Length along the East Approach

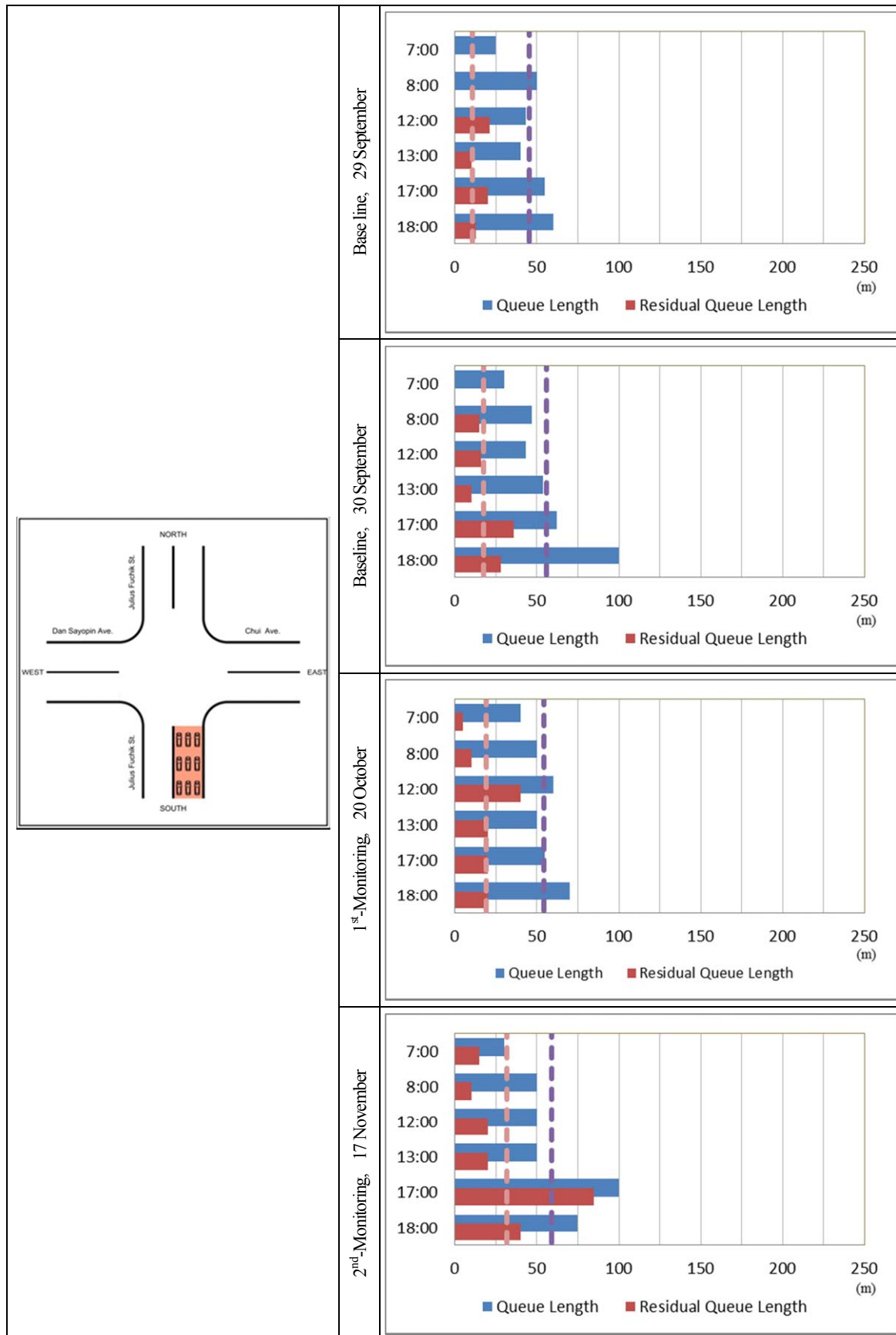


Figure A 23-1.1-21 Traffic Queue Length along the South Approach

(9) Travel Speed Survey

Travel Speed Survey was carried out for 2 directions, north-south and west-east directions. The average travel speed was improved after the implementation of the Pilot Project in each time zone; morning, daytime and evening. In **Figure A 23-1.1-22, 23**, the horizontal blue line shows the average speed of north-west direction, the red one shows west-east direction. The average speed of 2 directions have been improved. It could be said that the vehicles have aligned in a line by following the new road markings, as a result the left-turning vehicles might not likely retard subsequent vehicles by the making separated lane.

The result of Travel Speed Survey is presented below;

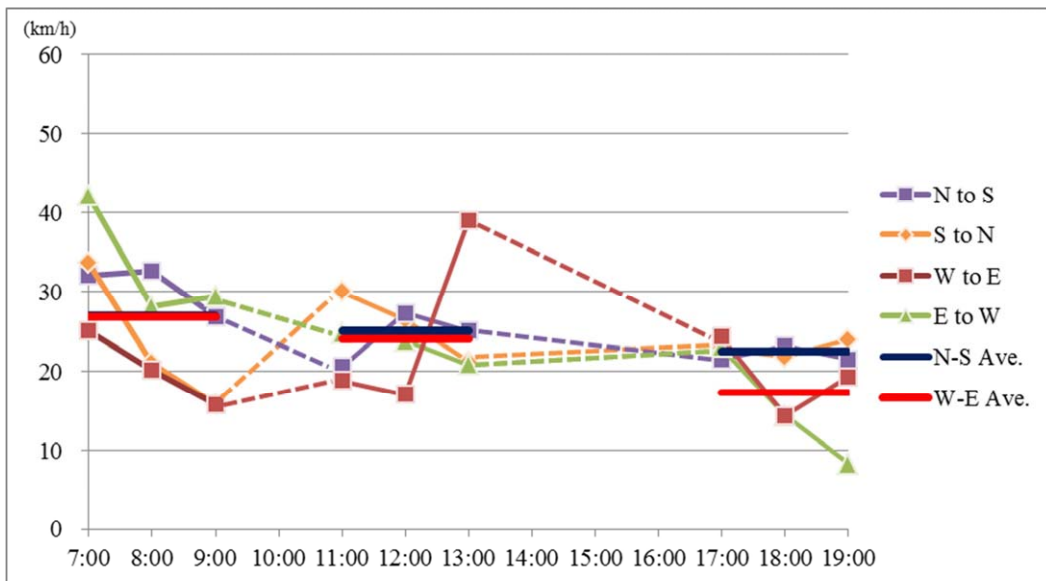


Figure A 23-1.1-22 Travel Speed Survey Baseline Survey

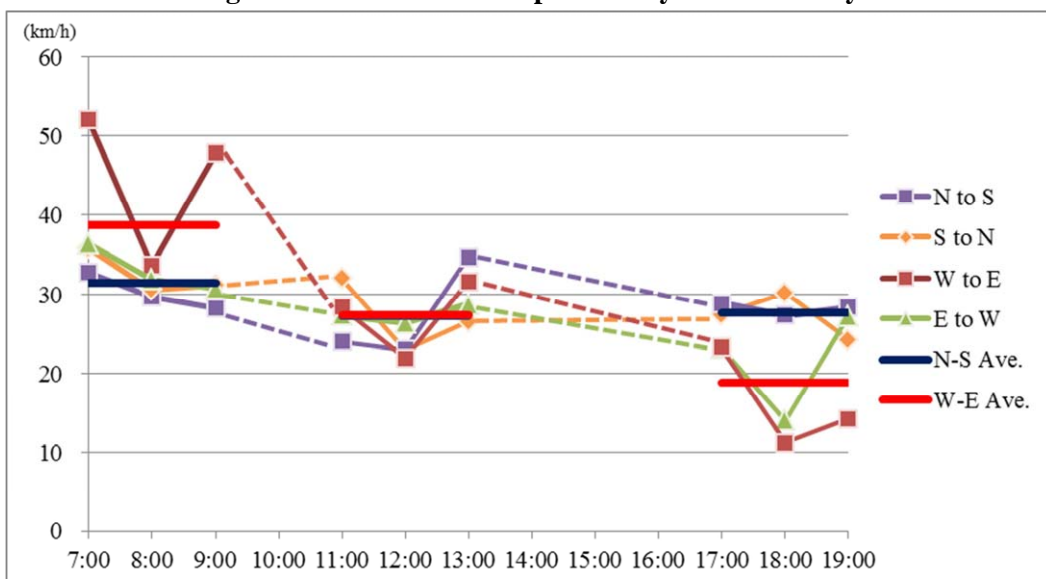


Figure A 23-1.1-23 Travel Speed Survey 2nd-Monitoring Survey

(10) Traffic Signal Cycle Survey

Survey in August, 2011

The JICA Study Team conducted the traffic signal survey at IS-01 for showing the simulation result in the 2nd WG Meeting which was held on 17 August, 2011. The result of traffic signal cycle is shown in **Figure A 23-1.1-24**.

Survey in September & November, 2011

According to the traffic signal survey, there is no difference between Baseline and 2nd-Monitoring Surveys. The JICA Study Team analysed about the signal sequence to improve at IS-01 by Traffic Control System Improvement. On the other hand, there is difference between August and September - November data. As explained in **Figure A 23-1.2.4**, the traffic volume in July is relatively small due to a long vacation in Bishkek. Therefore, it is possible that a short traffic signal cycle was used in July.

Phase	1	2	3	
Schematics				
Previous Survey by the JICA Study Team in July, 2011				
	Green	Amber	Sum	
1Phase	20	4	24	
2Phase	18	4	22	
3Phase	20	4	24	
Sum	58	12	70	
Baseline & 2nd-Monitoring Survey in September & November, 2011				
	Green	Green Flash	Amber	Sum
1Phase	16	7	4	27
2Phase	17	7	4	28
3Phase	16	7	4	27
Sum	49	21	12	82

Figure A 23-1.1-24 Result of Traffic Signal Cycle at IS – 01

(11) Public Opinion Survey

The JICA Study Team executed public opinion survey on 29 September and 17 November, 2011. The Public Opinion Survey was implemented in 5 locations of Bishkek City as mentioned below;

- ✓ Chui / Dan Sayopin Ave. w / Julius Fuchik St.
- ✓ Almatinskaya St. / Jibek Jolu Ave.
- ✓ Chui Ave. / Sovetskaya St.
- ✓ Jibek Jolu Ave. w / Molodaya Gvardia Blvd.
- ✓ Gorki St. w / Sovetskaya St.

The JICA Study Team prepared the Public Opinion Survey Form. The Public Opinion Survey Form No.1,

Q0 to Q3 consists of the general question, and Form No.2, Q4 to Q7 (for 2nd-Monitoring Survey) consists of the specific question related to Traffic Flow Improvement. Public Opinion Survey Form No.2, is shown in **Figure A 23-1.1-25**

2 of 2

Q.4 Are you aware of Intersection of Chui / Dan Sayopin Ave. w / Julius Fuchik St. which has been improved under Jica Pilot Project?

1. Yes If you select "1 (Yes)" in Q.4, Please proceed to Q.5 and Q.6

2. No If you select "2 (No)" in Q.4, Please proceed to Q.7

Q.5 Please answer following questions about improvement works under Jica Pilot Project.

Q.5-1 Do you think that the lane markings have been improved than before?

1. Yes, I think so.

2. No, I don't think so.

3. Others (Please Specify) _____

Q.5-2 Do you think that the stop lines have been improved than before?

1. Yes, I think so.

2. No, I don't think so.

3. Others (Please Specify) _____

Q.5-3 Do you think that the pedestrian crossing lines have been improved than before?

1. Yes, I think so.

2. No, I don't think so.

3. Others (Please Specify) _____

Q.5-4 Do you think that the road signs have been improved than before?

1. Yes, I think so.

2. No, I don't think so.

3. Others (Please Specify) _____
(Please proceed Q.6)

Q.6

Q.6-1 Do you know the underground crossing at east side of intersection along Chui Ave.?

1. Yes If you select "1 (Yes)" in Q.6-1, Please proceed to Q.6-2

2. No If you select "2 (No)" in Q.6-1, Please proceed to Q.7

Q.6-2 Do you want to use the underground crossing?

1. Yes, I want to use it.

2. No, I don't want to use it. If you select "2 (No)" in Q.6-2, Please proceed to Q.6-3

Q.6-3 What kind of improvement is necessary to attract for the underground crossing?

1. If there is lighting system in the underground, it will be attractive to use.

2. If there are kiosks in the underground, it will be attractive to use.

3. Even though there is lighting system and/or kiosks in the underground, it will not be attractive to use.

4. Others (Please Specify) _____

Q.7 Why aren't you aware of the Pilot Project on Chui / Dan Sayopin Ave. w / Julius Fuchik St. ?

1. I am aware of the project on Chui Ave. / Julius Fuchik St. but I have not known it is done by JICA Pilot Project.

2. I do not pass through Chui / Dan Sayopin Ave. w / Julius Fuchik St.

3. I am not interesting in the Pilot Project.

That's All. Thank You Very Much for Your Cooperation.

