

AN APPROACH TO FIND OUT THE ALTERNATIVE SOLUTION AT AN URBAN INTERSECTION

A Project and Thesis submitted in partial fulfillment of the requirements for the
Award of Degree of

Bachelor of Science in Civil Engineering

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It is stated that the work “**An Approach to Find out the Alternative Solution at an Urban Intersection**” reported in this thesis has been performed under the supervision of Khondhaker Al Momin Lecturer, Department of Civil Engineering, Daffodil International University. The thesis contains no material previously published or written by another person, to the best of my knowledge and belief except where due to reference were made in the thesis itself.



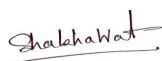
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Finally, we would like to thank all of our teachers and classmates of the Department of Civil Engineering, Daffodil International University and our parents whose encouragement and cooperation was very helpful to the progress of this thesis.

Dedication

In the hopes that this work may in some way contribute to the people of Dhaka city. This project is dedicated to the people who are facing traffic jam in their daily life. This is our little attempt to improvise the traffic flow of technical intersection, Dhaka.

We would like to dedicate this project to our senior brothers who motivate us to do something for country. It will be honor for us if our thesis is beneficial for the people of our nation.

Thirdly we would like to dedicate this project to our supervisor who gives us different kinds of ideas and gives appreciation about our work. For that we will always be grateful to him.

At last we are thankful to Allah for giving us the ability to complete the thesis.

ABSTRACT

Efficiency delivery of city needed for the victory of a city whose transportation system is an important component. For a sustainable economic development efficient transportation is a vital thing. In Bangladesh traffic is now a growing concern. Insufficient traffic control can waste people's valuable time and energy also happens road accidents and many other economic problems.

Technical intersections have multiple leg parts. We first selected the type of the technical turn. We collect our data for counting the passing vehicle. Our motive is to increase the passing value of pre development and after that we will compare between pre and post development. For that we add a flyover over Aricha road, Dhaka. By adding the flyover, it will be more sufficient for the users to use those legs. It will reduce the traffic jam in technical intersection also the flowing rate will be increased than the pre development value. So, the comparison will show us the proper development.

However, data calculations may not be decent enough to illustrate the actual situation.

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CHAPTER -1 INTRODUCTION

1.1 Introduction

The transportation sector grew rapidly after Bangladesh gained independence in 1971, thus the transportation in roads and river began to develop rapidly though travel in air came later. The number of vehicles are increasing and traffic jam also growing up day by day. The transportation developed mostly with land vehicles but it's still need improvements with safety standards which endangers the life of civilians. Dhaka traffic needs to be more focused on managing the roads and highways as it is the world busiest and worst traffic occurs in this mega city.

A traffic count may be a count of auto or a personal road, and intersection road traffic counts offer the supply information accustomed to calculate daily traffic, the quality of the vehicle worldwide will increase and therefore the want for flexibility increases, the frequency and amount of traffic jams in giant cities increases. High fuel prices and environmental considerations provide necessary inducements to cut back traffic delays. In short, the foremost operative measures to touch upon traffic jams appear to be to make new roads- an alternate that's usually not viable thanks to lack of infrastructure and or having government fiscal budget plan and due to environmental or social desires. It also associates an additional economical use of existing infrastructure and capabilities through the management and control of an improved traffic. The dynamic control in an urban setup has continuously been terribly engaging to traffic engineers and has been for quite some time.

Urban arterial roads in Dhaka city where most of the vehicle travel around and are being used as a main purpose of travel considerably continuously used as primarily as a main traffic artery and having the capability of carrying high volumes of traffic, however, the mega city has a poor construction of having artery in major roads where vehicles and footpath are very bad in this urban cities, areas such as Mirpur, Dhanmondi, Mohakhali, Gabtoli where major traffic occurs but due to lack of development or arterial roads in this areas, pedestals and vehicles clash each other and have accidents between them as

footpaths and roads are not developed properly by the government. Due to high level of population in this mega city where 12 million + are roaming around and lived in this city, congestion and pollution is normal in this city, so traffic accidents is normal here and as urban arterial roads are very attractive to the drivers, a large variety of vehicles coming into urban vessel roads will cause traffic congestion or perhaps cause traffic accidents. Vehicles on arterial roads have to be compelled to cut back period of time and number of stops.

The purpose is to achieve a flowing traffic of vehicles on the main arteries, Green Wave Control is an arterial traffic coordination system that combines traffic signals from intersections with arterial roads to adapt to any red light or less while driving at a certain speed. In other words, traffic signs at neighboring intersections turn green in a certain time sequence, like a rotating “Green Wave”.

1.2 Traffic Jam in Bangladesh

All the megacities across the world are suffering from traffic jam but there traffic jam is for a certain amount of hours. In Dhaka city it cannot be called as traffic jam, it is totally mismanagement or traffic chaos. It has become nightmare for Bangladeshi people. According to a report in the last ten years the average traffic speed in Dhaka city has dropped from 21 kilometers per hour (Kmph) to 7 kmph. By 2035, the speed might drop to 4kmph which we can say slower than our walking speed. That's the reason people are facing financial loses. Because they have to pay extra charges for extra hours. The researchers says that dealing with this kind of traffic jam can cause serious damages to our physical and mental health. This is a crucial social problem for Bangladeshi people and need to solve by governmental organization.



Figure 1.1 Traffic Jam

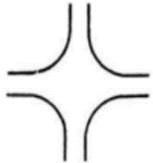


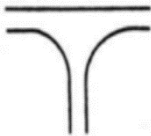
1.3 Transport System

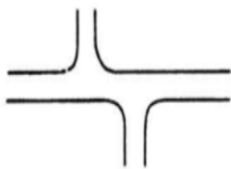
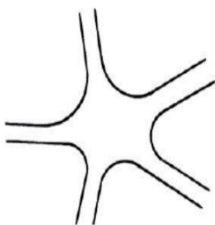
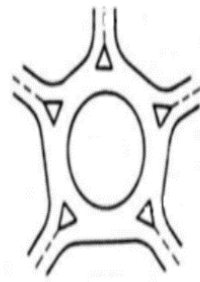
According to BRTA (Bangladesh Road Transport Authority) Bangladesh has 3.1 million registered vehicle and Dhaka has almost 1 million off them. But another study shows that 5 million vehicles, including the registered vehicles are working on the road. Dhaka people make thirty million trips every day where 47 percent involve buses, 32 percent are made in rickshaws, 9 percent by private cars that occupy 76 percent of the road and 7 percent by public transport. If a dependable public transport system is introduce then the pressure of private cars and other vehicles will decrease.

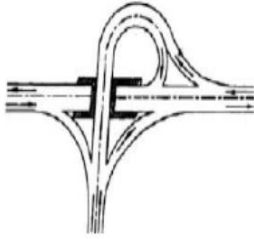
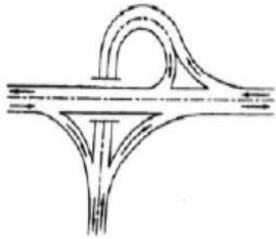
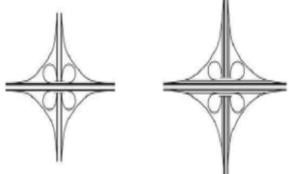
1.4 Intersection


Intersections are important element for a road section. It is a grade junction where two or more roads converge, meet or cross. Each intersection can vary greatly in scope, shape, use of channelization and other types of traffic control devices. There are there types of basic intersection inn Bangladesh [T-intersection, Crossing intersection, multi-leg]. Intersection is the crucial way for increasing the traffic flow also use for street space to bring people together while making the traffic more foreseeable.

Table 1.1 Classification of Intersection

Type	classification	Advantage	Defect	General picture
Plan Intersection	Crossing Intersection	The form is much easier, the traffic organization is suitable, street corner building is easy to be handle, the application scope is broad.	Many dispute points are there.	
	X-Intersection	Small footprint, lower cost, and a broad application range	Higher demand for the sharp angle of intersection	
	Y-Intersection	The construction cost is less and the area is quite small.	High demand for intersection angle	
	T-Intersection	Good clarity at intersections, safe driving	The traffic is minor.	

