Study and Analysis of Traffic Problems in Ramallah and Al_Beireh City Center

Submitted By:

Ihab Mahmoud Fayyt.

Supervisor:

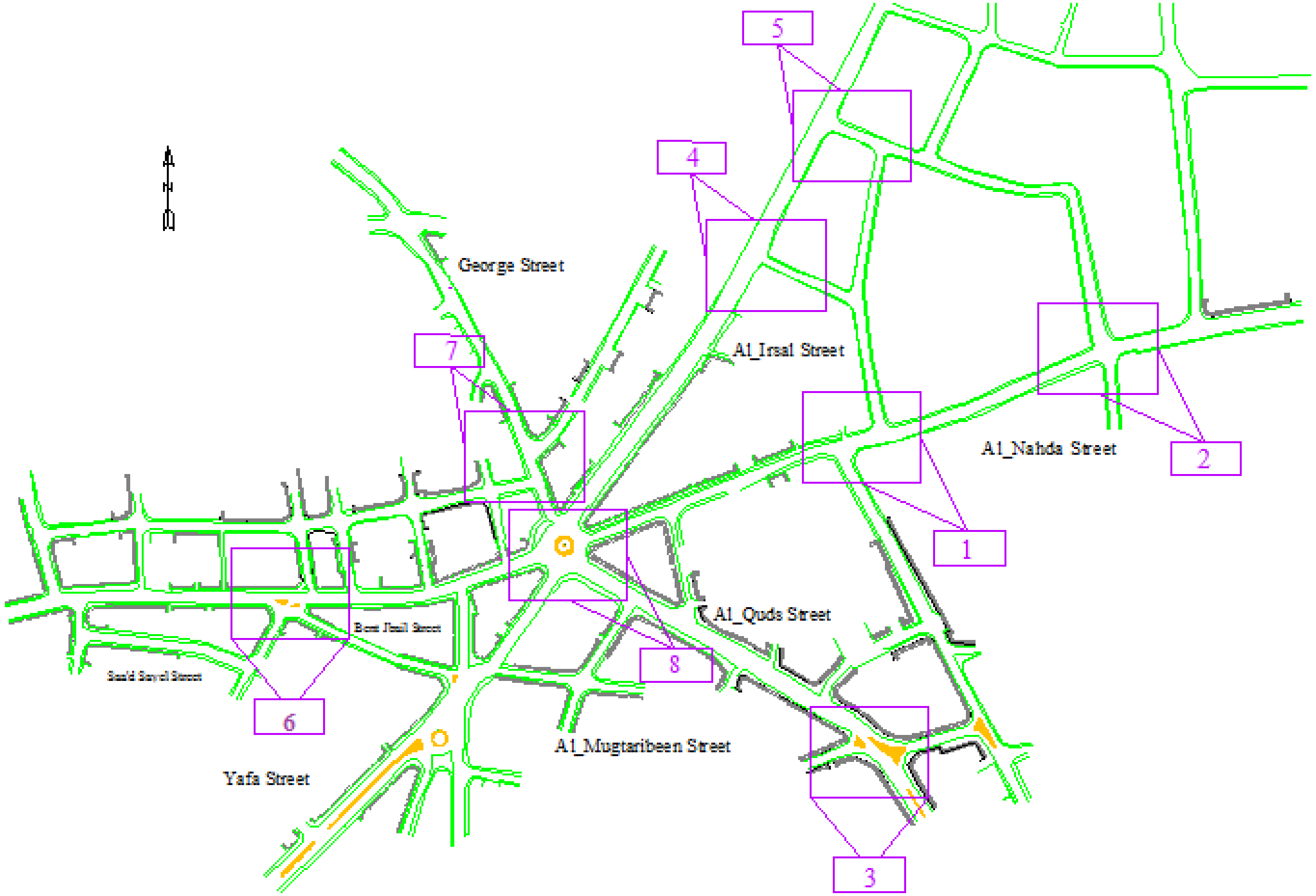
Dr. Wael AlHajyaseen.

Case Study

- ✓ Studying the current situation and existing problems of the traffic system in Ramallah and Al-Beireh CBD area.
- ✓ Collection a required data from different resources.
- ✓ Analysis of collecting data using traffic programs.
- ✓ Trying to find the best solution for each links and nodes problems.

Study area

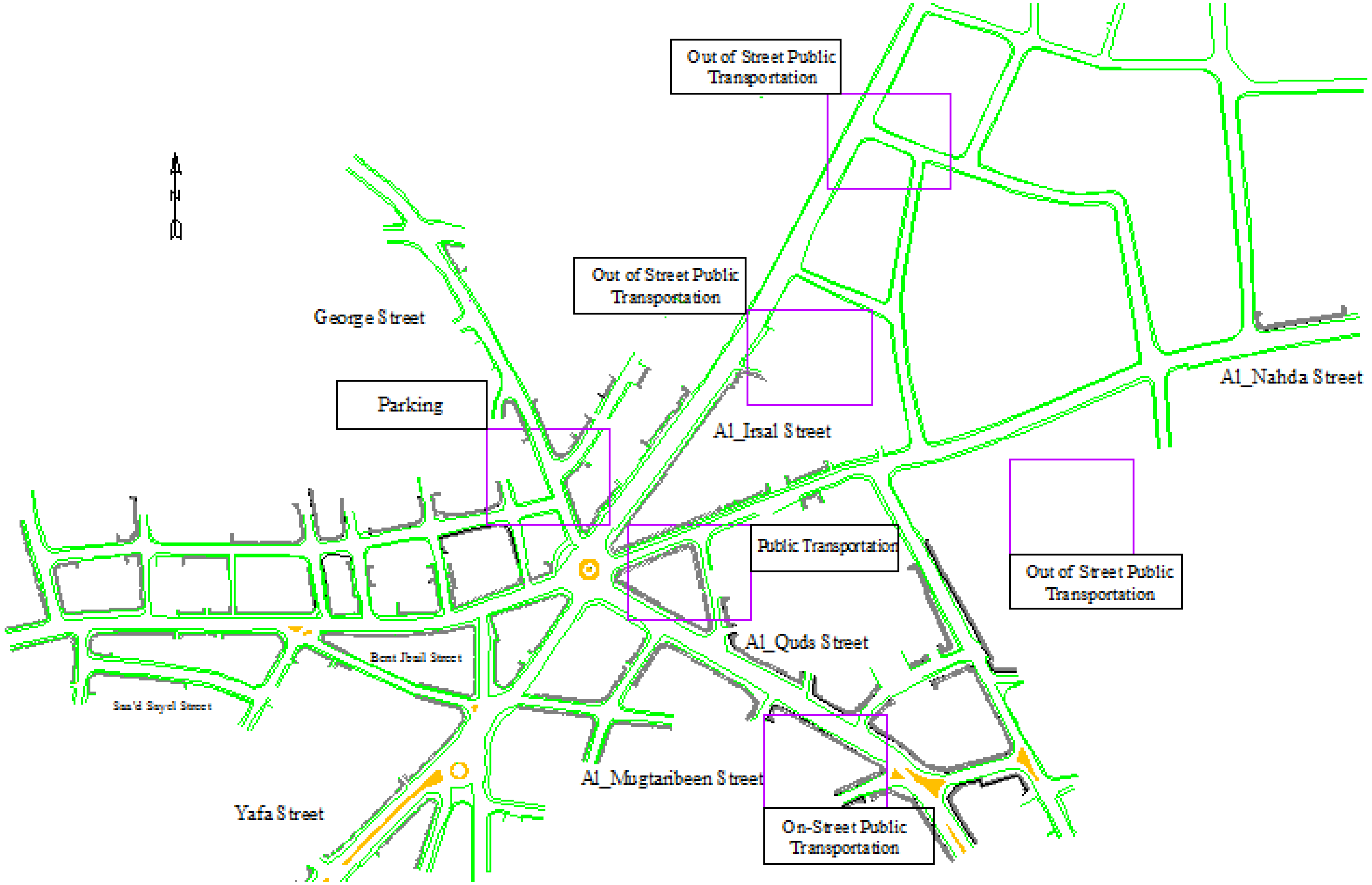
- Study area was selected to be Ramallah and Al-Beireh CBD area.
- Most congested intersections and links were included in study in CBD area.



Why this Study Area was selected ???

- ✓ The most congested area in the city of Ramallah and Al-Beireh cities, because it connects all parts of the cities with each other.

- ✓ Concentration of public transportation parking inside CBD area.



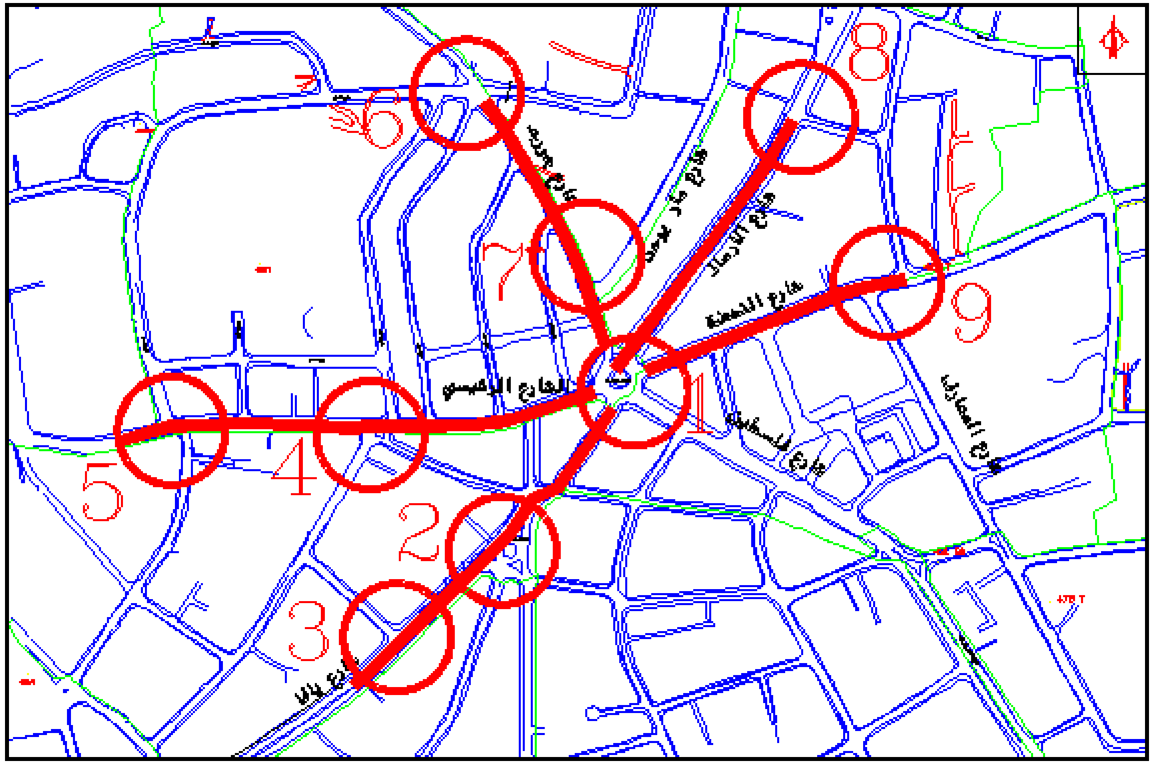
Distribution of Public Transportation Stations in Study Area.

Literature Review

- ✓ No periodic studies that needs to meet the development of transportation system in the study area.
- ✓ The last study was in 2009, and the source study was Universal Group for Engineering and Consulting.

map of Previous Study

in year 2009.



Literature Review

- All data at intersections in the study area were collected manually in 2012 and not to rely on previous studies.

- The previous data was used only to estimate the traffic flow in the future, and to determine the growth rate that used in design the level of service.

Collected Data

- ✓ Traffic flow:
  1. Vehicles movements.
  2. Crossing Pedestrian.
- ✓ Intersections and Links Dimensions.
- ✓ Accident Data.
- ✓ Traffic control signs.

Traffic Flow – Vehicles movements

- ✓ Collection a vehicle movements at all bounds at intersections was in November and March in year 2012.

- ✓ Time of collection data was selected as an estimated Peak time during a day.

- ✓ It was noticed that the peak time are mainly at PM period, exactly with the end of working hours and schools.

Calculations of vehicles movements include:

- ✓ Peak Hour (PH).
- ✓ Peak Hour Volume (PHV).
- ✓ Peak Hour Factor (PHF).
- ✓ Percent of Heavy Vehicles (HV).
- ✓ Average Daily Traffic (ADT).
- ✓ Design Hourly Volume (DHV).

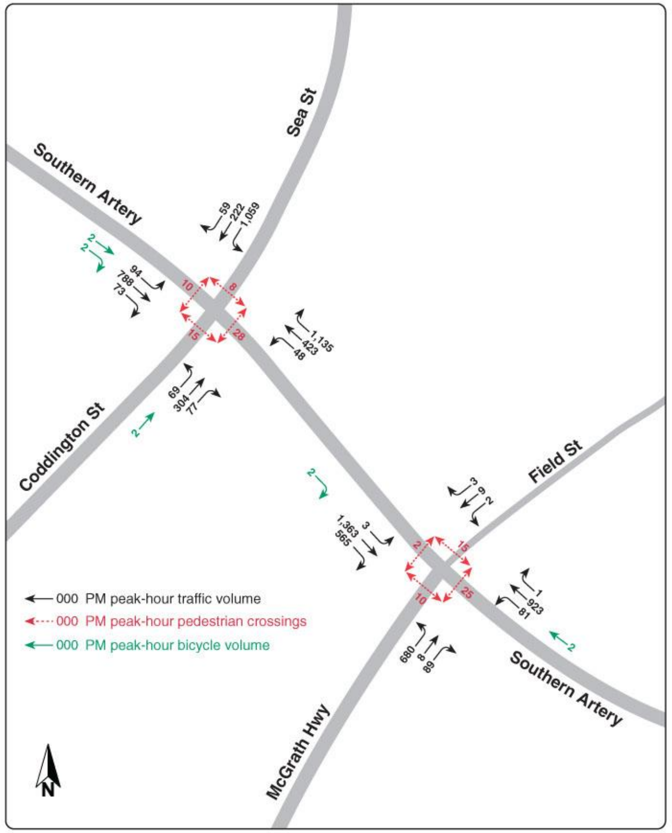


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FIGURE 8
Vehicle and Bicycle Volumes and Pedestrian Crossings
2022 PM Peak Hour

Safety and Operations Analyses at Selected Intersections

Traffic Hour at Peak Hour

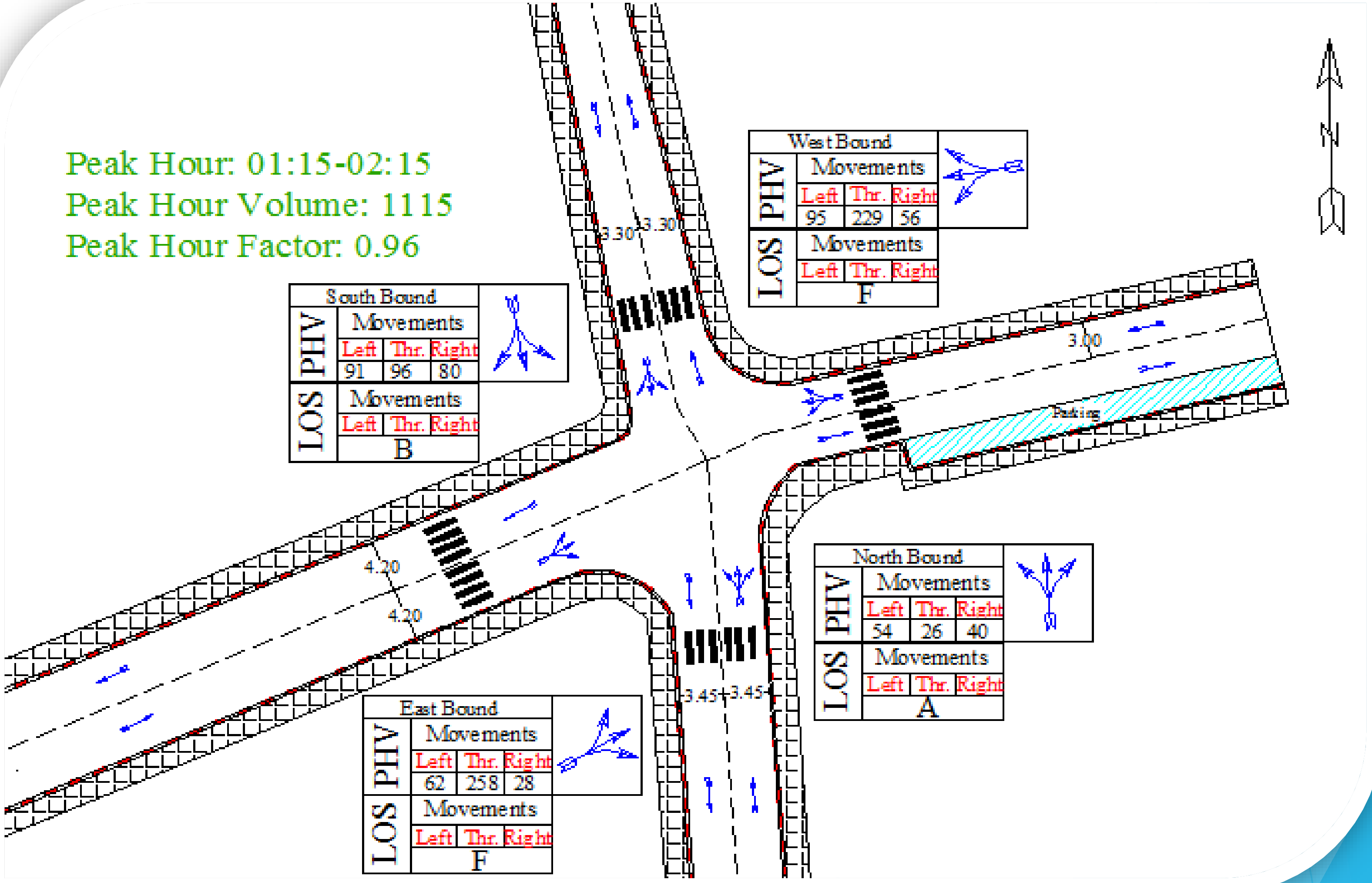
Intersection Name	Peak hour		Northbound			Southbound			Eastbound			Westbound		
	From	To	L	T	R	L	T	R	L	T	R	L	T	R
Intersection I-1	01:45	02:45	394	124	295	….	….	….	125	275	….	….	456	171
Intersection I-2	01:15	02:15	54	26	40	91	96	80	95	229	56	62	258	28
Intersection I-3	01:30	02:30	537	….	324	320	380	369	….	….	….	….	….	….
Intersection I-4	01:15	02:15	….	456	….	….	528	….	….	….	….	355	….	178
Intersection I-5	01:00	02:00	145	113	….	….	381	120	73	111	….	163	119	160
Intersection I-6 (1)	01:45	02:45	….	….	….	….	….	….	380	….	167	436	264	274
Intersection I-6 (2)	01:45	02:45	….	….	….	….	….	112	….	….	….	….	628	….
Intersection I-7	12:45	01:45	….	319	….	….	….	….	73	….	….	….	….	425

Al-Manarah Roundabout	Peak hour		Al-Irsal Street			Al-Nahda Street				Al-Mughtaribeen				-------------		
	01:15	02:15	L	T	R	L	T	R	R.R	L.L	L	T	R	….	….	….
			187	95	183	164	164	78	165	190	84	388	251	….	….	….

