An Najah National University
Engineering College
Civil Engineering Department

Graduation Project

Traffic System Management for "Tulkarem"

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Outline


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Introduction

- Tulkarem city is located at the northwestern part of the West Bank , It had a population of approximately 67,804.

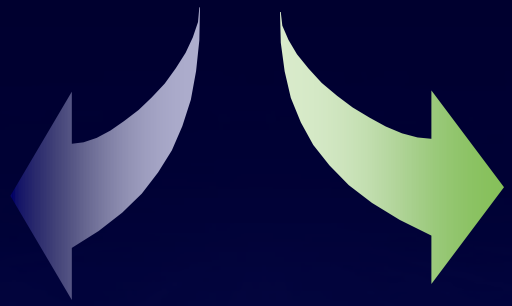
- The traffic volumes in this city are considered to be high . It requires a complete traffic management plan to make better use of the existing roadway network structure and to keep an acceptable level of service for the operation for both pedestrian and vehicular traffic.

Map of Tulkarem



Problem Definition

Congestion Problems
These are major problems that can be clearly seen in the CBD area.



Delay Problems
These are other problems that result of congestion in the CBD area.

Geometric Problems
These problems are obvious because no much has been done to improve the geometry of the intersections.

Parking and pedestrian Problems The parking capacity in the Tulkarem city is limited. Random parking observed while there is lack of parking control and management

Safety Problems
These problems are noticed in the study area, because the right of way is not clear for conflict points at intersections

