Analysis of Effect Of Standstill Distance (CC0) And Headway Time(CC1) in vehicle flow and Queue length near Newmarket-Nilkhet Junction In Dhaka By VISSIM

CE 454

Transportation Engineering Sessional II:

Pavement Design and Traffic Studies

By

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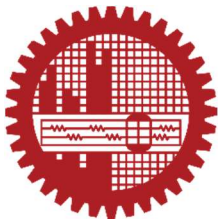

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CHAPTER I: Introduction

1.1Background

Whether comparing junction geometries, analysing public transport priority schemes or considering the effects of certain signalling – PTV Vissim allows you to simulate traffic patterns exactly. Motorised private transport, goods transport, rail and road related public transport, pedestrians and cyclists – as the world's leading software for microscopic traffic simulation, PTV Vissim displays all road users and their interactions in one model. Scientifically sound motion models provide a realistic modelling of all road users.

The software offers flexibility in several respects: the concept of links and connectors allows users to model geometries with any level of complexity. Attributes for driver and vehicle characteristics enable individual parameterisation. Furthermore, a large number of interfaces provide seamless integration with other systems for signal controllers, traffic management or emissions models.

PTV Vissim is rounded off with comprehensive analysis options, creating a powerful tool for the evaluation and planning of urban and extra-urban transport infrastructure. For example, the simulation software may be used to create detailed computational results or impressive 3D animations for different scenarios. It is the perfect way to present convincing and comprehensible planned infrastructure measures to decision-makers and the public.

In this assignment ,as a beginner level students of VISSIM ,change of traffic flow and the length of queue in Nilkhet road and Mirpur Road is evaluated.

1.2Scope of the research

This assignment represents the correlation of traffic flow with CC) and CC1 value change in VISSIM which signifies the study of traffic engineering based on simulation process.this simulation will provide direction in geometric design of road and development of road infrastructure in Dhaka city caring safety and mobility.

1.3Objectives

Every thesis has an objective & in academic program generally almost every thesis has two types of objectives; one is Primary & another one is Secondary.

1.3.1 Primary objectives

1. To find out the characteristics of traffic flow and queue length with change of standstill distance and headway distance.

1.4.2 Secondary objectives

1.To show the relationship among standstill distance, headway distance, traffic flow, queue length, occupancy rate etc.

2.To cope up with the increasing congestion in Nilkhet-Newmarket

3.To be introduced with VISSSIM software.

1.4Sequence of this thesis

Chapter One: Introduction: This chapter contains the general background, , scope of the research, objectives and sequence of this thesis.

Chapter Two: Literature Review: In this chapter the introductory description of such keywords that can be comprehensive of the assignment to anybody.

Chapter Three: Methodology: The details,step by step of coding the problem of Newmarket-Nilkhet junction, are jotted in thsii section.

Chapter Four: Data Collection, Analysis and Results: In this chapter data collection process and analysis of data are presented with their results.

Chapter Five:Conclusions and Recommendations: This chapter represents the summary of findings from data analysis,results and recommendation for further research.

CHAPTER II: Literature Review

2.1 System And Model

System

A collection of entities(e.g.,peopleormachines) that act and interact together toward the accomplishment of some logical end.

Simplified/abstract tool use to observe or predict behavior of real system.

Model

A model is never equal to the real system, because it is always simpler than the reality. The accuracy of a model is determined by its tendency to approach the real system.

Simulation

Simulation is the imitation of the operation of a real-world process or system over time.[1] The act of simulating something first requires that a model be developed; this model represents the key characteristics or behaviors/functions of the selected physical or abstract system or process. The model represents the system itself, whereas the simulation represents the operation of the system over time.

Simulation is used in many contexts, such as simulation of technology for performance optimization, safety engineering, testing, training, education, and video games. Often, computer experiments are used to study simulation models. Simulation is also used with scientific modelling of natural systems or human systems to gain insight into their functioning.[2] Simulation can be used to show the eventual real effects of alternative conditions and courses of action. Simulation is also used when the real system cannot be

engaged, because it may not be accessible, or it may be dangerous or unacceptable to engage, or it is being designed but not yet built, or it may simply not exist

2.2 Steps in Simulation

- Definition of the problem
- Field studies to determine inputs needed for model formula
- Development of Logic
- Development of Computer Simulation Programme
- Calibration of Model
- Validation of Model

