



FEASIBILITY STUDY OF PROVIDING A SKYWALK FOR PEDESTRIAN AT KALUPUR STATION ROAD

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Abstract - As a developing State, mixed flow of the Ahmadabad urban road traffic is most obvious characteristic at pedestrian crossing where conflicts between the pedestrians and motor vehicle occur frequently. In this thesis, aim is to reduce the accident ratio and time delay for the Pedestrian by providing a skywalk for the pedestrian. To check the adequacy of pedestrian facilities, pedestrian surveys is to be done and also check the Level of service of the existing pedestrian facilities are evaluated for the existing condition as per the guideline of HCM 2000 and guidelines of pedestrian facility IRC 103:2012 and suggestion is given with design required for the pedestrian skywalk. For this study there are a number of places in Ahmadabad which is suffering from heavy traffic. Among them “**Kalupur Railway Station**” is the study area which is facing the problems. So by providing a skywalk movement will be smooth, safely and have comfortable journey for the pedestrian

Keywords - Pedestrian, Level of Service, Skywalk, Pedestrian facility, Vehicle traffic

I. INTRODUCTION

Walking is one of the most relevant means of mode in transportation. Walking is considered as the most relevant form of mode for the people using public transport and for people having no vehicles. Due to heavy traffic pedestrian are not having a smooth and comfort walk and it also increase the delay time of pedestrian. Due to irregular shape and poor maintenance of footpath pedestrian are not using the footpath. Due to inadequate facility provided for the pedestrian movement, there exist a conflict between pedestrian and motor vehicle by sharing a limited space of road, and it result increase the road accident ratio. To overcome this problem a skywalk is provided to reduce the conflict between the pedestrian and vehicle movement and it also provide a safe, comfort and smooth walk for the pedestrian. The purpose of skywalk is to provide an effective disposal of commuter from station area to location like bus stop, taxi stand, off road etc

1.1 Objective of Study

- To carry out the feasibility study for the pedestrian in urban area.
- To Identification of the problem related selected area.
- To study about exiting pedestrian flow characteristics based on hourly volume variation.
- To estimate pedestrian level of service.
- To recommended appropriate facilities or new suggestions of the new pedestrian movement facility.

1.2 Scope of Work

- Finding existing traffic vehicle hourly volume, pedestrian hourly volume and delay to pedestrian in traffic zone.
- To access the present level of service LOS concept for the analysis of pedestrian facility using HCM 2000
- Finding the pedestrian flow rate, critical gap for per pedestrian, average delay for per pedestrian and suggest for the improving pedestrian facility.
- Provide design facility of suggested improved facility.

II. BACKGROUND AND LITERATURE REVIEW

Large number of studies has been reported on focusing to identifying the means to reduce pedestrian delay. Many research have been examin for the improvement of pedestrian facility some of the research are *Heemanish et al. (2008)*, have analysis for the requirement of skywalk at Bandra station. The purpose and objective of the study is to find whether there is a need of the skywalk or not and to identify the commuter or pedestrian use the skywalk or not. *Dipika Gupta el*

at. (May 2014) have suggested a construction of skywalk at intersection after finding the delay time of pedestrian at intersection. After collecting the data he has estimated the delay time. Then with the help of VISSIM Software he has constructed a model representing the real scenerio of the pedestrian movement. And finally gave a conclusion either providing a pedestrian phase it is better to construct a skywalk. Hitesh A Patel, Hiral Patel et al. (Aug 2015) have presented a pedestrian planning to improve the pedestrian facility at Incom Tax intersection in Ahmedbad. They have find a pedestrian flow characteristic based on hourly volume, and the analysis of pedestrian delay time with level of service (LOS) base on HCM 2000 and IRC:103:2012 and model is created at intersection for the smooth and comfortable walk for the pedestrian.

III. METHODOLOGY

3.1 Selection of Study Area

Ahmedabad city is the administrative headquarters of the Ahmedabad district and is the seat of the Gujarat High Court. It is the sixth-largest city and seventh-largest metropolitan area of India.

