

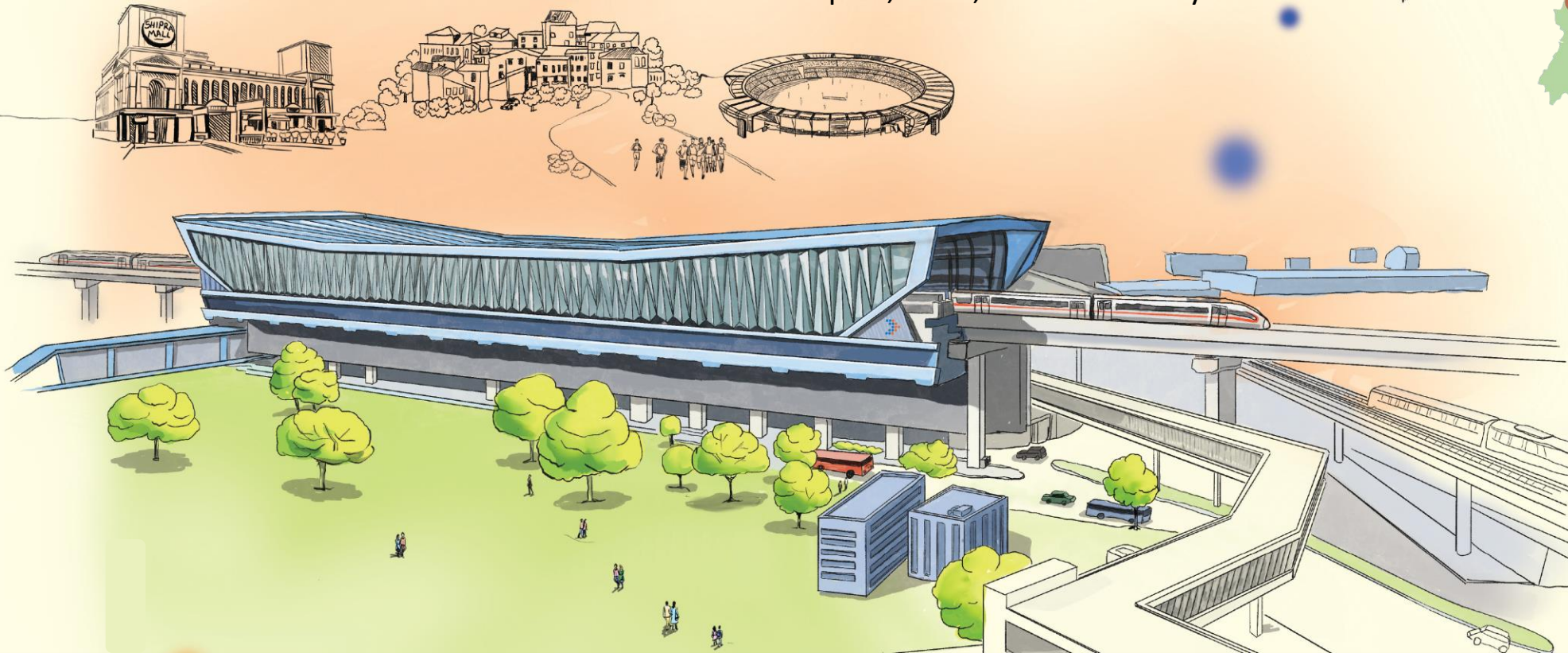
National Capital Region Transport Corporation

Workshop on Transit Oriented Development

TOPIC

Prof. H. M. Shivanand Swamy

Center of Excellence in Urban Transport, CRDF, CEPT University



22.07.2023

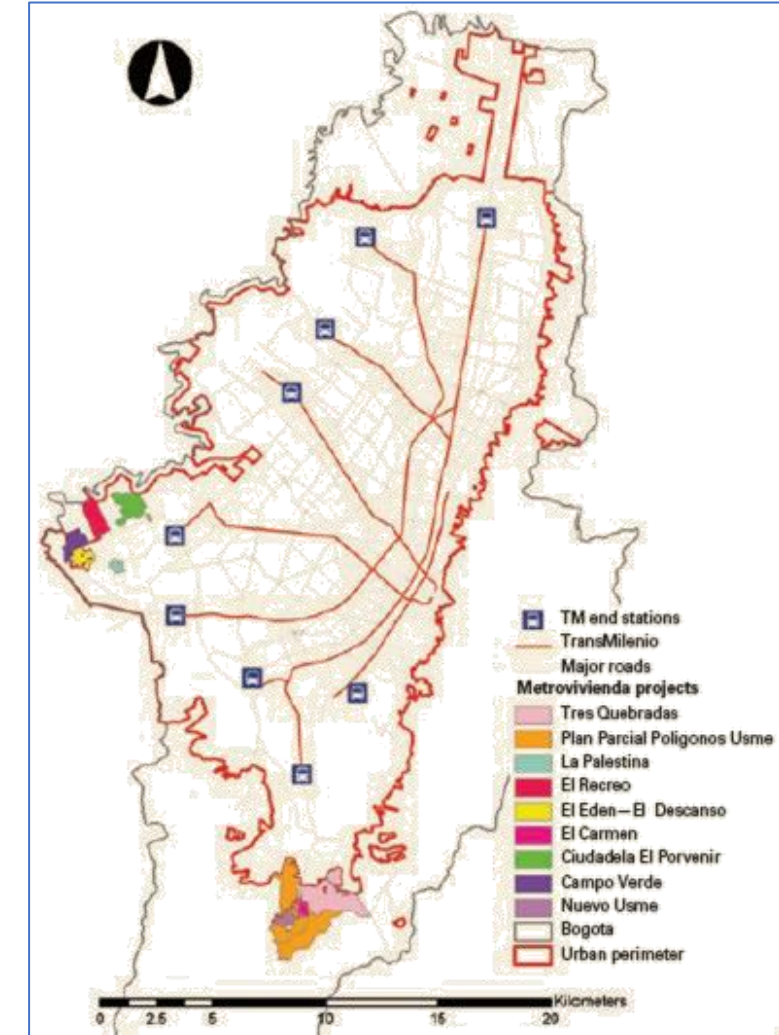


Transit Oriented Development

- Higher density development
- Pedestrian-friendly streets
- Green Network
- Efficient use of front margin
- Efficient use of ground
- Higher transit connectivity
- High intensity of infrastructure
- Well-designed and well-managed public parking (On-street & Off-street)
- Destination to city tourist places, Economic Centre, Commercial hub and major transit route

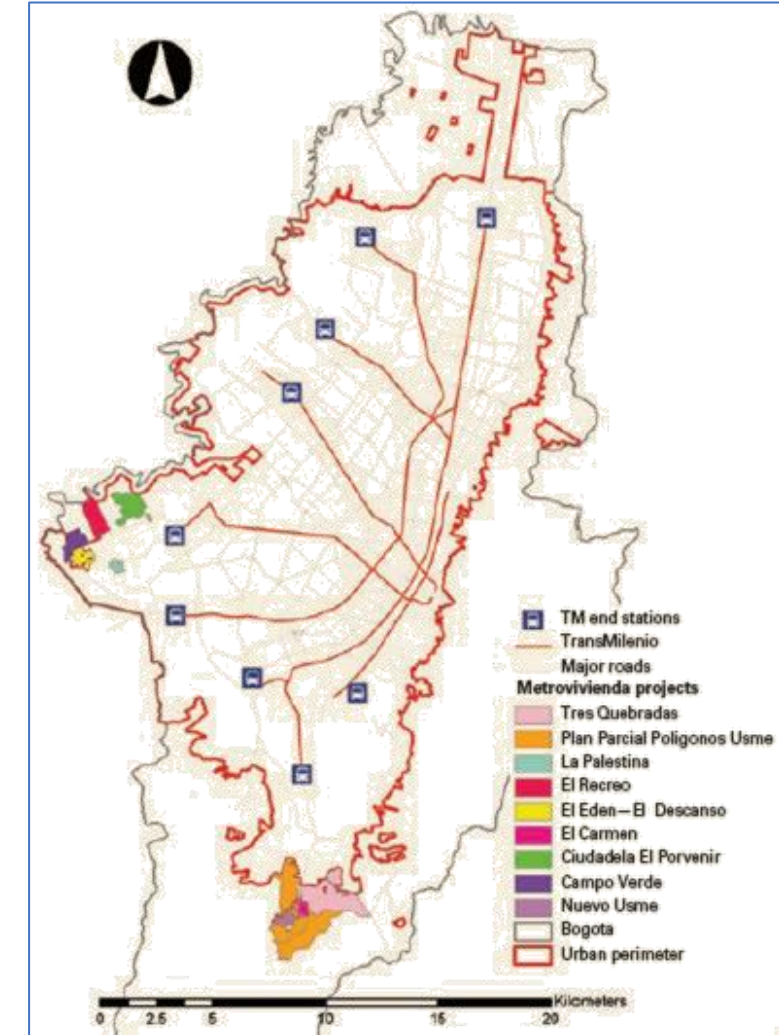
Bogota: TransMilenio BRT

- Bogota has first class BRT system called TransMilenio.
- For further enhancement of the service, BRT system has adopted a trunk feeder model by establishing segregated bus ways on cities major arterial road.
- Feeder buses also operate in low-income neighbourhood on the urban periphery



Factors supporting Bogota TOD

- Transportation demand management to lessen traffic congestion
- Connecting affordable housing : [Metrovivienda](#).
- [Metrovivienda](#)
- Provide serviced land on which private development entity can construct affordable housing for low-income group on the areas near transit so that low-income group can afford shelter and transport together.



Hong Kong SAR, China: Profitable transit

- Land value capture as a tool for mobilising finance through “Rail +property” (R+P) programme.
- MRTC purchases development right from local government at a before rail price and sells these rights to a selected developers at an “after rail” price.
- Supplementary real estate development covered all transit costs (investment, operations and maintenance).
- MRTC generates 62% of its income from property activities, more than twice the fare revenue.



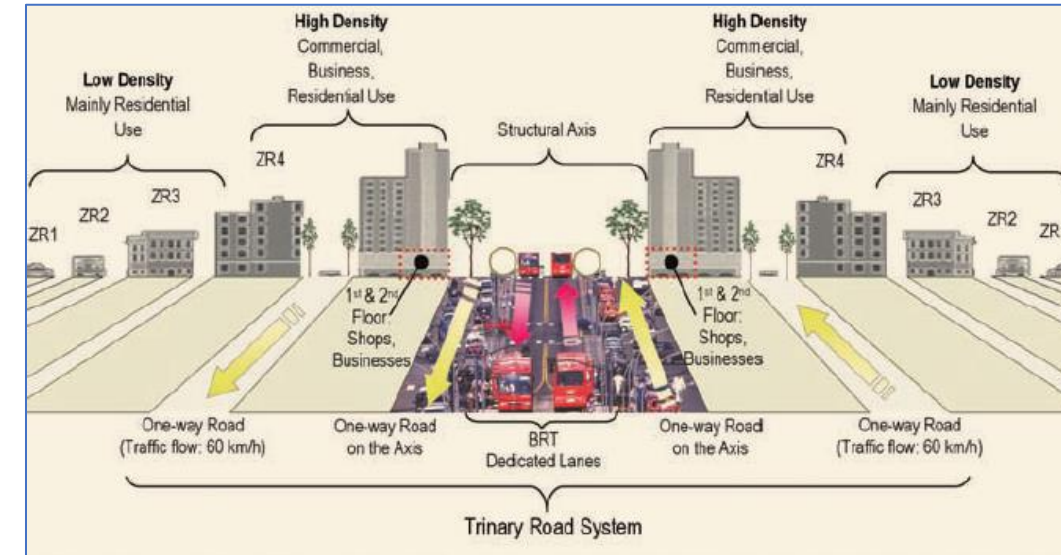
SOURCE: Suzuki, H., Cervero, R., & Luchi, K. (2013). Transforming Cities with Transit. Washington D.C.: The World Bank

The break up of revenues is as follows –
Railway Operations

24%	
Property Rental	22%
Property Development	26%
Station Commercial Development	24%
Revenue from outside HK	04%

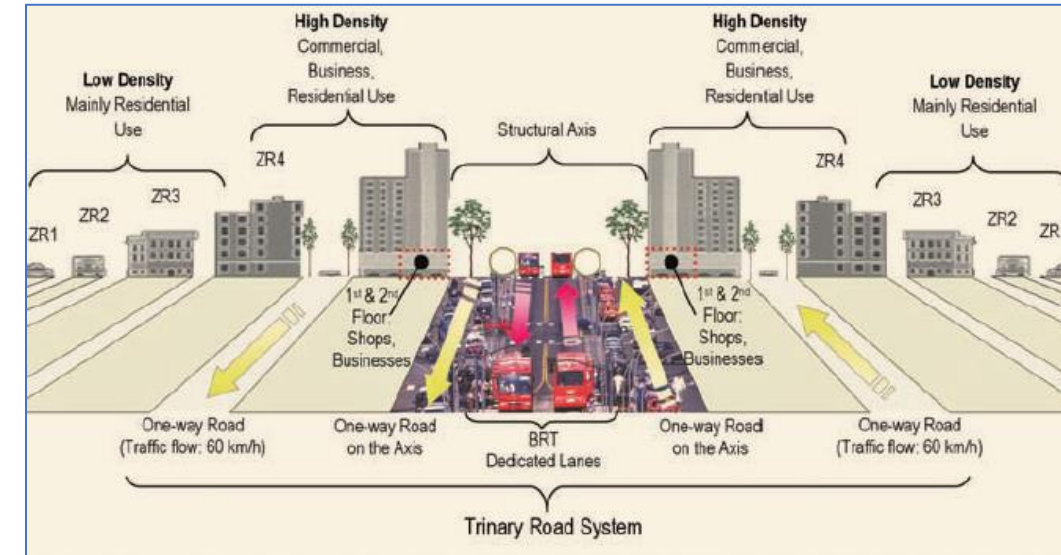
Curitiba, Brazil

- Shift from radial concentric growth to a linear growth pattern.
- To ensure TOD built form, Curitiba government mandated that all medium and large scale urban development along BRT corridor.
- Good modal connections between different bus systems.
- Land use planning to focus on pedestrians.



TRANSIT ORIENTED DEVELOPMENT

- Concept of **TRINARY**, three parallel roadways with compatible land use, building heights that tapers with distance from BRT corridor.
- The first two floors along the busway, doesn't count against FAR and are devoted to retail use.
- Above second floor, building must be setback at least 5m from plot line, to allow sun on busway.
- The inclusion of upper level housing allows property owner to density bonus, which balanced the bus flow in both the directions and ensure the efficient use of BRT.



A MARKET ORIENTED APPROACH



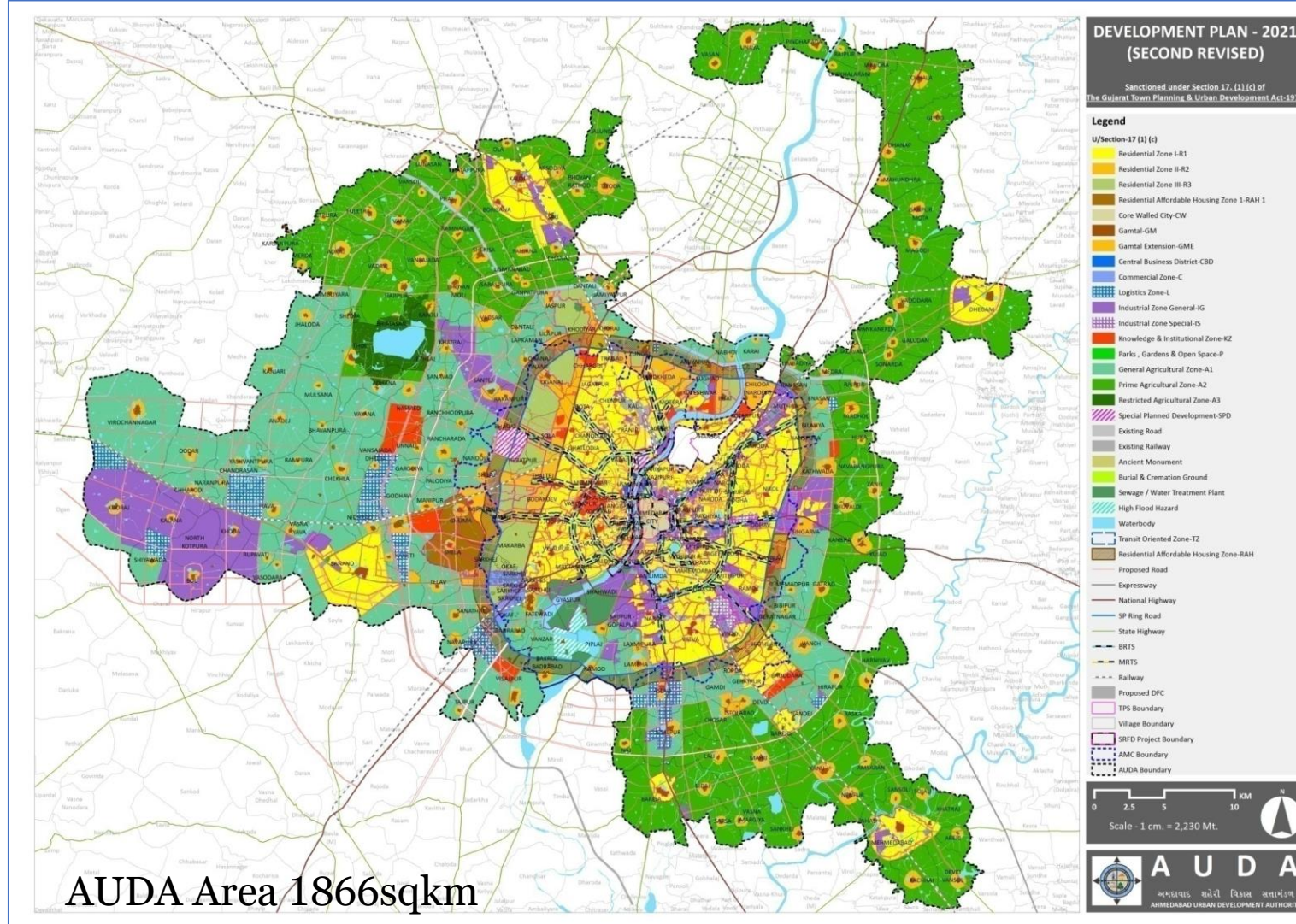
Ahmedabad Municipal Corporation, Ahmedabad Urban Development Authority, Government of Gujarat

- TOZ Concept was first introduced in **DP Plan 2021** which is **sanctioned** in **December 2014**.
- TOZ Concept has been amended in **GTP&UDA Act 1976** by **GOG** in February 2014.
- Transit Oriented Zone in Ahmedabad has been planned along the **BRTS and MRTS** corridor.
- The total area under TOZ is about **4000 Ha**.

