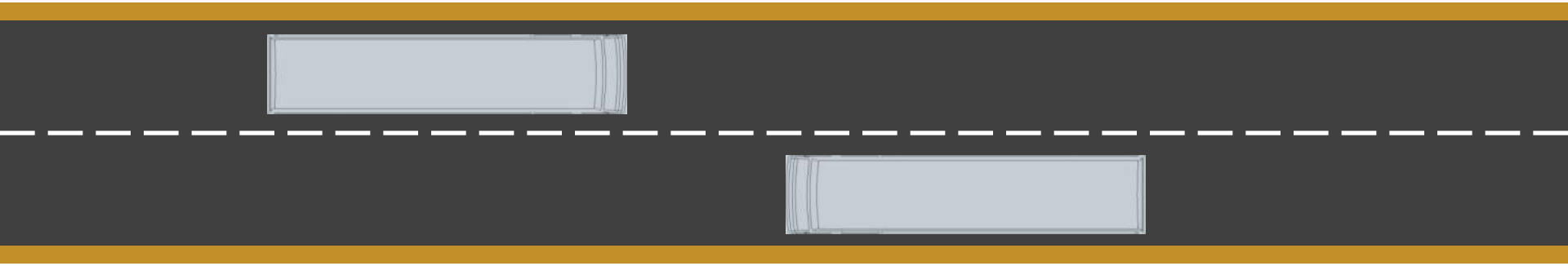
IRF Regional Conference
March 2013
Marrakesh, Morocco

BRTS in Gujarat



Presentation by

Dr. Guruprasad Mohapatra, IAS

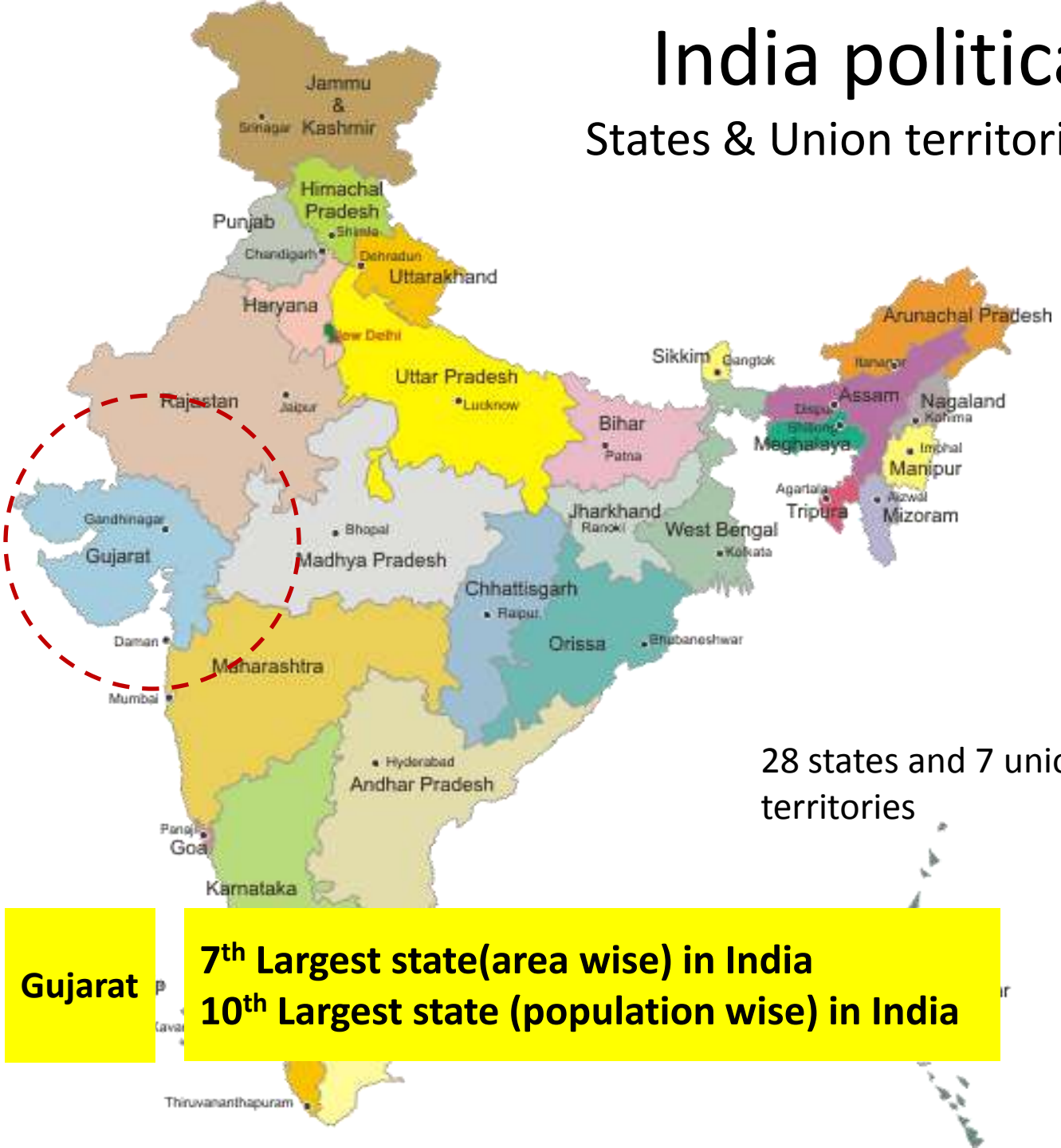
Municipal Commissioner

Ahmedabad Municipal Corporation

Technical Support:
Centre of Excellence in Urban Transport (CoE), CEPT University, Ahmedabad

