Local Area Planning for Transit Oriented Development

An Illustrated Handbook for Indian Cities

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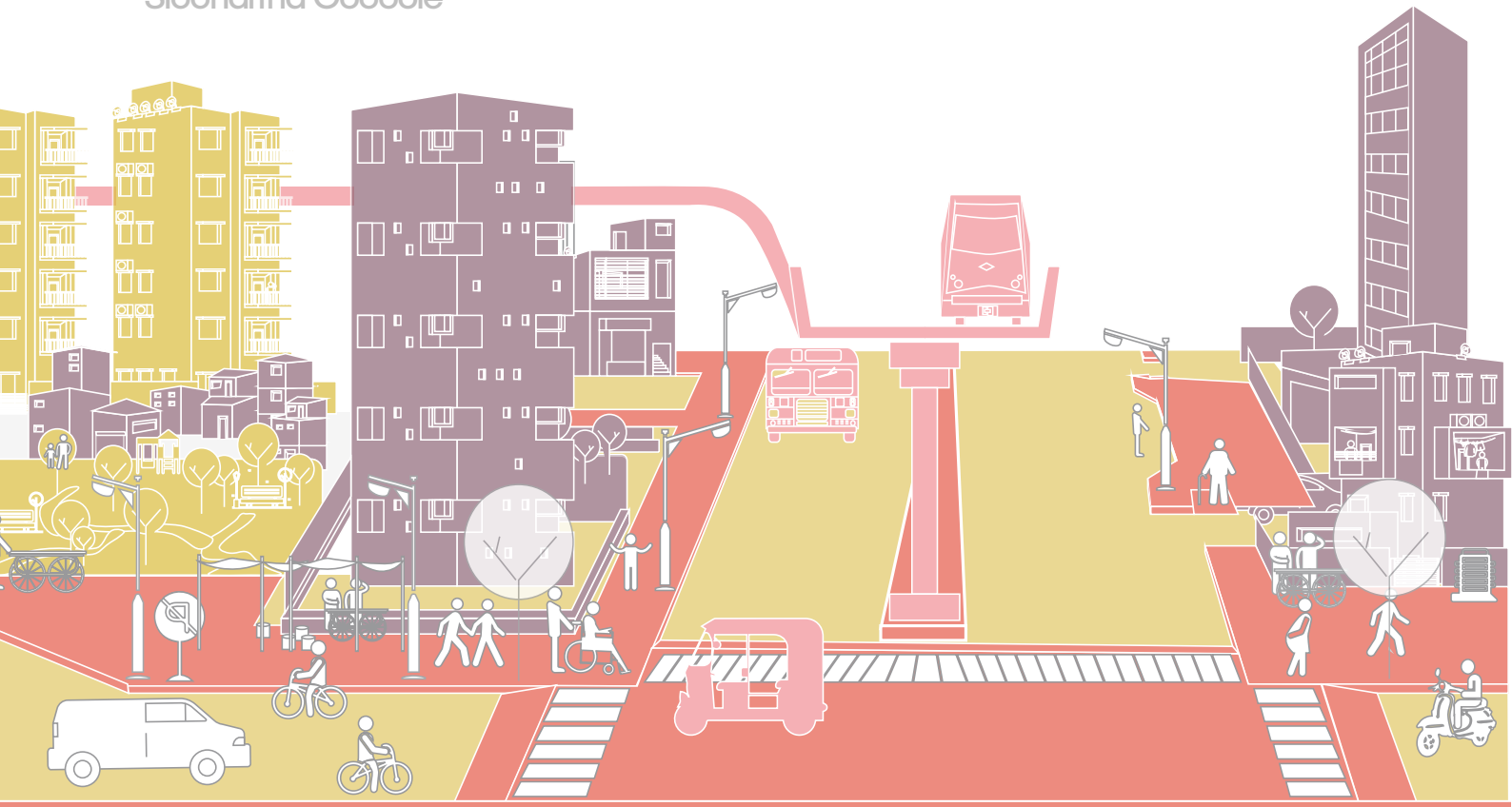

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TCPO
Town & Country Planning Organization

Ministry of Housing and Urban Affairs
Government of India

SHAKTI
SUSTAINABLE ENERGY
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ACKNOWLEDGMENT

This illustrated handbook is an outcome of numerous collaborative efforts over the years between 2017-2020. We would like to acknowledge the important role played by the following people, organizations, and initiatives in shaping this publication and making it possible.

The starting point of this work was the National TOD policy (2017) by the Ministry of Housing and Urban Affairs, the Government of India. This policy initiated the dialogue on how Transit Oriented Development (TOD) should be planned and implemented in Indian cities. We are encouraged to work further on this question of what model of TOD is appropriate for Indian cities. Our efforts were further aided by the idea of Local Area Plans (LAP) being developed jointly by Dr Bimal Patel's team from HCP-DPM and AUDA (Ahmedabad Urban Development Authority) for Ahmedabad, Gujarat. We began to see TOD as an important set of planning principles and LAP as a planning mechanism that makes it work.

Apart from this idea of making TOD-based local area plans, our work was further enriched by all the discussions with urban planning and urban design experts at the erstwhile Indian Railway Station Development Corporation (IRSDC) while preparing the planning framework for Station Area Development (2019). We have also incorporated the 3V approach developed by Salat Serge and Gerald Ollivier (2017) as it gave an apt tool for city-level analysis and planning. We have operationalized the 3V approach for Indian cities as part of this book. We have also learned from the TOD Standard (2017) developed by the Institute of Transportation and Development Policy (ITDP) and the methodology for 'People near Transit' by ITDP India.

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- Authors

LIST OF ABBREVIATIONS

AH- Affordable Housing

APU - Azim Premji University

BU- Building Use

DCR - Development Control Regulation

DP- Development Plan

EWS - Economically Weaker Section

FAR- Floor Area Ratio

FSI- Floor Space Index

GHG- Green House Gas

HIG- High Income Group

LAP- Local Area Plan

LBF- Land Based Financing

LIG- Low Income Group

LU- Land Use

LVC- Land Value Capture

MIG- Middle Income Group

MOHUA - Ministry of Housing and Urban Affairs

NMT- Non-motorised transportation

NMV - Non Motorized Vehicle

POPOS - Privately Owned Public Open Spaces

PT- Public transport

ROW- Right of Way

SA - Social Amenities

SWM- Solid Waste Management

TDM- Travel Demand Management

TOA- Transit Oriented Area

TOB- Transit Oriented Building

TOC- Transit Oriented City

TOD- Transit Oriented Development

TOS- Transit Oriented Street

TOZ- Transit Oriented Zone

TPS - Town Planning Scheme

ULB- Urban Local Body

VKT- Vehicle Kilometers Traveled

Local Area Planning for Transit Oriented Development

An Illustrated handbook for Indian cities

CONTENTS

INTRODUCTION

CHALLENGES OF URBANIZATION IN INDIA

- Population growth rates for urban India show that by 2050 about 814 million people will live in urban places. Urban local governments are confronted with daunting obligatory responsibilities of catering to public purpose needs of the inhabitants of cities. These include public provisioning of basic infrastructure, transport, ease of mobility, affordable housing, among other fundamental needs.

- Paucity of resources including land and finances as prerogatives, place serious challenges to urban planning for Indian cities.

- Cities such as Mumbai and Delhi have public transit commuter populations, as large as 5 million (or more) everyday. Bengtaluru, Hyderabad and Chennai, host at least 1 million commuters on a daily basis, across different modes of public transport. Projections indicate that with greater influx of people to urban centres, commuters population and hence the demand for public transit is expected to increase two fold within a short span of less than ten years. Individualised private transport is unsustainable in such a context. In this scenario, the importance of augmenting public transit services in cities in India is not only urgent, but also inevitable.

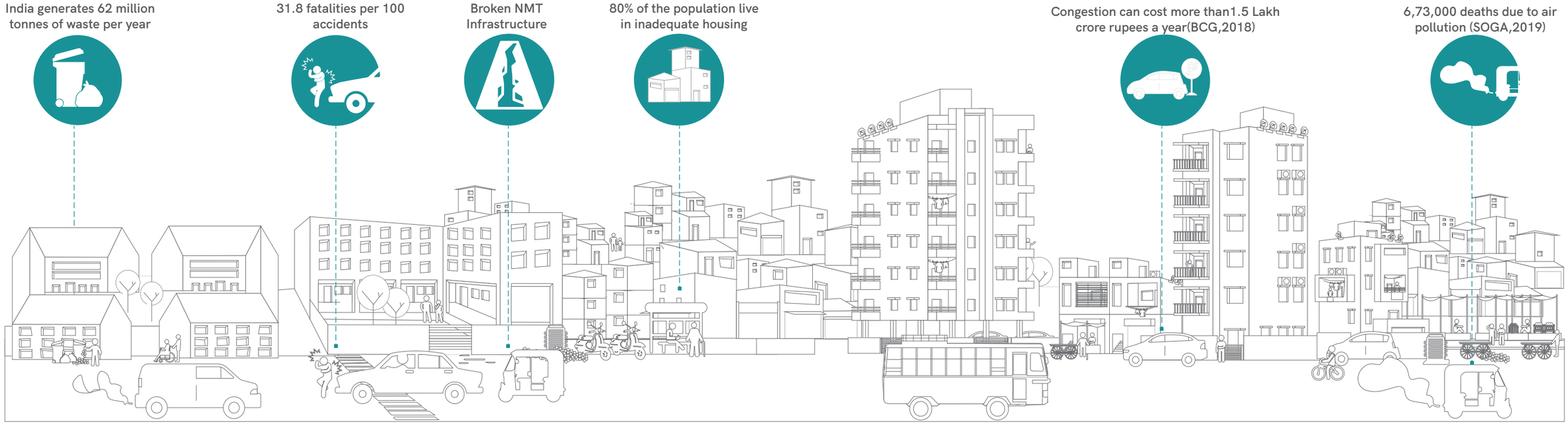
- However, public transit systems in Indian cities have been witnessing decreasing ridership and reduced fleet sizes in case of existing systems like municipal bus services; while newer systems like metro are seeing a short-fall in ridership (in some cases nearly -1000%) than what was projected.

- The number of registered motor vehicles in India has increased 700 times, from 0.3 million in 1951 to 210 million in 2015. Out of this, 32% are concentrated in metropolitan cities. Studies report that congestion in just four cities can cost up to 22 billion dollars a year

- Air pollution is a rising threat to Indian cities. In 2013, nearly 6,73,000 deaths were caused due to ambient air pollution, as per reports by Global Burden of Diseases. The rising motorization, sprawling urban development and mono-functional land uses have increased the VKT in Indian cities and inadvertently are contributing to pollution. The rising motorization, sprawling urban development and mono-functional land uses have increased the VKT in Indian cities and inadvertently are contributing to pollution.

- Road safety is a rising concern in urbanizing India with increased rates of motorization. Statistics reveal that the number of road related accidents per one lakh population has decreased marginally from 40 to 36, in the years from 2015 to 2017 yet, the number of fatalities per 100 accidents have increased from 31.4 in 2016 to 31.8 in 2018. Out of those killed, 13% are pedestrians, highlighting the increase in speeds and car-friendly street design.

- Presently, India faces a shortage of 18 million houses, out of which 95% lies in low income group. Unpacking the nature of shortage, more than 80% of the population live in inadequate conditions of housing. Despite the severe shortage there was a 73% increase between 2001 and 2011 in the number of vacant houses in urban India.



- Traditionally, urban planning legislation in India, separates public transport planning from spatial planning. This implies that place of residence of inhabitants is poorly connected with place of work. This 'work-home-place' dis juncture engenders several other public problems, such as increased commuting distances and hours, increased commuting costs for the masses, increased air pollution, congestion, health hazards, to name a few. Considering that on an average, 50% of the trips undertaken in the city are through motorised transport, and approximately 95% of urban population is from the low-income group, aligning the 'work-home-place' relationship is vital.

- Policies and regulations for addressing these public problems are often developed and administered in silos. Sectoral silos are in several States, accompanied by lack of pedagogical guidelines for effective implementation of LAPs, thereby, exacerbating the 'work-home-place' dis juncture. A strategic approach and method to urban planning that cuts across sectors and scales of development is the need of the day.

- In the face of these challenges, the current discourse on urban planning practice in India is paving the way for cities to embrace strategic planning approaches hinged on addressing a range of public problems. This handbook on LAP around transit shows some ways in which India's cities could explore reform in its conventional planning methods, so as to build liveable places and boost orderly and planned developments around public transit.

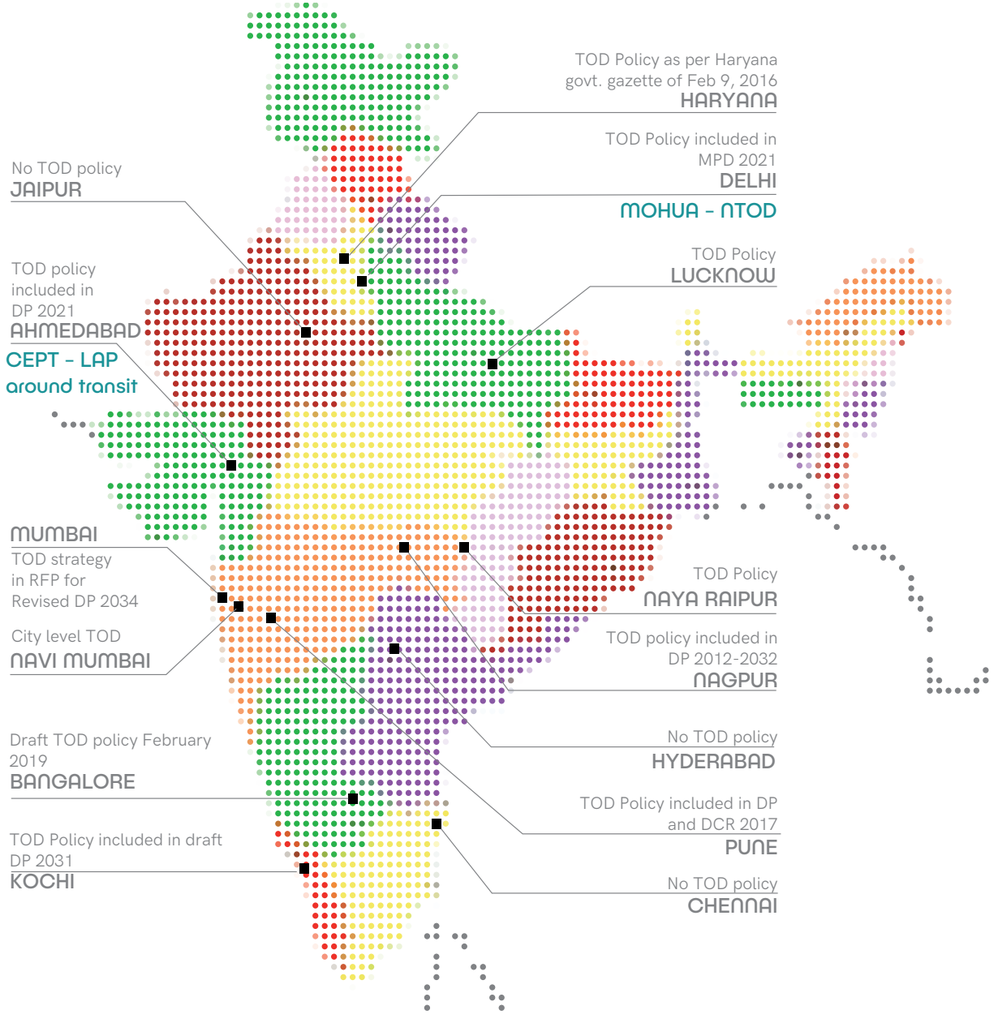
IN CONTEXT OF GLOBAL GOALS

This handbook draws its foundations from two sources of law and policy. One, the national TOD policy (MoHUA) and the National Urban Transport Policy (NUTP); and two, provisions in the 12th Schedule of the constitution for urban planning and service delivery, as obligatory functions of urban local bodies. To build on these prescriptions, the handbook relies on efforts undertaken by the Ahmedabad Urban Development Authority (AUDA) to institutionalise and mainstream local area planning. Further, this handbook builds on existing academic international literature and guidance documents on development around transit systems. The handbook provides demonstrative examples to contextualize and implement normative constructs of TOD through the local area planning (LAP) process (and vice versa), for the Indian City.

The concept of LAP around transit is in alignment with three of the SDG's, i.e., 9- industry, innovation and infrastructure, 11- Sustainable cities and communities and 13- Climate action. The handbook helps in achieving these goals through integration of socio-economic development, infrastructure, land use and transport, in Indian cities.

The language of the handbook is simple and universal, making the technical concepts of LAP around transit more accessible to stakeholders of all types.

LAP & TOD IN INDIA



LAP FOR TRANSIT

DEFINITION OF LAP

LAP is a planning instrument to integrate city-level mobility and infrastructure development envisioned in a development plan, with neighbourhood level accessibility and area-level improvement either through natural process of urban renewal or through planned redevelopment.

DEFINITION OF TOD

To create a dense, diverse and accessible urban fabric to enhance, encourage and induce commuter populations to use public transit as their preferred mode of getting around and also support non-motorized transit.

UNDERSTANDING TOD

What does TOD aim?

- The primary aim of TOD is to make cities more liveable by connecting place of work to place of residence of inhabitants, by planning accessible, dense and diverse urban places around transit, supported by walkable and cycle friendly neighbourhoods and well-designed public realm. This will go a long way in encouraging, inducing and enhancing an increase in public transit ridership. It makes it possible to live a stress-free life without complete dependence on car for fulfilling mobility, basic services and everyday needs. This would in turn improve livability and quality of life.
- TOD also aims to increase public transit ridership. As ridership increases public transit systems become more viable and self-sustaining. Public transit ridership goes up when people can easily access jobs, education, health care, etc, by using the transit. By doing so, TOD also builds a symbiotic relation between, transit and development.

Where did TOD come from?

- The idea of complimentary land development around transport corridors is not new in the urban planning history. Organically evolved Indian cities were dense with diverse activities along the main transport corridors. With the emergence of high-capacity public transit systems, the cities need to be retrofitted in terms of well-designed public spaces, streets and built-form around transit nodes or corridors. The future cities need to be built around extensive transit use.

Why is TOD crucial to Indian cities?

- Concentrating spatial and economic development in proximity to transit through TOD will help optimise public capital and recurring expenditure on infrastructure development and augmentation. In parallel it will also help achieve social and environmental benefits on expensive transit infrastructure projects.
- To achieving compact city development, TOD is an opportunity to guide low carbon development around and towards transit, re-design public realm and increase public transit ridership. This will enable India to align with international climate change adaptation targets, to contain global warming to the 1.5 degree Celsius.
- Adopting TOD promises direct reduction in Green House Gas emissions. With high population growth rates in Indian cities, planning for TOD is crucial to integrate city-level development plans with city-level mobility and infrastructure plans and investments.

UNDERSTANDING LAP

What does LAP aim?

- Local Area Plans or LAPs form part of guidelines for urban and regional plan formulation and implementation guidelines, as the smallest scale at which urban planning processes can be undertaken. LAP around transit aims at promoting planned natural urban renewal, systematic redevelopment where relevant, accessible street networks, improved streets and public realm design, street-oriented buildings and upgrading of municipal infrastructure.
- As a response to paucity of land for public purpose, LAP process conceived here, aims to create a win-win situation for all stakeholders. To do so, the LAP process aids urban local bodies to obtain land for public purpose in lieu of regulatory incentives provided to the private landowner. This helps the urban local body meet its obligatory functions to create better street network, public open spaces and liveable places. LAPs are conceived here, as market responsive mechanisms which strengthens the public realm while promoting redevelopment on private lands. To achieve this, LAP incorporates special 'development promotion' (not control) regulations that aim to attract investments, jobs, markets and people in an area around transit. In terms of scale, complexity and implementation, the LAP bridges the current gap between proposals for future land use zoning and consumption of built space in the city level regulatory Development Plan vis a vis specific local requirement.
- The idea of LAP around transit is to deliver transit conducive, transit oriented (re) development rather than just piling up floor space next to transit and creating 'transit adjacent development'.

Where did LAP come from?

- LAPs are not a new mechanism for Indian cities. Various state level planning legislations have provisions for making localized plans as part of the larger planning framework.
- The city of Ahmedabad initiated a number of local area plans to implement the vision articulated in the development plan of the city since 2014. LAPs are statutory planning mechanism in the state of Gujarat, after the 2014 and 2017 amendments in the GTPUD Act of 1976.
- Today, many States have initiated plans and projects which integrates land use provisions and public transit investments.
- With the leadership of MoHUA, 25 cities have initiated the preparations of making LAPs.

Why is LAP crucial to Indian cities?

- LAP is crucial for Indian cities as it provides a regulatory foundation, either for planned natural urban renewal or planned redevelopment, in existing urban areas.
- LAP approach promotes a bottom-up, participatory planning process by engaging with the local population and capturing their requirements of accessibility and physical and social infrastructure.

UNDERSTANDING LAP

Why is LAP Crucial to Indian cities (contd.)

- The LAP serves as a platform for people at the local levels to identify a wish list of projects to improve the built environment
- Mixed land use development with higher floor space utilization supported by enhanced and improved public realm will go a long way in increasing the use of transit systems.
- The LAP mechanism provides impetus for long standing amendments to State level planning legislations to allow renewal and/ or planned redevelopment in existing urban areas.
- LAP around transit enables higher use of public transit system, which will go a long way in addressing traffic congestion, pollution levels, road safety and accrue long term environmental benefits.
- The LAP around transit is an opportunity for the transit and planning authorities to come together and work in coordinated manner with long term goals.
- Multi-scalar planning mechanism if city-level DP, TPS and LAP framework as an integrated, dynamic and cyclic process will better inform the preparation of the DP.
- LAPs linked to municipal budgets helps establish institutional and financial integration in addition to a clear link to the DP.
- Indian cities today need to steer a shift towards a strategic planning approach. To do so, they need to rethink current urban planning practice and usher reforms to accommodate mechanisms such as LAP around transit, that address inter-related public problems confronting them.

LAP IN A NUT SHELL

A Local Area Plan includes:

- A comprehensive understanding of the existing conditions and its spatial representation;
- Policy and Spatial design solutions that address the needs of the community in terms of Amenities, Services, Utilities and Transportation;
- Incorporation of the needs of all section of actual population of each local area; Impacts of new amenities on travel demand and environment
- A market assessment of what is feasible in terms of Redevelopment;
- Whether the community-desired improvements could be achieved by the real estate market or public investment;
- An implementation strategy including prioritization of projects where funds must be invested to execute the plan in a timely manner.

Objectives of the LAP should be

- Preserving and Upgrading the Environment (greenery, water bodies, wetlands and parks)
- Preservation of Heritage
- Upgrading of Social Infrastructure (schools, neighborhood parks, sports facilities, dispensaries, community centers, cultural centers, public open space, etc.)
- Earmarking for livelihood generating areas for informal sector - vending zones, weekly markets, etc
- Safety and Accessibility for all ages, genders and differently-abled people to public spaces, amenities and public transportation.
- Redevelopment of degraded areas as well as of congested parts of the city.
- Road Space and parking facilities for different modes of transport including cyclists, rickshaws/ other NMVs/ pedestrians, etc.
- Civic Infrastructure up-gradation and removal of dis functionalities.
- Transit Oriented Development i.e. densification at public transport hubs to maximize the number of people having easy access to public transportation.
- Disaster Mitigation and Management Practices

Components of the LAP around Transit

- Streets: Equitable Distribution of Road Space and Universal Accessibility to all public spaces.
- Hubs: Multi-modal Interchange and Feeder Systems.
- Access: Accessibility norms for Social Infrastructure and Open Space.
- Parking norms and strategies for Travel Demand Management.
- Safety: Strategies for increasing Safety for Women e.g. lighting, accessibility, eyes on the street through retrofitting, hawkers, introduction of NMT/ other feeder modes, introduction of mixed use, etc.
- Affordability: Accommodation of more affordable housing wherever lacking, or local employment uses wherever lacking, to reduce travel demand and bring in equity.
- Services: Decentralized Infrastructure provision to enable recycling of Water and local reuse, to augment available water supply and facilitate local ground water recharge. Decentralized local Solid Waste Management Systems to reduce landfill and facilitate door to door collection, recycling & reuse, etc.

LINK BETWEEN LAP AND TOD

LAP is a flexible planning instrument whereas TOD represent planning and design ideas. Linking LAP with TOD is a strategic response to the problem of 'work-home-place' dis-juncture. This integrated response encompasses several dimensions. These are defined as under

TOD

(Public) TRANSIT

- Any form of shared or collective mobility can be called public, which could be either state owned or privately-owned.
- It comprises a complete network facilitating movement of people and goods in the city.
- Access to the network is as important as coverage of the network.
- Accessibility should be the final goal of transportation planning in the city and not increasing mobility per say in other words public transit planning ensures higher accessibility.

ORIENTED

- At the macro level, location of jobs and people's place of residence are aligned with public transit networks.
- At both macro and micro levels, transport infrastructure networks, including road, rail, water ways and others, converge at several locations in the city.
- At the micro level, all streets typically lead to the transit station, especially for pedestrians, cyclists and para-transit users. Neighbourhoods promote pedestrian access, thorough fares and mix land use.
- At the private realm, design of building frontage should promote transit use by being oriented to the streets and public open spaces.

DEVELOPMENT

- Involves regulation of design of the private realm (buildings, residences, commercial, institutional) in ways that strengthen the use of public realm (footpaths, roads, streets, parks, open spaces).
- Necessitates design of reciprocal institutional and financial arrangements wherein public or private investments in the public realm helps public institutions achieve public purpose targets while also earning revenue returns from private developments (and vice versa).

ADVANTAGES FOR LINKING LAP AND TOD

- More land under public realm and streets
- Low crowding of vehicles but well-managed, high crowding of people
- Well-designed streets
- Street-oriented buildings (not inward looking), no compound walls
- Continuous up-gradation of infrastructure
- Treating parking as real estate

LAP

PLAN FOR TRANSIT ACCESS

- Implies planning at macro and micro levels, for connectivity and access.
- At multiple scales of intervention, reflects as proposals for completion of road and transit networks aligned with place of stay and work, re-configuration of smaller urban blocks that provide greater sense of direction to the pedestrian and vehicle user, enables traffic calming and aids the development of fine grained pedestrian access towards transit. Means, linking transit with the adjoining land use and buildings at multiple levels.
- Needs readjustment of design of all roads, to lead to transit station.
- Requires concerted efforts to develop network of pedestrian access across the TOZ.

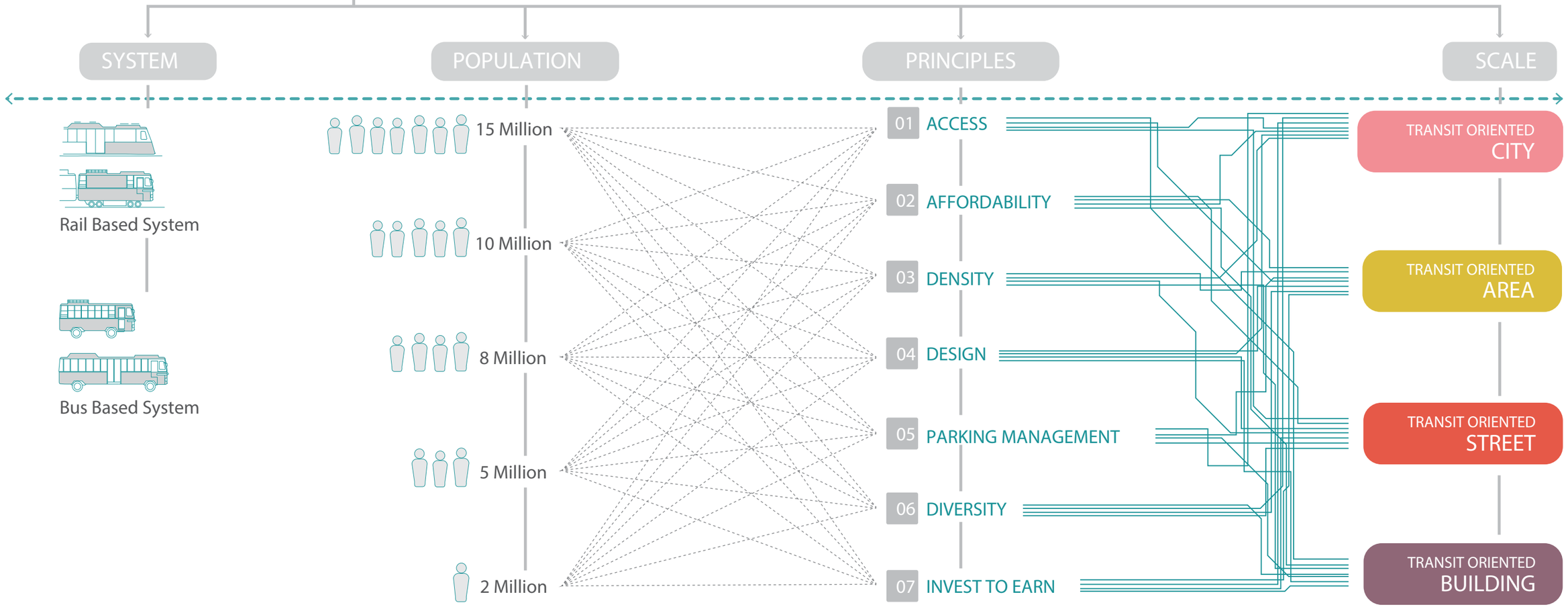
REGULATE AND INCENTIVIZE THE PRIVATE REALM

- Regulations and urban design guidelines encourage active frontages and discourage opaque property line demarcations/boundary demarcations.
- Regulations and policy instruments enable public institutions to get land for public access from private landowners while promoting urban renewal or redevelopment.
- Implies building line and frontage to contribute to the public domain.
- Allow mix land use based on the width of the roads and plot sizes.

INVESTMENTS IN PUBLIC REALM

- Requires revisiting configuration of street right of way and prioritizing investments in developing the full road section including pedestrian access, bike lanes, utilities, landscape, public toilets, hawking zone, on-street parking, etc.
- Needs a people-oriented lens to develop gardens, parks, plaza, also to dispersion and congregation area near transit stations.

LAP AROUND TRANSIT



HOW WILL THIS HELP YOU?

Political Leaders

As key decision makers of planning and governance of the country, political leaders are crucial to making our cities livable, commuter-friendly, sustainable and inclusive. To this end, the handbook serves as a blueprint for enabling such development of local areas around transit.
Local areas around transit need to cater to multiple types of inhabitants, including residents, commuters, pedestrians, private entrepreneurs, informal vendors, firms, transit agencies and several others. Political leaders have a key role to play in bringing all the different stakeholders together in order to enable locally relevant forms of development around transit. This handbook provides guidance on how to achieve these goals through a systematic planning process.

Citizens

Residents and beneficiaries of transit systems play a fundamental role in ensuring LAPs around transit. At the city level, they play a crucial role in promoting sustainable mobility through the use of public transit. At the local levels, their role is vital in facilitating inclusive development by supporting mixed land use zoning, participating in the design and maintenance of walkable neighborhoods and precincts, and ensuring design of street-oriented buildings, with augmented infrastructure.

The handbook informs citizens of possible urban design interventions in their localities. In doing so, it equips them with the necessary information to participate in local level planning processes and empowers them to assume positions of stewardship for design, development, and maintenance of places they inhabit.

Private Developers

The handbook presents and demonstrates a way to develop land near transit by utilizing the various incentives provided in development regulations pertaining to TOZ. This will promote the idea of inner-city redevelopment in a systematic way. It shows how this approach will make the inner-city area near transit are more attractive for people, jobs, activities to thrive, while preventing urban sprawl and optimizing costs for all. The LAP for transit fosters the idea of development 'promotion' regulations, rather than regulations that control and restrict development in core areas of the city.
Developers play a crucial role in redeveloping inner city areas around transit while innovating on urban design through form-based codes.

Banking Institutions

LAP around transit augments existing investments in transit infrastructure since it enhances social benefits, improves quality of life and makes our cities inclusive and accessible. The handbook presents and demonstrates such opportunities and complimenting institutional frameworks.

The handbook presents cases of market responsive and marketable redevelopment projects through new planning mechanisms. If these mechanisms are backed by financing mechanisms then it will go a long way in creating sustainable and live-able cities for all.

Government Officials

The handbook provides the necessary technical information to government officials, so as to assist in two pivotal roles; first, decision-making along with political leaders and officials; second, coordinating with planners, formulating and implementing plans through a strategic planning approach, rather than a technocratic one.

Whether to cater to needs of housing development for the economically weaker section in proximity to transit, or to take advantage of the market momentum created by investments in transit infrastructure, it is most crucial for the planning authority to steer coordination between the transit agency, land (re)development agency, municipal authority, departments and/ or parastatals in charge of infrastructure development and maintenance, across various tiers of the government.

Planning Authority

The handbook presents and demonstrates an Indian model of LAP around transit, which will assist in implementing integrated land use and transport planning, for Indian cities. The process demonstrated includes four key aspects: database creation, institutional arrangements and financial planning in addition to spatial-economic planning.

As technical and knowledge partners, the Planning Authority's role in enabling stakeholder participation in decision making is key. To this end, its ability to mediate between all stakeholders' to facilitate consensus is central to the process.

The city planners here assume a significant responsibility to drive the process of changing planning legislation in their respective states, so as to accommodate the process of "Local Area Planning".

PRINCIPLES

LAP FOR TRANSIT

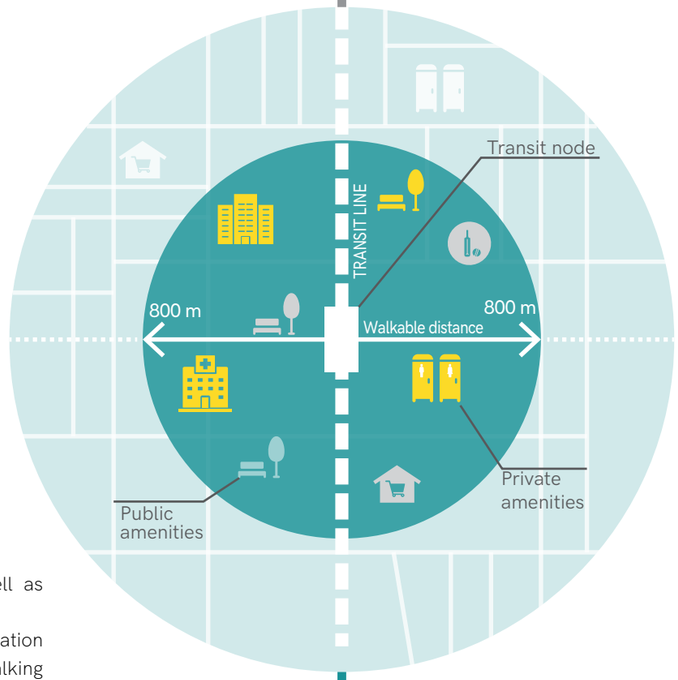
1 WHAT IS ACCESS?

Accessibility is the ‘ability’ to reach.

Accessibility comprises of physical access as well as socio-economic access.

Physical access means being able to access the station and transit zone through the means of better walking and cycling infrastructure for all age groups and specially-abled.

Socio-economic access means the provision of a range of social infrastructure (schools, hospitals, parks, etc.) and amenities, which are accessible by people across diverse socio-economic groups.



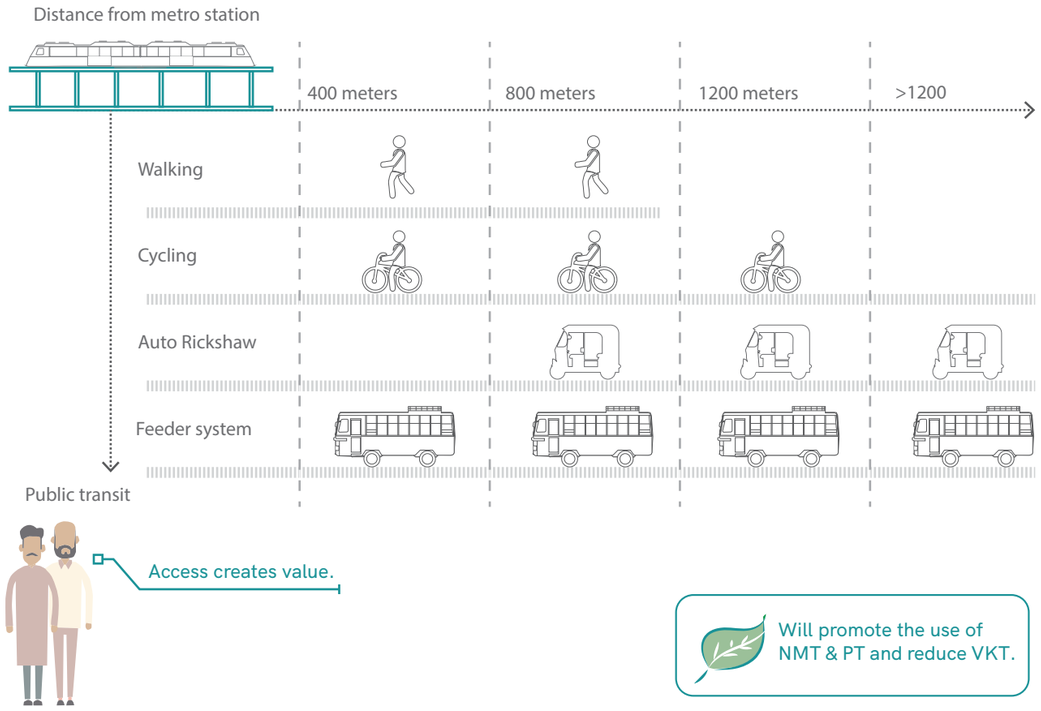
WHY PROVIDE ACCESS?

Proximity does not automatically create accessibility.

The fundamental aim of accessibility is to connect people and transit. Considering demographic diversity, varied travel behaviour and distinct development patterns in Indian cities, accessibility is the key to making LAPs inclusive.

Integrating transit oriented local development with socio-economic accessibility also facilitates affordability and enhances transit ridership.

HOW TO PLAN FOR ACCESS?

