

Existing Facilities And Deficiencies In A Busy Intersection At Dhaka Based On The Condition Survey Of The Study Area

Mahmudul Hasan*, Tajkia Syeed Tofa**, Mohammad Rakibul Islam Khan***

*(Department of Civil Engineering, Bangladesh University of Engineering and Technology)

** (Department of Civil Engineering, Bangladesh University of Engineering and Technology)

***(Department of Civil Engineering, Bangladesh University of Engineering and Technology)

ABSTRACT

Roundabouts have become increasingly popular in recent years as an innovative operational and safety solution at both low volume and high volume intersections. This paper contains capacity analysis of existing roads at a busy intersection in Dhaka named Polashi intersection, compare capacity and volume, AADT, velocity study, road user behavior, pedestrian flow analysis for proposed roundabout. Evaluations are made on a rational basis using qualitative analysis wherever possible and accepting that some matters determine by the exercise of judgments. Roundabouts have a number of advantages over traffic signals depending on the conditions. They reduce the severity of crashes since head-on and right-angle conflicts are nearly eliminated. They may consume less land area since turn pocket lanes are not needed. They have lower energy and maintenance costs

Keywords – Bicycle lane, Intersection, Pedestrian, Traffic Volume, Sidewalk, Safety

I. INTRODUCTION

Dhaka has a population of more than 15 million (BBS, 2011) people within a small area of 350 km². It is reportedly the 9th largest urban centre of the world. The transportation system of Dhaka city consists of a combination of both motorized and non-motorized vehicles. According to the recent Strategic Transportation Plan for Dhaka city, the primary mode of transport for personal trips is about a third (34%) non-motorized rickshaws, another one third (34%) buses and the remaining 30% using walking or other motorized vehicles. Number of all vehicles per 100,000 populations is only 2,630 vehicles whereas 2,195 are non-motorized vehicles. Pedestrians are now making up about 72 percent of road accident fatalities, 45 percent of casualties and are involved in about 48 percent of all reported accidents in Dhaka Metropolitan city [MAAP5]. Indeed, with fatal accidents 70 percent was 'pedestrian-motorized vehicle' collisions [Mahmud et al.]. From the stated figures, one can simply understand the severity of the condition prevailed in the city relating with pedestrian traffic.

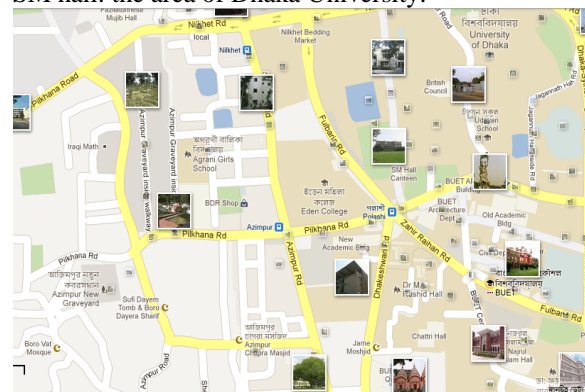
Recently Gulistan-Jatrabari Flyover has established to bypass the traffic mainly from Mawa, Demra, Jatrabari to the city centre to avoid the traffic congestion. One of the ramps connects Kutubkhali in South Jatrabari and Demra to Chankharpool in Dhaka Medical College Hospital area up to Palashi and Azimpur. Traffic volume is increasing at Polashi to Chankharpool intersection due to this new flyover which emerges this study. The degree of risk from road accidents has also increased considerably with increasing number of road traffic at this intersection.

This research focuses on exploring the Polashi intersection to improve its performance in the face of dispersed growth.

So, the main objectives of the study are i) to explore the existing problems with alternative solution that encountered for safe and convenient traffic and pedestrian movements at Polashi intersection, ii) to determine the capacity and iii) to analyze pedestrian flow based on manual pedestrian counting in the study area.

II. STUDY AREA

Five different roads have been studied to get different information and Level-of-Services on the roads and walkways. Buet to Polashi, one of the major junctions of Polashi intersection is considered as a major residential and institutional area. The other roads are: Nilkhet: one of the only book stalls, pilkhana: contains new BUET building, Azimpur: the residential and fire brigade, hall, bus counter lastly, SM hall: the area of Dhaka University.



