Urban Design and Architectural Guidelines for Amaravati Capital City

MIS/Dir/Plng/552/2017/VJA - Part (1)

Draft

September 2025

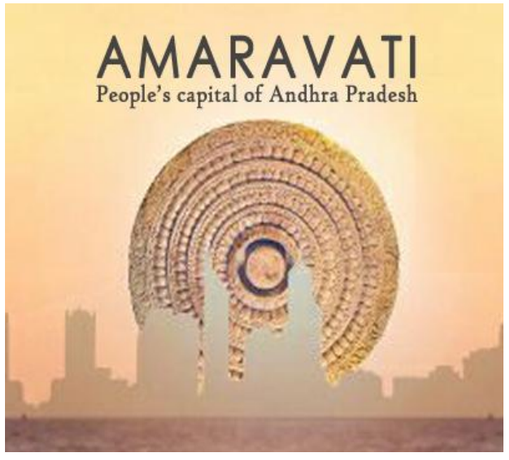
A Collaborative "People Place and Planet" Approach

Table of Contents

1. Introduction 4
   - 1.1 Project Vision and Approach 6
   - 1.2 Masterplan and Local Regulations Review 9
   - 1.3 Guiding Principles 15
   - 1.4 Purpose and Scope of Guidelines 21
2. City Level Strategies 25
   - 2.1 Image and Identity 28
   - 2.2 Urban Form and Density 36
   - 2.3 Mixed Use and Flexible Zoning 41
   - 2.4 Blue and Green Network 49
   - 2.5 Mobility and Infrastructure 54
   - 2.6 Smart and Sustainable Development 58
   - 2.7 Quality of Life and Well-Being 65
   - 2.8 Social Equity and Integration 73
   - 2.9 Heritage, Art and Culture 78
   - 2.10 Place Making and Branding 85
3. Waterfront and Open Space Network Guidelines 94
   - 3.1 Riverfront, Canals, Lakes and Ponds 97
   - 3.2 Open Space Network 110
   - 3.3 Open Space Plantation and Materials 125
   - 3.4 Waterfront and Open Space Network Demonstration 145
4. Village Integration Guidelines 165
   - 4.1 Analysis of Selected Villages 168
   - 4.2 Village Integration Guidelines 181
   - 4.3 Village Integration Demonstrations 192
5. Transit and Pedestrian Oriented Development (TPOD) Guidelines 213
   - 5.1 Built Form, Density and Mixed Use 217
   - 5.2 Multi-Modal Transit and Last Mile Connectivity 228
   - 5.3 Street-Level Interface and Multi-Level Linkages 233
   - 5.4 TPOD Demonstration 240
   - 5.5 Phased Development 266
6. Streetscape Guidelines 273
   - 6.1 Street Sections 276
   - 6.2 Street Intersections 310
   - 6.3 Public Realm Infrastructure 328
   - 6.4 Street Plantation and Materials 343
7. Built Form Guidelines 363
   - 7.1 Site Development and Building Typologies 366
   - 7.2 Architectural and Facade Treatment 396
   - 7.3 Green Building Features 405
8. Implementation 431
   - 8.1 Regulatory Framework 434
   - 8.2 Implementation Mechanism 436
   - 8.3 Use of UDAG 439
   - 8.4 Next Steps 441

Appendix 447
   - A.1 Glossary of Terms 449
   - A.2 UDAG Checklists 453

1 Introduction



Introduction

1.1
Project Vision and Approach

1.2
Masterplan and Local Regulations Review

1.3
Guiding Principles

1.4
Purpose and Scope of Guidelines

1.1 Project Vision and Approach

1.1 Project Vision and Approach

Overview

The vision for Urban Design and Architectural Guidelines (UDAG), is to guide the future development of Amaravati to become a walkable, liveable and happy city with a unique image and identity. Amaravati is envisioned to celebrate the waterfront and integrate the existing villages with smart planning, architectural, landscape and sustainable urban design to create an inclusive**,** world-class people's capital city. Amaravati, together with the existing cities of Vijayawada and Guntur across the river has the potential to eventually become the smart mega city of Andhra Pradesh. Andhra Pradesh Capital Regional Development Authority (APCRDA, the Client) has appointed UDP International, in a Consortium Agreement with Green Space Alliance (GSA) and Terracon Ecotech for the preparation of the UDAG for Amaravati Capital City (the "Project").

The UDAG will be crucial for developing Amaravati as a smart and sustainable world-class city and ensuring the new capital city is implemented as envisioned. The Land Pooling Scheme (LPS) has been instrumental in getting the land needed from the farmers. Hence village integration with the new development is key to the success of Amaravati. Together with various consultants, APCRDA has developed the Masterplan and is working with Amaravati Development Corporation Ltd. (ADCL) to implement the capital city development. The UDAG is aimed to play a critical role in shaping Amaravati, the new capital city, with a unique image and identity supported by sustainable urban mobility and infrastructure supported by the blue and green network with high-quality public open space. Also, it will ensure that the new developments, including the LPS layouts, are well integrated with the existing villages, showcasing the local heritage, art and culture. The UDAG will also help to guide ongoing and future new developments to be undertaken by APCRDA, ADCL, institutional, public and private sectors within the new capital city to ensure a high quality and cohesive built environment that enables the new capital city to not only become a smart and sustainable model city of Andhra Pradesh but also put Amaravati on the world map.

Key node along River Krishna offering open space to enjoy views of the river and city as well

1.1 Project Vision and Approach

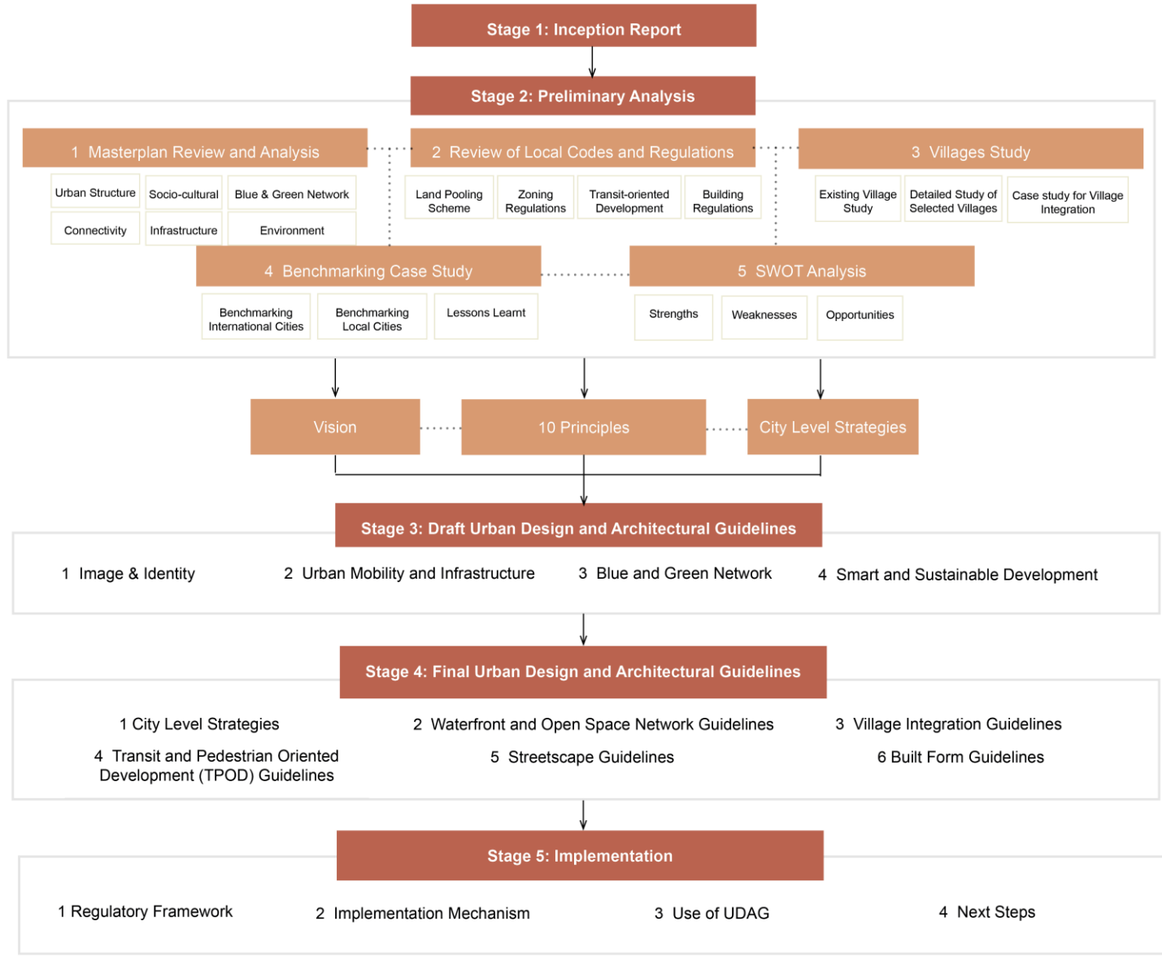
Approach and Methodology

A collaborative place-making approach with a focus on People, Place and Planet as shown below in the Smart and Sustainable City Framework (developed by ISU and UDP International) is used to develop the Final UDAG for Amaravati. The project consists of five stages as shown in the methodology below, which includes Inception, Preliminary Analysis, Draft UDAG, Final UDAG, as well as Implementation. The Preliminary Analysis Stage began with project appreciation involving a review of the Amaravati Masterplan, land pooling scheme, and the local codes and regulations. Several site visits and meetings with APCRDA, ADCL, various village representatives and other key stakeholders resulted in an in-depth understanding of the masterplan, the site and surrounding context including the existing villages. A benchmarking study of international and local cities helped highlight best practices in city development and urban design guidelines resulting in lessons learnt that were adapted to develop the UDAG for Amaravati.

Smart and Sustainable City Framework by ISU and UDP International

To create Amaravati Capital City as a model for India and beyond, it is important to lay the foundation using the smart and sustainable city framework with a focus on ‘People, Place, and Planet’. ‘Smart Thinking’ can then be incorporated into the planning and design, using technology as an enabler to support the development of Amaravati, to enable Smart Living, Smart Environment, Smart Mobility, Smart Infrastructure, Smart Governance and Smart Economy. Following the Smart and Sustainable City Framework as a basis, 10 guiding principles were formulated by the UDP International team working together with APCRDA. These principles identify the core values of what Amaravati needs to embody as a people’s new capital, to guide the development of UDAG.

After an extensive preliminary analysis of the existing context and plans, 10 guiding principles were formulated together with APCRDA, to realise the vision of Amaravati as a people’s capital city. The 10 principles focus on building the city with strong emphasis on the pedestrian experience promoting public transit and walkability with less dependence on vehicles. These principles help guide the development of City Level Strategies as well as UDAG. From image & identity, branding and social integration strategies, the city of Amaravati can be developed with a unique form and culture that is distinct from other cities in India and beyond. The strategies also aim to improve the liveability of the city through walkability and open space network strategies with well landscaped pedestrian-friendly street. Transit and Pedestrian Oriented Development (TPOD) with flexible zoning, mixed use, and green building strategies help guide sustainable community and city development. The vision and the guiding principles, form the basis of the City Level Strategies, and the final guidelines. The Final UDAG consists of a series of guidelines, including, Waterfront and Open Space Network, Village Integration, Transit and Pedestrian Oriented Development, Streetscape Guidelines, Built-Form Guidelines, as well as the framework and next steps for the implementation of the Guidelines.



Methodology

1.2 Masterplan and Local Regulations Review

1.2 Masterplan and Local Regulations Review

Masterplan

The masterplan has covered various aspects of Amaravati's development, including:

- A concept structure of 3 axes (Civic Axis, Recreation Axis and Waterfront Axis) and 3 nodes (Government Node, University Node, and Tourism Node)
- Consist of 9 themed clusters with unique functionalities
- Provision of land-use plan including commercial centres and township model
- Identified key tourist destinations, proposed landmarks of the city and heritage buildings
- Proposed road network and grid pattern of the entire city while following Vastu Principles
- Priority is given to commercial development in CBD addressing the riverfront area as the anchor of the city in relation with river
- Focused on transport network connecting functional areas of themed city clusters

However, there are still issues with regards to the masterplan that needed to be addressed and taken forward by the UDAG

Economy

- Population and employment density distribution will affect the dependency on transit system. However the proposed employment density distribution is not in relation to public transportation and circulation
- Percentage of mixed use distribution needs to be reviewed to encourage 24/7 life in all the clusters

Living

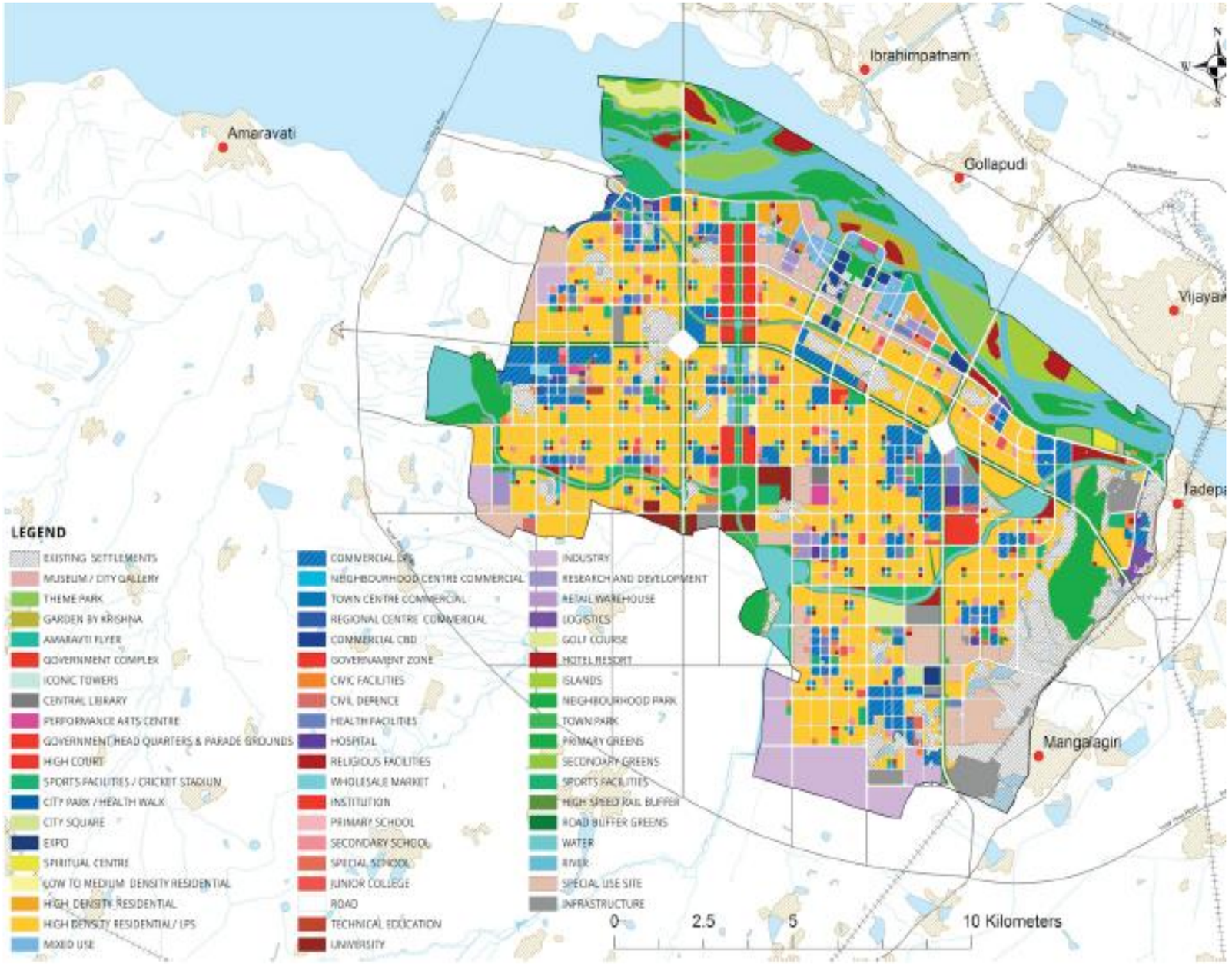
- Riverfront development and integration with capital complex and LPS needs to be reviewed with respect to built form as well as transit connectivity
- Surrounding natural topographic features need to be considered for establishing natural landmarks for city image
- New developments should take into consideration and be sensitive to heritage structures and existing villages within their vicinity
- Transition for commercial development along planned city axis needs to be reviewed sensitively to avoid sudden change in character, urban form and functions

Governance

- While existing villages are preserved and protected, they need to be reviewed for their integration with the surrounding LPS layouts in terms of physical, socio-economic, built-form, heritage, culture, infrastructure, functional and administrative requirements
- The proposed land use plan clearly defines the use of the LPS plots. However, the density distribution versus built form and public space correlation needs to be considered
- Proposed landmark parcels would showcase the image and identity of Amaravati, which should reflect the local Andhra character

Infrastructure

- City level public infrastructure needs to contribute and help improve river and canal water quality, including stormwater and grey water treatment before discharging
- While water gates and infrastructure are proposed to mitigate floods and prevent water entering into habitable areas, they should be designed creatively to avoid physical and visual barriers
- Bund road is proposed to prevent flooding to the hinterland, but this could be designed to become a key feature and ensure public accessibility to the riverfront area
- Although water distribution network and treatment plants are proposed, detailed feasibility study should be done to ensure the quantity of water distribution centres and locations are suitable to serve the different users in the city



Proposed Land Use Plan

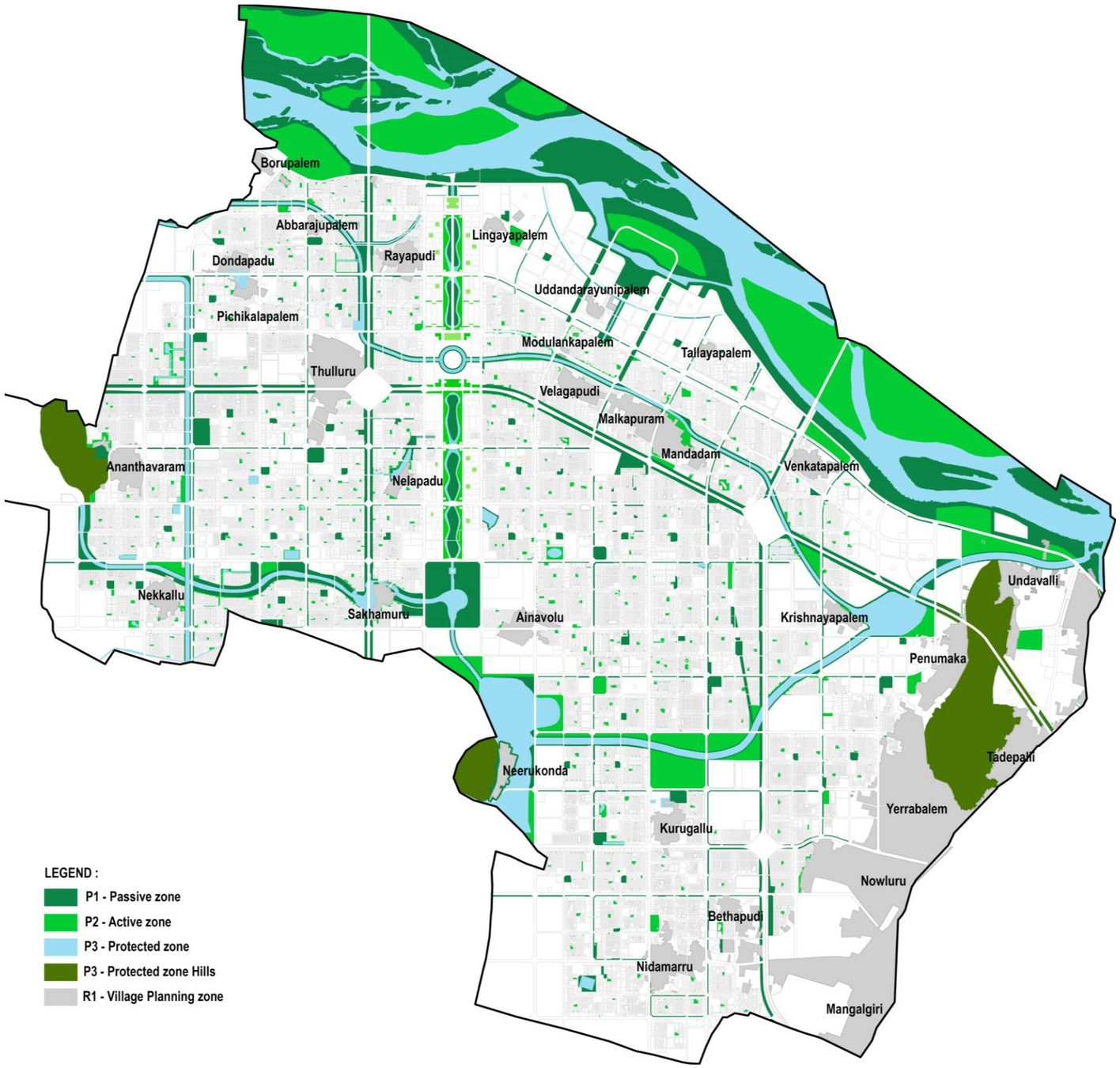
1.2 Masterplan and Local Regulations Review

Mobility

- While the proposed road network provides a hierarchy and grid pattern for Amaravati, the major arterial road running east-west is cutting the capital city into two parts; creating hurdles on north-south connectivity and pedestrian movement within the city
- Public transportation routes including alignments and station locations need to be well integrated with land use, density to create transit nodes to increase catchment and maximize ridership
- Transit line alignments, population, land use and density distribution needs to reviewed and overlapped to facilitate origin-destination movement within city
- The proposed road network should also focus on enhancing connectivity by pedestrian and NMT network to public transit station, parks and riverfront
- NMT routes need to be connected to public transport network for facilitating urban movement
- While the road hierarchy anticipates for future traffic needs for Amaravati, the current capacity may not fully utilise the space given for the proposed road network for some time. The potential for interim open space use on road network until further road capacity is needed should be explored to create a more walkable environment to help reduce car dependency
- The existing and proposed canal network within the city can be explore for the potential and feasibility of water transportation and connectivity to different parts of the city
- Heritage tourism destinations needs to be connected by road, waterways and transit network for promoting tourism

Environment

- The proposed blue-green network can potentially reduce flooding using the canals as diversion of excess water to reservoirs and green areas to reduce stormwater runoffs
- The proposed reservoirs act as detention tanks to reduce the flow of water to River Krishna
- However, some areas of the city do not have access to the canals and would need to address their flooding issues alternatively.
- While new developments would provide higher plinth level to prevent flooding, they should ensure not to worsen flooding situation of existing villages
- The orientation of many peripheral neighbourhood plots does not allow consistent shading throughout, therefore would require sensitive design for micro-climate control to ensure a suitable built form to reduce energy consumption from buildings with a well landscaped streetscape environment
- Although the proposed land use plan includes various types of open spaces, the open space provision and distribution seem to be less than intended for the masterplan
- Many of the tourism destinations are along the blue network, which need to respect water bodies and canals for its environmental value
- Eco habitat and biodiversity along riverfront to be considered
- Functionality of spaces for various urban activities needs to be addressed
- Open space network system is not interconnected; pocket parks and green spaces need to form part of the open space network
- Connections of internal water canals and River Krishna need to be considered through planned green corridors and buffer zones



Blue and Green Network

1.2 Masterplan and Local Regulations Review

Land Pooling Scheme

Land pooling taken up by the government of Andhra Pradesh along with APCRDA is an innovative step in creating adequate land for the new People's Capital. Guarantee return of developed and reconstituted plots and other benefits are provided for land owners volunteering to offer their land.

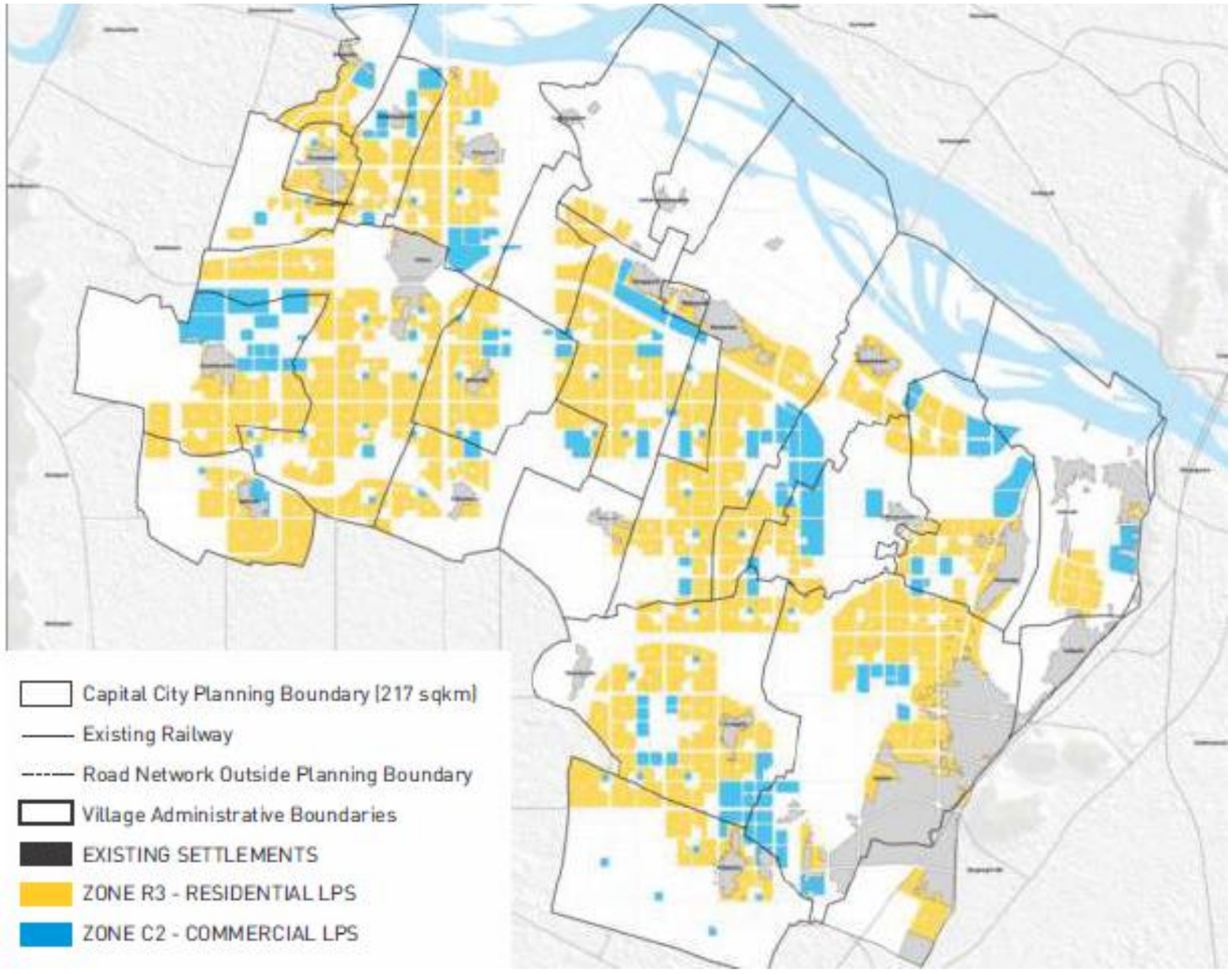
APCRDA was constituted to undertake development scheme and landowners voluntarily sign ownership rights over APCRDA. APCRDA and ADC together develop the land by implementing the public infrastructure such as roads, sewage lines, ICT etc.

Under the leadership of the Commissioner, APCRDA, the LPS evolved after numerous community engagement sessions and events involving the local residents. It enhanced the social integration and also involved the use of local resources like tractors, NREGA workers to aid the making of the city.

Through the LPS, a total of 31.6% of the land is returnable land (combined commercial and residential) to the farmers who came forward to give their land to the development of the capital city. The LPS was instrumental to help determine the final masterplan and the shape of the City.

However, the LPS resulted in the following issues that need to be addressed:

- The LPS compromised on open space provision within the capital city. As during the process of allotting the returnable lands due to the LPS, some of the core principles of planning were not followed in certain areas, for example, provision of adequate open spaces and community facilities.
- As a result of the LPS, the overall planning and design of the capital city looks monotonous potentially missing some of the elements of surprise and curiosity within the new capital city.
- The LPS joint share of land could become a challenge as the city grows, unless a sensitive framework is in place to address issues that may arise.
- To address the needs of the landowners, plots are allocated in numerous sizes were allotted, which offers way too many options.
- The urban form as defined by zoning, is too restrictive in terms of development potential and plot sizes.
- Currently plot amalgamation is not allowed, which might restrict comprehensive developments and should be looked into in the future



Map showing Amaravati Capital City LPS returnable residential and commercial land

Source: LPS Handbook

1.2 Masterplan and Local Regulations Review

Zoning Regulations

The Zoning Regulations (ZR) have jurisdiction over the entire city and address the following:

- Control the design, location, use or occupancy of all buildings and structures
- Regulate land uses, buildable area, building type, parking, setback, service area and equipment, fencing, circulation, signage and green coverage etc.

FSI/ FAR

As per the APCRDA ZR, the FSI ranges from 0.4 to 5 for the LPS Masterplan building typologies. However, the ZR do not give any plot amalgamation strategies for plots that are smaller in residential and commercial categories which may be too restrictive. Permissible FSI as per ZR do not correspond to the urban density clusters as per the planning strategy.

There is no hierarchy in building heights associated with the FSI consideration, for example along the Seed Access Road with the neighbouring typologies. A city should have variations and allow transition in the urban form of the city within its neighbourhoods to create a memorable skyline. Therefore, there is need to have more categories for FSI consideration and review several LPS layouts along major transit corridors for change in FSI/ FAR.

Land Use and Building Height Restriction

R1 shall have a height ceiling. Though it is defined as a low-rise development area, it provides relaxation of additional built up area of 200%. This might lead to a situation where it becomes a high rise high density area, which brings pressure on infrastructure which not only needs better road network but also sewage and drainage networks. Therefore, a height ceiling is required.

Proper guidelines are needed to be in place to check and protect P3 zone as it covers the natural environment and features that are at present highly vulnerable to encroachment. Under P3 permitted uses, biodiversity parks, trails, etc. can be encouraged and construction should not be allowed except for utilities.

Special zones may be introduced to protect the existing heritage structures and culture as heritage zones are not indicated in the Planning regulations and P3 consists of only hills and existing water bodies.

Urban Grain and Form

Urban grain as per zoning regulation and FSI consideration is very small considering maximum ground coverage. Maximum no. of plot division with small sizes for commercial area will not form sufficient site area required for large scale urban development typology. Present situation with small plot size and FSI zoning regulation generates very uniform flat skyline which does not work well to create a sense of place and character. Moreover, large parcel of land with many small commercial plots do not work in isolation. There is a need for a densification strategy along with introduction of mixed use development.

Also, the ZR are not flexible in terms of high rise building typologies, FSI as per TPOD and neighbourhood centres concepts. Moreover, there is no skyline variation as per ZR for the overall city and they do not consider prominent transit corridors for FSI and higher densities.

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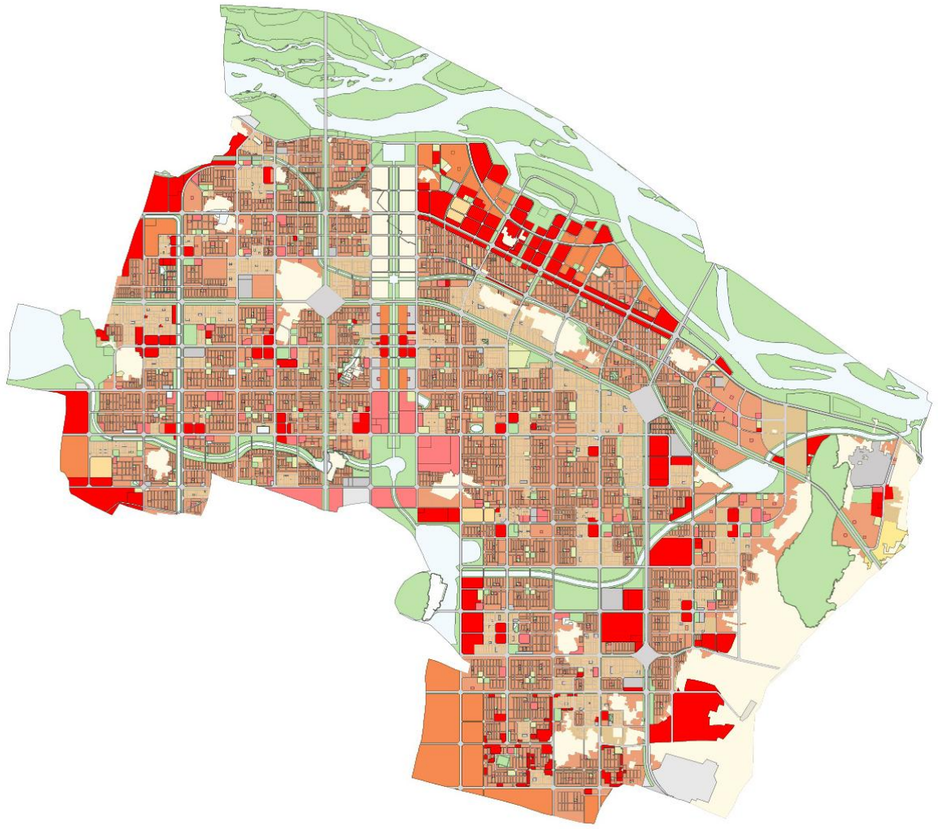

Map showing the FSI distribution in Amaravati city.

Overview of Rayapudi village with LPS layout as per zoning regulation showing the urban grain and height variation

1.2 Masterplan and Local Regulations Review

Building Regulation GO 119

The Building Regulations address the following:

- Control building activities
- Protect the environment and provide better living conditions to the citizens and also enable business friendly structure
- Apply to all development, re-development, erection and/or re-erection of a building as well as to the design, construction of, or reconstruction and additions and alterations to a building

However, some regulations are too general and not clearly set or specific enough which can lead to issues later on.

General

- Boundary wall needs to be perforated to enable visual connectivity as per the GO but percentage of openings is not specified. The design should be specified in terms of privacy, type of building, and transparency
- Provision of a helipad in case of buildings more than 60m in height is a rule mandated in the GO which needs to be reviewed
- Guidelines for hoardings are not present in the present GO
- Minimum clearance/distance from the oil and gas pipelines are not specified
- Regulations regarding building of new religious sites are not specified
- In the case of cluster housing, no set backs are specified
- The provisions for disabled, elderly and children are applicable for public facilities more than 2000 sq m but not applicable to private and public residences
- Parking spaces for the specially abled should also be given certain % to make the city universally accessible
- Regulations for Design for children are not specified in GO 119, in terms of safety and location
- For plots more than 5000 sq. m minimum of 1 tree for every 80 sq. m of land is to be planted contributes to less green %.
- Location of TOT LOT open space in plots more than 5000 sq. m need to be specified as there is chance that it can be a place of future development when sold to others
- Provisions for temporary structures such as fairs are not present in the existing code

Parking

- As per GO 119 parking spaces range from 60% to 20% depending on various categories
- Proper guidelines that aid the design of mechanical parking/car lifts enabling a two tier parking are not present in the present scenario
- The parking standards need to be flexible to encourage such a use
- With growth in digital platforms for shared car usage and transit usage in other cities parking standards are getting reduced and spaces in multiplexes are being transformed to other creative uses
- Regulations need to be flexible enough to encourage the interim use of parking spaces
- 10% of visitors parking should be onsite parking only
- As on street parking is not allowed in Amaravati, special care needs to be taken to accommodate visitors parking or need to explore further if parking should be allowed in commercial areas

Perforated boundary walls

Organised open Spaces

Proper guidelines for Children Spaces

Parking at CRDA Office Lenin Centre VIjayawada

Source: https://www.e-architect.co.uk/barcelona/pomaret-houses, https://www.indiamart.com/khyati-internatinol/amusement-chilren-park.html,, https://news.virginia.edu/content/bovs-buildings-grounds-committee-reviews-schedule-ivy-corridor

1.3 Guiding Principles

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1 *Nurture a People-First, Socially Inclusive and Equitable City*

People's needs will be prioritised in Amaravati. The people-first principle reckons every individual as a valuable stakeholder of the city, regardless of age, physical status, income etc. The inclusiveness and equality being treasured with a 'People- first' lens will make Amaravati the true 'People's Capital'.

New Delhi, India – Raahgiri Day, a weekly event in which streets are closed to cars and open to residents to celebrate community

Berlin, German – Barrier-free design has implemented in the city of Berlin to cater the diverse groups of people

2 *Reposition the Krishna River as the Heart and Soul of the City*

The new Capital City can take advantage of its location near riverfront like many international cities. Amaravati can develop Krishna River as the heart and soul of the city. The riverfront and the canals together form the blue and green network which will provide an enjoyable environment and opportunities for tourism development.

Victoria Harbourfront, Hong Kong – Waterfront as an active space

Marina Bay, Singapore – Bayfront as the key development area in the city

Source: http://www.ionewsplus.com/raahgiri-back-in-new-avatar-as-bhubaneswar-pathotsav/, http://www.stadtentwicklung.berlin.de/bauen/barrierefreies_bauen/index_en.shtml, https://www.yearbook.gov.hk/2012/en/gallery_urban.html, https://trithucvn.net/du-lich/23-thanh-pho-hang-dau-the-gioi-ve-nghe-thuat-am-thuc-va-am-nhac.html

1.3 Guiding Principles

3 *Encourage a Transit and Pedestrian Oriented Development*

Sustainable transit will be backbone of mobility in Amaravati with effective Transit and Pedestrian Oriented Development. The convenience of enhanced mobility with efficient multi-modal transit, including rail, bus, tram, water transit, as well as biking and walking and less dependence on cars.

Waterfront, Toronto – Cycling paths and LRT system along the waterfront

Alexanderplatz, Berlin – A pedestrian-oriented public square which is also well-served by public transit

4 *Ensure Mixed Use Development*

Encourage horizontal and vertical mixed use developments in Amaravati to create a vibrant city bustling with activity 24/7. The mix of land uses and activities will also foster diverse economic opportunities for Amaravati and its people.

Canary Wharf, London – Mixed use development in the business district ensures constant activities throughout the week

Sheppard-Yonge, Toronto – A mixed use development in Uptown Toronto to put together offices, shopping malls and condominiums

Source: http://eventsintorontonow.blogspot.com/2015/09/10-lasting-things-from-summer-in-toronto.html, : http://www.eriksmail.de/110617Berlin.html, http://www.geograph.org.uk/photo/440200, http://pharmacyprep.com/pharmacy-prep-location.html

1.3 Guiding Principles

5 *Preserve Local Heritage, Art and Culture*

Local heritage, art and culture are keys to create a sense of place and community ownership to strengthen the local identity and collective memories of the city. Amaravati with its emphasis on village integration, local art and culture will nurture local craftsman and artists to become an attractive city for residents and visitors alike.

Distillery District, Toronto – The old distillery buildings were revitalized into a mixed use area to attract tourists but also conserve the heritage

Superkilen, Copenhagen – Exemplifying how art can give a serendipitous impact to users in a public space

6 *Strive for a Liveable, Walkable and Connected City*

A liveable, walkable and connected Amaravati encourages people to live an active lifestyle and walk to their destinations with a pleasant experience under comfortable and safe conditions. Design responding to the micro-climate needs of the people and the local environment to create a memorable city life.

Stanley Park, Vancouver – Waterfront is a key design area of Downtown Vancouver

Millennium Bridge, London – A pedestrian-only bridge connecting the banks of River Thames

Source: https://www.gettyimages.com/videos/walk-toronto?sort=mostpopularandofflinecontent=includeandphrase=walk%20toronto, https://archiscapes.wordpress.com/2015/05/24/superkilen-copenhagen-topotek-big-superflex/superkilen-black-market-copenhagen-topotek-15/, https://www.huffpost.com/entry/insanely-cheap-off-peak-d_n_8094728, https://failures.wikispaces.com/Millennium+Bridge+Performance+Issues

1.3 Guiding Principles

7 *Develop a Vibrant City with High Quality of Life*

Amaravati with its high quality public spaces and diverse opportunities will become an attractive destination. The city will be able to attract a diverse group of people, businesses and activities to create a vibrant city offering a high quality of life to its people and visitors alike.

Piccadilly Gardens, Manchester – A green and vibrant open space for people to gather on weekends

Tempelhofer Feld, Berlin – The disused airport was transformed into a vibrant public space for leisure activities, enhancing people's living quality

8 *Build a Clean, Green, Healthy and Happy City*

Amaravati embraces the idea of clean, green, healthy and happy city to minimise the impacts of the development to the environment and ensure the well-being of its inhabitants. Amaravati will become a great city to live, work, play, learn and have fun for all age and income groups.

Gardens by the Bay, Singapore – A collection of gardens in the city provides a clean and healthy environment for its people

Zero Carbon Building, Hong Kong – Exemplifying how the city can be supported solely by renewable energy

Source: https://www.visitmanchester.com/visitor-information/travel-information/piccadilly-bus-station-p276441, https://www.sundaypost.com/in10/travel-in10/savouring-sydney-budget/ , https://en.wikipedia.org/wiki/Gardens_by_the_Bay, http://www.worldgbc.org/news-media/worldgbc-launches-asia-pacific-leadership-green-building-awards-2018

1.3 Guiding Principles

9

Promote Smart and Sustainable Development

The design of Amaravati will look for ways to improve the efficiency and convenience in daily lives, not limited to technological advancements but also smart thinking, planning and design with a focus on People, Place and Planet. This will also enhance the city's resiliency in physical, social, environmental and economic aspects.

Edmonton, Canada – A rising city as one of the world's newest smart cities thanks to their Open City Initiatives

Barcelona, Spain – One of the world's smartest cities due to its extensive use of big data technology in tackling urban problems

10

Create a Unique City Image and Identity

Amaravati will become a city with a unique image and identity contributed by its rich Andhra culture and local heritage together with its context-specific new development. Amaravati will be a new world class capital city, a model for other cities in AP, India and beyond.

River Thames, London – The city established its unique image through a series of new and old landmarks

Downtown, Singapore – The city aims to become 'a city in a garden' through enhancing the green initiatives

Source: https://www.moneysense.ca/spend/real-estate/buy-edmonton-real-estate-2018/, http://magazine.pickandpow.com/en/barcelona-the-latin-smart-city/, http://eaun17.uroweb.org/the-meeting/about-london/, http://www.scmp.com/lifestyle/travel-leisure/article/2108716/best-things-do-singapore-layover-airport-jacuzzis-and

1.4 Purpose and Scope of Guidelines

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Purpose of UDAG

Given the scale of the new capital city, Amaravati will need to be developed strategically over ten to twenty years and beyond. As a result of the LPS, an extensive road network will need to be implemented within the next couple years, hence horizontally the urban structure of the city will begin to be realized soon. However, vertically the built environment will take a much longer time to be developed, so the interim use of the land within the city will become important.

The UDAG will not only help guide the development of Amaravati but will also help minimize urban development issues of the new capital city over time. The UDAG will guide the future development of Amaravati to create an accessible city with multi-modal transit and an extensive blue and green network, resulting in smart, sustainable and resilient development that is human scaled and pedestrian friendly; making Amaravati's vision a reality.

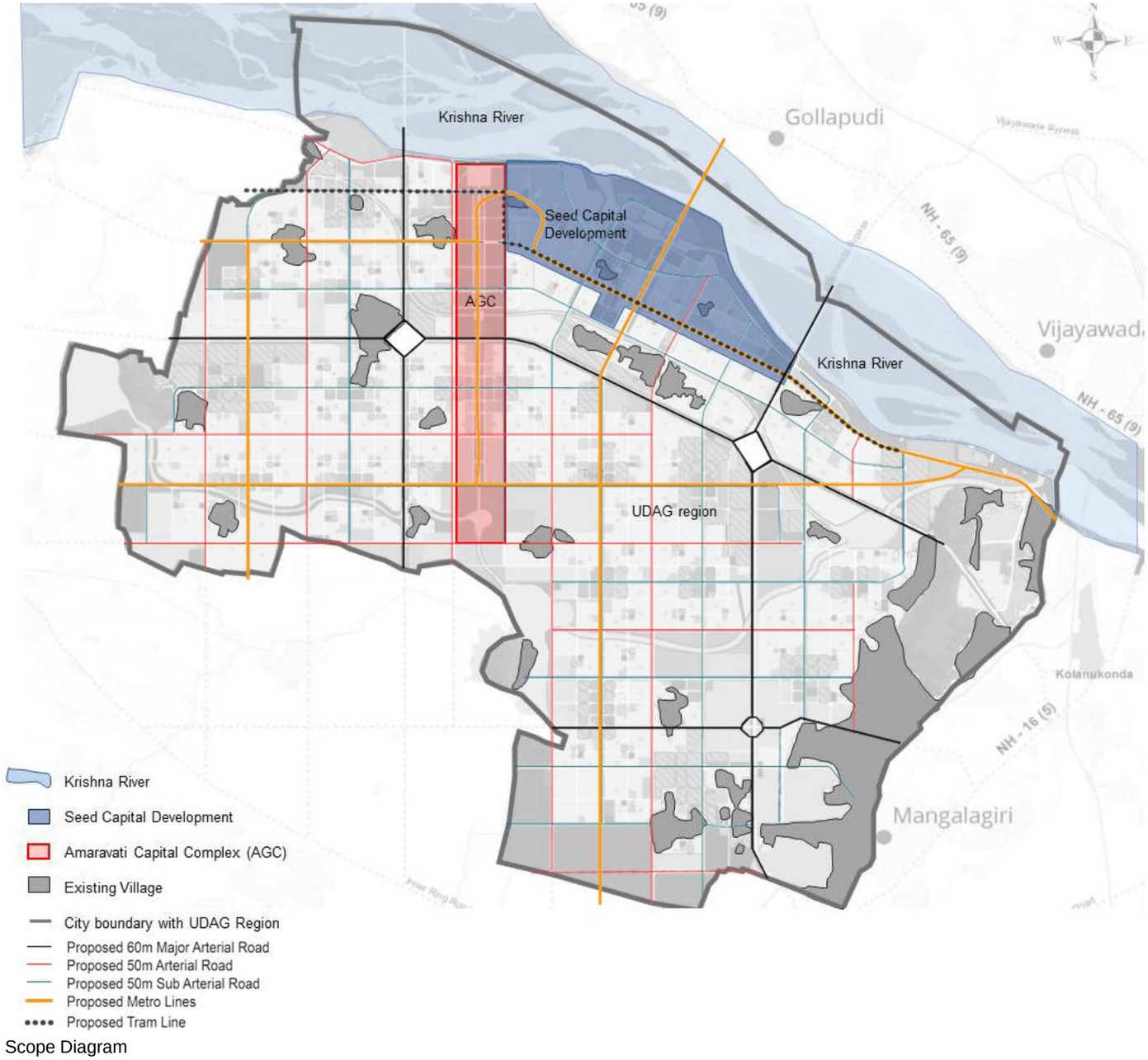
River Krishna is a valuable natural asset of the new capital city with a potential to become the heart and soul of Amaravati. The river offers an opportunity for Amaravati to become an attractive tourist destination, but also adds to the city's image, identity and uniqueness. The river should form the basis of the blue and green network with various types of open spaces, to make Amaravati, a green, clean, healthy and happy city, with a high quality of life.

ZR should be more flexible to promote vertical zoning, mixed use and mixed income developments, interim uses with more sustainable development regulations. Developments along the riverfront should contribute to the city skyline along the river and provide views to the river, including higher density development along transit corridors and key developments such as the AGC and the Seed Capital. They will further help shape the city's urban form, which can be viewed from key vantage points, such as the Kanaka Durga Temple across River Krishna and the Undavalli Caves.

To make Amaravati liveable, affordability must be maintained; several social infrastructure and public facilities must be implemented to increase the overall happiness and social well-being of the community. Amaravati should ensure fair economic opportunities for all sectors of society by implementing informal sector and encouraging mixed-income households into communities.

Additionally, building a cohesive community through social integration and engagement with local villages will be critical in making Amaravati a successful new capital city. Preserving heritage and integrating local art and culture will help create a unique image and identity for the new capital city. Amaravati should be a welcoming place integrating the local people within existing villages, as well as future residents. The UDAG will guide the future development of the city and its built environment and dictate the character of the city with respect to the local character and vernacular architecture especially within the existing villages and the surrounding LPS areas.

To facilitate the increase in urban mobility, Amaravati must develop sustainably with efficient use of transit, resources, green building, smart and innovative technologies, etc. Pedestrian pathways and accessibility must be emphasized in existing villages to promote NMT and walkability throughout the city and within the neighbourhoods creating a healthy, and happy city with a sense of community. Amaravati should be a liveable, walkable and connected city through Transit and Pedestrian Oriented development (TPOD). Streetscape should develop in line with the transport and infrastructure plans to form the urban structure of the city with well-landscaped, pedestrian-friendly streets, thereby creating a vibrant and pleasant environment for pedestrians while being sensitive to the micro-climate.



UDAG Scope Diagram

1.4 Purpose and Scope of Guidelines

Scope of UDAG

The new capital city should be developed to be a place where children, elders, as well as women are empowered to have equal involvement and engagement within the community and the city. Amaravati should continue to strive to be a socially inclusive, and equitable city that is vibrant, pedestrian friendly and safe.

The Scope of UDAG covers the riverfront, the canals and open space network, the streetscape, built form along the streets, commercial, mixed use and large scale developments along TPOD areas and larger sites. The integration of LPS areas with the existing villages as well as AGC and Seed Capital are equally important UDAG implementation framework and mechanism is included to ensure the proper use of the guidelines in shaping the future development of Amaravati.

Working together with APCRDA, the project team has developed the Final UDAG that will make Amaravati a true people's capital, a destination of opportunities and a world-class city of the future.

Use of UDAG

UDAG are intended to guide the development of Amaravati into a people's capital enjoyed by all. With respect to the urban form, streetscape, open space, public infrastructures, architecture and sustainable development, the guidelines will direct public sector and private developments into prioritising the needs of local residents and pedestrians. Integrating the existing villages, local heritage, art and culture, as well as the AGC and Seed Capital. With its blue and green network, the city will transform into a city with a unique image and identity through place-making and smart city strategies**.** UDAG includes both mandatory and suggestive guidelines and stipulates whether they are intended for public sector, private or other sector or both in some cases.

Target Users

UDAG should be considered in all developments projects, from public realm to large developments, in Amaravati. In applying the guidelines, it is important for decision makers, developers, planners, designers, engineers and community representatives to consider how their projects are in regards to the UDAG as well as the 10 principles.

Content

The UDAG include the following sections:

1. Introduction
2. City Level Strategies
3. Waterfront and Open Space Guidelines
4. Village Integration Guidelines
5. Transit and Pedestrian Oriented Development Guidelines
6. Streetscape Guidelines
7. Built Form Guidelines
8. Implementation

Appendix

Skyline with protected green areas

Urban Mobility - BRT at Belo Horizonte

Krishna River

Smart and Sustainable Development

Source: APCRDA, http://gba2016.hkgbc.org.hk/, https://brtdata.org/location/latin_america/brazil/belo_horizonte, https://tamil.oneindia.com/news/india/yes-it-s-vijayawada-but-why-210243.html

1.4 Purpose and Scope of Guidelines

| | | Codes/ Strategies/ Guidelines | | |

2 City Level Strategies

Overview

City Level Strategies

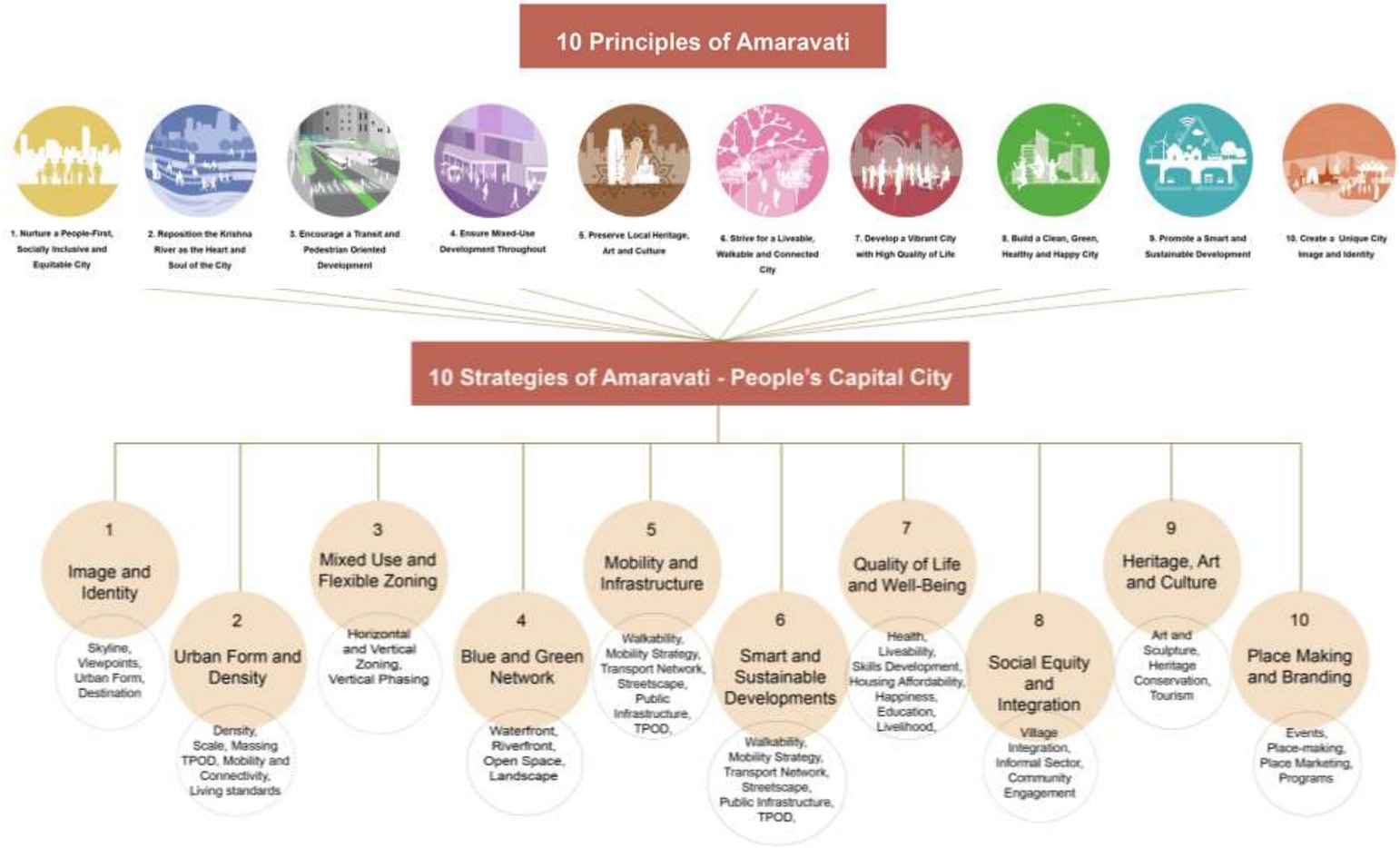
The future development of Amaravati guided by the UDAG will ensure that the city is designed using a people-first approach to form a liveable and walkable city. Amaravati will be transformed with River Krishna as the heart and soul of the city, together with its blue and green network, supported by sustainable transit making walking and biking a priority. With key developments of AGC and the Seed Capital along the waterfront and various townships in the hinterland should be well integrated with existing villages. By promoting the local heritage, art and culture within the existing villages, along landscaped streets and open spaces to improve the quality of life of the residents and visitors alike.

Amaravati should become a resilient city that is responsive to climate change, promotes a healthy lifestyle, is participatory in decision making, offers multi-modal transit and uses efficient, clean technologies for infrastructure development. In addition encouraging Transit and Pedestrian Oriented Development (TPOD), with high rise compact mixed use development along transit corridors to create a unique image and identity for the new Capital City.

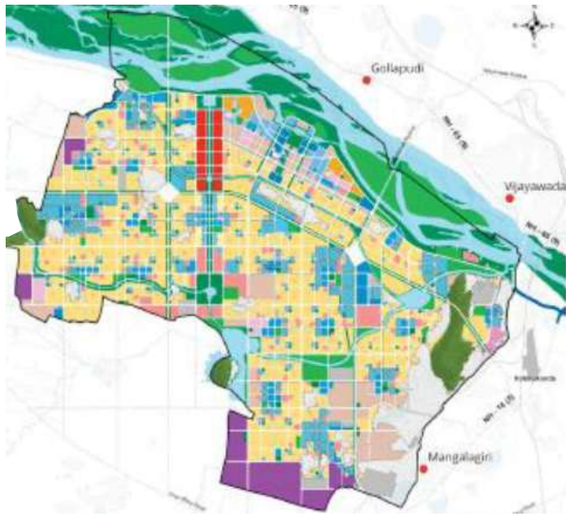
Based on the ten guiding principles, 'City Level Strategies' were developed to ensure that Amaravati will become a liveable and walkable city offering a high quality of life for its people. With the help of UDAG, Amaravati has the opportunity to become a smart, sustainable and resilient city, a model for other cities in India and beyond.

The City Level Strategies aim to capitalise on the natural blue and green assets, the future developments of the LPS, the existing villages, as well as the heritage and culture to define Amaravati's character as the capital city of Andhra Pradesh. The diagram on the right illustrates the 10 Guiding Principles introduced in Chapter 1, and the City Level Strategies to shape the future development of the Amaravati. The 10 city level strategies are listed below and will be further elaborated in the following sections:

- Image and Identity
- Urban Form and Density
- Mixed Use and Flexible Zoning
- Blue and Green Network
- Mobility and Infrastructure
- Smart and Sustainable Development
- Quality of Life and Well-Being
- Social Equity and Integration
- Heritage, Art and Culture
- Place Making and Branding



Guiding Principles and City Level Strategies.



City Level Strategies

2.1 Image and Identity	**2.2 Urban Form and Density**	**2.3 Mixed Use and Flexible Zoning**	**2.4 Blue and Green Network**	**2.5 Mobility and Infrastructure**
2.6 Smart and Sustainable Development	**2.7 Quality of Life and Well-Being**	**2.8 Social Equity and Integration**	**2.9 Heritage, Art and Culture**	**2.10 Place Making and Branding**

2.1 Image and Identity

2.1 Image and Identity

Image and Identity

A city's image is based on its urban form and structure, the city skyline, the quality of its public space, architecture, natural setting and the surrounding context. Amaravati, being developed along River Krishna, should have a unique image and identity with a skyline that increases the attractiveness of the city as viewed from various vantage points. The character of the city comes from not only the built form but also its people, which can be seen through the local heritage, art, culture, music, traditions, customs, food etc. Together they create the image and identity of the city.

Skyline, waterfront and landscaped open space contribute to the city's unique image and identity. The city image is created by the urban form, building profile, waterfront and public realm of the city, which should be unique and distinctive. A skyline is critical to the image of the city and in order to appreciate a city's skyline, certain viewpoints, or key locations must be designated to fully embrace the city views.

Viewpoints are places around the city that provide a view to the city. They can be natural or manmade, such as a waterfront, mountain peak, rooftop, plaza, etc. Viewpoints enhance a city's experience as they provide different vantage points to enjoy the overall view and skyline of the city. Every city should have important viewpoints and certain features that highlight the city symbolically.

Vistas, on the other hand, can be viewed through or along an avenue or an open space corridor. Different from viewpoints, it is narrowed by a line of structures or trees on either side. Vistas are important for a city as they help enhance the feel of streetscapes along view corridors and improve the quality of the surrounding area, for example the civic axis of the AGC as shown in the adjacent image.

This section will guide the identification, preservation, and enhancement of viewpoints and vistas of the city leading to a world-class image and identity for Amaravati.

Visual Corridor of Amaravati Government Complex

Source: Amaravati Government Complex Concept Masterplan, 2018

2.1 Image and Identity

City Level Views

For Amaravati, city level views can be classified as follows:

Waterfront View of River Krishna

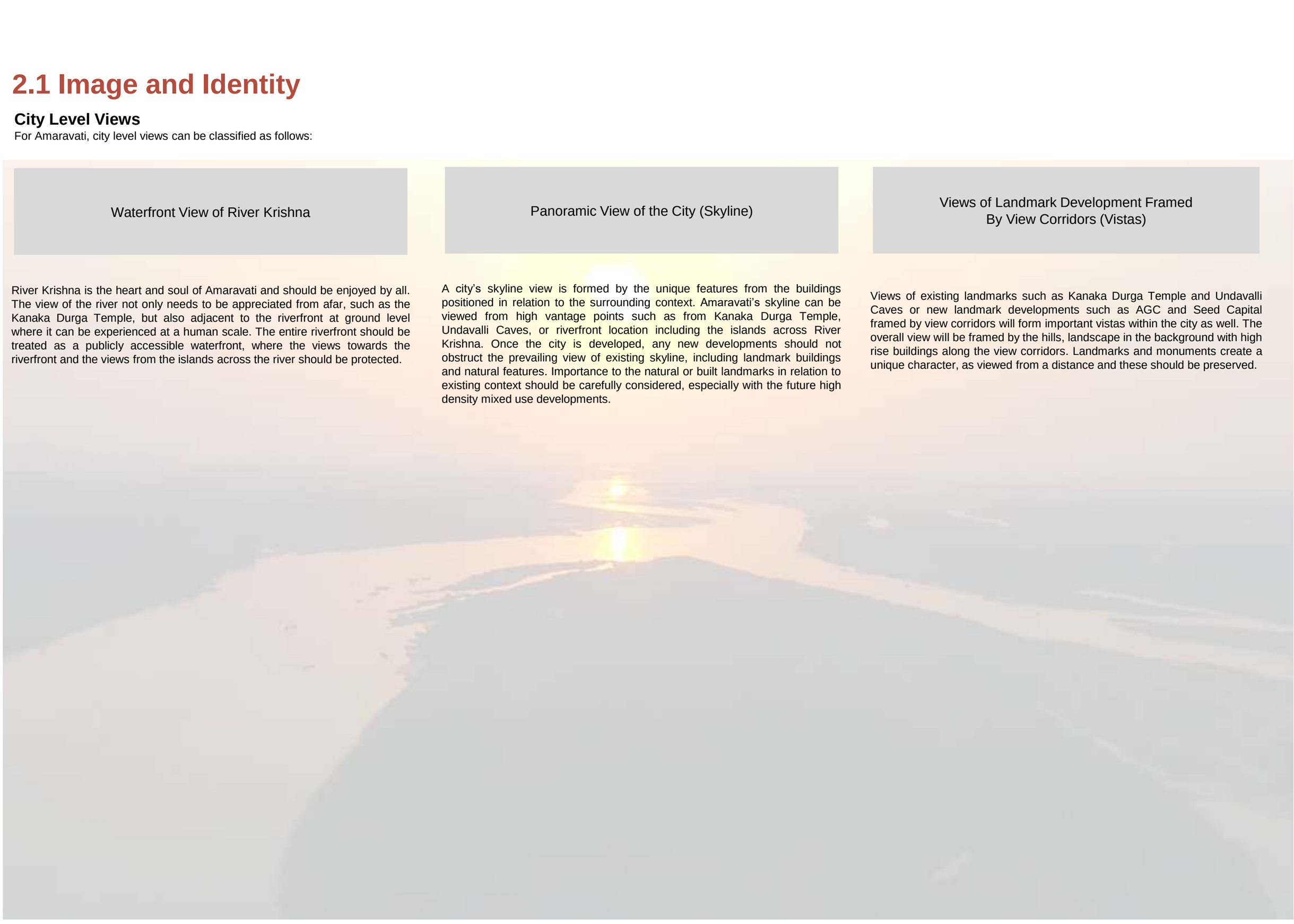
River Krishna is the heart and soul of Amaravati and should be enjoyed by all. The view of the river not only needs to be appreciated from afar, such as the Kanaka Durga Temple, but also adjacent to the riverfront at ground level where it can be experienced at a human scale. The entire riverfront should be treated as a publicly accessible waterfront, where the views towards the riverfront and the views from the islands across the river should be protected.

Panoramic View of the City (Skyline)

A city's skyline view is formed by the unique features from the buildings positioned in relation to the surrounding context. Amaravati's skyline can be viewed from high vantage points such as from Kanaka Durga Temple, Undavalli Caves, or riverfront location including the islands across River Krishna. Once the city is developed, any new developments should not obstruct the prevailing view of existing skyline, including landmark buildings and natural features. Importance to the natural or built landmarks in relation to existing context should be carefully considered, especially with the future high density mixed use developments.

Views of Landmark Development Framed By View Corridors (Vistas)

Views of existing landmarks such as Kanaka Durga Temple and Undavalli Caves or new landmark developments such as AGC and Seed Capital framed by view corridors will form important vistas within the city as well. The overall view will be framed by the hills, landscape in the background with high rise buildings along the view corridors. Landmarks and monuments create a unique character, as viewed from a distance and these should be preserved.



2.1 Image and Identity

Viewpoints and Viewsheds

Amaravati will be developed along the River Krishna with the principle north south civic access formed by the AGC, the mountain peaks to the north, south, east and west as well as the canals meandering from east to west across the city. Together these help form viewsheds and vistas that can be viewed from various vantage points and viewpoints.

The image and identity of the city with its blue and green network will make it unique and attractive to residents and visitors alike. A viewpoint is a place that showcases an overall view of the city. Viewsheds are the visible areas from a vantage point, and view corridors are the existing or planned openings in the built environment, such as the civic axis, major open spaces and streets such as the waterfront boulevard that offers city views and scenic vistas. Viewsheds increase the desirability of an area, which can attract residents and more visitors to enjoy and experience the city. As developments progress in the capital city, these important view corridors should be protected and enhanced through a view management framework by the public sector. It is important to provide opportunities to enhance the education and raise awareness of the general public to gain more support from the local residents, community and private sector, various institutions and professional organizations to work together to improve and safeguard the city's image and identity.

City views should always be open to public and key viewpoints should be given importance and preserved as they can enhance people's experience of the city and become landmark destinations as well. Viewpoints do not have to be stationary; a corridor can also create a moving scenery providing an opportunity to observe a city's transition from one end to another. New developments should consider the perspectives from different viewpoints to protect people's rights to the scenery of the city's skyline and waterfront views.

For Amaravati, the principles for city level views include:

- Landmark and tall buildings should contribute to an interesting skyline and be sufficiently spaced apart to minimize the loss of open sky views
- Developments adjacent to existing viewpoints, such as Undavalli Caves, Kanaka Durga Temple and River Krishna should be controlled and protected to enhance the experience of heritage and nature enthusiasts
- Vistas shall be framed with both landscape and buildings, in order to increase the visibility of key views
- Landmark buildings located on major sites should be emphasized through their design and architectural expression
- A stepped building height profile with high rise buildings in the hinterland and low rise buildings towards the waterfront
- Qualitative view assessment should be applied to all designated views
- While assessing a viewshed, parameters such as building height, geometric pattern, adjacent land use, site and surrounding context should be considered
- UDAG should be implemented by APCRDA, and any new developments should follow the guidelines, both mandatory and suggestive as appropriate

Structure Plan

- **A** Government complex (civic axis) view
- **B** Central spine of Seed Capital
- **C** View from surrounding hills and water bodies
- **D** View from City park

Map showing Structure Plan for Vantage Points

Source: Base map – APCRDA, For Hill Peak heights - https://gis.apcrda.org/lps/index.html

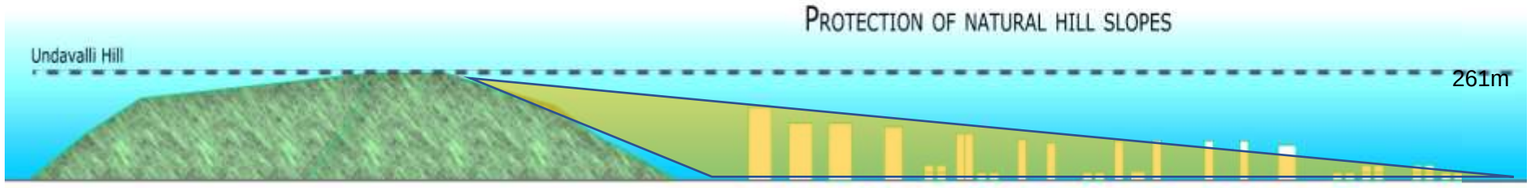
2.1 Image and Identity

City Skyline

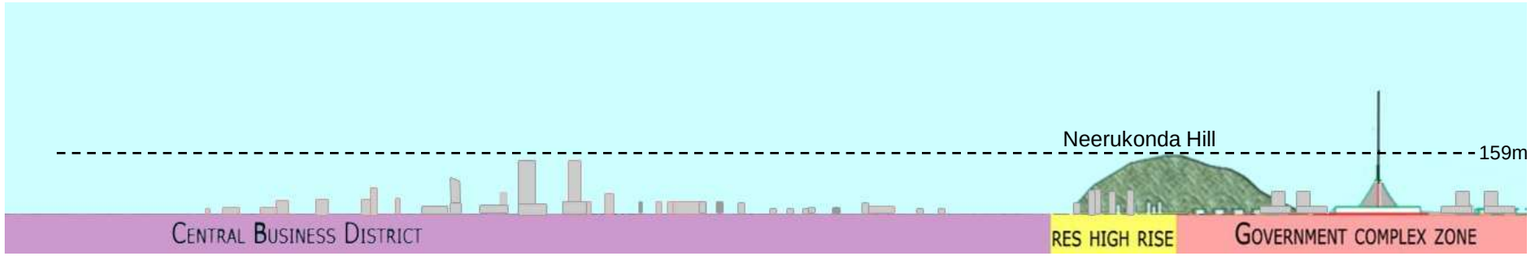
A skyline is critical to the image of a place because it highlights the characteristics of the city. The principles below aim to guide and protect Amaravati's skyline:

- Amaravati's skyline should have a coherent variation in building height profile from the high-density core area to low-density fringe areas
- Ridgelines / peaks are valuable assets and could be potential vantage points so their preservation should be given special consideration in the development process
- A building free zone below the ridgelines should be maintained when viewing from key and popular vantage points
- To ensure riverfront, canals and other water bodies are enjoyed by all, there needs to be restriction and limitation for developments near the waterfront
- There should be visual coherence highlighting key areas of the city such as AGC, Seed Capital, transit corridors through built form, massing, colour, texture and landscaping
- Amaravati should apply the stepped building height profile to enhance the visual appearance. High rise buildings should be located inland, with low rise developments along the riverfront
- It is important to avoid creating the "wall" effect along the views of the river and water bodies
- Connectivity between tall buildings and open spaces should be enhanced to facilitate unobstructed use of the spaces by occupants and pedestrians
- Low rise developments/ open spaces and parks also offer visual relief between high rise development clusters
- When more than one cluster is introduced in a city next to each other, a gradual transition should be observed between the clusters through landscape corridors or urban greenways
- Cluster compositions should incorporate central points of significance to provide visual references to enhance legibility and orientation and should be well integrated to adjacent clusters
- There should not be a big variation in height at fringe area. It should form a smooth visual and aesthetic transition between neighbourhoods and city boundaries

Conceptual city skyline sketch from Kondapalli Hill



Proposed protection of hills such as Undavalli and skylines towards the city from higher altitudes



Conceptual city skyline sketch along River Krishna

2.1 Image and Identity

Key Vantage Points of Amaravati

Amaravati, given its waterfront location and surrounding context, can be viewed from several vantage points, including the hills to the north, east and west and the islands in River Krishna. Some of the vantage points offer city level views such as the skyline and the riverfront. It is also important to consider the many villages in Amaravati as they form an important part of the city's identity and local character.

New developments of Amaravati should also provide additional vantage points within the city to appreciate the natural and manmade features of the city, while also allowing people to look beyond the city. The following are some of the vantage points through which the city can be viewed from:

1. Kanaka Durga Temple, Indrakeeladri Hill
2. Bhavani Islands
3. Seed Capital
4. Kondapalli Hill
5. AGC
6. Ananthavaram Hill
7. Sakhamaru Park
8. Neerukonda Hill
9. Mangalgiri Hill
10. Penumaka Hill
11. Tadepalli Hill
12. Undavalli Caves

View from Undavalli Caves

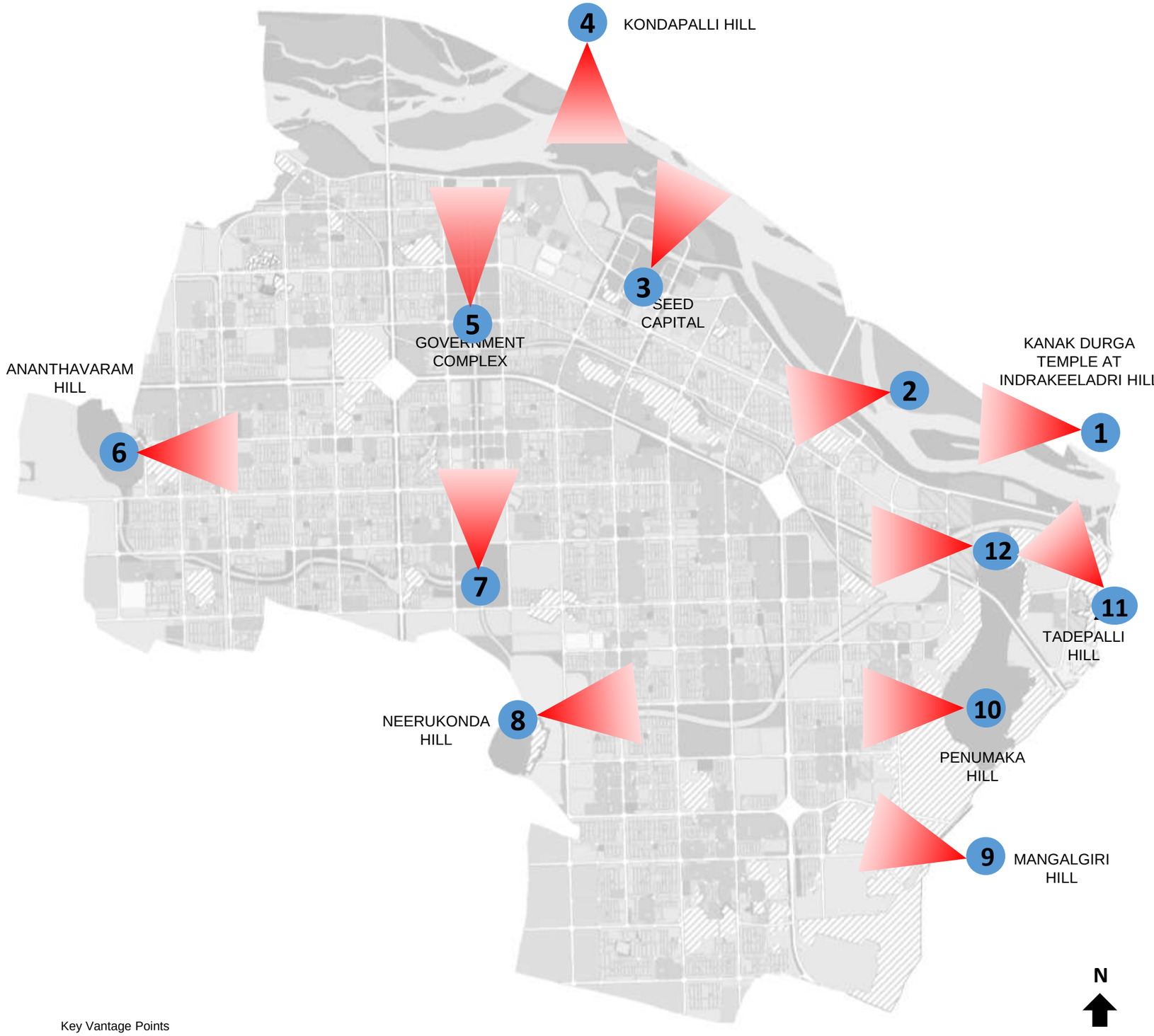
View from Kanaka Durga Temple

View from Undavalli Caves

View from Bhavani Islands

View from the Ananthavaram Temple

View from Punnami Ghat



Key Vantage Points

Source: Base map – APCRDA, on site images

2.1 Image and Identity

Setting Up Designated Views

Designated views should be set up at different viewpoints of the city to ensure the unique image and identity of the city can be enjoyed by citizens and tourists. Designated views should be carefully managed and protected. It is important that viewing places are accessible and well-managed to provide a quality experience to the users.

It should be noted that although the contexts of designated views are unique and different, there are similar features or key principles for view management which could be adapted and applied. Reference is taken from the London View Management Framework to indicate how valuable viewpoints can be maintained.

A designated view should consist of multiple viewing locations at specific locations within the city as appropriate. For example within a 120 degree field of interest, different points are assessed to test if good views are offered. The view should be defined into three layers according to the distance. These are foreground, middle ground, and background, so that different action and restriction can be imposed. Together they should be managed such that the viewing corridor is protected. The adjacent image shows the different components of a designated view.

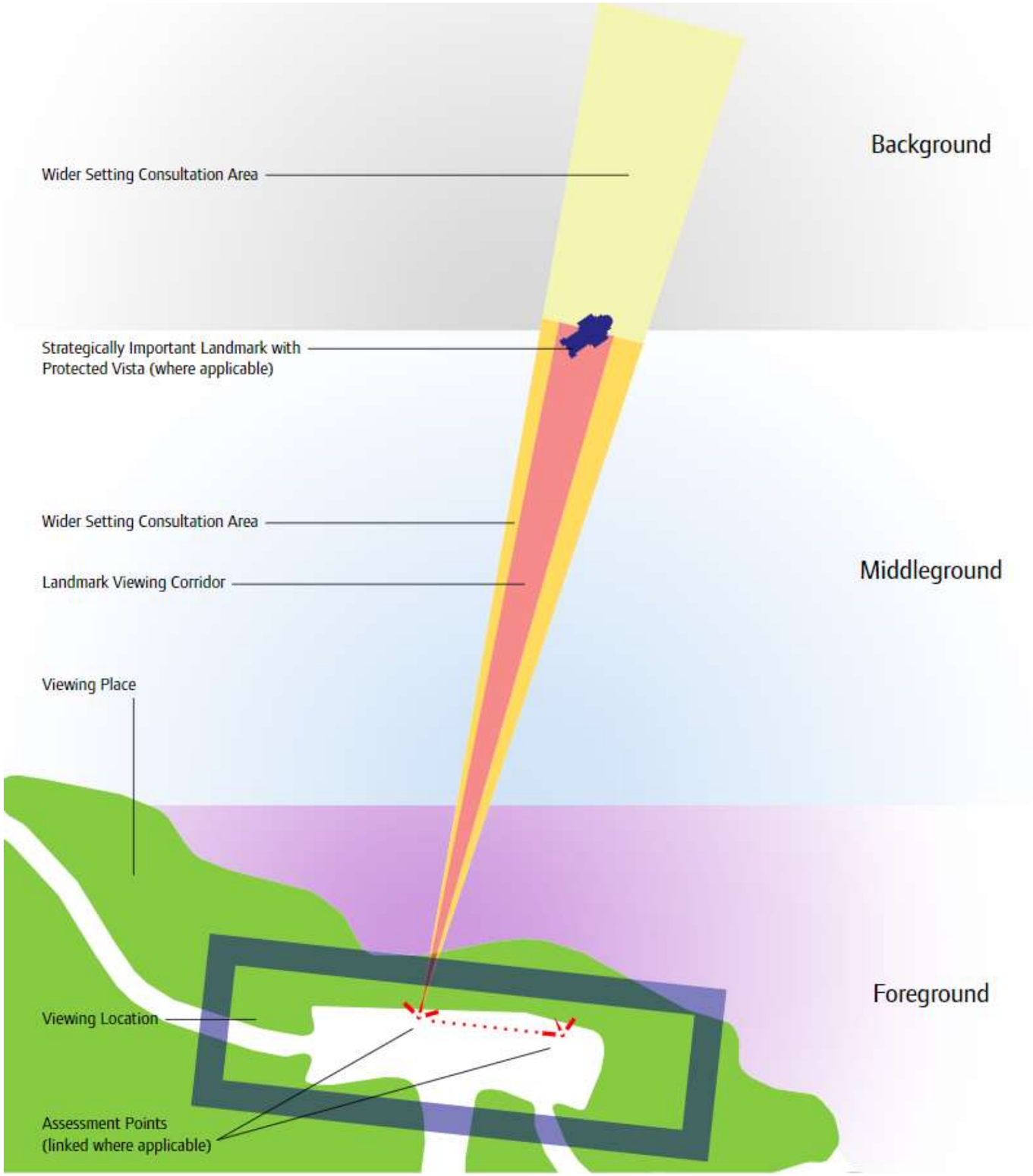
Foreground covers mainly the viewing place, and together with middle ground, which is the space before the specific landmark/ skyline, the viewing location is covered. A triangular landmark viewing corridor is formed between the assessment point of the viewing location and the strategically important landmark. This viewing corridor should be kept clear.

Further to the foreground and middle ground, the distant area will form the background to a landmark with its built/ landscaped urban form. The background comprises of the wider setting consultation area that influences the image of the city for the viewer to recognise its uniqueness. Visual analysis and assessment is therefore required for change within the wider setting consultation area to conduct view-sensitive development.

A Landmark Viewing Corridor is formed between the assessment points and the strategically important landmark. Assessment points should have clear and unobstructed viewing of landmarks as the optimal viewing points at the viewing location.

Amaravati View Management Framework

Amaravati View Management Framework (AVMF) should be developed by APCRDA, which will be crucial for safeguarding the future development of Amaravati. AVMF should aim to designate, protect and manage important views of the city and some of its major landmarks. Through UDAG city level strategies and the AVMF will help guide to protect and enhance the local culture, creating viable vistas for the people to experience and enjoy the city views.



Components of a Designated View (Plan)

Source: London View Management Framework (https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/supplementary-planning-guidance/london-view-management)

2.1 Image and Identity

Urban Design and Architectural Guidelines

- Education on design guidelines and undertaking design reviews gives communities a chance to decide how development will affect their city, neighbourhoods and countryside
- Responsible controls of elements such as building height, massing, design, materials, colour, landscaping, and streets are established in the Urban Design and Architectural Guidelines to guide future development of the city

Zoning and Land Use Ordinances

- Zoning and Land Use Ordinances should protect city views
- Zoning area of a viewshed needs to be amended
- Zoning bylaws should limit the height of building based on their proximity to designated viewshed

Green Belt Legislation

- Green belts are open tracts of land that create a scenic buffer between developed areas and surroundings
- Green belt should allow landscaping or urban farming on designated strips of land eliminating land speculation and development pressures

Strict Billboard Controls

- Billboards mar the scenic beauty of a place and need to be sensitively designed and located
- Banning billboards ensures that the unique beauty of scenic vistas and viewsheds remains unmarred by intrusive and unnecessary signs

Examples of protected country parks to preserve green spaces and viewpoints, Hong Kong

People enjoying the viewpoints in the country parks in Hong Kong

Education Awareness and Participation

- Conducting visual assessment to begin to identify what are the possible ways to create such points
- Encourage citizens, school groups, local leaders, business owners to participate in a visual assessment to identify community's concerns

Incentives and Benefits

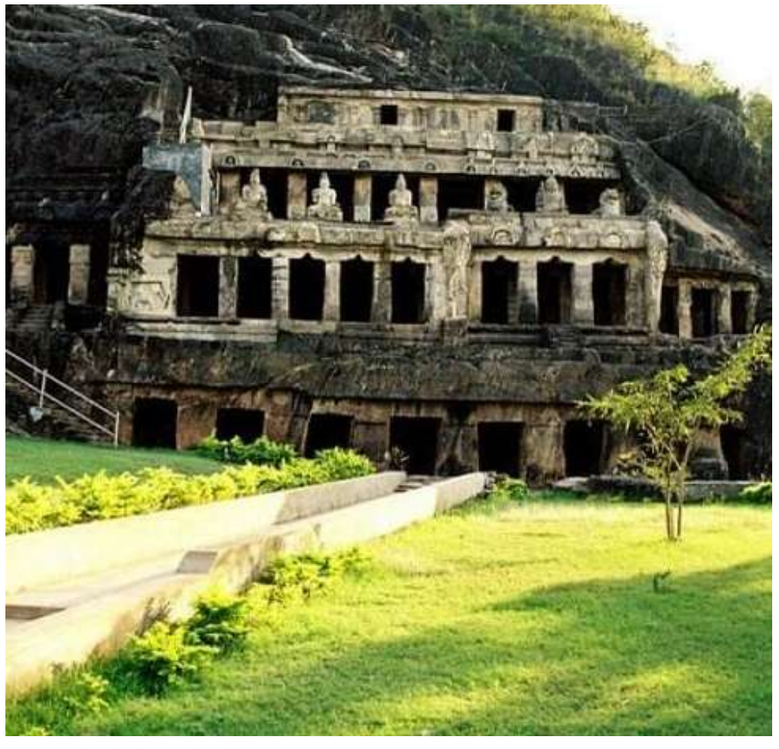
- Incentives can provide significant motivation for preservation of scenic vistas and viewsheds
- Grants to community groups to conduct education programs for local landowners on the benefits of viewshed protection or to establish a local trust, can help preserve scenic quality
- Provide tax benefits for property owners and award grants for successful viewshed conservation efforts

Land Purchase

- Although lands are allotted as per LPS government can re-look at acquiring land in the viewsheds
- Land trusts are private organizations at local, state or regional level that can hold the land for the benefit of public
- Land trusts can re-sale the land to consumers who agree to a specific land use restrictions
- Land trusts can also help in educating property owners on the benefits of such a process

Transfer of Development Rights

- Transfer of development rights is an alternative strategy to purchase land
- These preserve scenic areas by transferring development rights from sensitive lands to areas marked for growth such as TPOD



Protect viewshed at Undavalli Caves

Public engagement and consultation

Source: https://www.pinterest.co.uk/pin/238972323957282378/?lp=true; https://www.hongkongfp.com/2015/11/10/country-park-land-will-not-be-developed-in-my-term-sec-for-development/; https://traveltriangle.com/blog/places-to-visit-in-vijayawada/

2.2 Urban Form and Density

2.2 Urban Form and Density

Urban Form and Density

The urban form of the city is made up of the built form, building height profile, density and its development context. As part of the 10 Principles of Amaravati, creating a Transit and Pedestrian Oriented Development (TPOD) with mixed use developments within key developments such as AGC, Seed Capital and major transit corridors to help shape the urban form of the city.

The built environment of a city makes up for the overall urban form. Density, scale, bulk, and massing are responsible for defining the physical characteristics of the city. This varies from sizes as small as individual sites or blocks, to as large as a neighbourhood, township, district, the whole urban area or even a region. As part of the 10 Principles of Amaravati, creating a Transit and Pedestrian Oriented Development (TPOD) with mixed use developments throughout should be one of the main focuses along with major developments such as AGC and Seed Capital in shaping the city for the future. The development of waterfront and open space network is also a key element to the built environment of Amaravati. It is important to note that developments should respect the surrounding context and the human scale to create a harmonious city. This section aims to guide how developments should react to the various elements at a city level.

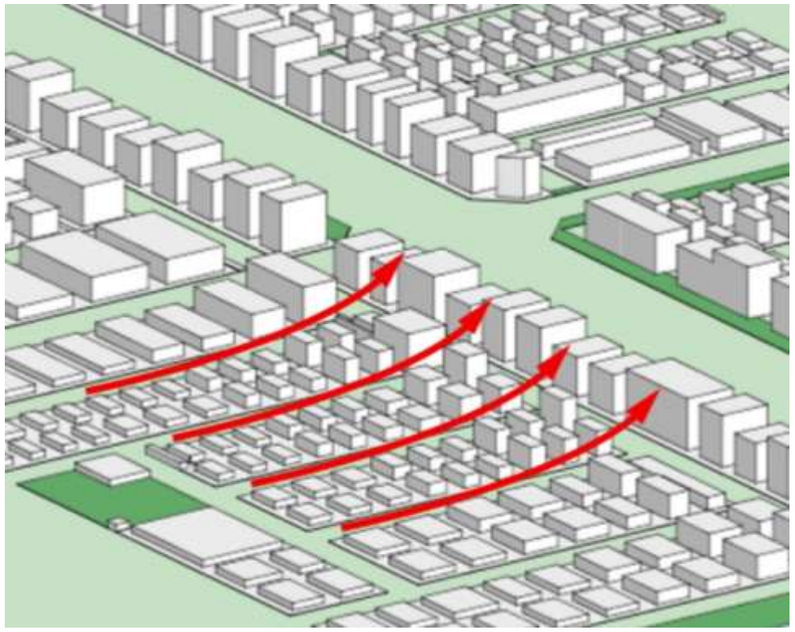
Population and development density should increase for TPOD along major transit corridors. Tall buildings should be located at transit nodes and in key urban areas. A coherent gradation should be ensured in building height profile from the high-density core areas to the low-density fringe areas. A stepped building height profile that decreases towards the riverfront and the canals should also be adopted to result in an interesting skyline but also offer some waterfront views to the developments behind.

High density developments will form clusters which should reflect the character of the area. These developments will form the basis of the transit nodes. By placing these core clusters along transit nodes through TPOD, it improves legibility by establishing physical and visual connection within and between districts. A gradual transition through open space and landscaped urban greenways should be observed between clusters to create more legibility and orientation with a positive visual effect for viewers.

LPS development should be of lower density and building height should be compatible to the existing villages maintain existing local character. Integration between the existing villages and the surrounding LPS area is key to foster organic growth of local community.

Details of TPOD, Built Form and Village Integration Guidelines will be further discussed in the respective chapters.

Transit Oriented Developments (Arlington County, Virginia, USA)



Density increased towards major transit corridors

Density increased towards Transit and Pedestrian Oriented Developments (TPOD)

Source: http://81.47.175.201/livingrail/index.php?option=com_contentandview=articleandid=754:arlington-country-rail-based-developmentandcatid=28:urban-developmentsandItemid=103

2.2 Urban Form and Density

Density and Scale

Development density should consider the character of the district and strive for a balanced physical, social, economic, and environmental viability. This varies under different zones and development schemes as shown in the density classification reference. It is possible to have built form with a range building heights varying from the urban core to the city fringe areas. A balance between built form and open space is essential to promote good quality of life for all citizens. Therefore it is encouraged to increase the building height and density in the urban core areas in order to provide more open space for the public to enjoy.

Note - Building types and colour codes represents residential development defined by height and density

Reference for density classification proposed by Ecodesntiy Source: http://www.ecodencity.com.au/building-types/

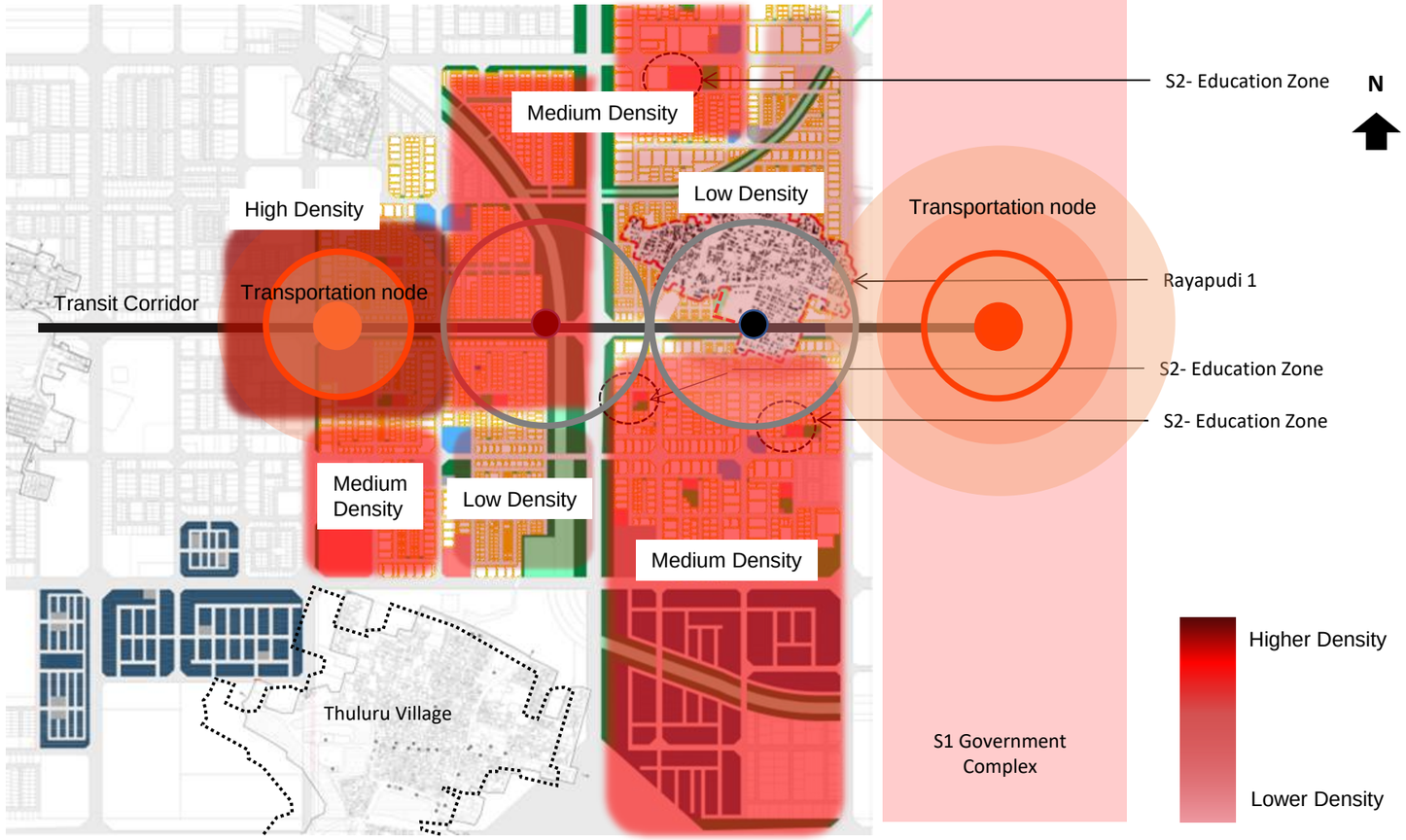
2.2 Urban Form and Density

Density and Scale

Developments of different density need to be planned with an integrated approach in consideration of the quality of life, environmental impact as well as effective use of infrastructure, street and transportation network. Amaravati should encourage higher density developments along the transit corridors, or areas designated for town centres of the districts. Developments surrounding existing villages should be lower density to balance with the heritage and buildings that are typically low-rise.

In addition to density, the scale of the urban developments should be considered to enhance the urban design quality of the city. The city should be developed with a human scale to offer a pedestrian-friendly experience in Amaravati. The urban form should be compatible with the surrounding context regarding density and scale. Incompatible, inharmonious, discordant, and out of place development should not be permitted. Buildings being identified as landmarks or key developments may be considered in a more prominent scale, yet not overly dominant such that they deconstruct the overall urban form of the city. The scale of individual development and its impact on the surrounding context should be carefully assessed for large scale developments before any permission is granted for construction to begin.

Amaravati should ensure a harmonious transition between existing villages and new developments. Villages as well as protected areas will be exempted from high density developments even in close proximity to transportation nodes and similar principle apply to waterfront developments as well. Development areas adjacent to protected area, including water bodies and open spaces, should not exceed medium density even if it is in close proximity to a transportation hub or commercial areas. In fringe areas lower densities are preferred to avoid disrupting the open space and the natural environment. The scale of developments around existing villages should be sensitive and not be overly large scaled. Rayapudi village is used as an example here to exhibit the density classification.



Purposed Density Distribution in Rayapudi

Example of high density development

Example of low density development

Source: https://chainimage.com/image/columbia-pike-in-arlington-va-better-cities-towns-online, https://www.cotswolds.com/plan-your-trip/towns-and-villages/cirencester-p621633

2.2 Urban Form and Density

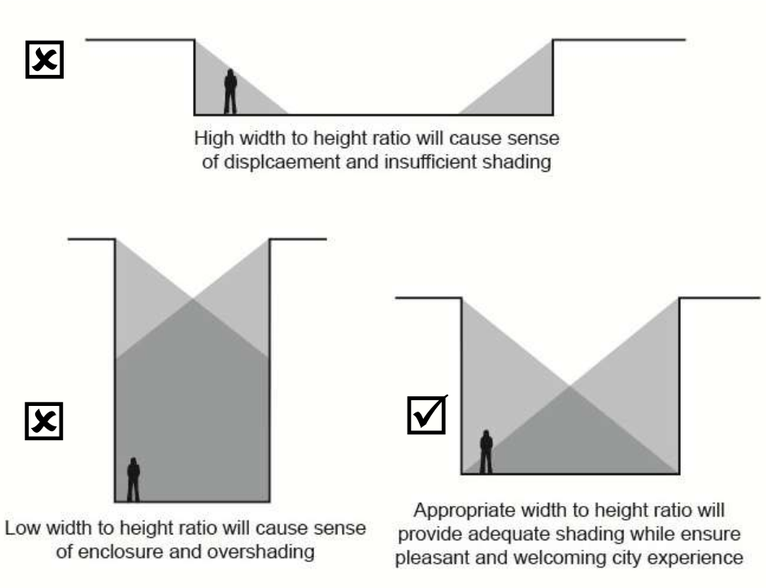
Bulk and Massing

Building heights should be compatible with the surrounding context. The shading effect of the buildings should be considered in response to surrounding land use to establish optimal shading in hot weather while not over-shading the area. The width-to-height ratio should be calculated and controlled to avoid over-shading. Appropriate width to height ratio would affect the character and function of the area as shown in the image below.

Developments should also enumerate the building configuration and the urban grain to be formed. As this will also determine the flow of vehicles and pedestrians, as well as the overall atmosphere of the area. Smaller street blocks will foster a stronger street environment and community interaction due to higher pedestrian intersection points. Building configuration should be compatible so that appropriate lot size can be utilised, which also encourages street activities and creates a sense of community. The urban grain formed should enhance accessibility with a priority for pedestrians and reserve open spaces within the community.

In alignment with the Vaastu principles, the buildings are encouraged to be built in parallel to the cardinal axis and north-east axis stated in the masterplan at a city scale. The buildings should also be oriented to optimise the ventilation, sunlight coverage and shading. The corner and ending vista affected by the orientation of the building should be given due consideration. It should provide sufficient surveillance to public realm with eyes on the street and avoid blank walls by defensible design.

Overlooking green spaces with appropriate building orientation



Width to height ratio and its impact

Compatible building height

Buildings without considerations of surrounding context

Source: http://whichwayaustin.blogspot.com/2012/07/courtyard-housing-example-from-zurich.html, https://www.tripsavvy.com/san-francisco-things-not-to-do-4117258, http://news.images.itv.com/image/file/553513/img.jpg

2.3 Mixed Use and Flexible Zoning

2.3 Mixed Use and Flexible Zoning

As a new capital city for Andhra Pradesh, Amaravati should be designed to support the long term growth of the city in terms of population and economy. Having the opportunity to do things right from the beginning, Amaravati should look to create a compact city that encourages vibrancy and economic opportunities through mixed use developments and flexible zoning throughout..

Horizontal Mixed Use Developments

Zoning has an important effect on how the city forms and how people interact within the city. The proposed land use masterplan concentrates commercial zones into several large clusters with residential use spread across the city. This would cause residents needing to commute to these commercial clusters for employment, which will increase the burden of the city's transportation and road network with increasing traffic in the future. Alternatively, there should be a more diverse mix of land use as shown in the adjacent image to reduce the need for commuting.

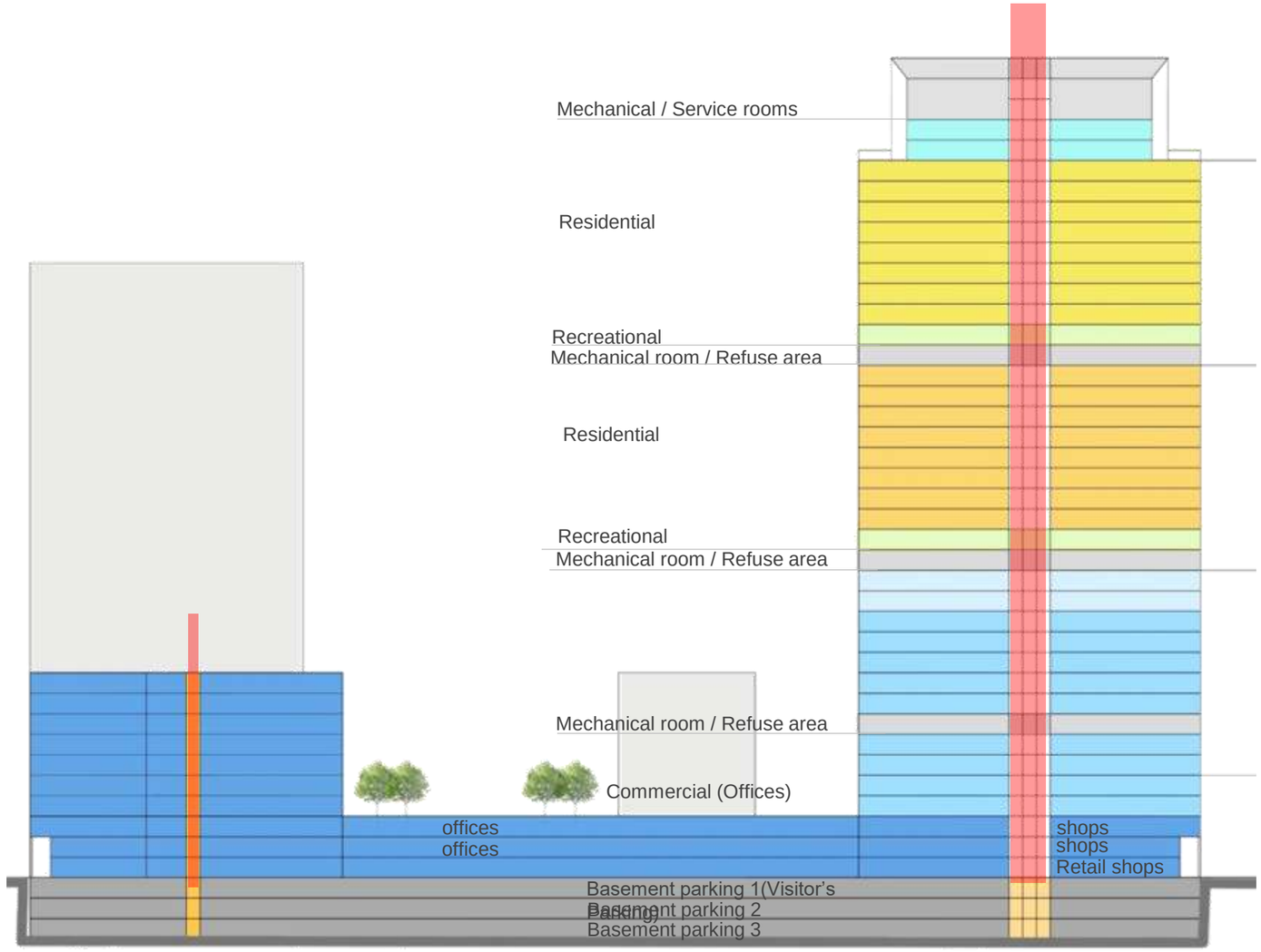
Amaravati should aim to create communities providing a mix of different land uses through horizontal mixed use zoning. Within a radius of 500m, different zones should be reachable to include retail, commercial, residential, education, healthcare, open spaces and other functions. The percentage of land use variation can be part of a larger scale layout plan with detailed planning and urban design strategies to create a desirable character and vision for each specific area.

Vertical Mixed Use Developments

Vertical mixed use zoning should also be encouraged in the city especially in key development areas such the Seed Capital and TPOD zones to activate the city using diverse pattern of spaces, and exploit the full potential of the development. Vertical mixed use refers to putting a combination of residential, commercial, retail and open space in a single development complex. Such compact use of space provides convenience by reducing the number of trips needed for daily travels. The zoning regulation allows for some mixed use elements with 5% of the total GFA or 60 square meters, whichever is less, to be allocated for convenience store within most of the residential zones. This should be further relaxed to increase the retail usage at a maximum three stories from the ground in R4 zones. Ground floor retail should be encouraged at key retail corridors to create a specific character and sense of place while ensuring street level continuity. These corridors should be located in close proximity to transportation nodes, either extending linearly from the nodes, or surrounding the nodes. Vertical mixed use developments with commercial, residential, retail and community uses will further promote vibrancy and economic growth.

Taking the existing mixed use commercial zone forward, the vertical mixed use should be reinforced by more detailed categorisation and rearrangement of existing commercial zones. For instance, GFA distribution retail in C1 mixed use commercial zone, which is marked as 30% in current land use masterplan, should be classified into 10%, 20%, 30% for different kinds of mixed use types, based on the local character and the area. For instance, the distribution of retail function in mixed use zone should be allocated as 30% in financial areas, while in more residential areas should accommodate 10% due to their specific needs. Vertical mixed use should also be encouraged in TPOD and other commercial zones by intensifying the retail usage, and support commercial-residential mixed use developments.

Horizontal and vertical mixed use zoning will be further elaborated in the TPOD and Built Form Guidelines Chapters.



Vertical mixed use developments reduces commuting distance for people

C1 Mixed Use Commercial Zone		
C1 (A)	C1 (B)	C1 (C)
10% GFA for retail usage	20% GFA for retail usage	30% GFA for retail usage
For area where a controlled noise level is suggested, with potentially less active retail options such as art and culture related stores, to ensure street activities without causing nuisance to residents	For area with a well balance between economic activity and residential function to support the daily retail needs and create key retail street in a district	For area with active commercial and economical activities, such as CBD, to promote ground floor vibrancy and offer leisure daily activity place for residents/workers in an accessible distance

2.3 Mixed Use and Flexible Zoning

Flexible Zoning

In addition to the proposed zoning regulation (ZR), a more comprehensive zoning with diverse FSI parameter is recommended, especially in the residential zone, to provide more flexibility to the land use. The existing land use plan is dominated by R3 medium to high density zone. According to the ZR, four types of buildings are included within R3 zone, which are 'Detached, Semi-Detached and Attached' (proposed FSI 1.75), 'Medium Density Apartments' (proposed FSI 2.0), 'High Density Apartments' (proposed FSI 2.4), and 'Group Development' (proposed FSI 2.4). It is suggested that within the R3 zoning, detail specification of types of buildings should be allocated to each lot in the zoning plan to ensure a good mix of building typologies with diverse height profile. Some of the R3 zoning can be revised to other usages to encourage more mixed use development as shown in the reference images.

As per ZR, in R1, R2 and R3 zone only allows for commercial space up to 20 sq.m., which can be further relaxed to encourage more mixed use developments. Relaxation of height restriction for high density R3, R4, and C1 zones with provision of open spaces or community facilities at ground level as compensation is also recommended. The proposed FSI, building coverage and maximum number of floors should correspond to each other. Sample calculation is shown on the right to exhibit the discrepancy in current regulation. In both cases, it is shown that different scenarios can be achieved under the same FSI, Maximum Building Coverage and Maximum Number of Floors regarding the height control. Thus, to achieve a more compact city for Amaravati, relaxation to FSI and building heights is recommended to enrich the diversity of the urban form. The development parameters should be verified with similar calculation process, to get the appropriate density and mix of use.

The retail zone should be singled out from the commercial zone, with specification on requirement of active frontage consecutively encourage potential outdoor activities, such as sport and community events to make the city more vibrant. Also, it is suggested that more lots should be dedicated to mixed use. Additional mixed use zones of different FSI should be proposed in the zoning regulation to diversify developments. At least 20% of the overall developments should be dedicated to mixed use.

Overall, ZR should provide more diversity in FSI with varying building heights to allow for more flexible developments with interesting and unique built forms

Suggested Land Use Zoning	Maximum Number of Floors and FSI in ZR	Relaxed Height Restriction Suggestion by UDAG
R3 (D, SD and A)	G+3/ FSI 1.75 (60%)	G+3 / FSI 1.75
R3 (AP-MR)	G+5/ FSI 2.0 (50%)	G+7/ FSI 3.0
R3 (AP-HR)	G+11/ FSI 2.4 (50%)	G+12/ FSI 5.0
R3 (GD)	G+11/ FSI 2.4	G+12/ FSI 5.0
R4	Continuous / FSI 3.5	G+18/ FSI 7.5
C1	G+8/ FSI 3.5	G+14/ FSI 6

Suggestion on relaxation of height restriction

References of mixed use development with retail uses on the ground floor and residential uses on the upper levels

Sample calculation
Below shows an example based on current ZR

Zoning Parameter
Zoning: R3 (GD)
Minimum Plot size: 4000 m2
Maximum Building Coverage: 50%
FSI: 2.4
Maximum Number of Floors: G+11

Assume a plot of 4000 m^2 is undergoing development and the developer prefer to maximize the floor area usage. The maximum GFA will be:
4000 x 2.4 = 9600 m^2

Situation 1: The developer prefers to build at the highest. Due to the height restriction of 11 floors, the built up area per floor will be:
9600 / 11 = 872.7m^2
The potential site coverage will therefore be:
872.7 / 4000 = 21.8%

Situation 2: The developer prefers to maximise site coverage. Due to the restriction of maximum site coverage, the site area being covered by the building will be:
4000 x 50% = 2000 m^2
The number of floor of the building will therefore be:
9600 / 2000 = approximately 5 floors

Sample calculation table on relationship between FSI, Maximum Building Coverage, and Maximum Number of Floors

Source: http://grahambabaarchitects.com/chophouse-row/

2.3 Mixed Use and Flexible Zoning

Micro-pooling

Micro-pooling, or site amalgamation, refers to the combination of multiple plots forming a new plot. It is typically used for large developments such as mixed use developments, which requires larger plot sizes in order to maximise land use and functionality. For areas where there are limited large plots available, amalgamating several sites together may be an option to consider.

There are numerous small sized plots in Amaravati, which may be difficult and unviable to develop. These plots should be amalgamated through micro pooling if they provide benefits to the city, community and the developers so it is a win-win situation for all. However, micro-pooling should be well regulated to ensure that developments are not erasing the urban structure and destroying the urban fabric and the local context of the city. It is recommended that public amenities and facilities should be provided as a priority when micro-pooling is used as shown in the adjacent reference images.

The use of micro-pooling is mainly recommended for provision of quality public open space and should not be allowed for combing large plots to form superblocks with mega developments. Study on the existing plot typologies and the provisions made for minimum green area and maximum building height in the Zoning Regulations (September 2016) of Amaravati Capital City should be done to consider micro-pooling in residential and commercial zones within the city. Amaravati should consider micro-pooling when it can achieve more than one of the following:

- Allow better use of space within plots
- Combine very small plots to offer better and more viable developments
- Provide larger public open space with more benefits for the community
- Provide opportunity for vertical mixed use development
- Provide public facilities for the neighbourhood
- Create a vibrant and socially inclusive environment
- Reduce the number of very small and irregular size plots

Creating a social inclusive environment through micro-pooling for mixed use developments

Existing village context

Sensitive developments with respect to adjacent buildings

Source: https://apalongisland.org/2015/05/04/downtown-revitalization-walking-tour-village-of-valley-stream/, http://nationalcore.org/affordable-housing/grand-opening-at-westlake-village-caps-15-year-revitalization-of-san-marcoss-richmar-neighborhood/

2.3 Mixed Use and Flexible Zoning

Criteria for Micro-pooling

	Proposed Micro-Pooling		
	Residential		Commercial
Zoning District	R1	R3	C2
Area after Micro-Pooling (sq. m.)	100 to 300	200 to 1000	50 to 1000

Micro-pooling should be restricted by the following:

- Micro-pooling should be allowed only for plots of the same zoning type
- For amalgamated plots, zoning regulations would apply based on the area of the plot post amalgamation
- For commercial plots, only C2 plots can be selected for amalgamation.
- For residential plots, R2 is low density premium residential development and R4 is multi-family high density housing with large plot sizes, therefore they are not permitted for micro-pooling

R1 (Village Planning Zone):

- It is observed that plot typologies in village areas have plot sizes as small as 20 sq. m.
- Hence, micro-pooling would allow very small plots to become more functional for use
- After amalgamation, green areas would increase as plots over 300 sq. m. require a minimum green area of 15% as specified in Zoning Regulations.
- In order to retain the existing fine grain character of the existing villages, the amalgamation for R1 zones should be restricted to 300 sq. m.

R3 (Medium to High Density Zone):

- Micro-pooling in R3 zone would allow for more green area at plot level as seen in the adjacent figure.

C2 (General Commercial Zone):

- There are 25 sq. m. plots in C2 zone which are smaller than the minimum plot size (50 sq. m.) specified in the Zoning Regulations. Apart from giving flexibility for design, micro-pooling in this zone would lead to increase in permissible building height, higher density and more green open space at plot level as seen in the adjacent figure.

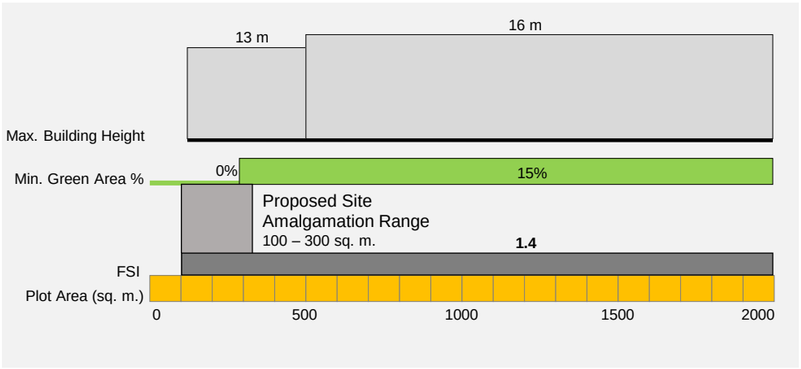


Diagram showing proposed micro-pooling for R1 plots with respect to Zonal Regulations

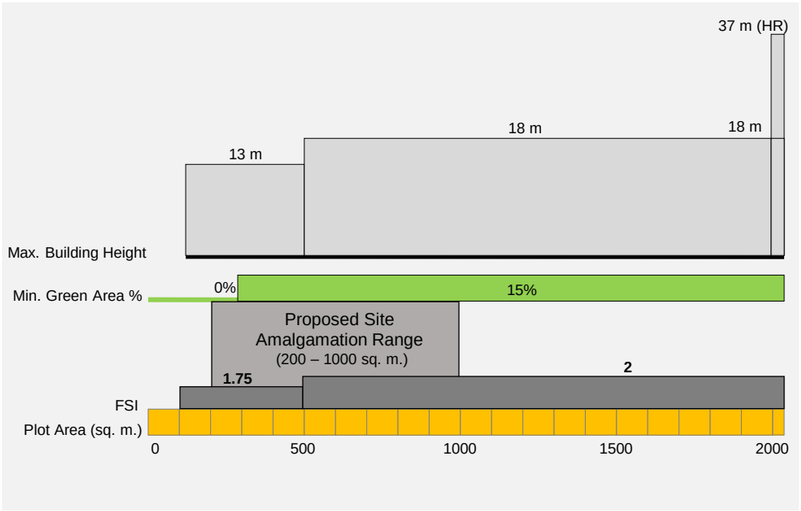


Diagram showing proposed micro-pooling for R3 plots with respect to Zonal Regulations

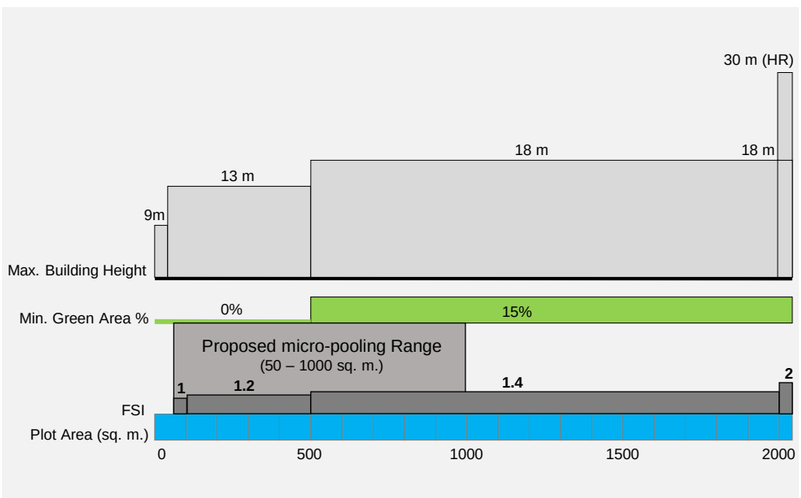
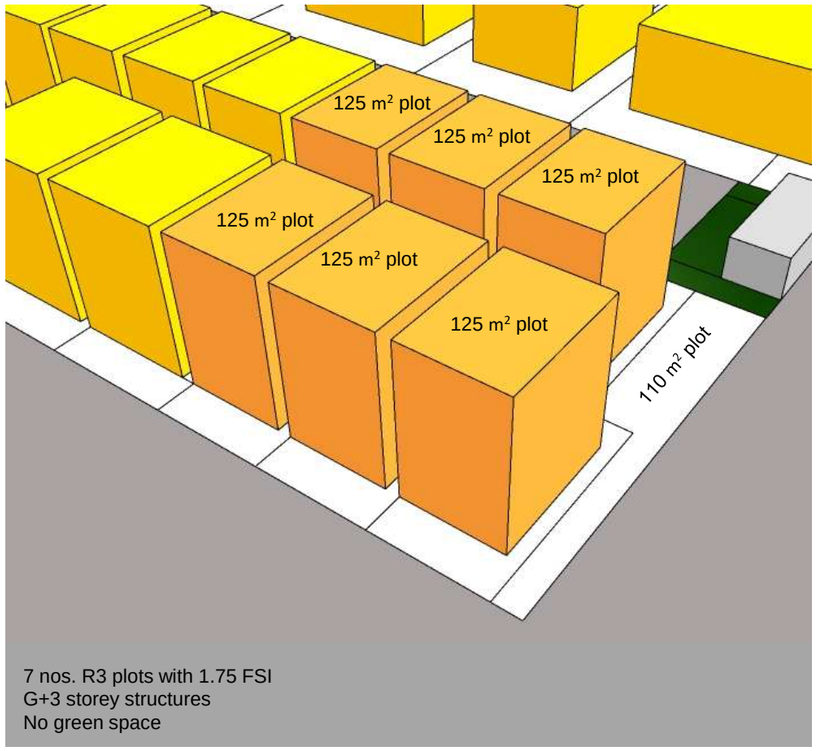
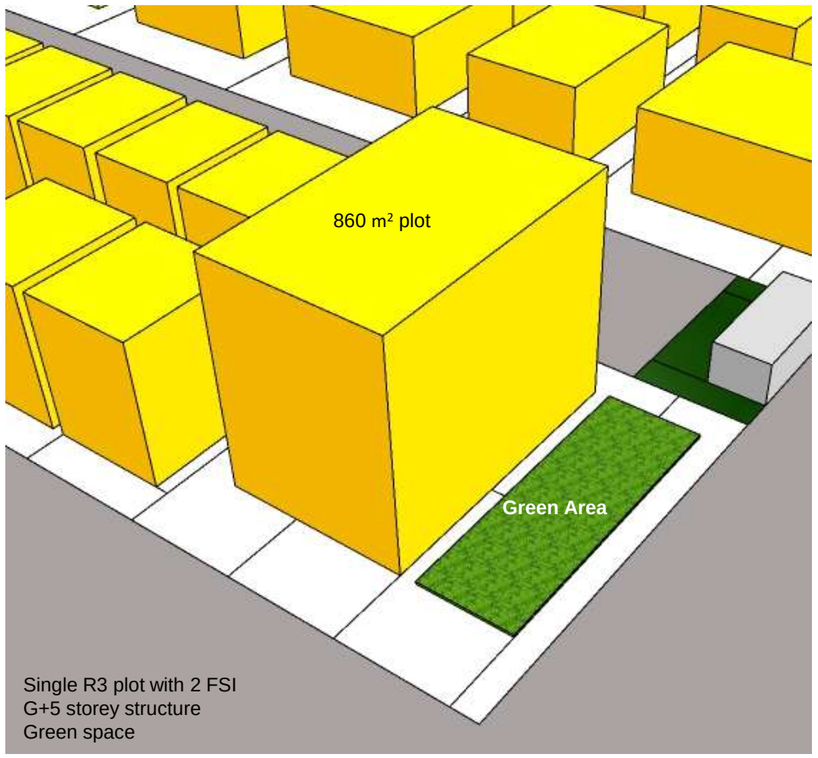


Diagram showing proposed micro-pooling for C2 plots with respect to Zonal Regulations



7 nos. R3 plots with 1.75 FSI
G+3 storey structures
No green space

View showing an example of 5 R3 plots selected for amalgamation



Single R3 plot with 2 FSI
G+5 storey structure
Green space

View showing the R3 plot after amalgamation

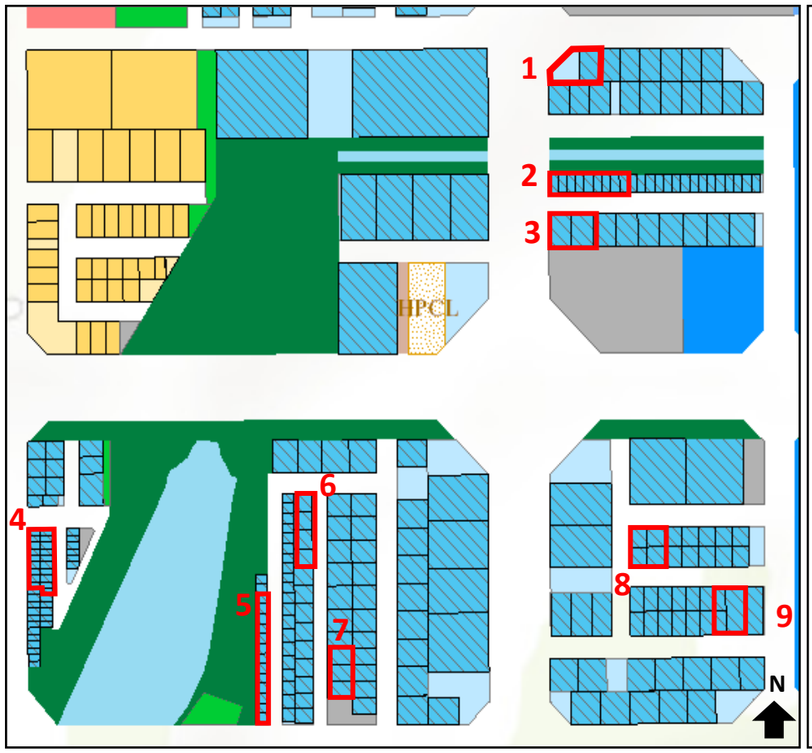
2.3 Mixed Use and Flexible Zoning

Potential Sites for Micro-pooling

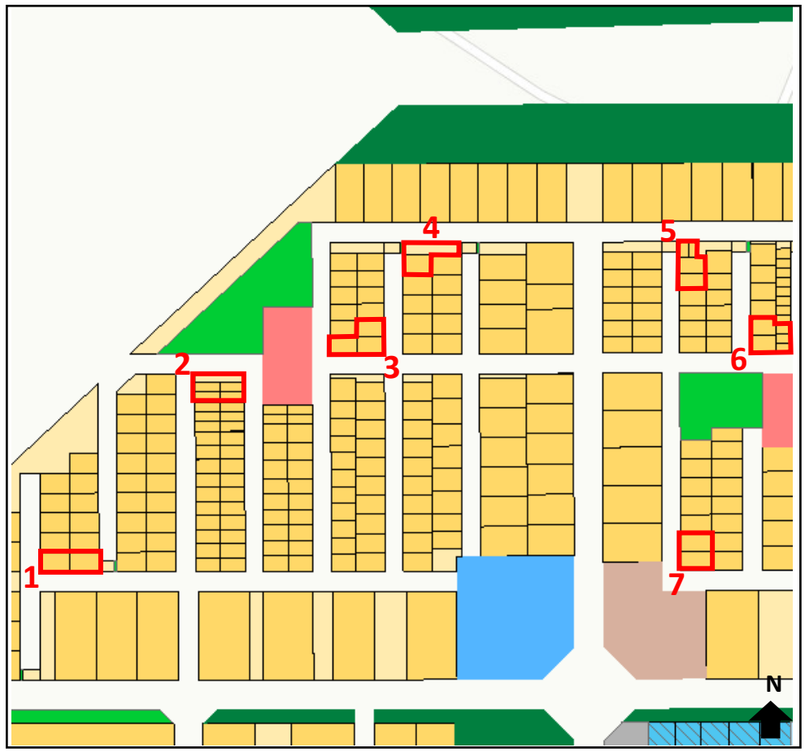
As a result of the land pooling scheme for the formation of the Capital City, there are over several hundreds of plot typologies in the LPS layouts. It is observed that there are a large number of odd plots in the LPS layouts as shown in the adjacent images. These plots have one or more of the following characteristics:

- The plots are too small i.e. smaller than the minimum area of the land use specified in Annexure 2 of Zoning Regulations
- The proportion of the plot makes it less functional for use
- The plots are located at corner or T junctions
- The plots have odd shapes which reduce their functionality for use

A large number of such odd plots are vacant and vulnerable to activities such as dumping and encroachment. Hence there is a need to address these plots in order to maximize their use and increase their economic potential. Micro-pooling of these odd plots with adjacent plots could work as an effective strategy for the city, the community and for the developers as well. Incentives should be offered to adjacent plot owners for purchasing these odd plots.



