ESTIMATING TRAFFIC VOLUME TO IDENTIFY THE LEVEL OF SERVICE IN MAJOR INTERSECTIONS OF MIRPUR 10, DHAKA-1216, BANGLADESH.

Submitted by

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A Thesis Submitted to the Department of Civil Engineering, Daffodil International University in Partial Fulfillment of the Requirements for the Degree of

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DECLARATION

The thesis entitled *"Estimating traffic volume to identify the level of service in major intersections of Mirpur 10, dhaka-1216, Bangladesh*." has been performed under the supervision of **Mr. Saurav Barua**, (Assistant Professor) Department of Civil Engineering, Daffodil International University, Dhaka, Bangladesh, and got permission in partial completion of the requirement for the Bachelor of Science in Civil Engineering. This is hereby declared that this thesis or any part of it has not been submitted elsewhere and any degree.

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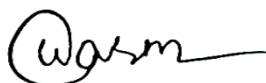**Md.Moktadir Rahman**
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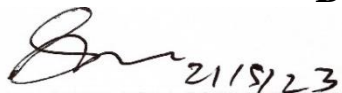
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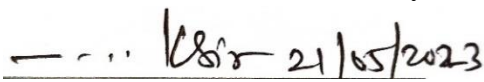
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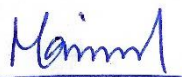**Dr. M. R. Kabir**   Chairman
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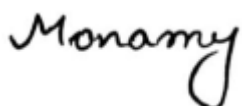**Mohammad Mominul Hoque**   Member (Internal)
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ABSTRACT

The increment of vehicles due to the proportional increment of populations and a rapid development of modern society is a major concern in Metropolitan cities in developing countries like Bangladesh. So, it is imperative to monitor traffic volume as well as the quality of transport supply termed as the Level of Service (LOS). The present study is an investigation of the behavior of mixed traffic flow in Dhaka Mirpur-10 city of Bangladesh. Field Traffic volume survey was carried out to determine the level of service at 3 major Unfinalized intersections in Dhaka north city corporation (DNCC). Level of service (LOS) was determined by volume capacity ratio and peak hour factor (PHF) method. Nature of traffic flow in Dhaka Mirpur-10 city is heterogeneous. So, this heterogeneous or mixed traffic are simplified by Passenger car unit (PCU). Then estimated PCU was used to determine LOS. LOS was calculated for both directions of roads. Car, CNG, Private Car, rickshaw and bike are the dominant vehicles in Manicotti, Mirpur-10. According to PHF method and V/C ratio method, LOS of Manicotti intersection is very unstable and worst. Residential area is very worst in nature after analyzing both V/C ratio and PHF method. Considering and evaluating all the findings it can be recommended that Restriction for truck movement in daytime should be applied in Manicotti intersection and width. Also, incorporation of an effective traffic signal, traffic rules and regulation should be applied and maintained properly in the worst condition intersection should be extra bike lane rout system the traffic flow in Mirpur-10 DNCC area.

ACKNOWLEDGEMENTS

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CHAPTER 1
INTRODUCTION

1.1 General

The circumstances of the traffic and the number of cars in that specific region would be evaluated as part of traffic volume research for transportation engineering in Mirpur-10. A traffic volume analysis at the specific location of Mirpur-10 would offer important insights into the transportation system and aid in developing and upgrading traffic management measures. The aims, purpose, and importance of performing the traffic volume study in Mirpur-10 are often outlined in the opening portion of such a study. It would provide background information for the study and elucidate the significance of comprehending the volume of traffic in the area. Here is an example of an introduction for a traffic volume study in Mirpur-10 in the field of transportation engineering. Mirpur-10, a district of Bangladesh's capital, the city of DNCC is a thriving one. It is a key component of the area's transportation system. It is essential to carry out a thorough traffic volume analysis in Mirpur-10 as urbanization and population growth continue. In order to improve traffic management techniques and transportation planning, this study intends to evaluate the area's existing traffic conditions and vehicle volume.

1.2 Back ground

Give a brief description of the location of Mirpur-10 in relation to the region's transportation system. Draw attention to any unique features of the location that might have an impact on traffic flow, such as its closeness to important thoroughfares, commercial sectors, or residential areas. Mention any local transportation studies that have been done in the past and point out the necessity of a thorough traffic volume analysis. The neighborhood's Mirpur-10 acts as a key node connecting diverse residential, commercial, and institutional districts. It is a thriving and dynamic area of the city and is home to many businesses, educational facilities, and apartment buildings. Its prominence within the urban landscape is further amplified by its very important highways and transit hubs. Prior transportation studies in Mirpur-10 have mostly concentrated on infrastructure development, traffic flow, and congestion patterns. To get precise information on the number of cars at various times of the day and on different road segments, a thorough examination of traffic volume is still required. Such information can greatly aid in understanding the existing transportation situation and support decision-making for future planning that is supported by facts.

1.3 Work Plan

1) Determine the current traffic volume in Mirpur-10 during peak and off-peak hours.

2) Identify the research area's traffic patterns, including busy times and congested locations.

3) Recognize how traffic flow is affected by current transportation infrastructure, such as road networks and intersections.

4) Offer trustworthy information that can be applied to Mirpur-10's future transportation planning and development endeavors.

1.4 Objective

The purpose of this study is to find out the problems of current traffic volume in Mirpur-10 during peak and off-peak hours.

1.5 Summary

In order to analyze the volume of traffic, a combination of hand counts and computerized traffic counters will be strategically positioned throughout Mirpur-10. The gathering of data will take place over a predetermined time period, ensuring that representative samples are acquired for various hours and days of the week. It is critical to be aware of any potential restrictions that could emerge throughout the study, such as unfavorable weather, ongoing road work, or other outside circumstances that could impair the accuracy and dependability of the data gathered. There will be steps taken to lessen these restrictions and guarantee that the study's findings are very valid.

CHAPTER 2
LITERATURE REVIEW

2.1 General

The goal of the literature review section is to give a thorough overview of prior research on traffic volume in metropolitan settings, with a focus on pertinent studies carried out in situations similar to Mirpur-10. The main conclusions, methodology, and information gaps that will support the present traffic volume study will be highlighted in this review.

2.2 Importance of Traffic Volume Studies:

The significance of researching traffic volume in mirpur-10, DNCC areas is emphasized in this paragraph. It examines how traffic volume data can be used to plan transportation, build infrastructure, regulate traffic, and improve safety. The assessment emphasizes the importance of reliable traffic volume data for effective urban mobility and sustainable transportation options.

2.3 Traffic Volume Measurement Techniques:

Here, several technologies and measurement techniques are discussed. Traditional methods like hand counts and observational surveys are included, along with automated methods including loop detectors, video-based systems, and remote sensing tools. The benefits, drawbacks, and applicability of each technique are examined to determine which is best for Mirpur-10.

2.4 Factors Influencing Traffic Volume:

The elements influencing traffic volume in metropolitan areas are examined in this subsection. It examines both internal and exterior elements, including road characteristics, traffic laws, and travel behavior. Exterior factors covered include land use patterns, population density, and economic activity. Knowing these elements will make it easier to understand the unique dynamics of traffic volume in Mirpur-10.

2.5 Traffic Volume Patterns and Characteristics:

The following section includes studies that look into the characteristics and trends of traffic volume in metropolitan regions. Research on peak traffic hours, temporal fluctuations, geographic distribution, and congestion locations is examined. The review looks for overlaps and discrepancies across earlier studies in addition to possible applications of those conclusions to Mirpur-10.

2.6 Traffic Volume and Infrastructure:

The relationship between the amount of traffic and the infrastructure for transport is examined in this subsection. It discusses studies that look into how intersections, traffic signals, road networks, and public transportation services impact traffic volume. The analysis emphasizes how important infrastructural design and development are to efficiently managing traffic congestion.

2.7 Traffic Volume and Safety:

In the present piece, the study on the connection between urban traffic volume and health and safety is examined. It looks at studies that look into the connection between pedestrian safety, accident rates, and traffic volume. The analysis highlights how crucial it is to take safety precautions into account and spot high-risk regions when analyzing Mirpur-10 traffic volume.

2.8 Gaps in Knowledge:

The existing literature on volume traffic studies in metropolitan settings is reviewed in this article to identify deficiencies. It draws attention to areas that require more study, including how emerging transportation technologies, such as ride-sharing and autonomous vehicles, affect traffic volume, how data on traffic volume is integrated with additional transportation metrics, and how socioeconomic factors affect traffic volume designs.

2.9 PHF

Table 2.1: Peak Hour Factor Value

LOS with respect to it's PHF.	
Pake Hour Factor Value	**Los**
0.7 or less	A
0.8 or less	B
0.85 or less	C
0.90 or less	D
0.95 or less	E
>1 or less	F

Table 2.1: Peak Hour Factor Value

2.10 Summary

In this chapter, we have discussed about the key features of problems of traffic volume to identify the level of service in major intersections of Mirpur 10, dhaka-1216, Bangladesh. Also on floods, some aspects of water transport accidents and also analysis of port management in Bangladesh. The next chapter deals with the methodology of our research.

CHAPTER 3
METHODOLOGY

3.1 General

To make it possible to analyze the volume of traffic, a combination of hand counts and computerized traffic counters will be strategically positioned throughout Mirpur-10. The gathering of data will take place over a predetermined time period, ensuring that representative samples are acquired for various hours and days of the week.

3.2 Method

The main objective of this research is to identify the LOS of different intersections. LOS is related with Modal composition of various transport, Road capacity and Road geometry. Modal composition describes the key operational, commercial advantages and properties of any transport in terms of cost, speed, accessibility, frequency, safety, comfort, etc. In this research to achieve the LOS, traffic volume survey was carried out to count mixed vehicles, geometric feature survey. All traffic data were collected into three phases like morning peak (8-10am), afternoon off peak (12-2pm) and evening peak (4-6pm) and each peak was continued for 2 hours duration (Transport, 2004). Geometric feature survey is needed to identify the existing road capacity. To identify the existing supply and capacity conditions of various intersections road length, width of carriageway, footpath, median, shoulder, number of legs and control system etc. data has been collected by conducting field survey. The calculation of Passenger car unit or PCU is very important to analyze the mixed or heterogeneous traffic and PCU is a simplification which convert the different types of vehicles into equivalent number of passenger cars [26]. By conducting a private survey in 2014, 11,000 battery operated auto-rickshaws, 35,000 rickshaws, 800 CNG-rickshaws and auto-tempos, 1,500 human hauler, 1,200 rickshaw vans and 1,500 cars and micro-buses are investigated [3] (Table 2.)

