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Feasibility Studies and Performance Evaluation of BRTS in Rajahmundry and Kakinada Corridor

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Abstract: ***This paper presents the design of guide way for BRTS. There is some debate about the best type of guide way for BRTS. Bus Rapid Transit System (BRTS) is a high user capacity transport system which delivers very fast, reliable, comfort and cost effective mode of movement for the customers. Since BRTS run in their exclusive lanes, there are very less chances of congestion and accidents. Even due to application of green technologies, air and noise pollution are very less. BRTS has proper provisions for right of ways, easy boarding and alighting facilities for passengers. Moreover with the use of artificial intelligence BRTS stands out quite better than other public transport systems. The first BRTS was implemented in Curitiba, Brazil in the name of Rede Integrada de Transporte in 1974. This service inspired many services around the world. As of November 2019, about 45 million passengers use BRTS every day. Government of India has emphasized on creating SMART cities. In this regard, BRTS will definitely ensure to achieve a good smart city in terms of public transportation system. With increasing population and growing demand for speedy intercity and intra-city transportation services, BRTS will play a major role. This project examines two major cities in Andhra Pradesh; Rajahmundry and Kakinada, both the cities have been declared as a smart cities in 2018, by Govt. of India. It also tries to find out new approaches in terms of cost, quality and time of BRTS in future 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, traffic behaviour in BRTS corridor.***
Keywords: BRTS, Pollution.

I. INTRODUCTION

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 different stages of evaluation and set-up (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 passageway with a demand up to 20,000 phpdt supplementing the heavy metro transit routes.

A. Planning And Implementation Of BRTS 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

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Ahmedabad	45	1400		60	A pilot corridor of 12 km for Rs 880million is under construction and detailed proposals 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 recognized for a total block cost estimation of 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 to implement a BRTS Project in India.
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 with a cost of Rs 8682 million. A pilot project of 11.45km is in advance stage of implementation.

Table 1 BRTS Proposals in INDIA

Kakinada and Rajahmundry are the a major and fastest growing economy city in Andhra Pradesh and also in India especially in transport.

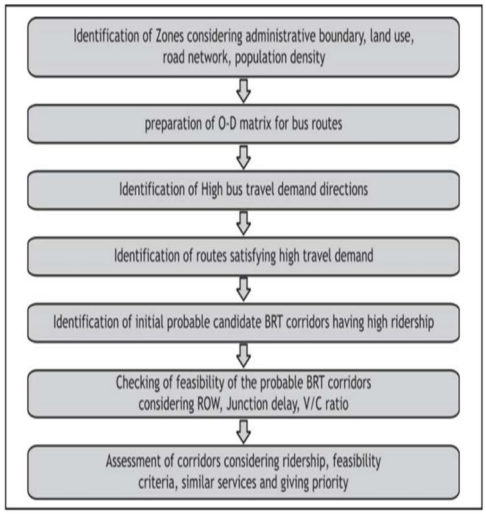
The transport is important for the development of a country. Development of urban population has made genuine difficulties and forced greater demand on the assets of municipal governments in India. Bus rapid transit system (BRTS) is a bus-based mass transit system.

It is a new technology used to decrease the congestion of traffic, travel time, air pollution. BRT aims to join the limit and speed of metro with the more feasibility, bring down cost and effortlessness of a transport framework. The Selection of a passageway is finished by directing different quantities of studies in Kakinada and Rajahmundry by which the BRTS can be effortlessly executed in it.

Various types of vehicles existing in the traffic mainly classified into eight different groups as follows:

1) Motorized two-wheelers which include motor cycles, scooters, and mopeds
2) Motorized three wheelers (MTHW), which consist of auto rickshaws three wheeled motorized transit vehicles to transmit a maximum of three passengers and tempos-three wheeled mechanical vehicles to transmit small sizes of imports:
3) Cars, including jeeps and small vans;
4) Light means of transportation containing large traveller vans and small four-wheeled goods vehicles;
5) Buses;
6) Trucks;
7) Bicycles and
8) Tricycles which contain cycle rickshaws three-wheeled pedal-type shipment vehicles can also be seen in the city roads

II. METHODOLOGY



III. TRAFFIC DATA COLLECTION

Traffic Data Collection and projections thereof of traffic volumes are basic requirements for planning of road development and management schemes. Traffic Data forms an integral part in the science of descriptive national economics and such knowledge is essential in drawing up a rational transport policy for movement of passengers and goods by both government and the private sectors.

