A TREND OF TRAFFIC VOLUME STUDY AFTER COVID-19 BETWEEN FARMGATE TO SHAHBAGH IN DHAKA CITY

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A thesis submitted to the Department of Civil Engineering, Sonargaon University, inpartial fulfillment of the requirement for the degree of Bachelor of Science in Civil Engineering.



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Semester Year : Fall-2021

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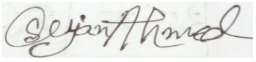
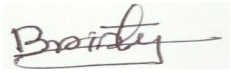
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DECLARATION

It is hereby declared that this thesis/project or any part of it has not been submitted elsewhere for the award of any degree or diploma.

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To

This thesis work is dedicated to our supervisor, Md. Lutfor Rahman Sir, Assistant Professor who has been a constant source of support and encouragement during the challenges of graduate school and life.

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ABSTRACT

In the case implications of social distancing measures, which aim to “flatten the curve” of the spread and in turn, have significantly changed people’s travel behavior Traffic engineering uses engineering methods and techniques to achieve the safe and time efficient movement of people and goods on roadways. The safe and time efficient movement of the people and goods is dependent on Traffic flow, which is directly connected to the traffic characteristics. The three main parameters traffic flow are volume, speed and density. We conducted a traffic volume study in the same road at two different times in Dhaka city. This study specifically aims to assess the change of traffic volume with respect to travel behavior, traffic characteristics and socio-demographic characteristics with the change of control policies.

The current work studies traffic characteristics this situation in the city of Dhaka at one selected priority junction. In this work emphasis was given on traffic volume and the analysis was carried out through primary traffic flow surveys at Shahbagh to Farmgate junction in Dhaka city. Traffic flow is studied by manual methods. For better understanding of the present status of traffic flow at the junction, traffic survey is conducted. With the help of the data collection, an attempt had been made to understand the traffic patterns during different time periods. Traffic control at that junction is also dependent on the traffic flow characteristics. Hence the results from the present study are helpful in controlling the traffic at the intersection and also in suggesting some of the remedial measures to improve the traffic safety in the region. in different ways. However, the data we found did not serve the overall purpose. Before the Hourly PCU Shahbagh to Farmgate junction. So level of Service (LOS) of this junction remains “F” like before. So no effect on this Shahbagh to Farmgate junction.

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CHAPTER 1
INTRODUCTION

1.1 Background and Motivations

Traffic volume studies are conducted to determine the number, movements, and classifications of roadway vehicles at a given location. These data helps to identify critical flow time periods, determining the influence of large vehicles or pedestrians on vehicular traffic flow. Traffic volume studies are conducted to determine the number, movements and classifications of road way vehicles at a given location. These data can help identify critical flow time periods, determine the influence of large vehicles or pedestrians on vehicular traffic flow, or document traffic volume trends. The length of the sampling period depends on the type of count being taken and the intended use of the data recorded. For example, an intersection count may be conducted during the peak flow period. If so, manual count with 30-minute intervals could be used to obtain the traffic volume data. The information on traffic volume is an important input required for planning, analysis, design and operation of roadway systems. Highway capacity values and speed flow relationships used for planning, design and operation of highways, in most of the developed countries, pertain to fairly homogeneous traffic conditions comprising vehicles of more or less uniform static and dynamic characteristics. But the traffic scenario in developing countries like Bangladesh differs significantly from the conditions of developed countries in many respects. In Bangladesh road traffic, the heterogeneity is of high degree with vehicles of widely varying static and dynamic characteristics. Under this condition, it becomes difficult to make the vehicles to follow traffic lanes. Consequently, the vehicles tend to choose any advantageous lateral position on the road based on space availability. Under the said traffic conditions expressing traffic volume as number of vehicles passing a given section of road per unit time will be inappropriate and some other suitable base needs to be adopted for the purpose. The problem of measuring volume of such heterogeneous traffic has been addressed by converting the different types of vehicles into equivalent passenger cars and expressing the volume in terms of Passenger Car Unit (PCU) per hour. The PCU is the universally adopted unit of measurement of traffic volume, derived by taking the passenger car as the ‘standard vehicle'. (1)[i]

1.2 Research Objectives and Overview

The objectives of carrying out traffic volume count are designing, improving traffic system, planning, management.

1.2.1 Design purposes:

- Structural and geometric design of pavements, bridge, and other highway facilities. Structural design is based on repetition of wheel load on the pavement in entire design life. AADT is needed with traffic growthrate to compute design wheel repetition. Geometric design is based on peak hour volume to avoid congestion.
- Intersection design including minimum turning path, channelization, flaring, traffic control devices viz. traffic signs, markings, signals based on approach volume and turning proportions.
- Pedestrian volume study is useful for designing side-walks, pedestrian crossing.

1.2.2 Improvement purposes:

- To allocate limited maintenance budget rationally, it is important toknow the traffic volume carried by a particular roadway section in order to decide the importance of the road and fixing its relative priority.
- In order to improve the roadway operating condition, it is import-ant to know the traffic volume.
- To determine the type of improvement measure need to be taken.
- To measure the effectiveness of a traffic control measure.

1.2.3 Planning Purposes:

- Accurate information on the amount of traffic on the roads is vitalfor the planning of both road maintenance and improvement policies.
- Traffic volume network analysis helps in deciding/planning if thereis need for Improvement
- Expansion in terms of construction missing links, by-pass, alternative road.

1.2.4 Dynamic Traffic Management Purposes:

Up to date and continuous flow/congestion information is essential for optimizing

- Traffic signal design and thereby improving junction performance.
- Network productivity by providing information to the road user.

1.2.5 Other Purposes:

- Estimation of highway usage
- Measurement of current demand of a facility
- Estimation of trends
- Economic feasibility evaluation.

Specific Objectives of our Traffic Volume Study

- After lockdown impact of vehicle %, hourly volume, hourly PCU on this road
- To determine vehicle composition during survey period
- To determine service flow rate in PCU unit
- To determine Directional Distribution (DD) of traffic
- To compare our data with previous studies

Scopes of Traffic Volume Study

- Magnitudes, classifications and the time and directional split of vehicular flows. Magnitude is represented by volume of traffic. Vehicles are classified into some predefined classes based on vehicle size and capacity. In a two-way road, vehicles moving towards two directions are counted separately to get the proportion. Time and directional split is useful to identify tidal flow.

- Proportions of vehicles in traffic stream. Proportion of vehicles indicates whether public or private transport dominates the traffic system. It also indicates the choice of road users

- Hourly, daily, yearly and seasonal variation of vehicular flows. These variations are needed to establish expansion factors for future use. Using expansion factors, AADT can be calculated from short count.

- Flow fluctuation on different approaches at a junction or different parts of a road network system.

1.3 Organization of the Thesis

Chapter 1: This chapter provides the background and motivations of the trend of traffic volume study between Shahbag and Farmgate in Dhaka city. The overall objectives and expected outcomes are also described in this chapter.

Chapter 2: This chapter provides review of literature. Providing all required knowledge, information and materials regarding traffic volume study, with a special focus on a trend of traffic volume study between Shahbag to Farmgate in Dhaka city

Chapter 3: Methodology. This chapter describes the methodology adopted to carry out the research. Following a systematic method of colleting workable data for the trend of traffic volume.

Chapter 4: Results and Discussion. This chapter describes the results and discussion of the trend of traffic volume between Shahbag and Farmgate in Dhaka city.

Chapter 5: Conclusions and Future Work. This chapter summarizes the conclusions and major contributions of this study and provides recommendations for future studies.