3.3 Formula

$$\text{Volume Capacity Ratio, } \mathbf{VCR} = \frac{\text{Total hour } \mathbf{PCU}}{\mathbf{Capacity}}$$

$$\text{Capacity, } \mathbf{C} = \frac{\text{Highest design capacity } * \text{ Effective width}}{\mathbf{12}}$$

To estimate the LOS two useful methods have been applied. The volume-capacity ratio is 1st of them. Volume capacity ratio (V/C) is one of the most used Index to assess

traffic status in cities, in which V is the total number of vehicles passing a point in one hour and C for the maximum number of vehicles that can pass a certain point at the reasonable traffic condition,
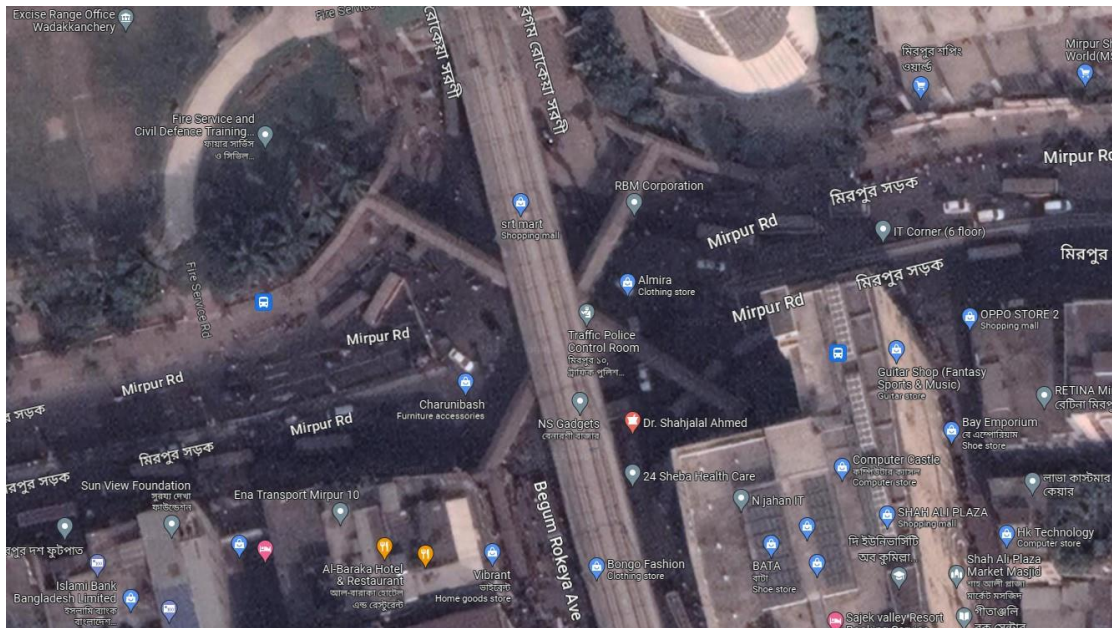
Figure 3.1: *Satellite map*

"Volume -Capacity Ratio (V/C) is a measure that reflects mobility and quality of travel of a facility or a section of a facility. It compares roadway demand (vehicle volumes) with roadway supply (carrying capacity) [18]

The V/C method is associated with LOS and determining how well a roadway is performing. This measure can alert transportation providers to areas where traffic mitigation measures should be considered. V/C ratio was calculated by following formula [30,31]

3.4 Explanation of Approach Criteria

Approach	Problems	Explanation
IST 1 - Mirpur-1 to Mirpur-10	Too much amount of Car-CNG, Private Car and motorcycle.	Congestion caused by a high number of Car-CNG, Private Car and motorcycle. is most noticeable near the intersection of Mirpur 1 and Mirpur 10, especially during peak hours, such as from 8:00 to 9:00 am and 5:00 to 6:00 pm.
IST2 - Mirpur10 to Shewrapara	Too much amount of variceal Car-CNG, Private Car and Bus-Track.	These cars are given less precedence at the intersection of Mirpur 10 during peak hours, notably from 7.30 AM to 9.30 AM, a significant amount of delay is caused for those travelling from Mirpur 10 to Shewrapara (right turning vehicles).
IST 3 - Mirpur-14 to Mirpur 10	Too much amount of Car-CNG, Private Car, motorcycle and rickshaws.	It is important that rickshaws be removed from the main highways in this area. However, because there are a lot of middle-class and low-income residents in Mirpur and rickshaws are their primary form of transportation, removing rickshaws from the neighborhood won't be beneficial.
IST 4 - Pallavi to Mirpur 10	Too much amount of variceal Car-CNG, Private Car and Bus-Track.	Vessels should be moved in the middle of the river. Because the water level falls at the highest rate which causes the travel discontinuation.

Table 3.1: Explanation of Approach Criteria

3.5 Summary

Here is how we discuss about estimate the LOS two useful methods have been applied. The volume-capacity ratio, Volume -Capacity Ratio (V/C) and traffic volume survey was carried out to count mixed vehicles, geometric feature survey we can solve.

CHAPTER 4
ROAD GEOMETRY OF INTERSECTIONS

4.1 General

Understanding the road geometry of crossings becomes crucial when analyzing traffic volume in the Mirpur-10 and the DNCC (Dhaka North City Corporation) sectors. The intersection's efficiency, safety, and traffic flow are all directly impacted by the road's shape. Here are some important considerations to keep in mind while looking at intersection road shape in the context of the amount of traffic research.

4.2 Study Area

Understanding analyzing traffic volume in the Mirpur-10 and the DNCC (Dhaka North City Corporation) sectors. Working area details and located in Fig.7.

Figure 1: Road Connectivity of Intersection Approach
(a) IST-01 (b) IST-02
(c) IST-03 (d) IST-04
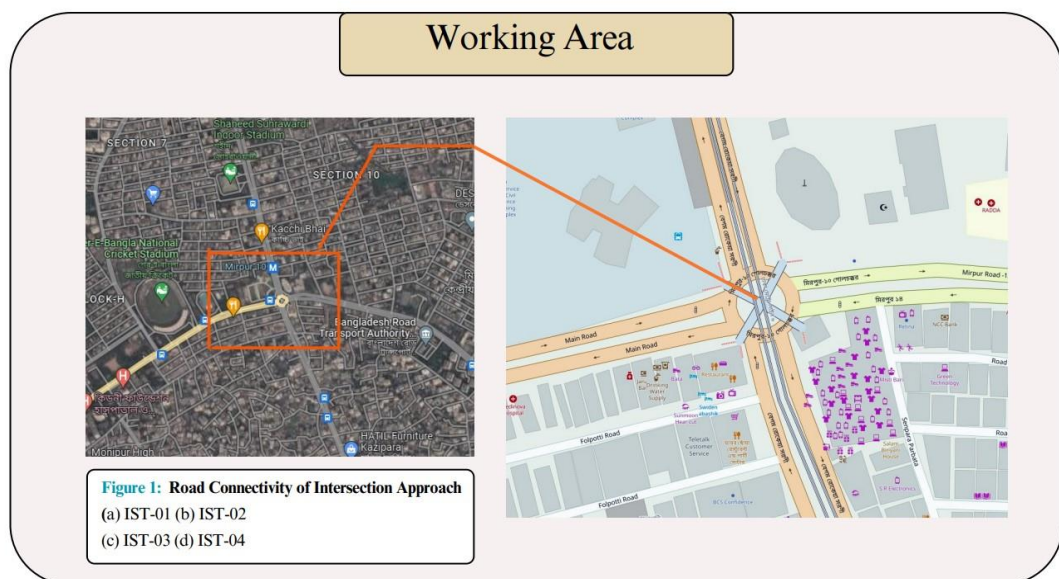
Figure 4.1: Satellite map to google map

Mirpur-10 and the DNCC (Dhaka North City Corporation) sectors. There are have four approaches in this intersection.

4.3 Location in google Map
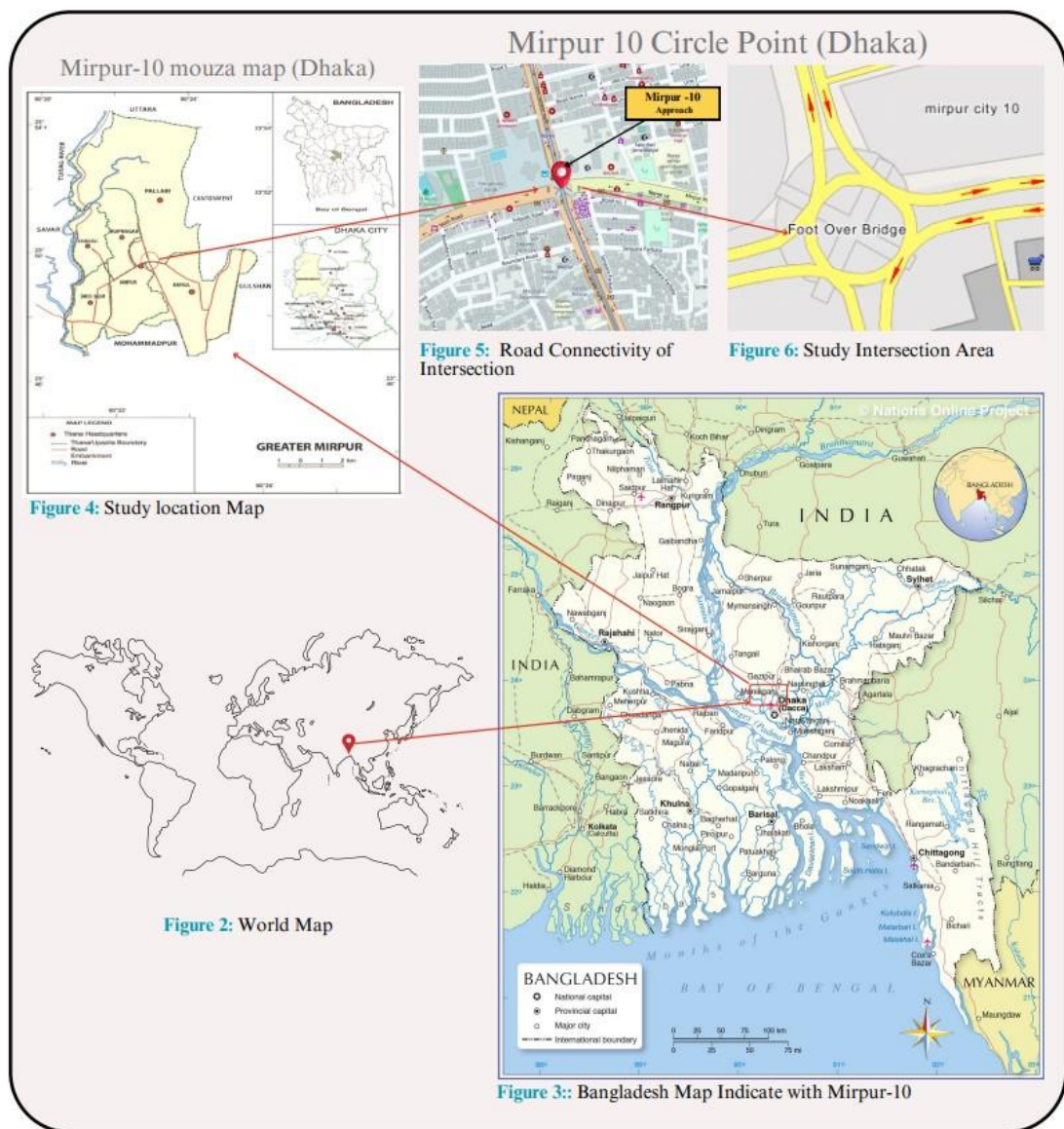
Figure 4.2: Google map

4.4 Description of Map Input

Understanding the road geometry of crossings becomes crucial when analyzing traffic volume in the Mirpur-10 and the DNCC (Dhaka North City Corporation) sectors. The

4.5 Dimensions of approach lane

Mirpur-10 and the DNCC (Dhaka North City Corporation) sectors. The mirpur-10 intersection each on approach lane width, medilan and footpath width noted in this table.

Intersection Name	Road Name	Lane Width (ft.)		Median (ft.)	Footpath width (ft.)	
		Right	Left		Right	Left
Mirpur-10	IST 1- Techinal to Mirpur 10	24 ft.	24 ft.	6 ft.	10 ft.	10 ft.
	IST 2- Kachukshet to Mirpur 10	24 ft.	24 ft.	6 ft.	10 ft.	10 ft.
	IST 3- Mohakhali to Mirpur 10	24 ft.	24 ft.	6 ft.	10 ft.	10 ft.
	IST 4-Pallavi To Mirpur 10	24 ft.	24 ft.	6 ft.	10 ft.	10 ft.

