

<b>Sector</b>	Urban Development
<b>Sub - sector</b>	Urban Development
<b>Profile No.</b>	UD-01
<b>Project Title</b>	Metro Rail for Ahmedabad and Gandhinagar

## Project Rationale

Urbanization in any city generally results in problems of traffic congestion and it reflects the problem of inadequate public transportation system.

Ahmedabad, the highest populated city of Gujarat is also in the state of rapid urbanisation which results in heavy traffic congestion from the peripheral parts of the city. Thus, there is an urgent need of a Mass transportation system in the city which will cater to the local as well as regional traffic of the city.

The projected per capita trip rate (PCTR) for motorised mode for the years 2010, 2025 and 2035 are as in the table below:

**Vehicular PCTR values**

Year	PCTR Value
2003 (observed)	0.72
2010	0.80
2025	0.90
2035	1.00

With this objective, Government of Gujarat intends to introduce a Metro Rail Project in the city that will facilitate as effective and sustainable public transportation system for the cities of Ahmedabad and Gandhinagar.

## Project Components

For the purpose of planning the train operations and components, the peak hour peak direction traffic demand for North-South line (from APMC, Vasana to Akshardham, and Gandhinagar through Ashram Road, Motera and Koba circle) is estimated as follows:

Year	Peak hour peak direction traffic demand
2010	13,000
2025	24,000
2035	37,000

Similarly, the peak hour peak direction traffic demand for East-West line (from Kalupur Railway station to Thaltej through Delhi Darwaja / ITO) is as follows:

Year	Peak hour peak direction traffic demand
2010	13,000
2025	18,000
2035	26,000

Based on the techno – economic considerations, mainly traffic forecast study and reconnaissance of engineering feasibility, the corridors that are identified for the Phase – 1 and Full system are:

#### **Under Phase I**

- North - South Corridor: It would cover a distance of about 33 kms.
- East - West Corridor: It would cover a distance of about 11 kms.

#### **Under Phase II (Full system)**

When Metro Rail would be fully operational, it would cover the following areas / routes:

- Changodar – Sarkhej – Makatpura – APMC, Vasna – ITO – Sabarmati – Motera – Koba circle – Akshardham, Gandhinagar
- Kalupur – Prem Darwaja – ITO – Manav Mandir – Drive In cinema – Thaltej
- APMC, Vasna – Manav Mandir – Naranpura – RTO
- Sarkhej – Iscon temple – Thaltej – Khodiyar – Indroda circle

The phase I of the project is expected to be operational by 2008 and the phase II is expected to be operational by 2035.

## **Proposed Infrastructure**

The Metro system will be designed to provide high frequency services both during peak hours and off-peak hours. Short trains, consisting of 3 coaches each are proposed at the interval of 5 minutes during peak hours and 15 minutes during off-peak hours. 3 more coaches can be added to these trains with increase in demand.

The salient features of the proposed train operation plan are:

- ↳ Running of services for 19 hours of the day (5 AM to midnight) with a section dwell time of 30 seconds.
- ↳ Make up time of 5-10%, with 8-12% coasting.
- ↳ Scheduled speed of 32 kmph

The project also consists of construction of elevated corridor with traction system in-order to generate medium capacity Metro Rail System in the city.

The other broad features of the project are:

- Advance automatic signaling system
- Integration of high-tech telecommunication facilities like Mobile radio communication system, use of optical fiber cables, network monitoring and management etc.
- Automatic fare collection system

Each coach train will consist of two driving motor coaches (DMC) and a trailer coach (TC), while 6 coach train will consist of 2 DMCs, 2 MCs (motor coaches) and 2 TCs (Trailer coach).

The capacity of each coach and train would be as follows:

Type of coach / train	Passenger capacity
DMC	253 passengers
3-Car train	786 passengers
MC and TC	280 passengers
6 Car train	1626 passengers

## Market and Growth drivers

Ahmedabad, with population of more than 5 million, is the largest city of Gujarat. The State has witnessed rapid economic growth in the past and is known as commercial capital of the State. The rapid urbanization has resulted in the increase in demand of efficient public transport system, which is lacking in the city. The commonly used mode of transport is private owned vehicles (prominently two wheelers and cars).

Ahmedabad having gained “Mega City” status is likely to witness further growth around the existing city limits. Recently, the State Government has merged the peripheral areas of the city into the jurisdiction of AMC limits. These areas would also require public transport system.

Traffic forecast made for the proposed Metro Rail project is as given below:

Sr.	Year	Per hour per day per trip	
		East West corridor	North South corridor
1	2010	12,933	12,709
2	2025	17,590	23,237
3	2035	25,862	36,747

## Expected benefits

The envisioned Metro System project for Ahmedabad and Gandhinagar will provide variety of benefits to the cities viz.

1. Savings in fuel consumption, vehicle operating cost, travel time.
2. Reduction in road accidents and air pollution.

## Project Cost

The cost estimations of the metro rail project have been prepared covering civil, electrical, signalling and telecommunication works, rolling stock, environmental protection, rehabilitation etc. at INR 43,000 million (US \$ 956 million) (June 2004 basis). In addition, taxes and duties are estimated at INR 7,170 million (US \$ 159.33 million).

## Financial Indicators

### A. Fare structure, Financial options, FIRR

The financial analysis for the project have been worked out taking into consideration completion cost, operation and maintenance cost as well as the additional expenditure to be incurred in coming years for additional rolling stock, signalling and telecom and augmentation of power supply system. The fare structure ranges from INR 8 for distance up to 2 km to INR 25 for a distance beyond 40 km. Moreover, earning from advertisement and commercial developments is taken as 10% of the fare box revenue.

Based on these factors, FIRR for the project works out as 4.64%.

### B. Property development potential

The feasibility study indicates that there is huge potential for development of Townships between Koba circle to Indroda circle, coming under jurisdiction of AUDA and GUDA for part funding of Metro Rail system. The return anticipated from property development is about INR 15,000 million in 10 to 15 years.

### C. Financing strategy

There are two possible models for financing the project.

1. Delhi Metro Model: The model envisages 40% cost sharing by two Governments equally, where the cost of private land is to be borne by State Government. The Government land will be provided free of cost. It is also anticipated that INR 15,000 million can be obtained by property development, with the balance being taken as loan.
2. BOT model: The project can be financed through generation of revenues from vast land available between Gandhinagar and Ahmedabad. So it is recommended that the project is implemented through BOT. The concessionaire shall operate and maintain the system for 30 years before handing the system to Government. The land for development is to be procured by the Government and handed over to the SPV at actual cost price. Also, the viability gap of INR 15,000 million which is to be provided will be shared equally between Central and State Governments. The pre tax return on equity of the concessionaire would work out to 14%.

### D. Economic analysis

The economic analysis of the project has been carried out by taking into account estimated total cost that the local economy would be called upon to bear. The analysis also envisages a situation wherein the existing infrastructure continues to be utilized taking into account increased estimated cost due to higher projected traffic.

The Economic internal rate of return (EIRR) for the proposed project has been worked out using Discounted Cash Flow Technique to the net benefit stream at economic prices, and its value is estimated as 26.95%.

## Agencies to be contacted

Gujarat Infrastructure Development Board (GIDB)

Industrial Extension Bureau

Mott MacDonald India