Case Study on Extending of Bus Rapid Transit System in Indore City from Vijay Nagar Square to Aurobindo Hospital.

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Abstract: *Bus Rapid Transit System (BRTS) is the Safe, Economical, Rapid, Convenient & New concept of Public transport in Indian scenario perhaps in India there are more than 20 series of B.R.T.S is running successfully in India the few examples are Pune, Ahmedabad, Rajkot etc., Indore is also a successful example of BRTS. Indore is the most populous city in Madhya Pradesh with population of about 1.6 million according to the 2001 census. It is likely to rise to 2.5 million and 3.6 million by 2011 and 2035 respectively. Now this is the peak time to think about the urban transport. BRTS is the most economical eco-friendly solution of public transportation for growing cities of India. The Indore, City of Madhya Pradesh, India is well known as the city of Two Wheelers and has a large two wheeler population; Also the traffic here is prone to frequent congestions during peak hours; leading to jams causing huge delays in travel times. Moreover, pollution created by these vehicles is a huge cause of concern for the public and local authorities. To tackle this problem, the Madhya Pradesh Government came up with a plan to implementation of the BRTS in May 2013, and successfully introduced it on an about 13 KM. This system has introduced the separate lanes and signalling system for Buses and thus is independent of the on road traffics, aimed at decreasing congestion and pollution by encouraging Indore motorists to take the BRTS instead of driving. The author has given the idea about the extension of BRTS from Vijay Nagar Square to Aurobindo Hospital can be considered as a significant measure to improve the overall traffic congestion in the city of Indore.*

Keywords: BRTS, Indore City, Rapid Transport, Extending.

1. INTRODUCTION

Bus Rapid Transit System (BRTS) takes part of its name from "Rapid Transit", which describes a high-capacity transport system with its own way, implemented using buses through infrastructural and other improvements, to provide a high level of service. Complicated as it sounds, this is nothing but high-capacity articulated buses operating in lanes reserved for their exclusive use and for any city to become fully functional and truly competent on both National and International levels, it is very important that the public transportation system is firmly in place; and also relied upon by the government and the people. This paper is aimed to extend the BRTS, Indore and the traffic scenario in that part of Indore city where the BRTS has been implemented.

Indore City:

Indore, a historical city situated on the banks of rivers Khan and Saraswati is the largest city of 'Indore Agro Industrial Region' of Madhya Pradesh. It is almost centrally located on the fertile Malwa Plateau at latitude 220 43' North and longitude 760 42' East and is the nerve centre of the economic activities of the state. Indore is the most populous city in Madhya Pradesh with population of about 1.6 million according to the 2001 census. It is likely to rise to 2.5 million and 3.6 million by 2011 and 2035 respectively. The average annual growth rate of population is around 40% as per the statistics of census 2001. Indore has an average literacy rate of 72%, higher than the national average of 59.5%: male literacy is 78%, and female literacy is 65%.

Indore is one of the fastest growing Tier II cities in India. It already is the commercial capital of central India. The rapid industrial and commercial development coupled with the rise in population in the recent past has contributed to a large scale increase in traffic on the city roads. This increasing intensity of traffic has resulted in the manifestation of a number of problems like congestion, delay, accidents, pollution etc. which pose a potential threat to the economic vitality and productive efficiency of the city.

BRTS System in Indore:

The Indore BRTS or Ahilya Path is the bus rapid transit systemfor the city of Indore, Madhya Pradesh by AICTSL also called I-Bus(Intelligent Bus), became operational from 10 May 2013. The Indore BRTS project started in 2007 under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM). It involves the participation of the Governments of India and Madhya Pradesh, and the World Bank.The length of the Corridor is 12.046 (7.485 Miles).

While the completed BRTS will cover 106 km, connecting all major corridors in Indore, Phase-I of the project proposes three corridors: the AB Road pilot corridor, the Vijayanagar Chowraha-Ujjain Road junction and Ujjain Road junction-the Airport. The current Rs. 130-crore AB Road pilot corridor runs along 11.7 km and will cater to around 70,000 passengers daily. BRTS may also be linked to the upcoming Indore Metro as planned.

2. OBJECTIVE OF STUDY

- To extend the BRTS Indore, Vijay Nagar to Aurobindo Hospital, Indore.
- To reduce the congestion on the Ujjain road.
- To reduce the CO_2 emission and noise pollution reduction.
- To provide extra corridor for the emergency's and institutional purpose.