This Guideline considers the fact that traffic flow data is important in planning of a particular section of the road network and for its subsequent maintenance. Traffic flow pattern appears to be random in distribution, as it reflects people's motivation in terms of different composition of vehicles on different types of roads under varying environmental conditions. It follows then that data being collected is a methodological statistics, because traffic flow pattern follows a random distribution. Despite such complexities, it does follow fairly and clearly defined patterns that are possible to classify and analyse. Thus, traffic data collection and analysis follows varying trends and plays an important role in the evaluation and management of road network schemes. While taking cognisance of the above, traffic flow data is needed for different purposes by different Ministries and/or Organisations in India. The major areas for which this data is required are:

1) Planning prioritisation and project initiation.
2) Project design.
3) Planning maintenance.
4) National Transport Statistics.
5) Road Safety Measures.
6) Traffic Control.

A. Traffic volume studies along the BRTS road in Kakinada and Rajahmundry along Hanumanthuwaka Simhachalam corridor

Table 2 Indrapalem to Samarlakota during Peak Hour5.00PM-6.00PM

Type Of Vehicle	Total Count In Number
Buses	34
Cars	128
Auto	98
Bikes	196
School Buses	27
HMV vehicles	3

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Table 3 Samarlakota to Indrapalem during Peak Hour 5.00PM-6.00PM

Type Of Vehicle	Total Count In Number
Buses	27
Cars	124
Auto	115
Bikes	396
School Buses	11
HMV Vehicles	6

Table 4 Samarlakota to Vetlapalem during Peak Hour5.00PM-6.00PM

Type Of Vehicle	Total Count In Number
Buses	35
Cars	134
Auto	115
Bikes	176
School Buses	31
Heavy loading Vehicles	16

Table 5 Samarlakota to Peddapuram during Peak Hour5.00PM-6.00PM

Type Of Vehicle	Total Count In Number
Buses	35
Cars	134
Auto	115
Bikes	176
School Buses	31
Heavy loading Vehicles	16

Table 6 Samarlakota to Peddapuram during Peak Hour5.00PM-6.00PM

Type Of Vehicle	Total Count In Number
Buses	27
Cars	96
Auto	91
Bikes	197
School Buses	26
Heavy loading Vehicles	21

Table 7 Railway station to Kotipalli Bus stop during Peak Hour5.00PM-6.00PM

Type Of Vehicle	Total Count In Number
Buses	31
Cars	54
Auto	143
Bikes	211
School Buses	13
Heavy loading Vehicles	1