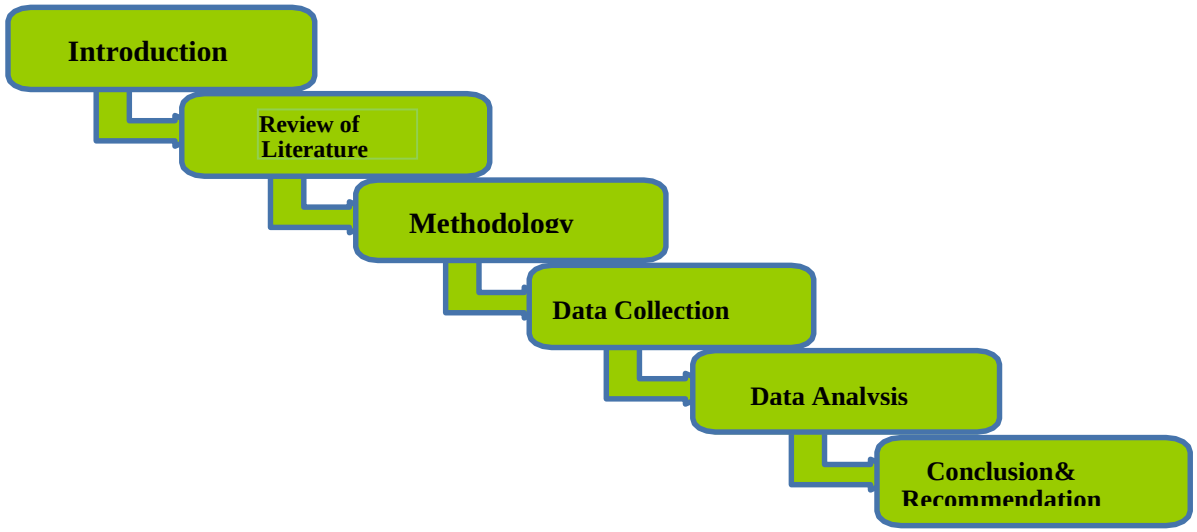


Table 1.3 Organization of the thesis

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

Transportation is carrying civilization to a brighter future. Currently transportation is one of the most burning problems in every territory of the globe. Every country is approaching as per their desires and try to resolve transportation issues as per the capabilities and resources they owe. While designing any structure it is necessary to calculate the loads coming on it to determine the reinforcement to be provided for safe functioning of the structure. In transportation volume serves the identical purpose. For planning, designing, scheduling, safe operation and development of transportation systemthe prime requisite is traffic volume. Traffic volume is the number of vehicles passing a section of a roadway at some stage in precise unit of time. Traffic volume researches are performed to determine the count, movement and classification of roadway vehicles at a given location so as to become aware of critical time flow periods, the influence of heavy vehicles or pedestrians on vehicular traffic flow or traffic volume trends. (2)

2.2 Content:

Volume/flow:
The total number of vehicles that pass over a given point or section of a lane or roadwayduring a given time interval. It is the actual number of vehicle observed or predicted to passing a point during a given interval. (3)

Rate of flow:
The equivalent hourly rate at which vehicles pass over a given point or section of a laneor roadway during a time interval less than 1hr. usually 25 min.

Demand:
Demand is a measure of the number of vehicles (or passengers, or persons) waiting for service in the given time period. Demand is frequently higher than actual volumes wherecongestion exists. Some trips divert to alternative routes and other trips are simply not made. In case of uncongested condition demand would be equal to volume.

Capacity:
Capacity is the maximum number that can reasonably be expected to be served in thegiven time period. Capacity should be precisely defined as the flow rate for the period immediately preceding the formation of queues. Once queue is formed it will becomes queue discharge rate. This is more important than the stable-flow value.

PCU/PCE:
PCE means passenger car equivalent to express various types and characteristics vehiclesto a common type usually the passenger car. One car is considered to one unit.

ADT:
Average daily traffic or ADT, and sometimes also mean daily traffic, is the average number of vehicles two-way passing a specific point in a 24-hour period, normally measured throughout ayear. ADT is the standard measurement for vehicle traffic load on a section of road and the basis for most decisions regarding transport planning, or to the environmental hazards of pollution related to road transport. Road authorities have norms based on ADT, with decisions to expand road capacity at given thresholds.
The common applications are:

- Planning of highway activities
- Measurement of current demand

AADT (Annual average daily traffic):
Annual average daily traffic, abbreviated AADT, is a measure used primarily in transportation planning and transportation engineering. It is the total volume of vehicle traffic of a highway orroad for a year divided by 365 days. AADT is a useful and simple measurement of how busy theroad is. It is also sometimes reported as Average Annual Daily Traffic. (4)
This is useful for:

- Estimation of highway user revenues
- Accident rates per 1000 vehicle-km
- Traffic volume trends
- Economic feasibility
- Development of hierarchical system of facilities

Average Weekday Traffic (AWT):

The average 24-hr weekday volume at a given location over a defined time period less than oneyear. A common application is to measure an AWT for each month of the year.

Average Annual Weekday Traffic (AAWT):

The average 24-hr volume occurring on weekdays over a full 365-day year, estimated as number of vehicles passing a site on weekdays in a year divided by the number of weekdays(usually 260, considering 7-day week).

Expansion Factor:

Hourly, Daily and Monthly Expansion factors can be determined using data obtained at continuous count station.

Peak Hour Volume (PHV):

Maximum number of vehicles that pass a point on a highway during a period of 60 consecutive minutes.

It is useful for:-

- Functional classification of highways
- Design of geometric characteristics
- Capacity analysis
- Traffic operational plans
- Parking regulations

(5)

Design Hourly Volume:
It is the economic hourly flow of future year, which is used for designing geometric features roadway. It is chosen in such a way that during the design period it should not be exceeded too often or too much. (6)

I**nterrupted flow:** Flow at stop and go situation.

Uninterrupted flow: When the flow is smooth.

Saturation flow: The maximum hourly rate of an approach at a signalized junction.

Service flow rate: The maximum hourly rate of a roadway section during a givenperiod under prevailing roadway condition.

Free flow: When drivers face no restriction in driving and can maintain their desired speeds.

Forced flow: When lane changing opportunity decreases with increasing traffic volume and drivers are forced to follow slow leaders.

Stable/ Steady flow: When demands are well below the roadway capacity and theaverage rate of flow remains almost constant with time.

Unstable flow: When demand is at or near or exceeds the roadway capacity and theaverage rate of flow fluctuates largely with time.

Peak flow: Flow at peak periods.

Off-peak flow: Flow at Off-peak/lean periods.

Previous Traffic Volume Studies:

Traffic counts in road transport can be both manual and automated (using induction loops in the road surface) counts. Both result in numbers of road vehicles on some road link that usually distinguish between trucks (buses) and cars. The induction loop data can also be used to calculate travel times, but in these data there usually is no distinction between trucks, buses and cars.
Counts of trains, ships and airplanes are in principle also possible, but the collection and use of such data is uncommon outside major hubs, such as railway stations, airports or seaports. With new technology becoming avail- able, traffic counts for all modes of transport can be based on approaches, such as satellite observation, GPS location services, traffic cameras, Bluetooth communication and cellular phones. This opens up now possibilities to create a complete picture of traffic flows in areas that were previously difficult to map.

Traffic control and projected traffic count:

A traffic count needs to be performed to assess the effect on traffic flow during construction. Warning signs must be placed weeks in advance so that the users may select an alternative route to avoid congestion. Local authorities should be contacted to determine if they have any restrictions regarding lane closures. Before developing staging plans, the agency's traffic operations department will provide the maximum allowable lane closure hours in each direction and the maximum number of lanes that can be closed at one time. An 8- to 10-h night window is required for the contractor to properly complete his work. Extra hours are permitted for weekend work.