Objectives

A

Create short-term manage to the current problem

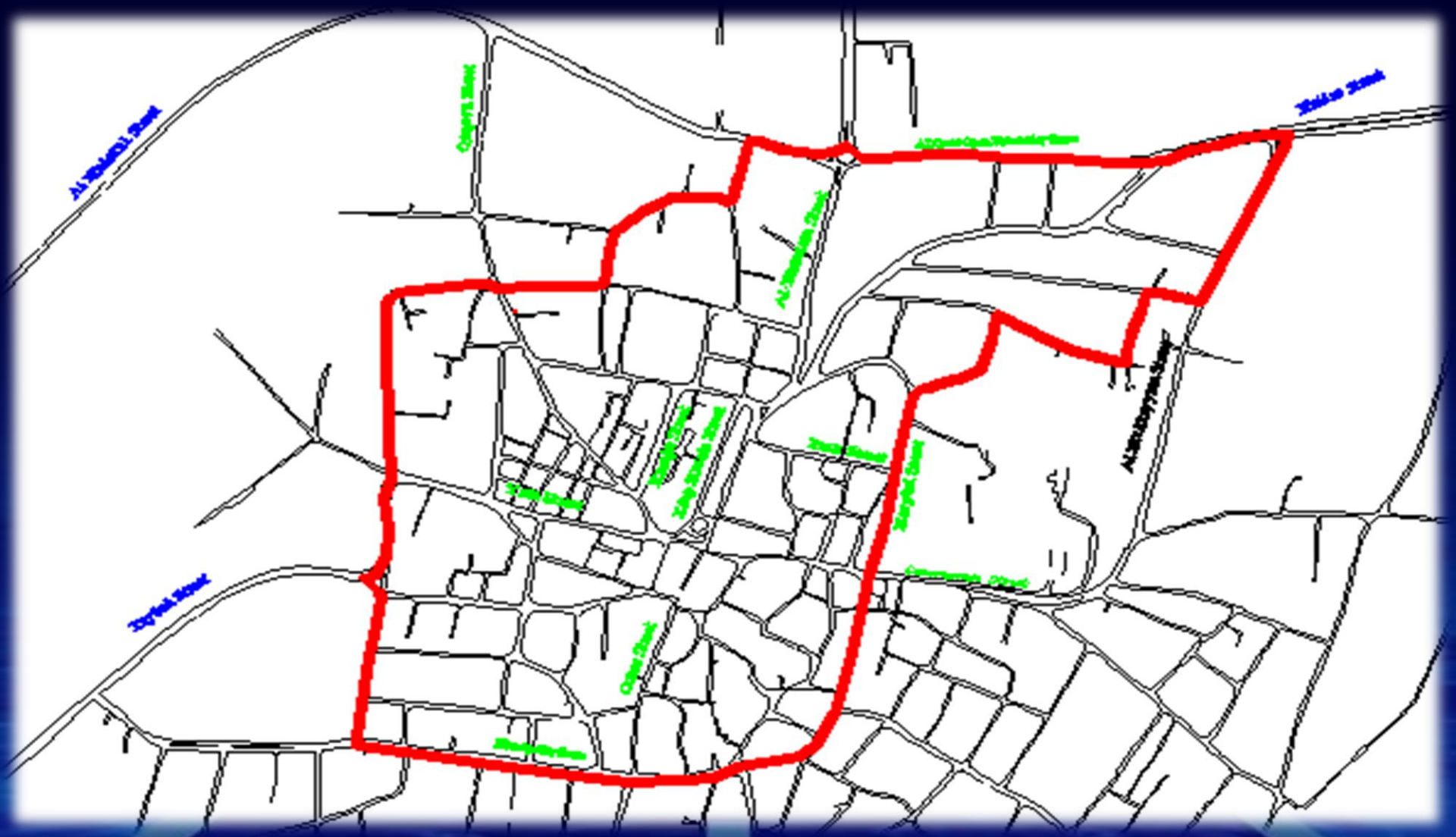
B

suggest and examine alternatives to solve current problems,

C

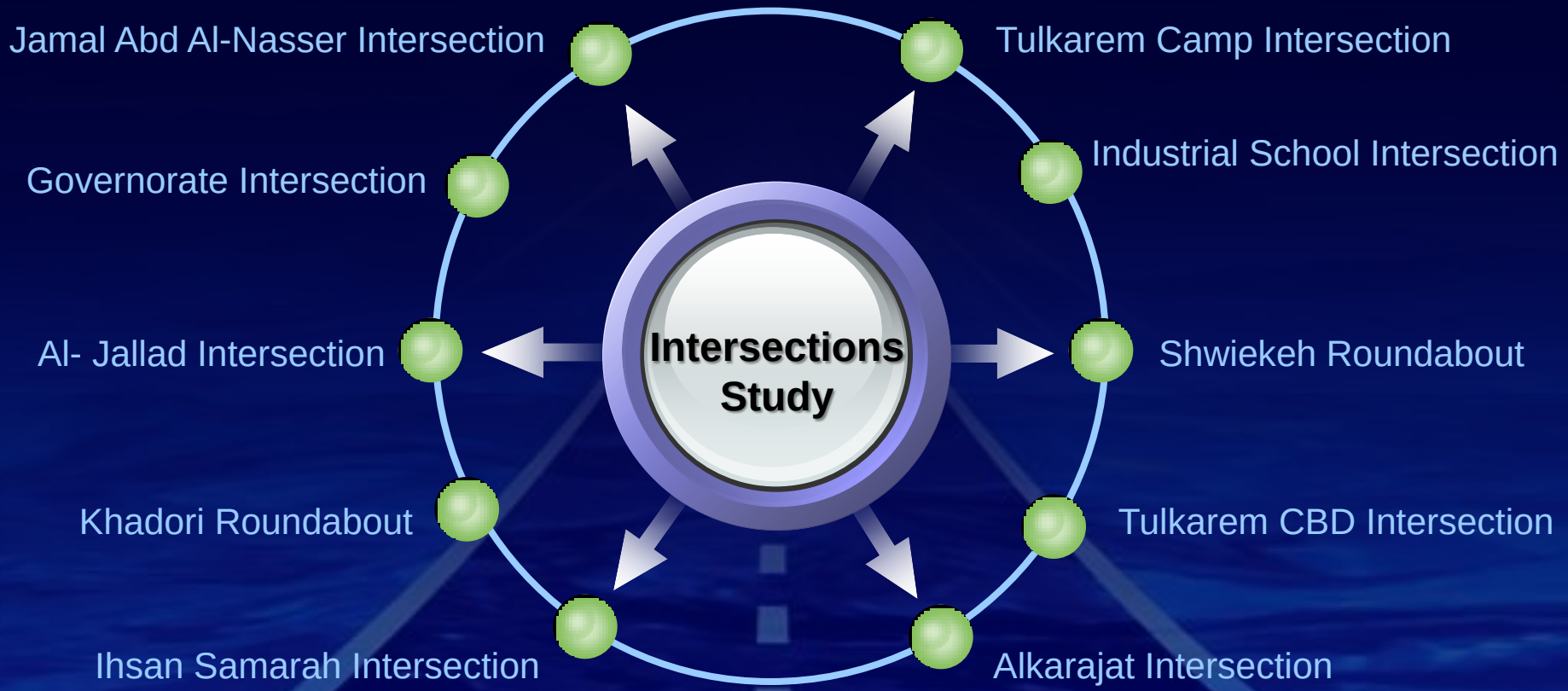
Changes in the geometric design of the intersections could be necessary to better serve the movement of traffic.

Study area

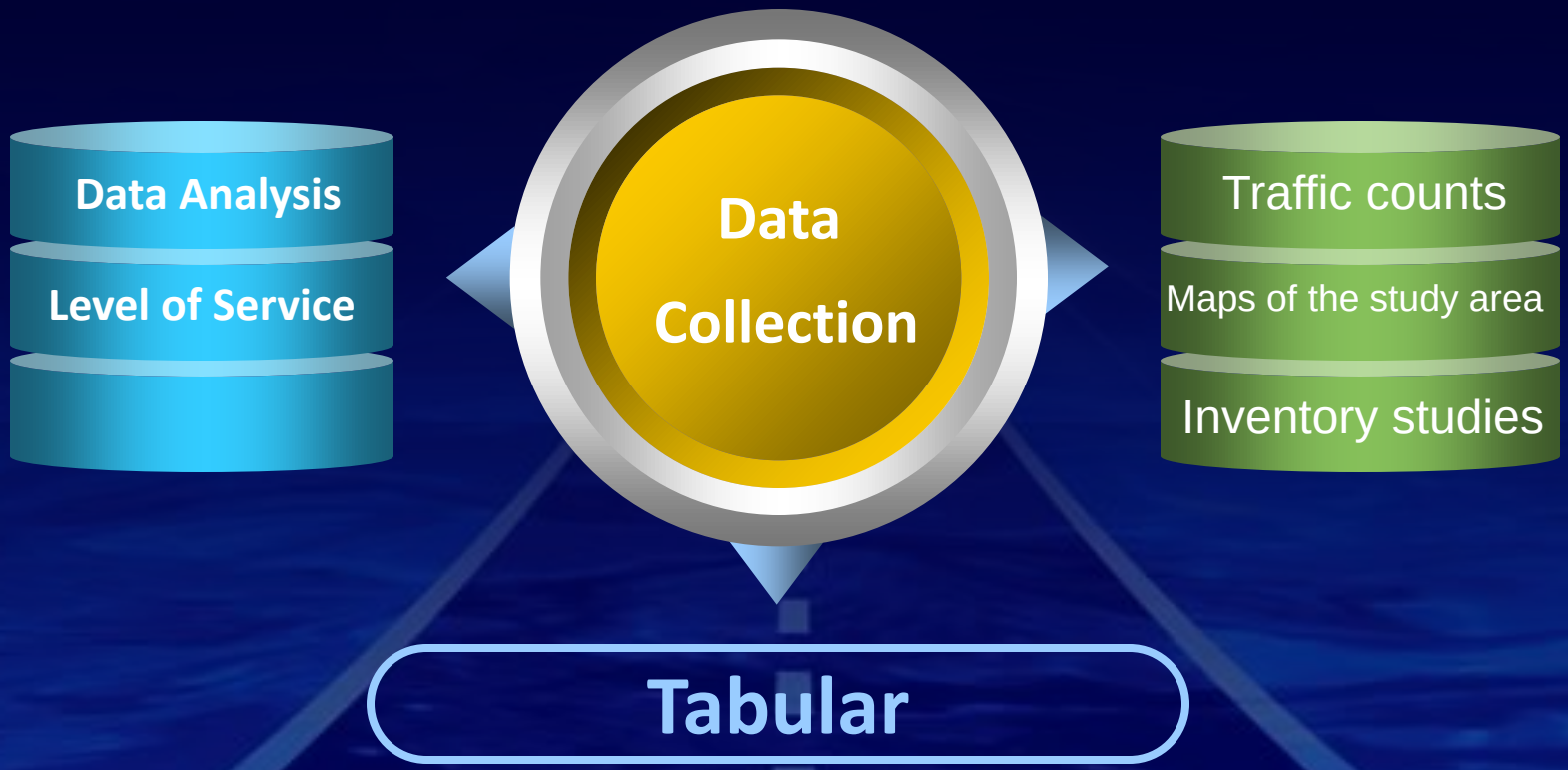


The Central Business District (CBD) is considered as the core of any city

CBD Area Intersections



Methodology



Level of Service (LOS)

1

Level of Service Analyses (LOS) were conducted using HCS 3.0 as an input file, obtaining a reports file

2

Currently no signalized intersections are in operation within the study area

3

The output is presented in Figure (4.1) along with peak hour volumes on the wall .