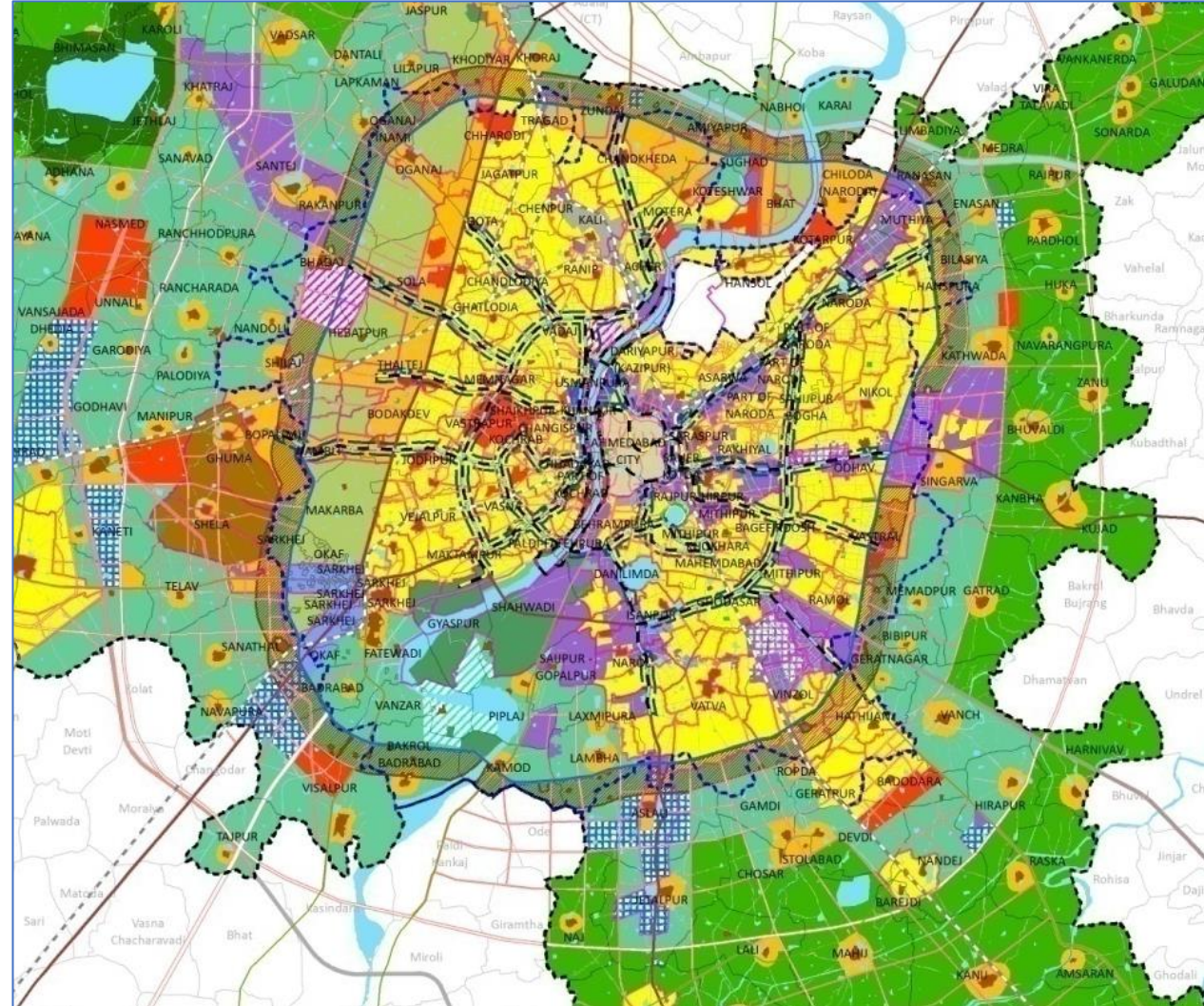
Development Plan Objectives

1. Land use and Transportation Integration
2. Ensure Compact City Form
3. Enhance Accessibility, connectivity and Mobility
4. Ensure minimum energy footprint

REVISED DRAFT DEVELOPMENT PLAN 2021



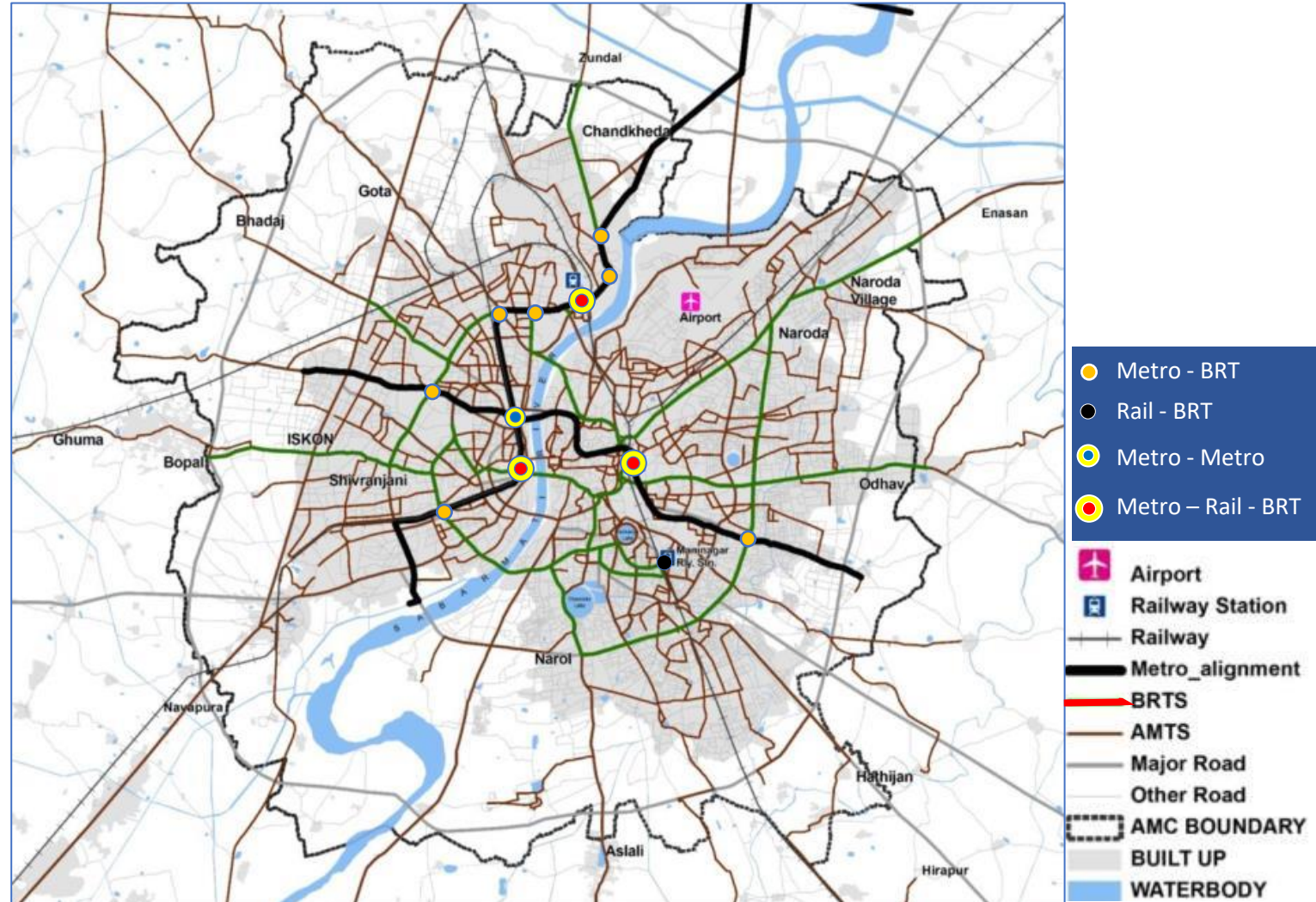
REVISED DRAFT DEVELOPMENT PLAN 2021



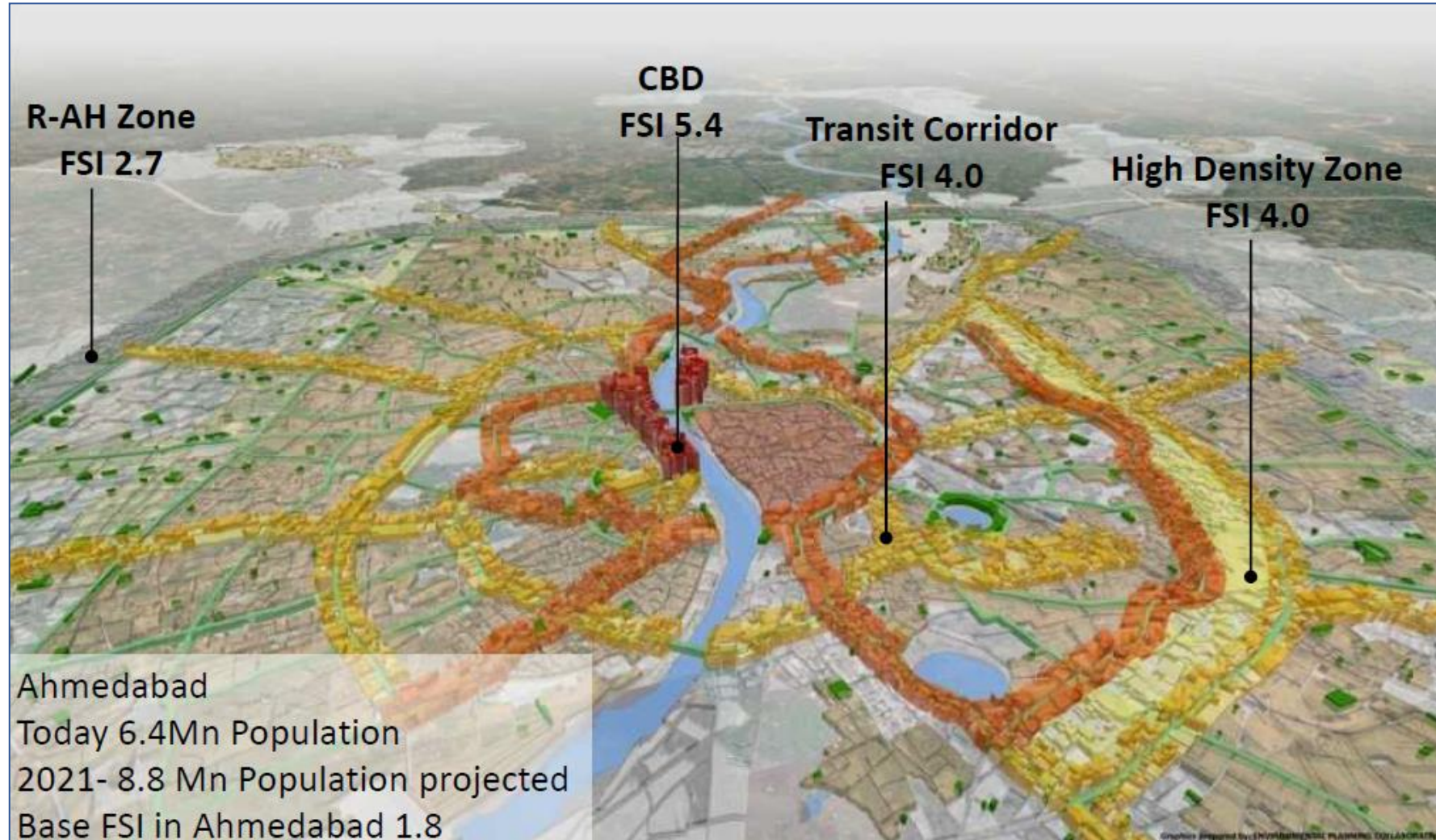
The GTPUD Act was amended in 2014 (Chapter V-I)

- As per amended Act clause no. 76A. (1) “The Appropriate Authority may make one or more Local Area Plan(LAP) for the development area or any part there of in the final development plan.”
- The Appropriate Authority shall prepare the LAP as per the provisions of amended Act including
- Publishing the Boundaries of LAP in Official Gazette as well as in the News Paper;
- Call Stakeholders meetings and invite objections and suggestions;
- Considering the objections and suggestions, modify the LAP accordingly or same shall be published in Official Gazette for inviting objections and suggestions and then the LAP shall be submitted to the Govt.
- If the area under LAP is not a part of the Preliminary or Final TP scheme, the Prior Permission of Govt. is required.

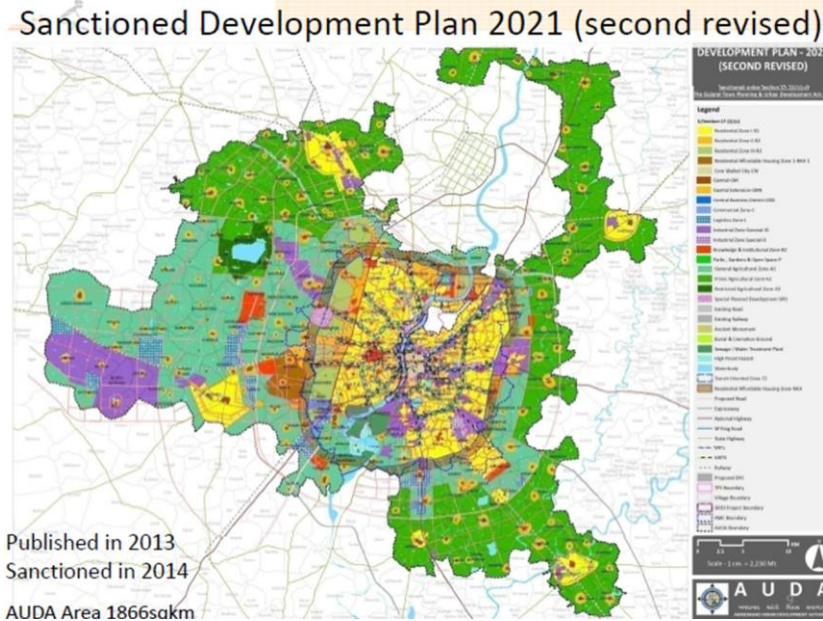
INTEGRATED TRANSIT NETWORK PLAN



INTEGRATED LAND USE WITH MASS TRANSIT 2021

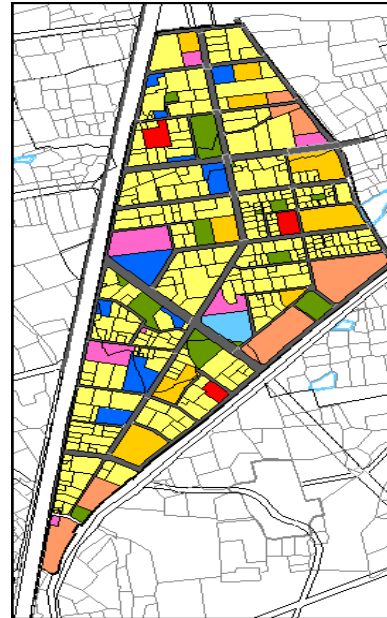


“Development Plan” (Macro Level) (Since 1954)



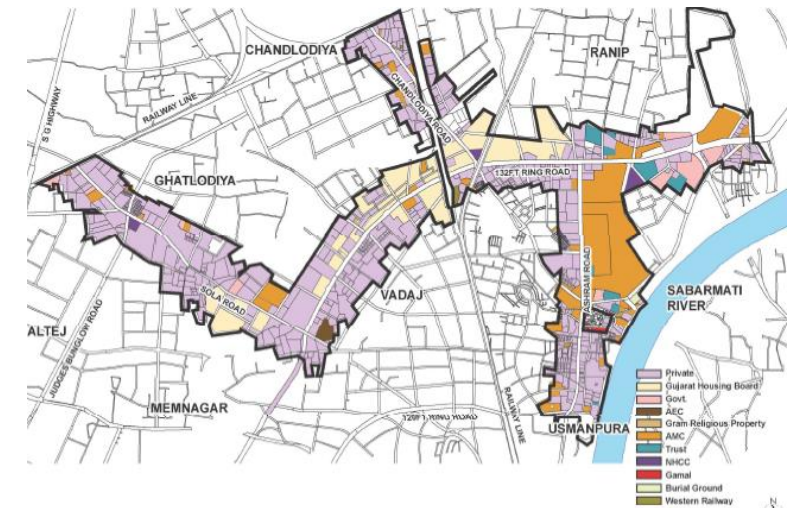
- Zoning Proposals;
- Regulation for Development;
- City level Transportation and infrastructure planning and implementation.

“Town Planning Schemes” (Micro Level) (since 1915)



- Land reconstitution;
- Neighborhood level road network , social and physical infrastructure;
- Financing of neighborhood level infrastructure.

Local Area Plan” (Micro Level) (Since 2014)



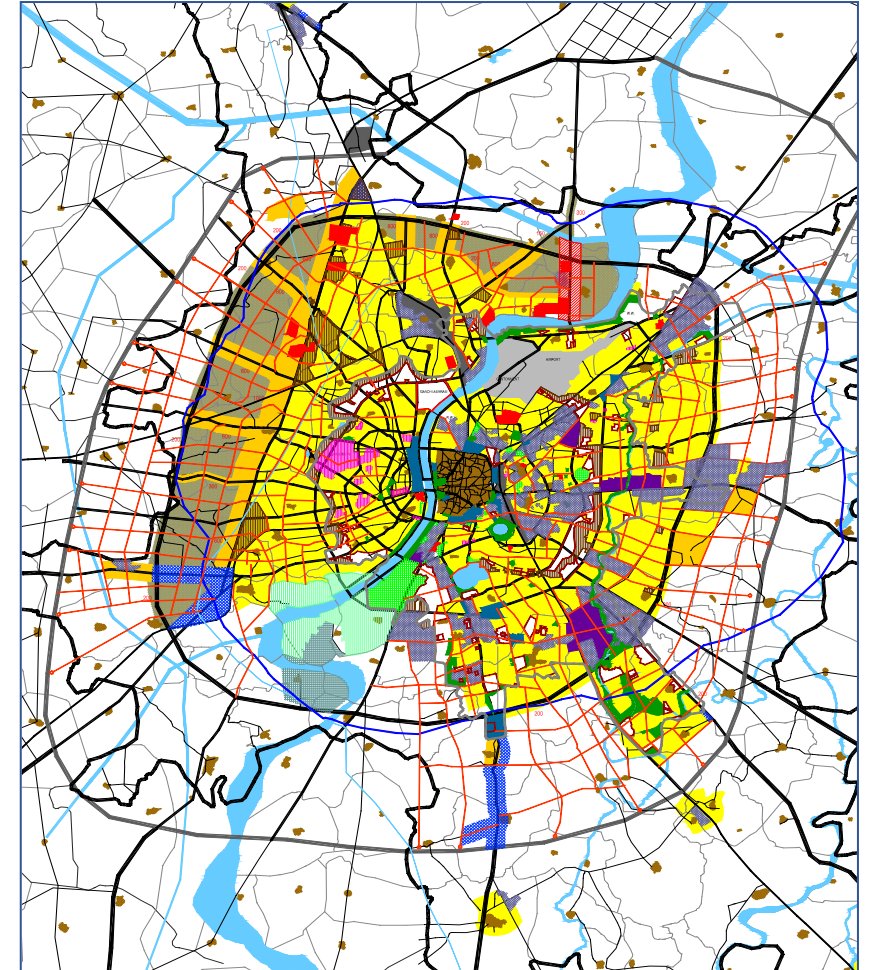
- Detailed area level plan with urban design interventions
- Planning for TOZ
- Amendment in Gujarat Town Planning & Urban Development Act, 1976 -Local Area Plan.

