Efficiency Enhancement of BRTS Corridor and Outer Road Traffic by Zoning of the Private Vehicles into the BRTS Corridor BRTS at Sikar Road -Jaipur

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***Abstract*-The main emphasis in this particular research is on the efficiency enhancement of the traffic flow on the main road as well as that of the BRTS (Bus rapid Transit System) at the Sikar road (V.K.I area) by diverting the private buses, cabs, and auto rickshaws along with existing plying of the Low floor buses in the BRTS corridor. The motive is to increase the efficiency by significant amount of the traffic that passes through the main road and also to increase the efficiency of under occupied BRTS corridor so as to reduce the congestion during peak hours. The project includes a research or the survey that takes into account the counting of the number of vehicles passing at a particular area and at a particular instance and also the type of the vehicles passing. The reason for congestion is identified and the proposed scenario for traffic enhancement is discussed.**

Keywords- BRTS Corridor,Traffic,PCU,Urban Roads

I. INTRODUCTION

In India, 2-wheelers are increasing at the rate of 12% per annum in last two decades. Car ownership in the country is also on jump as far as the large cities are concerned .(<300/1000ppl) [1].In India BRTS is now becoming an integral part of Public transportation system and more and more cities are adopting the BRTS concept for the growth and development of the city transportation system. Ahmadabad is a great example where the BRTS has turned out to be a great success and it has become a role model for the nation to follow such a bright innovation.

The main area of the study is that part of traffic engineering that deals with the removal of congestion of the traffic and the ways to increase the efficiency of the traffic on all the merits of the public transport. It includes the classification of the vehicles and its division into categories according to the vehicle size, type and its origin and destination studies .The vehicles are counted on the manual traffic counter machine and moreover their timings of operations are also noted down for bifurcating them according to various categories.

The main idea is to see the variation of the traffic on peak hours and on holidays and working days as well and focus on as to how much of the traffic and what kind of traffic could be channelized into the BRTS vacant pathway which is being minimally utilized by the Low Floor Buses.

Alongside the BRTS pathway, i.e. on the main road, the traffic congestion is caused mainly by two wheelers or the four wheelers is studied and detailed analysis is carried out on traffic volume studies as well as the case studies. These studies are planned for a specific stretch of 3-Kms long stretch (from BhawaniNiketan School till the SoniManipal Hospital Rotary) on the Sikar road, Jaipur City where traffic is increasing rapidly and the utilization of the BRTS is not properly devised.

The objectives of the proposed system can be stated as follows:-

The traffic flow would be smoothened after the application of the proposal. Accidents would reduce as the portion of traffic would be put into BRTS. Future demands could be easily met by using BRTS corridor. Decrease in travel time for public transport passengers due to dedicated bus lanes and potentially for private vehicle users due to improved efficiency of intersection management. Decrease in travel costs for the BRT users. Decrease in energy consumption from par transit, old bus, and private vehicle trips that are avoided due to from a modal shift to BRT. Reduction injuries, loss of life, and economic productivity due to improved road safety along the BRT corridors. Impact of system on environmental quality and quantifiable public health benefits. Comparison of Current BRT System and Proposed System-

In current BRT system, lane is reserved only for transportation of public transport whereas in proposed system the current BRT lanes will also be used for the transportation of specific traffic such as other private Buses and traffic based on proposed survey work.

The current system has reserved lanes only for use for public transport buses whereas in proposed system the same lanes will also be used for other traffic based on survey to increase the efficiency of existed lanes and BRT corridor. The proposed BRTS system may also include High-quality vehicles that are easy to board, clean & comfortable to ride which are not yet running in BRT lane.

The proposed system directly increases the efficiency of BRT corridor about 30% as well as increases the average traffic speed which results in less time delay, less numbers of

accidents, less emission of CO_2gas [2]. The proposed will not influence the current BRT system in any manner as the proposed system will be based upon the practical surveying of BRT corridor and the nearby lanes.

The proposed system will provide a more efficient and smooth flow of traffic over the current system. The entire study and the calculations are based upon the IRC code recommendations for the Maximum or the standard occupancy given for the two lane roads and the six lane roads. PCU- It is a vehicle unit used for expressing highway/roadway capacity. One car is considered as a single unit, cycle, motorcycle is considered as half car unit. Bus, truck causes a lot of inconvenience becauseof its large size and is considered equivalent to 3or 4.