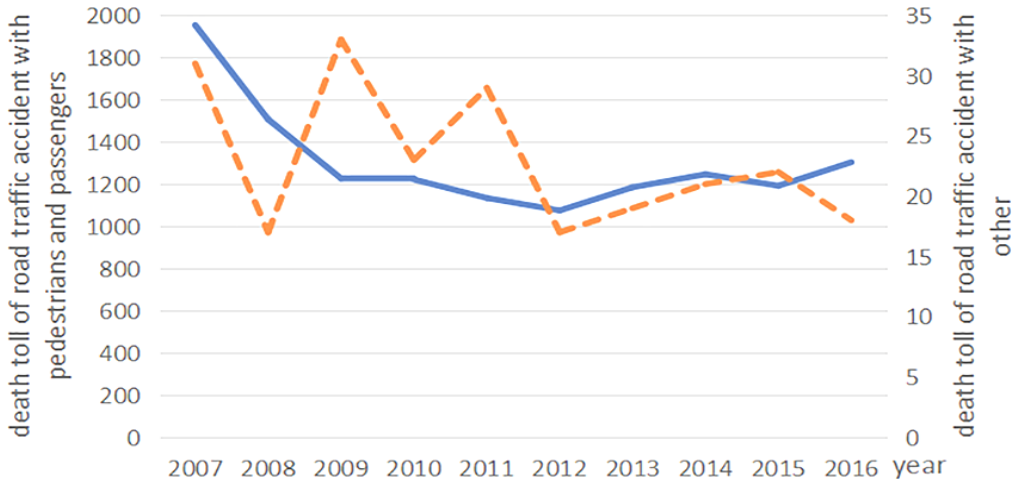


Fig: 2.2 Traffic Accident in China in 2007 (7)

2.2.1 Counting Methods:

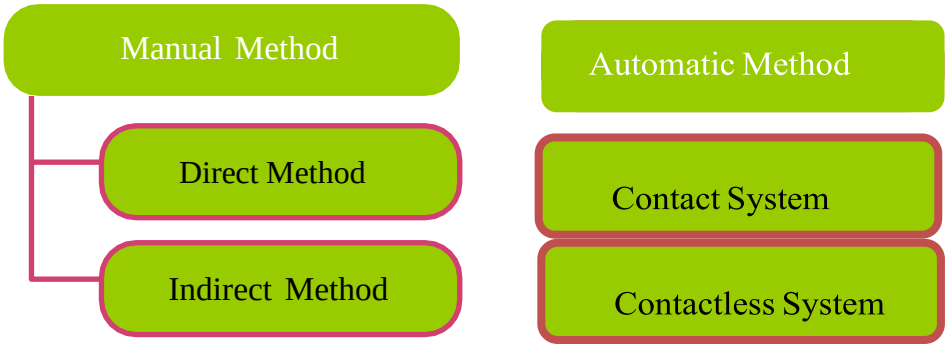


Table2.2.1: Counting Methods

Two methods are available for conducting traffic volume counts: (1) manual and (2) automatic. Manual counts are typically used to gather data for determination of vehicle classification, turning movements, direction of travel, pedestrian movements, or vehicle occupancy. Automatic counts are typically used to gather data for determination of vehicle hourly patterns, daily or seasonal variations and growth trends, or annual traffic estimates. The selection of study method should be determined using the count period. The count period should be representative of the time of day, day of month, and month of year for the study area. For example, counts at a summer resort would not be taken in January. The count period should avoid special event or compromising weather conditions .Count periods may range from 10minutes to 1 year . (7)

2.2.2 Manual Counting Method:

Most applications of manual counts require small samples of data at any given location. Manual counts are sometimes used when the effort and expense of automated equipment are not justified. Manual counts are necessary when automatic equipment is not available. Manual counts are typicallyused for periods of less than a day. Normal intervals for a manual count are 10, 20, or 50 minutes.

Manual Count Recording Methods:
Manual counts are recorded using one of three methods: tally sheets, mechanical counting boards or electronic counting boards.

Tally Sheets:

Recording data onto tally sheets is the simplest means of conducting manual counts. The data can be recorded with a tick mark on a pre-prepared field form. A watch or stopwatch is necessary to measure the desired count interval.



Fig2.2.1:Tally Sheet



Fig2.2.2:Mechanical counter

Mechanical Counting Boards:

Mechanical count boards consist of counters mounted on a board that record each direction of travel. Common counts include pedestrian, bicycle, vehicle classification, and traffic volume counts. Typical counters are push button devices with three to five registers. Each button represents a different stratification of type of vehicle or pedestrian being counted. The limited number of buttons on the counter can restrict the number of classifications that can be counted on a given board. A watch or a stopwatch is also necessary with this method to measure the desired count interval. (8)

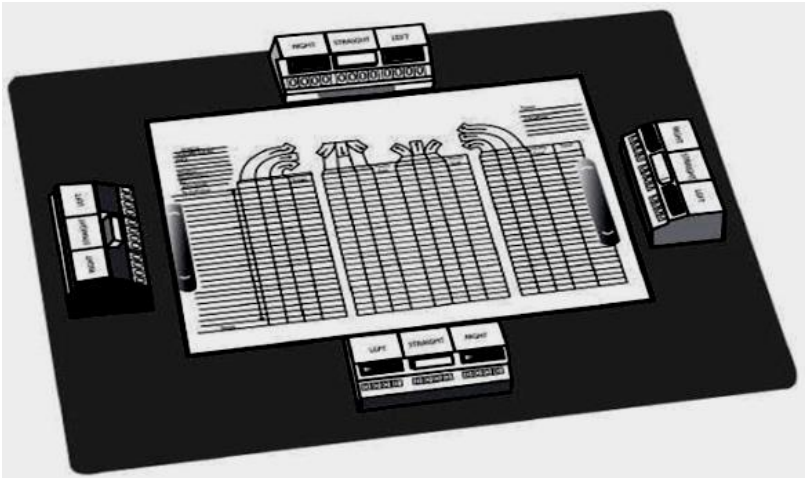


Fig 2.2.3: Mechanical Counting Board

Electronic Counting Boards:

Electronic Counting Boards Electronic counting boards are battery-operated,hand-held devices used in collecting traffic count data. They are similar to mechanical counting boards, but with some important differences. Electroniccounting boards are lighter, more compact, and easier to handle.



Fig 2.2.4: Electronic Counting Board

Label Data Forms and Record Observations:

Manual counts may produce a large number of data forms; therefore, the data forms should be carefully labeled and organized. On each tally sheet (a blank tally sheet is provided in Appendix B), the observer should record the location,time and date of observation, and weather conditions. Follow the data recording methods discussed earlier.





Fig 2.2.5: Signal Mounted Video Came

Direct Method: Data is counted by using hand tally and manualcounters/enumerators.
Advantages: By this method traffic volume as well as vehicle classification and turning proportions can be obtained. Data can be used immediately aftercollection.
Disadvantages: This method is not practicable for long duration count andwhen flow is high. Error is common especially when volume is high.

Direct Method: Data is counted by using hand tally and manual counters/enumerators.

Advantages: By this method traffic volume as well as vehicle classification and turning proportions can be obtained. Data can be used immediately after collection.

Disadvantages: This method is not practicable for long duration count andwhen flow is high. Error is common especially when volume is high. Count cannot be cross checked. Count cannot be done in bad weather.

