

Metro Transit System: A case study of Surat

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Abstract: Surat is Gujarat's 2nd most popular city, India's 8th most popular city. It is the 73rd largest urban area in the world. Diamond city Surat's population grew from 2.8 million to 4.5 million as per 2011 census. Surat is a unique case where population has already exceeded 5 million and shall have approximately 07 million populations by the year 2021. Surat is the most dynamic cities of India having a faster growth rate due to migration from various parts of Gujarat. Due to high population growth rate there is a demand for transport creating pressure on existing transport system. There is more demand of transportation cause congestion on roads due to increasing in private transport. The inter-city traffic volume in Surat necessitated with integrated multi model mass transit rapid system. The paper deals with the "Metro transit system in Surat". This paper provides information of differentiation of Surat metro transit system and other mass transit system at the area under the metro project. The project scope includes detailed studies related to traffic demand forecasting, location and land planning, transport mode integration and financial analysis.

Key Words: Metro transit system, public transport, Traffic congestion, Surat city, Corridor Passenger, Mass transit system

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I. INTRODUCTION

Indian cities are fast emerging as engines of economic growth with an estimated 60% of the country's Gross Domestic Product originating from the urban areas and thereby generating money, jobs and a better lifestyle for all. Due to the high level of economic growth of the country, there has been an increased migration from the rural areas to the cities. Currently, about 30% of the population lives in the urban areas and this situation is expected to grow to 40% by 2021. Increasing urbanization along with unplanned and unregulated growth has put an immense pressure on the urban infrastructure especially on the urban transport. Also the increase in the income level of the people has led to an increased ownership of private vehicles thereby contributing to increased congestion on the roads [1].

It is estimated that an investment of over Rs.900 billion is planned for rail-based Mass Rapid Transit System projects in 10 cities over the next five years. The city planners in 19th century, England were among the first people to understand the need for a standardized, massive and efficient system of transport for the growing cities. Their first innovation came to be known as the London Underground, also known as the Tube Rail System. It took us more than 37 years, since our independence, to build our first metro system i.e., the Kolkata Metro Railway System. Chennai and Mumbai MRTS projects were also started but they could not compete with the immediate requirement of the city. The Delhi metro system is also a running MRTS project provided by the DMRC and the Namma metro is in the process of becoming a major mode of transportation in the city of Bengaluru [1].

Mass Rapid Transit System is probably the best way to decongest traffic. However, a number of considerations should be kept in mind in order to run a successful MRTS. "Viability of metro projects depend upon correct defining of traffic corridors, technology adopted, availability of land, volume of traffic carried, capacity utilisation and acceptance of the mode by the commuters," Architect Jit Kumar Gupta mentions. MRT systems in India consist of the systems with their modes as the metro trains or the diesel/electric multiple units (DMUs/EMUs/MEMUs/DEMU). The nation's first MRT system was the Kolkata Metro Rail which began its service in 1984 [1].

In order for a city to become sustainable, the public transportation share must be somewhat around 70%, whilst it averages near about 35% in Indian agglomerations. The rising energy consumption and depleting natural resources pose another threat towards the planet. The increase in the number of road accidents over past few decades and the deficiency of land in urban areas are among other few obstacles which support the implementation of mass rapid transportation [1].

1.1. Surat Metro Transit System

Transportation is backbone of development of any areas. It enables functioning of urban as well as rural areas efficiently by providing access and mobility. Metro rail corridor for Surat city is one the prominent transportation project in the Gujarat. Further, the CEPT’s study report recommends the following corridors as potential metro network [2] [3]

- 1) Dream City – Kamraj (28.90 kms)
- 2) Bhesan – Umbhel (26.30 kms)
- 3) Majura Gate – Karamala (15.80 kms)

The first phase of metro comprises of two corridors: North-South corridor and East- Waste corridor. Total 38 stations are proposed consisting of elevated and underground stations.

Sr. no	Corridor	Under ground	At grade	Total
1	Sarthana to Dream city	6.47 km	15.14 km	21.16 km
2	Bhesan to Saroli	-	18.74 km	18.74 km
Total		6.47 km	33.88 km	40.35 km

Table 1: Phase 1 Surat Metro Corridor [1]

For Phase-II, Majura Gate - Ved can be considered. The extension to Karamala based on road network developments and demand build can be considered after demand assessment. Similarly, extensions from Sarthana – Kamrej/Vav and Saroli-Umbhel can be taken up in subsequent phases.

