

**STAMFORD UNIVERSITY BANGLADESH  
DEPARTMENT OF CIVIL ENGINEERING**

**Study on the effects on traffic performance of  
newly constructed U-Turn from Mohakhali to  
Uttara road .**

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**NOVEMBER 2021**

# **The Study on the effects on traffic performance of newly constructed U-Turn from Mohakhali to Uttara road .**

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**In partial fulfillment of the requirement for the degree of  
Bachelor of Science (B.Sc.) in Civil Engineering.**

**NOVEMBER 2021**

# **STAMFORD UNIVERSITY BANGLADESH**

## **DEPARTMENT OF CIVIL ENGINEERING**

**The thesis titled Study on the effects on traffic performance of newly constructed U-turn from Mohakhali to Uttara road . Submitted by S.M Akib Reza, Sadek Ahmed, Ashraful Islum, Yousuf Hossen ID No CEN 06509736, CEN 06509752 ,CEN 06509783 ,CEN 06509789 have been accepted as satisfactory in partial fulfillment of the requirement for the degree of B.Sc. in Civil Engineering.**

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## **DECLARATION**

We, the students of the Department of Civil Engineering hereby solemnly declare that , the works presented in the project & thesis has been carried out by us and has not previously been submitted to any other University/College/Organizations for any academic qualification/certificate/diploma/degree.

We warrant that the present work does not breach any copyright.

We further undertake to identify the University against any loss or damage arising from breach of the forgoing obligations.

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## **DEDICATION**

We would like to dedicate this thesis to our parents. we would like to Dedicate our work to our supervisor Anika Nowshin Mowrin ,Assistant professor department of civil engineering .

## **ACKNOWLEDGEMENT**

The research ' Study on the effects on traffic performance of newly constructed U-turn from Mohakhali to Uttara road' conducted as partial fulfilment of the requirements for the degree of Bachelor of Science (B.Sc.)in Civil Engineering .This critical work has come to life due to the unconditional help and co-operation in different ways by many people .we express our greatfullness and thank them for their kind assistance in preparation of this project & thesis.

First of all, we would like to show our highest gratitude to almighty Allah Subhana Wa Ta' la for his mercy and blessing while preparing our project and thesis. we are indebted to our supervisor of project and thesis, Anika Nowshin Mowrin ,Assistant Professor, Stamford university of Bangladesh for making as believe that logic is power , and with the right principles and dedication a man can achieve anything .Thank you for your assistance and your patience for your kind guidance for completing this hard work .

We are also grateful to all of our teachers of the university for their Co-operation and Dedicated teaching for the achievement of the degree of B.Sc. in civil engineering . Co-operation and assistance of all the officers and Staffs of the University are acknowledged.

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## **ABSTRACT**

In Bangladesh at Dhaka city from Mohakhali to Uttara road has been increased installation of non-traversable medians and directional median opening has produced an increased number of U-turns on multilane highways. Arguments have been advanced by some opponents of median modification projects that the increased numbers of U-turns may result in safety and operational problems on multilane highways. The primary objective of this study is to evaluate the operational effects of traffic movement on U-turn on multilane roadways.

To achieve this research objective, extensive data we have collected. Field measurements we have conducted at 4 locations in Mohakhali to Uttara road area of Dhaka city to collect traffic operations data. In this study we have used two methods which are online survey and field survey for data collection. This methods help us to understand what people think about this u turn and its benefits. After completing this study we have found that in some locations road users are satisfied of this u turn however others believe that there is no change or development of traffic performance after completing this u turn. For example in Uttara point people and drivers feel comfortable by using this u turn while at Banani point people are not comfortable using u turn due to congestion.

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## CHAPTER ONE

### INTRODUCTION

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 General :**

The planning of U-turn need geometric and traffic planning aspect. In Bangladesh, not much regulation talk about U-turn facilities, it quite same in Highway Capacity Manual from Transportation Research Board, actually no regulation and manual for knowing U-turn characteristics. According to the problems mentioned above, the problem to find the best performance in U-turn facilities to known the characteristics became a necessary to do. Find the best U-turn facilities that are safety and fill of operational aspects of U-turn movements.

U-turn traffic has long been regarded as a dilemma. Establishing a U-turn opening could cause some traffic congestion, whereas forbidding U-turns will cause vehicles that need to perform a U-turn detour a long distance. U-turn designs are mainly used under two circumstances . the first case is making a U-turn rather than a direct left turn (DLT), and the second case is for when vehicles need to make a U-turn. However, some traffic conflicts, delay and stops still exist even with a U-turn design. To reduce such problems, many alternative measures have been proposed to improve the performance of U-turn designs, such as signalization exclusive left turn lane design and some novel techniques such as autonomous vehicles. Among these measures, many different solutions have specific application conditions and restrictions, and the U-Turn issue still has potential for improvement. The facilities design is still a significant way from solving existing problems.

### **1.2 Background of U –Turn :**

A U-turn in driving refers to performing a 180° rotation to reverse the direction of travel. It is called a "U-turn" because the maneuver looks like the letter U. In some areas, the maneuver is illegal, while in others, it is treated as a more ordinary turn, merely extended. In still other areas, lanes are occasionally marked "U-turn permitted" or even "U-turn only."A diagram showing the path of a driver performing a U-turn on a normal two-way road.Occasionally, on a divided highway, special U-turn ramps exist to allow traffic to make a U-turn, though often

their use is restricted to emergency and police vehicles only. In the United States, U-turn regulations vary by state: in Indiana U-turns are allowed as long as the driver follows all of the precautions normally ascribed to making a left turn (yielding right-of-way, etc.). Many places, including Texas and Georgia, have specially designed U-turn lanes (referred to as Texas U-turn lanes). In Michigan, U-turns are required for many left turns to and from divided highways, as part of the Michigan left maneuver. In some special situations, U-turns can be regulated through the use of a traffic light, where it is the only directional choice and drivers in the specified lane cannot continue forward (“U-turn only” lanes).

### **1.3 Objective:**

- ❖ To find the effectiveness of the selected U-Turn to reduce the traffic jam .
- ❖ To suggest the best position and size of U-Turn of the study area .

### **1.4 Scope of the study :**

This project focus on the effects of u turns in roadway to Mohakhali to Uttara .This report can be used as a secondary source for others researchers .Based on this study people can easily know about the u-turns effects .As we know u turns make road use easier and it also helps to avoid the traffic congestion. so This study will give a clear explanations of the problems which people’s are facing to use road .This study will help for future traffic planning .This study will provide valuable information to the road users so that they can use this route easy and comfortably .

### **1.5 Limitations of the study :**

- ❖ A lot of vehicles were very speedy in rush hours that’s why it was difficult to collect the data from drivers .
- ❖ A few number of pedestrians were so much busy in rush hours . So they did,t interest co-operate us to collect data .
- ❖ It was difficult to get large number of response from people due to pandemic situation of COVID 19 .
- ❖ A few number of drivers were not interested to help us for collecting data .

## **1.6 Organization of the this :**

### **Organization of the thesis**

The thesis has been arranged in the following under also including reference as well as appendices used for the study.

Chapter 1: This includes the general introduction, Background, the objectives of study and the scope & limitation of the study.

Chapter 2: This chapter includes comprehensive review of the Literature as well as their important topics related with the study. The available approaches to the work are also discussed here.

Chapter 3: In this chapter discuss about different Study area, Data measurement methodology and flow chart of study area.

Chapter 4: This is the main chapter of all. It consists with the data collection and analysis with result. In this chapter the result of the analysis and various things are presented equally. The calculation has been recorded with the Microsoft Excel.

Chapter 5: This chapter is about conclusion and recommendation for further improvement is presented here. In addition to these five chapters reference of authors and journals are given in the reference section.

## **1.7 Summary:**

The study is dedicated to U-Turn effects which are newly constructed at Mohakhali to Uttara road .The main objective of the study is to find response and taught of the road users about these U-Turns .Limitation and scope of the study also included in this chapter. Organization of the entire thesis work is also organized in this chapter.



## CHAPTER TWO

# LITERATURE REVIEW



# **CHAPTER TWO**

## **LITERATURE REVIEW**

### **2.1 General**

Most of the available literature deals U-turns, which involves the use of openings before or after the intersection .Even though this type is not the focal point of this study, it was considered appropriate to discuss it in this report to demonstrate the relative operational and safety improvements of this design over conventional left-turn treatments.

### **2.2 Traffic Management**

Traffic management is the organization, arrangement, guidance and control of both stationary and moving traffic, including pedestrians, bicyclists and all types of vehicles. Its aim is to provide for the safe, orderly and efficient movement of persons and goods, and to protect and, where possible, enhance the quality of the local environment on and adjacent to traffic facilities. This book is an introduction to traffic management, written in laypersons' language, and assuming no background knowledge of the subject. Various basic traffic characteristics relating to road users, vehicles and roads, and traffic regulation and control, are discussed, including some traffic volume and traffic flow considerations relevant to traffic management. For effective traffic management, it is essential that the practitioner works from factual information. Road inventory and statistical methods, and the more common types of traffic studies, including traffic volume and composition, origin and destination, speed, travel time and delay, accidents and parking are described. "Before and after" studies, and estimation of future traffic are also covered. As a basis for logically applying traffic management techniques it is necessary to develop a classification or hierarchy of all roads to ensure that the primary purpose of each of them is defined, agreed and understood. A functional classification of roads suitable for traffic management purposes, and a process for developing such a system is described. Several chapters go on to discuss various aspects of traffic management, including signing and delineation, pedestrian facilities, bicycle facilities, intersections, traffic signals, road capacity, parking, roadside safety and roadway lighting. The objectives of local area traffic management schemes, and a systematic process for developing them are described, and the various techniques that may be used and the principles of design of traffic management devices are summarised. The application of traffic management techniques to rural and urban arterial roads respectively is discussed,

emphasising the desirability of treating routes or networks as a whole rather than simply focussing on isolated problem spots. Past and likely future trends in road travel, and various techniques for travel demand management are described. While these sorts of techniques are well known, and their use should be encouraged, they are unlikely to have much effect on travel in Australia at least for the foreseeable future. The important area of traffic enforcement and the associated aspects of education and encouragement are considered. Unless traffic management is logically applied and consistently enforced, it will not be effective. Enforcement must be considered an integral part of traffic management. (TRRL)

### **2.3 U-Turn Details**

The provision of U-turn facilities is only appropriate in a limited number of situations. U-turns should only be provided for one of the following reasons.

- ❖ To accommodate a minor traffic movement beyond an intersection that is not otherwise catered for at that intersection, and where the next available intersection is some way downstream.
- ❖ To remove U turning vehicles in advance of an intersection, if their presence would hinder the safe and effective operation of that intersection.
- ❖ Safety is a major concern at all intersections and U-Turns can be particularly unsafe, especially on high volume, high speed roads. The provision of a U-turn facility must be carefully considered against the potential for accidents before deciding whether to incorporate a U-turn into the design.
- ❖ U-turn facilities should not be provided on Expressways and Freeways, as this movement should be catered for within grade separated interchanges.
- ❖ U-turns are not suitable for roads with more than three lanes in each direction.

The following safety issues are of particular importance:

- ❖ Entry to the U-turn: Vehicles enter the U-turn facility from the lane nearest to the median, which normally carries the fastest moving vehicles. Deceleration should take place clear of this traffic in a dedicated lane within the median. Adequate median width and deceleration length must therefore be provided.
- ❖ Stacking within the U-turn lane: Vehicles queuing to make U-turn maneuvers should be clear of the through traffic lanes. There should be

- sufficient length within the U-turn lane for vehicles to decelerate and to stop at the back of any queuing vehicles, even at peak times. If the volume of traffic making the U-turn requires traffic to queue in the fast lane of the mainline, then a conventional junction should be provided.
- ❖ Lane discipline within the U turn lane: At peak times, there is a tendency for drivers to decelerate in the inner lane alongside the queue and to then force their way in at the front of the queue. This practice is both anti social and unsafe, and closes down one through lane (thereby reducing capacity on the mainline). The layout of the U-turn facility should discourage this practice.
  - ❖ Crossing of the opposing traffic: Drivers in the U-turn facility need an unobstructed view of the approaching traffic, so that they can judge gap acceptance or rejection. The vehicle should be at right angles to the approaching traffic when waiting to cross the opposing flow. Lighting columns or trees in the median of a curved alignment may obstruct sight lines. The U turning driver must be able to see and be seen.
  - ❖ Joining the main traffic stream: When the speed of approaching vehicles is high, there is little latitude for error. The driver making the U-turn can choose to turn very tightly into the inner lane or to swing more widely into the outer lane. The approaching driver on the main line must anticipate that action and make any lane changing maneuver necessary, should the U turning vehicle have chosen too short a gap.

The width of the road should be sufficient that relevant design vehicle can make the turn without encroaching beyond the outer edges of the pavement. In some instances, this leads to widening of the median, or, where this cannot be achieved, the adoption of ‘local bulbing’ on the far side of the U-turn.

The median should be wide enough to provide a protected lane for U turning vehicles and an adequate inner radius for the maneuver.

U-turns are frequently associated with weaving movements, particularly where a pair of U-turns is provided in conjunction with a right in, right out intersection. Weaving capacity should always be checked to determine the weaving length required.

Wherever a U-turn facility is to be provided, the reciprocal U-turn should also be provided. If a minor road has only right turns in and out, a pair of U-Turns should be provided in order to cater for the left turns, both in and out. This helps to present a consistent layout to drivers.

U turning vehicles follow paths that are close to the physical limits for the operation of the vehicle. The layout should be checked, using a vehicle template for the design vehicle, to ensure that swept paths remain within the travelled way.

Following figure shows the elements that make up the standard U-turn facility.

**ENTRY TAPER**

The entry taper is the length over which the U-turn lane develops from zero to its full width. Following table gives the taper length, which depends upon design speed.

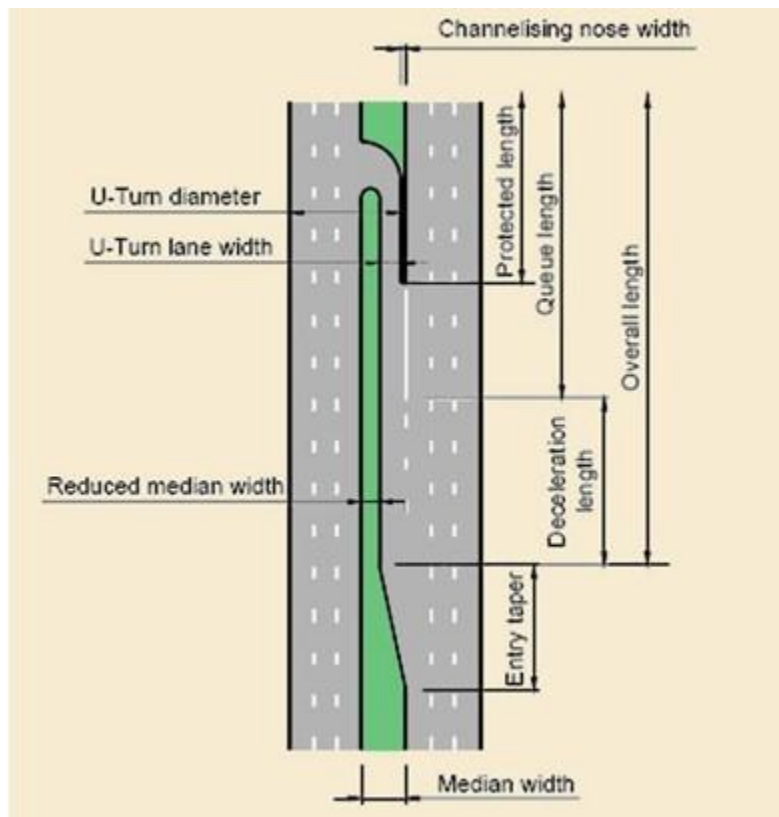


Figure 2.1 : U-Turn Elements

At design speeds of 80km/h and above, the change in alignment at both ends of the entry taper should be smoothed using large radius curves, typical radii being in the range 200m to 600m.