Indirect Method: In this method, data is collected using video camera.Video is captured for long time and data is collected later by rewinding.

Advantages: Besides traffic volume, several traffic parameters can be obtained from recorded film. Data can be cross checked and quality can beensured. This method is applicable when volume is high. It is suitable for non-lane based traffic operation.

Disadvantages: A suitable elevated place is required for filming operation. Data cannot be used immediately after collection. Data must be manually transcript of recorded film. This process is time consuming and tedious. Because oflimitation of capacity of film, it is not suitable for long duration counts. Qualityof video recorded on film is dependent on intensity of light and this method is not suitable in overcast days.

Automatic Counting Method:

The automatic count method provides a means for gathering large amounts of traffic data. Automatic counts are usually taken in 1-hour intervals for each

24- Hour period. The counts may extend for a week, month, or year. When the counts are recorded for each 24-hour time period, the peak flow period can be identified. (9)

Automatic Count Recording Methods:

Automatic counts are recorded using one of three methods: portable counters,permanent counters, and videotape.

Portable Counters:

Portable counting is a form of manual observation. Portable counters serve thesame purpose as manual counts but with automatic counting equipment. The period of data collection using this method is usually longer than when using manual counts. The portable counter method is mainly used for 24-hour counts. Pneumatic road tubes are used to conduct this method of automatic

Videotape:
Observers can record count data by videotaping traffic. Traffic volumes can be counted by viewing videotapes recorded with a camera at a collection site. A digital clock in the video image can prove useful in noting time intervals. Video-taping is not a cost-effective option in most situations. Few small jurisdictions have access to this equipment.
An automatic count study includes three key steps (Robertson 1994):

1. Perform necessary office preparations.

2. Deploy and calibrate data collection equipment.

3. Check data and retrieve equipment.

Perform Necessary Office Preparations:

During office preparations, coordinate all data collection activities with appropriate state and local officials, including transportation, traffic, and law enforcement agencies. For example, you may coordinate with state or local officials in obtaining traffic control for the deployment and recovery of equipment. The field team must be briefed on the data collection process to ensure that all observers are collecting the same data type. The team should assemble and inspect all tools, supplies, and equipment. Each piece of equipment should be tested.

Deploy and Calibrate Data Collection Equipment:
The portable counter method using pneumatic road tubes is described here since the other methods are not cost-effective for jurisdictions in most automatic count study situations. The road tubes are prepared on the roadside to minimize the time each traffic lane is closed. Workers then place the road tubes across the lanes. The location of the tubes should be outside the influence of other factors such as an intersection, major access points, etc. Traffic control should be provided to protect the crew. After placing, the crew should make sure that the tubes are functioning properly. Finally, the crew can secure the road tubes to the pavement. To avoid theft, the recorder may also be secured.

Check Data and Retrieve Equipment:

When the data collection period has ended, the recorded data are checked for accuracy. Crews recover data collection equipment by reversing the process theyused to deploy it. Again, this automatic traffic count can be further classified as intrusive and non-intrusive methods. The former include counting systems that involve placing sensors in or on the roadbed; the latter involve remote observational techniques. In general the intrusive methods are used most widely because of their relative ease of use and because they have been employed for decades. The only widely used non-intrusive method is manual counting, which enjoys wide application because of its ease. Intrusive methods, however, have evolved little over the last decade, but in the US, with federal transport policy emphasis on IT solutions to traffic management, progress is being made in the development of non-intrusive methods. The major intrusive methods include. (10)

Bending plate:

A weight pad attached to a metal plate embedded in the road to measure axel weight and speed. It is an expensive device and requires alteration to the road bed.

Pneumatic road tube:

Arubber tube that is placed across the lanes that uses pressure changes to recordthe number of axle movements in a counter placed on the side of the road. The drawback is that it has limited lane coverage, may become displaced, and can bedislodged by snow ploughs.

Piezo-electric sensor:

A device that is placed in a groove cut into the roadbed of the lane(s) being counted. This electronic counter can be used to measure weight and speed. Cutting into the roadbed can affect the integrity of the roadbed and decrease thelife of the pavement

Inductive loop:

A wire embedded in the road in a square formation that creates a magnetic field that relays the information to a counting device at the side of the road. This has a generally short life expectancy because it can be damaged by heavy vehicles, and is also prone to installation errors.



Fig2.2.6: Pneumatic tube technology is used to collect vehicle classification data



Fig2.2.7 Using radar technologies, Smart Sensor HD devices have the capability of detecting vehicles

Advantages: This method is suitable for long duration or continuous count. It is used as permanent counting station. It does not need manpower and is free from human error. Data isobtained in usable format. It is less expensive as manpower is not needed. Count is not selected by bad weather condition. (11)

Disadvantages: It requires strict lane discipline. Non-motorized vehicles are hard to detect by this method. Detailed classification of vehicle is not possible. Accuracy is less than manual method. Installation cost is high.

2.3 Summary

Providing all required knowledge, information and materials regarding traffic volume study, team of people can be appointed to carry out volume survey by following proper method.

CHAPTER 3
METHODOLOGY

3.1 Introduction:

Traffic surveys and studies are an integral component of a comprehensive Traffic and Transportation study. Appreciation of existing traffic and travel characteristics is extremely important for developing comprehensive traffic and transportation plan. Moreover the traffic survey data, apart from helping in understanding the existing traffic and transportation situation along with its problems and constraints, would help in development, calibration and validation of the travel demand forecasting models. In order to achieving these goals number of traffic surveys has to be set out in Farmgate Road Segment and Shahabagh Road Segment. But before the final survey a reconnaissance and piloting survey has been executed to familiarize with the jobs and to find any problem that may occur in vehicle counting in final survey.

3.2 Methodology Overview

Survey Zone:

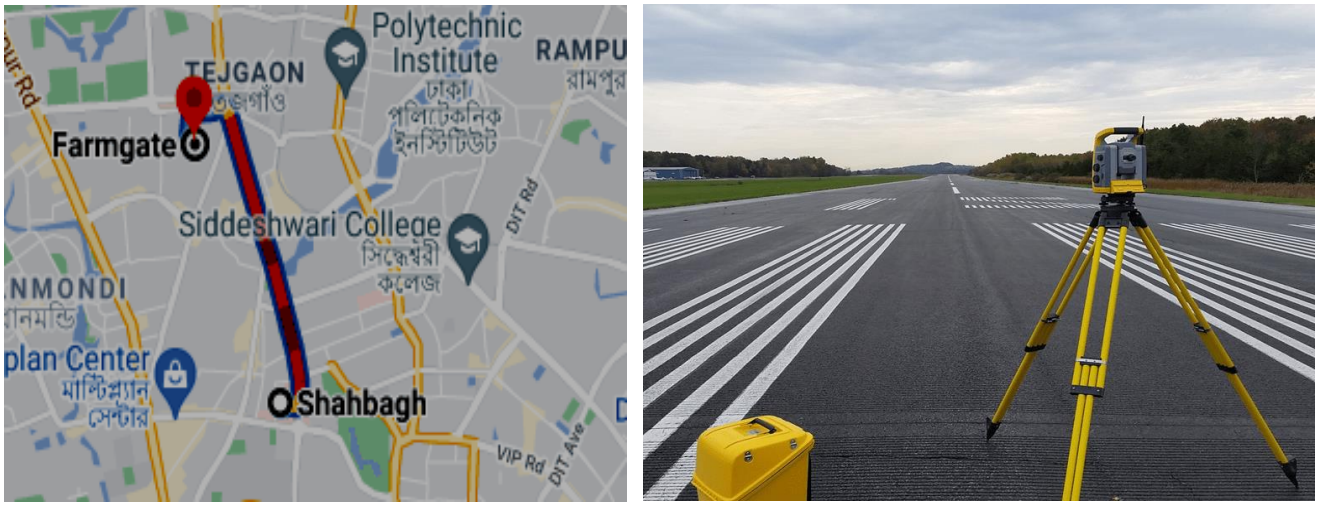


Fig3.2: Survey Road

Reconnaissance Survey

A walkover reconnaissance and route alignment survey first carried out. This is essentially carried out to verify the physical features on the ground which may not be clearly visible inthe map due to developments that might have taken place subsequent to the preparation of the map. On the basis of reconnaissance survey, some Traffic Analysis Zone (TAZs) for taking survey data has been identified. Again, observing the pattern of vehicle along the road, the enumerators are assigned to count the specific vehicle for traffic volume study.
Some bottleneck points were identified in the reconnaissance survey. And causes of bottlenecks were also identified. Pedestrian facility along the road was also observed in this survey.