	Staggered Intersection	Optimize the use of survival resources	Short distance, inadequate interweaving length, and rough traffic	
	Multi-road Intersection	The traffic capacity is comparatively high.	The direction of traffic flow is elaborated, with many intersections, joining points and diversion points	
	Roundabout Intersection	No need to park, saves time, decreases traffic accidents, improve driving safety, simple traffic organization, and increase beauty.	It engage a large area, the vehicle speed is lower, and the traffic volume is not large. There are a large number of intersections, and the construction cost is much higher than that of common level intersections.	

Grade Separations	Underpass Interchange	Less land occupancy and less effect on urban space and nearby environment	High requirements for waste system design	
	Overpass Interchange	The construction is more suitable, the cost is lower, because the excavation is tiny, the involvement with the underground pipeline is small, and the drainage is easy to deal with.	The disadvantages are that the land residency is huge, the line bridge affects the sight and surrounding landscape, the approach road is long or lengthwise the slope is large, which is not beneficial to non-motor vehicle traffic.	
	Separate grade crossing	The utility model has the advantages of less land occupancy, simple structure and lower cost	The vehicles on and off the road can't change with each other.	

	Interchange	The most perfect link facilities in highway network	The cost is high, the land occupancy is broad, and it has certain complication in technology.	
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[According to a study conducted by Accident Research Institute (ARI) at the Bangladesh University of Engineering and Technology, a total of 307 road accidents took place in Dhaka's 54 busiest intersections between 2009 and 2015, claiming as many as 198 lives and leaving 103 others injured. So we can say that travelling in Dhaka is nothing but short of a nightmare as the roads has become a death trap for many people. Stakeholders says that awareness among people and the proper design of intersection can reduce this kind accidents]

1.5 Flyover

A flyover is a high level road bridge that carries one road top over the top of another road and also crosses over a highway interchange or intersection. There are seven flyovers in Bangladesh [Mohakhali, Khilgaon, Tejgaon, Banani, Kuril, Jatrabari and Mogbazar]. The Mayor Mohammed Hanif flyover is the largest flyover in Bangladesh which total length is 11.7km.



Figure 1.2 Flyover

In Bangladesh flyover is much more needed than any other country across the world. Because the traffic flow is huge in this country. To reduce the traffic jam and increase the vehicle passing value it is the most crucial thing. Flyover is not only use for increase the arterial traffic flow of a country it also reduce the traffic time for all remaining at-grade traffic. The purpose of this road design is to connect two points in congested areas or roads and intersections of roads. It also gives facilities that provides passage over a barrier without blocking the path below which is more time consuming for the passengers.

1.6 Problem statement

Dhaka is our capital of Bangladesh, the most densely populated country in the world. Twelve million people live in this city of Dhaka, here maximum signals from the traffic lights does not work properly, so the sheriff and sergeant from DMP had to interfere on the roads and need to manage physically by showing sign with their hands and manage the traffic personally, it is quite difficult to control and adjustable capacity for the main traffic direction at different times of the day. The traffic light shows more clearly than the hand signal.

Most of the time, Dhaka people tend to see the traffic police and follows them more than the traffic signals, like when people drive through road the traffic light are being

or stayed red light but traffic police shows to go and pass through the red lights, it shows the traffic police have more control over roads than digital traffic lights or automated light, during rush hours in daytime or office hours traffic police needs the most to handle the arterial roads and tend to interfere by the traffic police as they can handle the traffic jams more effectively and efficiently.

1.7 Objectives

Objectives and thesis of this project are:

1. Development a traffic system –

Designing a road sign suitable for unobstructed flow of traffic by tacking traffic and identifying the sign in the selected location. Also providing subsidies from government in order to take control the traffic system through technological movement could result a greater and effective way to monitor the traffic jams and how the system works through AI.

2. Information Technology-

By adapting information through intelligence and computer technologies and understanding the traffic system, the process and information gathering could increase a level of efficiency through monitoring vehicles travel through roads especially in arteries roads. So the performance would be a great deal to traffic signals and the way how the driving experience works in roads.

3. Traffic controlling-

The main objective of this project is to control and work with the traffic system if there is any system in Dhaka metropolitan sector, however if they have no system, they need to build a system that works for the society and environment and if it helps for the people to travel safety and comfortably on the roads, so government should invest in research and development sector to improve the

level of efficient in this particular sector and maintain the traffic in the best possible way.

4. Reduce noise pollution by alternating new technologies-

In this era, modern technologies have been greater part and have been established in people lives, in terms of vehicles and roads which bonds each other at the same time.

We need to realize there is a huge problem in urban cities where noise pollution and congestion has greater impact on people lives and have health hazard and problems especially in the cities. So, the way we can beat up and make a solution, we can introduce EV's which are electronic vehicle into the roads, by this the noise pollution and congestion would decrease enormously and lives and standard of living of the people would greatly increase. So pollution and global warming would reduce drastically by involving EV's into the market and roads.

1.8 Scope

The scope of this investigation is-

The main aim of this investigation is to analyze the congestion status over time by means of video simulation from the VISSIM Software.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

A number of people are facing traffic crowding each and every day. The rate of traffic crowding is high in cities which kill valuable time and money. There is a high chance of causing road accidents and hampering our health due to traffic intervals. Besides, when vehicles discharge their huge amount of detrimental carbon radiation which affects the environment badly. Its kill's valuable time of commuters, beside waste of fuels causes pollution and emission of greenhouse effect.

2.2 Signal

In the Dhaka city the total of 253 approaches and 70 signalized intersections are studied. In the field surveys are conducted in each intersection, and it is announce that out of 70 signalized intersections 84% are fixed time (FT) of signal system [1]. Field monitoring reveal that with the fixed nature of system control often the prefixed timing plan is not match the order of actual flow. Notable numbers of physical deficiencies are identified at the intersections.

The position of signal is wrong at 59% intersections, signal light supervision is wrong at 27% intersections and controller conditions are not satisfactory for most of the intersections. In the restricted area for the maintenance of signal at 21% intersections. At 45 % approaches signals are not use due to obstructions. Significant numbers of operational insufficiency are also observed at most of the intersections.



Fig-2.1: Traffic Signal

2.3 Background

Bangladesh is a small country with a large amount of population. As we know Dhaka is the capital of Bangladesh. But the problem is traffic jam is almost nightmare for the people here. Because they have to face almost 2-3 traffic jam daily. It causes damage to their physical and mental health also. For example: the technical intersection. In the peak hour's traffic passing decreases for the traffic jam. It kills almost 1- 2 hours in a day. To reduce this traffic jam, we need follow the traffic rules.

Researchers says that the traffic situation in Dhaka could be improvise, but a tiny has been achieved in that regard [2]. To have safe a jam free roads, we need to have a sound urban transport curriculum and an integrated system. Those are the lacking's we have in this country. An analysis of future urban transport needs, Evaluate the existing accessibility levels with the expected trends of urban slump, concluded that just maintaining availability level would require road portion that are not financially or environmentally durable.

So, our transport sector may not develop as required to meet the needs; but some innovative measures can better the situation.

2.4 General Characteristics of signal

Bangladesh is a serious concern in case of urban traffic system. In Dhaka, a city of about millions of inhabitants, thousands of (DMP) Dhaka metropolitan police, constable and sergeants deployed at intersection daily use hand signal. Light signal are more efficient in this phases should be set on traffic demand. (DMP) Dhaka Metropolitan Police should know all the skills, cycle times, adjust phasing plans, traffic light law. It's true that Dhaka road is inadequate compared to all big cities of the world. Why should an automated traffic signal fail? Where its works fine in New York, Moscow or even Kolkata. According to sign manual auto signal system should be maintained strictly

2.5 Vehicle speed

Road accident is a common incident now a days in Bangladesh. Over speeding of vehicle Responsible for accidents. So many speed restricted areas like school, collage, hospital, Highways, construction area where might should be control vehicle speed. A wireless Forewarning system will help control vehicle speed. The systems have two parts transmitting Unit and receiving unit. When vehicle enters the range of transmission the RF receiver in Attached in vehicle will receive the signal will display the information in an LCD monitor. In Bangladesh rural area most of the road are off-road, in the off-road the vehicle driver must be Use the low speed and save from the road accident. In Bangladesh speed limits are generally very low as follows; 25 KPH in town. 30 KPH on rural / main roads. 80 KPH on highways / motorways. The equipment used in Bangladesh for determine the speed is speed gun.



