Developing Low Carbon Society 2035 Bhopal: Initiatives and Actions

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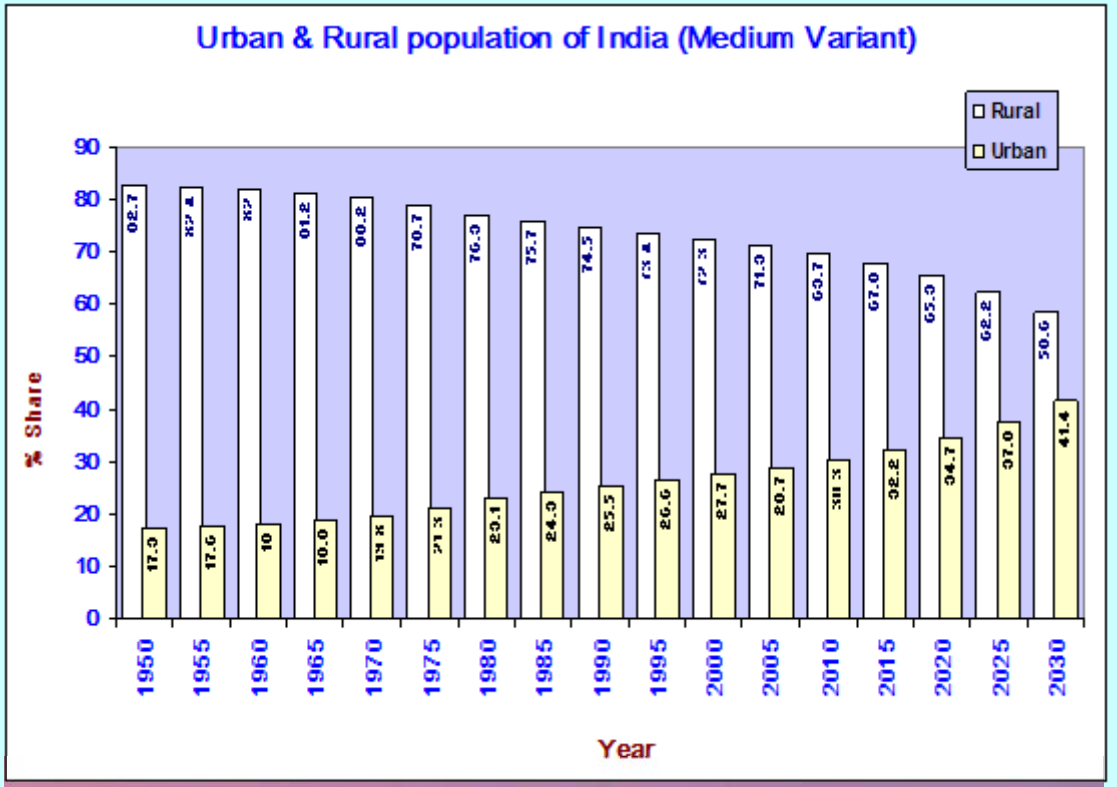
Presentation Outline

- Indian Scenario
- LCS Development in Bhopal
- BRTS Bhopal

Demographic Transitions in India: Urban/Rural



Million Plus UAs / Cities India: 2011

53 Million Plus UAs/Cities in India with population of one million or more. In Census 2001 the number was 35.

Mega UAs/Cities

- Three megacities in India as per Census 2011 (Provisional) with 10 million or more population
- These are:
  - Greater Mumbai UA 18.4 million
  - Delhi UA 16.3 million
  - Kolkata UA 14.1 million

Low Carbon Development: Few Questions for India

- Recent Govt. Schemes

(If these are taking care of Low Carbon guidelines?)

- MRTS / BRTS

(Is the shift happening? What about stranded assets?)

- Urban lifestyle / Awareness

(Is society ready to cope up with Low Carbon guidelines?)

- Local Governance

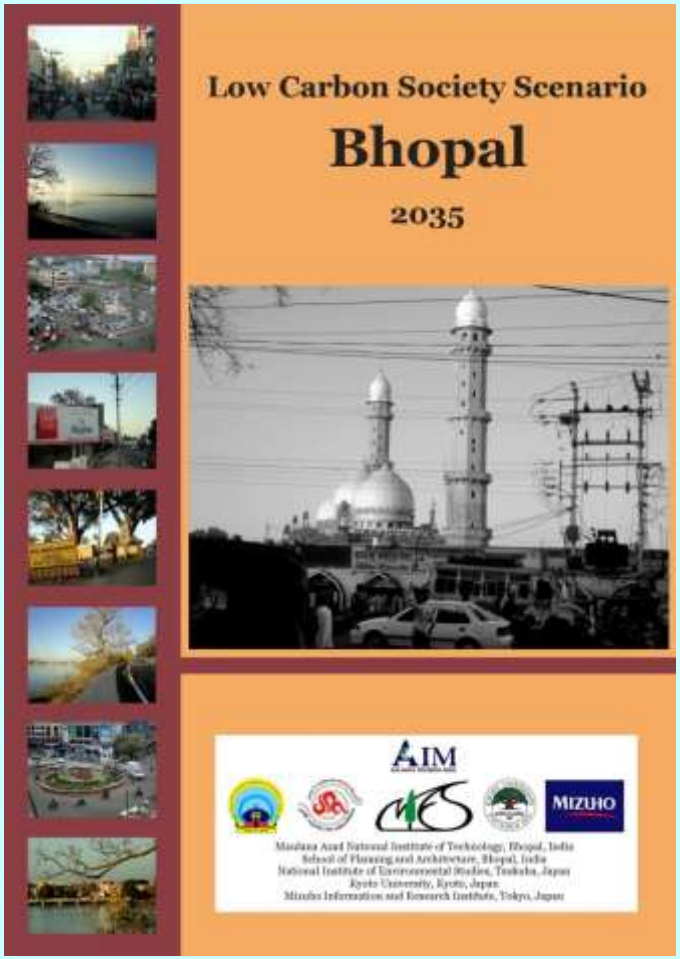
(Coordination / Plan implementation?)

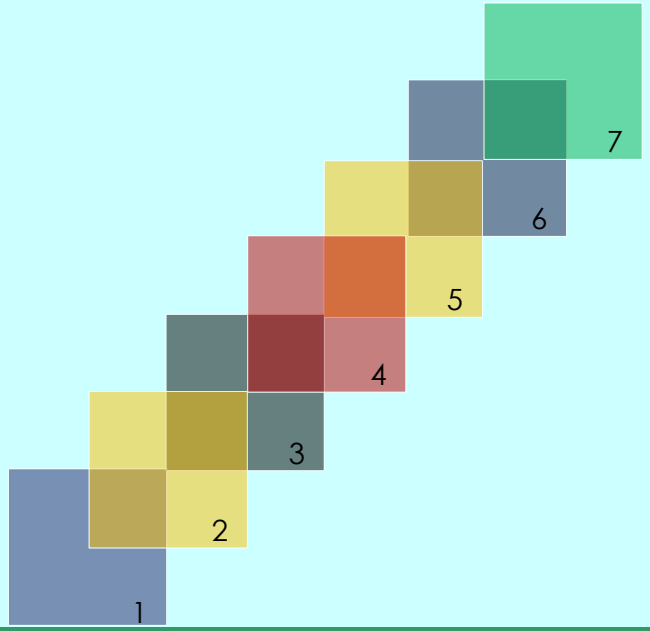
- Financing

(Long recovery Period?)

