SPEED PROFILE ANALYSIS AT THE SPEED BREAKERS AT SOME LOCATIONS IN DHAKA CITY

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Bachelor of Science in Civil Engineering

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SEPTEMBER, 2022

CERTIFICATION

This is to certify that this project and thesis entitled "**Speed Profile Analysis at the Speed Breakers at Some Locations in Dhaka City**" is done by the following students under my direct supervision and this work has been carried out by them in the Department of Civil Engineering under the Faculty of Engineering of Daffodil International University in partial fulfillment of the requirements for the degree of Bachelor of Science in Civil Engineering. The presentation of the work was held on September 2022.

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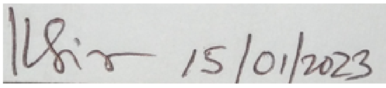

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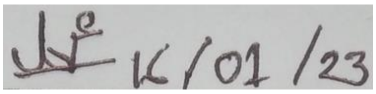

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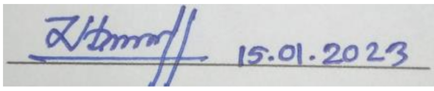

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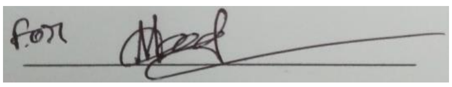

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We hereby attest that we are the sole author of this thesis and that no part of it, nor the entire thesis, has been submitted to any other university or institution for a degree. We certify that this project report, Speed Breakers analysis at the Speed Breakers, is done by us under the supervision of Mr. Rakibul Hassan, Department of Civil Engineering, Daffodil International University. We are announcing that this project is our unique work, we additionally proclaim that this undertaking works are unique and have never been submitted in its entirety for any degree or diploma at this university.

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DEDICATION

We devote this work to almighty ALLAH first, also our parents and teachers for their deep amicable support and help.

ABSTRACT

A speed breaker is placed perpendicular to a road to force drivers to reduce their speed. By regulating the speed of vehicles on local streets and accident-prone areas, they serve a significant role in enhancing safety. The reduction in speed is mostly determined by the length, height and kind of speed breakers. Commonly utilized types of speed breakers include speed bumps, speed humps, and artificial speed breakers. The purpose of this study is to determine the variation in speeds of different classes of vehicles at speed breakers road section of Manik Mia Avenue, Shyamoli Ring Road and West Raza Bazar in Dhaka. We provide a new approach for calculating the maximum permissible speed in curves that takes into account the three variables of the situation (distance, time, and speed) using the appropriate tools. The vehicle's dynamics are represented by a count and an average that incorporates a longitudinal top view and a side view-based speed analysis of speed breakers. The volume of traffic on the aforementioned highways was measured every 0-15 feet. Results found that during peak hours, the video was captured and the variation of speeds before and after 20 feet (Manik Mia Avenue), 6 feet (Shyamoli Ring Road), and 2 feet (West Rajabazar) from speed breakers was estimated at these sites. Both of the distances between us are identified by vehicle. The remaining rickshaw time at the Manik Mia avenue speed breaker is 8.94 km/h (2.02 seconds), while the remaining bike time is 15.36 km/h (1.12 sec). At an average of 1.12 seconds (11.96 kilometers per hour) per car, the West Rajabazar speed breaker was traversed. The average maximum speed per vehicle on Manik Mia Avenue is 12.25 km/h (1.51 seconds). We reviewed three-speed breakers in designated areas of Dhaka city and were able to determine the speed of the vehicles in front of the speed breaker while crossing the speed breaker and after crossing the speed breaker. Besides, we have been able to determine how many vehicles are moving every hour and what kind of vehicles are moving at Manik Mia Avenue carries 2,790 vehicles per hour, Shyamoli Ring Road in Dhaka sees an average of 2040 vehicle passes each hour, and West Razabazar there are 720 vehicular traffic movements each and every hour

CHAPTER 1: INTRODUCTION

1.1 General

Speed breakers are very important to control the speed of the vehicle. In developed countries, speed breakers play a very important role in controlling the speed of their vehicles. In developed countries, speed breakers are considered to silence traffic. When the vehicle driver knows that there is a speed breaker ahead, he must control the speed of his vehicle. Speed breakers are of different types such as plastic speed breakers, and normal speed breakers (ex: concrete or rock-made). Plastic speed breakers are not common in our country, but plastic speed breakers are used in developed countries. Such as China, the USA, the UK, Japan, etc. Common speed breakers are used in our country but they work well if used properly.

1.2 Background of study

Speed breakers are normally used in some vital specific locations and some crucial places. Speed breakers are used solely in school-college-madrasa hospitals and some necessary people's offices and speed breakers are used at all locations the place frequent pedestrians pass due to the fact the usage of speed breakers reduces cars installments relatively. There is a unique coverage on what kind of speed breaker needs to be used at which location. In locations, the place very small cars cross and many pedestrians go on the road, the top of the speed breaker is barely greater and its size is shorter. On roads that elevate heavy site visitors however want to manipulate the speed of the vehicles, the speed breakers are slightly large and the top is a good deal shorter or shorter so that the automobiles can pass ahead easily.

1.3 Objectives

The main objectives of the study are:

- Finding the type of vehicles and the number of vehicles plying through the speed breakers in Manik Mia Avenue, Shaymoli Ring Road and West Raza Bazar.
- Analyzing the speed profile of vehicles at Manik Mia Avenue, Shyamoli Ring Road, and West Raja Bazar speed breakers.

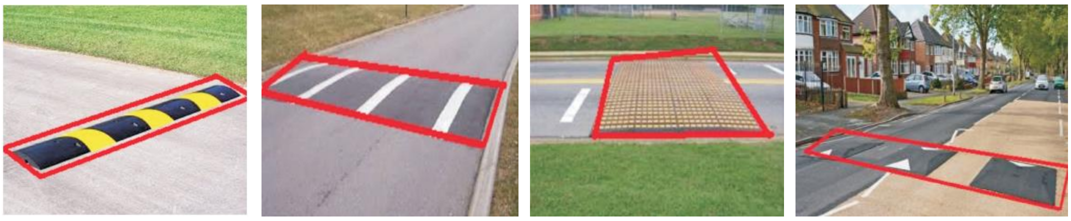
1.4 Problem Statement

The purpose of speed profiles, which are elevated pavements set at an angle to the road, is to get drivers to slow down. Those speed bumps serve a vital role in reducing accidents on the tight turns and residential streets of Dhaka. The length, height, and design of speed breakers greatly affect how much speed is lowered. Speed bumps, speed humps, and artificial speed breakers are often used types of speed breakers. We analyzed the speeds of various vehicle classes in Dhaka and determined the optimal bump height for each road segment based on the varying speeds of the cars that use it. Dhaka's Manik Mia Avenue, Shyamoli Ring Road, and West Raja Bazar were chosen as the three sites for this. Each of the aforementioned roadways' volume was measured at regular intervals of 15 feet. Video was taken at busy times, and the difference in speeds before and after 10 meters from speed breakers was tallied.

CHAPTER 2: LITERATURE REVIEW

2.1 Speed Profile Analysis on Speed Breakers

Designing and maintaining roads with a focus on traffic safety is essential. However, as the global population travels more by car, a deeper awareness of road traffic safety becomes important. Speed is the primary indicator of a roadway system's traffic performance, since it reflects the quality of service experienced by the traffic flow. In accident-prone locations, speed bumps, also known as road bumps, are commonly used to regulate vehicle speed and improve traffic safety. Excessive provision of speed breakers causes annoyance and pain among road users. According to the 2015 Road Accident Report by the Hossain and Farque (2019) 4,726 persons were killed annually due to road humps, while 6,672 were killed owing to potholes and speed breakers. Speed humps should only be installed in locations where speed-related collisions are prevalent. Different types of speed breakers result in varying degrees of speed decrease (Hasen). They are detailed below and illustrated in Figure 2.1.



(a) (b) (c) (d)

Figure 2.1: Types of Speed Breakers

(a) Speed Bumps, (b) Speed Humps, (c) Speed Cushions, (d) Speed Tables

2.2 Importance of speed breaker

Speed breakers are essential for safety. Speed breakers are provided in various important places such as educational institutions, hospitals, and garment factories, and in populated areas speed breakers are used more to avoid acid ends. Accidents are reduced to a great extent due to the use of speed breakers but there are some rules for using speed breakers (Hasen, 2016). Such a speed breaker should be properly placed in the right place and there should be marking and lighting with it. Proper marking lighting can reduce accidents. When we go down a fast road, seeing the speed breaker forces the car to slow down. Speed breaker protects the motor from accidents. Pedestrians can easily cross the road due to the presence of speed breakers. Tallam (2016) reported 44%

of accidents can be avoided by using speed breakers on roads. For this reason, if speed breakers are installed on every highway, people will be saved from many accidents. Its significance is more in densely populated cities, if speed breakers are used, many accidents are reduced and automobile drivers can control the speed of their vehicles.

2.3 Purpose of speed breaker study

In the conclusion of the Speed Breaker chapter, we are aware that accidents can happen if there are no speed breakers on the road. A speed breaker provides safety for people, and automobiles to cross the road. It is recognized what the speed breaker will look like and what color should be used i.e. we can recognize how many types of speed breakers (Georgiev & Kunchev, 2019). How to get to the speed breaker and from a distance, you can understand the front speed breaker. I can be aware of the location of the speed breaker. Generally, people cross more in front of schools, colleges, universities, spiritual institutions, libraries, theatres, and residential houses, so I can understand why speed is given on the road for their safety. No automobile can be overtaken by a speed breaker on the road, some of the problems caused by providing speed breakers, such as people losing time to go somewhere, and victims suffering from crossing problems, can be found. This is a primary drawback for emergency vehicles like ambulances, fire carriers, etc. There are some speed breakers on the road which are built without traffic signs. Due to the lack of markings or traffic signs on the roads, accidents are constantly happening.

2.4 Utilization and effects of Speed Bumps on Automobiles

In both emerging and developed nations, road accidents and injuries are becoming substantial contributors to mortality. Therefore, traffic calming is necessary on today's highways. Multiple strong solutions are required to make highways absolutely safe for users, cars, and the environment. In order to ensure the safety of cars and the environment, it is necessary to implement steps to reduce speed. However, if similar designs and structures are implemented without the usage of recognized criteria, they could cause chaos and have serious consequences for people, vehicles, and the environment. Consequently, there is a need for rapid identification and elimination of these issues, i.e., if designs are wrong, they should be removed and replaced with new ones that have the correct proportions, which would aid in the reduction of traffic-related issues (Raj *et al.*, 2019).

For speed reduction and traffic management, a multitude of measures, including signboards, chicanes, speed breakers, driver education, raised intersections, roundabouts, and traffic circles, can be adopted. Figure 2.2 depicts several horizontal and vertical flow retardation measures, which include the following:

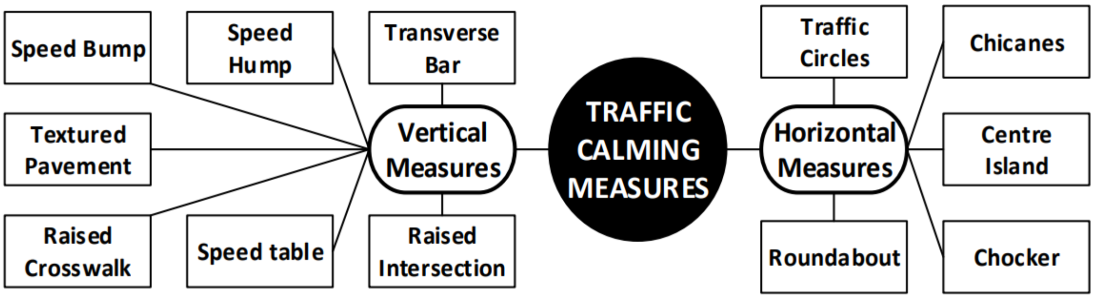


Figure 2.2: Several traffic calming strategies

Source: Raj *et al.*, 2019

Rfff, the main focus is on speed breakers or speed bumps, which are used to slow down vehicles and reduce the risk of accidents and injuries. Careless construction of speed breakers without proper planning could endanger drivers' lives. Unfortunately, speed breakers are often undervalued in two ways: first, since they are often installed in inappropriate locations where they are superfluous, and second, because they are often built improperly without approved design usage. Research has been done on everything from motorcycles to rickshaws, and everything in between. Whole-Body Vibration (WBV) and vehicle damage are common outcomes of these road imperfections (Rathee et al, 2021).

2.4.1 Impacts on vehicles

The vehicle has deteriorated mostly owing to damage to the undercarriage, wear and tear on the brakes and tires, suspension problems, and damage to internal components. The influence that speed bumps have on moving cars is depicted in Figure 2.2. An exhaustive literature review on the effects of vehicles as well as rules for the design and installation of speed humps created the network layout that can be seen in Figure 2.3.

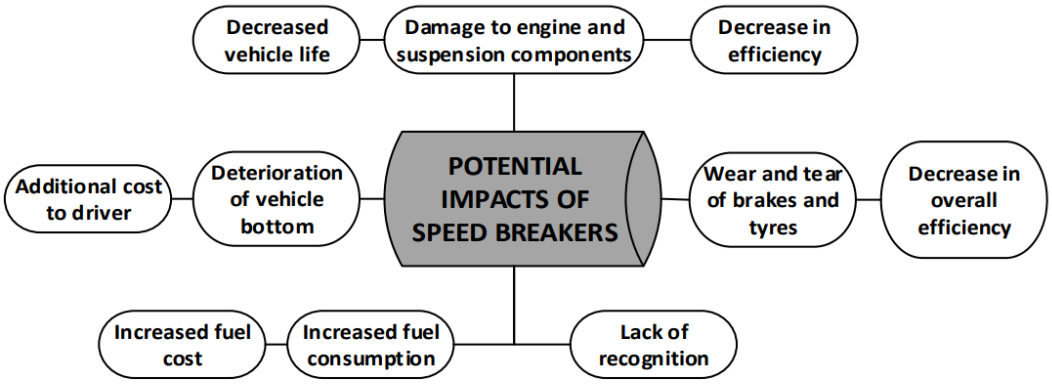


Figure 2.3: Potential impacts of speed breakers on vehicle

(Source: Rathee *et al.*, 2021)

2.4.2 Speed management and community acceptance

On the basis of a 1992 literature review and survey, an analysis into the utilization of road bumps as speed moderators in metropolitan areas was done. In this study, community acceptability was investigated, and acceptance-influencing elements were identified. Utilizing survey methods, the impact of the speed spike experience in the population was determined. Control of the vehicle, heat, noise, and vibration were among the issues observed as a result of road bumps. It has been discovered that emergency vehicles may experience pain, damage, security rules, and delays.

2.4.3 Designs and Speed Behavior

The University of Leeds conducted a study on the speed of road design on driving speeds in 1997. A number of methods for slowing down a vehicle were evaluated in this literature. Indirect influences on driving behavior were examined in this study.

In 2000, ITE journal published a discussion on geometric standards for speed humps, in which the contribution of innovative designs was regarded as the major goal for users in countries with widely varying environmental conditions (Choong et al, 2020), vehicle attributes, and driver expectations. Shock absorbers in the suspension system reduce the vertical acceleration that would otherwise be caused. The length of the speed hump was highlighted as an important design feature due to the correlation between its length and the magnitude of the linear dynamic effects it would produce. In the initial stage, a radar gun was utilized to log the recorded speeds. Mesaros Anghel *et al.* (2014) focused on root Sum of Square (RSS) equal to discomfort criteria was used to quantify the level of discomfort experienced by test subjects during the second phase of the study, which involved studies performed in an off-road environment. The findings suggested a larger sample size was necessary to define pain thresholds. Because the humps in the Watts and Seminole profiles are the same profile, further research should focus on varying the ramp slopes.

Yadav and Srivastava (2014) noted in 1992, it was described how flat-topped tables, humps, raised junctions, cushions, and chicanes were the most frequent traffic calming devices in industrialized countries like the United Kingdom. A model for traffic calming was provided in 2000 under the Transportation Research subheading; the analysis focused on the effects of various traffic-calming measure combinations on the speed of unconstrained vehicles. At strategic, traffic-calmed locations, data on motorist habits was gathered. For the purpose of estimating model variables, regression was used. It was determined that speed tables had the largest effect on speeds, followed by speed humps, chicanes, and cushions, with further analysis into the design of banked turns being warranted.

