

WELCOME

BUS RAPID TRANSIT SYSTEM IN BHOPAL

BHOPAL MUNICIPAL CORPORATION

BCEOM
SOCIETE FRANCAISE D'INGENIERIE



Bhopal Municipal Corporation

BHOPAL CITY

Self-contained Sub-cities of Bhopal

S. No	Name of sub-city	Estimated Population (Lakhs)
1	Bairagarh	2.00
2	Old city	4.00
3	Capital city (TT Nagar)	3.50
4	BHEL Township	2.50
5	Service Township (BHEL Extn)	2.50
6	Misrod	8.00
7	Neori	2.50
	Total	25.00

Urban sprawl has contributed to problems of Transport

EXISTING PUBLIC TRANSPORT IN BHOPAL

Type of Mode	Share of passenger Trips (%)	Remarks (Total No. of Vehicles)	%
Public Transport Mode	48.6	Standard Bus (39)	5.3
		Mini-Bus (600)	31.0
		Tempos (450)	12.3
Intermediate Public Transport	5.7	Auto (3,000)	5.2
		Taxi	0.5
Private Mode	37.4	Two Wheeler (300,000)	34.5
		Cars (50,000)	2.9
Non-motorized Mode	8.3	Cycle	8.3
Total	100		100
Nearly 90% of Public Transport consist of Mini-Bus & Tempos.			