II. PROJECT AREA

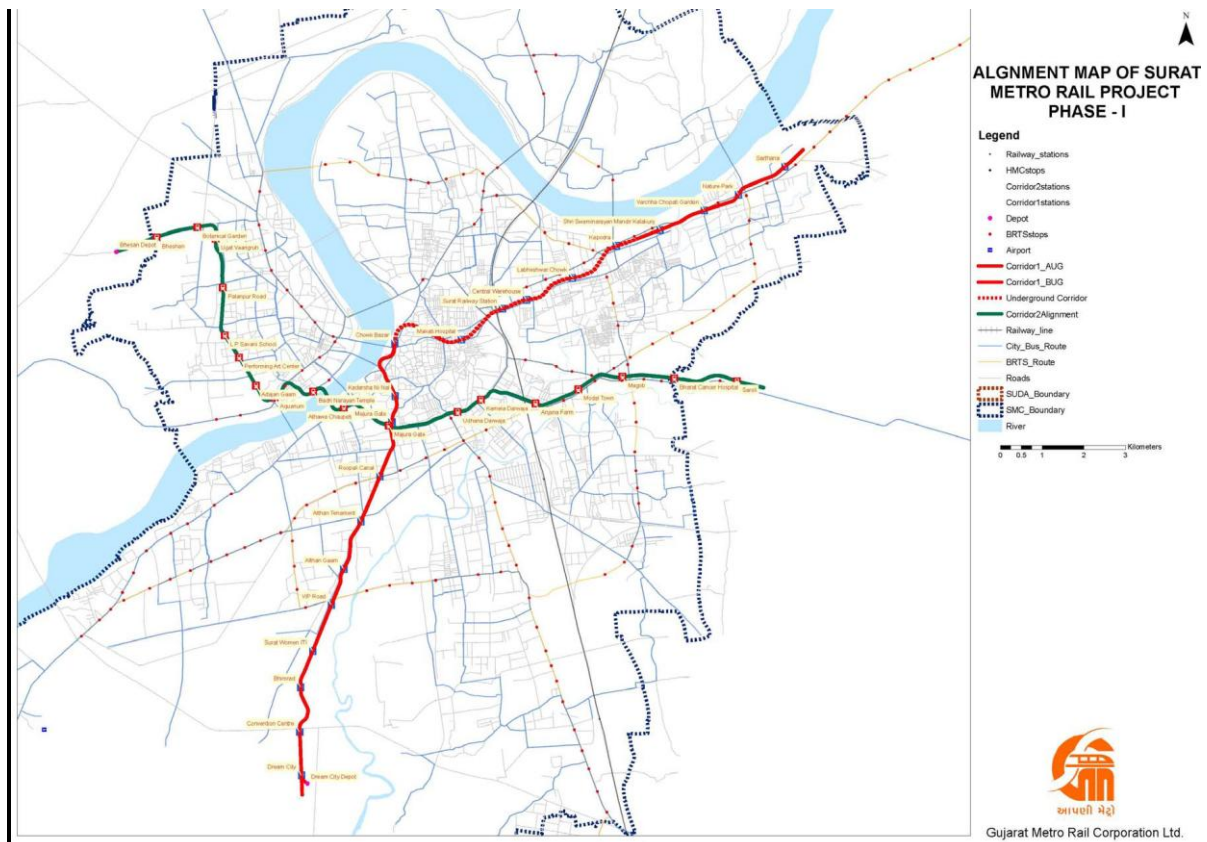


Fig 1 SIA surat metro

Corridor 1: Sarthana – Dream city

This corridor provides metro connectivity to Gadhpur Township, Sarthana Nature Park, Nana Varachhe village, Kalakunj Junction, Kapodra and Puna village, Labheshwar Chowk area, Big Diamond Market (Mini Bazar) of Surat, Retail Sari Market, Surat Railway Station, Muskati Hospital, Bhagal junction, Gandhi Bagh, Chowk Bazar, Majura Gate, Roopali Canal, Altha Treatment, Althan Gram, VIP road Women IIT, Bhimrad, Convention City and Dream City [2].