Counting Period

- Counting was performed along the day in Nablus Street during (7:00 AM – 4:00 PM) hours.
- Counting was performed at Industrial School intersection from (7:00-11:00) AM and (1:00-3:00) PM which is considered to be representive of traffic volume pattern at the intersections in the Tulkarem city
- The count was done on all intersections during the peak period for two hours; one in the morning at (9:00 - 11:00) AM and or one in the evening at (1:00 - 3:00) PM.
- The Unified Peak Hour on all intersections is (1:15–2:15) PM

Analysis of the Collected Data

- The result of counting in Nablus street = 6758 veh/day during (7:00 – 4:00) hours ,which is equal 9 hours.

- **X = No. of vehicle per hour in the intersection /total volume in the Nablus Street**
- **(1/X) = Expansion Factor**

  Which use to determine Representive Day Time Traffic for other intersections

- **The total volume during 6 hrs count at industrial School Intersection, equal 7526 veh/hr and PHV = 1521**

Intersection Unified Peak Hour

$$Y = \frac{\text{peak hour volume}}{\text{total volume due period count}} \rightarrow Y = \frac{1521}{7526} \rightarrow 0.202$$

Y: % of traffic volume in the peak hour with respect to the day traffic volume

Table (4.1): Summary of Unified peak hour

No. of Intersection	Name of Intersection	Representive Day Time Traffic	unified Peak Hours volume (Veh/hrs)
1	Tulkarem Camp	11006	2223
2	Industrial School	-------	-------
3	Shwiekeh	15943	3220
4	Tulkarem CBD	23003	4647
5	Alkarajat	6620	1337
6	Jamal Abd Al-Nasser	5024	1015
7	Governorate	6614	1336
8	Al- Jallad	8394	1696
9	Khadori	10787	2179
10	Ihsan Samarah	8025	1621

Traffic Signal Warrant

Traffic control signals should not be installed unless one or more of the signal warrants are met

Table 4.2: Summery of analysis for Signal warrant for the studied Intersections

No. of Intersection	Name of Intersection	Volume of Major Approach	Volume of Minor Approach	Warrant 11 met (Yes or No)	Volume of Major Approach after 5 year	Volume of Minor Approach after 5 year	Warrant 11 met (Yes or No)
1	Tulkarem Camp	2105	119	NO	2440	138	NO
2	Industrial School	1175	346	YES	1826	401	YES
3	Shwiekeh	1435	1762	YES	1664	2043	YES
4	Tulkarem CBD	3441	1206	YES	3989	1398	YES
5	Alkarajat	857	481	yes	993	558	yes
6	Jamal Abd Al-Nasser	363	189	NO	421	219	NO
7	Governorate	665	671	yes	771	778	yes
8	Al- Jallad	885	812	YES	1026	941	YES
9	Khadori	1230	1209	YES	1426	1402	YES
10	Ihsan Samarah	846	777	YES	981	901	YES

Parking Study

-The parking conditions in Tulkarem city are sophisticated due to narrow streets and places

-The period during which the parking study is counted was (8:00 AM – 2:00 PM) in weekday, and the summary of results are :

1) Actual Supply = 2004 Sp-hr

Which is equal to 2004 * 60 = 120,240 sp-min

Σ (time x no. veh) = 67515 veh.min **(for Total period)**
The stall parking are available about half.

2) Turn Over = 1.5838 veh/sp

3) Average Duration = 2.13 hrs/veh

Intersection Design

Geometric Design Criteria:

The design vehicles are (Passenger Car Single Unit, Bus, WB-15).

- **Lane width :** lane with varies from (2.7-3.6) for different intersections based on average space.

- **Sidewalks:** The minimum sidewalk width is 1.2m; sidewalk widths of 2.4 m or greater may be needed in commercial areas.

- **Minimum Turning Radii:** design minimum turning radii were taken as11 m for single unit truck, and 5 meter for small crossing roads and passenger vehicles as the design vehicle.

Roadway Intersection Design and Improvements

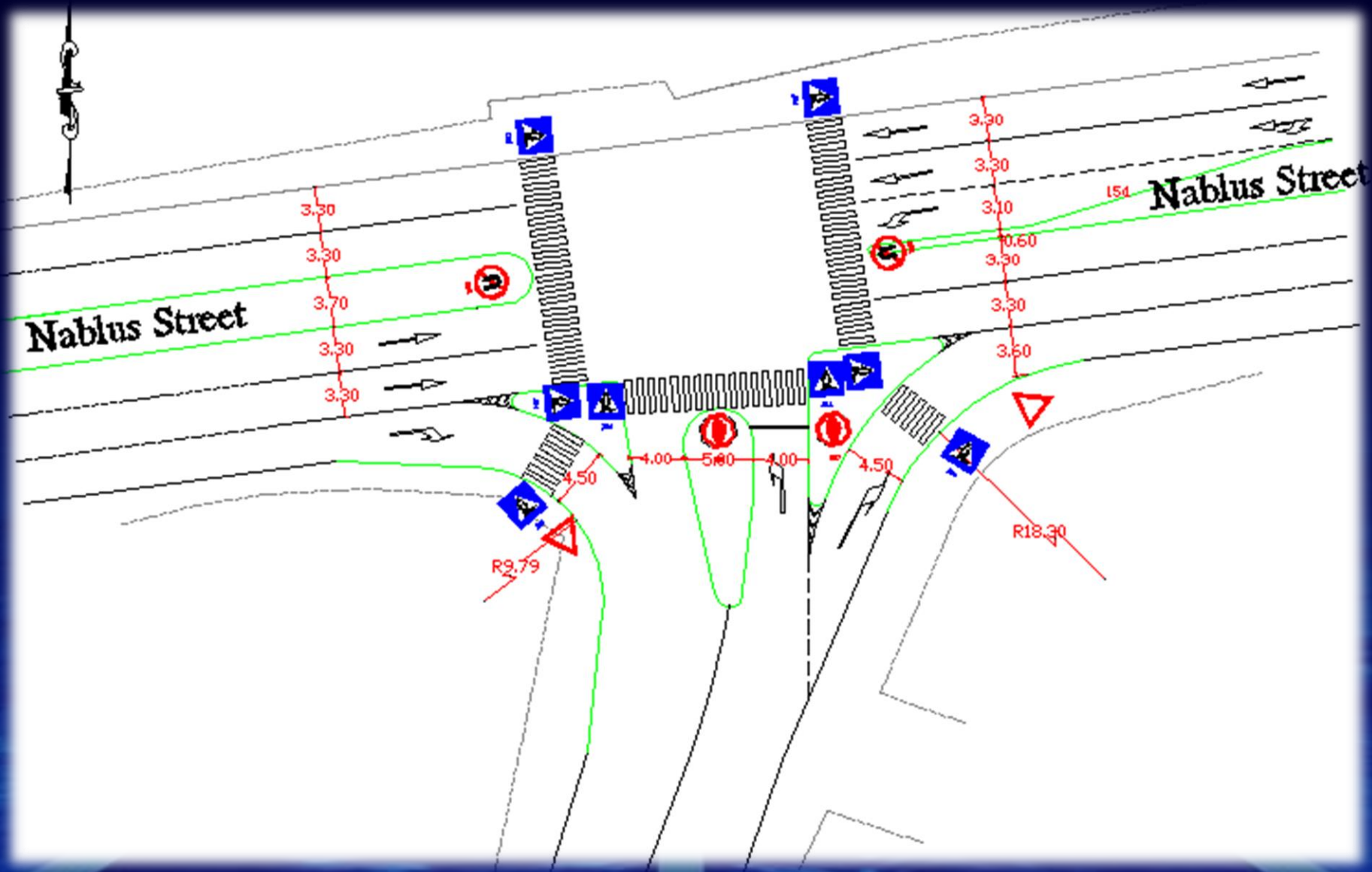
There are 10 intersections for which drawings depicting the recommended improvements have been prepared. Improvement at these intersection rang :

