“A TRAFFIC VOLUME STUDIES BETWEEN TECHNICAL TO MIRPUR-1 JUNCTION IN DHAKA CITY”

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A thesis submitted to the Department of Civil Engineering in partial fulfillment for the degree of Bachelor of Science in Civil Engineering



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Section: (21B)
Year: Spring 2024

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BOARD OF EXAMINERS

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to

Our Parents

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Respectable Supervisor

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ABSTRACT

In this case, a field traffic volume survey is essential for assessing the existing traffic volume and predicting the traffic volume going forward. Traffic volume studies are carried out to determine the quantity, movements, and classifications of highway vehicles at a certain location. The influence of heavy vehicles or people on vehicular traffic flow can be measured using these statistics, and changes in traffic volume can be monitored. Additionally, it creates opportunities for things like flow variation on various approaches to a junction, vehicle proportions in the traffic stream, effectiveness of a traffic control measure, traffic operation and control of existing facilities, and more. Road capacity, pavement structural design, signal timings, channelization, and geometric design. A traffic volume survey is being conducted at the Technical – Junction in accordance with the target of our thesis. Traffic flow is measured manually using counting techniques. Passenger Car Units (PCUs) are used to simplify this heterogeneous or mixed traffic in order to perform additional calculations. An effort has been made to comprehend the traffic patterns at various times with the aid of the data collecting. The characteristics of the traffic flow play a role in traffic control at theintersection. Therefore, the findings from the current study are useful for both managing traffic at the intersection and suggesting some corrective actions to increase traffic safety in the area. Based on the results of the work, corrective actions can be suggested, such as widening the road or increasing the availability of public transportation. According to our thesis another target is make a perfect option for highway intersection. On any route, traffic intersections are trouble places that cause a significant portion of accidents. Depending on the volume and behavior of the traffic, these areas need to be kept under some level of management to ensure their safety. Based on this, junctions and interchanges are built; the inner chapter covered the many forms of interchanges. Several images from have been used during the study on traffic volume for location maps and some projection on different intersections.

Keywords: volume, interchange, traffic, vehicles, road.

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CHAPTER 1
INTRODUCTION

1.1 Background and Motivations

System of transportation is dynamic. To stay up with a transportation system that is constantly developing, traffic information needs to be updated often, The analysis of traffic volume is crucial for determining the situation today and forecasting the future. The phrase ‘traffic volume study’ is sometimes knows as a ‘traffic flow survey.’ It is described as a process used to estimate the amount of traffic that will be present on the roadways at a specific location and time. The volume of a day or an hour might change significantly depending on the day of week or the hour of the day. In this investigation, we must systematically gather and analyze the data. The information can be utilized for a number of traffic engineering tasks, including monitoring traffic, forecasting traffic, and more.

In order to determine priorities and deadlines for traffic improvements, traffic statistics are used in the research, planning, designing, and regulation phases of traffic engineering. To measure and comprehend the amount, composition, and time and route distribution of volume for each under his control, the traffic engineer must gain a general understanding of traffic volume characteristics.

Objective

i. To calculate the traffic volume of different types of vehicles (Bus, Truck, Private Car,CNG & Motorcycle) in Dhaka city (Technical Junction).

ii. Observe traffic flow patterns in evening session for 1 hour count.

iii. Observe the T-Intersection and given the suitable solution for freeway (no intersection,no signal).

1.1 Scope of Studies

1.1.1 Planning Purpose

- This evidence indicates that the volume of traffic contributes to the maintenance of a moderated road policy.
- This analysis will aid in the planning and design of any extension that involves construction missing links, by-passes, alternate routes, U-turns, etc.
- Minimum turning path, channelization, flaring, traffic control devices visualization, traffic signs, markings, and signals depending on approach volume and turning proportions.

1.1.2 Improvement Purpose

- Understanding the traffic volume is crucial when assessing the current operating/service condition of a roadway section in order to enhance its operating condition.
- To properly determine the value of a given roadway stretch and set its relative priority within our constrained maintenance budget, it is crucial to know the volume of traffic that it carries.

1.2 Organization of the Report

- haters are used to organize the thesis. Each chapter will

  start with an introduction andinclude several subsections after that.

Chapter 1: Introduction

- This chapter covers the entire study context and established objectives.

Chapter 2: Literature Review

- This chapter examines a number of accident-related parameters and prior accident prediction methods. Additionally, this chapter documents significant facts and findings.