Fig-2.2 Speed Gun

2.6 Traffic Rules

It sounds unpleasant but not only in Dhaka is the whole country full of undisciplined drivers who has no respect for traffic rules. Recently government has taken some positive steps to reduce this kind of activities. For example: widening the roads, expansion of footpaths, building flyover or over bridges. Survey says this year between January 1 and April 20, 1841 were killed and 5447 were injured by road accident. All of these accident happened for the lack of knowledge about traffic rules.

Table-2.1 Traffic Rules

	New Laws	Existing laws
Offence	Punishment	Punishment
Driving without license	6 months jail with Tk. 25000 fine	4 months jail with Tk.400 fine

Vehicle without registration	6 months jail or Tk. 50,000 fine or both	3 months jail or Tk. 2,000 fine or both 9 (for first time)/ 6 months jail or Tk. 5,000 fine or both (for second time)
Unfit Vehicles	6 months jail or Tk. 25,000 fine or both	3 months jail or Tk. 2,000 fine or both 9 (for first time)/ 6 months jail or Tk. 5,000 fine or both (for second time)
Vehicles without route permit	6 months jail or Tk. 25,000 fine or both	3 months jail or Tk. 2,000 fine or both
Meter tempering	6 months jail or Tk. 50,000 fine or both	None
Body Modification	3 years jail or Tk. 300,000 fine or both	2 years jail or Tk. 5,000 fine or both
Over speeding	3 months jail or Tk. 10,000 fine or both	3 months jail or Tk 5000 fine or both
Honking banned horns	3 months jail or Tk. 15,000 fine or both	Tk 200 fine
Using wrong route	3 months jail or Tk. 10,000 fine or both	Tk 200 fine
Violating traffic signals	3 months jail or Tk. 10,000 fine or both	1 months jail or Tk. 500 fine or both

2.7 Road Accidents

Road accident is a common incident now a days in Bangladesh. Over speeding of vehicle and reckless driving responsible for accident .so many speed restricted areas like school, collage, hospitals , highway, construction area where might should be control vehicle speed .in these area speed limiter signboard need placed by authority .a standard speed limit must be enforceable .in Bangladesh standard speed limit of 40 km/h is for urban and rural area .50 km/h speed limit may raise for width much road .60 km/h can be applied as a maximum speed limit .25,40,50,60 km/h only should be signed for limit . Government changes speed limit in appreciate time while needs .in recently authority declared speed limit on highway across the county at 80 km/h it will be 50



Fig-2.3 Road Accident

Km /h in foggy condition. Vehicle must be stopped in very thick fog condition. Lowest speed limit is 25 km/h this should be used in very narrow way. Speed breakers also may help to control high speed in restricted area. High way police may detect over speeding by using speed guns and speedometer. Authority have right to take action against the violating the limit. Driver's need to give special training program. It is very essential

for all road users and driver to know about speed and government should aware the public.

2.8 PCU

Passenger car unit is a barometer that used in transportation engineering to evaluate traffic flow. It is based on the mean speed value of different kinds of vehicles, and calculated by dividing the mean speed value of passenger cars by the mean speed value of any vehicle class. It is important for traffic capacity analysis, signal design, development of traffic flow.

Typical values for PCU:

- 1) Private Car 1
- 2) Motorcycle 0.75
- 3) Bicycle 0.5
- 4) Bus 3

The highway capacity is measured in PCE/hour daily.

2.9 Average Daily Traffic

The capacity of traffic passing a point on a highway in both directions during an average day of less than a year (or design year). It is the average of 24 hour traffic volume at a given location for some spell which is less than a year (a month, a week or some days). It was calculated by dividing the traffic count obtained during a given spell by the number of days in that time period.

2.10 Annual Average Daily Traffic

AADT is defined as the average of 24hour traffic volume at a given location over a full 365 days/year. It is the most common method used by agencies, the total volume of traffic passing a roadside observation point over the spell of a calendar year, divided by the number of days in that year (365 or 366 days).

2.11 The Peak Hour Factor

It compares the traffic volume during the 15 minutes of the peak hour with total volume during the peak hour. Basically it calculates the 15 minutes of the rush hour. Basically in Bangladesh peak hours are (8am-9am) in morning, (12 pm-1pm) in afternoon, (6pm-7pm) in night. In those times we can see the proper traffic jam of Dhaka.



Fig-2.4: Rush hour of Bangladesh

2.12 Traffic weeks

1. It should be pursued for six months as noticed by Dhaka Metropolitan Police. The services should be provided are:
2. Creating understanding, civic sense and consciousness about traffic laws and traffic safety among the people. This should select all the vehicle owners, drivers and pedestrians;
3. Assist disabled, blind, elderly people, children and pregnant women to cross the roads, ensure that the pedestrians use the foot over bridges wherever obtainable;
4. Make sure that the vehicles do not stop on/over the zebra crossings;
5. Rickshaw-pullers should take some lessons about the benefits of driving in single lines and parking in columns and rows, as may be significant.
6. Providing free footpaths and foot over bridges for hawkers.

7. The traffic police should give warnings to the drivers for eventual punishment in case of brake the traffic rules during the fourth and fifth months. In the sixth month, there should be no understanding.

2.13 Effect of COVID-19 in traffic

In Bangladesh covid-19 was first reported on March 08, 2020. Government implemented lockdown all public transportation has been shut down to reduce the risk of spread corona virus. Both negative and positive impact was seen in transportation sector for traffic restriction policy. Transportation industry accused that they struggled during lockdown and was unable to meet their basic needs. After mobility control implement we can see a significant result in traffic related occurrence. When road traffic is reduced there is less chances for road user involved in collision both urban and highway. We found that for traffic vehicle accident. Significant outcome of covid-19 lockdown shown limited public transportation can prevent accident and decrease economic losses.

3.1. Form of Data Collection

For the Pandemic COVID-19 situation it was not possible to collect the data physically also physically work of the group members couldn't be done due to lockdown. That's why we have chosen a project which can be developed. In this data collection we converted 6 hours into 1 hour because of software limitation and got Car, Bus, pickup van, CNG, motorcycle, NMV In a period. Bellow there we draw a flow chart where we have indicated three legs for Technical intersection which are Kallayanpur leg, Gabtoli leg, Mirpur leg. We have taken pre COVID-19 data for the intersections.

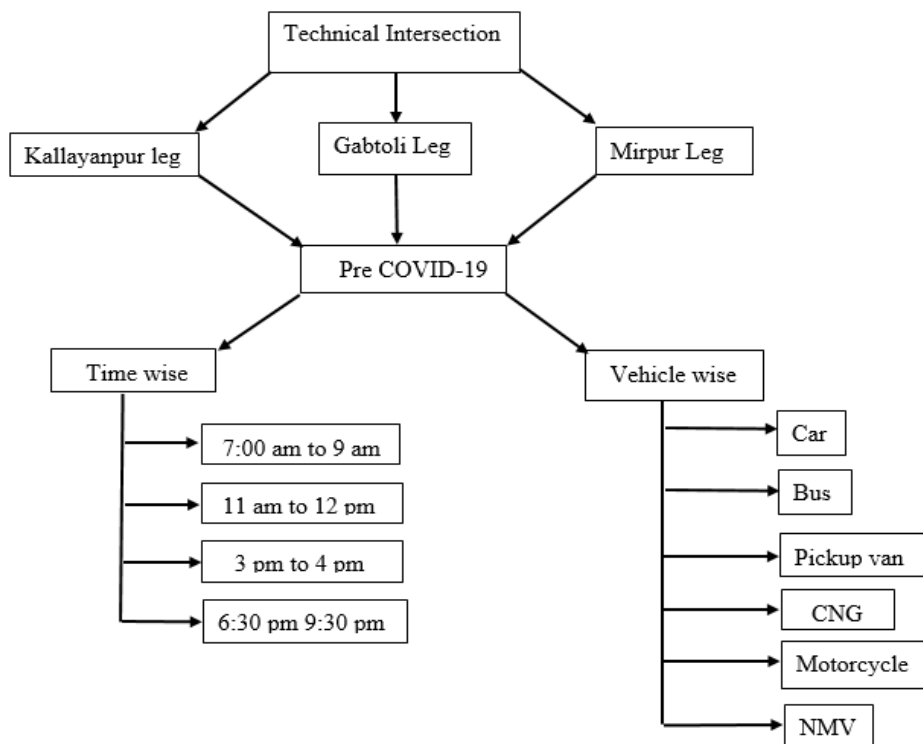


Fig-3.1 Flowchart for Technical intersections.