2.3 Traffic simulation tools

- **Urban Traffic Modeling**
- Urban traffic simulators have been used to model urban congestion. They have to cope with large numbers of vehicles and signaled junctions.
    - **NETSIM** (Network Simulation) is used to help traffic engineers analyze potential urban traffic system designs.
    - **SIMNET** simulates the simplified movement of individual vehicles in connected street networks.
- **Intersection Design Simulations**
- The design of intersections is a complex problem that is important component in getting efficient traffic flow results in a larger network.
    - TEXAS (Traffic Experimental and Analytical Simulation) helped with the need to redesign Texas highways and street systems due to the complexity of intersection design.
    - TRAFFICQ developed for the UK Department of Transport is designed to aid the evaluation of alternative traffic management plans for networks.
    - SIGART was developed to extend knowledge of roundabouts and the development of signal-controlled roundabouts.
    -

Signal Timing and Control System Simulations

Synchro is a macroscopic analysis and optimization software application. Synchro supports the Highway Capacity Manual's methodology (2000 & 2010 methods) for signalized intersections and roundabouts.

SIGOP II (SIGnal OPtimization) is a traffic signal optimization model. It is designed to generate optimal traffic signal timing plans for arterial or grid networks.

CYRANO (CYcle-free Responsive Algorithm for Network Optimisation) is a traffic signal optimisation model for real time traffic control. It generates network signal timing plans for undersaturated conditions.

DYNEMO is used for the development, evaluation and optimisation of traffic control systems for urban networks.

FLEXSYT (flexible network and traffic control simulation study tool) is a tool that uses a traffic control programming language (TRAFCOL) developed by Dutch traffic engineers in the study of traffic control programs

Public-Transport Traffic Modeling

As a response to a government initiative for public transport, simulations have made attempts to find more efficient routes for public transport vehicles.

TRAF-NETSIM was used to develop an adaptive bus priority system.

MISSION facilitates general traffic, bus, trams, light-railways for analyze of public transport systems and noise levels.

Traffic Congestion Simulations

Congestion is the main target of investigation by many simulations. Long queues can entrap cars that do not wish to pass through the bottleneck that generated them, compounding the problem and causing spillovers. Congestion management is aimed at queue avoidance and containment.

ACCESS (Area-wide Control of Congested System) is a computer model which implements a critical intersection control and queue management policy for saturated network condition.

INTRAS (Integrated Traffic Simulation) is used for the detection of stopped vehicles and the necessary steps required to remove the stoppage. It helped to develop freeway incident detection techniques for the Federal Highway Administration. ion Simulations

2.4 Use of VISSIM Micro-simulation Modelling

- Multi-modal integration
- Car park guidance system
- Automated parking simulation
- Active Traffic Management
- Insane vehicle

- Pedestrian Modelling (Viswalk)

    - Airport planning
    - Crowd Management (Major Event Evacuation)

2.5 Adjusting Driving Behavior

Every link and connector can have a unique Behavior Type. Under "Network Objects" Right Click "Links" and Select "Show List". A new window will appear below the network editor. All Links and Connectors by default should be "Urban (motorized)" as the "Link Behavior Type".

VISSIM uses two types of models: Wiedemann 74 and Wiedemann 99.

Wiedemann 74 is suitable for urban traffic and merging
Wiedemann 99 is suitable freeway traffic with no merging
You may need to change the "LinkBehavType" for some or all links/connectors

Wiedemann Model

1. To adjust specific parameters for each Wiedemann model, Select Base Data > Driving Behaviors from the top toolbar
2. A new "Driving Behavior" window will appear below the Network Editor
3. Right Click your desired CarFollowModType and select "Edit…"
4. A new window will appear and only adjust the following parameters

"Following" tab and Car following model: Wiedemann 74

- Look ahead distance

- Look back distance
- Average standstill distance

"Following" tab and Car following model: Wiedemann 99

- Look ahead distance
- Look back distance
- CC0 (Standstill Distance)
- CC1 (Headway Time)

CC0 (Standstill Distance): the average desired standstill distance between two vehicles or the desired rear-bumper to front-bumper distance (feet) between stopped vehicles, as shown in the Figure below.

CC1 (Headway Time): is the gap (seconds) which a driver wants to maintain at a certain speed. The higher the value, the more cautious the driver is as shown in Figure 46. Desired Safety Distance = CC1 +CCO.