Table 4.1: *lane Dimensions*

4.6 Study Area in Satellite Map

Understanding the road geometry of crossings becomes crucial when analyzing traffic volume in the Mirpur-10 and the DNCC (Dhaka North City Corporation) sectors.

Figure 4.3: *Satellite map*

4.7 Summary

CHAPTER 5
DATA COLLECTION

5.1 General

The most time-consuming part of any research project is undoubtedly gathering reliable data. Due to the paucity of authentic data, data collection and preparation are the most arduous stage of the research work. In this study, we have collected our data from Mirpur-10 Intersection traffic volume amounts.

5.2 Field survey

The survey locations of the study are :

(1)   Mirpur-10 Intersection

Total varical volume data were collected and photographs of ghat were captured during survey.

Figure 5.1: *Mirpur Bus intersection.*

Figure 5.2: IST 1- Mirpur-1 to Mirpur-10

Figure 5.3: IST 2- Mirpur-10 to Shewrapara

Figure 5.4: IST 3- Mirpur-14 to Mirpur 10

Figure 5.5: IST 4- Pallavi to Mirpur 10

Figure 5.6: After Take volume in every approach's

5.3 Data Chart

5.3.1 Morning Peak Hour IST-1

Analyzing traffic volume for one hour in the Mirpur-10 and the DNCC (Dhaka North City Corporation) sectors. **Car-CNG**, Private Car are the most vehicles that travel through **IST-1** approach 290 for one hour in the morning. After that, 132 buses and tracks run on this road at this time of the day.

Figure 5.11: Morning Peak IST-1

5.3.2 Morning Peak Hour IST-2

We are analyzing traffic volume for one hour in the Mirpur-10 and the DNCC (Dhaka North City Corporation) sectors. The number of vehicles plying this **IST-2** approach to Mirpur 10 is mostly pick-up vans. Which is calculated for one hour. After this, there are mostly motorcycles
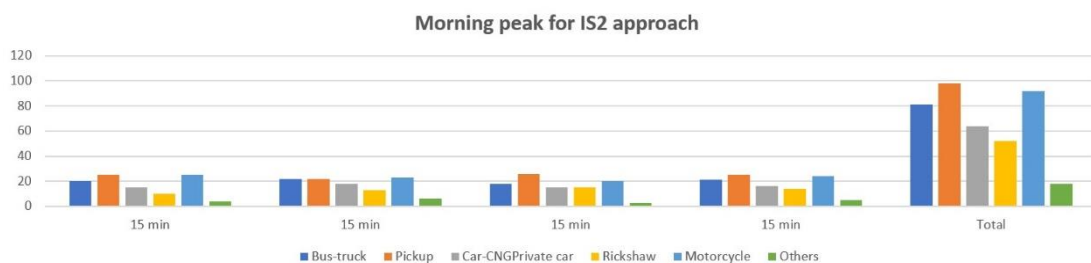
Figure 5.12: Morning Peak IST-2

5.3.3 Morning Peak Hour IST-3

We are analyzing traffic volume for one hour in the Mirpur-10 and the DNCC (Dhaka North City Corporation) sectors. **Car-CNG**, Private car are the most vehicles that travel through **IST-3** for one hour in the morning. After that, the number of traffic is more than motorcycle, which is 127 nos. Which is calculated over an hour just for this approach.
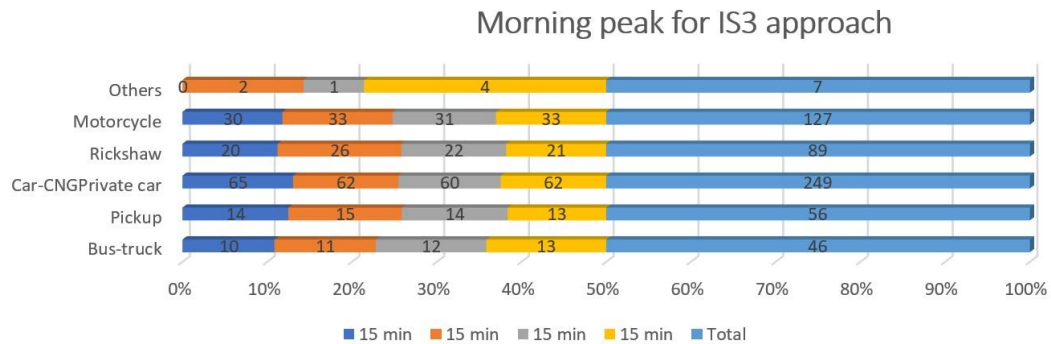
Figure 5.13: Morning Peak IST-3

5.3.4 Morning Peak Hour IST-4

We are analyzing traffic volume in the Mirpur-10 and the DNCC (Dhaka North City Corporation) sectors. With this approach to Mirpur 10, pickup vans are the most common vehicles in the morning. Many commercial vehicles have been created, with pickup trucks using this method for commercial operations, as opposed to the **IST-2** and **IST-4** systems. In the morning, which is more.
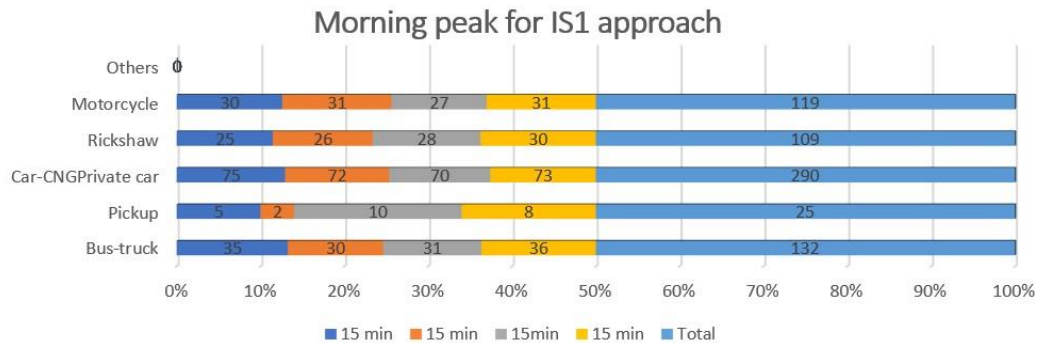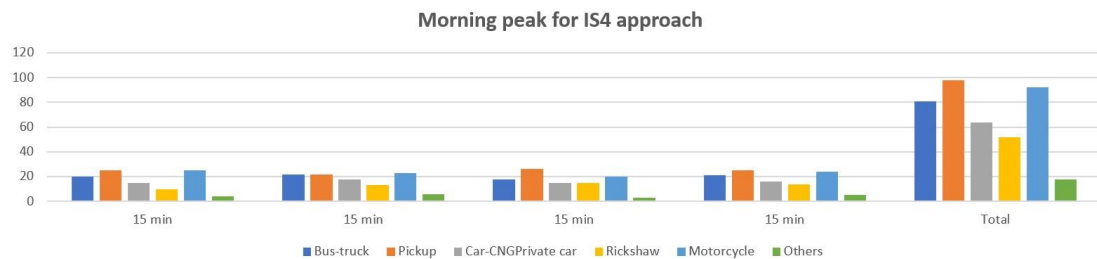

Figure 5.14: Morning Peak IST-4

5.3.5 Noon Off Peak Hour IST-1

We are analyzing traffic volume for one hour in the Mirpur-10 and the DNCC (Dhaka North City Corporation) sectors. **Car-CNG**, Private car are the most vehicles that travel through **IST-1** for one hour in the noon noon off peak. After that, the number of traffic is more than motorcycle, which is 121 nos. Which is calculated over an hour just for this approach.

Figure 5.15: *Noon Off Peak IST-1*

5.3.6 Noon Off Peak Hour IST-2

We are analyzing traffic volume for one hour in the Mirpur-10 and the DNCC (Dhaka North City Corporation) sectors. **Car-CNG**, Private car are the most vehicles that travel through **IST-2** for one hour in the noon off peak. After that, the number of traffic is more than Bus-Truck,Which is calculated over an hour just for this approach.
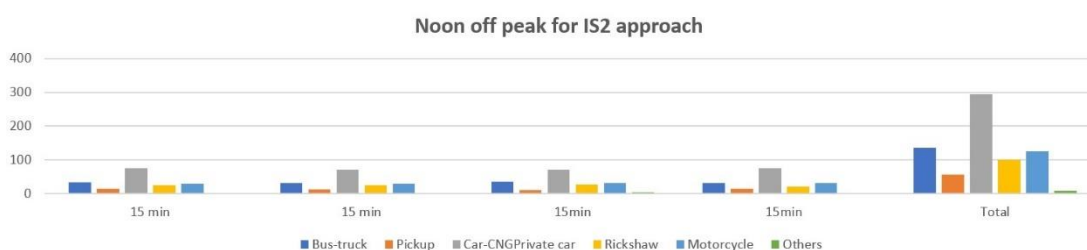
Figure 5.16: *Noon Off Peak IST-2*

5.3.7 Noon Off Peak Hour IST-3

In the sectors of Mirpur-10 and DNCC (Dhaka North City Corporation), we are analyzing traffic volume for one hour. The majority of traffic through **IST-3** during the noon off-peak hour is composed of private cars and cars powered by **CNG**. The amount of traffic after that exceeds that of buses and trucks, which is estimated to take over an hour simply for this method of transportation.

	BUS-TRUCK	PICKUP	CAR-CNGPRIVATE CAR	RICKSHAW	MOTORCYCLE	OTHERS
15min (top)	33	8	74	22	33	5
Total	136	33	291	101	124	7
	35	7	72	28	29	--
	33	8	70	26	32	2
	35	10	75	25	30	--
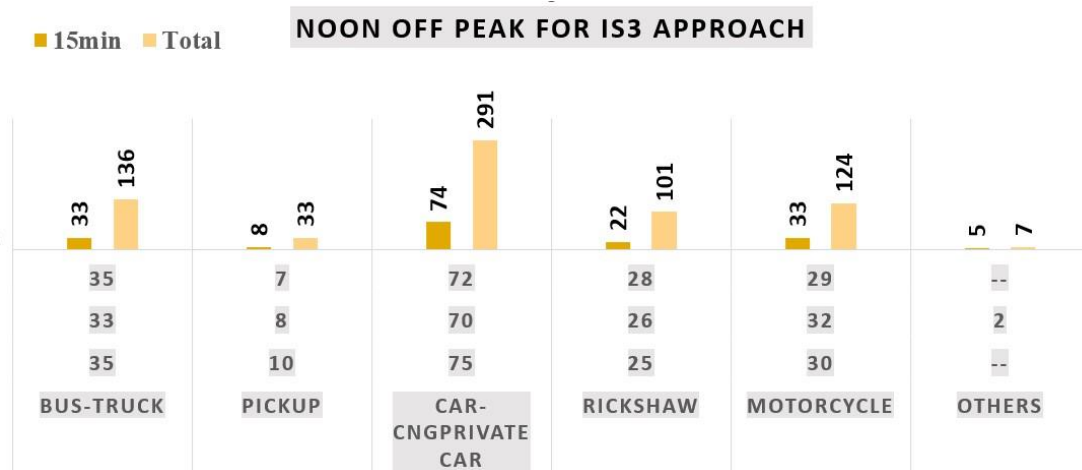
Figure 5.17: Noon Off Peak IST-3

5.3.8 Noon Off Peak Hour IST-4

In the sectors of Mirpur-10 and DNCC (Dhaka North City Corporation), we are analyzing traffic volume for one hour. The majority of vehicles that pass through **IST-4** at the noon off-peak period are cars and private cars. Following that, there is more traffic than there is for buses and trucks, which takes almost an hour just for this strategy.

