

# Optimisation of Public Transportation to Link Employment

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**Abstract-** Accessibility may be defined as the frequency of the transportation system in a specific time at a specific location. In defining accessibility the land use Pattern and transportation is very useful. An assessment of transport from an accessibility approach could help in addressing issues of equity and transport disadvantage. Accessibility is strongly affected by the design of infrastructure such as public transportation routes and stops, road network, and the availability of various Land use development in a close proximity. Ahmedabad is the major metropolitan city of Gujarat state and due to rapid industry growth the need of sustainable transit facility which are connected to the all class of people and connected through urban area. The main objective is to examine whether the public transit links the residential locations of workers with activity locations in Ahmedabad City and how accessibility to activities impact transit demand.

**Index Terms-** Accessibility, Transportation System, Equity, Metropolitan city, Transit Demand.

## 1. INTRODUCTION

Rapid population increase, suburbanization, economic growth, motorization, and car dependency are common urban problems experienced by many growing cities. The situations are more severe in the developing countries. Most of their previous developments were undergone disorderly and unsatisfactorily. This resulted in terrible traffic congestion. They are mainly stem from inefficient urban structure and suburbanization, which are caused by rapid population and high economic growth. Public transportation system is the key component of sustainable transport system. The system can relieve congestion and provides efficient way of moving large number of people. Since accessibility is the ultimate goal of most

transportation activity (excepting the small amount of travel that has no desired destination), transport planning should be based on accessibility. However, conventional planning tends to evaluate transport system performance based primarily on motor vehicle travel conditions using indicators such as roadway level-of-service, traffic speeds and vehicle operating costs; other accessibility factors are often overlooked or undervalued. Even with a considerable amount of attention being paid to the role of public transportation in addressing inner-city mobility problems, there is very little evidence of the degree to which one affects the other. In other words, very few urban researchers have specifically focused on how labor participation is affected by increases in public transportation availability.

### 1.1 NEED OF STUDY

The urban transport problems in India are acute because of rapid motorization. The major challenge for urban transport managed by ULB's in India is how to improve the current urban transport situation or at least prevent it from deteriorating further. The urban transport situation in large cities in India is deteriorating. The deterioration is more prevalent in metropolitan cities where there is an excessive concentration of vehicles. Commuters in these cities are experiencing acute road congestion, rising air pollution and a high level of accident risk. Efficient and Reliable urban transport systems and its policy are crucial for India to sustain a high growth rate and alleviate poverty.

### 1.2 OBJECTIVES

- To develop accessibility values for origins & destinations to reach the Bus-stops.

- To develop accessibility values for the Network that includes both walking and travel from origin up to the destination.
- To develop the accessibility values for the bus stops.
- To develop relationship between accessibility of stops and travel demand.

## 2. STUDY AREA

The Ahmedabad city is located in the state of Gujarat, which is located in the western part of India. Ahmedabad city is seventh largest metropolis in India and largest in the state. The city is known as the commercial capital of the state and known as the textile capital of India.

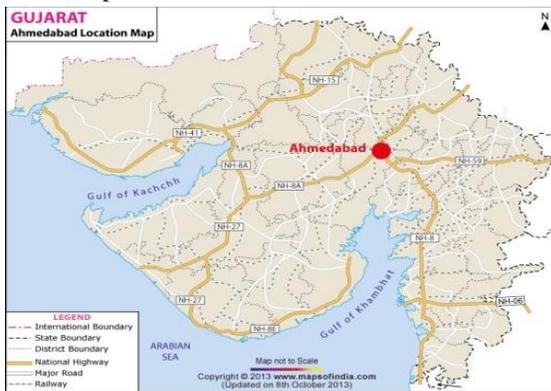


Fig -1: Location of Ahmedabad City

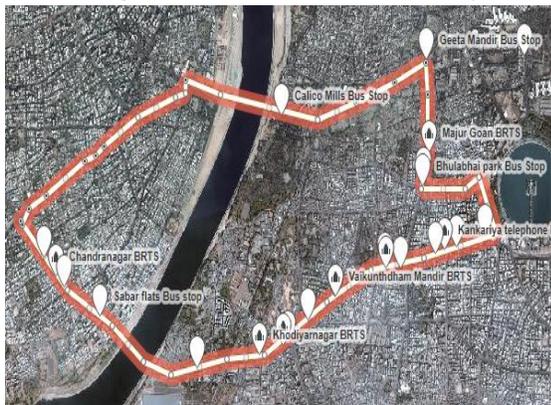


Fig -2: Study area

The study area includes the highlighted portion in the map of Ahmedabad as shown in above fig. This study area includes some of the major transport station which are used by all type of employers in Ahmedabad city to reach their work destinations. The study area having major slums land use characteristics of particular city as shown in below map.

