Technology to Leverage Services for Improved Mobility

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Surat City Profile

- **8th Largest** in India as per population
- **4th fastest growing** city globally
- Termed as **Economic Capital** of Gujarat
- **9/10 Diamonds in the world** are cut and polished here
- **40%** of nations total man-made fabric & **28%** of nation’s total man-made fiber production

- **Area**: 326.5 sq.km
- **Population**: 2011- 44.6 Lakh (SMC)
- **Density**: 138 Persons/ Ha (Census-2011)
- **Population Growth Rate**: 59% increase in a decade (2001-2011)
- **Admin Zones**: 7

- **2nd largest in Gujarat and 8th largest In India**
- **Fastest growing city in India**
- **Large number of migrant populations in the city from various parts of India due to economy generating textile and diamond industries**
Mobility Issues

Rapid Growth in Population
- 2001 – 28.0 Lac | 2011 – 44.6 Lac

Rapid Growth in Vehicles
- 16.7 Lakh Vehicles added in Last 10 Years

High City Mobility
- 38 Lac Passenger Trips per Day

Inadequacies in Road Network
- Incomplete Road Network and Constrains such as River, Canal, Railway

Increase in Congestion Time and Travel Time
- Decrease in travel speed from 28 kmph to 18 kmph, Increase in Travel Time from 13 mins to 25 mins
**SARAL** means “Simple” which also implies mobility being Easy, Convenient and Accessible aimed towards a healthy living environment.

The vision “**SARAL Mobility 2046**” is achieved through **five strategic goals** defined as:

1. **Improving quality of life of people** by providing for a Safe and Sustainable transport system
2. **Supporting the economic growth in the city** by enhancing Accessibility for people and goods to major activity centers.
3. **Ensuring efficient connections** by providing Reliable multi-modal travel options
4. **Optimizing transport system operations** and enhancing travel experience of people through Advanced Technological Applications in transport.
5. **Contributing to the environment** by promoting Low carbon mobility
Leveraging in Transportation

Types of Leverage

1. Integration
   Integration between BRTS, City Bus and HMC services

2. Information
   Timetables, tariff information, route maps

3. Networking
   City has increase network from 10 km in 2014 to 430 km in 2019

4. Technology
   Control Centre, GPS, ETM, POS, Vending Machine

5. Analytics
   Analysis of ITMS and AFCS data to improve the efficiency of PT Service

Transit Performance Indicator

- Ridership – Passenger/Bus
- Revenue – Revenue/Bus
- Vehicle Utilisation
- Earning Per Kilometer
- Cost per Kilometer
- Accident Rate
- Load Factor
- Occupancy Ratio
How is Surat Adopting ITS Tools

Intelligent Transport System (ITS) Leveraging

Automatic Fare Collection System

Intelligent Transport Management System

Intelligent Traffic Control System
SMC is implementing a city wide integrated system – “Intelligent Transit Management System” (ITMS), to manage diverse set of transportation needs for the city – this includes:

(a) Public transport and
(b) Vehicles related to civic services like Solid Waste Management, Drainage, Heavy Engineering, Emergency Services.
Scope & Coverage

Integrated Transit Management System Framework for Surat City

**PROJECT SCOPE**

**Hardware**
- 153 BRTS stations
- 575 City Buses
- 166 BRTS Buses
- 6 Depots
- 535 Department Vehicles
- 50 Emergency Vehicles

**Software**
- Automatic Vehicle Location System (AVLS)
- Depot Management System (DMS)
- Enterprise Management System (EMS)
- Website
Flow Diagram

Intelligent Transport Management System

AVLS
- Dashboard
- Alerts Management
- Administration
- Monitoring & Control

SMC ITMS Control Center

Enterprises Management System

Passenger Information System

BRT & City Buses

In Vehicle Passenger Information System

SMC Departments Integration

Depot Management System

Call Takers/Operators

Incident Management System

Depot Users

Ambulance

Fire brigade
Intelligent Transport Management System

Components

- BRTS Station PIS
- City Bus Shelter PIS
- Bus Driver Console
- In Bus PIS
Intelligent Transport Management System