## **QUEUE LENGTH AND PROTECTED LENGTH**

The queue length is dependent on the volume of traffic wishing to make the U-turn maneuver and the opposing flow on the main line. At un-signalized U-Turns, storage length may be based on the number of turning vehicles likely to arrive in an average 2 minute period during the peak hour.

If the U turn is signalized, the storage length may be based on 1.5-2.0 times the average number of vehicles that would store per signal cycle depending on cycle length, signal phasing and arrival/departure rates. In both cases, advice should be sought from a traffic engineer.

Part of the queue length should be protected by a channelizing nose. This should extend over one third of the maximum queue length, subject to a minimum protected length of 15m and a maximum of 30m.

On urban collector roads, it may be impractical to provide full standard U-turn facilities. Under heavy flow conditions, much of the deceleration will occur in the through lanes. The length of the U-turn lane should be taken as the longer of either the queue length, to cater for conditions when the queue is at a maximum and speeds are low, or the deceleration length, to reflect the situation under light traffic conditions when there is no queue present. The protected length should be the minimum value of 15m.

## **CHANNELIZING NOSE WIDTH**

The channelizing nose, which is delineated by painted curbs and preceded by retro reflective road studs, should normally be 2.0m wide. This may be reduced in urban areas. The minimum width of around 0.35m is achieved by laying curbs back to back with 50mm mortar in between.

## **REDUCED MEDIAN WIDTH**

This width allows vehicles at the head of the U-turn to begin to turn while protected by the median and should normally be 5m or more. In difficult locations this may be reduced to a minimum of 2.0m (in rural areas) or 1.0m (in urban areas).

## U-TURN LANE WIDTH

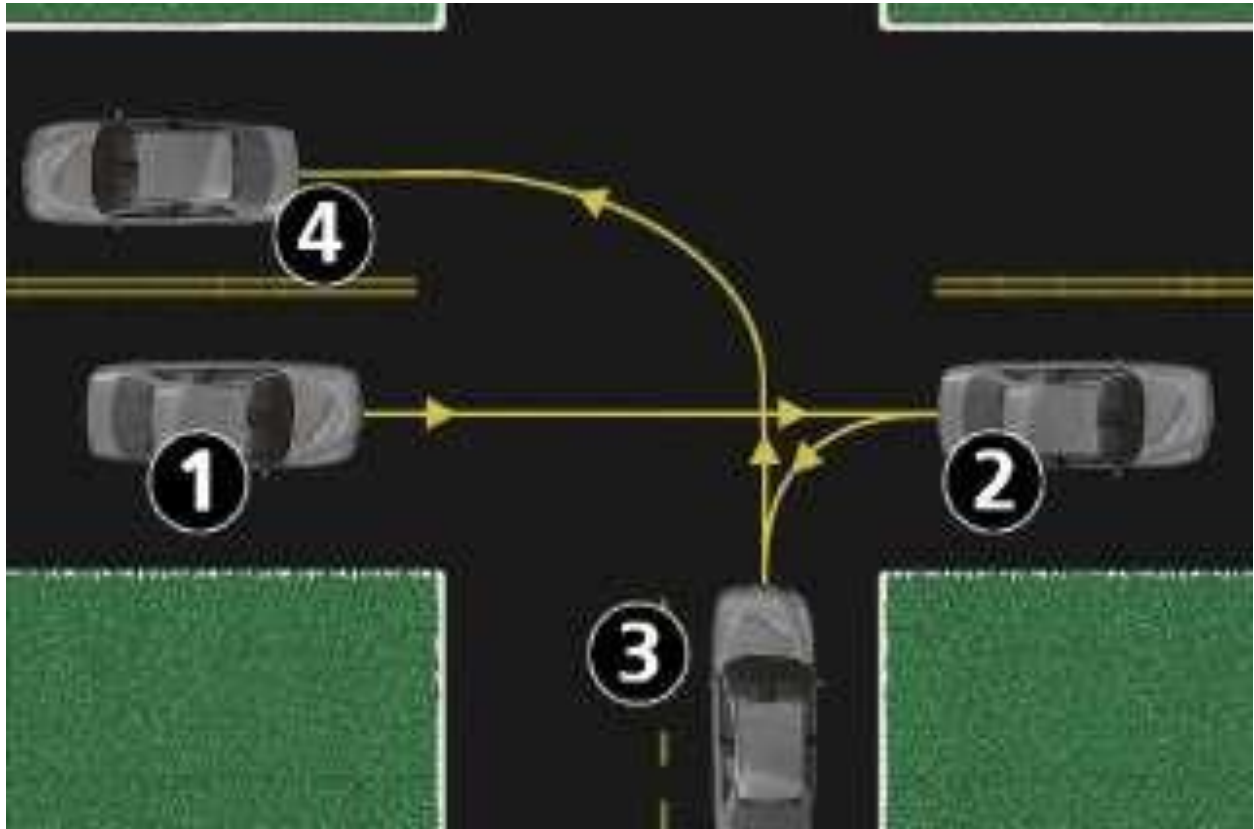
The standard width for a U turn lane (between curbs) is 3.7m. The resultant width of the unprotected part of the U turn lane therefore lies within the range of 4.0m to 5.7m.

## 2.4 Types of U-Turn

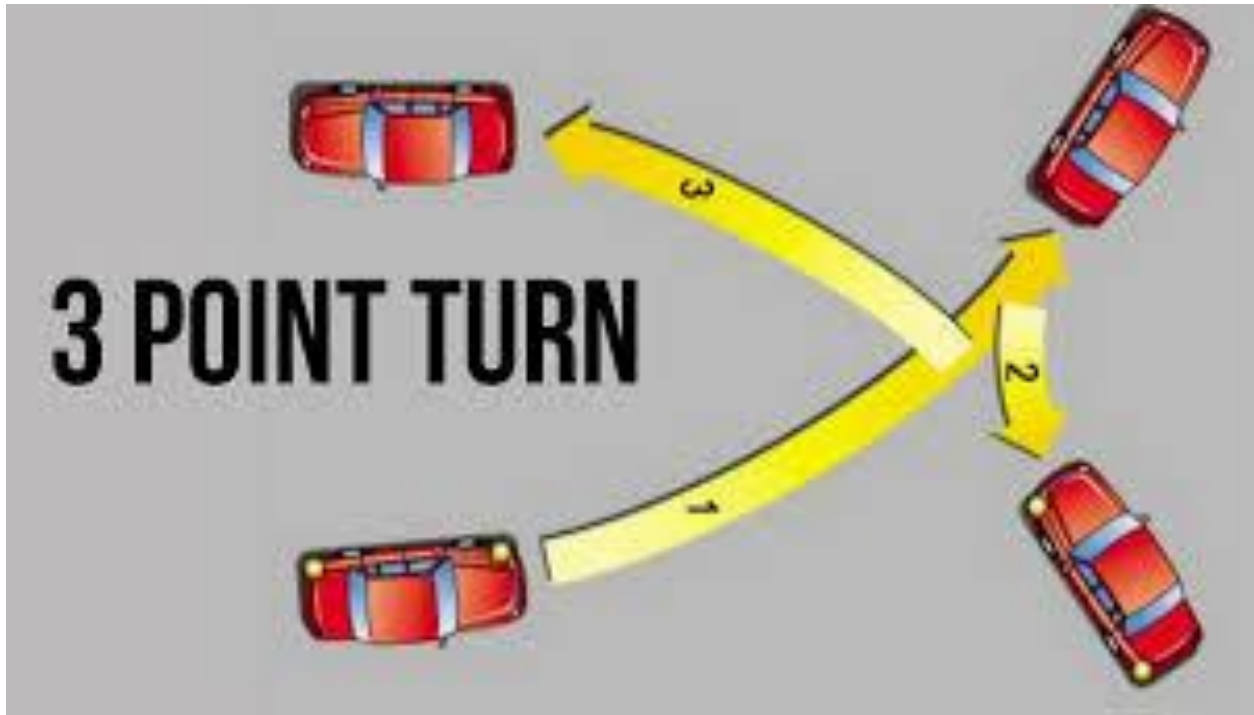
- ❖ U-Turns.
- ❖ 2-point turns.
- ❖ 3-point turns.
- ❖ 5-point or K-turns.
- ❖ Protected left and right turns.
- ❖ Unprotected left turns.
- ❖ Right turns on red.



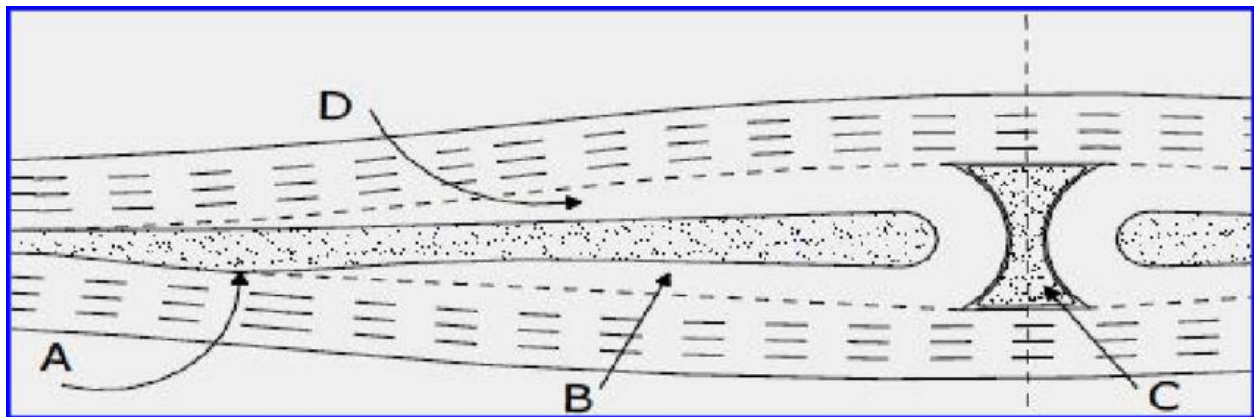
**Figure 2.2 : U-Turn**



**Figure 2.3 : Two Points U-Turn**



**Figure 2.4: Three Points U-Turn**

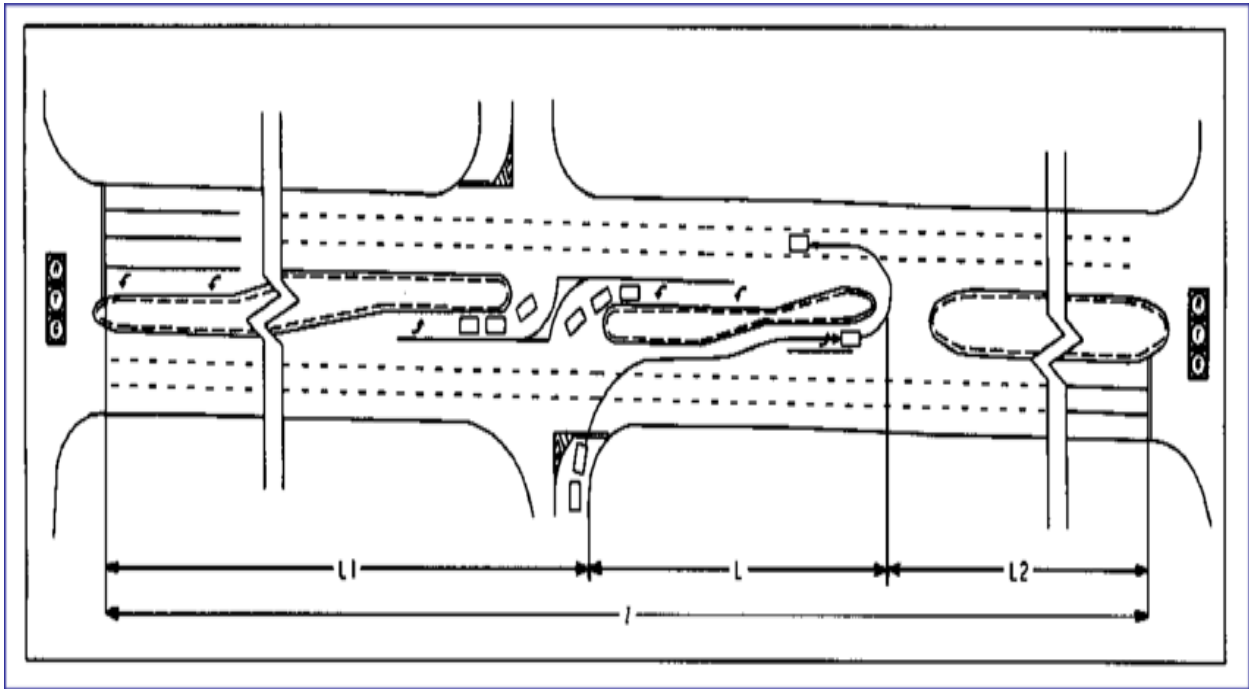


**Figure 2.5: Protected Left And Right Turn**





**Figure 2.6 : Unprotected Left Turn**



**Figure 2.7 : Right Turn U-Turn**

## 2.5 Review of Literature

Multiple interventions and innovations in geometric layouts on the road are done to reduce the travel time, reduce traffic congestion and increase the mobility flow. One of these improvements is the introduction of protected U-turns at junctions. With the implementation of this technique, the through moving traffic is given priority as they traverse without any obstruction. Such a system is beneficial if the designer aims to design the junction signal free and it lessens the travel time to some extent. Although it is practical there are certain implications and consequences that arise with the execution of such an unconventional layout. The goal of this paper is to highlight the potential consequences as well as the advantages of this arrangement. In order to develop a better understanding of these phenomena, some existing examples are given of Lahore in this paper to pinpoint the pressing issues at large i.e. obstructions to pedestrians, land acquisition issues in urban areas, need to provide pedestrian bridges which ultimately increase the cost of the project. The contribution of this research will aid the geometric designers and traffic engineers to take multiple considerations in the planning/designing the stage from all ends before instigating this pattern on roads .

Median openings are provided in multilane divided roads to enable U-turns. The atypical conditions prevailing in India motivated this study for the development of a methodology for the proper computation of the capacity for U-turns at these locations. Harders' formula has been widely used by various researchers to evaluate capacity for U-turns and this formula needs three elementary factors—namely, conflicting traffic volume, critical gap, and follow-up time. We collected the required data for capacity estimation from different uncontrolled median openings in India. We estimated the first input parameter required for Harders' formula, conflicting traffic volume, by analyzing the lateral placement of vehicles at the median opening area. We estimated the second parameter, critical gap, by using four different critical gap estimation procedures—namely; modified Raff, maximum likelihood, macroscopic probability equilibrium, and merging behavior. The third parameter, follow-up time, was measured directly in the field. Consequently, we calculated U-turn capacity for the given traffic streams and the findings were tested against the field capacity estimated in the field using Kyte's method. We then determined a suitable method for critical gap estimation in the Indian context by using two statistical parameters.

