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Pedestrian Warrants For Developing Countries By Simulation Approach

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Abstract

Jay walkers are exposed to higher risk while crossing the road due to lack of appropriate pedestrian warrants and standards. The pedestrian facilities and standards adopted in developed countries are not feasible in developing nation like India. Mid-block pedestrian crossing with different land uses as criteria was selected as case study inside Delhi Urban area. The PTV Vissim and PTV Viswalk, widely used micro simulation software used for modelling heterogeneous, non-lane behavior traffic and pedestrian-vehicular interaction. The inbuilt calibration parameters have been developed considering lane based and homogeneous traffic with less complex characteristics. Hence the calibration parameter for Indian traffic and pedestrian behavior was identified and modified with various combinations for the best representation in the simulation model. As a proposal suitable warrants are developed and simulated for the safe pedestrian movement.

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1. Introduction

The most prevalent mode of transportation is walking which is generally the start and end of each journey. Though pedestrians are encouraged to walk, but they do not find walking to be conducive either due to higher risk

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with vehicular interaction or lack of pedestrian facilities and encroachment along the route which can be found in most of cities in India.

According to the data published by TRIPP (Transport Research and Injury Prevention Programme) 15% of RTI (Road Traffic Injuries) death in the country occurred in cities with a population more than a million. As per 2011 census 2.5% of cities are million plus cities in India. It is also revealed that half of the road casualties (death and injuries) are pedestrian and cyclist in million plus cities. In 2013 Delhi alone accounts for 1831 fatalities from 7569 road accidents case. Out of these, pedestrian (44%) and cyclist (6%) both accounts for 50% in total road accident as against the accidents of 9% and 5% respectively at national level.

There is a need to understand the pedestrian crossing behavior in developing countries to have a suitable strategy for pedestrian facilities. The Indian Road Congress (IRC-103-1988, 2012) pedestrian guideline highlights only the relationship of PV^2 (Peak Hour Pedestrian Volume and Vehicular Volume) subject to the conditions, if greater than 1×10^8 and 2×10^8 for undivided and divided carriageway¹. But it does not mention about the different warrant provisions. Many researchers have suggested for pedestrian crossing by engineering guidelines. The model which was developed in the early stage does not demonstrate microscopic details. In order to overcome the problem, micro simulation software is used for finding out the suitable control measure for pedestrian crossing at Mid-block.

2. Warrants in Developed Countries

2.1. The United States of America

As per Highway Capacity Manual (HCM 2000) pedestrian crossing is considered when the pedestrian volume crossing the major street at an intersection or midblock location during an average day is 100 or more for each of any 4 hours or 190 or more during any 1 hour². This gives the provision of crossing but does not specify the type of pedestrian crossing.

2.2. Warwickshire, UK

In Warwickshire, a PV^2 value considering the weights of pedestrian age type, vehicle type, waiting time, width of road, speed limit and accident record is used to justify pedestrian crossing, suggesting that the value of PV^2 greater than 0.4×10^8 , 0.6×10^8 , 0.9×10^8 justifies a refuge, a Zebra crossing and a signalized crossing respectively³.

3. Study Area

Delhi officially the National Capital Territory of Delhi (NCT), is the largest metropolis by area and the second largest metropolis by population in India. The case study selected for this study was located in The National Capital Territory of India. Both the locations were characterized by two different land uses. The location- 1(Saket) which was located in one of the major arterial road of Delhi and the surrounding landuse was mixed development. The location-2 (Connaught Place) was one of the largest financial, commercial and business centers in New Delhi located on arterial road and the surrounding land use characterized by full scale commercial activities.

3.1. Site Observation

At location-1 the pedestrian peak hour was observed at 0830-0930 with a total flow of 1214 pedestrian crossing from both the direction. During the same time period a total of 9410 PCU was observed on both the direction. The most frequent vehicle type at the site was cars, followed by two-wheelers.

Since the location-2 was located at commercial place, the late peak was observed at 1230-1330 with the total flow of 1932 pedestrian on both the direction and 4890 PCU as peak vehicular flow. The car and two-wheeler was found to be more predominant modes.

Further in a research pedestrian crossing speed of 0.95m/s was observed⁴. The pedestrian crossing speed was influenced by number of traffic lanes, traffic volume, landuse and movement in group⁵. The pedestrian behavior

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