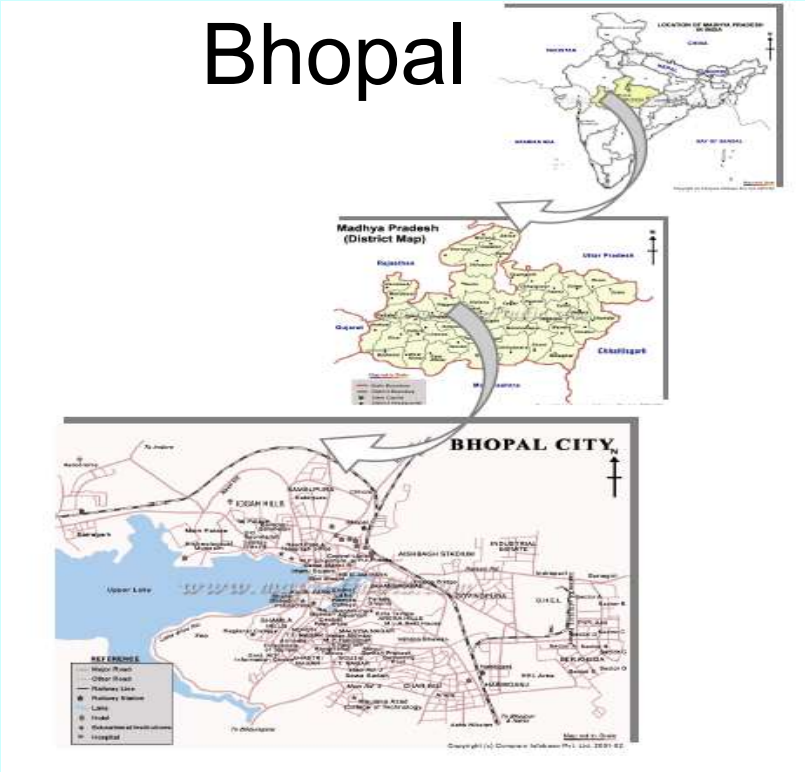
Need for Paradigm shift from Project Approach to Holistic Approach

LOW CARBON SOCIETY: BHOPAL



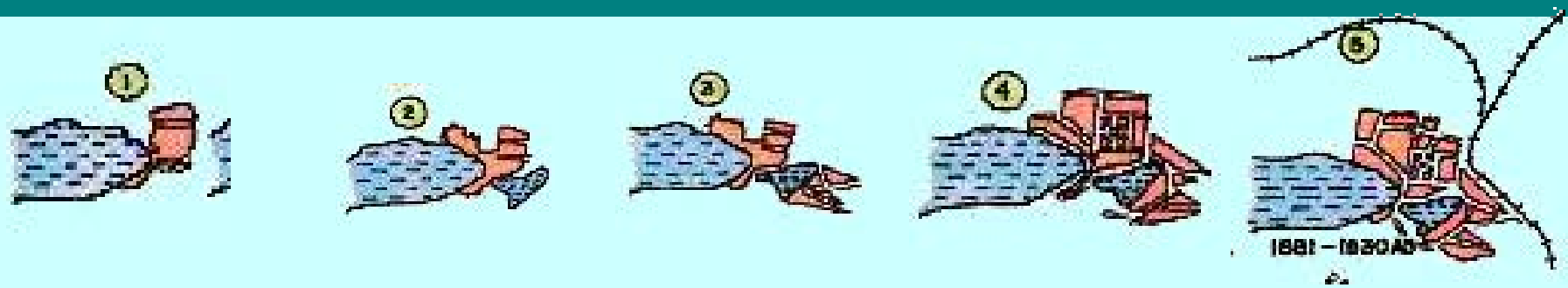


The Study area

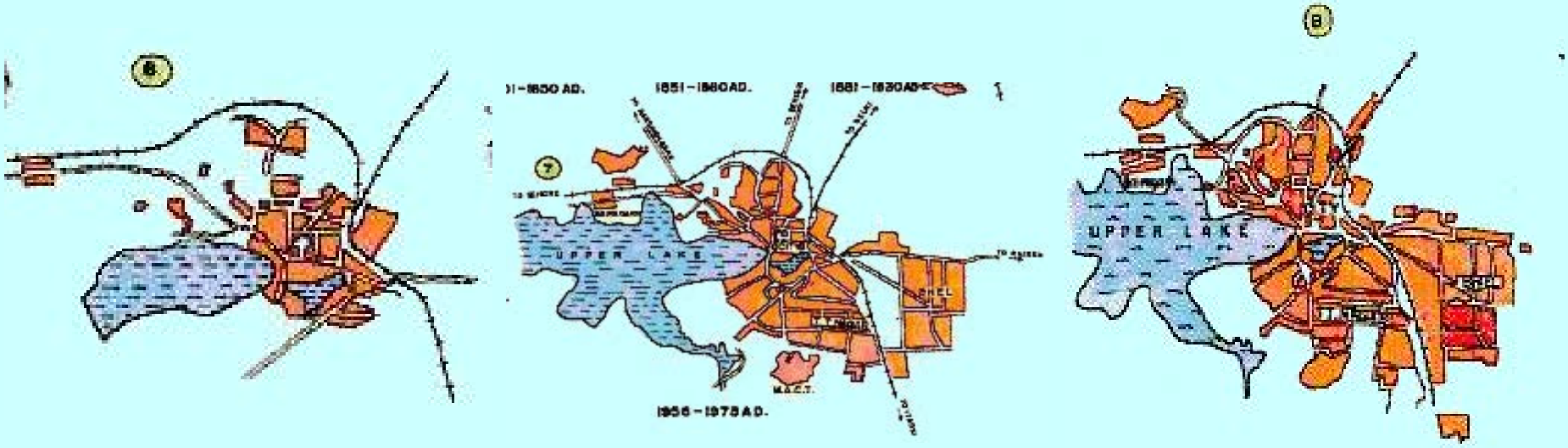


- The city is centrally located in India
- The climate is composite climate representing a large part of India
- The city has physical features like large water body, Hills and forests for analysis of local variations.
- A million plus city, it can represent many large Indian cities.
- Amongst the 21 fastest growing cities in India.