Plan showing example of micro-pooling of C2 plots



Plan showing example of micro-pooling of R3 plots

Micro-pooling near villages should be sensitive and not overarching existing buildings

Example of Micro-Pooling in R3

Plot no.	Minimum size of Individual Plot (sq. m.)	Combined plot area after amalgamation (sq. m.)
1	418.06	836.13
2	175.59	988.89
3	326.10	978.31
4	418.07	955.61
5	100.41	789.91
6	100.38	953.22
7	418.17	836.34

Example of Micro-Pooling in C2

Plot no.	Minimum size of Individual Plot (sq. m.)	Combined plot area after amalgamation (sq. m.)
1	418.0	886.5
2	100.3	903.0
3	451.5	903.0
4	50.1	951.9
5	75.2	977.6
6	209.0	836.1
7	250.8	766.4
8	209.0	836.1
9	175.5	903.0

Source: https://www.thehindu.com/news/national/andhra-pradesh/Nelapadu-in-for-major-transformation/article14475736.ece, https://gis.apcrda.org/lps/index.html

2.3 Mixed Use and Flexible Zoning

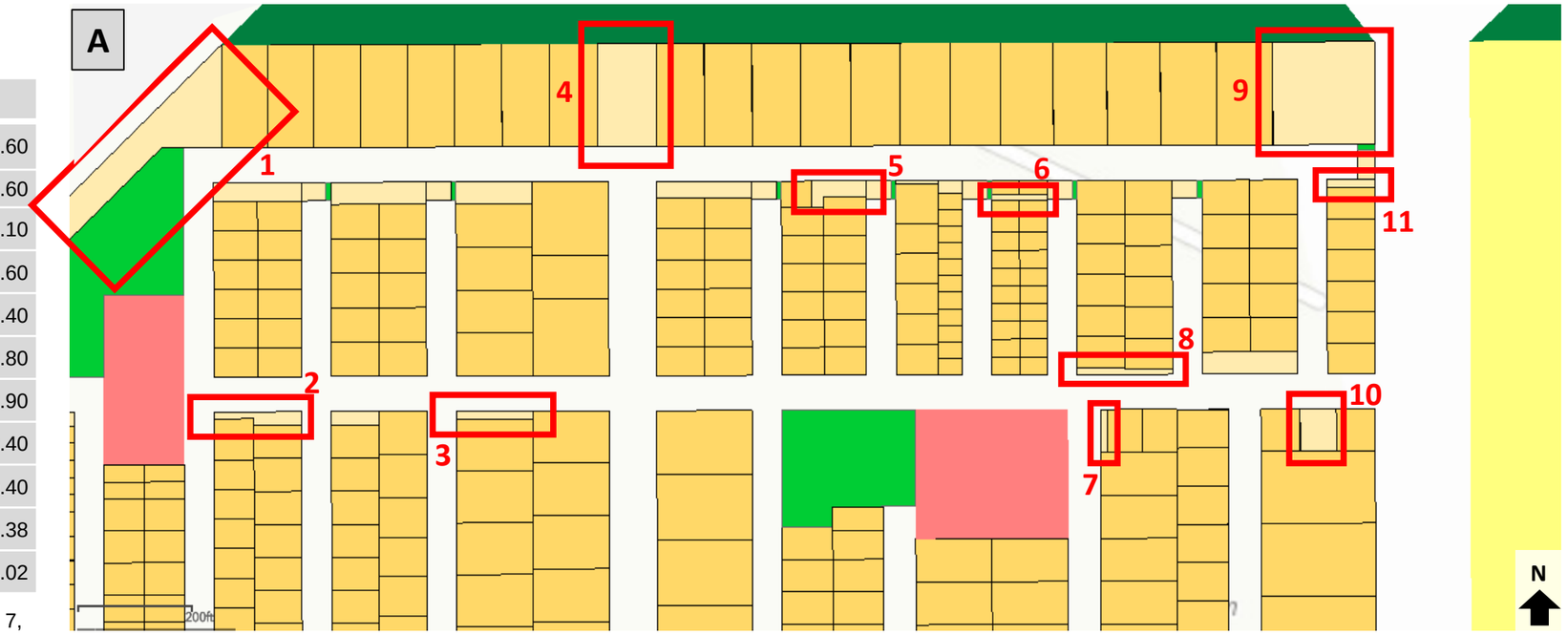
The following shows two selected areas as examples for micropooling.

Selected area A:

- The selected residential vacant plots for micro-pooling are shown below:

Plot no.	Length (m)	Width (m)
1	238.7	15.60
2	45.90	6.60
3	40.00	4.10
4	50.00	30.60
5	20.40	18.40
6	29.03	2.80
7	20.80	3.90
8	50.00	2.40
9	53.40	50.40
10	20.34	18.38
11	25.00	4.02

- Due to very narrow plot widths as compared to the length, plot no. 2, 3, 6, 7, 8, 11 are selected
- Plots no. 4 and 10 are selected as they are directly placed at T junctions which affects the market value of plot
- Corner plots at junction of arterial roads like 1 and 9 are selected as there is heavy traffic movement at these junctions



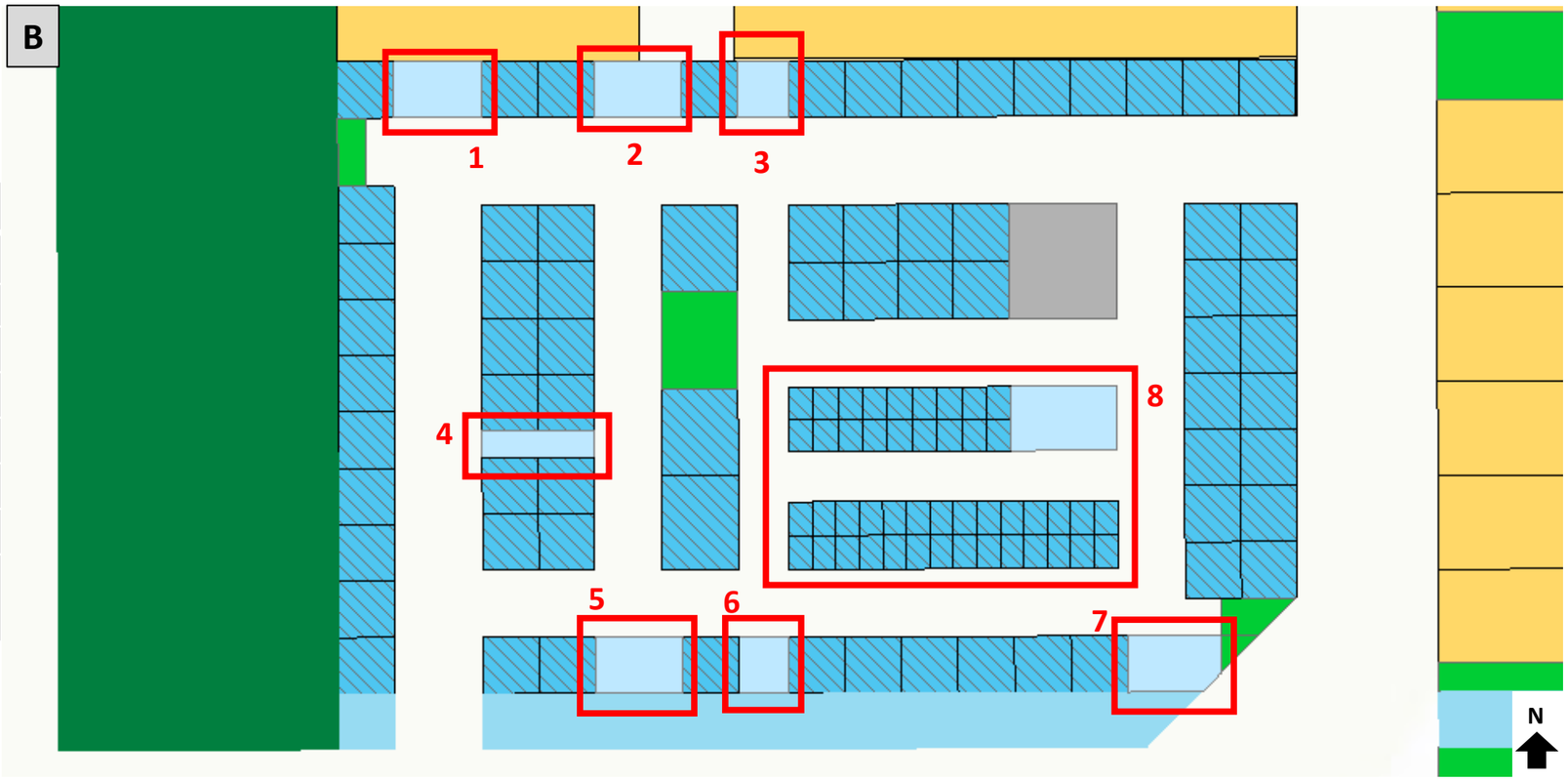
A - Plan showing selected plots for micro-pooling in Nelapadu LPS

Selected area B:

- The selected commercial vacant plots for micro-pooling are shown below:

Plot no.	Length (m)	Width (m)
1	15.60	10.00
2	15.50	10.00
3	10.00	9.10
4	20.00	4.70
5	15.50	10.00
6	9.00	10.00
7	16.70	10.00
8 (plots each of 25.04 sq. m. area)	6.00	4.18

- Group of plots demarcated with no. 8 consists of smaller C2 plots
- Other plots are selected as they are directly placed at T junctions which affects the market value of plot
- Plot no. 4 is selected due to narrow width as compared to the length of plot



B - Plan showing selected plots for micro-pooling in Nelapadu LPS

Source: https://gis.apcrda.org/lps/index.html

2.3 Mixed Use and Flexible Zoning

Planned Unit Development

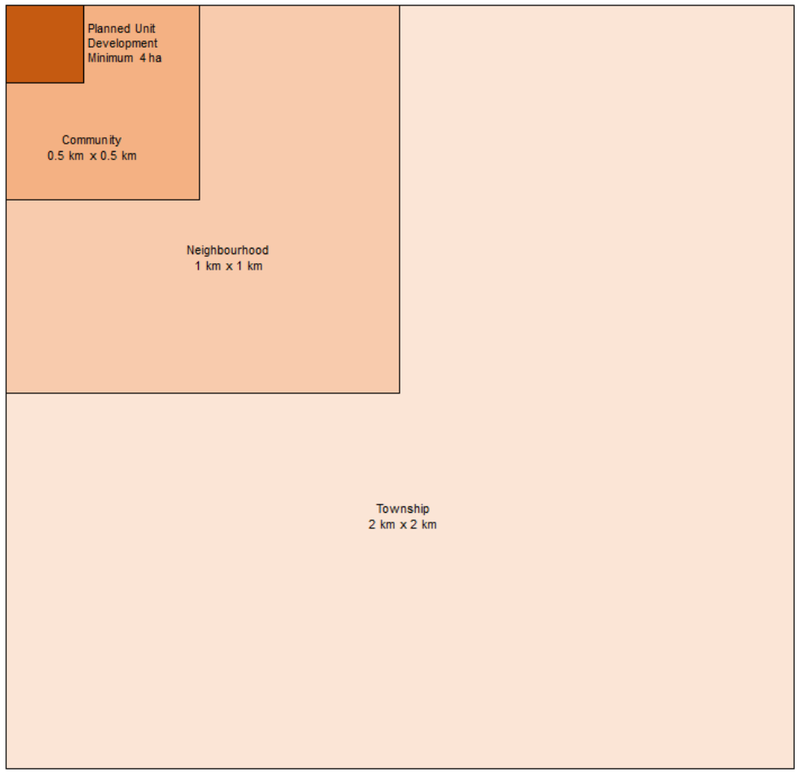
The provision for Planned Unit Development (PUD) has been made in the Zoning Regulations. It is a residential or commercial development guided by an overall design plan in which one or more of the zoning or subdivision regulations, other than use regulations, shall be permitted to be waived or varied. This is to allow flexibility and creativity in site and building design and location, in accordance with general guidelines. As Amaravati is a new city, PUDs should be carefully considered as it will potentially impact the built form and contribute positively to improve the quality of life in the city for its people and visitors alike. Key considerations for PUDs are as follows:

- PUDs can encourage diversification, variation and imagination in the relationship of uses, structures, open spaces and heights of structures for developments conceived and implemented as comprehensive and cohesive unified projects
- Cluster development should be intended to create more open spaces and new infrastructure
- Minimum area required for PUD is 4 Ha with a maximum plot size of 5000 sq. m.
- Density of land use shall in no case be more than 15 percent higher than allowed in the zoning district

PUDs should be required to include a masterplan presentation highlighting the benefits of the development and should only be permitted if it more public benefits at a neighbourhood, township or city level.

PUD can provide more pedestrian space to form walkable neighbourhood centres

Clustered developments allows more accessibility and usage to open spaces



PUD can provide major activity nodes within townships that encourages vibrancy to the area

PUD can provide larger open space area than individual plots to improve the quality of life

Source: https://commons.wikimedia.org/wiki/File:Discovery_Bay.jpg, http://www.singapore-guide.com/top10/top10-shopping-little-india.htm

2.4 Blue and Green Network

2.4 Blue and Green Network

Blue and Green Network

Establishing a blue and green network is essential in protecting Amaravati's natural assets and creating a socially inclusive and a resilient city. With abundance of natural resources and as mostly a greenfield city, Amaravati has the unique opportunity to form a smart and sustainable development. The built environment should be enhanced through careful and sensitive planning to create a network of open spaces as well as connection with the river, the canals and other water bodies. The ecological impact should be minimised through enhancing and preserving the existing "blue" and "green" assets of the city to provide quality open spaces for future generations. Amaravati should reposition River Krishna as the heart and soul of the city, to form part of a bigger network connecting to the canals, and other water bodies and green open spaces within the city. Creating an active waterfront along the river and the canals will attract tourism and cultural opportunities while improving the quality of life and the health of the people.

River Krishna

River Krishna is the major natural feature of Amaravati. The shared vision for the waterfront is to establish an iconic landscape destination that creates value and identity for the new Capital City by celebrating water and re-connecting people with River Krishna through the blue and green network as shown in the adjacent images.

Purpose

- Nurture watershed and urban ecosystem health
- Ensure storm water management / flood control
- Enhance biodiversity, landscape character and identity
- Re-connect people with the river and provide urban amenity
- Improve microclimate and air quality
- Offer acoustic buffering from traffic noise
- Provide substantial mature tree canopy

Key Aspects of Waterfront

- Maintain existing high quality vegetation where possible to protect and enhance natural heritage
- Integrated design that brings the city and the people to the water
- Islands form an integral part of the Protected zone and no development shall be allowed on the Islands
- Riverfront should be protected by a buffer zone and a public zone with no development at the waters edge
- Access to the natural heritage of various islands across the riverfront and the canals in the hinterland to encourage people interacting with the riverfront

Elements of a Waterfront

- Native and adaptive planting
- Pedestrian promenade / boardwalk
- Pedestrian amenities and structures
- Strong pedestrian connections at street intersections
- Spaces for gathering
- Sculpted landform (acoustic control and water management)
- Feature lighting
- Cycling and pedestrian amenities
- Public art and sculpture
- Way finding signage
- Interpretive signage for environmental education
- Regular public events and celebrations during festivals and other occasions

Amaravati's blue and green network should provide a recreation and leisure amenity that is worthy of a world-class city and will be further elaborated in the Waterfront and Open Space Network Guidelines Chapter.

Viewing deck along the riverfront offering excellent views of the river

Kwun Tong Promenade in Hong Kong

Walking trails and nodes along the river with Natural edge protection

Source: https://www.yearbook.gov.hk/2012/en/gallery_urban.html; http://www.landezine.com/index.php/2012/01/ecological-coridor-landscape-architecture/turenscape-sanlihe-river-ecological-corridor-06/

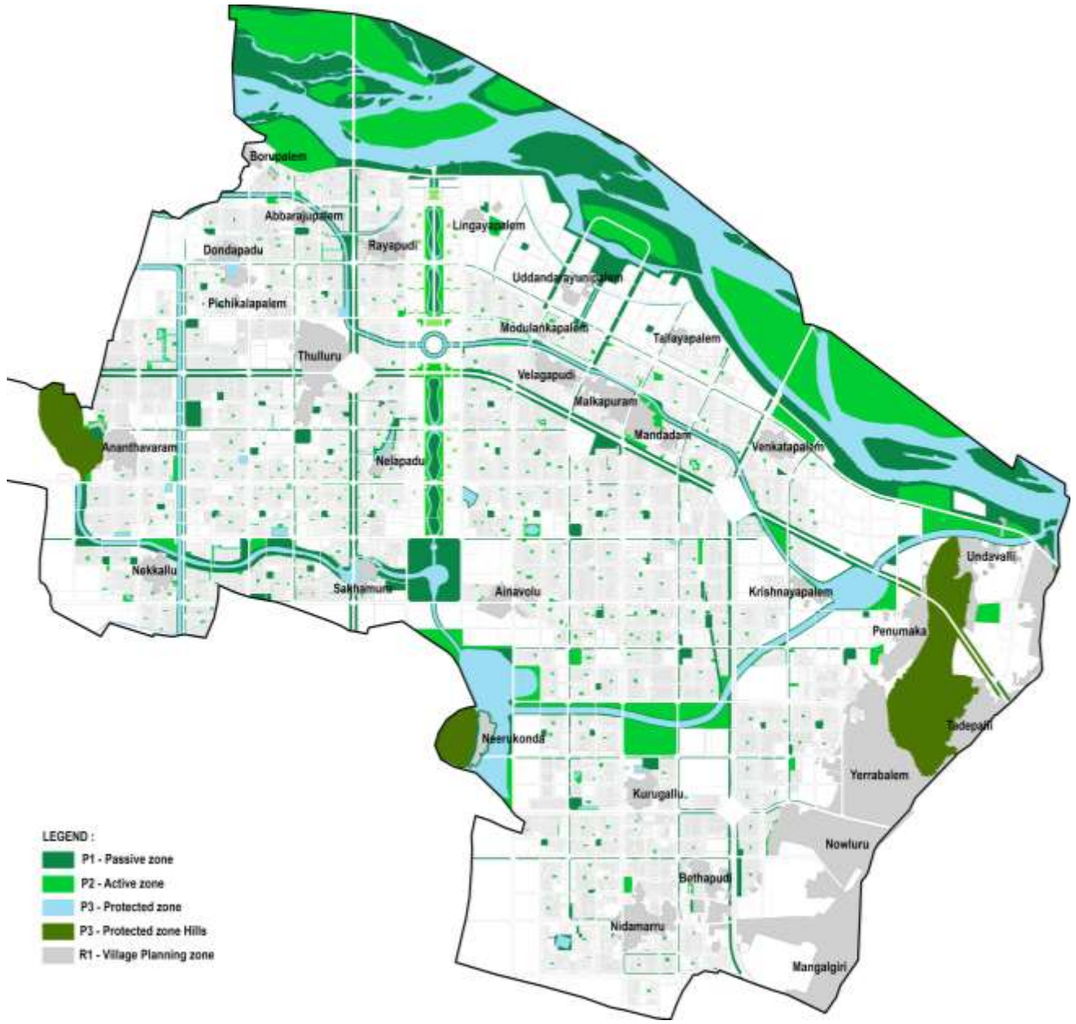
2.4 Blue and Green Network

Open Space Network

Amaravati includes opens spaces at various scales, including the city, township, neighbourhood and community level. It is important that the connections between open spaces should be well established to form a network. A comprehensive open space network should be formed by linking open spaces at various levels including connectivity of the green areas and water bodies. Open spaces and waterfront should be connected with footpaths and welcoming entrances and public accessibility should be ensured to avoid them from becoming private areas.

A continuous waterfront promenade is recommended along River Krishna offering public accessibility to the waterfront and to provide space for public enjoyment for all. The waterfront should offer a diverse range of opportunities including strolling, jogging, cycling, leisure, fishing, urban and community agriculture where appropriate. The promenade should interact with the water edge at certain key nodes rather than going consistently along the edge with a buffer zone to preserve the natural ecology along the waterfront. Similar to River Krishna, canals and other water bodies should be publicly accessible and preserved with buffer zones to restrict developments from being built too close to the water.

For example, a Water Transit Oriented Developments (WTOD) can be adapted to connect Amaravati around and within the city through River Krishna and the canal network. In addition, pedestrian-friendly walkways are recommended to create a walkable environment between open spaces, such as green corridors. Landscaping and planting can improve the walking experience for pedestrians to encourage active transport as shown in the images below.



Amaravati Capital City: Open space and green protected area map

Example of public plaza, Vancouver

Example of water transport, Netherlands

Example of open space with water bodies, Bishan-Ang Mo Kio Park, Singapore

Source: Base Map source: APCRDA, Amaravati Existing Village Base Map, Revised Masterplan Report 2017, https://i.pinimg.com/originals/5b/dd/38/5bdd3840a72fd160b4740e22cb5260d4.jpg, https://science.howstuffworks.com/environmental/green-science/green-rooftop.html, ULI Hotel and Resort Development Council, 2015

2.4 Blue and Green Network

Hierarchy of Open Space

The development of public open space requires a human oriented approach. Studying the patterns of daily life, uses and needs helps determine how public spaces should be designed for people of all ages and sectors of society. Amaravati should define a hierarchy of open spaces in different scales, sizes, and functions to promote a happy and healthy lifestyle. As the target users of the open space depend on the location and type, the design and features will also vary based on the configuration and context of the open space within the hierarchy catering to the needs of the people as shown in the adjacent images.

City Level

Large, natural landscapes and parks are important spaces of the city that represents the city's image and identity. They are destinations for locals and tourists, usually covering a large area with unique views of the city. Natural landscape area requires extra care and regulations to preserve the natural environment. City level open spaces should be well connected with public transport to allow higher usage of the open spaces.

Town Level

Town level open spaces are designed to be multifunctional and socially inclusive to allow all residents to have the opportunity to use and enjoy. Provision of sports and exercising facilities are encouraged to promote active lifestyle for the citizens of Amaravati. Age friendly designs are recommended by installing adequate seating, shading, clear way finding, and public amenities such as water fountains, lighting or toilets, to create a safe and comfortable environment.

Neighbourhood Level

Smaller scale neighbourhood and community parks aim to facilitate the local use of the community as a gathering place. The use of neighbourhood level open spaces varies between the characters of the neighbourhood. A residential neighbourhood would design parks with the intention to serve families by providing children's area or swimming pools, whereas a neighbourhood park in a business district would anticipate more office workers by giving more seating and sunlight areas for people to enjoy an outdoor lunch or a stroll.

Plot Level

Plot level open spaces are usually small scale within an urban area, such as public squares and urban plazas. Their designs may be dictated by the building use and the surrounding development context. It may become a natural extension of the cafes and restaurants or a waiting area of the buildings. Given incentives, developers may prefer to manage the space as Privately Owned Public Space (POPS). These will be further elaborated in the Waterfront and Open Space Network Guidelines Chapter.

City Level Parks

Town Parks

Neighbourhood Parks

Community Parks

Public Squares

Urban Plazas

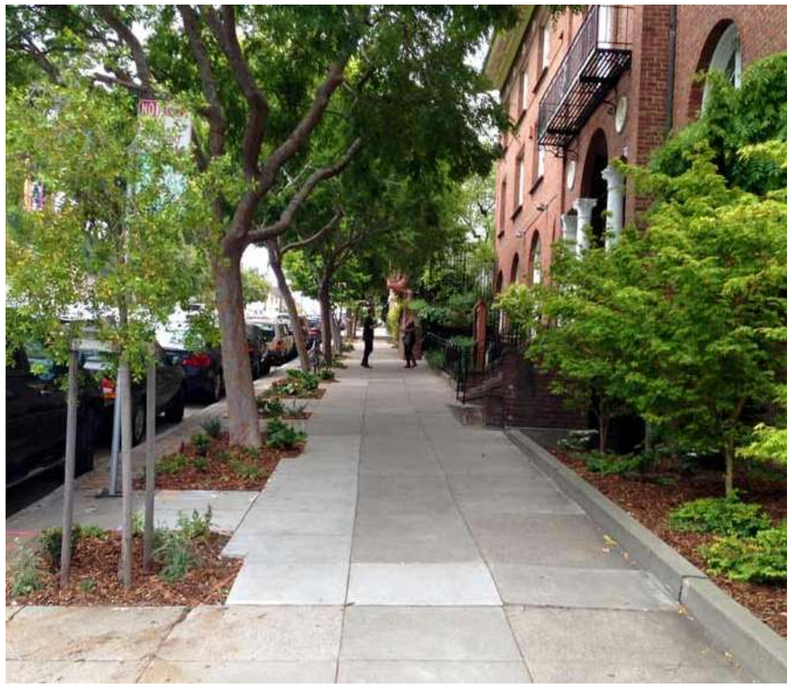
Source: http://www.gardensbythebay.com.sg/en/book-a-venue/silver-leaf.html, http://www.londontown.com/LondonInformation/Leisure/ , httpswww.langleytimes.comopinionletter-langley-ukulele-ensemble-wonderful-musical-ambassadors, http://www.monroeville.pa.us/parks/gazebo.htm, Source-https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcRl5tzwK7y8vDbU0fobF-FxkNOBxp5I934X7rz6exXJZKxrtOTW, https://www.landscapeinstitute.org/case-studies/woolwich_squares

2.4 Blue and Green Network

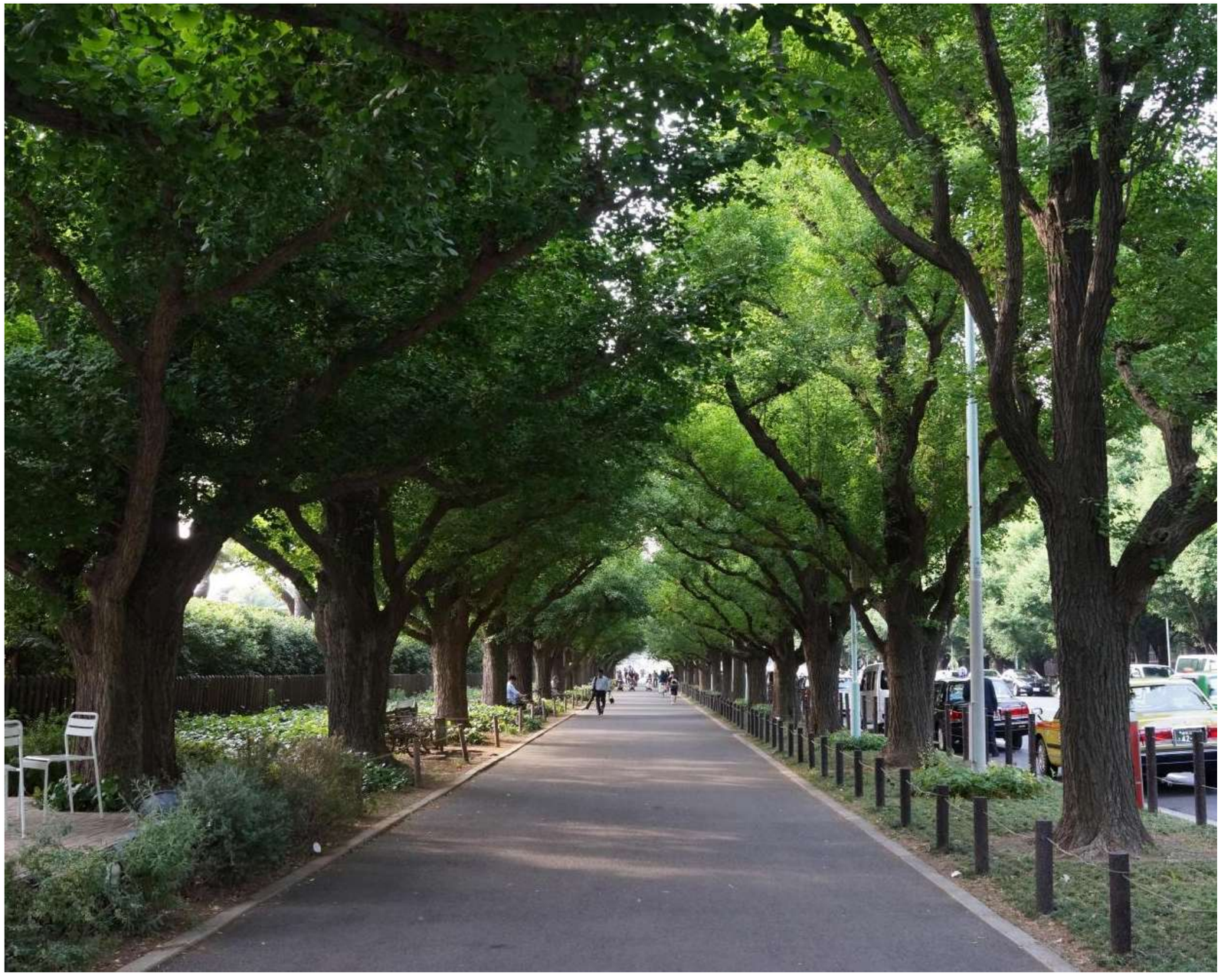
Plantation

Plantation has a visual and environmental impact to the walkability of the streets. It contributes to making streets more comfortable as well as shaping the character of the streets. Greening of streets reduces the micro climate and also creates a more welcoming environment that encourages people to walk. It is important to bring people closer to nature despite living in an urban area. The visual effect of greening not only is more pleasant to the eyes but also contributes to stress relief to improve their psychological and physical wellbeing. The plantation of trees and other greenery makes street more appealing, which would complement to properties along the streets and thus raises the property value. Retail use and restaurants would enjoy the increased footfall to attract more businesses.

Plantation is essential for not only improving the air quality, but also reducing heat island effect and creating a comfortable urban environment which will help reduce the carbon footprint of Amaravati. Trees provide shading on the road to reduce the heat island effect, but also assist with storm water management by reducing water runoffs and improving groundwater recharge. People would be able to appreciate the outdoor environment with better air quality and micro climate for walking as shown in the images. Plantation along the streets is aimed to improve the micro climate and make Amaravati a pleasant and pedestrian friendly, environmentally sustainable, walkable and liveable city.



Example of permeable sidewalk, San Francisco



Creating a green pedestrian corridor can provide a more liveable and walkable environment

Source: https://www.ambassadors-japan.com/en/tokyodailylife/37/, https://hoodline.com/2013/05/permeable-sidewalk-installed-on-page-street, https://network.thehighline.org/projects/atlanta-beltline/

2.5 Mobility and Infrastructure

2.5 Mobility and Infrastructure

Mobility and Infrastructure

A city's transport network is the backbone of its urban mobility and it is critical to have an efficient transport network that connects the city with less dependency on private vehicles. Amaravati in addition to the vehicular circulation should promote a multi-modal transit including NMT and pedestrian walkability with a well designed network of streets and public spaces to make the city walkable and enjoyable. Amaravati should also ensure proper infrastructure is in place for generations to come, from road and sewage to water supply and energy resources; infrastructure needs of the city should be world class. TPOD should help optimise the transport network and other public realm infrastructure to ensure that Amaravati becomes a walkable and liveable city.

Mobility Strategy

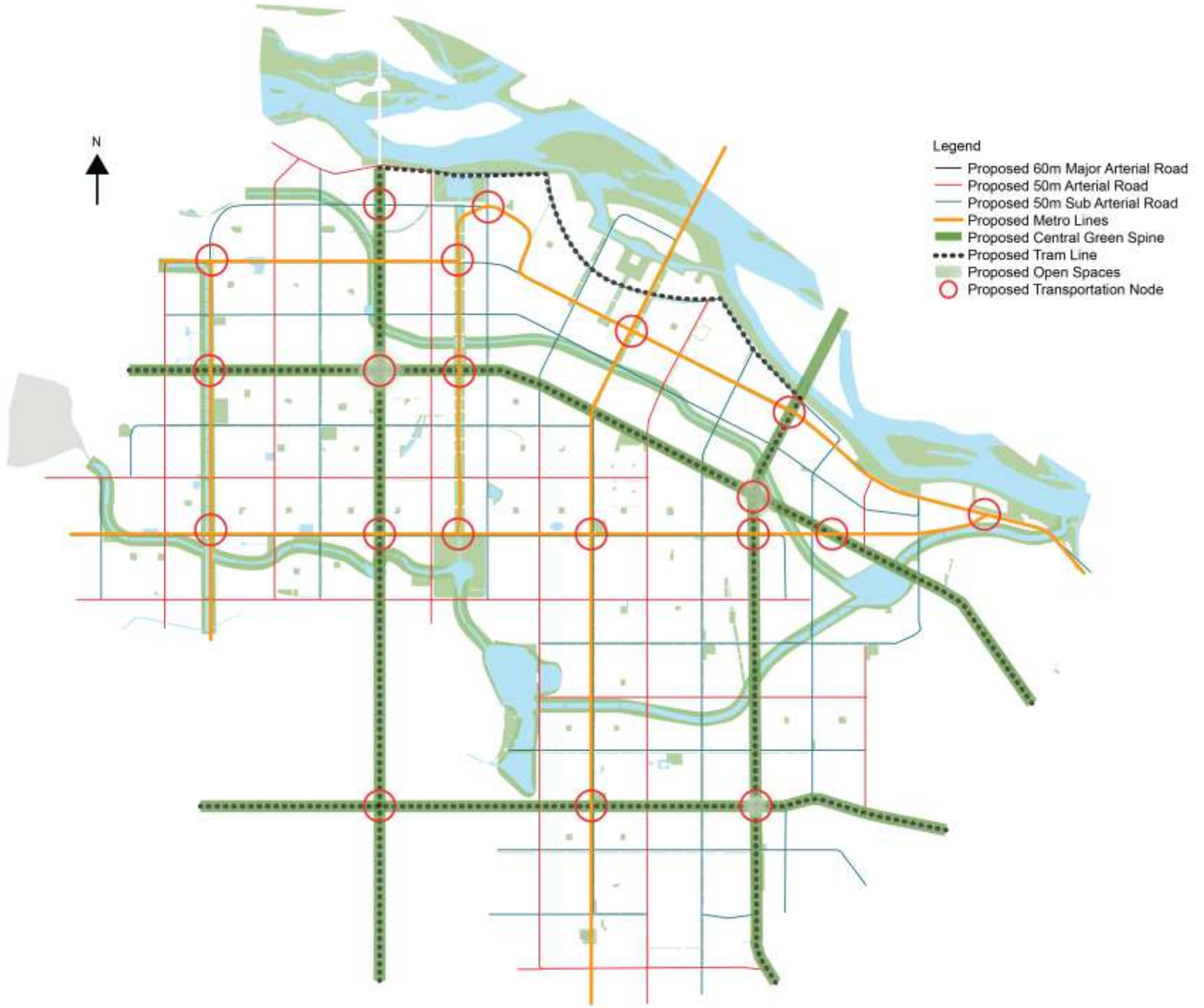
As a new capital city, Amaravati with its Andhra culture and diverse character of the various existing villages can be developed as a city with a unique image and identity. These local characteristics should be embraced and incorporated as part of city life. Residents and tourists should be able to experience the local culture of Amaravati as they navigate through the city. Streets are in essence the living room of the city and offer the first impression of Amaravati and the quality of city life and as such should offer a pleasant environment, a place of memorable experiences for local people and visitors alike.

Roads should not just be a conduit for vehicles generating traffic congestion and streets are not simply a passageway that gets people from place to place. Rather, they should be an integral part of the public realm infrastructure creating the image and identity of the city. The street design of Amaravati will prioritize the people's needs by considering the movements and behaviours of pedestrians, in addition to providing road space for vehicles. Vibrant streets will connect with open spaces to encourage active lifestyle and social interaction in the city. Adequate open spaces should be available on either side of the streets with footpaths and for larger arterial roads will have a green spine provision that could also form a bio-swale to address the flooding issue forming the storm water management solution for the city. The Streetscape Guidelines provide the urban design framework for the different street types and intersections while catering to the local context and the needs of the people.

The most critical of the city-level strategies is setting up inter and intra city transport network. A sustainable transport network is a key to the city offering urban mobility but also enabling city life to happen. It is important to ensure that the road network is adequate for ensuring smooth vehicular flow without traffic congestion. But, it is equally important that the roads are pedestrian friendly with generous footpaths, cycle tracks, paving, lighting and street furniture. Streets that are human scale with context sensitive landscaping, inclusion of art and sculpture help create a high quality public realm, allowing for a memorable pedestrian experience. This will set Amaravati apart from other cities in India and beyond.

Interim Strategy

A phased development strategy where the part of the right-of-way of the road network including the cloverleaf areas can be developed as open space including urban agriculture in the interim as the road capacity is not needed until much later. When there is need for road capacity then the interim open space can be reinstated as appropriate. The smaller local streets should be developed more like shared streets. In addition the vacant land can be used for temporary uses in the interim such as events and exhibitions, fairs, markets, urban agriculture, solar panels, parking and other amenities until there is market demand or plan for development.



Mobility Strategy

2.5 Mobility and Infrastructure

Walkability

Walking is an important aspect in people's daily activities which cities have often neglected. A walkable city not only promotes walking which is a healthier mode of transport for people but also makes the city safe while generating economic opportunities. High quality public space and pedestrian areas within the city need to be abundant and should be well designed in human scale and should be comfortable and attractive spaces for people of Amaravati and visitors alike.

Streetscape

Streets are one of the major deciding factors of a city's success in liveability and walkability. Streets are often mistaken simply as conduits for vehicles to connect or provide linkages to destinations. It is important to consider streets as part of the city's public open space network. A walkable street enables outdoor city life, encourages interactions among people, and creates a sense of belonging. A vibrant and thriving city is attractive for residents and tourists, and enhances a city's walkability and liveability as well. There should be a change in mind-set in the design of streets with a focus on people rather than only vehicles.

Streets should be designed in a way that allows pedestrians to engage in various activities. Landscape should be provided to create adequate buffer between pedestrians and vehicles for an enjoyable street environment. Provision of cycling lanes is recommended to promote active and healthy transport.

- Given the hierarchy of the road network, the overall streetscape strategy needs to be established in a sensitive and holistic approach with consideration of adjacent land use
- Streets should be designed to ensure a balance between pedestrians, NMT and vehicles, integrating local context and character
- Footpaths width are proposed to offer an abundant amount of pedestrian space, with the provision of various street furniture and landscape to ensure a comfortable and desirable walking experience
- Typical footpath sections and intersections are suggested with a design for place making, as well as art, culture and heritage preservation
- Integration of public utility should be been considered in the streetscape which promote consistent development with the infrastructure

Intersections

Intersection is the place with the most traffic flow and typically result in conflict between different users. It is essential to have a clear separation between vehicular and pedestrian flow. At the same time, the function of intersections should be beyond connectivity. Intersections should also be places for people to gather and enjoy rather than only to pass through. Major intersections play a important role in city image identity serving as gateways, indicating the arrival at a new district or neighbourhood.

To provide a more walkable and liveable environment where people can enjoy, Amaravati should utilise intersections as a place of interaction. Street corners should provide adequate spacing where people can linger, similar to a plaza. Traffic should be kept at a slow speed so that people would not be threatened by the vehicles while commuting between street corners. Street corners can also further enhance the character of the neighbourhood through arts and sculpture. By placing more emphasis on the people's experience on foot, the city can inspire an atmosphere of vibrancy and liveliness from people walking and appreciating the outdoor environment as shown in the adjacent images.

Creating walkable street that enables outdoor city life, encourages interactions among people, and creates a sense of belonging

Visualisation of pedestrian oriented streets

Source: https://www.treehugger.com/urban-design/preserve-your-brain-live-walkable-neighborhood.html

2.5 Mobility and Infrastructure

Transit Pedestrian Oriented Development (TPOD)

Transit and Pedestrian Oriented Development promotes sustainable urban mobility with the following key aspects.

- TPOD keeps residents within close proximity to public transport, improves the catchment and increase the viability of the transit network. Concentration of residential and commercial use creates a compact environment where facilities are shared among users. This reduces the cost of infrastructures per capita.
- TPOD creates high density developments that are concentrated along transit nodes, it promotes walking and the use of non-motorized transport through a network of pedestrian friendly streets and paths.
- TPOD provides the opportunity to adopt an efficient and well-connected pedestrian network. As compact strategically clustered development bring advantages to the city socially, environmentally and economically.
- Transit corridors or transport nodes such as BRT stops and MRT stations also become the urban core of the city.

Public Infrastructure

Public infrastructure is defined as facilities or systems that provide the necessary support in the urban environment. It is generally referring to structures such as roads, bridges, water supply, sewage, electrical grids, telecommunications, internet and open space network. There are mainly 6 key areas of infrastructure management including transportation, flood management, water supply, waste water management, solid waste management and power supply. Public infrastructure helps make a city more functional, connected, socially inclusive, convenient, and comfortable for the lives for the people of Amaravati.

A well-planned and designed public infrastructure structure will ensure an efficient use of space in the public realm and is pivotal to the growth of the city. The less favourable public facilities such as the integrated solid waste management facility should be placed away from residential developments, green open space and the street corners to prevent disturbance to pedestrian movement and visual quality of the area. Function of public infrastructure should be cohesive to the urban design of the city, and the TPOD developmental approach. The public infrastructure should be carefully articulated to maintain aesthetic quality and development compatability with the surrounding context.

Streets, Public infrastructure and Utility services

- Streets should accommodate all amenities and facilities that are needed on a daily basis by pedestrians, cyclists or transit users on city streets.
- In addition, streets are portals for other city level outreach, advertising and public service initiatives that can be provided for citizens with minimal effort

Further details are included in the TPOD, Built Form and Streetscape Guidelines Chapters.

Kyoto – Transit oriented development

Waterfront, Toronto – Cycling paths and LRT system along the waterfront

Source: https://sf.streetsblog.org/2018/05/16/spur-talk-how-to-get-more-out-of-rail/, http://eventsintorontonow.blogspot.com/2015/09/10-lasting-things-from-summer-in-toronto.html

2.6 Smart and Sustainable Development

2.6 Smart and Sustainable Development

Smart and Sustainable Developments

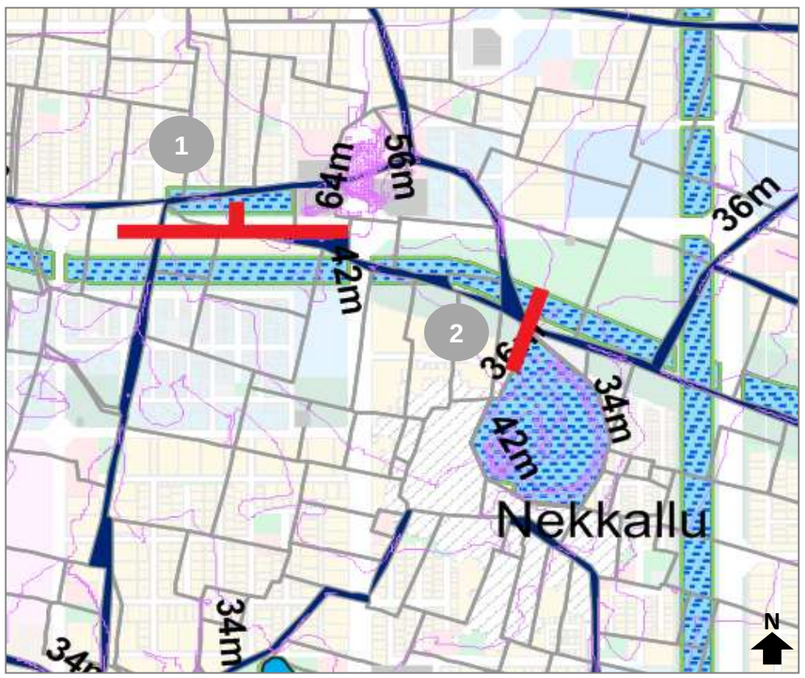
A smart and sustainable city should be responsive to climate change, and promote a healthy lifestyle, is participatory in decision making, multi-modal and uses efficient, clean technologies for infrastructure development. Amaravati has the golden opportunity by doing this right and setting a high standard to become an example for India and the world. Smart City strategies should target the liveability, happiness and well-being of the residents by improving the infrastructure, climate, health and inclusiveness of the city through technology driven initiatives

Water Management at City Level

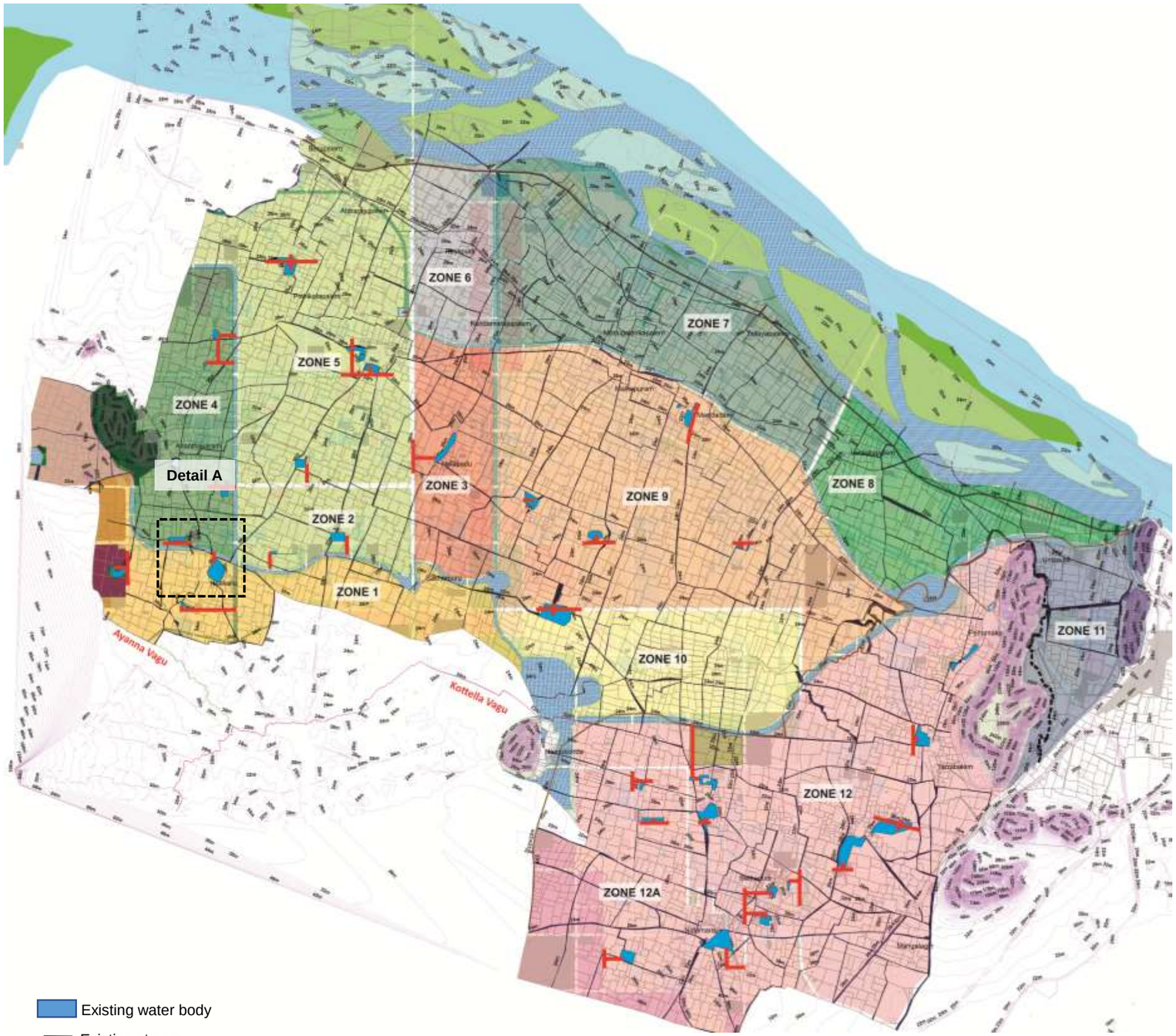
Alteration in the natural topography and contours of the area would result in changes in the surface hydrology system, impacting the watersheds in existing water bodies. The intent is to connect the existing water bodies with the proposed storm water drainage and the blue and green networks to ensure supply of water in the water bodies. Providing unencumbered water inlets and proper outflow arrangement for existing water bodies help in preventing stagnation of water thereby preventing weeding and algal growth.

- By connecting water bodies to the nearest storm water drainage line allowing a specified quantity of treated storm water to be discharged into the water body during monsoon period
- For water bodies located close to the canals, an unencumbered water inlet from the canal to the water body should be provided
- Appropriate measures such as provision of reed bed system need to be taken in infrastructure design to ensure that, the water entering in the water bodies from the storm water drains is free from solid waste and wastewater

Further details of green building and sustainable development will be elaborated in the Waterfront and Open Space Network Guidelines, Streetscape Guidelines and Built Form Guidelines Chapters.



Plan of Detail A showing connection of existing water body with storm water drain in case 1 and canal in case 2

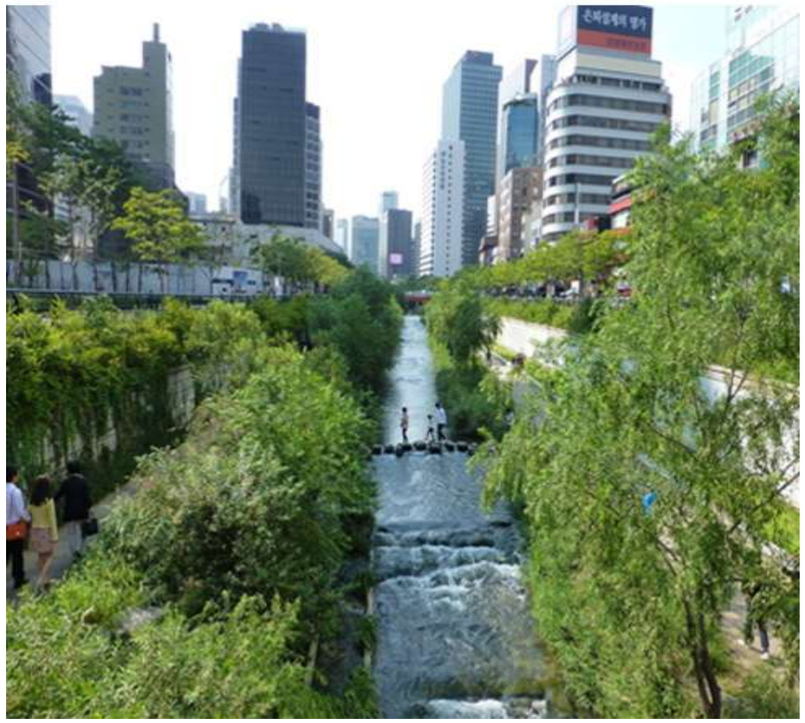


Plan showing existing water bodies and stream network and proposed connectivity of water bodies to storm water drainage network for Amaravati Capital City

Source: Base map- Contour map of Cadastral connectivity (APCRDA), Amaravati - TRUNK and LPS INFRA report (2018)

2.6 Smart and Sustainable Development

Water Management at City Level

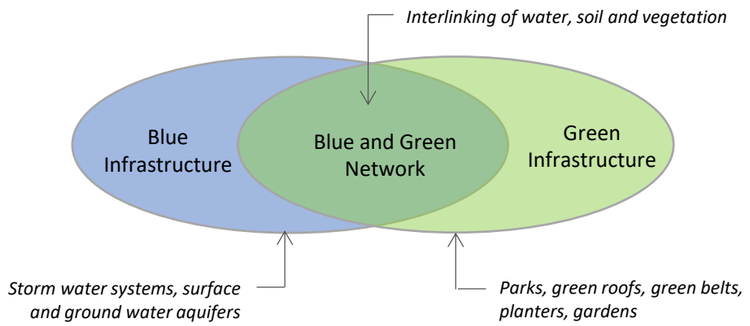


Soft interface between land and water Cheonggyecheon River Restoration in Seoul

Enhancing the Natural Ecosystem

The intent is to create a natural ecosystem in which the blue and green elements are interlinked to form a cohesive ecological network that provides multiple regulating and cultural ecosystem services by:

- Limited use of concrete in water canals with gradient of more than 3% and detention ponds in order increase the potential of water cleansing through biophysical processes;
- Create a natural habitat for diverse range of flora and fauna and provide an opportunity for residents to interact with and learn from nature
- Soft interface between water bodies and green buffer zone with the use of natural elements such as rocks and vegetation
- Planting of aquatic vegetation at the base detention ponds to make the ponds act as natural wetlands that use biophysical processes for cleaning storm water



Interlinking blue and green infrastructure with the blue and green network

Example of Bio-retention swales

Sustainable Drainage Strategies

The intent is to supplement the functioning of conventional storm water drainage system with the use of sustainable drainage strategies that uses natural methods for storm water management and aid in flood control by:

- Incorporation of sustainable drainage system in conjunction to conventional storm water drainage system

Sustainable drainage elements to be used at street level are:

- Bio-retention swales in buffer areas and in multi-functional zone of streetscape (refer 6.4 Streetscape guidelines for Bio-swale details)
- Plantation of large canopy trees in multifunctional zones
- Use of permeable paving in urban plazas and surface parking areas

Use of sustainable drainage strategies is to be prioritized in areas that are under high risk of inundation.

- In areas with a high ground water table, selection of appropriate sustainable drainage strategies should be made such as the use of wet bio-swales. Adequate provision should be made for lining with impermeable membrane in sustainable drainage elements to prevent percolation of ground water
- Regular maintenance of sustainable drainage elements ensures long term efficiency of the system. Before the onset of monsoon, the catchment area (i.e. roads and pavements) is to be cleaned.

Regular maintenance of rain gardens and swales in Oregon using field guides

Green Space Protection and Management Policy

The intent is to protect and manage green spaces that are planned as primary greens, secondary green links and recreational landscapes in order to maintain their productivity in storm water retention by:

- Development of a policy for the protection and management of green spaces i.e. P1 and P2 land use types to ensure:
  - The maintenance and upkeep of green spaces
  - Planting of native and ecosystem based species of flora
  - The protection of green spaces for carrying out of their ecological functions
- Management and monitoring of green spaces by the Gardens Department or any other authority identified for the role
- Portion of open spaces should be reserved for environment management activities such as compost pits, waste water treatment and renewable energy generation
- Advanced Locality Management (ALM) committees should be set up to coordinate with authorities to carry out environmental improvement activities at local level

Source: https://nacto.org/publication/urban-street-stormwater-guide/stormwater-elements/green-stormwater-elements/bioretention-swale/ ; www.nclurbandesign.org; http://extension.oregonstate.edu/stormwater/sites/default/files/fieldguide.pdf

2.6 Smart and Sustainable Development

Water Management at Neighbourhood Level

Multi-functional Spaces for Flood Management

The intent is to combine functions in the urban realm to make systems more resilient, adaptive and robust by:

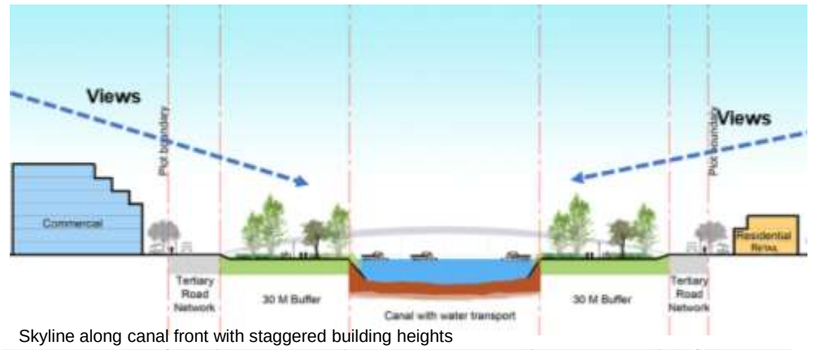
- Open spaces/urban plazas should be as multi-functional spaces and a measure for flood control. During floods, the open spaces act as areas for short-term storage, retention or infiltration of surface runoff to reduce pressure on the city's infrastructure
- Part of storm water collected at neighbourhood level should be discharged into open spaces such as neighbourhood parks
- Buffer green spaces along the canals should be designed at a lower level from the adjoining road level to hold water overflowing from the canal and prevent it from entering the roads
- Separate sewage and storm water drainage lines and cross drains should not be permitted to avoid mixing of sewage with storm water

Restoration and Protection of Existing Water Bodies

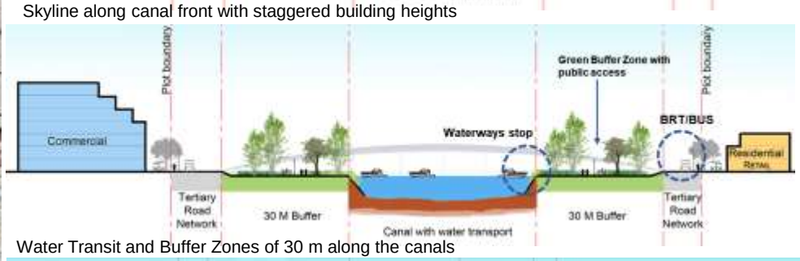
The intent is to protect existing natural hydrology of the area by preserving and restoring existing natural water bodies.

- Existing natural water bodies like lakes, tanks, ponds and wells should be protected from pollution, encroachment, dumping or any other activity which would endanger the health of the water body
- The protection and management of the water bodies should be undertaken by the Advanced Locality Management (ALM) Committee of the area
- Restoration of existing water bodies should be ensured by
  - Contouring and maintaining natural flow of water
  - Cleaning, de-silting, de-weeding and deepening of water body;
  - Implementing bio-remediation measures for removing contaminants;
  - Planting of native vegetation around water bodies; and
- Preparation of an ecology and biodiversity action plan for the water body and its environs

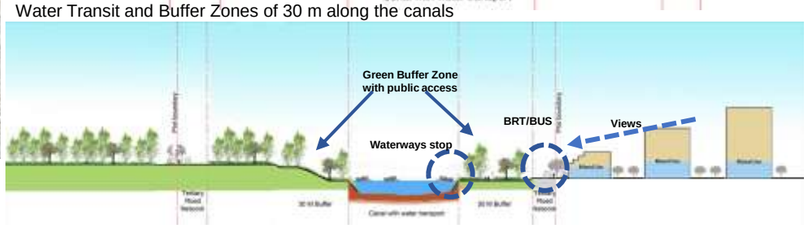
Zollhallen Platz in Freiberg, Germany, uses permeable paving, green areas and underground cistern for increasing flood resilience of the area



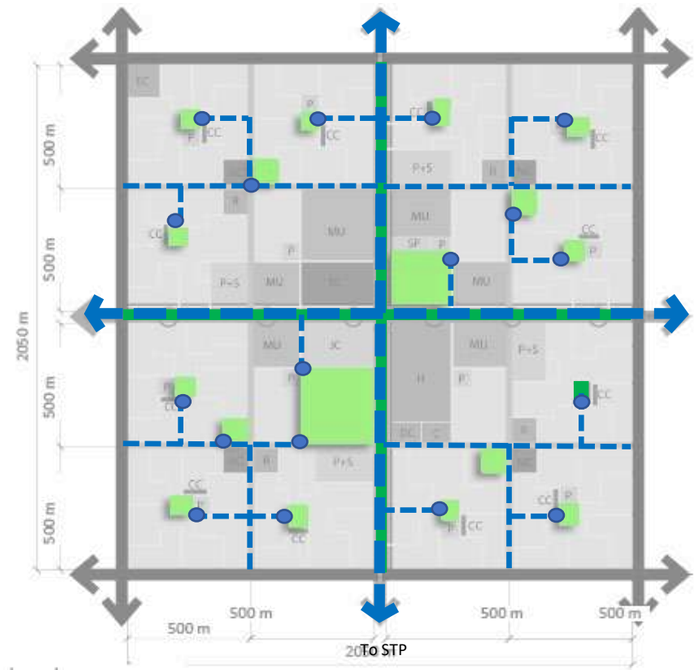
Skyline along canal front with staggered building heights



Water Transit and Buffer Zones of 30 m along the canals



Mixed use developments along canals



Conceptual model of a township showing storm water discharge to neighbourhood green spaces

Dry and wet season functioning of a neighbourhood park

Restoration of an area along the Tarnava Mica River in Transilvania, Romania

Source: http://www.moef.nic.in; https://land8.com/how-zollhallen-plaza-is-ready-for-a-100-year-flood; https://www.risa-hamburg.de/, http://www.ceeweb.org/work-areas/priority-areas/green-infrastructure/restoration-project/#gallery-1

2.6 Smart and Sustainable Development

Urban Agriculture

Amaravati Capital City is located in the fertile deltaic belt of the Krishna River. The productive soil and the saucer shape topography of the region makes conditions favorable for paddy cultivation, which has been practiced for generations, making it a part of the famous “rice bowl of India”. Andhra Pradesh contributes 16-18% towards rice production from an area of about 10% of country’s rice area.

Prior to the city development, 80.91% of the total area of Amaravati Capital Region was under agricultural use. Three or more crops were grown annually and there are more than 120 varieties in total. In the Survey of India maps, fruit cultivation like mango groves has been observed in the Capital City boundaries.

Given Amaravati’s agricultural heritage, it is appropriate to provide urban agriculture within the city. Urban agriculture is the growing, processing, and distribution of food and non-food plant and tree crops and the raising of livestock, directly for the urban market, both within and on the fringe of an urban area. Urban agriculture should be integrated into the urban economic and ecological system while being embedded in and interacts with the urban ecosystem. Such linkages include the use of urban residents as laborers, use of typical urban resources (like organic waste as compost and urban wastewater for irrigation), and direct links with urban consumers and direct impacts on urban ecology.

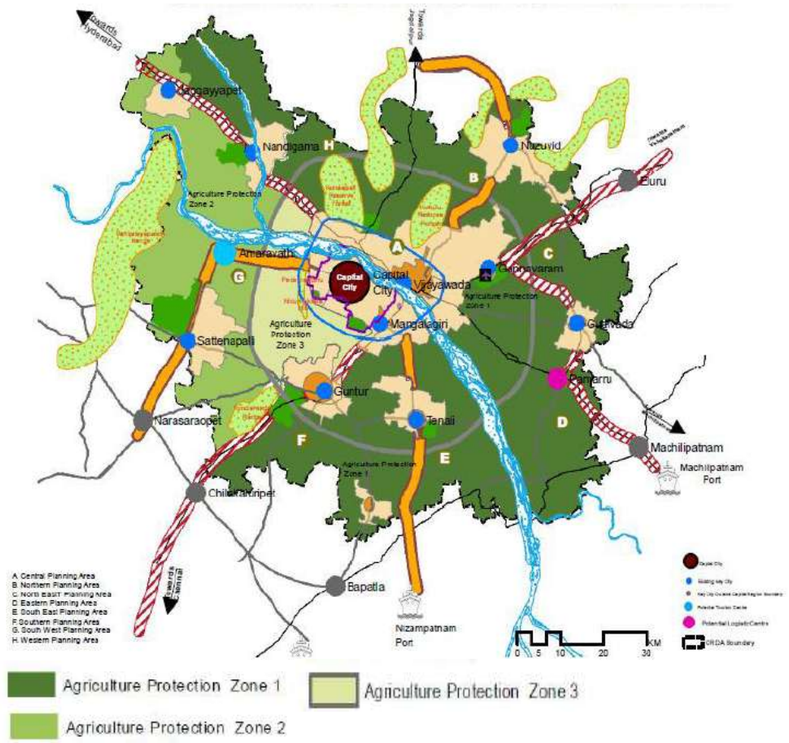
Benefits of Urban Agriculture:

- Environmental: Improvement of local biodiversity, enhancement of ecosystem services, regulation of the hydrological cycle, improvement of air quality, improved waste management, improved micro climate, urban greening, reduced ecological footprints, recreation, environmental education
- Socio-cultural: aids in building community, diversified cultural services, effective educational tool, food security and nutrition
- Economic resilience: added income generation, employment generation, enterprise development, scope for marketing enterprises
- Subsistence: self-production of food and herbs, savings on health expenditures by self-cultivation at household level, part of livelihood strategies for the urban poor
- Multi-functional: organic and diverse agriculture, building up of urban green spaces network, amalgamation of aesthetic, institutional and recreation

Peri-Urban Agriculture in Amaravati:
Agricultural zones cover 63% of land area in the regional plan of Amaravati and its zonal distribution is:

- Agriculture Protection Zone 1 (44.41%) includes fertile lands, existing plantations, and aquaculture areas and provides opportunity for existing agricultural activities to remain intact
- Agriculture Protection Zone 2 (13.22%) acts as a green belt and it restricts development outside the outer ring road. It can be used for recreational purpose. Open to sky recreational activities, recreation and temporary structure for public purposes such as fairs, exhibitions, amusement parks in the form of tents and tarpaulin shelters erected for temporary and ceremonial activities, parking lots
- Agriculture Protection Zone 3 (5.6%) is earmarked for the city’s future expansion

Urban agriculture and community farming should be encouraged as interim use in waterfront areas, within and in the fringe areas of the existing villages where appropriate.



Amaravati Capital City: agriculture protection zones map

Agricultural fields of Amaravati

Examples of urban agriculture within the city

Example of community farming at Nana Nani Park

Source: https://crda.ap.gov.in/APCRDADOCS/DETAILED_DRAFTPLAN/Chapter%206%20-%20Development%20Strategy%20and%20Perspective%20Plan%20for%20Capital%20Region.pdf, https://www.thehindu.com/features/metroplus/society/chennais-urban-farmers/article7516117.ece (K.V. Srinivasan 2015), https://cityfarmer.info/urban-farmers-in-india-growing-fruit-vegetables-at-home-to-cut-dependence-on-market/

2.6 Smart and Sustainable Development

Climate Control

Urban areas are on average 1–2°C warmer per year than their surrounding rural areas. This is called Urban Heat Island (UHI) effect which is caused due to the following:

- Anthropogenic heat released from heated or cooling buildings
- Heat released by traffic
- Building materials store solar heat and release at night
- Tall buildings trap air in to the street canyons and reduce wind speed within the city
- Lack of vegetation, evaporative cooling and shading
- Long wave radiation is reflected from walls back to street level

UHIs can also intensify heat waves in cities, with periods of abnormally hot and often humid weather. To reduce the UHI effect, micro-climate management is required to help maintain outdoor temperatures

The following are methods for micro-climate management:

Cool materials

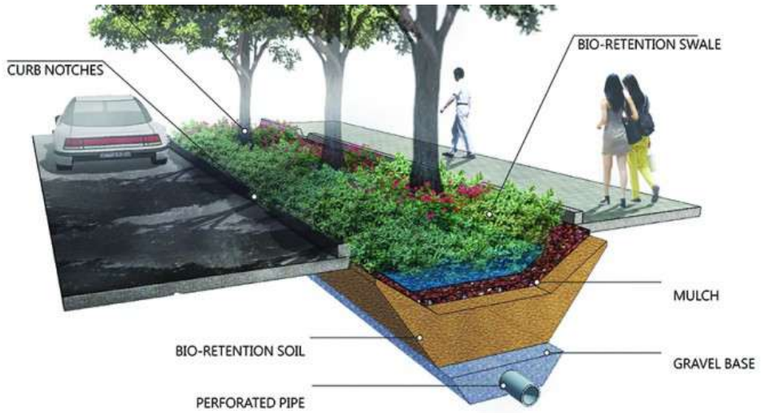
- High solar reflectance and infrared emitting values result in lower external surface temperatures, reduce heat penetrating into the building and decrease the ambient air temperature
- Cool pavements (concrete tiles coloured by infrared reflective colours), cool asphalt (light coloured asphalt pavements presenting much higher diffuse reflectivity to solar radiation), and photo catalytic materials (i.e. materials containing TiO_2 are added to the surface of pavements to reduce air pollution created mainly by traffic) should be used as appropriate

Green spaces

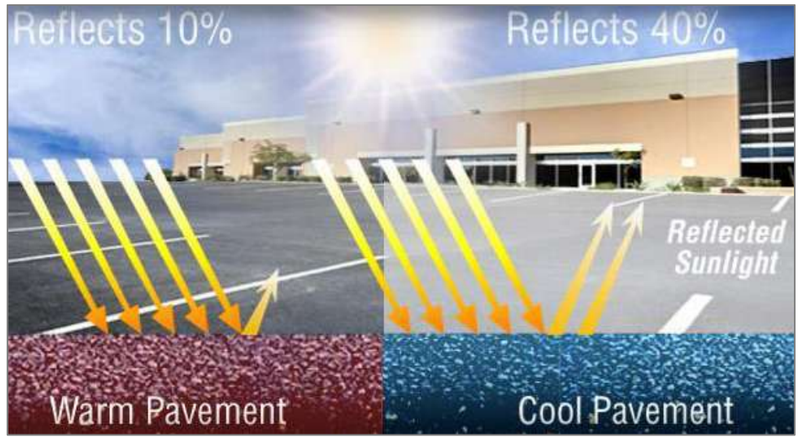
- Urban climates should be cooled through shading and evapotranspiration
- Parks, open spaces, bio-retention ponds (shallow landscaped depressions which are typically under drained and rely on engineered soils, enhanced vegetation and filtration to remove pollution and reduce runoff downstream), bio-swales and rain gardens for UHI reduction

Thermal sensors and mist control system

- Encourage misters that are programmed using a system of thermal sensors that monitor the ambient temperature, relative humidity and footfall in an area
- During high temperature, clouds of mist are emitted through sprinkler system to help reduce ambient temperature and provide cooling



Bio-swales

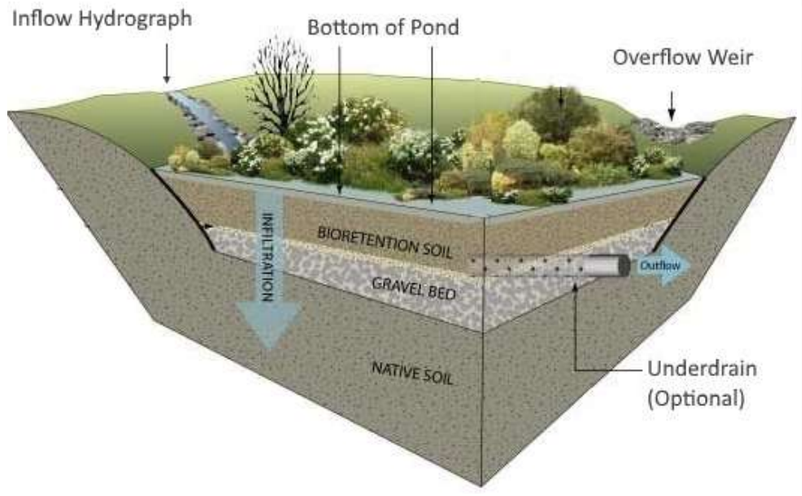


Cool Pavements reflects sunlight which helps in reducing UHI

Rain garden

Mist Control system in Marina Bay waterfront promenade, Singapore

Bio-retention swale



Bio-retention ponds

Source: Ramboll, http://ccap.org/cooler-roofs-pavements-and-cars-courtesy-of-heat-island-group-lawrence-berkeley-national-labs/, https://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/newjersey/explore/rain-gardens-1.xml, https://www.hydrologystudio.com/help/bioretention-ponds.html, Jacklee, 2011, https://commons.wikimedia.org/wiki/File:Mist_Walk,_Lower_Boardwalk,_Marina_Bay,_Singapore_-_20110618-01.JPG,

2.6 Smart and Sustainable Development

The following strategies should be encouraged using technology to create smart developments in Amaravati as shown in the adjacent images.

- **Smart Buildings**
- Provide productive and cost-effective environment through optimisation of four basic elements: structure, systems, services and management, and the interrelationship between them according to the user's needs through use of technology
- Lower operational costs and offers benefits for owners and occupants
- Linking the building´s environmental and electrical systems into a single network so they can exchange information and work together to achieve optimum efficiency
- Promote and encourage green buildings, low carbon and net zero buildings

Smart Lighting System

- Designed for energy efficiency
- Include high efficiency fixtures and automated controls that make adjustments based on conditions such as occupancy or daylight availability
- Lighting Control System refers to an intelligent networked system of devices related to lighting control, which may include relays, occupancy sensors, photocells, light control switches or touchscreens, and signals from other building systems (such as fire alarm or HVAC) which can be adjusted both at device locations and at central computer

Smart Parking System

- Provide real-time information and guidance to available parking spaces in a particular geographic area
- Use low-cost sensors for data collection and connect to mobile payment applications to allow people to reserve parking in advance or finding parking spots
- Reduces car emissions in urban centres by minimising the need for people to go around city blocks searching for parking and also helps to control illegal parking

Electric Vehicle Charging Stations

- Supplies electric energy for the recharging of electric vehicles, such as plug-in electric vehicles, including electric cars, neighbourhood electric vehicles and plug-in hybrids to encourage clean-energy vehicles.
- Promote and encourage the use of electric vehicles Also provide secure EV parking and charging stations at all transit station, all public spaces, commercial and institutional buildings.

Smart Cards

- Contactless smart card which allows commuters to travel on multiple forms of public transport using a single card and without the inconvenience of finding exact cash for single journeys
  Eg **:** The Octopus Card in Hong Kong is a successful example and is used to pay for rides on the MTR, buses, minibuses, ferries, trams and taxis. It is also used for payments in shops, department stores, supermarkets, fast food and retail outlets, bookstores, convenience stores, cinemas, public swimming pools, car parks, schools and other places

City-level Surveillance System

- Install CCTV cameras at public places and traffic junctions to help in detecting crime and vandalism as well as crowd and traffic prone areas

Temperature, Air and Noise pollution sensors

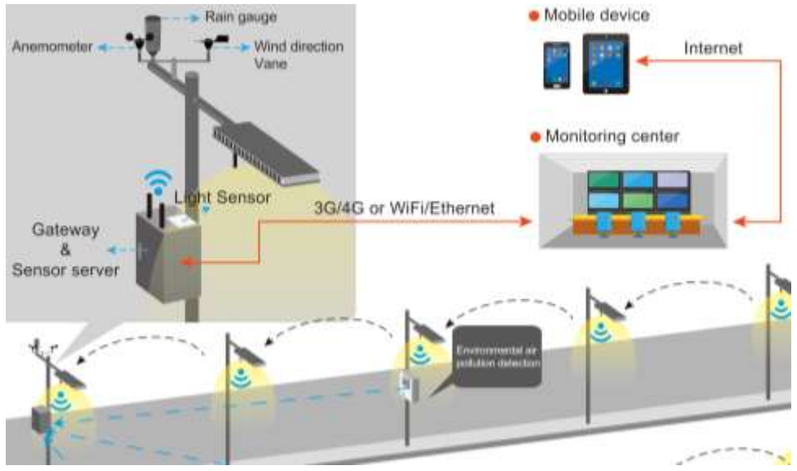
- Detect real-time temperature, air and noise pollution levels at different areas to support policy decisions against pollution

Solar Street Lights

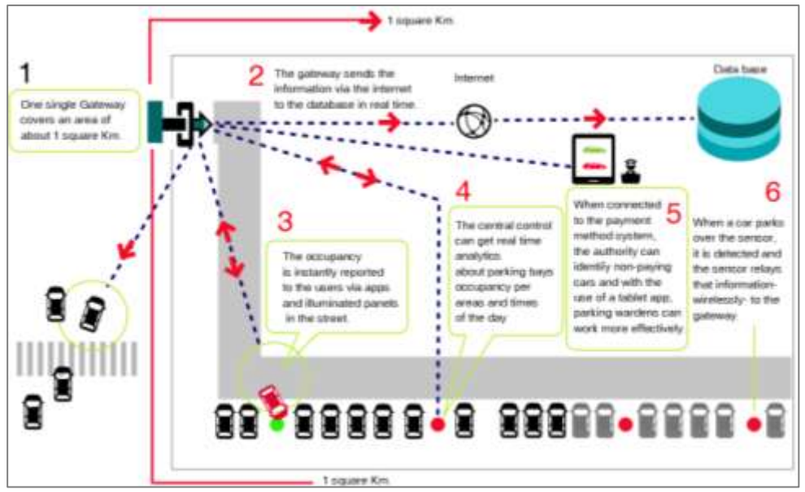
- Energy efficient light sources which are powered by photovoltaic panels generally mounted on the lighting structure or integrated in the pole
- Rechargeable and uses a fluorescent or LED lamp during the night

Intelligent Building

Electric Vehicle Charging Station

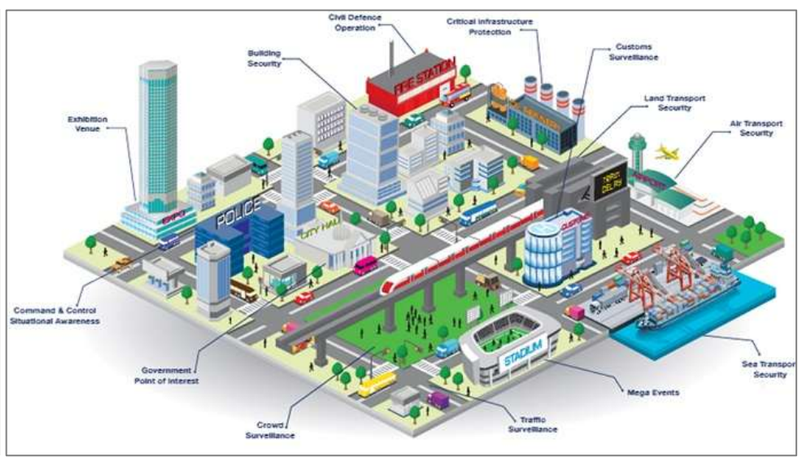


Smart Lighting System



Smart Parking System

Octopus Card in Hong Kong



City level surveillance system

Source: https://www.commscopetraining.com/pls/newsitem.php?anddx=1andob=3andid=401195, https://www.cens.com/cens/html/en/news/news_inner_48111.html, https://www.happiestminds.com/whitepapers/smart-parking.pdf, http://www.hongkong.net/transportation/octopus-card, http://www.fotovoltaik-energy.com/site/photo-gallery/, https://www.nec.com/en/global/solutions/safety/Inter-Agency/PVSS/index.html

2.7 Quality of Life and Well-Being

2.7 Quality of Life and Well-Being

Quality of Life and Well-Being

Improving the quality of life for the people of Amaravati is about creating a happy city giving people the opportunity to thrive, excel and make positive changes for a healthy lifestyle. The liveability, happiness, health and wellbeing of the people of Amaravati will be enhanced by catering to the various needs of the people in health, skills development, education and employment opportunities as well. Providing high quality blue and green network, connecting the city with a reliable public transit, and promoting the heritage, art and culture of Amaravati will be the key to create a liveable, sustainable and economically viable city that is an attractive place for the people of Andhra Pradesh, India, and beyond.

Liveability

Liveability of a city not only involves affordable housing but also high quality public space, community facilities and amenities for leisure, recreation and health care etc. in a vibrant and pleasant city environment offering sustainable mobility through transit, biking and walking, providing educational and employment opportunities with economic competitiveness, and promoting the well-being of the people of Amaravati. A city should be designed in such a way in which the people are nurtured to a better way of life addressing their various needs and provide opportunities for leisure, recreation and to cultivate spiritual growth. As Amaravati aims to become the “People’s Capital”, the provision of public facilities and amenities should be prioritised in the city for its long term growth. Accessibility to high quality public space is vital to creating a liveable city. From public parks, plazas and other recreational facilities to schools, hospitals and more, they should be made available to the public within close proximity, preferably within a walkable distance.

To accommodate the needs of the citizens, public facilities and amenities often are costly to build and maintain. Therefore, to maximise their use and ensure a higher reach of users, cities should look to build upward rather than expanding outward. Creating a more compact city can benefit Amaravati in several ways. Reducing the time spent by people for commuting would improve the efficiency of the city. Businesses are able to create more synergy with opportunities for interactions, which can drive economic growth. There will also be less dependency on cars, thereby encouraging public and active transport including transit, walking and cycling.

A network of open spaces is essential to promote a healthy lifestyle for the city. Connections between open spaces will determine how well the spaces are being utilised by creating a walkable environment for pedestrians. Streets should be designed to be people oriented; planting along the roads should provide a scenic view to pedestrians while also giving shading, and allow a buffer zone away from vehicles traveling on the road. Walkability is greatly enhanced with a comfortable and safe environment which in return allows open spaces to become destinations as shown in the adjacent images.

Healthy living

Provide open spaces as destination to improve quality of life

Create walkable and active street environment

Source: http://www.hyperactivz.com/active-lifestyle/, https://www.eco-business.com/news/green-spaces-boosts-wellbeing-urban-dwellers-study/, http://wglt.org/post/bloomington-aldermen-discuss-complete-streets

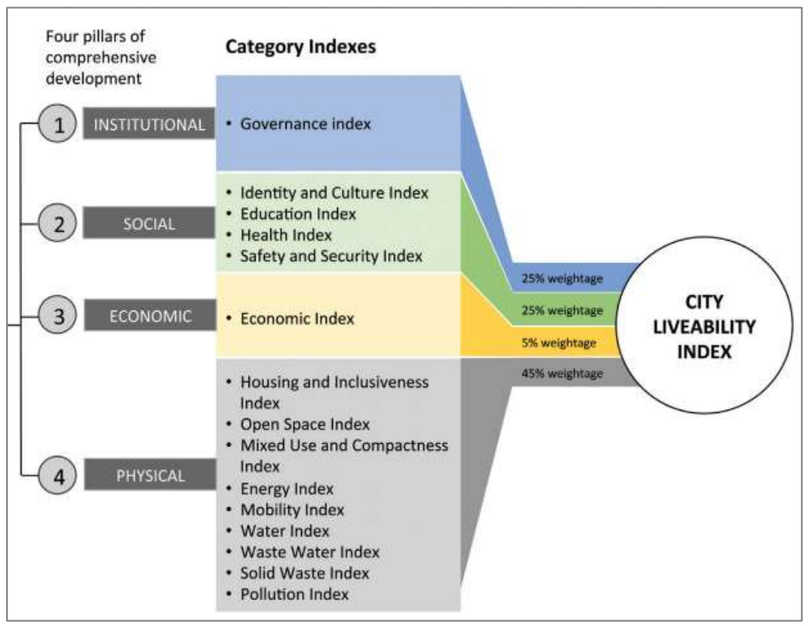
2.7 Quality of Life and Well-Being

Rapid urbanisation and uncontrolled development lead to issues like congestion, increased pollution levels, environmental degradation, health issues etc. Housing becomes unaffordable with high real estate value. Large scale gated communities are designed with infrastructure which are disconnected with the outside environment creating safety, exclusivity and isolation issues as well as minimal and true community engagement. Infrastructure developments are affected due to overlap between different government institutions creating issues in co-ordination which eventually disconnects people from the city and its environment. Yet they are popular in many cities for security, exclusivity and other reasons adversely impacting city life. Hence, mixed income communities with various income ranges should be encouraged to ensure that the city does not become predominant of isolated enclaves. Yet these are prevalent and popular in many cities. Mixed income communities within various income ranges should be encouraged.

Liveability, Happiness and Wellness studies help in mitigating these issues by proper planning of land-use, housing, transportation, safety etc. They create healthy environments for people to live, work and play, enhancing occupant health and quality of life.

Liveability Index

- Liveability index is rating for cities for their urban quality of life based on assessments of stability, healthcare, culture, environment, education and infrastructure
- The Ministry of Urban Development (MoUD), Govt. of India has developed a set of 'Liveability Standards in Cities' to generate a Liveability Index and rate cities



Happiness

- Happiness index is quantitative measurement of well-being and quality of life which is based on equitable social development, cultural preservation, conservation of environment and promotion of good governance.
- It is measured using parameters including housing, income, work, community, civic engagement, education, environment, health, life satisfaction, safety and life-work balance.

Happiness and Liveability Framework

Elements	Liveability matrix	Happiness matrix
Governance	• Citizen participation • IT connectivity • ICT-enabled Government services	• Community engagement • Citizen services available online, digital media etc. • Efficiency of urban operations and services
Identity and Culture	• Restoration and reuse of historic buildings • Restoration of ecologically important areas • No. of cultural/sports events hosted by city	• Tourism development • Vibrant activity spaces for public interaction • Responsibility towards environment • Increase in green and open spaces • Community relationship
Education	• Access of education • Availability of education • Quality of education	• Early education • Opportunities to learn and skill advancement
Health	• Availability and quality healthcare (no. of hospital beds, healthcare professionals) • Response time in case of emergencies	• Quality of healthcare • Patient satisfaction • Healthy and active behaviour (smoking and obesity prevalence and access to exercising opportunities) • Healthy food habits • Mental health promotion and protection
Safety and Security	• Number of crimes recorded per lakh people • Availability of surveillance systems and coverage extent	• City level surveillance systems • Crime prevention through environmental design (CPTED)
Economy and Employment	• Increase in Tax collection • Increase in issuance of Construction permits • Unemployment rate	• Life-work balance • Level of employee satisfaction • Quality of work
Housing and Inclusiveness	• Percentage of Slum / EWS households covered through formal / affordable housing • Percentage of slum areas through basic services	• Quality of affordable housing • Average housing price • Average rent level • Provision of basic services to slum areas
Public Open Spaces	• Availability of green spaces • Availability of public and recreational places	• Quality and accessibility of green and public spaces • Vibrant activity spaces for public interaction
Mixed Use and Compactness	• Share of mixed land in overall city land use • Net Density	• Walkability • Type and density of mixed use

Elements	Liveability matrix	Happiness matrix
Power Supply	• Percentage of population with authorized electrical services • Percentage of electrical connections covered through smart meters • Total energy consumption per capita	• Provision of 24 x 7 power supply for the overall city • Provision of 100% smart meters at city, neighbourhood and household levels
Transportation and Mobility	• Geographical coverage of public transport • Availability of public transport and mode share • Percentage of road network with dedicated bicycle tracks • Paid parking spaces availability • Percentage footpath coverage – wider than 1.2 m	• Accessibility and frequency of public transport • Quality of footpath and bicycle tracks • Barrier free design • Easily accessible paid parking spaces • Smart parking systems • Travel cards
Water Supply	• Household level coverage of direct water supply connections • Per capita supply of water • Level of non-revenue water • Percentage of water connections covered through meters	• Quality of water supply • Provision of 24 x 7 water supply • Quality of infrastructure for water supply transportation • Provision of 100% water meters at district and household levels • Monitoring and maintenance of water supply network through systems like SCADA
Waste Water Management	• Coverage of toilets • Coverage of storm water drains and sewerage network • Extent of re-use and recycling of waste water	• Quality of infrastructure for waste and water management • Provision of recycling facilities • Incentives for re-use
Solid Waste Management	• Household level coverage of municipal solid waste collection • Efficiency of collection • Extent of solid waste recovered through reuse	• Frequency of solid waste collection • Provision of reuse facilities
Reduced Pollution	• Concentration of SO2, NO2, PM10 – air pollution • Level of noise pollution • Quality of water in public surface water bodies	• Monitoring air quality, noise and water pollution • Measures for reducing pollution levels

Sources: http://smartcities.gov.in/upload/uploadfiles/files/LiveabilityStandards.pdf, https://www.ukayamut.com/wp-content/uploads/2014/03/models-for-sustainable-cities-valerie.pdf, https://crda.ap.gov.in/apcrdaCOMMUNI/media/apcrdadocs/WorkshopPanelPresentations/Happy%20City-%20Plan,%20Vision%20_%20Action/Livability_v1.pdf

2.7 Quality of Life and Well-Being

Thriving Places Index

Thriving Places Concept

Happy City's Thriving Places Index represents the drivers of wellbeing – factors which are known to improve people's wellbeing now and in the long term.
These indices are arranged into three elements:

1. SUSTAINABILITY comprising:
- CO_2 emissions
- Energy consumption
- Waste and recycling rates

2. LOCAL CONDITIONS comprising:
- Work and local economy
- Mental and physical health
- Education and learning
- Place and environment
- People and community

3. EQUALITY comprising:
- Wellbeing inequalities
- Health inequalities
- Income inequalities

Well Standards

- The WELL Standards (WELL) is the first standard to focus exclusively on the health and wellness of the people in buildings
- It is a performance-based system for measuring and certifying features of buildings that impact human health and well-being
- It combines best practices in design and construction with evidence-based medical and scientific research – harnessing buildings and communities as vehicles to support human health and well-being
- WELL empowers the creation of healthy environments for people to live, work and play, enhancing occupant health and quality of life globally
- It is administered by the International WELL Building Institute (IWBI), a public benefit corporation whose mission is to improve human health and wellbeing through the built environment
- WELL Building Standards can lead to a built environment that helps to improve the nutrition, fitness, mood, sleep, comfort and performance of its occupants
- Well Community Standard supports health and well-being through inclusive, integrated and resilient communities

WELL Building Standard features involve the following two types of standards:
- Performance-based standards that allow flexibility in how a project meets acceptable quantified thresholds
- Prescriptive standards that require specific technologies, design strategies or protocols to be implemented

The categories for Community and Building Standards are given as follows:

Categories	Community Standard	Building Standard
AIR	• Ambient air quality • Reduce traffic pollution-parking restrictions • Low emission vehicles • Strategies to reduce exposure to pollution-smoking ban • Pollution source separation • Air quality education	• Ventilation effectiveness, outdoor air systems, air flush, toxin infiltration into space • Filtration and air purification • Cleaning protocol, microbe and mold control, pest control, cleanable surfaces and cleaning equipment • Material Safety
WATER	• Drinking water quality • Public water sanitation • Facilities provisions • Strategies for managing contaminated water on a systems scale • Strategies to promote drinking water access • Storm water management	• Water testing and monitoring • Inorganic Contaminants • Organic Contaminants • Agricultural Contaminants • Public Water Additives • Drinking Water Promotion
NOURISHMENT	• Fruit and vegetable access • Availability and affordability • Policies to reduce the availability of processed foods • Nutritional information and education • Food advertising and promotion • Food safety and security; • Public food inspection information; • Urban agriculture	• Food contamination • Food production • Sanitary preparation • Labelling of artificial ingredients, nutrition information, allergens • Food advertising • Proper portion control • Space for and encouragement of mindful eating
LIGHT	• Maintained illuminance levels for roads and walkways • Strategies for limiting light pollution and light trespass • Glare and Discomfort avoidance • Light Masterplan	• Visual Lighting Design • Daylighting modeling • Glare control • Circadian lighting and circadian emulation • Light quality • Automatic shading and dimming control
FITNESS	• Environmental design and operational strategies to reduce risk of transportation-related injuries • Mixed land use and connectivity • Walkability • Cyclist infrastructure • Infrastructure to encourage active transportation • Movement network planning • Strategies to promote daily physical activity and exercise	• Circulation enhancement • Activity incentives and structured fitness programs • Spaces and equipment for physical activity • Active furnishings and active design • Active transportation support

Sources: https://www.wellcertified.com/sites/default/files/resources/CommunityStandard_WELL.pdf, https://standard.wellcertified.com/light/circadian-lighting-design, https://s3.eu-west-2.amazonaws.com/hcindex-files/docs/THRIVING_PLACES_INDEX_FULL_REPORT_FINAL.pdf

2.7 Quality of Life and Well-Being

Well Standards

Categories	Community Standard	Building Standard
MIND	• Access to mental health care • Substance abuse and addiction services • Access to green spaces • Outdoor child play spaces • Restorative blue, green and built spaces	• Integrative design • Biophilic design • Adaptable spaces • Material transparency • Healthy sleep policy • Business travel • Stress and Addiction Treatment • Altruism • Self Monitoring • Organizational Transparency
TEMPERATURE	• Strategies to reduce heat island effect – water bodies and green spaces • Policies to deal with extreme temperatures • Policies to manage sun exposure and ultraviolet risk	Not applicable*
SOUND	• Noise exposure assessment • Planning for acoustics • Techniques to reduce sound propagation • Hearing health education	Not applicable*
MATERIALS	• Strategies to reduce exposure to hazardous chemical substances in cases of uncontrolled/accidental release and contaminated sites • Strategies to limit use of hazardous chemicals in landscaping and outdoor structures • Construction remediation	Not applicable*
COMFORT	Not applicable*	• Accessible design • Physical and visual ergonomics • Interior and externally generated noise levels • Reverberation time • Sound masking • Sound barriers • Sound reducing surfaces • Thermal comfort, including individual thermal control and radiant thermal comfort
COMMUNITY	• Health impact assessments • Policies that address the social determinants of health • Health promotion programming; • Policies that foster cohesive community identity and empowerment • Crime prevention through environmental design preparedness • Policies and planning for community disaster and emergency	Not applicable*

*these categories are not applicable given the categories of the Well Standards, however these factors will also have impact on these categories.

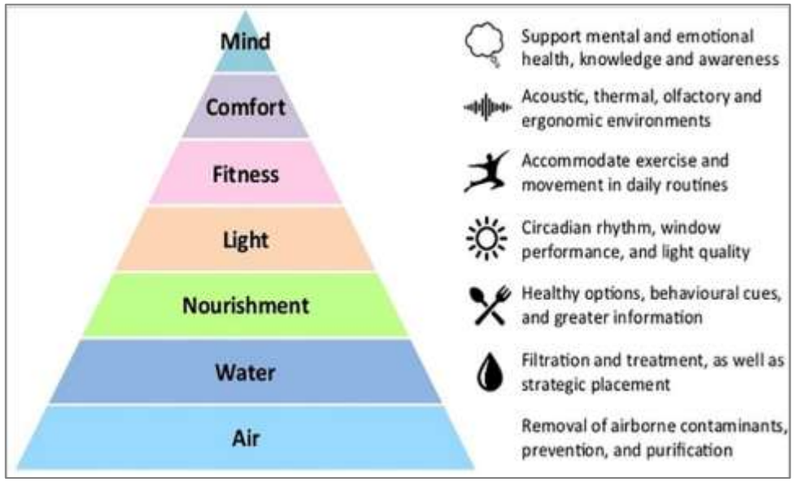


Diagram for Well Building Standard

To qualify for the WELL Building Standard:

- The gross square footage entered for the project should include the sum of the floor areas of the spaces within the building including basements, mezzanine, intermediate-floored tiers and penthouses with headroom height of 7.5 feet or greater.
- The gross square footage should exclude non-enclosed (or non-enclosable) roofed-over areas such as exterior covered walkways, porches, terraces or steps, roof overhangs and similar features
- It should also exclude air shafts, pipe trenches, chimneys and floor area dedicated to the parking and circulation of motor vehicles

To qualify for the WELL Community Standard, projects must meet at least two of the following conditions:

- Planned daytime or night-time population of 500 people or more
- Planned total floor area of 50,000 m² [538,000 ft²] or more
- Planned total building count of 10 or more
- Total land area of two hectares [five acres] or more

In addition, the WELL Community Standard is designed for integrated, mixed use developments. Therefore, projects must also include at least two of the following:

- Multifamily residential: at least one building with five or more dwelling units
- Office and/or retail: at least 1 space, employing a total of at least 5 people
- Public use recreation or leisure, accessible from dawn to dusk: at least one space, of at least 0.4 hectare [one acre]

Sources: https://www.wellcertified.com/sites/default/files/resources/CommunityStandard_WELL.pdf, https://standard.wellcertified.com/light/circadian-lighting-design, https://www.wellcertified.com/sites/default/files/resources/WELL%20CERTIFICATION%20GUIDEBOOK_6.7.18.pdf

2.7 Quality of Life and Well-Being

Applicability Matrix

Categories	Liveability				Happiness				Well Community Standards			
	Pre-Construction	Construction	Post Construction	Post Occupancy	Pre-Construction	Construction	Post Construction	Post Occupancy	Pre-Construction	Construction	Post Construction	Post Occupancy
Governance	Citizen Participation	Citizen Participation	Citizen Participation	Citizen Participation	Community engagement		Community engagement	Community engagement	Policies that foster cohesive community identity and empowerment			Policies that foster cohesive community identity and empowerment
	IT Connectivity			ICT enabled Government services	Citizen services available online, digital media etc.		Efficiency of urban operations and services	Citizen services available online, digital media etc.				
	ICT enabled Government services							Efficiency of urban operations and services				
Identity and Culture	Restoration and reuse of historic buildings	Restoration and reuse of historic buildings		No.of cultural / sports events hosted by the city	Tourism Development	Vibrant activity spaces for public interaction		Tourism Development	Restorative blue, green and built spaces			Restorative blue, green and built spaces
	Restoration of ecologically important areas	Restoration of ecologically important areas			Responsibility towards environment			Vibrant activity spaces for public interaction	Strategies to reduce heat island effect			
					Increase in green and open spaces			Responsibility towards environment				
								Community relationship				
Education	Availability of education			Quality of education	Early education			Opportunities to learn and skill development	Policies that foster better education facilities	Access of Education		Quality of Education Infrastructure
	Access of education											
Health	Availability of healthcare (no.of hospital beds, healthcare professionals)		Healthcare infrastructure quality	Quality of healthcare	Access to exercising opportunities			Quality of healthcare	Policies that address the social determinants of health		Quality of Healthcare facilities	Health impact assessments
				Response time in case of emergencies				Patient Satisfaction	Strategies to promote daily physical activity and exercise			Health promotion programming
								Mental Health promotion and protection				Access to mental health care
Safety and Security	Availability of surveillance systems and coverage extent		Availability of surveillance systems and coverage extent	Availability of surveillance systems and coverage extent	City level surveillance systems		City level surveillance systems	City level surveillance systems	Crime prevention through environmental design preparedness			Vibrant activity spaces
				No.of crimes recorded per lakh people	Crime prevention through environmental design preparedness			Vibrant activity spaces	Policies and planning for community disaster and emergency			Response time for community disaster and emergency

2.7 Quality of Life and Well-Being

Applicability Matrix

Categories	Liveability				Happiness				Well Community Standards			
	Pre-Construction	Construction	Post Construction	Post Occupancy	Pre-Construction	Construction	Post Construction	Post Occupancy	Pre-Construction	Construction	Post Construction	Post Occupancy
Economy and Employment	Increase in issuance of Construction permits			Increase in issuance of Construction permits Increase in Tax collection Unemployment rate				Life-work balance Level of employee satisfaction Quality of work				
Housing and Inclusiveness	Percentage of Slum / EWS households covered through formal / affordable housing Percentage of slum areas through basic services			Percentage of Slum / EWS households covered through formal / affordable housing Percentage of slum areas through basic services	Average housing price		Average housing price	Quality of affordable housing Average rent level				
Public Open Spaces	Availability of green spaces Availability of public and recreational places		Quality of green spaces, public and recreational places	Quality of green spaces Quality of public and recreational places	Availability and accessibility of green and public spaces			Quality and accessibility of green and public spaces Vibrant activity spaces for public interaction	Access to green spaces Strategies to limit use of hazardous chemicals in landscaping and outdoor structures			Quality of green spaces Quality of outdoor play areas
Mixed Use and Compactness	Share of mixed land in overall city land use Net Density	mixed use in buildings		mixed use both vertical and horizontal Net Density	Walkability Type and density of Mixed use	mixed use in buildings		Quality of walking Type and density of Mixed use	Mixed land use and connectivity Walkability			Mixed land use and connectivity Quality of walking
Power Supply	Percentage of population with authorized electrical services Percentage of electrical connections covered through smart meters Total energy consumption per capita			Percentage of population with authorized electrical services Percentage of electrical connections covered through smart meters Total energy consumption per capita	Provision of 24 x 7 power supply for the overall city Provision of 100% smart meters at city, neighbourhood and household levels		Provision of 24 x 7 power supply for the overall city Provision of 100% smart meters at city, neighbourhood and household levels	Provision of 24 x 7 power supply for the overall city Provision of 100% smart meters at city, neighbourhood and household levels				
Transportation and Mobility	Geographical coverage of public transport Availability of public transport and mode share Percentage of road network with dedicated bicycle tracks		Percentage of road network with dedicated bicycle tracks Percentage footpath coverage – wider than 1.2 m	Availability of public transport and mode share Paid parking spaces availability Percentage footpath coverage – wider than 1.2 m	Accessibity and Frequency of Public Transport Barrier free design Smart Parking systems Access to paid parking spaces Travel Cards		Quality of footpath and bicycle tracks Barrier free design	Quality of footpath and bicycle tracks Barrier free design Smart Parking systems Easily accessible paid parking spaces Travel Cards	Infrastructure to encourage active transportation Movement network planning Cyclist infrastructure Environmental design and operational strategies to reduce risk of transportation-related injuries			Infrastructure to encourage active transportation Quality of cyclist infrastructure

2.7 Quality of Life and Well-Being

Applicability Matrix

Categories	Liveability				Happiness				Well Community Standards			
	Pre-Construction	Construction	Post Construction	Post Occupancy	Pre-Construction	Construction	Post Construction	Post Occupancy	Pre-Construction	Construction	Post Construction	Post Occupancy
Water Supply	Household level coverage of direct water supply connections		Household level coverage of direct water supply connections	Household level coverage of direct water supply connections	Provision of 24 x 7 water supply		Quality of water supply	Quality of water supply	Public water sanitation		Public water sanitation	Drinking water quality
	Per capita supply of water		Percentage of water connections covered through meters	Per capita supply of water	Provision of 100% water meters at district and household levels		Provision of 24 x 7 water supply	Provision of 24 x 7 water supply	Facilities provisions		Facilities provisions	Public water sanitation
	Percentage of water connections covered through meters			Level of non-revenue water	Monitoring and maintenance of water supply network through systems like SCADA			Quality of Infrastructure for water supply transportation	Strategies for managing contaminated water on a systems scale			Facilities provisions
				Percentage of water connections covered through meters				Monitoring and maintenance of water supply network through systems like SCADA	Strategies to promote drinking water access			
Waste Water Management	Coverage of toilets		Extent of re-use and recycling of waste water	Coverage of toilets	Provision of recycling facilities		Provision of recycling facilities	Quality of Infrastructure for Waste Water Management	Storm water management		Storm water management	Storm water management
	Coverage of storm water drains and sewerage network			Coverage of storm water drains and sewerage network	Incentives for re-use			Provision of recycling facilities	Facilities provisions		Facilities provisions	Facilities provisions
				Extent of re-use and recycling of waste water				Incentives for re-use	Provision of recycling facilities			Provision of recycling facilities
Solid Waste Management	Household level coverage of municipal solid waste collection		Household level coverage of municipal solid waste collection	Household level coverage of municipal solid waste collection	Provision of reuse facilities			Frequency of solid waste collection				
	Extent of solid waste recovered through reuse			Efficiency of collection				Provision of reuse facilities				
Reduced Pollution	Concentration of SO2, NO2, PM10 – air pollution	Level of noise pollution		Concentration of SO2, NO2, PM10 – air pollution	Monitoring air quality, noise and water pollution			Monitoring air quality, noise and water pollution	Strategies to reduce exposure to pollution	Strategies to reduce exposure to pollution		Strategies to reduce exposure to pollution
	Level of noise pollution			Level of noise pollution	Measures for reducing pollution levels			Measures for reducing pollution levels	Techniques to reduce sound propagation	Techniques to reduce sound propagation		Techniques to reduce sound propagation
				Quality of water in public surface water bodies					Strategies to reduce exposure to hazardous chemical substances in cases of uncontrolled/accidental release and contaminated sites			
				Construction remediation					Construction remediation			
Light									Strategies for limiting light pollution and light trespass		Maintained illuminance levels for roads and walkways	Maintained illuminance levels for roads and walkways
									Glare and Discomfort avoidance			
									Light Master Plan			
Nourishment	Food safety and security				Food safety and security				Availability and access of fruits and vegetables			Access and Affordability of fruits and vegetables
	Urban agriculture				Urban agriculture				Policies to reduce the availability of processed foods			Nutritional information and education
									Food safety and security			Food advertising and promotion
									Urban agriculture			

2.8 Social Equity and Integration

2.8 Social Equity and Integration

Social Equity and Integration

The existing villages in Amaravati are key to building a People's Capital. The development of the new capital city should integrate the new development with the village while uplifting the quality of life of the villagers. The informal sector plays a significant part to the livelihood of the people, which should be preserved and maintained, but better organized within the city. By integrating the villages and accommodating the informal sector within the new capital city results in the social equity and interaction of all levels of society which will help build a more inclusive and cohesive society.

As a "People's Capital", the livelihood of the current citizens should be considered. Amaravati occupies 29 existing villages which should be well integrated with the city's masterplan. Some of these villages are more urban, some more rural; they should be well integrated to become part of the new capital city, while the existing local heritage, art and culture should be recognized and preserved. The transformation of Amaravati should be taken as an opportunity to uplift the villages such that it can improve the quality of life of the villagers. These villages should be transformed with high quality public space, community facilities, provision of infrastructure for water and electricity as well as social amenities including education and healthcare.

Developments for the new capital should be sensitive with respect to the villages in a way where the village communities would be well integrated with the LPS developments, and not be isolated by large gated developments. There should be a smooth and seamless connection between the villages and new developments to create a harmonious transition from existing to new areas.

The integration of the villages will be studied among various aspects, from socio-economic, environmental and physical to administrative and community aspects. These will be further elaborated in the Village Integration Chapter.

Existing village in Amaravati

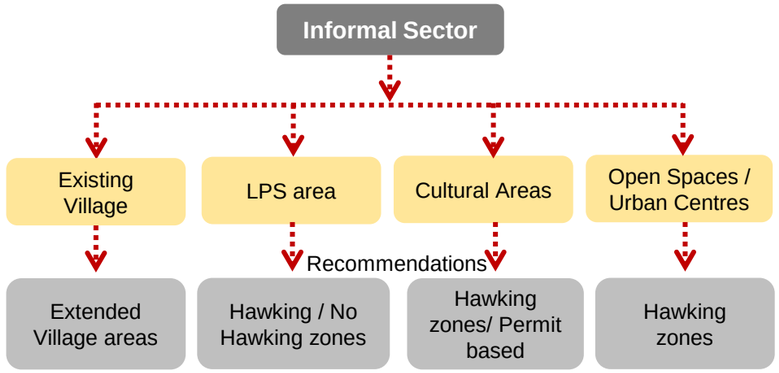
Visual concept of village integration

Source: https://www.thehindu.com/news/national/andhra-Pradesh/

2.8 Social Equity and Integration

Informal Sector

Street vending is an important source of livelihood for nearly 2.5% of Indian population. It provides 'affordable' services to the majority of urban population. Informal sector is formed organically through natural accretion over time and develops into agglomeration economies. The term urban vendor is inclusive of traders and service providers, stationary as well as mobile vendors and incorporates all other local/region specific terms used to describe them, such as, hawkers, vendors, footpath traders, etc.



Informal Sector in Existing Villages

- Due to major transformation in the livelihood from a more agrarian community into an urban community after land pooling, such villagers could consider informal vending as an alternate employment opportunity
- As villages absorb migrant population, village areas become potential market for selling their products
- The multi-functional space inside the village is a potential zone with activities like socio-cultural, exhibitions, fairs etc. for informal vending and street markets and fairs.

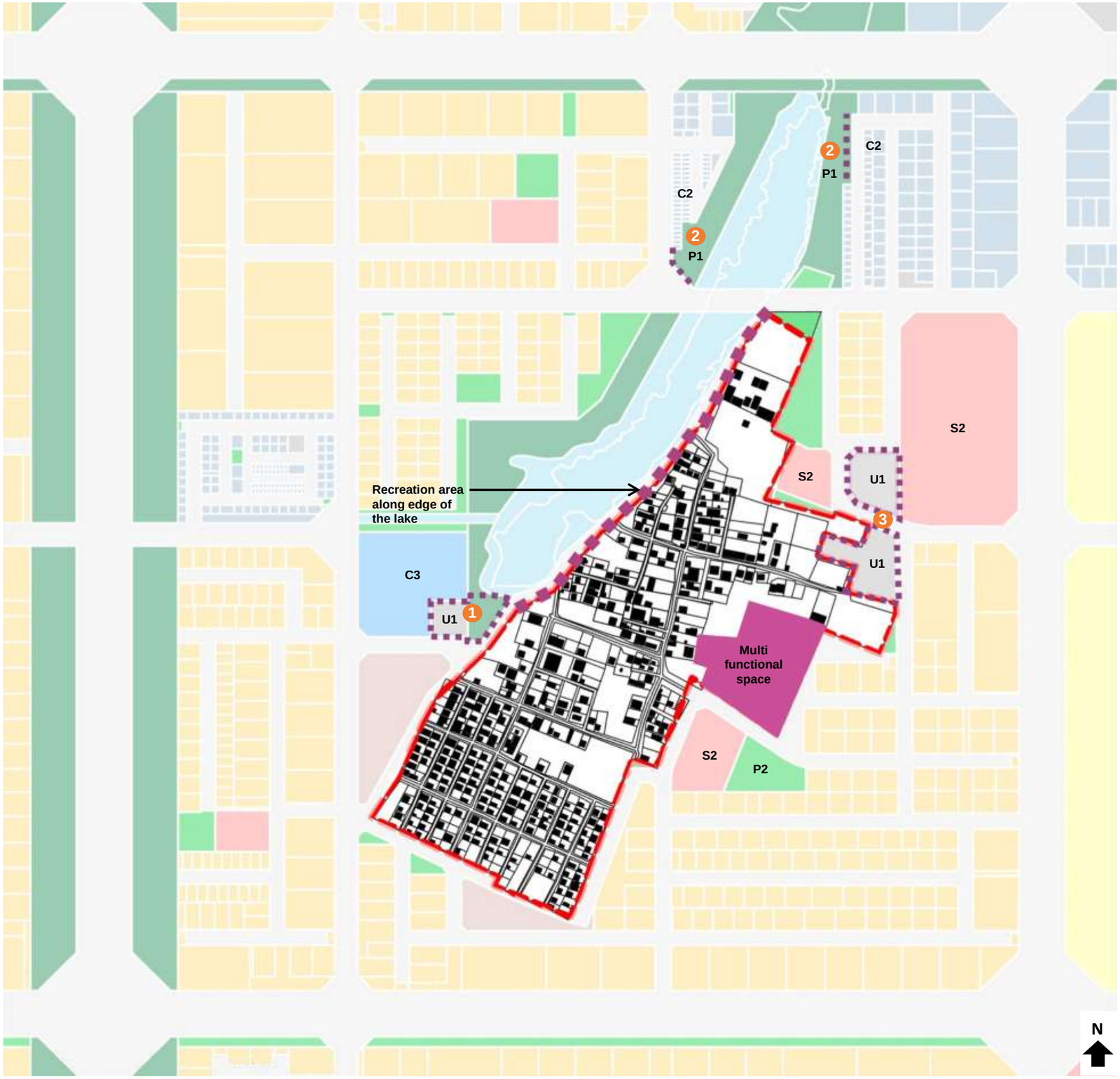
Informal Sector in LPS Area

- To organize informal sector in LPS areas, hawking zones should be provided
- Transit points and activity areas become potential zones for informal markets
- Designated zones can be provided in public owned lands near these activity areas
- Minimum size of designated stall shall be 1.8m X 1.8m (6ft X 6ft)
- For development of planned hawker zones, PPP (public-private partnership) model of funding can be used

Eg: In Bhubaneshwar City, advertisement companies financed the cost of vending zones by developing aesthetically pleasing fixed kiosks with certain spaces for advertisement

Eg: Nelapadu village and surrounding LPS is taken as example to demonstrate informal sector in both village and LPS area.

- There is a lake at the edge of the village which is a potential recreational area. Development of informal markets for arts and crafts along this activity area should be proposed
- The multi-functional spaces inside the village are potential zones for informal vending
- Developing designating informal zones in the following LPS areas:
  - Along the U1-Reserve zone (transit point) and C3-Neighbourhood center zone (activity area)
  - Along P1-Passive zone which is a recreation area adjacent to lake and C2-General commercial zone
  - Around U1-Reserve zone (transit point) & S2-Education zone (activity area)



Plan showing proposal for informal sector in Nelapadu village and LPS area

Source: Village integration Map with LPS (Base map) – APCRDA, http://www.inclusivecities.org/wp-content/uploads/2012/10/Kumar_WIEGO_PB7.pdf, http://www.rsarchitects.net/Research/MCGM%20-%20FINAL%20REPORT.pdf

2.8 Social Equity and Integration

Informal Sector in Cultural Areas

- Cultural areas like religious institutions, community gathering spaces, art galleries, museums etc. have a natural flow of local population throughout the year. Informal markets like food stalls, eateries are developed around these areas. Time-restricted hawking zones can be designated around these cultural areas according to the temporal pattern in the area
- During festivals or socio-cultural events, there is a high tourist intake in certain areas to allow for potential informal vending. Vending can be allowed during the festivities through temporary special permits

Eg: Informal market in Mohammed Ali Road, Mumbai during Ramzan festival

Informal Sector in Open Spaces

- Open spaces such as parks and promenades are places where a large number of people visit for leisure, relaxation and exercise. Mostly food and drinks vendors flock to such areas
- Designated hawking zones in open spaces to ensure the integrity of the open space along with providing for goods and services of the users of the open space

Eg: Designated food stalls in Girgaum and Juhu beach, Mumbai

- Weekly markets or flea markets can be organized in designated areas near open spaces

Eg: Weekly market “Ravivari Bazaar” along the Sabarmati Riverfront in Ahmedabad

Informal Sector in Urban Centres

- Designated hawking zones in these areas with re-tractable stalls for hawkers and open seating area for eatery stalls
- Designated hawking zones in business districts can help in giving life to the area after office hours

Night Food Court at IGMC Stadium road in Vijayawada

Designated hawker stalls in Singapore

Facilities for Informal Sector

As per URDPFI Guidelines (2015), basic civic facilities should be provided in vending zones and vendor markets, such as:

- Solid waste disposal
- Public toilet
- Aesthetic design of mobile stalls/push carts
- Electricity
- Drinking water
- Protective covers
- Storage facilities including cold storage for specific goods like fish, meat and poultry
- Parking areas

Informal Sector as Urban Community Workforce

Urban vendors are a part of street life and known to people of the locality. Their position in society can be formalized by training licensed vendors to assist government authorities in the management of the public realm by reporting incidents, providing first aid and assisting during emergencies.

Kondapalli Shopping District in Vijayawada

Informal market near religious institutions at Shahbaz gaothan, Belapur, Navi Mumbai

Source: https://www.thehindu.com/news/cities/Vijayawada/grab-a-late-night-snack-at-this-food-court/article8619143.ece; http://blog.visiit.com/12-best-shopping-places-in-vijayawada/, on-site image of Shahbad village, Belapur, http://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I.pdf

2.8 Social Equity and Integration

Informal Sector along Streets

- Informal sector is permitted on only 25 m collector and 17m neighbourhood roads and only intersections of Arterial and Sub Arterial 50m wide roads for place making
- Informal sector is located on specific roads to build character and enhance local flavour of the city at special zones of the village boundary
- Informal sector is restricted to streets within specific zones and given permission in the MFZs, inside APCRDA plot boundary only
- Informal sector should be accommodated where there is demand for their goods and services—near major intersections, public transport stops, parks and so on
- Create informal sector/ hawker zone at regular interval of 30 min walking distance
- Licenced informal sector should be provided with prior location and facilities in APCRDA plot
- Hawkers or informal sector should be placed near tree or with proper shaded areas

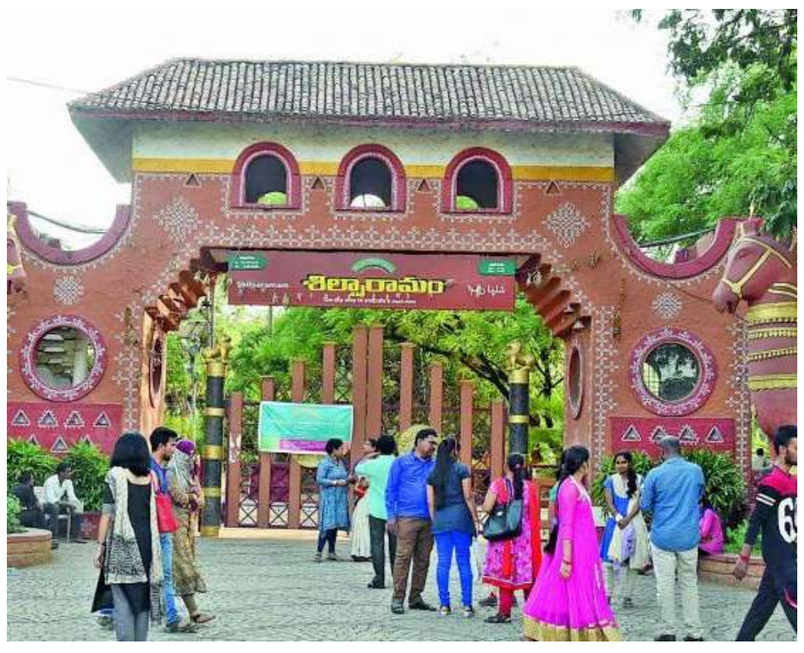
Strategies for Community Nodes for Informal Sector

- APCRDA plots should have a safe and unobstructed pedestrian access of 5m to improve the walkability within the neighborhood
- Pedestrian pathways should be durable and built with time-tested materials and features. They should be sustainable using locally-sourced and recycled materials where feasible
- Pedestrian pathways should have proper illumination
- Restricted access for vehicular movement in community nodes must be followed
- These community nodes can have segregated spaces as following:
  - 40% of plot area for active use
  - 50% of plot area for green cover
  - 10% of plot area for bicycle bays / smart infra utilities
- Active use includes weekly markets, tot-lots, recycling units/ composting pits, etc.
- Community nodes shall provide access to bicycles where ever necessary. There must be a bicycle bay within a radius of 10 – 15metres for such a provision.

Delhi Market

Janapath , Delhi

China town , Singapore



Shilparaman, Hyderabad

Source: https://www.hellotravel.com/india/city-shopping-kutch , https://www.tripoto.com/trip/best-street-shopping-places-in-delhi-568ec49baf804 , https://www.shutterstock.com/search/singapore+chinatown ,https://www.deccanchronicle.com/nation/current-affairs/220417/hyderabad-shilparamam-to-close-temporarily-from-june.html

2.9 Heritage, Art and Culture

2.9 Heritage, Art and Culture

Heritage, Art and Culture

The city's heritage, art and culture gives a distinctive character differentiating Amaravati from other cities. To preserve and foster these unique elements, Amaravati should celebrate the local culture and heritage through art and sculpture and should be showcased throughout the city. Conservation of existing built and natural heritage is a must. To introduce Amaravati's local heritage, art and culture to a wider audience, a heritage tourism circuit and walk should be developed to invite more people to learn about Amaravati. The current practice of using the airport as a venue for promoting Andhra heritage, art and culture is great and should be developed further, as airports function as gateways to the city.

Promoting Andhra Culture

Andhra Pradesh is one of the 29 states of India. Its history record has begun since the Vedic period. It is mentioned in Sanskrit epics such as Aitareya Brahmana (800 BCE).

The city has potential to develop a very unique image and identity because of the historical character defined through various arts and cultural practices

A quote below from the first Convocation Address of the Andhra University in 1927 shows the strong identity of Andhras.

"We, the Andhras, are fortunately situated in some respects. I firmly believe that if any part of India is capable of developing an effective sense of unity it is in Andhra. The hold of conservatism is not strong. Our generosity of spirit and openness of mind are well -known. Our social instinct and suggestibility are still active. Our moral sense and sympathetic imagination are not much warped by dogma. Our women are relatively more free. Love of the mother-tongue binds us all."
- Dr. Sarvepalli Radhakrishnan

The long history of Amaravati consists of various kingdoms and dynasties. Amaravati has a rich and diverse local art and culture, which needs to be protected together with the character of the city in the present times. Various elements of Andhra Culture had been identified in Amaravati which are significant assets of the city. These elements include but are not limited to:

- Festivals
- Dance
- Music
- Language
- Literature
- Modern Drama
- Visual Arts
- Handcrafts
- Telugutalli

Kondapalli Toys and crafts

Bobbili Veena made in Andhra

Dance form Kuchipudi

Music- Burra Katha

Andhra Architectural Heritage

Festivals

Source: https://www.inrootz.in/mythology-articles-stories/ar312/7-best-heritage-places-to-visit-in-andhra-pradesh

2.9 Heritage, Art and Culture

Promoting Public Art and Sculpture

- Art is cultural identity of any place or city. India is full of varieties within itself with different cultural identities through art which can be represented in various ways through art
- Andhra Pradesh and Amaravati have unique identity since ancient times, through rock cut architecture (Undavalli Caves), wall paintings and sculptures like Ajanta-Ellora. They can be represented directly in a traditional or modern way
- Public spaces and streetscape can become more lively and interactive with people through art and sculpture, such as wall painting, Rangoli pattern, wooden toys or dances
- Locations of these artwork can be identified on streets or big walls of public building facades. Design elements can be placed on compound wall, railings, bollards, pavement patterns of intersection, pedestrian walkways etc
- Art installations should be in specific zones of public buildings or commercial areas such as art galleries, multipurpose halls, institutional areas like school and collage campus, malls, cinema halls and performance theatres. Art can also be placed inside APCRDA plots in government buildings, public parks and green buffer zones while considering protective measures to promote public art
- It can also be placed along the streets in MFZs or intersection corners associated with public interactive places
- Any art installation should not affect the functionality of footpath or carriage way, entry / exit areas for which it is designed as per guidelines
- It should not hide signage boards or traffic signals
- Art display should be sensitively placed considering its clear visibility from multiple directions
- Area around the art installation should be kept vacant for pubic as a gathering place for people to enjoy and interact with the artworks
- Public Art in the city must be integrated with regular street in order to play a dual role – “utility” as well as “aesthetics”.
- Public Art can be a powerful tool for education and outreach. Carefully designed art could have a significant impact on the behavioural patterns of people.
- Public Art also helps build civic pride and a sense of belonging amongst citizens, especially if local communities can be involved in their creation, installation, renewal and maintenance.

Elements of the urban infrastructure possibly usable as public art:

- Pavements
- Manhole Covers
- Dustbins
- Bus Stops
- Boundary Walls, Fences and Handrails
- Public Toilets
- Tree Trunks or tree cover
- Street Furniture- sitting benches, lighting poles etc.