Depot Management System (DMS)

Bus Allocation on schedule

Window for Available bus details

Window for available drivers

Characteristics:
• Human Resource Management
• Store Inventory
• Workshop Module
• Vehicle & Crew Allocation

Key Benefits:
• Reduced human involvement in allocation process – Digitization of depots
• Single format across all the operators for all Depot related activity
• Database for allocation – Bus, Driver, ETM & Conductor
• With inputs from AVLS data, Sitilink can terminate or black list driver
• Driver Performance Assessment program can be started with available data from DMS
Intelligent Transport Management System

**Automatic Vehicle Location System (AVLS)**

**Characteristics:**
- Vehicle tracking at every 3 sec in BRTS & 6 sec in CBS.
- Passenger Information System (PIS) & Passenger Announcement System (PAS)
- Two way communication with driver
- Alert management w.r.t. operational & real time issues

**Key Benefits:**
- **Real time monitoring** of public transport
- With inputs from AVLS, Sitilink started **system generated operator billing** after reconciliation
- **Availability of database** which can directly use for several Transit Performance Indicators
- **Panic message** to control center through BDC
- **Real time information** to users through PIS & PAS
Vehicle Incident Management System

Characteristics:
- capability to manage any incident from control center
- provide quickest route to reach location of incident location and provides location of nearby emergency service.

Key Benefits:
- Different department work close to resolve incident
- Provides quick response & service during critical duration of incident
Enterprise Management System (EMS)

Characteristics:
- Monitors assets owned by Sitilink
- Provide working status of all equipment such as GPS, BDC, station server, etc

Key Benefits:
- Sitilink is able to monitor all the equipment from control center
Passenger Information System (PIS)

**BUS PIS**

- Bus front and Rear PIS show the Route Number, Origin & Destination and Via Stops
- Next Bus stop, various public awareness messages and route diversion details, New Route Details, Complaint Number, etc.

**BRTS STATION PIS**

- Route wise ETA is displayed through Station PIS on all BRTS Station
- Poster for New Route, Diverted Route, Event, Public Awareness Message
Automatic Fare Collection System (AFCS) project aims to automate the fare collection mechanism and technology within Surat’s transport ecosystem (BRTS & City Bus Services) and enhance operational capability, citizen’s satisfaction, reliability and ease of operations for its services offered through various transits.
Automatic Fare Collection System

Scope & Coverage

ETM’s HTT 1430 → POS 206 → Pole Validator 1300 → Turnstiles 414 → Fare Gate Validator 414

AUTOMATIC FARE COLLECTION SYSTEM

Swing Gate 195 → UPS 195 → Station Server 195 → Mobile Application 1 → AFCS Software 1

153 BRTS Station → 166 BRTS Buses → 575 City Buses
Automatic Fare Collection System

Flow Diagram
Automatic Fare Collection System

Components

BRTS Station ETM with POS

Turnstile with Fare gate Validator

City Bus Pole Validator

Surat Money Card
Automatic Fare Collection System

Dashboard Data

Hour basis Ridership and Revenue
Sitilink mobile application offers citizens to plan their journey in an efficient way. Surat Sitilink application provides multiple options listed as below:

- Journey Planners
- M-ticketing
- Route and Stops Information
- Route Map

SMC Department vehicle application is developed for the real-time vehicle tracking and reporting. Also used for the operator billing based on AVLS Data.

Sitilink Supervisor application is developed for Sitilink operations.
Intelligent Traffic Control System

Objectives

- Improve Journey Time Reliability
- Safety Improvement & real time information
- Accident Reduction
- Traffic Enforcement & Increased Traffic Signal Efficiency
- Increase Operational Efficiency
- Reduction in Traffic Congestion & Pollution Control
- Public Awareness
Intelligent Traffic Control System

Scope

Traffic Junction Component
- Adaptive Traffic Controller
- Vehicle Detector
- Pedestrian and BRTS Signals
- Zebra Crossing and Stop Lane Marking

Traffic Enforcement and Surveillance
- Red Light Violation detection system
- Speed violation detection system
- Traffic Violation cameras and E challan devices
- Traffic surveillance and ANPR