Figure A 23-1.1-25 Public Opinion Survey Form No.2

A total of 1,000 persons were asked the question Q4 to Q7. Out of 1,000 respondents, 330 respondents responded that they were aware of JICA Pilot Project. 80% to 90% of the respondents said that the Pilot Project has curative effects against intersection improvement by the road markings, stop lines, pedestrian crossing lines and road signs. In **Figure A 23-1.1-26**, the blue bar shows the responses answered as “Yes”, the red bar shows the responses answered as “No” and the green bar shows the responses answered as “Other”.

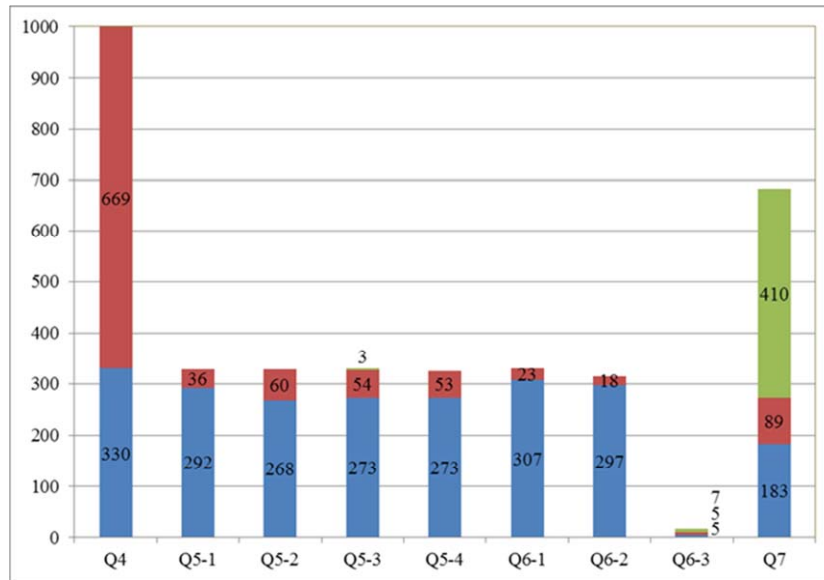


Figure A 23-1.1-26 Result of Public Opinion Survey Form No.2

23-1.1.6 Project Implementation II (2nd Year)

(1) Methodology for Pilot Project Implementation II

Flow of Traffic Flow Improvement Plan and relation of other Pilot Projects are shown in following figure.

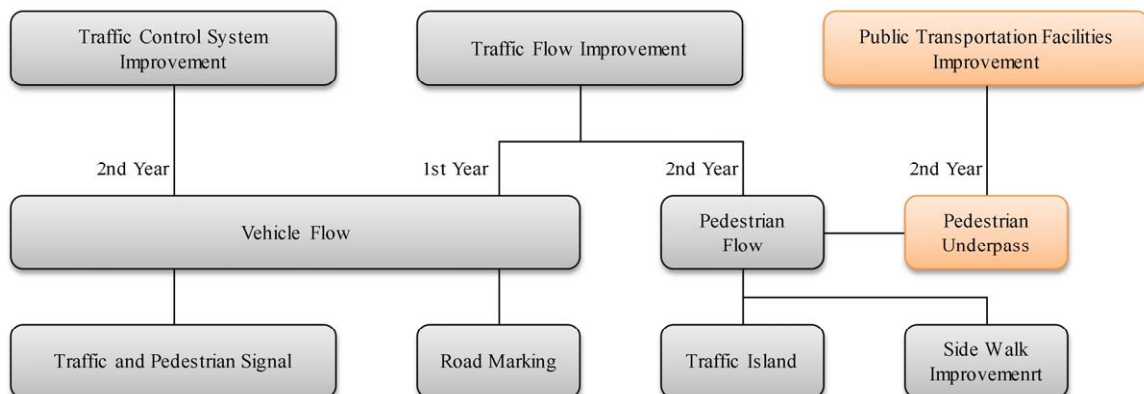


Figure A 23-1.1-27 Flow of Traffic Flow Improvement Plan and Relation of Other Pilot Project

In 2nd year, the road marking was also done around 30m from beginning point of each approach because most of road marking which was painted in 1st year had been disappeared. The reason of the road marking disappear in short time is described later on.

23-1.1.7 Objectives of Construction of Traffic Island

Based on the 1st field survey, the road users had been confused where they can run without road marking and road sign. In the other hand, the pedestrians had been running to cross because the area of intersection is large. Therefore the road marking and road sign had been done for vehicle flow in 1st year. In 2nd year, the traffic island and side walk has been constructed and improved for the pedestrian flow. The objectives of Construction of Traffic Island shall be as follows;

- ✓ To keep the safety space for the pedestrians
- ✓ To distinguish the vehicle and pedestrian flow
- ✓ To direct the traffic regulation

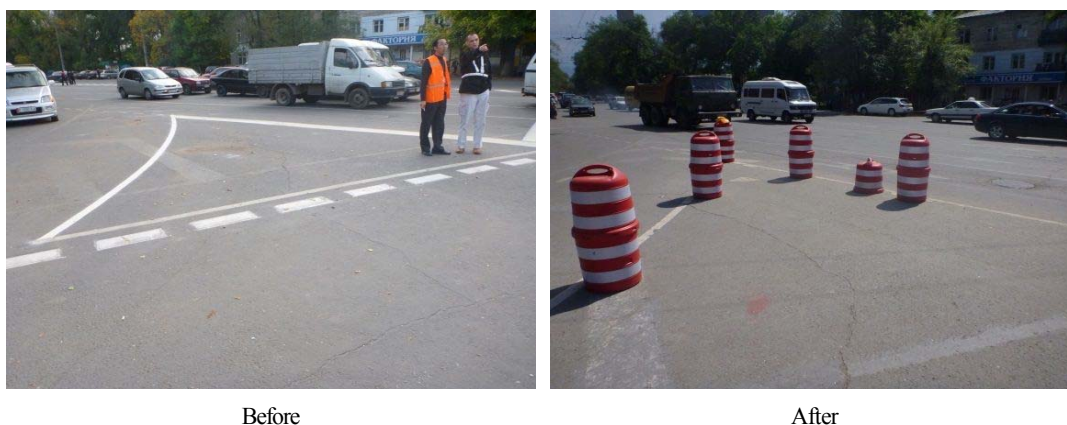
In Bishkek City, there are a lot of large size intersections. The problem of large size intersection shall be as follows,

- ✓ The drivers confuse to run in the intersection
- ✓ The transit time takes long
- ✓ The pedestrians take time to cross the intersection
- ✓ Those intersections are described further below with new bottleneck intersections.

In October 2011, 1st year, Traffic Flow Improvement Plan has been finished by making the road marking.

As the 1st and 2nd-monitoring survey result by the JICA Study Team, the road users in Bishkek City do not get used to the road marking and they run on it. Therefore the cushion drums are temporarily installed where will be constructed the traffic island.

The **Picture A23-1.1-7** shows contrast between before and after IS-01.



Picture A 23-1.1-7

The number of pedestrian in the east-west direction is about 5,200 persons (7:00-19:00) by the baseline survey and about 5,600 persons (7:00-19:00) by the 2nd-monitoring survey. For your information, the Shizuoka City also counted the number of pedestrian on 17 November, 2011 and there were 4,200 persons (7:00-19:00) in front of the prefectural government of Shizuoka.

Even if a lot of pedestrians are crossing this intersection, there are not the pedestrian signal and they are confusing the timing of crossing.

23-1.1.8 Implementation Schedule of Traffic Island and Side Walk

Figure A 23-1.1-28 shows the implementation schedule of traffic island and side walk conducted.

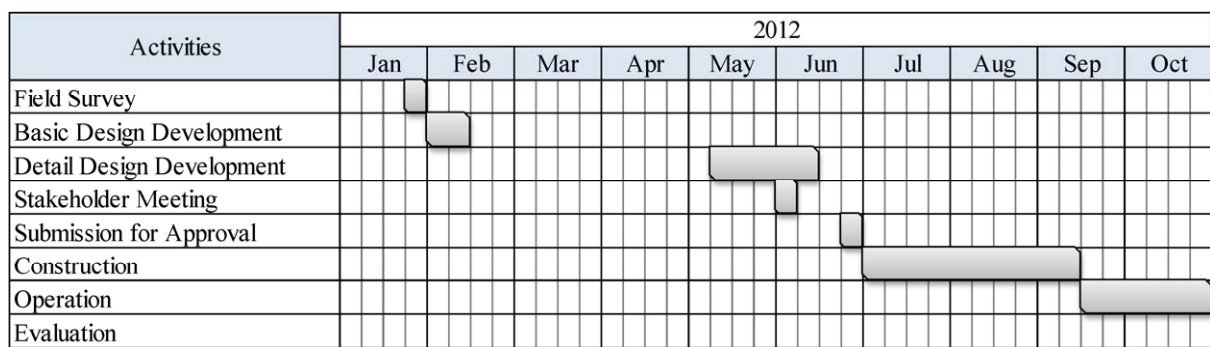


Figure A 23-1.1-28 Implementation Schedule

23-1.1.9 Field Survey

The Topographical Survey and site investigation had been carried out at IS-01 to make basic design such as traffic island, road marking and bus stop improvement in the field survey stage. The topographical map which JICA Study Team obtained from Capital Construction has been used for Intergel'po Intersection for road marking. Figure A 23-1.1-29 & 30 show the output of baseline survey at above 2 intersections.