TABLE- 1 PCU VALUES FOR URBAN ROADS AS PER INDIAN ROADS CONGRESS IRC 86-1983

S.No.	***Vehicle Type***	***Equivalent PCU factor***	
		Percentage composition of vehicle type in traffic	
	Fast Vehicles	**5%**	**10% & above**
1	Two wheelers	0.5	0.75
2	Cars and Cabs	1.0	1.0
3	Loading Vehicles	2.2	3.7
4	Bus	2.2	3.7
5	Auto	1.2	2.0

This table indicates the equivalent number for the occupancy of different type of vehicles on an urban road. The given PCU values indicate the occupancy factor of the vehicle.

TABLE-2 STANDARD OCCUPANCY TABLE AS PER INDIAN ROADS CONGRESS IRC 86-1983

Type of carriageway	***Total design service volume for different categories of Urban roads, PCU per hour***		
	Arterial Roads	***Sub-Arterial roads***	***Collector roads***
2 lane one way	2400	1900	1400
2 lane two way	1500	1200	900
3lane one way	3600	2900	2200
4 lane undivided four lane	3000	2400	1800
4 lane divided two way	3600	2900	
6 lane divided two way	5400	4300	
8 lane divided two way	7200		

This table shows total PCU occupancy for different types / categories of roads (as mentioned above) in an urban city for a particular hour during peak time.

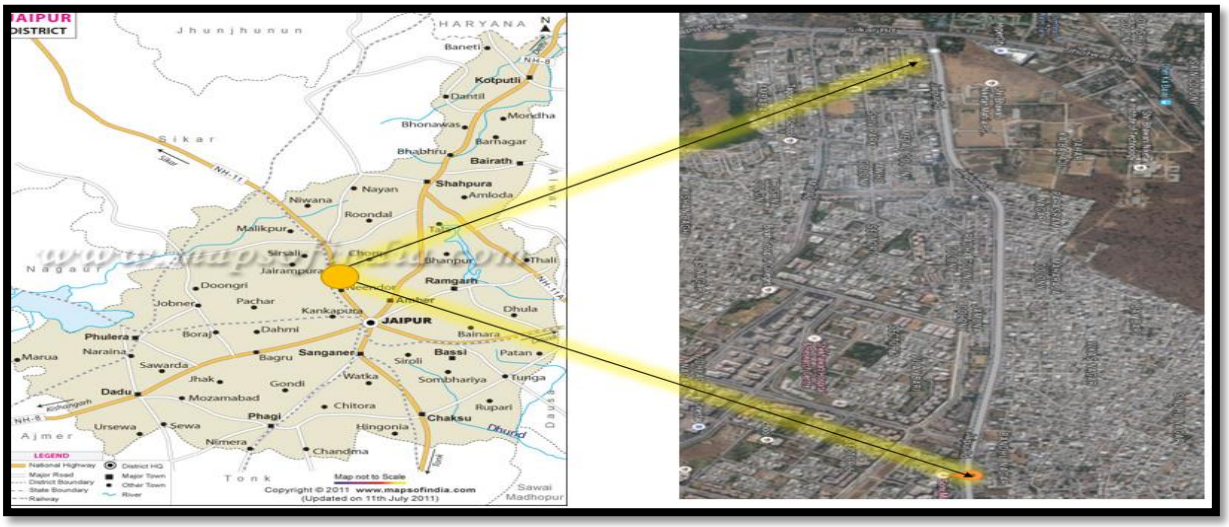

Fig 1. Study Area map

II. RESULTS AND DISCUSSION

TABLE-3 MAXIMUM PCU AT PEAK HOURS FOR DIFFERENT VEHICLES

Vehicles	***Peak Hour PCU****	***Time***
Two wheelers	2070	Evening
Cars	2360	Evening
Cabs	246	Evening
Auto	86	Evening
Loading	606	Morning
Buses	828	Evening

The above data indicates the PCUs obtained as per our survey for different type of vehicles for a particular peak hour that shows the maximum value.

TABLE-4 PCU VALUES FOR MAIN ROAD AND BRTS CORRIDOR OCCUPANCY AS PER OUR SURVEY ANALYSIS

PCU Count	*Morning*		*Evening*	
Days (Jan-Feb 2016)	BRTS corridor	Main road	BRTS corridor	Main road
Monday	378	3999	405	4261
Tuesday	642	3824	400	4128
Wednesday	370	3735	390	4004
Thursday	387	3992	**433****	4058
Friday	327	3997	421	**4218****
Saturday	398	3525	417	4536
Sunday	313	2330	321	2663

The table 4 represents the maximum value of the PCU per hour for BRTS corridor as well as the main road during any time on any day of the week and the values are indicated.

