



# MAHARASHTRA METRO RAIL CORPORATION LTD.

## MULTI MODAL INTEGRATION



# PRESENTATION STRUCTURE

- *About Metro Rail Projects in India*
- *Operational, Under Construction & Upcoming Metro Rail Projects in Maharashtra*
- *Vision and Mission of Maha Metro*
- *Nagpur City- A Glance*
- *Vehicle growth in Nagpur*
- *Major stakeholders*
- *National Urban Transport Policy-2006*
- *Nagpur Metro network*
- *Multi Modal Integration Initiatives*
- *MMI Planning in Nagpur and site implementation*
- *Site installation at operational Metro Stations*
- *Feeder service project implementation in Nagpur*
- *Electric vehicle charging stations at all metro stations to promote Electric Vehicles*
- *Common Mobility Card*
- *Green Journey Planning App*
- *Green Initiatives by Maha Metro*
- *Issues in Urban Transport-Nagpur Context*
- *Connecting the dots-Urban Transport and Climate Change*
- *Some myths regarding Transportation*

# ABOUT METRO RAIL PROJECTS IN INDIA

## Key Figures

- Operational Routes: 697.40 km
- Under Construction Routes: 515.46 km
- Approved Routes: 471.54 km
- Proposed Routes: 1045 km

## Fun Facts

- Oldest (First) Metro Rail System: [Kolkata Metro](#)
- Newest Metro Rail System: [Nagpur Metro](#)
- Largest Metro System: [Delhi Metro](#) (347 km)
- Smallest Metro System: [Ahmedabad Metro](#) (6 km)
- Busiest (Highest Ridership) Metro System: [Delhi Metro](#)

# OPERATIONAL, UNDER CONSTRUCTION & UPCOMING METRO RAIL PROJECTS IN MAHARASHTRA

Name of Project	Operational Network	Under Construction new routes	Approved New routes	Proposed New routes	Operator	Start Date
Mumbai Metro	11.40 km	169 km	21.29 km	136.40 km	MMOPL, MMRC & MMMOCL	8 June, 2014
Navi Mumbai Metro	0 km	11.10 km	0 km	95.30 km	CIDCO	-
Nagpur Metro	22.90 km	18.80 km	48.30 km	0 km	Maha-Metro	8 March, 2019
Pune Metro	0 km	58.58 km	4.41 km	26.46 km	Maha-Metro & Pune IT City Metro Rail Ltd.	-
Thane Metro	0 km	0 km	0 km	29 km		

## VISION

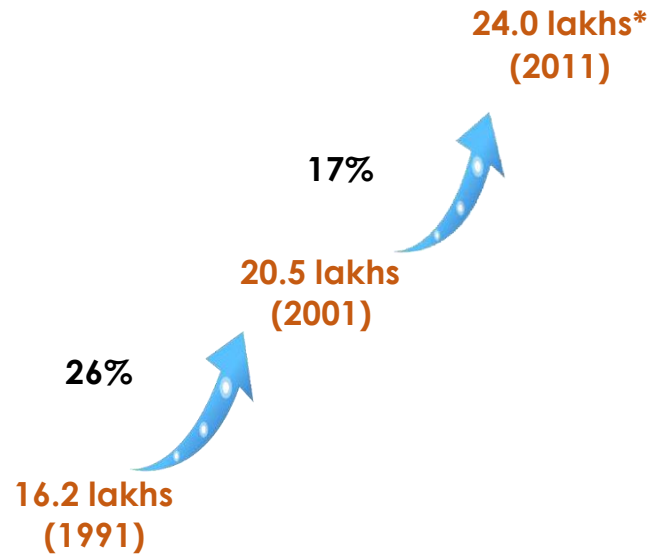
*To create an energy efficient Metro Rail System of International standard which will enhance the quality of life of the citizens of Nagpur and be instrumental in the overall development of the city by making it more vibrant & attractive and utilize the full potential of 'Green Energy' in the form of Solar, Wind, etc.*

## MISSION

*To provide a safe, reliable, efficient, affordable, commuter friendly and environmentally sustainable rapid public transport system for the Nagpur Metro Region.*

# NAGPUR CITY – A GLANCE

## Population Growth

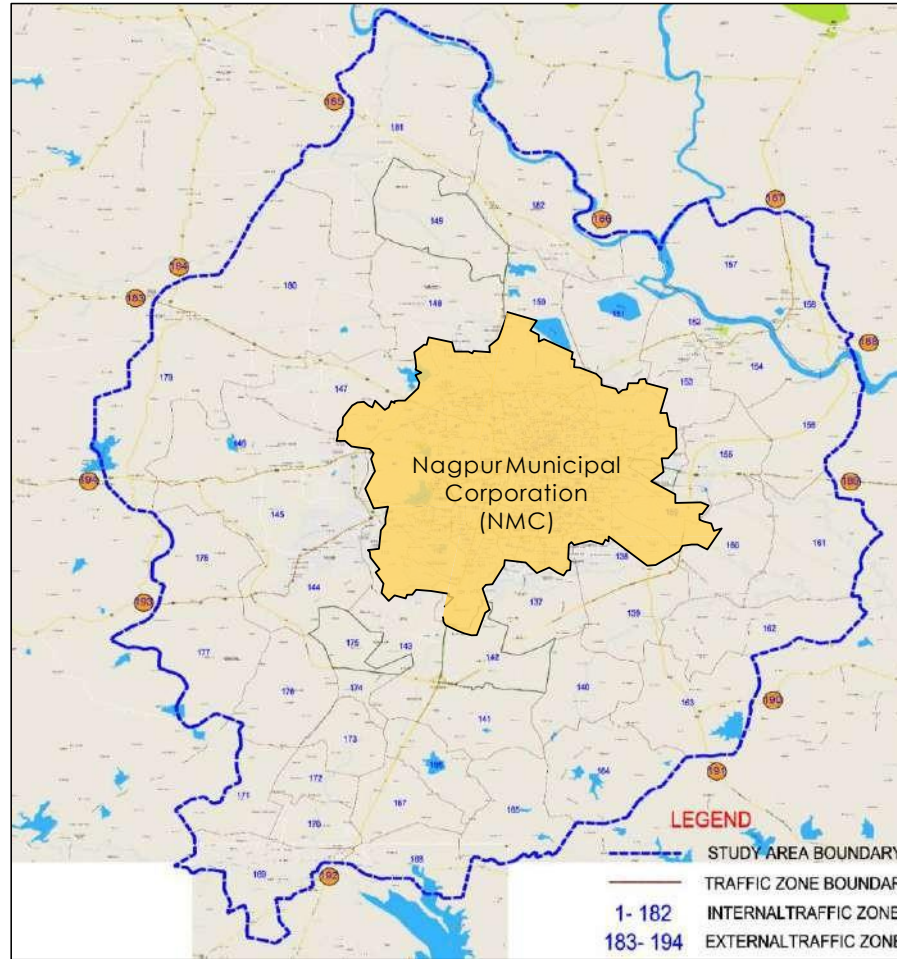


Source: Census 2011, Population of Nagpur Municipal Corporation : 23.99 Lakhs



Urban Area **34.3 Lakhs**  
**1550 Sq. km. (2018)**

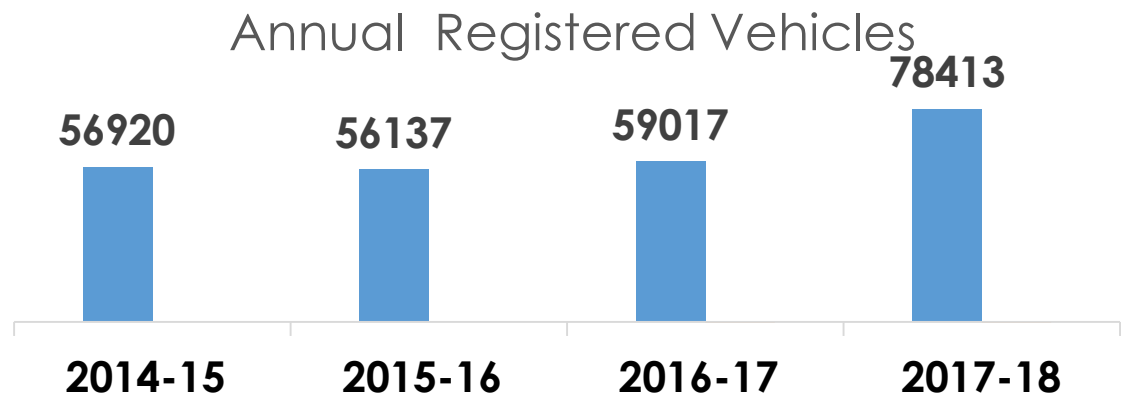
NMC Area **227 Sq. km.**



- **Nagpur is third-largest city of Maharashtra after Mumbai and Pune**
- **It is major commercial and political center of the Vidarbha region of Maharashtra**

- **12<sup>th</sup> Five Year Plan on Urban Transport Infrastructure mandates planning of MRT for 20 lakh population as per 2011 census**
- **Construction of MRT for population above 30 lakh population**

# VEHICLE GROWTH IN NAGPUR



> 12  
lacs



> 1.63  
lacs



> 15  
Thousand

Total  
**14.7 lacs**

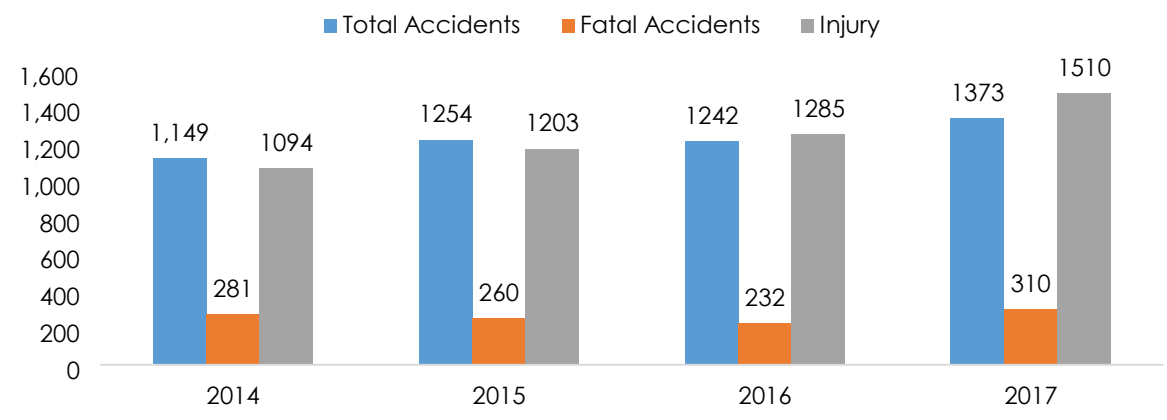
## Accidents



**More than 250  
Fatalities /Annum**

*Source: Data collected from RTO, 2016*

### Accident Data



# NAGPUR

# Major Stakeholders



Nagpur Municipal Corporation



Maharashtra Metro Rail Corporation Limited



Nagpur Improvement Trust



MIHAN India Limited



Indian Railways



Regional Transport Authority



Traffic Police Department



Government of India



Maharashtra Pollution Control Board  
महाराष्ट्र प्रदूषण नियंत्रण मंडळ

Pollution Control Board



Government of India

Collector (DSO)



State Road Transport Corporation



महाराष्ट्र राज्य प्रदूषण नियंत्रण मंडळ

Maharashtra Industrial Development Corporation



National Highways Authority of India



Public Works Department



Maharashtra Airport Development Corporation

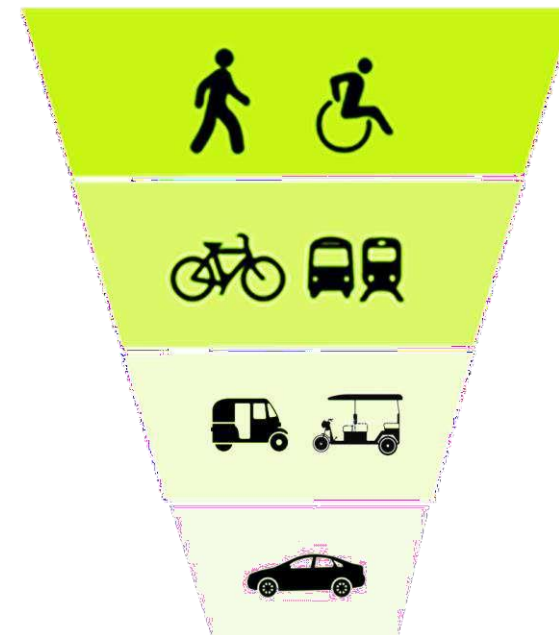
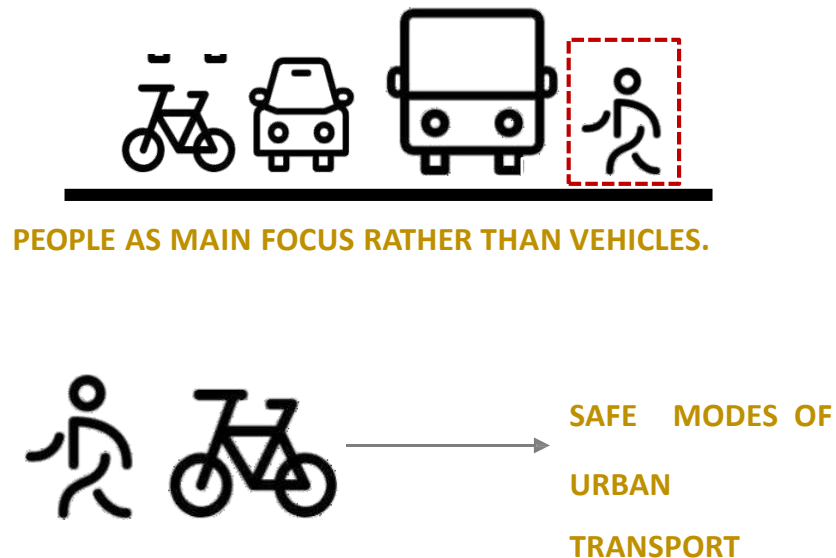


# NATIONAL URBAN TRANSPORT POLICY - 2006

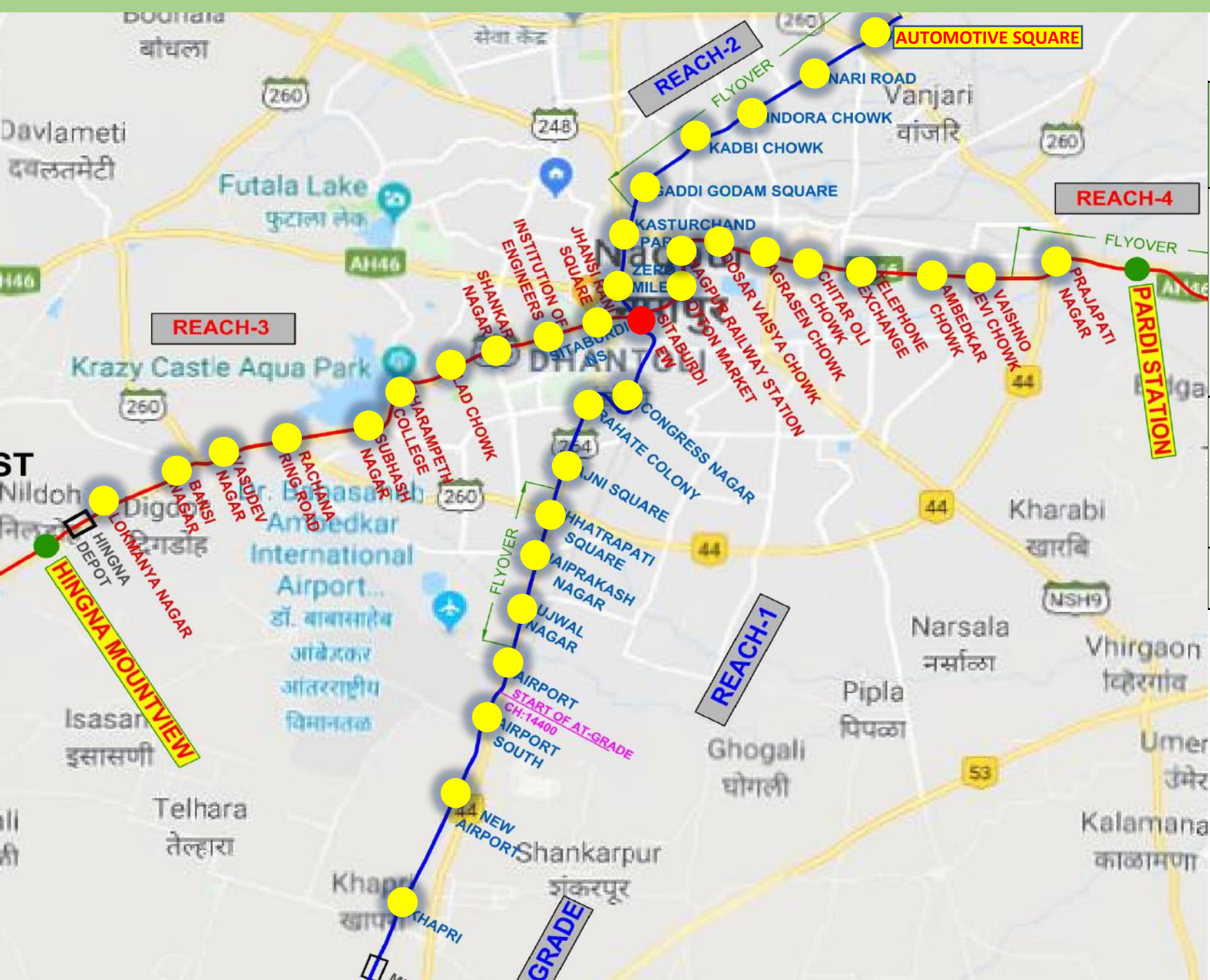
“Ministry of Housing & Urban Affairs (MoHUA) through the National Urban Transport Policy stresses the **NEED TO MOVE PEOPLE RATHER THAN VEHICLES**”

## VISION:

*“To have a people centric environment and encourage **URBAN TRANSPORT WITH LOW CARBON FOOTPRINT.**”*



# NAGPUR METRO NETWORK



SN	CORRIDOR	LENGTH (KM)	STATIONS
1	NORTH – SOUTH CORRIDOR (REACH-1 & 2)	19.658	19
2	EAST – WEST CORRIDOR (REACH-3 & 4)	18.557	19
	<b>TOTAL</b>	<b>38.215</b>	<b>38</b>

