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A Review on “Pedestrian Behaviour at Crossing Intersection”

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ABSTRACT- Pedestrians' road crossings behavior in India has become a major concern in road traffic flow, especially in urban areas where there are no controls for pedestrians' road crossing. With the increase of motor vehicles growth rate, there is an increase in the regulation of motor vehicles on the road but the regulation of pedestrians is completely neglected. Several studies are there to understand the pedestrian movement and all the studies are based on fundamental diagrams only. These studies construct a base to characterize pedestrian flow. Several experiments have conducted to understand the pedestrian flow, likewise some field observations have done to represent fundamental diagrams. Therefore, before going to analyze the data from the observation, it is necessary to note down the pedestrian flow parameters carefully. The aim of the review paper is to build up the base to fundamental diagrams and for characterization of pedestrian. And derive the required flow diagrams and results from the field observations. Field survey is conducted to know the vehicle pedestrian interaction, and this field data with respect to pedestrian crossing at signalized, Unsignalized or at midblock sections is aimed to be observed. And the impact of vehicle pedestrian interaction at several intersections/midblock sections is to be studied.

KEYWORDS: Pedestrians, Intersection, Vehicle, Midblock

I. INTRODUCTION

Walking has always been the primary means of human motion. And that's why we considered the pedestrians are the basic elements of transportation. In ancient ages there was a huge pedestrian walking take place and walking is the only mode of transportation. For every transport related to travel and journeys must begin and end in walking. This pedestrian walk is an effective mode of transportation for short trips. Walking is a major mode of transportation in Indian cities also. In order to provide the best design spaces for human motion or circulation like at airport corridors, shopping malls, subways etc. for that pedestrian motion is studied empirically in all aspects. It is carried away by two levels. At macroscopic level one can analyze the basic flow parameters like speed, density of pedestrian motion and at microscopic level one may track the paths followed by individual pedestrians while moving respectively. From this it is clear that the pedestrian may create own paths in their journey trip. Coming to the pedestrian crosswalks there were several cross walks like zebra crossing are designed for a road, provide gainful work to assist the pedestrians to move from one side to the other side of road, and which plays a significant role in the mobility and safety mode of signalized intersections. In some other places like where the busy traffic takes place, pedestrian choose the mid blocks to cross the road. But there is no safety as compared to signalized intersections. Even many pedestrian crosswalks are taking place in these midblock sections. Depend on the vehicular pedestrian motion demand cross walk width is defined. Some existing manuals are published about the crosswalk width, but they do not provide clear specifications for the required crosswalk width, regarding different pedestrian demand volumes and properties. Pedestrian flow consists of two types, unidirectional (single file motion) and bidirectional. In unidirectional flow, pedestrian motion is in one direction only, whereas in bidirectional pedestrian can walk from the both direction and interact with each other. Pedestrian road safety is one of the major aspects of transportation engineering in urban areas. The illegal crossing behavior of the pedestrian is a major fact in the road safety issue.



A crosswalk is a fundamental pedestrian facility in the urban roadway system which helps the pedestrians to safely cross the streets. This study identifies pedestrian characteristics such as pedestrian crossing speed and their compliance behavior towards traffic regulations at the respective study areas and evaluating the significant factors that affect pedestrian crossing speed in the crosswalks at intersections. A video survey is preferred for this study and detailed analyses is needed in order to study the changes of pedestrian characteristics. Length of the crosswalk and pedestrian speed are very important indicators to determine minimum pedestrian crossing timing.

Problem statement:

The problem of this thesis can be broadly stated as “understanding vehicular, pedestrian flow interactions in varied situations.” In some situations, pedestrian motion is observed empirically. This describes the following

- Crossing time for pedestrian will be measured to evaluate the maximum pedestrian flow, crossing speed, density, and the adequacy of the geometry and location of signalized crosswalk. The signal timing for pedestrian and motorists will also be examined.
- To analyze and study the effect of various factors related to vehicle, pedestrian interactions like pedestrian characteristics, pedestrian movements, traffic conditions, road conditions.
- The signalized crosswalk performance will be examined if it can handle the pedestrians safely and efficiently.

Objectives of the Project:

- To study the pedestrian crossing facilities at crossings in Vadodara City.
- To study pedestrian movement pattern at some selected crossings in Vadodara City.
- To identify the problems associated with pedestrian crossing at intersection.
- To evaluate the necessity of exclusive pedestrian phase at signalized intersection.