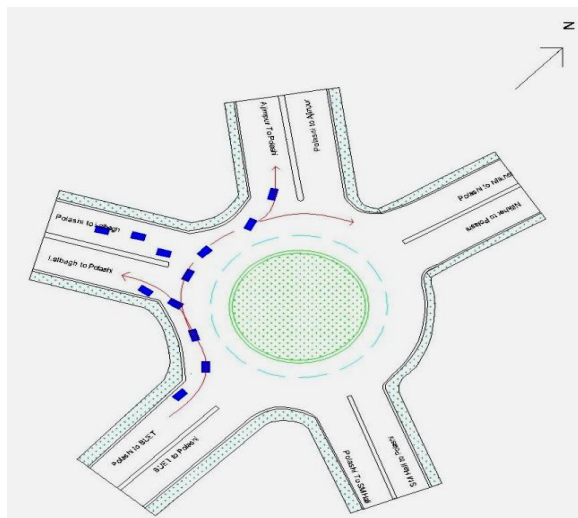


Figure 1: Study area

III. RESULTS AND DISCUSSIONS

To determine the existing operational problems in Polashi intersection, two types of data analysis techniques has been adopted in this paper. These are:

- I. Based on Average Annual Daily Traffic (AADT) from the volume study.
- II. Pedestrian flow analysis based on manual pedestrian counting in the study area.
- III. Existing facilities and deficiencies in the Polashi intersection based on the condition survey of the study area.

3.1 VOLUME STUDY

Traffic volume studies are conducted to determine the number, movements, and classifications of roadway vehicles at a given location. These data can help identify critical flow time periods, determine the influence of large vehicles or pedestrians on vehicular traffic flow, or document traffic volume trends. The length of the sampling period depends on the type of count being taken and the intended use of the data recorded. For example, an intersection count may be conducted during the peak flow period. If so, manual count with 15-minute intervals could be used to obtain the traffic volume data.

In this study manual volume counting is performed by 5 small groups of surveyors, each group had taken their position in a suitable place in the respective approach to Polashi intersection.

Table 1: Traffic volume from Azimpur to Polashi Intersection

Motorized	PCU	AADT
BUET	34.4	482.5
Nilkhet	130.6	1831.8
SM	47.5	666.2
Lalbagh	301.7	4231.6
U-turn (azimpur)	38.65	542.1

Table 2: Traffic volume from Nilkhet to Polashi Intersection

Motorized	PCU	AADT
BUET	1250	17532.5
Azimpur	450	6311.7
SM	455	6381.8
Lalbagh	335	4698.7
U-turn	0	0.0

Table 3: Traffic volume from SM Hall to Polashi Intersection

Motorized	PCU	AADT
BUET	488	6844.7
Azimpur	619	8682.1
Nilkhet	736	10323.1
Lalbagh	331	4642.6
U-turn	458	6423.9

Table 4: Traffic volume from BUET to Polashi Intersection

Motorized	PCU	AADT
Nilkhet	185.8	2606.0
Azimpur	118.2	1657.9
SM	52.5	736.4
Lalbagh	56.2	788.3
U-turn	313.4	4395.7

Table 5: Traffic volume from Lalbagh to Polashi Intersection

Motorized	PCU	AADT
BUET	258	3618.7
Azimpur	222	3113.8
SM	350	4909.1
Nilkhet	238	3338.2
U-turn	2	28.1

3.2 PEDESTRIAN FLOW IN THE POLASHI INTERSECTION

Pedestrian flow is also calculated by appointing five small groups of surveyors in five approaches to polashi intersection. Data's are collected from every group and analyzed for each road (Polashi to S.M. Hall, Azimpur, Pilkhana, Nilkhet). The pedestrian unit flow rate (ped/min/ft) is obtained by taking the pedestrian 15-minute flow rate (ped/15-min) and dividing by the effective walkway width. The AASHTO suggests collecting pedestrian opposing flow volumes at 15-minute intervals. The sum of the two directional flows is used as the 15-minute flow rate. Obstacle widths can be measured from the field in estimating pedestrian flow along sidewalks. The effective widths are reduced by an additional 2ft for constricting effects of mailboxes, street furniture. The number of pedestrians within a given area has been

determined by manual count. Pedestrians are counted for 15min. Using AASHTO table-8-16 & table8-27, characteristics of pedestrian flow and level of service are determined. Average Values (width of both left and right sidewalk) are taken for sidewalk calculations.

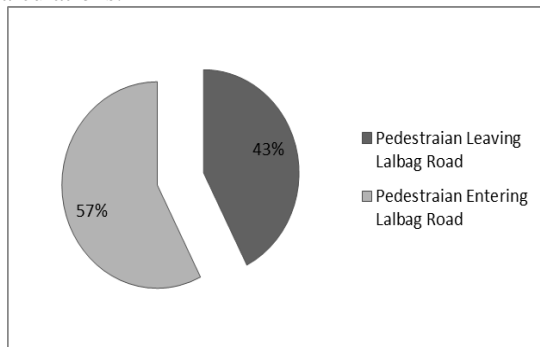


Figure 2: Pedestrian in and out in Lalbag road

Total 334 pedestrians were counted in this approach of road. Among them, 142 were heading towards polashi intersection while 192 pedestrians were entering to lalbagh road.