CHAPTER III: METHODOLOGY

3.1 Code the problem

View→background→edit→load

Pictures are loaded and by scale option the figures are scaled .Then with origin option the figured are placed correctly.

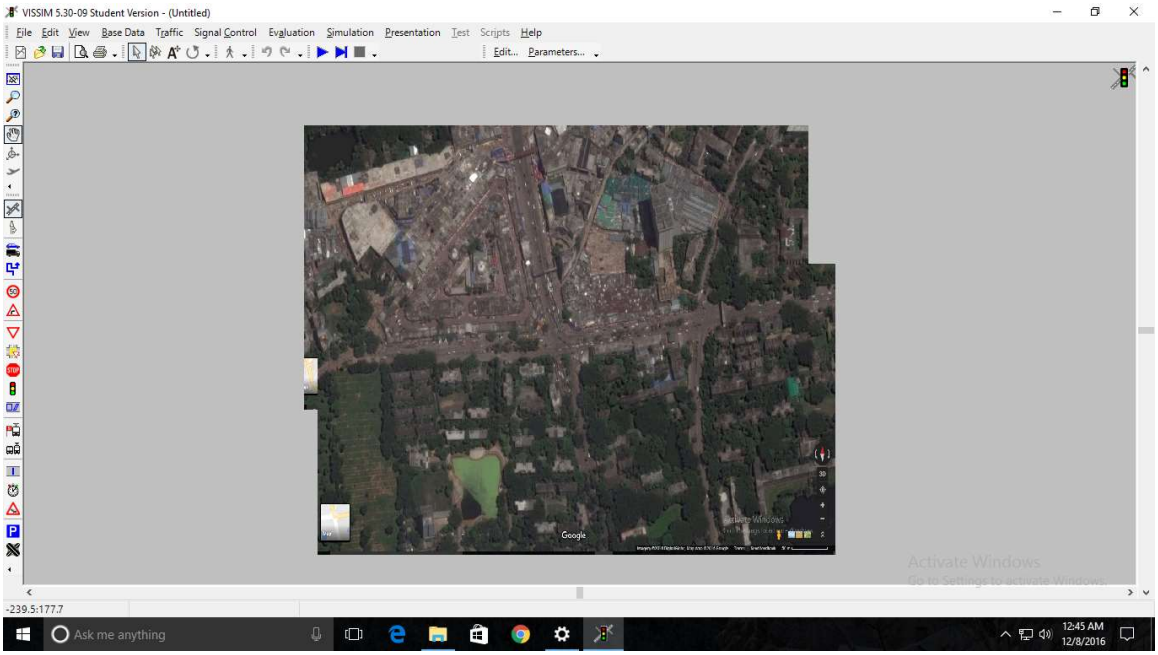

Figure 1:Background edit

Links and connectors(from left side toolbar)→Left click of mouse

To code the link ,right button of mouse is clicked and pressed until finishing the link position.