II. LITERATURE REVIEW

Earlier studies provide significant facts about pedestrian demographic characteristics (such as age, gender) and how these characteristics influence road crossing behavior. Such studies have focused on detailed experiments to find out the effect of age on road crossing decisions with effect of vehicle distance or speed of vehicle (Oxley et al., 1997; Lobjois and Cavallo, 2007). Most of these studies have been carried out in a virtual environment. Road crossing behavior with respect to gender and baggage held has also been observed in various studies. Males have a tendency to show more hazardous road crossing behavior than females due to less waiting time (Khan et al., 1999; Tiwari et al., 2007). Few studies have also explored the importance of the pedestrian speed at different locations (Knoblauch et al., 1996; Rastogi et al., 2011), such as the zebra crossing location (Varhelyi, 1998) and signalized intersections (Tarawneh, 2001). Outline of these studies suggest that males walk significantly faster than females while crossing the roads. A recent study was focused on legal versus illegal pedestrian road crossing behavior at mid-block location in China (Cherry et al., 2012). Few studies have identified pedestrian behavior in mixed traffic streets and developed a micro-simulation model in order to find out the fundamental characteristics as well as the conflicts of the pedestrian movement (Shahin, 2006). A study in Beijing, investigated pedestrian behavior and traffic characteristics at unsignalized midblock crosswalk. Authors have explained the pedestrian speed change condition with pedestrian behavior (Shi et al., 2007). Some studies have also addressed pedestrian road crossing behavior by considering the effectiveness of educational training programs (Dommes et al., 2012). Studies had identified the importance of the environmental characteristics, such as type of crossing facility, traffic volume and roadway geometry on road crossing behavior (Kadali and Vedagiri, 2013). Some studies have also explored the pedestrian road crossing behavior before and after re-construction of traffic facility (Gupta et al., 2010).

Seyfried et al. (2005) has intended to develop an experiment which focused on the effect of density on speed. Heilbing et al. (2007) observed the density with the individual speeds of the pedestrian. The results of the researches varied from place to place, due to the way of their collection and representing the models and results. Lam et al. (2002) determined the walking speed under various pedestrian and traffic conditions like bi-directional flow and pedestrian flow relationships at signalized crosswalks are studied. Bi-directional flow Y. S. Lee (2005) was observed the differences in pedestrian walking speeds on a unidirectional and bi-directional flow.



Weidmann (1993) has intended to develop how the density effects on the pedestrian walking speeds under different walking conditions like mixed traffic conditions (disturbed pedestrian movement). Few more studies have done by Seyfried et al. (2005) on density and flow relationship of pedestrian streams.

III. PROPOSEED METHODOLOGY

Experimental set up:

The experiment road section of L & T Circle, Vadodara City was framed by ranging rods at four corners; the size of the section is 19 x 8.5m. It is shown in the fig 3.2.1. So that entry and exit timings can note down easily, i.e. here the pedestrian crossing is a bi-directional flow. Camera should be located at a desired point. So the camera was fixed at required distance from the cross section of the road about 12m from the starting point of the section along the perpendicular bisector of measured section to avoid the parallax error. It also records the crossing behavior of pedestrian and vehicles which helps in analyzing the flow difficulties. Leveling is to be done by centering the bubble of the tripod. And the next step is to record the valuable pedestrian crossing data by clicking on the record button. The data is to be taken in peak hour timings only it should bring very good results in further steps.

The study locations chosen for the present study, satisfies the following criteria:

- The pedestrian traffic is enough.
- The traffic flow is continuous.
- The effective width of the road is uniform throughout the length considered.
- For video recording of pedestrian flow, the road width considered should be easily accessed from vantage point.

Data Collection Technique-

There are different methods for data collection. These are given below:

1. Direct observation methods,
2. Video observation methods,
3. Time Lapse Photography,
4. Pedestrian opinion surveys.

IV. CONCLUSION

Pedestrian crossing behavior depends on the destination, age, education, physical condition and overall awareness of the pedestrian. The issues associated with pedestrian crossing activities generally create considerable emotional concern within the community, especially when the community is reacting to an incident involving pedestrian injury. Pedestrian crossing safety relies on the judgment exercised by pedestrians and drivers. To interact safely requires an exchange of information between the pedestrian and the motorist. Although traffic control devices can help to promote an exchange of information, educating pedestrians and drivers is paramount to providing for a safe operation. Provision of visible cross marking must be installed in all the intersections. Considering the high density of pedestrian traffic all over the city, it should be provided to ensure safe pedestrian crossing. Median island with median barrier must be provided in all the intersections to ensure safe pedestrian crossing. Street lighting around the crossing should be adequate so that cross marks are easily captured by the vehicle drivers to have stopping sight distance to avoid collision. Management of existing physical infrastructure must be enhanced to enable more effective use of crosswalks. It is provided with better road markings, signs, traffic signals, canalization at intersections, turn restrictions and separation barriers, space for bus stops, and parking or waiting areas for public transport vehicles (buses, rickshaws, auto-rickshaws, taxis, etc.). Pedestrian crossing should be considered carefully in traffic engineering and planning of the intersections and mid blocks.

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