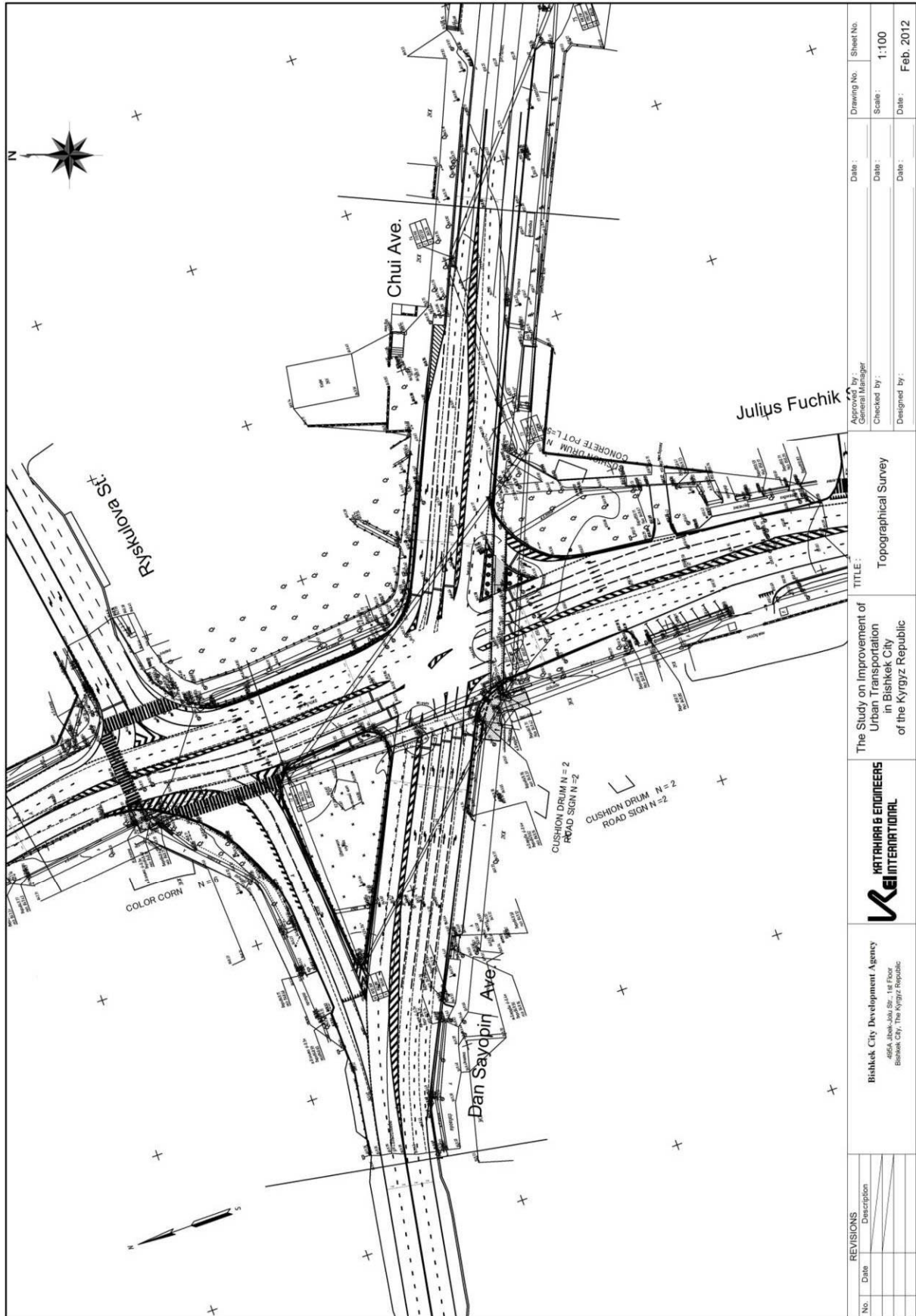


Figure A 23-1.1-29 Baseline Survey at Chui - Fuchik Intersection

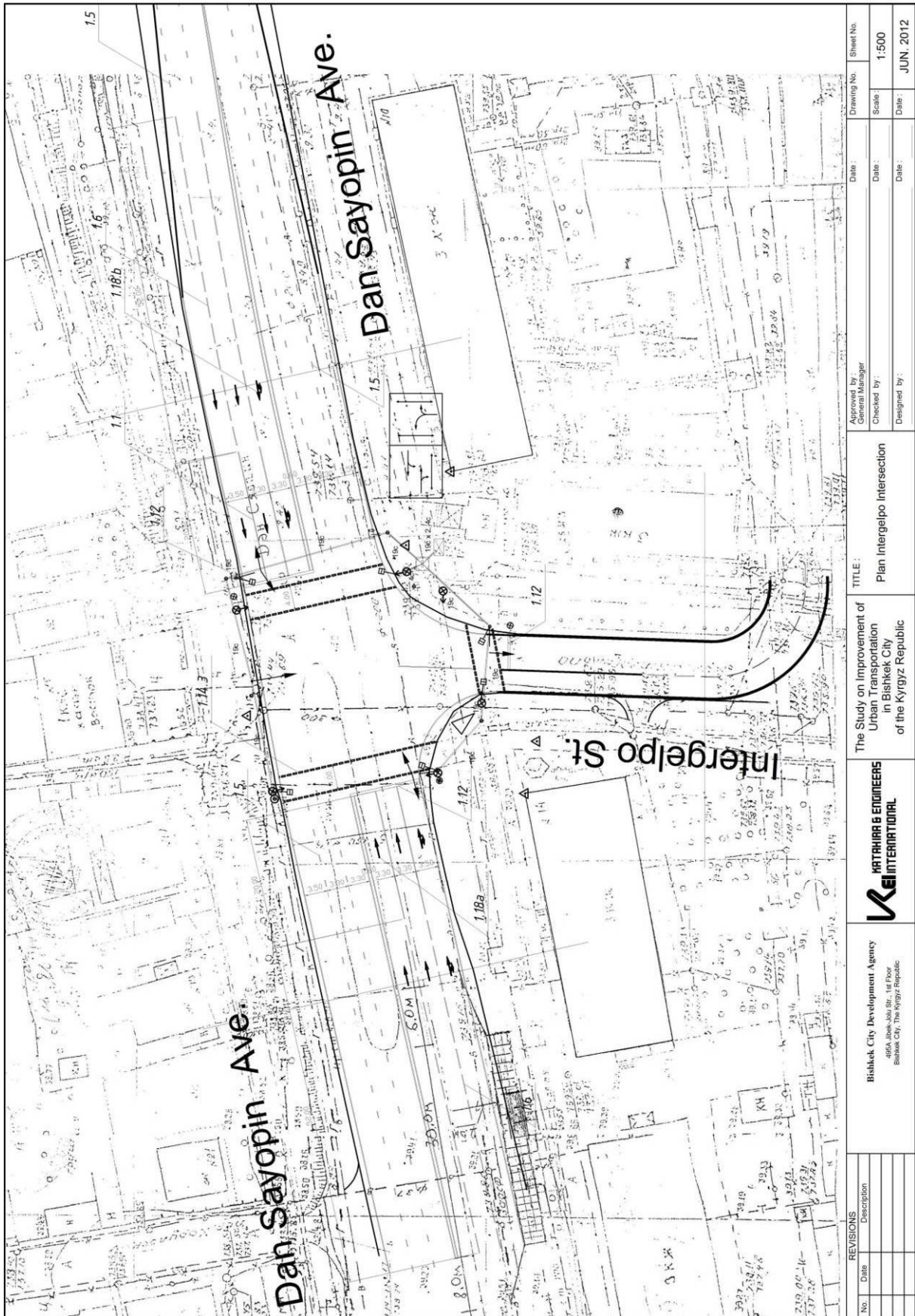


Figure A 23-1.1-30 Baseline Survey at Intergel'po Intersection

23-1.1.10 General Condition of Pedestrian Flow

The pedestrian flow which ties up the vehicle flow is conspicuous at IS-01. The reasons are shown below.

- ✓ The length of pedestrian crossing in the east-west direction is 49.9 m, and in the north-south direction is 30.2 m.
- ✓ The pedestrians are confused without the pedestrian signal.
- ✓ The pedestrians cross the intersection other than pedestrian crossing.
- ✓ The side walk is not good condition due to the broken drainage and gradient of pavement

Picture A 23-1.1-8 shows the above condition.



Pedestrian Crossing



Without the Pedestrian Signal



Pedestrians



Side Walk

Picture A 23-1.1-8

Following table shows basic pedestrian crossing data at Chui-Fuchik Intersection. The pedestrians frequently disturb the traffic flow caused by missing of timing to cross and taking time to cross. Therefore, the pedestrian flow also is an important factor for Traffic Flow Improvement.

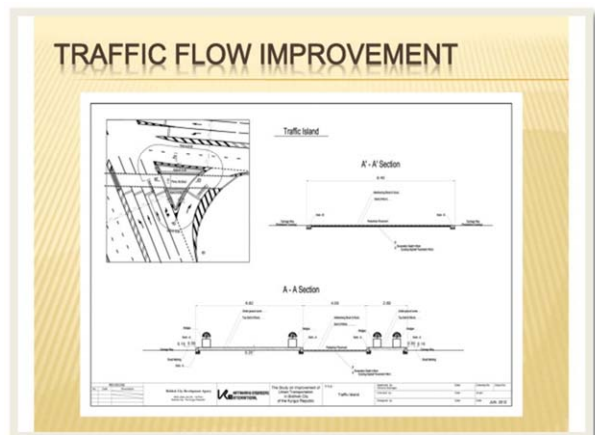
Table A 23-1.1-7 Basic Pedestrian Crossing Data

Location	Length	Width	Side Walk Condition	Volume of Pedestrian / day
East - West Direction	49.9 m	4.0 m	Poor	5600
North - South Direction	30.2 m	4.0 m	Poor	3000

23-1.1.11 Construction of Traffic Island and Improvement of Side Walk

(1) 5th Working Group Meeting

The contents of traffic island construction and side walk improvement were explained by JICA Study Team in the 5th Working Group Meeting (WG meeting). All working group member have agreed our suggestion. The 5th WG meeting was held 5th June.



Picture A 23-1.1-9 5th WG Meeting

(2) Schedule of Construction of Traffic Island and Improvement of Side Walk

Figure A 23-1.1-31 shows the construction schedule of traffic island and side walk conducted.

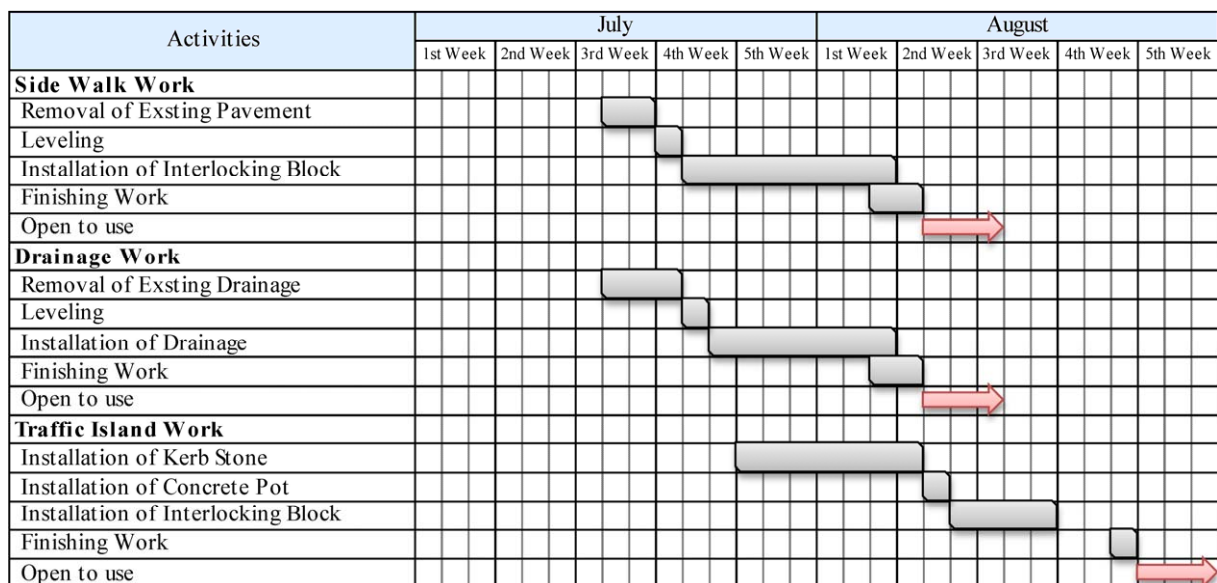


Figure A 23-1.1-31 Work Schedule

(3) Summary for Construction of Traffic Island and Improvement of Side Walk

The contract amount and summary of construction is shown below.

Table A 23-1.1-8 Summary of Contract of Pilot Project II

Items	Description
Project Name	Pilot Project II (Traffic Flow Improvement and Public Transportation Facilities Improvement)
Local Contractor	RM Servise Ltd.,
Construction Cost	USD 112,387.71
Work Period	From 2, July, 2012 to 20, September, 2012
Location	Cui – Fuchik and Intergel'po Intersection

In 2nd year, JICA Study Team grouped Traffic Flow Improvement and Public Transportation Facilities Improvement, and announced the tender the Pilot Project II in final of May. The reason of grouped 2 improvement plans are shown below.

- ✓ To combine the construction of Chui-Fuchik Intersection and bus stop near its intersection.
- ✓ To collaborate the pedestrian flow between its intersection and the bus stop
- ✓ To unify the management of supervise 2 improvement plans

Table A 23-1.1-9 shows summary of Pilot Project II.

Table A 23-1.1-9 Summary of Pilot Project II

Improvement Plan	Description	Volume of Construction	Amount (USD)
Traffic Flow Improvement	Traffic Island	65.06 sq.m	12,256.79
	Side Walk	144.52 sq.m	17,996.44
	Drainage	23.0 m	4645.26
	Road Marking	362.4 sq.m	15,953.91
Public Transportation Facilities Improvement	Pedestrian Underpass	43.8 m	31,400.22
	Bus Stop Shelter	1 unit	20,207.63
	Bus Stop Cage Marking	138 sq.m	9,927.46

(4) Construction Policy of Traffic Island

The traffic island was temporally constructed due to considered to remove. The reason that this project is social experiment and if it is ineffective for the traffic flow and pedestrian flow, can be efficient to remove. According to this policy, the traffic island was constructed without cutting existing asphalt. **Figure A 23-1.1-32** shows the structure of traffic island.

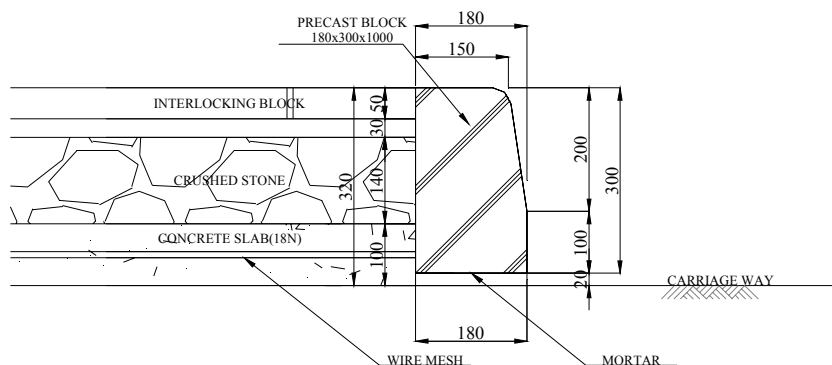


Figure A 23-1.1-32 Structure of Traffic Island

(5) Construction Policy of Side Walk

The side walk was improved by installing interlocking block. The reason for installing interlocking block is not necessary to cure after the construction and pedestrians can pass through immediately. As previously explained, the pedestrians pass through at IS-01 5,600 persons per day in the east-west direction.

(6) Construction Policy of Drainage

The drainages have been installed by precast concrete product under the SNIP standard. The existing drainages were installed by cast in place concrete. The precast concrete accelerated the open to use and can be kept good quality of concrete.

(7) Drawing of Traffic Island and Improvement of Side Walk

In 2nd year, it was necessary to approve the construction drawing by Bishkek City Main Department of Architecture and Bishkek Traffic Safety Department. The reason is shown below.

- ✓ In 1st year, the road marking only was implemented by Pilot Project (Traffic Flow Improvement).
- ✓ Pilot Project II consists of construction of traffic island and improvement of side walk, bus stop, and pedestrian underpass.
- ✓ In order to avoid the damages to other existing infrastructure (underground and spatial), drawings were verified
- ✓ The above matter is responsible for the control of Bishkek City Main Department of Architecture.

Figure A 23-1.1-33, 34 and 35 shows the approval drawing of traffic island and sidewalk.