	Bus-truck	Pickup	Car-CNGPrivate car	Rickshaw	Motorcycle	Others
Total	130	42	289	101	123	9
	32	9	72	28	33	--
	30	10	70	25	28	7
	33	11	72	23	32	--
	35	12	75	25	30	2
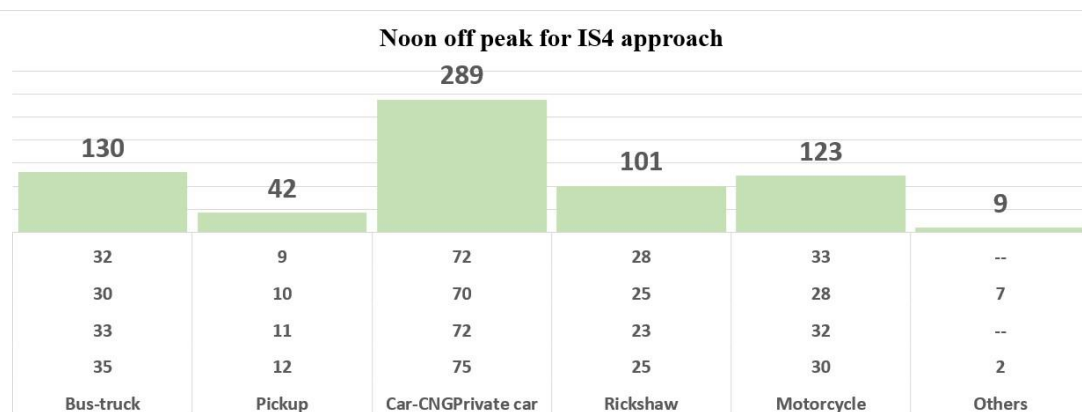
Figure 5.18: Noon Off Peak IST-4

5.3.9 Evening Peak Hour IST-1

In the sectors of Mirpur-10 and DNCC (Dhaka North City Corporation), we are analyzing traffic volume for one hour. The majority of vehicles that pass through **IST-1** at the Evening peak period are cars and private cars. Following that, there is more traffic than there is for buses and trucks, which takes almost an hour just for this strategy.
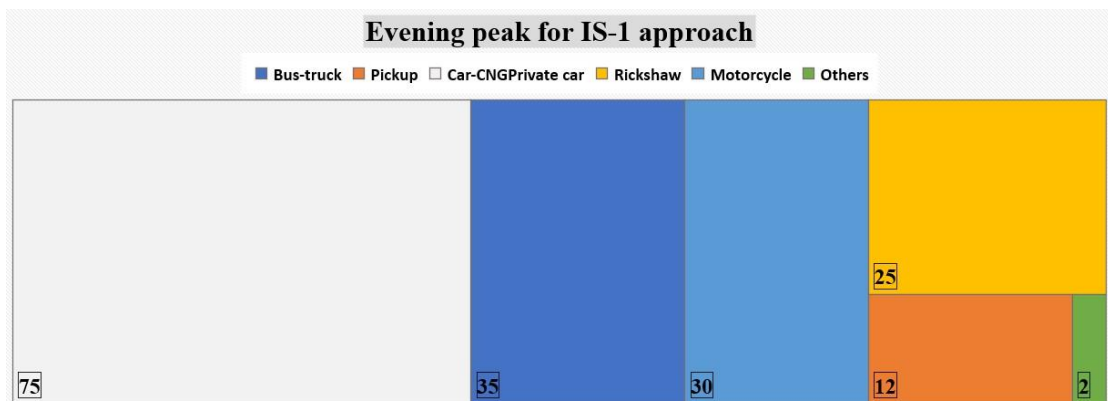
Figure 5.19: *Evening Peak IST-1*

5.3.10 Evening Peak Hour IST-2

We are analyzing traffic volume for one hour in the Mirpur-10 and the DNCC (Dhaka North City Corporation) sectors. **Car-CNG**, Private car are the most vehicles that travel through **IST-2** for one hour in the noon Evening peak. After that, the number of traffic is more than **Bus-Truck**, which is 35 nos. Which is calculated over an hour just for this approach.

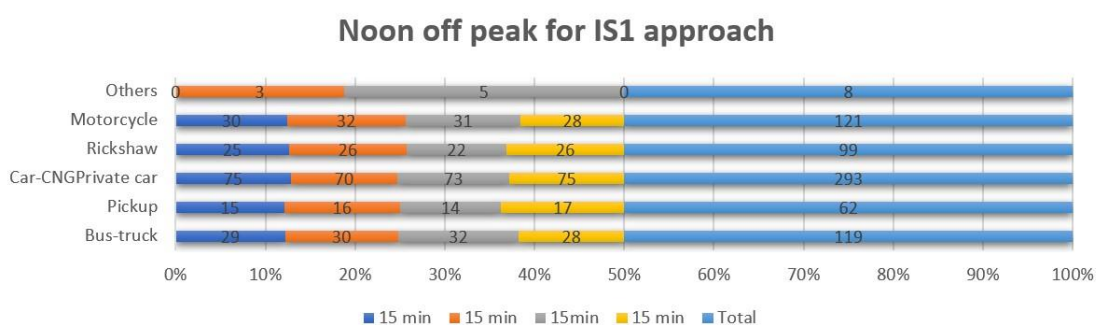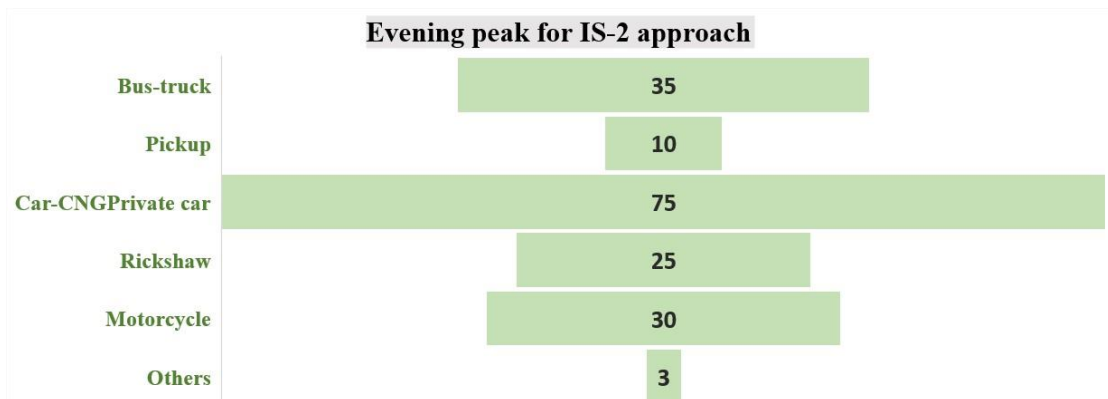**Figure 5.20:** *Evening Peak IST-2*

5.3.11 Evening Peak Hour IST-3

We are analyzing traffic volume for one hour in the Mirpur-10 and the DNCC (Dhaka North City Corporation) sectors. **Car-CNG**, Private car are the most vehicles that travel through **IST-3** for one hour in the noon Evening peak. After that, the number of traffic is more than **Bus-Truck**, which is 138 nos. Which is calculated over an hour just for this approach.
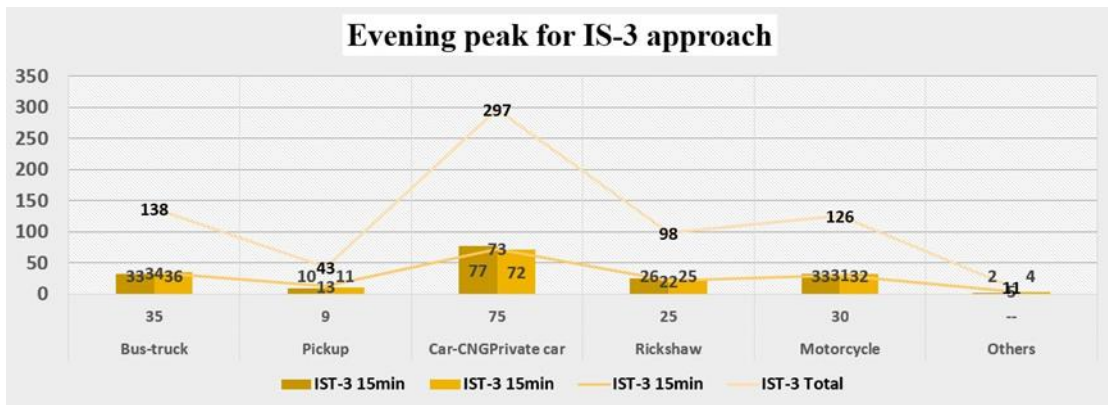
Figure 5.21: Evening Peak IST-3

5.3.12 Evening Peak Hour IST-4

We are analyzing traffic volume for one hour in the Mirpur-10 and the DNCC (Dhaka North City Corporation) sectors. **Car-CNG**, Private car are the most vehicles that travel through **IST-4** for one hour in the noon Evening peak. After that, the number of traffic is more than **Bus-Truck**, which is 35 nos. Which is calculated over an hour just for this approach.
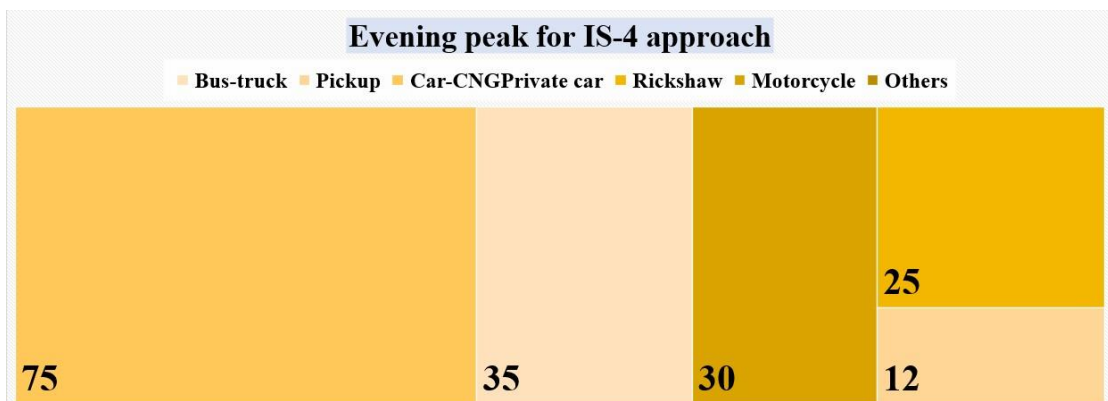
Figure 5.22: Evening Peak IST-4

5.4 Recommendation

After collecting the data, we can see that Car-CNG, Private Car are moving more through Mirpur 10 among the vehicles moving through all the approaches, for which there is a lot of jam. If we can divide these Car-CNG, Private Cars into motorcycles and create separate lanes for motorcycles, then maybe it is possible to reduce the jam to some extent. Unnecessarily occupying footpaths, shops have been built irregularly, making it more difficult for vehicles to move.

5.5 Summary

From this chapter we get an actual figure of how much traffic is moving through all the approaches of Mirpur 10 for a single day of three hours of the day and the exact idea of what kind of traffic is moving along with it.