3 Stage Process Under the Gujarat Urban Development and Town Planning Act-1976

Development Plan

Provides Overall Development Framework

- Overall Direction of Urban Expansion
- Landuse Zoning
- City level road network
- Rapid Transit Network
- Transit Ready Streets
- City Level Infrastructure (Utilities & Amenities)
- Reservations of Land for other Public Purposes
- Development Control Regulation/rules

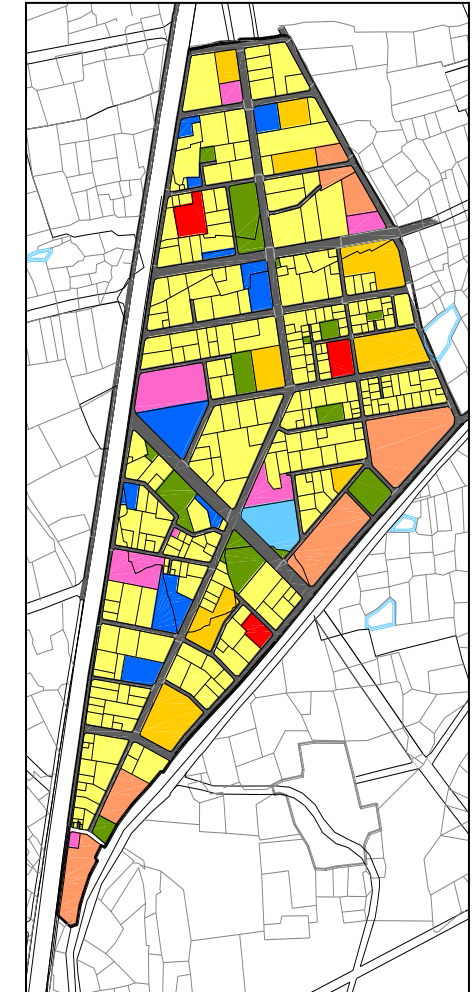


Under the Gujarat Urban Development and Town Planning Act-1976

Town Planning Scheme (TPS)

A land readjustment tool to adapt land for urban use

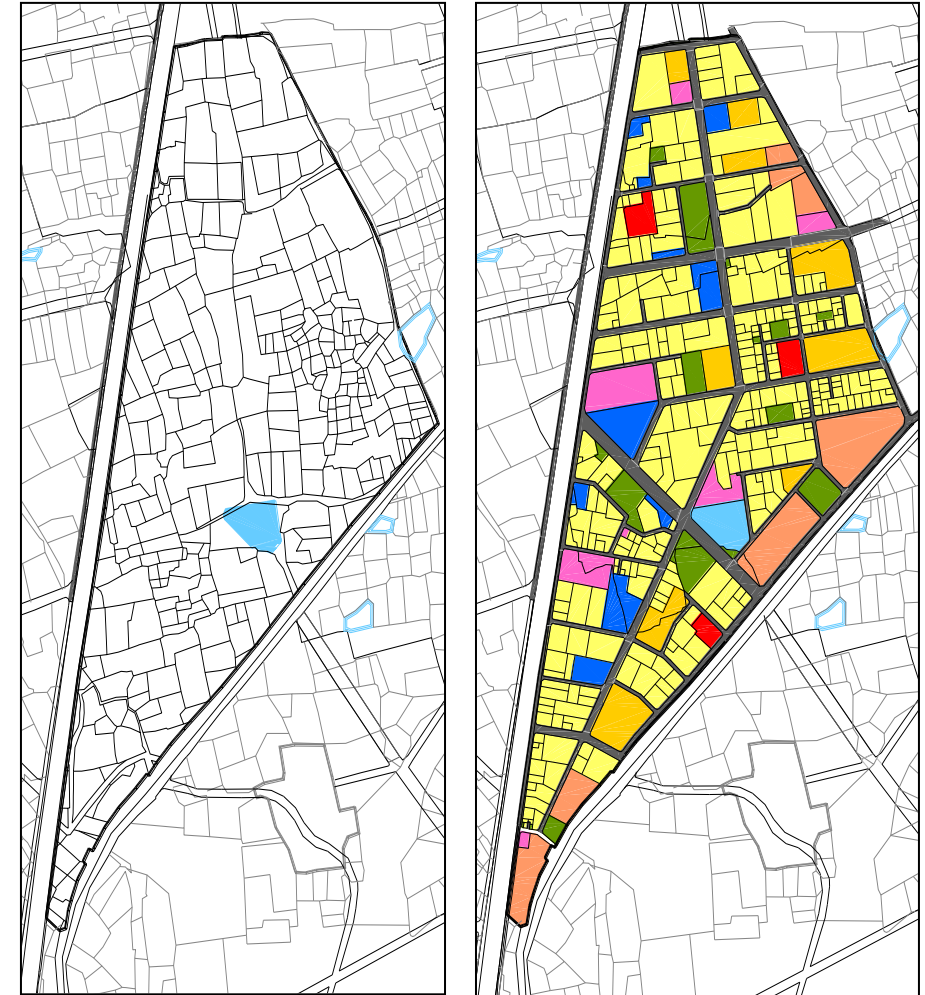
- Reconstitution of land holdings
- Appropriation of land for public uses without acquisition
- Local level road network
- Local level social and physical infrastructure
- **Land Bank for Urban Poor**
- Infrastructure Cost Recovery
 - Land appropriation compensation adjusted against land value increments due to infra. provision
 - **Land for Financing of infrastructure (15%)**



Under the Gujarat Urban Development and Town Planning Act-1976

Land Area for Public Purposes

- Appropriation of land for public uses upto 50% & adjust against betterment levy
 - Road Network upto 20%
 - Local level social and physical infrastructure upto 5%
 - Land for Economically Weaker Section Housing upto 10%)
 - Land Bank for Financing of infrastructure upto 15%



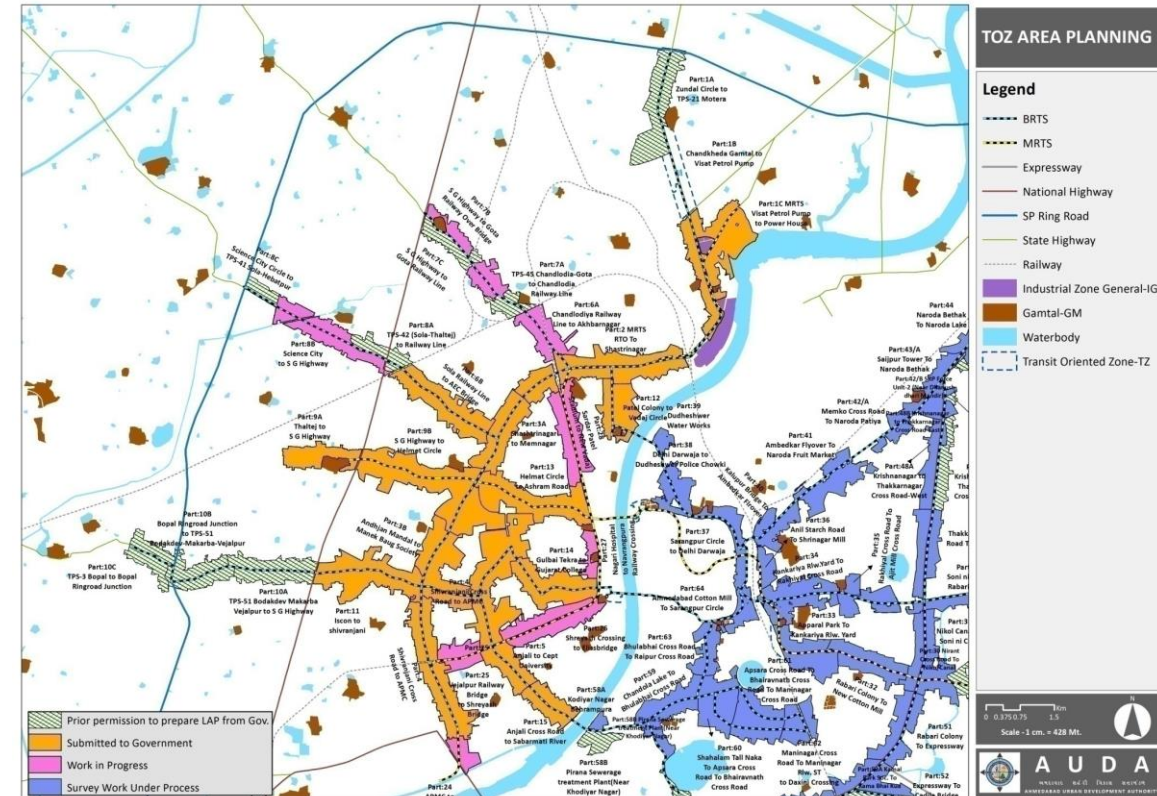
TRANSIT ORIENTED DEVELOPMENT

- In order to achieve the goal of compact city development and to reduce usage of private vehicles, AUDA has introduced Transit Oriented Zone (TOZ) with intention to integrate land use with public transport. TOZ offers 4 FSI on **200mt buffer** on either side of BRT and MRT network as specified in Development Plan.
- Ahmedabad city has about 2500 kms of well-connected road network. To ease mobility, AUDA has introduced Transit Oriented Zone (TOZ) covering a total length of 120 km along BRT and 35 kms along MRT.



TRANSIT ORIENTED DEVELOPMENT

- FSI - 4
- Land Uses – As Per DP Zoning Regulations
- No Land Use Mix proposed
 - Delhi - 30% minimum mandatory residential
- No dwelling sizes specified;
 - Delhi has 50% unit sizes 32-40sqm; 50% unit sizes 62 sqm.
- TPS provides land for EWS. Also DP proposed Affordable Housing Zone; No proposal under LAAP



No.	Road Width (in meters)	Maximum Permissible Building Height (in meters)
1	Less than 9.0 mts	10.0
2	9.0 mts and less than 12.0 mts	21.0
3	12.0 mts. and less than 18.0 mts	25.0
4	18.0 mts and less than 36.0 mt	45.0
5	36.0 mts and above	70

- Planning or redefine the existing developed or undeveloped or developing area in terms of accessibility, walkability, and connectivity as well plan for future infrastructure, amenities and utilities requirements to sustain the future density and growth.
- Prescribe public domain area and plan for future public plaza along transit corridor
- Conduct public consultation for the future plan and consider the objections and suggestion received.

Development Guidelines

No.	Road Width (in meters)	Maximum Permissible Building Height (in meters)
1	Less than 9.0 mts	10.0
2	9.0 mts and less than 12.0 mts	21.0
3	12.0 mts. and less than 18.0 mts	25.0
4	18.0 mts and less than 36.0 mt	45.0
5	36.0 mts and above	70

FSI - 4

Land Uses – As Per DP Zoning Regulations

No Land Use Mix proposed (Delhi - 30% minimum mandatory residential)

No dwelling sizes specified; Delhi has 50% unit sizes 32-40sqm; 50% unit sizes 62 sqm.

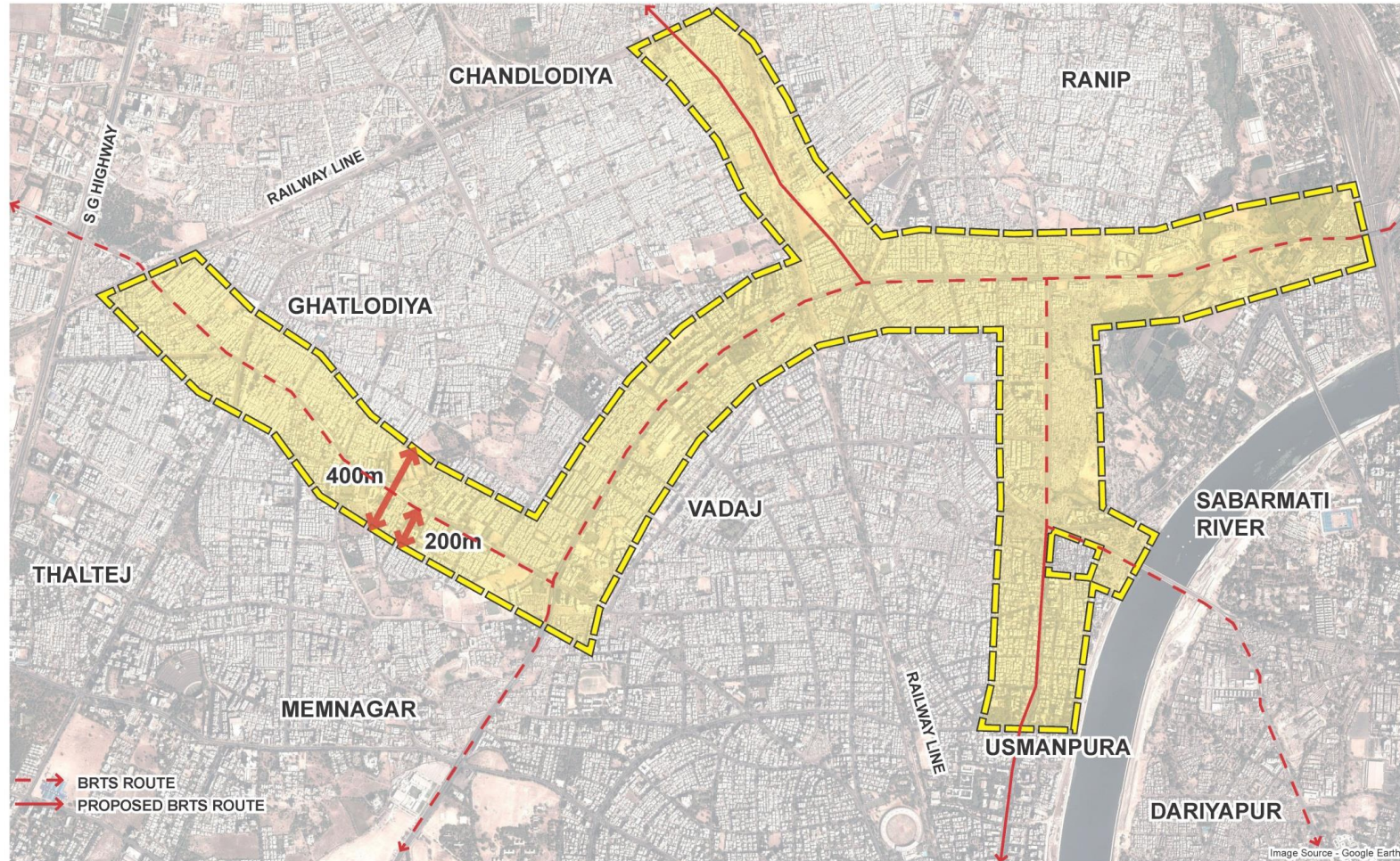
TPS provides land for EWS. Also DP proposed Affordable Housing Zone; No proposal

Street related Interventions

- **Future ROW:** Land identified as public ROW and to be developed as and when property is redeveloped
- **Flexible ROW:** Public ROW that can be flexibly located by the property owner connecting predefined network links on either side
- **Pedestrian ROW:** Existing Private roads to be notified as Public ROW
- **Public Domain:** Part of the roadside margin identified in LAP to be kept as public domain used as foot path to be kept open for public use (FSI provide as compensation or monetary compensation is also provided)

