International Journal of Research in Engineering, Science and Management
Volume-1, Issue-5, May 2018
www.ijresm.com

Increasing Efficiency of BRTS from Nigdi to Dapodi

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***Abstract*—The paper aims at discussing the problems incorporated in the BRTS system from Nigdi to Dapodi and formulation of a methodology of solution for the corridors in the context of present challenges like increasing traffic congestion and fatal accidents, lack of road and transport infrastructure for the BRTS. Due to this challenges faced by the system the BRTS system was forcefully shut down in this corridor. The present methodology combines both, existing travel demand estimate and feasibility analysis in terms of traffic and road infrastructure characteristics for selection and phasing of BRT corridors. The paper aims at presenting a solution for the corridors from Nigdi to Dapodi to curb the problems of traffic congestion, smooth flow of traffic, preventing mishaps. It gives details of the surveys conducted by us and information based on environmental changes and methodology suggested to deal with the challenges. Incorporation of feasibility constraints both for selection and phasing of BRT corridors would enable planners and decision makers to make more informed decisions about implementing BRTS in this corridor as well as other Indian cities which face the same challenges.**

Index Terms—BRTS

I. Introduction

Bus Rapid Transit System (BRTS) takes part of its name from "Rapid Transit", which describes a high-capacity transport system with its own right-of-way, implemented using buses through infrastructural and scheduling 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. The Bus Rapid Transit system is expected to revolutionize public transport with new buses, special lanes and new routes, all at a low cost. Bus Rapid Transit System, or 'High Capacity Bus System' as it is commonly referred to, is a flexible mass-transit mode that has the advantage of being the most economical amongst the mass-transit options.

Pimpri Chinchwad is one of the most vibrant industrial and urban settlements in Maharashtra. Its developed industrial sector, proximity to Pune and the growing IT sector draws a large group of people and businesses to settle in the city, temporarily or permanently. This creates a growing demand for urban infrastructure, especially for urban transport infrastructure and public transport. Pimpri Chinchwad Municipal Corporation (PCMC) has undertaken an exercise of identifying the service need for urban transport and to satisfy the identified needs through a well-designed and efficient network of Bus based Rapid Transit System (BRTS). As part of this exercise, PCMC has profiled the current transportation network and patterns in the city and has projected them for the future. Based on these, a Compressive Mobility Plan has been prepared, identifying the need for Urban Transport solutions along various corridors of the city A Bus – based Rapid Transit System (BRTS) has been chosen as the solution to the public transport service needs of PCMC. For proposed BRTS PCMC wants to take up two routes for immediate implementation are: 1. Kalewadi to Dehu-Alandi road, and 2. Nashik Phata to Wakad.

II. Needs

Central business districts (CBDs) have continued to prosper and grow in ways that require more transport capacity and improved access. Given the cost and environmental impacts associated with parking and road construction and the traditional urban form of most CBDs, improved and expanded public transport emerges as an important alternative for providing that capacity. In addition, many suburban cities exceed the aggregate employment base of many urban city CBDs but do not currently have the focus and density to make rail-based rapid transit a cost effective investment.

BRTS can be the most cost-effective means of serving a broad variety of urban and suburban environments. BRTS vehicles, whether they are driver-steered or electronically guided, can operate on streets, in freeway medians, on railroad rights-of way, on aerial structures, and underground. BRTS systems can also provide a broad array of express, limited-stop, and local all stop services on a single facility without complex signal and guide-way switching systems.

BRTS can provide quality performance with sufficient transport capacity. For example, the Ottawa transit way system's link to the CBD carries more people in the peak hour than most LRT segment.

III. Major Elements of Bus Rapid Transit

Running ways: Running ways drive travel speeds, reliability and identity. Options range from general traffic lanes to fully grade separated BRT transit ways.

Stations: Stations, as the entry point to the system, are the single most important customer interface, affecting accessibility, reliability, comfort, safety and security, as well as dwell times, and system image. BRT station options vary from simple stops with basic shelter to complex intermodal terminals with many amenities.

Vehicle: BRTS system can utilized a wide range of vehicles, from standard buses to specialized vehicles. Options vary in term of size, propulsion system, design, internal configuration, and horizontal/longitudinal control, all of which impact system performance, capacity and service quality.

A. Objective

- Increasing efficiency of the BRTS corridor.
- Saving in travel time on the exclusive travel ways the person minutes saved is more than the person minutes lost by people in automobiles, which means significant saving in travel time. Exclusive travel ways reduce travel times in general about 1.5 to 2 minutes per mile (Hobart et al, 2004). Actual time savings are greatest when the previous speeds were the slowest.
- Reduced congestion has long been recognized as an environmental problem. Other than causing delay, it causes noise and fumes and increases health risks to road users and residents. Cost estimates for HCBS are significantly less than the cost of grade separators, provided to reduce congestion.
- Increased safety by creating segregated bicycle lanes and re designing intersections, conflicts between motorized traffic and bicyclists can be reduced leading to a sharp decrease in the number of accidents and fatalities for bicyclists and motorized two-wheelers.
- Increased capacity an exclusive bus lane carries significantly more people than an adjoining general traffic lane during the peak travel periods. The number of bus riders in an exclusive bus lane exceeds the number of automobile occupants using adjacent lanes. Thus exclusive travel ways result in to increased capacity. If a separate segregated lane is constructed for BRTS and bicycles, the curbside lane, which is currently used by bicyclists, becomes available to motorized traffic and buses. This relatively small investment in bicycle lanes can increase the road space for motorized traffic by 50% on three lane roads.

