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BRTS PERFORMANCE AND EVALUATION OF VISHAKHAPATNAM

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ABSTRACT

Bus Rapid Transit System (BRTS) is an innovative, high capacity, lower cost public transport solution, which can significantly improve urban mobility. In Visakhapatnam — the movement of people and goods has largely been dependent on the motor vehicle. As a result, traffic in roads has increased a lot, road side parking in passing area, street vendors on service roads inadequate foot over bridges and existing road behavior are not suppose to handle this traffic, this is because of inappropriate planning, and improvement of these facilities have resulted in congestion and delays, which are costly and inconvenience to the commuters on the road. The speed and delay studies should be helpful, for the further alternate route. This work includes alternative routes, proposing foot over bridges, where it is needed, intersection models and traffic behavior in BRTS corridor.

KEYWORDS: Spot Speed Studies, Traffic Volume Studies, Fly Over Inter Section, Foot Over Bridge Design & Sketch Up

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Original Article

INTRODUCTION

The government of India has launched a major programme, viz. Jawaharlal Nehru National Urban renewal mission (JNNURM), for promoting reforms and investments for selected 67 cities. It aims to encourage cities, to initiate steps to bring about improvement in the existing service levels, in a financially sustainable manner. The JNNURM consists of two sub-missions- the Urban Infrastructure & Governance and the Basic Services to the Urban Poor. Vishakhapatnam is one of the eligible cities, under the scheme. JNNURM also aims to encourage reforms and fast track planned development in cities, are considering Projects in the field of Urban Public mass transport, in order to make cities work efficiently equitably. It is essential to create incentives and support urban reforms at the state levels; develop appropriate enabling and regulatory frameworks; enhance the creditworthiness of municipalities, and integrate the poor with the service delivery system.

The National Urban Transport Policy (NUTP), Central Government promotes investments in public transport, as well as measurements that make its use more attractive. The Central Government encourages all State capitals, as well as other cities with a population of more than one million, to start planning for high capacity public transport systems. The NUTP further states that, the central government would offer support under the NURM, for premium service infrastructure, such as improved bus stations / terminals, improved passenger information systems, use of intelligent systems for monitoring and control, restructuring of State Transport Corporations, etc.

The NUTP envisage the basic principle, in financing such public transport systems would be that, the

government should provide the infrastructure, but the users (direct and indirect beneficiaries within the city) must pay for the operating costs and the rolling stock.

Current trends in India suggest that, increasing need for urban mass transit mobility is now being felt and addressed by various cities in India, following the best practices in the world. Safe, flexible, adaptable with economically and financially feasible options of BRTS/HCBS, is increasingly embraced by Indian cities.

BRTS proposals are in various stages of appraisal and implementation (Table 1.1) in Ahmedabad, Bhopal, Delhi, Indore, Jaipur and Pune. In some of the metro cities like Delhi, Bangalore etc, BRTS has been planned to serve the medium dense corridor, with a demand upto 20,000 phpdt, supplementing the heavy metro transit routes.

Table 1.1: Planning and Implementation of BRT Systems in India

City	Population (lakh)	City Bus Fleet Bus	City Bus Fleet Minibus	Modal Split (%)	BRTS/HCBS Planning and Implementation
Delhi	140	9000		80	In addition to High capacity metro rail, LRT, monorail, IRBT proposals totaling 450km, BRTS networks of about 400km being planned in various phases
Ahmedabad	45	1400		60	A pilot corridor of 12 km for rs 880million is under construction and detailed designs of phase 1 for 46 km have been approved and are being taken up.
Pune	24	1000		20	BRTS network of about 130 km has been identified for a toal block cost estimate of about Rs. 10.164 million A pilot project has been constructed and is operational on a 12.2 km long Hadapsar. Swargate-Katraj corridor Pune was the first city India to implement a BRTS Project.
Jaipur	23	225	3500	15	A BRTS network of about 42km for implementation has been identified in 8 interconnected corridors in phase 1
Indore	18	150	13000	40	BRTS network of about 120km has been identified at a cost of Rs 8682 million. A pilot project of 11.45km is in advance stage of implementation.

Vishakhapatnam is one of the largest and fastest growing economies cities in Andhra Pradesh, and also in India, especially in transport. The transport is important for the development of a country. Growth of urban population has created serious challenges and imposed greater demand, on the resources of municipal governments in India. Bus rapid transit (BRT) is a bus-based mass transit system. It is a new technology, used to decrease the congestion of traffic, travel time, air pollution. BRT aims to combine the capacity and speed of metro, with the flexibility, lower cost and simplicity of a bus system. The Selection of a corridor is done by conducting various numbers of surveys in Vishakhapatnam, by which the BRTS can be easily implemented in it.