A CASE -WADAJ

LOCAL AREA PLAN

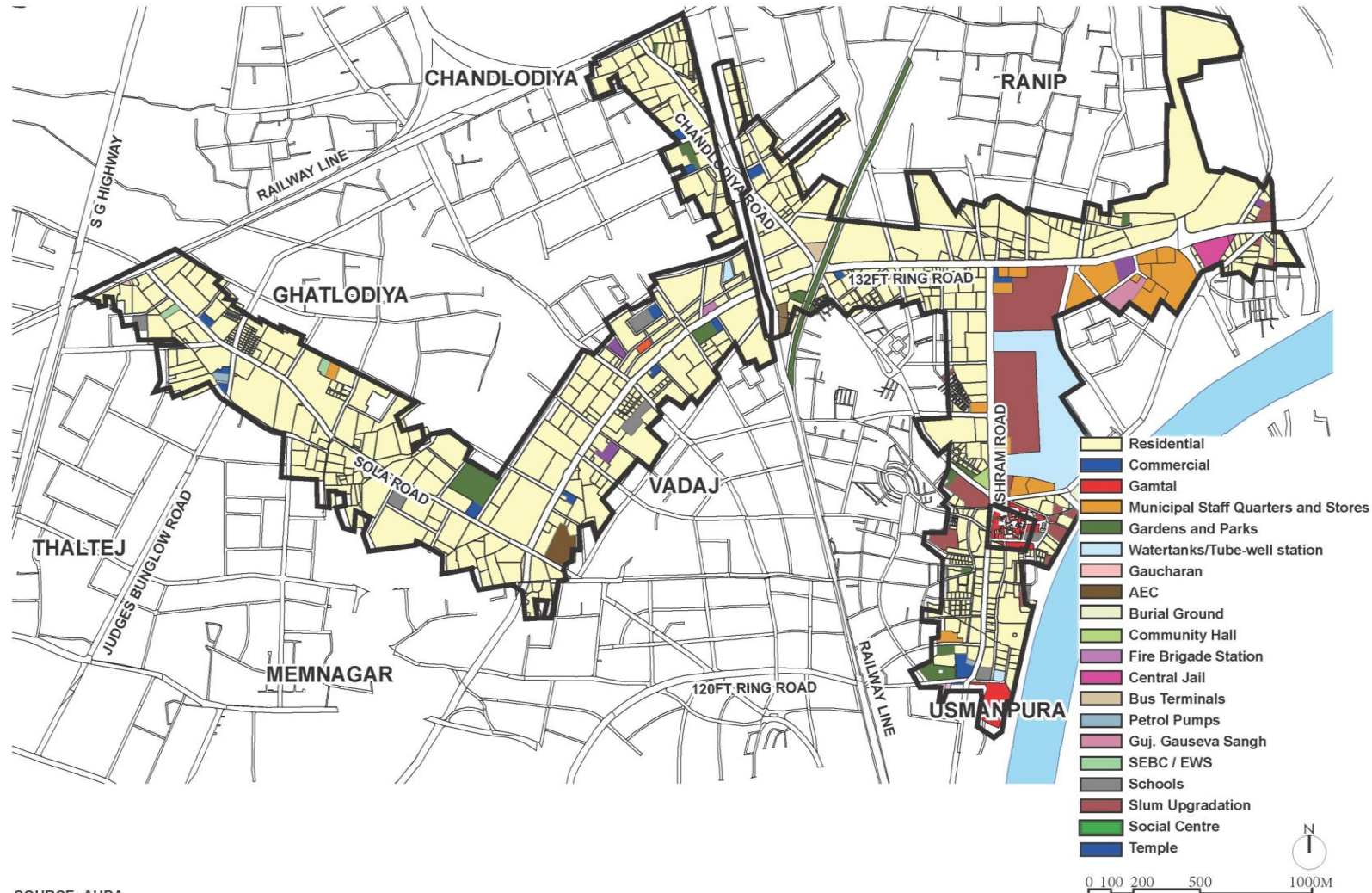


AREA - 4.32 SQ KMS

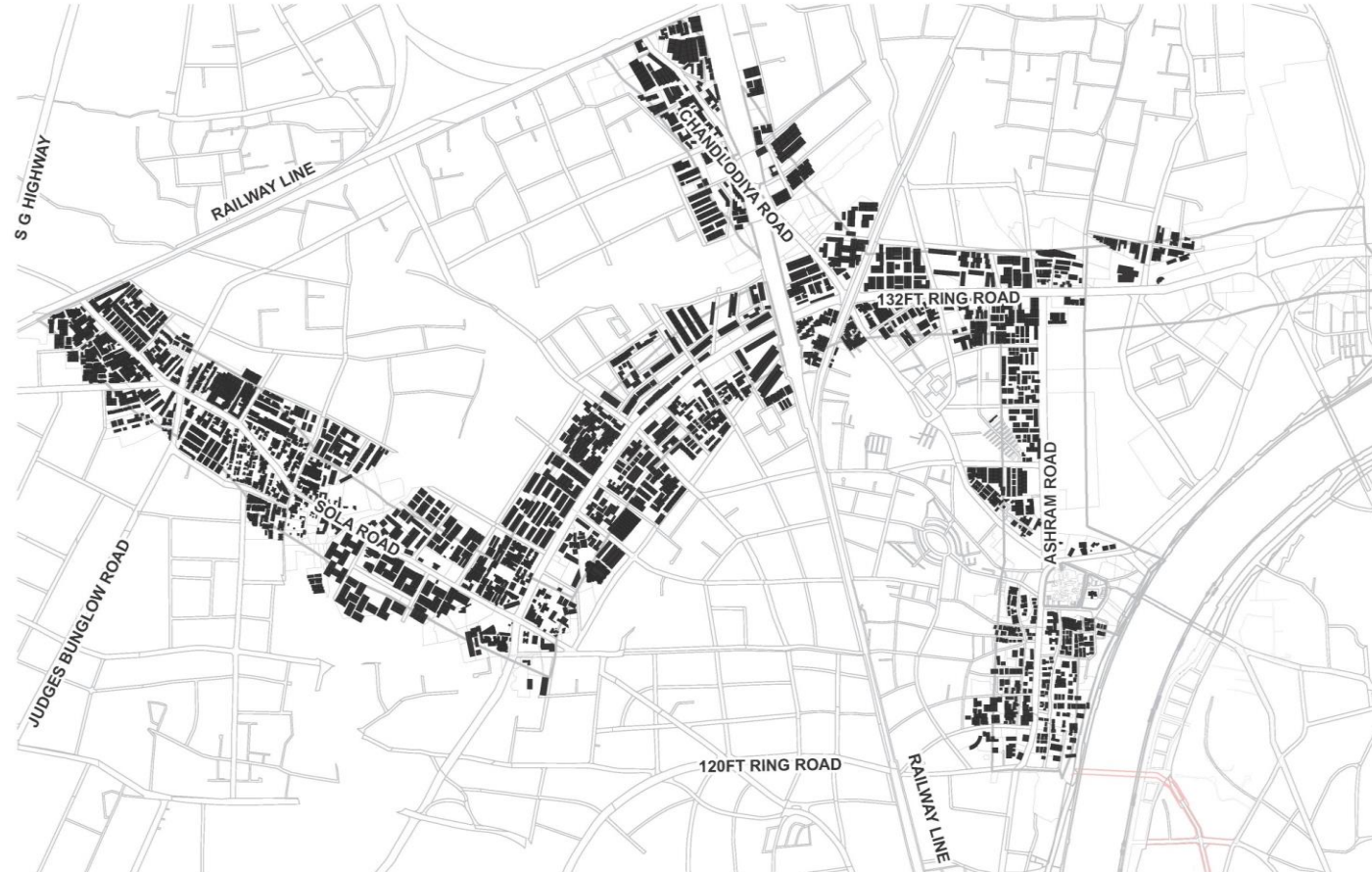
SOURCE: AUDA



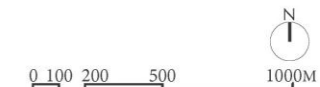
LOCAL AREA PLAN – LAND USE ANALYSIS



LOCAL AREA PLAN – FOOT-PRINT USE ANALYSIS



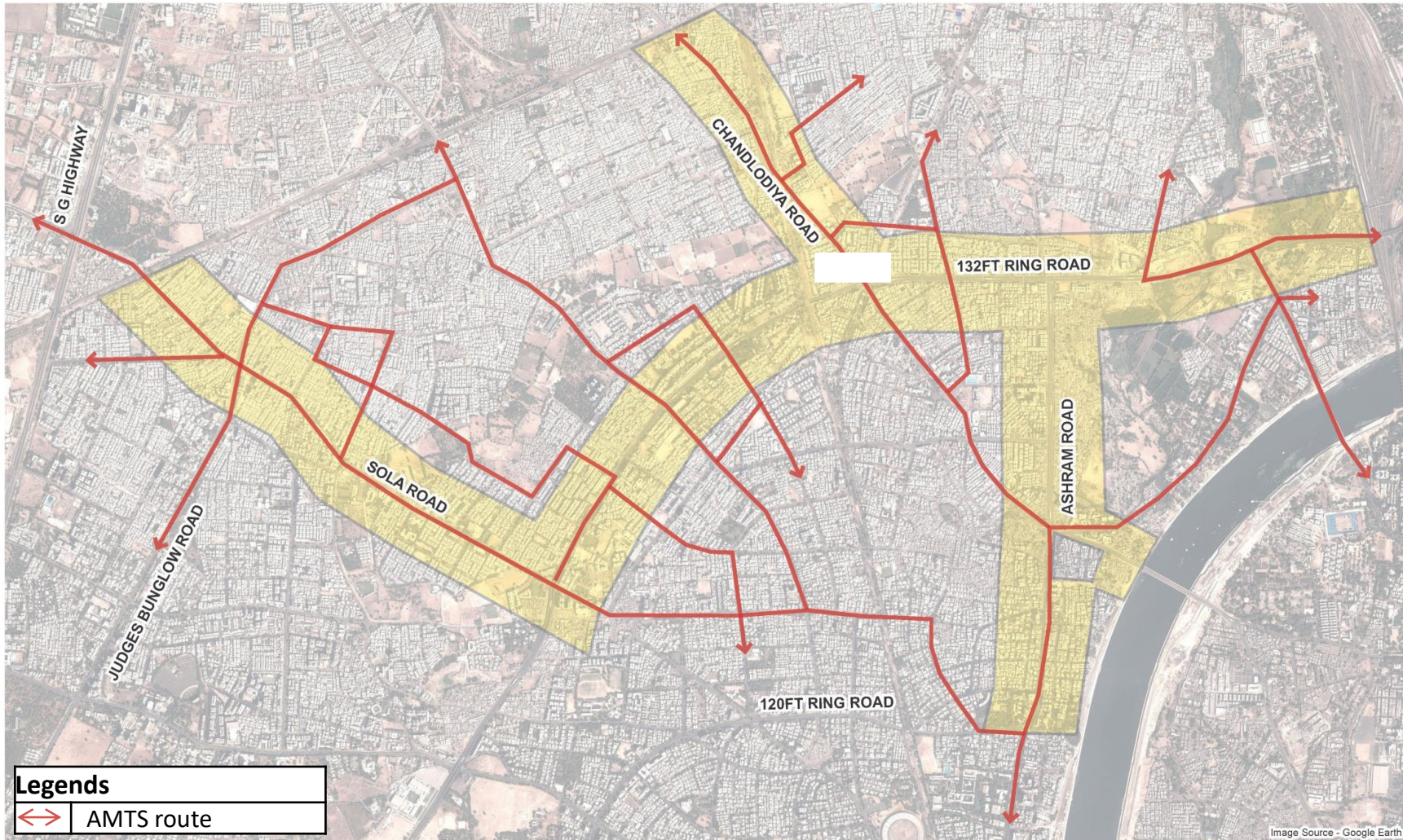
GROUND COVERAGE : 28%



EXPANDING THE PUBLIC REALM

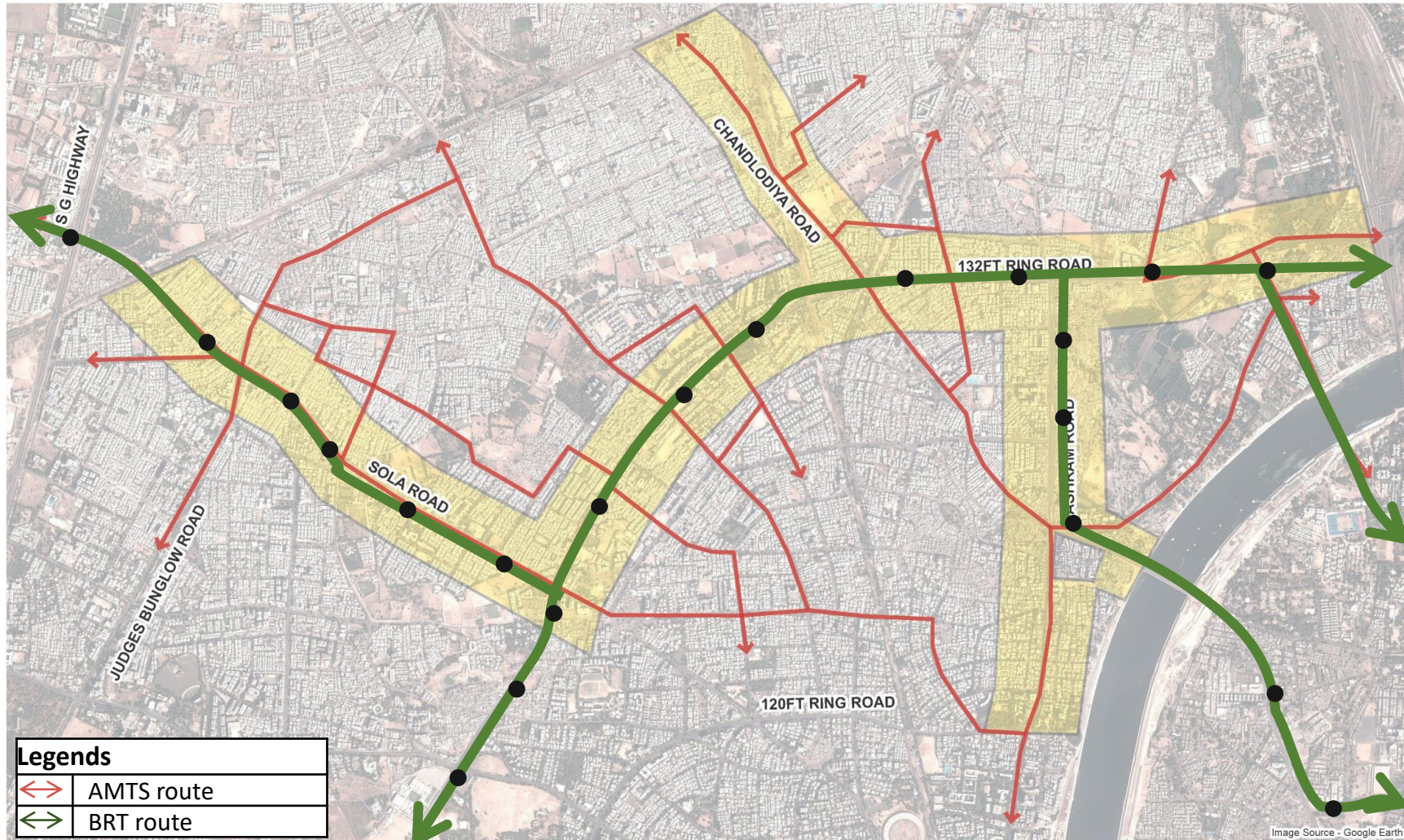
PUBLIC TRANSPORT AND PROPOSED PUBLIC SPACES

LOCAL AREA PLAN - AMTS



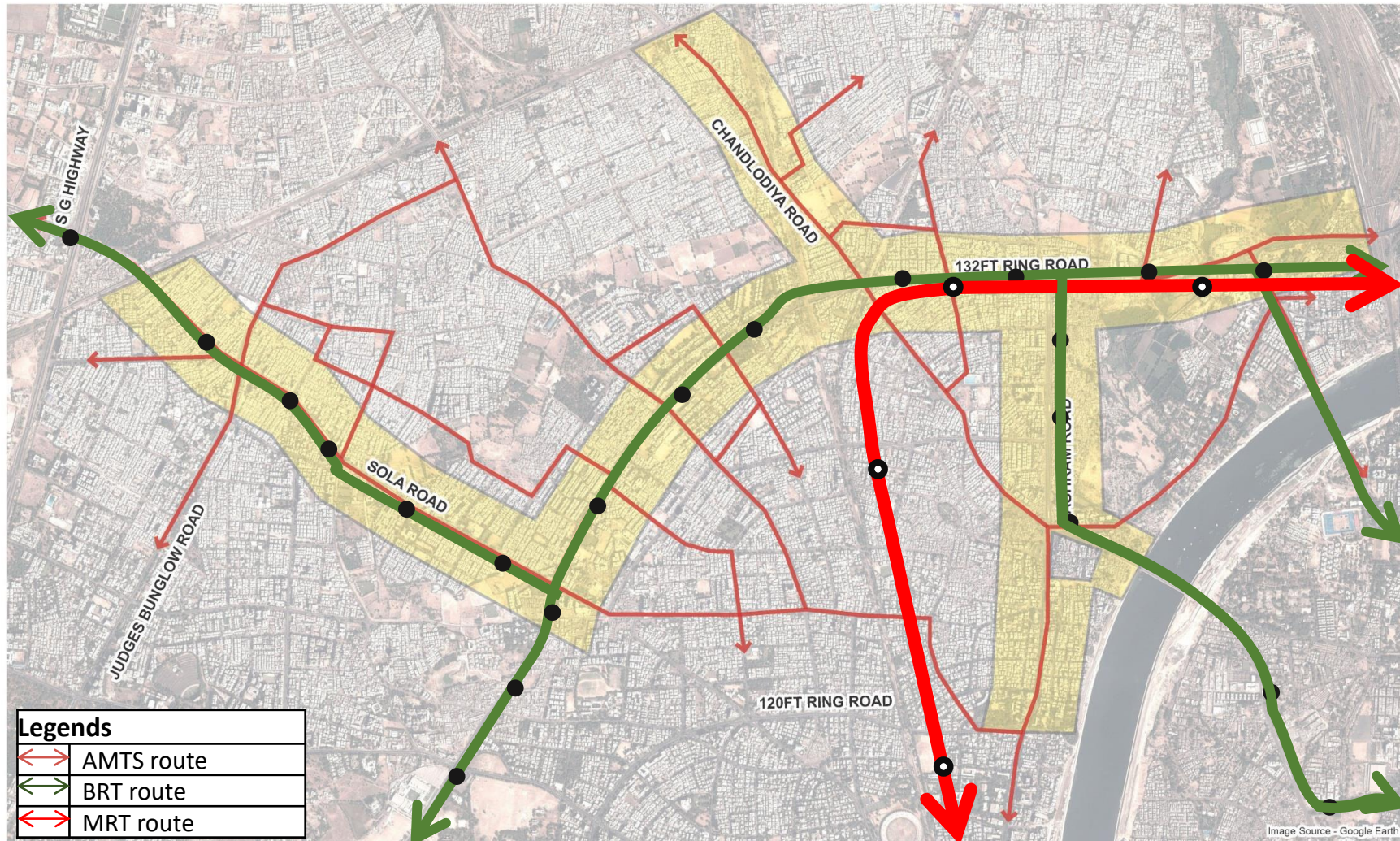
The present AMTS route does not complement the BRTS. The AMTS network requires redesign to better serve the transit users. In some cases the AMTS and BRTS follow the same route which may be unnecessary. While some areas are not well served, a well-designed AMTS that work with BRTS will help increase the overall use of the public transit system and ridership.

LOCAL AREA PLAN – AMTS + BRTS



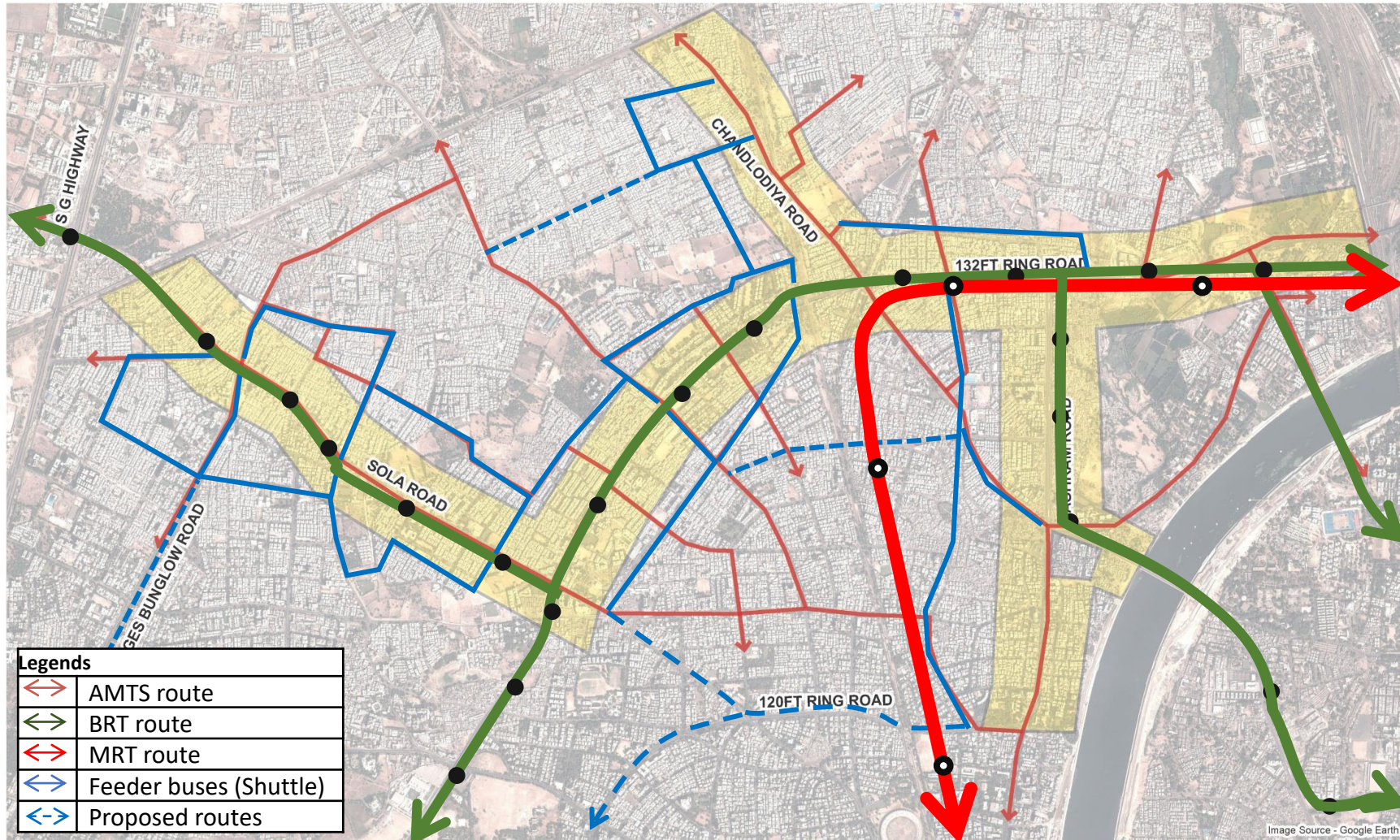
The present AMTS route does not compliment the BRTS. The AMTS network requires redesign to better serve the transit users. In some cases the AMTS and BRTS follow the same route which may be unnecessary. While some areas are not well served, a well-designed AMTS that work with BRTS will help increase the overall use of the public transit system and ridership.