On section of road often more than one U-turn median opening that operates, but sometimes this make long queue in some periods time. It's causing many factors like on- coming speed and maneuver that make waiting time. Basically, no

procedure or guideline for U-turn sections design. The attempted to find the optimal approach regarding acceptances gap that occurs at U-turn median opening and the appropriate application criteria for the road that use U-turn median opening based on the capacity and traffic demand existing in the U-turn median opening. Gap acceptances influential for operational of U-turn, where the vehicle while performing maneuvers will decrease the speed of vehicles. The evaluation of the delay and travel time will provide to know the performance of the U-turn median opening. The purpose of this study is to evaluation the performance of U-turn median opening with study case at Soekarno Hatta Road, Palembang, Indonesia. The specific objectives in this study are to find the operational performance of U-turn movement by delay and travel time analysis by HCM 2000 and to evaluate the performance of U-turn using Vissim Simulation program. Vissim Simulation used for simulated 2 difference of width median opening and U-turn fly over. Simulated case study using Vissim simulation with different of width median opening showed in narrow width median opening will make major delay and the high of travel time. Based on the comparison of four scenarios of U-turn models and existing model. The best performance of U-turn facilities showed on 4th model. The 4th model is U-turn with fly over design, showed the performance are saturation degree 0.7333, delay study 3,43905, delay vissim 3,133479, and the travel time is 526,20. The travel time would lower with an increasingly the width of median opening. Simulation showed that travel time and delay slight differences when the width of median opening large than existing U-turn. Then comparison from U-turn with road median opening design and fly over U-turn design showed the last design give the best in traffic performance.

Field observations indicate that left turning vehicles at U-turn sections lead to a significantly bottleneck (congestion) at both origin and destination (opposing) roads. The bottlenecks have been observed in several U-turns such as Kufa –Najaf U-turn sections, Najaf –Karbala U-turn sections. It was found that left turn flow from U-turn leads to high congestion on both origin and destination roads. Therefore, field improvements have been done by the traffic policemen who create a temporary barrier from traffic plastic signs in order to protect left turning vehicles from through traffic in opposing direction. This study introduces new design for U-turn in order to protect both turning and through traffic to increase the level of performance. This design has been tested by using simulation model. The developed model (S-Paramics) has been calibrated using field data collected from Al-Najaf city. Then, the validation for the developed model has been implemented using another set of field data. Finally, the simulation model has been adopted to test the new design for U-turn. It was found that the new design gives higher capacity than the current design.

## 2.6 Performance

U-turns can reduce travel times on major arterials by reducing the number of conflicts between left turning vehicles, in some cases by more than 30%. The reduction in the number of conflicts also improves the safety of the highway by reducing the number of crashes. This decrease in crashes is most significant on 6-lane and 8-lane highways. A study completed in Florida showed that the use of the U-turn concept on 6-lane arterials over direct left turns reduced the total number of crashes by 26% and the injury/fatality crash rate was lowered by 32%. Though the reduction in non-injury crashes was not considered statistically significant, the reduction in injury accidents was considered significant. This trend was also similar for 8-lane highways; however, 4-lane arterials involve another factor when considering the use of U-turns. The narrow receiving bay of 4-lane arterials presents a problem for trucks trying to negotiate a U-turn. In the same study, it was found that U-turns actually increase the crash rate when truck volumes were high, so it is not advised to employ this concept in such conditions.

In another study conducted on a six-lane highway in Pinellas County, Florida, a full opening was transformed into a directional opening. This change implied that left turn egress from driveways was restricted. Left-turning vehicles were forced to make a right turn followed by a downstream U-turn to complete their desired movement. The safety effects of this conversion were studied by counting the number of potential conflicts before and after the openings were changed. A traffic conflict was defined as an event involving two or more road users where the action of one vehicle caused another to make an evasive maneuver to avoid a crash. After installing the directional opening, the average number of daily conflicts was reduced by 46%. The average number of conflicts per hour was also reduced by 30%. Another interesting fact noted in this study was that the conflict rate of right-turn U-turn vehicles during peak hours was 8% lower than during non-peak hours. This may indicate that drivers are more cautious in performing the U-turn movement when opposing traffic volumes are very high. A different study performed on the same highway found similar results. When comparing the number of conflicts per hour between vehicles performing direct left turns from driveways and indirect left turns by way of median U-turns, the number of conflicts for the indirect left turning vehicles were lower by 50% and 22% and 34%, during peak, off-peak and total time periods respectively.

## 2.7 Delay issue

The primary objective of using U-turns is to reduce travel time of through vehicles on major arterials. When placed in highway corridors with proper volume combinations, this alternative can have significant effects on the net traffic flow through that corridor. Qualitatively, U-turns are most applicable when high volume arterials have low to moderate left turn volumes (approximately 10 to 15 % of entering volume), and crossstreets have low to moderate volumes. Past research indicated that for arterial volumes greater than 400 vehicles per hour per lane, the use of U-turn will reduce delays as compared to conventional left-turn treatments. The conclusion of the study was that the U-turn was superior to the two-way left-turning lane (TWLTL) in mean vehicle speed and total system time in peak periods, while still remaining roughly equal during non-peak periods. The U-turn treatment used in Michigan, which prohibited left turns, provided 20 to 50 % capacity gains at intersections. More specifically, the benefits from using U-turns increased rapidly as the total incoming flow (sum of all approaches) to the intersection increased beyond 6,000 vph with 10 percent left-turning flow. When the left-turning flow was increased to 20 percent, a drastic reduction in delay was realized at volumes as low as 4,500 vph. A different study performed on Michigan's boulevard design also demonstrated the pronounced reduction in delay from using the U-turn over direct left turns. Simulations showed that when the percent saturation of each leg entering the intersection increased beyond 70 %, the use of direct left turns is rendered totally inefficient, while the U-turn design remained effective. The trend continued as the percent of left turns was increased from 10 percent to 25 percent during the simulation. This suggests that U-turns can be much more efficient than direct left turns when an intersection is at 70 percent of saturation or higher. In some cases, it may be difficult for U-turning vehicles to find adequate gaps in traffic to perform their desired movement. For this situation, openings can be placed on both the arterial and cross streets to provide relief. Then, some of the left turning vehicles on the arterial can make a right turn onto the cross street, followed by a U-turn on the minor street. A simulation performed by Hummer and Thompson attempted to compare the efficiency of intersections with four U-turns to those with two U-turns. In addition, stop-controlled openings were compared to signalized openings for both alternatives. They found that the intersection with four stop-controlled U-turns created the least delay of any intersection alternative studied. On average, it led to a savings of eight to fifteen seconds per vehicle for both left-turning and through vehicles. Placing U-turns on both intersecting highways also increases the left turn capacity when left turn volumes are very high. For vehicles to complete the U-turn movement. A study performed on ten highways in Tampa, Florida found that this

critical gap ranged from 5.8 to 7.4 seconds with an average of about 6.8 seconds . The study also noted two other important facts. First, when traffic volumes are higher, vehicles will make U-turns into smaller gaps than when volumes are lower. This may be attributed to drivers' impatience when waiting for long periods of time in the U-turn lane. Secondly, it was found that at higher speeds, drivers required considerably larger time headways to complete the U-turn movement because drivers are less able to judge gaps at the higher speeds. Critical gaps are a difficult element to study because of the higher number of lanes on arterials. Some people are willing to make a U-turn when only the nearest lane is clear while others are not. However, all these issues should be considered when deciding whether to place the opening on the arterial, and/or the cross street, or not to implement the U-turn.

## **2.8 U-Turns Restriction Guidelines**

There are some situation where u turns should not be constructed . Limiting factors related to road way geometry must be satisfied before u turns can be save and effective . General scenarios for avoiding u turns included the following :

- ❖ Arterials with narrow medians and no prospects of gaining extra right of way are generally poor candidates for the u turn, unless the cross over can be built on the cross street
- ❖ U turns where the receiving roadway width is less than 24 feet should be avoided. Any width less than 24 feet would make it difficult for larger vehicles to make a u turn movement.
- ❖ A median width of 60 feet on a four lane highway is recommended by AASHTO for a large semi trailer vehicle. However ,a narrow is possible on six or eight lane arterials
- ❖ U turns at intersections should not be used when the protected left turn phase on the main line over laps a right turn on the side street. Further more ,any movement that may involve the unexpected crossing of paths during green or yellow intervals must be prohibited
- ❖ Another important factor to consider when implementing u turns is sites distance . Many sites DOT'S restrict u turns on any curve or near the crest of a grade where approaching vehicles can not be seen with in 500 ft by u turning drivers. In addition ,U turns that don't meet the Minimum AASHTO requirements for site distance must be prohibited .
- ❖ An accident history threshold of 5 or more U-turn related crashes over any 12 months period has also been recommended when prohibiting u turns.

## **2.9 Summary of Literature Review**

The literature that was reviewed indicate that the use of median U-turns is very effective in reducing crash rates as well as delay when placed on high volume arterials intersecting with low to moderate volume cross streets. The most efficient configuration is that of stop-controlled median U-turns. This has been shown to increase intersection capacity by 20 to 50 percent while decreasing the rate of crashes by up to 30 percent. Median openings placed only on the arterial also work well. Allowing U-turns at the intersection is not advised due to the conflicts the U-turning vehicles encounter with right-on-red vehicles from the cross street. However, if the number of these conflicts is low or non-existent, this method may be considered. Median U-turns are a relatively low cost means of improving traffic flow and have already been employed extensively in Florida and Michigan with much success.



## CHAPTER THREE

# METHODOLOGY



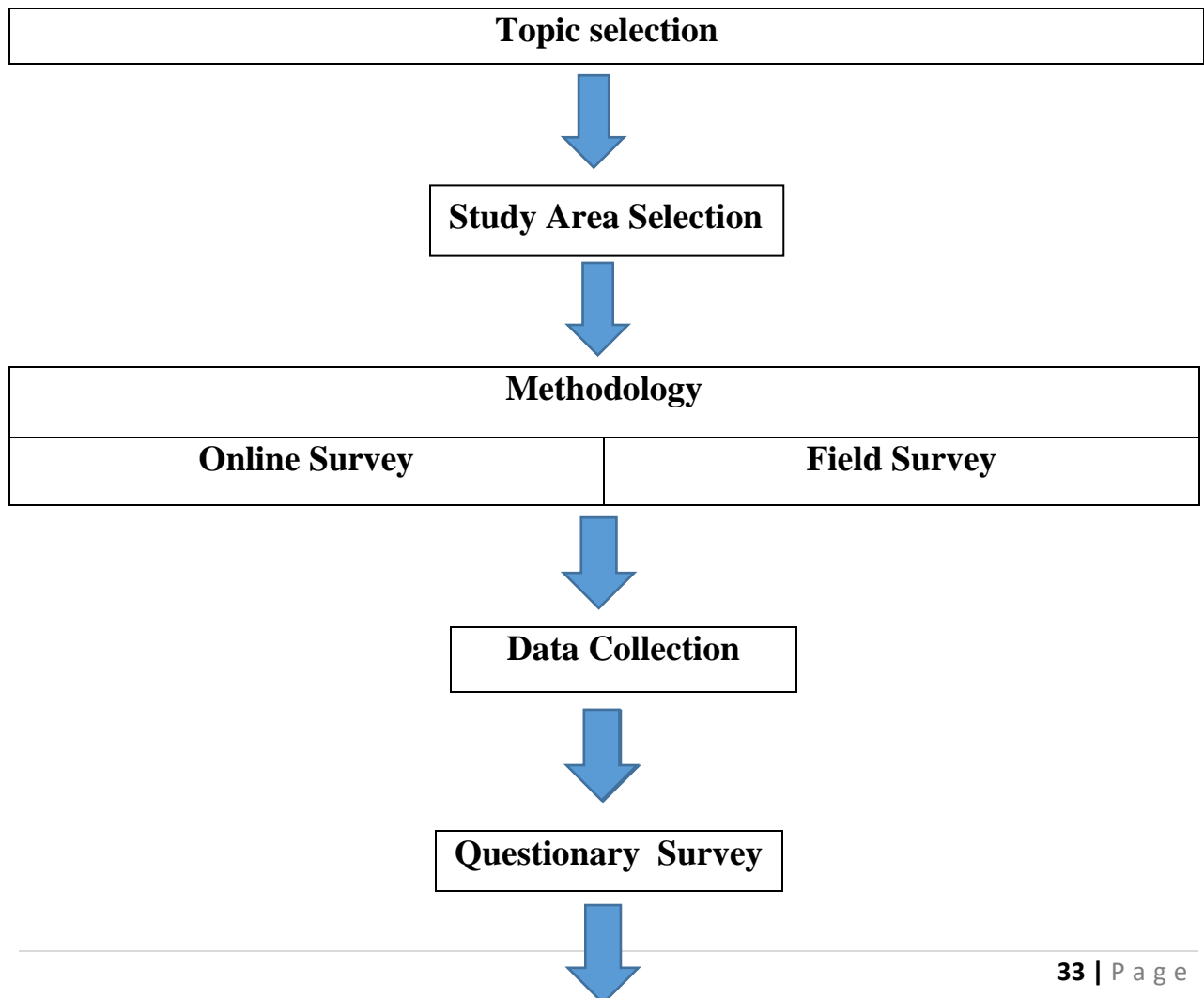
# CHAPTER THREE

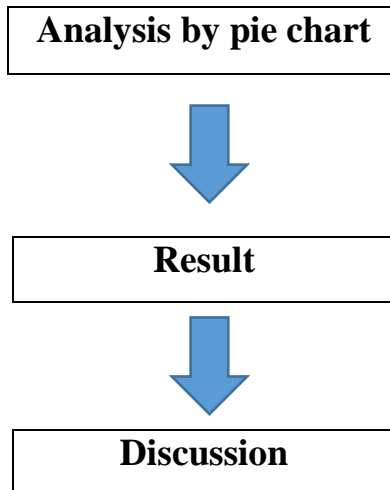
## METHODOLOGY

### 3.1 General

The objective of this study was to determine the traffic performance of newly constructed U-turns. To achieve this objective, we discussed with pedestrians and drivers at these U-Turn locations .we found their opinions about this U-Turn. Then the results were analyzed to examine the relative changes in the performance of the U-Turn and used in developing a set of conditions that could be used in identifying cases where the use of U-turns should be considered as an alternative option.

### 3.2 Flow Chart of Study :





### **3.3 Statement of Flow Chart :**

#### **3.3.1 Topic selection**

The topic is selected for this study is **Study on the effects on traffic performance of newly constructed U-Turn from Mohakhali to Uttara road**. Nowadays, traffic congestion is most concern issue for people who lives Dhaka city for a long period . Government has take some steps to decrease traffic jam from Dhaka city U-Turn is one of them . so, we choose this topic to find out the U-Turn is beneficial or not .

#### **3.3.2 Study Area Selection :**

After completing the topic selection we start to find the best possible location for completing the survey .In this purpose we select the Mohakhali to Uttara road for this survey and also select four points in this route which are Banani, Kaula, Battalion 1 and Uttara point .

#### **3.3.3 Methodology :**

We have completed our survey by two ways they are online data collection and on field data collection . Online data collection is done by taking online responses and on field data collection is done by taking data from the selected location .

**3.3.4 Online Survey :**At the beginning of survey we try to gather knowledge about U-Turn. After that we created a Google form with 17 questions which we distributed by online in different categories people to collect their opinion .

### **3.3.5 Field Survey :**

We collected data by a hard copy including some questions , from the Uttara house building U-Turn point then Battelion1 point ,Kaula point ,Banani point respectively .In these points we asked people and drives several questions about the u turns they use . After that we took all of this response and complete the data collection.

### **3.3.6 Data Collection :**

We selected four places to collect data which are Uttara , Battelion 1, Kaula and Banani . After , selecting the pedestrians and drivers we found their response about this U-Turn . We selected various type of driver among them took response from BUS,PRIVATE CAR, CNG, TRUCK ,PICK- UP and BIKE. We collected 103 data from drivers and people from the 4 location of our selected areas . After collecting their opinion we calculated the opinion and after this calculation we get some value we put the values In Excel sheet to create the Pie chart from them and by this chart we can easily find what people thought about this u turns effects.

**3.3.7 Questionary survey :** we selected ten questions for drivers and pedestrians to complete this survey. We collected data from our four selected points in peak hours in four several days .