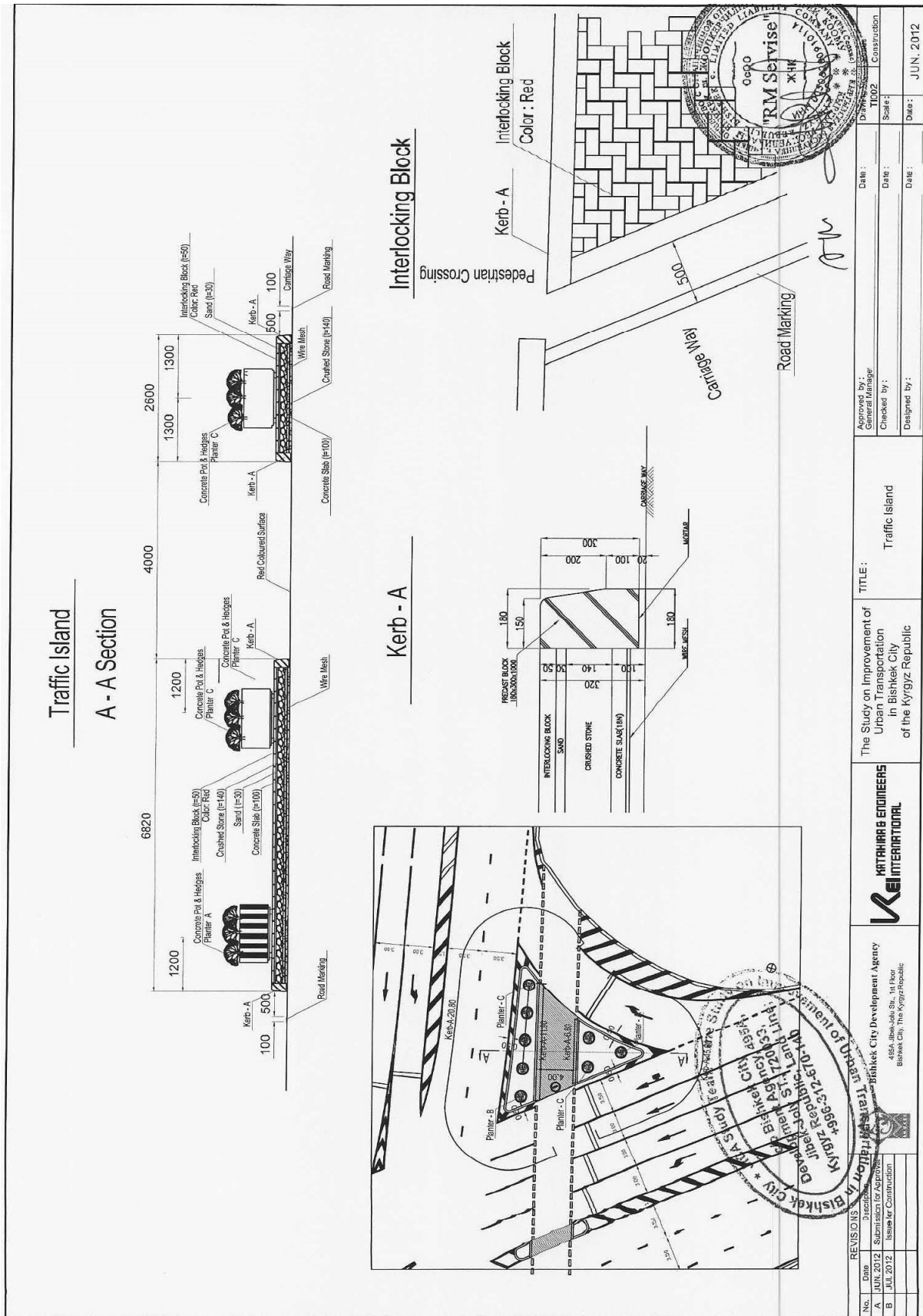


Figure A 23-1.1-33 Approval Drawing of Traffic Island

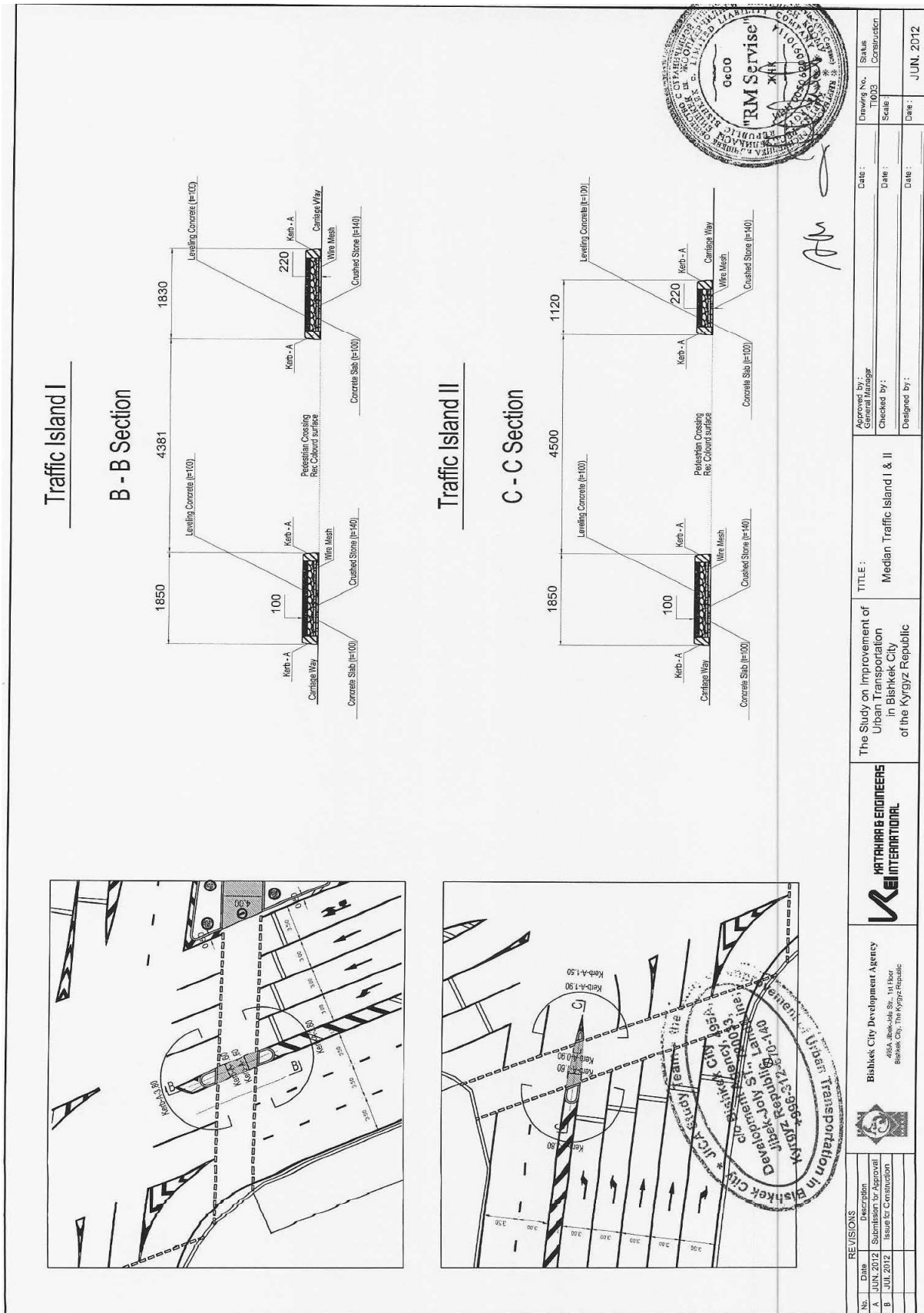


Figure A 23-1.1-34 Approval Drawing of Traffic Island

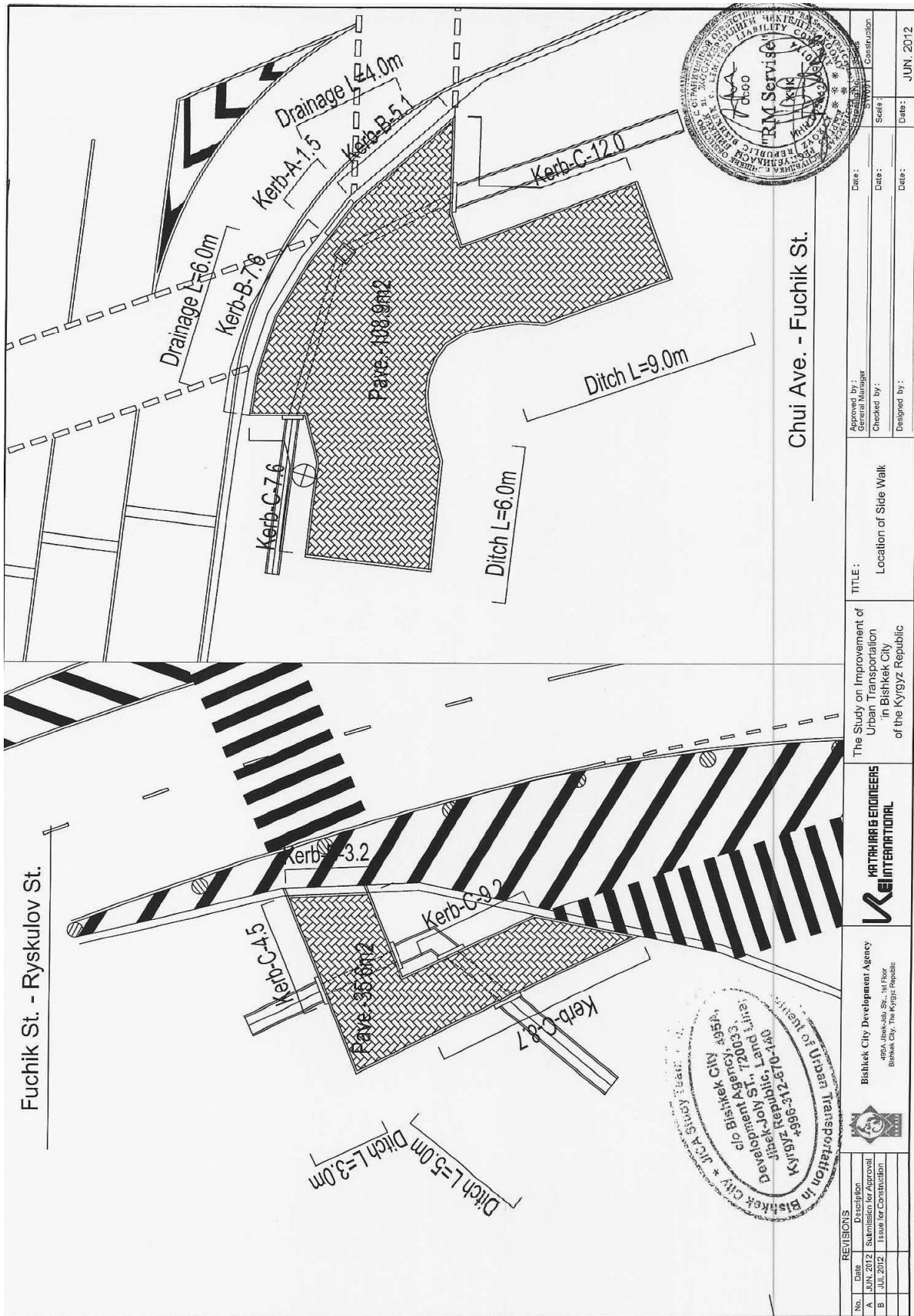


Figure A 23-1.1-35 Approval Drawing of Sidewalk

(8) Result of Traffic Island Construction and Side Walk Improvement

The **Picture A 23-1.1-10** shows the before and after



Before

In 1st year, only cushion drums were installed. After the installation, they were damaged by road users.



After

The corner of traffic island will be finished after the installation of traffic signal pole.



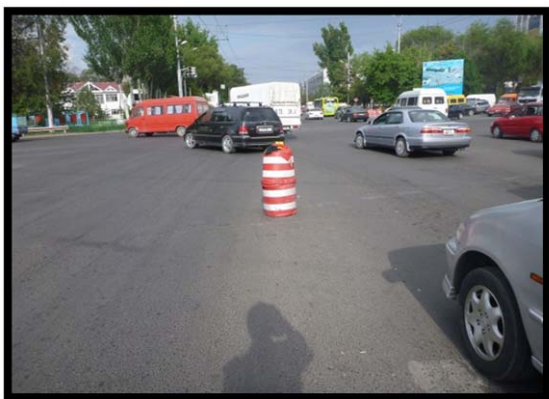
Before

Same of the above coment. This picture is in the south approach.



After

The traafic island has been installed and the marking also has been done.



Before

Same as above comment. This picture is in the west approach.



After

Same as above comment.



Before

There is puddle in the side walk in the winter season and it is not easy to walk. This is the part southwest of the intersection.



After

The interlocking blocks have been installed. The difference height was eliminated between side walk and road level.



Before

There is flatness and it is not easy to walk. This is the part southwest of the intersection.



After

The interlocking block has been installed. The difference height was eliminated between side walk and road level.