# NAGPUR METRO NETWORK– PHASE-1&2

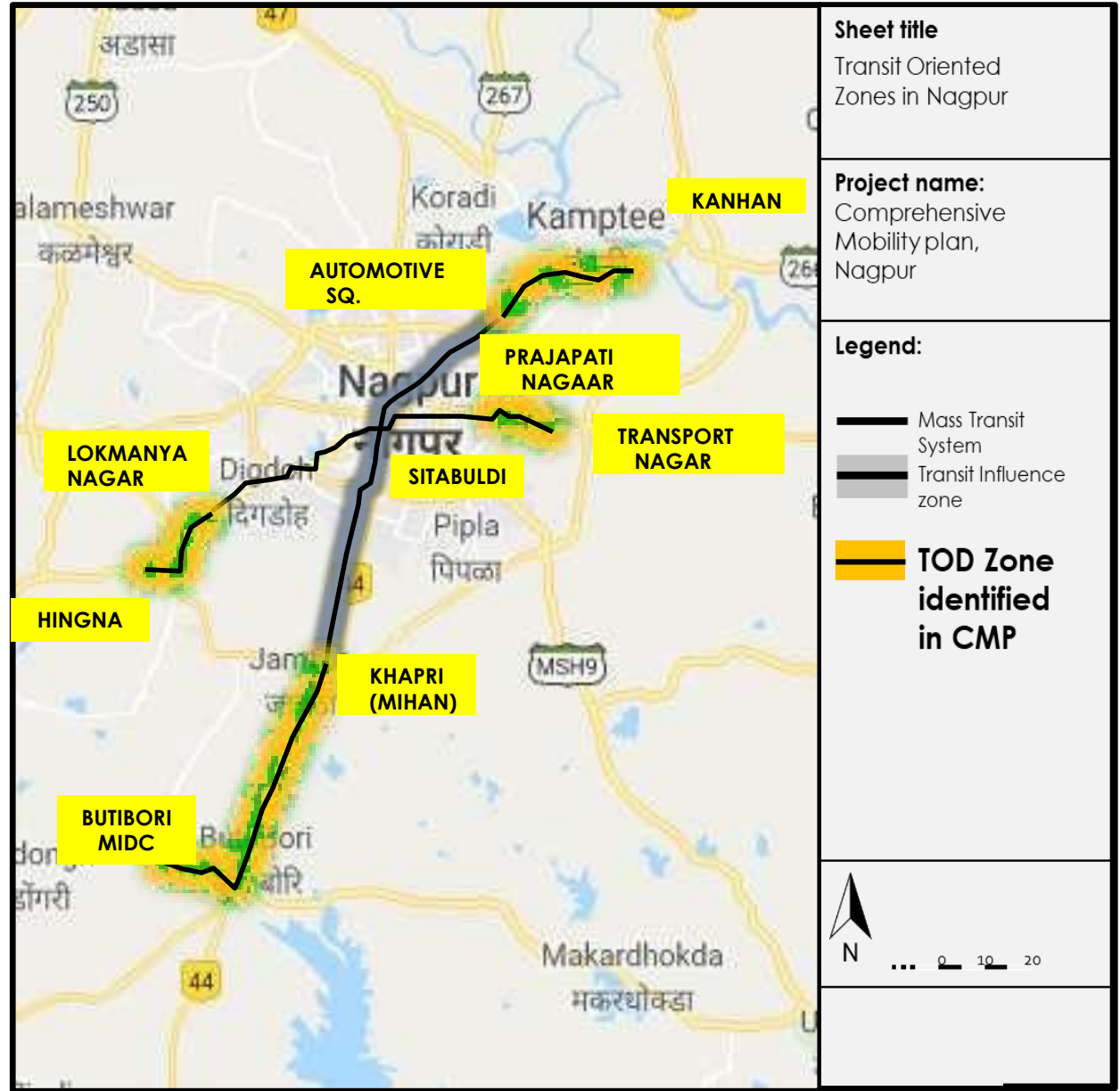
## Phase-1 Corridors (38.215 km)

- MIHAN to Automotive SQ. (NS Corridor) to
- Lokmanya Nagar to Prajapati Nagar (EW Corridor)

## Proposed Phase-II Corridors (43.8 km)

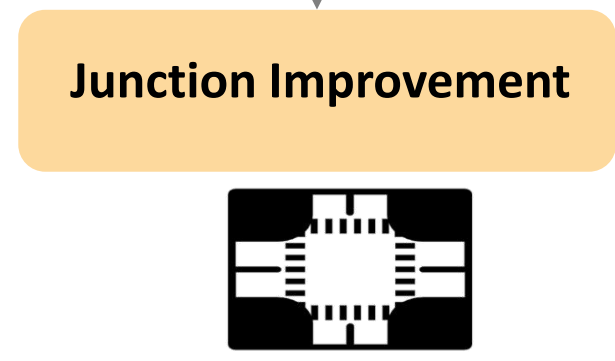
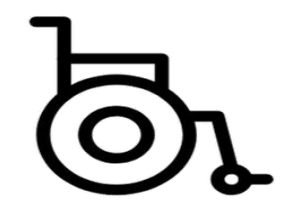
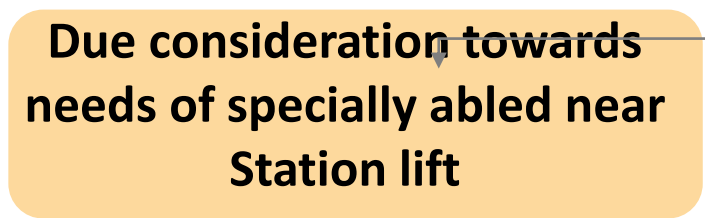
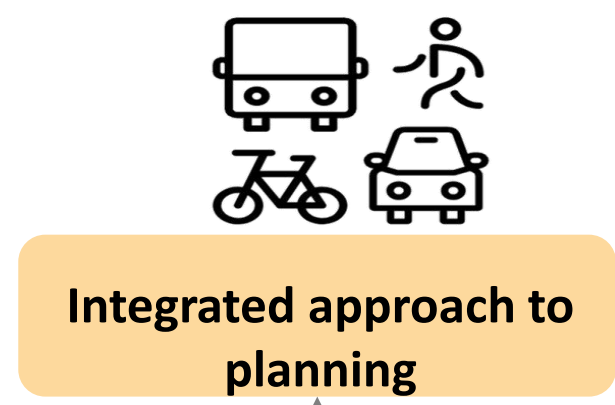
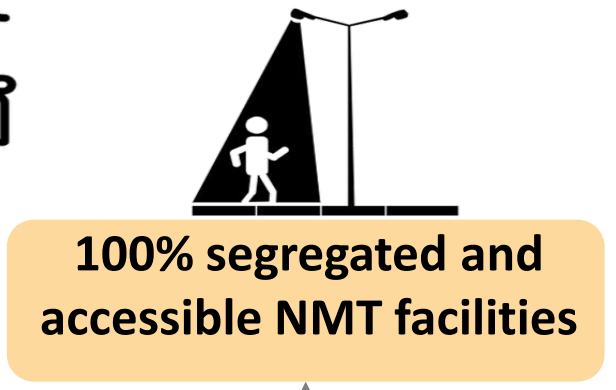
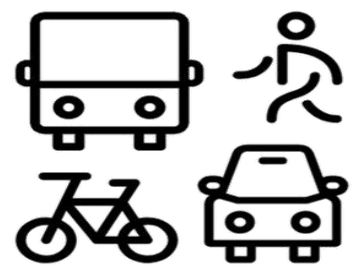
- Kanhan River to MIDC ESR (NS Corridor)
- Transport Nagar to Hingna (EW Corridor)

## High Capacity Mass Transit Corridors (1 KM BUFFER)

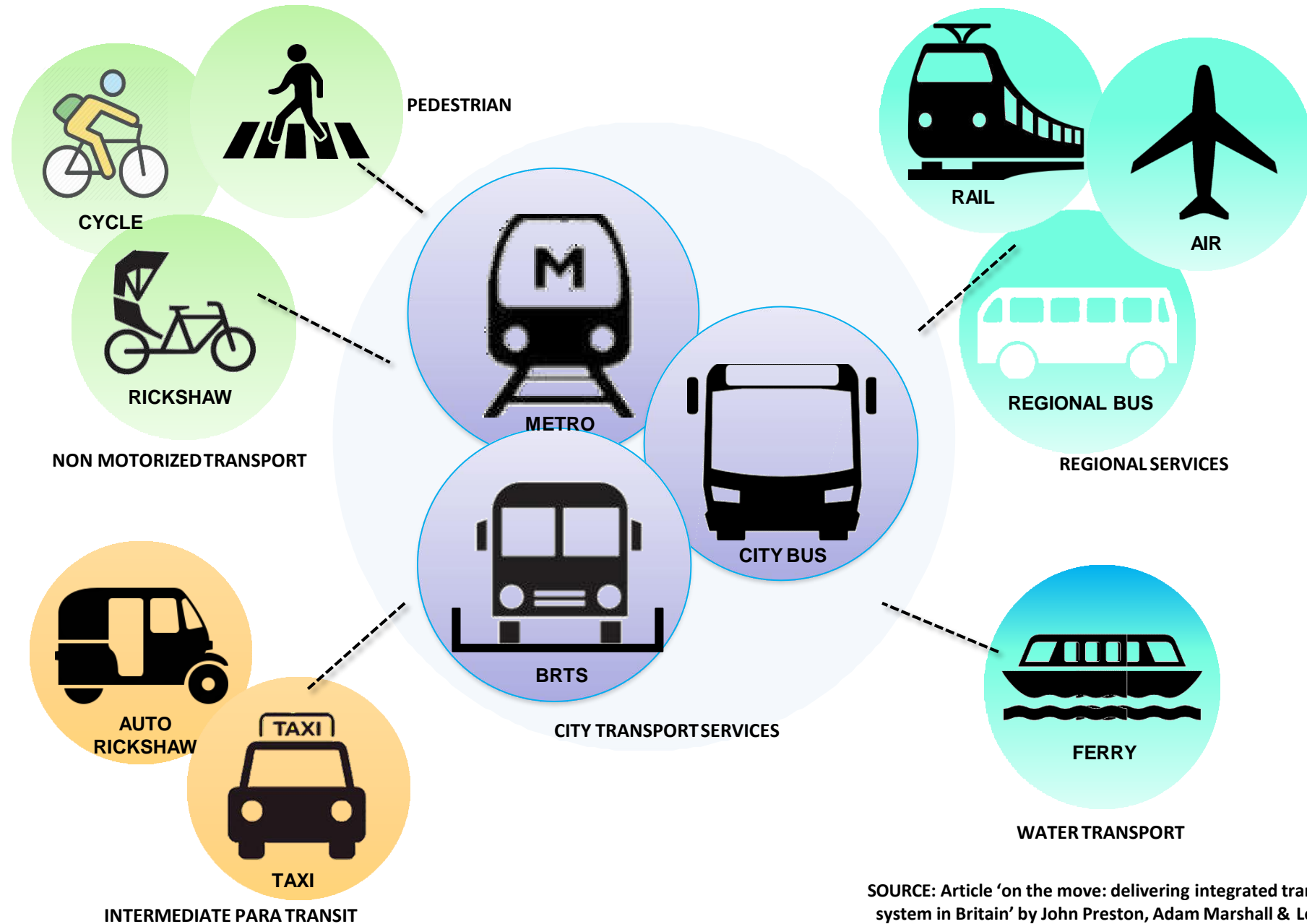


# **MULTIMODAL INTEGRATION INITIATIVES**

# DESIGN PRINCIPLES OF MMI



# MULTIMODAL INTEGRATION- CONCEPT

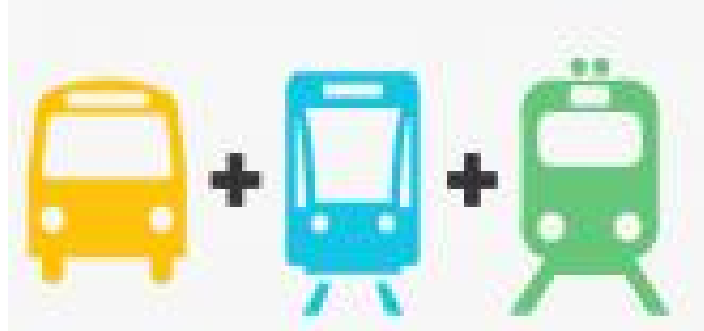


SOURCE: Article 'on the move: delivering integrated transit system in Britain' by John Preston, Adam Marshall & Lena Tochterman

# DESIGN PRINCIPLES OF MMI



## NMT



## PUBLIC TRANSPORT



## IPT



## PRIVATE VEHICLES

### PRIORITY

PEDESTRIANS, CYCLISTS

BUSSES, FEEDER BUSES

AUTO'S, TAXI'S

2W, 4W

### PROXIMITY TO STATION

**WITHIN 50 M OF THE ENTRY/EXIT**

**WITHIN 100 M OF THE ENTRY/EXIT**

**WITHIN 150M OF THE ENTRY/EXIT**

PICK UP/ DROP OFF POINTS WITHIN **>150M OF THE ENTRY/EXIT**

### INFRASTRUCTURE REQUIREMENT

- AT GRADE OR GRADE SEPARATED CROSSING
- GUARD RAILS

- BUS STOPS
- CHARGING STATIONS

- AUTO STANDS
- DROP OFF POINTS

- PICK UP AND DROP OFF POINTS
- PARKING

### SPACE REQUIREMENT

SIDEWALKS: MIN 2.0 M  
CYCLE LANE: MIN 2.0 M

BUS BAY: MIN 15M PER BUS  
SIDEWALK: MIN 3M AT STN

PARKING BAY FOR 1 AUTO: 3.5M X 2M

PARKING BAY:  
2W: 2M X 1.2 M  
4W: 5M X 2.5M

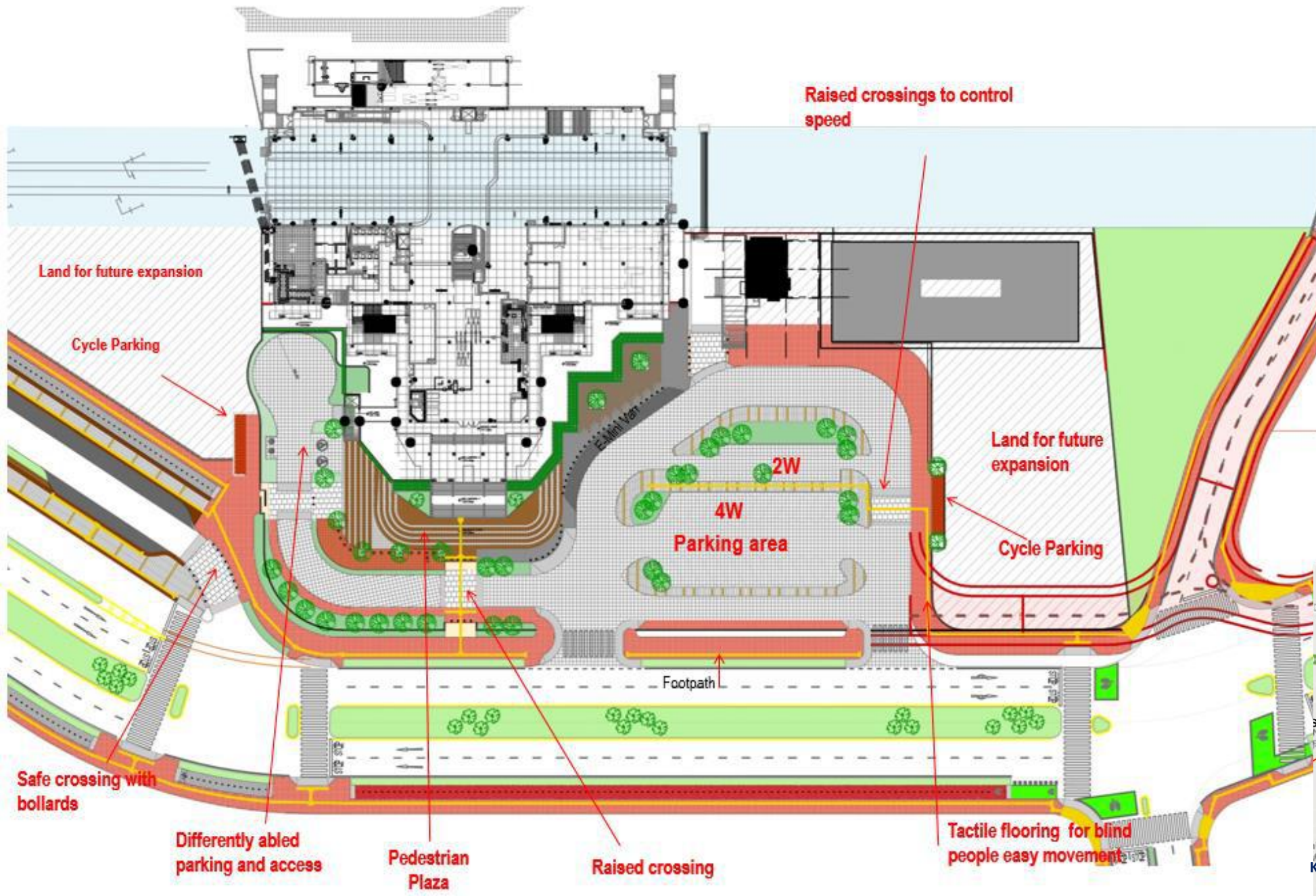
# MODES FOR INTEGRATION





# **MMI PLANNING IN NAGPUR AND SITE IMPLEMENTATION**

# TERMINAL METRO STATION-KHAPRI (MIHAN)



## KEY MMI FEATURES

- Dedicated Drop-off and pick-up facility for all modes
- Specially-abled bay and parking
- Dedicated 2W, 4W, cycle parking
- Pedestrian Plaza & landscaped courts