3. LITERATURE REVIEW

AnanthRangarajan et.al (2010) The City of Pune, Maharashtra, India is well known as the city of Two Wheelers and has a large two wheeler population; Also the traffic here is prone to frequent congestions during peak hours; leading to jams causing huge delays in travel times. Moreover, pollution created by these vehicles is a huge cause of concern for the public and local authorities alike. To tackle this problem, the Pune Municipal Corporation came up with a plan to implement the BRTS in Dec. 2006, and successfully introduced it on a 13 KM stretch, becoming the first city in India to do so.

Manjurali I. Balya et.al (2016) Cities in the developing countries in general and India in particular, are in search of sustainable solutions to their accessibility and mobility issues. The process is complicated due to the rapid pace of urbanization, which is characterized by motorization, the coexistence of motorized and non-motorized modes, deteriorating public transport services and institutions and deteriorating air quality. A variety of modes such as walking, cycling, two-wheelers, Para-transit, public transport, cars etc. are used to meet the travel needs in urban areas

4. METHODOLOGY

The word methodology is defined as a system, which comprises the principles, practices, and procedures, which are applied to a specific branch of knowledge. Methodology refers to the way in which information is found or the way something is done. Methodology includes the methods, techniques and procedures that are used to collect and analyze information. The output and reliability of the study depends on the methodology followed. A sequential and methodology has been followed throughout the study.

4.1. DATA COLLECTION

Some quantitative data collected to conduct the study i.e. Quantitative data was collected by surveys and observations. To achieve the optimum result three type of survey has been conducted in this study. Surveys enable the study to obtain data about practices, situations or views at one point in time.

Type of vehicle	08 to 09 AM	09 to 10AM	10 to 11AM	01 to 02 PM	02 to 03PM	05 to 06PM	06 to 07PM	07 to 08PM	Total
2 Wheeler	430	450	378	325	301	370	510	475	3239
3 Wheeler	42	72	50	35	30	35	60	55	379
Bus (city)	14	18	25	10	12	15	20	16	130
Bus	21	25	26	15	13	25	25	20	170
Truck	28	32	40	25	22	15	15	17	194
Magic	14	25	35	16	25	30	45	40	230
Cycle	18	30	45	25	15	20	19	25	197
Car	240	325	312	175	125	250	356	300	2083
Tractor	29	35	30	15	7	20	20	15	171
Total	836	1012	941	641	550	780	1070	963	6793
Total good transportation	78	92	96	55	42	60	60	52	535
Total public transportation	758	920	845	586	508	720	1010	911	6258

4.2 FIELD SURVEY

To get the optimum result four types of survey was conducted. The following primary traffic and travel surveys conducted as a part of the study:

a) Geometric features survey

b) Observation survey

c) Questionnaire survey

d) Traffic volume survey

4.2.1 GEOMETRIC FEATURES SURVEY

The geometric features of the study area were surveyed in details to calculate the capacity and the level of service (LOS). As geometric features, carriage way width, width of the median, numbers of lane, sidewalk width etc. were surveyed.

4.2.2 OBSERVATION SURVEY

Lot of photographs were used to illustrate the existing situation and problems for the absence of BRTS in the study area. Some of these photographs have been collected directly from field survey and some other from daily newspapers as well as from internet websites to gather information about. In addition, to get the data of passenger boarding frequency, passenger volume was surveyed by observation in three peak hours (8.00 am-9.00 am, 9.00 am-10.00 am, 5.00 pm-6.00 pm).

4.2.3 QUESTIONNAIRE SURVEY

A structured both end questionnaires was designed to explore the public transport users' opinion for BRTS at study area. Passenger opinions for Ibus facilities from a representative sample was surveyed which carry out the data of passenger journeys by different public transportation facilities, number of journey in a day, passengers' problems facing during picking and dropping etc. The boarding passengers were surveyed by random sampling, with a sample size of about 100, twenty from each stop. To get the highest response from the respondent off peak hour has been chosen because study shows that response rate is 60% during off peak period.