2.4.4 Passive speed control strategies

According to the Deevela *et al.* (2019), vertical undulations on roads were employed to reduce speed in the 1970s, and since then, they have become a widespread passive means of reducing speed in many countries. Many studies have examined the speed of undulations in reducing speeds up to the 85^{th} and 50^{th} percentiles, respectively, for the purpose of traffic calming. To reduce speed and reduce mortality in urban areas, speed bumps were examined in Italy in 2001. It was also claimed that speed humps' benefits in reducing accidents and protecting pedestrians outweigh their expenses, which include fixing damaged cars.

2.4.5 Optimal Designs of Speed Humps

Streets with speed humps can be either one- or two-way. You shouldn't put them on roads that hospitals and rescue services use. Traffic slowing measures like speed humps and tables are installed to make cycling more convenient and secure. At the 2007 annual ITE meeting, recommendations were proposed for the creation of speed bumps. It has been observed that the construction and design of speed humps vary throughout jurisdictions and are met with opposition from various parties. An exhaustive literature analysis was used to develop these state-of-the-art principles, and an online survey was used to supplement this information and help fill in the gaps shown by the resulting framework. The primary users of split speed tables are emergency services and public transportation providers. It was mentioned that stakeholders such citizens, business owners, property owners, emergency services, schools, hospitals, medical centers, transit operators, road maintenance employees, snow plow operators, and garbage collection agencies should be consulted before any humps are built. After speed humps were put in place, drivers slowed down and there was less traffic overall. Olajide (2022) argued that implementing speed humps and tables in communities around the country, a framework was designed with the assistance of several agencies (Olajide *et al.*, 2022).

The purpose of installing speed humps in residential areas is to slow down traffic and reduce the likelihood of accidents. For the reasons stated by Saadoon, speed bumps are not reliable for maintaining the targeted speed limits. According to research by Cross and Wasters, the jarring effect of shocks accounts for 36% of all back injuries sustained by operators of moving machinery. In 2007, researchers employed a seat pad accelerometer to assess the risks posed by WBV brought on by Speed Control Humps (SCHs) in a variety of ergonomic settings, finding that hump geometry was the primary factor affecting the shocks brought on by these undulations. Car model, placement of passengers, speed, and hump geometry were also considered. The findings indicated that circular humps are riskier, and two novel humps were presented that performed better (Iqbal *et al.*, 2016). The focus of the research at hand is on the deconstruction of old buildings and the planning of brand-new replacements.

2.5 Previous Literature Gap

Alam *et al.* (2011) focused on motor vehicles driving without any regard for speed limits are a leading cause of accidents in the country. The law related to speeding is rarely enforced, and instead, a reliance on speed breakers actually contributes to more accidents than it helps at curbing speeding vehicles. Maniruzzaman and Mitra (2005) noted the drivers should be warned of the presence of speed breakers by posting suitable advance warning signs. Vehicle over speed is one of the major factors for road accidents (Hoque, 2004). To control speed in sensitive areas speed breakers are used across the road. Generally, the speed breakers are of width 9 meters with the height ranging from 6 to 30cms (Hamim *et al.*, 2019), speed breaker are effective in keeping vehicle speeds down, their use is sometimes controversial as they can increase traffic noise, may damage vehicles if traversed at too great a speed, and slow emergency vehicles. The pattern of placement of speed beakers depends upon the location and the type of treatment used. Some of the suggested locations have already been indicated in Clause 2. At ‘T’ intersections, speed breakers should be installed on minor roads (Ahmed & Hainin,, 2014); perpendicular arms about 10 meters away from the inner edges of major roads. Proper sign boards and markings are required to be provided at such locations. Normally we know speed breakers are raised sections of pavement across the travel way on the road and are approximately 3 to 4 inches high (2014). Speed bumps should be located at proper locations otherwise, it causes more traffic problems. Alireza, *et al.* (2013) conducted a study for finding the best location for placing of speed breakers. The vehicle load acted upon the speed breaker system is transmitted to rack and pinion arrangements. Then, reciprocating motion of the speed-breaker is converted into rotary motion using the rack and pinion arrangement where the axis of the pinion is coupled with the sprocket arrangement. The utilization of the electrical energy is goon increasing with the growth of population. Electricity is generated when the vehicle moves over the speed breaker, Hamim *et al.*, 2019).

CHAPTER 3: MATERIALS AND METHODS

3.1 Study Design

Trial experimental based thesis has been design. For analyzing the speed profile at speed breakers, three different locations were considered in Dhaka city. The methodology adopted at these locations can be explained in flow chart.

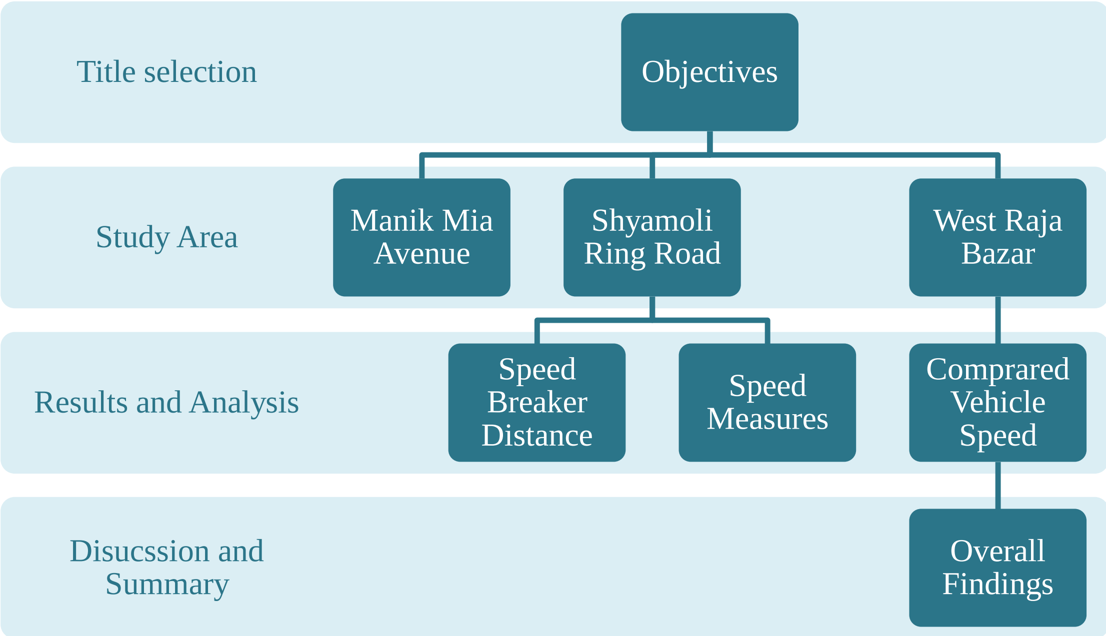


Figure 3.1: Flow chart of study design

3.2 Study Area Brief

Manik Mia Avenue, Area-1: Manik Mia Avenue is a traffic importance location in Dhaka city. This avenue connected to Mirpur widest road in Dhaka City, Located in front of National Parliament House of Bangladesh.

Figure 3.2: Manik Mia Avenue

(Source: https://www.google.com/maps/place/Manik+Mia+Ave,+Dhaka/

@23.7584213,90.3770099,620m/data=!3m2!1e3!4b1!4m5!3m4!1s0x3755b8ab73712 59b:0xbed374efaa25ba!8m2!3d23.7584213!4d90.3791986)

Shyamoli Ring Road, Area-2: Shyamoli Ring road crossing systems in has 3 kilometers long vahicle while it has 2.2 kilometers long roads including alleys and lanes. It and there are no underpasses for pedestrian to cross the road at Adhabar, Basila and Mohammadpur area. The basic reason for choosing the below study area is due to their speed prominent junction in the Janata housing road and these are some of the busiest intersections in terms of pedestrian movement.

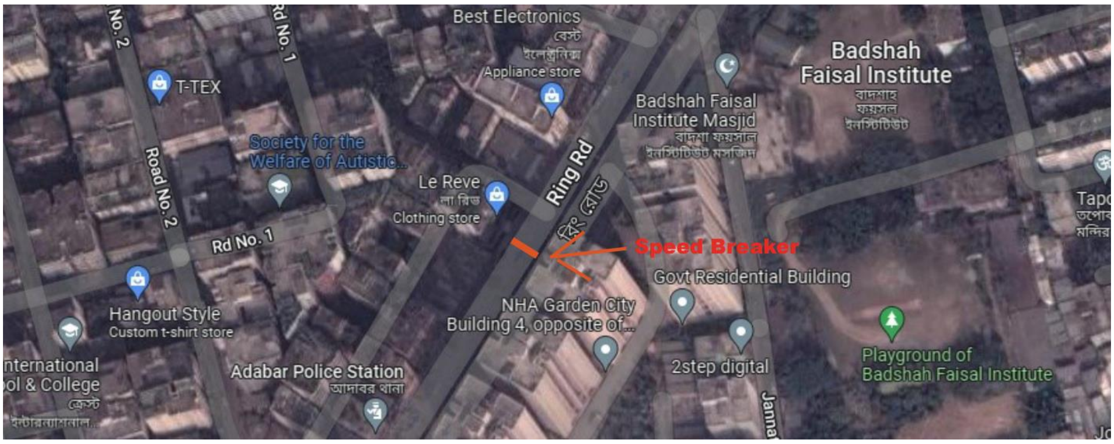


Figure 3.3: Shymoli Ring Road

(Source: https://www.google.com/maps/place/Ring+Rd,+Dhaka/ @23.7693803,90.3564078,620m/data=!3m2!1e3!4b1!4m5!3m4!1s0x3755c0a69e61d 613:0x6156cab8856c734a!8m2!3d23.7693803!4d90.3585965)

West Raja Bazar, Area-3: For this research, we have chosen to focus on the crossroads of West Raja bazaar. If not Dhaka's busiest, this is certainly a major crossroads there. To get there, drivers can either take Indira Road or Sukrabad Road, and they'll eventually run into each other here. It's at the crossroads of three different neighborhoods. Vehicles primarily en route to these residential areas cause congestion in this area. Congestion issues stem from the prevalence of left and right turns at these intersections. Our research will go into greater detail on these issues and how to alleviate current traffic congestion.

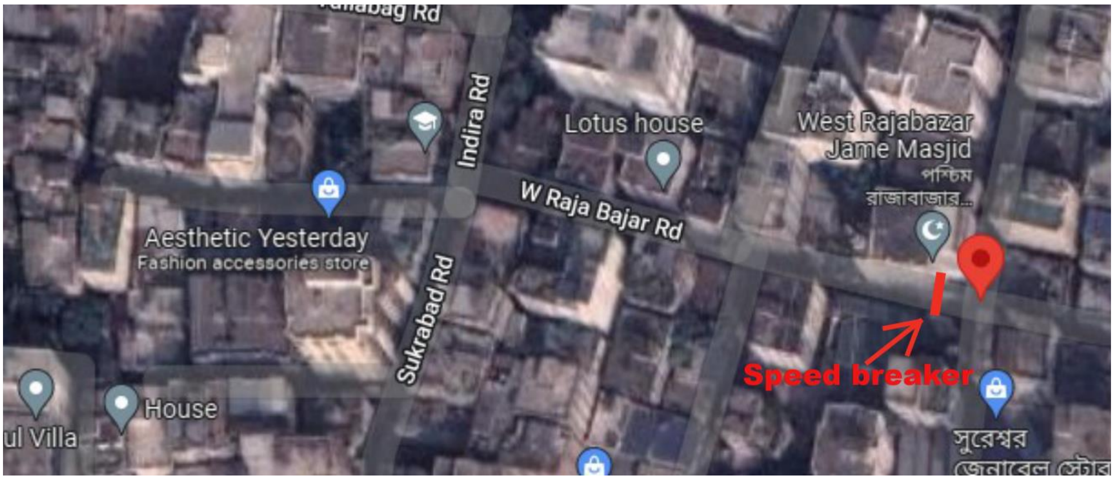


Figure 3.4: West Raja Bazar

Source: https://www.google.com/maps/place/West+Rajabazar,+Dhaka+1205/ @23.754915,90.3477136,4962m/data=!3m2!1e3!4b1!4m5!3m4!1s0x3755b8aee4156 61b:0x2dd630b66ac26c3b!8m2!3d23.7549191!4d90.3815325

3.3 Data Collection Point

Every country is progressing differently, and the biggest contributor to this progress is the transportation system. Transportation is driving civilization to a brighter future. This is our working point on Tuesday, July 26, 2022, at 10:00 am and observed the video at home and found out the total number and types of vehicles in 1 hour at Manik mia Avenue. This is the location of Manik Mia Ave Dhaka speed breaker longitude: 23.758647, latitude: 90.379750.

Figure 3.5: Manik Mia Avenue front side Midpoint Speed Breaker

Source: Smartphone camera, 26th July, 2022

Figure 3.6: Manik Mia Avenue back side Midpoint Speed Breaker,

Source: Smartphone camera, 26th July, 2022

This is our working point on Thursday, July 28, 2022, at 12:10 pm and observed the video at home by recording we found out the total number and types of vehicles in 1 hour at Shyamoli Ring Road. This is the location of Shyamoli Ring Road, Johori Mohollah Ring Rd, Dhaka 1207 Ring Rd, Dhaka 1207 located longitude: 23.773443, latitude: 90.361358.

Figure 3.7: Shyamoli Ring Road front side Midpoint road speed breaker

Source: Smartphone camera, 28th July, 2022

Figure 3.8: Shyamoli Ring Road back side Midpoint road speed breaker

Source: Smartphone camera, 28th July, 2022

This is our working point on Thursday, August 02, 2022, at 02:30 pm and observed the video at home by recording we found out the total number and types of vehicles in 1 hour at West Razabazar, Farmgate. This is the location of West Razabazar Dhaka 1215 longitude: 23.754905, latitude: 90.381526.

Figure 3.9: West Razabazar front side midpoint road speed breaker

Source: Smartphone camera, 2nd August, 2022

Figure 3.10: West Razabazar back side midpoint road speed breaker

Source: Smartphone camera, 2nd August, 2022

3.4 Used of Materials

1) Tape measure
2) Speed Gun
3) Smartphone
4) Chalk

3.4.1 Tape measure

Its compact size makes it ideal for measuring long distances on the go and for stowing away in a toolbox. It has become so commonplace now that you can buy a small version to carry on your keychain. Tape measures longer than 100 meters are commonly used by surveyors. The metal blade is marked in linear increments, and it comes with a protective sheath, a button that acts as a stopper, a belt clip, an end hook, and a hand stripe. This device is widely used as a standard unit of measurement. Its compact size makes it ideal for measuring long distances on the go and for stowing away in a toolbox. It has become so popular that it is now available as a keychain fob or novelty item in miniature.