Bhopal: Chronological Development



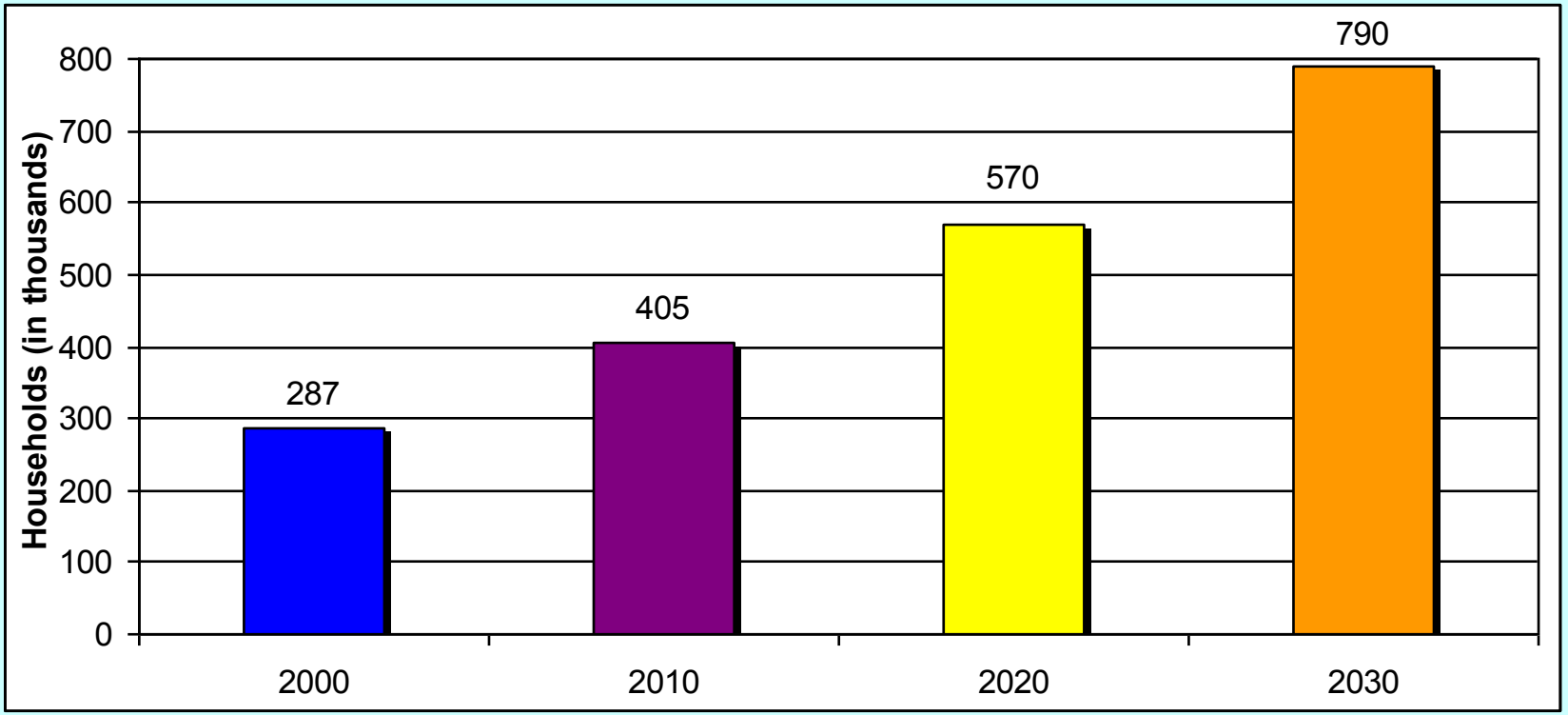
1010 - 1200 AD | 1201 - 1800 AD | 1801 - 1850 AD | 1851 - 1880 AD | 1881 - 1930 AD



1931 - 1955 AD | 1956 - 1973 AD | 1974- 2000 AD

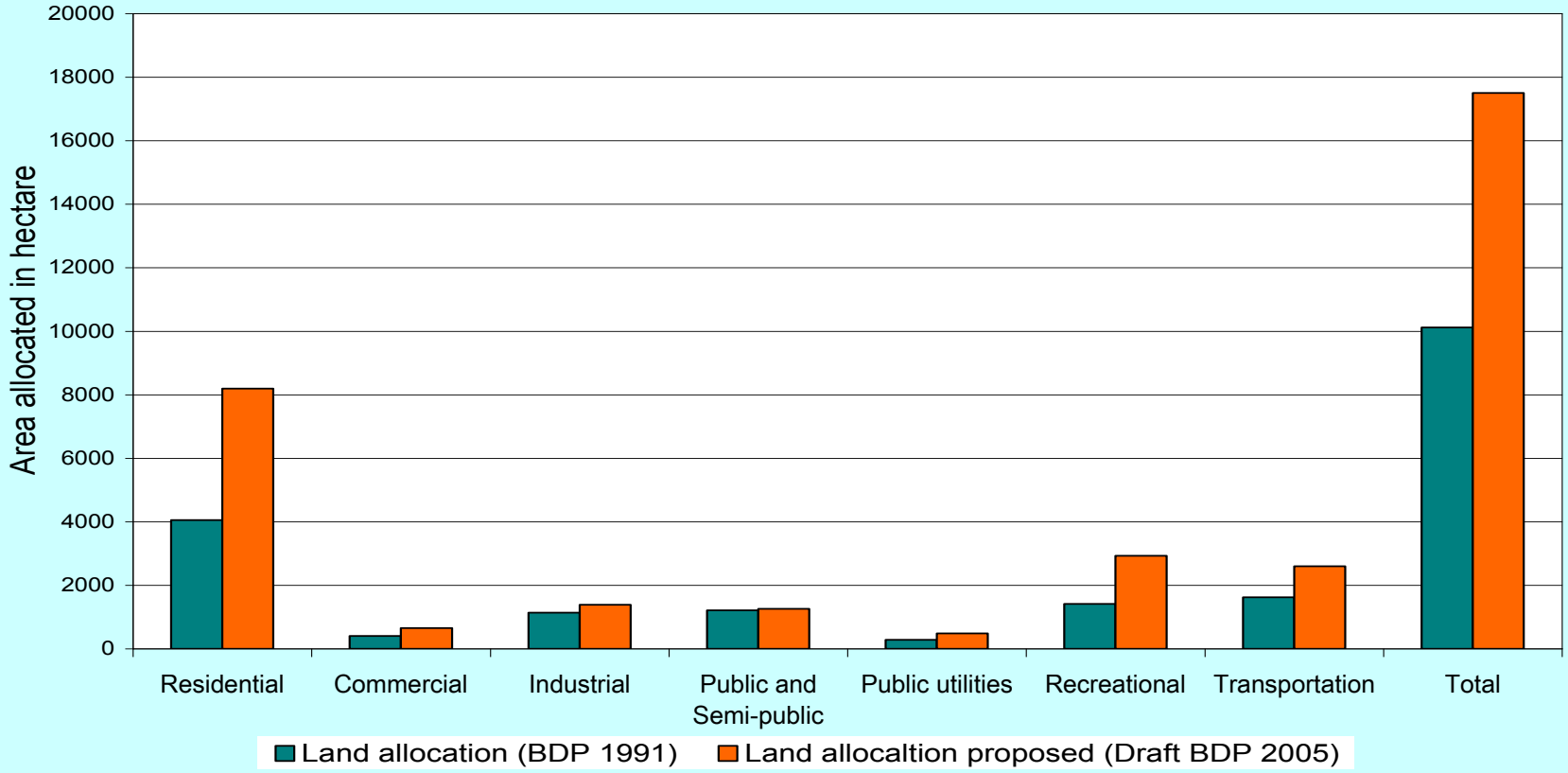
Bhopal: Drivers of Change

- **Population growth**
  - Urban population has increased at an average decadal growth rate of over 70% in last 4 decades.
  - The longer perspective and various estimates indicate that the city would grow around 3.5 million by 2021.