Sculpture installation on the street to promote local art and culture

Folk dance wall paintings , Delhi

Kuchipudi Mudra

Script sculpture art installation at intersection in Arabic country

Source: https://www.colourbox.com/image/woman-hand-showing-chatura-hasta-hand-gesture-also-called-mudra-meaning-square-of-indian-classic-dance-bharata-natyam-also-used-in-other-indian-classical-dances-kuchipudi-and-odissi-image-1517149, https://susieofarabia.blogspot.com/2014/06/skywatch-arabic-script-sculpture.html

2.9 Heritage, Art and Culture

Conservation of Heritage Areas

National level:

- **Undavalli Caves** is under the list of nationally protected monuments under Archeological Survey of India (ASI), which follows The Ancient Monuments and Archaeological Sites and Remains Act (AMASR),1958
- AMASR Act, 1958 provides regulations for prohibited area (100 meter around the national monument) and regulated area (200 meter beyond the prohibited area) of National Monument.
- Prohibited area - No construction is allowed in prohibited area except heritage interpretation center, cultural center, public amenities etc.
- Regulated area - Construction in regulated area in accordance with heritage bye laws/ Development Control Regulations

City Level:

- Evaluate the heritage character of the existing areas as per their significance like historical, cultural, architectural, ecological, aesthetic, technological, scientific etc.
- Document these areas by preparing data cards so that they can be accorded grade status to ensure their retention
- Provide regulations for heritage areas in Amaravati's Development Control Regulations (DCR)
- Demarcate the heritages areas as per the grade in DCR
- The following are the possible grade categories:

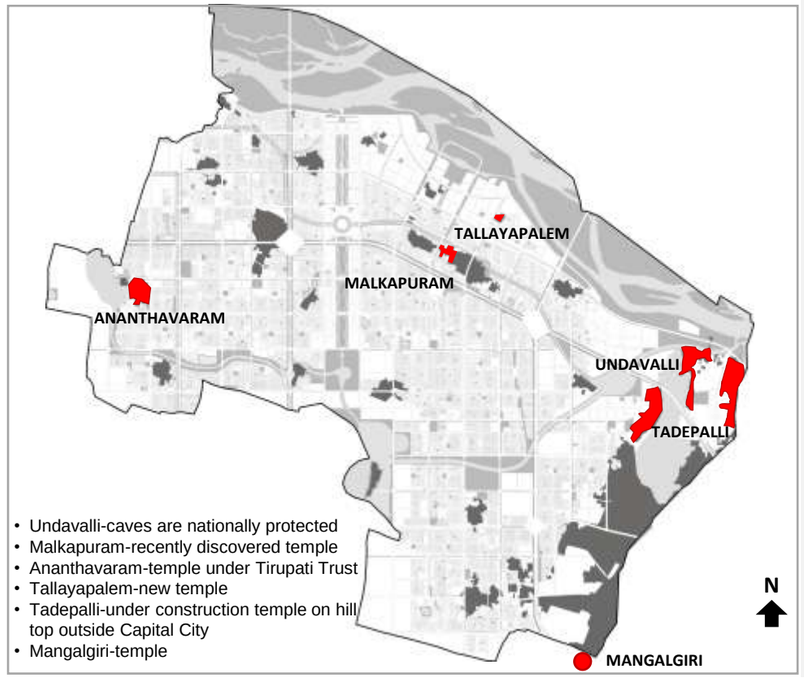
1. **Grade I** – comprises of buildings and precincts of national or historical importance, embodying excellence in architectural style, design, technology and material usage and/or aesthetics; they may be associated with a great historical event, personality, movement or institution. They have been and are the prime landmarks of the region. All natural sites shall fall within Grade-I.
   Scope of changes: No interventions should be permitted either on exterior or interior of the heritage building or natural features unless it is necessary in the interest of strengthening and prolonging the life of the buildings/or precincts or any part or features thereof.

2. **Grade II (A & B)** – comprises of buildings and precincts of regional or local importance possessing special architectural or aesthetic merit, or cultural or historical significance though of a lower scale than Grade I. They are local landmarks which contribute to the image and identity of the region. They may be work of master craftsmen or may be models of proportion and ornamentation or designed to suit a particular climate.
   Scope of changes: Grade II (A) - Internal changes and adaptive re-use may be allowed but subject to strict scrutiny. Grade-II (B) : In addition to the above, extension or additional building in the same plot or compound could in certain circumstances, be allowed provided that the extension / additional building is in harmony with the existing heritage building(s) or precincts especially in terms of height and façade

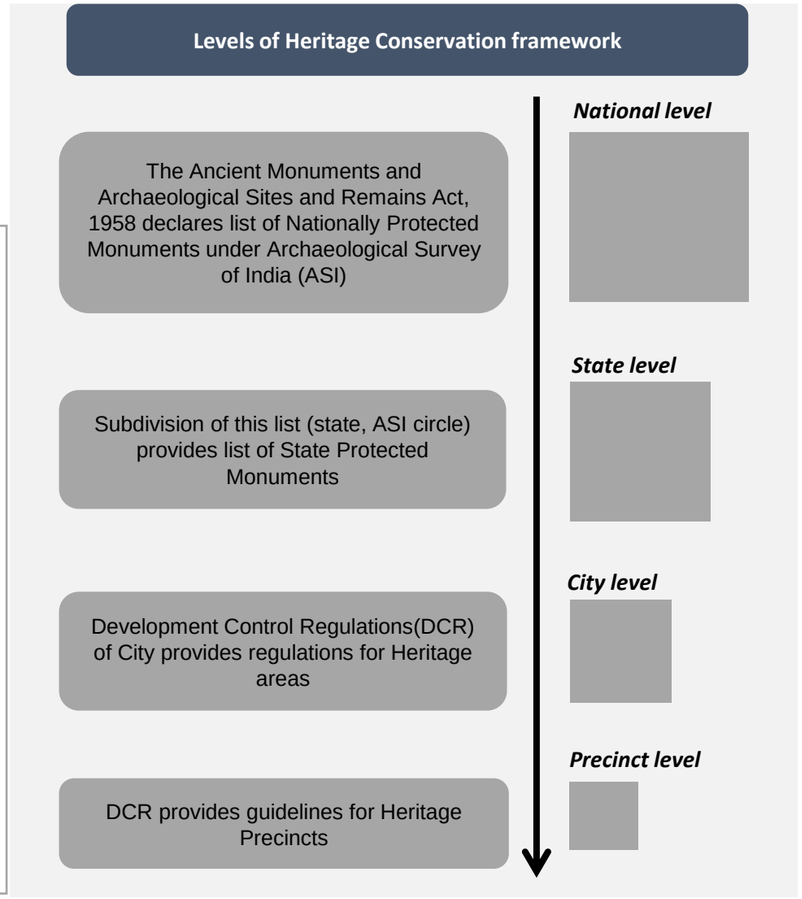
3. **Grade III** – comprises buildings and precincts of importance for townscape; that evoke architectural, aesthetic, or sociological interest through not as much as in Grade II. These contribute to determine the character of the locality and can be representative of lifestyle of a particular community or region and may also be distinguished by setting, or special character of the façade and uniformity of height, width and scale.
   Scope of changes: Sensitive additions, alterations, extensions and interior renovations shall be permissible but these should not alter the character of the building/ precinct. Reconstruction is permissible but only for buildings that are totally structurally unsafe as certified by a Structural Engineer and corroborated by the Heritage Conservation Committee.

Precinct Level:

- Identity heritage precincts
- Provide guidelines like maintaining the skyline, setback control, plinth heights, typical features for entrance, roof profile balcony/ verandah, signage etc. to preserve the heritage character of the precinct
- Adaptive re-use of buildings to maintain character and style of the precinct
- It helps in generating economy and developing tourism potential of the area



Amaravati Capital City map showing villages having heritage significance



Graphic showing levels of heritage conservation framework

Enhancement of Heritage areas

- Provide elements like outside sitting areas (arugu) which acts as spill-out space for activities on the street and rangolis which shows strong cultural identity of the village
- Provide native vegetation
- Provide lighting and signage designs related to Andhra Culture

Existing access street to Malkapuram temple

Conceptual image showing access street to Malkapuram temple with elements for enhancements

Source: APCRDA; https://cpwd.gov.in/Publication/ConservationHertBuildings.pdf, http://spa.ac.in/writereaddata/Day2NMA.pdf

2.9 Heritage, Art and Culture

Develop a Heritage Tourism Circuit

- Demarcate areas of importance and routes for heritage walks and tourist sites in the city and the villages as shown in the images in this page and following pages.

City Level

1) Proposed Heritage Tourism Circuit along NH-16(5) highway and railway route to Vijayawada:

- Kanak Durga Temple in Vijayawada: This holy shrine of Goddess Durga located in Indrakeeladri Hill which is the second largest temple in Andhra Pradesh
- Undavalli Caves and Temple: It is a monolithic example of Indian rock-cut architecture which is declared National Monument under ASI
- Sri Parammapadanatha temple and Anjaneya swamy temple in Tadepalli: These are under construction temples on Tadepalli hill outside the Capital City
- Panakala Lakshmi Narasimha Swamy Temple which is a famous Lord Vishnu temple and Lord Shiva temple on Mangalgiri Hill in Mangalgiri town

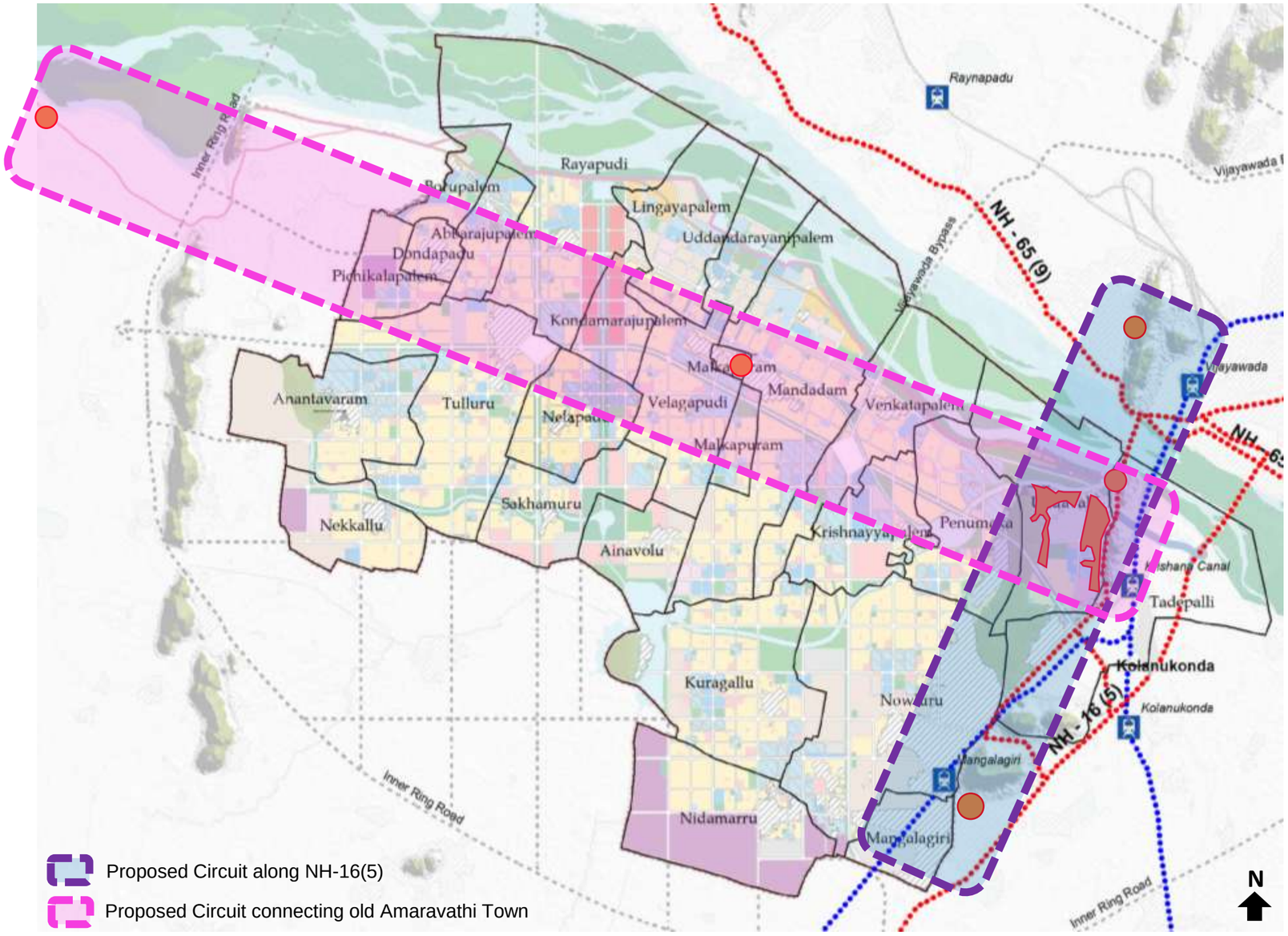
2) Proposed Heritage Tourism Circuit connecting old Amaravati town :

- Dhyana Buddha statue at Amaravati old town: It is a 125 ft (38 m) statue located on the banks of Krishna river spread across 4.5-acre. The Lord Buddha statue depicts meditating (dhyana mudra) while he is seated on a giant lotus in open air which has a museum inside it depicting the events in the life of Buddha.
- Amaralingeswara Swamy Temple: It is located in Amararama which is one of the Pancharama Kshetras (5 temples dedicated to Lord Shiva) in Andhra Pradesh.
- Amaravathi Stupa: It is a ruined Buddhist monument built in phases during Satavahana dynasty under the protection of the ASI. The campus includes Archaeological Museum displaying the art traditions of Amaravati.
- Malkapuram temple: It is a recently discovered Heritage site which has a temple and a stambha with inscriptions
- Undavalli Caves and Temple: It is a monolithic example of Indian rock-cut architecture which is declared National Monument under ASI

Precinct level

Proposing Heritage walk around religious sites

- Malkapuram village: Proposed Heritage walk around Malkapuram temple, Stambha, Ram mandir and Shiv temple explaining the history and culture of that area



Map showing Proposed Heritage Tourism Circuits

Proposed Circuit along NH-16(5)

- Kanak Durga Temple in Vijayawada
- Undavalli Caves (national monument)
- Tadepalli – Under construction temple on hill top
- Panakala Lakshmi Narasimha Swamy Temple in Mangalgiri

Proposed Circuit connecting old Amaravathi town

- Dhyana Buddha statue at Amaravathi town
- Amaralingeswara Swamy Temple
- Amaravathi Stupa and Archaeological Museum
- Malkapuram temple
- Undavalli caves (national monument)

Source: Base Map source: APCRDA, http://121.242.207.115/asi.nic.in/museum-amaravati/, https://discoveramaravathi.com/2017/02/24/amaralingeswara-swamy-temple-amaravathi/, http://www.discoveredindia.com/andhra-pradesh/attractions/museums/amaravati-museum.html, https://www.lonelyplanet.com/india/attractions/amaravathi-stupa/a/poi-sig/1153493/356195, https://www.indianholiday.com/tourist-attraction/andhra-pradesh/monuments-in-andhra-pradesh/amravati-stupa.html

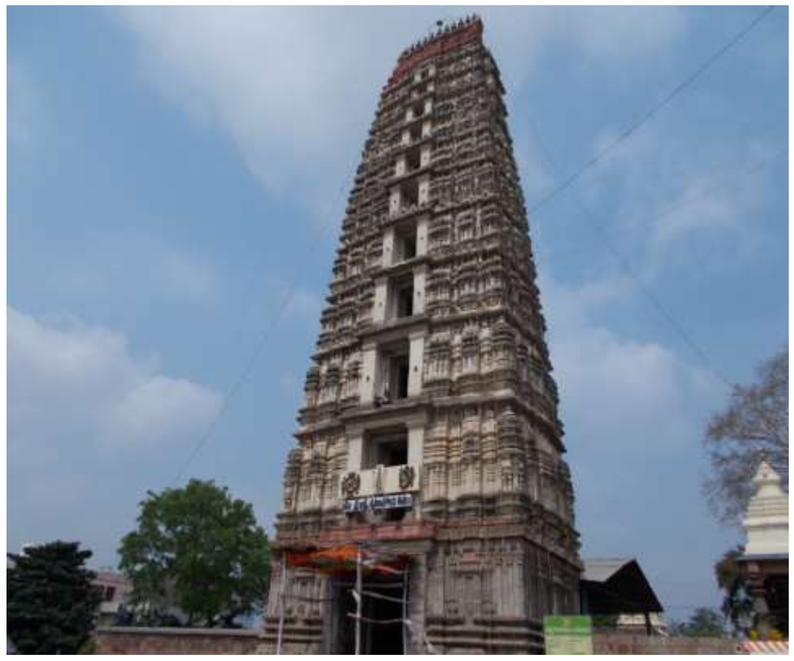
2.9 Heritage, Art and Culture

Sites in the Proposed Heritage Tourism Circuit

Dhyana Buddha statue at Amaravathi Temple town

Kanak Durga Temple at Vijayawada

Undavalli caves - monolithic example of Indian rock-cut architecture



Gopuram of Temple at Mangalgiri

Ruins of Amaravathi Stupa, Amaravathi town

Sri Parammapadanatha temple at Tadepalli hill

Source: On-site images, https://www.templepurohit.com/hindu-temple/vijayawada-kanakadurga-temple/, https://crda.ap.gov.in/apcrdacommuni/Media/APCRDADOCS/LPS/2018/APR/APCRDA%20LPS%20Book%208th%20April.pdf, https://en.wikipedia.org/wiki/Amaravati_Stupa#/media/File:Amaravathi_Sthupa_02.JPG, https://plus.google.com/photos/photo/101654178915429994728/6564733982356803826

2.9 Heritage, Art and Culture

Proposed Heritage walk around religious sites

Stambha

Shiv Mandir

Malkapuram temple

Ram Mandir

Map of Malkapuram village showing route for heritage walk around religious sites

Image source: Base Map source: APCRDA, Amaravati Existing Village Base Map, on-site images of Malkapuram village

2.10 Place Making and Branding

2.10 Place Making and Branding

Place Making and Branding

As Amaravati is branded as the People's Capital accordingly people first and pedestrian priority with extensive community engagement and outreach should form important parts of the city development process. The city should also promote itself and the local culture through various programmes such as seasonal and festive events, street markets, culture and music shows and art fairs. In addition other national and international events should be organized such as the Happy Cities Summit to help raise the profile of Amaravati not only in AP and in India but to the world.

To make Amaravati the People's Capital, it is crucial to make the city a place for the people and the community. The city should not only be a composition of urban spaces, streets, buildings, and greenways, but also places where people gather, enjoy, and love; for events, festivities and happy memories. The UDAG promotes urban design excellence, community and place making which should be the key for the city's development in creating a sense of place and sense of ownership. Amaravati is a city with rich natural and local heritage art and culture with abundant natural resources. The people of Amaravati should be united through community and place making initiatives and events showcasing the art, culture, heritage and natural assets

Place making within the public realm should play a critical role especially in high quality public spaces and streets to help integrate local heritage, art, and culture with existing villages. The key spaces for place making include the green networks and riverfront promenade and canal buffer areas at city level, plazas, civil buildings, gathering spaces, and school yards at district and neighbourhood level, and religious spaces at village level. At the street level, place making is essential for the visual corridor framing streetscapes including the road as well.

Happy City Summit 2018 in Vijayawada, India as a event to encourage reimagination of urban design and placemaking

Key Typologies

Among these key spaces for place making, five typologies are identified, including:

- Parks and open spaces
- Riverfront and waterfront promenade
- Public gathering space
- Communal/ civic buildings
- Streets

Design guidelines of these key spaces will be introduced to promote place marketing, branding, event, and other happenings with the intent to encourage interactions between people and place. This guideline will mainly serve as a guidance note for urban design to inspire place making in Amaravati, while organic place making process should be initiated, organised, and created from a bottom-up approach.

Details of Streetscape, Village Integration, Waterfront and Open Spaces Guidelines will be further discussed in respective chapters.

Pedestrian bridge across waterbody within neighbourhood park

Image Source: Happy Summit 2018

2.10 Place Making and Branding

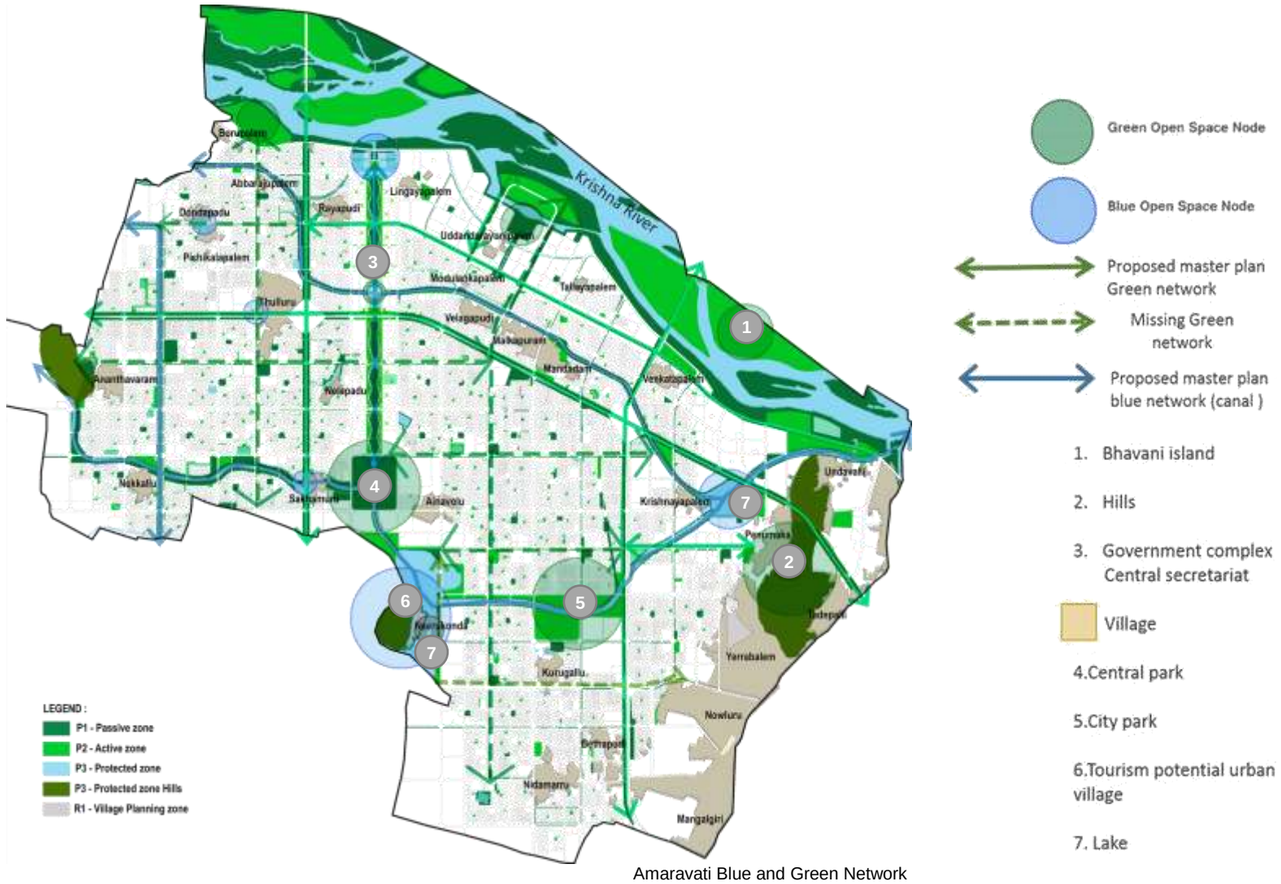
City Level Place Making Strategy

To propose strategies for place making, the foundation is to identify potential sites as per the five typologies. The urban design should follow the below rules to offer legibility to these spaces and ensure feasibility of their place making. The five typologies should together form a holistic place making network for Amaravati.

From a city level, the creation of a network of open space, waterfront and public gathering spaces should be considered, with integration of the street level place making. To grant access to these places, multiple pedestrian access should be offered to form a complete and connected network. It is important to include community public spaces in neighbourhoods as part of this network. Adjacent land use to the street, open space, and public gathering spaces, especially at ground and on the upper two levels should be carefully considered. The design of these spaces and its surrounding land use should consider the viability for events, happenings, and programmes. Place marketing and branding of the key developments, including public gathering spaces, open spaces and waterfront areas needs to be considered during the design stage.

Place making should also be consistent with respect to the potential users, for instance, the target users in commercial area would anticipate to be white-collars workers. The place making initiative to be proposed during the day would therefore be passive given their outfits and time constraints.

In some cases, place making can be used as a technique for city branding. Through urban design and place making strategies, underutilised and vacant spaces should be transformed into temporary or permanent landmarks of the city attracting local and tourists at different times of the day for a variety of activities. These spaces will also become a node for social interaction with vibrancy and energy. A prime example would be the Temple Street in Hong Kong, which is a popular place for street performers attracting tourists, or New York's Central Park, where its enormous size turns it into a landmark for locals and tourists for leisure activities, or the Charminar night market, which has numerous makeshift shops and hawker stalls offering a variety of products for locals and tourists.



Amaravati Blue and Green Network

Hinkar Thirtha in Mangalagiri Hill

Temple Street in Hong Kong as example of place making attraction

Happy Cities Hackathon 2018

Source: https://traveltriangle.com/blog/places-to-visit-in-vijayawada/, http://www.hong-kong-hotels.ws/attractions/night-market.htm, https://www.pinterest.pt/abdullahsacak/art/

2.10 Place Making and Branding

Neighbourhood and Village Level

As a rule of thumb, place making design should be sensible to the surrounding land use and existing context. The adjacent land-use need to be carefully considered to avoid adverse impact and leverage from it if possible. For instance, the dead-end streets near playgrounds or school areas can be potential sites for children recreation or an extension to the playgrounds. Such ideas would require prioritisation of children's safety during the design phase.

At a village level, there should be emphasis on art and culture preservation, potential spaces in the villages for place making initiatives, such as local flea market, food trucks and culture sharing/ exchange workshops, should be identified. As seen in the example of Rayapudi, several spaces in close proximity are identified as potential sites for place making. Designated event spaces in public realm such as public gathering space within village can provide employment and exhibit local culture, while attracting tourists through place marketing.

Building Level

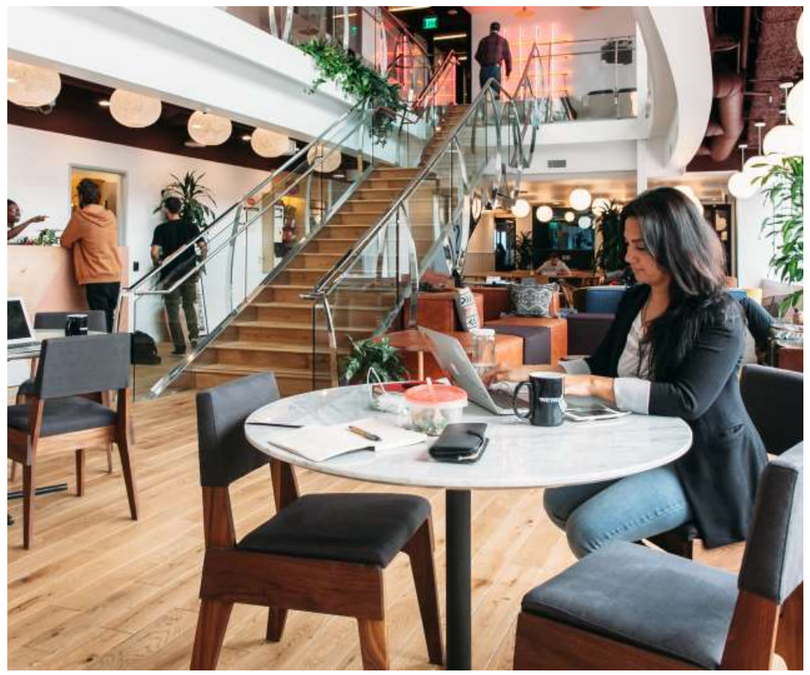
Besides outdoor spaces, civic buildings, communal areas and other indoor spaces can be potentially used for place making. The design of these public/semi-public buildings had been stated in the public buildings section under the architectural guideline. Further to that, to encourage place making, co-working, co-living, and other collaborative spaces and activities within specific areas can be boosted. Spaces should be offered to the community to initiate place making events in public realms. Reuse, revitalise and adapt underused/ old community facilities and buildings through place making process will add extra value to the place. place making should also consider Inclusive design that encourages the minority community as one of the major users, or even put them in first priority in certain places.

Place making on streets in Village

Place making with respect to adjacent land-use

Existing village

Place making through art and culture



Co-working space as an example of indoor place making

Source: MaD Social Lab, https://www.facebook.com/hkiccMaDasia/photos/a.1808465539198616/1872371822807987/?type=3&theater, http://www.bmoremedia.com/features/creativeplacemaking080613.aspx, https://tech.co/switch-home-office-to-coworking-space-2017-12, https://www.artsy.net/show/ninoska-huerta-gallery-pre-event-to-look-up-to-the-sky-umbrella-sky-art-arrives-to-downtown-gables

2.10 Place Making and Branding

Street level

To foster the place making process, public realm design should consider, especially streets design, to enhance circulation and wander in the city which helps to give meaning to our daily activities. The following measures should be considered for the design of streetscape to support place making of surrounding spaces.

The street design should ensure safe pedestrian circulation, comfortable walking environment to support seamless integration of the street network with the public spaces network. Blank walls along streets and meaningless dead-ends streets should be avoided. The pavement and wall painting should encourage local art and culture preservation. Together with the active street frontage, they should form a continuous visual link to public space. In addition to this, attractive gateway or special aesthetic design in public spaces to differentiate the areas, harmonizing the surrounding context, should be established.

Besides the role as a connector to open spaces, the street itself can function as a place in various ways. For instance, street furniture can facilitate diverse leisure activities, both passive and active, in public spaces and encourage interaction through design of street furniture. Shared spaces should be included in the city design along the minnow local streets to promote community activities. Street vending should be allowed with respect to surrounding context to create vibrancy in public realm. For instance, the central green space and buffer zones in major arterial road can be potential sites for street vending and events.

Streets can be used during certain period to transform the space into a place where collective memories are formed in residential neighbourhoods. Street should be closed during weekend or non-peak hour for event and festival such as Happy Sunday in Pushkar Gaht and Magic Carpet in Hong Kong, or as a temporary pedestrianisation zone or play street. This will transform the street into place for performance and street events, which should be promoted mainly in commercial area to ensure 24/7 activities. Noise issues, nuisance and disruption to various surrounding users should be avoided as far as possible.

Forming Collaborations and Partnerships

Amaravati will take time to develop over the next decade or so, so in the initial stage it is important for various stakeholders to come together to collaborate and form partnerships. For example villages, communities, universities and businesses should come together and form collaborations and partnerships and take initiative to organize various events and programs that can promote Amaravati as it is being developed. This is called Phase 0.

Phase 0 has already started in Amaravati with the recent visitors centre developed at the initial ground breaking site, which is a successful example. This can be further expanded for events beyond just a place to display the models. Place making and branding is further elaborated in streetscape Guidelines, Waterfront and Open Space Network Guidelines and Village Integration Guidelines Chapters.

Feng-chia night market in Taichung, Taiwan

Street Furniture placed in New York, US to encourage interaction

Happy Sunday in Pushkar Gaht, India to define the public street, and preserve art and culture

Wangfujin Pedestrian Zone with eye-catching entrance to define the sense of place

Source: https://historiasdenuevayork.es/2011/08/28/meeting-bowls-unos-bancos-muy-sociales/, https://historiasdenuevayork.es/2011/08/28/meeting-bowls-unos-bancos-muy-sociales/., http://www.thehindu.com/todays-paper/tp-national/tp-andhrapradesh/article17011822.ece/alternates/FREE_660/08og-Happy_G571+GIR13NBQG.3.jpg.jpg/,, http://www.3dkezhan.com/upload/image/20160920/1474382300692811.png

Summary of City Level Strategies

Strategies	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Image and Identity					28
River Krishna is the heart and soul of Amaravati and should be enjoyed by all. The view of the river not only needs to be appreciated from afar, but also adjacent to the riverfront at ground level. The entire riverfront should be treated as a publicly accessible waterfront, so the riverfront is enjoyed by all, including views towards the river as well as the views of the city from the islands across the river.	√		√		
The vantage points such as Kanaka Durga Temple, Undavalli Caves, or riverfront location including the islands across River Krishna should not be compromised. City views should not be obstructed by any new developments of the existing built heritage and natural features. Major developments such as AGC, Seed Capital should carefully consider the importance of the natural heritage, built landmarks, existing villages and surrounding context, especially with the future high density mixed use developments	√		√		
Views of key developments such as AGC and Seed Capital framed by view corridors should form important vistas contributing to views within the city	√	√		√	
Urban Form and Density					36
Creating TPOD with mixed use developments throughout should be the main focus in shaping the city for the future. Population and development density should be increased for TPOD along major transit corridors	√	√		√	
Developments of different density need to be planned with an integrated approach in consideration of the quality of life, environmental impact as well as effective use of streets network and transportation infrastructure. Amaravati should encourage higher density developments along the transit corridors, or areas designated for town centres with the city	√	√		√	
LPS development should be of lower density and building height should be compatible to the existing villages to maintain local character. Integration between the existing villages and the surrounding LPS area is key to foster local community and organic growth	√	√	√		
Building configuration should be compatible so that appropriate lot size can be utilised, which also encourages street activities and creates a sense of community. The urban grain formed should enhance accessibility with a priority for pedestrians within a hierarchy of open spaces of the city	√	√		√	
Mixed Use and Flexible Zoning					41
Amaravati should aim to create communities providing different land uses through horizontal mixed use zoning. TPOD zones within a radius of 500m should include a mix of land use such as retail, commercial, residential, education, healthcare, open spaces and other functions	√	√		√	
Vertical mixed use zoning should also be encouraged in the city especially in key development areas such as AGC, the Seed Capital and TPOD zones to activate the city using diverse pattern of public spaces, and exploit the full potential of the development	√	√		√	
ZR should provide more diversity in FSI with varying building heights to allow for more flexible developments with interesting and unique built forms	√			√	
There are numerous small sized plots in Amaravati, which may be difficult and unviable to develop. These plots should be amalgamated through micro pooling if they provide benefits to the city, community and the developers so it is a win-win situation for all	√	√		√	
Planned Unit Developments (PUDs) can encourage diversification and variation through comprehensive planning and design in relation to the land uses, buildings, open spaces with varied building heights to form a cohesive development. PUDs should be required to include a masterplan layout highlighting the benefits of the development and should only be permitted if it offers more public benefits at a neighbourhood, township or city level	√	√		√	

Summary of City Level Strategies

Strategies	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Blue and Green Network					49
Amaravati should reposition itself with River Krishna as the heart and soul of the city, to form part of the blue and green network connecting to the canals, and other water bodies and green open spaces together within the city.	√			√	
Distinct precincts along River Krishna should be created with different themes corresponding to the surrounding existing context and proposed land use to provide a diverse experience along the riverfront	√			√	
Water bodies should be preserved with buffer zones to restrict developments from building too close to the water edge. Waterfront should be connected with open spaces with footpaths and welcoming entrances ensuring public accessibility to avoid waterfronts from becoming private development areas	√	√	√		
Amaravati should define a hierarchy of open spaces in different scales, sizes, and functions catering to the needs of the residents to promote a happy and healthy lifestyle	√		√		
Mobility and Infrastructure					54
Amaravati should adopt a sustainable transport network that ensures smooth vehicular flow without traffic congestion and is also pedestrian friendly with generous footpaths, cycle tracks, paving, lighting and street furniture. Streets should be human scale with context sensitive landscaping, inclusion of art and sculpture help create a high quality public realm, allowing for a memorable pedestrian experience	√		√		
Amaravati should follow a phased development strategy where part of the right-of-way of the road network including the cloverleaf areas can be developed as open space including urban agriculture in the interim as it is likely that the road capacity will only be needed much later, when the interim open space can be reinstated as appropriate.	√			√	
TPOD keeps residents within close proximity to public transport, helps improve the catchment and ridership to increase the viability of the transit network. Mixed use development with a concentration of residential and commercial use creates a compact environment where facilities are shared among users. This minimises intra city travel thereby reducing the cost of infrastructure per capita	√			√	
Streets should accommodate all amenities and facilities that are required on a daily basis by people, cyclists or transit users to result in a comfortable and pleasant pedestrian experience.	√		√		
Smart and Sustainable Development					58
Water bodies should be to the nearest storm water drainage line allowing a specified quantity of treated storm water to be discharged into the water body during monsoon period	√		√		
Sustainable drainage elements should be adopted such as bio-swale on street level and areas of high risk inundation.	√		√		
Green space should be protected and managed by planting of native and ecosystem based species of flora, limiting the use of concrete and providing softer interface between waterbodies and green buffer zones	√		√		
Open spaces should act as areas for short-term storage, retention or infiltration of surface runoff to reduce pressure on the city's infrastructure	√		√		
Existing water bodies should be protected and managed from pollution, encroachment, dumping or any other activity which would endanger the water body	√		√		
Given Amaravati's agricultural heritage, it is appropriate to provide urban agriculture within the city for interim uses to begin with at appropriate locations	√	√		√	
Climate control measures including cooling materials on road pavement, provision of green spaces, and installation of thermal sensors and mist control systems should be adopted to reduce the ambient temperature of Amaravati	√	√		√	
Energy efficient designs in buildings, lighting system, parking senor systems, electric vehicle charging etc. should be adopted to achieve smart living and smart infrastructure.	√	√		√	
Cashless payment for public transport should be set up under one universal system to offer convenience to commuters, similar to the Octopus Card in Hong Kong	√			√	

Summary of City Level Strategies

Strategies	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Quality of Life and Well-Being					65
The concept of compact city should be promoted to increase accessibility to quality open spaces, public facilities and amenities to be shared among residents to encourage vibrancy in public spaces resulting in more social interaction	√			√	
Amaravati's performance should be assessed and monitored based on Livability Index, Happiness Index and WELL Standards	√	√		√	
Social Equity and Integration					73
New development of the capital should be sensitive and integrate well with the villages and the LPS developments, and should not be isolated by large gated communities	√	√	√		
To organize informal sector in villages and LPS areas, hawking zones should be provided near transit and bus stations. Activity areas, open space and urban centres should become potential zones for informal markets, and should not be isolated by large gated developments	√			√	
Heritage, Art and Culture					78
Art installations should be in specific zones of public buildings or commercial areas such as art galleries, multipurpose halls, institutional areas like school and collage campus, malls, cinema halls and performance theatres. Art can also be placed inside APCRDA plots in government buildings, public parks and green buffer zones while considering protective measures to promote public art.	√	√		√	
Prohibited areas and regulated areas should be identified within close proximity to heritage areas to preserve and protect the heritage character	√		√		
The heritage character of the existing areas should be assessed for their significance like historic, cultural, architectural, ecological, aesthetic, technological, scientific etc.	√		√		
Heritage Tourism Circuit along NH-16(5) highway and railway route to Vijayawada and Heritage Tourism Circuit connecting old Amaravati town to connect heritage sites together should be developed to offer a unique experience to the people of Amaravati	√			√	
Heritage walks around religious sites and heritage precinct should be proposed to promote Amaravati's local art and culture.	√			√	
Place making and Branding					85
Public spaces with respect to the surrounding land use should be Identified to create opportunities for community and place making. Different scale of place making space can be explored depending on functionality, from town level parks to streets or even public spaces within buildings	√			√	
Villages, communities, universities and businesses should collaborate to work together with APCRDA to organise events and programs that contributes to the branding of Amaravati	√	√		√	

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3 Waterfront and Open Space Network Guidelines

Waterfront and Open Space Network

Overview

Amaravati's "Blue and Green Network" is a planning strategy that seeks to protect the ecological and hydrological assets of the new Capital City to create a liveable, walkable, resilient, environmentally sustainable, economically viable and socially thriving place that is attractive for residents and visitors.

The unprecedented rate of urban growth, coupled with current and anticipated effects of climate change and loss of habitat and biodiversity, demand innovative approaches to city planning that help cities to adapt to and mitigate the impacts of climate change and protect ecosystems. According to the Intergovernmental Panel on Climate Change (IPCC) in 2014, "the next two decades present a window of opportunity for mitigation [and adaptation] in urban areas, as a large portion of the world's urban areas will be developed during this period". Many cities are striving toward sustainable urbanisation practices, expanding their green infrastructure to enhance climate-resilience and investing in clean technologies. The blue and green network planning expands these efforts by including the rehabilitation and maintenance of the "blue" water cycle in urban areas adding to the conventional engineering solutions. This blue and green network planning process also prioritises the quality of green spaces over quantity by focusing on upgrading existing green spaces. By preserving a city's ecological and hydrological relationships, the blue and green network acknowledges that cities are embedded as part of our natural environment.

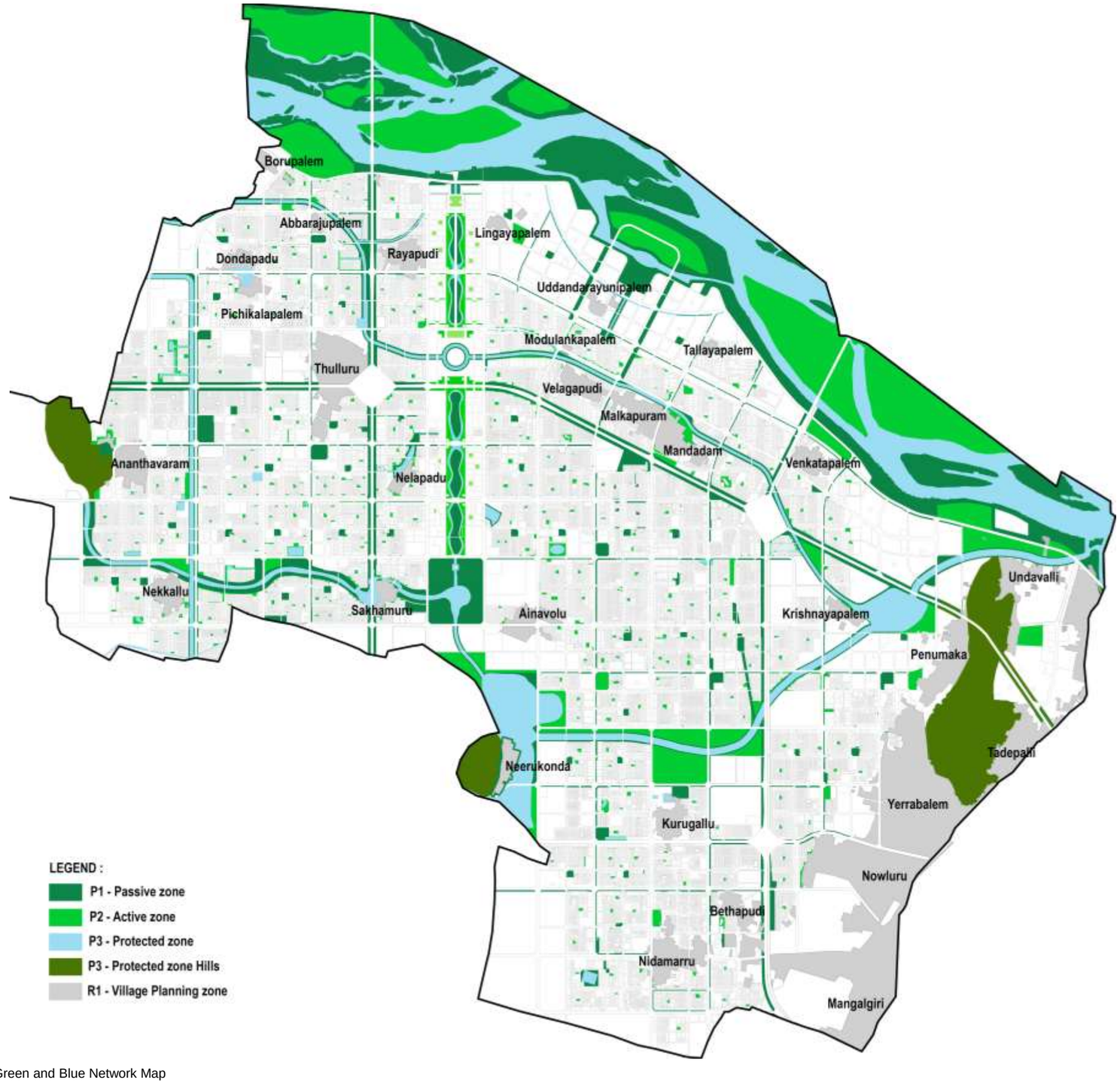
Amaravati is blessed with a bounty of natural resources which need careful and sensitive planning and management. River Krishna provides an opportunity not only to demonstrate how the city preserves these elements but also turning them into destinations that connect with the people. In addition, the city is blessed with canals and lakes, which have the opportunity to be connected with open spaces to form a blue and green network. Being mostly a greenfield city, this assumes even more importance to minimize any ecological impacts and creating a smart and sustainable new capital city for generations to come.

Intent, Scope and Limitation

The chapter discusses the best practices and guidelines on creating a vibrant waterfront with view corridors leading to the diverse range of activity nodes, including connectivity along the riverfront and canals as well as pedestrian linkages to the hinterland. The waterfront environment should be well protected by setting up adequate buffer with no development along the waterfront of Amaravati. The chapter will also demonstrate how to preserve the views of River Krishna and the canals.

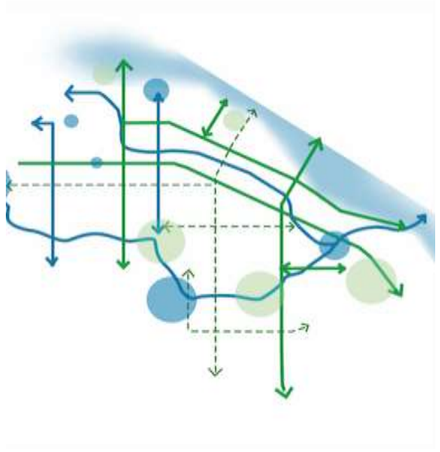
This chapter will also look at the various types of open spaces in the city to form a hierarchy of open space and continuity between different spaces. It also specifies planting character and typology in these open spaces. Overall, the design of the waterfront and open spaces should adapt a sensitive placemaking approach with a focus on people, place and planet.

Creating a people-friendly and environmentally sustainable waterfront will need various stakeholders to come together to make smart decisions and act responsibly. Developments should consider the city's waterfront and other open spaces as part of the blue and green network, providing connectivity and accessibility for public enjoyment for all. Also flooding issues need to be addressed with mitigation measures to ensure context sensitive and limited development along the waterfront.



Green and Blue Network Map

Source: Revised Masterplan Report 04042017



Waterfront and Open Space Network Guidelines

3.1
Riverfront, Canals, Lakes and Ponds

3.2
Open Space Network

3.3
Open Space Plantation and Materials

3.4
Waterfront and Open Space Network Demonstration

3.1 Riverfront, Canals, Lakes and Ponds

3.1 Riverfront, Canals, Lakes and Ponds

Waterfront

Vision

River Krishna is an important natural asset for Amaravati and the people of Andhra Pradesh. The vision for Amaravati is to reposition River Krishna as the “Heart and Soul” of the new Capital City. River Krishna will become Amaravati’s image and identity that is unique to other cities in India and beyond.

Objective

River Krishna has the potential to be transformed into an exciting and attractive destination for people that combines ecology, flood protection, storm water management, trails, urban recreational spaces combined with a heritage and cultural programme. River Krishna revitalisation is a city-building strategy to support the long term Capital City’s growth and economic competitiveness.

Core Principles

- Feature River Krishna as the heart and soul of Amaravati and showcase the biodiversity, natural heritage and preserve the islands across the river
- Provide sustainable mobility along the waterfront for pedestrian, cycle, transit and vehicular modes with easy public access for people to experience and engage with the river
- Allow sensitive limited development with stepped building height profile offering physical and visual access to the waterfront from the hinterland while ensuring public access 24/7
- Offer flexible use public open space organizing activities, events and programs during festivals and special occasions

Ecological edge along existing bund line at Krishna River.

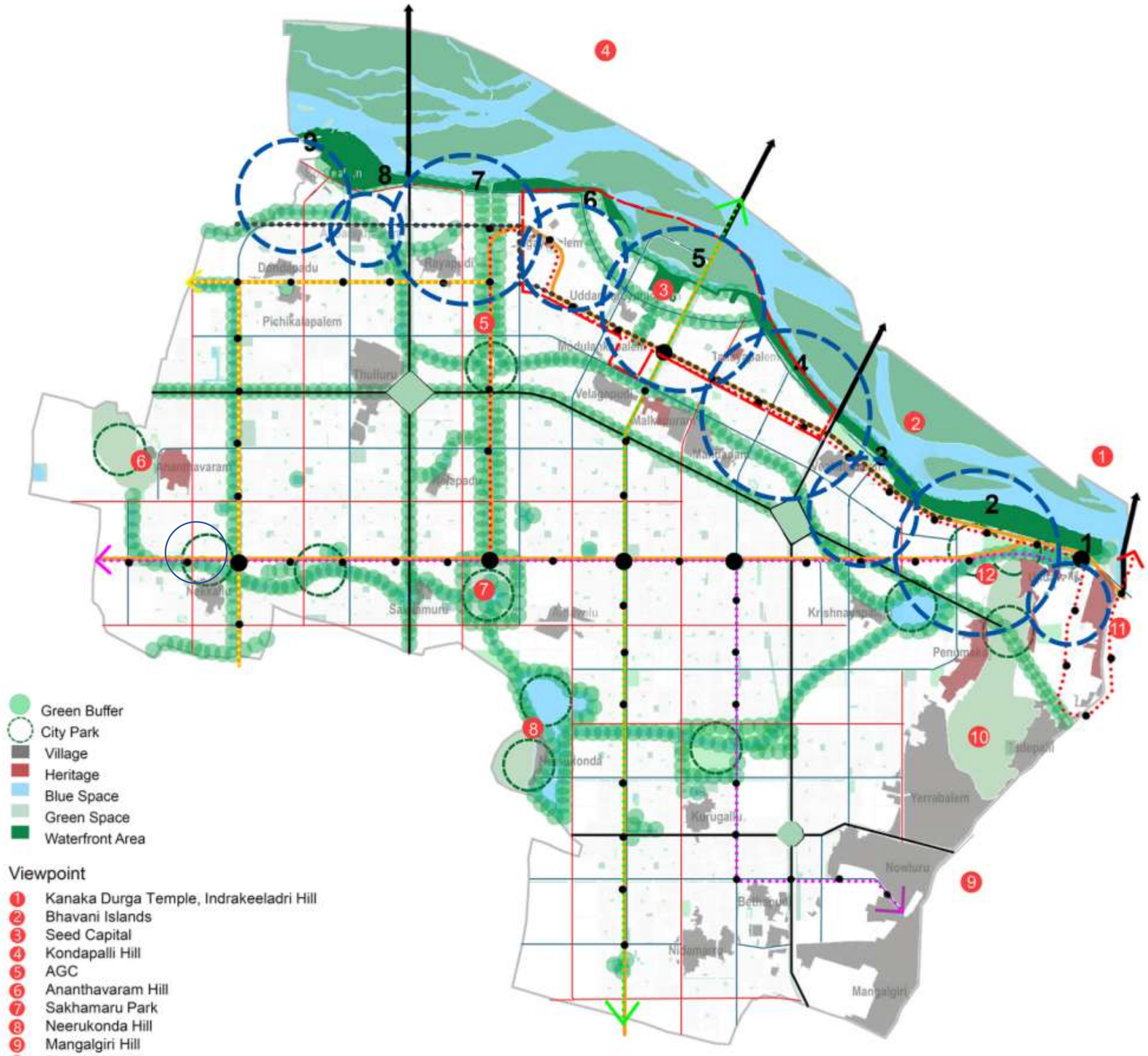
3.1 Riverfront, Canals, Lakes and Ponds

Waterfront Framework

Located to the north of Amaravati, the River Krishna stretches across the entire city. The riverfront should be publicly accessible, socially inclusive and become an attractive destination for the residents and visitors. A Waterfront Boulevard along the riverfront provides pedestrian, cycle, transit, and vehicular access to the waterfront. The 22km riverfront should be developed as precincts to showcase the character of the adjacent areas while bringing the city to the waterfront.The existing bund road is the river front as the flood water reach the bund every year. The nine precincts proposed are unique with distinctive nodes offering riverfront views as well as abundant public space and amenities with both active and passive uses. The precincts along the riverfront aim to correspond with the adjacent areas either existing or proposed developments and include the following:

1. Eastern Gateway
2. Heritage
3. Art/Culture
4. Tourism
5. CBD
6. Eco
7. Civic
8. Western Gateway
9. Health/Sports

Starting with the Eastern Gateway Precinct close to the bridge, the main access point to Amaravati will be the first precinct. Moving towards the west along the river, there are existing villages of Venkatapalem and Tallayapalem, Undavalli Caves that could be developed as the heritage and tourism area complemented by local art and culture. These together form the Heritage, Art/Culture, and Tourism Precincts. The Seed Capital forms the CBD Precinct with finance and commercial mixed use, offering a vibrant waterfront experience. Further towards the west before reaching the AGC or the Civic Precinct there is a need for a break in the pace. This can be in the form of an Eco Park Precinct providing a natural pause point, a more relaxing passive area between the hustle and bustle of the CBD and a more formal AGC. Beyond the Civic precinct is the proposed bridge, which forms the Western Gateway Precinct. Further west is the proposed stadium that forms part of the Health/Sports Precinct.



3.1 Riverfront, Canals, Lakes and Ponds

Strategies for Waterfront Development

The waterfront strategies help guide the development of the riverfront, canals, lakes and other water bodies to make Amaravati a resilient and socially thriving city by providing an accessible waterfront with both active and passive areas for the public enjoyment for all.

Develop a continuously accessible waterfront

River Krishna along with the canals, lakes and other water bodies should be showcased as attractive destinations for both residents and visitors. A continuous and accessible waterfront promenade should provide various opportunities for activities for public enjoyment, including strolling, jogging, cycling, sitting, or fishing where appropriate. A pedestrian-friendly environment should be provided to ensure that residents and visitors can fully enjoy the waterfront experience. Waterfront development should aim to complement the scale, extent and natural setting of the waterfront.

Create a diverse range of distinct nodes behind the bund and buffer zone

It is important to create a diverse range of distinct nodes along the waterfront. Waterfront sites should be reserved for cultural, tourism-related, recreational and retail activities. An active waterfront with diverse range of activities and functions would ensure public enjoyment and instill a sense of city pride among the people of Amaravati. Nodes should offer active and passive areas with points of interest such as landscaping areas, outdoor seating areas, lookout areas, boardwalks, and piers help create a diverse range of activities along the waterfront. These will become destinations which attract local and tourists alike. It is important to create a diverse range of distinct nodes along the waterfront in line with the view corridors and pedestrian linkages from the hinterland.

Connect the hinterland to the waterfront

Efforts should be made to bring the city to the waterfront and the waterfront to the city, so people can easily access and engage well with the waterfront. The water edge should be protected by a buffer zone along the riverfront, which is abutted by a public zone with no development and should have visual access and direct pedestrian linkages from the hinterland areas to the waterfront. Building heights and spaces should respect the human experience of the waterfront in terms of usage, interaction and perception by the users. Stepped building height profile should be followed along waterfront so as to prevent walled development and offer waterfront views from the developments behind.

Green Buffer Cultuurpark Westergasfabriek,Central Amsterdam

Bishan - Ang Mo Kio Parkn,Singapore

Shenzhen Maozhou River Greenway Guangming

3.1 Riverfront, Canals, Lakes and Ponds

Riverfront
Along River Krishna

Develop a continuously accessible waterfront

Elements to Activate the Riverfront

A continuously accessible River Krishna provides the opportunity for people to experience the riverfront of Amaravati, through high quality public realm to activate the riverfront and help the surrounding developments and neighbourhoods to be re-engaged with the river.

1. Promenade

A promenade is a linear public space along the riverfront that provides for various activities and uses. More than just a pedestrian pathway along the waterfront, it acts as a moving vista providing different viewpoints and transition between active and passive zones. These could include different activities from one end to another, ranging from a social gathering place to an activated space with kiosks, cafes, retail, and other uses. Promenades should be landscaped with wider footpath spaces and designated with unique paving specific to the waterfront promenade and the adjoining area. Several seating areas should be located along the promenade for people to enjoy the riverfront either enjoying the views, sitting and watching others pass by, relaxing, resting and enjoying the riverfront. Certain areas can be designated for public artwork or performance areas to enhance vibrancy along the promenade. The riverfront promenade should be developed, promoted and well coordinated with place making and place marketing strategies. Promenades guidelines are as follow:

- Riverfront promenade should be 5m to 20m wide and connect the nodes along the riverfront
- Distinct pavement should be provided for the promenade
- Clear signage and wayfinding should be provided to key nodes, to the hinterland
- Seating should be provided and oriented towards the riverfront at a max interval of 300m where appropriate

2. Flexible Open Spaces

The design and use of open spaces along the riverfront should be accessible and sensitive to the environment. Open space should remain flexible and adaptive so that it can be operational year-round. Open space needs to be connected by footpaths and promenades for easy access, and provide a panoramic view of the riverfront with the city backdrop as well. Flexible use of open space should be allowed for temporary or permanent installations, such as public art, sidewalk cafés, street fairs, festive and other events. The attractive open space along the riverfront will become a landmark for Amaravati. Flexible open spaces guidelines are as follow

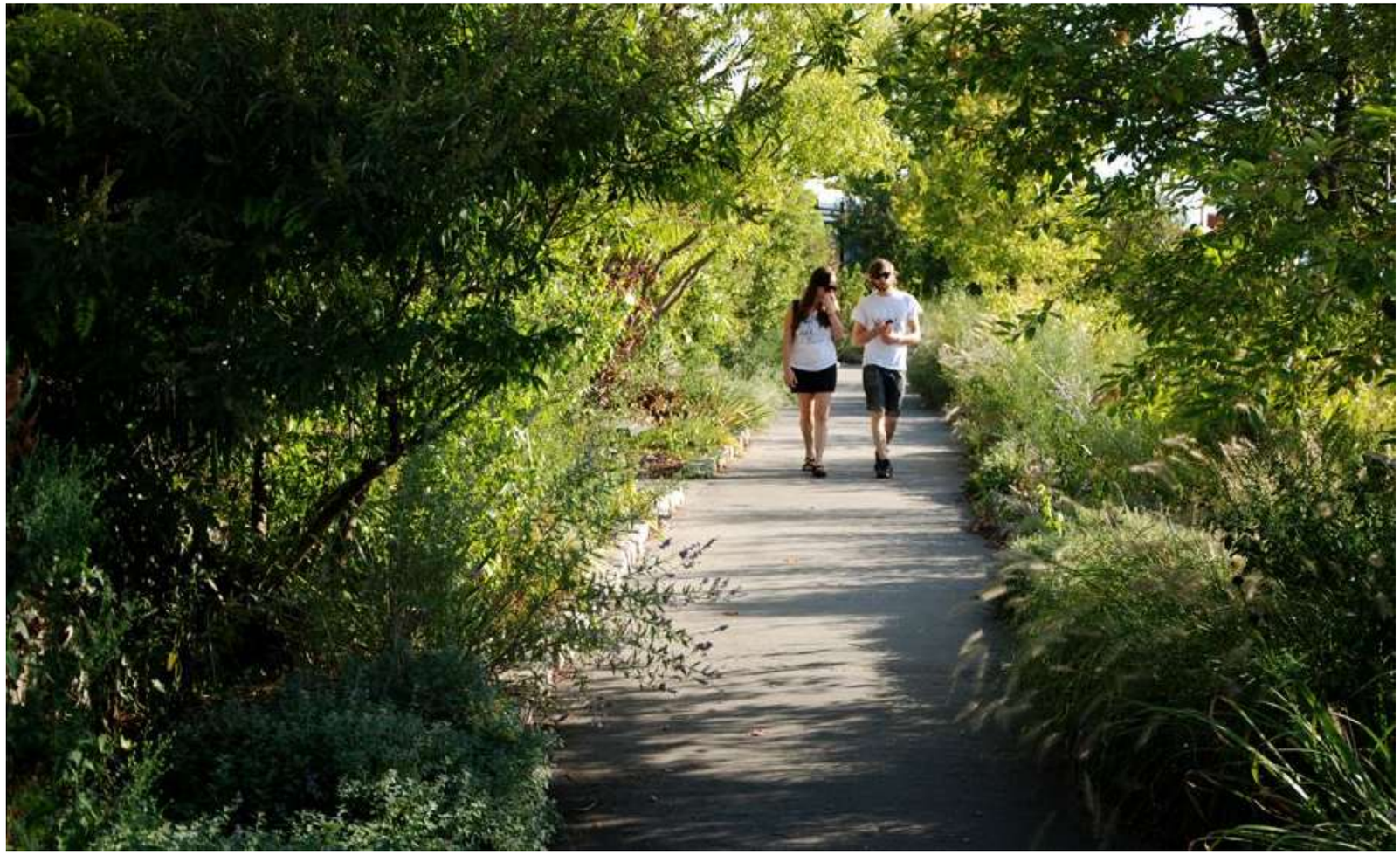
- Open space should be located along the riverfront, accessible and linked by pedestrian paths and view corridors from the hinterland
- Open spaces along the riverfront should be linked with walking trails and clear wayfinding
- Planting should not block visual access to the riverfront, of open space, entrance/exit from the street
- Seating should be provided and oriented towards the riverfront where appropriate

3. Walking Trails

Walking trails should be designed with respect to the physical setting including landscape and vegetation of the environment. Trails should be natural and continuous so that people can experience the natural environment to the fullest. The walking trails should be unique in exploring the different conditions and opportunities of the surroundings. Walking trails guidelines are as follows:

- Walking trails should be minimum 6 m wide
- Clear signage and wayfinding should be provided at 50 m interval
- Pedestrian scale lighting should be provided at 9 m interval
- Permeable surface should be provided for walking trails
- Seating should be provided at 500 m interval

Various elements on the riverfront such as promenade, open spaces, and walking trails, sensitive and active uses can help create a riverfront destination enjoyed by all ages as shown in the reference images below.



Create a sensitive walking trail

Source: https://ny.curbed.com/2012/9/20/10327076/exploring-the-under-the-radar-pier-44-waterfront-garden

3.1 Riverfront, Canals, Lakes and Ponds

Riverfront

Create a diverse range of distinct nodes behind the bund and buffer zone

River Krishna should become the attractive destination of Amaravati for people to experience the riverfront and also enjoy the city views from the islands across and other higher vantage points. Therefore it is crucial that the riverfront has a diverse range of distinct nodes where residents and tourists enjoy the themed precincts.

Variety

Develop a variety of public access and flexible open spaces that offer many recreational opportunities and enhance other uses along the riverfront.

Character

Emphasize Amaravati's waterfront setting by designing accessible landscaped public open spaces as a backdrop to the riverfront's spectacular natural heritage with built form as a backdrop.

Context

Built form of the plots along the river should have a distinct character and form with the river as a front yard.

Guidelines for Nodes

- There should be a maximum of 1 km distance between nodes to create a variety of destinations along the riverfront
- Riverfront signage should provide a map showing all nodes and the distance to other nodes and key areas along the riverfront, such as landmarks, recreational space, etc.
- Clear and wayfinding should be provided, including directions to other key nodes, landmarks, pedestrian crossings on waterfront boulevards, public transport and more
- Nodes should be connected by the promenade linking other nodes with walking trails and open spaces in between
- Local artwork should be integrated into the key nodes to create distinct character for the nodes

Ecological edge along existing bund line at Krishna Riverfront.

https://travelphilippinesidea.com/index.php/2024/02/13/the-longest-river-in-the-philppines/

3.1 Riverfront, Canals, Lakes and Ponds

Riverfront
Towards River Krishna

Connect the hinterland to the waterfront

Connectivity is crucial to a successful riverfront. As River Krishna stretches along Amaravati, the riverfront experience is maximised when the city's pedestrian network is linked to the riverfront.
Visual and physical connections to the river should be formed through pedestrian walkways or forming an unobstructed path from the urban grid to the riverfront. A clear path to the riverfront enables views of River Krishna and create landmark nodes to provide key views of Amaravati and reinforce the city's image and identity.

View Corridors and Pedestrian Linkages

View Corridors and pedestrian linkages to the riverfront should be publicly accessible with clear wayfinding. If private lots are cutting off a direct path towards the riverfront, it is recommended that the private developments should provide a public passage to re-connect the pedestrian paths and provide direct access to the riverfront.

Major streets from the hinterland to the riverfront should encourage pedestrian movement to the waterfront and should be designed such that the buildings and landscape form view corridors with a continuous and pedestrian-friendly street. Developments along the major view corridors should have active street frontages with primarily public uses at ground level, such as retail shops and restaurants.

https://permies.com/t/142936/a/110761/pond4.jpg

View corridors and pedestrian linkages guidelines are as follows:

- Min 4m setback should be provided as an easement for plots facing the riverfront
- Min 3m setback should be provided for all structures from these connecting roads
- Built form at the riverfront should enable maximum views of River Krishna
- Building lines should be maintained along major streets that form view corridors to the riverfront
- Curb-cuts should be provided at crossings to accommodate people of all levels of mobility, and removable bollards should be installed to restrict vehicular access for safety (refer to Streetscape Guidelines)
- Service entrances should not be permitted along major streets that disrupt pedestrian linkages and view corridors to the riverfront
- Visibility of public space should be maintained with storefront glazing on ground level floors of developments facing public space. Building corners should use storefront glazing to provide visual connections to the publicly oriented uses from all approaches
- Building and shop entrances should face the view corridors and pedestrian linkages to the riverfront to encourage pedestrian movement
- Outdoor dining with café seating and arcaded ground floors should be encouraged for retail and restaurants along the view corridor
- Wide pedestrian crossings of 10 m should be provided at intersections to provide safe pedestrian access to the riverfront from the hinterland
- Private developments should be designed with publicly accessible POPS and public pathways providing linkages to the riverfront

Outdoor café seating for restaurants along view corridors

Connecting Open Spaces to the Riverfront

Developments along the riverfront should be intertwined with public spaces, such as parks and plazas. The design of the pedestrian linkages should become as an extension from the riverfront so that it forms part of a public space network between the riverfront and the hinterland.

Connecting open space to the riverfront guidelines are as follows:

- Changes in elevation should be provided for with steps, landscape, screening and enclosures as appropriate (refer to Plantation and Materials section)
- A finished edge should be provided along the connection
- Pedestrian crosswalks should be provided at 100m interval
- Public amenities, such as seating, toilets and signage, etc. should be located at the ends of the connection to encourage movement along the streets connecting to the hinterland and the waterfront
- Street furniture such as seats, benches, wayfinding and signage should be provided at the pedestrian crossings along waterfront boulevard
- Adequate lighting should be provided at a human scale at 15m intervals to ensure visibility and safety
- Spatial pattern of street lights and trees along the waterfront boulevard should be designed such that it creates a character of the pedestrian linkage to ensure the visibility of the road and the views of the riverfront remains uninterrupted

Source: Amaravati concept handbook, https://www.archdaily.com/445661/red-ribbon-park-turenscape Courtesy Turenscape, http://www.ataland.com/City,

3.1 Riverfront, Canals, Lakes and Ponds

Riverfront

Stepped Building Height Profile

Stepped building height profile aims to create an interesting skyline along the riverfront and maximize views to the River Krishna. Strategies for Stepped Building Height Profile are as follows:

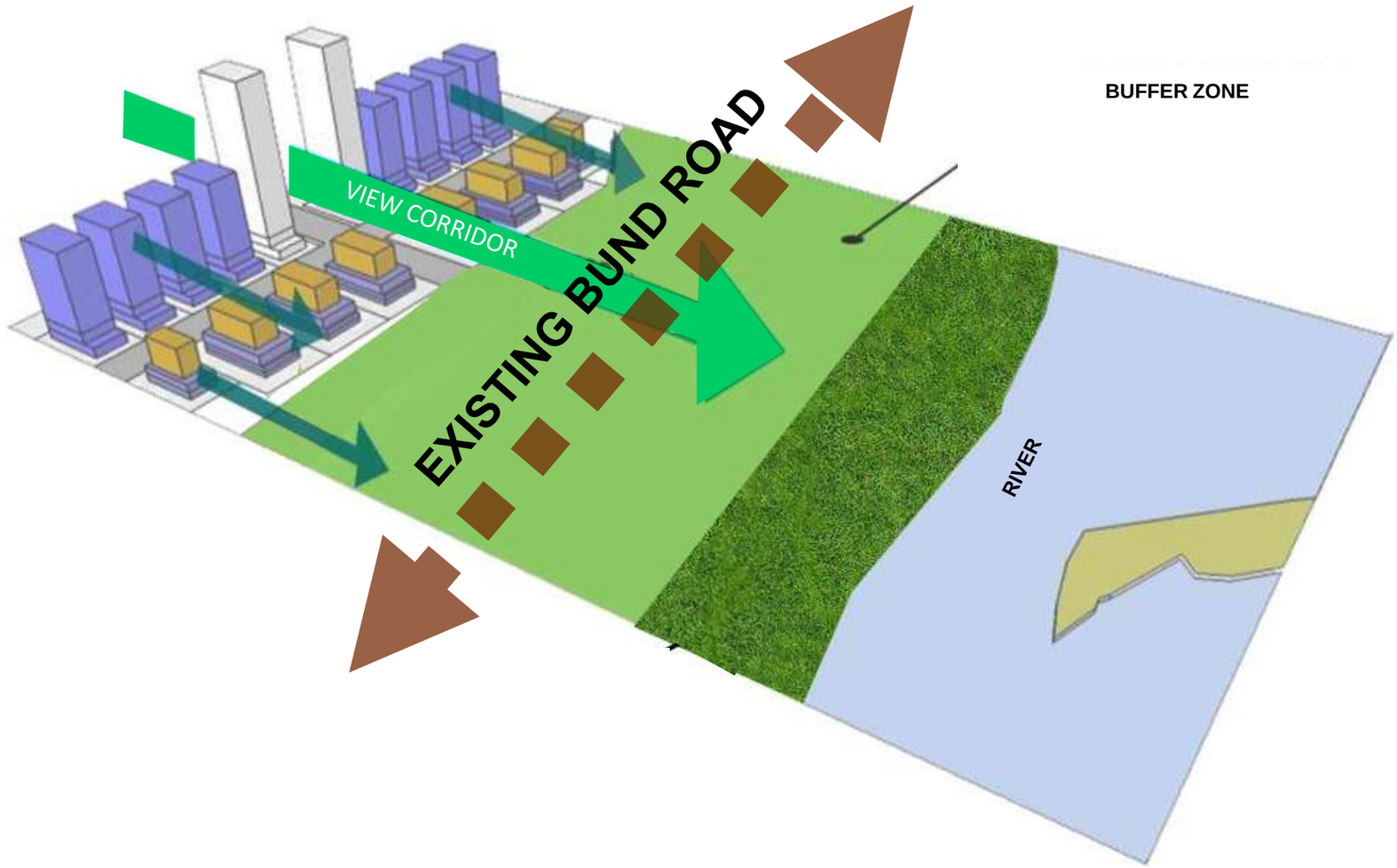
- Stepped building height profile should be followed for 200m beyond waterfront boulevard towards the hinterland to provide river views to buildings directly facing River Krishna
- Landmarks with viewpoints to the river should be ensured to provide key images of the city and reinforce the city's image and identity
- Stepped building height profile should be followed to provide river views to buildings directly facing River Krishna

Outdoor Activities and Uses

Activities/ Sports/ Children areas along the river:

- Create outdoor activities for leisure, sports and children play areas
- Use pockets and open space nodes along the river for activities, leisure and sports including viewing decks, pavilions, art installations at different locations

Some examples of outdoor activity areas:
- Decks and view points
- Pavilions and public art installations
- Skatepark
- Outdoor gym
- Outdoor basketball court



Stepped building heights towards the riverfront

3.1 Riverfront, Canals, Lakes and Ponds

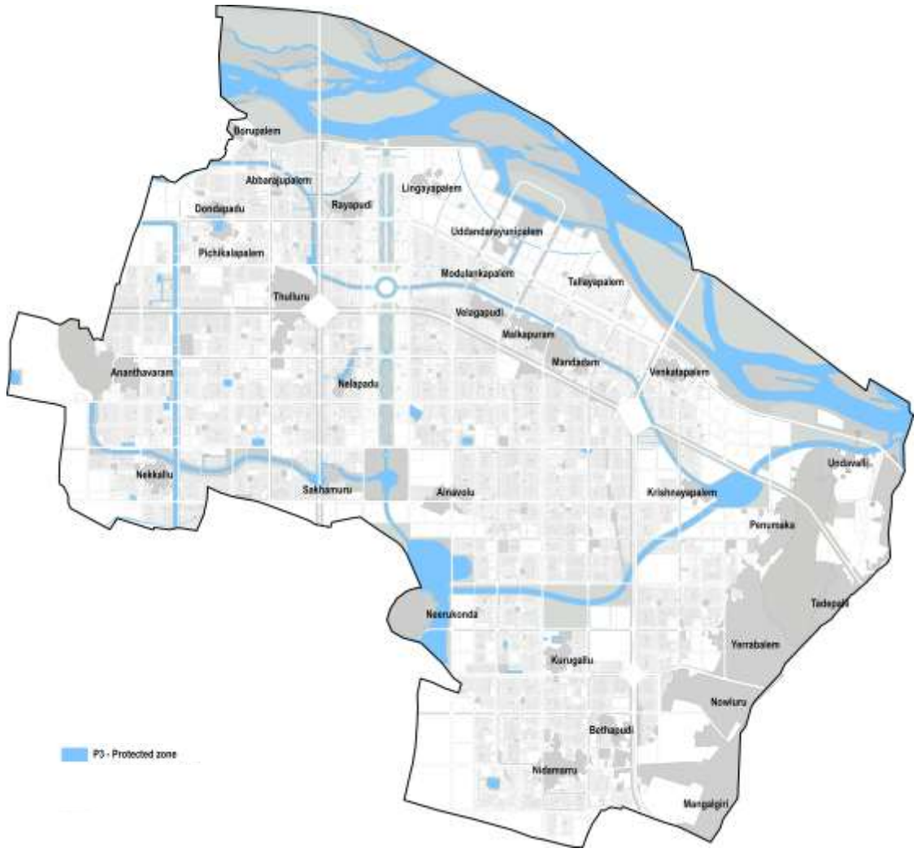
Canals

Canal Network

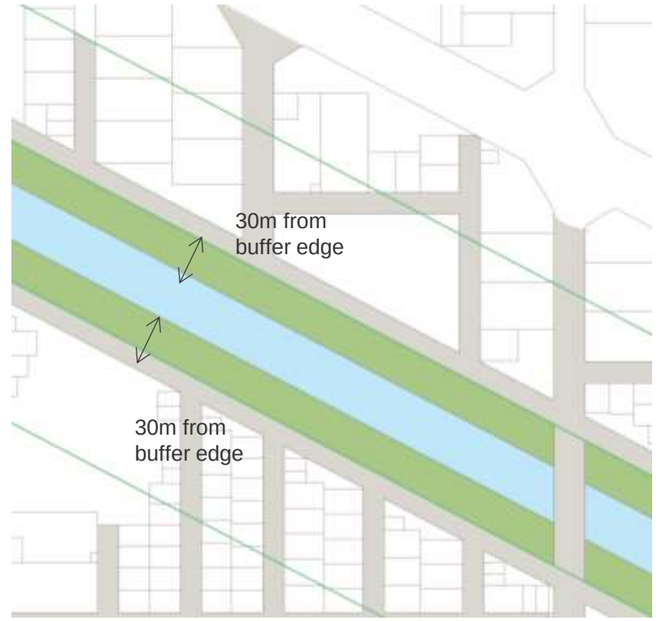
The canal system forms part of the blue and green network of Amaravati and offers a unique opportunity to be part of the public realm and overall open space and also serves as flood mitigation measure for the city. As a centre piece of the community, the canal network should be made accessible and inviting through landscape features.

In order to foster a more established guideline for the canal, it will include:

- No developments along water edge should be permitted
- A continuous green buffer 30 m should be provided on either side of the canal
- Restricted developments on the water edge and a stepped building height profile should be followed for 100m on either side to maximize canal front views
- Mixed-use development is encouraged for developments up to 100 m on either side, facing the canals with pedestrian paths along the waterfront so they do not become private areas
- Buffer zone should include trails, promenades and bike paths for walking and cycling
- Clear wayfinding and signage should be provided along and to the canals
- Higher quality public realm should be provided along the promenades
- Soft tree lined and landscaped edge should be provided along the canal
- Consistent landscaped entry features for the canal front should be identified
- Appropriate lighting features that balance safety and natural environment should be selected
- Safe and clearly marked access points to the canal should be identified at 500 m regular intervals
- Promenade should provide a distinct sense of place along the canal
- Seating at 300m interval should be provided facing the waterfront where appropriate



Water, canals and lakes network map of Amaravati



Stepped building profile for buildings within 30 m of buffer edge

Canal Buffer Zone

The canal buffer zone should be in place to protect the natural landscape along the water's edge from any development/construction. The buffer zone contributes and preserves biodiversity along the canal while providing space for recreational, leisure and relaxation. Water transit shall be provided where appropriate. Canal buffer zone guidelines are as follow.

- Pedestrian path of minimum 3m to 6m wide should be provided
- Bike paths of minimum 2m to 3m wide should be provided
- Landscaping should be provided where appropriate
- Pedestrian scale lighting should be provided at a 9m interval for safety and visibility
- Seating areas should be provided at a 20m interval along pedestrian paths and facing the canal
- Developments within buffer zone are not permitted
- Clear access points to the canal shoreline should be provided

Plantation

- Minimum 70% tree coverage should be provided
- Minimum 75 % permeable surface should be provided

Natural edge along canal with cycle track in the Netherlands

Active canal development with recreational spaces in Seoul

Source: ABC Waters @ Kallang River (Potong Pasir), https://blogs.yahoo.co.jpgunmano_kumasan26089299.html

3.1 Riverfront, Canals, Lakes and Ponds

Canals

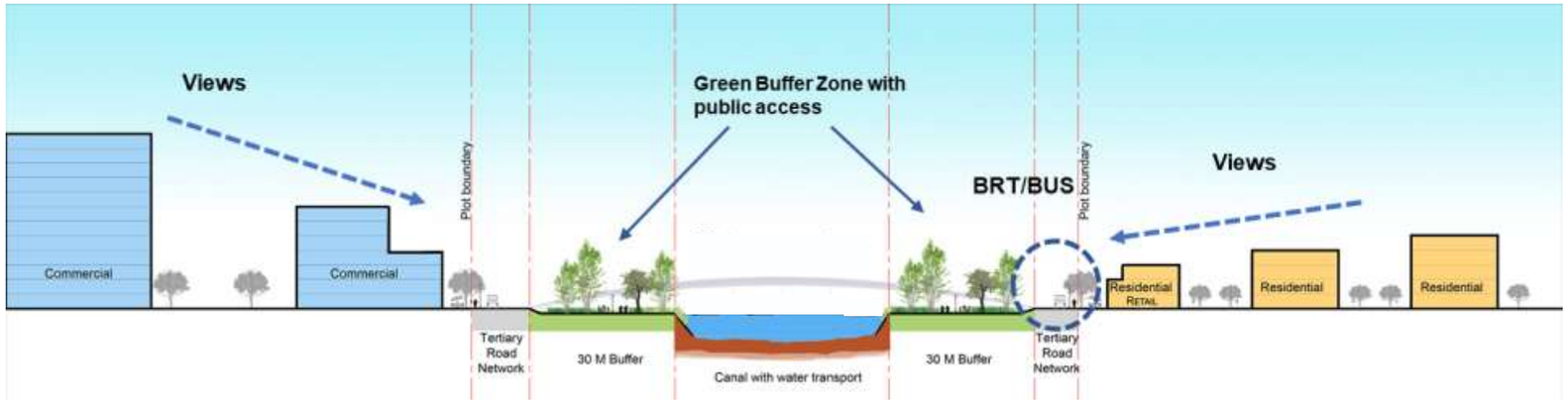
Water Transit and Pedestrian Oriented Development (W-TPOD)

Water Transit and Pedestrian Oriented Development (W-TPOD) has the potential to become an additional mode of public transport and reconnect Amaravati around and within the city through River Krishna and along the canal network. Water transport avoids traffic on the roads while providing a pleasant scenic mode of transport. Unlike a normal TPOD (Transit and pedestrian oriented development), the highest buildings will not be at the water edge as the strategy aims to maximise the view of the waterfront. There should be a stepped building height from the water edge maximising views of the canal from surrounding developments. W-TPOD guidelines are as follow:

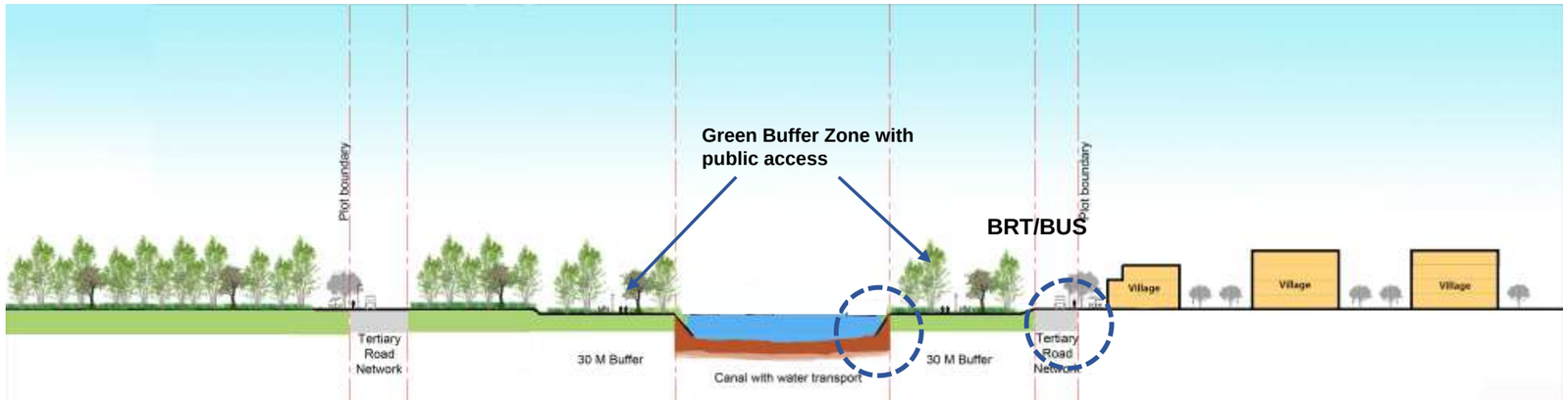
- Water transit network connection to BRT/MRT should be developed with commercial development along the canals
- Waterway transit stops with pedestrian linkage to other public transport should be provided
- Landscaping along waterfront should be provided
- Stepped development profile should be followed with no buildings permitted at water edge along canals to maximise waterfront views
- Low building heights for developments close to the canals with maximum building height restriction of 8 m
- Private residential developments should not be permitted along canals
- Mixed use development with green roofs and terraces towards the canal edge should be provided to achieve maximum frontage of towards waterfront
- Building should be a maximum 20m of height with min 6m no building zones with active building frontage with balconies and semi or fully covered space
- Clear pedestrian signage and wayfinding should be provided to connect water transit to BRT/MRT at waterway stops and pedestrian path intersections

https://www.turenscape.com/en/news/detail/360.html

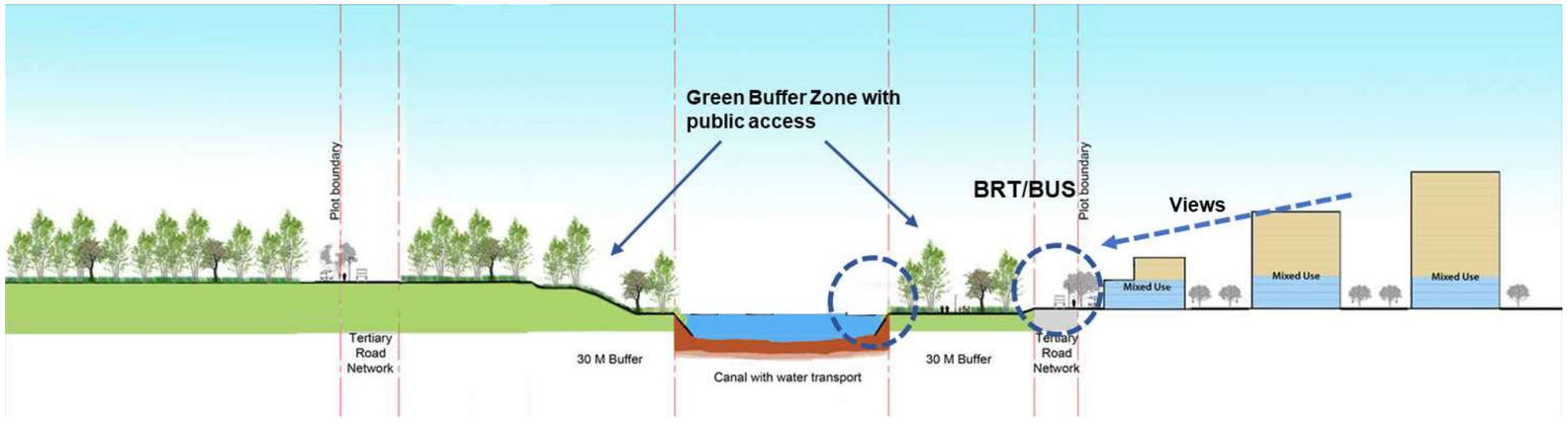
Canals along LPS developments



Canals along villages



Canals along mixed-use developments



3.1 Riverfront, Canals, Lakes and Ponds

Lakes, Ponds and its Precincts

Lakes and ponds are important features of Amaravati's landscape that should be protected as ecological environments that also allow for leisure activities such as picnic or sports for surrounding neighborhood. Lakes are not only a important source of water, but often provide valuable habitats to plants and animals, moderate the hydrological extreme events (drought and floods), influence microclimate, enhance the aesthetic beauty of the landscape and extend many recreational opportunities (Guidelines for National Lake Conservation Plan, 2008).

Protection of Environment and Water Quality:

- Prevention of any kind of water related pollution from point sources by diverting and treating the pollution loads before entering the lakes/ponds
- In situ measures of lake cleaning should be undertaken, such as de-silting, de-weeding, bioremediation, aeration, bio-manipulation, or any other successfully tested eco-technologies where appropriate
- Catchment area treatment which may include afforestation, storm water drainage, silt traps etc.
- Public awareness on protection of lakes
- Encourage public involvement for lakes/ponds conservation

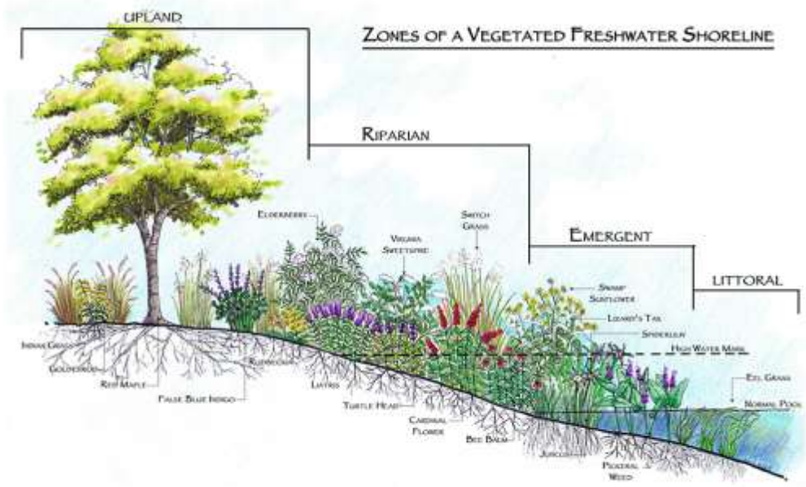
Lakes and ponds guidelines are as follow:

- Building should be a max building height of 20m with min 6m set back with active building frontage with balconies and semi or fully covered space
- Lakes/ponds should not be filled or reclaimed and any development that divides the water bodies should not be allowed
- Multiple accessibility points should be ensured from all sides and the water body and should not surrounded by private developments
- Appropriate lighting features that balance safety and natural environment should be provided and selected
- Buildings should be beyond the buffer zone and limited to a building height restriction of up to a maximum of 8 m closer to the waterbody
- Benches and seating areas at points of interest facing the lakes/ponds for relaxation should be provided
- Appropriate shrubs and grass species should be planted near the water edge as a riparian
- A stepped development profile with 100 m mixed use development zone beyond the buffer zone should be provided to maximize views with no development on the water's edge

Lakes and ponds, with accessible open space and public park for leisure and recreation

Natural shoreline landscaping around the lakes to conserve exisiting ecosystem.

Ecological landscape and public areas around lakes and ponds for protection of environment and water quality



Example of natural shoreline landscaping for fresh water

Source: https://commons.wikimedia.org/wiki/File:(1)Lake_Northam_Victoria_Park.jpg
http://rrstormwater.com/plants-and-your-stormwater-control-measures, https://land8.com/10-projects-that-show-how-turenscape-is-leading-the-way-in-ecological-design/

3.1 Riverfront, Canals, Lakes and Ponds

Lakes, Ponds and its Precincts

Lake Buffer Zone

Similar to the riverfront and canals, there should be a 50 m buffer zone to protect the water bodies and prevent developments from surrounding it. Lake Buffer Zone guidelines are as follow:

- Pedestrian path of min 3-6 m wide should be provided
- Landscaping where appropriate (refer to Plantation and Materials section)
- Pedestrian scale lighting should be provided at a 9 m interval for safety and visibility
- Seating areas should be provided at a max of 100 m interval along pedestrian paths facing the waterfront where appropriate
- Pedestrian paths should ensure multiple entrances and exits (min of 4) to the lake for accessibility and safety
- Buildings should be beyond the buffer zone and limited with a building height restriction of a up to max of 12m
- Cycle tracks of min 2-3 m wide should be provided
- Signage and wayfinding should be at entrances, exits, and by the lake as well as intersections of pedestrian paths
- Lakes and ponds should consist of a min 30m buffer zone that has green coverage, trees and ecological landscape
- Buffer zone should consist of walking trails and pedestrian paths

Plantation

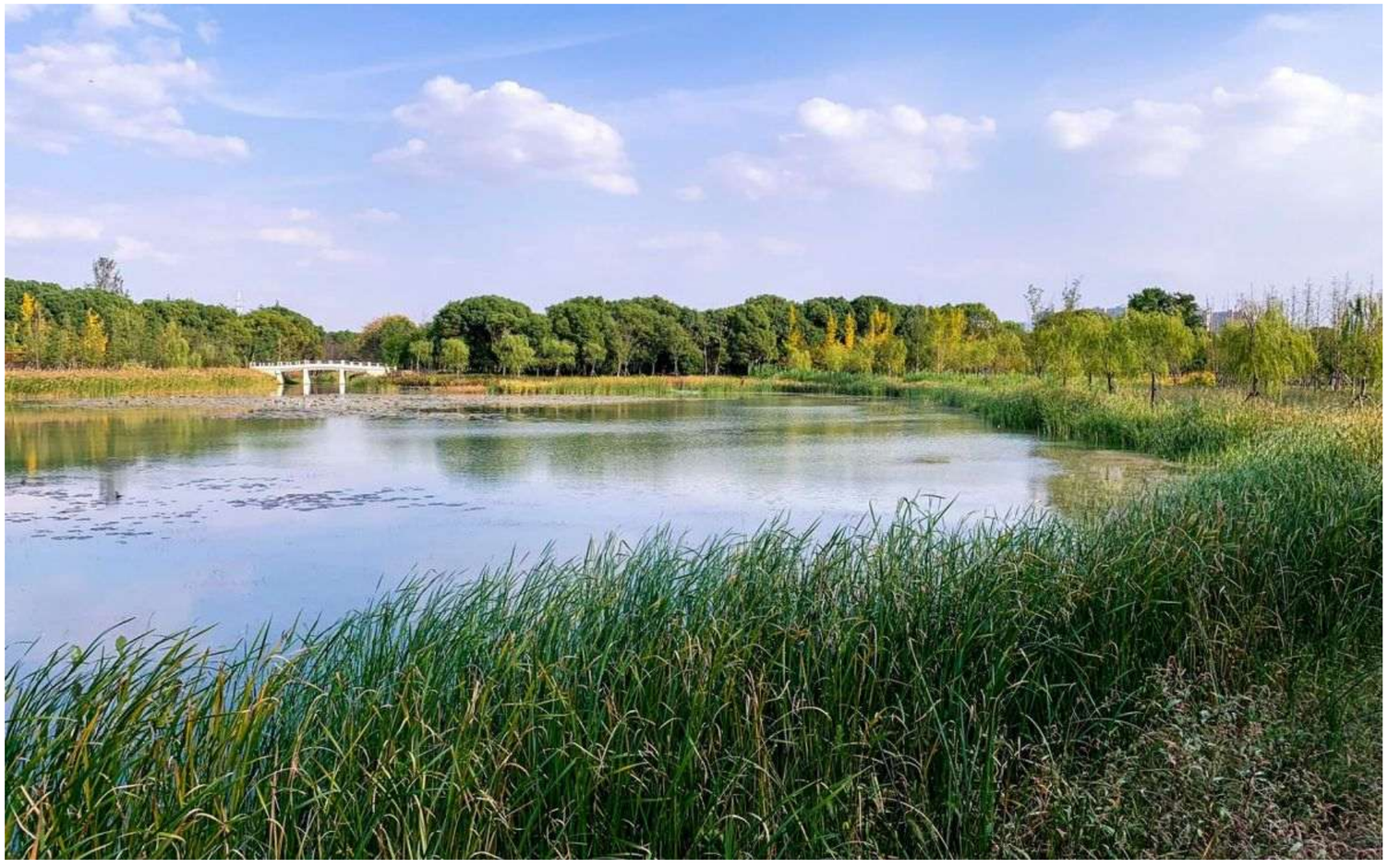
- Minimum 70% tree coverage should be provided
- Minimum 75 % permeable surface should be provided

Amenities and Activities

- Amenities should be provided based on the scale of the lake or pond
- Program activities and events should be organised to attract visitors
- Educational awareness programs should be developed by working together with community groups, local schools and universities

Surround lakes/ponds with trees and plantation for leisure and relaxation

Amsa Ecological Park (located in Amsa-dong



https://asla-ncc.org/portfolio-items/forest-park-west-entry/

3.1 Riverfront, Canals, Lakes and Ponds

Flood Mitigation Strategies

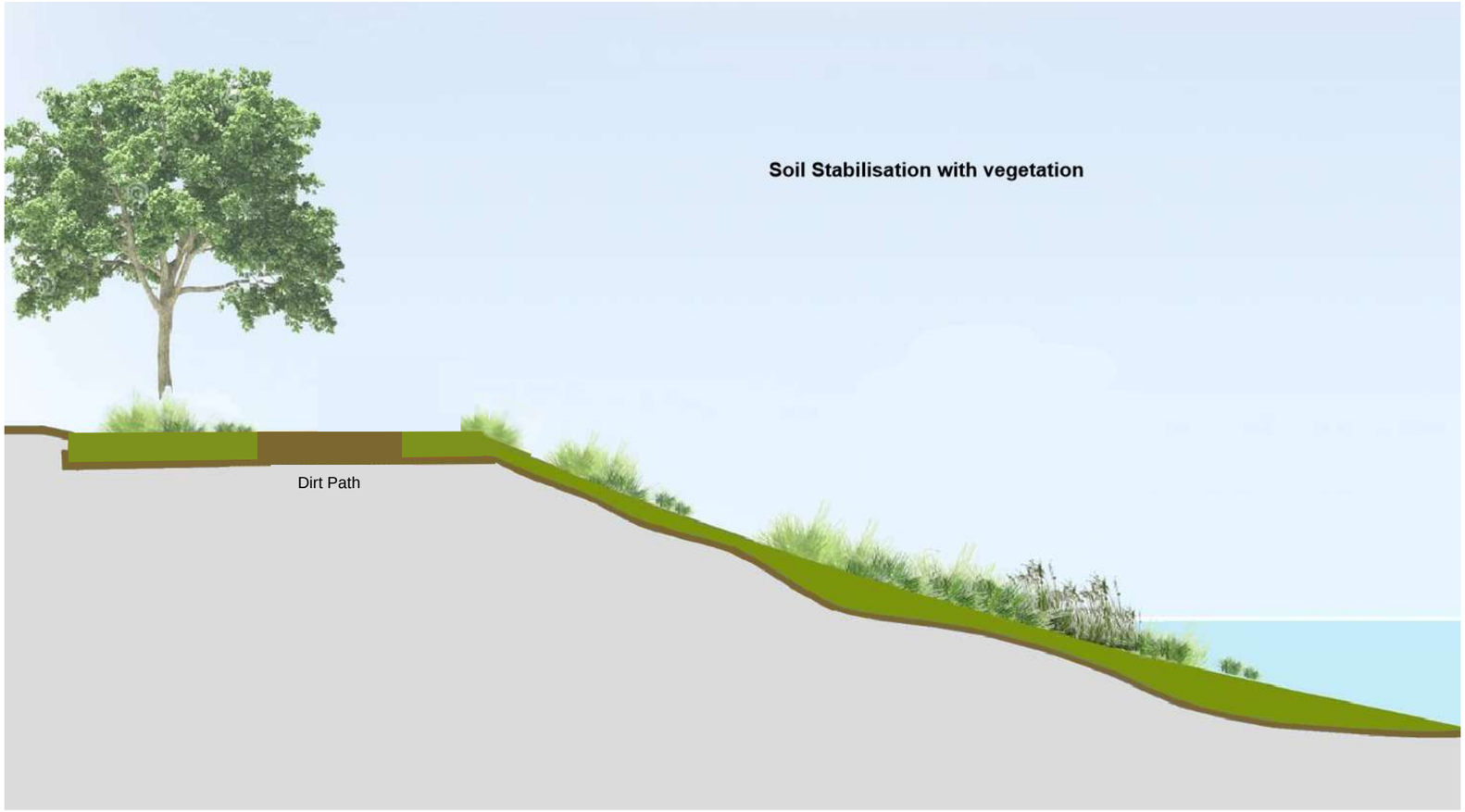
One of the benefits in establishing a Blue and Green network is contributing to flood mitigation. Amaravati is enriched with forest, hills, river, canal, lakes, ponds, fertile agricultural land, wetland along river with different biodiversity, which can act as a natural barrier or storage for storm water runoffs. The existing natural resources should be preserved for cultivating native wildlife in the community. Good landscape design and provision can also reduce the severity of flooding by improving water catchment and drainage.

- Developments should be avoided along the water edge to provide a buffer area for vegetation
- Soil stabilisation through vegetation with a palette of local, native trees and shrubs along the river edge should be done (refer to Plantation and Materials Section)
- Bio swales should be provided to ensure effectiveness in removal of pollutants in the storm water runoff and increasing the recreational standard of the neighbourhood
- Storm water collected from bio swales should be used for irrigation
- Existing wetlands and other natural landscape should be preserved when possible to act as buffer against flooding

Riparian Corridors

A riparian corridor should be designed to be uninterrupted to help reduce the concentrated flows to the water body and providing continuous habitat for birds and other wildlife species that require undisturbed access to food, shelter and water. Trees are the most important element in a riparian corridor for removing nutrients, stabilizing the soil, modifying water temperature and providing food for aquatic organisms.

Recreation in the buffer zone should be balanced with the effects this will have on existing features, especially in terms of excess nutrients, contaminants and chemicals, including pesticides, fertilizers, and herbicides.



Soil Stabilisation with Vegetation

Example of riparian corridors reuniting river edge with people and native wildlife

Examples of wetlands along canals

Examples of bioswale for stormwater treatment

Image Source: © OLIN / Sahar Coston-HardyVillage 2015 ASLA Professional Award, © lo_409/shuttershock Hotels.com, https://www.flickr.com/photos/48875472@N06/4688793738

3.2 Open Space Network

3.2 Open Space Network

Hierarchy Of Open Spaces And Parks

The network of open spaces should follow a hierarchy that reflects the following three components. :

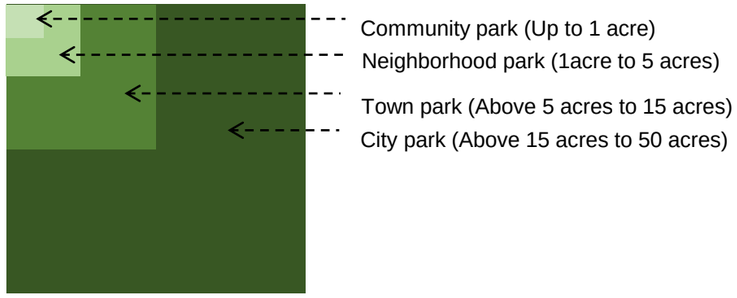
- The catchment size
- The type of activities facilitated, and
- Its physical size

Vision

The parks and open space system is envisioned to become a layered collection of high quality spaces at different scales, knit together with a pedestrian and cycling-friendly street network and transit system.

Objectives

The public realm should be designed for the experience of people, and to encourage a culture of walking and outdoor activities through all seasons. The thoughtful design of scale is a first step to building a successful public realm.



Focus On People

A human centred approach is fundamental in the development of open spaces, which are the living rooms of the city.

Understanding the needs, patterns of uses and daily life of the people will help promote a happy and healthy life within the city.

Therefore, it is important to focus on People, Place and Planet in open space development.

Design should be considered at various scales and time to offer high quality open spaces for use throughout the year; during days and nights, weekdays and weekends, festive seasons and special occasions.

Privately Owned Publicly-accessible Spaces (POPS)

Urban Plazas

Public Squares

Community Parks

Neighborhood Parks

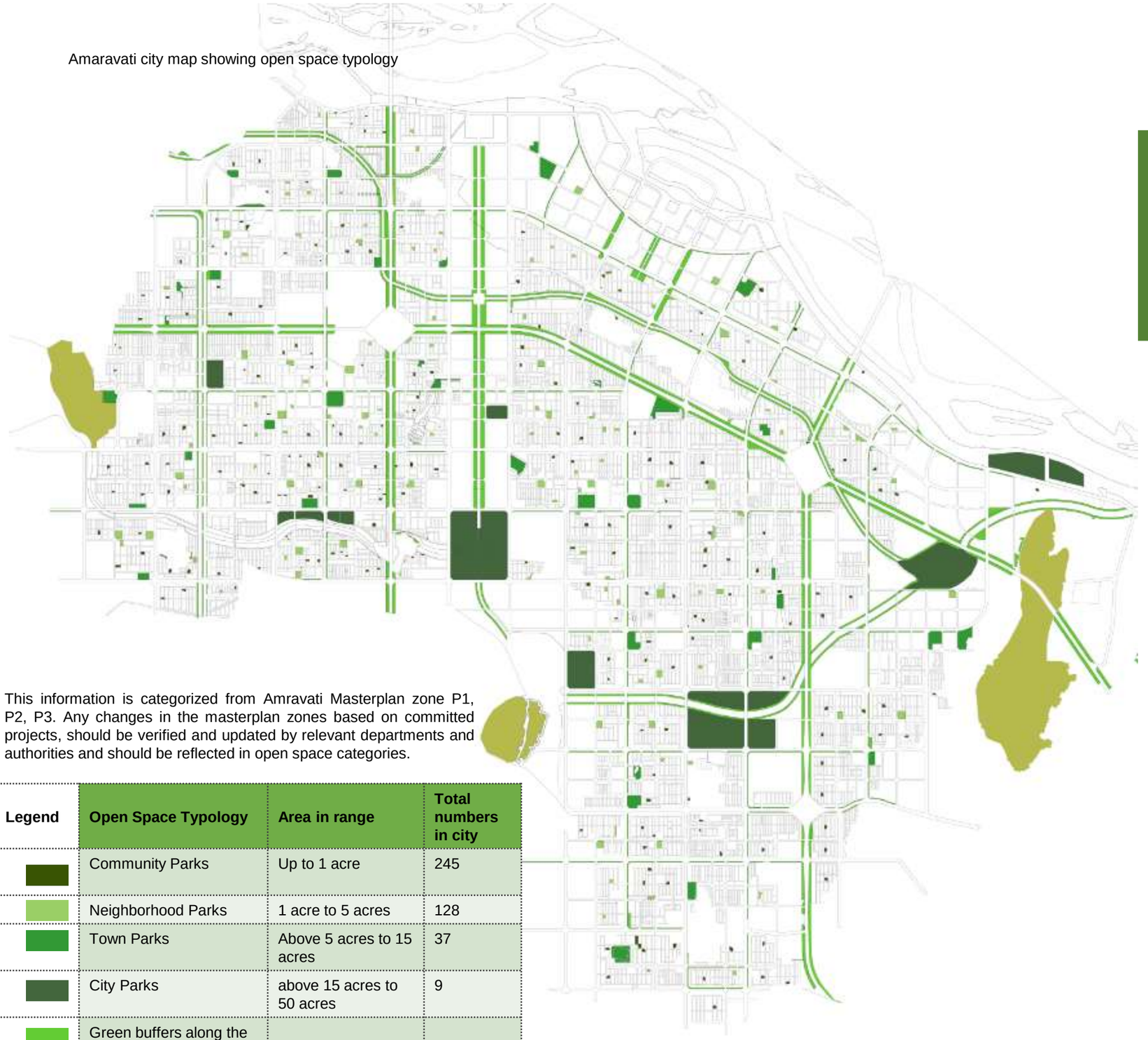
Town Parks

City Parks

Buffer Zone Along Roads

Hills

Amaravati city map showing open space typology



This information is categorized from Amravati Masterplan zone P1, P2, P3. Any changes in the masterplan zones based on committed projects, should be verified and updated by relevant departments and authorities and should be reflected in open space categories.

Legend	Open Space Typology	Area in range	Total numbers in city
	Community Parks	Up to 1 acre	245
	Neighborhood Parks	1 acre to 5 acres	128
	Town Parks	Above 5 acres to 15 acres	37
	City Parks	above 15 acres to 50 acres	9
	Green buffers along the road		
	Hills		3

3.2 Open Space Network

City Level Open Spaces

Hills

Amaravati has 3 major hills Undavalli, Neerukonda and Ananthavaram. Undavalli Hill area is categorized as Reserved Forest Area and no interventions are proposed. Neerukonda and Ananthavaram Hills have potential to become focal points and provides opportunity to view the future Capital City urban form from a higher ground. These hills should be considered for environmental, tourism and heritage value preservation. The aim should be maintaining two thirds of the area under green cover in order to prevent erosion and land degradation and to ensure the stability of the fragile eco-system.
Biosphere Reserves (BRs) are representative parts of natural and cultural landscapes extending over large area of terrestrial or coastal/marine ecosystems or a combination thereof and representative examples of bio-geographic zones/provinces. Biosphere reserves are demarcated into following 3 inter-related zones:

1.Core zone - Core zone should contain suitable habitat for numerous plant and animal species, including higher order predators and may contain centres of endemism. Core areas often conserve the wild species and also represent important genetic reservoirs. The core zone should be kept free from disturbance**.** 60-80% of the hill areas should be provided as protected areas for plantation, habitat creation and rejuvenation with restricted access and control point.

2. Buffer zone - The buffer zone refers to the area adjoins or surrounds core zone. Its uses and activities should be managed in a way that protects the core zone in its natural condition. Buffer zone should refrain from activities that will have adverse impact on the eco-system. Uses and activities such as restoration, demonstration sites for enhancing value addition to the resources, limited recreation, tourism, fishing, grazing, etc. should be more acceptable. Research and educational activities should be encouraged.

3. Transition zone - The transition area is the outermost part of a biosphere reserve. This is usually not delimited one and is a zone where conservation knowledge and management skills are applied and uses are managed in harmony with the purpose of the biosphere reserve. This includes settlements, crop lands, managed forests and area for intensive recreation and other economic uses characteristics of the region.
(As per Ministry of Environment and Forest India)

4. Soil erosion and slope protection on hills

- Soil erosion has been a major issue in the past and will become an even greater issue in the future as population growth continues to expand and land resources are more intensively used, often to a point of destruction
- Watershed areas of the hills should be conserved, retained and connected to canal network
- Forest trails and steps –use of local natural material without mortar for pedestrian pathways as far as possible
- Retain existing topographical conditions and contours and maintain them as far as possible
- Preventive plantation techniques should be provided to reduce and restrict soil erosion
- Proper storm water management systems should be provided to avoid water clogging and stagnation

Vetiver system

- Vetiver species planation is the main component in vetiver system for soil and water conservation
- Vetiver System could be an important tool to reduce erosion (by up to 90%), reduce and conserve rainfall runoff (by as much as 70%), improve ground water recharge, remove pollutants from water, reduce the risk of flooding
- Vetiver System can effectively and at low cost, protect slopes, stop or significantly reduce the risk of slippage, and prevent down stream water contamination. This is because vetiver grass roots have a high tensile strength - average 75 MPa that can increase shear strength of soil by a factor of 40, and because when planted on slopes vetiver will reduce slope hydraulic pressures through the removal of water

5. Cultural and religious areas on hills

- Pilgrim sites located inside Protected Areas should be designated as sacred groves, with strict building and expansion controls, in accordance with the Forest Conservation Act, 1980 and the Environment Protection Act,1986. (As per Ministry of Environment and Forest India)

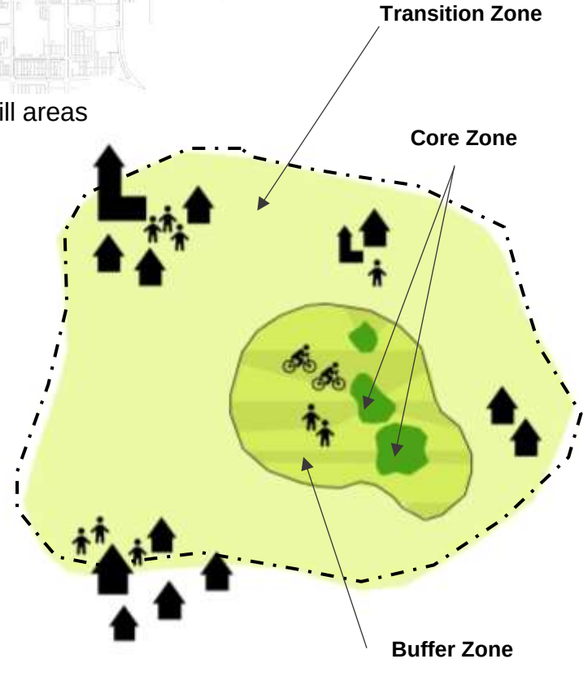
Overall development on hills should follow:

- All development built up including religious, tourism, iconic structures should be limited to max 1% of the development site area
- Restrict temporary structures to min of 5 % in areas excluding the areas of plantation
- Plantation - Existing flora fauna should be conserved / retained.
- Native and local species should be planted.
- Minimum 75 % of tree cover should be provided
- Minimum 90% of permeable spaces should be provided (Refer to section 3.3 for details)

Green Network Map in masterplan highlighting the hill areas

Slope Protection on hills

Source : http://Www.Vetiver.Org/G/Landscaping.Html, Ministry Of Environment, Forest and Climate Change , Revised Masterplan Report 04042017



Source : Zoning in UNESCO biosphere reserves: core, buffer and transition zones

3.2 Open Space Network

Green Buffer Zone Along The Road.

- Buffer zones adjacent to roads and other transportation corridors reduces traffic impact on surrounding habitats.
- Buffer zones increase the distances between roads and adjacent habitat and habitats remain undisturbed.
- Buffer zones should help reduce the inputs of pollutants from vehicle exhausts to nutrient-poor shrub land ecosystems.

1. Elements and Amenities to be Provided within Green Buffer Zone

- Pause points
- Jogging track
- Shaded seating areas
- Tree grooves
- Herbal gardens
- Thematic gardens.

2. Facilities to be Provided within Green Buffer Zone

- Cycle racks
- Sculptures and art work
- Sustainable storm water management such as rain/dry ponds, retention ponds, bio swales.
- Seating
- Dustbins

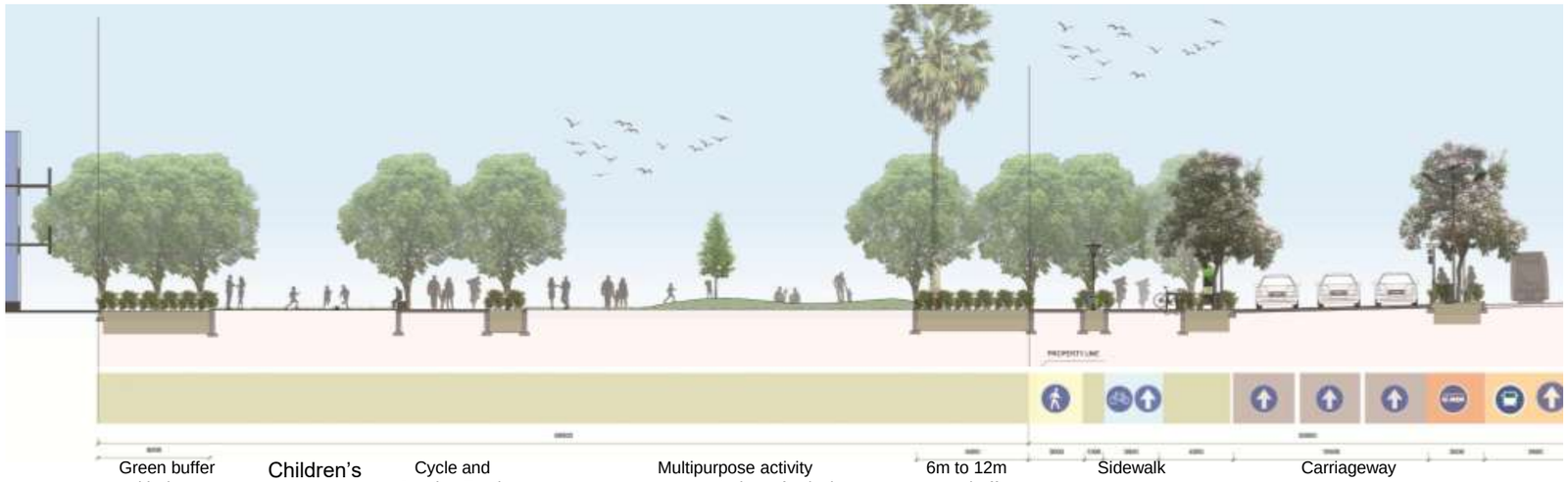
3. Plantations

- Minimum 75 % of total area should be provided with tree plantation.
- Shrubs and ground covers - Minimum 70% of area should be covered.
- Permeable surface area - Minimum 75% of road buffer zones area should be permeable
- Irrigation for soft scape area should be provided.

For plantation distribution refer to Section 3.3

Green buffers along the road

Green network map in masterplan highlighting the green buffers along the road



Schematic section of Buffer zone along the 60 m wide major arterial road

3.2 Open Space Network

City Parks (above 15 acres to 50 Acres)

City parks should be an important venues for place making for Amaravati city. They should be places for gathering, social interaction, events, place for marketing, and branding. The design of city level parks should keep the concept of place-making in consideration. City level parks should be the destination for citizens as well as for visitors and should designed to become landmark identity for the Capital City.

1. Elements and Amenities to be Provided within City Park

- Tourism destinations
- Botanical garden
- Conservatories
- Theme parks
- Water bodies – lakes , ponds , with nonpolluting recreational activities
- Jogging tracks/cycle track
- Leisure lawn areas
- Gathering spaces
- Public plazas
- Exhibitions spaces
- Play area and recreational activities for all age groups.
- All landscape elements should be safe and designed to be universally accessible

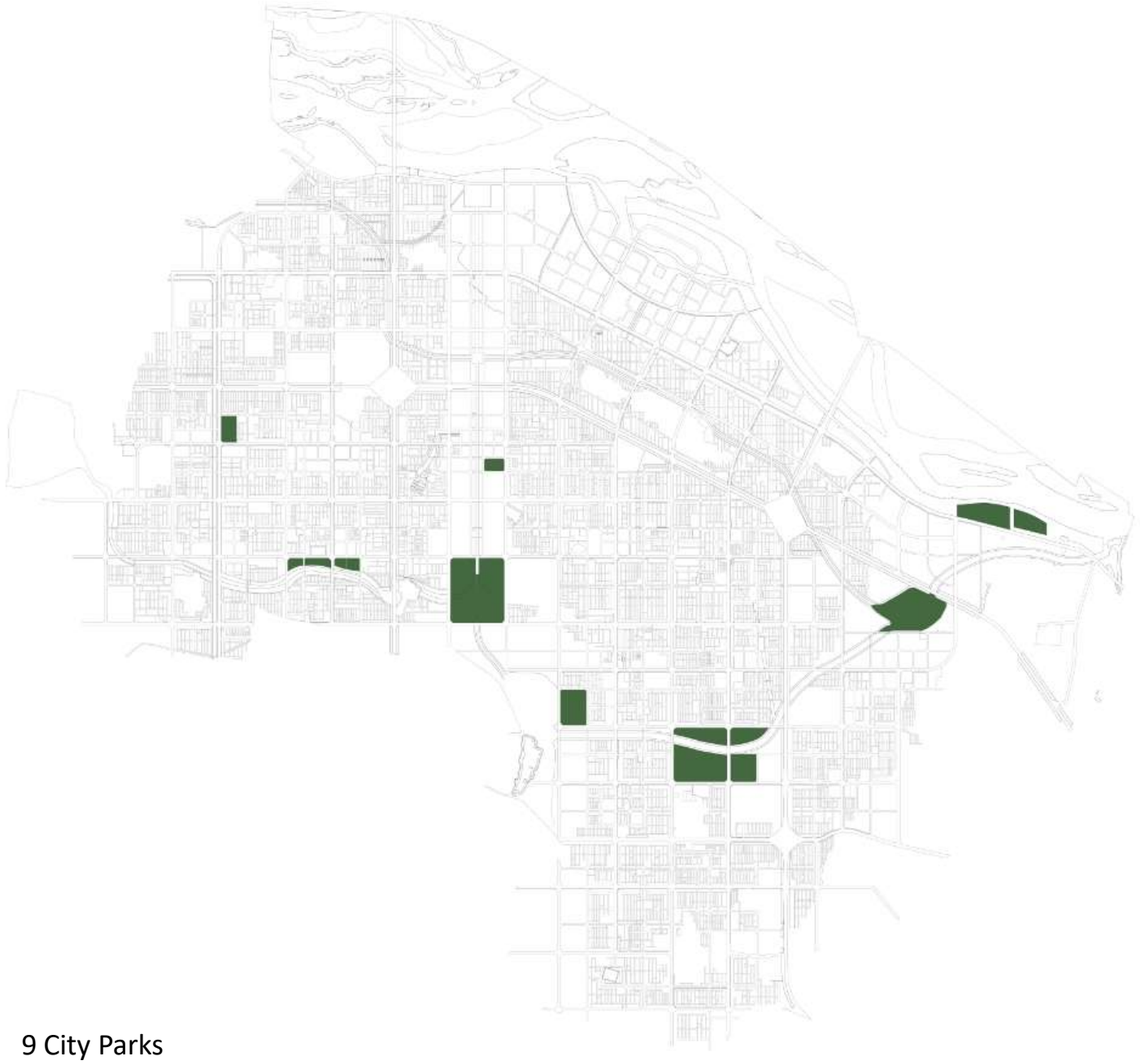
2. Facilities to be Provided within City Park

- Toilets- separate toilets for ladies and gents within 300m of walking distances from the active areas should be provided
- Parking under the hardscape and sports courts park amenity buildings to avoid use of landscaped park area to be used for surface parking
- Drinking water facilities- within 300 m walking radius
- Information/ food kiosk to be located at entrance and resting areas.

3. Plantation

- 50-70% of Park Area should be under tree cover
- Shrubs and ground covers – Minimum 50% of area should be covered
- Permeable surface area - Minimum 60% of city level parks area should be permeable
- Irrigation for softscape area should be provided.

For plantation distribution refer to Section 3.3



9 City Parks

Green network map in masterplan highlighting the City Level Parks

Tourism destination.

Botanical Gardens / Conservatories

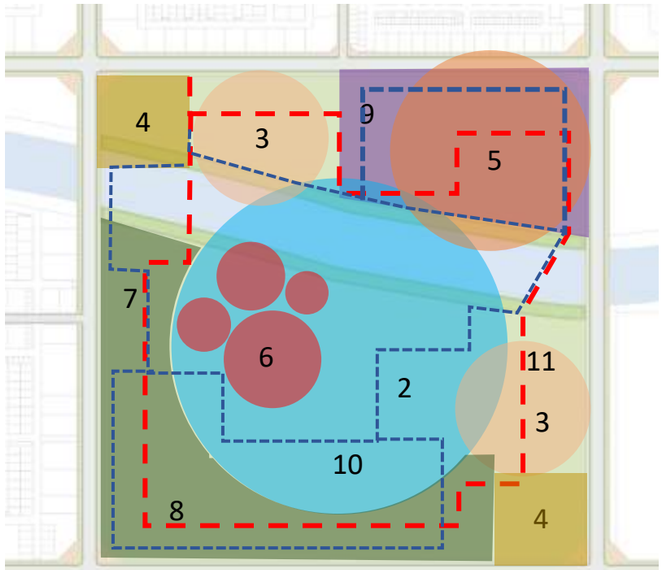
Theme garden

Sources: http://www.gardensbythebay.com.sg/en/book-a-venue/silver-leaf.html

3.2 Open Space Network

City Park- Typology

1. Elements and Amenities

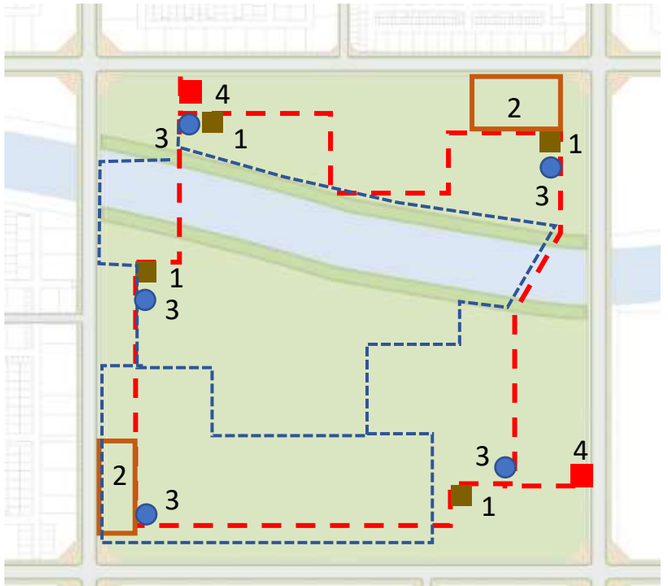


1. Jogging tracks
2. Leisure lawn areas
3. Gathering spaces
4. Public plazas
5. Play area and Recreational activities for all age groups
6. Tourism destinations
7. Botanical garden
8. Conservatories
9. Theme parks
10. Water bodies – lakes , ponds
11. Exhibitions spaces

Jogging Track

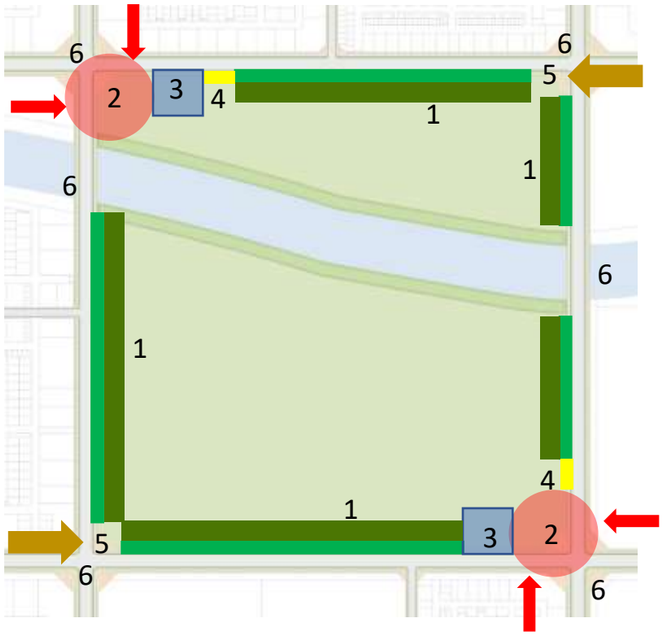
Cycle Track

2. Facilities



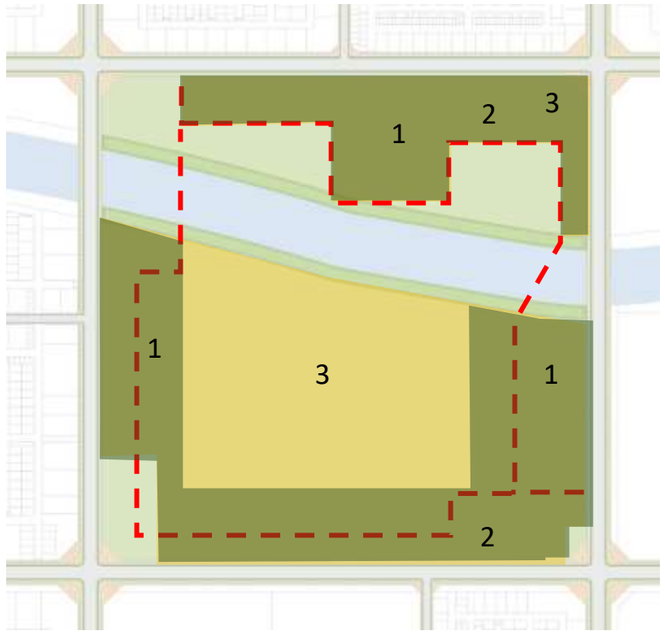
1. Toilets- separate toilets for ladies and gents within 300m of walking distances from the active areas should be provided
2. Parking under the hardscape and sports courts park amenity buildings to avoid use of landscaped park area should be used for surface parking
3. Drinking water facilities- within 300 m walking radius
4. Information/ food kiosk should be located at entrance and resting areas

3. Edge Treatment



1. Achieve minimum 60% plantation edge of the total perimeter
2. Maximum 20 % of the edge as entry exit points should be equally divided on street frontage
3. 5% of the street frontage should be allocated for active street edge
4. Maximum 5%of the edge should be treated with advertisement banners and hoardings
5. Maximum 10% edge should be vehicular access entry exit points.(excluding community and neighbourhood parks)
6. Minimum 50% visibility should be achieved along the park edge through plantation

4. Plantation



1. Minimum 50%of park area should be provided with tree cover
2. Minimum 50%of park area should be provided with shrubs and groundcovers
3. Permeable surface area Minimum 60% of city level parks area

Jogging Track

3.2 Open Space Network

Town Parks (above 5 acres to 15 Acres)

Parks Town parks should be an area designated for recreational and leisure activities for citizens along with protection of natural habitats in the township.

