

STATION AREA PLANNING



A GUIDE TO PLANNING AND IMPLEMENTING TRANSIT ORIENTED DEVELOPMENT IN INDIAN CITIES

Supported by:

Institute for Transportation and Development Policy

ENVIRONMENTAL PLANNING COLLABORATIVE



This study was supported by and prepared in collaboration with the Institute for Transportation and Development Policy. ITDP is an international not-for-profit organization headquartered in New York, working with cities worldwide to bring about transport solutions that cut greenhouse gas emissions, reduce poverty, and improve the quality of urban life. With projects worldwide, ITDP helps cities improve their sustainable transportation options, making getting around greener, easier, more affordable, and enjoyable for all.

DRAFT 1.0

30 Oct 2012

Authors:

Chirayu Bhatt (EPC)
Pushkaraj Paradkar (EPC)
Nadim van de Fliert (EPC)

Supported by:

Purvi Bhatt (HCP)
Nishita Kedia (HCP)
Anand Amin (EPC)
Premsharan Patel & Rendering Studio (HCP)

Acknowledgements:

This study would not have been possible without the vision and support of Dr. Bimal Patel (EPC) and Shreya Gadepalli (ITDP). The study was prepared in close collaboration with HCP Design and Project Management Pvt. Ltd. (HCP). Apart from this, a number of people contributed through their ideas, discussions and other support in the making of this document.

Mr. Ashish Sharma, IAS (PCMC)

Smt. Pratibha Bhadane (PCMC)

Mr. Prashant Patil (PCMC)

Chris Kost (ITDP)

Vanishree Herlekar (ITDP)

Pranjali Deshpande (ITDP)

Kamlesh Mehta (HCP)

Anuj Malhotra (ITDP)

Nitin Warriar (ITDP)

B.R. Balachandran (ITDP)

Luc Nadal (ITDP)

Cover Image: Development around BRT in Guangzhou, China. Courtesy: Chirayu Bhatt



EPC is a not-for-profit urban planning and policy research organization that works closely with government agencies, non-profits and other partners through collaborative interventions to promote productive, equitable, safe and sustainable living environments.

ENVIRONMENTAL PLANNING COLLABORATIVE
501 Paritosh, Usmanpura, Ahmedabad 380013
Ph: +91 79 2755 0102 WWW.EPC.ORG.IN

Contents

Introduction / Purpose	3
What is the Purpose of this Report?	3
Why Now?	3
Who is it Useful For?	4
Summary of Chapters	4
1. Transit Oriented Development.....	7
What is Transit Oriented Development (TOD)?	7
Transit Oriented Development (TOD)	10
Why TOD for Indian Cities?	10
Current Development Trends of Indian Cities	12
Examples of Successful TOD	13
2. Planning for Transit.....	15
Introduction	15
Regional Scale Planning	15
Transit Corridor Planning	16
Station Area Planning.....	17
Development at Parcel Level	18
3. Station Area Planning: Principles	19
1. Align the Development Character with the Transit and Place Type	20
2. Create a Walkable Urban Street Network	22
3. Promote Complete Streets	23
4. Right Size Public/Private Parking to Manage Private Vehicle Use	24
5. Provide Well Designed and Functional Public Space and Amenities	25
6. Ensure the Integrity of Natural Systems and the Environment.....	26
7. Conserve and Celebrate the Built Heritage	27
8. Maintain a Stock of Affordable Housing	28
9. Involve the Public in Key Decision Making.....	29
10. Capture Value for Financial Sustainance	31
4. Station Area Planning: Place Types	33
Inner City Areas ('Old City' Areas).....	34
Business Districts (Incl. CBD Areas).....	35

Urban Activity Centers.....	36
General Urban	37
Suburban Centers	38
General Suburban.....	39
How To Identify A Place Type	40
5. Station Area Planning: Process	41
Introduction.....	41
Existing Legislative Framework for Planning TOD	41
The Process of Station Area Planning.....	43
Key Stakeholders: Interests and Roles	47
6. Case Study – Kalewadi Phata.....	51
Background and Context	51
Selecting the Case Study Station Area.....	53
Identifying the Station Area Place Type and Existing Conditions.....	54
Adding Road Network.....	55
Adjusting the DCRs to Influence Development Character	55
A Note on FSI and Infrastructure.....	58
A Note on Implementation.....	58
Visualizing from the Street Level.....	59
CONCLUSION	61
Key Take-Away Points.....	61
Challenges To Station Area Planning.....	62
New Tools To Further Enhance Station Area Planning.....	63
Works Cited	65
List of Figures Sourced	65
APPENDICES.....	69
APPENDIX 1: Additional Resources for TOD and Examples.....	69
APPENDIX 2: Street Classification Matrix – System & Standards.....	70
APPENDIX 3: Place Type Self-Diagnostic Tool	72

Introduction / Purpose

WHAT IS THE PURPOSE OF THIS REPORT?

The aim of this report is to equip planners and decision makers in local and state government with guidelines, principles, and a process which could be used to promote Transit Oriented Development (TOD) in Indian cities. It is a guide which can be used at all levels (public and private) to:

1. Raise awareness about the importance of TOD
2. Promote appropriate decisions regarding physical development around public transport
3. Undertake the requisite policy changes to make it a reality

Station area planning is a tool to implement Transit Oriented Development in Indian cities. The aim of publishing this guide is to provide focused and concise recommendations for integrating development with transit.

WHY NOW?

Indian cities today face numerous challenges. Increasing traffic, poor transport infrastructure and growing population are leading to a deteriorating quality of life in urban India. Cities have failed to ensure safe, secure and quality public transport for all. Existing urban public transport is old and insufficient to keep up with growing population and expanding cities. In its recent report, McKinsey Global Institute estimates that by 2030, about 590 million people will be living in cities in India, up from 350 million at present. This 70% growth in population of the cities over the next 20 years would mean that every year India would need tremendous additional investments in infrastructure and services, unseen in the past.



Figure 1: Churchgate Terminus, Mumbai at rush hour

Various national policies and programs have already been initiated in order to meet this demand for infrastructure and services in the cities. Programs like the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) and the Sustainable Urban Transport Project (SUTP) are examples of government initiatives aimed at improving the provision of public transport in Indian Cities.

With this commitment to improving public transport infrastructure and investment in future public transport, it is equally important to create the right framework for development alongside the new and proposed public transport. This will serve 3 purposes:

1. To maximize the impact of new investment by facilitating more users to benefit from the public transport
2. To accommodate more of the future development on existing and proposed public transport corridors and hence containing urban sprawl
3. To create a mechanism to help finance the requisite infrastructure and public transport investments by enabling recapture of a portion of the increase in value of properties surrounding public transport

Ideally, for maximizing co-benefits, planning for public transport and development around it is done simultaneously / concurrently. Hence, in the Indian context, this would be the perfect time to consider and implement policies and planning that facilitate Transit Oriented Development.

Without such an approach, it will be difficult to prevent the pressure of new developments in cities from eating up the surrounding arable land. With proper planning, densification of underused areas and reduction of traffic congestion by providing quality public transport can not only deter horizontal expansion, but also reduce environmental impacts and pollution, ultimately offering a better quality of life to all.

WHO IS IT USEFUL FOR?

This guide is useful for planners, decision makers in government, developers and the public at large who can help make Transit Oriented Development a reality. The intention is to help clarify the issues, explain available legislative tools and related decisions that are involved in planning TOD. It should help the decision makers and stakeholders understand the unique character of different places and the varying scales of resultant development that are likely to occur around various stations, as well as the micro level planning and implementation concerns for individual stations. It provides all stakeholders the tools necessary to analyze and identify Place Types, decide place-specific requirements, apply appropriate principles, and execute the planning around the stations. Covering the scope from planning to implementation, this guide suggests a mechanism to implement Transit Oriented Development within the existing legislative framework.

SUMMARY OF CHAPTERS

The guide is divided into six chapters, each having a number of sub-sections. This guide introduces the need for prioritizing Transit Oriented Development while planning for public transport. It sets the stage for TOD and station area planning in Indian cities with many cities investing in public transport plans.

The first chapter begins with the definition of Transit Oriented Development. It outlines the characteristics of TOD and the consequent benefits. The guide advocates for TOD to avoid the current

development trend (sprawl) of Indian cities and to prevent the negative consequences of this unsustainable pattern of growth. Finally, a few examples of TODs with brief discussion follow to help visualize what a successful TOD looks like.

The second chapter – Planning for Transit – demonstrates how the consideration of transit along with harmonious land use development arises at various scales of planning. The sub-chapters explain the various levels of planning for transit – from a regional vision of public transport, to the definition of transit corridors, and the establishment of the Station Area Plans, which are a means to achieving TOD. Finally, stakeholders will plan at the parcel level to bring the vision of transit and aligned development to realization.

The third chapter outlines the principles for Station Area Planning, followed by summarized strategies for each principle to help guide the process and the planning efforts. This chapter also illustrates examples to show the results of implementing the outlined principles.

The fourth chapter describes the Place Types typically found in Indian cities. This will assist station area planning stakeholders when identifying a particular station area Place Type in a TOD framework. Their goal is to understand the current conditions and potential of each unique place along the transit corridor, which will guide their decisions to either mute or amplify the neighborhood's attributes through appropriate planning and development regulations.

The fifth chapter describes the process for implementing TODs in India through station area planning. It provides an overview of the existing legal mechanisms like the Development Plans (DPs), Town Planning Schemes (TPSs), and Development Control Regulations (DCRs). The key recommendation for cities and local governments wanting to implement TOD is to prepare a local area plan / detailed area plan – also called a Station Area Plan. This physical plan has to be supported by a set of guidelines to control development character / density, etc. However, there will also be a need to layout new streets / pedestrian paths in order to enhance pedestrian connectivity around public transport. One way to implement this is through the use of land acquisition and compensation through additional built area allowable on the remaining plot (through FSI). A more equitable, albeit longer and slightly complex process would require the use of land pooling (similar to the Town Planning Scheme) mechanism. Depending on the legal framework available for implementing planning within different states, the specifics of the implementation may vary for each state. The chapter concludes with a section identifying the stakeholders, their interests, and their role in the station area planning process.

The last chapter is devoted to the case study of a Station Area Plan as being recommended for a BRT station junction of the Dehu–Kalewadi and Aundh–Ravet routes in Pimpri-Chinchwad, near Pune, Maharashtra.

Lastly, the report concludes by summarizing the opportunities to create better cities through the intervention of Transit Oriented Development and Station Area Planning. It offers five take-away points / action items for decision-makers, current challenges to implementing TOD and opportunities to create new mechanisms that might optimize TOD practices.

1. Transit Oriented Development

WHAT IS TRANSIT ORIENTED DEVELOPMENT (TOD)?

DEFINING TRANSIT

Transit is a singular term used commonly to describe shared public transportation service. Available for the general public, it is distinct from taxicabs and hired buses which cannot be shared by strangers without prior arrangement.

In this guide, the word transit refers mainly to public transport modes such as suburban rail, metro / subway rail, light rail/tram and bus rapid transit systems (BRTS). Though the word transit is more commonly used in western countries, it is gaining prominence in Asia to describe mass transportation systems. In India, it is also known as public transport. The term transit has been used in this report to conform to its current international usage. Thus, for instance, suburban rail in Mumbai/Chennai could also be termed transit.

DEFINING TRANSIT ORIENTED DEVELOPMENT (TOD)

TOD projects are pedestrian friendly, compact, mixed-use developments within walking distance of a transit station and a core commercial area (Calthorpe 1993). TODs are built both to support public transport and to leverage the development opportunities that such a system may provide. Several studies have suggested that coordinated land use policies near public transport stations can lead to increase in ridership. When planned and organized appropriately, they can also support the financing of public transport.

Over time TOD has come to acquire the meaning of planned development around any type of transit and not necessarily a train station. TOD is not just any development near transit. It is a development that:

- Increases "location efficiency" so people can walk, cycle and use public transport
- Boosts public transport ridership and reduces use of private vehicles
- Provides a rich mix of housing, jobs, shopping and recreational choices
- Provides value for the public and private sectors, and for both new and existing residents
- Affords an accessible and safe living environment for children, adults, and those of advanced age and limited mobility
- Creates a sense of community and place



Figure 2: Peter Calthorpe, TOD diagram

TOD CHARACTERISTICS AND BENEFITS



Figure 3: TOD along BRT Corridor – Curitiba, Brazil

Development with high intensity of uses (as measured in number of jobs, residents & visitors)

BENEFITS:

- Reduces sprawl and conserves open space
- More efficient use of land, energy, and resources
- Transit ridership is maximized to planned capacity
- Fare-box revenues are re-invested in station area infrastructure and upkeep



Figure 4: Kharghar skyline, Navi Mumbai

A Rich mix of uses within walking distance of public transport stations

BENEFITS:

- Co-locating jobs and housing creates shorter commutes within the region
- Decreased travel distances means less fossil fuel consumption and cleaner air in the city overall

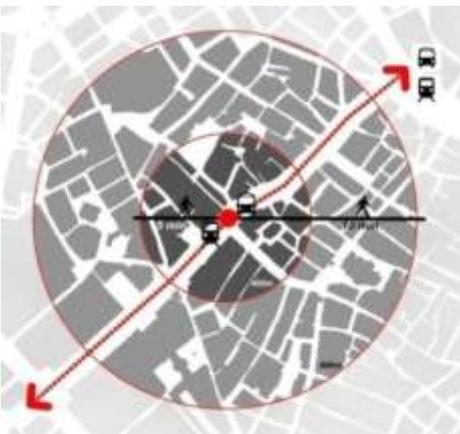


Figure 5: A TOD neighborhood conceptual diagram

A Dense network of streets and paths

BENEFITS:

- Results in human-scaled urban environments
- Shorter street crossings result in increased safety
- Reduces vehicle road speeds
- Auto-free streets, alleys, and greenways encourage non-motorized transit



Figure 6: Rea Vaya BRT station, Johannesburg, South

Access to high-quality public transport

BENEFITS:

- Minimizes street traffic/congestion
- Reduces household transportation expenditures
- Increases land value around the transit stop

Neighborhoods, streets, and edge conditions that support walking and cycling

BENEFITS:

- Increased pedestrian and cyclist safety, ease, comfort, and mobility
- Increase of non-motorized transport for short trips
- Area retail revenue improves with higher foot-traffic



Figure 7: Pedestrian promenade, Calgary, Canada

Increased mobility by regulating parking and road use

BENEFITS:

- Decreased personal vehicle use and road congestion
- Parking fees are a source of municipal funding for infrastructure development and maintenance

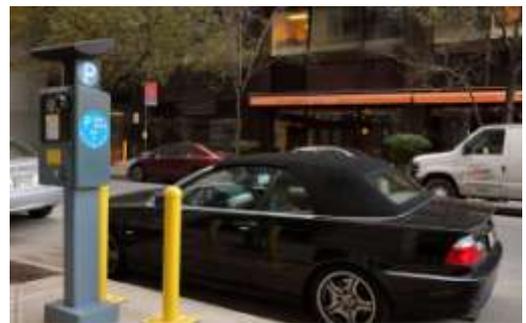


Figure 8: Pay-to-park, New York City, USA

Continuous network of inter-connected public open spaces and parks

BENEFITS:

- Accessible, free, and aesthetically pleasing public open spaces shared by residents and visitors
- Creates a sense of community and spaces for civic engagement/recreation



Figure 9: City parks, Curitiba, Brazil

Conserved historic structures and natural ecology

BENEFITS:

- Establishes community pride and a sense of cultural identity
- Preserves the local area flora, fauna, and other natural assets



Figure 10: UNESCO World Heritage site, Lijiang, China

TRANSIT ORIENTED DEVELOPMENT (TOD)

Many of the characteristics of Transit Oriented Development relate to the quality of the streets that will define new TOD areas. A dense network of streets and paths surrounding high quality public transport shortens street crossings, improves both pedestrian and traffic flows, and facilitates the structuring of a denser, more compact development pattern. Streets and edge conditions prioritize the livability, safety, and mobility of pedestrians and cyclists. Regulating parking and road use not only increases mobility, but also provides one of many sources of additional funding. Using appropriate mechanisms to capture the increased value of higher density will also help to fund the public transport and its associated infrastructure. Intense development around the transit affords ample space for more inhabitants and visitors, which, in turn, maximizes transit ridership and fare box revenues.

Transit Oriented Development, furthermore, redefines the character and quality of the neighborhood in areas where it is promoted. Often, an optimal balance of jobs, housing, commerce, recreation, amenities, and services within the same district reduces commute times and distances, curbs personal vehicle use, and cuts the level of carbon emissions. Continuous networks of public open space and efforts to conserve neighborhood heritage enhance the public realm and foster a sense of identity for residents and visitors. Finally, the provision of affordable housing near public transport ensures that all groups have equitable access to the benefits of TOD.

Transit Oriented Development benefits all stakeholders in the community – local government, transit agencies, developers, property owners, local businesses, and new and existing residents. Ultimately, TOD is more sustainable in many ways. Compact development around transit stations helps conserve open space, leading to a more efficient use of land, energy, and resources. Decreased travel distances means less fossil fuel consumption and cleaner air in the city overall. Ensuring a degree of municipal financial independence, concentrated development results in increased city tax revenues for local government, which can, in turn, pay for the transit investments and further community benefits and infrastructure. Property owners likewise benefit from increased property values and rent revenues. TOD also promotes increased transit ridership at low cost, minimizes traffic increases, and encourages walking and cycling. The increase in pedestrian traffic, in turn, bolsters local commerce. For residents and those who work in the area, TOD reduces household transportation expenditures, ensures a safer, better connected, and aesthetically pleasing street realm, and promotes a healthier lifestyle.

WHY TOD FOR INDIAN CITIES?

As explained previously, the state of public transport in the majority of Indian cities has degraded over the years. Rising population and underdeveloped mass transport has led to a rapid rise of personal vehicles, traffic congestion and an increase in pollution levels. Moreover, the majority of people do not use public transport simply because of the lack of it and inaccessibility to the transit. Therefore, while augmenting public transport, planning for accessibility is the need of the hour. Increased density and improved connectivity through Transit Oriented Development can help achieve that. But, one of the most important reasons for thinking about TOD for Indian cities is the recent emphasis on public transport at all levels of government.

NEW INVESTMENTS IN PUBLIC TRANSPORT

An increase in Indian funding for public transport and services infrastructure signals a need for TOD and intensified planning at the station area. Recently, the national government in India has taken concrete steps to ensure funding through special schemes and policies to initiate planning and construction of new public transport in urban areas. This includes funding for bus-based transport and metro rail public transport through JNNURM.

The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) is an initiative of the central government of India towards upgrading the transport and services infrastructure of Indian cities along with requisite municipal reforms to support the same. JNNURM is currently being implemented in 63 cities nationwide. Phase 2 of JNNURM has been proposed for the Twelfth Five year Plan from 2012-2017.



Figure 11: 'Janmarg,' Ahmedabad BRTS, Gujarat

Cities such as Ahmedabad have taken advantage of the JNNURM funds towards creation of a BRTS. The central government has also approved partial funding exclusively for metro construction for cities with over 20 lakh population. This funding has helped initiate many metro projects throughout many Indian cities such as Bangalore, Pune, and Ahmedabad to name a few.

Some cities are using a combination of local, state and national sources to fund new public transport initiatives such as with Bangalore's Metro and Pimpri-Chinchwad's BRTS. Other cities are using these funds to aggressively enhance their existing systems, such as Delhi and Ahmedabad. Many cities are considering sale of 'FSI' as a means of raising finances and promoting Transit Oriented Development. However, TOD is more than just increasing FSI. Hence, an integrated approach to TOD is needed.

CURRENT DEVELOPMENT TRENDS OF INDIAN CITIES

If one examines the built fabric of the Indian cities, it would be apparent that the current form of development may be attributed to sporadic interventions by developers or the government. Most of the fabric is approximately uniformly built, except the old core city areas and the slums. The built form barely takes advantage of the availability of or proximity to public transit.

The kind of developments currently shaping up in urban India are gated communities, townships, malls, campuses, IT parks etc., which are often oriented to private vehicles. In defining this new development, participation of local governments and the public is limited and passive. Arguably, the existing built density (persons per hectare) of many larger Indian cities (non-metro cities like Ahmedabad, Pune, Mysore, etc.) is high enough to support public transport. Yet, due to various reasons, these cities can be seen expanding laterally with new lower density development. A number of western cities experienced this phenomenon in the 1950s and 1960s due to three primary reasons: increasing affluence of the middle class, development of new and improved road systems; and, growth of cheaper and easily affordable automobiles.

CONSEQUENCES OF URBAN SPRAWL

Urban sprawl as the alternative to Transit Oriented Development has many drawbacks. Allowing lateral growth of low-density developments on the urban periphery negatively impacts public health and the environment – primarily due to the increased dependence on automobiles. The increase in harmful carbon (CO₂) emissions due to higher travel distances deteriorates air quality, pollutes water systems, damages fragile ecologies, and contributes to climate change. Sprawl also consumes large tracts of arable land, wildlife habitats, and other natural resources, where the increase in impervious surfaces (concrete, asphalt, etc.) results in urban heating and increased storm water runoff. Moreover, urban sprawl bears significantly higher infrastructure development and maintenance costs. The increased



Figure 12: Urban sprawl, Las Vegas, Nevada, USA

development at the periphery forces city officials to build highways and roads that reach these areas. Providing utilities such as water, sewerage, and electricity is also more expensive per household in lower-density areas away from city centers.

India has the opportunity to learn from the mistakes of the west and not repeat them. Through a combination of the provision of new / improved public transport, and a higher allowable density in close proximity to public transport, Indian cities can change the direction of new development from unsustainable automobile-oriented, to more sustainable Transit Oriented Development. As the name suggests, TOD is geared towards reaping the benefits of public transport and effectively fostering public transport by the increase in ridership. This is done by modifying factors such as land use zoning and FSI (Floor Space Index), which dictate the development character to accommodate development that is integrated with transit.

EXAMPLES OF SUCCESSFUL TOD



Figure 13: Curitiba, Brazil

The Brazilian city of **Curitiba** was the first to successfully implement a BRTS and to foster Transit Oriented Development around the stations. In 1965 the city adopted a new master plan that promoted high density residential and industrial development along the BRT corridors by changing the zoning and land use policies.

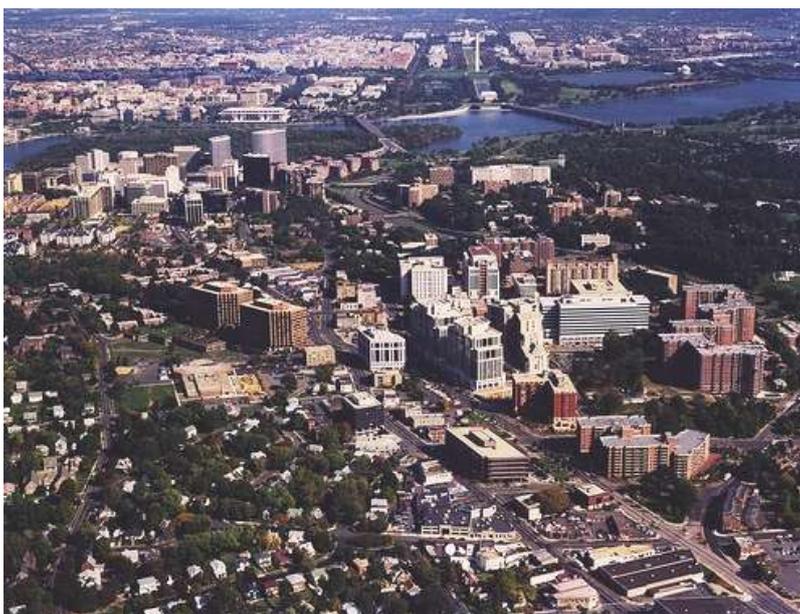


Figure 14: Arlington, Virginia corridor near Washington, D.C., USA

Integration of land use and transportation was encouraged around the closely spaced stations within the **Rosslyn-Ballston** corridor. Despite the enormous amount of commercial development which happened around this corridor in the past thirty years, the area has still retained a healthy amount of residential development.



Figure 15: Guangzhou, China

Density in **Guangzhou** is focused around the BRT corridor and the system has been matched to commute-hour transit demand. With nearly 800,000 passenger trips daily, it is the world's second largest BRT system after TransMilenio in Bogotá, Colombia.



Figure 16: Tempe, Arizona, USA

Since the opening of the first Light Rail route, this town within the greater **Phoenix** metro area has been integrating land use with transportation promoting higher density developments within the corridor. The first few projects are beginning to emerge around the stations, as shown in the picture here.

2. Planning for Transit

INTRODUCTION

Typically, planning for transit happens at various scales and at different times in the development process of a city. These plans are prepared by different agencies (private, public, or collaborative venture) and often enabled through different legislations. In order to understand and plan for Transit Oriented Development, it is important to first understand the overall process of planning for transit and where TOD planning fits into the city's or metropolitan area's overall planning processes.

REGIONAL SCALE PLANNING

In India, large metropolitan areas in most states are required to prepare a long range (10-20 year horizon) plan for the area and surrounding region based on the relevant Town and Country Planning act of the state. Such a plan offers the first opportunity for integrating the growth plans of the city with the vision of a new / expanded transit network. Ideally, planning at the regional scale should integrate regional goals (such as decreasing traffic congestion, decreasing pollution levels and improving public health) with regional contexts (such as the consideration of population growth and the location of major employment centers). However, in reality the ideas for introduction of new transit are often separated from the regional / metropolitan planning process.

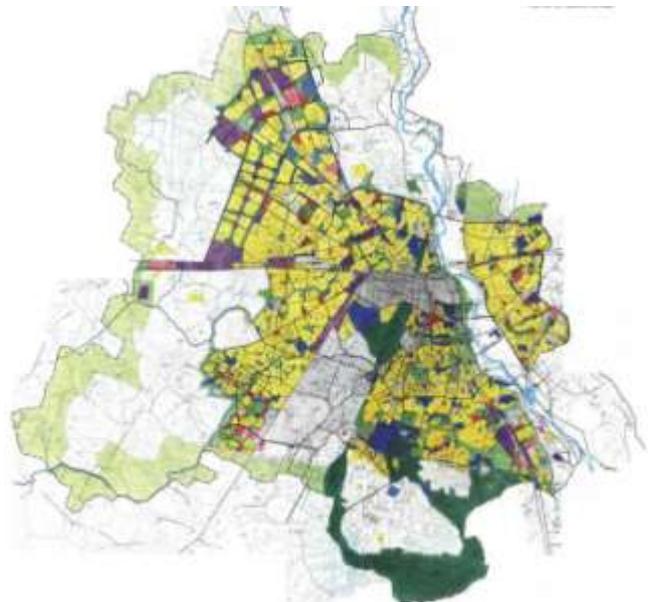


Figure 17: Master Plan for Delhi 2021, land use map

Apart from the statutory regional plans and development plans that are prepared as per the relevant town planning act, there are various other

studies and plans undertaken by the state, cities and/or metropolitan organizations. As required by JNNURM, cities are required to prepare a Comprehensive Mobility Plan(CMP), which integrates mobility needs of the city with the existing future growth trends. This in-turn is based on a previous Comprehensive Traffic and Transportation Study (CTTS). Both these studies are ideally conducted at the city / metro level and should incorporate concepts and proposals for transit.

Despite the fact cities and metropolitan areas are to plan for their own future, in many parts of the country, the state is still the one that defines the future vision for various cities. Planning for transit is a part of the future vision and is frequently driven by the desires and aspirations of state leadership. Such planning frequently follows a process outside of the ones mentioned above.

Regardless, planning for transit (new or enhancement of existing) happens at a regional scale when the vision for improved connectivity in a growing city emerges. While the vision establishes a preliminary need for the transit, a detailed feasibility study is not usually included with this vision. A regional development authority or equivalent is responsible for translating this vision into a clearly delineated Development Plan / Master Plan for the urban area. The regional authority will also update and adjust the Plan over time as the vision shifts.

Once the preliminary need is acknowledged with requisite political support for the idea, a separate study is undertaken to determine feasibility, which includes priorities for corridors, cost/benefit analysis, etc.

Plan: Development Plan / Master Plan or Comprehensive Regional Plan

Agency: Regional / Metropolitan / Urban Development Authority

Frequency: Every 10 years or 20 years

TRANSIT CORRIDOR PLANNING

As a part of the feasibility planning / corridor planning, the corridors with the most need/demand are identified. Alternatives for transit technology (rail/bus etc.) must be evaluated vis-à-vis the projected ridership, costs, and other parameters. This process is usually undertaken with the help of specific transport planning expertise and involves modeling of alternatives and scenarios to arrive at the final recommendation for transit corridors / stations, etc.

Such a plan also considers the existing and proposed uses along the corridors and may make suggestions for the same. For example, a new transit line may allow higher density development along certain corridors. Such recommendations may be reflected in the next version of the regional plan.

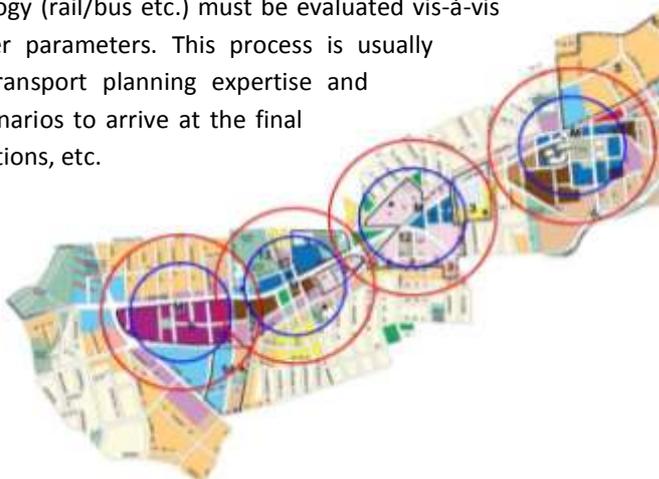


Figure 18: Rosslyn-Ballston TOD corridor, Arlington, Virginia, USA

The primary elements identified in this plan include the phase-wise implementation of the different transit corridors, approximate station locations, an operations plan and financing mechanisms, etc. With the government needing continuously to reduce the funding it has to provide from public sources, more feasibility plans for transit include funding alternatives that are based on capturing the value of improvements made by the new transit system. This includes land value capture mechanisms through outright sale of development rights and/or tax increment financing, etc.

Plan: Feasibility Plan or Transit Corridor Plan

Agency: State Urban Development Department, Unified Metropolitan Transit Authority or Urban Development Authority or Urban Local Body

Frequency: Once, at the time of development of new transit. Subsequently, each time there is expansion of a transit corridor, or more frequently if needed.

STATION AREA PLANNING

Station area planning usually takes place after the initial feasibility plan / corridor plan is completed for the transit corridor. Such planning requires in-depth understanding of the local area. Station area planning involves applying the general approach to Transit Oriented Development (Principles) and applying them as per the need and uniqueness of different areas (Place Types) in the city. The end result is a plan that may include:

1. A specific location for each station (more defined than the previous planning efforts)
2. An area of influence around each station
3. A future plan for the influence area, including access to proposed transit through new pedestrian/bicycle connections and new streets (as needed in the specific station area)
4. Development guidelines and regulations based on the specific Place Type for each station area
5. Any specific needs of individual station areas to be addressed through special projects

Public engagement is critical to the success of planning for TOD. This will ensure that the new policies and plan being prepared are aligned with the broader vision of the community and it will create buy-in for future implementation of the plan.



Figure 19: Station Area Plan for Kalewadi-Phata BRT station, Pimpri-Chinchwad, Maharashtra

Plan: Station Area Plan

Agency: Regional Development Authority OR Urban Local Body

Frequency: Once at the time of development of new transit. Subsequently each time there is expansion of transit corridor or more frequently if needed.

DEVELOPMENT AT PARCEL LEVEL

Urban development happens parcel by parcel around each station along a transit corridor. Once the Station Area Plan defines critical access, it is incumbent on the Transit Authority and Urban Development Authority to prepare guidelines and regulations for development control that facilitate the implementation of the station area plan. At times this calls for discussions/negotiations with individual developers to ensure smooth connectivity and access to the proposed transit.

Hong Kong is a good example of a city where the transit authority is able to discuss/negotiate with the developers to facilitate direct access from high-impact developments to the transit station via underground/overhead walkways. Such connections can be facilitated through appropriate incentives/disincentives provided in the DCR (Development Control Regulations) based on the vision of the Station Area Plan.



Figure 20: Overhead walkways linking developments with transit, Hong Kong

In the U.S., planners, city officials, and developers come to the table with needs and interests to be voiced and heard. This interaction often results in Community Benefits Agreements (CBAs). In these agreements, the city and residents support the developer's proposed project, and the developer must provide some specific amenities or mitigate harmful development effects to the neighborhood. Such a mechanism might also assist in strengthening public support for the Station Area Plan.

3. Station Area Planning: Principles

The principles of Transit Oriented Development defined in this chapter outline a framework for thinking about transport and land use in an integrated manner. They will help the local governments and development authorities chart a new direction of growth that is also sustainable in the long run as opposed to the current sprawl oriented growth. Each city and metro area will have its own unique set of issues and concerns which will need to be addressed in the process of defining goals for TOD. Thus, these goals may vary from city to city, while the direction may be the same. This is the reason why these principles are not oriented towards specific goals, but rather lay the general direction for aligning development with transit and vice-versa.



Figure 21: Decatur, Georgia. The city was recognized as one of the most walkable cities in the US.



Figure 22: Transit aligned with land use and development.

An example of Transit Oriented Development is the City of Decatur, near Atlanta, Georgia, USA. When the transit line was constructed near Decatur in the late 1970s, the city consisted of mostly low-rise developments. However, with the increasing use of transit there was greater demand for development in the area. The Atlanta Regional Commission (ARC) set up a new program called Livable Centers Initiative (LCI) in 2000 to improve the land use-transport integration within its planning. As part of this program ARC funded a number of efforts for planning and implementing TOD in the region. A plan prepared by the City of Decatur was accepted into the program that led to new development in and around the city center of Decatur. Today, Decatur is one of the leading TODs in the Atlanta region. This was possible due to the framework of the LCI program, which allowed context-specific planning to help integrate land use and transport in different parts of the Atlanta region.

The key understanding from this and other examples of TOD is that the desired end-goals will not be achieved in one go, but rather step-by-step, with a number of interim goals. Hence, the specific end-goals are not as critical to the planning process as the principles that set the right direction and framework for development.

The principles presented here are generic. They will need to be aligned with more specific goals as applicable to the specific context to which they are being applied. In the hand of planners, architects, engineers and other urban practitioners, these principles will help set direction and priorities for aligning land use and transportation.



Figure 23: Street running light-rail in downtown Baltimore, Maryland, USA

1. ALIGN THE DEVELOPMENT CHARACTER WITH THE TRANSIT AND PLACE TYPE

In the process of planning for Transit Oriented Development, the key point is to align the development character with the proximity and access to public transport. The aim of TOD is not only to encourage people to live within walking distance of the transit but also to promote higher ridership in public transport. Studies have shown that people who live in TODs are more likely to use transit than people who live elsewhere. Thus it is not just high density that is needed in the influence areas of public transport, but the entire development should be aligned with public transit.

ACCOMMODATE HIGHER DENSITY IN CLOSE PROXIMITY TO PUBLIC TRANSPORT:

Provision of new public transport leads to an increase in the value of development in the influence zone. Increasing the density in this area has multifold benefits:

- 1) it allows more people to benefit from proximity to better transport;
- 2) it allows developers to benefit from increase in the value of development; and
- 3) it allows the city to support the infrastructure improvements through the resultant increases in amount of property tax collected.

At a minimum, the density allowed in the influence zone should be twice what is allowed in the surrounding areas.

IDENTIFY AREAS IN TERMS OF AGE OF DEVELOPMENT:

Redevelopment of existing built-up areas is more difficult than developing in Greenfield areas. Hence, in order to promote redevelopment, appropriate incentives need to be in place. Moreover, it may not be economically viable to redevelop recently developed areas (built in the last 5 years). Preparing an appropriate phasing plan for the station area would be important, so required public amenities could be developed within the 1st phase of redevelopment.

CREATE USABLE BLOCKS FOR DEVELOPMENT:

Blocks and plots need to be of a developable size. Places with very large plots should be broken down to accommodate public streets, while plots which are too small to develop should be encouraged to consolidate with adjacent plots so as to improve efficiency of land use and urban development.



Figure 24: Wilshire Boulevard, Los Angeles, USA. Wilshire Rapid Bus line is one of the most heavily travelled bus routes in the US



Figure 25: Guangzhou, China. The old development along the BRT station with new high rises in the background



Figure 26: New York City, USA. Dense, built up urban blocks near public transport stations



Figure 27: Paley Park, New York. A pocket park located in between the dense urban fabric



Figure 28: Västra hamnen, Malmö, Sweden. Mixed-use, high density development fosters an efficient urban realm



Figure 29: Ballard Estate, Mumbai was developed between 1910 and 1940. Urban design guidelines dictated the heights and design form

MATCH APPROPRIATE BUILDING AND OPEN SPACE TYPES WITH THE CHARACTER OF THE STATION AREA:

Different places maintain unique characters and appropriate new building and open space types should be targeted for construction in these areas. Development at each Place Type should, then, conform to appropriately identified needs according to the character and context of the neighborhood. Proposing low-rise dwellings in a potential business district would be discouraged, for example, as would a large-scale transit plaza in a general suburban area.

ESTABLISH DEVELOPMENT RULES BASED ON PLACE TYPES:

In most Indian cities, the development regulations are uniformly applicable regardless of the differences in character of each place (except “old city” areas which often have special recommendations). With station area planning it should be possible for each station area to establish its own optimum limits for FSI, ground coverage, setbacks, etc. so as to achieve the desired development character. Setbacks could also be addressed differently for different street types.

ENCOURAGE MIXED LAND USE:

Land use within the TOD should allow for a mix of uses to coexist in close proximity in order to minimize local trips. Moreover, in order to encourage mixed land use, the city may provide incentives for incorporating local serving retail within new developments and redevelopment of existing plots.

URBAN DESIGN GUIDELINES:

Place Type and station area specific urban design guidelines can be set to create a unified urban realm in the desired development. This helps improve the quality and character of public realm which is key to vibrant and lively urban environments. This should focus on giving an identity to the development and enhancing the physical attributes. Urban design guidelines could include specific recommendations for ground / street fronting uses, elements like colonnades, overhangs, transparency, materials for cladding, flooring, etc. Improved and consistent signage and directional way-finding should be an inherent part of any urban design guidelines for the city.

2. CREATE A WALKABLE URBAN STREET NETWORK

The urban framework includes the grid of streets and blocks that form the basic structure on which urban development can occur. Along with the planning of new routes for public transport, it is important to lay out the framework for urban development around it, whether it is for greenfield corridors or for corridors that pass through existing developed areas. Public transport will improve the connectivity and accessibility of the places it passes through, and as a result would encourage new developments in the area in the long term. In order to be mutually beneficial, the urban development should be planned based on a framework of walkable urban place. At times, this may mean readjustments to the existing building policies and by-laws.



Figure 30: Copenhagen, Denmark. The pedestrian and bicycle friendly city possesses excellent circulation of streets and ideal block sizes

ESTABLISH STREET NETWORK: The first step would be to establish / reorganize the street network to emphasize connectivity and easy access for pedestrians and non-motorized vehicles. Re-tooling the street fabric involves breaking down super blocks into human scale blocks with a dense grid of local streets to decrease walking and cycling distances. Ultimately, block perimeters in station areas should not exceed 600m, and any side of the urban block should not be greater than twice the length of any other side. To mitigate excessive disruption, avoid removing existing streets to the extent possible, ensure new streets are well connected with existing streets, and minimize complicating intersections.



Figure 31: Guayaquil, Ecuador. 9 de Octubre Avenue is the central arterial of the city

STREET CLASSIFICATION: The street network at each station area comprises a diverse array of street types: major & minor arterials, major & minor streets, local streets, and non-motorized transit (NMT)-only streets. Arterials exist to facilitate the flow of through traffic, while vehicular traffic within the district is diffused into a network of more frequent major, minor, and local streets, thereby protecting the primary users of streets in a station area – the pedestrians and cyclists.



Figure 32: Amsterdam, Netherlands. Trams, buses, cars, cyclists, and pedestrians share the street

MULTI-MODAL STREETS: The new, urban street network will prioritize and support diverse mobility options by connecting multiple modes of (public) transport with surrounding land uses and ensure easy access to other station locations. As a general rule of thumb for the street grid, pedestrian priority streets can be as often as every 100-150m, producing ideal walkable blocks of up to 15,000 m² each (or 1.5 hectares). Cycle friendly streets occur at about every 200-250m and streets with mixed traffic can be at every 400-500m.

3. PROMOTE COMPLETE STREETS

The streets surrounding public transport corridors need to support multiple transportation modes – buses, rickshaws, cycles, pedestrians, private cars, and two-wheelers. They also need to provide for the safety of all users. The design of intersections and crossings, footpaths and transit stops should consider the safety of the young, the elderly, and the mobility impaired. This approach to designing streets may necessitate trade-offs due to space constraints, but the needs of the pedestrians, bicyclists, and transit users should be prioritized over the convenience of private vehicle users.

REALIGN STREETS FOR BETTER PEDESTRIAN COMFORT: Narrow traffic lanes and slow speeds are desirable in transit oriented neighborhoods. Increased pedestrian use will need wide footpaths and trees for shade. At a minimum, footpaths should be 2m wide and free of all obstacles. A zone of tree planters and street lighting/ furniture should be in addition to this clear width. Tactile paving and ramps should be used as appropriate to provide disabled friendly access.

ENCOURAGE ACTIVE STREET USAGE: Along with wide footpaths, streets should also include space for vendors where possible. Seating spaces should be available for people to rest. Ground floor retail facing the street should not have parking or compound walls in front of the shops. Separate spaces can be carved out for informal street side stalls, small markets and activities likely to develop around stations which help enliven the public realm.



Figure 33: Istanbul, Turkey. Making space for street side stalls and seating

PRIORITIZE SAFETY AND SECURITY: Streets should be planned for the safety and security of users with design responses that include lighting and improved visibility for users – conditions that create “eyes on the street.” Emergency calling booths should be placed where appropriate and CCTV cameras should be installed near stations and bus stops to promote a sense of security.



Figure 34: New Delhi. Separate and quality cycle tracks

FACILITATE MOVEMENT OF CYCLES AND PROVIDE CYCLE PARKING FACILITIES: The streets surrounding the station areas should encourage cycle usage by providing cycle tracks / lanes, separate signal phases for cyclists, and intermittent cycle parking along the street. Full service “bike stations” (weather protected bicycle parking services) should be considered at major / terminal stations. Public cycle sharing systems, if installed, should be placed in close proximity to stations and bus stops.

STREET DESIGN GUIDELINES: Each street and road type should roughly conform to appropriate street design guidelines as outlined for it in the Street Classification System & Standards matrix found in Appendix 2.

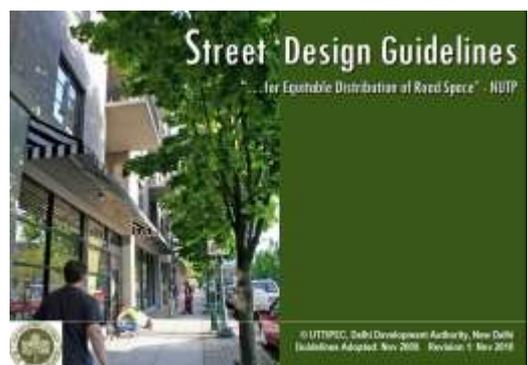


Figure 35: UTTIPEC Delhi Development Authority, an example of Street Design Guidelines

4. RIGHT SIZE PUBLIC/PRIVATE PARKING TO MANAGE PRIVATE VEHICLE USE

Car use should be discouraged through the efficient management of private and public parking. One of the key concerns amongst city governments today is to provide sufficient public parking in order to mitigate the scarcity of parking in private developments. Parking is not a public good – definitely not in the same vein as public parks, clean air, and potable water. Only in the rare case where provision of public parking promotes more / higher use of other sustainable modes of transport (e.g. park and ride at public transport terminal stations) could it come close to being considered a public good. Hence, it is crucial to understand the impact of parking provision on choice of transport and other parameters before taking a decision on whether to provide additional public parking or not. Used judiciously, it could help manage the transport needs of the city while also contributing revenues for the operation and maintenance of public transport.



Figure 36 (a) and (b): Bogotá, Colombia. Images before and after enforcement of parking regulations on Avenue Carrera 15

ANALYZE PARKING SUPPLY AND DEMAND: The presence of high quality public transport can reduce the parking demands; therefore, plans should quantify existing parking and estimate future requirements in the area considering the new transit and the resultant change in needs.

PRIVATE PARKING: Parking is a significant factor impacting the use of private vehicles. With the provision of new public transport routes, it is important to maintain the minimum private parking standards over time. Studies show that people living in TOD areas own fewer private vehicles and drive less than the region's average. Thus, key private parking recommendations include: 1) The minimum private parking requirements in the influence area should not increase beyond what is currently mandated; 2) Maximum private parking should be specified, instead; 3) Parking should not be bundled with other property (residential / commercial, etc.), but sold/traded separately so people who do not require parking are not forced to pay for the same.

REGULATE PUBLIC PARKING: Parking on public land (whether it is a paved street or an unpaved open space) should never be free. It is in the city's interest to ensure public amenities are maintained and for that purpose, parking should be regulated and charged at market rate. Authorities should also curtail illegal parking by strictly enforcing parking regulations. Rather than fixing the price for each area, the city should allow parking managers (public or private) to align the price of parking such that at least 10% of the spaces are available at any time. Plans should regulate every public parking spot for all types of private vehicles. Loading zones, zones for auto rickshaws and no parking zone designations can be asserted by color coding the curbs.

LOCATE PARKING TO MAXIMIZE PLACEMAKING: Park and Ride facilities near terminal stations need not always be adjacent to the station. In order to strengthen local retail and services, it is best if the parking is placed at least 150-200m away from the station itself.

5. PROVIDE WELL DESIGNED AND FUNCTIONAL PUBLIC SPACE AND AMENITIES

Access to numerous high quality public amenities is one of the advantages of living in urban areas. Most Indian cities have had reasonably good access to public parks and other amenities like public schools, health facilities, and libraries, etc. in the past. As the cities grew, they have not been able to keep pace with the rapid urbanization and the challenge of maintenance of existing amenities. This, combined with the liberalization of the economy, has pushed middle class Indians to support more private amenities (schools, libraries, health facilities, sports and country clubs, etc.) while the older decaying public facilities are left for captive poor users. The same is true for public open space where most new developments now include significant private parks and garden spaces. If the bulk of the Indian middle class population has to be attracted to live closer to older areas, in proximity to public transport, the provision and maintenance of quality amenities and public open space will be a critical issue.

PLAN FOR OPEN SPACE AND PUBLIC PARKS: The provision of open space such as plazas or parks should be an integral consideration in the plan for Transit Oriented Development. Such a plan calls for a coherent approach to creating meaningful spaces in between the buildings. To the extent possible, the plan should lay out a continuous and interconnected network of public open spaces and trails around transit, seamlessly integrated with station access points.

OPEN SPACE ELEMENTS AND MAINTENANCE: A successful public space is easy to walk around in, provides comfortable places for sitting, and incorporates shade and landscaping, attractive lighting, water fountains, well-serviced public toilets, and public art. It is important to make these spaces feel welcoming and safe both for the people who live and/or work in the influence area as well as for visiting public transport users.

Moreover, these parks and public spaces need to be well programmed so they are used by the communities around the station areas. Involving community members in programming public space also inspires a sense of community ownership. Ultimately, however, these spaces will not thrive unless resources are also dedicated to the upkeep and quality-maintenance of the space.

PUBLIC AMENITIES: Access to public amenities by walking / public transport can significantly reduce the burden on existing transport systems. Ensure that schools, health facilities, libraries, etc. are walking distance from transit stops (400-800m). It would also be important to invite residents to help define the need for other amenities in the neighborhood – whether retail, child care, or other services should be included.

ENSURE ACCESSIBILITY: Care should be taken to ensure that the amenities and open spaces are easy to find and have unrestricted access. The amenities and public spaces must be accessible for everyone aged “eight to eighty,” and for those with disabilities.



Figure 37: Shirpur, Maharashtra. Urban plaza amidst dense development



Figure 38: Sydney, Australia. Lighting enhancing visibility and security in an open space

6. ENSURE THE INTEGRITY OF NATURAL SYSTEMS AND THE ENVIRONMENT

Cities are an intricate and complex balance of the existing natural systems (land, water, flora, fauna, etc.) with the human interventions that have adjusted these systems in order to shape the built realm. The broad disciplines of urbanism and the environment year after year shed new light on the nature of this interaction, with learnings on how best to achieve a harmonious interplay between the two. Any kind of development has consequences for the natural system being disrupted, whether building on a greenfield site in the urban periphery, or on an infill site in already developed areas. Planning for TOD should, therefore, consider both the environmental impact on the immediate station area and the reduction in wasteful energy consumption for the broader transit corridor and region.

ENVIRONMENTAL PRESERVATION AT THE STATION AREA: Before undertaking any new development in a station area, a survey should take account of the topography and existing natural resources in both the area's unbuilt and built-up plots. From this, planners and stakeholders can discern any potentially compromising factors for the natural environment in the immediate and surrounding areas. The process should identify unbuildable land, fragile ecosystems (e.g. wetlands), wildlife habitats, key water and drainage systems, and other natural resource systems to ensure development either completely avoids or mitigates damage to them. If a significant portion of the surveyed land is found to be unsuitable for development, planners should consider shifting the station location to another site along the corridor.

Additionally, the station area planning process should celebrate the natural heritage of the area by not only protecting the biodiversity of native flora and fauna, but by providing space for them – possibly in open areas and public parks. The above-mentioned survey should also seek to identify natural assets, such as strategic tree cover and water elements (small lakes, ponds, creeks, etc.), in and around station areas for preservation.



Figure 39: Urban wetlands, Toronto, Canada



Figure 40: Urban roof gardens in Southeast Falsecreek, Vancouver, Canada. This Olympic Village has been called the World's Greenest Neighborhood

ENVIRONMENTAL SUSTAINABILITY OF THE REGION:

The concept of the environmental sustainability of the city applies also at the scale of the region. Not only does the compact and dense form of TOD mitigate excessive environmental harms through efficient energy use and decreases in greenhouse gas (GHG) emissions, but transit corridor development can demand and sustain advanced, energy-efficient building strategies and technology.

ENERGY EFFICIENT BUILDINGS AND COMMUNITY SYSTEMS:

Station area development should incorporate climate-responsive design and advanced conservation features in planning around transit, and for all new buildings in the area (e.g. south-facing block orientations, photovoltaic panels, green roofs, runoff cisterns for rainwater collection, etc.). Utilizing local renewable energy sources and providing natural, community-level water and waste recycling systems will improve the sustainable character of the area overall. Defining general guidelines for energy-efficiency should occur concurrent to planning for TOD. Green buildings and systems should be the ultimate goal for the entire city.

7. CONSERVE AND CELEBRATE THE BUILT HERITAGE

A city's built heritage helps its residents understand the past and links it to the present. In the face of rapid globalization and largely homogenized developments, heritage conservation is a way of preserving a sense of spatial, individual, and community identity (Choudhary 2004).

Frequently, the provision of new public transport brings new investment into the area with a demand for new, higher, and denser environments. This new development also poses a threat to some of the older development that may have significant tangible (i.e. the built environment, historic structures, and monuments) or intangible (i.e. in the form of communities, cultures, traditions, etc.) value for the heritage of the place. Hence, it is important to ensure that such buildings and monuments that are part of the heritage are preserved and maintained while not imposing a significant cost to the existing owners. The preservation of cultural and heritage properties is a public good and the cities should find ways to incentivize preservation of such properties. An effective Transfer of Development Rights (TDR) mechanism needs to be enabled through appropriate state policy / law so cities can incentivize and support heritage conservation. A Station Area Plan should, then, outline the process for heritage conservation.



Figure 41: Prague, Czech Republic. Heritage is not only preserved but celebrated in this old town



Figure 42: Khotachiwadi, Mumbai is identified as a Heritage Precinct and has its own conservation guidelines

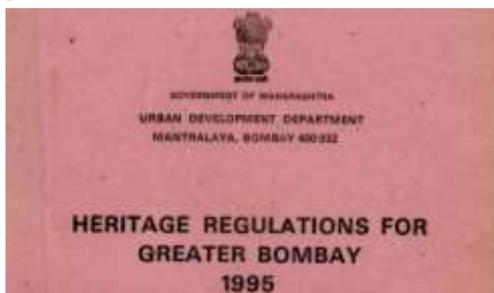


Figure 43: Heritage Regulations for Bombay, cover page

IDENTIFY STRUCTURES WITH HISTORICAL VALUE:

Make a plan which marks out the historic structures within a given station area. The plan should clearly identify international / national heritage resources (through UNESCO world heritage sites, Archeological Survey of India, Intach, etc.) and state / local resources on a singular map / list. A prioritization plan should include a gradation of priority for channeling local funds. Wherever possible, heritage should be accommodated and celebrated in the new development through mutual dialogue with local developers.

IDENTIFY THE INCENTIVES:

Many national and international organizations provide cities and individuals appropriate funding for heritage conservation. Local incentives like transfer of development rights (TDRs) need to be used carefully to ensure balanced development.

CREATE GUIDELINES FOR CONSERVATION / REDEVELOPMENT:

Historic preservation guidelines can be customized to suit an area marked for high density and TOD. Innovative means can be employed to celebrate the history and give the station area an identity with the help of historic preservation. Not all properties need to be preserved 100%. Selective redevelopment and adaptive reuse strategies could be adopted for appropriate properties to ensure economic viability while retaining core elements important for the heritage of the place. This can be outlined through appropriate / detailed guidelines for heritage conservation.

8. MAINTAIN A STOCK OF AFFORDABLE HOUSING

Equitable distribution of resources is critical to sustainable growth of cities. While planning for public transport, it is important to ensure that the benefits of such an investment are distributed equitably to all residents of the city. Considering equitable access to transport means people from poor and low-income households need to be in close proximity to public transport. Thus, creating and maintaining a stock of affordable housing near public transport, with good access to jobs and other public amenities, is important. This will allow people at the lowest income levels to minimize their expenditure on transport, which can then be used towards more productive purposes. Providing these individuals a home closer to the station will also secure higher transit ridership, because these are the same households who are more likely to use transit on a regular basis. A state policy on commitment to providing / maintaining a stock of affordable housing in close proximity to public transport will ensure that cities do their best to retain these places rather than promoting large-scale gentrification.

ALIGN WITH CITYWIDE AFFORDABLE HOUSING PLAN & GOALS: A citywide affordable housing plan should set affordable housing goals, and help proactively implement policies such as density bonuses for provision of such housing in close proximity to public transport. Policies should reflect market realities and ensure that the housing thus provided remains affordable for a certain minimum time period (say 10 years).



Figure 44: Pimpri-Chinchwad, Maharashtra, JNNURM affordable housing

INCENTIVIZE AFFORDABLE HOUSING NEAR STATION AREAS: Resources should be targeted at station areas to maximize affordability. In newly developing areas, a process similar to Town Planning Schemes (TPSs) could have the potential of securing land dedicated for development of affordable housing (based on the current town planning acts enacted at the state level). If a TPS is not used, provisions could be made in the Development Control Regulations (DCRs) for reserving either a percentage of the built property or a percentage of the land area that could then be managed and operated by a local Affordable Housing Authority.

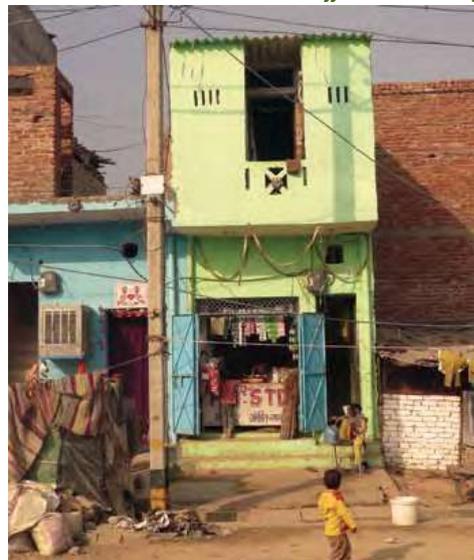


Figure 45: Savda Ghevara, Delhi, slum upgradation

MINIMIZE THE DISPLACEMENT OF CURRENT RESIDENTS: One of the most important policies to enact for the city / state is a commitment to minimize the relocation of existing households living in affordable housing (such as slums, chawls, and other informal housing). It is estimated that in any city / town in India approximately 25 - 35% of people live in slums and chawls in a dispersed manner across the city. They occupy merely 3-5% of the total land area, however. This proves that they are already living in extremely high density conditions and it is perverse to relocate them into further denser housing away from the city. Further, by keeping the slums and upgrading them in-site, a good stock of affordable housing will remain available for the low-income residents, which would be dispersed within the existing city boundary, thus in close proximity to public transport.

9. INVOLVE THE PUBLIC IN KEY DECISION MAKING

Public participation is critical to the success of any planning effort. While the 74th constitutional amendment outlines the need for planning to be done at the local level in consultation with the people, it is yet to be implemented in spirit. One of the key learnings from the western experience on public participation is that it leads to a better plan and a win-win for all stakeholders. By including people's suggestions, the plan is better informed of the local conditions and has greater buy-in from the stakeholders. This results in faster implementation and also leads to savings of time and reduction of extra costs due to delay. As city planning officials understand, the planning process needs to balance the interests of a number of different stakeholders including the political leadership and the developer community. Involving the public helps balance these varied interest and leads t he process in a direction that is mutually beneficial for all stakeholders. A detailed public participation plan should be developed which addresses the specific issues and ensures cooperation of all the parties involved.



Figure 46: Ahmedabad, Gujarat. Public meeting for a Town Planning Scheme



Figure 47: Pune, Maharashtra. Community participation to determine affordable housing schemes



Figure 48: Chennai, Tamil Nadu. City-wide meeting

CREATE A MECHANISM FOR PUBLIC PARTICIPATION: It is important to organize the public participation process in order to maximize the participation from various stakeholders. This can be done through setting up appropriate committees.

A *steering committee* can be set up to help take key decisions. It usually consists of stakeholders that are directly impacted by the planning decisions for the particular plan. The steering committee often consists of elected representatives from the area and administrators who are involved with the specifics of the execution of the plan.

An *advisory committee* consisting of respected community leaders, eminent citizens, and other stakeholders could help provide broader suggestions into the process.

A *technical committee* made up of experts from various fields such as transportation, real estate development, planning, engineering, services, etc. could help vet the plan from a technical standpoint.

The early involvement of elected and appointed officials can help ensure their support and smooth the way for adoption of the plan. Developers and property owners should be involved in some capacity as they bring an important perspective regarding the market feasibility of plan alternatives. The mechanism of public participation should be aligned with the scale and extent of the planning effort.

CONDUCT LARGER PUBLIC OUTREACH, INCLUDING WORKSHOPS AND OPEN HOUSES:

Outreach to the larger public is as important as targeted participation from key stakeholders. Creating diverse opportunities for the public to know about the plan and to provide inputs in the planning process will secure consensus and support for the implementation of the plan. Visual tools and photo simulations of development alternatives are useful tools for engaging the public, and can help clarify contentious issues. To maximize participation, the planning process should be staged at an easily accessible venue, at times when the community people are likely to be able to attend. It is important that the notification is sent publicly – such as through a newspaper – as well as privately through the mail. Moreover, to have meaningful input, the community should be educated about TOD and its potential to leverage private investment for community benefits like public parks and plazas.



Figure 49: Pune, Maharashtra. Sample house mockup in an affordable housing scheme open to the public

ENSURE INFORMATION DISSEMINATION: In the age of information overload, it is important to provide at least the basic information through newspapers and websites. This ensures that people who are unable to dedicate time for meetings and workshops can continue to be informed and help support the planning process passively. Depending on the diversity of people involved, it may be important to provide the information in multiple languages.



Figure 50: Sangli, Maharashtra. Planners explaining a slum renewal project

10. CAPTURE VALUE FOR FINANCIAL SUSTENANCE

Various studies show that over a period of time, development in close proximity to public transport becomes more valuable than that which is farther away. This does not just apply to rail-based public transport, but there is evidence that even bus rapid transit (with dedicated right-of-way) has a similar impact. Hence, new public transport can generate tremendous value by concentrating development around the stations. While this creates benefits for private land owners and developers, the city bears the cost of the infrastructure upgrades that result in this higher value. It is possible to recapture a portion of this increase in value to fund station area improvements, infrastructure, and the creation of civic projects such as open spaces, etc.

Financing strategies could include property and sales taxes, property premiums, real estate revenues, fare box revenues, vacancy taxes, fees on parking and business licenses, etc. Many cities are creating city-specific Urban Transport Funds (UTF), which can finance public transport from sources as outlined above. While devising the financing strategies, care should be taken that in the final calculations, it should still be more profitable to develop in closer proximity to public transport than elsewhere. If this is not true, the fundamental purpose of TOD of bringing more development closer to public transport will be lost and it will be a lose-lose condition for all stakeholders. Care should be taken to ensure that the benefits of development are just and equitable to the entire station area community.



Figure 51: Chongqing, China. A plaza surrounded by shopping area



Figure 52: Istanbul, Turkey. A popular mixed-use development around a major transit line

CONSIDER APPROPRIATE FINANCING MECHANISMS FOR FUNDING PUBLIC TRANSPORT AND RELATED INFRASTRUCTURE:

Plans should consider how to fund public transport and related infrastructure. Funding considerations should also include the upgradation of existing streets and other services like water, sewerage, etc. since these will need to be upgraded if Transit Oriented Development has to be planned. A premium for the use of additional FSI in the influence area of transit is one of the potential sources of financing an Urban Transport Fund (such as implemented by the Pimpri Chinchwad Municipal Corporation). Other strategies include land banking along public transport corridors and tax increment financing, etc.

ENSURE ATTRACTIVENESS OF DEVELOPING NEAR PUBLIC TRANSPORT:

The financing mechanisms need to ensure the attractiveness of developing around public transport in order to promote higher density development. For this to be effective, the planning of financing strategies needs to include local developers and real estate professionals along with the city officials and administrators. Without support from the development community it is very difficult to implement successful TOD.

4. Station Area Planning: Place Types

Cities are made up of different types of places. These include places of employment, places for shopping, places of rest and leisure, places for gathering, etc. The places in the city are important for people's understanding of the city itself. The uniqueness of places leads to an understanding of the city as a collection of unique environs and experiences. This uniqueness can be further enhanced or muted by the planning and development regulations which are implemented by local governments.

Most places also have a name that signifies the type of place it is along with its character. For example, a Jhaveri Bazaar (jewelry market) is different from a Subzi Mandi (vegetable market) in its function and character, yet they are both places of shopping. Similarly, in today's vocabulary, the mall is different



Figure 53: Plan Voisin, Paris by Le Corbusier

from the daily grocery shop. Yet these shopping districts also differ greatly from a suburban community of residential bungalows, for example, or a high-density office complex in the central business district.

One of the key aspects of "Modern" city planning was the homogeneity of place propagated by its strongest advocates, including Le Corbusier. This is antithetical to all existing cities and to the structure of those cities. This mono culture of

homogenous places was rejected by the people and eventually led to the fall of modernism as a dominant paradigm in the planning of cities.

The current paradigm of urban planning, as promoted by proponents of New Urbanism, is much more inclusive of the uniqueness and character offered by different places in the city. It affirms the role of good planning to enhance and sustain the vibrant character of these places rather than homogenize all areas with similar regulation and character. One of the shortcomings of current planning in Indian cities is that it fails to adequately respond to the unique character of different places within the city. However, while planning for Transit Oriented Development, it is possible, and even preferable to accommodate and enhance the unique characteristics of different Place Types.

Just as different places need different planning policies, so do station areas that fall within these Place Types. Some station areas are located in bustling old city centers, while others are in the newly developing outskirts of the city. Some stations are located in areas experiencing rapid growth while others could be in built out neighborhoods where most change will be incremental. Every station area, whether existing or proposed, will need customized strategies to create high performing Transit Oriented Development (TOD) projects. These strategies may be based on the place that it is today, or the place it is envisioned to be in the future. While all the principles of the preceding chapter apply in each context to some degree, some of them are more applicable to certain Place Types. The concept of Place Types will help the planners, officials, and citizens understand certain key aspects, such as what to expect in terms of the character, role, and function of the places that are there today or will be created in future.



Figure 54: Transect

INNER CITY AREAS ('OLD CITY' AREAS)

Older historic areas close to the center of the city need new vitality through improved infrastructure and support for preserving their built heritage.

Existing Character / Challenges – Inner city areas are the old cores of our cities characterized by high-density, low-rise development. Most inner city areas are organic settlements with intricate street patterns. They are usually located close to the center of the city and are characterized by a dense mix of housing and employment types. Frequently, they also house a range of trade and wholesale commodities markets, small businesses, and informal businesses (such as street vendors). Though there is tremendous pressure in the inner city areas to replace the old buildings with new ones for functional needs, a lot of these structures remain to retain the historic character of the urban fabric.

Primary Transport Alternatives – Inner city areas are thriving pedestrian districts which currently face congestion due to an excess of motor vehicles moving people and goods through these areas. Reinforcing the pedestrian character by identifying areas for partial / complete pedestrianization with appropriate public transport connections at key nodes would promote revitalization. Non-motorized freight and cycle rickshaws could enhance sustainable transport while ensuring commercial viability. Cycle sharing could find significant use in these places and, hence, stations could have integrated cycle sharing facilities.

Future Potential – The compact urban pattern of the inner city area can be well connected with efficient primary and secondary public transport. With appropriate policies and measures to enhance pedestrian connectivity, these areas can continue to function as commercial and cultural centers of activity for the city. The extensive amount of older housing, once refurbished, could also serve as a stock of affordable housing for the city.

Targeted Principles –*BUILT HERITAGE*: promote preservation of historic buildings while redeveloping existing built-out areas; *AFFORDABLE HOUSING*: refurbish older inner city dwellings as a stock of affordable housing units; *COMPLETE STREETS*: ensure the existing street network caters to pedestrians, cyclists, and non-motorized transit.



Figure 55: Walled City, Ahmedabad

BUSINESS DISTRICTS (INCL. CBD AREAS)

Traditional centers of work need better public transport options and an infusion of housing / retail uses in order to enhance the vibrant character of the district.

Existing Character / Challenges – In reality there are few areas in Indian cities that have been planned as business districts. Located in close proximity to or surrounding inner city areas, most have developed into a business district over a period of time due to a higher concentration of public organizations and private offices. They are primary drivers of work-related trips in the city / region and also act as destinations for other uses. These areas are usually characterized by large lot developments with density higher than the surrounding areas. Often, they have fewer residential, retail and other uses. Civic uses are found interspersed within the district.

Primary Transport Alternatives –Due to a high concentration of workplaces these areas draw large numbers of people. They serve as commuter hubs for the larger region and may need to be served by multiple transit options such as metro rail, a high frequency regional bus, BRT/LRT, local bus service, taxis / auto-rickshaws, etc. The high concentration of working population also requires much better footpaths and cycle sharing facilities that can serve for short trips within the district.

Future Potential – These areas have experienced sustained economic growth over a period of time making them lucrative destinations. As the city grows, these areas may continue to attract more businesses and people. New cultural and civic amenities may be housed here since there is potential to build on larger parcels / plots. Public spaces and pedestrian amenities need to be improved in order to retain the attractiveness of these business hubs. Introducing more housing into the area can help enliven the district during non-business hours.

Targeted Principles –*MIXED USE*: establish more residential and retail uses to complement the employment center; *WALKABLE STREET NETWORK*: with various street types intersecting at the CBD, prioritize pedestrian needs; *PARKING*: curtail illegal street parking, regulate daytime public parking during peak business hours, and limit provision of private parking.



Figure 56: Nariman Point, Mumbai, Maharashtra

URBAN ACTIVITY CENTERS

Both improved regional connectivity and within-district local connectivity can enhance the draw of shopping and cultural destinations in the activity center.

Existing Character / Challenges – The urban activity centers are interspersed throughout the city. These are defined by one or more regional-scale destinations and a dense residential fabric. Some illustrative examples include areas surrounding: a large inner-city mall, a recreational public lake district, and a civic/cultural event venue i.e. Example - Kankaria Lake precinct in Ahmedabad, FC Road in Pune, Linking Road, Mumbai. Strategic location is what generally creates an urban activity center over a period of time. Their form is similar to the surrounding neighborhoods except for a larger concentration of cultural, commercial, institutional, and/or recreational landmarks. Like business centers, densities in the urban activity centers are usually high, drawing a large volume of visitors from other precincts as well.

Primary Transport Alternatives – Improved regional connectivity could enhance the potential of urban activity centers. A higher concentration of regional serving retail and entertainment tends to increase traffic congestion, which needs to be taken care of by ensuring excellent transit connections and frequencies and a mix of transit types – metro rail, BRT/LRT, and local buses. Activity centers also need a high availability of intermediate public transit (IPT) as there is potential for frequent short trips. The provision of cycle sharing can also enhance the activity center’s multi-modal options and mitigate vehicle congestion. Pedestrian connectivity and environment is very important and good quality footpaths can serve this district very well.

Future Potential – With the right mix of pedestrian, cycle, and public transport amenities, the activity centers hold the potential for developing into specialized areas for the city, e.g. for shopping, for cultural amenities, for recreation, etc. A well designed street pattern and public open spaces can be used for integrating accessibility and mobility while increasing the connectivity with regional transit. Additional careful planning would be needed to connect the activity centers with surrounding uses, depending on local conditions.

Targeted Principles – *MULTI-MODAL CONNECTIVITY*: provide a diverse range of regionally connected transit options; *PUBLIC SPACE*: high quality and well-connected public spaces will enhance the destination experience of visitors and residents; *URBAN DESIGN*: improve the public realm with attractive and place-specific design features.



Figure 57: Linking Road, Mumbai, Maharashtra

GENERAL URBAN

Better planning, transit efficiency, good public space, and affordable housing options can enhance the dense, established character of general urban areas.

Existing Character / Challenges – General urban neighborhoods usually comprise vast swathes of moderate-to-high density urban residential uses (equal to or greater than found in suburban areas), mixed with some employment, retail, and entertainment uses. These areas have a higher concentration of local-serving retail – smaller scale destinations including restaurants and shops scattered throughout the uniform residential fabric. Unlike business and activity centers, they draw residents primarily from the surrounding neighborhoods. The surrounding residential communities have been there for a long time giving these areas a sense of place in the city and thus making them desirable places to live. Due to their strategic location, these areas tend to have higher prices than general suburban areas.

Primary Transport Alternatives – General urban areas are well connected to the local transit network and often include either metro rail or BRT/LRT connections. If no direct access to the regional transit network exists, it should be accessible by a short ride on a feeder system or local bus. The general urban areas serve both as origins and destinations for commuters. In addition, provision could be augmented for non-motorized transport and cycle sharing.

Future Potential – These areas have a big potential for urban revitalization with the addition of a regional transit station, good public spaces, and affordable housing in the area. The general urban centers can be better planned and can have provision for some informal retail. Pedestrian and cycle connections within and between the neighborhoods and to adjacent activity centers should be improved.

Targeted Principles – *PUBLIC SPACE*: enhances the public spaces at local-serving retail nodes; *AFFORDABLE HOUSING*: increase affordable housing options to allow the poor access to public transit in these well-connected neighborhoods; *COMPLETE STREETS*: improve pedestrian and cycle infrastructure throughout general urban streets



Figure 58: Pune, Maharashtra

SUBURBAN CENTERS

Incentivizing development with smaller footprints diversifies the existing large-footprint retail and can improve walkability surrounding public transport terminal stations.

Existing Character/ Challenges – Densities in suburban center scan range from moderate to high. Housing is usually mixed with local serving retail. This retail is located closer to the edges of the built fabric of the city, usually at important junctions. Commercial uses include new malls, cinemas and other large footprint developments currently prevalent. These developments usually serve a population within a radius of 3-5km. Development here tends to be more recently built (within the last 5 years) than that found in the urban centers. The intensity of uses is often noticeably greater within a 400m radius of a major intersection / junction, with decreasing intensity radiating away from the centers

Primary Transport Alternatives – Suburban centers are marked by the provision of higher level public transport service than in general suburban areas. This may include metro rail or BRT/LRT, etc. The public transport connects these areas to other urban centers, business districts, and inner city areas. They are also well connected with surface street networks and can serve as terminal stations which may include park-and-ride type facilities.

Future Potential –The areas surrounding public transport terminal stations at suburban centers can serve as future Transit Oriented Developments. There is enough potential for generating more diversity in employment types and for the provision of affordable housing. Feeder services and intermediate public transport (IPT) will facilitate development in this direction. Since a number of existing developments comprise large footprints, it is also possible to have more walkable, smaller footprint development in the near future. This has to be incentivized with appropriate development control regulations and buildable area ratios.

Targeted Principles – *RE-TOOL STREET NETWORK*: break down super blocks to provide for interspersed smaller-scale developments and increased walkability; *PUBLIC PARKING*: terminal stations can contain nearby, regulated commuter park-and-ride facilities; *PUBLIC SPACE ECOLOGY*: take stock of and integrate the area's natural assets into the design of suburban center public space networks



Figure 59: Suburban Mumbai, Maharashtra

GENERAL SUBURBAN

Though lower in density, these areas have the potential for development of more housing, retail, and employment when supported by more and better transit options.

Existing Character / Challenges– Densities are generally moderate to low and characterized primarily by residential development with sparse pockets of local serving retail. General suburban areas are neighborhoods usually found in the fringe areas of a city, and are being urbanized. This Place Type has less diversity in housing stock compared to the other Place Types mentioned. A significant number of individual residences mixed with several gated residential apartments characterize general suburban areas. Retail clustered around local nodes serves a population within a radius of 1-3 km.

Primary Transport Alternatives – General suburban neighborhoods are primarily residential areas that may be served by local buses, feeder services, and IPT. If served by metro rail or high frequency bus lines along a corridor (BRT), the stations would form suburban centers, which might then support such public transport. To maintain the lower-density suburban character of this place, however, density should align with available transit capacity.

Future potential – General suburban neighborhoods offer significant development opportunities with a potential to provide residents with more housing, retail, employment and mobility options. Improvement over the existing built density could support feeder services and help promote more walkable environments. Connectivity and accessibility to public transport by cycle tracks, pedestrian access, as well as feeder routes need to be enhanced.

Targeted Principles – *ALIGN DENSITY WITH TRANSIT: Density should only be increased to augment demand for available local buses, feeder transit, and IPT services; MIXED USE: diversify the housing stock, incorporate local-serving retail in new residential developments, and establish some employment uses; ENVIRONMENTAL INTEGRITY: avoid harmful encroachment into fragile lands when urbanizing general suburban areas*



Figure 60: Beyond Kothrud – Pune, Maharashtra

HOW TO IDENTIFY A PLACE TYPE

The Place Types outlined above provide both general guidelines for the existing character of areas where transit stations will be placed and a broader vision of the potential urban identify that the city hopes to achieve in places that will be serviced by new transit.

Based on these guidelines and the vision of change for a specific area, station area planners should aim to identify the Place Type of a chosen station location to recognize the existing development character, possible development challenges, and suggested interventions to enhance the Place Type's unique attributes. Although each Place Type includes a list of targeted principles relevant to its character and future development, each Station Area Plan should consider and incorporate all the principles outlined in the preceding chapter.

Appendix 3 includes an initial version of a diagnostic tool that might assist stakeholders in identifying the Place Type of the area they are considering. Bearing in mind the unique character of places across all Indian cities, it is up to each local jurisdiction to identify the appropriate Place Type for any given location. A particular place might not fit exactly into one of these types, and it is unlikely that a chosen site will fit all the characteristics of one of the types. The key questions in the diagnostic tool will help cities narrow the selection, but should not preclude the possibility of a chosen site straddling two or more Place Types.

5. Station Area Planning: Process

INTRODUCTION

The focus of this section is to define the mechanisms for and process of station area planning. Station area planning is the means by which Transit Oriented Development (TOD) can be implemented. The purpose of station area planning is to encourage and enable development around station areas that is walkable and oriented towards public transport. If well planned, it will help achieve a denser yet livable urban realm within a station area. To achieve this, some amount of land readjustment may be necessary. The mechanisms for and process of preparing and implementing the Station Area Plan are outlined below.

PREREQUISITES TO CONDUCTING STATION AREA PLANNING

The planning process itself needs to apply the principles and best practices outlined above. This needs to be done with the involvement of all major stakeholders including private land owners and real estate developers. With proper public outreach and participation, it is possible to create buy-in from the public and hence, facilitate smoother implementation of the plan.

A successful station area planning process requires a minimum of three key meetings at which all stakeholders are present. These meetings can occur roughly at the outset of the process, before approval of a draft Station Area Plan, and after endorsement of a final Plan that is about to be implemented. Independent meetings with specific partners will also be held regularly to flesh out details and address stakeholder-specific concerns.

The implementation of the plan also needs statutory support. This means that the process will need to use implementation tools that are legal and authorized by a certain Act of the assembly at the state level. In order to understand what statutory tool may be used to implement the Station Area Plan, it is important to understand the existing tools available to government planners and administrators for implementation of plans today. In some cases, effective station area planning might necessitate longer-term efforts aimed at amending the existing legal mechanisms to account for newer development realities and concerns.

EXISTING LEGISLATIVE FRAMEWORK FOR PLANNING TOD

There are three major statutory instruments for station area planning as in most of the state town planning acts. These are the Development Plans (DPs), the Town Planning Scheme (TPS) mechanism, and lastly, the Development Control Regulations (DCRs). For purposes of TOD planning, the first two reference provisions for the state's authority to appropriate land for development purposes, while the latter guides and directs the development character after the street and footpath network, infrastructure, and public amenities have been laid out. Cities and municipalities are able to call upon one or more of these tools as dictated by the station planning context.

DEVELOPMENT PLANS

The Development Plan (DP) is a comprehensive strategic document for the development of the city (Ballaney and Patel 2009). It includes a land use master plan, which identifies the expansion of the city into the surrounding agricultural land in anticipation of future urban growth. A variety of other issues – such as infrastructure development, transportation, heritage protection, economic development,

environmental protection, and land use zoning – are discussed in the DP. In most cities, a public land development agency (such as the Delhi Development Authority) prepares and implements the DP.

The fundamental aspect of a Station Area Plan is the effective street and open space network, which increases connectivity between the developments and accessibility to and from the stations. Through an amendment of the DP, the streets and open spaces needed for the Plan can be outlined within this legal document. The city can then acquire the land for newly defined streets as sanctioned by the Land Acquisition Act (LAA, 1894) – compensating the owners through either direct payment of the market price of the land or by allowing additional FSI for development on the landowner's remaining land.

TOWN PLANNING SCHEMES

A Town Planning Scheme (TPS) is a detailed land reconstitution, infrastructure development, and financing proposal rolled into one (Ballaney and Patel 2009). While the DP provides a macro-level view for planning of city-wide exigencies, the TPS affords a more detailed micro-level approach to planning in specific districts. Town Planning Schemes are usually a part of the two-step Development Plan – Town Planning Scheme (DP-TPS) process.

The DP includes a land use master plan wherein the areas of future growth of the city into the surrounding agricultural region are identified. These areas are then 'opened up' for non-agricultural uses and divided into smaller areas of 250 to 500 acres, usually encompassing land owned by 100 to 250 landowners. Detailed physical plans are prepared for these areas, which are called Town Planning Schemes. In the schemes, space needed for common amenities is carved from a collective pool and all land owners have to surrender land proportionate to their original holding. Thus, no single landowner loses his/her complete land to the development process and everyone retains some portion of their original ownership.

The TPS allows for the vision of the Development Plan (DP) to be implemented when it opens up new areas for urban growth and development. It has the potential to define a new regular street framework within an irregular pattern of existing land ownership. This is one of the key reasons why the framework of the TPS is important to the process of station area planning. A similar process of land readjustment modeled on the TPS – if accommodated within the planning act at the state level – would authorize an effective tool for the creation of new roads, developable plots, open space, public amenities, and other infrastructure for the station area.

The Town Planning Scheme (TPS) has been used as a democratic, fair, and non-coercive legal tool of land readjustment in India for almost a century (Ballaney 2008). Originally, the TPS mechanism was used to improve services in existing developed areas. In more recent times, it has been used as a tool to develop serviced urban land from agricultural land. The TPS process has been successfully implemented in various cities in Gujarat and a number of other states are considering changes to the town planning act to make the implementation of town planning schemes more effective.

DEVELOPMENT CONTROL REGULATIONS

Development Control Regulations prescribe the rules for building activity and development work in the city. These rules apply to the design and construction of individual buildings and groups of buildings on plots of land within the entire jurisdiction. DCRs specify parameters such as building height, density, the Floor Space Index (FSI), ground coverage, setbacks, allowed land uses, compound walls, off-street private parking, affordable housing requirements, heritage preservation, etc.

Many of the factors that can incentivize and facilitate achieving the goals of Transit Oriented Development will need to be addressed in appropriate DCR amendments. Adjusting certain DCR

requirements – such as doubling the maximum allowable FSI surrounding a transit stop– can help achieve an increase in density around the stations, for example.

LAND ACQUISITION VS. LAND POOLING

The two primary ways for state governments to appropriate land for station area development are the land acquisition method (through the Land Acquisition Act, 1894) and the land pooling method (through provisions related to TPSs in the state planning act). The former is invoked while effecting an amendment to the Development Plan, while the latter follows from the intricate DP-TPS process that can be adapted for station area planning.

While the land acquisition method may seem an effective approach to establishing new streets, infrastructure, and public amenities for densifying station areas, it is not the ideal solution. The response from the local community, for example, may not be positive. This is due to the fact that land acquisition is not an equitable instrument of implementation. In a land acquisition scenario, the person who loses the land due to a road or open space reservation loses the entire value of their holding while the adjacent landowner gains value due to proximity to new infrastructure.

The land pooling method of the TPS is more equitable than the land acquisition approach. With the space needed for the common amenities carved from a collective pool, all landowners must surrender an equal percentage share of their original property. Ultimately, all landowners retain some portion of their original ownership and stand to benefit from the new infrastructure windfalls. The TPS land pooling approach also allows for redress of public grievances at various stages of the process. Due to these complexities, the process may be a little more time consuming, but it yields results that create win-win situations for all involved.

Thus, in the short term, land acquisition can be a mechanism for implementing the Station Area Plan street grid, open spaces, and public amenities definition. However, in the long term, a more equitable approach similar to TPS land pooling may be a more appropriate implementation tool.

THE PROCESS OF STATION AREA PLANNING

Prior to beginning the station area planning process, a vision plan at the regional and transit corridor levels should already be in place, as discussed in chapter 2. This should have been done either at the regional scale, as part of the Development Plan (Master Plan – the standard term for the comprehensive plan prepared under the state town planning act) or separately, on the transit corridor scale, when planning for public transport routes.

After extensive data, mobility, and spatial analysis, the transit authority will have determined general station locations and the corresponding threshold capacities for the density of development around these. As soon as the station locations are broadly finalized and the vision plan for the corridor is defined, the actual process of station area planning can begin. This process includes the steps outlined below. It is imperative to note, however, that the steps are not necessarily sequential, but are often overlapping and simultaneous. Some elements of the process form a continuous thread throughout

1. Preparation / update of cadastral maps
2. Preparation of the Station Area Plan
3. Financial analysis and identification of funding mechanisms
4. Definition of the development character according to the Place Type
5. Implementation of the Station Area Plan
6. Outlining Development Control Regulations for the station area

7. Monitoring, Evaluation, and Adjustment of the Plan as necessary

STEP 1 – PREPARE / UPDATE CADASTRAL MAPS

One of the key challenges of undertaking detailed area planning in Indian cities is the relative lack or outdated nature of maps. In order to effectively plan around transit stops, it is important to understand land ownership in terms of the extents of plots, and the placement of existing buildings in relation to the edges of the plots. This information is usually captured in cadastral maps, though the level of detail of these maps varies for each state and city.

A number of these maps have not been updated for a very long time. Thus, the first task is to update a proper cadastral map that also clarifies built vs. unbuilt and public vs. private property. Where not present, these maps should be prepared by referencing ownership, plot area, tenure, and encumbrances



Figure 61: Sample of base map with physical features surveyed, Ahmedabad

data from the relevant Revenue Department office, for example. A proper cadastral map would enable the city to plan and implement new streets, infrastructure, and public amenities in the station area.

STEP 2 – PREPARE STATION AREA PLAN

This step involves creation of the Station Area Plan. As discussed earlier, the planning process should include regular stakeholder participation.

After having engaged the key stakeholders at the outset of the planning process with a vision for the new station area, planners will take their inputs and, along with extensive survey data, will begin to define the new street grid through undeveloped and developed lands, as necessary. In an undeveloped area this process can be implemented relatively more easily, but in a fully developed area the process will need to take into account existing buildings and developments.

Based on these guidelines and the principles outlined above, a detailed plan

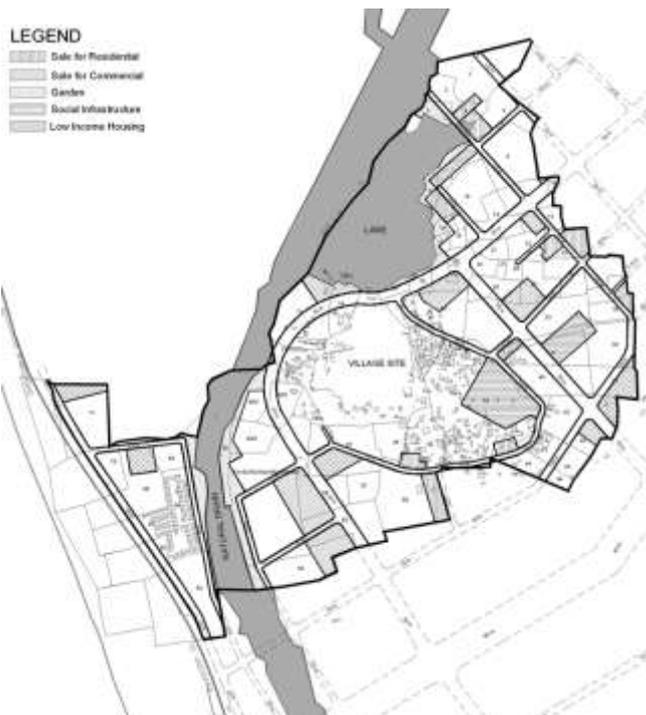


Figure 62: Delineation of Final Plots and Road Network, Ahmedabad

should be drawn showing the new infrastructure to accommodate the increased density. In either a built out or undeveloped context, possible consolidation or division of plots for new development can be highlighted, along with the new pedestrian-friendly streets, public open spaces (parks and plazas), other infrastructure, and amenities. It should also include before and after visualizations so people can understand the impact of the new plan on the existing area.

The planners should reach out to the public for further inputs on a final draft Station Area Plan, and at other points as deemed necessary.

STEP 3 – IDENTIFY FINANCING MECHANISMS

Successful station area planning can be quite costly at the outset, primarily to fund initial capital improvements. While the improvements create benefits for private land owners and developers, the city bears the cost of the infrastructure upgrades that result in the area’s higher value. It is possible to recapture a portion of this increase in value to fund station area streets, improvements, infrastructure, and the creation of civic projects such as open spaces, etc.

At this stage, to assuage the substantial up-front investment, city planners and officials must come up with a sound financing strategy that leverages the increase in value that will be generated. Additionally, they must establish a financing scheme for ongoing operational costs and infrastructure maintenance. Table 1 outlines the distinct sources of potential funding for both initial capital expenses and ongoing operating costs.

Table 1: Some Potential Financing Strategies	
Capital Expenses	Ongoing Operating Costs
<ul style="list-style-type: none"> • Issuance of TDRs as compensation for land • Premium charges for use of additional FSI • Land banking along public transport corridors • Tax-increment financing • Increased taxes in station area <ul style="list-style-type: none"> ○ e.g. station area vacant land taxes 	<ul style="list-style-type: none"> • Farebox revenues from transit • Advertising on transit • Private vehicle user charges <ul style="list-style-type: none"> ○ e.g. parking fees • Increased taxes in station area <ul style="list-style-type: none"> ○ e.g. property and real estate taxes • Higher station area business license and registration fees

Potential financing strategies might include increased property and real estate sales taxes; taxes on station area vacant lands; additional fees for business licenses in the influence zone; the issuance of Development Rights Certificates (or Transferable Development Rights for increased FSI allowance); premium charges for the use of additional FSI; private vehicle user charges (parking fees); farebox revenues from public transit; advertising revenues from the transit corridor; land banking along public transport corridors; and tax-increment financing (TIF)¹, etc. Finally, cities can establish Urban Transport Funds (UTF) to coordinate the financing of public transport and station area improvements/maintenance from sources as outlined above.

¹ For more information on TIF see “Tax Increment Finance Best Practices Reference Guide” published by the Council of Development Finance Agencies and the International Council of Shopping Centers. 2007. <<http://www.icsc.org/government/CDFA.pdf>>.

Furthermore, it is imperative that the station area planners have a grounded understanding of the existing market conditions and are attuned to the opportune timing for when to implement the transit and accompanying development definitions. The land value surrounding a potential transit station rises in short bursts at approximately three key instances – when the station location is announced, when the station planning is finalized and construction begins, and when the station opens and transit to the neighborhood commences. In between these occurrences, the land value experiences a general steady increase.

Planners must, in particular, note that the most significant rise in demand comes just before or immediately after the transit is established. They must make certain that development around the stations is profitable and properly incentivized to guarantee capture of the increased value when financing mechanisms such as FSI charges are applied.

STEP 4 – DEFINE DEVELOPMENT CHARACTER

The developed character for station areas can be worked out based on the Place Types and principles described in the previous sections and can be further fine-tuned for a particular station area. After having identified the Place Type, all stakeholders should have a sense of the character of the neighborhood to recognize both the existing types of buildings and open spaces as well as the form that newer development will eventually take.

Although there are no hard and fast rules, a particular station area should target appropriate building and open space types to be developed, keeping in mind the established vision for the Place Type. For example, an area identified as a potential CBD surrounding a BRT station might hope to develop mid/high-rise office/commercial, mid/high-rise residential over commercial, and institutional building types as well as a transit plaza, small parks, and a food vendor plaza to cater to the office lunch hour rush. The ultimate ideal is to ensure appropriate, complementary buildings and public spaces for each distinct station area.

Additionally, station area planners should determine the built identity of the neighborhood. How buildings sit on the street, how the street is framed by the relative compactness or openness of the surrounding built fabric, and how views and the public realm are managed by variegated building heights can all be adjusted and controlled through the establishment of setback, ground coverage, allowable FSI, and building height rules.

STEP 5 – IMPLEMENT THE STATION AREA PLAN

There are two ways to implement the street carving, open space delimitation, and general land re-adjustment of the Station Area Plan, as described earlier. One is using the land acquisition mechanism while the other is through a statutory station area planning process incorporated in the state planning act. In some cases, however, the nature of the built-out area is such that it does not require the establishment of new streets, open spaces, other infrastructure, or public amenities, which would preclude the utilization of either of these two alternatives.

Alternative 1: Using the Land Acquisition Mechanism

In most states, land acquisition is the only alternative available for implementing a development plan / master plan. In such cases the original owner of the land needs to be compensated. This can be done either as a direct indemnity based on the market rate of the land acquired or by compensating through a Development Rights Certificate (which can be traded with other developers). This certificate is an allowance for increased FSI in a receiving development.

Alternative 2: Statutory Station Area Planning Process

Another method for implementing a Station Area Plan is to establish a statutory process by the same name in the state town planning act. Such a statutory process could be modeled along the lines of the Town Planning Scheme mechanism, which is already in the state town planning acts of the majority of states in India. With the legal mechanism for creating Station Area Plans in place, implementing the plan would be as simple as following the statutory dictates to achieve detailed and equitable land appropriation, land readjustment, and infrastructure development – in close coordination with the landowners – and the mechanisms for financing and implementing it.

STEP 6 – OUTLINE DEVELOPMENT CONTROL REGULATIONS FOR STATION AREA

Planners and officials can establish provisions for achieving the delineated development character of station areas by modifying the Development Control Regulations (DCRs) as necessary.

For instance, DCRs should be amended to double (at the least) the maximum allowable FSI in the transit station zone of influence and to allow utilization of TDRs (increased FSI) on payment of premium charges. In general, the DCRs should also reflect reduced setbacks, front/side/rear margins, or built-to-lines. The DCR for station areas should not delimit a maximum ground coverage condition, nor a restriction on building height, but should incentivize provision of the least off-street parking at new developments. Finally, prohibiting or discouraging compound walls/grills/etc. around ground floor retail is imperative to preserving the pedestrian-focused integrity of all station areas.

The case study in the next chapter will illustrate in more detail the effect of each of these DCR adjustments to the built form and character of a station area.

STEP 7 – MONITOR, EVALUATE, AND ADJUST THE STATION AREA PLAN AS NECESSARY

Enabling the plan does not guarantee the station area's proper development. Goals and targets can be set for development around the transit stops. Progress towards these should regularly be monitored and evaluated. Area demand, number of housing units, occupancy totals, area jobs, densities, transit ridership and various other figures can be synthesized to track the progress towards station area goals. Tracking these trends will not only ensure accountability and assist in refining the Station Area Plan (if necessary), but can also inform future policies for TOD.

KEY STAKEHOLDERS: INTERESTS AND ROLES

In order to guarantee successful implementation of the Station Area Plan, the process must ensure that everyone has a voice, plays their role, and coordinates effectively. Each stakeholder comes to the table with certain interests, and mediating the hopes and concerns of each involves a delicate exercise of compromise. An understanding of the particular interests of each stakeholder will assist in achieving an equitable gain for all parties involved. In the end, a fully-participatory and transparent Station Area Plan will benefit each stakeholder in some way.

Moreover, the stakeholders should maintain a special regard for the concerns of the most disadvantaged groups being affected by the plan. Thus, priority should be given to the needs of the urban poor and disadvantaged when making key decisions. The following list includes some of the stakeholders and parties involved, their particular interests, and their role in the station area planning process.

URBAN PLANNERS

Planners will play a pivotal role in mediating the interests of all parties involved to achieve an equitable outcome. Their duty is to the common good and should not be misdirected by any biased interest.

They will conduct data analysis at various scales, update cadastral maps, guide Place Type and development character identification, and facilitate the Station Area Plan preparation and implementation. Planners will certainly take part in most committee meetings, as necessary.

DECISION MAKERS / GOVERNMENT

Whether a city council member or a municipal engineer, the decision makers must have the best interests of the citizens in mind. They must strive to achieve a just and equitable distribution of costs and benefits without one set of constituents gaining over another. Leaving this unchecked could threaten the entire process.

The state government needs to come up with supportive policies for station area planning. They need to introduce a development framework that encourages local government to plan more intensive development around bus / rail stations. The state government should develop and monitor institutional mechanism that works to make station area planning a success.

The primary role of the local government is to support and enable the statutory implementation mechanisms and guidelines to facilitate the Station Area Plan process. They should also aim to channel sufficient resources to this endeavor to facilitate a more effective process. City leaders will often head steering, advisory, and technical committees.

TRANSIT AGENCIES

Transit Agencies aim to furnish the city with an effective public transport system at the lowest cost possible. They hope to maximize ridership without overburdening the system.

After establishing a vision plan for the transit corridor and defining approximate station locations, the agency will continue to coordinate with planners and officials at the station level to ensure transit exigencies are met.

LANDOWNERS AND RESIDENTS

The landowners' and residents' stakes in the station area are well established. Though they understand that the new infrastructure, public transport access, and amenities will both augment land value and enhance quality of life, care must be taken to manage the windfalls and wipeouts affecting all. If one landowner benefits while another is short-changed, the process is jeopardized. Likewise, the long-term displacement of all current residents must be avoided to the greatest extent possible.

Nevertheless, some landowners and residents may oppose station area planning for the rapid changes being induced in their surroundings. Such concerns must be addressed with full and open disclosure about the all-around benefits to the greater community.



Figure 63: Consultation with landowners, Bhuj, Gujarat

Residents and landowners should be encouraged to participate and engage at all points where stakeholder input is required to voice their concerns and provide comments on the plan. The landowners should, furthermore, fully comply with or participate in Town Planning Schemes and/or other land re-adjustment processes. Some landowners may serve on a steering committee.

DEVELOPERS

The real estate developer should seek to build quality, livable environments of any land use type in the station area, from which he hopes to gain a fair profit.

The developer will propose developments in line with station area goals, targets, and parameters, and will meet development control requirements on all projects being constructed. Some developers may take on more formal roles by serving on a steering committee, for example.

There is a false notion among governmental bodies that developers have malicious intentions. This is false, as they are just operating within the market system. Because they have a good understanding of market forces, the process should tap into and take advantage of their knowledge and experience.

LOCAL LEADERS

Local elected representatives, community leaders, and religious leaders have the interests of their constituents in mind. They are central figures in consensus-building because of their influence and ability to link the general public with those who are conducting the plan.

By publicly endorsing the principles of TOD, they will help garner broad support for the process. Local leaders will often serve on either advisory or steering committees to provide input to the Station Area Plan.

Since some leaders are more vocal than others, however, the planning coordinators must ensure that not one or a few leaders dominate the entire process, but that all are afforded a hearing.

BUSINESSES AND BUSINESS ASSOCIATIONS

Existing and new business owners in station areas aim to sustain their shops, restaurants, offices, etc. by retaining and attracting customers. The increased density and walkability at station areas will support this endeavor. The process and plan should guarantee, however, that the benefits associated with increases in foot traffic and public infrastructure are equitably distributed across the business corridors.

Either business association representatives or business owners themselves will participate in all key moments of stakeholder engagement. To ensure that the concerns for station area commercial and retail vibrancy are met, business representatives will be asked to join steering and advisory committees.

GENERAL PUBLIC

Residents and visitors of the greater area have a keen awareness of the changing nature of their city.

The general public can provide input throughout the station area planning process by keeping informed and voicing ideas/concerns in participatory gatherings and forums.

6. CASE STUDY – KALEWADI PHATA

Case study Location: Kalewadi–Phata and Aundh–Ravet Road junction, Pimpri-Chinchwad, Maharashtra

BACKGROUND AND CONTEXT

Pimpri-Chinchwad lies just northwest of Pune in Maharashtra, approximately 165 km southwest of Mumbai. In the last four decades it has developed into a predominately industrial area, with the installation of core large-scale industries making way for the further growth of ancillary and small-scale industries in and around the industrial belt.



Figure 64: Map of Pune and Pimpri-Chinchwad (Source: Google Maps)

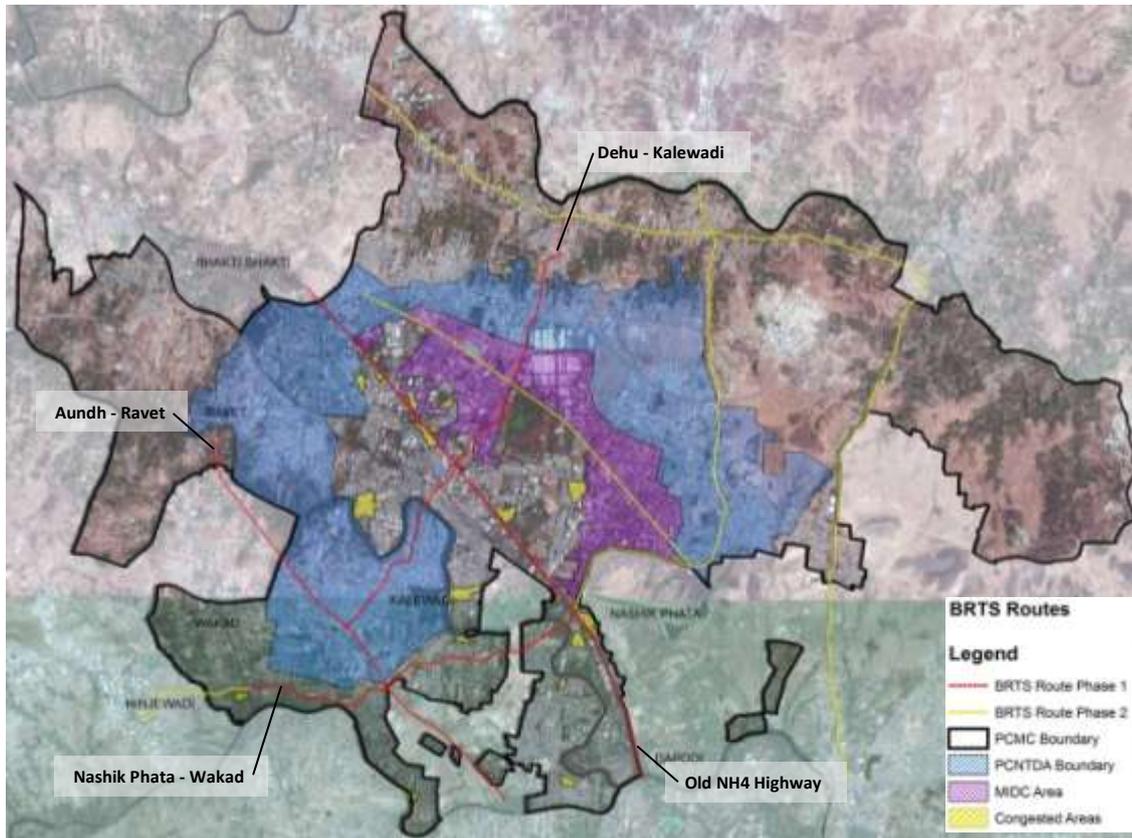
In recent years, the city has experienced rapid growth due to its proximity to the IT hub of Pune, with several IT parks being developed in and around Pimpri-Chinchwad as well. In particular, Hinjewadi – an IT park just west of Pimpri-Chinchwad – has grown to such a state that the 70,000+ employees who daily commute from the greater Pune region are settling in nearby Pimpri-Chinchwad. Thus, along with the growing number of inhabitants and industries, built development in the Pimpri-Chinchwad Municipal Corporation (PCMC) area has risen by 84% between 2000 and 2007 (Anand 2010). The current population of around 17 lakh is expected to continue growing in the next decade, straining the existing basic infrastructure.

Table 2: Pimpri-Chinchwad Municipal Area Figures

Land Area:	171.51 km ²
Population (2011 census):	1,729,320 (17.28 lakh)
Density:	10,000 / km ²

The Pimpri-Chinchwad Municipal Corporation (PCMC) is responsible for the provision of all municipal services to its citizens, and as the city continues to grow, it seeks to address all the infrastructure and development concerns that arise. Of the numerous projects taken up by the PCMC, one of its main endeavors has been the provision of a quality public transportation system with high levels of service. The steep increase in private automobiles and two-wheelers, and inability of the existing road network to accommodate further traffic, has alerted the city officials to the need for improved physical infrastructure that supports and encourages a highly-patronized, quality public transit system.

Figure 65: Pimpri-Chinchwad municipal area with proposed BRTS routes; phase one (red) and phase two (yellow)



Having completed a Comprehensive Mobility Plan that included an integrated Traffic and Land-use study, the PCMC has planned eight Bus Rapid Transit (BRT) routes to be established in two phases. The four initial routes that form the first phase include Nashik Phata–Wakad, Dehu–Kalewadi, Aundh–Ravet, and the Pune-Mumbai Road (NH4 highway); an additional four routes are to follow in phase two.

PCMC INFRASTRUCTURE FINANCING MECHANISM

Pimpri-Chinchwad was also chosen as a case study because of its carefully conceived financing schemes. Between government funds through JNNURM, loans from multilateral banks and funding agencies, and resources in PCMC’s coffers, the bulk of the new infrastructure cost will be accounted for. In particular, PCMC has set up an Urban Transport Fund (UTF) managed by a Special Purpose Vehicle (SPV) to assist in capturing the increased value associated with public transit (ADB 2010).

Within the transit system’s “zone of influence” (a radius of approximately 400 meters), the SPV can (i) charge a premium for loading additional FSI in the station corridor through TDRs, (ii) levy charges for development in the influence zone, (iii) augment taxes after designating a high property tax zone, and (iv) utilize other mechanisms as necessary and feasible. Loading TDRs in the PCMC station area “zone of influence” is particularly advantageous, because it facilitates densification of the BRTS corridor in addition to generating revenues.

SELECTING THE CASE STUDY STATION AREA

In order to select a potential station area to illustrate the effect of this report's principles, the authors developed a framework and criteria by which to analyze the land use types and to rate the potential for development along the various BRT routes in Pimpri-Chinchwad. Using aerial imagery and general impressions from site visits, the project team identified built types and land uses along the proposed transit corridors. They ranked five potential sites using selection criteria that considered (i) the amount of station area land within the PCMC boundary lines, (ii) the amount of developable vacant land, (iii) variety of existing building and land use types, (iv) the potential for the existing area to be redeveloped, (v) the potential to develop public open spaces, and (vi) proximity to other transport infrastructure.

With these criteria in mind, the authors chose the T-station terminating at Kalewadi (see circle area in below map). Two BRT routes meet here: namely, the Aundh–Ravet route and the Dehu–Kalewadi Phata route. This node has been selected due to a good combination of developed land and vacant land available for development.

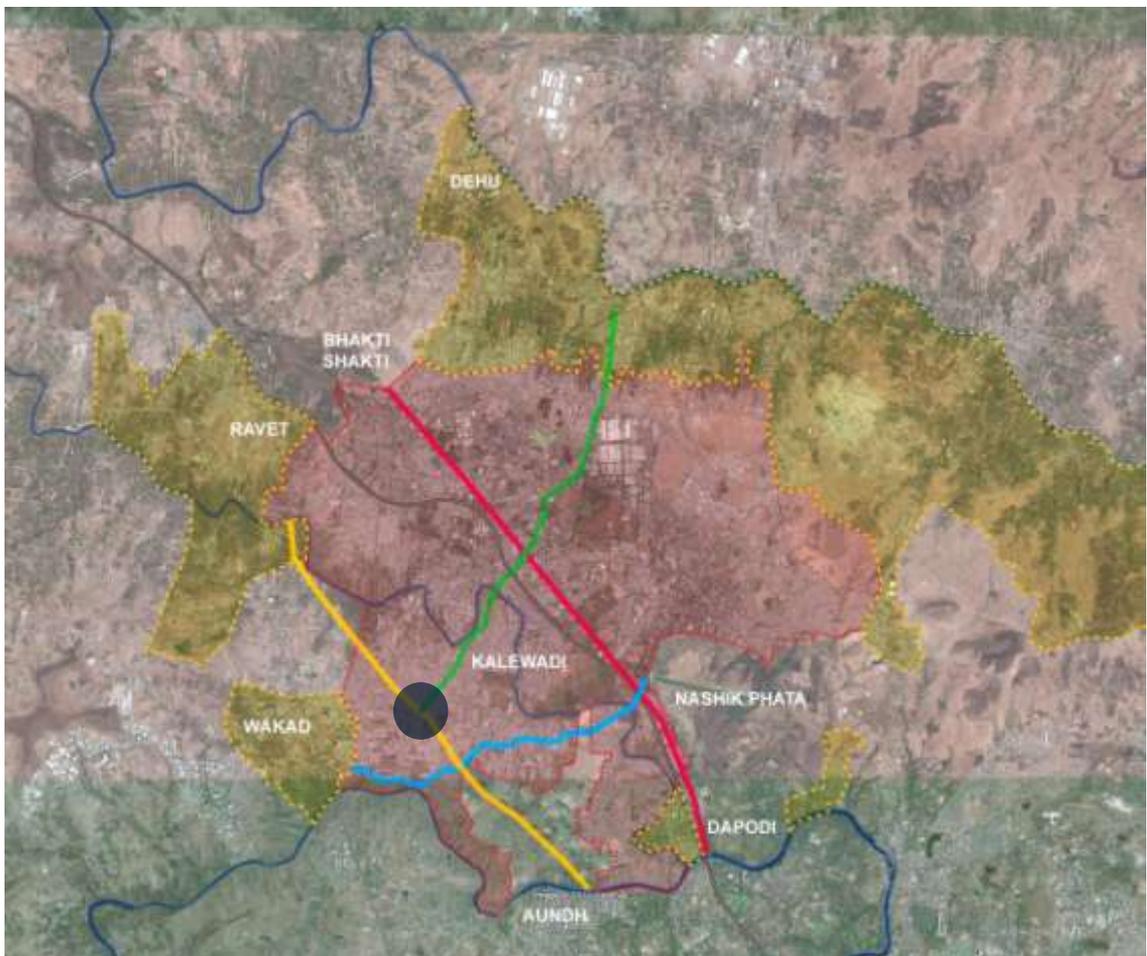


Figure 66: Pimpri-Chinchwad proposed phase one BRTS routes; case study site location circled

IDENTIFYING THE STATION AREA PLACE TYPE AND EXISTING CONDITIONS

The area to the north of the Aundh–Ravet line is largely a small-lot, high density residential zone, while on the south are large chunks of vacant land bordered by high-rise residential townships. Based on the Place Type descriptions, planners determined the character of the case study location most closely resembled a General Urban fabric on the north end of the station area, and a Suburban Center with larger developed and undeveloped plots on the southern side. The new DP, nonetheless, identifies the vacant land in this area as primarily slated for commercial use. As an important future crossroads, the station area planners see the potential for targeting development here with the vision of an Urban Activity Center in mind.



Figure 67: Existing conditions at the station area – a general urban fabric to the north and suburban center to the south

To better understand the current conditions, maps were developed to clearly define the extent of built versus un-built land. The BRT station is located slightly to the left of the crossroad in Figure 67 above. A flyover has been proposed over the Aundh–Ravet route. The BRT station is located just underneath the flyover.



Figure 68: Built vs. un-built land in station area



Figure 69: 100 meter and 400 meter buffer zones

In addition to obtaining official current land-use plan maps from the Pimpri-Chinchwad New Town Development Authority (PCNTDA), the planners overlaid both a 100 meter and 400 meter buffer zone along the two intersecting transit lines to get a sense of the scope of the station area. An area of 400 meters on all four sides of the station (or 800m x 800m) has been identified as the influence zone.

ADDING ROAD NETWORK

Figure 70: Delineation of new street grid and public open spaces



The vacant land in this station area is about 196,488 square meters. Additional roads need to be introduced so as to create more optimal routes for the residents and thereby reduce the traffic pressure on the arterials. The next step thus becomes to identify and introduce the network of roads and streets which can help increase the accessibility of the stations and improve traffic flow. The focus here should be to provide alternative routes for pedestrians and NMT. Streets have been inserted keeping in mind the hierarchy (see Appendix 2 for Street Classification Matrix), expected usage, and connections. Also green spaces and open spaces have been introduced at key locations for better livability within the station area.

ADJUSTING THE DCRS TO INFLUENCE DEVELOPMENT CHARACTER

A number of revisions to Pimpri-Chinchwad's existing Development Control Regulations (DCRs) have been suggested to facilitate an enabling environment for increased density and the accompanying value capture scheme.

It is important to note that a distinction is made in the DCRs between requirements for congested and non-congested areas. The below examples illustrate only the proposed revisions for non-congested areas of the city. For station areas like Kalewadi Phata, this report suggests modifying the following elements of the DCRs.

HEIGHT

The restriction on building heights has been removed altogether, except for restrictions due to airport proximity and aircraft flight-paths.

PARKING

Minimum requirements for parking provision within the BRT corridor are set, while any additional provision will occupy part of the FSI allowance for each development, thereby de-incentivizing more parking.

BASEMENT

Proposed developments on the plots in the BRT corridor can have up to two basements across the extent of the plot margins (not just below the building footprint), as and where it is structurally feasible, and considering that the capability of all adjacent lots in building the basement is not hampered.

GROUND COVERAGE

No maximum ground coverage limit for any proposed development has been fixed.

SETBACKS

Setback distances for all new developments have been adjusted and lowered for the most part. While the existing front setbacks were originally 7.5 meters, this case study suggests lowering the front and side setback requirements to 6.0 meters in non-congested areas, or 4.5 meters in congested areas.

EXISTING (NON-CONGESTED)	PROPOSED (non-congested)
Height: 18 meters maximum	Height: Unrestricted
Parking: Minimum as set in existing DCRs	Parking: Only minimum is free of FSI
Basement: 1 maximum below footprint	Basement: 2 maximum below plot lines
Ground Coverage: 33-50 %	Ground Coverage: No Limit
Front Setback: 7.5 meters	Front Setback: 6.0 meters
Side Setback: 3.0 meters (minimum)	Side Setback: 6.0 meters

Table 2: Provided here are examples of potential building masses created by the existing and proposed DCRs.

FSI

The key revision to be made is the increase in maximum FSI allowance in the station area, as distinct from other areas of the city. Doubling the density around Kalewadi Phata station, at the least, can be accomplished to create very distinctive, compact environments. The below scenario depicts the proposed FSI for non-congested areas up to a maximum of 3.0, based on plot size.



Figure 71: Existing FSI 2.0 allowance in Pimpri-Chinchwad



Figure 72: Proposed FSI allowances for plots of <500 m², plots of 500-999 m², and plots ≥ 1,000 m²

FSI: 3.0

With a maximum FSI of 3.0, the building height rises to six floors. This does not look excessively higher than the surrounding buildings, some of which are the same height already (Figure 73). It is important to note that lower setback restrictions help increase the dialogue between the pedestrians and ground floor commercial, thereby creating an efficient building footprint. The DCR also forbids compound walls along ground floor retail development for this very reason. At the same time, sufficient usable and continuous open space is created in between the buildings as a quality public realm.



Figure 73: Potential development character of Kalewadi Phata station area with an allowable FSI of 3.0

A NOTE ON FSI AND INFRASTRUCTURE

One of the key concerns raised by local government planners is that the areas supporting increased FSI need simultaneous improvements in infrastructure (water, sewer, etc.). Although it is an expensive and onerous process, planners must ensure careful thought is given to how to integrate infrastructure improvements to complement the proposed increase in FSI. Cities cannot revise the DCRs to provide for increased FSI in isolation; planning for the supporting infrastructure must be a parallel priority.

A NOTE ON IMPLEMENTATION

For this case study, since the implementation of the station area plan needs to occur over a short span of time it is recommended to be implemented using the development plan and land acquisition process. Using this process, new streets can be implemented along with other social amenities such as parks/ green space. An amendment to the existing development control regulations shall be needed to enhance the character of development within the station area.

VISUALIZING FROM THE STREET LEVEL

Enhanced DCRs and improved street design leads to a more pedestrian friendly environment within the station area at Kalewadi Phata. The following images (Figures 74 and 75) give the observer a sense of the street realm envisioned by these changes.



Figure 74: Sample street rendering for an 18 meter street in Pimpri-Chinchwad



Figure 75: Sample street rendering for a 6 meter street in Pimpri-Chinchwad. Pedestrian paths may need to be cut through the urban fabric to improve access and mobility in station areas.

CONCLUSION

With the dramatic increase in India's urban population, cities across the country face numerous challenges. In particular, dealing with the mobility and accessibility of ever-growing populations presents complex problems that require a holistic solution. With the vision of improved mass transit for India's largest cities comes a requisite need for integrating land use planning with the planned construction and expansion of public transport systems. In particular, shifting the focus from vehicle movement to human access in compact, dense, mixed-use, and multi-modal nodes surrounding public transport will establish a new pattern of development for India. It is hoped that a new mechanism aimed at applying the principles of Transit Oriented Development at the station area – catered, of course, to the particular context of the city's unique Place Types – will spur development that enhances the social, economic, and spatial potential of each city.

KEY TAKE-AWAY POINTS

The principles and process of station area planning may seem daunting and complex, but decision makers should take away at least five key points upon which they can act immediately to get the ball moving for Transit Oriented Development in Indian cities.

- **Re-align street networks to foster better development patterns and create more human scale streets**
 - Shorten street crossings to increase safety
 - Reduce vehicle road speeds
 - Implement car free streets, alleys, and greenways to encourage non-motorized transit
- **At a minimum, double the allowable FSI at station locations**
 - Maximize potential of the influence area near station by increasing the FSI
- **Design streets for humans and NMT, not automobiles**
 - Ensure an efficient and uniform network of pedestrian footpaths connected to stations
 - Minimize car impact by channeling traffic, and regulating and limiting parking
 - Develop appropriate cycling infrastructure
- **Design and implement appropriate self-financing mechanisms**
 - Implement appropriate parking/development rights to balance capital and operating costs of transit.
- **Keep all stakeholders equally informed and maintain transparency**
 - Hold 3 meetings, at least, where all stakeholders are present, to re-align and coordinate the vision and process of TOD
 - Share information through the most accessible means possible – e.g. radio, television, newspaper, internet etc.

CHALLENGES TO STATION AREA PLANNING

While the benefits of Station Area Planning are significant, there are many challenges / barriers faced that limit its broader implementation. A number of challenges have emerged in the course of the current study, which need to be addressed to make Station Area Planning a success; some of which have been discussed below.

ACCEPTANCE OF PLACE BASED REGULATIONS

Station area Planning requires specific customized /tailored place based regulations and strategies since every station area faces a unique set of challenges for creating high-quality TOD. Although the 74th Amendment in the Constitution gives thrust to local area planning, most of the cities in India follow general development regulations and planning norms applicable to the entire city. In the current planning framework, urban planners and local government are reluctant to create and utilize place based regulations. There is an implied fear amongst the planners to use their discretion in preparing more contextual and specific plans.

ABSENCE OF AREA LEVEL/MICRO LEVEL PLANNING PRACTICES IN MOST CITIES

Over the years, the planning process in India has concentrated more on regional level and city level master planning and has acquired proficiency in it. However, there is a need to focus on and enhance micro level planning to further strengthen the overall planning process as well as station area planning across the country. Currently, preparation of local area or ward level plans is carried out by very few cities. For example - TP schemes have been successful only in the state of Gujarat and Maharashtra. Lack of convergence of planning at between different levels has been a significant barrier to their successful implementation.

TRANSFER OF DEVELOPMENT RIGHTS (TDR) MECHANISM

TDR is a market based mechanism /tool used to balance the interest of individual land owner (through development rights) and the interests of the collective. TDR is used for heritage conservation, green space preservation, growth management, preservation of existing affordable housing, environmental protection, infill development, public infrastructure development etc.

TDR has not been well used in India. In Maharashtra, it is used as a means of compensation; thus, it is used in a very limited manner. Good understanding of TDR can enhance its use as a multipurpose planning and policy tool.

NEW TOOLS TO FURTHER ENHANCE STATION AREA PLANNING

Along with the challenges, the implementation of Station Area Plans have created opportunities for new tools that would further enhance Station Area Planning. These may require further legal support, enabled by state legislation. As one of many next steps, legislators can propose new tools to be instituted to further enable effective station area planning.

The following list provides a sample of legal mechanisms, gleamed either from the Indian context or from the western experience. Those mechanisms that were instituted in the western experience are proven to facilitate the propagation of Transit Oriented Development. The mechanisms observed in the Indian context have been successful in achieving the principles of TOD outlined in this guide, but should be further replicated and enforced across the different states.

LAND POOLING MECHANISM

Though it has proven remarkably successful in places like Gujarat, the land pooling mechanism (known as Town Planning Scheme) is not yet functional in many of India's states. As it has continually been improved and refined, the changes made to the TPS legislation in Gujarat in 1999 could serve as a model for other states to improve the implementation of the land-pooling mechanism for purposes of station area planning. These guidelines will need statutory support if they are to be successful.

DESIGN GUIDELINES

Urban, street, and open space design guidelines should be developed to influence the aesthetics of transit corridors, but not restrict the pleasing quality of a flexible, location-specific public realm. Station area planners should elicit ideas and input from the public in each area to ensure designs are localized and endogenous.

PARKING POLICIES

So far Parking is seen as a problem of supply. Rather, parking needs to be viewed by planners as a tool for managing demand for private automobile based transport. Parking policies will, likewise, need to be refined to augment public parking (on-street and structured) oversight and enforcement – ensuring, thereby, a steady stream of income for public infrastructure improvements and better managed street space. Though these are mandated by the JNNURM requirements, and most cities have begun preparing them, it is imperative to monitor how well aligned they are with the existing or proposed transit in each urban area.

STRENGTHENING THE 74TH AMENDMENT IMPLEMENTATION

Most municipalities in India still struggle to realize true public participation in local governance called for by the Constitution (74th Amendment) Act (CAA), which gives more voice to people in the planning and decision-making process. In this light, while most planning is done by the urban development authority or at the state level, cities must further empowered and in turn they must try to empower all sections of the population in the governance, planning, and implementation of projects.

TOWNSHIP POLICIES

Numerous states in India have introduced integrated township policies for development of new townships. The intent of such a policy is to facilitate the creation of high quality live/work environments with adequate infrastructure and services, in the form of sustainable integrated townships on Greenfield sites. However, the townships can only be successful by integrating it with a variety of public transportation options within and outside the community, as well as connecting to key regional destinations and major employment sites. If done right, such policies can potentially promote further dense, mixed-use, public-transport-supportive land development and help cities manage their future growth center.

Works Cited

- Anand, Ritu, et al. (December 2010). "FSI-linked TDR for financing BRTS & corridor densification: Pimpri-Chinchwad initiative." Infrastructure Development Finance Company, Ltd (IDFC) Policy Group. Quarterly, No. 10.
- Asian Development Bank (ADB) (April 2010). "Urban Development Policy of India (Part 2): Corridor Densification by Floor Space Index-Linked Land Use Control and Infrastructure Financing Mechanism." Urban Innovations and Best Practices. www.adb.org/urbandev.
- Ballaney, Shirley and Bimal Patel (2009). "Using the 'Development Plan—Town Planning Scheme' Mechanism to Appropriate Land and Build Urban Infrastructure." HCP Development, Planning, and Management.
- Ballaney, Shirley (2008). "The Town Planning Mechanism in Gujarat, India." World Bank Institute.
- Calthorpe, Peter (1993). *The Next American Metropolis: Ecology, Community, and the American Dream*. Princeton Architectural Press.
- Choudhary, Parul (2004). "Historic Conservation in the Netherlands: Frameworks, Strategies, and Impacts." Department of Urban and Regional Planning, University of Illinois Urbana Champaign.

List of Figures Sourced

INTRO

Figure 1: Churchgate Terminus, Mumbai. Magical Mumbai. <<http://www.magicalmumbai.com/3466/most-crowded-busiest-stations-mumbai>>.

CHAPTER 1

Figure 2: TOD Diagram. Calthorpe Associates. "Urban Design Standards for Low Carbon Communities." Presentation on 24 September 2010. China Sustainable Energy Program / The Energy Foundation.

Figure 3: TOD along BRT corridor, Curitiba. Learning Architecture blog. <<https://architectureintlprogram.wordpress.com/?s=curitiba>>.

Figure 4: Kharghar skyline, Mumbai. Tarun Chandel (photographer). <<http://photos.tarunchandel.com>>.

Figure 5: A TOD neighborhood diagram. EPC.

Figure 6: Rea Vaya BRT, Johannesburg. www.flickr.com (user: AfricanGoals2010).

Figure 7: Pedestrian promenade, Calgary, Canada. www.flickr.com (user: Surrealplaces).

Figure 8: Pay to park, NYC, USA. www.flickr.com (user: wmliu).

Figure 9: City parks, Curitiba. Learning Architecture blog. <<https://architectureintlprogram.wordpress.com/?s=curitiba>>.

Figure 10: World Heritage site, Lijiang, China. www.flickr.com (user: bricoleurbanism).

Figure 11: 'Janmarg,' Ahmedabad. ITDP India (2009), Introduction BRT. www.flickr.com (user: itdpindia).

Figure 12: Urban sprawl, Las Vegas, USA. www.flickr.com (user: cocol_m).

Figure 13: Curitiba BRT corridor development, Brazil. Global Transport Knowledge Practice (gTKP). IPPUC. <<http://www.gtkp.com/themepage.php?themepgid=45>>.

Figure 14: Arlington, VA, USA corridor. StreetsWiki. <<http://streetswiki.wikispaces.com/Transit-Oriented+Development>>.

Figure 15: Guangzhou, China. Chirayu Bhatt (photographer), EPC.

Figure 16: Tempe, Arizona, USA. www.flickr.com (user: Steven Vance).

CHAPTER 2

Figure 17: Master Plan for Delhi 2021. Delhi Development Authority (DDA), <<http://dda.org.in>>.

Figure 18: Arlington TOD corridor. "30 Years of Smart Growth: Arlington County's Experience with Transit Oriented Development in the Rosslyn-Ballston Metro corridor." Presentation in July 2008. Arlington County Department of Community Planning, Housing and Development, Planning Division.

Figure 19: Station Area Plan of Pimpri Chinchwad BRT station. EPC.

Figure 20: Overhead walkways, Hong Kong. www.flickr.com (user: rart).

CHAPTER 3

Figure 21: Walkable streets. Decatur, Georgia. "City of Decatur, Georgia: Transit-Oriented Development." Metropolitan Atlanta Rapid Transit Authority (MARTA) TOD Guidelines.

Figure 22: Transit aligned with development. "City of Decatur, Georgia: Transit-Oriented Development." Metropolitan Atlanta Rapid Transit Authority (MARTA) TOD Guidelines.

Figure 23: Baltimore, MD light rail along downtown street. "TOD 204: Planning for TOD at the Regional Scale – the Big Picture." Center for Transit-Oriented Development.

Figure 24: Wilshire Boulevard, Los Angeles, USA. Barry Swenson Builder: The Bay Area Real Estate Blog. <<http://www.barryswensonbuilder.com/bay-area-real-estate-blog/?Tag=transit%20oriented%20development%20san%20jose>>.

Figure 25: Guangzhou, China BRT. Karl Fjellstrom (photographer), ITDP. <<http://thecityfix.com/blog/best-of-2010-most-popular-posts>>.

Figure 26: New York City dense urban blocks. www.flickr.com (user: Songquan Deng).

Figure 27: Paley Park, New York City. Jim Henderson (photographer) (2008). [www.wikipedia.org](http://en.wikipedia.org/wiki/File:Paley_Park.JPG). <http://en.wikipedia.org/wiki/File:Paley_Park.JPG>.

Figure 28: Västra hamnen, Malmö, Sweden. www.flickr.com (user: La Citta Vita).

Figure 29: Ballard Estate, Mumbai. Architecture & Developpement. <http://www.archidev.org/IMG/jpg/Ballard_estate.jpg>.

Figure 30: Copenhagen, Denmark figure-ground street grid. Jacobs, Allan B. *Great Streets*. MIT Press: Cambridge, Massachusetts, 1995.

Figure 31: Guayaquil, Ecuador, 9 de Octubre Avenue. www.flickr.com (user: newarknj26lonely).

Figure 32: Amsterdam, Netherlands shared street. www.flickr.com (user: Generaal Gibson).

Figure 33: Istanbul, Turkey street side stalls and seating. Qamar Shaikh (photographer), EPC.

Figure 34: New Delhi, cycle tracks. www.flickr.com (user: BRT_DELHI).

Figure 35: Street Design Guidelines cover page. UTTIPEC, Delhi Development Authority. <<http://www.uttipeec.nic.in>>.

Figure 36 (a) and (b): Bogotá, Colombia parking enforcement. Barter, Paul. "Parking (r)evolution in Bogotá: The Golden Era, 1998-2000." *Reinventing Parking*. 6 October 2010. <<http://www.reinventingparking.org/2010/10/parking-revolution-in-bogota-golden-era.html>>.

Figure 37: Shirpur, Maharashtra, urban plaza. www.flickr.com

Figure 38: Sydney, Australia, LED path lighting trail. City of Sydney. <<http://www.cityofsydney.nsw.gov.au>>.

Figure 39: Toronto, Canada, urban wetlands. www.flickr.com (user: John Fredrik).

Figure 40: Vancouver, Canada, roof gardens. www.flickr.com (user: RayVanEng).

Figure 41: Old town Prague, Czech Republic. www.flickr.com (user: rocketsareneat).

Figure 42: Mumbai, Khotachiwadi heritage precinct. <<http://khotachiwadi.urbz.net/bungalows/>>.

Figure 43: Heritage Regulations for Greater Bombay, Government of Maharashtra.

Figure 44: Pimpri-Chinchwad JNNURM affordable housing. Chirayu Bhatt (photographer), EPC.

Figure 45: Savda Ghevara, Delhi slum upgradation. Johnson, Chris (Editor). "Indian Cities: Managing Urban Growth." *Metropolis*. <<http://www.metropolis.org/sites/default/files/publications/2011/Metropolis-India-managing-urban-growth.pdf>>.

Figure 46: Ahmedabad, TPS public meeting. Ballaney, S. and B. Patel. "(Creating and) Unlocking Land Values To Finance Urban Infrastructure – Use of Urban Planning and the Town Planning Scheme Mechanism in Gujarat." (Presentation in Bangalore, 2009).

Figure 47: Pune, affordable housing community participation. "Yerwada Slum Upgrade." *Design with the Other 90%: Cities*. <<http://www.designother90.org/cities/solutions/yerwada-slum-upgrade>>.

Figure 48: Chennai city-wide meeting. www.thehindu.com.

Figure 49: Pune sample house mock-up. www.flickr.com.

Figure 50: Sangli, slum renewal project explanation. "Sangli Inclusive Planning." *Design with the Other 90%: Cities*. <<http://www.designother90.org/cities/solutions/sangli-inclusive-planning>>.

Figure 51: Chongqing, China plaza. ITDP report (2011)

Figure 52: Istanbul, Turkey mixed use around tram. Qamar Shaikh (photographer), EPC.

CHAPTER 4

Figure 53: Plan Voisin, Paris by Le Corbusier. Course site for Dr. Martin F. Reichert. "Visions of the City: Utopia or Necropolis?" <http://www.nyu.edu/classes/reichert/sem/city/lecorbu_img.html>.

Figure 54: TOD transect. Wassell, J. for Duany-Plater Zyberk and Company (2010). <<http://urbanlandscapes.info/tag/transect/>>.

Figure 55: Ahmedabad, Walled City. EPC.

Figure 56: Mumbai, Nariman Point. www.flickr.com (user: thebigk).

Figure 57: Shivranjini, Ahmedabad, Gujarat. Roj Nu Amdavad – Daily Ahmedabad Photo blog. <<http://rojnuamdavad.wordpress.com>>.

Figure 58: Pune, Maharashtra. www.skyscrapercity.com.

Figure 59: Suburban Mumbai, Maharashtra. www.skyscrapercity.com.

Figure 60: Beyond Kothrud, Pune, Maharashtra. www.skyscrapercity.com.

CHAPTER 5

Figure 61: Base map of surveyed lands. Ballaney, Shirley (2008). "The Town Planning Mechanism in Gujarat, India." World Bank Institute.

Figure 62: Final plots and road network of TP Scheme. Ballaney, Shirley (2008). "The Town Planning Mechanism in Gujarat, India." World Bank Institute.

Figure 63: Consultation with landowners, Bhuj, Gujarat. EPC.

CHAPTER 6

Figure 64: Map of Pune and Pimpri-Chinchwad. Google maps.

Figure 65: Pimpri-Chinchwad municipal area with proposed BRT routes. EPC.

Figure 66: Pimpri-Chinchwad case study location area on map. EPC.

Figure 67: Existing conditions at station area, Kalewadi - Phata, Pimpri-Chinchwad. EPC.

Figure 68: Kalewadi-Phata station area, Pimpri-Chinchwad, built vs. unbuilt land. EPC.

Figure 69: Kalewadi-Phata station area, Pimpri-Chinchwad, buffer zones. EPC.

Figure 70: Kalewadi-Phata station area, Pimpri-Chinchwad, delineation of new street grid. EPC.

Figure 71: Kalewadi-Phata station area, Pimpri-Chinchwad, existing FSI 2.0 mass. EPC.

Figure 72: Kalewadi-Phata station area, Pimpri-Chinchwad, proposed FSI allowance based on plot size. EPC.

Figure 73: Kalewadi-Phata station area, Pimpri-Chinchwad, potential development at FSI 3.0. EPC.

Figure 74: Kalewadi-Phata station area, Pimpri-Chinchwad, sample street rendering, 18 meters. EPC.

Figure 75: Kalewadi-Phata station area, Pimpri-Chinchwad, sample street rendering, 6 meters. EPC.

APPENDICES

APPENDIX 1: ADDITIONAL RESOURCES FOR TOD AND EXAMPLES

a. General TOD principles and guidelines

Bernick, Michael S. and Cervero, Robert B. *Transit Villages in the 21st Century*. New York, NY: McGraw-Hill, 1997.

Brookings Institution – Center on Urban and Metropolitan Policy and the Great Station Foundation. “Transit Oriented Development: Moving from Rhetoric to Reality.” 2002.

Calthorpe, Peter. *The Next American Metropolis: Ecology, Community, and Planning*. Princeton, NJ: Princeton Architectural Press, 1994.

Center for Transit-Oriented Development. Reconnecting America – Resource Center. <<http://reconnectingamerica.org/resource-center>>

Urban Land Institute.

“Developing Around Transit: Strategies and Solutions that Work.” 2004.

“Light Rail Transit, Phoenix, Arizona: Economic Development along the Planned Light-Rail Line.” 2001.

“Ten Principles for Successful Development around Transit.” 2003.

b. Curitiba, Brazil

Demery, Jr., Leroy W. “Special Report No. 1: Bus Rapid Transit in Curitiba, Brazil – An Information Summary. Publictransit.us. 11 December, 2004.

Goodman, Joseph, Laube, Melissa, and Schwenk, Judith. “Curitiba’s Bus System is Model for Rapid Transit.” *Race, Poverty, and the Environment: A Journal for social and environmental justice*. Urban Habitat. Winter 2005/2006. Pp 75-76.

c. Arlington, Virginia, USA

Weaver, Susan. “Large Community Case Study: Rosslyn-Ballston Corridor, Arlington, Virginia.” Long Island Index. January 2011.

d. Guangzhou, China

Fjellstrom, Karl. “High capacity BRT planning, implementation, & operation: Case Study of the Guangzhou BRT.” Institute for Transportation & Development Policy (ITDP). Presentation at UNCRD EST Conference, Bangkok. 24 August 2010. <http://www.uncrd.or.jp/env/5th-regional-est-forum/doc/08_Breakout%20Session2-B/BS2-B-3_Guangzhou_BRT.pdf>.

e. Tempe, Arizona, USA

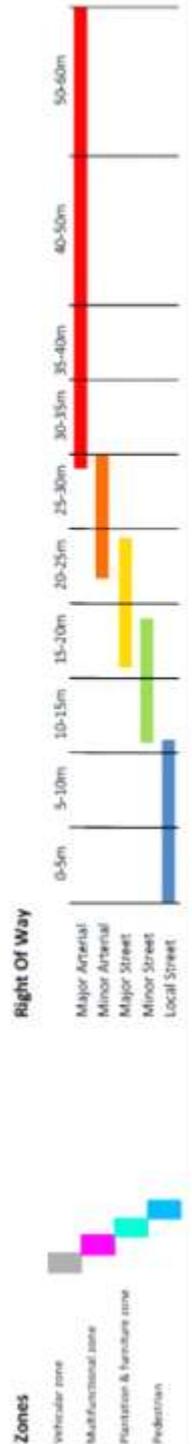
Padgett, Mike. “New zoning in works along light-rail corridor.” *The Phoenix Business Journal*. 31 August 2003. <<http://www.bizjournals.com/phoenix/stories/2003/09/01/story2.html>>.

APPENDIX 2: STREET CLASSIFICATION MATRIX – SYSTEM & STANDARDS

	Urban		Urban					
	Expressway	Highway	Major arterial	Minor arterial	Major street	Minor street	Local street	NMT Only street
ROW	As per IRC codes	As per IRC codes	28m - 60m	22m - 30m	16m - 24m	12m - 18m	Less than 12m	Minimum 3.0m clear width to allow emergency access
Connectivity	Inter-city only	Inter towns, village, city	Main citywide roads	Streets with major arterials at both ends	Streets with arterials at both ends	Streets with major streets at street one end		Streets for pedestrians & cyclists only, can also include pedestrian areas
Design speed	As per IRC codes	As per IRC codes	30 - 50 kph	30 - 50 kph	30 - 40 kph	30 kph	<20 kph	Service areas for vehicles can be allowed only at specific times of the day
Carriageway	As per IRC codes	As per IRC codes	Minimum 2 and Maximum 3 vehicular lanes in each direction, lane width min 2.3m - max 3.3m	2 lanes in each direction, lane width min 2.3m - max 3.3m	Maximum 2 lanes in each direction, lane width min 2.3m - max 3.3m, for 1 vehicular lane in each direction lane width - 3.3m	Maximum 1 vehicular lane in each direction, lane width - 3.5m	No lane demarcation, shared space	Not applicable
Central median	As per IRC codes	As per IRC codes	Required. Minimum 0.3m width	Required. Minimum 0.3m width	Optional. Required only if carriageway is 2 lanes in each direction, minimum 0.3m width	Not permitted	Not permitted	Not applicable
Street lighting	As per IRC codes	As per IRC codes	Required. Every 20-25m (2) within the central median or within the "Plantation & Furniture Zone", as per 188 conditions	Required. Every 20-25m (2) within the central median or within the "Plantation & Furniture Zone", as per 188 conditions	Required. Every 20-25m (2) within the central median or within the "Plantation & Furniture Zone", as per 188 conditions	Required. Every 20-25m (2) within shared space as per site conditions	Required. Every 20-25m (2) within shared space as per site conditions	Not applicable
Cycle lane	Not permitted	Not permitted	Required. Segregated / demarcated cycle lane - minimum 2m clear width in each direction, can be combined with service / access lane	Recommended if ROW > 22m, segregated / demarcated cycle lane - minimum 2m clear width in each direction, can be combined with service / access lane	Recommended if ROW > 16m, demarcated cycle lane - minimum 2m clear width in each direction	Recommended if ROW > 18m, demarcated cycle lane - minimum 2m in each direction	Pedestrian / cyclist right of way	No segregation between pedestrians and cyclists
On-street parking	Not permitted	Not permitted	Optional. Parallel parking - minimum 2.0m clear width if provided	Optional. Parallel parking - minimum 2.0m clear width if provided	Optional. Parallel parking - minimum 2.0m clear width if provided	Optional. Only if ROW > 14m, parallel parking - minimum 2.0m clear width in any one side (odd-even days system) can be provided	Optional as per site conditions	Not permitted
On-street vendor space	Not permitted	Not permitted	Optional, only in place of parallel parking, maximum upto 50% of parking spaces as per demand	Optional, only in place of parallel parking, maximum upto 50% of parking spaces as per demand	Optional, only in place of parallel parking, maximum upto 50% of parking spaces as per demand	Not permitted	Not permitted	Optional, only if ROW > 4m, held in designated vendor zones only
Service lane / Access lane	Required. No direct access from any street except at intersections	Required. No direct access from any street except at intersections	Required only if ROW > 40, can be combined with cycle lane, minimum 3.0m clear width	Optional	Not permitted	Not permitted	Not permitted	Not permitted

Pedestrian lighting	Not permitted	Not permitted	Required. Every 10-15m (1/1) as per site conditions	Required. Every 10-15m (1/1) as per site conditions	Required. Every 10-15m (1/1) as per site conditions	Required. Every 10-15m (1/1) as per site conditions	Required. Every 10-15m (1/1) as per site conditions
Plantation & furniture zone	Not permitted	Not permitted	Required. Minimum 1m space adjoining sidewalk on either side	Required. Minimum 0.5m space adjoining sidewalk on either side	Required. Minimum 0.5m space adjoining sidewalk on either side	Required. Minimum 0.5m space adjoining sidewalk on either side	No designated "Plantation & Furniture Zone"
Street furniture	Not permitted	Not permitted	Required. Benches and dual-bins every 30m, within the "Plantation & Furniture Zone"	Required. Benches and dual-bins every 30m, within the "Plantation & Furniture Zone"	Required. Benches and dual-bins every 30m, within the "Plantation & Furniture Zone"	Required. Benches and dual-bins every 30m, within the "Plantation & Furniture Zone"	Optional as per site conditions
Tree plantation / Shading structures	Optional	Optional	Required. Shade providing trees every 6m, within the "Plantation & Furniture Zone"	Required. Shade providing trees every 6m, within the "Plantation & Furniture Zone"	Required. Shade providing trees every 6m, within the "Plantation & Furniture Zone"	Optional, within the "Plantation & Furniture Zone"	Optional, required only if ROW > 3m
Sidewalk	Not permitted	Optional. Required only where passing through urban areas, minimum 2.5 m unobstructed walking space	Required. Minimum 2.5m unobstructed walking space	Required. Minimum 2.5m unobstructed walking space	Required. Minimum 2.5m unobstructed walking space	Required. Minimum 2.5m unobstructed walking space	Shared space
Pedestrian & cyclist crossings	Required. Pedestrian overbridge / underpass every 400m where passing through urban areas	Required. Pedestrian overbridge / underpass / at-grade for pedestrians & cyclists, every 400m where passing through urban areas	Required. Pedestrian overbridge / underpass / at-grade crossings for pedestrians & cyclists only, every 200m, signalized / non-signalized	Required. At grade crossings for pedestrians & cyclists only, every 200m, signalized / non-signalized	Required. At grade crossings for pedestrians & cyclists only, every 200m, signalized / non-signalized	Required. At grade crossings for pedestrians & cyclists only, every 200m, signalized / non-signalized	Optional, pedestrian / cyclist right of way
Public transport	Required. Within 400m of intersection, where passing through urban areas	Required. Within 400m of intersection, where passing through urban areas	Recommended. Public transport stop or station every 300m	Recommended. Public transport stop or station every 300m	Recommended. Public transport stop or station every 300m	Recommended. Public transport stop or station every 300m	Not permitted
Flyovers & Underpasses	Required for interaction with all categories of streets (including other expressways)	Recommended for interactions with major arterials only	Not recommended	Not recommended	Not recommended	Not recommended	Not permitted

NOTE: Highway should follow characteristics of major arterials and should be designed as such when passing through urban areas, unless it is grade separated



APPENDIX 3: PLACE TYPE SELF-DIAGNOSTIC TOOL

Included here is an initial version of a self-diagnostic tool to help identify a station area Place Type for Transit Oriented Development. The intention of this matrix is to help all the station area planning partners identify the areas they are planning within the place typology. The description of Place Types are generalized so as to highlight similarities between them, as well as the parameters that tend to differentiate their character, land use mix, retail/services character, and other development factors. These characteristics are intended to be descriptive and not prescriptive, in the recognition that all places are unique and their future development should be determined by the stakeholders involved.

	Inner City Area	CBD Area	Urban Activity Center
What are the characteristics of the Station Area?	Original and significant center of economic and cultural activity; organic settlements with intricate street patterns	Primary center of economic and cultural activity with regional scale destinations; large lot developments with higher density	Significant center of economic and cultural activity with regional-serving retail, culture, and recreation destinations amid dense residential areas
What is the predominant land use mix? <div style="display: flex; align-items: center; gap: 5px;"> Residential Commercial Other </div>			
Density Character			
What are the retail characteristics?	Regional-serving market destination due to large no. of wholesalers; local-serving retail; informal businesses	Regional-serving retail and services destination; supplementary businesses to serve employment centers; need local-serving retail	Regional-serving destination retail; need more community-serving retail
Examples			
Ahmedabad	Walled City / Manek Chowk	Ashram Road	Kankaria Lake Precinct Gujarat University
Pune	Old City / Laxmi Road	JM Road	FC Road
Bangalore	Chickpet	UB City, M G Road	Palace Grounds, University area

Because of the vast spectrum of Indian cities and their diverse contexts, it is difficult to precisely qualify and quantify the building and open space types along with development character that are currently found, and can be targeted, for each Place Type. The principle idea is, rather, to encourage development of buildings and open spaces that are complementary to an area’s existing built fabric and to define a built character that conforms to the future vision for the neighborhood.

This tool can be applied and further refined in regions across India, but will serve principally to help align the development of a station area with a neighborhood’s existing and potential character.

General Urban	Suburban Center	General Suburban	
Primarily a uniform, dense urban residential district strategically located between urban activity centers	Local focus of economic and community activity, often without a distinct center	Predominantly residential district with access to regional and sub-regional centers	What are the characteristics of the Station Area?
			What is the predominant land use mix? <ul style="list-style-type: none"> ■ Residential ■ Commercial ■ Other
			Density Character
Local and some regional-serving retail (shops, restaurants, entertainment)	Community-serving, big-box destination retail; need for more supplementary local serving retail	Primarily local-serving retail; need for some community-serving retail	What are the retail characteristics?
Examples			
Navrangpura Ambawadi	Iskcon crossroads, Corporate Road	Bopal, Thaltej	Ahmedabad
Kothrud	Aundh, Hinjewadi, Baner	Singhad Road, Koregaon Park	Pune
Jayanagar	Whitefield, Hebbal	Devanahalli, Yelahanka	Bangalore