- widening of intersection approaches to provide additional travel lanes to parking prohibitions to accomplish the same purpose or to widen existing lanes where possible

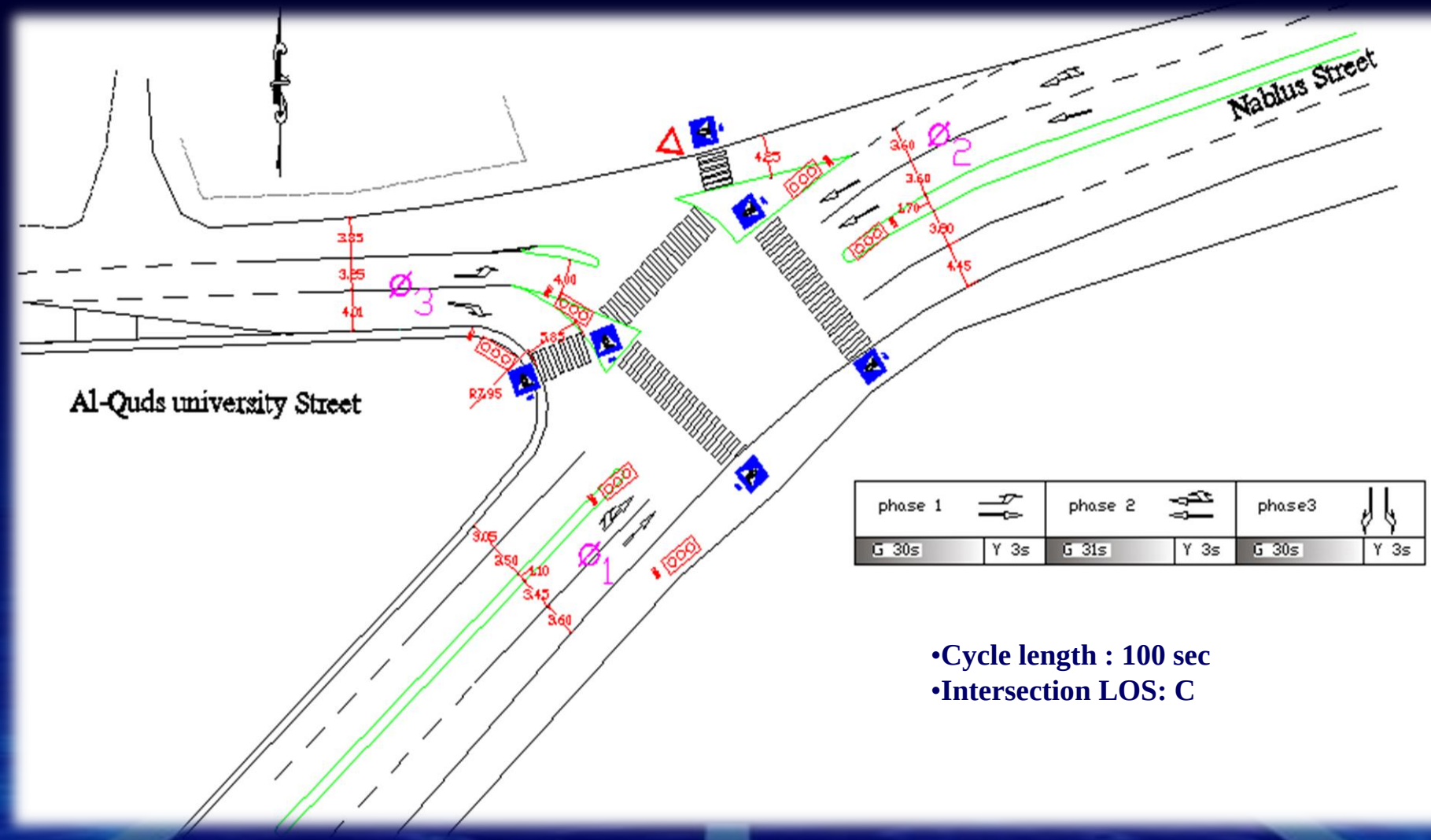
- pavement marking.

- providing traffic control signs.