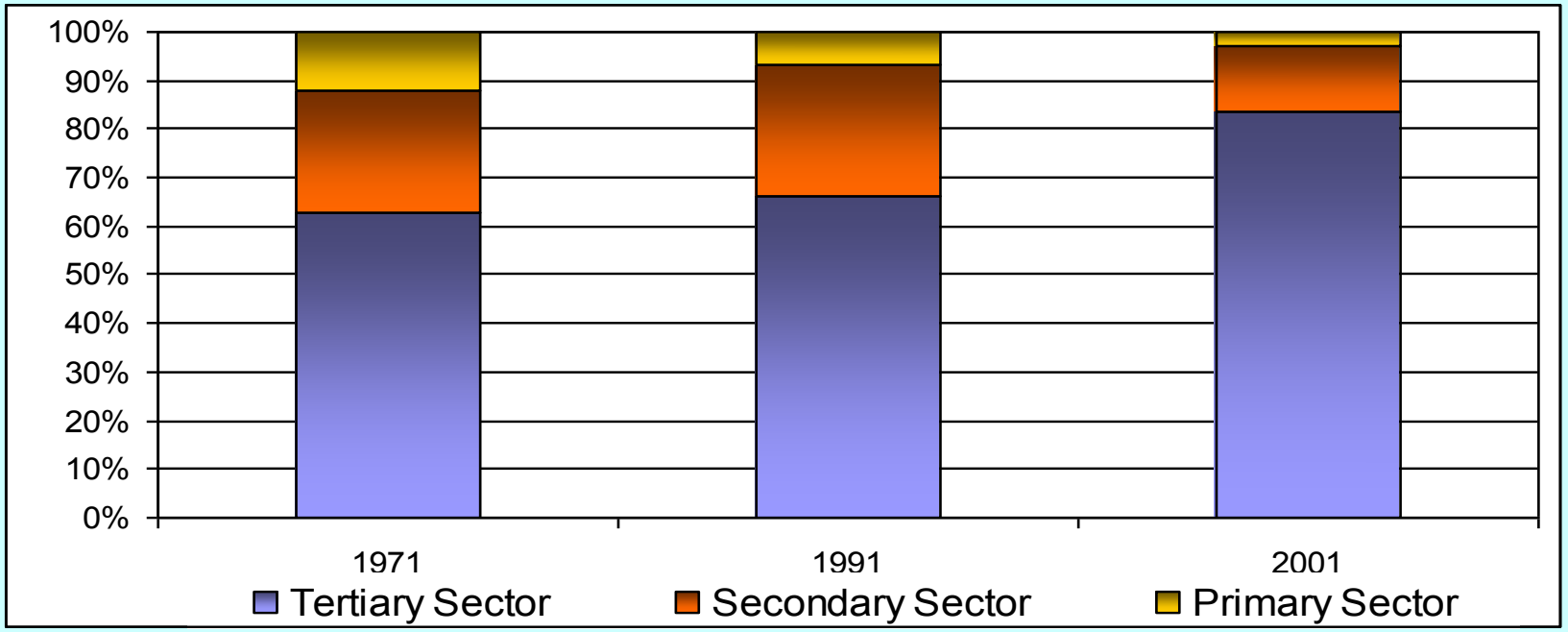
Bhopal: Drivers of Change

- **Land-use change**
  - The development plan area has expanded as the density of many wards has reached to more than 400persons/hectare.
  - The residential sector has doubled in the two plan period.



Bhopal: Drivers of Change

- **Changing occupational pattern**
  - The occupation in tertiary sector has grown from 64% in 1971 to 87% 2001.
  - The distribution of workers in secondary sector has moved up from 33% to 36% in 1991 which saw steep decline to 15% in 2001.



Source: NRS, 2002

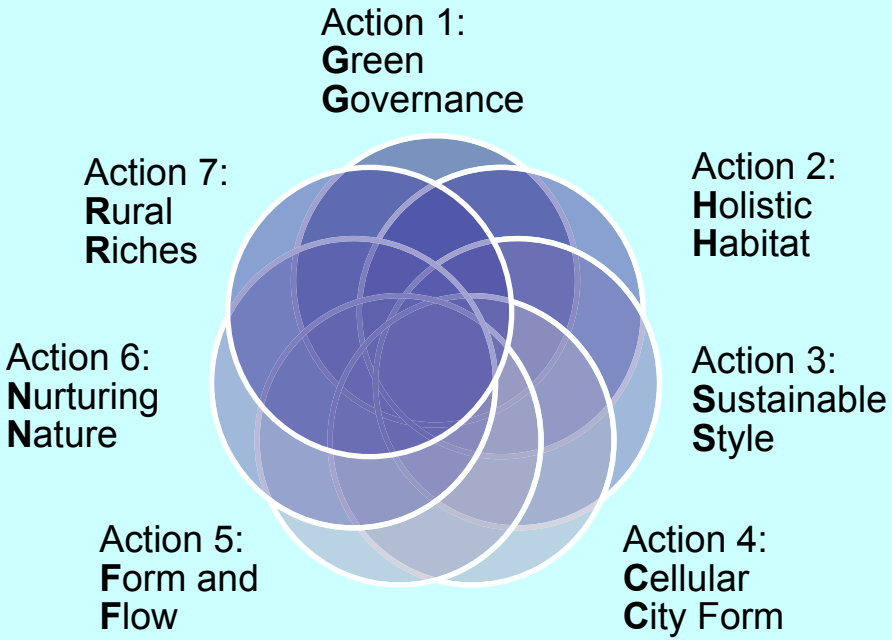
Bhopal LCS vision

- To be a sustainable low carbon city in line with Development Priorities
  - Ready for future and resilient to change
  - Conservation and green orient for quality of life
  - Economic and social competitive clean and green industries
  - Efficient transport system
  - Community participation in city development

Two Scenarios

- Business As Usual (BAU) scenario
  - The present trend in Bhopal city has been considered with existing technology in both residential and transport sector with prevailing economic and demographic trends. The BAU scenario for future energy consumption and emissions projection in Bhopal city envisages the continuum of present government policies, and capture forecast for various economic, demographic, land use and energy use indicators.
- Low Carbon Society (LCS) scenario
  - For analysing the possibilities of reducing the GHG emissions in future a sustainable development future scenario is drawn here for Bhopal city that is expected take it towards ***Low Carbon Society***. the energy consumption trajectory / emissions trajectory in residential and transport sector in Bhopal that would result from aggressive policies to promote demand side management, energy efficiency, development of renewable energy, and other policies to promote sustainable development

Bhopal LCS: Seven Actions



		SECTORAL CONTRIBUTION				
	ACTIONS	Residential	Commercial	Industry	Passenger Transport	Freight Transport
1	GREEN GOVERNANCE					
2	HOLISTIC HABITAT					
3	SUSTAINABLE STYLE					
4	CELLULAR CITY FORM					
5	FORM AND FLOW					
6	NURTURING NATURE					
7	RURAL RICHES					

Actions towards LCS Bhopal 2035

- Action-5: **F**orm and **F**low
  - Integrating Transport with City structure – a two level approach
    - Connecting the Cells:
      - Route optimization considering the topography, water bodies and other natural barriers.
      - Reducing travel demand and time between zones.
      - Enhancing Public Transport systems.
    - Walkable Cells:
      - Transportation within compact closely knit work-home mixed land use zones.
      - Promoting non-automated means of transport-Inclusion of bike tracks, pedestrian walkways, subways and cross overs.
  - Migration to Sustainable Technology
    - Emission norms
    - Alternative fuels use
    - Traffic management (passenger and freight)
    - Parking policy

BRTS Bhopal

Most Recent addition August 2013:

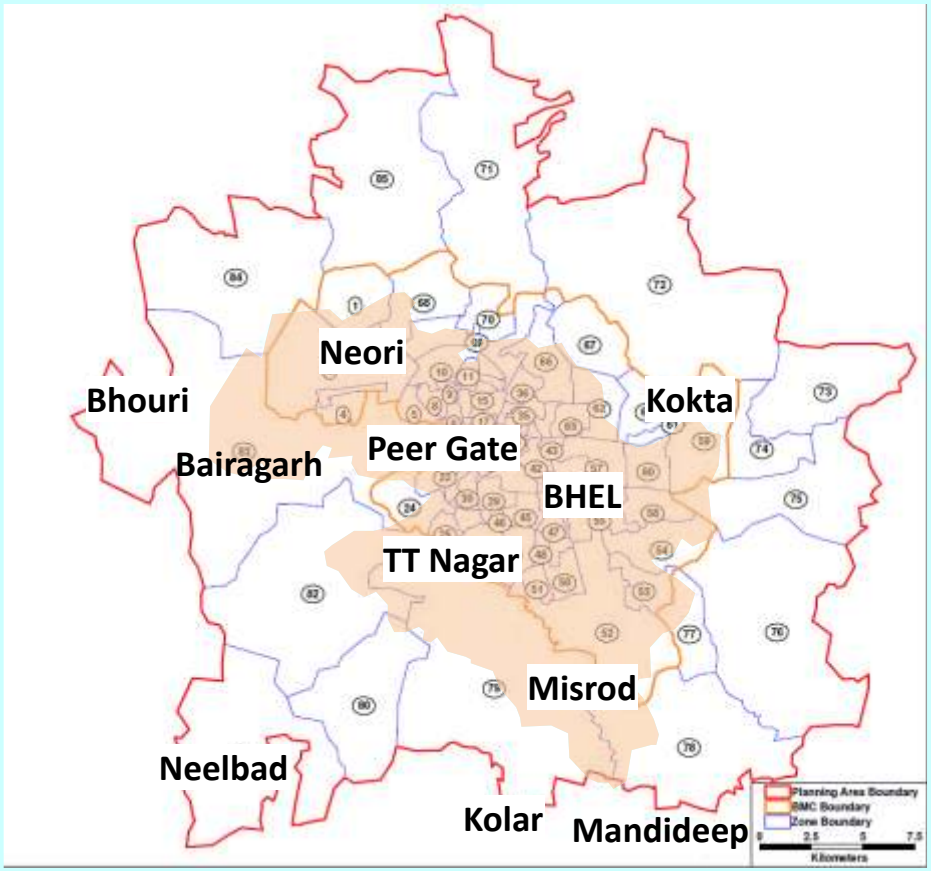
24 km Bhopal BRTS (became operational) total route length 44 km.

City Form

Urban Area – As per census of India
Population density shall be greater than 400 persons/ sq. km

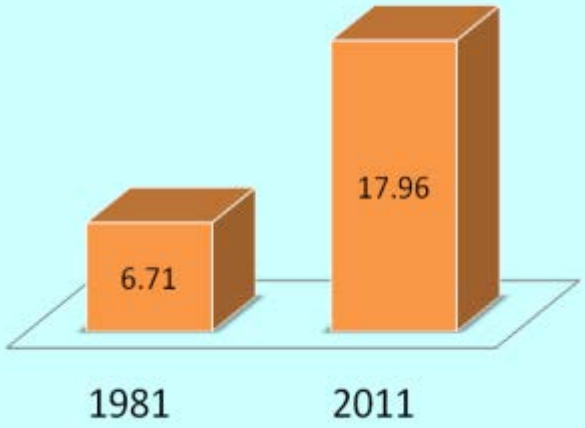
Area	Population (lakhs) (2011)	Area (sq km)	Density (persons/sq km)
Municipal Area	17.96	258	6,961
Planning Area	1.35	505	267
Kolar Town	0.87	50	1,740
Total	**20.18**	**813**	**2,482**

No provision for rail based urban transport in Master Plan



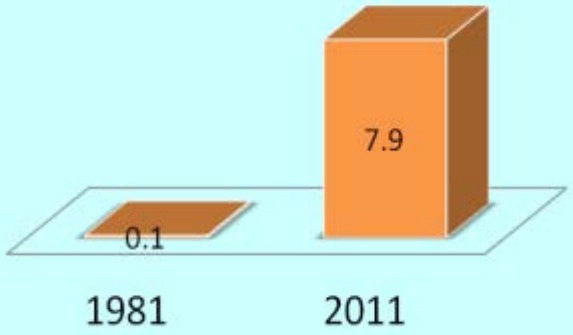
Sprawling Bhopal City

Flow of Population and Vehicles

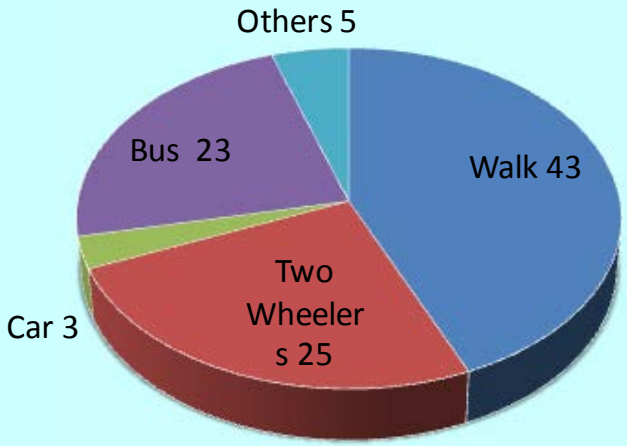


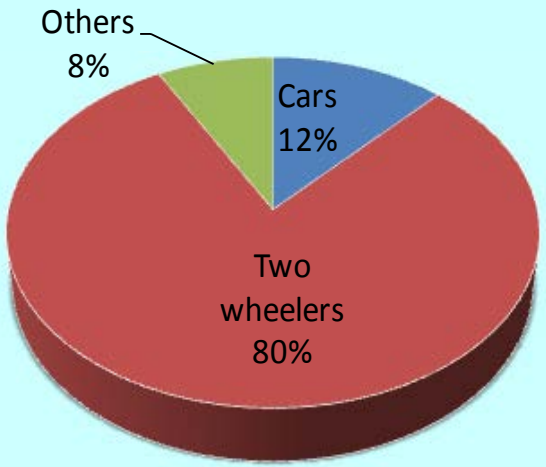
Population growth

Since 1981, the population of Bhopal has multiplied about 2.5 times and number of registered vehicles has increased 85 times. Of the 7.9 lakh registered vehicles in 2011, 92% are cars and two wheelers which accounts for only 28% of modal share.