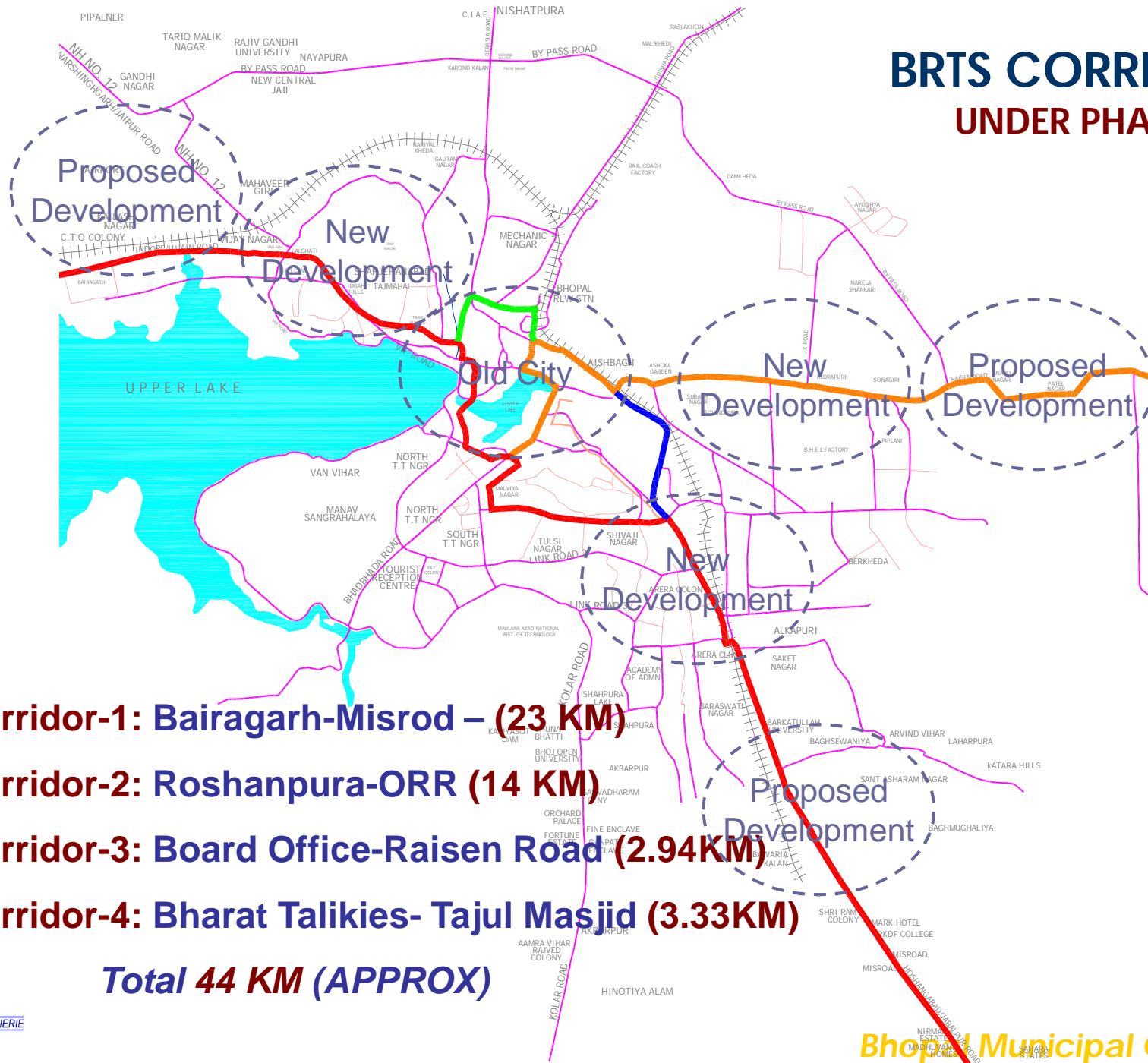
OPERATIONAL CHARACTERISTICS OF EXISTING PUBLIC TRANSPORT

- The Average route length is about 27km
- Most of the routes pass through old city area, because of demand
- Frequent request stops
- The number of passenger per trip is about 46.
- Passengers on board at any time 14.
- Passengers boarding/alighting about 3/Stop
- Number of passengers waiting at a stop is 14.
- The Av. journey time 1Hr 25Min. 50% of time for boarding & alighting. Net Travel time is 40Min: Avg. Travel Speed-45kms/h

STATUS OF PROPOSED BHOPAL BRTS

- Pilot study on BRTS conducted by BCLL & BMC
- Identified 4 BRTS Corridors to be Developed under Phase-I, approved under JNNURM
- Detailed Engineering Study of identified Corridors by **BCEOM** *French Consultant* is under progress

BRTS CORRIDORS UNDER PHASE-I



- Corridor-1: Bairagarh-Misrod – (23 KM)**
- Corridor-2: Roshanpura-ORR (14 KM)**