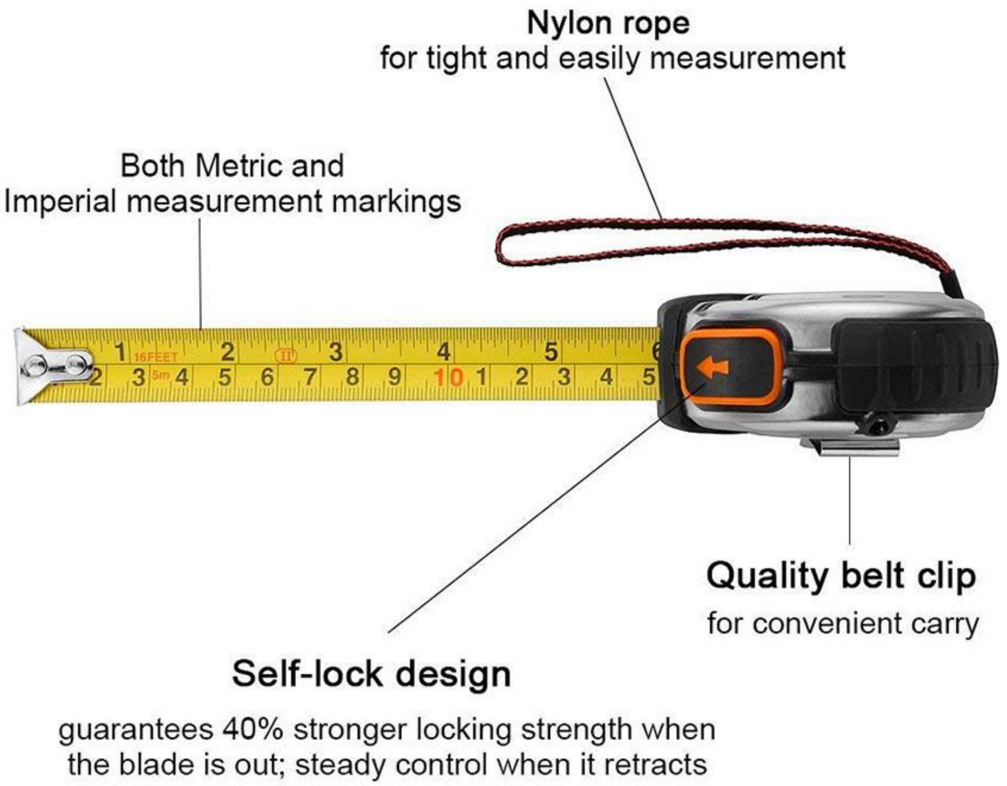


Figure 3.11: Steel Tape (Sample)

3.4.2 Speed Gun

Speed trap gun is a device used to measure the speed of moving objects. It is used in law-enforcement to measure the speed of moving vehicles and is often used in professional spectator sport, for things such as the measurement of bowling speeds in cricket, speed of pitched baseballs, and speed of tennis serves. A radar speed gun is a Doppler radar unit that may be hand-held, vehicle-mounted or static. It measures the speed of the objects at which it is pointed by detecting a change in frequency of the returned radar signal caused by the Doppler effect, whereby the frequency of the returned signal is increased in proportion to the object's speed of approach if the object is approaching, and lowered if the object is receding. This tools we are collected from local traffic police by the consent.

Figure 3.12: Speed Gun (Sample)

3.4.3 Smartphone

We are used best Smartphone for video recording and portrait photograph by Xiaomi Note 6pro. Runner up smartphone for photography on the measures vehicle speed in the study area.

3.4.4 Chalk

A chalk is a reusable writing surface on speed breaker area and measures distance sign with road.

3.5 Experimental Method

We are selected for experimental study constant 0-15 feet and total measures area 0-80 feet limit with speed breakers.

Table 3.1: Speed measurement area by location

Area Name	Area for Speed Measures
Manik Mia Avenue	0-80 Feet
Shyamoli Ring Road	0-66 Feet
West Raja Bazar	0-62 Feet

CHAPTER 4: DATA ANALYSIS AND RESULTS

4.1 Introduction

There has been some discussion of experimental survey on speed profile analysis of speed breakers measures, distance, and cars continuing into speed breakers junction. This chapter also discusses in detail a particular point of the site within the selecting region of the city of Dhaka. Performing calculations on speed data ranging from 0 to 15 feet and converting to kilometers per distance.

4.2 Manik Mia Avenue

Table 4.1 reveals that out of 870 vehicles, the majority are automobiles (31.18%) and the fewest are lagunas (1.08%). Buss (6.45%) of 180, truck (4.30%) of 120, rickshaw (3.23%) of 90, bike (29.03%) of 810, cycle (2.15%) of 60, CNG auto rickshaw (12.90%) of 360, microcar (7.53%) of 210, and Minitruck (2.15%) of 60 vehicles were also discovered that experimental survey. There are 2,790 vehicle movements every hour in Manik Mia Avenue of Dhaka city

Table 4.1: Vehicles count of Manik Mia Avenue

Vehicles	The number of vehicles	The number of vehicles (%)
Buss	180	6.45
Truck	120	4.30
Car	870	31.18
Rickshaw	90	3.23
Bike	810	29.03
Laguna	30	1.08
Cycle	60	2.15
CNG	360	12.90
Microcar	210	7.53
Minitruck	60	2.15
Total	2790	100

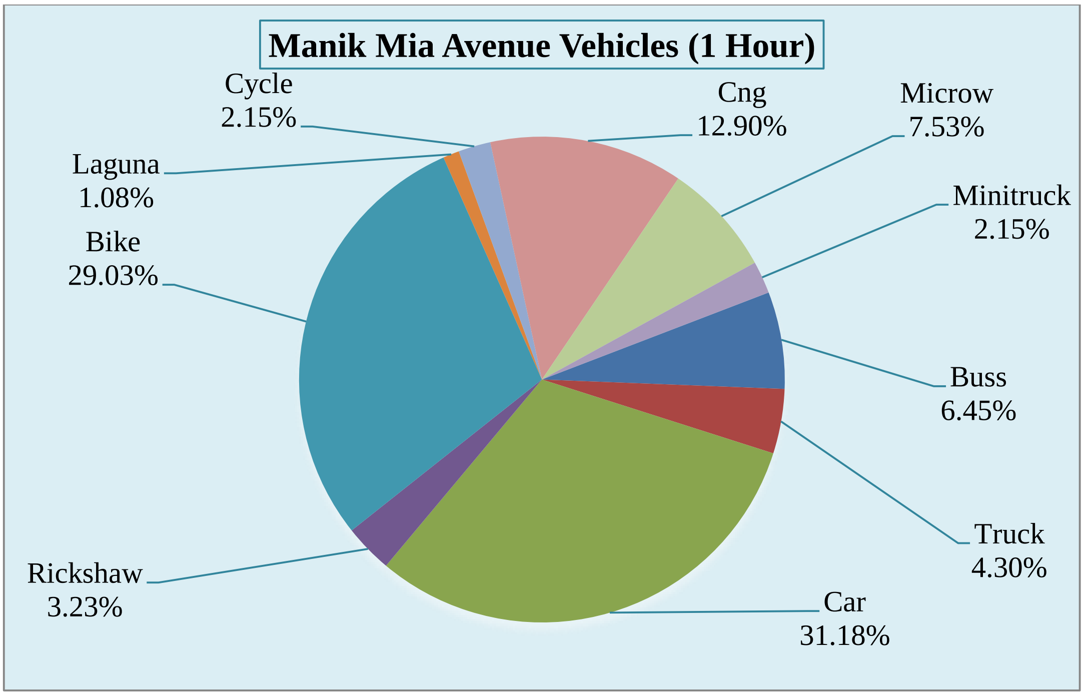


Figure 4.1: Vehicles count of Manik Mia Avenue

4.2.1 Speed Analysis of Bus

Table 4.2 reveals that calculating speed breaker distance 20 ft of total 0-80 ft measures. We are found that maximum speed 13.16 km/hr (1 sec) in 0 feet and minimum 7.85 km/hr (2.8 sec.) in 50 feet for buses, located Manik Mia Avenue. We calculated here. Speed = Total distance/Total time.

Table 4.2: Speed calculation of bus at Manik Mia Avenue

Distance (ft)	Speed (ft/sec)	Time (sec.)	Speed (km/hr)
80	9.37	1.6	10.29
65	8.67	1.9	9.52
50	7.15	2.8	7.85
30	8.33	1.8	9.14
15	10.34	1.45	11.35
0	12	1	13.16

Figure 4.2 present that speed breaker's north side National parliament road, residential area in south, east side Khamarbari squared and west side location are mirpur road. We were found in top view:

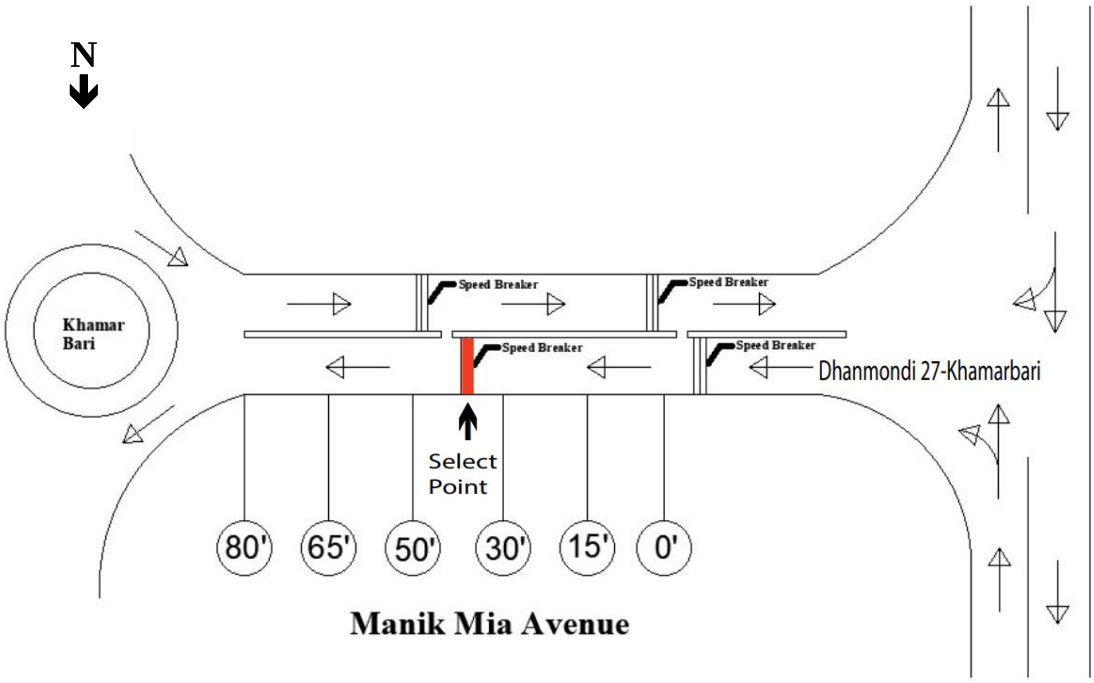


Figure 4.2: Top view of Manik Mia Avenue

Distance (ft) by speed calculated of buses at Manik Mia Avenue in show figure 4.3:

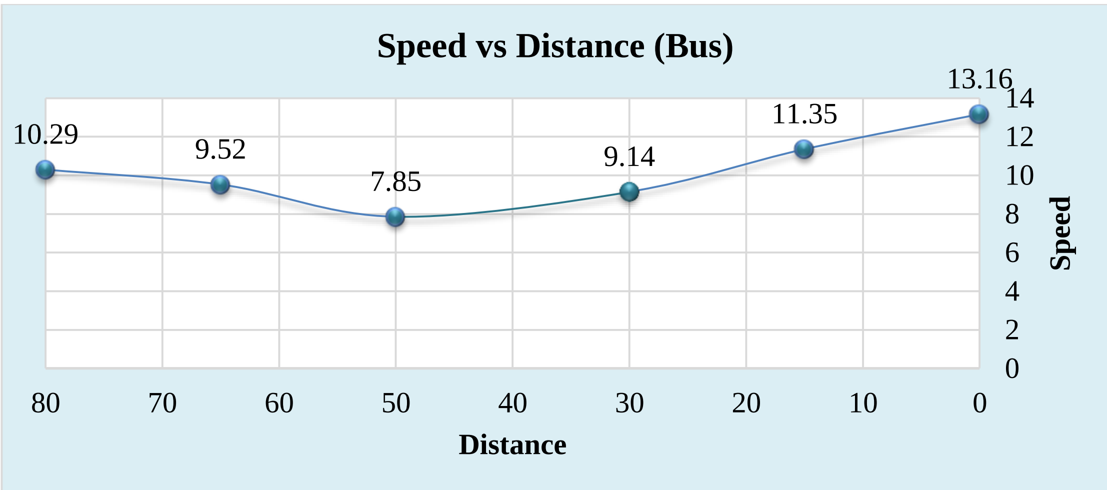


Figure 4.3: Speed graph of bus at Dhanmondi 27-Khamar Bari

We are segmented speed breaker 5 portion, constant per height 1" in 0 feet, after 5' height into 5", middle point of speed breaker are height 7.5", similarly 5" for 15 feet and last 1" for measures 20 feet we are found figure 4.4.

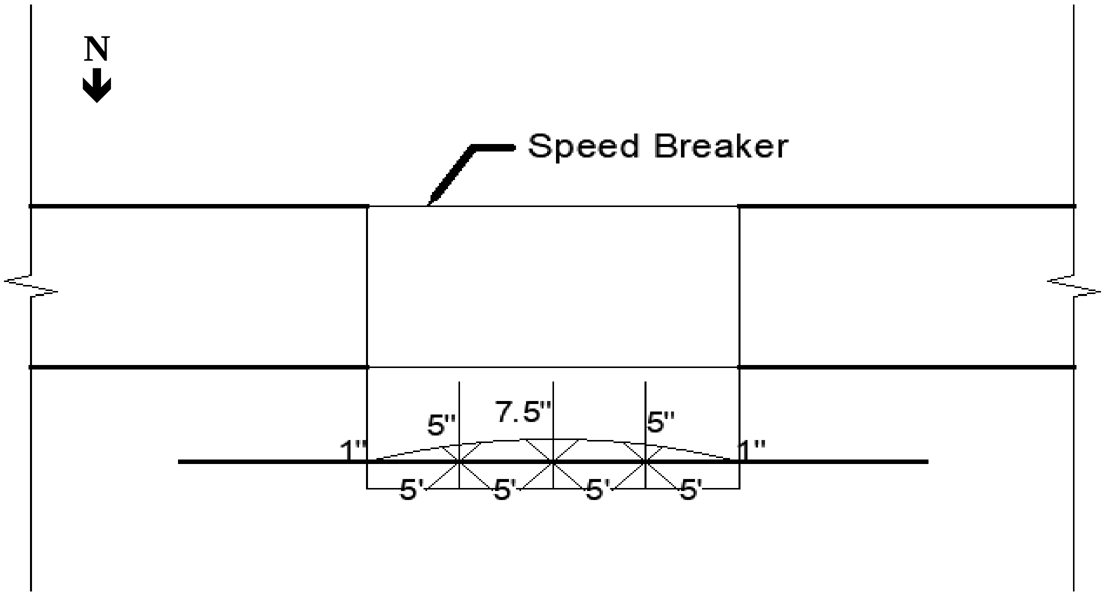


Figure 4.4: Speed breaker side view of Manik Mia Avenue

4.2.2 Speed Analysis of Truck

According to Table 4.3, 20 feet of the total 0-80 feet measures are accounted for when computing speed breaker distance. For trucks on Manik Mia Avenue, we measured top speeds of 13.16 km/h (1 second) after traveling zero feet and lowest speeds of 8.3 km/h (2.64 seconds) after traveling fifty feet.