Intersection 1

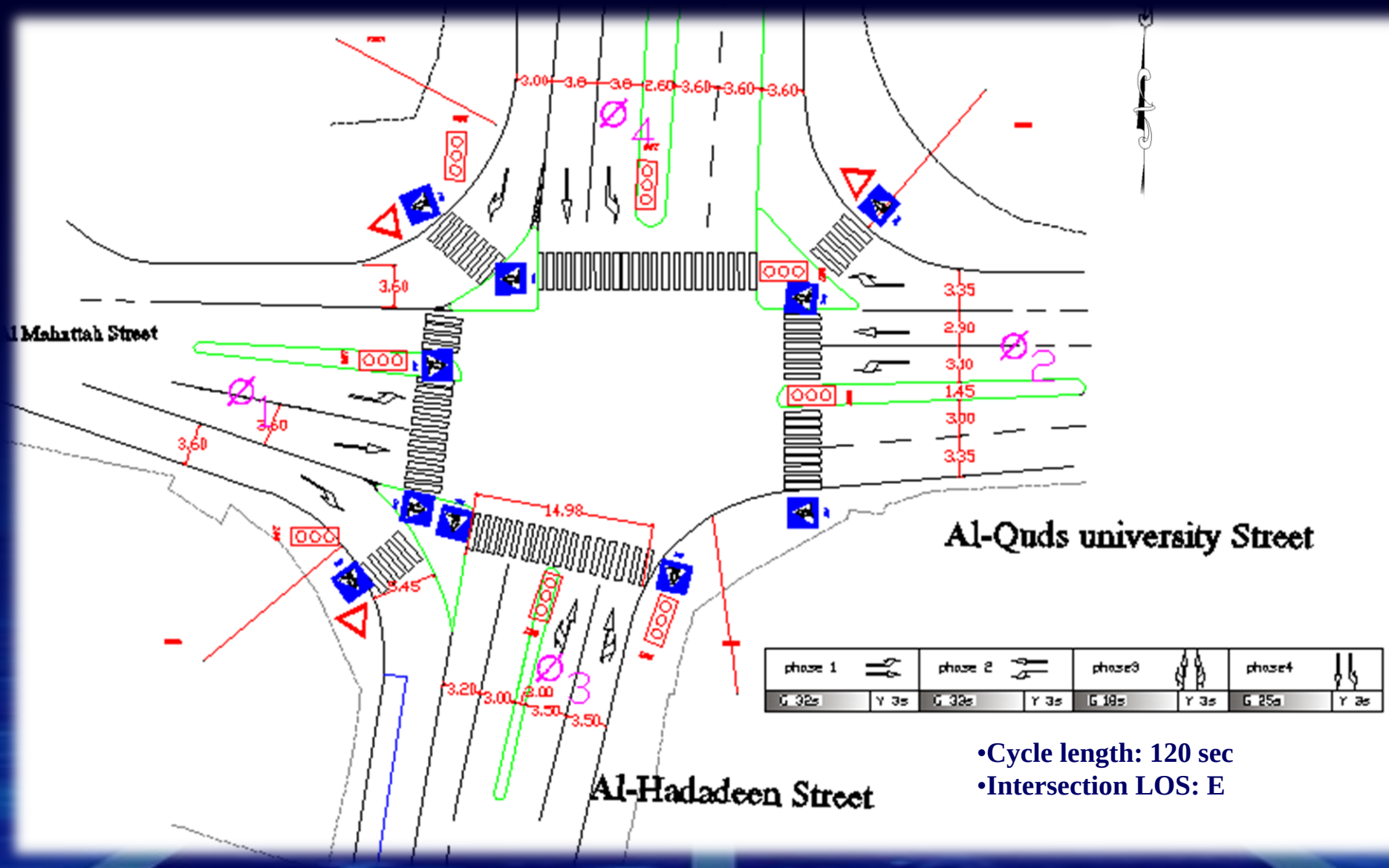


Intersection 2



- **Cycle length : 100 sec**
- **Intersection LOS: C**

Intersection 3



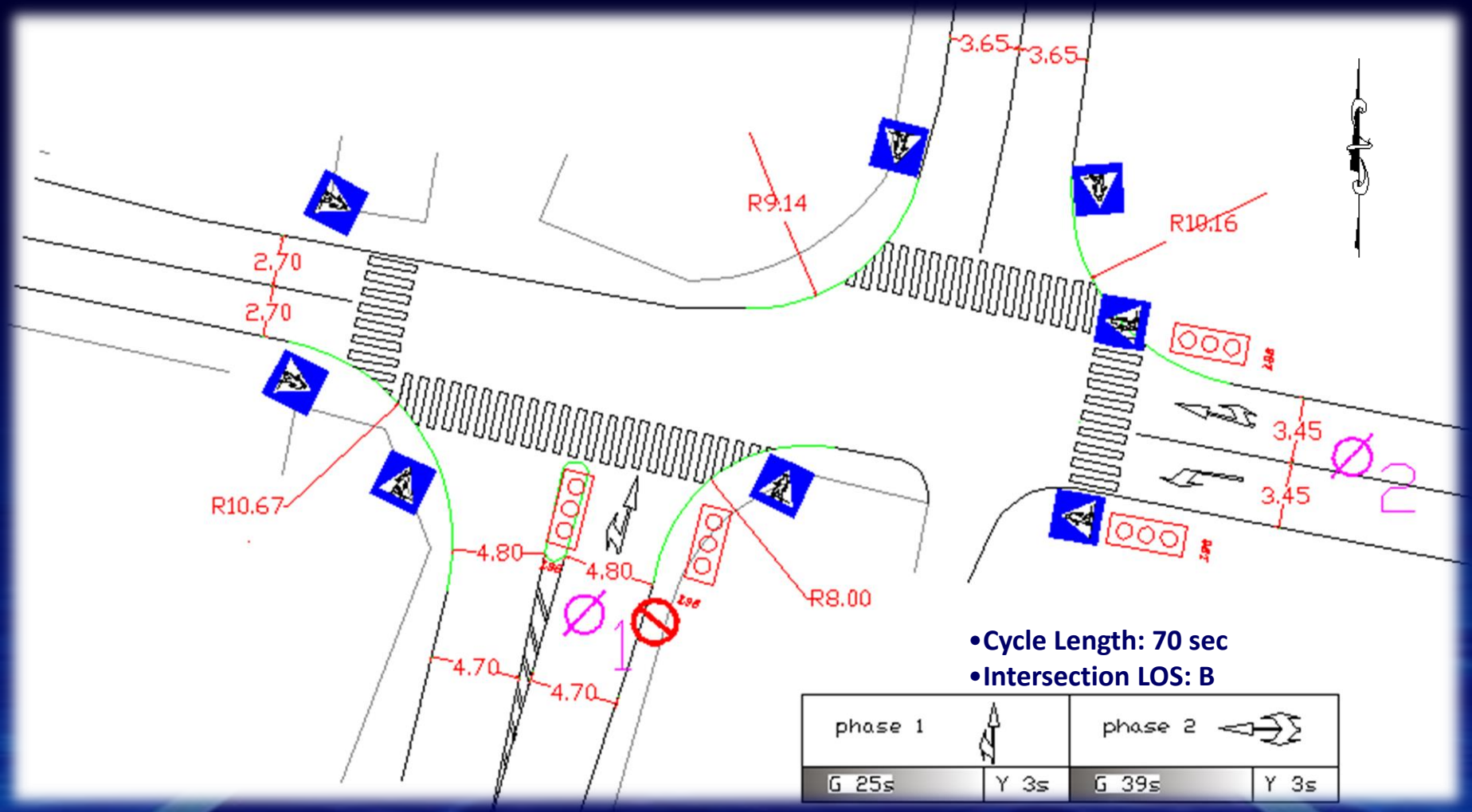
- **Cycle length: 120 sec**
- **Intersection LOS: E**