- Corridor-3: Board Office-Raisen Road (2.94KM)**
- Corridor-4: Bharat Talikies- Tajul Masjid (3.33KM)**

Total 44 KM (APPROX)

ESSENTIALS OF BRTS

Major Elements

- Running Ways
- Stations
- Vehicles
- Fare collection
- ITS
- Service and Operations Plan

System Performance

- Travel Time Savings
- Reliability
- Safety & Security
- Capacity
- Identity and Image
- Reduction in congestion on road



SUMMARY OF DESIGN FEATURES

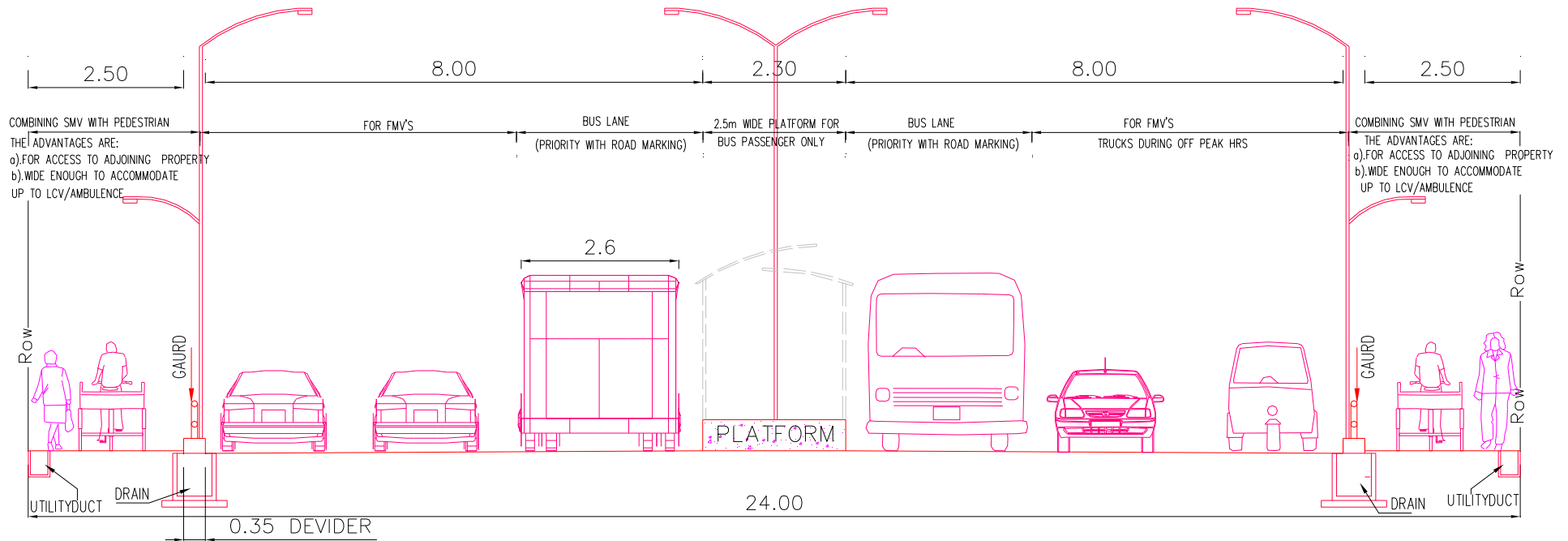
Pavement	Flexible
Location of Bus way	At central median
Width of Bus way	3.3-3.5 meter
Length of platform	25 meter
Width of Platform	2.5 meter
* Location of Bus stop	Near intersection, mostly
Land Acquisition for road	Avoided AFAP
Passenger movement at mid section if Platform provided	Through pedestrian activated signals (PAS)
Type of system	Combination of <i>partially</i> Open & <i>partially</i> Closed System
Segregation of Bus lanes	Up to ROW of 30meters and Above