Traffic Volume Calculations for intersections

Intersection No.	Peak Hour	Peak Hour Volume (Veh/hr.)	Max. 15 min Volume	Peak Hour Factor	Average Daily Traffic (Veh/day)
I-1	01:30-02:30	1618	427	0.94	20225
I-2	01:15-02:15	1115	289	0.96	13940
I-3	01:30-02:30	1561	426	0.92	19515
I-4	01:15-02:15	1608	412	0.97	20100
I-5	01:00-02:00	1569	397	0.97	19615
I-6 (1)	01:00-02:00	1160	295	0.98	14500
I-6 (2)	01:30-02:30	770	205	0.94	9625
I-7	12:45-01:45	817	223	0.92	10215
I-8	01:15-02:15	1949	501	0.97	24360

Example of intersection Calculations

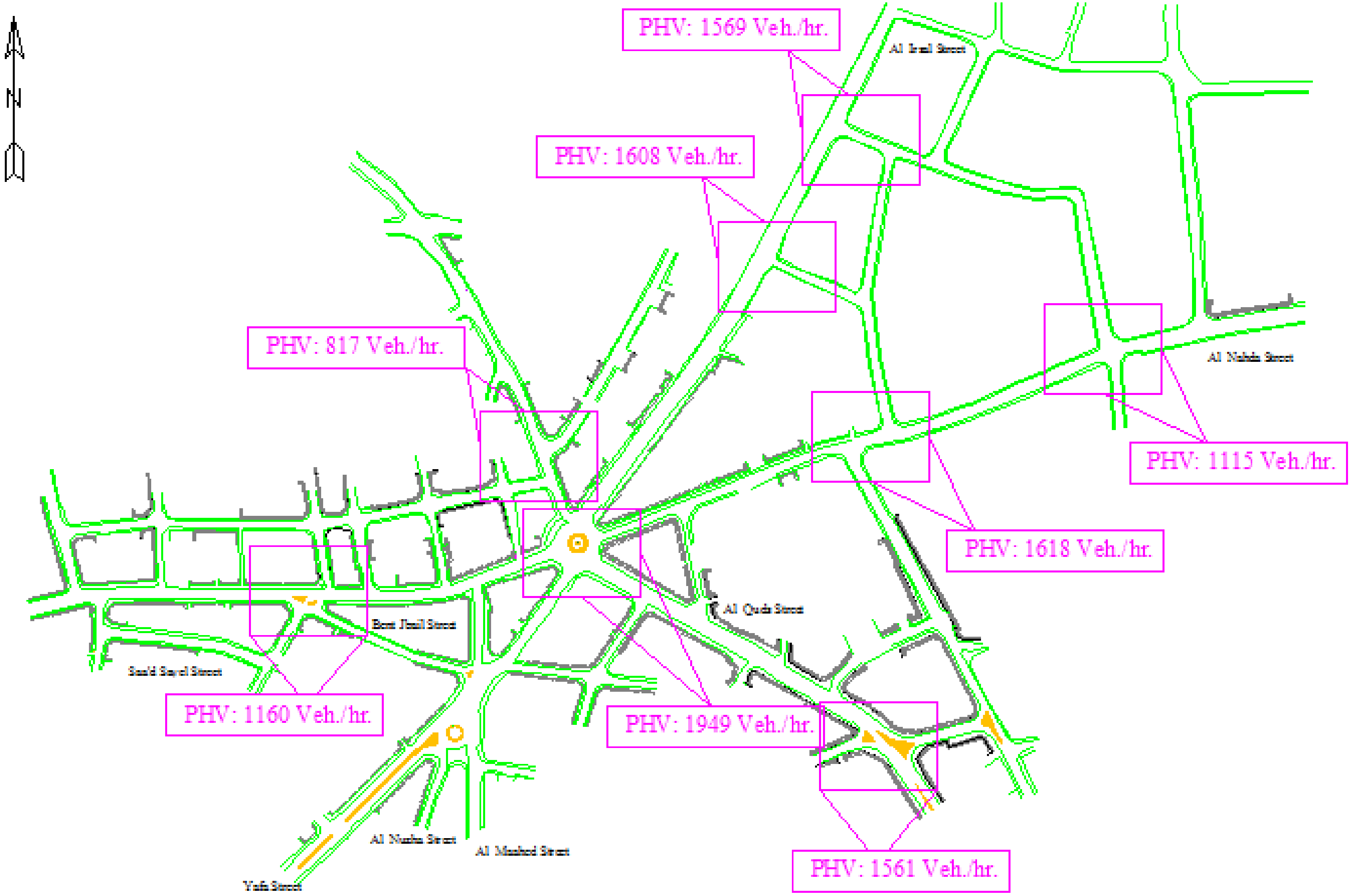


Calculations of traffic

Movements at intersection

I-2 at Al-Nahda Street

Peak Hour Volume (PHV) at each Intersections



Pedestrian Study

- ✓ Basis of Pedestrian classification based on the age of the pedestrian.

- ✓ These categories are classified as:

1. Less than 20 years.
2. Between 20-50 years.
3. Greater than 50 years.

Pedestrian Study

- ✓ Collection of pedestrian flow data was at intersection that pedestrian intersect each approach.

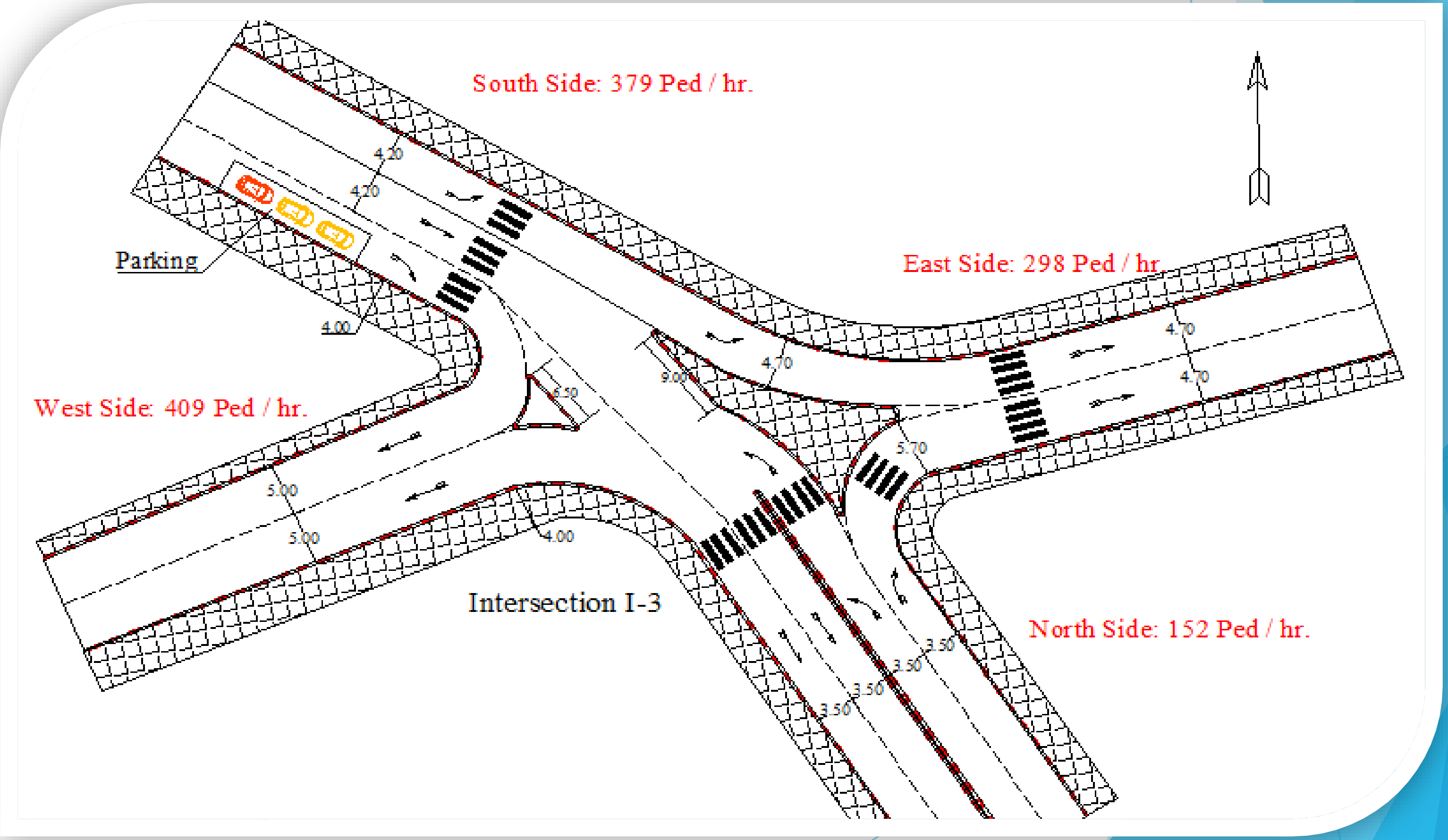
- ✓ calculations of Pedestrian flow are concentrated to find the peak hour volume for pedestrians that intersect approaches.

Pedestrian Calculations Summary at each intersection

Intersection #	Peak hour		Pedestrian Peak Hour Volume	Pedestrian Peak Hour Volume
	From	To		
I-1	01:30	02:30	424	0.90
I-2	01:30	02:30	1254	0.95
I-3	01:30	02:30	744	0.93
I-4	01:30	02:30	679	0.87
I-5	01:30	02:30	875	0.94
I-6	01:30	02:30	1089	0.98
I-7	01:00	02:00	932	0.92
I-8	01:45	02:45	501	0.94

Example of Pedestrian Study at each Approach

Calculations of Pedestrian Movements at intersection I-3 at Al-Quds Street



Accident Data

- Accident Data is an a clear indication of traffic safety in the study area.

- Accident data were collected manually from the Palestinian Traffic Police in Ramallah and Al_Beireh city.

- The Accident Data were collected to year 2011, and found that was 1651 accident in the study area.

Accident Data

- ✓ *There was many problems are faced during collecting data, its summarized as:*

1. Unavailability of computerized accident data and only on the books written information.

2. An emphasis and difficulty on giving information of accident data.

Calculations of Accident Rates

- ✓ Calculations of accident rates are different between Nodes and Links.
- ✓ On Nodes: calculation of accident rates are based on The rate per million of entering vehicles (RMEVs) at intersections.
- ✓ On Links: calculation of accident rates are based on The rate per 100 million vehicle Kilometers (RMVKm).

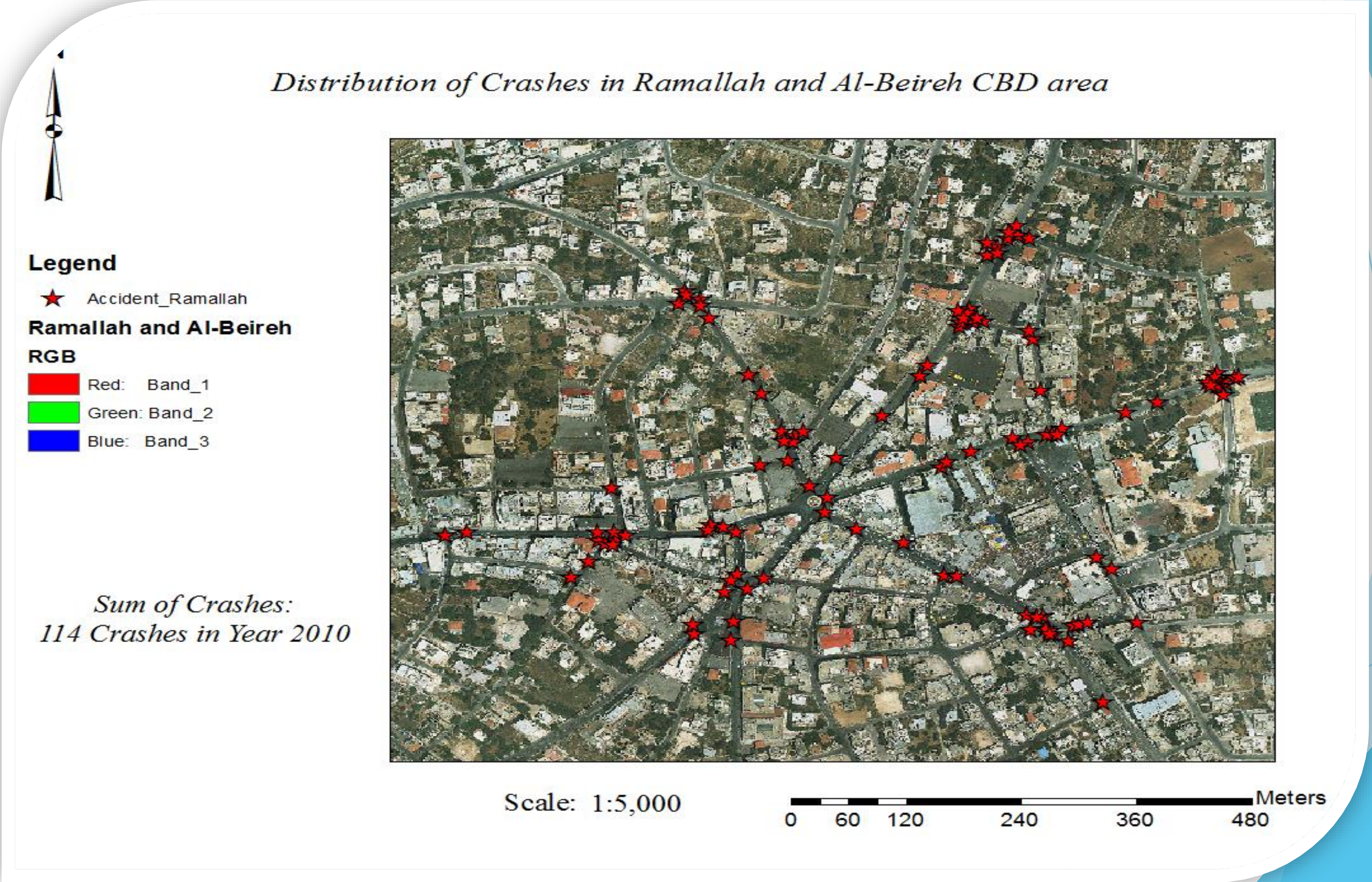
Calculations of Accident Rates

- ✓ In calculation of accident rates, An Average Daily Traffic (ADT) are needed in calculation.
- ✓ ADT are calculated from the equation:

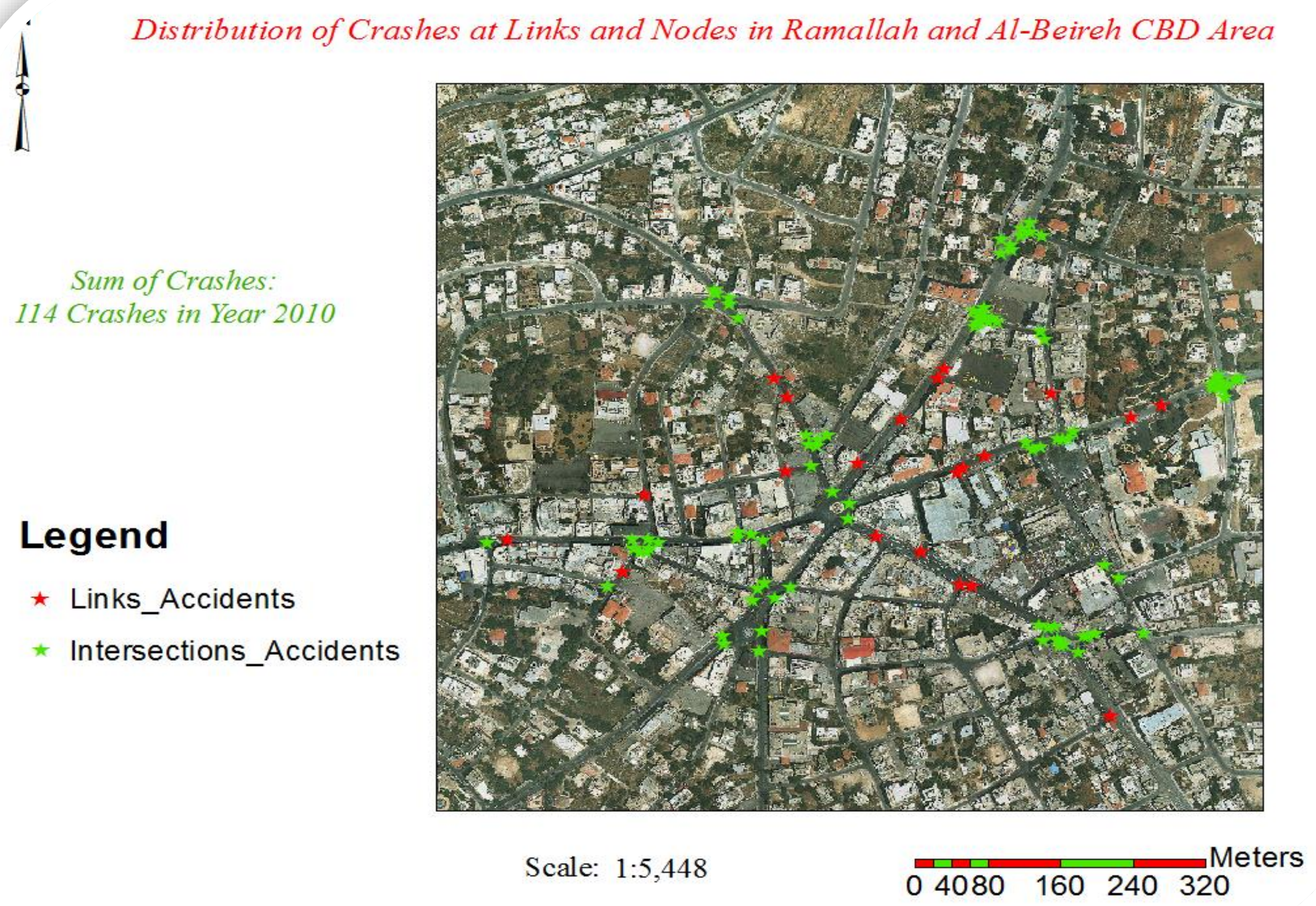
$$\text{ADT} = \frac{DHV}{K}, \quad \text{where:}$$

- ✓ k is a factor and taken in Ramallah and Al_Beireh City to be equal (0.08).
- ✓ DHV is assumed to be equals of Peak Hour Volume (PHV).