Intersection 4

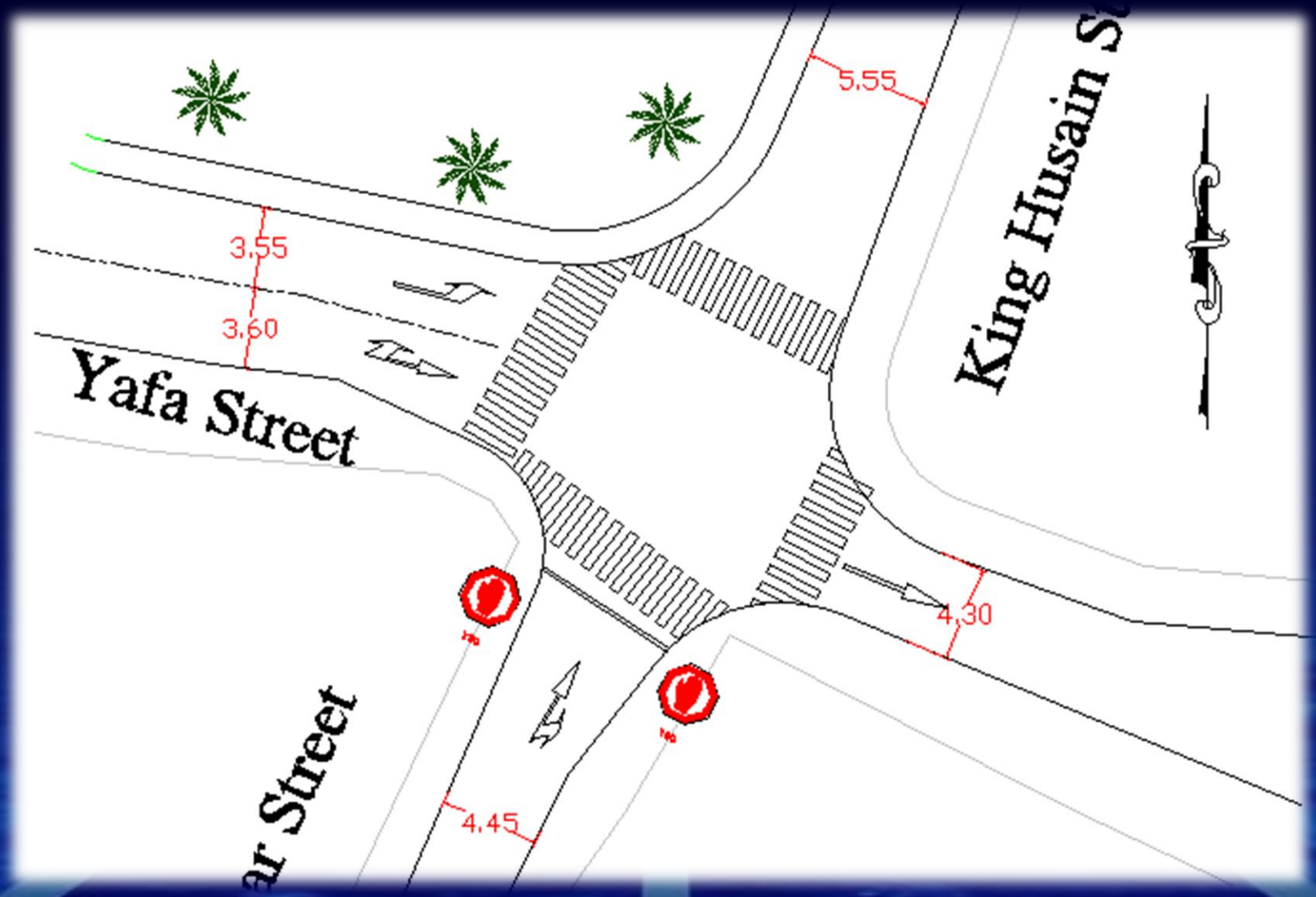


- Cycle length: 120 sec
- Intersection LOS: D

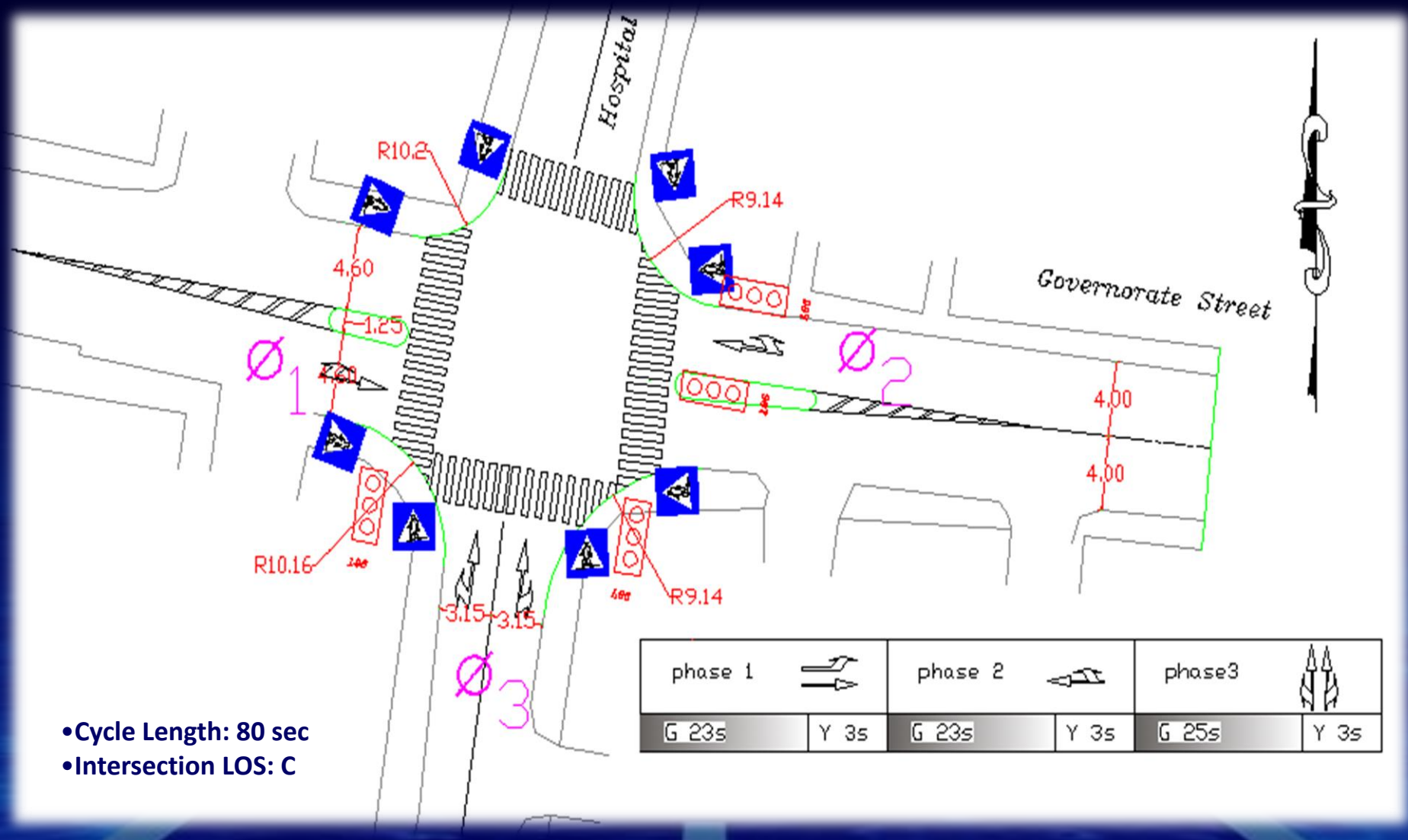
Intersection 5