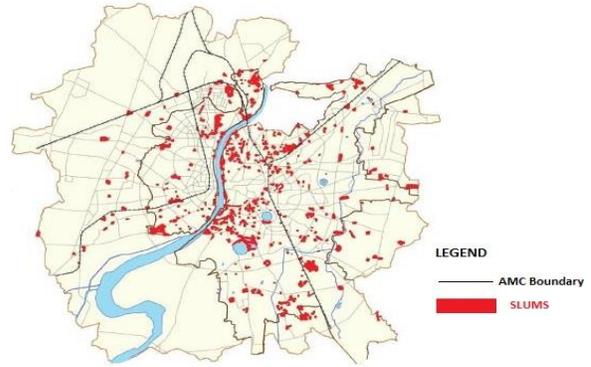


Fig -3: Slums Location in Ahmedabad City

## 3. DATA COLLECTION

- The objective is to evaluate the efficiency of transport system, which is done Through Accessibility Analysis. Accessibility is measured in terms of the total travel time required to reach the destination through the public transit network. The number of Destinations which can be reached within a give travel time is termed as Accessibility to Employment Destinations.
- The Bus-stops in Study Area are defined as Accessibility center which are created junctions at which the travel demands and Accessibility generates.

AMTS Bus-Stops	BRTS Bus-Stops
Anjali	Anjali
Dungershi nagar	Chandranagar
Sabar Flats	Danilimda
Pirana	Vaikuntham Society
Danhil Chowk	Swaminaran Collage
Danilimda	Kankaria Telephone Exchange
AMTS Bus stop	BhulabhaiPark
Peer kamal masjid	Majur Goan
Shah alam Toll naka	Geeta Mandir
Somnath Mahadev	-
Bhulabhai Park	--
Geeta Mandir	-
Municipal Chowal	-
Museum	-
Fatehnagar Bus stop	-

Origins:

The Development Plan is spatially joined to the Fishnet created of 100 m\*100 m square. The centre of all the squares is represented by a point and is saved separately as a point shape file. The Slum Locations are marked as points separately and each is represented by a unique ID. The Origins are considered as the Residential Zone in the

Development Plan and only Areas falling under AUDA is considered.

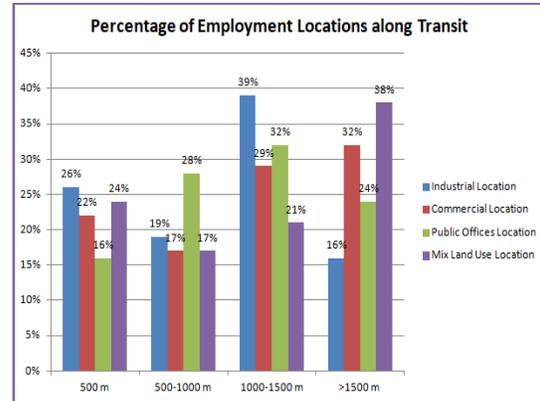
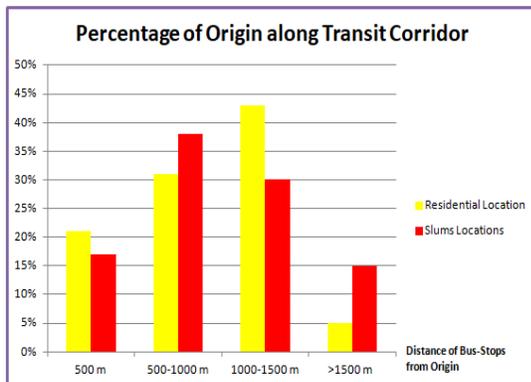
**Destinations:**

The analysis is done to see whether the origins i.e. the Residential Locations are able to reach the Destinations i.e. Work Places. Here the work places are separated from Land Use Map and stored as a separate shape file. The Commercial, Industrial and Public Places are allotted as Work Locations and thus are represented as Destinations in the Fishnet. Thus a total Land Use Destination are selected as having potential Employment Opportunities. Total location of opportunities considered for analysis are 541 in numbers each representing an area of 10,000 sq m making a total area of 5.41 sq km or 541 hectares on the ground.