LOCAL AREA PLAN – AMTS + BRTS + METRO



The present AMTS route does not compliment the BRTS. The AMTS network requires redesign to better serve the transit users. In some cases the AMTS and BRTS follow the same route which may be unnecessary. While some areas are not well served, a well-designed AMTS that work with BRTS will help increase the overall use of the public transit system and ridership.

LOCAL AREA PLAN – AMTS + BRTS + METRO + PROPOSED FEEDER ROUTES



The present AMTS route does not complement the BRTS. The AMTS network requires redesign to better serve the transit users. In some cases the AMTS and BRTS follow the same route which may be unnecessary. While some areas are not well served, a well-designed AMTS that work with BRTS will help increase the overall use of the public transit system and ridership.

IMPROVING WALKABILITY BY REDUCING BLOCK SIZES

- **Future ROW:** Land identified as public ROW and to be developed as and when property is redeveloped
- **Flexible ROW:** Public ROW that can be flexibly located by the property owner connecting predefined network links on either side
- **Pedestrian ROW:** Existing Private roads to be notified as Public ROW
- **Public Domain:** Part of the roadside margin identified in LAP to be kept as public domain used as foot path to be kept open for public use (FSI provide as compensation or monetary compensation is also provided)

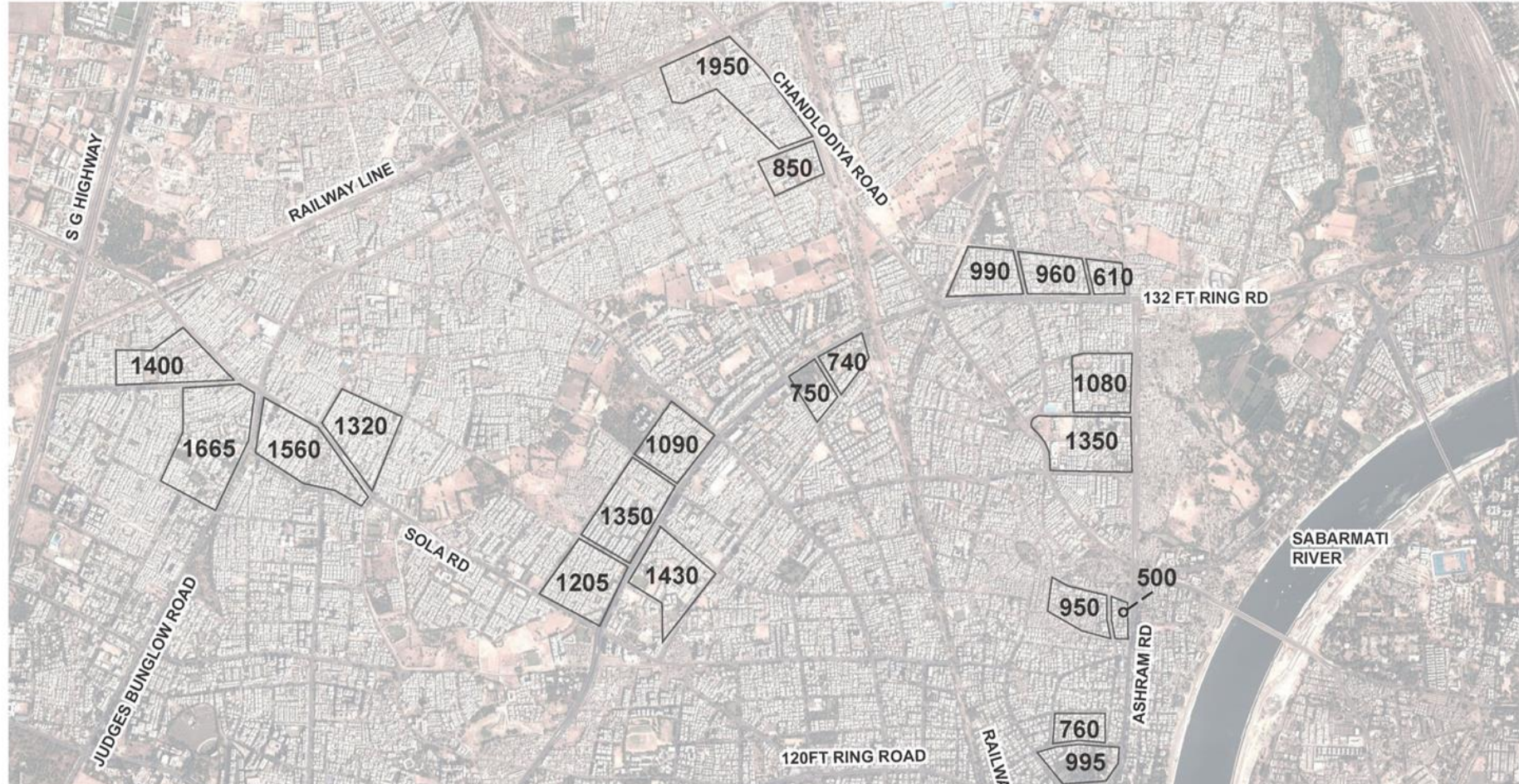
LOCAL AREA PLAN – EXISTING STREET NETWORK (TOZ WADAJ)



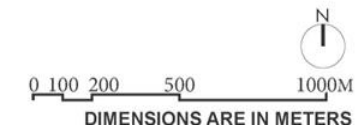
LOCAL AREA PLAN – STREET HIERARCHY (TOZ WADAJ)