Study area selected for this study must follow the following criteria:

- Pedestrian traffic is enough
- Traffic flow is continuous
- The effective width of the flow is uniform throughout the length of corridor.
- The site must have regular bus service route.
- The site must be having a maximum traffic flow

Taking this in to consideration the study area selected Kalupur Railway Station Road of Ahmadabad city

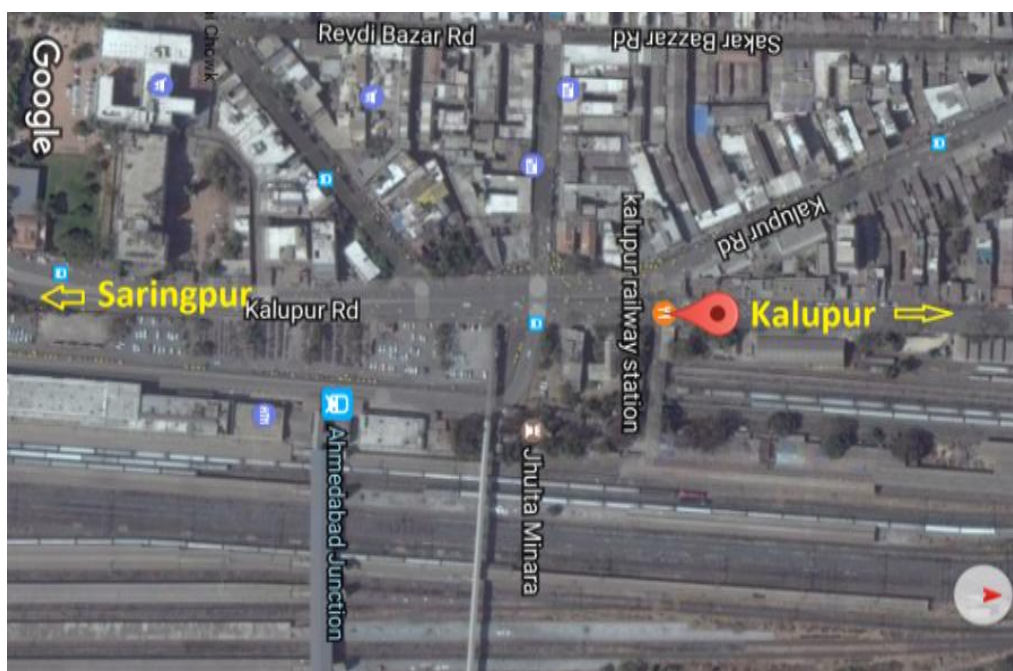


Figure 1. Google image of Kalupur Station

3.2 Problem Identification

There are several problems that cause a serious obstruction to the flow of pedestrians at the study area. The footpaths that are present from AMTS Bus stop to Kalupur railway station are completely occupied by street vendors and commercial shops. So the pedestrians walk on the road interrupting the traffic. There is no proper parking for the autoriksha. Another serious problem to consider is the lack of signs and zebra crossings. Due to lack of these signs and markings the pedestrians cross the road at mid-block. This leads to the accidents of the pedestrians. Due to the vehicles being parked on the footpaths pedestrian are unable to move on them and pedestrian walk on the road. There is no proper way to manoeuvre leading to irregular flow of pedestrians in the area. There is no proper signal control for vehicle. The railway passengers are a major fleet and during their arrivals and departures the traffic becomes too congested causing a significant problem to them. This leads to missing their train and delay in their schedule. The intermediate public transport such as auto-rickshaws occupy the parking facilities. Stopping of autos on the midblock create a serious problem to the traffic flow.

3.3 Problem Solution

After observing the difficulties of pedestrians and identifying the problems causing these inefficiencies. There are various solution for improving the pedestrian accessibility and safety.

- By Improving Pedestrian Facility
 - ✓ Clearing vendors/sellers on road side or foot path.
 - ✓ Sky walk /Foot-over-bridge (FOB) with escalators.
 - ✓ Footpath widening and signage.
 - ✓ Pedestrian Guardrail
 - ✓ Subway/underpass
- By Improving Parking Facility
 - ✓ Proper management of on-street parking of Autoriksha.
 - ✓ Prohibiting on-street parking.