Chapter 3: Research Methodology

- This chapter establishes the practical approach that will be used for the techniques or procedures used with statistical analysis by means of gathered data and comparing them with selected studies. Also promote the methodologies.

Chapter 4: Result and Finding

- This chapter will go over the final outcome of the data analysis and
- explain it.

Chapter 5: Conclusion

- The dissertation's concluding chapter presents conclusions regarding the study's results, contribution to current knowledge, study limits, and lastly, future research directions.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

The studies that were previously investigated in relation to traffic volume study and T- Intersection are discussed in this chapter. This chapter would demonstrate the connections between our study and earlier research as well as the research gap that this dissertation seeks to fill.

Traffic volume studies are intended to determine the quantity, evolution, and groupings of street vehicles in a certain location. This information can be used to distinguish between basic stream durations, determine how large cars or pedestrians will affect the vehicular traffic stream, or record traffic volume patterns. To evaluate and comprehend the magnitude, arrangement, and time and course distribution of volume for each region under his forecast, the traffic engineer needs have general information on traffic volume attributes.

T-intersection is a three-way junction where three roads come together. The most fundamental type of intersection is a T, where two roads intersect at a straight angle (or close to a right angle). A T-junction is an intersection where a major road and a minor road cross. These are more typical intersection kinds that you will frequently run into. At a T- intersection, the minor roadway is usually always regulated by a stop sign, but the major route's traffic moves on without having to stop. Compared to crossroads, they are simpler. T-junctions function effectively when there is light to moderate traffic, but they might be challenging to exit while turning right if there is heavy traffic. A T-intersection may have traffic lights erected to regulate when vehicles can proceed if it becomes congested if there are several accidents. If no lines are present, the intersection may be uncontrolled, a give- way (a white line), or a stop (yellow line).

According to our thesis work we count the numbers of vehicles like- (Bus, Truck, CNG, and Private Car) which passes through the Technical Junction (T-Intersection) and given the suitable solution for the intersection.

2.2 Previous Works on Traffic Volume Study

Specifically, the literature on the impact of traffic volume, speed flow relationships, passenger car equivalents, peak hour factor, flow variations, traffic capacity, and level of serviceability is discussed in the present study, which focuses on the significance of traffic volume in traffic engineering of urban and suburban road links (LOS). But numerous investigations have contributed to the development and modification of the current study. Here are only a few of them in brief:

According to examined the impact of stream speed, traffic volume, and traffic type on passenger car equivalents. The PCU factors were developed using Chandra'smethod, and it was discovered that for two axle trucks, the PCU values increased as the compositional share of the relevant vehicle classes in the traffic stream increased. The compositional share of two-wheelers in the traffic stream has virtually little impact on their PCU. Various places in the range have different compositional shares of 2W of 31.69% to 34.23%, but only a 1.1% rise in PCU values, which may be related to the vehicle's great mobility. Bullock cart PCU values rise in slow moving traffic as the compositional share ofthe stream declines. **Satyanarayana (2012)** (Ref-2)

According to provided a better understanding of the complexity of vehicle interactions in diverse traffic. The PCU estimations for the various types of vehicles in heterogeneous traffic, for a wide range of traffic volume and highway conditions, show that the PCU value of a vehicle changes dramatically with changes in traffic volume and roadway width. **V.T Hamizh Arasan and Krishnamurthy (2008)** (Ref-3)

According to examined the relationship between Passenger Car Equivalency (PCE) and traffic volume and composition. A method is shown to estimate PCE using the stream speed as the Measure of Equivalence (MOE). The decrease in stream speed brought on by a vehicle type's minor increase in traffic volume is contrasted with the decrease brought on by an old-technology car, which serves as the reference vehicle for PCE estimate. The study shows that both traffic volume and its composition have an impact on PCE. All vehicle classes have found that their PCE values raise as traffic volume rises, but large trucks are most affected. The compositional share of two-wheelers in the traffic stream essentially has no impact on PCE. **Basu D, Maitra S.R (2006)** (Ref-4)

According to categorization level for urban traffic that is diverse indicated. To determine LOS, they took into account concentration, road occupancy, and motorized two-wheeler travel speeds, and car travel speeds. **Marwah and Bhuvanesh (2000).** (Ref-5)

As a way to measure traffic on urban highways, six (6) levels of services were proposed, with five (5) in a stable flow zone (the traditional LOS A to E region) and 1 representing the unstable flow (currently LOS F). For road widths of 12 feet (lane), in one direction, they calculated capacity values for study locations on urban roadways as 2000 and 2200 PCU per hour per lane.

