

## CHAPTER – 1 INTRODUCTION

### 1.1 Background

- 1.1.1 The historic city of Ahmedabad is amongst the major metropolitan cities in India. With the increasing opportunities for trade and commerce and as a center for higher education, the population of the city is already touching 6 million and this heavy growth continues.
- 1.1.2 The city, known as Ashapalli or Ashaval in ancient times, was founded by King Karnadeva Vaghela as Karnavati in 11th Century as capital of his kingdom. Later on Sultan Ahmed Shah of Gujarat Sultanate shifted his capital from Patan to Karnavati and renamed it as Ahmedabad in 1411 AD. A number of monuments built during his era are spread over the old city area. The walled city was also built during this era and its 12 gates are still existing though most of the wall can't be seen anymore. The city thrived as the capital of strong kingdom but later became part of the Moghul Sultanate in 1573. Shahjahan spent the prime of his life in this city and developed the present Shahi Baug area. The city was invaded by the Marathas in the year 1707 and ruled by them from 1753 AD to 1817 AD, when the city was taken over by the British.
- 1.1.3 During the British period the city became "Manchester of India" due to large scale manufacturing of textile. The first textile mill was set up in 1854 and more such mills followed soon after with rapid industrialization. However, the textile industry in the city is no more a force to reckon with, yet it is fifth largest producer of denim cloth in the world. The eastern part of the walled city is mostly inhabited by the families of mill mazdoors, who have been forced to find alternative jobs due to closure of most of the textile mills. However many chemical and pharmaceutical industries have come up around the city. Trade is still flourishing in the city as textile weaving, tie-and-dye work, zari work and intricate silk embroidery produced by this city has been famous for centuries.
- 1.1.4 Ahmedabad became capital of the newly formed Gujarat State in the year 1960 but a new capital was established at Gandhinagar in 1970. At present Ahmedabad is the district headquarter and the biggest city of the state. The High Court and many offices of the Central Government still exist at Ahmedabad. A new Division of Western Railway has recently been formed at Ahmedabad due to the increasing share of rail traffic in the area with development of private ports in Gujarat.
- 1.1.5 The city is also a tourist place and gateway to Saurashtra and Kuchchh region. The main tourist attraction of the city are Ahmed Shah's Tomb, Teen Darwaza, Bhadra Fort, Swami Narayan Temple, Geeta Mandir, Shaking

Minarets, Jama Masjid, Kankaria Lake, Rani Sipri's Mosque and Tomb, Rani Rupmati Mosque, Shahibaug Palace and Sabarmati Ashram. In addition number of festivals are celebrated with colour and gaiety to promote tourism.

- 1.1.6 The city has many educational institutes including Gujarat University. The other internationally and nationally known academic and research institutes are the Indian Institute of Management (IIM), the Physical Research Laboratory, the Institute of Plasma Research, the Space Application Centre, the School of Architecture and Centre for Environment Planning, the National Institute of Design, L.D. Institute of Technology and Nirma University.
- 1.1.7 Gandhinagar, the Capital of Gujarat, is a carefully planned city on the lines of Chandigarh. The city is divided in 30 well-planned sectors, which are generally self-contained. The core of the city is the Assembly Building (Vidhan Sabha) with administrative offices and Secretariat surrounding it. The wide roads, lined with trees are crossing at right angles to each other and have lawns on both sides. The tree cover in Gandhinagar is one of the biggest in India.
- 1.1.8 Gandhinagar is well connected with Ahmedabad through highway from the city as well as Airport. The rail connection to Ahmedabad is also available but the same is not very popular. The city has Akshardham Temple as a tourist attraction.

## **1.2 Study Area Characteristics**

### **1.2.1 Study Area**

The study area consists of Ahmedabad Urban Development Authority (AUDA) area, Ahmedabad Municipal Corporation (AMC) area and Gandhi Nagar Urban Development Authority (GUDA) area. The study area totals to 1351 sq km.