India political

States & Union territories



28 states and 7 union territories

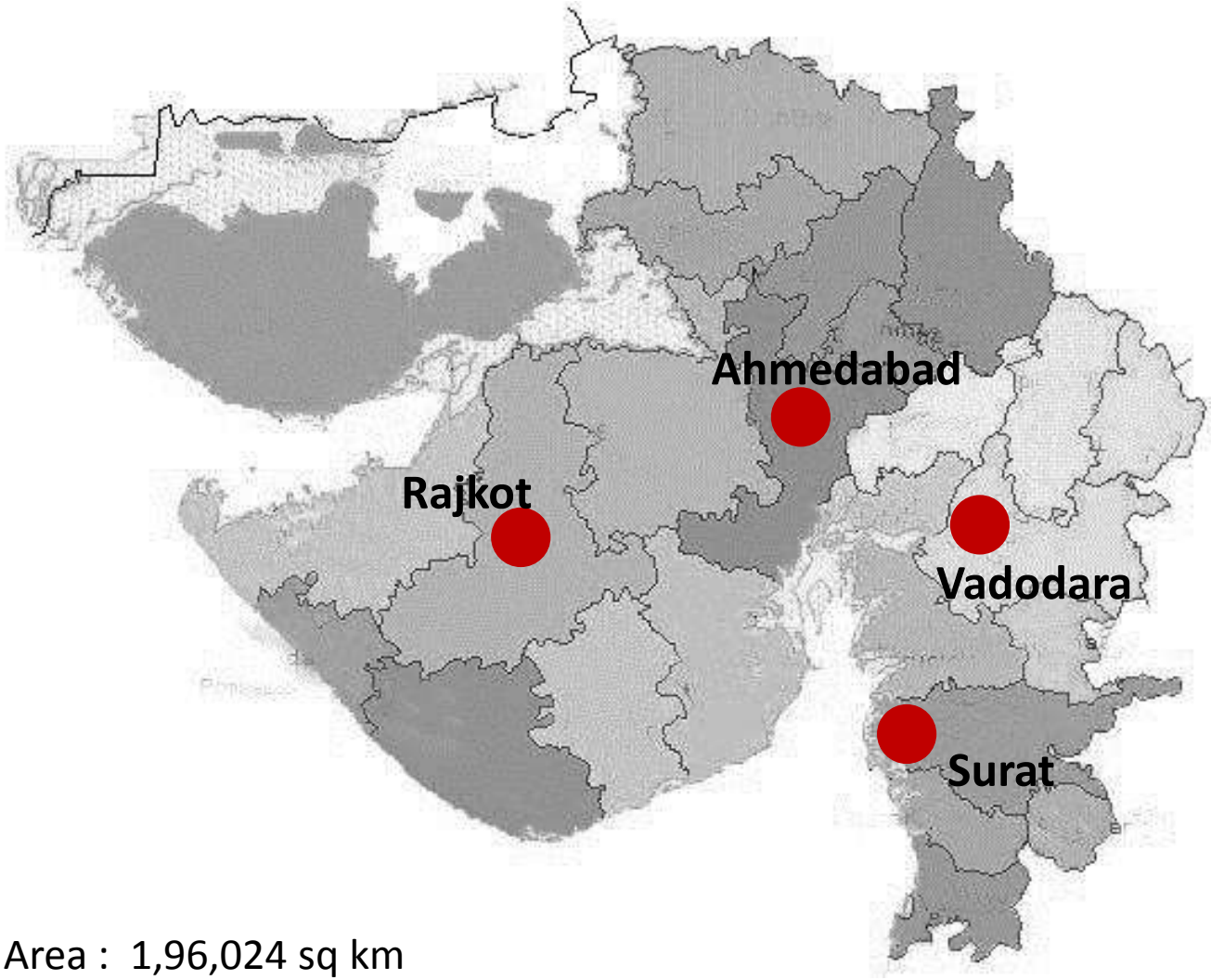
Gujarat

7th Largest state(area wise) in India

10th Largest state (population wise) in India

BRT Cities in Gujarat

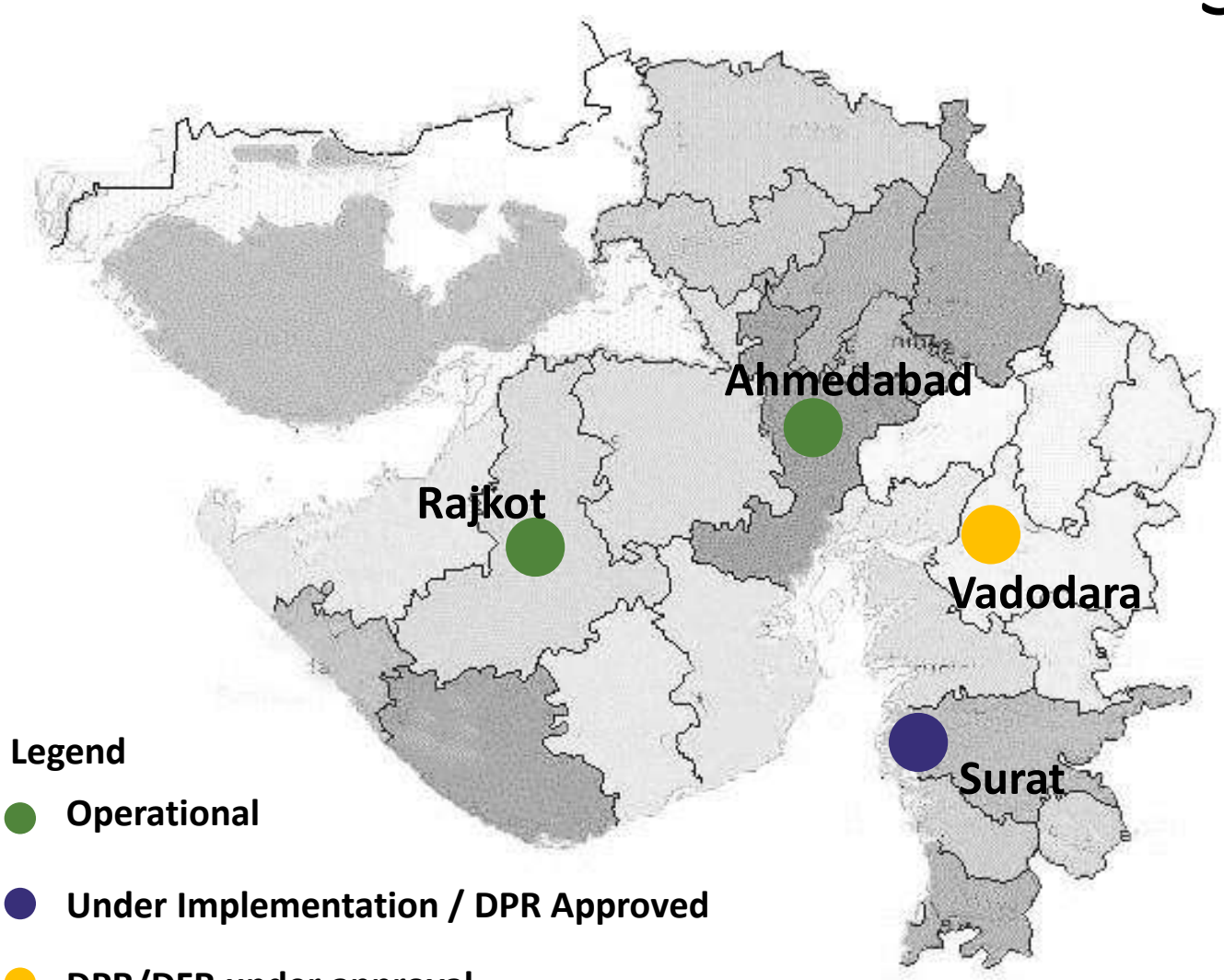
First four largest cities of Gujarat

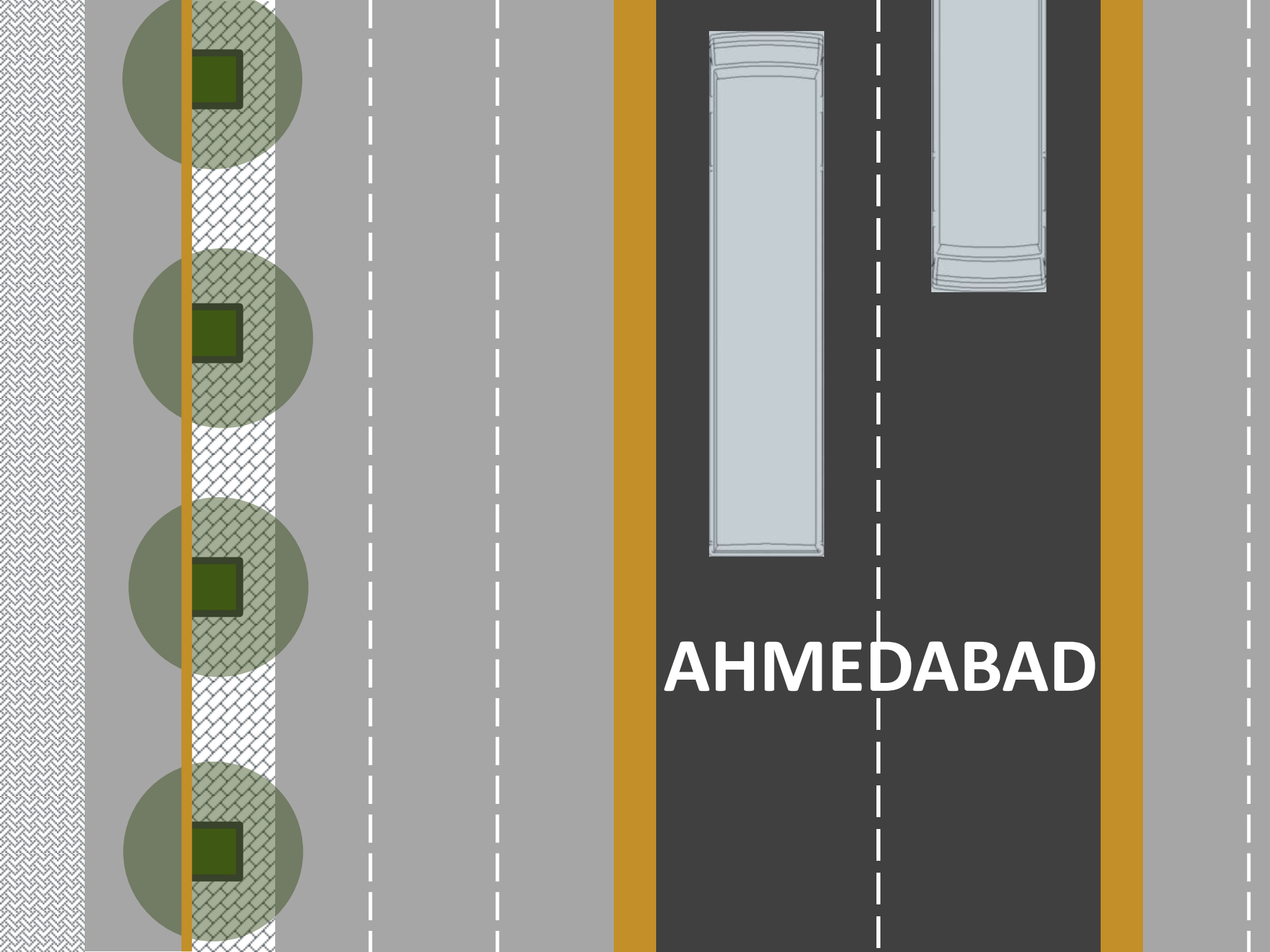


Area : 1,96,024 sq km

Population : 60.4 million

BRT Cities in Gujarat
Status

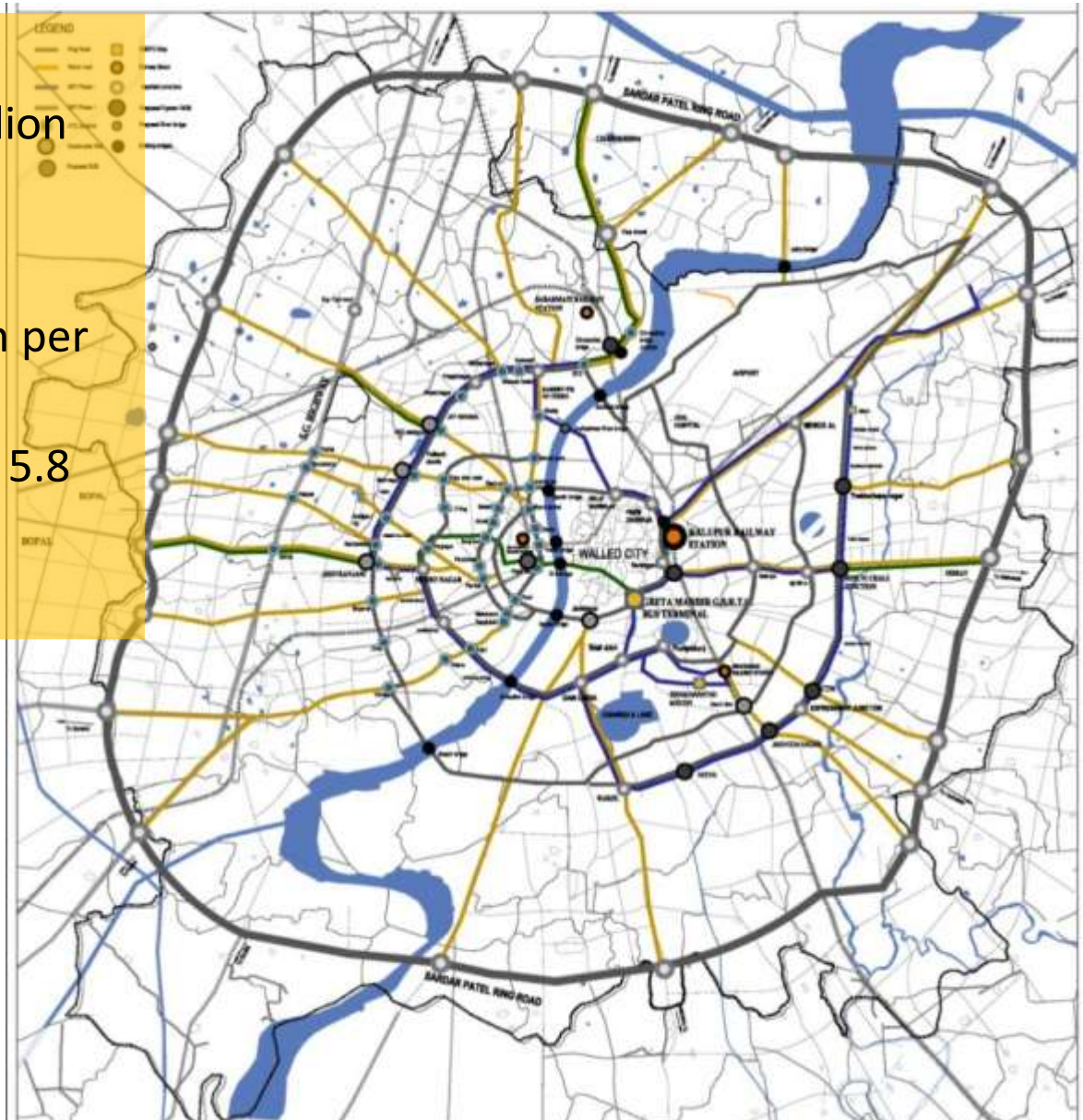



AHMEDABAD

AHMEDABAD

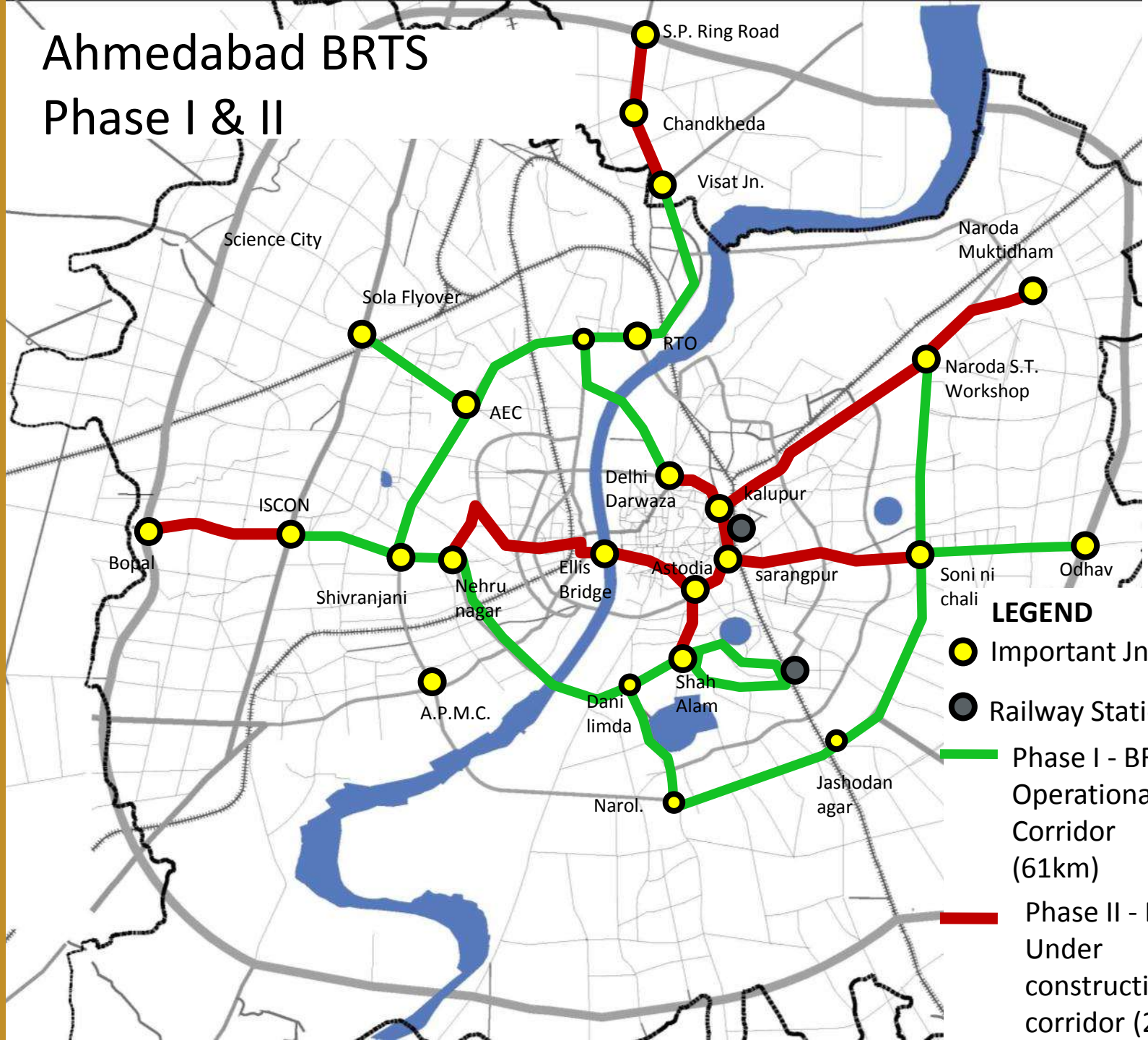
Ahmedabad Today

- Area of 466 sq kms
- Population of 6 million
- 2.7 million vehicles
- 2 wheelers-73 %
- Bus trips 0.9 million per day
- Average trip length 5.8 kms



AHMEDABAD

Ahmedabad BRTS
Phase I & II



AHMEDABAD

Status – Phase 01 & 02

- Civil Works:
- Network Development
  - 61 km implemented and operations
  - 28 km under construction
  - 93 BRTS station operational

- Infrastructure Development
  - 2-River bridges implemented to complete network and city mobility – operational
  - BRTS Depot cum Workshop at Chandola implemented and operational
  - BRTS Depot cum workshop at Odhav – tendered

AHMEDABAD

Glimpses – Phase 01 & 02

AHMEDABAD

Glimpses – Phase 01 & 02

AHMEDABAD

Glimpses – Phase 01 & 02

Landscaping along the corridor

AHMEDABAD

Glimpses – Phase 01 & 02

BRTS infrastructure complementing urban scape

AHMEDABAD

Glimpses – Phase 01 & 02

AHMEDABAD

Glimpses – Phase 01 & 02

ITS equipped and modern bus shelters

Glimpses – Phase 01 & 02

Creating community spaces along the corridor

AHMEDABAD

Glimpses – Phase 01 & 02

Workshop & depot for bus parking and maintenance

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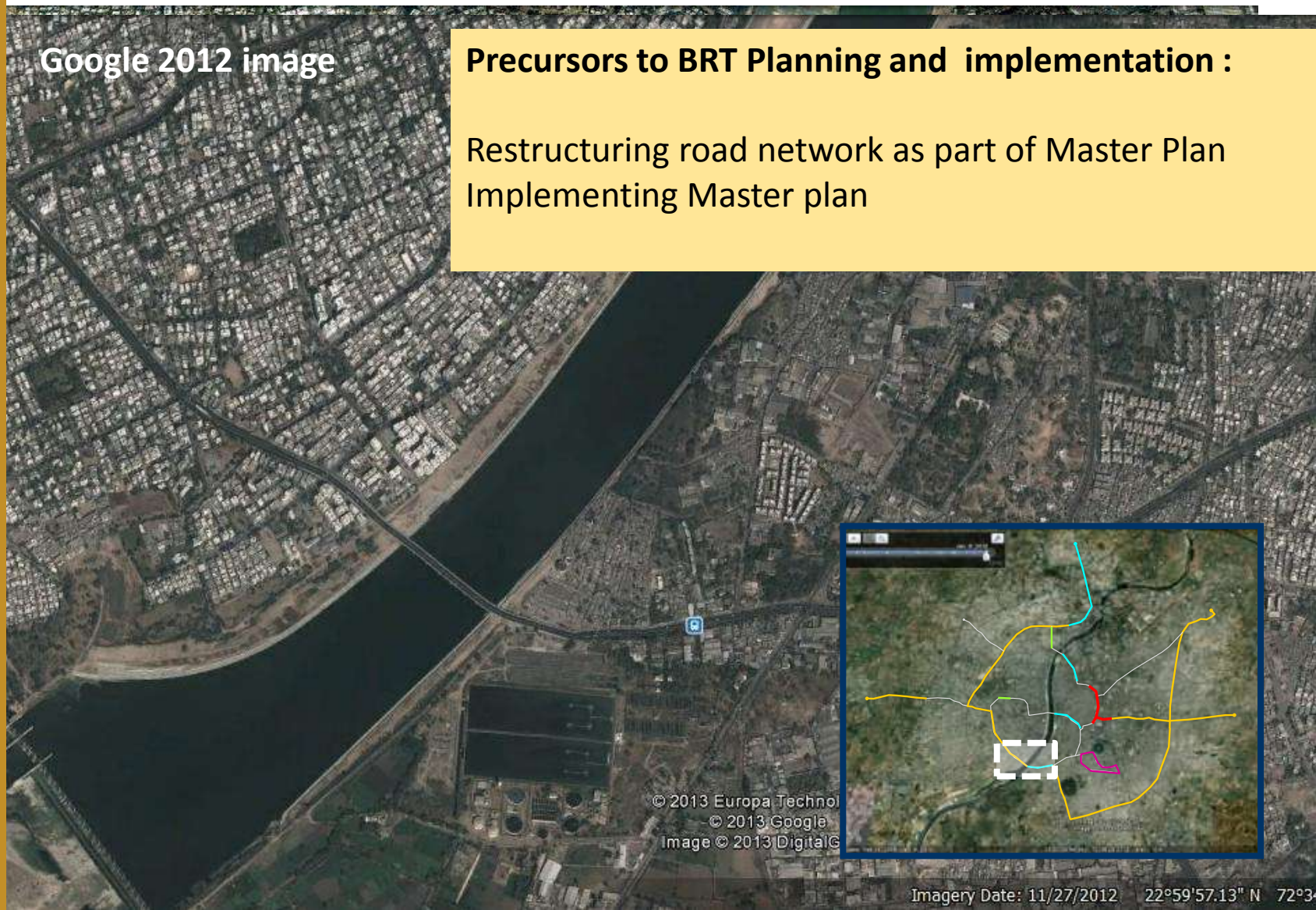
Land reforms examples
CHANDRANAGAR - PIRANA :
New river bridge connecting to Maninagar and eastern parts



Precursors to BRT Planning and implementation :