2.3 Definition

- Volume/flow: Volume refers to the total number of vehicles that cross a specific place, lane, or roadway within a specific period of time. It is the actual number of cars seen or anticipated to pass a particular location within a certain period.
- Rate of flow: The rate at which vehicles pass a specific location on the road is known as the rate of flow, and it is typically expressed in terms of vehicles per hour.
- Design Hourly Volume: Economical situation Roadway geometric elements are designed using the economic hourly flow of the upcoming year. It is chosen so that it shouldn't be surpassed too frequently or excessively during the design phase.
- Peak hour factor: Because peak hour is the most crucial time period, traffic engineers concentrate on the peak-hour traffic volume while evaluating capacity and

the other 6 factors. And it's also when traffic volume is at its maximum, as any driver who commutes during morning or evening rush hours is aware. Because significant short-term changes often happen during an hour, the measurement of level of service is based on peak rates of flow happening during the peak hour. Utilizing a peak 03-minute rate of flow is standard procedure. Instead of cars every 03 minutes, flow rates are typically reported in vehicles per hour.

- Daily variation factor (DF): It is described as the proportion of AADT above the yearly average volume on a specific day of the week.
- PCU (or PCE): The number of passenger cars that one truck, bus, or RV (recreational vehicle) displaces in a particular traffic stream is known as the passenger car unit (passenger car equivalent). The passenger car unit (passenger car equivalent) is used in the assessment of traffic volume in order to reflect the various impact or intensity on the roadway due to the diverse vehicles in terms of size, operating characteristics, and design.

2.4 Research Gap

In previous studies, we discovered the use of the indirect method, which was carried out utilizing a video camera or other video recording equipment together with simulation software, satellite remote sensing, GPS etc. We are unable to utilize them in our study. Because we cannot possibly have any expertise of simulation software or applications of this kind. Another is that we don't have enough money to use video recording equipment like cameras. And that is a result of our knowledge or lack of understanding.

In that later chapter, we discuss about PCU rate across that junction and analysis, note down some problem with planning and solution. Rather discuss about some different kind of intersection and given justification among them, but our justification was our own thought. We collected information from books, some journal and websites.

Spaces were limited because of our proximity to the intersection. A modest budget and limited space prevent us from making significant changes because a makeover of the region is necessary to reduce traffic issues. We cannot, however, fully redesign while our budget is limited. There may already be large structures, hospitals, and other infrastructure.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Data Collection Procedure

3.1.1 General

A thorough understanding of the survey region, which will be briefly detailed in this chapter, is necessary to complete a smooth data gathering process.

3.1.2 Date and Time

The survey took place on 24, 25 & 26 April 2024. Data was collected for 1 hours interval. Data was collected for 7 hours (till 10.00 AM - 5.00 PM) in each day of the week.

3.1.3 Location

Technical Junction: In this junction vehicles comes from Mirpur Road to Dhaka-Aricha Highway either in both direction and both inflow and outflow. This intersection looks like English T-word, and also called those type of intersection is T-intersection (also similarly as Y- intersection). In this area many institute, infrastructure, hospital, corporate office, housing society are standing beside, such as Govt. Bangla College, Bangladesh University of Health Sciences, BIHS General Hospital, Bangladesh Institute of Dermatology STD and AIDS, Deputy Director Office, Kallyanpur housing society, Housing and Building Research Institute, etc. This intersection is one of the important intersections in Bangladesh.