B. Methodology

Problem study: In Pimpri Chinchwad the BRT Corridor from Dapodi to Nigdi does not work efficiently as the grade separators of the adjacent highway & the BRT lanes coincide. As a result there is always a chance for the vehicles exiting or entering the adjacent highway through grade separator to cause accidents/collisions with the buses causing a havoc. Due to this problem the BRT Corridor from Dapodi to Nigdi does not work.

Literature review: Study and refer the various research papers obtained from Professors and Scholars of high profile colleges and analysis of the data obtained from them.

Analysis of various data obtained from surveys: Analyze the various data obtained from the surveys conducted above and present them in a graphical representation.

Preparation of model with integrated solution: Prepare a 3D model with the given solution for the problem.
Result obtain from given solution: Provide a theoretical as well as 3D model of the solution to overcome the above BRT problem.

IV. Solution of the Problem

- The solution of above problem is providing an OPEN CUT at the junctions where grade separator is obstructing the way of BRT system.
- And where the underpass is obstructing, provide an OVERPASS BRIDGE for an undisturbed way for the BRT system.

V. BRTS System Benefits

Increased Accessibility: BRTS being a flexible system can run on the street across the street, over the street or on canal banks. Although it serves communities best when built on surface, BRTS can be run on elevated structures or in tunnels if necessary. Stations and right-of-way are compact and efficient.

Safety and Security: BRTS will be a safe mode of public transportation. Passengers traveling by BRTS are very safe and neighborhoods through which the system passes are also much safer. A single bus will remove about 50 cars from the road and scientific signal systems will make the neighborhoods safer for local traffic and pedestrians. Customer perceptions of "personal safety" or security reveal that customers perceive BRT systems to be safer than the rest of the transit system.

Right-of-way: The main feature of a BRT system is having dedicated bus lanes which operate separate from all other traffic modes.

Comprehensive coverage: In addition to using dedicated bus lanes, BRTs can also take advantage of existing roadways in cities that already have a comprehensive road network for private automobiles. Service can be made more time efficient and reliable than a standard bus system by taking advantage of bus priority methods.

Bus priority at Intersections /Signals: Preferential treatment of buses at intersections reduces delay to buses to a great extent. Intersection priority can be particularly helpful when implemented in conjunction with bus lanes or streets.

VI. Negative Impacts

On locations where the existing carriageway is too narrow, due to many reasons including encroachments to allow construction of new corridor and consequent widening, construction of stations and depots, additional land acquisition is unavoidable. There are few stretches along identified corridors where existing carriageway is just insufficient for the system to be built, thereby, necessitating clearance of structures

VII. Conclusion

From the surveys carried out by us and the research and study of the challenges faced by the BRTS system from the corridor Nigdi to Dapodi we have arrived at the following conclusions and rather solutions in order to overcome the challenges faced by the BRT system keeping in mind the traffic factor, ecological factor, economic factor as well as keeping in mind the population factor of the area.

Following are the solutions provided by us in order to curb the problems:

1) Underpass: An underpass can be provided in the emerging and diverging lanes of the corridor. The underpass can be kept as a BRTS route so that the BRT can travel through the lanes without any obstruction .Thereby preventing traffic congestion leading to fast transition of traffic and preventing mishaps and accidents thereby preventing any fatal injuries or deaths. The underpass can lead to smooth flow of BRT thereby proving the main purpose of the system which is rapid transits of the public.

2) Overpass: In some corridors where tunnels are provided to switch the roads/lanes, the BRT route has been provided parallel to the tunnels which leads to improper traffic flow, accidents, thereby risking the lives of public. In order to solve these problems at the tunnel corridors we suggest to continue the BRT route along the overpass above the tunnel. This won't make an intersection between the switching lanes and the BRT route. Thereby providing a smooth flow of the BRT without any obstruction. This will also avoid any collisions of the BRT and the cars switching the lanes. Thus increasing the safety factor of the public. All this advantages may fulfill the main purpose of the BRT system.

ACKNOWLEDGMENT

I express my deepest gratitude to my project guide Prof. Dr. U.S. Patil, whose encouragement, guidance and support from the initial to the final level enabled me to develop an understanding of the subject. Besides, I would like to thank Prof. Dr. Deepa Joshi, Head of the Civil Engineering Department, DIT, and Pune for providing their invaluable advice and for providing me with an environment to complete my project successfully. I am deeply indebted to all the faculty members of Civil engineering department, DIT, Pune, for their help in making the project successful.

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