# MMI FACILITIES AT KHAPRI METRO STATION



# IMPLEMENTATION PHOTOGRAPHS-KHAPRI METRO STATION



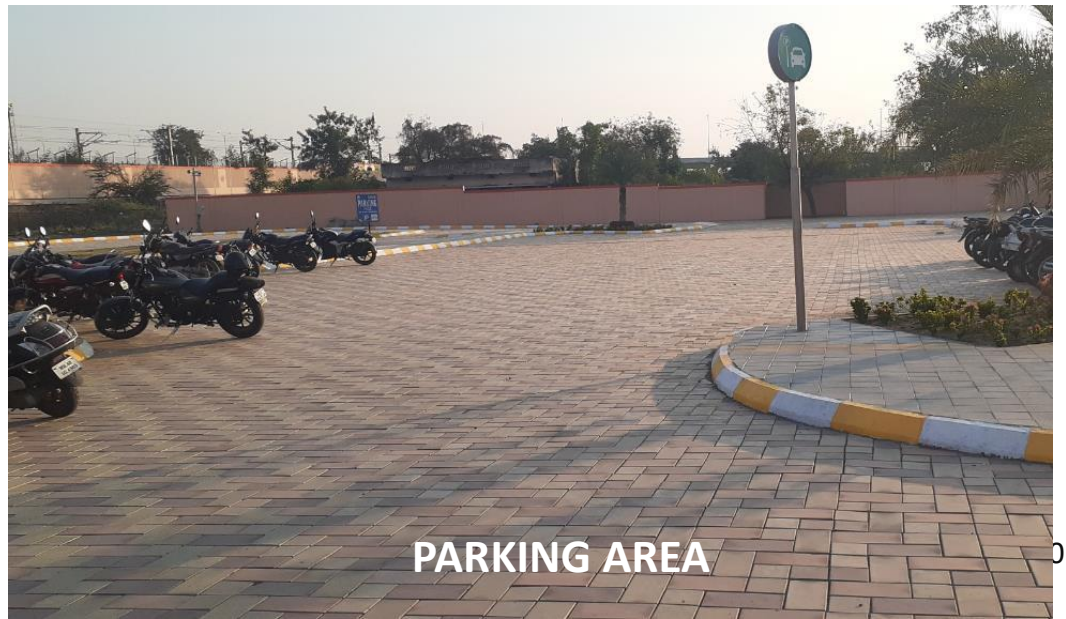
**STATION ENTRY**



**PARKING AREA**



**PEDESTRIAN AREA**



**PARKING AREA**

# IMPLEMENTATION PHOTOGRAPHS-KHAPRI METRO STATION



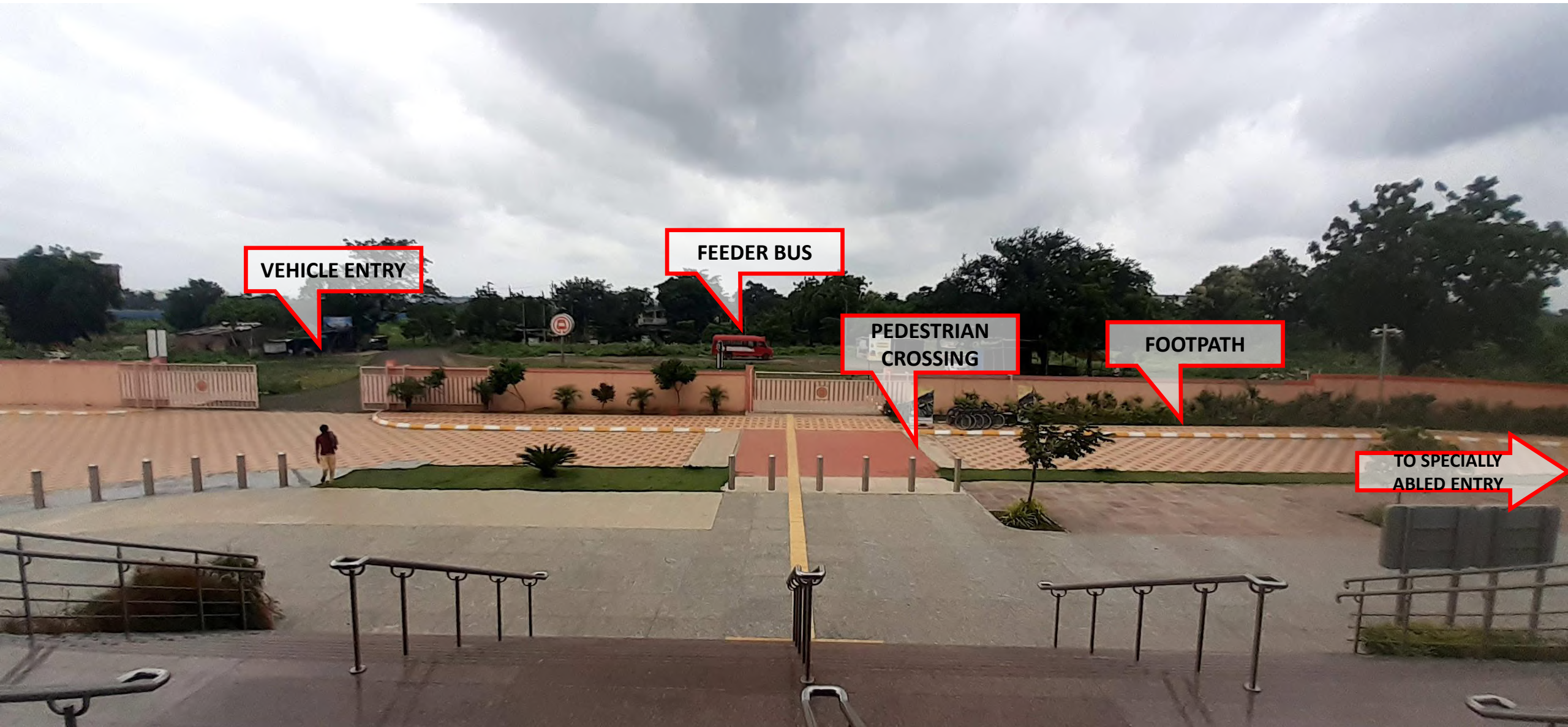
LANDSCAPING

2W PARKING

4W PARKING

E-VEHICLE CHARGING

# IMPLEMENTATION PHOTOGRAPHS-KHAPRI METRO STATION



VEHICLE ENTRY

FEEDER BUS

PEDESTRIAN  
CROSSING

FOOTPATH

TO SPECIALLY  
ABLED ENTRY

# IMPLEMENTATION PHOTOGRAPHS-KHAPRI METRO STATION



**FEEDER BUS**

**VEHICLE ENTRY  
DIVYANGJAN**

**PARKING  
DIVYANGJAN**

**COMMUTER ENTRY  
DIVYANGJAN**

# AERIAL VIEW OF KHAPRI METRO STATION AND KHAPRI RAILWAY STATION WITH MMI FACILITIES

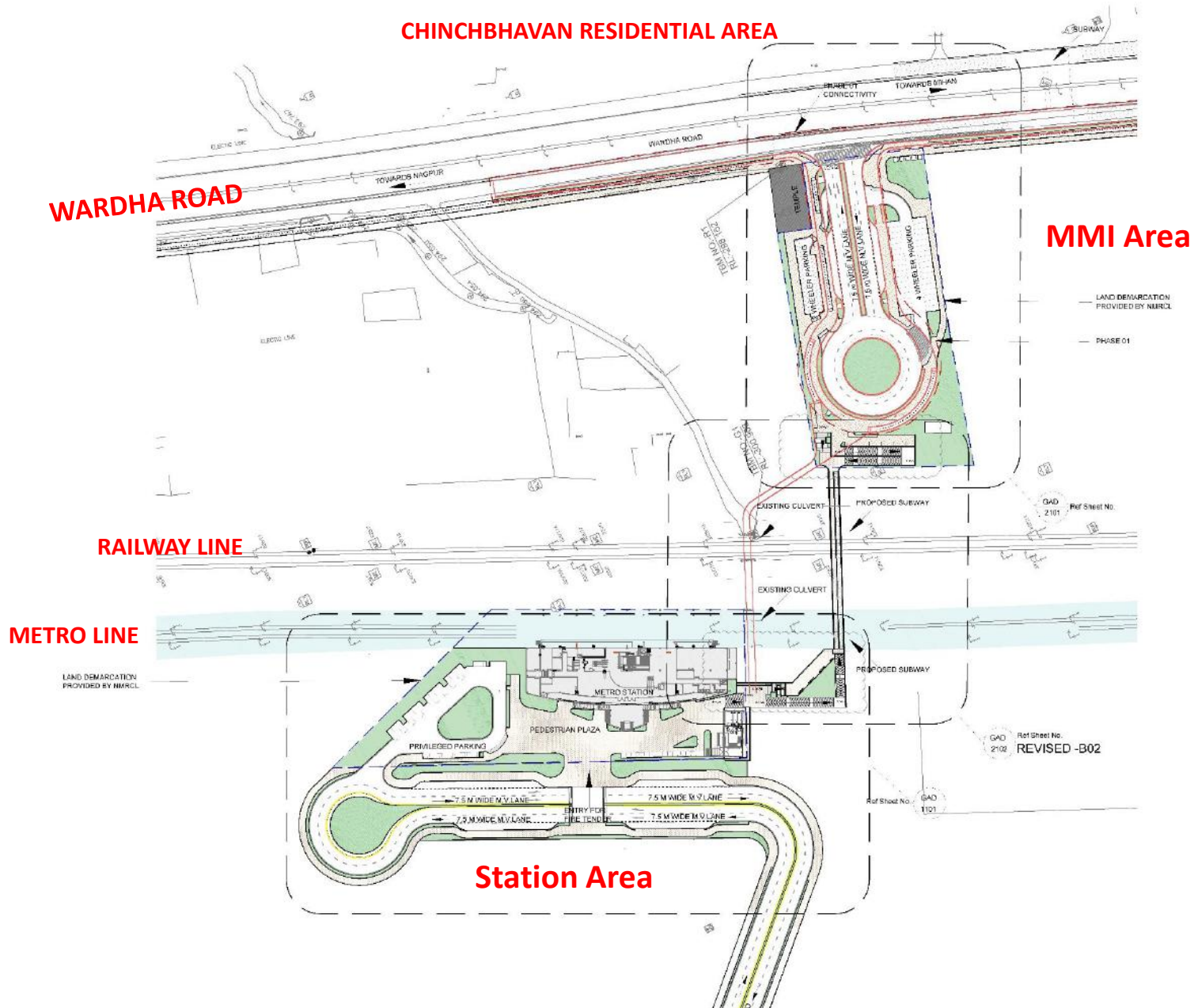


Pick up and drop off facility including park and ride facility

Khapri Metro Station

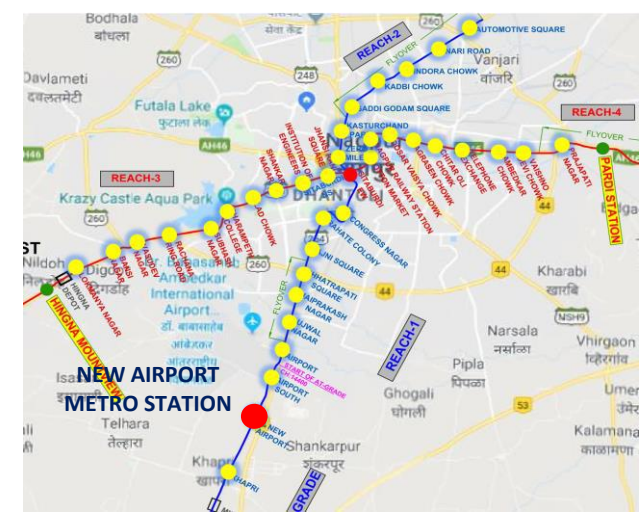


# NEW AIRPORT METRO STATION



## KEY MMI FEATURES

- Metro connectivity to Wardha Road (NH), Chichbhan area as well as MIHAN.
- Planned with consideration of Proposed New Airport
- Dedicated Drop-off and pick-up facility for all modes
- Subway connectivity to Wardha Road
- Specially-abled bay and parking
- Dedicated 2W, 4W, cycle parking.



# AERIAL VIEW OF NEW AIRPORT METRO STATION CONNECTING UPCOMING AIRPORT AT NAGPUR

**New Airport Metro Station**

**Pick up and drop off facility including park and ride facility**

**Subway constructed for connectivity to Chinchbhawan area**

**Pick up and drop off facility including park and ride facility**

Image © 2021 Maxar Technologies

Google Earth

# SUBWAY WITH RAMP CONSTRUCTED BELOW RAILWAY LINE AND METRO LINE TO GIVE PROPER CONNECTIVITY TO NEW AIRPORT METRO STATION



# IMPLEMENTATION PHOTOGRAPHS-NEW AIRPORT METRO STATION



DROP OFF AREA



PEDESTRIAN AREA

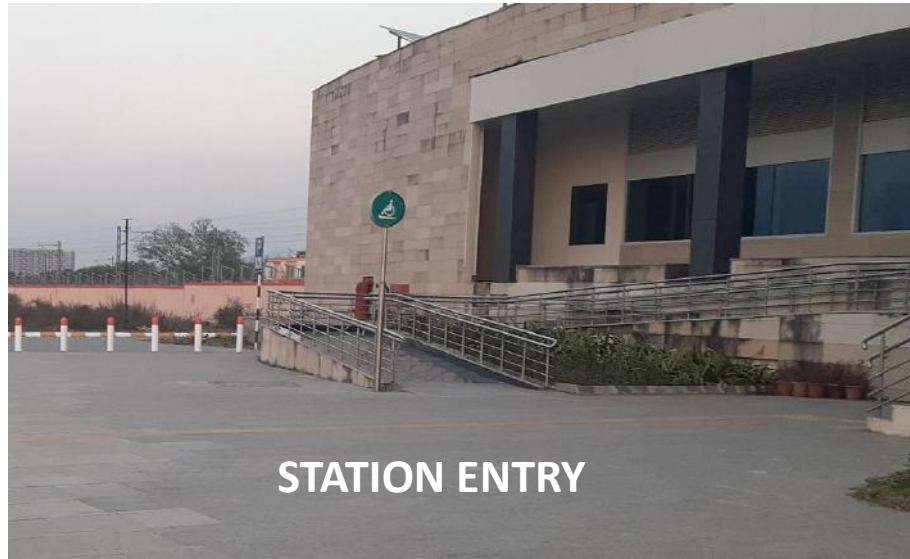


E-RICKSHA DROP



STATION ENTRY

# IMPLEMENTATION PHOTOGRAPHS-NEW AIRPORT METRO STATION



**STATION ENTRY**



**PARKING AREA**



**PEDESTRIAN PLAZA**



**PEDESTRIAN SUBWAY**

# IMPLEMENTATION PHOTOGRAPHS-NEW AIRPORT METRO STATION



**2W PARKING**

**E-VEHICLE CHARGING**

**4W PARKING**

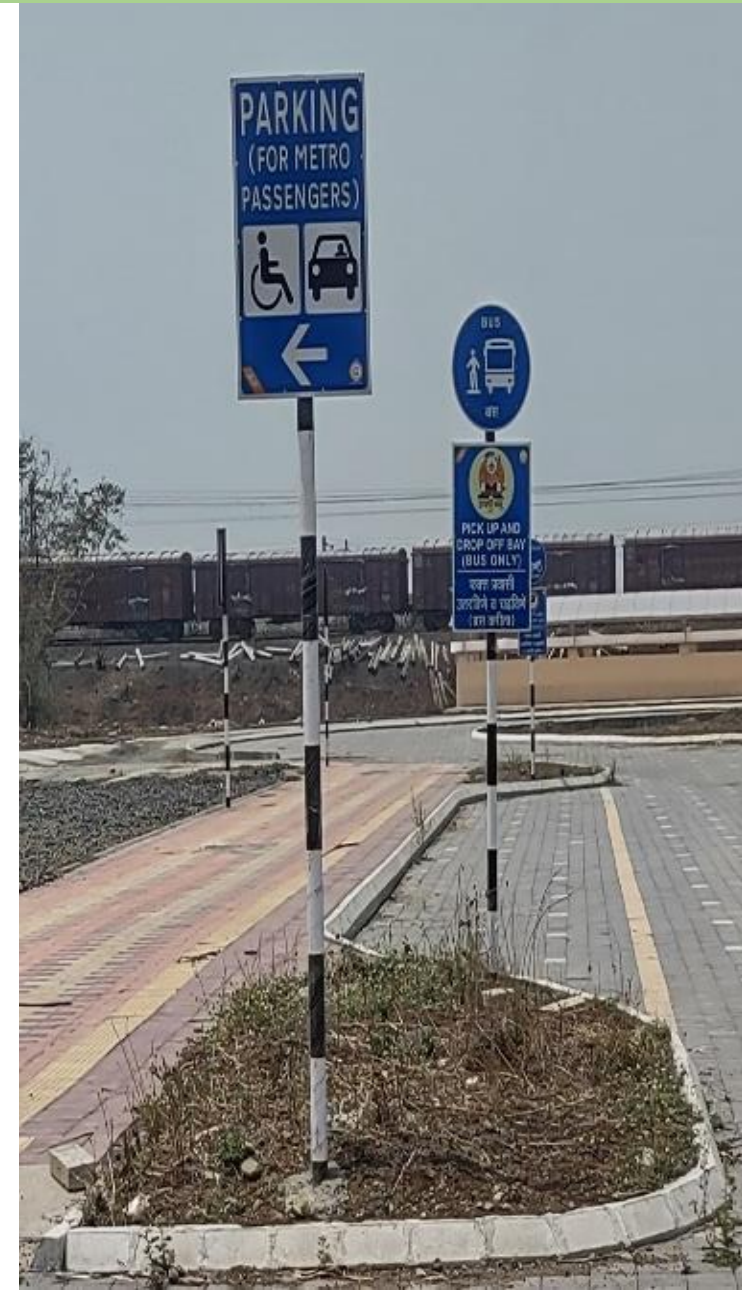
**COMMUTER ENTRY SPECIALLY ABLED**

**PEDESTRIAN PLAZA**

# PARK AND RIDE FACILITY AT NEW AIRPORT METRO STATION FOR CHINCHBHAWAN AREA

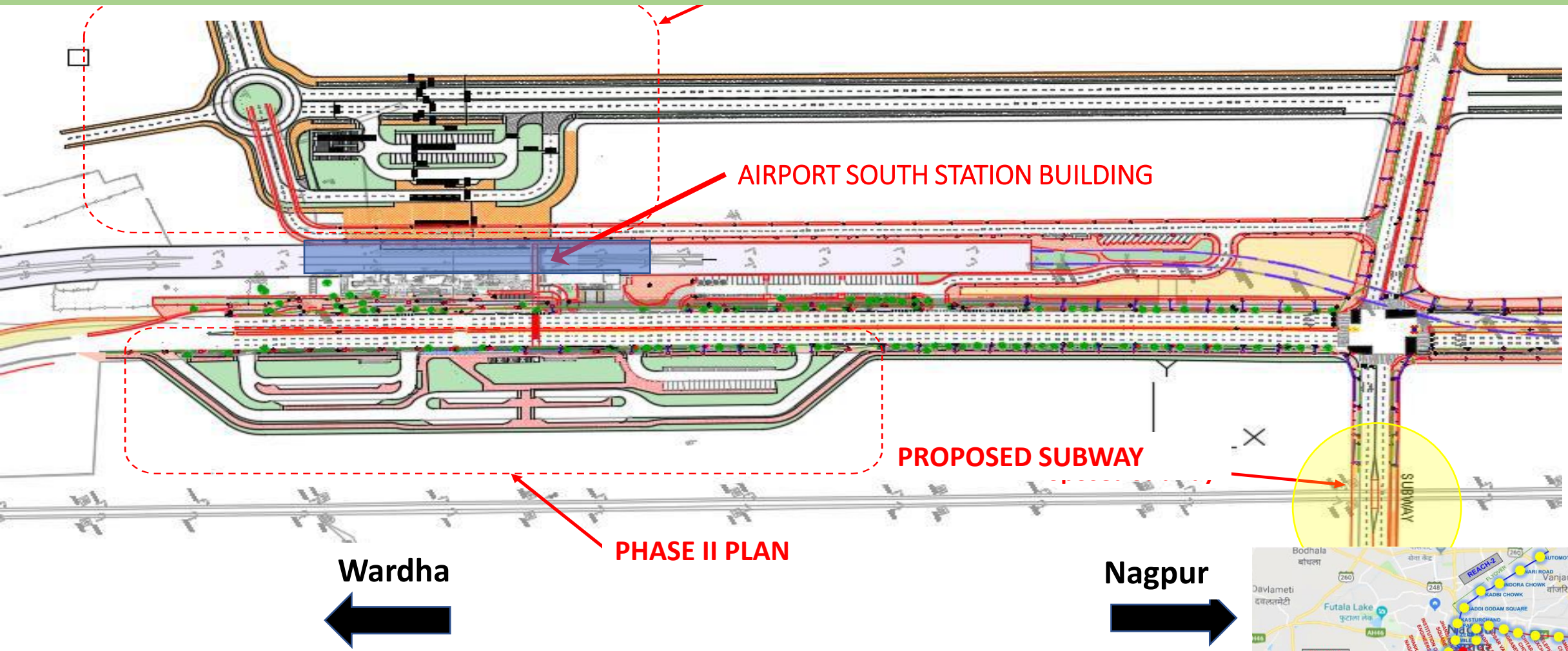


# SIGNAGES FOR 2W, 4W, DIVYANGJAN PARKING, BUS PICK UP AND DROP OFF AT NEW AIRPORT METRO STATION





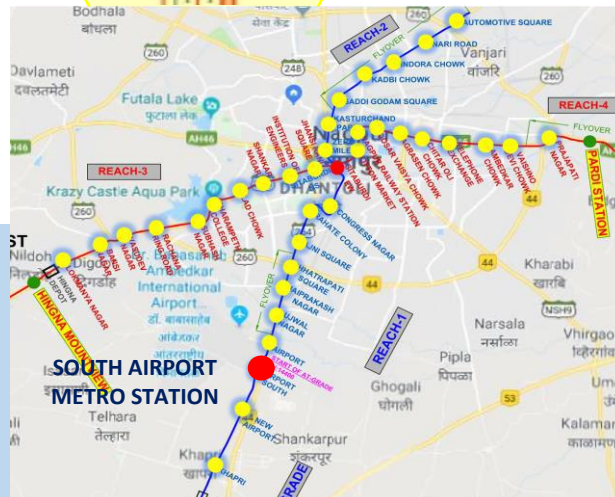
# AIRPORT SOUTH METRO STATION



## KEY MMI FEATURES

- Metro connectivity to Wardha Road (NH) as well as MIHAN area
- 100% Segregated cycle tracks and Footpaths
- Dedicated Drop-off and pick-up facility for all modes