3.1.4 Location Map

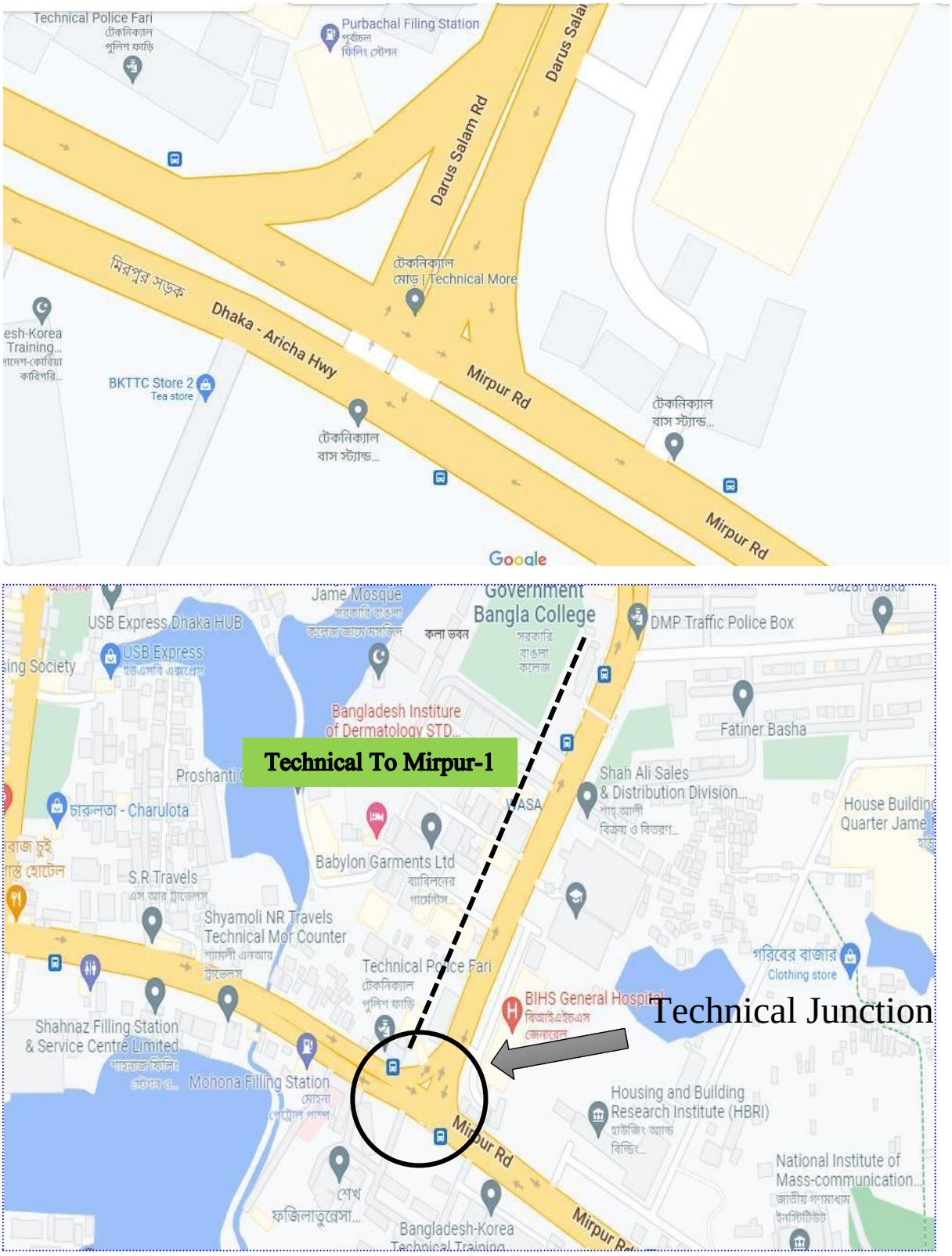


Figure 3.1: Location on Google Map

3.2 Methodology

3.2.1 Counting Method

Two methods are available for conducting traffic volume study. They are,

i. Manual Counting Method
ii. Automatic Counting Method

In this research study we have been used Manual Counting Method.

3.2.2 Manual Counting Method

In this method vehicles are counted manually. There are two methods of Manual CountingMethod.

They are,

i. Direct Method
ii. Indirect Method

3.2.2.1 Direct Method

Utilizing manual counters and enumerators as well as hand tally, data is counted.

Advantages and disadvantages of Direct Method is given below:

Advantage	Disadvantage
This technique can be used to determine traffic volume, vehicle categorization, and turning percentages. Data is immediately used after collection.	When the flow is high and the duration count is long, this strategy is impractical. Error is frequent, particularly when the volume is high. Cross-checking count is impossible. Severe weather makes counting impossible.

3.2.2.2 Indirect Method

Data is gathered using a video camera in this technique. Data is later acquired by rewindinga video that has been recorded for a long time.

We have been done Manual Counting Method on Direct Method by using: Data sheet, stop watch, calculator.

3.3 Counting Periods

For every time period, vehicles can be counted. The length of the count depends on the reason for collecting the data. In order to conduct operational studies or traffic control and management, a brief count is done during peak hours. Long duration counting is done for planning and design purposes. We gathered volume data for our study over the course of One (01) hours.