CHAPTER 6
DATA ANALYSIS

6.1 General

During peak hours, execute volume traffic studies at the planned intersection in Mirpur 10. The early morning and late evening rush hours, when traffic is at its heaviest, are referred to as peak hours. During these times of high traffic, it is critical to gather information on the total number of cars using each approach to the intersection. Determine the overall volume of traffic that passes through each approach during peak hours. You will receive the peak hour volume (PHV) for every approach after doing this. Determine the overall volume of traffic that passes through all approaches during a non-peak period. You will then be given the OPHV (off-peak hour volume) for each approach. Multiply the PHV by the OPHV for every approach to determine the PHF.

6.2 PHF for approaches in mirpur-10 intersection.
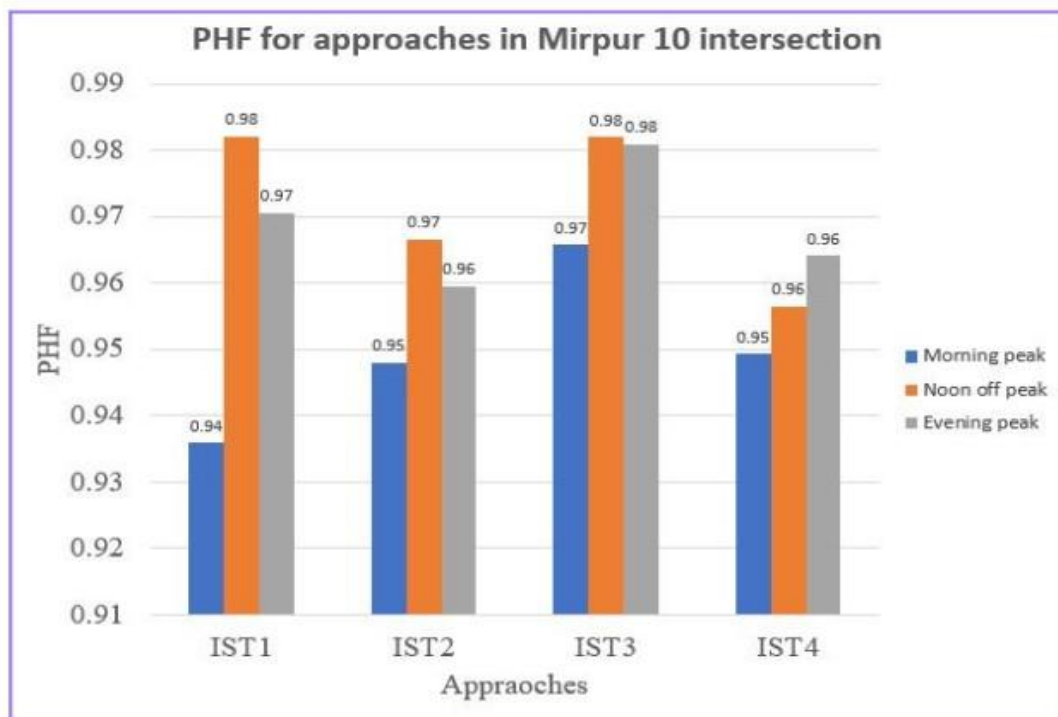
Figure 6.1: *PHF for approaches in mirpur-10 intersection*

In Mirpur 10, there is a lot of traffic around noon all approach. In the middle of the day, a number of them make their way through IST 1- Mirpur-1 to Mirpur-10 approach.

PHF

6.3 Recommendation's: PHF for all approach

PHF FOR IST-1

Traffic is less in the morning with an amount of **0.94(E)**. It has less traffic than in the evening. Again, in IST-1 evening is **0.98(F)** which is higher than morning and evening. Evening is higher than morning, but lower than evening **0.97(F).**

PHF FOR IST-2

IST-2 Intersection has the highest traffic volume in the noon **0.97(F)**. A little less traffic during the noon than in the evening which is **0.96(F)**. There is less traffic in the morning than in the evening which amounts to **0.95(E)**.Maximum traffic in the noon **0.97(F)** and less in the morning **0.95(E)** Comparatively evening traffic volume is close to noon traffic volume **0.96(F)**.

PHF FOR IST-3

Here the highest value is noon amount is more **0.98 (F)**, and evening amount is **0.98 (F)**, but here vehicle amount is more at noon then evening. And here the least number of vehicle run in the morning is **0.97(F)**.

PHF FOR IST-4

Here the maximum value is **0.96(F)** at evening and **0.96(F)** at noon but here the vehicle volume is more at evening. And the lowest number of vehicles is in the morning at **0.95(E)**. The highest number of vehicles is at night and the lowest number is in the morning.

6.4 Observation: PHF for all approach

Here it is seen that most of the vehicles move through approach no.3. That's more in the morning, noon and evening than most other approaches. After that vehicles move through approach No. 2, No. 4 and No. 1 respectively. Here we can say that there are many government and non-government agencies with approach number 3, along with many big business establishments.

Notable among them are Public Order Management, PSC Convention Hall - Mirpur-13, Mirpur-13 Central Mosque, Bangladesh Road Transport Authority (BRTA), Dhaka Metro Circle-1, Manipur High School and College (Branch-2), Shaheed Police Memorial College. ,Navy College, Kachukshet Bazar.
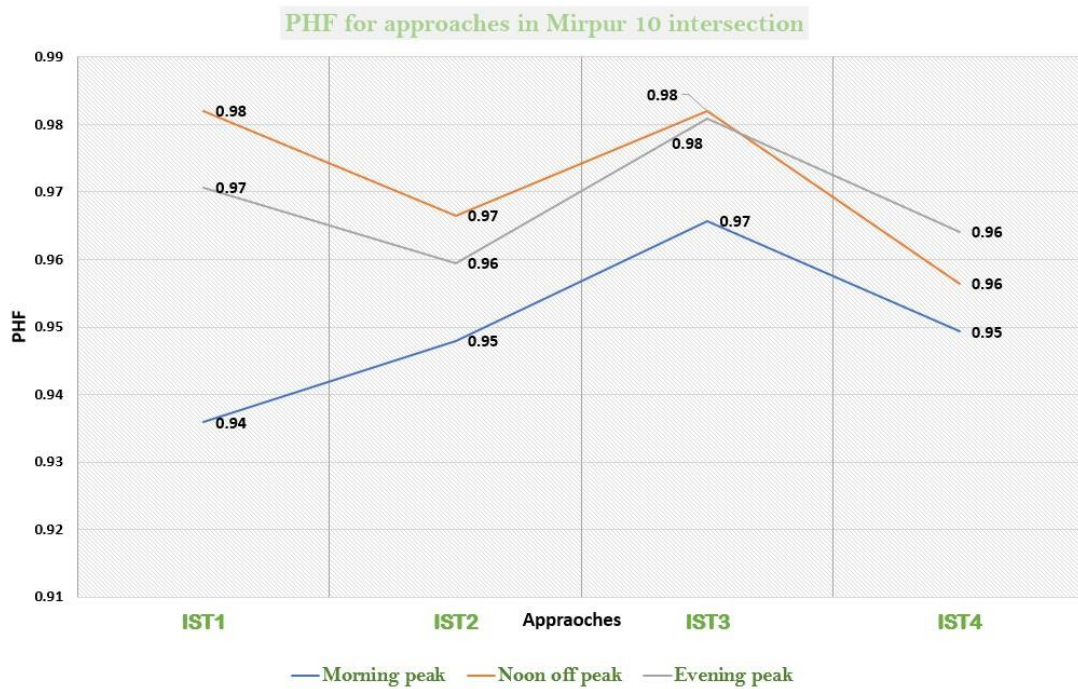
Figure 6.2: *PHF for approaches in mirpur-10 intersection*

Finally, the vehicles operated by this approach are passenger carriers. Because most of the educational institutions and residential areas are located in this direction.

6.5 Analysis

6.5.1 Morning PHF

This part of the chapter deals with field data collection

Morning Peak								
PHF					**PHF**			
IST-1					IST-2			
Traffic	P.H.F	Los			Traffic	P.H.F	Los	
	0.935872	E				0.947977	E	
PHF					**PHF**			
IST-3					IST-4			
Traffic	P.H.F	Los			Traffic	P.H.F	Los	
	0.965672	F				0.949301	E	

Table 6.3: Morning PHF

6.5.2 Noon PHF

This part of the chapter deals with field data collection.

Noon off peak								
PHF					**PHF**			
IST-1					IST-2			
Traffic	P.H.F	Los			Traffic	P.H.F	Los	
All	0.98203	F			All	0.96654	F	
PHF					**PHF**			
IST-3					IST-4			
Traffic	P.H.F	Los			Traffic	P.H.F	Los	
All	0.98196	F			All	0.95639	F	

Table 6.4: *Noon PHF*

6.5.3 Evening PHF

Evening Peak								
PHF					**PHF**			
IST-1					IST-2			
Traffic	P.H.F	Los			Traffic	P.H.F	Los	
All	0.97059	F			All	0.9595	F	
PHF					**PHF**			
IST-3					IST-4			
Traffic	P.H.F	Los			Traffic	P.H.F	Los	
All	0.98089	F			All	0.96407	F	

Table 6.5: *Evening PHF*

6.5.4 Morning PHF

Peak hour (IST-1): Approach Mirpur-1 to Mirpur-10, there is strong morning traffic. People leave for work at that time, and students leave for class. At that time, private cars operated by CNG accounted for 43% of all vehicle sales, followed by motorcycles (19%), buses (18%), the rickshaws (16%), and pickup trucks (4%). Location of the IST-2 morning peak: Mirpur-10 to Shewrapara There is heavy morning traffic when approaching. At that time, pick-ups account for 23% of all trips, while rickshaws account for 16%. summit (IST-3) Approach Mirpur-14 to Mirpur 10 in the morning. The morning has the most traffic. People begin to move around in the morning. People suffer at this time as a result of traffic congestion. At that time, private cars powered by CNG account for 43% of all vehicle sales, followed by motorcycles (22%), rickshaws (16%), pick-up trucks (10%), buses (8%), and other vehicles (1%). Ascend Pallavi to Mirpur 10 in the morning summit (IST- 4). In Dhaka, suffering is also known as a traffic gridlock, and it is worse in the morning. People begin to move in the morning. People are suffering now as a result of the traffic congestion. The pickup is at that point at 24%. motorbike 23%, rickshaw 13%, pick-up 10%, bus-truck 20%, private cars with CNG 16%, and other 4%.