- The number of private car is predominant in this road; second most availablevehicle along this road is motorcycle.

- There are some other bridge on this road.

- There are number of commercial building, shop, office building is situated on both side of the road

- There are two hospitals, Bardem Hospital and Bangabondhu Medical College Hospital is situated alongside the road,which is a major attraction of traffic and emergency vehicle.

- A large number of private vehicle type traffic is generated from this area

On the basis of all information a model classified traffic volume survey data sheet was developed for pilot survey.

Pilot Survey:

In the light of the results of reconnaissance survey a pilot survey was set out. A pilot surveyis a "pre- survey" of final survey. A pilot survey helped to work out some of the procedural bugs even though it is not likely to add anything new or important to main survey. Here aresome outcomes from pilot survey:

- It permitted preliminary testing of the method of survey that leads to testing more precise method in the main survey. It leads to changing some process, dropping some, anddeveloping new process for volume count and speed study.
- It provided the enumerators with ideas, approaches and clues that have not been foreseen in the reconnaissance survey. Such as place selected for counting traffic volume inreconnaissance survey did not provide clear view of the road, which raise the need of selecting new place for traffic count. TAZs identified in the pilot survey provide clearer view than before and decrease the chance of error.

Counting Method:

The counting method (CM), also known as Ochberg's counting method, is a therapeutic treatment designed to help with the desensitization of post traumatic stress disorder (PTSD)symptoms. The method was designed by psychiatrist Frank Ochberg in the early 1990s.

3.3 Summary:

Following a systematic method of colleting workable data can be collected. A well definedand disciplined method of survey leads to reliable data for further planning, designing and decision making process.

CHAPTER 4
RESULTS AND DISCUSSION

4.1 Introduction:

Following the method described before data were collected. To accomplish a smooth process of data collection, a wholesome knowledge regarding the survey area is required, which will be described below along with the process of data collection. (12)[ii]

Date:

Data for volume study were collected on 15 September to 21 September 2021. It was Wednesday to Tuesday.

Again Data were collected on 14 December to 20 December 2021. It was Tuesday to Monday.

It was total 14 working days.

Duration:

Duration of data collection was 30 minutes, which was took place from 05:00 pm to 05:30 pm.

Weather Condition:

It was a rainy and cold day. But some days were good and Sky was clear. We had to face occasional light rain while collecting data, but we worked and enjoyed the rest of the time.

Location:

Location of the traffic volume study was selected to be from Farmgate to Shahbagh. Vehicles from Farmgate to Shahbagh and from Shahbagh to Farmgate were counted.

Observation:

Main goal of observation was classified vehicle counts. As the vehicles were classified in different categories, they were counted throughout the counting period.

Method:

The survey was conducted by direct count with manual method. But because of the lockdown, we were having trouble spontaneously counting cars, so we recorded the video on our mobile phones, and then came home and tiled the vehicles, counting them separately .

Equipment:

For recording data a tabulated sheet was prepared by enumerators beforehand, which come handy in recording classified vehicle count. A stop watch was used to follow the time of data collection.

Number of Enumerator:

There were 4 enumerators in group. Every enumerator was appointed to count one or more than one category of vehicle

4.2: Specific Aim
Discussion

Data Analysis
Data were collected following the procedure described before and collected data were analyzed.
Volume Count Data:

DAY1

Site & Location : Shahbagh to Farmgate
Observation: One directional (N to S) classified Vehicle count.
Date : 15.09.2021 (Wednesday)
Time : 5.00 Pm- 5.30 Pm
Duration : 30minute
Weather Condition: Cloudy day

DATA COLLECTION TABLE

Cycle (Min)	Number of Vehicles						
	Bus	**Cng**	**Car**	**Microbus/Jeep/ Ambulance**	**Bike**	**Nmv**	**Utility**
00-05	48	24	45	27	33	12	5
05-10	47	36	74	34	43	15	9
10-15	63	38	53	41	35	9	6
15-20	69	33	59	38	41	11	7
20-25	81	44	79	43	36	13	0
25-30	73	41	81	37	46	17	8
Total	381	216	391	220	234	67	35

Table 4.2: Data Collection

DAY2

Site & Location : Shahbagh to Farmgate
Observation: One directional (N to S) classified Vehicle count.
Date: 16.09.2021 (Thursday)
Time : 5.00 Pm- 5.30 Pm
Duration : 30minute
Weather Condition: Hot day

DATA COLLECTION TABLE

Cycle (Min)	Number of Vehicles						
	Bus	Cng	Car	Microbus/Jeep/ Ambulance	Bike	Nmv	Utility
00-05	80	55	78	52	78	10	2
05-10	71	61	68	39	56	17	8
10-15	89	42	91	41	69	9	5
15-20	68	36	115	38	71	7	11
20-25	65	38	99	45	80	16	6
25-30	82	45	125	56	66	12	9
Total	445	277	576	271	420	71	41

Table 4.2.1: Data Collection

DAY 3

Site & Location : Shahbagh to Farmgate
Observation: One directional (N to S) classified Vehicle count.
Date: 17.09.2021 (Friday)
Time : 5.00 Pm- 5.30 Pm
Duration : 30minute Weather
Condition: Hot day

DATA COLLECTION TABLE

Cycle (Min)	Number of Vehicles						
	Bus	Cng	Car	Microbus/Jeep/ Ambulance	Bike	Nmv	Utility
00-05	25	16	25	15	22	19	0
05-10	35	8	31	11	29	12	2
10-15	32	16	22	21	43	8	5
15-20	34	14	15	16	17	16	0
20-25	35	19	19	19	27	13	4
25-30	35	21	13	27	34	11	1
Total	196	94	125	109	172	79	12

Table 4.2.2: Data Collection

DAY 4

Site & Location : Shahbagh to Farmgate
Observation: One directional (N to S) classified Vehicle count
Date.: 18.09.2021 (Saturday)
Time : 5.00 Pm- 5.30 Pm
Duration : 30minute Weather Condition:
Hot Day

DATA COLLECTION TABLE

Cycle (Min)	Number of Vehicles						
	Bus	Cng	Car	Microbus/Jeep/ Ambulance	Bike	Nmv	Utility
00-05	45	51	50	55	75	8	3
05-10	62	35	77	61	59	10	0
10-15	54	42	61	43	48	11	5
15-20	48	22	49	46	36	6	2
20-25	66	19	76	56	33	16	8
25-30	71	36	56	38	22	7	4
Total	346	205	369	299	273	58	22