The different types of vehicles present in the traffic can be broadly grouped into eight different categories, as follows:

(1). Motorized two-wheelers, which include motor cycles, scooters, and mopeds(2) motorized three wheelers (MTHW), which include auto rickshaws, three wheeled motorized transit vehicles to carry a maximum of three passengers and tempos-three wheeled motorized vehicles, to carry small quantities of goods:(3) cars, including jeeps and small vans;(4) light commercial vehicles, comprising large passenger vans and small four-wheeled goods vehicles;(5) buses;(6) trucks;(7) bicycles; and (8) tricycles, which include cycle rickshaws and three-wheeled pedal-type transit vehicles, to carry a maximum of two passengers and three-wheeled pedal- type vehicles are also prevalent on Indian roads.

NEED FOR THE STUDY

Problem Statement

Under the heterogeneous traffic-flow conditions, prevailing on Vishakhapatnam roads, the buses being relatively larger vehicles find it difficult to maneuver through the mixed traffic and are subjected to frequent acceleration, and deceleration leading to lower speed and discomfort to both driver and passenger. This also result in enormous delay and uncertainty, to bus passenger and consequently the level of service of buses gets reduced, considerably making buses a less attractive mode of transport. Hence, there is an urgent need to study the problem comprehensively and find ways and means to enhance the level of service of bus transit. The road traffic in Indian cities has grown at a very steep rate, in the recent past, making the available transport infrastructure inadequate. As augmentation of urban transport infrastructure is expensive, there is a need for finding alternative solution to the problem. One way is to device methods, for optimal utilization of available infrastructure road space, in such a way that, the carrying capacity of the road way, in terms of number of persons transported, is enhanced. This may be achieved by providing exclusive road space for buses, which will facilitate faster movement of more people in less number of vehicles, resulting in reduced congestion and air pollution.

In our case, because of low frequency of BRTS, the unoccupied roadway of BRTS, largely affect the other traffic; the level of service of other vehicle speed gets reduced considerably. At some places or at some stretch, the frequency of BRTS is very low and other vehicle running parallel to BRT are more, due to BRT lane the speed of other vehicle are interrupted.

OBJECTIVES OF THE STUDY

- To relieve the traffic congestion.
- To analyze the present traffic condition.
- To provide ridership attraction.

- To encourage people to opt for public transportation for the welfare of government.
- To study the flow characteristics of heterogeneous traffic on selected stretches.
- To identify the impact of BRTS on traffic along implemented corridor.
- To identify the impact of BRTS on traffic also on the adjacent areas.
- To identify that the BRTS is justify or not.
- To identify that other vehicle speed is affected or not due to BRTS corridor.

STUDY AREA

The Vishakhapatnam is a huge developed city. It is the financial capital of Andhra Pradesh state. This city Occupies 11,161 square kilometers area. The Vishakhapatnam is famous for its natural harbour, Ship building unit, Steel plant, Oil refineries, Dolphin's Nose Hills, Ramakrishna beach & Rushikonda beach etc. It is the only city in Andhra Pradesh, containing the Industrial & IT Hub. The Vishakhapatnam city has different transport facilities, such as Airways, railways and roadways and Ship corridor. Vishakhapatnam is well connected to many other locations, in India.

The assignment consists of providing consultancy support, for implementation of BRTS for the following two identified corridors (Figure 1)

PTC CORRIDOR

Pendurthi to Dwarakanagar via NAD junction (22.60km), i.e. via Pendurrthi- Gopalapatnam- NAD-Kancharapalem-Railway Station-Dwarakanagar Bus Station

STC CORRIDOR

Pendurthi to Dwarakanagar via simhachalam (20.40 km), i.e. via vepagunta-Simhapur Colony Road-Gosala-Adivivaram-Hanumanthawaka Junction-Hanumanthawaka junction-Maddilapalem-Dwarakanagar Bus Station

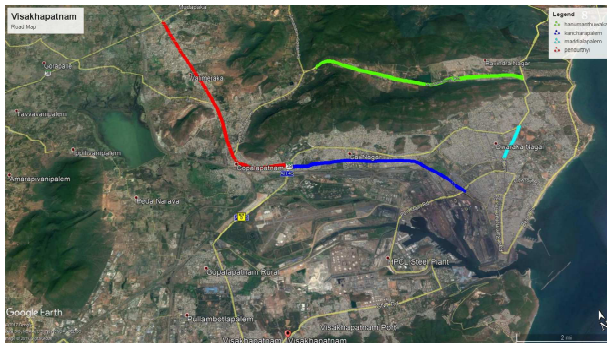

Figure 1: BRTS Corridor

Table 1: Corridor Distance

NAME	DISTANCE
NAD TO PENDURTHI	12km
NAD TO RAILWAY STATION	15km
HANUMANTHA WAKA TO SIMHACHALAM	14km
MADDILAPALAM TO RTC COMPLEX	3km