1. Elements and Amenities to be Provided within Town Park

- Sports club
- Sports courts and open fitness area
- Play area and recreational activities should be provided for all age groups as far as possible
- Senior citizen – recreational and resting area
- Jogging tracks
- Cycle track
- Pets park
- All landscape elements should be safe and designed should be universally accessible.

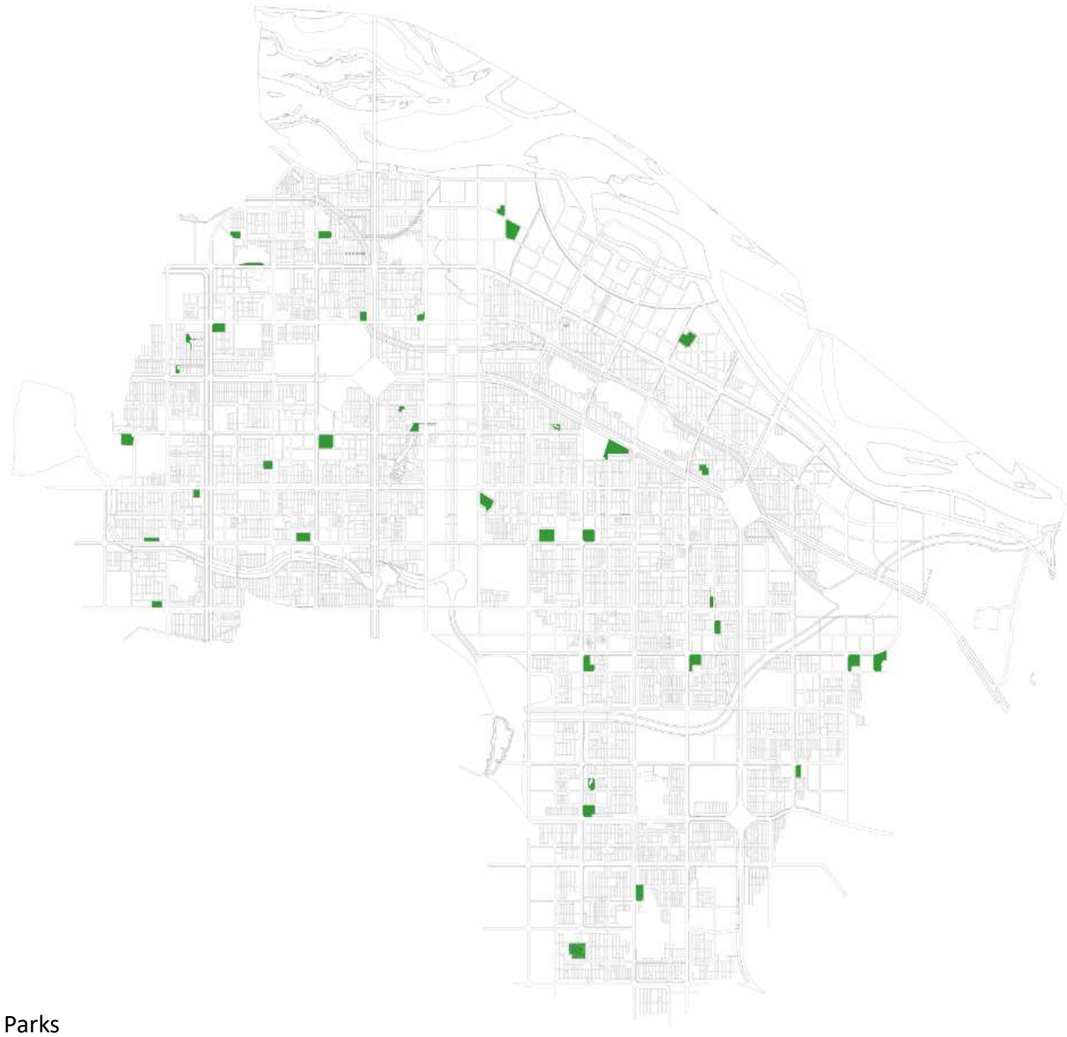
2. Facilities to be Provided within Town Park

- Toilets- separate toilets for ladies and gents within 300m of walking distances from the active areas should be provided
- Parking should be provided near the entry exit points accessible directly from the access road
- Parking under the hardscape and sports courts park amenity buildings to avoid use of landscaped park area should be used for surface parking
- Drinking water facilities should be provided at walking distance from active areas
- Information/ food kiosk should be located at entrance and resting areas

3. Plantation

- 50-70 % of Park Area should be provided with Tree Cover
- Shrubs and ground covers - Minimum 70% of park area should be covered
- Permeable surface area- Minimum 75% of park area should be permeable
- Irrigation for softscape area should be provided.

For plantation distribution refer to Section 3.3



37 Town Parks

Green network map in masterplan highlighting the Town parks

Sports courts

Jogging tracks

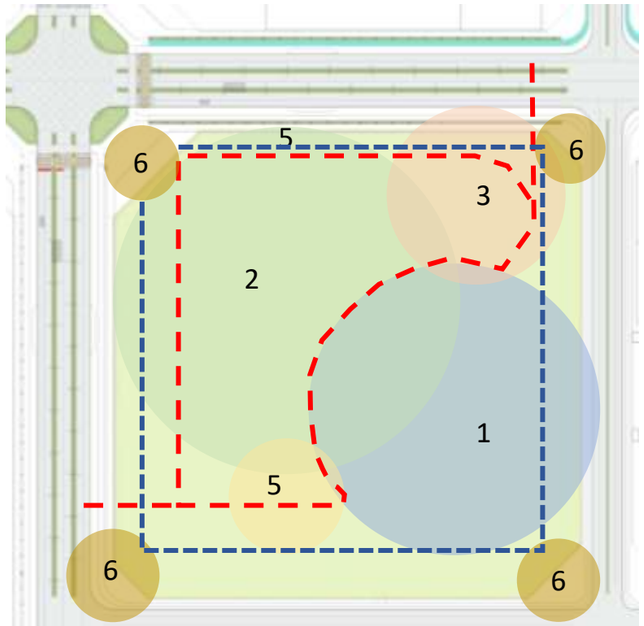
Playscapes

Source: https://www.waterplay.com/en/featured-projects/spout-house-farm/, The new Rig, http://www.londontown.com/LondonInformation/Leisure/, http://urbantoronto.ca/news/2016/06/event-kids-officially-opens-regent-parks-athletic-grounds, https://www.archdaily.com/139145/sculptural-playground-annabau, https://www.townofirmosc.com/residents-visitors/parks-and-facilities/irmo-town-park/

3.2 Open Space Network

Town Park - Typology

1. Elements and Amenities

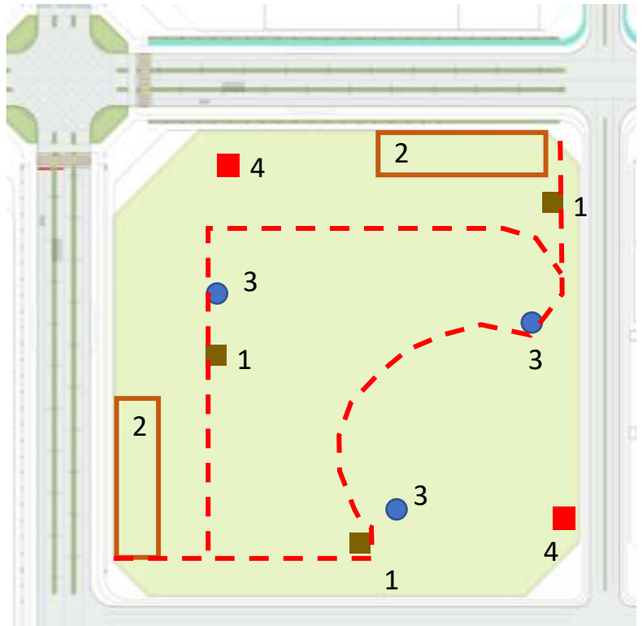


1. Sport's club , Sport's courts and open fitness area
2. Play area for kids and Recreational areas for all age groups
3. Resting Areas for Senior Citizen Jogging tracks
4. Cycle track
5. Pets park
6. Entrance plaza

Jogging Track

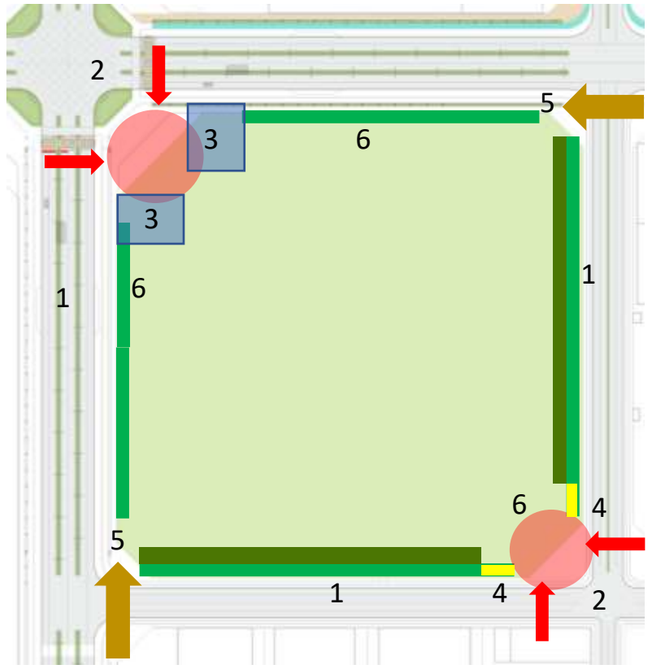
Cycle Track

2. Facilities



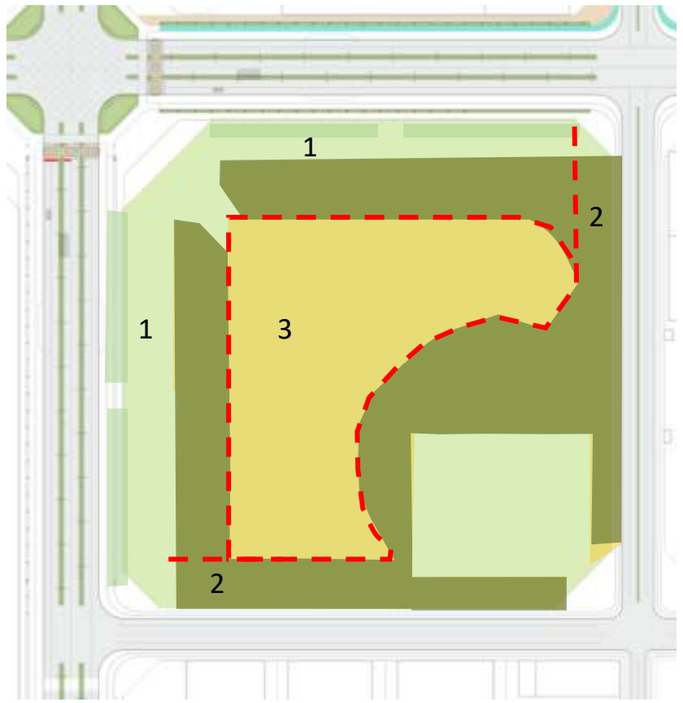
1. Toilets- separate toilets for ladies and gents within 300m of walking distances from the active areas should be provided
2. Parking under the hardscape and sports courts park amenity buildings to avoid use of landscaped park area should be used for surface parking
3. Drinking water facilities- within 300 m walking radius
4. Information/ food kiosk should be located at entrance and resting areas

3. Edge Treatment



1. Achieve minimum 60% plantation edge of the total perimeter
2. Maximum 20 % of the edge as entry exit points should be equally divided on street frontage
3. 5% of the street frontage should be allocated for active street edge
4. Maximum 5%of the edge should be treated with advertisement banners and hoardings
5. Maximum 10% edge should be vehicular access entry exit points.(excluding community and neighbourhood parks)
6. Minimum 50% visibility should be achieved along the park edge through plantation

4. Plantation



1. Minimum 50%of park area should be provided with tree cover
2. Minimum 50%of park area should be provided with shrubs and groundcovers
3. Permeable surface area Minimum 60% of town parks area

Jogging Track

3.2 Open Space Network

Neighborhood Parks (1 Acres to 5 Acres)

Each neighbourhood should have its own park and urban square as an outdoor “living room” where children play and people meet as part of their daily lives. Parks should be designed as a interactive space for organizing social, local festival and cultural events. These parks should be accessible from all sides for residents as part of extension of urban fabric, public buildings, neighbourhood centre and primary organizing element within the urban fabric / development with respect to street and block layout, land use configuration and built form character.

1. Purpose

- Community gathering and relaxation
- Everyday play space
- Green space for aesthetics, clean air, microclimate control
- Water management
- Contribute to biodiversity
- Active recreation

2.Objectives for a Neighborhood Parks

- Within a 5 minute walk of all residences in each neighbourhood
- High visibility public frontage – approximately 50% of park perimeter, where feasible

3.Elements of Neighborhood Parks

- Play area and recreational activities should be provided for all age groups as far as possible
- All landscape elements should be safe
- Designed should be universally accessible
- Informal flexible lawn space
- Comfortable seating areas
- Bicycle parking at park entrances and cycle tracks
- Pockets of rain gardens with full infiltration with reservoirs showcasing native plants
- Pedestrian lighting
- Permanent, flexible use of park shelter to provide shade and accommodate group use
- Multipurpose sport’s courts and open fitness area
- Skate zones
- Fitness equipment
- Community farming

4. Plantation

- Minimum 50 % of tree cover should be provided
- Shrubs and ground covers - 60% of area should be covered
- Permeable Surface area 60% of park area should be permeable
- Irrigation for softscape area should be provided.

For plantation distribution refer to Section 3.3

128 Neighborhood Parks

Green network map in masterplan highlighting the Neighborhood parks

Creative seating areas

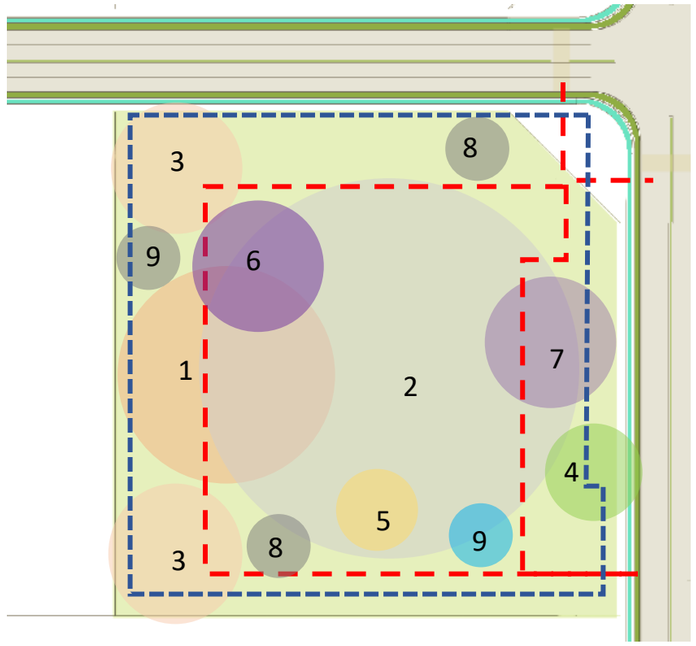
Play courts

Source: https://www.straitstimes.com/singapore/car-lite-green-vibrant-community-spaces-uras-vision-for-new-neighbourhoods, httpswww.langleytimes.comopinionletter-langley-ukulele-ensemble-wonderful-musical-ambassadors, http://blog.sina.com.cn/s/blog_7043004d0102vxvf.html, httpswww.versacourt.comresidential-basketball-court-photos.html

3.2 Open Space Network

Neighborhood Park - Typology

1. Elements and Amenities

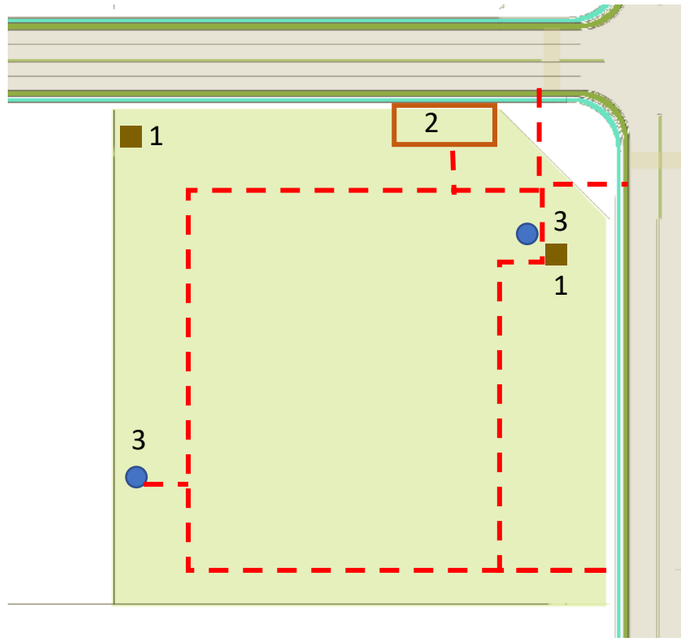


1. Play area and Recreational activities for all age groups
2. Informal Flexible lawn Space
3. Comfortable seating areas
4. Bicycle Parking at Park Entrances
5. Pockets of Rain Gardens with full infiltration with reservoirs showcasing native plants.
6. Multipurpose Sports Court
7. Open Fitness Area with Fitness Equipment's
8. Pergola / Trellis for shaded seating areas
9. Skate Zones

Jogging Track

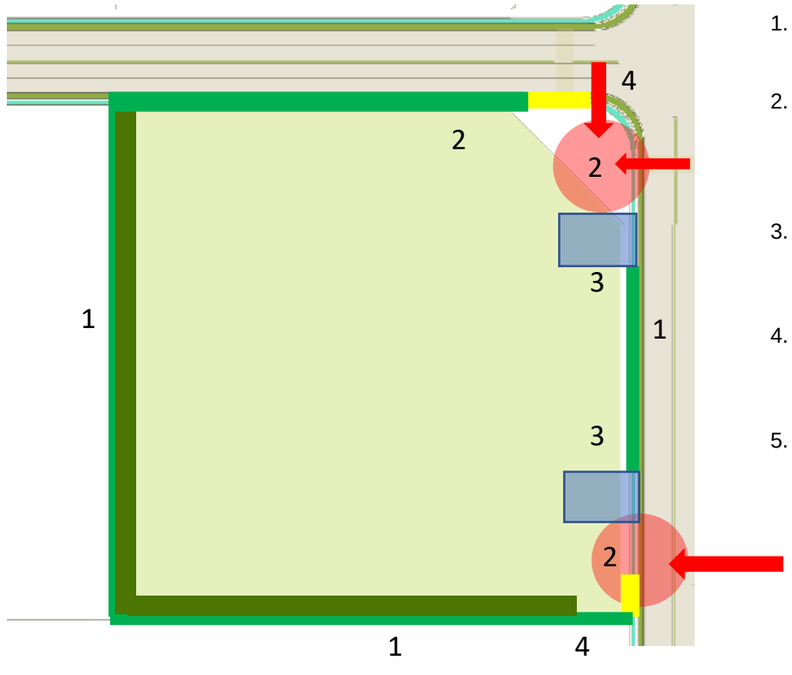
Cycle Track

2. Facilities



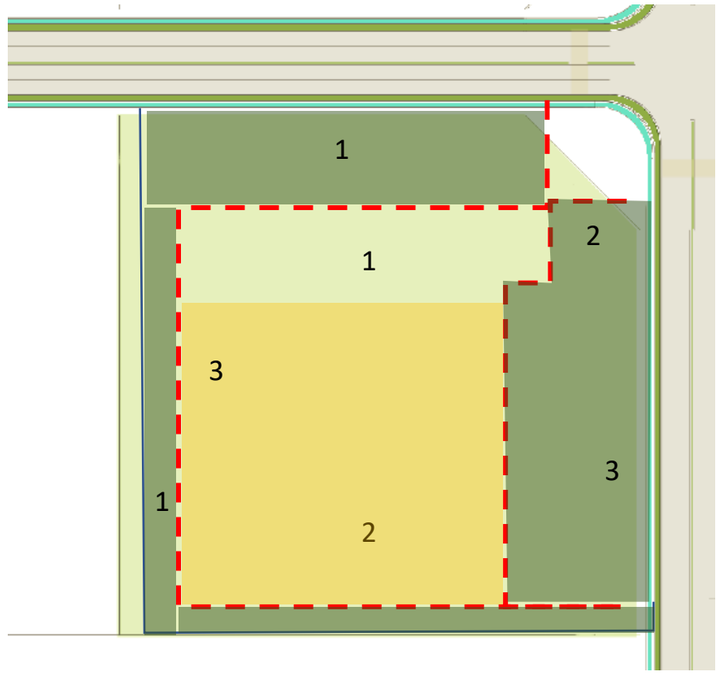
1. Toilets- separate toilets for ladies and gents within 300m of walking distances from the active areas should be provided
2. Parking under the hardscape and sports courts park amenity buildings to avoid use of landscaped park area should be used for surface parking
3. Drinking water facilities- within 300 m walking radius

3. Edge Treatment



1. Achieve minimum 60% of the plantation edge
2. Maximum 20 % of the edge as entry exit points should be equally divided on street frontage
3. 5% of the street frontage should be allocated for active street edge
4. Maximum 5%of the edge should be treated with advertisement banners and hoardings
5. Minimum 50% visibility should be achieved along the park edge through plantation

4. Plantation



1. Minimum 50%of park area should be provided with tree cover
2. Minimum 50%of park area should be provided with shrubs and groundcovers
3. Permeable surface area Minimum 60% of neighborhood parks area

Jogging Track

3.2 Open Space Network

Community Parks (Up to 1 Acres)

Community parks and gardens up to 1 acre should be easily accessible and form an integral part of the open space network and add values to the residents nearby. Community parks should be visually accessible from neighbouring uses and public areas as much as practical to provide passive surveillance. Community parks and gardens should be designed to meet the following:

1.Community Gardens should be Designed to Meet the Following:

- Form a open space network with other public amenities, such as parks and playgrounds, by sensitive positioning and design
- Distinguish itself by hedges and/or fencing (maximum 1.2 m)
- Decorative entrance
- Provision of seating and landscape with shading
- Establish a clear way-finding and signage system
- Include auxiliary structures for equipment storage if needed
- Provide raised planting beds for wheelchair users and others with mobility issues
- Ensure accessibility and walkability by provision of walkway
- Low-level lighting illuminated starting from early evening for security reasons
- Community gardens should be visually accessible from neighbouring uses and public areas as much as practical to provide passive surveillance

2. Elements and Amenities to be provided within community park-

- Featured Entry Gateways and Shades spaces for seating
- Walkways and Pathways (minimum 1.8m width)
- Play areas for kids with 90 % visibility to allow passive surveillance.
- Play Equipment's with comfortable spacing considering the safety area demarcations
- Areas with 30 % passive and 70 % active activity considerations.
- Lawn Areas for leisure and Recreation
- Play area and Recreational activities should be provided for all age groups as far as possible
- All Landscape Elements should be safe and designed should be universally accessible

3. Facilities to be provided within community park

- Toilets- separate toilets for ladies and gents within 300m of walking distances from the active areas should be provided
- Parking should be provided for Non motorized vehicles only
- Drinking water facilities to be provided at walking distance from active areas

4. **Plantation**

- Minimum 30 % of tree cover should be provided
- Shrubs and ground covers - Minimum 50% of area should be covered
- Permeable surface area - Minimum 60 % of community park area should be permeable
- Irrigation for softscape area should be provided

For plantation distribution refer to Section 3.3

Green network map in masterplan highlighting the Neighborhood parks

Shaded seating areas in Community park

Seating in Community park

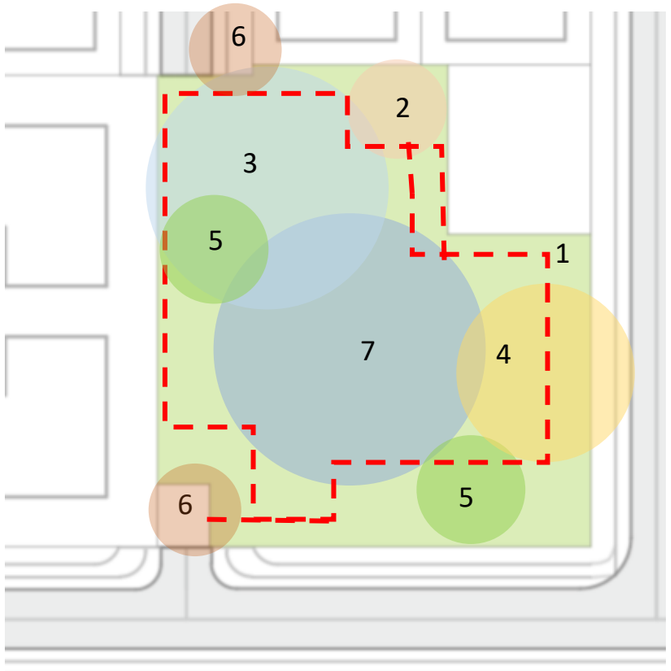
Play areas in community parks

Source: https://www.architecturaldigest.com/gallery/bette-midler-new-york-restoration-project-slideshow#10, http://www.monroeville.pa.us/parks/gazebo.htm, http://www.monroeville.pa.us/parks/gazebo.htm, httpswww.archdaily.com131747shanghai-houtan-park-turenscape

3.2 Open Space Network

Community Park - Typology

1. Elements and Amenities

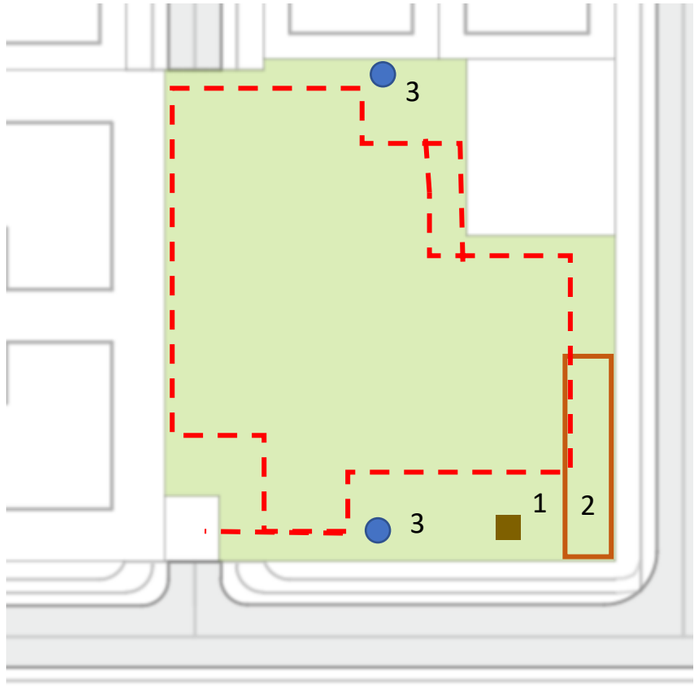


1. Walkways and pathways (minimum 1.8 m width)
2. Shades spaces for seating
3. Play areas for kids with 90% visibility to allow passive surveillance.
4. Play equipment's with comfortable spacing considering the safety area demarcations.
5. Play area and recreational activities for all age groups should be provided
6. Featured entry gateways
7. Lawn areas for leisure and recreation

Jogging Track

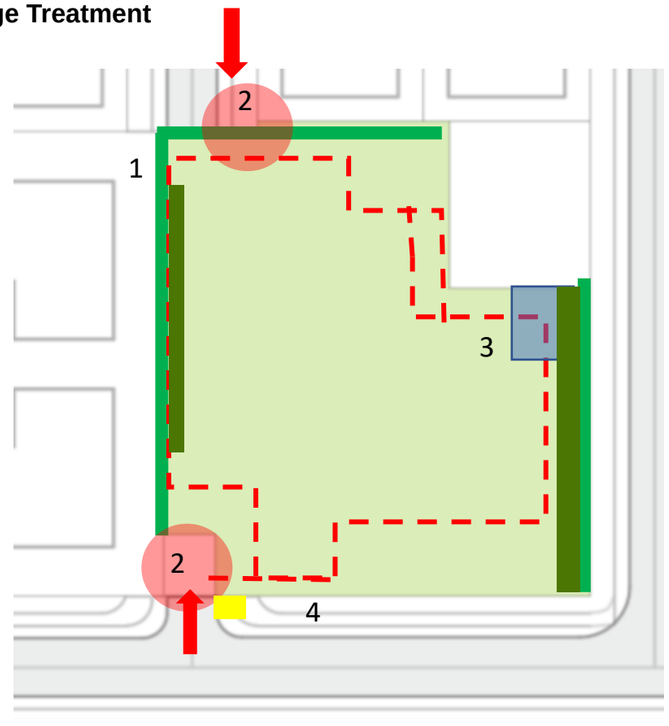
Cycle Track

2. Facilities



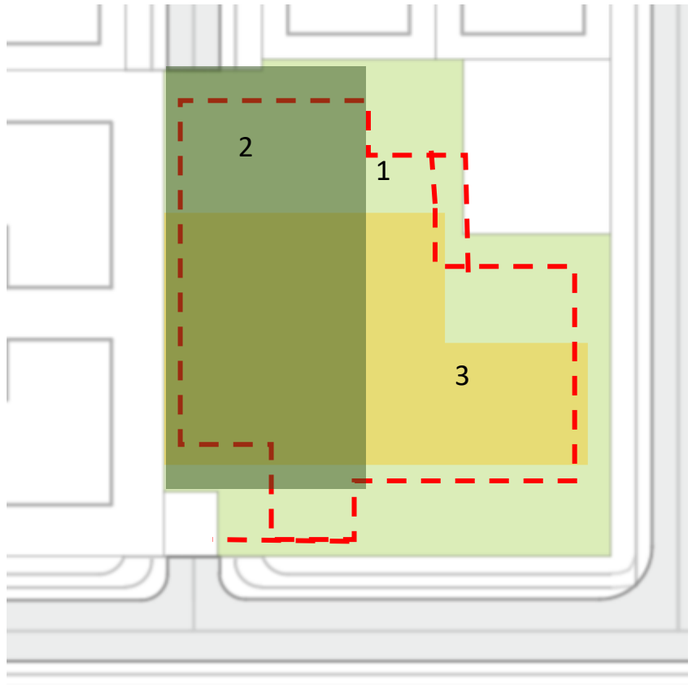
1. Toilets- separate toilets for ladies and gents within 300m of walking distances from the active areas should be provided
2. Parking under the hardscape and sports courts park amenity buildings to avoid use of landscaped park area should be used for surface parking
3. Drinking water facilities- within 300 m walking radius

3. Edge Treatment



1. Achieve minimum 60% of the plantation edge
2. Maximum 20 % of the edge as entry exit points should be equally divided on street frontage
3. 5% of the street frontage should be allocated for active street edge
4. Maximum 5% of the edge should be treated with advertisement banners and hoardings
5. Minimum 50% visibility should be achieved along the park edge through plantation.

4. Plantation



1. Minimum 50%of park area should be provided with tree cover
2. Minimum 50%of park area should be provided with shrubs and groundcovers
3. Permeable surface area Minimum 60% of community parks area

Jogging Track

3.2 Open Space Network

Privately Owned Publicly-Spaces (POPS)

POPS are a specific type of outdoor space which the public are invited to use, but remain privately owned and maintained. As such, the location and design of publicly accessible POPS should be planned for both enhance the development and complement the larger public realm network.

1. Purpose

- To enhance the urban structure and support city building
- To connect with and expand the public realm, creating additional variety and scales of outdoor space
- To create interaction at the community and pedestrian scale
- To enhance pedestrian connectivity
- To provide microclimatic comfort
- To provide on-site water treatment to control and manage storm water at source
- Zoning Regulation for Amaravati City mandates open space in commercial areas by the developers and edge treatment on site in terms of compound wall etc.
- These interim strategies to enhance the open space should be introduced, and incentives should also be given accordingly

Examples

- New York, developers are encouraged to create open spaces in front or below their buildings in exchange for additional floor area or related waivers More often, these “privately owned public spaces” are designed to encourage public uses
- City Walk Saket, Delhi is an example of POPS. The public space is accessible to people and is maintained by a private entity. A famous concept in the Western countries is widely accepted as it helps to not only to enhance the open space ratio but also creates vibrancy and builds community engagement on a greater level

2. Elements of a publicly accessible POPS

- Partially enclosed by building facades
- Water features/ Fountains to create ambient noise and a tranquil environment
- Public art and Signages
- Pedestrian scale lighting, seating areas and trees for shade
- Creative changes of elevation as a source of play or seating
- Shaded seating areas and Interactive spaces
- Playscapes

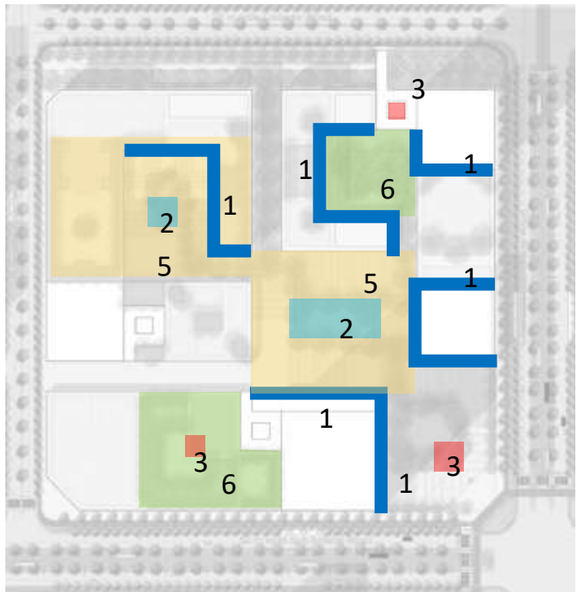
3. Plantation

- Minimum 30% of tree cover should be provided
- Shrubs and ground covers - 35% of area should be covered
- Permeable surface area - 50% of POPS should be permeable
- Irrigation for softscape area should be provided

For plantation distribution refer to Section 3.3

Privately Owned Publicly Spaces- Typology

1. Elements and Amenities



1. Partially enclosed by building facades
2. Water features/ Fountains to create ambient noise and a tranquil environment
3. Public art and Signage's
4. Shaded seating areas and Interactive spaces
5. Playscapes

2. Plantation

1. Minimum 30 %of park area should be provided with tree Cover
2. Minimum 35 %of park area should be provided with shrubs and groundcovers
3. Permeable surface area -Minimum 50 % of community park area

3.2 Open Space Network

Public Squares

Public Squares are social spaces for daily urban life, framed by the surrounding buildings. Squares may include depending on their size and context.

1.Purpose

- Social space and amenities for daily life
- Activities relate to surrounding uses: cafes, shops, cultural and transit facilities etc.
- Larger size squares: community gatherings, temporary markets etc.

2.Objectives for a Public Square:

- Development frontage – 50%
- Public frontage – 50%
- Average width should be no less than 45 metres when using a 1:1 ratio, and no less than 32 metres when using a 2:1 ratio
- Maximize sunlight access (locate on south side of buildings)
- Durable materials for high volume pedestrian use

3.Elements of a Public Square

- Typical Elements of an open space
- Potential commercial concessions (food kiosks/open air cafes) in the square or in adjacent uses
- Fountains / water features
- Seating areas
- Pedestrian Accessways
- Contemporary LED lighting
- Public art installations
- Shade structure like Trellis and Pergola
- Location of Public Plaza near active areas like Restaurants and Retails
- Gardens and contemporary planting
- Outdoor game areas

4. Plantation

- Minimum 30% of tree cover should be provided
- Permeable surface area - 50% of Squares and plazas should be permeable
- Irrigation for softscape area should be provided

For plantation distribution refer to Section 3.3

Source: : https://www.land-studio.org/project/public-square-redesign, http://www.cssboston.com/portfolio/riverside-plaza/, https://upload.wikimedia.org/wikipedia/commons/thumb/6/6f/Piazza_della_Signoria.jpg/1200px-Piazza_della_Signoria.jpg, https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcRl5tzwK7y8vDbU0fobF-FxkNOBxp5I934X7rz6exXJZKxrtOTW

3.2 Open Space Network

Urban Plazas And Gathering Places

Urban plazas and gathering places should be integrated into development. The spaces should be relatively small in size, but will serve as an important social space for residents and employees. The guidelines intend to ensure public access, safety, and enjoyment and avoid privatization of the public use area.

- Generally, corner plazas should have a 1:2 proportion of length to width, with the longer side aligning with the public street
- Include tree planting and seating areas in plazas that are predominantly hard surfaced, which the hard surfaces should be shaded by tree canopies to a optimal level
- For ground area that is not covered by tree canopies, soft or permeable surfaces such as law or grass pavers that are less water-sensitive should be used
- Plazas should be have appropriate sunlight and shading access, particularly in zones where relaxation and sitting are anticipated
- Design and locate corner plazas to provide shelter from the wind and mitigate noise with provision of landscapes

Corner plazas should be connected to the pedestrian network by walkways, breezeways and atriums. Other pedestrian destination points, such as primary building entrances or transit stops, should be located along the plaza.

Source: http://www.en.strasbourg.eu/en/discover-the-city/the-formation-of-the-territory/the-history-of-strasbourg-s-districts/neuhof---stockfeld---ganzau-2/

Source: https://www.landscapeinstitute.org/case-studies/woolwich_squares/

Guidelines for Urban Plazas and Gathering Places

- Public spaces should be positioned in highly visible locations and animate them by locating active usages such as retail or restaurants in adjacent
- Spaces should be designed to be welcoming to the public and not viewed as private area. Railings, fences, or gates are not permitted
- Seating areas including moveable tables and chairs in secured sites should be provided with identified maintenance responsibilities and programming
- Extensive landscaping should be provided to increase greenery
- Public amenities such as special paving, fountains and other elements should be provided for public enjoyment
- Quality materials such as stone, brick, and wrought iron should be used
- Interactive arts that allow flexible use, movement, and interaction with the viewers should be integrated
- Unique historic and cultural elements should be incorporated to strengthen the identity
- Shaded seating areas with trees or structures such as gazebos should be provided
- Lighting should be integrated for safety and to avoid glare

Plantation

- Minimum 30% of tree cover should be provided
- Permeable surface area - 50% of squares and plazas should be permeable
- Irrigation for softscape area should be provided.

For plantation distribution refer to Section 3.3

Source: http://www.landezine.com/index.php/2011/12/squares-in-armenieres-landscape-architecture/armentieres-square-by-atelier-des-paysages-bruel-delmar-03/

Source :https://www.landscapeinstitute.org/case-studies/woolwich_squares/

Source: http://www.en.strasbourg.eu/en/discover-the-city/the-formation-of-the-territory/the-history-of-strasbourg-s-districts/neuhof---stockfeld---ganzau-2/, https://www.landscapeinstitute.org/case-studies/woolwich_squares/, http://www.landezine.com/index.php/2011/12/squares-in-armenieres-landscape-architecture/armentieres-square-by-atelier-des-paysages-bruel-delmar-03/, https://www.landscapeinstitute.org/case-studies/woolwich_squares/

3.3 Open Space Plantation and Materials

3.3 Open Space Plantation and Materials

Edge Treatment, Signage , Lighting

1. Edge treatments for all open spaces

- Minimum 60% plantation edge of the total perimeter should be achieved
- Maximum 20 % of the edge as entry exit points should be equally divided on street frontage
- 5% of the street frontage should be allocated for active street edge.
- Maximum 5%of the edge should be treated with advertisement banners and hoardings
- Maximum 10% edge should be vehicular access entry exit points.(excluding communityand neighbourhood parks)
- Minimum 50% visibility should be achieved along the park edge through plantation

2. Signage

Signage's should be integrated with the park , and other elements of the park .
Use of symbols and info graphics should be used to communicate key areas and messages.
Area demarcation and information signage's should be placed at strategic locations to guide people throughout the park.

Signage and wayfinding should be provided at strategic locations in open spaces such as:

- Entry /exits
- Pathways
- Plazas
- Public facilities

2. Lighting

- Lighting is an integral part of parks and open spaces, allowing people to use the space even in evening hours.
- Lighting also plays an important role in safety of any open space reducing the level of crime and perception on crime
- Lighting should be considered in active areas like kids play , sports courts , pathways , public facility areas.
- Lighting should also be used to highlight certain features like artwork sculptures and water fountains.

Types of lighting should be provided:

- Pole lights of height 3m should be placed along the pathway at 9m c/c
- Bollards, pathfinders – to illuminate pedestrian pathways
- Uplighters at trees and shrub plantation areas.
- Flood lights – Sports courts and playscapes
- Led strips – Seats and steps

Park Signage
Source - https://rsmdesign.com/portfolio/beacon-park-irvine-ca/

Park Signage
Source - http://www.fwdesign.com/work_burgess_park.php

Flood Lights
Source-https://www.newburytoday.co.uk/news/home/22928/new-floodlights-at-victoria-park-tennis-courts-to-switch-on-next-week.html

Bollard Lights

Pole Lights

Tree uplighters

Led Strip for Steps

Source: https://rsmdesign.com/portfolio/beacon-park-irvine-ca/, *http://www.fwdesign.com/work_burgess_park.php,* https://www.newburytoday.co.uk/news/home/22928/new-floodlights-at-victoria-park-tennis-courts-to-switch-on-next-week.html, https://www.eye.co.jp/projects/urbanscape/kameyama.html, https://www.ylighting.com/led-garden-and-pathway-bollard---b77330-by-bega-BEGY16629.html, http://wyerandco.com.au/, http://conceptlandscape.tumblr.com/post/14979618791/concept-exp-architectes-antoine-chassagnol, https://www.marshalls.co.uk/documents/presentations/2017-half-year-report-presentation.pdf, https://divisare.com/projects/227078-awp-office-for-territorial-reconfiguration-anna-positano-urban-lounge

3.3 Open Space Plantation and Materials

Material , Signage and Park Furniture

1. Materials

- Pathway and walkways - Natural stone paving, concrete paver blocks, stamped concrete, colored concrete of pastel shades with rough texture as per design considerations
- Cycle tracks - colored concrete, colored asphalt e.g. pastel shades of red, blue and green to define hierarchy of roads
- Plazas - Natural stone paving of lighter shades
- Sports courts – Synthetic/ rubberized flooring and artificial turf
- Kids play areas – Synthetic/ rubberized flooring and artificial turf
- Seating - Natural stone cladding and coping of lighter shades.

2 .Park furniture

- Park Furniture adds character in open spaces. Park furniture should be integrated part of the park infrastructure
- Dustbin - at intervals of 30 m
- Bollards – to restrict vehicular access
- Each open space should have minimum 1 art and sculptural element to promote local culture and identity

Park furniture

Natural Stone Seat

Natural stone pathway

Kids play area

Source: https://rsmdesign.com/portfolio/beacon-park-irvine-ca/, *http://www.fwdesign.com/work_burgess_park.php,* https://www.newburytoday.co.uk/news/home/22928/new-floodlights-at-victoria-park-tennis-courts-to-switch-on-next-week.html, https://www.eye.co.jp/projects/urbanscape/kameyama.html, https://www.ylighting.com/led-garden-and-pathway-bollard---b77330-by-bega-BEGY16629.html, http://wyerandco.com.au/, http://conceptlandscape.tumblr.com/post/14979618791/concept-exp-architectes-antoine-chassagnol, https://www.marshalls.co.uk/documents/presentations/2017-half-year-report-presentation.pdf, https://divisare.com/projects/227078-awp-office-for-territorial-reconfiguration-anna-positano-urban-lounge

3.3 Open Space Plantation and Materials

A. Soil Mix and Irrigation

Soil mixes
Excavate for formation levels and trenches, soil filling grade with mixture as described in specification

Planting Soil Mix:
Mix topsoil with the following soil amendments and fertilizers in the following quantities:

Tree Pits

Min. soil depth 1200 mm
1/10 composted sewage sludge.
1/10 bark fines.
1/5 coarse sand.
3/5 topsoil.
Providing and treating all planting beds with termite powder 4 to 5 grams per plant or as directed by planting contractor.

Planting Beds-Shrubs

Min. soil depth 600 mm
1/3 topsoil.
1/3 excavated soil.
1/6 compost.
1/6 coarse sand.
Amendments required in soil analysis report.
Providing and treating all planting beds with termite powder 4 to 5 grams per plant or as directed by planting contractor.

Planting Beds-Lawn and Ground Covers

Min. soil depth 300 mm
1/3 topsoil.
1/3 excavated soil.
1/6 compost.
1/6 coarse sand.
Amendments required in soil analysis report. Providing and treating all planting beds with termite powder 4 to 5 grams per plant or as directed by planting contractor.

Irrigation Systems

- Based on different areas, combination of drip and sprinkler irrigation should be adopted.
- Sprinkler irrigation should be used for areas such as multi purpose lawn , ground cover areas.
- Drip irrigation should be used in areas such as shrub beds , planters and tree plantation areas.
- Advantages of irrigation system are that rain water is recycled and the wastage of water is considerably reduced.

Sprinkler Irrigation

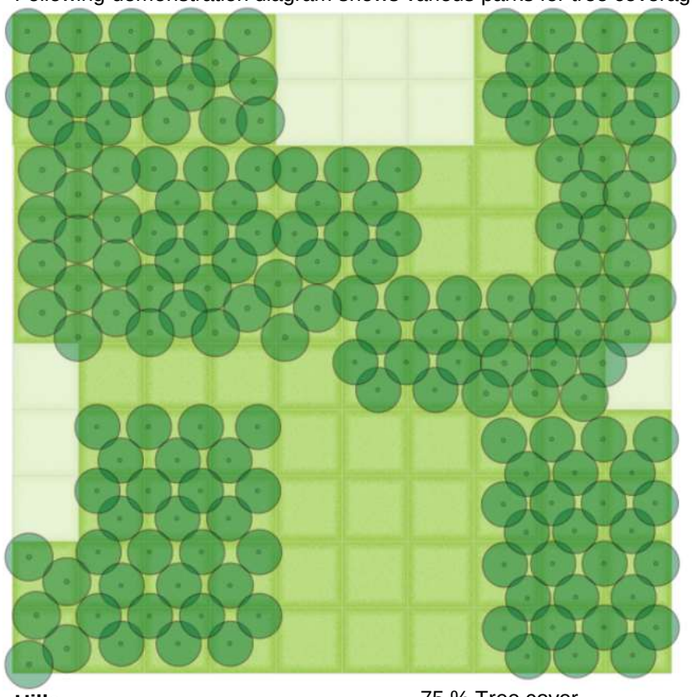
Drip Irrigation

Source: https://www.directenergy.com/blog/how-to-start-your-sprinkler-system-for-spring/, Source-http://gardenwithdiana.com/tour-mariani-plants-with-me/

3.3 Open Space Plantation and Materials

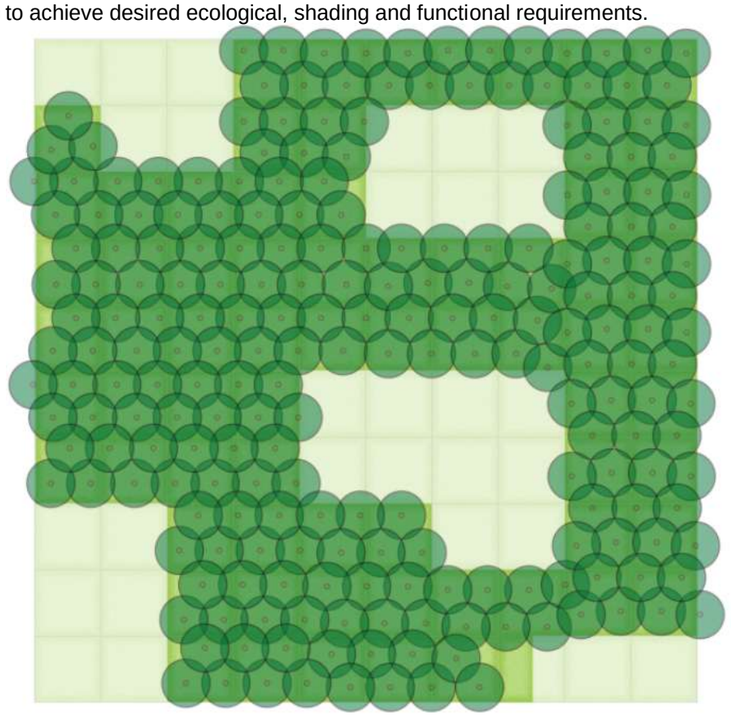
B. Tree Coverage- Demonstration

Following demonstration diagram shows various parks for tree coverage ratio to achieve desired ecological, shading and functional requirements.



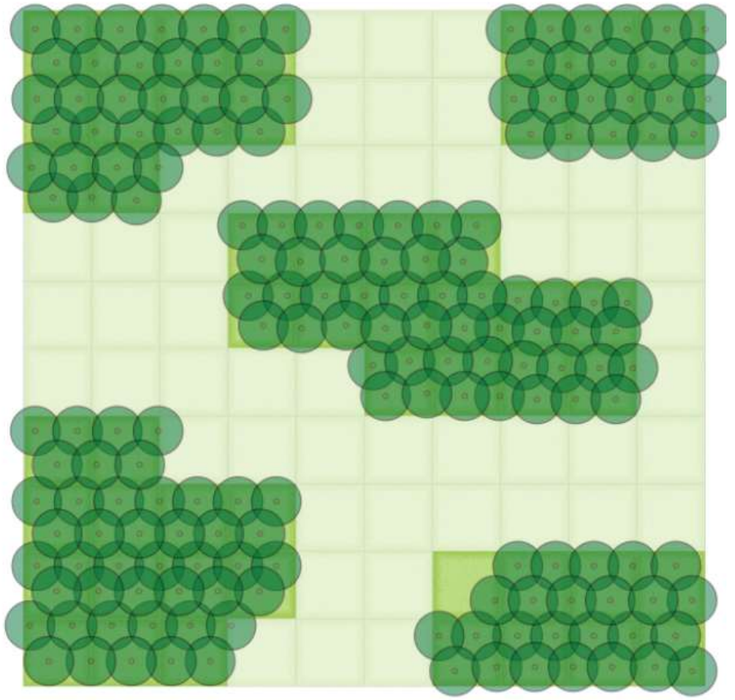
Hills

75 % Tree cover
90 % Permeable land



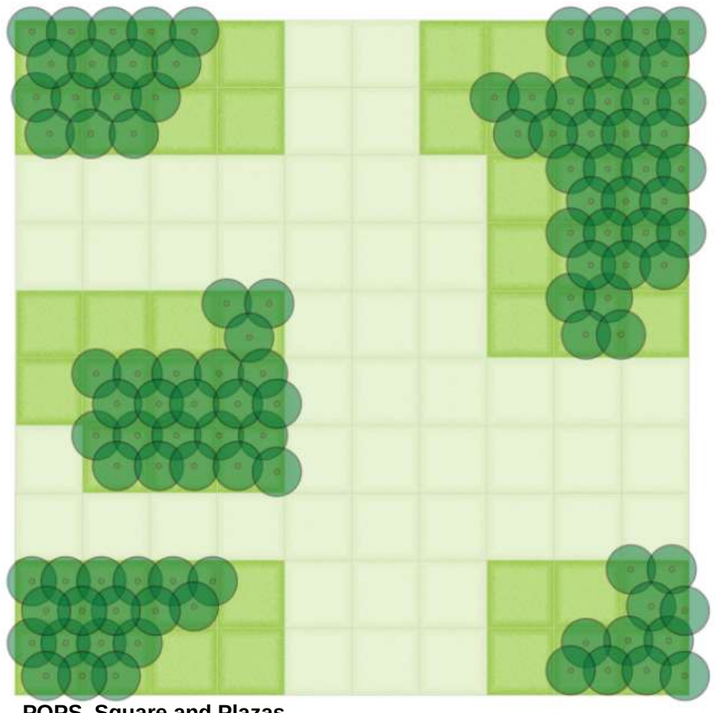
Rivers and Canals , Green buffer along the road

70% Tree cover
75 % Permeable land



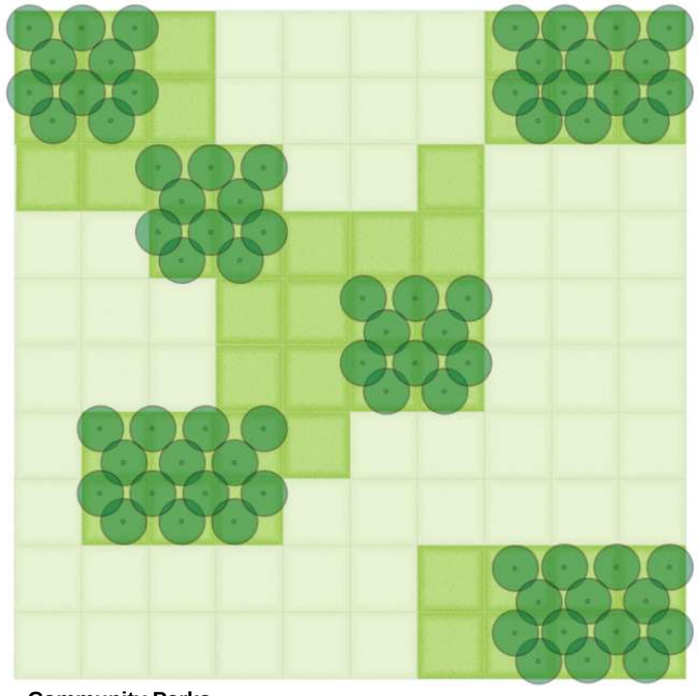
City level Parks , Town Parks Neighborhood Park

50 % Tree cover
60 % Permeable land



POPS, Square and Plazas

30 % Tree cover
50 % Permeable land



Community Parks

30 % Tree cover
75 % Permeable land

Legend

Land

Permeable surface

Tree canopy cover

3.3 Open Space Plantation and Materials

C. Characteristics of Trees

1. Habitat creating trees
Trees providing necessary elements for survival of any ecosystem for example insects , birds , animals etc.

2. Screening trees
Trees providing visual barriers between spaces when used as edge plantations.

3. Air purifying trees
Trees which purify the air not just by giving out oxygen , but by absorbing the harmful toxins from air.

4. **Fragrant and ornamental trees**
- Fragrant trees provide distinctive fragrance in respective seasons, which enhance the environment of the space.
- Trees which are flowering or colorful or have a distinct form which are used as decorative and featured elements in landscape.

HABITAT TREE – Parrot Habitat on Mangifera Indica

HABITAT TREE – Butterfly Habitat on lantana Camara

SCREENING TREE – Ficus Benjamina hedge

SCREENING TREE – Bamboo plantation

ORNAMENTAL TREE– Plumeria Rubra

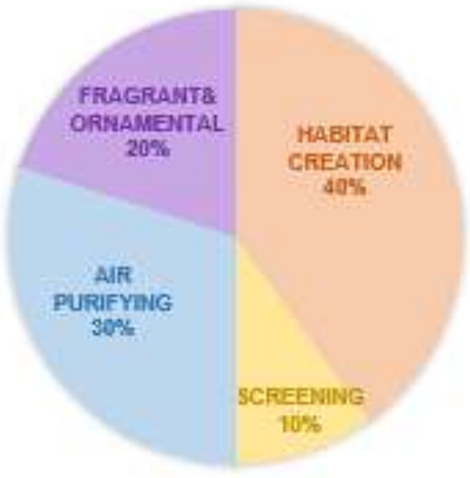
ORNAMENTAL TREE– Foxtail Palm

Source: https://theurgetowander.com/2013/05/25/parrots-mango-trees/, https://theurgetowander.com/2013/05/25/parrots-mango-trees/, https://store.ricardosnursery.com/products/indian-laurel-fig-ficus-retusa-nitida, http://truegreennursery.com.au/product/bamboo-gracilis/, https://www.stpaulsgarwood.com/plumeria-rubra-tree.html, http://mgonline.com/articles/foxtail.aspx

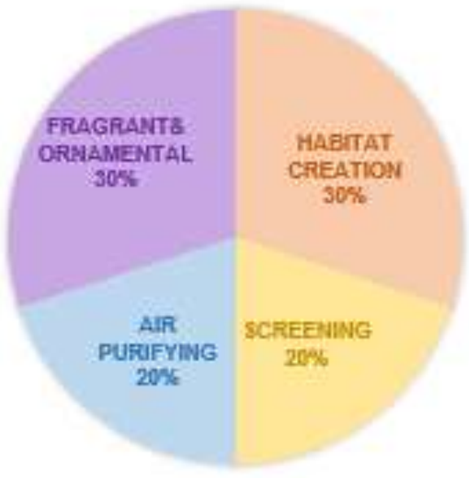
3.3 Open Space Plantation and Materials

D. Distribution of Planting According to its Character and Spaces

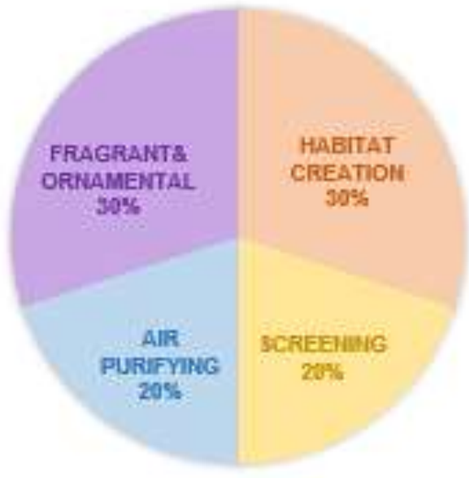
1. Buffer zone along the road

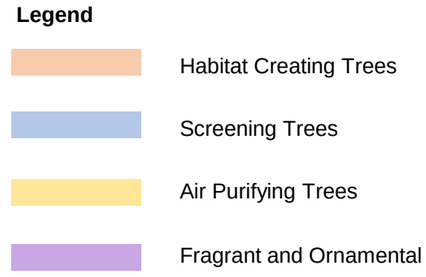


2. City and town parks

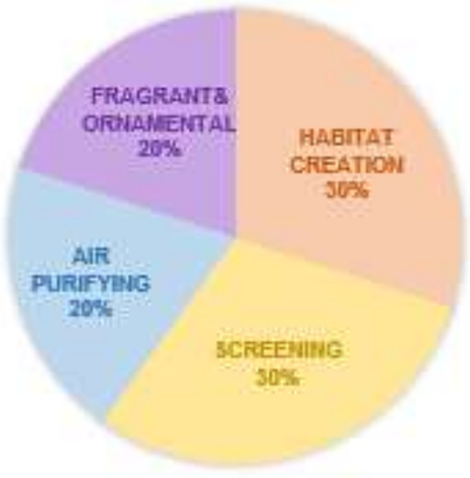


3. Neighborhood parks

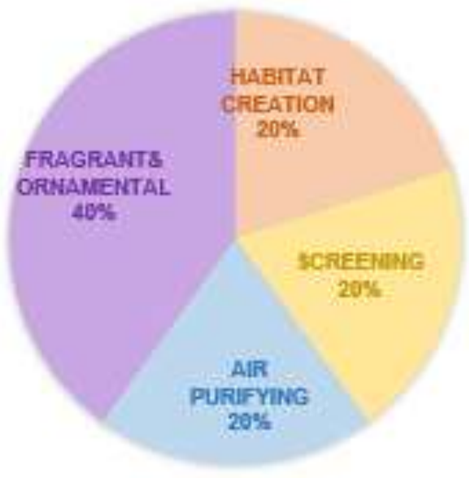




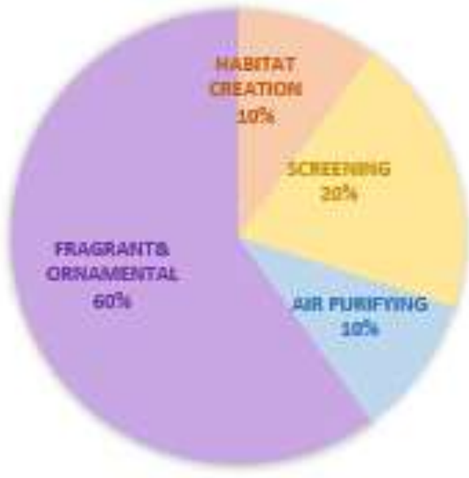
4.Community parks



5.Privately owned publicly accessible open spaces



6.Squares and plazas



3.3 Open Space Plantation and Materials

E. Tree Plantation List

SR.NO.	TREES	HABITAT	SCREENING	AIR PURIFYING	FRAGRANT/ ORNAMENTAL
1	Ficus bengalensis				
2	Delonix regia				
3	Mangifera indica				
4	Pongamia pinnata				
5	Samanea saman				
6	Tamarandus indica				
7	Thespesia populenea				
8	Albezia lebbek				
9	Chloroxylon swetinea				
10	Neolambrekia cadamba				
11	Barringtonia asiatica				
12	Tabubia argentia				
13	Terminalia catappa				
14	Mimusops elangi				
15	Michelia champaca				
16	Fillicium decepens				
17	Messua ferrea				
18	Erytrina indica				
19	Gyrocarpus amiracanus				
20	Azadirchta indica				
21	Bahunia purpurea				
22	Bahunia recemosa				
23	Alstonia scholaris				
24	Eucalyptus citriodora				
25	Saraca indica				
26	Syzegium cumini				
27	Dillinia indica				
28	Tabubia pillada				
29	Milea azadarach				
30	Plumeria alba				
31	Cordia sebestina				
32	Callistemon cirtinus				
33	Milingtonia hortensis				
34	Necthathus arbor tritis				
35	Diospyros malabarica				
36	Terminalia alata				
37	Pterocarpus marsupium				

3.3 Open Space Plantation and Materials

Tree Plantation List

38	Shorea roxburghii				
39	Dalbergia latifolia				
40	Terminalia arjuna				
41	Ficus racemosa				
42	Peltophorum pterocarpum				
43	Tabebuia aurea				
44	Dalbergia sissoo				
45	Polyalthia longifolia				
46	Plumeria obtusa				
47	Plumeria rubra				
48	Schefflera actinophylla				
49	Cassia fistula				
50	Lagerstroemia speciosa				
51	Melaleuca bracteata				
52	Butea monosperma				
53	Cassia javanica				
54	Phyllanthus emblica				
55	Bombex ceiba				
56	Grevillea robusta				
57	Jacaranda mimosifolia				
58	Polyalthia longifolia				
59	Ficus racemosa				
60	Cochlospermum religiosum				
61	Ficus religiosa				
62	Grevillea robusta				
63	Anthocephalus cadamba				
64	Calophyllum inophyllum				
65	Madhuca latifolia				
66	Melia azedarach				
67	Spathodea campanulata				
68	Pterospermum acerifolium				
69	Albizia julibrissin				
70	Acacia auriculiformi				
71	Zizipus jujuba				
72	Crataeva religiosa				
73	Aegle marmelos				
74	Muntingia calabura				

3.3 Open Space Plantation and Materials

F. Shrub Plantation List

SR.NO.	SHRUBS	HABITAT	SCREENING	AIR PURIFY	FRAGRANT/ ORNAMENTAL
1	Bambusa multiplexa				
2	Raphis exalsa				
3	Bambusa ventricosa				
4	Nerium indicum				
5	Tabernaemontana divaricate				
6	Hibiscus rosa sinensis				
7	Acalypha wilkisiana tahiti				
8	Jathropha pandureafolia				
9	Boungainvillea spectabilis				
10	Boungainvillea glabra				
11	Carissa carandus				
12	Tabernamontana dwarf				
13	Cestrum necturnum				
14	Jasminum multiflorum				
15	Jasminum sambac				
17	Jasminum grandiflorum				
18	Hymenocallis caribaea				
19	Lilium candidum				
20	Adenium obesum				
21	Euphorbia milli				
22	Nerium olander dwarf				
23	Pedilanthus tithymloides				
24	Furcarea foetida				
25	Thumbergia erecta				
26	Sansevieria hyacinthoides				
27	Ficus benjamina				
28	Galphemia glouca				
29	Ixora odorata				
30	Tecoma stans				
31	Mussenda clabrata				
32	Gardenia lucida				
33	Allamenda cathrtica				
34	Drecena marginata				
35	Clerodendrum inreme				
36	Acalypha wilkisiana macafeana				
37	Mussenda ethrophtlla				

3.3 Open Space Plantation and Materials

Shrub Plantation List

SR.NO.	SHRUBS	HABITAT	SCREENING	AIR PURIFY	FRAGRANT/ ORNAMENTAL
38	Rondeletia leucophylla				
39	Cycas beddomei				
40	Memecylon umbellatum				
41	Nephrolepis cordifolia				
42	Murraya koenigii				
43	Furcraea foetida				
44	Duranta repens				
45	Clerodendrum indicum				
46	Heliconia psittacorum				
47	Tulbagia lily				
48	Acalypha indica				
49	Euphorbia cotnifolia				
50	Crinum lily				
51	Catharanthus rosea				
52	Pennisetum rueppeli				
53	Boungainvillea thimma				
54	Agapanthus africans				
55	Dracaena fragrans				
56	Philodendron xanadu				
57	Ficus starlight				
58	Canna indica				
59	Alpenia vittata				
60	Duranta repens alba				
61	Stachytarpheta indica				
62	Bauhinia galpinii				
63	Tecoma capensis				
64	Malvaviscus arboreus mexicanus				
65	Jatropha multifida				
66	Exocaria-bicolor-variegata				
67	Schefflera arboricola				
68	Syzygium australe				
69	Heliconia pissitocorum				
70	Gardenia jaminoids				
71	Murraya paniculata				
72	Heliconia caribaea big red				
73	Alpenia purpurata				

3.3 Open Space Plantation and Materials

Shrub Plantation List

74	Crossandra infundibuliformis				
75	Sterelizia reginae				
76	Plumbago capensis				
77	Acalypha hispida				
78	Hemelia petens				
79	Tabernaemontana divericata				
80	Pachystachys lutea				
81	Cymbopogon citratus				
82	Calliandra haematocephala				
	WETLAND SPECIES				
SR.NO.		**HABITAT**	**SCREENING**	**AIR PURIFY**	**FRAGRANT/ ORNAMENTAL**
1	Eichhornia crassipes				
2	Ipomoea aquatica				
3	Nelumbo nucifera				
4	Phyla nodiflora				
5	Alternanthera sessilis				
6	Commelina benghalensis				
7	Myriophyllum indicum				
8	Utricularia aurea				
9	Hydrilla verticillata				
10	Ceratophyllum demersum				

- Additional tress may be considered to achieve the desired open space character .
- Following references should be referred for additional plantation

1. MOEF list
2. Andhra Pradesh tree list

3.3 Open Space Plantation

Selected Tree List

Cassia fistula

Erythrina indica

Delonix regia

Ficus benghalensis

Mangifera indica

Peltophorum inerme

Gliricidia sepium

Gyrocarpus americanus

Pongamia pinnata

Samanea saman

Tamarindus indica

Thespesia populnea

3.3 Open Space Plantation

Selected Tree List

Alstonia scholaris

Azadirachta indica

Acacia chundra

Albizia amara

Albizia lebbek

Annona squamosa

Bauhinia purpurea

Bauhinia racemosa

Boswellia serrata

Chloroxylon swietenia

Mellitia ovalifolia

Nyctanthes arbor tritis

3.3 Open Space Plantation

Selected Tree List

Tabebuia argentia

Tabebuia pallida

Neolamarckia cadamba

Barringtonia asiatica

Dillenia indica

Michelia champaca

Terminalia catappa

Mimusops elengi

Messua ferrea

Filicium decipiens

3.3 Open Space Plantation

Selected Tree List

Mussaenda

Tecoma gaudichaudi

Ficus benjamina

Plumeria Alba

Thevetia peruviana

Cordia sebestina

Callistemon citrinus

3.3 Open Space Plantation

Selected Shrub List

Bougainvillea spectabilis

Bougainvillea glabra

Jasminum multiflorum

Cestrum nocturnum

Hibiscus rosa-sinensis

Jasminum sambac

Nerium indicum

Evolvulus alsinoides

Tabernaemontana divaricazta

Jasminum grandiflorum

Tabernaemontana divaricata

Mirabilis jalapa

3.3 Open Space Plantation

Selected Shrub List

Hymenocallis caribaea

Lilium candidum

Calendula officinalis

Acalypha wilkensiana 'Tahiti'

Adenium obesum

Carissa carandas

Euphorbia milli

Jatropha panduraefolia

Lantana sellowiana (purple)

Lantana sellowiana (white)

Lantana camara

Nerium oleander (dwarf)

3.3 Open Space Plantation

Selected Shrub List

Hymenocallis caribaea

Dracaena reflexa

Pedilanthus Tithymaloides

Acalypha wilkensiana 'Tahiti'

Polyscias balfouriana

Syngonium podophyllum

Tabernaemontana coronaria

Tabernamontana dwarf

Stanotaphrum secundatum variegated

Yucca aloifolia

Cymbopogon citratus

Stanotaphrum secundatum

3.3 Open Space Plantation

Selected Shrub List

Rhapis Excelsa

Agave geminiflora

Sansevieria trifasciata 'hahnii'

Furcraea foetida

Bambusa ventricosa

Pandanus sanderi

Sansevieria

Bambusa multiplexa

3.4 Waterfront and Open Space Network Demonstration

3.4 Waterfront and Open Space Network Demonstration

Waterfront Demonstration View

Waterfront boulevard with EFTS (tram/bus) and waterfront promenade

3.4 Waterfront and Open Space Network Demonstration

Waterfront Demonstration View

Publicly accessible riverfront with public space promenades, walking trails, amenities with both active and passive uses

3.4 Waterfront and Open Space Network Demonstration

Waterfront Demonstration View

Pedestrian walkway, waterfront promenade and plaza along riverfront

3.4 Waterfront and Open Space Network Demonstration

Waterfront Demonstration View

Pathway along the riverfront offering excellent views of the river

3.4 Waterfront and Open Space Network Demonstration

Open Space Demonstration View

Community Park

3.4 Waterfront and Open Space Network Demonstration

Open Space Demonstration View

Pedestrian Bridge Across Pond

3.4 Waterfront and Open Space Network Demonstration

Open Space Demonstration View

Community Centre Open Space

3.4 Waterfront and Open Space Network Demonstration

Open Space Demonstration View

Town park with TPOD node in the backdrop

Summary of Waterfront and Open Space Network Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Relevant Section/ pages
Promenade					101
Riverfront promenade should be 5m to 20m wide and connect the nodes along the riverfront	√		√		
Distinct pavement should be provided for the promenade	√		√		
Clear signage and wayfinding should be provided to key nodes, to the hinterland	√		√		
Seating should be provided and oriented towards the riverfront at a max interval of 300m where appropriate	√		√		
Flexible Open Space					101
Open space should be located along the riverfront, accessible and linked by pedestrian paths and view corridors from the hinterland	√		√		
Open spaces along the riverfront should be linked with walking trails and clear wayfinding	√		√		
Planting should not block visual access to the riverfront, of open space, entrance/exit from the street	√		√		
Seating should be provided and oriented towards the riverfront where appropriate	√			√	
Walking Trails					101
Walking trails should be minimum 6 m wide	√		√		
Clear signage and wayfinding should be provided at 50 m interval	√		√		
Pedestrian scale lighting should be provided at 9 m interval	√		√		
Permeable surface should be provided for walking trails	√		√		
Seating should be provided at 500 m interval	√		√		
Nodes					102
There should be a maximum of 1 km distance between nodes to create a variety of destinations along the riverfront	√		√		
Riverfront signage should provide a map showing all nodes and the distance to other nodes and key areas along the riverfront, such as landmarks, recreational space, etc.	√	√	√		
Clear and wayfinding should be provided, including directions to other key nodes, landmarks, pedestrian crossings on waterfront boulevards, public transport and more	√		√		
Nodes should be connected by the promenade linking other nodes with walking trails and open spaces in between	√	√	√		
Local artwork should be integrated into the key nodes to create distinct character for the nodes	√	√		√	

Summary of Waterfront and Open Space Network Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Relevant Section/ pages
View Corridors and Pedestrian Linkages					103
Min 4m setback should be provided as an easement for plots facing the riverfront	√	√	√		
Min 3m setback should be provided for all structures from these connecting roads	√	√	√		
Built form at the riverfront should enable maximum views of River Krishna	√	√	√		
Building lines should be maintained along major streets that form view corridors to the riverfront	√	√	√		
Curb-cuts should be provided at crossings to accommodate people of all levels of mobility, and removable bollards should be installed to restrict vehicular access for safety (refer to Streetscape Guidelines)	√	√	√		
Service entrances should not be permitted along major streets that disrupt pedestrian linkages and view corridors to the riverfront	√	√	√		
Visibility of public space should be maintained with storefront glazing on ground level floors of developments facing public space. Building corners should use storefront glazing to provide visual connections to the publicly oriented uses from all approaches	√	√	√		
Building and shop entrances should face the view corridors and pedestrian linkages to the riverfront to encourage pedestrian movement	√	√	√		
Outdoor dining with café seating and arcaded ground floors should be encouraged for retail and restaurants along the view corridor	√			√	
Wide pedestrian crossings of 10 m should be provided at intersections to provide safe pedestrian access to the riverfront from the hinterland	√	√	√		
Private developments should be designed with publicly accessible POPS and public pathways providing linkages to the riverfront	√	√		√	
Connecting Open Space to the Riverfront					103
Changes in elevation should be provided for with steps, landscape, screening and enclosures as appropriate (refer to Plantation and Materials section)	√	√	√		
A finished edge should be provided along the connection	√			√	
Pedestrian crosswalks should be provided at 100m interval	√		√		
Public amenities, such as seating, toilets and signage, etc. should be located at the ends of the connection to encourage movement along the streets connecting to the hinterland and the waterfront	√		√		
Street furniture such as seats, benches, wayfinding and signage should be provided at the pedestrian crossings along waterfront boulevard	√		√		
Adequate lighting should be provided at a human scale at 15m intervals to ensure visibility and safety	√		√		
Spatial pattern of street lights and trees along the waterfront boulevard should be designed such that it creates a character of the pedestrian linkage to ensure the visibility of the road and the views of the riverfront remains uninterrupted	√			√	
Stepped Building Height Profile					104
Stepped building height profile should be followed for 200m beyond waterfront boulevard towards the hinterland to provide river views to buildings directly facing River Krishna	√	√		√	
Landmarks with viewpoints to the river should be ensured to provide key images of the city and reinforce the city's image and identity	√	√	√		

Summary of Waterfront and Open Space Network Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Relevant Section/ pages
Canal Buffer Zone					105
No developments along water edge should be permitted		√	√		
A continuous green buffer 30 m should be provided on either side of the canal	√	√	√		
Restricted developments on the water edge and a stepped building height profile should be followed for 100m on either side to maximize canal front views	√	√	√		
Mixed-use development is encouraged for developments up to 100 m on either side, facing the canals with pedestrian paths along the waterfront so they do not become private areas	√		√		
Buffer zone should include trails, promenades and bike paths for walking and cycling	√		√		
Clear wayfinding and signage should be provided along and to the canals	√		√		
Higher quality public realm should be provided along the promenades	√		√		
Soft tree lined and landscaped edge should be provided along the canal	√		√		
Consistent landscaped entry features for the canal front should be identified	√		√		
Appropriate lighting features that balance safety and natural environment should be selected	√		√		
Safe and clearly marked access points to the canal need should be identified at 500 m regular intervals	√		√		
Promenade should provide a distinct sense of place along the canal	√			√	
Seating at 300m interval should be provided facing the waterfront where appropriate	√		√		
Water Transit and Pedestrian Oriented Development (W-TPOD)					106
Water transit network connection to BRT/MRT should be developed with commercial development along the canals	√	√		√	
Waterway transit stops with pedestrian linkage to other public transport should be provided	√	√	√		
Landscaping along waterfront should be provided	√	√	√		
Stepped development profile should be followed with no buildings permitted at water edge along canals to maximise waterfront views	√	√	√		
Low building heights for developments close to the canals with maximum building height restriction of 8 m	√	√	√		
Private residential developments should not be permitted along canals	√	√	√		
Mixed use development with green roofs and terraces towards the canal edge should be provided to achieve maximum frontage of towards waterfront	√	√	√		
Building should be a maximum of 20m with min 6m no building zones with active building frontage with balconies and semi or fully covered space	√	√	√		
Clear pedestrian signage and wayfinding should be provided to connect water transit to BRT/MRT at waterway stops and pedestrian path intersections	√		√		

Summary of Waterfront and Open Space Network Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Relevant Section/ pages
Lakes and Ponds					107
Building should be a max of 20m with min 6m setback with active building frontage with balconies and semi or fully covered space	√	√	√		
Lakes/ponds should not be filled or reclaimed and any development that divides the water bodies should not be allowed	√	√	√		
Multiple accessibility points should be ensured from all sides and the water body and should not surrounded by private developments	√	√	√		
Appropriate lighting features that balance safety and natural environment should be provided and selected	√		√		
Buildings should be beyond the buffer zone and limited to a building height restriction of up to a maximum of 8 m closer to the waterbody	√	√	√		
Benches and seating areas at points of interest facing the lakes/ponds for relaxation should be provided	√			√	
Appropriate shrubs and grass species should be planted near the water edge as a riparian	√			√	
A stepped development profile with 100 m mixed use development zone beyond the buffer zone should be provided to maximize views with no development on the water's edge	√	√	√		
Lake Buffer Zone					108
Pedestrian path of min 3-6 m wide should be provided	√		√		
Landscaping where appropriate (refer to Plantation and Materials section)	√		√		
Pedestrian scale lighting should be provided at a 9 m interval for safety and visibility	√		√		
Seating areas should be provided at a max of 100 m interval along pedestrian paths facing the waterfront where appropriate	√		√		
Pedestrian paths should ensure multiple entrances and exits (min of 4) to the lake for accessibility and safety	√		√		
Buildings should be beyond the 50 m buffer zone and limited with a building height restriction of a up to max of 12m	√	√	√		
Cycle tracks of min 2-3 m wide should be provided	√		√		
Signage and wayfinding should be at entrances, exits, and by the lake as well as intersections of pedestrian paths	√		√		
Lakes and ponds should consist of a min 30m buffer zone that has green coverage, trees and ecological landscape	√		√		
Buffer zone should consist of walking trails and pedestrian paths	√		√		

Summary of Waterfront and Open Space Network Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Relevant Section/ pages
Hills					112
Provide 60-80% of the hill areas as protected areas for plantation, habitat creation and rejuvenation with restricted access and control point	√		√		
Watershed areas of the hills should be conserved, retained and connected to canal network	√		√		
Forest trails and steps –use of local natural material without mortar for pedestrian pathways as far as possible	√		√		
Retain existing topographical conditions and contours and maintain them by using plantation techniques	√		√		
Provide preventive plantation techniques to reduce and restrict soil erosion	√		√		
Provide featured structures to represent local identity at strategic locations considering visual corridors from the city areas	√		√		
All development built up including religious, tourism, iconic structures should be limited to max 1% of the development site area	√	√	√		
Restrict temporary structures to min of 5 % in areas excluding the areas of plantation.	√	√	√		
Restrict sound produced from loud speakers, sound emitting construction equipment and fire crackers as per Guidelines	√	√	√		
Restrict the private vehicular movement with providing only non-polluting vehicular access	√	√		√	
Restrict lights only in active areas for safety and security concerns	√		√		
Provide screen and buffer plantation at the edge of the hills	√		√		
Provide proper storm water management systems to avoid water clogging and stagnation	√		√		
Existing flora fauna should be conserved / retained and Native and local species should be planted	√	√	√		
Minimum 75 % of tree cover should be provided	√		√		
Minimum 90% of permeable spaces should be provided	√		√		
Cultural and Religious areas on hills - Pilgrim sites located inside Protected Areas must be designated as sacred groves, with strict building and expansion controls, in accordance with the Forest Conservation Act, 1980 and the Environment Protection Act,1986. (As per Ministry of Environment and Forest India)	√	√	√		
Green Buffer Zones along the Road					113
Facilities like cycle racks along sidewalk sides should be provided	√	√	√		
Sculptures and artworks should be provided.	√	√		√	
70-90 % of total area should be provided with tree plantation	√		√		

Summary of Waterfront and Open Space Network Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Relevant Section/ pages
Minimum 75 % of the road buffer zones area should be permeable	√		√		
Minimum 70 % of the total area should be provided with shrubs and groundcovers	√		√		
Irrigation should be provided for softscape area	√		√		
Incorporate Sustainable Storm water management through rain/ dry ponds, retention ponds, bio swales, etc.	√		√		
Types of plantation mix should be provided as per Guidelines with % distribution	√		√		
City Parks (above 15 acres to 50 acres considered as large scale open spaces)					114
Elements like jogging tracks, leisure lawns , gathering spaces, public plazas, playscapes should be provided	√		√		
Tourism destinations, botanical gardens, conservatories, theme parks and water bodies should be designed with exhibition spaces	√	√		√	
Toilets- separate toilets for ladies and gents within 300m of walking distances from the active areas should be provided	√		√		
All landscape elements should be safe and designed should be universally accessible	√		√		
Parking under the hardscape and sports courts parks amenity buildings should be provided	√		√		
Drinking water facilities should be within 300 m walking radius and information/ food kiosk should be located at entrance and resting areas	√		√		
Plantation- 50-70% of should be achieved through tree plantation	√		√		
Permeable surface area- minimum 60% of park area	√		√		
Minimum 50 % of area should be covered for shrubs and groundcover	√		√		
Irrigation for softscape area should be provided	√		√		
Types of Plantation mix should be provided as per Guidelines with % distribution.	√		√		
Town Park (Above 5 acres to 15 acres)					116
Elements and amenities like sports club, open fitness area, jogging track, cycle track, resting areas for senior citizen areas should be provided	√		√		
All landscape elements should be safe and designed should be universally accessible	√		√		

Summary of Waterfront and Open Space Network Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Relevant Section/ pages
Play area and recreational activities for all age groups should be provided as far as possible	√		√		
Pets park and sports club should be provided	√			√	
Parking should be provided near the entry exit points accessible directly from the access road	√		√		
Parking under the hardscape and sports courts park amenity buildings should be provided	√		√		
Drinking water facilities should be provided at walking distance from active areas	√		√		
Information/ food kiosk should be located at entrance and resting areas	√		√		
Plantation-50-70% of should be achieved through tree plantation	√		√		
Minimum 70% of area should be covered with shrubs and ground covers	√		√		
Minimum 75% of permeable surface area	√		√		
Irrigation for softscape area should be provided	√		√		
Neighborhood Parks (1 acre to 5 acres)					118
Elements like informal flexible lawn space, comfortable seating areas, bicycle parking at park entrances, cycle tracks	√		√		
Pockets of rain gardens with full infiltrations with reservoirs showcasing native plants	√		√		
Pedestrian lighting and permanent flexible use of park shelter to provide shade and accommodate group uses should be provided.	√		√		
Play area and recreational activities, comfortable seating areas for all age groups should be provided as far as possible	√		√		
All landscape elements should be safe and designed should be universally accessible.	√		√		
Community farming should be provided where appropriate	√			√	
Skate zones, multipurpose sports courts and fitness areas with equipment's should be provided.	√			√	
Toilets- separate toilets for ladies and gents within 300m of walking distances from the active areas should be provided	√		√		
Parking should be provided for non motorized vehicles	√		√		
Drinking water facilities should be provided at walking distance from active areas.	√	√	√		

Summary of Waterfront and Open Space Network Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Relevant Section/ pages
Plantation-30-50% of should be achieved through tree plantation	√		√		
Minimum 60 % of area should be covered with shrubs and ground covers	√		√		
Minimum 70% of permeable surface area	√		√		
Types of Plantation mix should be provided as per Guidelines with % distribution	√		√		
Community Park (Up to 1 acre)					120
Walkways and pathways(minimum 1.8m width) should be provided	√		√		
Shaded spaces for seating along with lawns for recreation and leisure should be designed	√		√		
Featured entry gateways should be provided					
Play areas for kids with 90% visibility to allow passive surveillance	√		√		
Play equipment's with comfortable spacing considering the safety area demarcations	√		√		
Play area and recreational activities for all age groups should be provided as far as possible	√		√		
All landscape elements should be safe and designed should be universally accessible	√		√		
Areas with 30 % passive and 70% active activity considerations	√		√		
Toilets- separate toilets for ladies and gents within 300m of walking distances from the active areas should be provided	√		√		
Parking should be provided for non motorized vehicles	√		√		
Drinking water facilities should be provided at walking distance from active areas	√		√		
Plantation- 30-50% of should be achieved through tree plantation	√		√		
Minimum 50% of area should be covered with shrubs and ground covers should be provided	√		√		
Minimum 60% of permeable surface area of community park should be provided	√		√		
Irrigation for softscape area should be provided	√		√		
Types of plantation mix should be provided as per Guidelines with % distribution	√		√		

Summary of Waterfront and Open Space Network Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Relevant Section/ pages
Privately Owned Public Space (POPS) (Up to1 Acre)					122
Water features, fountain , shaded seating, interactive spaces should be provided.		√	√		
Public art , signage's , pedestrian scale lighting should be designed		√	√		
Creative changes of elevation as a source of play or seating should be provided		√	√		
Play area and recreational activities for all age groups should be provided as far as possible		√	√		
All landscape elements should be safe and designed should be universally accessible		√	√		
Plantation-20-30% of should be achieved through tree plantation		√	√		
Minimum 35% of area should be covered with shrubs and ground covers should be provided		√	√		
Minimum 50% of permeable surface area of community park should be provided		√	√		
Irrigation for softscape area should be provided		√	√		
Types of plantation mix should be provided as per Guidelines with % distribution.		√	√		
Public Squares and Urban Plazas and Gathering Space					123-124
Potential commercial concessions (food kiosks/open air cafes) in the square or in adjacent uses with water fountains, features , seats should be designed	√	√		√	
Outdoor game areas , pedestrian access ways and public plazas near active areas like restaurants and retails should be provided	√	√		√	
Shade structures like trellis pergolas and typical elements of open spaces should be provided with LED lighting should be provided	√	√	√		
Play area and recreational activities for all age groups should be provided and all landscape elements should be safe and designed should be universally accessible	√	√		√	
Minimum 30 % of tree cover should be provided and minimum 35 % of area should be covered with shrubs and ground covers should be provided	√	√	√		
50% of the area needs should be permeable and irrigation for softscape area should be provided	√	√	√		
Types of plantation mix should be provided as per Guidelines with % distribution	√	√	√		
Edge Treatment, Park Furniture, Signage and Lighting					126
Edge Treatment for all Above open spaces					
Minimum 60% of the plantation edge should be achieved	√	√	√		
Maximum 20 % of the edge as entry exit points should be equally divided on street frontage	√	√	√		

Summary of Waterfront and Open Space Network Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Relevant Section/ pages
5% of the street frontage should be allocated for active street edge	√	√	√		
Maximum 5% of the edge should be treated with advertisement banners and hoardings	√	√	√		
Maximum 10% edge should be vehicular access entry exit points(excluding communityand neighborhood parks)	√	√	√		
Boundary screen plantation should be maintained at maximum 1.2 meter in height.	√	√	√		
Lighting (for all above open spaces)					126
Pole lights of height 3m should be placed along the pathway at 9m c/c and bollards, pathfinders – to illuminate pedestrian pathways	√	√	√		
Uplighters at trees and shrub plantation areas and flood lights –sports courts and playscapes	√	√	√		
Park Furniture (for all above open spaces)					127
Dustbin- at intervals of 30 m	√	√	√		
Way finding signage's at strategic locations like entry /exits, pathways, plazas, public facilities	√	√	√		
Materials (for all above open spaces)					127
Pathway and walkways - Natural stone paving, concrete paver blocks, stamped concrete, colored concrete of pastel shades with rough texture as per design considerations	√	√	√		
Cycle tracks - colored concrete, colored asphalt e.g. pastel shades of red, blue and green to define hierarchy of roads	√	√	√		

Summary of Waterfront and Open Space Network Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Relevant Section/ pages
Soil mix (for all above open spaces)					128
Tree Pits	√	√	√		
Min. soil depth 1200 mm	√	√	√		
1/5 coarse sand	√	√	√		
3/5 topsoil	√	√	√		
Providing and treating all planting beds with ant termite powder 4 to 5 grams per plant or as directed by planting contractor	√	√	√		
1/10 composted sewage sludge	√	√	√		
1/10 bark fines	√	√	√		
Shrubs	√	√	√		
Min. soil depth 600 mm	√	√	√		
1/6 coarse sand	√	√	√		
1/3 topsoil	√	√	√		
1/3 Excavated Soil	√	√	√		
1/6 Compost	√	√	√		
Providing and treating all planting beds with ant termite powder 4 to 5 grams per plant or as directed by planting contractor	√	√	√		
Lawn and Ground Covers:	√	√	√		
Min. soil depth 300 mm	√	√	√		
1/6 coarse sand	√	√	√		
1/3 topsoil	√	√	√		
1/3 Excavated Soil	√	√	√		
1/6 Compost	√	√	√		
Providing and treating all planting beds with ant termite powder 4 to 5 grams per plant or as directed by planting contractor	√	√	√		

4 Village Integration Guidelines

Village Integration

Amaravati Capital City includes 29 villages within its limits as shown in the masterplan. These existing villages should be integrated well with the surrounding new development for effective functioning of the overall city. It is necessary for the existing villages to be integrated well in order to have an inclusive and balanced relationship with the urban fabric. The following aspects should be addressed:

- Development of infrastructure facilities should cater to the needs of the population while retaining the human scale of the villages
- Quality of life of residents should be improved through development and upgrade of amenities like education and healthcare
- Traditional character and cultural heritage of the villages should be retained
- Means of income and livelihood of the villagers should transform from an agrarian community into an urban community after land pooling
- Any adverse impact of social and political changes brought about by new developments on the functioning of existing villages should be minimised

Villages in Amaravati

1. Uddandarayunipalem	2. Velagapudi	3. Mandadam
4. Modulankapalem	5. Tallayapalem	6. Lingayapalem
7. Thulluru	8. Sakhamuru	9. Ainavolu
10. Krishnarayapalem	11. Nowlur	12. Yerrabalem
13. Undavalli	14. Penumaka	15. Borupalem
16. Abbarajupalem	17. Dondapadu	18. Pichikalapalem
19. Ananthavaram	20. Nekkallu	21. Kurugallu
22. Neerukonda	23. Nidamarru	24. Bethapudi
25. Tadepalli (includes Nulakapeta, Dolas Nagar)		26. Venkatapalem
27. Rayapudi	28. Malkapuram	29. Nelapadu
30. Mangalgiri (part within city)		

Methodology and Framework

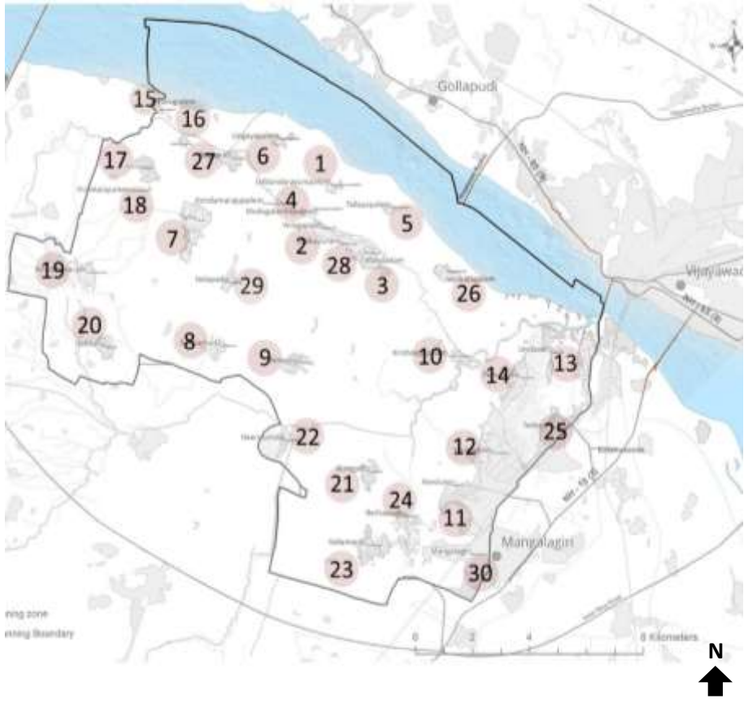
To address the issues mentioned above, research has been conducted, including a background study of existing 29 villages in Amaravati, detail study of 3 selected villages and case studies of village integration were also undertaken. Village integration can broadly categorised in the following frameworks:

- Physical integration
- Socio-Economic integration
- Environmental integration
- Community integration
- Administrative integration

Various reports from APCRDA as listed below were also reviewed:

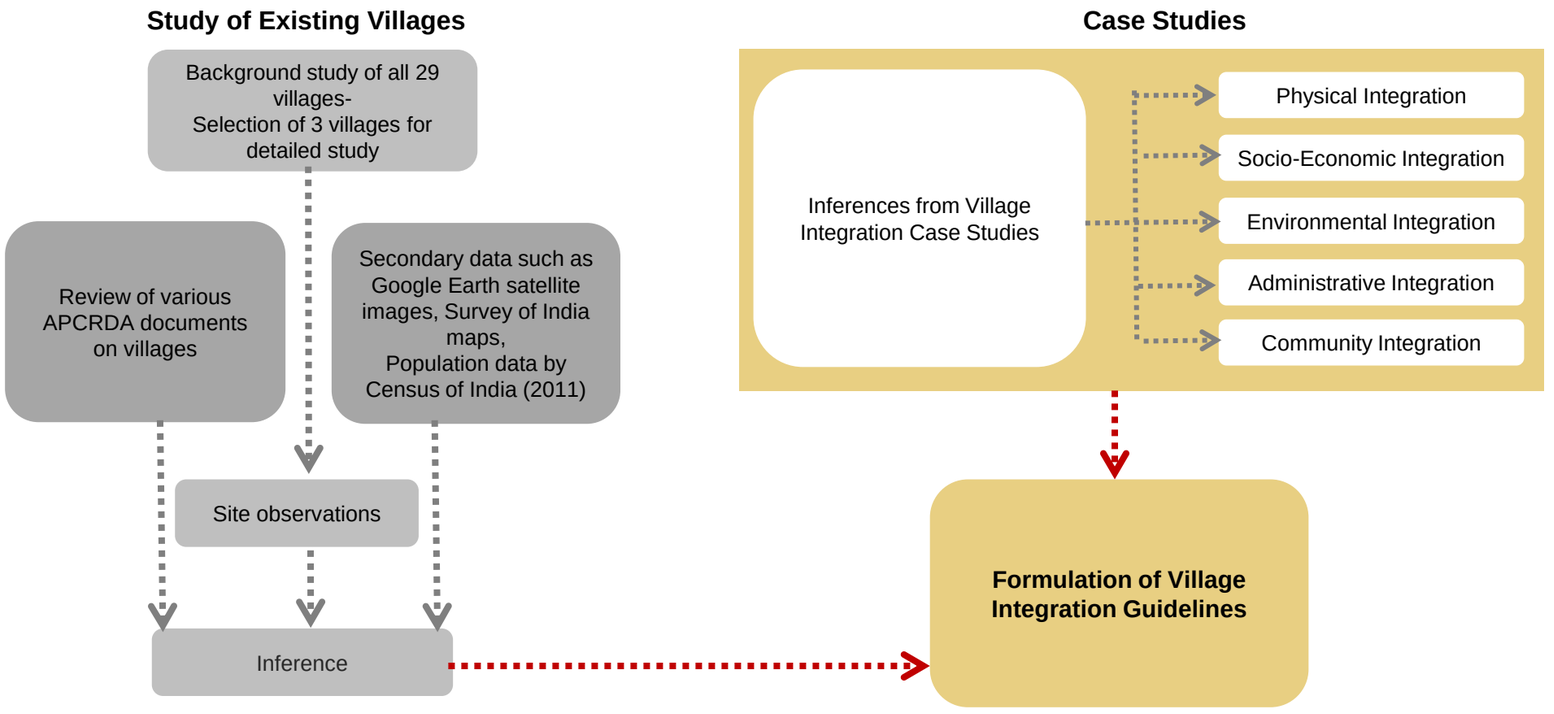
- Strategic Environmental and Social Assessment – Environmental and Social Management Framework (February 2017)
- Draft Rehabilitation and Resettlement Schemes for villages (Aug 2017)
- Final Draft Resettlement Policy Framework (September 2017)
- Happy City Blueprint Socio-Economic Masterplan (April 2018)

A study of the villages was carried out through several site visits, interactions with APCRDA and locals, analysis of Google Earth satellite images and Survey of India maps. Together with APCRDA three villages were selected to demonstrate integration between existing villages and the surrounding LPS development. The three villages, Rayapudi, Malkapuram and Nelapadu were selected based on criteria such as location, heritage, natural features such as riverfront, canals, ponds as well as proximity to AGC and SEED Capital. Further detailed analysis and inference of the study was used to guide the formulation of the village integration guidelines.



Plan of Amaravati Capital City showing location of existing villages

Images showing character and existing street conditions of different villages in Amaravati Capital City



Flowchart showing methodology adopted for village integration guidelines.

Image source: Report on Detailed Masterplan of Capital City

Village Integration

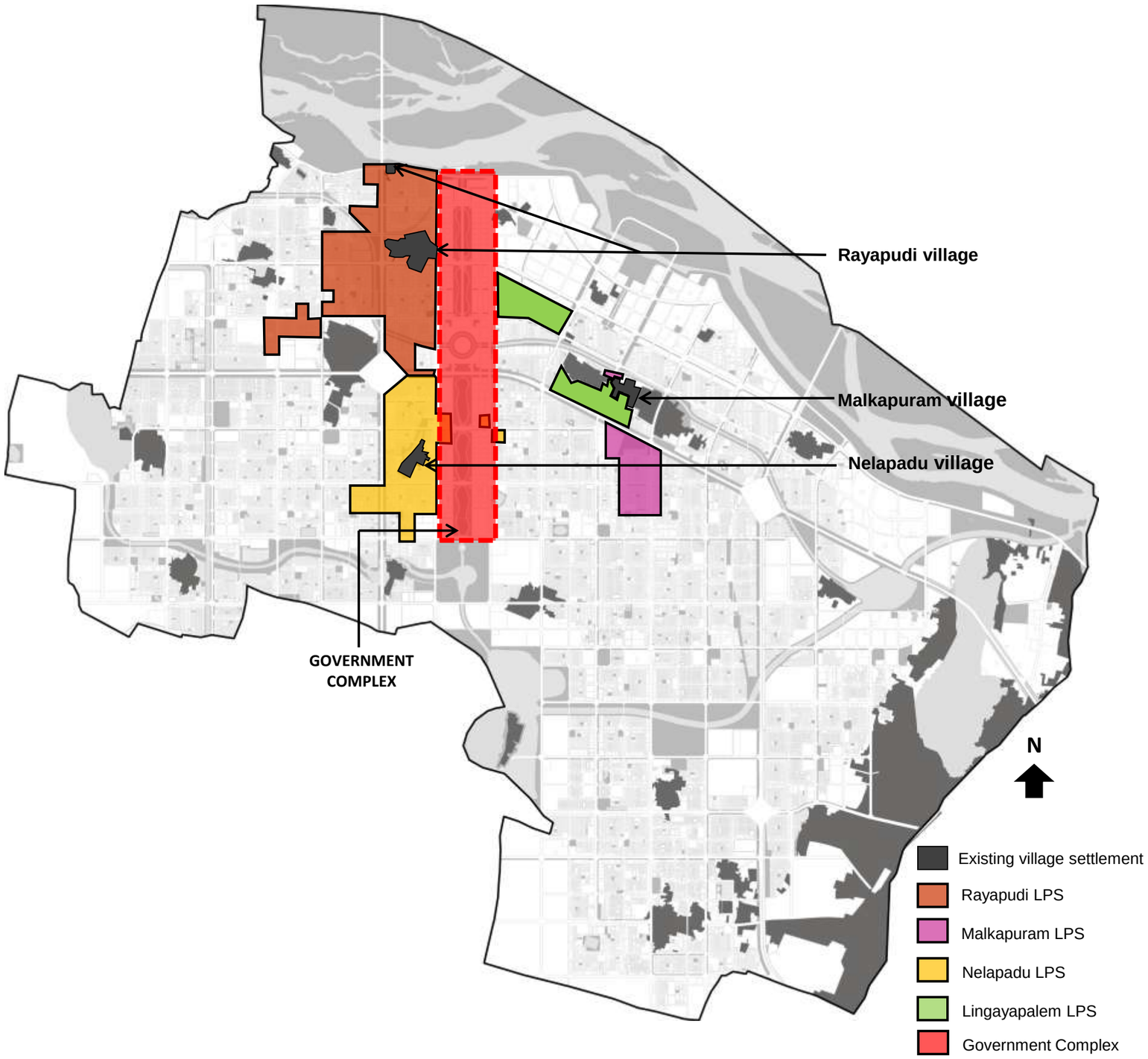
4.1
Analysis of Selected Villages

4.2
Village Integration Guidelines

4.3
Village Integration Demonstration

4.1 Analysis of Selected Villages

4.1 Analysis of Selected Villages



Plan of Amaravati Capital City showing the 3 villages selected for detail study with their corresponding LPS boundaries

Image source: Base map – APCRDA, https://crda.ap.gov.in/APCRDA/UserInterface/Admin/crdalpslayouts.aspx

Selected Villages for Analysis

The following 3 villages were selected for detailed study & analysis in consultation with APCRDA based on their importance in terms of location, heritage value and presence of natural features.

1. Nelapadu Village

- This was the first village to participate in the LPS process and has become a point of reference for preparation of Land Pooling layouts for all the other villages in the Capital City.
- It is located adjacent to the Government Complex, which positions the village under high development pressure.
- Presence of natural features at the edge of the village such as a large lake
- Current and ongoing construction of adjacent development and roads

2. Malkapuram Village

- Situated at a prime location near Seed Capital and Interim Government Complex (Velagapudi) and surrounded by commercial area.
- Recently discovered heritage site - Malkapuram Temple and a stambha with inscriptions with great heritage value
- Presence of natural features near the heritage site including a large pond

3. Rayapudi Village

- Adjacent to the Government Complex, which creates high potential developmental pressure to the village; hence it is critical to observe the existing conditions and impacts from future developments.
- Located along Seed Access Road (60m wide) improving its connectivity to the rest of the city and making its location prominent However the Seed Access Road has dissected part of the village to the other side of the road
- Presence of natural features at the edge of the village including a pond

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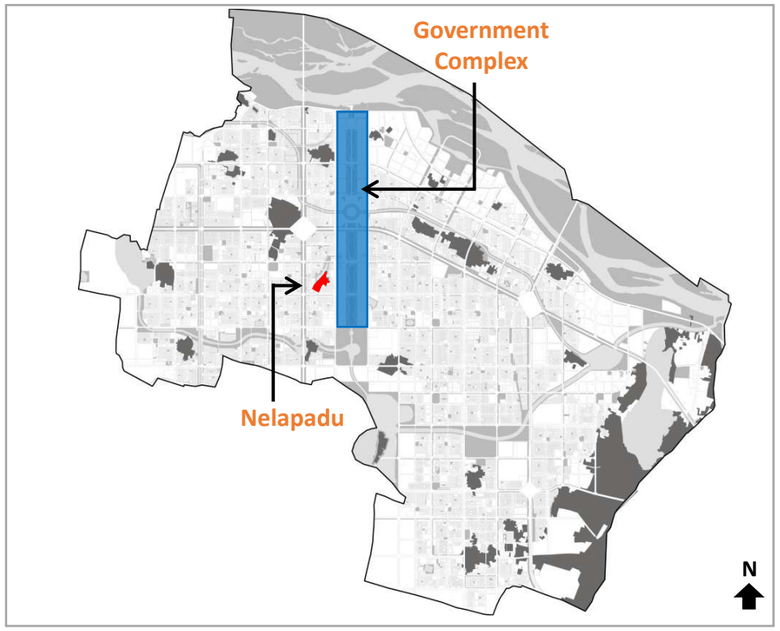
4.1 Analysis of Selected Villages

Nelapadu

A) Location and Context

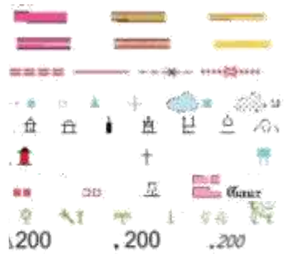
- It is part of first phase of Amaravati Capital City development and located near Government Complex in Mandal Thulluru
- Area of the village is 18.66 Ha
- Population of 1,028 as per Census of India, 2011
- Population density is 55 persons /Ha



Location of Nelapadu Village in Amaravati Capital City

Location of Nelapadu Village in Survey Map of India, 2011

Roads, metalled: according to importance
Roads, double carriageway, according to importance
Unmetalled road, Cart-track, Pack-track with pass, Foot-path
Wells, lined, unlined, Tube well, Spring, Tanks, perennial; dry
Temple, Chhatri, Church, Mosque, Idgah, Tomb, Graves
Post office, Telegraphy office, Overhead tank
Huts, permanent; temporary. Tower. Antiquities
Palms, palmyra; other. Plantain. Conifer. Bamboo. Other trees
Heights, triangulated; station; point; approximate



Survey Observations

- There are wells, weir, siphon, aqueduct and high tension lines surrounding the village. (Survey of India map, 2011)
- Lake and water body surrounds the village on the north-western part which has partly dried up

B) Connectivity and Accessibility

- The village is not directly connected to proposed arterial road-50m wide
- Majority of the village is located within 5min (400m radius) walking distance

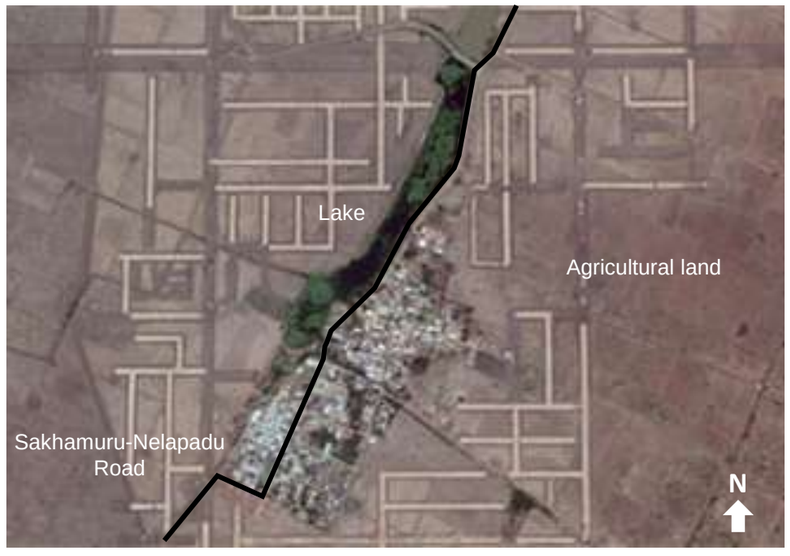
C) Built Form

- Built form is mostly regular with linear development along the edge of the lake
- Buildings are mostly ground structures with both vernacular and RCC construction technology
- Tobacco drying units are converted into residential units for rental accommodation creating additional source of income to the villagers

Use of R.C.C construction technology

Arugu (sitting area) outside houses acts as an interaction space

Map of Nelapadu Village and LPS showing existing natural assets and amenities



Google Earth satellite image of Nelapadu village showing on-going construction of roads, 2018

Images showing various building typologies in Nelapadu village

Source: Base Map source: APCRDA, http://www.soinakshe.uk.gov.in - dated 2011, Amaravati Existing Village Base Map

4.1 Analysis of Selected Villages

Nelapadu

D) Open Space and Natural Assets

- Lake at the edge of the village is currently in poor condition due to negligence
- The lake will be fragmented into 3 parts by proposed road network
- The lake is demarcated in P3 (protected zone) with a buffer but the northern part of the lake is demarcated in P1 (passive zone)
- P1 (passive zone) in northern part of lake should be P3 (protected zone) for protection of water body
- As a mitigation measure culverts are required to channelize water and connect water bodies

Images showing lake at the edge of Nelapadu Village

E) Amenities and Facilities

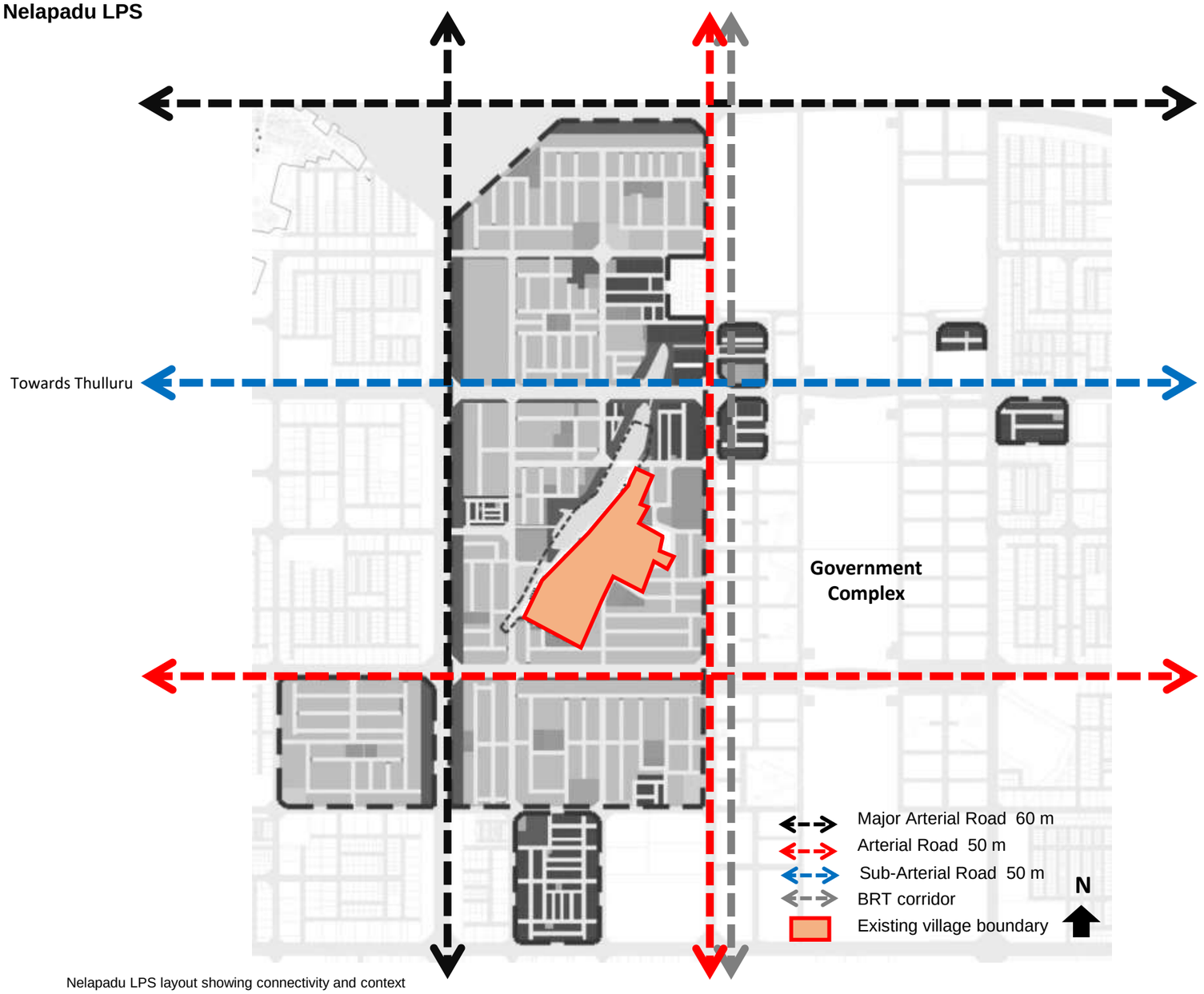
- There are social and religious places like temples, churches and prayer hall in this village depicting a mix of communities.
- There are spaces for community interaction
- Educational and health facilities exist but need to be upgraded
- Public healthcare facilities are provided in Thulluru
- There is a Panchayat office, new office, NTR water bank and over head water tank available.

Temple

Church

New office

Nelapadu LPS



Nelapadu LPS layout showing connectivity and context

F) Cultural and Socio Economic Aspects

- Villagers get alternate source of income by renting property
- A trend of migration of educated young population to Hyderabad and Vishakhapatnam for better job opportunities
- ASHA workers visit homes for public health

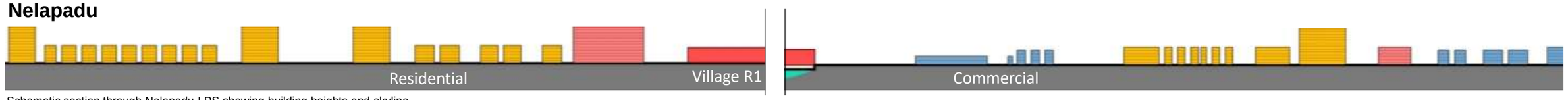
Opportunities

- Nelapadu LPS allocation was planned with considerations of existing village boundary and Amaravati Masterplan zoning.
- Proximity to BRT line will improve connectivity to other parts of the city
- The adjacent Main Arterial Road will improve connectivity of the area and therefore increases real estate value.

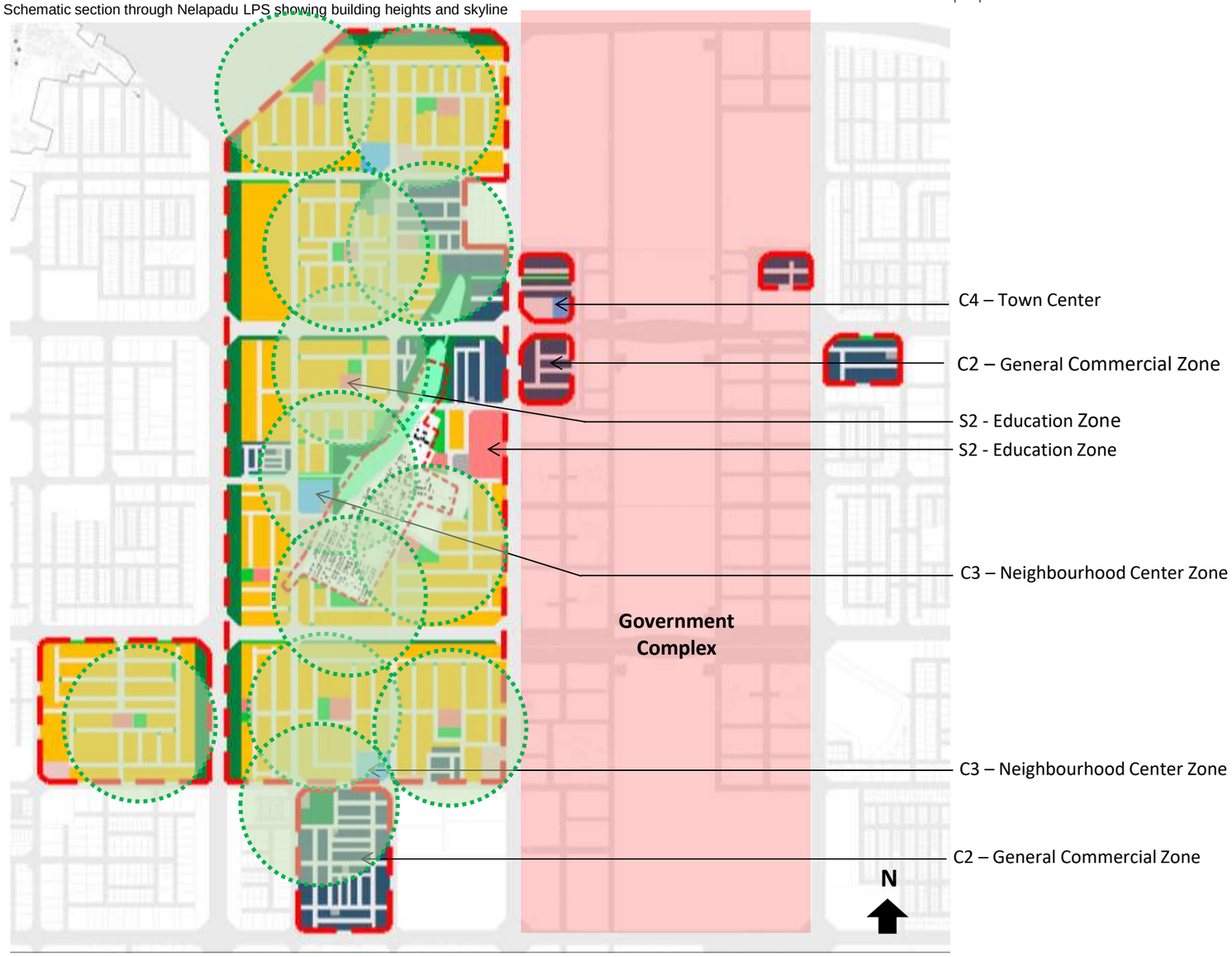
Source: Base Map - APCRDA, Amaravati Existing Village Base Map, https://crda.ap.gov.in/APCRDA/UserInterface/Admin/crdalpslayouts.aspx

4.1 Analysis of Selected Villages

Nelapadu



Schematic section through Nelapadu LPS showing building heights and skyline



Nelapadu LPS layout showing potential for amenities

Nelapadu LPS layout showing proposed FSI distribution

- Residential R3 (4000 sq. m. and above) FSI 2.4
- Residential R3 (500-4000 sq. m.) FSI 2
- Residential R3 (100-499 sq. m.) FSI 1.75
- Educational (FSI as per approval)
- Commercial C2 (2000 sq. m. and above) FSI 2
- Commercial C2 (500-1999 sq. m.) FSI 1.4
- Commercial C2 (100-499 sq. m.) FSI 1.2
- Commercial C2 (50-99 sq. m.) FSI 1
- Commercial C3 FSI 1.5
- 5 min walking distance radii (400m)
- Government Complex

Opportunities

- Educational use and commercial use plots near the existing village can be developed to meet the educational and healthcare needs of the village population, owing to flexibility of use offered by ZR
- Mixed use development is possible along the arterial road between the LPS and Government Complex
- Most of the open spaces in the LPS are within walking distance (400m radius).
- The lake within the village will be fragmented by roads. Together with the green buffer along the canal, these natural features can be transformed into an attractive open spaces for the village and the LPS

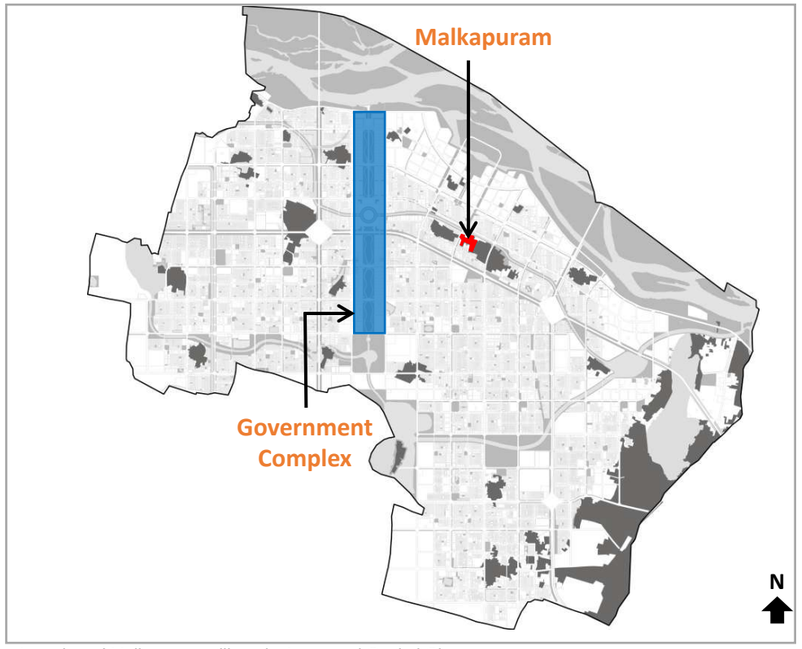
Source: Base Map source: APCRDA, Amaravati Existing Village Base Map, https://crda.ap.gov.in/APCRDA/UserInterface/Admin/crdalpslayouts.aspx

4.1 Analysis of Selected Villages

Malkapuram

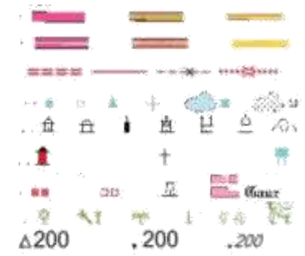
A) Location and Context

- Located near Seed Capital area, between two existing villages (Velagapudi and Mandadam) in Mandal Thulluru
- Area of the village is 19.44 Ha
- Population is 1,360 as per Census of India, 2011
- Population Density is 70 persons/Ha
- The Vijayawada-Amaravati Road passes through the village



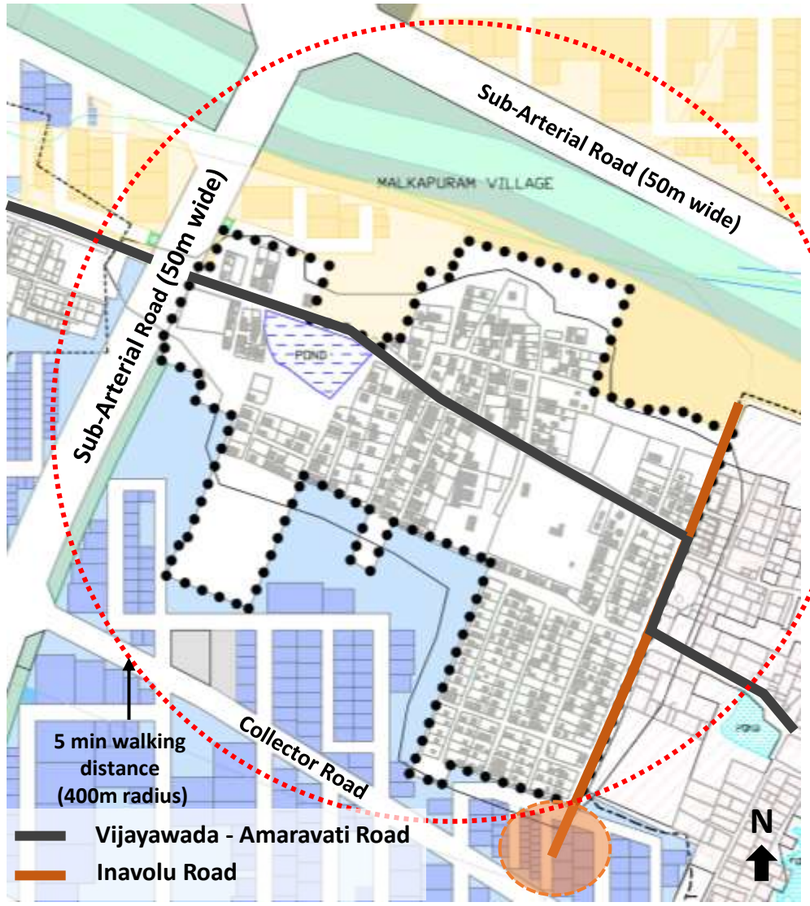
Location of Malkapuram village in Amaravati Capital City

Location of Malkapuram Village in Survey Map of India, 2011



Survey Observations

- The village is developed in a linear manner along the Vijayawada-Amaravati Road
- As per Survey Map of India there are a large number of tube wells on north of village towards the canal



Map of Malkapuram Village showing road connectivity

Google Earth satellite image of Malkapuram village, 2017

Images showing various building typologies in Malkapuram village

B) Connectivity and Accessibility

- The village access is planned through proposed Sub-Arterial Road (50m wide)
- Existing Inavolu Road between Malkapuram and Mandadam village is not connected to the proposed Collector Road (25m wide). Connectivity from Inavolu Road with the Collector Road is needed
- The entire village is within 5min walking distance (400m radius) so it is walkable.