Corridor 2: Bhesan – saroli

Prominent areas like Bhesan Treatment Plant, International Cricket Stadium, SMC Botanical Garden, Palanpur, LP Savani School, Performing Art Centre, TGB Circle, Aquarium, Badri Narayan Temple, Star Bazar, Tapi River, Athawa Chopati, Majura Gate, UdhanaDarwaja, Kamala Darwaja, Anjana Junction, Parvat Pataya, Magub Village, Bharat Cancer Hospital, Saroli etc. are connected through this route [2].

2.1. Other mass transit system in surat

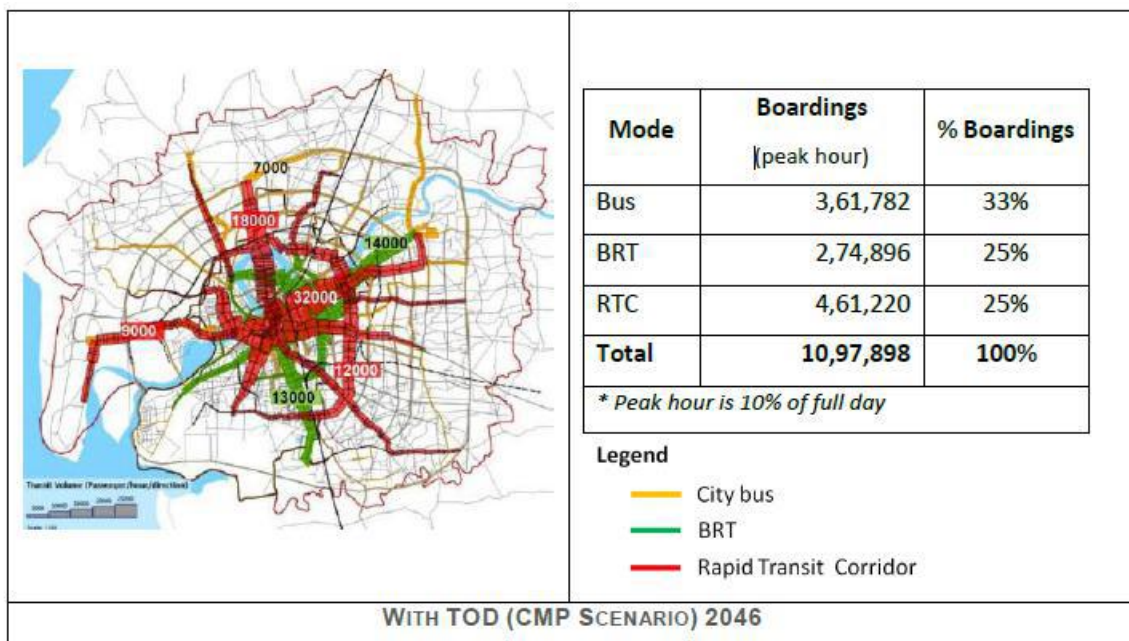
There are BRTS – Bus Rapid Transit system, Surat City buses, HMC bus by provided government transport. There are 66 AC premium standard buses and 50 AC midi buses in Surat. 34 AC midi HMC buses and 875 non AC city buses are provided by government. BRTS and City buses are operational on 12 routes and 44 routes including urban and sub urban areas of the city with an average daily ridership of 1.4 lakh and 1.35 lakh respectively. The city authority have inaugurated High Mobility Corridor of 15km on ring road around old city area is operational with 24 buses station and 12 buses at headway of 10 min [5] [2].

2.2. Transport demand forecast:

Metro policy 2017 proposes that proposal for central assistance for identified Metro Rail project should suggest by State government. The Detailed Project Report (DRP) for Surat metro is being submitted for central assistance is not only being submitted through state government for various reason but Government of Gujarat(GOG) apart from its own 50% contribution of equity is also contributing towards the cost of the land and towards taxes and duties. The policy puts a mandatory pre-requisite for the city having a Comprehensive Mobility Plan (CMP) for planning metro rail in any city. As per requirement of the city the DPR of Surat Metro Rail Project has been prepared by DMRC which have sufficient expertise to formulate DPR for other cities in the country. In the year 2017, a Comprehensive Mobility Plan (CMP) for Surat city has been got completed by Surat Municipal Corporation (SMC) through Centre of Excellence in Urban Transport (CEPT), Ahmedabad [3].