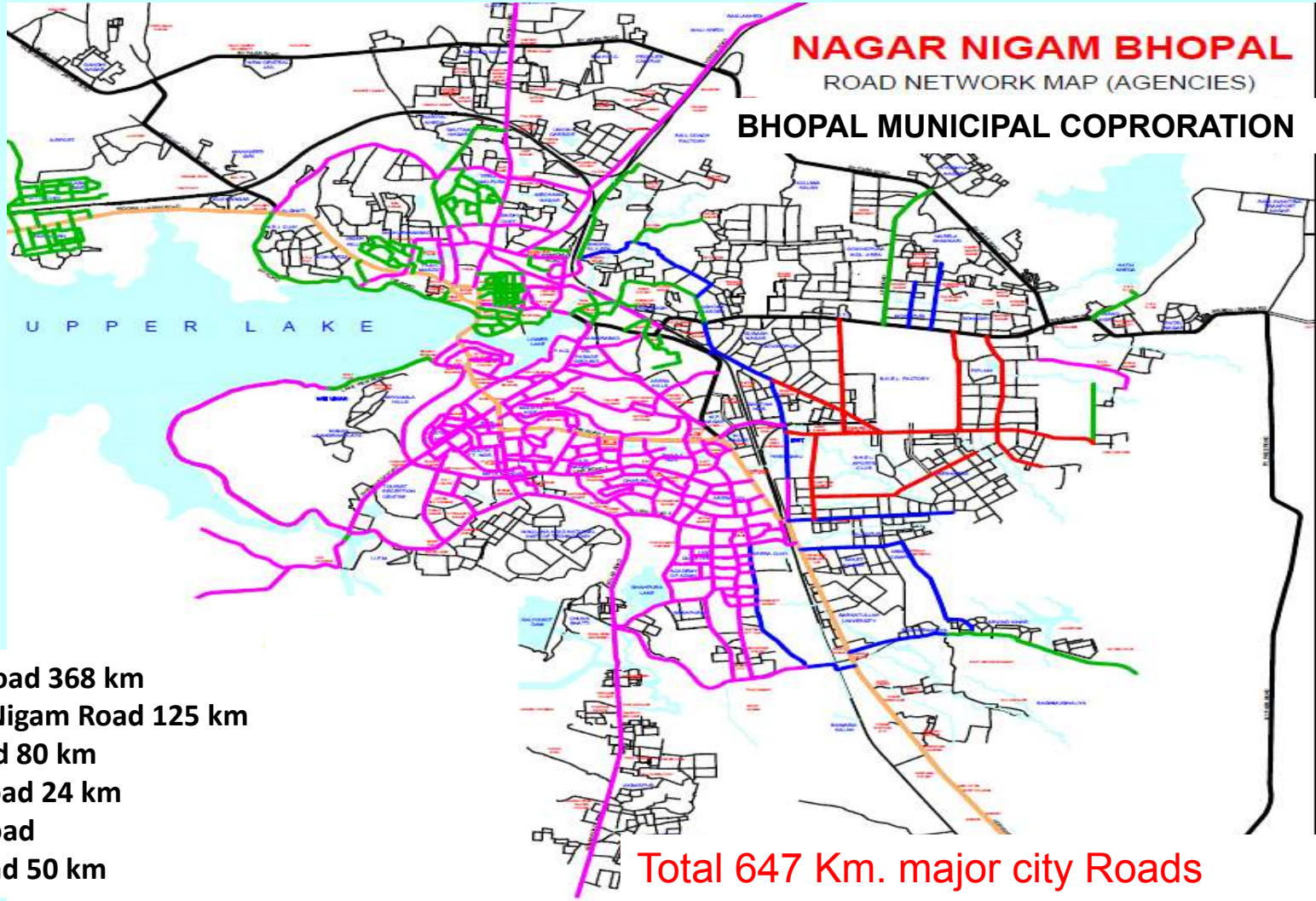


Vehicular growth

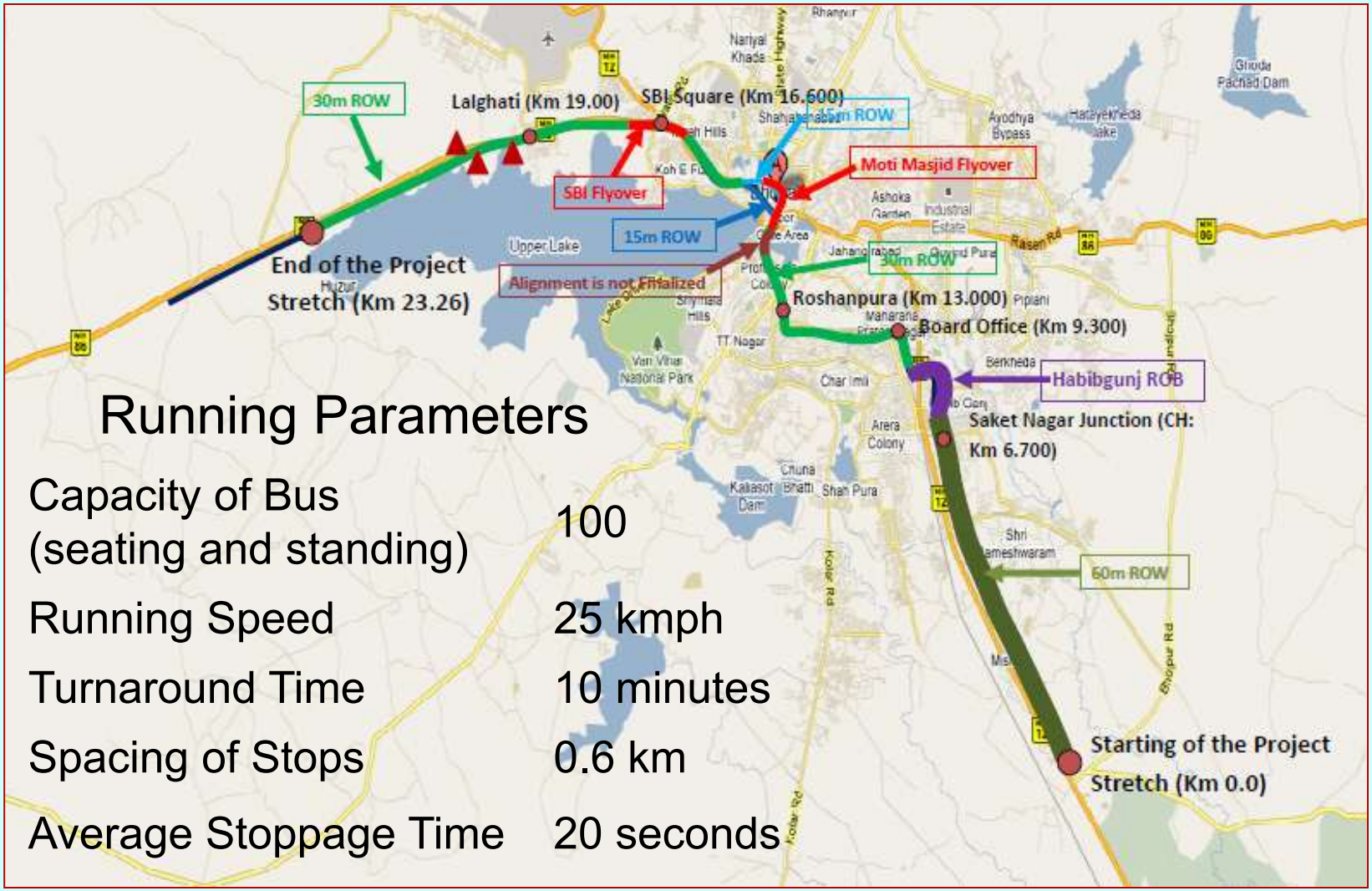




Road Network Map of Bhopal City



Bhopal BRTS: Phase-I



Running Parameters

Capacity of Bus (seating and standing)	100
Running Speed	25 kmph
Turnaround Time	10 minutes
Spacing of Stops	0.6 km
Average Stoppage Time	20 seconds

Intelligent Transport System

Live Tracking
- Current Location
- Current Speed
- Last Updated Time
- Status of the Vehicle

PIS
- Route Name
- Destination
- ETA in minutes

Report Generation

- Trace of the vehicle travelled in the specified time range.
- Vehicle Start/End Time wise Searching…
- Maximum Speed wise searching….
- Distance wise searching…
- Idle location details.
- Speed Graph
- Vehicle Statistics

Schedule Adherence System
- Expected Time of Arrival (ETA)
- Deviations or Violations

PAS
- Next Stop to be reached
- Destination of the Bus

Training & Support Infrastructure

Depot

Maintenance

Mobile Squad

Dry run

Traffic Wardens

Regular Training

BRTS is Transforming Bhopal

- Enhanced Street Lighting
- Better Public transport
- Promoting growth along the corridor