Distribution of Crashes in Study Area



Distribution of Crashes in Study Area

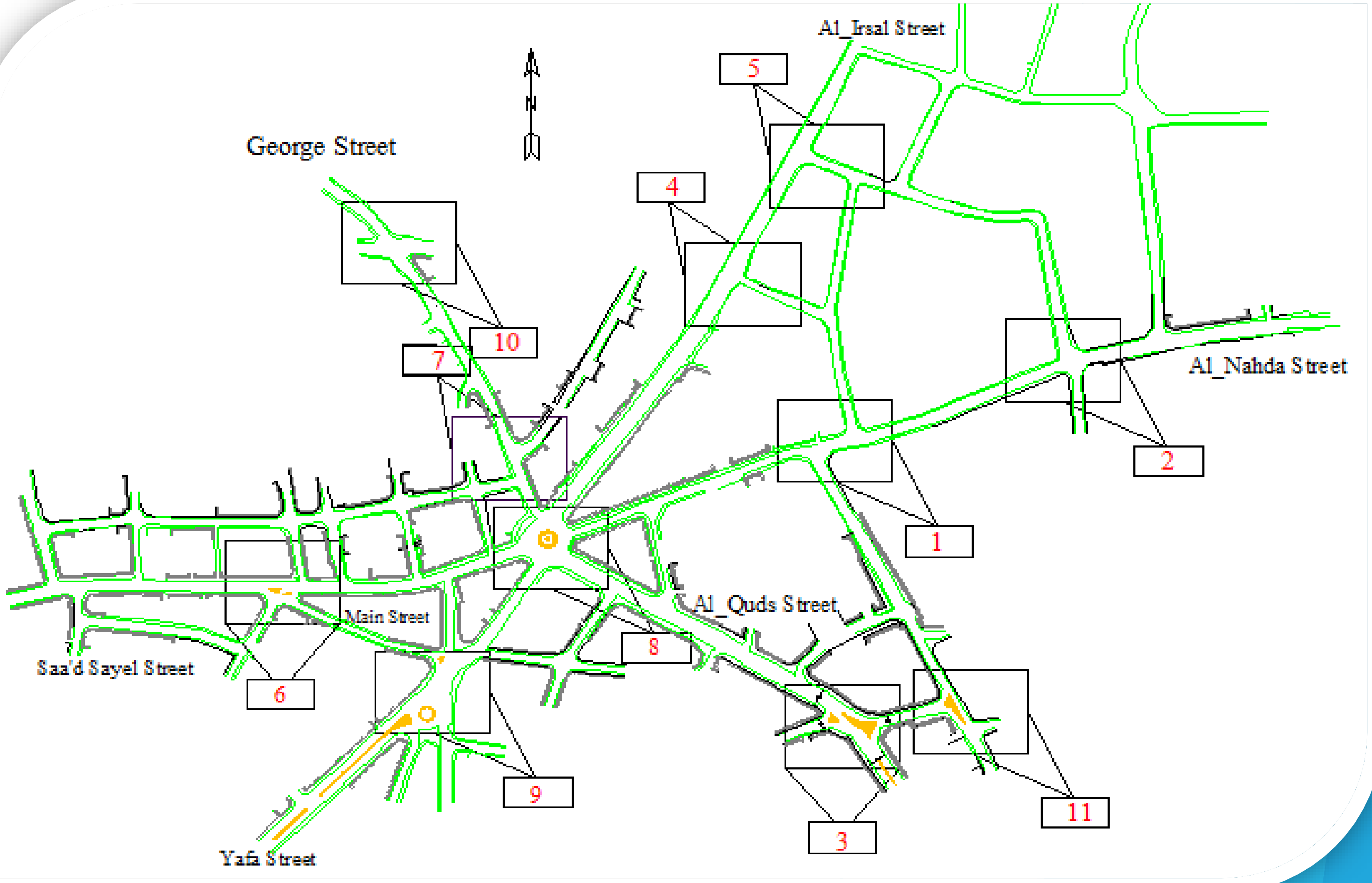


Accident Rates at Nodes

Calculation of Accident

Rates at specified nodes

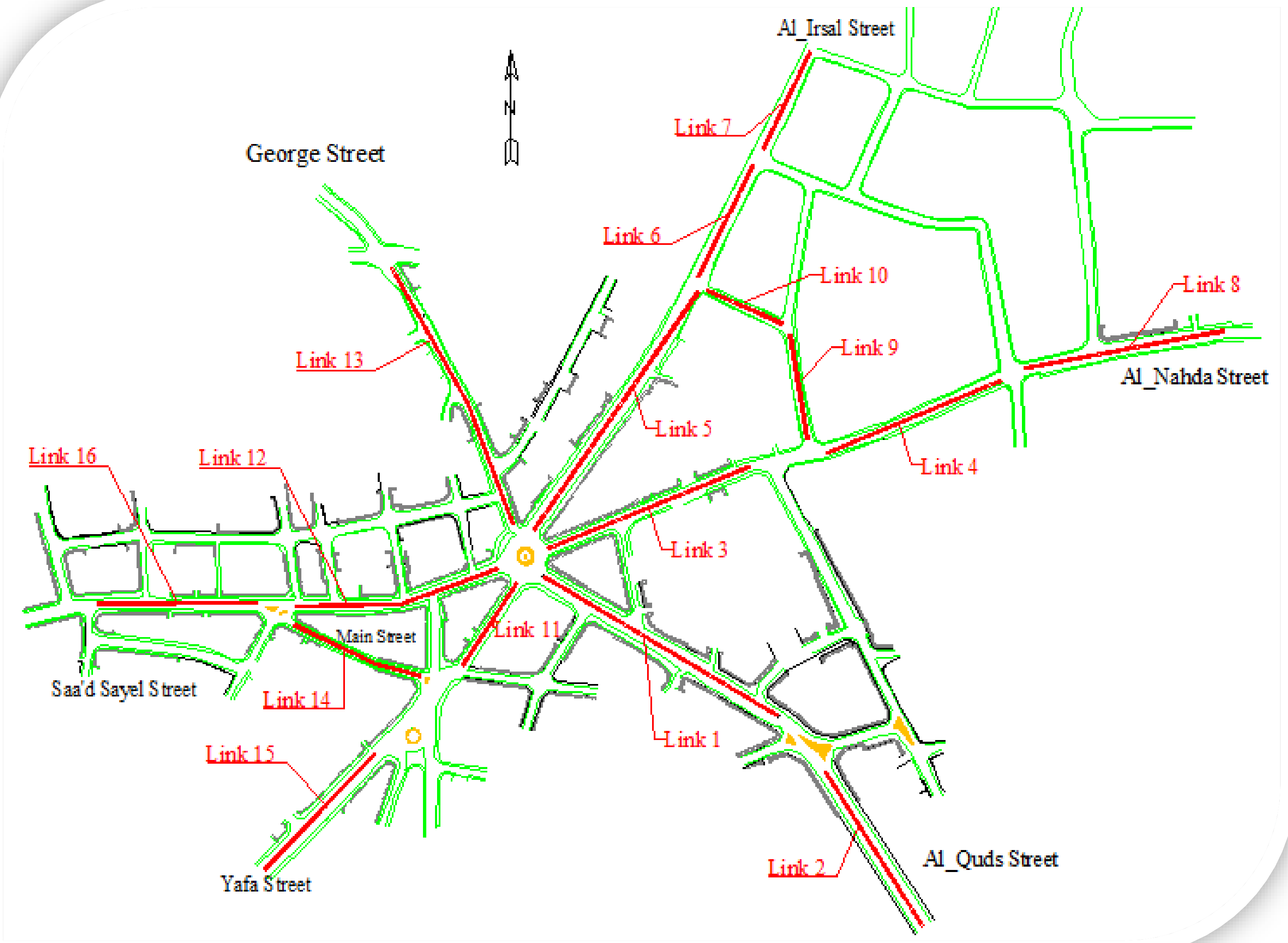
in the study area



Accident Rates at Nodes

Node No.	No. of Accident	Average Daily Traffic (ADT) (Veh / day)	Crash Rate (RMEVs) %
1	7	20225	0.95
2	11	16840	1.79
3	12	19515	1.68
4	11	20100	1.5
5	9	19615	1.26
6	7	14500	1.32
7	5	10215	1.34
8	3	24360	0.34
9	9	18750	1.31
10	6	13450	1.22
11	3	10925	0.75

Accident Rates at Links



Accident Rates at Links

Link No.	Number of Accident	Peak Hour Volume (Veh/day)	Average Daily Traffic (ADT)	Length of Link (Km)	Accident Rate (RMVKm)
1	4	700	8750	0.24	522
2	1	1241	15515	0.17	104
3	3	1075	13440	0.19	322
4	2	1113	13915	0.16	246
5	4	1430	17875	0.5	122
6	0	1216	15200	0.12	0
7	0	1201	15015	0.10	0
8	0	696	8700	0.14	0
9	1	398	4975	0.12	459
10	0	533	6665	0.07	0
11	0	913	11415	0.10	0
12	0	740	9250	0.20	0
13	2	817	10215	0.18	298
14	0	335	4190	0.13	0
15	0	724	9050	0.10	0
16	1	644	8050	0.17	200

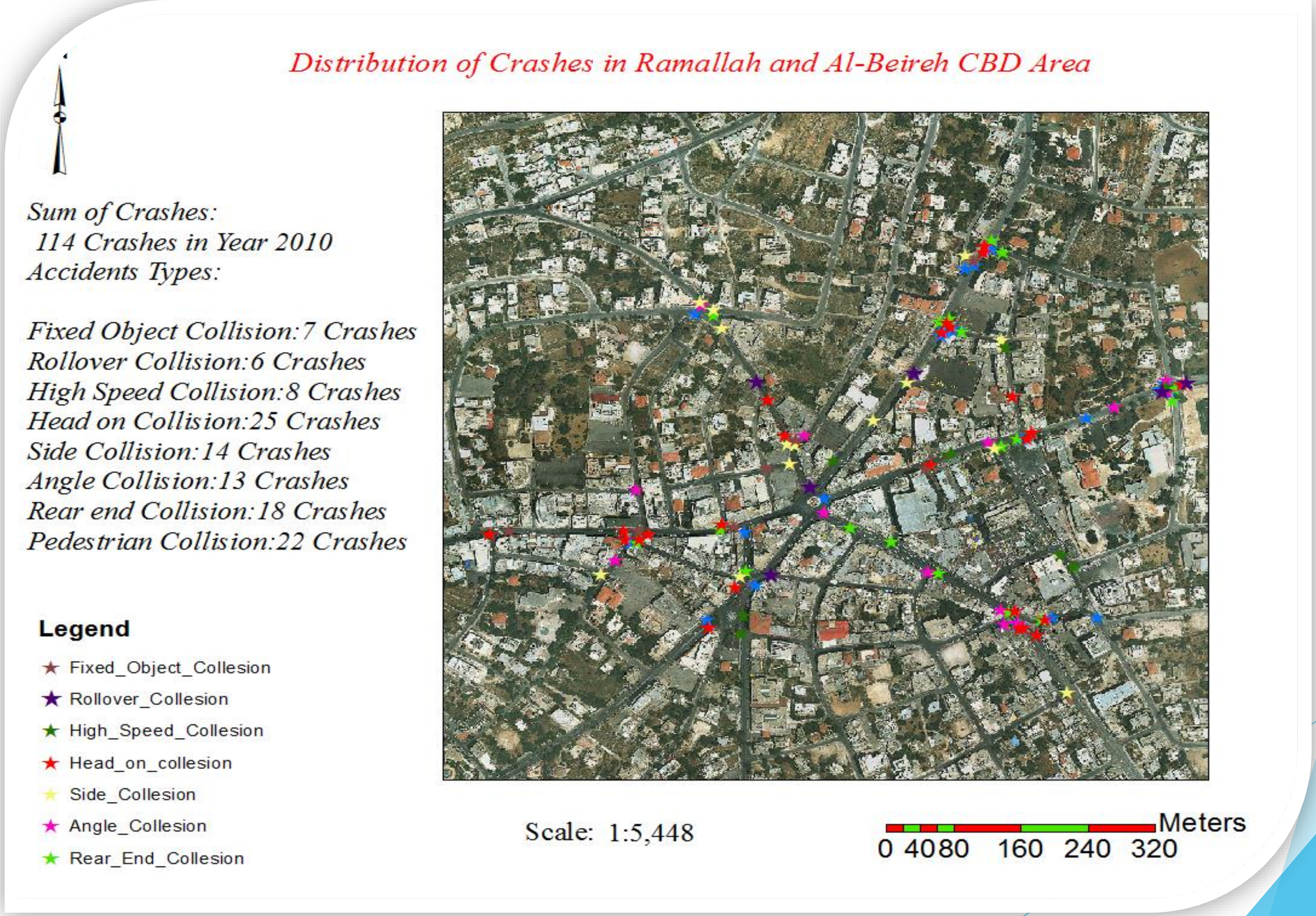
Causes of Crashes

Accident Causes can be classified based on its type as:

- ✓ rear end collision
- ✓ Angle collision
- ✓ side collision
- ✓ head-on collision
- ✓ High speed and didn't stop on signal
- ✓ Rollover collision
- ✓ Pedestrian collision
- ✓ fixed object collision

Side Collision

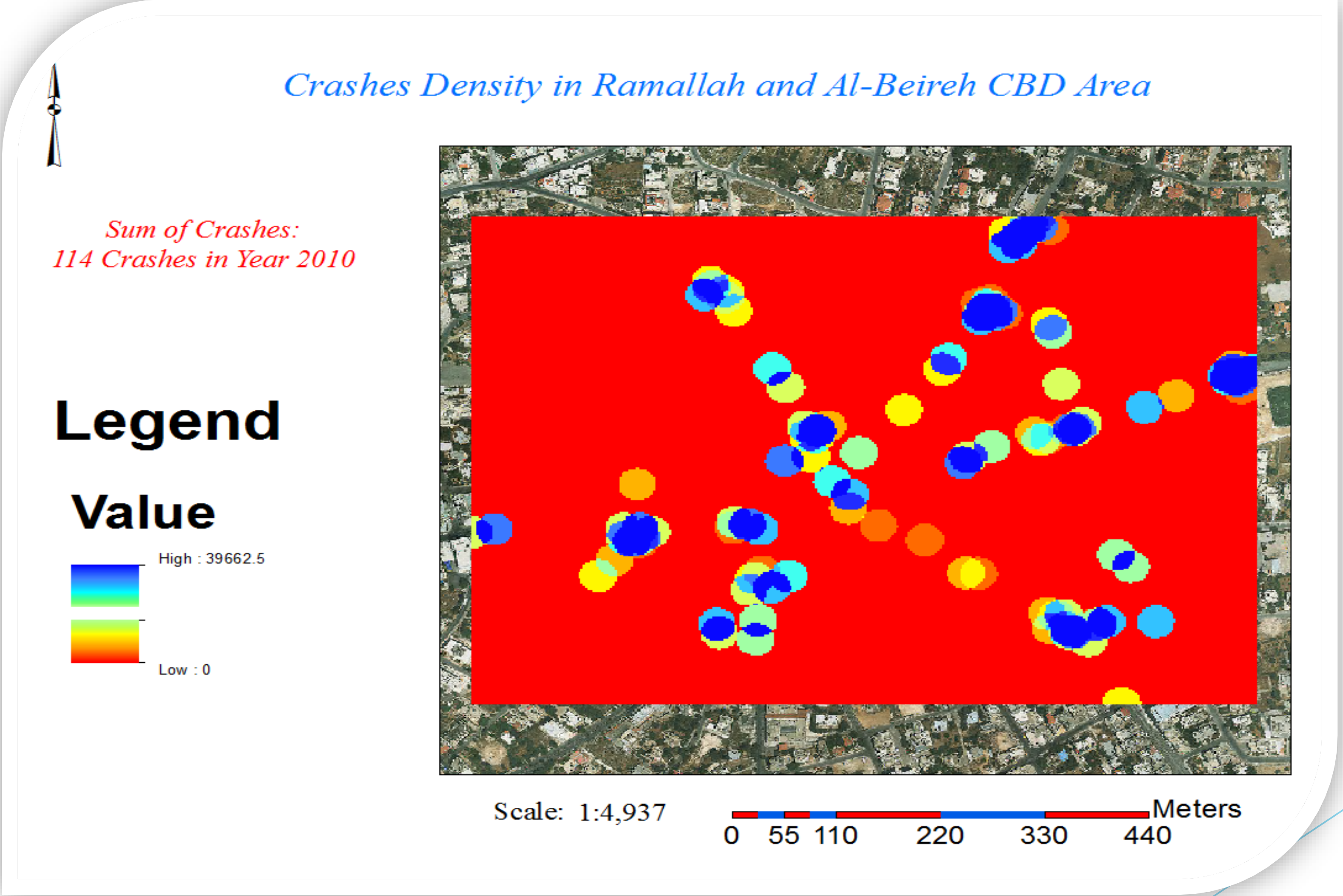
Causes of Crashes



Accident Percentage based on types

Accident Percentage (%)			
Symbols	Types	No. of Accidents	Accident %
1	Rear end collision	18	15.78
2	Angle collision	13	11.40
3	Side collision	14	12.28
4	Head-on collision	25	21.92
5	High speed and didn't stop on signal	8	07.02
6	Rollover collision	6	05.26
7	Pedestrian	22	19.30
8	Fixed object	7	06.14
Sum of accidents		114	100

Density of Traffic Accident at Nodes and Links.

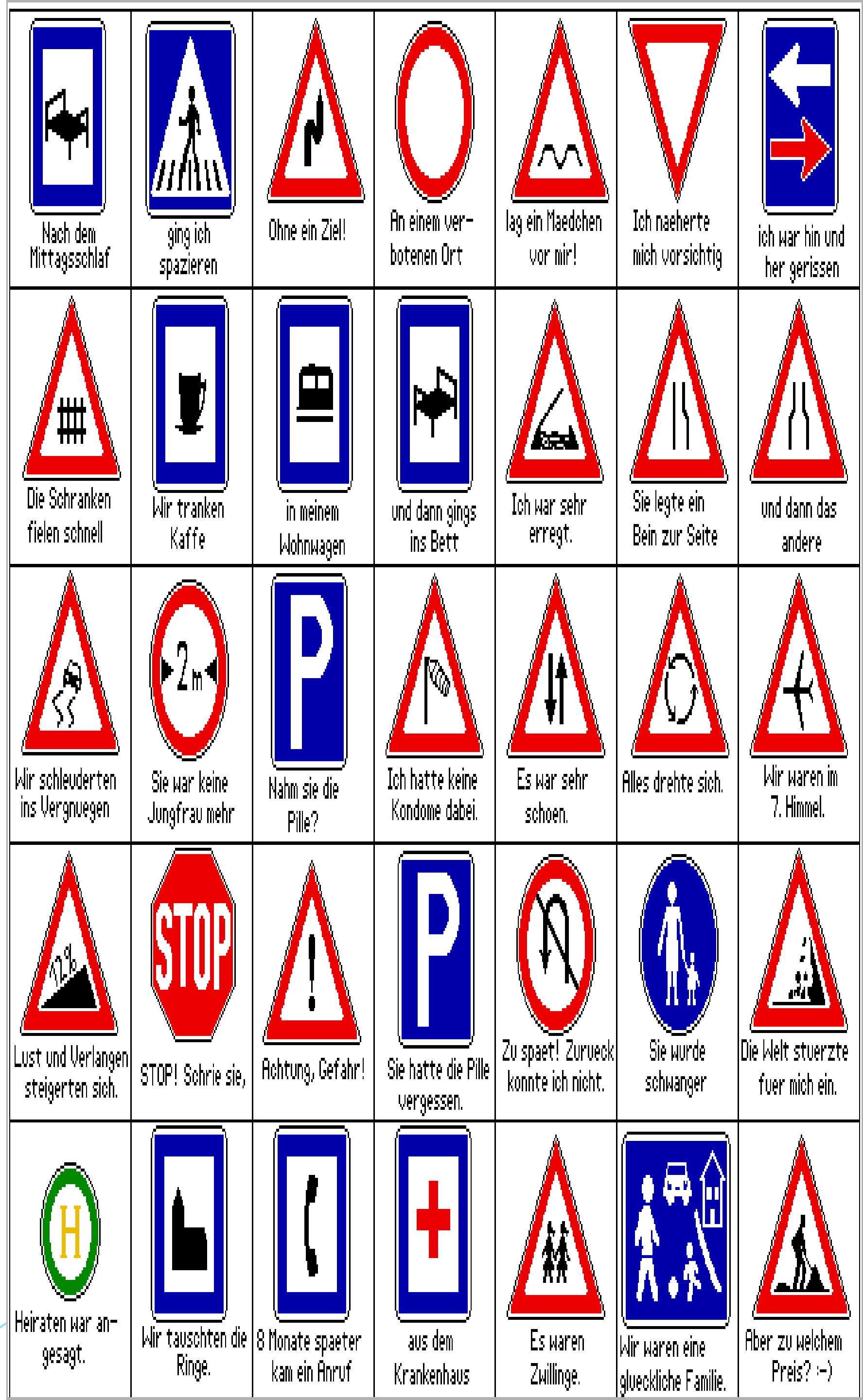


Traffic Control signs

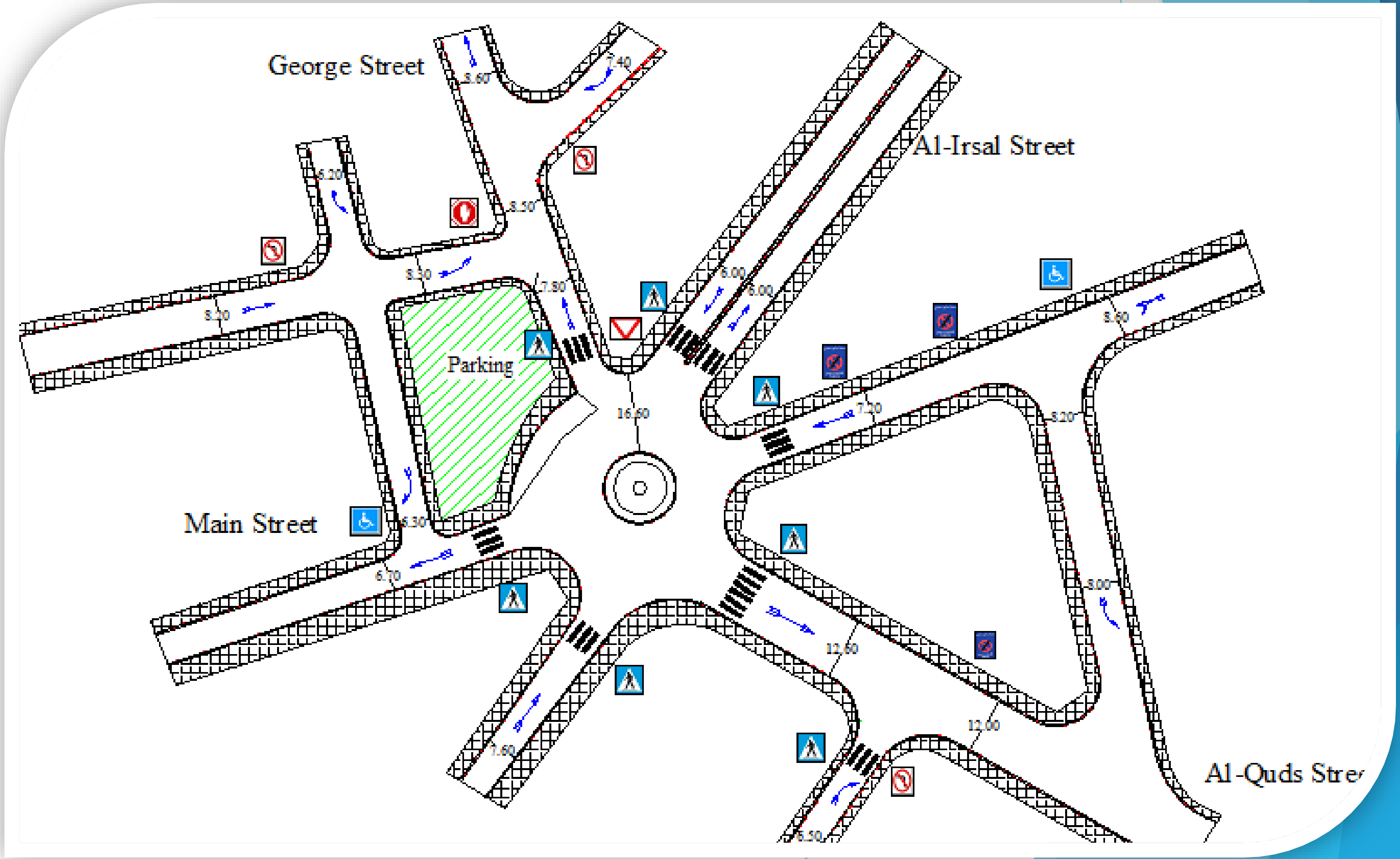
- Traffic control signs are the best way to regulate the traffic and prevent conflicts.