Morning Peak			
Approach	**15 min highest CPU**	**PHF**	**Loss**
IST 1-Mirpur-1 to Mirpur-10	249.5	0.94	E
IST 2-Mirpur-10 to Shewrapara	173	0.95	E
IST 3-Mirpur-10 to Mirpur-14	167.5	0.97	F
IST 4-Uttara South to Mirpur-10	143	0.95	E
Noon Peak			
Approach	**15 min highest CPU**	**PHF**	**Loss**
IST 1-Mirpur-1 to Mirpur-10	236.5	0.98	F
IST 2-Mirpur-10 to Shewrapara	254	0.97	F
IST 3-Mirpur-10 to Mirpur-14	242.5	0.98	F
IST 4-Uttara South to Mirpur-10	246.5	0.96	F
Evening Peak			
Approach	**15 min highest CPU**	**PHF**	**Loss**
IST 1-Mirpur-1 to Mirpur-10	246.5	0.97	F
IST 2-Mirpur-10 to Shewrapara	250	0.96	F
IST 3-Mirpur-10 to Mirpur-14	248.5	0.98	F
IST 4-Uttara South to Mirpur-10	250.5	0.96	F

Table 6.6: Loss

6.5.6 Noon PHF

Here, there are more than 42% of private cars that run on compressed natural gas. Bus trucks and motorcyclists follow at 17% each. In that case, 14% more cars are on the

road than there are rickshaws. Additionally, there are fewer pickups than rickshaws. and 1% is the lowest other. Here, the Car - CNG Private Car more has the most vehicles, while the other less has the fewest. Among men, 43% is the highest and 1% is the lowest. Car, CNG, and private vehicles make up the majority of the fleet (42%). Then, 19% of vehicles are bus trucks. Therefore, there are 17% fewer motorcycles than bus trucks. then 14% for rickshaw. Pickup volume is the lowest and is 8% smaller than rickshaw volume. Vehicles make up the remaining 1%. Here, private cars powered by CNG account for 42% of all vehicles, while other vehicles make up the remaining 1%. 42% of the total vehicles in this area are cars, CNG, and private vehicles. The smallest percentage of cars is 1%. Motorcycles that are account for 20% less CNG private cars than cars. Bus 18% is less than that. Rickshaw makes up 5% less than a bus. Here, the largest percentage of private cars that use CNG is 42%. And in this case, only 1% of other vehicles have the lowest value. Motorcycles, at 19%, are the second-most valuable type of vehicle. Then, the value of the bus truck is 18% higher. Bus trucks outweigh rickshaws by 14.0%. Rickshaw costs 6% less than Pickup. The value ranges from 1% for other vehicles to 42% for the highest value.

6.5.7 Evening PHF

The number of vehicles in this sunlight increases significantly in the evening, causing a congestion. The primary cause of the Car-CNG, Privet Car traffic bottleneck, which accounts for around 42%, is Itst1. And right now, 19% of all trucks are buses, which is the second-highest percentage. Car-CNG, private vehicle traffic congestion is at a 42% level. Currently, pedestrians are very dispersed. At the moment, bus trucks are 18%, rickshaws 14%, pick-ups 6%, and other vehicles 1%, while motorcycles make up 19% of all vehicles. One of the key reasons for peak traffic is traffic. This road sees a lot of traffic. About 42% of them are private cars that run on CNG. In the evening, this road has higher traffic congestion. In the late afternoon, Mirpur-10 gets very congested.

LOS with respect to it's PHF.	
Pake Hour Factor Value	**Los**
0.7 or less	A
0.8 or less	B
0.85 or less	C
0.90 or less	D
0.95 or less	E
>1 or less	F

Table 6.7: *Loss respect PHF*

And automobiles are mainly responsible for the bottlenecks. This road sees a lot of traffic. About 42% of them are private cars that run on CNG. 19% of all vehicles are buses, trucks, motorcycles, rickshaws, and other vehicles constitute 1%.

Mirpur 10 intersection			
Time	Approach	PHF	LOS
Morning peak	IST1	0.94	E
Morning peak	IST2	0.95	E
Morning peak	IST3	0.97	F
Morning peak	IST4	0.95	E
Noon off peak	IST1	0.98	F
Noon off peak	IST2	0.97	F
Noon off peak	IST3	0.98	F
Noon off peak	IST4	0.96	F
Evening peak	IST1	0.97	F
Evening peak	IST2	0.96	F
Evening peak	IST3	0.98	F
Evening peak	IST4	0.96	F

Table 6.8: *Approach Loss*

6.6 Recommendation for PHF

Because these cars are given less precedence at the intersection of Mirpur 10 during peak hours, notably from 7.30 AM to 9.30 AM, a significant amount of delay is caused for those traveling from Mirpur 1 to Rokeya Soroni (right turning vehicles). However, compared to other directions, this direction has more actual traffic. in ascending order

When a vehicle turns at its fastest speed to make up for this delay, collisions frequently happen.

6.8 CPU Morning Peak

MODAL SHARE OF MORNING PEAK IST1

Bus-truck ▪ Pickup ▪ Car-CNGPrivate car ▪ Rickshaw ▪ Motorcycle ▪ Others
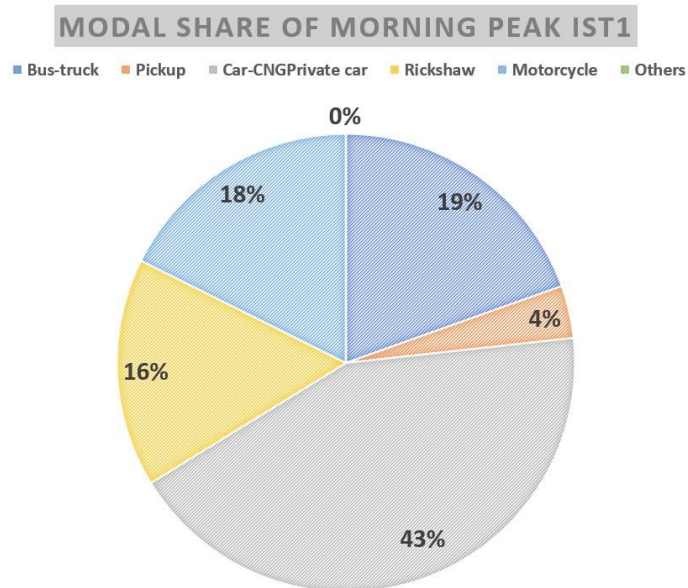
0%
18%
19%
4%
16%
43%

Figure 6.2: Modal Share of Morning peak [IST-1] Mirpur-1 to Mirpur-10

Morning peak (IST-1): Approach Mirpur-1 to Mirpur-10, There is a lot of traffic in the morning. At that time people go to office and students go to school. At that time Car-CNG private car is the most 43%, motorcycle 19%, Bus-truck 18%, Rickshaw 16% and Pickup 4%.

MODAL SHARE OF MORNING PEAK IST2

Bus-truck ▪ Pickup ▪ Car-CNGPrivate car ▪ Rickshaw ▪ Motorcycle ▪ Others
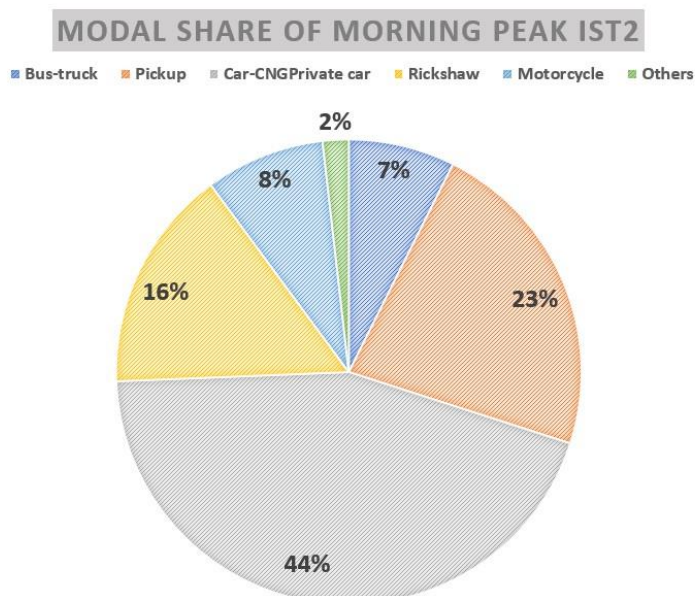
2%
8%
7%
16%
23%
44%

Figure 6.3: Modal Share of Morning peak [IST-2] Mirpur-10 to Shewrapara

Morning peak (IST-2) Location Mirpur-10 to Shewrapara Approach in the morning, there is a lot of traffic. At that time Car-CNG private car is the most 44%, Rickshaw 16% and Pickup 23%.

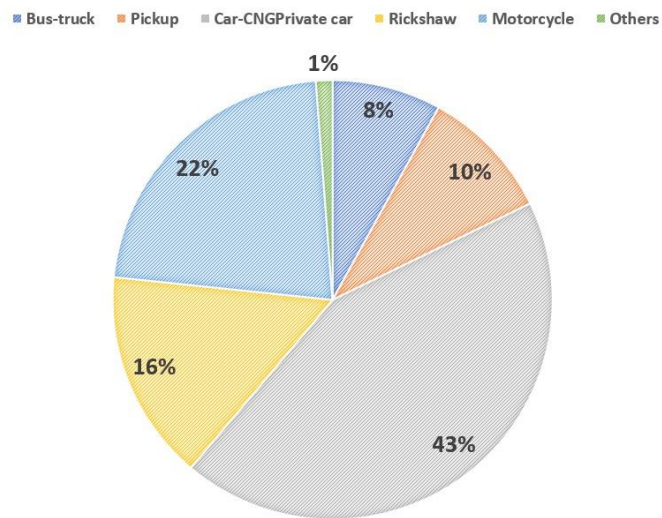Bus-truck Pickup Car-CNGPrivate car Rickshaw Motorcycle Others

Figure 6.4: Modal Share of Morning peak [IST-3] Mirpur-14 to Mirpur-10

Morning peak (IST-3) Approach Mirpur-14 to Mirpur 10.The most traffic is in the morning. In the morning, the movement of people starts. And at this time, people suffer due to traffic jams. At that time Car-CNG private car is the most 43%, motorcycle 22%, Rickshaw 16% and Pickup 10%, Bus-Truck 8%, others 1%.

MODAL SHARE OF MORNING PEAK IST4

Bus-truck Pickup Car-CNGPrivate car Rickshaw Motorcycle Others

Figure 6.5: Modal Share of Morning peak [IST-4] Pallavi To Mirpur-10
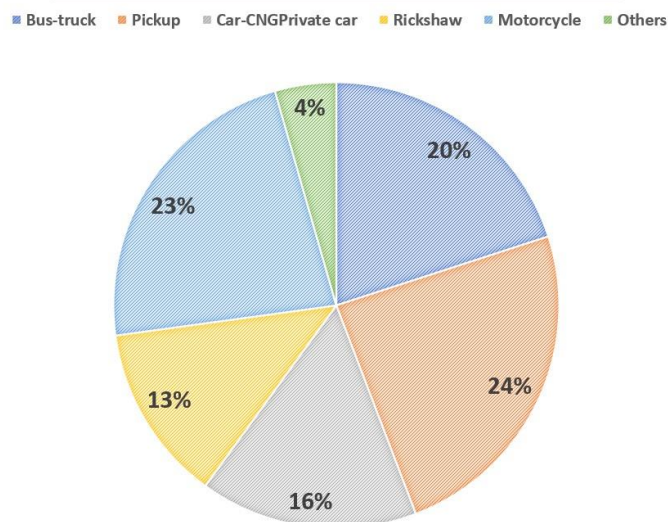
Morning peak (IST- 4) Approach Pallavi To Mirpur 10.Traffic jam is another name for suffering in Dhaka city, it is more in the morning. In the morning people start moving. And at this time people suffer because of traffic jam. At that time the pickup is 24% the most. motorcycle 23%, Rickshaw 13% and Pickup 10%, Bus-Truck 20%, Car-CNG privet car 16%, others 4%.