The nodes and links are created with their names and exact position. The links are edited with the link types. The bus stops, which are served by busses within the planning area, have been integrated in Q-GIS. 13 bus stops in STC and 22 bus stops in PTC have been integrated, for both the corridors. The stops can be created either on nodes, or the links. The stops are created, based on its location and links connected to that stops. The name of stops and exact place of the stops can be edited, using by Q-GIS.

BRTS CORRODORS – PTC & STC

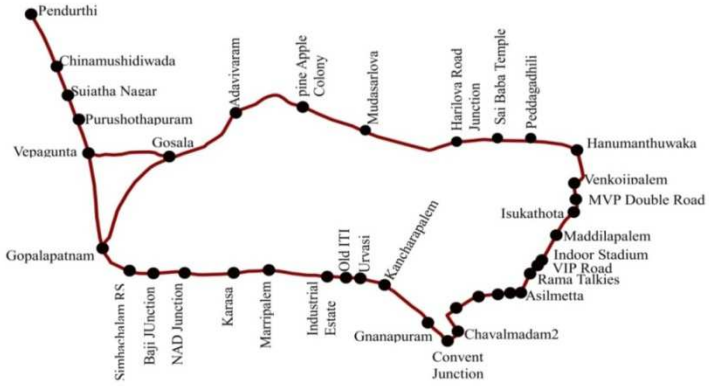

Figure 2: Stops in Planning Area

DATA COLLECTION

The main focus of the study is in the estimation of number of vehicles in queue, at signalized intersections under low volume conditions, in order to achieve this objective, data collection was carried out at two signalized intersection in Hanuman thawaka to simhachalam corridor and Pendurthi, to NAD corridor. The data were analyzed, during evening three hours peak data, in one week average data should be collected. The actual number of vehicle entering and existing was observed manually.

Traffic Volume Studies along the BRTS Road in Visakhapatnam along Hanumanthuwaka Simhachalam Corridor

Table 2: Simhachalam to Hanumanthuwaka during Peak Hour5.00PM-6.00PM (SIMHACHALAM)

Type of Vehicle	Total Count in Number
Buses	34
Cars	128
Auto	98
Bikes	196
School Buses	27
Heavy Loading Vehicles	3

Table 3: Hanumanthuwaka to Simhachalam during Peak Hour5.00PM-6.00PM (APPOLO)

Type of Vehicle	Total Count in Number
Buses	27
Cars	124
Auto	115

Table 3: Contd.,	
Bikes	396
School Buses	11
Heavy Loading Vehicles	6

Table 4: Simhachalam to Hanumanthuwaka during Peak Hour5:00PM-6.00PM (ADDIVIVARAM)

Type of Vehicle	Total Count In Number
Buses	26
Cars	98
Auto	165
Bikes	485
School Buses	4
Heavy Loading Vehicles	6

Table 5: Hanumanthuwaka to Simhachalam during Peak Hour5:00PM-6:00PM(MUDASARLOVA)

Type Of Vehicle	Total Count In Number
Buses	32
Cars	165
Auto	198
Bikes	562
School Buses	7
Heavy Loading Vehicles	2

Traffic volume studies along the BRTS road in Visakhapatnam along Pendhurthi to NAD corridor:

Table 6: Pendurthi to NAD during Peak Hour5.00PM-6.00PM(PENDURTHI)

Type of Vehicle	Total Count In Number
Buses	35
Cars	356
Auto	267
Bikes	435
School Buses	31
Heavy Loading Vehicles	16

Table 7: NAD to Pendurthi during Peak Hour5.00PM-6.00PM (GOPALPATNAM)

Type of Vehicle	Total Count In Number
Buses	27
Cars	198
Auto	276
Bikes	378
School Buses	26
Heavy Loading Vehicles	21

Table 8: Pendurthi to NAD during Peak Hour 5.00PM-6.00PM (NAD)

Type of Vehicle	Total Count In Number
Buses	38
Cars	364
Auto	296
Bikes	341
School Buses	21
Heavy Loading Vehicles	8

Table 9: NAD to Pendurhi during Peak Hour 5.00PM-6.00PM (BAJJI JUNCTION)

