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Environmental Consequences of BRTS project for Ahmadabad City

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Abstract

Urban form and urban transport system have an enormous impact on the way of people travel. Travel can be characterized trip frequency, travel distance, model choice, route choice etc. With rapid growing economies and population, there is increasing trend of expansion urban sprawl and auto mobilization. There is direct effect on the level of transport demand, travel pattern and its impact on the environment. Sustainable transport systems are those, which aim to reduce the emission, fossil fuel combustion, and the combustion of natural land. Most fundamentally, more emphasis should be on role of private automobile as the private mode of transport and shifting travel towards other sustainable modes such as public transit, cycling, walking.

This research aim to study the impact of proposed Bus Rapid Transit system during the construction phase and operation phase in the Ahmedabad city. A stated preference survey is being conducted to be study willingness of commuters from current modes to proposed Bus Rapid Transit system. Evaluating the pre and post-BRTS implementation scenario, which is possible to represent and communicate effectively the issues of environmental impact and sustainability related to transport.

1.1 Need of the Study

Ahmedabad with a population of 5.5 million (2007) has a total vehicle population of 1.5 million. With declining birth and death rate trends continuing, the city is expected grow at a moderate rate and stabilize by the year 2035 with a population of about 10 to 11 million. About 6,000 buses ply on these roads and close to 60% share is of public transport in the region. The city of Ahmedabad has seen a rapid growth in two wheeler population in the last two decades, which has also resulted in rising pollution levels in the city. Vehicular pollution generally accounts for 60-70 per cent of total pollution loads of a city. The root cause of air pollution in Ahmedabad is the two-stroke two wheelers and auto rickshaws, which contribute to the pollution load. Today, world has nearly one billion automobile – almost all in cities –likely to cross 2.5 billion by 2050. The outcome is environmental degradation, alarming increase in road fatalities, urban congestion and social inequity.

1.2 What is BRTS ?

BRTS means Bus Rapid Transit System. It incorporates most of the high-quality aspects of metro systems without the high investments. It uses available space on arterial roads of cities with dedicated bus ways. It utilizes modern technologies for optimizing flow, passenger movement, ticketing, bus scheduling, and traffic signal priority.

BRTS is designed to address the sources of delay of traditional bus service and to be an attractive service to passengers. BRTS is an incrementally enhanced transit mode, providing faster, passenger-friendly service. This is accomplished in multiple ways including improvement to the infrastructure, vehicle road use and stops/stations; utilizing cleaner, quieter and lighter vehicles; and integrating an amalgam of ITS technologies.

The goals for a BRTS system are similar to the goals of other rapid transit systems. The service must be rapid, providing reduced travel times to passengers. However, there are other BRTS service goals that can provide a meaningful rapid transit service.

The following is a generally agreed upon list of BRTS goals:

- **Shorter trip times**—Fewer stops; Faster travel; Less congestion
- **Short wait**—More frequent service; Even spacing between vehicles
- **Easy to use**—Easy and rapid embarkation and debarkation; Simple fare collection; Clear signing including indication of routing
- **Accessible**—Ease of access for physically challenged and elderly
- **Welcoming**—Comfortable vehicle interior designed for both seating and standing; Clean, affordable service (in line with other transit services)
- **Integrated**—Convenient to parking and other transportation modes including neighborhood bus service and bicycle access
- **Distinctive**—Modern, distinctive design for vehicles and stations
- **Low environmental impact**—Low-emission and low-noise transit vehicles
- **Incremental development**—Service can grow to meet rising demand and to accommodate new technologies

Impacts

- Accidents and Air Pollution
- With city-wide total integrated transport network and land use planned & with shift to BRT
- Fatal reduction: 89%
- Reduction in injuries from accidents: 75%
- Collisions reduction: 79%

- Pollutant reduction

  Sulphur Dioxide: 43%

  Nitrogen Dioxide: 18%

  Particulate matter: 12%

Travel Time

- Speeds increased to 26.7%.
- 32% reduction in average trip time for users
- Equal Opportunity Access
- Fully accessible for users with disabilities, elderly, youngsters and pregnant women
- Quality and Consistency
- Poll shows that the system is 49% very good and another 49% good affordability

1.3 EXISTING TRANSPORTATION SYSTEM – VEHICLES

1.3.1 System Components

Ahmedabad city is well connected by an expressway, several national and state highways, the broad-gauge, meter-gauge railways, and an international airport. The city transportation system is predominantly dependent on roadway systems. Vehicular growth has been rapid. The network is experiencing heavy congestion. Consequently, air pollution has become severe.