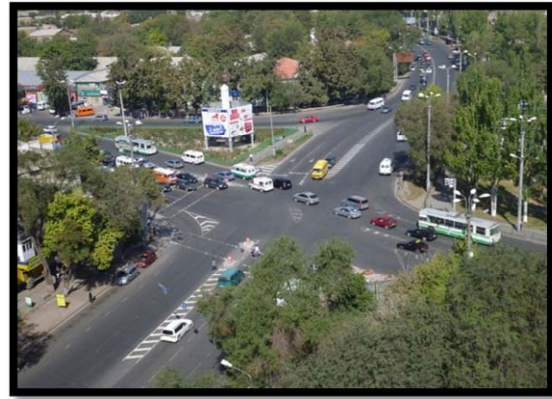
Before

This ditch was constructed by installing concrete cover at the both side of ditch.



After

The precast concrete drainage has been installed. The drainage pipe also has been replaced.



Before

Some part of road marking is still at IS-01 in June, 2012.

After

The road marking has been done at a minimal length, 30m from the center of the intersection in September, 2012.



Before

There are not road markings at the Intergel'po Intersection.

After

The road markings have been done at a minimal length, 30m from the center of the intersection in September, 2012.



Before

The advertisement was installed in September, 2011. This is for the road marking announcement only.

After

This advertisement is for Pilot Project II (Traffic Flow Improvement and Public Transportation Facilities Improvement).

Picture A 23-1.1-10 Before and After

23-1.1.12 Road Marking at the Chui - Fuchik Intersection

(1) Condition of Road Markings in October, 2011

The road markings which has been lined out in October, 2011 were almost disappeared. The causes of road

markings disappearance are shown below.

- ✓ It is difficult to heat-seal due to the old pavement surface.
- ✓ The pavement surface is soiled with oil and/or car exhaust.
- ✓ The road users do not obey the traffic rules and they run on the marking by car.

Picture A 23-1.1-11 shows the condition of pavement.



Picture A 23-1.1-11 Soiled Pavement Surface with Oil and / or Car Exhaust

(2) Road Markings Installation for Vehicle Flow

The road markings have been lined out due to the above described at IS-01 in 2nd year. The objective of road marking construction in 2nd year is to reflect the effect of Traffic Signal System Improvement. The road markings have been lined out 30m on each approach from center of intersection, and total road marking area including lane marking, allows and pedestrian crossing line are 310.4 sq.m.

Picture A 23-1.1-12 shows road markings at IS-01.



Picture A 23-1.1-12 Road Marking for Vehicle Flow

(3) Road Markings Installation for Pedestrian Flow

The red colored surface has been done to accent the pedestrian crossing at the traffic island. The marking area of pedestrian flow is 52 sq.m. The implementation was done in the night time from 8 o'clock due to

avoidance of peak time.

Picture A 23-1.1-13 shows road marking for pedestrian flow.



Picture A 23-1.1-13 Road Marking for Pedestrian Flow

23-1.1.13 Evaluation of Pilot Project

The 1st monitoring survey was carried out on 15 November, 2011 and 2nd monitoring survey was on 28 March, 2012 after Traffic Signal System improved. The aim of 3rd monitoring and 4th monitoring survey was to evaluate the Pilot Project by comparing the traffic surveys which were carried out in 2011 and 2012. Therefore, the survey contents are the same of previous survey as below.

- (1) Traffic Count by Direction
- (2) Traffic Queue Length
- (3) Travel Speed Survey
- (4) Signal Cycle Survey
- (5) Public Opinion Survey

In this section, the pilot project is evaluated comparing previous data and 3rd and 4th monitoring survey data.

23-1.1.13.1 Traffic Count by Direction

- (1) Comparison of Traffic Volume

Table A 23-1.1-10 shows the traffic volume summary. According to the result of traffic volume data, there are 3 singular numerical numbers with grey hatching, discussed further below, these numerical numbers have an impact on the result of queue and residual length survey.

Table A 23-1.1-10 Summary of Traffic Volume

Unit: VEH													
	Direction No.	Baseline Survey-1		Baseline Survey-2		1st-Monitoring Survey		2st-Monitoring Survey		3st-Monitoring Survey		4st-Monitoring Survey	
		29-Sep-11	Total	30-Sep-11	Total	20-Oct-11	Total	17-Nov-11	Total	15-Nov-12	Total	28-Mar-13	Total
Eastern	1	1,971	12,984	1,618	11,683	1,386	11,348	1,316	12,822	1,111	18,110	1,067	11,728
	2	10,078		9,324		8,921		8,953		15,487		9,852	
	3	935		741		1,041		2,553		1,512		809	
Southern	4	1,975	7,850	1,997	8,643	1,908	8,010	2,238	9,720	2,166	9,263	1,404	7,671
	5	3,943		4,877		3,944		6,151		5,565		4,507	
	6	1,932		1,769		2,158		1,331		1,532		1,760	
Western	7	2,506	26,143	2,818	27,891	2,894	22,920	2,700	20,162	2,403	19,535	3,038	19,686
	8	18,146		16,067		10,572		9,393		7,776		10,331	
	9	5,491		9,006		9,454		8,069		9,356		6,317	
Northern	10	4,222	11,774	4,874	15,950	5,901	12,113	7,525	12,468	6,412	10,723	3,598	9,358
	11	4,435		8,177		4,471		2,965		2,774		4,267	
	12	3,117		2,899		1,741		1,978		1,537		1,493	
Total		58,751		64,167		54,391		55,172		57,631		48,443	

The reason of these numerical numbers is to be rehabilitated and improved the streets which are shown in **Table A 23-1.1-11** and **Figure A 23-1.1-36**. The road users had gone through Chui-Fuchik Intersection instead of alternative road during the construction period. Therefore, the traffic volume of 4th-Monitoring Survey resulted less than other monitoring surveys.

The street name and schedule of rehabilitation and improvement project are shown as below.

Table A 23-1.1-11 Road Network Condition around Chui-Fuchik Intersection

No.	Street Name	Section	Length (m)	Type of Construction	Construction Period
1	Pavlova St.	Chui Ave.to Ryskulova St.	300	Rehabilitation	June, 2012 to November, 2012
2	Kulieva St.	Chui Ave.to Ryskulova St.	300		
3	Zelenaya St.	Chui Ave.to Ryskulova St.	300		
4	Beishenaliyeva St.	Chui Ave.to Ryskulova St.	300		
5	Dimitrova St.	Intergel'po St. to Pishpekskaya St.	340		
6	Pishpekskaya St.	Den Syaopin St. to Moskovskaya St.	500	Improvement	
7	Moskovskaya St.	Fuchik St. to Intergel'po St.	440	Rehabilitation	
8	Kievskaya St.	Kulieva St. to Fuchik St.	680	New Construction	

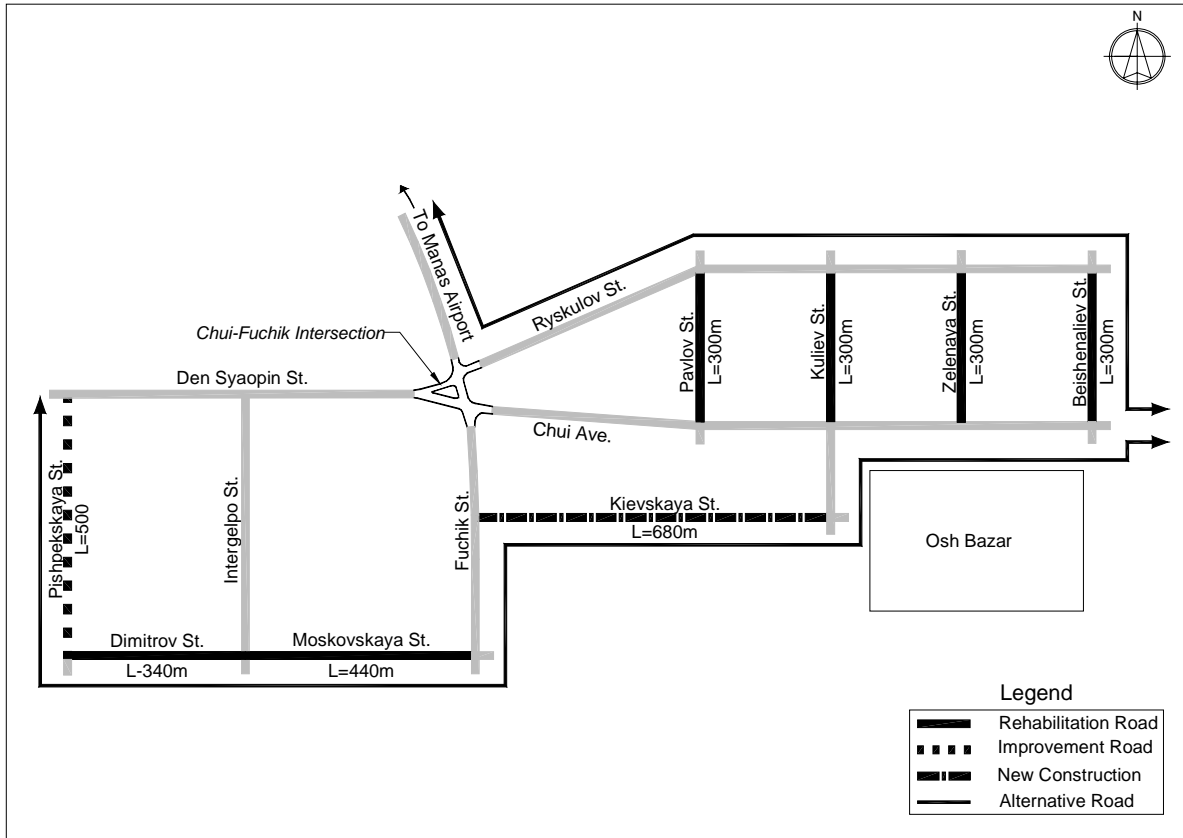


Figure A 23-1.1-36 Road Network Condition around Chui-Fuchik Intersection

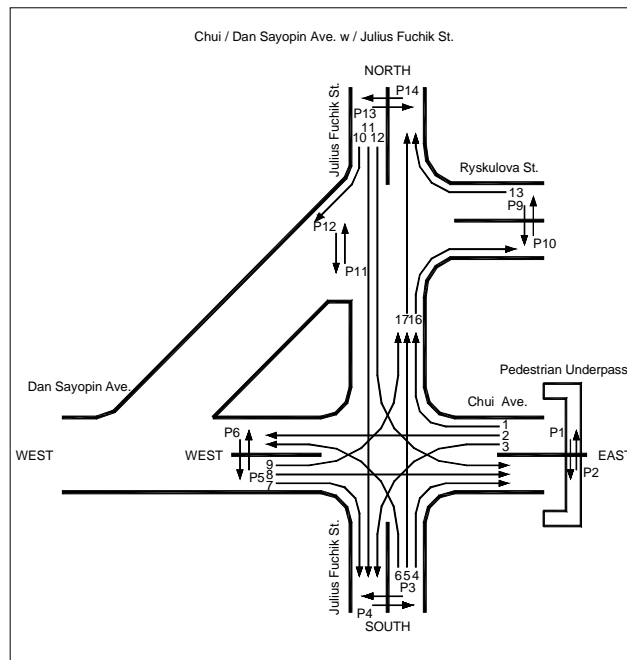


Figure A 23-1.1-37 Traffic Count by Direction

(2) Peak Hour Traffic Volume

The peak hour was considered 3 times a day; Morning Peak Hour (7:00-11:00), Daytime Peak Hour (11:00-15:00) and Evening Peak Hour (15:00-19:00).

There is a difference of 800VEH to compare the peak hour traffic volume of 3rd-Monitoring Survey to **Table A 23-1.1-11**. Fourth Monitoring Survey data is due to the influence of road network circumstance around IS-01. These monitoring survey data is shown in **Table A 23-1.1-12**.

Table A 23-1.1-12 Peak Hour Traffic Volume (PCU) by 3rd- Monitoring & 4th-Monitoring Survey

Survey Date: 15 November, 2012 (Thursday)

Time Zone	Classification	Sedan, Pickup, Minivan	Mimbus	Midibus	Trolleybus, Big Bus	Light Truck	Heavy Truck	Total in VEH	Total in PCU	Proportion
	PCU	1.0	1.5	2.0	3.0	2.0	3.0			
Morning	10:00-11:00	3833	1115	44	18	227	54	5291	6266	0.98
Daytime	12:00-13:00	3854	1134	38	14	143	65	5248	6157	0.96
Evening	18:00-19:00	4579	1116	25	13	134	40	5907	6732	1.05
Average		4089	1122	36	15	168	53	5482	6385	1.00

Survey Date: 28 March, 2013 (Thursday)

Time Zone	Classification	Sedan, Pickup, Minivan	Mimbus	Midibus	Trolleybus, Big Bus	Light Truck	Heavy Truck	Total in VEH	Total in PCU	Proportion
	PCU	1.0	1.5	2.0	3.0	2.0	3.0			
Morning	8:00-9:00	3329	1301	54	13	108	44	4849	5779	1.03
Daytime	11:10-12:10	2909	1148	46	24	111	51	4289	5175	0.93
Evening	17:40-18:40	3452	1135	43	12	135	87	4864	5810	1.04
Average		3230	1195	48	16	118	61	4667	5588	1.00

(3) Vehicle Movement

As the result of 3rd-Monitoring Survey in November, 2012 and 4th-Monitoring Survey in march, 2013, the traffic volume is decreased because of road network circumstance around IS-01. However, the proportion of traffic flow is not changed.

