Is it safe to cross the road?

Assessing the quality of Pedestrian Facilities

UNDERSTANDING THE ISSUE

Pedestrians form an integral part of an urban transportation system. Walking is one of the most important modes of transport in the urban environment. Moving on foot can act either as a feeder mode or as an alternate mode to major modes of transportation. "Very short trip lengths within the urban environment would be more suitable for walking as compared to a vehicular trip as long as the walk facilities are provided. Provisions of adequate and safe pedestrian facilities in the urban setting would definitely encourage more people to walk.

The main issues that are associated with the pedestrian crossing behaviour are:

1. Significant numbers of pedestrians fail to comply with the delay involved in a pedestrian crossing due to lack of proper facilities, leading to unsafe crossing behaviour. (Image 1 & 2)
2. Where the primary function of a mid-block crossing is to allow pedestrians to cross, authorities may well wish to shift priority from vehicles to pedestrians, because pedestrian movement forms a very important part of general city movement and modal share. (Image 3 & 4)

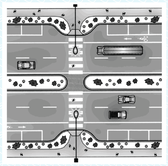


Image 1

Image 2

Image 3

Image 4

3. There is a lack of proper standards, policies & guidelines for design of these facilities. The I.R.C. codes don't detail much about standards for provision of facilities at mid-block crossings.
4. Most of the cities in the Indian scenario lack proper pedestrian facilities. Parameters for assessment of Level of Services (L.O.S.) are also unavailable; the study contributes for developing standards for the same. The L.O.S. standards can be understood as a measure of the quality of service that is available to the user i.e. pedestrian. As we use L.O.S. criteria of speed and volume curves for identifying which L.O.S. the urban roads offer for vehicles, similar thought was used for finding parameters that help finding the L.O.S. for pedestrians.

PLATOON SIZE	DELAY(SEC)	GAP SIZE(SEC)
≥6	≤1.88	≤0.88
5	3.19	1.26
4	5.43	1.79
3	9.22	2.56
2	15.65	3.65
1	≥26.56	5.20

Table 1 Shows the variation in the gap acceptance behaviour of pedestrian with change in platoon size

These issues can generally be observed easily while crossing the road on regular basis. The risk taking behaviour of pedestrians increases while crossing the road due to the delay they face waiting for a safe opportunity to cross.

The research provides a measure of change in road crossing behaviour of pedestrians with increase in group size of pedestrians. The change is in terms of gap acceptance i.e. the gap size between vehicles that is selected by the pedestrian to cross the road at different group sizes of pedestrians i.e. single pedestrian, group of 2 or more. It also supports the fact that the pedestrians start stopping the vehicles after reaching a particular group size.

This is somewhat related to the delay that is being faced by the pedestrian for crossing. The above statement can be understood by this example:

A pedestrian approaches a road crossing, now he has to find a safe gap between vehicles so that he can cross the road. If he doesn't find a safe gap then he has to wait and faces delay. At the same time, while the pedestrian is waiting, because of the demand for crossing the road some more pedestrians will reach the crossing randomly and platooning occurs. There is a change in the behaviour of crossing with platooning, which is described by this analysis. (Table 1)

Gurgaon, which is considered to be one of the largest corporate hubs in India now-a-days but lacks transport facilities, was taken as case study. (Image 5 & 6)

Image 5

Image 6

SOLUTIONS AND RECOMMENDATIONS

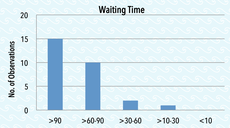
To make a city pedestrian friendly and therefore make a transport system more inclusive first of all the Level of Services of pedestrian facilities have to be assessed.

For that a L.O.S. (Level of Service) criterion has been developed in the research, which is classified into 6 levels from L.O.S. A to F (where A is excellent & F is very poor), based on a technical evaluation with logit model & k-mean cluster analysis.

The pedestrian himself is not able to perceive properly the delay that is faced by him while crossing the road, which is understood from the qualitative analysis that has been done. It means that the pedestrian perception cannot possibly be used for formulating L.O.S. criteria.