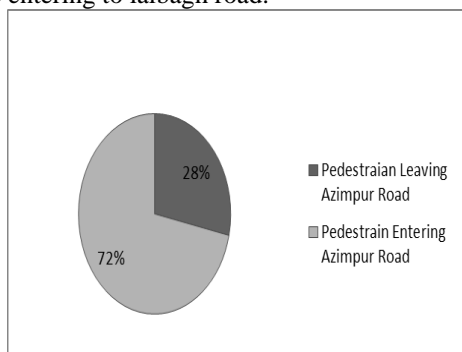


Figure 3: Pedestrian in and out in Azimpur road

Total 218 pedestrians were spotted in this approach of road. Among them, 62 were heading towards polashi intersection while 156 pedestrians were entering to Azimpur road.

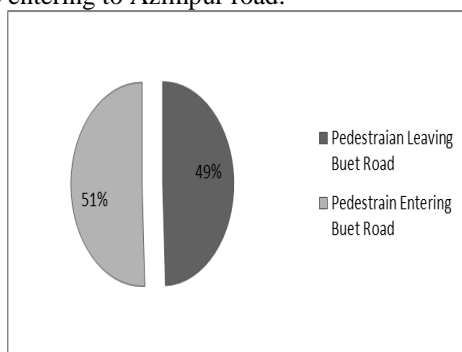


Figure 4: Pedestrian in and out from BUET road

Total 559 pedestrians were counted in this approach of road on that time. Among them, 276 were heading towards polashi intersection while 289 pedestrians were entering to BUET road.

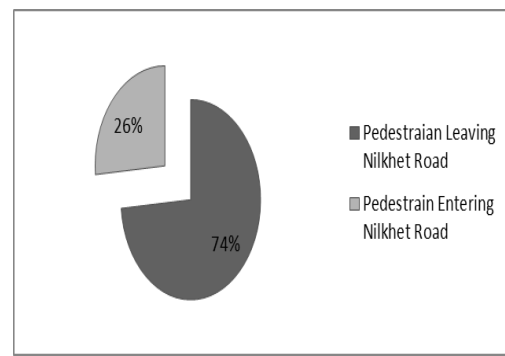


Figure 5: Pedestrian in and out in Nilkhet road

Total 144 pedestrians were counted in this approach of road. Among them, 106 were heading towards polashi intersection while 38 pedestrians were entering to lalbagh road.

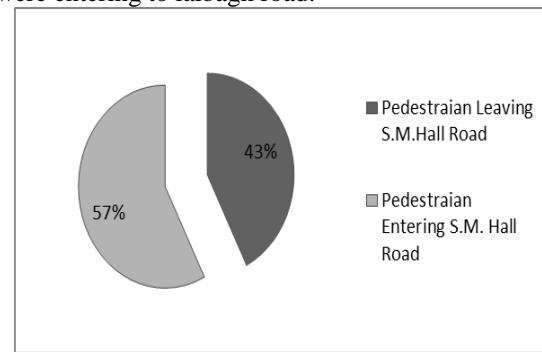


Figure 6: Pedestrian in and out from S.M. Hall road

From the above figure, Total 294 pedestrians were counted in this approach of road. Among them, 142 were heading towards polashi intersection while 152 pedestrians were entering to lalbagh road.

Sidewalk flows evaluation shows that, Level of service is found A for all roads except Buet to Polashi. Where pedestrian density is the most. Types of flow are impeded (Nilkhet, S.M. Hall, Azimpur) and constrained (BUET, Pilkhana road) Besides Total pedestrian from BUET to Polashi has been found to maximum among others. Variation of travel pattern between roads have been observed where as leaving (49%) as well as entering (51%) in BUET road are almost equal. It depends on trip purposes. At BUET road has several residential hall and residential area. Again, a major population meets their domestic needs from Polashi Bazar which lies at Pilkhana road. This a major reason for large pedestrian flow. Nilkhet Book market is one of the crowded places in Dhaka city at peak hour. A lot of student meets their demand from there. There is a bus route at Azimpur road also a reason for pedestrian generation.

IV. CONCLUSION AND RECOMMENDATION

Firstly, the presence of a museum named “Abul Barquat Smrity Jadughar” is a sensitive case because of its historical importance. That’s why it is

not possible to give any alternate solution. Secondly, The position & placement of the new market is not valid. So, it is recommended to destruct the structure. Thirdly, the bank is responsible for the reduction of the capacity of the road. It should be removed to a suitable place. Fourthly, temporary tea stalls reduce the effective width of the road & disturbs the normal flow continuity. So it should be removed.

Fifthly, temporary slums and dustbins hamper the general road environment. Hence, immediate removal is necessary. Along with that, fruit and food market in footpath is an extended portion of the BUET bazaar. It prevents the free movement of the pedestrians. Therefore, replacing of this portion is to be accomplished. Lastly, the vans gathered on the edges of the road behind the bank are troublesome. A separate place for storage of the vans should be provided.

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