

AN INSIGHT ON MEASURES OF TRAFFIC CALMING

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Abstract : The economic growth and prosperity of a developing country like India directly depends on urbanization. Nearly 66% of income is generated by people in cities and towns which accounts for about 33% of population. Urbanization which is a part and parcel of country's economic growth leads to increase in vehicle ownership rate and number of vehicles per capita. Urban sprawl and automobile dependency have resulted in significant traffic growth. These trends in automobile travel may place considerable strain on the roadway network's ability to safely accommodate all users within the public right-of-way. With the current vehicle ownership rate, congestion, delay, pollution are at alarming rate in cities and towns. Traffic Calming is a technique that helps to reduce impact of motor vehicles which in turn reduces congestion and accidents. Traffic Calming puts forward to combine various physical measures to change driver behavior and to improve facilities for non-motorized users. This technique mainly concentrates on physical alterations to road that tend the motorists to reduce speed so that pedestrians and cyclists comfortably use the facilities. Traffic calming encompasses a series of physical treatments that are meant to lower vehicle speeds and volumes by creating the visual impression that certain streets are not intended cut-through traffic.

Keywords - Traffic Calming, lower vehicle speeds, right-of-way.

I. Introduction

The urban population of India is enormously increasing at the rate of about 3.5% per year because of which there is rapid growth in road users i.e motorists and pedestrians. Assuming decadal increase of around 32%, India's urban population is expected to increase from 377 million in 2011 to 500 million in 2021. In terms of percentage of total population, the urban population has gone up from 17% in 1951 to 31.8% in 2011 and is expected to increase up to around 35% by the year 2021[P.Teja Abhilash et.al, 2015]. Road traffic conditions in India are getting worse day by day. The average number of vehicles in India is growing at the rate 10.16 percent annually, since last five years. Because of sudden rise in number of vehicles, road-traffic problems like congestion, unpredictable travel-time delays and road-accidents, are taking a serious shape. These calls for the vital need of effective techniques like traffic calming, which make use of low cost technology to alleviate traffic problems. "Traffic calming is the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users" (Lockwood et.al., 1997).

Nearly 40-50% of users travel with speeds higher than the permissible speed which is the main cause for collisions and increase in death rate of pedestrians.

Nevertheless, when traffic queuing was the major problem in western countries drivers opt for local streets which cause trouble to local residential users. Traffic

calming whose origin is in 1960s concentrates on reducing speed of traffic flow without restricting access so that pedestrian and bicycle traffic conditions can be improvised. Traffic calming measures are appropriate for slowing traffic when cut-through traffic is not the problem. Installation and usage of cameras at accident prone regions help to reduce number of accidents (Li et al., 2013).

The main goals of traffic calming initiatives can be summarized in the following:

- Improve traffic safety
- Improve environmental quality
- Improve the quality of public spaces (Mattias Juhasz et.al.,2016)

Research studies have shown that proper classification of measures and appropriate usage of traffic calming measures give beneficial results. However, the extent of application of traffic calming measure depends on the existing physical characteristics of road and possible alterations under optimum economic conditions.

II. Classification of Traffic Calming Measures

Traffic Calming measures are primarily classified into two categories according to the researchers namely

- Speed Control Measures
- Volume Control Measures

The purpose of speed control measures is to reduce number of collisions with minimum physical alterations on roads viz display of sign boards, provision of median

barriers without confining the movement of pedestrians. Volume control measures concentrate on major physical alterations to roads due to which there will be restricted movement of pedestrians. Speed control measures are further classified into two types namely

- Vertical deflection devices
- Horizontal deflection devices

Most of the horizontal deflection devices aim at narrowing the carriageway whereas vertical deflection devices are meant to increase reduced level of carriageway to reduce the speed of traffic. From the literature studies, the purpose of current topic is to explain various measures which probably give good results in achievement of traffic calming.

III. Speed Control Measures

Speed Control measures are meant to reduce speed of vehicles in residential areas and also near schools and hospitals. Some of the measures that are under vertical deflection devices are

- Raised crosswalks and intersections
- ‘H’ humps
- Rumble devices

Raised Crosswalks and intersections:

Raised crosswalks are elongated speed humps that are flat in middle and possess gradient at the sides whereas raised intersections are elevated structures which cover the entire carriageway. Raised intersections and crosswalks are shown in fig.1 and fig.2 respectively.



Figure.1: Raised intersections



Figure.2: Raised crosswalks

Source: <http://www.cmap.illinois.gov>

‘H’ humps:

‘H’ Humps are elevated plateaus which have ‘H’ shaped gaps that allow the tyres of buses and cars to traverse the hump with less impact of jerk on the passengers and also to reduce the speed while traversing. Fig.3 depicts ‘H’ humps.

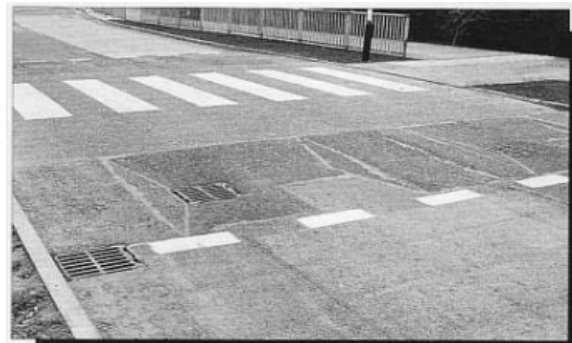


Figure.3: ‘H’ humps

Rumble devices:

Rumble devices as shown in fig.4 is a part of road laid with chipped material in form of stripes to caution driver regarding the sudden deep bend ahead in mountainous terrains and on village roads.