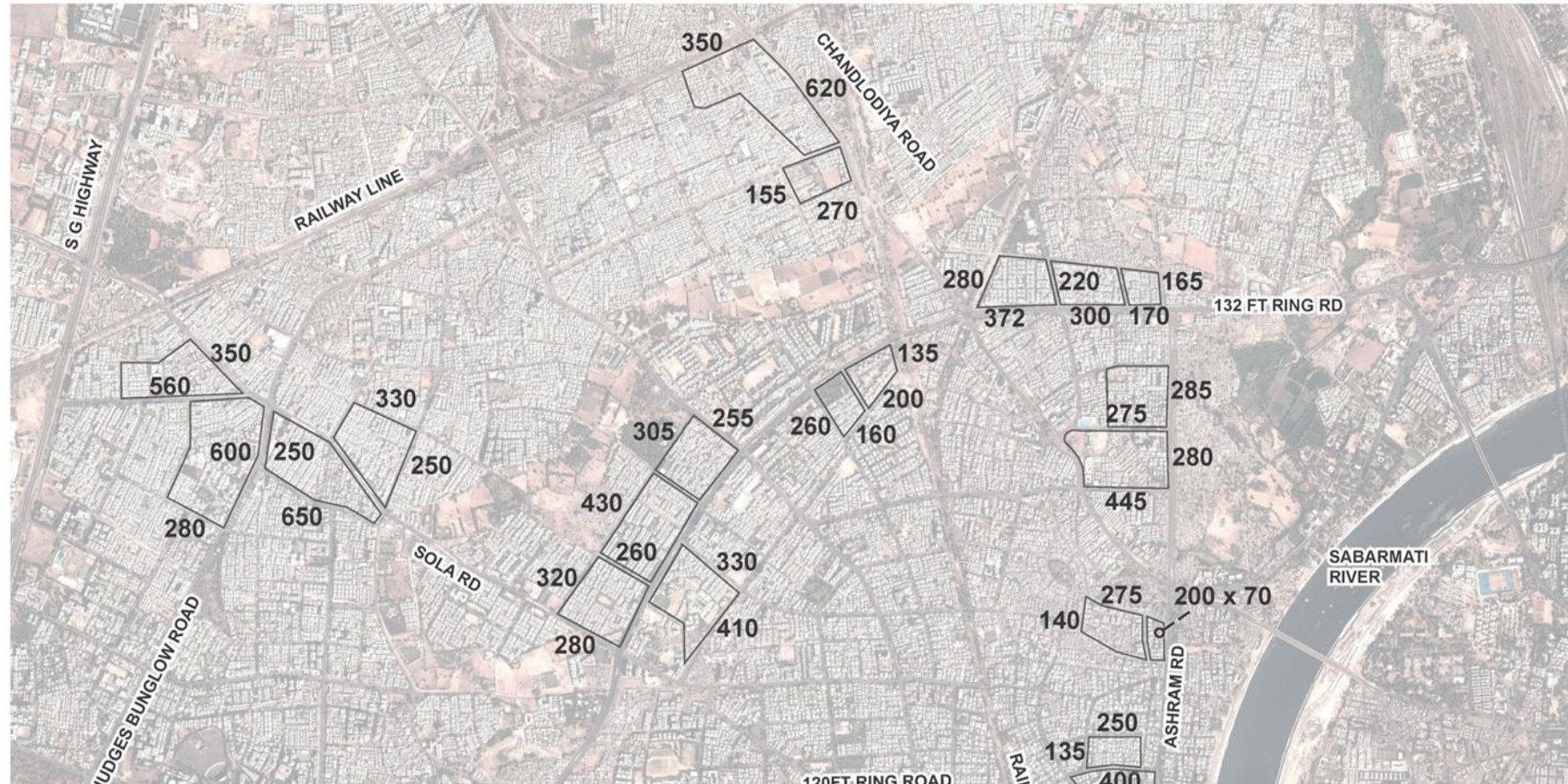
LOCAL AREA PLAN – BLOCK PERIMETER



BLOCK PERIMETER : 500 to 1950
AVG PERIMETER : 1200
NUMBER OF BLOCKS : 116

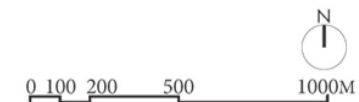


LOCAL AREA PLAN – BLOCK SIZE PROPOSED

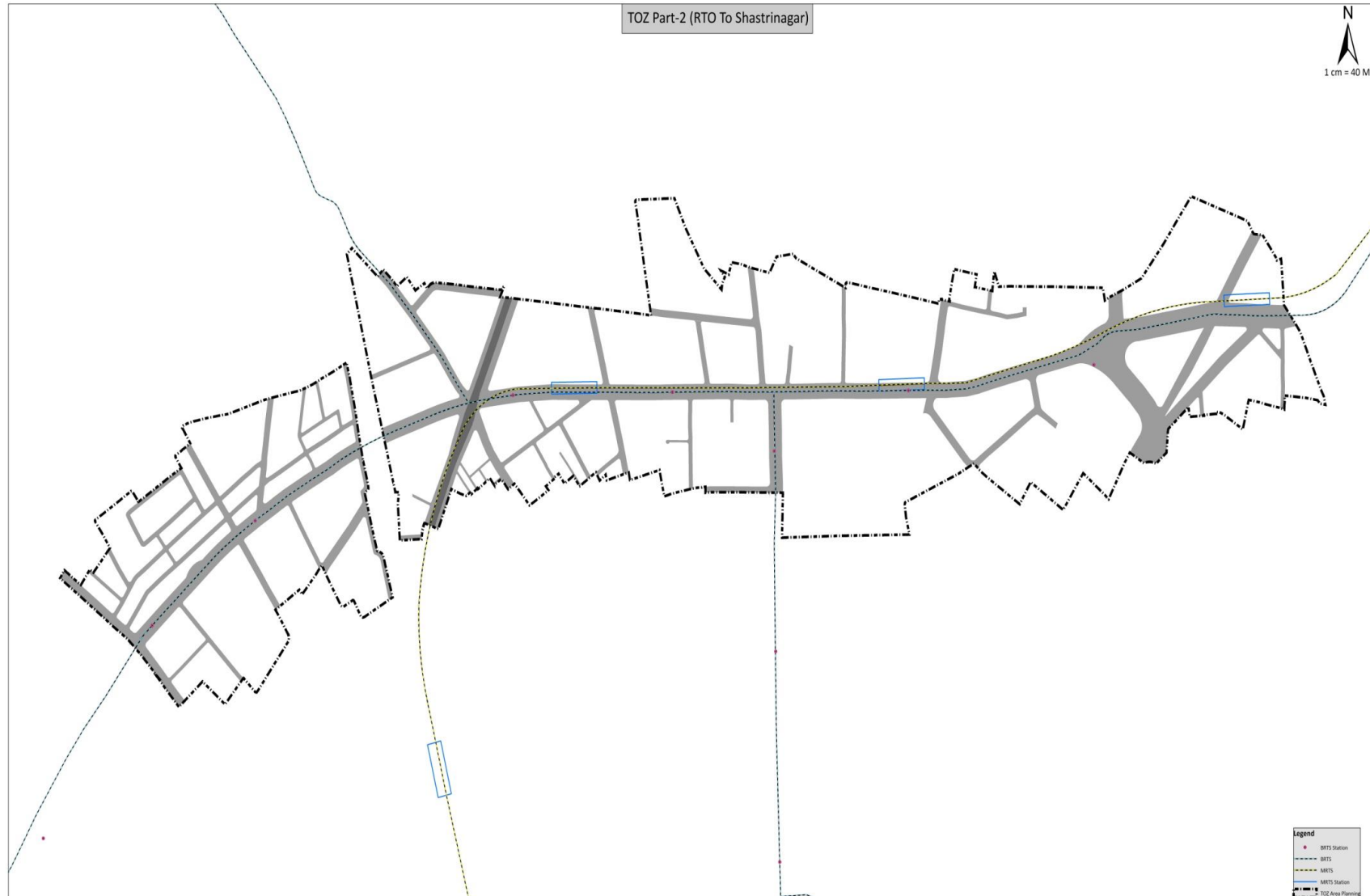


BLOCK SIZES : 165 x 170 to 350 x 620
AVG BLOCK SIZE : 250 x 350
NUMBER OF BLOCKS : 116

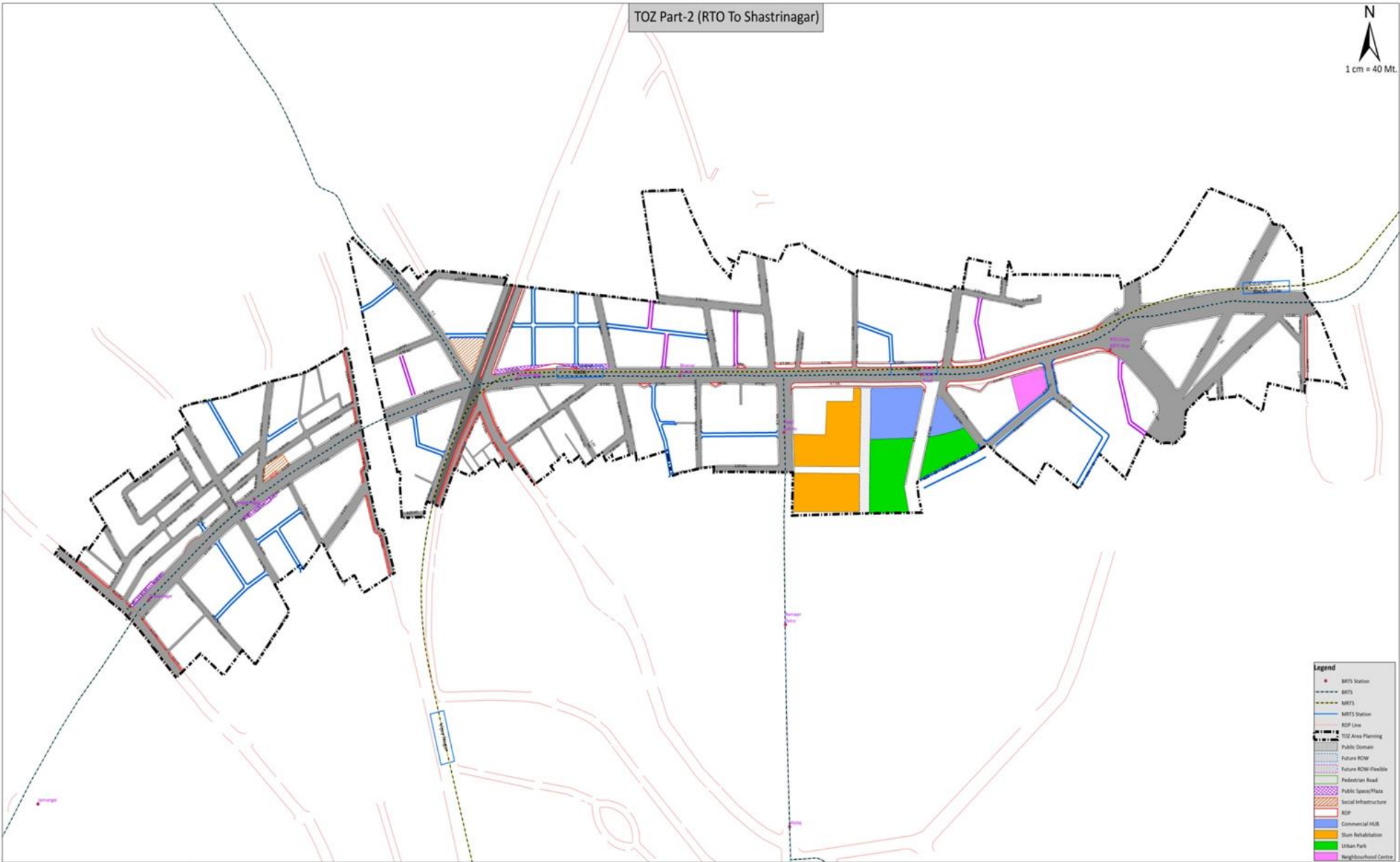
DIMENSIONS ARE IN METERS



LOCAL AREA PLAN – EXISTING NOTIFIED ROAD

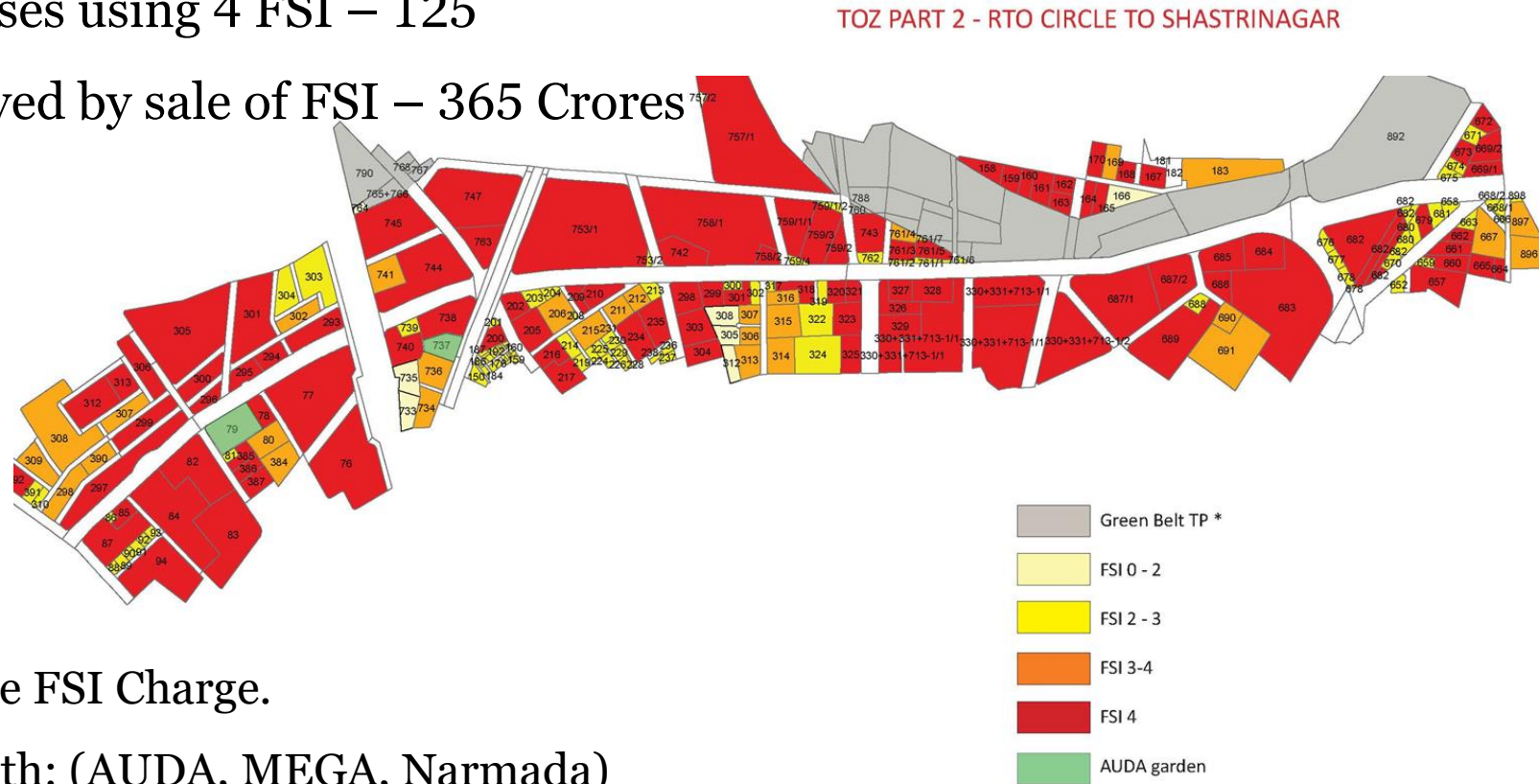


LOCAL AREA PLAN – PROPOSED NETWORK



RESOURCE MOBILIZATION

- Average FSI 3.2
- Number of Cases using 4 FSI – 125
- Amount received by sale of FSI – 365 Crores



* For Green belt TP areas, the average net FSI achieved of 3.80 in rest of the area has been considered.

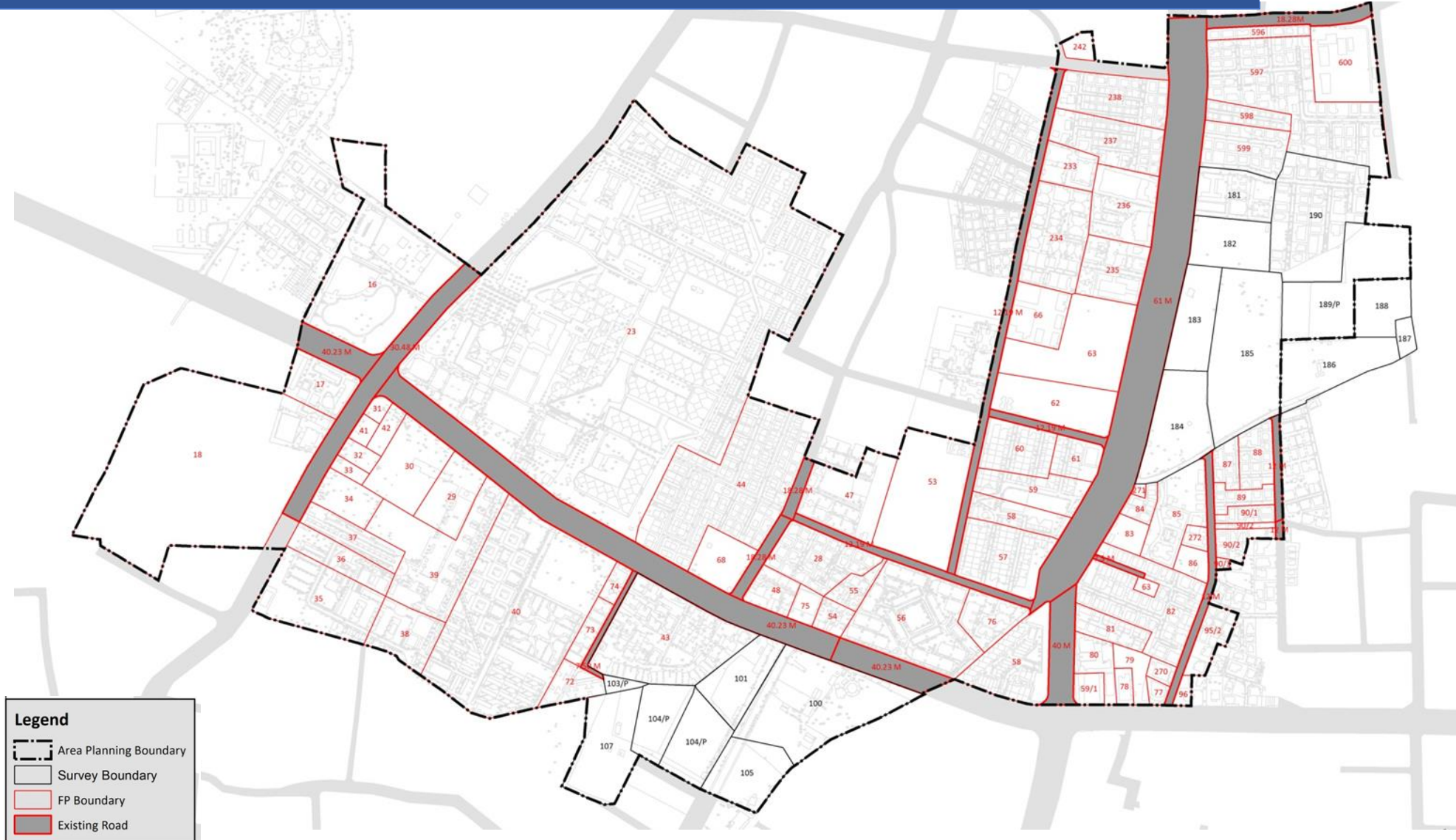
- AMC collects the FSI Charge.
- To be shared with: (AUDA, MEGA, Narmada)

PROCES OF LOCAL AREA PLAN (TOZ) ANDHAJAN MANDAL TO MAEK BAUG SOCIETY

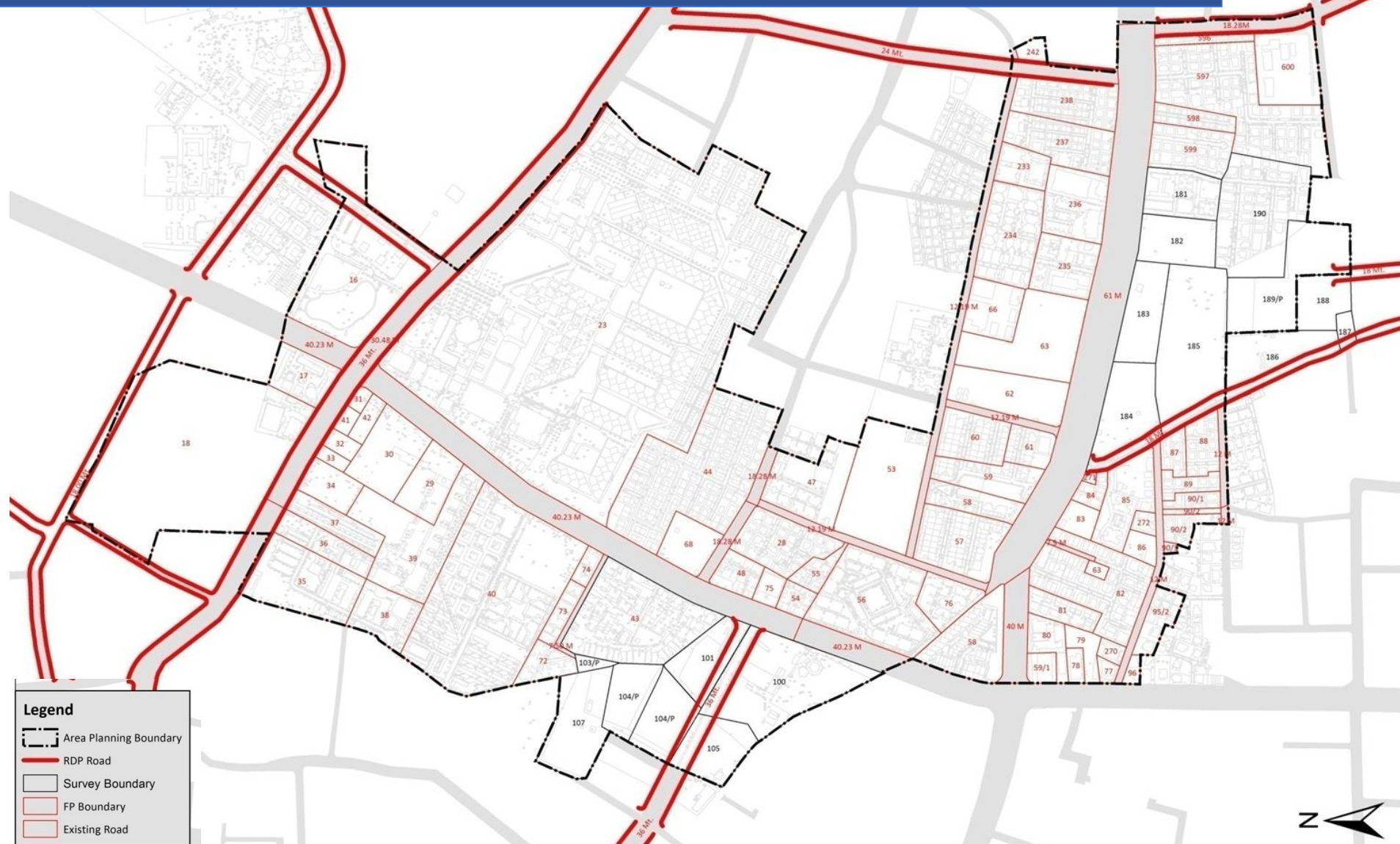
EXISTING SURVEY



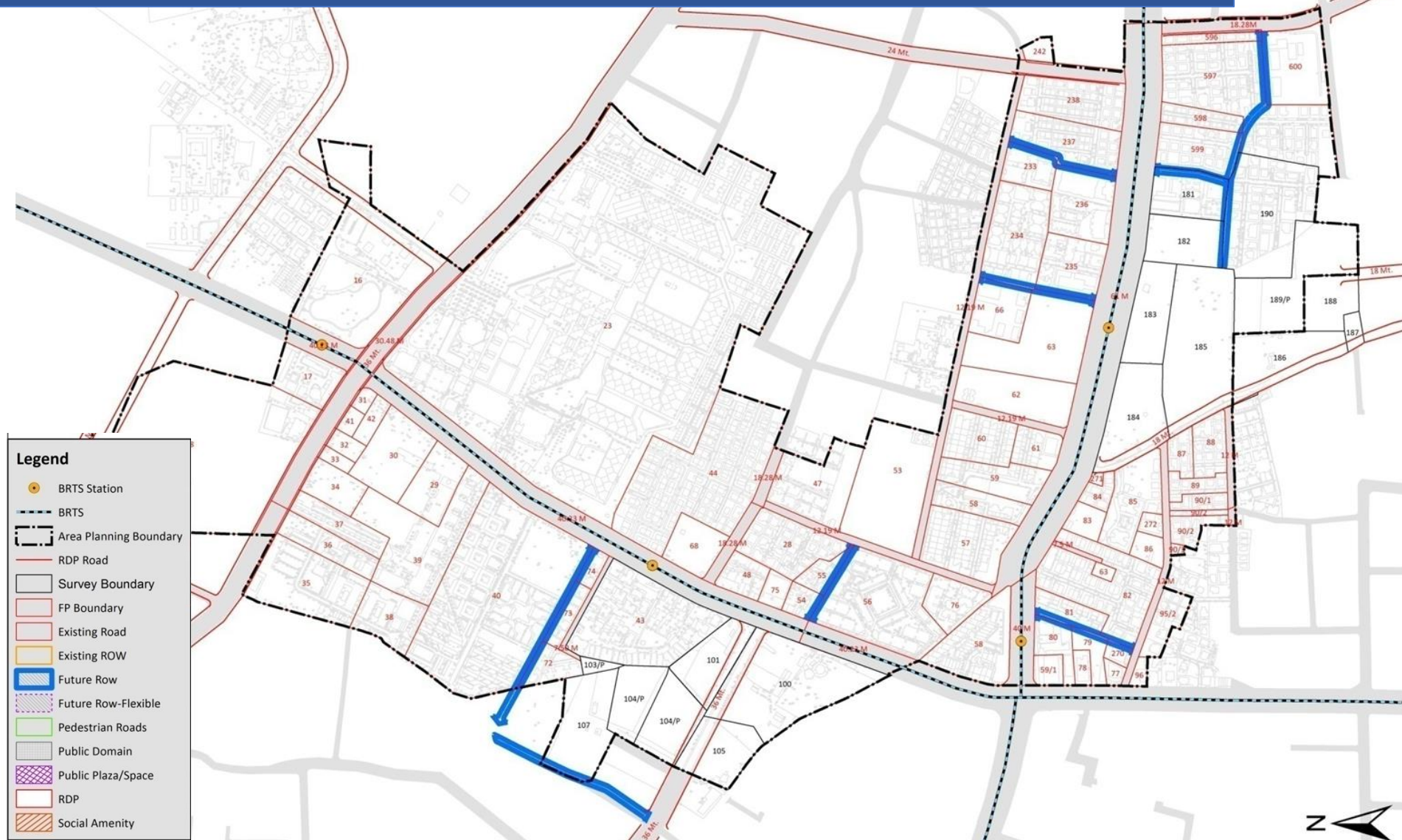
EXISTING STREET NETWORK



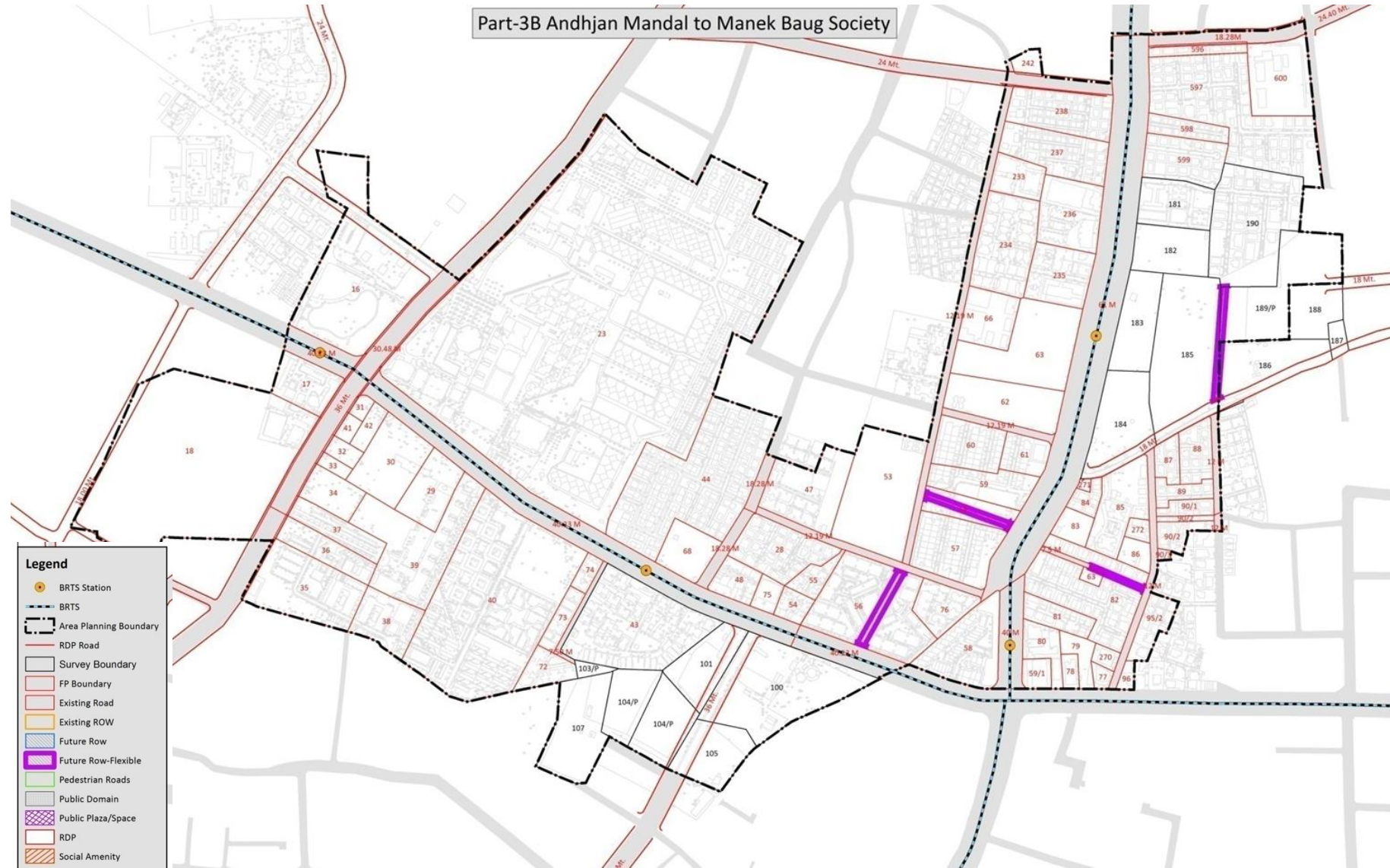
EXISTING Notified ROW (TP-DP ROADS)