Table 4.3: Speed calculation of Truck at Manik Mia Avenue

Distance (ft)	Speed (ft/sec)	Time (sec.)	Speed (km/hr)
80	9.68	1.55	10.62
65	8.82	1.7	9.68
50	7.57	2.64	8.3
30	9.26	1.62	10.16
15	10.71	1.4	11.75
0	12	1	13.16

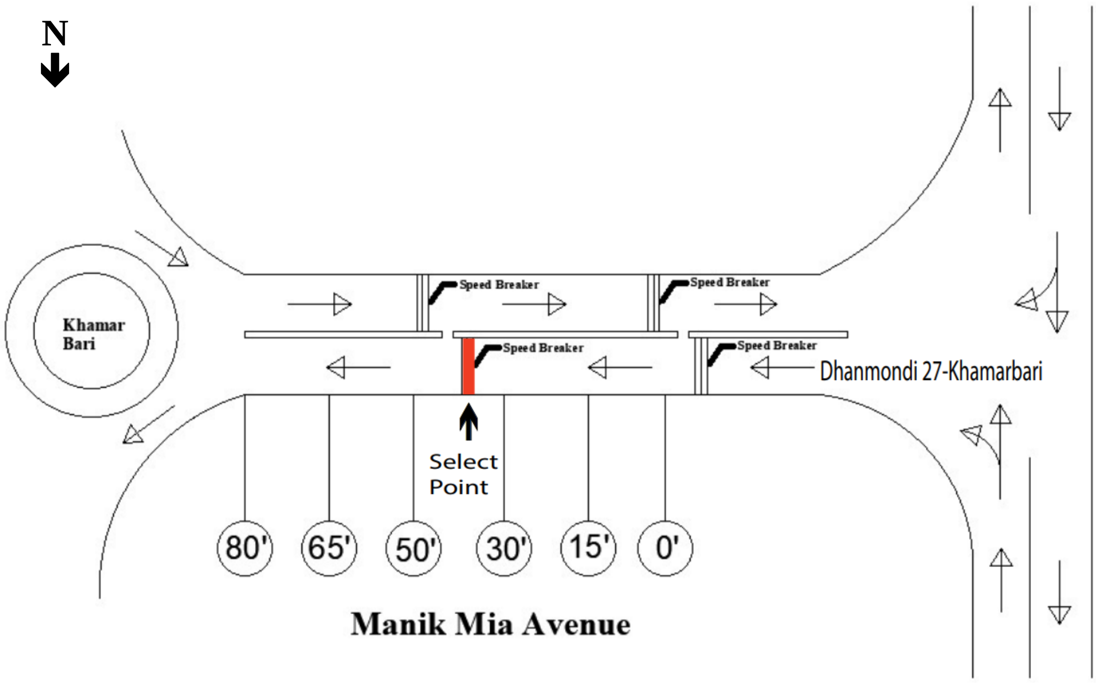


Figure 4.5: Top view of Manik Mia Avenue

Distance (ft) by speed calculated of truck at Manik Mia Avenue in show figure 4.6:

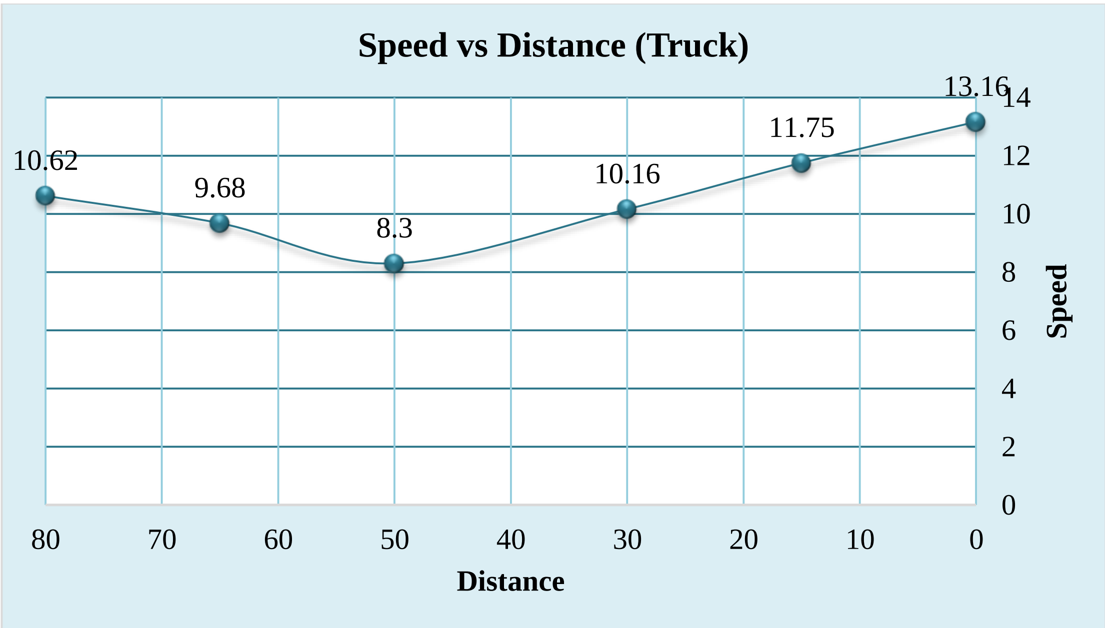


Figure 4.6: Speed graph of truck at Dhanmondi 27-Khamar Bari

4.2.3 Speed Analysis of Bike

Calculating the speed breaker distance accounts for 20 feet of the entire 0-80 feet measures, as shown in Table 4.4. The bike positioned on Manik Mia Avenue had a maximum speed of 19.74 kilometers per hour (1 second) in 0 feet and a minimum speed of 12.25 kilometers per hour (1.79 seconds) in 50 feet, according to our findings.

Table 4.4: Speed calculation of bike at Manik Mia Avenue

Distance (ft)	Speed (ft/sec)	Time (sec.)	Speed (km/hr)
80	13.88	1.08	15.22
65	11.81	1.27	12.95
50	11.17	1.79	12.25
30	12.5	1.2	13.71
15	16.67	0.9	18.28
0	18	0.5	19.74

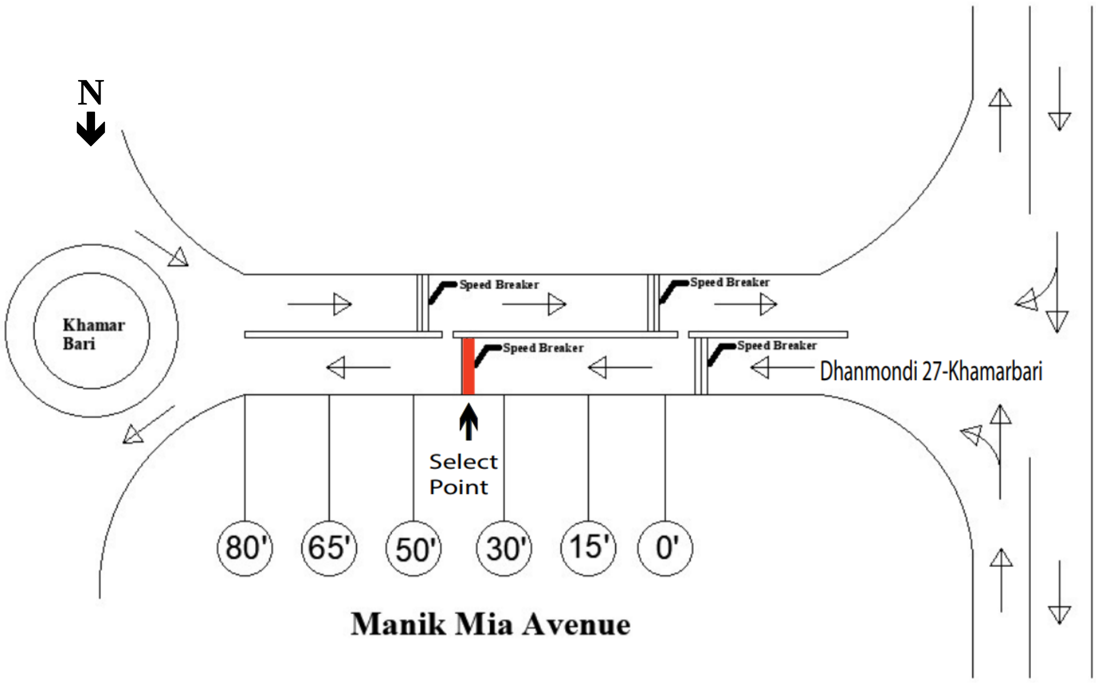


Figure 4.7: Top view of Manik Mia Avenue

Distance (ft) by speed calculated of bike at Manik Mia Avenue in show figure 4.8:

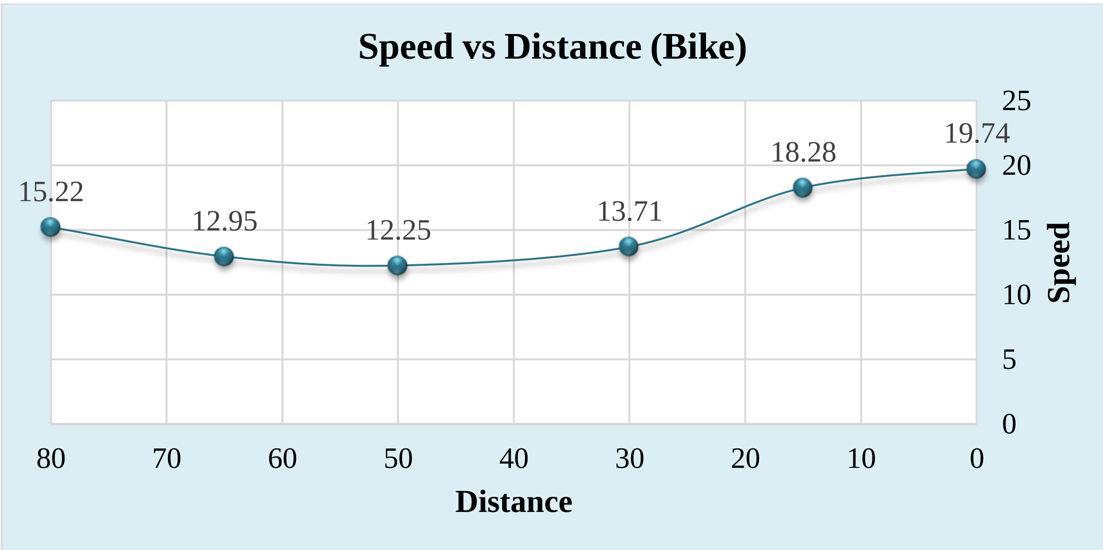


Figure 4.8: Speed graph of bike at Dhanmondi 27-Khamar Bari

4.2.4 Speed Analysis of Car

20 feet of the total 0-80 feet are measured for determining the speed breaker distance, as shown in Table 4.5. For cars located on Manik Mia Avenue, we discovered a maximum speed of 17.55 km/h (1 second) in 0 feet and a minimum speed of 11.43 km/h (1.92 seconds) in 50 feet.

Table 4.5: Speed calculation of car at Manik Mia Avenue

Distance (ft)	Speed (ft/sec)	Time (sec.)	Speed (km/hr)
80	13.64	1.1	14.96
65	10.88	1.4	11.93
50	10.42	1.92	11.43
30	10.56	1.42	11.58
15	15	1	16.45
0	16	0.8	17.55

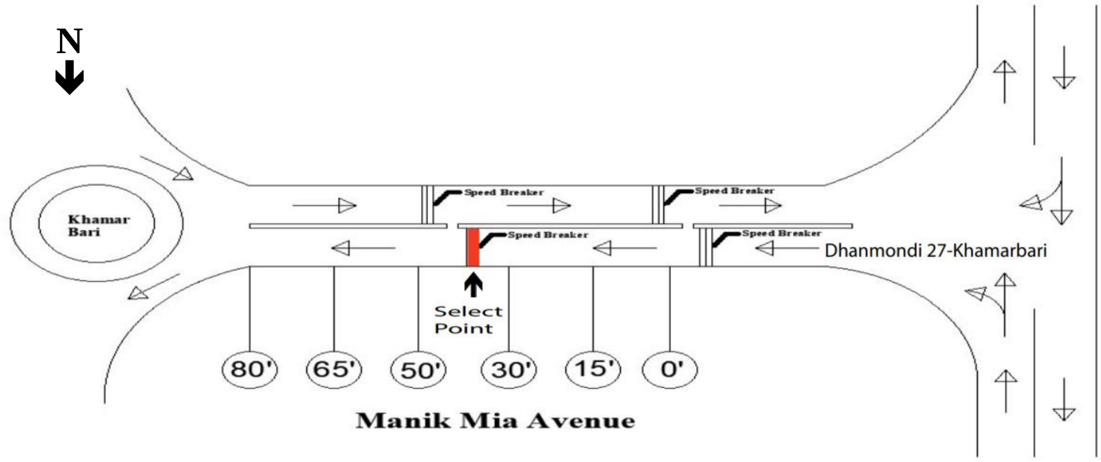


Figure 4.9: Top view of Manik Mia Avenue

Distance (ft) by speed calculated of car at Manik Mia avenue in show figure 4.9::

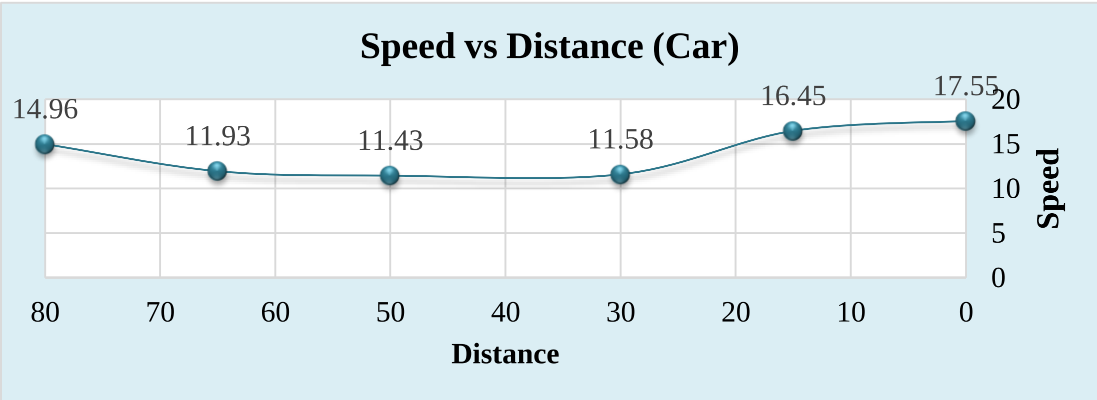


Figure 4.10: Speed graph of car at Dhanmondi 27-Khamar Bari

4.2.5 Speed Analysis of CNG

According to Table 4.6, calculating speed breaker distance 20 ft. of total 0-80 ft. measures. We discovered that the max speed for CNG is 16.45 km/hr (1 sec) in 0 feet and the speed limit is 12.63 km/hr. (1.7 sec.) in 50 feet for Manik Mia Avenue.

Table 4.6: Speed calculation of cng at Manik Mia Avenue

Distance (ft)	Speed (ft/sec)	Time (sec.)	Speed (km/hr)
80	15	1	16.45
65	11.85	1.32	12.99
50	11.52	1.7	12.63
30	11.84	1.3	12.98
15	13.63	1.1	14.95
0	15	1	16.45

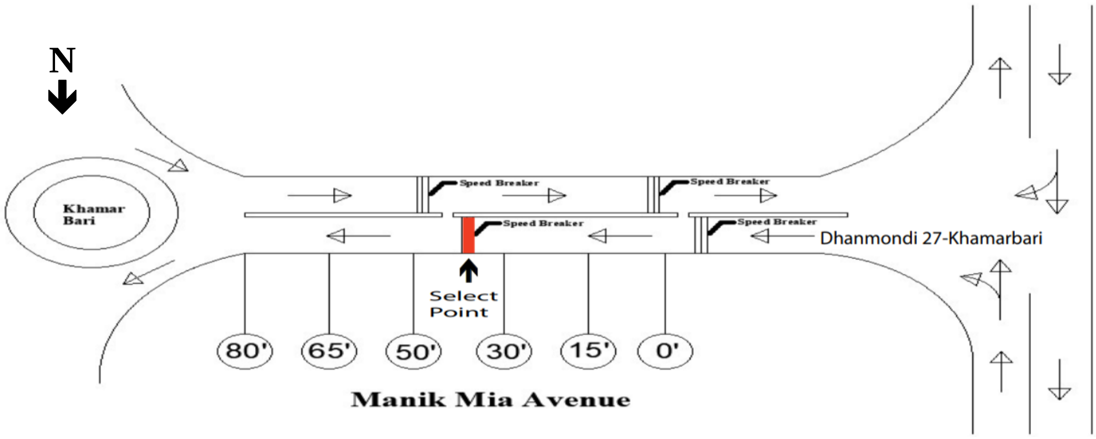


Figure 4.11: Top view of Manik Mia Avenue

Distance (ft) by speed calculated of CNG at Manik Mia Avenue in show figure 4.12:

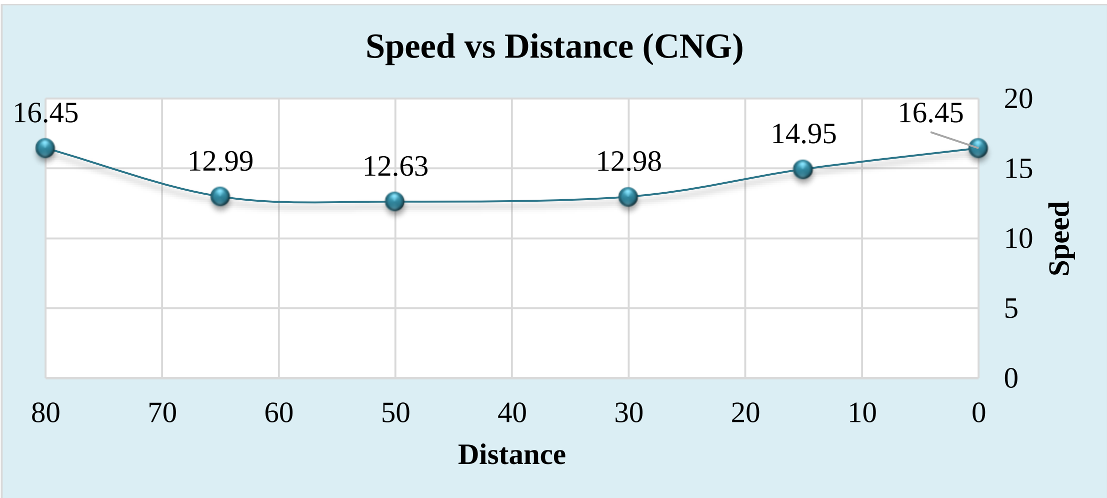


Figure 4.12: Speed graph of CNG at Dhanmondi 27-Khamar Bari

4.2.6 Speed Analysis of Rickshaw

Table 4.2 shows that 20 ft of the total 0-80 ft measures are used to figure out the speed breaker distance. We found that the rickshaw on Manik Mia Avenue went as fast as 10.97 km/hr (1.5 sec) in 0 feet and as slow as 7.45 km/hr (2.9 sec) in 50 feet.