SYSTEM DESIGN FEATURES

Running Way: A Combination of *Partially CLOSED & OPEN* Systems

- With $30\text{m} \geq \text{RoW}$ - it will be a *partially* closed system
- With 24-30m RoW - it will be an open system (bus lane priority with Road Marking only)
- With 20-24m RoW - it will be *partially* open system (bus lane priority with Road Marking)
- With $<20\text{m}$ RoW - there will be one-way system
- Wherever 45m RoW is available, service lanes for access and MVs/Cycles would be provided

SYSTEM DESIGN FEATURES



OPEN SYSTEM

TYPICAL CROSS SECTION FOR 24 METER RIGHT OF WAY

(For Buses Hydraulically Operated Doors will be Required on the RIGHT Side & Emergency Door on left)

24m Cross Section is applicable to about 11% of the total length of all corridors

SYSTEM DESIGN FEATURES

- 2.5m wide **CENTRAL PLATFORM** where the RoW is between 24-30m
- Provision of access to adjoining properties by combining pedestrian path, SMV lane & cycle track
- Bus stands at an average distance of 500m and as per Boarding-Alighting survey results (demand)
- Provision of pedestrian actuated signals at bus stop and automatic signalling at intersections

SYSTEM DESIGN FEATURES

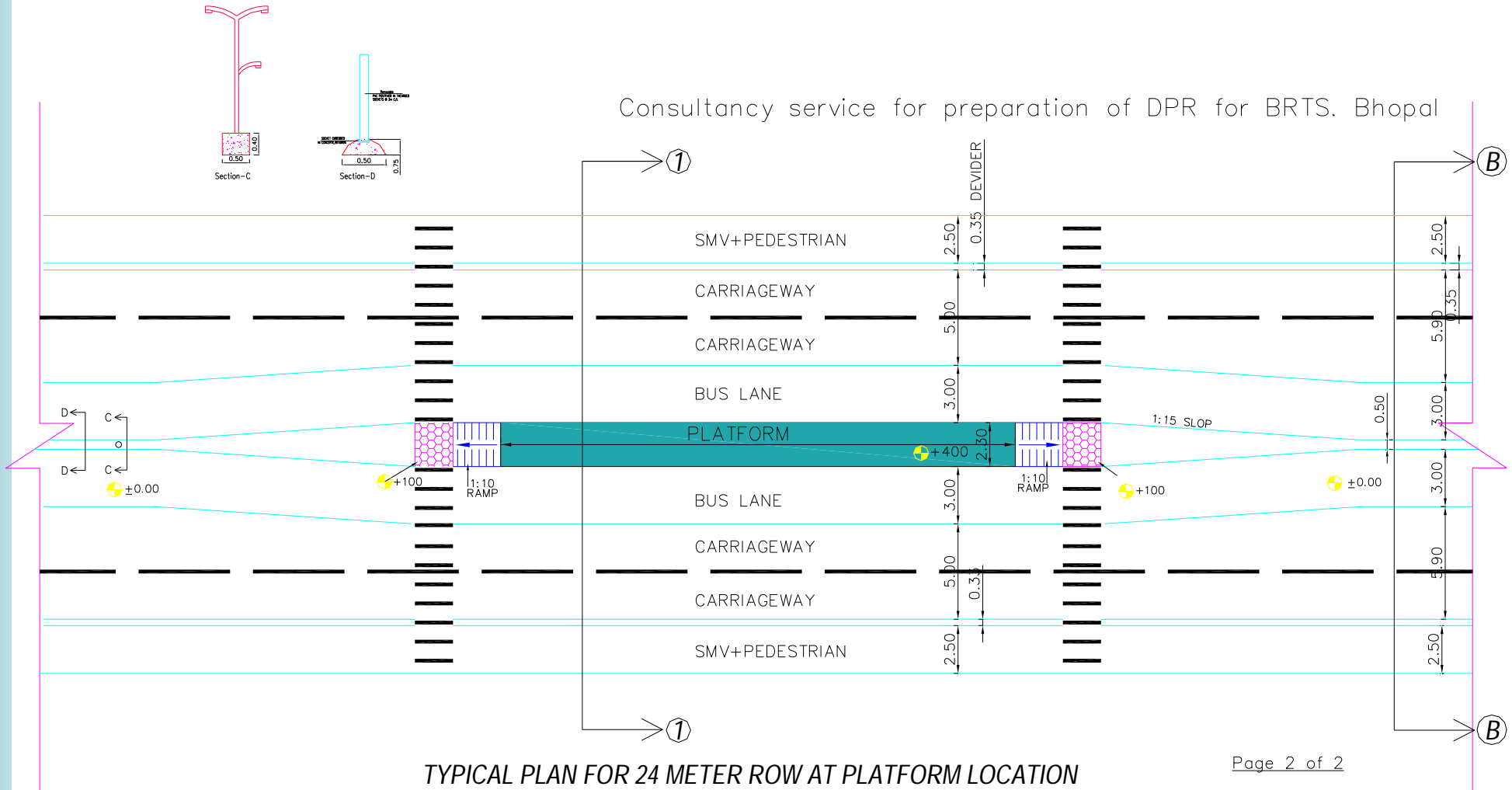
Advantage of Central Common Platform

(Due to Generally restricted RoW availability in Bhopal with central divider and Electric poles)

- Saving of space and at the same time provide wider platform, and ease of geometry
- 2m saved space would be distributed to the FMV lanes
- Central existing utilities to be remained undisturbed saving cost
- Exclusive corridor and bus platforms can not be used by other public transport mode (adding to the operational efficiency)
- Easy transformation to a restricted RoW zone from relatively wider zone
- Central wider platform could also accommodate ticketing facility

PLAN AT BUS STAND LOCATION (Central Common Platform)