3.4 The Reconnaissance Survey Methodology

Before we started the actual work on the first day, we conducted a reconnaissance survey. We simply traveled to the study site and divided the road's full length into three equal parts. After that, we decide on the reference points from which we collected our volume data. Additionally, we went directly to the site the day after the treatment to take volume measurements. However, if we were able to do real reconnaissance, we would have a clear understanding of the general layout of the study zone.

3.5 Study Method

The Manual Method has been revised. Data is gathered using a Data Sheet in this manner. Data is entered on data sheets, or it can be checked off on a pre-made field form. The desired count interval must be measured using a stopwatch.



Figure 3.2: Group work for vehicle counting in Direct Method (a & b)

3.6 Work Details

Counting Date	: Counting from April 24, 2024, to April 26, 2024
Counting Period	: 1 hours
Start and End Time	: Starting at 10:00 am and ending at 05:00 pm
Vehicle Types	: Bus, Truck, Private Car, CNG & Motrocycle.
Weather Condition	: Sunny during the day, with occasional haze in the evening.
Method	: Manual Method
Equipment's	: Data Sheet, Stop Watch, Calculator.
Survey Location	: Technical Junction To Mirpur-1.








Figure 3.3: Traffic volume count for above vehicle (a, b, c, d & e)

CHAPTER 4

RESULT AND DISCUSSION

4.1 Data Collection Table Technical Junction To Mirpur-1 Dhaka.

Table 4.1: Summary of data for three days.

Vehicle	Day-1	Day-2	Day-3
BAS	25	19	23
PICUP	15	10	13
CAR	226	200	220
CNG	90	70	84
MOTORCYCLE	90	65	88

4.2 Volume / Flow (15 minits)

Table 4.2: Day One detailed data.

Vehicle	Number of Vehicle	PCE	PCU	Total
BAS	25	3	75	
PICUP	15	1	15	370
CAR	226	1	226	
CNG	90	0.5	45	
MOTORCYCLE	90	0.1	9	

Details Calculation :
for day 1,

Table 4.3: HEF, DEF & MEF value

Hourly Expansion Factor (HEF)	9.00 am -10.00 am	17.11
Daily Expansion Factor (DEF)	Thursday	7.012
Monthly Expansion Factor (MEF)	April	1.482

Service Flow Rate :
370×4= 1480 veh / hr

Daily Volume :
1480× 17.11= 25322.8 veh / day

Weakly Volume :
25322.8× 7.012 = 177563.47 veh / weak

ADT :
177563.47÷ 7 = 25366.21

AADT :
25366.21 × 1.482 = 37592.72 veh / day

Service flow rate (vch/ hr)

Table 4.4: Service flow rate (Technical To Mirpur-1)

Vehicle	Day-1	Day-2	Day-3	Total
	9.00am-10.00am	2.00pm-3.00pm	4.00pm-5.00pm	
BUS	100	76	92	268
PICUP	60	40	52	152
CAR	904	800	880	2584
CNG	360	280	336	976
MOTORCYCLE	360	260	352	992
PCU/ HR	1784	1456	1712	4952

Figure 4.1: Service flow rate (Technical To Mirpur-1)