3.2. Collection scheme

For the development we have collected a preliminary data of three working days (Tuesday, Wednesday, and Saturday) and converted into a single data. We simulated the program for 600 seconds because of student version.

3.3. Techniques for Data Collection

Because of the lockdown conditions we couldn't attend in physical surveys. We heard about an app where we can easily collect values from home but the app was not available in play store or any other online portal. Authority had closed their app permanently and the reason is unknown. We found a group who had done their project at the same location. We collected the videos from them for the data collection so that we can develop the project area by using VISSIM software. In this paper, primary data was collected from surveys and observation in the field. We divided our thesis area into three leg which are Kallayanpur, Gabtoli, and Mirpur for collecting our data simply.

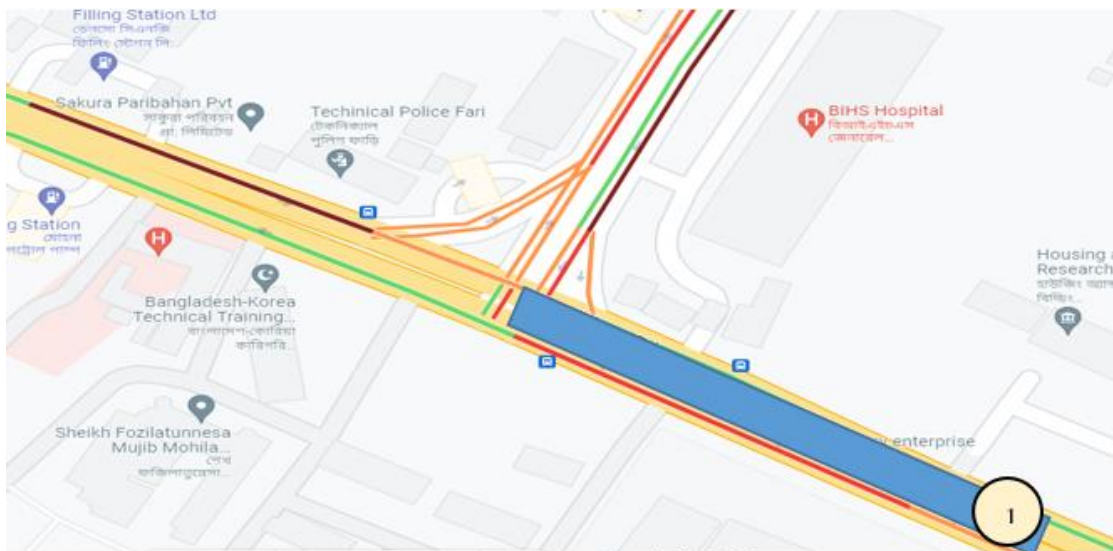


Fig-3.2 kallayanpur leg

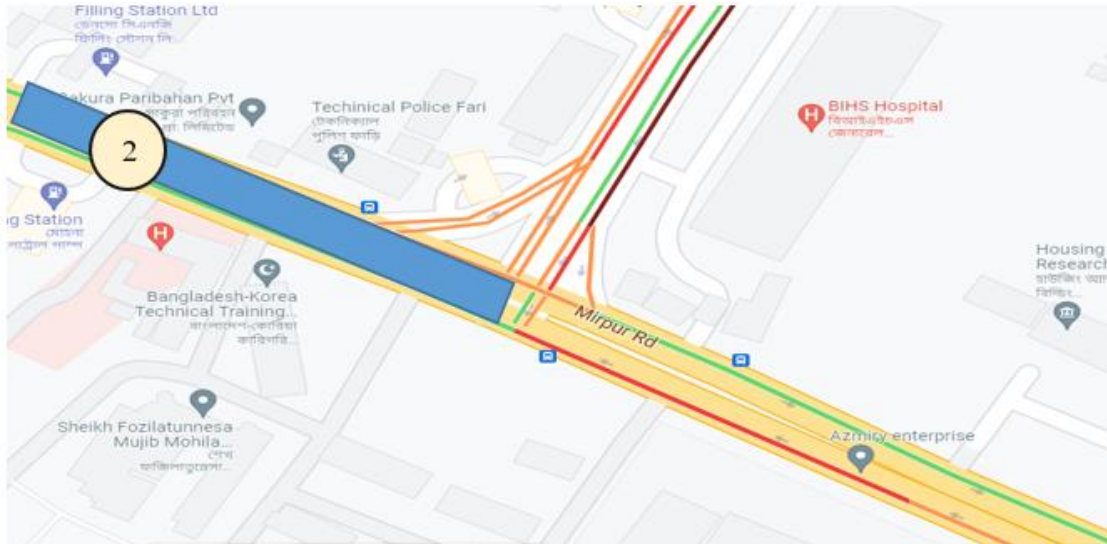


Fig-3.3: Gabtoli leg

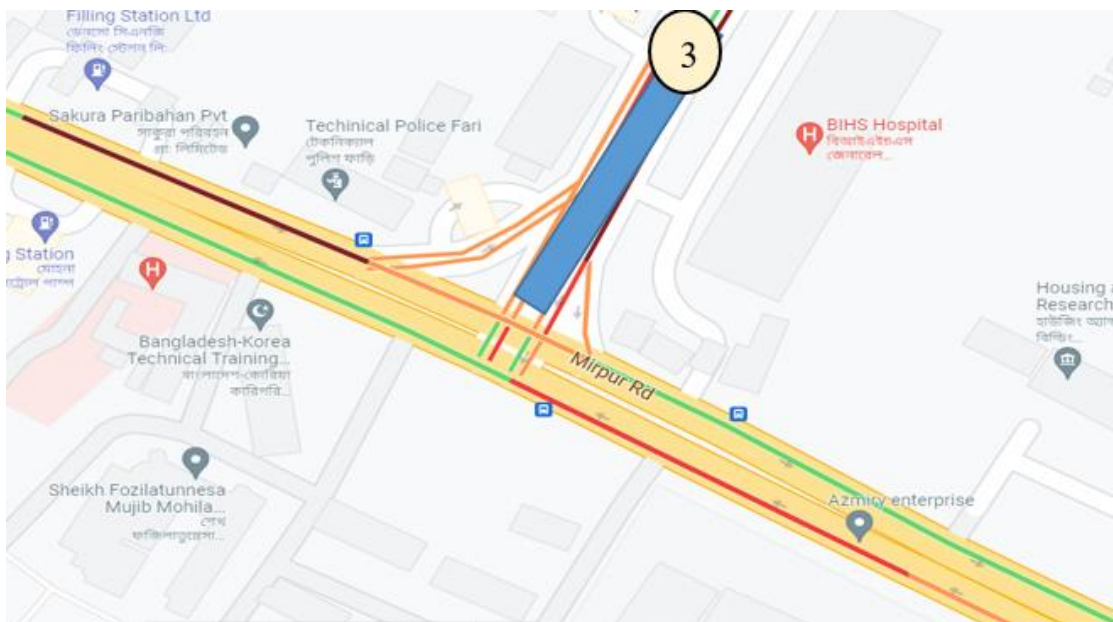


Fig-3.4: Mirpur leg

3.4. Data Collection

For the analytical purpose we have selected different kinds of intersections. We decided to develop the technical intersection. Darussalam road, Mirpur road, Dhaka Aricha highway, these roads are situated at technical intersections. Kallayanpur leg, Gabtoli leg, Mirpur leg, we counted the traffic volume data for each intersection for three days. To calculate the traffic volume, we have divided four period of time per day which are from 7am to 9am (morning peak), 11am to 12pm (morning off peak), 3pm to 4pm

(afternoon off peak) and 6:30pm to 8:30pm (evening peak). Stopwatch, hand note, pen, mobile record had been used during this functioning. Day wise data and intersection wise data had been collected for this operation. We just put the data into the Vissim software (vehicle input). After the simulation we found the vehicle passing value, mean speed etc. So, we collect the data and put it into Microsoft Excel.

3.5. VISSIM

It is a software that helps us to expand our microscopic planning simulation into a stable test environment no matter how we choose to utilize the traffic simulation software and it is flexible also. It is the most trusted modeling and simulation software. Used for control the system design and digital signal processing at the intersection. We can compare the traffic volume before and after developing the intersection.