Bhopal before BRTS

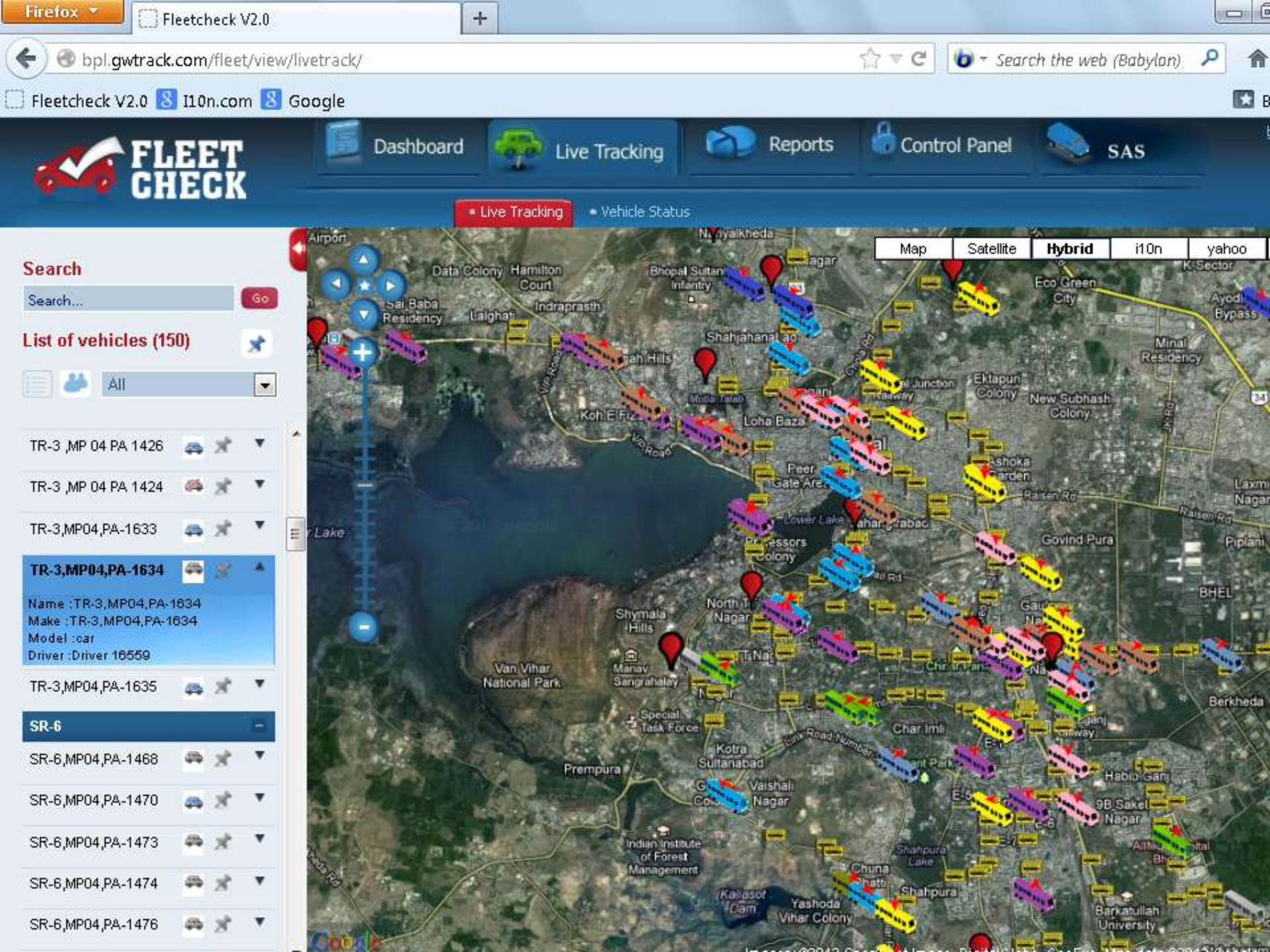
Bhopal after BRTS

BRTS is Transforming Bhopal

- Improved ROW and travel space
- Better Urbanscape
- Smoother traffic flow
- Segregation by speed of travel.