Table 4.7: Speed calculation of rickshaw at Manik Mia Avenue

Distance (ft)	Speed (ft/sec)	Time (sec.)	Speed (km/hr)
80	8.66	1.9	9.5
65	7.14	2.1	7.83
50	6.8	2.9	7.45
30	7.57	1.98	8.3
15	8.72	1.72	9.56
0	10	1.5	10.97

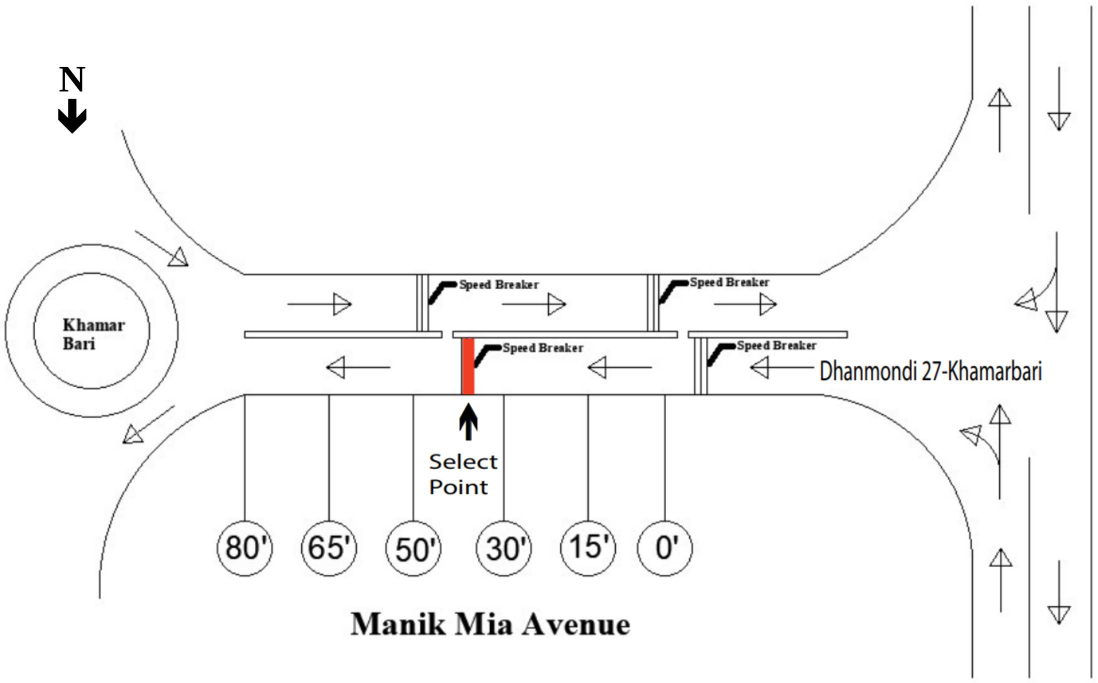


Figure 4.13: Top view of Manik Mia Avenue

Distance (ft) by speed calculated of rickshaw at Manik Mia Avenue in show figure

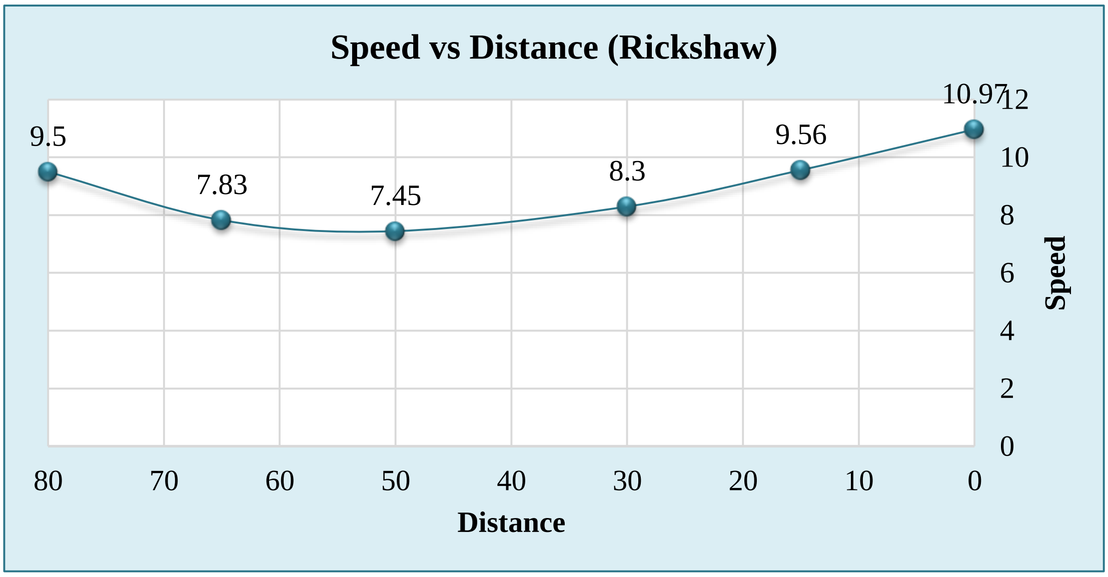


Figure 4.14: Speed graph of rickshaw at Dhanmondi 27-Khamar Bari

4.3 Shyamoli Ring Road

According to Table 4.8 rickshaws account for 38.24% of 780, while buses and trucks account for only 1.45%. There were also a number of other vehicle types uncovered in the experimental survey, including cars (19.12%) and CNG and cycles (8.82%) (180), mini-trucks (4.41%) (90), lagunas (4.41%) (90), and bikes (13.24%) (270). Shyamoli Ring Road in Dhaka sees an average of 2040 vehicle passes each hour. Here is a 1 hour vehicles count of Shyamoli Ring road.

Table 4.8: Vehicles count of Shyamoli Ring road

Vehicle Name	The Number of Vehicle	The Number of Vehicle (%)
Bus	30	1.47
Truck	30	1.47
Car	390	19.12
CNG	180	8.82
Cycle	180	8.82
Minitruck	90	4.41
Rickshaw	780	38.24
Bike	270	13.2
Leguna	90	4.41
Total	2040	100

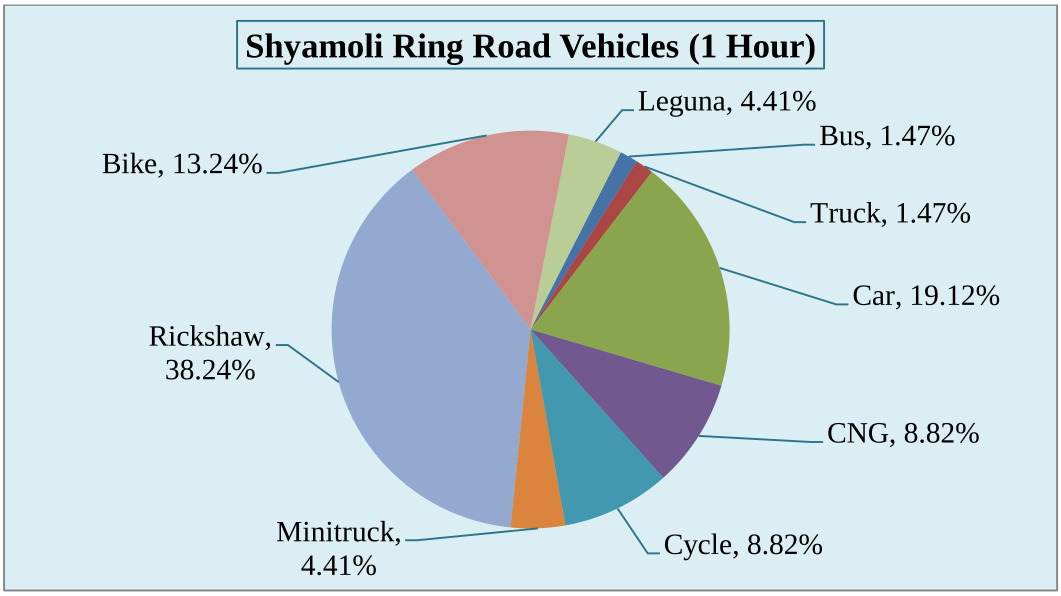


Figure 4.15: Vehicles count of Shyamoli Ring road (in percentage)

4.3.1 Speed Analysis of Bus

According to table 4.9, calculating speed breaker distance 6 ft. of total 0-66 ft. measures. We discovered that the maximum speed for buses is 9.87 km/hr (1 sec) in 0 feet and the minimum speed is 6.6 km/hr (0.98 sec.) in 36 feet on Shyamoli Ring Road.

Table 4.9: Speed calculation of bus at Shyamoli Ring road

Distance (ft)	Speed (ft/sec)	Time (sec.)	Speed (km/hr)
66	8.57	1.75	9.4
51	7.14	2.1	7.83
36	6.02	0.98	6.6
30	6.05	2.48	6.63
15	7.89	1.9	8.65
0	9	1	9.87

Figure 4.16 shows that the Shyamoli Ring Road is separated into four sections by a turning lane, as well as a speed breaker on the north side of pearl street (road-1), a local pathway in the southeast, the eastern side of Mirpur Road, and the west side location of Tazmahal road. We were discovered in the top view position:

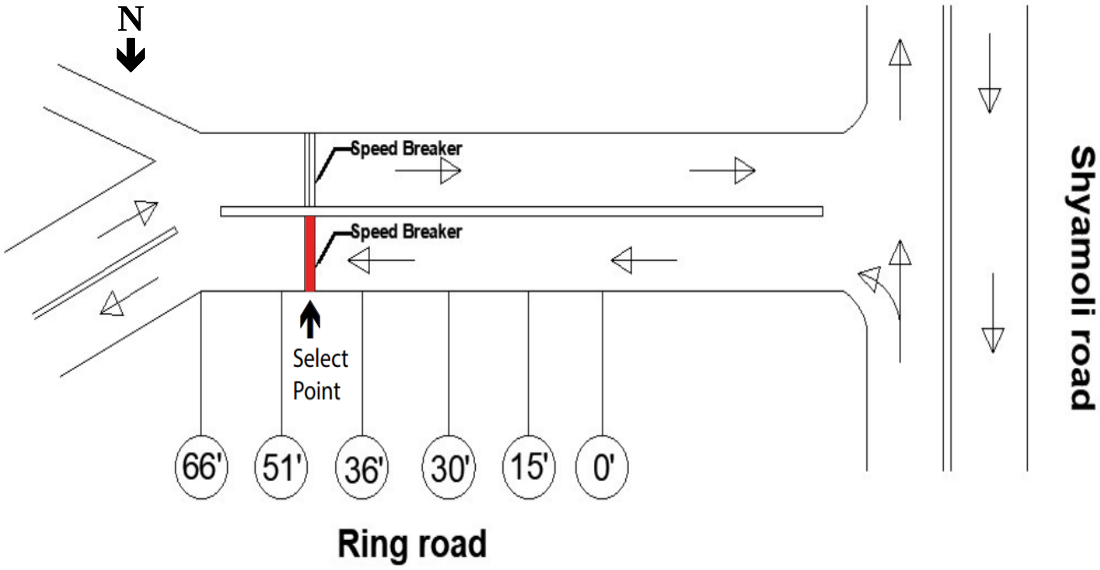


Figure 4.16: Top view of Shyamoli Ring road

Distance (ft) by speed calculated of bus at Shyamoli Ring Road in show figure 4.17:

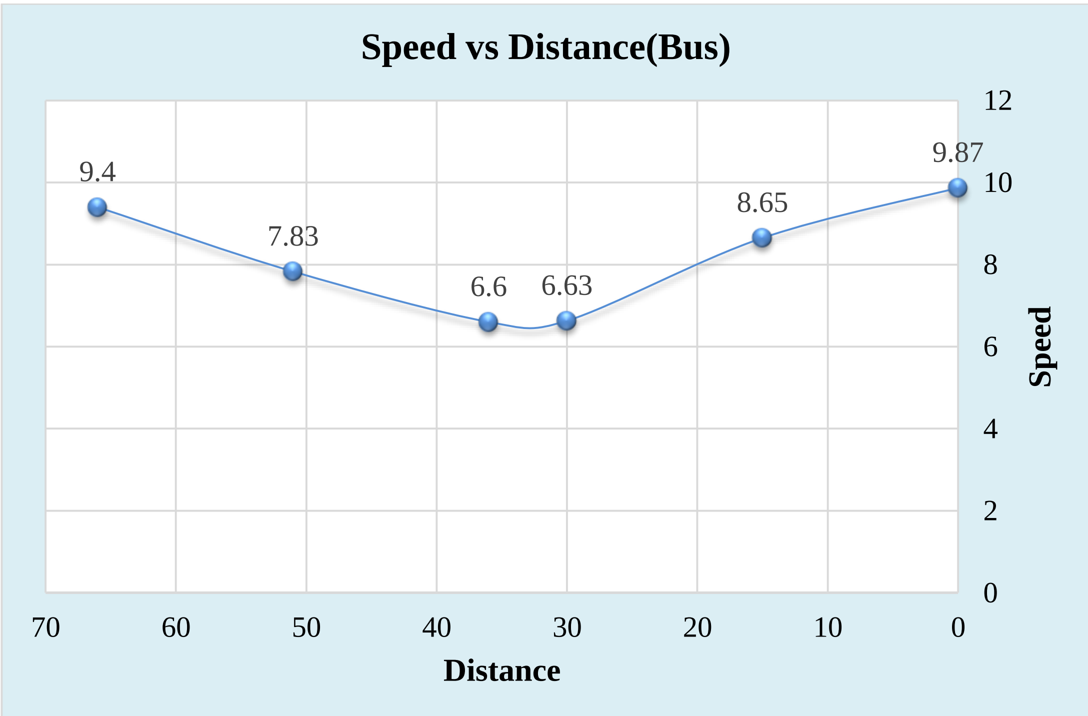


Figure 4.17: Speed graph of bus at Shyamoli Ring road

We are segmented speed breaker component number 5, constant per height 1 inch distance 0 feet, after 3 feet height in distance 1.6 feet, middle point of speed breaker are height 4 inches, similarly 1.6 feet for weight 6 feet on the last 1" seen in figure 4.18.