6.8.1 CPU Noon Off Peak
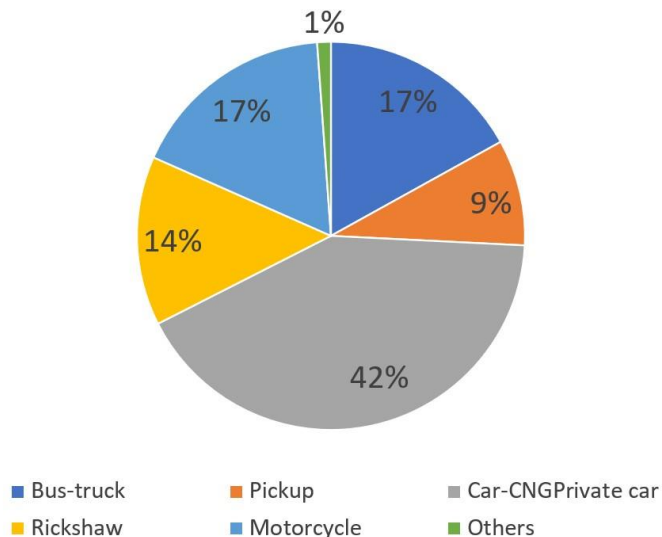
Modal share of Noon off peak IST1

Figure 6.2: Modal Share of Noon Off peak [IST-1] Mirpur-1 to Mirpur-10

The number of vehicle here is the highest number of Car-CNG private Car are more than 42%. Then bus trucks and motorcycles are 17%. Then the number of vehicle is more than the number of rickshaws 14%. And the amount of pickup is less than rickshaw. and the lowest other is 1%. Here the maximum number of vehicles is Car – CNG private Car more and the lowest number of vehicles is other less. The highest man is 43% and the lowest is 1%.
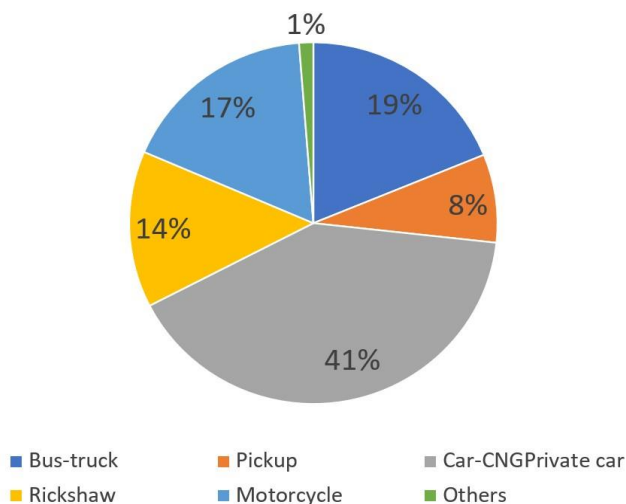
Modal share of Noon off peak IST2

Figure 6.3: Modal Share of Noon Off peak [IST-2] Mirpur-10 to Shewrapara

In Navigability problem (C6), 18% of people are strongly agree, 52% of people are agree, 13% of neutral, 13% of people are disagree and 4% of people are strongly disagree respectively.

Modal share of Noon off peak IST3

Figure 6.4: Modal Share of Noon Off peak [IST-3] Mirpur-14 to Mirpur-10

In Insufficient number of ports (C7), 30% of people are strongly agree, 37% of people are agree, 15% of people are neutral, 7% of people are disagree and 11% of people are strongly disagree respectively.

Modal share of Noon off peak IST4

Figure 6.5: Modal Share of Noon Off peak [IST-4] Pallavi To Mirpur-10

In Unfit vessels (C8), 42% of people are strongly agree, 39% of people are agree, 15% of neutral, 2% of people are disagree and 2% of people are strongly disagree respectively.

6.8.2 CPU Evening Peak
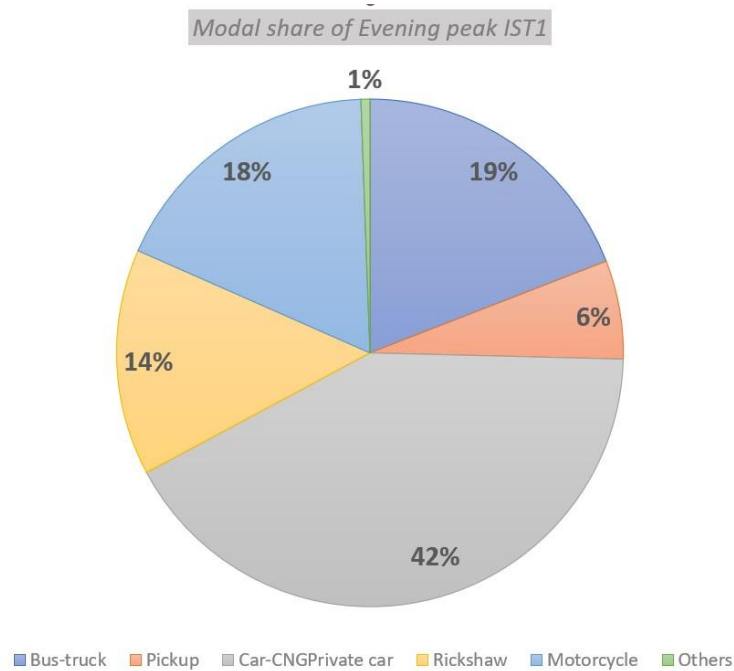
Figure 6.2: Modal Share of Evening peak [IST-1] Mirpur-1 to Mirpur-10

In Flood problem (C5), 26% of people are strongly agree, 48% of people are agree, 15% of neutral, 7% of people are disagree and 4% of people are strongly disagree respectively.
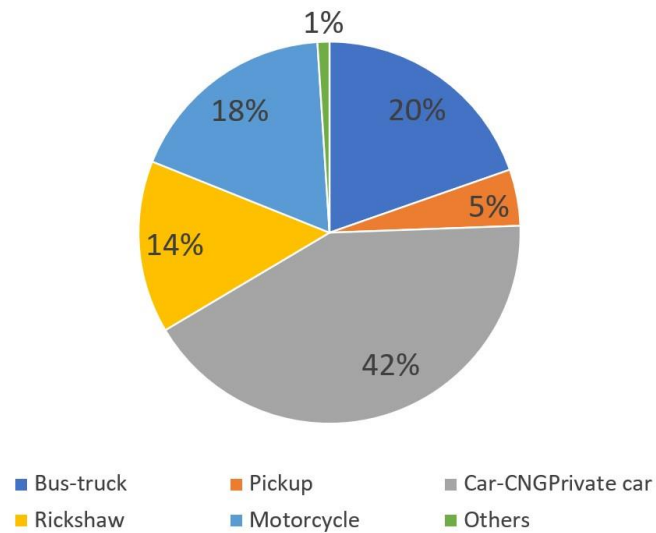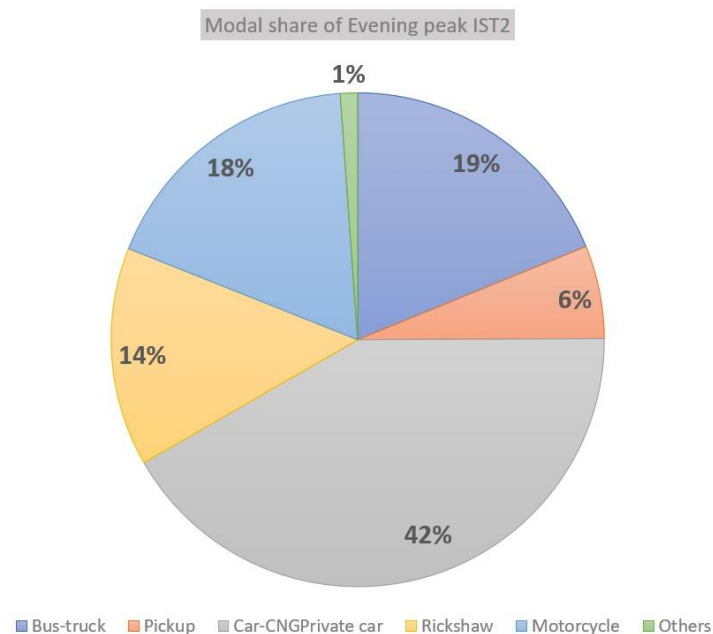

Figure 6.3: Modal Share of Evening peak [IST-2] Mirpur-10 to Shewrapara

In Flood problem (C5), 26% of people are strongly agree, 48% of people are agree, 15% of neutral, 7% of people are disagree and 4% of people are strongly disagree respectively.
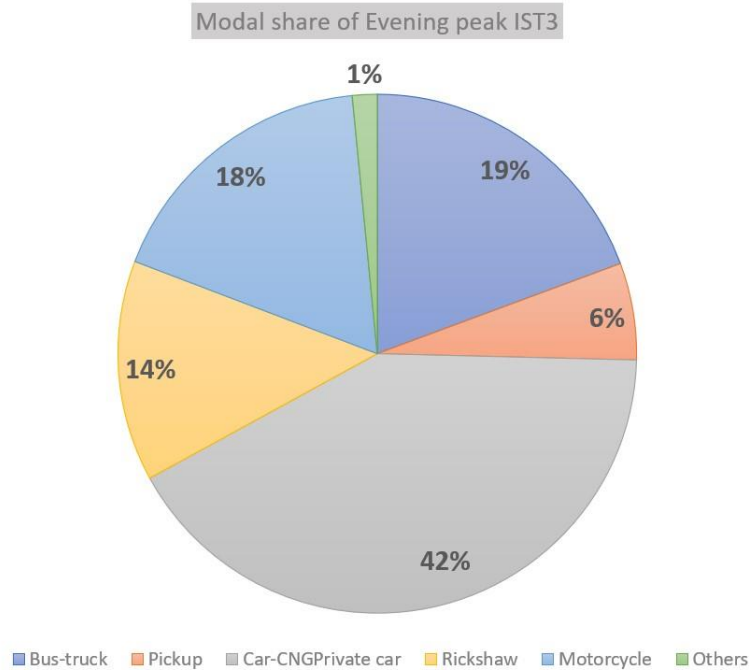
Figure 6.4: Modal Share of Evening peak [IST-3] Mirpur-14 to Mirpur-10

In Flood problem (C5), 26% of people are strongly agree, 48% of people are agree, 15% of neutral, 7% of people are disagree and 4% of people are strongly disagree respectively.
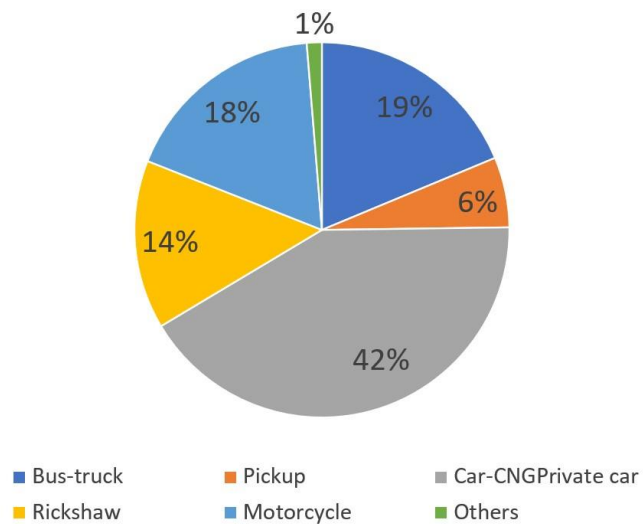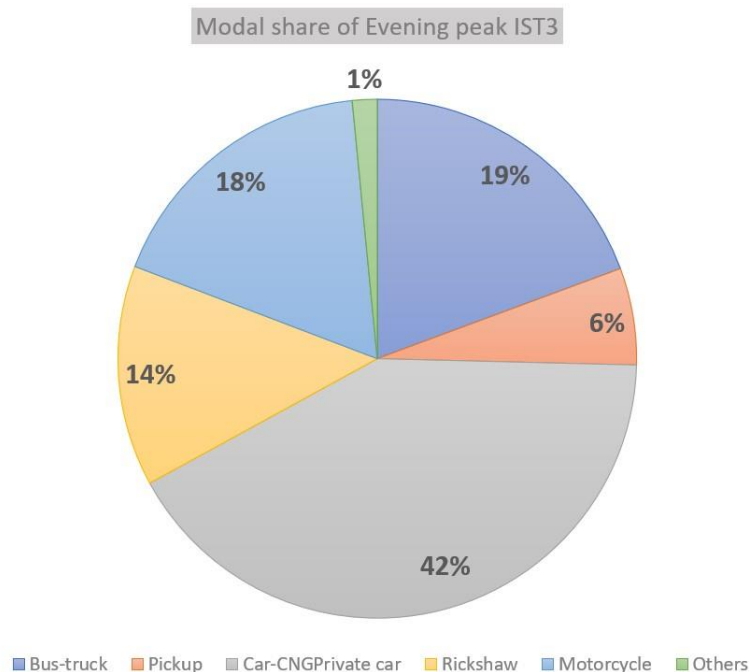

Figure 6.5: Modal Share of Evening peak [IST-4] Pallavi To Mirpur-10

In Unfit vessels (C8), 42% of people are strongly agree, 39% of people are agree, 15% of neutral, 2% of people are disagree and 2% of people are strongly disagree respectively.