Consultancy service for preparation of DPR for BRTS. Bhopal



TYPICAL PLAN FOR 24 METER ROW AT PLATFORM LOCATION

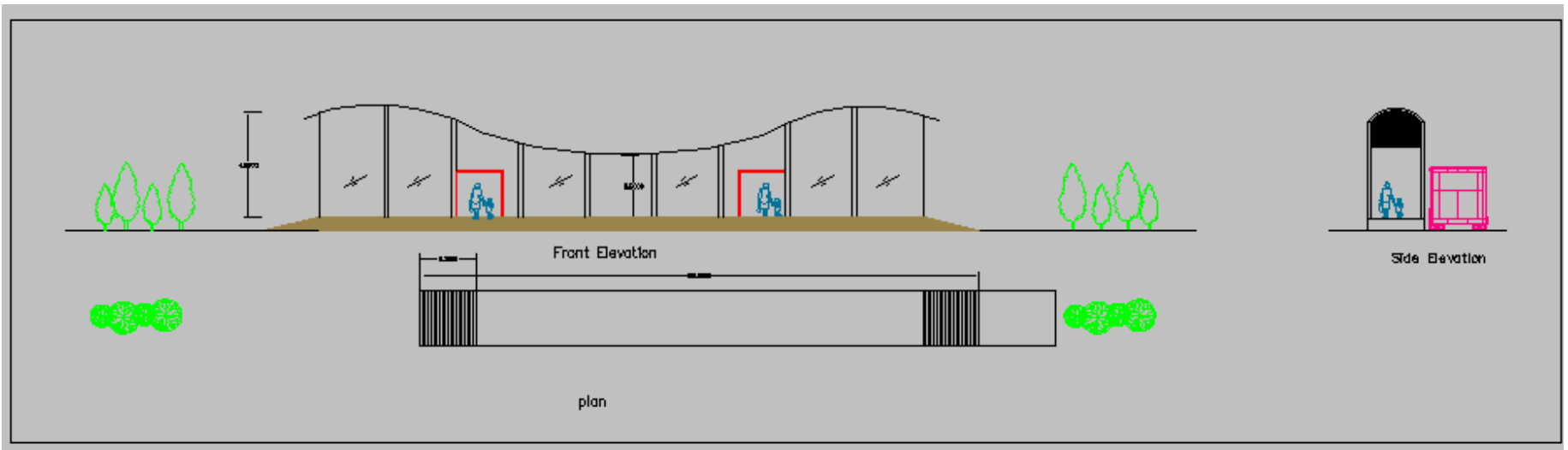
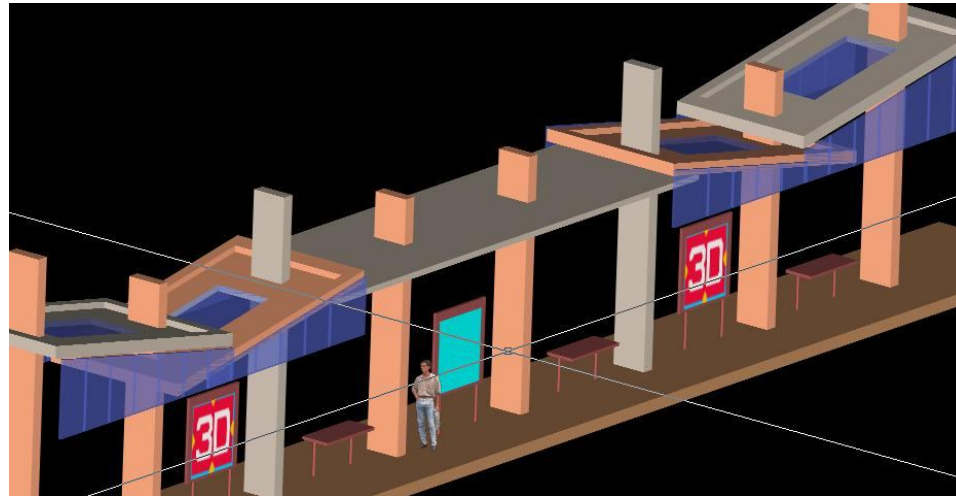
SYSTEM DESIGN FEATURES

Bus Stops

- The Bus stop locations are being proposed based on:
 - a) Boarding-Alighting survey (demands)
 - b) At approx 500m interval.
 - c) At Signalised intersections
- In case of high demands at a mid section - platforms will be provided with at grade pedestrian crossing and PAS
- Access to Bus Stops at intersections with automatic signalling