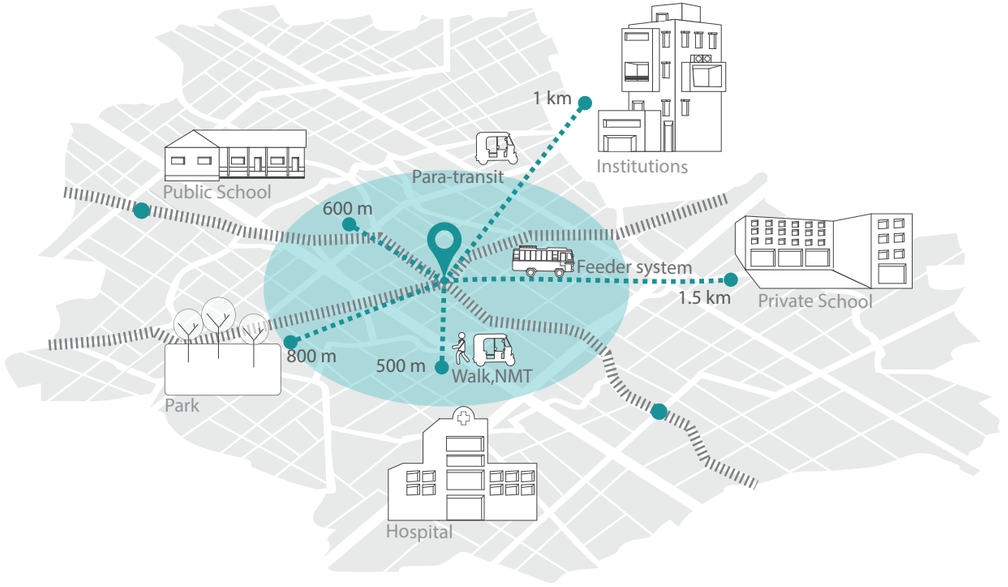


Access creates value.

Will promote the use of NMT & PT and reduce VKT.

- Ensure multi-modal integration through fare integration, seamless transfer at stations and timetable synchronization.
- Create agile institutional arrangements for transit agencies to coordinate with ULB and planning authority to create a city-wide 'Universal Accessibility Plan'.

- Improving first and last mile connectivity through well-connected street network, better walking and cycling infrastructure and provision of feeder systems (PT and para-transit), will make transit infrastructure physically accessible.
- Create diverse social infrastructure and amenities accessible to various socio-economic groups.



- Plan for access to each LAP area from the transit node for better connectivity to institutions, open spaces, important local nodes perhaps through public transport (feeder system & para-transit) within 1.5 km radius and walking and NMT infrastructure, within 500 m radius.

- Ensure all physical street infrastructure is accessible to all age groups as well as specially-abled users through universal design.

2 WHAT CONSTITUTES PUBLIC REALM DESIGN?

Good public realm design, takes into account, mobility needs of all users and influences the experience of a place. Public realm should always be viewed in context of its built form, uses, street network and larger city context.

WHY IS PUBLIC REALM DESIGN CRUCIAL?

Every transit commuter is a pedestrian before boarding and after alighting. A pedestrian on a typical Indian street is constantly negotiating between undefined street edges, introverted private realm, poor quality NMT infrastructure and haphazard parking. So, designing the public realm and regulating the private realm would help pedestrian access transit, thereby, increasing transit ridership.

HOW TO ENSURE GOOD PUBLIC REALM DESIGN?

T.O. city | T.O.area | T.O.street | T.O. building

- Will promote NMT, green cover, child-friendly city and universal access.

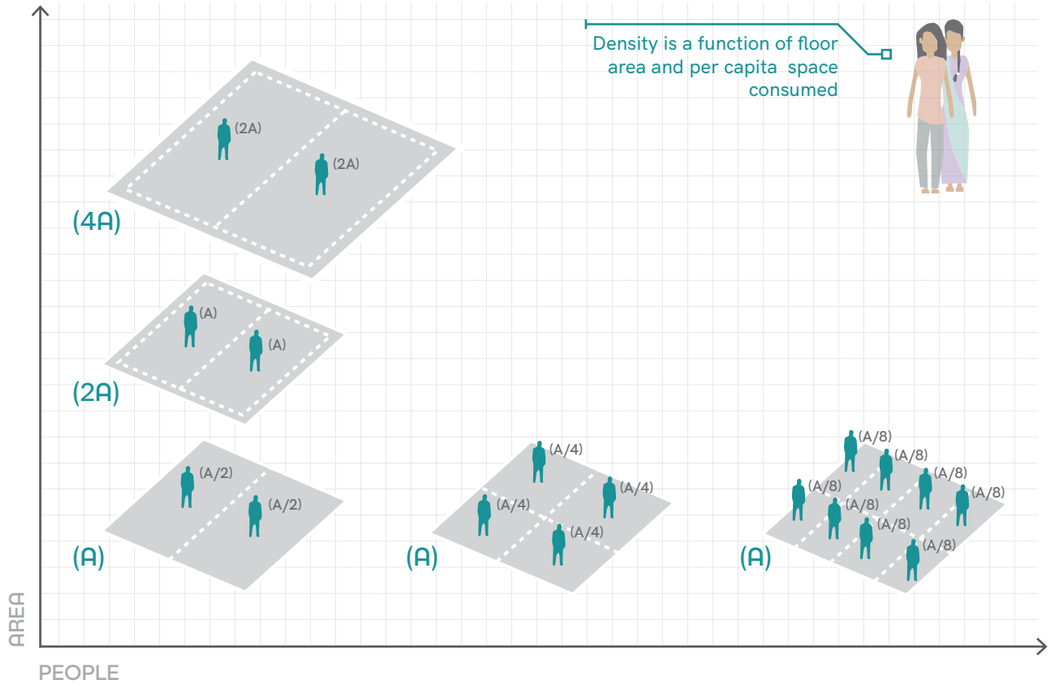
- Design a network of arterial streets in sync with the transit networks.
- Develop network of integrated public realm design and not a few corridors.
- Design for multi-modal integration.
- Create a responsive interface between the private and public realm using a form-based approach.

- Enable ease of access for pedestrian movement through design of a complete street network leading towards the transit node.
- Design streets for people and not roads for vehicles (NTOD, 2014)
- Accommodate all road users in street design

- Design complete streets making it safe and shaded for pedestrians, equitably shared and universally accessible (specially-abled, all age groups) by all users (pedestrian, cyclist, automobile, parking, vending)
- Pedestrian access is to be at the plot side facing the main access, car access from side-lanes or back.

- Introduce form based codes
- Built to line buildings (uniform front margins)
- No compound walls

3 WHAT IS DENSITY-INTENSITY?



Density is a measure of human intensity within a given area. There could also be floor space density or built units density. Density determines intensity of land utilization. Public transit system should bring more people (commuters) near transit. This will increase the ridership of the transit systems and lessen the traffic congestion in the city. The tools available with planners to bring more 'people near transit' (ITDP,2019) is increasing the supply of floor space in the transit influence zone.

However, supply of floor space would not automatically bring more people near transit or increase density. So, density and intensity of floor space needs to be understood as a combined function of floor area supply and per capita floor space consumption.

For local area plans near transit, it could be planned based on three distinct approaches based on the principle of density-intensity - transformation, intensification and in-fill.

WHY DENSITY-INTENSITY?

More people near transit would mean higher transit ridership and less traffic congestion in the city. More floor space near transit may not bring more people near transit, as tall buildings does not always mean high density - for example, commercial-only areas or high-end residential areas would decrease the number of people in the area. Traditionally, many Indian cities have achieved low or mid-rise high density with low FSI values (less than 1.5).

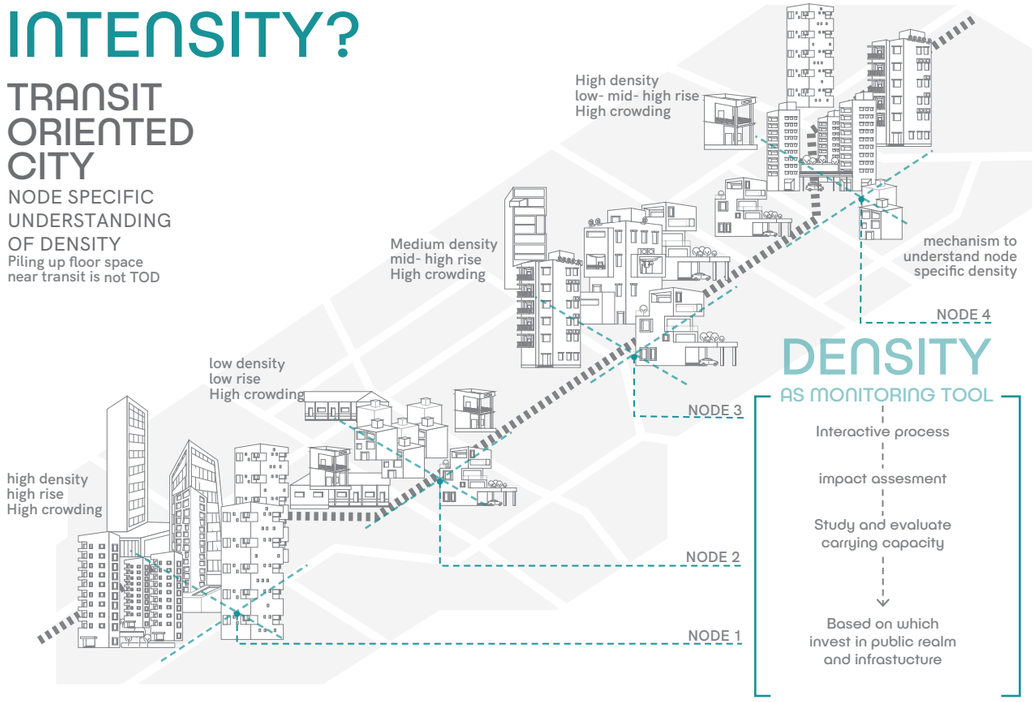
This should not be replaced by high-rise, (relatively) low-density near transit station just by supply of more FSI. Planners should understand these dynamics in each city and make a context-specific local area plan based on the local demand for more floor space and the nature of the real estate market. Land and real estate prices, property transactions, high per capita floor space consumption are good indicators of demand for more floor space in an area.

HOW TO PLAN FOR DENSITY-INTENSITY?

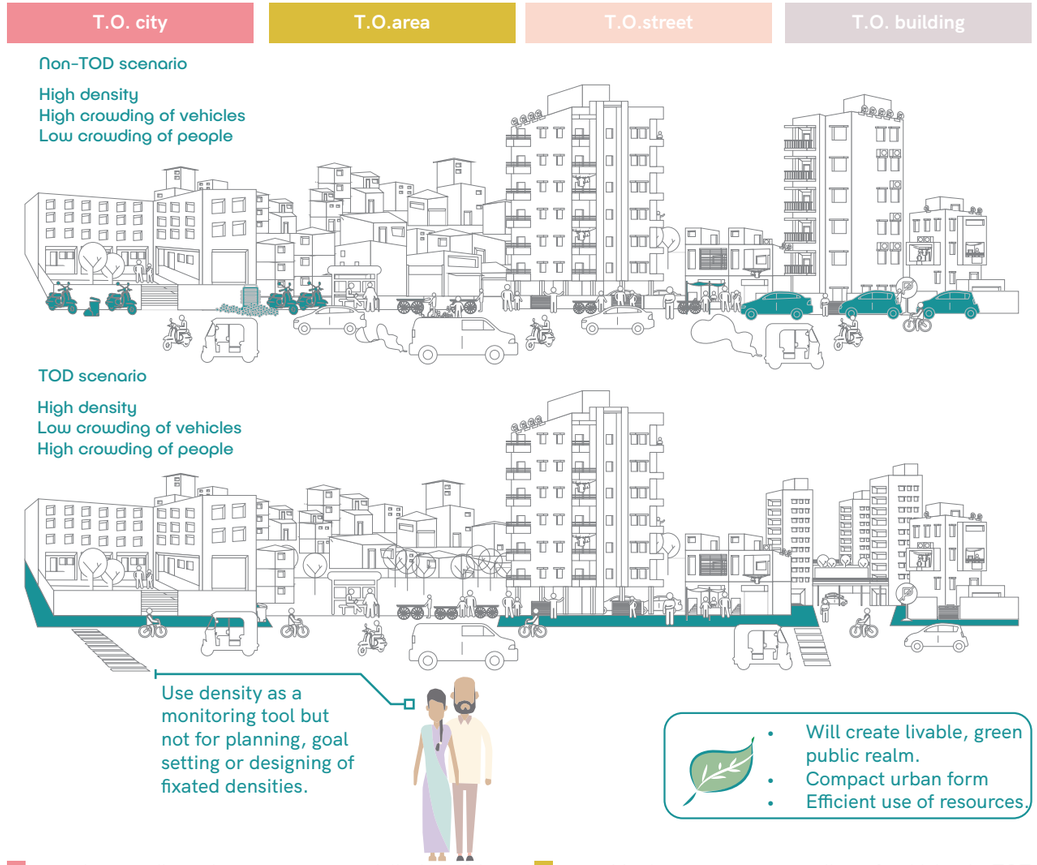
TRANSIT ORIENTED CITY

NODE SPECIFIC UNDERSTANDING OF DENSITY

Piling up floor space near transit is not TOD



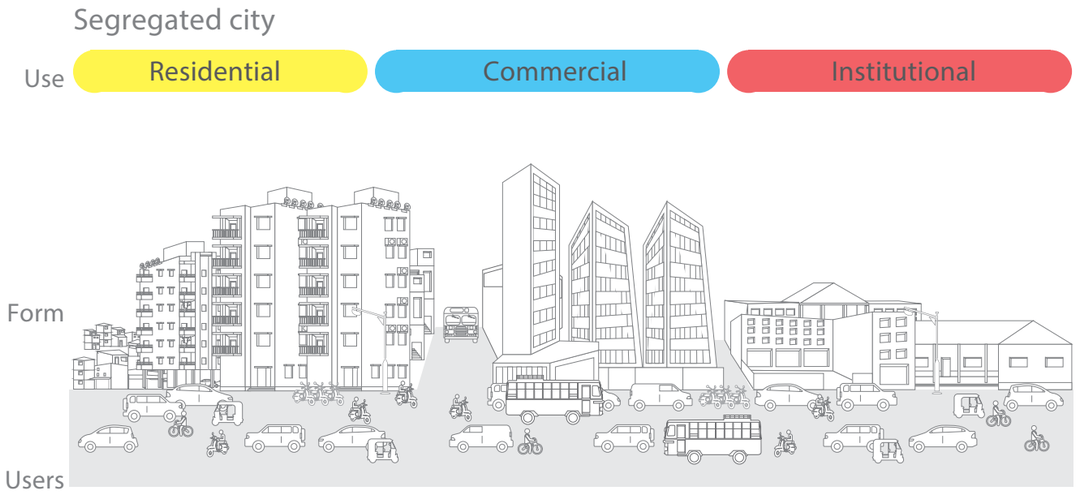
- Establish a node specific understanding of density across the transit network. Assess each node in terms of density (per capita floor space consumed), built form and crowding (per capita public space available).
- Use density as a monitoring tool to carry out impact assessment and evaluate carrying capacity at each node. Carrying capacity of an area is not a fixed entity and can be enhanced by increasing area under public realm based on demand. And so, it has to be an iterative process and should be reviewed at regular intervals.
- Planning approach of 'transformation' is required in already dense core city area, which could benefit from better public realm design, access enhancement, up-gradation of infrastructure and street-oriented buildings.



- Intermediate city areas, are partially benefiting from more intensification of floor space, while increasing access and investing in public realm design. The suburban centres around transit can benefit from 'infilling' the un-utilized land and building new infrastructure with better street design. Salat, S., & Ollivier, G. (2017). Transforming the urban space through transit-oriented development: the 3V Approach.

- Monitor on-street crowding of vehicles in TOZ and give more area under public realm as a better way to manage density and high crowding of people on the street.
- Considering most Indian cities are inherently dense, LAP around transit should focus on accommodating more people and less vehicles on street, while achieving compact urban form.
-

4 WHAT IS DIVERSITY?



Diversity indicates mix of uses and users. Heterogeneity of uses in-turn increases the number and types of users. Diversity is therefore, a function of land use, building use as well as users.

Diversity is a function of land use, building use, built form and users.

WHY DO WE NEED DIVERSITY?

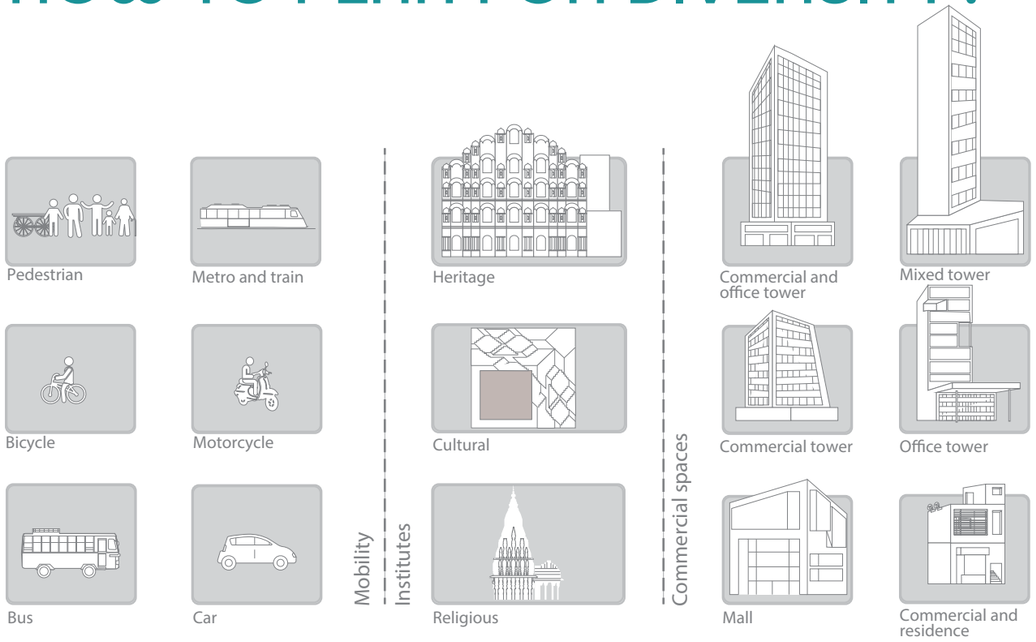
Indian cities have always had a mixed characteristic at building and street level, enabling co-existence of different users. Conventional planning focuses on segregated mono-functional uses, compromising on diversity and promoting, gated communities.

Diversity makes any area more accessible and attractive to a wider section of the population. This increases the chance of human interaction (social + economic) and in-turn increases choices (movement, housing, commerce, leisure).

Diverse neighbourhoods make urban labour market function in the most efficient way.

Heterogeneity within a TOZ will also facilitate increased ridership.

HOW TO PLAN FOR DIVERSITY?



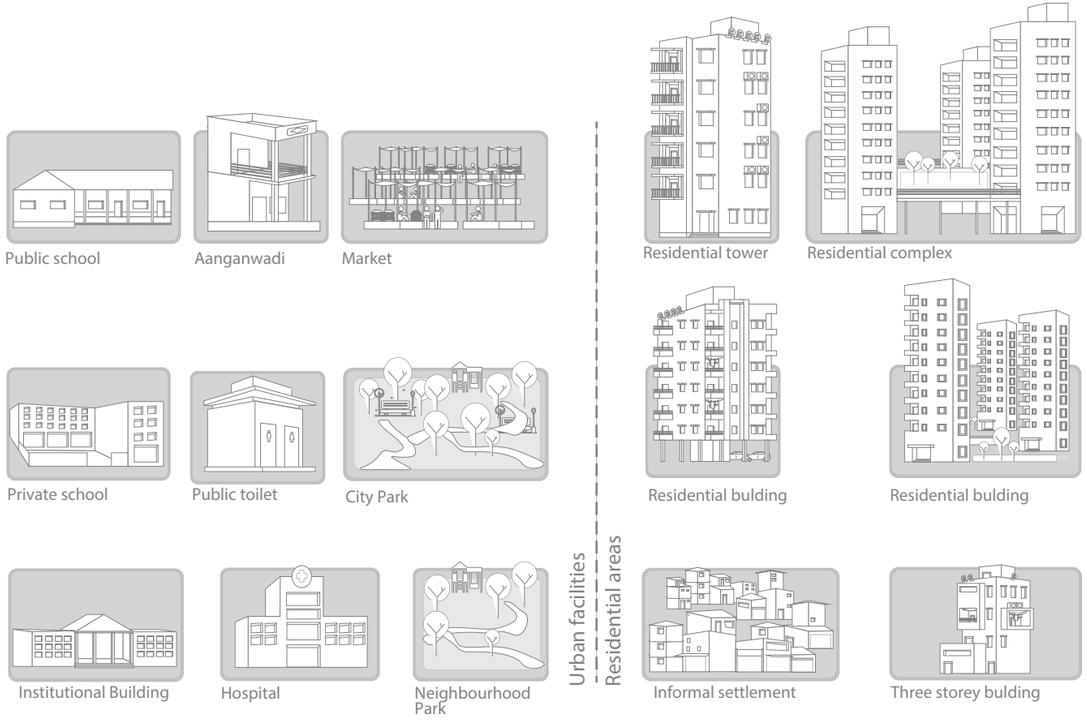
Livable city and socially interactive places.

Flexible market responsive zoning

- Introduce flexible FSI with simpler definition without many exemptions
- Allow flexible land use and introduce mixed use - mixed income housing,retail shopping, office spaces, institutions. Avoid gated communities and plotted development.
- Identify transit node typologies based on the local context within a city, transit type and station location; using the 3V framework.

- Develop area-based strategy in LAPs to promote mixed-use development at building level. Example: Case of Ahmedabad, which defines permissible building uses, based on road widths.
- To cater to the diversity in users, LAPs should provide a balanced mix of public and private amenities. Example: Government schools and primary health centers alongside private schools and hospitals.

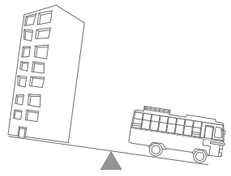
T.O. city | T.O.area | T.O.street | T.O. building



- Equitable distribution of road space to accommodate diversity in uses and users. Example: Designing Shared streets, which include pedestrians, automobiles, parking, as well as informal vending.

- Within LAPs, based on transit node typology, recommend proportionate mix of uses at the building level to bring in diversity.

5 WHAT IS AFFORDABILITY?

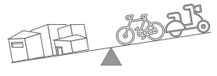


Affordable house on periphery

Long commute along with high transport cost

While living in the periphery

Trade-off on TRANSPORT (High transit costs).



No Infrastructure

Low transport cost

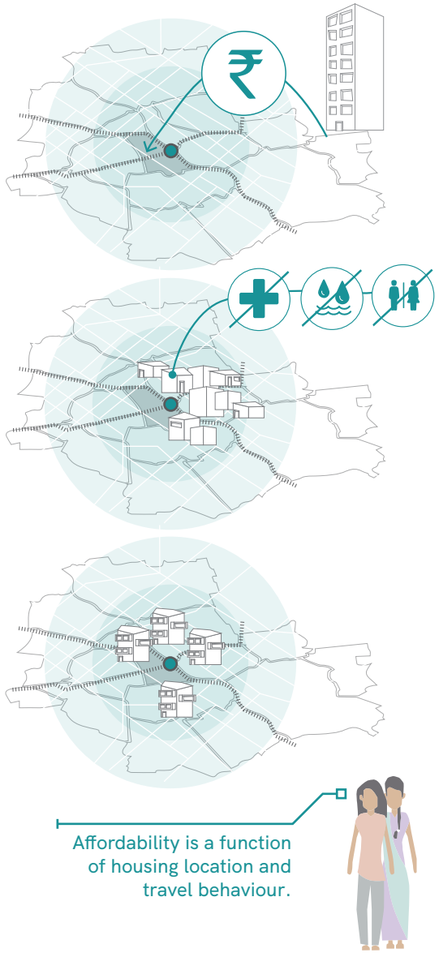
While living in the core city

Trade-off on HOUSING (Inadequate housing + services)

Affordable adequate and accessible housing

Affordable adequate and accessible transport

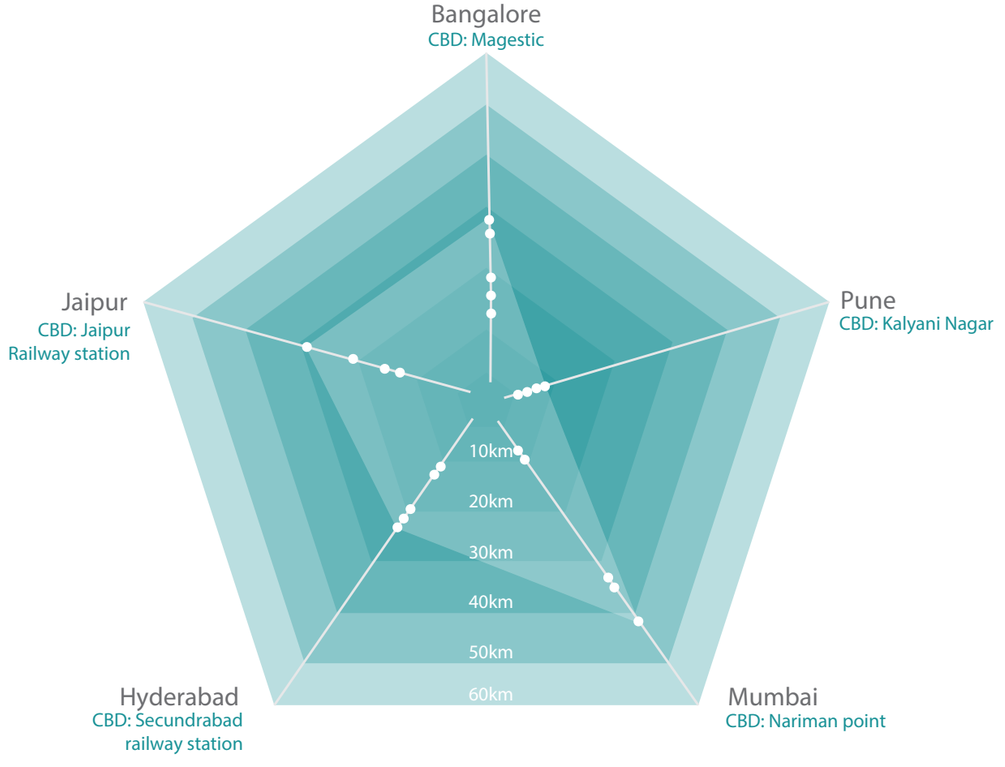
Equilibrium between housing & transport



Affordability is a function of housing location and travel behaviour.

An average Indian spends 60% of their income on their living needs as well as transportation needs. So, affordability is a function of both, housing cost and transportation cost.

WHY IS AFFORDABILITY CRUCIAL?



According to Census 2011, nearly 50% of urban Indians either walk, cycle or use public transit for work trips. 80-90% of this population belongs to the economically weaker sections and lower income groups of the society. Due to lack of affordable housing options in the city, they are forced to locate themselves away from the city center, which is devoid of public transit infrastructure.

Increased affordability in housing and availability of affordable transit within the area around transit will increase transit accessibility and hence, increase transit ridership. Therefore, accessibility is crucial to affordability.

HOW TO PLAN FOR AFFORDABILITY?

POLICY - PMAY

- "Insitu" Slum Redevelopment
- Affordable Housing through credit linked subsidy
- Affordable Housing in partnership
- Subsidy for beneficiary led individual house construction

LINK AFFORDABLE HOUSING WITH PUBLIC TRANSPORT

Will support low-income commuters to be more productive and reduce VKT.

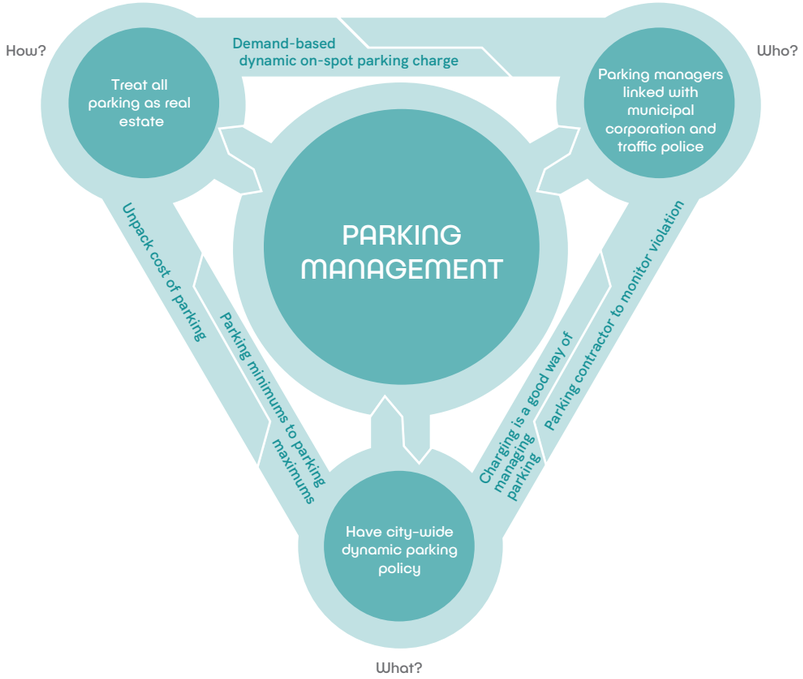
Bring affordable housing near transit or take transit to affordable housing

- Propose affordable housing projects based on location affordability index. Location affordability index is an indicator of housing and transportation costs at the neighbourhood level.
- Make transit accessible and affordable by subsidizing transit fares based on economic group (in sync with daily wages), age etc.
- Incentivise national schemes such as PMAY to make housing in areas around transit.

- Based on the node typology, proportionate number of affordable housing units should be provided.
- Incentivise more stand-alone affordable housing projects in areas around transit. Fixed % of EWS to be considered while planning LAP.

T.O. city | T.O.area | T.O.street | T.O. building

6 WHAT IS PARKING MANAGEMENT?



Demand management is the application of policies and strategies to influence travel behaviour towards sustainable choices such as public transportation and non- motorised transportation. Instead of increasing supply of transportation resources in the form of roads and flyovers, demand management focuses on controlling the travel demand. Parking management essentially is demand management for the consumption of space used for the parking of private motor vehicles.

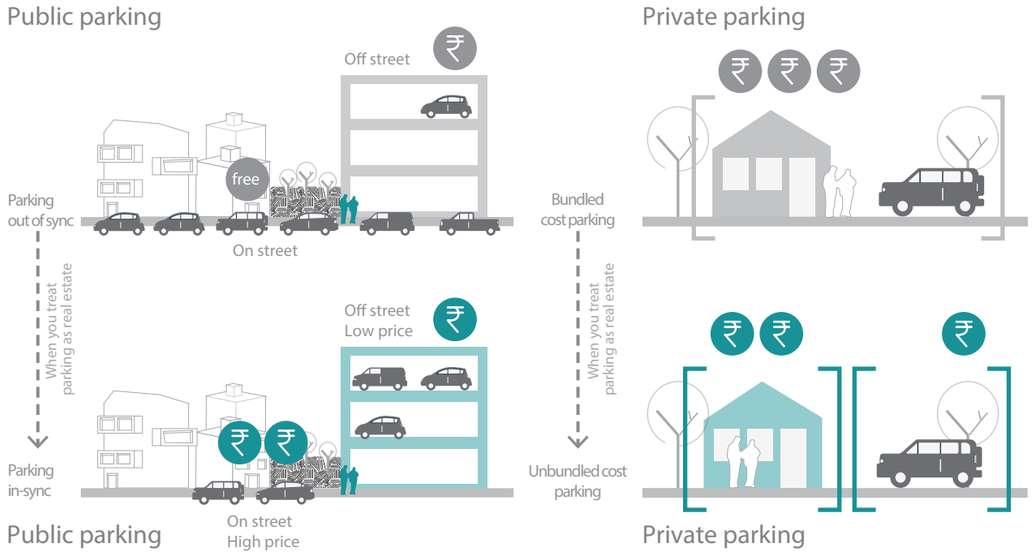
Sometimes due to economic constrains or limitations of space it is not possible to always keep increasing the supply of transport resources , in this case parking.
In such cases demand management becomes a handy tool to efficiently organize parking at the area and city level.

WHY SHOULD WE MANAGE PARKING DEMAND?

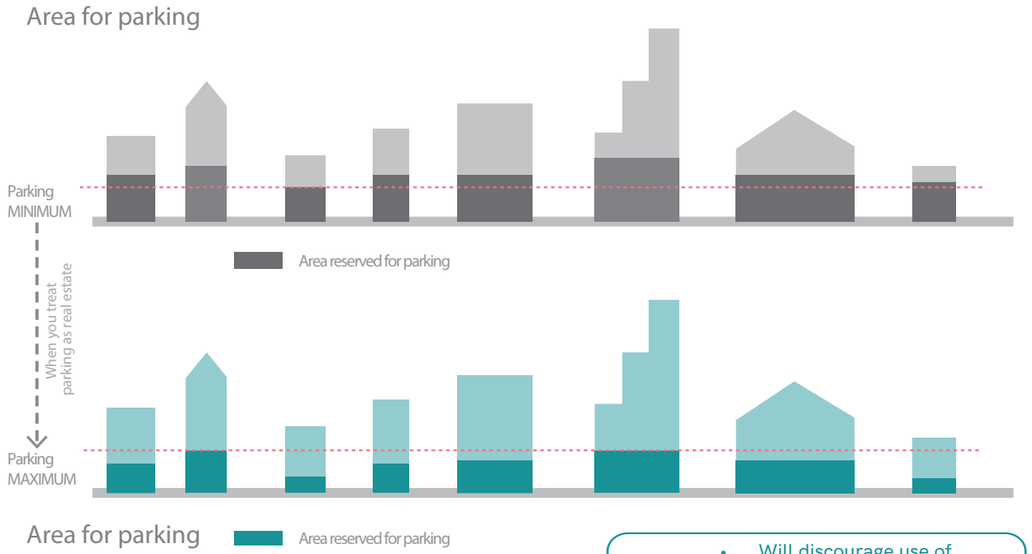
The current planning regulations ensures higher supply of off-street parking while there is chaos on the street. Since, parking is a location-linked activity, high demand on street will not go away by providing more parking in buildings. Given the regulations, on-street parking is conflicting with street activities, while parking lots within buildings remain empty. Unless, we manage on-street parking well, we will not be able to improve the street, public realm or walkability.

HOW TO PLAN FOR PARKING?

TREAT PARKING AS REAL ESTATE



T.O. city | T.O.area | T.O.street | T.O. building



- Will discourage use of private motor vehicles.
- Efficient use of land and resources.

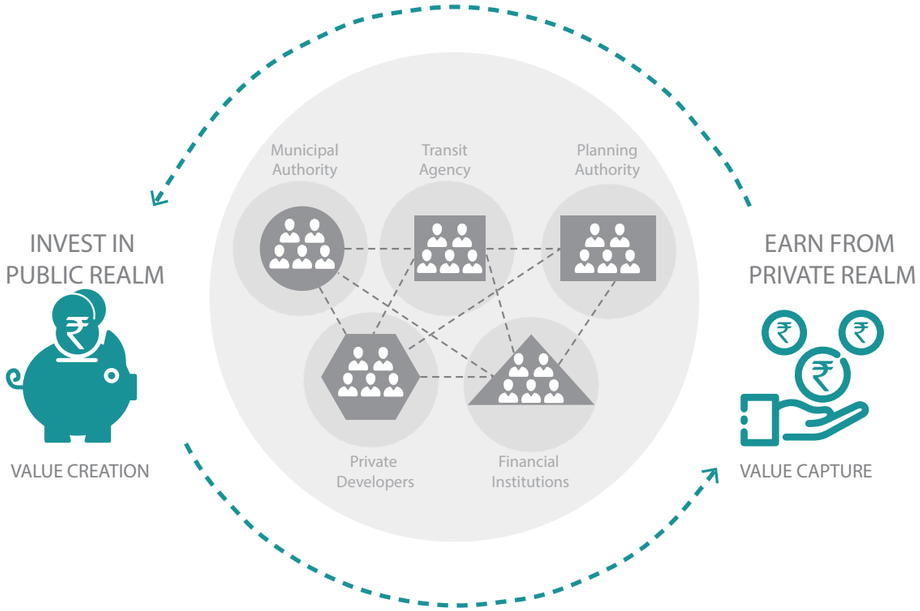
- Demarcate area in city core around the transit node to implement on-street parking charges.
- Extend to major destinations, arterial roads and subsequently to secondary roads. Eventually extend to suburbs and peripheries.
- Develop a parking policy and pricing strategy based on demand-based dynamic on-spot parking charge.

- Put in place a pricing regime for parking, both in building and streets
- Vehicle use restrictions
- Road space reallocation
- Priority for bus and non-motorized modes
- Flexible work hours.
- Priority of intervention: Calibration – Unbundling – Minimums to Maximums

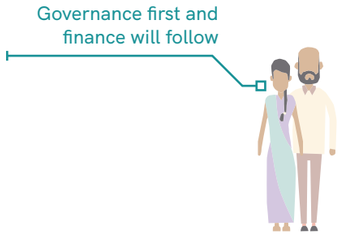
- Establish the link between on-street and off-street parking.
- Public parking - Price the on-street higher than the off-street to reduce the pressure on the former.
- Off-street private parking – Separate the parking cost from the house cost to avoid burdening home buyers. Regulate off-street private parking.

- Active frontages to be given priority over parking provision. Example: Parking provided in the rear half of the ground floor.
- DCRs to recommend parking maximum instead of parking minimum to dis-incentivise land being leveraged for parking at the cost of housing.