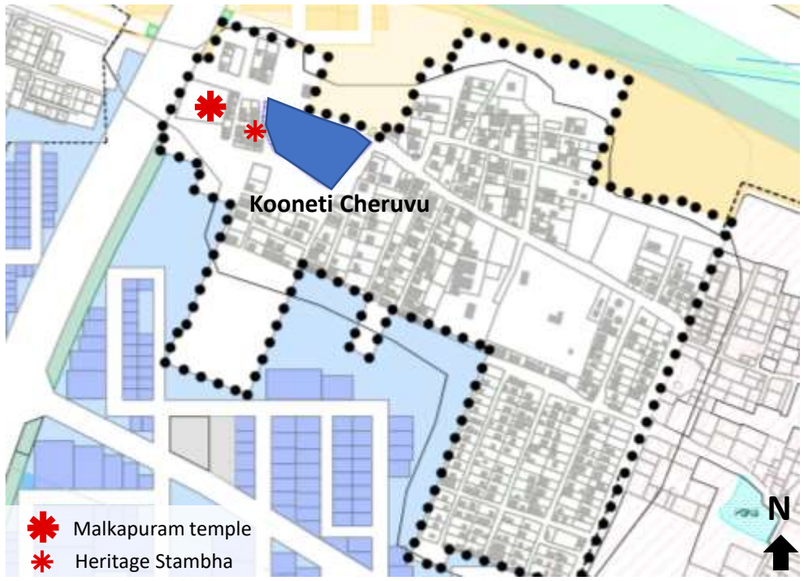
C) Built Form and Heritage

- Large open spaces in between buildings with regular built form
- Buildings are G to G+3 storey high
- Due to its location near Seed Capital and Interim Government Complex (Velagaudi), the real estate value of this area has increased

Source: Base Map source: APCRDA, http://www.soinakshe.uk.gov.in - dated 2011, Amaravati Existing Village Base Map

4.1 Analysis of Selected Villages

Malkapuram



Map of Malkapuram Village showing location of Kooneti Cheruvu (pond)

- Recently discovered temple called Malkapuram Temple, which was built by queen Rudramadevi in 1920
- Stambha near the temple area which has ancient inscriptions carved out; explaining the rich history of Malkapuram
- Due to the lack of awareness and recognition, the temple is currently in ruins
- Excavation may be required to find the remains of the Malkapuram temple

D) Open Spaces and Natural Assets

- Kooneti Cheruvu is a pond that attracts migratory birds to this area
- Presently, the pond is deteriorating due to negligence, garbage dumping, mixing of storm water, algal growth, dumping of debris, etc.
- As the water quality is deteriorating, there is a need for restoration and maintenance of the pond
- Providing proper infrastructure facilities to the nearby areas is key to avoid mixing of storm water
- Measures should be taken to stop garbage dumping into the pond

E) Amenities and Facilities

- There are 2 primary schools in this village
- Public healthcare facilities are available in Thulluru
- Religious gathering spaces like temples and churches are present. There are also other spaces for community interaction
- Other facilities like Panchayat office, NTR water bank and overhead water tank are available
- Due to strategic location near Interim Government Complex, advertisement boards are placed on main roads as revenue generation for the villages

F) Cultural and Socio Economic Aspects

- Conversion of livelihood from agriculture to small trading
- Self-help groups for women are active in the village
- Mix of various communities reside in the village

Access road to the temple

Façade of the temple

Shiva Temple

Church

Migratory birds in the pond

Dumping of garbage

Malkapuram temple in ruins

Access road to Stambha

Primary School

Primary School

Algal growth in the pond

Mixing of storm water

Stambha

Remains of original temple outside

Panchayat office

NTR Water bank

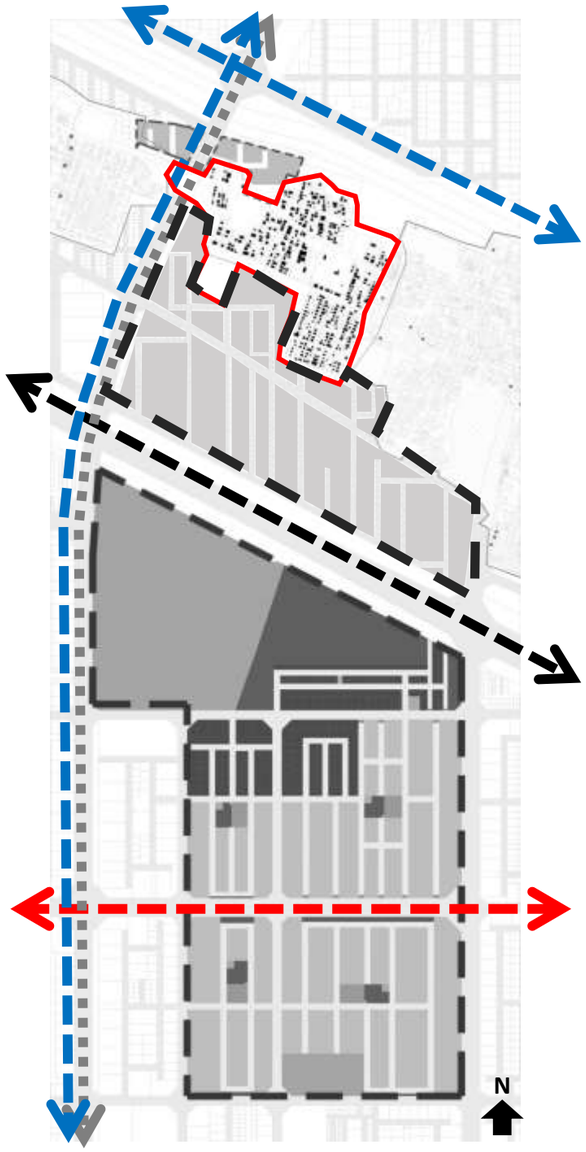
Advertisement board

Source: Base Map source: APCRDA, Amaravati Existing Village Base Map http://www.thehansindia.com/posts/index/Andhra-Pradesh/2016-03-30/Malkapuram-temple-to-be-made-a-tourist-attraction/217418

4.1 Analysis of Selected Villages

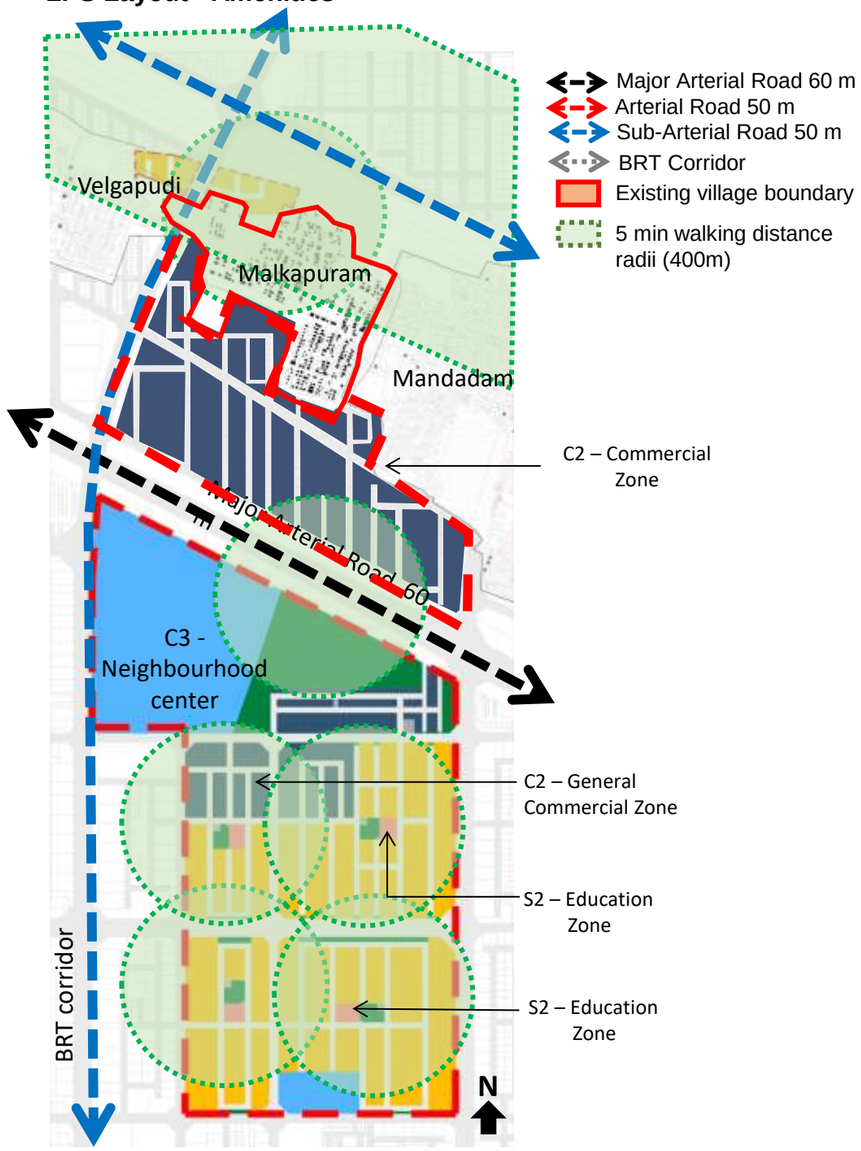
Schematic section through Malkapuram LPS showing building heights and skyline

LPS Layout - Connectivity



Malkapuram and Lingayapalem LPS layout showing connectivity

LPS Layout - Amenities



Malkapuram LPS layout showing amenities

LPS Layout – Urban Form

Malkapuram LPS layout showing proposed FSI distribution

Opportunities

- LPS allocation was planned considering existing village boundary and Masterplan zoning
- Abutting BRT corridor will improve connectivity to other parts of the city
- Lingayapalem LPS is adjacent to Malkapuram village while major area of Malkapuram LPS is located at a distance from the original village

- Commercial plots near Malkapuram can provide healthcare facilities for the village population, owing to the flexibility of use offered by ZR
- Most of the open spaces are within walking distance (400m radius)
- The pond within the village and the green buffer along the canal could act as an open space for the village and the LPS abutting it

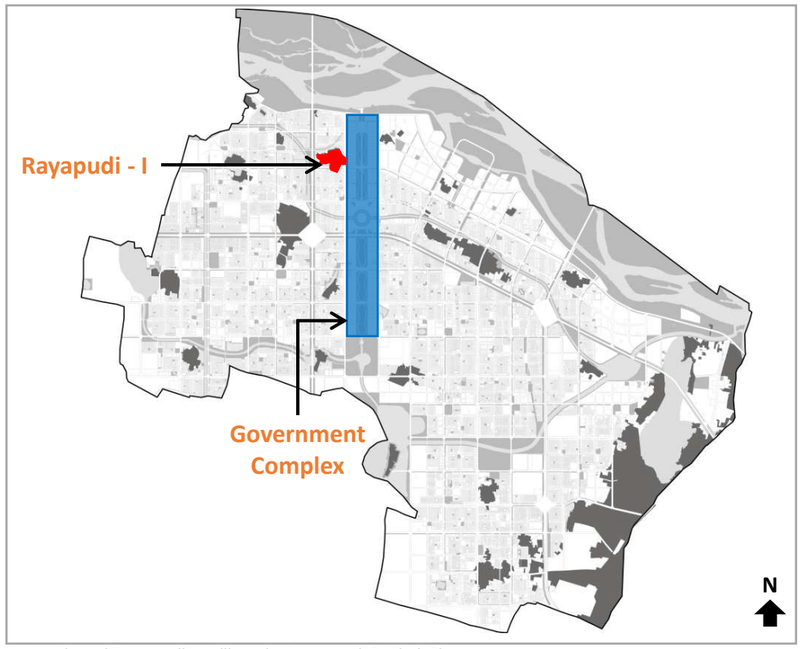
Source: Base Map: APCRDA, Amaravati Existing Village Base Map, https://crda.ap.gov.in/APCRDA/UserInterface/Admin/crdalpslayouts.aspx

4.1 Analysis of Selected Villages

Rayapudi – I

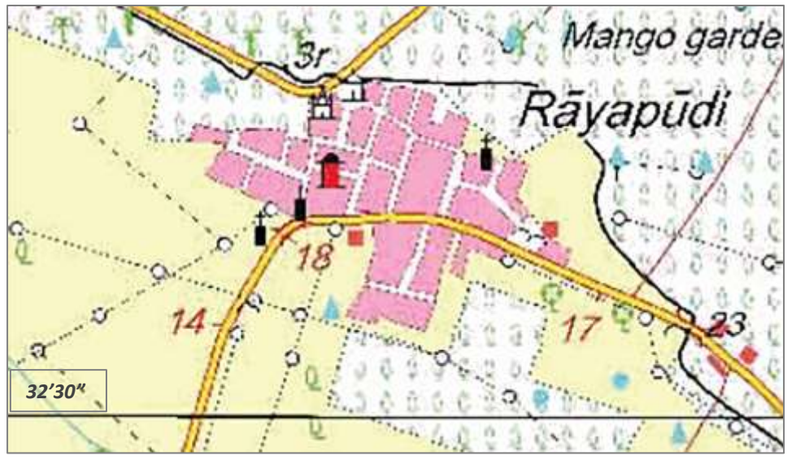
A) Location and Context

- Located adjacent to Government Complex in Mandal Thulluru and part of first phase of the Amaravati Capital City development
- Area of the village is 34.05 Ha
- Population is 4,817 as per Census of India, 2011
- Population Density is 141 persons/Ha
- There are 2 existing roads connecting the site - Abbirajupalem Road and Rayapudi Main Road.



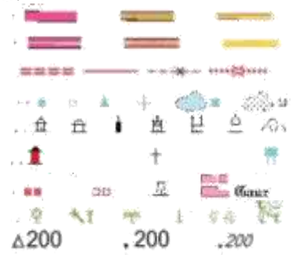
Location of Rayapudi - I village in Amaravati Capital City

Google Earth satellite image of Rayapudi – I village showing site edges, 2017



Location of Rayapudi – I village in Survey of India map, 2011

Roads, metalled: according to importance
Roads, double carriageway, according to importance
Unmetalled road, Cart-track, Pack-track with pass, Foot-path
Wells, lined, unlined, Tube well, Spring, Tanks, perennial; dry
Temple, Chhatri, Church, Mosque, Idgah, Tomb, Graves
Post office, Telegraphy office, Overhead tank
Huts, permanent; temporary. Tower. Antiquities
Palms, palmyra; other. Plantain. Conifer. Bamboo. Other trees
Heights, triangulated; station; point; approximate

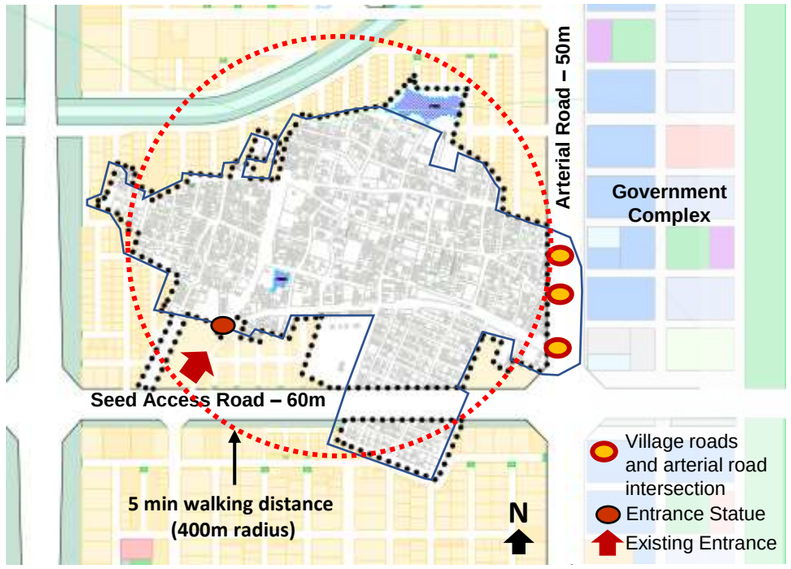


Survey observations:

- There are unlined wells and tube-wells for irrigation based on Survey of India maps.
- There are on-going road constructions
- The condition of the water body in the north is deteriorating

B) Connectivity and Accessibility

- Seed Access Road (60m wide) fragments the village into two parts
- The entrance road (towards Thullur) is the main access road to the village
- A statue acts as a landmark entrance for the village
- Seed Access Road connects the main access road of the village, which provides a well-defined entrance for the village
- The village is connected to Arterial Road (50m wide) along Government Complex through minor access roads.
- Majority of the village is located within 5min walking distance (400m radius)



Map of Rayapudi village showing road connectivity

C) Built Form

- Organically spread built form with a mix of plot sizes
- Building height varies from G to G+3 with both vernacular and RCC construction technology
- Due to ongoing constructions of the Government Complex, there is influx of migrant labourers. As a result villagers are constructing vertically to provide rental accommodation which acts as an alternate source of income
- Due to ongoing transformation, there is a possibility of unauthorized construction (both vertical & horizontal) which needs to be controlled and monitored

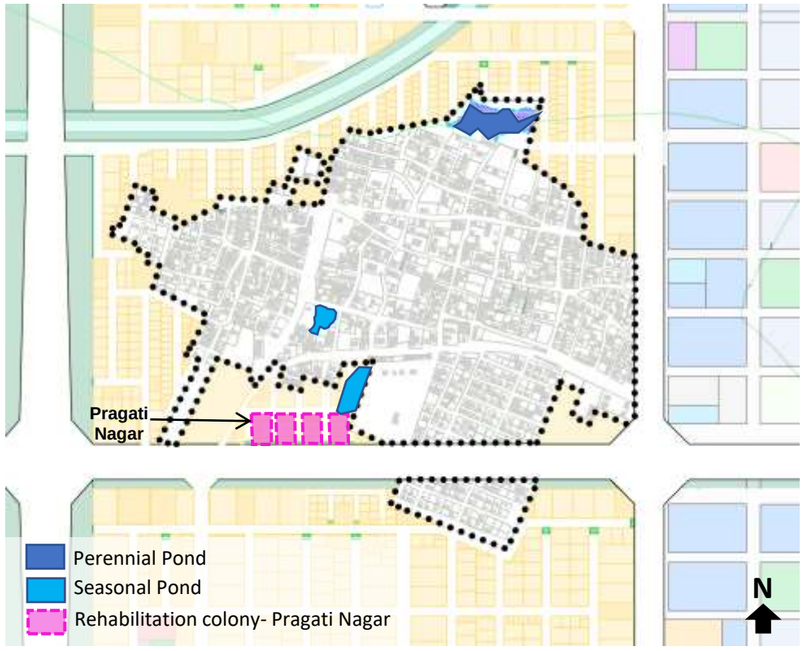
Images showing on-going construction of Government Complex

On-site images showing various building typologies in Rayapudi – I village

Source: Base Map source: APCRDA, http://www.soinakshe.uk.gov.in - dated 2011, Amaravati Existing Village Base Map

4.1 Analysis of Selected Villages

Rayapudi – I



Map showing Rayapudi – I village with its water bodies

On-site images showing abandoned wells

Primary Schools

Community interaction space

Panchayat employed sanitation workers

E) Amenities and Facilities

- The village has social amenities like temples, mosques, churches and burial ground which shows diverse mix of communities with different religious cultures, such as Islam, Buddhism, Christianity, etc
- There are 2 primary schools in this village showing provision of educational amenities for the community
- Nearest primary healthcare center is at Thulluru. Medical camps are set up periodically for health check ups. Hence healthcare facilities are lacking.
- Other amenities includes post office and NTR water bank
- CRDA office and banks with ATM are available

D) Open Spaces and Natural Assets

- There are 3 ponds of which 2 are located within the village and 1 outside the village
- There is natural contour flow and rejuvenation of pond in north which is perennial.
- Currently, the water condition of inner village ponds is deteriorating due to lack of cleaning, dumping of garbage, nonpoint source of pollution during its flow
- It extends towards the R3 (medium to high density) zone so the plots overlap the pond area
- Due to provision of piped water system, wells are abandoned

On-site images of Venkateshwar temple, Mosque and Church showing diverse mix of community

Image showing existing pond with deteriorating condition of water

Image showing Dry Pond near Pragati Nagar

CRDA office

Bank with ATM

NTR Water Bank

F) Cultural and Socio Economic Aspects

- Conversion of livelihood from agriculture to small trading
- Many villagers have started building vertically to provide rental accommodation
- Panchayat employs sanitation workers for cleaning and maintenance work
- ASHA workers conduct visits to houses and medical camps are set up periodically for health check ups for the villagers.
- Self Help Groups for women are active in the village

Inferences:

- Proper pedestrian crossings should be provided at the junction where village is connected to arterial road (towards Government Complex) for conflict-free traffic movement
- Water bodies should be free of any built development, it cannot be filled and needs to be protected
- Potential for development of home based business with the help of subsidized loans from government bodies
- Some of the villagers are interested in construction and real estate business, so training should be provided to equip them with the essential skills
- Employment for Panchayat employed workers in the new setup

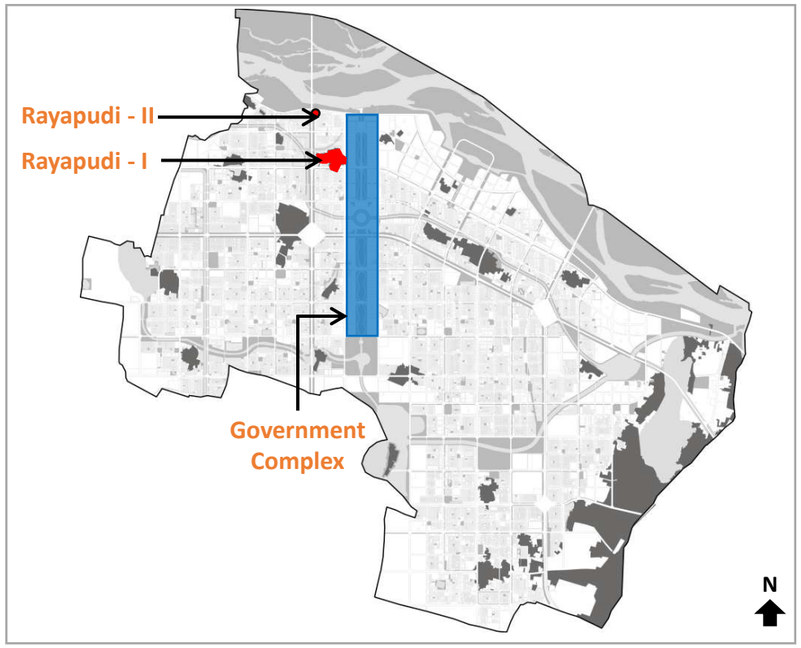
Source: Base Map source: APCRDA, Amaravati Existing Village Base Map

4.1 Analysis of Selected Villages

Rayapudi – II

A) Location and Context

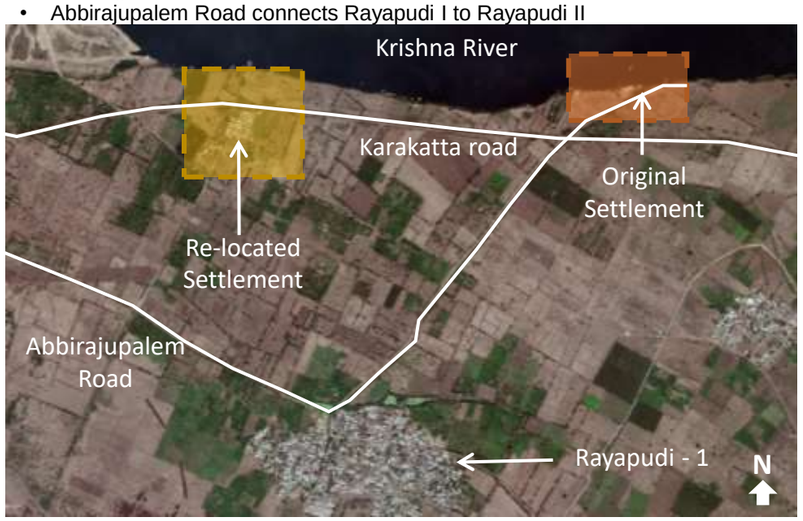
- It is a fishing village located near Government Complex and the edge of Krishna River in Mandal Thulluru. It is not a revenue village
- The original settlement was adjacent to river Krishna near Karakatta Road
- Due to flooding, the village was relocated 8 years ago to its current location
- Free houses were provided by the Government to those who were affected by flooding



Location of Rayapudi - II village in Amaravati Capital City

B) Connectivity and Accessibility

- Existing Karakatta Road connects the village with other areas
- Abbirajupalem Road connects Rayapudi I to Rayapudi II



Google Earth satellite image of Rayapudi – II village showing site edges, 2017

Google Earth image of Rayapudi – II village showing built form in 2017

C) Built Form

- Building height is ground storey with both vernacular and RCC construction technology.
- Free Government housing is with AAC blocks walls on ground storey, covering 60% of the village through Indra Awas Yojana to the people affected by floods

Traditional houses

Free housing provided by government

D) Open Spaces and Natural Assets

- Pushkara ghat is along the banks of river adjacent to the original settlement
- There is fishing activity near the river
- Waterfront development becomes an interface for socio-cultural activities
- Current villagers wash clothes along the river, which contributes to the deteriorating water condition

E) Amenities and Facilities

- Village houses are provided with electricity and septic tanks
- There is no piped water system. People have constructed hand-pumps for drinking water
- There is a lack of basic infrastructure including storm water drainage, sanitation, street lighting as well as education and healthcare facilities. All of these need to be addressed in order to improve the village's living condition

Pushkara ghat along the banks of river Krishna

Area for fishing activity near the river

- There is an existing water treatment plant which supplies water for irrigation to villages like Rayapudi, Thulluru, Mandadam, Dondapadu, Sakhamaru and Ainovulu.

F) Cultural and Socio Economic Aspects

- Fishing is the main occupation. The other occupations include agricultural labourers and petty traders
- As agricultural lands are voluntarily pooled for LPS, there is an opportunity for agricultural labourers to become involved in construction and real estate development outside the village

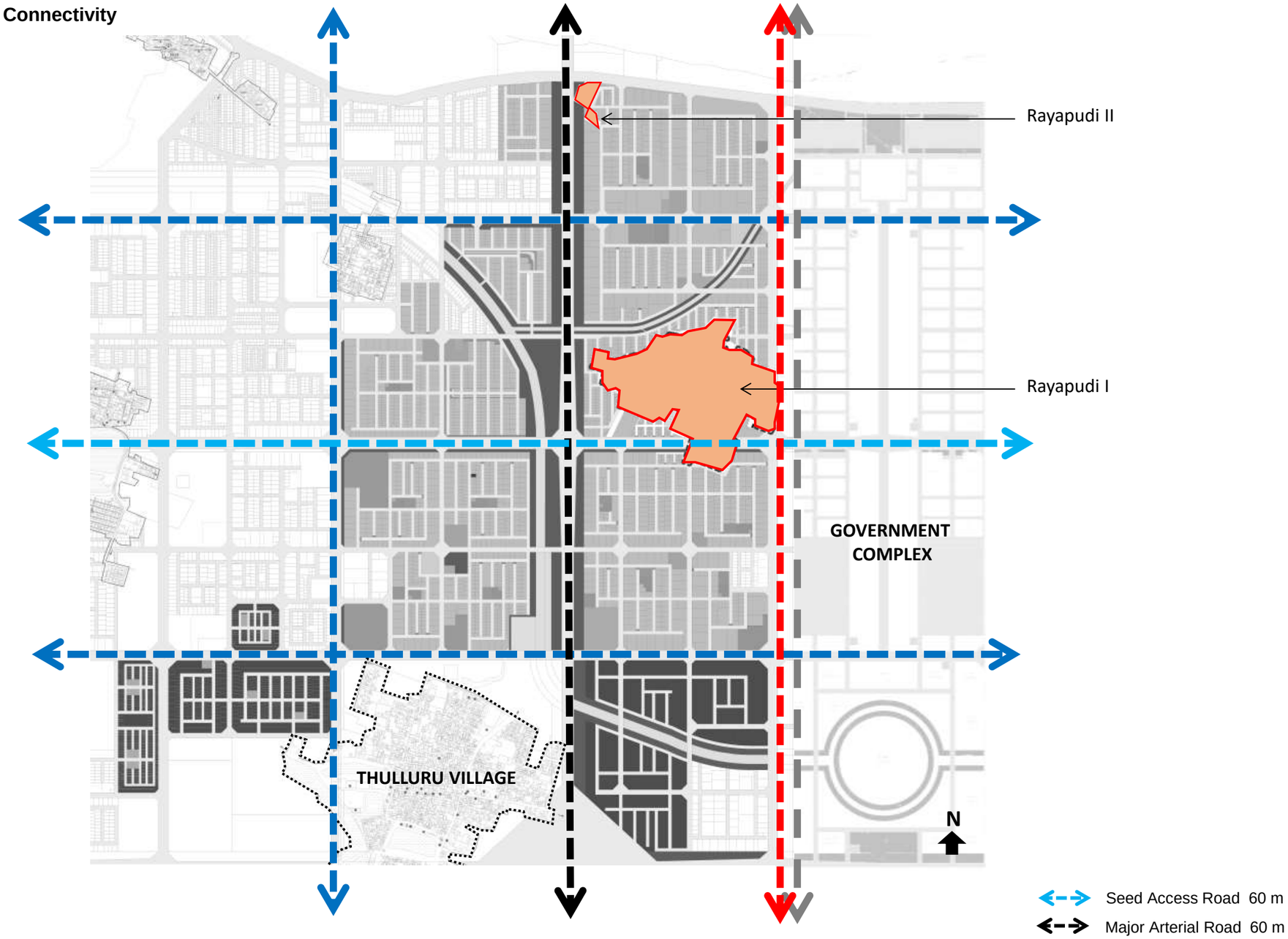
On-site images showing existing Water Treatment Plant

Source: Base Map source: APCRDA, http://www.soinakshe.uk.gov.in - dated 2011

4.1 Analysis of Selected Villages

Rayapudi – I & II

Rayapudi LPS Layout – Connectivity



Rayapudi LPS layout showing connectivity

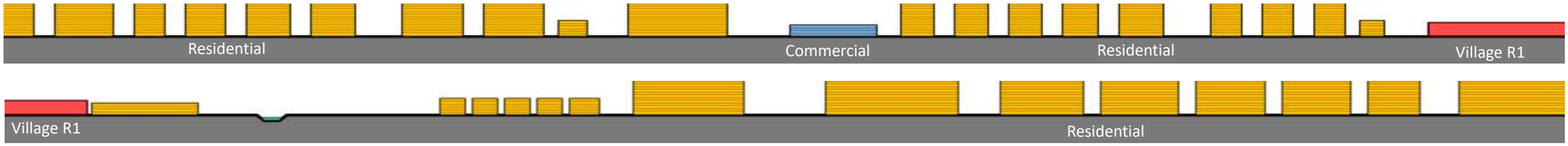
Opportunities

- High density plots were planned along the major roads
- Proximity to BRT corridor will improve connectivity to other parts of the city
- Townships within LPS are planned based on the road hierarchy and adjacent developments

Source: Base Map – APCRDA, Amaravati Existing Village Base Map, https://crda.ap.gov.in/APCRDA/UserInterface/Admin/crdalpslayouts.aspx

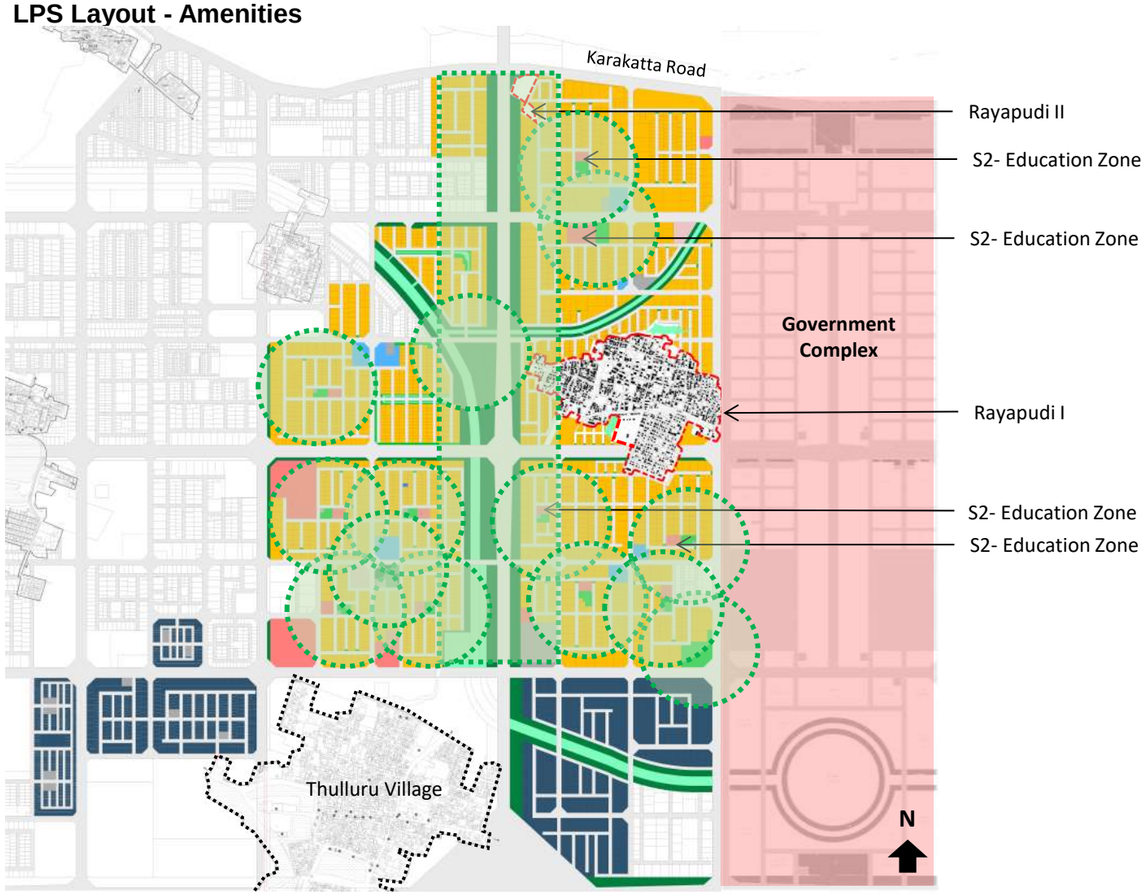
4.1 Analysis of Selected Villages

Rayapudi - I & II



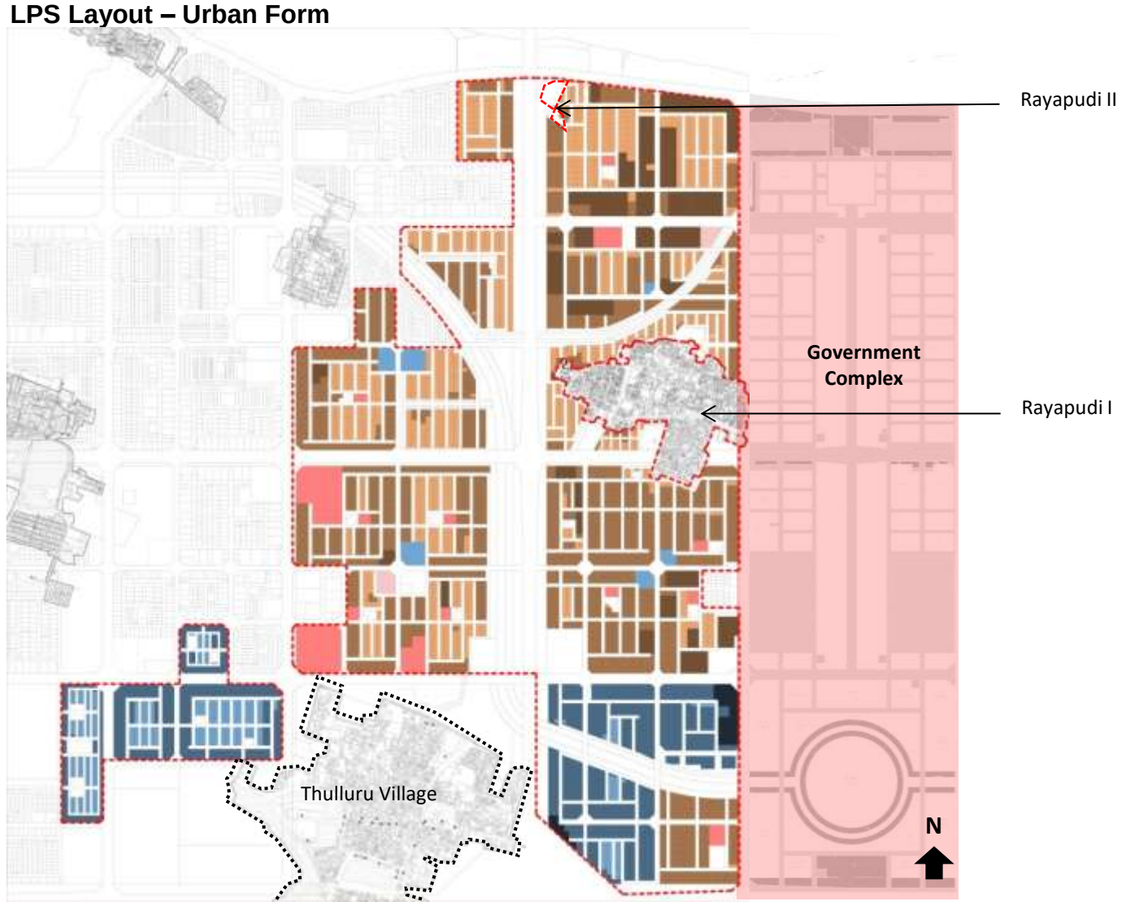
Schematic sections through Rayapudi LPS showing building heights

LPS Layout - Amenities



Rayapudi LPS layout showing amenities

LPS Layout – Urban Form



Rayapudi LPS layout showing proposed FSI distribution

- Residential R3 (4000 sq. m. and above) FSI 2.4
- Residential R3 (500-4000 sq. m.) FSI 2
- Residential R3 (100-499 sq. m.) FSI 1.75
- Educational (FSI as per approval)
- Commercial C2 (2000 sq. m. and above) FSI 2
- Commercial C2 (500-1999 sq. m) FSI 1.4
- Commercial C2 (100-499 sq. m.) FSI 1.2
- Commercial C2 (50-99 sq. m.) FSI 1
- 5 min walking distance radii (400m)
- Government Complex

Opportunities

- S2 (education zone) plots near the existing village can meet the educational and healthcare needs of the village population, owing to flexibility of use offered by Zoning Regulations (ZR)
- Neighbourhood, community and education facilities are planned within a 5-10 min walking distance.
- 400 m radius walkability from open spaces in the LPS layout reflects the ease of accessibility

Areas for Improvement

- Lack of recreational spaces within village boundaries

Source: Base Map – APCRDA, Amaravati Existing Village Base Map, https://crda.ap.gov.in/APCRDA/UserInterface/Admin/crdalpslayouts.aspx;

4.2 Village Integration Guidelines

4.2 Village Integration Guidelines

From the selected village analysis, key issues and opportunities are identified to ensure the seamless integration of the existing villages with the surrounding LPS development. Guidelines are formulated using the selected three villages as examples to illustrate how the integration can be achieved

By understanding the key issues and opportunities in the villages, strategies are proposed to address the different scenarios specifically, which can then be replicated to other villages. A summary of the key issues and opportunities learned from each of the selected villages is as follow:

Nelapadu

- Rich in natural resources
- No connection to proposed Arterial Road
- Linear development along lake
- Did not fully utilize the lake
- Lake being fragmented by new road cutting through
- An increasing trend of people, especially younger population, are leaving for other cities for employment opportunities

Malkapuram

- Rich in historical assets
- Lack of connectivity of internal road network to the LPS proposed road network
- An increasing trend of people, especially younger population leaving for other cities for employment opportunities
- Lack of basic infrastructure including water, electricity and stormwater treatment
- Lack of prominence for the heritage sites
- Risk of development pressure as the village is surrounded by commercial developments given the close proximity to Seed Capital and adjacent to commercial zones in the Lingayapalem LPS
- High percentage of women population within the village and their needs are to addressed

Rayapudi

- Close proximity to the Amaravati Government Complex
- Lack of internal road network connecting internal layout of the village
- There are water assets but their water quality is deteriorating
- The southern part of the village is fragmented by Seed Access Road
- Presence of unauthorized development is at risk due to villages expanding vertically to create rental accommodations for migrant construction workers
- Proposed road network does not connect to main access road in the village
- Close proximity to River Krishna riverfront for Rayapudi II
- Risk of being surrounded by high density development
- Some of the villagers are interested in construction and real estate business

The village integration guidelines aim to provide a clear direction on how to address the above mentioned key issues and opportunities from 5 different aspects, including physical integration, socio-economic integration, environmental integration, community integration and administrative integration.

Context sensitive village integration showing market improvement

4.2 Village Integration Guidelines

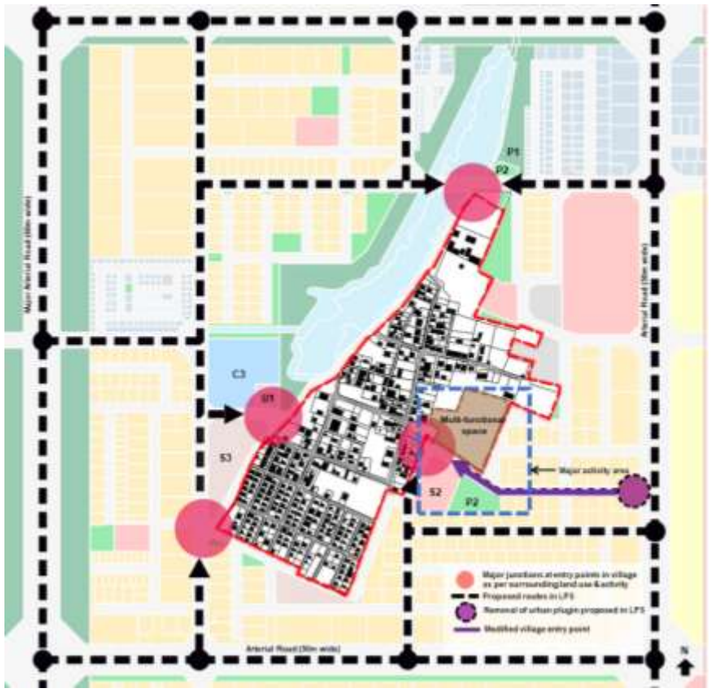
Physical Integration

The Amaravati Masterplan proposed a grid pattern for the capital city's road network to be adopted city wide, which does not align with the existing roads and dissects some of the existing ponds and villages. Therefore, connectivity from the existing villages to LPS and surrounding areas should be established and ponds should be restored. Additionally, other infrastructure such as water supply, electricity, sewage and drainage should be provided for the villages to accommodate the needs of the residents and future requirements.

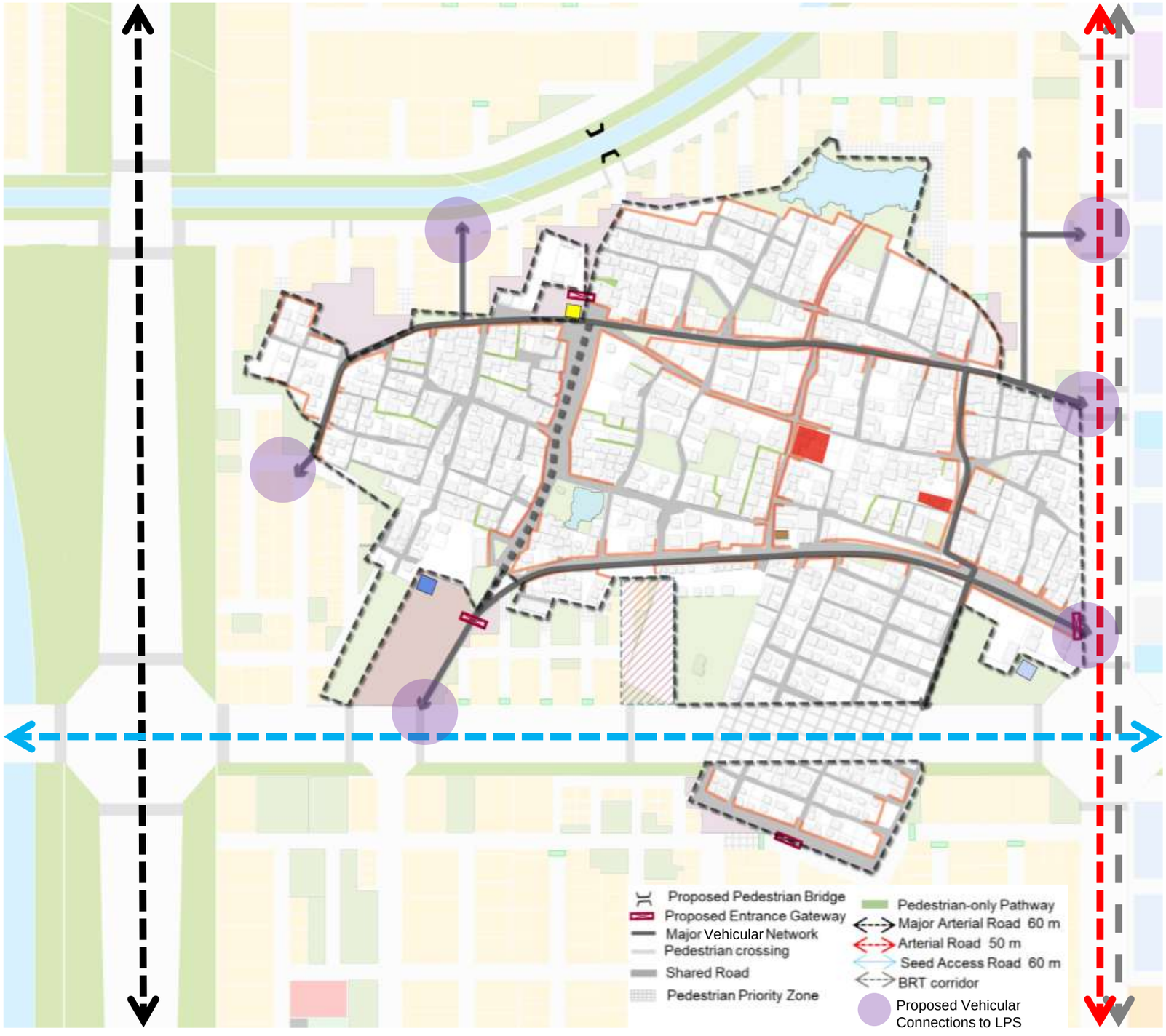
It is important that, the character of the villages should be maintained and preserved. New developments should be sensitive to the village in terms of building height, materials and colours. The fragmented villages should be reconnected through the use of pedestrian linkages and vacant areas between LPS plot and villages should create multifunctional spaces for activities. Villages should be pedestrian friendly and avoid being car dominated. Vehicular accesses should mainly be provided only as needed, such as for emergency vehicles. Strategies for physical integration are as follow:

A) Connectivity to LPS and Surrounding Areas

- Existing village access roads should connect with the proposed road network
- Vehicular and pedestrian crossings should be provided at junctions where village is connected to proposed road network for free movement
- Villages should be planned with traffic prone areas with a low speed zone for pedestrian safety
- Villages should connect to nearby transit points and major activity areas
- Junctions where proposed road network connects the village should act as major nodes with entry points of the village



Proposed connectivity and nodes around Nelapadu village and LPS



Proposed physical integration of Rayapudi village with LPS

4.2 Village Integration Guidelines

Physical Integration

B) Infrastructure Development

- Existing and new road network should be enhanced and developed
- Existing sewage system should be upgraded for future needs
- Utility (water supply, electricity, sewage) connections for households should be provided underground to free up space on the street
- Storm water drainage in the villages with bio swale and permeable surface on ground level should be provided
- Decentralized waste water treatment facility should be included in villages
- Rain water harvesting should be provided for plots more than 200 sq. m.
- Treated water should be used for irrigation in landscaped areas

C) Enhancing Village Character

- Fragmented villages should be connected by pedestrian priority zone to retain the village character (e.g. Rayapudi village the proposed arterial road fragment the village into two parts and in Ainavolu village, the proposed arterial roads (50m wide) fragments the village into 4 parts)
- A maximum vehicular speed of 30km/h should be followed in pedestrian priority zones
- Vacant plots between the village and new development should be used as multi-functional spaces for activities

Pedestrian crossings for safety and connecting villages to LPS

Example of village with improved infrastructure

Paved shaded streets with decorative paving and ethnic shops

Paved shaded streets with trees and open space

- Village edges should be redefined to ensure no marginal lands are created
- A minimum 6m wide road at the periphery of the multi-functional space should be provided for emergency vehicle access
- Minimum 60% of the multi-functional space should be permeable / softscape surface with greening
- New developments / redevelopments of existing buildings should be sensitive to the existing village character including height, building materials and colours
- Socio-cultural events, festivals, weekly markets, fairs, exhibitions, recreation etc. in the multi-functional space should be organised to bring vibrancy to the village and provide a platform for villagers to sell their products and thereby generating economic opportunities for the villagers
- Pedestrians should have right of way to the streets within villages to promote pedestrian-friendly environment and retain distinct character of the village

Shaded farmers market in Santa Fe

D) Parking

- Vehicular access points to a site should be limited with a maximum of 2 spaces
- Parking basements should not be permitted in the village core area due to narrow streets but should allow parking at the periphery of the villages
- Parking spaces should be avoided on building fronts and main streets; instead they should provide surface parking on the side or rear end instead
- Street parking should be provided in the interim as appropriate and screened with landscape/wall or screening compatible with the building design
- Parking should be accessed from secondary streets, where possible, in order to decongest main roads
- Visitor parking should be provided on vacant plots adjacent to the villages depending on the activity

Parking space at rear of plot screened and shaded

Source: https://www.driverknowledgetests.com/resources/pedestrian-crossings-and-refuges

4.2 Village Integration Guidelines

Physical Integration

E) Access for Emergency Vehicles

(for new development /redevelopment of existing buildings)

- For access of emergency vehicles like ambulance, fire engine and hearse, road width should be 9 m; minimum road width for fire tender movement is 6 m
- As per IS code 13039 - External Hydrant Systems Provision and Maintenance : In towns /cities, fire hydrants either stand post type or underground type should be provided at intervals of 100 m connected to sufficient capacity water reservoir. It should be located at a distance of not less than 2 m from face of the buildings
- For buildings along a pedestrianized street, emergency vehicle access should be provided towards rear side of the plot
- Currently, the road widths are less so road widening is required
- As per NBC 2016 – Fire and Life Safety (Part 4), the above provisions are applicable to the following buildings:

a. Hotel, educational, institutional, business, mercantile, industrial, storage, hazardous and mixed occupancies, where any of these buildings have floor area more than 500 sq. m. on any one or more floors
b. Educational buildings having height 9 m and above
c. Institutional buildings having height 9 m and above
d. All assembly buildings
e. Buildings larger than 300 sq. m. of incidental assembly occupancy on any floor
f. Buildings with two basements or more, or with one basement of area more than 500 sq. m.

Nelapadu map showing selected area for road widening illustration

E.g.: For Nelapadu Village, options for road widening to 9 m width with proposed ground coverage as per Zonal Regulation has been illustrated below:

Road widening from center of existing road :

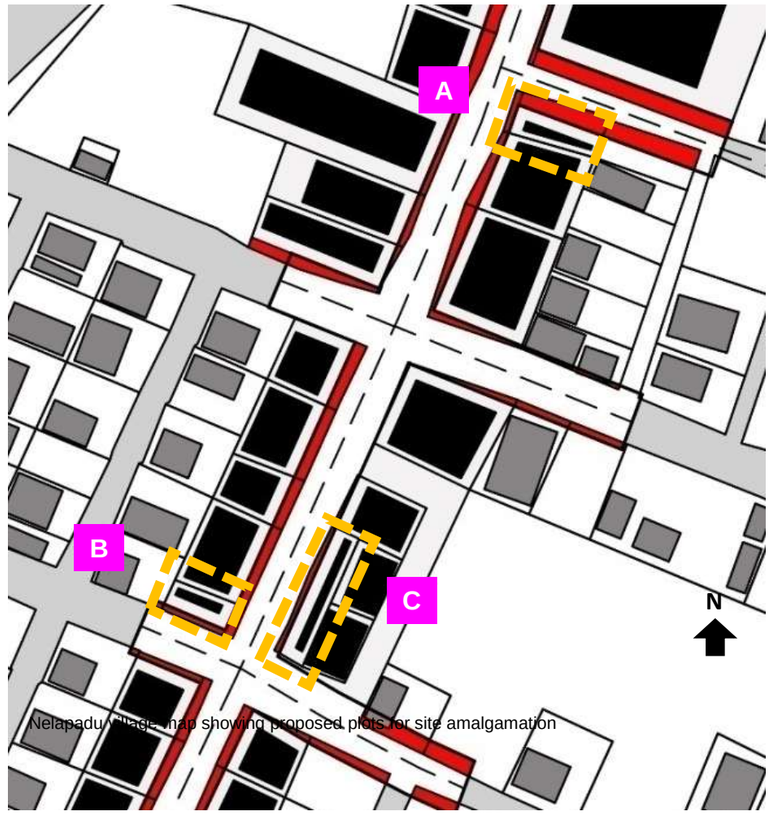
- Plots on both sides of the road are affected
- Minimum plot area after widening is 43.3 sq. m.
- Average percentage reduction of plot size is 13%

Road widening from center of the existing road

Integration of smaller plots affected by road widening

Road widening may cause the size and proportion of certain plots shrink to a point where they are subjected to poor quality of light and ventilation. In some cases plots may become too small for developments. As such, these plots should be considered to be amalgamated with adjacent plots to resolve these issues.

E.g.: In Nelapadu Village, proposed plots for site amalgamation after road widening (from center of the existing road) to the proposed 9 m width has been described as below:



Nelapadu Village map showing proposed plots for site amalgamation

A summary of areas of plots affected by road-widening is given below:

Plot name	Existing Plot area (sq. m.)	Length (m)	Width (m)	Plot area after road widening (sq. m.)	Length (m)	Width (m)
A	97.9	14.9	6.64	62.2	13.86	4.55
B	60.8	11.7	4.92	28.8	10.25	4.39
C	102.1	21.1	4.96	86.2	21.1	4.10

- These corner plots with narrow width can be amalgamated with the adjacent plot

Image source: Village integration Map with LPS layout (Base Map) – APCRDA

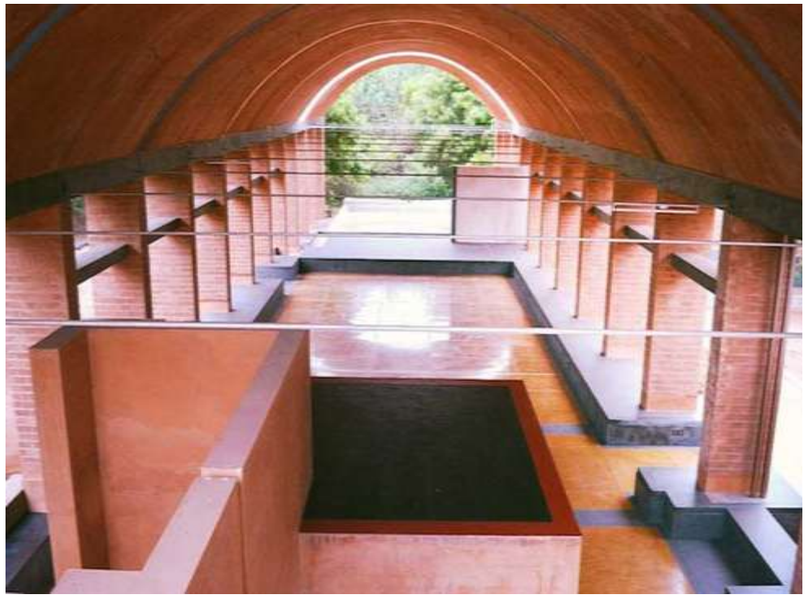
4.2 Village Integration Guidelines

Socio-Economic Integration

As Amaravati is all set to become the new capital city for AP, the villages are also going through their own transition as part of the city development. Villages will have to adapt to a new way of living as the city is moving away from its agricultural heritage. Therefore it is important to create more economic opportunities for the villagers by providing skills development programs to enhance their economic livelihood. Also improving the villages with high quality public open spaces, community facilities and amenities will make their quality of life better. In addition to active street frontages with mixed use developments, community and place making programs and events should be organized together with the villagers which will add value to their life experience as well. APCRDA should also take this opportunity to improve the quality of life of the villagers through provision of community and public spaces, multi-functional spaces, education and healthcare facilities. The villages should be treated as a unique aspect of Amaravati as part of the city's image and identity by promoting the local culture with landmarks such as entrance gateways and heritage sites. Strategies for socio-economic integration are as follow:

A) Village and Activity Center

- There should be at least one Village Centre in a multi-functional space with provision of skill development training programs (like trade, construction business, surveying etc.) and public amenities in each village
- Village Centres should have a min area of 150 sq. m. and vernacular design elements should be included as part of its built form
- Village Centre should also consist of outdoor spill-out spaces for gatherings, cultural events and community discussions



Reference image showing use of Vernacular elements in village center

Image showing entrance gateway at Nelapadu Village

B) Community and Public Spaces

- Traditional gathering spaces in the villages should be identified, preserved and enhanced by creating activity areas/plazas. The spaces should be re-activated with events and programs such as light and sound shows etc.
- Cultural events intrinsic to the identity of the village should be organised
- Traditional arts, crafts, textiles and articles should be promoted through exhibitions, fairs, weekly markets etc.
- Tourist precincts should be developed with public art installations within villages with religious, heritage and eco-tourism potential

C) Entrance Gateways

- Entrance points of existing villages have gateways, which helps to create image and identity of the village and should be retained
- Landmarks should be created near the entrance or alternatively the entrance gateway should be designed as a landmark for the village
- Clear signage should be available next to entrance gateway for visitors
- Public plazas should be at entrance gateway to further highlight and define the entrance of the village

Reference image showing open space outside village center after redevelopment

Reference image showing entrance gateway after redevelopment

Image Source : https://en.wikipedia.org/wiki/Sivaganga#/media/File:Sivaganga_arch.JPG, https://www.re-thinkingthefuture.com/sustainability/15-architecture-firms-in-india-practising-sustainable-and-vernacular-architecture/

4.2 Village Integration Guidelines

Socio-Economic Integration

D) Multi-Functional Space

- Vacant plots at the village edge and open space within the villages should be identified as buffer areas for multi-functional space
- A 6m wide road should be provided at the periphery of the multifunctional space for fire tender movement
- Socio-cultural events, festivals, weekly markets, fairs, exhibitions, recreation etc. which are temporary structures, should be permitted
- Development should be limited to only 10% of the plot area with uses such as public amenities, kiosks, small cafes etc.
- Minimum 60% of the multi-functional space should be open space with permeable / soft-scape surface

Eg: Nelapadu

- Proposed multi-functional space between the existing village and other development, including a village centre within the multi-functional area

Proposed multi-functional space in Malkapuram

E) Heritage

- Heritage sites should be enhanced with open space and landscaping
- Any development encroaching heritage sites should be relocated and re-provisioned in the periphery of the heritage site or village.
- No new development should be permitted within 300m radius from the heritage sites
- Heritage sites should have clear signage to improve legibility of the area
- An information board or plate should be available to introduce the history and significance of the heritage
- Wayfinding tools should be clear to bring people to the heritage sites with ease, from public transport, village gateway to main streets within the village

Eg: Malkapuram

- Provision of information board near Malkapuram Temple and Heritage Stambha
- Provision of wayfinding tools from Mangalagiri – Rayapudi Road to the heritages
- Development of open space and landscaping near the heritage Stambha
- Avoid development near the Heritage Stambha for better legibility

Enhancement of the Stambha in Malkapuram with open space making it an attractive destination

4.2 Village Integration Guidelines

Socio-Economic Integration

Mixed use typology with retail frontage in Little India, Singapore

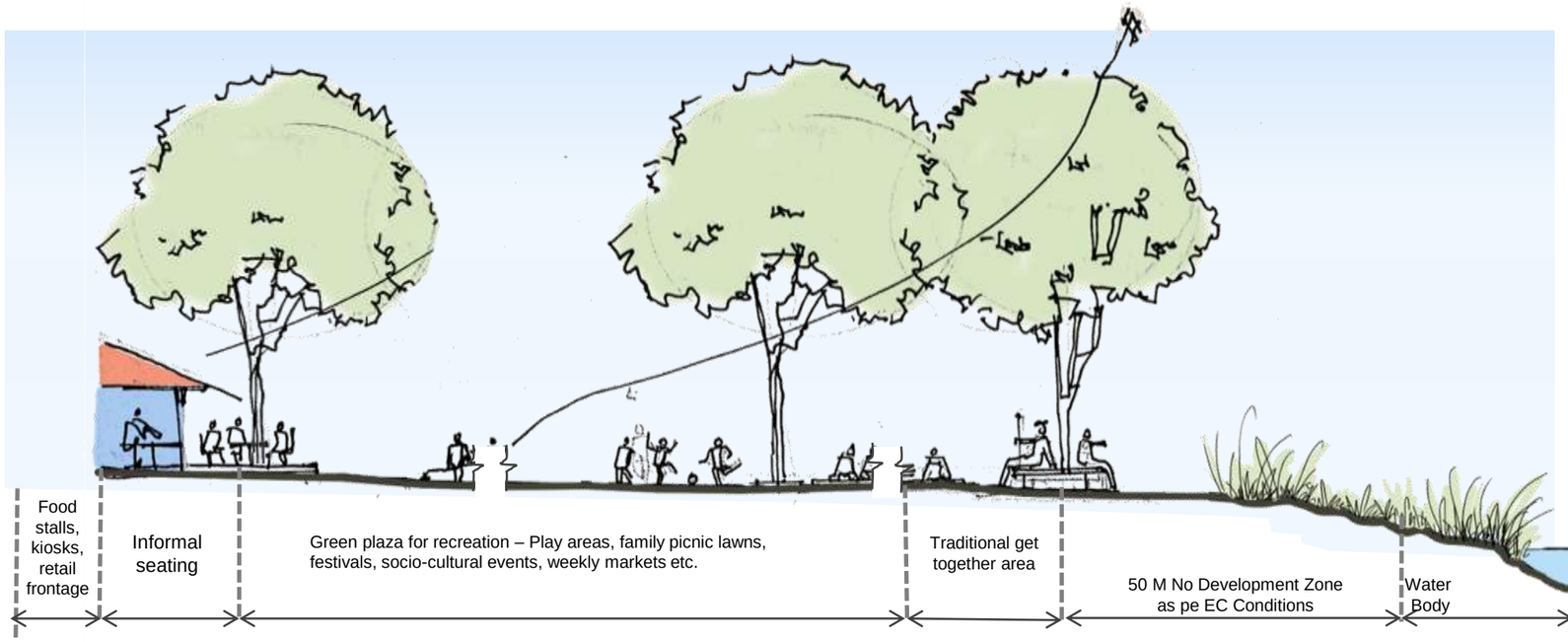
Image showing school in Malkapuram village

F) Mixed Use Development

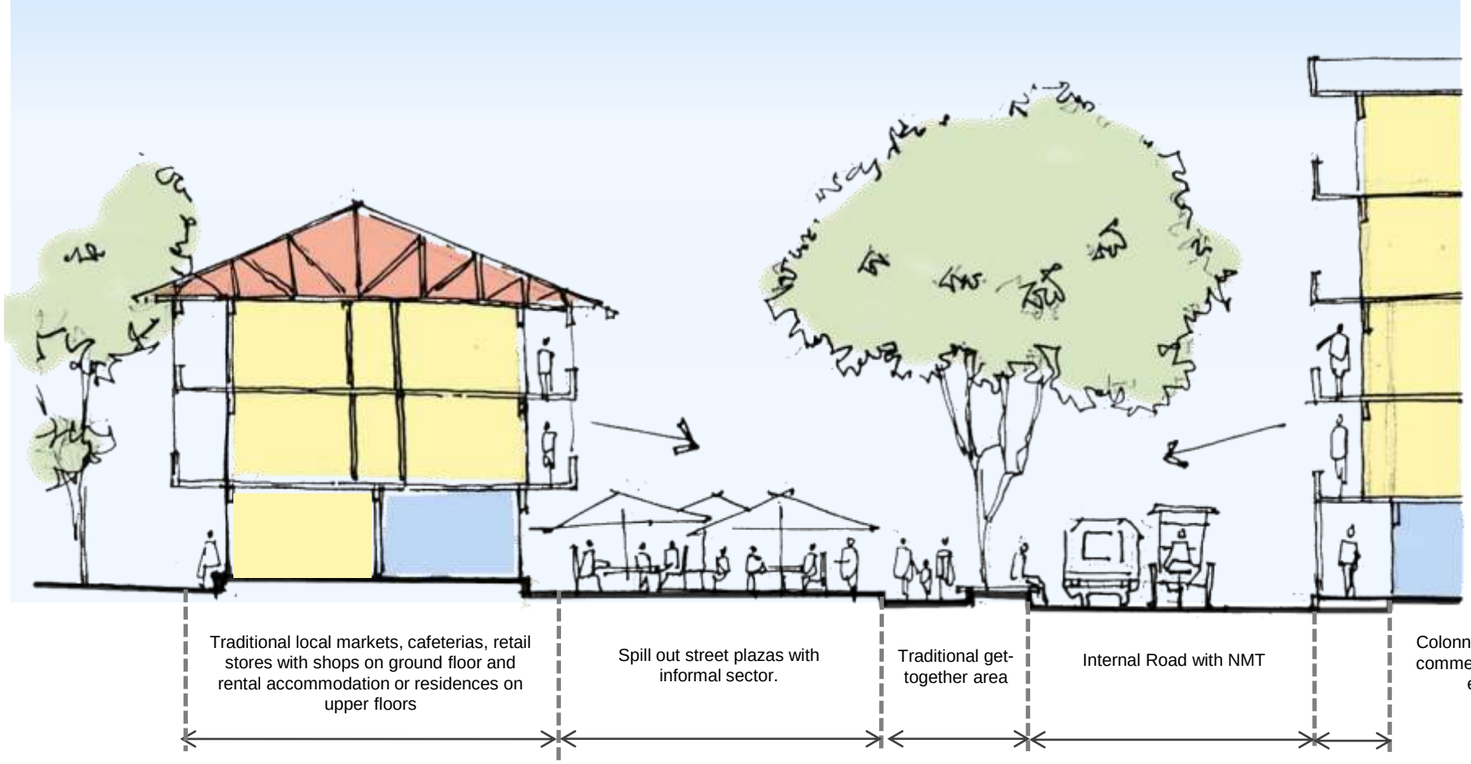
- Active retail frontage with spill-out should be provided to create interactive spaces along water bodies, open spaces, multi-functional activity areas and main pedestrian routes
- Rental accommodation should be permitted on upper floors for working population and home stays for tourists
- Areas for informal sector and vending activity or daily/weekly market should be identified in appropriate places such as village centre, streets, religious places, etc.
- Retail frontage along arterial roads should set up for commercial and service-oriented establishments.
- Small-scale food processing unit and milk marketing with support of a functional dairy cooperative should be available

G) Improved Social Amenities

- Education and healthcare facilities should be provided within the village or nearby
- Healthcare facilities for livestock should be provided within the village or nearby
- Water fountains and public toilets should be provided in villages
- Adequate shading, lighting and seating should be provided in villages
- Landscaped streets and paved pedestrian paths should be provided
- Medium to large plots (over 500m^2) in LPS should be identified to be used for education and health facilities
- Public amenity should be available within 500m radius of village



Conceptual sections showing active street frontage and gathering spaces



Conceptual sections showing active street frontage and gathering spaces

Reference image showing community Health Centre

Reference image showing school after redevelopment

Image source: https://www.bambootravel.co.uk/holidays-to-malaysia/gallery/pictures-of-west-malaysia-and-Singapore, https://www.re-thinkingthefuture.com/sustainability/15-architecture-firms-in-india-practising-sustainable-and-vernacular-architecture/

4.2 Village Integration Guidelines

Environmental Integration

Many of the villages are located within close proximity of natural assets, especially water bodies given the need for farming and agriculture. As the villages are transitioning the functionality of the water bodies can change to recreational spaces for the villagers and residents of the surrounding areas. The natural assets and water bodies should be protected for biodiversity restoration and conservation. Enhancements to the green space can also improve the village from flooding and soil erosion. Drainage and vegetation can play a huge part in the quality of life of the villages and should be monitored and maintained thoroughly. Strategies for environmental integration are as follow:

A) Open Space and Waterfront Connectivity

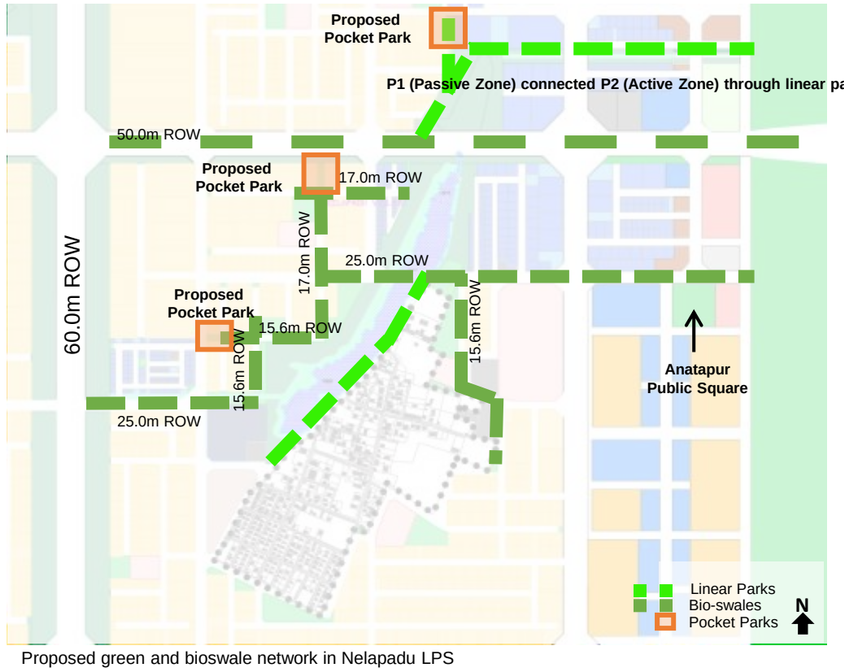
- A network of recreational spaces should be created providing connectivity between different types of open spaces
- A network of pocket parks should be provided with pedestrian connections
- Buffer zone along water bodies should be provided with bio-swales
- High quality pedestrian linkage and network should be formed between the waterfront and internal nodes with high footfall
- Pedestrian linkages such as bridges should be provided across water bodies to not only connect villages, but also offer a pleasant pedestrian experience Open space should be high quality and easily accessible
- Existing water features such as rivers, lakes and ponds should be transformed into attractive places through restoration and water management

E.g.: Nelapadu village

- Connecting P1-Passive Zone around the lake with P2-Active Zones in the LPS through pocket and linear parks
- Connect buffer between P3-Protected Zone and P1-Passive Zone
- Bio-swales are proposed from 15.6m ROW up to 50m ROW (Refer Streetscape and Open Space Guideline)

E.g.: Malkapuram village

- Creating new open space within the village and promenade along the river
- Enhance connectivity between open spaces through pedestrian linkages



Proposed green and bioswale network in Nelapadu LPS

Proposed green network in Malkapuram

Reference image showing bioswale along pedestrian connection

Reference image showing Paley Park (pocket park) in New York

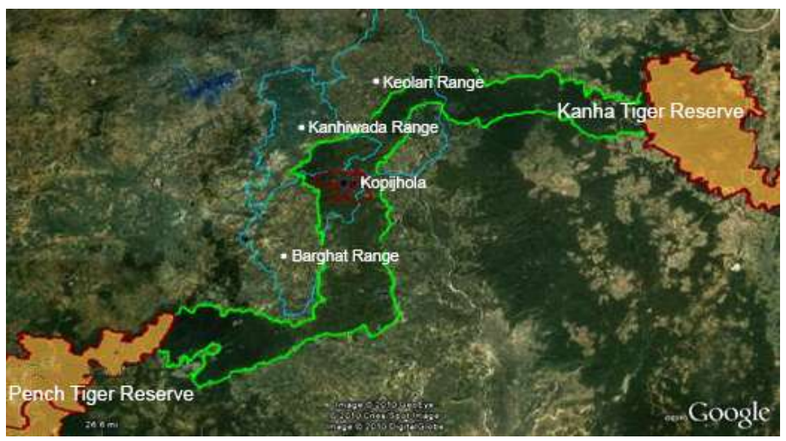
Image Source: Village integration Map with LPS layout (Base Map) – APCRDA, https://gis.apcrda.org/lps/index.html, https://www.pps.org/places/paley-park;

4.2 Village Integration Guidelines

Environmental Integration

B) Ecology and Biodiversity Action Plan (BAP)

- Mitigation measures and proposals for biodiversity restoration/ conservation/ enhancement should be provided to address the threatened species and habitats in the area



Proposal of wildlife corridor connecting Pench and Kanha Tiger Reserve, MP, India

Wildlife crossing (overpass) at Banff National Park, Alberta, Canada

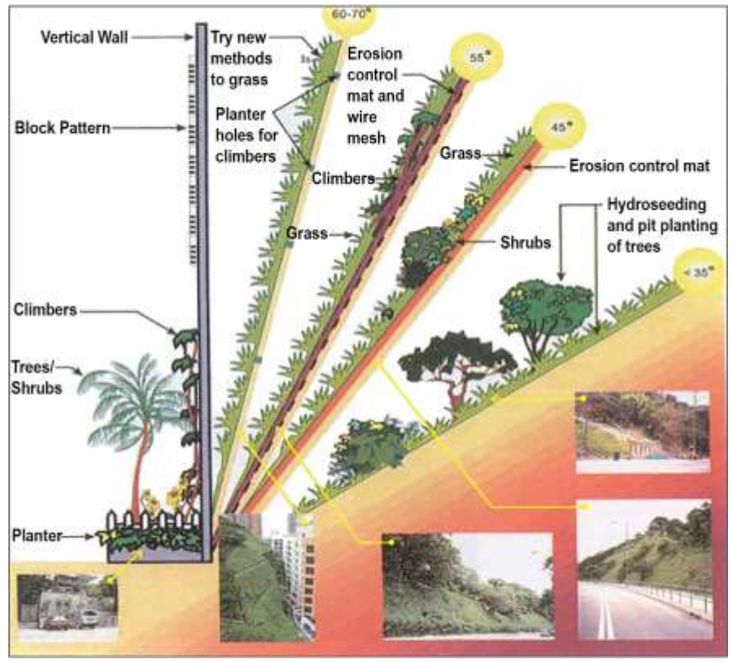
Underpass Wildlife crossing on Trans-Canada Highway at Banff National Park, Alberta, Canada

C) Slope Protection

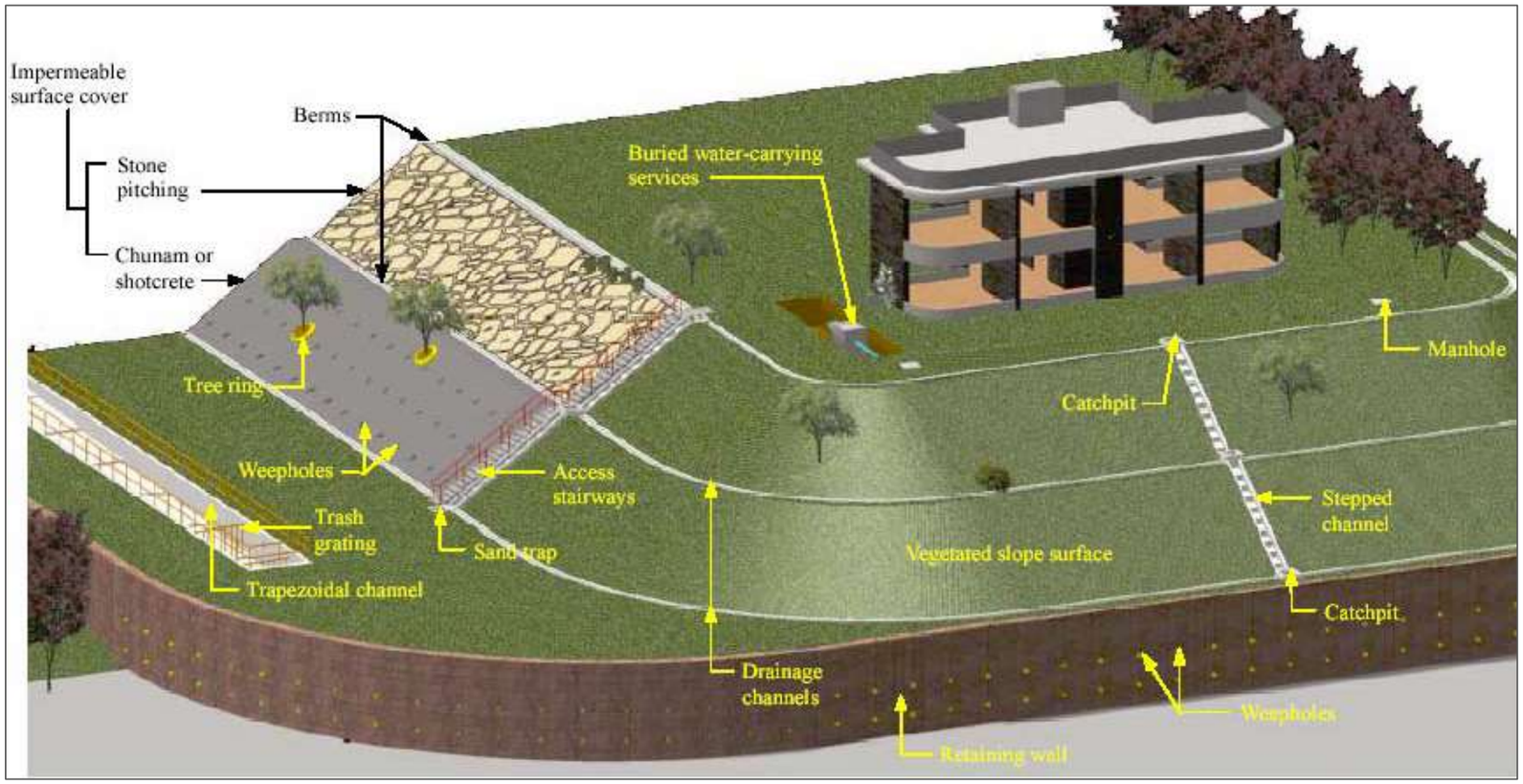
- Vegetation on slopes should be provided to reduce soil erosion
- Appropriate design of drainage system, which includes surface channel, stepped or trapezoidal channel, catch pit and/or sand trap, should be provided to control the storm water discharge
- Subsoil drainage system should lay beneath the surface for ground water discharge
- The water pressure in subsoil drain system should be maintained by the following methods:
  - Introducing a filter layer behind the slope leading water to outlets
  - Provision of weep holes, cut-off drain and subsoil drain pipe

D) Monitoring and Surveillance

- Monitoring and surveillance mechanism should be provided to maintain natural assets
- The protection and management of the water bodies should be undertaken by the Advanced Locality Management (ALM) committee of the area



Various methods to protect a slope surface using vegetation



Various types of slope protection strategies

Image Source: https://www.wwfindia.org/?5880/Helping-the-tigers-of-Kopijhola, https://mymodernmet.com/wildlife-crossings/, http://www.montana.edu/news/17385/msu-s-western-transportation-institute-featured-for-research-on-wildlife-crossings, http://personal.cityu.edu.hk/~bswmwong/pl/pdf/slope_protection.pdf;

4.2 Village Integration Guidelines

Community Integration

As part of the guiding principles, Amaravati should be a people-first, socially inclusive and equitable city. Public engagement is therefore critical to gather the community needs in creating the best scenario for village integration. It is important to set up a channel of communication for the public sector to discuss with the private sector, villagers, communities, and other key stakeholders on strategies and projects as Amaravati moves forward to become the capital city. The communication should be two-way, such that the public sector is able to educate and raise awareness while receiving feedback from the community and village representatives. This proactive approach to public outreach and citizen engagement will make the community engagement process more inclusive and transparent. This will be the key to differentiate Amaravati as a smart and sustainable city with a people-first mentality. Strategies for community integration are as follow:

- Village Improvement Group (VIG) should be set up with inclusion of village representatives with equal percentage/ratio of male-female/minority from the village population. VIGs should work together with the government to ensure that the Local Area Plans would result in the smart and sustainable development of the villages
- Village Centre should be provided for community interaction, for meetings and events such as sports and other socio-cultural activities
- Community centre should be provided within the village centre for community engagement, education and awareness including grievance redressal mechanism; it should have a minimum area of 50 sq. m.
- Village representatives should organise and document consultative meetings with stakeholders at monthly intervals
- Citizen outreach should share information through different channels, such as TV, news media, social media and more
- Projects related to villages should go through public consultation. Consultation should include direct interaction with the community through meetings with elected representatives, opinion surveys, open house events etc. (Refer to Implementation Chapter)
- Community members should be engaged in collecting data and mapping data to inform stakeholders of facts and trends

Administrative Integration

To ensure village integration as a continuous and ongoing practice for Amaravati, village preservation and community engagement should be required at an administrative level to ensure the voices of the community can be heard. Panchayats and village representatives should be aware of any upcoming projects and strategies with regards to their respective villages so that they are well informed and give feedback about their aspirations and concerns. The panchayats should be equipped to resolve any disputes or concerns raised by the community. The Zoning Regulations should include an ‘urban villages’ zone and develop a Village Improvement Plan to preserve and enhance the village character. Strategies for administrative integration are as follow:

- Village panchayat areas should be included in Amaravati Capital City’s administrative boundary as part of the administrative setup
- To ensure the voices and needs of the villages are heard and addressed, there should be at least 2 representatives from the village population in the administrative setup
- R1-village planning zone should be designated as ‘urban village zone’
- Local development authority should have a separate team responsible for urban village zone
- Local Area Plans should be developed in detail for different urban villages by the local development authority to help in better understanding the infrastructure/developmental/socio-cultural/economic needs of the villages
- Grievance redressal mechanism should be setup for resolving any disputes on land pooling, acquisition and any other issues raised by the people

Eg: Rayapudi

- Disputes regarding development might arise frequently due to the high development pressure and potential brought by its proximity to the government complex
- Grievance redressal mechanism is necessary to ensure issues or disputes on land polling and development will be addressed

Chief Minister with farmers on a flagging occasion and formation of ‘ Farmers First’ for welfare and imparting knowledge of urban construction and economic opportunities to the villagers. .

Consultations with the village elders and grama committee members

Pubic Consultation Meeting by APCRDA

Land Pooling Scheme process, land transactions and agreements with the Villagers done by APCRDA

Rally conducted for environmental awareness in the villages

Image Source: https://crda.ap.gov.in/APCRDACOMMUNI/Media/Articlephotos/CRDAMU363.jpg, http://www.unnati.org/pdfs/books/OwnerDrivenHousingProcess.pdf, http://vro-india.org/women-empowerment/, https://www.archdaily.com/870856/m-a-c-made-in-earth/59111e24e58ece3310000221-m-a-c-made-in-earth-image, https://www.conftool.com/landandpoverty2018/index.php/04-09-Cherukuri-540_ppt.pdf?page=downloadPaper&filename=04-09-Cherukuri-540_ppt.pdf&form_id=540&form_index=2&form_version=final

4.3 Village Integration Demonstration

4.3 Village Integration Demonstration

Nelapadu

Nelapadu is rich in natural assets, but they are poorly maintained. It is therefore essential to ensure all natural assets are well protected and utilised to form a unique identity for the village. A summary of the key issues are recapped and the proposed strategies are summarised below.

Key issues

- Rich in natural resources
- No connection to proposed Arterial Road
- Linear development along lake
- Did not fully utilize the lake
- Lake being fragmented by new road cutting through
- An increasing trend of people, especially younger population, are leaving for other cities for employment opportunities

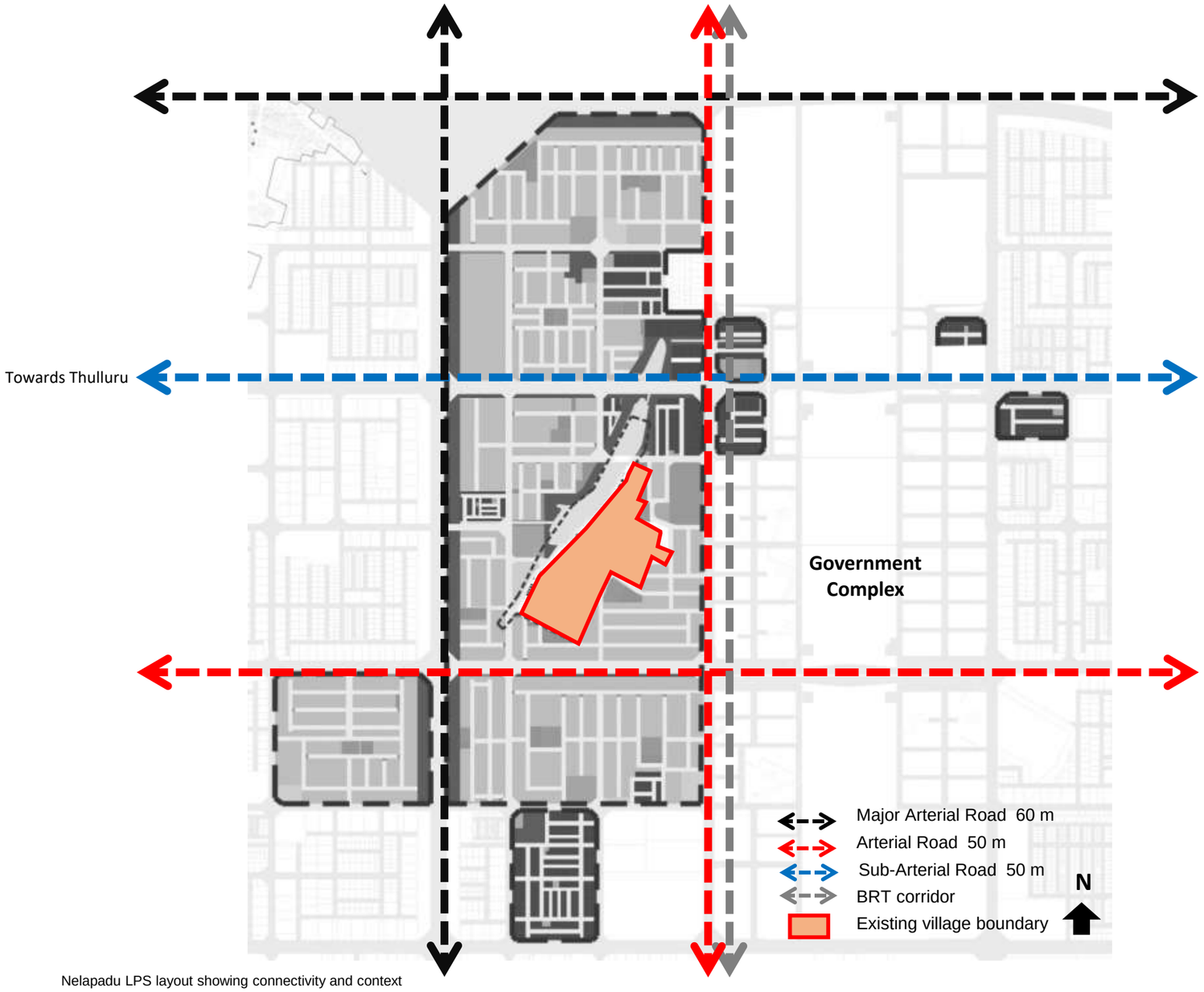
Key Strategies

- Circulation and integrated development
    - Fragmented lake should be re-connected by allowing the flow of water between fragments
    - LPS roads should connect to existing roads leading to the village, especially towards the Government Complex
    - Village centres should be provided to act as gathering places for the village and interact with LPS developments
    - Buffer areas should be provided at village edge for seamless transition between built forms
    - More employment opportunities should be explored for the people in Nelapadu for their livelihood

- Integrate the natural asset
    - Walkable riverfront promenade surrounding the lake
    - Transforming the lake into a recreational landmark

- Open spaces and pedestrian connectivity
    - Traditional entry gateways of Andhra Pradesh

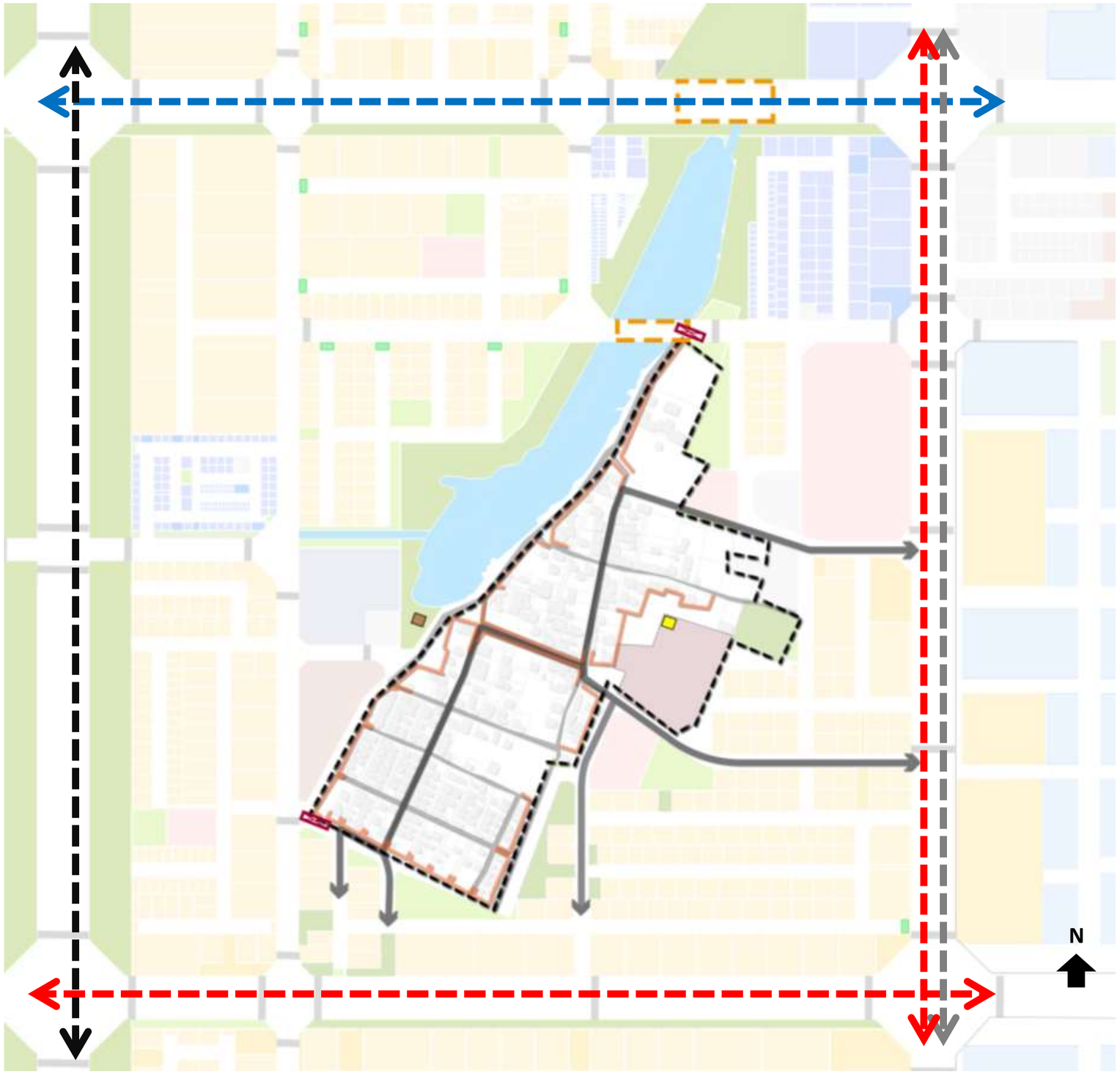
Natural water bodies are in risk of deteriorating in Nelapadu (left)



Nelapadu LPS layout showing connectivity and context

4.3 Village Integration Demonstration

Nelapadu Village Integration



Proposed village integration of Nelapadu village with LPS

R3 - Medium to High Density Zone
C2 - General commercial Zone
C3 - Neighbourhood center Zone
P1 - Passive Zone
P2 - Active Zone
P3 - Protected Zone
U1 - Reserve Zone
U2 - Road reserve Zone
S2 - Education Zone
S3 - Special Zone
Shared Roads
Proposed Multi-functional Space
Water bodies inside the village
Vacant plot proposed as Recreational space
Proposed Village Center
Proposed Entrance Gateway
Existing Office
Mixed use

SR2 - Low Density Zone
SR4 - High Density Zone
SC1a – Mixed Use
SC1b – Mixed Use
SP1 - Passive Zone
SP2 - Active Zone
SP3 - Protected Zone
SS1 - Government Zone
SS2a - Education Zone
SS2b - Cultural Zone
SS3 - Special Zone
SU1 - Reserve Zone
SU2 - Road Network
Major Vehicular Network
Pedestrian crossing
Proposed Culvert
Major Arterial Road 60 m
Arterial Road 50 m
Sub-Arterial Road 50 m
BRT corridor

Circulation and Integrated Development

- Taking advantage of the existing lake and city commercial zoning, the village has the potential for eco-tourism around the lake
- Proposed roads/bridges passing through the lake should provide wide culverts for maintaining the free flow of water even at low water levels (maintain bottom level of culvert)
- The village centre will be placed in the multi-functional space next to open space and landmarks in the village, such as church, temple, and statues etc. This will create an activity node as a gathering point for the villagers
- The adjacent map has highlighted several key connections of the village roads that should be linked to the LPS for direct access to the village
- Mixed use developments should be provided along the main access roads in the villages to create vibrant streets

Reference image showing village market center at Kew Community

Source: Amaravati Existing Village Base Map, https://gis.apcrda.org/lps/index.html, https://crda.ap.gov.in/APCRDA/UserInterface/Admin/DRAFTAGCPOBJECTIONS.aspx, http://ilovemarkets.co.uk/listing/kew-village-community-market/

4.3 Village Integration Demonstration

Nelapadu Village Integration Proposal

Proposed open space network plan of Nelapadu village with LPS

- R3 - Medium to High Density Zone
- C2 - General commercial Zone
- C3 - Neighbourhood center Zone
- P1 - Passive Zone
- P2 - Active Zone
- P3 - Protected Zone
- U1 - Reserve Zone
- U2 - Road reserve Zone
- S2 - Education Zone
- S3 - Special Zone
- Vacant plot proposed as Socio-cultural activity space
- Proposed Recreational Space
- Water bodies inside the village
- Proposed Development in Vacant Plots
- Existing Office
- Proposed Village Center
- Proposed Entrance Gateway
- SR2 - Low Density Zone
- SR4 - High Density Zone
- SC1a – Mixed Use
- SC1b – Mixed Use
- SP1 - Passive Zone
- SP2 - Active Zone
- SP3 - Protected Zone
- SS1 - Government Zone
- SS2a - Education Zone
- SS2b - Cultural Zone
- SS3 - Special Zone
- SU1 - Reserve Zone
- SU2 - Road Network
- Pedestrian Connectivity
- Proposed Open Space
- Pedestrian Crossing
- Proposed Culvert
- Proposed Public Square
- Proposed Major Pedestrian Street
- Activity Nodes

Integrate the Natural Asset

- The natural assets in Nelapadu such as the lake should be capitalised to provide opportunities for the development of high quality open space.
- A walkable riverfront promenade surrounding the lake should be provided to allow people to enjoy the stunning view of the lake
- Recreational amenities such as seating, plazas and playground alongside should be provided
- The lake should be transformed into a recreational landmark

Open Spaces and Pedestrian Connectivity

- Traditional entry gateways of Andhra Pradesh are proposed on Sakhamuru-Nelapadu Road connecting existing access road of the village with LPS layout to clearly define the entry of the village.
- Open space should be around the entrance gateway to enhance the legibility and visual of the entrance to attract more footfall and interaction
- Inner village access roads should become more pedestrian friendly roads to better connect all open spaces and create a walkable environment within Nelapadu

Reference image showing lakefront promenade with natural edges at Wilcox Park, Ontario

Source: Amaravati Existing Village Base Map, https://gis.apcrda.org/lps/index.html, https://crda.ap.gov.in/APCRDA/UserInterface/Admin/DRAFTAGCPOBJECTIONS.aspx, https://www.co.ozaukee.wi.us/2101/Culvert-Design, http://www.dillon.ca/projects/project-details/lake-wilcox-park

4.3 Village Integration Demonstration

Malkapuram

As Malkapuram is unique for its heritage, the focus of Malkapuram's integration is to protect and promote the historic value of the heritage sites. A summary of the key issues are recapped and the proposed strategies are summarised below.

Key issues

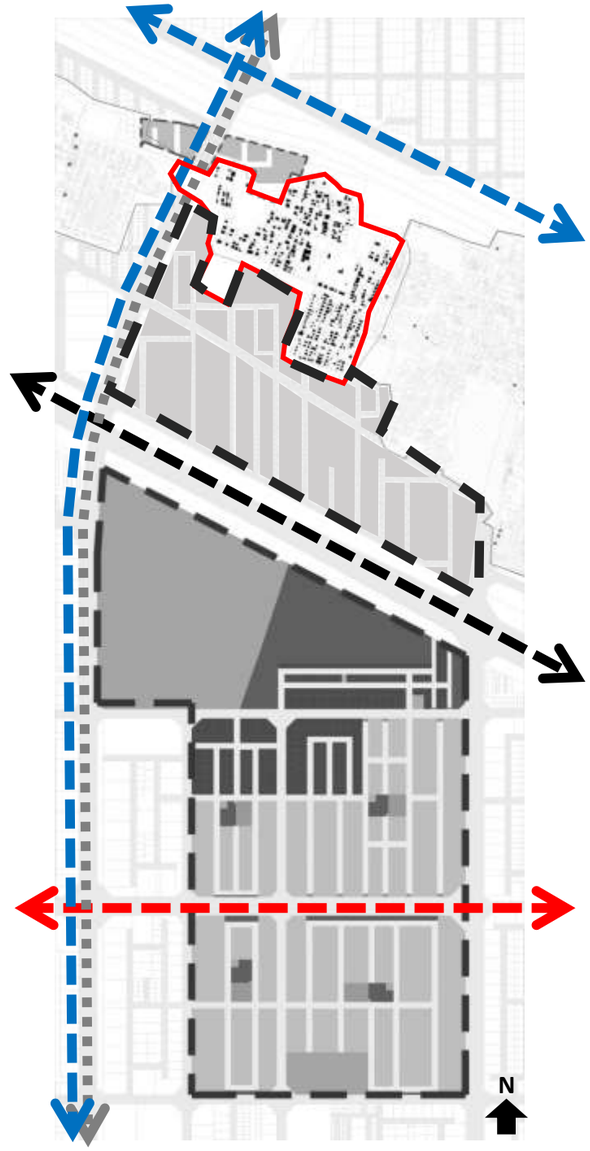
- Rich in historical assets
- Lack of connectivity of internal road network to the LPS proposed road network
- An increasing trend of people, especially younger population, leaving for other cities for employment opportunities
- Lack of basic infrastructure including water, electricity and storm water treatment
- Lack of prominence for the heritage sites
- Risk of surrounded by commercial developments given the close proximity to Seed Capital and adjacent to commercial zones in the Lingayapalem LPS
- High percentage of women population within the village

Key Strategies

- Integrate the historical assets
    - Heritage areas should be well maintained
    - Education and awareness should be raised with heritage trails
- Circulation and integrated development
    - Internal roads should be connected to LPS roads
    - Basic amenities and infrastructure such as water, electricity and road network should be provided
    - Water Management such as storm water treatment should be provided
    - Job opportunities, especially for women, within the village should be explored
- Open spaces and pedestrian connectivity
    - Green buffer along the canal should be extended
    - Water transport should be explored for better connectivity
    - Waterfront Promenade should be provided
    - Traditional entrance gateways should be provided

Image showing the poor condition of the pond

Preservation of heritage sites including in Malkapuram is key part of their village integration



Malkapuram and Lingayapalem LPS layout showing connectivity

4.3 Village Integration Demonstration

Malkapuram Village Integration Proposal

R3 - Medium to High Density Zone
C2 - General commercial Zone
C3 - Neighbourhood center Zone
P1 - Passive Zone
P2 - Active Zone
P3 - Protected Zone
U1 - Reserve Zone
U2 - Road reserve Zone
S2 - Education Zone
S3 - Special Zone
Proposed Mixed Use (APCRDA plot)
Vacant plot proposed as Recreational space
Vacant plot proposed as Socio-cultural activity space
Water bodies inside the village
Panchayat Office
Existing Educational Amenities
Pedestrian Priority Zone

Existing Heritage Temple
Heritage Stambha
Proposed Village Center
Proposed Entrance Gateway
Mixed use
Major vehicular Network
Pedestrian crossing
Proposed Culvert
Activity Node
Route for Heritage walk
Existing temples
Proposed Recreational Space near the Water Body
Shared Road
Sub-Arterial Road 50 m
BRT corridor

Integrating Historical Assets

- Malkapuram has the potential to develop into a village for heritage and tourism
- Malkapurum Temple and the Stambha should be better maintained; an open space should be provided around the heritage sites to protect from developments
- A heritage trail should be created to connect all sites for tourism development
- Art gallery and museum should be provided to promote Malkapuram'a history with open space around to create a node showcasing the character of the village

Circulation and Integrated Development

- As seen in the adjacent map, connections to LPS roads from existing access roads in Malkapuram should be provided to enhance the village's connectivity and accessibility
- Pedestrian priority Zone should be provided at the Sub-Arterial Road due west to connect Malkapuram with Velagapudi
- With vacant plots available close to the canal, different activities should be provided near the canal, such as art exhibition, festive celebration, picnic, sport and recreational activities
- Vacant plots along the edge of Malkapuram can act as buffer areas between the village and new developments
- Mixed use developments should be provided along the main access roads in the villages to create vibrant streets

Environmental Protection

- Proper infrastructure facilities should be provided for the restoration and maintenance of the pond
- Monitoring should be provided to avoid mixing of storm water and dumping
- Water treatment facilities should be provided near the village

Structure plan of Malkapuram village with LPS

Source: Amaravati Existing Village Base Map, https://gis.apcrda.org/lps/index.html, https://crda.ap.gov.in/APCRDA/UserInterface/Admin/DRAFTAGCPOBJECTIONS.aspx

4.3 Village Integration Demonstration

Malkapuram Village Integration Proposal

R3 - Medium to High Density Zone
C2 - General commercial Zone
C3 - Neighbourhood center Zone
P1 - Passive Zone
P2 - Active Zone
P3 - Protected Zone
U1 - Reserve Zone
U2 - Road reserve Zone
S2 - Education Zone
S3 - Special Zone
Proposed Mixed Use (APCRDA plot)
Vacant plot proposed as Recreational space
Vacant plot proposed as Socio-cultural activity space
Water bodies inside the village
Proposed Major Pedestrian Street
Possible Developments in Vacant Plots

Existing Heritage Temple
Heritage Stambha
Proposed Village Center
Proposed Entrance Gateway
Pedestrian crossing
Proposed Culvert
Activity Node
Route for Heritage walk
Existing temples
Proposed Recreational Space near the Water Body
Shared Road
Pedestrian Pavement
Proposed Public Square
Pedestrian Connectivity
Proposed Open Space
Panchayat Office
Existing Educational Amenities

Open Spaces and Pedestrian Connectivity

- Green buffer along both sides of the canal should be extended to create a more walkable and environment-friendly promenade that offers splendid views and recreation area for relaxation, with amenities such as coffee shops and retails along the promenade that bring footfall towards the canal
- An open public square should be provided at the western entrance gateway of Malkapuram to form a node for people to interact and attract more visitors
- Village centre should be provided in the multi-functional space near the pond within the village
- Open space should integrate the existing natural environment and amenities to strengthen the identity of the village and encourage social interaction as there is a mixed of communities in the village
- Traditional entry gateways should be at the junctions of Penumaka – Amaravati Road and the LPS layout, the Inavolu Road and the Penumaka – Amaravati Road respectively to define the entrance of Malkapuram
- Open space should be provided near heritage sites to enhance the aesthetic quality and highlight the importance of the heritage sites
- A pedestrian network with well-structured pathways connecting the canal should be provided to improve accessibility and navigation for pedestrians
- Water transport should be provided at the canal for better connectivity for the village

Proposed open space network plan of Malkapuram village with LPS

Source: Amaravati Existing Village Base Map, https://gis.apcrda.org/lps/index.html, https://crda.ap.gov.in/APCRDA/UserInterface/Admin/DRAFTAGCPOBJECTIONS.aspx, https://www.authentikcanada.com/holidays/tourist-office-ottawa#slide_3,

4.3 Village Integration Demonstration

Malkapuram Village Integration Proposal

Revitalisation of Stambha and temple in Malkapuram offering high quality open space with improved accessiblity for people to appreciate and enjoy

4.3 Village Integration Demonstration

Rayapudi

Rayapudi has high development potential and pressure due to its proximity to the Government Complex. It is therefore essential to ensure all infrastructure can support future development and population. A summary of the key issues are recapped and the proposed strategies are summarised below.

Key issues

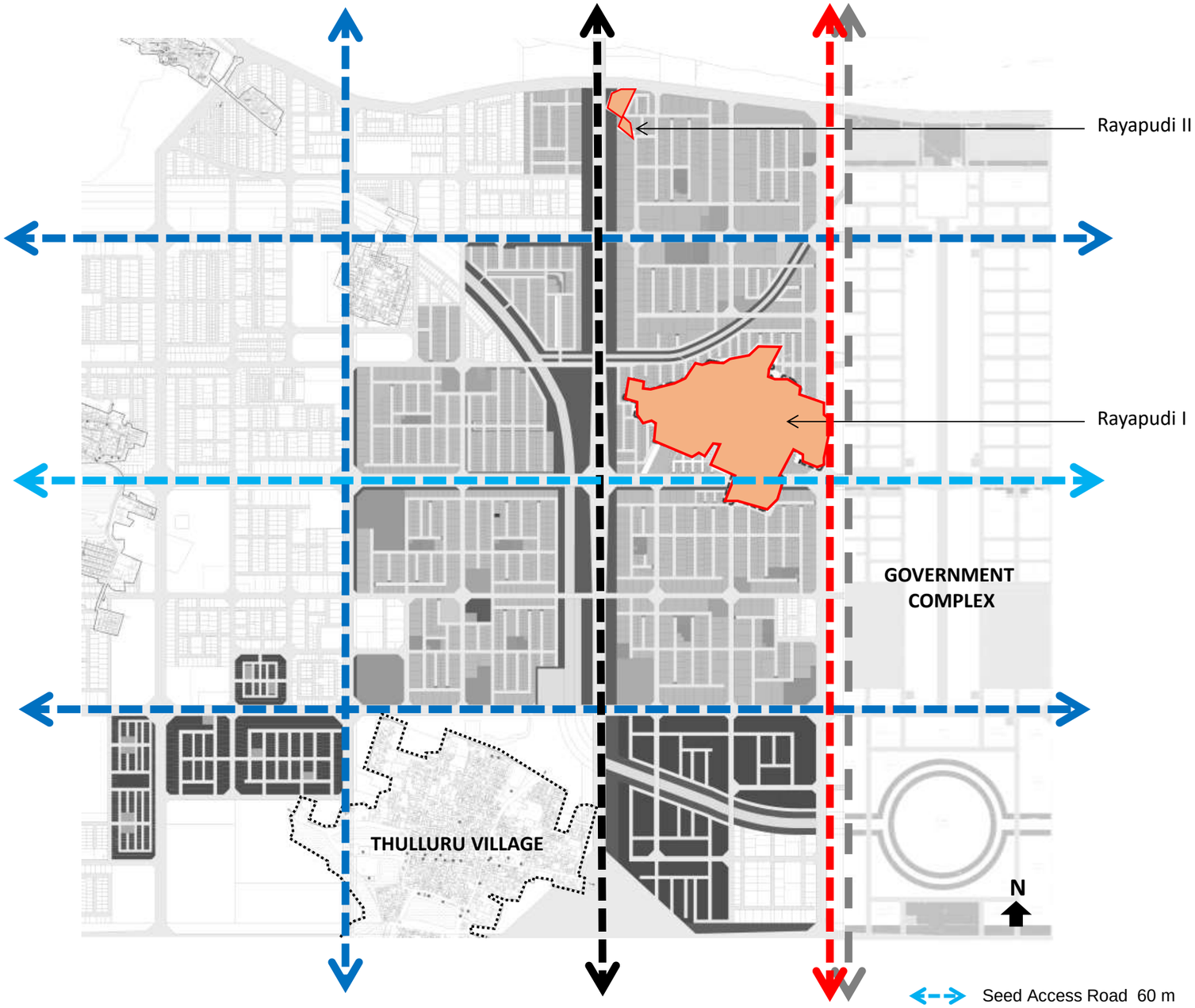
- Close proximity to the Amaravati Government Complex
- Lack of internal road network connecting internal layout of the village
- Presence of water assets but the water quality is deteriorating
- The southern part of the village is fragmented by Seed Access Road
- Presence of unauthorized development is at risk due to villages building vertically to create rental accommodations to migrant construction workers
- Proposed road network does not connect to main access road in the village
- Close proximity to River Krishna riverfront for Rayapudi II
- Risk of being surrounded by high density development
- Some of the villagers are interested in construction and real estate business

Key Strategies

- Circulation and integrated development
  - Sustainable conservative approach
  - Comprehensive pedestrian network
  - Linkages to the Arterial Road from the village should be provided to allow interaction with the surrounding context while keeping traffic reasonable to create a pedestrian-friendly environment
  - Education and health facilities should be provided close to village for better accessibility

- Open spaces and pedestrian connectivity
  - More multi-purpose open space should be provided
  - High quality pedestrian network should be provided to link all open spaces and water bodies including bridges

Natural water bodies are in risk of deteriorating in Rayapudi



Rayapudi LPS layout showing connectivity

4.3 Village Integration Demonstration

Rayapudi II - Village Integration Proposal

Proposed village integration of Rayapudi – II village with LPS

R3 - Medium to High Density Zone
P1-Passive Zone
Water bodies
Navy Plot
Vacant Plots Proposed as Socio-cultural Area
Vacant Plots Proposed as Sports Activity Space
Vacant Plots Proposed as Recreational Space
Proposed Village Centre

Proposed Sports Center
Proposed Public Square
Proposed Open Space
Proposed Pedestrian Connectivity
Proposed Major Pedestrian Streets
Mixed Use
Pedestrian Crossing
Activity Nodes
Proposed Entrance Gateways

Open Spaces and Pedestrian Connectivity

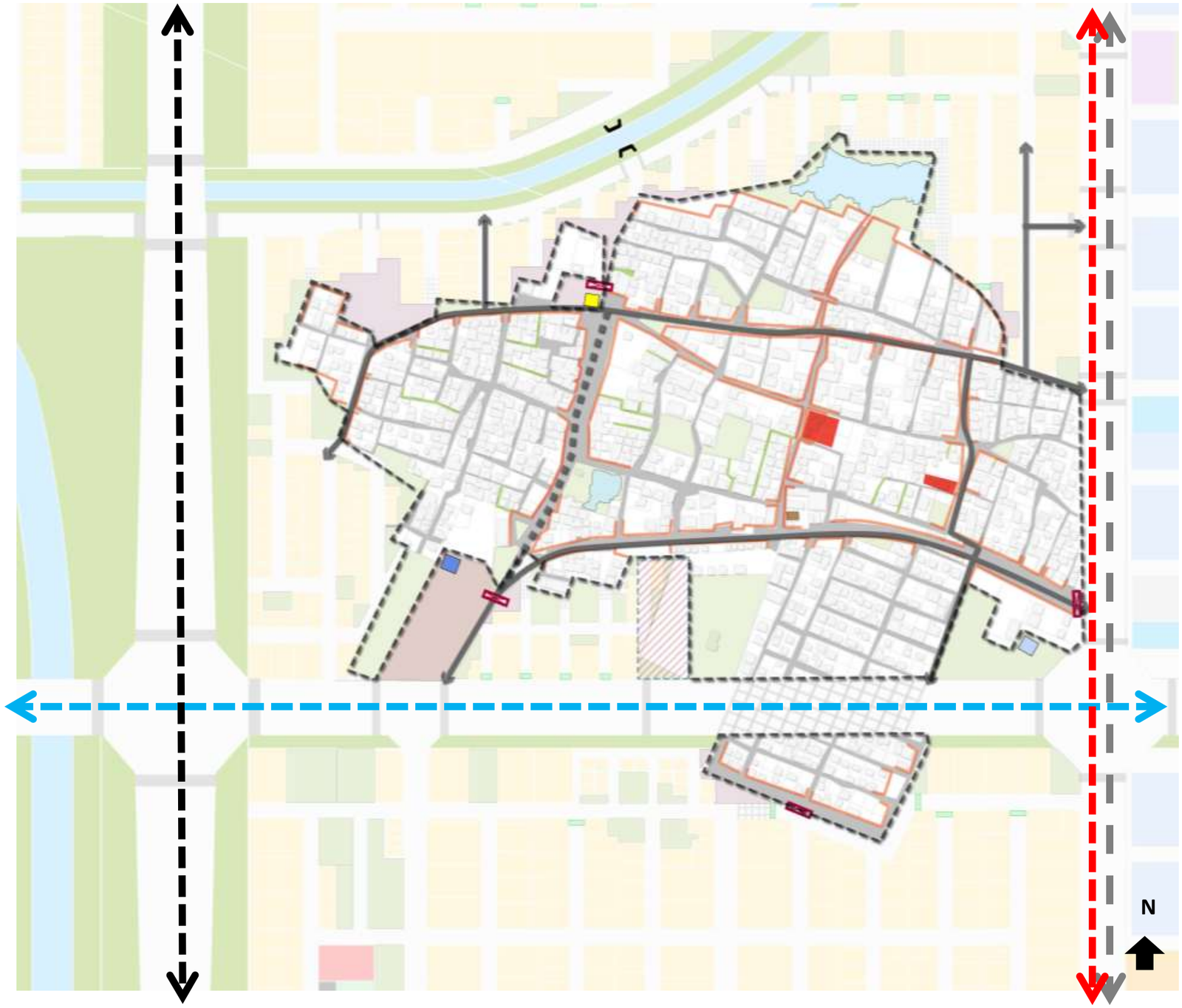
- Village centre should be located at the southern part of the village, in a cluster with other community land use for interactions including sports and socio-cultural activities
- As highlighted in red, open space and public square should be provided on the left of the village acting as a buffer to separate the village from the main LPS road
- Pedestrian network should be extended towards to the riverfront to allow villages and visitors to access the riverfront
- Active frontage should be encouraged along the main pedestrian route within the village to influence the quality of pedestrian routes and pleasure in walking
- An entrance gateway should be located on the northern edge of the village as it is the interface facing the main LPS road. There should also be clear signage at the gateway for better legibility of the village

Reference image showing entrance gateway at Bangalore

Source: Amaravati Existing Village Base Map, https://gis.apcrda.org/lps/index.html, https://crda.ap.gov.in/APCRDA/UserInterface/Admin/DRAFTAGCPOBJECTIONS.aspx, http://www.travelpitara.com/Soukya-Holistic-Health-Centre-Bangalore-hoteldetails.aspx?id=439

4.3 Village Integration Demonstration

Rayapudi I - Village Integration Proposal



Proposed village integration of Rayapudi village with LPS

- R3 - Medium to High Density Zone
- C2 - General commercial Zone
- C3 - Neighbourhood center Zone
- P1 - Passive Zone
- P2 - Active Zone
- P3 - Protected Zone
- U1 - Reserve Zone
- U2 - Road reserve Zone
- S2 - Education Zone
- S3 - Special Zone
- Proposed Recreational Space
- Vacant Plot proposed as Socio-cultural Activity Space
- Water Bodies inside the Village
- Proposed Village Centre
- Activity Node
- Proposed Pedestrian Bridge
- Shared street with placemaking
- Reserved Plot for AP Transport
- Existing Educational Amenities
- CRDA Office
- SR2 - Low Density Zone
- SR4 - High Density Zone
- SC1a – Mixed Use
- SC1b – Mixed Use
- SP1 - Passive Zone
- SP2 - Active Zone
- SP3 - Protected Zone
- SS1 - Government Zone
- SS2a - Education Zone
- SS2b - Cultural Zone
- SS3 - Special Zone
- SU1 - Reserve Zone
- Proposed Sports Activity Space
- Proposed Entrance Gateway
- Mixed Use
- Major vehicular Network
- Pedestrian crossing
- Shared Road
- Pedestrian Priority Zone
- Pedestrian-only Pathway
- Major Arterial Road 60 m
- Arterial Road 50 m
- Seed Access Road 60 m
- BRT corridor

Circulation and Integrated Development

- Rayapudi should be transformed into an attractive tourist destination as it has a long history, unique cultural festivals and rich natural elements
- As seen in the adjacent map, connection of major vehicular access roads within Rayapudi to the Arterial Road and Seed Access Road should be provided to strengthen the physical connectivity
- Open space around water bodies should be provided to preserve the water bodies while providing a place for people to enjoy
- Vacant plots at the edge of Rayapudi should used as recreational/socio-cultural space
- Entrance gateway should be at the junction connected to Arterial Road due east and at the proposed socio-cultural activity space due south
- Pedestrian access should be prioritised within the village with mixed use developments along major access roads to create active street fronts
- Education and health facilities should be close to the village and easily accessible
- As part of the village is fragmented due to Seed Access Road, a pedestrian priority zone should be provided to connect the village on foot

Reference image showing active pedestrian street

Source: Amaravati Existing Village Base Map, https://gis.apcrda.org/lps/index.html, https://crda.ap.gov.in/APCRDA/UserInterface/Admin/DRAFTAGCPOBJECTIONS.aspx

4.3 Village Integration Demonstration

Rayapudi I - Village Integration Proposal

- R3 - Medium to High Density Zone
- C2 - General Commercial Zone
- C3 - Neighbourhood Center Zone
- P1 - Passive Zone
- P2 - Active Zone
- P3 - Protected Zone
- U1 - Reserve Zone
- U2 - Road reserve Zone
- S2 - Education Zone
- S3 - Special Zone
- Road Affected area (RAA)
- Vacant plot proposed as Socio-cultural activity space
- Proposed Recreational Space
- Water bodies inside the village
- Proposed Public Square
- Pedestrian Connectivity
- Activity Nodes
- Proposed Sports Center
- Proposed Commercial Center
- CRDA Office
- Existing Educational Amenities
- SR2 - Low Density Zone
- SR4 - High Density Zone
- SC1a – Mixed Use
- SC1b – Mixed Use
- SP1 - Passive Zone
- SP2 - Active Zone
- SP3 - Protected Zone
- SS1 - Government Zone
- SS2a - Education Zone
- SS2b - Cultural Zone
- SS3 - Special Zone
- SU1 - Reserve Zone
- SU2 - Road Network
- Proposed Open Space
- Pedestrian Crossing
- Proposed Pedestrian Bridge
- Proposed Development in Vacant Plots
- Proposed Major Pedestrian Street
- Proposed Village Center
- Shared Road with Placemaking
- Reserved Plot for AP Transport

Proposed open space network plan of Rayapudi village with LPS

Open Spaces and Pedestrian Connectivity

- As Rayapudi is located with close proximity to the AGC and the Arterial Road, it is expected that the development pressure is higher in this village. Therefore, pedestrian connectivity of the area should be improved especially linking the open spaces and fragmented village to create a walkable environment
- Six vacant plots near the edge of the village should be used as public squares, open spaces, recreational centers to provide social and economic opportunities for Rayapudi
- Developments and multi-functional open spaces should be provided in vacant plots near existing amenities (including church, school, etc.) within the village to increase accessible open space for social benefits
- Open space along the edge of village should act as a buffer access between Rayapudi and LPS developments; pedestrian connections should also be ensured
- Pedestrian bridge should be provided for crossing the canal to connect the open spaces across the canal

Source: Amaravati Existing Village Base Map, https://iremlandscape.wordpress.com/tag/public-open-spaces//

4.3 Village Integration Demonstration

Rayapudi I - Village Integration Masterplan

4.3 Village Integration Demonstration

Rayapudi I - Village Integration Demonstrations

Bringing the village closer to the waterbody

Vibrant waterfront at Seaport Village in San Diego

Taking village edges and turning into socio-economic spaces

Wholesale clothes market in Hyderabad

Source: https://www.seaportvillage.com/, https://www.whatsuplife.in/hyderabad/blog/wp-content/uploads/2018/09/shilparaman.jpg

4.3 Village Integration Demonstration

Rayapudi I - Village Integration Demonstrations

Activating water bodies near the villages

Attractive open space with lake in Vondel Park, Amsterdam

Activating open space with village centre

Community gathering space for residents in San Diego

Source: https://upload.wikimedia.org/wikipedia/commons/3/37/Vondelpark.jpg/, https://www.travelingmom.com/family-vacations/san-diego-family-vacations/day-trip-in-san-diego-seaport-village/

4.3 Village Integration Demonstration

Rayapudi I - Village Integration Demonstrations

Pedestrian priority zone with pedestrian crossing connecting fragmented Rayapudi I

Summary of Village Integration Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Connectivity to LPS and Surrounding Areas					183
Existing village access roads should connect with the proposed road network	√	√	√		
Vehicular and pedestrian crossings should be provided at junctions where village is connected to proposed road network for free movement	√	√	√		
Villages should be planned with traffic prone areas with a low speed zone for pedestrian safety	√		√		
Villages should connect to nearby transit points and major activity areas	√	√	√		
Junctions where proposed road network connects the village should act as major nodes with entry points of the village	√	√	√		
Infrastructure Development					184
Existing and new road network should be enhanced and developed	√	√	√		
Existing sewage system should be upgraded for future needs	√	√	√		
Utility (water supply, electricity, sewage) connections for households should be provided underground to free up space on the street	√	√	√		
Storm water drainage in the villages with bio swale and permeable surface on ground level should be provided	√	√	√		
Decentralized waste water treatment facility should be included in villages	√			√	
Rain water harvesting should be provided for plots more than 200 sq. m.	√	√		√	
Treated water should be used for irrigation in landscaped areas	√	√		√	
Enhancing Village Character					184
Fragmented villages should be connected by pedestrian priority zone to retain the village character (e.g. Rayapudi village the proposed arterial road fragment the village into two parts and in Ainavolu village, the proposed arterial roads (50m wide) fragments the village into 4 parts)	√		√		
A maximum vehicular speed of 30km/h should be followed in pedestrian priority zones	√		√		
Vacant plots between the village and new development should be used as multi-functional spaces for activities	√	√	√		
Village edges should be redefined to ensure no marginal lands are created	√		√		
A minimum 6m wide road at the periphery of the multi-functional space should be provided for emergency vehicle access	√	√	√		
Minimum 60% of the multi-functional space should be permeable / softscape surface with greening	√	√	√		
New developments / redevelopments of existing buildings should be sensitive to the existing village character including height, building materials and colours	√	√	√		
Socio-cultural events, festivals, weekly markets, fairs, exhibitions, recreation etc. in the multi-functional space should be organised to bring vibrancy to the village and provide a platform for villagers to sell their products and thereby generating economic opportunities for the villagers	√	√		√	
Pedestrians should have right of way to the streets within villages to promote pedestrian-friendly environment and retain distinct character of the village	√	√	√		

Summary of Village Integration Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Parking					184
Vehicular access points to a site should be limited with a maximum of 2 spaces	√	√	√		
Parking basements should not be permitted in the village core area due to narrow streets but should allow parking at the periphery of the villages	√	√	√		
Parking spaces should be avoided on building fronts and main streets; instead they should provide surface parking on the side or rear end instead	√	√	√		
Street parking should be provided in the interim as appropriate and screened with landscape/wall or screening compatible with the building design	√		√		
Parking should be accessed from secondary streets, where possible, in order to decongest main roads	√	√	√		
Visitor parking should be provided on vacant plots adjacent to the villages depending on the activity	√			√	
Access for Emergency Vehicles (for new development /redevelopment of existing buildings)					185
For access of emergency vehicles like ambulance, fire engine and hearse, road width should be 9m; minimum road width for fire tender movement is 6m	√		√		
As per IS code 13039 - External Hydrant Systems Provision and Maintenance: In towns /cities, fire hydrants either stand post type or underground type should be provided at intervals of 100m connected to sufficient capacity water reservoir. It should be located at a distance of not less than 2m from face of the buildings	√		√		
For buildings along a pedestrianized street, emergency vehicle access should be provided towards rear side of the plot	√	√	√		
As per NBC 2016 – Fire and Life Safety (Part 4), the above provisions are applicable to the following buildings: a. Hotel, educational, institutional, business, mercantile, industrial, storage, hazardous and mixed occupancies, where any of these buildings have floor area more than 500 sq. m. on any one or more floors b. Educational buildings having height 9 m and above c. Institutional buildings having height 9 m and above d. All assembly buildings e. Buildings having area more than 300 sq. m. of incidental assembly occupancy on any floor f. Buildings with two basements or more, or with one basement of area more than 500 sq. m.	√	√	√		
Integration of Smaller Plots Affected by Road Widening					185
Amalgamation should be considered for small village plots becoming unviable for developments due to road widening	√	√		√	
Village and Activity Center					186
There should be at least one Village Centre in a multi-functional space with provision of skill development training programs (like trade, construction business, surveying etc.) and public amenities in each village	√		√		
Village Centres should have a min area of 150 sq. m. and vernacular design elements should be included as part of its built form	√		√		
Village Centres should also consist of outdoor spill-out spaces for gatherings, cultural events and community discussions	√			√	

Summary of Village Integration Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Community and Public Spaces					186
Traditional gathering spaces in the villages should be identified, preserved and enhanced by creating activity areas/plazas. The spaces should be re-activated with events and programs such as light and sound shows etc.	√	√	√		
Cultural events intrinsic to the identity of the village should be organised	√	√		√	
Traditional arts, crafts, textiles and articles should be promoted through exhibitions, fairs, weekly markets etc.	√	√		√	
Tourist precincts should be developed with public art installations within villages with religious, heritage and eco-tourism potential	√		√		
Entrance Gateways					186
Entrance points of existing villages have gateways, which helps to create image and identity of the village and should be retained	√		√		
Landmarks should be created near the entrance or alternatively the entrance gateway should be designed as a landmark for the village	√	√		√	
Clear signage should be available next to entrance gateway for visitors	√		√		
Public plazas should be at entrance gateway to further highlight and define the entrance of the village	√		√		
Multi-Functional Space					187
Vacant plots at the village edge and open space within the villages should be identified as buffer areas for multi-functional space	√		√		
A 6m wide road should be provided at the periphery of the multifunctional space for fire tender movement	√		√		
Socio-cultural events, festivals, weekly markets, fairs, exhibitions, recreation etc. which are temporary structures, should be permitted	√	√		√	
Development should be limited to only 10% of the plot area with uses such as public amenities, kiosks, small cafes etc.	√	√	√		
Minimum 60% of the multi-functional space should be open space with permeable / soft-scape surface	√	√	√		
Heritage					187
Heritage sites should be enhanced with open space and landscaping	√		√		
Any development encroaching heritage sites should be relocated and re-provisioned in the periphery of the heritage site or village.	√		√		
No new development should be permitted within 300m radius from the heritage sites	√		√		
Heritage sites should have clear signage to improve legibility of the area	√		√		
An information board or plate should be available to introduce the history and significance of the heritage	√		√		
Wayfinding tools should be clear to bring people to the heritage sites with ease, from public transport, village gateway to main streets within the village	√		√		
Mixed Use Development					188
Active retail frontage with spill-out should be provided to create interactive spaces along water bodies, open spaces, multi-functional activity areas and main pedestrian routes	√	√	√		
Rental accommodation should be permitted on upper floors for working population and home stays for tourists	√	√	√		
Areas for informal sector and vending activity or daily/weekly market should be identified in appropriate places such as village centre, streets, religious places, etc.	√		√		
Retail frontage along arterial roads should set up for commercial and service-oriented establishments.	√	√	√		
Small-scale food processing unit and milk marketing with support of a functional dairy cooperative should be available	√	√		√	

Summary of Village Integration Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Improved Social Amenities					188
Education and healthcare facilities should be provided within the village or nearby	√		√		
Healthcare facilities for livestock should be provided within the village or nearby	√		√		
Water fountains and public toilets should be provided in villages	√		√		
Adequate shading, lighting and seating should be provided in villages	√		√		
Landscaped streets and paved pedestrian paths should be provided in villages	√		√		
Medium to large plots (over 500m^2) in LPS should be identified to be used for education and health facilities	√		√		
Public amenity should be available within 500m radius of village	√		√		
Open Space and Waterfront Connectivity					189
A network of recreational spaces should be created providing connectivity between different types of open spaces	√		√		
A network of pocket parks should be provided with pedestrian connections	√		√		
Buffer zone along water bodies should be provided with bio-swales	√		√		
High quality pedestrian linkage and network should be formed between the waterfront and internal nodes with high footfall	√		√		
Pedestrian linkages such as bridges should be provided across water bodies to not only connect villages, but also offer a pleasant pedestrian experience	√			√	
Open space should be high quality and easily accessible	√		√		
Existing water features such as rivers, lakes and ponds should be transformed into attractive places through restoration and water management	√	√	√		
Ecology and Biodiversity Action Plan (BAP)					190
Mitigation measures and proposals for biodiversity restoration/ conservation/ enhancement should be provided to address the threatened species and habitats in the area	√		√		
Slope Protection					190
Vegetation on slopes should be provided to reduce soil erosion	√		√		
Appropriate design of drainage system, which includes surface channel, stepped or trapezoidal channel, catch pit and/or sand trap, should be provided to control the storm water discharge	√		√		
Subsoil drainage system should lay beneath the surface for ground water discharge	√			√	
The water pressure in subsoil drain system should be maintained by the following methods: ○ Introducing a filter layer behind the slope leading water to outlets ○ Provision of weep holes, cut-off drain and subsoil drain pipe	√			√	

Summary of Village Integration Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Monitoring and Surveillance					190
Monitoring and surveillance mechanism should be provided to maintain natural assets	√	√	√		
The protection and management of the water bodies should be undertaken by the Advanced Locality Management (ALM) committee of the area	√	√	√		
Community Integration					191
Village Improvement Group (VIG) should be set up with inclusion of village representatives with equal percentage/ratio of male-female/minority from the village population. VIGs should work together with the government to ensure that the Local Area Plans would result in the smart and sustainable development of the villages	√	√	√		
Village Centre should be provided for community interaction, for meetings and events such as sports and other socio-cultural activities	√	√	√		
Community centre should be provided within the village centre for community engagement, education and awareness including grievance redressal mechanism; it should have a minimum area of 50 sq. m.	√	√	√		
Village representatives should organise and document consultative meetings with stakeholders at monthly intervals	√	√		√	
Citizen outreach should share information through different channels, such as TV, news media, social media and more	√	√	√		
Projects related to villages should go through public consultation. Consultation should include direct interaction with the community through meetings with elected representatives, opinion surveys, open house events etc. (Refer to Implementation Chapter)	√	√	√		
Community members should be engaged in collecting data and mapping data to inform stakeholders of facts and trends	√	√	√		
Administrative Integration					191
Village panchayat areas should be included in Amaravati Capital City's administrative boundary as part of the administrative setup	√		√		
To ensure the voices and needs of the villages are heard and addressed, there should be at least 2 representatives from the village population in the administrative	√	√	√		
R1-village planning zone should be designated as 'urban villages'	√		√		
Local development authority should have a separate team responsible for urban villages	√		√		
Local Area Plans should be developed in detail for different urban villages by the local development authority to help in better understanding the infrastructure/developmental/socio-cultural/economic needs of the villages	√	√	√		
Grievance redressal mechanism should be setup for resolving any disputes on land pooling, acquisition and any other issues raised by the people	√		√		

5 Transit and Pedestrian Oriented Development (TPOD) Guidelines

Transit and Pedestrian Oriented Development

Overview

Transit and Pedestrian Oriented Development (TPOD) refers to creating high density developments concentrated within close proximity of public transport connected by pedestrian network to promote walkability. TPOD concept uses a pedestrian first approach with priority given to people over transit and vehicles. TPOD uses the transport node as the central core; usually a BRT stop or a MRT station.