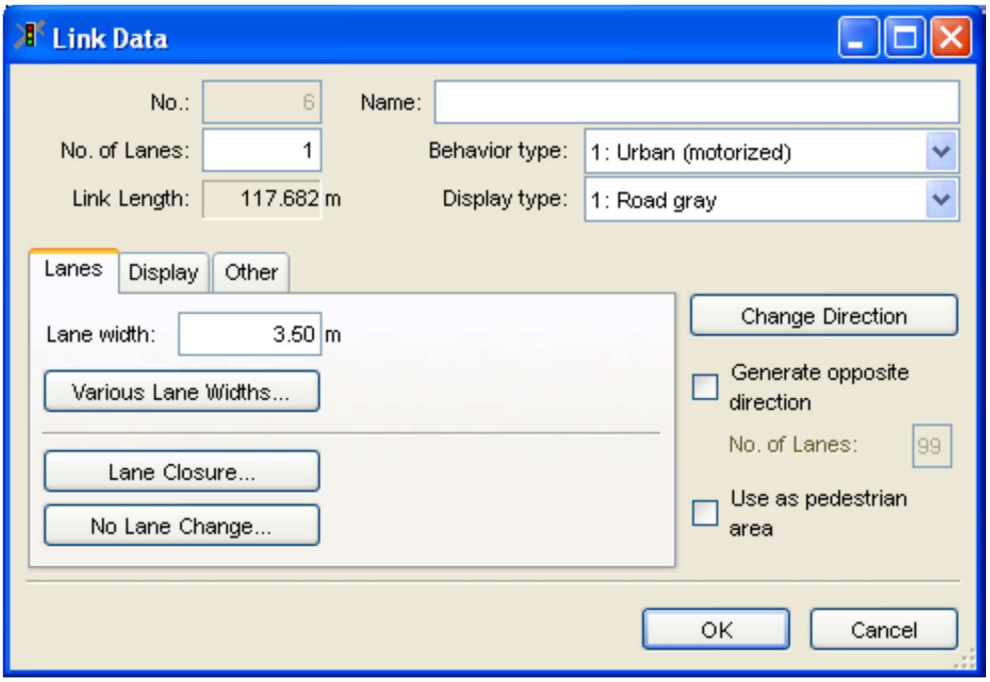

Figure 2:Link edit

In my assignment No of links =3
Lane width=3.66 meter

Then it comes as

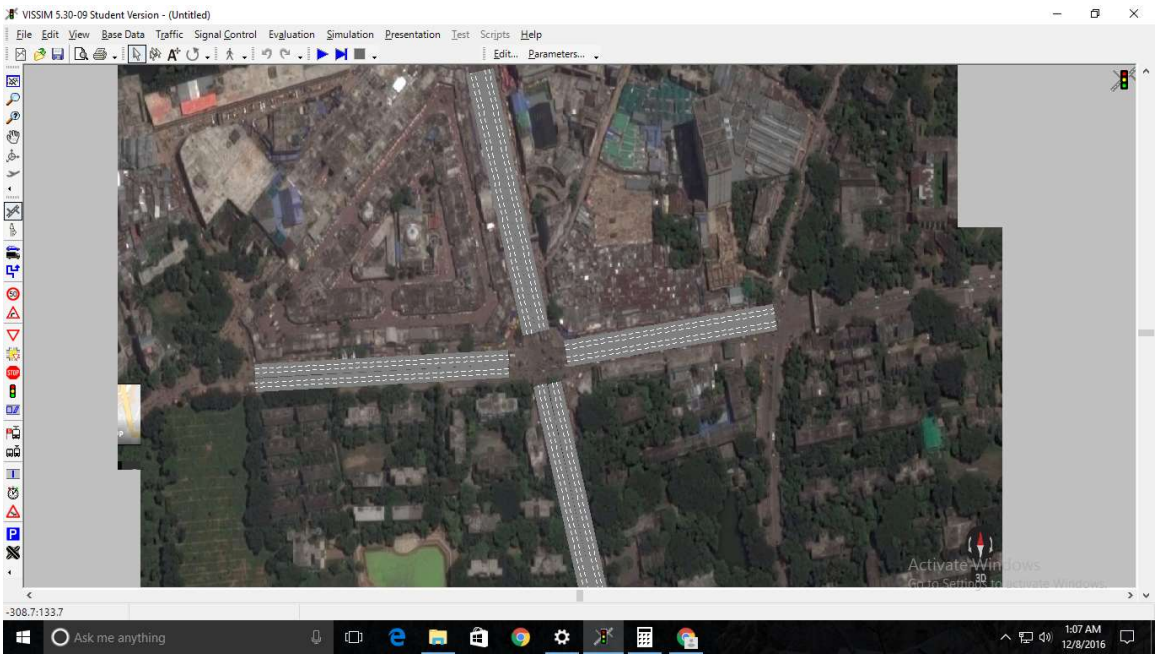

Figure 3:Link code

After connecting the links by connector:

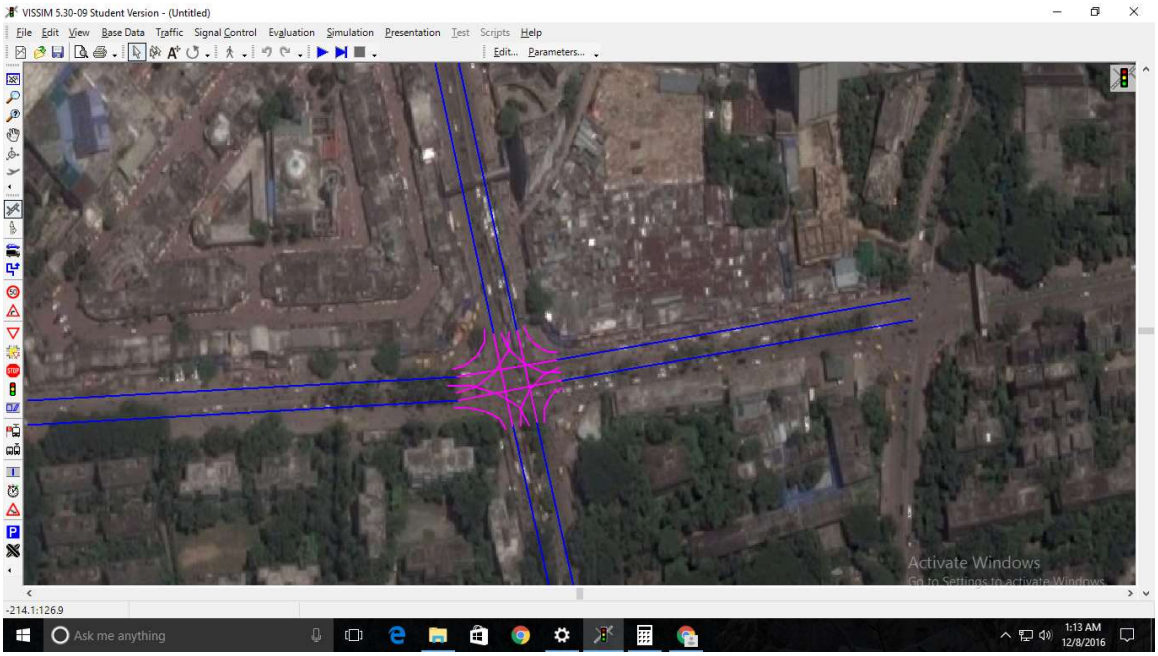

Figure 4:Connect the link

Then assigning traffic volume, route, traffic signal, to get data for analysis :

- edit in driving behavior as wiedmann 99
- desired position at free flow: any
- ticked all choice at that window
- evaluation file are configured to collect data

3.2 Simulate code

Then this is ready for simulation. Snapshot taken as

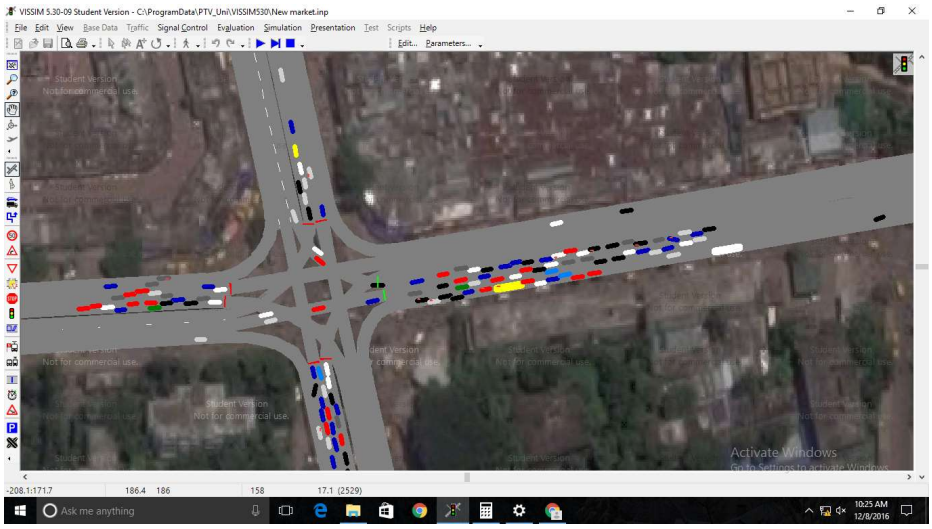

Figure 5:Simulation the code

3.3 Get the evaluation result in notepad

From the location of VISSIM file ,the files of evaluation are got as .FZI,MES,.STZ,.SIG etc.