III. ANALYSIS DEMAND ASSESSMENT ALONG CORRIDOR

An assessment of potential ridership on the three CMP metro corridors for the future years of 2026 and 2046 has been undertaken. An analysis of future Public Transport (PT) is important to assess suitability of a metro or another rapid transit mode.



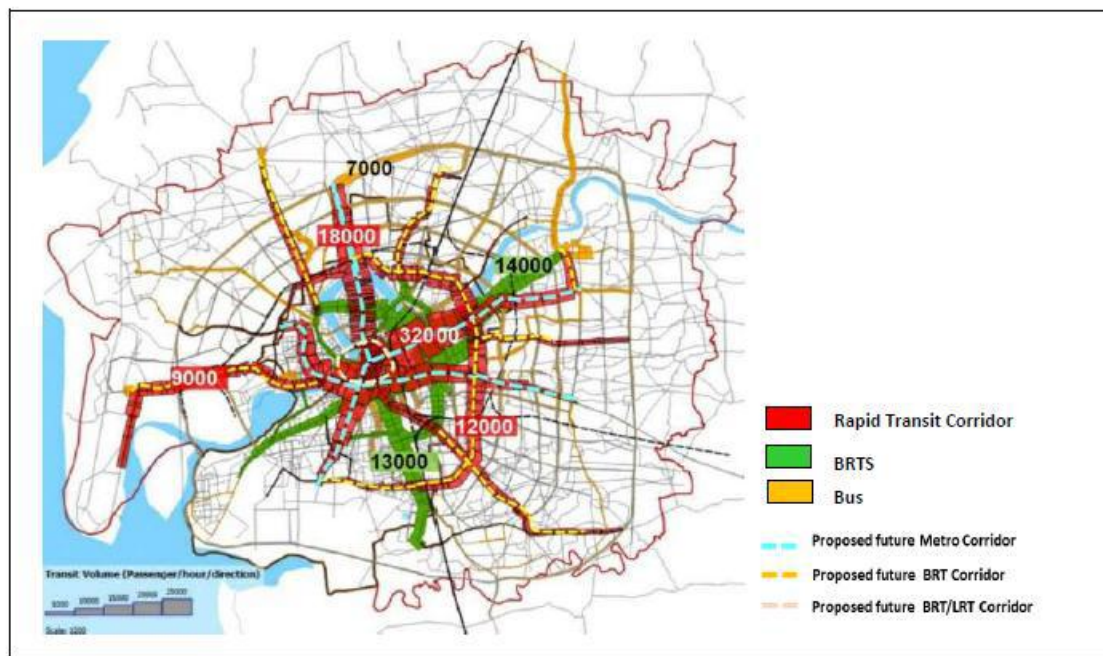
Source: Comprehensive Mobility Plan Surat - 2046, CoE- UT, CEPT University [4]

This network was analyzed and the demand outputs in terms of peak passenger flows or peak hour peak direction traffic (PHPDT) for the year 2026 and horizon year 2046 has been presented in the Table.

Sr. no	Corridor	Year 2026	Year 2026	Year 2036	Year 2036	Year 2046	Year 2046
		PHPDT	Ridership	PHPDT	Ridership	PHPDT	Ridership
1.	Sarthana to Dream city	16298	431040	27966	812050	34264	1032120
2.	Bhesan to saroli	6500	202140	16945	546390	24032	782330
3.	Majuragte to karamala	4618	109590	15999	356720	24386	533140

It can be seen that DreamCity to Sarthana has the highest passenger flow of 16000 PHPDT in 2026 going up to 34000 PHPDT in 2046. The other two corridors - Bhesan – Saroli and Majuragate to Karamala has a demand of around 24000 PHPDT in 2046.

Hence based on the passenger flows Figure 1.2 shows the potential Metro and BRT corridor of about 73 km and 213 km for the future years respectively.