Intersection 6

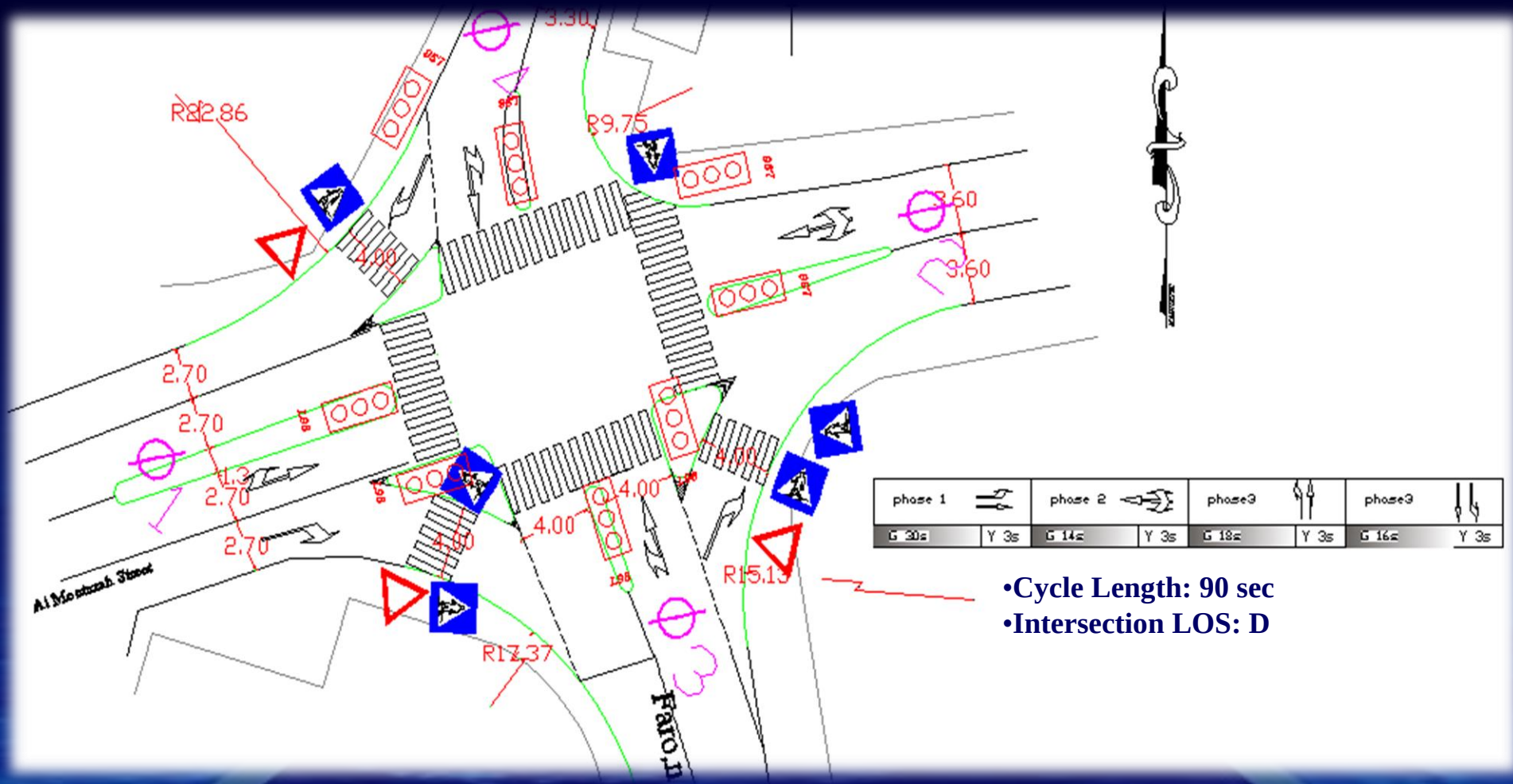


Intersection 7



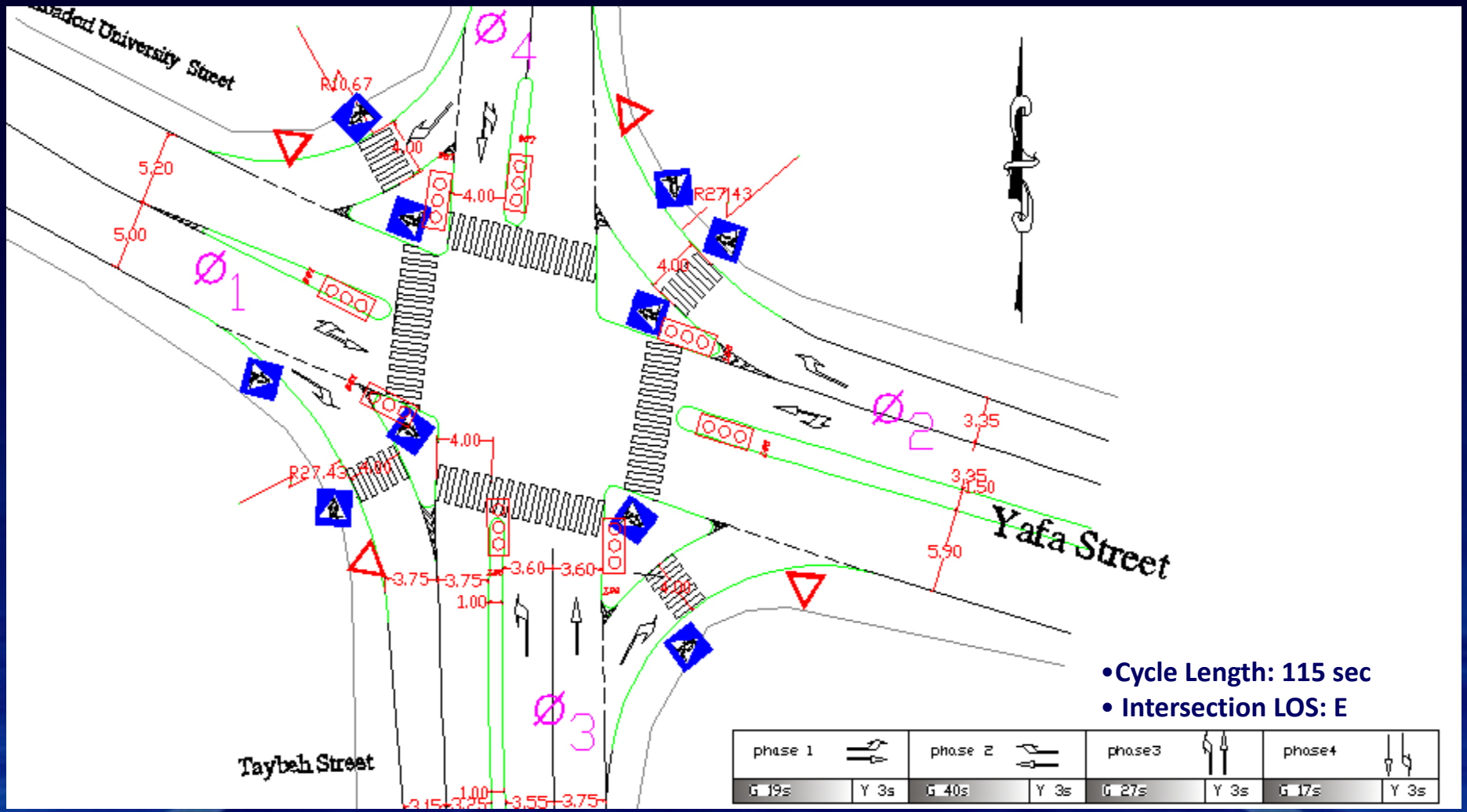
- **Cycle Length: 80 sec**
- **Intersection LOS: C**