Information Dissemination
- Speed control sign board and VMS system
- ECB system
- Mobile application and traffic portal
- Traffic control centre
## Intelligent Traffic Control System Coverage

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<th>Particular</th>
<th>Junction/Location/Number</th>
<th>Geographical Coverage</th>
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<td>Red Light Violation Detection (RLVD) Systems</td>
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<td>8</td>
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<td>Emergency Call Box (ECB) System</td>
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<td>E-Challan Hand Held Device</td>
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<td>12</td>
<td>Traffic Command Center</td>
<td>Location</td>
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Application of ITS Tools

- **Bus Station analysis (Peak - off Peak Load)**
  - OD Analysis, Passenger Transfer Analysis
  - Route wise and Bus wise Conductor analysis to improve the revenue collection
  - Driver Analysis to improve the reliability

- **Accident and Breakdown analysis (Operator wise)**
  - Schedule Optimization
    - Route direction wise and peak hour wise
  - Trip and Schedule Adherence Analysis
    - Route and Operator wise
  - Operator wise and Bus wise Schedule and Actual Arrival/Departure

- **Route Performance Analysis**
  - (Route wise - Ridership, Revenue, vehicle utilization, dead kilometer, revenue kilometer)
  - Interchange Station & Infrastructure requirement
  - Guiding Emergency Vehicle (Ambulance and Fire Fighter) for Short and Less traffic route to reach incident point/hospital.
ITS Integration for PT/SMC Services

- **Integrated Fare**
  - (Single ticket to travel in BRTS, City Bus and HMC)

- **Integrated Schedules**
  - (schedules prepared considering integrated corridors for BRTS, City bus and HMC)

- **Passenger Information System**
  - In Bus and Station: Passenger information such as next stop indicator, Bus estimated time of arrival.

- **Passenger Announcement System (PAS)**
  - (in Bus)

- **General Transit Feed Specification**
  - (GTFS – Integration with Google)

- **SMC Department Vehicle and Emergency vehicles integration**
ITS Project Benefits

**CITIZEN**

**Faster Ticket Issuance:**
- Shorten payment time for QR ticket.
- No need to prepare change for Surat Money Card
- Passengers don’t need to calculate the fare
- Mobile Ticketing
- Increased reliability and User satisfaction
- Boarding & alighting complete with one tap for Surat Money Card simple & speedy for everyone (barrier free)

**IMPROVED OPERATIONS**

Automatization of fare calculation/collection:
- Accurate and strict fare collection
- Reduce manual fare collection.
- Improve on-time operation by shortening passenger boarding & alighting times
- Lower equipment & operation cost by reducing cash handling
- Single established system across the operators
- Transit violations monitoring

**SMC/SSCDL**

Data Driven Decision Making
- Passenger/origin-destination/sales assisting in better
- Bus services and Frequency planning including last mile connectivity.
- Reduction in personal vehicles with better utilization of Public transport infrastructure
- Aid multi-modal integration

**SOCIETY**

Shift from private vehicle to public transportation:
- Reduce traffic congestion
- Ease air pollution
- Provide more business opportunities to the
- Area around public transportation
- Surat money card:
- Contribute to environment by reduce paper tickets for AFCS system
Unique Features

6. Helpline Number for Complain Management (18002330233) throughout operational hours

For Complaints related to BRTS and City bus, feel free to call on Sitilink toll free number 18002330233
Towards Vision Achievement

Surat has increased their ITMS scope by spending more amount in the project to avail maximum benefit.

Integrated the Public Transport system, SMC department vehicles and emergency services using ITMS and AFCS system.

Increase in Travel Time reliability and Reduction in Congestion through ITCS. Increase the efficiency and utilization of services.

By using Intelligent Transportation System (ITS), Surat Municipal Corporation is aiming towards achieving their Vision and Goal “SARAL” mobility for Surat City.

Safe & Sustainable
Advanced
Reliable
Accessible
Low Carbon
THANK YOU

Visit Surat to Experience World Class Public Transportation System

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