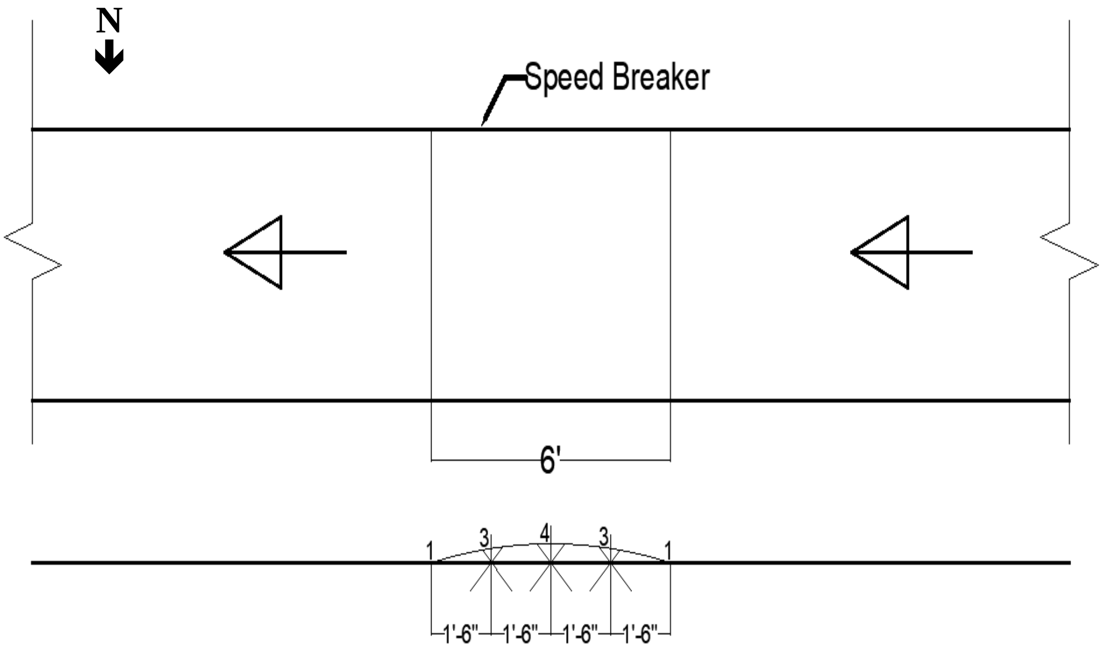


Figure 4.18: Speed breaker side view of Shyamoli Ring road

4.3.2 Speed Analysis of Car

The results shown in table 4.10, which shows that the calculated speed breaker distance is 6 feet out of a total of 0-66 feet. We found that the maximum speed for cars at Shyamoli Ring Road was 9.87 kilometers per hour (1.8 seconds) in 0 feet, and that the minimum speed was 6.58 kilometers per hour (one second) in 36 feet.

Table 4.10: Speed calculation of car at Shyamoli Ring road

Distance (ft)	Speed (ft/sec)	Time (sec.)	Speed (km/hr)
66	8.33	1.8	9.13
51	7.5	2	8.22
36	6	1	6.58
30	6.82	2.2	7.48
15	7.89	1.9	8.65
0	9	1.8	9.87

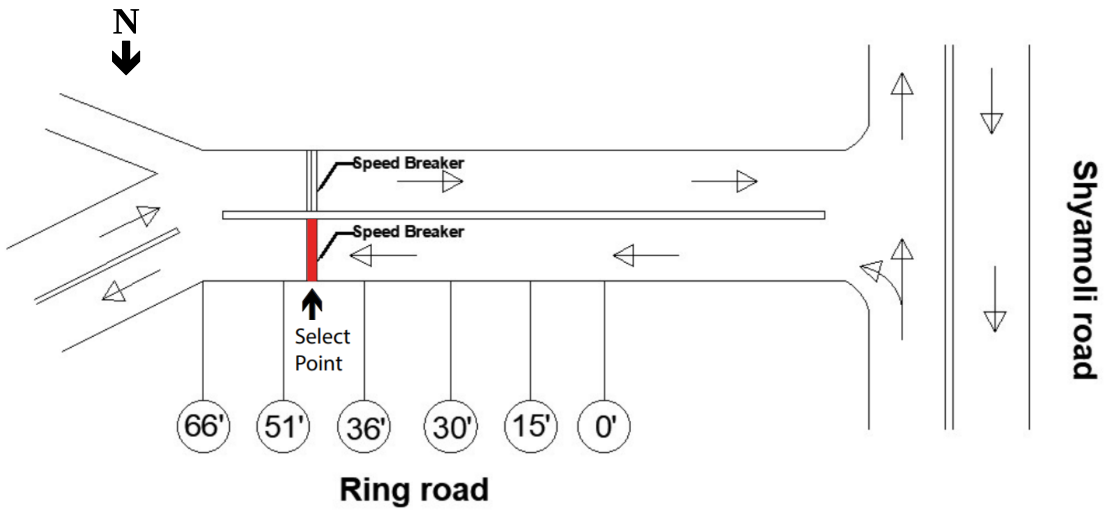


Figure 4.19: Top view of Shyamoli Ring road

Distance (ft) by speed calculated of car at Shyamoli Ring Road in show figure 4.20:

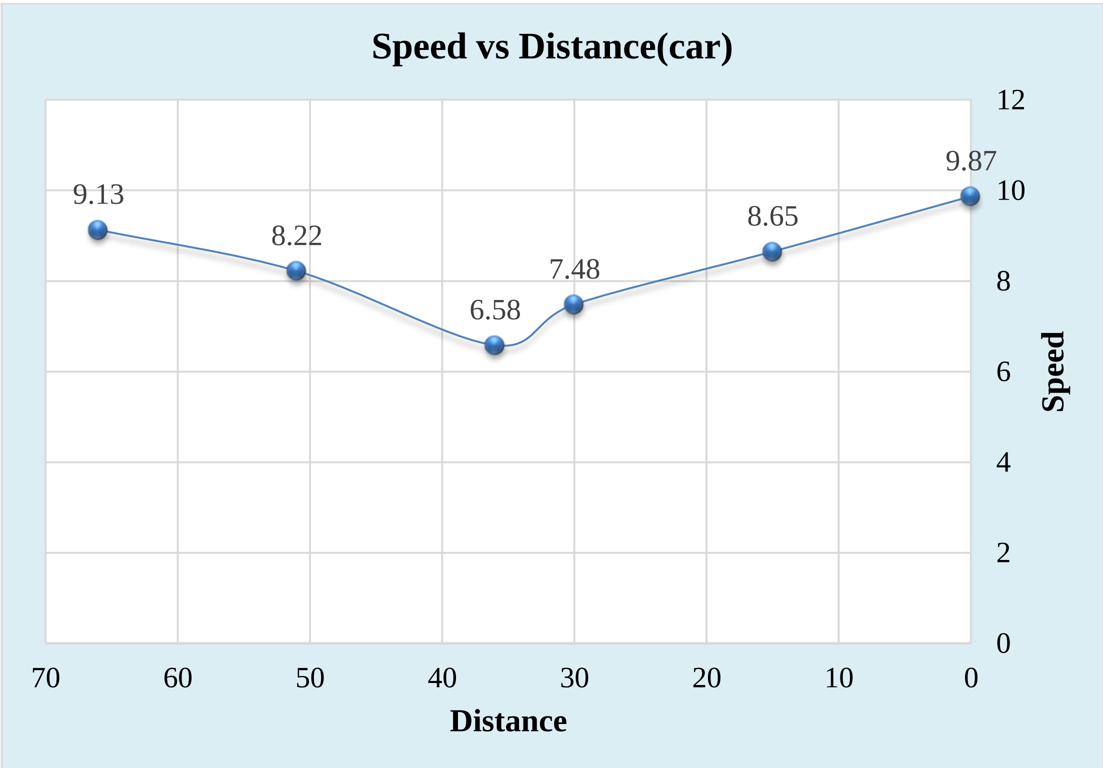


Figure 4.20: Speed graph of private car at Shyamoli Ring road

4.3.3 Speed Analysis of Bike

Table 4.11 demonstrates that the speed breaker distance is calculated to be 6 feet out of a total of 0-66 feet. Shyamoli Ring Road has a greatest speed of 10.97 km/h (0.87 seconds) in 0 feet and a smallest amount speed of 7.48 km/h (0.80 seconds) in 36 feet.

Table 4.11: Speed calculation of bike at Shyamoli Ring road

Distance (ft)	Speed (ft/sec)	Time (sec.)	Speed (km/hr)
66	8.33	1.8	9.67
51	7.5	2	8.22
36	6.82	0.8	7.48
30	7.14	2.1	7.83
15	8.33	1	9.13
0	10	0.8	10.97

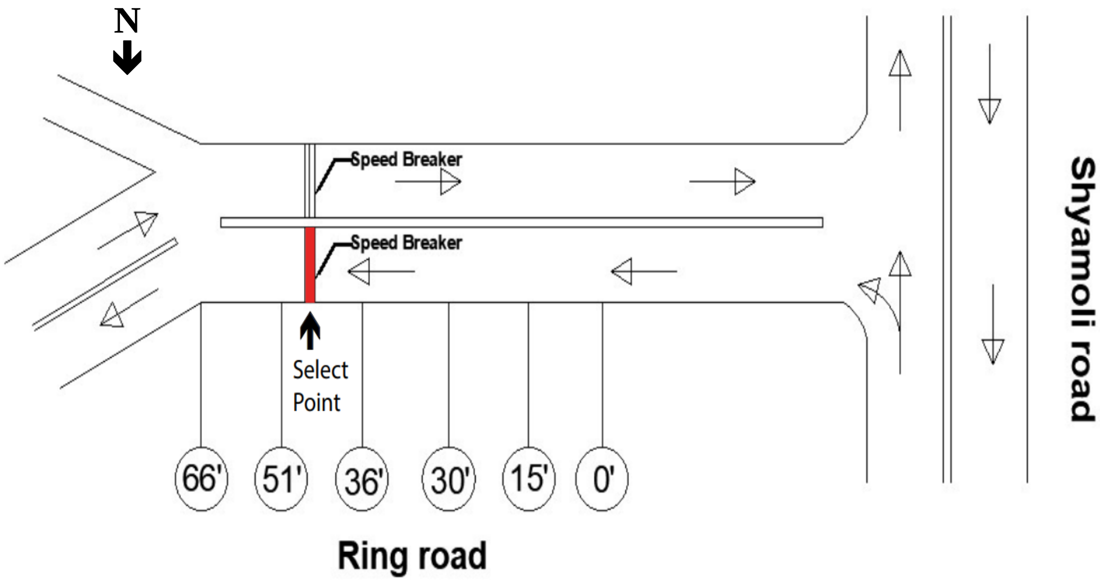


Figure 4.21: Top view of Shyamoli Ring road

Distance (ft) by speed calculated of bike at Shyamoli Ring Road in show figure 4.22:

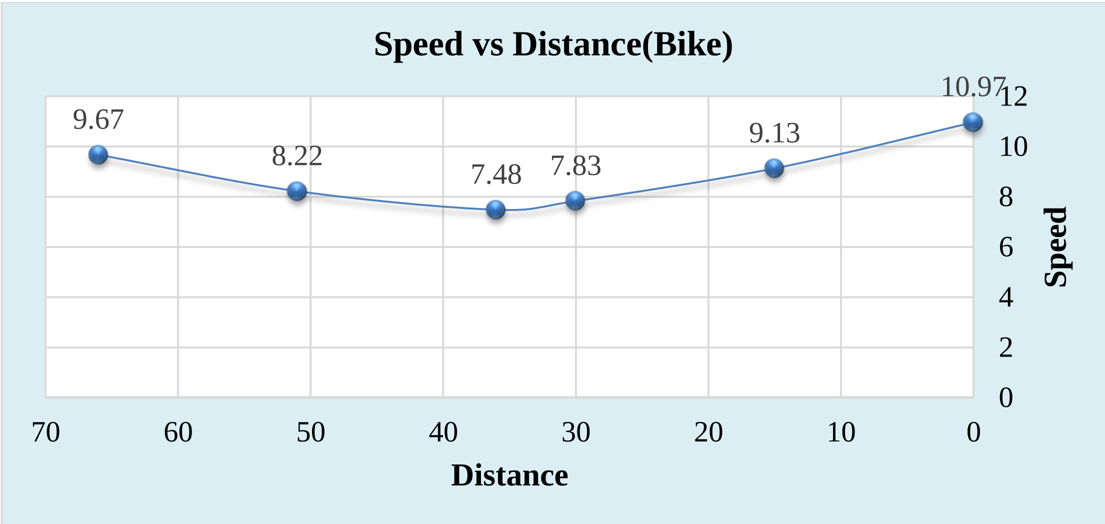


Figure 4.22: Speed graph of bike at Shyamoli Ring road

4.3.4 Speed Analysis of Rickshaw

The statistics are reported in table 4.12, which calculates the speed breaker distance to be 6 feet out of a total of 0-66 feet. We determined that the greatest speed for rickshaw stationed on the Shyamoli Ring Road was 9.87 kilometers per hour for one second in 0 feet, while the minimum speed was 5.96 kilometers per hour for 1.1 seconds in 36 feet.

Table 4.12: Speed calculation of rickshaw at Shyamoli Ring road

Distance (ft)	Speed (ft/sec)	Time (sec.)	Speed (km/hr)
66	6.98	2.15	7.65
51	6.41	2.34	7.03
36	5.44	1.1	5.96
30	5.72	2.6	6.32
15	7.5	2	8.22
0	9	1	9.87

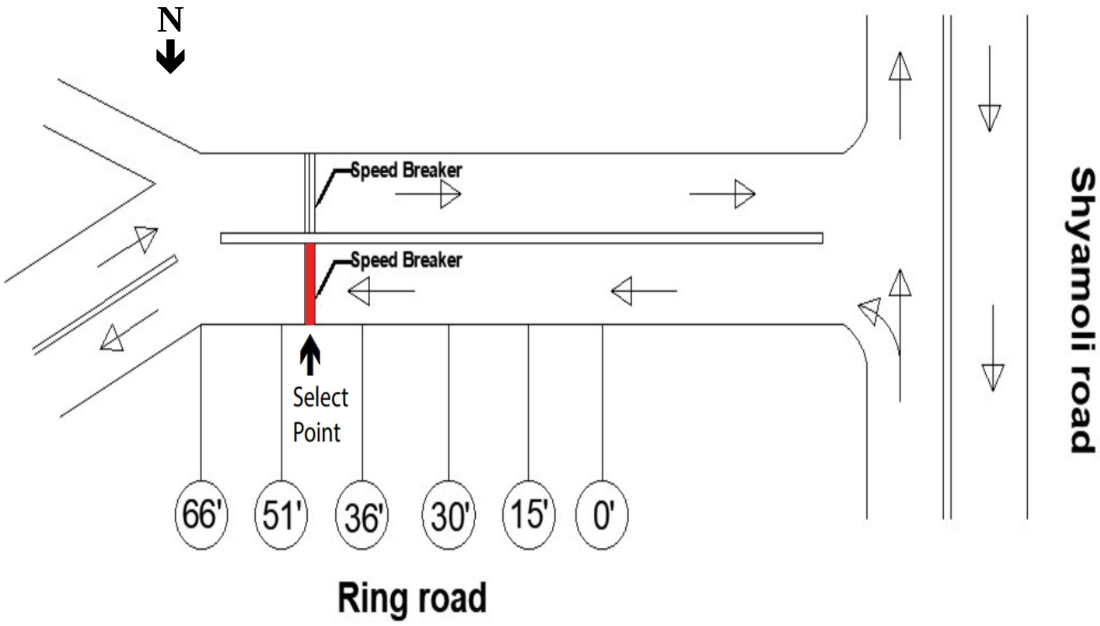


Figure 4.23: Top view of Shyamoli Ring road

Distance (ft) by speed calculated of rickshaw at Shyamoli Ring Road in show figure 4.24:

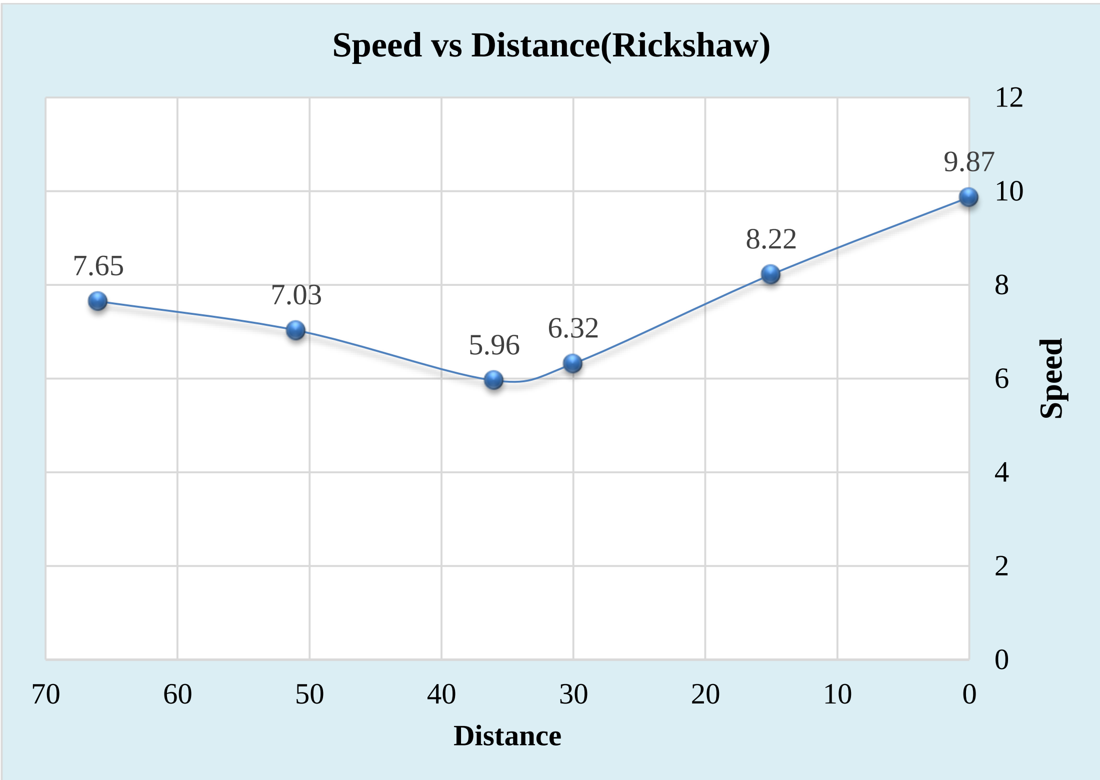


Figure 4.24: Speed graph of rickshaw at Shyamoli Ring road

4.4 West Raja Bazar

According to Table 4.13, the majority are rickshaws (41.66%) of 300 vehicles, while just (8.33%) are CNG and 60 vehicles. In addition, a bike was found in (33.33%) of 240, a car in (6.67%) of 48 and a cycle in (10%) of 72 vehicles in that experimental survey. In Dhaka city's West Raja Bazar, there are 720 vehicular traffic movements each and every hour.

Table 4.13: Vehicles count of West Rajabazar

Vehicles Name	The Number of vehicle	The Number of Vehicles (%)
Bike	240	33.33
Rickshaw	300	41.67
CNG	60	8.33
Car	48	6.67
Cycle	72	10
Total	720	100

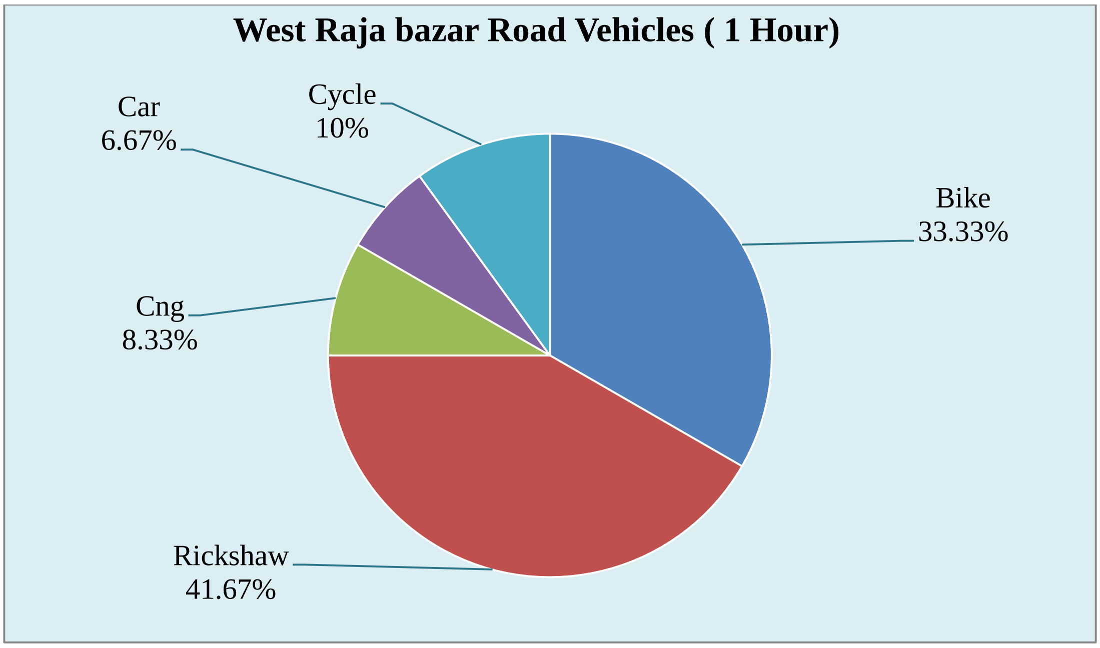


Figure 4.25: Vehicles count of West Rajabazar

4.4.1 Speed Analysis of Bike

Table 4.14 shows that the total distance from 0-62 feet to a speed breaker is 2 feet. We found that the fastest speed for a bike in West Raja Bazar was 15 km/hr (1 sec) in 0 distance and the slowest speed was 7.31 km/hr (0.3 sec) in 32 distances.

Table 4.14: Speed calculation of bike at West Razabazar road

Distance (ft)	Speed (ft/sec)	Time (sec.)	Speed (km/hr)
62	13.64	1.1	14.96
47	11.53	1.3	12.66
32	6.67	0.3	7.31
30	10.34	1.45	11.35
15	12.5	1.2	13.71
0	13.67	1	15

Figure 4.26 illustrates how the speed breaker at West Rajabazar is divided into four split junctions. Local walkway on the north side and a connection to Panthapath road on the south side, a link to Indira road on the east side, and Sukrabad on the west side are the locations. We were discovered in the aerial perspective:

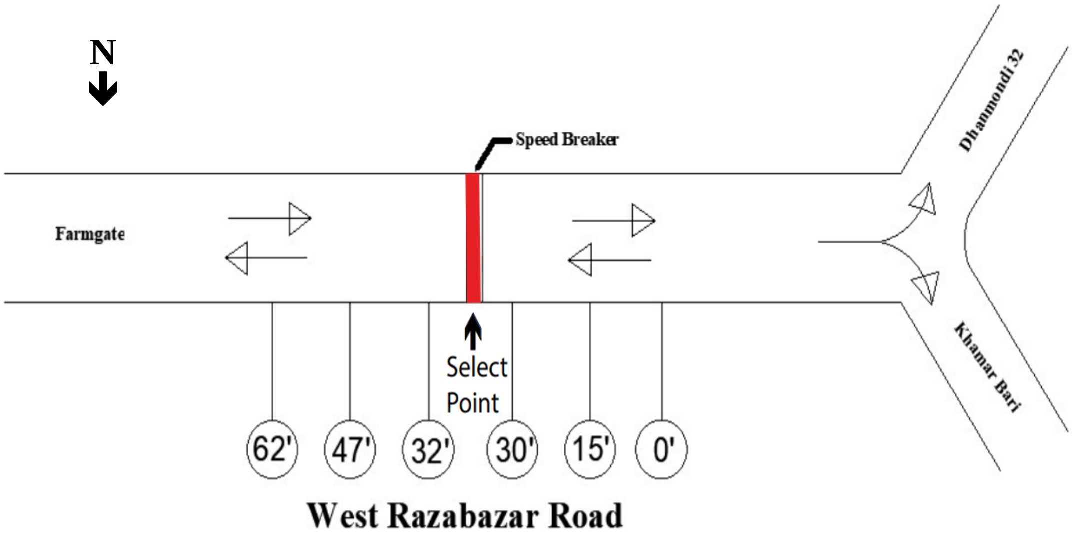


Figure 4.26: Top view of West Razabazar road

Distance (ft) by speed calculated of bike at West Rajabazar in show figure 4.27:

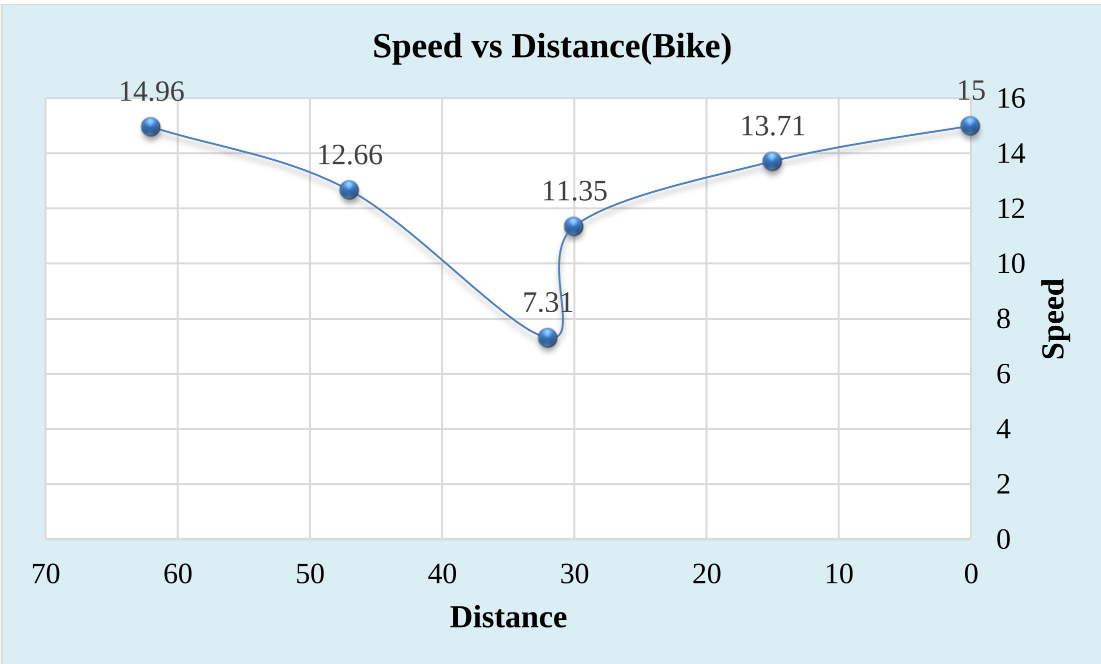


Figure 4.27: Speed graph of bike at West Razabazar road

Experiment results for a speed breaker with five sections are shown in Figure 4.28: the first section has a distance of 0 inches and a height of 1 inch, the second section has a distance of 3 inches and a height of 6 inches, the third section has a distance of 4 inches and a height of 6 inches, the fourth section has a distance of 3 inches and a height of 6 inches, and the fifth section has a distance of 1 inch and a height of 6 inches.

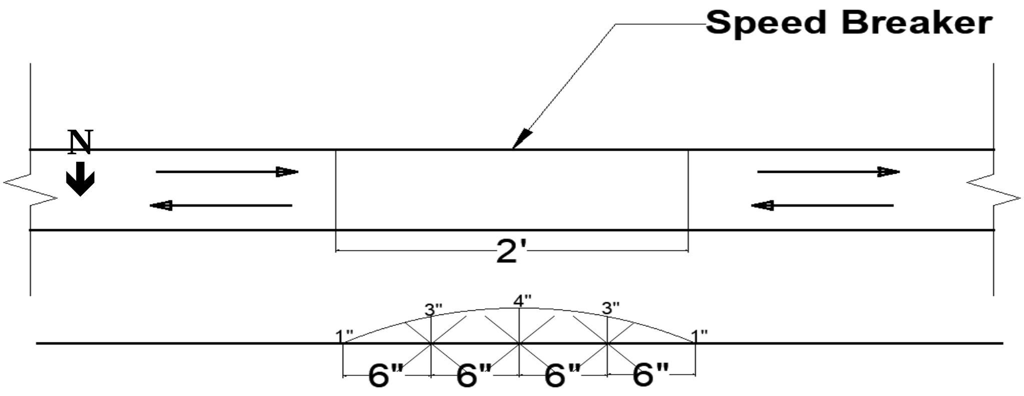


Figure 4.28: Speed breaker side view of West Razabazar road

4.4.2 Speed Analysis of Rickshaw

Table 4.15 demonstrates that 2 feet of the total 0-62 feet are used to calculate the speed breaker distance. West Raja Bazar rickshaws have a max speed of 12 km/h (1 second) over 0 distance and a minimal speed of 5.49 km/h (0.4 seconds) over 32 distances.

Table 4.15: Speed calculation of rickshaw at West Razabazar road

Distance (ft)	Speed (ft/sec)	Time (sec.)	Speed (km/hr)
62	10.71	1.4	11.75
47	9.38	1.6	10.28
32	5	0.4	5.49
30	8.33	1.8	9.14
15	10	1.5	10.97
0	10.94	1	12

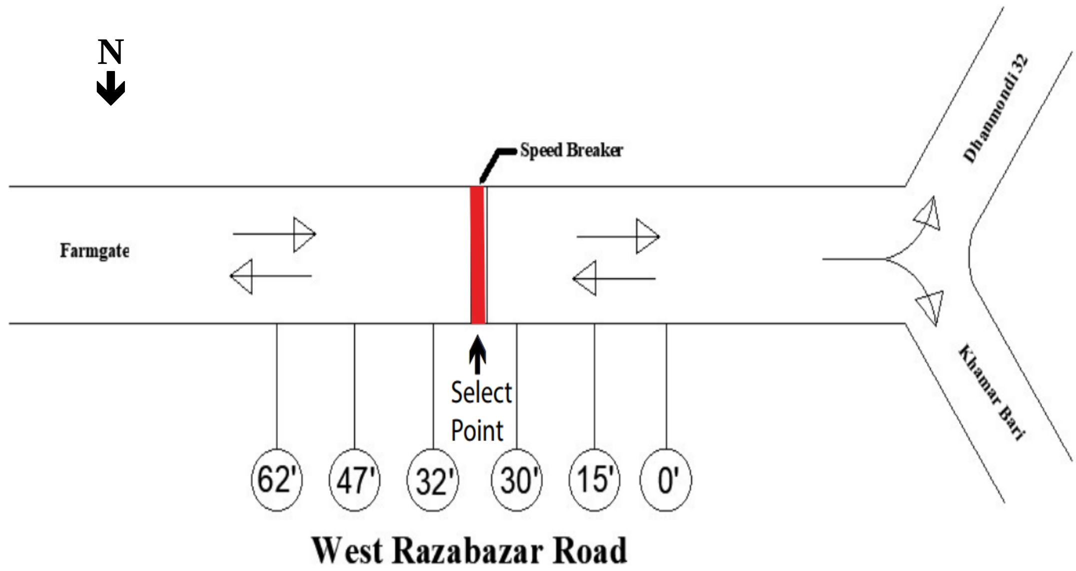


Figure 4.29: Top view of West Razabazar road

Distance (ft) by speed calculated of rickshaw at West Rajabazar in show figure 4.30:

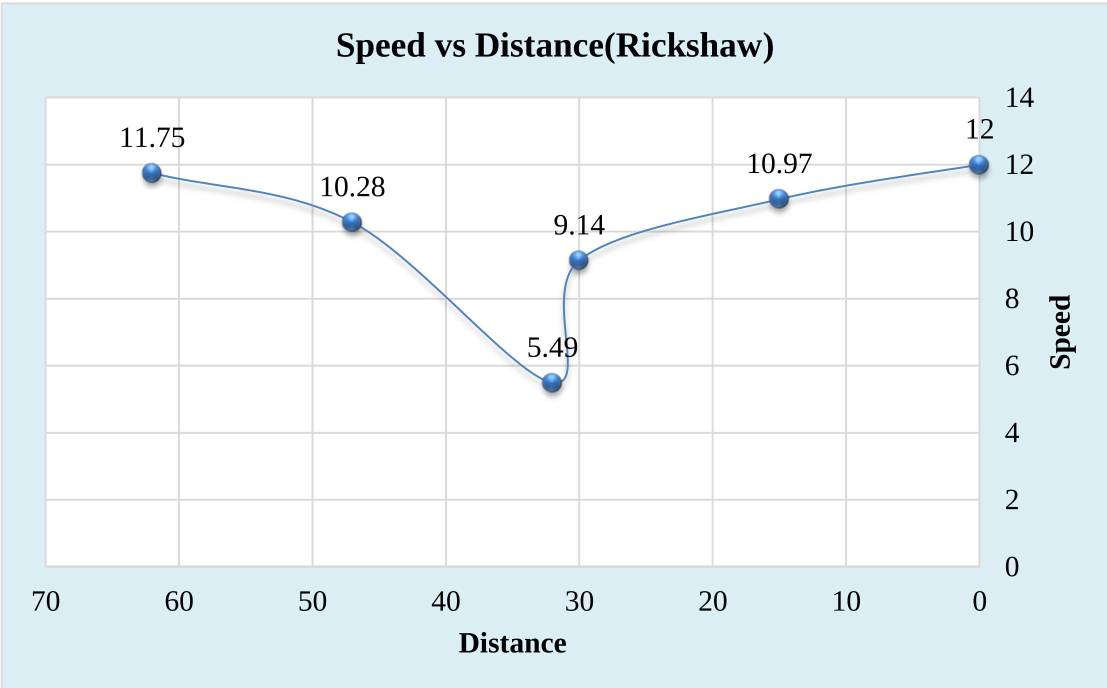


Figure 4.30: Speed graph of rickshaw at West Razabazar road

4.4.3 Speed Analysis of CNG

The results of the distance are presented in Table 4.16 and represent 2 feet of the total 0-62 feet measurements. We determined that the maximum speed for CNG, which was located in West Raja Bazar, was 14 kilometers per distance (one second) in 0 feet and that the minimum speed was 6.26 kilometers per hour (three-quarters of a second) in 32 feet.