### **3.3.8 Data Analysis by pie chart :**

We analyzed the collected data by Excel sheet by which we create pie chart for the different questions and after that we combined the driver questions and survey questions of online and create a combined pie chart for the analysis.

### **3.3.9 Results :**

We completed the data collection and we create the Pie chart by excel sheet and from this pie chart we can get the results about the newly constructed U-Turns in the selected route which are on the basis of people opinions what they thought about this U-Turns.

### **3.3.10 Recommendation :**

After completing this survey we found the effects of newly constructed U-Turns in selected road .Then we analyzed the data collections and create pie chart of drivers and pedestrians opinions .Finally we have reached on results and given some recommendations on the basis of results .

### 3.4 STUDY AREA

The survey performed in, Banani , Kaula, Battalion 1, and Uttara Point.

A basic network was developed that was used as the basis for the simulation .The network consisted of four U-Turns. The locations where newly U-turns were constructed. In this scheme, at **Uttara** North - and South -bound right turns Similarly, the South -bound through right at U-Turn and at **Battalion 1** south-bound right a U-turn and north bounded right U-Turn. Therefore, the four U-Turn are so much interested use these U-turn .In addition, at **kaula** and **Banani** also has right turn , since the intention of the study was to examine the impact of the U-turn movements at a U-Turn as opposed to the performance of the entire.

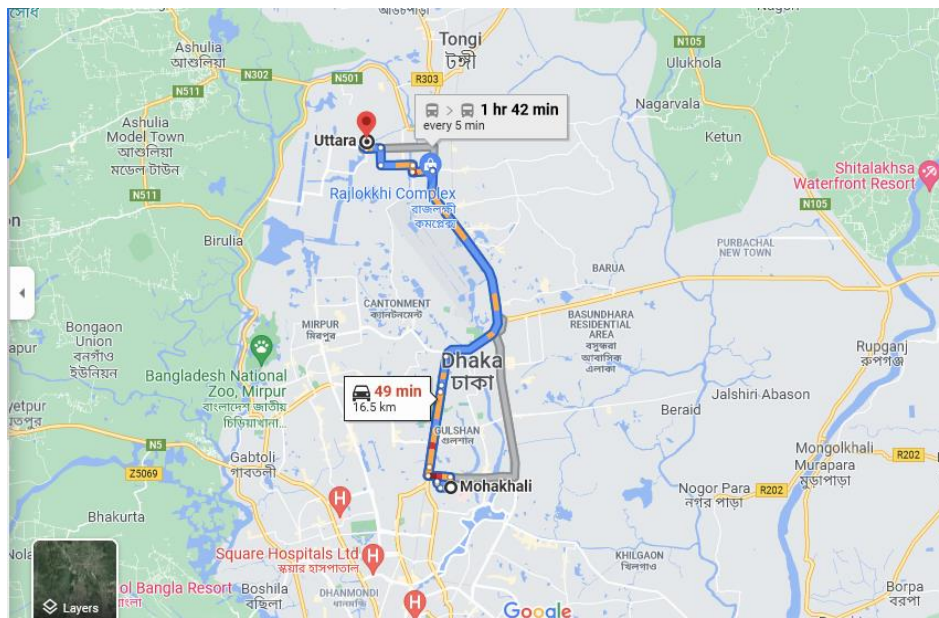
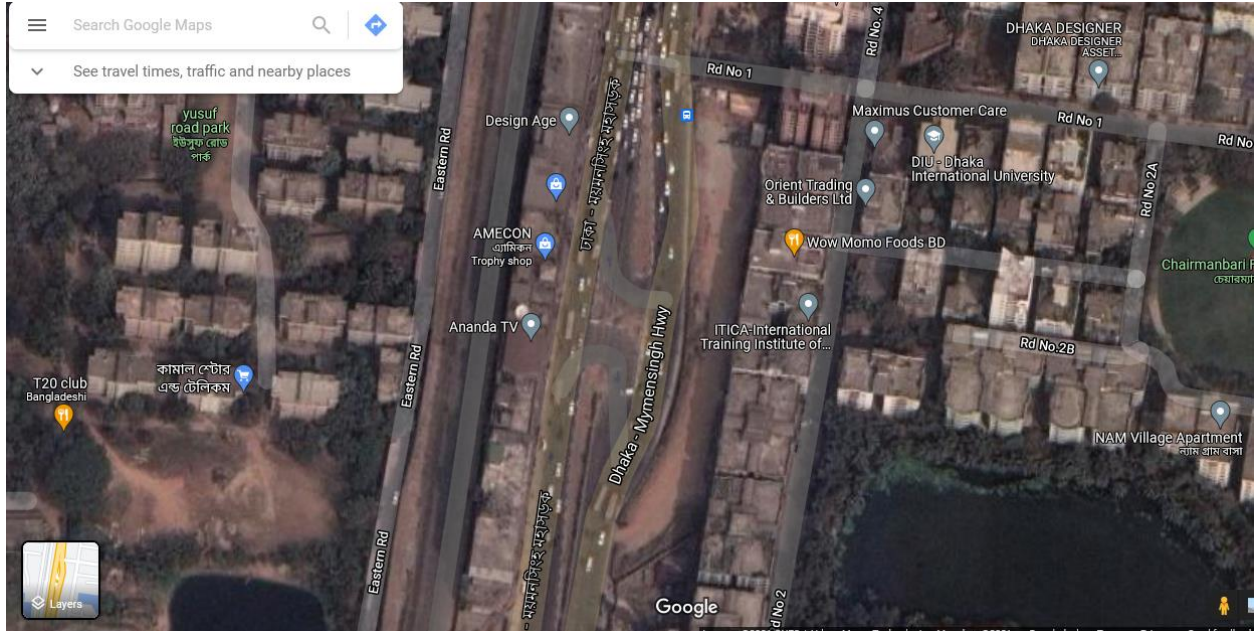
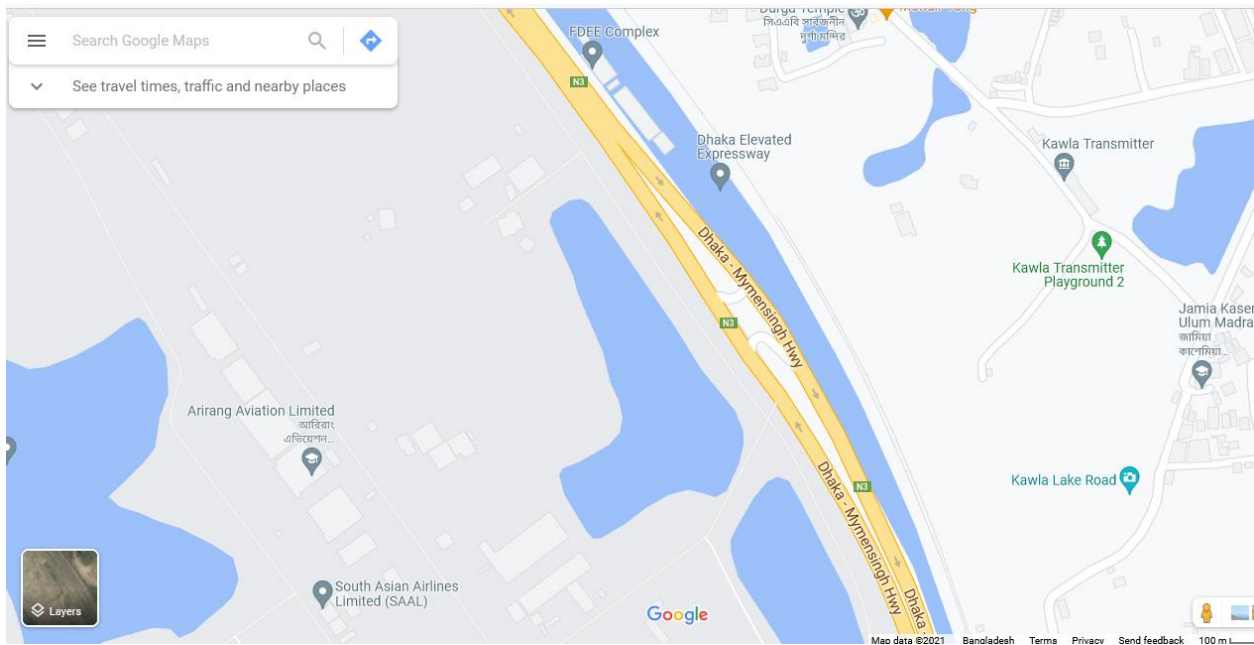


Figure 3.1: Map of Network Area Mohakhali to Uttara road



**Figure 3.2 : Study area map on Banani point**

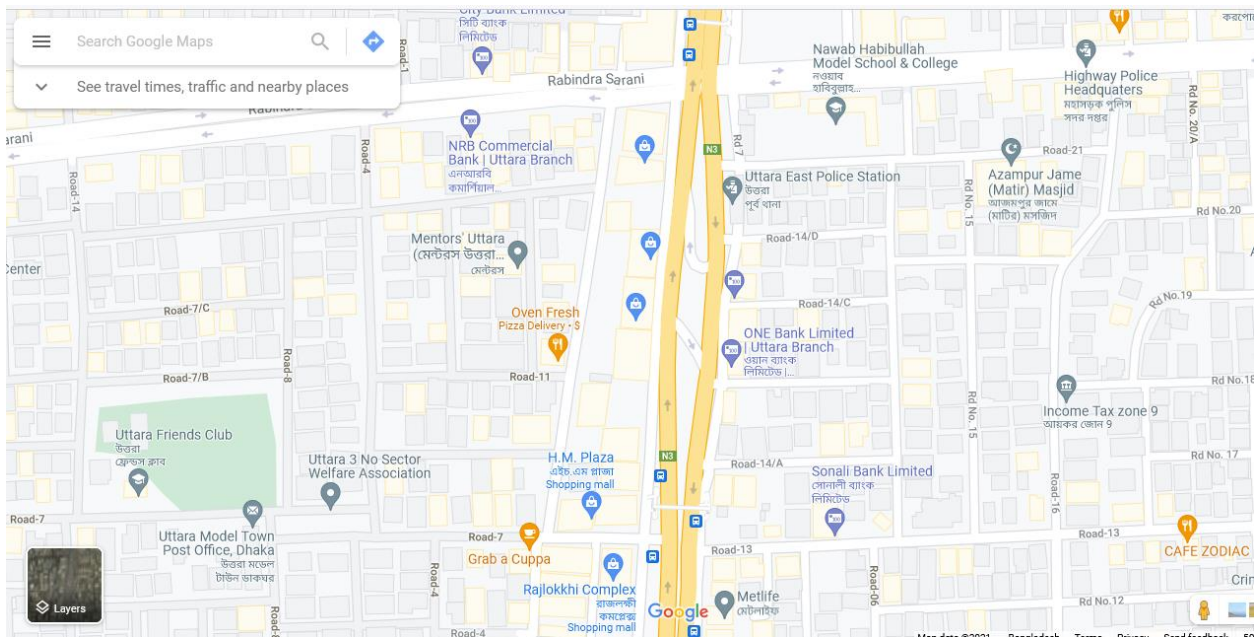


**Figure 3.3: Study area map on Kaula point**





**Figure 3.4: Study area map on Battelion 1 point**



**Figure 3.5: Study area map on Uttara point**



**Figure 3.6: Study area at Banani point**





**Figure 3.7: Study area at Uttara point**

**3.5 Summary :** In summary, the chapter covers the research approach methodology adopted on this research .Work procedure is presented by flow chart .Field survey and photographic survey are also included in this chapter .The selected direction of routes shown by map at the beginning of the chapter





## CHAPTER FOUR

# DATA COLLECTION AND ANALYSIS

# **CHAPTER FOUR**

## **DATA COLLECTION AND ANALYSIS**

### **4.1 General :**

Results have been obtained by questionnaire survey and it analyzed by pie chart . The results have been obtained by questionnaire survey have been presented in the flowing chart

### **4.2 Data Collection and Analysis :**

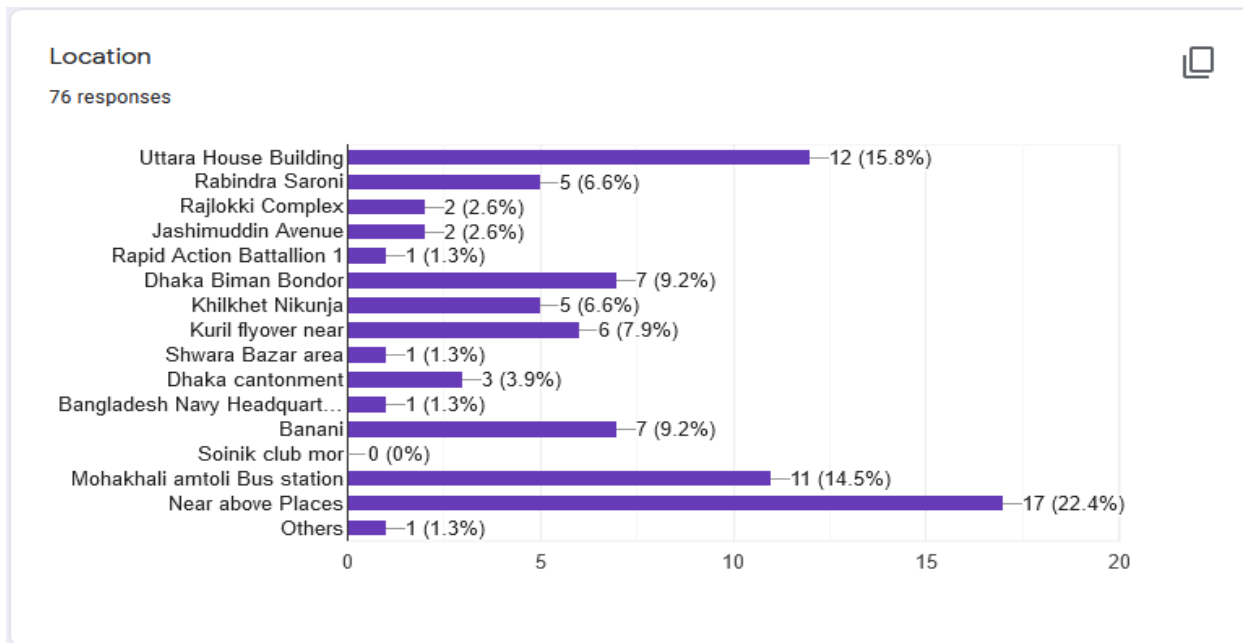
Data collection for this survey is divided in two part one of them is online data collection and another one is filed survey data collection .In online data collection we firstly select 17 questions for the people who regularly use this U-Turns .we take their response through Google forms and after taking their response we create the Pie chart and get a result which is conducted in a summary table . For the field survey data collection we again select 10 questions for the drivers who regularly use this U-Turns and in four different days we take responses from the drivers. After taking their responses we create a data table for them and by this data table we create the Pie chart by this table we can easily see the thought of them on this newly constructed u turns .