The vehicle movement for each peak hour traffic volume is shown in **Figure A 23-1.1-38 & 39**.

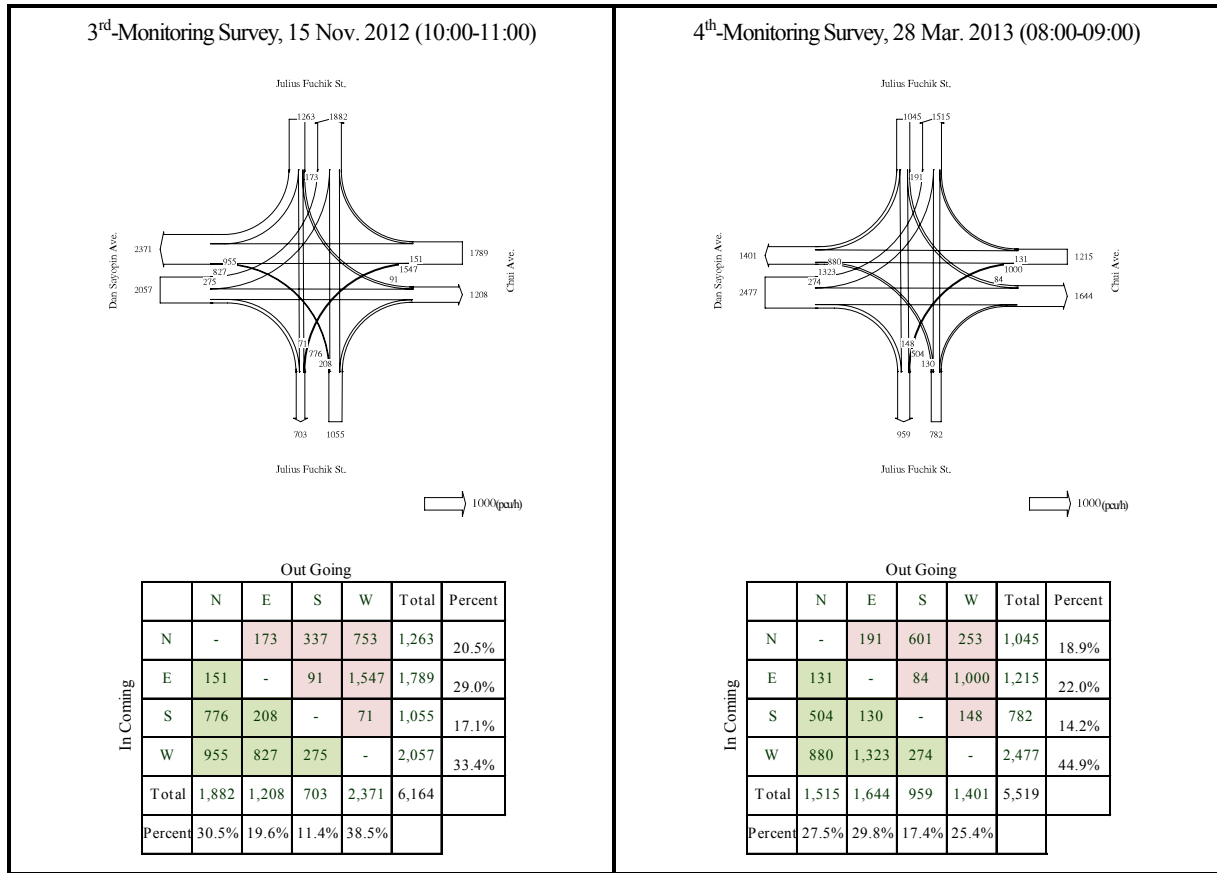
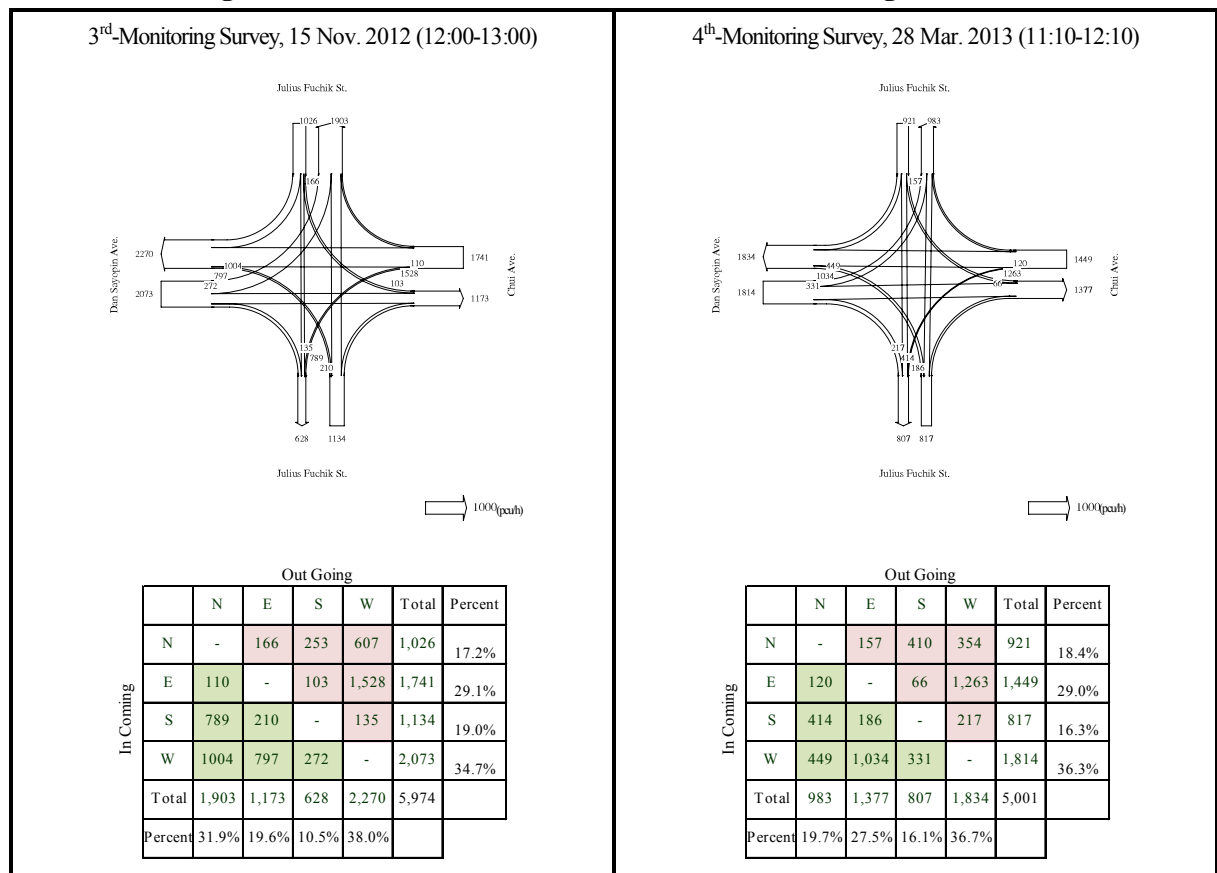


Figure A 23-1.1-38 Vehicle Movement at IS - 01 for Morning Peak Hour



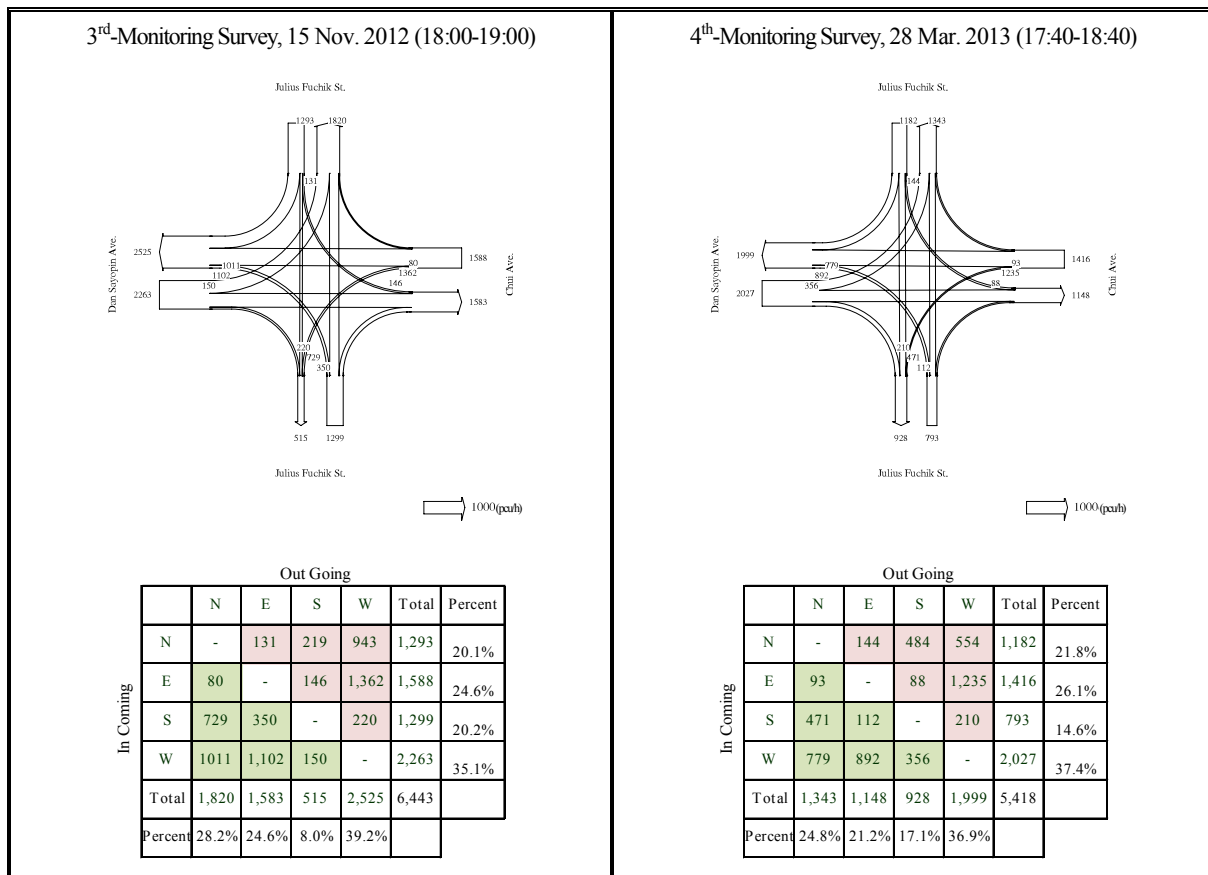


Figure A 23-1.1-39 Vehicle Movement at IS - 01 for Daytime & Evening Peak Hour

(4) Pedestrian Movement

According to the result of 3rd-Monitoring Survey, the numbers of pedestrian who passed through the pedestrian underpass were totally 53. In addition, 4th-Moning Survey resulted that there were 662 numbers to pass through pedestrian underpass. Before the improvement of pedestrian underpass, no one used this underpass. Therefore, it is said that it got high effect by Public Transportation Facilities Improvement. Actually, the people are sometimes crossing on the road at east side of intersection even if there is no pedestrian crossing. However, almost of people are using this underpass.

The pedestrian flow of south side of intersection is also improved by the construction of traffic island. The pedestrian flow encumbered the traffic flow by crossing at the pedestrian crosswalk of south side because it was a long distance. However, they do not have to cross in one sitting and they can stop and wait until pedestrian signal is changed at the traffic island.

There are two issues in the future. One is some people do not observe the pedestrian signal and other is the vehicles drivers do not stop before the stop line and the pedestrian signal is completely hidden from the people.