Restructuring road network as part of Master Plan
Implementing Master plan

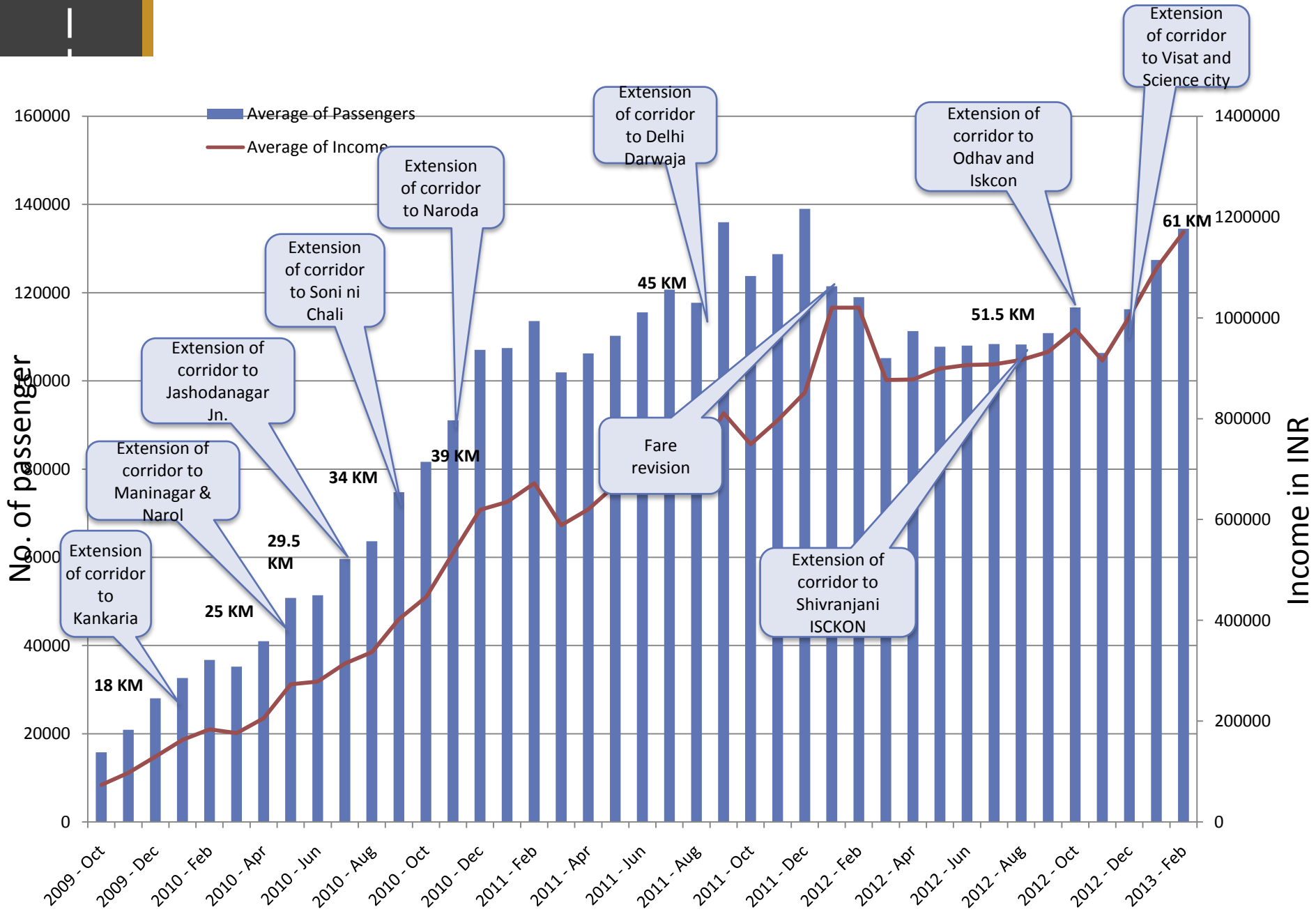
AHMEDABAD

Land reforms : DHANPITH – ASTODIA

AHMEDABAD

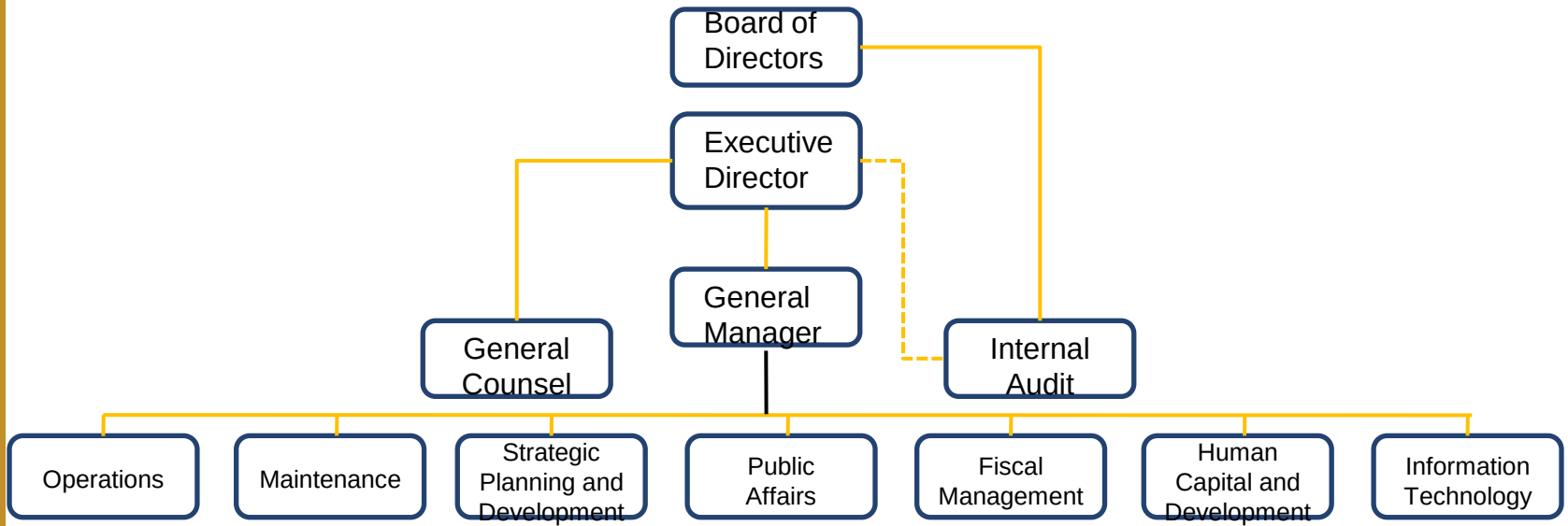
Ahmedabad BRTS (Janmarg) today

Network Length operational corridor	61Kms
Number of Stations	93
Operational Timings	6:00 AM to 11:00 PM
Peak Hours	8:00 AM – 10:45 PM ; 5:00 PM – 9:00 PM
Bus operated during Peak	119 (20 AC buses) (Weekday) , 106 (Sunday/Holiday)
Average Daily Ridership	1,40,000 (0.14 Million)


Average of Passengers
Average of Income
No. of passenger
Income in INR
160000
140000
120000
100000
80000
60000
40000
20000
0
1400000
1200000
1000000
800000
600000
400000
200000
0
18 KM
25 KM
29.5 KM
34 KM
39 KM
45 KM
51.5 KM
61 KM
Extension of corridor to Kankaria
Extension of corridor to Maninagar & Narol
Extension of corridor to Jashodanagar Jn.
Extension of corridor to Soni ni Chali
Extension of corridor to Naroda
Extension of corridor to Delhi Darwaja
Fare revision
Extension of corridor to Shivranjani ISCKON
Extension of corridor to Odhav and Iskcon
Extension of corridor to Visat and Science city
2009 - Oct
2009 - Dec
2010 - Feb
2010 - Apr
2010 - Jun
2010 - Aug
2010 - Oct
2010 - Dec
2011 - Feb
2011 - Apr
2011 - Jun
2011 - Aug
2011 - Oct
2011 - Dec
2012 - Feb
2012 - Apr
2012 - Jun
2012 - Aug
2012 - Oct
2012 - Dec
2013 - Feb

AHMEDABAD

Institutional Structure



Responsibilities of Janmarg

- Policy-making and setting standards for the corridors.
- Planning and design.
- Project implementation.
- Contracting.
- Operational management.
- Financial management.
- Administration.
- Marketing.

AHMEDABAD

Fare revision formula – Once a year

Changes linked to fuel price change in same proportion (effected monthly)

Changes linked to changes in Wholesale Price Index (effected annually)

1.2 Lag Effect – on Both Components

Revised Fare = Base Fare + 1.2*((Base Fare*0.5*change in fuel price)+ (Base Fare* 0.5 * Change in Whole Sale Price Index))

RF=6.02 + **1.2** x ((6.02 x **0.5** x (46.15-35.4)/35.4) + (6.02 x **0.5** x (154.9-127.3)/127.3))

Ratio of Fuel and Other Cost payments as of September 2012 is 48:52

AHMEDABAD

PPP Arrangements

There are a total of **nine PPP arrangements** which Ahmedabad Janmarg has entered into to ensure efficient operations of Janmarg BRTS

Component	Solution/Design	Construction /Supply	Operations	Management	Maintenance
Bus Stations / Corridor / Flyovers	AJL/CEPT	Fixed Time/ Fixed Rate Contractor	-	-	Presently under Defect Liability Period
Buses	AJL/CEPT	Buses hired for 7 years from Operator	Bus Operator	Janmarg/ Operator	Bus Operator
Control Room Management., IT Systems , Ticketing,	AJL/CEPT	Service Provider	Service Provider through annuity	Service Provider through annuity	Service Provider through annuity
Sky Walks	Conceptual Design by CEPT/ Detailed Design by Concessionaire	Concessionaire	Concessionaire	Concessionaire	Concessionaire
Parking	AJL/CEPT	Parking constructed as part of corridor	Pay and Park Operator	Operator overseen by Janmarg	Pay and Park Operator
Hardware elements (Sliding doors/ turnstiles)	AJL/CEPT	Supplier	Janmarg / Service Provider	Janmarg / Service Provider	Supplier through AMC
Advertisement Rights	AJL/CEPT	Licensee	Licensee	Janmarg	Licensee
House Keeping	AJL/CEPT		-	Janmarg	Service Provider
Landscaping	AJL/CEPT	Licensee	-	Janmarg	Licensee

AHMEDABAD

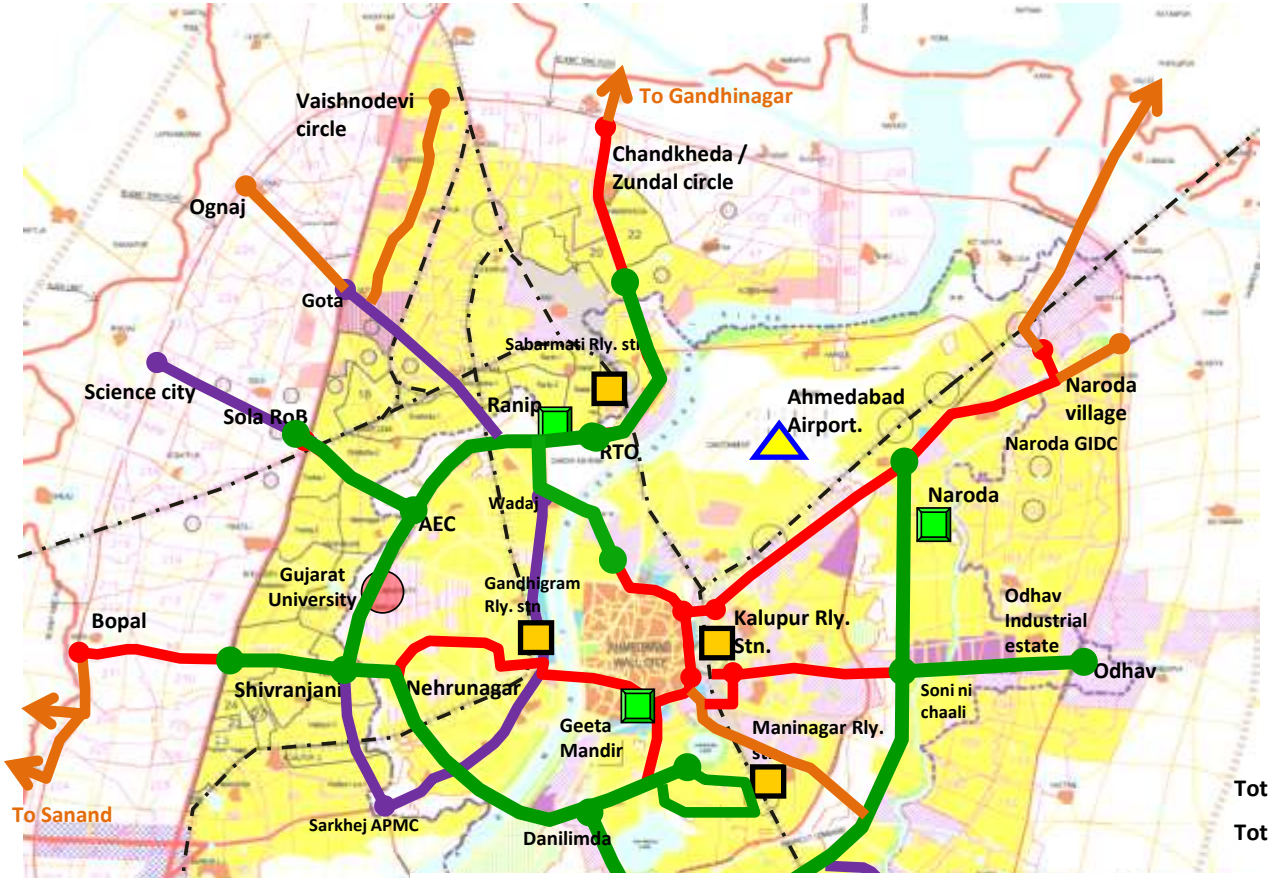
Ahmedabad BRTS Capital cost expenditure till date

Element	Qty	Expenditure
Roadway construction (including bus lanes)	61 km operational corridor	6100 Million INR (112 Million USD)
Bus shelters	93 operational bus shelter	418.5 Million INR (77 Million USD)
Workshop/depot	1	150 Million INR (27.6 Million USD)
Total capital cost expenditure for BRTS Infrastructure development		6668.5 Million INR (1227 Million USD)

Note: includes infrastructure cost for 61km operational corridors, cost of 28km under construction corridors have not been added here.

AHMEDABAD

Selected Corridors for Phase 03



- Network identified for BRTS phase 03: **26.8km**
- Total coverage of BRTS after phase 03 network: **135 sqkm**
- BRTS Stations proposed in phase 03: **52 stations**

AHMEDABAD

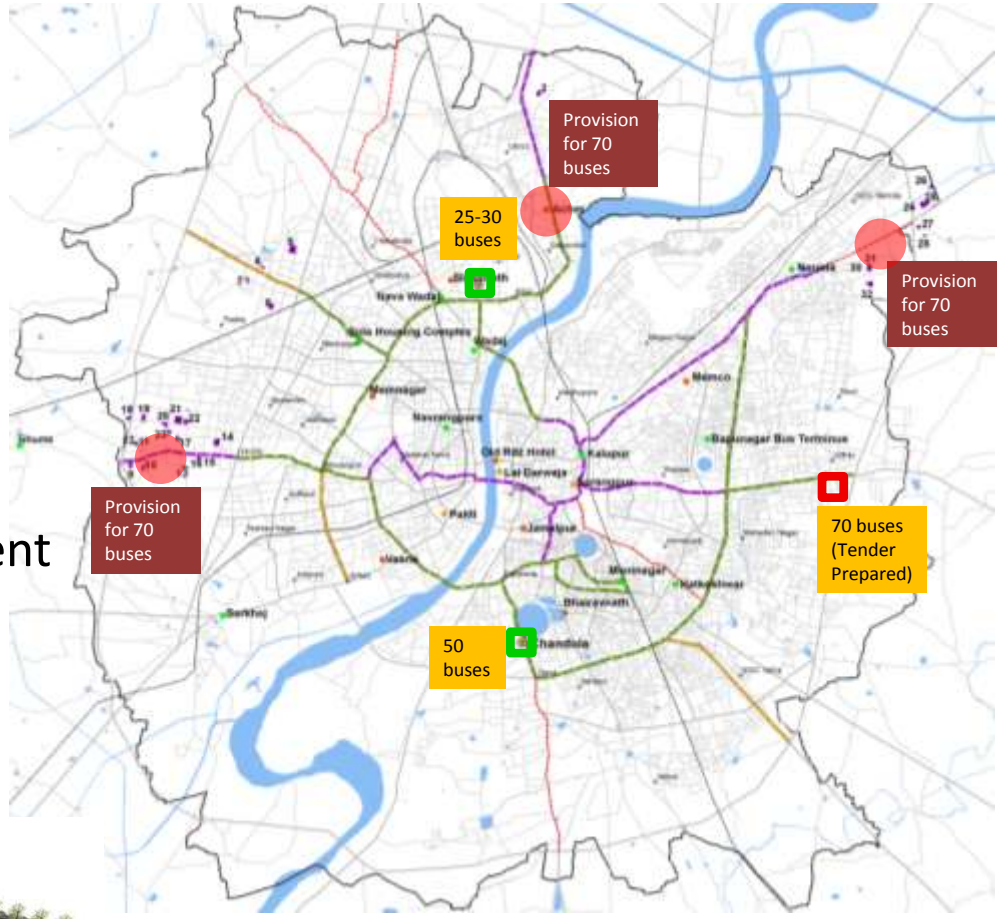
Design Elements for Phase 03

Proposed BRTS Depot Infrastructure

- Acher (70)
- Ambli (70)
- Naroda (70)

Benefits

- Bus dispatch management
- Quick response to incidence management
- Reducing dead kms