#### **4.2.1 Online Survey**

#### **4.2.2 Field Survey**

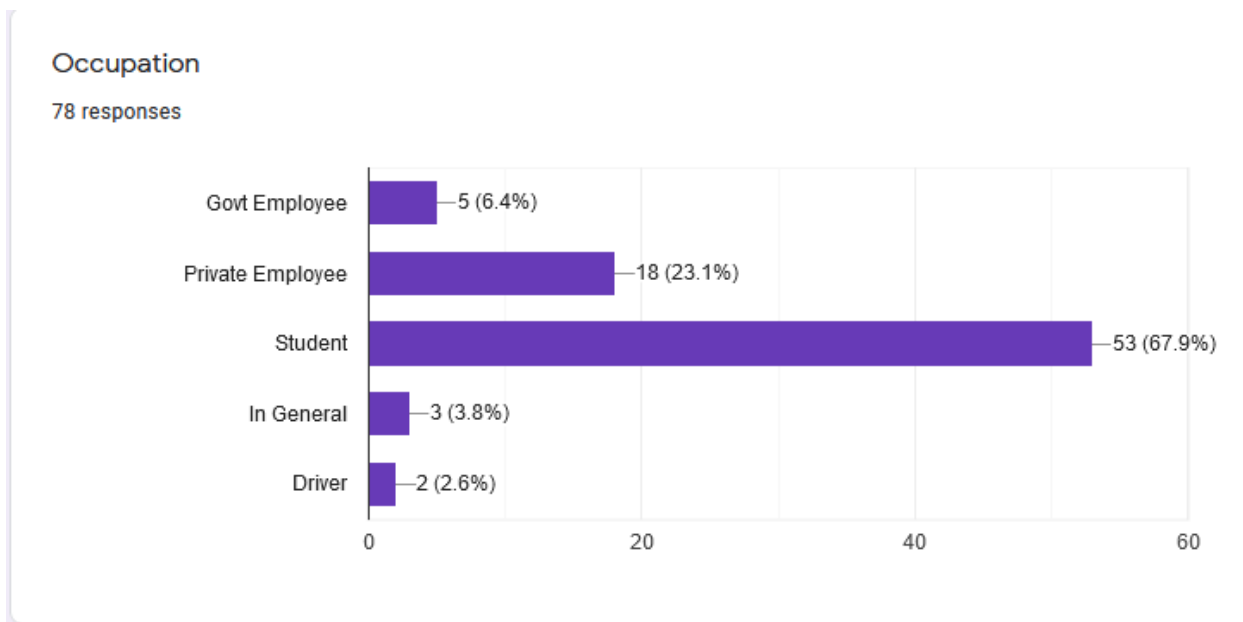
##### **4.2.1 Online survey**

From Mohakhali to Uttara road the survey has been conducted in several locations from the problems of Banani, Kaula, Battalion 1 and Uttara area have been considered in the study and try to find out the effects of newly constructed u turns . There are many problems in the route .we surveyed four u turns location and took some pictures are included in below and the surveyed data are given in pie chart.



**Figure: 4.1 Demographic survey : (Location )**

**Summary :** This data gives us the result who use this U-Turns regularly. Among them maximum people are from near above the places and Uttara house building area.

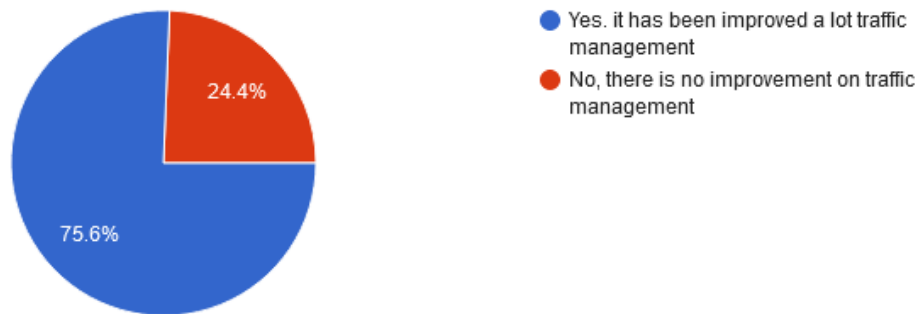


**Figure : 4.2 Demographic survey :(Occupation )**

**Summary :** This data gives us the result of which occupation people are regularly use this U-Turn. Among them student and private employee are most.

Is Uttara U Turn Significantly improving Traffic management?

78 responses

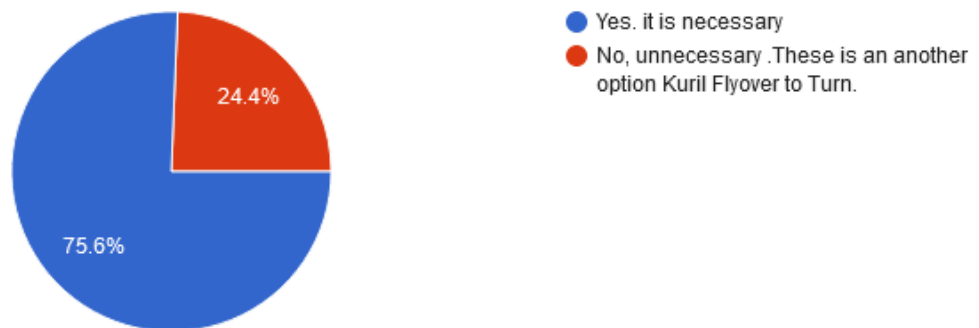


**Figure : 4.3 Survey Question 1**

**Summary :** 75.6 % people think that this U-Turn has been improved a lot on traffic management ,on the other hand hand 24.4% people think that there is no improvement on traffic management .so, we can say that U-Turn improved the traffic management .

A U-Turn in front of cantonment,Army Golf club, railway station . is it necessary ??

78 responses

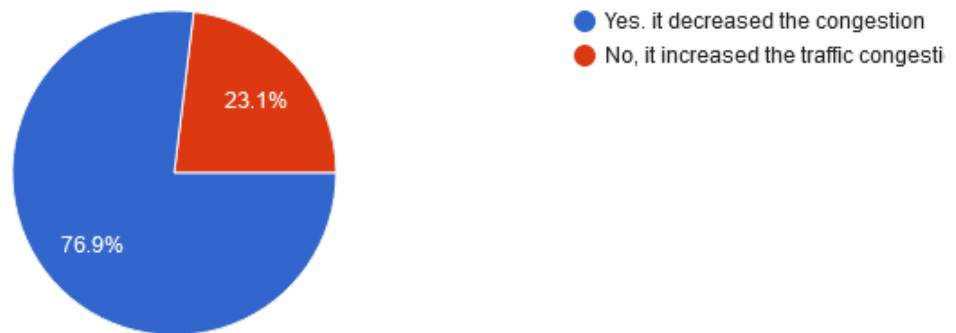


**Figure: 4.4 Survey Question 2**

**Summary :** 75.6 % people think that the U-turn is necessary in the asking points and around 24.4% people think that no need of U-Turn in selected area .From this summary we can say that U-Turn is necessary in the asking area.

Is it Noticeably decreasing Traffic congestion at Uttara point???

78 responses

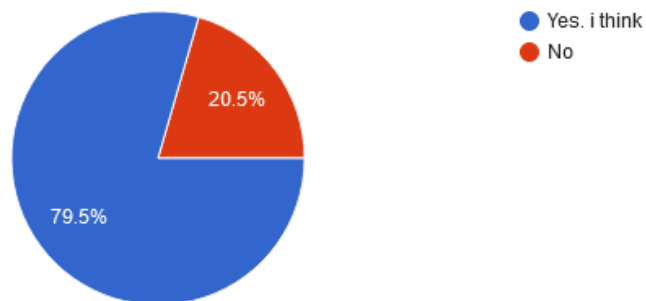


**Figure; 4.5 Survey Question 3**

**Summary :** 76.9 % people think that U-turn has noticeably decreased the traffic congestion at Uttara point and 23.1% people think that U-Turn increased the traffic congestion . So, we can say that traffic congestion is decreased at U-Turn area .

Do you think this U turn project will conflicts of BRT project???

78 responses

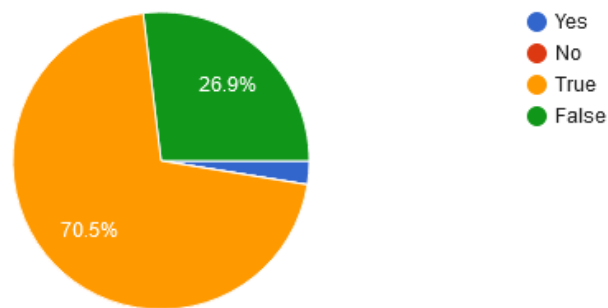


**Figure: 4.6 Survey Question 4**

**Summary :** 79.5% people think that U-turn project Will conflict the Bus rapid transit(BRT) project and 20.5 % peoples are against it .From this summary we find that U-Turn will conflicts the BRT project.

The U-Turn project will make narrow the traffic lanes and obstructs the district level buses .

78 responses

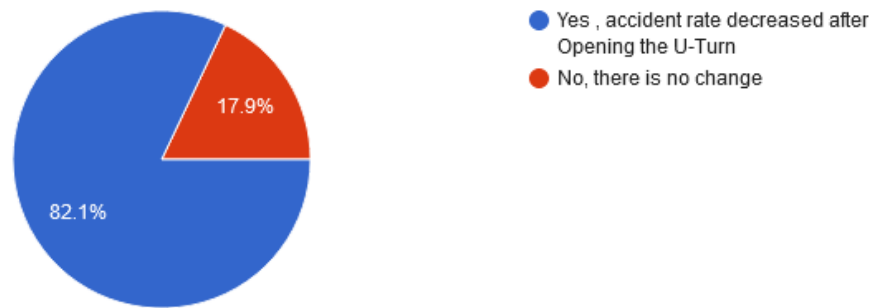


**Figure: 4.7 Survey Question 5**

**Summary :** 70.5% People think that this U- Turns makes narrow the traffic lane and obstructs the district level buses but 26.9 % people are disagree on this .They think U-Turn project will not make narrow the traffic lanes. So, we can say that this U-Turns makes road lanes narrow in some places.

Do you think about U-Turn decrease the Accident rate on road ??

78 responses



**Figure: 4.8 Survey Question 6**

**Summary :** 82.1% people think that the accident rate decreased after the opening of this U-Turns project and 17.9% people think that there is no change . So, We can say that U-Turn decreased the accident rate .

How will the Economy be effected rate by U-Turn ?

76 responses

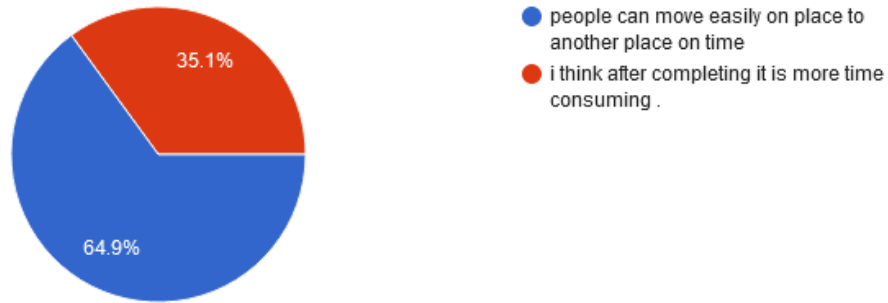


**Figure: 4.9 Survey Question 7**

**Summary :** 65.8% people think that economic rate will be growth by this U-Turns project ,on the other hand 32.9% people think that there is no changes in economy. So we can say that U-Turn project is beneficial for economic rate

How effects on Human life on rush hours ??

77 responses

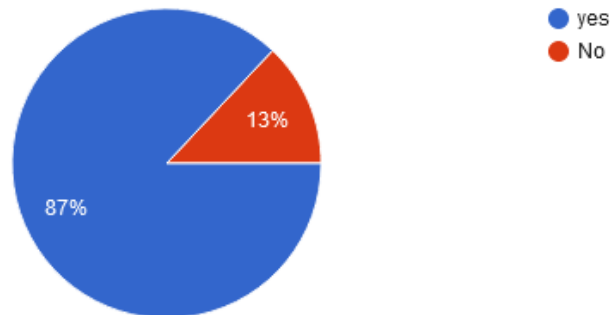


**Figure: 4.10 Survey Question 8**

**Summary :** 64.9% people think that this project will help people to move from one place to another on time but 35.1 % people think that U-Turns make difficult to move from one place to another place .So we can say that the U-turn saves time for movement .

Is it beneficial for reducing Traffic congestion ?

77 responses



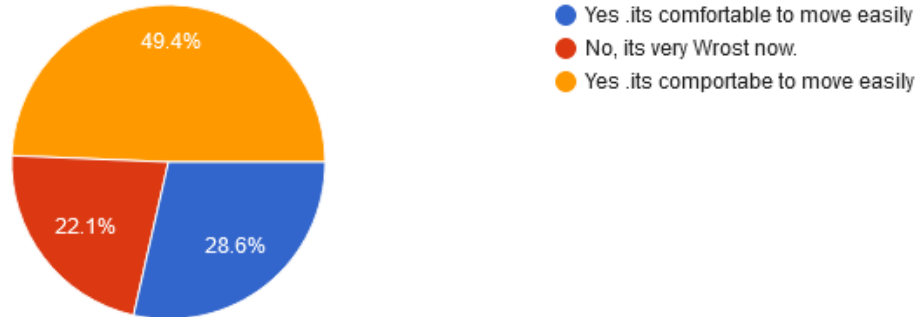
**Figure: 4.11 Survey Question 9**

**Summary :** 87% people think that U- Turns are beneficial for reducing the traffic congestion , on the other hand 13% people against that its not beneficial for reducing traffic congestion. From this we can say U-Turn reduce the traffic congestion.



Do you think people feel Comfortable to use this U-Turn???

77 responses

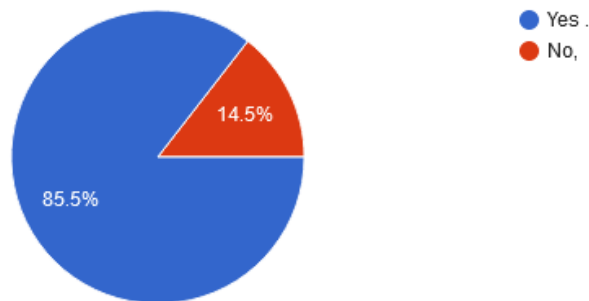


**Figure: 4.12 Survey Question 10**

**Summary :** 79.9 % people think that it is comfortable to use this U-Turns but 22.1 % people think that it's worst now. We can say that U-Turn is comfortable to use.

Is U-Turn helpful for saving Time?

76 responses

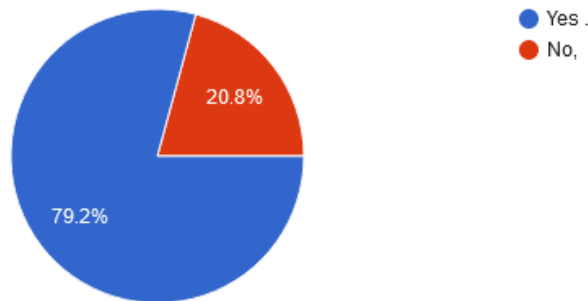


**Figure: 4.13 Survey Question 11**

**Summary :** 85.5% people think that U-turn is helpful for saving time on the other hand 14.5% people think that U-Turn can not save time .So , from this it can say U-Turn is helpful for saving time .

Is This U-Turn suitable for future road design ?

77 responses

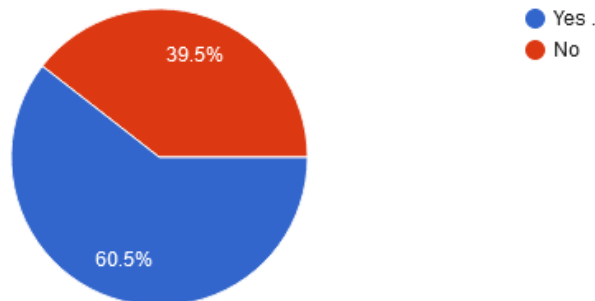


**Figure: 4.14 Survey Question 12**

**Summary :** 79.2% people think that U-turn is suitable for future road design but 20.8% people do not agree with it. So, we can say that it's suitable for future design .

Do you think U-Turn is the best solution for reducing traffic jam??