4.2.4 TRAFFIC VOLUME SURVEY

According to STP,2005 80% of the daily traffic moved in the 16 hour period from 6:00 am to 10:00 pm, and 48% moved in the 8 hour period between 8:00 am and 4:00 pm. A reconnaissance survey was made in the study area to identify the peak hour for traffic volume study. 15 minutes' traffic volume was counted in the selected bus stop from 9.00 am to 8.00 pm. From the reconnaissance survey, it was found that traffic volume is mostly higher at the period of 9:00 am-11:00 pm and 5:00-8:00 pm. For the final traffic volume survey classified traffic volume counts was done in two days (a weekday and a weekend) in three peak hours (9:00 am -10:00 am, 1:00 am -3:00 am, 5:00 pm -8:00 pm) which is very commonly assumed, considering office and Universities opening and closing times in the morning and afternoon respectively. Data collected from the field survey through the manual counting method. One-hour traffic volumes were count considering all directional flow. Two persons counted the vehicles in which one person counted the volume of Car/ Tempo/ Pickup/ Cycle and Motorcycle and the other person counted the volume of large bus, Mini bus, Auto Rickshaw, Tempo/Human Hauler. Collected data was compiled and processed by Microsoft Excel for peak period bus volume and total traffic volume analysis.

Fig.1: Measuring road width at Vijay Nagar

4.2 BASIC FEATURES ABOUT ROADS:

Name of road:MR-10 Road Corridor

Total length of road: 8.0 km

No. of signalized intersections: 12 no.

No. of Rotary intersections: 03

No. of lane on Road: 06

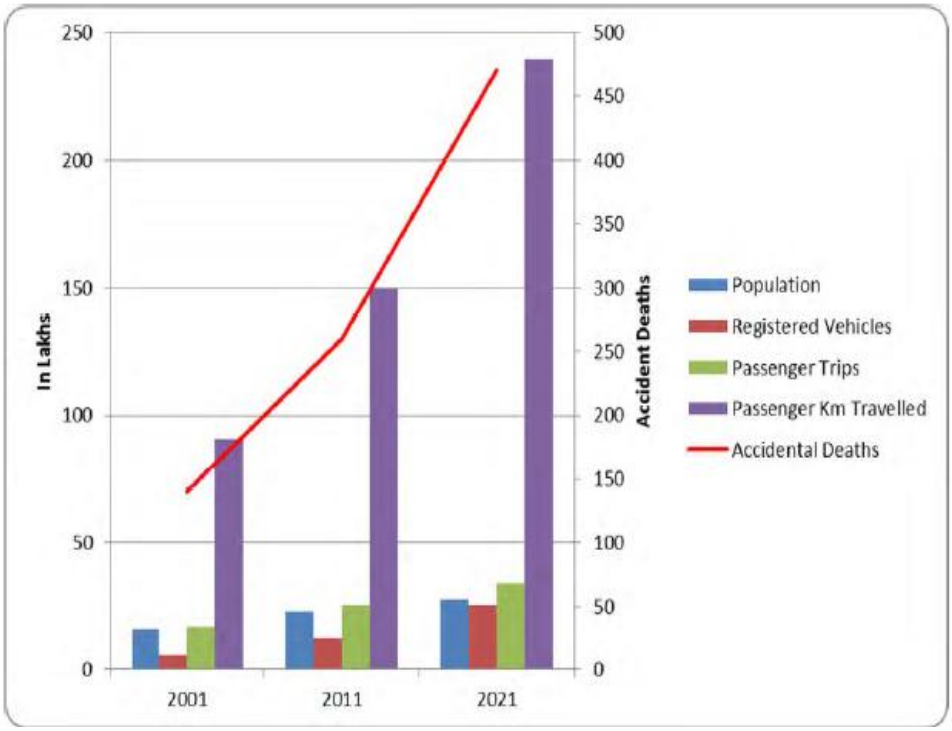
Type of traffic: Mixes Traffic

MR10 Road corridor from Vijay Nagar square to Aurobindo college is 8 km long. It consist of 2 lane road from Vijay Nagar to Chandra Gupta Maurya square and 3 lane road from Chandra Gupta Maurya square to Lavkush square (i.e. express way) then again 2 lane road upto Aurobindo college. There are 12 intersections on this route and in them 7 intersections are important to consider for traffic survey and passengers survey. These are Vijay Nagar square, Sayaji square, Bapat square, Hira Nagar square, Chandra Gupta Maurya square, Lavkush square and Aurobindo hospital. These also include 3 rotary intersections at Vijay Nagar square, Sayaji square and Chandra Gupta Maurya square. This route also consist of service road on both side with greenery along the road and a wide divider between two ways is also provided.