### **1.2.2 Population Growth Pattern**

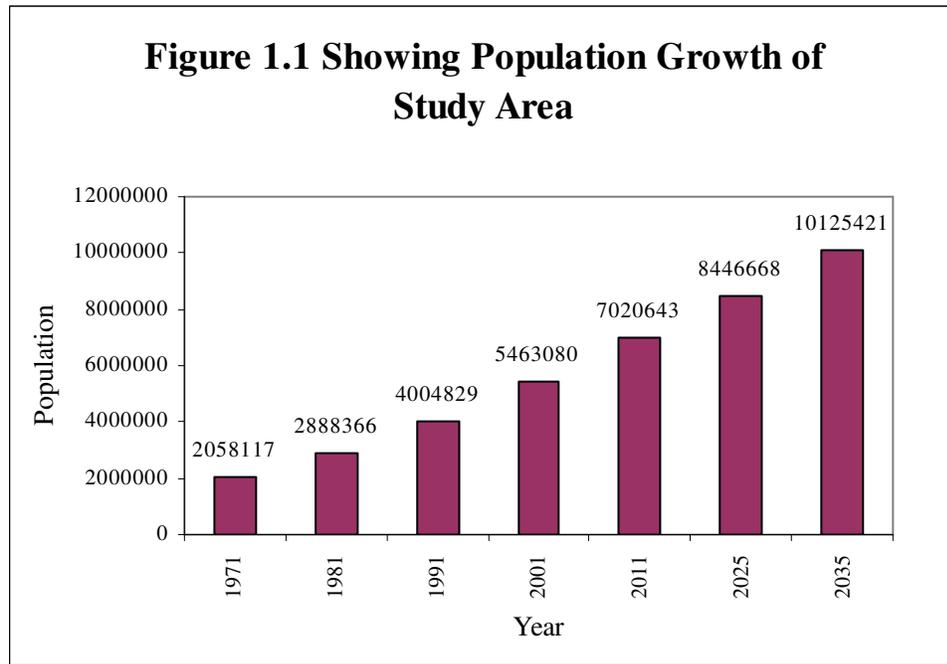
The annual growth rate of population in Ahmedabad was about 3.15 % during 1991-2001. However, the addition in terms of absolute number is 1,45,825 persons / year. Ahmedabad Municipal Corporation (AMC) has a population growth rate 2.29%. The relative growth rates and concentration of population in AMC vis-à-vis the other part of Ahmedabad Urban Development Area (AUDA) and Gandhi Nagar presented below.

**Table 1.1 Annual Growth Rate of Population 1991-2001**

Area	Population		Annual Growth Rate	Population Addition / Year
	1991	2001		
AMC	2876710	3609049	2.29	0.73 Lakh
AUDA	1004760	1652933	5.10	0.65 Lakh
Gandhinagar	123359	201098	5.00	0.08Laks
Total	4004829	5463080	3.15	1.46Lakhs

Source: Revised Development Plan of AUDA – 2011 and Draft development Plan for Gandhinagar – 2011

1.2.3 The population of AUDA (including AMC) area and Gandhinagar is expected to be 7.02 millions in the year 2011 and 8.45 millions in 2025 and 10.13 millions in the year 2035. Population growth of study area is shown in **Figure 1.1**.



Source: Revised Development Plan of AUDA – 2011 and Draft development Plan for Gandhinagar – 2011