- In the study area there are no signalized intersection and all of intersections have a stop control signs.

- Most of traffic signs in the study area are to determine the directions of vehicles movements, pedestrian cross walking, and distribution of Parking and public transportation.



Example of Traffic Signs Study at intersection and connected links



Studying of Traffic Signs

at Al-Manarah Roundabout

(I-8).

Road Inventory

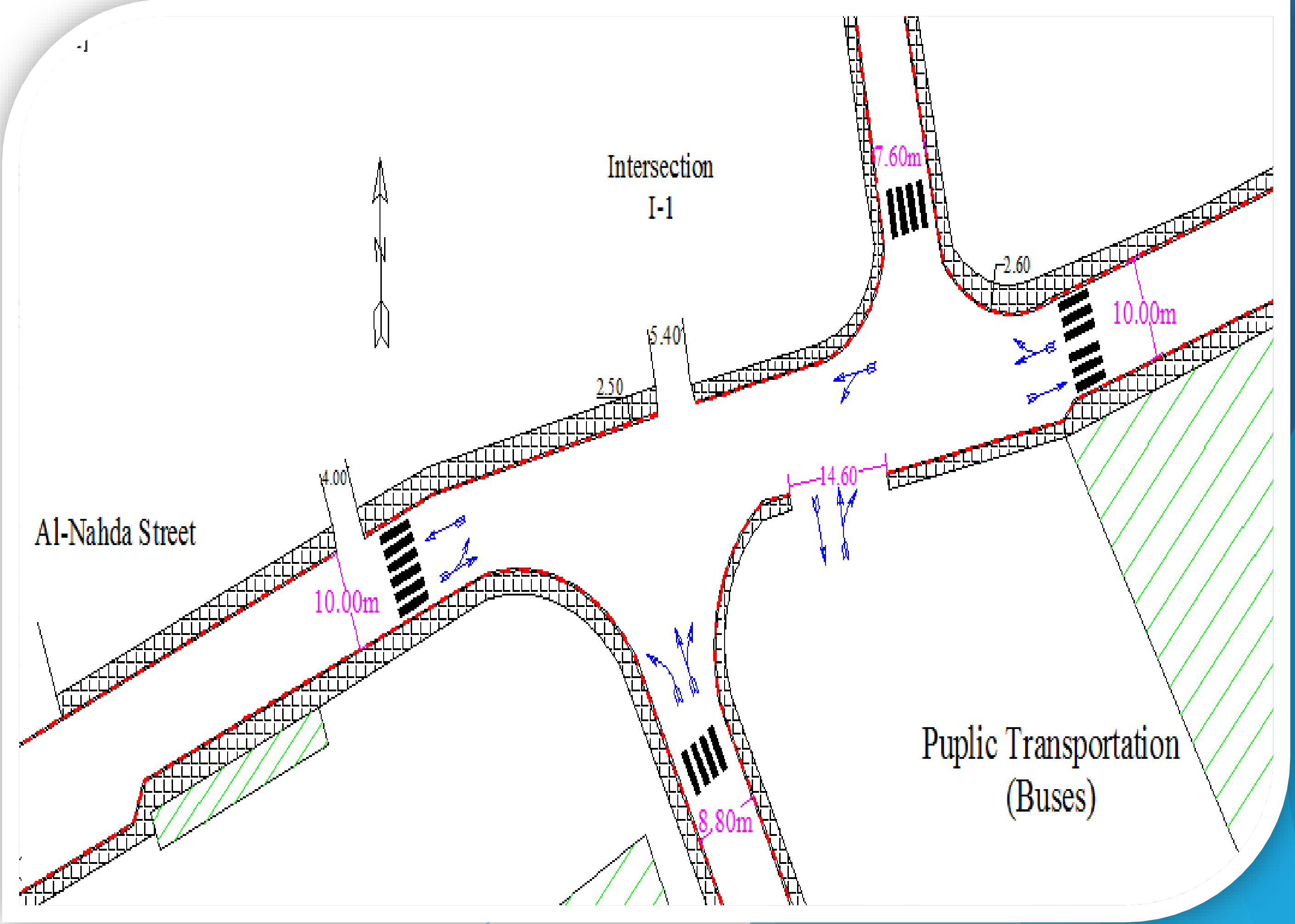
studying of road inventory are important to identify the properties of roads:

- ✓ Intersections and Links dimensions.
- ✓ number of lanes.
- ✓ direction of vehicle movements
- ✓ availability of parking places on the roads.

Example of Road Inventory

Approach Direction	Directions	Number of Lanes	Approach Width (m)	Sidewalk Availability		Parking at the street	
				Left	Right	Left	Right
North	One Way	1	7.60	Yes	Yes	Yes	No
East	Two Way	2	10.00	Yes	Yes	No	Yes
South	One Way	2	8.80	Yes	Yes	No	No
West	Two Way	2	10.00	Yes	Yes	Yes	No

Intersection Dimensions, Traffic Volumes, and Sidewalk availability at intersection I-1 at Al-Nahda Street.



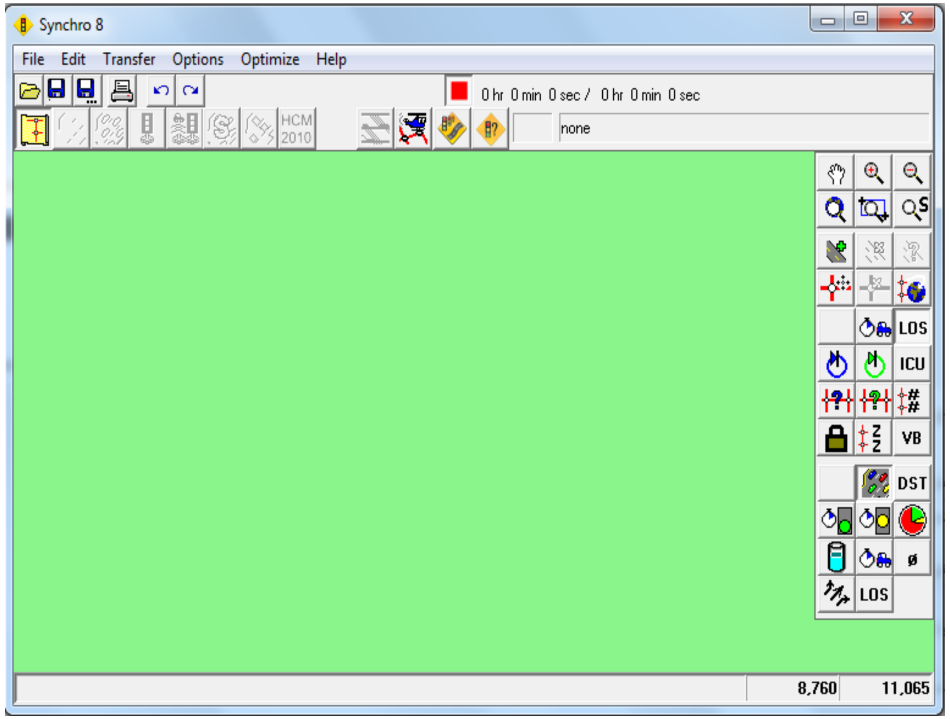
Data Analysis

- ✓ Data Analysis is the way to know the current situation of roads based on level of service at intersections.

- ✓ Data Analysis also includes knowing the effects of accident rates on traffic safety in the study area.

Data Analysis

- ✓ Analysis of traffic data to find the Level of Service (LOS) by using a software Programs.
- ✓ Programs were used to analysis data are Highway Capacity Solution (HCS 2000) and SYNCHRO 8.0 Programs.



SYNCHRO 8.0 and HCS 2000 face Programs.

Level of Service at existing conditions

- ✓ After analysis, noticed there are a Weak level of service at intersections. The most was (LOS F) that indicates to high congestion and delay and must to search for solutions to reduce traffic congestion and to improvement traffic safety.

Intersection No.	Peak Hour	North Bound			East Bound			South Bound			West Bound		
		L	T	R	L	T	R	L	T	R	L	T	R
I-1	01:30-02:30	D	D	D	F	F	---	---	---	---	---	F	F
I-2	01:15-02:15	B	B	B	F	F	F	A	A	A	F	F	F
I-3	01:30-02:30	F	---	F	---	---	---	F	F	F	---	---	---
I-4	01:15-02:15	---	F	---	---	---	---	---	F	---	C	---	B
I-5	01:00-02:00	F	F	---	B	---	B	---	F	F	A	A	A
I-6 (1)	01:00-02:00	---	---	---	---	F	F	---	---	---	F	F	F
I-6 (2)	01:00-02:00	---	---	---	---	---	---	---	---	B	---	E	---
I-7	12:45-01:45	---	F	---	C	---	---	---	---	---	---	---	F

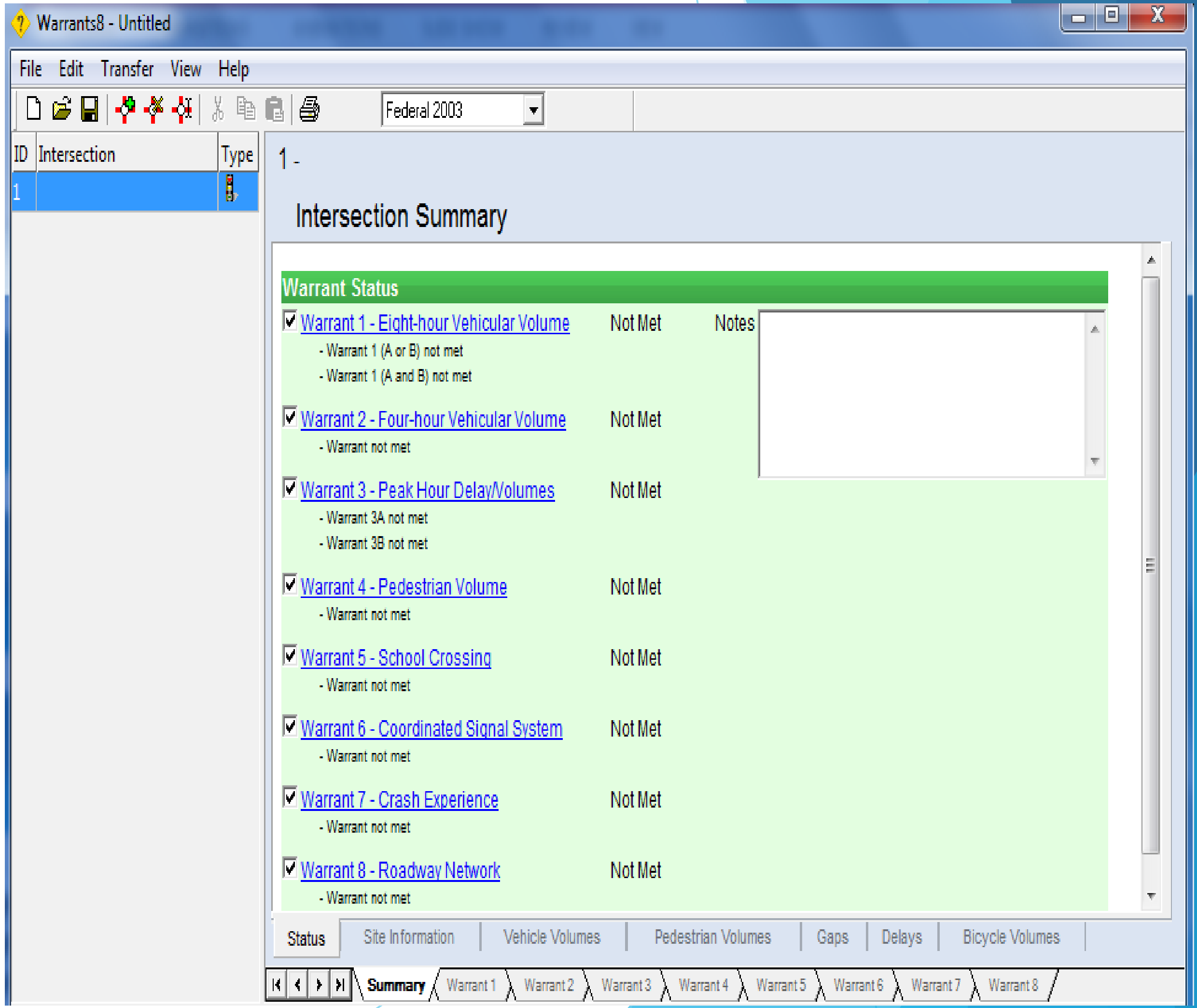
Traffic Signal Warrants Evaluation

- One of the most effective ways of controlling traffic at an intersection is the use of traffic signals.
- The most important factors that determines the need for traffic signals at a particular intersection is the intersection’s approach traffic volume
- other factors such as pedestrian volumes and crash experience may also play a sufficient rule.

Traffic Signal Warrants Evaluation

- ✓ All Warrants for all intersections are calculated manually and by using SYNCHRO 8 program.

- ✓ Warrant 1 (eight hour vehicular volume) was not considered because of no eight hour volume accounted at all intersections and no previous eight hour volume account available data.



SYNCHRO 8.0 Program for Checking Warrants for Signal Traffic.

Check of Warrants for using Traffic Signals

Intersection #	Warrant 1	Warrant 2	Warrant 3	Warrant 4	Warrant 5	Warrant 6	Warrant 7	Warrant 8	Warranted Or Not?
Intersection I-1	N\A	Met	Met	Not Met	Not Met	Not Met	Not Met	N\A	Yes
Intersection I-2	N\A	Not Met	Met	Not Met	Not Met	Not Met	Not Met	N\A	No
Intersection I-3	N\A	Not Met	Not Met	Not Met	Not Met	Not Met	Not Met	N\A	No
Intersection I-4	N\A	Not Met	Met	Not Met	Not Met	Not Met	Not Met	N\A	Yes
Intersection I-5	N\A	Not Met	Met	Not Met	Not Met	Not Met	Not Met	N\A	Yes
Intersection I-6	N\A	Not Met	Not Met	Not Met	Not Met	Not Met	Not Met	N\A	No
Intersection I-7	N\A	Not Met	Not Met	Not Met	Not Met	Not Met	Not Met	Not Met	No

Check of Warrants for using Traffic Signals

- ✓ Intersections I-3 and I-6 did not warranted but it was necessary to design a Signal Traffic to avoid conflict points at intersections due to geometrical design.

- ✓ Number of Warranted intersections are 6 intersections, and need to design a Traffic Signals.

Intersection Problems and suggested solutions

Intersection Problems and suggested solutions

- During the study of intersections and data collection, many problems at intersections were noticed.

- These problems are varied from geometric problems such as the design of radii for curves to Non-compliance with traffic rules such as a parking presence at intersections.

- There are also some problems such as availability of traffic signs and their conditions, distributions, and where it placed to be visible to all people.

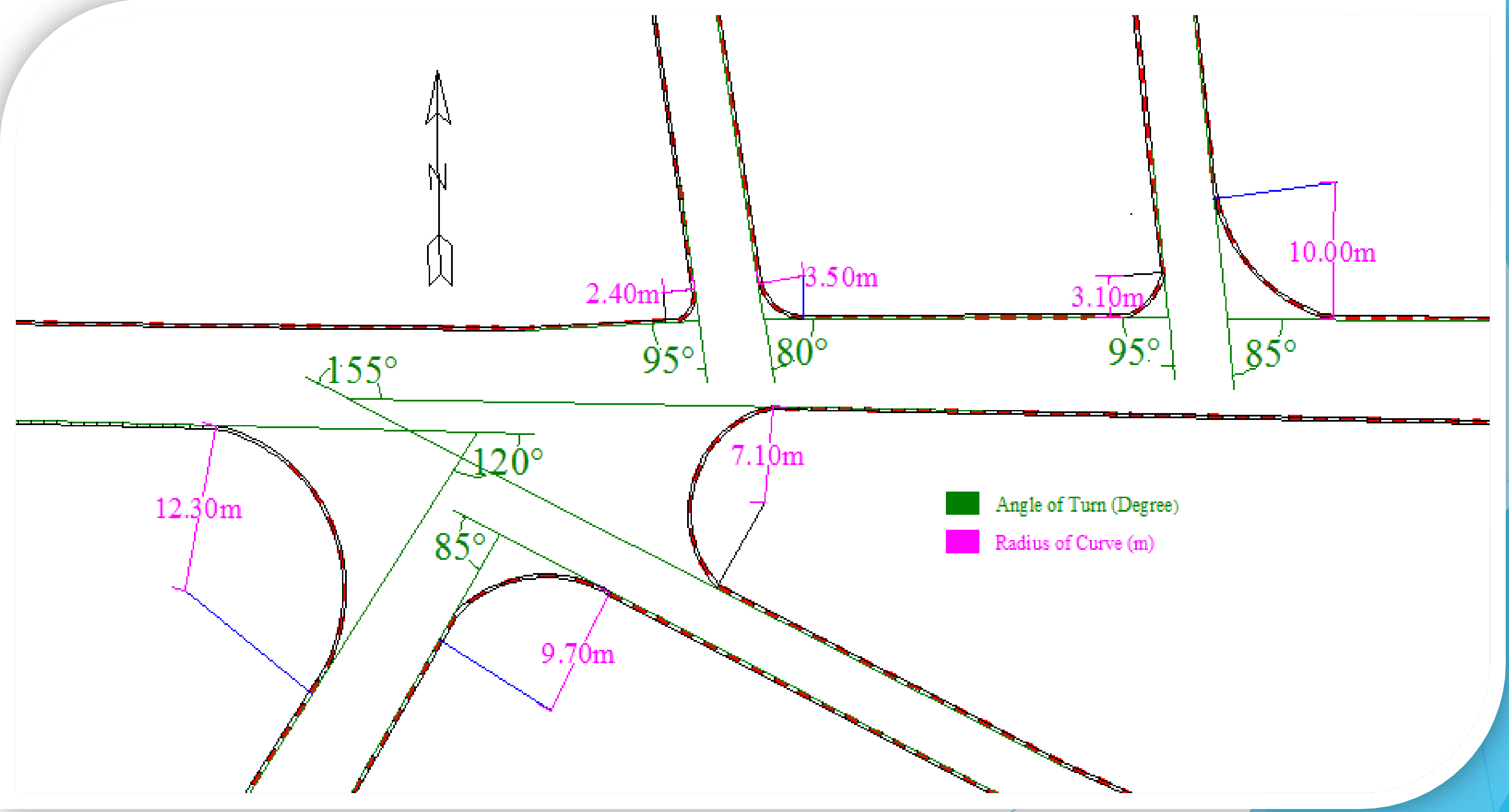
Intersections curves radii

- Current conditions for Radii for each curves of intersections were measured by taken the length of curve and found the radius on AutoCAD program.

- this radii were compared with the minimum required radii and check which it need to editing or not.