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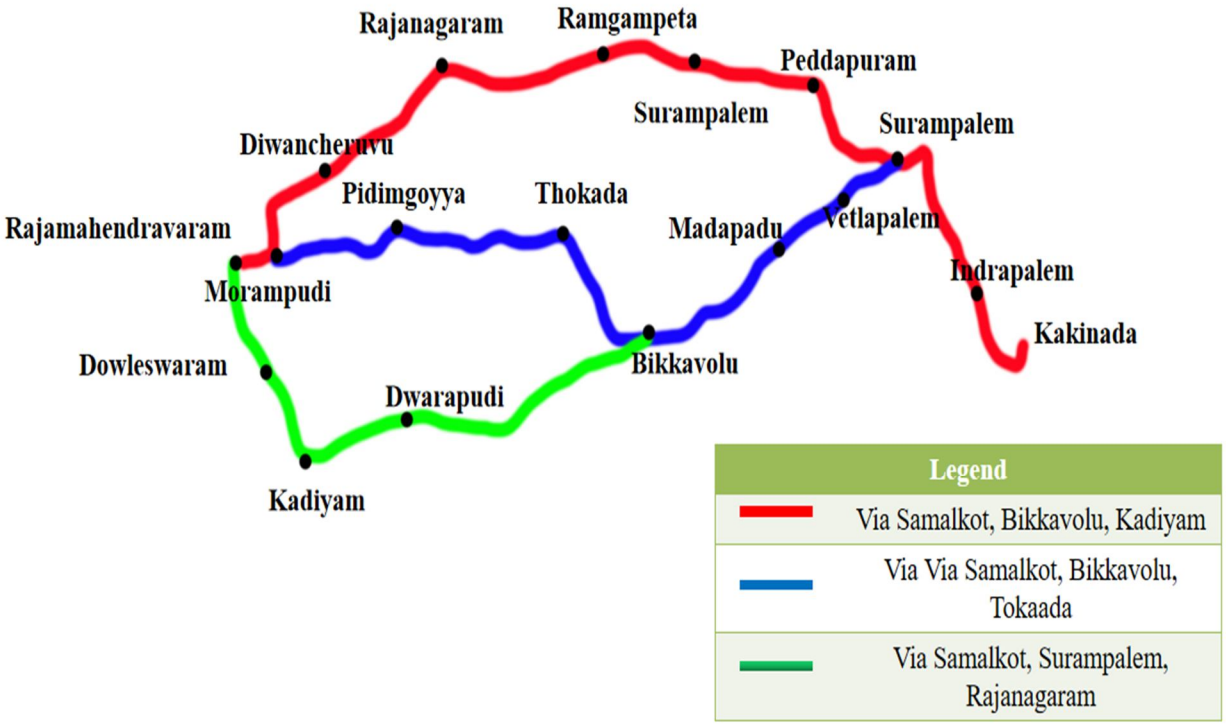
Table 8 Kotipalli Bus Stop to Railway station during Peak Hour5.00PM-6.00PM

Type Of Vehicle	Total Count In Number
Buses	27
Cars	82
Auto	180
Bikes	268
School Buses	17
Heavy loading Vehicles	2

Table 9 Average Spot Speed studies 20m Distance @ BRTS Corridor

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

IV. BRTS CORRIDORS



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A. Major Junctions on This Corridor

S.No		Junction Name	Junction Type
1	Kakinada	Bhanugudi	+
2		Kulaicheruvu	T
3		Balaji Cheruvu	+
4		Govt Hospital	Y
5		Dr. Br Ambedkar Statude	Y
6		Indrapalem	T
7		Madhavapatnam	+
8	Samarlakot	Samalkot Bridge	T
9		BusStop	+
10	Peddapuram	Peddapuram	T
11	Surampalem	Ramesampeta	T
12		Ramgampeta	T
13	Rajanagaram	NH16	T
14	Rajahmundry	Lalachervu	Y
15		Morampudi	+

V. CONCLUSIONS AND RECOMMENDATIONS

BRTS goes 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 inhabitancies 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. Flyovers reduce the risk of accidents and also pollution effect is reduced.

1) A vital favourable position of BRTS is its flexibility. This approach fits incremental learning of the issue, and disposing of mix-ups as the improvement continues. The relatively low execution costs also don't leave taxpayers tied to one specific technology or solution.

2) Appropriate consideration should be given to person on foot approach, intersection and distribution in transport stations. Continued planning of BRT stations and designs ought to limit troubles of pedestrian distribution 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.

3) 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

4) 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

5) The signal system should be resorted to at the junctions to minimize the merging/ weaving of the traffic

6) Traffic can be minimizing by providing the grade separations at the busy intersection in the city like Hanumanthuwaka, NAD Junction, Maddilapalem. by this traffic issues can be reduced.

7) Speed and delay studies should be help full for further alternative routes should be designed.Speed and delay studies should be help full for further alternative routes should be designed.

8) Time travelled can be reduced to 20% by using the BRTS

9) Fuel consuption can be reduced because minimal breaking can be done.

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10) By providing the alternative way approatch to meet the cities can be benificail to the travellers all along the three routes and minimal use of private mode of transit system.

11) Traffic can be minimizes by providing the grade separations at the busy intersection in the city like Morampudi, RJY Railway Station, Rajanagaram, Indrapalem and extension of floyover at samarlakota by this traffic issues can be reduced.