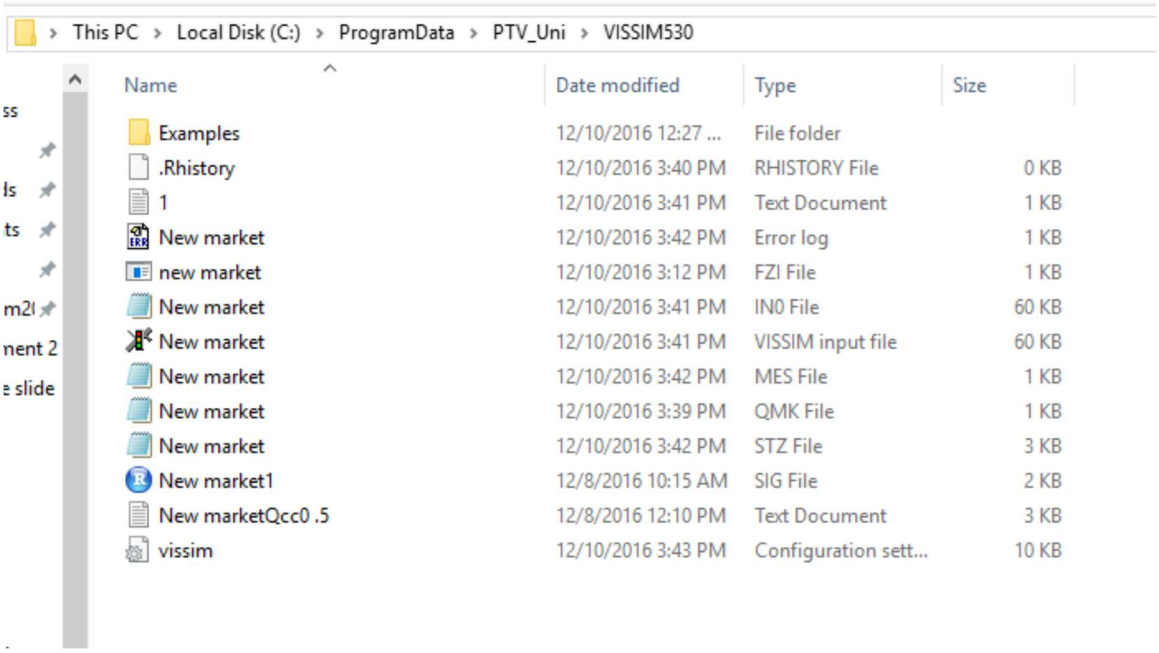

Figure 6:Output of evaluation files

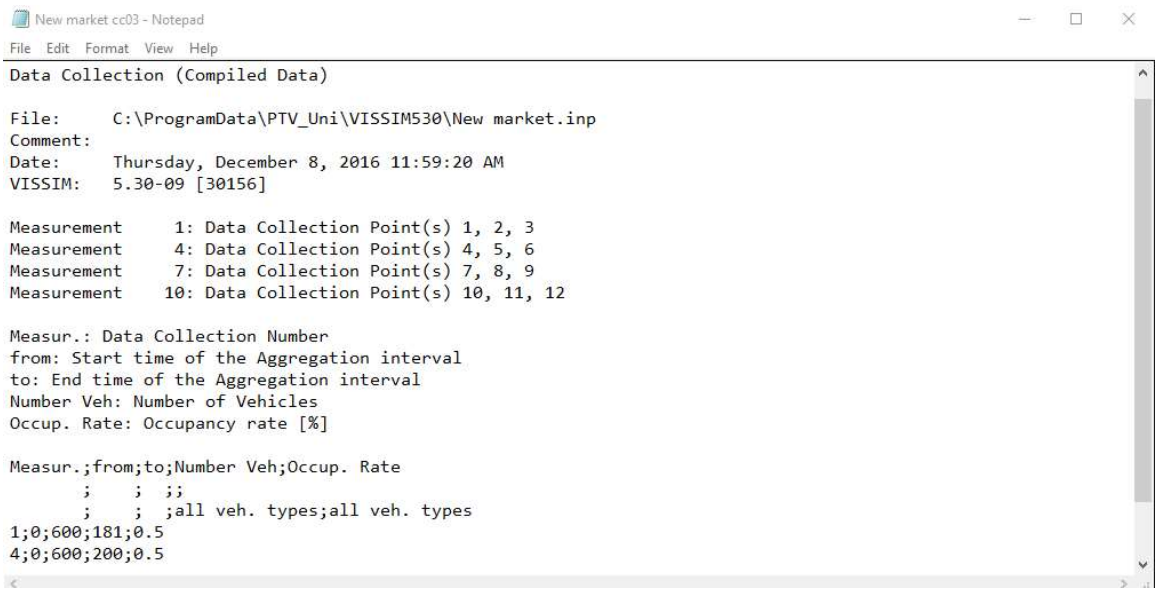

Figure 7:Open .MES file

CHAPTER IV: ANALYSIS OF VULNERABLE ROAD USER CRASH DATA IN DHAKA CITY

4.1 Effect of CCO on vehicle number

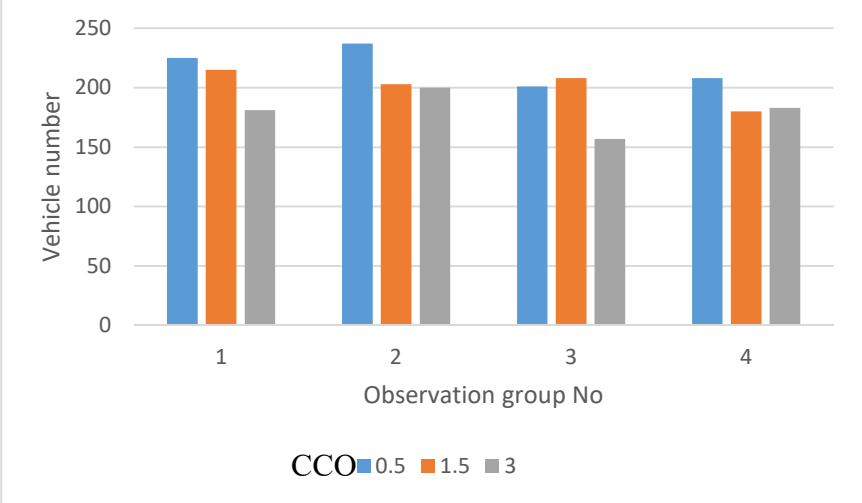

Figure 8: Effect of CCO on vehicle number