Intersection 8

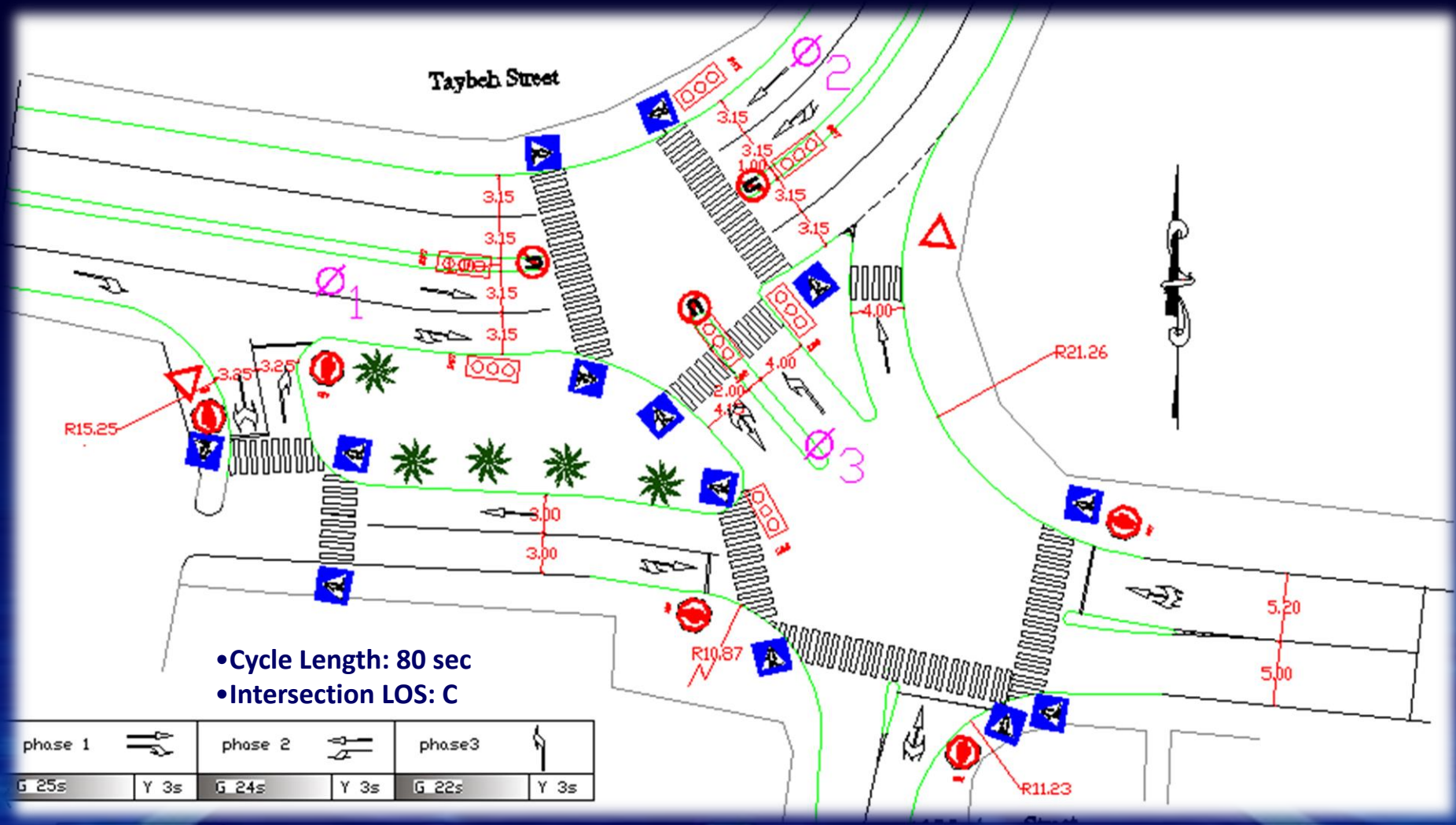


- **Cycle Length: 90 sec**
- **Intersection LOS: D**

Intersection 9



Intersection 10



Conclusion and Recommendation

There are many problems related to the traffic and geometric conditions in Tulkarem roadway network that need to be analyzed to overcome the related traffic problems pertaining to the existing conditions.

The improvements recommended in the TSM Study were evaluated and examined for the project traffic volume

The timing plans for the warranted intersection were calibrated and evaluated to meet future traffic conditions.

Public transportation in the Tulkarem city became organized after the establishment of a new garage

Parking in the Tulkarem city is a not major problem

Pedestrian movement in the area of study can not be ignored

Conclusion and Recommendation

The vegetables market should be moved from the current location in the CBD, to facilitate the movement on Jamal Abed Al Nasser intersection and the rest of CBD area.

This will have a positive impact on the golden market street.

In future, this street should be for pedestrians only.


Thank You !
Team Work
Company
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