AHMEDABAD

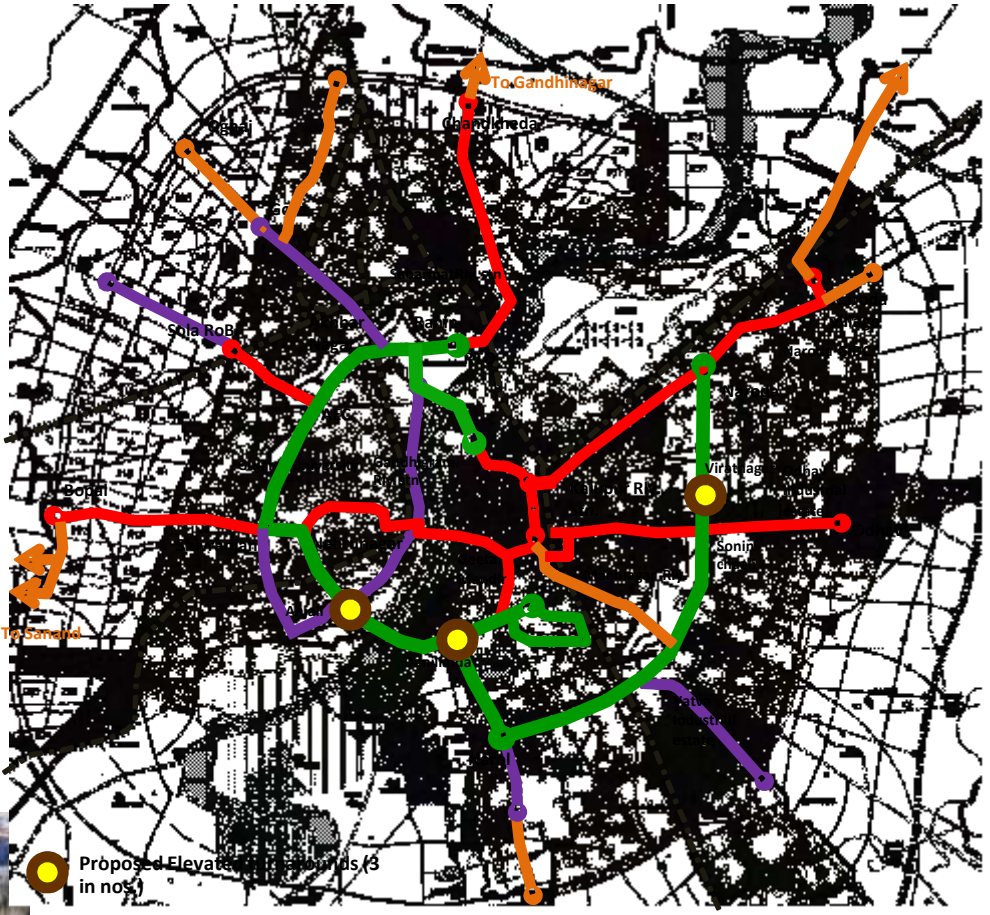
Design innovations for Phase 03

Elevated Turn-around facility

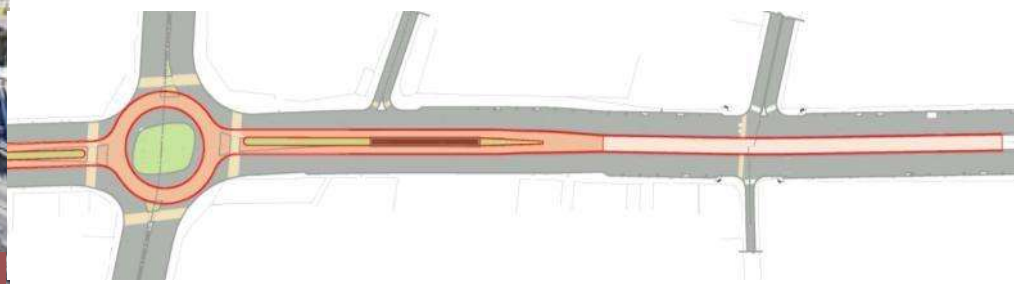
- Anjali
- Danilimda
- Viratnagar

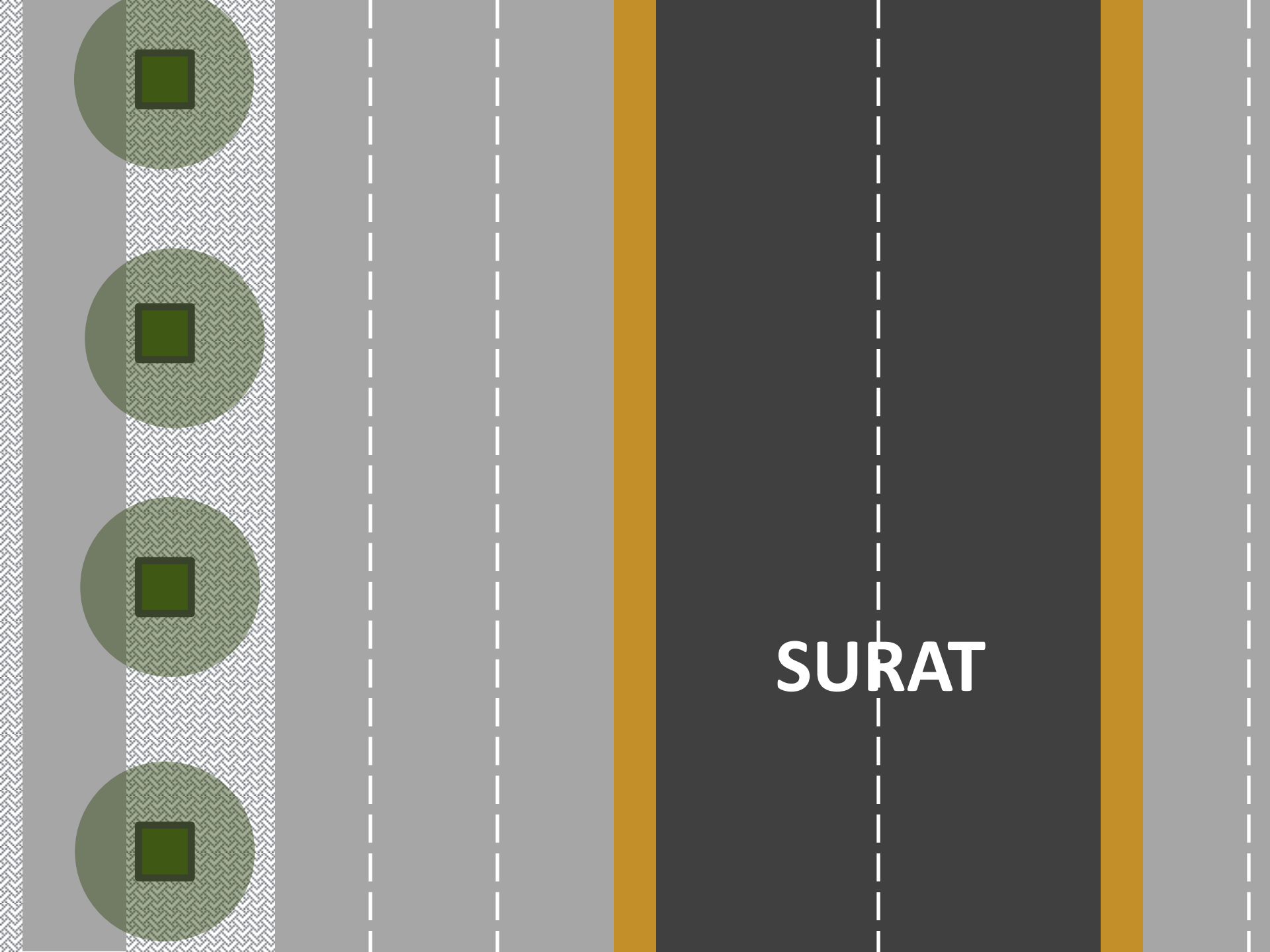
Benefits

- Operational flexibility
- Reduce Junction delays



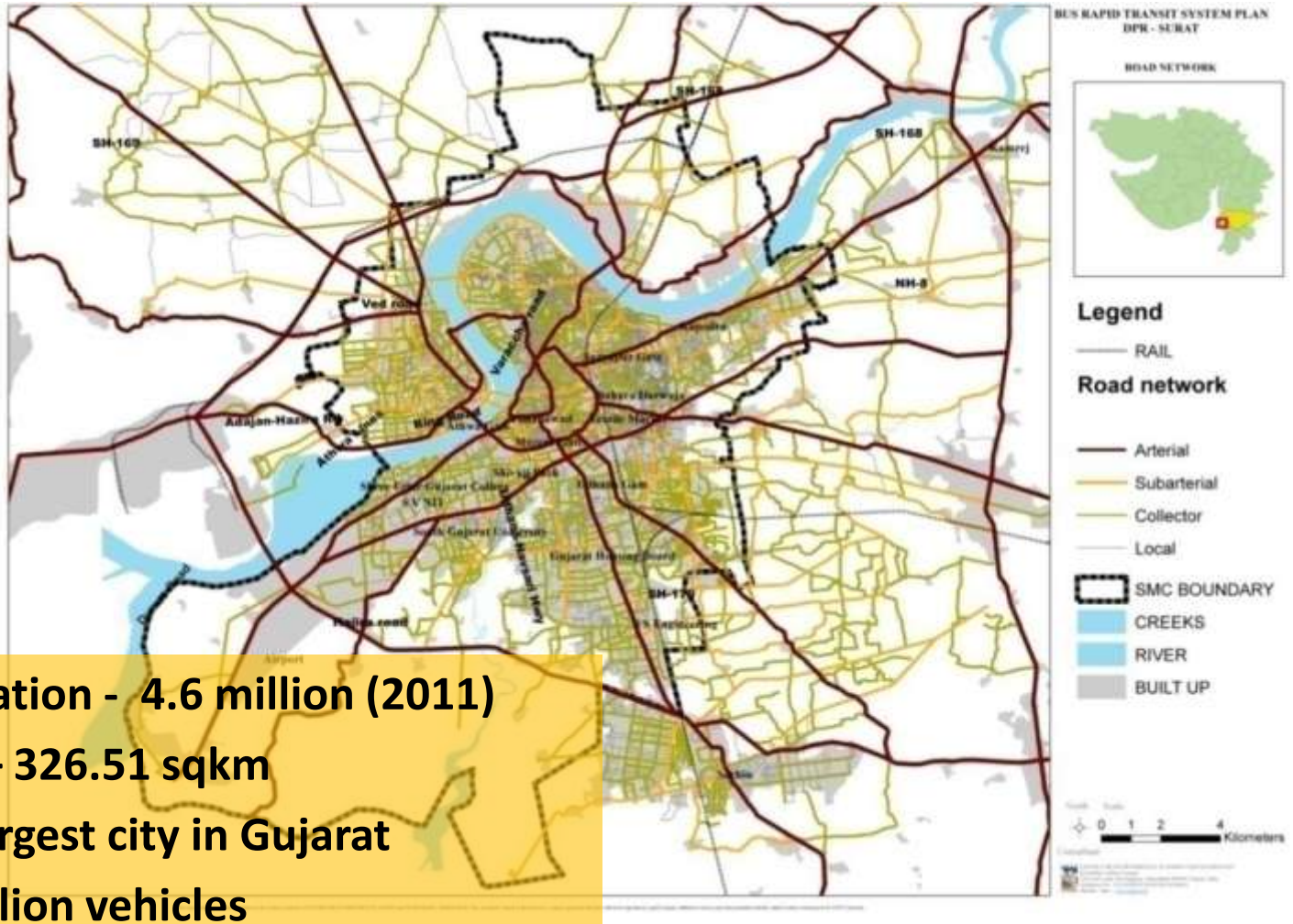
Example : Topakapi, Istanbul




SURAT

SURAT

Surat today



- Population - 4.6 million (2011)
- Area – 326.51 sqkm
- 2nd largest city in Gujarat
- 3.6 million vehicles
- 2 wheelers – above 50 % share
- Average trip length 4.11km

SURAT

SURAT BRTS NETWORK

PHASE 1

- Year of Sanction 2008
- Start Year of implementation – 2009
- Phase 1 Corridors – 30 km
  - Corridor 1 (10 km) Completion date – 2013
  - Corridor 2 (20 km) Completion date – 2014

PHASE 2

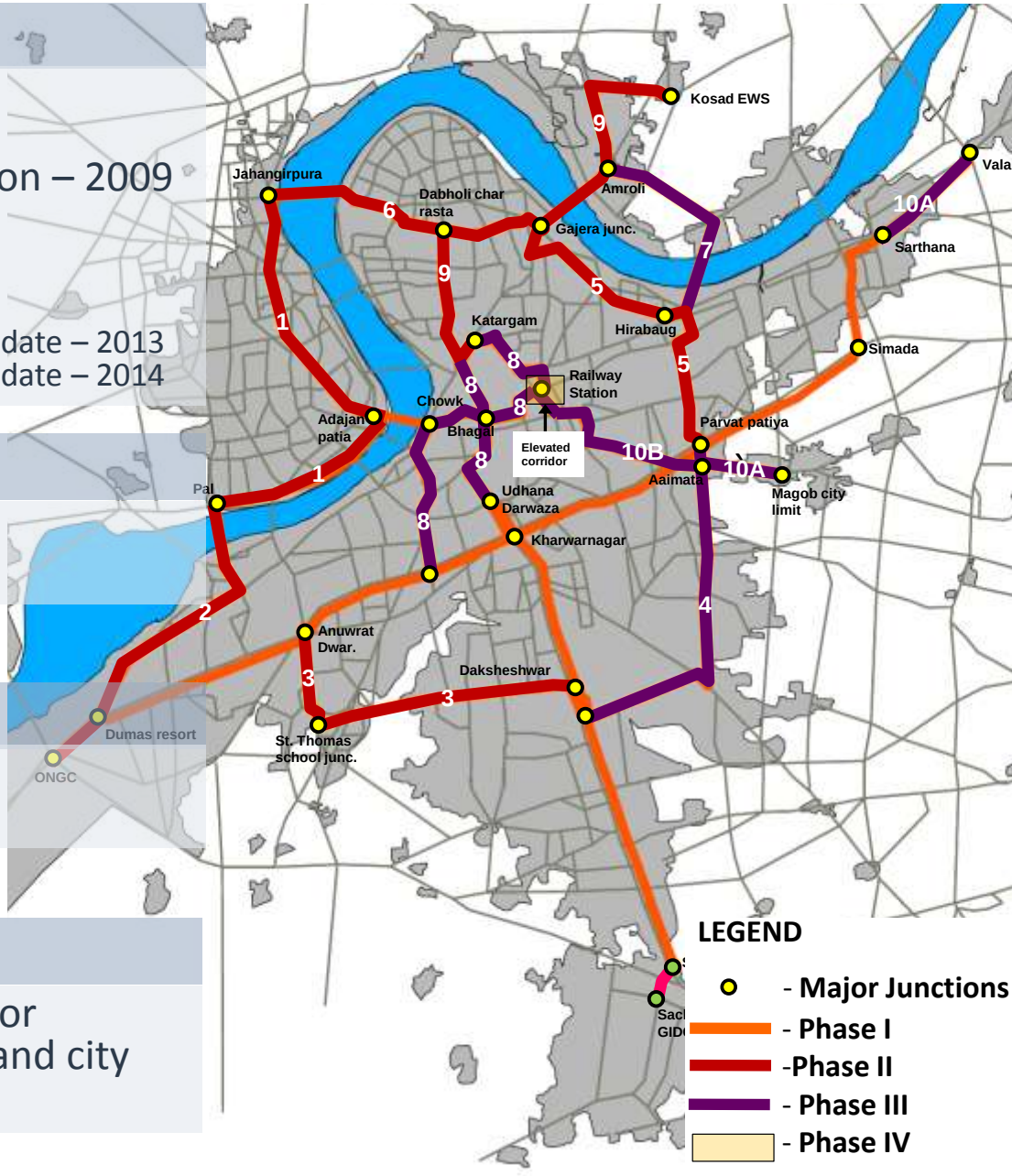
- Network length - 42 kms

PHASE 3

- Network length - 30 kms

PHASE 4

- 3.5 km long elevated corridor connecting railway station and city center

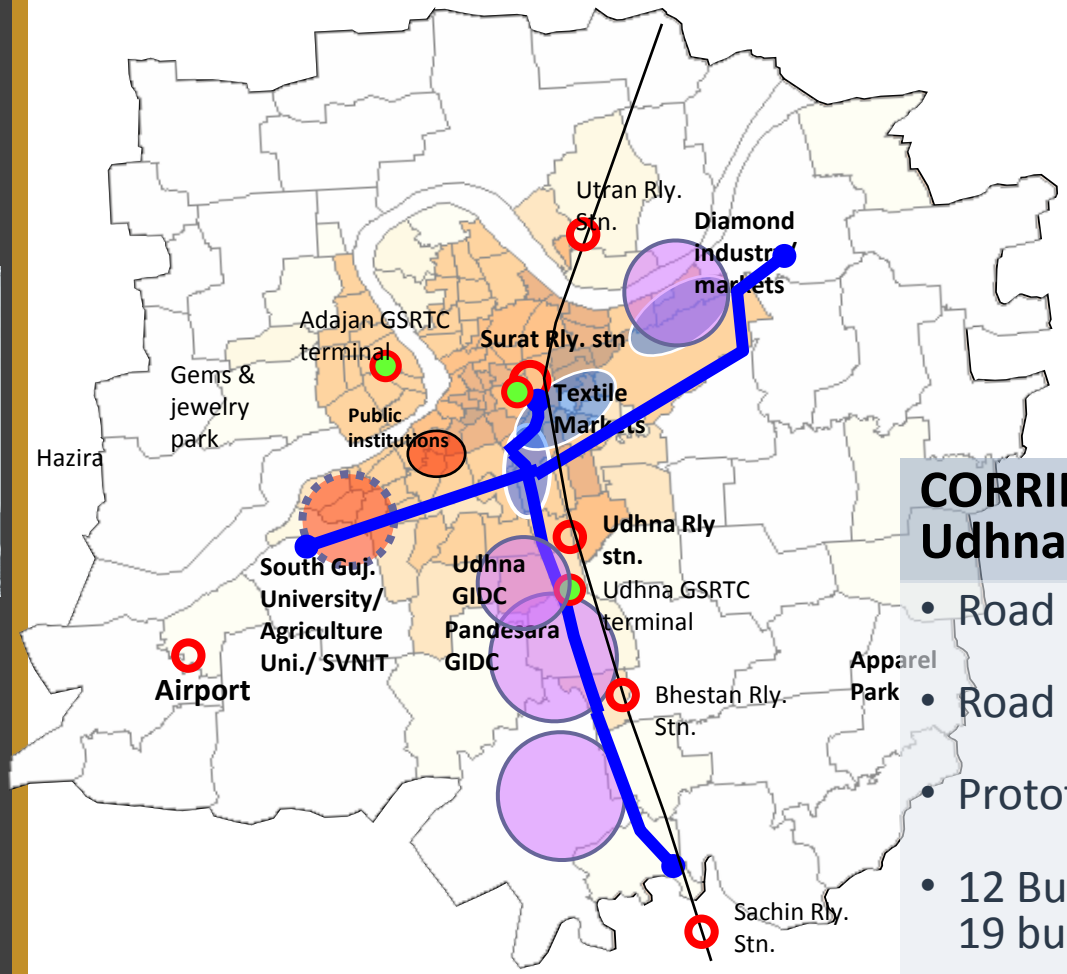


SURAT

Corridor Selection

- Corridors creating complete public transit network
- Connectivity of major origin and destinations
- Catalyst for area development - low income & low accessibility zones
- Formation of strong network for flexible route operations