There are benefits in increasing density near transit zones and locating land-uses with a mix of residential, commercial, business, recreational, amenities and open spaces in a cluster. It increases catchment and transit ridership and improves accessibility to facilities, reduces time and cost of travel, as well as reduces the need for car ownership by providing alternative transit modes. TPOD offers sustainable urban mobility and improves the quality of life of the residents and visitors to Amaravati.

An efficient and well connected pedestrian network is therefore important within a transport node. TPOD helps businesses as they are more likely to prosper with high footfalls. Active transport also improves the health of people from the increased amount of walking compared to a car-driven community. There are likely less noise and emission pollution as the result of less vehicles on the road.

To maximise the advantages of transit nodes, changing the development density and connecting neighbourhoods on a human scale is a solution to forming a smart and sustainable neighbourhood.. Amaravati should incorporate a TPOD concept to create an integrated pedestrian and public transport network connecting transit with developments and end users. To form an efficient and effective TPOD, the following strategies were derived:

1. Prioritise walking, biking and transit over cars
2. Create districts with **short commutes**
3. Develop neighbourhoods that **promote walking**
4. **Prioritise Non-Motorized Transport (NMT)** networks
5. Create **vibrant networks** of streets and paths
6. Place **high density development near** high-quality **public transit**
7. Plan for **mixed use development, both vertically and horizontally**
8. Optimise **catchment, transit capacity and operation**
9. **Improve urban mobility** by regulating parking and vehicular use
10. Adopt a phased development approach transitioning from BRT to MRT

Intent and Scope

The TPOD Chapter will explain the concept behind the strategies and guidelines while visually demonstrating the benefits of having an integrated transit and pedestrian network in a community. The chapter will highlight the built form, density and mixed use; street interface and multilevel linkages; multi-modal transit and last mile connectivity; and in the end provide a TPOD demonstration and phased development of transit nodes for Amaravati overall.

The importance of large scale integrated development and pedestrian connectivity with the design of high quality open space will be emphasised to create a healthy and vibrant walking environment around the transit node. Lastly, the multi-level linkage will show how transit nodes and the neighbourhood are connected seamlessly to encourage the use of public transport and reduce car dependency.

Currently the City of Vancouver’s largest transit-oriented development, Marine Gateway is a mixed use development that adjoins the Sky-train station

https://www.canadianarchitect.com/features/new-tod-town/

Transit and Pedestrian Oriented Development

Advantages of TPOD

- **Promotes public transport**

Encourage more public transport use with an integrated multi-modal transit system including Non-Motorised Transport (NMT).

- **Reduces private vehicle dependency**

A community with a strong and dependable transit system and streetscaping elements can discourage vehicle dependency and congestion through design policy and enforcement.

- **Increases accessibility**

With a multi-modal, well-connected transportation and pedestrian network, TPOD not only increases the accessibility within the neighbourhood, but also improves the mobility options for non-drivers. People can easily get to places they want with multiple choices of transport rather than relying on automobiles.

- **Increases ridership**

A successful TPOD will increase the ridership of public transit thanks to the high density mixed use developments surrounding the transit node and the increased footfall from surrounding neighbourhood.

- **Reduces pollution**

By providing convenient public transportation system as well as safe and easy pedestrian access to transit, TPOD lowers the rate of air pollution, energy consumption and fuel emission, which improves the quality of environment and public health.

- **Strengthens local economies**

Improving local public transit and pedestrian environment will reduce cost and time spent on commuting. People will be able to spend their time on other economic activities in the local area. Also, a high density area provides economic opportunities that encourage businesses to open near transportation nodes as well.

- **Increases real estate value**

Improved accessibility and transportation cost savings to TPOD neighborhoods will boost their attractiveness and potentially increase revenue from land within TPOD “Influence Zone”, which appreciates over time.

- **Emphasize sensitive development**

While TPOD can drive up property prices and accelerate gentrification, with a more sensitive development approach, this can be offset by allocating a significant portion of the new development to affordable housing.

- **Encourages social equity**

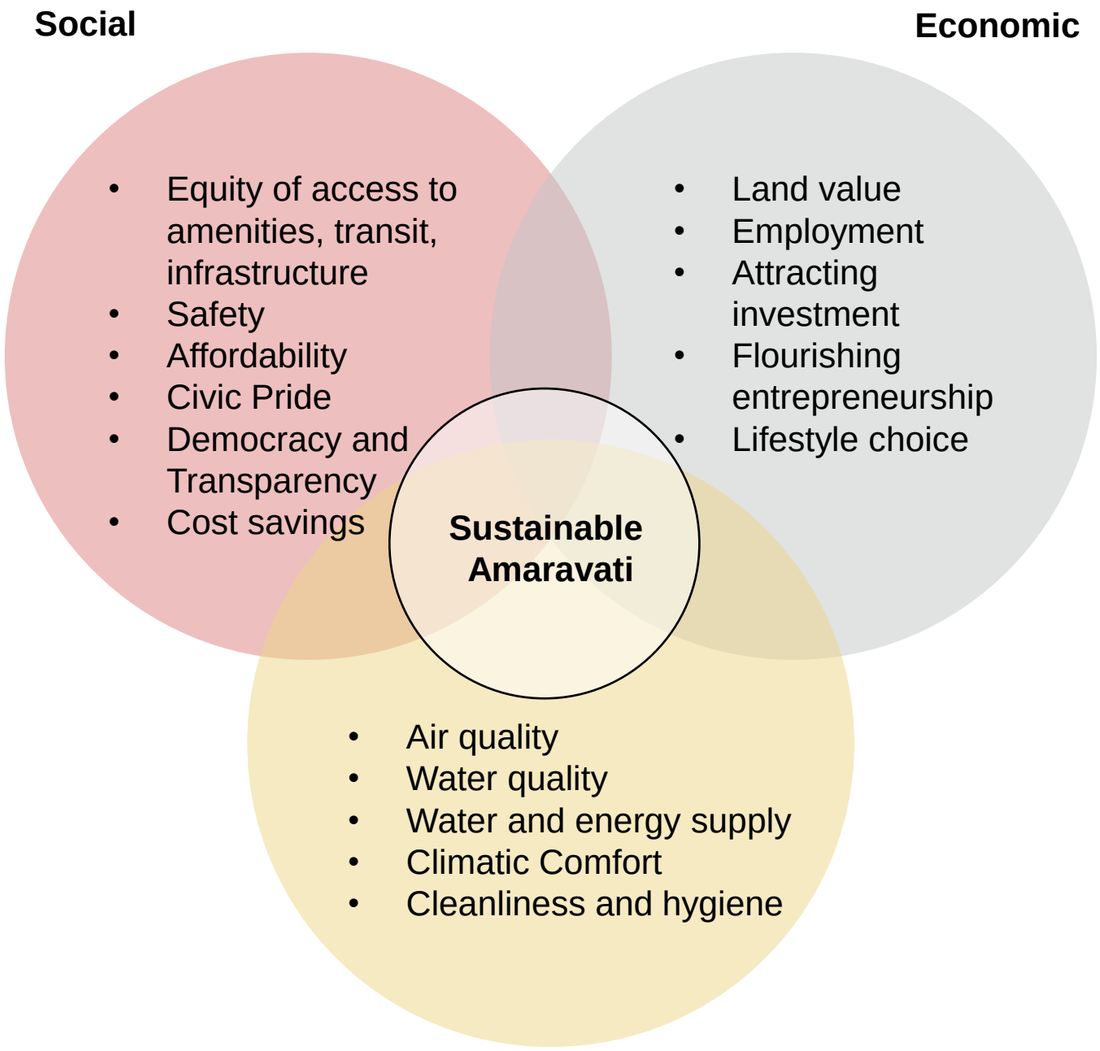
An inclusive TPOD approach promotes higher densities and the concentration of jobs within relatively small areas, which provides access to different job opportunities and services to people of all sectors of the city and encourage social equity as a result.

- **Creates a smart, sustainable and liveable community**

A well-designed TPOD empowers people with the choice to walk, cycle, or take public transportation to meet their daily needs by providing greater transit accessibility and a mix of uses within the community fabric. This concentration creates vibrant communities with high quality public area and shorter commuting distance, which improve the sustainability and liveability of the community.

Limitations

There are a number of limitations when it comes to building TPOD. One of the major concerns would be the capacity of the transit network. Given that Amaravati is a greenfield site, consideration of the type of transit network should be studied prior to implementing a TPOD. Also, to cater future growth of the city, it is expected that upgrade and expansion of the transit network has to be considered in the future. The land use around TPOD should ensure that it is supporting the various needs of the neighbourhood. Review of the masterplan, zoning regulations, land use, density and building heights are recommended to match the requirements of the major transit nodes of TPOD.



Transit and Pedestrian Oriented Development (TPOD)

5.1
Built Form, Density and Mixed Use

5.2
Multi-modal Transit and Last Mile Connectivity

5.3
Street Level Interface and Multi-Level Linkages

5.4
TPOD Demonstration

5.5
Phased Development

5.1 Built Form, Density and Mixed Use

5.1 Built Form, Density and Mixed Use

TPOD Nodes Network Plan

Transit nodes have different levels of significance as per location of the node, intersection and neighbouring land uses. Based upon these criteria TPOD nodes are identified with the network plan

Criteria for TPOD nodes

The level of influence is considered based on the following:

1. Mass transit corridor
2. Density and land use
3. Major intersections

Primary TPOD Node - City Level

Primary TPOD Nodes are interchange nodes of two transit lines, BRT and MRT lines, or intersection of two MRT lines connecting different places or zones of the city. They are major potential zones with respect to land use and source of large pedestrian generators. Primary TPOD Nodes should have public transit interchange (PTI) with other public modes to achieve last mile connectivity in city transit network.

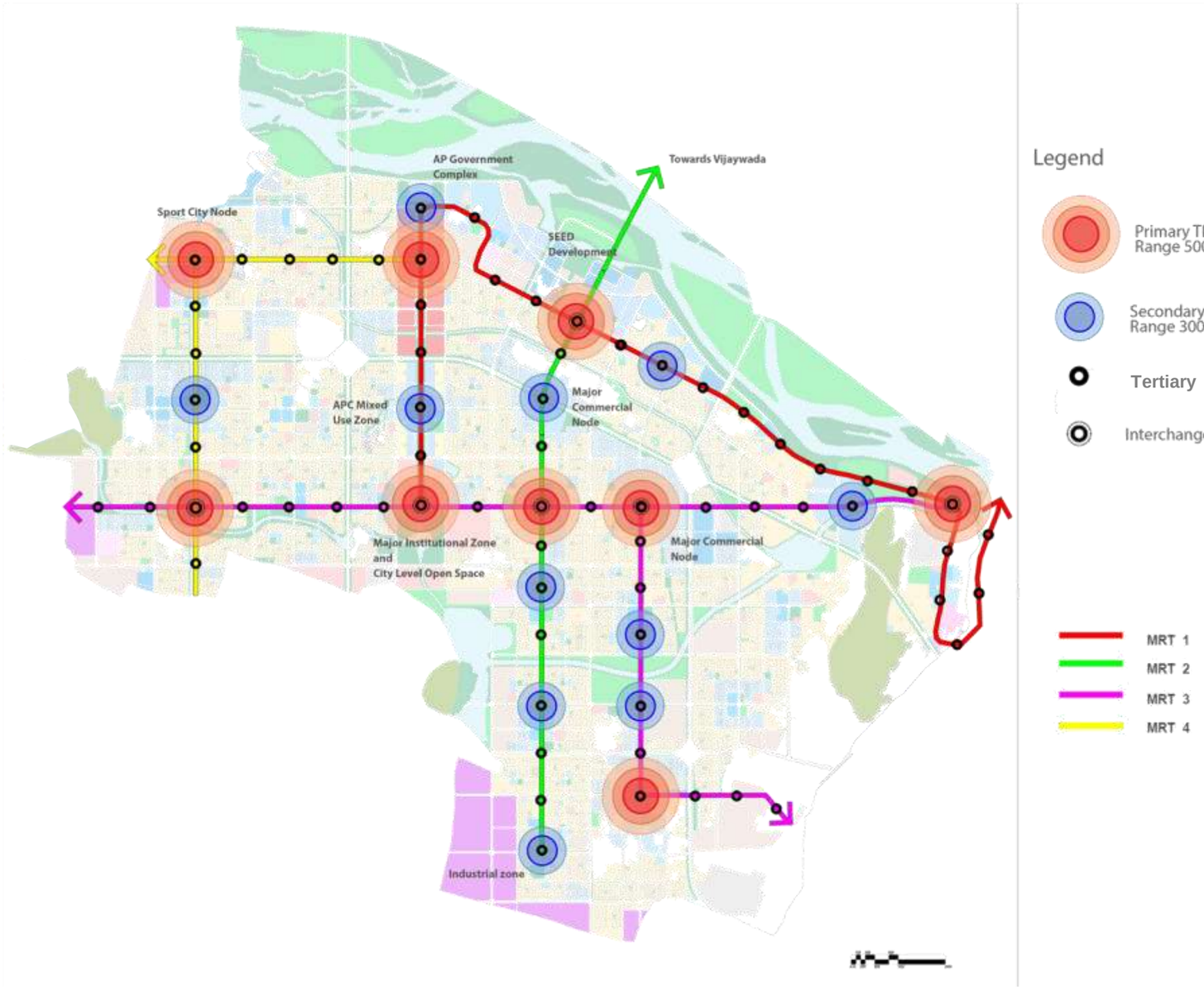
Secondary TPOD Node - District Level

Secondary TPOD Nodes are usually near commercial zones and important locations, such as city gateway, riverfront or city parks. They are potential business centres for the area. Secondary TPOD Nodes should be connecting to other transport modes.

Tertiary TPOD Node - Neighbourhood Level

Tertiary TPOD Nodes are transit stations near residential developments. The neighbourhood is complemented by a small mix of retail and commercial for small businesses. An abundance of open spaces should be in close proximity for the local residents. Tertiary TPOD Nodes should be within walking distance to nearby residential areas and/or have cycle tracks and other transport modes.

TPOD Nodes	Key Characteristics	Minimum Mixed Use Percentage
Primary	Major interchange hub and commercial area	Min 30%
Secondary	Commercial Area	Min 25%
Tertiary	Residential Area	Min 20%



Map showing TPOD nodes and range covered in meters.

5.1 Built Form, Density and Mixed Use

Built Form, Density and Mixed Use

The built environment should correspond with local needs of the residents. There should be adequate mixed use developments surrounding the transit nodes. A diverse mix of residential, commercial, retail and open space should be distributed horizontally and vertically to accommodate and create a sustainable environment within TPOD. Developments should aim to maximise land use with anticipation of the growth of the neighbourhood as well as the catchment for increased ridership of the public transport.

High Density Development at TPOD Nodes

Placing developments near public transport should increase catchment and ridership while reducing the time of commute by bringing destinations closer to people. At the same time, a high density area provides economic opportunities that encourage businesses to open near transportation nodes as well. People will have shorter commutes as transit is more accessible to their daily necessities as it is within walking distance, which shortens the need to commute longer distances or use private vehicles. Real estate value and property prices also increase at TPOD nodes as well.

The change in density should be well visualised. Different radius ranges are used to denote TPOD Influence zones. Closer influence zones should allow for higher density and gradually progress to lower density developments. To create high density around the transit nodes, additional FSI incentives should be given to shape the built form and create a unique image, distinctive identity and vibrant environment. This also helps improve legibility, orientation and permeability within the transit node influence zone.

Developments can receive the bonus floors by providing public facilities, such as public parks or post offices. Incentives can include:

- Adopting utilities in private parcels e.g. fire station, police station, post office, local government offices etc.
- Creating public spaces through vacant or utility plots
- Developing city parks, maintaining and handing over to departments
- Constructing city level public infrastructure
- On-site utility management e.g. Sewage Treatment Plan (STP), waste, water recycling, renewal energy supply etc.

3D view of the density distribution

High density developments around the BRT system

Shopping mall at Tung Chong MTR station

Bus Rapid Transit Systems in Cleveland,

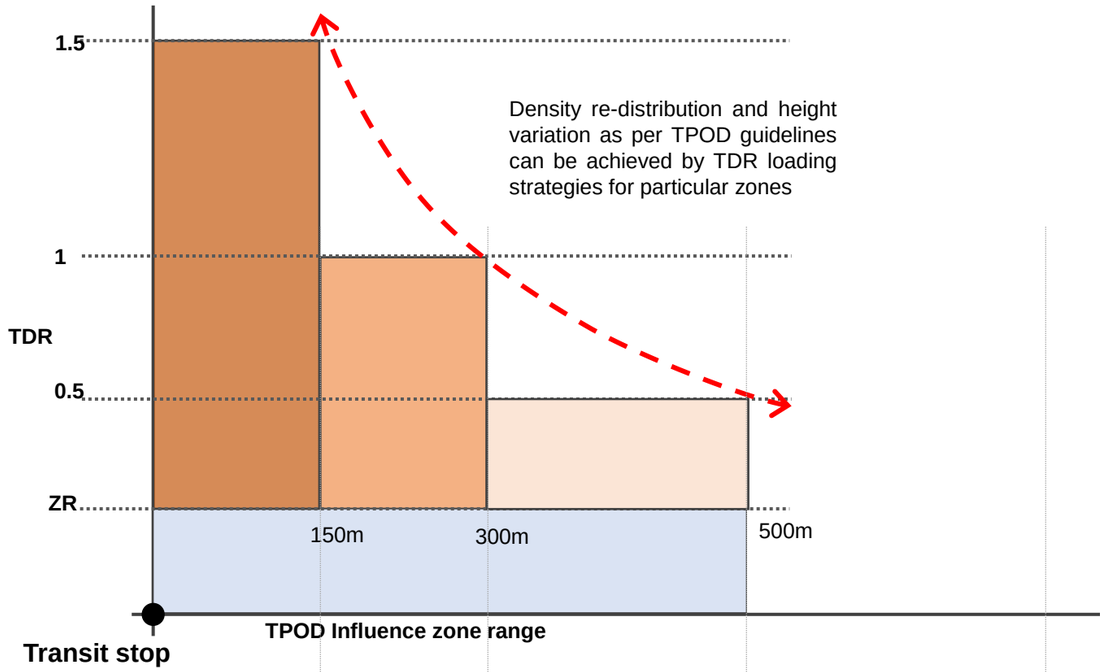
Image Source: http://www.cosmohotel.com.hk/shopping-sightseeing/shopping.html, https://usa.streetsblog.org/2013/09/26/itdp-study-a-coming-out-for-bus-based-transit-oriented-development/, http://www.chinadaily.com.cn/life/2012-09/18/content_15764696.htm

5.1 Built Form, Density and Mixed Use

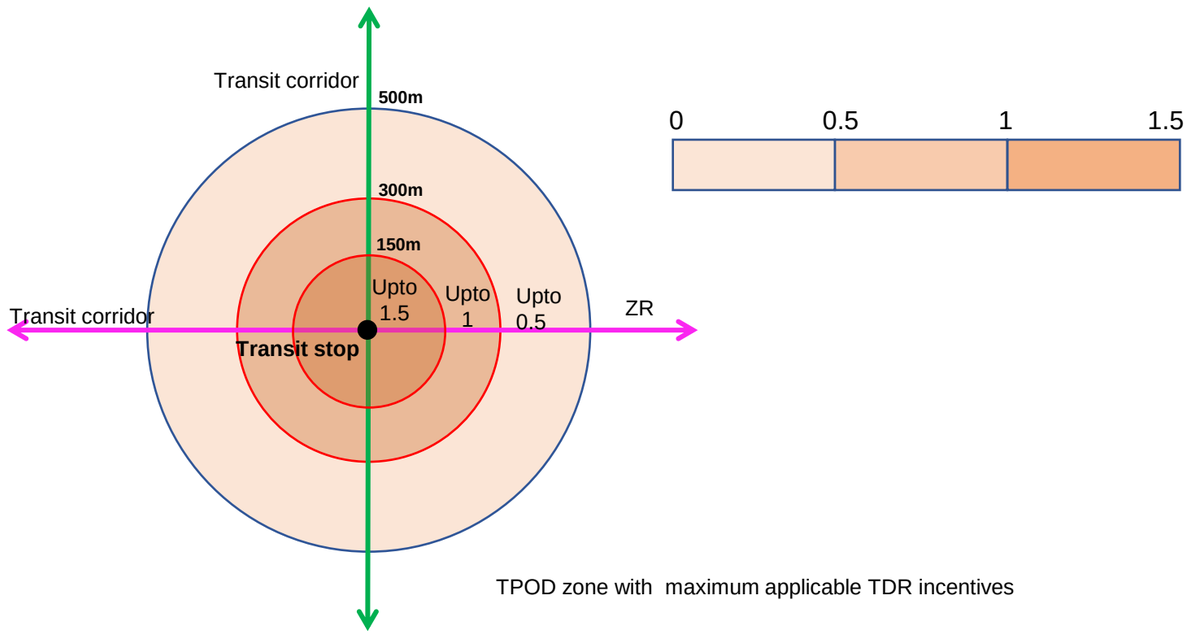
Incentive Based Bonus Plot Ratio Distribution Policy and Density Management

	TPOD–INCENTIVE BASED BONUS PLOT RATIO BASED IN TPOD ZONE AND ALONG TRANSIT CORRIDOR Listed parameters to be followed in respective TPOD zones for additional plot ratio		
Parameters	**500m radii**	**300m radii**	**150m radii**
Privately Owned Public Spaces (POPS)	Min. 10 % additional open space	Min.15 % additional open space	Min.20 % additional open space
Green area coverage	Min. 10% G.O.R	Min. 20% G.O.R	Min. 50% G.O.R
Mixed use development	✓	✓	✓
Green building	Not applicable	✓	✓
Adopting utilities in private plots (e.g. fire station, police station, post office, local government offices etc.)	Not applicable	✓	✓
On-site utility management (eg. STP, waste, water recycling, renewal energy supply etc.)	Not applicable	✓	✓
Constructing city level public infrastructure on site	Not applicable	✓	✓
Developing city parks, maintaining and handing over to departments	Not applicable	✓	✓
Adopting public utilities and constructing on site	Not applicable	Not applicable	✓
Public amenities (under Govt. Authority)	Not applicable	Not applicable	i. Compulsory provision of at least one public amenity under Govt. zone. ii. If private STP is provided then STP under public amenity is optional

*Note-All incentive-based policies for TPOD should be governed within the regulations of respective authorities



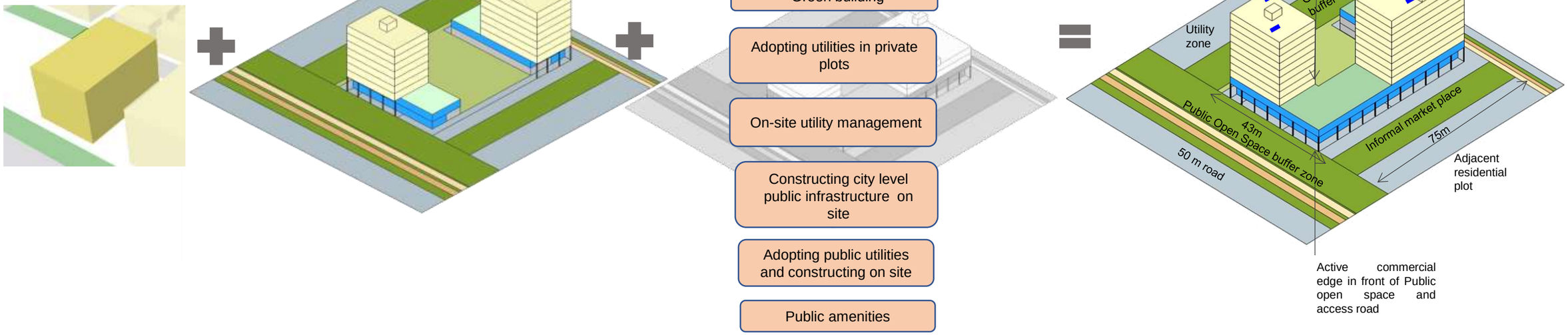
The relationship between the distance from transit Stop and applicable additional FSI



TPOD zone with maximum applicable TDR incentives

5.1 Built Form, Density and Mixed Use

Application of incentive based bonus plot ratio to TPOD plots



ZR (FSI = 2.4)

Existing masterplan Urban form

Zoning Regulation Incentive Addition

Zoning Regulation + Urban Design Guidelines

Incentive Addition

Total Incentive Based Bonus Plot Ratio

(2.4 FSI+ 1.5 Incentive Based Bonus Plot Ratio)

Zoning Regulation + Urban Design Guidelines + Incentive Addition Strategies

5.1 Built Form, Density and Mixed Use

Influence Zones of TPOD Nodes

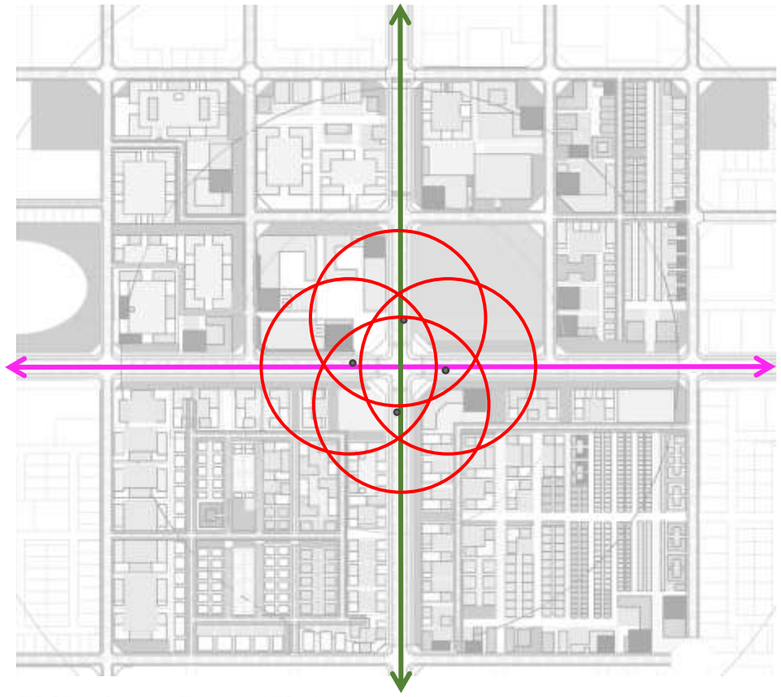
Setting up TPOD will influence the density and built form of the area surrounding transit nodes. Increasing the density along transit corridors provides the opportunity to create a walkable environment and create a more connected and vibrant community. A high density core should be planned surrounding the transit station, followed by a gradual reduction in height and density as one would move away from the TPOD.

Influence Zone 1
Zone 1 denotes the area within 150m radius from the transit nodes. Being the closest to transit stations, Zone 1 has high density commercial and residential mixed use to form a City, District or Neighbourhood centre. There is high level of footfall in Zone 1 as people come from public transport or walking from Zone 2 or Zone 3. A well-connected pedestrian and open space network is linked from transit stations to surrounding developments.

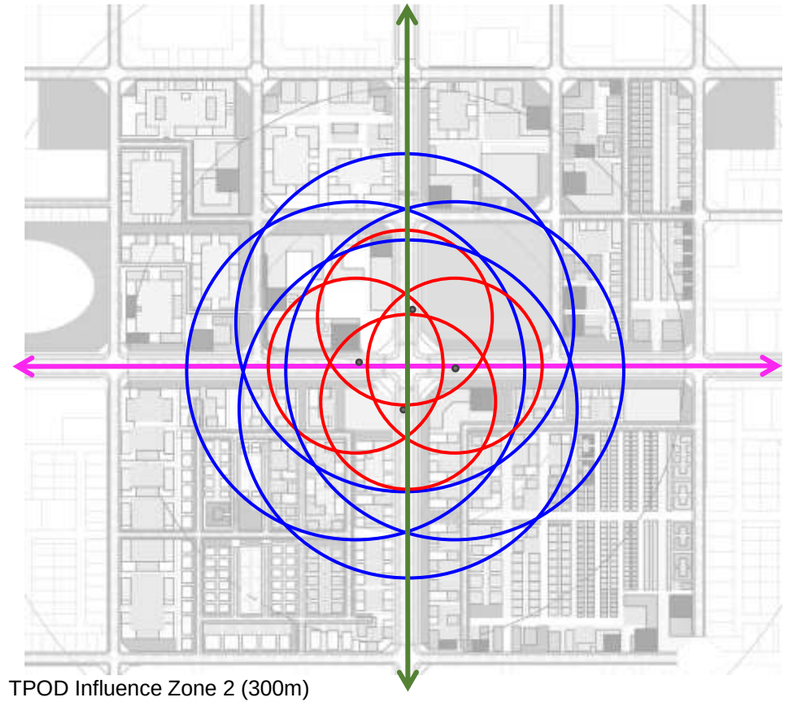
Influence Zone 2
Zone 2 refers to the area within 300m radius of transit nodes but outside of Zone 1. Residential mixed use would be a dominant land-use in Zone 2 to house a high density of population while providing an active frontage on ground level to create vibrant walkable streets extending from Zone 1. Open space continues to link from Zone 1 with pedestrian linkages to promote commuting by walking or cycling.

Influence Zone 3
Zone 3 reaches beyond the 300m and all the way to 500m radius of transit nodes. The density of Zone 3 is lower than Zone 1 and Zone 2 with a mix of commercial and residential available catering to the local needs. Zone 3 connects TPOD with communities outside of the influence zones providing retail, school, and public facilities.

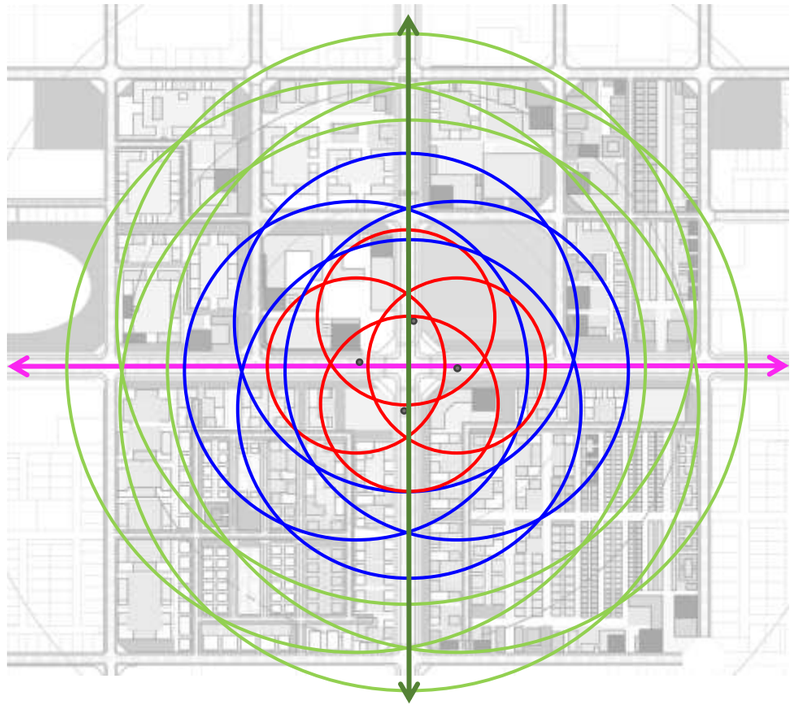
General	
	Influence Area – 150 m – 300 m / 10 min walk
	Catchment Area with feeder network – 500 m
TPOD FAR	FAR and Density 3.0-4.0 allowed for TPOD zones
	Min 20% to 30% mandatory FAR for affordable housing within TPOD Zone
Mixed Use	Land zoned as mixed use consisting of 50% to 70% residential, 20% to 40% commercial and retail, and 10% public amenities
Road Space	Max 20% land reserved for roads
Open Space	Min 40% land reserve for public open space and additional 10% open space in privately owned public developments
Parking	Max parking 20% of total FAR and 10% for visitor parking
Active Street frontage	Retail 60%
Implementation	Include a TPOD chapter in the masterplan/Development Plan/Comprehensive Plan/ UDAG
	Create a TPOD policy as a special law that supersedes the existing regulations
	Establish a TPOD overlay district as a special area in the existing development regulations
Transit Type	Bus Lines – Initial Phase - (1-2 yrs)
	BRT – Intermediate Phase – (3-5yrs)
	MRTs – Final Phase –(6 -12 yrs)



TPOD Influence Zone 1 (150m)



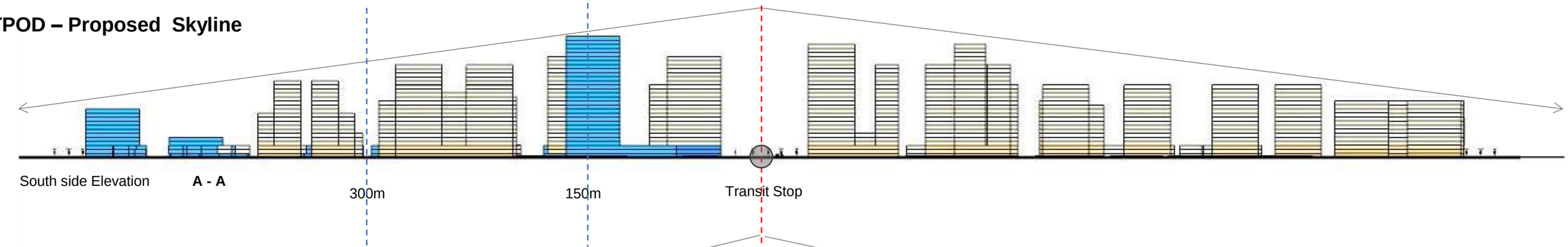
TPOD Influence Zone 2 (300m)

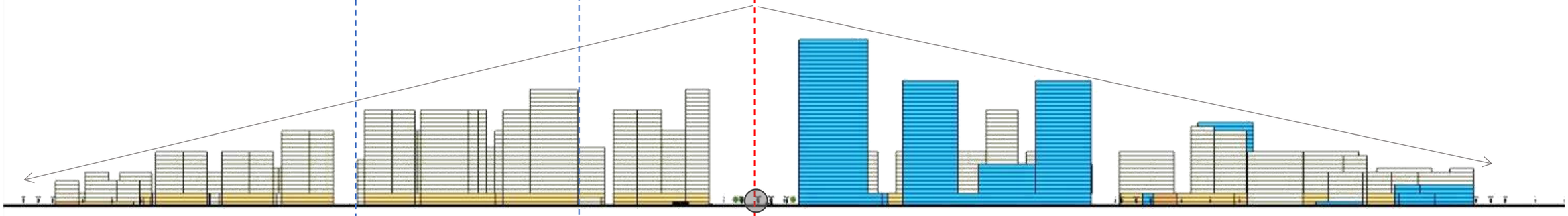


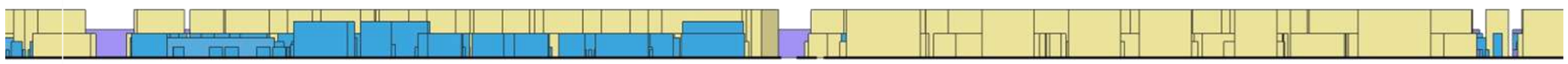
TPOD Influence Zone 3 (500m)

5.1 Built Form, Density and Mixed Use

TPOD – Proposed Skyline



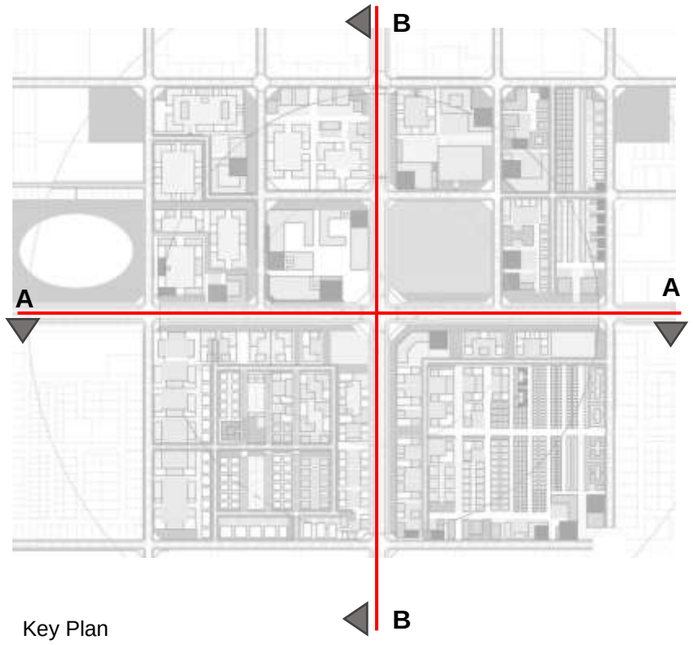




Existing skyline

Base model

Revised urban design model



Key Plan

5.1 Built Form, Density and Mixed Use

TPOD Zoning Regulations

- Masterplan zoning regulations and minimum building heights are to be followed as a base norm.
- Masterplan zoning regulation standard and built form guidelines are to be followed for plot development. Additional FSI is to be followed with incentive based TPOD guidelines.
- Additional FSI and building heights for parcels within TPOD node are incentive based and described in the TPOD guidelines.
- All incentive-based policies for TPOD are to be governed within the regulations of respective authorities.

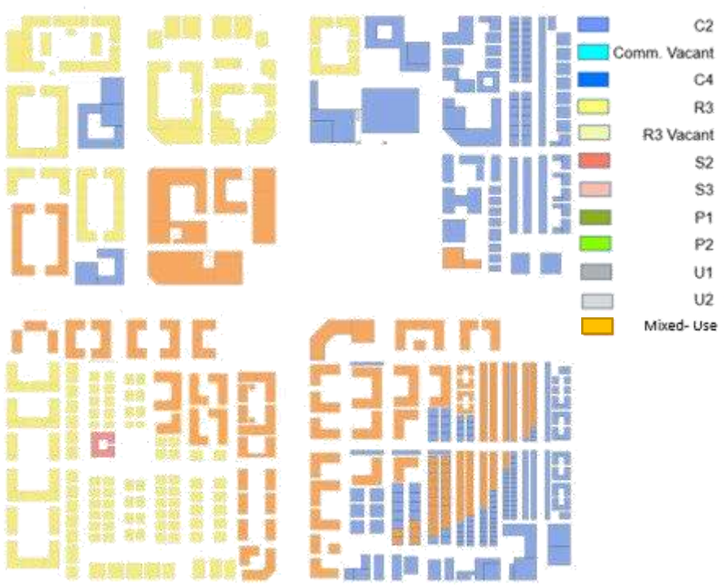
TPOD Influence Zone	Density	Maximum height Restriction	Additional FSI
Zone 1 (150m)	High	Up to 120 m	1.5
Zone 2 (300m)	High	Up to 100m	1
Zone 3 (500m)	Medium	Up to 60m	0.5

Parcels within TPOD zone should be mixed use development and consist of the following vertical distribution:

Mixed Use Development within TPOD Zones
Parcels within TPOD zone should be mixed use development and consist of the following vertical distribution: i. 50% to 70% residential ii. 20% to 40% commercial and retail iii. 10% public amenities • Commercial use includes offcies, hotels, service apts etc • Retail use include restaurants, shops etc. • These activities should be located on the ground and lower floors of the building. (Refer to Built Form Chapter) • Min 40% land reserve should be for public open space and additional 10% publicly accessible privately owned public space (POPS)

High-density development along the BRT corridor in Curitiba

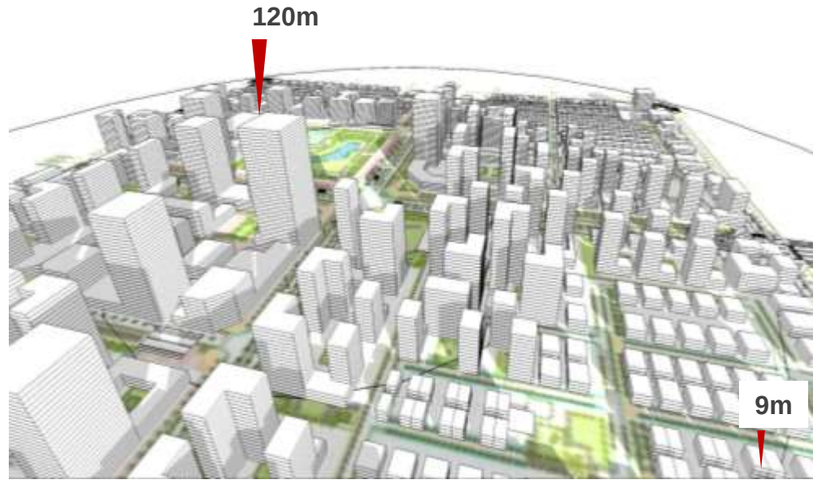
TPOD Zone – Proposed Land Use with Mixed Use Development



TPOD Zone- Building Height Distribution

TPOD Zone – Proposed Massing Model

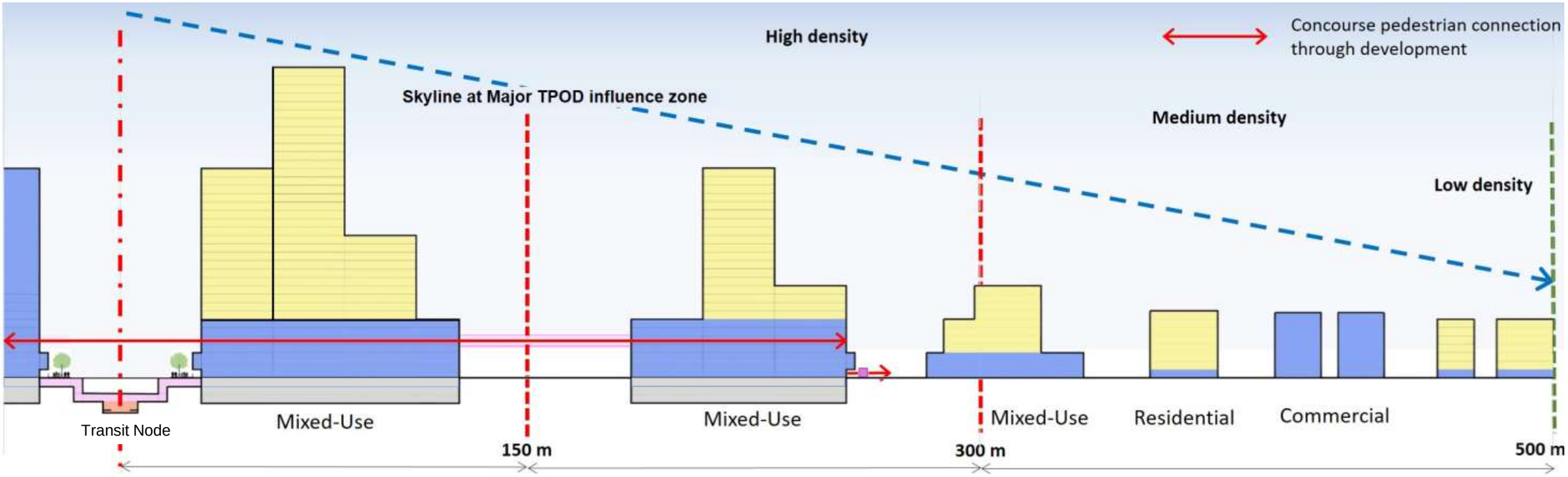
TPOD Zone – Proposed Massing Model



Source: http://cdn.cseindia.org/userfiles/Fabio%20Duarte.pdf

5.1 Built Form, Density and Mixed Use

Section on one side at 500 m range from TPOD node



Section showing variation in building densities from Transit node

Mixed use developments along TPOD corridor

Planning for adequate mixed use developments surrounding the transit nodes with a diverse mix of residential, commercial, retail and open space distributed horizontally and vertically will accommodate local needs and create sustainable environment for TPOD. There should be a balance mix of different land use and density as described below:

- Locate the highest density and mixed uses (apartments, offices, etc.) immediately adjacent and as close as possible to the transit station
- Land around transit nodes should be zoned as mixed use, consisting of 50% to 70% residential, 20% to 40% commercial or retail and 10% public amenities
- Building Towers within 150 m radius within TPOD node can go up to 120 m in height
- Create transition in scale between higher density development around the transit station and adjacent lower density development by descending building heights and densities from the transit station i.e. a stepped building profile
- Orient buildings towards transit stations and provide direct pedestrian access to minimise conflict with vehicles
- Pedestrian movement is diverted to station area for maximum ridership with increased catchment, by directly connecting concourse to different floors of adjacent developments along transit corridor

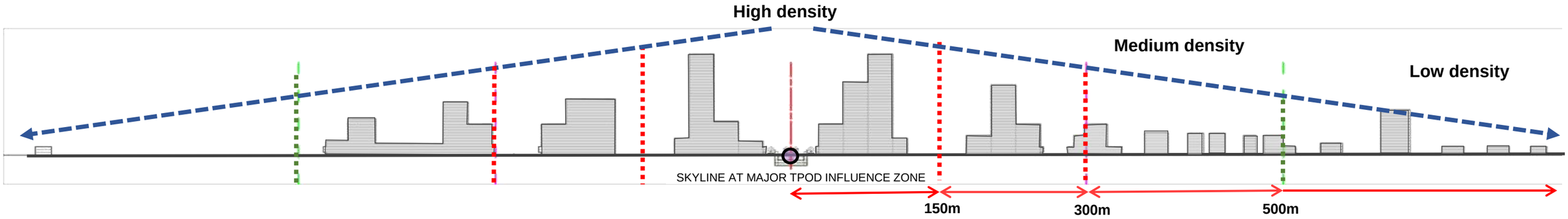
Union Square, Hong Kong

Crystal city, Virginia

Source: https://en.wikipedia.org/wiki/Union_Square_(Hong_Kong), https://www.arlnow.com/2018/11/13/breaking-amazon-will-split-hq2-between-crystal-city-long-island/

5.1 Built Form, Density and Mixed Use

High Density Development Profile at TPOD Zone



Built form along transit corridor should be high rise with high density mixed use to increase catchment considering maximum pedestrian generating locations. As distance increases density decrease with decrease in height.

3D Views showing high density mixed use development at TPOD nodes

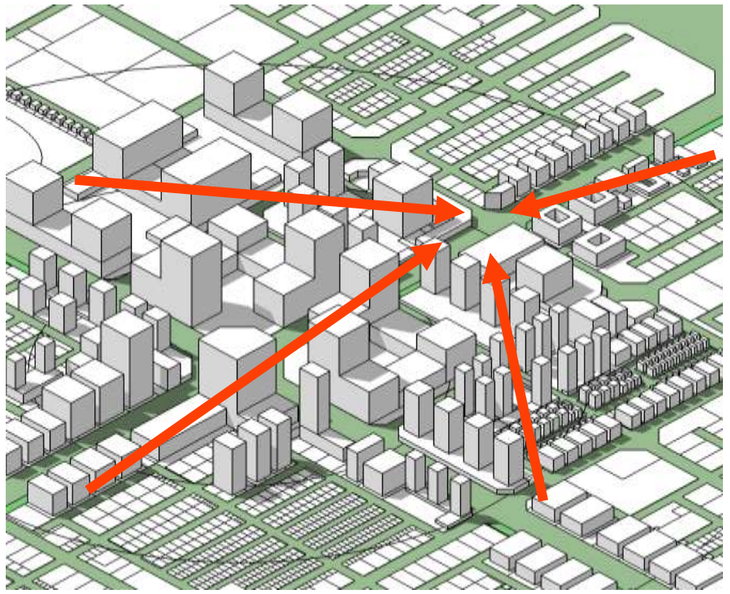
5.1 Built Form, Density and Mixed Use

High Density Developments along TPOD Corridor

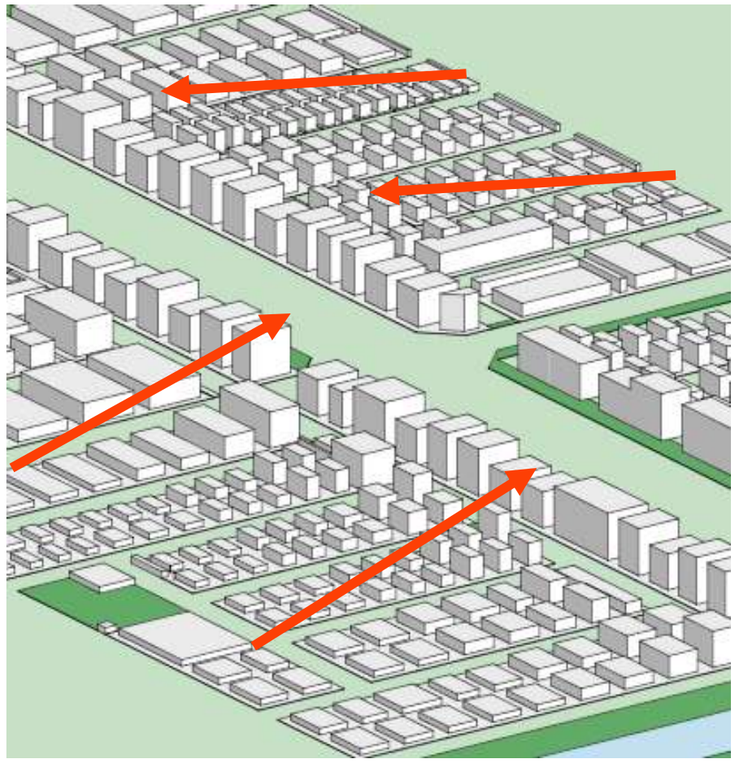
View showing corner plaza at TPOD node with people first approach

View showing multiple transit interchange with public transit corridor, pedestrian and cycle track with dedicated lane and linked network for last mile connectivity

Higher Density points



Higher Density towards main streets



5.2 Multi-modal Transit and Last Mile Connectivity

5.2 Multi-modal Transit and Last Mile Connectivity

Multi–modal Transit

The aim of road system strategy should be to create a well connected circulation for both pedestrians and vehicles. A well-designed transit node should seamlessly connect the various transit options together for commuters to change from one to another. The different modes of transit should work together like a system rather than individually competing against each other. Mass transit volume should bring commuters from furthest distance, which they will change to local level transport for the last mile connectivity. Therefore a mix of different modes of transit should help facilitate the various destinations for users. Typically a transit node consist of a combination of the following:

- MRT
- BRT
- Buses
- Shuttle Buses
- Feeder Buses
- Taxis
- Para Transit
- NMT
- Water Transport
- Other Modes of Transit

Public Transport Interchanges

The design of public transport interchange should also provide a welcoming environment for people while waiting or deciding the type of transport to be used. The area should allow people to comfortably stay instead of a mere space to pass by. A sizeable area with seating and landscape is recommended as a way to create a “place”. Interchange does not have to be single functioned as a waiting area but also has other uses, such as café or shops for people to spend their time in between transits.

Digital Connection

Technology can be used as a tool to enhance the linkage between transit options and ease the transition from one mode to another. An example would be adapting a smart card payment system where all public transports share a unified payment method such that it simplified the process of transferring between rides. Stations should provide clear way-finding as well as schedule and timetables of different transit options at stations. Moreover, digitalised information for transit schedule and availability allows better access for commuters to plan their trips efficiently. Mobile applications are popular ways to share real-time transport information readily for commuters to make adjustments when necessary.

Bus stop with waiting area in Singapore

Digital wayfinding facility in New York

Public Transport Interchange in Australia

Mobile app showing real time transit information

Source: https://www.citylab.com/transportation/2017/03/singapore-may-have-designed-the-worlds-best-bus-stop/518226/; https://www.externalworksindex.co.uk/entry/136636/Trueform/Digital-SBS-wayfinding-totems-for-New-York-City/; https://commons.wikimedia.org/wiki/File:Broadbeach_South_transport_interchange_(27677988034).jpg; https://www.imore.com/transit-app-goes-free-adds-real-time-vehicle-location-and-more

5.2 Multi-modal Transit and Last Mile Connectivity

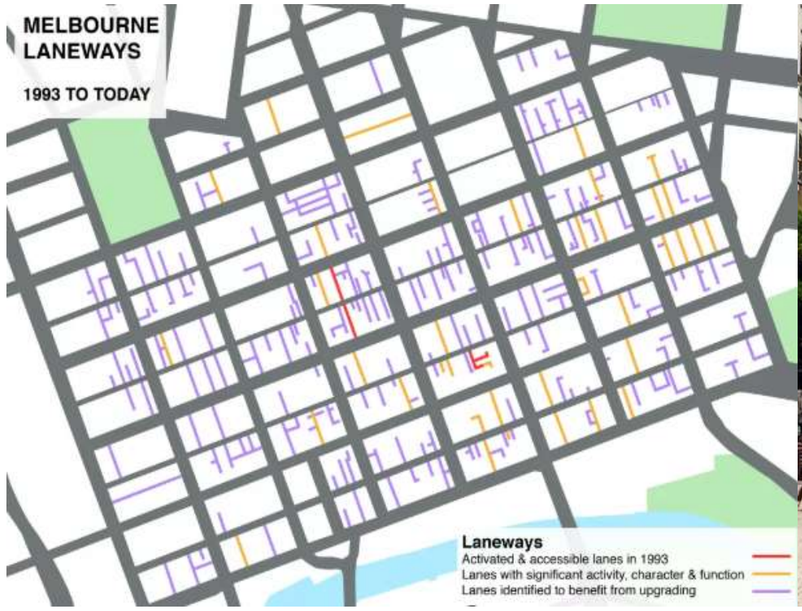
Last Mile Connectivity

Aside from the design of transit node and interchange, the design of the pedestrian should ensure a high priority is given to pedestrians and environment, creating an uninterrupted and environmental friendly pedestrian network for people within their neighbourhoods and the city. It is important to connect people to transit centre, public buildings and open space from all places within the city. The benefits of a connected pedestrian network is not only to encourage walking and reduce the private vehicle dependency, but also to increase mobility within the neighbourhood. Hence it is crucial that within TPOD node, a well linked and comprehensive pedestrian network is built to connect residents access to daily necessities, such as shopping, commuting to work or school, and using public open space.

A pedestrian network should function well and encourage opportunities to develop neighbourhoods that promote walking. More spaces should be given to pedestrians walkways with proper lighting so that pedestrians feel comfortable and safe to travel. Adequate pedestrian crossings should be made available to allow pedestrian movements across streets. Around the transport nodes, there should be slower traffic speed on local roads for the footfall by putting in traffic calming measures or changing the streets to shared spaces. Specifically, direct universally accessible pedestrian access should be provided from the buildings oriented towards the transit station to minimize conflict with vehicles.

In addition, a strong and well connected cycling network is an important element for a successful TPOD, which is an effective way to solve the “last mile connectivity” problem and connect people to public transit network. More spaces should be given to cycle tracks and the non-motorized transport network should be considered and integrated with pedestrian network as a whole so that people can seamlessly transition between different transportation modes within the neighbourhoods. Strategies for multi-modal transit and last mile connectivity are as follow:

- The shortest direct route for pedestrians and non-motorized modes of transport should be provided to access transit stops within TPOD zone 1 and 2 through buildings or complexes using POPS or open spaces, plazas and squares
- Narrow roads of 9m to 12m within TPOD zone 1 and 2 should consider pedestrianisation/shared streets and proposed as public spaces, depending on the pedestrian movement and activity time slots
- A well connected pedestrian network should be provided to create a walkable and environment friendly space for citizens to promote healthy lifestyle and encourage last mile connectivity to transit stops



Example of laneway connections through city blocks in Melbourne

Image showing pedestrian street in

Image showing cycling tracks in Vancouver, Canada

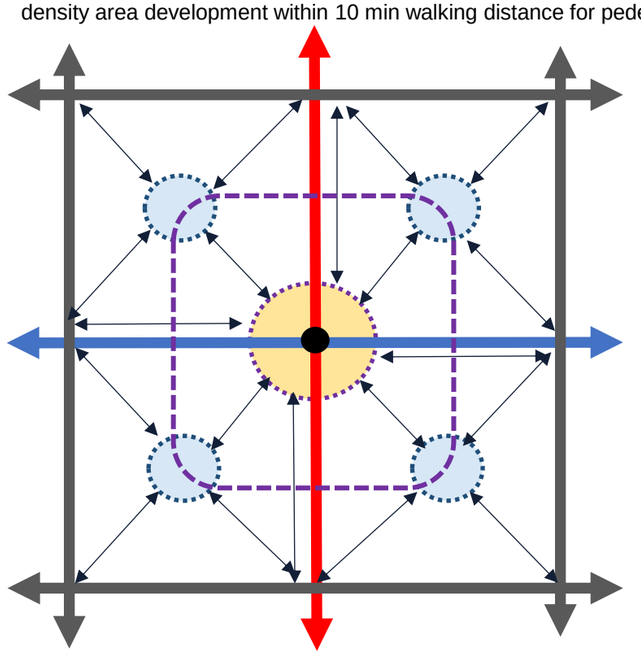
Image showing cycling racks near transit station

Source: https://flatironbike.com/2011/04/30/bicycles-transit-and-the-last-mile/, https://www.itdp.org/library/standards-and-guides/tod3-0/what-is-tod/

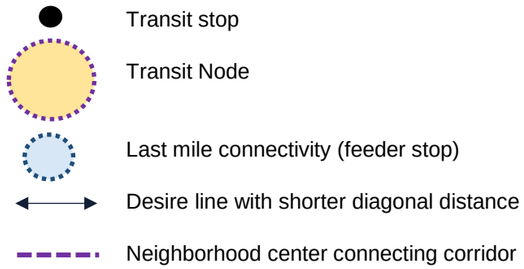
5.2 Multi-modal Transit and Last Mile Connectivity

Schematic Strategic Plan to increase pedestrian connectivity to station

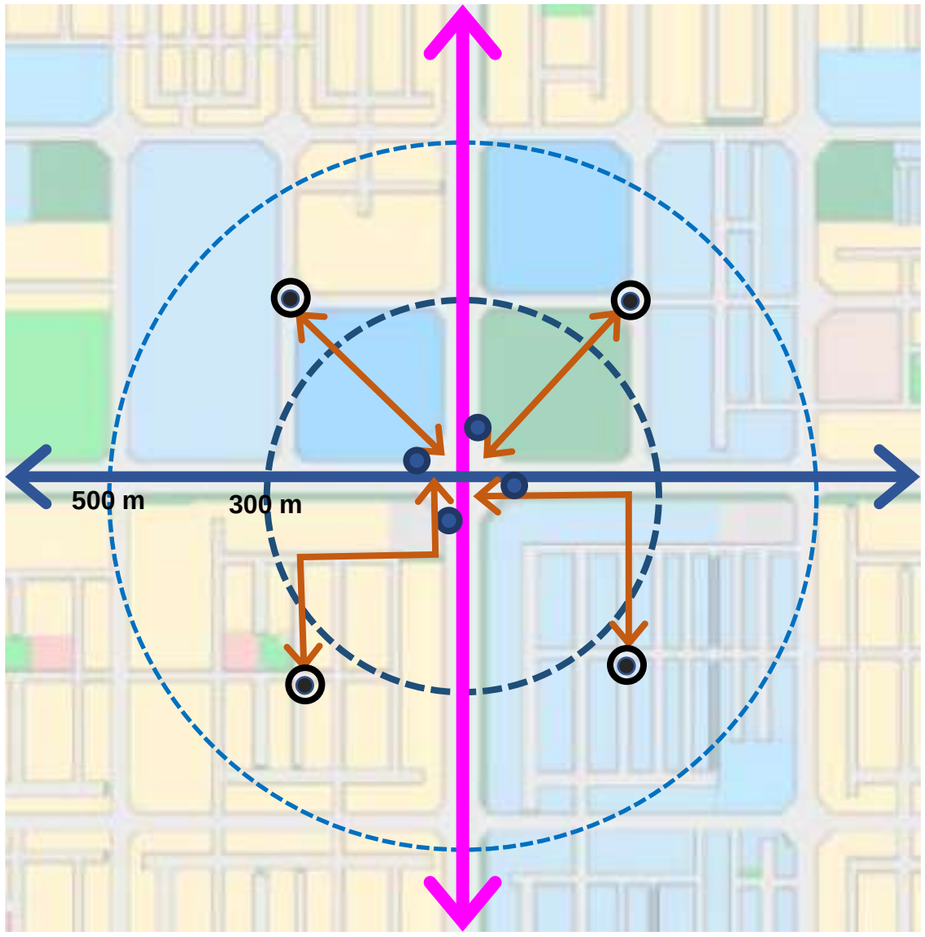
- Design of pedestrian connections to major transit station of MRT or LRT lines to maximise ridership and increase the pedestrian catchment
- There should be a pedestrian connection network towards transit node within the range of 10 min walking distance. Underground or elevated connection should be provided where appropriate.
- TPOD works with the idea of maximum dependency on other supporting intermodal transit network system
- The 300m radii from the transit node indicate the concentration of high density area development within 5 min walking distance for pedestrians.
- The 500m radii from the transit node indicate the concentration of medium density area development within 10 min walking distance for pedestrians.



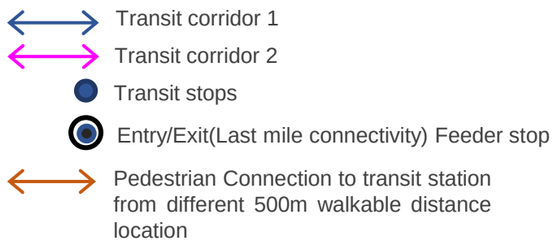
Last mile connectivity conceptual diagram

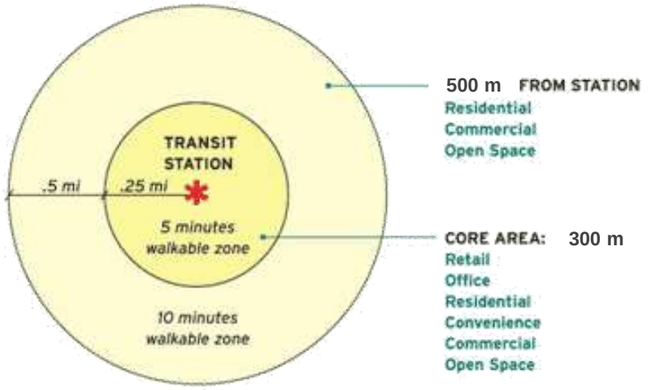


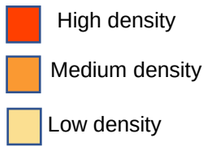
- Hierarchy of the transit network for intermediate transit mode of network should be integrated with major transit corridors and system



Plan showing conceptual walkable pedestrian connection to transit station







- To increase the ease of pedestrian connection to transit stop, entry–exit points and pathways are planed conveniently considering movement pattern within a 10 min walkable distance which connects adjacent neighbourhood to transit stops
- Entry – Exit nodes of connectivity should be planned with intermodal transit network for last mile connectivity to the respective neighbourhood
- Neighbourhood centres of intermodal transit stops should be connected with transit network
- In order to extend the range of mobility and improve accessibility, a safe and well-designed cycling environment should be provided and designed within the TPOD network.
- Bike racks and storages should be available within a walking distance near the transit
- Cycling tracks should be separated from pedestrian pathways to ensure the safety of all users

5.2 Multi-modal Transit and Last Mile Connectivity

Limited Parking

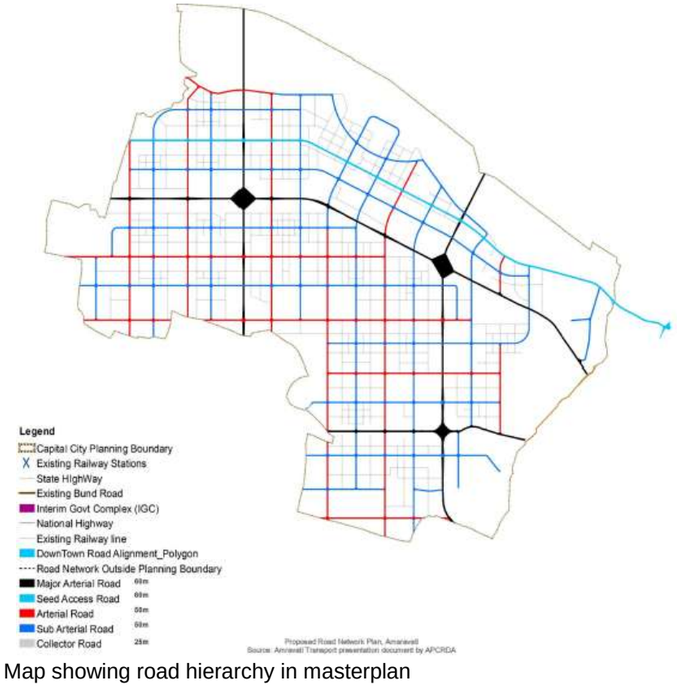
- Ensure pedestrian friendly circulation in TPOD zone with maximum ease of axis to predominant destinations
- Encourage underground parking or over surface parking lots provided at development sites around transportation nodes
- Provision of cycle parking with shower facilities within walking distance from the TPOD node
- Provision of parking under public parks, town and district centres
- Max parking 20% of total FAR and 10% for visitor parking

Road Network

The core of the road system strategy is to create a well-connected circulation both for pedestrians and vehicles. This network should give priority to pedestrians and environment, creating an uninterrupted and environmental friendly pedestrian network for people within their neighbourhoods and the city. It is important to connect people to transit centre, public buildings and open space from all places within the community.

Image showing cycling parking near bus station

Image showing underground parking near mixed use development



Map showing road hierarchy in masterplan

Typical section of 50m wide Sub Arterial Road

Source: http://bowcleanair.org/membership, https://news.fitzrovia.org.uk/2012/06/06/175-bed-basement-hotel-tottenham-court-road/

5.3 Street Level Interface and Multi-Level Linkages

5.3 Street Interface and Multi-Level Linkages

Strategies for Street Level Interface

The benefit of having street level interface is to create safe and vibrant areas that allow residents and visitors to reach destinations within walking distance. Close proximity can generate high footfall which provides economic opportunities in the neighbourhood in return. Hence it is important to build a well-connected pedestrian network with active street frontages to connect the people of the city to daily necessities.

A universally accessible pedestrian environment is an important prerequisite for creating a successful street level interface. It is important to prioritise walking, biking and transit over cars. In addition, streets with blank walls should be avoided, and a well-designed network of streets and paths with proper street level interface should be considered. Within TPOD, overly large development complexes and city blocks are not recommended and should be avoided.

Large development sites can provide high-rise mixed use developments that can keep residents within close proximity to public transport stations. However, they need to be integrated, as isolated developments reduce the accessibility and connectivity at street level with respect to the human scale. Providing interesting and active laneways and walkways in between larger developments would improve permeability and help pedestrians move easily between city blocks.

To create a safe and vibrant walking environment for residents, the pedestrian network should have the following elements:

- Pedestrian first with priority always
- Clear way-finding signage
- Good visibility for safety and easy orientation
- Sufficient space to accommodate footfall
- Greening along walkways

Examples of well-connected pedestrian network and street interface

Copenhagen, Denmark

Guangzhou, China

Mixed Use Transit-oriented development in Guangzhou

Amsterdam, The Netherlands

Sources: http://sustainableamsterdam.com/2015/12/reguliersbreestraat/,https://www.vienncouver.com/2015/01/viennas-begegnungszone-shared-space-program/, https://traveldigg.com/champs-elysees-world-class-shopping-center-in-paris/, https://www.itdp.org/city-transformations/buenos-aires/, http://www.itdp-china.org/enbus/?lang=1

5.3 Street Interface and Multi-Level Linkages

Open Space at Street Level

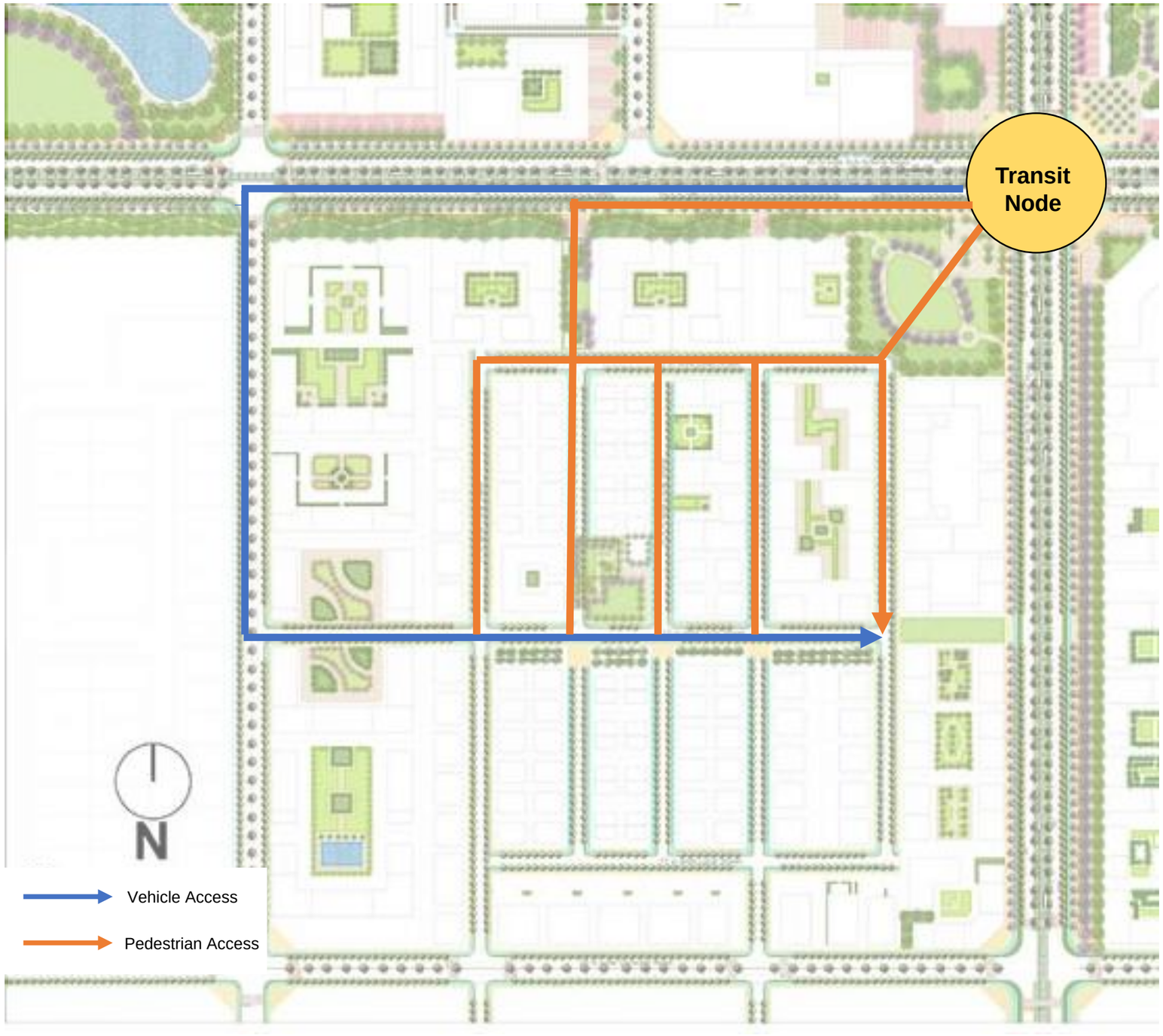
Urban open space, such as public square, parks, green roofs, water bodies, green corridors, provides critical ecosystem services which can promote physical and psychological well-being of urban residents and create a sustainable and liveable community.

- Different levels of open spaces should be provided in different TPOD influential zones to ensure people can access and enjoy the open space within a walkable distance in their neighbourhoods and within the city as well.
- A well-connected park network should be established through a well-connected street network to allow for easy access to all amenities.
- Min 30% land should be reserved for public open space and additional 10% open space in private developments
- Design of street and open space should create an interactive and lively space that is socially inclusive for all, facilitating an experiental based pedestrian movement to the TPOD center

Pedestrian Connectivity at TPOD Nodes

The open space, both public park and green corridor, also plays an important role in connecting residents from the transit node to the other places. With the connected and easily accessible open space as well as pedestrian friendly street, it is more convenient, time-saving and sustainable for citizens to walk than to drive to their destinations. Hence, it is crucial to provide a well-connected open space network within the TPOD zone to encourage walking and improve sustainable urban mobility.

Street network and open spaces along the built form



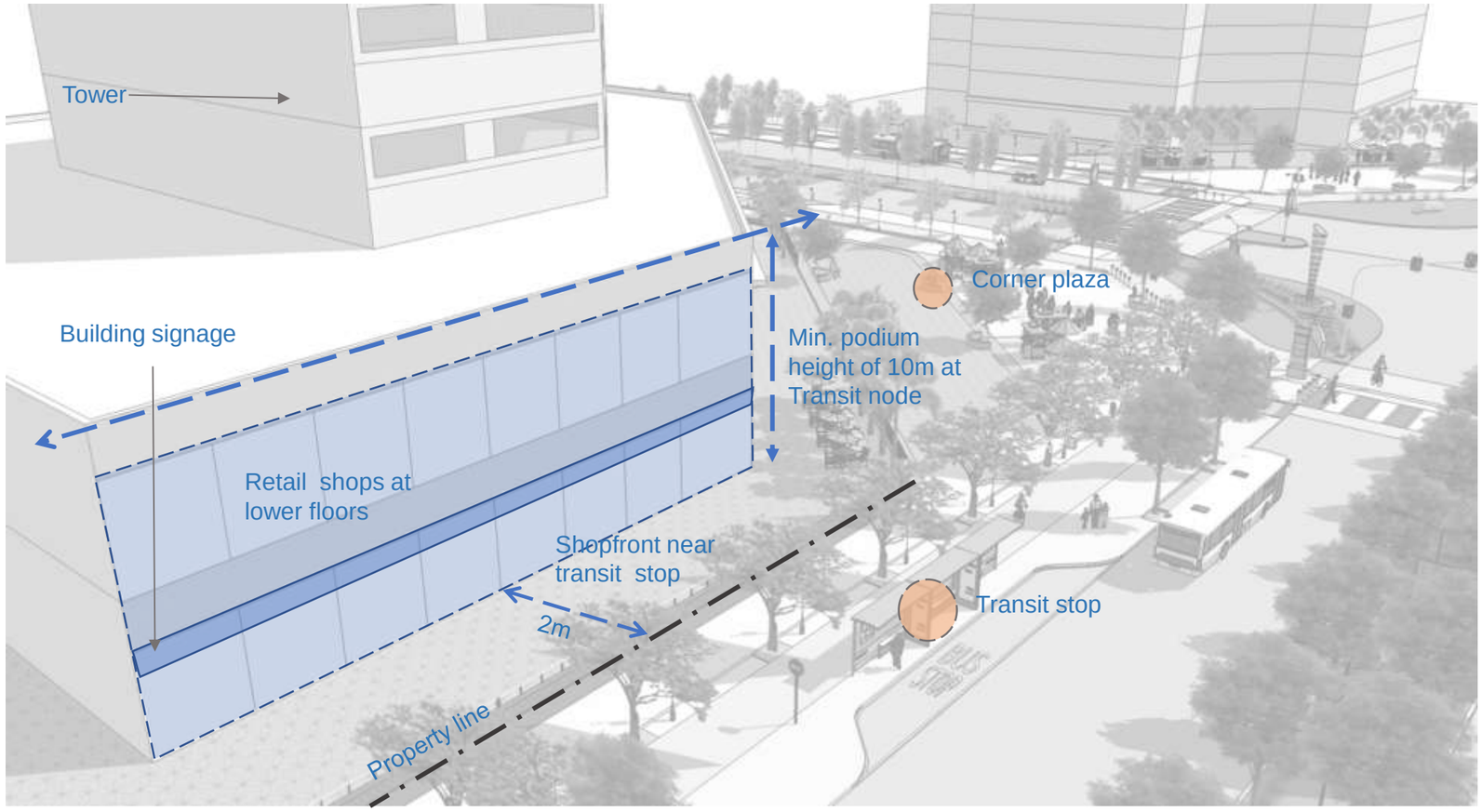
Comparison of pedestrian and vehicle access from transit station to a particular area.

5.3 Street Interface and Multi-Level Linkages

Street Environment at TPOD Nodes

In order for a TPOD node to function well, streets should maximise its usage for the enjoyment of people. It is important for buildings to create a continuous active street frontage that encourages pedestrian movement along the paths that connects to public transport. The vibrant activities of the street attract pedestrians to travel along the path. Creating an active and enjoyable street of transit nodes should be as follow:

- Large scale public, commercial and mixed use development plots should provide multi-level pedestrian connectivity towards transit node
- Weather protection design near transit stops should be provided to offer more comfortable waiting areas for commuters. This can include covered waiting areas, building projections, colonnades, awnings and use of landscaping
- Building pedestrian entrances should be oriented towards transit stops and provide direct pedestrian access
- Ground floor should be designed with active uses such as shops, retail, restaurants, outdoor cafes along the street to provide street level interface within TPOD zone 1 and 2
- Street planting should form boulevards to create pedestrian-friendly environment
- Public art should be used at transit nodes to create landmarks that help establish a character for each transit stop
- All parking requirement to be located under the built structure or at the rear side. (Area - Stilt and basement)
- Provide basement and podium parking as per zoning requirement. No surface parking is permitted
- Public parking should be provided under public parks or town centres
- Provision of cycle parking racks within walking distance from the transit stop in TPOD Influence Zone 1 within MFZ area (Refer Streetscape Guidelines)
- Colonnades and landscaped streets to provide shading and pedestrian comfort
- Minimum building setbacks for parcels should follow ZR



TPOD node street interface view

Image showing weather protection design of building near transit.

Image showing street environment near transit node

Image showing setback from the shopfront near the road in Paris

Source: https://www.ankrommoisan.com/blog/2017/09/29/transit-oriented-development-our-experience, https://www.bisnow.com/archives/newsletter/local-real-estate/washington-dc/14306-the-developers-poised-to-benefit-from-the-15m-sf-richmond-highway-land-use-plan

5.3 Street Interface and Multi-Level Linkages

Colonnades

Colonnades are a long sequence of columns joined by their entablature which are part of a building or free-standing. They act as a semi-public interface/spill-out area between the street and building and an essential protection against sun and rain. They also improve the micro climate of the area. Colonnades should be designed with the following characteristics:

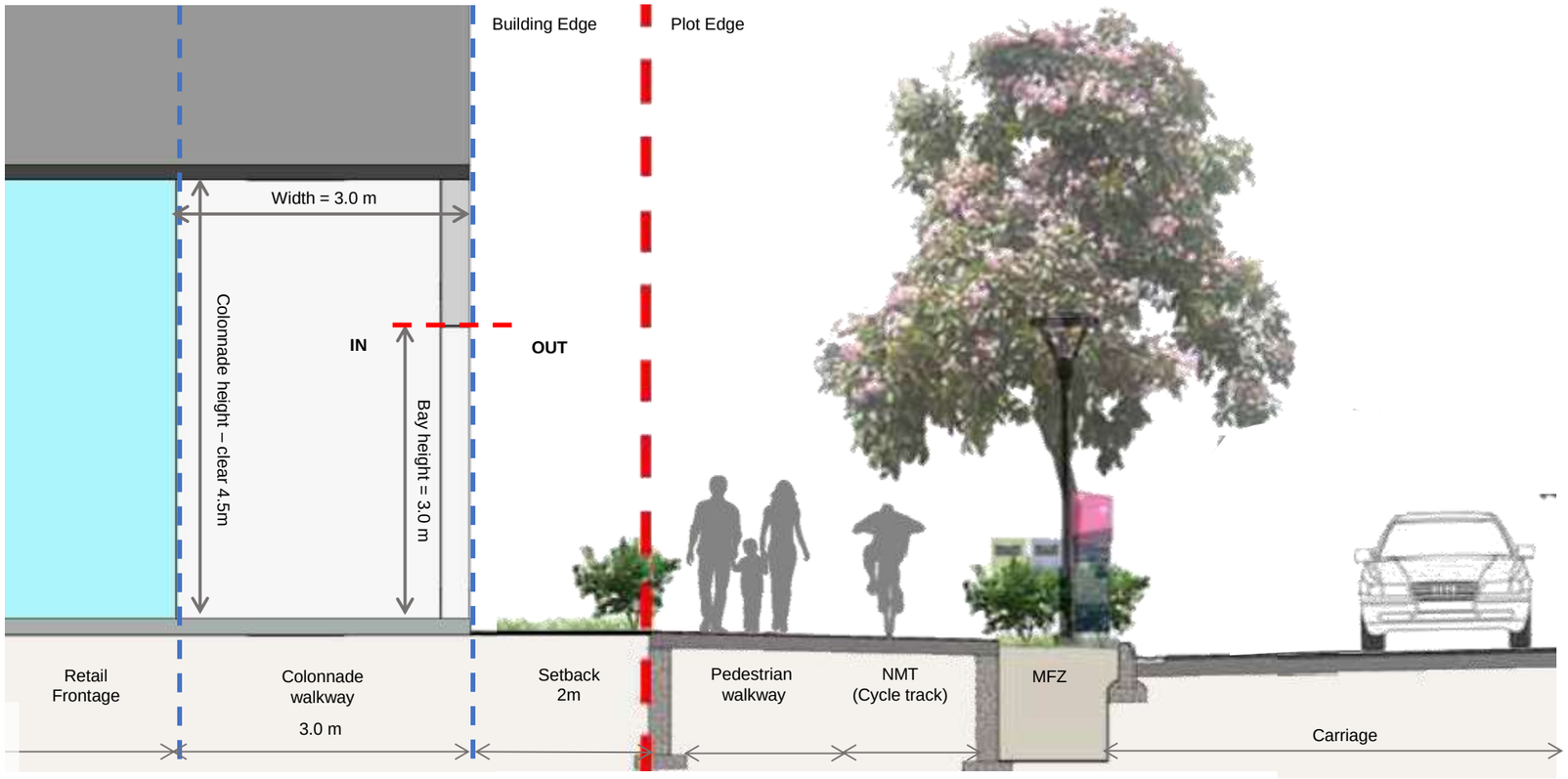
- Colonnades should act as a semi-public interface/spill-out area between the street and building to act as an essential protection against harsh sun and rain and also improve the micro climate of the area; local architectural elements should be introduced as appropriate
- These buildings should ideally be placed with zero setback or 2m setback to be considered from the front property line to maintain same built edge line with colonnades within 300m TPOD zone
- Maximum level difference of 0.15m should be permitted between shop and internal colonnade facade and it shall not project beyond the building line
- Height of colonnade should be maintained at clear min 4.5 m to 6 m as per shops heights and width minimum 3m. This is to ensure that visibility to active uses are not hindered, and that it provides a sufficient amount of space for movement and permeability.
- Buildings within TPOD zone 1 and 2 (within 300m radius) should provide colonnades at the street frontage with active street edge.
- Commercial and mixed use development within TPOD zone of 300m radius should provide colonnades along the street frontage or POPS

Image showing neo-classical colonnade design (Delhi order) at Connaught place, New Delhi

Image showing modern interpretation of colonnade design at Richtiring Office Building, Wallisellen, Switzerland

Key Plan showing location of colonnade at transit stop

Location of Colonnade



TPOD node street section showing colonnades

Source: https://gis.apcrda.org/lps/index.html, https://en.wikipedia.org/wiki/Colonnade, https://en.wikipedia.org/wiki/Colonnade#/media/File:St._Peter%27s_Square,_1992.jpg, https://trekkerpedia.com/.../how-to-spend-a-day-in-connaught-place-delhi/, https://www.archdaily.com/568946/richtiring-office-building-maxdudler/546bcdcde58ece78db000027-12_richtiring-c-stefan_mueller-jpg

5.3 Street Interface and Multi-Level Linkages

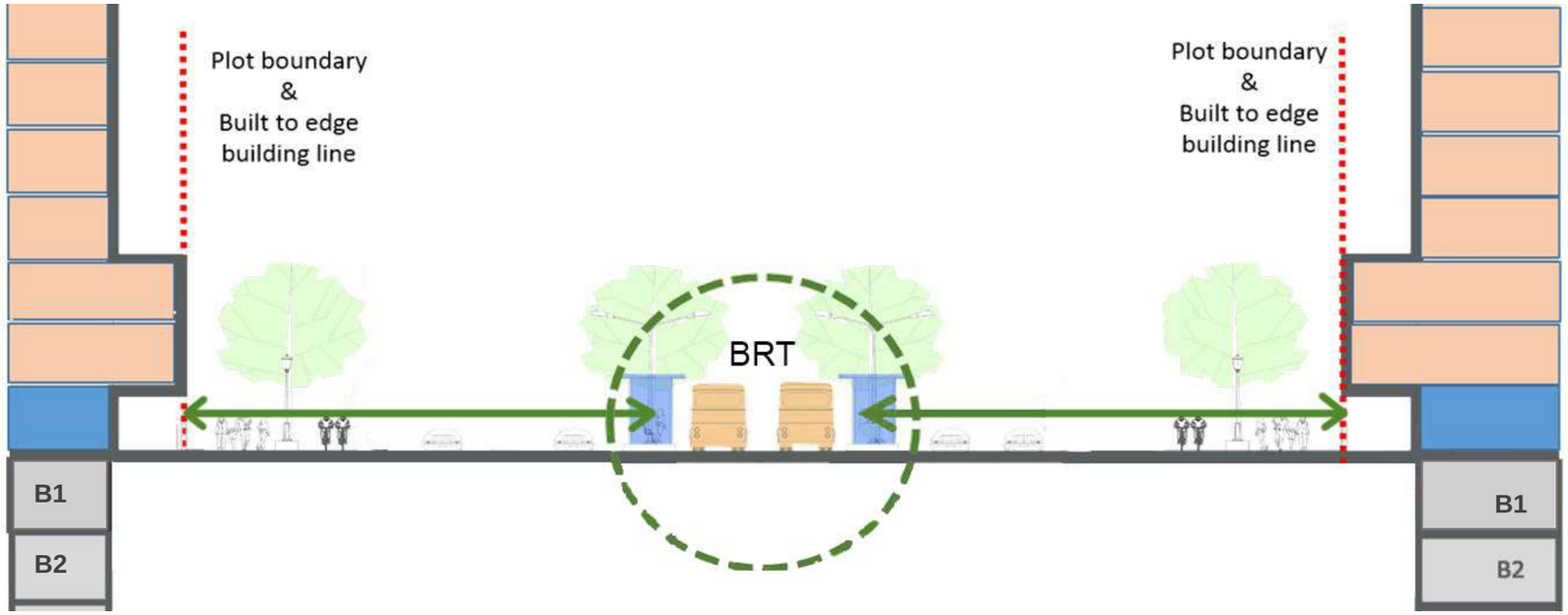
Multi Level Linkages

Linkage to transit stops should ensure a safe and convenient pedestrian connection is established. Depending on the mode of transport available, pedestrian network should integrate the transit stops with the surrounding for a seamless connection on foot. Transit stops should link to multiple options for ease of interchange, connect to nearby developments and open spaces for higher accessibility, and encourage use of public transport.

BRT Corridor

Guidelines on linkages along a BRT corridor are given below:

- Concourse platforms should connect different modes of transit at street level
- BRT is in the centre of the roads and segregated from other vehicles to avoid congestion
- Pedestrians should be given direct access to bus stops with crossings linking from sidewalks (refer to Streetscape Guidelines)
- No on-street parking is available along BRT corridor; instead mixed use developments near transit stations are encouraged to provide underground parking and entrances/exits located at the rear side of the building
- Streets with adequate planting to form boulevards offering a pleasant pedestrian experience (refer to Streetscape Guidelines)
- Pedestrian network connecting open spaces and internal plazas to transit nodes
- Upper level footbridge linkages connecting large buildings over the BRT corridor at primary node intersection is suggested
- Multiple transit options should be available for last mile connectivity, such as feeder bus, taxis, cycling and walking



Section view of BRT stop at transit node

Image showing cycling parking near the MTR exit in Shenzhen

Example of pedestrian connections at a transit node. (Source: ITDP, 2018)

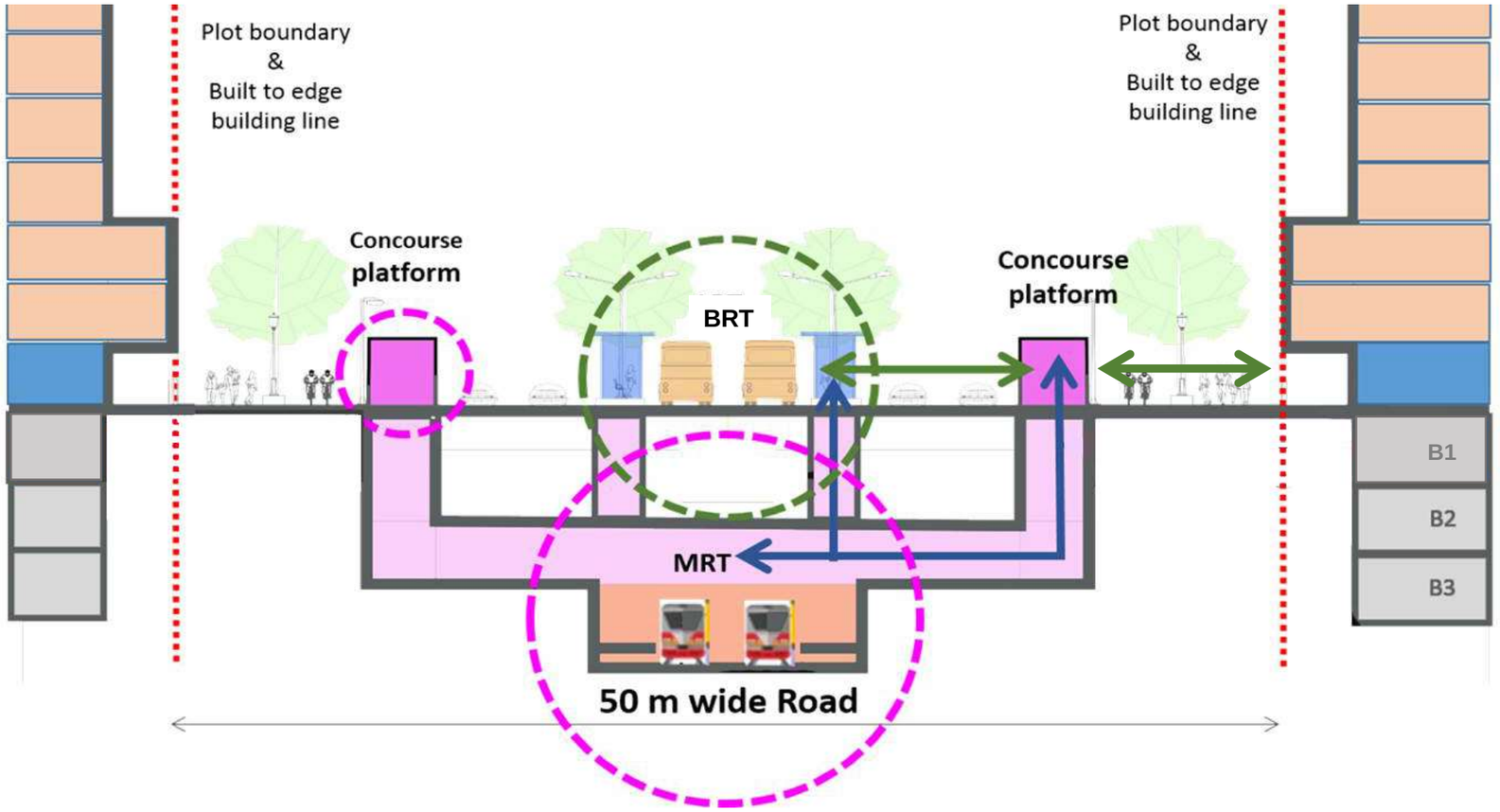
Source: https://www.itdp.org/library/standards-and-guides/tod3-0/what-is-tod/, https://image.baidu.com/search/detail?ct=503316480&z=0&ipn=d&word

5.3 Street Interface and Multi-Level Linkages

BRT + MRT Corridor

Guidelines on linkage along BRT + MRT corridor are given below:

- Addition of MRT can be used to increase traffic capacity when needed
- Concourse platforms should be interconnected for BRT and MRT at street level
- Provision of concourse platforms should be at MFZ and not blocking pedestrian walkways or cycling tracks
- Concourse platforms should be clearly visible for pedestrians
- MRT corridor will be below ground level while BRT will be at street level to avoid congestion
- Pedestrians should be given direct access to bus stops with crossings linking from sidewalks (refer to Streetscape Guidelines)
- Alternatively, upper level footbridge linkages can be provided to connect large scale developments with the BRT corridors at primary nodes of intersection
- Clear concourse platforms way finding signage should be available for better connectivity and accessibility
- On-street surface parking is discouraged along BRT + MRT corridor; instead parking should be provided within mixed use developments near transit stations underground with entrances/exits at the rear side of the building
- Street planting should form boulevards to create pedestrian-friendly environment. (Refer to Street Guidelines)
- Pedestrian network should connect open spaces and internal plazas to transit nodes



Example of BRT/MRT system development

BRT corridor in Quito, Ecuador

BRT and MRT connection in Guangzhou

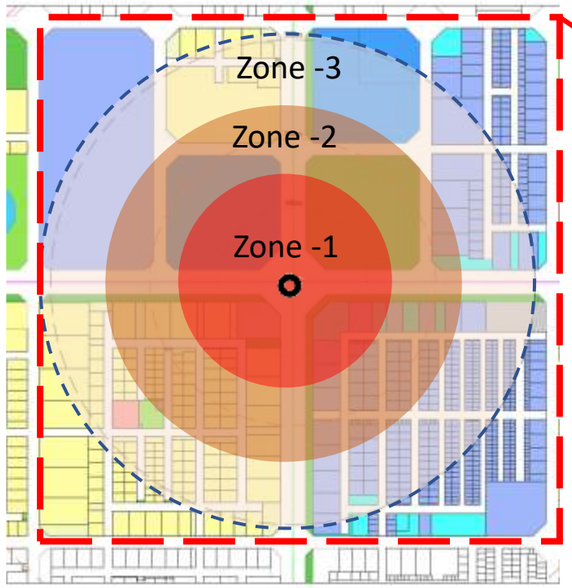
BRT development in Bogota

Source: https://link.springer.com/chapter/10.5822/978-1-61091-835-0_9, https://www.itdp.org/2016/12/06/interview-with-dan-chatman/, http://wwf.panda.org/wwf_news/?204389

5.4 TPOD Demonstration

5.4 TPOD Demonstration

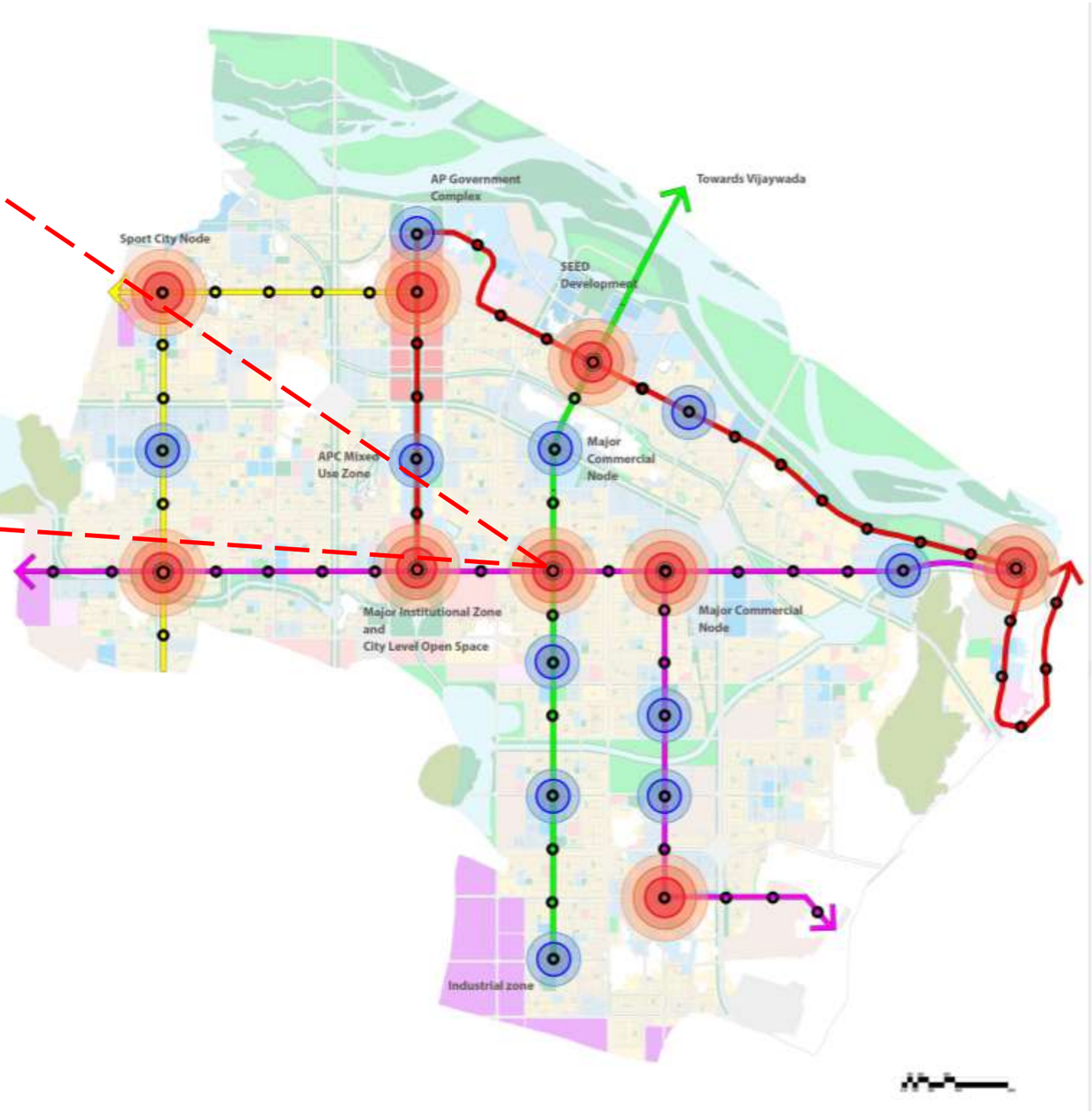
TPOD Node – Demonstration Area Location



Masterplan demonstration area schematic zone - 1km x 1km

Demonstration of a primary transit node located at intersection of two proposed MRT lines shown in the masterplan which as follows -

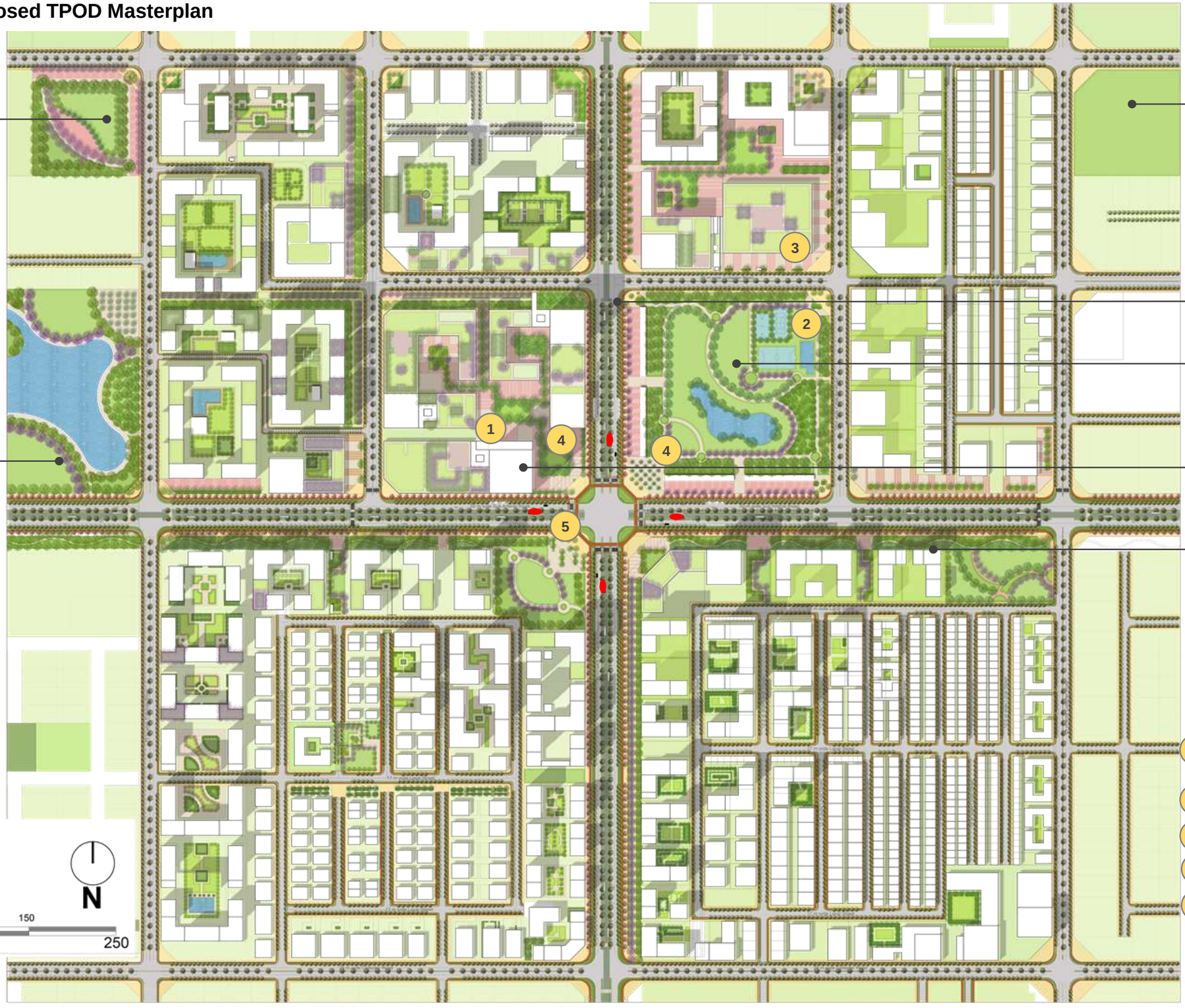
- Proposed masterplan of Transit and Pedestrian Oriented Development at Transit Node
- Comparison of existing and proposed land uses
- Proposed structure plan of TPOD Node
- Plot Amalgamation and Plot Division at proposed TPOD node
- Proposed masterplan of TPOD node
- Building use and height distribution within TPOD node
- Proposed Built Typologies within TPOD



Plan showing city level strategic locations for TPOD nodes.

5.4 TPOD Demonstration

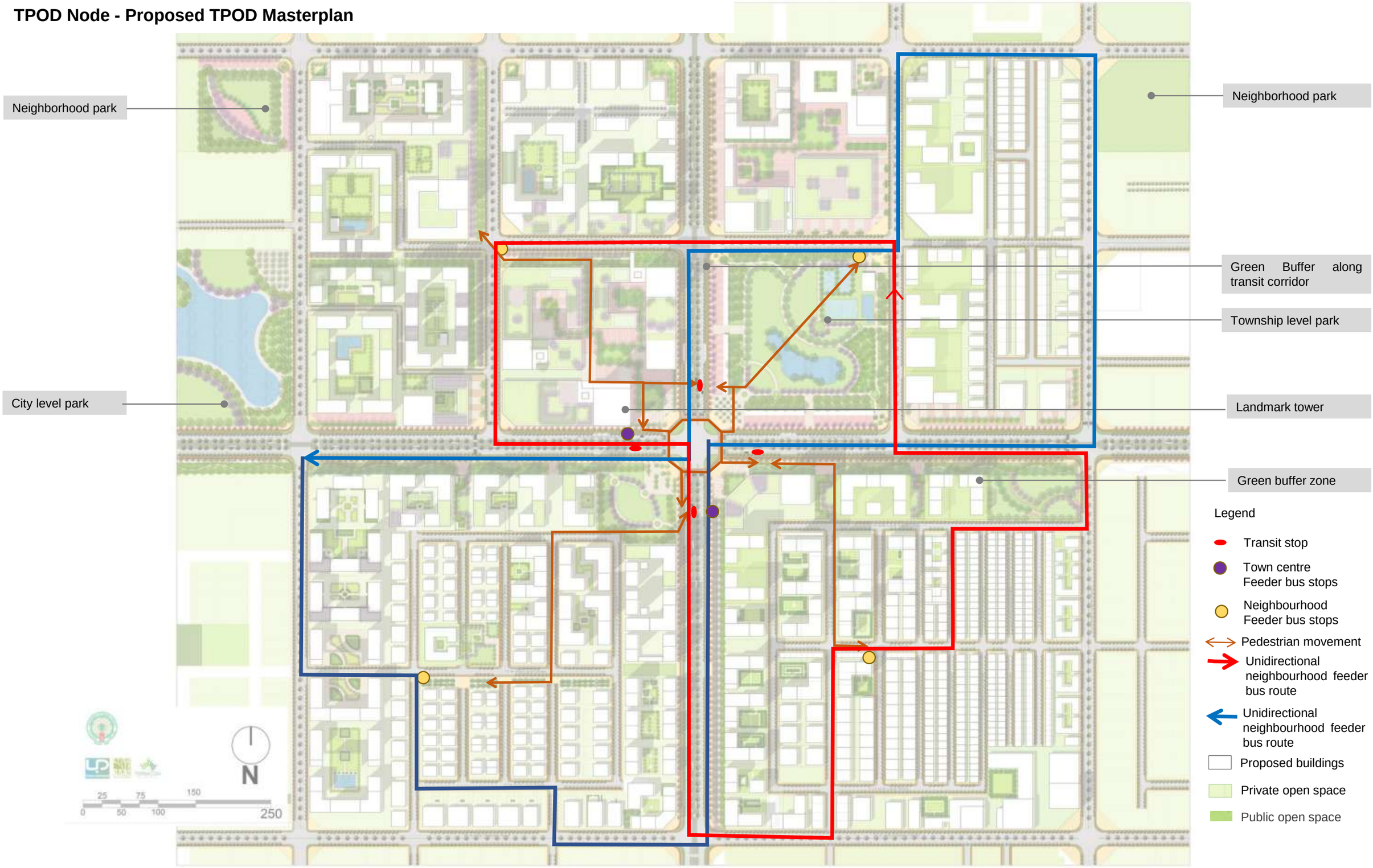
TPOD Node – Proposed TPOD Masterplan



masterplan showing variation building typologies from transit node along with open spaces

5.4 TPOD Demonstration

TPOD Node - Proposed TPOD Masterplan



Masterplan showing variation building typologies from transit node along with open spaces

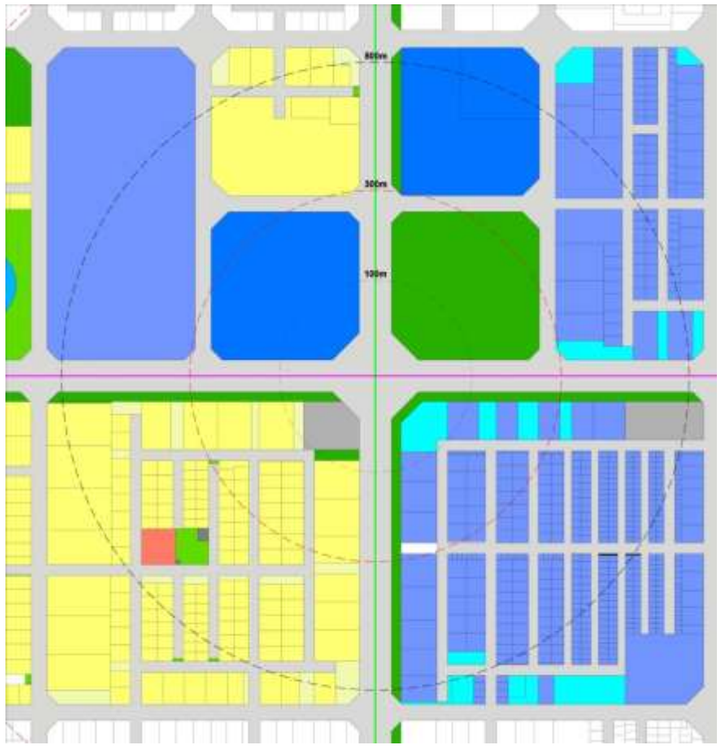
5.4 TPOD Demonstration

Existing and Proposed Land Uses

Advantages of TPOD proposed land use:

- Redistribution of density along transit node with change in land use to mixed use.
- Increase in percentage of open space.
- Redistributed load on utility infrastructure as result of built form typology.