Fig-3.5 Background of technical Intersection

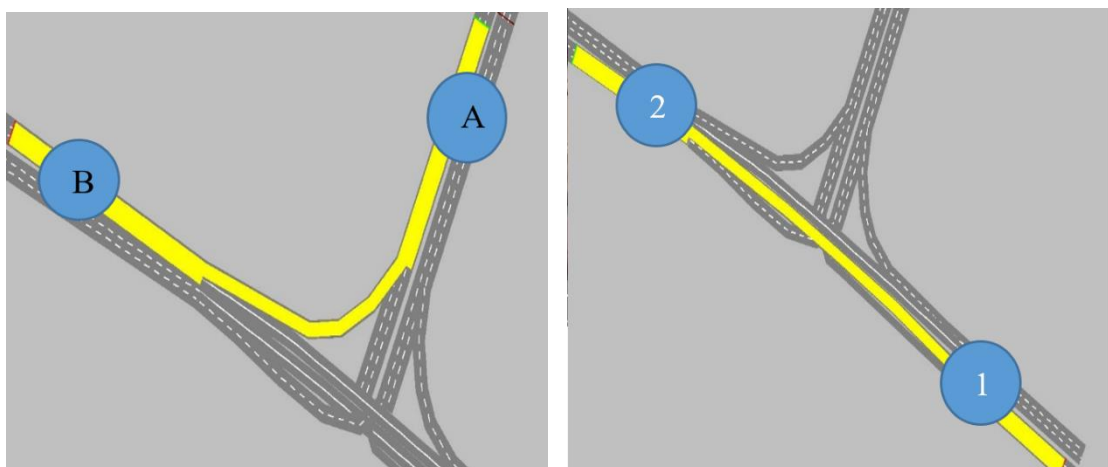


Fig-3.6 Routes of technical Intersection

Route is way of travel or movement. It is a software that can make a model for powerful routing decision. Also, we can input a large amount of turning decision data. For example: Above we can see the path between A to B which is for Mirpur 1 to Gabtoli and 1 to 2 which is for Kallayanpur to Gabtoli.

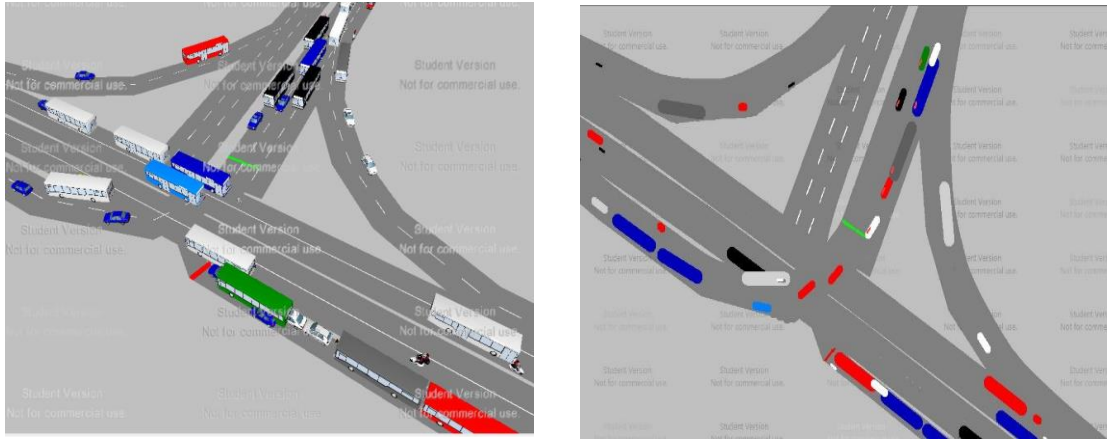


Fig-3.7 3D & 2D view after simulation

This is a student/Trial version. We can access easily that's why we worked in this version but there are some limitations where we can run the program only for 600 seconds. From this simulation we got some files (.sig, .mes, .err, .inp, .ini, .qmk, .mer). For the simulation we need the (.inp) file and for data collection we have used (.mes) file. We used a software for convert the (.mes) file into Microsoft Excel spreadsheet. After that we can easily check the data from the excel file.

CHAPTER 4 Data Analysis

4.1 General

Basically, Research means a creation of new knowledge or uses of existing knowledge, and it is a creative way to generate new ideas, concepts or methodologies. In this thesis paper we have developed a project which will fulfil the peoples need.

4.2 Research Motive

- 1) To develop the roadway condition.
- 2) To create a variation in current intersection condition.
- 3) To reduce traffic jam or traffic volume by developing an intersection.
- 4) To compare between previous flow rate and after developing the intersection flow rate by using VISSIM Software.

4.3 Variation in the current data

As we are developing the technical intersection in Dhaka city. Those intersections are situated at Dhaka Aricha highway, Mirpur road and Darussalam road.

The intersections are:

Predevelopment Chart

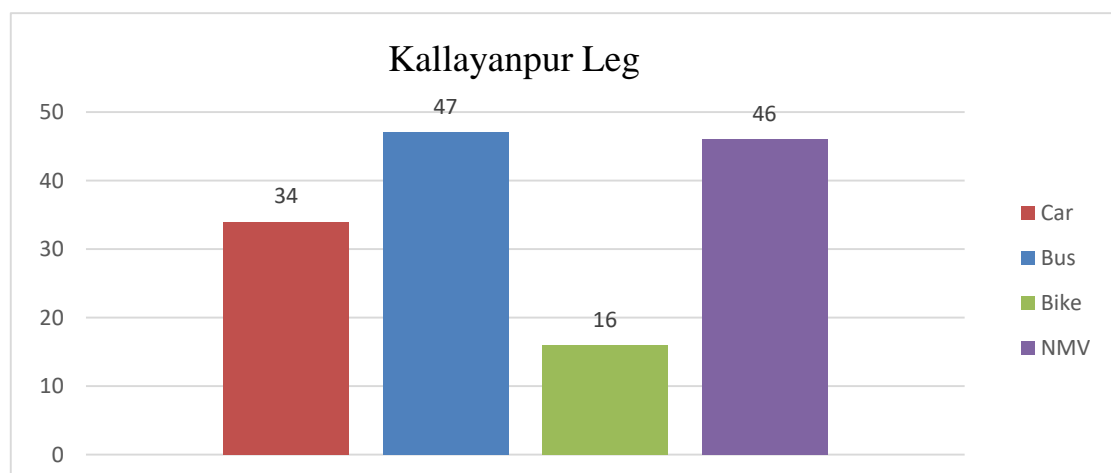


Fig 4.1 Kallayanpur leg

In this chart we can see the predevelopment vehicle passing value for 600 seconds simulation at kallayanpur leg. For this simulation time we got the passing value of vehicles [cars= 34, Buses= 47, Bikes= 16 and NMV which is none motorize vehicle 46].

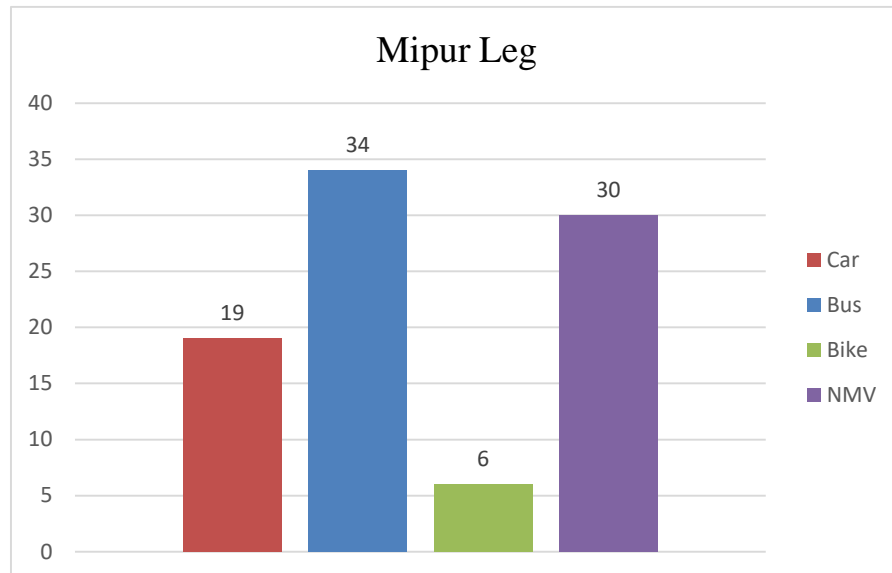


Fig 4.2 Mirpur Leg

Here, we can see the passing vehicle values for Mirpur Leg and it is also for 600 seconds simulation. The highest vehicle passed by this leg is [Bus=34] and the other passing vehicles are [car=19, Bike=6, NMV=30]. In this chart we have put those values.