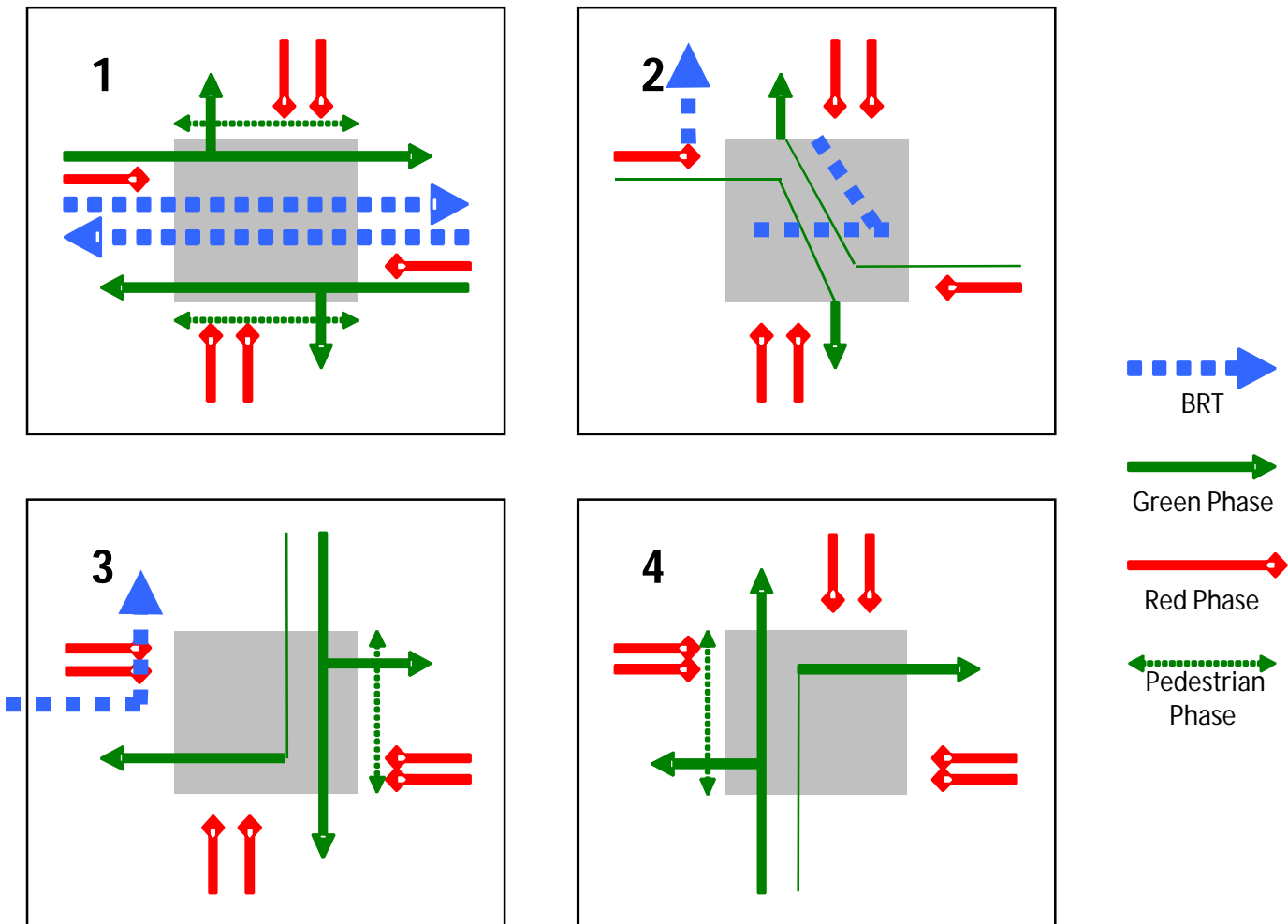
SYSTEM DESIGN FEATURES

Bus Stops (Conceptual)