3.4 Data collection and Analysis

There is different method for data collection

- Direct observation method
- Video observation method
- Time laps Photography
- Pedestrian Opinion survey

For this study data collected is done in two way direct observation methods and video graphic observation methods. In observation method, primary data collection and secondary data collection are two different way to collect the data. Pedestrian volume count and questionnaire survey is carried out to determine the pedestrian flow characteristic. Pedestrian were also asked about socio economic profile, travel patent and willingness to use the skywalk. In video graphic survey observation. The video camera is installed at selected location is such a way that it capture the pedestrian movement and approach road.

Data collection done on selected study area:

- Past Accident Record
- Pedestrian Volume count
- Traffic Volume Count
- Road inventory Survey
- Pedestrian opinion Survey

For this study survey work is carried out to find the pedestrian volume and traffic volume for two different day at peak hour of normal working day and weekend day.

Analysis for level of service based on HCM 2000 at unsignalised intersection in which pedestrian walkway speed depends on the property of elderly pedestrian in walking population. If 0 to 20 percent of pedestrian are elderly, a walking speed 1.2m/s is recommended. If elderly pedestrian constitute more ten 20 percent of all pedestrian, 1m/s walking speed is recommended in addition, upgrade of 10 percent or greater reduce walking speed by 0.1m/s. Pedestrian LOS for sidewalks and sideways is calculated using the pedestrian unit flow rate. Determination of the peak 15-min count and effective walkway width is required to compute pedestrian unit flow rate with equation

$$V_p = \frac{V_{15}}{15 * W_E}$$

Where

- V_p = pedestrian unit flow rate (p/min/m),
- V_{15} = peak 15min flow rate (p-15min), and
- W_E = effective walkway width

Delay has been widely accepted as the key performance index for unsignalized intersections, thus it is necessary to estimate delays accurately for all kind of traffic participants at unsignalized intersection. The critical gap is the time measured in second in which pedestrian will not attempt being crossing the street. They may have their own judgment to determine if the available gap is long enough for a safe crossing. For a single pedestrian critical gap is computed according to HCM 2000

$$tc = \frac{L}{S_p} + ts$$

Where

- tc = critical gap for single pedestrian(s),
- S_p = average pedestrian walking speed (m/s),
- L = crosswalk length (m), and
- ts = pedestrian start-up time and clearance time (s)

The delay experienced by the pedestrian is service measured. As per research it indicates that the average delay of pedestrian at unsignalized intersection crossing depends on the critical gap. The average delay for per pedestrian is obtained by equation.

$$d_p = \frac{L}{v} (e^{vt_G} - vt_G - 1)$$

Where

- d_p = average pedestrian delay (s),
- v = vehicular flow rate (veh/sec),
- t_G = group critical gap
- $t_G = tc + 2(N_p - 1)$

If platoon flow is not observed N_p is assumed to be 1.

LOS for pedestrian at unsignalised intersection is obtained based on the average delay of pedestrian

Table 1. Level of service as per HCM 2000

LOS	Average delay/Pedestrian (s)	Likelihood of Risk-taking Behavioural
A	<5	Low
B	≥5-10	
C	>10-20	Medium
D	>20-30	
E	>30-45	High
F	>45	Very High

IV. CONCLUSION

In this research paper study was take in to account the time saving of the pedestrian, comfort safety and security, which is to be consider at the time of providing the pedestrian facility. There is a need of alternative mode of transport for the pedestrian to reduce the congestion. So by providing a skywalk it reduces the congestion and traffic problem near the station and also reduce the pedestrian delay time and pedestrian can move safely and comfortably. In this study the pedestrian time saving is the only benefit consider for the pedestrian. By providing the skywalk it also reduces the delay time of pedestrian. And provide a safe movement for the pedestrian. In this study pedestrian delay time of the existing condition is to be found and proposed for providing a skywalk with design facility required for the skywalk.

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