With the increase of CCO ,the vehicle number is decreased and with the decrease of CCO ,the flow increases (in most of the cases)

4.2 Effect of CCO on queue length

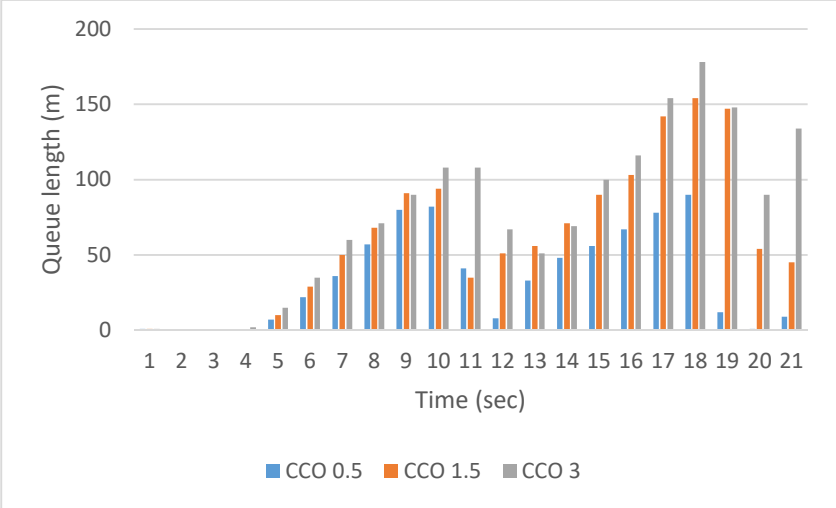

Figure 9: Effect of CCO on queue length

With the increase of time,queue length increases in the beginning .After crossing the time 10 sec it starts to decrease and after 12 sec ,queue length again increases upto 18 sec.