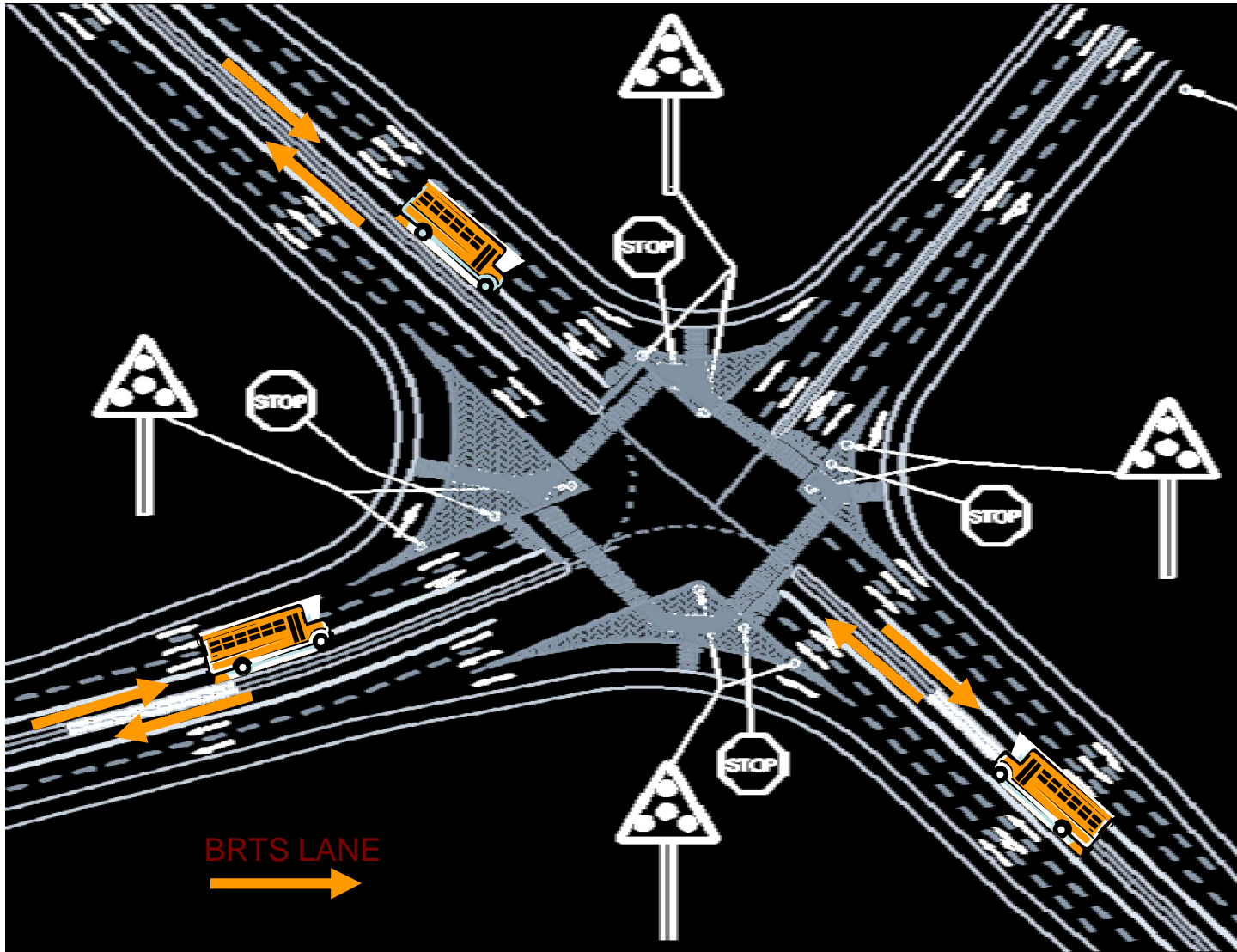
SYSTEM DESIGN FEATURES

Signal Phasing - At Intersections



SYSTEM DESIGN FEATURES

Intersection Improvement Plan (Typ)



SYSTEM DESIGN FEATURES

ROLLING STOCK (Vehicles)

- Aesthetically designed buses
- Buses with right side wide door hydraulically operated by driver
- Front left hand emergency door
- Height of Bus floor and platform to be at same level

SYSTEM DESIGN FEATURES

ITS Application

- GPS based GSM Network Technology using GPRS communication channels
- Automatic Vehicle Location Server (AVLS) facilitating Real Time Tracking to bus operation
- Use of GPS based technology for:
 - Keeping timetable of bus movement and Route Planning,
 - Passenger Information System (PIS)
 - Fare chart in Ticket Vending machine
 - Generation of various types of reports for better management of fleet
- Transit (BRTS) Preferential Signal Phasing at intersections wherever possible,
- PAS at mid-block bus stops
- Automatic Ticket Vending machines,
- Swipe Card Tickets etc.



OPERATIONS PLANNING

Corridors

- All Corridors put together account for a total length of 44kms.
- Corridor 3 and 4 are only road links to connect Corridors 1 and 2.
- For operational purpose, it can be safely assumed to have only two Corridors i.e.
- Corridor 1 Length (23.5 + 2.9) 26.4kms say 27kms
- Corridor 2 Length (14.6 + 2.9) 17.5kms say 18kms

OPERATIONS PLANNING

Fleet requirement

- Average Journey speed : 25KMPH i.e. 2.4Min/KM
- Average stand time at Terminal : 10Mts

Corridor / Frequency of Buses	Required Fleet Size		
	10 mints	8 mints	5 mints
Corridor 1 (Journey time = 65mts)	15	19	30
Corridor 2 (Journey time = 45mts)	11	14	22

OPERATIONS PLANNING

<i>Terminals at:</i>	<i>Integration of Services</i> <i>(Could be considered in three areas)</i>
<ul style="list-style-type: none">■ Bairagarh■ Old Bhopal (Existing Bus Stand)■ T.T Nagar (New Market)■ Misrod■ Raisen Road (BHEL Township)	<ul style="list-style-type: none">■ Operational integration■ Fare integration■ Infrastructure integration