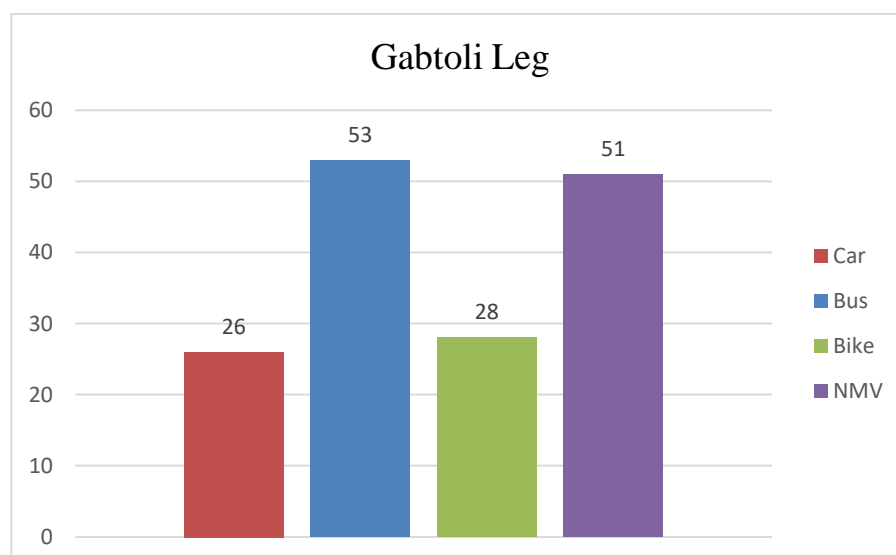


Fig 4.3 Gabtoli Leg

In this chart we plot the passing vehicle values for Gabtoli Leg. Where we can see the highest amount of vehicle passed through this leg is [Bus=53] and the values for other vehicles are [car=26, Bike=28, NMV=51]

Post Development Charts

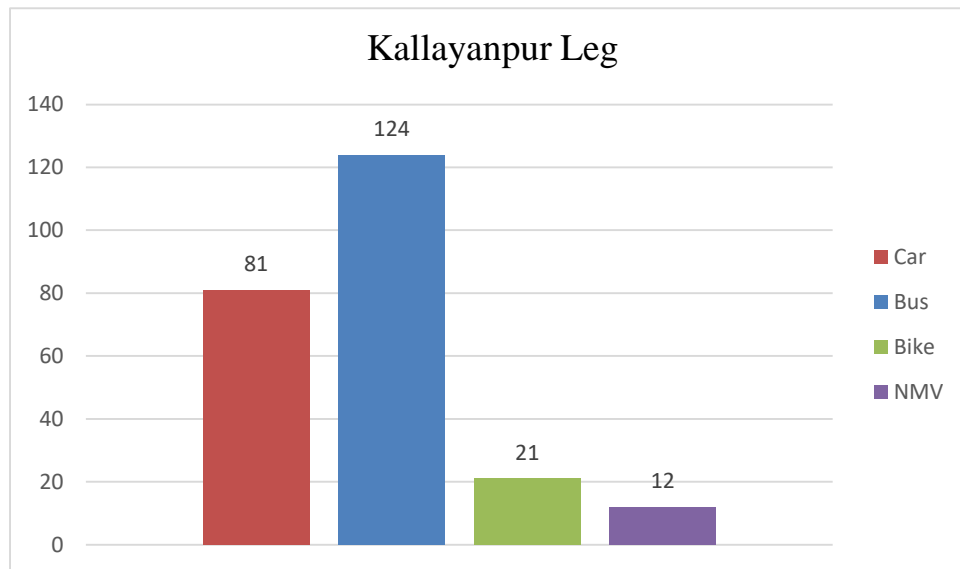


Fig 4.4 Kallayanpur Leg

Here we can see the post development for Kallayanpur leg. If we compare this chart with the pre development chart we will see the development in vehicle passing values. Here the passing values of the vehicles are [Car=81, Bus=124, Bike=21, NMV=12].

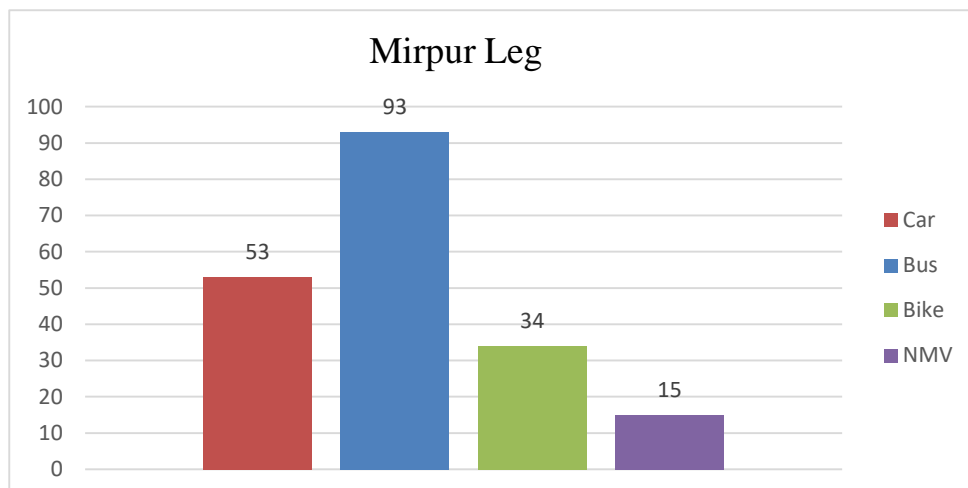


Fig 4.5 Mirpur Leg

In this part we can see the post development chart of Gabtoli leg. Where the vehicle passing values are [Car=53, Bus=93, Bike=34, NMV=15]. Through this leg the most passing vehicles are Buses and Cars.

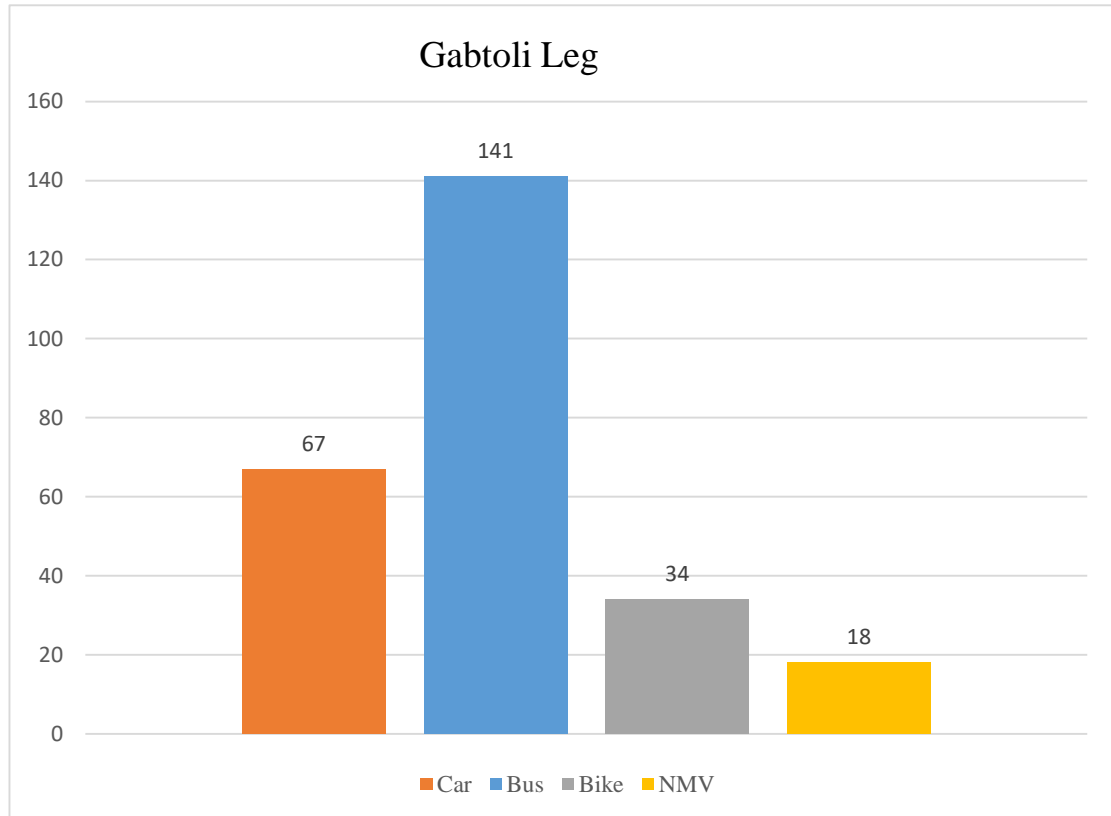


Fig 4.6 Gabtoli Leg

This chart is for the post development passing value for gabtoli leg. In this chart we see the vehicle passing value for [Car=67, Bus=141, Bike=34, NMV=18]. The maximum flowing rate of this leg is for Bus.