Traffic on this road is Mix Traffic flow. Vehicles are found on the corridor are cars, taxis, two wheelers, auto rickshaws, bus, minibus, trucks, cycle etc. Analysis is carried out for the traffic flow characteristics, vehicular traffic composition of all modes types, peak hour and off-peak hours' traffic, PCUs, etc.

4.3 ACCIDENTAL SURVEY

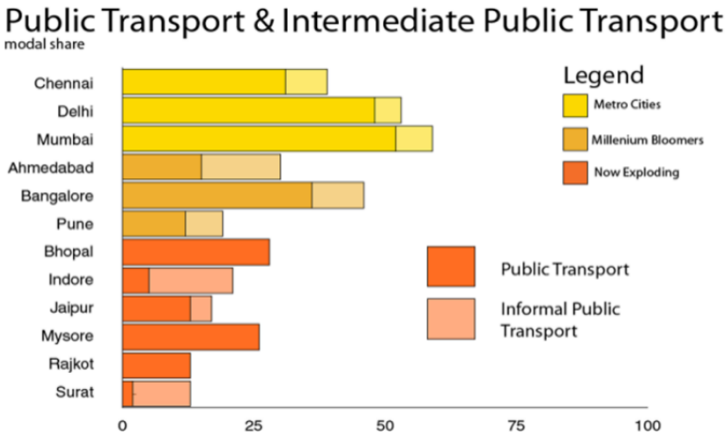
Accident data over the past years will help to the nature and extent of hazards inherent in the present system and the need to improve the situation. The usefulness of an accurate and comprehensive system of collection and recording accident data cannot be emphasized over accident data serve to identify the basic causes of accidents and to suggest means for overcoming the deficiencies that lead to such accident.



Graph 1: Growth of population and accidental deaths

5. METROPOLITAN TRANSPORT SCENARIO

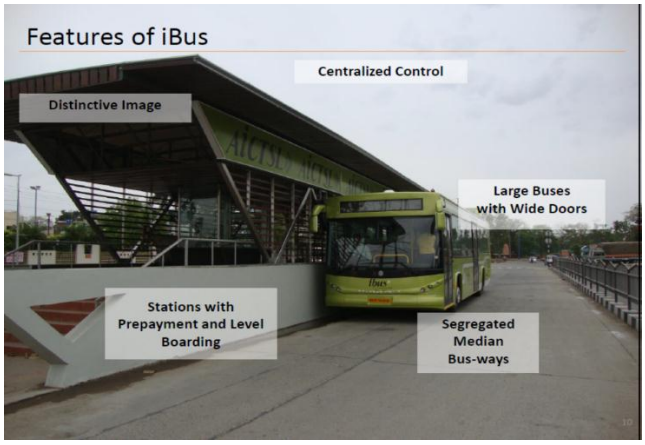
India is the second most populous country in the world and home to about 35 cities with populations of more than 1 million. India has had favourable rapid economic growth for more than a decade now. Increased income has paved the way for rapidly increasing levels of motor vehicle ownership and use, particularly in city areas. The emerging traffic situation has resulted in alarming levels of congestion, air pollution, noise, and traffic danger. Or most segments of the population, mobility and accessibility have declined with time. Although the four mega-cities (Delhi, Mumbai, Kolkata and Chennai) have rail-based mass transit routes, the limited coverage of systems in these cities and generally unorganized, poor-quality, inadequate bus services (similar to other Indian cities) have resulted in an improper public transport supply in Indian cities. Also, apart from Delhi, no significant efforts have been made recently to improve bus travel, which accounts for over 90 percent of all public transport use in India.



Graph 2: Modal share of public transport and intermediate public transport.