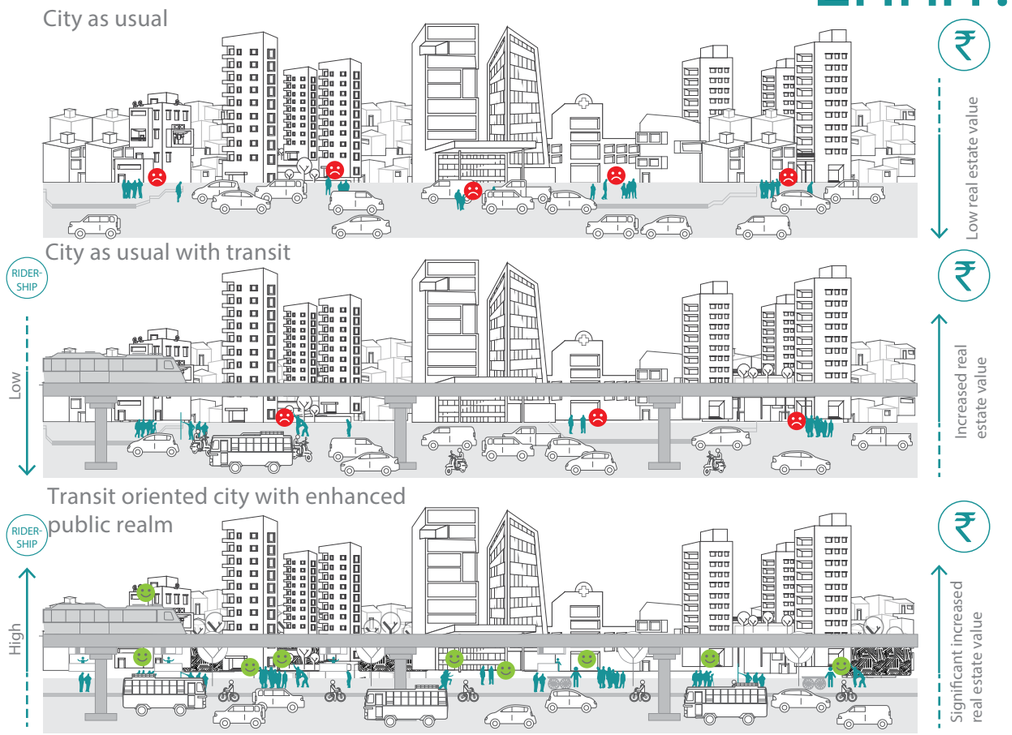
7 WHAT IS INVEST TO EARN?

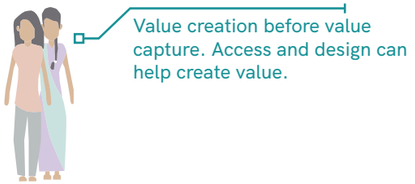


Governance frameworks and finance strategies form the basis for implementing LAP around transit.
It is essential for various authorities and agencies to come together to create and invest in public infrastructure so that the city can earn the benefits from the private investments in the area.



WHY SHOULD WE INVEST TO EARN?

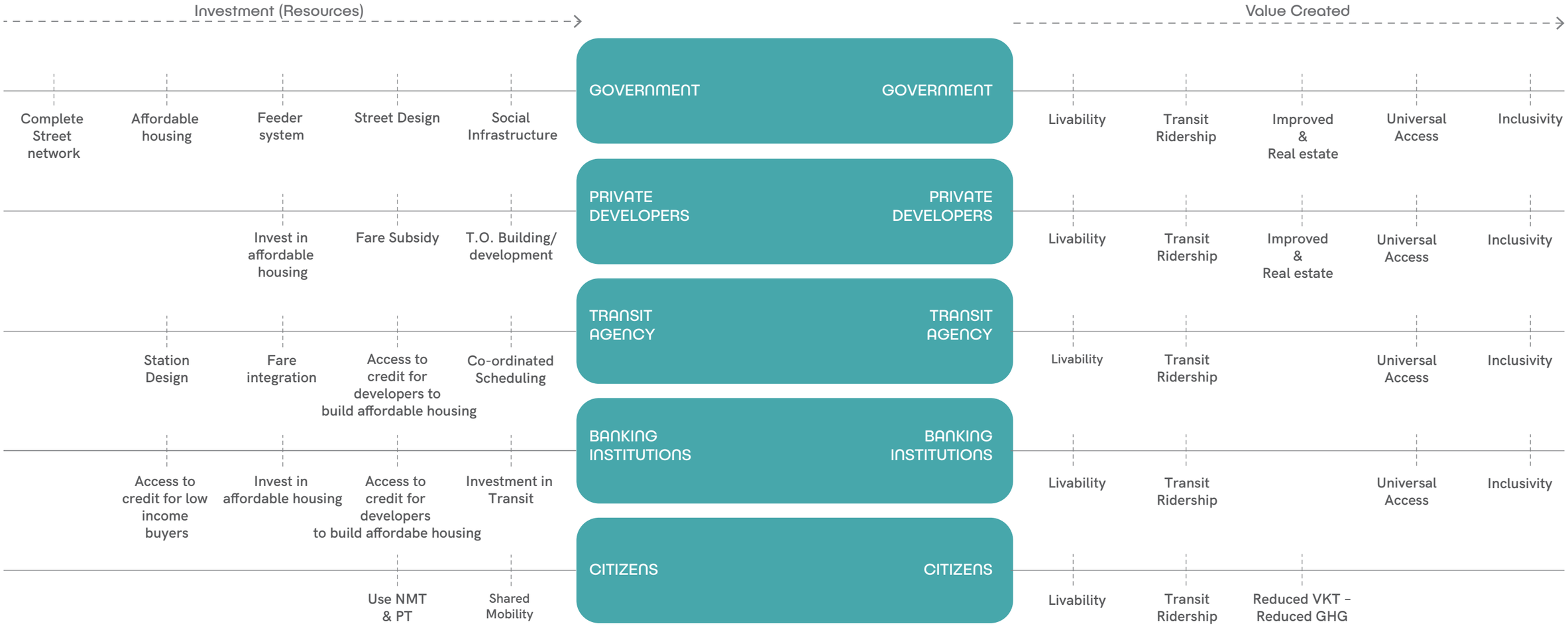




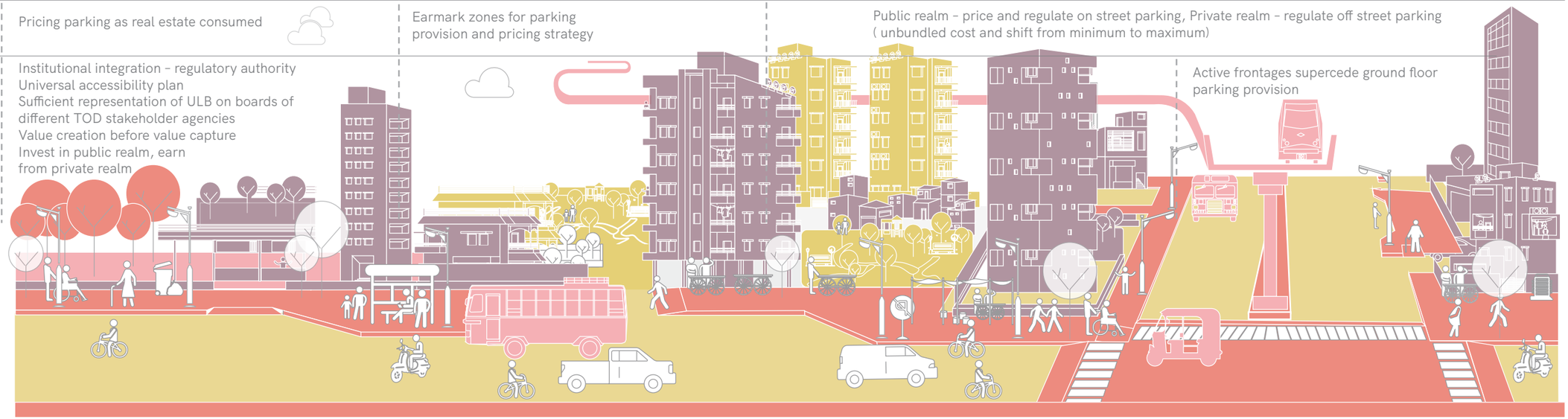
Land-use transport integration is key to value creation. Investing in value creation before value capture, ensures increased accessibility within the LAP zone and, increased utility of the transit system. By integrating institutions we are integrating different modes of transit. This will increase the accessibility of the transit system and in turn raise transit ridership.

HOW TO INVEST TO EARN?

Accountability, effectiveness, responsiveness, efficiency, generate resources in a democratic process.



Principles	Transit Oriented City	Transit Oriented Area	Transit Oriented Street	Transit Oriented Building
Access	Multimodal integration Universal accessibility	Physically accessible infrastructure First & last mile connectivity (Feeder system)	Universal design	Pedestrian access at ground floor level
Affordability	Locational affordability and Location efficiency Affordable transit fares (Based on minimum wages) Incentivize national schemes to making housing in TOZ Modify DCRs - to include affordable housing units	Socio-economic diversity of infrastructure Street network for ease of movement House commuters near transit		Dwelling unit size
Density	Prescribe the minimum percentage of Built Typology or Dwelling unit size that is most likely to support higher densities		Crowding factor	Dwelling unit size
Design	Form Based Codes Design network of arterial street	Street networks for pedestrian access	Shared, safe, shaded and universally accessible streets = Complete streets	Active Frontages
Diversity	Intermodal diversity Flexible land use guideline Mixed income housing TOZ Typology based on Node and transit type	Mixed use over segregated monofunctional uses Diversity in social infrastructure	Shared streets - pedestrian, cyclist, vendors, motorist and parking	Flexible building use
Travel Demand Management	Pricing parking as real estate consumed	Earmark zones for parking provision and pricing strategy	Public realm - price and regulate on street parking, Private realm - regulate off street parking (unbundled cost and shift from minimum to maximum)	
Invest to earn	Institutional integration - regulatory authority Universal accessibility plan Sufficient representation of ULB on boards of different TOD stakeholder agencies Value creation before value capture Invest in public realm, earn from private realm			Active frontages supercede ground floor parking provision



LAP AROUND TRANSIT

TRANSIT SYSTEM

Sub-Urban rail

Metro Rail

POPULATION

15+ Million

10+ Million

5+ Million

2 Million

DEMO CITY

- MUMBAI
- BANGALORE
- PUNE
- JAIPUR

SITE CHARACTER

- **Lower Parel station**- Transformation
  Brownfield, Core city, High density, Mixed use with high end commercial, Medium-high rise
- **Sandal soap factory station- Intensification**
  Brownfield, Industrial sub-centre, Medium density, Mixed use with industrial and high end commercial, Low-medium-high rise
- **Sambhaji udhyan station- Transformation**
  Brownfield, Core city, Medium-high density, Mixed use, Low to medium rise
- **Civil lines station- In-fill**
  Brownfield, Suburban, Low-medium density, Residential and Institutional use , Low-medium rise

HOW TO PLAN

PLAN YOUR CITY USING 3V FRAMEWORK

Develop Planning Brief

PLAN YOUR AREA USING LAP

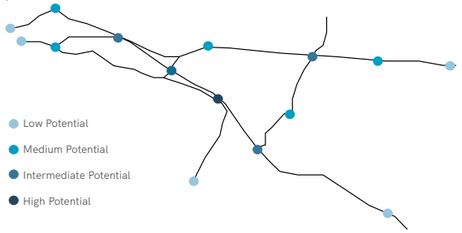
PLAN YOUR CITY

3V FRAMEWORK

WHAT IS 3V FRAMEWORK?

What is 3V

The 3V approach is utilized to understand a cities transit network in relation with the adjoining transit influence areas. The 3V's stand for Node value, Place value and Market value. Based on these parameters, the framework seeks to determine the relative areas of potential within a city rather than across cities.



The framework develops typologies of stations that classifies all stations in a mass transit network into clusters, to which different development strategies can then be applied.
It creates a relative benchmark of what is the best transit node and hence a more achievable and quantifiable target for other transit nodes in the city.

Scope

The framework is applicable to large cities with extensive networks and smaller cities with a few mass transit lines or a bus rapid transit system.
The framework can be utilized as a tool for analysis and assessment which can aide in the process of planning.

Limitation

The framework is data intensive and hence requires an already existing data base system.

Why is 3V important for Indian cities?

As various Indian cities of different contexts are investing heavily in establishing mass transit systems the framework can provide much needed support in two key areas -
The framework is adaptable to both brown-field and greenfield conditions of planning. As most of the Indian cities are being retrofitted with mass transit systems, the framework can help policy makers and planners, capitalize on the existing strength of the nodes that are identified.
As Indian cities are polycentric, the 3V framework helps identify the strengths of different nodes and can assist in proposing relevant and context specific interventions. In doing so, policy makers are able to plan the transit network and zone best suited for the city, and can be used to frame specific planning briefs, which can then be implemented.

Calculation

All sub indexes/parameters, were normalized to a value of one. And was then aggregated using the weighted average method to derive the final node,place and market value.

NODE VALUE

Node value is dependent on the importance or relevance of a node with respect to others across the transportation network. Its intensity is directly proportional to the number of transit lines and different types of transit modes that are available at the node. Also, the network relevance of the same is computed, which is calculated through the introduction of degree, closeness and 'betweenness centrality' (World Bank, 2017).

PLACE VALUE

Place Value is dependent on the level and quality of urban fabric around the existing node. The intensity of this is directly proportional to a mix of land use, the presence of social infrastructure and amenities, the degree of pedestrian friendliness (block sizes, intersection density) etc. (World Bank, 2017).

MARKET VALUE

Market potential value is dependent on the unrealized redevelopment potential of the land parcels around transit. On such land parcels economic activities, number of jobs and real estate attractiveness defines the demand. Whilst the ease of redevelopment, amount of land and proposed FAR (FSI) will determine the supply. The land prices fluctuation, properties changing hands and volume of market transactions (either on land or floor space) are also good indicators to gauge the market potential for nodal development in the area (World Bank, 2017).

TYPOLOGY AND STRATEGIES

Node value based typology

Single-line stations belong mostly to the branches of the urban rail system extending outward into the suburbs.
Core transfer stations are transfer stations with two or more lines concentrated at the city core.
Highly connective hubs rank high in inter-modality, centrality, and intensity of passengers flows. They have the highest node values.

Place value based typology

Suburban areas are generally low to moderately populated areas that lack a combination of street connectivity, pedestrian and bicycle facilities, and urban amenities to more fully support the level of transit service. Suburban areas are generally mono-functional on large areas of land.
Urban areas are moderately or substantially populated areas with a good or improving pedestrian/bicycle network and some mix of neighborhood retail and service amenities as well as a moderate mix of supporting jobs.
Intense urban areas combine a high diversity and intensity of uses with high economic concentrations, making these areas the most likely to support a transit lifestyle.

Market value based typology

Limited areas have weaker market conditions and lack the demand necessary to support new compact and/or mixed-use development. An emphasis on visioning and planning, to begin to develop interest, is more appropriate.

Emerging areas have limited to moderate real estate market conditions; intensive building types are generally not supported in the near term. Although they may lack immediate market support for TOD, emerging areas may be ideally suited for catalytic TOD investments to enhance local market strength, because land and development costs are not high and small investments may catalyze further market investment.
Strong areas have market conditions that are already ripe or ripening, TOD investment should focus on improving urban living amenities and developing prototype developments.

Investment strategies

Infill is mainly for nodes in suburban neighborhoods with single transit lines and low market value. It involves the reuse of urban land for new, higher-density construction. The strategy is to promote long-term planning and increase activity levels .Such locations can provide good opportunities for affordable housing.
Intensification is for urban neighborhoods with interchanges and emerging markets. Which are typically built-up areas with good existing or potential public transit links that can support redevelopment at higher than existing densities. Such locations can be prime opportunities to provide affordable housing.
Transformation is for major hubs. Creating a high level of place value—through job concentration and good urban design, including major investments in public spaces—can create high peaks of land and real estate value. The strategy is to invest in aggressive TOD projects to push the market.

DATA FRAMEWORK

NODE VALUE

Centrality
- Degree centrality
- Betweenness centrality
- Slow - Fast train
- Closeness centrality

Intensity of human flow
- Daily ridership
- Boarding alighting data
- Projected ridership
- Section load

Inter-modal diversity
- No of alternate transit options in the area - bus stand, bus depo, auto stand etc.

PLACE VALUE

Density of street intersections- number of intersection per SqKm

Local pedestrian accessibility
- Area covered under 8 min walking distance
- Average urban block size - Area and Perimeter

Diversity of uses
- no of types of land use
- Area under each land use
- Built-up area under each use

Density of social amenities
- No of cultural,educational,health services etc.

Unmet demand of social amenities

MARKET VALUE

Drivers of demand
- Human density
- Jobs/Residential ratio
- Human density growth potential

Drivers of supply
- Real estate opportunities - Develop-able land and develop-able floor space in the area

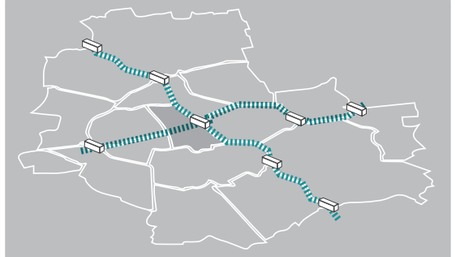
Market Vibrancy
- Dynamics of real estate - Additional square meter built in the area (last 10 years)

Social composition of neighborhood
- Average or median income
- Percentage of managers in labor force

No of accessible jobs by public transit (30mins)

HOW DO YOU DO IT?

STEP 1-DELINEATE



- Locate and Identify the transit corridor
- Demarcate the stations and the 800 m buffer around the stations.

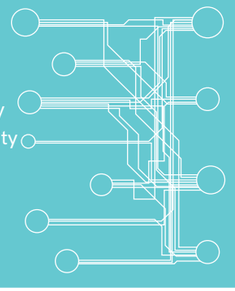
STEP 2-IDENTIFY DATA

- Create a list of parameters/Subindex and sources based on the 3V data framework.
- Identify data gaps based on availability of parameters/subindex.
- Based on data gaps, identify appropriate proxy/substitute and their sources.
- Compile final list for 3V's.

STEP 3-COLLECT DATA

Node value

- Degree centrality
- Closeness centrality
- Betweenness centrality
- Intensity of node activity
- Inter-modal diversity

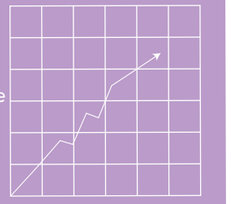


Place value

- Density of street intersections
- Pedestrian accessibility
- Pedestrian/bicycle connectivity
- Diversity of land uses
- Density of social infrastructure.

Market value

- Human density
- Activity mix
- Demand supply market
- Human density growth rate
- Number of accessible jobs
- Real estate opportunities
- Dynamics of real estate
- Volume of transactions.



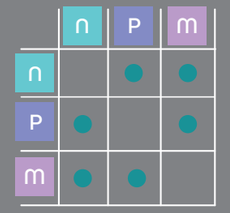
STEP 4 - CALCULATE 3V'S

- Transfer all data collected on to a master excel sheet. Preferably each sheet is assigned to each of the 3V's.
- Calculate the parameters/subindex by normalizing values to 1.
- Assign weight-age to each of the parameters/sub indexes.
- Calculate the aggregated Index of node, place and market value by the weighted average method.

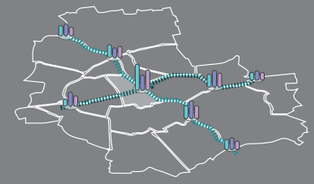
STEP 5 - ANALYZE AND PLAN

- Plot all transit station onto a 2D graph, Node v/s Place, Place v/s Market and Node v/s Market.
- Overlay the 3V's on to a map to spatialize the data, and draw initial inferences by broadly defining typologies.
- Use the 3V's to develop typologies based on the clustering of stations. And also highlight benchmark transit nodes for the network. (Further detailed in the following pages)
- Based on the above methods identify the direction for planning brief.

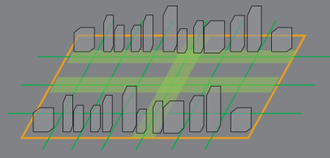
PLOT AND SPATIALIZE



BUILD TYPOLOGY



DEVELOP PLANNING BRIEF

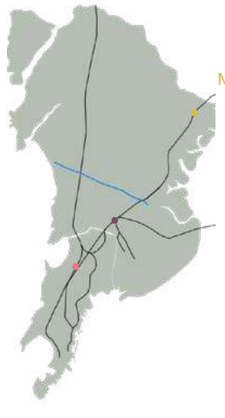


HOW DO YOU USE IT?

FOR PLANNING

At the LAP level

3V can help build a rationale for planning at the LAP level while being cognizant of the transit network. This can be achieved by identifying the typology of the station and then the development potential of each transit node, and hence define the necessary phasing and degree of investment.



0.45	Core Transfer
0.38	Urban
0.18	Limited

0.72	High Connectivity Hub
0.26	Suburban
0.47	Emerging

0.80	High Connectivity Hub
0.48	Urban
0.31	Limited

For example lets consider the 3 transit stations Kurla, Dadar and Mulund. All of them are quite diverse in their urban fabric, geographic location, function in the transit network and market characteristics. Which is also reflected in their Node,Place and Market.

Hence the development strategies that need to be employed are unique.

In the case of **Mulund**, located in the suburbs of greater mumbai, the 3V suggests the **Intensification** strategy. The relatively higher node and place value and low market value, it indicates an untapped potential of the market. Hence the strategies would include investing in increasing place value, by enhancing the level of accessibility. Formulate a long term visioning plan, so as to plan investments and activate the market gradually.

In the case of **Kurla**, the 3V framework suggest the **transformation** strategy. Although the market value is reflective of its high node value the dip, in market value can be attributed to the low place value. Hence the investments are to be focused on creating high quality public realm which can be supportive of higher densities. The plan should also focus on facilitating higher mix of uses and densities. And develop TOD projects that can greatly boost the micro economy meaning higher concentration of job of different nature etc.

In the case of **Dadar**, the 3V framework suggests the **transformation** strategy. Here the focus would be to activate the market potential. As node and place area already higher, the lower market potential can be improved with better and more development centric regulations which are focused towards more efficient usage of land. Increased FAR/FSI opening up higher build able volumes and also setting controls on DU sizes can help achieve higher densities, area under on street parking needs to be removed or highly priced.

The above inferences can be augmented by looking more closely at the urban fabric of the respective nodes.

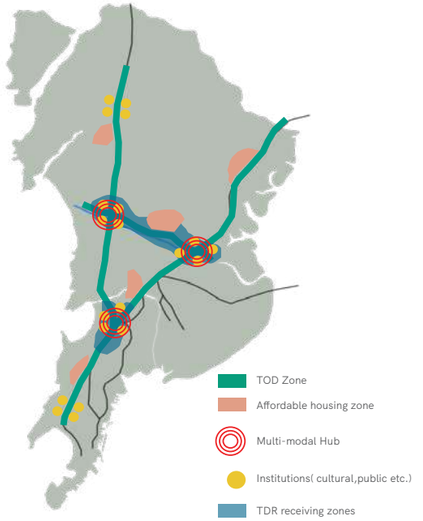
At the City level

3V can help synchronize land use and transport by giving the right cues to the development plan. For instance the framework can help decide

Where ,along the transit corridor, higher but differential population densities can be located. Which can be achieved by identifying the TOZs that are ready for higher FSI/FAR or to be demarcated as TDR receiving zones.

Where major institutional, commercial and other job centers can be planned with transit, hence supporting higher job densities along transit corridor.

Which transit nodes can be designed as multi-modal hubs and where Affordable housing provisions can be made within accessible distance of the transit network.



FOR MONITORING

The 3V is a dynamic framework which can enable its users to constantly monitor and update the situation of transit nodes in the city. By virtue of the data used, the 3V provides quantifiable indicators of how much a particular node has improved or not. It can also be used to assess the impacts and efficiency of a given Local area plan.

Broadly the 3V can help monitor in two areas,

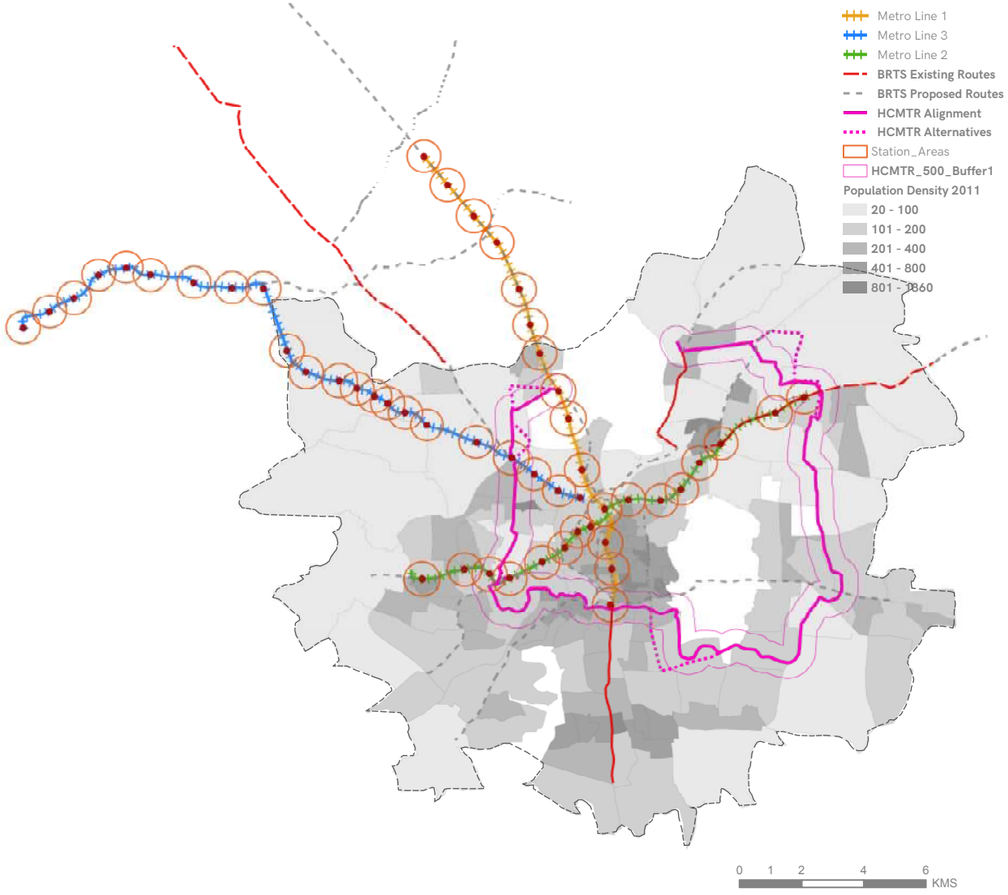
Land use monitoring - area under streets, roads, intersection density, block sizes, building use etc.

Transit monitoring - availability of transit options within TOZ, frequency of transit, the degree of ridership

PLAN YOUR CITY

OPERATIONALIZING THE 3V APPROACH IN PUNE

STEP 1
DELINEATE



NETWORK PROFILE

Municipal area – 421 sq. kms.
Metropolitan area - 7256.46 sq. kms.•

Population (2018*) - 6.7 Million
Census-2011 – 3.12 Million
DENSITY – 5600 / sq. kms.

Total Street Network - 2200 kms.
Total Vehicle Population - 36,27,280

Transit profile - Buses
No. of buses- 1402
No. of terminals - 99

Transit profile - Rainbow BRTS
Existing BRTS
Routes - 4 Nos. - 61 kms.
Stations - 36
Proposed BRTS
Routes - 3 Nos. - 114 kms.
Stations - 66

Transit profile - IPT
Total Nos. - 12261

Transit profile- Bicycle Sharing (PBS)
No. of Cycles - 7700 existing (2018)
13100 (proposed)
No. of Stations - 388 (proposed)
300 kms. Cycle Tracks/Lanes (proposed

Transit profile-Metro Line
Line - 01 (Swargate to PCMC)
Length- 16.95 kms.
No. of stations - 14 Stations
Expected Daily Ridership 2037 - 4,43,849

Line - 02 (Vanaz to Ramwadi)
Length- 14.66 kms.
No. of stations - 16
Expected Daily Ridership 2037 - 2,90,515

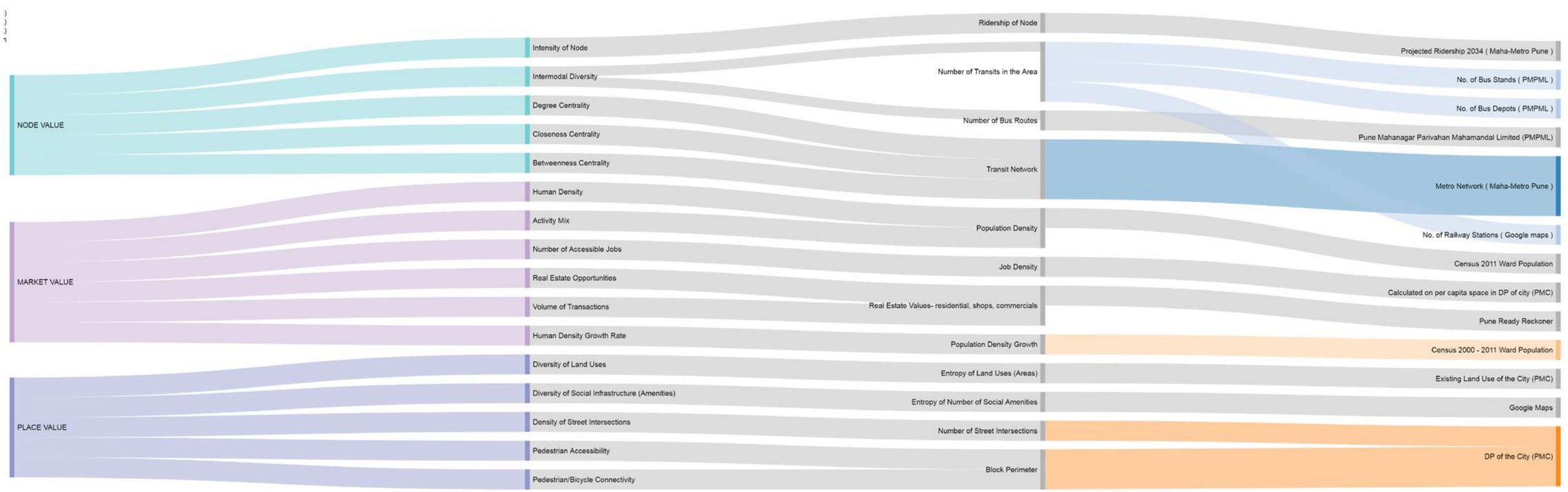
Line - 03 (Shivajinagar to Hinjewadi)
Length - 23.3 kms.
No. of stations - 23 Stations

Transit profile-HCMTR
(High Capacity Mass Transit Route)
Character - Elevated Ring Road
Length - 37 kms.
ROW - 24 Meters
Central BRTS corridor with three lanes of carriage way on both sides.

Modal Share
Walking - 47%
Buses - 11%
Cycles - 9%
IPT - 4%
2 Wheeler - 26%
4 Wheeler - 6%

STEP 2
IDENTIFY DATA

STEP 3
COLLECT DATA



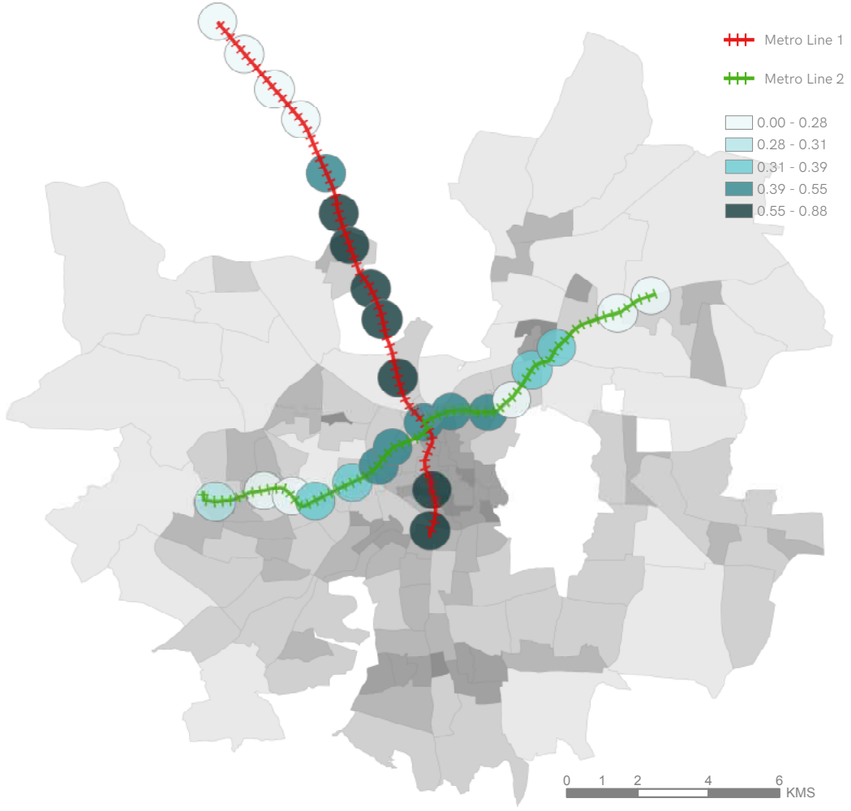
NODE value

STEP 4
CALCULATE NODE VALUE

PARAMETER	METHOD/SOFTWARE USED	WEIGHTAGE
CENTRALITY Degree centrality Closeness centrality Betweenness centrality	"GEPHI" software was used to calculate the centralities.	10% Since the line is linear, values of centrality will not vary.
INTENSITY OF NODE Daily projected ridership	Values were normalized to 1	60% Projected Ridership is the main component as it validates the node and its importance in the network.
INTER-MODAL DIVERSITY Number of Bus Routes No. Of Bus Stands No. Of bus Depots Presence of BRTS stations	Weighted average method was used to derive inter-modal value. Value were then normalized to 1	30% Bus Routes, Bus Stands, Bus Depots, BRTS PMPML are the other inter-modal transport facilities that enhance the area .hence constitutes 30%.

All sub indexes/parameters, were normalized to a value of one. And was then aggregated using the weighted average method to derive the final node value.

The weight ages vary as per accuracy and relevance of the data available or extracted to formulate the node value



Each of these sub-indexes are combined into a aggregated index as the NODE Value. The Node values vary across all the stations and are computed only for the stations of two lines off the three lines planned in Pune. Then spatially located them into five major categories and found that one line exhibits higher node values than the other, which lies mostly in the medium and low distribution range of nodes.

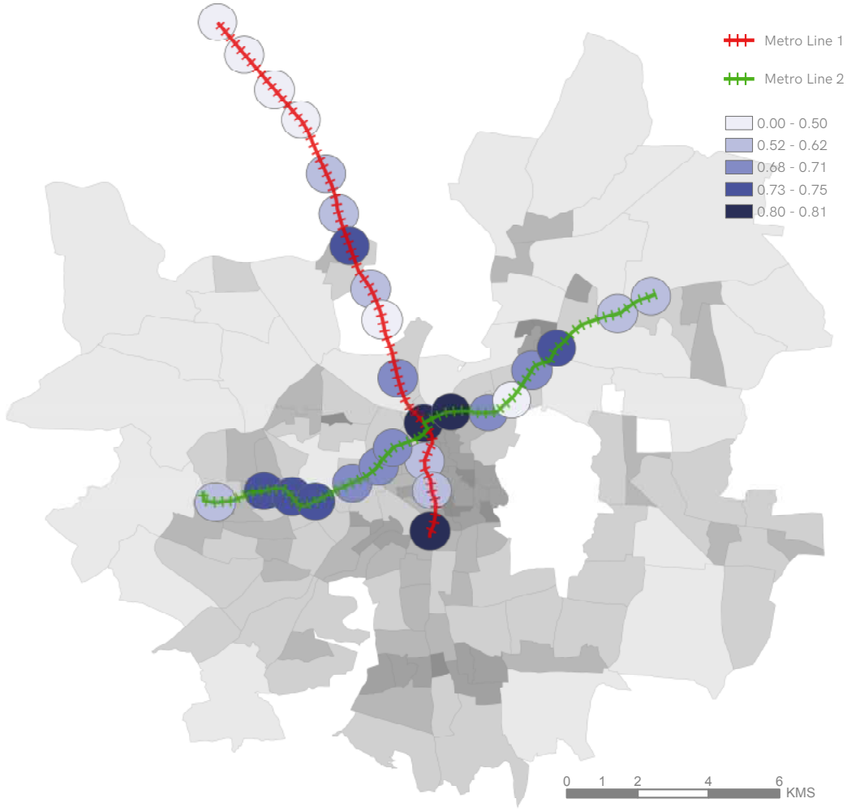
MAXIMUM NODE VALUE: SWARGATE (0.88)
(This area has city wide connectivity and has a interstate bus junction, a high inter-modal diversity).

MINIMUM NODE VALUE : KALYANI NAGAR (0.26)
(This area has the lowest node value).

PLACE value

STEP 4
CALCULATE PLACE VALUE

PARAMETER	METHOD/SOFTWARE USED	WEIGHTAGE
INTERSECTION DENSITY		20%
Number of street intersections	Geographic Information System(GIS)	The existing street network gives the picture on density of existing streets.
PEDESTRIAN ACCESSIBILITY		35%
Block perimeter	Geographic Information System(GIS)	Block perimeter is major component to providing accessibility.
DIVERSITY OF LAND USE		35%
Land uses	Entropy index of land uses	The existing use distribution in the area decides the potential and opportunities in the area and the existing mix of uses.
DIVERSITY OF SOCIAL AMENITIES		10%
Number of social amenities	Entropy Index of social amenities	Since just the number of social amenities are considered and not the areas of the same.
All sub indexes/parameters, were normalized to a value of one. And was then aggregated using the weighted average method to derive the final Place value		The weight ages vary as per accuracy and relevance of the data available or extracted to formulate the place value



Each of these sub indexes are combined into a single weighted average as the PLACE Value. The aggregated place value index maintains the pattern of higher place value only at three stations in the city. Place value is evenly distributed across the line two as many of the places on this line lie in areas with high urban developments. There are six stations which have low place values .

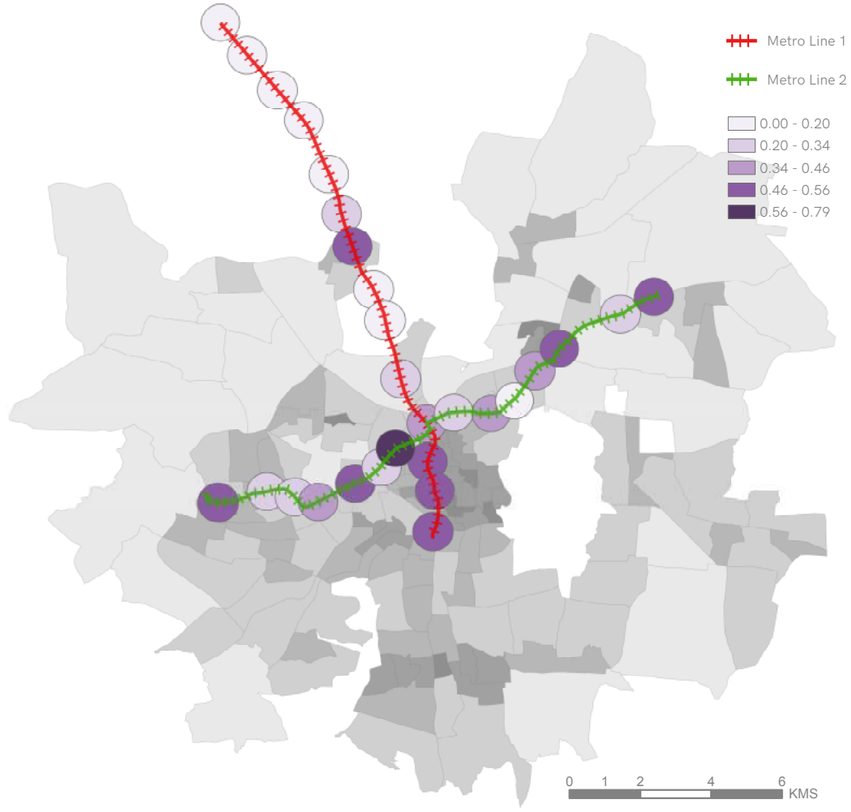
MAXIMUM PLACE VALUE: PMC (0.81)
(This area has high urban quality and it is at the city center).

MINIMUM PLACE VALUE : KHADKI (0.52)
(This area has the lowest urban quality as it is under cantonment and exhibits very low development).

MARKET value

STEP 4
CALCULATE MARKET VALUE

PARAMETER	METHOD/SOFTWARE USED	WEIGHTAGE
HUMAN DENSITY		33%
Ward level population data	Derived people/SqM and distributed it across the transit area	The existing street network gives the picture on density of existing streets.
HUMAN DENSITY GROWTH RATE		33%
Ward level population data	Geographic Information System(GIS)	Block perimeter is major component to providing accessibility.
REAL ESTATE OPPORTUNITY		33%
Ready reckoner rates for residential, Commercial units and shops	Average of ready reckoner rates	The existing use distribution in the area decides the potential and opportunities in the area and the existing mix of uses.
JOB/RESIDENTIAL RATIO		
Commercial area size and standard space requirements based on the existing land-use of the city (PMC)	Distributed Jobs/SqM (derived from census 2011 ward level data) over commercial area in catchment area.	The weight ages vary as per accuracy and relevance of the data available or extracted to formulate the market value

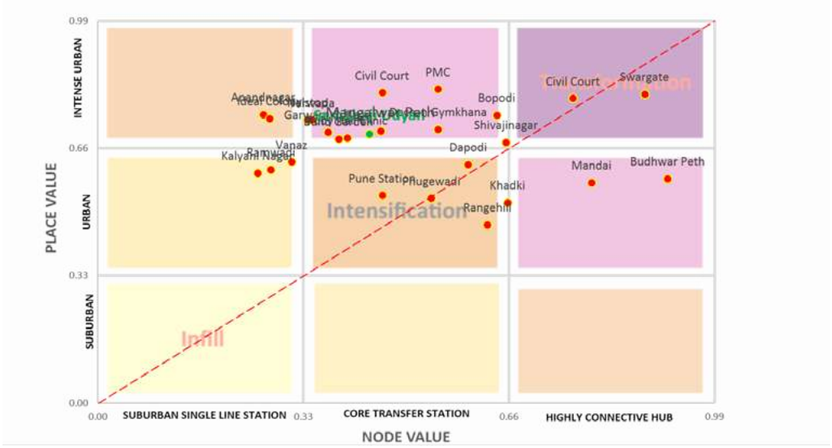


Each of these sub indexes are combined into a single weighted average as the MARKET Value. The aggregated market value index has a variance all along the nodes as the market drivers of demand and supply vary from place to place with impact on the node and the place value of the area.

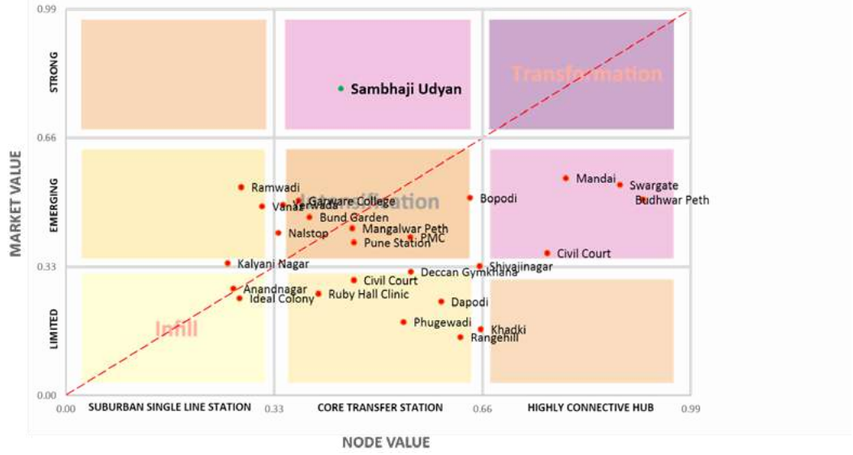
MAXIMUM MARKET VALUE:- SAMBHAJI UDYAN (0.79)
(This area is in city center and has high demand and supply in the market).
MINIMUM MARKET VALUE : PHUGEWADI (0.19)
(It is in the outskirts and has very less market drivers).

STEP 5
ANALYZE

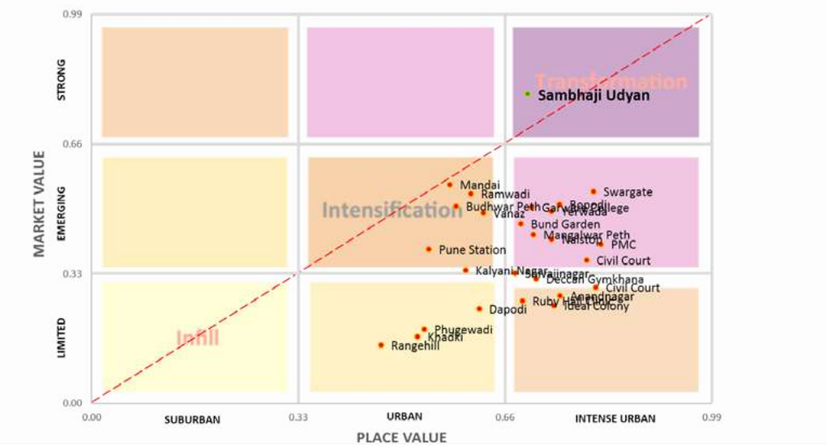
PLACE - NODE CORRELATION



MARKET - NODE CORRELATION



MARKET - PLACE CORRELATION



From the three graphs it is quite evident that most stations in Pune on an average have high place value. While both market potential value and node value vary.
It can be inferred that, Pune will need to focus on infill and intensification strategies to further enhance the transit nodes. Insisting on creating development consistent of higher population and job densities.

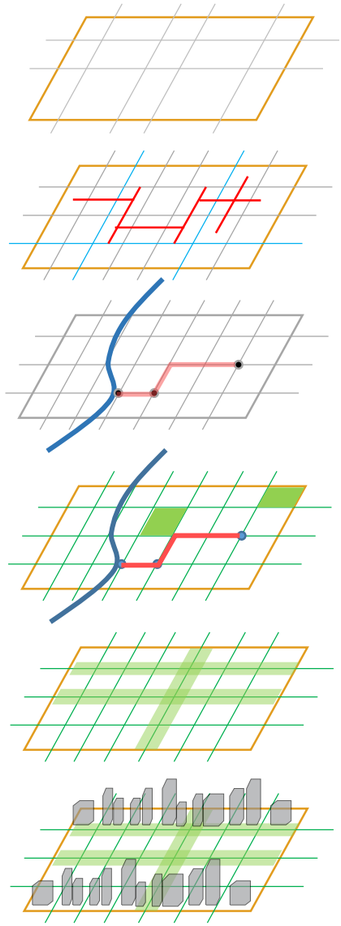
(This area has the lowest urban quality as it is under cantonment and exhibits very low development).

For example the Sambhaji Udyan transit node (marked in green circle) is located within the city center of Pune and possesses high place and market value but only medium node value. Consequently, the development strategy to be followed is transformation, with a focus on improving the node connectivity with the city while augmenting the public realm.

STEP 5
DEVELOP PLANNING BRIEF

3V RECOMMENDATIONS FOR SAMBHAJI UDYAN METRO STATION

Station Typology :- Core Transfer Station
Intense Urban Area
Strong Market



INCREASE NODE VALUE - Intensification

- Improve intra network connection by introducing new connections with other transit nodes
- Propose for multi-modal connections
- Strengthen inter modal diversity in transit influence zone

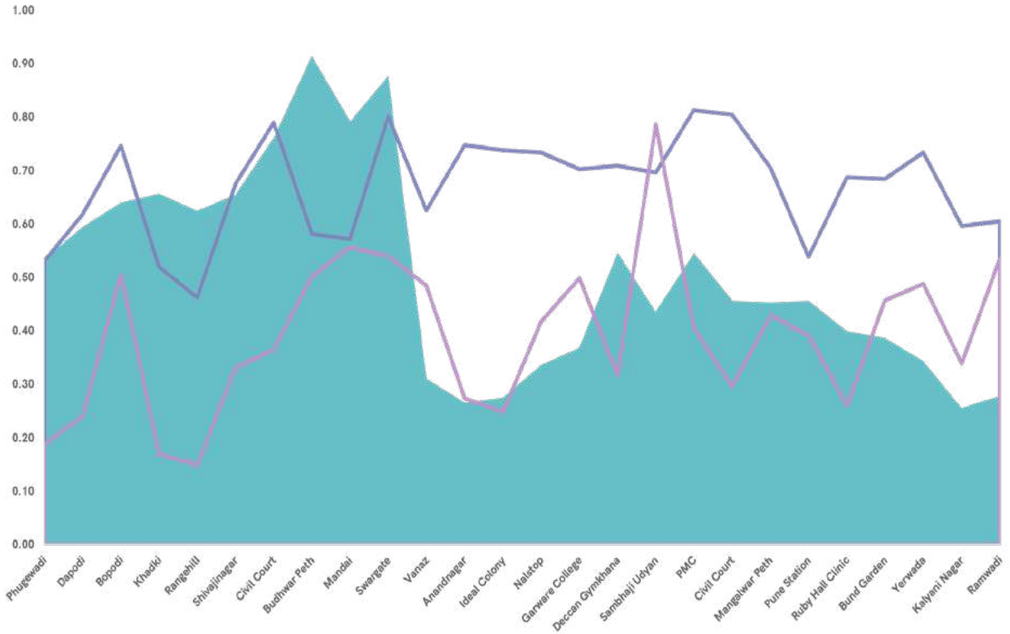
INCREASE PLACE VALUE - Transformation

- Intensify mix of uses, by facilitating concentration of commercial, cultural and educational amenities
- Facilitate vertical mix
- Improve NMT access to station
- Reduce the proportion of area under parking

INCREASE MARKET VALUE - Transformation

- Facilitate and promote higher job density in the area
- Increase FSI, to allow for higher built up area
- Create space for affordable housing, by controlling dwelling unit size

NODE, PLACE AND MARKET

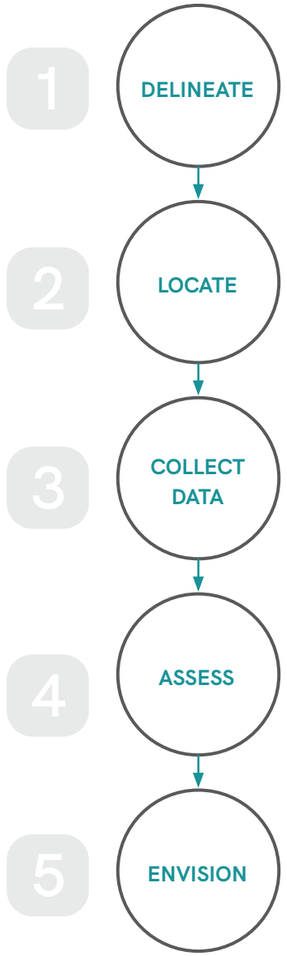


PLAN YOUR AREA

LAP PLANNING FRAMEWORK

LAP PLANNING FRAMEWORK

Reconnaissance - Local Area Plan



A circle of 400m radius drawn keeping the transit node at the center to demarcate the extent of the LAP. The final boundary will include all blocks which is covered more than half

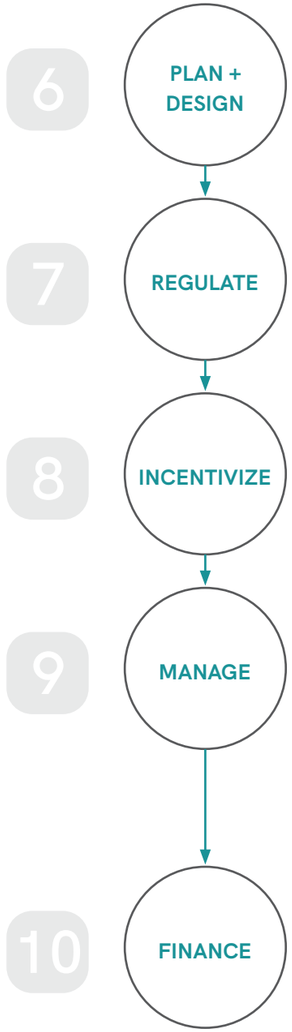
Conduct a preliminary survey and understand the site and its character. Photo documentation, perception studies, SWOT analysis etc. to be carried out and locate transit node in context of city.

Collect data on built form, land ownership, street inventory, street activity, land market, land use. Organize database on TOD scales City,Area, Street and Building.

Assess data on built form, land ownership, street inventory, street activity, land market, land use. Organize database on TOD scales City,Area, Street and Building.

Identify and analyze the planning brief for the LAP. Formulate broad contours of the necessary planning or design interventions with respect to TOD scales - City,Area,Street and Building.

Preparation - Local Area Plan



Create the physical plan for street networks and the design for streets, public spaces and street edges.
TOD principles - Accessibility and Design of Public realm

Create an enabling framework to aide and regulate the private realm, in terms of density and mix of uses that is conducive to TOZ.
TOD principles - Density and Diversity

Incentivize the provision, building and sustenance of affordable housing in TOZ and hence also ensuring a diverse urban fabric.
TOD principles - Affordability and Diversity

Manage the public realm, by placing regulatory mechanism to organize on street and off street parking dynamics
TOD principles - Parking

Calculate the costs to be incurred, identify revenue sources and phasing of the plan to ensure implementation of the plan (6-9)
TOD principles - Invest to earn

DETAILED LAP PLANNING FRAMEWORK

PLAN + DESIGN

To Improve Network

A. Identify major mobility corridors and then super blocks

B. Identify activity generator or strategic centers (Heritage, Museum, Transit Node)

C. Locate existing street network and Plot boundaries and existing built structure

a. Assess the network – Highlight dead ends or broken links.
b. Assess the connectivity to the major activity generator or strategic centers.

D. Propose revised street network

a. Plan the super block
   i. The street network should first aim to complete all possible network that fall within the public realm (i.e. if links are made through public land – A foot over bridge or sky walk to enhance pedestrian mobility over the railway track)
   ii. Next, propose street network which require to pass through the private realm.
   iii. Ensure newer streets are aligned to plot boundaries as far as possible
   iv. If at all proposed streets must pass through existing property it will fall under the redevelopment scenario.
   v. Ensure proposed streets follow hierarchy and ascertain that all collector streets terminate on either sub-arterial, arterial or any other road of higher hierarchy.
   vi. Finally ensure the resulting blocks created are of walkable block perimeter and shape.
   vii. Assess whether the street network connects all activity generators or strategic centers.
   viii. Identify possible Pedestrian corridors based on highest pedestrian activity. These streets can then be designated for other supporting activities like vending etc.

E. Finally ensure all super blocks are linked to each other and the global network (i.e. Through movement) are linked to Local network (To movement)

a. Ensure all junctions (Arterial – sub arterial, Sub arterial - collector, Collector – Pedestrian) are geared towards Pedestrian and NMT

To Improve public realm

A. Develop street guidelines

a. Based on the context develop pedestrian friendly street guidelines. The said guidelines have to be reflective of the functional hierarchy of streets.
   i. In TOD areas, higher priority to be given to Pedestrian>NMT>Publictransport>Private transport
b. Streets guidelines should also detail out location of services and look to integrate all services spatially.

B. Develop building regulations

a. Based on the functional identity or TOD Typology develop contextual regulation (For e.g. New york city). Nonetheless the regulation must address the following
   i. Ensure active frontages are propagated
   ii. Ensure built to line varies from 50 % to 100 % based on the proximity to activity generators or strategic centers (Transit station, Heritage sites etc.)
   iii. Avoid all hard edges like compound walls

REGULATE

To Improve Density

A. Assess existing densities – Population density, DU density based on a ground truth survey

B. Assess demand of the area –

a. Existing consumption of floor space – Is consumed FSI/FAR higher or lower than prescribed FAR/FSI.
b. Market rates for area – Is the value higher or lower than the surrounding area

C. Based on the above 2 possible scenarios arise

a. Low demand scenario - Low Market prices & Low FSI/FAR Consumption. Inference is
   i. Demand might be getting absorbed elsewhere, feedback for DP
   ii. No Demand
b. High demand scenario - Low Market Prices & High FSI/FAR consumption or High Market Prices & Low FSI/FAR consumption or High Market Prices & High FSI/FAR consumption
   i. High Demand – Increase FSI/FAR

D. If FSI/FAR to be increased

a. Estimate necessary open space required
b. Estimate necessary up gradation of existing trunk infrastructure

To Improve diversity

A. Understand and evaluate present land use and building use mix based on which develop a functional identity for the Transit node (if 3V used, develop TOD Typology)

B. Based on this develop the framework for diversity at the over all area level and then based on road widths

a. Based on the functional identity detail out incompatible uses.
   i. For e.g. a purely residential unit will be incompatible in a node whose functional identity is commercial. In such places mixed units are preferable.
   ii. Incompatible uses can either be enforced or dis – incentivized
b. Link road widths to permissible uses. E.g. Ahmedabad

C. Private stakeholders to be incentivized for contributing to area under public realm and providing inclusive housing

INCENTIVIZE

To Support Affordability

A. **Incentivize the development of smaller and affordable units. 3 Segments to be considered – Market driven affordable housing, Rental housing and government supported mixed income or affordable housing units.**
B. **Incentive mechanism that can be utilized**
   a. Reducing chargeable FSI/FAR
   b. Reduction in parking requirement

MANAGE

To Manage parking

A. **On street parking is to be charged higher than off street parking.**
B. **On street parking in TOZ needs to be regulated**
C. **On street parking provisions to be defined by the type of streets i.e. Mobility, Shared Mobility and Pedestrian.**
D. **Parking units/Lots are to be discouraged within TOZs.**

FINANCE

To Plan Resources

A. **Understand how much the plan will cost?**
B. **What is cost of new roads, infrastructure etc.**
C. **Identify various revenue generating mechanisms in the LAP**
   a. Chargeable FSI
   b. Parking management
   c. Advertisement
D. **Develop the phasing component for the plan to chart investment and revenue generation flow**

KEY PERFORMANCE INDICATORS

The indicators need to be placed in comparison before and after making the plan. These performance indicators help evaluate the plan in accordance with the principles laid down in this handbook. There may be other performance indicators for implementation, finance or other components.

Accessibility

a. Increase in transit ridership per day/month/year
b. Reduction in average block perimeter in the area
c. Percentage of streets with walkable footpaths
d. Increase in junction density in the area
e. Increase in safe pedestrian crossings in the area
f. Increase in the number of lifts/escalators to access the stations

Design

a. Percentage increase in area under public realm and streets
b. Percentage increase in area under public open spaces
c. Increase in number of buildings with active frontages
d. Kilometers of streets being re-designed under street design projects
e. Number of place-making, urban design projects in the area

Density

a. Increase in proposed floor space (sq mts) in the area
b. Percentage of homes within 5 min (~400 m) walking distance of transit stations
c. Percentage of shops/offices within 5 min walking distance of transit stations

Diversity

a. Increase in area/floorspace under mixed land use
b. Increase in land use entropy index
c. Increase in the number of new recreational facilities and social amenities

Affordability

a. Increase in land for affordable housing
b. Increase in floorspace earmarked for affordable housing

Parking Demand

a. Increase in street kilometers under paid on-street parking policy
b. Increase in area with special parking regulations for unbundled parking in homes, offices and commercial establishments

Invest to Earn

a. Increase in revenue from re-development and new building projects
b. Increase in investments for the infrastructure and services in the local area

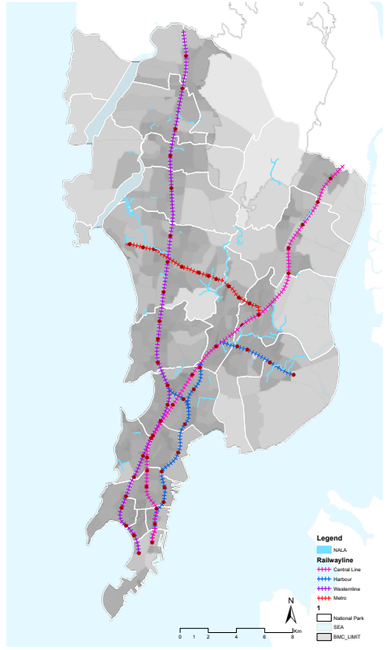
PLAN YOUR AREA

MUMBAI, LOWER PAREL

A CASE OF TRANSFORMATION

DEMONSTRATION OF LAP PLANNING FRAMEWORK

UNDERSTANDING CITY CONTEXT



CITY PROFILE
AREA: 480.24 sq.km
POPULATION: 12.44 million
(Census 2011)
DENSITY: 25,903 per/sq.km

PUBLIC TRANSIT
Suburban Rail - 427.5 Km
Metro - 11.4 km (operational) +
222.6km (proposed)
Monorail- 19.54Km (Operational)

TRANSIT BEHAVIOR
Train - 40.6%
Bus - 27.7%
Rickshaw - 6.8%
Taxi - 1.7%
Car - 7.9%
2W - 13.7 %
Metro/mono - 1.6 %

The city of Mumbai, is known as the financial capital now, was a major hub of textile manufacturing in the country. Many textile mills were located around the Lower Parel area. With the mills lying defunct since 1970s-80s; The supreme court judgment on the redevelopment of mill lands in 1996, made the area one of the most sought-after parcels of real estate in Mumbai then on.

The redevelopment of the low-rise mills and chawls with large ground coverage has rapidly changed the skyline of the area to high rise luxury real estate. However, this rapid redevelopment has not been able to add any new public areas or utilities or road space to enhance livability for the residents and commuters.

STEP 1-2
DELINEATE-LOCATE

Lower Parel today is a mixture of high end real estate in few pockets surrounded by defunct industrial and large parcels of railway land. This LAP intends to achieve greater 'transformation' by adding more area under public realm, utility and road space.

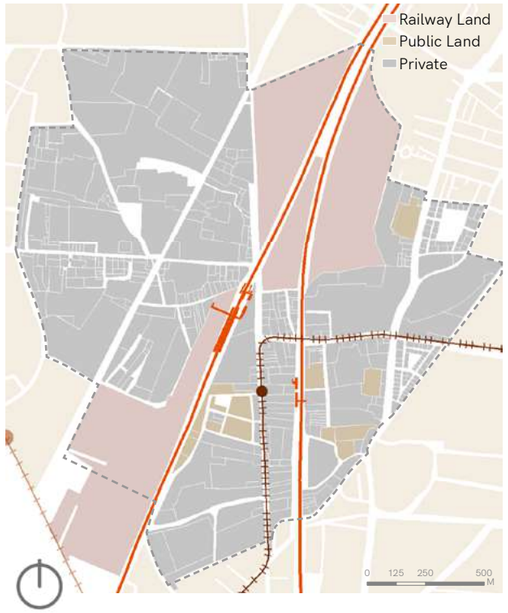
To delineate the site, an 800 meter radius circle is drawn keeping the transit node at the center. The final boundary are delineated based on the next major road or completion of an urban block.

Changing Mill Landscape of Lower Parel

Transit Oriented AREA

STEP 3
DATA COLLECTION AT AREA LEVEL

1. CADASTRAL

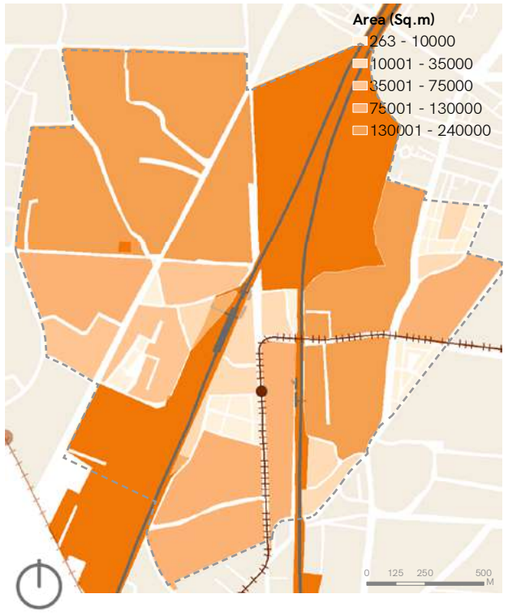


The important stakeholders in the area are the Indian Railways and the private sector owning the mill land parcel.
The LAP strategies can focus on a framework to unlock the potential of railway land and incentivize creation of public open spaces from the area under the private ownership

2. LAND USE

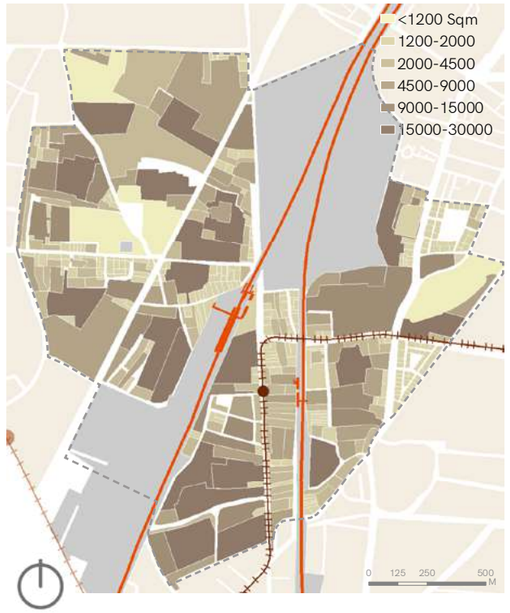
The land use pattern shows a mix of uses with the redevelopment of the mills. However, most of the redeveloped buildings are mono functional without a vertical mix of uses, with high compound walls and as a result does not contribute to the public realm.
The suburban railway network divides the area/city in two parts, the east and west.

3. BLOCK SIZES



With the area transforming from industrial lands to mix use residential and commercial / retail development, the large block sizes result in an average time of 20 min to walk half the block perimeter. Thus, reducing the level of walkability.
The redevelopment should focus on creating additional pedestrian priority roads to support the changing land use of the area.

4. PLOT SIZES

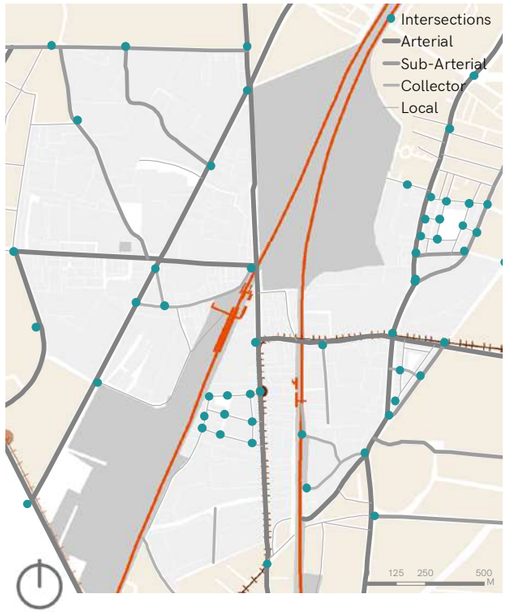


The large plot sizes and depths is a result of single ownership of mill lands in the private domain and a lack of addition of new roads to the area on redevelopment.
The large plots have helped in supporting the emerging typology, however created gated communities reducing walk-ability and livability in the area

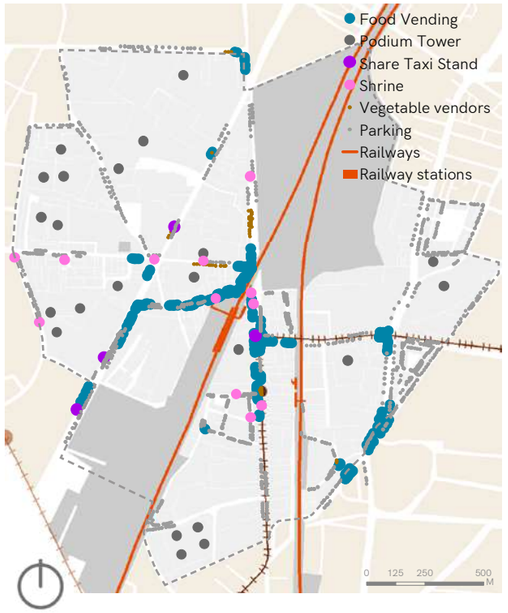
STEP 3

DATA COLLECTION AT STREET LEVEL

5. EXISTING STREET NETWORK



6. ACTIVITY MAPPING



The linear geography of the city results in few arterial north south connections. Further the railway land divides the city creating an inefficient east-west connection. Some of the key issues to be tackled

- Existence of incompatible street hierarchy and disjointed network leading to traffic congestion.
- Poor quality of footpaths and lack of street design reduces the walkability further.
- Lack of parking facilities and management around station.
- Large volume of informal activity close to station area.

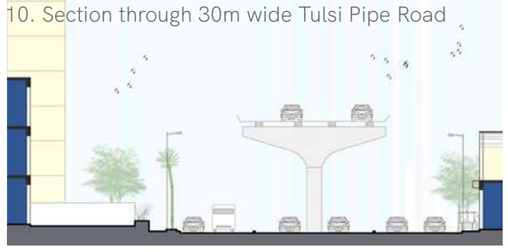
Therefore, the proposal should aim at creating larger area in public realm around the station to absorb the demand for on street parking and vending zones.

7. Value of Active Frontage

8. Low Quality of Footpaths

9. Informal vending in station areas

10. Section through 30m wide Tulsi Pipe Road



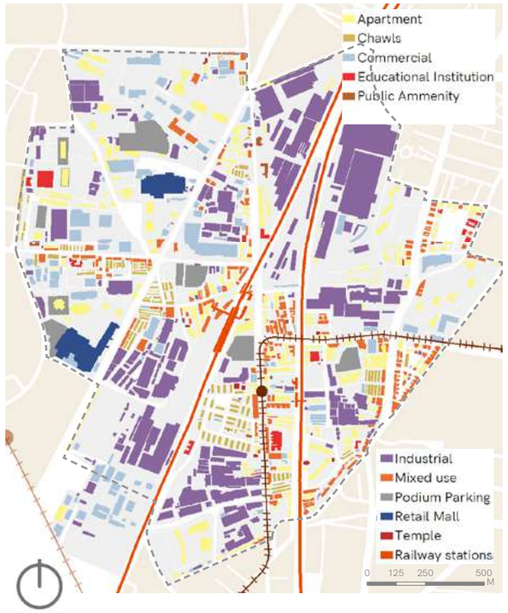
The top corner image strongly exhibits how movement patterns are affected where a well paved and landscaped footpath fails to attract pedestrian compared to a broken-shop lined one.

The existing blocks have continuous footpaths however, there is a lack of design consideration with respect to street utilities, landscape and ergonomics to make it safe and usable pedestrians.

STEP 3

DATA COLLECTION AT BUILDING LEVEL

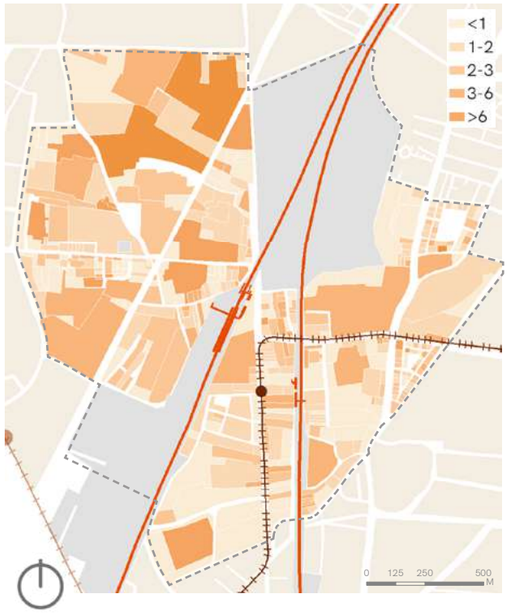
11. Built Typology



The area exhibits diversity in built typologies. However, a close study of the earlier residential typologies like chawls reveals them as transit-oriented building with built to line edges, no compound walls leading to an active life between the buildings and streets.

The new typologies are in complete contrast acting as gated activities with a lack of interactive frontages

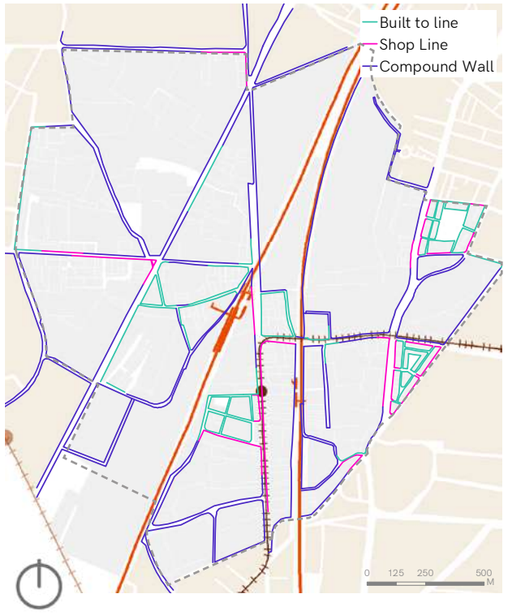
12. Consumed FAR



The high FAR seen in the recently developed land parcels resulted in low ground coverage and tall buildings with no area being added into the public open spaces.

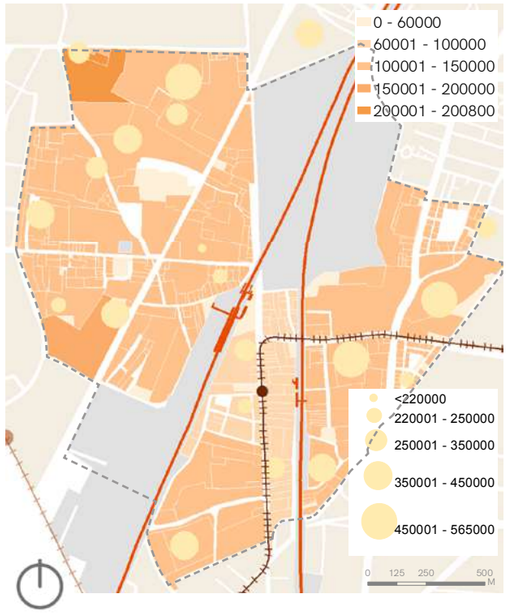
Also, most of the built area is contributed by the parking podiums which is counter intuitive to the idea of TOD.

13. Edge Conditions



The edges are dominated by high compound walls of both newly built buildings and defunct industrial land. Resulting in non-responsive edges and in active frontages.

14. Property Prices(Rs/sqm)



There is high demand for retail commercial, corporate offices and high-end residential units in the area. Redevelopment of existing chawl units and efficient utilization of railway land can provide opportunities for adding affordable housing units in the area.

STEP 4
ASSESS

ISSUES/OPPORTUNITIES | PROPOSAL

T.O. CITY

- East West Connectivity
- Enhance east west connectivity

T.O.AREA

- Lack of Multimodal Integration
- Cumbersome station exits
- Railway as the largest land stake holder
- Opportunity for TOD On railway Land
- Creating a amultimodal hub
- Decongesting and activating the station area
- Unlocking the potential of railway land

T.O.STREET

- Incomplete street network
- Narrow streets (5-6m wide) leading to plots
- Lack of PT and NMT infrastructure
- Enhance street connectivity for better accessibility in the area
- Enhance PT and NMT Infrastructure

T.O.BUILDING

- Lack of spatial Planning
- Mix of Built Typology
- Large Plots = Low Ground Coverage
- Tall Building = High FSI
- No open space added in public realm
- Enable Redevelopment
- Regulate Development keeping the TOD Principles in mind.
- Incentivise creation of area in public realm through redevlopment

STEP 4
ASSESS

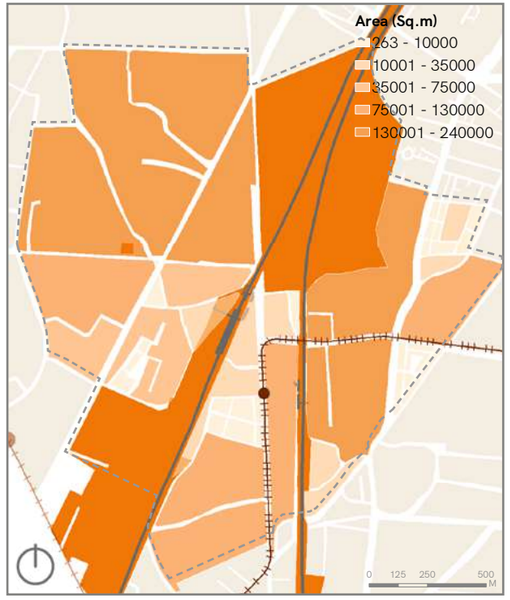
STEP 5
ENVISION

SCALES	STEP 3 - DATA COLLECTION			STEP 4 ASSESS		STEP 5 - ENVISION	PRINCIPLES
	INTENT	DATA COLLECTED	SCENARIO	ISSUES/OPPORTUNITIES	PLANNING BRIEF	PROPOSALS	
AREA	Ownership and redevelopment potential	Cadestral	Two large stakeholders- Railways and private sector	Potential for redevlopment	Incentivize redevelopment and creation of public open spaces	East-west connectivity. Creating a multimodal hub. Facilitate redevelopment of railway land to provide affordable housing component to development incentives such as air rights and making TOZ as TDR receiving zone. Complete street network by adding roads in areas with large blocks having poor accessibility . Increase intersections through plot margins and redevelopment, removing cul-de-sacs. Allocate paid parking zones based on demand and building use.	ACCESS
	Fabric and redevelopment potential	Plot Sizes	Majority large plots of single ownership	Single ownership creating gated communities and compromised walkability	Incentivize redevelopment to increase area under public realm and improve accessibility		DESIGN
	Character	Landuse	Redevelopemnt of mills has led to a horizontal mix of uses	Monofunctional building since vertical mix unexplored	Acknowledging the redevelopment pattern, plan for liberal mixed use zoning including horizontal and vertical mix. Plan for corresponding pedestrian infrastructure, public amenities, social infrastructure and parking management		DENSITY
	Walkability	Block Sizes	Large block sizes due to industrial landuse	Compromised walkability due to large block perimeter requiring 40min to cover a single perimeter	Redevelopment should focus on creating additional pedestrian priority streets to support the changing landuse		
STREET	Accessibility	Street Hierarchy	Linear geography and large parcels of railway land creates an inefficient east-west connection	East-west connection will help reduce traffic congestion and improve accessibility	Provide east-west connection using compliment-ing street hierarchy and providing NMT infrastructure	Dedicated and unobstructured cycling and pedestrian pathways through the area. Redistribution of ROW so as to incorporate all street activities like vehicular movment, NMT movement, utilities, green spaces, vending, busstops, parking for cycles, organized parking for vehicles.	DIVERSITY
	Flow of pedestrian and onstreet space consump-tion	Public realm	Conflict between parking, informal vending and pededstrians	Lack of parking management and large volume of informal activity close to the station	Increase area under public realm to absorb the demand for informal vending zones		AFFORDABILITY
BUILDING	Mix of uses, Population density and use of space over time	Building use	Diverse mix of building uses.Older buildings showcase characteristics of TOB, unlike new development	New developments lack active frontages impacting the street character	New developments to take cue from character of the older development. Older development can be redeveloped while retaining the existing edge character		
	Consumed FSI	Building height	New developments show low ground coverage yet no area being added into the public realm	Unutilised front and side margins due to low ground coverage	Increase area under public realm	Incoporate public domain as a building regulation requirement based on road width. Regulate building frontages to avoid parking towards front margin. Disallow tall compound walls, mandate/incentivize built-to-edge. Incentivize pedestrian access at ground level through private property. Regulate supply of parking in buildings by converting parking minimus to maximums.	PARKING MANAGEMENT
	Relation between public and private	Edge condition	Edges dominated by high compound walls and podium parking	Compromised safety of pedestrians and poor design of public realm	Increased edge porosity through physical or visual connection or active frontages. Amend DCR to shift from parking minimum to maximum.		
	Market demand	Property/land price	High land prices- Employment hub with premium residential units.	Lack of affordable housing choices	Utilise public (railway) land to develop affordable housing		INVEST TO EARN

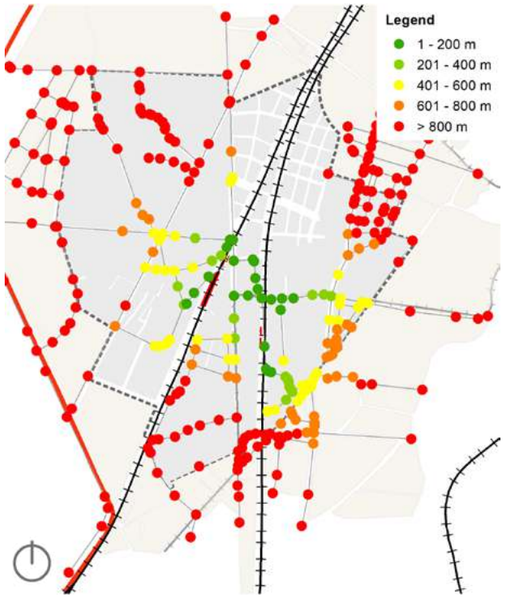
STEP 6

PLAN+DESIGN -IMPROVE NETWORK

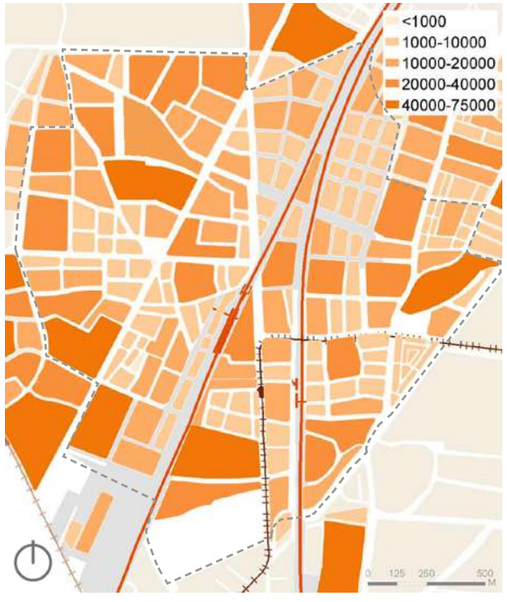
15. EXISTING BLOCK SIZES



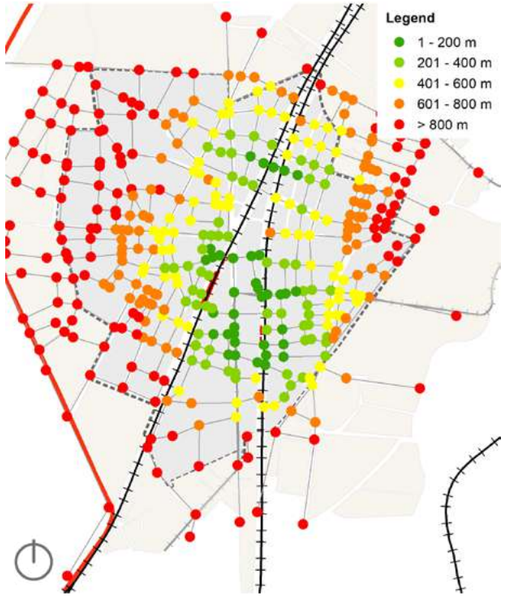
16. ACCESSIBILITY MAP- EXISTING



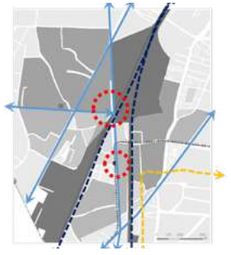
17. PROPOSED BLOCK SIZES



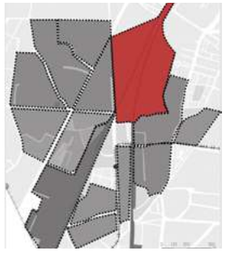
18. ACCESSIBILITY MAP- IMPROVED



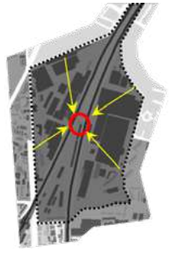
IDENTIFY MOBILITY CORRIDOR



DEMARCATE SUPER BLOCKS

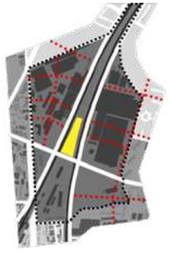


ACTIVITY GENERATOR



MULTI-MODAL HUB

IDENTIFY NEW SUB ARTERIAL ROADS AND PLAN SUBSEQUENT STREETS

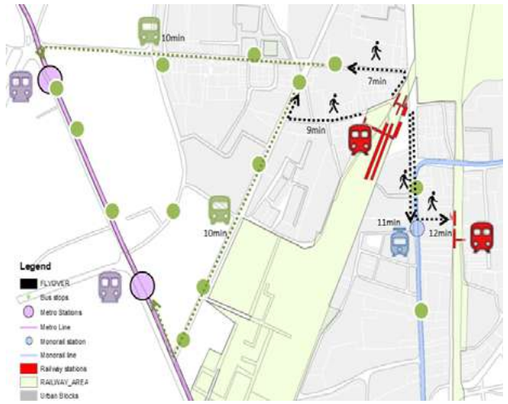


STEP 6

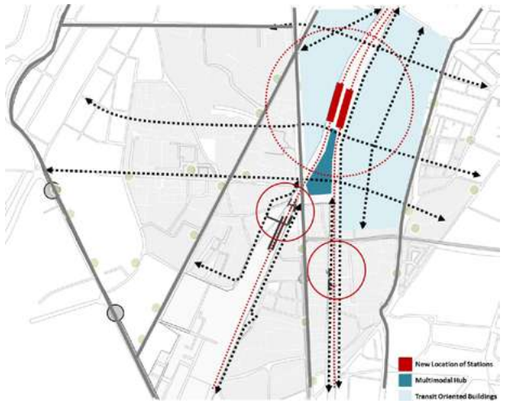
PLAN+DESIGN -IMPROVE NETWORK

Data Required	Intent	Proposal
Plot Size Map	To identify new roads under redevelopment scenario	Proposed Block Sizes
Existing Building Use and Land use Map	To understand pedestrian flows(origin and destination) and possibility of pedestrian thoroughfares	
Street Hierarchy Map	To understand the flow of vehicular traffic	Multi-modal Hub
Existing Footpath Map	To assess NMT network completion	
Existing Accessibility Map	To assess the distance from each node to transit station and identify the need for newer connections	

19. EAST - WEST CONNECTIVITY MAP- EXISTING



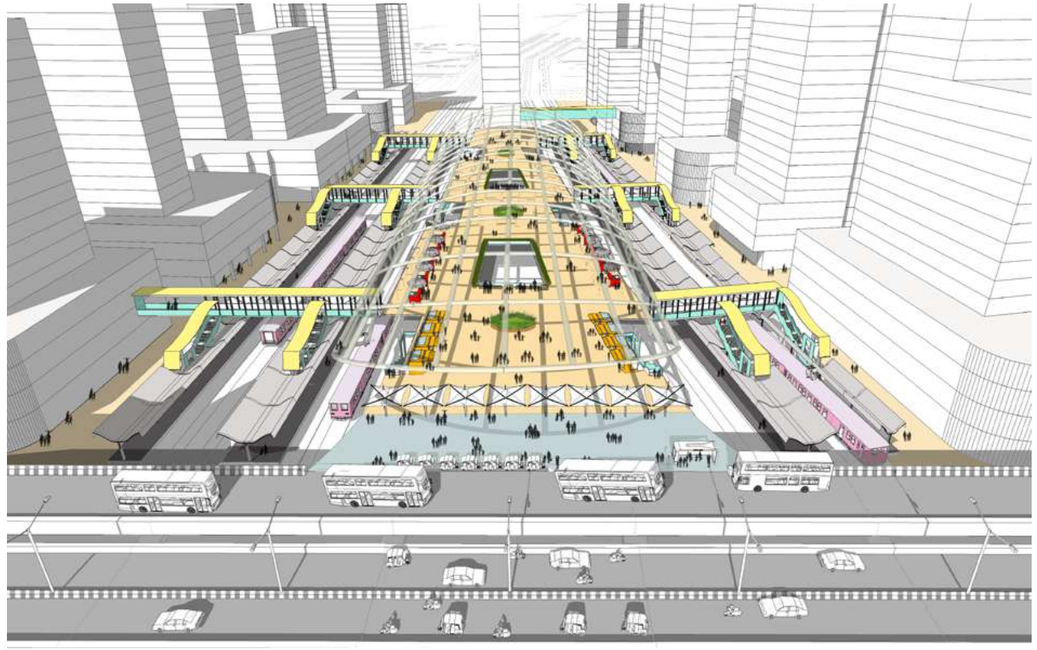
20. EAST - WEST CONNECTIVITY - PROPOSED



The station has great strengths owing to the presence of multiple transit facilities within the 800 meter of the station. But owing to dispersed locations of these structures i.e. Lower Parel suburban rail station, Currey Road suburban rail Station, Mono rail and Metro rail there is hardly any connectivity between these modes. The lack of multi-modal integration, cumbersome station exits, traffic congestion and lack of east - west connectivity greatly affects the potential of the area.

By integrating the Lower Parel and curry road station the transit node can be redesigned into a multi-modal hub (Fig 20). This promotes access across the site by connecting the western and eastern parts of the site. In doing so commuters can transfer from western to the central line conveniently.

21. MULTI-MODAL HUB



The multi-modal hub (Fig 21) promotes 3 different levels of connectivity.

The design promotes direct access from feeder systems (Buses and para-transit) to the transit hub. Thus, promoting seam less transfer across modes.

The design promotes vending activity and pedestrian mobility at the concourse level. By connecting the concourse level to the Transit Oriented Buildings, the pedestrian activity is further expanding and also allows for east - west connection.

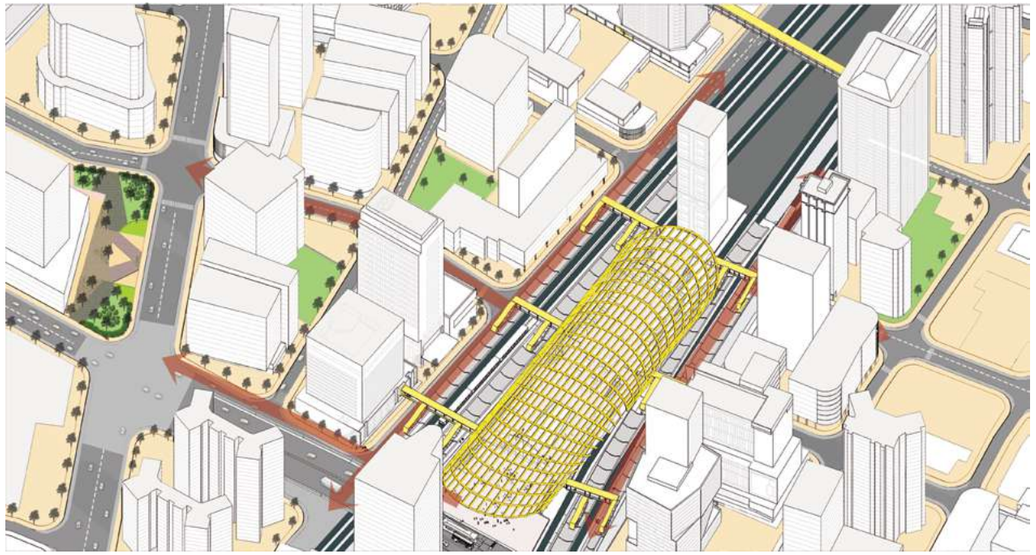
The design enables pedestrians to directly access the multi-modal hub via the street network.

These 3 levels ensures and creates an opportunity for a well connected hub promoting and creating a vibrant public realm.

STEP 6

PLAN+DESIGN -IMPROVE PUBLIC REALM

22. DESIGN AT AREA LEVEL



Data Required	Intent	Proposal
Public Realm activity Map	To evaluate the utilization of street space and relation between activities	Public Realm Area Level - Design Public Realm Street Level Design Public Realm Building Level Design
Street Hierarchy	To understand the flow of vehicular and pedestrian movement and nature of NMT infrastructure required	
Street Section	To understand the distribution of the ROW	
Edge condition	To understand the interface between public and private realm and its impact on the walking environment.	

23. DESIGN AT STREET LEVEL

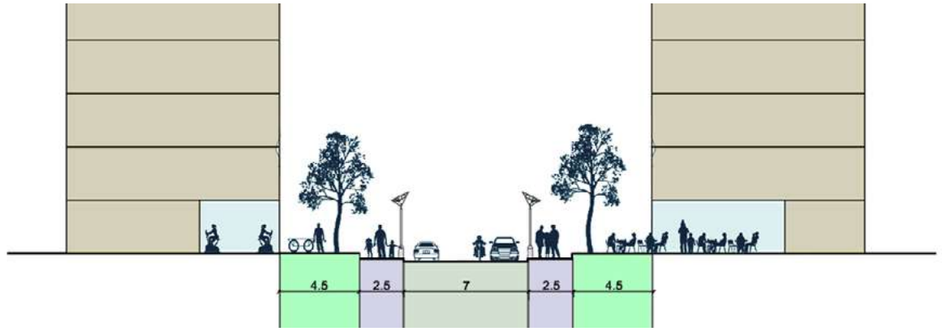
In Lower Parel at the area level, the focus is to design a continuous public realm and augment the effective area under public realm. This is achieved by opening up the spaces in building margins and connecting it with the continuous network of public realm i.e. streets. This would result in a public realm that is active and also further add to the proposed street network, as the effective block sizes will reduce. Hence supporting NMT mobility.

All streets in areas around transit need to prioritize NMT mobility over Motor vehicles mobility. Hence the design supports the seamless movement of NMT by providing a continuous while the motor vehicles are at the lower level. This type of junction would ensure motor vehicles are moving at lower speeds and hence reducing the chances of conflicts.

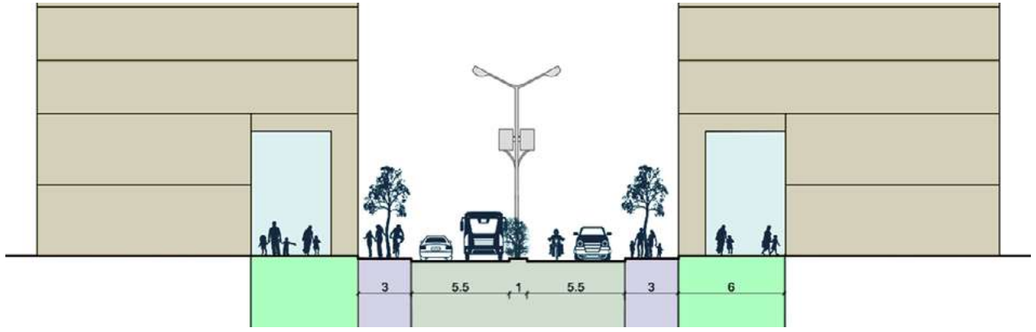
STEP 6

PLAN+DESIGN -IMPROVE PUBLIC REALM

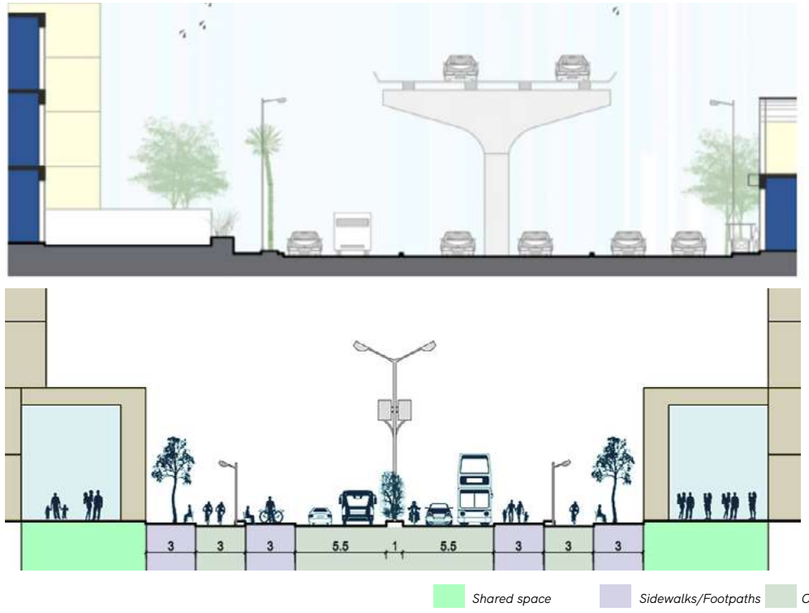
24. 12m ROW - PROPOSED STREET SECTION



26. 18m ROW - PROPOSED STREET SECTION



25. 30m ROW - PROPOSED STREET SECTION



Streets in TOZ have to be geared towards pedestrian and NMV mobility. The proportion of space alloted is to be decided based on the functional hierarchy of the street. Street guidelines should also include the threshold between private and public realm. In all Fig 24 ,25 and 26 the shared space is the site for multiple activities such as vending, eating, walking etc. This when combined with the Transit oriented building guidelines of active edges and open access ground to floor adds more value to shared spaces.

STEP 6

PLAN+DESIGN -IMPROVE PUBLIC REALM

27. DESIGN AT BUILDING LEVEL

The buildings that fall in the areas around transit would not be allowed to construct compound walls and promote built to line via form-based codes or supportive building guidelines will promote an interactive design of the threshold of public - private realm. This would also ensure increase in area under public realm at the building level.

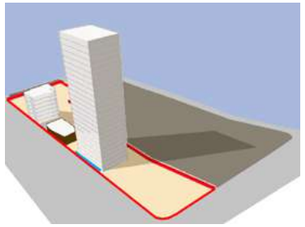
Similarly, the front facade which will face the streets, would not be allowed to have dead activities such as parking. Hence promoting a more interactive public-private threshold which will help increase the foot fall.

The above image further illustrates how the front margins of properties can be utilized to create a vibrant public space, which combines with the NMT pathway.

The central aim of Transit oriented buildings is to create a vibrant and attractive ground floor use. From the above image, despite the internal configuration , if the buildings are built to line and do not possess a hard edge these structures will promote and contribute to the public realm of the area.

28. DESIGN AT BUILDING LEVEL

Residential Appartment



Plot area- 0.11 Ha
Ground coverage- 46%
Height- G+21
FAR- 4
Road width- 18m
Front setback- No
Compound wall- No
Active frontage- Yes, shop line

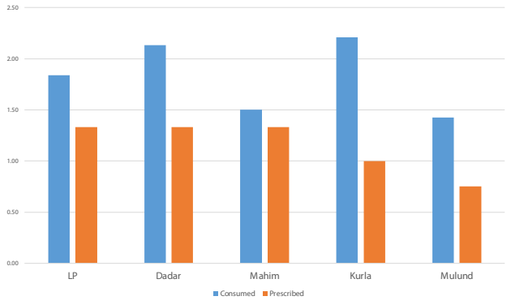
BDD Chawls

Plot area- 4.8 Ha
Ground coverage- 39%
Height- G+3
FAR- 1.2
Road width- 18m
Front setback- No
Compound wall- No
Active frontage- Yes, shop line

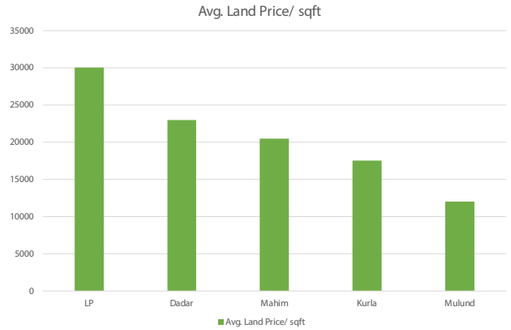
Mill Redevelopment

Plot area- 4.16 Ha
Ground coverage- 13%
Height- G+40
FAR- 1.74
Road width- 24m
Front setback- No
Compound wall- No
Active frontage- Yes, along main road

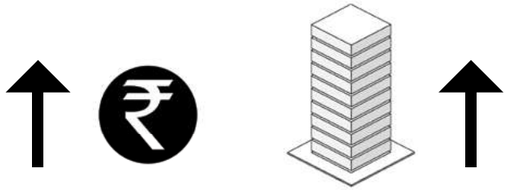
STEP 7
REGULATE -DENSITY



High demand for floor space



Relatively higher land prices (ready reckoner)

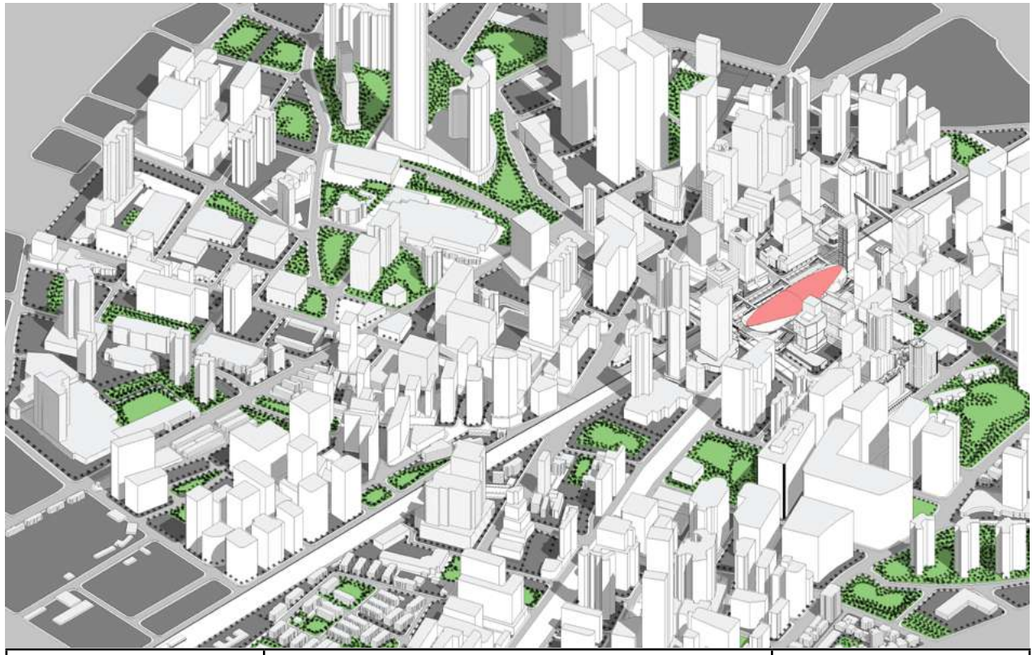


HIGH DEMAND AND HIGH LAND RATES IN LOWER PAREL

Lower parel, being a case of transformation, has a strong and resilient market. The higher land prices and consumption of floor space indicates the need for an increase in build able floor space. Also, large parcels of railway land under utilized proves to be a great opportunity to facilitate the needs of the city. And as density and the resulting human intensity can be experienced in the built form and crowding on streets, this LAP will also focus on strengthening and augmenting the existing public realm so as to support the existing and expected rise in population.

This would mean to promote High Rise and High dense built form. Which can be achieved by increasing the utilization of land (permitting higher FSI) in private and public land and maximizing on the potential of side and rear margins.

29. TRANSFORMATION SCENARIO - PUBLIC REALM + HIGHER BUILDING VOLUMES

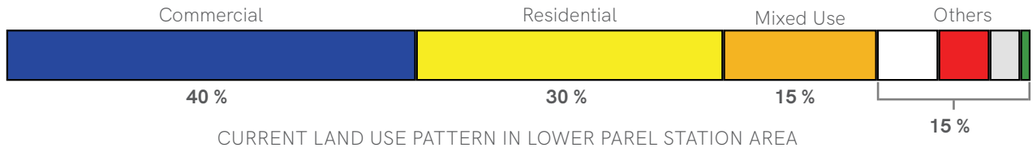


Data Required	Intent	Proposal
Plot Sizes	To understand availability of land from plot margins for redevelopment which contributes to area under public realm and there by crowding in public realm.	Given the transformation scenario and the availability of multiple modes of transit there will be an increase in the use of public realm hence.
Building Use		
Existing street network Map	To understand pedestrian flows(origin and destination) and possibility of pedestrian thorough fares	
Public Realm Activity Map	To assess the level of crowding in the public realm and space consumed.	

To further ascertain an increase in population density, the LAP also suggests building government supported mixed income housing or affordable rental housing on public land.

Apart from this ,as elaborated under the principle of design, the LAP also suggests a well-connected public realm i.e. connecting existing and proposed public spaces,building frontage to be utilized as privately owned public spaces and ensure access to spaces between buildings

STEP 7
REGULATE -DIVERSITY



CURRENT LAND USE PATTERN IN LOWER PAREL STATION AREA

Data Required	Intent	Proposal
Existing building typology and use map	To understand the degree of mix in uses (Horizontal + Vertical) and users	Providing for mixed use development Hierarchy of open spaces within the public realm
Public realm activity map	To understand the different type of activities on street	
Street Section	To understand the distribution of ROW	
Public infrastructure and amenities	To ascertain the availability of public and private infrastructure and amenities	

30. DIVERSITY IN BUILT USE

31. DIVERSITY IN BUILT FORM

32. DIVERSITY IN OPEN SPACES

Current Landuse pattern around the station area has healthy mix showing the potential of the area to develop as diversely integrated commercial and residential development. The LAP attempts to achieve diversity at micro and macro levels. At micro level, allowing diversity in built-form through regulations and at macro level or area level, by identifying incompatible uses i.e. Manufacturing units or any industry which falls into red, orange or yellow category of industries as identified by the Central pollution control board (CPCB)

Areas around transit which are going to handle many commuters and other users, are spaces which will have high levels of interaction. Given the variety of uses and users that exist, This would allow for high rise, high dense commercial structures as well as redeveloped BDD Chawls on the site. Apart from the aforesaid, diversity in open spaces is in integral. Public spaces can vary from interactive streets, to public plazas or neighborhood level parks.

STEP 8
INCENTIVIZE -AFFORDABILITY

Data Required	Intent	Proposal
Cadastral Map	Identify potential sites for new AH projects	Identifying public land (railway) for mixed income housing. Redevelopment of BDD Chawls
Building use and typology map	To identify and assess the demand for AH in the LAP Area.	
Property and land prices	AH to be proposed and located based on market demand at the transit node	
Building condition	To help assist in prioritizing redevelopment for AH	

33. MAP SHOWING POTENTIAL SITE FOR AFFORDABLE HOUSING

The availability of affordable housing in around transit would allow the users of mass transit to live around transit. But as nodes in a city vary, the methods by which it can be implemented vary. There are broadly four strategies that can be employed.

In Lower Parel with nearly 21% of the land falling within the railway lands, there is greater opportunity to develop government sponsored mixed income & mixed use housing. The potential sites are highlighted on the left.

34. CHAWL REDEVELOPMENT

Simultaneously, in the case of the BDD chawls a government supported redevelopment project is preferred. This will redevelop existing BDD chawls into a residential + commercial unit. The design would be as per Transit Oriented Building guidelines while maintaining the human scale of the chawl typology. The Ground floor will promote commercial activity which opens into a central public plaza which allows for pedestrian mobility.

STEP 9
MANAGE -PARKING

Data Required	Intent	Proposal
Existing Building Use	To locate and understand the parking demand	Proposed Demand based pricing at area level
Existing street network Map	To locate parking provision and identify zones for paid parking	
Street Section	To understand road space utilization by parking	
Public realm activity map	To map existing parking (priced and non-priced) and other street activities	
Existing Building Height	To estimate off street parking supply	

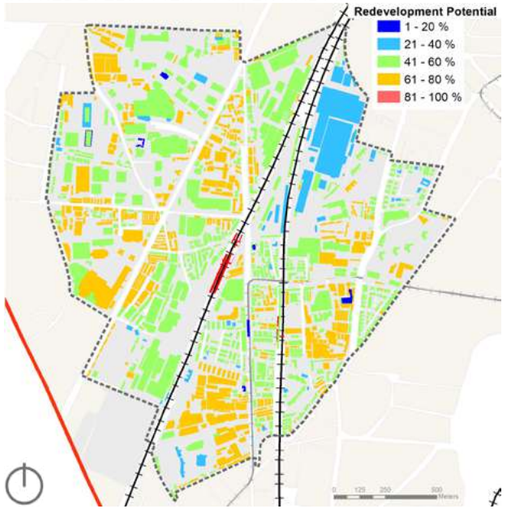
35. DEMAND BASED PRICING AT AREA LEVEL

The case of Lower Parel, Mumbai is an example of transformation scenario which demonstrates high market demand. Treating parking as real estate will enable the city to charge the true cost of parking. This can be done through demand based dynamic pricing while the minimum is much higher than available off-street parking charges.

STEP 10
FINANCE -INVEST TO EARN

Data Required	Intent	Proposal
Building Age Map	The following parameters were used to analyze the redevelopment potential of the site. Each parameter was assigned a weight-age based on which the redevelopment potential is created.	Redevelopment Potential Map
Street Hierarchy Map		
Building Use Map		
Property Price Map		
Consumed FAR		
Cadastral Map	To assess the variations in redevelopment potential based on ownership	Contextualizing Redevelopment Potential

36. REDEVELOPMENT POTENTIAL MAP



Potential sites for investment are largely guided by redevelopment potential of the site. The above map is based on 5 parameters, Road width (25%), Price (15%), age (15%), use (30%) and building height (15%). Within the building use, the highest potential for redevelopment is for industrial use, followed by residential, commercial and lastly institutional.
In case of Lower parel, owing to the very high redevelopment potential, market potential and high human intensity all investments are to be made in improving public realm.

PLAN YOUR AREA

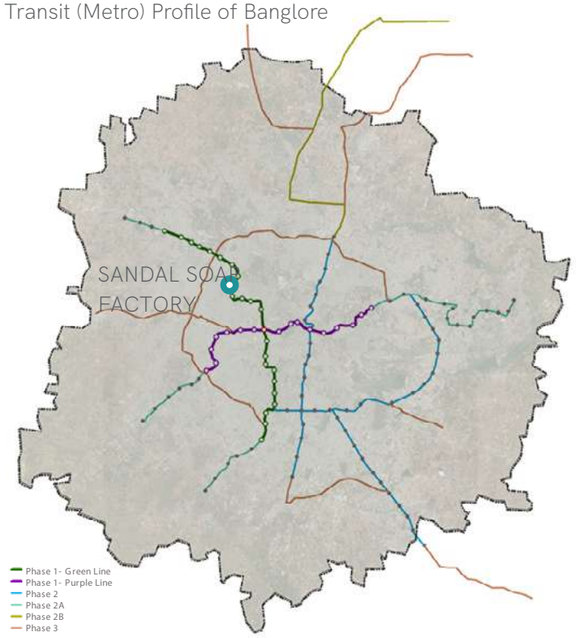
BANGALORE, SANDAL SOAP FACTORY

CASE OF INTENSIFICATION

LAP CASE STUDY

UNDERSTANDING CITY CONTEXT

Transit (Metro) Profile of Banglore



CITY PROFILE

AREA: 741.9 Sq Km
POPULATION: 8.5 million (Census 2011)
DENSITY: 16016 People/Sq Km

PUBLIC TRANSIT

Metro - 42.3Km, 40 stations
Daily ridership - 4 Lakh
City Bus - 6203 Buses
Daily ridership - 35.8 Lakh

TRANSIT BEHAVIOR

Bus - 28%
Car - 10%
2W - 23%
Cycle - 5%
Walk - 29%
Auto/Taxi - 3%

Bangalore is one of the primate cities of India and the capital of Karnataka. Since the 2000's the city has attracted various industries and is the hub of the IT Sector. The city, was initially referred to as the garden city and then silicon valley of India, is growing at a rapid rate both demographically and spatially. The population has reached 11.9 million (2019) and has spread over an area of 741.9 Sq.Km. With such growth pressure, the development in city is happening at an unprecedented rate.

The growing population and size of city had increased the no. Of private vehicles. This resulted in increase in pollution levels, congestions and road accidents. This called for the need of a mass transit system like metro rail in the city. City's Current Metro System started implementing from May 2011 and developed over several phases.

STEP 1-2
DELINEATE-SITUATE

SITE & CONTEXT:

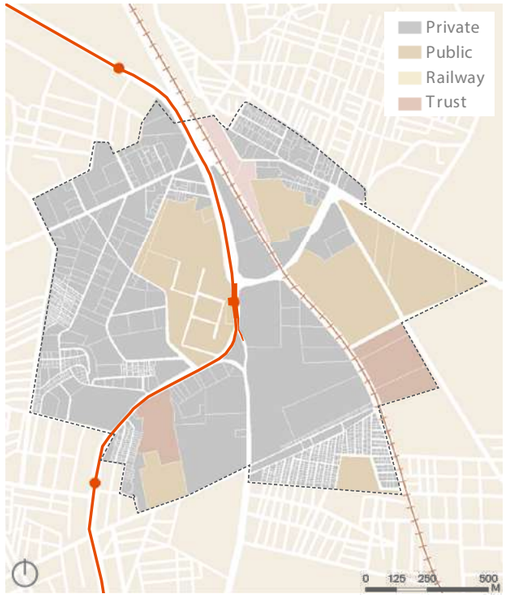
The Sandal Soap Factory metro station is located on the green line, 7th station from Nagasandra in the north. The station gets its name from the Sandal Soap Factory, a public sector undertaking under state government, which abuts the station. The station area was once an industrial area dominated by non-obnoxious industries. The spreading of city, pressure of development and shifting of industries to Peenya initiated redevelopment in the zone. This shift began with Brigade Gateway's construction in 2006, on a former industrial land. Also in the vicinity of the station are landmark like metro Cash and carry, Yeshwanthpur Traffic and Transit Management Centre (TTMC) and ISKON temple.
Given the presence of industrial lands and large swathes of public land, sandal soap factory, becomes a case of intensification. Where the LAP will enable the intensified usage of these land parcels to create opportunities of mixed income housing, better street network and increased area under public realm.

Site Delineation: A buffer of 800m from the Sandal Soap Factory station is taken into consideration for LAP

Transit Oriented AREA

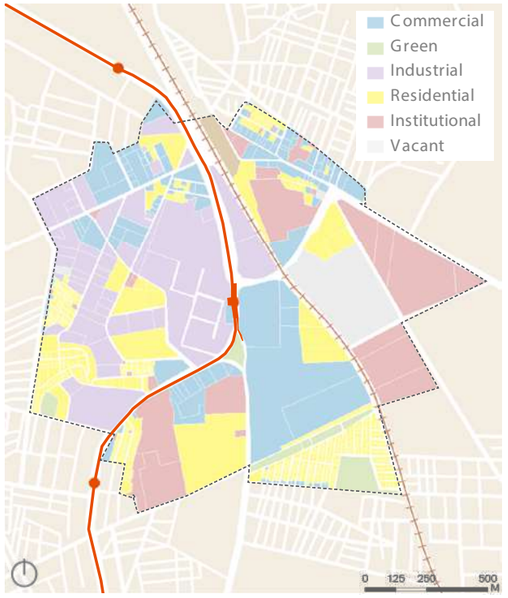
STEP 3
DATA COLLECTION AT AREA LEVEL

1. CADASTRAL



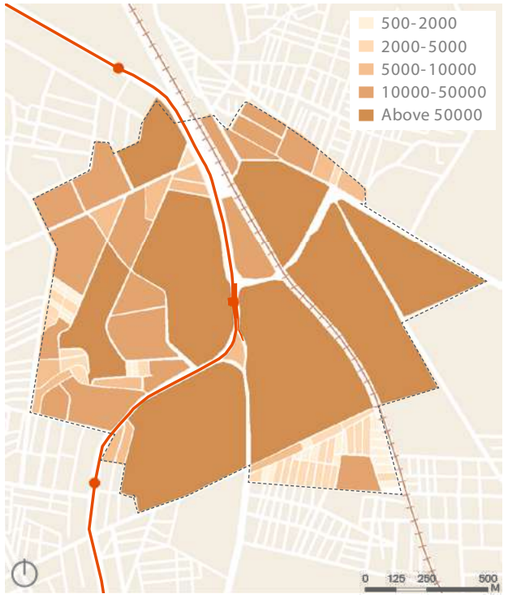
The ownership pattern in the area was studied and it revealed 24.42% of land under public ownership, about 3.15% under trust and the remaining under private. A huge percentage of land under public belongs to Mysore sandal soap factory along with TTMC, IISC and railway. These lands are not utilized to their potential and are consuming prime real estate of the city.

2. LAND-USE



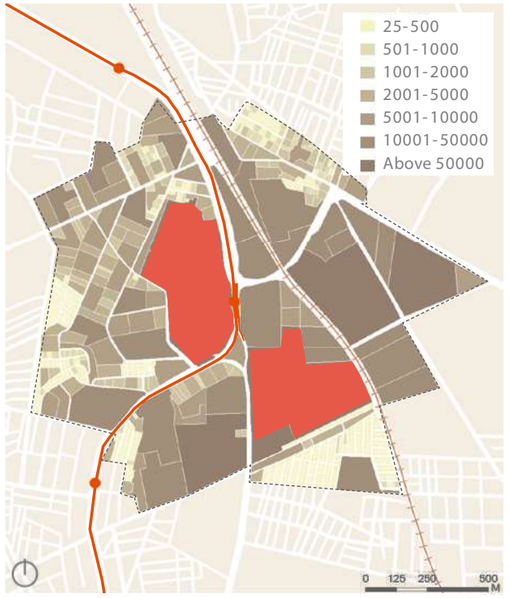
The area has an almost equal percentage of residential (22.5%), commercial (24.9%), industrial (24.6%) and institutional (19%) uses. The area has also about 5.9% vacant land and about 2.8% of land under greens. The development pattern in the area suggests a fast shift from industrial to commercial and residential land-use.

3. BLOCK SIZES



The block sizes have a huge impact on walkability and accessibility in the area. The area is dominated with huge blocks (especially the ones close to the metro station). This hampers the pedestrian accessibility and also movement to and/or from the metro station.

4. PLOT SIZES

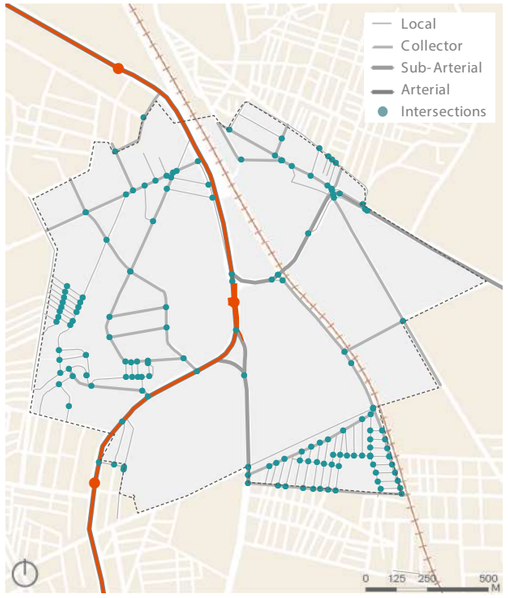


The area has huge plots, wherein, at places one plot makes up an entire block. For example, the plot on which brigade gateway and sandal soap factory hampers through movement. This worsens the accessibility and pedestrian connectivity in the area.
Mean plot size in the area is as high as 1577 sq.m. and thus poses a challenge for connectivity in the station area. Adding to the challange of connectivity is the railway line that hampers east-west movement.

STEP 3

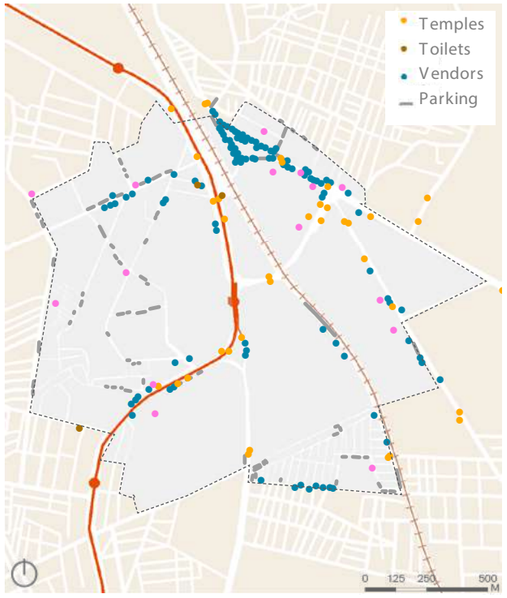
DATA COLLECTION AT STREET LEVEL

5. STREET HEIRARCHY AND INTERSECTIONS



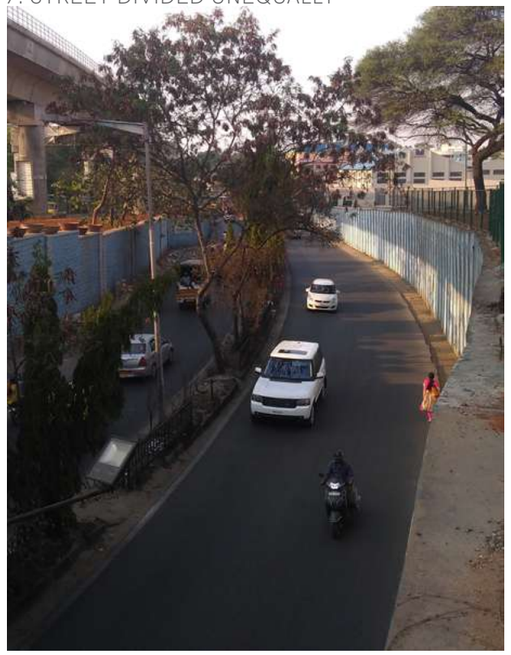
As mentioned earlier, the block sizes are huge in the area and hampers movement. This also renders the street network not very friendly for pedestrians. The area under roads in the station buffer amounts to only about 13%. Also, the distribution of road space is inequitable, wherein, motorized vehicles are using the majority of the ROW and side-lining the other users of the street.

6. STREET ACTIVITIES



The streets accommodate various activities and public amenities. This includes vending spaces, parking, bus stands, public toilets and resting points. Currently these activities, without any allocated space, share street space with vehicles and pedestrians. These activities are essential to the street and activate it. These spaces add to the diversity in area, allow easy availability of daily retail, provide livelihood. Hence, these activities should be formalized and streets should be designed keeping these existing activities in consideration.

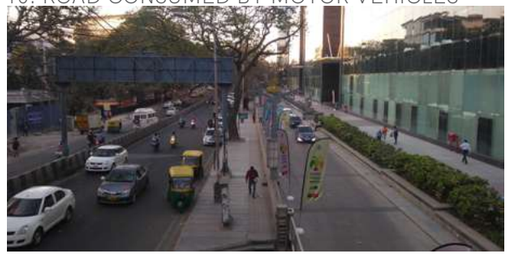
7. STREET DIVIDED UNEQUALLY



8. PARKING PEDESTRIAN CONFLICT

9.SHARED USAGE OF A LOCAL STREET

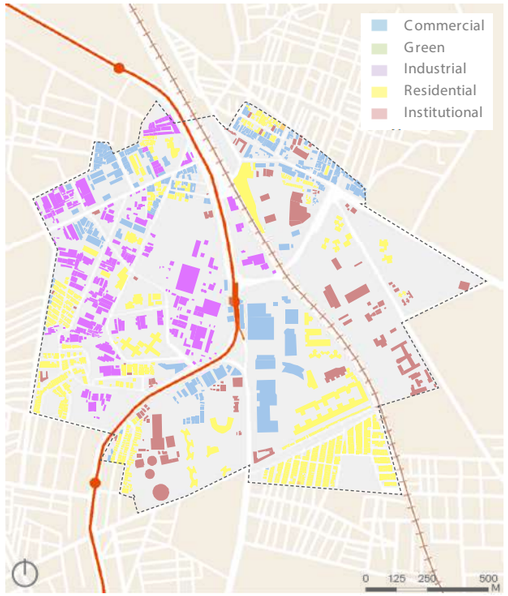
10. ROAD CONSUMED BY MOTOR VEHICLES



11. NO FORMAL SPACES FOR VENDING

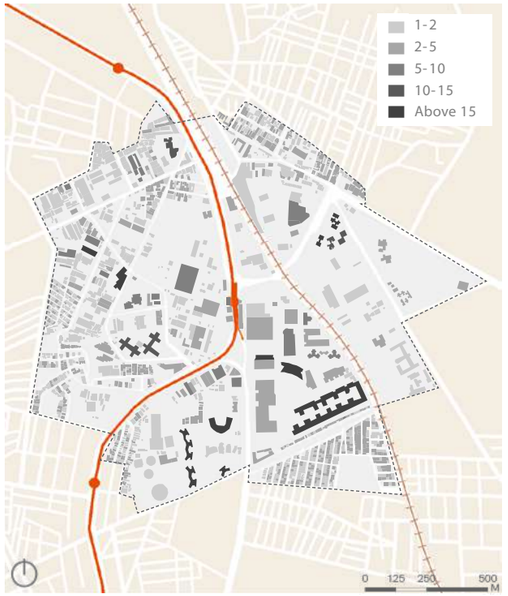
STEP 3
DATA COLLECTION AT BUILDING LEVEL

12. BUILT-USE



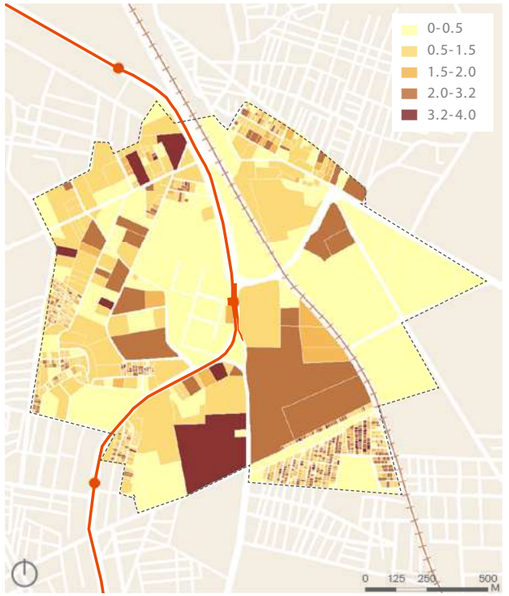
The built typology in the area is dominated by industrial buildings, followed by residential typologies. There is a mix of residential typology in the area. While the older built areas have the bungalow and row-house typology, the new residential building are majorly high-rise apartments. The commercial in the area also vary from malls and office spaces like World Trade Centre to the small retail shops.

13. BUILT HEIGHT



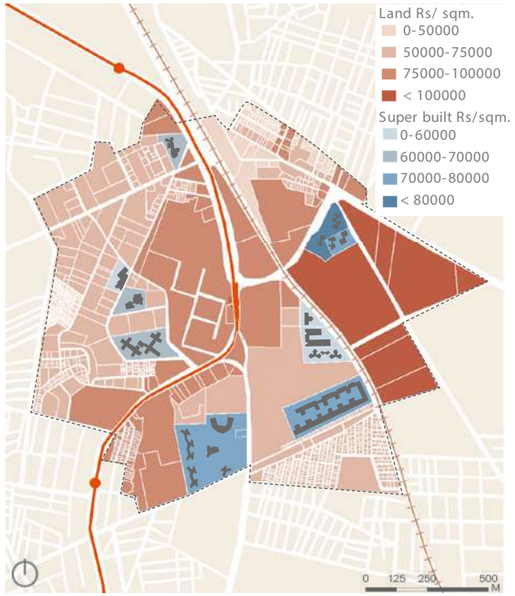
The area was earlier a low rise industrial and residential area, with generally G+1 and G+2 built fabric. But, recently (since 2006), with the onset of redevelopment has high rises adding to its skyline. The new-built is generally soaring high with apartments and commercial towers generally above 15 floors.

14. CONSUMED FSI



The area shows stark difference in FSI consumption patterns. Wherein, industrial and institutional plots in the area are consuming low FSI and are not using the prime land upto its potential. On the other hand, the new high-rise condominiums are consuming high FSI.

15. GOVT REGULATED RATES



The land-value regulated by government (2017-2018) varies from INR 36000 per sq. m. to INR 106600 per sq. m. The value of apartments/ flats is prescribed as cost per sq. m. on super built-up area and ranges from INR 85100 to 52000. The land prices near transit are generally high as it is in this case. This high real estate leaves the area less affordable for all sectors of society.

STEP 4
ASSESS

ISSUES/OPPORTUNITIES | PROPOSAL

T.O. CITY

- Lack of affordable options in areas accessible to transit.
- No provision for pedestrians and NMT users.

- Link affordable housing schemes like PMAY with Transit Oriented Development Plans.
- Make policies such that more EWS and LIG options are created in areas near transit.
- Focus on pedestrian and NMT infrastructure as a priority in TOD areas.

T.O.AREA

- Lack of connectivity to TTMC and Yeshwanthpur Railway Station from metro station.
- Underutilized or defunct Govt. Land
- Slum and Unorganized street vending
- High rate of redevelopment of industrial and vacant land
- Lack of affordability

- Connect the three atleast for pedestrian access.
- Redevelop Government lands while intensifying their usage to its potential.
- Organize the activities with dedicated spaces.
- Make development regulations to guide the upcoming development in the area.

T.O.STREET

- Big blocks creating lack of pedestrian walkability
- Weak connection to metro station
- Lack of PT and NMT infrastructure

- Break down block sizes wherever possible, o else provide for public access from private properties.
- Distribute road space such that the distribuition is equitable for all street users.

T.O.BUILDING

- New-Built Gentrification
- Rampant compound wall architecture
- Lack of eyes on street

- Mandate a percentage for EWS and LIG provision in all new construction effectively.
- Ensure active frontages and incentivize mixed land-use in the area.

STEP 4
ASSESS

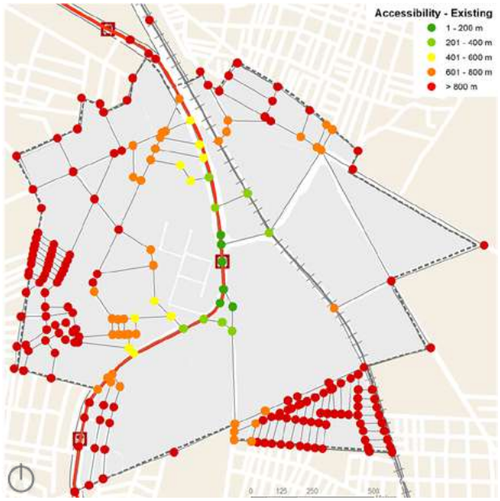
SCALES	Intent	Data Collected	Scenario
AREA	Ownership and redevelopment potential	Cadestral	25% land under public ownership (Sandal Soap factor, TTMC, Railway)
	Fabric and redevelopment potential	Plot Sizes	Average plot size 1577 SqM
	Character	Landuse	Balanced mix of residential (22.5%). Commercial (24.9%), industrial (24.6%), institutional (19%) uses. 5.9% vacant land and 2.8% green spaces
	Walkability	Block Sizes	Large block sizes especially close to the metro station
STREET	Accessibility	Street Hierarchy	Intersection density is less owing to the large block sizes
	Utilisation of ROW	Street sections	Poor distribution of road space
	Flow of pedestrian and onstreet space consumption	Public realm	Co-existence of multiple activities including vending, parking, bus stands, public toilets and resting points
BUILDING	Mix of uses, Population density and use of space over time	Building use	Area dominated by large industrial units with diverse residential typologies
	Consumed FSI	Building height	Post 2006 shift from G+2 structures to high rise commercial and residential towers.
	Population Density, Income and use of space over time	Building typology	
	Redevelopment potential	Building age	
	Relation between public and private	Edge condition	Large single ownership plots make the edges impermeable with high compound walls
	Market demand	Property/land price	Government rate varies from INR 36,000/sqm to INR 1,06,600/sqm. Land prices generally higher along the transit.

STEP 5
ENVISION

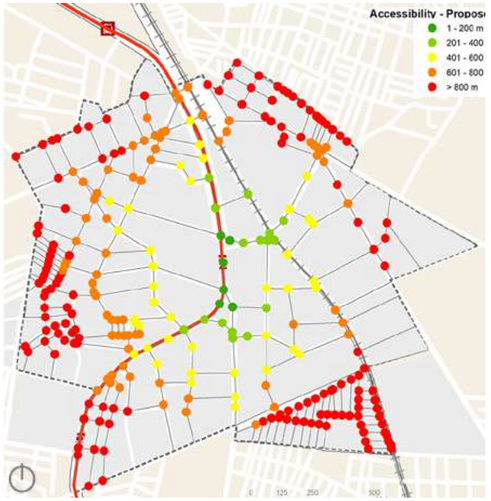
Issues/Opportunities	Planning Brief
potential for redevelopment	Incentivize redevelopment and creation of public open spaces and affordable housing
Large plots with singular ownership hampers accessibility and pedestrian connectivity	Incentivize redevelopment to increase area under public realm and improve accessibility
Development patterrn suggests a shift from industrial to commercial and residedntial landuse	Plan for liberal mixed use zoning including horizontal and vertical mix to accommodate the shift from industrial to residential and commercial use.
Compromised access to metro station	Improve accessibility prioritising blocks along metro corridor
Incomplete street network resulting in low permeanbility for pedestrians and NMT	Physically integrate TTMC, Yeshwanthpur Railway Station and Metro Station and increase number of intersections to facilitate movement across transit area
Motor vehicles consume majority of ROW and NMT is sidelined	Plan for shared streets
No dedicated space for these activities causing conflict at multiple instances	Plan for equitable distribution of ROW and shared streets
Diversity of users and uses	DCRs to permit such diversity in uses and users
Exisitng demand for high FSI consumption	Plan for vertial mix of uses and users. Incemtivise and plan for redevelopemnt of industrial plots
Unsafe and inaccssible for pedestrians	Redesign edges of large plots and blocks to improve walkability and provide access to the exisitng green spaces. This will result in increased are under public realm.
Increasing demand for commercial and residential	Incentivise affordable housing or mixed income housing while catering to the market demand

ACCESSIBILITY

16. ACCESSIBILITY MAP- EXISTING



17. ACCESSIBILITY MAP- IMPROVED (PROPOSED)



The Sandal soap factory area, is dominated by large scale commercial, residential, Institutional and industrial units. Hence creating large and inaccessible block sizes and affecting walkability. Which is reflected from the accessibility map (Fig 1).

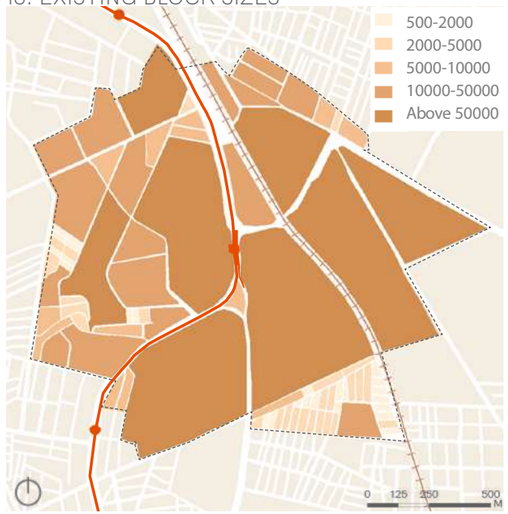
The key focus area under accessibility was to reduce the overall distance traveled and time consumed by an individual. Hence the LAPS identified the various broken links via the accessibility map.

The proposed links, were either extension of existing links , constructing new links and also building newer connections between key landmarks. Like for e.g. TTMC,Metro Station and sandal soap factory.

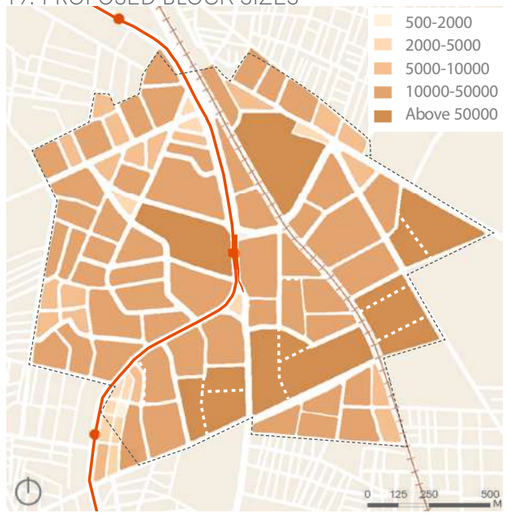
These interventions in effect created public realm by adding more onto streets and reduced the block sizes as seen in Fig 4. The area under public realm increased to 26% from 12.96%.

Data Required	Intent	Proposal
Plot Size Map	To identify new roads under redevelopment scenario	Proposed Block Sizes and road network
Existing Accessibility Map	To identify dead ends or broken links	
Existing Building Use and Land use Map	To understand pedestrian flows(origin and destination) and possibility of pedestrian thoroughfares	

18. EXISTING BLOCK SIZES



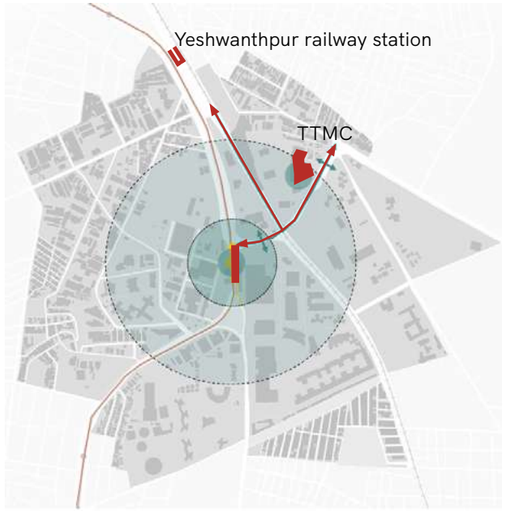
19. PROPOSED BLOCK SIZES



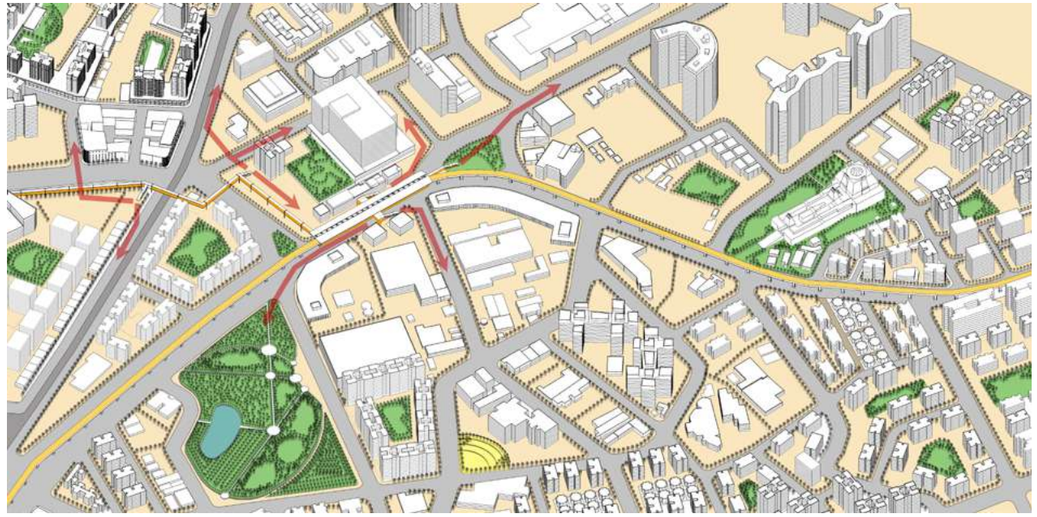
ACCESSIBILITY

20. ACCESSIBILITY MAP- EXISTING

21. ACCESSIBILITY MAP- EXISTING



22. CONNECTIVITY TO THE STATION AND PUBLIC REALM AROUND



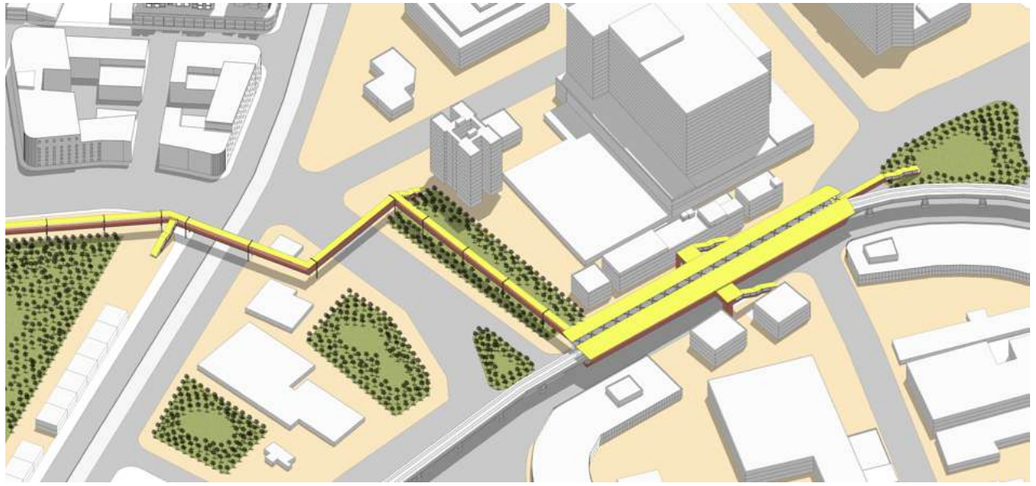
Existing Building Use	Identify major institutions,public spaces etc.	Pedestrian Sky walk
Existing Footpath Map	To assess NMT network completion	
Existing Accessibility Map	To assess the distance from each node to transit station and identify the need for newer connections	

Major transit structures like Traffic Transit Management Center, Yeshwanthpur Railway Station and the sandal soap metro station are not easily accessible. The Area level proposal suggest to connect all these places through pedestrian sky walk bridge to enhance the accessibility in this area.

The pedestrian sky walk also connects pedestrians to near by public spaces and further adds to the network of streets created.

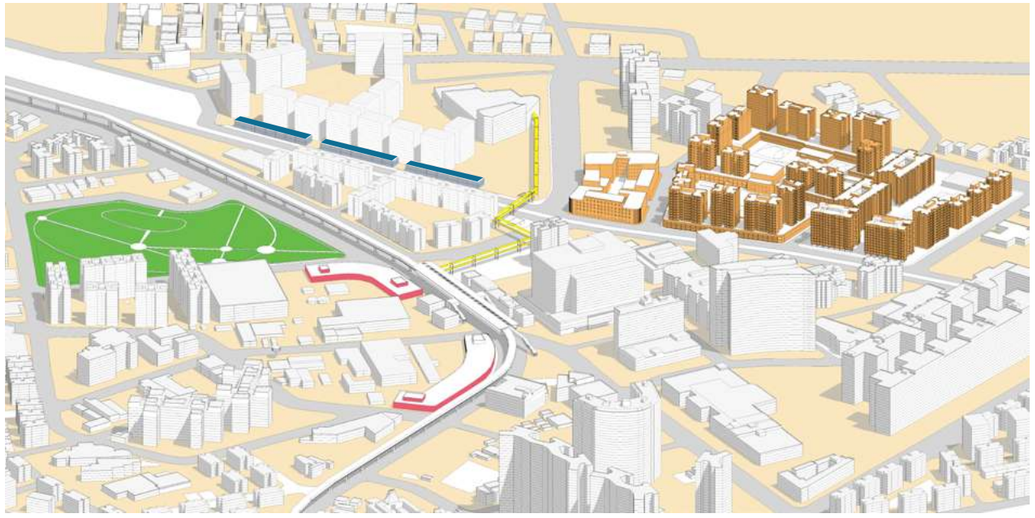
DESIGN

23. PUBLIC REALM DESIGN AT AREA LEVEL



Data Required	Intent	Proposal
Public Realm activity Map	To evaluate the utilization of street space and relation between activities	Public Realm Area Level - Design Public Realm Building Level Design
Street Hierarchy	To understand the flow of vehicular and pedestrian movement and nature of NMT infrastructure required	
Edge condition	To understand the interface between public and private realm and its impact on the walking environment.	

24. PUBLIC REALM DESIGN AT AREA LEVEL



To enhance the overall livability of area, the LAP proposes multiple interventions in the public realm at the area level. The redevelopment of frontage of sandal soap factory into active retail spaces, redesigning land under sandal soap factory into a public garden and reorganizing street vendor activities .

This is further complimented by opening up the space between buildings, it expands the area under public realm and promotes free pedestrian and NMT movement. Such identified projects will be taken up in phase wise development.

DESIGN

25. PUBLIC REALM DESIGN AT BUILDING LEVEL

SANDAL SOAP FACTORY - ACTIVATE PLOT EDGES

EXISTING

PROPOSED

Currently, areas next to station are gated and have high compound walls which leads to lesser porosity and visual connectivity to area. In Redevelopment scenario it is suggested to incorporate more active facades through covered walkways and shop fronts, dedicated vending spaces, drop-off areas for IPTs would lead to more vibrant and active environment since it adds more eyes on streets.

TRAFFIC ISLAND- ACTIVATE DEAD SPACE

EXISTING

PROPOSED

Opening up existing traffic islands to pedestrian mobility will greatly add to the area under the public realm and its diversity. Apart from this, it can also act as a breather space for those exiting the metro station.

26. ACTIVATE BUILDING FACADE AND FRONTAGE

The LAP, looks at the changing the scenario of residential neighborhood and enables a more flexible approach to accommodate various functions such as small scale retail, medium commercial, recreational and office spaces. Aligning the built form to create continuous street edge would help to create threshold between public and private realm.

Built form with setback on ground floor will create a shaded, deep covered space on ground. No compound walls would extend the walkways and merge the public and private realm.

DENSITY

27. BUILT FORM DENSITY

Given the large portions of public and private land, the LAP supports an intensified usage of existing land parcels. This would entail intensifying the market, by catalyzing existing markets with specific site interventions. In this LAP this is proposed to be achieved by the introduction of large mixed income housing projects and redesigning of the public realm, by introducing area level public spaces and improved connectivity.

Along with the project centric approach, regulations which support higher building volumes are to be introduced. This is to be further supported by introducing a minimum cap of specific dwelling unit sizes, which will enable densification.

28. NETWORK OF PUBLIC REALM IN INTENSIFICATION SCENARIO

Data Required	Intent	Proposal
Plot Sizes	To understand availability of land from plot margins for redevelopment which contributes to area under public realm and there by crowding in public realm.	Increase in floor space Increase in area under public realm Introduction of catalytic projects i.e. Mixed income housing
Building Use		
Existing street network Map	To understand pedestrian flows(origin and destination) and possibility of pedestrian thorough fares	
Public Realm Activity Map	To assess the level of crowding in the public realm and space consumed.	

The increase in density and building volume also needs to be supported with a simultaneous increase in public realm. The above figure illustrates the network of public spaces that the LAP creates and hence will be supportive of increased human density.

The above scenario illustrates the increase in amount to public realm in the area from 13% to 27% through interventions of various scale of public spaces and plazas. This is possible due to opening of land under Sandal Soap Factory and interventions on the defunct industrial lands along with the vast amount of railway land in the area.

DIVERSITY

29. DIVERSITY IN BUILT USE

In the station area, owing to the presence of existing of industrial, commercial and residential uses the LAP aims to promotes a flexible land use framework. This framework aims to create mixed use units which allow a commercial or institutional use for the ground floor and ground floor plus 1. Such units should also accommodate public access of the ground floor.

To do this the LAP will incentivize mixed use buildings over mono-functional units, by means of additional building volume. And will also disallow or regulate industrial units based on the pollution category as stipulated by the state pollution control board. For e.g. those industries which are under red, orange and yellow category will be prohibited.

30. DIVERSITY IN OPEN SPACES

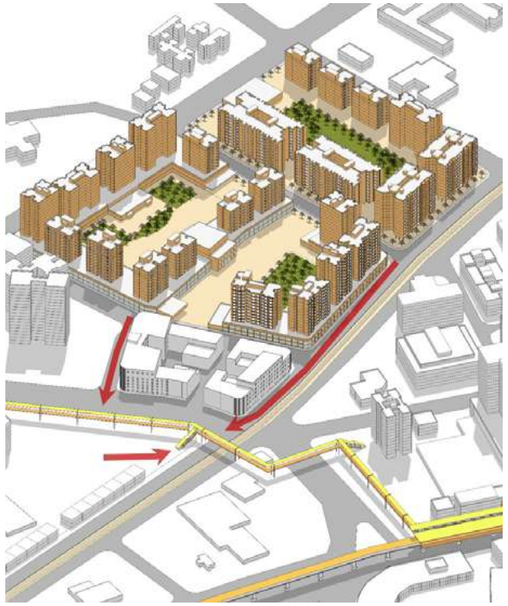
Data Required	Intent	Proposal
Existing building typology and use map	To understand the degree of mix in uses (Horizontal + Vertical) and users	Providing for mixed use development Hierarchy of open spaces within the public realm
Public realm activity map	To understand the different type of activities on street	
Street Section	To understand the distribution of ROW	
Public infrastructure and amenities	To ascertain the availability of public and private infrastructure and amenities	

Identifying the need for different degrees of public spaces,the LAP proposes area level public gardens, block level landscape plaza and public plazas. In doing so providing sufficient space and opportunity for multiple activities to take place. These public spaces along with pedestrian friendly streets and buildings with publicly accessible ground floor spaces adds considerably to public realm and its quality.

AFFORDABILITY

Data Required	Intent	Proposal
Cadastral Map	Identify potential sites for new AH projects	Mixed income housing
Building use and typology map	To identify and assess the demand for AH in the LAP Area.	
Property and land prices	AH to be proposed and located based on market demand at the transit node	
Building condition	To help assist in prioritizing redevelopment for AH	

31. MIXED INCOME HOUSING

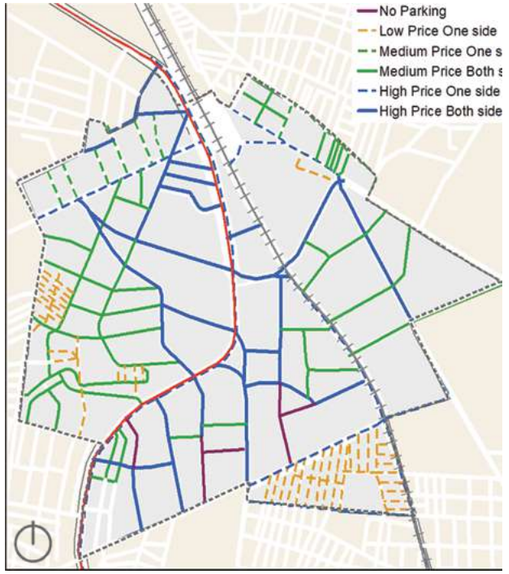


In Yeshwanthpur, LAP proposes a mixed income housing complex in defunct industrial land and railway lands which is located in walkable distance from metro station. The housing unit will also support commercial and other amenities on the ground floors.

PARKING

Data Required	Intent	Proposal
Existing Building Use	To locate and understand the parking demand	Proposed Demand based pricing at area level
Existing street network Map	To locate parking provision and identify zones for paid parking	
Street Section	To understand road space utilization by parking	
Public realm activity map	To map existing parking (priced and non-priced) and other street activities	
Existing Building Height	To estimate off street parking supply	

32. DIFFERENTIAL PRICING AT AREA LEVEL

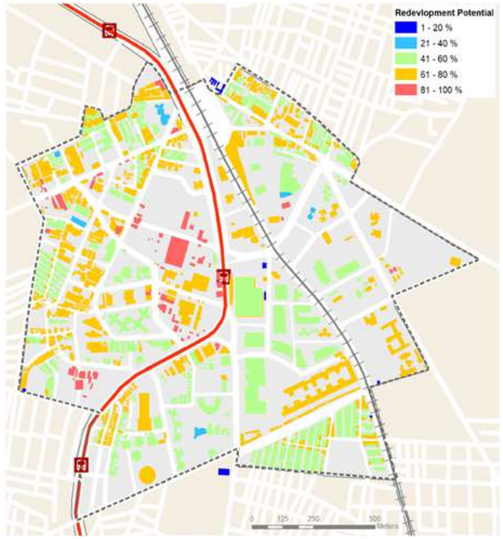


A phased out pricing strategy which begins with the transit node will help put in place a pricing regime.
Given Bangalore's heavy traffic restricting vehicle use on certain pathways closer to the transit node would further discourage parking,this step is to be implemented after the pricing mechanism is in place.

INVEST TO EARN

Data Required	Intent	Proposal
Building Age Map	The parameters were used to analyze the redevelopment potential of the site. Each parameter was assigned a weight-age based on which the redevelopment potential is created.	Redevelopment Potential Map
Street Hierarchy Map		
Building Use Map		
Property Price Map		
Consumed FAR		
Cadastral Map	To assess the variations in redevelopment potential based on ownership	Contextualizing Redevelopment Potential

33. REDEVELOPMENT POTENTIAL MAP



While comparing the existing building use map Fig 12 and Fig 33, it is quite evident that a large number of industrial units are likely to under redevelopment. Given the case, the LAP could focus on redeveloping industrial plots first as part of phase 1.

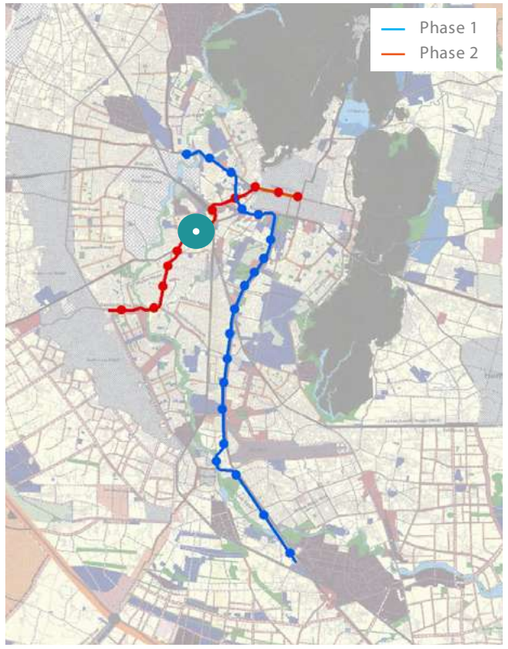
PLAN YOUR AREA

JAIPUR, CIVIL LINES

CASE OF INFILL

LAP CASE STUDY

UNDERSTANDING CITY CONTEXT



Jaipur is surrounded by Nahargarh hills in north and Jhalana in the east which are part of Aravalli hills. It is one of the earliest planned cities of India, planned on the principles of vastu and modelled as 9 squares under the architectural guidance of Vidyadhar Bhattacharya. It was founded on 18 November 1726 by Maharaja Jai Singh II, the ruler of Amber, after whom the city is named. Jaipur is also part of the golden triangle of tourism.

CITY PROFILE
AREA: 484.64 sq.km
POPULATION: 3.1 million
(Census 2011)
DENSITY: 6404 people/sq.km

PUBLIC TRANSIT
Metro - 9.7 km (operational) + 25.4 Km (proposed)

TRANSIT BEHAVIOR
Public transit - 19%
Rickshaw - 6%
Taxi - 4%
Car - 8%
2W - 31%
Walk & cycle - 32 %

STEP 1-2
DELINEATE-LOCATE

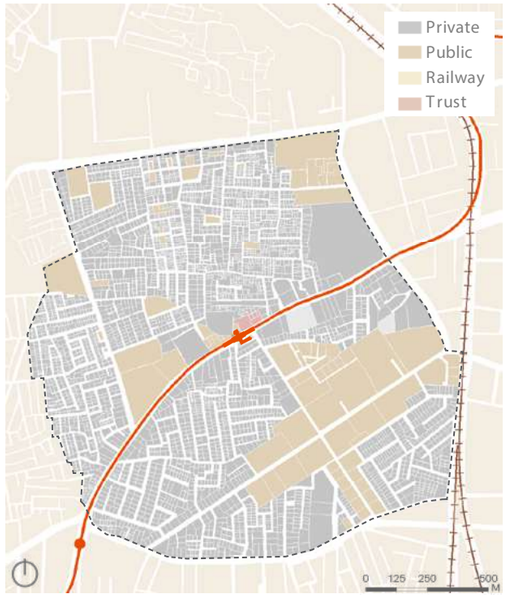
The Civil lines in Jaipur, like many others in the country, was originally a residential area developed for senior civilian officers during the British raj and continued to remain as one. With the introduction of a new ring road in the master plan of 2011 and subsequently the metro phase 1 in 2014, the area began to slowly transform, with medium rise commercial structures. Although, predominantly still a residential area, there is a slow infusion of commercial along the main transit corridor.

Transit Oriented AREA

STEP 3

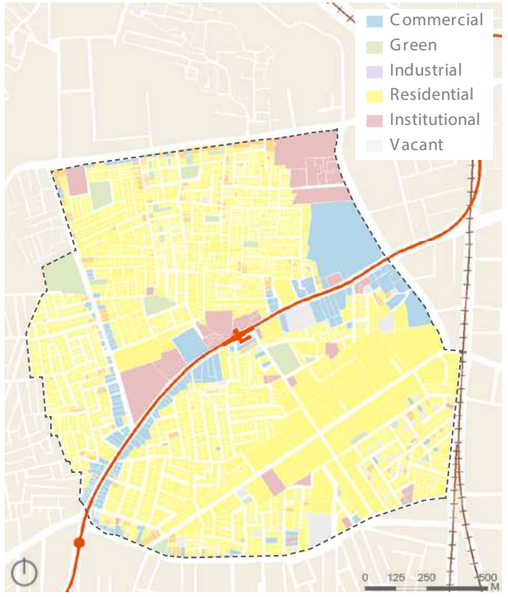
DATA COLLECTION AT AREA LEVEL

1. CADASTRAL



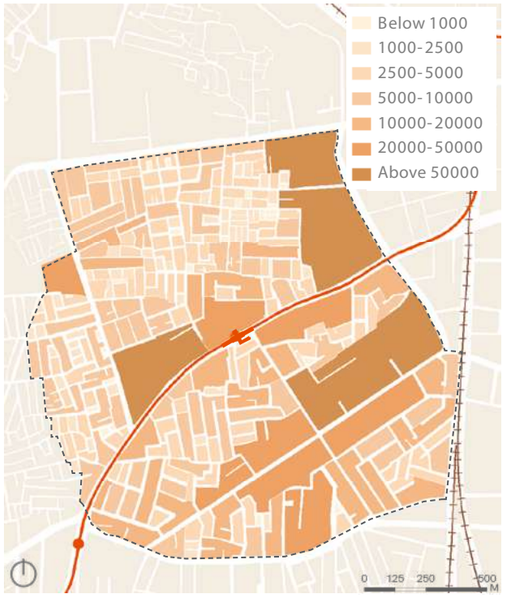
The area has about 20% of land under public ownership. The major percentage of this public land is dedicated to government quarters and bungalows for civil servants. The land, in general, is underutilized and can be seen as a potential of catalytic development in area.

2. LAND-USE



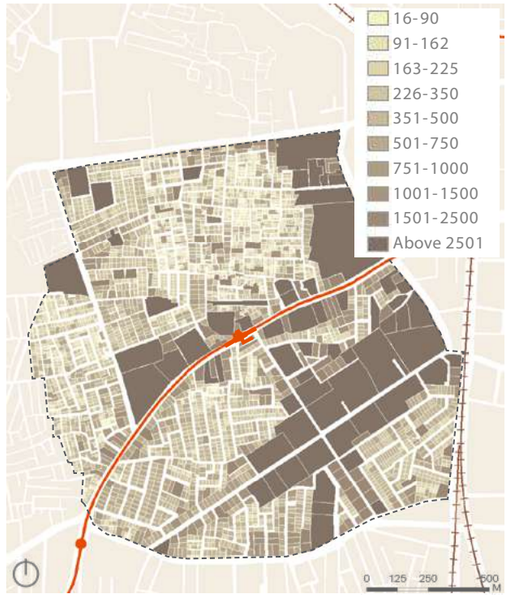
The area is dominated by residential use that forms 70% of land-use. Commercial (13%), institutional (7%) and mixed uses can be observed along the major roads.

3. BLOCK SIZES



The block sizes have a huge impact on walkability and accessibility in the area. The area has big blocks close to the metro station. This hampers the pedestrian accessibility and also movement to and/or from the metro station. In general, the block sizes are walkable.

4. PLOT SIZES

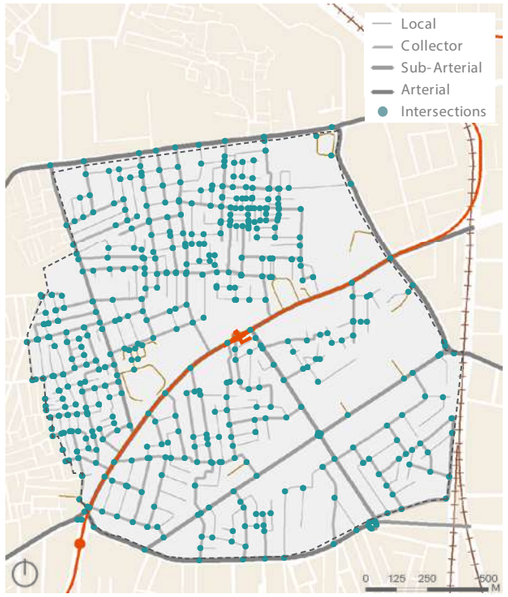


The plot sizes are very small in the area, with major proportion of plots below 250 SqM. This is a perceived deterrent to redevelopment in the area. The bigger plot sizes in the area are under public ownership.

STEP 3

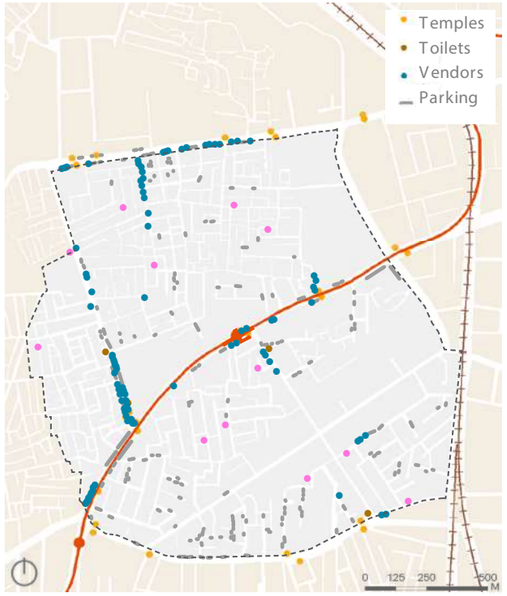
DATA COLLECTION AT STREET LEVEL

5. STREET HEIRARCHY AND INTERSECTIONS



The area under roads in the station buffer amounts to only about 18.36%. Also, the distribution of road space is inequitable, wherein, motorized vehicles are using the majority of the ROW and side-lining the other users of the street.

6. STREET ACTIVITIES



The streets also accommodate various activities and public amenities. Currently these activities essential to street, without any allocated and formalized space, share street space with vehicles and pedestrians. These spaces add to the diversity in area, allow easy availability of daily retail items in vicinity, provide livelihood and on top of all this make the street secure with constant eyes on the street.

View showing transport running at three levels

Mixed use character with small shops

Places of worship generating activity in area

Food stalls near bus stops and junctions

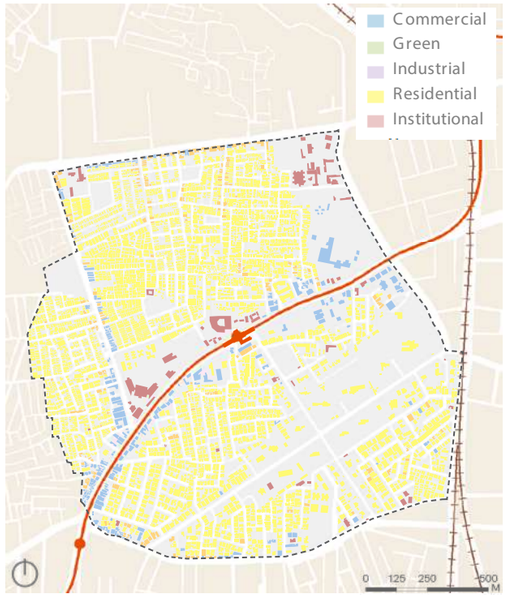
Vendors taking up road and footpath space

Unregularised movement of vehicles at junction

STEP 3

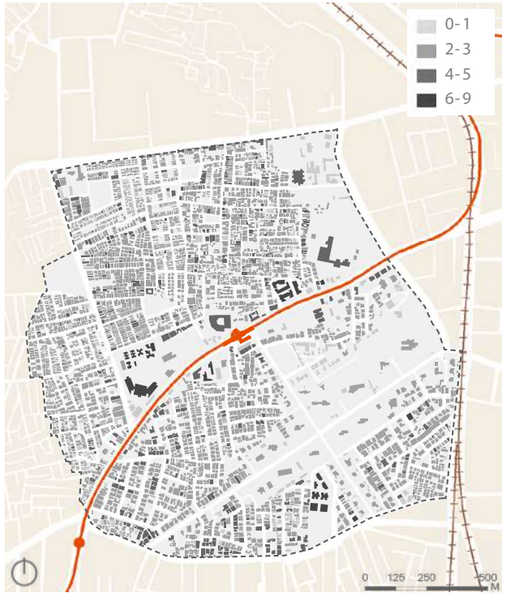
DATA COLLECTION AT BUILDING LEVEL

7. BUILT-USE



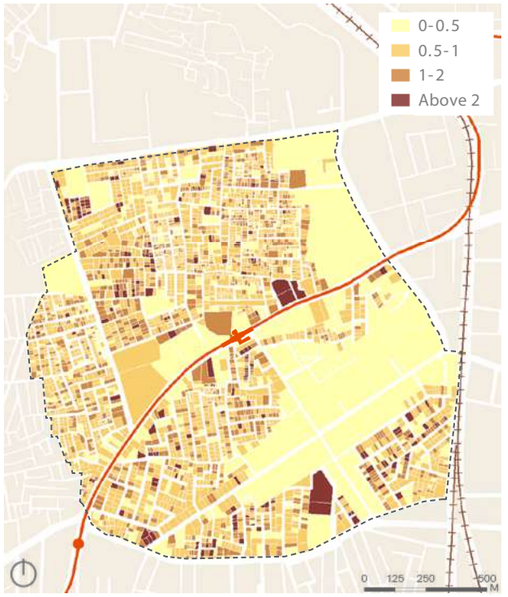
Individual bungalows and row houses dominate the built in the area. The north of metro line has compact low-rise built that abuts narrow streets. The south side of metro has bungalows of middle and high-income group.

8. BUILT HEIGHT



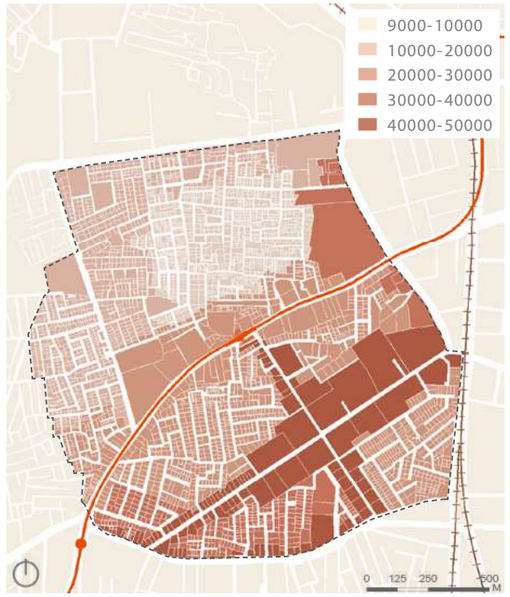
The built form in the area is low-rise, with maximum buildings having G+1 and G+2. While, a few mid-rise buildings are now being observed , commercial and residential apartments are now being constructed along the arterial road.

9. CONSUMED FSI



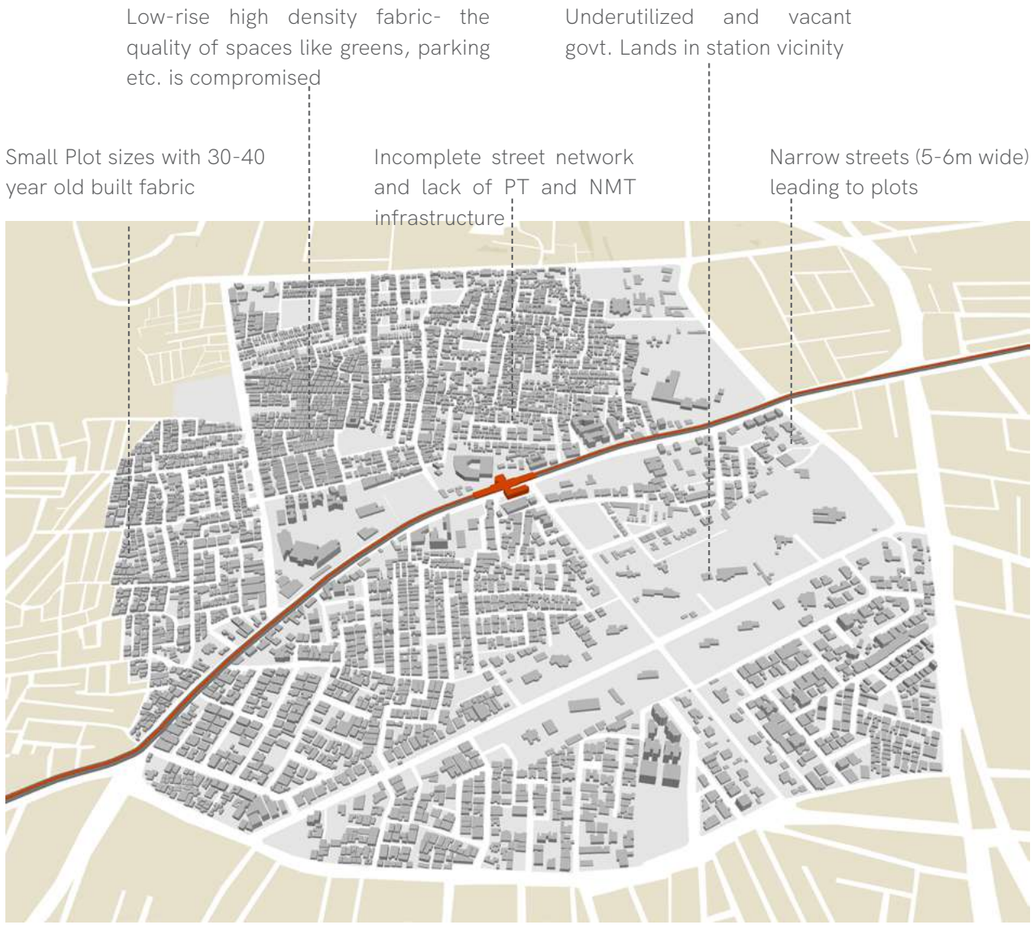
FSI consumption is generally low in the area. With the government bungalows and quarters poorly utilizing the land adding to the situation. There are also a few individual bungalows that have constructed more than allowed height and FSI in the area.

10. GOVT REGULATED RATES



The government regulated prices in Jaipur are called as District Legislative Committee (DLC) rates. The high variation in prices can be seen from the map. While the highest cost is where the public bungalows are there. The cheapest land is the interior area on the north side of the metro line.

STEP 4
ASSESS



ISSUES/OPPORTUNITIES

PROPOSAL

T.O. CITY

- The city is growing horizontally and sprawling out, instead of growing vertically.
- Redevelopment is low with no incentives in place for the same. Also, small plot sizes, multiple owners and clear land titles act as a deterrent.

- Guide Development to the TOD Area at a City Level
- Enable and incentivize redevelopment in zones close to transit in order to use the land to its potential

T.O.AREA

- Low Ridership.
- Development near transit is business as usual, no influence of metro on development
- Lack-luster market
- Underutilized and vacant govt. lands in station vicinity

- Activate Station Area
- Utilize Underused and Vacant Govt. Lands
- Incentivize and allow for more development with higer FSI and amalgamation policies in place

T.O.STREET

- Incomplete street network
- Narrow streets (5-6m wide) leading to plots
- Lack of PT and NMT infrastructure

- Enhance Street Connectivity for Better Accessibility in the Area
- Enhance PT and NMT Infrastructure

T.O.BUILDING

- Small Plot sizes
- 30-40 year old built fabric
- Low-rise high density fabric- the quality of spaces like greens, parking etc. is compromised

- Enable Redevelopment
- Regulate Development keeping the TOD Principles in mind

STEP 4
ASSESS

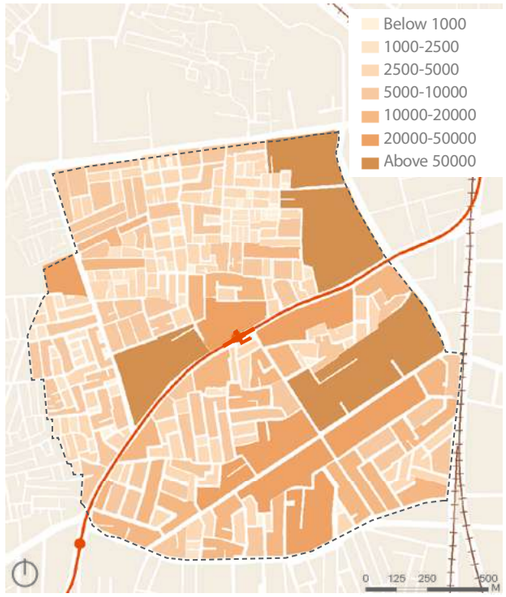
SCALES	Intent	Data Collected	Scenario
AREA	Ownership and redevelopment potential	Cadestral	20% land under public ownership
	Fabric and redevelopment potential	Plot Sizes	Small plot sizes, less than 250sqm
	Character	Landuse	Majority residential (70%), with commercial (13%) and institutional (7%) uses. Mixed uses are observed along primary roads.
	Walkability	Block Sizes	Generally, walkable block sizes. But, blocks close to the metro station are relatively larger
STREET	Accessibility	Street Hierarchy	Broken links and dead ends, hence walkability is hampered
	Utilisation of ROW	Street sections	Poor distribution of road space
	Flow of pedestrian and onstreet space consumption	Public realm	Co-existence of multiple activities including vending, parking, religious activities and public toilets
BUILDING	Mix of uses, Population density and use of space over time	Building use	Primarily residential use and vertical mixed use nnot explored
	Consumed FSI	Building height	Majority G+1 and G+2
	Population Density, Income and use of space over time	Building typology	Individual bungalows and row houses are the dominant building typology
	Redevelopment potential	Building age	
	Relation between public and private	Edge condition	
	Market demand	Property/land price	Govt. owned plots with bungalows have high value. Property value along metro has not witnessed and increase

STEP 5
ENVISION

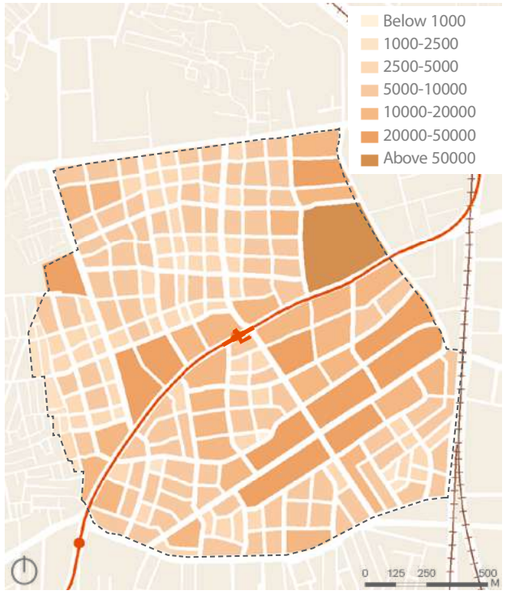
Issues/Opportunities	Planning Brief
Public land, which are the only large plots, are underutilised	Enable and incentivise redevelopment in TOZ to utilise its potential
Small plots, a deterrent to redevelopment	Incentivize redevelopment through amalgamation, with higher FSI
City sprawling horizontally while vertical expansion remains unexplored.	Incentivise vertical mix of uses
Compromised access to metro station. Despite small, walkable block sizes, the circulation pattern is disorganised	Improve accessibility prioritising blocks along metro corridor. Regularise the street network.
Incomplete street network resulting in low permeanbility for pedestrians and NMT	Organize and complete street network
Motor vehicles consume majority of ROW and NMT is sidelined	Plan for shared streets
No dedicated space for these activities causing conflict and congestion at multiple instances	Plan for equitable distribution of ROW and shared streets. Design continuous footpaths and manage parking.
Lack lustre market but redevelopment can be incentivised	DCRs to incentivise such diversity in uses and users through redevelopment regulations
Lack lustre market but redevelopment can be incentivised	DCRs to incentivise such diversity in uses and users through redevelopment regulations
Arterial raods shows very few instances of redevelopment (commercial and residential)	Prioritise redevelopment along artertial roads to activate station area and the market
Underutilised potential	Incetivise redevelpment with higher FSI and vertical mix

ACCESSIBILITY

11. EXISTING BLOCK SIZES



12. PROPOSED BLOCK SIZES

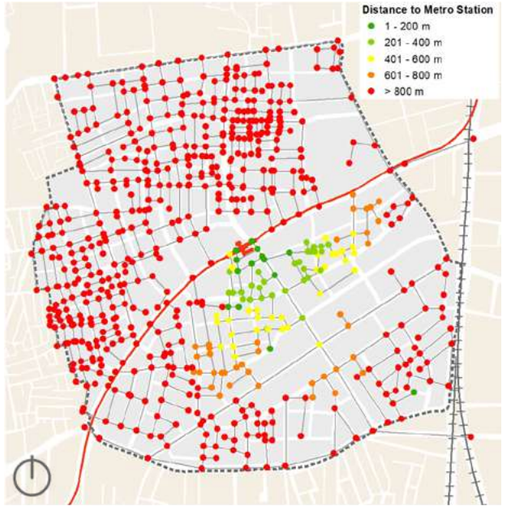


The civil lines station is largely residential (70%) with very small block sizes and plot sizes. Yet, from the above map it is quite clear that the street networks are incomplete. Hence despite smaller block sizes it is not walkable owing. Also owing to the smaller plot sizes, the chances of redevelopment is fairly less .

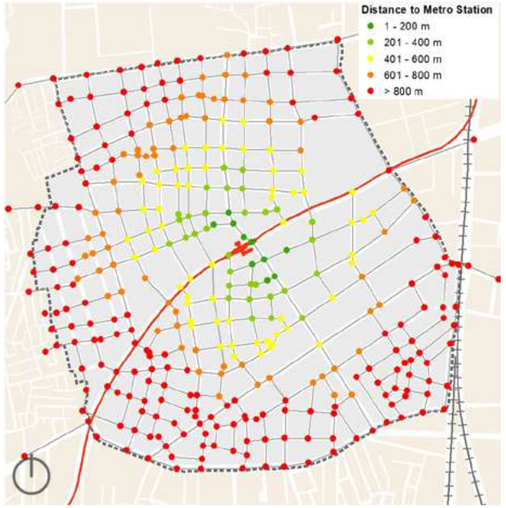
Consequently the proposed street network looks to improve the complete the street network and through the process of amalgamation introduce larger plot sizes and even block sizes. In this case the area under roads have increased from 18% to 30% and while the average block perimeter is 350 meter.

Data Required	Intent	Proposal
Plot Size Map	To identify new roads under redevelopment scenario	Proposed Block Sizes and improved street network
Existing Building Use and Land use Map	To understand pedestrian flows(origin and destination) and possibility of pedestrian thoroughfares	
Existing Street network map	To understand the flow of vehicular traffic	
Existing Accessibility Map	To assess the distance from each node to transit station and identify the need for newer connections	

13. ACCESSIBILITY MAP- EXISTING



14. ACCESSIBILITY MAP- IMPROVED



The improved road network, has greatly increased the accessibility level of the site. By completing and making necessary connections the number of dead ends where reduced. Thus increasing and introducing wider connections. The same is clearly reflected in the Accessibility map - improved, where the spread of green, yellow and orange nodes have spread.

DESIGN

Data Required	Intent	Proposal
Public Realm activity Map	To evaluate the utilization of street space and relation between activities	Public Realm Area Level - Design Public Realm Street Level Design Public Realm Building Level Design
Existing Street Network Map	To understand the flow of vehicular and pedestrian movement and nature of NMT infrastructure required	
Street Section	To understand the distribution of the ROW	
Edge condition Map	To understand the interface between public and private realm and its impact on the walking environment.	

15. DESIGN AT AREA LEVEL - METRO CONNECTIVITY

In civil lines the aim is to design a network of public realm. The above image, details out a redevelopment scenario of on government land, which is the most probable case of redevelopment given the lack luster market. The idea here is to build continuous NMT pathways which connect the relocated government quarters, Affordable and mixed income housing complex , proposed commercial complex with the proposed public plaza and green spaces. This would greatly augment the existing 4% area under green public spaces.

This network can then be expanded to the other parts of the site as and when plots amalgamate and redevelopment on site begins.

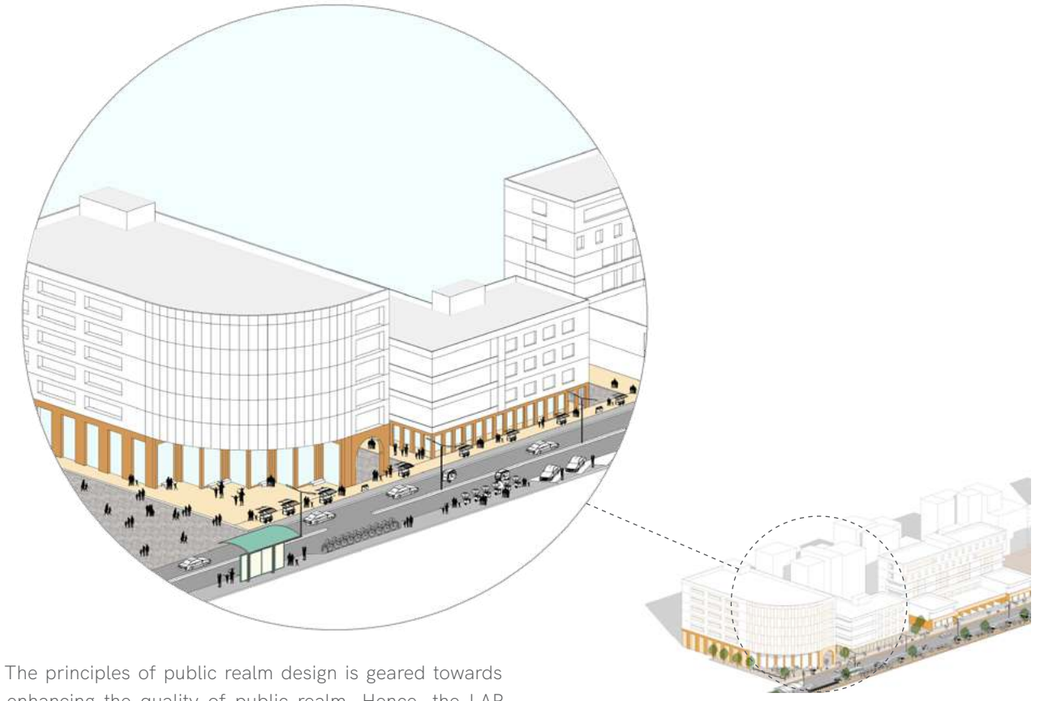
The idea here is to also acquire public realm from plot margins or land when plots undergo redevelopment. This would also encourage the idea that a better designed public realm will create value.

16. DESIGN AT STREET LEVEL - COMMERCIAL COMPLEX AND VENDING PLAZA

By connecting the metro station with a commercial complex and vending plaza, the design promotes a vibrant public space that supports pedestrian access and activity.

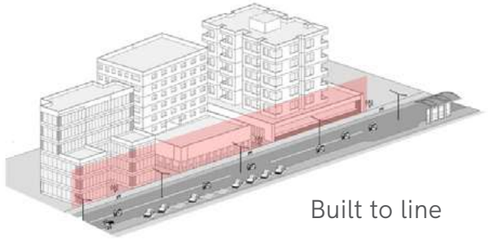
DESIGN

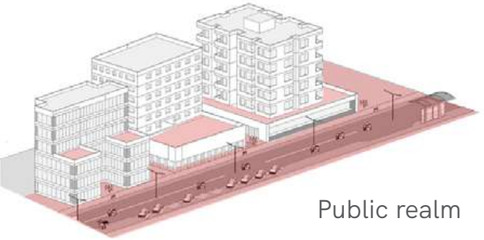
17. DESIGN AT STREET LEVEL

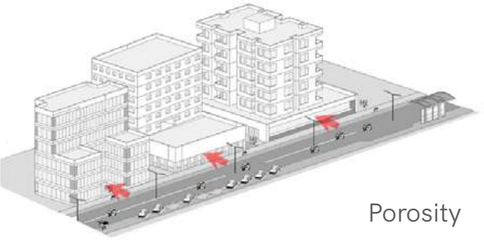


The principles of public realm design is geared towards enhancing the quality of public realm. Hence, the LAP promotes continuous and wide pedestrian pathways. The same can be achieved only by combining the privately owned public spaces (area within plot margins) along with the publicly owned spaces.

18. DESIGN AT BUILDING LEVEL







Buildings are integral to life on streets. The LAP, looks at creating highly porous and built to line structures. The benefit is an interactive threshold between public and private realm.
Simultaneously, by introducing structures like the podium tower typology with appropriate setbacks a new type of public realm is created. Thus allowing for pedestrian and street activities to expand into buildings. This would further strengthen connection between public and private .

Further, by promoting the vernacular arcade feature of Jaipur as part of the new built form the LAP looks to create spaces which are climate sensitive.

DENSITY

19. REDEVELOPMENT SCENARIO - EVOLVING URBAN PUBLIC REALM AND BUILT FORM

Plot Size (SqM)	FSI	POPOS	SA	EWS
>500	2	NA	NA	NA
500-2000	3	10%		
2000-10000	3-4	10%	10%	
<10000	3-4	10%	10%	10%

The civil lines is a case of infill, where a lack luster market needs to be incentivized. The strategy proposed is to promote plot amalgamation as the site has predominantly smaller plot sizes. The incentives are based on the final plot size that is an outcome of the amalgamation. Hence bigger the plots higher the FSI. Apart from this the larger plot sizes are to also reserve area to create privately owned publicly open spaces, social amenities and EWS housing. The area to be reserved is decided upon the size of the final plot.

The above table and images illustrate a scenario of transformation. As different plot sizes amalgamate, the public realm can be strengthened with the addition of streets and public spaces which will in turn support the new built.

Data Required	Intent	Proposal
Plot Sizes	To understand availability of land from plot margins for redevelopment which contributes to area under public realm and there by crowding in public realm.	Given the infill scenario, the plan promotes redevelopment via plot amalgamation and a supporting network of public realm.
Building Use		
Existing street network Map	To understand pedestrian flows(origin and destination) and possibility of pedestrian thorough fares	
Public Realm Activity Map	To assess the level of crowding in the public realm and space consumed.	

20. HIGH CROWDING OF PEOPLE AND LOW CROWDING OF CARS

In areas around transit the core idea is high density, low crowding of vehicles and high crowding of people. Based on the availability and quality of public realm the crowding factor in sites would vary.

DIVERSITY

21. DIVERSITY IN BUILT USE

Data Required	Intent	Proposal
Existing building typology and use map	To understand the degree of mix in uses (Horizontal + Vertical) and users	Facilitating mixed use development Hierarchy of open spaces within the public realm
Public realm activity map	To understand the different type of activities on street	
Street Section	To understand the distribution of ROW	
Public infrastructure and amenities	To ascertain the availability of public and private infrastructure and amenities	

22. DIVERSITY IN OPEN SPACES

In civil lines, the LAP promotes the use of flexible land use. This is to promote the rise in residential mixed use, where the ground floor is occupied by commercial establishments. This is keeping in mind that the site is predominantly residential use.

Via the redevelopment model, as illustrated under density, the site has opportunity to create a diverse set of public spaces.

AFFORDABILITY

Data Required	Intent	Proposal
Cadastral Map	Identify potential sites for new mixed income or ah projects	Identifying public land (railway) for mixed income housing and subsequent construction.
Building use and typology map	To identify and assess the demand for Mixed income housing in the LAP Area.	
Property and land prices	Mixed income housing to be proposed and located based on market demand at the transit node	

23. IDENTIFICATION OF SITE

The availability of affordable housing around transit would allow the users of mass transit to live around transit and hence increase transit ridership and provides a cheap and accessible mode of travel. But as nodes in a city vary, the methods by which it can be implemented vary.

The LAP in civil lines promotes the construction of mixed-use housing via the redevelopment model illustrated in density. The availability of government land in the area is an opportunity to create housing options for the users of mass transit.

24. MIXED INCOME HOUSING

Apart from providing housing options, via the redevelopment model, the project can also create area level or city level public spaces. These spaces are accessible to all and can cater to multiple needs of the commuters and residents of the site.

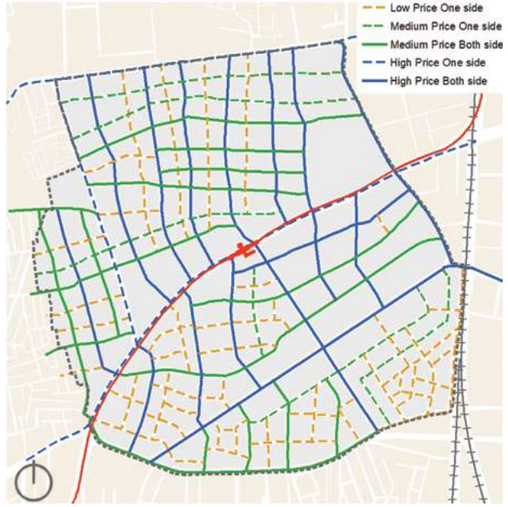
The LAP also identifies the need to introduce good pedestrian connectivity to the transit node, hence as stated under the design principle a continuous public realm will further enhance the livability of the area.

The project can also act as a catalyst to help augment the market value of the area.

PARKING

Data Required	Intent	Proposal
Existing Building Use	To locate and understand the parking demand	Proposed Demand based pricing at area level
Existing street network Map	To locate parking provision and identify zones for paid parking	
Street Section	To understand road space utilization by parking	
Public realm activity map	To map existing parking (priced and non-priced) and other street activities	
Existing Building Height	To estimate off street parking supply	

25. ON-STREET PARKING STRATEGY



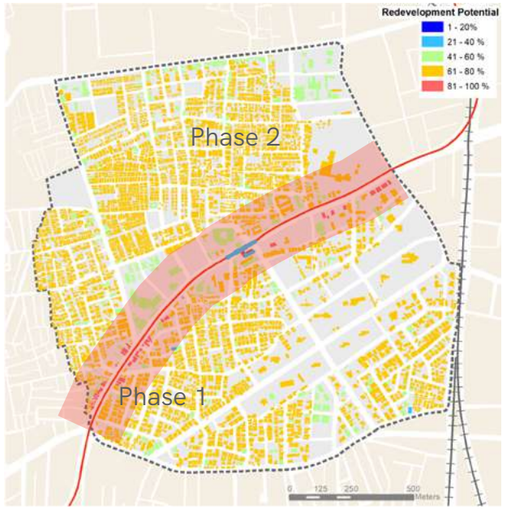
The case of Civil Lines, Jaipur is an example of infill scenario which demonstrates a lack-luster market. Begin to charge on street parking around transit node and arterial roads in a phased out manner. Eventually extend to secondary roads with regulated parking (odd-even strategy)

`

INVEST TO EARN

Data Required	Intent	Proposal
Building Age Map	The parameters were used to analyze the redevelopment potential of the site. Each parameter was assigned a weight-age based on which the redevelopment potential is created.	Redevelopment Potential Map
Street Hierarchy Map		
Building Use Map		
Property Price Map		
Consumed FAR		
Cadastral Map	To assess the variations in redevelopment potential based on ownership	Contextualizing Redevelopment Potential

26. REDEVELOPMENT POTENTIAL



As per the map generated it is observed that, majority of the site has high redevelopment potential. Yet, considering the availability of government land, the slow infusion of commercial development and structures with highest redevelopment potential along the transit corridor it would be safe to speculate that area adjacent to the corridor would be the first to redevelop. Based on the this the LAP proposes a 2 stage phasing plan, beginning with the area marked under red as phase 1 of the LAP.

Phase 1 would also be the focus of public investments to help catalyze the market, so that private investor have a strong incentive.

INTEGRATING KPIs

TOWARDS SUCCESS OF TOD

WHY DO WE NEED KPIs?

HOW CAN KPIs HELP ACHIEVE TOD?

"

Key performance indicators (KPIs) refer to a set of quantifiable measurements used to gauge a company's (In this case a TOD LAP) overall long-term performance. KPIs specifically help determine a plan's strategic, financial, and operational achievements.

-Investopedia

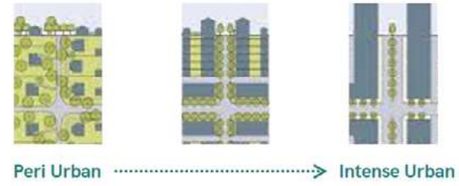
A well made KPI toolkit is powerful enough to assess the existing situation and plan for the future. A toolkit should be flexible enough to align itself with the specific city character and goals.

Any toolkit, however well made, cannot ensure its final intent unless made a part of the statutory mechanism. The toolkit, when made statutory, will become a mandate for the state and local body to undertake and assess at specified intervals.

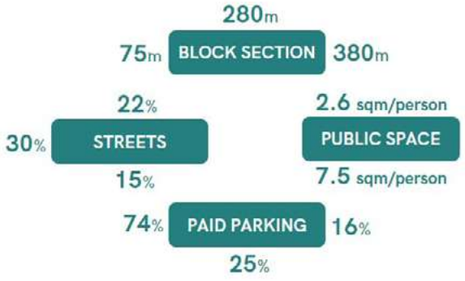
NEED FOR A FLEXIBLE EVALUATION MECHANISM

Cities across the country have different growth patterns and characteristics. Hence requirements and planning required for each of cities has to be tailored to its focus and specification.

As cities have different characteristics, so do its different regions. A city can me made up of peri urban, suburban, intense urban characteristics. These different regions will have different priorities and focus for development.



A well made KPI toolkit is powerful enough to assess the existing situation and plan for the future. A toolkit should be flexible enough to align itself with the specific city character and goals. Hence, an approach which is flexible and city specific is needed for the KPI Toolkit.



WHAT WILL THE KPIs BE?

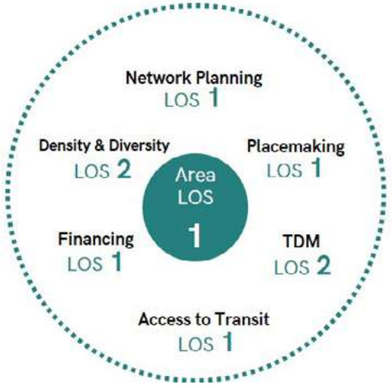
WEAVING INDICATORS INTO A TOOLKIT

What is an LOS Approach ?

A LOS: Level Of Service Approach, is a mechanism which takes in consideration the flexibility each evaluation parameter should have, in order to cater to different characteristics each city can have.

How can LOS approach help ?

LOS values can be addressed to different goals, or analyze different solutions, which can be tailored to different regions or city conditions. This helps to cater to different priorities that a city can have.

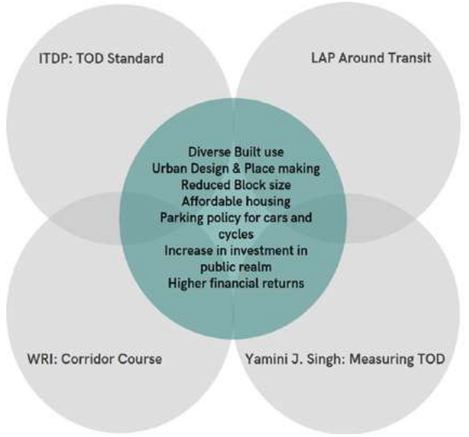


Why does LOS approach matter?

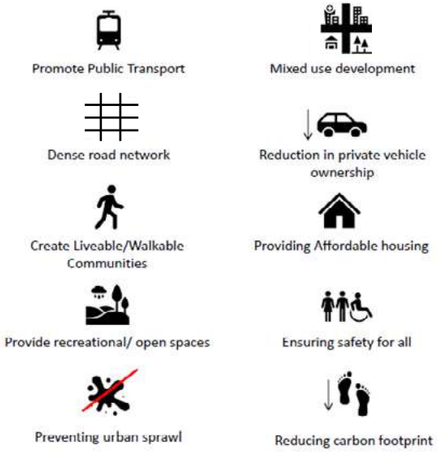
LOS values can be summed up to form an area level or a city level index. This index will help to set a goal for a city or an area and then execute policies towards it. Within a city LOS, various area LOS scores can be altered contextually.

IDENTIFYING INDICATORS FOR TOD

Existing Literature



Policy Objective



There is a lot of existing research on measurability and evaluation of success of TOD along with manuals and handbooks guiding towards a planning and executing TOD. These directions guide us towards identifying indicators to measure TOD

The objectives of the National TOD Policy guide us to what TOD should achieve in the long run and hence also tell us what should be the measurable components of the same.

The following indicators can be further expanded into relative benchmarks for evaluation process.

NETWORK PLANNING **PLACEMAKING & STREET DESIGN** **FINANCING**

ACCESS TO TRANSIT **DENSITY & DIVERSITY** **TRAFFIC DEMAND MANAGEMENT**

IDENTIFYING RELATIVE BENCHMARKS

Identifying **Existing Research** & Parallels

Understanding existing research and published literature related to the indicator being studied. Searching for parallel published research which helps to investigate laterally and beyond obvious.

Applicability of identified research **contextually**

Identified indicators and benchmarks should be tested and applied contextually in order to test its relevance and applicability. Benchmarks can then be modified or adapted as per the pilot testing

Comfirming applicability through **pilot execution**

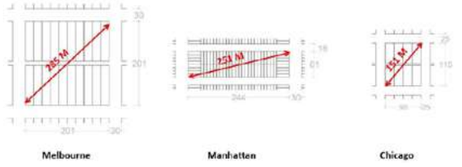
A pilot testing makes sure the designed set of indicators and the toolkit functions well as per the context. It also helps in understanding errors and shortcomings of the process which can be modified later.

Note: The indicators thus formulated with the process described above are a part of the unpublished thesis: **Godbole S.M. (2020), Developing a Key Performance Indicator toolkit for TOD in Indian Cities, CEPT University, Ahmedabad.** For further information on process of indicator formulation please refer the said thesis.

ACCESS NETWORK PLANNING

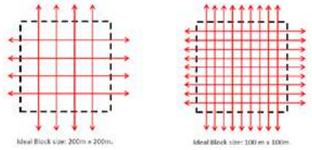
Block Section

Many researchers and experts have suggested BLOCK SECTION as a better tool over conventional methods as a measure of walkability. It connects two farthest points in the block. A block section of 280m or less is usually associated with walkability, usually observed in proved walkable cities like New York, Melbourne and Chicago.



Intersection Density

Intersection density is closely related to block section. Smaller the average block size, more intersection density. An intersection density of around 80/sq. km is ideal for walkability.

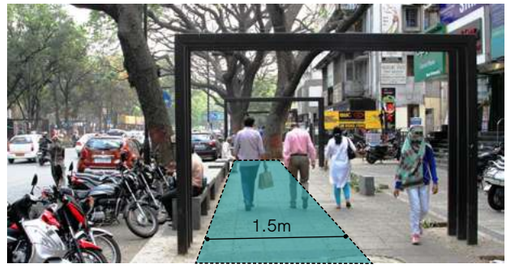


Area Under Roads

Many Indian planning guidelines prescribe a minimum 15% of road area as a measure of good network planning. The above intersection density measure also gives the same value.

Walking Width Available

A micro measure of walkability can be measured by providing adequate walking widths, usually more than 1.2m, ideally which should be 1.5 m.



1. Jangli Maharaj Road Pune. Adequate walking widths ensure equitable access and street real estate to all.

DERIVED BENCHMARKS

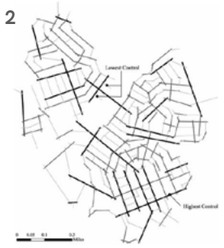
<280M	Average length of Block section in the neighbourhood.
>80/SQKM	Desired density of intersection
>15%	Area under roads
>1.2M	Desired dedicated walking widths

ACCESS Reach to Transit

Space Syntax

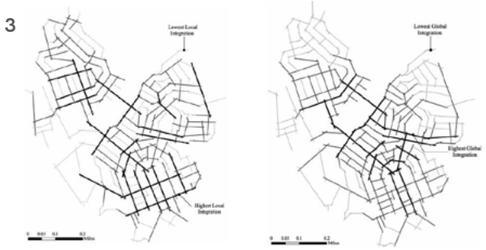
It is a method to look at network like a circuit to analyze its effectiveness. Measures of space syntax like control values and integration values show us the circuit efficiency and link dependence.

2



Control value represents the degree to which a line is important for accessing neighbourhood lines. A high control line indicates that a street is very important for the connectivity of the area.

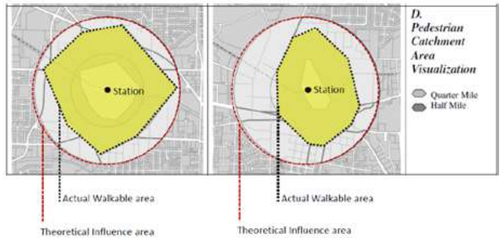
3



Integration is an indicator of how easily one can reach a specific line of the axial map. The higher the integration value of the line, the lower the number of axial lines required to reach that line.

Pedestrian Catchment Area

Pedestrian catchment areas (PCA) are theoretically walkable zones that can be mapped to show the actual area that can be accessed via the path network from a fixed point of interest.



A PCA ratio of **0.6 to 0.75** is considered to be good for accessibility.

DERIVED BENCHMARKS

>60%	Least PCA ratio
>3.00	Desired Control Value
>1.20	Desired Local Integration Value
>3.50	Desired Global Integration Value

DENSITY & DIVERSITY

Focused Density

Indian cities need to develop FOCUSED DENSITIES along transit corridors. Indian cities are dense and diverse, hence certain densities such as housing, job and built density which would support TOD should be increased.

Built Density
Built volume along corridors should be atleast 1.5 times more than the region's FSI.

DU Density
Dwelling units being around 5000 per Sq.Km ensures focused density around transit.

Job Density
Jobs available (formal & informal) being around 17,000 contributes towards focused density.

Rich mix

Diversity in housing type, jobs, building use as well as in land use should be encouraged in the TOD Zone. This can be measured through the following indicators:

Non Residential Use
Facilitating non-residential uses of atleast 30-50% should be maintained.

Resident:Employment Ratio
Residential Employment ratio gives an idea of the job availability in the neighbourhood.

Balanced Land-use
This can be measured by surveying land uses and calculating land dissimilarity index.

DERIVED BENCHMARKS

>50%	Permissible FAR along Transit Corridor.	>30%	Desirable non residential use
>5,000/SQKM	Desired DU Density	>0.50	Desirable Resident -Employment ratio
>17,000/SQKM	Desired Job Density	>0.325	Land Entropy index

DESIGN

Spatial Character

Developing apt spatial character helps in value creation for the neighbourhood. This helps, as the TOD region get more demand (through value creation) which can be used to earn through this value.

Street Design

Street design aspects are concentrated around the objectives of the TOD policy which have the same concerns. Here the design aspects have been thus derived from **making walkable and safe streets**.

DERIVED BENCHMARKS

>50%	Permissible FAR along Transit Corridor.
>5,000/SQKM	Desired DU Density
>17,000/SQKM	Desired Job Density
>30%	Desirable non residential use
>0.50	Desirable Resident -Employment ratio
>0.325	Land Entropy index

AFFORDABILITY

Equitable Provision

The National TOD policy aims to include affordable and social housing one of its main objectives for achieving a Transit Oriented Development. . In many countries, the transit is often placed or planned for in areas of economic affluence, or due to development rights and gentrification it fails to include housing for all socio-economic groups (Marks et al., 2016). The success of TOD thus depends on the integration of all socio-economic groups and achieving a true People-near-Transit model.

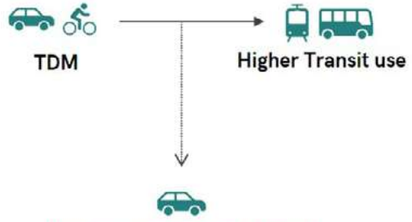
DERIVED BENCHMARKS

>15%	FAR reserved for housing less than 25 sq.m.
>15%	FAR reserved for housing less than 40 sq.m.
>5%	FAR reserved for hotels, hostels and other rentals.

PARKING MANAGEMENT

Optimisation of Travel

Traffic Demand Management has to be done in order to reduce use of private vehicles in TOD zones and to promote public transport and NMT. TDM has three main objectives: optimisation of travel, road safety and parking management for private vehicles. The objectives thus mentioned can reduce fatality rate and improve road safety.



Reduce use of Private Vehicle

Dependence on private vehicles can be done efficiently by providing good public transport. Also, by discouraging use of private vehicles In a TOD zone can be done by implementing a sound Parking policy and incentivising PT.

+

Promoting NMT

By providing right infrastructure for NMT transport and integrating it with Landuse, can result into more mode share by NMT, thus reducing the fatality rate prevalent and making sure safe streets.

Increase Streets under paid parking

An area can start with having at least 50% of the streets under paid parking and increase further.

Dynamic Parking Charges

Parking charges should vary as per peak time, and have at least a difference of two times between the maximum and minimum charges.

Increase in NMT mode share

In a good TOD region, NMT mode share should be above 60-70% which denotes less use of private vehicles

Decrease in fatality rate

By providing safer conditions, TOD should show a decrease in fatality rate. Should be aimed to less than 2/ lakh population.

DERIVED BENCHMARKS

>50%	Streets under paid parking
>1:2	Ratio of min to max parking charges
>60	Trip mode share by NMT
>2/LAKH	Fatality rate to be lowered

CREATING A TOOLKIT

Step 1
Identify lower and higher ends of the benchmark spectrum

Assign LOS score from lower to high benchmark values. This has be within realistic value limits.

Step 2
Resolve Remarks corresponding to LOS scores

Remarks corresponding to the summation of factor specific LOS scores, should be identified (Better for scoring)

Step 3
Calculate area LOS Values

Using Over all LOS scores, Area level TOD Score should be calculated for a city level comparison.

ACCESS: Network Planning				
	LOS	1	2	3
A	Block Section	<150	150-250	>250
B	Intersection Density	>=80	50-80	<50
C	Percentage in streets	>=20	15-20	<15
D	Percentage of streets with more than 12.m footpaths	>=50	30-50	<30
Overall LOS	Calculated LOS Score (A+B+C+D)			
1	4-6	The neighbourhood has a very good road density and planning, being walking friendly		
2	7-10	The neighbourhood has considerably good road planning. Though it may require planning intervention for a better network planning outcome		
3	10-12	The neighbourhood has poor network planning.		

ACESSS: Reach to Transit				
	LOS	1	2	3
A	PCA	>0.75	0.40-0.75	>0.4
B	SS : Control	>=3.00	-	-
C	SS : Global Integration	>=1.20	-	-
D	SS : Local Integration	>=3.50	-	-
Overall LOS	Calculated LOS Score (A+B+C+D)			
1	3-5	Access to transit is well planned		
2	6-8	Access to transit and route directness is average.		
3	9-12	Access to transit and route directness is poor. Requires better network planning		

DESIGN				
	Macro level			
	LOS	1	2	3
A	Area under POS (sqm/person)	>2.3	1.8-2.3	<1.8
B	Number of streets with BTL and active frontage (ROWs >=24m)	>=70%	40%-70%	<40%
C	Number of streets with BTL and active frontage (ROWs <24m)	>=50%	25%-50%	<25%
Overall LOS	Calculated LOS Score (A+B+C)			
1	3-4	The neighbourhood has enough designed open space. With interative built edge.		
2	5-7	More open space per capita should be carved out. Average street-built interaction		
3	8-9	Inefficient designed open space. Absent street-built interaction		
	Street design			
	LOS	1	2	3
A	Max Vehicular speed (km/hr)	<20	20-40	>40
B	Walking zone: Mixed use (meters)	>=2.5	1.5-2.5	<1.5
C	Walking zone: Commercial (meters)	>=4	2.0-4.0	<2.0
D	Pedestrian crossing - median distance (meters)	<=150	150-300	>300
E	Streetlighting - Mobility (Lux)	30		
F	Streetlighting - Local (Lux)	25		
G	Streetlighting - Pedestrian (Lux)	20		
Overall LOS	Calculated LOS Score (A+B+C+D+E+F+G)			
1	7-12	Street is acting like a shared space with walkable environment		
2	12-16	Walking enviroment pro-walking, through street design needs to be developed		
3	17-21	Streets do no have a walkable environment. Need redesign and monitoring		

AFFORDABILITY				
	LOS	1	2	3
A	Housing less than 25 sqm	>=15%	10%-15%	<10%
B	Housing less than 40 sqm	>=15%	10%-15%	<10%
C	Rental Housing and Hostels	>=5%	2.5%-5%	<2.5%
Overall LOS	Calculated LOS Score (A+B+C)			
1	3-4	Equitable mix of housing is available in the neighbourhood		
2	5-7	Rental and affordable housing needs to be facilitated more through policies		
3	8-9	Streets do no have a walkable environment. Need redesign and monitoring		

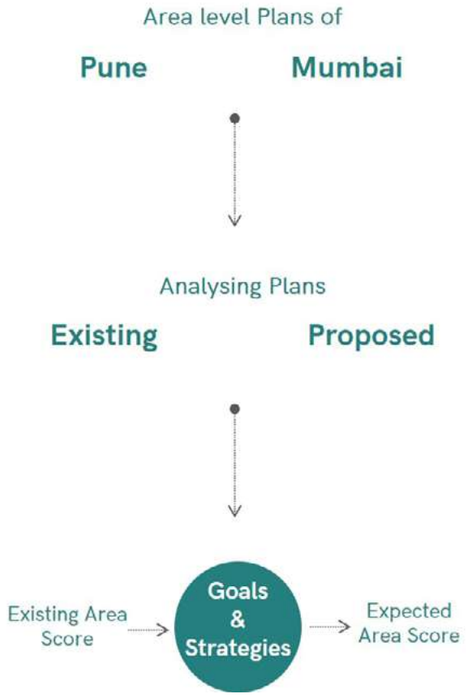
DENSITY & DIVERSITY				
	Density			
	LOS	1	2	3
A	Increase In FAR along corridor	>50% of base FSI	30-50% of base FSI	<30% of base FSI
B	Average desired DU density	>10,000 DU/sqkm	5,000-10,000 DU/sqkm	<5,000 DU/sqkm
C	Number of jobs	20,000/sqm	15,000-20,000/sqm	<10,000/sqm
Overall LOS	Calculated LOS Score (A+B+C)			
1	3-4	Density is complimentary to the transit planned		
2	5-7	Density need to be improved with policies regulations		
3	8-9	Density not supportive of the planned transit		
	Diversity			
	LOS	1	2	3
A	Non residential area	>=40%	20-40%	<20%
B	Job-Resident ratio	>=0.6	0.4-0.6	<0.4
C	Land entropy index	>=0.325	0.325-0.230	<0.230
Overall LOS	Calculated LOS Score (A+B+C+D)			
1	3-4	Neighbourhood has good of mix of uses, and jobs to residents ratio		
2	5-7	Diversity can be enhanced through policy and icentives		
3	8-9	Poor diversity in the neighbourhood. Dominance of a single land use observed. Policy intervention necessary		

PARKING MANAGEMENT				
	LOS	1	2	3
A	Streets under paid parking	>50%	30%-50%	<30%
B	Ration of min to max parking fee	>4	4-2	<2
C	Mode share by NMT + PT	>=70%	40%-70%	<40%
D	Fatality rate/lakh population	<=5	5-10	>10
Overall LOS	Calculated LOS Score (A+B+C)			
1	4-6	Traffic management policy has been implemented efficiently, with priority to NMT modes.		
2	7-9	Parking prices and streets under paid parking should be increased. Prioritisation needed for NMT Modes		
3	10-12	Poor implementation of Traffic management policy.		

Area LOS value: Σ (All the measured Overall LOS Values) / Number of values evaluated.

WHAT WILL THE KPIs TELL US?

TESTING THE TOOLKIT



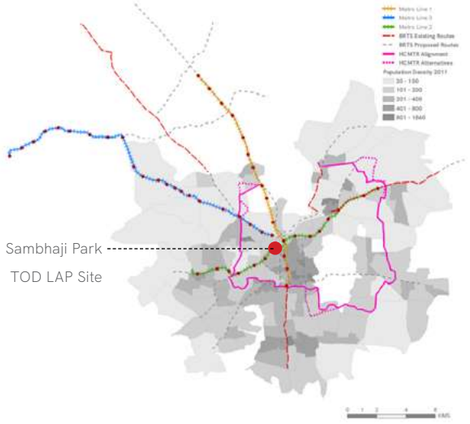
Two LAP proposals in Mumbai and Pune will be tested as a pilot project for the TOD KPI toolkit. These two cities have different character and will be useful in understanding the what the toolkit achieves and where it lacks.

The toolkit will analyse both, the existing situation and the proposed plan. This will give a clear perspective of how the area will transformed, which factors will be focussed upon.

The process also helps us to analyse whether the goals and strategies set by analysing the existing conditions have been achieved in the proposed plan. Thus reflecting the efficiency of the planning process.

SAMBHAJI PARK METRO STATION

The Sambhaji Park metro station lies in the proximity of the Jangli Maharaj Road, Shivajinagar. . The station site consists of a planned TP scheme area (Bhamburda TPS 1) with the river cutting through it, and old city core to the east of the river. The site consists of Heritage sites, Prime educational institutions, a shopping district and almost 40% of old city core.



Sambhaji Park metro station is located centrally in Pune, having high place and market values

Site for TOD LAP

A good mix of uses can be seen in the TOD LAP zone of the metro station

Site Character

Identified Characteristics

Incomplete Street network
Large Block sizes
Inconsistent Plot sizes
Underutilised FSI
Non interactive street edge
Non existent TDM

Improvement Strategies

Reducing Block sizes
Incentive based plot size reduction
Proposed design intervention for multimodal integration

Existing Situation

ACCESS	Although macro planning is good, street design and pedestrian facilities should be prioritized
DENSITY	FAR along corridor should be increased (atleast 50% more than base FSI)
DIVERSITY	Rich diversity exists in the neighbourhood
DESIGN	Public Open space is concentrated. Active frontage need to be developed for streets in lower hierarchy
STREET DESIGN	Although adequate street design measures present, should be applicable to whole area, rather than a particular street.
PARKING MANAGEMENT	Implementation of Parking Policy is weak and should be a priority

Area LOS value: 1.66 → **2.0**

Planning Stage

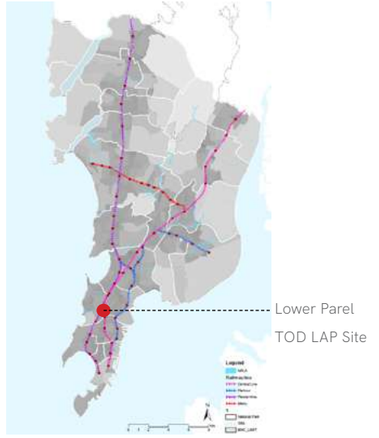
ACCESS	Network Planning is efficient
DENSITY	Increase in FAR will facilitate the increase in number of jobs
DIVERSITY	Rich diversity exists in the neighbourhood
DESIGN	Interactive street edges have increased.
STREET DESIGN	Street is acting like a shared space with walkable environment
PARKING MANAGEMENT	Parking prices and streets under paid parking should be increased. Prioritisation needed for NMT Modes

Area LOS value: 1.16 → **1.0**

The existing situation broadly tell us areas of concern are **Density, Public realm and design, and TDM**. Here it is evident that the issues identified and verified through the TOD KPI toolkit have been improved in the proposed plan. Planning for efficient and Traffic Demand Management techniques have not been done , where the area even after planning proposals.

LOWER PAREL METRO STATION, MUMBAI

Lower Parel has been the hub of textile mills in Mumbai; but due to redevelopments from 1996, has changed the skyline to high rise luxury apartments. The site selected has scarcity of open space, has large block sizes with many gated communities.



Mumbai's PT network. Lower Parel is serviced with local suburban rail and metro.

A good mix of uses observed, though plot and block sizes are relatively big.

Site Character

Commercial

Industrial

Car Oriented

Identified Characteristics

Incomplete Street network
Large Block sizes
Inconsistent Plot sizes
Underutilised FSI
Lack of multimodal integration

Improvement Strategies

Providing Complete street network
Street interactive urban design strategies
Incentive based Built regulations to promote efficient use of land
Increase FSI along corridor

Existing Situation

ACCESS	The neighbourhood has poor network planning.
DENSITY	Density need to be improved with policies regulations
DIVERSITY	Neighbourhood has good of mix of uses, and jobs to resident's ratio
DESIGN	Inefficient designed open space. Absent street-built interaction
STREET DESIGN	Streets do no have a walkable environment. Need redesign and monitoring
PARKING MANAGEMENT	Streets do no have a walkable environment. Need redesign and monitoring

Area LOS value: 2.15 → **2.0**

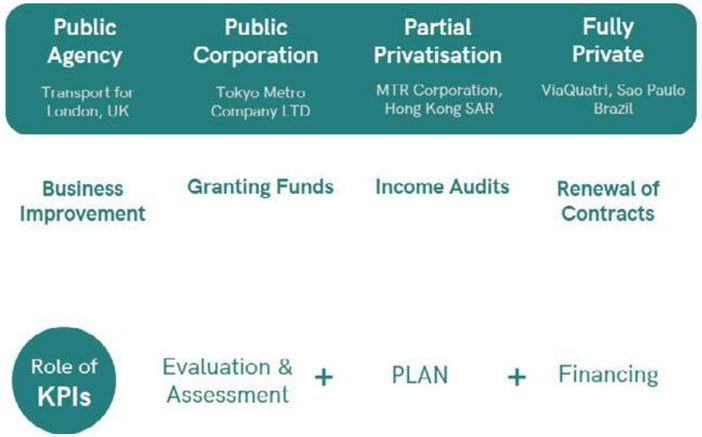
Planning Stage

ACCESS	The neighbourhood has a very good road density and planning, being walking friendly
DENSITY	Density is complimentary to the transit planned
DIVERSITY	Neighbourhood has good of mix of uses, and jobs to resident's ratio
DESIGN	More open space per capita should be carved out. Average street-built interaction
STREET DESIGN	Street is acting like a shared space with walkable environment
PARKING MANAGEMENT	Parking prices and streets under paid parking should be increased. Prioritisation needed for NMT Modes

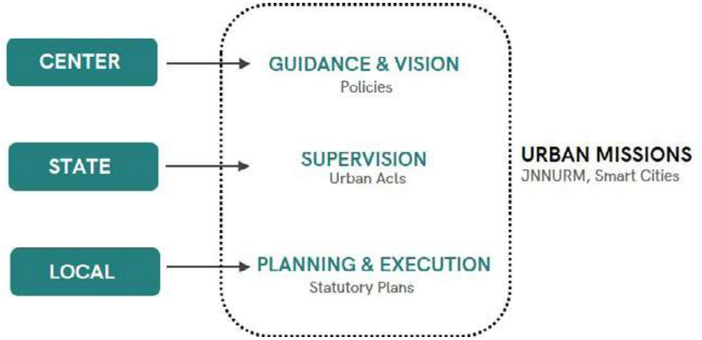
Area LOS value: 1.33 → **1.0**

The existing situation broadly tell us areas of concern are **Density, Public realm and design, and TDM**. Here it is evident that the issues identified and verified through the TOD KPI toolkit have been improved in the proposed plan. Planning for efficient and Traffic Demand Management techniques have not been done , where the area even after planning proposals.

KPIs: PART OF PLANNING



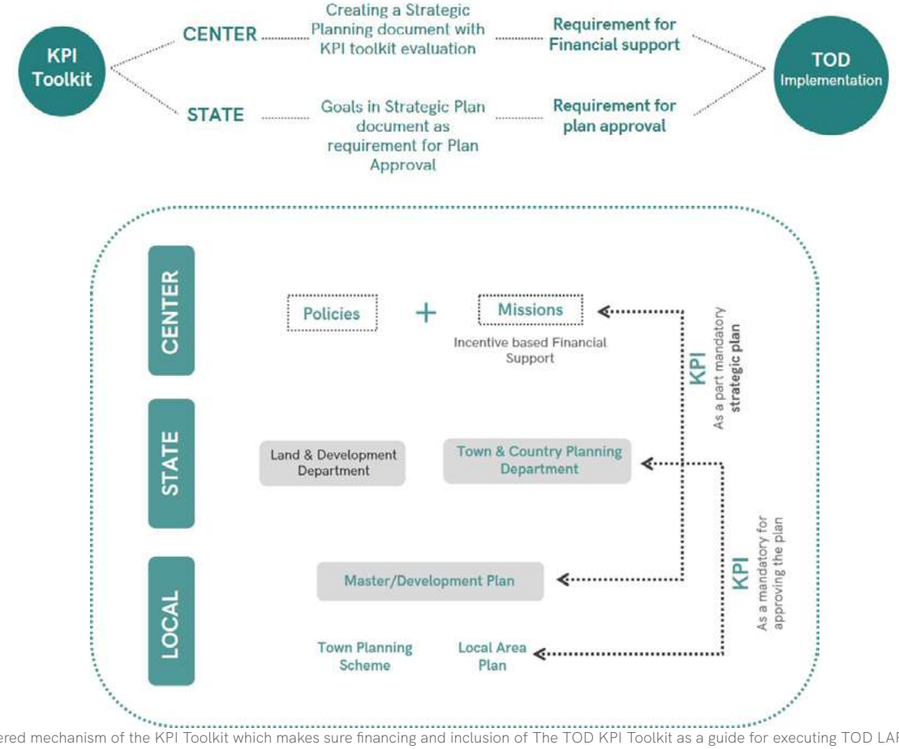
KPIs play different roles in different types of organizations worldwide. From assessing performance to financing, KPIs can be used in many ways. As in case of India, agencies Implementing TOD are either ULBs or Parastatal organizations, which have financial constraints. This toolkit can be a medium to grab some capital share from the central government through a consciously designed system.



India has a Hierarchical Planning system, where the Center directs development through policies, the state supervises, and local bodies execute. Urban Missions like Smart Cities, tie all these systems together and create an organizational flow in order to finance and execute projects. The TOD KPI Toolkit can be a mandate through these urban missions, in order to ascertain their implementation through local plans.

OPERATIONALISING KPIS THROUGH URBAN MISSIONS

Urban Missions can mandate the KPI Toolkit assessment and goals as a part of the STRATEGIC PLAN (To be published with the Statutory City Development Plans). These Strategic Plans should be mandate to receive financing from central government. Also the Strategic Plan document will act as reference for the state government to approve local plans as per goals set in the TOD Toolkit.



A two-tiered mechanism of the KPI Toolkit which makes sure financing and inclusion of The TOD KPI Toolkit as a guide for executing TOD LAPs.

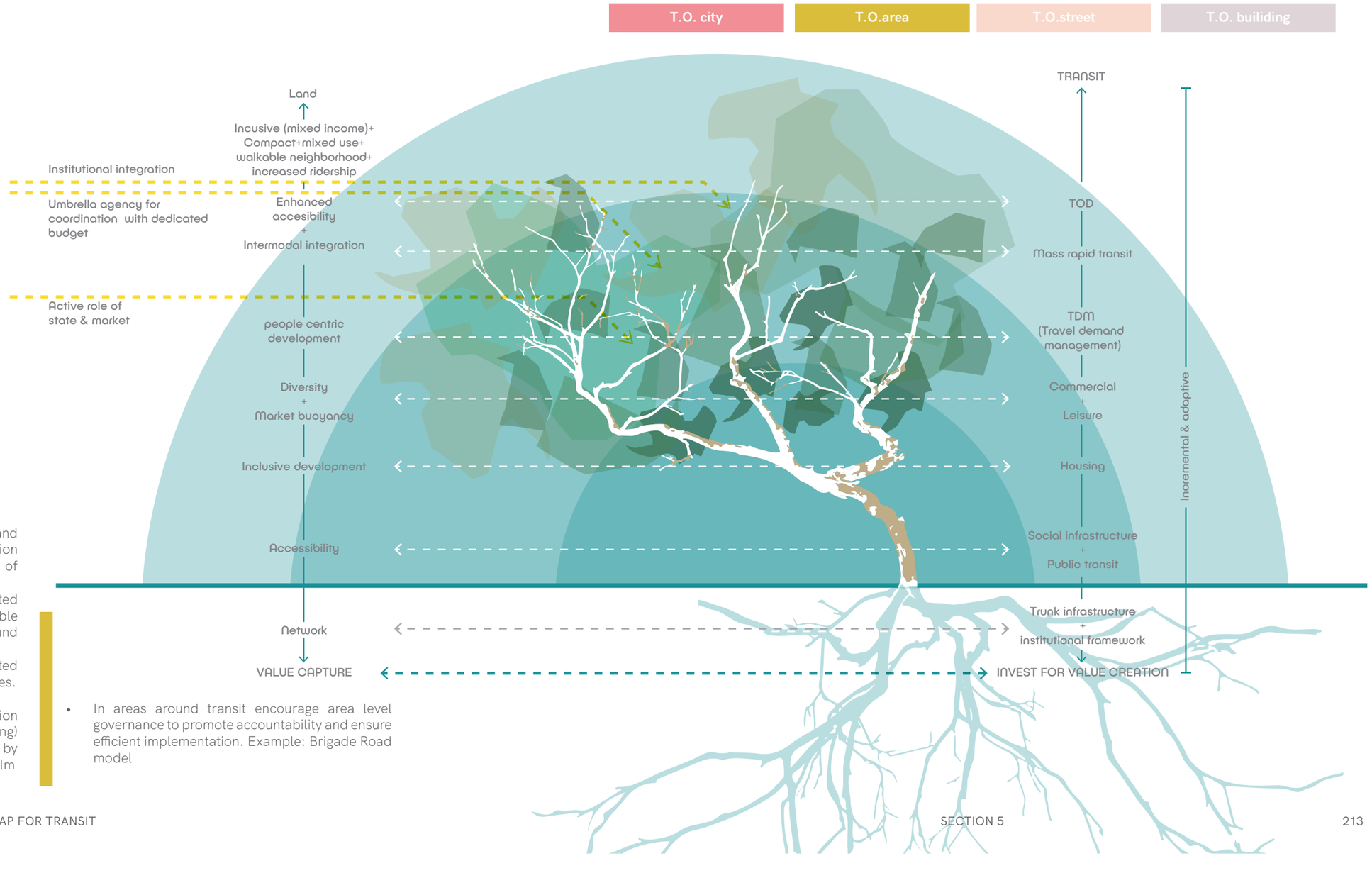
Image References

1: https://go.itdp.org/display/public/J+M+Road-+Photographs

2,3: Perver K. Baran , Daniel A. Rodríguez & Asad J. Khattak (2008) Space Syntax and Walking in a New Urbanist and Suburban Neighbourhoods, Journal of Urban Design, 13:1,
5-28, DOI: 10.1080/13574800701803498

GOVERNANCE & FINANCE

Governance framework LAND + TRANSIT



- Institute an umbrella agency for coordination and planning for land use and transport integration with a dedicated budget and regular stream of revenue.
- Land+Transit umbrella agency can be constituted as a 'Regulatory Authority' that is accountable and has the power to implement the LAPs around Transit.
- Empower ULBs by including elected representatives on the board of transit agencies.
- Introduce common mobility card.
- As a fundamental principle, follow 'value creation (social and physical infrastructure, housing) before value capture' and operationalize by investing in public realm to earn in private realm

- In areas around transit encourage area level governance to promote accountability and ensure efficient implementation. Example: Brigade Road model

HOW TO INSTITUTIONALIZE LAP AND TOD – ENTRY POINTS

Institutional arrangements: Define list of stakeholders involved in governance and management of LAPs around transit – public, private, civil society, banks, auditors, elected representatives, international finance institutions, contractors, retailers, commuters, residents etc. For each define roles and responsibilities in enabling effective management of LAPs and TOZs. Delineate communication protocols for effective operations and maintenance of the TOZ. Also, under institutional arrangements, define an exhaustive list of laws, rules, regulations that need to be considered and developed for planning and management.

Data management and governance: data creation, data management, data sharing.

Capacity building for the public authority, for data creation, data management, data sharing, planning, operations and maintenance, coordination and management of multiple stakeholders

Creation of a common technology led 'system' such as a Geo portal, for ease of visibility and management of TOZs, involving multiple stakeholders. Data access frameworks need to be developed for this purpose in order to ensure stakeholders are able to view and edit data pertinent to their role and responsibility in the broader governance mechanism.

Create a Road map, covering activities and targets within all the above, spanning three horizon periods: 1-2 years, 2-5 years and 5 years and above

Develop a Monitoring and Evaluation framework, with input, output indicators and desirable outcomes. Accompany this with a results framework, and Key Performance Indicators to incentivise performance on part of all parties involved.

Develop a framework of types of financial arrangements possible and corresponding contracts – Procurement guidelines, contracts for government owned assets and outsourcing, model service level agreements between public and private service providers, PPPs and other variants of partnership arrangements involving stewardship from all parties involved.

LAP for transit can be scaled up and mainstreamed to all other parts of the city, addressing local needs for amenities and basic services – for example, LAPs in residential areas, LAPs in business districts, LAPs around public open spaces; LAPs around affordable housing and so on. Describe the full LAP preparation process as it should be/ is mandated legally.

GOVERNANCE MODELS

Several governance models may be explored, based on context.

Complete public ownership, involving public investment for capital and recurring expenditure, for development, operation and maintenance of transit and precinct. Revenues may be generated through crowd sourcing or selectively letting out spaces through rental agreements.

Public authorities make the entire investment, to develop transit, while outsourcing the operations and maintenance of the infrastructure and other commercial areas such as retail, parking etc on demand. Pricing strategies and revenue share arrangements in this case, may be annually determined through performance oriented renewable contracts.

Public private partnerships, may be evaluated through feasibility studies and viability determined by all parties involved in partnership arrangements – public, private and banking institutions. Accompanied by due diligence, this would necessarily need to include risk analysis of fiduciary risks, estimation of revenue returns over a long term. Include in contractual agreements, clear mandates on authority agency responsible for determination of revenue share arrangements and pricing strategy and any re-negotiation on these.

In all cases, make contractual provisions for transparent process of re-negotiation, when confronted with financial risks.

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