Table 4.16: Speed calculation of CNG at West Razabazar road

Distance (ft)	Speed (ft/sec)	Time (sec.)	Speed (km/hr)
62	12	1.25	13.16
47	11.54	1.3	12.66
32	5.71	0.35	6.26
30	10.71	1.4	11.75
15	11.54	1.3	12.66
0	12.76	1	14

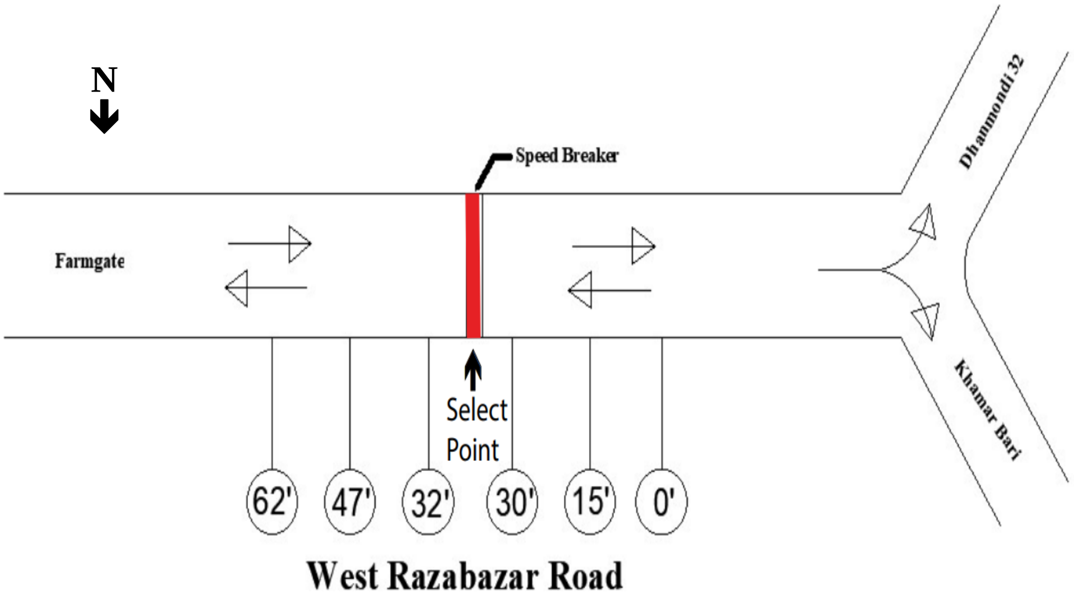


Figure 4.31: Top view of West Razabazar road

Distance (ft) by speed calculated of compressed natural gas (CNG) auto rickshaw at West Rajabazar in show figure 4.32:

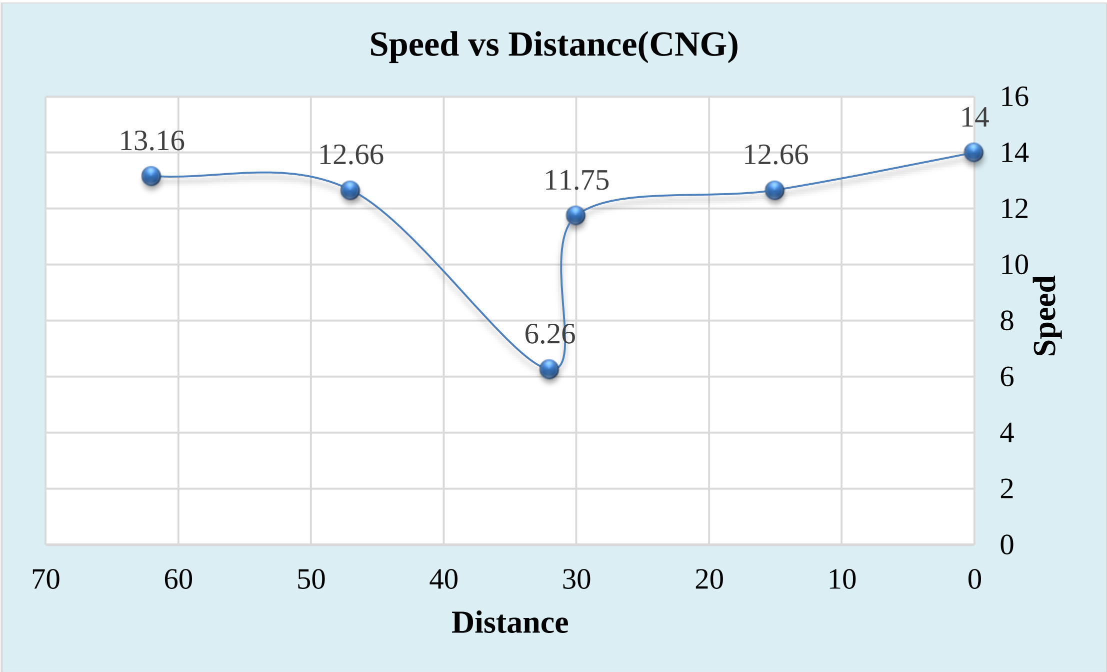


Figure 4.32: Speed graph of cng at West Razabazar road

4.4.4 Speed Analysis of Car

Thus according Table 4.17 calculating speed breaker distance 2 feet of total 0-62 feet measures are all vehicles. We discovered a top speed of 16 km/hr (1 sec) in 0 distance and an absolute lowest speed of 10.97 km/hr (0.2 sec.) in 32 distances for cars in West Raja Bazar.

Table 4.17: Speed calculation of car at West Razabazar road

Distance (ft)	Speed (ft/sec)	Time (sec.)	Speed (km/hr)
62	15	1	16.46
47	11.54	1.3	12.66
32	10	0.2	10.97
30	10.34	1.45	11.35
15	13.04	1.15	14.31
0	14.59	1	16

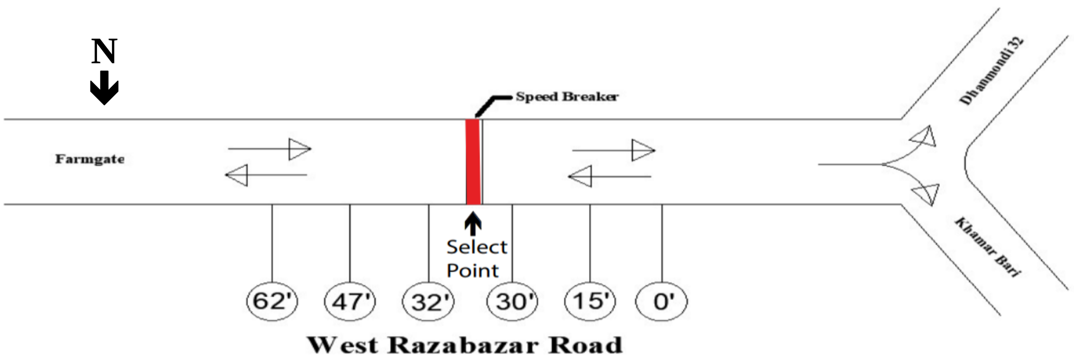


Figure 4.33: Top view of West Razabazar road

Distance (ft) by speed calculated of car at West Rajabazar in show figure 4.34:

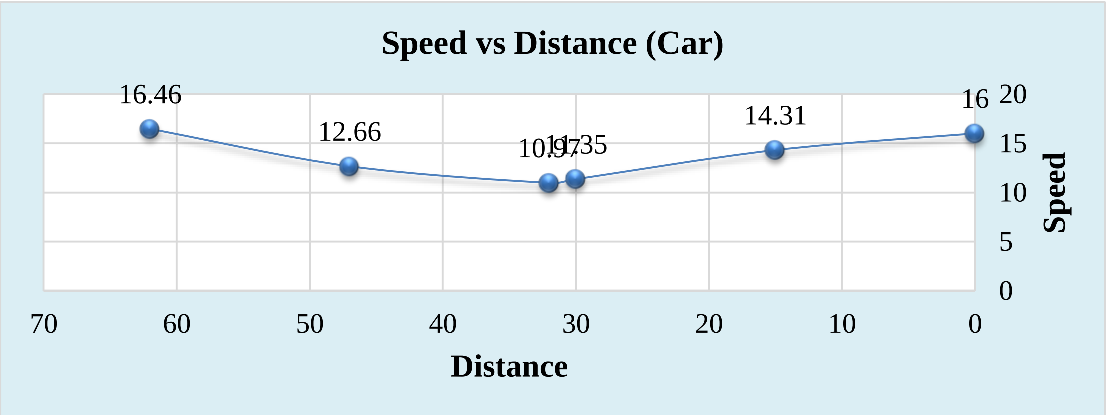


Figure 4.34: Speed graph of car at West Razabazar Road

4.5 Speed Breakers wise Comparison

Table 4.18 shows that comparatively max average distance 40 feet of Manik Mia Avenue, Moderately 33 feet average distance of Shyamoli Ring Road selected speed breaker, lowest 31 feet distance of West Rajabazar. We are compared both are distance indentified by vehicle. Slowly time left of rickshaw by the Manik Mia avenue speed breaker is 8.94 Km/Hr (2.02 sec) and highly movement of bike 15.36 Km/Hr (1.12 sec). Average 1.12 sec (11.96 Km/Hr) per vehicle moved into West Rajabazar speed breaker. Maximum speed per vehicle average 12.25 Km/Hr (1.51 sec) in Manik Mia Avenue.

Table 4.18: Vehicle wise average calculation of speed breakers

Area Name	Variable	Average					
		Bus	Truck	Bike	Car	CNG	Rickshaw
Manik Mia Avenue	Distance (ft)	40	40	40	40	40	40
	Speed (Km/Hr)	10.22	10.61	15.36	13.98	14.41	8.94
Shyamoli Ring Road	Distance (ft)	33	0	33	33	33	33
	Speed (Km/Hr)	8.16	0	8.88	8.32	9.50	7.51
West Rajabazar	Distance (ft)	0	0	31	31	31	31
	Speed (Km/Hr)	0	0	12.50	13.63	11.75	9.94

CHAPTER 5: DISCUSSION

5.1 Findings

We reviewed three speed breakers in designated areas of Dhaka city and were able to determine the speed of the vehicles in front of the speed breaker while crossing the speed breaker and after crossing the speed breaker. Besides, we have been able to determine how many vehicles are moving every hour and what kind of vehicles are moving at Manik Mia Avenue, Shyamoli Ring Road and West Razabazar.

5.2 Discussion

We were conducting research on the speed profiles at various speed breakers located around the city of Dhaka. Our investigation focused on the region around Farmgate, which included Manik Mia Avenue, Shyamoli Ring road, and West Rajabazar. On Tuesday, July 26, 2022, at 10:00 a.m., we captured the video from the side of the Manik Mia Avenue speed breaker. After recording the video, we viewed it at home and determined the total number of cars and the sorts of vehicles that passed by in one hour. By observing the video at home on Thursday, July 28, 2022 at 12:10 p.m. and recording it from the side of the speed breaker on the Shyamoli Ring Road, we were able to determine the total number of cars and the sorts of vehicles that passed through the breaker in one hour. In addition, we captured the video from the speed breaker on the side of West Razabazar Road on Thursday, August 2, 2022 at 2:30 p.m. and watched it at home. By recording the video, we were able to determine the total number of cars and the types of vehicles that passed in one hour. We were able to establish the average speed of vehicles by examining the speeds at which vehicles traveled on selected area's speed breaker. The length of the speed breaker on Manik Mia Avenue was twenty feet and the average speed of the vehicles was twelve a quarter kilometers per hour; the length of the speed breaker on Shyamoli was six feet and the average speed of the vehicles was eight and fourteen kilometers per hour; and the length of the speed breaker on West Rajabazar was two feet, and the average speed of the vehicles was eleven and ninety-five kilometers per hour.

CHAPTER 6: CONCLUSION

The speed profile analysis came to the conclusion that three specific locations within Dhaka city had the following characteristics: the maximum average distance was 40 feet on Manik Mia Avenue; the moderately average distance was 33 feet on the Shyamoli Ring Road selected speed breaker; and the West Rajabazar location had the shortest distance, at 31 feet. The West Rajabazar speed breaker was passed by vehicles at an average rate of 11.96 kilometers per hour, taking 1.12 seconds. On Manik Mia Avenue, the highest speed limit for individual vehicles is 12.25 kilometers per hour, or 1.51 seconds. The cumulative effect of this loss turns out to be a speed breaker when you consider the volume of traffic that uses the road. In light of this work, it is necessary to reevaluate the value that can be gained from installing speed bumps. This work identifies gaps in our knowledge about speed breaks and helps us strategize how to best meet our demands for reducing speed while minimizing the impact on other critical components of the situation. In light of the investigation and the following findings:

1. The speed breakers have an effect on the flow of cars for a height of 7.5 in Manik Mia Avenue and on the modest speed of commercial vehicles according to the survey. This indicates that when the class of the cars increases, the percentage of speed reduction experienced by vehicles at bump locations will also increase.

2. If the average speeds of vehicles that are supposed to be maintained on a given road are known, a model was devised to find out how high the speed breakers need to be. Field engineers can create bump geometry for speed control of vehicles using this helpful tool.

3. Our work highlights gaps in our understanding of speed breakers and helps us prioritize measures so that we can achieve our speed reduction goals without negatively impacting other, equally important goals. There is a lot of room for innovation in the design of traffic calming devices like speed humps, which have been utilized for decades but have negative side effects that need to be mitigated.

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APPENDIX-I: EXTERNAL DATA

1. Manik Mia avenue Part 1: https://youtu.be/N6EKrGpsf8E
2. Manik Mia avenue part 2 : https://youtu.be/6rOT15E743I
3. Shyamoli Ring road Part 1 : https://youtu.be/LAY94qP4G90
4. Shyamoli Ring road part 2: https://youtu.be/vN9OorC5jjo
5. West Raza Bazar : https://youtu.be/fZBgsvDovpY