Phase 1 – Work Status



CORRIDOR 1
Udhna Sachin (10 km)

- Road work completed - 4 km
- Road work under construction – 6 km
- Prototype Bus Stop completed
- 12 Bus stops under Progress of total 19 bus stops

CORRIDOR 2
Canal Corridor (20 km)

- Road work under construction:
- Bus stops tender uploaded

SURAT

Phase 1 Status

Ongoing Work at Udhana Sachin corridor and on Canal road

SURAT

Phase 1 Status

Ongoing Work at Dumas resort

SURAT

Phase 1 Status

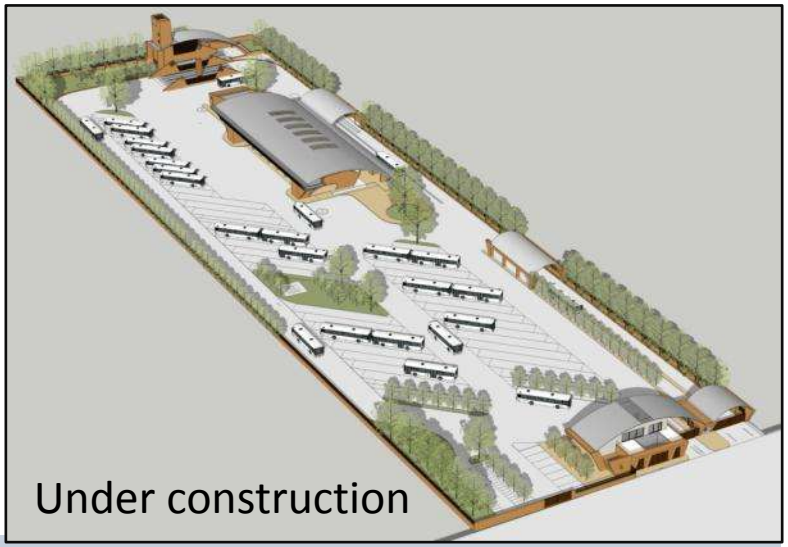
Prototype Bus Station Completed

Activity Area

Trees retained along Footpath

SURAT

Phase 1 Infrastructure



Proposed Workshop and Depot

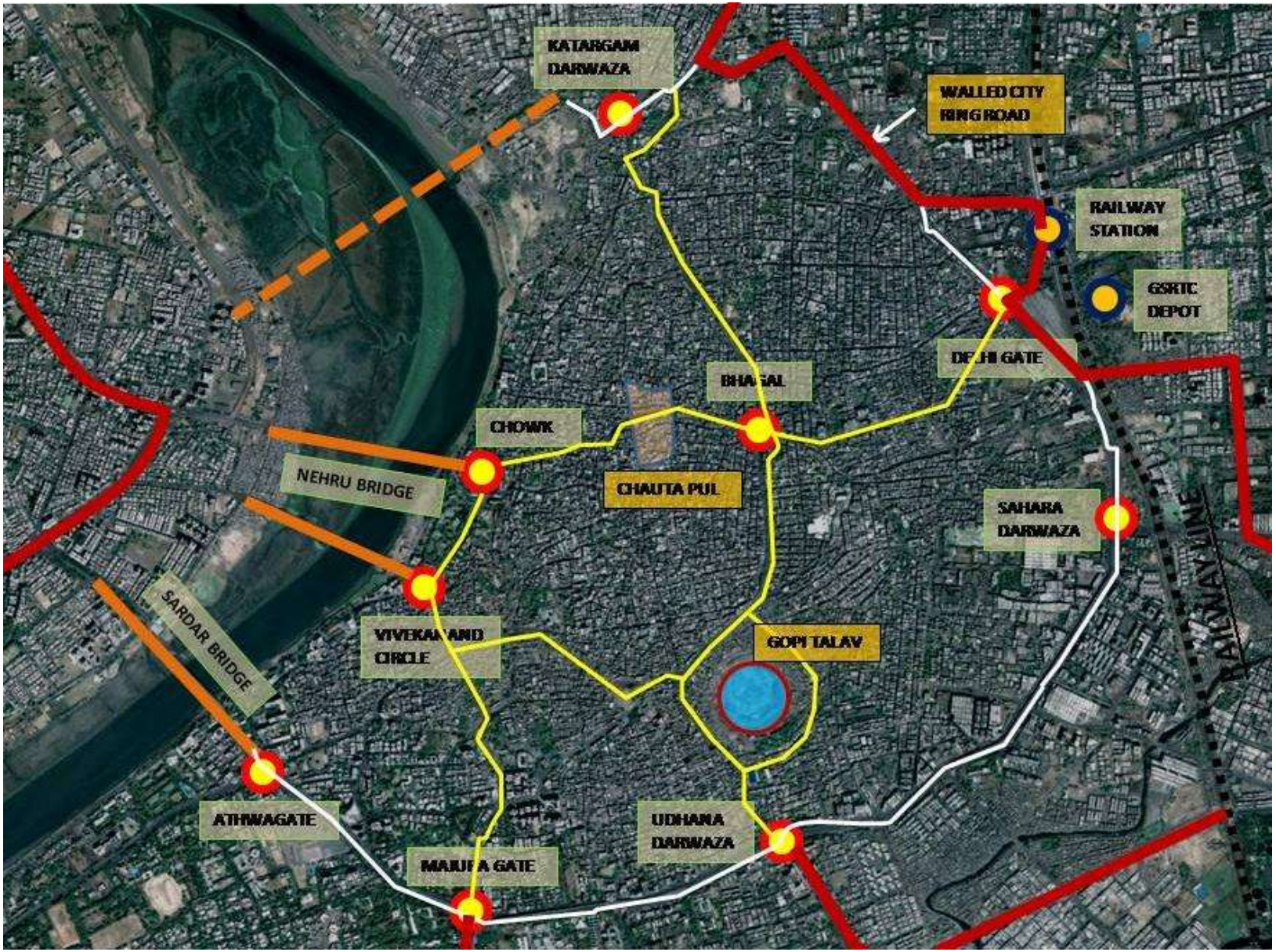
Prototype Bus Station

Workshop Depot design: Bhestan plot

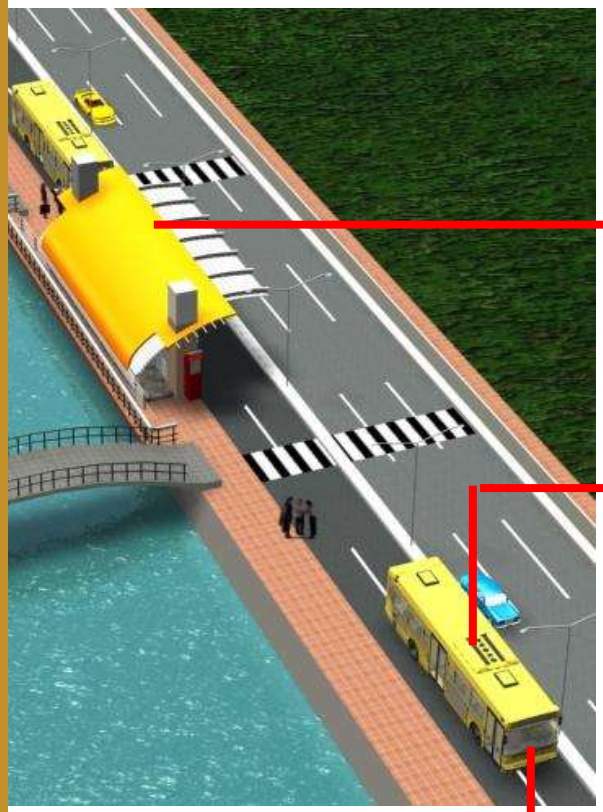
Control centre

SURAT

Inner city access (phase 4)



ITS Application, Operations control & Passenger Information System



PASSENGER INFORMATION SYSTEM

Passenger Information System in BRT Stops and terminals

Passenger Information System in Bus

Operations Control Center

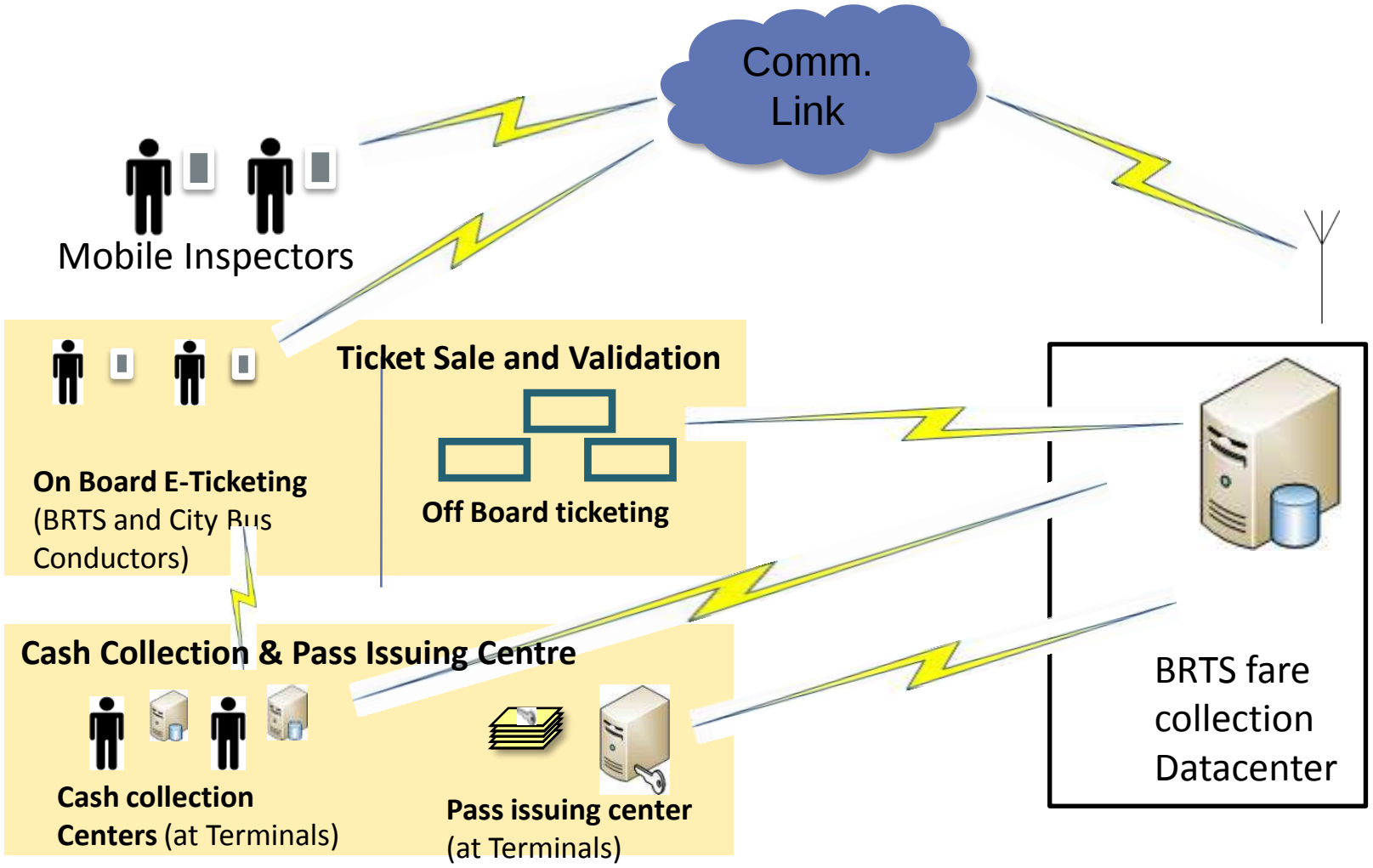
AUTOMATIC VEHICLE TRACKING & OPERATIONS CONTROL

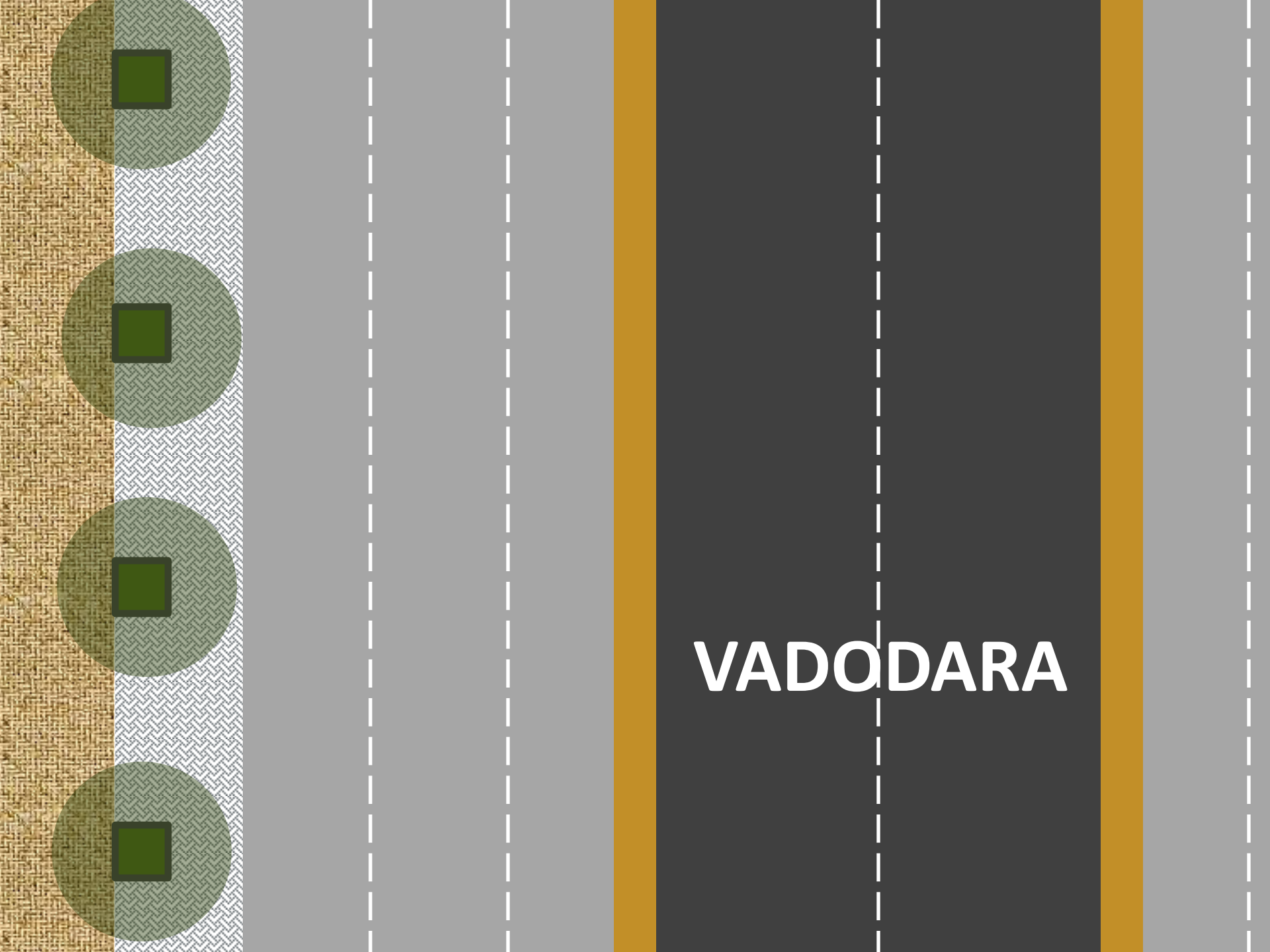
GPS/ GPRS module with two way voice and data communication