Type of Vehicle	Total Count In Number
Buses	31
Cars	268
Auto	312
Bikes	297
School Buses	19
Heavy Loading Vehicles	11

Table 10: Average Spot Speed Studies 20m Distance @ Vishakhapatnam

TIME	BUSES	CARS	BIKES	AUTOS
4.00-4.30	10	16	5	9
4.30-5.00	7	8	7	11
5.00-5.30	16	11	5	16
5.30-6.00	14	10	6	14
6.00-6.30	17	10	3	17
6.30-7.00	15	10	5	15
7.00-7.30	12	13	6	12
7.30-8.00	12	12	5	12
8.00-8.30	11	10	7	11
8.30-9.00	09	9	5	09
9.00-9.30	09	9	6	09

Table 11: Journey Speeds on PTC Corridor

NODE	DISTANCE (km)	MORNING PEAK (km/h)	EVENING PEAK (km/h)
Asilmeta –Dwaraka Nager	0.268	39.68	34.72
Dwaraka Nager-Sangam Sarath	0.294	55.55	27.77
Sangam Sarath-Dondaparthi	0.473	34.72	23.14
Dondaparthi-gnapuram	0.632	39.68	25.25
Gnapuram Railway Station-Kancharapalem	1.593	32.67	0.86
Kancharapalem-Urvasi	0.771	37.03	27.77
Uravasi-Old ITI	0.418	46.29	34.72
Old ITI-Industrial Estate	0.365	39.68	42.73

Table 11: Contd.,			
Industrial Estate-104 Area	0.751	50.50	39.68
104 Area Marripalem Railway Station	0.657	39.68	61.72
Marripalem Railway Station –Karasa	0.967	34.72	50.50
Karasa-NAD	0.813	46.29	34.72
NAD-Baji Jn	0.745	55.55	39.68
Baji Jn-Gopalapatnam RS	0.814	50.52	32.67
Gopalapatnam RS-Gopal Patnam PP	0.716	55.55	37.03
Gopal Patnam PP-Naidu Thota	0.588	42.73	46.29
Naidu-Thota-Vepa gunta	0.98	55.55	50.50
Vepagunta-Purushothama Puram	1.589	61.72	37.03
Purushothama Puram- Sujatha Nager	1.098	92.59	79.36
Sujatha Nager-China Mushiriwada	0.686	79.36	61.72
China Mushiriwada-Pendurthi Junior college	0.594	61.72	50.50
Pendurthi Junior College-Pendurthi	1.289	55.55	42.73
Pendurthi-BRTS Terminal Point	0.275	69.44	61.72

