

Game Changers

in Transit Oriented Development



Foreign &
Commonwealth
Office



National Institute of Urban Affairs

Published by

National Institute of Urban Affairs

1st and 2nd Floor, Core 4B, India Habitat Centre

Lodhi Road, New Delhi - 110003. India

www.niua.org

Copyright © 2017

National Institute of Urban Affairs (India)

and

Foreign & Commonwealth Office (UK)

All rights reserved. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the publisher, except in the case of brief quotations embodied in critical reviews and certain other noncommercial uses permitted by copyright law.

Game Changers

in Transit Oriented Development



Foreign &
Commonwealth
Office



National Institute of Urban Affairs

Acknowledgements

Prof. Jagan Shah
(Director NIUA)

Research, Compilation and Analysis

Suzana Jacob
Siddharth Pandit
Anand Iyer
Sabina Suri
Divya Jindal
Rewa Marathe
Neha Awasthi
Raman Kumar Singh

Technical Partners: RICS India

D. T. V. Raghu Rama Swamy
Ashish Gupta
Dr. Anil Sawhney
Sunil Agarwal

Expert Advisors

Akshima Ghate (The Energy & Resource Institute)
Arun Rewal (Arun Rewal Associates)
Banashree Banerjee (Institute of Housing & Urban Development Studies)
Dr. Divya Sharma (Oxford Policy Management)
Mriganka Saxena (Habitat Tectonics Architecture & Urbanism)

Graphic Design

Deep Pahwa
Kavita Rawat

Contents

List of Abbreviations	4
Foreword.....	6
THE ENVIRONMENT FOR GAME CHANGERS	9
Introduction.....	10
FINANCING TRANSIT ORIENTED DEVELOPMENT USING VALUE CAPTURE	13
What is Value Capture Finance?	14
Opportunities for Value Capture Financing in a TOD.....	16
Value Capture Finance Instruments Applicable for a TOD	30
Public Private Participation in TOD.....	50
Conclusions	57
Bibliography.....	59
FORM- BASED CODES – A CATALYST FOR SUCCESSFUL TRANSIT ORIENTED DEVELOPMENT	63
What are Form-Based Codes?.....	64
Relevance of Form-Based Codes for TOD	67
Elements of Form-Based Codes	71
Conclusions	109
Bibliography.....	112
ANNEXURE 1	114

List of Abbreviations

ABD:	Area Based Development
BOOT:	Built Own Operate Transfer
BRS:	Business Rate Supplement
BRT:	Bus Rapid Transit
BRTS:	Bus Rapid Transit System
CCP:	Corporation of City of Panaji
CEPAC:	Certificates of Additional Potential Construction Bond
DBFOT:	Design Built Finance Operate Transfer
DP:	Development Plan
FAR:	Floor Area Ratio
FBC:	Form-Based Code
FCO:	Foreign & Commonwealth Office
FSI:	Floor Space Index
GDCR:	Gujarat Development Control Regulation
GIS:	Geographic Information System
HPEC:	High Powered Expert Committee
ICT:	Information & Communication Technology
LEED ND:	Leadership in Energy Efficient Design Neighborhood Development
MMRDA:	Mumbai Metropolitan Region Development Authority
MoUD:	Ministry of Urban Development
M RTP:	Maharashtra Regional & Town Planning
MRTS:	Mass Rapid Transit System
MRVC:	Mumbai Rail Vikas Corporation
MTA:	Metropolitan Transportation Authority
MTR:	Mass Transit Railway
MUTP:	Mumbai Urban Transport Project

NCRTC:	National Capital Region Transport Corporation
NIUA:	National Institute of Urban Affairs
NMT:	Non Motorised Transport
O&M:	Operation and Management
ORR:	Outer Ring Road
PCIC:	Per Capita Investment Cost
PPP:	Public Private Participation
PWD:	Public Works Department
R+P:	Rail + Property
RICS:	Royal Institute of Chartered Surveyors
RLDA:	Railway Land Development Authority
RRTS:	Regional Rapid Transit System
SCM:	Smart City Mission
SCP:	Smart City Plan
SPV:	Special Purpose Vehicle
TA:	Town Architect
TDR:	Transfer of Development Right
TFL:	Transport for London
TIF:	Tax Increment Finance
TMC:	Thane Municipal Corporation
TOD:	Transit Oriented Development
TOR:	Terms of Reference
TOZ:	Transit Oriented Zone
TPS:	Town Planning Scheme
ULB:	Urban Local Body
VCF:	Value Capture Finance

Foreword

The Smart City Mission has directed the attention of the urban sector in India to the need and benefits of following an integrated approach to the formulation of city development strategies and the preparation of purposeful projects which can be implemented with efficiency. The Mission has also made us highly conscious of the interrelationships between planning, governance, finance and capacity; the fact that all these aspects must be addressed while envisaging a project or a development strategy. The outcomes that are expected from such an integrated and holistic approach are an improved quality of life, better quality of assets and enhanced efficiency and sustainability.

One of the fundamental principles of smart cities is the integration between land use and transportation. Urban historians will remind us that this integration is at the heart of city planning. Even a cursory glance at the oldest cities, which we admire for their streets and public places as much as their buildings, reveals the inherent bond between the spaces for movement and the spaces for rest. However, this bond became weak during the late 20th century because of proliferating modes of personal transportation and rampant unplanned urbanisation, which skewed the balance between density of population and land use and provision of basic services. The ‘smart’ city is one that aims to restore the balance and to reclaim the public purpose of cities, which is expected to result in improved economic and social performance.

Over the last several months, NIUA was engaged in a research project on Transit Oriented Development in Indian Smart Cities. As a part of this project, NIUA published *‘Transit Oriented Development for Indian Smart Cities — A Global Review of Transportation-Land-Use Integration’* in September 2016. This publication established five constructs—Urban Density, Urban Diversity, Urban Design, Housing and Mobility — as the core themes in a TOD. This publication was followed up by interactions with over 10 Indian smart cities through national, international workshops and an international immersion visit. NIUA is now pleased to published the final set of deliverables in this project. It

includes three Guidance Documents with the purpose of helping Indian smart cities in the process of implementing TOD. The three Guidance Documents are:

- ***A Smart(er) TOD — Learnings from MoUD's TOD Guidance Document and Smart City Plans*** is a study of TODs in 21 Smart Cities with respect to the Ministry of Urban Developments' TOD Guidance document.
- ***Game Changers in Transit Oriented Development*** discuss two important tools in operationalising TOD- Value Capture Financing for financial sustainability and Form-Based Codes for community-driven urban design.
- ***Assessing TOD — A List of Indicators*** compiles indicators of TOD within the five constructs established in *Transit Oriented Development for Indian Smart Cities — A Global Review of Transportation-Land-Use Integration*.

These publications illustrate the opportunity, role and scope of TOD in Indian Smart Cities.

We are thankful to the group of expert advisers — Arun Rewal, Banashree Banerjee, Dr. Divya Sharma, Mriganka Saxena, and Akshima Ghate — who have shared their wisdom and experience with the NIUA team and our technical partners from RICS India, D.T.V. Raghu Ramaswamy, Ashish Gupta, Dr. Anil Sawhney and Sunil Agarwal. The project has been made possible through the generous funding provided by the Prosperity Fund of the Foreign & Commonwealth Office of the United Kingdom and the support and encouragement provided by Ms. Natalie Toms, Mr. Sushil Rana and the team at the UK High Commission.

Prof. Jagan Shah
Director, NIUA

The Environment for Game Changers

Introduction

In contemporary planning, Transit Oriented Development (TOD) is globally recognised as a means of curbing sprawl and its ill effects. These ill effects can vary from traffic congestion and air pollution to the inefficient use of resources such as land, fuel and time. It creates inequalities within the society resulting from difference in access to opportunities based on age, gender and income. In its broadest sense, TOD is a compact, mixed use development around public transit station where most of the residents use public transit instead of private vehicles. Stepping beyond this limited definition, TOD is globally accepted as a development strategy. This approach, albeit relatively new, is gathering momentum as an efficient and effective means of managing the future growth of cities in India (WRI, 2016). In July 2015, the Ministry of Urban Development (MoUD), Government of India, introduced TOD in the state of Delhi, with the aim of addressing the growing problems of pollution, congestion and shortage of homes for poor households and the middle class. Further, Governments of the states of Jharkhand, Haryana and Madhya Pradesh are also in the process of preparing and approving TOD policies. MoUD has also recently released a Guidance Document for TOD to assist various government organisations, public authorities and urban development professionals in India, to integrate sustainable transport planning principles in diverse urban contexts.

Despite all these initiatives, there are several barriers to the effective operationalisation of TOD in Indian cities. This publication takes a look at two of those: financial sustainability and community-driven urban design. Cases across the world demonstrate their significance in the success and replication of TODs. This publication attempts to shed some light upon the opportunities in these two in Indian Smart Cities.

Financial Sustainability

Cities constantly struggle with the inability to completely fund essential and

potentially beneficial public investments through the governments' general or capital budgets. In theory, the shortfall in funding in public investments is attempted to be met by using the economic principle of 'beneficiary pays'. This in conventional financing includes only direct beneficiaries. In most cases of large public investments, the project planners have not been able to incorporate the best way of cost recovery from direct beneficiaries alone leading to deference or abandonment of many valuable projects due to financial constraints.

The concept of value capture was envisioned to address this widespread problem of public finance. Most of the times, benefits of public investment are not limited to direct beneficiaries (users of the facility or system). The activities supported by the public investment also generate a variety of indirect benefits to the residents and property owners in the proximity in the form of an increment in value of land and property. Value Capture Finance (VCF) mechanisms capitalise on this increment in value of property to finance public investments. It is an alternative source for local governments beyond government grants, augmentation of local self-revenues above operating expenses, public-private partnerships (PPP) and long-term borrowings, to finance public investments.

Community Driven Urban Design

Concentration of activities and land use planning, as is characteristic of a TOD, help in creating a good mix of activities within a neighbourhood; but in order to be successful, the area must be attractive to users. Community support to TOD is warranted against the criteria of being attractive to its users. Therefore, a balance is needed between achieving the most efficient system and recognising community goals. Urban design is the key mechanism in achieving this balance (Justin Jacobson, 2008). While urban density and urban diversity trigger activities and invite people in TODs, it is urban design that motivates people to visit and use such areas. Carefully drawn urban design of built environment gives form, shape and character to group of buildings, neighbourhoods and cities. TOD projects too depend on good urban design to coordinate transportation modes, to manage urban densities and mixed land-uses, and to create appealing public spaces.

Form-Based Code (FBC) is an urban design tool that lays emphasis on the physical character of the development based on a community's vision. The intent of FBCs is to provide a blueprint for future development that allows greater certainty in determining the outcome for growth. In strategic developments such as TOD, FBC's can play a big role to relate the development to the context of the surrounding community, while creating attractive and efficient urban design.

Scenario in India

Among the 60 Smart Cities announced under the Smart City Mission of India by 2016, 24 cities identify TOD as a strategy to address the various challenges they face, such as shortage in the availability of housing, traffic congestion, environmental pollution, road safety, unemployment and so on. Another 17 cities are implementing projects that integrate land use and transportation through high densities with mixed use, in close proximity of transit station. These projects point to broader shift in the approach, from 'management of cities' to 'strategic growth of cities'. In this period of transformation, Indian cities have the opportunity to embrace game changers such as **value capture financing (VCF)** and **Form-based codes (FBC)** for successful results.

*Financing Transit
Oriented Development
using Value Capture*

What is Value Capture Finance?

Evidence from around the world demonstrates that well-conceived infrastructure investment generates benefits that exceed costs. This is a result of the indirect benefits offered by the investment. These 'positive externalities' include financial windfalls received by property owners and businesses located near a transport project (Langley, 2013). In other words, large scale public infrastructure investment leads to an increment in land and property valuation. **Value capture** refers to the recovery of a share of this increment. The appreciation usually occurs due to regulatory changes such as higher permissible densities and change in land use, investments in public goods infrastructure that increases quality of housing, jobs access and transportation, or social benefits and emergence of an important commercial, cultural, institutional, or residential developments in the neighbourhood. Land/ property owners in the proximity then become indirect beneficiaries of the appreciation in value without any effort. This appreciation is also in business opportunities.

Value Capture Financing (VCF) is the mechanism of capturing the increment due to the appreciation in value. VCF is collaboration between the private and public sectors, in such a way that risks and benefits are fairly shared among all the actors (Carter). It allows local authorities to launch new projects, even without large financial resources. Private actors benefit from VCF because projects are properly planned and backed up by the public sector; either through a judicial authorisation such as notified plan or through risks sharing with the local authorities. VCF involves beneficiaries of public investment contributing financially either as taxes or fees in case of independent private land and property owners, or offering development such as housing, parks or commercial spaces in case of private developers. This form of financing is efficient because, beneficiaries of infrastructure are required to pay part of the investment costs, thus preventing the public from undervaluing public goods.

Importantly, these programmes capture value that can permanently increase the levels of revenue to the taxing authorities (Council of Development Finance Agencies, 2009).

‘Value capture is the concept of financing public infrastructure through capture of publicly created ‘value’ (Rybeck, 2004).’



Opportunities for Value Capture Financing in a TOD

The opportunity for VCF in TOD is two-fold:

- **TOD is a capital intensive development which needs large amount of public funding to build and operate the assets-** Because cities are almost always under a severe fiscal constraint, they face great challenges in financing capital-intensive mass transit systems and other developments such as high-density mixed-use living, to reverse car-dependent urbanisation (Suzuki, 2015). Such investments are essential for ensuring a good quality of life. VCF is an alternative means of raising finances for such projects.
- **TOD creates a value increment that will increase the value of land, property and businesses-** TOD creates additional value to land, property and businesses, with better accessibility and more efficient use of land with higher density, leading to agglomeration benefits. VCF mechanisms gives opportunity to capture the value of these benefits from the beneficiaries.

Broadly, a TOD involves five constructs- Urban Density, Urban Diversity, Urban Design, Mobility and Housing- as discussed in *NIUA's Transit Oriented Development Framework for Indian Smart Cities: Global Review of Land-use-Transportation Integration*. It builds around a public transit station, as elaborated by Certero 'the centre-piece of the transit village is the transit station itself and the civic and public spaces that surround it'. Various project within a TOD address these constructs to create compact, dense, walkable, mixed-use communities that are accessible by public transit. Thus, public transit investments are pivotal in the success of a TOD.

VCF is a necessary tool in TOD due to the large expenditure associated with building transit systems. Worldwide, metro construction costs range from \$43 million a kilometre (Seoul Subway Line 9) to \$600 million a kilometre

(Singapore Thomson MRT Line) (Pedestrian Observations, 2013). These projects also have a high operation and maintenance (O&M) costs, often exceeding cities' fiscal means. Traditionally, fare box collection is the source of revenue to transit companies. Cities such as Hong Kong and Singapore show a surplus of fare box revenue; but other cities with a dense network and high transit ridership such as New York and London show only 40% and 90% of O&M recovered using fare box revenue (Salon, 2014). New York and London but, as indicated in the Figure 1, suggest that use of value capture mechanisms has helped to meet the operating costs (Transit Leadership Summit, 2012). Tax Increment Financing (TIF) in New York and Business Rate Supplement (BRS) in London are the most popular VCF instruments used in the respective cities (ULI Europe). These instruments as well as and other VCF instruments for TOD are discussed in more detail later.

Global cities also illustrate that value capture can not only support transit agencies to meet operating cost, but also can raise funds for capital investments to build transit. The Grand Paris Express project raised 80% of the project cost

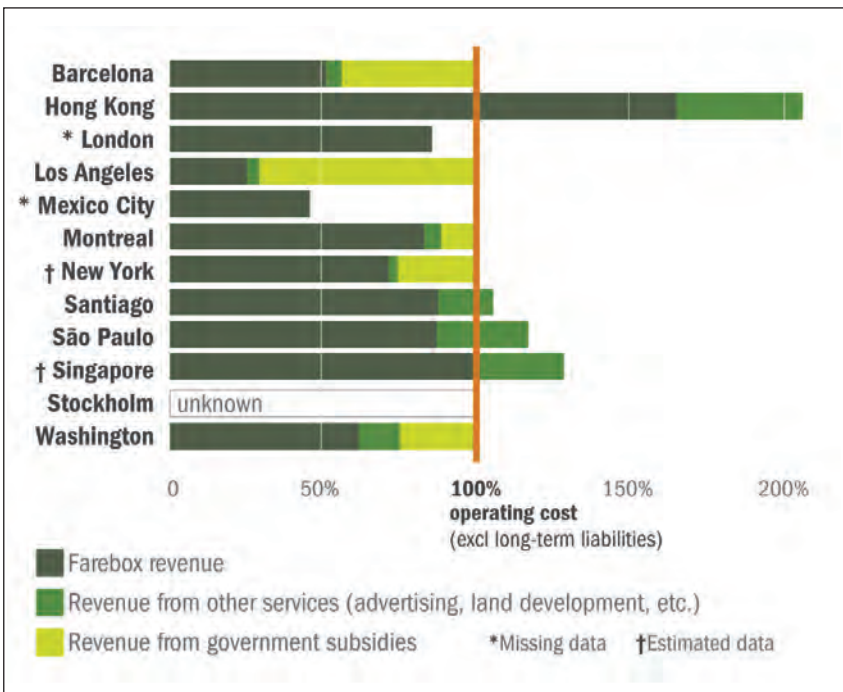


Figure 1: Operating budgets- revenues as percentage of costs (Transit Leadership Summit, 2012)

and New York 7 Line Extension raised 88% of its project cost through value capture (Salon, 2014). Crossrail in London is another example with 32% of project cost raised through value capture (Salon, 2014).

Housing is another capital intensive project in cities worldwide. Expenditure required to meet London’s infrastructure show that capital expenditure required on housing amounts to 32% of estimated budgetary requirement for London for the period 2016-2020 (ARUP, 2015). **Housing when bundled with transit is an effective way of improving housing stock.** The ‘Rail + Property’ (R+P) programme in Hong Kong SAR is a successful case of large scale value capture that also built housing stock in the city. By 2016, the Mass Transit Railway (MTR) Corporation of Hong Kong had developed 39 MTR stations, providing some 1,00,000 housing units and more than 2 million square metres of commercial space (Mass Transit Railway Corporation, 2016). From 2000

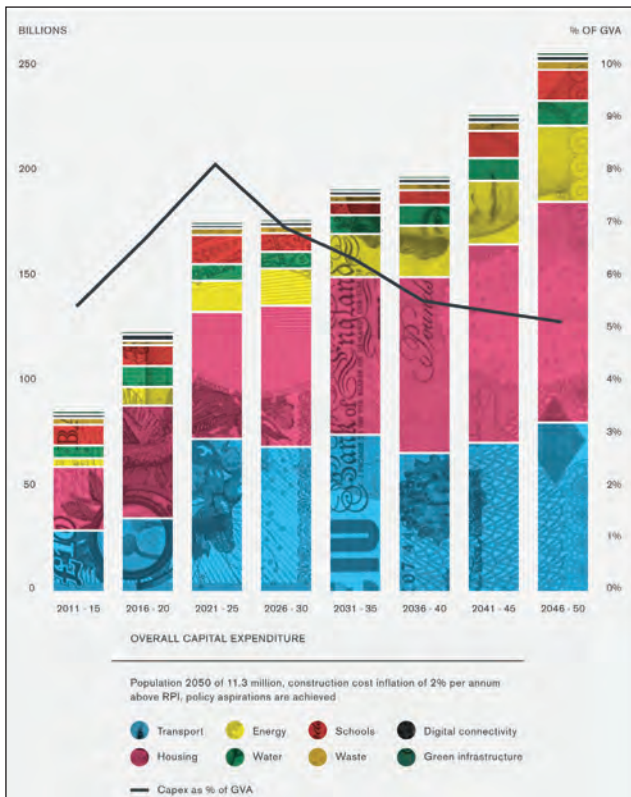


Figure 2: Projected capital expenditure in London (ARUP, 2015)

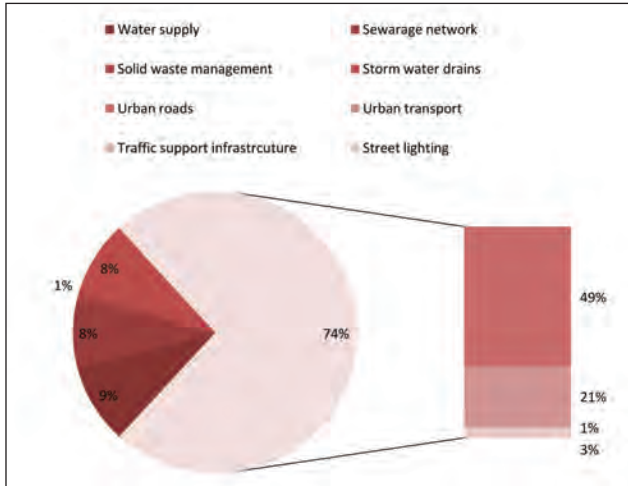


Figure 3: Share of Per Capita Investment Cost (PCIC)

to 2012 property development produced 38% and related business (such as commercial and property lease and management business) produced 28 % of the income of the transit company (Mass Transit Railway- MTR) in Hong Kong SAR (Suzuki, 2015).

VCF in global cities such as New York, Hong Kong, Tokyo and London allowed these cities to generate funds for transit investment, operation and maintenance. Indian cities also need large scale investment in public infrastructure such as transport. The Report on India Infrastructure and Services gives required per capita investment cost (PCIC) for various core infrastructure in various classes of Indian cities. These values for city class IB¹ indicate that 74% of PCIC for core infrastructure is for transportation including roads, urban transportation, traffic support infrastructure and street lighting (High Powered Expert Committee (HPEC), MoUD, 2011).

Some of India's current and proposed investment in public transit and TOD include the following:

- As of 2016, 20 Indian cities are building metro systems for 835 km of length.

¹City class IB has population between 1 to 5 Million

Additional 343.6 km of corridor has been approved and 879 km has been proposed. This amounts to nearly 910 stations and 115 interchanges, with a total estimated project cost of INR 2.16 trillion.

- National programmes such as Railway Station Redevelopment under the Railway Land Development Authority (RLDA) is engaging with city governments to redevelop 400 A and A1 railway station buildings to include commercial use.
- The Regional Rapid Transit System (RRTS) by National Capital Region Transport Corporation (NCRTC), connecting Delhi-Meerut and Delhi- Alwar, propose to develop self-contained TOD pockets with job centres along the corridor at strategic locations.
- Out of 60 Smart Cities announced, 24 Smart Cities have proposed TOD and another 17 Smart Cities have proposed projects that address TOD principles in their Smart City Plans (SCPs).

The general trend in Indian cities is to depend on government grants/ transfers, augmentation of revenue above operating expenses and long term borrowings to develop large scale infrastructure. Since governments recover limited value from these investments, their capacity to make similar investments elsewhere is constrained. Several Smart Cities of India have recognised the need to shift from automobile centred planning that leads to urban sprawl, to a model of compact development that reduces the overall need to travel, and if required, use public transport, as demonstrated in the various city cases presented in the NIUA publication- *A Smarter TOD*. Cities have acknowledged that TOD investments can help in guiding urban growth. Unfortunately financial constraints bind and severely limit such investments.

Many governments across the world have sought to address this problem by attempting to capture some share of the value increment in TOD using various innovative tools and policies. It is established by researches and practice in global cities that there is a clear positive impact on property values when accessibility is improved using public transport such as rail, BRT, and even conventional bus (Salon, 2014). Capture of this value increment has helped cities world-wide to reinvest and enable sustainable urban growth. If adapted well to local contexts, VCF can become an effective finance and planning apparatus for cities in India that are otherwise facing fiscal constraints in implementing TOD. **Under the strong economic growth and rising real incomes, there is**

enough potential in Indian cities too to use VCF mechanisms to fund these investments, while guiding cities towards a smart growth.

Putting Value Capture to Practise in TOD in Indian Smart Cities

Closer examinations of the 41 cities that propose TOD (or land-use transportation integration) in their area based development (ABD) indicate that 21 out of the 41 cities show a strong TOD, both in principle and projects; therefore these cities were chosen for studying VCF in TOD. The NIUA publication- *A Smarter TOD*, studied these 21 cities to summarise the objective of TOD in these cities, and briefly discussed the proposed interventions.

Before analysing the TOD proposals for VCF in these cities, it is necessary to establish the two dimensions of VCF- **VCF as a financing tool and VCF as a decision making tool** (Langley, 2013). Langley suggest that value capture programs though begun as financing methods, progressively evolve to become decision making tools (Langley, 2013). VCF contribute to public infrastructure decision-making by managing urban development patterns and transportation networks (McIntosh J. , 2014). **In India, VCF is still in a nascent stage; the current trends of VCF used in Indian cities indicate use of VCF only to capture value of public investments for financial sustainability. The use of VCF as a decision making tool is an advanced stage as practised in developed countries. Therefore, in the comments made on the 21 Smart Cities in this publication, the scope of VCF is explored only as a financing method.**

The reasons to employ VCF instruments in TOD in Smart Cities are two-fold. First, large investments are proposed in developing ABDs on TOD principles in these cities. Second, the existing and proposed enabling framework including policies, legislations and institutional arrangements necessitate or support the use of VCF in these cities. Before studying VCF instruments applicable for TODs in Indian Smart Cities, it is necessary to examine trends and conditions that encourage and compel state and local government agencies to consider VCF as a financing method for TOD. It is illustrated in the following sections under two heads- financial analysis of SCPs and enablers of VCF in TODs in Indian Smart Cities.

Financial Analysis of Smart City Plans in Indian Smart Cities

The TODs proposed in the 21 cities studied in this publication give many opportunity for the cities to capture value from public investment in transit and other large scale development such as affordable housing, knowledge hubs and job centres in close proximity to transit. Three important financial indicators that establish the need for VCF are-

1. Leveraging factor: Ratio of committed to non-committed resources in SCP
2. Debt: Amount of debt in the SCP budget
3. PPP: Amount to be invested in PPP in SCP

1) Leveraging factor: 21 Smart Cities are investing INR 58,586 crore, thereby leveraging INR 37,586 crore on the INR 21,000 crore investment by central and state governments. 50% (INR 29,424) of the total budget is identified as committed financial resource (SCM and convergence). 80% (INR 46,726) of the total budget is invested in ABDs. With the massive public investment proposed, a proportionate value increment is anticipated in the ABDs of the 21 cities. If not full, a part recovery of the investments using VCF will enable replication of such developments in other parts of the cities, as envisioned by the Smart City Mission.

2) Debt: 21 TOD cities are borrowing INR 5732 crore to develop their ABDs. These are long term borrowings from international funding organisations. In most cities, augmentation of own source revenue using strategies such as increase in parking charge and land and property taxes are proposed to raise the money for clearing the debt. These mechanisms will function better under a strategic umbrella of value capture. VCF instruments tie the charges/taxes to the value of investment, thereby developing a transparent system where the public is informed of the value prior to imposition of additional charges/ taxes.

3) PPP: INR 17,120 crore is proposed to be raised in PPP in the 21 cities. The PPP projects mostly include development of transit hub, open spaces, bus shelters, railway station complexes, commercial and business centre, slum redevelopment and public amenities, market redevelopment, and procurement of buses and public bike share system. These are proposed as traditional PPP arrangements. Since most of these projects include a construction element, joint developments involving local government, transit agency and private

developers will give increased benefits to all partners. Profit sharing between these partners will give confidence to the government to propose more projects, encourage transit agencies to improve public transport systems and private developers to engage more in such arrangements. The functioning of joint development is explained later.

In the 21 cities studied, within the ABD developments, 70% of budget (INR 21,058 crore) is proposed in the 5 constructs of TOD- Urban Density, Urban Diversity, Urban Design, Mobility and Housing. The remaining 30% is invested in developing the supporting basic infrastructure, namely water supply, sewerage connections, storm water drains, power supply and solid waste management. The ABDs under Smart City Mission are proposed as model developments for replication in other parts of cities. The Smart City Mission guidelines advises cities to enhance own revenue sources. Many cities in their SCPs have therefore proposed to increase land and property taxes, revise development charges and parking fee, etc. in their ABDs. The TOD proposals in the cities improve accessibility and quality of life for the residents, businesses and visitors, improving value of the area. Therefore, under the enabling environment offered by the Smart City Mission, cities have opportunities to employ VCF in TODs in Smart Cities.

Enablers for VCF in TOD in Indian Smart Cities

Experiences internationally demonstrate that a number of factors or enablers would be essential in successful value capture programme in a TOD. These enablers maybe broadly categorised into three frameworks- policy, legislative and institutional.

Policy Framework

Value Capture methods may be employed in a specific project (such as Crossrail) or specific area (such as Hudson Yard), but the decision of capturing value comes from a broader policy. For example, in Montreal, under value capture policy, the provincial government follows a policy that a certain percentage of local match funding should be in place before it will commit funds to build new railways. Previously, the provincial government paid for 100% of new railway capital costs (Salon, 2014). This type of policy decisions

Value Capture Policy in Karnataka

The Government of Karnataka has decided to create a dedicated fund for investment in mass transit systems by using VCF methods. Some of the innovative financing methods explored by the Karnataka government to fund their transport facilities are:

- Exchange of developed lands for the lands required by the project, as compensation
- Premium FSI/FAR
- Cess on approval of new layouts
- Construction and exploitation of commercial spaces near important infrastructure projects
- Generation of revenue through other sources like premium for road developments, etc.
- Betterment Tax

The ABD proposal of Hubli-Dharwad in Karnataka is a corridor based development on either side of BRT corridor. In the context of the state policy towards value capture, there is opportunity of VCF in the city.

allows national and state governments to propose transit and other capital intensive infrastructure without being over-burdened. Such policies also share responsibility of finance between national or state governments with local governments.

In the context for growing demand for resources to finance urban infrastructure expansion, the Ministry of Urban Development has proposed a Policy Framework for Value Capture Finance in 2016. The broader objective of this policy is to integrate VCF into project feasibility assessment for systematic and large scale adoption of capturing a part of potential increase in the value of land and other properties resulting from the public infrastructure investment.

Legislative Framework

Unless value capture financing mechanisms have legal backing, it is difficult for them to be sustainable and scalable. In London, for example, the primary legal mechanism for value capture mechanism is the use of planning obligations—Section 106 agreements of the Town and Country Planning Act 1990 (ARUP, 2015). Section 106 allows local authorities to negotiate agreements with

Legislative Framework for land-use change and regularisation in Nagpur

The site chosen for TOD in the SCP in Nagpur is notified as No-Development Zone under Green Belt in the Development Plan (DP), but the site is haphazardly developed inconsistent with the DP. Section 37 of the Maharashtra Regional and Town Planning (MRTP) Act permits land use change on request to the State government. The SCP proposes regularisation of unauthorised settlement and development using Town Planning Scheme (TPS). The legal framework offered by Gunthewari Act 2001 of Maharashtra² permits regularisation against a fee.

developers and require them to make some form of financial commitment to the local authority in exchange for the granting of planning permission. These have been used very effectively to secure affordable housing and infrastructure contributions in London. The strength of Section 106 is its flexibility, as each agreement is negotiated separately as part of the planning application process, which allows the contribution to be carefully tailored to the needs of the particular place and time.

A supporting legislative framework is very important in VCF. The 74th Constitutional Amendment Act specifies that revenue sharing arrangements between state governments and ULBs should be determined through laws passed by state legislatures. However, state governments in India have often introduced land-based financing mechanisms in an ad hoc manner through government executive orders (Sahil Gandhi, 2016). This has resulted in legal action against the financing mechanisms as well. For example, the Gujarat High Court and Supreme Court negated the contention of the Ahmedabad Development Authority that power to recover a fee is incidental to the function of carrying out development control. This judgement was made against the practice of Ahmedabad Urban Development Authority levying a type of development fee which was not under the Gujarat Town Planning and Urban Development Act (Sahil Gandhi, 2016).

A study conducted by National Institute of Urban Affairs on value capture

²The Gunthewari Act of Maharashtra allow regularisation of Gunthewari developments (development of private lands for construction of dwelling units in unauthorised areas, in this case of Nagpur, in green belt) existing on 1st January 2001.

finance identifies the relevant State Laws in all states that support nine VCF instruments already in practice in Indian cities (Annexure 1).

Institutional Framework

Where value capture is being implemented on a large scale to finance transit, basic institutional arrangements have been critical. Two parameters are key in institutional framework for TOD-

- strong transit authority and
- empowered local body.

The successful implementation of VCF in TODs in North American, European and East Asian cities is largely due to presence of strong transit agencies. New York, London and Hong Kong demonstrate this arrangement through the Metropolitan Transportation Authority (MTA), Transport for London (TfL) and Mass Transit Railway Corporation (MTR) respectively in these cities. A best case example is TfL in London. TfL has authority over region-wide transport planning and finance (Salon, 2014). It works with national government to develop taxation schemes to help fund transit (Salon, 2014). TfL also governs the roads and manage car user fees in the region. This makes cross-mode transportation subsidies relatively seamless, allowing transit to capture part of the location value of central destinations by charging private vehicles for driving and parking there.

Also, in cities that demonstrate successful VCF in TODs, it is a common observation that responsibility for city-level land use planning and investments in local infrastructure and services including finance is fully delegated to municipalities. The case is different in Indian cities. Except for Metro cities, most ULBs are often forced to depend on the upper tier of governments for resources and are thus restricted in their expenditure on public infrastructure and ability to capture value. Financial estimates of 20 Lighthouse cities under the National Smart Cities Mission indicate that only 8 out of 20 cities are leveraging at least twice the grant from various central and state schemes. Traditional revenue generation sources for ULBs are taxes and fees. In many cities, several forms of tax such as motor vehicles tax, profession tax, marketing cess, that were started as municipal taxes were later converted to

Limited Devolution of Powers to Corporation of City of Panaji

In Panaji city, majority of the urban services are not the function of Corporation of City of Panaji (CCP). The functions with respect to planning and implementation of urban services including construction of roads and bridges, are dealt by the State Public Works Department (PWD) and the planning and implementation of the storm water drainage related works are dealt by the State Water Resources Department (WRD). The urban planning function of the urban local body is undertaken by the North Goa Planning and Development Authority. The public transport company operational in Panaji- the Kadamba Transport Corporation Ltd. is a state government undertaking under the Government of Goa. The Panaji Corporation Act 2002, Section 109 and Section 143 authorise the CCP with taxation powers, but, presently, only collection of house tax, issue of trade license and issue of building construction license are carried out by CCP.

state taxes by law, taking financial governance to a large extent away from city governments. It is also a practise in some of the cities to charge for services at rates fixed by the State government, leading to a need for the sharing of resources. **Currently, falling behind in generating revenues through even taxes and fees, the ULBs needs major capacity building and empowerment to engage in creation and capture of value from TOD.**

The global best practices of VCF in New York, London and Hong Kong showcase a variety of scenarios- a state owned transit authority in New York State, a city government owned transit authority in London and a public-private arrangement in Hong Kong; yet, a common learning from these different cases is that all these agencies engaged with city governments under a common long term vision and well established operational procedures to enable successful value capture from TOD investments. These unburdened the city governments from fiscal constraints, provided profit to transit companies, and allowed for strategic urban planning. This scenario is absent in most Indian cities. Even in Delhi, despite the national government's strong support and operational success of the extensive metro system, the regional government and its transit agency have been unable to fully use value capture schemes as a strategic apparatus of infrastructure financing and urban development. **This underutilisation of land around metro stations is largely due to inconsistent policy and regulatory framework and lack of coordination among stakeholders** (Suzuki, 2015).

However, there are success stories for institutional enablers in Indian cities too. Ahmedabad has successfully demonstrated land assembly programmes in which the owners agree to exchange their barren lands for infrastructure-serviced smaller plots. Called as Town Planning Scheme (TPS), this instrument has played the biggest role in development of Ahmedabad city and its surrounding infrastructure. But, this instrument is yet to be used for developing compact developments in TOZs in the city.

Summary

The R+P development in Hong Kong is celebrated globally as one of the most successful model of value capture. The programme of involving the private sector in land development around transit stations covers the cost of transit investments, thus making the strategic investment in transit a long-term cost neutral decision for the government. Together with a state leasehold system for land and extreme urban density, value capture in TOD in Hong Kong rely on a strong legal framework and a well-established operating procedures for its success. Indian cities have densities high enough to support transit in their core areas and significant land under government ownership to support VCF in TOD, but indicate weakness in primarily two factors- legal framework and



operating procedures. The proposed National Value Capture Policy Framework is a welcome gesture at this juncture, as it establishes a deliberate attention on VCF as an innovative financing mechanism. Though some state governments have been using various VCF instruments, there had been no policy till now that establishes a strategic approach towards VCF.

Capturing value in TOD is not a project level decision, but rather a strategic policy of cities, backed by supporting legislations and institutional arrangements. The legal and institutional framework for VCF varies with the type of VCF instrument. For example, a Joint Development, as in the case of R+P development in Hong Kong and Tokyo, requires negotiations between local government, transit authority, land owners and developers to be placed as the highest priority to arrive at common consensus on nature of development and profit sharing, whereas in the case of air rights sale as seen in Sao Paulo, supporting planning instruments, such as flexible zoning enabling higher densities and taller structures at transit stations, take the prime importance.

It is accepted world-wide from evidence that value capture is a worthwhile source of the infrastructure funding, and should be routinely considered by governments in all project development phases; but putting the concept of value capture to practice requires governments to overcome a number of sensitivities varying with various VCF instruments. A wide range of value capture mechanisms are available for TOD, briefly discussed ahead.

Value Capture Finance Instruments Applicable for a TOD

Broadly, VCF instruments for a TOD can be categorised into two- **development-based instruments and finance-based instruments**. Some of the major instruments within these two categories are briefly described under. Suitable cases from 21 TOD cities are illustrated for each instrument to show opportunity for each of the instruments in TOD cities.

Development-based instruments

Land/ development-based instruments capture land value increments by selling or leasing land, development rights, and air rights. Under such schemes, governments, transit agencies, developers, and landowners jointly increase land values by exploring development opportunities of transit station areas and sharing increments in land values. Characteristics of development-based value capture are (Suzuki, 2015)-

- It does not create significant fiscal distortion or public opposition since there is no additional taxes or fees involved
- It can generate both direct revenues from incremental land value and sustainable long-term revenues from higher transit ridership and retail shops, leisure facilities, parking, and residential buildings in the precinct of station areas
- **It establishes a clear link between creating value and capturing value**
- **It has a much better chance of working well administratively in places with an inadequate property tax system as in most cities in developing countries**

1) Land sale or lease: The most direct value capture is for governments to build land banks through strategic acquisitions. Once a part of land is developed,

the value of the remaining land rises and the government can capture the entire increment by selling it in phases. However, given the political economy surrounding land transactions, this government-as-realtor strategy is likely to encourage undesirable practices. In greenfield developments where government owns large tracts of land, this strategy can be very valuable. A phased approach of monetising the land bank preferably through auctions is better to finance the development of newer areas. The Mumbai Metropolitan Region Development Authority (MMRDA) illustrates the use of proceeds from land sale for the Mumbai Urban Transport Project (MUTP). In 2006 and 2007, the MMRDA auctioned 80-year leases on 13 hectares of land, raising INR 120 crore. This amounts to five times the amount of annual infrastructure investment by Mumbai's municipal authorities (Suzuki, 2015).

Governments, when faced with resource constraints, have preferred to raise money by direct sale of undeveloped land. The periodic land auctions of Urban Development Authorities involving vast extents of vacant lands are the most common example. Value realisation increases with asset development as shown in Figure 4. **The sale of undeveloped land limits value capture and is therefore an extremely inefficient form of resource mobilisation. Rather, investing in developing the land assets and then selling them to private stakeholders in phases as the value increases, importantly through auctions will help to realise revenue for the ULBs.**

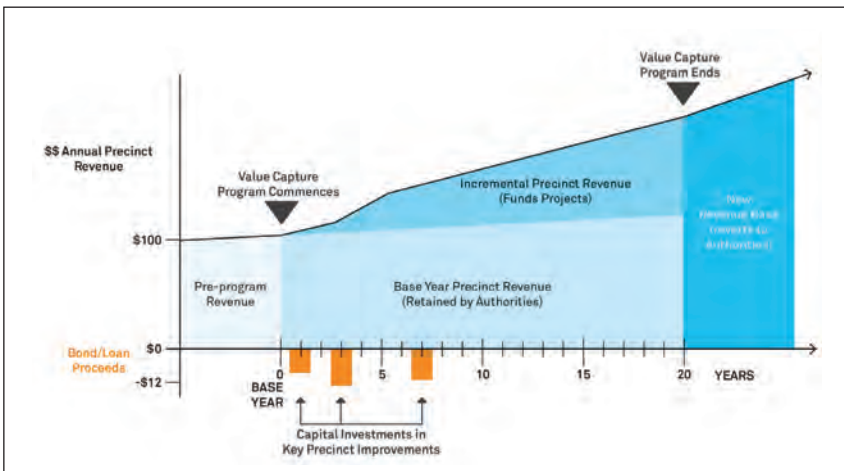


Figure 4: Value Capture Funding Model (Fahmy, 2015)

Ranchi due to its proposal of undertaking a greenfield TOD development on 341 acres of government owned land can look at land auction for value capture. The SCP of Ranchi proposes an investment of INR 60.19 crore towards land development in the ABD. Additionally, a loan of INR 315 crore is envisaged from World Bank for building knowledge institutions in the ABD. The master plan of ABD indicates 27.5 % (93.5 acre) of land dedicated for creation of knowledge institutions. TODs such as Kings Cross in London illustrate that anchor institutions trigger and sustain developments. Knowledge institutions need large parcels of land, and involve long duration of construction. Therefore, in Ranchi the developed land parcels could be put up for auction for these institutions as the first step. This may be followed by auctioning of smaller land parcels along the main corridor in the ABD, which are proposed for mixed use development. The phase-wise auction will help to capture the appreciation in value of land due to development of adjacent parcels. Phasing of development is also more likely to ensure an organic and market driven development on the site.

The proposed land uses in the ABD is as per approved Master Plan of Ranchi 2037, hence a legal support already exists for the development. Also, the SCP identifies PPP under specific terms of reference (TOR) as the mode of developing the knowledge hub and mixed use development. The TOR maybe developed to include specific design requirements such as affordable housing units, ground floor retail and open space mandates. Since the chosen site is free of encumbrances (government owned land), land development and auction is unlikely to face hurdles in Ranchi.

Use of public land leasing to finance infrastructure investments has been used extensively in China (Peterson, 2009). But the use of land lease revenue by local governments in China is sometimes unrestricted and not tied to any improvements of specific parcels of land (Anderson, 2012). In such scenario, relying on land sale or lease to finance municipal spending might create incentives for governments to convert rural land to urban use, thereby promoting sprawl.

2) Joint development: Joint development is a well-coordinated development of transit and/or transit station facilities and adjacent private properties between local government, transit agencies and developers. In this, the developers usually contribute physically or financially to the construction of the station facilities, as their property value will increase due to the transit investment. This instrument is most suitable for station building and immediate areas.

Joint development in Hong Kong SAR, China illustrates one of the best coordinations between government, transit company and private developers. Under the R+P program, the Hong Kong SAR government gives exclusive

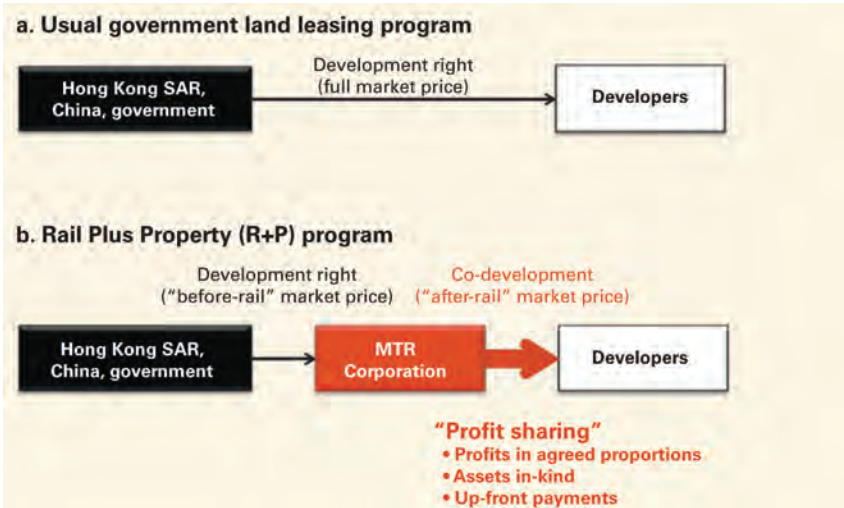


Figure 5: Joint Development Model in Hong Kong SAR (Suzuki, 2015)

property development rights of government-owned land at a 'before-rail' market price to the MTR Corporation (the transit company). MTR Corporation then captures the land value increment created by integrated development of rail and property, such as accessibility and agglomeration benefits, by partnering with private developers in developing the land and selling the completed development at an 'after-rail' market price. It recoups the capital, and O&M costs of railway projects through sharing profits. R+P also allow MTR Corporation to integrate different phases of rail and property development projects, ensuring smooth project implementation and reducing transaction costs. From 2000 to 2012, property development produced 38 percent of MTR's corporate income (Suzuki, 2015).

In a joint development, one of the most important factors is that the rules for sharing costs and profits among the local government, the transit company, and private developer should be clear and sound, easing project uncertainties and public opposition. The same consensus was arrived at during a workshop conducted by Royal Institute of Chartered Surveyors (RICS) in collaboration with NIUA and FCO. The learnings from the workshop are discussed later.

Under the Railway Land Development Authority (RLDA), Indian Railway has proposed redevelopment of stations as one of the key strategies for increasing non-tariff revenue. The New Thane Railway station in Thane is one of the 400 stations identified by RLDA for redevelopment. A ridership of 2 lakh commuters/day is anticipated in this station. A INR 300 crore project is proposed in a 90: 10 ratio between Thane Municipal Corporation (TMC) and Central railway. It is agreed between the two organisations that the basic station infrastructure will be developed by the Central railway and TMC in partnership, while circulation and integration with other modes of transport will be done by TMC. The station buildings will be developed with an FSI of 3 with commercial development. The partnership will be able to generate additional non-fare box revenue through lease or rent of commercial space on the station building. It will also increase fare box revenues since the multi-modal integration and commercial development provided at station will most likely increase ridership.

A MoU has been signed between RLDA and Mumbai Rail Vikas Corporation (MRVC) to plan and execute commercial development of land and air space at New Thane Station. TMC has also made agreements with Thane Traffic Police for management of traffic based on the new circulation and multi-modal integration proposed at New Thane Railway Station. Successful models worldwide demonstrate that joint development should include housing, but is lacking in the MoU signed between TMC and Railways. Housing maybe included in the scheme after due consideration of the development framework proposed under RLDA.

3) FAR (FSI) sale: Value capture through FAR sale is a suitable instrument to encourage vertical development and densification in certain areas. In this mechanism, a two-tier FAR structure should be designed, with a certain basic FAR bundled with property right and the remaining to be purchased, to enable value capture. The efficient mechanism for FAR sale is to define variable FAR limits in various parts of the city depending on the existing and new infrastructure and then auctioning the FARs in the market. This instrument is suitable only where the existing and proposed infrastructure can support the additional density.

City of Sao Paulo uses Certificates of Additional Potential Construction Bonds (CEPACs) in this sense. In this scheme, those proposing to build over the basic FAR will have to purchase CEPACs from the secondary market. The city holds periodic auctions for each area in the city, gradually releasing additional FAR so as to maximise the value capture. This has been used to guide densified urban growth along transit corridors. Curitiba also demonstrates the use of CEPAC, where a major national highway was converted into an urban avenue with the extension of BRT line and higher density land uses (Suzuki, 2015).

Ahmedabad in its ABD propose sale of FAR to encourage compact development adjacent to public transit. Densification of 515 acres of existing commercial and residential development in the Transit Oriented Zone (TOZ) in the ABD is proposed to be taken up by private developers through the purchase of additional chargeable FAR. A base FAR of 1.8, with an additional FAR of 2.2, totalling 4 FAR is allowed in the TOZ. This additional FAR translates to approximately 50 million square feet for 515 acres of TOZ area. The chargeable FAR is proposed to be sold at 40% of the existing rate. The SCP expects the sale of FAR to raise INR 250- 275 crore in the next 5 years. Also, slum redevelopment in 75 acre land in the ABD is proposed to be implemented through PPP (DBFOT model) where partners and developers will be given incentive FAR of 1.2 from base FAR of 1.8 totalling FAR 3 for development in exchange for developing affordable housing for slum dwellers.

These interventions in the ABD are supported by the Master Plan of Ahmedabad, Gujarat Development Control Regulation (GDCR) and Gujarat Rural Urban Housing Yojana. The Master Plan allows an increase in permissible FAR to 4 on 200 m of land on either side of the BRT corridor. FAR sale is also allowed in TOZ in Ahmedabad as per the GDCR. The Gujarat Rural Urban Housing Yojana permits in-situ rehabilitation of slums situated on public land by PPP.

The use of FAR as a value capture instrument is subjected to the risk of disincentivising vertical development, if the base FAR is not designed efficiently. **As a thumb rule, the base/ free FAR should be designed such that if fully utilised, the development will have the minimum density to support transit ridership.**

4) Air rights sale: Air rights are a form of value capture that involves the establishment of development rights above a public utility- mostly a transportation facility that generates an increment in land value. In air rights sale, generally, governments sell development rights extended beyond the limits specified in land use regulations (such as FAR) or created by regulatory changes to raise funds to finance public infrastructure and services (Suzuki, 2015). In another model, in New York, air rights signify transfer of un-built FAR (unused development right) on private property to feasible and adjacent public property and provide it for sale to raise finances. Generally air rights are sold through auctions. The logic behind selling air rights is that owners should contribute to infrastructure construction costs in proportion to the volume of their air rights use, as higher densities require additional infrastructure investments.

The ABD of Chandigarh includes the proposed underground metro stations at sector 17 and sector 43. The station at sector 17 is also an interchange station for the two metro lines proposed in the city. One of the focus areas in Chandigarh's SCP is on developing service oriented job centres in close proximity to public transit. In this context, sale of air rights above these metro stations maybe explored in the city to capture value of the investment and promote transit ridership. As per the finance models, approximately 6% of the overall budget to develop the Metro system is placed on revenue from property development along the metro corridor. Also, the Draft TOD policy prescribes an FAR of 3 with building height of up to 10 storeys in the city, which maybe leveraged at the metro stations.

The use of air rights in the United States dates back to 1913, when New York's Grand Central Terminal and adjacent Park Avenue development were built over the Central Railroad (Micheal Iacono, 2009). Other famous examples of such air rights allocation are the Atlantic and Hudson Yards Projects in New York City, parts of both of which are developed on old railway yards.

The revenue base for air rights development is narrow, since it only applies to specific developments and revenue is typically only generated on-site. For the same reason, the amount generated is likely to be small relative to the size of transportation budgets, but could be one of the components of financing plans for specific transportation improvements (Micheal Iacono, 2009).

5) Land readjustment/pooling: In land readjustment/pooling, land parcels in an area are pooled, converted into a lay-out, infrastructure developed, and a share of the land, in proportion to original ownership, returned as reconstituted parcels. There are different variants of such schemes depending on how the infrastructure development is financed. In most cases, a share of the developed land is sold to finance its cost, whereas in others, the land owners give a betterment charge to cover the infrastructure cost.

Tokyo demonstrates cases of land readjustment as a VCF instrument for transit. Under the Housing- Railway Integration Law, municipal governments and housing agencies in Tokyo can designate special land readjustment areas along future railway lines. In this scheme, several landowners within the designed areas give up and reserve percentages of their land for public

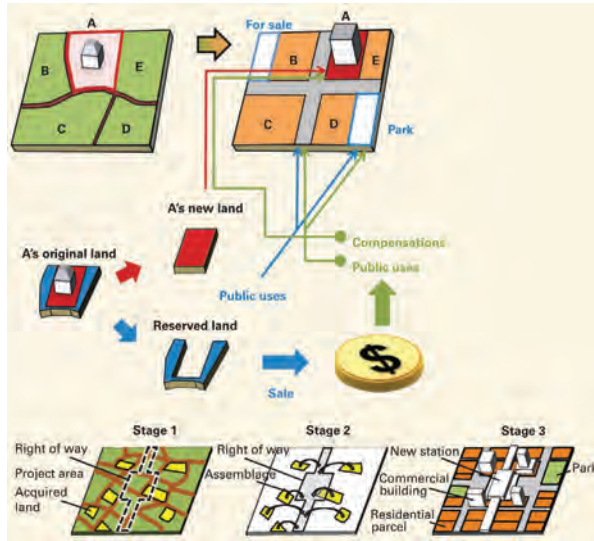


Figure 6: Integrated Land Adjustment Model in Tokyo (Suzuki, 2015)

uses, including the transit facilities or land sales to generate funds for public investments (Suzuki, 2015).

The success of land readjustment/pooling depends on availability of clear land titles, strong institutional capacities in land management and stakeholder negotiation. Gujarat has demonstrated use of its unique version of land readjustment called Town Planning Scheme (TPS) to guide the development of Ahmedabad city and its surrounding infrastructure.

6) Urban redevelopment schemes: Under this instrument, landowners and a developer establish a cooperative entity to consolidate piecemeal land parcels into a single site that they then develop (such as a high-rise mixed-use building) with new access roads and public open spaces. The local government modifies zoning codes and increases maximum FARs in the targeted redevelopment areas (typically around rail transit stations) and finances the infrastructure.

Tokyo also demonstrates urban redevelopment schemes for VCF in built up area. In Tokyo, under the Urban Redevelopment Law, landholders, tenants, and developers can create development opportunities in built-up areas, typically where a transit station exists or has newly opened. This urban redevelopment project consists of construction of a taller, higher-quality

Nagpur proposes to plan and develop intense TOD zones around metro stations in the ABD by land pooling and readjustment, alternatively called as Town Planning Schemes (TPS). The Bombay Town and Country Planning Act 1915 and 1954 of Maharashtra provides the legislative support for implementation of TPS in Nagpur. The selected site for development of intense zone of TOD is such that there is very little existing built up. The fragmented land parcels, most of which are currently vacant, are devoid of even basic infrastructure such as piped water supply. The SCP proposes to use TPS in the site under the following arrangement-

- For un-built plots, the authority will appropriate 40% and return 60% of the land to the owner
- In the rare case where a built property is impacted, the owner shall be compensated in any of the following manners-
 - land at an alternate location within the TPS area
 - Increased FAR
 - Transfer of Development Rights

Land pooling and development can provide land owners with serviced land parcel and/or equivalent residential and commercial property adjacent to metro station, while creating dense mixed use development around station areas to support the transit and prevent sprawling development. To phase development in the area, the vacant available land parcels are proposed to be developed with complete infrastructure in the first phase. In later phases, the smaller plots are proposed to be amalgamated to form larger plots, to be developed as high density mixed use buildings with greater FSI. Figure7 illustrates the phasing.

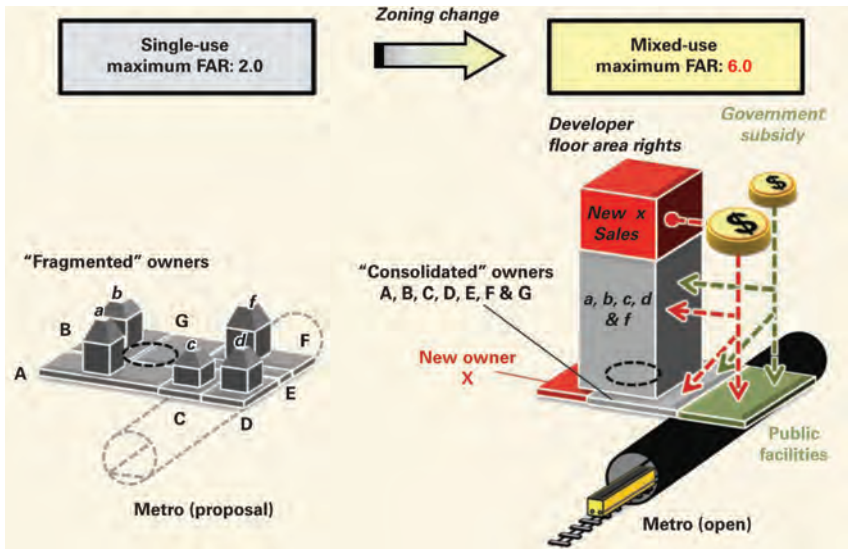


Figure 7: Phasing of Development in TOD Station Area in Nagpur (Smart City Plan Nagpur, 2016)

building on land prepared by assembling small parcels; construction of an underground metro station; and provision of public infrastructure. To capture the potential accessibility benefits conferred by the transit station, the local government first converts zoning codes from single use to mixed use with higher floor area ratios (Suzuki, 2015).

Stakeholder negotiation is most critical in the use of this instrument. Even though this has functioned well in cities of Japan, often city governments

elsewhere prefer acquisition using eminent domain rather than engaging private land owners and developers in a cooperative, because areas with existing built-up in many cases take indefinite time to get approval from land owners.



Stakeholders	Contribution	Benefit
Landholders (A, B, C, D, E, F & G)	Land parcel for the new building	Joint ownership of land for the new building (sections A, B, C, D, E, F & G) with higher access and better local infrastructure and service provision
Building owners (a, b, c, d & f)	Old buildings and housing units	Ownership of the new building (sections a, b, c, d & f) with higher access and better local infrastructure and service provision
Developer	Capital and property development expertise	Profit from section X and from surplus FAR
Transit agency	Construction of transit station	Transit-supportive environment/increased ridership
National government	Subsidies for land assemblage and road construction	Save road and other public infrastructure construction costs
Local government	Change in zoning code (from single use to mixed use with higher FAR)	Yields higher property tax revenue; promotes local economic development; builds townships resilient to natural disasters

Figure 8: Inclusive Urban Redevelopment Scheme in Japan (Suzuki, 2015)

Ujjain in its SCP proposes development of a multi-modal transit hub with compact, high density, mixed-use development. The redevelopment of the sparse development proposed on public land adjacent to Ujjain railway station and regional bus terminus will include BRTS transfer station, retail commercial and office space. Currently, a Built-Own-Operate-Transfer (BOOT) concession agreement is envisioned for this project, with the following responsibilities with private developer-

- Part funding of the project and implementation
- Disposal of mixed use units and earn considerations
- Paying licence premium to SPV
- O&M of assets up to inception of Resident Welfare Associations/ Commercial Condominiums
- O&M of parking facility with use of ICT Smart Parking Features
- Collection of parking fees

Even though the re-development is on public land, considering the value addition to the business, and anticipated increase in ridership, due to the improvements in infrastructure, an arrangement between the government (here, government is the land owner), transit operators of BRTS and railways, business owners, and developers maybe explored to redevelop the site as per the proposed plan for a comprehensive value realisation.

7) Transfer of development rights: One strategy that has assumed wide acceptance in recent years is the allotment to the land owner of transferable development rights equivalent to the extent of land foregone for infrastructure development. This involves separating the permissible development potential of the land from the land itself and allowing its transfer. Accordingly, the land loser is compensated with additional FAR of an equivalent extent which can be used by him or transferred to a third party for use elsewhere in another zone (receiving zone) provided the infrastructure in the receiving zone supports the transferred FAR. A TDR certificate is issued to the land owner and this certificate can be redeemed elsewhere. This opens up the possibility of a market where such development rights can be bought and sold.

Globally, TDR is mostly used as an instrument to manage development in historic areas and conservation zones. An example of this is the use of TDR in New York City for preservation of heritage landmark buildings, open spaces or cultural resources that might result in a revenue loss to the associated

Currently Kochi city has a very low share of land use under open spaces (0.34%). In its ABD, Kochi proposes to reconstitute densely packed retail area, along 1.5 km of arterial road, presently under low rise development to free land for development of green pockets. FAR up to 6 is made accessible in the site using TDR for a nominal fee. Urban Land Policy and Action for Kerala, and the Kerala Town and Country Planning Act 2016 gives the necessary policy and legal support for use of TDR for urban compaction.

landowner. **In a TOD as well, it is most suitable to use TDR as an instrument to limit or redirect development to create open/ public spaces, rather than intensify development.**

Summarising, as illustrated above, **development based value capture** plays a role not only as a financing instrument but also as an urban planning and public policy instrument (Suzuki, 2015).

- By changing land use regulations, such as allocating higher FARs and converting land from single to mixed use, governments can increase densities in station areas for diverse uses while increasing revenues.
- By using proceeds for investments in station areas (such as parks, street lights, bike lanes, and pedestrian sidewalks), governments, transit agencies, developers, and communities can jointly develop efficient, attractive, and safe public places, further increasing property values.
- By providing bonus FARs or other regulatory incentives, governments can require developers to include social facilities and affordable housing in exchange for the additional rights.

TOD itself has an objective to enable sound urban planning. Therefore, development-based capture, which also is a planning instrument, is a very effective method to make TOD investments financially viable.

Finance based instruments

Finance based instruments capture value increments by levying additional fee or tax on the beneficiaries of the TOD. These fee or tax is mostly levied on direct beneficiaries and the amount of taxation often varies with the type of beneficiary- resident, business, owner, tenant etc. **An important**

characteristic of finance based value capture is that it can be a sustainable financial source because their collection does not deplete like finite development based resources.

1) Land and property value tax: Land and property value tax is an annual tax on the increment of land or property value. It is the most common form of a finance based value capture. A land tax encourages high density development that will enhance land use efficiency. It also helps to stabilise prices and discourages speculative investment. Since urban land supply is relatively inelastic in the short run, taxing land will not alter the amount available for development but will take away the unearned land rent retained by landowners (Suzuki, 2015). Hence, many practitioners and analysts view land tax as a fiscal instrument that creates the least amount of distortions to the market. Business Rate Supplement (BRS) in London is an example for property value tax. It is collected at a rate of 2% on all existing commercial buildings that rent for more than GBP 55,000 per year in Greater London area. BRS is expected to provide 25% of the total project cost of Crossrail project in London (Salon, 2014). Some cities such as Pennsylvania have allowed a ‘split-rate tax’, which allows land to be taxed more heavily than building. In theory, moving to a split-rate tax reduces the deadweight losses associated with distortionary taxation and generates additional economic activity with activity in otherwise vacant land (Cohen, 2005). A more direct form of discouraging inactivity in land is by use of a vacant land tax.

The absence of transparent price discovery in land and property markets, poor state of land titles and administrative inefficiencies in taxation

The chosen ABD in Hubli-Dharwad is on either side of the BRT corridor. The BRT corridor connects the Hubli Railway station to the airport, and the abutting land hosts mostly commercial and high end residential uses. Hubli-Dharwad BRTS Company is implementing the BRTS in the twin cities, with an estimated cost of INR 690 crore. In the ABD, land or property tax is a suitable VCF tool because the entire ABD falls within the catchment of the BRTS corridor, thereby, all the land and property owners in the ABD are benefitting from the public investment. The state of Karnataka has a value capture policy in place, and existing legislations in the state permit levy of an urban land tax. Karnataka is also one of the most proactive states in electronic land management. This will facilitate better conditions of land titles and price discovery in Hubli-Dharwad, which are essential factors in employing land or property value tax.

makes implementation of land and property value tax difficult in developing countries.

2) Capital gain tax: Capital gain tax is a tax on the profit realised on the sale of land or property that has incurred a value addition due to the public investment. Capital gains tax is employed in Australia under the Income Tax Assessment Act 1997. In Australia, for eligible properties, 50% of the difference between the initial purchase and ultimate sale price is taxed at the seller's marginal tax rate. This tax but contributes to general federal revenue, and is not project specific (SGS Economois and Planning, 2016). For capturing value in a TOD using capital gains tax, it is necessary to administer the tax at a local level. Further, the lack of adequate information about market prices mean that capital gains are grossly under estimated. Even assuming credible price information availability, this taxation suffer from the problem of cascading of taxes. Apart from the physical investments made in the property, which is deductible, the land owner typically would have paid various forms of taxes like development fee, impact fee etc, which are generally not deducted from the capital gains tax calculation.

Though partial in its application, capital gains tax is a value capture mechanism as it increases with value. As new infrastructure increases the value of adjacent land and properties, the extra revenue generated through the capital gains tax as a result could be used as funding for infrastructure projects (SGS Economois and Planning, 2016).

Capital gains tax is applied at the point of sale. New Town Kolkata can explore opportunities to capture value through a capital gains tax, because sale of land and property in the currently greenfield site is most likely to generate large profits to the seller following identification of the site for development under the SCP. It is but required to first create a legislative framework that allows application of such a tax.

3) Betterment levy and special assessment: Betterment levy is a one-time upfront charge on the land value gain caused by public infrastructure investment. It captures a part or whole of the increase in property values that are the result of a new infrastructure project coming up in an area to pay for the cost of providing the infrastructure. Great Britain for a period imposed a betterment levy equal to 40 percent of the land-value gain attributable to

TNagar, the chosen ABD in Chennai is the commercial hub of the city. It is considered the biggest shopping district in India by revenue and is one of the highest commercial rent seeking areas in Chennai (Economic Times, 2013). The SCPs address the issues of congestion with improvement in streetscape and pedestrianisation of certain roads. Since the entire area is mostly businesses, the interventions are likely to increase business opportunities and therefore rental values in the site. The budget of ABD project in Chennai is the third lowest (INR 878) in 21 Smart Cities studied in this publication. Considering the small budget and the anticipated increment in the already high rental values, a one-time charge such as betterment levy is suitable to capture the value increments enjoyed by the rent seeking beneficiaries.

public investment (George E Peterson, 2009). This is also exercised in the United States using special assessment district, whereby annual levies are imposed on the district. In the WAVE streetcar system in downtown Fort Lauderdale, adjoining property owners paid one time charge to raise the funding gap required after the central, state and transportation grants. This is different from the tax increment financing (TIF) in its frequency of incidence.

Betterment levy poses a similar problem to capital gains tax because of the increment in value of land not being reflected in government attributed rates (ready reckoner or circle rates). Secondly it is difficult to attribute specific gains in the land value to investments in infrastructure.

4) Tax increment financing: Tax increment financing (TIF) is one of the most popular value capture mechanism in many developed countries, especially the United States. It uses higher taxation or increase in absolute value of tax revenues to fund infrastructure, through enabling governments to raise bond finance against the future revenue generated within a designated zone as a result of the infrastructure investment (SGS Economois and Planning, 2016). This allows for funds to be available at the construction stage with a bond issuance, repaid by the additional tax revenue flowing from the development of the surrounding area. Once a TIF district is established, taxes collected at the local level are ring fenced for a definite period of time. **The revenue base for TIF is limited, as it is typically applied to specific locations near a transportation improvement. The implicit tax rate is thus likely higher than for more conventional forms of public finance, though this should be weighed against the consideration that those subject to the charge are also receiving special benefit** (Micheal Iacono, 2009).

The ABD proposed in Indore is the rejuvenation of the core city area popular for its built heritage and commercial activity. SCP proposes to retrofit the ABD which has dense commercial developments. This area is directly connected via Metro, and BRTS. The area is a very old development with deteriorating infrastructure. Compared to the case of Chennai, illustrated in betterment levy, the proposal is massive (INR 4469 crore) in Indore. Indore is also availing a loan of INR 2003 crore under debt financing for the ABD. TIF over betterment levy suits Indore because of the large capital investment. Also, a part of ABD with the most intense commercial development is proposed to be pedestrianised to offer convenient and better shopping experience to the customers. The assessment of the ABD for value of taxation under TIF should consider the value increment experienced by the business owners in the pedestrianised zone additionally.

New York City uses a form of TIF, called Business Improvement District (BID), to deliver infrastructure and other services in designated areas through PPPs by the levy of a special additional tax on commercial property owners. By 2012, there were 67 BIDs spread across New York's five boroughs investing \$100 million annually. The biggest BID in the United States, the Times Square Alliance reported \$11 million in assessment revenue and \$18 million in total revenues in 2014.

5) Impact fee: Impact fees are levied, apart from the development charges, on new constructions in an area where a large new public investment has been announced. **The fee is calculated based on the total cost of the project investment proposed and the development potential within the influence area. Therefore, impact fee is unique for each project area and would require a project wise notification.** They differ from the usual development charges, as they are generally used to finance specific large new infrastructure projects, and not basic civic utility services. They are levied to recover at least a share of the investment made. It is collected when the landowner applies for new construction permission and varies depending on the location, the land use, and height. An example of impact fee is the levy on new developments within the 1 km wide Growth Corridor on both sides of the 162 km Outer Ring Road (ORR) around Hyderabad. The impact fees were higher for the part of the corridor within the ORR and for commercial uses, and increases with building height.

Summarising, some **finance based instruments** lack a clear link between

In Bhopal, INR 2565 crore is proposed to be invested in the ABD for developing land and public utilities, trunk infrastructure and affordable housing. If ABD is considered as a large public investment, in Bhopal, since the entire ABD is being redeveloped with high quality infrastructure, an impact fee maybe collected from the private developers building within ABD to recover the project costs. Levy of an impact fee is supported in Bhopal by the Madhya Pradesh Nagar Tatha Gram Nivesh Niyam 1975 (urban and rural investment act) and Madhya Pradesh Bhumi Vikas Niyam 1985 (development control regulations).

benefits and costs. For example, instruments such as land and property taxation are not necessarily tied to investment in infrastructure for specific neighbourhoods where the taxes are collected. Also, due to absence of transparent price discovery mechanisms, land and property tax and even capital gains tax are often underestimated. Instruments such as betterment levies and TIF overcome this weakness and create a stronger cost-benefit link by defining more explicitly where revenues will be applied. **An important advantage of finance based value capture is that it provides local government with direct finances for developing specific public infrastructure or utilities that are not usually undertaken by private sector.**

The table summarise the most suitable cities illustrated, among the 21 TOD cities studied, for each of the instruments discussed. Other cities proposing or looking forward to similar projects can also attempt to use these instruments for similar scenarios.

Selection and Phasing of VCF instruments in a TOD

There are a range of instruments available to city managers for value capture for TOD. These instruments differ in their method of taxation (tax, charges or land dedication), frequency of incidence (one time v/s recurring) and the subject of the incidence (residents, landowners, businesses). In a TOD, after a strategic decision of value capture is made, the selection of instrument for capturing value varies from location of incidence and time of incidence. Generally, most finance based value capture schemes are applied throughout the neighbourhood whereas development based schemes are more prevalent and effective in and around the station or along the transit corridor.

Sl. No.	VCF instrument	City	Scenario
1	Land sale or lease	Ranchi	Greenfield development on government land
2	Joint development	Thane	MoU signed between Central Railway and ULB
3	Premium and incentive FAR	Ahmedabad	Master plan and development control regulations recognise premium FAR in TOZs
4	Air rights	Chandigarh	Proposed underground metro station on government land; Draft TOD policy propose higher FAR in locations close to transit
5	Land readjustment/ pooling	Nagpur	Proposed TPS on private land to develop intense zone around metro station. Bombay Town and Country Planning Act 1915 and 1954 of Maharashtra support TPS in the state
6	Urban redevelopment scheme	Ujjain	Proposed redevelopment on sparsely developed government land to develop multi-modal transit hub with mixed use developments that will attract businesses
7	Transfer of development right	Kochi	Proposed redevelopment on private development with accessible premium FSI of 6 to create open spaces
8	Land and property value tax	Hubli-Dharwad	Entire ABD benefitting from public investment in BRTS in area with higher land value (compared to other parts in city)
9	Capital gains tax	New Town Kolkata	Proposal of greenfield ABD on private land is likely to result selling price of land and property to be high compared to the price at which the land or property was purchased
10	Betterment levy	Chennai	Increase in business due to proposed interventions is likely to increase rental value; ABD improvement is proposed in a small budget, therefore, it may be recovered as a one-time charge from the rent seeking property owners
11	Tax increment financing	Indore	Improvements to deteriorating infrastructure in old city area is likely to improve business opportunities; ABD is proposed with a large budget under debt financing
12	Impact fee	Bhopal	Proposal to redevelop entire ABD with high quality infrastructure; intensity of private development will create impact on the infrastructure

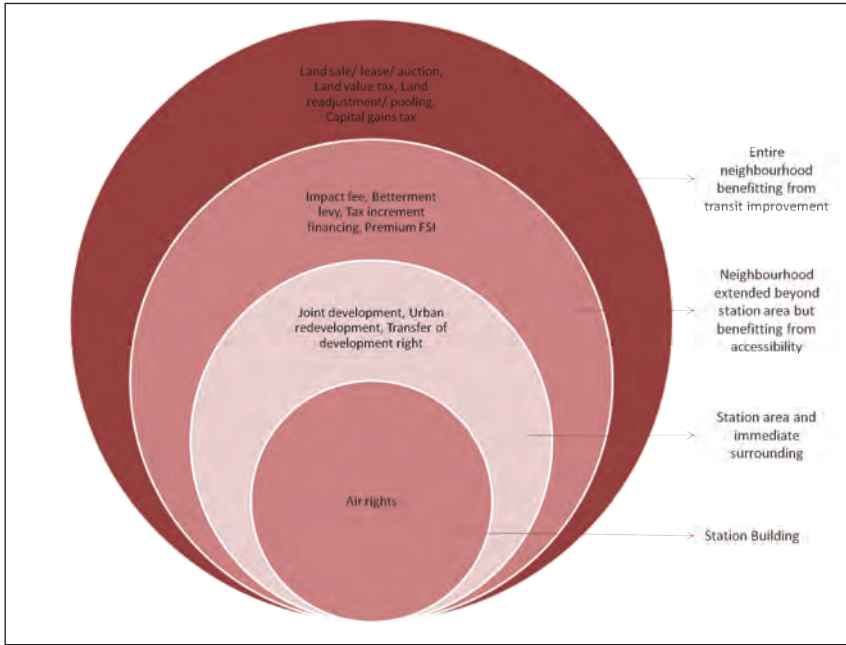


Figure 9: Illustration of VCF instruments suitable in and around transit station

Adopting one category of value capture does not preclude adopting another. Taking into account the different objectives, the regulatory and administrative feasibility, and the political acceptability of public infrastructure finance, these different instruments should be applied jointly in ways that suit the conditions of cities. A sustainable financial plan should tap into multiple options during multiple stages of a TOD for efficiency and tapping the best of all opportunities. Most finance-based instruments can be applied throughout the life-cycle of the project whereas development based instruments have relevance only after the project has been approved.

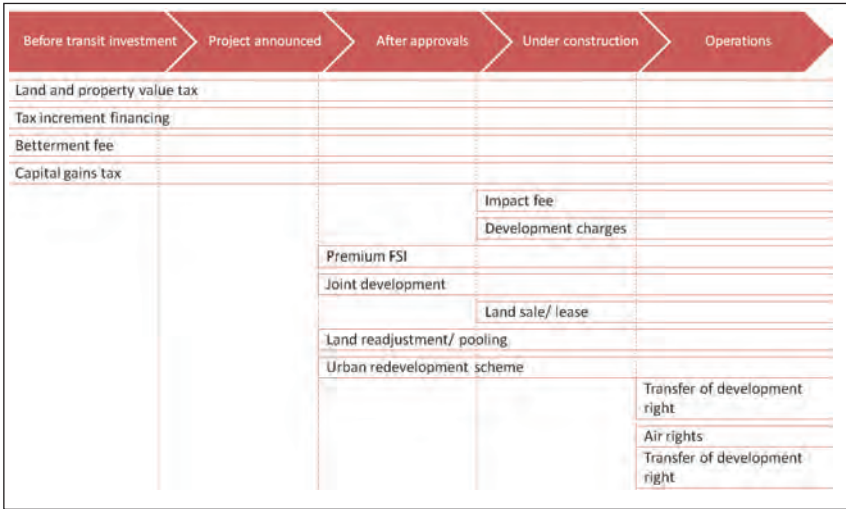


Figure 10: Phasing of VCF instruments in a TOD

Public Private Participation in TOD

In its different forms, VCF is a mechanism that can combine wider public goals with private objectives under the form of urban development funds, PPPs and joint ventures (Medda, 2011). VCF in TOD is new as far as Indian cities are concerned; but India has a long history of implementing Public Private Partnership (PPP) projects in road construction and development of affordable housing. In the Smart City plans of Lighthouse Cities³, 99 projects (out of 636 projects⁴) are identified by the cities to be funded using PPP mechanism. Maximum number of PPP projects in these cities are in transportation (20 projects; INR 758 crore), which majorly include development of multi-modal hubs, bus shelters and multi-level car parking, and the largest funding using PPP is in housing (6 projects; INR 3274 crore) for development of affordable housing and slum rehabilitation.

As cities begin to explore VCF for TOD, the first steps would be to assess the existing private sector engagement in TOD. Towards this, Royal Institute of Chartered Surveyors (RICS) School of Built Environment in partnership with Foreign and Commonwealth Office (FCO) and NIUA organised a *'Dialogue on Public Private Partnerships for Transit Oriented Development in Indian Smart Cities'*; The objective of this workshop was to promote stakeholder dialogue between private sector, government agencies and Smart Cities for implementation of successful TODs. The following section gives learning from the workshop on the existing scenario of private sector participation in TOD, and suggests next steps of city governments to engage private sector meaningfully and efficiently.

³Lighthouse cities are the first 20 Smart Cities announced

⁴Some of these projects can be further broken down into smaller components with financial allocation



Figure 11: Benefits of VCF in TOD to Various Stakeholders (CBRE, 2015)

Private Sector Participation in TOD

Real estate developers are important in TOD to organise the financial, physical and human resources needed to build projects around transit stations. Beyond their role in implementation, developers also often have a strong hand in the planning and design of a TOD. The streetcar suburbs as early as in the 1900s in the United States demonstrate examples of private real estate interests

responding to market demand by planning, designing and building projects around train stations (Transportation Research Board, 2004).

Business and operating models of TOD projects involve exploring options of value capture and capitalising on real estate potential, as demonstrated in the earlier chapters. VCF entail closer interactions between public and private sector. There are numerous opportunities where the private sector can engage in a TOD, ranging from private sector participating in the planning of TOD, joint development and even management of assets.

In cities such as Hong Kong SAR and Tokyo, it is seen that joint development between government and private has played the biggest role in capturing value in a TOD. TODs are attractive sites where retail, business, office and housing would prefer to locate. This demand for property ideally should interest private developers to invest, but in TODs in cities of India private sector have not shown the anticipated interest. This inhibition from the part of private sector is leading to financial stress on government to meet the demand for real estate development, laying constraints to make similar developments elsewhere.

What prevents private developer participation in a TOD?

Studies suggest that several reasons may disinterest private developers in TOD. Some of the most critical of these are (Steuteville, 2013) (Andrew Gunthrie, 2015)-

- Uncertainty of transit expansion and slow implementation of urban transit projects,
- High costs of transit accessible-sites and
- Complex regulatory hurdles for TOD than for traditional auto-oriented design.

The engagement organised by RICS School of Built Environment with private developers brought out more reasons for the inertia of private sector to participate in TOD. The learnings from the workshop regarding participation of private sector in TODs are-

1. Speculation associated with TOD often leads to misinterpretation of markets,

making TOD risky for the private developer. In the current practice of PPP, a sharing of project risk between public and private sector is absent.

2. Obtaining clearances is one of the most time consuming and tedious tasks for development. Under a joint development or PPP, matters such as clearances, in which governments hands are not tied need to be facilitated for faster development.
3. Most Indian PPP models in practise are not flexible based on market dynamics. They do not permit renegotiations, surrender and quick arbitrations, thus leading to redundant partnerships.
4. Developers are entrepreneurs who work on the principle of taking up risks to avail rewards. Cap on profits in locations with high incremental value such as TODs makes investments less attractive.
5. Corruption in all tiers of government discourages joint development between public and private.
6. There is a need for emergence of strong, regulatory bodies that will boost the confidence of the investors and make the sector transparent.

Way forward for private developer participation

Developer interest in TOD stems from market demand. While market demand is the overriding factor determining developer investments in TOD, many outside the control of developers, can also have a bearing in the decision to develop. Cervero studied 13 factors (Traspotation Research Board, 2004), applicable in US, thought to influence the willingness of a developer to go forward with a TOD project. These were rated in the order of importance. Factors that have significant importance are supportive land-use designations, potential rent premium for superior location/access, and proximity to transit station. Availability of tax incentive, extent of real-estate investment activity in the area or near site, mixed use development and public sector participation emerged as moderately important factors, while location in emerging real-estate market, unsubordinated ground lease with public agency, brownfield issues, parking below standard for product type, limited development experience with proposed product type, and locals as majority of tenants locals was designated least importance (Traspotation Research Board, 2004).

In the engagement with private developers organised by RICS, public sector support by sharing of risk and ease of doing business emerged

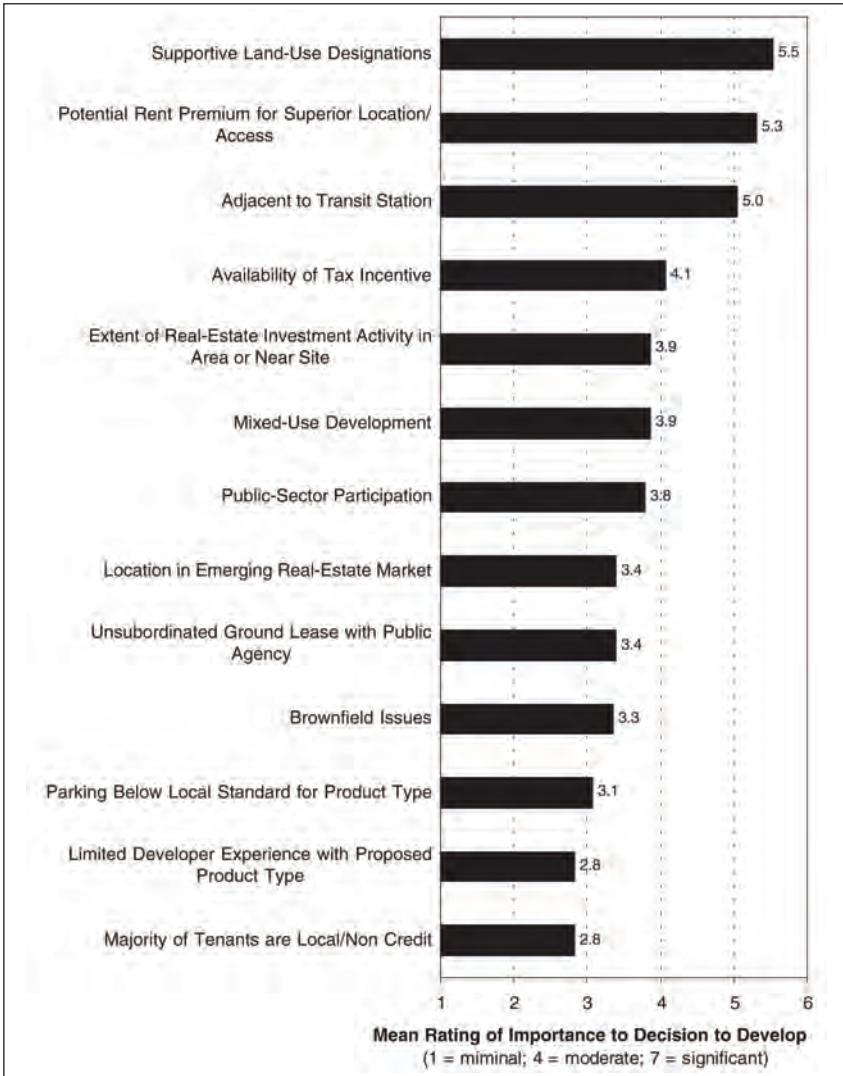


Figure 12: Importance of Factor in Willingness to Develop (Traspotation Research Board, 2004)

as the most critical factors for private sector participation in TOD. Supportive land-use designations and building control regulations were not highlighted as very important issues by most of the developers who participated, even though some developers prioritised it. This is contrary to the case in Unites States, where suitable supportive norms for TOD were the most significant factor influencing the decision to develop. This maybe because in the case of United States ease of doing business is in-built in the

operational procedures of VCF. Also, in most of the Indian PPPs, the public sector functions both as a party in agreement and the arbitrator in the case of disputes. This disturbs the smooth functioning of PPP, as the disputes between the public and private parties are always resolved to favour the public sector. **Specifically in applying VCF in TOD, it has to be accepted that the value increment is a result of both public and private investments and actions, and each entity is entitled to some portion of this value.**

VCF in TOD is still in its nascent stage in India. Successful TODs worldwide illustrates that a TOD is not an outcome of public investment alone, but also of investment of private developers, to create a new form of urbanism around transit stations. It is therefore necessary to inform developers about the opportunities and benefits of TOD, as well as be open to negotiate with developers to arrive at common consensus between public and private. Cervero identified various conditions necessary in the US (Traspotation Research Board, 2004) to engage and sustain private sector participation in TOD. Many of these are also relevant to Indian cities. TOD being an expensive and complex project involving multiple institutions and stakeholders requires, at the minimum, the following interventions to make it attractive for private developers in India.

- 1) **Shared long term vision:** The enterprise of creating a TOD over an extended period of time is subject to so many distractions and interruptions that the ability to stay focused on a shared vision is pivotal to success. Hence private developers should be made part of the visioning process to have the common consensus and vision for the development.
- 2) **Strong political leadership:** A political champion of a TOD proposal is critical to marshalling resources, building a coalition, gathering support from public and resolving disputes that invariably crop up along the way.
- 3) **Institutional coordination:** Implementing TOD requires multiple government agencies of varying nature to work together in a coordinated manner. This means that a private developer engaging in a TOD works with not one, but multiple government agencies. It is therefore necessary that processes are streamlined for ease of doing business.
- 4) **Permissive regulatory environments and enabling legislations:** Without clearly articulated legislation and supporting institutions that enables transit agencies and other local actors to assemble and bank land

and enter into joint development arrangements, TOD either gets ignored or ends up on the back-burner, lost in the pressing day-to-day needs of running a transit organisation.

- 5) **Bold policies that push conventional boundaries:** TOD is not a standard development. Standards for mortgage qualifications, building designs, and parking supplies need to reflect these market realities to give flexibility to developers within the larger TOD vision. These can include policies such as transit-accessible housing affordable by design rather than subsidy.

PPPs are defined broadly as any contractual arrangement under which the public and private sectors work together to achieve an outcome. It is suggested that PPPs can expand the pool of funding available to a government if they involve user charges or beneficiary charges (Clayton UTZ, 2016); but transit projects are generally difficult to deliver as user-pays PPPs because significant benefits from the transit investment accrue to people other than the users of the system. In these resource constraint times, to capitalise upon the value created by TODs, it is necessary that city governments look beyond traditional PPPs and explore VCF instruments. **The first step towards this is to enable efficient private sector participation and create an ecosystem where private sector wants to engage in TOD.** This may be achieved by resolving the existing issues in PPP. The sharing of responsibility and profit between public and private will allow governments to launch new projects and replicate success, without copious financial resources.

Conclusions

TOD-which creates articulated densities around transit hubs by locating amenities, employment, retail, and housing in close proximity-is one of the most effective ways to achieve sustainable urban development. Land and properties in such well-designed areas achieve an increment in value due to the accessibility and agglomeration benefits. **Collaborative efforts of city governments, transit agencies, developers, landowners, and communities can capitalise on this value increment to raise finances for sustainability.** In this joint value-creating exercise, city governments and transit agencies can contribute significantly to value creation either through supportive land-use designations, transit investment and infrastructure projects that improve quality of life.

The use of VCF as a financing tool in TOD has not been widely seen in India; but, the environment in the country is ripe for innovative approaches such as VCF. **With many investments proposed in transit and TOD, such as metro systems, RRTS, railway station redevelopment and TODs in Smart Cities, VCF is an opportunity as well as a necessity to raise finances for these investments.** There are several instruments used world-wide for capturing value from TODs. The application of these varies largely with local contexts and presence of an enabling environment. Each value capture mechanism has its own benefits, risks and implications for project funding and the economy more broadly. **These mechanisms should be developed and applied on a case-by-case basis according to their effectiveness and delivery risk in each circumstance, not just their capacity to raise revenue.**

Global success stories demonstrate that a policy, legislative and institutional framework supported the implementation of VCF. Such a framework is developing in Indian cities too. **In 2016, Ministry of Urban Development proposed a National Value Capture Policy Framework. This Framework will work as a guide to state and city governments to assist in assessing the scope of resource mobilisation, identifying the area of influence of**

proposed projects and optimising resource mobilisation. VCF is a new avenue in TOD in Indian cities, but, city governments have engaged with private sector through PPPs for a long time now in transportation and housing projects. **VCF is a way to optimise local authorities' resource management by creating a new kind of innovative PPP.** It gives the local authorities the opportunity to launch new projects, even without financial supplies (Carter).

Financing Guide for Smart Cities lists between 25 to 30 tools available for urban infrastructure financing. **VCF is only one among these, but requires greater attention in TOD, since TODs create a value increment inherently, which can be captured.** The intention of the section on VCF in this publication was to discuss the opportunity and need of VCF in TOD in Indian Smart Cities. **Indian Smart Cities need to proactively pursue and implement a basket of VCF instruments based on their local context to capture the monetary benefits of their intended TOD investments.**

Bibliography

A. Kemp, V. M. (2013). Value Capture Mechanisms to Fund Transport Infrastructure. Sydney: NZ Transport Agency research.

Andrew Gunthrie, Y. F. (2015). Developers perspective on transit oriented development. Minneapolis.

Arati Siddharth Petkar, S. S. (2013). A Study of Transit Oriented Development in Indian Context. Proceedings of International Conference on Advances in Civil Engineering.

ARUP. (2015). Capturing Value: London 2050 briefing paper. London: Future of London.

Australian Government. (2016). Using Value capture to Help Deliver Major Land Transport Infrastructure: Roles for the Australian Government. Australia: Department of Infrastructure and Regional Development, Australian Government.

Carter, A. (n.d.). Value Capture Finance: A Public and Private Actors Tool to Fund the Cities. Paris: FMDV- Supporting local authorities to access funding.

CBRE. (2015). Transit Oriented Development: The convergence of factors transforming cities. Australia: CBRE.

CIDCO Smart City Lab. (2016, April-June). Value Capture from Infrastructure Investments for Smart Cities. CIDCO@SMART Newsletter.

Clayton UTZ. (2016). Value Capture and Other Innovative Rail Infrastructure Procurement. Clayton UTZ.

Council of Development Finance Agencies. (2009). Advanced Tax Increment Finance Reference Guide. Columbus: Council of Development Finance Agencies.

Economic Times. (2013, February 07). India's biggest shopping district Theagaraya Nagar in Chennai to get a retail makeover. Economic Times.

Fahmy, M. (2015, October 17). Exploring Value Capture: Funding GCC Transport Infrastructure Projects. Retrieved February 5, 2017, from <https://www.linkedin.com/pulse/exploring-value-capture-funding-gcc-transport-projects-mahmoud-fahmy>

Fallerio, D. S. (2015). The Economic and Socio-Cultural Balance Sheet of Tourism in Goa: Future Options. International Journal of Scientific and Research Publications.

George E Peterson, O. K. (2009). Unlocking Land Values to Finance Urban Infrastructure. Washington: The World Bank.

George E. Peterson, O. K. (2010). Integrating Land Financial into Substantial Fiscal Management. Washington DC: World Bank.

Gihring, T. A. (2009). The Value Capture Approach to Stimulating Transit Oriented Development and Financing Transit Station Area Improvements. Washington: Victoria Transport Policy Institute.

Gregory K. Ingram, Y. H. (2011). Value Capture and Land Policies. Lincoln School of Land Policy.

Greifer, N. (2005). An Elected Officials Guide to Tax Increment Financing. Chicago: Government Finance Officers Association.

High Powered Expert Committee (HPEC), MoUD. (2011). Report on Indian Infrastructure and Services. New Delhi: Ministry of Urban Development.

- Horoaki Suzuki, J. M.-H. (2015). *Financing Transit-Oriented Development with Land Values*. Washington: World Bank Group.
- Huxley, J. (2009). *Value Capture Finance: Making urban development pay its way*. London: Urban Land Institute.
- Infrastructure Australia. (2016). *Capturing Value: Advice on making value capture work in Australia*. Infrastructure Australia.
- Infrastructure Victoria. (2016). *Value capture- options, challenges and opprtunities for Victoria*. Infrastructure Victoria.
- Isher Judge Ahluwalia, P. K. (n.d.). *Unlocking Land Value for Financing Urban Development in India*.
- James Robert McIntosh, P. N. (n.d.). *Framework for Land Value Capture from the investment in Transit in Car Dependent Cities*. Western Australia: Curtin University Sustainability Policy (CUSP) Institute.
- Jeffrey P. Cohen, C. C. (2005). *An Introduction to Two-Rate Taxation of Land and Buildings*. St. Louis: Federal Reserve Bank of St. Louis Review.
- Justin Jacobson, A. F. (2008). *Seven Americal TODs: Good paractices for Urban Design in TOD projects*. *Journal of Transport and Land Use*.
- Langley, J. (2013). *Value Capture Roadmap*. AECOM.
- Mass Transit Railway Corporation. (2016). *Business Overview of Mass Transit Railway Corporation*. Hong Kong: Mass Transit Railway Corporation.
- McIntosh, J. (2014). *Tax Increment Financing Framework for Integrated Transit and Urban Renewal Projects in Car Dependent Cities*. Western Australlia: Curtin University Sustainability Policy Institute.
- Medda, M. e. (2011). *Land value capture as a funding source for urban investment: The Warsaw metro systemm*. Warsaw: Ernst & Young.
- Ministry of Urban Development. (2016). *Transit Oriented Development Guidance Document*. New Delhi: Ministry of Urban Development.
- Ministry of Urban Development. (2016). *Value Capture Policy Framework (Proposed)*. New Delhi: Ministry of Urban Development.
- National Institute of Urban Affairs. (2017). *A Study of Value Capture Finance Draft*. New Delhi: National Institute of Urban Affairs.
- National Institute of Urban Affairs. (2016). *Transit Oriented Development Framework for Indian Smart Cities: Global Review of Transportation-Land-Use Integration*. New Delhi: National Insitute of Urban Affairs.
- Pedestrian Observations. (2013). *Comparative Subway Construction Costs, Revised*. Retrieved from <https://pedestrianobservations.wordpress.com/2013/06/03/comparative-subway-construction-costs-revised/>
- Rybeck, R. (2004). *Using Value Capture to Finance Infrastructure and Encourage Compact Development*. *Public Works Management & Policy*, 249-260.
- S. B. Friedman & Company. (2011). *Transportation Value Capture Analysis for the CMAP Region*. Chicago: Chicago Metropolitan Agency for Planning.
- Sahil Gandhi, V. P. (2016). *Land Based Financing in Metropolitan Cities in India*. *Urbanisation*.
- Salon, D. (2014). *Value Capture Opportunities for Urban Public Transport Finance*. London.
- Satya Sai Kumar Jillella, A. M. (2015). *Participatory Sustainability Approach to Value Capture-Based Urban Rail Financing in India through Deliberated Stakeholder Engagement*. *Sustainability*.

SGS Economics and Planning. (2016). Technical Paper on Value Capture. Infrastructure Australia.

Steuteville, R. (2013, August 2013). Overcoming barriers to transit-oriented development. Retrieved February 3, 2017, from Better Cities & Towns: <http://bettercities.net/article/overcoming-barriers-transit-oriented-development-20652>

Transit Leadership Summit. (2012). Transit Leadership Summit Summary. New York: Regional Plan Association.

Transportation Research Board. (2004). Transit-Oriented Development in the United States- Experiences, Challenges and Prospects. Washington: Transportation Research Board.

ULI Europe. (n.d.). Value Capture Finance: Making urban development pay its way. ULI Europe.

Value Capture for Public Transportation Projects:. (2015). Value Capture for Public Transportation Projects: Examples. American Public Transportation Association.

Walters, L. C. (n.d.). Land Value Capture in Policy and Practice.

WRI. (2016, February 18). Financing TOD in Indian Cities- Challenges and Opportunities. Retrieved February 5, 2017, from WRI: <http://wri-india.org/events/financing-tod-indian-cities-%E2%80%93-challenges-and-opportunities>

Form- Based Codes – A Catalyst for Successful Transit Oriented Development

What are Form-Based Codes?

Form-based codes (FBCs) are a new urban design tool, generally adopted into municipal law, that emphasise on the physical character or form of development based on a community's vision. It is a place-based, proactive method of regulation that provides a blueprint for future growth of an area by documenting the desired form of development and prescribing building form requirements to achieve the desired community vision. FBCs are intentional and they are directed to guide future growth that is particular and desirable to each community (Daniel G. Parolek K. P., 2008)

FBCs focus on how development relates to the context of the surrounding community, especially the relationships between buildings and the street, pedestrians and vehicles, and public and private spaces. As a tool FBCs have gained popularity in recent years because they not only addresses the design of the public realm by regulating the overall building form but also lay importance on streetscape design and individual building character in defining public spaces.

'Form-based codes foster predictable built results and a high-quality public realm by using physical form (rather than separation of uses) as the organising principle for the code. Form-based codes address the relationship between building facades and the public realm, the form and mass of buildings in relation to one another, and the scale and types of streets and blocks (Form-Based Codes Institute).'

FBCs are not guidelines which are advisory in nature but a prescriptive regulation, adopted into a city, town, or municipality to regulate the development of land for the purpose of achieving a specific urban form that relates to the streetscape and adjacent uses. The quality of development outcomes depends on the quality and objectives of the community plan that a code implements and is usually based on time-tested forms of urbanism.

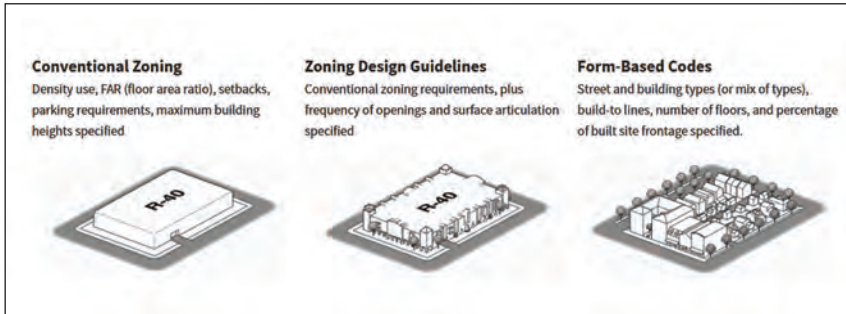


Figure 13: Difference between conventional zoning and Form-based codes (Formbasedcodes.org)

FBCs are easier to use than conventional zoning codes because they provide information in a more concise way with emphasis on illustrations over text.

Given that FBCs are written to tailor future development to achieve a community's vision, they offer a community the means to create the physical development it aspires and provides developers a clearer understanding of what the community seeks, fostering greater acceptance. Due to this emphasis on design, FBCs usually provide greater predictability about the visual aspects of development, including how well it fits in with the existing context of the community (Chicago Metropolitan Agency for Planning, 2013).

Difference Between FBCs and Conventional Zoning

FBCs represents a paradigm shift in the way that the built environment is regulated (City of Cincinnati, 2017). They are an innovative alternative to conventional zoning regulation because unlike conventional codes which regulate development through setback requirements, floor area, limits on building heights, density etc., FBCs emphasises site design and building form as it relates to streetscape and adjacent uses to create an appealing place.

Conventional zoning uses minimum setbacks to create building envelopes; however, the ultimate location and form of the building within the envelope is unpredictable. FBCs take a more holistic approach by considering the building form as it relates to the streetscape (City of Cincinnati, 2017). The codes reflect the importance of the relationship between various uses and building types to one-another, as part of an integral neighbourhood and overall community (City of Cincinnati, 2017).

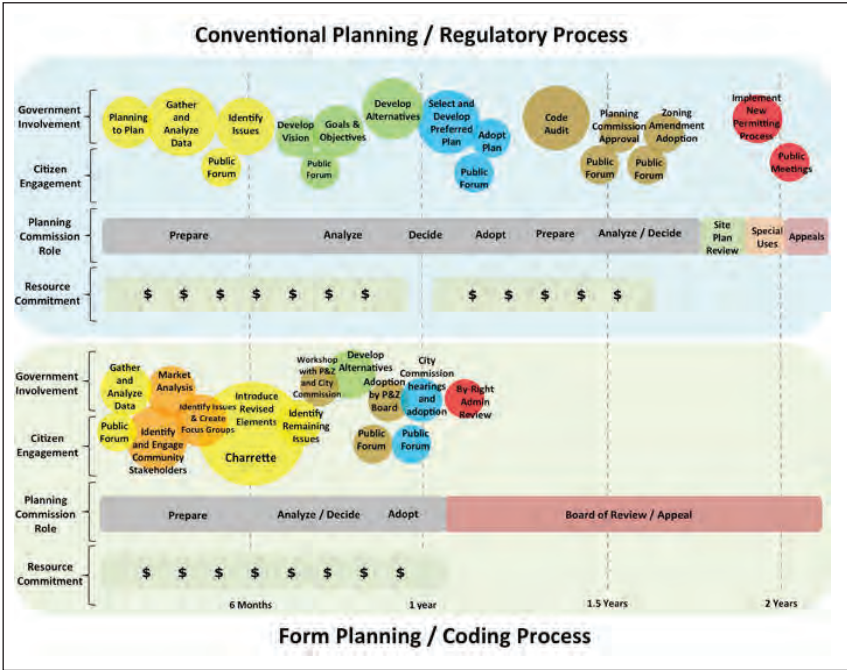


Figure 14: Difference between conventional zoning and form based codes planning process (formbasedcodes.org/blog/why-fbcs/the-benefits-of-form-based-planning/)

Relevance of Form-Based Codes for TOD

Orienting development to transit requires more than just placing development near transit. Transit-oriented urbanism works best when it is fine-grained, consists of different types and scales of development that include buildings and public spaces and is created incrementally over time by different developers (Benfield, 2012).

Given that a successful TOD requires both high densities and a broad mix of uses within an attractive built environment, a form-based approach is recommended as the most effective tool to promote TOD (Treasure Coast Regional Planning Council, 2012). As FBCs address the arrangement and design of streets and blocks; the placement, scale, and mass of buildings; the quantity and location of parking; and land use, including density and intensity they have gained popularity, over recent years, as an alternative way of regulating land-use that can also be directed at transit-supportive objectives.

There are several benefits of FBCs for transit-supportive places:

- They usually lead to a more predictable built environment, and they allow mixed-use walkable projects to be built by right (whereas this must be explicitly allowed in conventional zoning, it is inherently permitted in FBCs).
- FBCs promote compatible infill, allowing more opportunity for individual land owners to develop property, resulting in more diversity in architecture and style.
- The public process to develop the code is often more understandable for the public, since the discussion revolves around what a development should look like, rather than abstract concepts such as FAR or land-use. This encourages greater public participation.
- There is heightened emphasis on the design character of building facades

and ground floors, which are critical for transit districts due to the high level of pedestrian activity (Los Angeles County Metropolitan Transportation Authority).

FBCs are being increasingly seen as an indispensable tool, ideally suited to the task of creating TODs as they provide the zoning framework for articulating the urban form in a way that facilitates TOD principles such as creating compact, walkable, mixed use urban environments that are economically viable, connected, physically active, job friendly and accessible through affordable and convenient transportation.

FBCs once applied, can also promote predictability in land markets and protection of value over time (Kim, May 2010). FBCs typically deliver a strategy for improvement which is calibrated to the local economic opportunities that the market can deliver. They are operated in the interest of bolstering the fiscal health of the community (Daniel G. Parolek K. P., 2008). FBCs can be adopted into law as part of a project master plan process or an area-wide specific plan.

FBCs can be applied at various scales of design such as regional level, city wide, or infill and greenfield development at neighbourhood level such as TOD corridors and station areas. The following section briefly discuss two specific types- Transit Oriented Form Based Codes and Station Area Form Based Codes.

Transit Oriented Form-Based Codes provide detailed regulations for development and land uses within the specific development area and describe how the regulations will be used as part of a city's development review process. They also helps provide for the integration of new development and rehabilitation of existing structures with new and existing public transit infrastructure.

In addition TOD based FBCs focus on:

1. A mixture of development and open spaces that are situated in proximity to commerce, work places, residences, and civic buildings within walking distance of transit and one another.

2. Streets that meet the needs of multiple transit modes including public transit, pedestrians, cyclists and automobiles.
3. Development that is transit supportive- the utilisation of effective and predictable transit encourages surrounding development, which, in turn, supports transit. The basic principle being that convenient access to transit can be a key attraction that fosters mixed-use development, and the increased density in station areas in turn supports transit.
4. New and remodeled buildings collectively contributing to define the pedestrian- oriented space of public streets to support and strengthen the existing character of the neighbourhoods in which they are located.
5. The understanding of the area's existing urban fabric, focused on an interconnected grid street pattern and a mixture of architectural styles and uses, in order to support the successful expansion of public transit and compatible development (Moule and Polyzoides, 2010).

The Station Area Form-Based Code is a document that regulates land development by setting careful and coherent controls on building form—while employing more flexible parameters relative to building use and density. This greater emphasis on physical form is intended to produce attractive public realm (good streets, neighbourhoods and parks) complemented with a healthy mix of uses. The station area FBC uses simple and clear graphic prescriptions and parameters for future building height, sitting, use, and facades, as well as designs for public spaces, including streets, sidewalks and the public square.

As transit oriented FBCs address both the long term and short term interests of areas they have gained popularity as they not only create a special 'sense of place', but also permit flexible regulation of allowable uses within buildings enabling a fast response to changing economic patterns and spaces needs. Given that FBCs support phased, incremental design actions, they become ultimately supportive of both private and community interests. They maximise the performance of private projects, while building up a stable and permanent public realm (Benfield, 2012).

The key to achieving successful FBCs for TOD is based on a community's vision that emerges out of a participatory planning process. Creation of a FBC involves the following steps (Chicago Metropolitan Agency for Planning, 2013).

Step 1. Scoping: defining the area of the community to be addressed through the FBC and the extent to which the FBC interact with existing regulations

Step 2. Assessing the existing conditions: documenting and analysing the community's existing urban form at different scales, providing a basis for the creation of the FBC

Step 3. Visioning and creating regulations: defining the community's vision for its future and determining the specific regulations and procedures of the FBC.

The process for developing a FBC is based on intensive visioning and community engagement, followed by the drafting of a code to guide development. The planning process brings together various stakeholders such as city officials, developers, general public, planners and architects. The idea of the engagement process is not only to bring the various stakeholders together but also to respond to the real and diverse needs, seek a balance between private interests and the public good and ultimately move towards rapid implementation of the TOD project. The FBC outlines specific parameters for future building height, siting, use, and facades, as well as designs for public spaces, including streets, sidewalks and the public square.

Elements of Form-Based Codes

FBCs can be applied at a variety of scales such as downtowns, commercial corridors, TODs, areas that have been targeted for economic revitalisation or are the location of planned infrastructure improvements, existing neighbourhoods where infill development is intended to preserve or extend existing patterns of physical character, undeveloped greenfield areas adjacent to a municipality that are intended to accommodate growth etc. As defined by FBCI, the basic elements of FBCs include the following (North Central Texas Council of Governments Transportation Department):

1. Regulating Plan
2. Building Form Standards
3. Public Space/Street Standards
4. Architectural Standards
5. Administration
6. Definitions

In addition optional elements can include, Annotations, Landscape Standards and Environmental Resource Standards. Annotations include text and illustrations explaining the intentions of specific code provisions. Landscape standards include regulations controlling landscape design and plant materials on private property as they impact public spaces. Environment Resource Standards include regulations controlling issues such as storm water drainage and infiltration, development on slopes, tree protection, solar access, etc.

1. Regulating Plan

Regulating plan is a plan or map of the regulated area designating the locations where different building form standards apply based on clear community intentions regarding the physical character of the area being code.

The implementation of TOD in any community requires a thorough understanding of the community features that contribute to transit-supportive and transit-ready conditions. A typical TOD station area includes roughly a 800 m radius around a transit station, which generally represents a comfortable range of access to the transit station by pedestrians and cyclists. However, each specific TOD area is defined by the local community based on its unique characteristics and the geography of the area. In addition to these quantifiable measures, successful TOD also requires desirable urban conditions, typically measured qualitatively, within station areas to improve the pedestrian environment, quality of place, and economic sustainability (Treasure Coast Regional Planning Council, December 2012).

These analyses can act as tools to help identify common elements and themes for inclusion in the model comprehensive plan and land development regulations to support future public transportation systems. To draft a regulating plan, these steps need to be followed:

Step 1: Identify the area or district for intervention

The TOD station area is defined as an area extending a 5-15 minutes walking radius in all directions from a transit station. Within the TOD station area, the ‘Transit Core’ is roughly 1-2 km area surrounding a transit station, which also includes the area that is within roughly a five-minute walk (the pedestrian shed) from the transit station. The ‘Transit Neighbourhood’ includes the further 2-5 km from the transit station.

For a FBC to work efficiently, defining a set boundary for the area is key; as that will further help formulate criteria for building heights, mix of uses and all other key building form standards and architectural standards for the defined area.

Step 2: Data Collection

With defining the areas for the development of FBCs for TOD zone, it becomes critical to start collecting all the relevant data for the concerned area. A small data library for the community involved in preparation of the FBC is key. It should include an aerial imagery, parcel boundaries, property information,

employment establishments, roadway networks, and both existing and proposed transit routes.

In addition to the electronic data collection, qualitative data is also critical and needs to be collected in each community through field research, review of local regulatory documents, and interviews with local government and agency staff knowledgeable of local conditions. In addition to representatives from various departments within each local government, other interviewees should include representatives from local transit agencies, other local agencies such as community redevelopment agencies, metropolitan planning organisations and regional planning councils.

Step 3: Developing comprehensive maps of the selected area

Based on the available and collected data, development of comprehensive maps for the area becomes the next step. The basic list of maps includes:

- i. *Existing Conditions Map*
- ii. *Street Network & Block Structure Map/ Figure Ground Map*
- iii. *Existing Land Use Map*
- iv. *Proposed/ Future Land Use Map*
- v. *Residential Units Map (existing)/ Residential Density Map (existing)/ Non-Residential Intensity Map (existing)*
- vi. *Employment Intensity Map (existing)*
- vii. *Transit Service/Infrastructure Map*
- viii. *Development Patterns, Mobility & Interconnectivity*

i. Existing Conditions Map

This map provides a general overview of the existing conditions in the station area using aerial imagery. The map can help depict basic development patterns, areas of intensity, and unique geographic features such as water bodies, major infrastructure, large campuses, and other significant uses in the station area. The transportation network can be easily identified on the aerial imagery to help differentiate buildable blocks and parcels from rights-of-way.



Figure 15: Existing conditions map for an identified area in Florida TOD (Florida TOD guidebook)



Figure 16: Block structure map for an identified area in Florida TOD (Florida TOD guidebook)

ii. Street Network & Block Structure Map/Figure Ground Map

This map provides a graphic depiction of the street and building block network within the station area to help evaluate station accessibility, mobility, and interconnectivity. To assess transit-supportive conditions, this map enables evaluation of block size, spacing, grid density, and general interconnectivity throughout the TOD station area, through a two-dimensional illustration of an urban space showing the relationship between built and unbuilt space. It helps organise the primary components of an urban landscape – plots of land, streets, constructed spaces, and open spaces – into a black-and-white diagram of solid spaces and voids. The figure ground map helps indicate how public space is perceived, especially at the pedestrian scale, as well as ‘gaps’ in the pedestrian experience.

iii. Existing Land Use Map

The map of existing land uses indicates existing conditions around the subject transit stations. This map is critical as all the different area by-laws and the land use codes are intended to be consolidated into this map to enable the

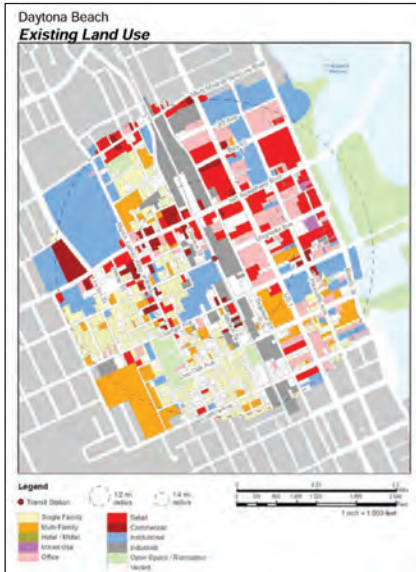


Figure 17: Existing land use map for Florida TOD (Florida TOD guidebook)

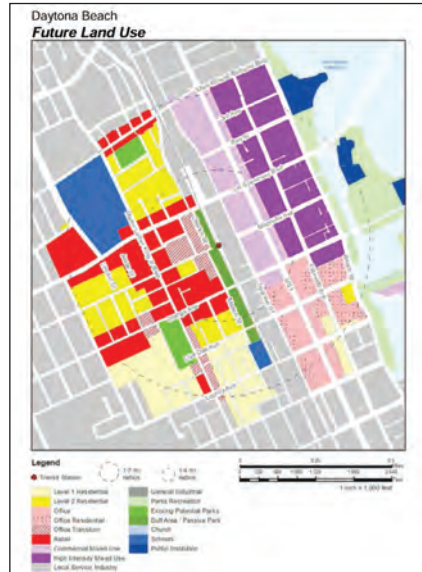


Figure 18: Future/proposed land use map with proposed FBC for an identified area in Florida TOD (Florida TOD guidebook)

predominant land use types within the TOD station area. The categories can vary from residential, hotels, mixed use, office, retail, commercial, institutional, industrial, open space/recreation and vacant land. In addition, locally significant uses, as identified by field research and interviews with local staff representatives can also be identified on each map as well. This map helps indicate the percentage of each of the existing land uses under defined categories with the TOD station area. The analysis also helps provide insight to key development conditions (e.g., percentage of open space, concentrations of institutional use in 'government centres', amount of vacant land).

iv. Proposed/ Future Land Use Map

While the existing land use map is helpful to understand current conditions, the future land use map helps indicate the anticipated mix and intensity of land use as established by a local government in its comprehensive plan. Used in combination with the existing land use map, the future land use map enables a comparison of current conditions to future (planned) conditions as well as progress towards the station area targets for mix of use as established

in the TOD framework. These maps also help identify the need for regulatory mechanisms at the local level (e.g., policies or regulations to require or prevent a particular land use, incentives to promote a missing land use).

v. Residential Units Map (existing)/ Residential Density Map (existing)/ Non-Residential Intensity Map (existing)

Ridership generated from a TOD station area relies heavily on the presence of residential units within walking distance from a transit station. The desired number of residential units increases from neighbourhood centres, to community centres, to regional centres while the amount of land allocated to residential uses decreases, reflecting the higher density residential development anticipated in more intense TOD station areas. These variations correlate to the notion of diversity along a transit corridor. While a central transit station in a regional centre may provide a high concentration of jobs, entertainment venues, and institutional activities, an edge transit station, classified as a neighbourhood centre, can provide a higher percentage of residential uses, which balances the corridor.

The density at which residential units occur is another key measure of transit-supportive quality. Higher residential densities are critical for TOD station areas to achieve the station area targets for residential units as infill development and new development occur. A TOD framework establishes gross residential density targets for the station area for portions anticipated to be residential.

An FBC prepared for TOD generally also includes various targets intensity, such as:

- (1) Targets for Floor/Area Ratio, or FAR, which is a ratio of total developed area within a building to property size, and
- (2) Minimums for building height (which can apply to residential, non-residential, and mixed-use properties).

Non-residential intensity can also be measured by the square footage of total development on a property with non-residential use, which can also be useful in concert with market analyses. All of the various measures of non-residential

intensity help indicate the location of significant employment centres and retail destinations, a characteristic that is further reinforced by job counts.

vi. Employment Intensity Map (existing)

Transit ridership is highly correlated to concentrations of employment, and the intensity of jobs within a TOD station area. Employment intensity is one measure of transit-supportive characteristic. The data enables development of a point layer that displays the general location of employment establishments and the number of employees within each establishment. Data tables can be generated for the suggested areas to indicate the total number of jobs as well as the number of jobs/unit area.

vii. Transit Service/Infrastructure Map

Successful TOD requires the provision of convenient and reliable transit service to influence land use patterns, regulations, and investment. The location of transit routes, and their interconnectivity with transit stations, provides significant influence on land development patterns. As defined in the Florida TOD Framework,

'A transit station, as distinct from a bus stop, is defined as a station serving a premium type or types of transit (e.g., commuter rail, light rail, or bus rapid transit) or a station that functions as a local bus hub. A local bus hub or transfer station is considered to be a premium transit station if it serves a minimum of three fixed routes operating with headways of 21-30 minutes or less. Transit stations also serve as intermodal hubs, typically connecting two or more modes of transportation' (Treasure Coast Regional Planning Council, 2012).'

viii. Development Patterns, Mobility & Interconnectivity

A challenge to the creation of transit-supportive environments over time is the interconnectivity and mobility of its station areas. A range of development patterns need to be considered for the following place type conditions: Urban Infill, Suburban Retrofit, and Greenfield

Urban Infill: Communities with an urban infill pattern tend to reflect a high-degree of street interconnectivity with smaller block sizes, resulting in extensive mobility for all users (motorised and non-motorised). Hence, policies that protect existing street networks may be necessary to protect this important transit-supportive quality.

Suburban Retrofit: Communities where station areas, tend to prioritised automobiles as the primary mode of transportation, often compromise on mobility by other modes. These environments tend to be characterised by wide thoroughfares connecting large, often single-use, blocks resulting in sparse street grids offering less interconnectivity. Further, transportation planning in these environments often overlooks pedestrian activity resulting in longer routes and poorly defined pedestrian spaces.

Greenfield: ‘Greenfield’ conditions are undeveloped lands, adjoining or surrounded by development. Greenfield areas present significant opportunity to establish transit-supportive conditions. To ensure that greenfield areas are developed in a TOD-supportive manner, it is necessary to have focused outreach to large land owners to develop consensus regarding future transit corridors, transit nodes, and a commitment to land uses that will maximise this infrastructure. This input will help facilitate the adoption of policies and regulations to establish the desired future development pattern over time.

Step 4: GIS Analysis

The analysis of a community’s progress towards implementing TOD should have its key focus upon its relationship between land use and transportation. Utilising geographic information system (GIS) data, a series of geospatial analyses can be conducted to provide insight into the various expected TOD measures established by the framework. These analyses can further help understand the proposed changes at both the macro (station area) and micro (site level) conditions of the study area.

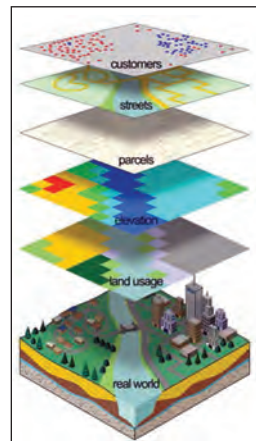


Figure 19: GIS enables the visualisation, analysis and interpretation of various factors (www.westfield.ma.edu)



(Ben MacLeod)

GIS enables the visualisation, analysis, and interpretation of various factors related to potential successful TODs, further allowing the integration of spatially-referenced parcel boundaries (at the site level) with site-specific information, such as property use, and building square footage. To further refine analyses using GIS, data from other sources can be integrated. The geospatial capabilities of GIS allow an analysis to study a range of conditions from the site level (an individual parcel) to the station area level (2-3 km radius around a transit station).

2. Building Form Standards

Building Form Standards are regulations controlling the configuration, features, and functions of buildings that define and shape the public realm.

Building form standards typically include a broad set of requirements for the configuration, features, and functions of buildings that define and shape the public realm, such as building placement and form, plot sizes, parking, as well as allowed land uses, encroachments, and frontage and building types. These standards are mapped to streets on a regulating plan. The types of buildings that make for a lively main street are different from the types of buildings that make for a quiet residential street. Building form standards can control such things as: the alignment of buildings to the street; how close buildings are to sidewalks; the visibility and accessibility of building entrances; minimum and maximum building height; minimum or maximum plot frontage coverage; minimum and maximum amounts of window coverage on facades; physical elements required on buildings (e.g. entrance platforms, porches, stairways, types of permitted balconies); and the general usage of floors (e.g. office, residential, or retail). These regulations are less concerned with architectural styles and designs than in how buildings shape public spaces. These standards help local government to regulate the quality of architecture, for example, to preserve the character of a neighbourhood. Some of the basic elements of building form standards are-

- i. Building envelope
- ii. Allowed building types
- iii. Building functions- in accordance with regulating plan
- iv. Building form
- v. Building setbacks/ building placement line
- vi. Facade composition
- vii. Parking
- viii. Encroachments
- ix. Building signage
- x. Open space- type/use/function (within the built form)

i. Building envelope

The goal of the building envelope standards is the creation of a vital and

coherent public realm through the creation of good street space. The intent of these form standards is to shape the street-space—the specific physical and functional character. The form and function controls on building frontages work together to frame the street-space while allowing the buildings greater latitude behind their facades. The building envelope standards aim for the minimum level of control necessary to meet this goal. It sets the basic parameters for governing building construction, including the building envelope (in three dimensions) and standards required or permitted functional elements, such as fenestration (windows and doors), entrance platforms, entry stairways, balconies, front porches, and boundary walls (if any). They establish the rules for development and redevelopment on private lots, unless otherwise indicated on the regulating plan. The regulating plan identifies the building envelope standard for all private building sites within the jurisdiction of FBC (Department of Energy, United States Government, 2011).

T6 Core (T6C)
1703-2.120 T6 Core (T6C)

A. Intent	<ul style="list-style-type: none"> Attached Medium-to-Large Footprint Simple Wall Plane along Street Building at ROW No Side Setbacks 4 Stories or More Diverse Mix of Frontages Primarily Shopfronts 	B. Sub-Zone(s)
<p>To reinforce and enhance the downtown city core and to enable it to evolve into a complete neighborhood that provides local and regional service, retail, entertainment, civic, and public uses, as well as a variety of urban housing choices. This zone can also be used around transit nodes. The following are generally appropriate form elements in this zone:</p>	<p>T6C-Open Zone (T6C-O)</p> <p>The open sub-zone provides the same building form but allows for a more diverse mix of uses.</p>	<p><i>General note: The drawing above is intended to provide a brief overview of this transect zone and is</i></p>

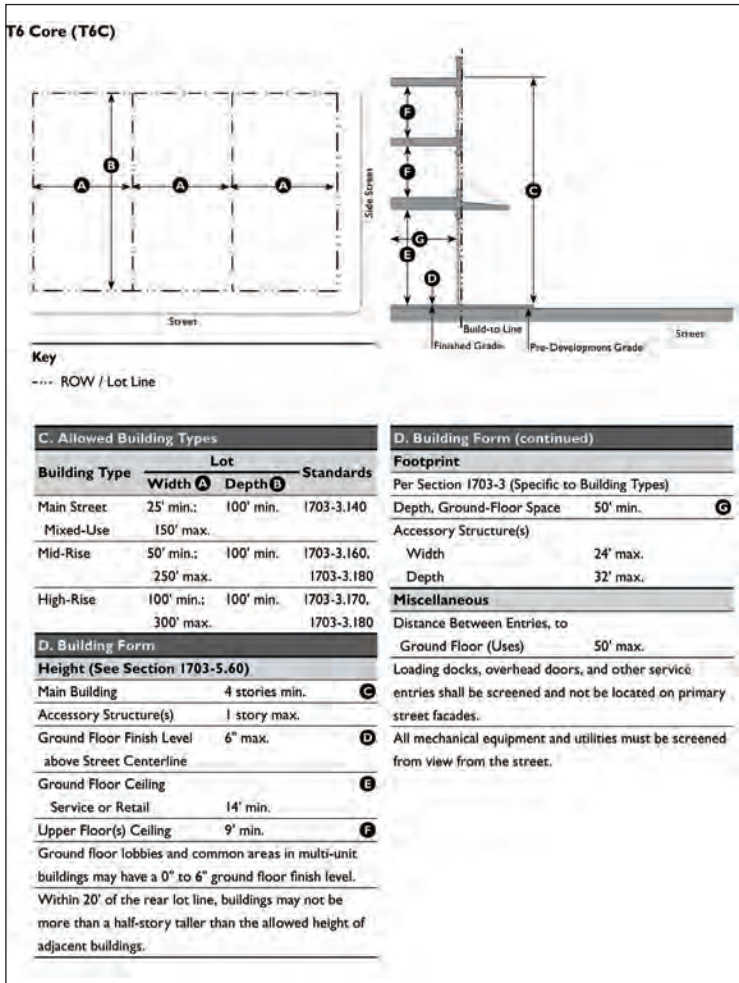




Figure 20: Building envelope codes for Cincinnati city (Cincinnati form based codes)

ii. Allowed building types

This particular section of the code works in coordination with the regulation plan. Allowing a set of building types helps formulate the desirable structure of the neighbourhood. The set building typology helps in organising informal development by setting norms to guide the development over time in a more structured manner. It further allows for an appropriate urban density for an area, allowing the growth to take place in a more organised manner.

Building Type		Transect Zones	
	Rowhouse/Townhouse. This building type is a small-to medium-sized typically attached structure that consists of 2-8 rowhouses placed side-by-side. In a feature unique to Cincinnati, this type may also occasionally be detached with minimal separations between the buildings. This type is typically located within medium-density neighborhoods or in a location that transitions from a primarily single-family neighborhood into a neighborhood main street. This type enables appropriately-scaled, well-designed higher densities and is important for providing a broad choice of housing types and promoting walkability.	T3E T3M T4N.MF T4N.SF T5M5 T5N.L5 T5N.S5 T5F T6C	
	Multi-plex Small. This building type is a medium structure that consists of 3-6 side-by-side and/or stacked dwelling units typically with one shared entry or individual entries along the front. This type has the appearance of a medium-sized family home and is appropriately scaled to fit sparingly within primarily single-family neighborhoods or into medium-density neighborhoods. This type enables appropriately-scaled, well-designed higher densities and is important for providing a broad choice of housing types and promoting walkability.	T3F T3M T4N.MF T4N.SF T5M5 T5N.L5 T5N.S5 T5F T6C	
	Multi-plex Large. This building type is a medium-to large-sized structure that consists of 7-18 side-by-side and/or stacked dwelling units, typically with one shared entry. This type is appropriately scaled to fit within medium-density neighborhoods or sparingly within large lot predominantly single-family neighborhoods. This type enables appropriately-scaled, well-designed higher densities and is important for providing a broad choice of housing types and promoting walkability.	T3E T3M T4N.MF T4N.SF T5M5 T5N.L5 T5N.S5 T5F T6C	

Key: T Allowed T Not Allowed

Figure 21: FBC for a residential building typologies in Cincinnati city (Cincinnati form based codes)

I. T&C Use Table		Use Type		Specific Use Subcategory		T&C	
Use Type	Specific Use Subcategory	C	U-P	C	U-P	C	U-P
Residential							
Dwelling		P ¹	P				
Home Occupation	1703-5.100.H	P ¹	P				
Home Office		UP ¹	P				
Retail							
General Retail, except with any of the following features:							
		P	P				
Alcoholic Beverage Sales		UP	UP				
Drive-Through Services	1703-5.100.F	—	—				
Floor Area over 10,000 sf		UP	UP				
Eating or Drinking Establishment, except with any of the following features:							
		P	P				
Alcoholic Beverage Sales		UP	UP				
Drive-Through Services	1703-5.100.F	—	—				
Floor Area over 10,000 sf		UP	UP				
Outdoor Entertainment	1703-5.100.I	P	MUP				
Services							
Animal Services, except with any of the following features:							
		P ¹	P				
Boarding		UP ¹	UP				
Automatic Teller Machine	1703-5.100.B	P	P				
Bank/Financial Services, except with the following features:							
			P	P			
Drive-Through Services	1703-5.100.D	—	—				
Day Care Center	1703-5.100.E	P	P				
Day Care Home: 1703-5.100.E							
			P	P			
Adult			UP	P			
Type A (7 - 12 Children)				P			
Type B (1 - 6 Children)				P			
Lodging:							
Inn			P ¹	P			
Hotel			P ¹	P			
Medical Services:							
Clinic			P ¹	P			
Doctor Office			P ¹	P			
Office: Professional			P ¹	P			
Personal Services			P	P			
Recreation, Education, Public Assembly							
Cultural Institution			P	P			
Meeting Facilities			P ¹	P			
Park, Open Space, Playground			P	P			
Public Safety Facility			P	P			
Recreational Facility:							
			P	P			
Indoor ≤ 1,000 sf			UP	UP			
Indoor > 1,000 sf					MUP ¹	MUP ¹	
Outdoor							
Religious Assembly							
			P	P			
School: Public or Private			P	P			
Studio: Art, Music, Dance			P	P			

Key:
 P Permitted Use
 MUP Minor Use Permit Required
 UP Use Permit Required
 — Use Not Allowed

End Notes
¹ Not allowed on the ground floor, except when located behind an allowed ground floor use.

Table Continues on Next Page →

Figure 22: FBC for building typologies for a specific area in Cincinnati city (Cincinnati form based codes)

iii. Building functions- in accordance with regulating plan

Building functions provide a more descriptive character to an urban area. An area can become a thriving urban space, through a comprehensive design of building functions and utilities. Especially in TODs, around station areas, building functions can help trigger and promote the local economies. Generally, building functions provide a variety of mixed use development choices, for a medium footprint, medium-density building types, which reinforce the walkable nature of neighbourhoods, support adjacent neighbourhoods through commercial and public transportation alternatives.



Figure 23: Building functions code for residential typology in Cincinnati city FBC (Cincinnati form based codes)

iv. Building form

The creation of transit and pedestrian-oriented development is dependent on three factors: density, diversity of uses, and design. FBCs place emphasis on the physical building form as it is an important factor in creating places that

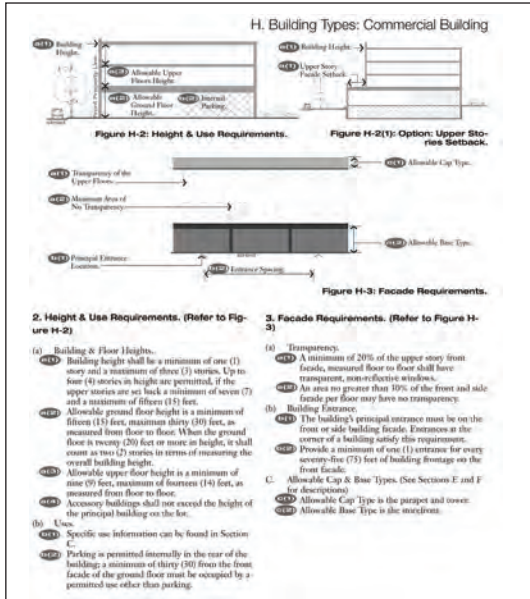


Figure 24: Building form standards for City of Bloomington, Illinois (City of Bloomington, Illinois FBC)

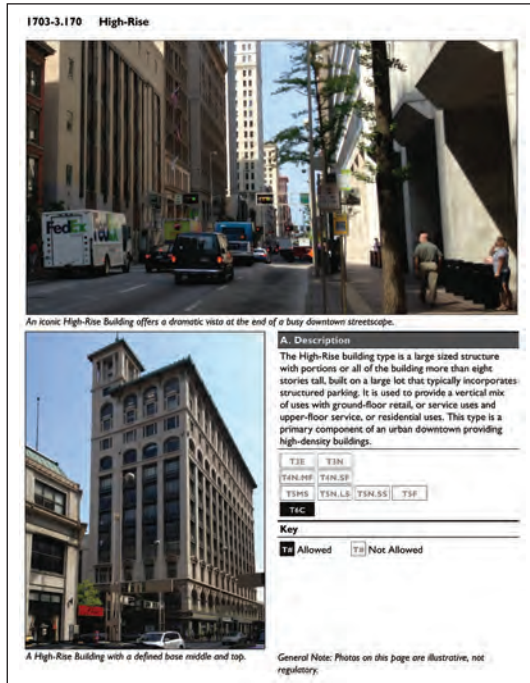


Figure 25: Building form standards for Cincinnati city (Cincinnati form based codes)

attract jobs and economic vitality while, density and uses can be expected to change over time as the area grows and matures. In area based developments, the building form helps form the visual image of the area and helps give the neighbourhood a distinct urban character.

v. Building setbacks/building placement line

The building setbacks are designated based on the regulating plan as an absolute line, incorporating an offset area (or depth) beyond that line (into the buildable area) allowing for jogs, facade articulation, etc., unless otherwise designated. Therefore, where the facade is placed within that zone, it is considered to be ‘built-to’. No part of any building may be located outside of the buildable area except overhanging eaves, awnings, storefronts, bay windows, stoops, steps, handicapped ramps or balconies. Building setbacks are critical as they help to organise the informal development and manage unauthorised use of urban space. **In Indian cities, predesigned building setbacks, can give proper, formal space to the smaller local economies (like space for vendors etc), while making sure that the pedestrian space and open space is not compromised.**

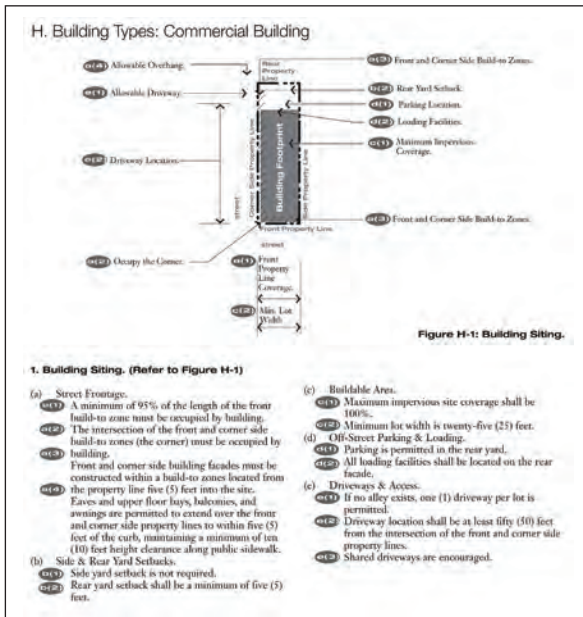


Figure 26: Building setback standards for City of Bloomington, Illinois (City of Bloomington, Illinois FBC)

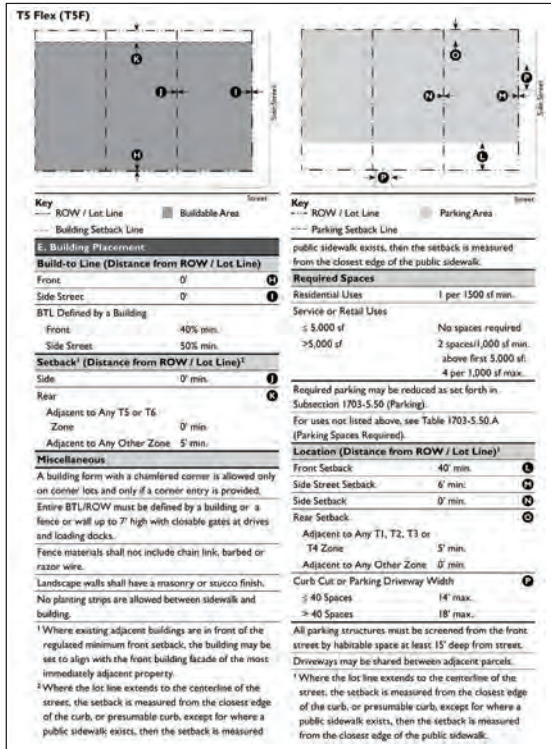


Figure 27: Building setback standards for Cincinnati city (Cincinnati form based codes)

vi. Facade composition

Facades present a complete and discrete visual composition of architectural articulation to maintain and promote a human scale interface both visually and physically of street-space. Facade composition is important to creating an appropriate “fit” between new construction and existing character of a neighbourhood or district. In conventional zoning, lack of comprehensive facade composition leads to individual frontages creating a visually disconnected composition. On the other hand, detailed codes for facades can help make the street compositions more proportionate. Further, facade detailing with materials and elements, such as windows, columns can give them a more distinct character. For example, the Cincinnati FBCs to support an interactive mix have promoted an average street frontage length for general urban and townhouse/small apartment, workshop, and detached frontages. These set codes have helped the city in developing interactive, walkable and vibrant streets.



Figure 28: Facade composition for a mixed use area in Cincinnati city FBC (Cincinnati form based codes)

Some key components of facade composition include:

- Location of openings/building entries and fenestrations/ windows in relation to building corners and one another
- Details and materials (articulation)
- Specifications for roof heights / cornice lines with adjacent buildings
- Massing elements that may be added to the main portion of a building, such as wings and bays.
- Other architectural elements that may define the local character of a community, such as arcades, eaves, cornices, porches and balconies.

vii. Parking

The most crucial dimension of station area planning is parking, which can help decide how commuters can have better last minute connectivity and access a station to either board transit, or to get to a destination after having travelled by transit. In a TOD, sufficient, conveniently placed and organised parking facilities for buses, taxi/autos or rickshaws, is crucial not just to the success of a station area development but also for improving last mile connectivity. While designing parking areas for station area plans pick up and drop off zones become key aspects to the easy and convenient circulation. Although one of the objectives of TOD is to encourage the use of public transit by reducing the parking requirement within the proposed development, the provision of parking facilities such as park and ride may be necessary in terminal stations of transit. All of these have to be accommodated in the design of the right of way surrounding a station.

Essential to the performance of a station as an urban place, the surrounding pedestrian convenience and safety over vehicular speed is key. Where parking is provided, it needs to be either properly screened or located at the rear of buildings. When parking is designed into garages or lots, it is preferred that retail or work-live liner buildings screen them and in case there is a provision for underground garages of mixed-use buildings, they should be accessed from the periphery.

Retail and commercial activities can transform stations into destination draws, useful beyond their purpose as embarkation or arrival points. The less

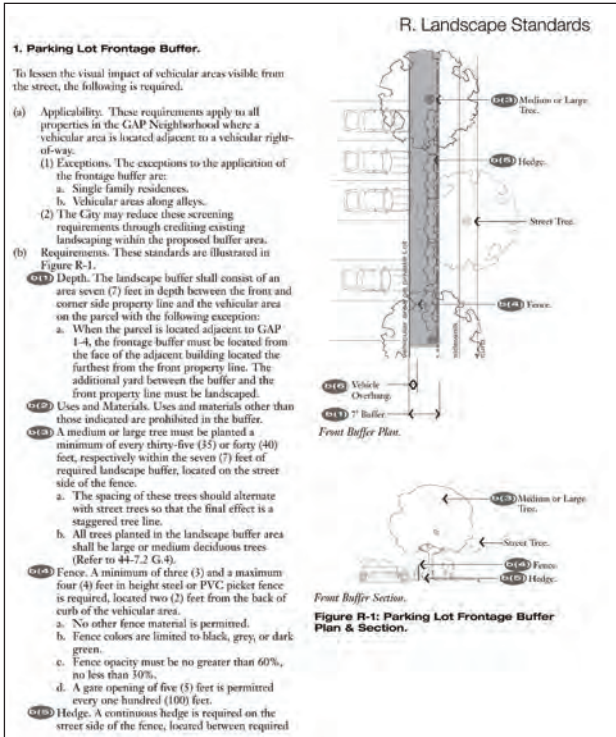


Figure 29: Typical parking space standards for City of Bloomington, Illinois (City of Bloomington, Illinois FBC)


intense the development around a station, the more proximate the location of parking should be, in part to enhance a sense of security for transit riders during off peak travel.

viii. Encroachments

Station areas, are usually encroached by informal sector (rickshaws, auto-rickshaws, vendors etc). Although they are the key to a thriving station area development, they also can lead to lack of pedestrian spaces and unauthorized encroachments. It is vital that there are formal spaces assigned for such local economies, as they are critical to the development of the neighbourhood and also the last mile connectivity around station areas. In commercial and retail areas, encroachment codes help in regulating the open spaces and corridor spaces for better circulation and movement.

T5 Main Street (TSMS)

1703-2.80 TS Main Street (TSMS)



A. Intent

To provide a focal point for neighborhoods that accommodates neighborhood serving retail, service, and residential uses in compact, walkable urban form. The following are generally appropriate form elements in this zone:

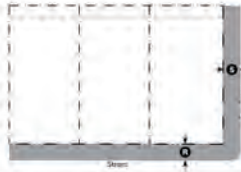
- Attached
- Small-to-Medium Footprint
- Simple Wall Plane along Street
- Building at the ROW
- Small to No Side Setbacks
- Up to 5 Stories
- Diverse Mix of Frontages

B. Sub-Zone(s)

TSMS-Open Zone (TSMS-O)

The open sub-zone provides the same building form but allows for a more diverse mix of uses on the ground floor, including residential, thus enabling the retail and service area to mature over time.

General note: The drawing above is intended to provide a brief overview of this transect zone and is illustrative only.



Key:
 --- ROW / Lot Line ■ Encroachment Area
 --- Building Setback Line

G. Encroachments

Encroachment Type	Front	Side St.
Shopfront: Awning ¹	14' max.	14' max.
Other	—	—
Architectural Features	3' max.	3' max.
Signage ²	A	A

Encroachments are not allowed across a side or rear lot line, within an Alley ROW or across a curb.

See Section 1703-4 (Specific to Frontage Types) for further refinement of the allowed encroachments for frontage elements.

¹May encroach into the street ROW to within 2" of the face of curb.

Key A = Allowed — = Not Allowed

H. Signage

Maximum Sign Area Allowed

Building Signs Max. 1 sf per linear foot of building frontage

Ground Signs Max. 1 sf per linear foot of lot frontage

Allowed Sign Types

Building Signs		
Awning	1 per awning	1703-5.80.K
Directory	1 per building	1703-5.80.L
Marquee	1 per building	1703-5.80.N
Projecting	1 per entry door	1703-5.80.P
Suspended	1 per entry door	1703-5.80.R
Wall ¹	1 per establishment	1703-5.80.S
Wall Mural	1 per building	1703-5.80.T
Window	1 per shopfront	1703-5.80.U
Ground Signs		
Landscape Wall	1 per building	1703-5.80.M
Sandwich Board	1 per establishment	1703-5.80.Q

See Subsection 1703-5.80 (Signs) for additional standards.

²Changeable copy signs allowed for public and semi-public uses.

Figure 30: Typical parking space standards for city of Cincinnati (Cincinnati form based codes)

ix. Building signage

Building signage is one of the basic aspects of urban street frontage. It is normally used in commercial and retail purposes. It is also used in neighbourhoods for directions and navigation purposes. Building signages should be designed such that they are aligned in commercial and retail areas, in order to maintain the urban character. They should not extend beyond the building such that they do not impact the pedestrians and commuters. They must be placed in the line of vision and fonts and local languages must be taken into consideration. They must be placed in areas where they are visible to the commuter and pedestrians from a distance and should be properly written in easy to read manner. To avoid vandalising of signages, they must be on certain given heights and locations.

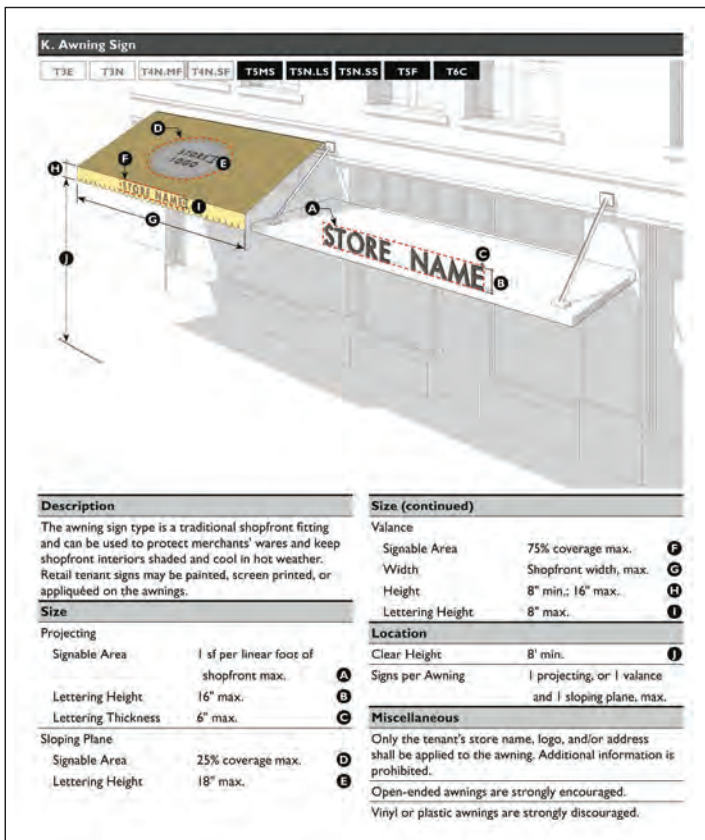


Figure 31: Sample building signage standards for city of Cincinnati (Sample building signage standards for city of Cincinnati)

x. Open space- type/use/function (within the built form)

As in station design, buildings and places around them should correspond to a transect of development intensity from dense to medium-dense urban areas. Open spaces, landscape and infrastructure should assume a particular character, depending on the transit zones and building typologies they are located within. Open spaces and pockets are vital to intense transit oriented developments as they help promote ease of movement and circulation. The character of open spaces, long corridors and open pockets is depended on the particular buildings around it, usual footfall in the area, and its proximity to the transit station. Open space and parks also help promoting easy movement and circulation in around transit stations and their design and proper functioning is key to the overall working of the transit station. However, if the stations are smaller and do not have heavy footfall the design of open spaces and functions round it needs to be different. While planning an open space, the surface treatment and paving materials must be designed to allow oxygen for tree roots and absorb storm water run-off.

Civic Space Type	Greenway	Green	Square
Illustration			
Description	A linear open space that may follow natural corridors providing unstructured and limited amounts of structured recreation.	An open space available for unstructured and limited amounts of structured recreation.	An open space available for civic purposes, unstructured and limited amounts of structured recreation.
Location and Size			
Location			
Service Area	Multiple neighborhoods	Neighborhood	Neighborhood
Size			
Minimum	8 acres	1 acre	1/2 acre
Maximum	-	15 acres	3 acres
Character			
Frontage	Independent or Building	Building	Building
Disposition of Elements	Natural or Informal	Informal	Formal
Typical Facilities	Passive and Active Recreation, Accessory Structure, Drinking Fountains, Community Facility < 5,000 gal, Paths and Trails	Passive and Active (unstructured or structured) Recreation, Accessory Structure, Drinking Fountains, Community Facility < 5,000 gal, Paths and Trails	Passive and Active (unstructured or structured) Recreation, Accessory Structure, Drinking Fountains, Community Facility < 5,000 gal, Paths and Trails
Key	Allowed	By Director	Not Allowed

Figure 32: FBC for open space type/functions for city of Cincinnati (Cincinnati form based codes)

3. Public Space/Street Standards:

Public Space/ Street Standards are specifications for the elements within the public realm (e.g., sidewalks, travel lanes, street trees, street furniture, etc.)

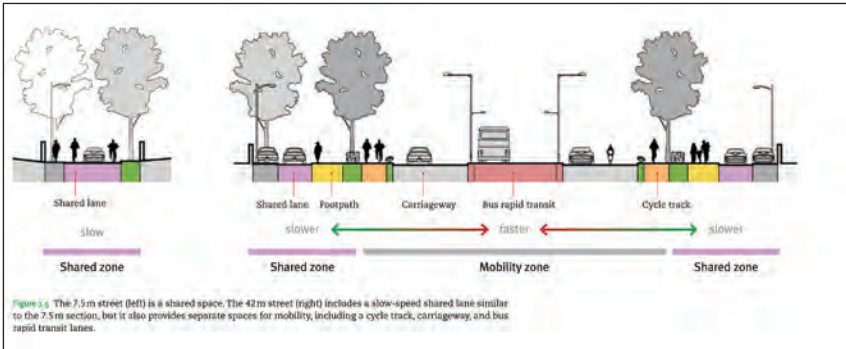
The public space and street standards is a valuable asset for any urban area; with the help of all residents and stakeholders, it can become a vital part of the area. The public space regulations are a resource for learning about the importance of an areas public space, the regulations that guide its use and form, and the rationale behind them. Municipal authorities or other pre-assigned stakeholders are required to maintain the public space property, so it is important that these codes are designed and are understood clearly. Some important elemnets of public space/street standarsa are:

- i. Sidewalks
- ii. Facade
- iii. Street trees
- iv. Tree cover
- v. Streetscape features -street furniture,signage, lighting, fences etc.

i. Sidewalks

Streets occupy approximately 20 percent of the total land area in a typical city, and they are the most important and ubiquitous form of public space (ITDP, EPC, December 2011). Design of streets under FBCs aims to facilitate the design of complete, safe, walkable, and liveable streets that accommodates different functions and provides space for all users. Through street and intersection codes one can get a sense of how the different elements come together for different types and sizes of streets (ITDP, EPC, December 2011). Streets should be planned and designed to follow the existing street system, and closed-end street patterns like cul-de-sacs should be prohibited if possible.

Sidewalks and safe and walkable streets are also play a key role in promoting walkable and vibrant neighbourhoods. Especially in making sure of last minute connectivity, walkable streets are crucial. Use of porous materials and proper tree cover and defined sidewalks can help promote commuters to use pedestrian pathways more instead of taking cars or auto-rickshaws.



Principles for street design

The design approach outlined in this manual is guided by the following principles:

 <p>Safety Streets must be safe for all users. This implies that every street needs to have a slow zone where pedestrians have priority. In smaller streets with a shared space format, the entire street becomes a slow zone for all users, including pedestrians, vendors, cycles, and cars.</p>	 <p>Mobility Larger roads can include a mobility zone for vehicle movement. This mobility zone—for private vehicles and public transport—is physically separated from the slow zone. The mobility zone may include a segregated cycle track if the speed differential between cyclists and motor vehicles is high. In addition, dedicated bus lanes can improve service quality for public transport users.</p>	 <p>Pedestrian accessibility All streets need to have continuous footpaths or safe shared space with minimal grade differences and adequate clear width for pedestrian through movement.</p>	 <p>Liveability Elements such as tree lines, landscaping, and furniture enhance a street's slow zone, creating space for relaxation, interaction, vending, and other activities.</p>	 <p>Sensitivity to local context Street design should factor in local street activities, patterns of pedestrian movement, and nearby land uses.</p>	 <p>Creative use of street space For example, the width occupied by a parking lane can become multi-functional if it includes occasional built-outs for street vending or street furniture.</p>
--	---	--	--	---	---

Figure 33: FBC for sidewalk standards and principles for better streets developed by ITDP for Indian streets (Better streets, better cities: A guide to street design in urban India)

ii. Facade

Frontages are the components of a building that provide an important transition and interface between the public realm (street and sidewalk) and the private realm (yard or building). The facade standards supplement the standards for each zone that the frontage types are allowed within. For each frontage type, a description, a statement of the type's intent and design standards must be provided. These standards should be designed with an intention to ensure development that reinforces the highly-valued existing character and scale of neighbourhoods and the area based development in alignment with the TOD guidelines.

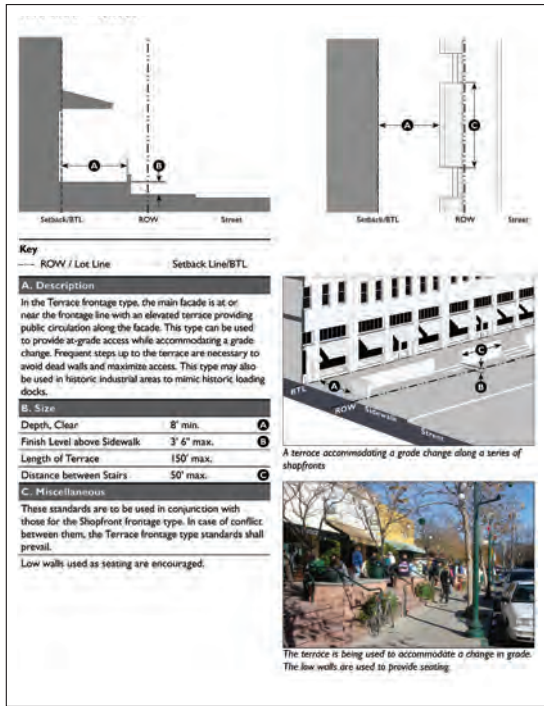


Figure 34: FBC for facades for city of Cincinnati (Cincinnati Form based codes)

iii. Street trees

Street trees are indispensable to the attractiveness, comfort and safety of street design. Street trees, along with the overall width of the street are a primary element in providing a sense of safe separation from traffic. Street trees increase the desirability of pedestrian activity, as well as enhance the status of the street and adjacent property values. Effective greening with appropriate street trees reduces the street temperature, making it comfortable for people to walk, cycle, or gather for social activities, even during summer afternoons and allow for sunlight in the winter. This is especially important in places with a humid climate or harsh daytime sun. Appropriate distance needs to be provided between trees to provide continuous shade, depending on the individual trees' canopy size and shape. Other aspects to consider with regard to street trees include the following:

1. Tree pits locations should be coordinated with the position of street lights.

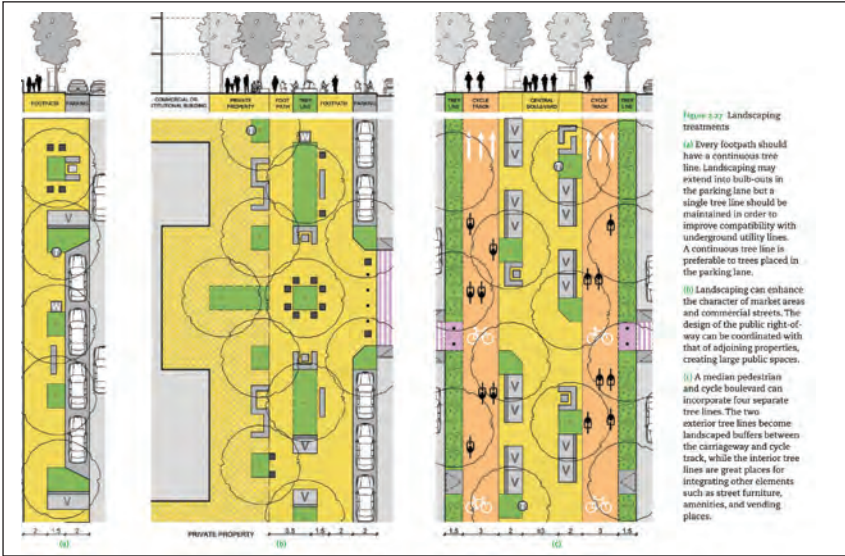


Figure 35: FBC for street tree plantations for better streets developed by ITDP for Indian street (Better streets, better cities: A guide to street design in urban India)

Tree Canopy Characteristics								
	Specific Name (Botanical Name)	Type	Size (height x spread)	Transect	Native	Planting Pattern	Produce / Color in Bloom	Special Instructions
LARGE SHADE TREES (> 50ft at maturity)	White Oak (Quercus alba)	Rounded	60' x 40'	T1	Yes	Regular Clustered	Nut / N/A	
	Pin Oak (Quercus palustris)	Rounded	60' x 40'	All	Yes	Allee Regular Clustered	Nut / N/A	Fast growing.
	Northern Red Oak (Quercus rubra)	Rounded	60' x 60'	All	Yes	Allee Regular Clustered	Nut / N/A	
	Goldspire sugar maple (Acer saccharum 'Goldspire')	Rounded	70' x 40'	T1, T2, T3	Yes	Allee Regular Clustered	Samara / N/A	Requires wide lawn area.
	American Linden (Tilia americana)	Oval	60' x 40'	T1, T2	Yes	Regular Clustered	Nutlike / Cream	
	American Elm (Ulmus americana)	Rounded	70' x 50'	T1, T2	Yes	Regular Clustered	Samara / N/A	Dutch elm resistant species only.
	Japanese Zelkova (Zelkova serrata)	Rounded	60' x 60'	T2, T3, T4	No	Allee Regular Clustered	Drupe / N/A	
	Littleleaf Linden (Tilia cordata)	Pyramidal	60' x 30'	T3, T4	No	Allee Regular Clustered	Nutlet / Cream	
	Crimean Linderr (Tilia euclifora)	Oval	50' x 25'	T3, T4	No	Allee Regular Clustered	Nutlet / Cream	Basal suckers.
	Silver Linden (Tilia tomentosa)	Oval	50' x 25'	T3, T4, T5	No	Allee Regular Clustered	Nutlet / Cream	Basal suckers.
	Kentucky Coffee tree (Gymnocladus dioica)	Oval	60' x 40'	T2, T3	No	Regular Clustered	Pod / NA	Male only.

Figure 36: FBC for tree details for city of Cincinnati (Cincinnati form based codes)

2. Every footpath should have a continuous tree line. Landscaping may extend into bulb-outs in the parking lane but a single tree line should be maintained in order to improve compatibility with underground utility lines. A continuous tree line is preferable to trees placed in the parking lane.
3. Landscaping can enhance the character of market areas and commercial streets. The design of the public right-of way can be coordinated with that of adjoining properties, creating large public spaces.
4. Medium-height vegetation should be trimmed directly adjacent to formal crossings to improve the visibility of pedestrians and cyclists.
5. Selection of tree species whose canopies do not encroach into pedestrian headroom or into tall curbside vehicles such as buses are preferred
6. Tree pits should have dimensions of at least 1.5 m x 1.5 m to accommodate roots at full maturity. On narrow sidewalks, the same surface area can be achieved with 1 m x 2.25 m tree pits. Hume pipes can lower the level at which roots spread out, thereby reducing damage to road surfaces and underground utilities.

A median pedestrian and cycle boulevard can incorporate four separate tree lines. The two exterior tree lines become landscaped buffers between the carriageway and cycle track, while the interior tree lines are great places for integrating other elements such as street furniture, amenities, and vending places.

iv. Tree cover

In public spaces and street standards, it is not enough to just provide trees and green areas. Considering the weather conditions in Indian cities, it is also important to make sure the tree cover is ample to support the use and utility of the urban area. In case of walkable neighbourhoods the tree cover should be such that it provides shading and ample cover for pedestrians, hence promoting walkability. While in vehicle prone areas, tree cover should be kept such that it not only reduces noise and air pollution. In detailed FBCs for cities, an inventory of tree covers and their cover/foilage and other seasonal details are generally drafted and adopted by city development agencies.

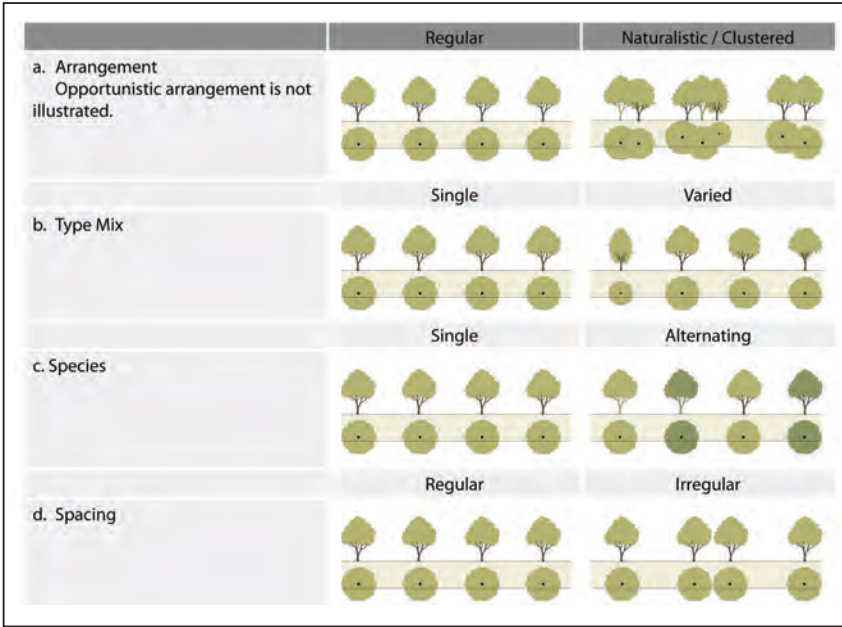


Figure 37: FBC for tree cover details for city of Cincinnati (Cincinnati form based codes)

v. Streetscape features -street furniture, signage, lighting, fences etc.

Streetscape feature are the elements that furnish the street environment and enhance community livability. Streetscape features such as seating, signage, lighting etc. serve pedestrian and outdoor activities, as well as provide lighting and signs for vehicle drivers. Provision of streetscape features such as pedestrian kiosks, benches, newspaper racks, bus shelters, space for outdoor cafe seating, planters etc. increase the number of opportunities for people to socialise and spend leisure time outdoors along public streets.

Seating is an essential piece of street furniture which provides opportunities for stationary pedestrian activities and rest to pedestrians and public transport users. Seating provided must be easy to clean, located in areas that are well watched, busy, and well shaded by trees or artificial canopies - to protect people from the harsh weather conditions. Seating can be either primary (chairs and benches, such as that found at a cafe or a transit stop) or secondary seating (low walls, steps, fountains edges, where people spontaneously collect).



Figure 38: FBC for street furniture for Indian cities developed by UTTIPEC, Delhi (Street Design Guidelines: Floor Equitable Distribution of road space-NUTP)

In either case, seating should be designed such that it is easy to clean and maintain.

The design of street furnishings including signages, fences, street lights, furniture and infrastructure must conform to the overall character and requirement of the neighbourhood and the public works department. In transit stations, all norms for safety and security of the area must be followed, as per the transit authorities. The public stations, stops and all platforms must be well equipped with ample lighting and signages for better usage and convenience of the commuters. After 200/500 m there must be provision for dustbins. All signages and other notifications must be placed at visible locations and in readable fonts and local as well as common languages to make sure commuters can utilise them properly. There are many other basic facilities, like dustbins, drop-off boxes, news racks which can be included in the facilities. For reference some of the from- based codes for these utilities have been identified below :

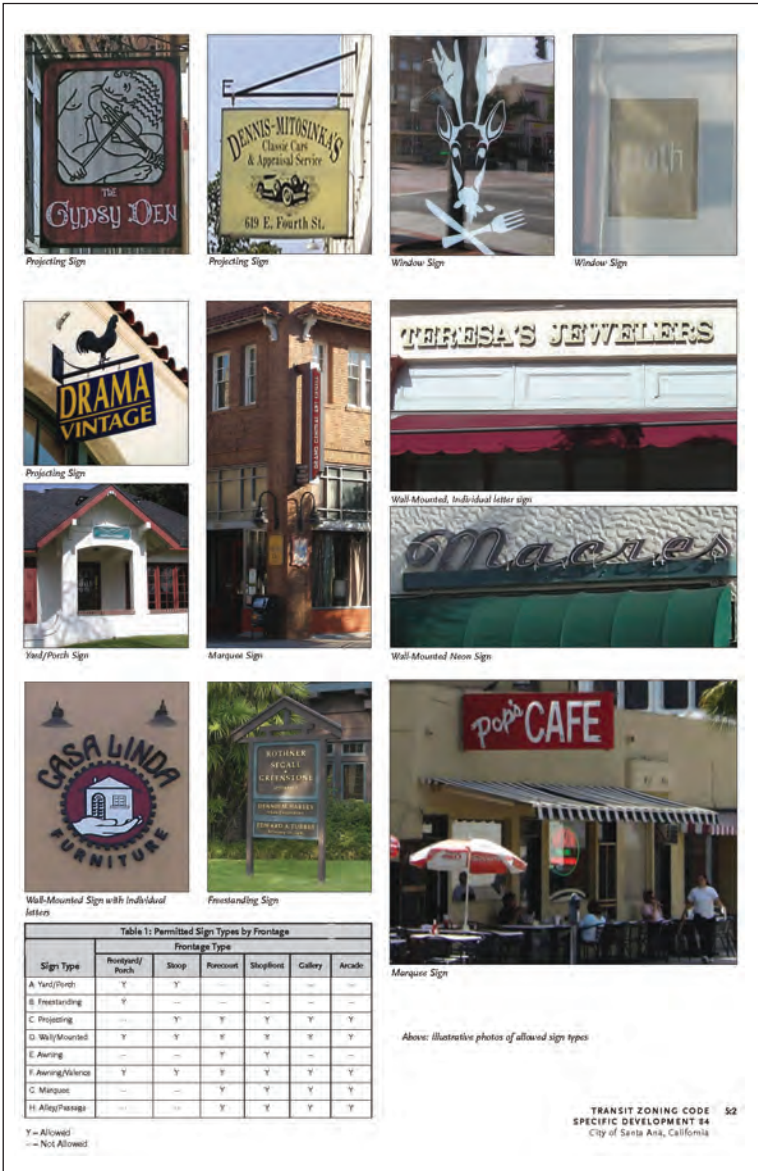


Figure 39: FBC for signages details as used for city of Cincinnati (Cincinnati form based codes)







Specific Sign Type	Illustration	Zones	Standards										
Building Signs													
Awning Sign. This sign type is a traditional storefront fitting and can be used to protect merchants' wares and keep storefront interiors shaded and cool in hot weather.		<table border="1"> <tr><td>T3E</td><td>T3N</td></tr> <tr><td>T4N.MF</td><td>T4N.SF</td></tr> <tr><td>TSMS</td><td>TSN.LS</td></tr> <tr><td>TSN.SS</td><td>TSF</td></tr> <tr><td>T4C</td><td></td></tr> </table>	T3E	T3N	T4N.MF	T4N.SF	TSMS	TSN.LS	TSN.SS	TSF	T4C		1703-5.80.K
T3E	T3N												
T4N.MF	T4N.SF												
TSMS	TSN.LS												
TSN.SS	TSF												
T4C													
Directory Sign. This sign type provides a listing of establishments within a building or series of buildings.		<table border="1"> <tr><td>T3E</td><td>T3N</td></tr> <tr><td>T4N.MF</td><td>T4N.SF</td></tr> <tr><td>TSMS</td><td>TSN.LS</td></tr> <tr><td>TSN.SS</td><td>TSF</td></tr> <tr><td>T4C</td><td></td></tr> </table>	T3E	T3N	T4N.MF	T4N.SF	TSMS	TSN.LS	TSN.SS	TSF	T4C		1703-5.80.L
T3E	T3N												
T4N.MF	T4N.SF												
TSMS	TSN.LS												
TSN.SS	TSF												
T4C													
Marquee Sign. This sign type is a vertical sign that is located either along the face, where it projects perpendicular to the facade, or at the corner of the building, where it projects at a 45 degree angle.		<table border="1"> <tr><td>T3E</td><td>T3N</td></tr> <tr><td>T4N.MF</td><td>T4N.SF</td></tr> <tr><td>TSMS</td><td>TSN.LS</td></tr> <tr><td>TSN.SS</td><td>TSF</td></tr> <tr><td>T4C</td><td></td></tr> </table>	T3E	T3N	T4N.MF	T4N.SF	TSMS	TSN.LS	TSN.SS	TSF	T4C		1703-5.80.N
T3E	T3N												
T4N.MF	T4N.SF												
TSMS	TSN.LS												
TSN.SS	TSF												
T4C													
Projecting Sign. This sign type is mounted perpendicular to a building's facade. These signs are small, pedestrian scaled, and easily read from both sides.		<table border="1"> <tr><td>T3E</td><td>T3N</td></tr> <tr><td>T4N.MF</td><td>T4N.SF</td></tr> <tr><td>TSMS</td><td>TSN.LS</td></tr> <tr><td>TSN.SS</td><td>TSF</td></tr> <tr><td>T4C</td><td></td></tr> </table>	T3E	T3N	T4N.MF	T4N.SF	TSMS	TSN.LS	TSN.SS	TSF	T4C		1703-5.80.P
T3E	T3N												
T4N.MF	T4N.SF												
TSMS	TSN.LS												
TSN.SS	TSF												
T4C													
Suspended Sign. This sign type is mounted to the underside of beams or ceilings of a porch, breezeway or similar covered area. These signs are small, pedestrian scaled, and easily read from both sides.		<table border="1"> <tr><td>T3E</td><td>T3N</td></tr> <tr><td>T4N.MF</td><td>T4N.SF</td></tr> <tr><td>TSMS</td><td>TSN.LS</td></tr> <tr><td>TSN.SS</td><td>TSF</td></tr> <tr><td>T4C</td><td></td></tr> </table>	T3E	T3N	T4N.MF	T4N.SF	TSMS	TSN.LS	TSN.SS	TSF	T4C		1703-5.80.R
T3E	T3N												
T4N.MF	T4N.SF												
TSMS	TSN.LS												
TSN.SS	TSF												
T4C													
Wall Sign. This sign type is flat against the facade consisting of individual cut letters applied directly to the building, or painted directly on the surface of the building.		<table border="1"> <tr><td>T3E</td><td>T3N</td></tr> <tr><td>T4N.MF</td><td>T4N.SF</td></tr> <tr><td>TSMS</td><td>TSN.LS</td></tr> <tr><td>TSN.SS</td><td>TSF</td></tr> <tr><td>T4C</td><td></td></tr> </table>	T3E	T3N	T4N.MF	T4N.SF	TSMS	TSN.LS	TSN.SS	TSF	T4C		1703-5.80.S
T3E	T3N												
T4N.MF	T4N.SF												
TSMS	TSN.LS												
TSN.SS	TSF												
T4C													
Key <input checked="" type="checkbox"/> Allowed <input checked="" type="checkbox"/> Allowed with Restrictions <input type="checkbox"/> Not Allowed													

Figure 40: FBC for signage details as used for city of Cincinnati (Cincinnati Form based codes)

4. Architectural Standards:

Architectural Standards are regulations controlling external architectural materials and quality.

Building elements are required relative to the type of building proposed; however, few FBCs regulate architecture strictly, and architectural standards are optional elements of a FBC. Most FBCs have little or nothing to say about architectural style and allow for architectural creativity. Most FBCs include very basic provisions that regulate building articulation, window proportions, rhythm of openings, prohibition of blank walls, and placement of signs- all with the goal of creating an attractive street and reinforcing the pedestrian scale of development (Mary Madden).

However, it may be appropriate to include architectural regulations in a FBC

for a historic districts, station areas etc as the additional overlay of historic district regulations/architectural standards can provide greater protection of historic structures and more detailed design regulation to maintain the architectural integrity of a neighbourhood or streetscape. These may be incorporated into a FBC or remain separate (Mary Madden). The figures given reflect on the aspects that FBC can include into the architectural standards for an area:



Figure 41: Aspects related to architectural standards covered in FBC for city of Whittier (City of Whittier)

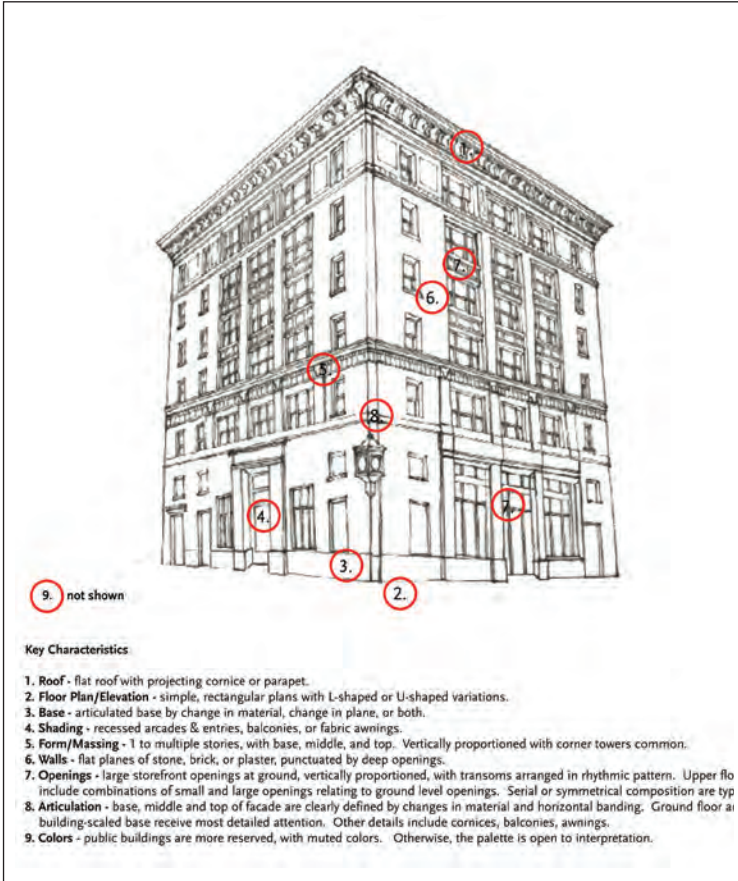


Figure 42: Aspects related to architectural standards covered in FBC for city of Whittier (City of Whittier)

Architectural standards must support the overall detail of the regulation plan and the set building form standards and further promote street design through better pedestrian connectivity. The proper configuration of buildings and public space in station vicinities should be the basis for developing comprehensive architectural standards and these codes must reciprocate with people-friendly street design. Street parking, drop-off lanes and slow-moving traffic generate large volumes of pedestrian traffic which positively affects both the character of buildings and the experience of living in them and detailed architectural standards can improve that experience.

Buildings around a transit station should be designed to accommodate a



Figure 43: Aspects related to architectural standards covered in FBC for city of Whittier (City of Whittier)

variety of uses over time. Their ground floors should be activated continuously be it residential or commercial frontages. As already mentioned, car entrances should be discreet and where parking is provided, it should be located behind or under buildings, so as to interfere as little as possible with the pedestrian-dominant urban public space.

TOD projects should be fitted into existing contexts in a manner that validates the historical continuity of towns and cities. New buildings should be designed in conjunction with adjacent existing ones to generate streets and public spaces of distinct character. This can be most often accomplished by designing building types of various densities and combining them into site plans that accomplish both internal project

coherence and a better fit into the collective form of a neighbourhood or District as a whole.

Most often, buildings of diverse types can also be designed to incorporate a variety of dwelling units by type and size, and can be expressed in an assortment of vernacular and contemporary styles. It is this complexity and variety, this attention to both the measured definition of new projects and the completion of existing street and city block form that generates an authentic sense of place. The broad consumer choice inherent in projects so designed is also a key ingredient to their financial success.

In addition, sustainable design methods should be promoted through FBCs at the building scale to capitalise on the local climatic conditions through active methods such as, cross ventilation, natural lighting, proper insulation, use of locally available construction materials and sustainable technologies. This emphasis on passive modes of environmental control can further reflect on the importance of permanence and durability in architectural design through FBCs.

5. Administration

Administration includes a clearly defined application and project review process.

This section provides an explanation of application and project review process necessary for the approval of development proposals once the FBC is in place. Implementing a FBC is not just a matter of desired form, but also a community's expectations about the role of government officials, public input into development and the necessity of architectural design and site plan review (Form-Based Codes Institute).

Different strategies used by communities to review projects under a FBC include (Form-Based Codes Institute):

- i. The Town Architect/ Strategic Advisor
- ii. Review by an Interdepartmental Team
- iii. Public Review Process

i. The Town Architect/ Strategic Advisor

Employing a Strategic Advisor or a Town Architect (TA) is a common practice in implementing a FBC, particularly in communities that do not otherwise have staff with the time or design skills to undertake the role. Ideally a TA should be a person or a firm who has participated in the community's visioning process and has an understanding of FBC, smart growth and has good site planning and architectural design sensibilities (Daniel G. Parolek, 2008). A Town Architect serves to ensure that development under the code meets the intent of the regulation. For a Town Architect strategy to be effective, a community must be willing to place trust in a professional designer to make decisions that will influence the results in the area under the code. TA can also help train other city staff who will likely assist with the FBC administration as well as continue to educate elected and appointed officials. The fee for the TA may be incorporated into the development application fees of each project.

ii. Review by an Interdepartmental Team

Some communities use a Design Review Committee (DRC) or a Development Review Board to do review of projects under the code. The board determines the consistency and ensures that the architecture of the building reflects the vision the community. A process such as this can also allow for public comment on a project before construction. The DRC may also grant minor deviations from the specific requirements of the code as long as they help further the code's intent.

iii. Public Review Process

A time bound (30-day or 50-day) administrative review process can also be put into place for projects of various sizes. Projects can also be reviewed through a public hearing. In addition, a variance process may also be needed which would allow the administration to relax or modify certain building standards within the codes. Selecting an appropriate strategy for code implementation is fundamental to developing, securing and managing a successful code.

6. Definitions

Definitions include a glossary to ensure the precise use of technical terms.

The definitions section provides the terms in a code that are technical in nature or that might not otherwise reflect a common usage of the work. If a term is not defined in the FBCs set, then the zoning administrator is expected to determine the correct definition of the term. Definitions are critical aspect of FBCs, as lack of clear definitions can lead to discrepancy in the way the code is understood or further implemented. Usually the glossary is in two parts, for general terms and uses and for specific codes related land-use terms referred to in the document. It provides a set legal framework which can help various stakeholders in implementing the code more effectively. The definitions glossary also makes the legal framework of the codes specific. As developing FBCs is a multi stakeholder engagement process, clearly set out definitions is an effective and precise way for the codes to not become ambiguous and let individual interests impact the development of the area.

For example in the Miami21 Codes (Public Hearing- First Reading 2008-04), the term ‘ OFFICE’ is defined as: *This category is intended to encompass land use functions predominantly related to business, professions, service or government. Office: A room or group of rooms used for conducting a business, profession, service, or government. Such facilities may include, but are not limited to, offices of attorneys, engineers, architects, physicians, dentists, accountants, financial institutions, real estate companies, insurance companies, financial planners, or corporate offices, and exclude manufacturing activities.* It clearly defines that the office spaces do not include any manufacturing activities.

Conclusions

Form based codes represent a fundamentally different way of regulating land use, with a clear focus on physical form and a community's design vision rather than simple separation of incompatible land uses through zoning. *This approach is effective especially for TODs, as comprehensive regulating frameworks can help streamline a community's vision, and individual aspirations of diverse group of stakeholders involved.*

FBCs are also useful in TOD as they can help optimise the three key aspects of TOD- density, diversity and design towards achieving a comprehensive urban framework. **TOD based FBCs can address diversity through a well-structured regulating plan and that can further be translated into the building form standards catering to the urban density concerns, while the design aspects can be taken care of through the urban design and architectural or street or landscape design sections of a FBC.** This flexibility with the codes also helps provide a smooth transition between urban planning to design scales and helps tie it with the overall development vision.

Generally, TOD plans are envisioned for very large urban agglomerations, and often it is difficult to accommodate the visions of the diverse set of communities and actively engage with them in the process. **FBC acts as a good model in such cases, helping address their concerns in the codes through active community engagement process involving design charettes and workshops at various stages of the process.** These exercises helps the city agencies, planners, designers, developers and other stakeholders at the city or community level understand the diverse considerations more comprehensively and helps them align their needs and requirements with the overall plans and vision of the community. It also in turn helps the participants and communities engage at different levels and keeps them enthusiastic throughout the process. In addition, this can yield other benefits, such as education of the community about urban design concepts, design vision contained within the Code and

can provide opportunities for local residents to interact with developers and other involved parties to understand the scale of proposed development its alignment within the principles outlined in the FBC.

In Indian cities, TODs not only act as active transport nodes but also are active places for local economies and informal sector providing them with visibility and space to interact and conduct business within the designed formal spaces. **FBC is an effective tool to facilitate this interaction through creating a vivid urban environment within these urban diversities and economies.** At the same time, it acts as a useful instrument in creating a synergetic urban environment while preventing urban sprawl.

While FBCs are have been implemented and executed comprehensively in diverse urban areas, cities and municipalities across the globe; the possibilities that the codes can offer or limitations are still being explored. Its effects or impacts especially related to TODs in Indian cities will only be reflected after an extensive utilisation and implementation. **Many Indian cities have introduced multiple aspects similar to FBCs in their development plans in the past, for example, Chandigarh's original master plan represents strict development and building by-laws in order to protect the overall image and form of the city, even though it is not formally called a FBC. The draft 'heritage zone guidelines' developed by INTACH for Fort Cochin, supported by the 'Regulations for ensuring and promoting conservation of heritage buildings, heritage precincts and natural heritage' under the Urban & Regional Planning and Development Act, 2003 for ensuring and promoting conservation of heritage buildings is another example.** This guideline document and the enactment of the law for Fort Cochin could well be considered a FBC, having all the municipal building rules and bye-laws in its zone. As the guidelines not only make recommendations for the existing constructions in the area, but also for new constructions and renovations, while proposing for the protection of existing open spaces mandatory along with cultural elements.

Although, the successful implementation and monitoring of codes depends totally on the community's active engagement and the development authority of an urban area, these codes do encourage better liveable urban environment. FBCs are overall an active and structured approach available to communities,

however they require a wider recognition among municipal staff and city officials to generate a more predictable/consistent urban form that also aids in promoting more walkable, inviting, and accessible for pedestrians and inclusive public realm.

Successful administration of FBCs would require the planning staff to develop additional competencies and capacities in design, landscape architecture, or engineering competencies that they might not previously possess or pursue additional training in design-related areas. **However, despite the additional complexities and effort required, proponents of the FBC's suggest that FBCs offer a better mechanism to manage urban form for towns that see themselves as becoming urban places, outweighing the organisational and procedural challenges created by this fundamentally different approach to development regulation.**

Bibliography

- Andrés Duany, W. W. (n.d.). *SmartCode & Manual*. New Urban Publications Inc.
- Benfield, K. (2012, May 21). *The Right Way to Zone for Transit-Oriented Development*. Retrieved February 15, 2017, from CITYLAB: <http://www.citylab.com/commute/2012/05/right-way-zone-transit-oriented-development/2058/>
- Boyer, M. (n.d.). *Form or Fluff?: Assessing the Proposed Advantages of Form-Based Codes for Municipalities*.
- Burdette, J. T. (April, 2004). *Form-Based Codes: A Cure for the Cancer Called Euclidean Zoning?* Virginia Polytechnic Institute and State University.
- Chicago Metropolitan Agency for Planning. (2013). *Form-Based Codes: A Step-by-Step Guide for Communities*. Chicago: Chicago Metropolitan Agency for Planning.
- Cincinnati, C. o. (2013). *City of Cincinnati Form-Based Code*. Cincinnati: City of Cincinnati.
- City of Cincinnati. (2017). *City Planning*. Retrieved from City of Cincinnati: <http://www.cincinnati-oh.gov/planning/planning-projects-studies/form-based-code/>
- City of Kansas. (September 2011). *Downtown Form Based Code: Overland park, Kansas*. Kansas: City of Kansas.
- Congress for the New Urbanism. (January 2010). *Form-Based Codes in 7 steps: The Michigan guidebook to livability*. Michigan: Congress for the New Urbanism.
- Daniel G. Parolek, K. P. (2008). *A Guide for Planners, Urban Designers, Municipalities, and Developers*. John Wiley & Sons.
- Dena Belzer, G. A. (June 2002). *Transit Oriented Development: Moving from rhetoric to reality*. The Brookings Institution Center on Urban and Metropolitan Policy.
- Department of Energy, United States Governmnet. (2011). *Downtown Form-Based Cose Overland Park*.
- Form-Based Codes Institute. (n.d.). Retrieved from <http://formbasedcodes.org/>
- Inc, O. D. (March 2010). *Proposal for Petaluma SMART Rail Station Areas: TOD master plan*. ity of
- ITDP, EPC. (December 2011). *Better streets, better cities: A guide to street design in urban India*. ITDP.
- Kim, K. (May 2010). *The evaluation of the impact of form based code and conventional zoning on fort mcperson redevelopment*. Georgia Institute of Technology.
- Langdon, P. (January 2006). *The Not-So-Secret Code*. Retrieved December 2016, from http://www.buffalosmartcode.org/downloads/The_Not_So_Secret_Code_Langdon_APA_Jan2006.pdf.
- Los Angeles County Metropolitan Transportation Authority. (n.d.). Retrieved from *Form-Based Codes*: <https://www.metro.net/projects/tod-toolkit/form-based-codes/>
- Louisville Metro Planning Commission. (March 2016). *Land Development Code for all of Louisville-Jefferson County, Kentucky*. Louisville: Louisville Metro Planning Commission.

Mary E Madden, B. S. (September 2006). Place making with Form based codes. Urban land Institute, 174-178.

Mary Madden, J. R. (n.d.). Planners Web. Retrieved from Typical Elements of Form Based Codes: <http://plannersweb.com/2014/12/fbc3/>

Moule and Polyzoïdes. (2010). Santa Ana Renaissance Transit Zoning Code. Santa Ana.

North Central Texas Council of Governments Transportation Department. (n.d.). Transit-Oriented Development and Form- Based Codes. 2007.

Office of Sustainable Communities, US-EPA. (2013). Infrastructure Financing Options for Transit Oriented Development. United States Environmental Protection Agency.

Polyzoïdes, S. (n.d.). <http://www.mparchitects.com/site/thoughts/notes-transit-oriented-development>. Retrieved January 2017, from [www.mparchitects.com: http://www.mparchitects.com/site/thoughts/notes-transit-oriented-development](http://www.mparchitects.com/site/thoughts/notes-transit-oriented-development)

(n.d.). Public Hearing- First Reading 2008-04.

Purdy, J. R. (2007). Smart growth tactics. Michigan Association of Planning, 7-14, Issue 28.

Singh, S. S. (April - June 2010). Form-Based Codes: An alternative method for development regulation. Institute of Town Planners, India Journal 7 - 2, , 27-33.

Talen, E. (Vol. 75, No. 2, Spring 2009). Design by the rules: The historical underpinnings of Form-Based Codes. Journal of the American Planning Association, 144-160.

Treasure Coast Regional Planning Council. (December 2012). Florida TOD guidebook. Florida department of transportation.

White & Smith, L. P. (November 2009). Form Based Codes: Practices and legal considerations.

Annexure 1

States	Urban Land Tax	Tax on Conversion of Land	Betterment Levy	Development Charge/ Impact fees	
Andhra Pradesh	Yes	Section 4 AP Conversion Act 2006	Betterment contribution S. 24 APTP ACT	Development charge - Section 27 APUAD Act	
Arunachal Pradesh	No specific provision	Conversion of Agriculture land into Non-agri purpose Rules, 2011; Section 99 (b)(8) AP LSR Act 2000	Improvement Expenses recoverable under section 408-409 APM Act	Section 133 - APM Act, 2007; Section 39(1) AP UCP Act 2007	
Assam	Tax on Specified Lands Section 3 ATSL Act; Assam Land Revenue Reassessment Act 1936	ALRR Act 1936	Section 144 (2)(a) GMC Act; Section 41 ATPC Act; Betterment tax - Section 32-37 Assam Highway Act 1989	No specific provision	
Bihar	No specific provision	Bihar Agriculture Land (Conversion for Non-Agriculture Purposes) Act, 2010	Section 131 BMA	Section 60 of Development Charge ; Section 62. Levy of Infrastructure and Amenities Charges under BUPD Act 2012	
Goa	Section 109 of City of Panaji Corporation Act, 2002 (both land and buildings are taxed); Section 143 of City of Panaji Corporation Act, 2002 (street tax)	Section 100A of The Goa, Daman and Diu Town and Country Planning Act, 1974 and Rules, 1976; Section 20A of Goa, Daman and Diu Town and Country Planning (Planning and Development Authorities) Rules, 1977	Section 54 of The Goa Housing Board Act and Rules; Section 41 of The Goa Tillari Irrigation Development Corporation Bill, 1999	Sections 43, 100 of The Goa, Daman and Diu Town and Country Planning Act, 1974 and Rules, 1976; Section 20A of Goa, Daman and Diu Town and Country Planning (Planning and Development Authorities) Rules, 1977	
Gujarat	Yes	Gujarat Land Revenue (Amendment) Bill-2016	Section 216 of Bombay Provincial Municipal Corporations Act, 1949 (Gujarat Adaptation of Laws (State and Concurrent subjects) Order, 1960.)	GTPUD Act (Chapter VII); value-based development charge also levied; Impact Fees Collected under AUDA	
Haryana	No specific provision	Section 3(1) - HDRUA Act	Section 93 - HUDA Act	No specific provision, however, a development charge is collected in controlled area (Haryana Municipal Act section 302D(1))	
Himachal Pradesh	No specific provision	No specific provision	No specific provision	Section 61 - HPTCP Act; Development Fee (Section 45) - HPHUDA Act	
Karnataka	Yes	Section 18 - KTCP Act and Rates prescribed by Kamataka Planning Authority Rules 1965	Bangalore Development Authority Act 1976	Section 18 A - KTCP Act-for value-based; Area-based also levied	
Kerala	No specific provision	Kerala Land Utilisation Order, 1967; The Kerala Conservation of Paddy Land and Wetland Act 2008	Section 25.2.2. of Master Plan for Kozhikode Urban Area-2035; also features in Kerala Irrigation and Water Conservation Act, 2003	Urban Policy and Action Plan for Kerala; Section 20 of The Kerala Building Tax Act, 1975 (referred to as building tax)	
Madhya Pradesh	No specific provision	No specific provision	Betterment tax S. 127 (5) (h) MPMC Act; Madhya Pradesh Town Improvement Trust Act 1960; Madhya Pradesh Town and Country Planning Act 1973	Madhya Pradesh Nagar Tatha Gram Nivesh Niyam 1975 and Madhya Pradesh Bhumi Vikas Rules 1985	
Maharashtra	Maharashtra Land Revenue Code 1966	Yes	Nagpur Improvement Trust Act 1936 Mumbai Municipal Corporation Act 1888; Mumbai Metropolitan Regional Development Authority (MMRDA) Act, 1974 - Section 26-30	Development Charge Section 124A Maharashtra Regional and Town Planning Act 1961 - Amended in 1993	

TDR and Incentive FSI	Premium on Relaxation of Rules or Additional FSI	Charge for Regularization of Unauthorized Development	Vacant Land Tax	Town Planning Scheme
No specific provision	No specific provision	The Andhra Pradesh Regulation and Penalization of unauthorized buildings and buildings constructed in deviation of the Sanctioned Plan Rules, 2015; Section 399 of HMC Act, 1955 - Compounding Fee; Section 452(2) and 636 of HMC Act, 1955 - Demolition Expenses; Section 456(4) of HMC Act, 1955 - Administration of Demolition Expenses; Section 440 of HMC Act, 1955 - Balconies	Section 85 (3) of the Andhra Pradesh Municipalities Act, 1965	Andhra Pradesh Town Planning Act 1920
No specific provision	No specific provision	Information Not available	No specific provision	No specific provision
No specific provision	No specific provision	No specific provision	No specific provision	No specific provision
No specific provision	No specific provision	Property Tax Collected from unauthorized properties but no regularization section 18 BPT (ACR) Rules 2013	Section 9 BPT(ACR) Rules	No specific provision
No specific provision	No specific provision	The Goa Regularisation of Unauthorized Construction Ordinance, 2016	No specific provision	Sections 56, 88, 89 of The Goa, Daman and Diu Town and Country Planning Act, 1974 and Rules, 1976
Regulations For The Rehabilitation and Redevelopment of the Slums 2010	Ahmedabad Urban Development Authority (AUDA) - Development Control Regulations in CDP 2021 - proposed	Section 7 GRUD Act	No specific provision	Gujarat Town Planning and Urban Development Act 1976
No specific provision	No specific provision	No specific provision	No specific provision	No specific provision
No specific provision	No specific provision	No specific provision	Section 46 Penalty for nonconstruction of buildings-HPHUDA Act	No specific provision
Section 14B - KTCP Act	Zonal Regulations of Mangalore 2011	Akrama-Sakrama Scheme	No specific provision	Karnataka Town and Country Planning Act 1961
Urban Policy and Action Plan for Kerala	Urban Policy and Action Plan for Kerala	Section 134 of Kerala Panchayat Building Rules, 2011	No specific provision	Kerala Town and Country Planning Ordinance, 2014 was introduced but scrapped
No specific provision	No specific provision	No specific provision	No specific provision	Madhya Pradesh Town and Country Planning Act 1973 - Section 50
1994 Amendment to MRTTP Act 1966	Yes	Maharashtra Gunthewari (Regulation, Upgradation and Control) Act 2001	Announced	Bombay Town Planning Act 1915 and 1954

States	Urban Land Tax	Tax on Conversion of Land	Betterment Levy	Development Charge/ Impact fees	
Meghalaya	No specific provision	No specific provision	Section 68 of Meghalaya Municipal Act, 1973	No specific provision	
Mizoram	No specific provision	Section 20 of Mizoram Land Revenue Rules, 2013	Section 32 of Mizoram Highways Act, 2002	Section 45 of The Mizoram Urban and Regional Development Act, 1990; Impact fees collected under Section 341 of Mizoram Municipalities Amendment Act 2015	
Nagaland	No specific provision	No specific provision	Section 41 of The Nagaland Highways Act, 1967	Section 169 of The Nagaland Municipal Act, 2001	
Odisha	No specific provision	No specific provision	Section 677 of Odisha Municipal Corporation Act, 2003; Section 70 The Orissa Town Planning & Improvement Trust Act, 1956; CDP Land and Implementation Policy, 2015.	Section 196 of Odisha Municipal Corporation Act, 2003; Section 84 of The Orissa Development Authorities Act, 1982	
Punjab	No specific provision	Section 7. Draft Policy for Housing & Urban Development	Section 141 of Punjab Regional and Town Planning and Development Act 1995.	Section 128 of Punjab Municipal Corporation Act, 1976. Policy for utilization of External Development Charges in the State of Punjab.	
Rajasthan	Section 20. Notification-Government of Rajasthan. Local Self Government, Urban Development & Housing Department	Section 90-A of Rajasthan Land Revenue Act, 1956		Section 106 Rajasthan Municipalities Act, 2009	
Sikkim	No specific provision	No specific provision	No specific provision	Section 94 of The Sikkim Municipalities Act, 2007	
Tamil Nadu	TNULT Act	Yes	Yes	Tamilnadu Town and Country Planning Act 1961 - Section 63B; Impact fees collected	
Tripura	No specific provision	Section 39 of the Tripura Town and Country Planning Act, 1975	No specific provision	Section 202 of The Tripura Municipal Act, 1994	
Uttar Pradesh	No specific provision	Zamindari Abolition and Land Reforms Act; Consolidation of Holdings Act	Section 35 of Uttar Pradesh Urban Planning and Development Act 1973	Sections 14 and 15 of UPUPD Act 1973	
Uttarakhand	No specific provision	Section 38-A of Uttarakhand Urban Country Planning Development Act, 1973	Section 35 of Uttarakhand Urban Country Planning Development Act, 1973	Section 15, Section 38-A of Uttarakhand Urban Country Planning Development Act, 1973	
West Bengal	WBULT ACT	Sections 4A, 4B, 4C and 4D of West Bengal Land Reforms Act, 1955	No specific provision	Section 102 of The West Bengal Town and Country (Planning and Development) Act, 1979	

TDR and Incentive FSI	Premium on Relaxation of Rules or Additional FSI	Charge for Regularization of Unauthorized Development	Vacant Land Tax	Town Planning Scheme
Section 9(f) of Meghalaya Heritage Act, 2012	No specific provision	Policy of the Meghalaya Urban Development Authority for Regularization of Unauthorized or Illegal Colonies	Under "holding" definition Meghalaya Municipal Act 1973	No specific provision
Section 341 of Mizoram Municipalities Amendment Act 2015	No specific provision	Policy of the Aizawl Development Authority for Regularization of Unauthorized or Illegal Colonies	Rule 13 & 14 of The Mizoram Municipalities (Property Tax) Management Rules, 2014; Section 221 of The Mizoram Municipalities Act, 2007	No specific provision
No specific provision	No specific provision	No specific provision	No specific provision	Section 375 of the Nagaland Municipal Act, 2001
Section 472 of Odisha Municipal Corporation Act, 2003; Section 64 of The Orissa Development Authorities Act, 1982	Section 9.3.1. Slum Rehabilitation & development Policy for Odisha	Regularisation of unauthorized /deviated construction through compounding Scheme	No specific provision	Section 22 of The Orissa Development Authorities Act, 1982
No specific provision	Section 12.1 (4) of Draft Policy for Housing & Urban Development	Policy for regularization of unauthorized Colonies and buildings under the Punjab Laws (Special Provisions) Act-2013	No specific provision	Land Pooling Policy for Punjab. S. 43, S. 139 of Punjab Regional and Town Planning and Development Act 1995.
Policy of Transferable Development Rights in Rajasthan 2012	RTIDF betterment levy on premium FAR along the two Metro corridors for height upto FAR of 4 rather than 1.33.	(For industrial land) RIICO Disposal of Land Rules 1979	Section 26. Notification-Govt of Rajasthan. Local Self Government, Urban Development & Housing Department	Integrated Township Schemes of Private Developers
No specific provision	No specific provision	Section 26 of The Sikkim Building Construction Regulations, 1991	No specific provision	No specific provision
Yes; Charged but no specific provision exist under any Act	Chennai Metropolitan Development Authority - DCR provision	Section 113A and section 113B - TNTCP Act	Section 81 (3) (a) of the Tamil Nadu District Municipalities Act, 1920	Yes
No specific provision	No specific provision	No specific provision	Section 13 of The Tripura Municipal (Assessment and Collection of Property Tax) Rules, 2016	No specific provision
Sub-section-(2) (i) of section-56 of the UPUPD Act, 1973	Policy for regulation of FAR- Housing Department , Govt. of UP	No specific provision	No specific provision	No specific provision
No specific provision	No specific provision	No specific provision	Section 18 of Uttarakhand Urban Country Planning Development Act, 1973	No specific provision
Section 91 WBT&CPD Act	Section 52 WBT&CPD Act	No specific provision	No specific provision	No specific provision

This study has been supported by generous grant from Prosperity Programme,
Foreign & Commonwealth Office, UK Government