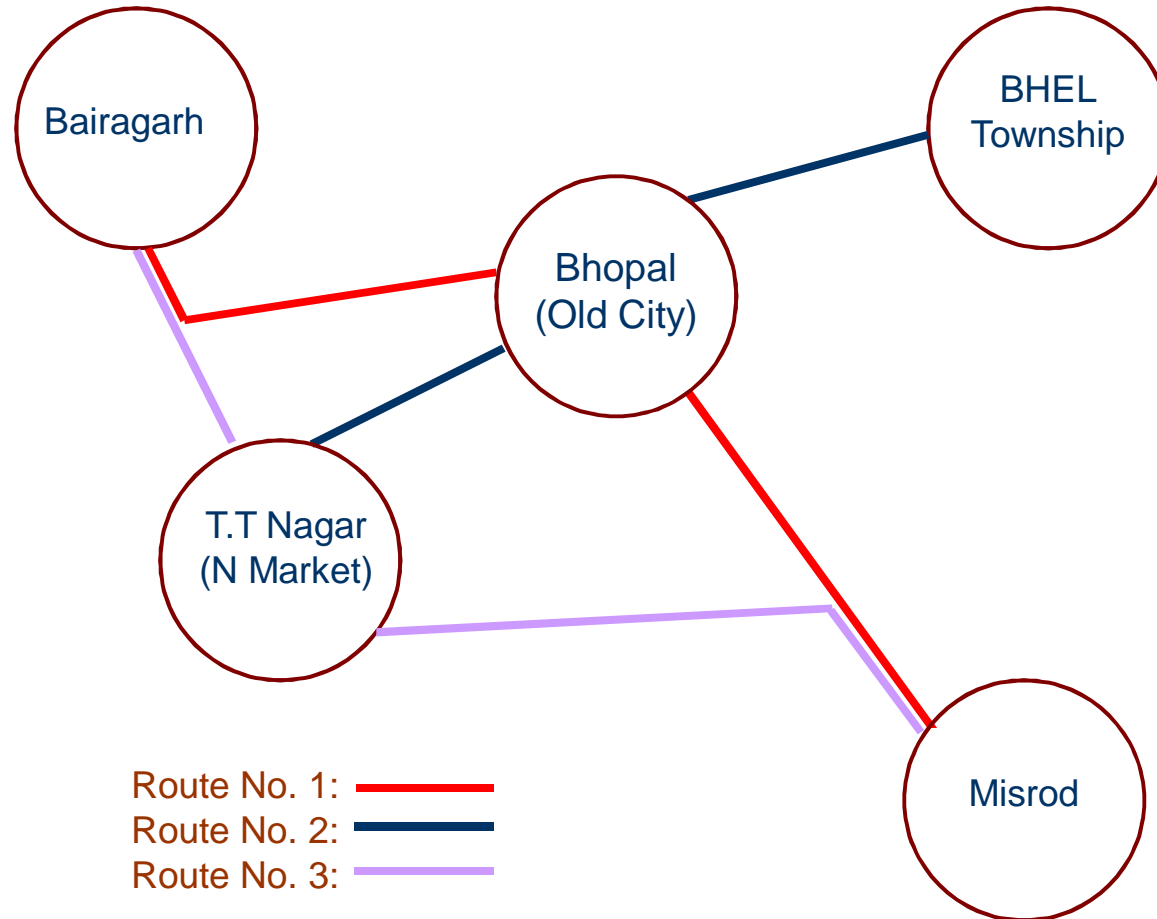
OPERATIONS PLANNING

Route Structure

Route 1	Bairagarh to Misrod (Via) Bharat Talkies	Via Corridors 1, 4, 3
Route 2	Roshanpura to O.R.R	Corridor 2
Route 3	Bairagarh to Misrod (Via) T.T. Nagar – New Market	Corridor 1

OPERATIONS PLANNING

Route Structure



STUDIES IN PROGRESS

Traffic and Transit Studies/ Surveys

- 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

Other Engineering Surveys Conducted

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

NOTE: ANALYSIS IS UNDER PROGRESS



ISSUES

- Road widths are not uniform through out the Corridors
- On street parking need to be restricted along the BRTS corridors. A comprehensive Parking Policy to be evolved
- Additional Demand on BRTS corridors to be created through:
 - (a) Restricting other competing modes of transport (including individual private modes)
 - (b) By attracting people to BRTS with world class services

THANKS

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Bhopal Municipal Corporation