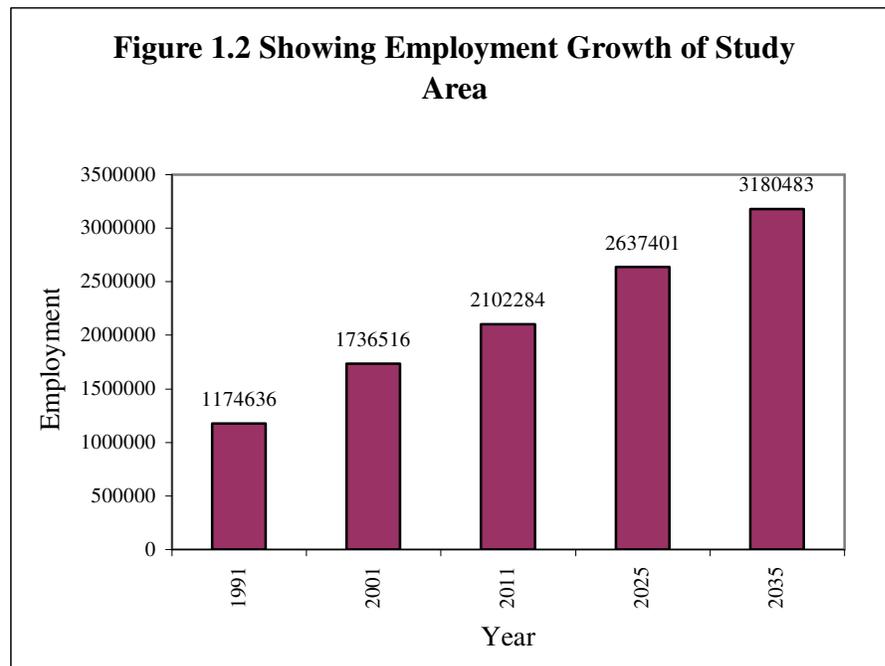
#### 1.2.4 Employment Growth Pattern

The annual growth rate of employment in AMC, AUDA and Gandhinagar areas is presented in **Table 1.2**. The Employment of AUDA (including AMC) area and Gandhinagar is expected to be 2.1 millions in the year 2011 and 2.63 millions in 2025 and 3.18 millions in the year 2035. Employment growth of study area is shown in **Figure 1.2**.

**Table 1.2 Annual Growth Rate of Employment 1991-2001**

Area	Employment		Annual Growth Rate	Employment Addition / Year
	1991	2001		
AMC	831459	1271212	4.33	0.44 Lakh
AUDA	306392	389420	2.43	0.08 Lakh
Gandhinagar	36785	75884	7.50	0.04Laks
Total	1174636	1736516	3.98	0.56Lakhs

Source: Revised Development Plan of AUDA – 2011 and Draft development Plan for Gandhinagar – 2011



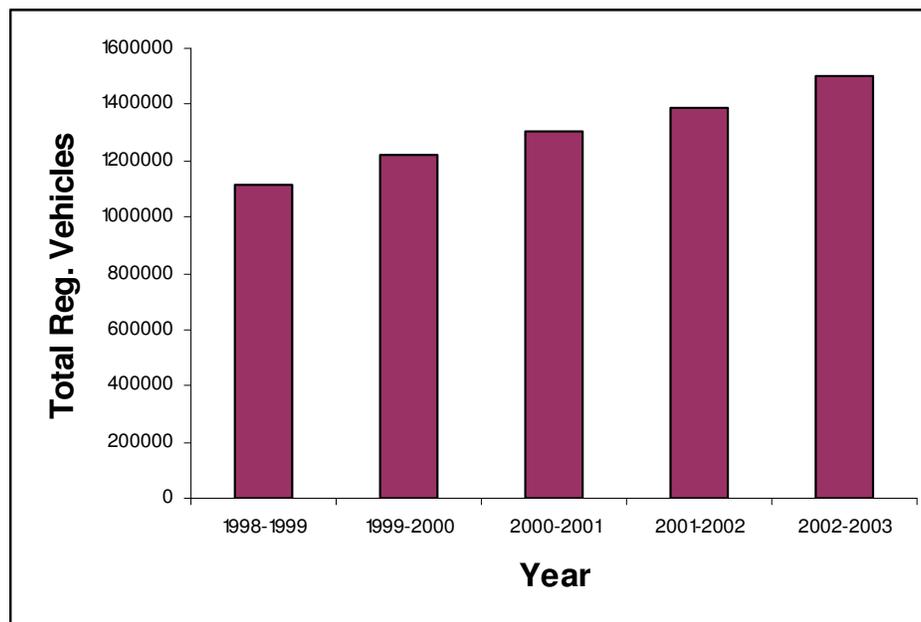
### 1.2.5 Transport Scenario

Growth of registered vehicles in Ahmedabad and Gandhi Nagar is presented in **Table 1.3** and **Figure 1.3**. From the table it can be observed that 11.12 lakhs vehicles were registered upto year 1998-99, by the year 2002-2003 these have grown upto 15.0lakh. Among the number of registered vehicles 2-wheelers account to around 70% - 72% of total vehicles registered. This is an indirect indication of dilapidated stage of public transport (bus) services in the study area. The increase in use of private vehicle directly contributes to increase in total vehicle kilometers travelled and emission levels of pollutants, which would deteriorate the quality of health.

**Table 1.3 Growth of Registered Vehicles in Ahmedabad and Gandhi Nagar**

Sl.No	Year	Two Wheelers	Cars / Jeeps	Auto Rick.	Other Veh.	Total Vehicles
1	1998-1999	786559	153107	49204	123138	1112008
2	1999-2000	862940	170603	51548	132706	1217797
3	2000-2001	924599	184946	53020	138631	1301196
4	2001-2002	993672	199353	53942	143883	1390850
5	2002-2003	1078591	215381	55912	149993	1499877

Source: RTO, Ahmedabad

**Figure 1.3 Growth of Registered Vehicles in Ahmedabad and Gandhi Nagar**

### 1.3 Review of Earlier Studies

1.3.1 Metropolitan Transport Project Organisation / Railways (MTP/R) Mumbai had made out a detailed traffic study and identified a number of corridors, most of them following existing rail routes, and in addition one circular route around the Central Business District (CBD). This study was made at the instance of Ahmedabad Urban Development Authority (AUDA) and Ahmedabad Municipal Corporation (AMC).