Existing LPS Masterplan Land use



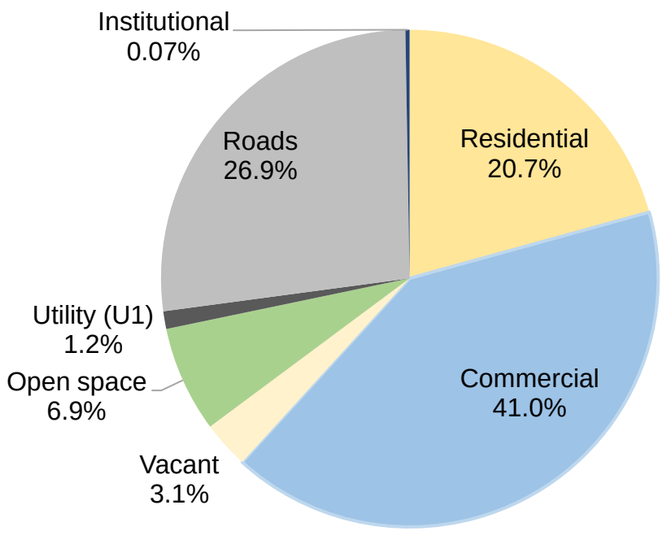
Legend

- C2
- Comm. Vacant
- C4
- R3
- R3 Vacant
- S2
- S3
- P1
- P2
- U1
- U2

Existing LPS Masterplan and Area

Residential = 54acres
Commercial = 107 acres
Institutional = 0.7acres
Vacant= 8 acres
Utility = 3.45 acres
Open space = 18 acres
Road network =70 acres
Total area = 260 acres

Existing Land use percentage



TPOD Proposed Land use

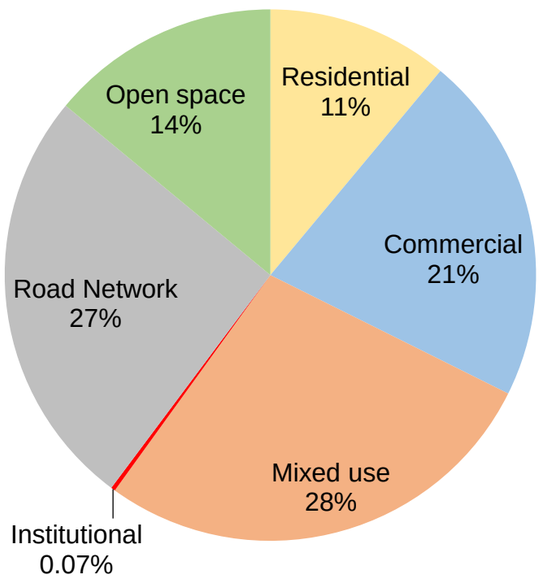
Legend

- C2
- Comm. Vacant
- C4
- R3
- R3 Vacant
- S2
- S3
- P1
- P2
- U1
- U2
- Mixed- Use

Proposed land use in percentage

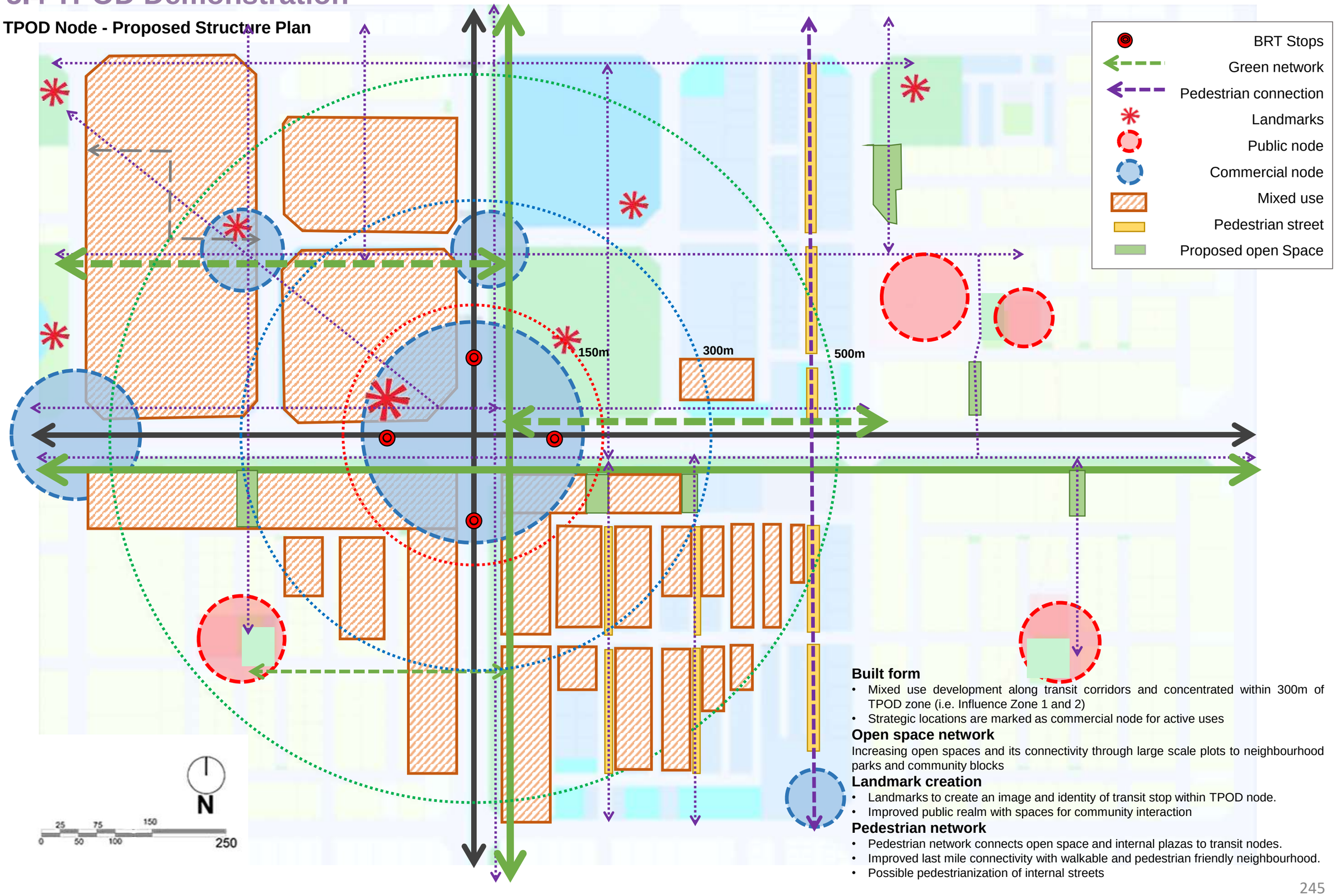
Residential = 29.59 acres
Commercial = 57 acres
Institutional = 0.7 acres
Mixed use = 73.7 acres
Open space = 37 acres
Road network = 70 acres
Total area = 260 acres

Proposed Land use percentage



5.4 TPOD Demonstration

TPOD Node - Proposed Structure Plan



Built form

- Mixed use development along transit corridors and concentrated within 300m of TPOD zone (i.e. Influence Zone 1 and 2)
- Strategic locations are marked as commercial node for active uses

Open space network

Increasing open spaces and its connectivity through large scale plots to neighbourhood parks and community blocks

Landmark creation

- Landmarks to create an image and identity of transit stop within TPOD node.
- Improved public realm with spaces for community interaction

Pedestrian network

- Pedestrian network connects open space and internal plazas to transit nodes.
- Improved last mile connectivity with walkable and pedestrian friendly neighbourhood.
- Possible pedestrianization of internal streets

5.4 TPOD Demonstration

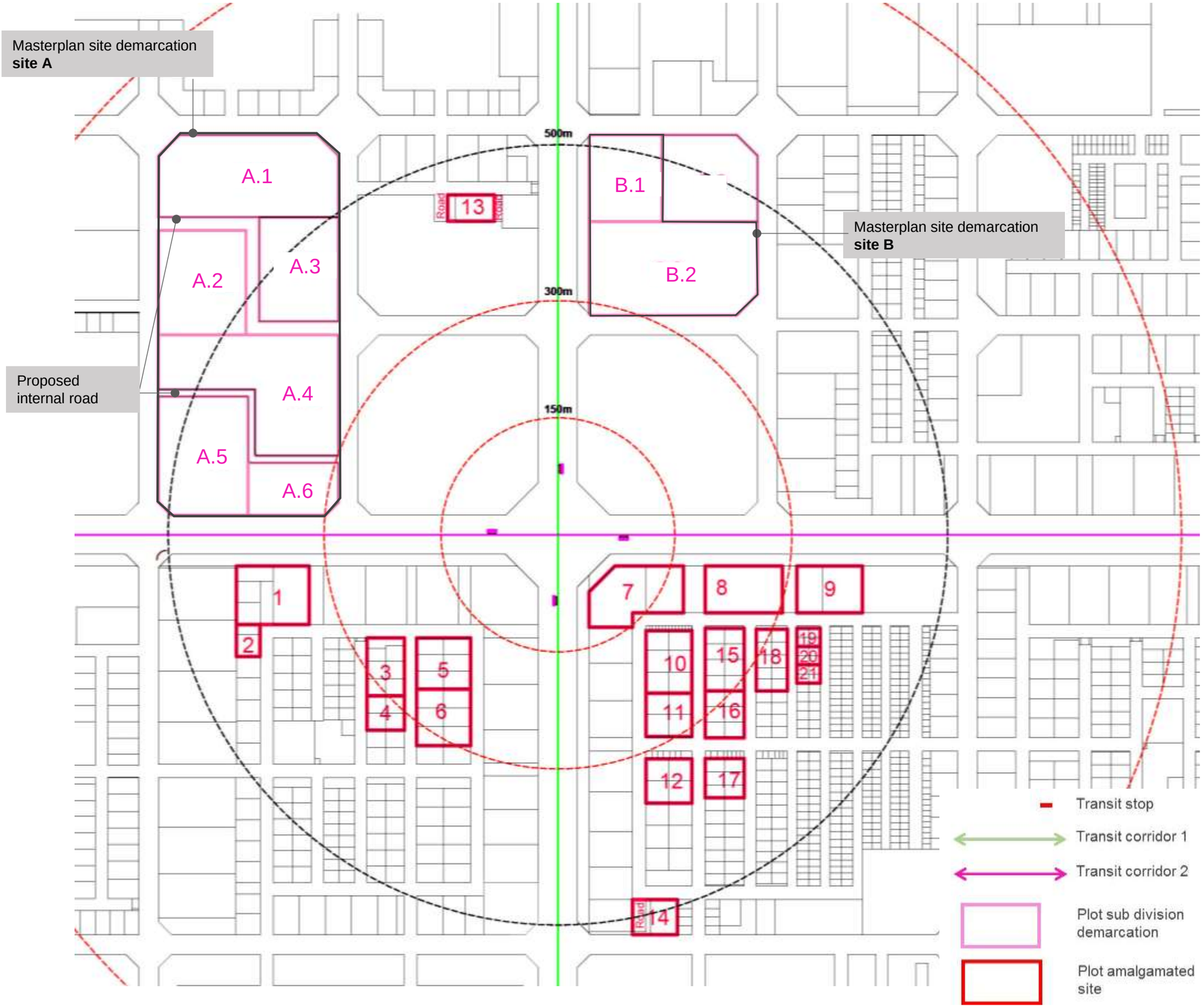
TPOD Node - Plot Amalgamation and Plot Division

Total number of plot amalgamation recommended sites =21

Plot No.	No. of plots amalgamated	Plot area in Sq.m
1	4	7001.00
2	2	1236.07
3	2	3565.15
4	2	2107.03
5	2	4414.75
6	2	5016.76
7	2	7742.95
8	2	5942.70
9	2	5040
10	6	4715.76
11	4	3277.61
12	4	3344.51
13	Street	2348
14	Site + Street	2582.90
15	8	4013.41
16	6	3010.05
17	6	2508.38
18	10	3160.56
19	4	702.34
22	4	702.34
21	4	702.34

Total number of sub divided plots = 2

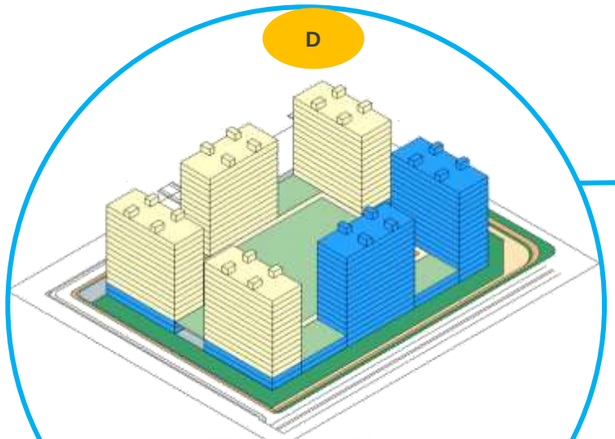
Site	Plot Number	No. of plot division	Plot area in Sq.m
Site A		**6**	**111716**
	A.1		23662
	A.2		15709.82
	A.3		13620.45
	A.4		26443.77
	A.5		17382.19
	A.6		7671.90
Internal roads			2845.50
Site B		**2**	**36014**
	B.1		25585
	B.2		10430.58



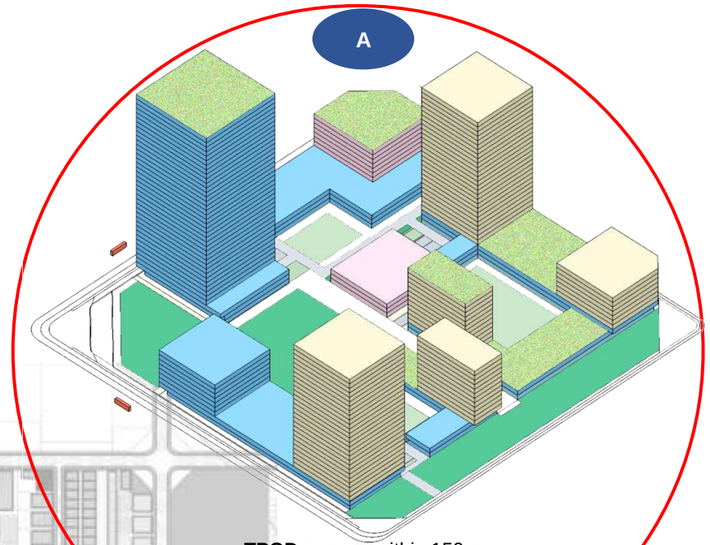
5.4 TPOD Demonstration

TPOD Node - Proposed Built Typologies

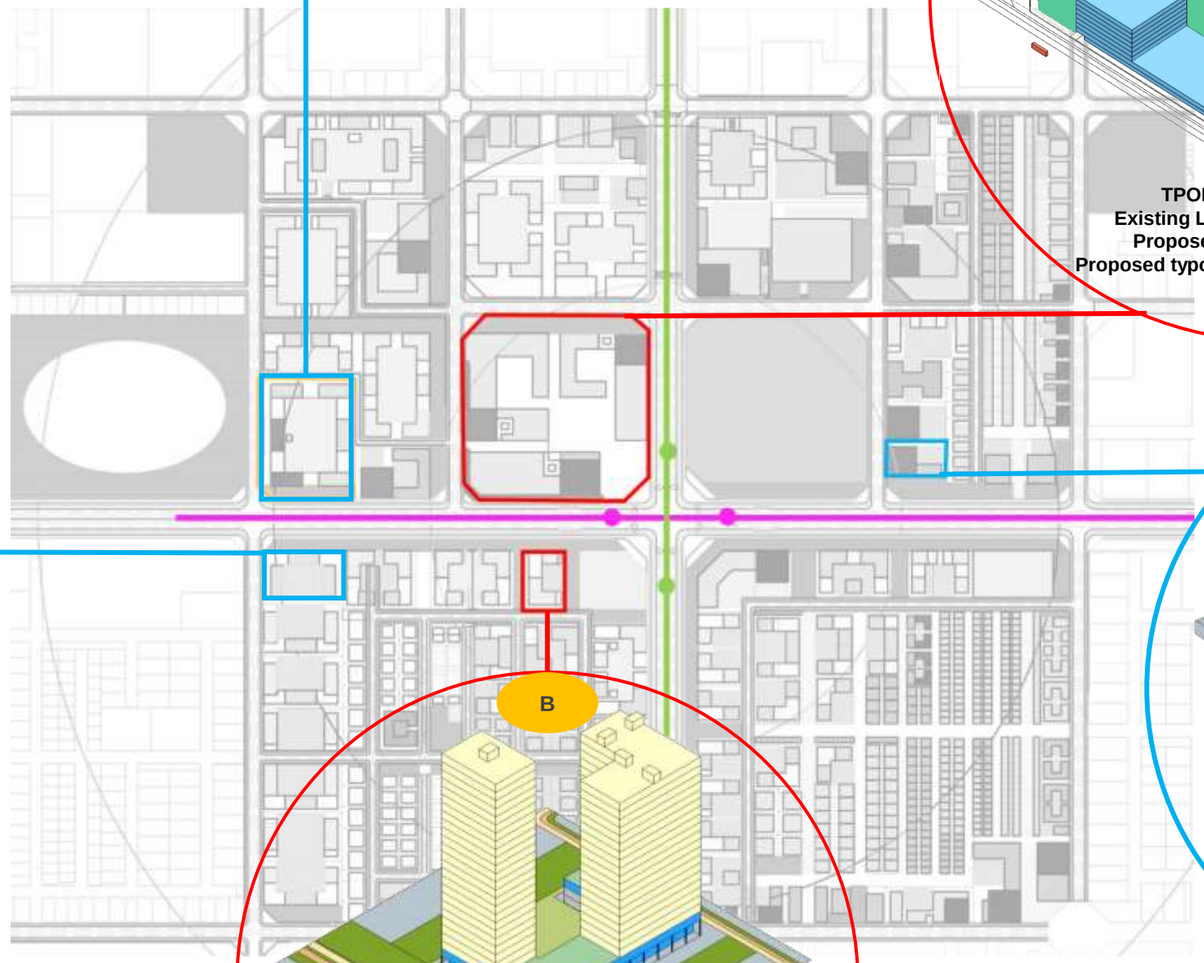
Based on the size, location and land use of plots within TPOD Nodes different built typologies are demonstrated here.

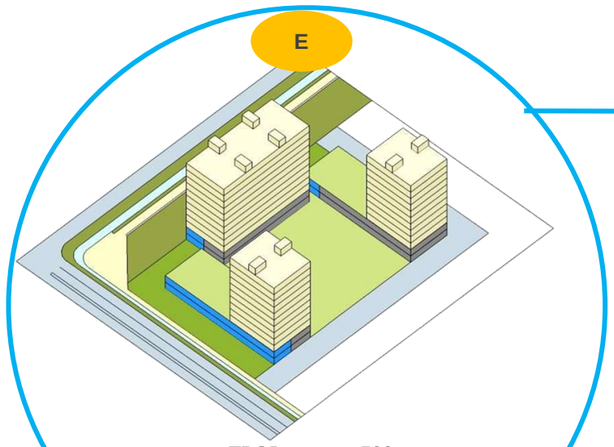


TPOD zone = 500m
Existing Land use = R3 Residential
Proposed Land use = Mixed use
Proposed typology = SOHO(Single Office House Office)

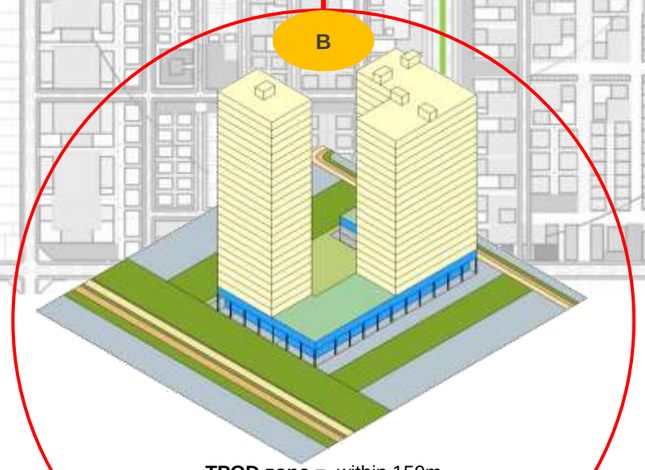


TPOD zone = within 150m
Existing Land use = C4 Commercial
Proposed Land use = Mixed use
Proposed typology = High-Density Mixed Use Complex

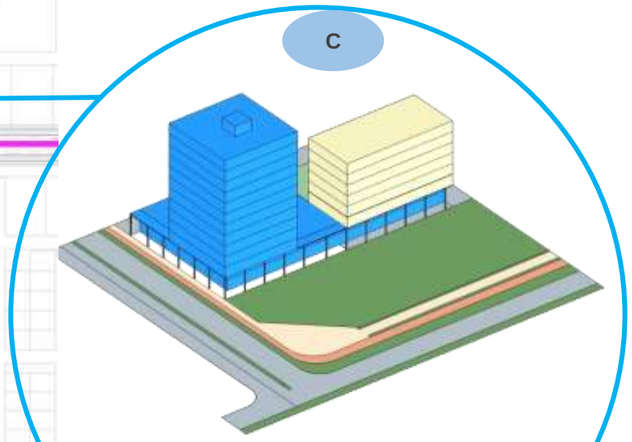




TPOD zone = 500
Existing Land use = R3 Residential
Proposed Land use = Residential
Proposed typology = Mid Rise Residential Apartment



TPOD zone = within 150m
Existing Land use = R3 Residential
Proposed Land use = Mixed use
Proposed typology = Multi Storeyed High Rise Apartments



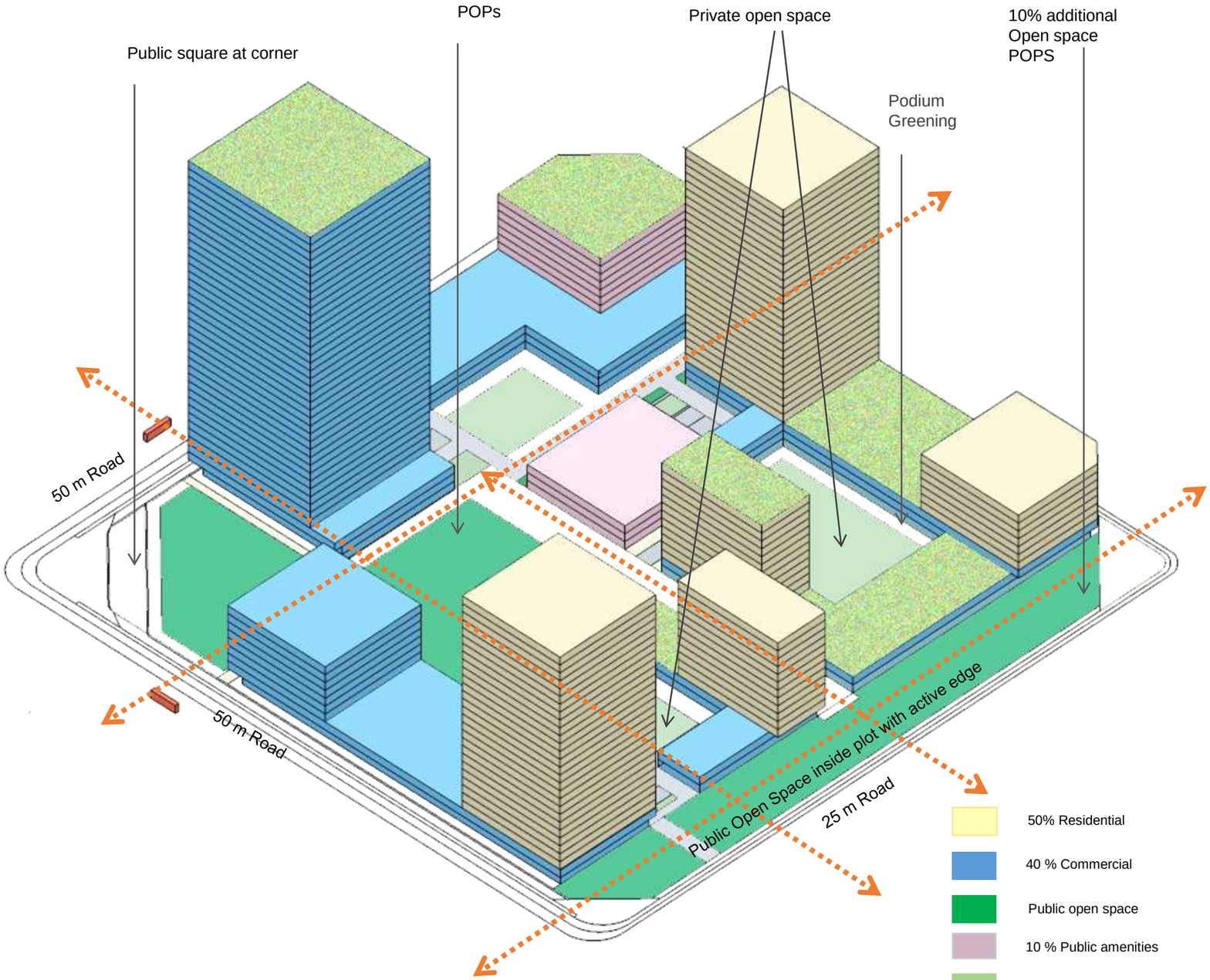
TPOD zone = 300m
Existing Land use = C2 Commercial
Proposed Land use = Mixed use
Proposed typology = Commercial Offices with Shopping Centre

5.4 TPOD Demonstration

TPOD Node - Proposed Built Typologies

A) High-Density Mixed Use Development Complex

TPOD zone = within 150m
Existing Land use = C4 Commercial
Proposed Land use = Mixed use



Large plot of area above 4000 sq m located within 150 m of TPOD node is developed with consideration for the following features-

- Mixed use development and increased open space area based upon incentives as well as redistribution of building heights.

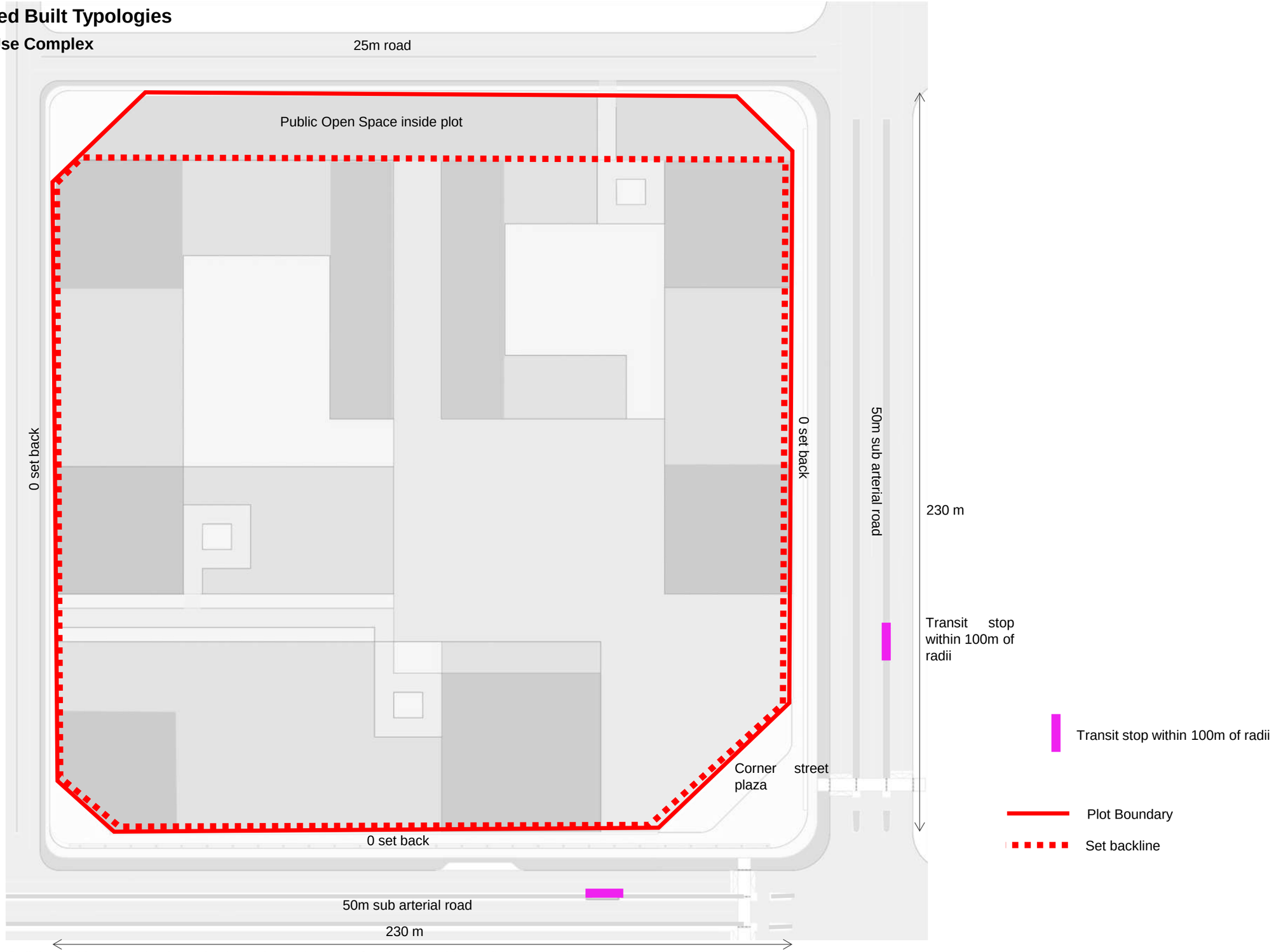
Site plan of plot development in context with major transit node

5.4 TPOD Demonstration

TPOD Node - Proposed Built Typologies

A) High-Density Mixed Use Complex

Setbacks



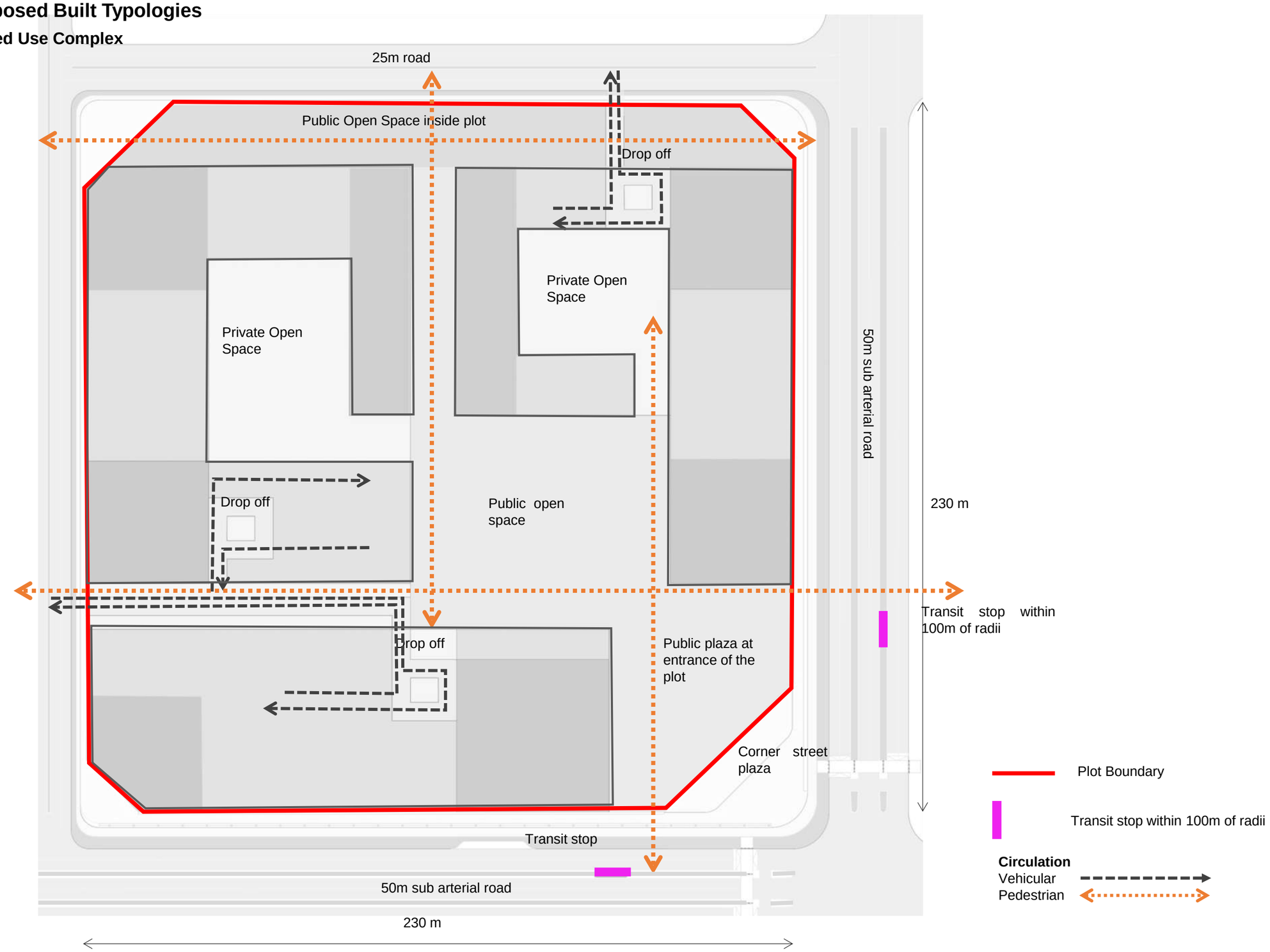
Buildings with zero setbacks and colonnades at the street frontier to enable retail, stores and active uses.

5.4 TPOD Demonstration

TPOD Node - Proposed Built Typologies

A) High-Density Mixed Use Complex

Circulation



- Vehicular entrances placed at roads with least ROW

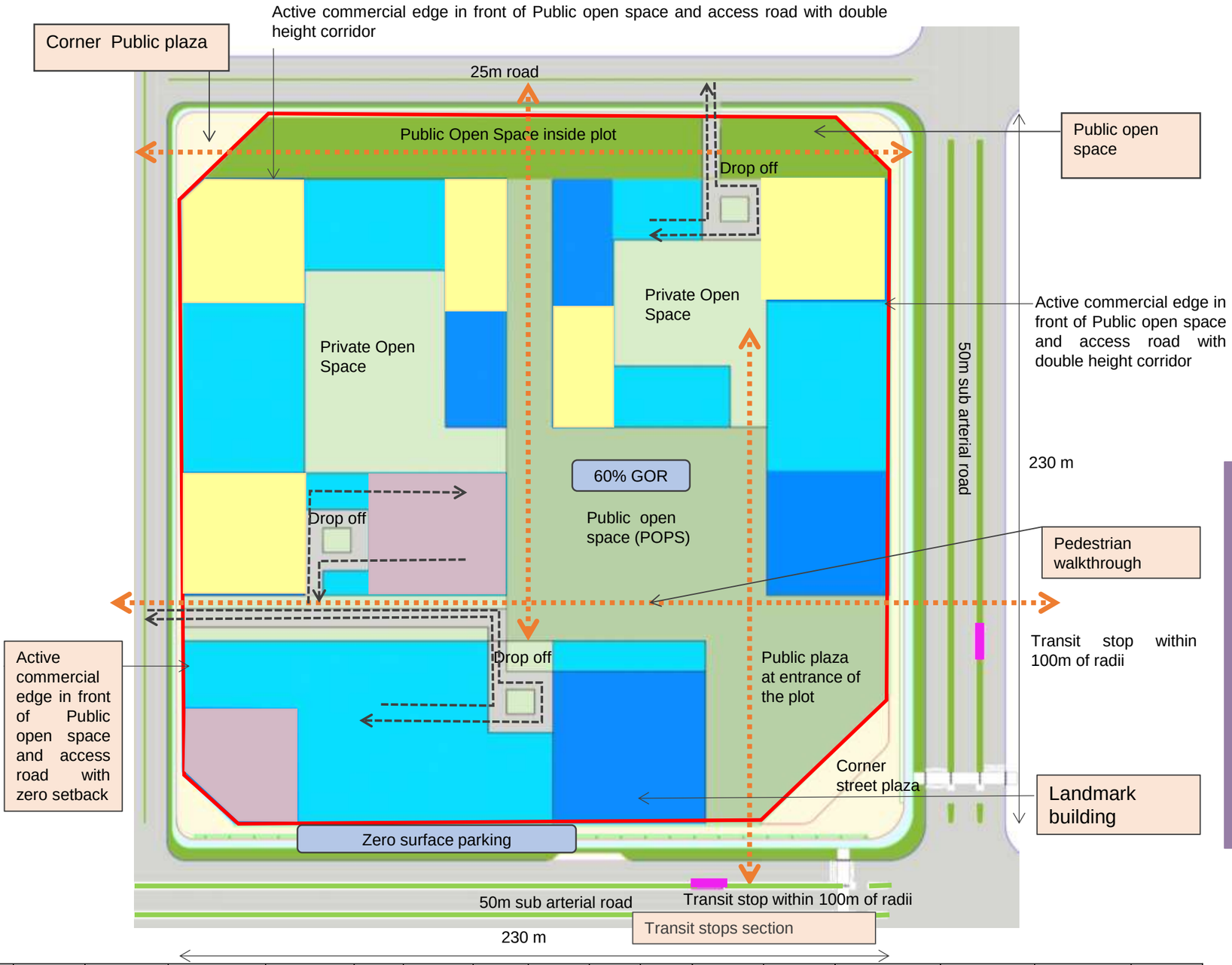
5.4 TPOD Demonstration

TPOD Node - Proposed Built Typologies

A) High-Density Mixed Use Complex

Layout Plan

- Provision of privately owned POPS enabling pedestrians to travel within development blocks
- Development of plot corners as public squares and plazas
- Separating private and public open spaces in the layout with courtyards
- Pedestrian connectivity through the plot from transit stops to public spaces and squares
- Basement parking and minimum area for vehicular movement at surface and ground level
- Parking entrances not in the way of pedestrian flow
- Greening and tree coverage are maximized within open spaces



Plot Boundary

Set back

Transit stop within 100m of radii

Circulation
Vehicular
Pedestrian

Residential

Commercial

Public open space

Private open space

Podium landscape

Plot area single in Sq. M	No. of Plots amalgum ated	Plot area after amalgumati on in Sq. M	Master Plan Landuse	Proposed Landuse	ZR FSI	Buildable area in Sq.M	GFA in %	GFA in Sq.M	GOR in %	GOR in sq.m	No. of floors as per ZR FSI	Height of bldg before TDR	Incentive based bonus plot ratio max.allowed	Permissible Buildable area after TDR	Bldg height as Per ZR	Bldg height achieved
51942	N.A	N.A	C4 Commercial	Mixuse	5	259710	55%	28568	60%	14025	9	27m	1.5	389565	conditional	120m max.

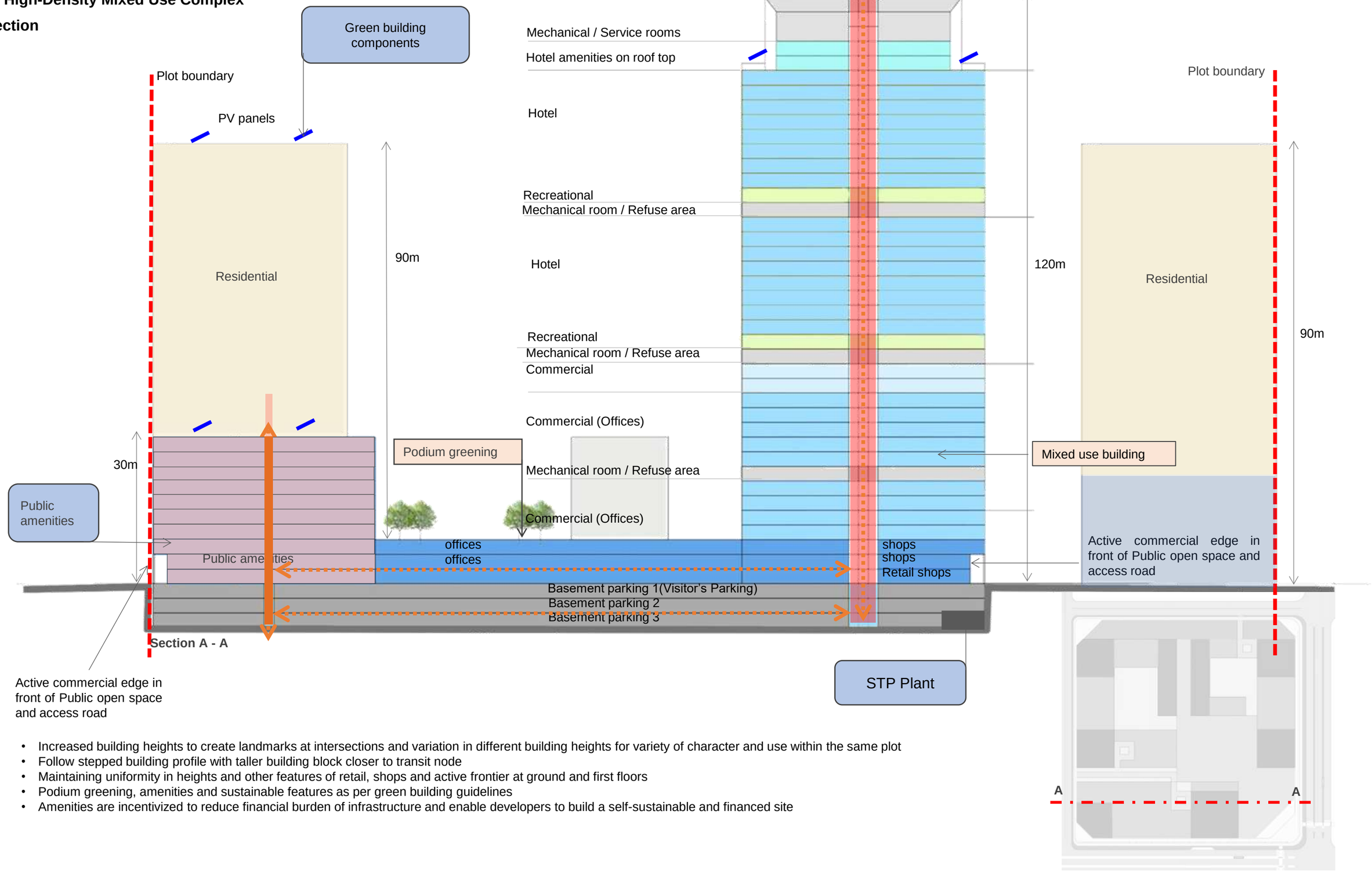
Additional bonus plot ratio is allotted to plot as per incentive based guideline table.

5.4 TPOD Demonstration

TPOD Node - Proposed Built Typologies

A) High-Density Mixed Use Complex

Section



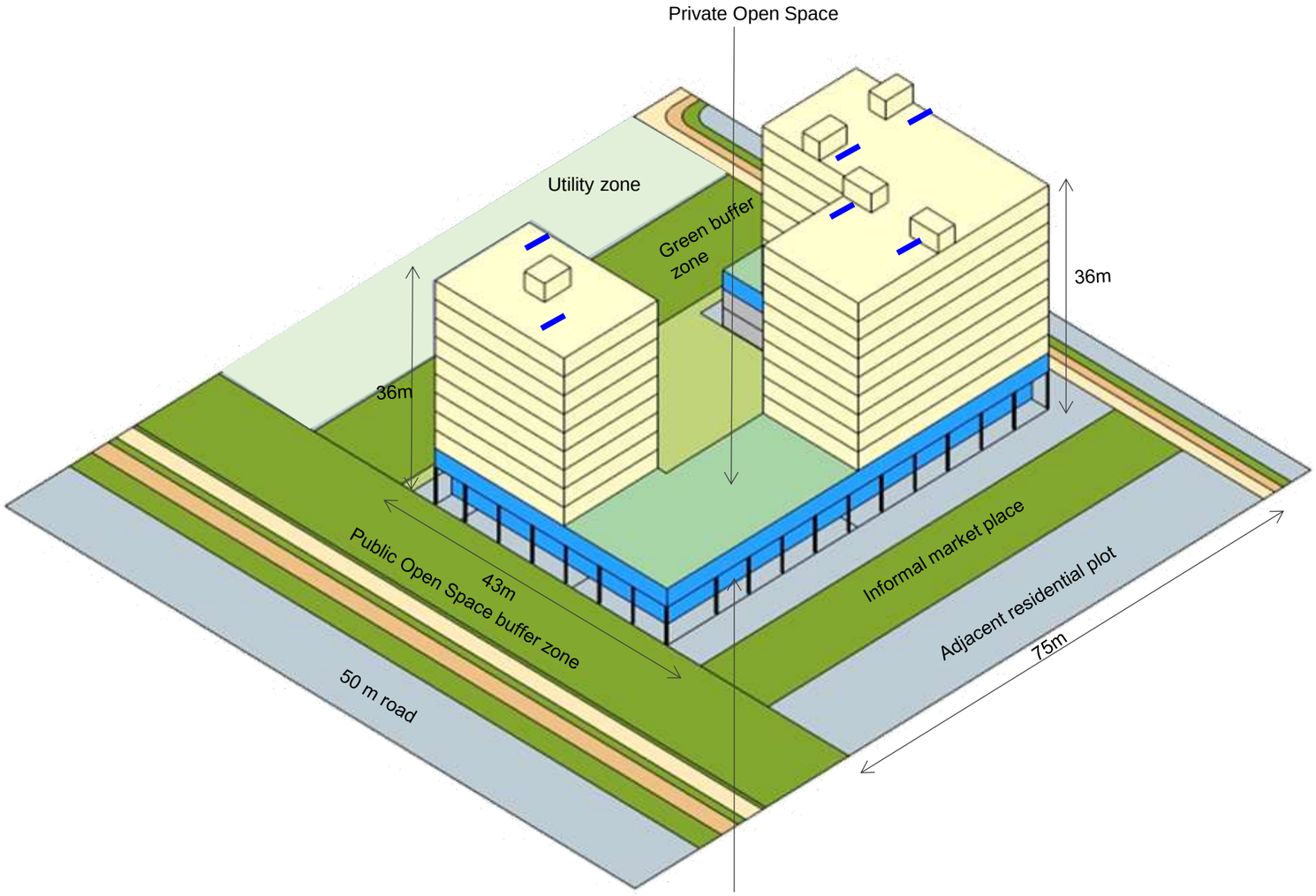
- Increased building heights to create landmarks at intersections and variation in different building heights for variety of character and use within the same plot
- Follow stepped building profile with taller building block closer to transit node
- Maintaining uniformity in heights and other features of retail, shops and active frontier at ground and first floors
- Podium greening, amenities and sustainable features as per green building guidelines
- Amenities are incentivized to reduce financial burden of infrastructure and enable developers to build a self-sustainable and financed site

5.4 TPOD Demonstration

TPOD Node - Proposed Built Typologies

B) Multi Storeyed High Rise Apartments

TPOD zone = within 150m
Existing Land use = R3 Residential
Proposed Land use = Mixed use



Active commercial edge in front of Public open space and access road

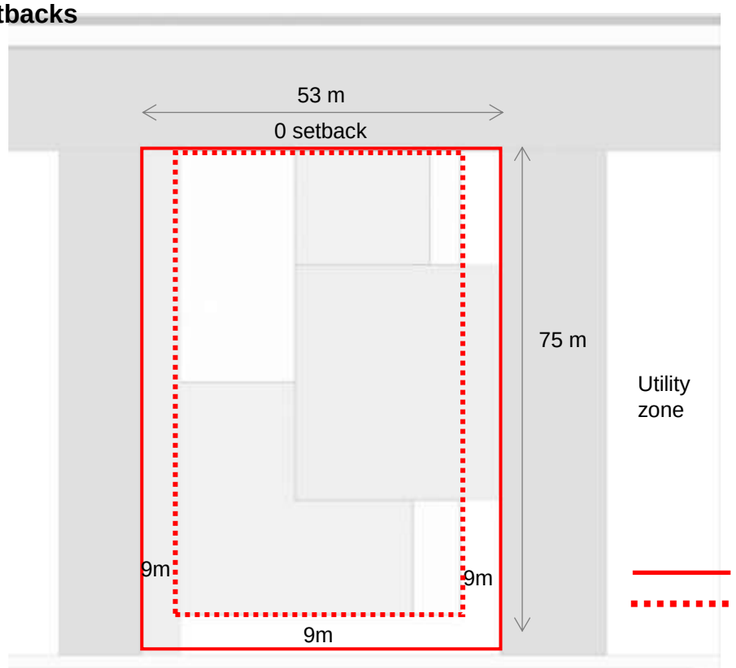
Site plan of plot development in context

5.4 TPOD Demonstration

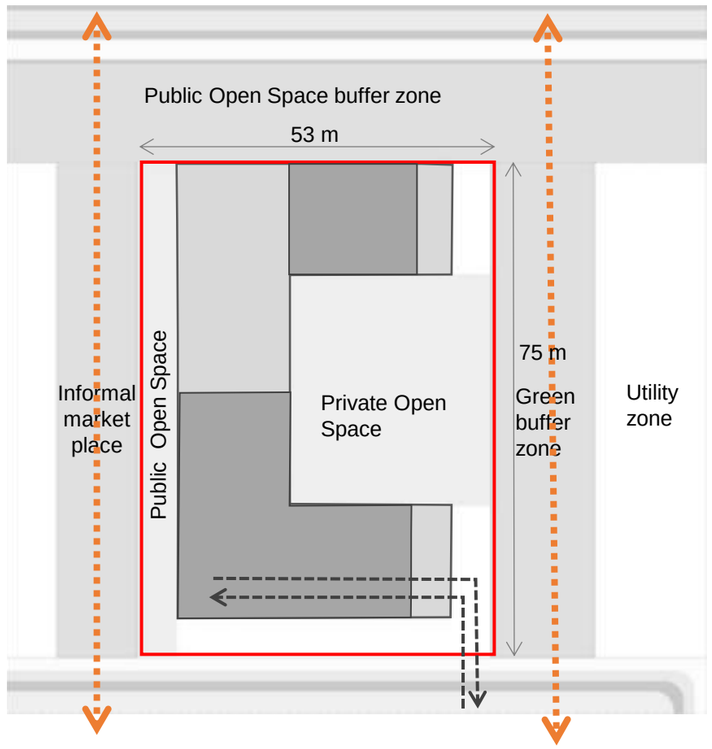
TPOD Node - Proposed Built Typologies

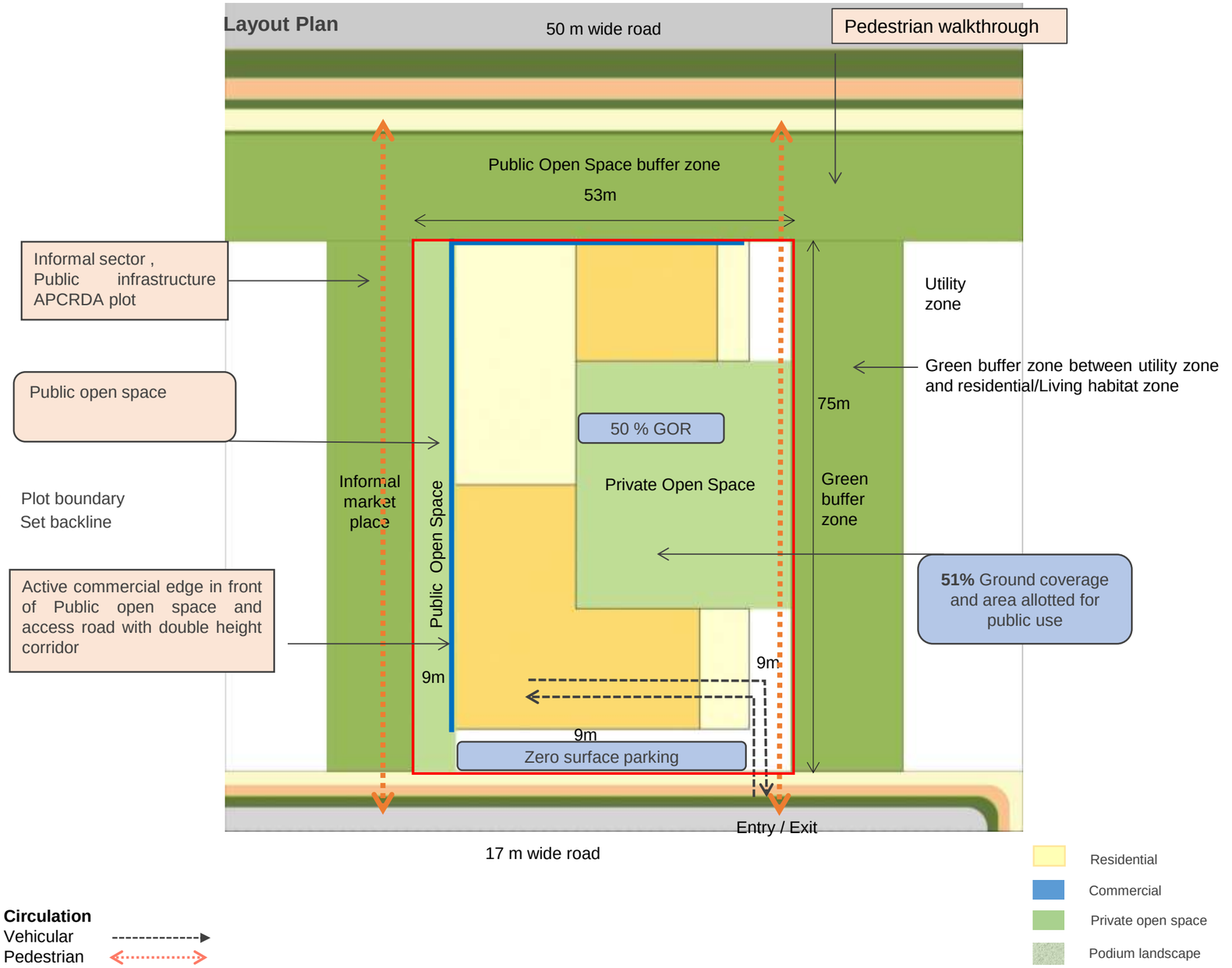
B) Multi Storeyed High Rise Apartments

Setbacks



Circulation





Circulation
Vehicular
Pedestrian

No. of Plots amalgum ated	Plot area after amalguma tion in Sq. M	Master Plan Landuse	Proposed Landuse	ZR FSI	Buildabl e area in Sq.M	GFA in %	GFA in Sq.M	GOR in %	GOR in Sq.M	No. of floors as per ZR FSI	Height of bldg before TDR	Incentive based bonus plot ratio max.allowe d	Permissible Buildable area after TDR	Bldg height as Per ZR	Bldg height achieved
N.A	N.A	Residential	Residential	2.4	9420	51%	2001.8	50%	1200	5	15m	1.5	14130	37m	36m

Additional bonus plot ratio is allotted to plot as per incentive based guideline table.

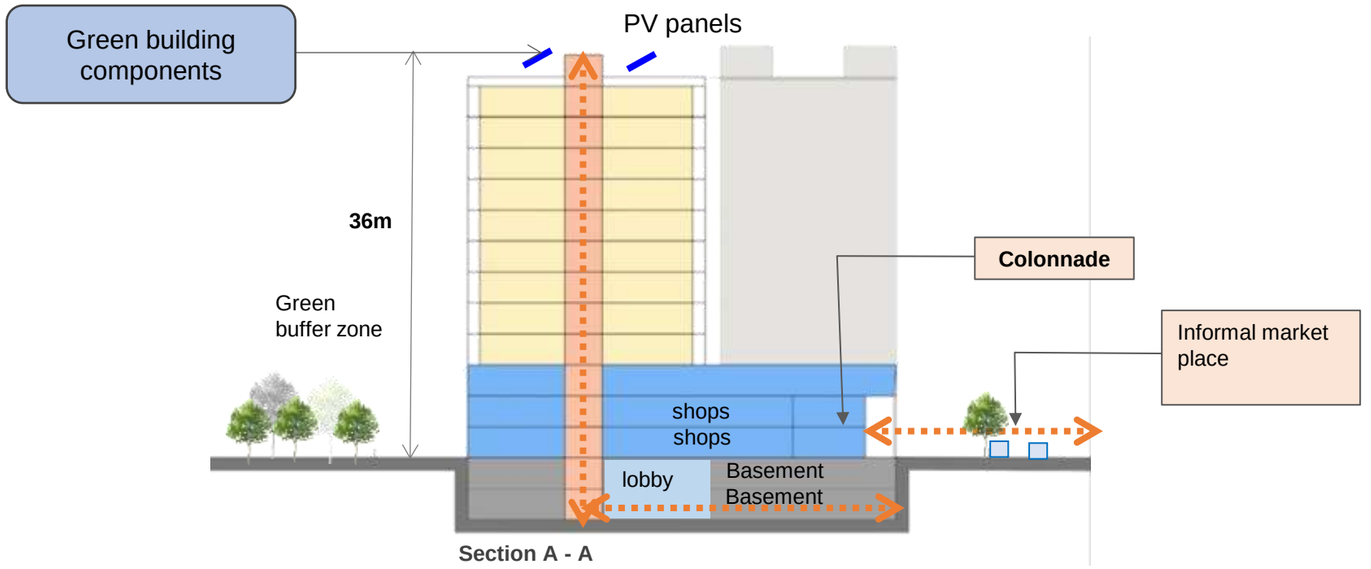
5.4 TPOD Demonstration

TPOD Node - Proposed Built Typologies

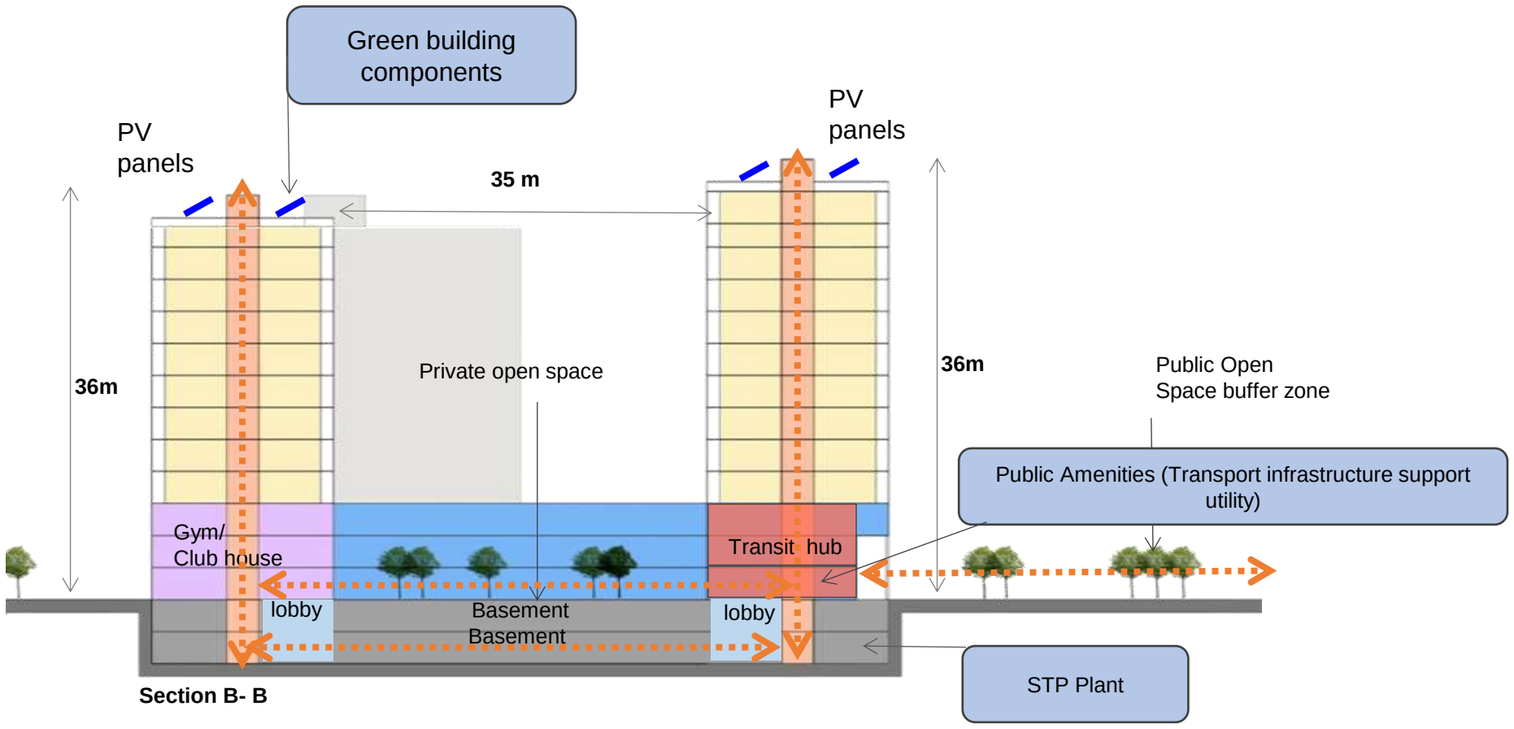
B) Multi Storeyed High Rise Apartments

Section

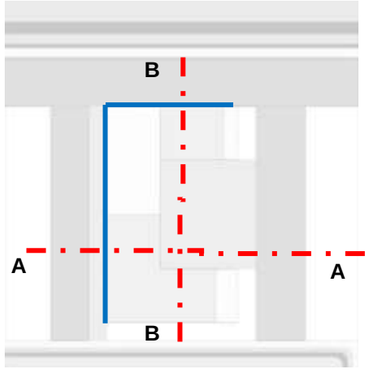
- Maintaining uniformity in heights
- Active frontier of buildings at street front with retail and commercial on lower floors.
- Increased density with higher building heights and open spaces distribution based upon incentives.
- Recreational open spaces can be used for kindergarten, gym, club houses and other amenities.
- Solid waste management and energy efficient services as per green building guidelines
- Zero surface parking with provision of basement parking and podium
- Parking entrance/exit at rear end of building



Section A - A



Section B- B

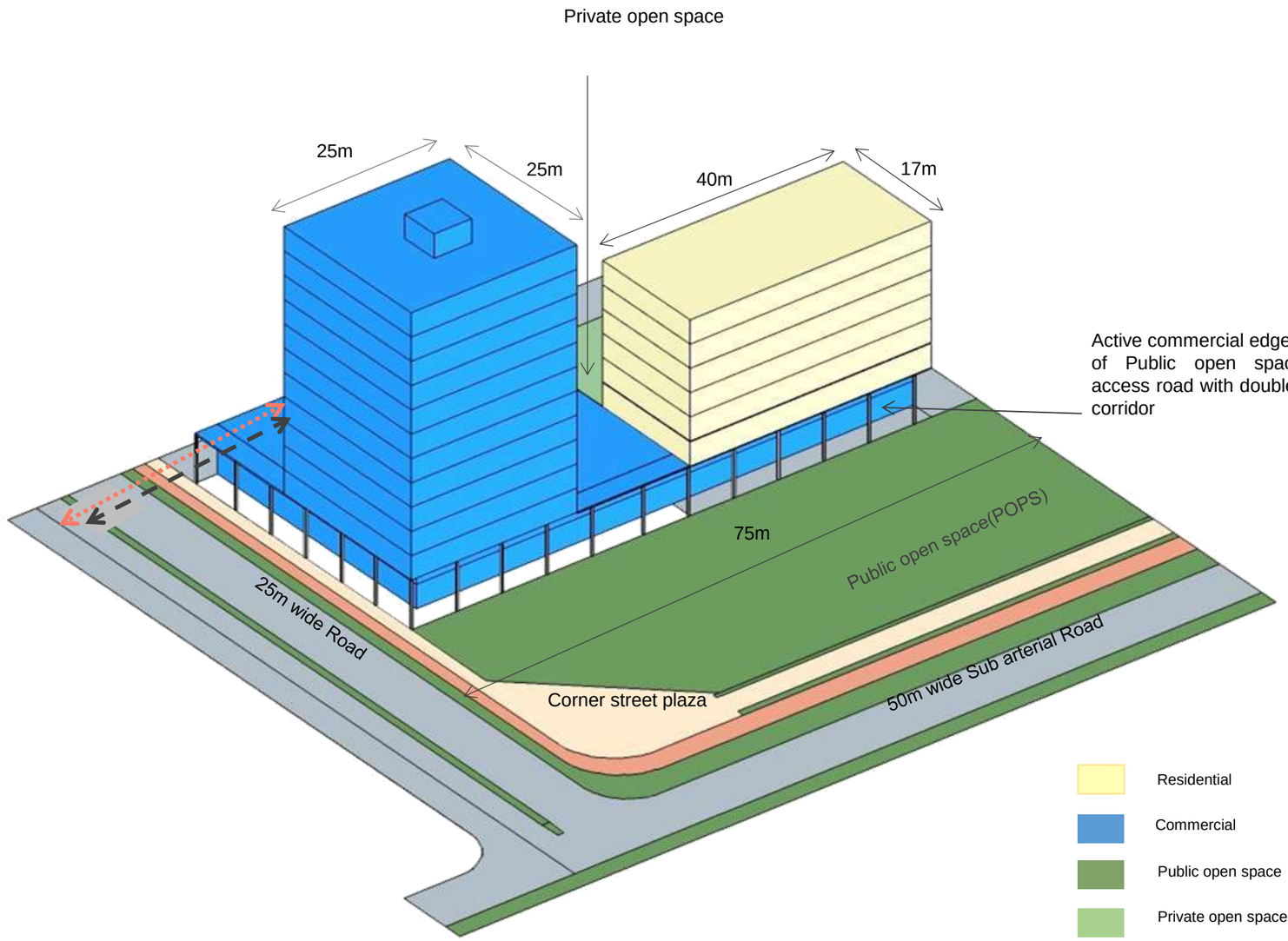


5.4 TPOD Demonstration

TPOD Node - Proposed Built Typologies

C) Commercial Offices with Shopping Centre

TPOD zone = within 300m
Existing Land use = C2 Commercial
Proposed Land use = Mixed use



Site plan of plot development in context

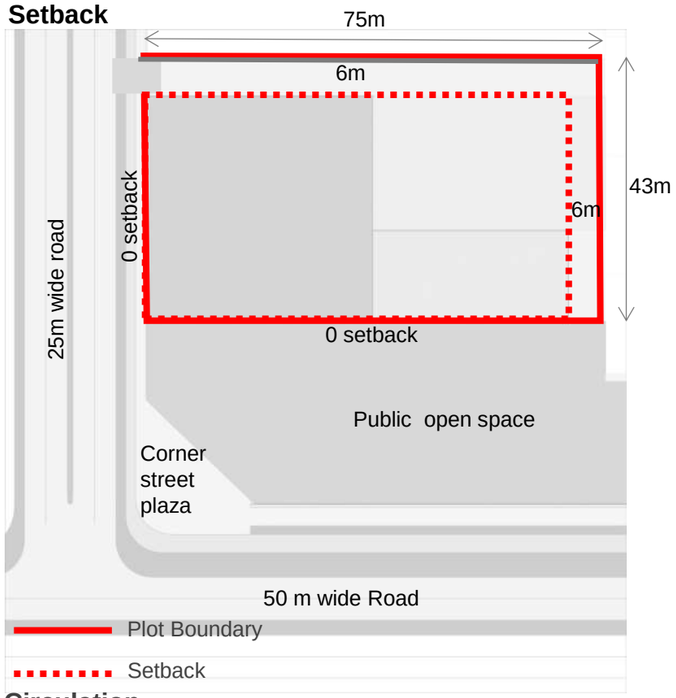
- Building frontier with retail, restaurants and shopping areas on lower floors
- Maintaining uniformity in heights
- Provide retail, shops and active frontier at ground and first floors.
- Publicly accessible open space in the setback area along street
- Solid waste management and energy efficient services as per green building guidelines
- Zero surface parking with provision of basement parking and podium

5.4 TPOD Demonstration

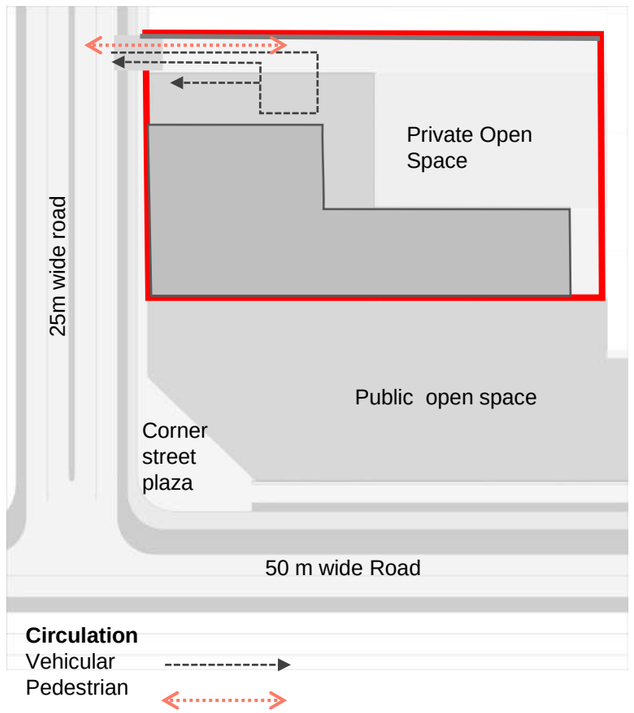
TPOD Node - Proposed Built Typologies

C) Commercial Offices with Shopping Centre

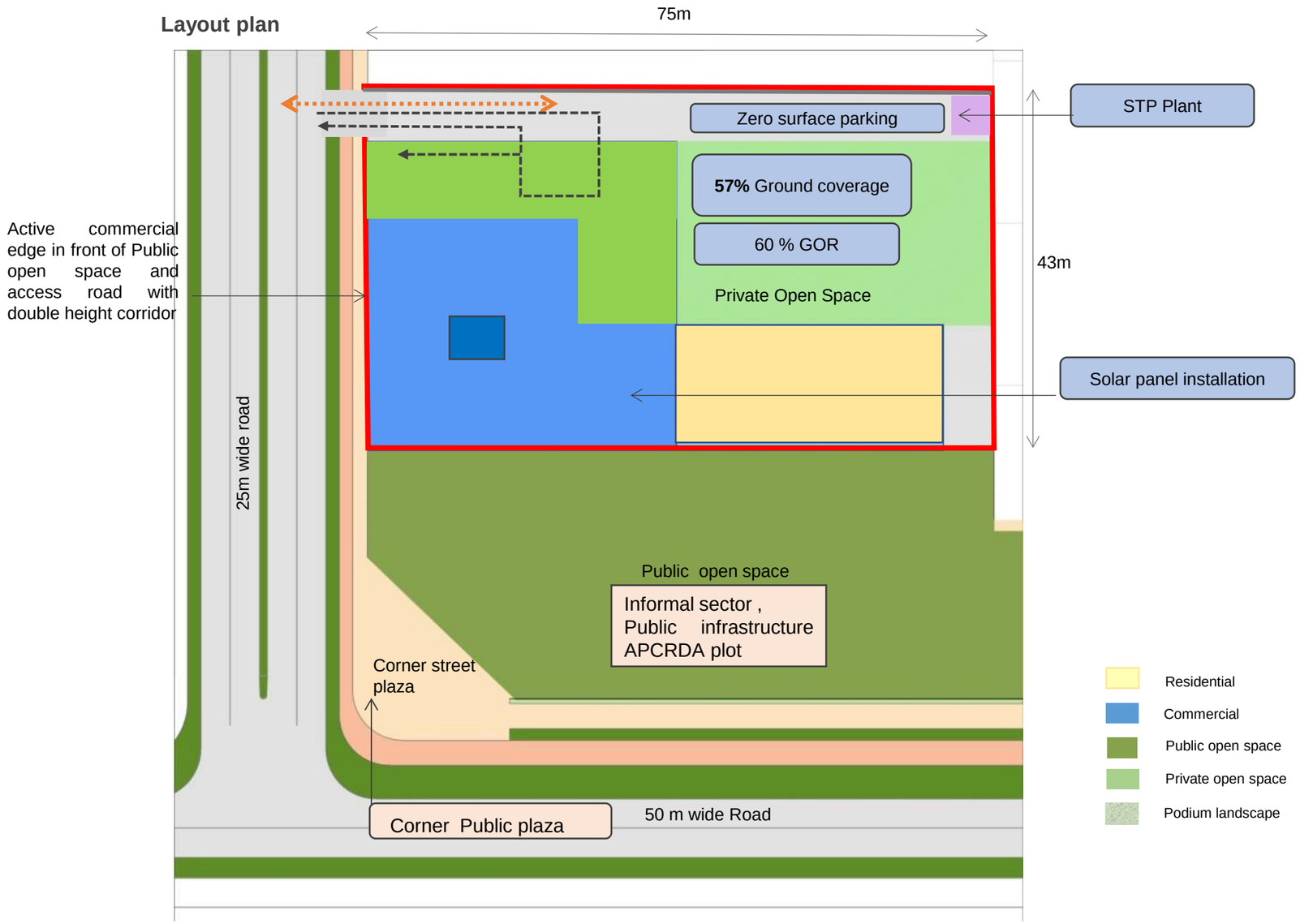
Setback



Circulation



Layout plan



Plot area single in Sq. M	No. of Plots amalgum ated	Plot area after amalgumat ion in Sq. M	Master Plan Landuse	Proposed Landuse	ZR FSI	Buildable area in Sq.M	GFA in %	GFA in Sq.M	GOR in %	GOR	No. of floors as per ZR FSI	Height of bldg before TDR	Incentive based bonus plot ratio max.allowed	Permissible Buildable area after TDR	Bldg height as Per ZR	Bldg height achieved
3225	N.A	N.A	Commercial	Mixed use	2	6450	57%	1838.3	60%	836	4	12	1	6450	30	36m

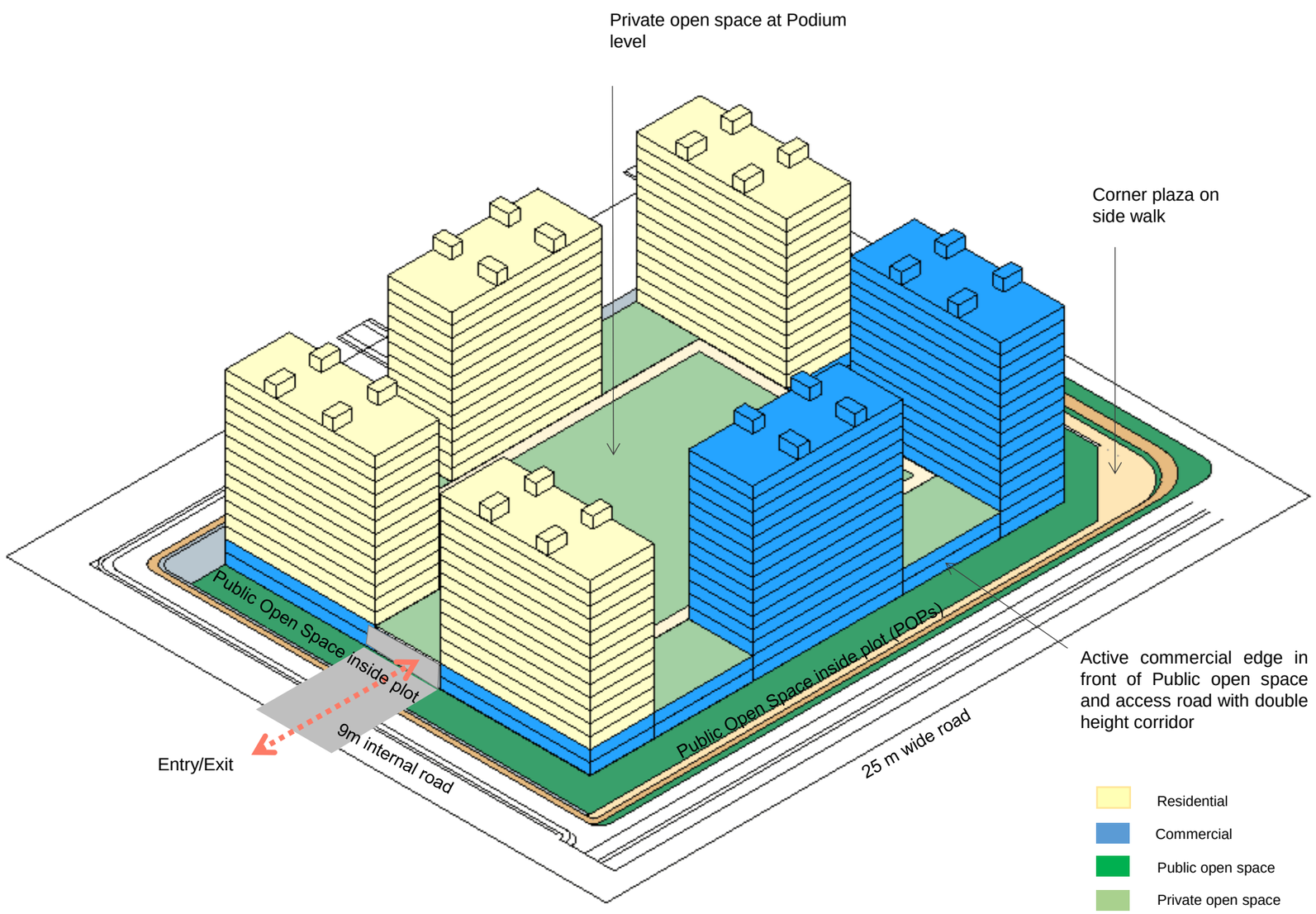
Additional bonus plot ratio is allotted to plot as per incentive based guideline table.

5.4 TPOD Demonstration

TPOD Node - Proposed Built Typologies

D) SOHO (Single Office House Office)

TPOD zone = within 500m
Existing Land use = R3 Residential
Proposed Land use = Mixed use



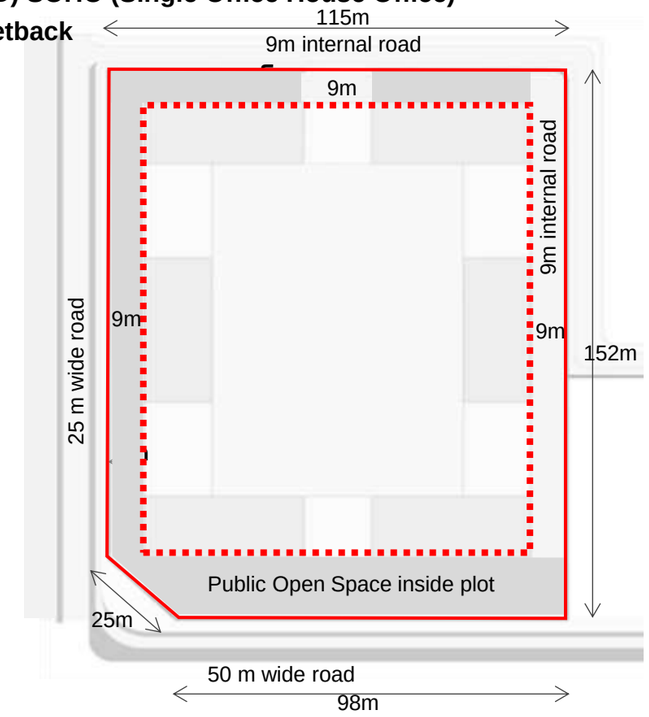
Site plan of plot development in context

5.4 TPOD Demonstration

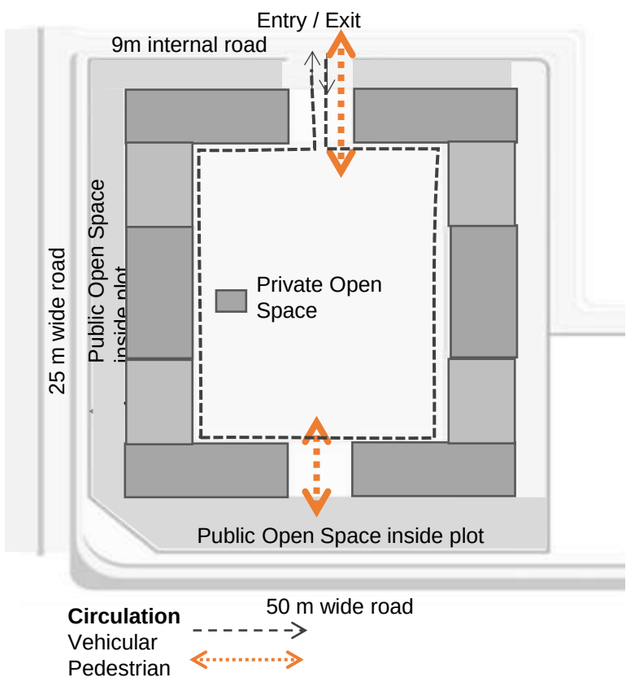
TPOD Node - Proposed Built Typologies

D) SOHO (Single Office House Office)

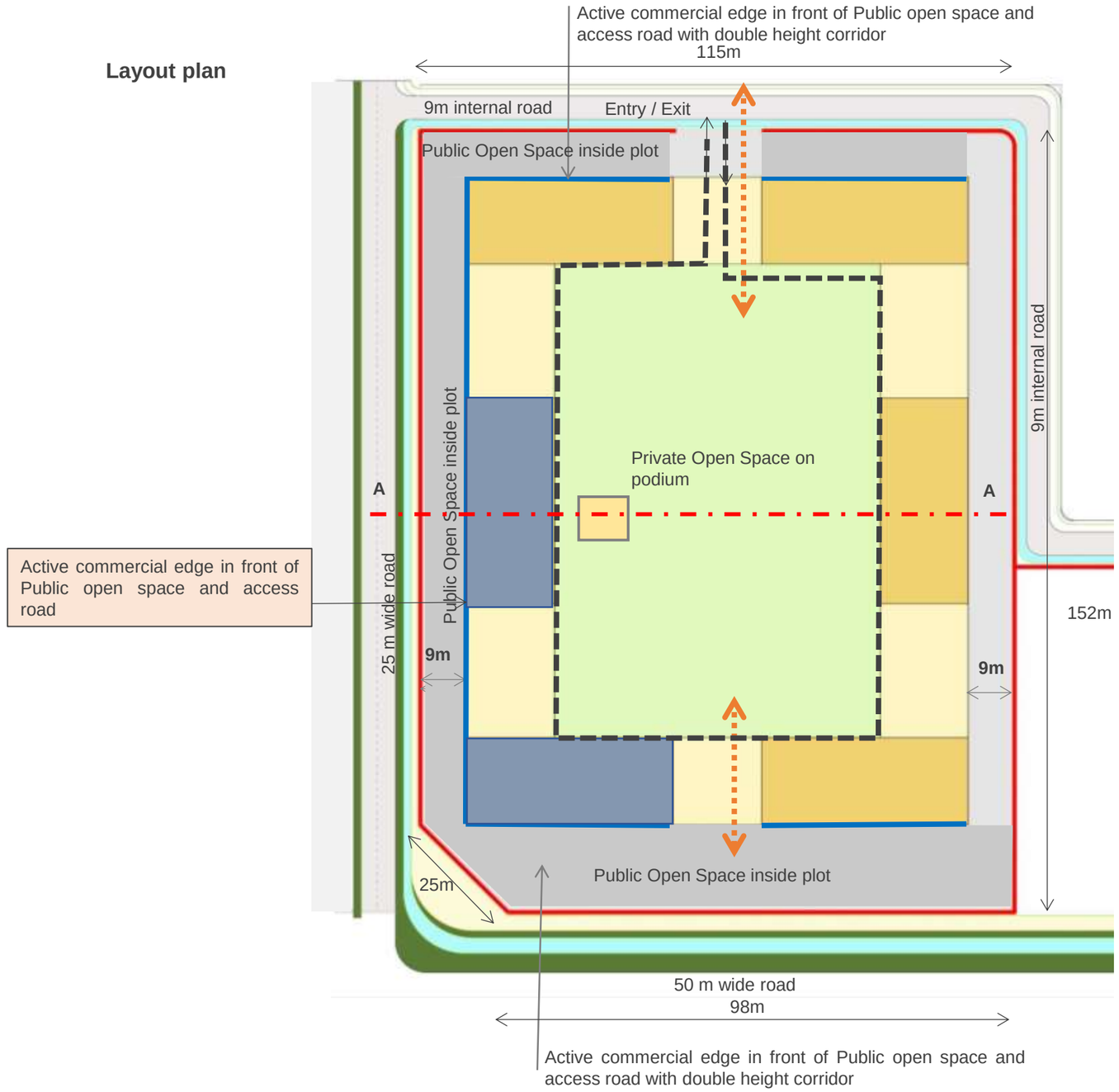
Setback



Circulation



Layout plan



Plot area single in Sq. M	No. of Plots amalgum ated	Plot area after amalgumati on in Sq. M	Master Plan Landuse	Proposed Landuse	ZR FSI	Buildable area in Sq.M	GFA in %	GFA in Sq.M	GOR in %	GOR in %	No. of floors as per ZR FSI	Height of bldg before TDR	Incentive based bonus plot ratio max.allowed	Permissible Buildable area after TDR	Bldg height as Per ZR	Bldg height achieved
17383	N.A	N.A	C2 Commercial	Mixuse	2	34766	36%	6257.9	88%	6400	6	18m	0.5	17383	37m	45m

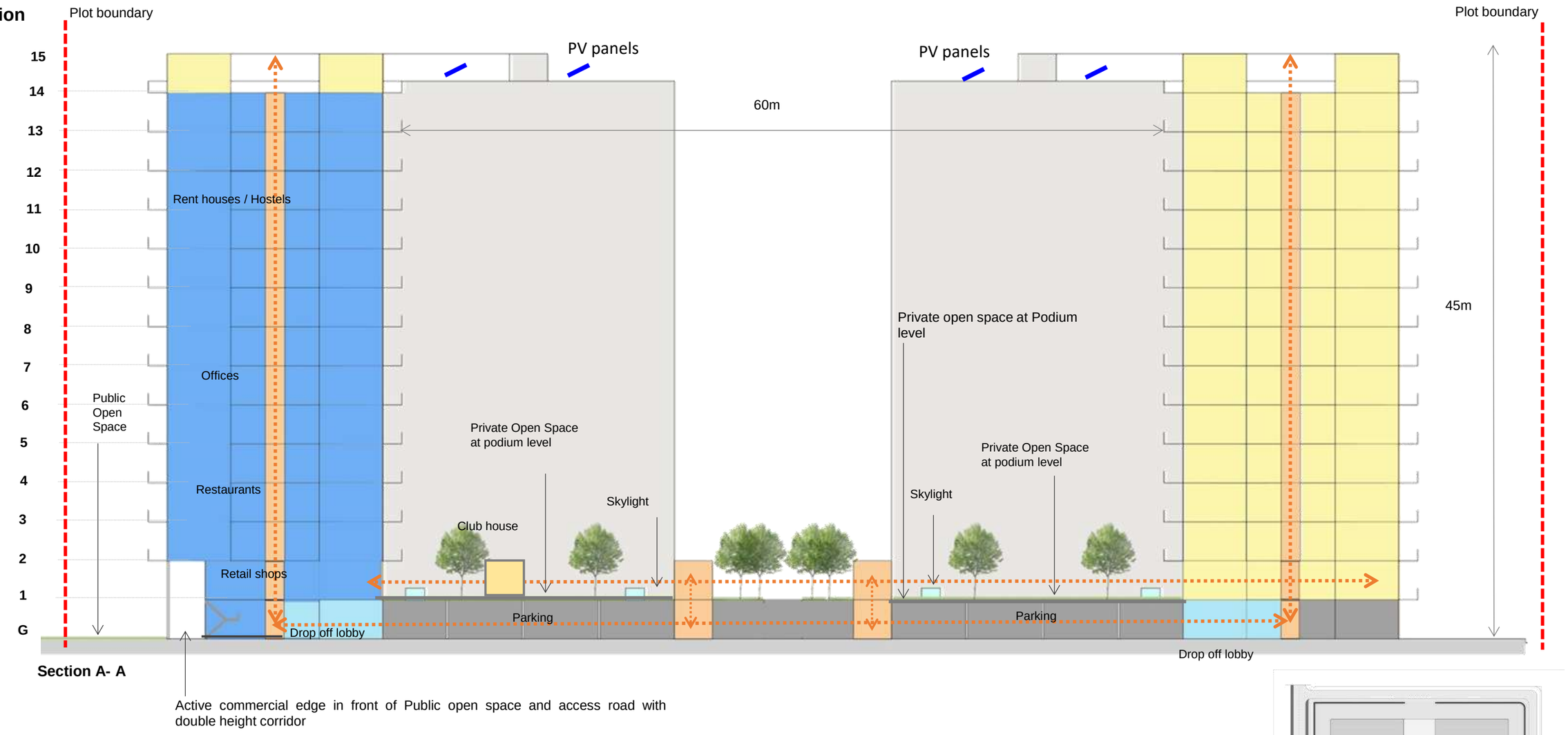
Additional bonus plot ratio is allotted to plot as per incentive based guideline table.

5.4 TPOD Demonstration

TPOD Node - Proposed Built Typologies

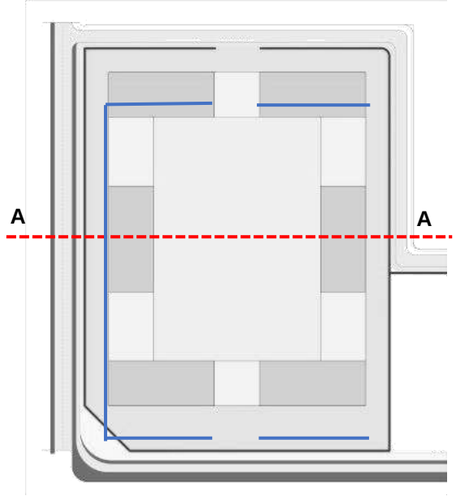
D) SOHO (Single Office House Office)

Section



Section A- A

Active commercial edge in front of Public open space and access road with double height corridor



These plots are developed as living and working areas where owners can have small scale offices and industries within the same plot as their residence.

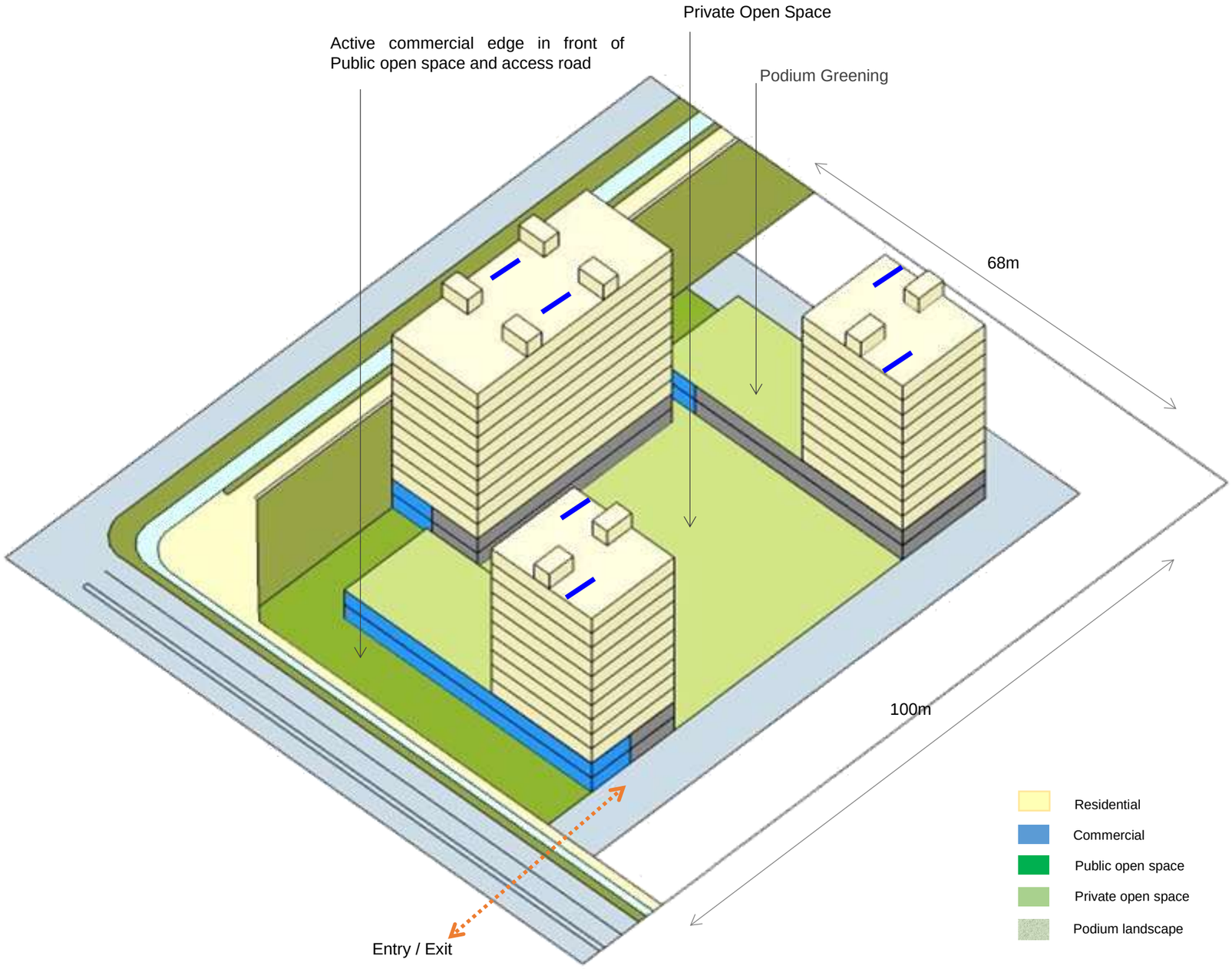
- Publicly accessible open space in the setback area along street
- Active commercial edge in buildings with offices and shops at frontier with public open space and access road with zero setback
- Podium greening, private green open spaces, play areas and outdoor activity areas
- Corner areas near intersection as public plaza
- Vehicular entrances placed at roads with least ROW

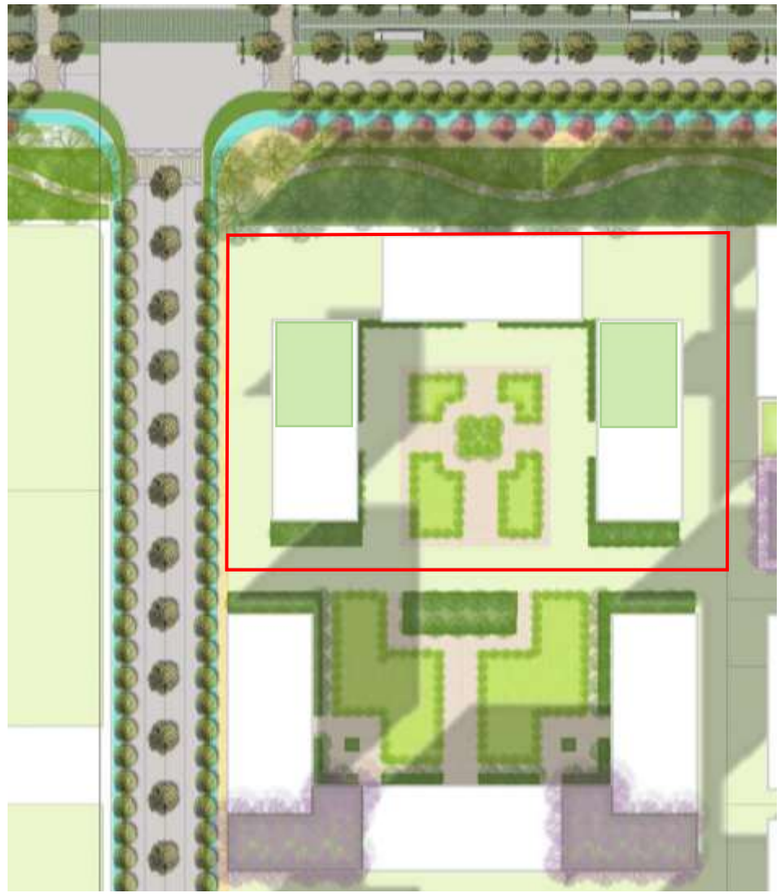
5.4 TPOD Demonstration

TPOD Node - Proposed Built Typologies

D) Mid Rise Residential Apartment

TPOD zone = within 500m
Existing Land use = R3 Residential
Proposed Land use = Residential





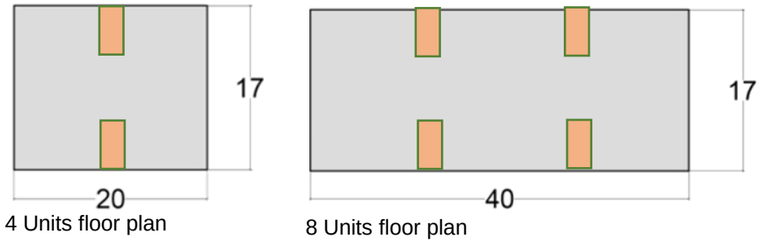
- Public Open Space inside plot

5.4 TPOD Demonstration

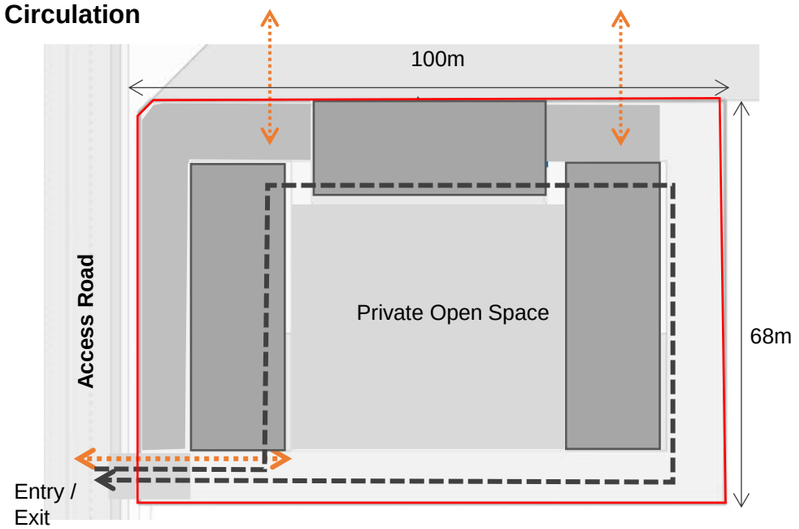
TPOD Node - Proposed Built Typologies

D) Mid Rise Residential Apartment

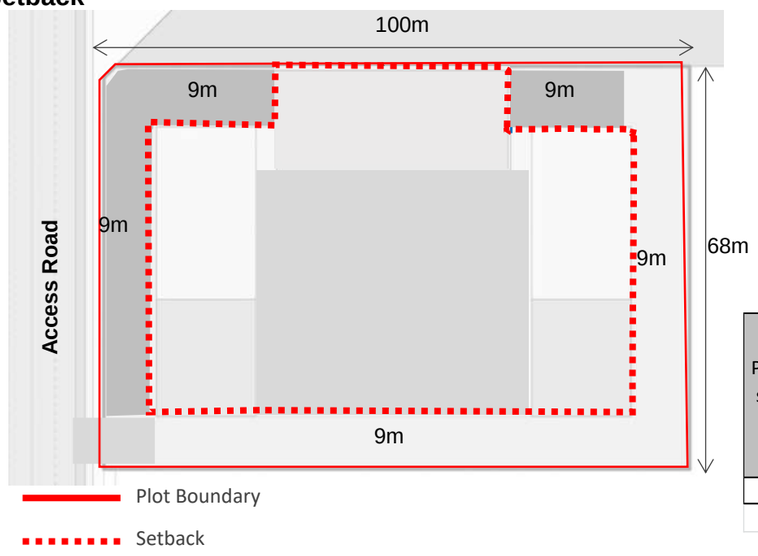
Unit block size

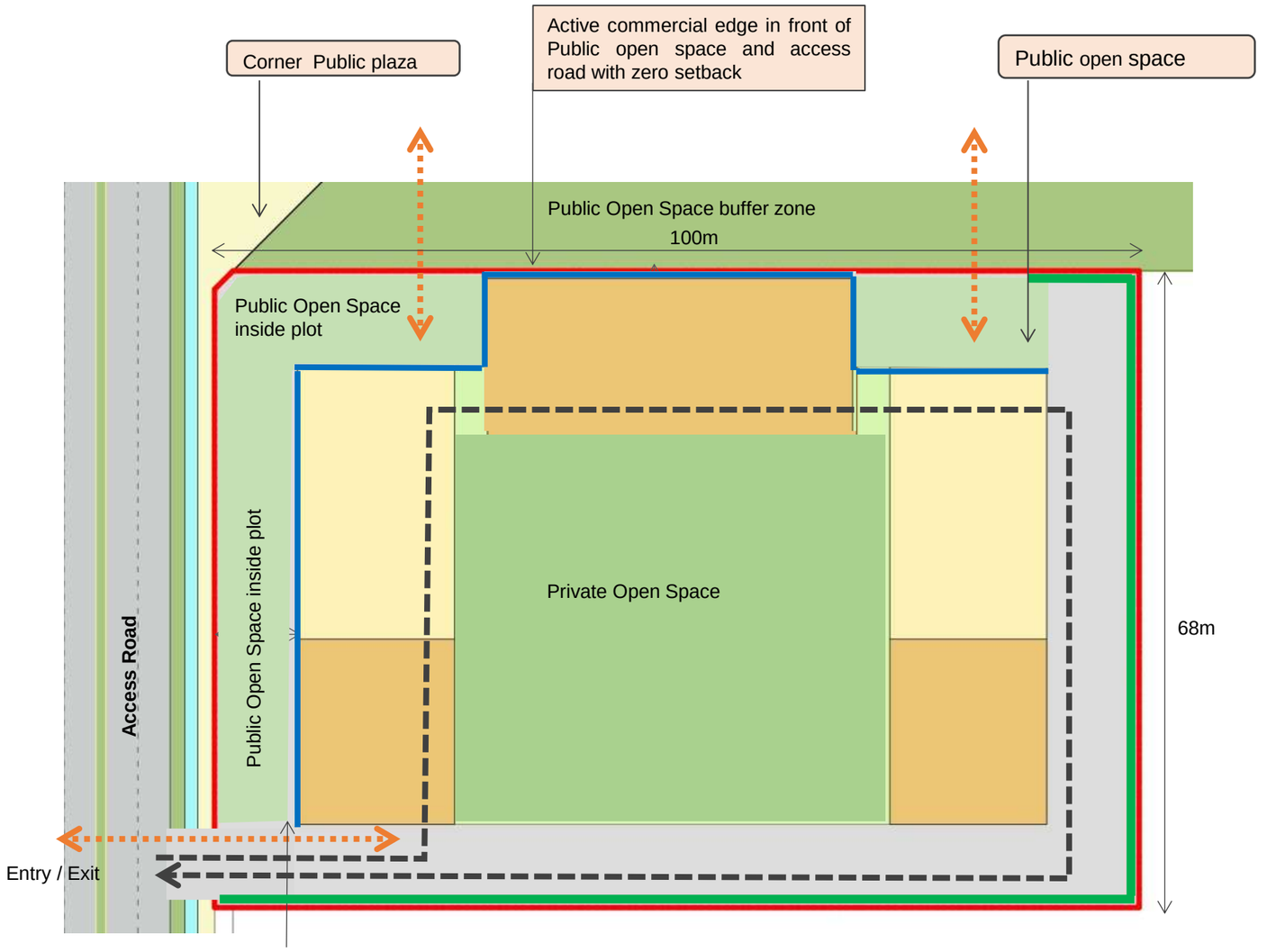


Circulation



Setback





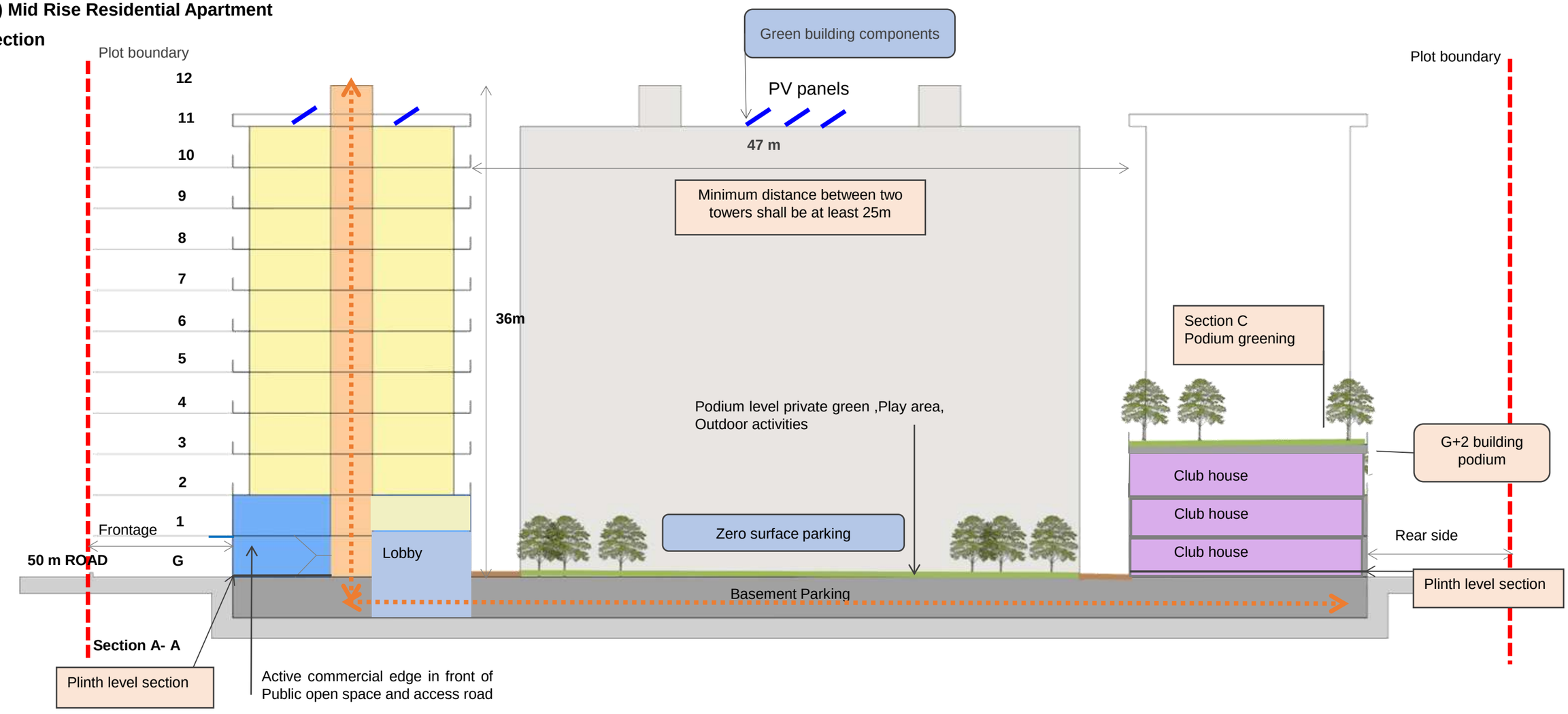
Plot area single in Sq. M	No. of Plots amalgum ated	Plot area after amalgumat ion in Sq. M	Master Plan Landuse	Proposed Landuse	ZR FSI	Buildable area in Sq.M	GFA in %	GFA in Sq.M	GOR in %	GOR	No. of floors as per ZR FSI	Height of bldg before TDR	Incentive based bonus plot ratio max.allowed	Permissible Buildable area after TDR	Bldg height as Per ZR	Bldg height achieved
6800	N.A	N.A	Residential	Residential	2.4	16320	35%	2380	46%	2051	11	36m	0	0	37m	36m

5.4 TPOD Demonstration

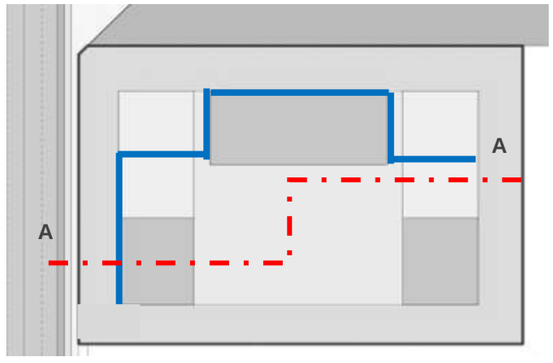
TPOD Node - Proposed Built Typologies

D) Mid Rise Residential Apartment

Section



- Active frontage with offices and shops facing public open space and access road with double height corridor and colonnade.
- Publicly accessible open space in the setback area along street
- Podium greening, private green open spaces, play areas and outdoor activity areas
- Amenities and sustainable features as per green building guidelines
- Corner areas near intersection as public plaza



5.4 TPOD Demonstration

Birds Eye View of TPOD Node Demonstration

Views of TPOD Node

Built form around township level open space

Built form along transit intersection

5.4 TPOD Demonstration

Primary TPOD Node

View of Primary TPOD node showing building heights, skyline profile, public transit network connecting to other plots with POPs, street corner plazas

5.5 Phased Development

5.5 Phased Development

Phased Development - Public Transit

TPOD should be implemented in phases as per transport infrastructure starting initially with BRT corridors to form TPOD nodes within large commercial areas and integrated with MRT at a later stage when appropriate.

BRT will be at grade and developed in a phased manner, starting on major arterial roads with stations at commercial zones. Mixed use development at higher density at the TPOD nodes.

The implementation of MRT will allow the transit corridor to continue to provide for expected future capacity of commuters living in close proximity of transit nodes. The provision of MRT has the following benefits:

- MRT should be provided below ground level to avoid congestion
- It will not replace but rather complement the existing BRT to create a seamless network of public transport
- Underground pathway should connect both MRT and BRT to ensure easy transfer and safe access to both public transport

The concourse platforms should be linked with underground pedestrian network to ensure the safety of pedestrian during the change of transit mode. It also enhances the connectivity of different modes of transit by connecting all transit modes.

In view of targeted transportation strategy for 2050 as per APCRDA. Phasing of different modes based on priorities is recommended below:

- Bus Lines – Initial Phase – (1-2 yrs)
- BRT* – Intermediate Phase – (3-5 yrs)
- MRT* – Final Phase – (6-12 yrs)

*Intermodal transit connection

Initial Phase
1-2 yrs

Intermediate Phase
3-5 yrs

Final Phase
6-12 yrs

Phased development of public transportation

Bus lines in initial phase

BRT corridor in intermediate phase

MRT in final phase

TPOD transit node

Source: https://www.shutterstock.com/video/clip-19855279-hong-kong-china---circa-november-2015, https://commons.wikimedia.org/w/index.php?curid=3014894, http://thecityfix.com/blog/

5.5 Phased Development

TPOD Multi Stakeholder Participation

Public Private and Public Participation

To successfully implement TPOD, there needs to be a collaborative efforts from public and private sector, community and other key stakeholders such that a vibrant, walkable, liveable and economically viable community is formed with public transport as the backbone.

The government should thoroughly study the location of TPOD from a city level by identifying the key areas along transit corridors that functions as major nodes. Moreover, the area surrounding the transit nodes should be a pedestrian friendly environment with quality public realm and green spaces. At the same time, there should be a diverse land-use (residential, commercial, retail) and public amenities for people to live, work and play. A review of the existing land-use is vital to the development of TPOD in order to balance the demands for various functions and foster the future growth of the community.

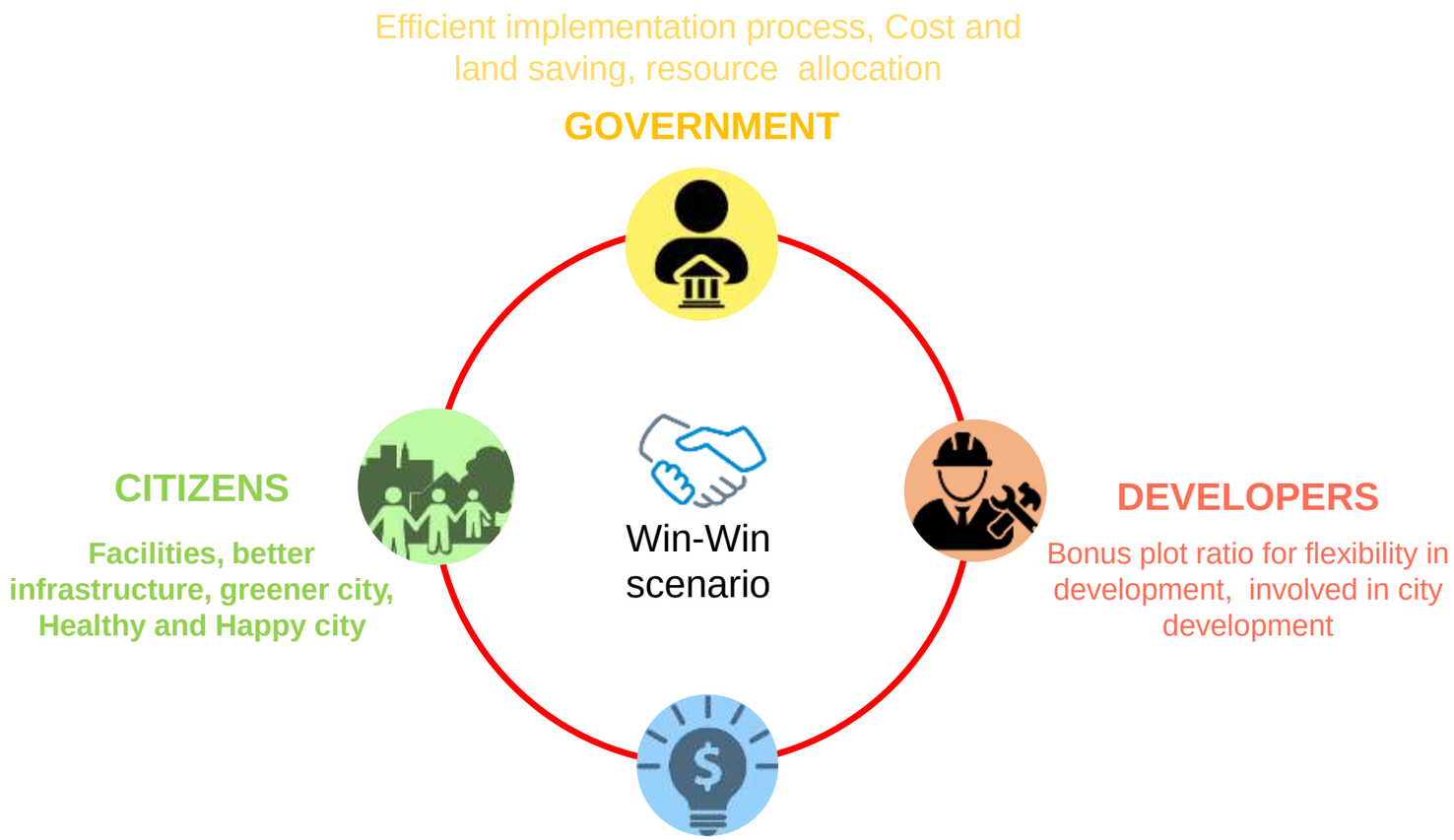
Private sector and developers need to be aware of the connectivity between their developments and transit stations. Self-evaluation of developments are expected to be performed to ensure the guidelines of TPOD in the UDAG are followed prior to development applications. Provision of active frontage and open space should form a continuous network to realise the potential of TPOD that creates a healthy footfall for economic vibrancy and quality of life.

Community participation is important for the success of TPOD. Design of TPOD should facilitate the use of public transport to reduce car ownership. The needs of the community are well considered such that they are within reach of walking distance. Connections within the area are accessible, convenient and enjoyable for pedestrians. The community should view TPOD as a mean to provide positive added value to the community and promote a better quality of life.

Public Education, Awareness and Opportunity

To ensure TPOD achieve its goals in the long run, public education and awareness are crucial at both city and local levels. Public education is required to promote the advantages and importance of implementing TPOD, as well as their contribution to create a better city. Possible strategies include publicity campaigns, educational programmes, competitions and public awareness activities. These strategies should be organised throughout the year to raise public awareness and inform the public about the successful outcomes of TPOD. The effect of such strategies will be more significant if they are formulated. With increased public awareness, change in behaviour and shift in transit mode are anticipated.

Promotion of TPOD will create opportunities to develop Amaravati into a smart and sustainable city with smart and green infrastructure. A win-win scenario will also be achieved as the government works closely with citizens to create a green, healthy and happy city with convenient and sustainable transit modes.



Summary of Transit and Pedestrian Oriented Development Guidelines

Guidelines	Public Sector	Private and other Sectors	Mandatory	Suggestive	Chapter Page
TPOD Nodes Network Plan					218
Criteria for Transit Nodes					
Primary TPOD Nodes are interchange nodes of two transit lines, BRT and MRT lines, or intersection of two MRT lines connecting different places or zones of the city. They are major potential zones with respect to land use and source of large pedestrian generators. Primary TPOD nodes should have public transit interchange (PTI) with other public modes to achieve last mile connectivity in city transit network.	√		√		
Secondary TPOD Nodes are usually near commercial zones and important locations, such as city gateway, riverfront or city parks. They are potential business centres for the area. Secondary TPOD Nodes should be connecting to other transport modes.	√		√		
Tertiary TPOD Nodes are transit stations near residential developments. The neighbourhood is complemented by a small mix of retail and commercial for small businesses. An abundance of open spaces should be in close proximity for the local residents. Tertiary TPOD Nodes should be within walking distance to nearby residential areas and/or have cycle tracks and other transport modes.	√		√		
Built Form, Density and Mixed Use					219
Additional FSI and building heights for parcels within TPOD node should be incentive based and given based on the parameters provided in the TPOD guidelines		√	√		
All incentive-based policies for TPOD should be governed within the regulations of respective authorities.	√		√		
Zone 1- Up to 150 metres (From BRT Transit stop)					
High density development should be allowed within 150 m from the transit station. i. Additional FSI up to 1.5 should be permitted ii. Building Height of 100 m to 120 m should be permitted	√	√	√		
Zone 2- 150 to 300 metres (From BRT Transit stop)					
High density development should be allowed between 150m to 300 m from the transit station i. Additional FSI up to 0.5 should be permitted ii. Building Height of 40 m to 60 m should be permitted	√	√	√		
Zone 3- 300 to 500 metres (From BRT Transit stop)					
Medium density development should be allowed between 300m to 500m from the transit station i. Additional FSI up to 0.5 should be permitted ii. Building Height of 40 m to 60 m should be permitted	√	√	√		
Mixed use Development within TPOD Zones					224
Parcels within TPOD zone should be mixed use development and consist of the following vertical distribution: i. 50% to 70% residential ii. 20% to 40% commercial iii. 10% public amenities	√	√	√		
Commercial and retail activities should be located on the ground and lower floors of the building	√	√	√		
Min 40% land reserve should be for public open space and additional 10% publicly accessible privately owned public space (POPS)	√	√		√	
Transition in scale between higher density development around the transit station and adjacent lower density development should be created by descending building heights and densities from the transit station to achieve a stepped building height profile, with the highest building at the transit node.	√	√	√		

Summary of Transit and Pedestrian Oriented Development Guidelines

Guidelines	Public Sector	Private and other Sectors	Mandatory	Suggestive	Chapter Page
Multi-modal Transit and Last Mile Connectivity					228
The shortest direct route for pedestrians and non-motorized modes of transport should be provided to access transit stops within TPOD zone 1 and 2 through buildings or complexes using POPS or open spaces, plazas and squares	√		√		
Narrow roads of 9m to 12m within TPOD zone 1 and 2 should consider pedestrianisation/shared streets and proposed as public spaces, depending on the pedestrian movement and activity time slots	√			√	
A well connected pedestrian network should be provided to create a walkable and environment friendly space for citizens to promote healthy lifestyle and encourage last mile connectivity to transit stops	√		√		
In order to extend the range of mobility and improve accessibility, a safe and well-designed cycling environment should be provided and designed within the TPOD network	√		√		
Street Level Interface and Multi-Level Linkage					234
Open Space at Street Level					235
Different levels of open spaces should be provided in different TPOD influential zones to ensure people can access and enjoy the open space within a walkable distance in their neighbourhoods and within the city as well.	√	√	√		
A well-connected park network should be established through a well-connected street network to allow for easy access to all amenities.	√	√	√		
Min 30% land should be reserved for public open space and additional 10% publicly accessible POPS	√	√	√		
Design of street and open space should create an interactive and lively space that is socially inclusive for all, facilitating an experiental based pedestrian movement to the TPOD center	√	√	√		
Street Environment at TPOD Nodes					236
Large scale public, commercial and mixed use development plots should provide multi-level pedestrian connectivity towards transit node	√	√		√	
Building pedestrian entrances should be oriented towards transit stops and provide direct pedestrian access	√	√	√		
Ground floor should be designed with active uses such as shops, retail, restaurants, outdoor cafes along the street to provide street level interface within TPOD zone 1 and 2	√	√	√		
Street planting should form boulevards to create pedestrian-friendly environment	√		√		
Public art should be used at transit nodes to create landmarks that help establish a character for each transit stop	√			√	
All parking requirement should be located under the built structure or at the rear side. (Area - Stilt and basement)	√	√	√		
Basement and podium parking should be provided as per zoning requirement. No surface parking is permitted	√	√	√		
Public parking should be provided under public parks or town centres	√	√	√		
A minimum 10 cycle parking racks should be provided within walking distance from the transit stop in TPOD zone 1 within MFZ area	√		√		
On-street surface parking is discouraged in Amaravati; instead mixed use developments near transit stations should provide underground parking that links to public transport and driveways to adjacent plots	√	√	√		

Summary of Transit and Pedestrian Oriented Development Guidelines

Guidelines	Public Sector	Private and other Sectors	Mandatory	Suggestive	Chapter Page
Colonnade					237
Colonnades should act as a semi-public interface/spill-out area between the street and building to act as an essential protection against harsh sun and rain and also improve the micro climate of the area; local architectural elements should be introduced as appropriate	√	√	√		
Buildings within TPOD zone 1 and 2 (within 300m radius) should provide colonnades at the street frontage with active street edge.		√	√		
These buildings should ideally be placed with zero setback or 2m setback to be considered from the front property line to maintain same built edge line with colonnades within 300m TPOD zone		√		√	
Height of colonnade should be maintained at clear min 4.5 m to 6 m as per shops heights and width minimum 3m. This is to ensure that visibility to active uses is not hindered, and that it provides a sufficient amount of space for movement and permeability.		√	√		
Maximum level difference of 0.15m should be permitted between shop and internal colonnade facade and it shall not project beyond the building line		√	√		
Commercial and mixed use development within TPOD zone of 300m radius should provide colonnades along the street frontage or POPS		√	√		
Multi-Level Linkage					238
Concourse platform should connect different modes of transit at the street level and along development parcels.	√			√	
Provision of concourse platforms should be at MFZ and not blocking pedestrian walkways or cycling tracks			√		
Pedestrians should be given direct access to bus stops with crossings linking from sidewalks (refer to Streetscape Guidelines)			√		
Clear concourse platforms way finding signage should be available for better connectivity and accessibility			√		
Street planting should form boulevards to create pedestrian-friendly environment. (refer to Street Guidelines)			√		
Alternatively, upper level footbridge linkages can be provided to connect large scale developments with the BRT corridors at primary nodes of intersection	√			√	
Concourse platforms should be clearly visible for pedestrians; clear concourse platforms way finding signage should be available for better connectivity and accessibility			√		
Multiple pedestrian connectivity options should be available within TPOD Influence Zone 1 and 2 to ensure accessibility to transit stops.		√	√		
Pedestrian network should connect open spaces and internal plazas to transit nodes.		√		√	
Phased development of public transportation					239
TPOD should be implemented in phases as per transport infrastructure starting initially with BRT corridors to form TPOD nodes within large commercial areas and integrated with MRT at a later stage when appropriate	√			√	
In view of targeted transportation strategy for 2050 as per APCRDA. Phasing of different modes based on priorities is recommended below: • Bus Lines – Initial Phase – (1-2 yrs) • BRT* – Intermediate Phase – (3-5 yrs) • MRT* – Final Phase – (6-12 yrs)	√			√	

6 Streetscape Guidelines

6.Streetscape Guidelines

Overview

Streetscape design is an important tool in creating a sense of place and belonging, enabling outdoor city life and helping streets perform their main function for sustainable mobility while facilitating desirable user behaviour. Sustainable streetscape design ensures that spaces are long-lasting and function as a part of the greater ecosystem such as employing technologies that manage storm water runoff and reduce carbon footprint. Pedestrian friendly and walkable streets help create vibrant and thriving cities for residents and visitors alike.

Hence, streetscape guidelines are critical components of the urban design guidelines for Amaravati as they lay the foundation for creating pedestrian friendly streets for multiple user groups. Amaravati, being mostly a greenfield city, has the unique advantage of creating precedents for all other cities in India to emulate and follow. The people's capital should develop pedestrian friendly and walkable streets with a new set of street typologies that classify streets based on the adjacent land use and character of the street, in order to guide future development of Amaravati. The street typologies will supplement the traditional functional classification system of streets, and support streetscape that reflects the diverse range of conditions in Andhra Pradesh. Guidance is provided throughout the chapter regarding various streetscape elements, including roadways, sidewalk, intersections, and uses along the curb, to ensure it functions well with respect to the street typologies. It is essential to maintain the unique function of each typology in respective locality in order to support the holistic development of Amaravati.

Streetscape design and future infrastructure developments must be environmentally sensitive and support Amaravati's character, people, culture and economic growth. Streetscape design aims to create a vibrant public realm in the city that not only enhances the quality of life for residents but also encourages healthy living, and facilitates active sustainable transportation model with priority for pedestrian and public transit.

Scope and Limitation

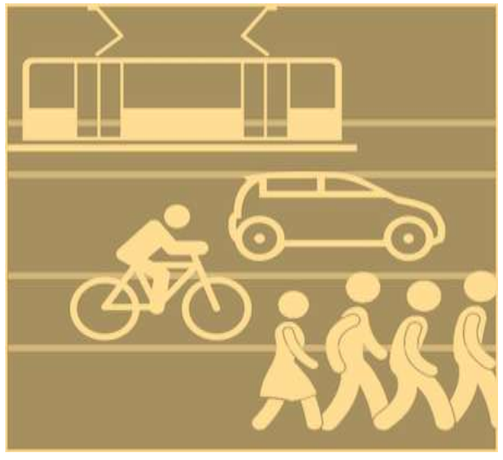
Streetscape chapter is based on city level strategies linked with Amaravati Masterplan. Streetscape with its sidewalk for different hierarchy of ROW have considered with restriction of carriage way width as per existing masterplan under LPS layouts. IRC standards have been adopted for ROW and sidewalks for integrating various street components. Majority of utilities and services have been planned underground as part of sidewalk which limits the streetscape design for hardscape and landscape areas treatments within the allocated MFZ. Despite these constraints the street design guidelines aim to provide desirable streets for pedestrians, cyclists and vehicles as well.

This chapter provides the guidelines for streetscape as well as infrastructure aspects for the city of Amaravati and the streetscape guidelines illustrated are suggestive and to be adapted as per detailed requirements.

La Rambla, Barcelona

Orchard Road, Singapore

http://trungtammuasam.biz/singapore/orchard-road-thien-duong-mua-sam-o-singapore/ , http://barcelona-home.com/blog/barcelona-la-rambla



Streetscape Guidelines

6.1
Street Sections

6.2
Street Intersections

6.3
Public Realm Infrastructure

6.4
Street Plantation and Materials

6.1 Street Sections

6.1 Streets Sections

Objectives

The streetscape guidelines are based on streets with the following objectives.

Pedestrian friendly streets that are accessible to all

Streets must be pedestrian friendly, safe and accessible for all users, as well as barrier-free regardless of physical abilities or age. Sidewalks should have continuous and unobstructed pathways and sight lines.

Complete streets with ground level interface and continuity

Streets should be complete, comfortable, human-scale, and vibrant with public art, cafés, benches, trees, awnings, and signage. Streets should be designed with inviting building entrances and transparent shop windows instead of blank walls at ground level to encourage street level interface and continuity.

Well landscaped and climate responsive streets

Streets should be well landscaped and climate responsive, energy efficient, robust, resilient to change, and include trees with larger canopy. Trees act as shading mechanism enhancing the micro climate, but plants and permeable surfaces also help to manage storm water drainage. Streetscape design features should encourage healthy, environmentally friendly and sustainable use of city's street network.

Smart streets with ease of maintenance and operation

Streets should be smart and sustainable, durable and built with time-tested materials and features. Streets should use locally-sourced and recycled materials and enhance the pedestrian experience with technology as far as possible. Maintenance responsibilities must be identified during the design process with a focus on being cost effective by reducing labour-intensive operations.

Context sensitive streets that emphasise local art and culture

Streetscape should be responsive to the natural and built environment of the surrounding context, including but not limited to the history, social needs, art, and local culture of the place.