Table 4.2.3: Data Collection

DAY 5

Site & Location : Shahbagh to Farmgate
Observation: One directional (N to S) classified Vehicle count.
Date: 19.09.2021 (Sunday)
Time : 5.00 Pm- 5.30 Pm
Duration : 30minute Weather Condition:
Hot Day

DATA COLLECTION TABLE

Cycle (Min)	Number of Vehicles						
	Bus	Cng	Car	Microbus/Jeep/ Ambulance	Bike	Nmv	Utility
00-05	92	66	123	67	81	9	3
05-10	88	57	89	61	90	11	5
10-15	103	42	99	76	103	13	0
15-20	89	67	115	68	68	7	6
20-25	95	51	78	83	56	19	2
25-30	67	44	83	69	88	12	3
Total	534	327	587	424	486	64	19

Table 4.2.4: Data Collection

DAY 6

Site & Location : Shahbagh to Farmgate
Observation: One directional (N to S) classified Vehicle count.
Date : 20.09.2021 (Monday)
Time : 5.00 Pm- 5.30 Pm
Duration : 30minute Weather
Condition: Hot day

DATA COLLECTION TABLE

Cycle (Min)	Number of Vehicles						
	Bus	Cng	Car	Microbus/Jeep/ Ambulance	Bike	Nmv	Utility
00-05	68	38	98	35	56	15	8
05-10	79	51	120	44	62	12	3
10-15	89	29	88	52	47	17	0
15-20	97	67	83	61	51	19	5
20-25	104	34	76	45	39	17	2
25-30	88	28	81	46	42	21	7
Total	529	247	546	283	297	101	25

Table 4.2.5: Data Collection

DAY 7

Site & Location : Shahbagh to Farmgate
Observation: One directional (N to S) classified Vehicle count.
Date: 21.09.2021 (Tuesday)
Time : 5.00 Pm- 5.30 Pm
Duration : 30minute
Weather Condition: Cloudy day

DATA COLLECTION TABLE

Cycle (Min)	Number of Vehicles						
	Bus	Cng	Car	Microbus/Jeep/ Ambulance	Bike	Nmv	Utility
00-05	79	51	122	56	35	18	3
05-10	78	55	104	44	52	24	2
10-15	105	47	89	62	45	22	0
15-20	97	53	98	61	51	17	1
20-25	85	62	82	47	44	15	8
25-30	80	48	92	42	46	21	5
Total	524	306	587	312	273	117	18

Table 4.2.6: Data Collection

DURING PERIOD
(15/09/21 to 14/12/21)

DAY 1

Site & Location : Shahbagh to Farmgate
Observation: One directional (N to S) classified Vehicle count.
Date : 14.12.2021 (tuesday)
Time : 5.00 Pm- 5.30 Pm
Duration : 30minute
Weather Condition: cold day

DATA COLLECTION TABLE

Cycle (Min)	Number of Vehicles						
	Bus	Cng	Car	Microbus/Jeep/ Ambulance	Bike	Nmv	Utility
00-05	61	53	77	24	62	18	1
05-10	67	58	82	29	58	19	4
10-15	72	47	86	28	55	12	8
15-20	78	45	91	31	43	16	3
20-25	81	55	94	34	57	19	2
25-30	86	51	105	28	48	13	1
Total	445	309	535	174	323	97	19

Table 4.2.7: Data Collection

DAY 2

Site & Location : Shahbagh to Farmgate
Observation: One directional (N to S) classified Vehicle count.
Date : 15.12.2021 (Wednesday)
Time : 5.00 Pm- 5.30 Pm
Duration : 30minute
Weather Condition: cold day

DATA COLLECTION TABLE

Cycle (Min)	Number of Vehicles						
	Bus	Cng	Car	Microbus/Jeep/ Ambulance	Bike	Nmv	Utility
00-05	117	61	128	52	85	15	0
05-10	101	68	101	49	93	17	4
10-15	99	73	92	58	80	18	8
15-20	102	80	120	45	103	21	0
20-25	85	89	103	46	117	19	2
25-30	97	85	109	48	121	23	7
Total	601	456	653	298	599	113	21

Table 4.2.8: Data Collection

DAY 3

Site & Location : Shahbagh to Farmgate
Observation: One directional (N to S) classified Vehicle count.
Date: 16.12.2021 (thursday)
Time : 5.00 Pm- 5.30 Pm
Duration : 30minute
Weather Condition: cold day

DATA COLLECTION TABLE

Cycle (Min)	Number of Vehicles						
	Bus	Cng	Car	Microbus/Jeep/ Ambulance	Bike	Nmv	Utility
00-05	33	25	38	24	33	21	0
05-10	26	17	32	29	29	23	1
10-15	29	29	39	28	21	22	0
15-20	39	41	43	31	39	25	2
20-25	35	38	45	34	45	24	0
25-30	40	45	42	29	51	17	3
Total	202	195	239	175	218	132	6

Table 4.2.9: Data Collection

DAY 4

Site & Location : Shahbagh to Farmgate
Observation: One directional (N to S) classified Vehicle count.
Date : 17.12.2021 (Friday)
Time : 5.00 Pm- 5.30 Pm
Duration : 30minute
Weather Condition: cold day

DATA COLLECTION TABLE

Cycle (Min)	Number of Vehicles						
	Bus	Cng	Car	Microbus/Jeep/ Ambulance	Bike	Nmv	Utility
00-05	41	20	42	21	48	19	1
05-10	47	21	48	25	51	10	0
10-15	39	26	56	18	48	13	3
15-20	38	16	57	19	43	15	5
20-25	57	19	51	33	59	21	1
25-30	59	31	59	22	63	17	2
Total	281	133	313	138	302	97	12

Table 4.2.10: Data Collection

DAY 5

Site & Location : Shahbagh to Farmgate
Observation: One directional (N to S) classifiedVehiclecount.
Date : 18.12.2021 (Saturday)
Time : 5.00 Pm- 5.30 Pm
Duration : 30minute Weather Condition: cold
day

DATA COLLECTION TABLE

Cycle (Min)	Number of Vehicles						
	Bus	Cng	Car	Microbus/Jeep/ Ambulance	Bike	Nmv	Utility
00-05	48	30	58	24	48	14	0
05-10	52	35	62	29	43	16	4
10-15	44	28	59	18	42	18	8
15-20	58	41	63	31	51	22	0
20-25	65	37	78	34	54	19	2
25-30	75	45	82	28	60	15	1
Total	342	216	392	164	298	104	15

Table 4.2.11: Data Collection

DAY 6

Site & Location : Shahbagh to Farmgate
Observation: One directional (N to S) classified Vehicle count.
Date : 19.12.2021 (Sunday)
Time : 5.00 Pm- 5.30 Pm
Duration:30minute Weather Condition:cold
day

DATA COLLECTION TABLE

Cycle (Min)	Number of Vehicles						
	Bus	Cng	Car	Microbus/Jeep/ Ambulance	Bike	Nmv	Utility
00-05	120	55	122	72	65	10	7
05-10	99	56	98	67	72	19	3
10-15	95	47	108	57	45	21	0
15-20	102	48	98	53	58	11	9
20-25	93	36	123	47	64	18	4
25-30	90	40	105	42	53	11	3
Total	599	242	654	348	357	90	26

Table 4.2.12: Data Collection

DAY 7

Site & Location : Shahbagh to Farmgate
Observation: One directional (N to S) classified Vehicle count.
Date: 20.12.2021 (monday)
Time: 5.00 Pm- 5.30 Pm
Duration: 30minute
Weather Condition: Cold day