Table: 1 Statement showing yearly figure of different type of vehicles registered in R.T.O. - Ahmedabad

Sr. No.	Types of vehicles	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	1-4-2008 to 30-11-2008
1	Motor Cycle/Scooter Moped	59269	72769	88088	112323	104279	115559	104567	55933
2	Auto rickshaws/Three wheelers	782	1734	2493	2610	19198	13022	7468	4379
3	Four wheeler M/car/Jeeps & Taxis	11633	12887	14400	15728	16245	20135	23355	17090
4	Goods Vehicle	1713	2236	2578	4025	5138	6384	5623	3668
5	Others	1555	2017	1602	2296	2700	3190	4044	3171
	Total	74952	91643	109161	136982	147560	158290	145057	84241

2.1 BRTS Corridor

Ahmedabad public transit system is at a crossroads. After over 5 decades of operation, AMTS has lost its glory. Services have deteriorated and the image has taken a major beating. Financially the organization is in a severe crisis situation. The effects of this are system wide and have become visible in the fact that the city has received the dubious distinction of becoming a highly polluted city in the country. However in terms of congestion, traffic accidents and other parameters the city has still not reached a position of from where recovery is not possible. There could not be a more appropriate time to take a critical look at the significant challenges and opportunities facing public transit in the city. This table is showing corridor for BRTS routes.

Table 3.2 List of Potential Corridor

Corridor No.	Name of Corridor	Length of Corridor (Kms.)
1	Vasna to Sabarmati to Naroda to Narol	47.5
2	Vasna to Sabarmati	15
3	Naroda to Narol	18
4A	Thaltej to Kalupur	9.1
4B	Sattadhar to Kalupur	9.55
5	Ghatlodia to Vadaj	4.92
6	Sabarmati to Sarkhej Via Ashram Rd.	17.63
7	Iskon to Kalupur	11.09
8	ST to Narol to Lambha	8.44
9	ST to Jashodanagar crossroad to Hathijan	12.81
10	Kalupur to Odhav	9.49
11	Kalupur to Naroda	10.29
12	Thaltoj to Narol to Lambha (Uni Road)	17.15
13	Sarkhej to Gota	12.45
14	Paldi to ST via Jamalpur	3.25
15	Iskon to Vasana Via Nehrunagar circle	6.35
16	Sabarmati to Kalupur	8.98
17	Vadaj to Gota	5.75
18	Shivranjani to Kalupur Via Shreys, New Bridge, ST	11.57

2.2 Impact of BRTS on Environmental parameter

Table 3.3 Environmental Impact Assessment Matrix

Activities for construction of BRTS Project	**Environmental attributes**							
Pre-Construction Phase	Air	Water	Land	Flora-Fauna	Noise	Socio-economic	Material	Vegetation
Land acquisition	x	x	x	x	x	x	x	x
Cut down of trees	x	x	x	x	x	x	x	x
Alignment	x	x	x	x	x	x	x	x
Excavation	x	x	x	x	x	x	x	x
Embankment	x	x	x	x	x	x	x	x
Resettlement			x			x	x	
During - Construction Phase								
Line out & Site Mobilizing	x	x	x		x		x	
Excavation & Piling	x	x	x		x		x	
P.C.C., Pile Concreting	x	x	x		x		x	
R.C.C. Fins up to plinth beam bottom level	x	x	x					
Base plate Fabrication & Fixing	x	x	x		x		x	
Plinth Beam Concreting	x	x	x		x		x	
Back filling, Floor P.C.C. & Raft	x	x	x		x		x	
R.C.C. up to slab level	x	x	x					
SS pipe fabrication & erection	x	x	x		x		x	
Slab	x	x	x		x		x	
De-shuttering								