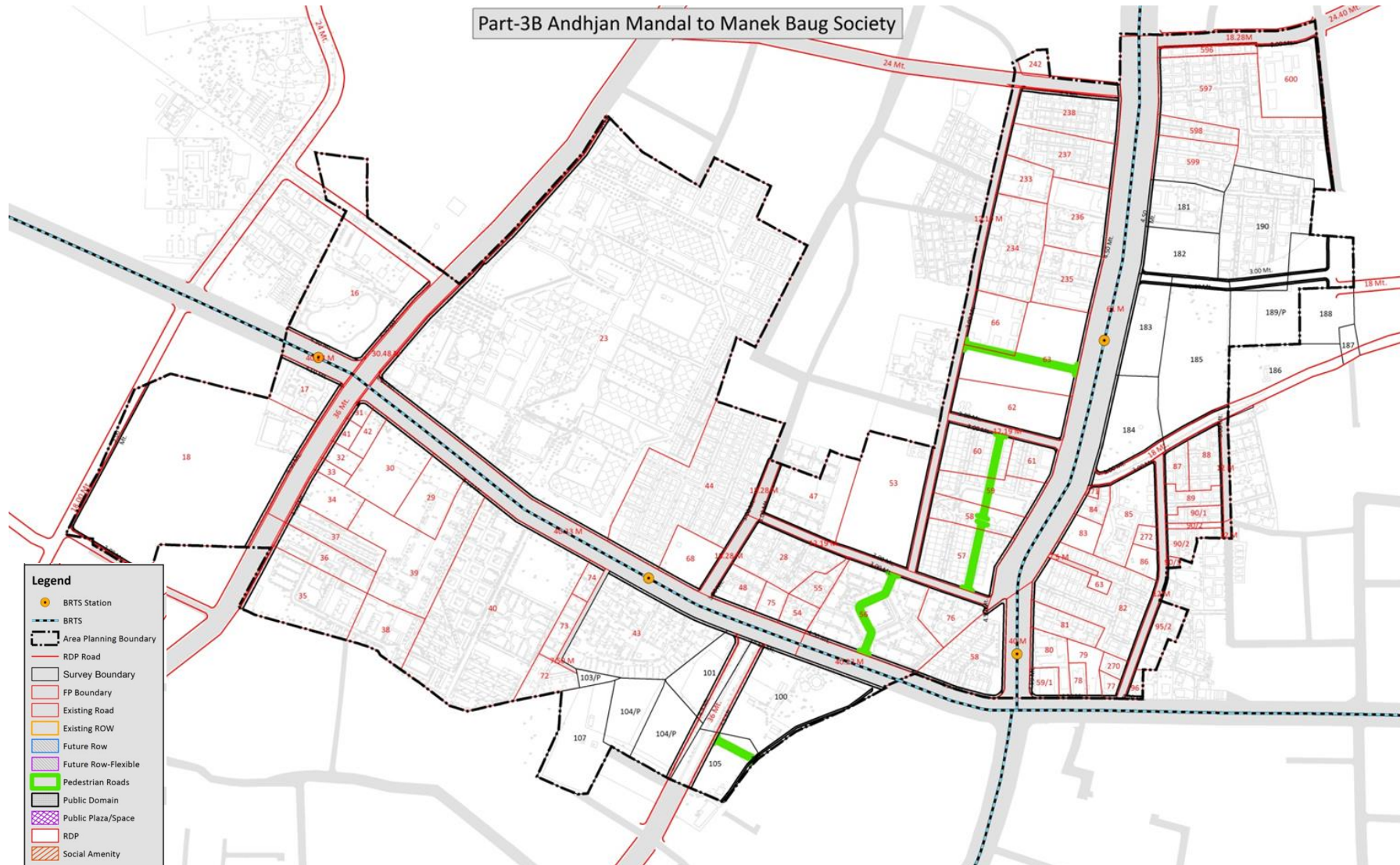
IDENTIFYING FUTURE ROW



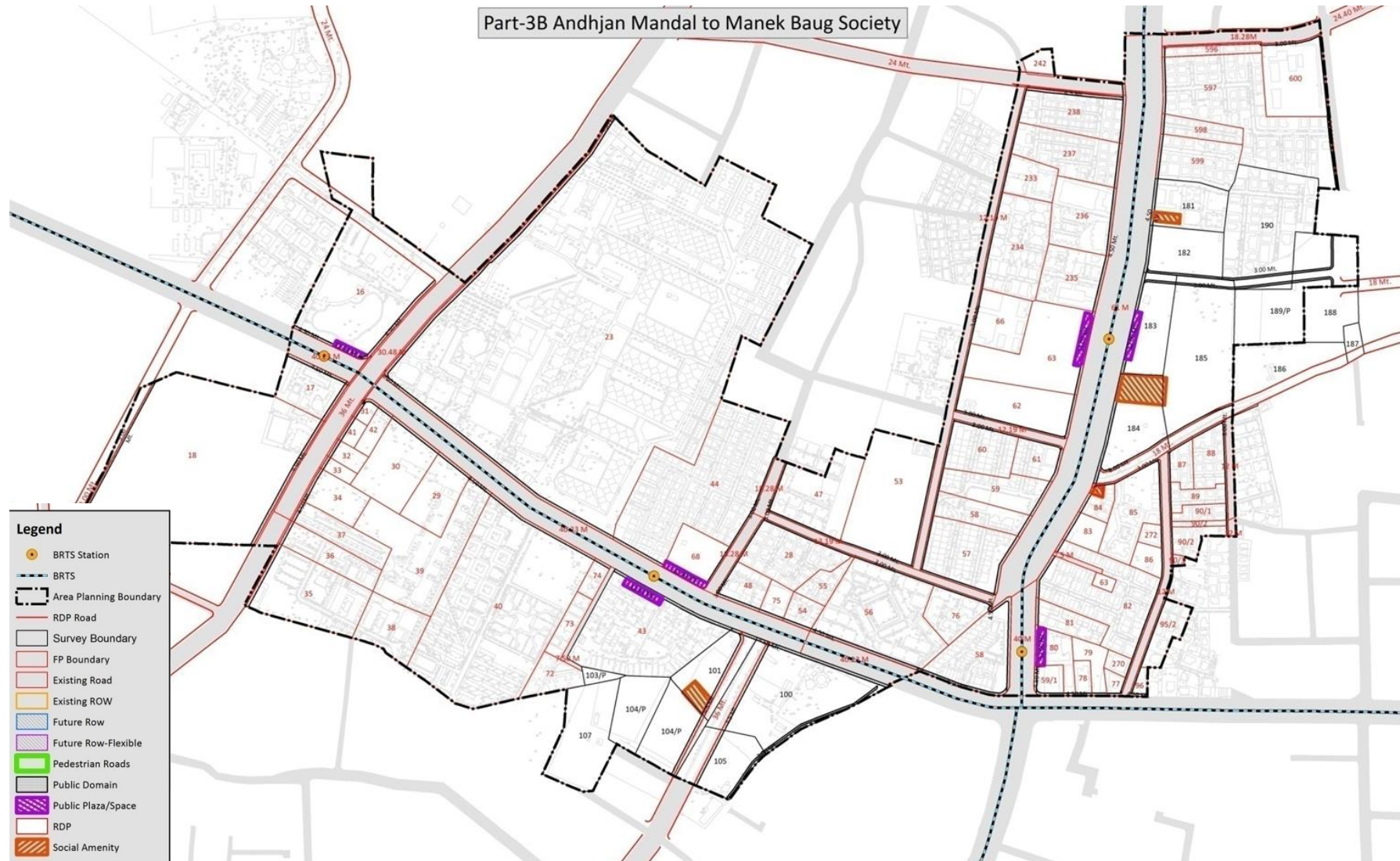
IDENTIFYING FUTURE ROW - FLEXIBLE



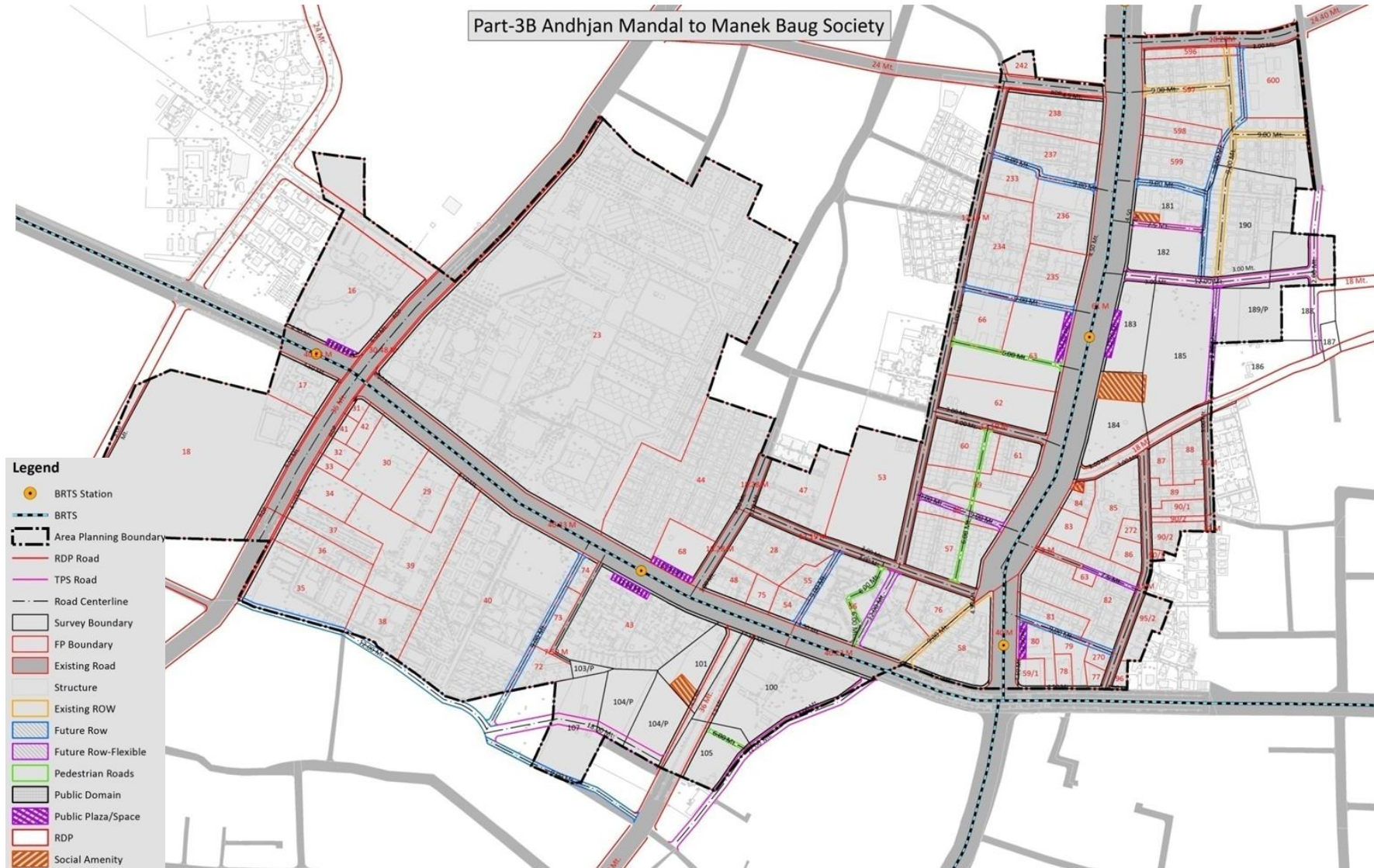
IDENTIFYING FUTURE PEDESTRIAN CONNECTIVITY AND PUBLIC DOMAIN



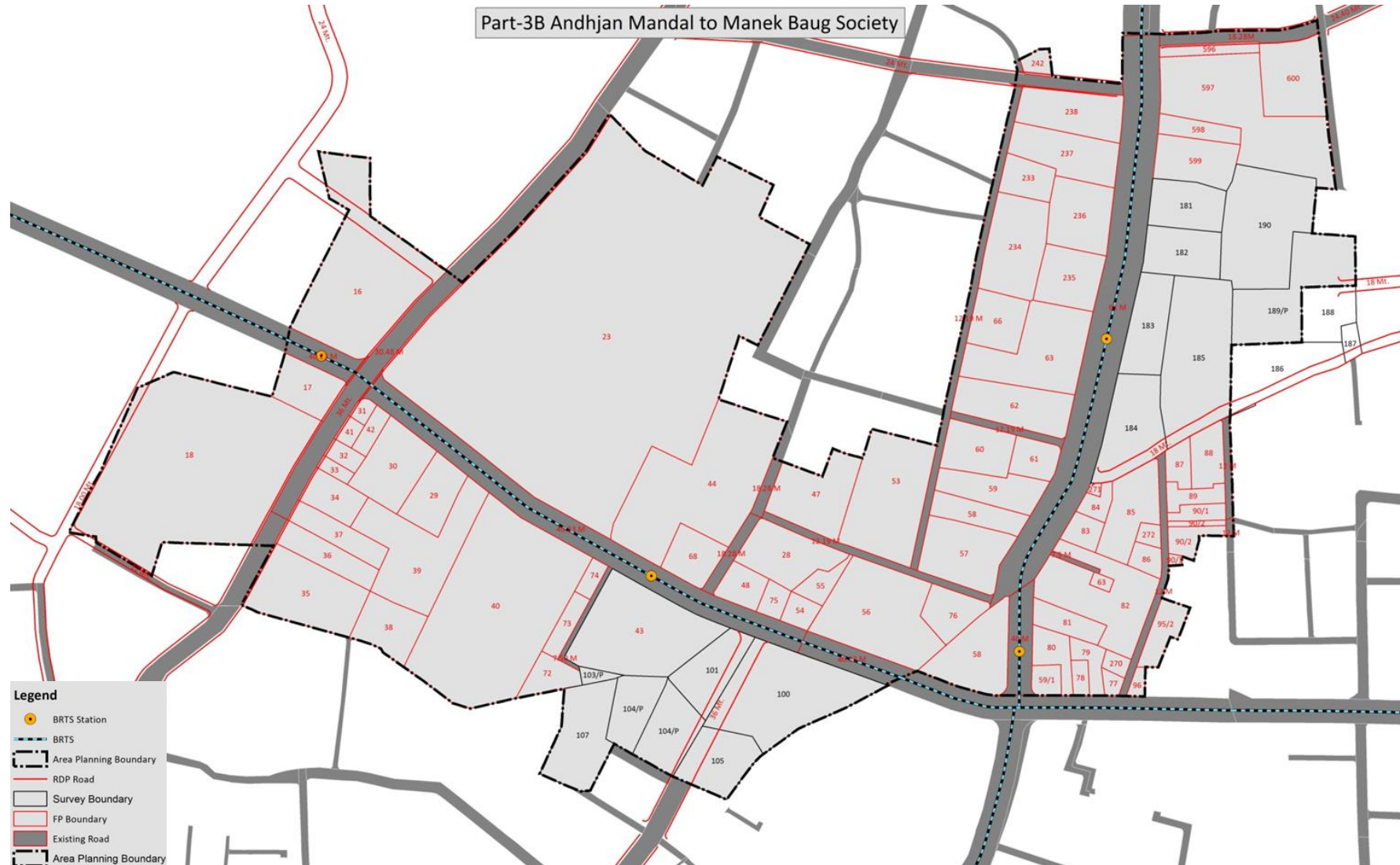
IDENTIFYING PUBLIC PLAZA AND SOCIAL INFRASTRUCTURE PLOTS



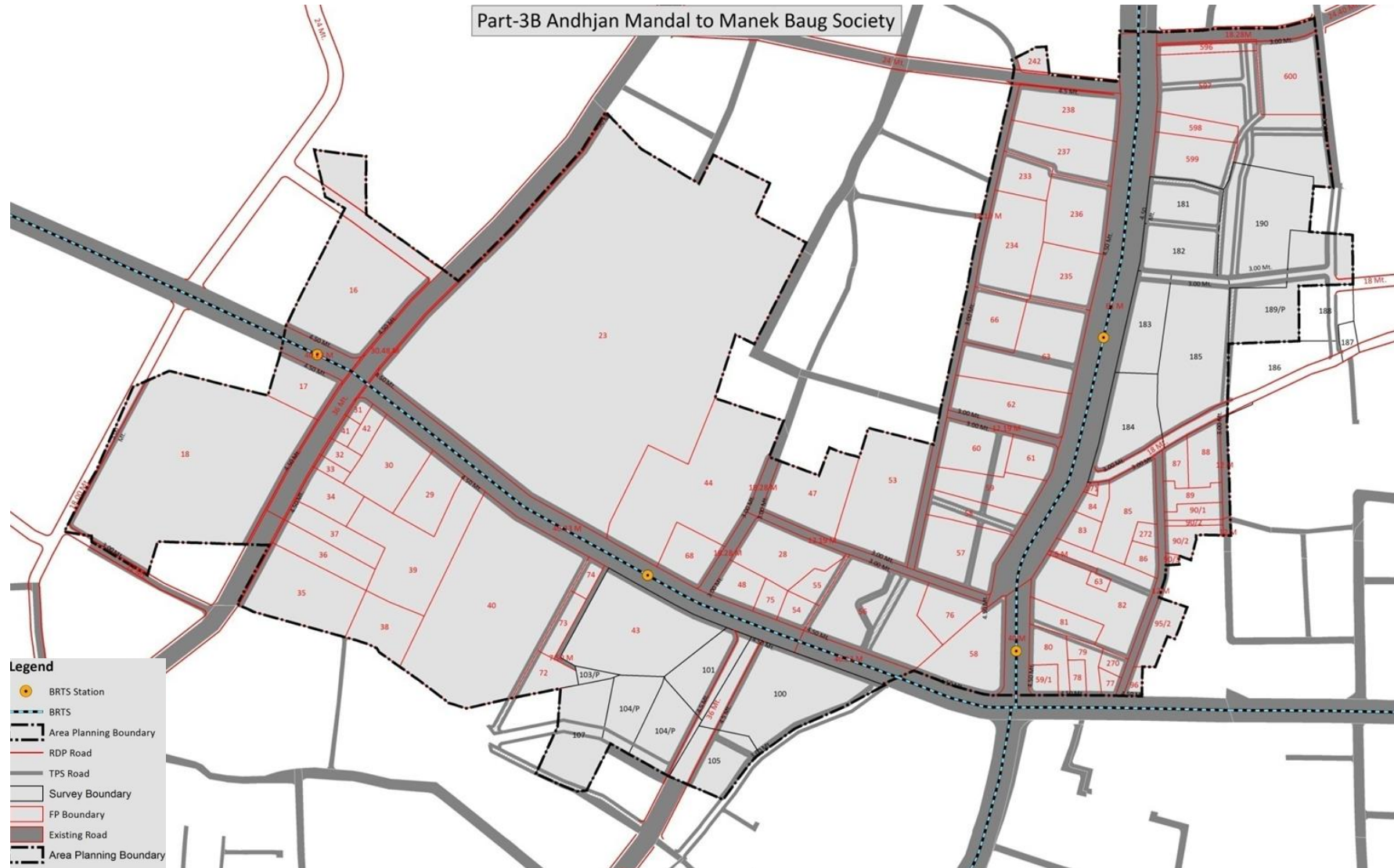
FINAL PROPOSAL



BLOCK PERIMETER (EXISTING)