REASON FOR HEAVY TRAFFIC FLOW ALONG MADDILAPALEM AND RTC COMPLEX

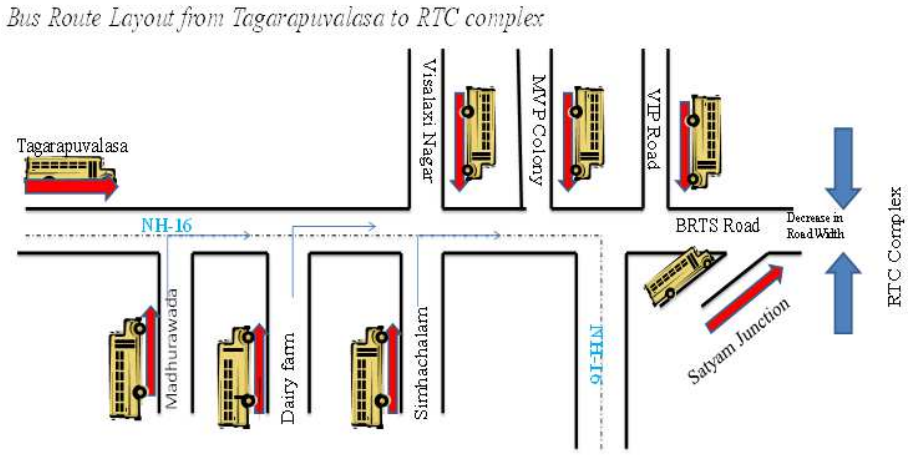

Figure 3: Inter Section Design in Hanumanthawaka Corridor

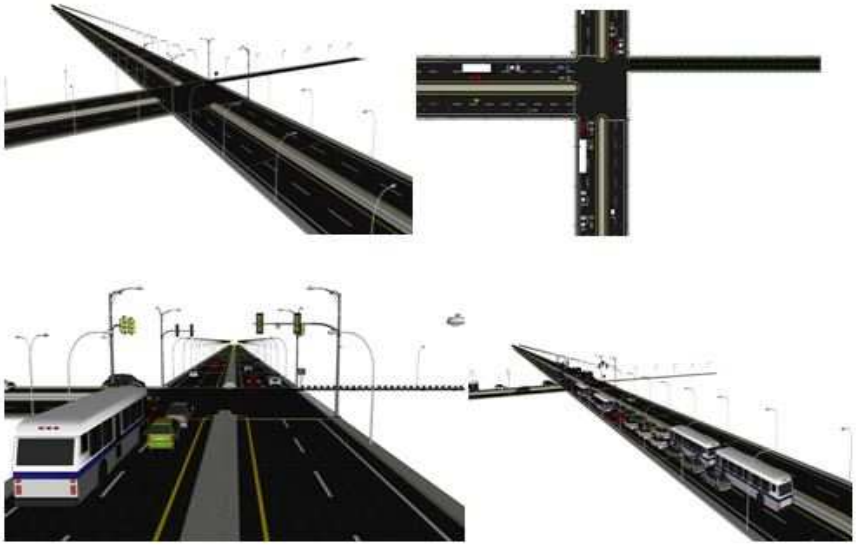

Figure 4: Road Network System in Hanumanth Waka Corridor

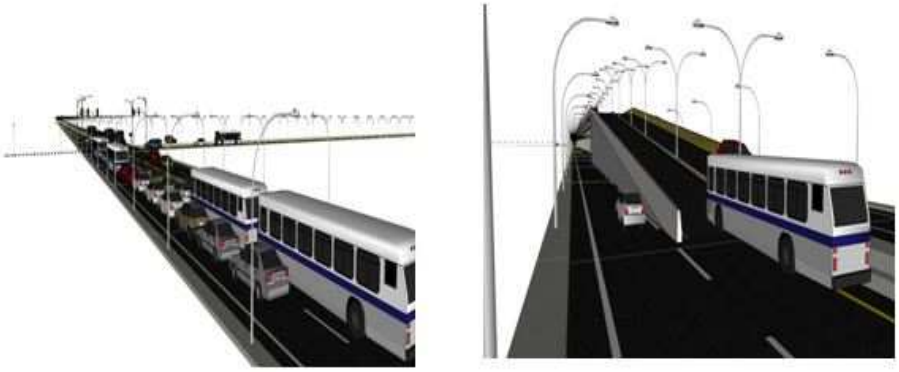

Figure 5: Road Network Systen in Hanumanth Waka Corridor

Figure 6: Sectional View of Flyover Design

CONCLUSIONS AND RECOMMENDATIONS

BRTS turns out to be a fruitful method, for taking care of the expanding travel demand and additionally supportable method of open transport successfully, since it has better administration with more noteworthy speeds and is

more financial. Additionally, it has edge over alternate means, because of different methods for transport, since it is more secure, because of the arrangement of devoted paths and utilization of further developed innovation. For estimation of transport ridership on various passages, normal inhabitance and recurrence of transports were evaluated, in light of test study information. Be that as it may, for detail outline, broad studies ought to be directed to get more exact ridership gauges for these courses. The present system joins both existing travel request gauge and plausibility investigation, as far as activity and street foundation attributes, for determination and staging of BRT halls. Consolidation of plausibility limitations both for determination and staging of BRT hallways, would empower organizers and chiefs, to settle on more educated choices about executing BRTS, in Indian urban communities.

- An important advantage of BRTS is its flexibility. This approach lends itself to incremental learning of the problem, and eliminating mistakes as the development proceeds. The relatively low implementation costs also don't leave taxpayers, tied to one particular technology or solution.
- Proper attention needs to be given to pedestrian approach, crossing and circulation in bus stations. Continued planning of BRT stations and configurations, should minimize difficulties of pedestrian circulation and passenger transfer. This implies that, stations should be as close to intersections as possible. Transit stations should be located in the heart of their target service areas.
- The commuters prefer to board/alight at intersections. Thus, creating informal bus stops, which cause hazardous Traffic conditions, it is advisable to plan the facilities, as per the commuters' requirements
- A dedicated lane for the buses should not be subjected to repeated punctures, into the facilities existing on the sides, such as offices and colonies the design provides, for adequate pedestrian safety for crossing the roads.
- The signal system should be resorted to at the junctions, to minimize the merging/ weaving of the traffic.
- Traffic can be minimizes by providing the grade separations, at the busy intersection in the city like Hanumanthuwaka, NAD Junction and Maddilapalem, by this traffic issues can be reduced.

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