DATA COLLECTION TABLE

Cycle (Min)	Number of Vehicles						
	Bus	Cng	Car	Microbus/Jeep/ Ambulance	Bike	Nmv	Utility
00-05	85	65	72	62	55	12	1
05-10	88	52	84	47	62	18	4
10-15	80	37	99	56	55	17	0
15-20	82	43	95	61	53	22	6
20-25	85	66	87	57	54	16	2
25-30	78	48	91	62	43	18	0
Total	498	321	528	345	322	104	13

Table 4.2.13: Data Collection

AVERAGE DATA COLLECTION TABLE

Date: 15.09.21 to 21.09.21

Previous Data Table

Cycle (Min)	Number of Vehicles						
	Bus	Cng	Car	Microbus/Jeep/ Ambulance	Bike	Nmv	Utility
00-05	437	301	541	307	380	91	24
05-10	460	303	563	294	391	101	29
10-15	535	256	503	336	390	89	21
15-20	502	292	534	328	335	83	32
20-25	531	262	509	338	315	109	30
25-30	496	263	531	315	344	101	37
Total	493.5	280.33	530.17	319.67	359.17	95.67	28.89

Table 4.2.14: Average Data Collection

Date: 14.12.21 to 20.12.21

During Period Data Table

Cycle (Min)	Number of Vehicles						
	Bus	Cng	Car	Microbus/Jeep/ Ambulance	Bike	Nmv	Utility
00-05	505	309	537	279	396	109	10
05-10	480	307	507	275	408	122	20
10-15	458	287	539	263	346	121	27
15-20	499	363	567	271	390	132	25
20-25	501	340	581	285	450	136	13
25-30	525	345	593	259	439	114	17
Total	494.67	325.17	554	272	404.83	122.33	18.67

Table 4.2.15: Average Data Collection

Passengar car unit(PCU)

Date: 15.09.21 to 21.09.21

Previous Data Table

Vehicle Composition	Observation in 30 minutes	Hourly Volume	Vehicle %	PCU	Hourly PCU
Bus	493.5	987	23.41	3	2961
CNG	280.33	560.66	13.30	0.5	280.33
Car	530.17	1060.34	25.16	1	1060.34
Microbus/ Jeep/ Ambulance	319.67	639.34	15.17	1.5	959.01
Motorcycle (MC)	359.17	718.34	17.04	0.1	71.83
NMV	95.67	191.34	4.54	0.5	95.67
Utility	28.83	57.66	1.37	1.5	86.49
Total	2107.34	4214.68	100		5514.67

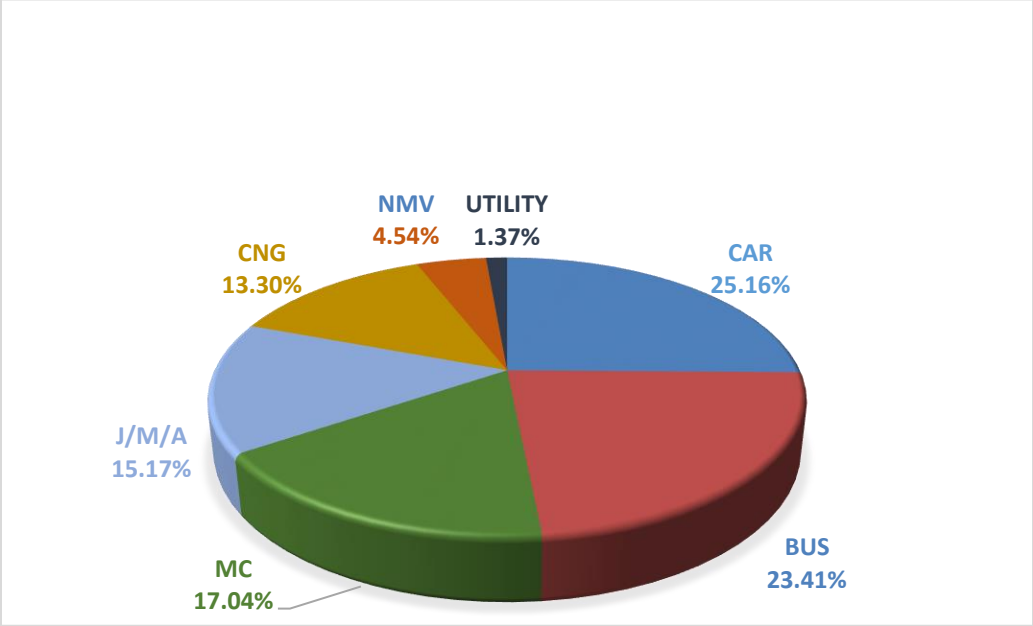
Table 4.2.16: Passenger car unit

Date: 14.12.21 to 20.12.21
During Period Data Table

Vehicle Composition	Observation in 30 minutes	Hourly Volume	Vehicle %	PCU	Hourly PCU
Bus	494.67	989.34	22.57	3	2968.02
CNG	325.17	650.34	14.84	0.5	325.17
Car	554	1108	25.28	1	1108
Microbus/Jeep/ Ambulance	272	544	12.41	1.5	816
Motorcycle (MC)	404.83	809.66	18.47	0.1	80.97
NMV	122.33	244.66	5.58	0.5	122.33
Utility	18.67	37.34	0.85	1.5	56.01
Total	2191.67	4383.34	100		5476.5

Table 4.2.17: Passenger car unit

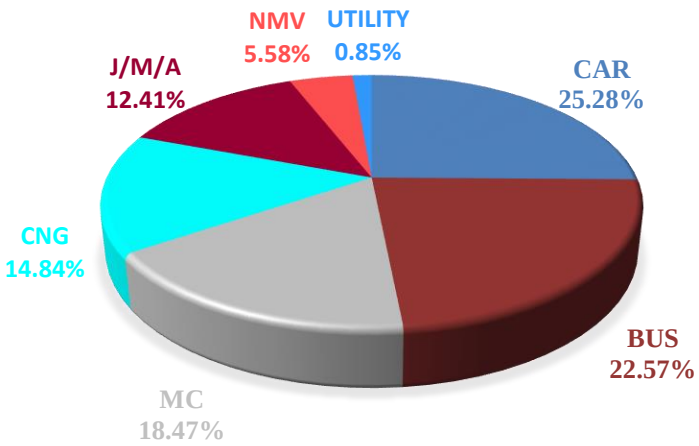
Date: 15.09.21 to 21.09.21
Previous Vehicle Composition



CAR	**25.16%**
BUS	**23.41%**
MOTORCYCLE	**17.04%**
JEEP/MICRO/AMBULANCE	**15.17%**
CNG	**13.30%**
NMV	**4.54%**
UTILITY	**1.37%**

Fig 4.2.1 Previous Vehicle composition

Date: 14.12.21 to 20.12.21
During Period Vehicle composition



CAR	**25.28%**
BUS	**22.57%**
MOTORCYCLE	**18.47%**
CNG	**14.84%**
JEEP/MICRO/AMBULANCE	**12.41%**
NMV	**5.58%**
UTILITY	**0.85%**

Fig 4.2.2 During period vehicle composition

Service Flow Rate and Level of Service (LOS)

Service Flow Rate is the maximum hourly rate at which persons or vehicles reasonably can be expected to traverse a point or uniform segment of a lane or roadway during a given period under prevailing roadway, traffic, and control conditions while maintaining a designated level of service. The service flow rates generally are based on a 25-minute period. Typically, the hourly service flow rate is defined as four times the peak 25-minute volume. Service flow rate is the traffic parameter most commonly used in capacity and level-of-service (LOS) evaluations. Knowledge of highway capacity and LOS is essential to properly fit a planned highway or street to the requirements of traffic demand.