BLOCK PERIMETER (PROPOSED)

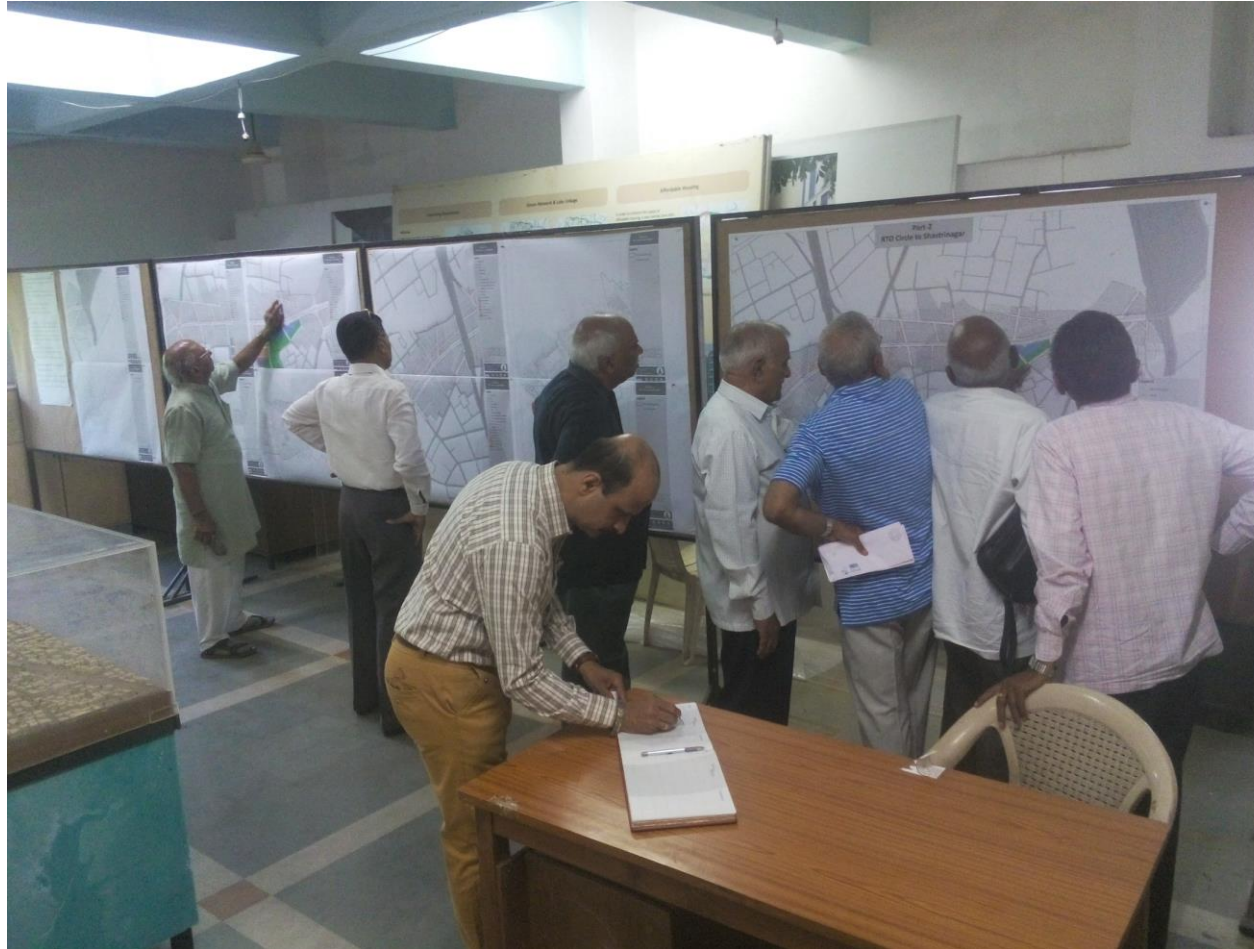


CHARGEABLE FSI PAID AMOUNT

	BRTS		MRTS		CBD	
Date	No of Cases	Amount (Cr)	No of Cases	Amount (Cr)	No of Cases	Amount (Cr)
01-04-2015 to 31-03-2016	50	57.28	0	0.00	0	0.00
01-04-2016 to 31-03-2017	69	145.66	12	26.59	3	15.65
01-04-2017 to 31-03-2018	72	169.45	15	43.89	3	19.88
01-04-2018 to 31-03-2019	63	100.75	12	26.53	9	42.66
01-04-2019 to 31-12-2019	64	60.42	10	7.46	1	5.60
Total	318	533.55	49	104.47	16	83.79

Over 700 developments underway in TOD Area

Suggestion and objections has been discussed and decision has been taken



PROPOSED SCHEMATIC VIEW NEAR MRT STATION



High density corridor along public transportation



Public activities around BRTS station area



Trees in Transit Oriented Zone of Ahmedabad



Well integration of various modes of transportation



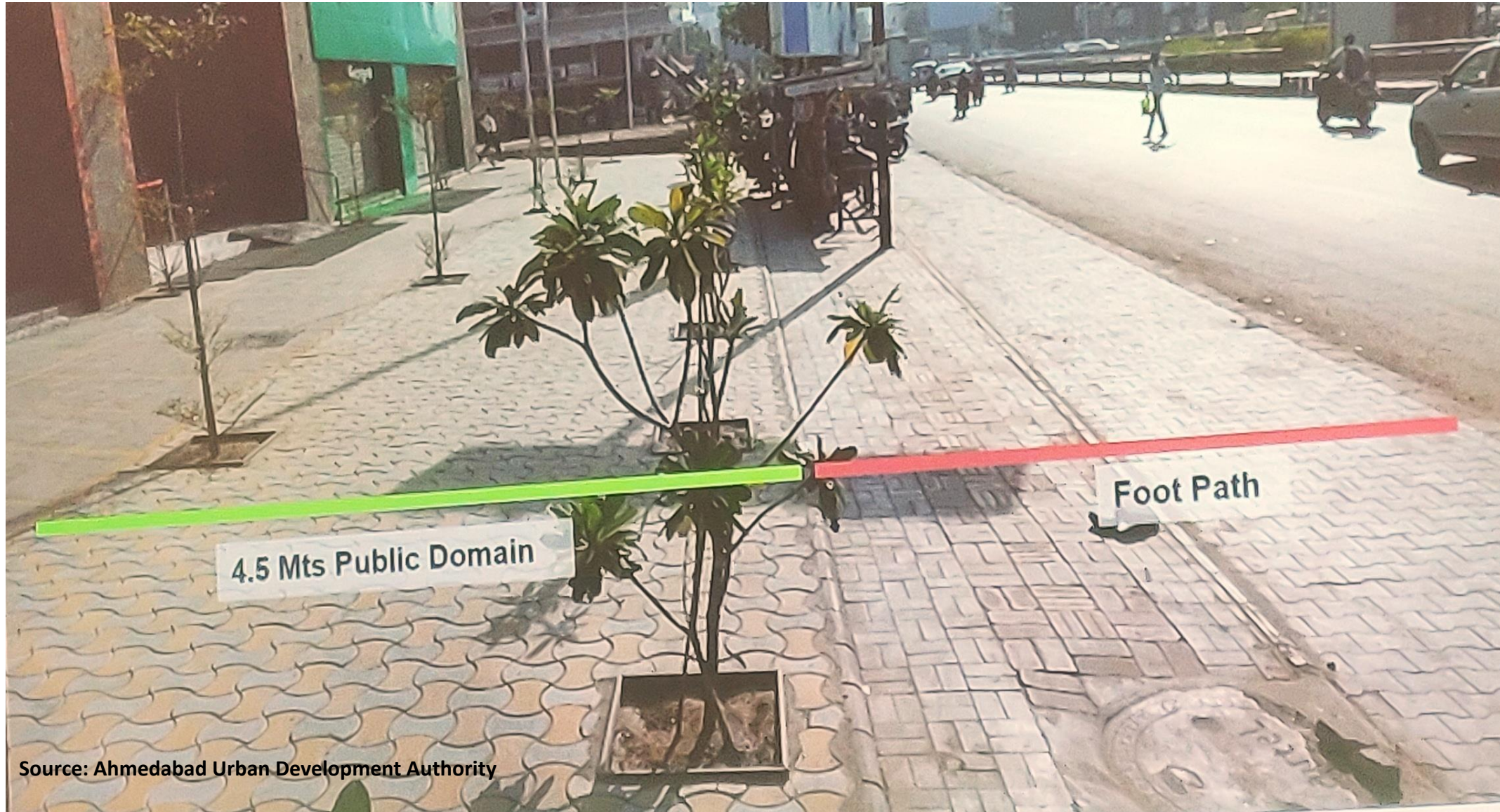






Already in motion - Making win-win plans

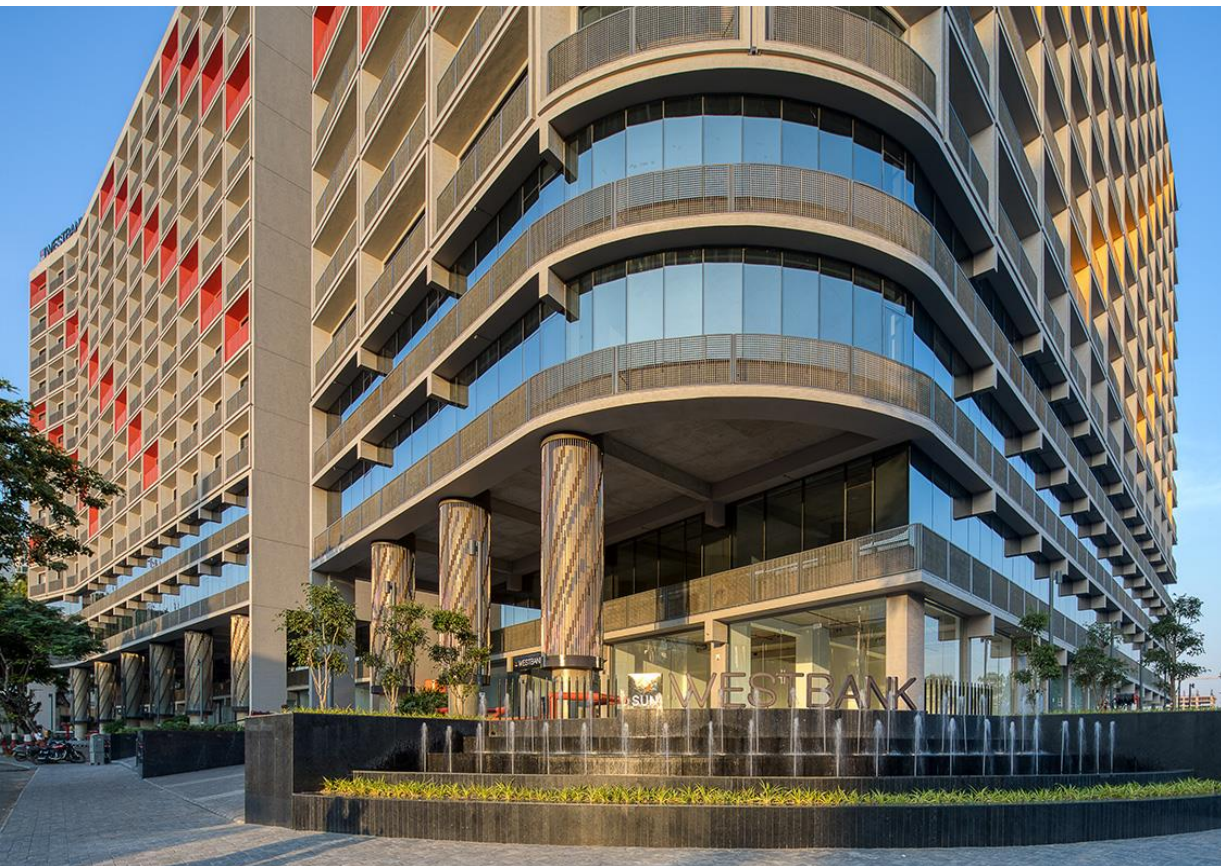
Give higher FSI but take back land for public use



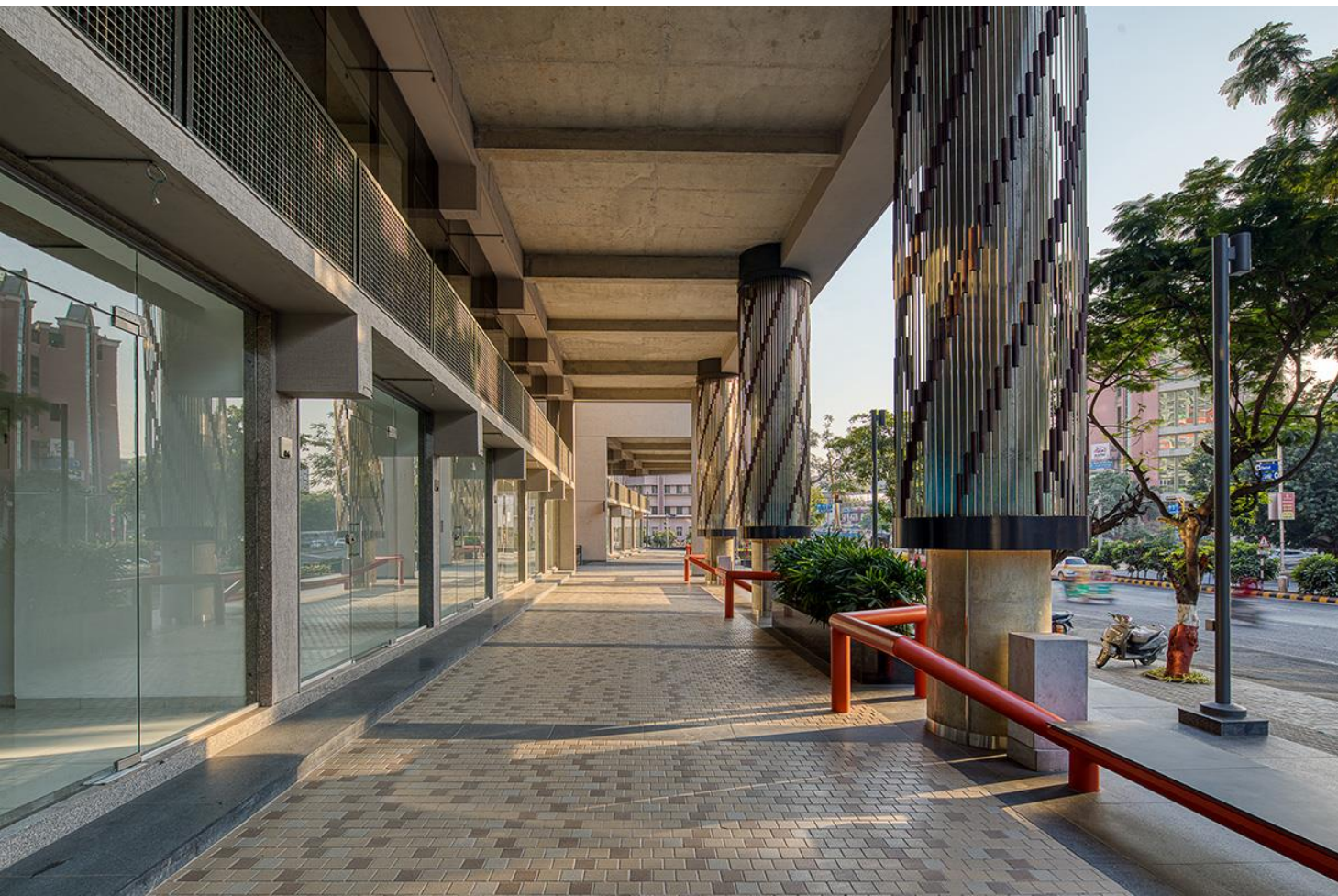
Source: Ahmedabad Urban Development Authority







New buildings being sanctioned under TOD-friendly byelaws
(the Westbank Building on the Ahmedabad Riverfront)



Arcades as frontage of the building
(the Westbank Building on the Ahmedabad Riverfront)

Public plaza - TOD-friendly byelaws



Reduced parking in TOD zone is a good idea

Land use	AHMEDABAD (% of Floor Area)		MUMBAI (% of Floor Area)	BANGALORE (% of Floor Area)	DELHI (2021) (% of Floor Area)	
	Everywhere	TOD	Everywhere	Everywhere	Everywhere	TOD
Residential Multi-Dwelling Units	20%	20%	12.8% <i>(carpet area up to 45 sq.mt.)</i> 19.5% - 25.5% <i>(90 sq.mt. – 120 sq.mt.)</i> 25.5% <i>(60 sq.mt. – 90 sq.mt.)</i>	15.33% - 46%	46% Open 56% Ground Floor Covered 64% Basement	30.59% Open 37.24% Ground Floor Covered 42.56% Basement
Retail	50%	35%	57.5% <i>(for every 40 sq.mt. up to 800 sq.mt.)</i> 15.3% <i>(for every 150 sq.mt. where shops do not exceed more than 20 sq.mt.)</i>	30.6% <i>(Food and Drinks)</i> 46% <i>(Shops, complexes and Malls etc.)</i> 57.5% <i>(Multiplex integrated with Shopping)</i>	69% Open 84% Ground Floor Covered 96% Basement 90% Multilevel with Ramps	30.59% Open 37.24% Ground Floor Covered 42.56% Basement 39.9% Multilevel with Ramps
Office	50%	35%	61.3% <i>(for every 37.5 sq.mt. of office space up to 1500 sq.m.t)</i>	46%	48% Automated Multilevel with lifts	

गति से प्रगति

Thank you

[hmshivanandswamy](mailto:hmshivanandswamy@cept.ac.in)
[@cept.ac.in](mailto:hmshivanandswamy@cept.ac.in)
coe.ut@cept.ac.in

CRDF CEPT
CEPT RESEARCH
AND DEVELOPMENT
FOUNDATION UNIVERSITY