BUS OPERATOR DEPOT

SURAT

Electronic fare collection system




VADODARA

Vadodara landmarks and major activity centres

VADODARA

Area : 158.5 sqkm(VMC)

Population: 1.66 million (VMC)

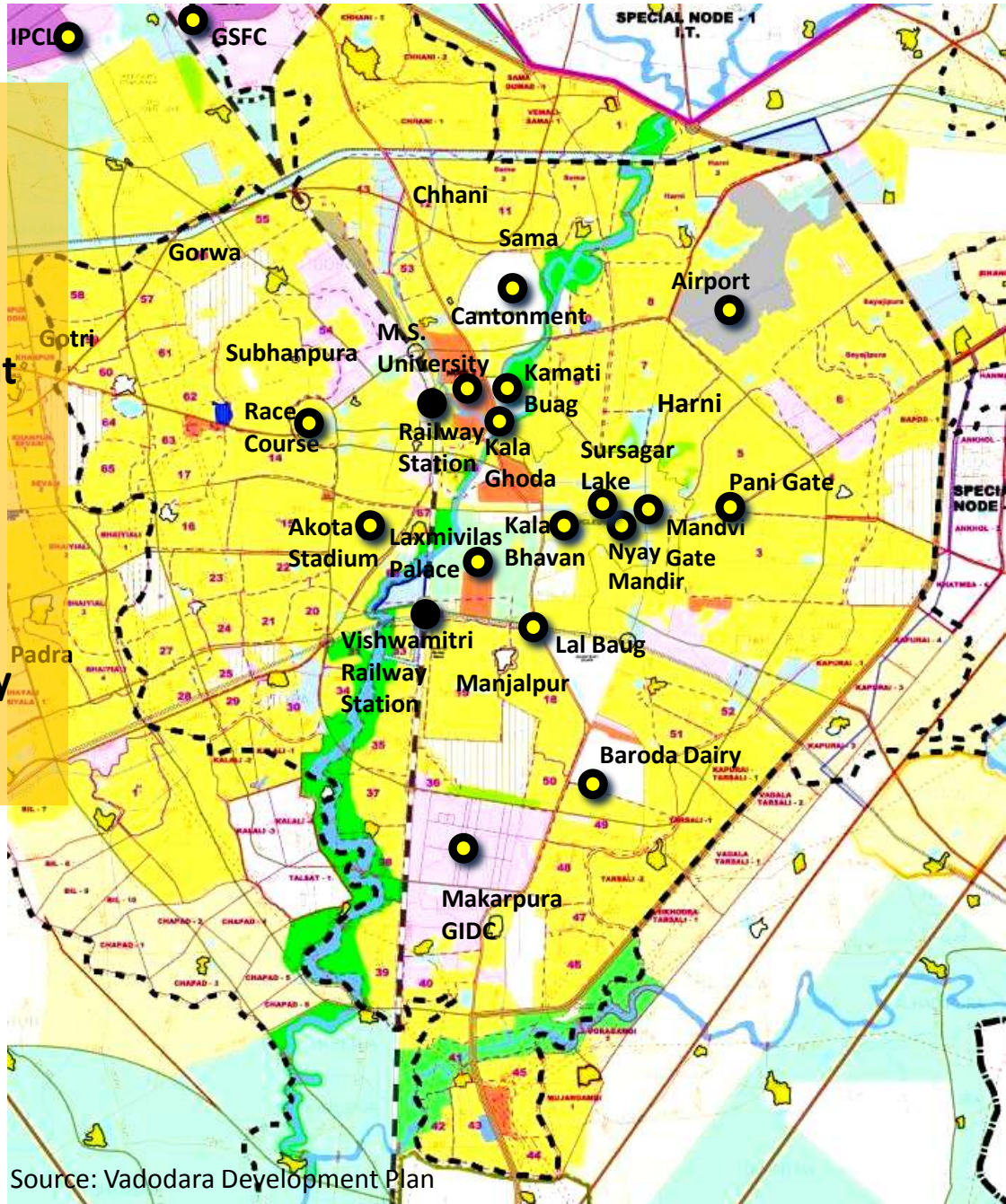
Third largest city of Gujarat

1.4 million vehicles

2 wheeler 76%

Average trip length 4.8km

Known as “the cultural city of Gujarat”



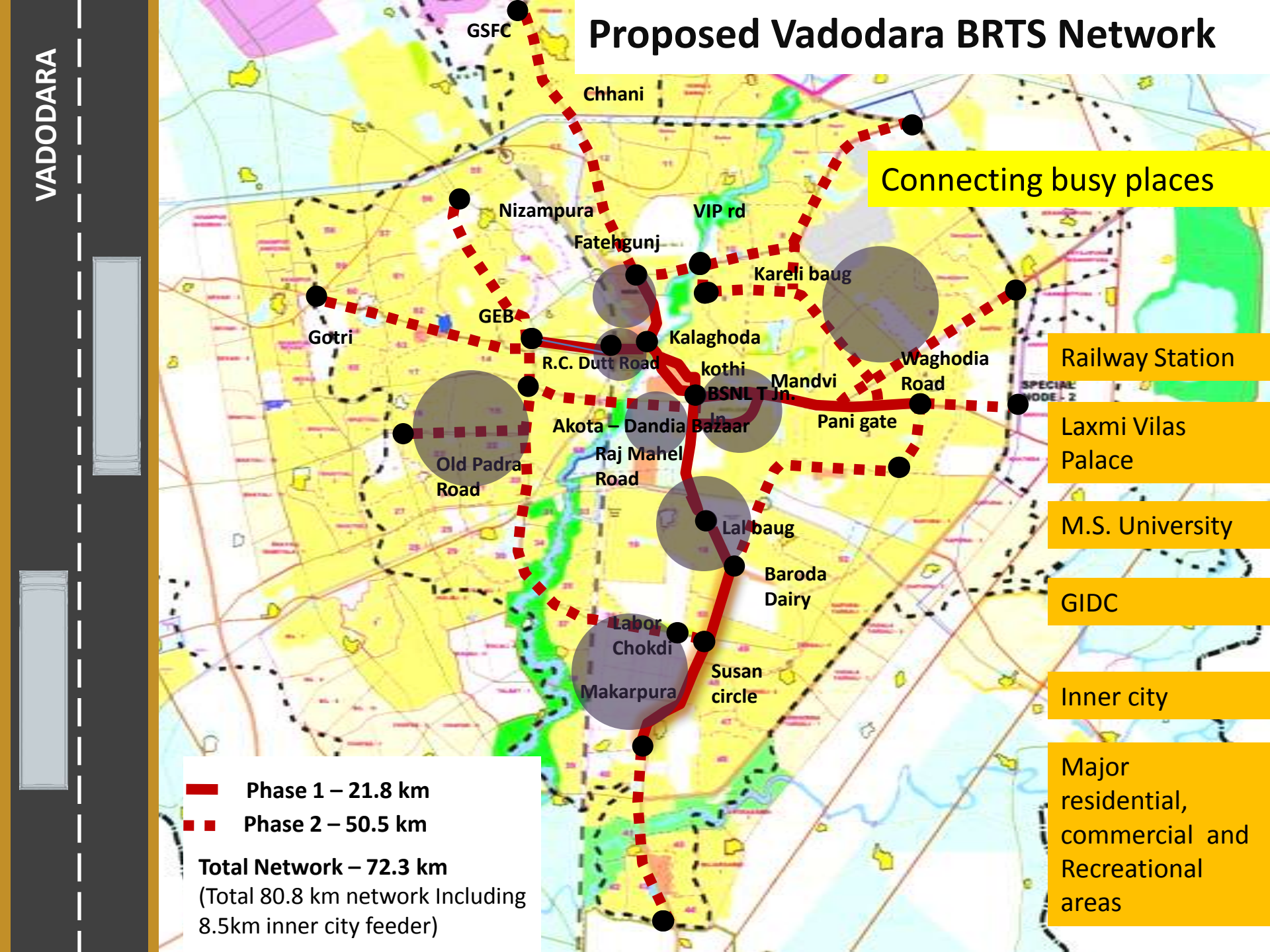
Source: Vadodara Development Plan

VADODARA

Mobility challenges

- Rapid city growth
- Inadequacies in the road network
  - Missing hierarchy
  - Lack of uniformity in RoW
  - Physical constraints – River, Canal, Railway Line
- Inadequate and inferior public transport (4% mode share) and para transit dependancy (19% share)
- Access to inner city
- Accidents due to interference of regional goods and passenger vehicles
- Congestion and high private vehicle dependency

Proposed Vadodara BRTS Network



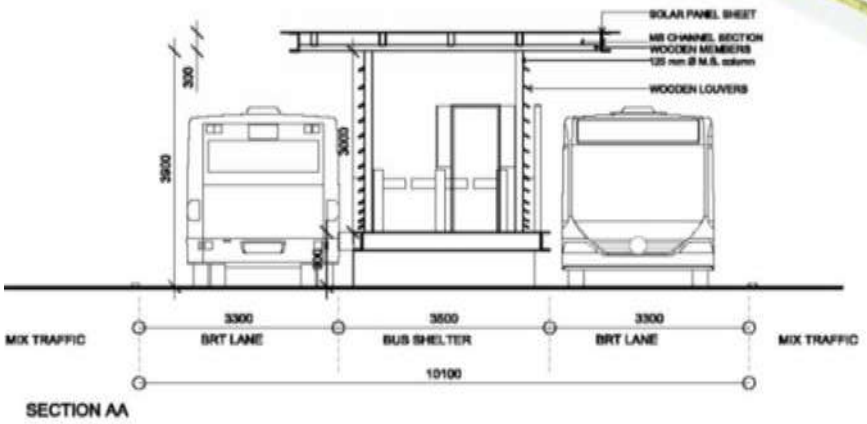
VADODARA

Key features of BRTS in Vadodara

- First phase to connect Railway station, M.S. University and major industrial and commercial area
- Connectivity to inner city
- Provision of feeder lines to BRTS trunk routes
- Small buses in core city area to accommodate existing movement and public transit

VADODARA

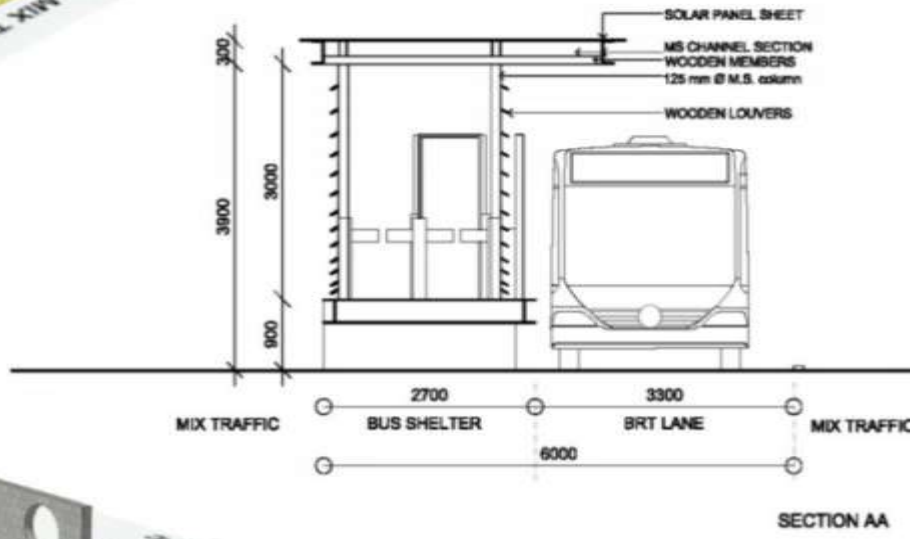
Infrastructure for Vadodara BRTS – Regular bus shelter