4.4 Compare with the pre-Development and post Development:

Three Legs data:

Pre development and Post Development data comparison:

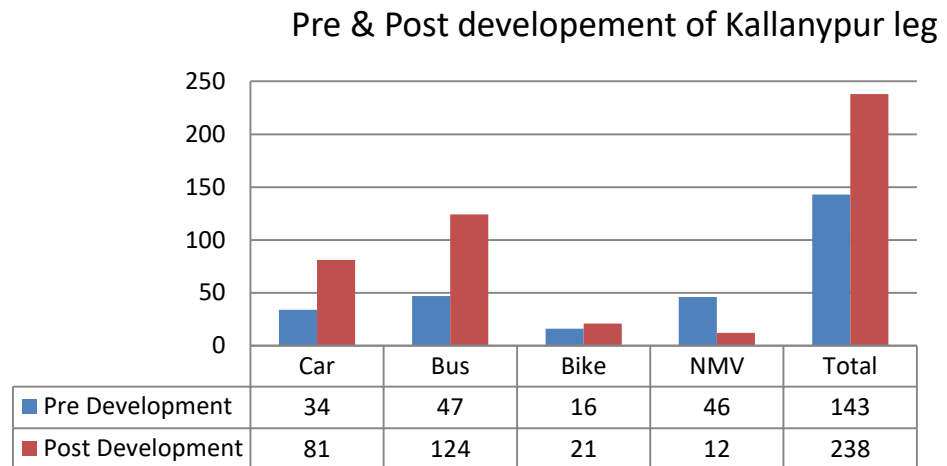


Fig 4.7 Kallayanpur leg Development

In this portion we compare the data of predevelopment and post development for Kallayanpur Leg. From this data we found improvement in post development data where we use a flyover for the development. Here we can see a good expansion for Car and a better development for Bus and the passing value of NMV vehicle is low because for the development we have closed flyover for 'NMV'. Overall the chart shows us a good development in post development data.

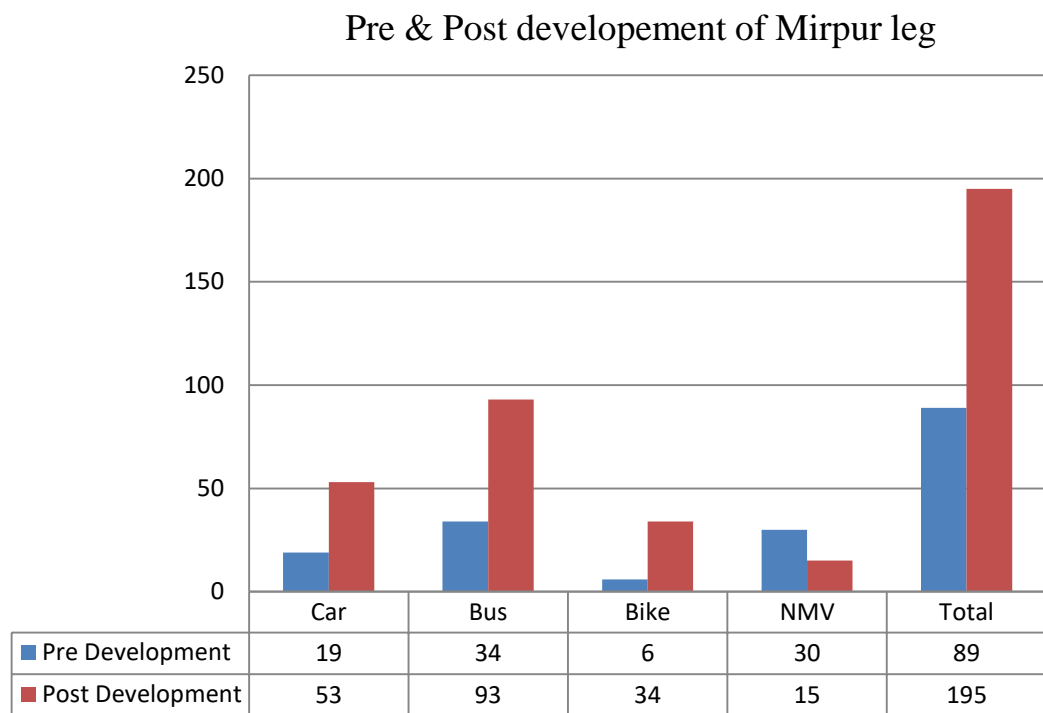


Fig 4.8 Mirpur leg Development

The chart shows us the development for Mirpur leg. Where the post development data of Car, Bus, Bike are much higher than the pre development data. Clearly, we can see increasing between these two developments. On the other hand, because of the closed path of flyover for 'NMV' half of the vehicles cannot pass. So, we can say that this can be count as the development for Mirpur leg.

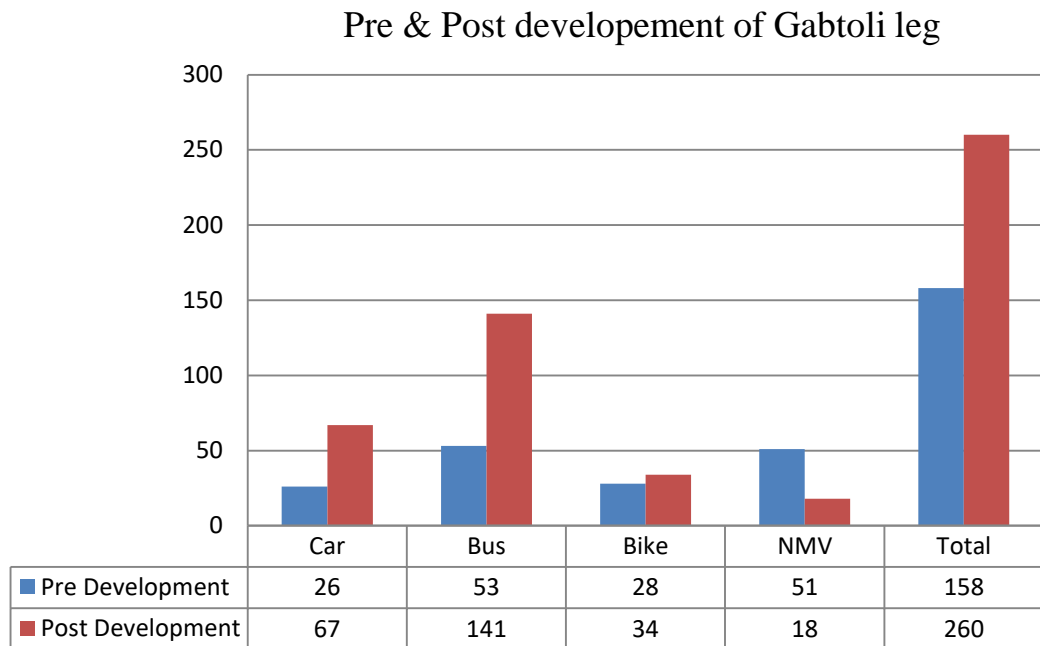


Fig 4.9 Gabtoli leg development

Here we can see the predevelopment data for Gabtoli are [Car=26, Bus=53, Bike=28, NMV=51, total=158] and the post developing data are [Car=67, Bus=141, Bike=34, NMV=18, total=260]. So, the result shows us the difference between these two data where, we can clearly see that post development data is higher than pre development data. Overall this is the development for Gabtoli leg.