76 responses

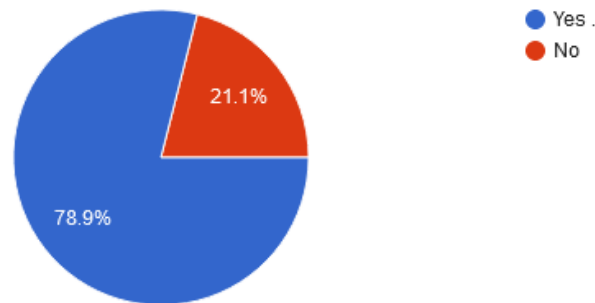


**4.15 Survey Question 13**

**Summary :** 60.5% People think that u turn is the best solution for reducing traffic jam ,on the other hand, 39.5 % people think U-Turn can not reduce traffic jam. So, we can say that U-Turn is best solution to reduce the traffic jam .

Does U-Turn make road use easier ?

76 responses

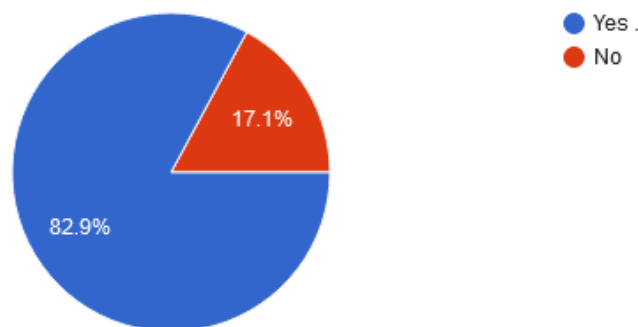


**Figure: 4.16 Survey Question 14**

**Summary :** 78.9 % people think that U-turns make road use easier for them , on the other hand 21.1% people think that U-Turn make road use difficult . So it can say that U-Turn make road use easier .

Does U-Turn reduce traffic over Turning on road ?

76 responses



**Figure: 4.17 Survey Question 15**

**Summary :** 82.9% people think that U-turns over turning on road has reduce ,but 17.1% people's are disagree about it .So it can say that U-Turn reduce over turning on road.

## Online Survey Data

Question	Options	Response	Percentage	Result
Location	Uttara House Bulding	12	15.8	This data gives us the result who use this U-Turns regularly. Among them maximum people are from near above the places and Uttara house building area.
	Rabindra Saroni	5	6.6	
	Rajlokki Complex	2	2.6	
	Jashim Uddin Avenue	2	2.6	
	Rapid Action Battalion-1	1	1.3	
	Dhaka Biman Bondor	7	9.2	
	Khilkheth Nikunja	5	6.6	
	Kuril Fly Over near	6	7.9	
	Shwara Bazar Area	1	1.3	
	Dhaka Cantonment	3	3.9	
	Bangladesh Navy Head Quarter	1	1.3	
	Banani	7	9.2	
	Soinik Club Mor	0	0	
	Mohakhali Amtoli Bus Station	11	14.5	
	Near Above Places	17	22.4	
Others	1	1.3		
Occupation	Govt Employee	5	6.4	This data gives us the result of which occupation people are regularly use this U-Turn. Among them
	Private Employee	18	23.1	
	Student	53	67.9	
	In General	3	3.8	
	Driver	2	2.6	

				student and private employee are most.
Is Uttara U-turn Significantly improving traffic management ?	Yes, it has been improved a lot traffic management	78	75.6	Maximum people think that this U-turn has been improved a lot of traffic management.
	No, there is no improvement on traffic management		24.4	

A U-turn in front of Cantonment Army Golf club, Railway Station, is it necessary?	Yes, it is necessary	78	75.6	Maximum people think that this U-turn is necessary in the asking points.
	No, Unnecessary, there is an another option Kuril Fly Over to turn.		24.4	
Is it Noticeably decreasing traffic congestion at Uttara point ?	Yes, it decrease the congestion	78	76.9	Maximum people think that U-turn has noticeably decrease the traffic congestion at Uttara point.
	No, it increased the traffic congestion		23.1	
Do you think this U-turn project will conflicts of BRT project ?	Yes, I think	78	79.5	Maximum people think that this U-turn project will conflict the Bus Rapid Transit (BRT)
	No		20.5	

The U-turn project will make narrow the traffic lanes and obstructs the district level buses ?	Yes	78	70.5	Maximum people think that this U-turn makes narrow the traffic lanes and obstructs the district level buses.
	No		26.9	
Do you think about U-turn decrease the accident rate on road ?	Yes, accident rate decreased after opening the U-turn	78	82.1	Maximum people think that the accident rate decreased after the opening of this U-turn project.
	No, there is no change		17.9	
How will the economy be the effected rate by U-turn ?	Economy rate will be growth	78	65.8	Maximum people think that economy rate will be growth by this U-turn project
	No, there will be no change on economy		32.9	
How effects on human life on Rush Hours ?	People can move easily on place to another place on time	78	64.9	Maximum people think that this project will help people to move from one place to another place on time
	I think after completing it is more time consuming		35.1	
Is it beneficial for reducing traffic congestion ?	Yes	78	87	Maximum people think that this U-turns are beneficial for reducing the traffic congestion.
	No		13	

Do you think people feel comfortable to use this U-turn ?	Yes, it's comfortable to move easily	78	77.9	Maximum people think that it's comfortable to use this U-turn
	No, it's very worst now		22.1	
Is U-turn helping for saving time ?	Yes	78	85.5	Maximum people think that this U-turn is helpful for saving Time.
	No		14.5	

Is this U-turn suitable for future road design ?	Yes	78	79.2	Maximum people think that this U-turn is suitable for road design.
	No		20.8	
Do you think U-turn is the best solution for reducing traffic jam ?	Yes,	78	60.5	Maximum people think that this U-turn is the best solution for reducing traffic jam.
	No,		39.5	
Does U-turn make road use easier ?	Yes	78	78.9	Maximum people think that this U-turn make road use easier for them.
	No		21.1	
Does U-turn reduce traffic over turning on	Yes	78	82.9	Maximum people think that this U-turns overturning on

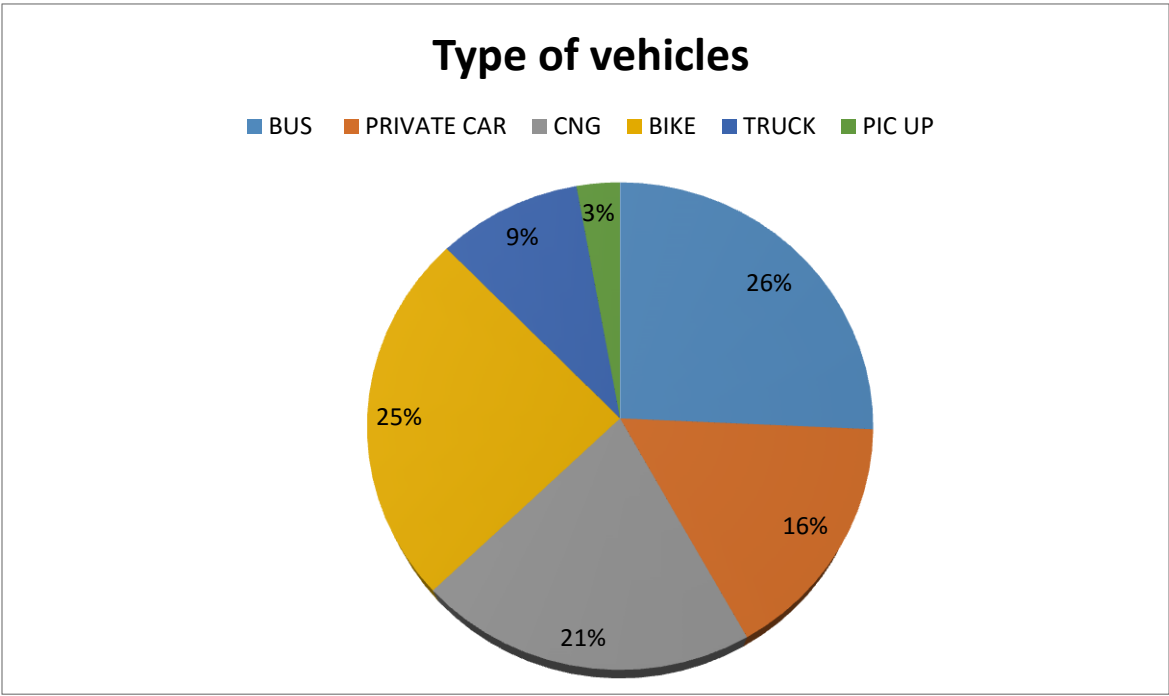
road ?	No		17.1	road has reduce.
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**4.2.2 Field Survey :**

Field survey data where used as a primary source data .At first 10 questions were prepared for the field survey. The survey work was done in the survey are through these questions .The total number of questionnaire survey for this study 103 responses .This survey was done by Four members on 9/9/21 at Uttara point 11/9/21 at Battalion 1 and Kaula point , 12/9/21 at Banani point.

**Q 1: which type of vehicle do you drive ?**

- a) Bus
- b) Private car
- c) CNG
- d) Bike
- e) Truck
- f) Pick up



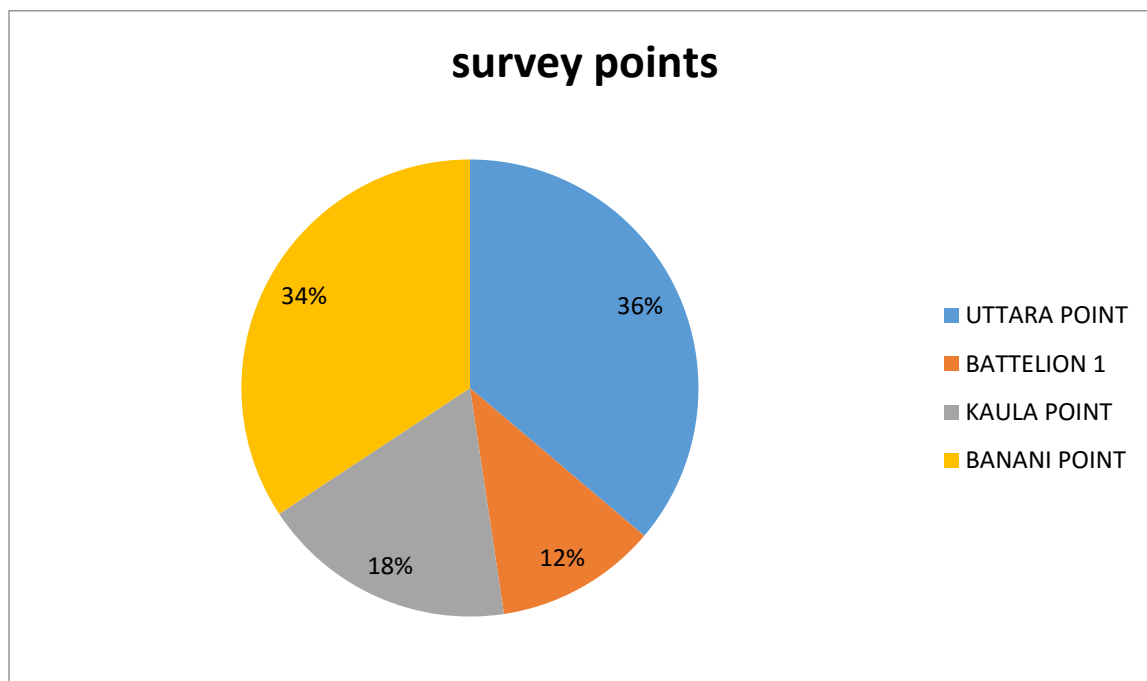
**Figure : 4.18 Type of vehicles**

**Summary :** There are many types of vehicle which use this U-Turn. Maximum of them is bus ,bike, CNG, private car the rate is 26% ,25%, 21%,16% respectively.



**Q 2: which u turn do you use most ?**

- a) Uttara point
- b) Battalion 1 point
- c) Kaula point
- d) Banani point



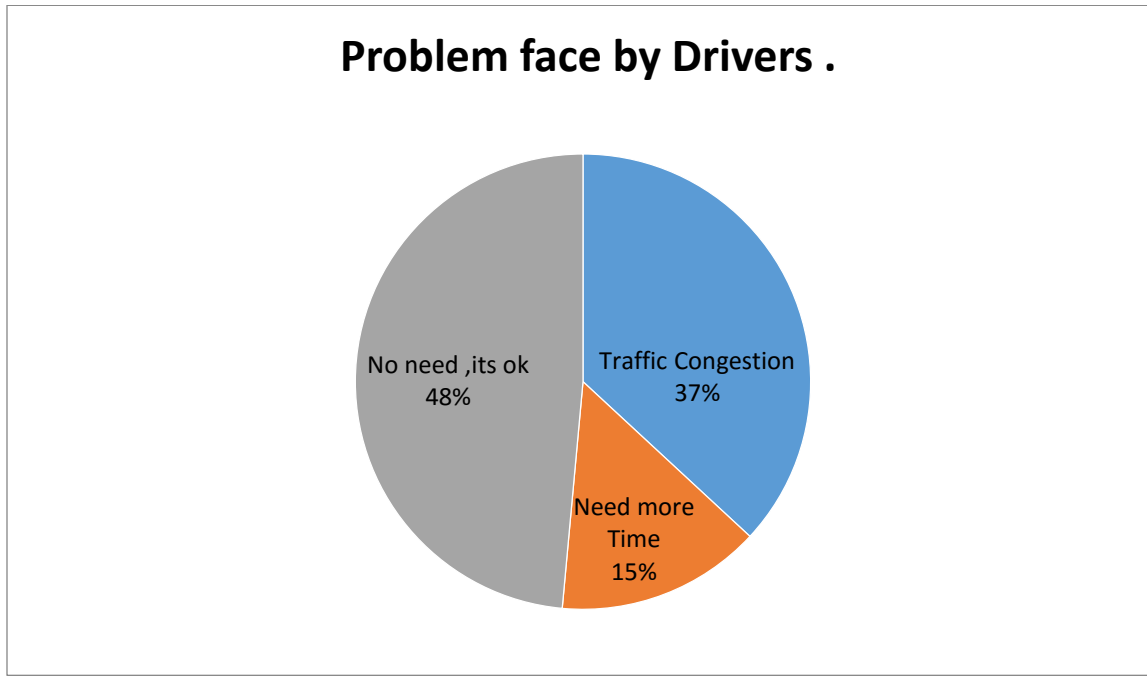
**Figure : 4.19 survey points**

**Summary :** 36% people use the Uttara point which is the most ,on the others point the use percentage is 34%,18%12% at Banani, Kaula ,Battalion 1.