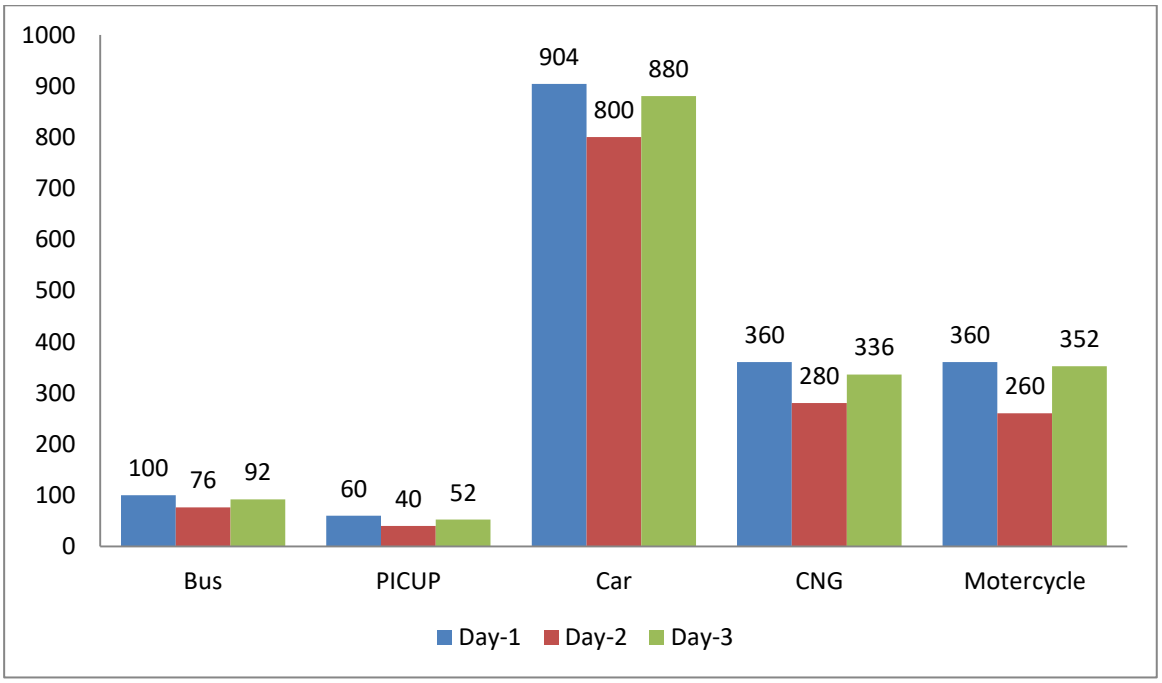


Figure : Volume in Different Section At Different Times.

Directional distribution :

Table 4.5: Calculation Table For Directional distribution.

Day	PCU/hr
Day-1	1784
Day-2	1456
Day-3	1712
Average = 1650.67	

Vehicle Composition :

Table 4.6: Vehicle Composition Table (Work Day).

Type of Vehicle	% Of Total Flow
BUS	5.60 %
PICUP	3.36 %
CAR	50.67 %
CNG	20.18 %
MOTORCYCLE	20.17 %

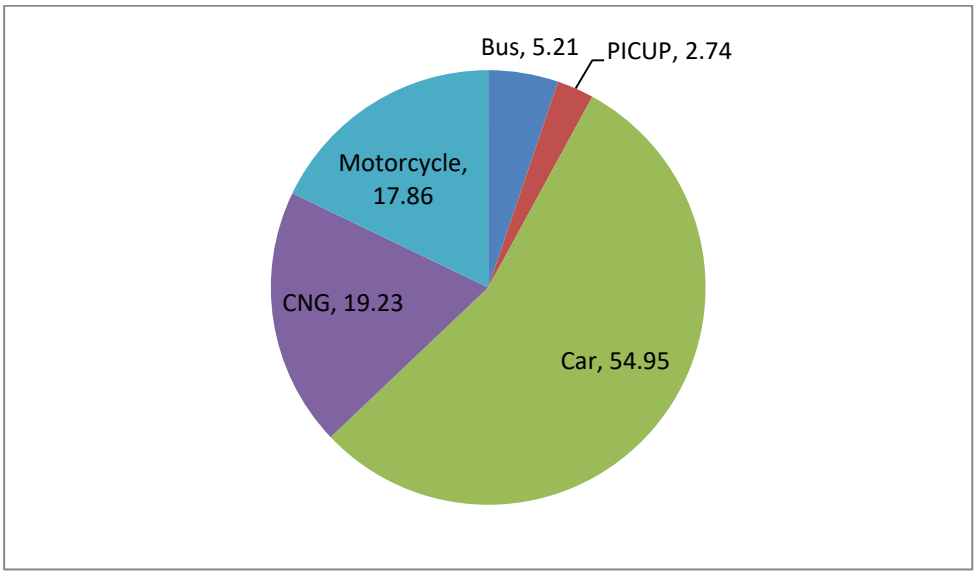


Figure 4.2: Vehicle Composition pi-chart (Work Day).

Table 4.7: Vehicle Composition Table (OFF Day).

Type OF Vehical	% Of Total Flow
BUS	5.21 %
PICUP	2.74 %
CAR	54.95 %
CNG	19.23 %
MOTORCYCLE	17.86 %