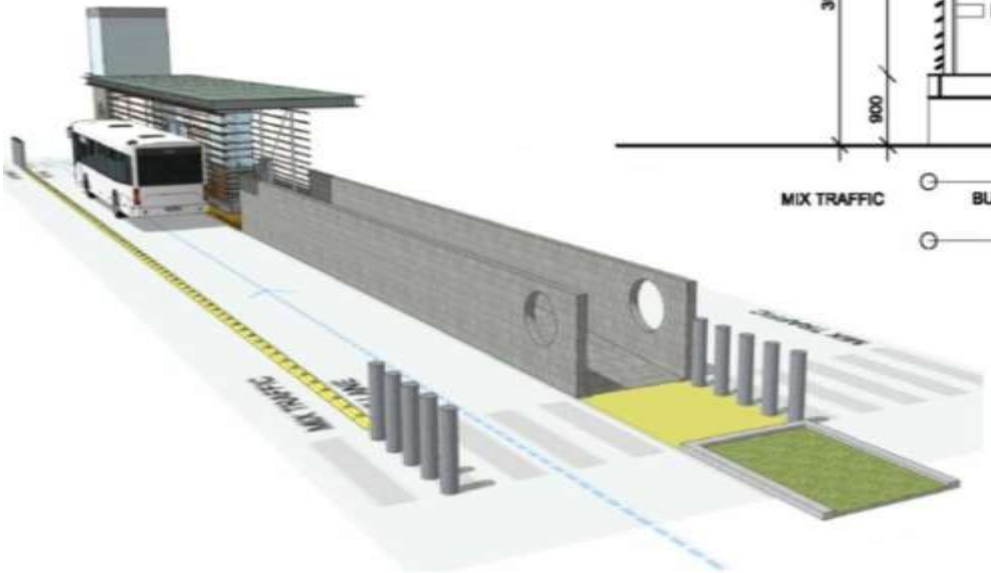
SECTION AA

VADODARA

Infrastructure for Vadodara BRTS – One way bus shelter



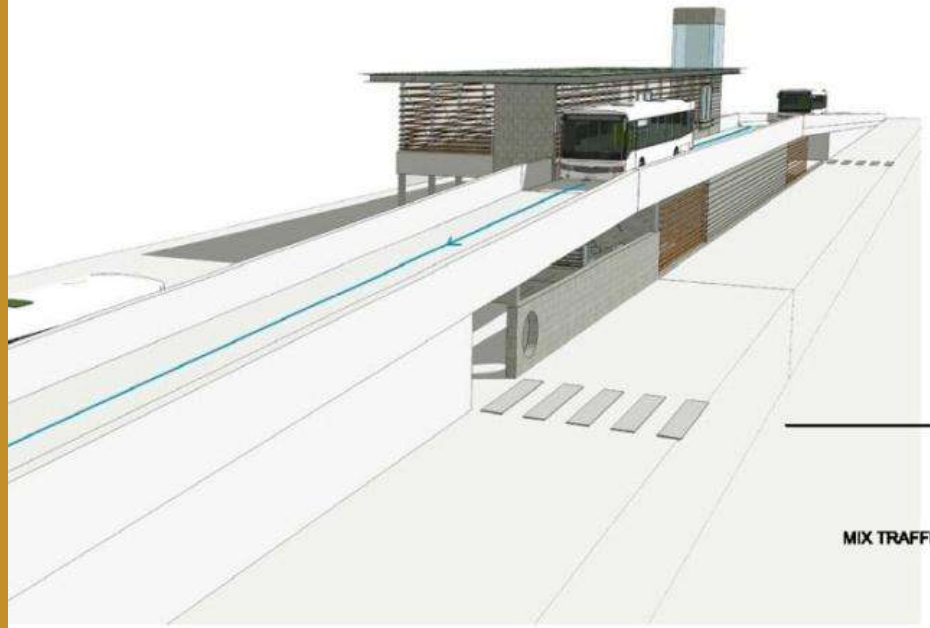
SECTION AA

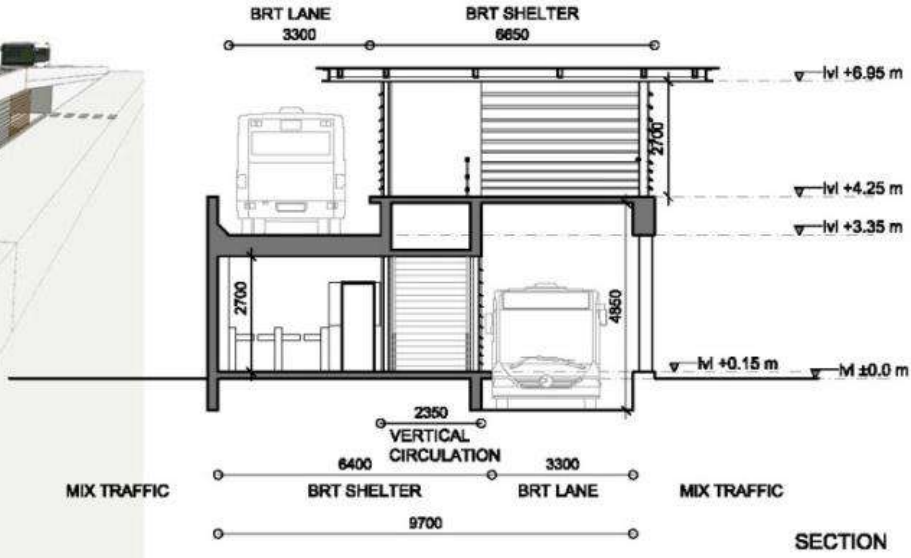


VADODARA

Innovative Bus shelter design – Vertical Split bus shelters

For inner city and other corridors with smaller RoW



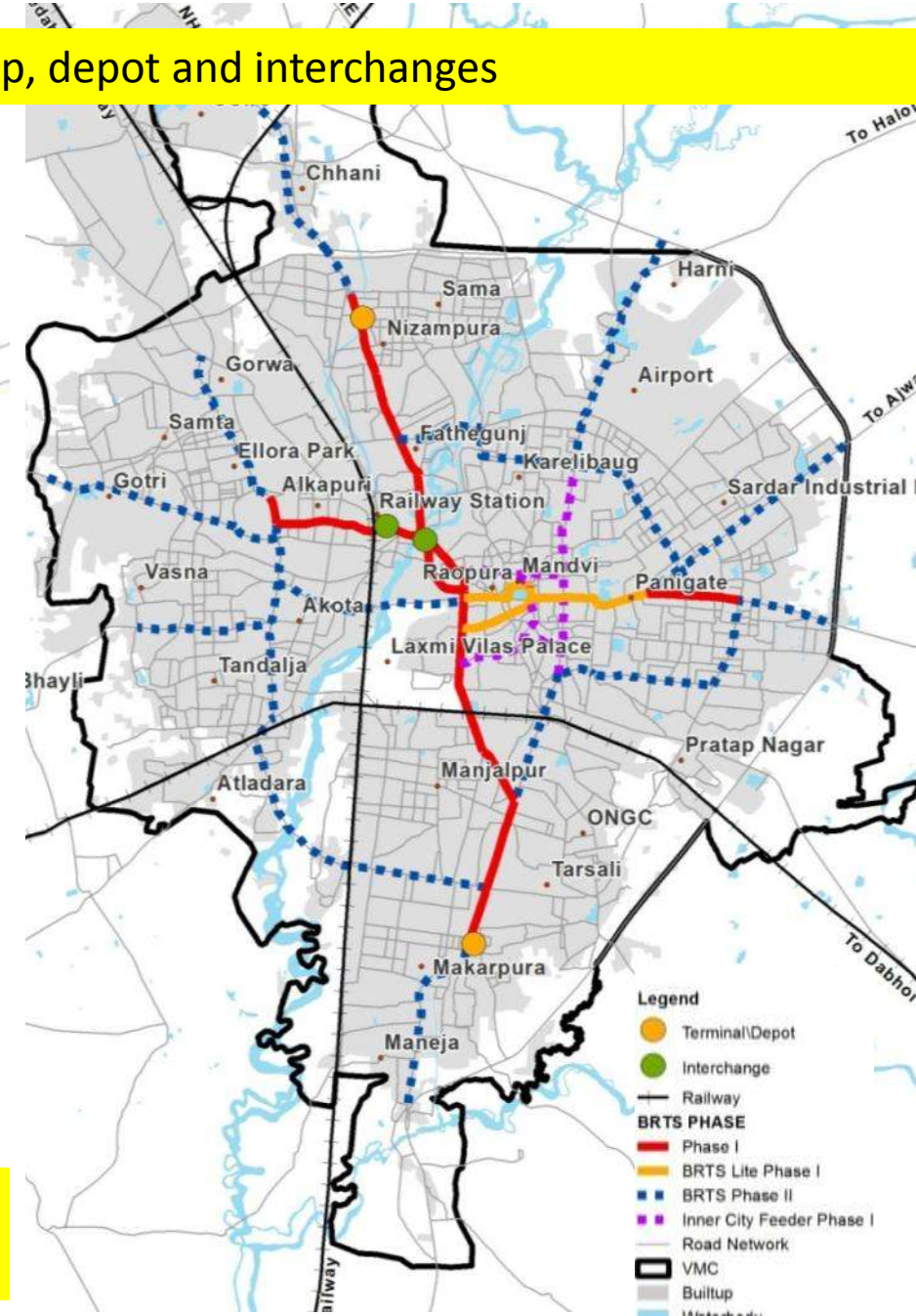


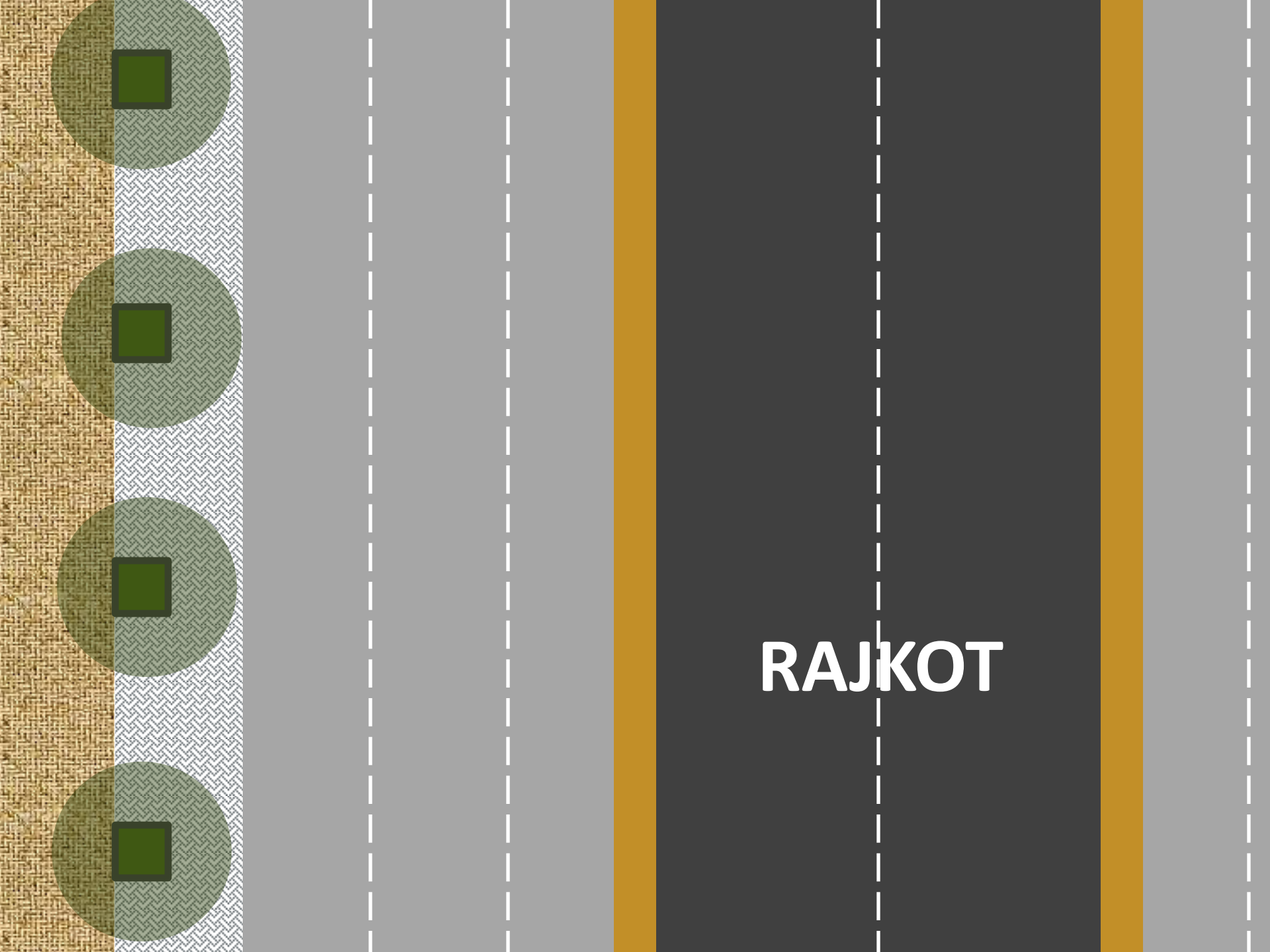
VADODARA

Transit infrastructure for Vadodara

Locations of Workshop, depot and interchanges

Conceptual design for Terminal, workshop/depot at Nizampura




RAJKOT

RAJKOT

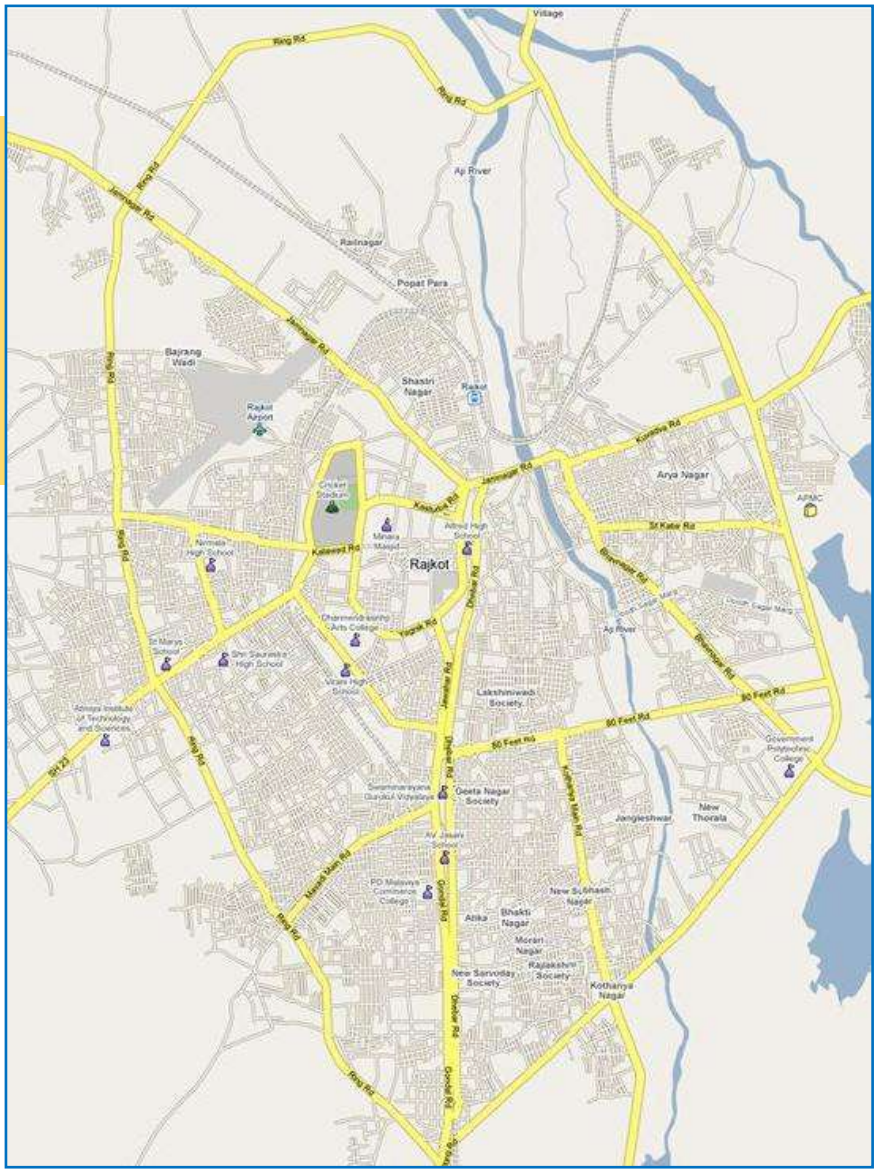
About City

Area : 104.86 Sq.Kms

Population : 1.3 million

(as per census 2011)