6.7 Recommendation for CPU

Here it is seen that most of the vehicles move through approach no.3. That's more in the morning, noon and evening than most other approaches. After that vehicles move through approach No. 2, No. 4 and No. 1 respectively. Here we can say that there are many government and non-government agencies with approach number 3, along with many big business establishments.

6.8 Summary

Because these cars are given less precedence at the intersection of Mirpur 10 during peak hours, notably from 7.30 AM to 9.30 AM, However, compared to other directions, this direction has more actual traffic. in ascending order. When a vehicle turns at its fastest speed to make up for this delay, collisions frequently happen.

CHAPTER 7
SYSTEM MODEL AND PROBLEM DEFINITION

7.1 General

Area-wide traffic control system installation and use are encouraged and supported by Land Transport. The majority of systems entail the installation of traffic signals on both city and state roads. Pavements must be built in obedience with the manual's Transportation Guidelines and Regulations. Installations of traffic signals must comply with the Land Transportation Rules and Guidelines handbook.

7.2 Area Description

The coordinates of mirpur-10 are 23.8042°N 90.3667°E. Its whole size is 22.65 square miles or 58.66 km2. It is located northeast of the metropolis of Dhaka. There were 1,074,232 people living in Mirpur, Bangladesh, as per the 2000 Census, with 54.15% men and 45.85% women. Shah Ali, Pallabi, and Kafrul now make up the three thanas that make up Mirpur Thana.

7.3 Recent Questions

There are various shopping malls, hospitals, schools, bus stops alongside the highway, amusement parks, and other amenities in the Mirpur area. National Heart Foundation Institute, Grameen Bank, Ibne Sina Hospital, Prince Bazar, Mukto Bangla Shopping Mall, Mukti Jodhdha Shopping Mall, Mirpur Butic House, Benarorsi Palli, Mirpur Bangla College, Mirpur University College, Mirpur Zoo, Botanical Garden, are a few significant organizations, etc.

7.4 Model Regarding the Systems and Problems Description

- Congestion caused by a high number of rickshaws is most noticeable near the intersection of Mirpur 1 and Mirpur 10, especially during peak hours, such as from 8:00 to 9:00 am and 5:00 to 6:00 pm.
- The roundabout at Mirpur 10 exists structurally but is not in use. There is a traffic signal in this area, and during peak hours, it frequently breaks down, causing considerable congestion. Furthermore, there is a traffic police presence there, and hand-held signal maintenance is also offered, which is against the fundamental concept of a roundabout intersection and is prohibited.

- There is a grade separated pedestrian walkway (FOB) at the intersection of Mirpur 10; however, pedestrians do not properly use it. Accidents so happen often. Even though there is a picket rail (pedestrian barrier) to stop people from crossing the street illegally at the intersection, it finishes quite close to the intersection. In order to avoid using FOB, people frequently cross the street at an intersection.
- These cars are given less precedence at the intersection of Mirpur 10 during peak hours, notably from 7.30 AM to 9.30 AM, a significant amount of delay is caused for those travelling from Mirpur 1 to Rokeya Soroni (right turning vehicles). However, compared to other directions, this direction has more actual traffic. When a vehicle turns at top speed in order to make up for this delay, accidents usually happen.

7.5 Other Problems

1. Because there aren't sufficient stops, public technology inadequately loads and unloads passengers.
2. Numerous clothing factories have been constructed in this region. So, there was a lot of traffic at peak hours. Additionally, there is a lot of foot activity at that time because of the garment workers. Therefore, it is a serious issue for pedestrians to cross at that moment.
3. Markets are expanding near the Mirpur 10 a crossroads Due to a dearth of parking spaces; consumers park their own cars on the side of the road.
4. Another problem is that this area becomes overcrowded during cricket matches because Mirpur Sher e Bangla Cricket Stadium is there.
5. The streets between Mirpur's 1 and 10 are filled by hawkers, primarily those peddling earthen wares, and there is also a flower nursery close by. At a consequence, these problems limit the movement of pedestrians.

7.6 Summary

This chapter describes the data analysis part of the study. Our study's recommendations and final thoughts are the subject of the following chapter. The next chapter discusses on recommendation and conclusion section of our research.

CHAPTER 8

SUSTAINABLE SOLUTIONS

8.1 General

Notwithstanding being technically operational, the Mirpur 10 circle is not in use. A traffic signal is also present, but because it is inoperable, there is severe congestion during peak hours. Therefore, it is crucial to improve this intersection. There should be built a grade separated roundabout or another type of grade separated interchange structure. However, because it is a five-legged intersection, a grade-separated roundabout is the best option because signal system upgrade may not provide a suitable solution.

8.2 Traffic Management

- o Despite being physically existent, the Mirpur 10 roundabout is not in use. A traffic signal is also present, but because it is inoperable, there is severe congestion during peak hours. Therefore, it is crucial to improve this intersection. There should be built a grade separated roundabout or another type of grade separated interchange structure. However, because it is a five-legged intersection, a grade separated roundabout is the best option because signal system upgrade may not provide a suitable solution.
- o At each intersection approach, channelization and the construction of a dedicated right turn and left turn lane are crucial.
- o In particular, an exclusive right turn lane is needed.
- o Introducing proper public transport facility is essential. Mainly it is urgent to improve existing services instead of introducing new service.
- o Each garment industry should offer bus services to the garment workers.
- o The schedules for the present public bus service must be modified. In addition, it is necessary to set up a proper bus stop with an unloading and loading station.
- o It is crucial to improve the present signals at all intersections. In addition, fresh signals need to be installed in Kalyanpur and Mirpur 10.
- o Ramp metering can be employed to begin ramp controlling, particularly at Rokeya Sarani in which there are several access road entries into the main road.
- o A separate bus lane must be implemented. Because there is more mixed traffic on this route and there are more people using public transportation, it is crucial for the traffic moving from the Mirpur 11 to Mirpur 10 crossroads.
- o Bus lay bys are required at every stop for safe passenger loading and unloading as well as for reducing traffic congestion due to poor loading and unloading at any point.
- o High occupancy vehicles can be used with HOV. The majority of high occupancy vehicles may be utilized to transport office workers and garment

workers. Additionally, in order to ease traffic during peak hours, offices and schools must offer separate buses for their own employees.

- The removal of hawkers and the repair of suitable spaces are two steps that must be taken to ensure proper use of footpaths.
- It is important that rickshaws be removed from the main highways in this area. However, because there are a lot of middle-class and low-income residents in Mirpur and rickshaws are their primary form of transportation, removing rickshaws from the neighborhood won't be beneficial.
- Instead of removing the rickshaws, a bicycle lane or path must be constructed. Because when people can securely and comfortably utilize bicycles or bikes, they will naturally replace rickshaws, and traffic will automatically decrease. However, as there isn't sufficient space on the ground, a grade separated bicycle lane should be built.

8.3 Transit Management

1. **Bus scheduling and routing:** All buses operating in the Mirpur area shall adhere to a set timetable and travel along the designated routes.
2. **Bus signal priority:** This demand should be made to promote the utilization of public transport.
3. **Express bike service:** Need to introduce the express bike service.
4. **Fare collection and integration:** An authority should closely monitor it.
5. **Monitoring, maintenance, and fleet management:** Need to start feeling better as soon as possible.
6. **Intermodal Coordination:** Between one transportation system and another, right transfer facilities are needed.
7. **Park-and-ride solutions:** Very important, especially for offices, schools, and markets.

8.4 Demand Management

There must be a written agreement between the parties receiving the benefits that each will contribute their fair share of the overall cost before any transport demand management, rail freight, or sea freight activity is submitted for financial support. Financial support for future sea freight and rail freight operations will be determined by the percentage of anticipated benefits noted in the review. These advantages will be distributed to the parties who will be receiving them.

The necessary demand management steps for Mirpur-10 area are for:

I. Rickshaws are an invalid form of public transportation that significantly increase traffic. Therefore, rickshaws must be removed from the area's main roadways (there is no intersection between Mirpur 1 and 10).

II. Should offer enough rickshaws on the side roads.

III. To minimize transportation demand, shared taxi services, carpooling, and other initiatives must be implemented.
IV. Office hours and school shifts could be staggered.
V. It is possible to implement e-commuting, e-commerce, and e-billings.

8.5 Restraint Decisions

a) The Mirpur 10 crossroads needs to be cleared of markets. If market elimination is not an option, curb parking restrictions must be implemented.
b) Parking fees are necessary for on-street parking, according to Shohana Iffat 5.
c) Loading/unloading facilities and restrictions
d) Transport routes
e) Peak-hour limitations
f) It should not be permitted for the express buses to enter the city. They ought to only depart from the Gabtoly terminal.

8.6 Conclusion

The capacity of the country as a whole increase, congestion goes down, and as a result, economic growth and people's quality of life improve. Area wide traffic management increases the road way capacity of that specific area while also combining all areas measures to improve it. Therefore, it is crucial for Bangladesh, a growing nation with severe traffic jams and other issues relating to public transportation.

8.7 Summary

In this chapter we have discussed sustainable solutions for Mirpur 10 Intersection. Discussed about what to do we are.

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SURVEY FORM

I. Speed of water transport is slow.
- o   Strongly agree
- o   Agree
- o   Neutral
- o   Disagree
- o   Strongly disagree

II. The river transports have to travel a lot of circular routes.
- o   Strongly agree
- o   Agree
- o   Neutral
- o   Disagree
- o   Strongly disagree

III. Natural calamities such as storm, cyclone, hurricane, frost etc creates a great impact on water transportation.
- o   Strongly agree
- o   Agree
- o   Neutral
- o   Disagree
- o   Strongly disagree

IV. The character of water transport is changed in different season. In the rainy season the transportation flow is smooth and minimizes the distance of destination. But in winter season the water level falls at a highest rate which causes the travel discontinued.
- o   Strongly agree
- o   Agree
- o   Neutral
- o   Disagree
- o   Strongly disagree

V. Flood causes various damages and disasters and flooded area have some obstacles.
- o   Strongly agree
- o   Agree
- o   Neutral
- o   Disagree
- o   Strongly disagree