- Specially-abled bay
- Dedicated 2W, 4W, cycle parking
- Proposed Subway for connectivity to Manish Nagar area



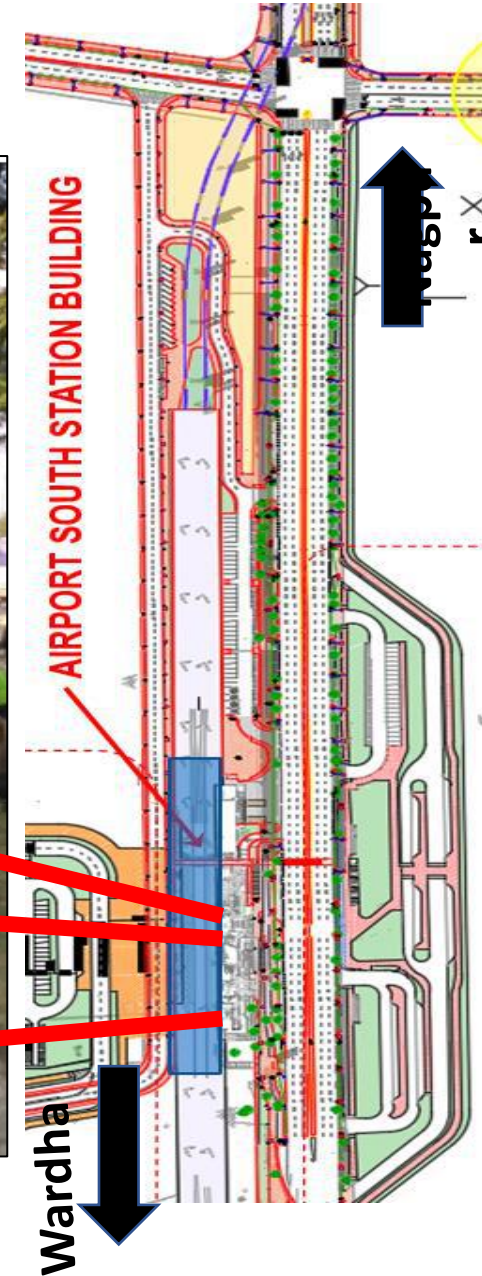
# AERIAL VIEW OF AIRPORT SOUTH METRO STATION WITH MMI FACILITIES



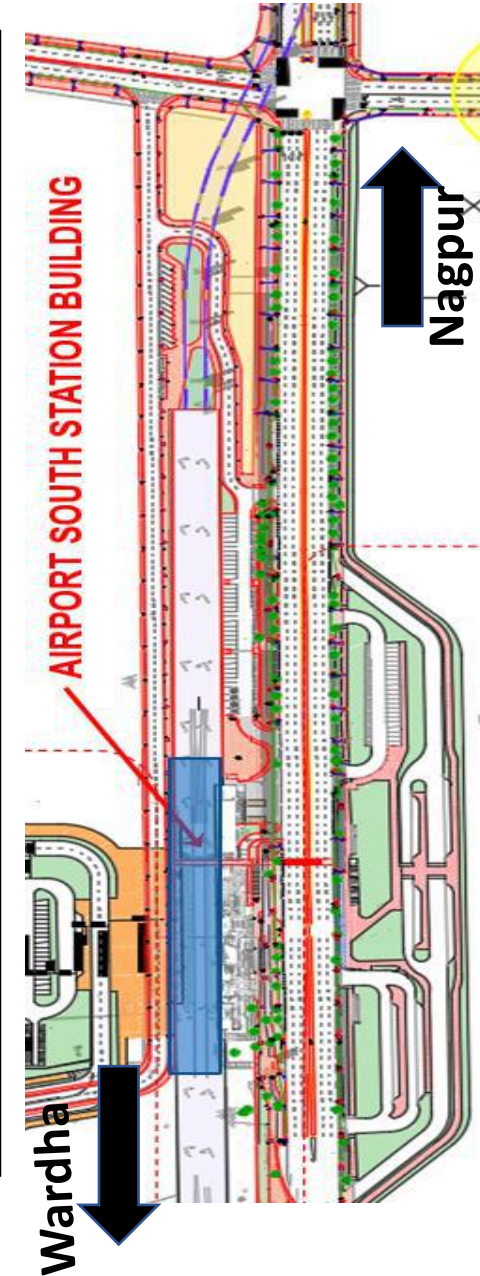
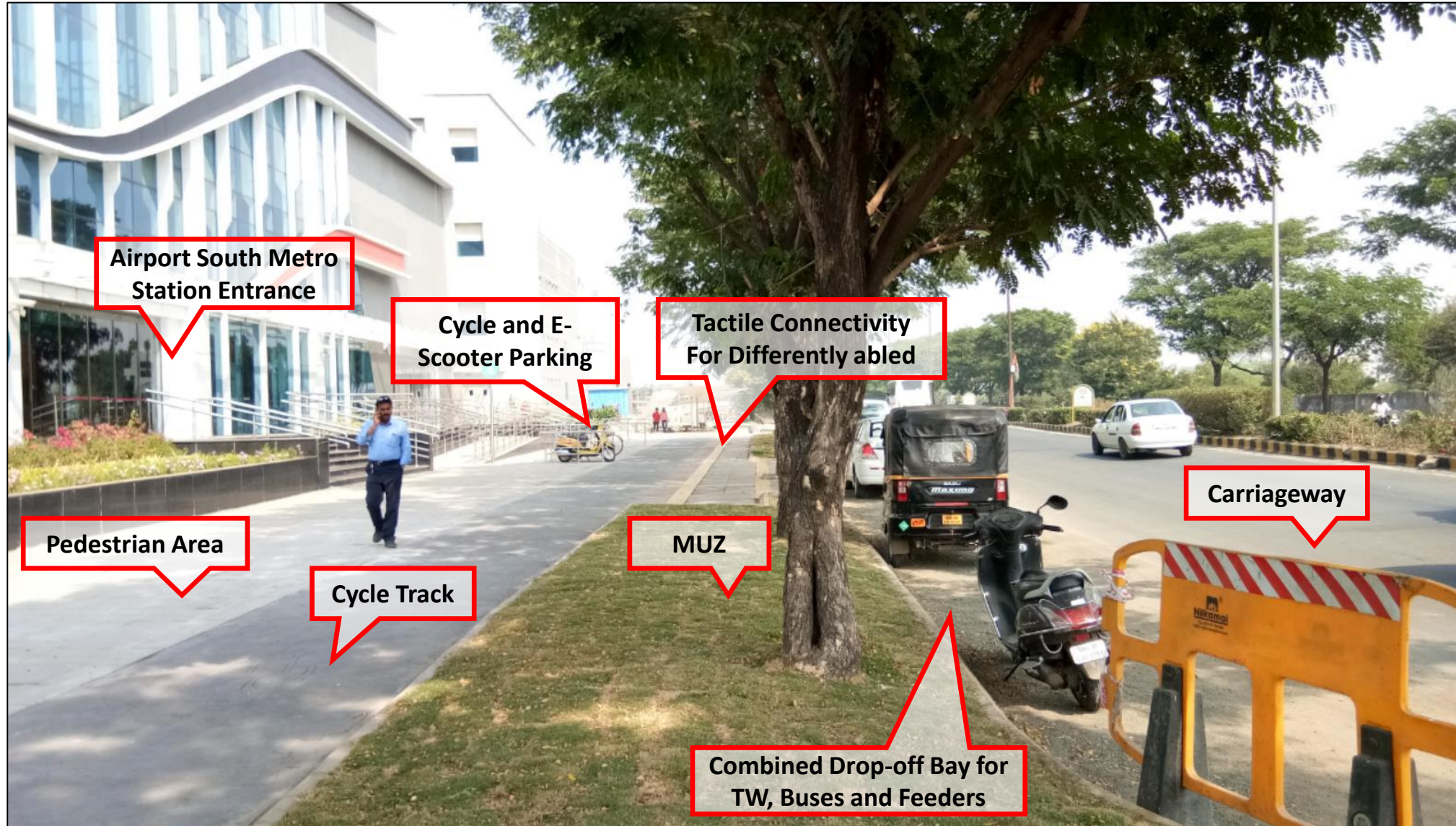
**Airport South Metro Station**

**Pick up and drop off bays, bus bays, parking for 2W, 4W, Divyangjan, pick up and drop off for Outstation buses**

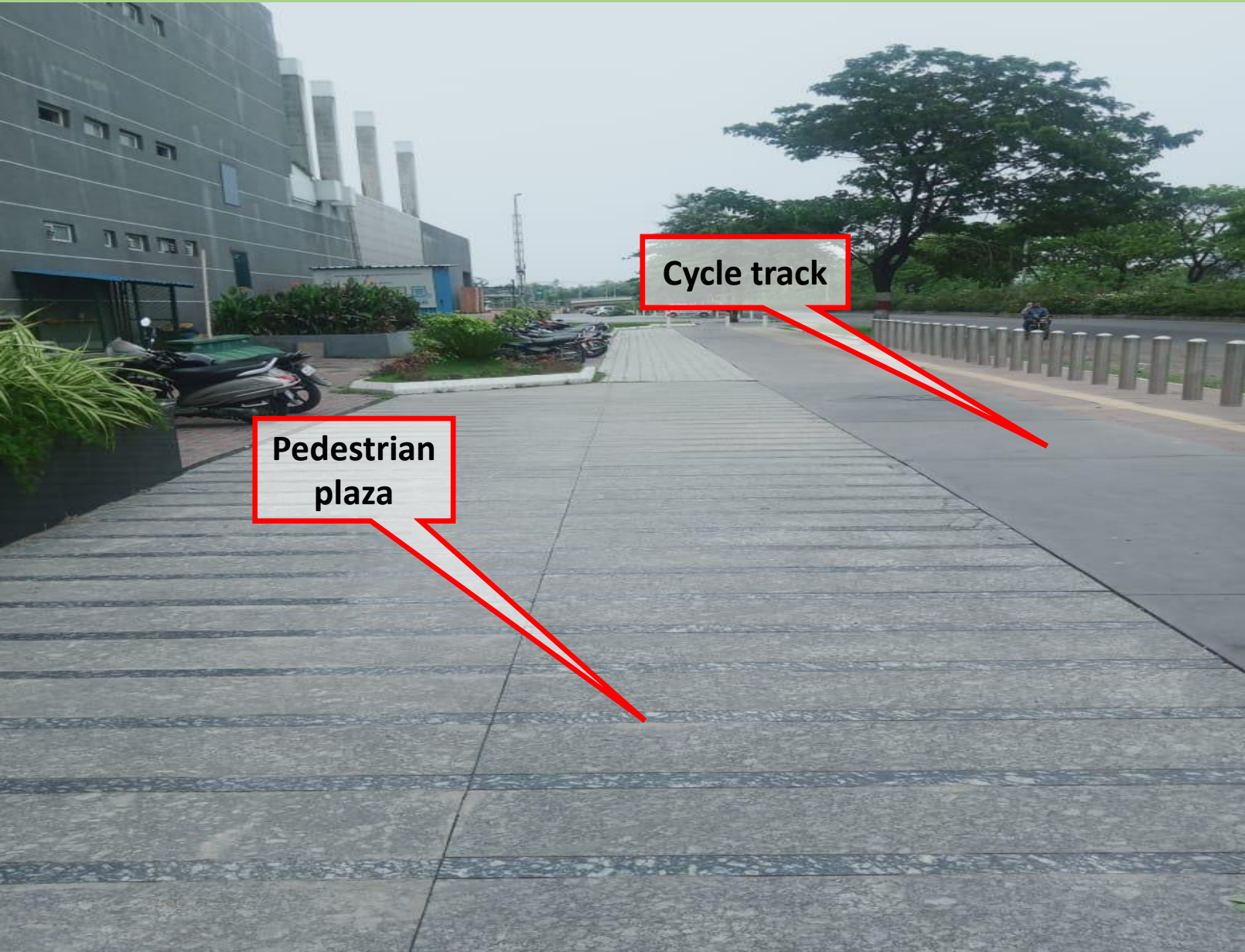
# MMI FACILITIES AT AIRPORT SOUTH



# MMI FACILITIES AT AIRPORT SOUTH



# CYCLE TRACK AND PEDESTRIAN PLAZA AT AIRPORT SOUTH METRO STATION



# AMPLE PARKING FOR 2W, 4W, DIVYANGJAN AT AIRPORT SOUTH METRO STATION

Parking for 2W, 4W,  
Divyangjan



# IMPLEMENTATION PHOTOGRAPHS – AIRPORT SOUTH



PARKING



PARKING ENTRY/EXIT



PARKING AREA



CYCLE TRACK

# IMPLEMENTATION PHOTOGRAPHS – AIRPORT SOUTH

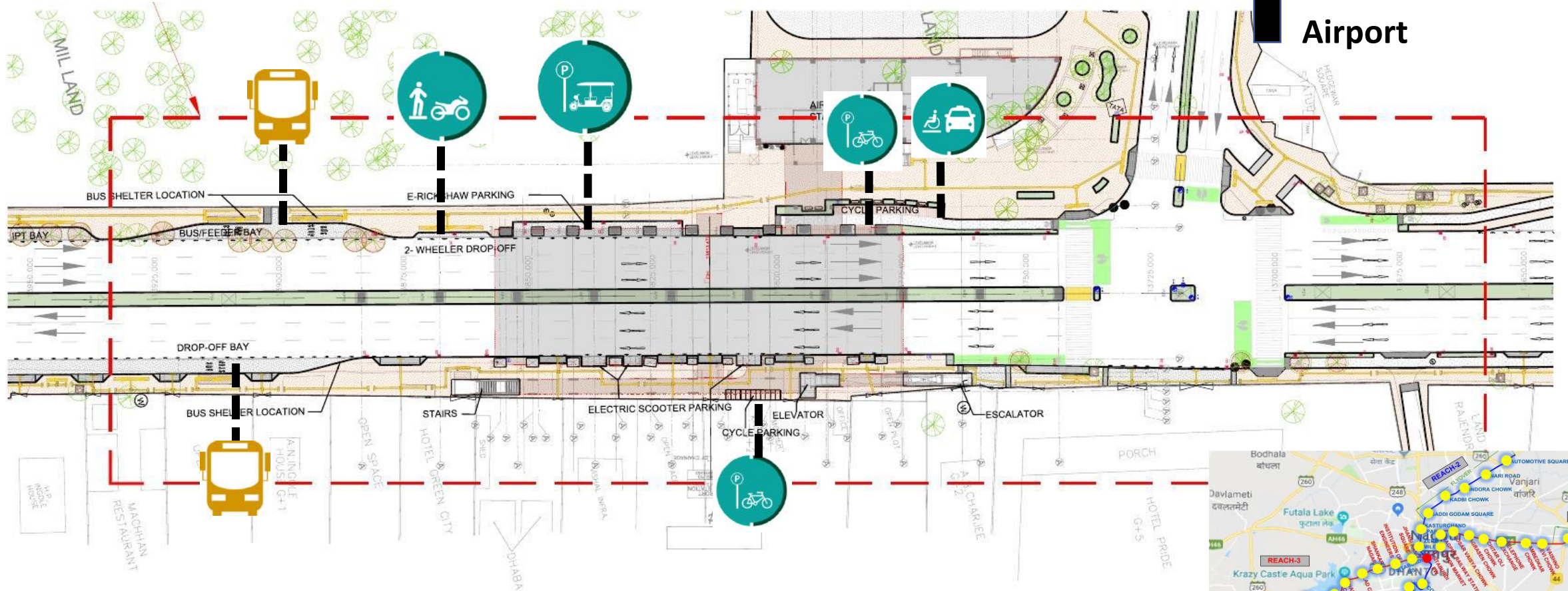




# AIRPORT METRO STATION

←  
Wardha

→  
Nagpur

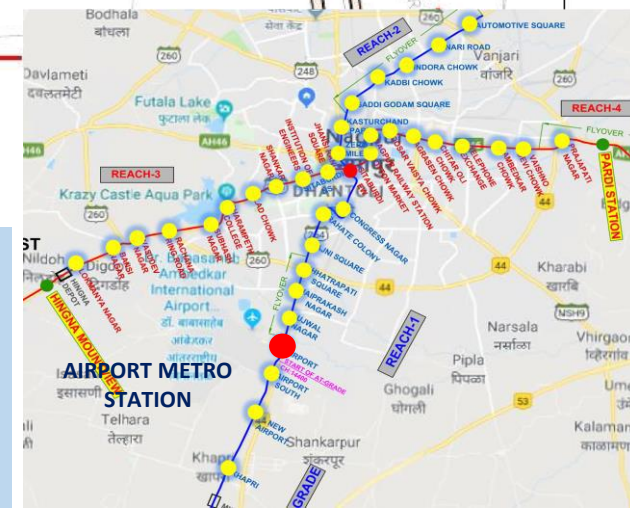


## KEY MMI FEATURES

- Connecting Nagpur International Airport
- 100% Segregated cycle tracks and Footpaths
- Dedicated Drop-off and pick-up facility for all