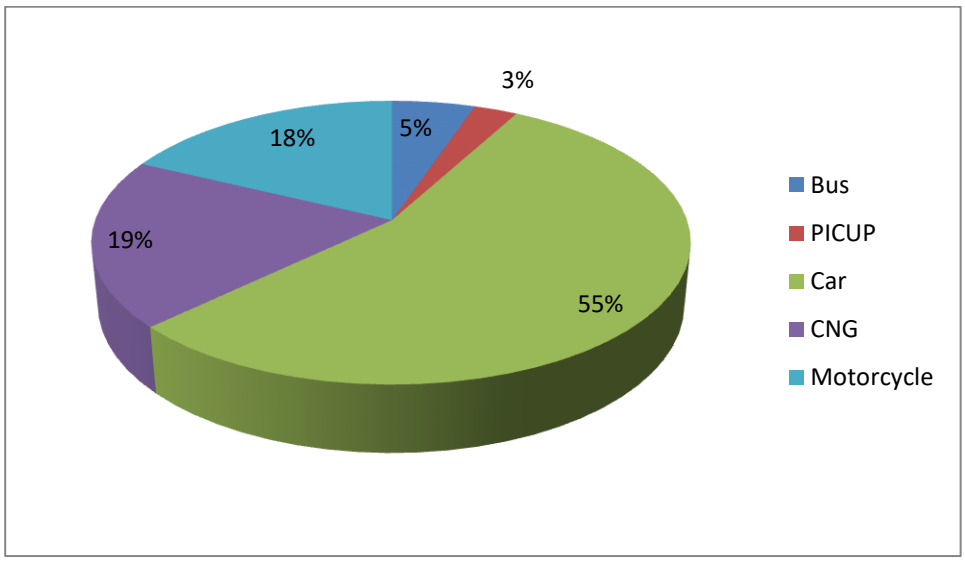


Figure 4.3: Vehicle Composition Pi-Chart (OFF Day).

Flow Fluctuation :

Table 4.8: Flow Fluctuation Table.

	Day	ADT
From Technical Junction To Mirpur-1	Day-1	24852.03
	Day-2	14731.75
	Day-3	16553.83
	Total = 56137.61	

Table 4.9: Present ADT Table.

	Day	% ADT
From Technical Junction To Mirpur-1	Day-1	44.27 %
	Day-2	26.24 %
	Day-3	29.49%
	Total = 100 %	

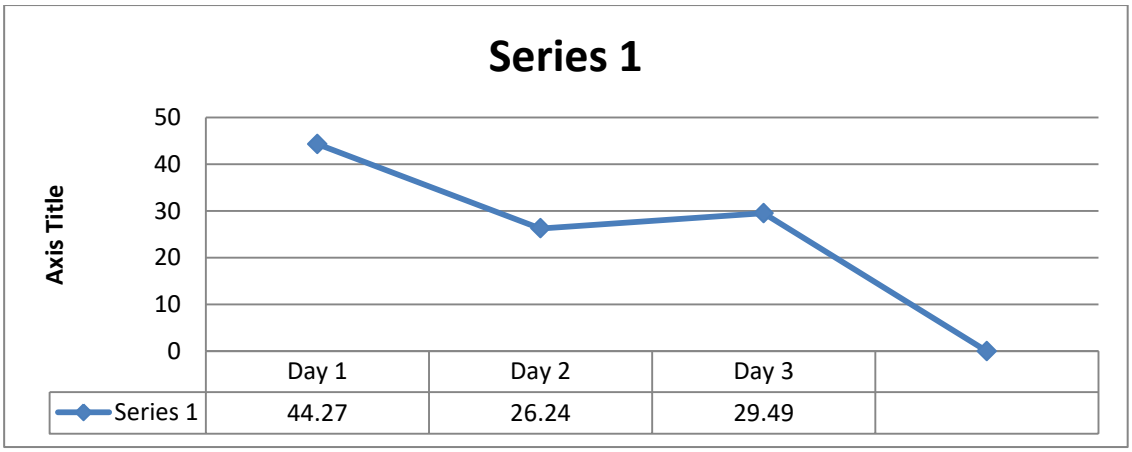


Figure 4.4: Flow Fluctuation Curse

4.2 Passenger Car and PCU

The flow of several vehicle classes must be combined into one common vehicle type, sucha passenger car, in order to depict the whole traffic flow on a roadway per unit of time. Asa result, each kind of vehicle is given an Equivalency Factor called a passenger car unit (PCU).Estimating the traffic volume of highway infrastructure under mixed traffic flows is challenging until the numerous vehicle classes are transformed into a single commonstandard vehicle unit. In terms of length, width, and other static and dynamic qualities, there are many distinct vehicle types. In addition, it has been shown that there are substantial differences in the driving styles of different vehicle kinds. Because of this, the features of mixed traffic flow are far more complicated than those of homogeneous traffic, which only consists of passenger automobiles.