6. EXISTING FACILITIES

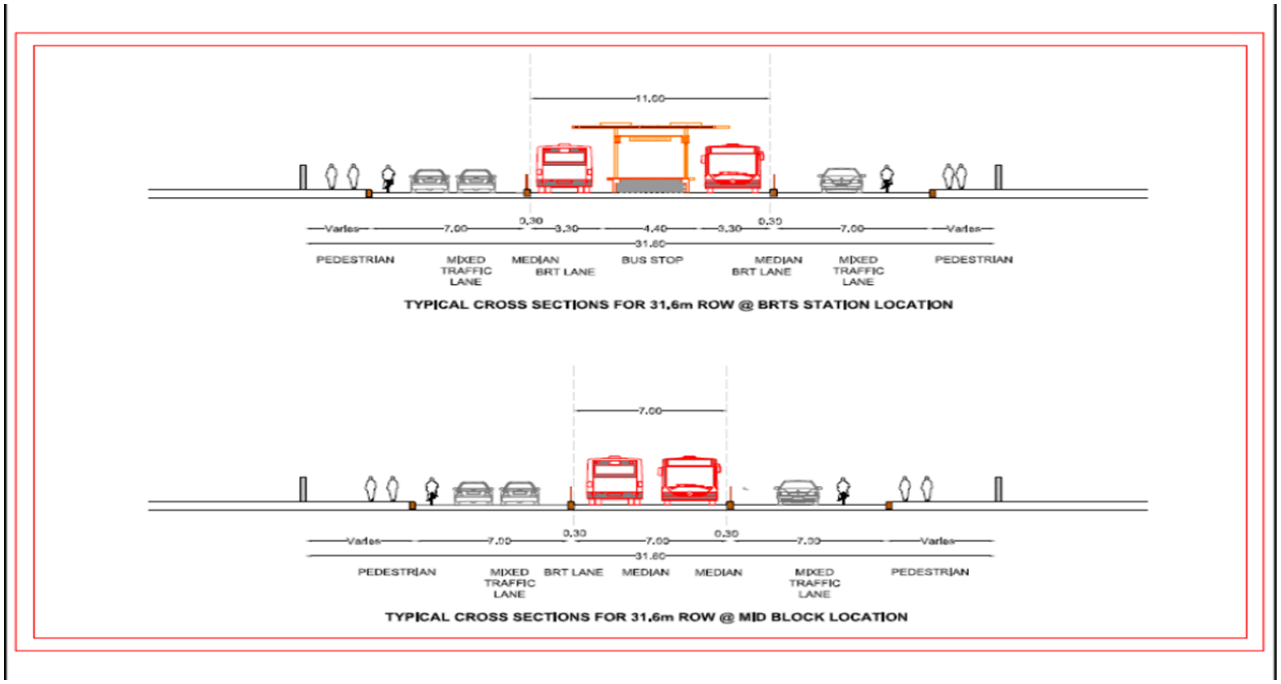
In this chapter, study area was detailed out to get the thorough idea of it. At first the location of the study area were identified to initiate the study. In term of field survey, geometric features were surveyed eventually to find out the capacity of the road and adequacy of the Right of Way (ROW) width. To observe and explore the actual operational condition of the study area lots of photographs were taken and analysed.



6.1 GENERAL DESCRIPTION OF THE STUDY AREA

The selected route from Vijay Nagar square to Aurobindo college is known as MR10 Road. MR-10 road corridor has twelve intersections between Vijay Nagar square to Aurobindo college. The traffic growth on this road is increasing rapidly day by day because of development of new colony and township along corridor. With direct connectivity of MR-10 road with Super corridor and Ujjain-Sanwer Road the traffic is expected to increase more. In future with the growth of Information Technology sector in the city i.e. Multinational companies like TCS & Infosys will start their center near super corridor and hence the traffic growth will increase enormously in the city at this section.

6.2 TYPICAL CROSS SECTION OF WAY



7. CONCLUSIONS

- The purpose can be achieved by providing ibus track at center of existing road (same as current BRTS track in AB road) or without much disturbance and construction purpose can be fulfilled by dedicating one lane out of 3 to BRTS.
- Mass transport enhance the quality of traffic as well provide safe, easy and comfortable means of transportation by using BRTS.
- Provide easy and smooth path way to emergency vehicles such as VIP vehicles, Institutional vehicles,Ambulance by connecting to medical hubs (Aurobindo to MY hospitals) without disturbing whole traffic flow.
- Modern techniques of power transmission saves the unwanted acquisition of land by providing pole type or underground network .(if these towers of transformer modernize can reduce the length of divider road can be expanded for the purpose of BRTS)
- On the basis of study the width of MR-10 Bridge is to be increased by 8m (3.5m plus 0.5m footpath on each lane).
- Time saving and Accident cost is reduced by extending the BRTS.
- In this corridor the Smart Card for the passenger is be introduced to decrease the unnecessary travel time by this process the congestion on the ticket counter will be decrease.
- On this route the 7 Bus stop will be provided for the two way traffic.
- 14 i-bus are required to run along the route, continuously throughout the day.

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