1.3.2 RITES in association with SOFRETU have supplemented the study carried by MTP/R. The study has recommended a Broad Gauge EMU conventional type system on the Kalupur-Barejadi corridor, a separate elevated corridor

for most of the length for the CBD area i.e. Sarkhej – Kalupur – SP Stadium and partly elevated and mostly surface corridor from Kalupur –Gandhi Nagar via Asarva.

- 1.3.3 Louis Berger Associates have carried out feasibility study in 2000-02 for Integrated Public Transport System (IPTS) for Ahmedabad. They have formulated three alternative project scenarios for IPTS system. These alternatives are intended to be complementary rather than mutually exclusive. Some of the broad recommendations are improvement of road cross sections, implementation of grade separation at key junctions, decentralization of AMTS bus terminals, implementation of inner city bus loop services, provision of dedicated bus lanes along Relief Road and Gandhi Road and on other key routes, development of IPTS consisting of 7-rail corridors and 8-bus corridors without using Indian Railways ROW or development of 9 rail corridors and 8 bus corridors by using Indian Railways ROW, development of five peripheral interception terminals for multi-modal facilities, development of north-south transit corridor from Makarba to Gandhi Nagar via Kalupur and Sabarmati and development of East-West corridor between Paldi to Kalol, Sola Road to S.P. Stadium and Shilaj to Naroda Township.

#### **1.4 Objective and Scope of the Work**

- 1.4.1 The objective of this study is the identification of most feasible corridors for Metro Rail and Regional Rail Systems and preparation of Detailed Project Report for them.
- 1.4.2 The study has been divided into 2-stages. Stage wise scope of the work is presented in the following paragraphs.

##### Stage – I

- Carrying out traffic and transportation studies for identified corridors,
- Estimation of rider-ship for these corridors,
- Approximate cost estimates for each corridors,
- Examining the potential for development of new townships between Sabarmati and Gandhi Nagar, and
- Selection of most feasible corridors for detailed engineering surveys and analysis in Stage – II.

##### Stage – II

- Estimation of travel demand and projection of sectional and station traffic loads for horizon years on selected corridors,
- Carrying out engineering surveys and investigations viz., topographical surveys and geo-technical investigations,

- Identification of utilities above-ground and underground along the selected corridors,
- Geometric design of the route alignments,
- Location of stations, preparation of layout plans for stations and traffic integration areas,
- Environmental impact assessment and preparation of environment management plan,
- Preparation of implementation strategy,
- Estimation of construction cost,
- Carrying out economic analysis, and
- Preparation of Detailed Project Report.

### **1.5 Composition of the Report**

The present Report consists of thirteen chapters in all. Chapter 1 gives a brief introduction of the Project, its background, scope of work, Study Area characteristics and brief re-cap of major relevant studies done earlier. Chapter 2 contains inferences from traffic data analysis, methodology adopted for transport demand modelling, projection of estimated demand to obtain the future travel demand pattern, evaluation of alternative alignments from traffic considerations and section and station loads on the recommended corridor.

System selection and its design have been explained in Chapter 3. Main features of the Track, Traction system and Power supply, Signalling system and Rolling stock, Telecommunication and Automatic Fare Collection system are described in this chapter. Chapter 4 gives the details of civil engineering works like geometric design norms, alignment description with land requirement, geo-technical investigation and utility details, construction methodology for elevated structures.

Chapter 5 explains the train operation plan. The power supply and traction requirement has been discussed in chapter 6. The depot locations and related infrastructure facilities have been detailed in chapter-7. Environmental Impact assessment and mitigation measures are given in Chapter 8.

The cost estimate has been discussed in Chapter 9. The fare structure and financing plan have been explained in Chapter 10. Chapter 11 contains economic analysis along with sensitivity analysis. An Implementation plan and strategy is presented in Chapter 12 and Chapter 13 gives the major conclusions and recommendations of the Study.