Example of Existing radii at intersections and minimum required radii

Existing Radii for Intersection I-6 at Main Street near Rokab Ice-Cream



Example of Existing radii at intersections and minimum required radii

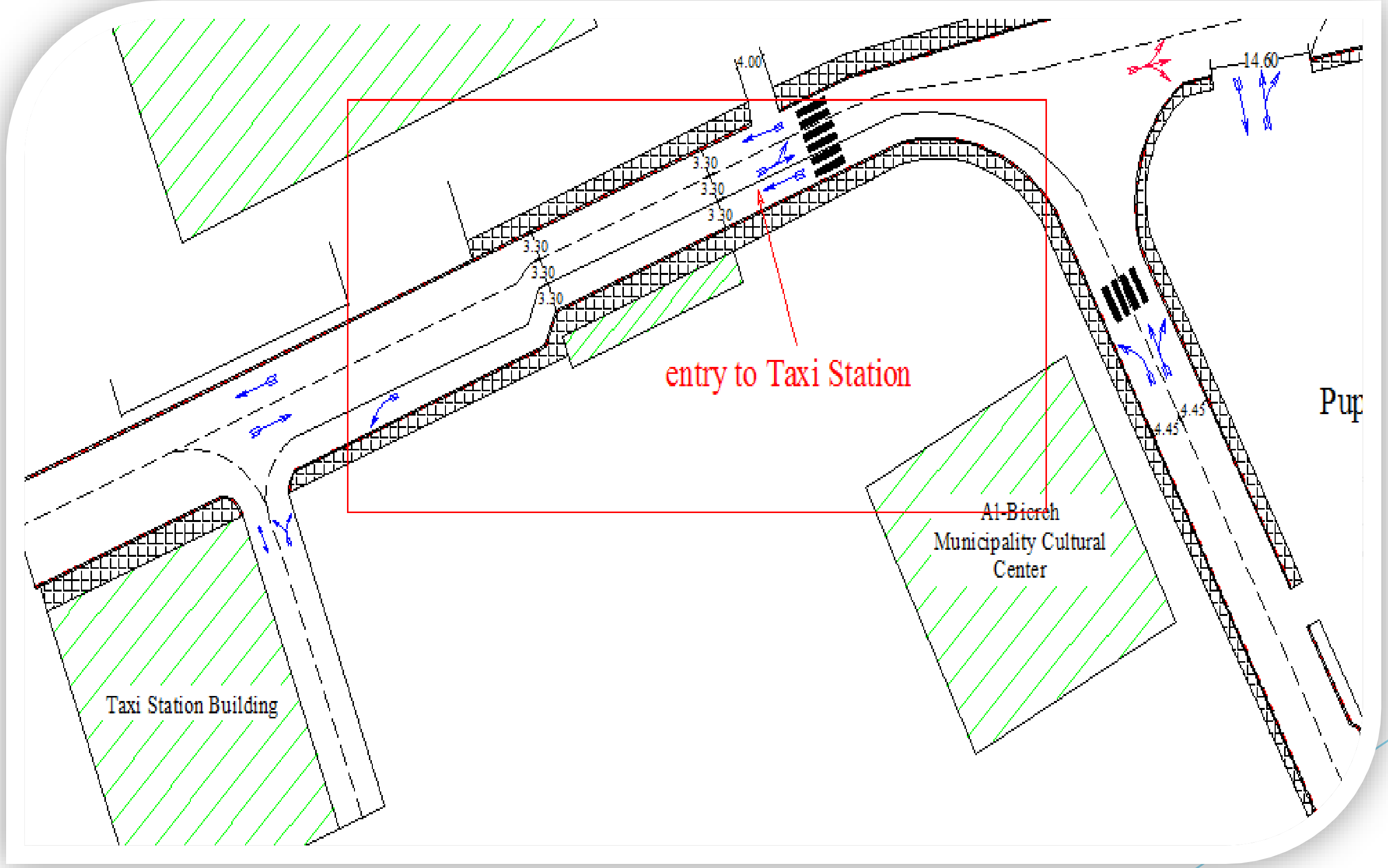
Existing and minimum required Radii for Intersection I-6 at Main Street near Rokab Ice-Cream

Intersection I-6									
Side	Existing Data			Design Vehicle	Minimum Required Data				Required Editing
	Angle of Turn (Degree)	Curve Type	Radius (m)		Curve Type	Radius (m)	Offset (m)	Taper L:T	
NE1	85	Simple	10.00	P	Simple With Taper	10.00	---	---	No
NW1	95	Simple	3.10	P	Simple With Taper	9.00	---	---	Yes
NE2	80	Simple	3.50	P	Simple With Taper	10.00	---	---	Yes
NE2	95	Simple	2.40	P	Simple	9.00	---	---	Yes
SW	120	Simple With Taper	12.30	SU	Simple With Taper	9.00	1.00	10:1	No
SE	85	Simple	9.70	SU	Simple	10.00	---	---	Yes
SEE	155	Simple	7.10	SU	Simple With Taper	9.00	1.30	8:1	Yes

Lanes Width and pedestrian sidewalk problems

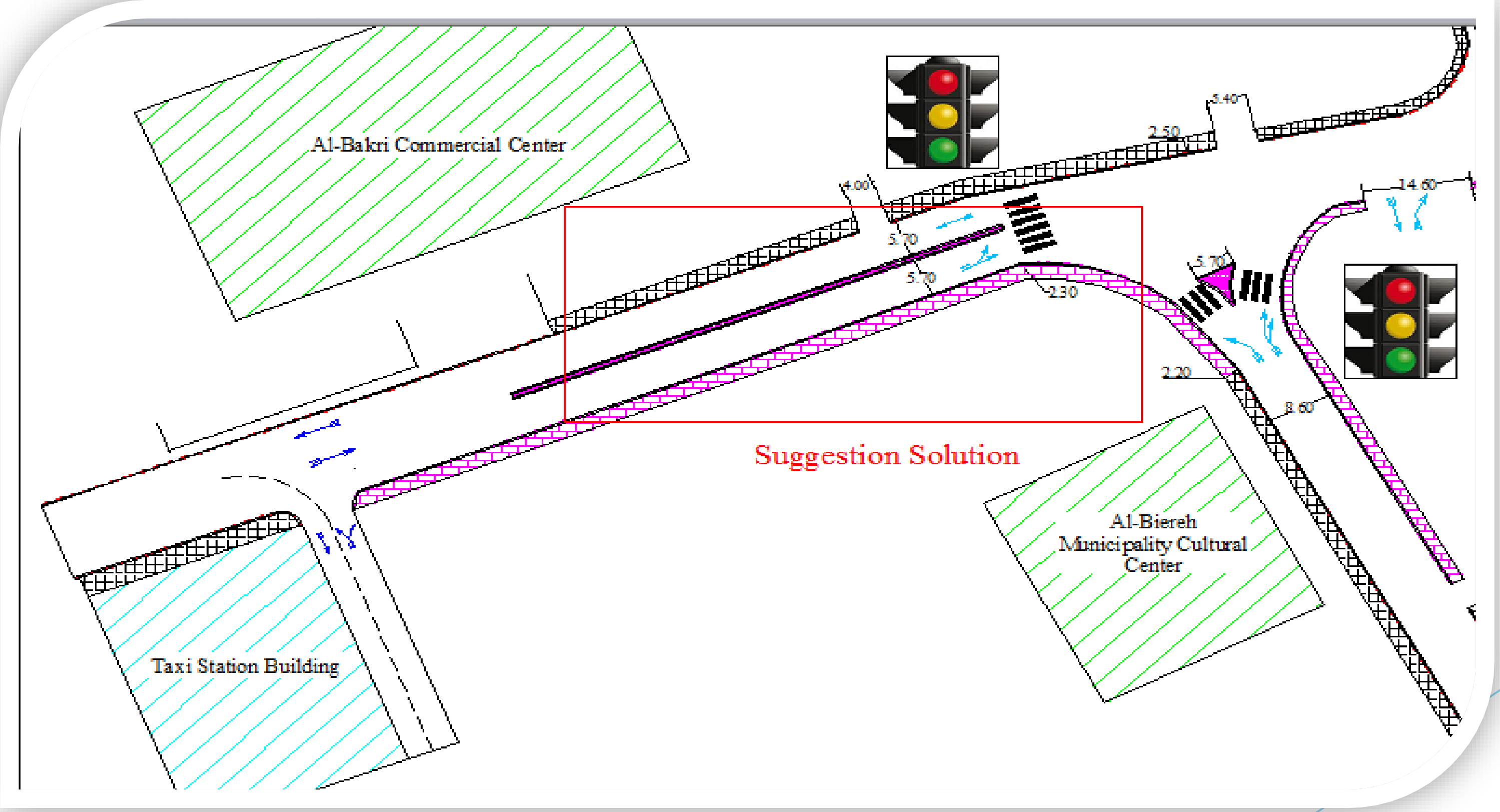
Intersection I-1: Al-Nahda Street beside Busses station.

- ✓ First problem is entry the vehicles into taxi's station near Al-Manarah Roundabout at East Bound. This vehicles enter the station in reverse direction to traffic movement that leads to conflict points and congestion.

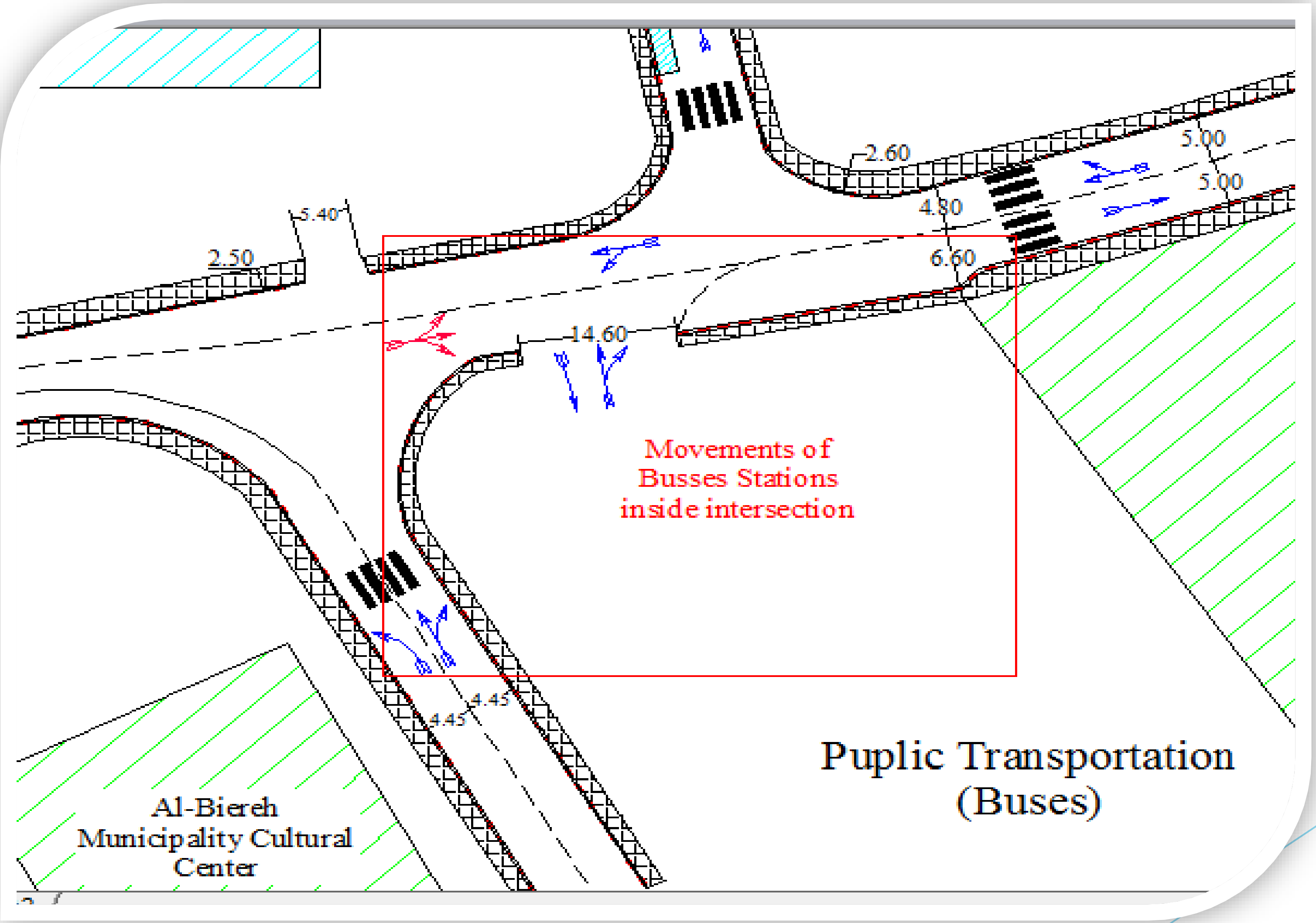


Suggested Solution:

- ✓ The best solution was to add a signal traffic to avoid conflict points and congestion and to regulate traffic movements. To do this it was necessary to add a new lane to EB lanes to be 4 lanes. These lanes must be divided by raised curb channelization. This is achieved by taking a lane width from Al-Beireh municipality cultural center and also remove an unlicensed seller beside street, and return sidewalk to the back.

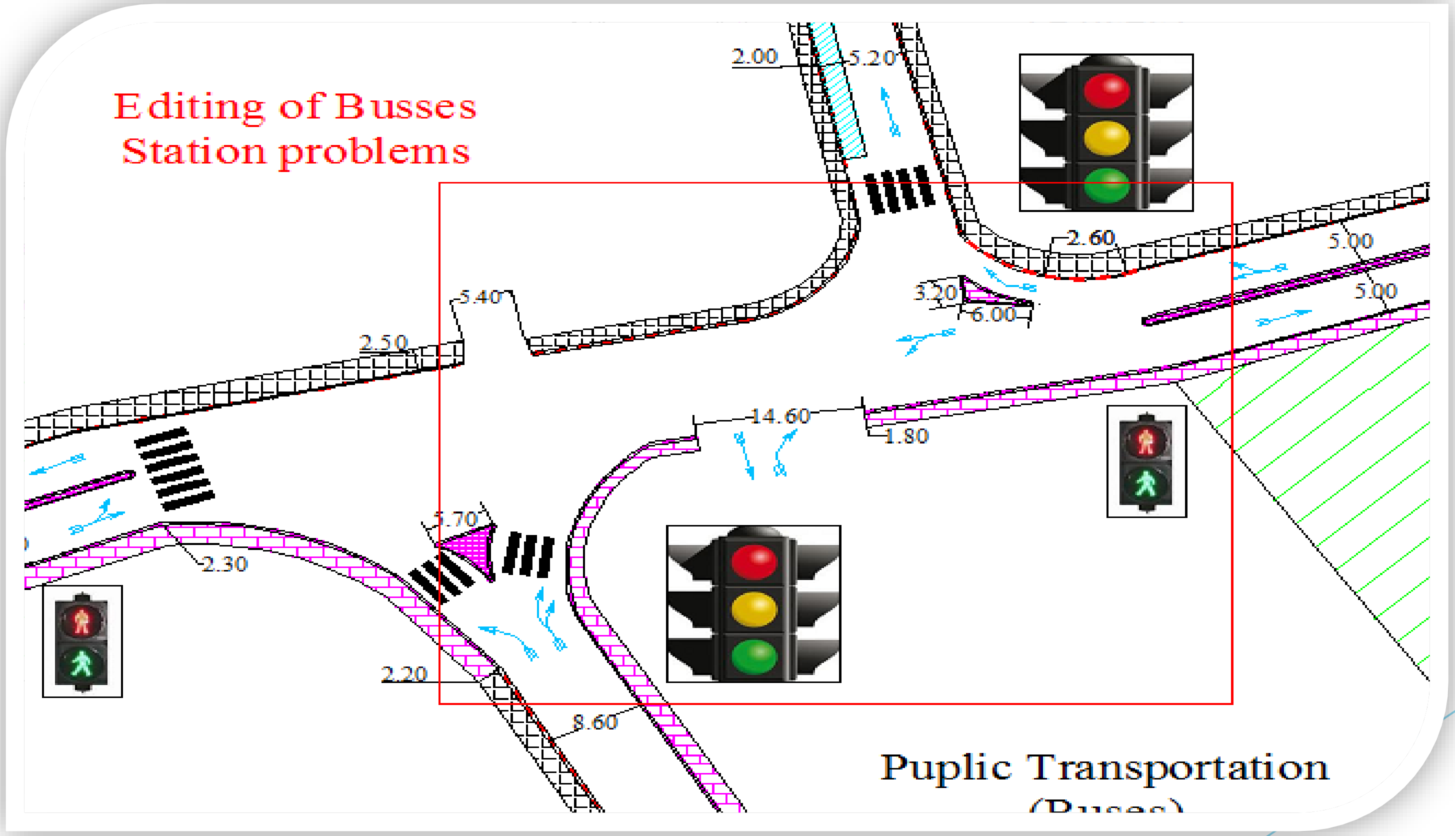


- The second problem is Busses Station movements inside the intersection and presence of busses that make a conflicting points when enter and exit the station.



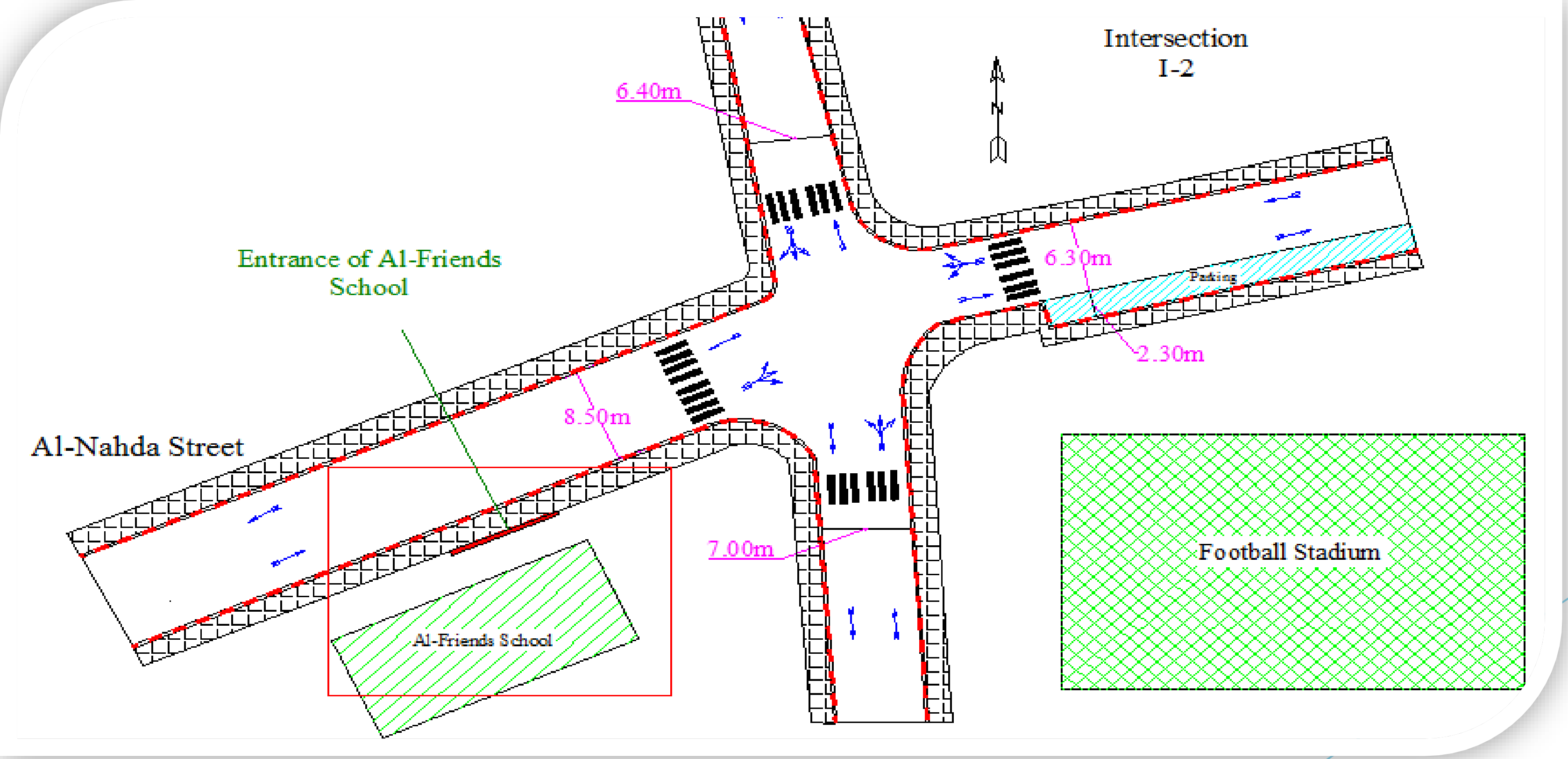
Suggested Solutions:

- ✓ To avoid conflict points due to Busses Station movements inside intersection; it must consider the correlation between the movements of Busses Station and all intersection movements. So the movements of Busses station will be signalized and added to North Bound phases. Also must prevent through movement of busses station to avoid conflict point. It must also edit the lane width and separation movements for East Bound direction by adding channelization and editing sidewalk width to appropriate design.