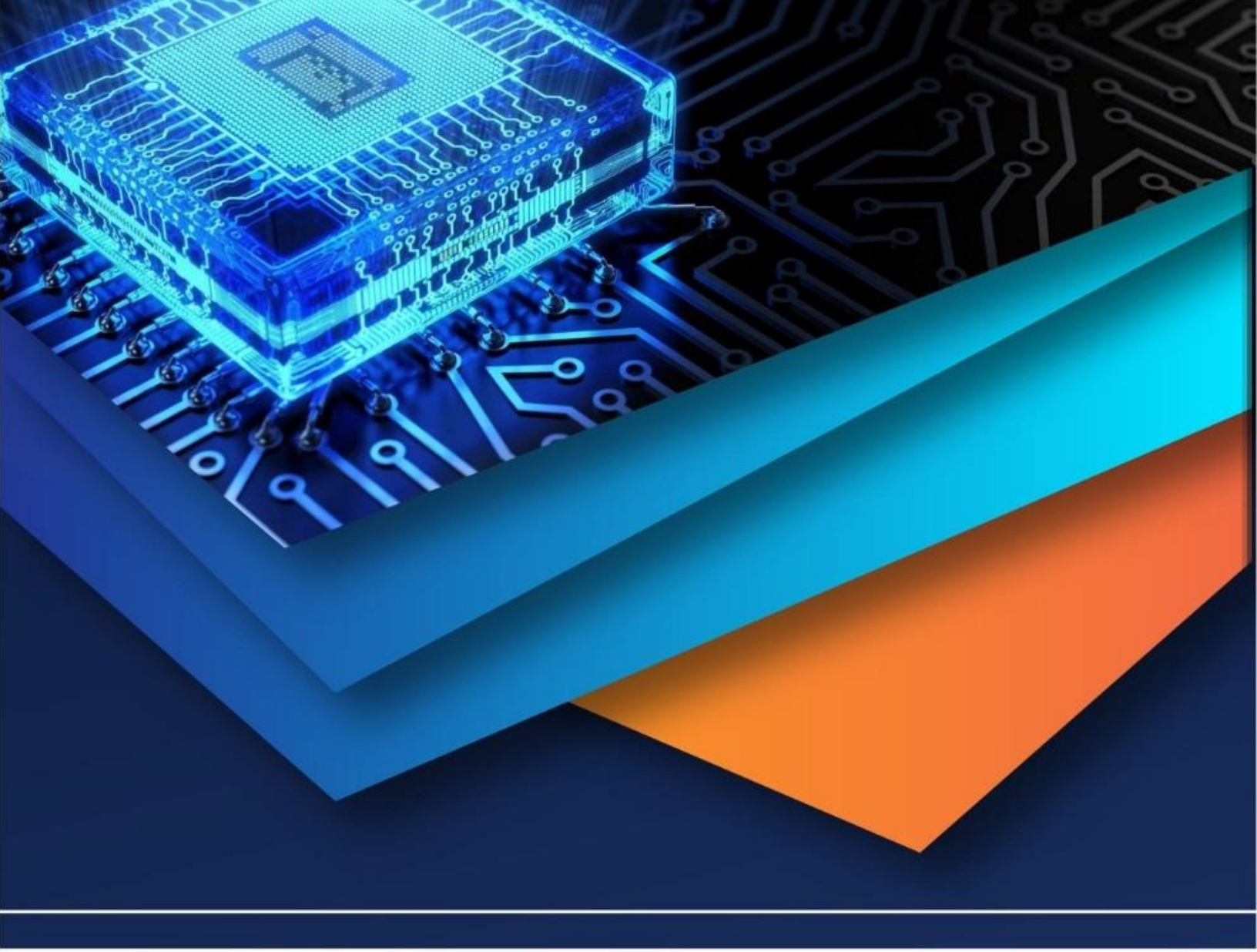
12) Proper attention needs to be given to pedestrian approach, crossing and circulation in bus stations. Continued planning of BRT stations and configurations should minimize difficulties of pedestrian circulation and passenger transfer. This implies that stations should be as close to intersections as possible. Transit stations should be located in the heart of their target service areas.

13) Flyovers play a major role in streaming the traffic control system and also through flyovers plenty of time is saved avoiding congestion.

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