## modes

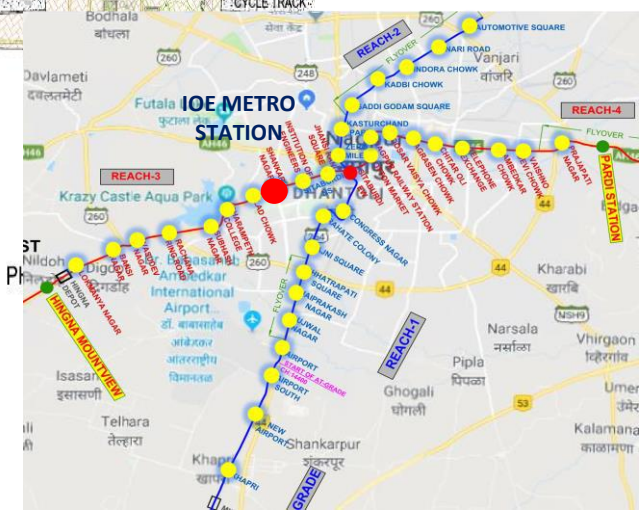
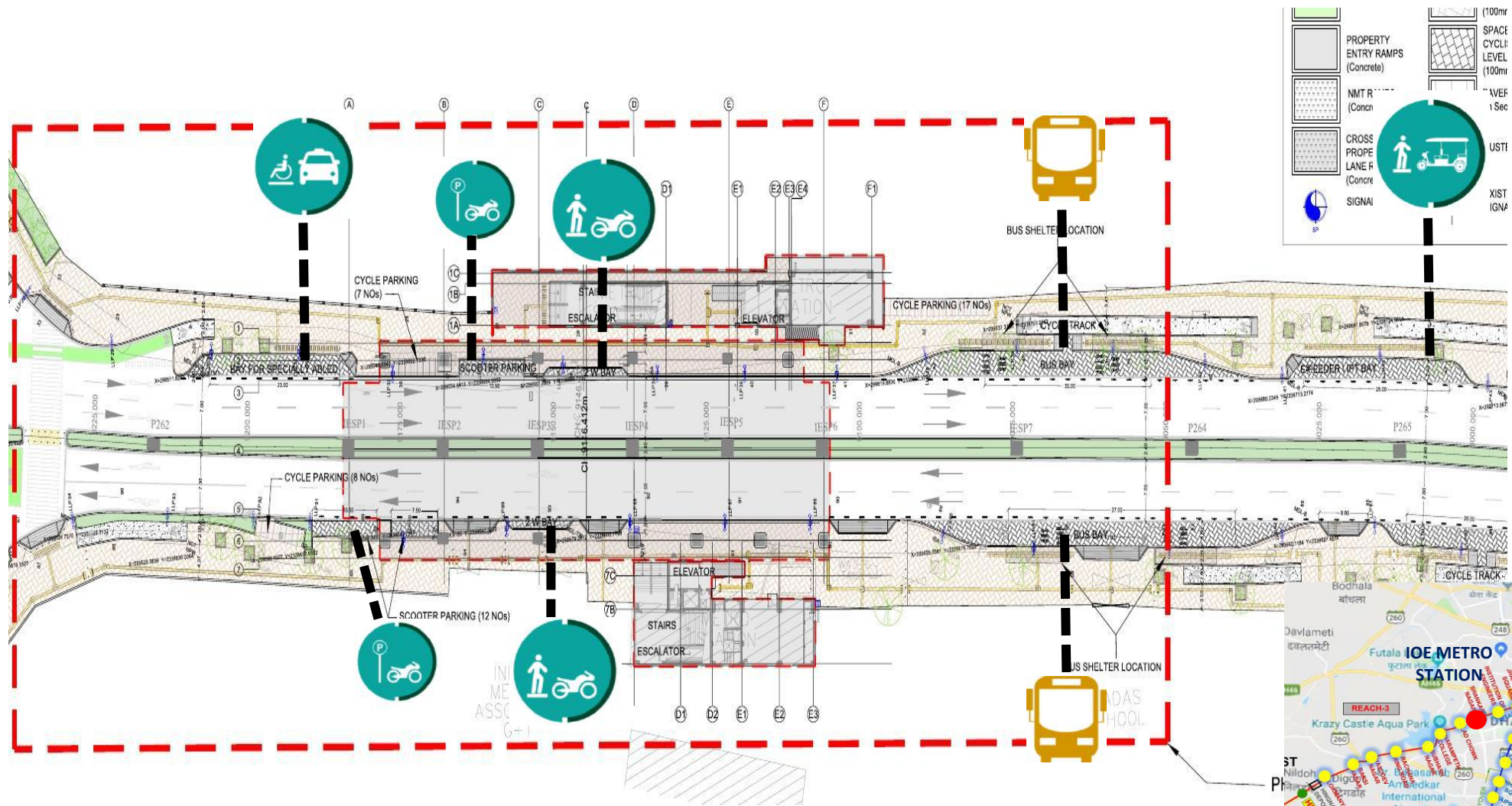
- Specially-abled bay
- Dedicated 2W, 4W, cycle parking
- Dedicated Feeder to Nagpur International Airport



# IMPLEMENTATION PHOTOGRAPHS – AIRPORT METRO STATION



# INSTITUTE OF ENGINEERS METRO STATION



# IMPLEMENTATION PHOTOGRAPHS – INSTITUTE OF ENGINEERS METRO STATION



# INSTITUTION OF ENGINEERS METRO STATION



**BEFORE**



**AFTER**

# 3D REPRESENTATION - NMT IMPROVEMENT FOR ENHANCED SAFETY

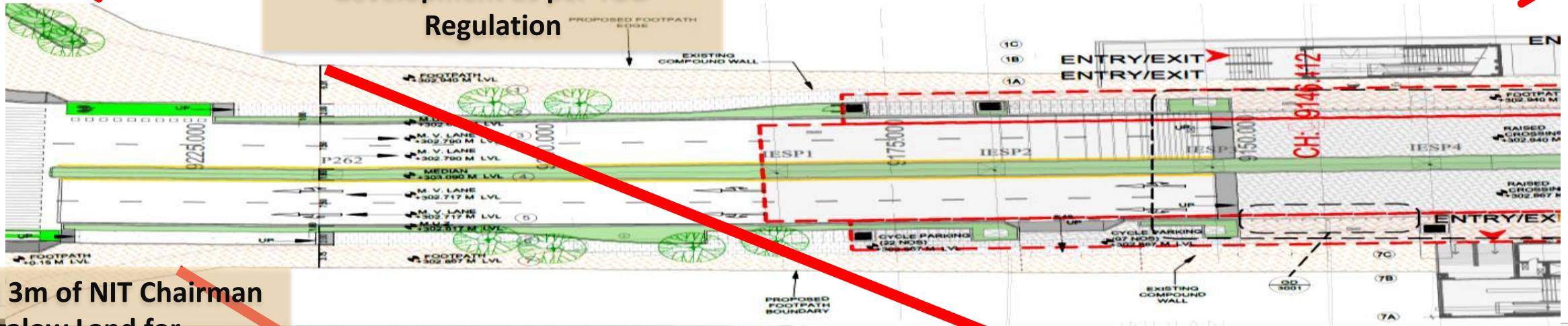


# IMPLEMENTATION PHOTOGRAPHS – INSTITUTE OF ENGINEERS METRO STATION

Shankar Nagar

Addl 3m of PKV Land for Footpath development as per TOD Regulation

Jhansi Rani



Addl 3m of NIT Chairman Bungalow Land for Footpath development as per TOD Regulation

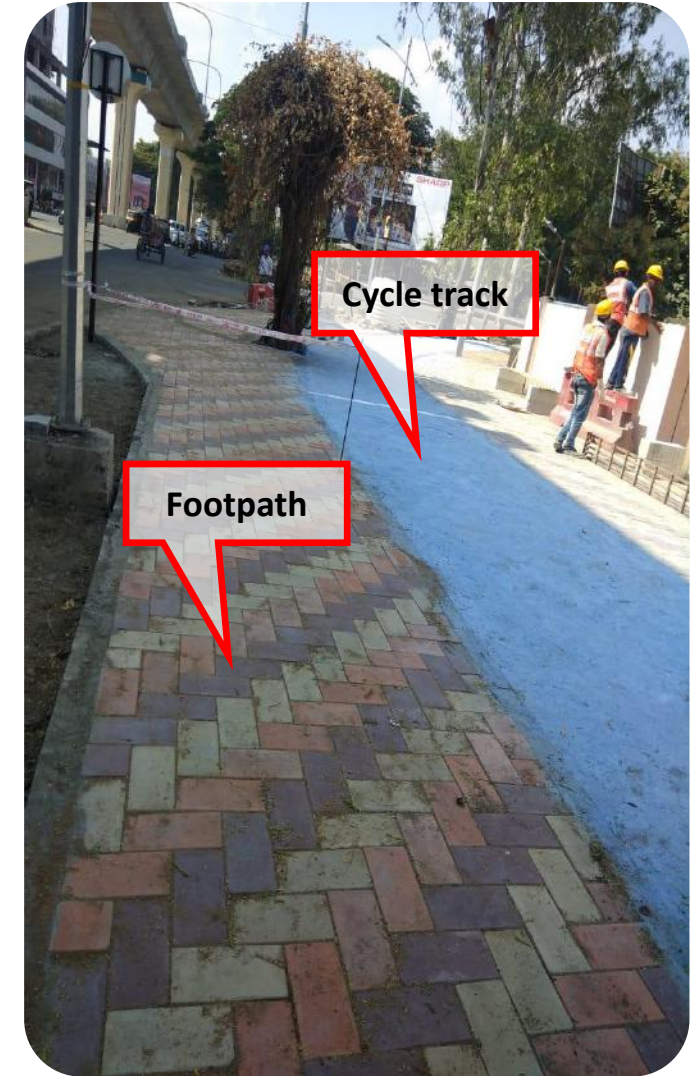
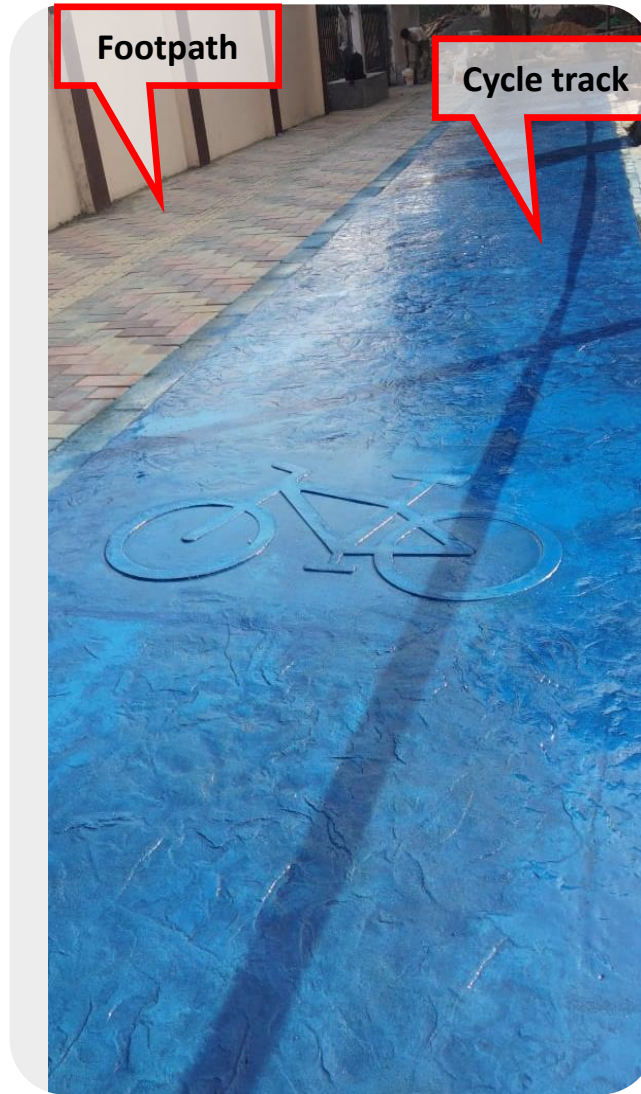


Equitable allocation of space for Carriageway & NMT facilities (footpath & cycle track)



Equitable allocation of space for Carriageway & NMT facilities (footpath, MUZ & cycle track)

# IMPLEMENTATION OF DEMO STRETCH – INSTITUTE OF ENGINEERS METRO STATION





**ONE WAY PROPOSAL AT SITABULDI  
INTERCHANGE METRO STATION  
BASED ON TRAFFIC VOLUME STUDY  
TO ACCOMMODATE FOOTPATH FOR  
PEDESTRIANS , PICK UP AND DROP  
OFF BAYS, BUS BAYS FOR  
CONNECTIVITY TO NON-METRO  
AREAS**

# EXISTING TRAFFIC MOVEMENT AT SITABULDI INTERCHANGE METRO STATION



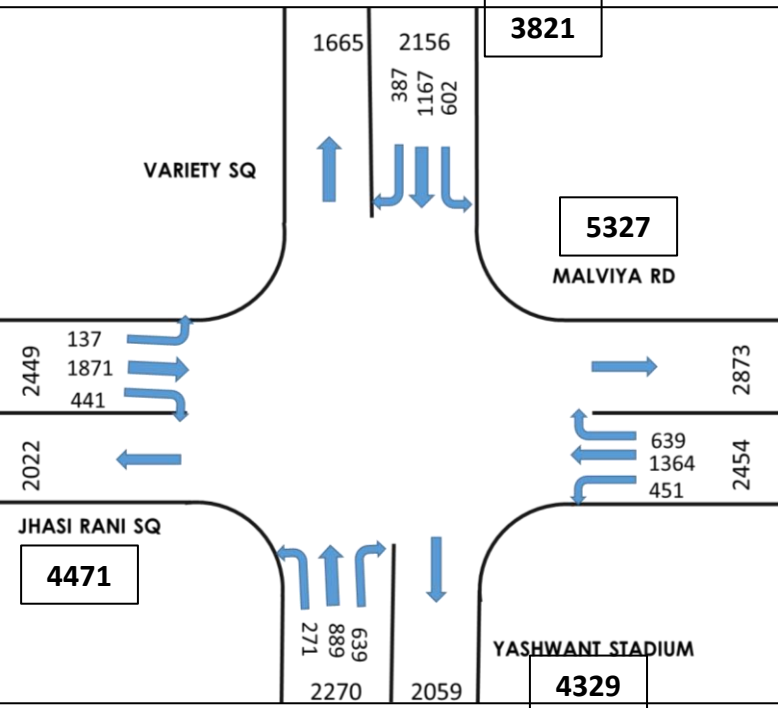
# FACILITY PLANNING– SITABULDI INTERCHANGE



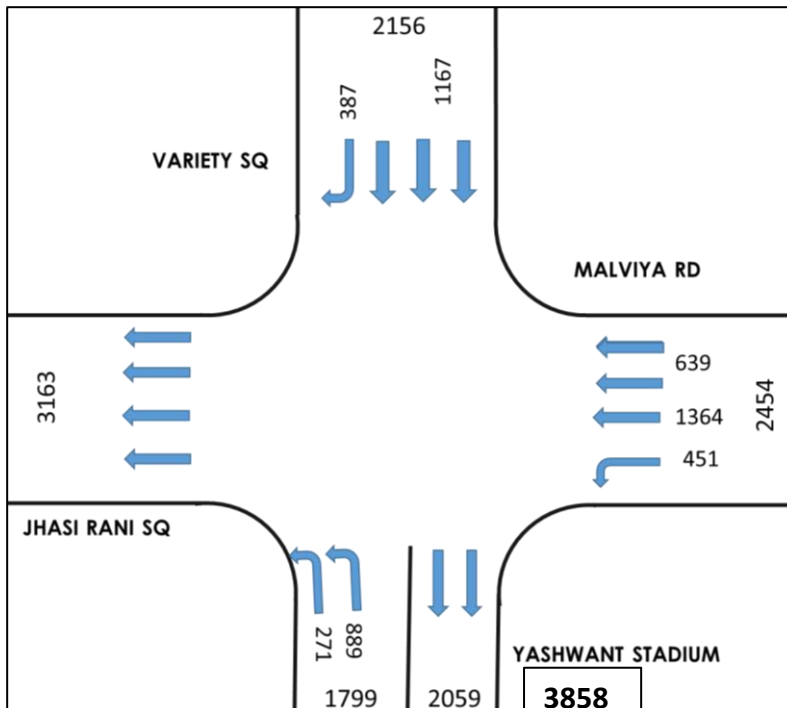
- Introduction of One-Way Loop in Sitabuldi Interchange Station after carefully considering existing and forecast traffic and pedestrian requirements
- Widened pedestrian facilities after one-way roads near Munje Chowk
- Proposal is approved by NMC



**BEFORE**



**AFTER**



# MUNJHE SQ

ARM	Before Improvement (PCU-2016)	After Improvement (PCU-2016)
JHANSI RANI	4471	3163
VARIETY SQ	3821	2156
MALVIYA RD	5327	2454
YASHWANT STADIUM	4329	3858

ARM	2021		2031	
	BAU	MMI	BAU	MMI
JHANSI RANI	5706	3396	9295	5532
VARIETY SQ	4877	2927	7944	4767
MALVIYA RD	6799	3132	11074	5102
YASHWANT STADIUM	4924	4489	8021	7312