**Q 3: What type of problems are you facing in this point**

- a) Traffic congestion more

- b) Need more time
- c) No it's okay

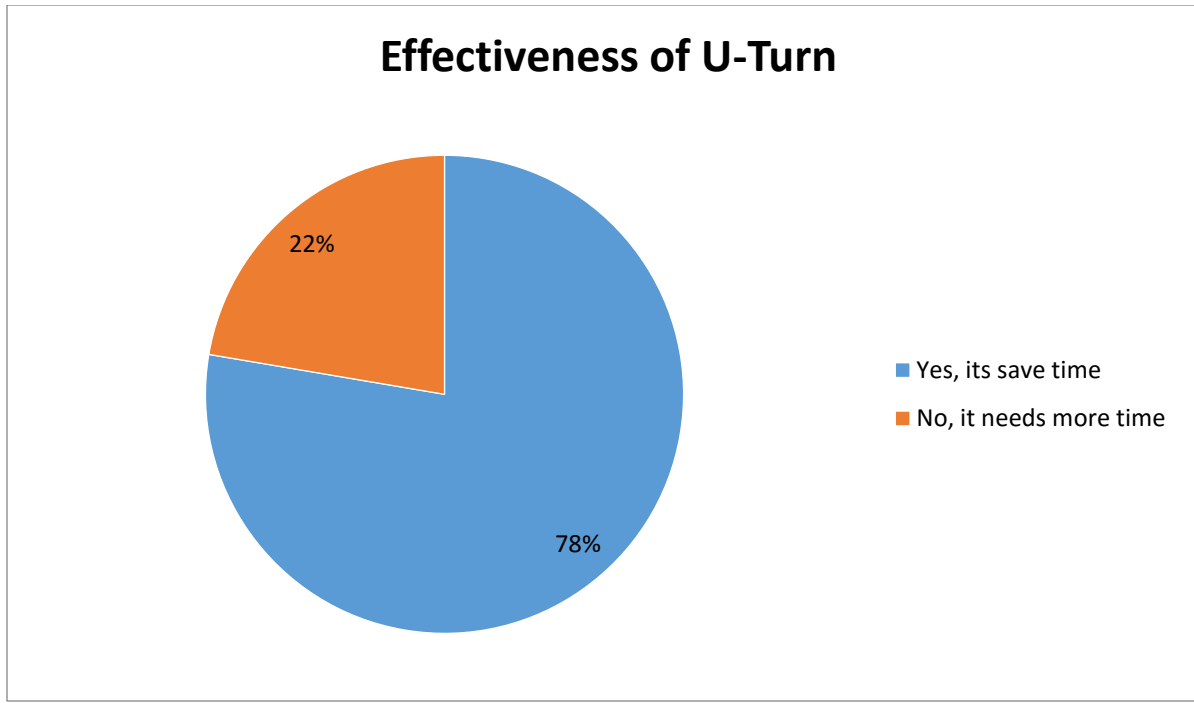


**Figure: 4.20 Problem face by Drivers .**

**Summary :** 48% people think that they don't have to face any problems to use this U-Turns but 37% people think they face traffic congestion more and 15% people think they need more time in this U-Turn .

**Q 4: Do you think u turn is effective project in this road to save time ?**

- a) Yes ,it's save time
- b) No ,it's need more time



**Figure: 4.21 Effectiveness of U-Turn**

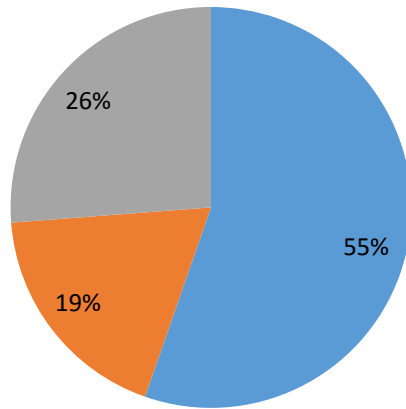
**Summary :** 78% people think that this U-Turns project save time but 22 % people think they need more time due to U-Turn. From this we can say that U-Turn save time .

**Q 5: Do you think u turn is a best solution to reduce traffic congestion ?**

- a) Yes
- b) No
- c) May be

## Traffic Congestion summary of U-Turn

■ YES ■ NO ■ MAY BE

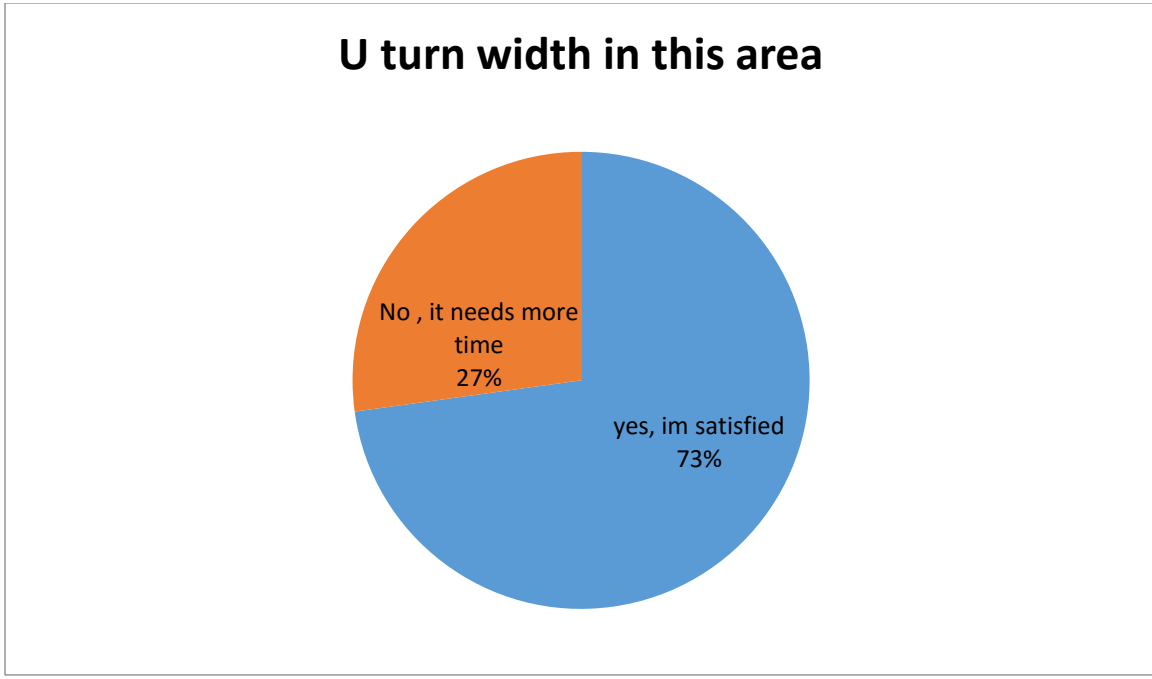


**Figure : 4.22 Traffic Congestion summary of U-Turn**

**Summary :** 55% people think that U-turn is the best solution to reduce traffic congestion ,on the other hand 26% people think U-Turn may the best solution and 19% people say that U-Turn is not the best solution .

**Q 6 : Are you satisfied with the U turn width in this area?**

- a) Yes , I am satisfied
- b) No , I am not satisfied

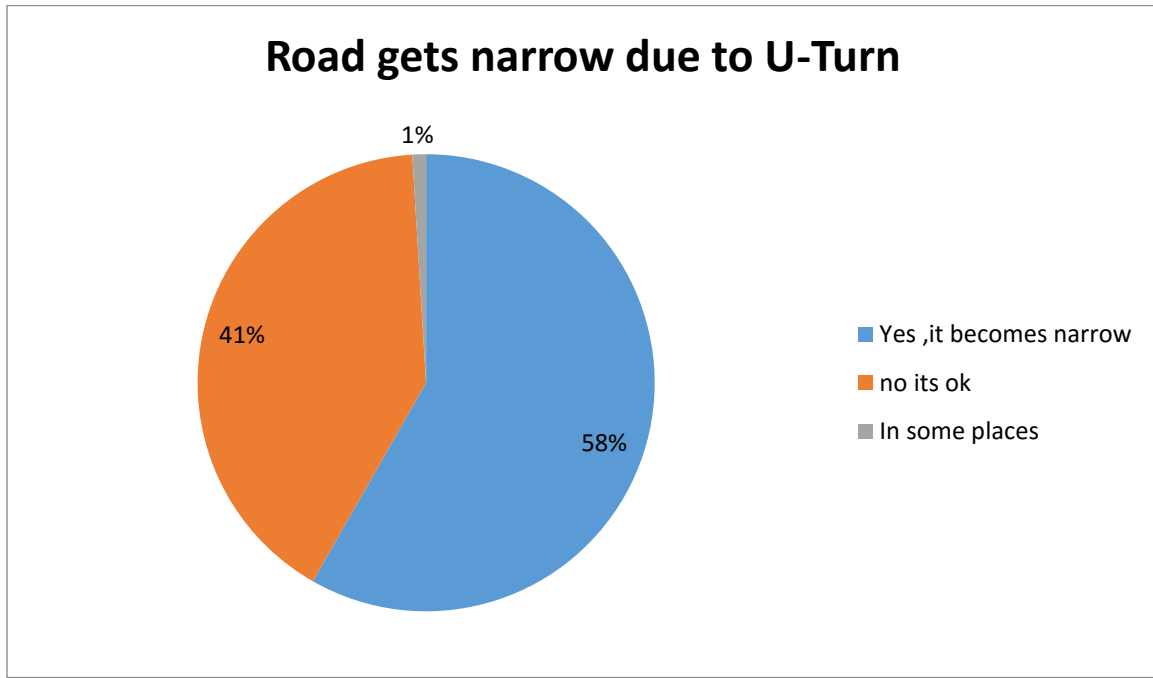


**Figure: 4.23 U turn width in this area**

**Summary :** 73% people think that they are satisfied with the width of the U-turns but 27% people are not satisfied . so we can say that U-Turn width is okay.

**Q 7 : Do you think straight road gets narrow due to U turn ?**

- a) Yes , it becomes narrow
- b) No ,it's okay
- c) In some places

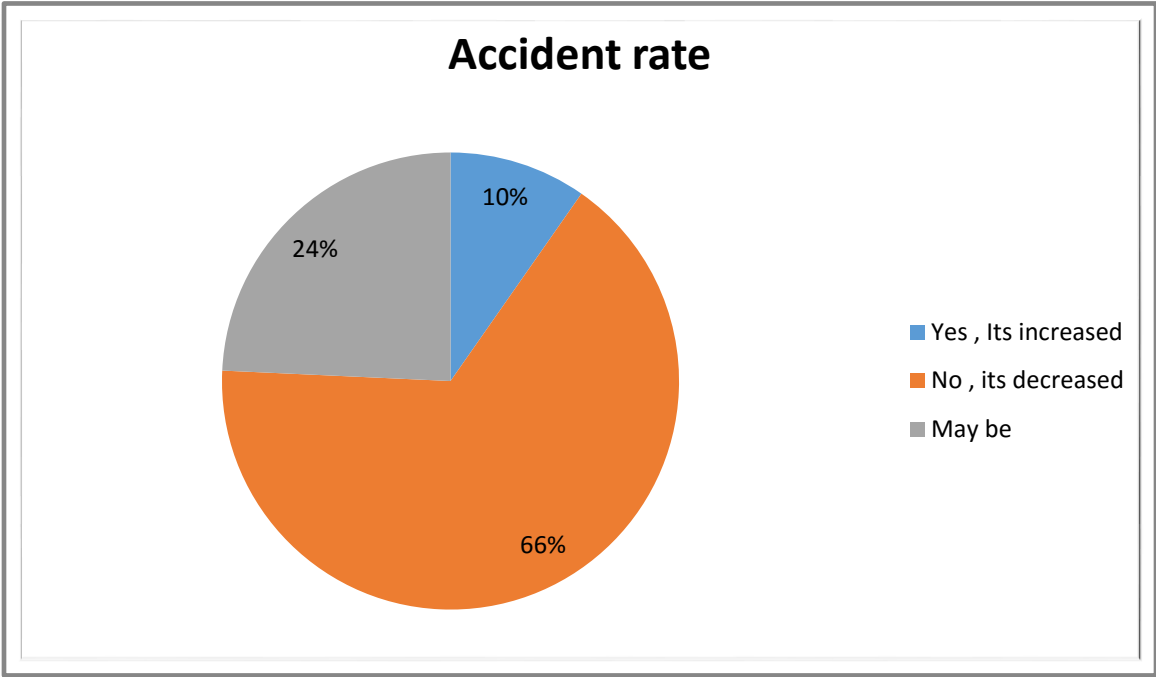


**Figure: 4.24 Road gets narrow due to U-Turn**

**Summary :** 58% people think that this U-Turns make the straight road gets narrow but 41% people think that there is no change in road length and 1% people think that in some places road gets narrow for U-Turn. So, it can say that road gets narrow for U-Turn .

**Q 8: Do you think accident rate is increased or decreased due to U turn project ?**

- a) Yes , it's increased
- b) No ,it's decreased
- c) May be

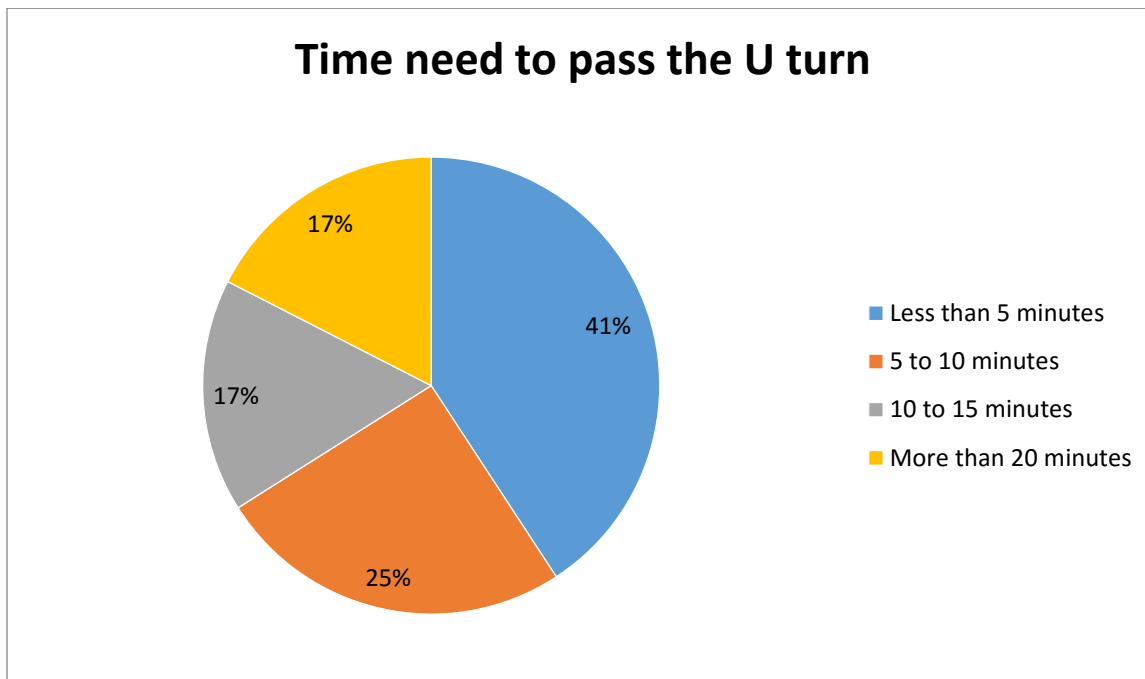


**Figure : 4.25 Accident rate**

**Summary :** 66% people think that U-turn decrease the accident rate but 10% people think that accident rate increased for U-Turn and 24% people think that accident rate may be increased or decreased .So, we can say that accident rate decreased due to U-Turn .

### Q 9 : How much time do you need to pass the U turn ?

- a) Less than 5 minutes
- b) 5 to 10 minutes
- c) 10 to 15 minutes
- d) More than 20 minutes .