4.5 Findings

We sort out the results in the following based on the simulation off the VISSIM application at technical intersection.

- 1) We observed that volume of Bus is higher among all types of vehicle in three intersection. However, the lowest passing vehicle among all legs is NMV.
- 2) After the simulation we saw the data collection for each pre and post development which gives us the conclusion of the development.
- 3) Traffic jam reduced for the development that's why people can save their time.
- 4) Environmental impacts reduced.
- 5) Traffic volume increased by the development for this intersection.
- 6) We observed that by this development intersection needs less traffic signal.

- 7) We find out that after this development it will be more comfortable for the users to using the flyover.

Chapter 5 Conclusion

5.1 Conclusion

As a result, we got the difference in traffic volume was notable compared to the pre-development and post-development at technical intersection. In this study we found that the variation in vehicle count for different legs are distinct. In general, it was observed that buses were outstandingly higher than other types of vehicle for Kallayanpur, Mirpur and gabtoli legs of the intersection. On the other hand, lowest amount of passing vehicle was NMV through these three legs. Our motive is to reduce traffic jam and increasing the traffic volume among these three legs. By the result we are satisfied because our target is to reduce traffic jam, traffic signal and an environment friendly road is to develop, and we did it.

5.2 Limitations

- 1) **Physical work:** The whole work is in COVID-19 pandemic situation and we are not out of this. For this reason, group members could not be able attend together for physical work. That's why we have to choose a project which we can do easily. We have done this project through online.
- 2) **Video Recording:** A preliminary data was needed to complete the project by way of Software. It was very costly to get all the equipment's for video recording and tough to record in heavy traffic area.
- 3) **VISSIM application:** Though it is very costly to effort the paid version of this software that's why we have used the Student/Demo version of this software. That's why the software has a limited functionality.
- 4) **Vehicle:** There are some vehicle of our country didn't have inserted into the software. So for simulation we didn't get these type of vehicle.
- 5) **Simulation:** For the limited functionality we can simulate the program only for 600 seconds.
- 6) **Program:** The Component Object Model (COM) interface is unavailable for the Student/Demo version. That's why we couldn't express too much about the model as like flyover or some 3D functions.

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Appendix

Preliminary Data

Location: Technical Intersection

Day: Tuesday

Date: 10/09/2020

Data Table 5.1 Kallayanpur Leg

Time	Car	Bus	Pickup van	CNG	Motorcycle	NMV	Total
7:00-9:00	608	465	46	310	325	9	1756
11:00-12	359	132	28	122	147	0	728
3:00-4:00	355	98	35	105	62	0	655
6:30-8:30	580	365	32	300	345	0	1622

Data Table 5.2 Mirpur Leg

Time	Car	Bus	Pickup van	CNG	Motorcycle	NMV	Total
7:00-9:00	2886	1443	170	1551	1048	58	7156
11:00-12	1001	725	61	882	1331	15	4015
3:00-4:00	1007	810	36	790	1117	17	3577
6:30-8:30	2197	1595	144	1585	1438	37	6983

Data Table 5.3 Gabtoli Leg

Time	Car	Bus	Pickup van	CNG	Motorcycle	NMV	Total
7:00-9:00	424	391	104	339	308	0	1566
11:00-12	384	146	67	457	509	19	1582
3:00-4:00	336	151	55	380	420	8	1350
6:30-8:30	368	360	97	330	318	0	1473

Location: Technical Intersection

Day: Tuesday

Date: 11/09/2020

Data Table 5.4 Kallayanpur Leg

Time	Car	Bus	Pickup van	CNG	Motorcycle	NMV	Total
7:00-9:00	1145	552	69	354	272	12	2404
11:00-12	1145	102	32	159	132	2	1572
3:00-4:00	340	128	47	102	89	0	706
6:30-8:30	1050	569	62	340	302	0	2323

Data Table 5.5 Mirpur Leg

Time	Car	Bus	Pickup van	CNG	Motorcycle	NMV	Total
7:00-9:00	2505	957	54	1442	875	27	5293
11:00-12	795	600	53	523	844	18	2277
3:00-4:00	1040	566	75	596	877	7	2559
6:30-8:30	1628	1581	91	1568	1343	17	5670

Data Table 5.6 Gabtoli Leg

Time	Car	Bus	Pickup van	CNG	Motorcycle	NMV	Total
7:00-9:00	430	372	133	365	294	0	1594
11:00-12	360	110	72	418	543	19	1522
3:00-4:00	320	140	64	410	415	0	1300
6:30-8:30	429	380	122	320	333	0	1584

Location: Technical Intersection

Day: Tuesday

Date: 16/09/2020

Data table 5.7 Kallayanpur Leg

Time	Car	Bus	Pickup van	CNG	Motorcycle	NMV	Total
7:00-9:00	980	495	54	380	305	8	2222
11:00-12	410	148	37	143	140	0	878
3:00-4:00	320	112	43	91	75	0	641
6:30-8:30	956	465	62	412	318	0	2213

Data Table 5.8 Mirpur Leg

Time	Car	Bus	Pickup van	CNG	Motorcycle	NMV	Total
7:00-9:00	2336	972	88	1367	839	8	5028
11:00-12	1891	652	74	1088	608	14	3899
3:00-4:00	983	384	68	371	645	13	2079
6:30-8:30	2123	641	41	975	1066	36	4257

Data Table 5.9 Gabtoli Leg

Time	Car	Bus	Pickup van	CNG	Motorcycle	NMV	Total
7:00-9:00	396	130	28	272	136	17	979
11:00-12	301	201	12	118	64	10	706
3:00-4:00	156	50	25	243	69	23	573
6:30-8:30	380	226	18	313	215	21	1188

Pre-Development Traffic Count

Location: Technical Intersection

Data Table 5.10 Intake of Kallayanpur Leg

Lane	Car	Bus	Bike	NMV
From Kallayanpur	7	5	4	0
	3	10	3	10
	0	0	0	0
	0	1	0	0
	12	9	2	15
	3	4	2	4
	0	0	0	0
	2	1	1	5
	6	15	3	11
	1	2	1	1
Total =	34	47	16	46

Data Table 5.11 Intake of Mirpur Leg

Lane	Car	Bus	Bike	NMV
From Mirpur	3	6	2	14
	4	6	0	4
	7	12	2	9
	0	2	0	1
	0	0	0	0
	4	5	0	2
	1	3	2	0
	0	0	0	0
	0	0	0	0
	0	0	0	0

Total =	19	34	6	30
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Data Table 5.12 Intake of Gabtoli Leg

Lane	Car	Bus	Bike	NMV
From Gabtoli	3	6	2	6
	0	4	2	6
	1	5	3	4
	8	10	5	12
	5	6	4	3
	0	0	0	0
	2	8	4	6
	7	13	8	11
	0	1	0	3
	0	0	0	0
Total =	26	53	28	51

Post-Development Traffic Count

Location: Technical Intersection

Data Table 5.13 Intake of Kallayanpur Leg

Lane	Car	Bus	Bike	NMV
From Kallayanpur	8	8	0	0
	5	14	4	0
	13	12	1	0
	8	6	4	5
	8	16	3	1
	9	12	1	2
	9	16	1	1
	9	12	3	0

	6	16	0	2
	6	12	4	1
Total =	81	124	21	12

Data Table 5.14 Intake of Mirpur Leg

Lane	Car	Bus	Bike	NMV
From Mirpur	3	7	7	4
	4	13	4	1
	16	15	7	2
	0	0	0	0
	5	7	2	0
	9	16	10	2
	2	4	1	1
	7	15	2	2
	7	15	1	3
	0	1	0	0
Total =	53	93	34	15

Data Table 5.15 Intake of Gabtoli Leg

Lane	Car	Bus	Bike	NMV
From Gabtoli	7	8	1	1
	7	12	2	1
	9	18	4	2
	4	13	2	1
	4	13	3	6
	7	22	5	2
	5	10	6	3
	7	15	5	0

	6	14	5	2
	11	16	1	0
Total =	67	141	34	18