# SITABULDI INTERCHANGE



LOCATION MAP

Towards Zero Mile

Station

**LEGEND**

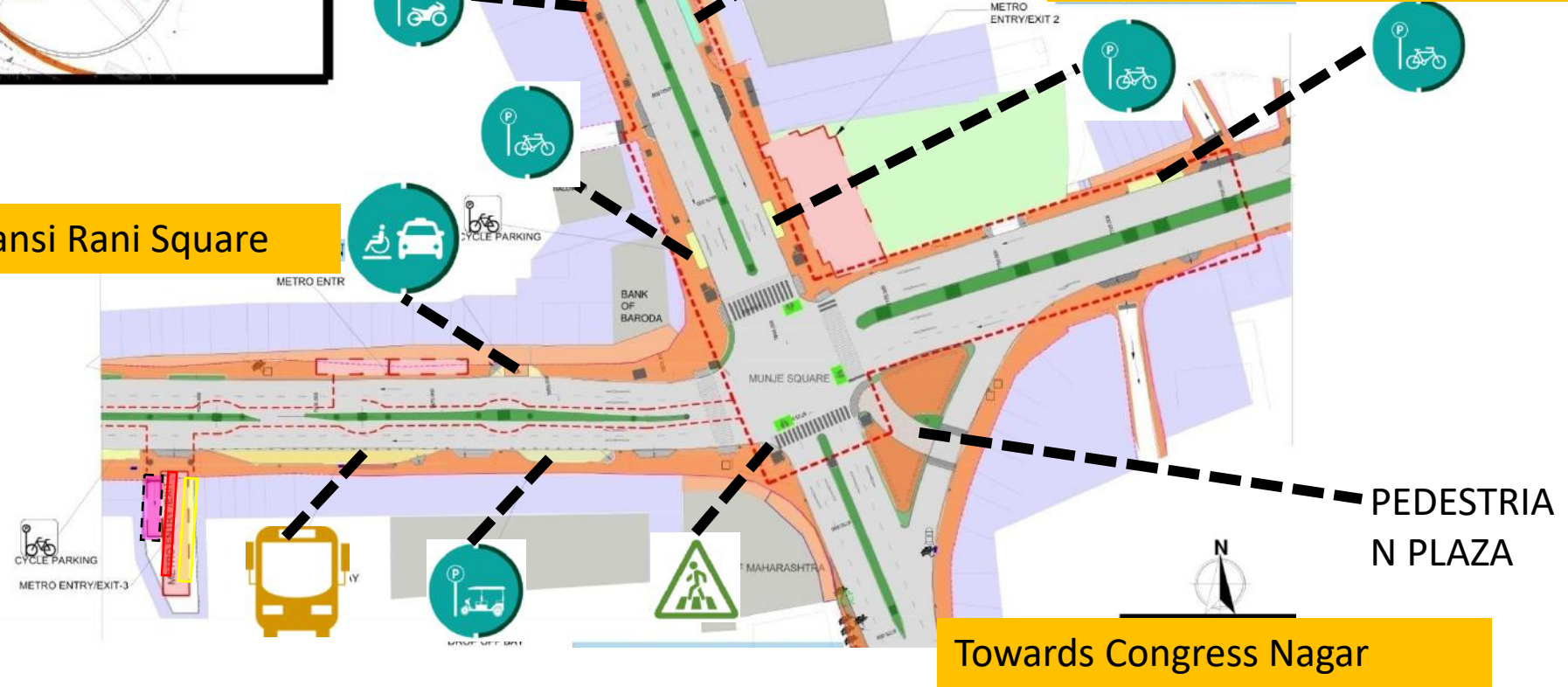
	STAIRCASE		CYCLE DOCKS		BUS DROP OFF BAY
	ESCALATOR		DROP OFF BAY FOR SPECIALLY ABLED		IPT DROP OFF BAY
	ELEVATOR		FEEDER DROP OFF BAY		PRIVATE DROP OFF BAY
	STATION BOX				

53

Towards Cotton Market



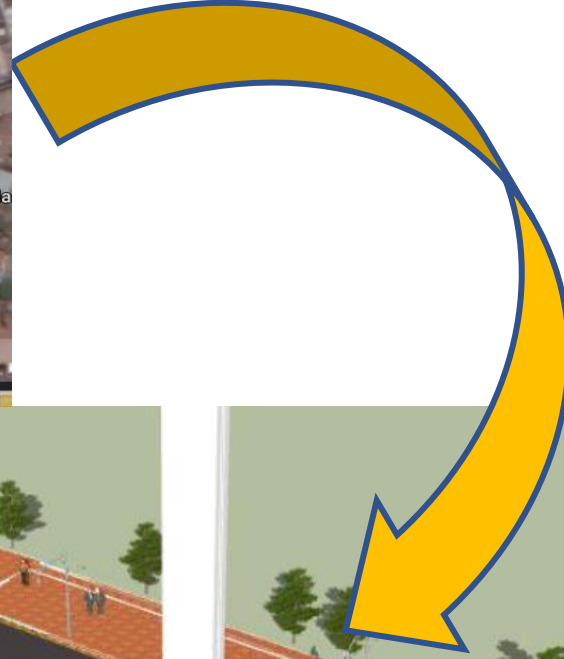
Towards Jhansi Rani Square



Towards Congress Nagar

53

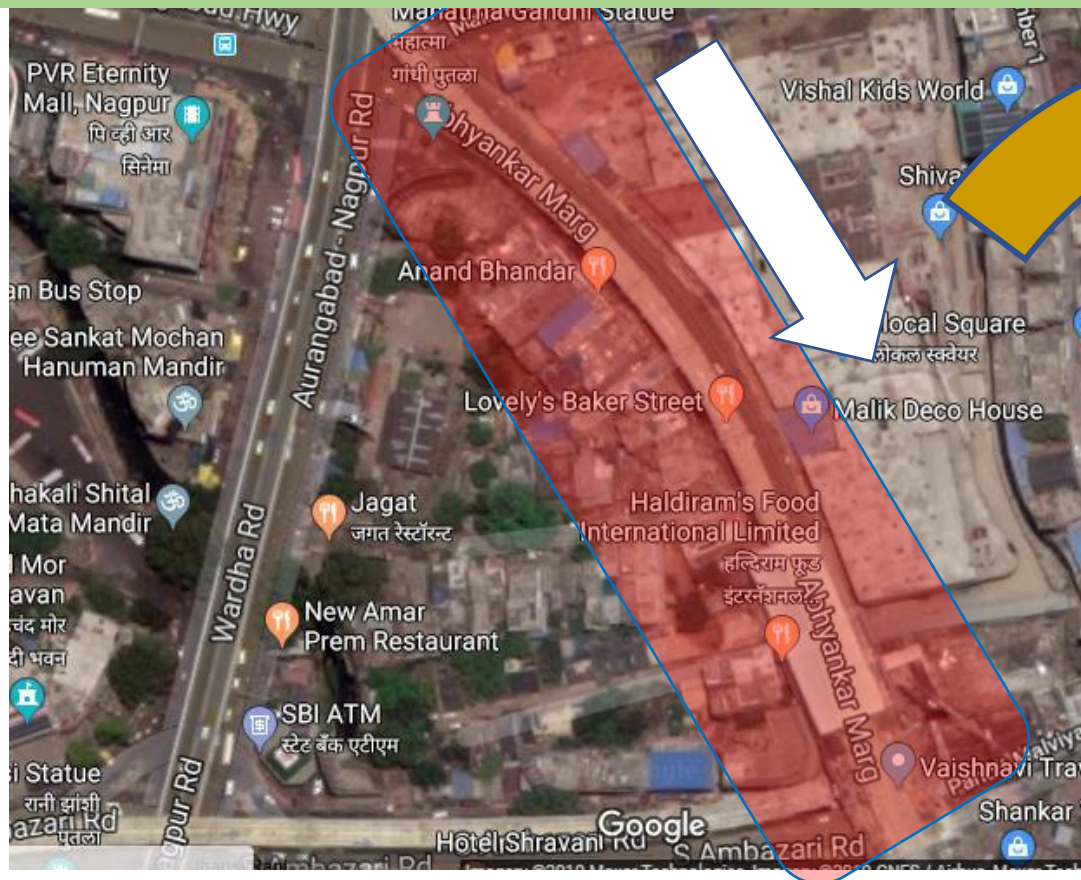
# FACILITY PLANNING– SITABULDI INTERCHANGE



**Munje Chowk to  
Rani Jhansi Square**



# FACILITY PLANNING– SITABULDI INTERCHANGE



**Variety Square to  
Munje Chowk**



# IMPLEMENTATION PHOTOGRAPHS – SITABULDI INTERCHANGE





**SIGNAGES INSTALLATION FOR ALL  
MMI FACILITIES AT ALL  
OPERATIONAL METRO STATIONS OF  
NAGPUR**

# AJNI METRO STATION



# AJNI METRO STATION



# RAHATE COLONY METRO STATION



# RAHATE COLONY METRO STATION



# IOE METRO STATION



# IOE METRO STATION



**FEEDER SERVICE PROJECT  
IMPLEMENTATION FOR NAGPUR**



# MEMORANDUM OF UNDERSTANDING SIGNED – FIRST & LAST MILE CONNECTIVITY OPERATION

महा मेट्रो



NAGPUR METRO

SN	Operator's Name	Proposed Services
1	Wicked Ride Adventure Services Pvt. Ltd. (Bounce)	Bicycle, E-Bicycle, E-Scooter
2	EV Rental Ventures LLP (Bajoria)	E-Rickshaw
3	Twarit Mobility Pvt.Ltd.	E-Rickshaw, E-lite E-Rickshaw
4	Ride -E Transport Pvt.Ltd.	E-Scooter
5	Bharat Vikas Parivar Foundation Nagpur	LPG Auto Rickshaw
6	Nikhil Furnitures	E-Rickshaw
7	Vogo Automotives Pvt.Ltd.	E-Scooter
8	Patni Automobiles	LPG Rickshaw
9	Rowwet Mobility Pvt. Ltd.	Bicycle, E-Bicycle, E-Scooter



# MEMORANDUM OF UNDERSTANDING SIGNED – FIRST & LAST MILE CONNECTIVITY OPERATION



SN	Operator's Name	Proposed Services
10	Prevalence Aggregator Services Pvt.Ltd.	E-Rickshaw
11	Motocruizer Technologies Pvt. Ltd.	Bicycle, E-Bicycle, E-Scooter
12	Tejasgreen Automotive Pvt.Ltd.	E-Rickshaw
13	ETO Motors Pvt. Ltd.	E-Rickshaw
14	Kinetic Green Energy & Power Solution Ltd.	E-Rickshaw
15	KHS Associates	E-Bicycle, E-Scooter, E-Rickshaw
16	MMI Mobility	Integration of Autorickshaw as a feeder through mobile app
17	Balaji Automotives	Bicycle, E-Bicycle, E-Scooter



# MEMORANDUM OF UNDERSTANDING SIGNED – FIRST & LAST MILE CONNECTIVITY OPERATION



SN	Operator's Name	Proposed Services
18	Navintam International OPC Pvt. Ltd.	Bicycle, E-Bicycle, E-Scooter, E-Rickshaw
19	M/s. Vidarbh Infotech Pvt. Ltd.	Bicycle, E-Bicycle, E-Scooter
20	Svidha Mobility Pvt. Ltd.	Feeder Services (Motorized & Non-Motorized vehicles including EVs)
21	Alf Electric Pvt Ltd	Bicycle, E-Bicycle, E-Scooter, E-Rickshaw
22	Swoop Motors LLP	Bicycle, E-Bicycle, E-Scooter
23	Indore India Pacific	Feeder Bus service
24	SAAD Travels	Feeder Bus service

# FEEDER SERVICES BEING PROVIDED BY MAHA METRO

- Maha Metro has not invested in procurement, operation and maintenance of fleet.
- Maha Metro fulfilled the requirement of fleet by executing MoUs.
- As many as 24 MoUs have been signed with different feeder operators.
- Out of these, 7 have been implemented. (Bounce closed PBS operation during Pandemic)
- Balance is under process of implementation and are expected to be operational once the effect of Pandemic wanes.

# INAUGURATION OF PBS SYSTEM (31.01.2019), E-RICKSHAW SHARING SYSTEM (06.09.2019), LOW SPEED ELECTRIC VEHICLES (17.02.2020)




**MAHARASHTRA METRO RAIL CORPORATION LIMITED**  
 Welcomes you for the launch ceremony of  
**KINETIC GREEN**  
 E-Rickshaw  
 at the hands of  
**Hon'ble Dr. Brijesh Dixit**  
 MD, Maha Metro  
 On 06th Sep. 2019



**Maha Metro's Kinetic Green E-Rickshaw**




Helpline No. 18002700557 | [www.metroinagpur.com](http://www.metroinagpur.com)

 /metrorailnagpur 
  @metrorailnagpur 
  Nagpur Metro Rail Project 
  @NagpurMetro



Helpline No. 18002700557 | [www.metroinagpur.com](http://www.metroinagpur.com)

 /metrorailnagpur 
  @metrorailnagpur 
  Nagpur Metro Rail Project 
  @NagpurMetro



# INAUGURATION OF METRO AIRPORT SHUTTLE BUS SERVICE (18.02.2021)



# INAUGURATION OF BUS AND CAB SYSTEM OF INDORE TRAVELS (03.03.2021)



- M/s. Twarit Mobility Pvt Ltd operating from following 5 Metro Stations from January 11, 2021.
  
- Till now, 1491 rides completed.
  - i. Rahate Colony
  - ii. Jaiprakash Nagar
  - iii. New Airport Metro Station
  - iv. Khapri Metro Station
  - v. Sitabuldi Interchange



# E-RICKSHAWS OF TWARIT MOBILITY PVT LTD AT METRO STATIONS



# FEEDER SERVICES BEING OPERATED BY ETO MOTORS PVT LTD

- M/s. ETO Motors Pvt Ltd installed 4 Charging stations at Subhash Nagar Station
- Brought 12 E-Rickshaws.
- 7 E-Rickshaws operating at nearby area of Metro Stations on Orange line
- 5 E-Rickshaws are operating at nearby area of Metro Stations on Aqua line.
- Till now, 774 rides completed



Charging Stations installed by ETO Motors at Subhash Nagar Metro Station with fleet

# E-RICKSHAWS OF ETO MOTORS ON AQUA & ORANGE LINES



# FEEDER SERVICES BEING OPERATED BY KHS ASSOCIATES

- KHS commenced E-scooter feeder service from 8<sup>th</sup> November 2020 (App based system )
- Total registered in App= 1076 nos. (Aadhar Card, photos, Electric bill, Driving License. Deposit =Rs.50/-)
- Till now, 566 rides completed.
- Total 24 electric vehicles are available at following locations with/without Charging Station.

<b>Sr.No.</b>	<b>Metro Stations/Locations with availability of fleet of KHS Associates</b>	<b>Metro Stations/Locations where Charging Stations installed by KHS Associates</b>
1.	Airport	Airport
2.	Rahate Colony	Rahate Colony
3.	Jaiprakash Nagar	Jaiprakash Nagar
4.	Ajni Square	Ajni Square
5.	Khapri	Metro Bhawan
6.	Sitabuldi Interchange	
7.	Lokmanya Nagar	
8.	Lata Mangeshkar College	
9.	NEERI campus	
10.	CRPF	

# KHS E-SCOOTERS & CHARGING POINTS AT METRO STATIONS



# FEEDER SERVICES BEING OPERATED BY VIDARHA INFOTECH PVT LTD (VIPL)

Sr.No.	Metro Station/Location	No. Bicycles available	No. of Bicycles issued on monthly subscription
1.	Khapri Metro station	10	
2.	Sitabuldi Metro station	7	
3.	Airport Metro Station	5	
4.	AIIMS	10	
	Total	32	22



# BHARAT RIDE MOBILE APPLICATION FOR OPERATION OF AUTO FEEDER SERVICE



Maha Metro Feeder Services  
Using Existing Auto-Rickshaws

## **Bharat Ride Mobile Application for operation of Auto feeder service**

- Bharat Ride Mobile Application operational from November 10, 2020 for existing Auto-Rickshaws services running in the city as per the MoU signed on 20<sup>th</sup> of October, 2020.
- 2 Auto Associations accepted to enroll Auto as a feeder service to Metro.
- Total customer apps downloaded by citizens till April 21, 2021 = 6366
- Total enrolment of Auto operators = 731
- Total rides = 859 (797 offline & 62 online).
- Additional feature launched from February 2021: Reimbursement of Metro Rail Ticket fares is given by various 'Retailers & Shop-keepers' associated with MMI Mobility Pvt. Ltd. against the purchase of Rs.300/- (min) & Gift the Maha Metro Smart Card on purchase of minimum of Rs.1500/-.
- The Metro ticket scanned by commuters from 2 Feb. 2021 till 21 April 2021 = 6321, costing Rs. 92,236/-

# METRO-AIRPORT E-BUS SHUTTLE SERVICE

- Commenced from 18<sup>th</sup> of February 2021.
- Fare = Rs.10/-
- Sufficient space provided for luggage in the bus.
- Service temporarily closed from 16<sup>th</sup> of April 2021 due to COVID-19 Pandemic situation.
- Total users of this service till operation = 1452



Ticket Counter at Nagpur Airport



# DEPLOYMENT OF FEEDER BUS SERVICE OF NMC AS PER THE REQUEST OF MAHA METRO

## G) Deployment of Feeder bus service of NMC as per the request of Maha Metro

- As per the request of Maha Metro, NMC bus stops at every operational Metro Station.
- Following are the details of operational NMC feeder routes

Sr. No.	Route		Date of commencement	Status			
	From Metro Station	To		Up to date trips	Up to date passengers	Per day trips	Average no. of passengers per day
1.	Lokmanya Nagar	Hingna Govt. Hospital	18 <sup>th</sup> Nov.2020	5792	26765	23	107
2.	Khapri	Butibori MIDC	18 <sup>th</sup> Nov.2020	4907	18682	19	75
3.	Khapri	AIIMS Hospital	23 <sup>rd</sup> Nov.2020	6412	5636	20	21
4.	Jaiprakash Nagar	Jaitala	23 <sup>rd</sup> Nov.2020	4866	7108	26	29
5.	Jaiprakash Nagar	Mhalgi Nagar	23 <sup>rd</sup> Nov.2020	4122	5163	18	21
6.	Jaiprakash Nagar	to Beltarodi to Airport South Metro station	23 <sup>rd</sup> Nov.2020	5016	15915	28	65