4.2.1 Passenger Car Unit or PCU

A vehicle unit or car unit called a passenger car unit, or PCU for short, is used to measure the speed of traffic flow on highways. PCU, then, is a measurement of the volume of trafficon a highway at a particular moment in time. PCU is also known as passenger car equivalent in various contexts (PCE).

The movement of cars along a road from one location to another at a specific time is known as traffic flow. Following are the many sorts of vehicles that make up the flow of traffic on highways:

4.3 Bus
4.4 PICUP / Heavy commercial vehicle / Lorry
4.5 CNG / Auto-rickshaw / Motorcycle
4.6 Private Car / Light good vehicle
4.7 Rickshaw
4.8 Bicycle

Mixed traffic flow refers to the movement of several types of highway vehicles. The traffic stream in emerging nations like Bangladesh comprises of mixed traffic flow.

4.8.1 PCU Values for Different Vehicle Class

The capacity of various types of roadway facilities with mixed traffic flow is expressed in PCU per hour per lane width or PCU per hour for the entire route. The Passenger Car Unit (PCU) values given in the geometric design of Highways (MoC, 2001) are given below:

4.9 Analysis

- ✓ In this research maximum vehicle are across Technical Junction at Morning Session,which 9:00 am – 10:00 am.
- ✓ For the various result we state that, Workdays traffic volume and PCU is higherthan the Off-days.
- ✓ Maximum tendency of the vehicle are left Dhaka city at evening time. So theoutflow and inflow are different.

4.10 Problems and Reasons

- ✓ Technical Junction aside route is national highway N5 or Technical to Mirpur-1 highway, which means traffic volume is higher than the other road, (True enough √).
- ✓ Many infrastructures, school, college, hospital, govt. office situated near this junction. So population, pedestrian, passenger is also high. [Busy intersection withlong-distance vehicle].
- ✓ For this junction, pedestrian and vehicle randomly are crossing the intersection, so there are given channel via island and also traffic police. Sometimes passenger considers too much time as delay than traffic signal light may requires. [minimum control or uncontrolled intersection].

CHAPTER 5
CONCLUSION

5.1 Introduction

This chapter will provide a summary of our one-year thesis project. Here too, we'll offer advice that provides a clear picture of what might be expected from upcoming studies on the tropics.

5.2 Summary of the Results

1. In this above discussion it is clear that, our almost maximum traffic flow rate found in Thursday. The maximum number of Bus found in Thursday at afternoon period.

2. The maximum number of Truck found in Wednesday at afternoon period.

3. The maximum number of Private Car found in Thursday at evening period.

4. The maximum number of CNG found in Thursday at evening period. Then also found out the different vehicle class in workdays and off-days with their percentages. Then discuss about passenger car, PCU, PCU rate in different vehicle class with reference table. Using the reference table for calculate the PCU in different vehicle in workdays and off- days, also found the peak value and percentages of different vehicle class.

5. Then analysis traffic volume, then stated some sort of problem and reason. Then give some solution and planning for that Technical Junction. In last portion stated that, justify the suitable highway intersection for Technical Junction.

6. The least amount of traffic is on Fridays.

5.3 Limitations and Future Scopes

- ✓ The survey was only done for 7 hours, which was a significant flow in this traffic volume study because a 24-hour survey is required for more accurate results.
- ✓ We gathered information for a sample of the traffic flow. A better picture could have been provided, though, if data could have been gathered for every type of vehicle, including light vehicles like rickshaws and van.
- ✓ We justify highway intersection, which actually our own point of view.

The current project's primary objectives are the study of traffic volume, PCU counting, analysis of the data, and provision of appropriate solutions for highway intersections and planning. Speed-flow studies are helpful to analyze more factors for future scope. For upcoming work, there is room for speed-flow studies on urban road links. Traffic control devices, traffic signal study, traffic stream characteristics and design, for example; speed and travel time, density and occupancy, spacing and headway, also be evaluate or practice after this research study.

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ABBREVIATIONS

AADT = Annual Average Daily Traffic

ADT = Average Daily Traffic

PCU = Passenger Car Unit

PCE = Passenger Car Equivalent

DF = Daily Variation Factor

MF = Monthly Variation Factor

AWT = Average Weekly Traffic

AAWT = Annual Average Weekly Traffic

HCM = Highway Capacity Manual

MOE = Measure of Equivalent

LOS = Level of Service

RV = Recreational Vehicle

CNG = Compressed Natural Gas