of slab								
Water proofing & chain mosaic	x	x	x		x		x	
Flooring	x	x	x		x		x	
Fabrication & ss wire rope fixing	x	x	x		x		x	
Electrical	x	x	x		x		x	
Signage work	x	x	x					
Seat, wood & rubber patta fixing	x	x	x		x		x	
Electrical fixtures fixing	x	x	x		x		x	
Misc.work & cleaning	x	x	x		x		x	
Occupational safety & health	x	x	x		x	x	x	
Control of traffic	x	x	x		x	x	x	
During Operation Phase								
Maintenance	x	x	x	x	x	x	x	x
Traffic	x		x		x	x		
Road safety	x	x	x		x	x	x	

2.3 Environmental and Social Impacts and Mitigation Measures

Impact	Mitigation Measures
Generation of Dust	• Sprinkling of water on: – Earth handling site, – Asphalt mixing site, – Construction site and – Temporary roads. • Dust Pollution control at stone crusher site through: – Masks for workers – Environment compliance measures at stone crushing units
Gaseous Pollution	• Vehicles and machineries will be regularly maintained to conform to the emission standards stipulated under Environment (Protection), Rules 1986. • Traffic on temporary roads will be smoothly regulated by traffic police / contractors representatives

Impact	Mitigation Measures
	• Asphalt mixing sites will be located sufficiently away from residential quarters. • Workers working in asphalt mixing and subsequent application of asphalt mix on road surface are exposed to high level of carcinogenic emissions. Such workers will be provided with masks and supervising officers will ensure that the workers use these masks
Noise	• Noise levels of machineries and construction equipment shall conform to relevant standards prescribed in Environment (Protection) Rules, 1986. • Workers will not be exposed to noise level more than that permitted for industrial premises, i.e. 90 dB (Leq) for 8 hours. Workers exposed to high noise levels will be provided with ear plugs • Timings of construction work generating noise pollution near the hospitals and residential areas shall be regulated. • Noise barriers have been proposed at 8 locations mainly Educational Institutes
Contamination from construction camps	All practical measures such as provision of septic tanks and oil interceptors will be taken to prevent any uncontrolled wastewater discharge from construction workers camps and storage areas to water bodies. The campsite will be adequately drained and connected to the nearest local drain.
Contamination from vehicle maintenance areas	Vehicle maintenance will be carried out in a confined area, away from water sources, and it will be ensured that used oil or lubricants are not disposed into watercourses.
Sanitation and water use in Construction Camps	Construction camp will be organized in a planned manner. Workers shall be provided proper sanitation facilities including toilets. Camps will have water supply facilities like tube wells or from other sources so that local water sources are not adversely affected.
Road safety issues	The construction site will be cordoned off with sign boards and additional signage will be placed to inform the public and travellers about the work in progress and safety measures to be adopted
Restriction to Access to nearby properties	Safe and convenient passage for vehicular and pedestrian access to adjacent properties and side roads will be arranged during the construction work
Hindrance to regular traffic flow on the corridor	Smooth flow of traffic by manning the temporary diversion roads will be arranged by the traffic police / contractor's representatives
Occupational Safety for workers	Contractor will arrange all safety measures for workers as per Factories Act. All workers employed for mixing asphaltic material, cement mortars, concrete etc., will be provided with protective footwear and protective goggles. For crusher workers masks will be provided.
Affected roadside amenities and cultural properties; Religions Structures – 20	Affected religious structures will be relocated. Alternative sites will be provided and appropriate enhancement will be done

3. Conclusions

- Less travel time
- Less congestion
- HCBS reduces congestion significantly at a less cost as compared to grade separator
- It's as good as grade separated
- More capacity
- Number of bus riders in exclusive bus lane exceeds number of private vehicle users in adjacent lane
- More safety
- Separate bus lanes and bicycle tracks reduces conflict and congestion which results in more safety
- Reduction in fuel consumption and pollution
- Improvement in accessibility of transport in the cities

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