The pedestrian movement at IS-01 in each peak hour traffic volume is presented below;

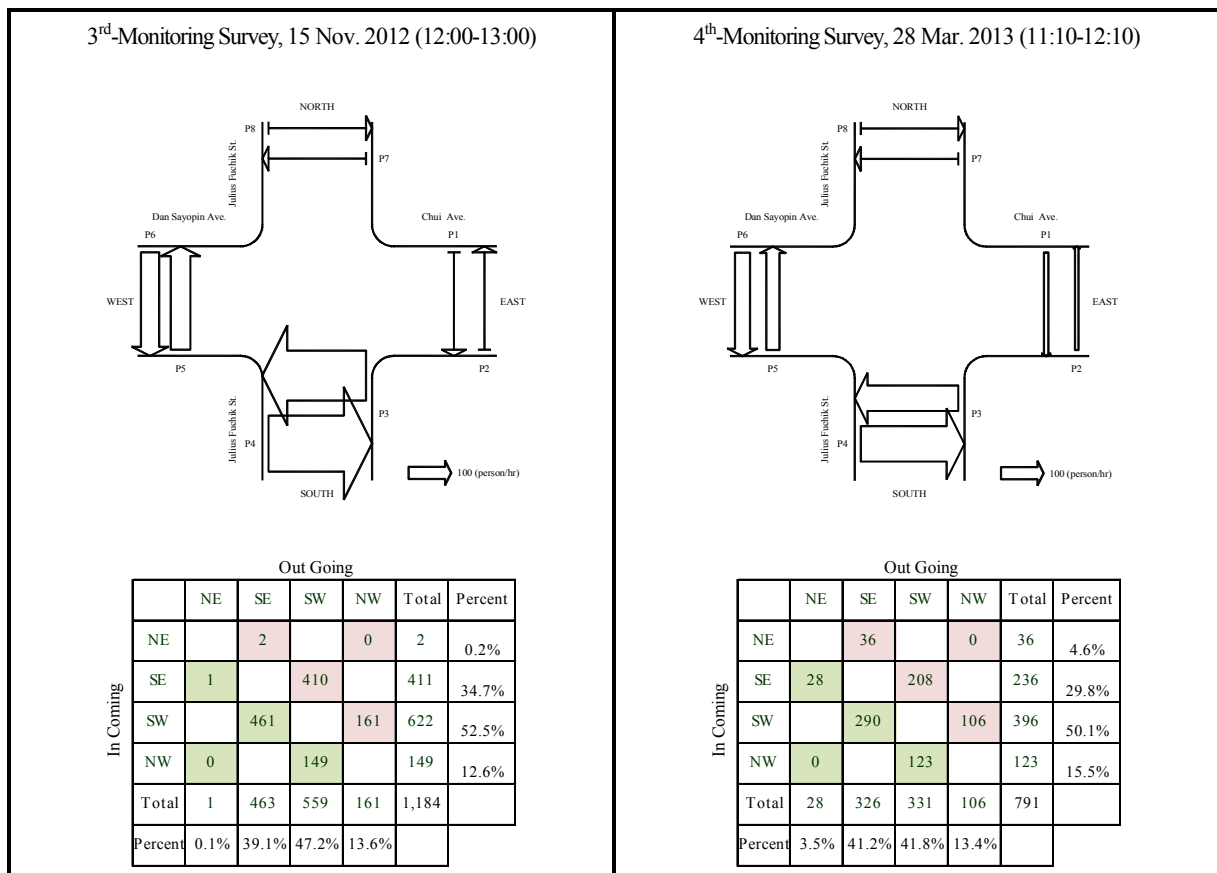
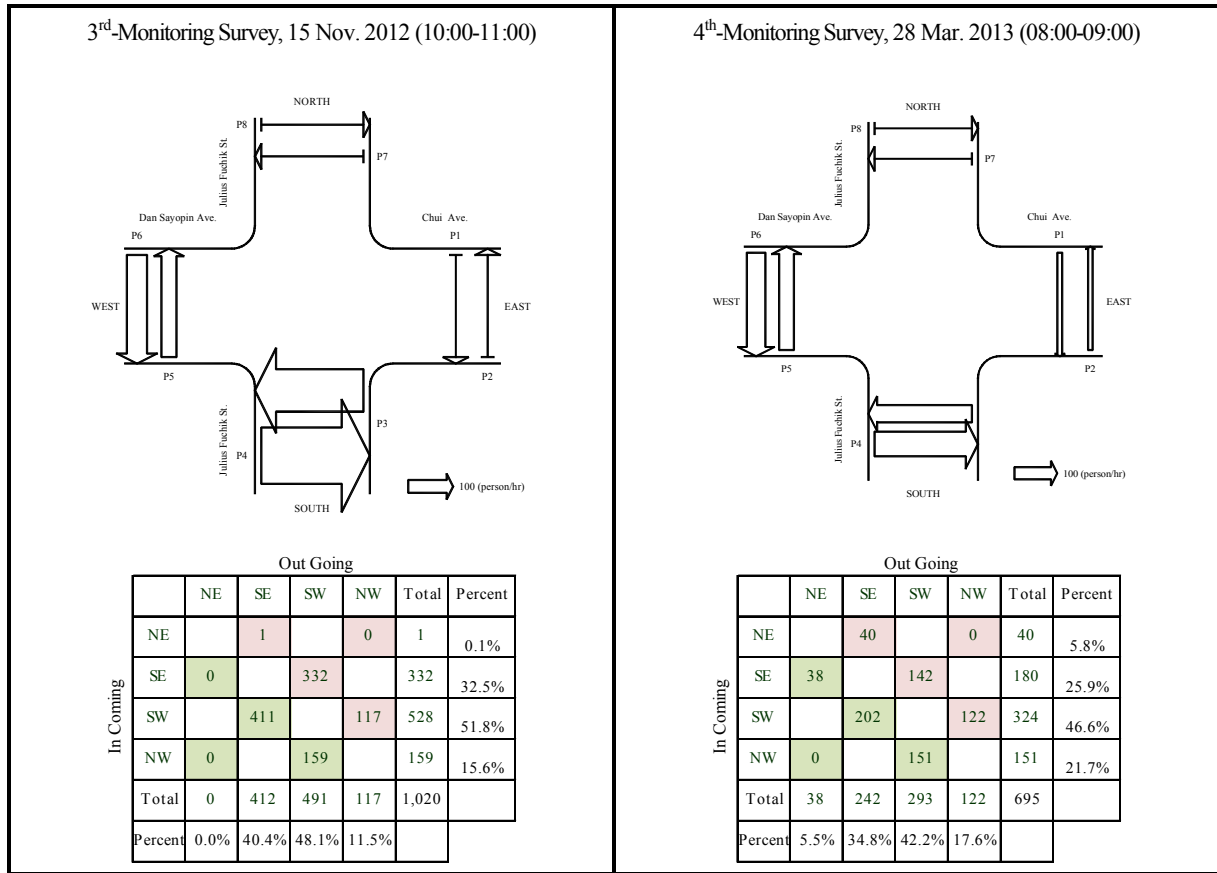


Figure A 23-1.1-40 Pedestrian Movement at IS - 01 for Morning and Daytime Peak Hour

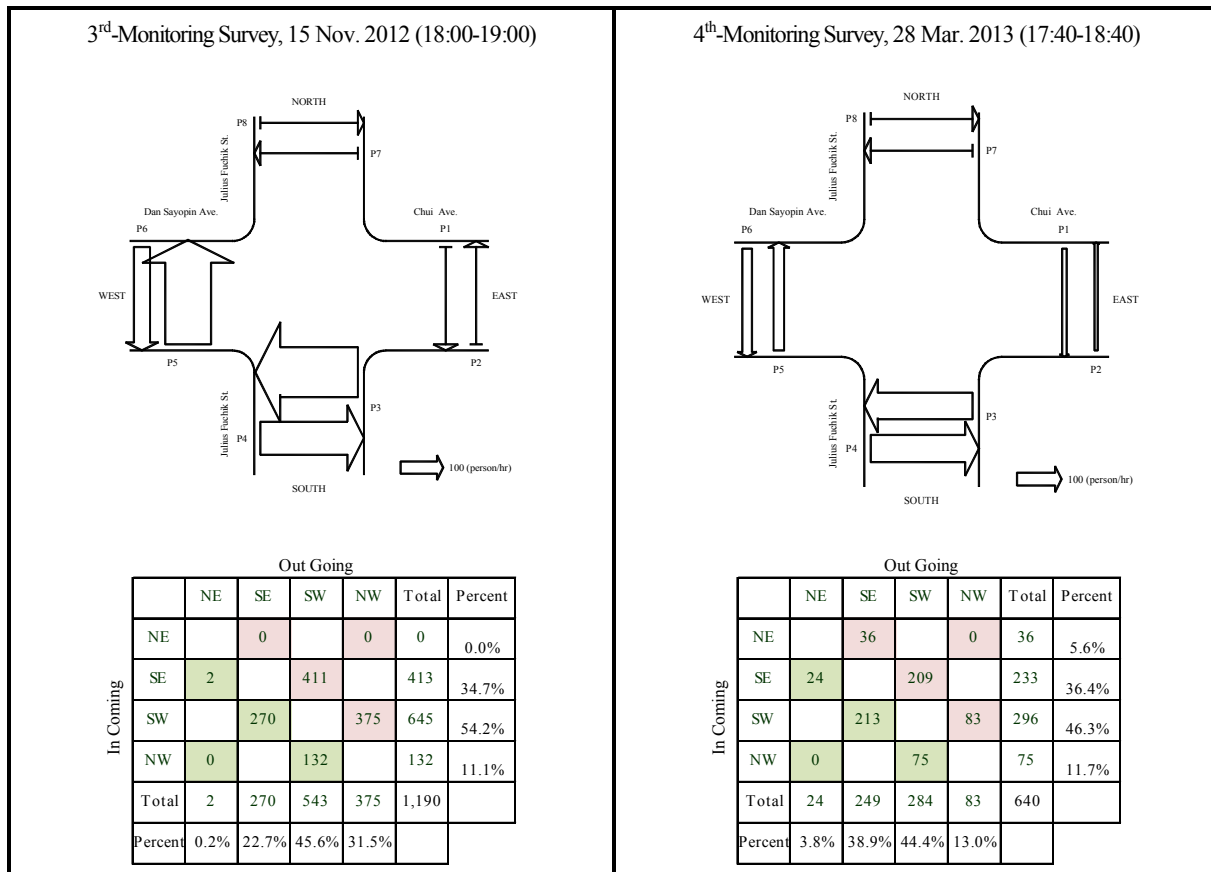


Figure A 23-1.1-41 Pedestrian Movement at IS - 01 for Evening Peak Hour

23-1.1.13.2 Traffic Queue & Residual Length

Figure A 23-1.1-42 to 45 shows the queue and residual length with compiling the max length of each survey hour. The charts are selected 4 surveys data such as Baseline Survey on 29 September, 2011, 2nd, 3rd and 4th-Monitoring Survey from all surveys which the JICA Study Team carried out. According to Figure A 23-1.1-42 and A 23-1.1-44, the averaged queue lengths were approximately 100m and the averaged residual lengths were between 30m and 100m at west and east approach. It might be said that the phase duration and/or phase sequence were not applicable.

The Traffic System Improvement has been finished on 31 October, 2012 and monitoring surveys were implemented 2 times on 15 November, 2012 and 28 March, 2013. Then, the pilot project, Traffic Flow and Traffic Control System Improvement have been evaluated the efficacy of improvement by comparing to the queue and residual length of western and eastern approach. As the result of 3rd-Monitoring Survey in Figure A 23-1.1-42, it was not improved caused by road network circumstance as it mentioned in “23-1.1.13. 1(1) Comparison of Traffic Volume”.