Source: Alternative Analysis Report, CEPT University, Ahmedabad [4]

3.1 Corridor Characteristics

3.1.1 RTC 1 (Rapid Transit Corridor): Dream City to Kamrej/ Vav

Dream city to Kamrej/ Vav corridor is about 29 km long cutting across the city centre and also connecting two far ends of the city. This corridor can be divided into three parts, i.e. Dream City to Majura Gate, Majura Gate to Surat railway station, Railway station to Sarthana and Sarthana to Kamrej/ Vav based on the adjacent land use characteristics. The section from proposed Dream city to Majura Gate is about 8km, of which Majura Gate to Althanis fairly densely developed with mixed uses industries, educational institutions, commercial and lower and middle income residential land uses. The section from Althan to Dream City is currently developing with residential and commercial land uses coming up in this area. Recently, the Southern Gujarat Chamber of Commerce and Industry(SGCCI) has developed a huge Exhibition Centre on this corridor towards proposed Dream City, which is likely to be a major attraction node in near future. Dream city is the one of the prestigious projects of Surat for which master planning is completed and the construction is underway. Envisaged as the diamond hub of India, it is expected to generate huge employment in future. Majura Gate to Railway station corridor passes through the city centre area which is very densely built up. The development consists of commercial, retail local markets, government buildings etc. The inner city is the major employment and attraction area in the city. The area around Railway station is also a major node. Gujarat State Road Transport Corporation (GSRTC) and the existing city bus terminals are also located in close proximity to the station, owing to which this node is already been planned and developed as the multimodal transit hub [3].

3.1.2 RTC 2: Bhesan to Umbhel

Bhesan to Umbhel corridor is around 28 km length passing through city centre via Adajan, MajuraGate, Kamela Darwaja and Saroli. This corridor can be divided into three parts; i.e. Bhesan to Adajan,

Adajan to Saroli and Saroli to Umbhel. Bhesan to Adajan is the main street of the western part of the city with existing Row ranging from 24m to 36m. A very small segment of around 3km from Bhesan to L P Savani has 24m Row which is proposed to be widened to 30m in CMP proposal. Roads with 30m and above are appropriate for development of any kind of rapid transit system. Bhesan to Adajan is the section with predominant upper and middle income group residential development. Along the corridor, mixed land use with retail shops and market on the road abutting properties can be seen. Many schools, hospitals and recreational activities are also located along this corridor. This corridor provides direct connectivity with city centre area [3].

3.1.3 RTC 3: Majura Gate to Karmala

The corridor from Majura Gate to Karmala via Ved has a length of about 15 km. Currently the city does not have direct connection across the river, and there is no development on the other side of the river. There is a proposal of connection across the river from Ved to Karmala with 45m of Row that will also attract development to happen across the river and will also provide direct connection to city centre from other side of the river. The Majura Gate to Ved via Chowk and Katargam has length of about 8km. A lot of government offices, local and informal markets are located along this corridor. The Katargam area has existing textile industries on one side and the other side of the corridor has predominantly residential land use with middle and upper middle income group of societies. Ved is an existing gamtal having predominantly residential development. There are also many educational institutes located along the corridor [3].

IV. CONCLUSION

Surat metro project has a three corridor but there are two corridor construction in first phase corridor 1 (Sarathana to Dream city) and corridor 2 (Bhesan to Saroli). After the construction completed and there is a demand to other 3rd corridor then it's constructed from Majuragate to Karamala. This project contributes to reduce traffic, fuel consumption, air pollution, vehicle operating cost, travel time, and accidents. The proposed metro will increase mobility, accessibility to facilitate the influence area, and increase in economy of the city. The project improves the aesthetic looks of the city.

REFERENCE

- [1]. A. Aditi, "(PDF) Mass Transit in India: A Need for Change," no. August, 2019, [Online]. Available: https://www.researchgate.net/publication/335004369_Mass_Transit_in_India_A_Need_for_Change.
- [2]. R. Limited, "Gujarat Metro Rail Corporation (GMRC) Limited Social Impact Assessment Study for SURAT Metro Rail Project (Phase-I) Gujarat Metro Rail Corporation (GMRC) Limited ECT (Pha," vol. 122001, no. 1, 2020.
- [3]. S. No, "SALIENT FEATURES OF SURAT METRO RAIL NETWORK (Phase-I) ROUTE LENGTH Standard Gauge (SG): Maximum Passengers : Peak Hour Peak Direction Traffic (PHPDT) (b) Train Composition," no. December, 2018. [1][2][3]
- [4]. <http://117.232.115.58:9080/AboutUs.aspx#:~:text=BRTS%20and%20City%20buses%20are,lacs%20and%201.35%20lacs%20respectively>.
- [5]. <https://www.suratmunicipal.gov.in/>