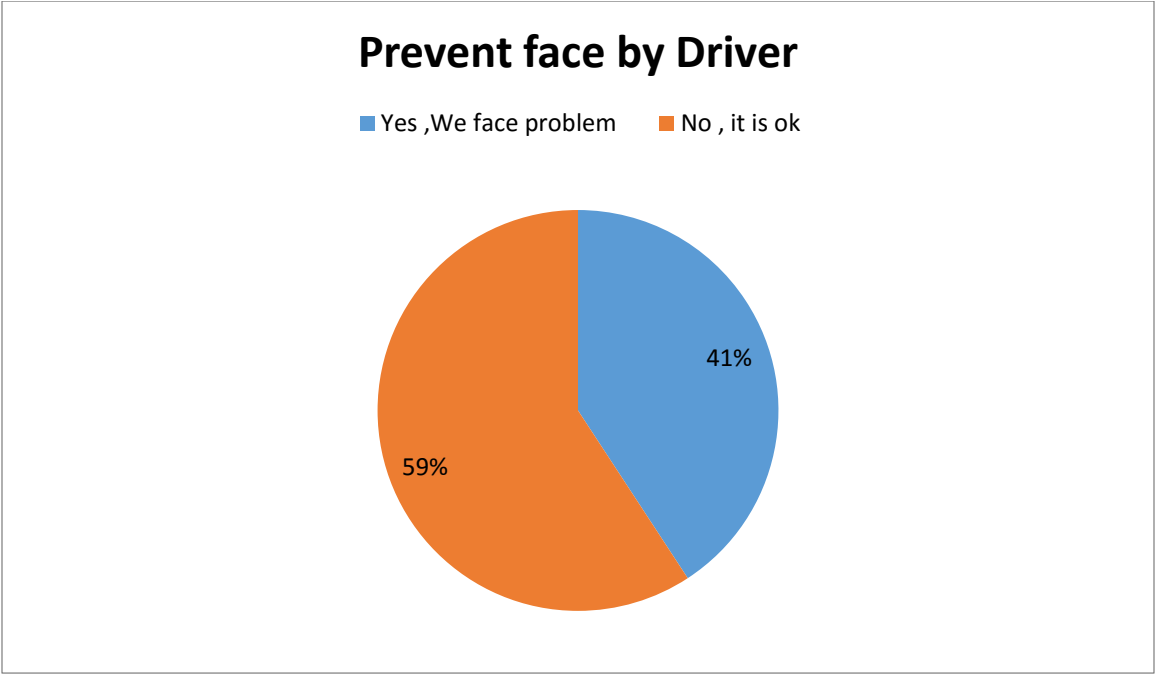
**Figure: 4.26 Time need to pass the U-Turn**

**Summary :** 41% people tell that they need less than 5 minutes to pass the U-Turns, 25% people say they need 5 to 10 minutes to pass the U-Turn, 17% people say they need 10 to 15 minutes to pass the U-Turn and 17% people say they need more than 20 minutes to pass the U-Turn. So we can say that maximum people need less time to pass the U-Turn.



**Q10 : Do you face any prevent to use straight road from Uttara to Mohakhali ?**

- a) Yes , we face problem
- b) No ,it's okay



**Figure : 4.27 Prevent face by Driver**

**Summary :** 59% people think that they face problem to use the straight road, on the other hand 41% people face problem to use the straight road .So it can say that drivers don,t face any prevent to use straight road .

## Field survey data for Driver

QUESTION	RESPONSE		PARCENTAGE	RESULT
which type of vehicle do you drive ?	Bus	26	26%	If we compare to all vehicles bus drivers at 26% and near about bike 25%
	Private car	16	16%	
	CNG	21	21%	
	Bike	25	25%	
	Truck	9	9%	
	Pic up	3	3%	
which u turn do you use most ?	Uttara	36	36%	Mostly use Uttara point at 36% and near about 34% at Banani
	Battalion 1	12	12%	
	Kaula	18	18%	
	Banani	34	34%	
What type of problems are you facing in this point ?	Traffic Congestion	37	37%	48 % people think that U -Turn is ok.
	Need More Time	15	15%	
	No Need, its ok	48	48%	
Do you think u turn is effective	Yes, its save time	78	78%	

project in this road to save time?	No, it needs more time	22	22%	78% people said that U turn project is beneficial.
Do you think u turn is a best solution reduce traffic congestion?	Yes	55	55%	55% people think that U turn can reduce the traffic congestion
	No	19	19%	
	May be	26	26%	
Are you satisfied with the U turn width in this area?	Yes, I'm satisfied	73	73%	73% people are satisfied.so it's okay.
	No, it needs more time	27	27%	
Do you think straight road gets narrow due to U turn?	Yes, it becomes narrow	58	58%	58% people said that road becomes narrow for U-Turn.
	No, it's ok	41	41%	
	In some places	1	1%	
Do you think accident rate is increased or decreased due to U turn project?	Yes, it's increased	10	10%	Maximum people said that accident rate decreased.
	No it's decreased	66	66%	
	May be	24	24%	

How much time do you need to pass the U turn?	Less than 5 minutes	41	41%	41% people said that it's need less than 5 minutes. So it's okay .
	5 to 10 minutes	25	25%	
	10 to 15 minutes	17	17%	
	More than 20 minutes	17	17%	
Do you face any prevent to use straight road from Uttara to Mohakhali?	Yes, we face problem	41	41%	59% people said that it's ok
	No, it's ok	59	59%	

### 4.3 Overall Data Table

#### Overall Data Table

Question	Options	Response	Percentage	Result
Location	Uttara House Bulding	12	15.8	This data gives us the result who use this U-Turns regularly. Among them maximum people are from near above the places and Uttara house building area.
	Rabindra Saroni	5	6.6	
	Rajlokki Complex	2	2.6	
	Jashim Uddin Avenue	2	2.6	
	Rapid Action Battalion-1	1	1.3	
	Dhaka Biman Bondor	7	9.2	
	Khilkhet Nikunja	5	6.6	
	Kuril Fly Over near	6	7.9	
	Shwara Bazar Area	1	1.3	
	Dhaka Cantonment	3	3.9	
	Bangladesh Navy Head Quarter	1	1.3	
	Banani	7	9.2	
	Soinik Club Mor	0	0	
	Mohakhali Amtoli Bus Station	11	14.5	
	Near Above Places	17	22.4	
Others	1	1.3		
Occupation	Govt Employee	5	6.4	This data gives us the result of which occupation people are
	Private Employee	18	23.1	
	Student	53	67.9	
	In General	3	3.8	

	Driver	2	2.6	regularly use this U-Turn. Among them student and private employee are most.
Is Uttara U-turn Significantly improving traffic management ?	Yes, it has been improved a lot traffic management	78	75.6	Maximum people think that this U-turn has been improved a lot of traffic management.
	No, there is no improvement on traffic management		24.4	

A U-turn in front of Cantonment Army Golf club, Railway Station, is it necessary?	Yes, it is necessary	78	75.6	Maximum people think that this U-turn is necessary in the asking points.
	No, Unnecessary, there is an another option Kuril Fly Over to turn.		24.4	
Is it Noticeably decreasing traffic congestion at Uttara point ?	Yes, it decrease the congestion	78	76.9	Maximum people think that U-turn has noticeably decrease the traffic congestion at Uttara point.
	No, it increased the traffic congestion		23.1	
Do you think this U-turn project will conflicts of	Yes, I think		79.5	Maximum people think that this U-turn project will

BRT project ?	No	78	20.5	conflict the Bus Rapid Transit (BRT)
The U-turn project will make narrow the traffic lanes and obstructs the district level buses ?	Yes	78	70.5	Maximum people think that this U-turn makes narrow the traffic lanes and obstructs the district level buses.
	No		26.9	
Do you think about U-turn decrease the accident rate on road ?	Yes, accident rate decreased after opening the U-turn	78	82.1	Maximum people think that the accident rate decreased after the opening of this U-turn project.
	No, there is no change		17.9	
How will the economy be the effected rate by U-turn ?	Economy rate will be growth	78	65.8	Maximum people think that economy rate will be growth by this U-turn project
	No, there will be no change on economy		32.9	
How effects on human life on Rush Hours ?	People can move easily on place to another place on time	78	64.9	Maximum people think that this project will help people to move from one place to another place on time
	I think after completing it is more time consuming		35.1	
Is it beneficial for reducing traffic	Yes	78	87	Maximum people think that this U-turns are beneficial for

congestion ?	No		13	reducing the traffic congestion.
Do you think people feel comfortable to use this U-turn ?	Yes, it's comfortable to move easily	78	77.9	Maximum people think that it's comfortable to use this U-turn
	No, it's very worst now		22.1	
Is U-turn helping for saving time ?	Yes	78	85.5	Maximum people think that this U-turn is helpful for saving Time.
	No		14.5	

Is this U-turn suitable for future road design ?	Yes	78	79.2	Maximum people think that this U-turn is suitable for road design.
	No		20.8	
Do you think U-turn is the best solution for reducing traffic jam ?	Yes,	78	60.5	Maximum people think that this U-turn is the best solution for reducing traffic jam.
	No,		39.5	
Does U-turn make road use easier ?	Yes	78	78.9	Maximum people think that this U-turn make road use easier



	No		21.1	for them.
Does U-turn reduce traffic over turning on road ?	Yes	78	82.9	Maximum people think that this U-turns overturning on road has reduce.
	No		17.1	

QUESTION	RESPONSE		PARCENTAGE	RESULT
which type of vehicle do you drive ?	Bus	26	26%	If we compare to all vehicles bus drivers at 26% and near about bike 25%
	Private car	16	16%	
	CNG	21	21%	
	Bike	25	25%	
	Truck	9	9%	
	Pic up	3	3%	
	Uttara	36	36%	Mostly use Uttara point at 36% and near

which u turn do you use most ?	Battalion 1	12	12%	about 34% at Banani
	Kaula	18	18%	
	Banani	34	34%	
What type of problems are you facing in this point ?	Traffic Congestion	37	37%	48 % people think that U -Turn is ok.
	Need More Time	15	15%	
	No Need, its ok	48	48%	
Do you think u turn is effective project in this road to save time?	Yes, its save time	78	78%	78% people said that U turn project is beneficial.
	No, it needs more time	22	22%	
Do you think u turn is a best solution reduce traffic congestion?	Yes	55	55%	55% people think that U turn can reduce the traffic congestion
	No	19	19%	
	May be	26	26%	
Are you satisfied with the U turn width in this area?	Yes, I'm satisfied	73	73%	73% people are satisfied.so it's okay.
	No, it needs more time	27	27%	
Do you think straight road gets	Yes, it becomes narrow	58	58%	58% people said that road becomes narrowfor U-Turn.

narrow due to U turn?	No, it's ok	41	41%	
	In some places	1	1%	
Do you think accident rate is increased or decreased due to U turn project?	Yes, it's increased	10	10%	Maximum people said that accident rate decreased.
	No it's decreased	66	66%	
	May be	24	24%	
How much time do you need to pass the U turn?	Less than 5 minutes	41	41%	41% people said that it's need less than 5 minutes. So it's okay .
	5 to 10 minutes	25	25%	
	10 to 15 minutes	17	17%	
	More than 20 minutes	17	17%	
Do you face any prevent to use straight road from Uttara to Mohakhali?	Yes, we face problem	41	41%	59% people said that it's ok
	No, it's ok	59	59%	

#### 4.4 Photographic Survey :

Reconnaissance was a process to observe the study area at a glance for preliminary data collection several on spot visit and informal data were collected for clear conceptualization and to develop a strategy to conduct the study .



**Figure 4.28 : when asking questions to bike user**



**Figure 4.29 : when asking questions to private car**





**Figure 4.30 : when asking questions to CNG driver**



**Figure 4.31 : when asking questions to Bus driver**





**Figure 4.32: Uttara U-Turn point**





**Figure 4.33: Battalion 1 U-Turn point**



**Figure 4.34: Banani U-Turn point**

## **4.5 Data Analysis :**

The total number of questionnaire survey taken for this study is 103 . We have prepared a total of 10 questions and through these questions we have collected information about the U-turns on Mohakhali to Uttara Road .

Questionnaire survey data has been analyzed through pie chart .

## **4.6 Summary of the chapter:**

In this chapter there is a discussion about the data collection ,data analysis, photographic survey etc.



## CHAPTER FIVE

### **CONCLUSION AND RECOMMENDATION**

## **CHAPTER FIVE**

### **CONCLUSION AND RECOMMENDATION**

#### **5.1 General :**

This study was based on the primary data and secondary data .This chapter concludes major findings from the competitive analysis, purposes recommendations and further research in this concern .

#### **5.2 Conclusion :**

After completing the data collection and the analysis we have found some conclusions on this study topic which is given below:

- ❖ We didn't compare our collected data with any pervious investigation report on accident rate, traffic jam to recommend our report .
- ❖ In Uttara point Public transport can avail there desire speed to reach their destinations by using this U-Turn .Before constructing this U-Turn people were unable to reach their destination on time because of several reasons like traffic congestion, traffic signal. We suggest this point best for U-Turn on basis our thesis study without comparing with any previous study report.
- ❖ In Battalion1 point we can see that vehicles need less time compare to before situation. Sometimes vehicles face little bit traffic congestion due to traffic signal of battalion police to maintain their traffic in out to headquarter.
- ❖ In Kaula point we can see that vehicles need more time to use this U-Turn due to the signal off Airport road .
- ❖ In Banani point we can see that vehicles need most of the time to use this U-Turn due to newly constructed U-Turn because it decreased the road width at this point. In peak hours ,the scenario is the worse due to unbearable traffic congestion.

### **5.3 Discussion :**

Analysis of the online data collection through pie chart gives us the result that the thought of the people who daily use this newly constructed U-Turns on the Mohakhali to Uttara Road and it also shows us that the problems they faced to use this U-Turns. Analysis of the field data collection through pie chart gives us the result that the thought of the driver who regularly use this U-Turn. The measurement of the road width and length of straight road and U-Turn point at Uttara is completely okay for a U-Turn , on the other hand at Banani U-Turn point straight road has become so narrow for the constructed U-Turn . By this pie charts we can see the Uttara point is best for all purposes of use, On the other hand in Banani point has some major problems. So, for future construction Uttara U-Turn need to follow to get best benefit of U-Turn .

### **5.4 Recommendation :**

- ❖ Based on the study we have found the Uttara u turn width and length is perfect without comparing with any previous standard report. So it can be used as an ideal U-Turn in future planning purpose by taking the measurement of it .
- ❖ Traffic signal should reduce before U-Turns for proper use .
- ❖ Parking need to be prohibited in U-turn area .
- ❖ The selection area of U-Turn need to be in a proper area for get benefits .
- ❖ People need to be known the proper use of U-Turn to reduce traffic congestion .
- ❖ In a U-Turn project, U-Turn area should be increased so that vehicle can easily move in turn road.
- ❖ A U-Turn project should be built in a location where traffic jam can not occur that means a running road should be chosen for a U-Turn project.
- ❖ The right side of straight road near the U-Turn should be free all time so that vehicle can easily pass the U-Turn. There should be used some highlighter on the right side of straight road near U-Turn.
- ❖ We have done this thesis study through pie chart. If others want to do the same study they can complete it by the use of others method.



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## Appendix

### Drivers questions

Topic : Questionary survey for U-Turn effects on  
Mohakhali to Uttara road.

#### **1. which type of vehicle do you drive ?**

- a) Bus
- b) Private car
- c) CNG
- d) Bike
- e) Truck
- f) Pick up

#### **2. which U-Turn do you use most ?**

- a) Uttara point
- b) Battalion 1 point
- c) Kaula point
- d) Banani point

#### **3. What type of problems are you facing in this point.**

- a) Traffic congestion more
- b) Need more time
- c) No it's okay

#### **4. Do you think u turn is effective project in this road to save time ?**

- a) Yes ,it's save time
- b) No ,it's need more time

**5. Do you think u turn is a best solution to reduce traffic congestion?**

- a) Yes
- b) No
- c) May be

**6. Are you satisfied with the U- Turn width in this area?**

- a) Yes , I am satisfied
- b) No , I am not satisfied

**7. Do you think straight road gets narrow due to U-turn ?**

- a) Yes , it becomes narrow
- b) No ,it's okay
- c) In some places

**8. Do you think accident rate is increased or decreased due to U-turn project ?**

- a) Yes , it's increased
- b) No ,it's decreased
- c) May be

**9. How much time do you need to pass the U-Turn ?**

- a) Less than 5 minutes
- b) 5 to 10 minutes
- c) 10 to 15 minutes
- d) More than 20 minutes

**10. Do you face any prevent to use straight road from Uttara to Mohakhali**

- a) Yes , we face problem
- b) No ,it's okay