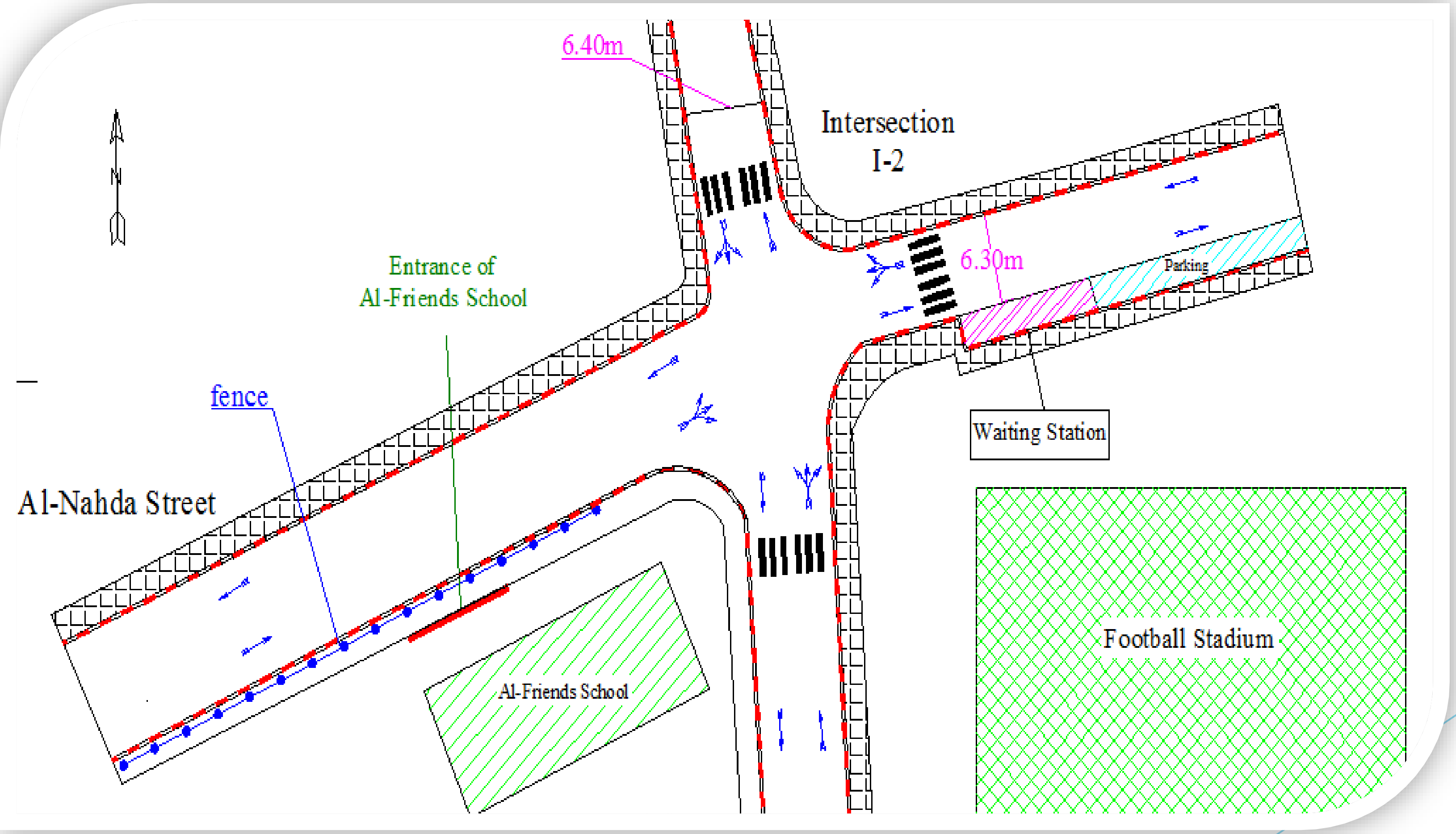
Intersection I-2: Al-Nahda Street beside Busses station.

- ✓ The most important problem at this intersection is school crossing students from Al-Friends School and dangerous of them because of high velocity of vehicles at this intersection and the congestion that occurs when student’s parents come to take their children.



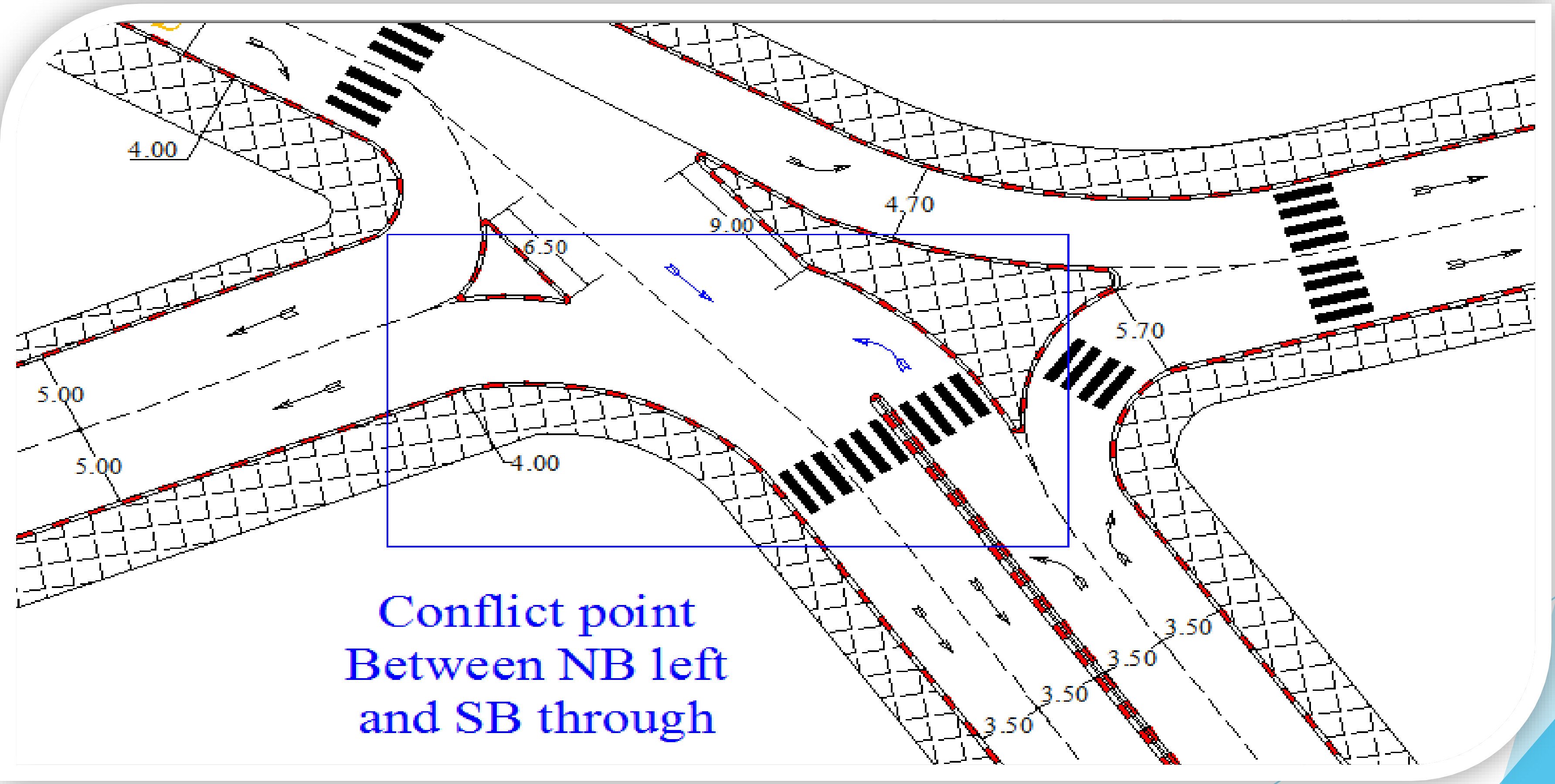
Suggested Solutions:

- ✓ To avoid the dangerous that results from school crossing of street with high velocity vehicles; it is suggested to set a fence beside pedestrian sidewalk and the students will walking along sidewalk and cross north bound side that have low traffic volume. And some students will waiting their parents at east side by keep parking away from



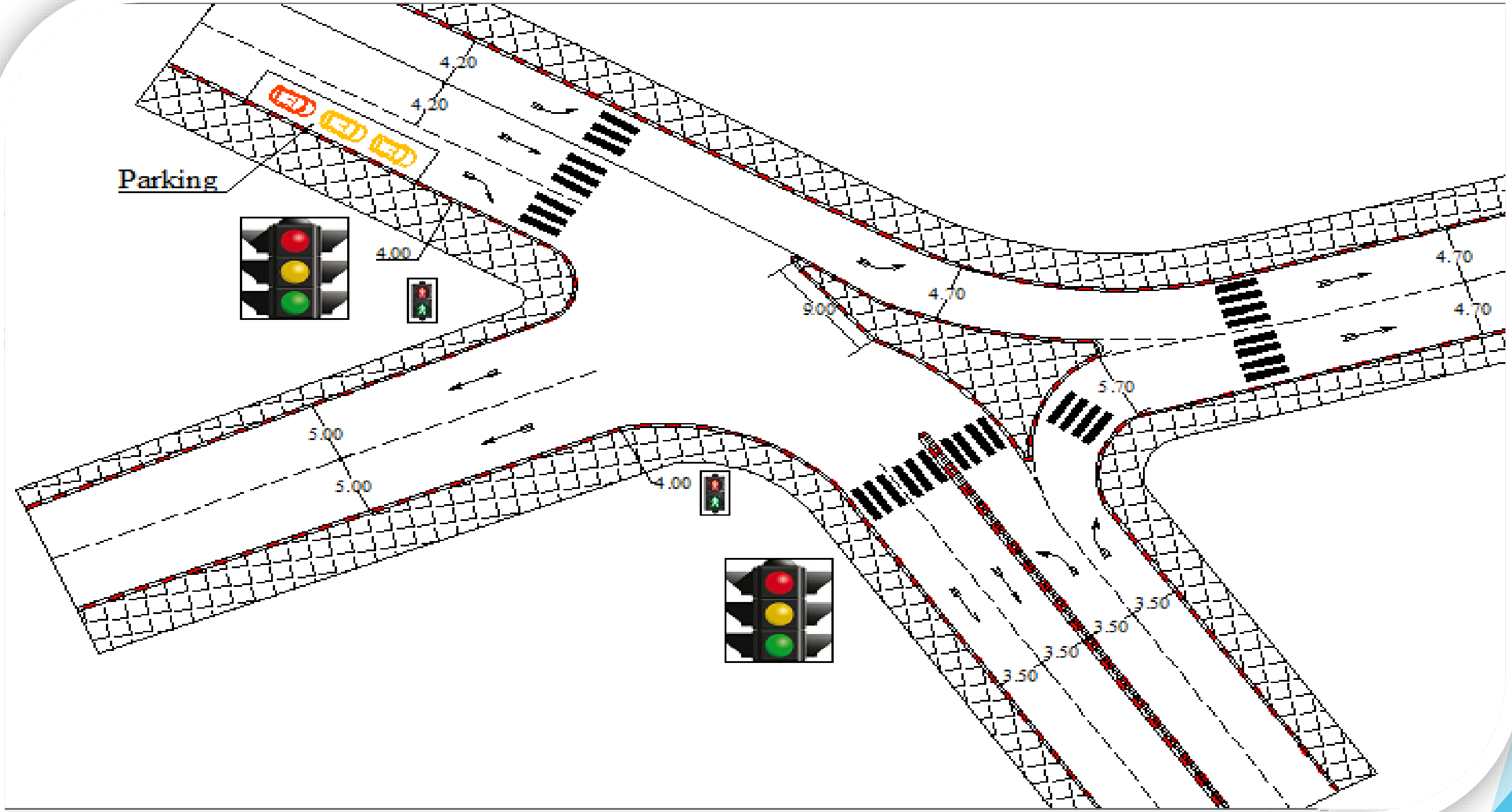
Intersection I-3: Al-Quds Street near Jordan Bank.

- ✓ The most important problem at this intersection is the conflict point between through movement from South Bound and left movement from North Bound that caused also mainly the delay at intersection.



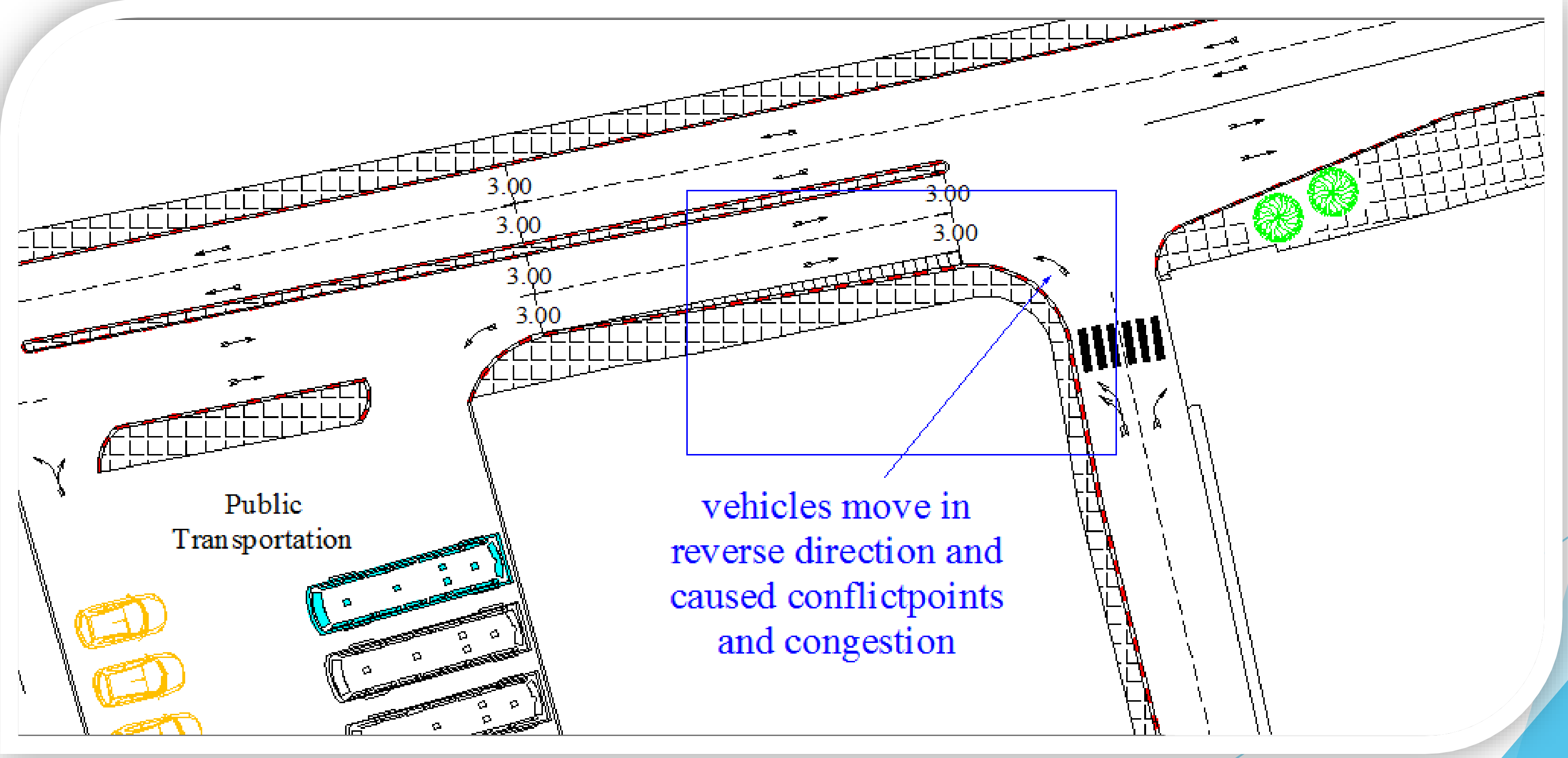
Suggested Solution:

- ✓ because of difficulty of regulate traffic movements by traffic signs. It must install signal devices that control the movements caused conflicts. The movements will be included in installing traffic signal devices are North Bound left, and South Bound through and right.



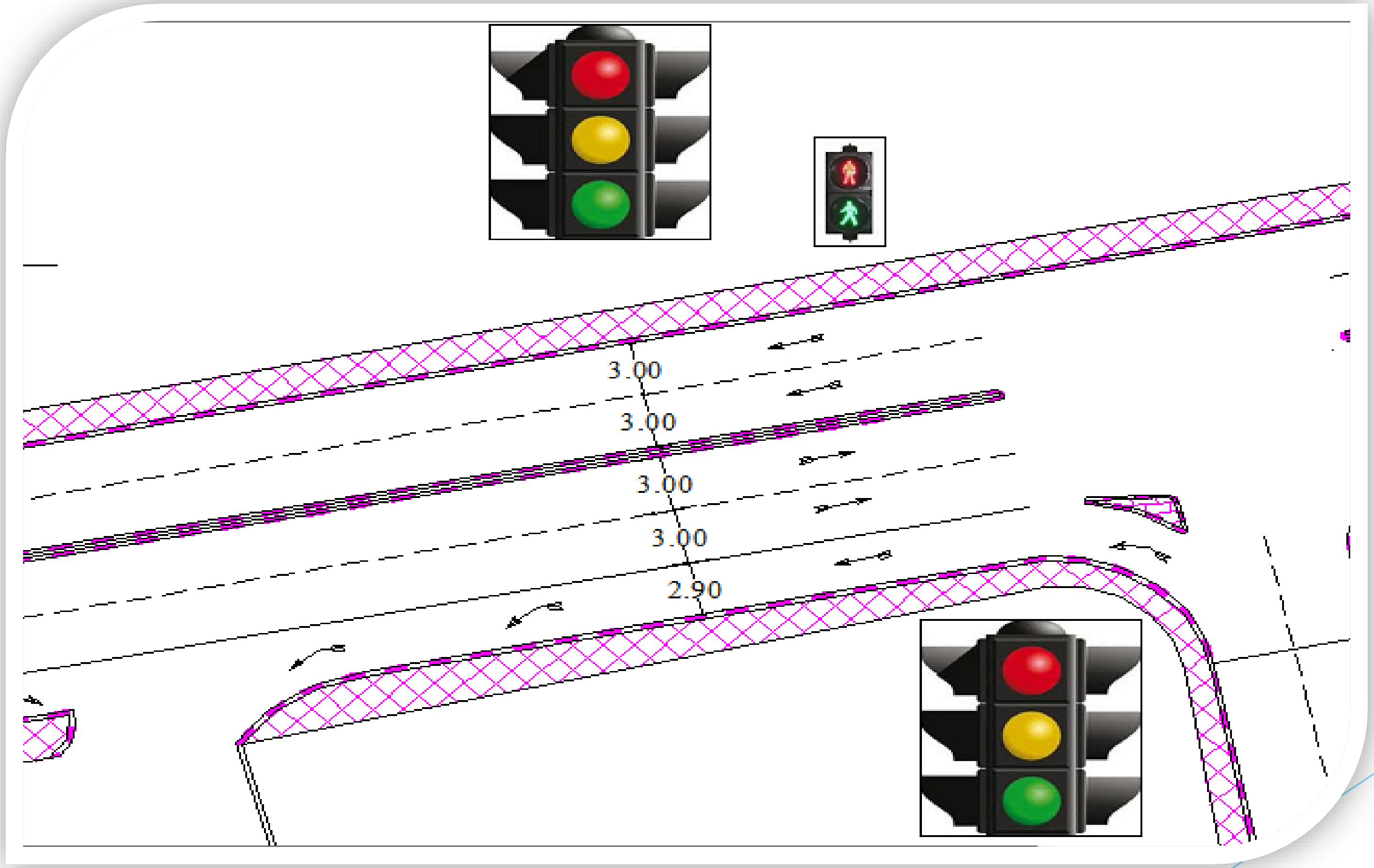
Intersection I-4: at Al-Irsal Street near Taxi Station:

- ✓ First problem is entry the vehicles into Busses station. These busses and taxis enter the station in reverse direction to traffic movement that leads to conflict points and congestion.