Heart of Saurashtra region



RAJKOT

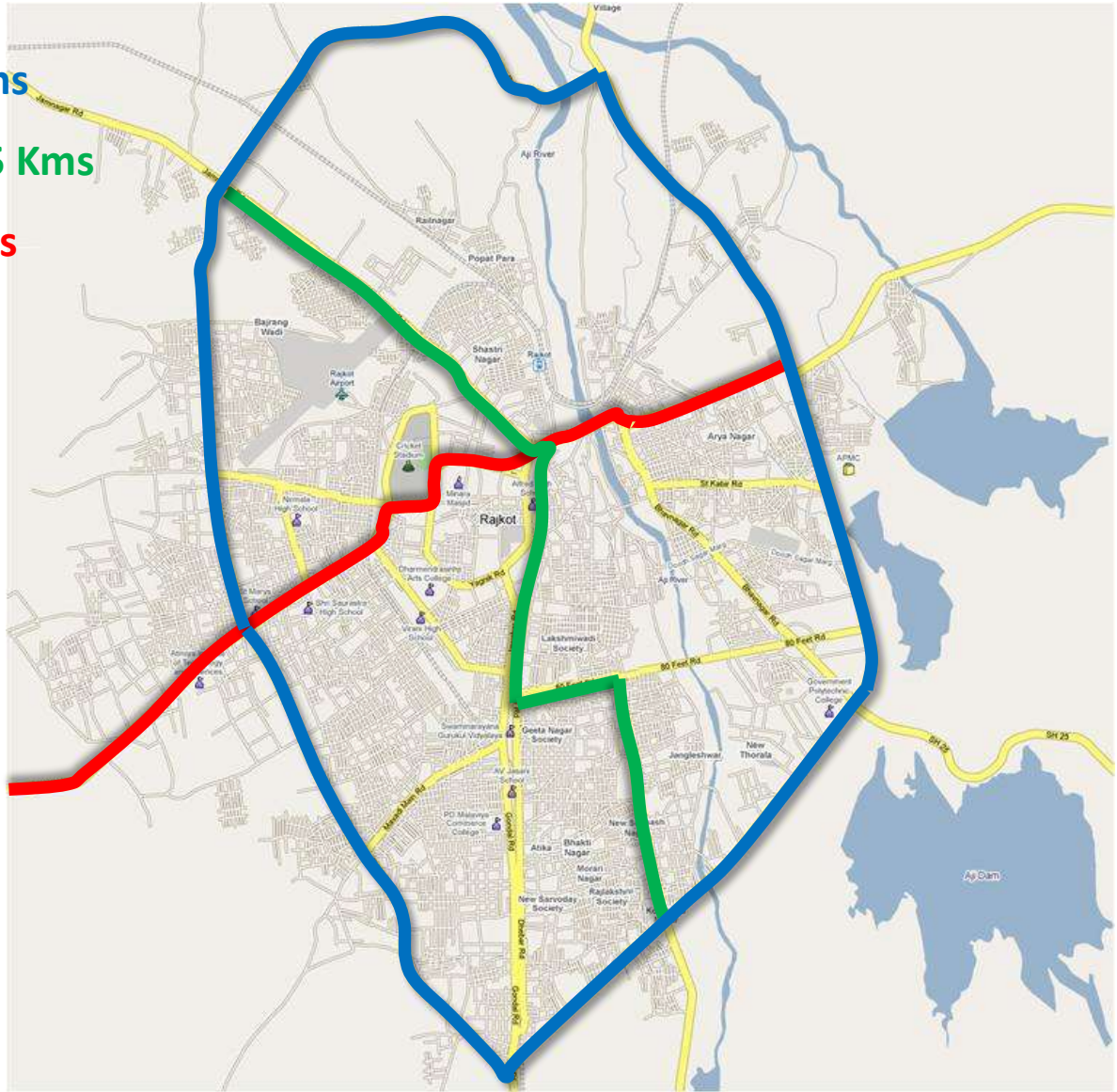
BRTS Corridor

Blue Corridor - 29 Kms

Green Corridor - 16.5 Kms

Red Corridor - 18 Kms

Total – 63.5 kms



Rajkot Blue Corridor BRTS – Phasing

Three Parts

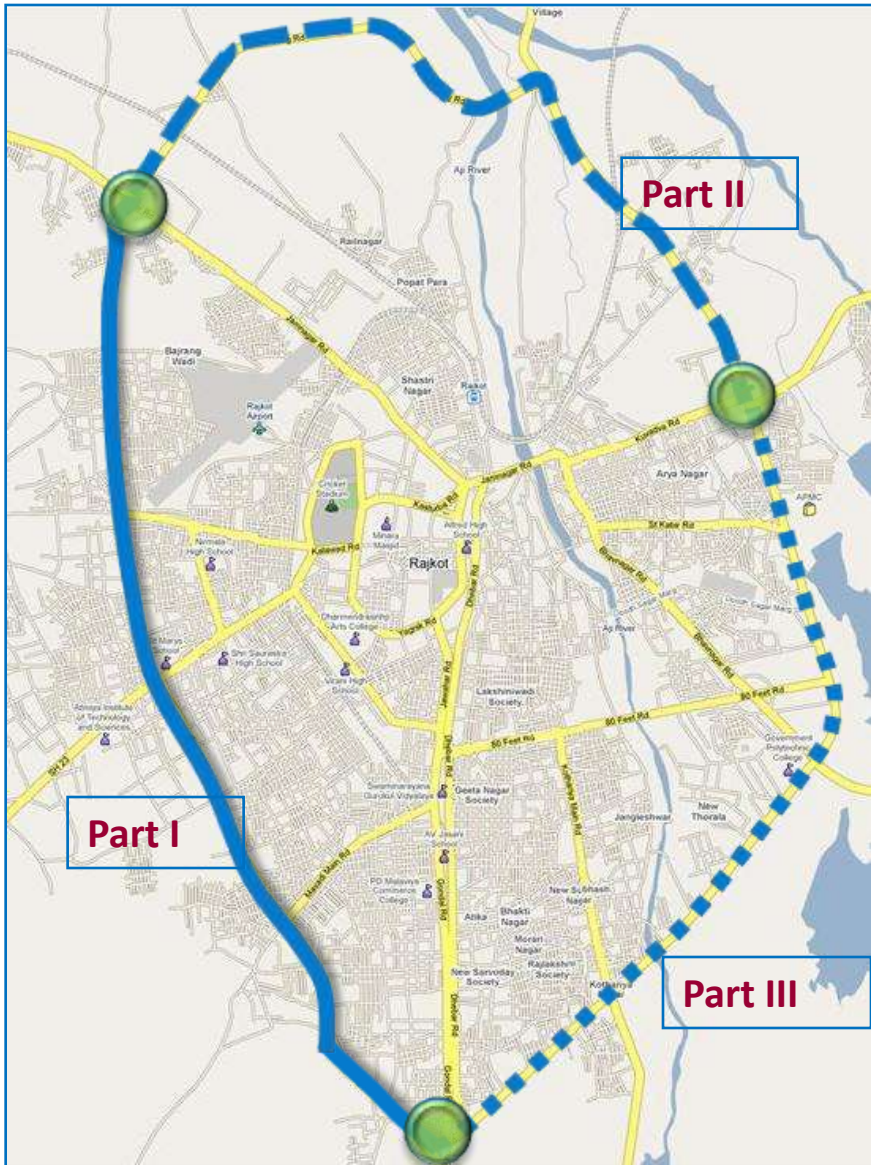
Part I – 10.7 km (Operational)
Gondal Road to Jamnagar Road

Part II – 9.16km
Jamnagar Road to
Morbi Road (RUDA area)

Part III – 9.14km
Morbi Road to Gondal Road (NH)

Operational corridor details
Blue Corridor (Part I) details

- ***10.70 kms***
- ***15 Junctions***
- ***18 Bus stops***
- ***Avg Trip Length***
  3.71 km



RAJKOT

Rajkot BRTS – Status
Bus Shelter & Road Way

RAJKOT

Completed Road ways

RAJKOT

Completed Cycle Track, Footpath area

RAJKOT

Rajkot BRTS Fly Over

RAJKOT

BRTS Trial Run with Tata and SML Bus

RAJKOT

BRTS Trial Run with Mercedes Benz Bus

- To provide effective mass transportation on BRTS, during this planned development of BRTS, 40 buses will be procured phase wise.
- Phase –I 10 + 1 Buses in 1st Month
- Phase – II 10 + 1 Buses within 6 Months
- Phase – III 20 + 2 Buses within 2 Years
- All buses will be AC with semi low floor 900 mm high
- All buses will be BS-III/BS-IV category equipped with GPS instrument

RAJKOT

Rajkot BRTS Corridor – Land reforms

- **Development of BRTS corridor leads to change in Skyline along the corridor.**
- **Land values is also increased by 3-4 times along the corridor**

Role of Rajkot Rajpath Ltd.

- Implementation of Blue, Green and Red BRTS corridors
- Planning for new BRTS network on western part of city
- Operation & Maintenance of BRTS Bus Service
- Operation & Maintenance of BRTS Corridor
- Revenue Generation from
  - Advertisement Kiosk
  - Advertisement on Unipole & Hoardings
  - Advertisement in /out Bus Shelter
  - Advertisement in /out BUS
  - Revenue from ATM space
  - Revenue from additional FSI along BRTS corridor

JnNURM funding pattern for Transportation projects in India

Name of agency	% share		
	Category A (Ahmedabad)	Category B (Surat, Vadodara, Rajkot)	Category C
Central (Federal) grant	35	50	80
State government grant	15	20	10
Urban Local Bodies	50	30	10

JnNURM covers 63 cities across India

JnNURM cities' classification is based on population

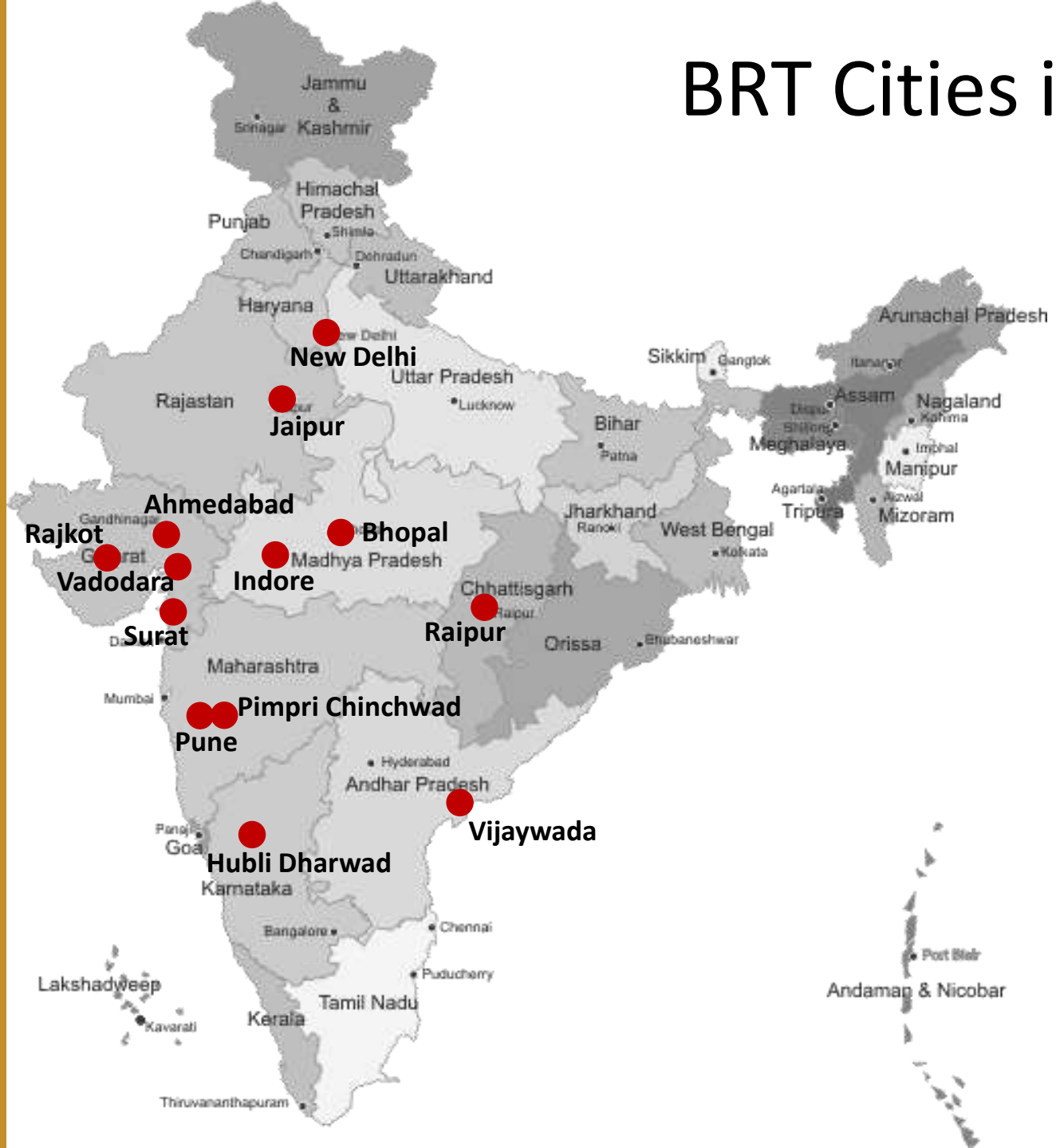
Category A : Cities having 4 Million (or +) population (7 cities)

Category B : Cities having 1 Million plus (up to 4 Million) population (28 cities)

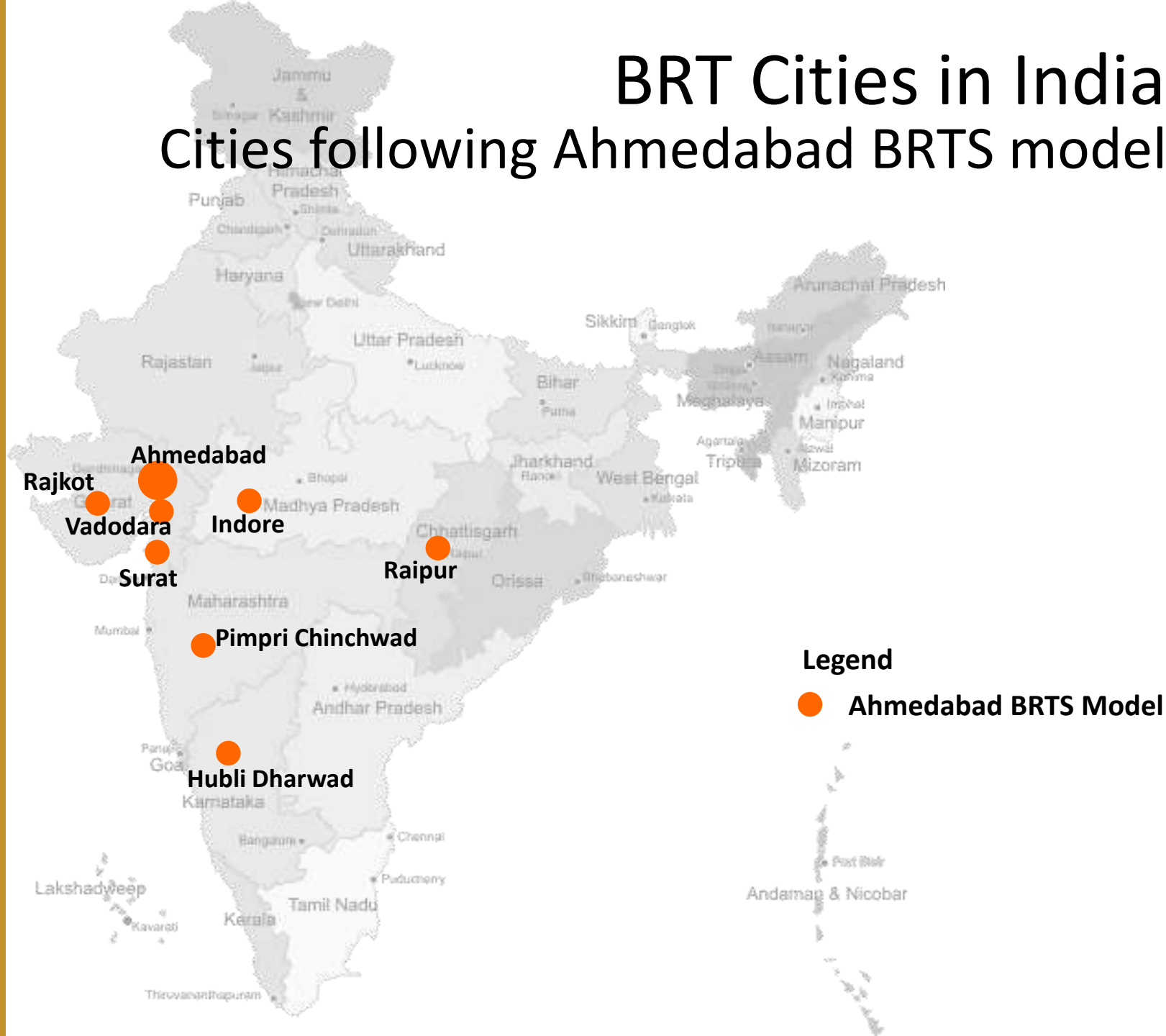
Category C : Cities having less than One Million population (28 cities)

JnNURM is a state sector scheme for Urban Renewal initiated by Govt. of India (GOI) to be implemented over 7-year period. The scheme envisages providing financial assistance to urban local bodies for urban development projects identified under City Development Plan.

BRT Cities in India



BRT Cities in India
Cities following Ahmedabad BRTS model



Success factors

- **Designing a network** and **not corridors**
- **Connecting "busy places" avoiding "busy roads"**
- **Innovative and context specific designs**
- **Leadership** by state government and urban local body
- **Ownership** of a system and for all key decisions
- Seeing **BRTS as a program** and not just a project
- **Partnership** and **oneness** of consultant and urban local body

Thank you!

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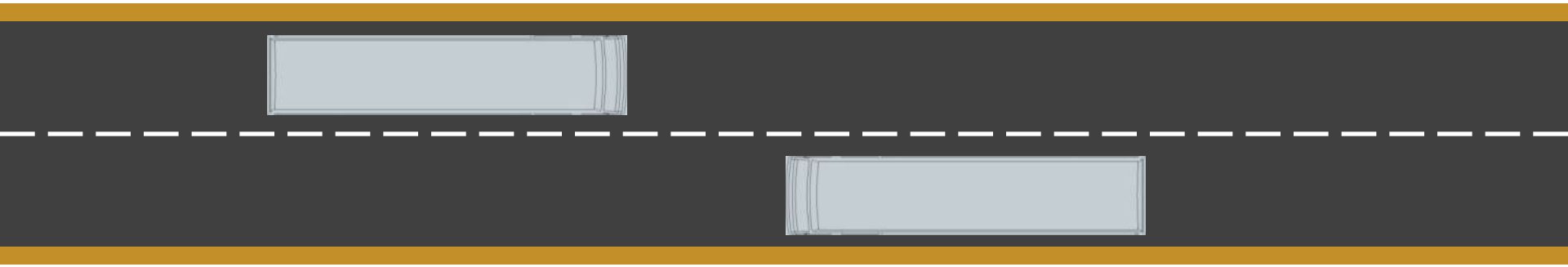

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