**4. DATA ANALYSIS**

The analysis is done primarily to determine the accessibility values of the residential sector Locations to destinations through the transit network. This is done in four steps.

1. Accessibility of residential sites and slums at bus stops while walking.
2. Accessibility of land use destinations (LUDs), ie commercial, industrial, public junctions and mixed-use sites at bus stops while walking
3. Accessibility of residential sites and slums to destinations (i.e. Public, Industrial, Mixed Use and Junctions) by Combined Walking and Travel by the Public Transport
4. Accessibility of bus stops to LUDs and in relation to the travel request.



Accessibility to destinations is shown in the following maps in terms of total travel time taken to reach the destination using public transportation and walking. The cards show the number of origins that can reach destinations in a particular travel time. The trip times are taken as 15 minutes, 30 minutes, 45 minutes, 60 Minutes. For each travel time, origins (i.e. residential locations and slums) capable of reaching the number of the destinations are indicated on each of the maps, in which the origins reach a particular use of the soil. Destinations such as commercial, industrial, public and Mix Land Use Location.

The symbology followed in each of the cards is shown in the table below. Here, each of LUDs are divided into percentages meaning High, Good, Medium, Poor and Null Accessibility. Yes LUD zero percent is achieved in some original travel time, it has NULL accessibility. 25% LUDs mean poor, 50% LUD low, 75% average and 100% high Accessibility.

TRAVEL ACCESSIBILITY		NULL	POOR	MEDIUM	GOOD	HIGH
LOCATIONS	TOTAL NO. OF DESTINATION	0%	25%	50%	75%	100%
INDUSTRIAL	103	0	26	51	77	103
COMMERCIAL	43	0	11	22	32	43
PUBLIC	56	0	14	28	43	56
MIX LAND USE	76	0	19	38	57	76

**5. CONCLUSIONS**

One of the objectives of the study was to assess the current state of public transport; and this is evaluated in terms of accessibility to workplaces. The coverage of public transport is evaluated and it shows the scope of workplaces from residential locations in relation to total distance traveled in particular time exceeds more than one hour for most LUDs that are not desirable be-

cause there are other public transit and public transit options commute to most LUDs. The other objective was to increase transit demand at bus stops which, by regression the analysis is judged to be dependent on travel time of 15 to 45 minutes for commercial areas residential areas and slums and 15 to 30 minutes of travel for junctions and mixed land use. Thus, we see that accessibility to industrial and public areas is poor, while accessibility to commercial, mixed-use and intersections is equitable with transit modes if the journey time is about 30 minutes with an average waiting time of 10 minutes at bus stops if residents do not have to walk more than 1.5 km to get near the bus stop.

#### REFERENCES

- [1] Varameth Vichiensan “Urban Mobility and Employment Accessibility in Bangkok: Present and Future”
- [2] Parvathy Rajendran, “ACCESSIBILITY ANALYSIS TO PUBLIC TRANSPORT – A CASE STUDY OF THIRUVANANTHAPURAM CITY” December - 2013.
- [3] Thomas W. Sanchez, “The Connection Between Public Transit and Employment” November 1998
- [4] Kevin Manaugh “Who Benefits from New Transportation Infrastructure? Using Accessibility Measures to Evaluate Social Equity in Transit Provision” January 2001
- [5] Chadra Bhatt “Urban Accessibility Index” May 2000
- [6] Todd Litman “Evaluating Accessibility for Transport Planning” July 2017.
- [7] Amy Helling “The Effect of Residential Accessibility to Employment on Mens and Womens Travel”
- [8] Sumeeta Srinivasan “Regional accessibility as a criterion for sustainable mobility: A study in the National Capital Region of Delhi” February 2002