Suggested Solutions:

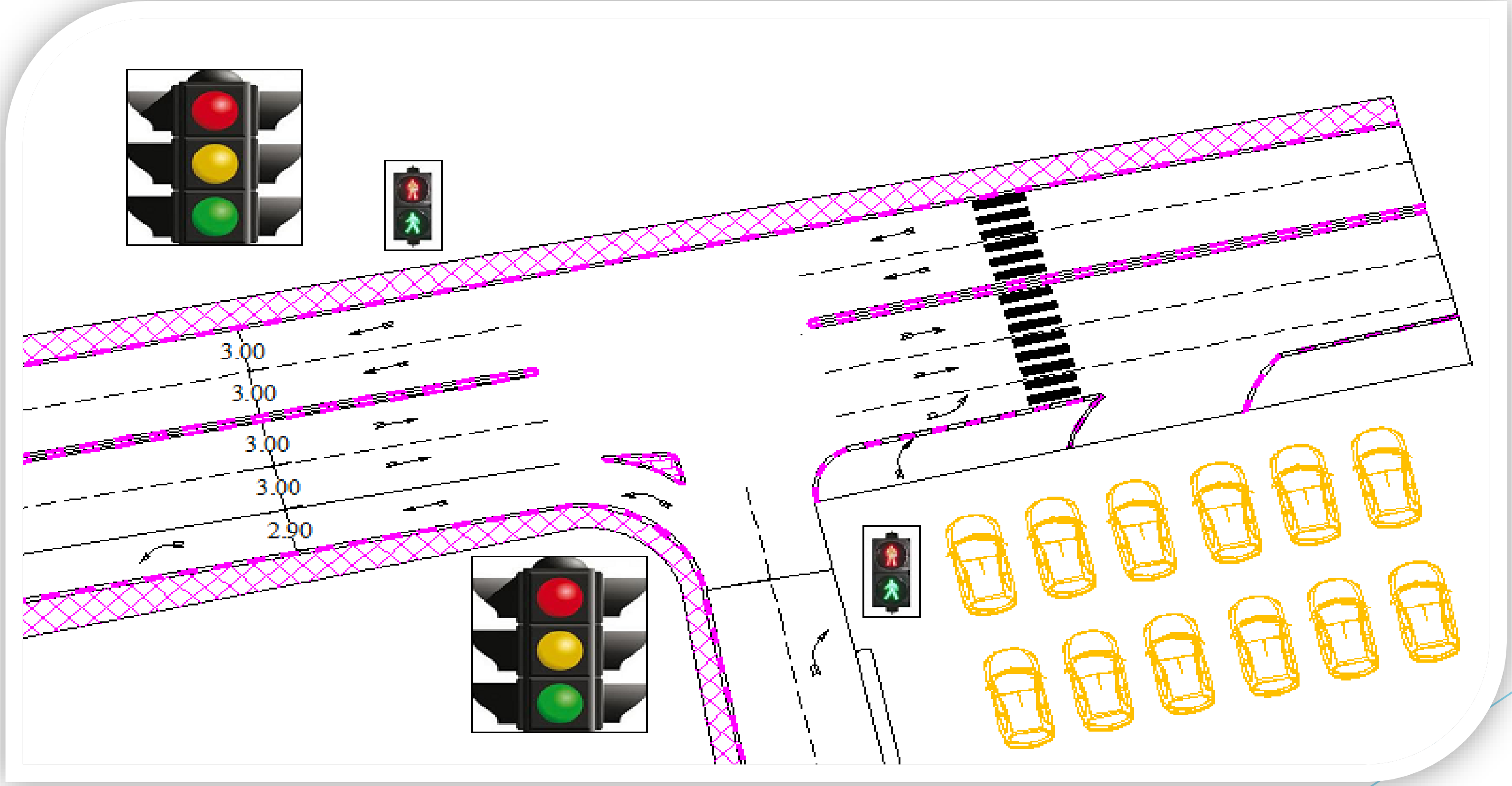
- ✓ The best solution was to install a signal traffic to avoid conflict points and congestion and to regulate traffic movements. To do this it was necessary to add anew lane to NB lanes to allow enter to busses station by using separately lane. This is achieved by taking a lane width from reducing sidewalks width



- ✓ Second problem is taxis station beside the intersection, its entrance from West Bound and exist from North side.

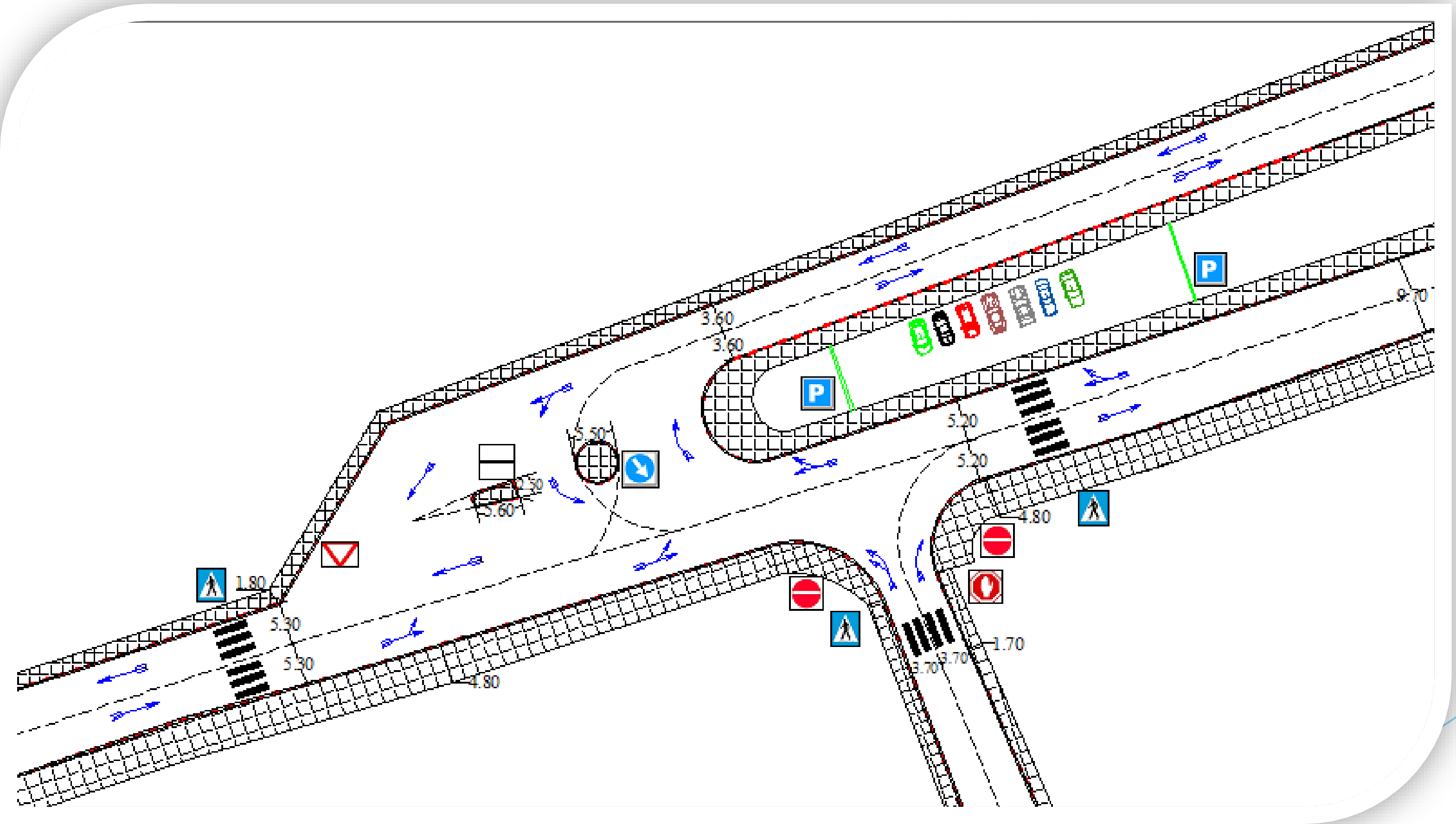
Suggested Solutions:

- ✓ To avoid conflict point at the intersection due to taxis station, it's preferred to move the exit of this station away of intersection and channelization the movement from West Bound to separate the signal traffic movements from unsignalized movements.



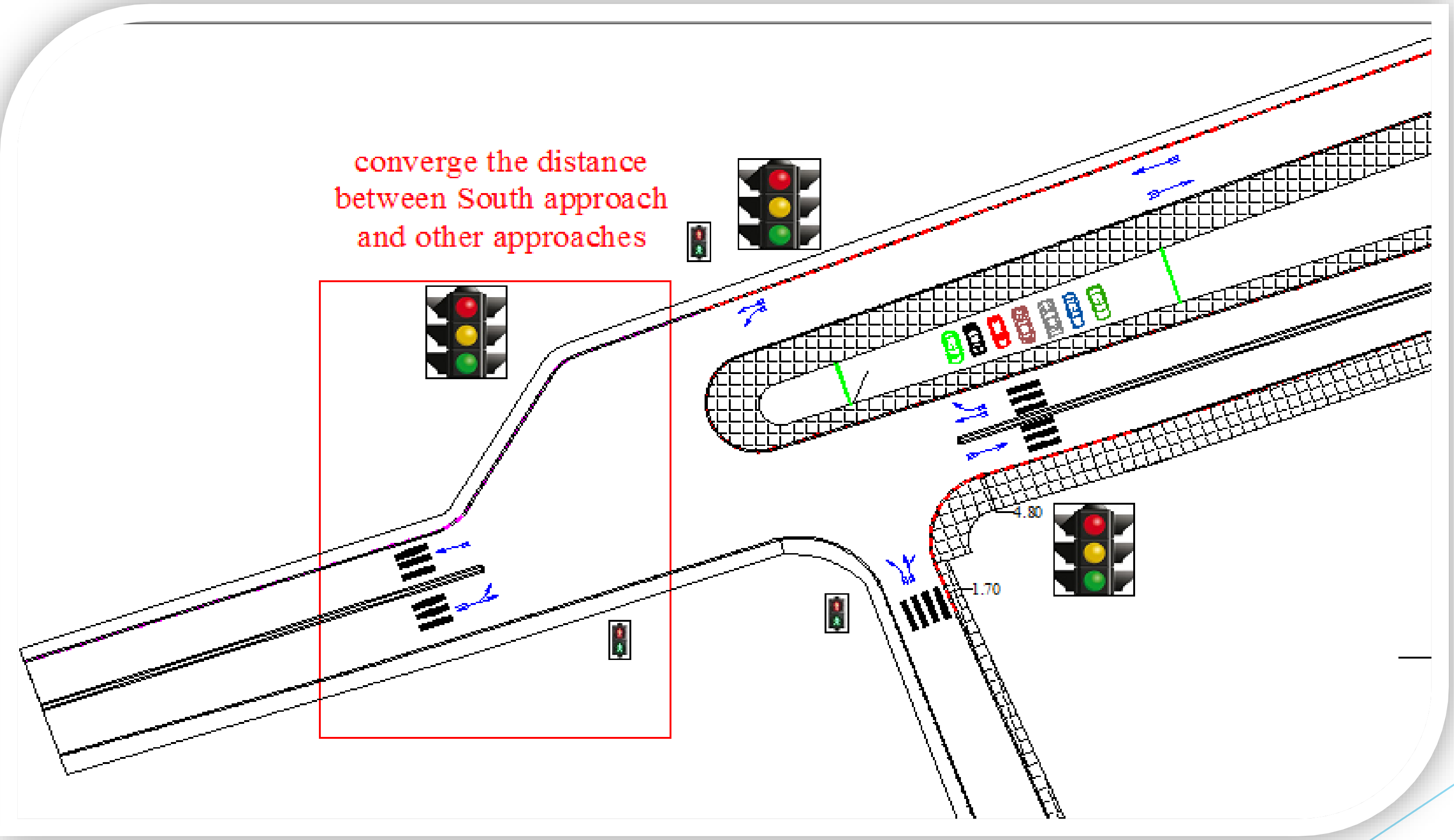
Intersection I-5: Al-Irsal Street near Al-Najmah Center.

- ✓ The most important problem at this intersection is the conflict point between traffic movements enter the intersection that caused delay and increase accident rate.



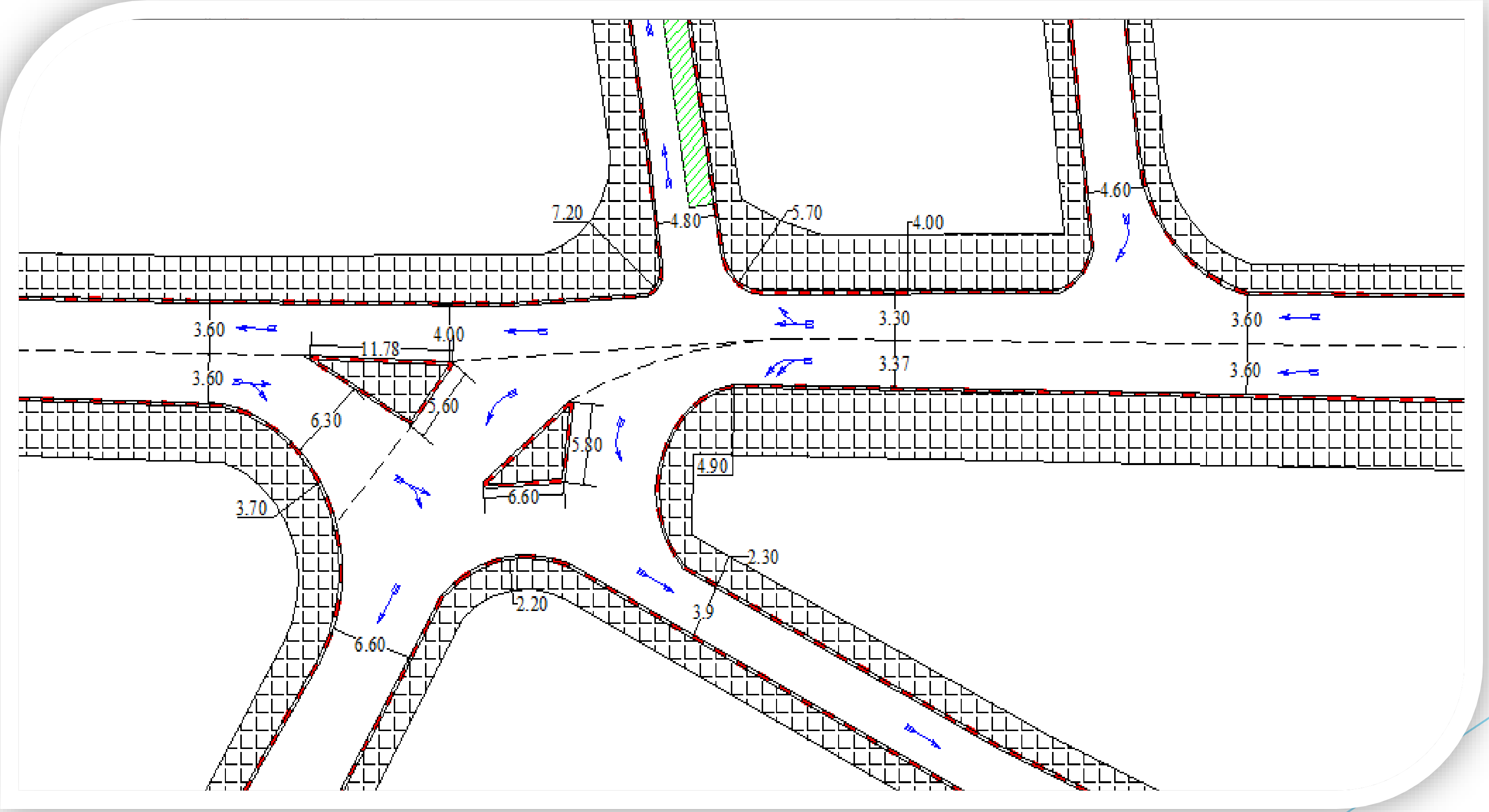
Suggested Solutions:

- ✓ It must install signal devices that control the movements at intersection to avoid conflict points. Also it's suggested to converge South approach to be near to intersection to reduce Red time interval for North Bound phase.



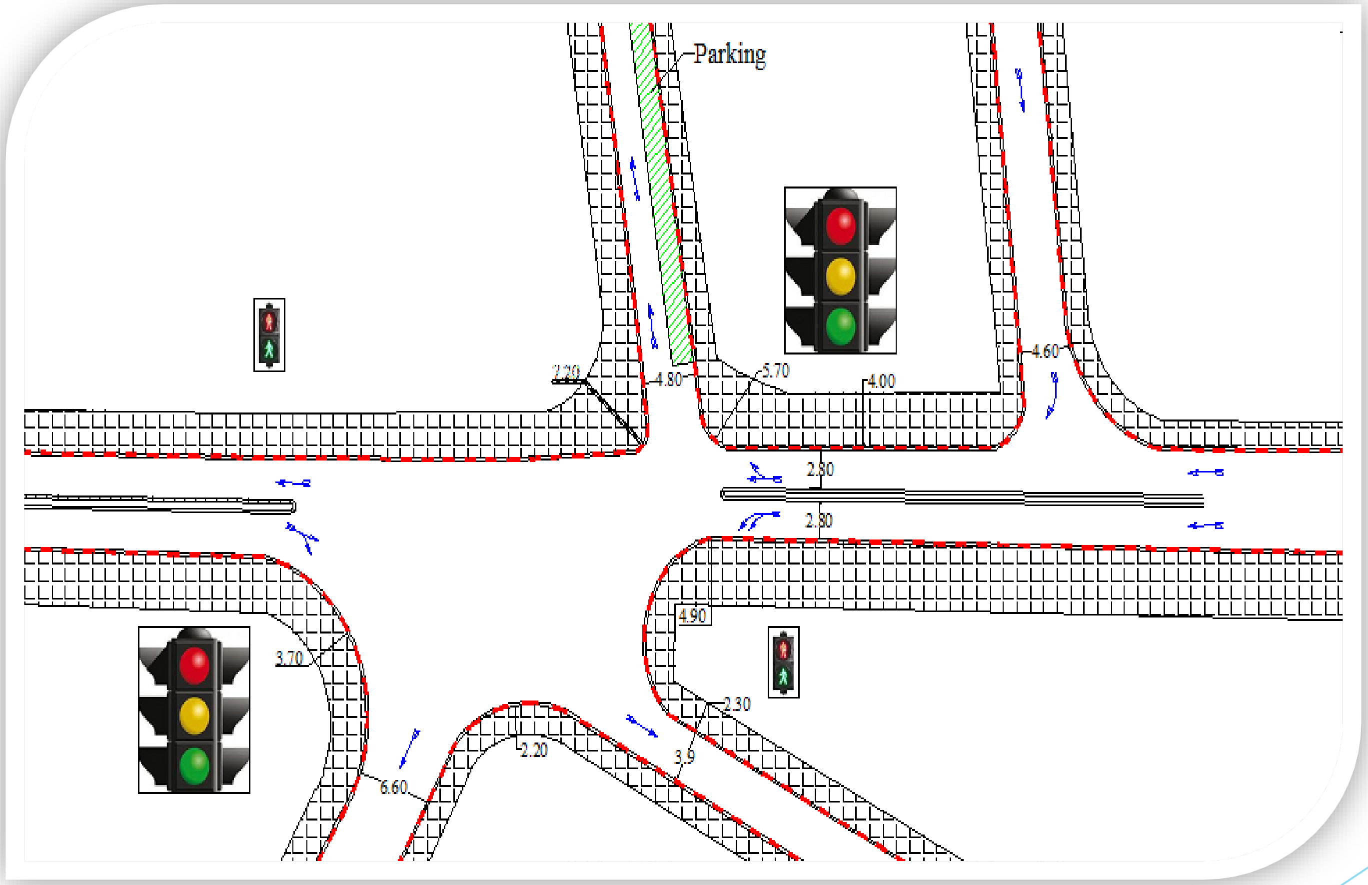
Intersection I-6: Main Street near Rokab Ice-cream.

- ✓ The most important problem at this intersection is the conflict point between through movement from South Bound and left movement from North Bound that caused also mainly the delay at intersection.