# IMPLEMENTATION OF NMC FEEDER BUS SERVICE



# ROUTE MAP OF NMC FEEDER BUS SERVICE IN MIHAN AREA



# IMPLEMENTATION OF NMC FEEDER BUS SERVICE IN MIHAN



NMC Feeder Bus Service at Khapri Metro Station



NMC Feeder Bus Service at Lupin



NMC Feeder Bus Service at Administrative Building



NMC Feeder Bus Service at GIF Technologies and Infocept

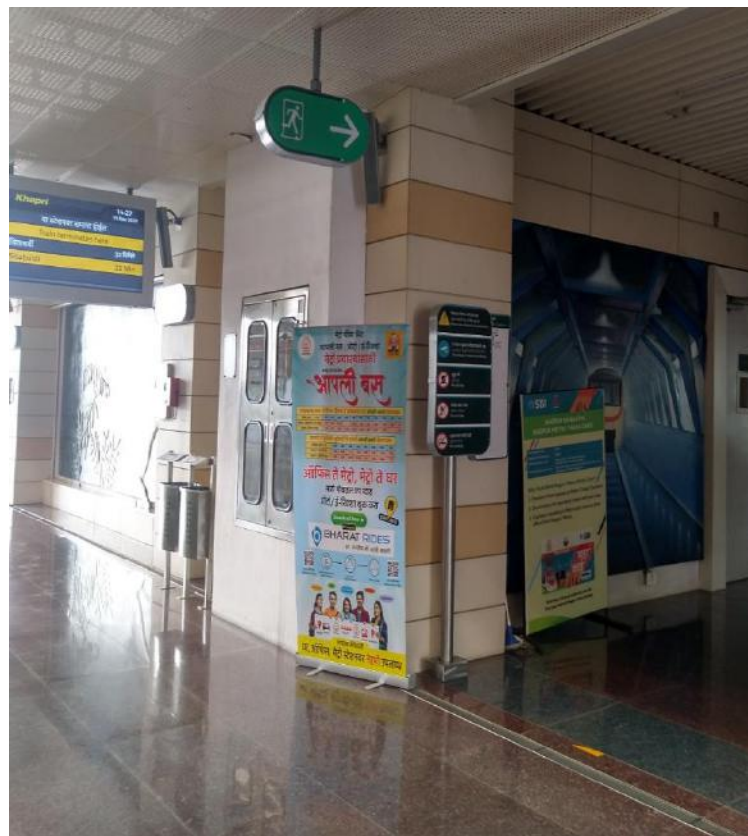


NMC Feeder Bus Service at HCL

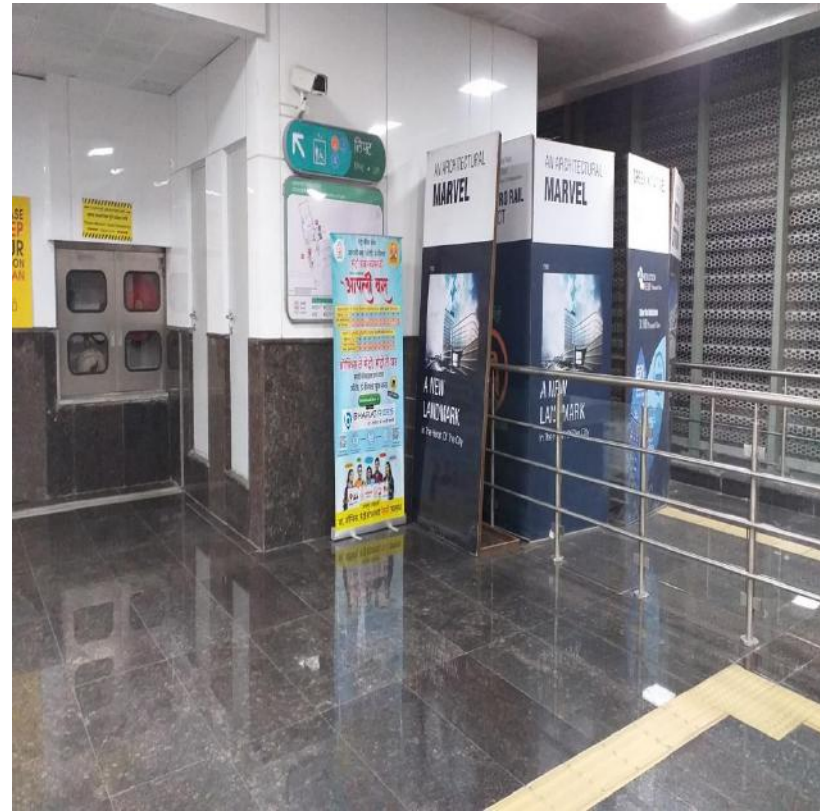
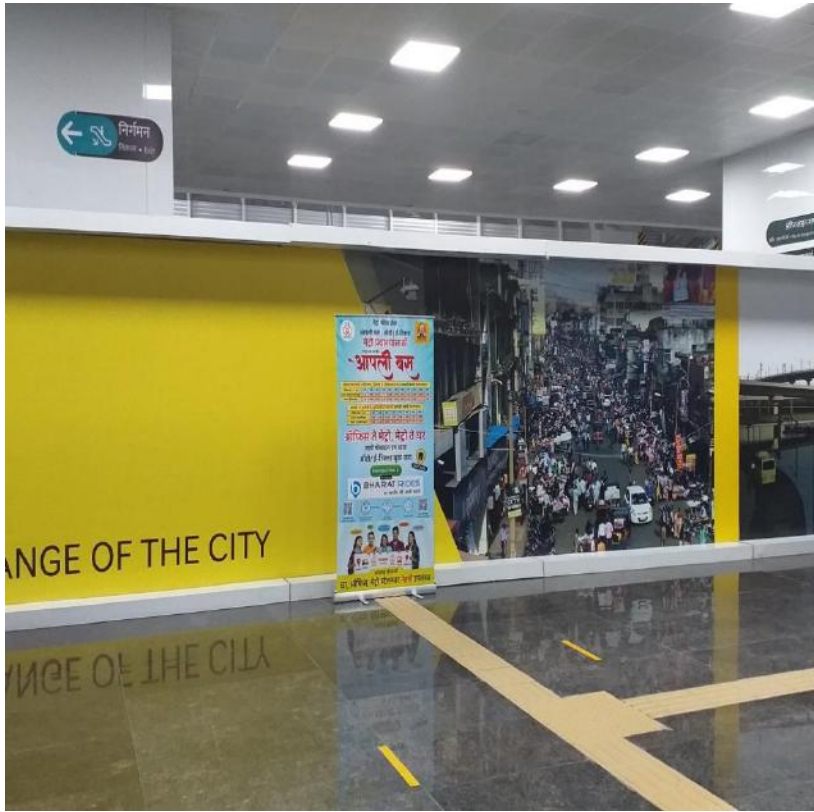


NMC Feeder Bus Service at MRO

# DISPLAY OF NMC BUS TIME TABLE BASED ON METRO TIME TABLE AT KHAPRI METRO STATION FOR LAST MILE CONNECTIVITY TO MIHAN AREA



# DISPLAY OF NMC BUS TIME TABLE BASED ON METRO TIME TABLE AT SITABULDI INTERCHANGE METRO STATION



# DISPLAY OF NMC BUS TIME TABLE BASED ON METRO TIME TABLE AT NEARBY AREAS OF JAIPRAKASH NAGAR METRO STATION



# AWARENESS CAMPAIGN FOR LAST MILE CONNECTIVITY

- Maha Metro along with NMC has conducted the awareness campaign in the MIHAN SEZ and Colleges (Engineering and Medical) near Lokmanya Nagar Metro station for NMC feeder bus service. (about 26000 students at Lokmanya Nagar and 53000 at MIHAN SEZ)





**ELECTRIC VEHICLE CHARGING  
STATIONS AT METRO STATIONS TO  
PROMOTE ELECTRIC VEHICLES**

# ELECTRIC VEHICLE CHARGING STATIONS- IMPLEMENTATION PHOTOGRAPHS

- Maha Metro has signed an agreement with M/s Energy Efficient Services Ltd. (EESL) on 31.12.2020 for installation and operation of EV charging systems at all Metro Stations of Nagpur Metro Rail Project.



EESL charging station at Congress Nagar Metro Station



EESL charging station at Airport Metro Station



EESL charging stations at Khapri Metro Station

# ELECTRIC VEHICLE CHARGING STATIONS- IMPLEMENTATION PHOTOGRAPHS

- As already mentioned above, ETO Motors Pvt Ltd has installed Charging Stations at Subhash Nagar Metro Station.



# ELECTRIC VEHICLE CHARGING STATIONS- IMPLEMENTATION PHOTOGRAPHS

• As already mentioned above, KHS Associates has installed Charging Stations at following Metro Stations:

1. Airport
2. Rahate Colony
3. Jaiprakash Naar
4. Ajni Square
5. Metro Bhawan



# **COMMON MOBILITY CARD**

# INNOVATIVE AND UNIQUE FINANCING MODEL FOR AFC SYSTEM

## Maha Metro - AFC System Provision in DPR

- DPR provisioned for use of Single journey Token and Multi-journey Smart Card.
- Also have had a provision for a Capital expenditure of ₹ 2.2 Billion (EUR 29.33 Million) for AFC System.

## Maha Metro's PPP Based Financing Model for AFC System



MAHA CARD

- Open loop chip based Contactless Smart Card in compliance with the NCMC mandate of GoI.
- Single EMV based Common mobility card for Metro, Buses, Parking, Feeders, Parking, Utility & other Retail payment.
- No investment on capital expenditure by MAHA Metro. The CAPEX and 10 year OPEX is being done by SBI Consortium. Consortium will get 4% Revenue share on all transit transactions.
- Maha Metro to also get ₹ 300 Million (EUR 4 Million) as royalty.
- Till April' 19, ₹ 24 Million (EUR 0.32 Million) of royalty received. Another ₹ 96 Million (EUR 1.28 Million) expected in May' 19

**Total Gain – CAPEX Savings (₹ 2.2 Billion) + Royalty (₹ 300 Million) = ₹ 2.5 Billion (EUR 33.33 Million)**

# **GREEN JOURNEY PLANNING APP**

# GREEN JOURNEY PLANNING APP-SALIENT FEATURES

- Provide First Mile and Last Mile Connectivity to the commuters/passengers using Single App.
- Connect Various Modes of Public Transport into Single system.
- Show options and Provide Booking Facility for First Mile and Last Mile Connectivity covering Various Public Transport system Via Nagpur Metro.
- Show Carbon emission saved/Generated during the Trip.

## **Current Status-**

- The Grant Agreement has been executed with GIZ.
- Tenders from bidders are also received on 27.07.2021 and are under process.
- Process is going on to get the mobilisation advance from GIZ for Green Journey Planning

App



# FIRST MILE AND LAST MILE CONNECTIVITY



# **GREEN INITIATIVES BY MAHA METRO**

# RATING GREEN MRTS RATING SYSTEM

All the Metro Stations of NMRP are planned & designed as per IGBC Norms. Till date Thirteen Metro Stations of NMRP are awarded “Platinum Rating” by IGBC.

(Reach-1: Khapri, New Airport, Airport South, Airport, Jaiprakash Nagar & Rahate Colony, Ajni Metro Station & Sitabuldi.

Reach-3: Lokmanya Nagar, Bansi Nagar, Vasudev Nagar, Subhash Nagar and IoE)



**The initiative shall result in:**

- *Water saving >30%*
- *Energy savings >15%*
- *Experiential passenger comfort*



# ENERGY EFFICIENCY & USE OF RENEWABLE ENERGY

## Energy Efficiency

- **Building envelope, HVAC & MEP** – Minimum 15% energy savings over BAU specifications
- **Energy monitoring** - Monitoring & tracking of energy use through BMS
- Reduction in energy requirements by using **energy efficient equipment**
- Maximized use of **renewable energy**

## On-site renewable energy - *Solar Energy*

- 65 % of the total operational energy requirement to be met from solar energy
- Total installed capacity to be 14 MWp in Phase-I augmented to 23 MWp in Phase-II
- Installed and commissioned 485.45 kWp Solar PV system at the four Metro stations and 273 kWp at Metro Bhavan.



# WASTE WATER POLICY

**BIODIGESTOR:-** Anaerobic Bacteria based sewage treatment Plants and technology is patented of Defense Research Development Organization (DRDO), GoI.

## Environment Friendly Features

- Less space requirement
- Energy Efficient
- No ground water contamination
- No sludge
- No foul smell
- Maintenance free
- Low material/ construction cost



**Operation Phase Installation -**  
100% use of treated water for flushing and landscaping by dual-plumbing system (Airport South)

**Hon'ble Dr. Brijesh Dixit, Managing Director-Maha-Metro**, has introduced Bio-digester Technology in the inception stage for overall environment sustainability of the project.

Because of his affords, Maha-Metro has signed a MoU with Defence Research Development Organization (DRDO) for transfer of technology. A MoU has been executed on 24<sup>th</sup> July 2016 for installation of Bio-digester Technology at 38 Metro Stations & 2 Depots at NMRP.

## NMRCL to adopt bio-digester technology

**Special Correspondent**

FOCUSING on its green initiatives in Metro Rail Project, the Nagpur Metro Rail Corporation Limited (NMRCL) will sign a Memorandum of Understanding (MoU) with Defence Research and Development Organisation (DRDO) on July 24 at 8.40 pm at Chief Project Manager's Office, Wardha Road, Near Khapri Bridge, for propagation and installation of Bio Digester Technology (BDT) in Nagpur.

NMRCL is planning to install BDT on 36 metro stations, depot and other metro buildings.

NMRCL is first Metro Rail in the country emphasising on green technology in the metro rail service. The metro has adopted solar energy to meet its energy require-

ments. This is second step towards its commitment for eco-friendly technology.

Brijesh Dixit, Managing Director of NMRCL, stated that he is working on Swachh Bharat Abhiyan, an ambitious initiative of Prime Minister Narendra Modi to make city more clean and green in future.

DRDO has developed a bio-digester technology to convert human faecal waste into water and gas in an eco-friendly way. The technology has been developed to solve the sanitation problem faced by soldiers in high altitude. This technology is a clean technology that does not pollute ground water and the effluent is water, CO<sub>2</sub> and Methane gas. The effluent water is enriched with minerals that is odourless, colourless and free of pathogens and can be used for gardening or recycled for flushing. This technology does not require any electricity and the digestion takes place in an anaerobic environment and in a sealed container due to bacterial activity. There is no sedimentation and therefore, the septic tank does not require evacuation at all. The effluent water is safe and it can be used safely where there is no sewerage or drainage system.

The digester is to be charged with the bacteria enriched inoculum only once at the time of installation and after that the bac-

teria will self-multiply. The bacteria can survive minimum three months even when the toilets are not in use and will start multiplying when the toilets are back in use.

It may be mentioned that human waste disposal in innocuous form is an ever growing problem leading to aesthetic nuisance, threat of organic pollution and several infectious diseases in epidemic proportions due to contamination of ground water and drinking water resources in highly populated cities.

This technology has been extended to Indian Railways for on-board treatment of human waste. Hundreds of stainless steel made biodigesters are in operation in different trains of Indian Railway.





Lokendra Singh and Mahesh Agrawal signing the MoU as Brijesh Dixit, Managing Director of Metro Rail and others look on.

Hundreds of bio-digesters are operating in J&K, Sikkim and Arunachal Pradesh Indian Railways too using the tech for on-board treatment of human waste.

# SALIENT FEATURES.....BIO-DIGESTER

## Why Bio digester?

### Maha-Metro Objectives:

- 1) 100% recycling of used water
- 2) No discharge to public drain
- 3) Space constraint.

**Bio digester:** An apparatus in which organic waste material is decomposed by microbial (an-aerobic bacteria) action with the production of biogas. The system is sustainable, totally eco-friendly, conserves water and produces fuel gas.

**Monomers** → **Volatile Acids** → **Acetic Acid + Hydrogen + CO<sub>2</sub>**  
**Acetic Acid + Hydrogen** → **CH<sub>4</sub> + CO<sub>2</sub>**



### Environment Friendly Features

- Less space requirement
- Low Energy requirement
- No ground water contamination
- No sludge formation
- No foul smell
- Low Maintenance
- Low material/ construction cost
- Can treat kitchen wastewater



### Process

Fermentation Tank  
**Bacteria (Inoculum)**  
Anaerobic microbial consortium  
One time bacterial feeding  
Waste converted to water and gas  
No sludge  
Effluent water is enriched with minerals

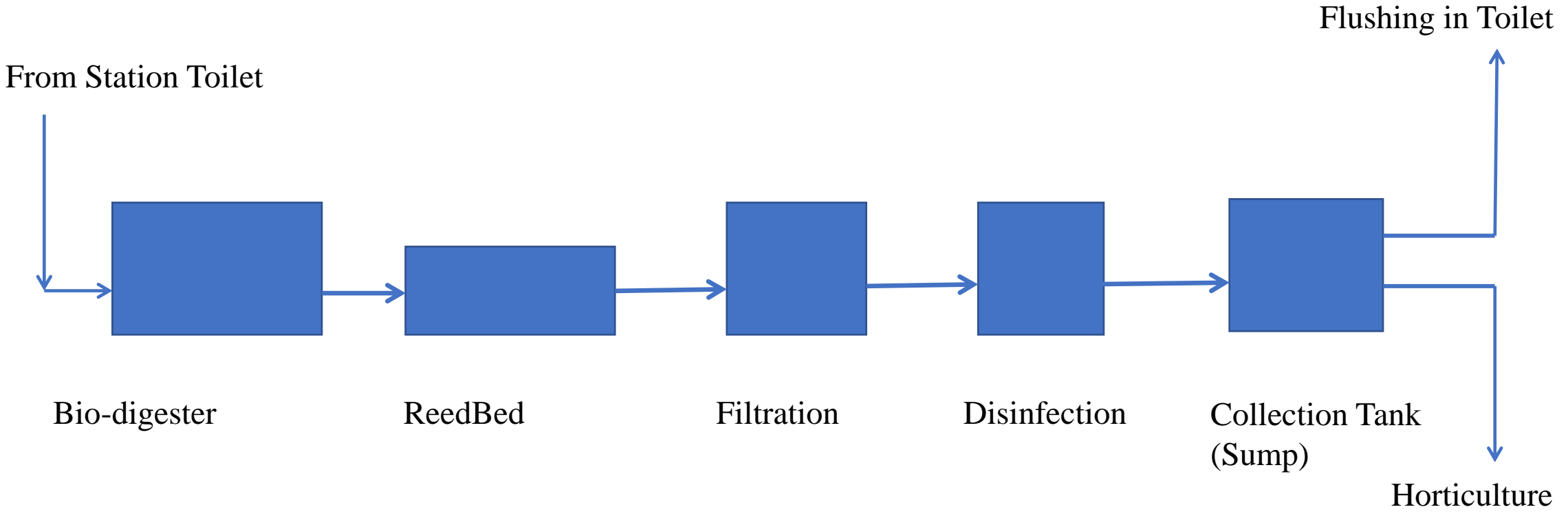


### Use

- At 38 Metro stations, 2 Depot & Administrative Building
- Treated water for horticulture & flushing

# BIO-DIGESTER – OPERATION PHASE TREATMENT SCHEME

**Bio-digester at three Priority Section (at grade) station :-10 KLD for Each Station**



Flow Chart for Recycle of Effluent Water



# ZERO LIQUID DISCHARGE POLICY

**BIODIGESTOR:-** Anaerobic Bacteria based sewage treatment Plants and technology is patented of Defense Research Development Organization (DRDO), GoI.