Delay(sec)	PERCENTILE		
	15	50	85
Revealed	2.3	4.7	10.45
Stated	26	62	82

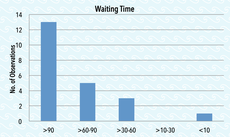
Variation in the perceived & actual delay to the pedestrian at Site 1 (Civil Hospital)



Delay perceived by pedestrian at Site 1 (Civil Hospital)

Delay(sec)	Percentile		
	15	50	85
Revealed	2.25	4.5	7.4
Stated	36	62	81

Variation in the perceived & actual delay to the pedestrian at Site 2 (Maruti Udyog)



Delay perceived by pedestrian at Site 2 (Maruti Udyog)

This analysis proved that there is a correlation between Delay and Gap Size, on the basis of the same the L.O.S. standards have been formulated. The Gap size was found to be the most critical parameter in affecting the crossing of pedestrian. The L.O.S. is proposed on the basis of delay faced by the pedestrian & Gap Size (between vehicles) available to pedestrians for crossing the road, which can be used for planning uncontrolled crossing facilities. These L.O.S. standards can be used to assess the existing Level of Service of various mid-block crossings.

Based on the assessment various improvement measures like speed breakers, rumble strips and kerb extensions can be implemented.

The developed L.O.S. are then the basis for checking the suitability and the impact of the measures at particular areas. Ultimately this leads to provision of better facilities for pedestrians.

Predictor	Coeff.	S.E. Coeff.	Z	P-value
Constant	3.33	1.84	-1.81	0.069
Gap	1.50	0.42	3.58	0.000
No. of Vehicles	0.23	0.15	-1.51	0.132
Group Size	0.41	0.41	1.01	0.313
Flow	42.16	33.59	1.26	0.209
Density	-18.45	16.08	-1.15	0.251

Logit regression analysis at Site 1 (Civil Hospital)

Predictor	Coeff.	S.E. Coeff.	Z	P-value
Constant	-4.37	2.21	-1.98	0.048
Gap	1.92	0.70	2.72	0.006
No. of Vehicles	0.31	0.22	1.39	0.164
Group Size	0.06	0.56	0.11	0.916
Flow	-3.88	2.72	-1.42	0.154
Density	-24.59	20.82	-1.18	0.238

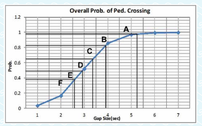
Logit regression analysis at Site2 (Maruti Udyog)

PREDICTOR	COEFF.	S.E. COEFF.	Z	P-VALUE
Constant	-5.04	1.30	-3.85	0.000
Gap	1.71	0.31	5.45	0.000
No. of Vehicles	0.02	0.09	0.23	0.816
Group Size	0.12	0.23	0.53	0.596
Road Width	0.29	0.65	0.45	0.655
Flow	0.38	1.65	0.23	0.815
Density	-0.44	1.90	-0.23	0.817

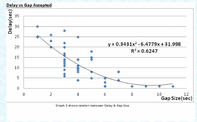
Logit regression analysis for composite data analysis.

Prob. of Crossing	Gap Size	Delay	L.O.S.
≥98.12	≥5.26	≤4	A
<98.12-≥82.34	<5.26-≥3.85	>4-≤8	B
<82.34-≥65.02	<3.85-≥3.31	>8-≤13	C
<65.02-≥48.83	<3.31-≥2.92	>13-≤20	D
<48.83-≥37.96	<2.92-≥2.66	>20-≤28	E
<37.96	<2.66	>28	F

L.O.S. standards based on Delay & Gap Size.



Relation between Delay and Gap size



Relation between Delay and Gap size

Chirag Chutani

Department of Transport Planning

Chirag Chutani has done his Bachelor's Degree in Civil Engineering from Kurukshetra University, Kurukshetra and a Master Degree in Planning from School of Planning and Architecture, New Delhi. He has a work experience of one year as a Site Engineer, where he was involved in building construction of the real estate firm SRS Promoters. His specialization is in Transport Planning.

Currently he works with the School of Planning and Architecture as a Research Associate.

A large group of people crossing the road is an indicator of a poor level of services being provided to the pedestrian.

Implemented by giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH