



## Feasibility Study on Development of Pedestrian Facility: A Case Study Savala Darwaja Visnagar

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**ABSTRACT:** Pedestrians form the largest single road user group and also are the most vulnerable road users. Pedestrians' movements are not restricted to lanes or specific routes however they are restricted by the physical boundaries around them such as the presence of walkways or pedestrian ways. Pedestrian facilities include sidewalks, paths, crosswalks, zebra crossing, curb cuts and median pedestrian signal, guard rail and transit stops. These facilities should be pedestrian friendly to promote walking and safety of the pedestrians. Visnagar acts as developing model in providing infrastructure to the various sections of society. The pedestrian facilities are poor in some of the areas of visnagar such as savaladarwaja, G D circle, M N road etc. It is found that pedestrian traffic in this intersection has been neglected in planning of pedestrian facilities. In the present work study feasibility study on development of pedestrian facility is taken up, to improve the pedestrian facility at these T-Intersections.

**KEYWORDS:** Pedestrian, Traffic Study Framework, Level of Service, safety and economic, Development of pedestrian facility

### I. INTRODUCTION

India is the second most populated country in the world with its population of one billion plus. The increasing in population density resulting in additional trips required higher capacity of urban transport system and transport infrastructure. This increase in the volume of trips causes congestion all the areas requiring the expansion of the pedestrian facilities.[1] In developing cities are undergoing dynamic economic changes with a fast growth of motorization as one its effects.[2] The average crossing speeds at different study locations are varied with respect to various pedestrians' characteristics like gender, age category, and baggage handling condition, volume and composition of traffic moving on road.[3]

In India, pedestrians account for 65% of the accident deaths and out of these, 35% are pedestrian children.[4] Pedestrians walk differently on different types of facilities. Walking speeds are governed not only by the width of the facility but also by age and gender, land uses, temporal variations, cell phone usage, carrying baggage while walking, and movement in groups.[5]

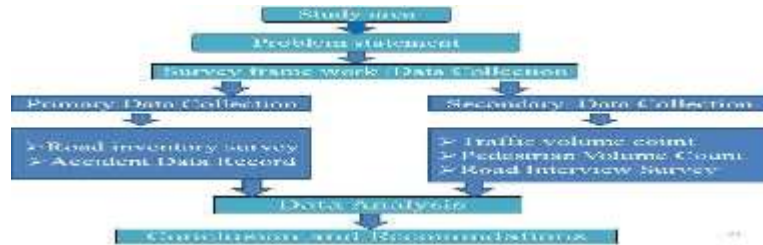
A total of 4,51,757 accidental deaths were reported in the country during 2014 showing an increase of 12.8% as compared to 2013. 4, 51,757 road accidents caused 1, 41,526 deaths including deaths of 34,252 offending drivers/pedestrians during 2014.[6] A total of 6,690 pedestrian deaths (4.7 per cent of the total) who died in India in 2014 and ministry of road transport and highways (MORTH) the report gives the total number of pedestrians killed as 8.8 per cent.[7] The pedestrian deaths to vary from 22% to 35% and population based studies reveal that 1/3rd to 1/4th of road deaths are among pedestrians.[8] Level of Service (LOS) in transportation engineering is a term used which describes existing operating conditions (or suitability) for a mode of travel in a transportation system. Motor vehicle LOS is primarily based on speed, travel time, and intersection delay.[9]

### II. OBJECTIVES OF THE STUDY

- ✦ To identify existing condition or problems.
- ✦ Analysed and assess present pedestrian facility and demand of facilities.
- ✦ To recommend the engineering design and planning aspects of pedestrian facilities on road side and at road crossings in urban and semi urban areas.

### III. SCOPE OF THE WORK

For the improvement of today's present pedestrian facilities such as reducing delay time, crossing accidents, safe and smoothly flow divert on other side etc.



UDY AREA : The study



Figure 1: Study area location

### IV. METHODOLOGY

The methodology provides the framework for the study as shown in figure 2.

### V. DATA COLLECTION AND ANALYSIS

The survey carried out of existing (accident data record) and proposed describes below. Road inventory Survey data collection as

In this survey work carried out of the existing data collected such as footpath, carriageway width, signal system, guard rail, street light, zebra crossing etc. in selected T-junction.

Past Accident data record

**Walkways and Sidewalk :** 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(.). This analysis is according to given equation and corresponds to obtained result of all legs analysis in table 1.

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

At the location of study area no walkway or sidewalk facility is provided. Hence,

$V_p = 0$  ped/min/m

Here, pedestrian unit flow rate  $V_p = 0$  ped/min/m. Hence, level of service for leg A, B, C as per HCM 2000 and 2012 (Exhibit 18.3) are as below.

Table 1: Pedestrian LOS criteria for Walkways and Sidewalk

LEG	LOS	Space (m <sup>2</sup> /Ped)	Flow Rate (Ped/min/m)	Speed (m/s)	v/c ratio
A	F	≤ 0.75	variable	≤ 0.75	variable
B	F	≤ 0.75	variable	≤ 0.75	variable
C	F	≤ 0.75	variable	≤ 0.75	variable

Computed average delay per pedestrian for crosswalk by LOS

The average delay per pedestrian for crosswalk is computed by equations as per HCM 2000 (Exhibit 18.13) for unsignalized section.

For single pedestrian critical gap is computed by following equation,  
Where,

The average delay per pedestrian for crosswalk is given by following equation.

Where,

$d_p$  = Average pedestrian delay(s)

$v = 0.19$  [Vehicular flow rate (veh/s)]  $t_G = 13.12$  [Group critical gap(s)]

$d_p = 49.13$  sec

LOS criteria for pedestrian at unsignalized section based on pedestrian delay.

Here, average per pedestrian delay = 49.13 sec, so it is greater than 45 as per HCM 2012 so that Level of service of pedestrian at unsignalized section (Savala Darwaja intersection) is LOS F and other criteria are as below table 2.

Table 2: Pedestrian characteristics at intersection

LOS	Pedestrian delay(s/p)	Likelihood of noncompliance
F	> 45	Very High

## VI. CONCLUSION

In Research project some major problems are found at intersection like high pedestrian traffic, insufficient pedestrian facility, and footpath not provided, traffic congestion, signal system is not provided, and also current pedestrian accident fatality is high as compare to before five years at this intersection. From the data collection and analyzing the data it is found that pedestrian existing hourly flow at intersection on Leg A, B, and C, are 642, 1158, and 529 respectively. And maximum peak flow of pedestrian at section on Leg A, B, and C, are 711, 1287, and 953 respectively. And also whole intersection pedestrian volume flow at intersection in hourly 2329 ped/hr. From the analysis of data collected it is found that the level of service of walkway and sidewalk for pedestrian as per HCM 2000 and 2012 at intersection is Los F on Leg A, B, C, respectively. As per calculation based on HCM 2012 and IRC 103: 2012 at the intersection pedestrian delay is very high. i.e. 49 sec which increase illegal pedestrian crossing responsible for accident, level of service is F at intersection.

**RECOMMENDATION:** We have suggested to provide footpath for all Leg A,B,C. It should be minimum 1.8 m as per IRC 103:2012. As per Traffic survey data analysis to suggest the basic facilities for pedestrian such as zebra crossing, Traffic Signal Management, police enforcement, guard rails etc. We have observed and as per data collection, from pedestrian opinion we can say that the other facility such as foot over bridge, subway or related facilities will needed after 3 or may be more year.

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