**Operation Phase Installation** - 100% use of treated water for flushing and landscaping by dual-plumbing system (Airport South)

# Demonstrative Pictures



**BIO-DIGESTER  
At New Airport station**



**BIO-DIGESTER  
At Airport South station**

# DEMONSTRATIVE PICTURES



**BIO-DIGESTER  
At IoE station**

# WATER CONSERVATION

## **Water Conservation through Rain Water Harvesting**

- Designed for 100 % collection of roof top run-off;
- Provisions at stations roof top, viaduct and building rooftop run-off

## **Efficient Water Fixtures**

- Ultra efficient plumbing features, thereby minimising potable water use.
- Adjustment of flow rates to minimum for efficient water use
- Reduction in fresh water requirements by use of treated STP water
- Use of drip irrigation technique for landscape

## **Re-use of Treated Water**

- Treated water in Bio-digester is being reused in toilet flushing and gardening



# TREE PLANTATION

“**Little Wood**” :- planted more than 5000 numbers of saplings in 30 Hectares land. “**Extension of Little Wood**” :- planted more than 6500 trees in 52 Hectares land.

Planted Native tree species including Medicinal plants with survival rate of more than 90%.

Acts as carbon sink and absorb CO2 upto **207 tones/year**.

Home for varieties of birds and small animals.

Introduced Vertical Garden on the pillars which helps in reducing Carbon Footprint in the city.



**ISSUES IN URBAN TRANSPORT-  
NAGPUR CONTEXT**

# CONCERNS IN URBAN TRANSPORT

Cities are sprawling – longer travel distances means higher dependence on motorized transport



Increase in Income and Availability of Financing resulting in higher ownership and thereby higher mobility



Lack of Alternatives causing increase dependency on private modes

Poor public transport



Quantity



Quality



Coverage

Walking and cycling are no longer safe



**CONNECTING THE DOTS-URBAN  
TRANSPORT AND CLIMATE CHANGE**



# TRANSPORT AND CLIMATE CHANGE

- **Level of economic activity** in a city usually determines the total number of **trips**.

## TRIPS

(divided amongst various **mode** of vehicle)

**Motorized  
Trips**



Translates into



**Non – Motorized  
Trips**



**Vehicular emission**  
(driving, congestion,  
drive behavior) CO<sub>x</sub>,  
NO<sub>x</sub>, etc



**Road side  
dust**  
(PM 2.5/PM10)



Consumption of  
non-renewable  
**fossil fuels**



Major contributor of  
**green house  
gases**, particularly  
CO<sub>2</sub> emission

- Also, **freight movement** in city and movement along the **adjacent highways**

# MAJOR CONTRIBUTORS TO AIR POLLUTION

Transportation produces ~ **23%** of the **global CO2 emissions** from fuel combustion and vehicle exhaust.

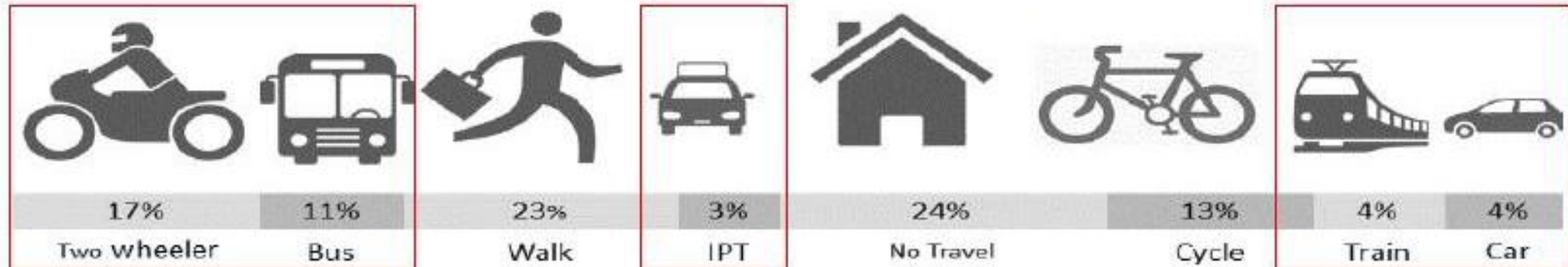
In India, **transport** sector (**road, railway, shipping, airport**) emits an estimated ~258Tg of CO2, of which **94.5%** was contributed by **road transport** (2003–2004).

**43%** of it comes from **freight** movement in urban areas

**57%** of it comes from **passenger** vehicle movement in urban areas

**40%** is motorized

**60%** is non-motorized



# MANIFESTATION OF THE PROBLEM

**THEN**



**NOW**



# MANIFESTATION OF THE PROBLEM



# MANIFESTATION OF THE PROBLEM



Maharashtra drought



Dust storms in Noida



Freak hail storm in India



Chennai/ Kerala/ Mumbai floods



Chennai water scarcity

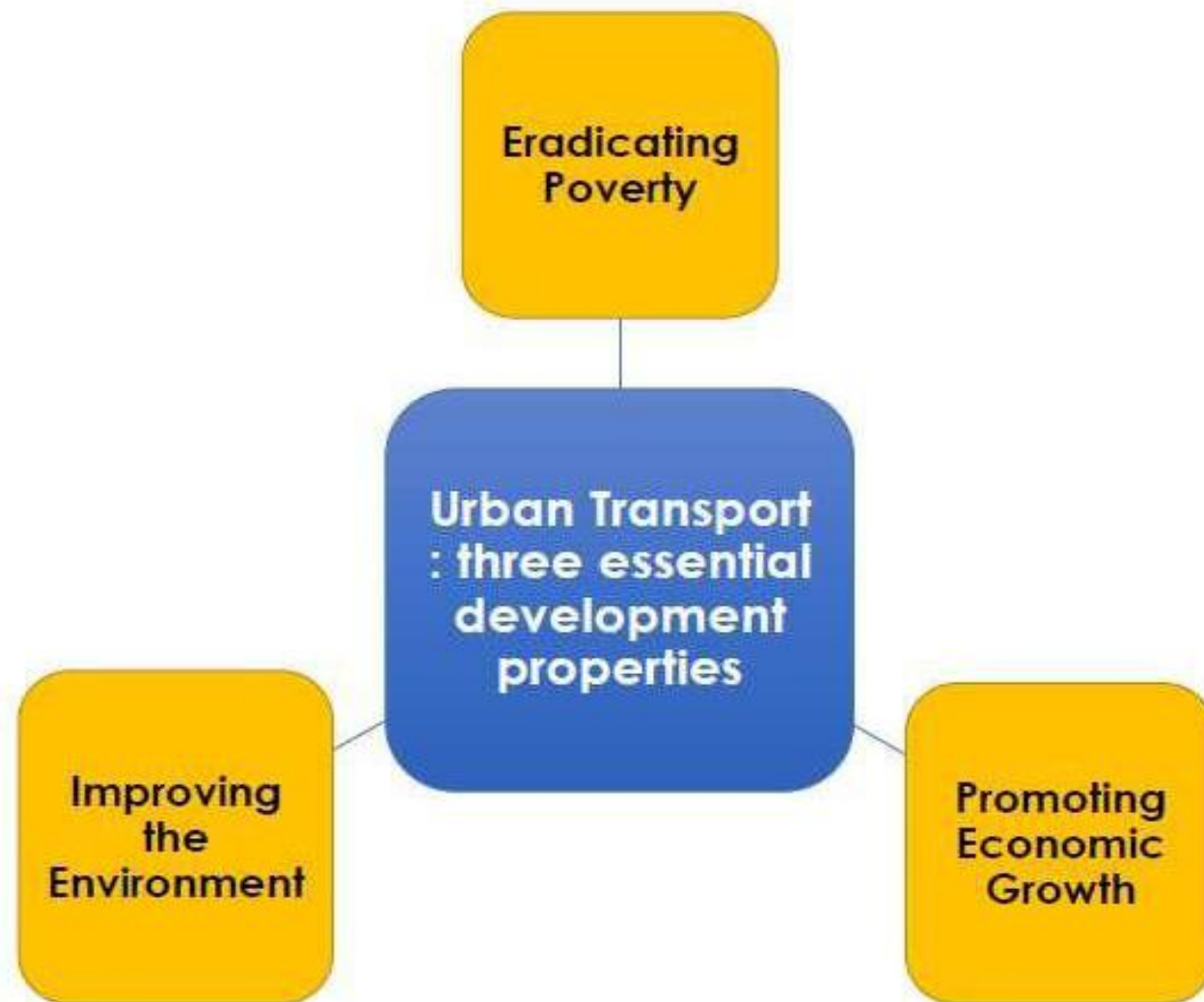


Forest Fire in Himachal and Uttarakhand

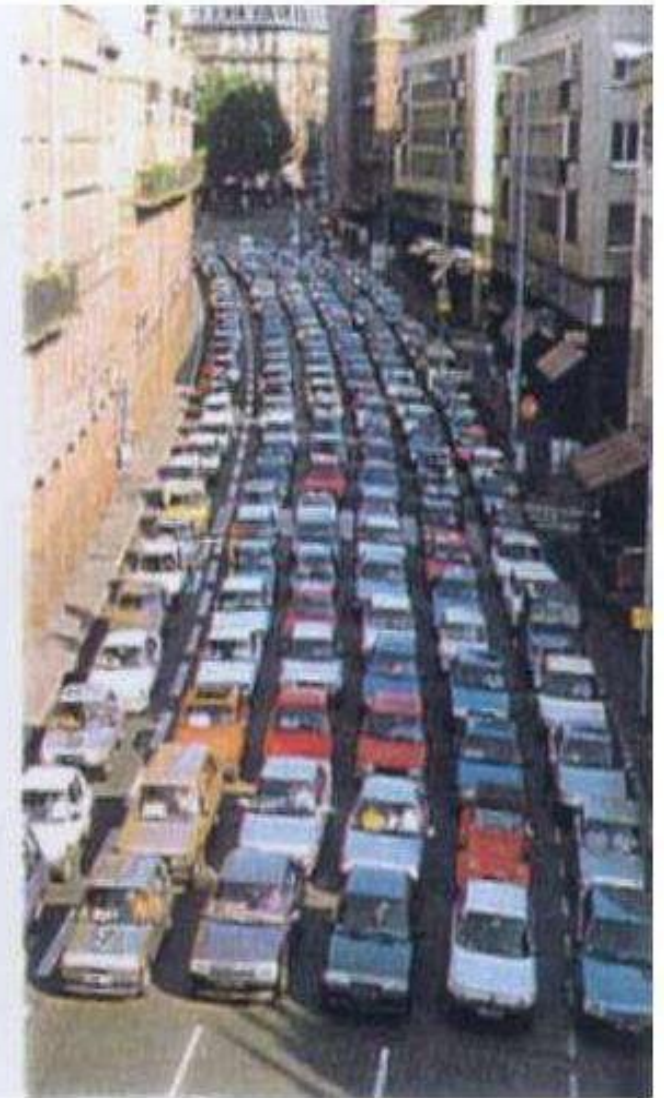
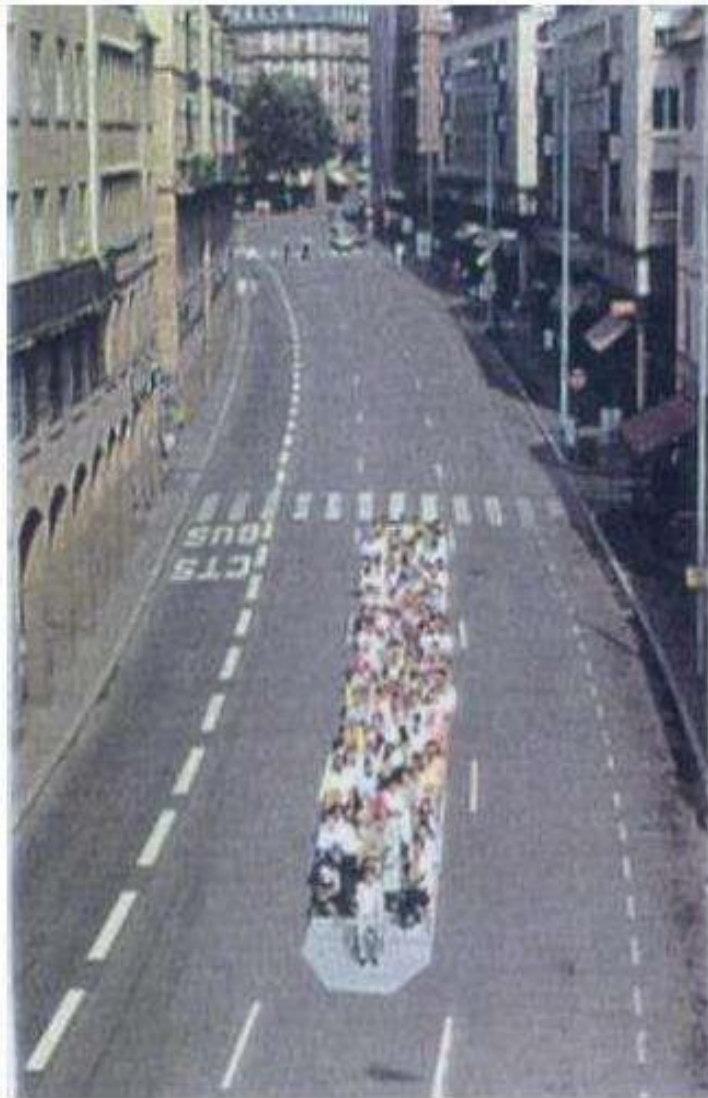
# IMPORTANCE OF URBAN TRANSPORT

The ever-increasing importance of cities, both as generators of economic growth and magnets for low-income people seeking better opportunities

Urban transport infrastructure is often the main tool to influence urban land development



# RESOURCE EFFICIENT PUBLIC TRANSPORT SYSTEM



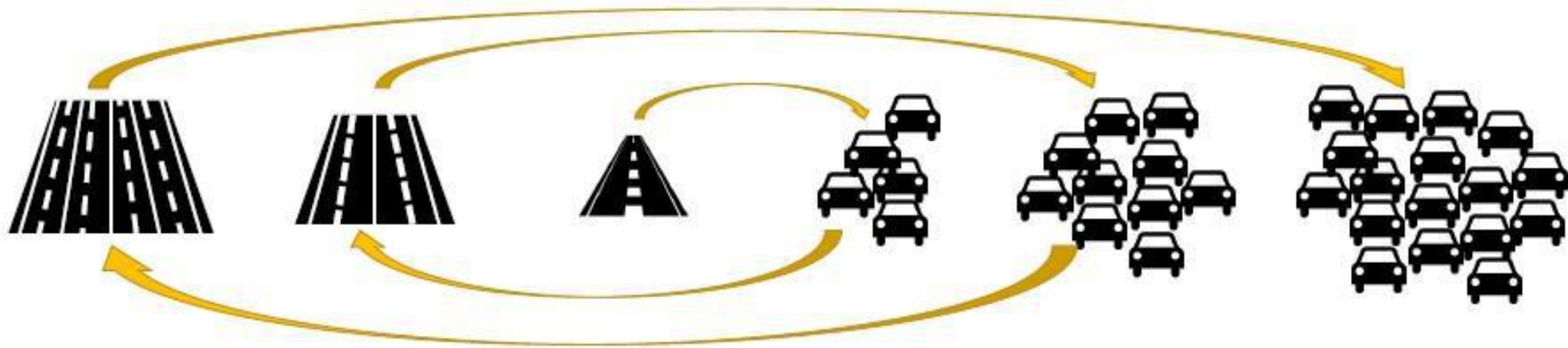
# **SOME MYTHS REGARDING TRANSPORTATION**



# Myth



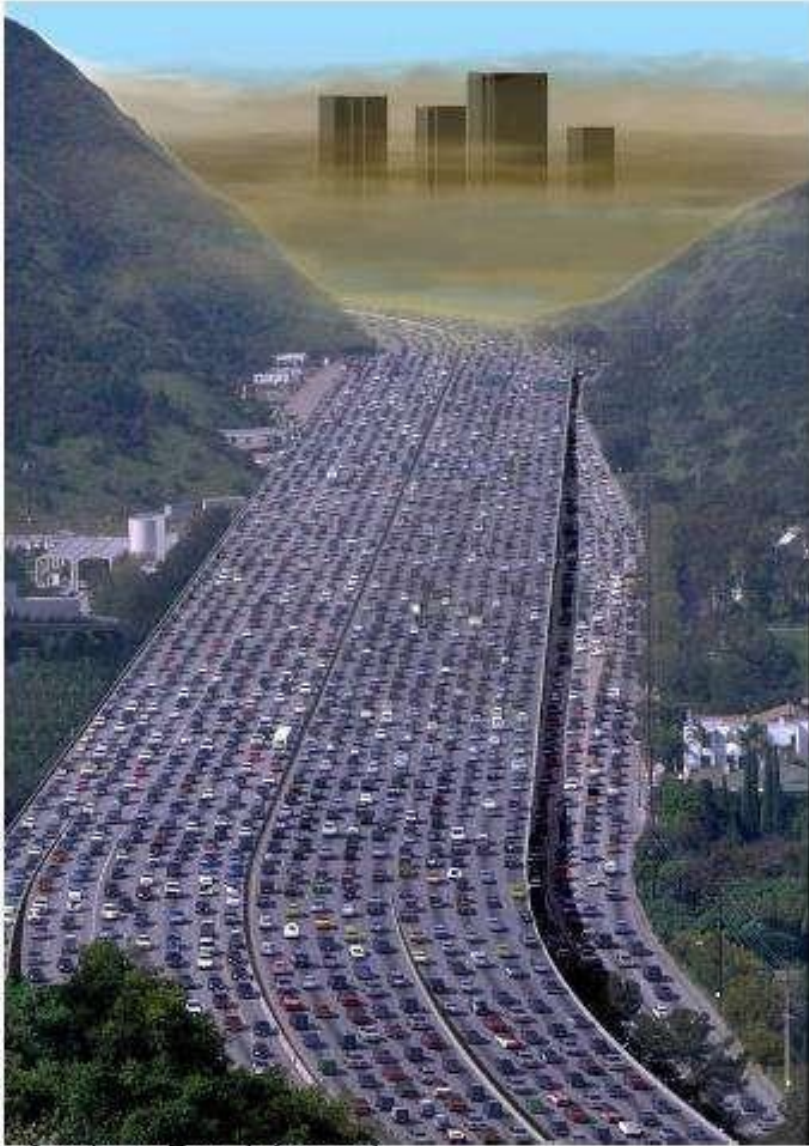
**Building more infrastructure like flyovers and overpasses would reduce congestion**



**This is true in short-term but in long-term the condition worsens**

- Flyovers, overpasses and road widening lead to more vehicles coming on to the road – same level of congestion returns but at a higher volume of traffic traveling longer distances
- Leads to greater dependence on private vehicles

# Impact of Endless Road Expansion



*Courtesy : Transfuture.net*



**We can not “build” our way out of congestion**



Very few people walk or cycle so why provide for them



- Over 50% of the trips in most cities in India are by walking or cycling
- Most people cannot drive (especially women & elderly)
- Share of walking and cycling coming down due to unsafe infrastructure
- This is easy to improve and less-expensive
- And it is good for health and environment

**Thank You**