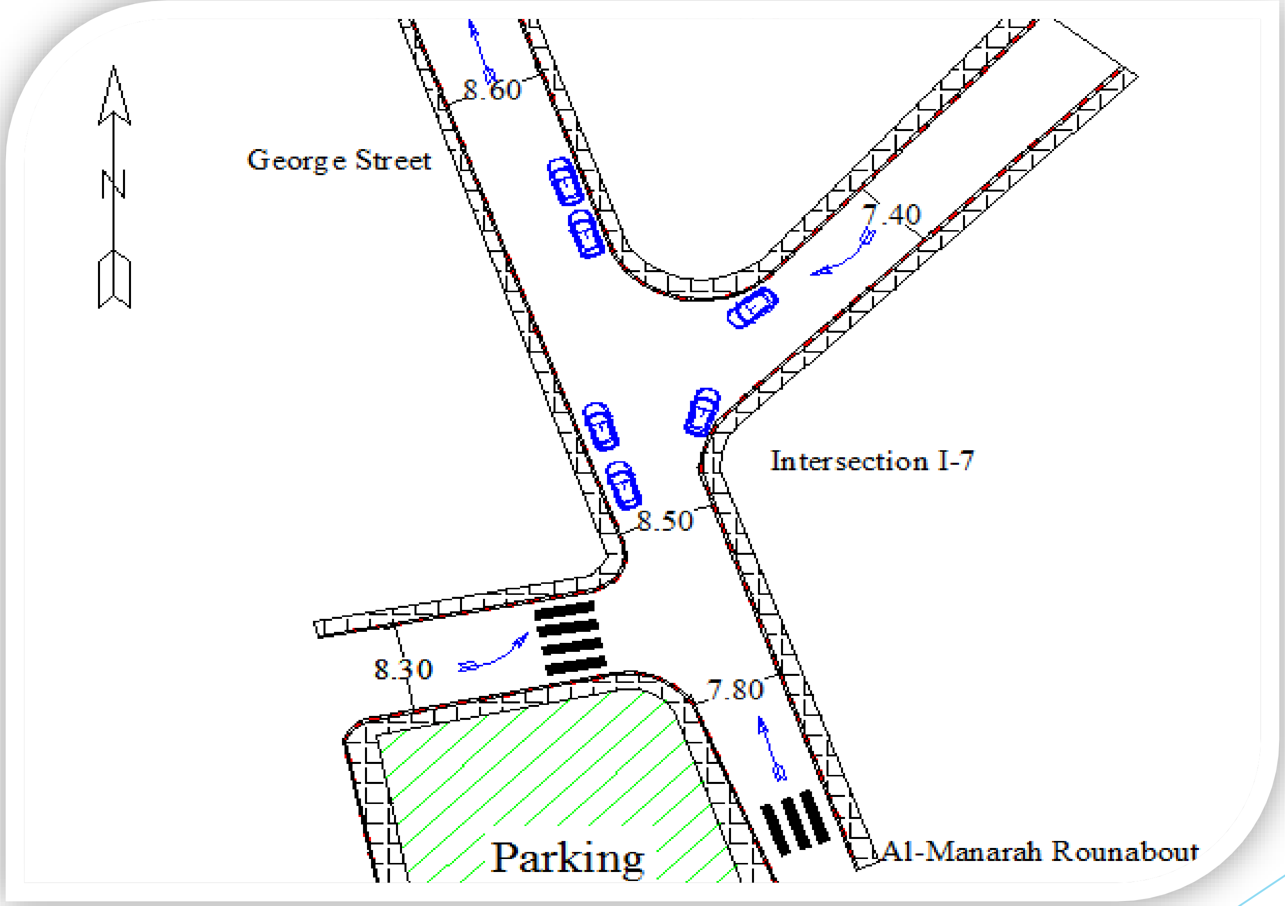
Suggested Solutions:

- ✓ After check if the intersection need installing signal devices, the result was unnecessary to use traffic signals. But because of difficulty of regulate traffic movements by traffic signs. It must to install signal devices that control the movements caused conflicts. Also it's preferable to remove the channelization that exist inside the intersection that are no need after installing traffic signal.



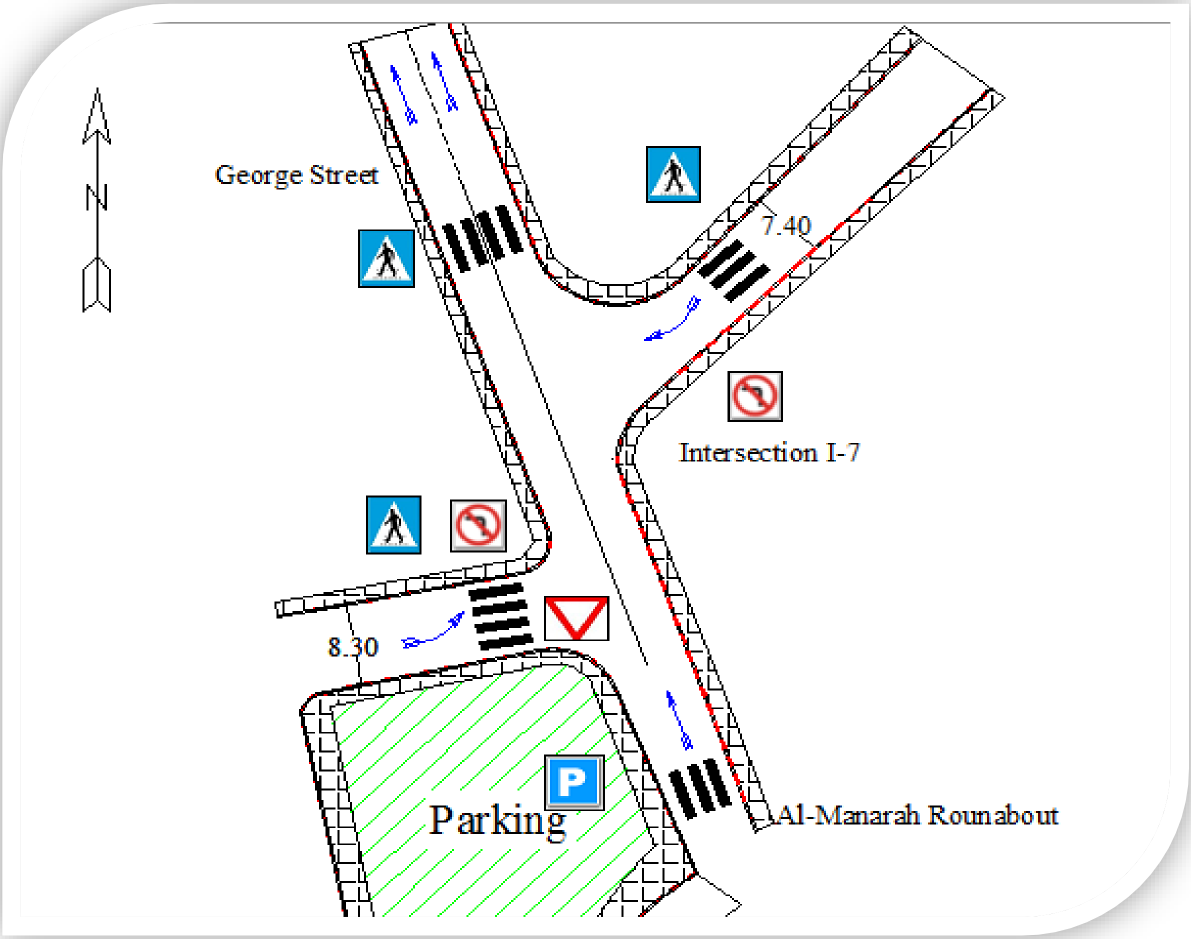
Intersection I-7: At George Street near Traffic Police Station.

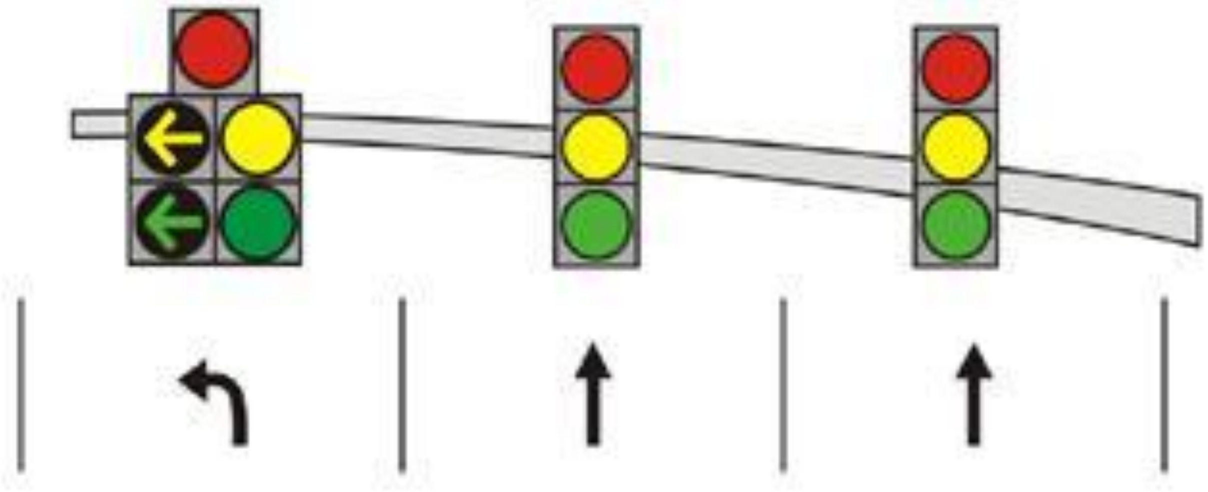
- ✓ The most important problem at this intersection is the presence of Traffic Police Station near intersection and illegal parking of Police vehicles at intersection.



Suggested Solutions:

- ✓ The first step is to move away all parking police vehicles at intersection and using the nearest parking beside Al-Manarah Roundabout to avoid congestion. And to avoid conflicting point due vehicle movements, suggested solution is to separate the movement from East Bound and North Bound with continuous marking.





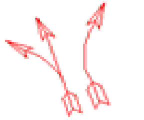
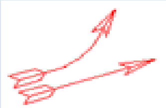
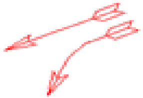
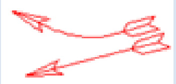
Calculations of Cycle Length at Signalized Intersections

Calculations of Cycle Length

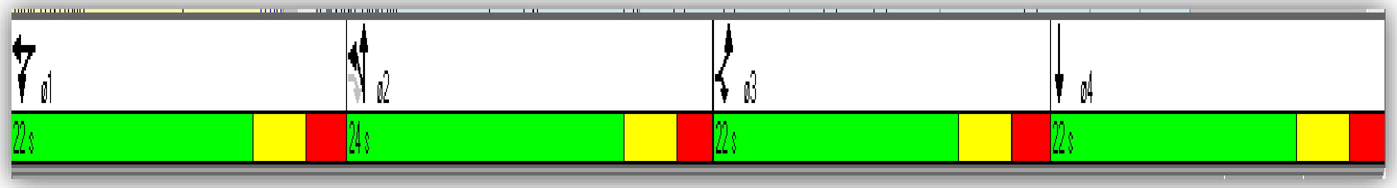
- ✓ Traffic control devices (TCD) must be use at intersection to reduce the number conflict points to satisfy the safety and minimum delay.

- ✓ Cycle length: is composed of the total signal time to serve all of the signal phases including the green time plus any change interval. Longer cycles will accommodate more vehicles per hour but that will also produce higher average delays

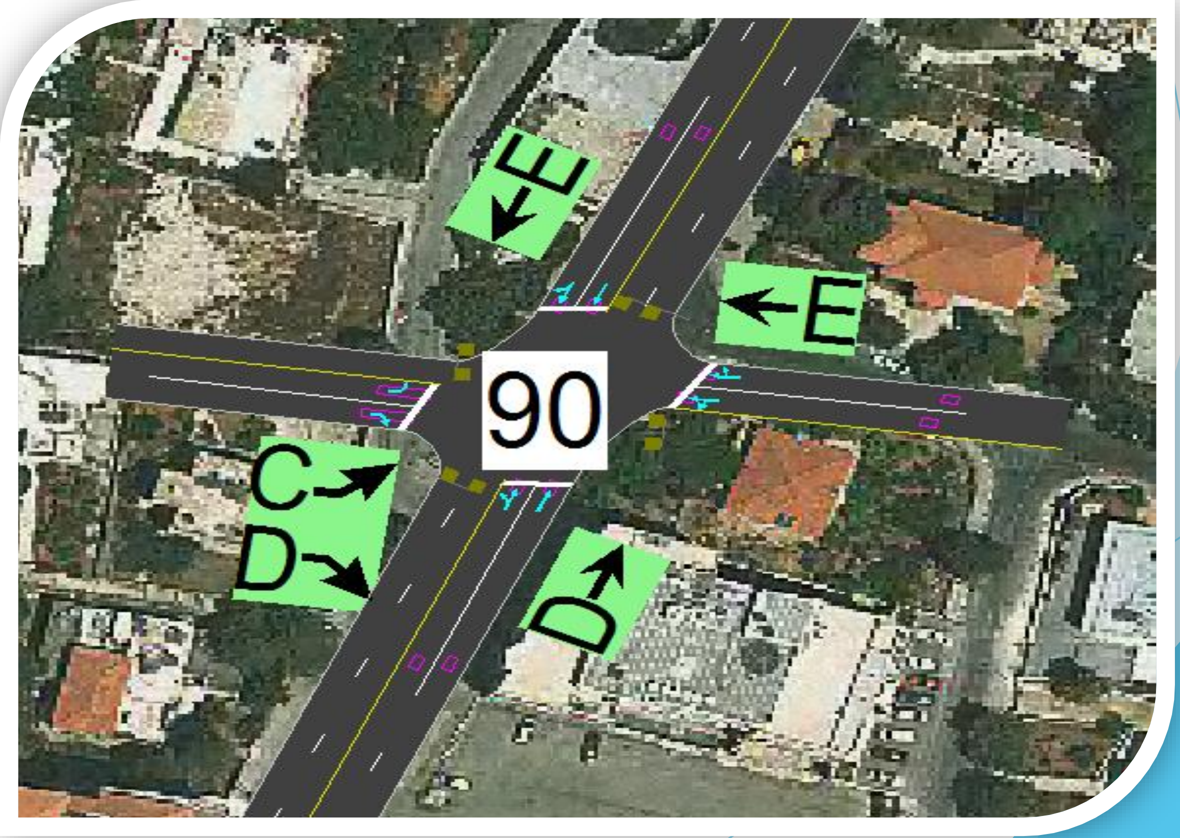
Example of Calculation of Cycle Length at Warranted Intersections:

Intersection				Phase			Time of Phase (sec)			Cycle length (sec)
No.	Name	LOS	Delay (sec)	No.	Movement	LOS	Green	Yellow	Red	
1		E	51.0	1	 WB Left Through WB Right	E	22	5.0	2.7	120
				2	 NB Left NB Through	D	24	5.0	2.4	
				3	 EB left Right	D	22	5.0	2.5	
				4	 SB Through SB Right	E	22	5.0	2.4	

Calculation of Cycle Length at intersection I-5 at Al-Irsal Street near Al-Najmah Center.



Cycle Length for Intersection I-5 at Al-Irsal Street near Al-Najmah Center.



Green Interval and LOS for Intersection I-5 at Al-Irsal Street near Al-Najmah Center

Summary of Cycle Length Calculations at Warranted intersections:

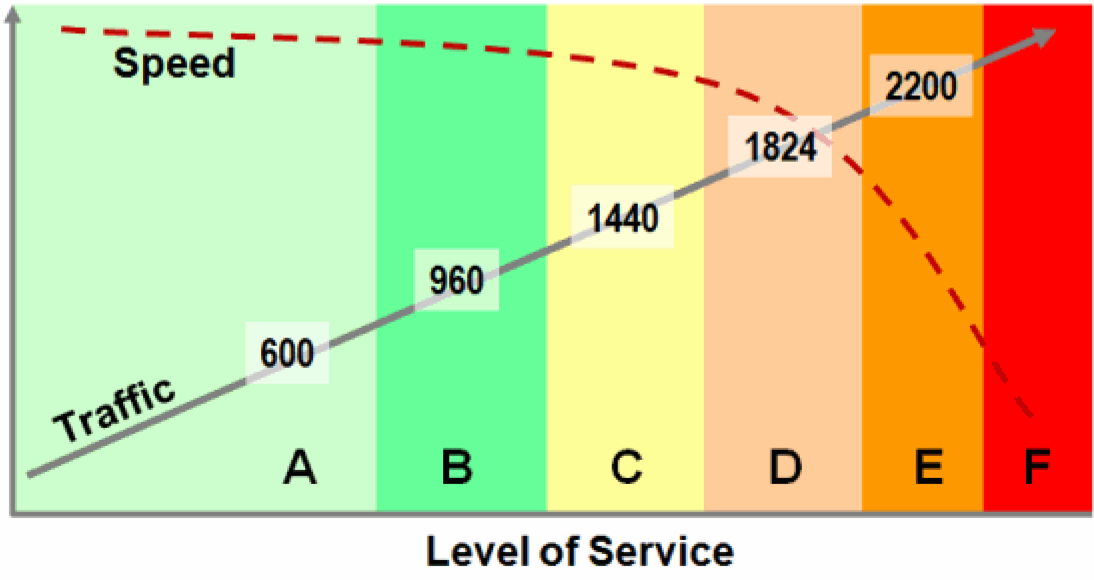
Intersection No.	No. of Phases	Cycle Length (Sec.)	Green Interval (Sec.)	Level of Service (LOS)	Delay (Sec.)
I-1	3	115	90	E	52.4
I-3	2	90	75	D	24.2
I-4	2	90	45	C	13.1
I-5	4	120	90	E	51.0
I-6	2	75	60	C	20.5

Level of Service (LOS) before and after analysis of suggested solutions:

- ✓ After Analysis the suggested solutions, it is supposed to improve Level of Service (LOS).

- ✓ Improve LOS leads to reduce delay and congestion in study area.

$$S = sf / \left(1 + a(v/c)^b\right)$$



summary of Level of Service (LOS) at all approaches in the intersections studied before and after editing:

Direction	North Bound						East Bound						South Bound						West Bound					
	Existing			Forecasted			Existing			Forecasted			Existing			Forecasted			Existing			Forecasted		
Intersection #	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R
I-1	D	D	D	C	B	B	F	F	-	C	D	-	-	-	-	-	-	-	-	F	F	-	D	D
I-2	A	A	A	A	A	A	F	F	F	D	D	D	B	B	B	B	B	B	F	F	F	E	E	E
I-3	F	-	F	C	-	B	-	-	-	-	-	-	F	F	F	C	C	B	-	-	-	-	-	-
I-4	-	F	-	-	C	-	-	-	-	-	-	-	-	F	-	-	C	-	C	-	B	C	-	A
I-5	F	F	-	D	D	-	B	-	B	D	-	D	-	F	F	-	E	E	A	A	A	E	E	E
I-6(1)	-	-	-	-	-	-	-	F	F	-	C	C	-	-	-	-	-	-	F	F	F	B	C	C
I-6(2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	B	-	-	B	-	E	-	-	E	-
I-7	-	F	-	-	E	-	C	-	-	C	-	-	-	-	-	-	-	-	-	-	F	-	-	C

Conclusion and Recommendation

In every work there are an end line, so this chapter will guide the readers to use this useful project and enable them to build on it. So any person who wants to follow up this work and build up on this project can keep this chapter in his mind.

Conclusion:

- ✓ This project did not have all required data for performing completed operation analysis at intersections, so it is needed from the municipality to complete the missing data on this project to save time and money.

- ✓ Excel sheet were used to the procedure for calculating the PHF, PHV, Peak time and others for each movements, approach, and whole intersection. So these sheets are effective in analysis and they save time of analyzers and give them a good view for the movements.

- ✓ Traffic safety is one of the main issues in transportation systems management because it gives an indications about critical location in the CBD area.

Conclusion:

- ✓ To satisfy and mobility the objectives of safety for pedestrian, it suggested to use a signal devices at warranted intersection and using a fence at sidewalk in high speed vehicle streets such as Al-Nahda Street.

- ✓ The most cause of congestion in Ramallah and Al-Beireh CBD area is precedence of public transportation inside this area.

- ✓ Growth rate at Ramallah and Al-Beireh CBD area is increasing rapidly and no places to Expansion of Street and CBD area, it is caused an increasing congestion at this area.

Recommendations:

A review of the existing conditions in Ramallah and Al-Beireh Cities indicates that it is needed to properly study and analyze traffic flow in the roadway network, to obtain detailed information about the streets and intersection, and to get a clear vision of the problems facing transportation at all.

Recommendations:

- ✓ unsignalized intersection should be evaluated for traffic signal warrants to ensure that the recommended traffic control can match the future needs.

- ✓ Re Design of intersection geometry that includes:

1. Lanes Width.
2. Sidewalk Width.
3. Radii of curves.

- ✓ Installing and re distribution of traffic signs.

- ✓ Prohibit an illegal Parking at intersections.

Thank you