4.3 Effect of CC1 on vehicle number

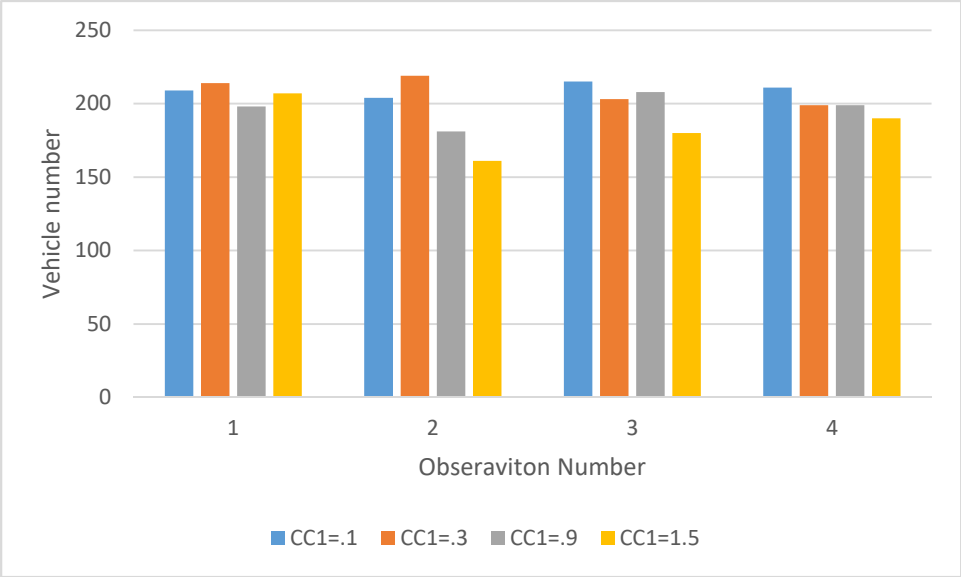

Figure 10: Effect of CC1 on vehicle number

With the increase of CC1 ,the vehicle number is decreased and with the decrease of CC1 ,the flow increases (in most of the cases).

4.4Effect of CC1 on queue length

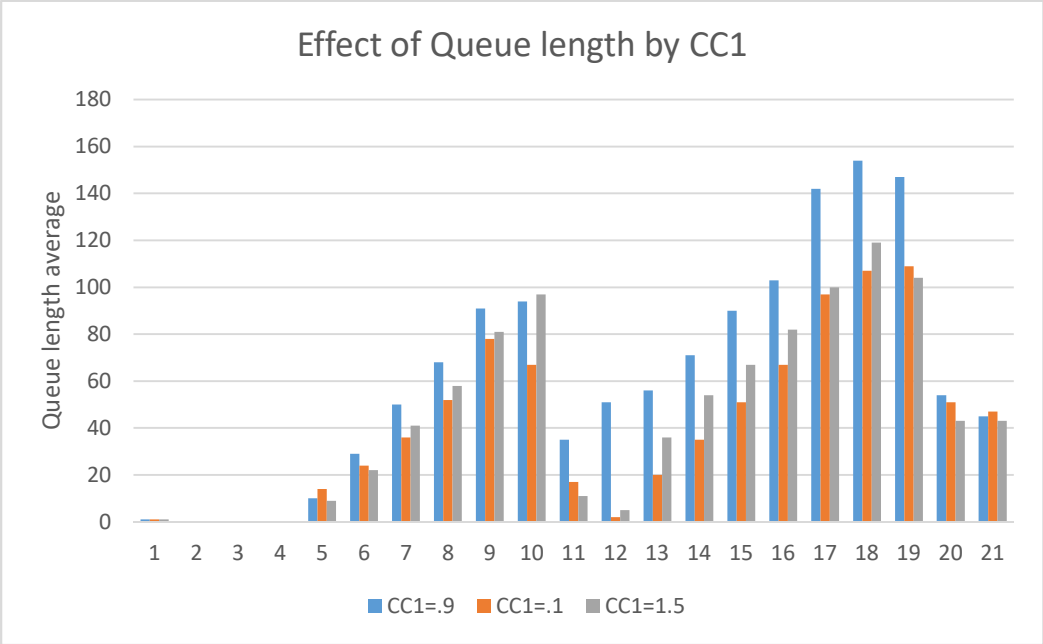

Figure 11: 4Effect of CC1 on queue length

With the increase of time, queue length increases in the beginning .After crossing the time 9 sec it starts to decrease and after 12 sec ,queue length again increases upto 18 sec.

CHAPTER V: RESULTS AND DISCUSSIONS

In the assignmnet it is assumed

- all vehicle flow ratio is same for all routes
- NMV (like rickshaw,van etc) is not considered.
- Secondary bypasses are not considered
- Vehicle flow is assumed as the survey was not possible due to time constraint

From analysis data result the conclusions are

- With the increase of CCO and CC1,the vehicle number is decreased and with the decrease of that ,the flow increases (in most of the cases).
- Effect of CCO and CC1 for queue length is sequentially increasing and decreasing.
- At 9 and 18 sec this queue length is high and at 12 sec, queue length is minimum.