

# CHAPTER THREE

## STUDY AREA AND METHODOLOGY

In this section we review the existing traffic system in the study area.

### 3.1 Studying Khartoum Existing Traffic System

The study includes site plan, land uses, traffic plan, traffic infrastructure, the most congested sites, and traffic culture.

**3.1.1 The Site plan:** The planning of the study area dates back to the colonial period, and no significant changes have been made since then, so we find many narrow roads, some of which are blocked by buildings.

The study area is located between the three main cities Khartoum, Khartoum North and Omdurman, due to this site, the area has become a transit point for thousands of cars passing through the three cities. see Figure ( 3,1 )



Figure (3, 1): shows Entrance and Exits of study area

Most of the land in the study area is a governmental land, where ministries, service centers and educational institutions are concentrated in these areas, in addition to commercial centers, bus stations and a few open squares.

Most of these ministries, service centers, educational institutions and business centers in the study area do not have private parking spaces, although they attract many citizens who park their cars on the road, thus causing an increase in traffic congestion.

**3.1.2 Traffic plan:** The traffic plan in the study area is constantly changing and is often accompanied by a lot of errors where traffic congestion breaks in some locations to make bottlenecks in other locations, so they are modified from time to time. The following are the main problems that arise when developing and implementing traffic plans in the study area:

- Change roads directions: sometimes the directions of roads are changed suddenly and without any prior notice to road users, causing bottlenecks and congestion.
- **Closure of roads:**
  - Roads are closed for maintenance reasons, for long periods, days or weeks, causing traffic congestion.
  - Roads are closed several times due to official celebrations that generate traffic congestion.
  - Traffic accidents especially on the bridge.

- **Traffic light signals**

Traffic signals are distributed in intersect of major roads to organize the traffic , but sometimes cause some problem due to:

- **Disrupt signals**, are renewed problem, because of the lack of a clear program of maintenance
- **Power outages:** sometimes, electricity is cut off therefore causing a lot of traffic jams
- sign Synchronization:** Often we pass the traffic signal and when we get to the

second after several minutes we find that the following mark is red and it was possible to synchronize these signals and account the next signal time by knowing the distance and road design speed, helps to avoid downtime many times. Despite the disadvantages (delay, congestion) of these light signals, there are many roads in study area have no signs.

#### **-Cars Type:**

In the study area private cars constitute the majority and can be considered to be the main of the cause's of traffic congestion. The Buses :although it's few of number but on the other hand it frequently stopping in road sides without control, its slow movement, in addition to that cross the whole area of study area throughout the day so made its causes traffic congestion.

**3.1.3 Traffic Infrastructure:** In the study area there is a lack of strong and modern infrastructure, the most weakness points are:

- There are few no wide.
- Most roads intersected together with each other, traffic lights are used to regulate traffic.
- No tunnels to connect the study area with adjacent sites.
- There are view parking spaces to accommodate all cars.
- No modern system to guide drivers to avoid congested roads.
- There are Only five bridges to connect the three cities khartoum, khartoum North and Omdurman.

#### **3.1.4 The most Congested Sites:**

In the study area there are some sites known by traffic congestion especially in the morning and afternoon, often this site is at the crossroads, near the bus station, commercial centers, markets and service institutions. Map show the most known congestion sites: see Figure (3, 2 ).



Most congested locations

Figure (3, 2): shows the most congested locations in the study area

Usually congestion is at the following locations:

**Intersections of roads:** here are some of most crowded roads intersections

AL-Tabia Street and Almek nimerr.

AL-Tabia Street with Alqaser Street:

AL-Tabia Street with Ahoria street.

Alsayed Abd Alrahman St. with almek Nimer st  
Alsayed Abd Alrahman St. with alhorria st.

**Near the bus station:** here are some of most crowded sites: near karkar bus station and Khartoum stadium bus station.

**Near the commercial centers and markets:** especially the following area:

Al-soug Alafranji market, nearby shopping sites for the street of Al-horia

**Near the services institutions:** The most congested sites are: Khartoum Hospital.

Khartoum university Colleges (Medical , Engineering), Khartoum Bank and Omdurman National Bank.

### **3.1.5 Traffic Culture:**

There are weakness in traffic culture for many drivers, a lot of them do not know much about traffic rules, some do not hesitate to cross the red sign, others want to reach their destination without being subject to the law and without being attend to road companions .causing danger to others and chaos which increase congestion. Here we review some of the behaviors that cause traffic congestion.

#### **▪ Culture of urgency:**

Some drivers are characterized by wheel and wish to reach their destination as soon as possible without taking into account the road partners and without being aware of the traffic laws, causing:

- i - Accidents:** causing congestion.
- ii -Ignoring of the law**

## **3.2 Methodology**

In define database here, a database will be create using Geographic Information Systems (GIS) technologies and will benefit from the great possibilities of this usng Arc-map software and this obtain in several stages as:

### **3.2.1 Data collection stage:**

- Coordinated mosaic for study area created at the year 2011, Ministry of Infrastructure.
- Roads map in studding area as a shape file, Ministry of Infrastructure.
- Traffic signals map in study area as a ship file, Ministry of Infrastructure.

- Numbers of cars enter and exit the studding area, Ministry of Infrastructure.
- Google Map
- Control Points distributed in study area Table (3.1).

Table (3.1): illustrate the coordinates of the control points in the study area

Control points			
Points	E(m)	N(m)	H(m)
0	449101.669	1725509.714	383.113
1	448340.14	1725365.933	383.415
2	448412.645	1724739.837	383.519
3	448367.877	1724260.062	381.851
4	449144.144	1724130.761	381.782
5	450199.025	1725462.274	381.784
6	450159.446	1724744.166	383.997
7	450067.027	1724230.469	385.429
8	450921.739	1725231.631	386.38
9	450718.066	1724957.814	383.806

Field surveyed data were collected for congested sites, random parking, asphalt width and roads conditions in the study area.

### 3.2.2 Data design stage:

Here the data will be formatted to help with information searches and spatial analysis processes and be compatible with the ArcMap format at the same time.

#### 3.2.2.1 Layers System:

Here the map will be organized into a set of slides to facilitate and organize data processing and analysis.

Table (3.2): Shows the layer of system

No	Layer	Type	Color	Function
1	LandUse	Polygon	Yellow	To show the site plan, and label of the main building
2	Road	Arc	Black	To show roads in study area and its properties
3	Parking	Polygon	Red	To show location of random parking
4	Congestion	Polygon	Brown	To show high congestion sites
5	Signals	Point	Blue	To show the light sign and its information
6	Ent-exits	Polygon	Blue	To show the Number of entering and exit cars in study area
7	Buses stations	Polygon	Brown	To show the Buses stations site in study area

### 3.2.2.2 Attribute Tables:

Here are some examples for the attributes tables

**Land Use layer** attributes table:

ID	Name	Land_Use	Area(m)
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**ID=Identity**

**Field Properties:**

Field	Field-Type	Field-Length
ID	Number	Short Integer
Name	Text	30(char)
Land_Use	Text	15(char)
Area	Number	flood

**Road layer** attributes table:

ID	Ro_name	Ro_type	Length(m)	Width(m)
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**Field Properties:**

Field	Field-Type	Field-Length
ID	Number	Short Integer
Ro_name	Text	30(char)
Ro_type	Text	30(char)
Length(m)	Number	flood
Width(m)	Number	flood

**Congestion layer attributes table:**

ID	Road	Ro_type	Area(m)
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**Field Properties:**

Field	Field-Type	Field-Length
ID	Number	Short Integer
Road	Text	30(char)
Ro_type	Text	15(char)
Area(m)	Number	flood

**3.2.3 Data processing stage:**

Arc/map software is used to Geo-reference the images, create layers, trace features, and attribute tables.

**3.2.3.1 Mosaic verification:** Since the mosaic obtained is already Geo-referenced, the mosaic is verified by reading 5 known points on the photographs and compared with control points obtained. The results show that the mosaic is a good Geo-reference.

**3.2.3.2 Mosaic Update:** Mosaic obtained is created in year 2011, so it need renew, Google Map is used to update mosaic by adding new features and deleting nonexistent.

**3.2.3.3 Feature class Creation:** For each layer listed in layers system table in the



design stage, a corresponding feature class is created in Arc/Catalog.

**3.2.3.4 Tracing Feature:** Features are traced to convert raster image to vector, tracing process start by adding the feature class (layer) to the arc/map windows.

**3.2.3.5 Attributes Table Creation:** For each layer, the attributes tables were created, and data was filled in Arc/map.