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TRAFFIC CALMING IN HYDERABAD CITY

P.Teja Abhilash , K.Jaya Sunder , K.Tharani

Abstract— Cities and towns play a vital role in promoting economic growth and prosperity. Although less than one-third of India's people live in cities and towns, these areas generate over two-third of the country's income and account for 90% of government revenues. In the coming years, as India becomes more and more urbanized, urban areas will play a critical role in sustaining high rates of economic growth. Although Indian cities have lower vehicle ownership rate, number of vehicles per capita, than their counterparts in developed countries, they suffer from worse congestion, delay, pollution, and accidents than cities in the industrialized world. Traffic calming is coined as the best technique to overcome traffic congestions and accidents. Traffic calming is the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behaviour and improve conditions for non-motorized street users. The concept of traffic calming is fundamentally concerned with reducing the adverse impact of motor vehicles on built up areas. This usually involves reducing vehicle speeds, providing more space for pedestrians and cyclists, and improving the local environment It includes change in street alignment, installation of barrier and other physical measures to reduce traffic speed and /or volume in the interest of safety and liveability. The main objective of this study is to reduce the high frequency of collision and the need for police enforcement. It aims at achieving slow speeds for motor vehicles and enhancement of safety for non motorized users. A junction in Hyderabad which is subjected to congestion and high frequency of collision is considered for study and requirements of traffic calming in the junction have been analysed.

***Index Terms*— Traffic Calming; congestion; slow speeds.**

I. INTRODUCTION

The rapid growth of India's urban population has put enormous strains on all transport systems. Its urban population is growing at an average rate of around 3% per year. The average rate of growth of the urban population is not expected to change significantly during the next ten years or so. 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. During the 2000s, 91 million people joined the ranks of urban dwellers – which implies that the growth rate in urban areas remains almost the same during the last twenty years; urban population increased by 31.5% from 1991 to 2001 and 31.8% from 2001 to 2011[1]. However, the number of metropolitan cities – those with a million plus population – has increased sharply over this period. From 35 in 2001, the number of metropolitan cities rose to 50 according to the Census of India, 2011. Out of these 50, eight cities – Mumbai, Delhi, Kolkata, Chennai, Hyderabad, Bangalore, Ahmedabad, and Pune – have population more than 5 million. India's big cities now account for a larger share of total urban population – a trend that has been observed since independence. In 2011, the share of metropolitan cities was 42.3%, up from 37.8% in 2001 and 27.7% in 1991[6].

Hyderabad is well connected to many other locationsinIndia,suchas Bangalore, Mumbai, Delhi, Kolkata, Nagpur, Chennai, Pune, Vishakhapatnam and Vijayawada, either through directly or through intermediary locations. The highway (express way) network linking Hyderabad to various parts of the country is very good. Three National Highways (NH) pass through the city—NH-7, NH-9 and NH-202. Five state highways—SH-1, SH-2, SH-4, SH-5 and SH-6 begin from Hyderabad [7]. As a growing city, regular multiple development projects, around the city had made traffic congestion a common issue. Like many other Indian metropolitan cities, Hyderabad also face parking problems, particularly in the city centre due to growing population density, encroachment of pavements, developing commercial centres[2]. In Hyderabad the roads occupy 10% of the total city area. Traffic calming is the name for road design strategies to reduce vehicle speeds and volumes. 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 for high-speed or cut-through traffic [9]. Thus, traffic calming can improve safety for pedestrians and reduce noise and pollution levels. Examples of these measures include Bulbouts, speed humps, chicanes, and traffic circles.

Traffic Calming techniques have emerged primarily as a society's response to concern for safety. Traffic Calming in the Western Nations have been implemented in residential areas, neighbourhoods and cities because inter-city highways and freeways are relatively safer [10]. It is well accepted by the experts that differences and variations in the speed, direction, and/or mass of vehicles usually determine the severity of road accidents. In the West, freeways are rated highly safe where driving speeds are the highest but relatively uniform. There is much less variation in direction and vehicle mass. In the last twenty-five years, residential areas and inner cities have become safer because of 30 km/h zones in the residential areas, despite considerable variation in the

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P.Teja Abhilash is a Post Graduate student in Transportation Engineering from MallaReddy Engineering College, Hyderabad.

K.Jaya Sunder is Asst.Prof, with M.Tech from IIT Nagpur working in Malla Reddy Engineering College, Hyderabad.

K.Tharani is a Post Graduate student in Remote Sensing and GIS from NIT Warangal.

direction and mass of vehicles using them[11]. Traffic Calming Techniques have played an important role in achieving safety by ensuring low driving speeds and smaller speed differences between different road users [8].

Traffic calming is defined by Institute of Traffic Engineers as, "The combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behaviour and improve conditions for non-motorized street users." It involves physical alterations to a road or street which cause or invite motorists to decrease driving speed and increase his attention to driving task. It includes change in street alignment, installation of barrier and other physical measures to reduce traffic speed and /or volume in the interest of safety and liveability [3].

Traffic calming techniques can be classified based on speed control measures and volume control measures. Various speed control measures that are intended to reduce speed and improve the conditions for non-motorists are (1) Speed humps (2) Speed tables (3) Raised crosswalks (4) Raised intersection (5) Traffic circles (6) Roundabouts. Various volume control measures that are intended to reduce the cut-through traffic by obstructing traffic movements in one or more directions are (1) Full closures (2) Half closures (3) Diagonal closures (4) Median barriers [4]. The main advantage of traffic calming is speed and volume control can be obtained at an effective cost but measures when implemented leads to rough drive for huge vehicles and impact to drainage needs have to be considered.

II. STUDY AREA

The study area for understanding traffic calming in Hyderabad city involves two regions namely Bowenpally-Balanagar stretch and Begumpet stretch. The reasons behind selecting those two stretches for study are poor road condition in Bowenpally-Balanagar stretch and regular traffic congestion in Begumpet stretch. The study areas are shown in fig 1(a) and 1(b) respectively.

Fig 1(a): Bowenpally-Balanagar Stretch

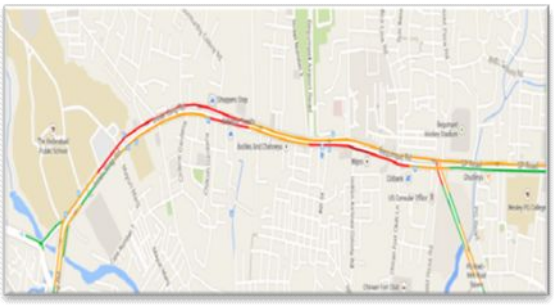

Fig 1(b): Begumpet Stretch

III. METHODOLOGY

The methodology followed to understand traffic calming in Hyderabad city is as shown in fig 2

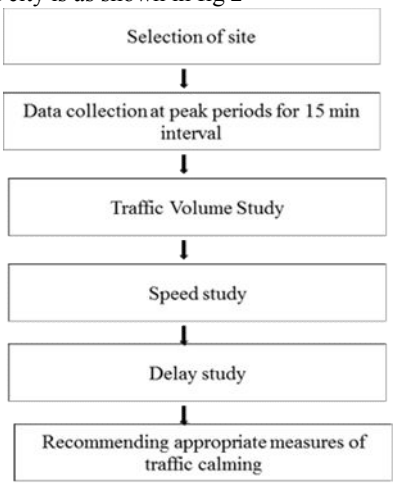

Fig 2: Methodology involved

A. Data Collection

Traffic flow study which includes study of movement of all types of vehicles through particular junction for a period of 15 min was made at regular interval of one hour from 8:00 am to 11:00 am in the morning and 4:00pm to 7:00pm in the evening. Signal timing was also noted down in these areas

B. Traffic Volume Count

Traffic volume studies are conducted to collect data on the number of vehicles and/or pedestrians that pass a point on a highway facility during a specified time period. This time period varies from as little as 15 minutes to as much as a year depending on the anticipated use of the data [5]. Traffic volume studies are usually conducted when certain volume characteristics are needed, some of which follow:

1. 1.Average Annual Daily Traffic (AADT) is the average of 24-hour counts collected every day of the year.
2. Average Daily Traffic (ADT) is the average of 24-hour counts collected over a number of days greater than one but less than a year.
3. Peak Hour Volume (PHV) is the maximum number of vehicles that pass a point on a highway during a period of 60 consecutive minutes.
4. Vehicle Classification (VC) records volume with respect to the type of vehicles.
5. Vehicle Miles of Travel (VMT) is a measure of travel along a section of road. It is the product of the traffic volume (that is, average weekday volume or ADT) and the length of roadway in miles to which the volume is applicable.

C. Speed Studies

Speed studies are conducted to estimate the distribution of speeds of vehicles in a stream of traffic at a particular location on a highway [5]. The speed of a vehicle is defined as the rate of movement of the vehicle; it is usually expressed in miles per hour (mi/h) or kilometres per hour (km/h). A spot speed study is carried out by recording the speeds of a sample of vehicles at a specified location. Speed characteristics identified by such a study will be valid only for the traffic and

environmental conditions that exist at the time of the study [12].

D. Delay Studies

A travel time study determines the amount of time required to travel from one point to another on a given route. In conducting such a study, information may also be collected on the locations, durations, and causes of delays [5]. When this is done, the study is known as a travel time and delay study. Data obtained from travel time and delay studies give a good indication of the level of service on the study section. These data also aid the traffic engineer in identifying problem locations, which may require special attention in order to improve the overall flow of traffic on the route.

IV. RESULTS

From table 1 and 2 it is evident that traffic flow at Bowenpally junction is more during 9:00am to 10:00am in the morning and 5.00pm to 6.00pm in the evening. On an average traffic flow during 9:00am to 10:00 am is 41% of total traffic flow. On an average traffic flow during 5:00pm to 6:00 pm is 39% of total traffic flow. From table 3 and 4 it is evident that traffic flow at Paradise junction is more during 9:00am to 10:00am in the morning. Number of two wheelers crossing the junction is more in both the cases. On an average traffic flow during 9:00am to 10:00 am is 36% of total traffic flow. Nearly 50% of traffic flow occurs during 5.00pm to 6.00pm.

From table 5 it can be said that speed of two wheelers at Bowenpally-Balanagar and Begumpet stretch is 13 Km/hr and 10 Km/hr respectively. According to IRC speed on district roads is 18-20 Km/hr. Reduction in speed is due to poor road condition and increased traffic volume count. From table 5 it can be said that speed of three wheelers at Bowenpally-Balanagar and Begumpet stretch is 11 Km/hr and 9 Km/hr respectively. According to IRC speed of three wheelers on district roads is 12-15 Km/hr. Reduction in speed is due to and increased traffic volume count at Begumpet. From table 5 it can be said that speed of four wheelers at Bowenpally-Balanagar and Begumpet stretch is 9 Km/hr and 8 Km/hr respectively. According to IRC speed of four wheelers on district roads is 8-10 Km/hr. Speed of four wheelers is in IRC standards.

V. RECCOMMENDATIONS

- Speed has been reduced at both the locations because of damaged overlays. Removal of the existing road and laying new road would improvise the speed at the junctions.
- From the tables it can be observed that traffic volume count has drastically increased in the past 5 years. Best way to reduce traffic volume count is to provide traffic circles at places where vehicles move with low speed.
- Level separated intersection at Begumpet area would help in easy movement of traffic.
- Median barrier if provided at Bowenpally-Balanagar junction would reduce traffic congestion because of movement of different type of vehicles at a time.
- Fly over also would serve the purpose of reducing the traffic volume count and would help to provide faster travel for multi axle vehicles.
- Separate lanes for heavy vehicles and multi axle vehicles help to reduce traffic volume count and increase in speed.
- Speed humps have to be provided on the path from Begumpet to NTR circle to reduce abrupt speed of two wheelers.
- From the pictures shown above, it can be said that there is misuse of foot paths at various places of study. This problem can be solved by providing raised crosswalks. Raised crosswalks can give elegant appearance as well as reduce traffic congestion.
- Footpaths have to be raised so that vehicles won't pass on footpath and cause inconvenience to pedestrians.
- Another problem that can be observed from the pictures is poor maintenance of roads which leads to storage of water during rainy reason. Proper camber has to be provided in roadways.

VI. E TABLES

TABLE 1 Vehicular Statistics of Bowenpally-Balanagar Stretch

	Number of vehicles that cross the junction in an interval of one hour		
Time / **Type of vehicle**	**8:00 to 9:00**	**9:00 to 10:00**	**10:00 to 11:00**
2- wheelers	**5540**	**8733**	**6295**
3-wheelers	**1244**	**2009**	**1386**
4-wheelers	**2440**	**3744**	**2738**
Heavy vehicles	**331**	**505**	**378**

TABLE 2 Vehicular Statistics of Bowenpally-Balanagar Stretch

	Number of vehicles that cross the junction in an interval of one hour		
Time / Type of vehicle	4:00 to 5:00	5:00 to 6:00	6:00 to 7:00
2- wheelers	6330	9172	6098
3-wheelers	1554	2247	1505
4-whcelers	2459	3436	2445
Heavy vehicles	502	668	507

TABLE 3 Vehicular Statistics of Begumpet Stretch

	Number of vehicles that cross the junction in an interval of one hour		
Time / Type of vehicle	8:00 to 9:00	9:00 to 10:00	10:00 to 11:00
2- wheelers	8012	12686	8925
3-wheelers	1237	1949	1300
4-wheelers	3074	4781	3242
Heavy vehicles	480	712	507

TABLE 4 Vehicular Statistics of Begumpet Stretch

	Number of vehicles that cross the junction in an interval of one hour		
Time / Type of vehicle	4:00 to 5:00	5:00 to 6:00	6:00 to 7:00
2- wheelers	10778	14734	14024
3-wheelers	1741	2356	2142
4-wheelers	4086	5450	6209
Heavy vehicles	584	712	678

TABLE 5 Speed Study

Type of vehicle	Bowenpally-Balanagar stretch (speed in Km/hr)	Begumpet Stretch (speed in Km/hr)
2- wheelers	13.09	10.28
3-wheelers	11.61	9.48
4-wheelers	9.23	8.89
Heavy vehicles	6.37	6.26

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