Figure.4: Rumble devices

Horizontal deflection devices are meant to narrow the path that facilitates slow movement of vehicles and the design of device also aims at avoiding congestion of

vehicles. Some of most commonly used horizontal deflection devices are

- Roundabouts
- Chicanes
- Centre blister

Roundabouts:

Roundabouts as shown in fig.4 are similar to traffic circles but have splitter islands that effectively prevent trucks from turning in front of the circle. Roundabouts involve an intersection design that can often improve operation, reduce crashes, and eliminate signal need. They are provided at the intersections of local or collector streets.



Figure.4: Roundabouts

Chicanes:

Chicanes are road space reallocation constructions that allow the traffic in both directions, though priority is given for only one flow of direction. Thus it helps in avoiding head on collisions when dividers are not provided in public places. Chicanes are shown in fig.5



Figure.5: Chicanes

Centre Blisters:

The islands constructed in the midway of road to restrict traffic speeds are called as Centre blisters as shown in fig.6. These are used for movement of commercial traffic at low speed. The prominent disadvantage of using blister is reduction in space for street parking.



Figure.6: Centre blisters

Source: www.mainroads.wa.gov.au

IV. Volume Control Measures

Volume control measures involve prevention of more than one movement of traffic by the usage of physical barriers. These measures help to eliminate cut-through traffic. Some of the most widely used volume control measures are

- Road Closures
- Modified ‘T’ Intersections

Road closures are the barriers provided along and across the street to avoid cut-through traffic, leaving the side-walks open. Modified ‘T’ intersections (fig.7) are so designed that vehicle reaching the end say car A must give way to on passing vehicle say car B which results in restricted movement and there by traffic volume is controlled.

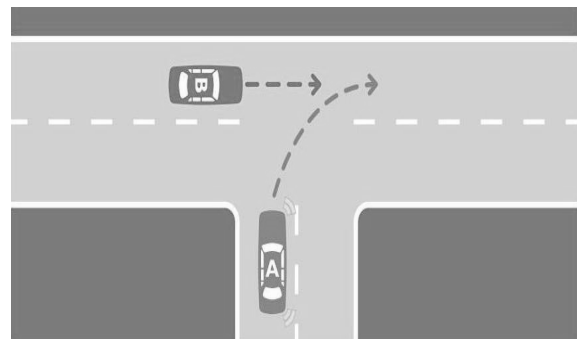


Figure.7: Modified ‘T’ Intersections

V. An Insight on generalized usage of probable traffic calming measures

The usage of traffic calming measures is essential in metropolitan cities where urbanization is booming in past 10-15 so that comfortable movement of vehicles can be attained. The paper gives an insight on generalized economic usage of measures at various areas to obtain easy right-of-way to all categories of vehicles.

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- Raised crosswalks along with rumble strips are to be used along the roads that do not have turns in residential, educational areas and also at public health care centres
- Raised intersections are to be provided at unsignalised intersections which witnesses heavy movement of passengers.
- 'H' humps are to be provided for comfortable movement of public and commercial transport vehicles mostly at the junction of arterial roads and highways
- Roundabouts are to be laid for continuous flow of traffic from all directions.
- The measure for narrowing the passage which makes the motorists to slow down in residential areas is achieved by the usage of center blisters and chicanes.

References

- [1] C. Edward Walter, "Sub urban Residential Traffic Calming", ITE Journal, September 1995.
- [2] Hernán Gonzalo-Orden a*, Marta Rojo a, Heriberto Pérez-Acebo b, Alaitz Linare, "Traffic calming measures and their effect on the variation of speed", Transportation Research Procedia 18 (2016).
- [3] Jeff Gulden, P.E. and Reid Ewing, PH.D., "New Traffic Calming Device of Choice", ITE Journal, December 2009
- [4] Joseph E. Womble, P.E. and W. Martin Bretherton Jr., P.E., "Traffic Calming Design Standards for New Residential Streets: A Proactive Approach", ITE Journal, March 2003.
- [5] John D. Leonard and W. Jeffrey Davis, "Urban Traffic Calming Treatments: Performance Measures and Design Conformance", ITE Journal, August 1997.
- [6] Laura Jateikienė a,*, Tadas Andriejauskas a, Ineta Lingytė a, Vilma Jasiūnienė, "Impact assessment of speed calming measures on road safety", 6th Transport Research Arena April 18-21, 2016
- [7] Reid Ewing, PH.D., Steven J. Brown, P.E. and Aaron Hoyt, "Traffic Calming Practice Revisited", ITE Journal, November 2005.
- [8] Saad Yousif, Mohammed Alterawi and Ralph R. Henson, "Effect of Road Narrowing on Junction Capacity Using Micro simulation", Journal of Transportation Engineering, Vol. 139, No. 6, June 1, 2013.
- [9] Todd Litman, "Traffic Calming Benefits, Costs and Equity Impacts", Victoria Transport Policy Institute, December 1999.
- [10] P. Teja Abhilash, K. Jaya Sunder, K. Tharani, "Traffic Calming in Hyderabad City", IJERM, Vol-2, Issue-5, May 2015