The scope for this particular project has got a very wide expanse because the concept of channelizing the on-road traffic into the minimally utilized BRTS corridor can be applied to the existing BRTS channels at many cities like Pune, Delhi, and Ahmadabad across the entire country [5]. Moreover the repercussions and the positive outcomes can also be examined and analyzed and applied properly for the betterment of the traffic and public commuting systems all over the country. Also, the project will also be able to help the local traffic management departments and the police authorities.

For the final outcome of the project, the analysis would be detailed out from the statistical study and the suggestions that would be provided by the local authorities and the people commuting from that area.

The present scenario clearly states that there is high negligence due to the weak management system of the BRTS corridor so in order to make the system efficient and worthy the channelization of the vehicles would be inculcated. Also the fact that there was improper utilization of the BRTS channel that wasn't allowing the use of resources, leading to delays, congestion and loss of fuel and degradation of engine quality of the vehicles running. The efficiency and the use of any particular road/ path or the channel can only be used to the fullest when the proper analysis and the research has been carried out . Moreover, there are ways or methods that can be deployed to find out the exact number of the vehicles that shall be put into the corridor after extracting them from the main road route so as to ease the pressure from the main road or the traffic route.

Once the passenger traffic in the corridor reaches 900 PCU per day, frequent all-day service should be in place. Where BRT routes interact with light rail, schedules should be coordinated for minimum waiting time when transferring between modes. BRT and light rail stations should also be close together for minimal distance for transfers. So, as a result some parts of all the classified vehicles are forced into the channel and a great deal of efficiency increase is shown.

More regulations and the rules will have to be enforced for the proper implementation of this project because without the application of some extra rules and maintenance of these services may go into vain and the traffic system would get crippled. For e.g.: by the use of ITS (intelligent transportation system) one can allow the use of BRTS corridor only for the long distance commuters and no passage of short distance commuters should be allowed in it, that will definitely help us to give the best possible chance for improving the traffic congestion and will also give the full utilization of the resources

With the onset of putting the private vehicles into the BRTS corridor, people will learn the value of time and discipline and hence they will have ease in the commutation from one place to another. And the strict conditions would be followed for each and every directed path and thereby making the entire passage highly smooth and desirable by all kind of commuters.

The IRC codes permit the PCU value of 4300 PCU per hour for a two way six lane road as mentioned earlier but according to our data analysis, it is inferred that the condition is already critical and the occupancy is reaching up to an alarming level of 4218 or 98.09% of the available capacity for main road alongside the BRTS corridor.

III. CONCLUSION

The IRC codes permit the PCU value of 1200 per hour for the two lane, two way traffic in BRTS corridor but being on the safer side we take 75% occupancy only for the smoothened traffic flow. So, the available PCU limit is 900.

Available space in BRTS corridor 900-433= 467 PCU per hour. Hence in the available window we will be able to make these scenarios

Scenario 1

Accommodating private buses of the main road in the BRTS corridor along with existing plying of the

Buses in the corridor. Taking the peak hour occupancy of Buses (PCU), from table 3 equal to 828 PCU or 102 in number. But as the available occupancy is only 467 PCU, so 828 PCU buses cannot be accommodated.

As a result for betterment we provide only 50% of the above occupancy i.e. only 1 way flows of private buses into the corridor. So the PCU that can be accommodated is 414

or approximately 50 buses in a particular peak hour. Now the new BRTS occupancy will be 70.58%.

Therefore, increase in efficiency of BRTS corridor = New occupancy – earlier occupancy
= 70.58%-36.08%
=34.5%

Similarly the increase in on road efficiency will be given by 9.63%

Scenario 2

In case two, the Autos and the cabs will be incorporated into the BRTS corridor along with the existing plying of the buses in the corridor. Taking the peak hour occupancy of the Autos and cabs from the table 3 as 86 and 246 PCU per hour respectively.

So, the total increase in the BRTs occupancy will be up to 63.75%.Hence increase in the efficiency of the BRTS corridor is 27.67%.

Similarly, decrease in the occupancy or burden of on road traffic will be from 98.09% to 90.37%.
Hence the efficiency enhancement is 7.72% of the main road.

REFERENCES

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