LOS Criteria:

LOS-A: Represents Free-flow condition; freedom to select travel speed; side-friction or interaction is very low; level of comfort and convenience is excellent

LOS-B: Represents a zone of stable flow; reasonable freedom to select travel speed; Side- friction starts affecting and level of comfort and convenience is relatively lower

LOS-C: Also a zone of stable flow; selection of speed is affected by others; Side-friction significantly affects the drivers and level of comfort and convenience declines noticeably

LOS-D: Represents the limit of stable flow; freedom to select travel speed is severely affected; Side-friction severely affects the drivers and level of comfort and convenience is poor.

LOS-E: Represents close to the capacity level; average speeds are low but uniform; Side- friction causes forced maneuvers and level of comfort and convenience is extremely poor and driver frustration is high.

LOS-F: Represents zone of forced or breakdown flow; queue formation takes place (stop- and-go waves); delays result.

Passenger Car Equivalent (PCE) : is a metric used in Transportation Engineering, to assess traffic-flow rate on a highway. A Passenger Car Equivalent is essentiallythe impact that a mode of transport has on traffic variables (such as headway, speed, density) compared to a single car

Date: 15.09.21 to 21.09.21
Previous Passenger Car Equivalent

Vehicle Composition	Observation in 30 minutes	PCE	Converted Number	Hourly PCU
Bus	493.5	3	1480.5	2961
CNG	280.33	0.5	140.165	280.33
Car	530.17	1	530.17	1060.34
Microbus/Jeep/ Ambulance	319.67	1.5	479.505	959.01
Motorcycle (MC)	359.17	0.1	35.92	71.83
NMV	95.67	0.5	47.84	95.67
Utility	28.83	0.5	14.42	86.49
Total	2107.34		2728.52	5514.67

Table 4.2.18 Previous Passenger Car Equivalent (PCE)

Date: 14.12.21 to 20.12.21

During Period Passenger Car Equivalent

Vehicle Composition	Observation in 30 minutes	PCE	Converted Number	Hourly PCU
Bus	494.67	3	1484.01	2968.02
CNG	325.17	0.5	162.59	325.17
Car	554	1	554	1108
Microbus/Jeep/ Ambulance	272	1.5	408	816
Motorcycle (MC)	404.83	0.1	40.48	80.97
NMV	122.33	0.5	61.17	122.33
Utility	18.67	0.5	9.34	56.01
Total	2191.67		2719.59	5476.5

Table 4.2.19 Passenger Car Equivalent

Los	Service Flow Rate(PCU/Hr)
A	**600**
B	**700**
C	**900**
D	**1200**
E	**1400**
F	**>1400**

Table 4.2.20: Service Flow Rate

Service Flow Rate (05:00 pm – 06:00 pm) = 5514.67 PCU/hr From calculation it is foundthat the service flow rate of this corridor at 05:00pm to 06:00 pm was 5514.67 PCU/hr.
Anotherone Service Flow Rate (05:00 pm – 06:00 pm) = 5476.5 PCU/hr From calculation it is found that the service flow rate of this corridor at 05:00pm to 06:00 pm was 5476.5 PCU/hr.

Again, level of service of a road can be determined from service flow rate. Level of serviceof a road can be classified according to service flow rate as below.

According to this previous data table the level of service of the road was ‘F’ at 05:00 pm-06:00 pm

According to this during period data table the level of service of the road was ‘F’ at 05:00 pm-06:00pm

Directional Distribution

The directional Distribution is defined as the percentage of heavier volume over the totalhighway volume. This directional distribution is relevant only when designing or analyzing highways with two or more lanes in one direction. Directional distribution are used for capacity analysis, signal timing, justifying traffic control etc. The directional distribution can be calculated from the data obtained by six groups as below:

Date: 15.09.21 to 21.09.21

Previous Data Table

Direction	Time	Average	Directional Distribution
Shahbagh to Farmgate	5:00PM-5:30PM	5514.67	52%
Farmgate to Shahbagh	5:00PM-5:30PM	5090.46	48%



Table.4.2.21- Previous Distribution direction

Date: 14.12.21 to 20.12.21
During period Data Table

Direction	Time	Average	Directional Distribution
Shahbagh to Farmgate	5:00PM-5:30PM	5476.5	51%
Farmgate to Shahbagh	5:00PM-5:30PM	5700.03	49%

51%	**49%**

Table.4.2.22 During Period Distribution Direction

4.3 Summary

This section of report presents the analysis based on collected data, which leads to make some comparison with previous data. When we compare our data collection table with the previous traffic volume data and during period traffic volume, we see that some difference.

CHAPTER 5
CONCLUSIONS AND FUTURE WORKS

5.1 Conclusion:

This report presented all possible analysis by the data collected from field survey. Now it'stime to discuss on the results obtained from the analysis and their significance. In our study, light vehicle was the predominant in the corridor among the vehicle counted. The most previous vehicle car counted value is 25.16% . The second most vehicle composition bus counted value is 23.41 %. The third most vehicle MC counted value is 17.04% . The fourth most vehicle (Jeep/ Microbus/) counted value is 15.17% . Fifth most vehicle CNG counted value is 13.30% . NMV & utility counted value is 4.54 % & 1.37 % .

The most during period vehicle car counted value is 25.28% . The second most vehicle composition bus counted value is 22.57 %. The third most vehicle MC counted value is 18.42% . The fourth most vehicle (Jeep/ Microbus/) counted value is 14.84% . Fifth most vehicle CNG counted value is 12.41% . NMV & utility counted value is 5.58 % & 0.85 % .

5.2 Limitations and Recommendations for Future Works:

Discussion on Directional Distribution:

52%of traffic flow was towards Shahbagh which indicates tidal flow towards South North.It was morning rush hour. So flow was higher towards the city center. 48 percent of trafficwas flowing towards North South. If another vehicle count was done in evening rush hour,opposite scenario might be seen.

Again 51%of traffic flow was towards Shahbagh which indicates tidal flow towards South North. It was morning rush hour. So flow was higher towards the city center. 49 percent of trafficwas flowing towards North South. If another vehicle count was done in evening rush hour,opposite scenario might be seen.

Discussion on Flow Fluctuation:

To draw flow fluctuation curve, it was assumed that volume for three continuous hours were counted, although all vehicles were counted within one hour. Each group counted vehicles for 30 minutes in each direction. Flow rates were calculated from that short countdata and plotted. The flow fluctuation curve shows a peak at 05:00 pm-05:30pm.

Recommendations:

There are some recommendations based on the study took place. They are as follows-

- Manual count method required trained enumerators, which was not available in this case.
- For more reliable data automatic data collection process should be used.
- Data were collected for 30 minutes by each group, which may not represent the hourly

fluctuation of traffic, so for more allegorical data one hour data should be taken.

- More public transport facility should be provided to support the need of inhabitants living the residential area near the road.
- NMV should be prohibited in this road which will help to increase the Level of Service and Travel Speed.
- This road mainly served the purpose of collector road. Collector roads should bedesigned for a level of service F or better.

Scope for Further Study:

There are some short comings in the study. If these shortcomings can be overcome, morereliable and valuable data can be obtained. These shortcomings are described below:

-This volume study was practiced by un-skilled enumerators, which may lead to some error in data collection process.

-Data collected by manual method of counting, which is unreliable and irreversible, more representatives and reliable data could be obtained if automatic data collectionmethod were followed.

Data were collected for short-term (30 minute), which was not representative to the flow characteristics of the road. If 10 days continuous data were collected, that would me much more representative than this short count of traffic volume.

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