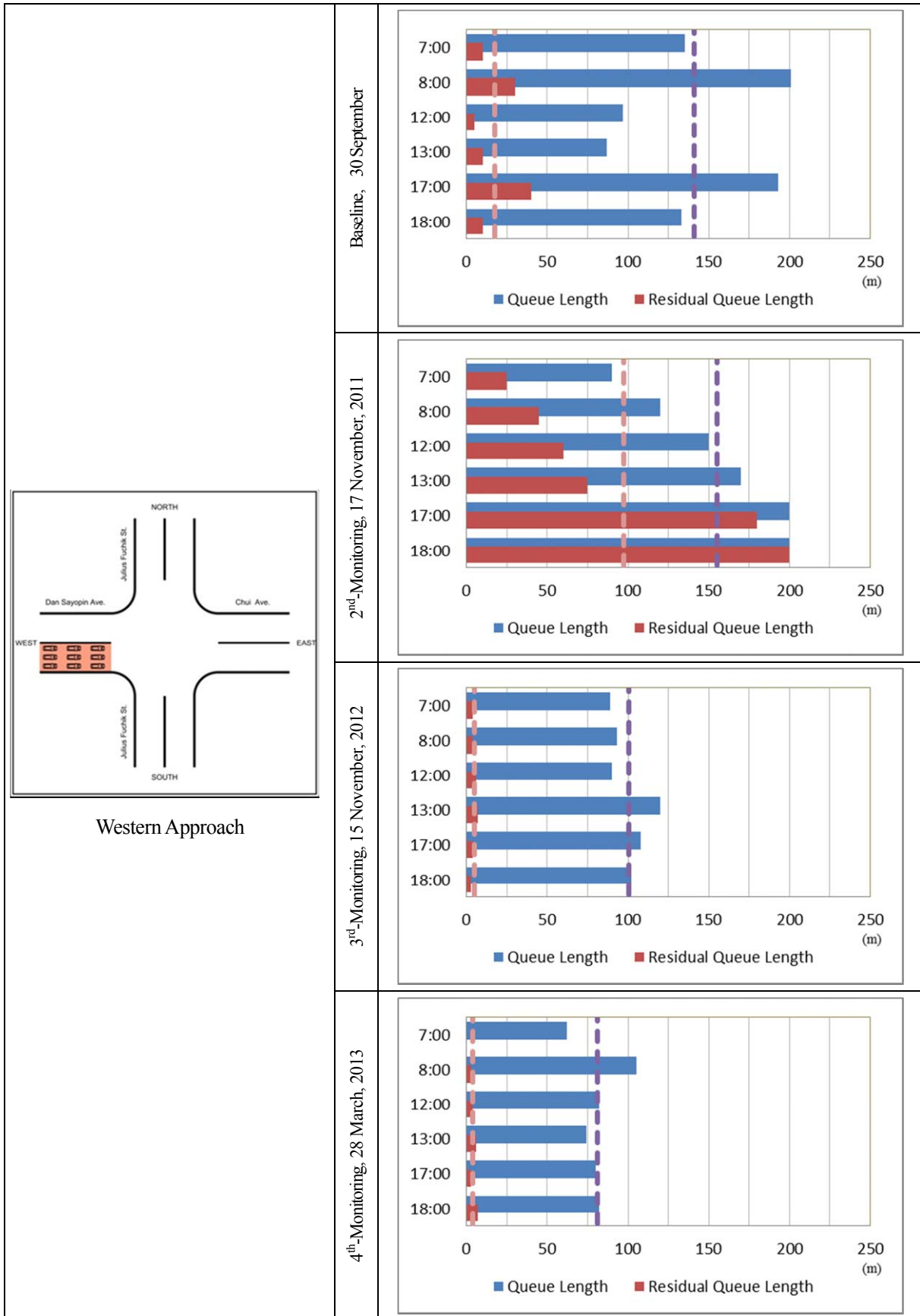


Figure A 23-1.1-42 Traffic Queue Length along the West Approach

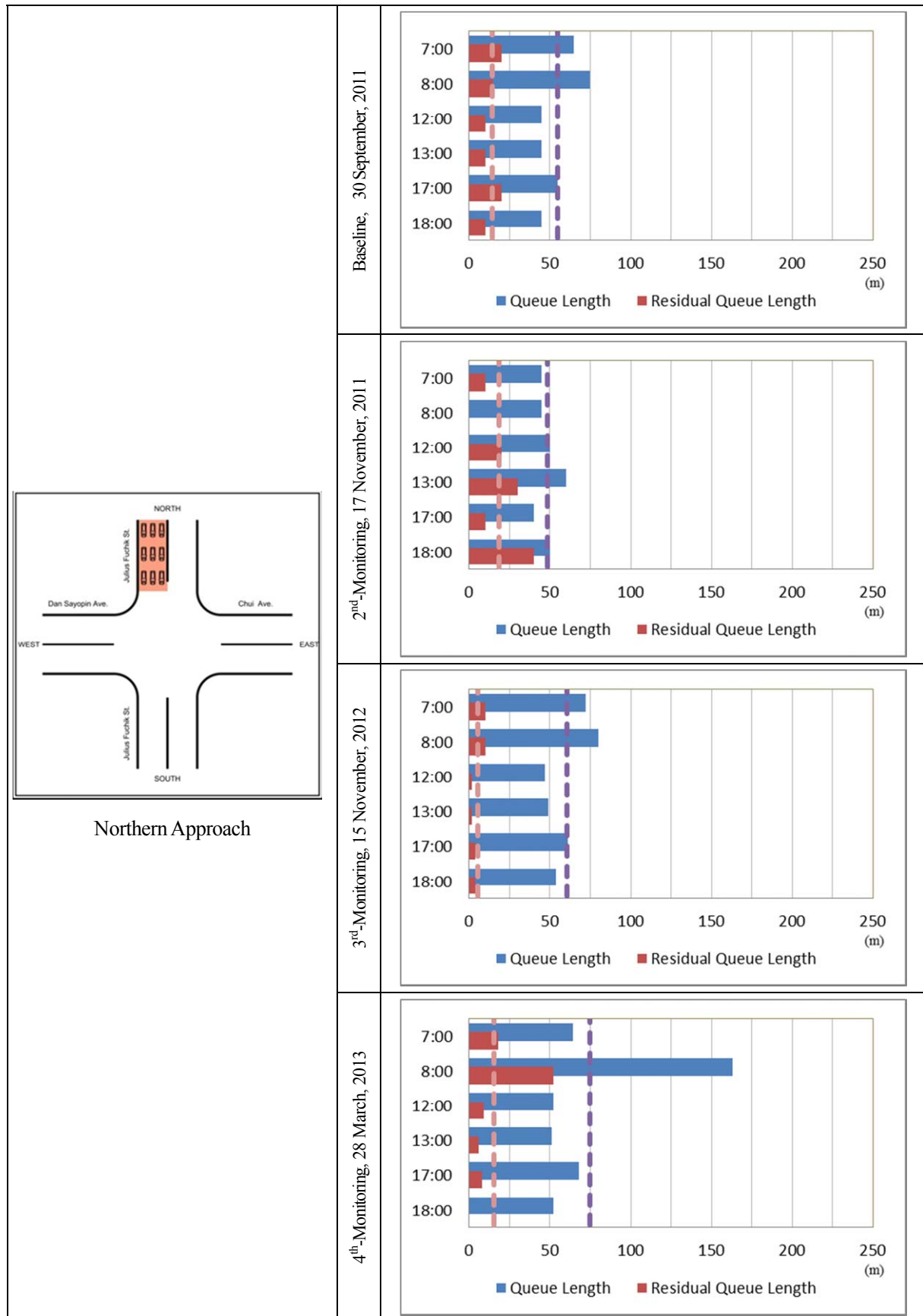


Figure A 23-1.1-43 Traffic Queue Length along the North Approach

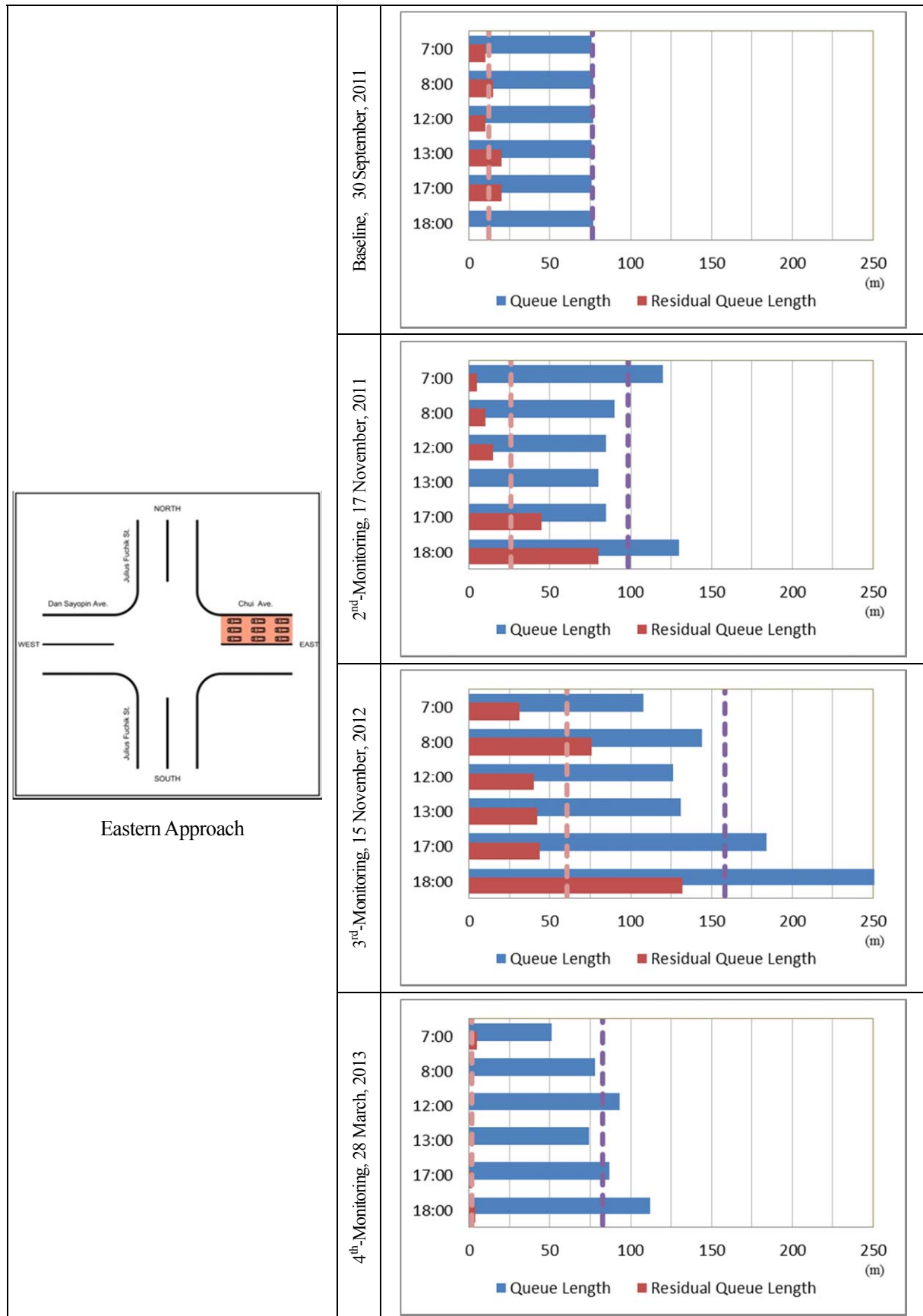


Figure A 23-1.1-44 Traffic Queue Length along the East Approach

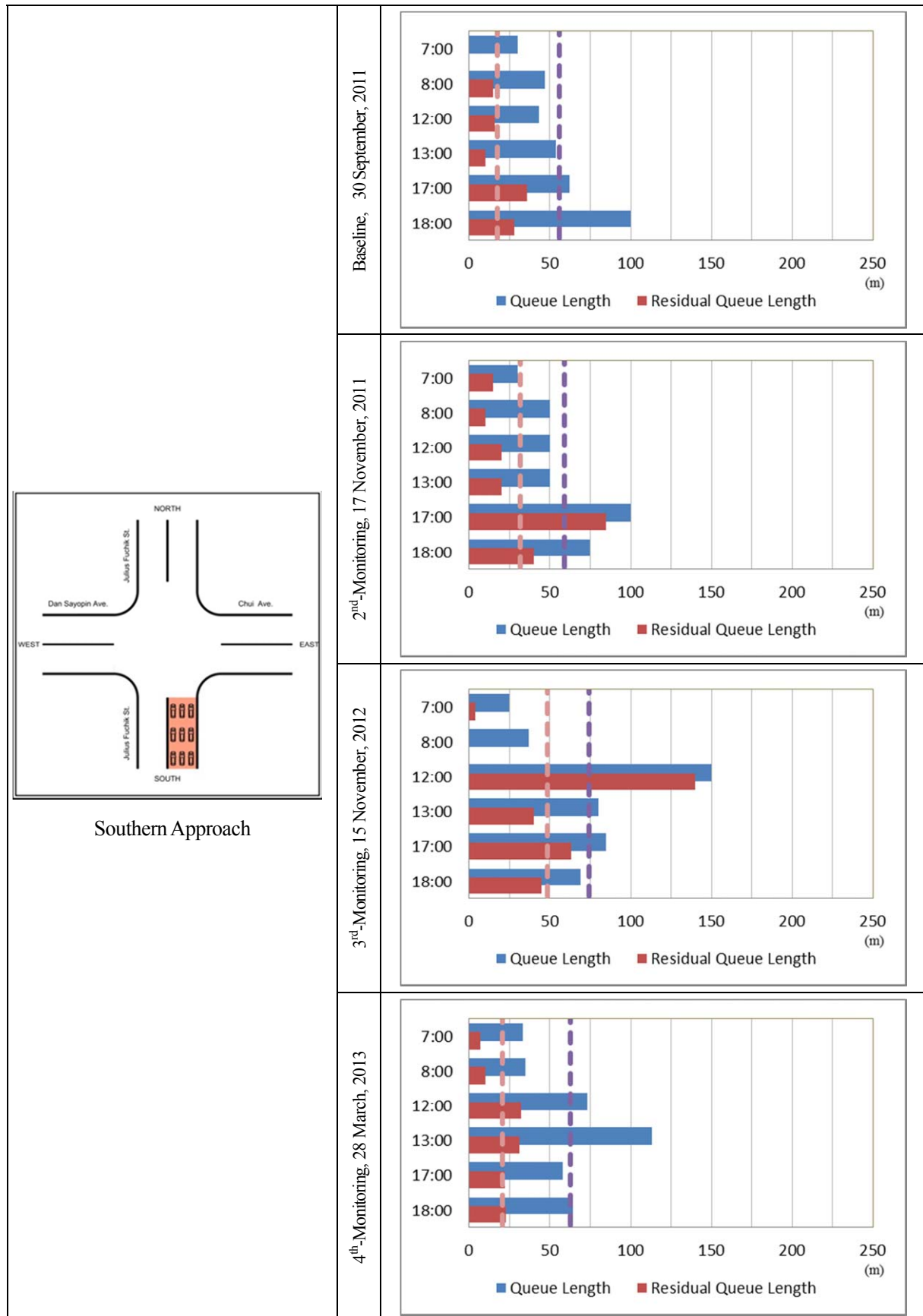


Figure A 23-1.1-45 Traffic Queue Length along the South Approach