Bhopal before BRTS

Bhopal after BRTS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Search...
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List of vehicles (150)
All
TR-3 ,MP 04 PA 1426
TR-3 ,MP 04 PA 1424
TR-3,MP04,PA-1633
TR-3,MP04,PA-1634
Name :TR-3,MP04,PA-1634
Make :TR-3,MP04,PA-1634
Model :car
Driver :Driver 16559
TR-3,MP04,PA-1635
SR-6
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Hybrid
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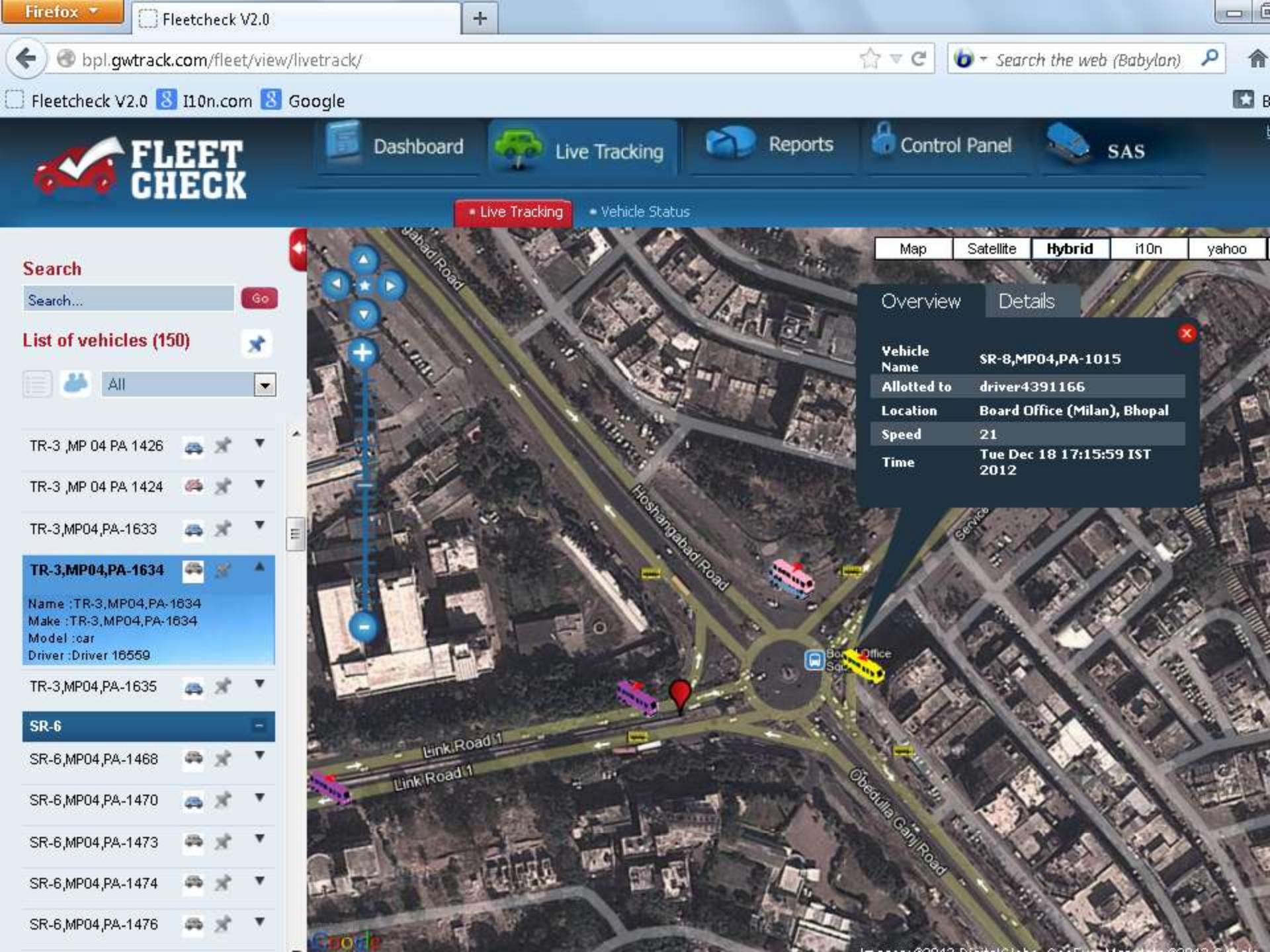
Airport
Data Colony
Hamilton Court
Bhopal Sultania Infantry
Eco Green City
Sai Baba Residency
Lalghati
Indraprasth
Shahjahanabad
Minal Residency
Ektapuri Colony
New Subhash Colony
Koh E Fiza
Loha Bazar
Peer Gate Area
Govind Pura
Piplani
BHEL
Shymala Hills
Van Vihar National Park
Manav Sangrahalay
Special Task Force
Char Imli
Berkheda
Kotra Sultanabad
Prempura
Vaishali Nagar
9B Saket Nagar
Indian Institute of Forest Management
Shahpura Lake
Shahpura
Kaliasot Dam
Yashoda Vihar Colony
Barkatullah University
Google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21
Time
Tue Dec 18 17:15:59 IST 2012
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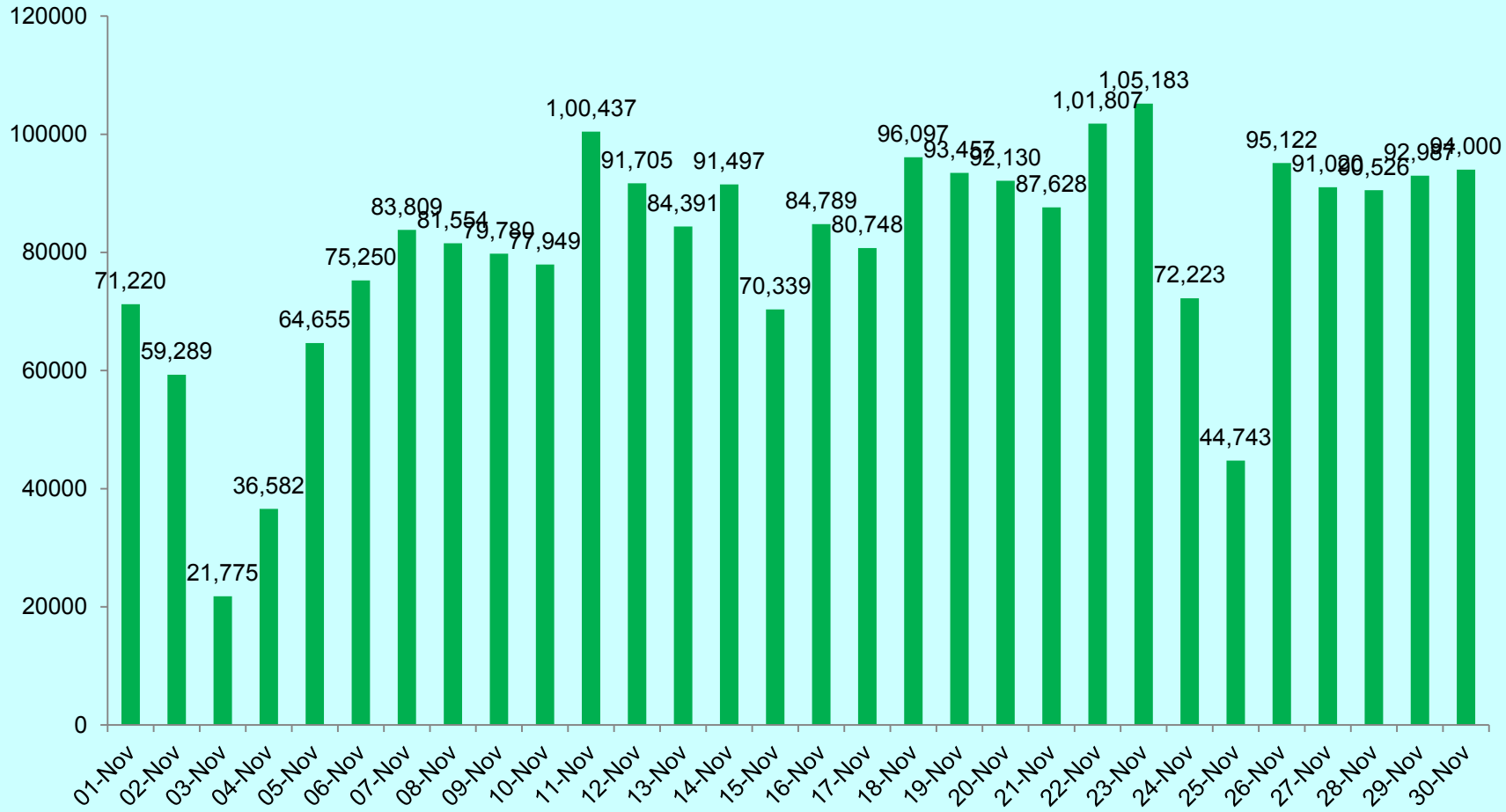
Hoshangabad Road
Link Road 1
Link Road 1
Obedulla Ganj Road
Service
Google

Ridership data for month of November 2013
(on Government run transport facilities)



BRTS impact on CO emissions

Nearly 80,000 passenger trips were shifted from other modes of transport to Bus transport

	From Mini Buses	From Tata Magic	From Two wheelers	From City Buses
Mode Share (% age)	60%	25%	15%	100%
No of Passengers per day	48000	20000	12000	80000
Number of vehicular trips	1600	2500	8000	1330
Avg. Trip Length	30	20	8	35
Vehicle KMs	48000	50000	64000	46550
CO Emission Factor(gm./km)	2.8	0.64	2.4	2.8
Total Emission(gms.)	134400	32000	153600	130340
Total Emission(kgs.)	134.4	32	153.6	130.34

Reduction in CO levels : (134.4+32+153.6)-130.34=189.66 kgs

Source: BMC estimates

Proposed and Ongoing Activities

Traffic and Transit studies

- Origin & Destination Survey
- Classified Traffic Volume Count
- Intersection Turning Movement Count
- Boarding and Alighting Survey
- Pedestrian Surveys
- Public Transport and Passengers Survey
- Public/Passenger Opinion Survey
- Speed and Delay Studies
- Parking Studies
- Road Inventory

Technical design studies

- Topographic Surveys
- Topographic survey for major and minor intersections
- Bridge Inventory & Investigation
- Geotechnical Investigations
- Pavement Investigation
- Utility Surveys

Issues and Challenges

- Structural issues
  - Non uniformity of road widths through out the corridors
  - Impediments of topography
  - Presence of heritage buildings
- Behavioural issues
  - Traffic violation on dedicated corridors
  - Restricting on-street parking along the BRTS corridors. (Parking Policy)
- Ridership issues
  - Generation of additional demand on BRTS corridors
    - Restricting other competing modes of transport (including individual private modes)
    - Attracting with quality services
- Institutional challenges
  - Integration of land use planning and urban transport development
    - TOD related provisions in land laws/master plan/zonal plan
    - Defined enforcement strategies/agencies and
    - Capacity development of sector experts at planning and execution level

Thanks!!

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