Integration with Multi-modal Transit System

Streets with integrated land-use transportation system should demonstrate the global standards to offer high levels of convenience to people of all sectors of society. The sustainable urban transport system should form a unique identity for the new capital with potential transportation means including the following:

- Rail system: Regional Rail/MRT/LRT/Tram
- Other Public Transport: BRT/Electric Bus/ Electric Taxi/ Ferries etc.
- NMT: Walking, Smart Bikes, e-Rickshaw

Amaravati has been planned with BRT/LRT/Tram as the public transport system to cater the needs of growing population which should be upgraded to MRT system. As part of UDAG a tram along the proposed ,Waterfront Boulevard and could possibly continue along the Civic axis along AGC. Dedicated lanes are reserved for public transport system, cyclists and pedestrians. Regional towns/cities are well connected by rail network with Capital City region.

Master plan has set the percentage modal split as

- Public Transport (avg.) = 60%
- Public Transport (CBD)= 70%
- Car Occupancy Rate = 1.2

This section provides a set of standards and guidelines for street design elements, including typical cross sections, sidewalks, intersections, material and landscape specifications for right-of-way at different levels.

Effective public transport

Waterfront Access

Public transit corridor

Happy streets

Queen's Road Central, Hong Kong

La Rambla, Barcelona

https://ggwash.org/view/39287/the-seven-keys-to-a-great-bus-rapid-transit-system , https://604now.com/vancouver-unhappiest-canada/ , https://ggwash.org/view/39287/the-seven-keys-to-a-great-bus-rapid-transit-system

Source: https://www.youtube.com/watch?v=jEF6qSXBstw , https://www.dreamstime.com/editorial-photography-queens-road-hong-kong , http://www.dw.com/en/famous boulevards-la-rambla-barcelona/a-38207724

6.1 Streets Sections

Road Network

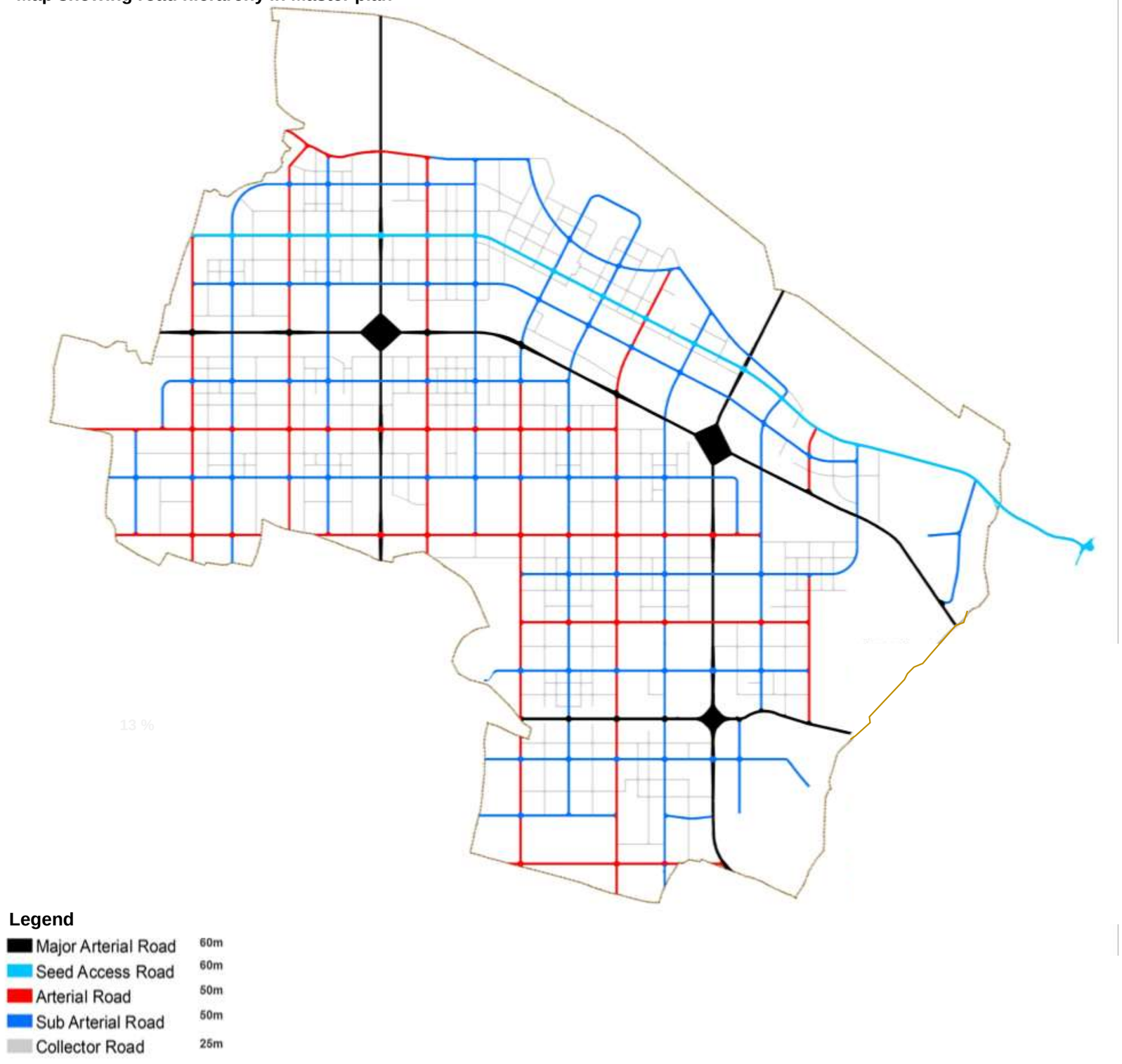
As per the masterplan the road network follows a grid pattern and consists of major arterial roads, arterial roads, sub arterial roads, collector roads and local streets. The various aspects of the road network includes the following:

- The road hierarchy follows a localized grid pattern
- Over 20% of the city area is roads and infrastructure as per masterplan
- All 27 townships are well connected through the grid road network
- The whole road network is 642km long
- Length of sub- arterial roads are around 28% of total roads
- Length of collector roads are around 50% of total roads
- The internal access roads are around 1100 km long

Road Hierarchy

The road hierarchy is further elaborated in the streetscape guidelines to incorporate urban design aspects and to ensure maximum connectivity while facilitating a Transit and Pedestrian Oriented Development (TPOD) approach. The road hierarchy shown in following pages indicates respective character of the context which should be followed in order to optimise the use of road network with regard to the adjacent land uses and built form (refer to Chapter 7 - Built Form Guidelines).

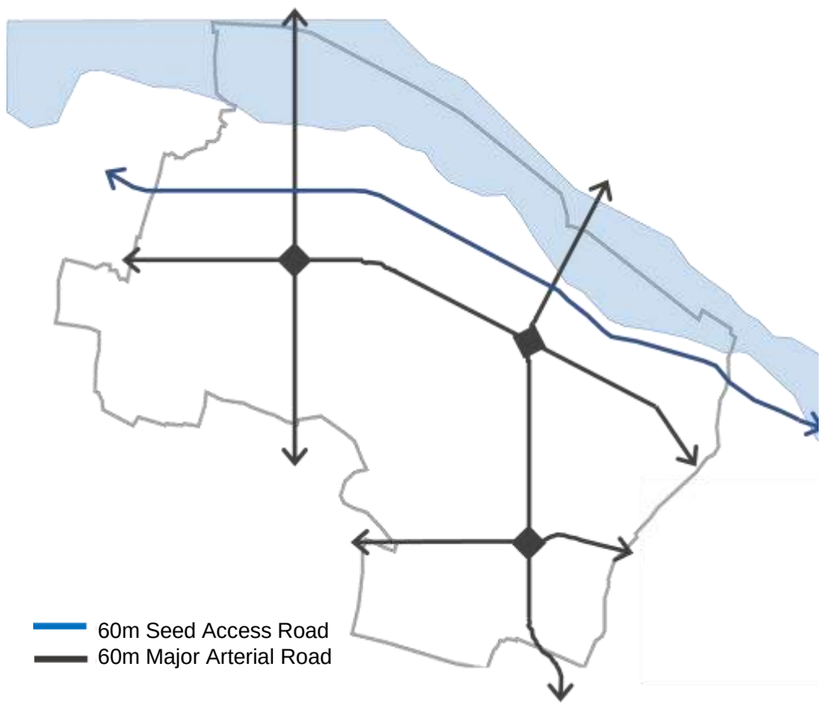
Map showing road hierarchy in Master plan

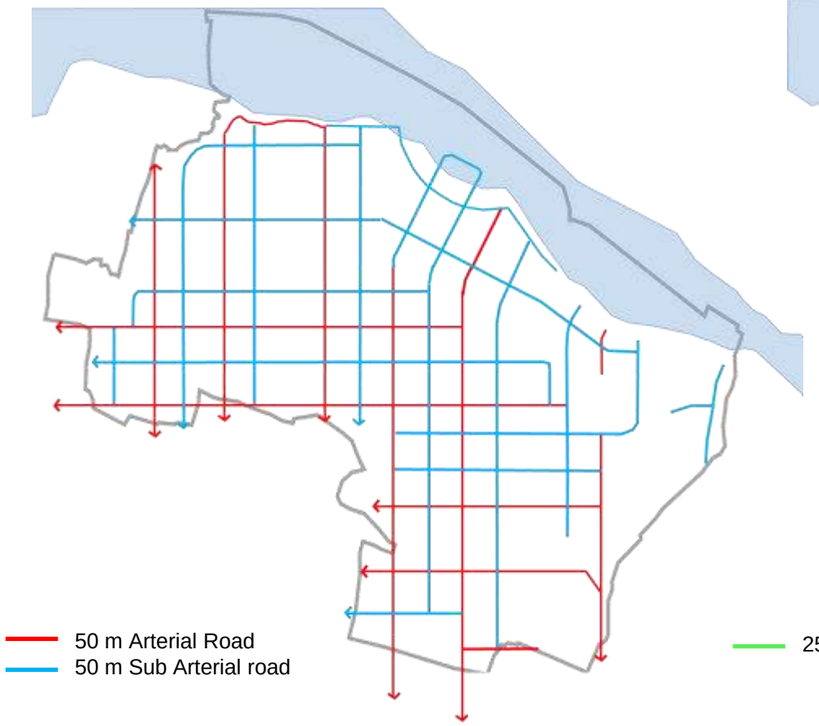


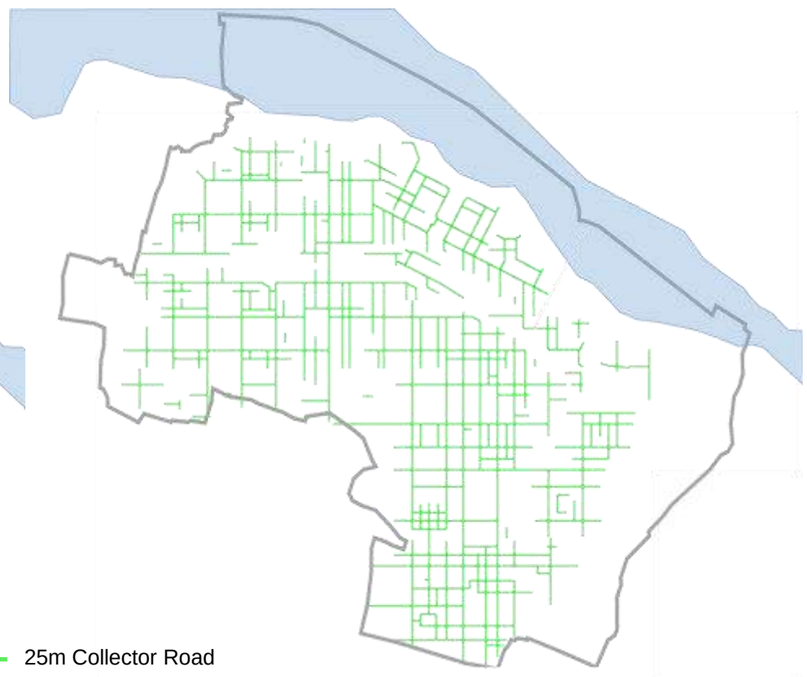
Proposed Road Network Plan, Amaravati, Source: Amaravati Transport presentation document by APCRDA

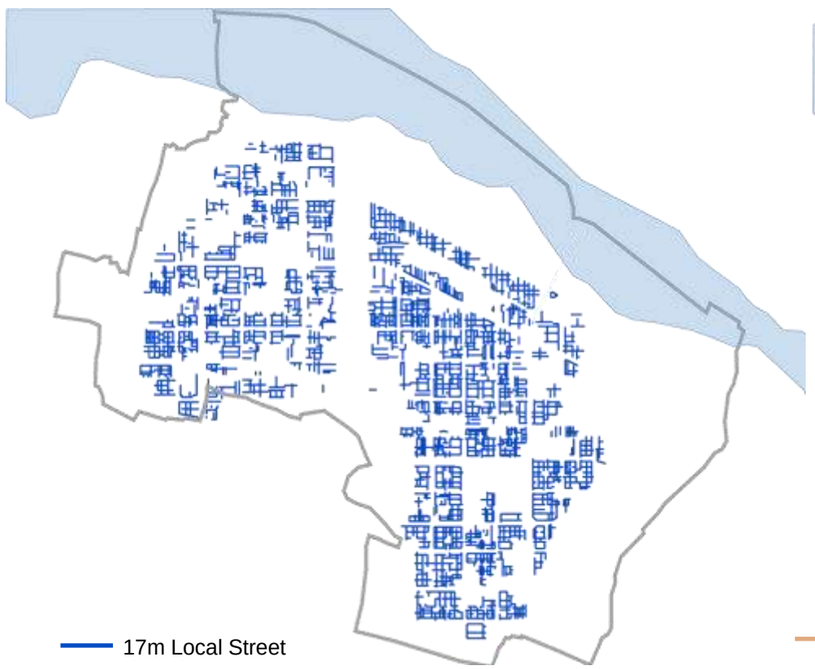
6.1 Streets Sections

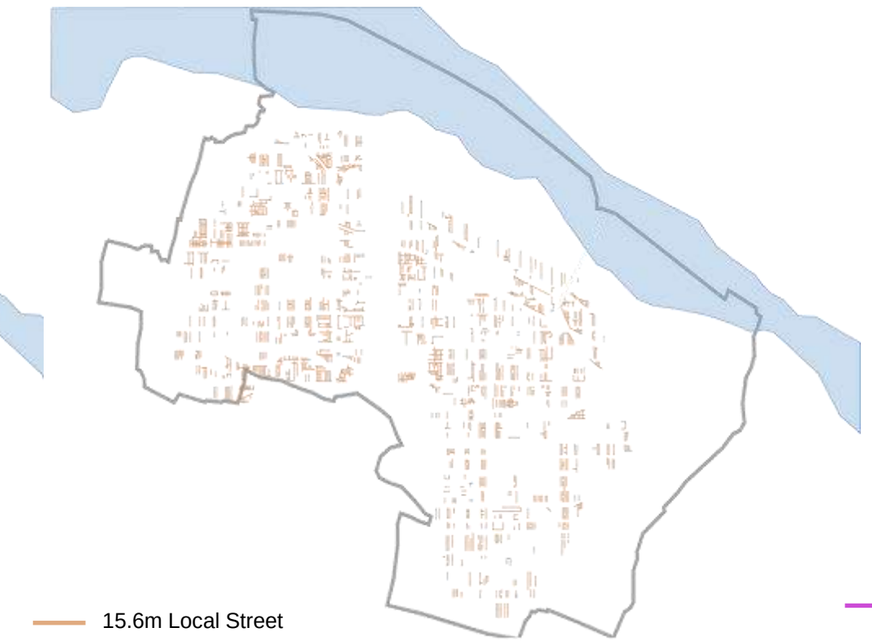
Maps showing Road Hierarchy in Amaravati Maser Plan

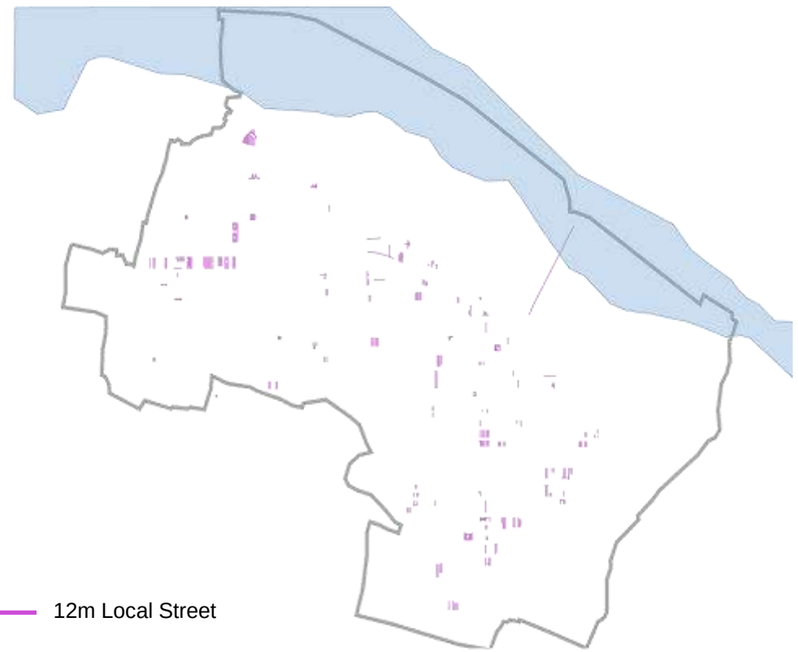












Proposed Road Network Plan, Amaravati, Source: Amaravati Transport presentation document by APCRDA

6.1 Streets Sections

Streetscape Design Approach

Complete streets with an integrated land-use transportation system should demonstrate the global standards to offer high levels of convenience to people of all walks of life and varying mobility abilities as well. The sustainable urban transport system should form a unique identity for the new capital city.
Potential transportation means includes:

Street Typologies

Amaravati city transport vision addresses the changing streetscape approach for roads in terms its use from vehicular to pedestrian people oriented sidewalks interacting with surrounding land use at its edge.

Major arterial road , Arterial road, Sub arterial roads of city have been designed for major Rapid Transit Lanes connected to neighbourhoods by the network of collector roads and local streets. Streetscape along collector roads and local streets emphasizes creating pedestrian realm to make active streets where as city level public Rapid Transit corridors kept for fast connectivity to city within and to AP capital region. Streets should help people make healthy decisions by creating favourable environment for walking, bicycling, and use of transit modes. Streets lined with healthy trees provide beauty, shade and improved air quality to bring happiness to city user to main sustainable and happy city character to Amaravati capital city.

There are four primary zones in the sidewalks for public realm along streets, which include frontage zone, pedestrian walkways, cycle track and multi functional zones for different uses.

Illustrations on the right show typical street composition for different road widths and pedestrian realm along sidewalks for people.

As interaction occurs between these zones, development of a cohesive design for the pedestrian realm is important. Design should consider the unique conditions associated with city context and each zone; as well as how the pedestrian interacts with other factors of the street, such as cycle and transit facilities and junctions. Maintaining clear functional relation and interaction between pedestrians, cyclists and motorists in these areas of sidewalks with plot edge and vehicular carriage ways is critical.

60m wide Major Arterial Road

50m wide Arterial Road

50m wide Sub Arterial Road

25m wide Collector Road

17m wide Local street

15.6m wide Local street

12m wide Local street

9m wide Local street

*Note: 9m road location as per masterplan

Street types and Typical street sections as per ROW

6.1 Streets Sections

Proposed Road Hierarchy Matrix for Amaravati

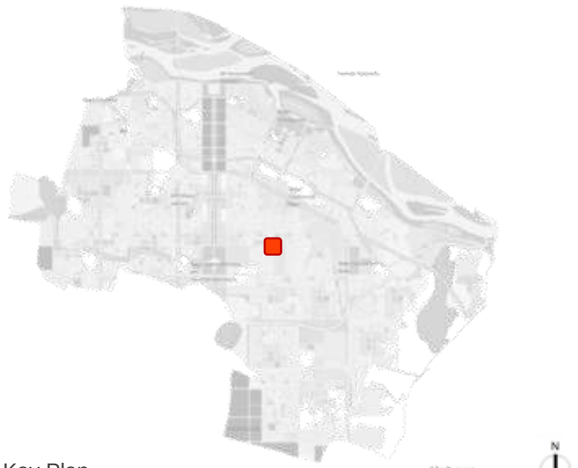
Street Types	ROW	Street Image	Street Characteristics
Major Arterial road / Seed Access Road	**60m**	**Vehicular Centric** ↓ **People Centric**	Heavy traffic and **effective transit oriented approach** for facilitation of convenient and **high speed connectivity** to different parts of city for ease of transportation and districts of capital region within less timeframe.
Arterial Road	**50m**		High speed corridor for vehicular moment. **Integrated approach** with major arterial road and sub arterial road while creating public space
Sub Arterial Road	**50m**		**Important transit route** considering dedicated **public transport** network connecting collector and major arterial road. **Multi-modal transit connectivity approach**, ease of **access to all** and design approach with good **transition spaces**.
Distributor/Collector Road	**25m**		**More lively spaces, shaded sidewalk** and **informal sector** considering its importance as **connector street** between high speed Rapid Transit Lanes and neighbourhood spaces.
Unclassified Roads./ Local Streets	**17m** **15.6m** **12m** **9m**		More **people oriented** approach with **shared streets, shaded sidewalk**, accommodation and **ease of access** for transit network options for **last mile connectivity**.

6.1 Streets Sections

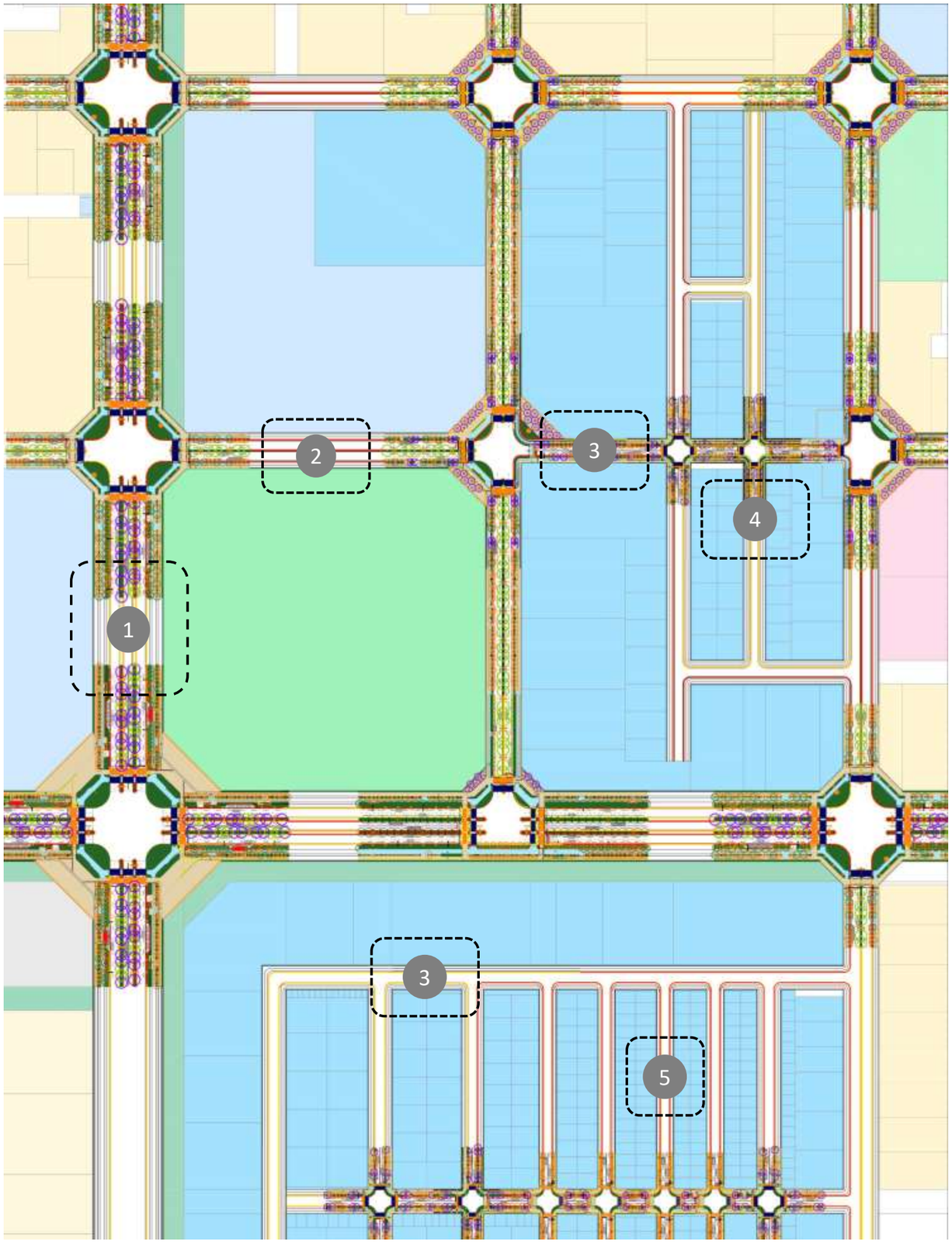
Road Network
Sample Community Block

A sample community block within the masterplan is selected as indicated in the key plan below to demonstrate typical scenarios for streetscape guidelines corresponding to adjacent land use context along the street edges.

Adjacent image shows a selected area of Amaravati Masterplan highlighting a community block of 500m X 500m. The road network displayed includes all street typologies and intersections with respect to ROW designed as per transport and infrastructure plan for Amaravati.



Key Plan



1 50 m scenario

2 25 m scenario

3 17 m scenario

4 15.6 m scenario

5 12 m scenario

6.1 Streets Sections

Street Components

Following street components have been identified that should contribute to the success of complete street approach of Amaravati capital city.

Sidewalks

Sidewalk is the pedestrian realm between the plot line and the curb. This space allows for interactions between various elements on the street, including walking and cycling.

Frontage Zone

The Frontage zone is adjacent to the building edge. It provides space for door openings, steps, architectural elements, window shopping, displays, seating arrangement and similar features.

Multi Functional Zone (MFZ)

MFZ provides different functions as per the different types of streets for plantation, street furniture, temporary drop off, drop of areas, lighting and public infrastructure etc.

Non Motorized Transit Zone(NMT)

Non Motorised Transit (NMT) includes both walking and cycling. NMT Zone constitutes pedestrian walkways as well as cycle tracks.

Pedestrian Walkways (NMT)

Pedestrian walkways are the spaces where people are intended to walk along streets.

Cycle Track (NMT)

Cyclists can be accommodated on cycle tracks located within the pedestrian realm, the carriage way or as shared paths.

Carriage way (CR)

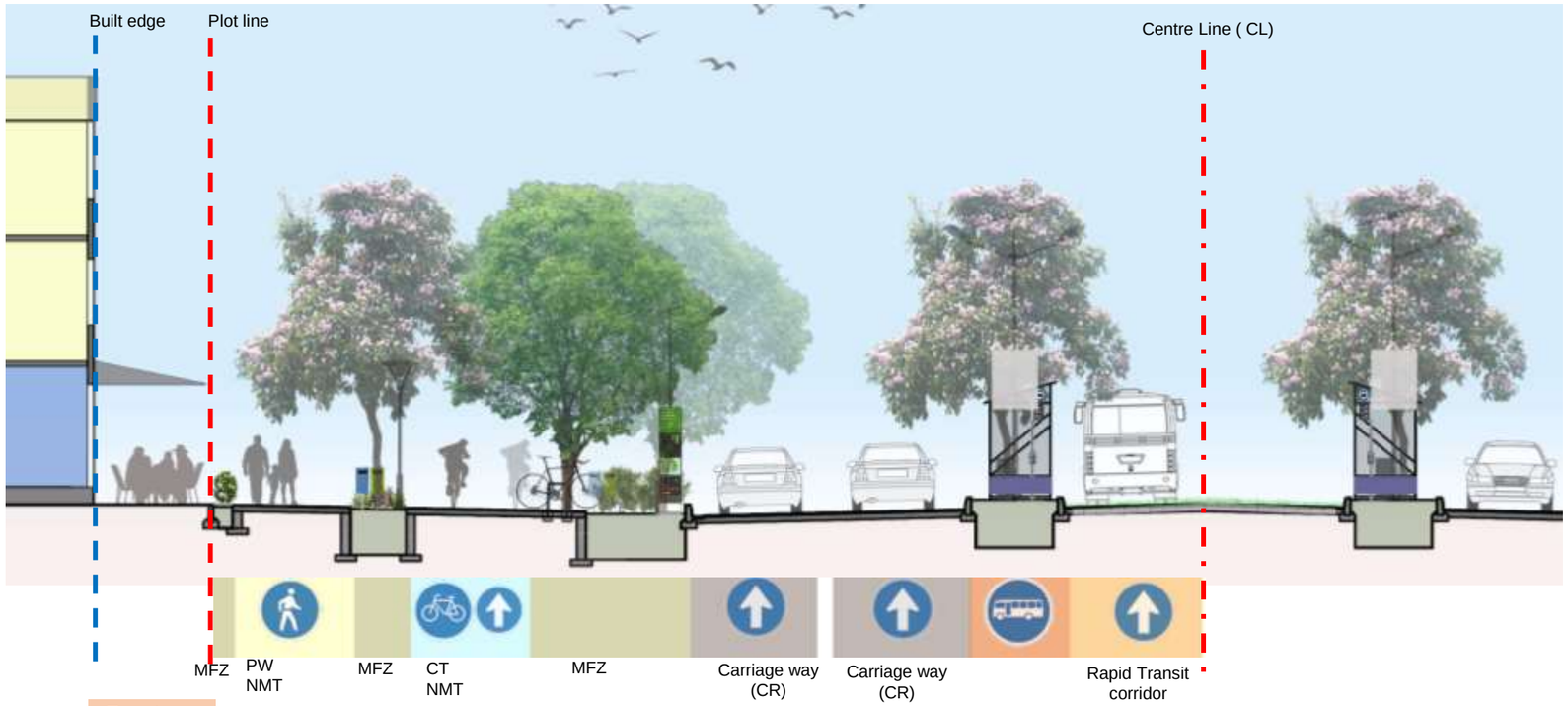
The areas dedicated to motor vehicles include carriage way, turning lanes and drop off.

Rapid Transit Lanes

Transit facilities include metro lines, bus and tram lanes, stops, stations and associated waiting platforms.

Central Median (CM)

The central median or central reservation is the reserved area that separates opposing lanes of traffic on divided roadways. Medians are located in the centre of ROW defining lanes of vehicular transit movement network. They serve various functions, including refuge space for pedestrians, indentations for turning lanes, dedications for public Rapid Transit Lanes and space for trees and landscaping.



Typical street section for Sidewalks zones demarcation

Sidewalk

City of Toronto

Sidewalk

City of Bloomington, Berlin

Source: http://bquiet.ca/blog/ , http://wglt.org/post/bloomington-aldermen-discuss-complete-streets

6.1 Streets Sections

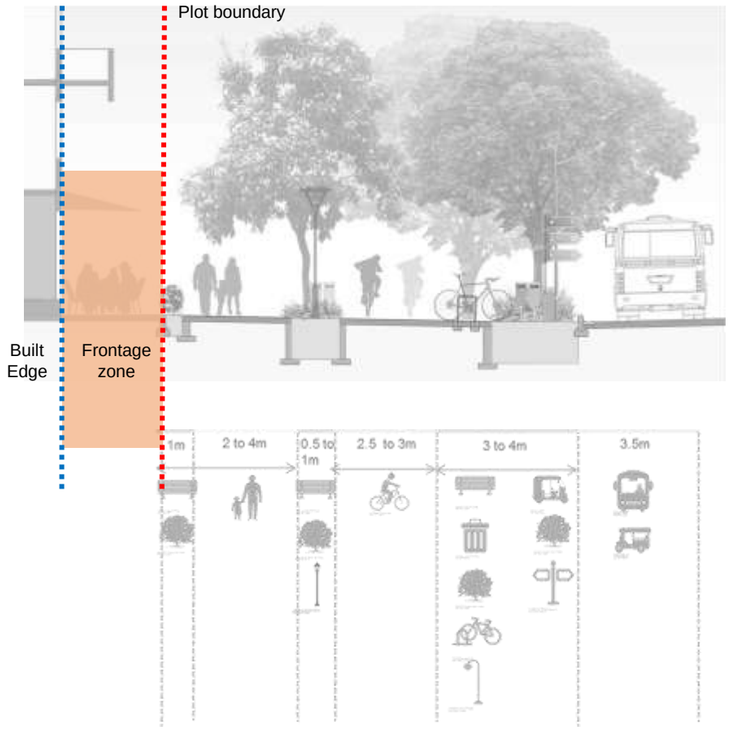
Frontage Zone

- Keep this space as clear as possible so that people should walk and stand in the shadow of buildings.
- Mixed use and commercial development the frontage zone should be constructed at the same grade and level as the sidewalk zone.
- The surface material within the frontage zone should differentiate public and private zone by accent paving material or colour.
- Commercial plots should have common frontage for colonnade or seating areas without compromising on planting strip from boundary edge.

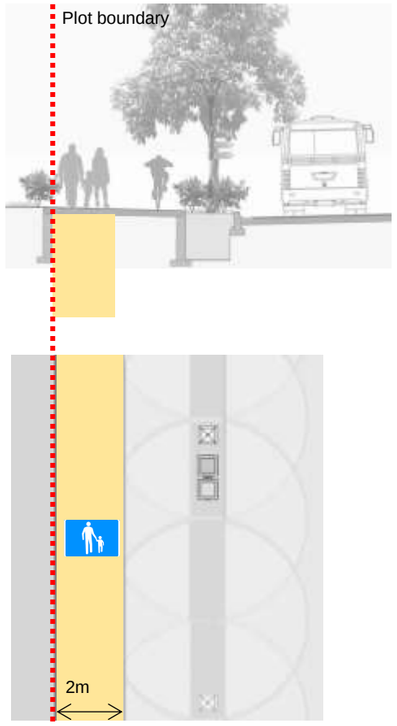
Pedestrian Walkway (NMT)

- Pedestrian walkway forms part of the NMT corridor along roads of different ROWs and should be a within range of dimension making it flexible as per guidelines without compromising on MFZ corridor
- Walkway width should be determined by street types and its ROW, land use and as per universal accessibility measures
- Greening in MFZ should be in consideration of pedestrian walkways to provide shading and noise buffer
- Pedestrian path should be clear and accessible to all. No obstructions should be considered within this corridor
- Bollards should be provided at specific areas to remind pedestrians they are entering into different spaces, such as between plot entrances/exits, cycle tracks, or at intersections/crossings to restrict vehicular entry
- Pedestrian walkway should raise to a higher level than carriageways and should be separated by curb. It should have uniform height 0.15m above road level.
- Curb ramp for entry/exit points at plot should be accommodated into MFZ /Green corridor at 1.4 m
- Where raised pedestrian walkway is not possible then railing, bollard, curb stone separator should be provided to create walkway separated from carriageway

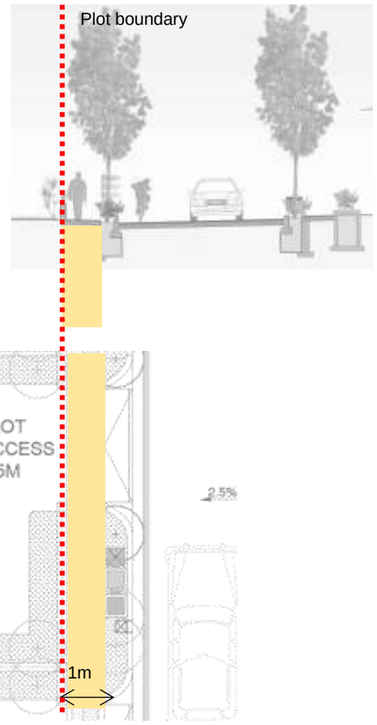
50m wide Arterial Road



25m wide Collector Road



9 wide Local street



Frontage zone

Washington DC street showing frontage zone with different colour , texture demarcation

Street Plan View

Street Plan View

Amaravti city proposed view for 25 m wide Collector Road streetscape

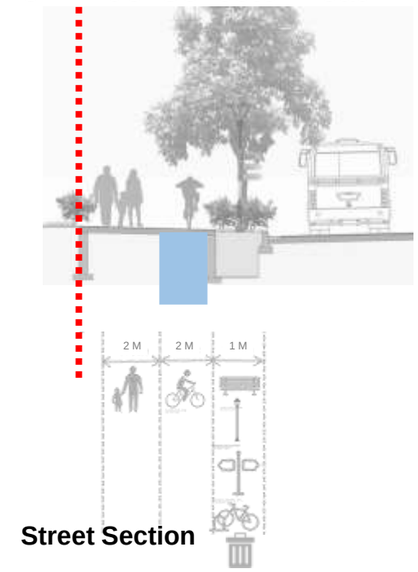
https://nacto.org/publication/urban-street-design-guide/street-design-elements/Sidewalks/

6.1 Streets Sections

Cycle Track (NMT)

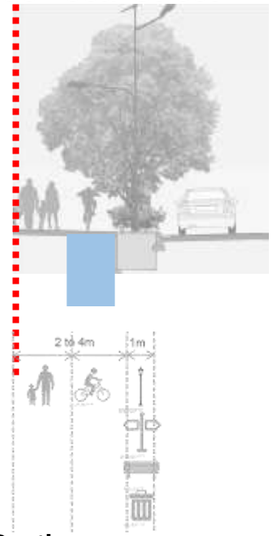
- Cycle track should be meant only for non-polluting, slow moving modes like cyclists and e-bikes
- No obstructions or street furniture should be considered within this corridor
- NMT track should be on same level of pedestrian walkway 150 mm above with road level separated by color and texture for demarcation
- NMT track should be free of obstacles such as furniture, plantation, utility covers etc.
- E-shared bikes drop off and charging stations should be at strategic points along NMT corridor preferably in multi functional zone
- Asphalt or concrete is recommended with different color texture to improve visibility to follow the same track while riding
- Proper gradient should be maintained with provision of storm water drains to avoid water logging

25m wide Collector Road



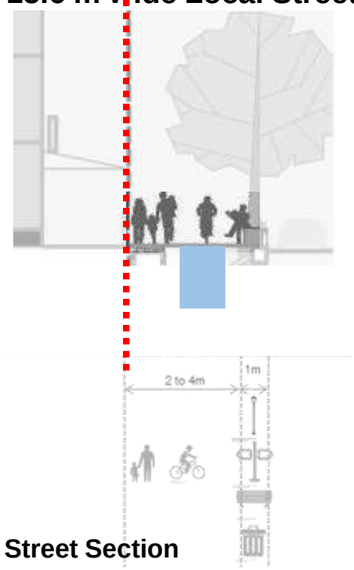
Street Section

17 m wide Local Street

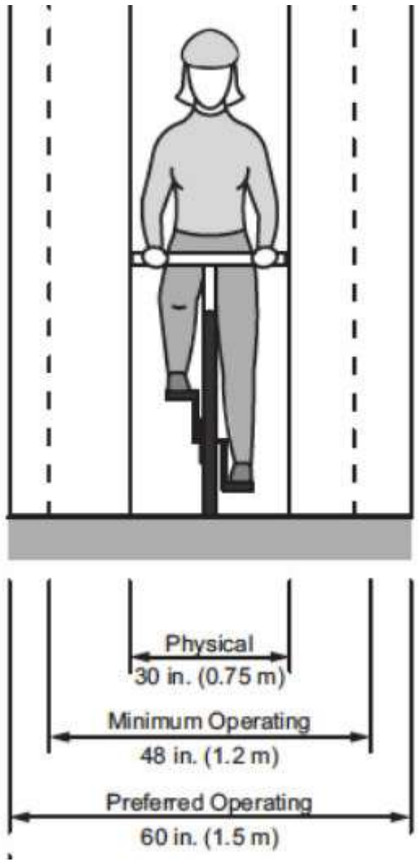


Street Section

15.6 m wide Local Street



Street Section



Space requirements for cyclist

Santa Monica, California

Quincy Market in Boston_ shared street

E bikes

Private bicycle

Shared bikes

Source:http://azbikelaw.org/aashto-guide-for-the-development-of-bicycle-facilities/https://www.telegraph.co.uk/motoring/green-motoring/5794900/Ultramotor-A2B-electric-bicycle-is-a-volt-from-the-blue.html, https://www.glassdoor.co.in/Photos/Barton-and-Loguidice-Office-Photos-IMG1123323.htm, https://www.fordgobike.com/blog/how-ford-gobike-protects-your-data

6.1 Streets Sections

Multi Functional Zones

Following are different types of MFZ depending of ROW and width for each MFZ varies as per street typology.

MFZ 1

- MFZ 1 along the commercial edge should be partially paved areas with direct access to shopfront.
- Along residential edge maximum shrubbery with trees should be provided as buffer for increasing green cover thereby addressing privacy issues.

MFZ 2

- Greening should depend on the width of pedestrian walkways to provide adequate shading for pedestrians and reduce noise pollution from vehicular movement
- All walkways should have bollards to protect pedestrians from vehicular movement

MFZ 3

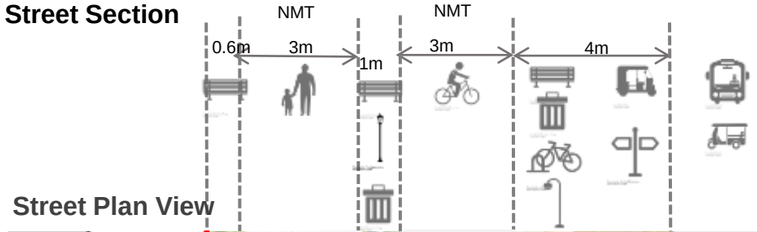
- Street furniture and utilities should be provided, such as lighting, bus stops and cycle racks
- Medium to large size trees with dense shrubs should be planted in this zone
- Bio-swales should be provided for sustainable measures and storm water management

MFZ 4 – Central Median

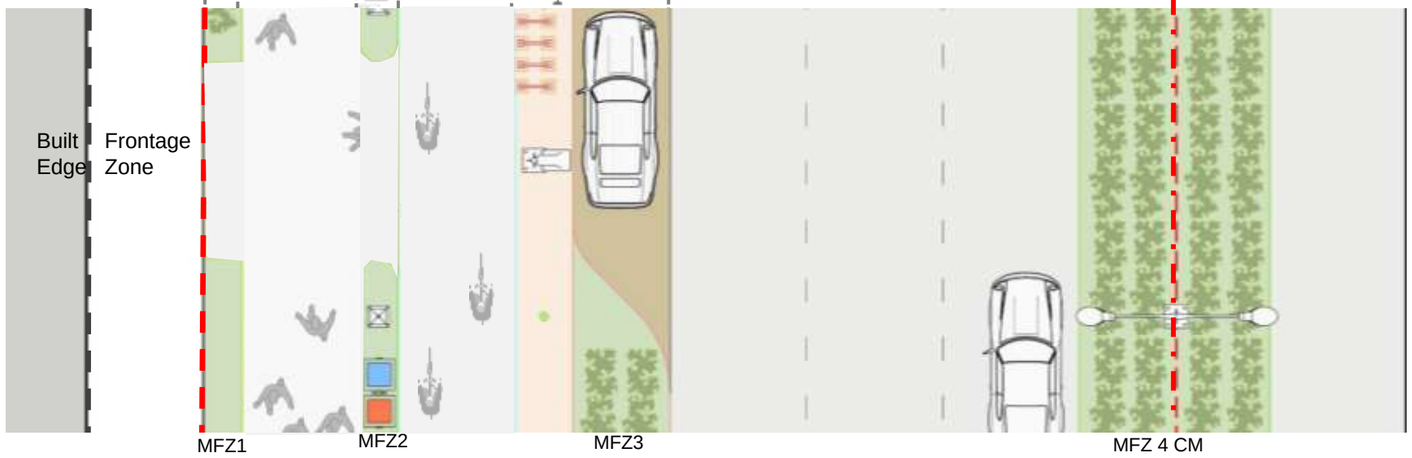
- Median spaces should be 100 % covered with trees and shrubs except for pedestrian crossings and intersections
- Central median should be 150mm above carriage way level

50 m Arterial Road Section

Street Section



Street Plan View



Chicago

Chicago

Boston

https://in.pinterest.com/deisy_v_c/median-landscape-architecture/ , http://www.wbur.org/news/2016/08/07/photos-bostons-newbury-street-shuts-down-to-cars-opens-for-pedestrians

6.1 Streets Sections

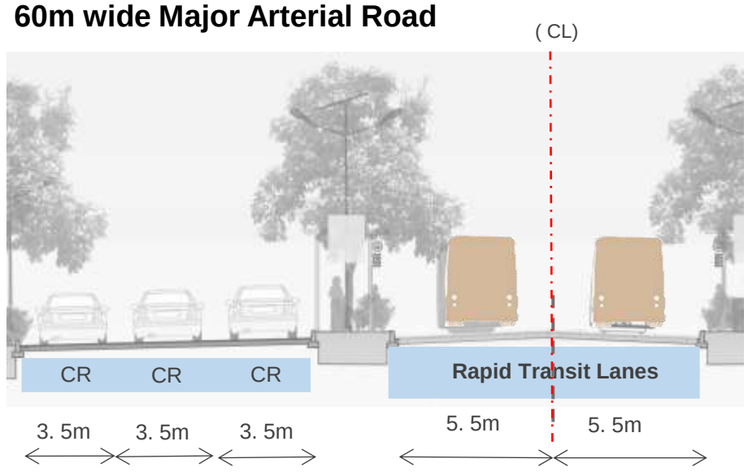
Rapid Transit Lanes

- Dedicated lanes for high capacity, high quality public transport system at comparatively lower costs
- BRT and LRT are suitable options which should be chosen based on the capacity and catchment required and possibly MRT in the future
- Rapid Transit Lanes are effective in improving public transport as they reduce headway, avoid delays and improve fuel efficiency
- Dedicated Rapid Transit Lanes are recommended on roads with ROW 25m and above
- 3.75 m lane for single transit lane as per IRC code
- Width of transit lane should be min 7 m undivided for 2 way bus flow and separated from carriage way with median or divider in between
- Proper provision of midway crossing should be made for commuter to access median and transit stops easily
- Pedestrian refuge of minimum 1m in width should be provided at all crossing locations

Carriageway (CR)

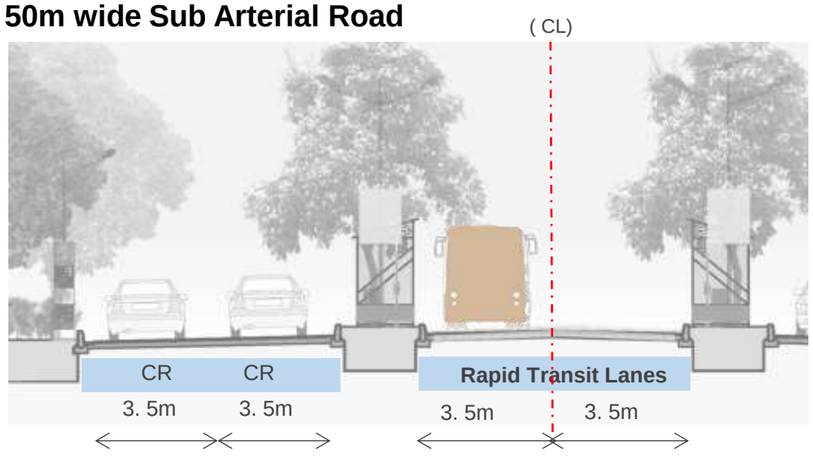
- Width of carriageway should be uniform through out the length of the street till it changes its hierarchy
- Carriageway's width should be 3.5 m as per standard
- Carriageway on any street should be demarcated with yellow color lines at the edge of the sidewalks. Internal lanes should be marked in white color dashed lines. Marking should be with thermoplastic paint
- Utility services are not recommended on or beneath carriageways as they require digging of road for repairs and maintenance
- Construction technology and material specification should comply with IRC standards
- The level of street and storm water drain should be designed to ensure that water from the road does not enter into any adjoining plot and easily enters into drain

60m wide Major Arterial Road



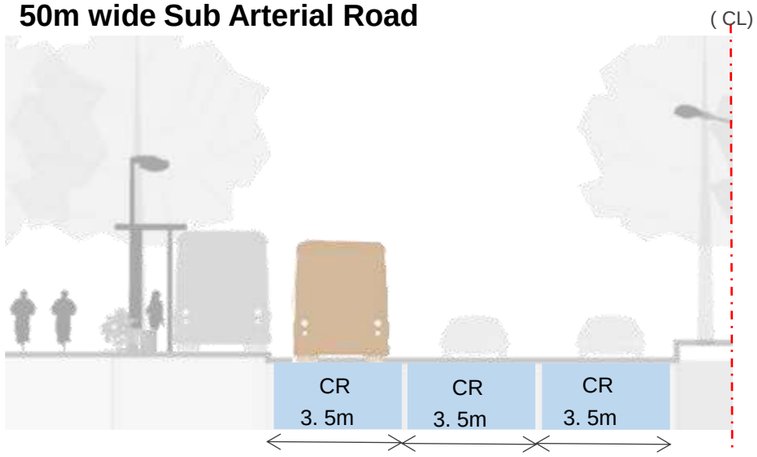
Street Section

50m wide Sub Arterial Road



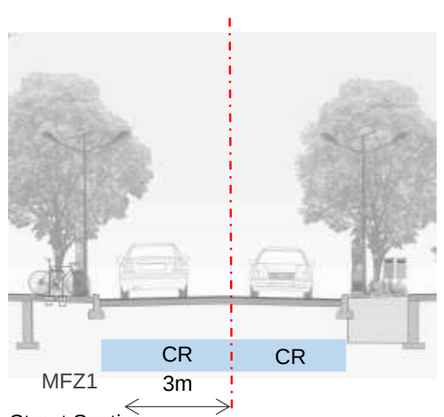
Street Section

50m wide Sub Arterial Road



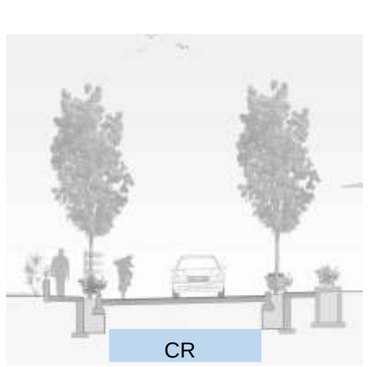
Street Section

15.6 wide Local street



Street Section

9m Wide Local Street



Street Section

Barcelona's green paved tram way

BRT Lane, Dhaka

https://www.treehugger.com/lawn-garden/barcelonian-tram-tracks-detailed-with-grass.htm, http://en.ntvbd.com/bangladesh/41457/Deal-signed-to-build-Dhaka-airport-Gazipur-BRT-routel

6.1 Streets Sections

Drop off

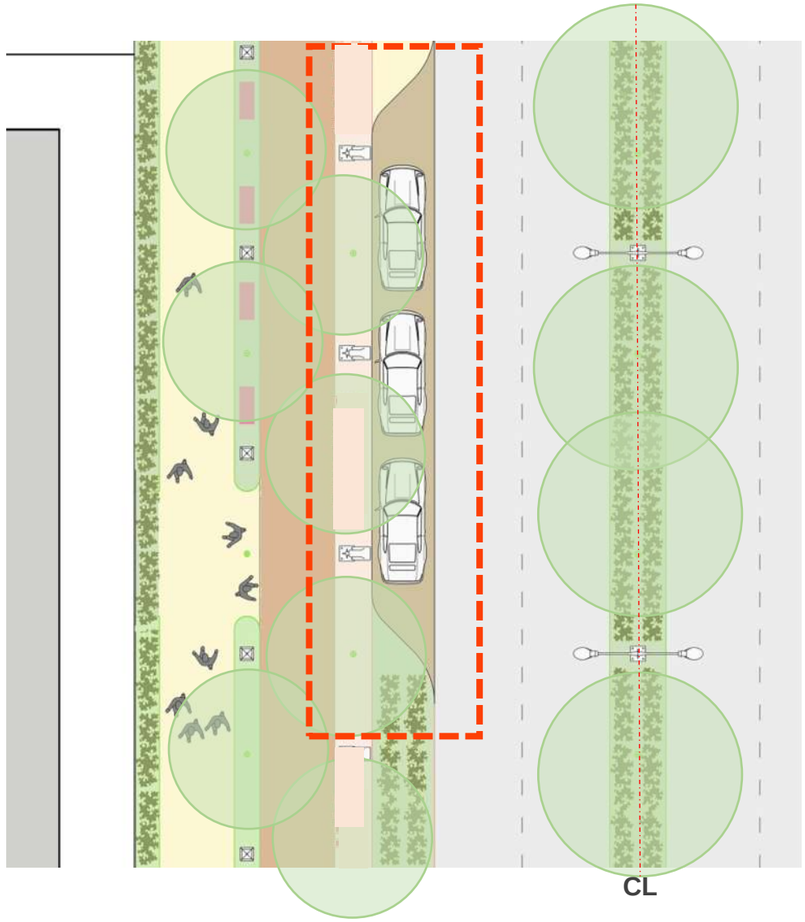
- Drop off should be restricted to arterial and sub arterial roads only. On-street drop off zones should be marked on all the streets with specific time limits
- Drop off should be provided parallel to sidewalk on all roads
- It should be noted that provision of surface drop off is an additional facility and should be monitored by relevant authorities
- Drop off and on street parking areas should be marked clearly on road surfaces and signage boards
- Intersections and other critical locations should be kept free from drop off and other encroachments up to min 50m from junctions
- Drop off should not be allowed on pedestrian walkway and cycle tracks
- The provision of surface drop off depends on the land use, ROW and type of street. It should be primarily provided near commercial and mixed use land use
- Strong enforcement should be required to avoid double drop off or halting vehicles on busy or narrow streets like local streets of Amaravati
- Use of permeable grass pavers should be provided for drop off areas
- Drop off zone should be demarcated with yellow line with entry and exit arrows. Signage with directional arrow should be located at the beginning and end of no drop off zone
- On-street drop off should be permissible only in designated spaces as pay and park facility
- There may be need for on-street parking in the interim before public transit is implemented, if so the drop off zone should be considered and further explored as part of an interim strategy

Feeder bus or Rickshaw drop off

Feeder bus or Rickshaw stands should be preferably located:

- Within MFZ wherever provided
- Near bus stops and transit stations
- Near junctions but 50 m away from the intersection of local and feeder roads. Generally 50m before and 20m after transit stop
- Capacity of rickshaw stands should be limited to 5 to 7 rickshaw per drop off zone
- Feeder bus or Rickshaw stands should be located parallel to curb with sign boards
- Car parking and drop off should not be allowed in dedicated feeder bus or rickshaw drop off areas
- Adequete EV charging facilieties to be provided along Arterial & Sub Aeterial roads for public transit vehicles.

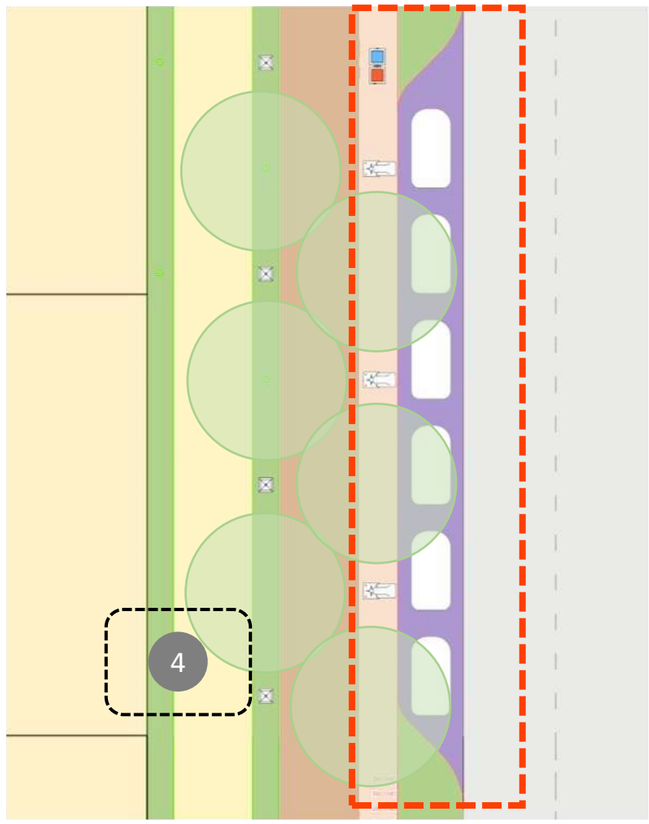
50m wide Road



Street Plan View

Drop off or Parallel parking

50m wide Road



Street Plan View

E rickshaw

http://www.unifiedparking.com/ ,http://www.dnaindia.com/delhi/report-speak-up-delhi-e-rick-a-bane-more-than-a-boon-2546440 , http://www.ecbilla.com/ecommerce-news/others/e-rickshaws-in-uttarpradesh.html

6.1 Streets Sections

Sidewalks

- Sidewalks should be designed to promote walking and enrich the pedestrian experience with shade giving trees along all streets of Amaravati
- There should be varied street fronts providing interesting routes and inviting destinations
- Sidewalk along various street types should define a character contributing to the identity of place, neighbourhoods and the city
- Sidewalks should provide direct connectivity to transit stations promoting healthy and active transportation built around pedestrian friendly walkable streets

Sidewalks of De La Rambla, Barcelona

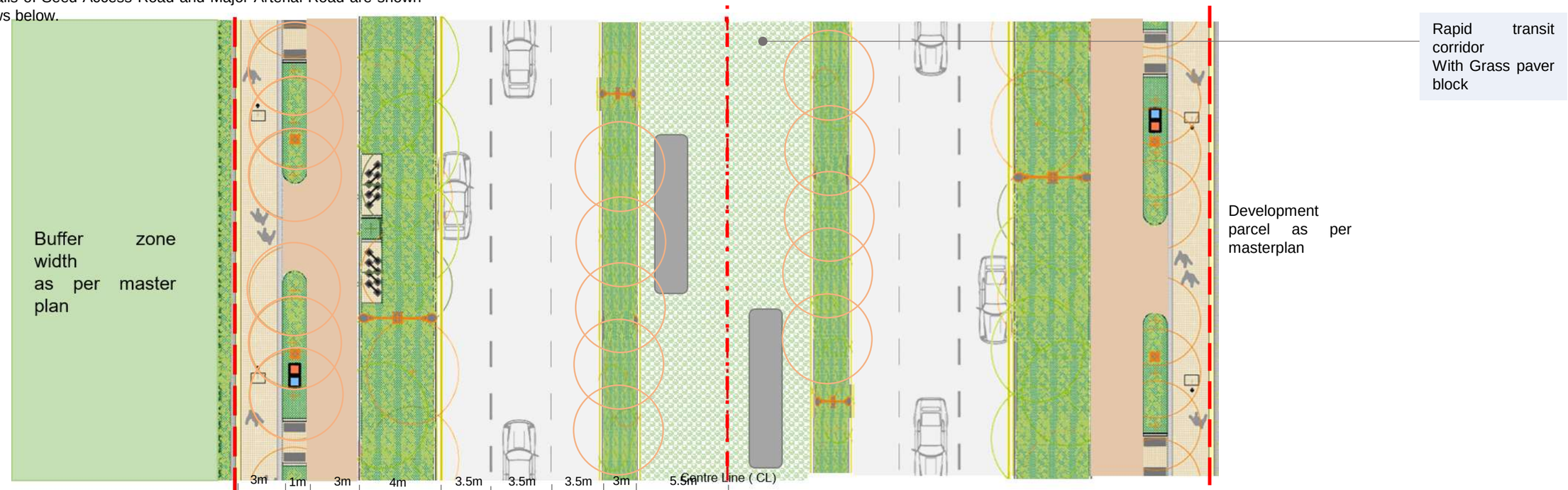
https://okdiario.com/espana/cataluna/2016/04/21/colau-quiere-reducir-un-33-las-terrazas-de-la-rambla-del-poblenou-y-los-negocios-haran-huelga-114776

6.1 Streets Sections

Typical Plans of Sidewalk

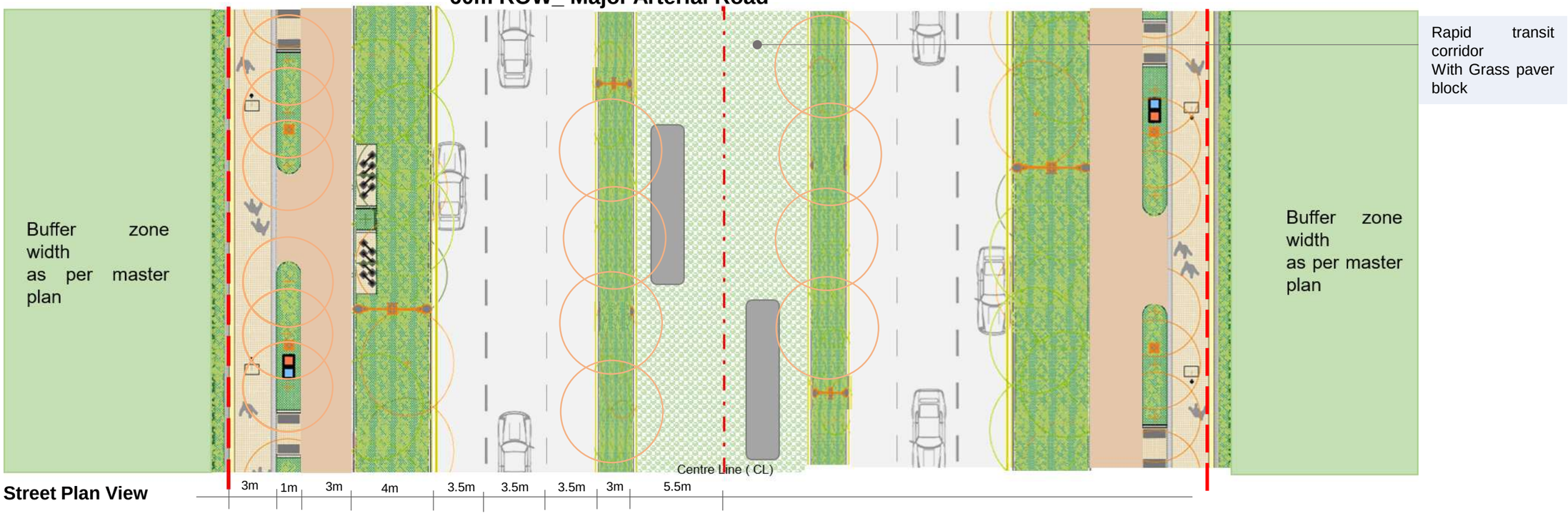
The following illustrations exhibit the typical scenarios of sidewalks with diverse zones serving different users groups. The allocation will be based on different scenarios and the adjacent land use For instance, two scenario will be proposed for 25 m collector road in adjacent to residential an commercial use respectively. Details of Seed Access Road and Major Arterial Road are shown in street plan views below.

60m ROW_Seed Access Road



Street Plan View

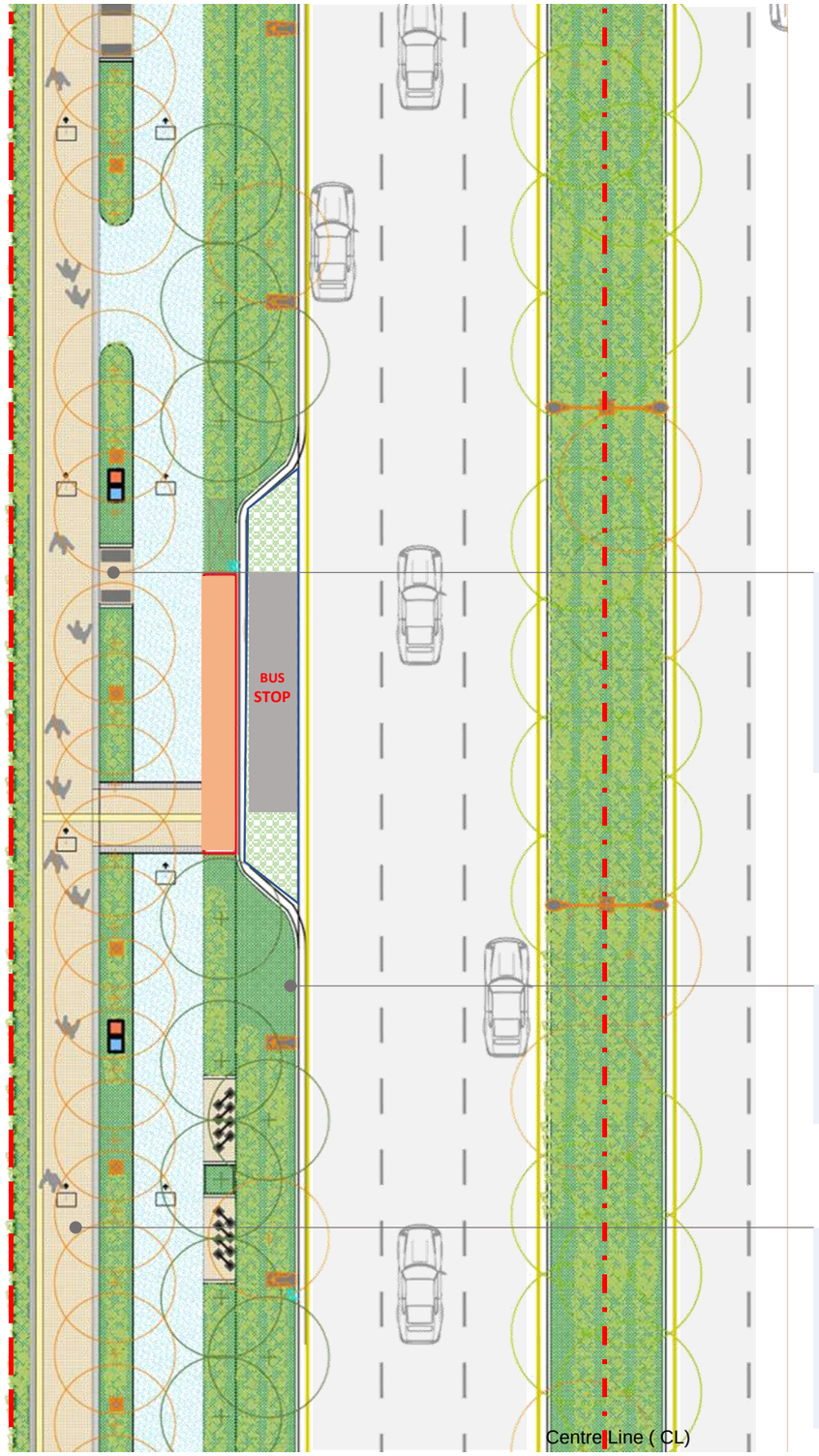
60m ROW_ Major Arterial Road



Street Plan View

6.1 Streets Sections

50m ROW_ Arterial Road



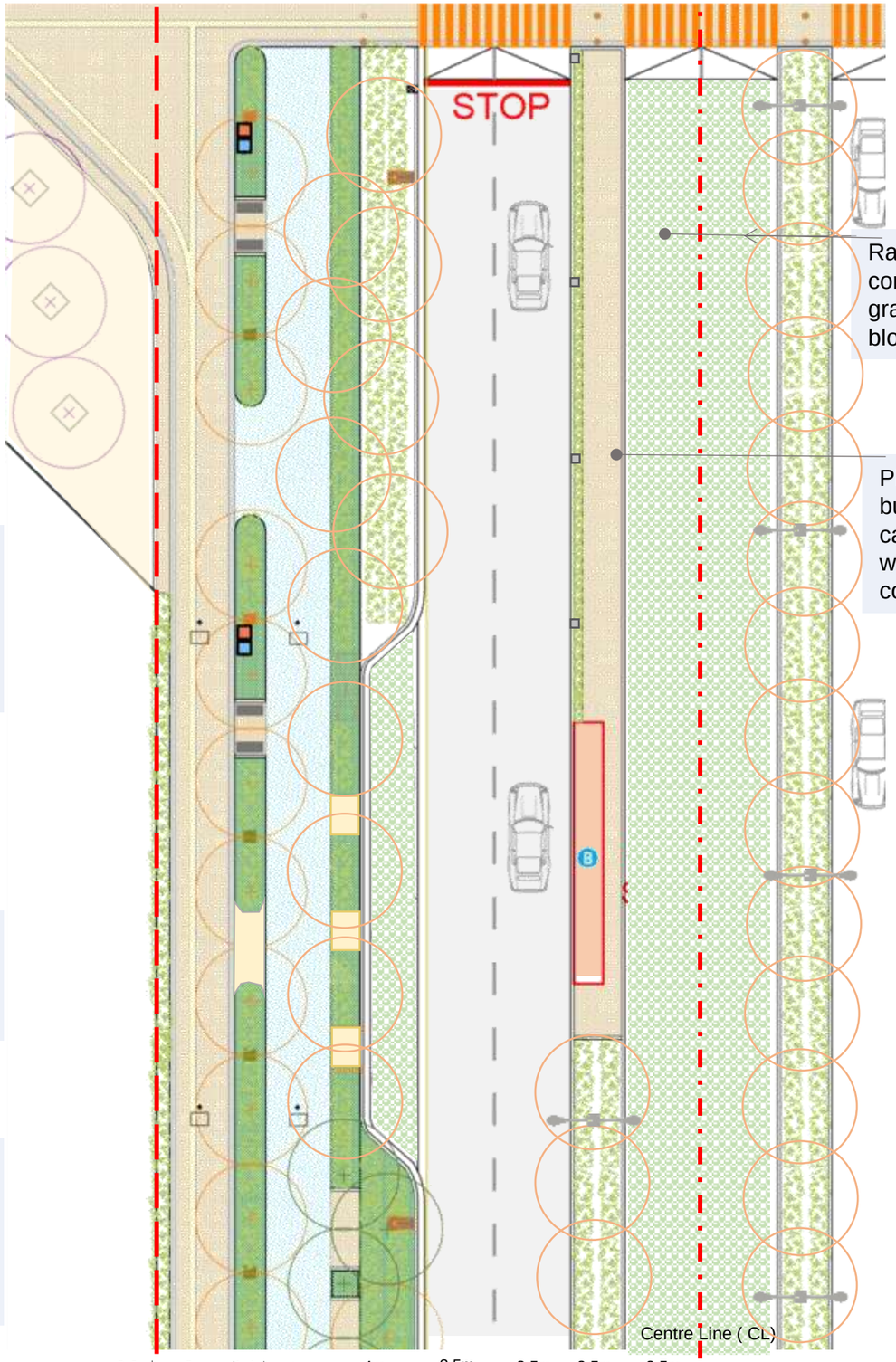
Street Furniture: Benches, dustbins, public kiosks and bicycle racks should be mandatory within MFZ

No vehicular access to plots adjacent to Arterial roads should be considered.

Pedestrian using public transit must have easy and clear walkway of 3m for both ways.

Street Plan View

50m ROW_Sub Arterial Road



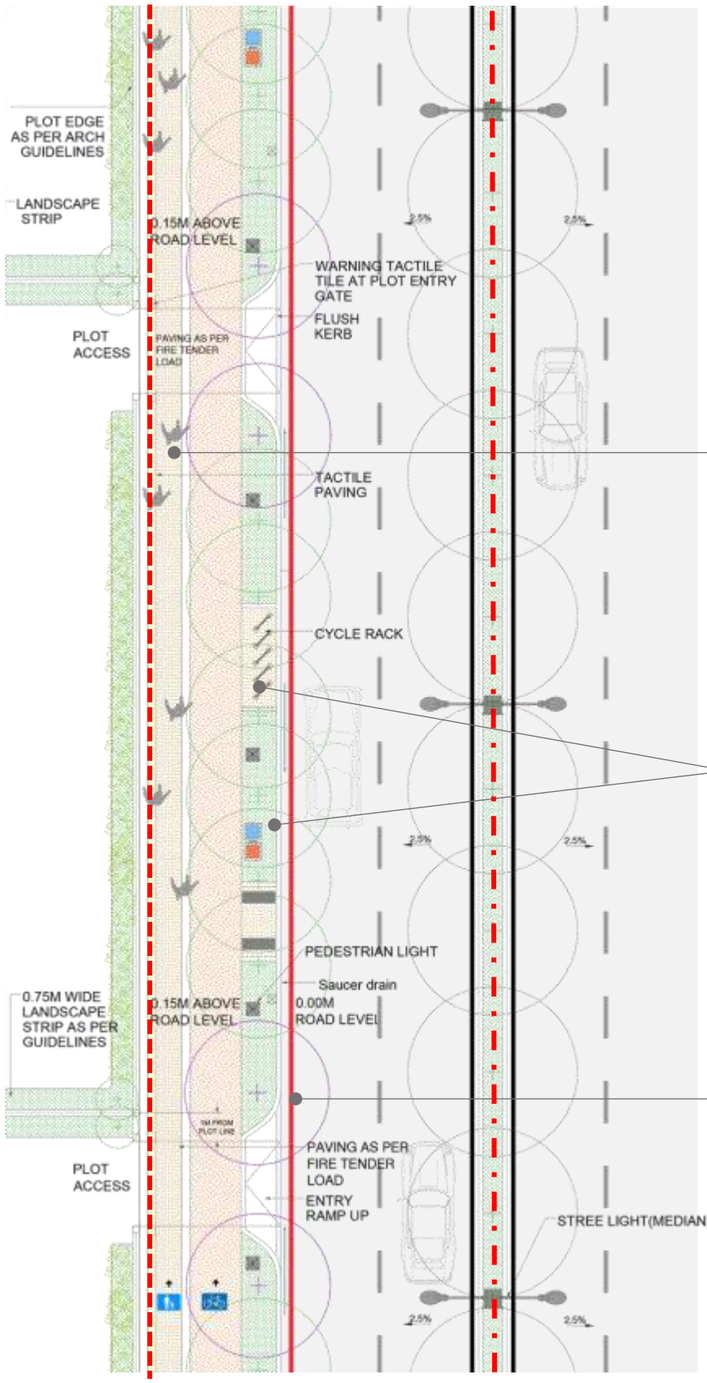
Rapid transit corridor with grass paver block

Plantation buffer on carriage way with pedestrian connection

Street Plan View

6.1 Streets Sections

25m ROW_Collector Road



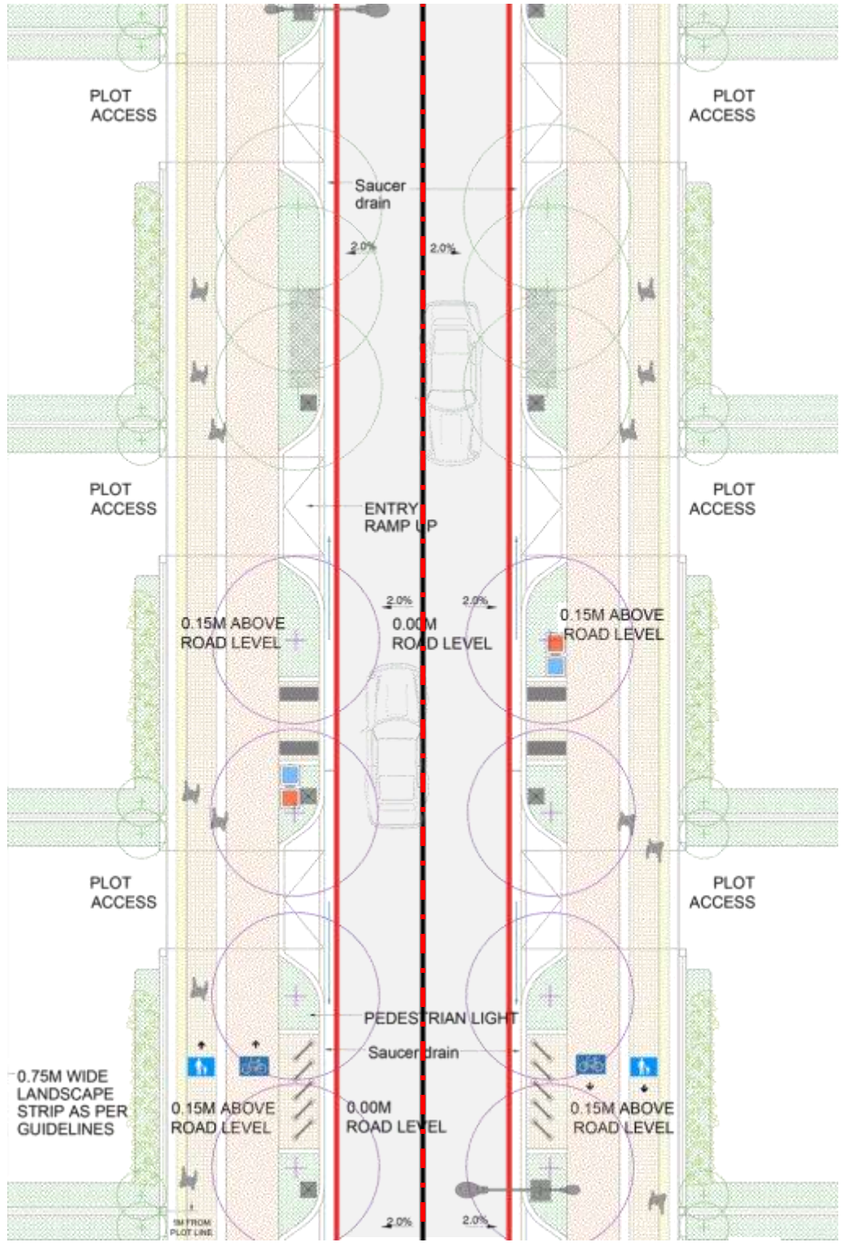
Clear pedestrian walkway

Street Furniture: Benches and dustbins are mandatory within MFZ

Curved curb with ramp of 3m minimum should be provided where access to plots is required.

Street Plan View Centre Line (CL)

17m ROW_ Local Street

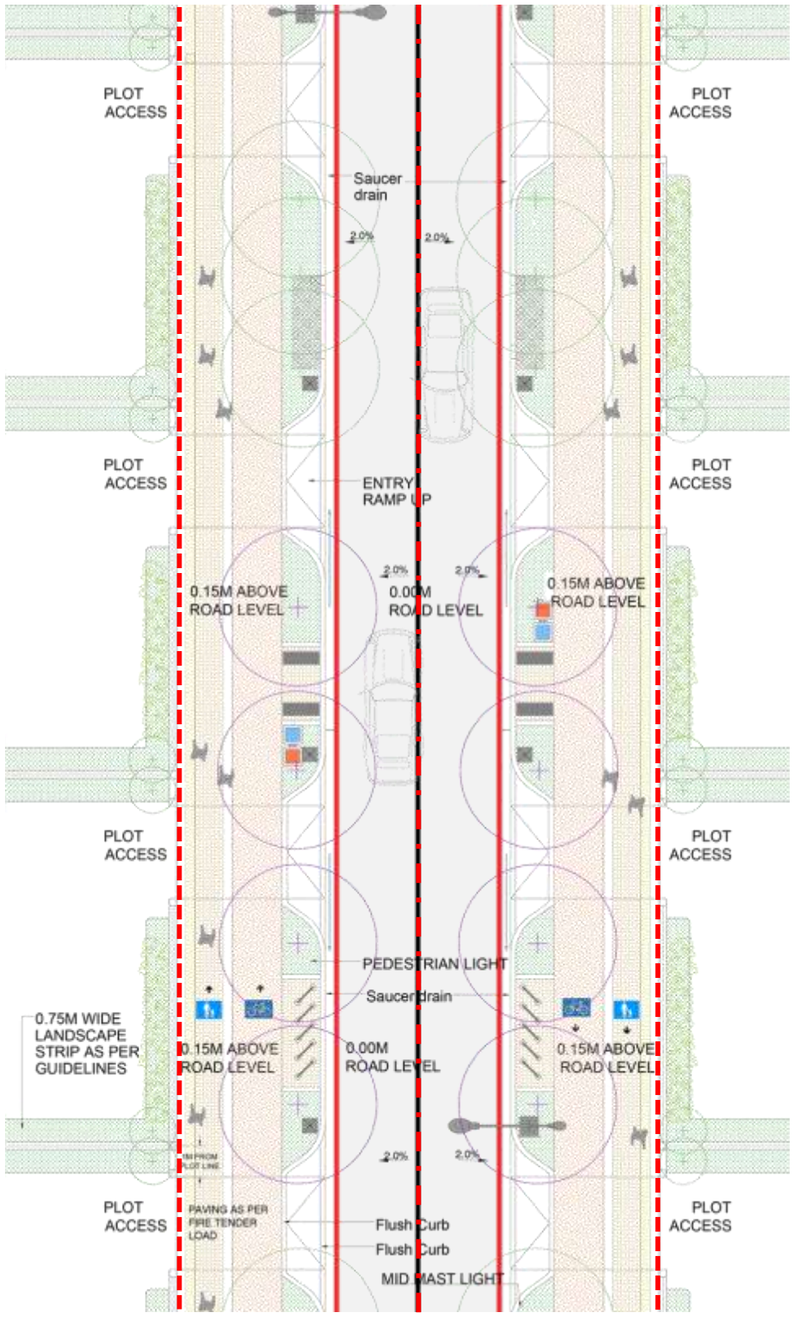


Street Plan View Centre Line (CL)

N

6.1 Streets Sections

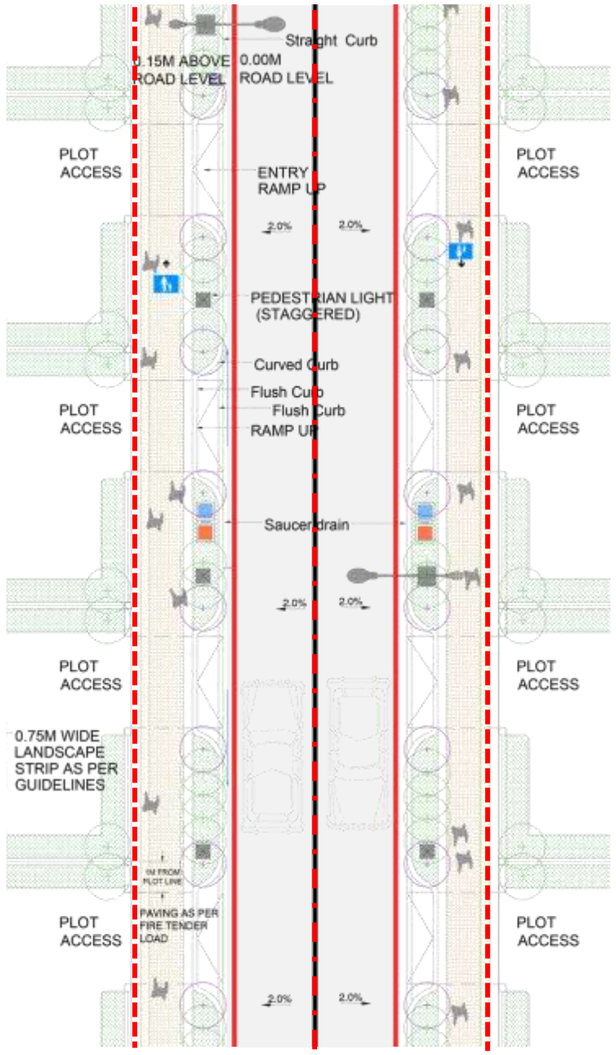
15.6m ROW_ Local Street



Centre Line (CL)

Street Plan View

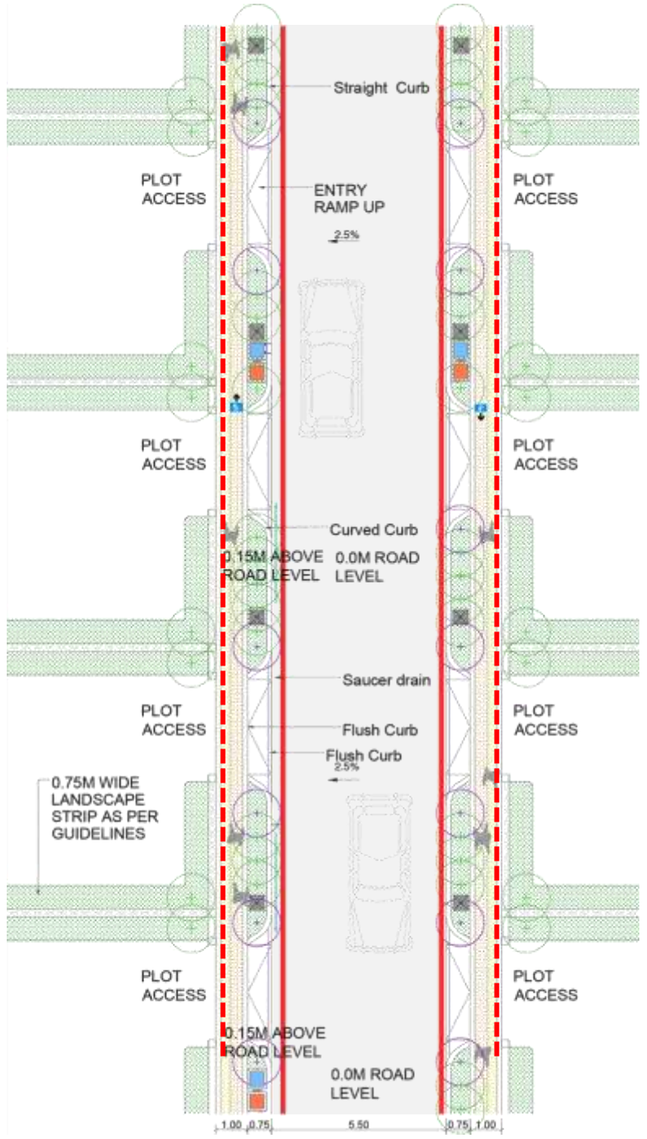
12m ROW_ Local Street



Centre Line (CL)

Street Plan View

9mROW_ Local Street



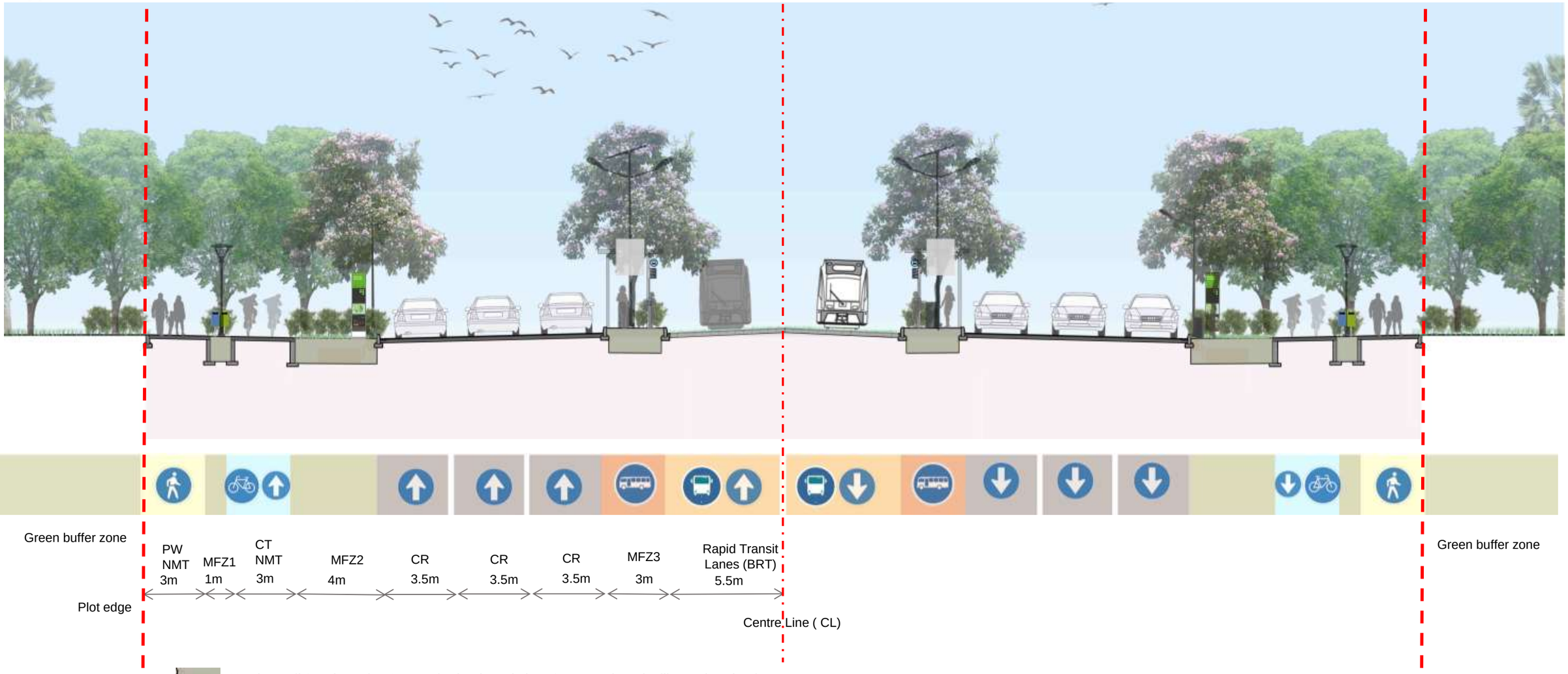
Note : Plot line allocation is subject to masterplan plot boundaries

Street Plan View

N

6.1 Streets Sections

Typical street section _60m wide Major Arterial Road



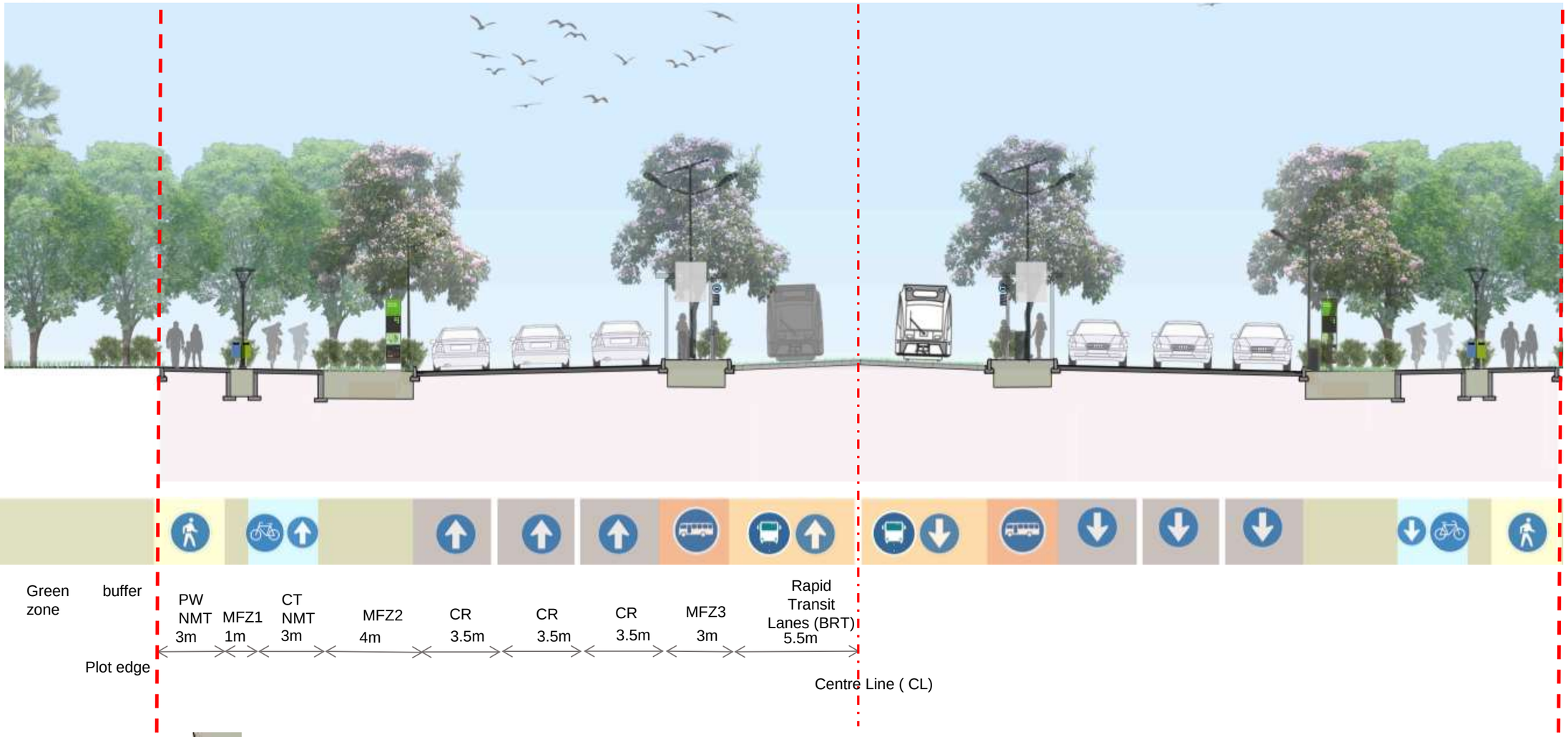
Garden soil for plantation 1.2m min depth and clear from services / utility under planting zones.

*Note : Root barrier should be considered for protecting civil work.

Street Section

6.1 Streets Sections

Typical street section_60m wide Seed Access Road



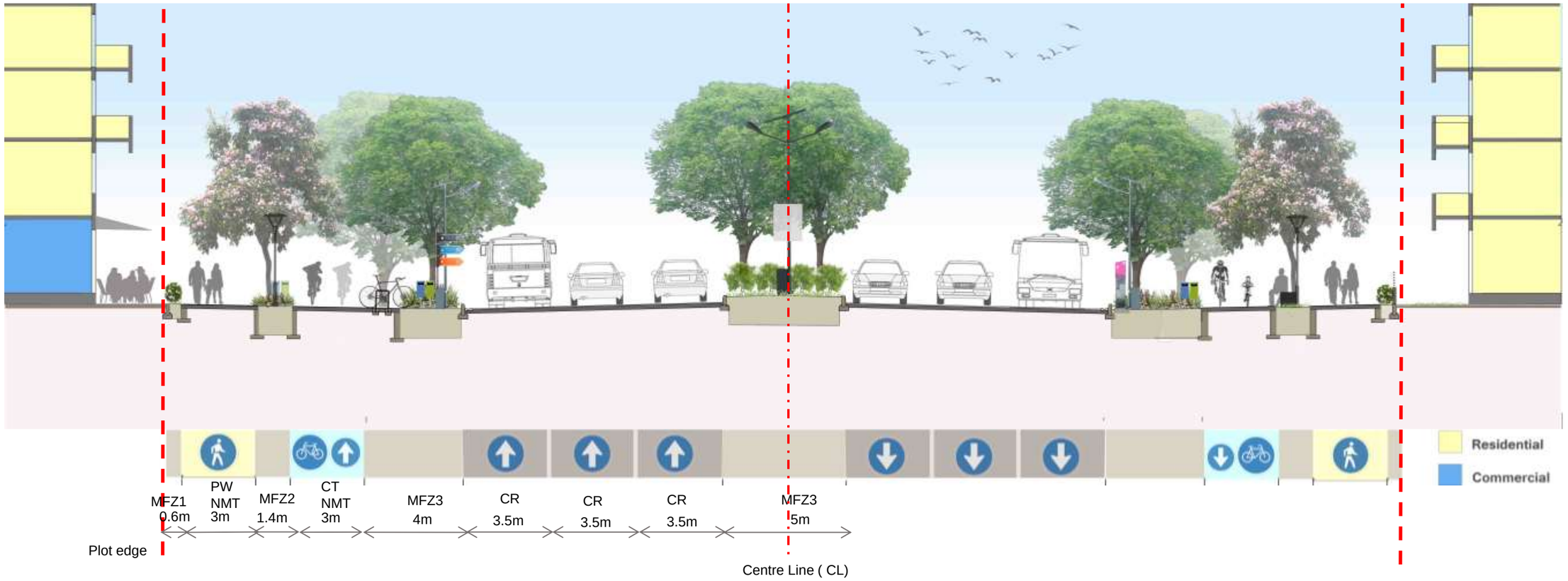
Garden soil for plantation 1.2m min depth and clear from services / utility under planting zones.

*Note : Root barrier should be considered for protecting civil work.

Street Section

6.1 Streets Sections

Typical street section _50m wide Arterial Road



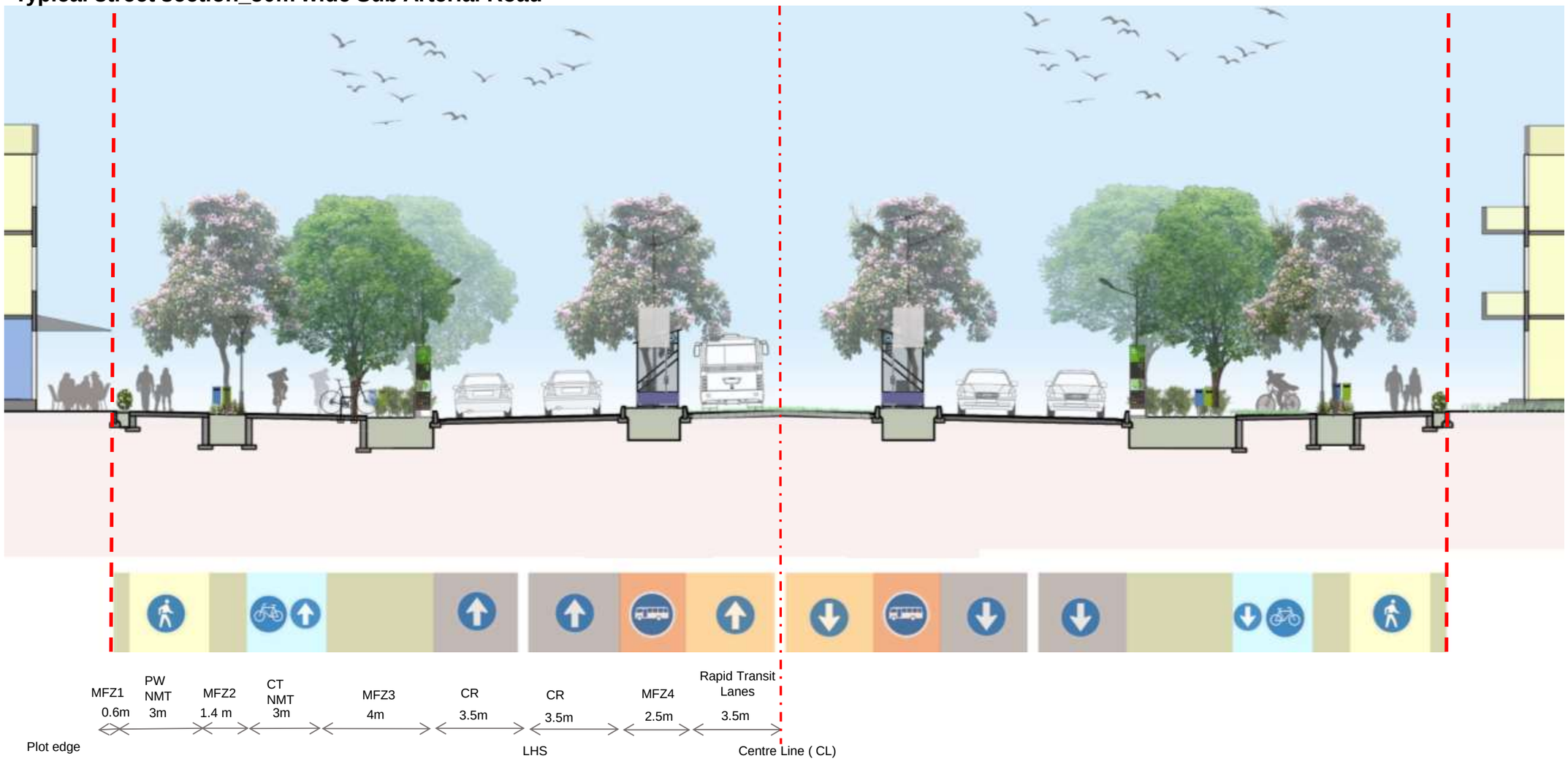
Street Section

Garden soil for plantation 1.2m min depth and clear from services / utility under planting zones.

*Note : Root barrier should be considered for protecting civil work.

6.1 Streets Sections

Typical street section_50m wide Sub Arterial Road



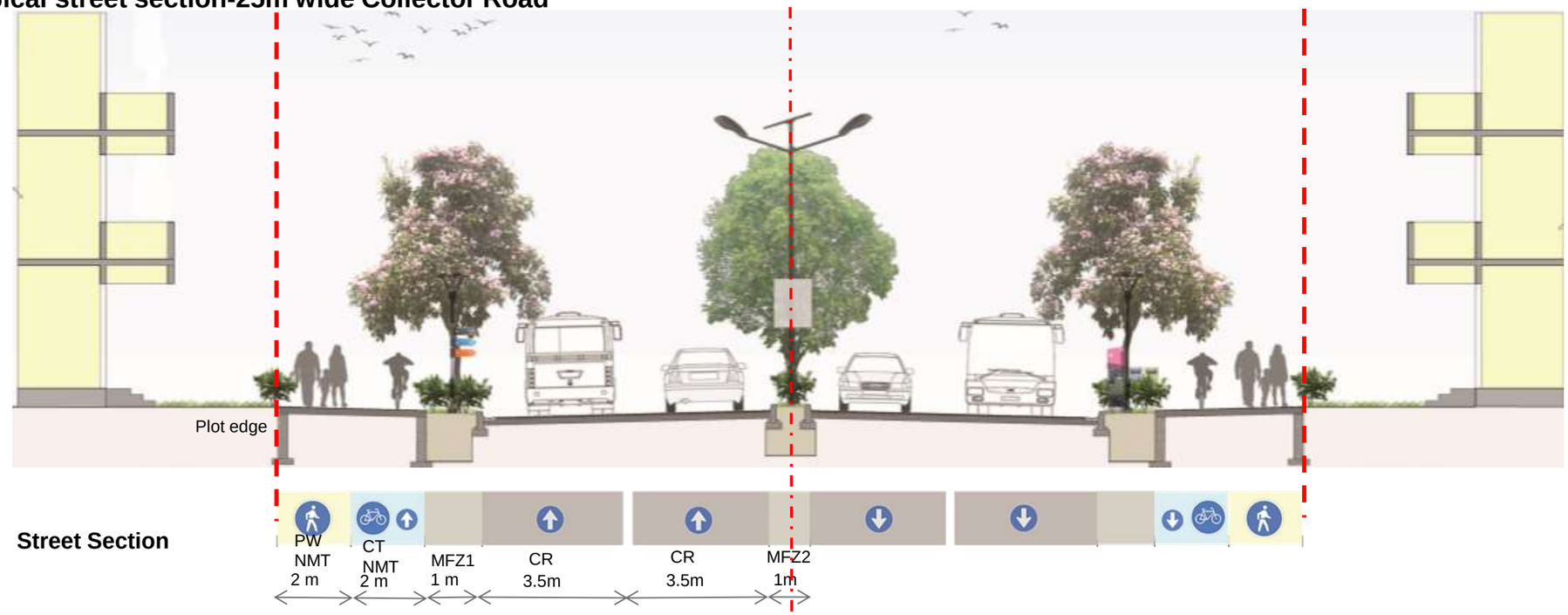
Garden soil for plantation 1.2m min depth and clear from services / utility under planting zones.

*Note : Root barrier should be considered for protecting civil work.

Street Section

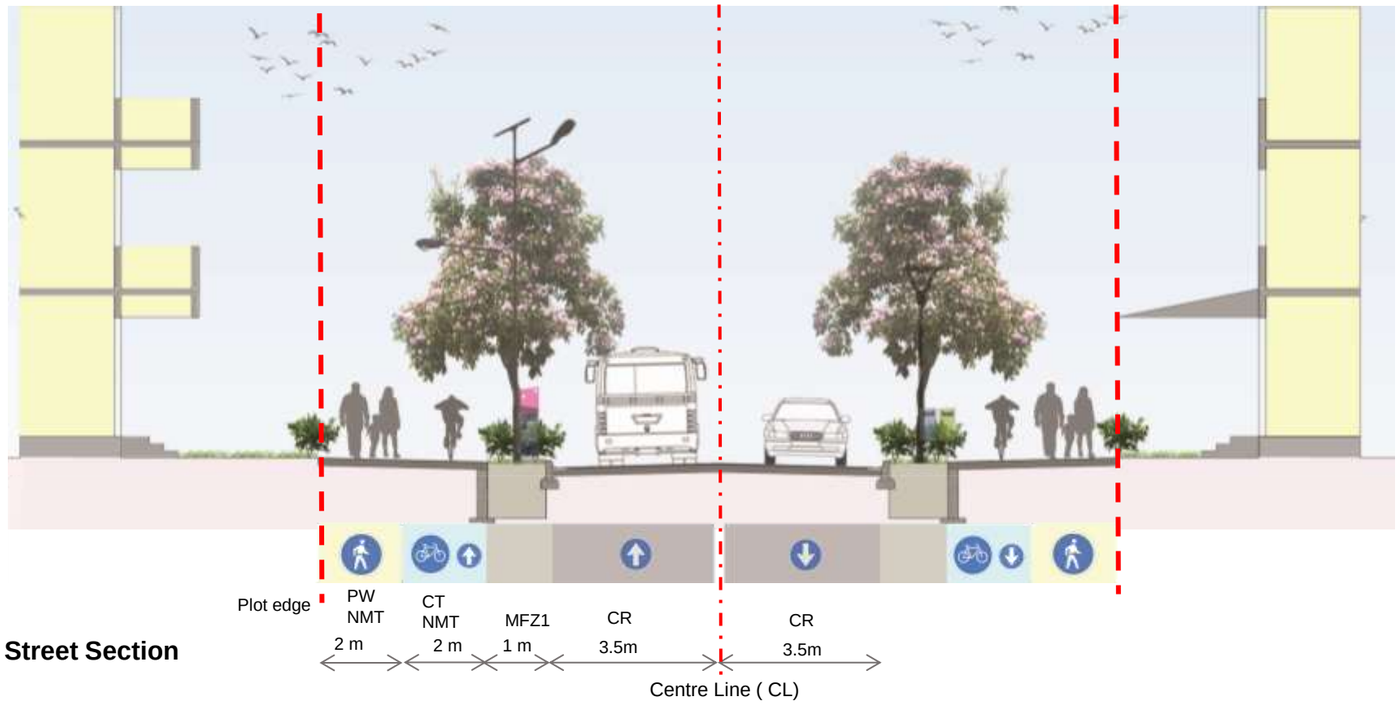
6.1 Streets Sections

Typical street section-25m wide Collector Road



Street Section

Typical street section_17m wide Local street



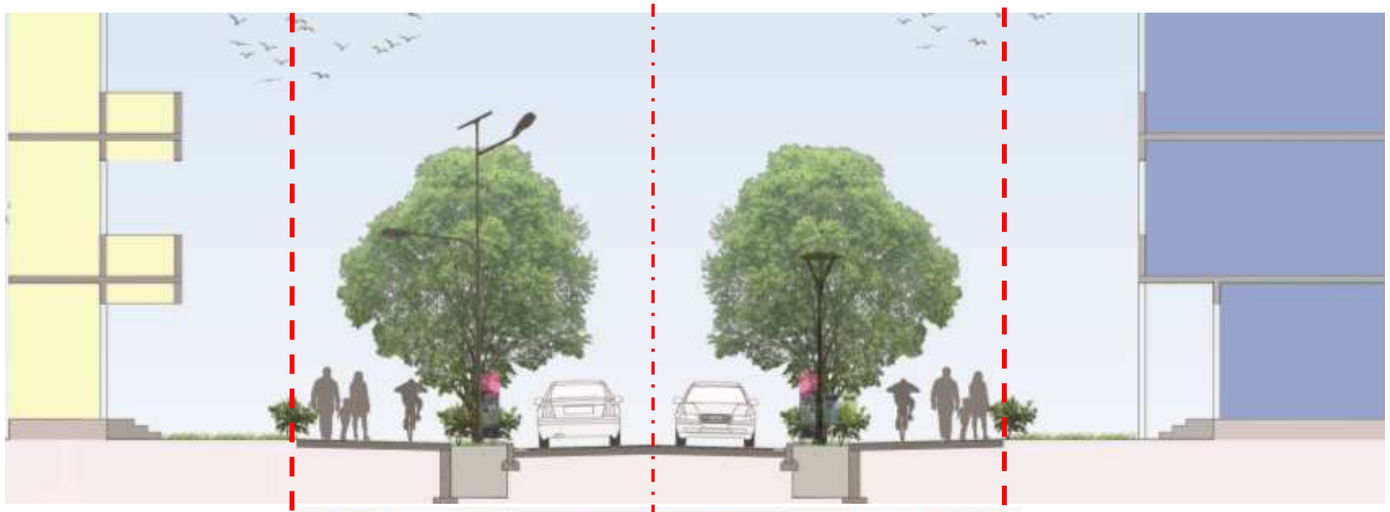
Street Section

Garden soil for plantation 1.2m min depth and clear from services / utility under planting zones.

*Note : Root barrier should be considered for protecting civil work.

6.1 Streets Sections

Typical street section_15.6m wide Local street

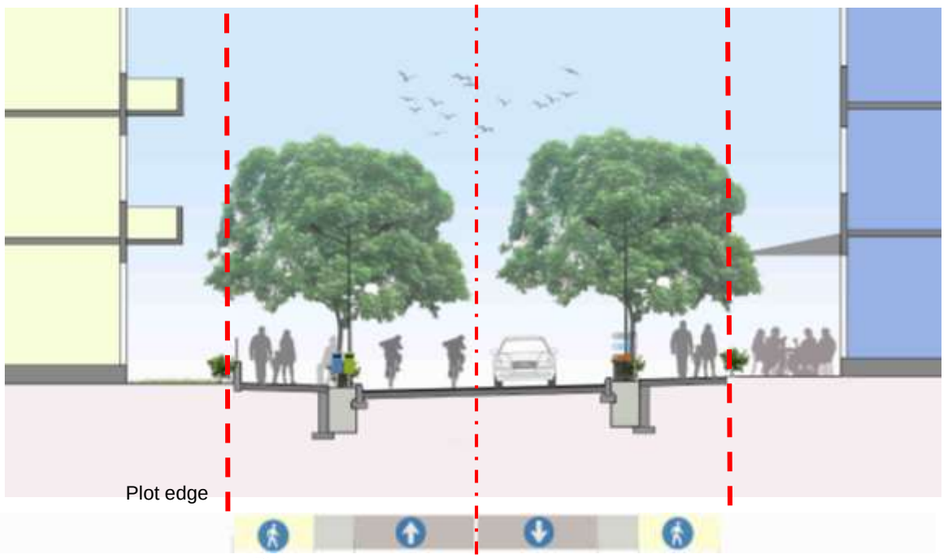


Garden soil for plantation 1.2m min depth and clear from services / utility under planting zones.

*Note : Root barrier should be considered for protecting civil work.

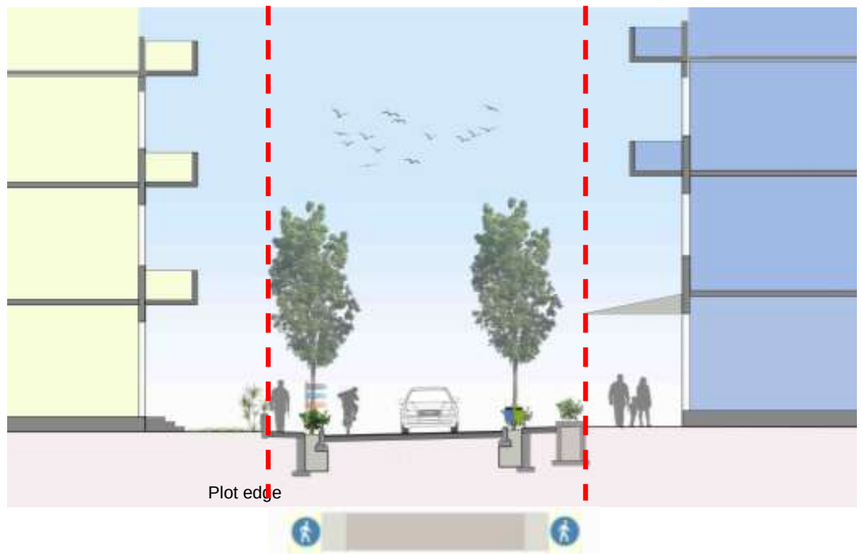
Street Section

Typical street section_12m wide Local street



Street Section

Typical street section_9m wide Local street



Street Section

6.1 Streets Sections

Street Furniture

- Street furniture should be installed in the landscape /MFZ. It should also be considered in the Frontage Zone or on curb extensions at intersection for place making
- Street furniture should not be installed in or protrude into the NMT zone including pedestrian walkways and cycle tracks
- Street furniture should enhance the identity and character of the corridor and surrounding district in accordance with context

Guideline Content

1. Shade Structure
2. Benches and Seating
3. Litter and Recycling Receptacles
4. Drinking Fountains
5. Pedestrian Signs and Wayfinding
6. Street Lighting.
7. Tree Grates and Guards
8. Cycle Racks
9. Bollards
10. Utility Covers and Screens

Shade Structures

Shade structure
Port Hedland – Kiwis and Kangaroos

- Shade structures wood, metal or synthetic fabric should be used as shade material
- Shade structure finishes and style should complement other street furnishings

Benches and Seating

Well shaded, easy-to-maintain Seating, Beijing

- Provide ample seating in shaded locations
- Seating surfaces should be low heat conducting

Pedestrian Signs and Wayfinding

- Pedestrian signs and wayfinding signs should be located in gathering areas and where pedestrians should change their route
- Use a coordinated system for all way finding elements

Pedestrian Lighting

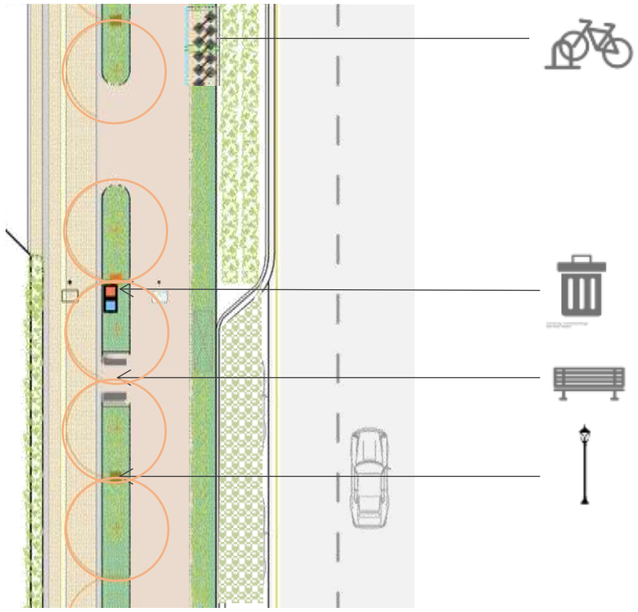
- Provide pedestrian-scaled lighting in all pedestrian areas to create a safe and pleasant environment
- Light intensity should coincide with surrounding land use

https://nacto.org/publication/urban-street-design-guide/street-design-elements/sidewalks/, http://www.commenthow.com/article/display/3839/0/ShowBox+-+Create+your+own+street+stage+and+seating, https://rendeveloper.club/outdoor-led-light-fixtures/, https://archpaper.com/2015/03/product-outdoor-lighting-with-an-architectural-bent/, https://www.welcomehomeamerica.com/p/5272/18x18-high-intensity-stop-sign, https://seeklogo.com/vector-logo/253919/pedestrian-crossing-sign

6.1 Streets Sections

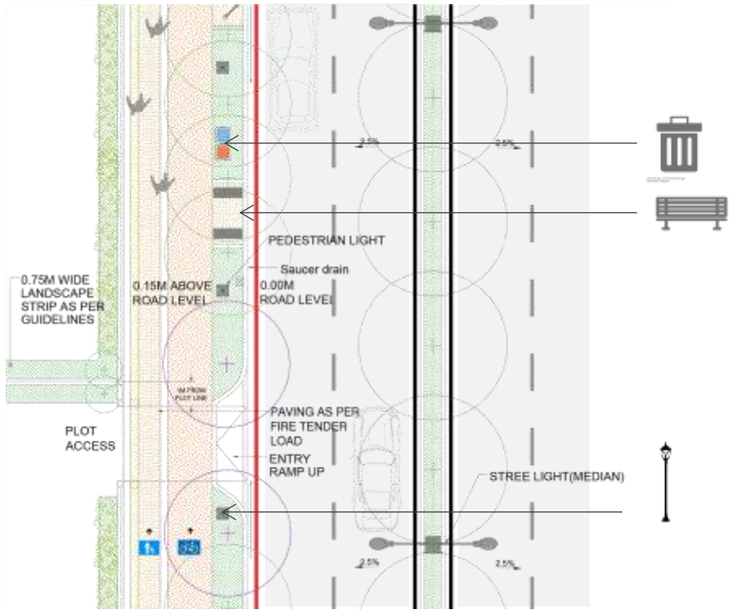
Street Furniture

50 m Sub Arterial Road



Typical Street Plan View_Arterial Road

25 m Collector Road



Typical Street Plan View_25m Collector Road

Tree Grates and Guards

Yuba City, California

- Tree grates should permit ample tree growth and provide a comfortable walking surface
- Tree guards should be provided as part of plaza and where trees are prone to damage by vehicles, machinery, or animals

Planters

Bloor street, Toronto

- Planters should be considered in areas of high pedestrian activity or hardscape with planting constraints
- Planters should be located not to impede pedestrian flow and accessibility
- Irrigation and maintenance aspects of planter should be considered

Cycle Racks

San Francisco city

- Provide cycle racks at transit stops and key cycling destinations
- Cycle rack location should not impede pedestrian flow and accessibility

Bollards

- Bollards should be used to delineate pedestrian and vehicular areas where no vertical curb is present
- Spacing of bollards should be adjusted to permit universal accessibility

Utility Covers and Screens

Paving expert – Recessed Tray Covers for manhole

Recessed Manholes Beesley and Fildes Ltd

- Integrate functional elements such as utility covers and screens with the streetscape or paving pattern (tray type)
- Utility covers and screens should contribute to the identity of a district or neighbourhood

https://cityofatchison.com/departments/public-works/city-projects/, https://urbantoronto.ca/forum/threads/daily-poll-for-june-11-2010-bloor-street-revitalization.13174/, https://actreesnews.org/alliance-for-community-trees-news/advantages-green-infrastructure/, https://www.indiamart.com/proddetail/active-blocking-bollards-15518814791.html, https://www.indiamart.com/proddetail/recessed-manhole-cover-18438575455.html,, https://ehsmith.co.uk/suppliers/wrekin/

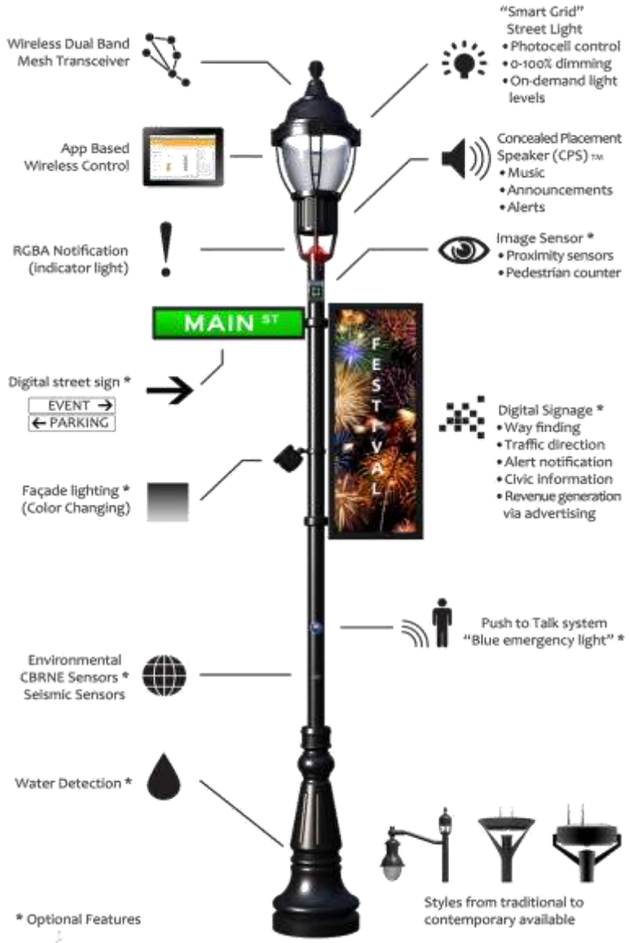
6.1 Streets Sections

Street Lighting

Lighting should be an integral part of street design to illuminate the street, pedestrian areas and crosswalks

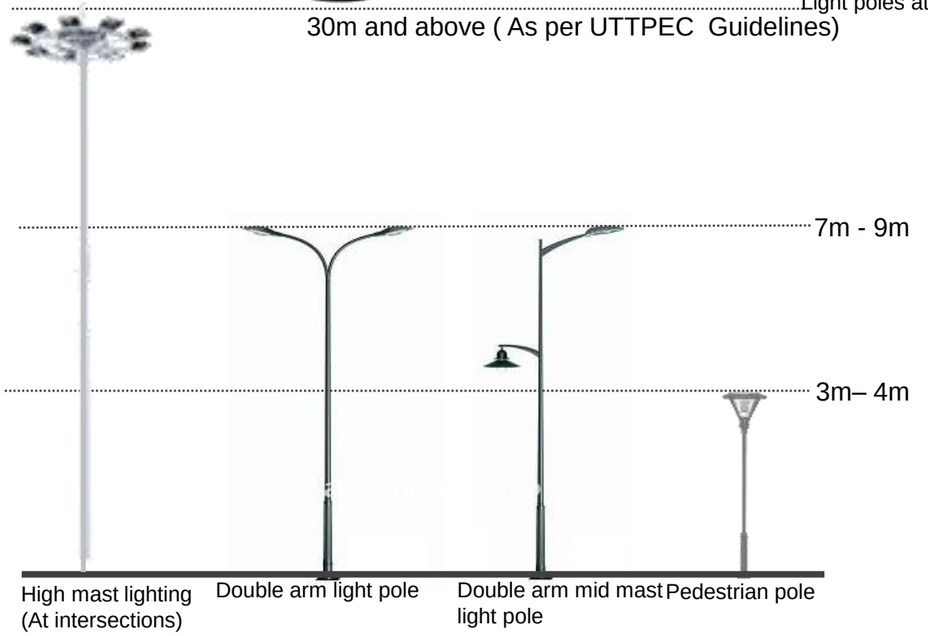
Street lights should:

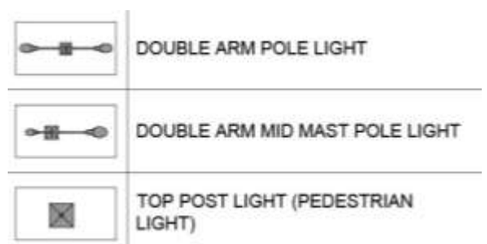
- Create a safe and secure environment for pedestrians
- Improve the legibility of streets, intersections, ramps, transit stops, critical nodes and activity zones
- Highlight squares, public spaces, and special districts to encourage night time use
- Reflect the character and urban design of the street type to create a recognizable hierarchy of roads and spaces
- For lighting at median, interval as mentioned in streetscape matrix for different ROW and pole height ranges from 7.4 to 12 m (Refer streetscape guidelines matrix for respective ROW)
- Lighting at MFZ for pedestrian interval should be 8m to 10m and pole height should be 3.5m
- Pedestrian scale lighting (lower than 6m) should be combined with roadway scale lighting in high-activity areas to increase visibility and traffic awareness
- Paired alignment of light poles across a street should be adopted as it provides and reinforces the direction of the traffic flow
- Staggered arrangement of light poles should be used in lower activity areas as it creates a less formal setting
- LED lighting should be used and as technology develops, future consideration should be given to the ability to provide network control that allows lighting colour control as a way to highlight locations in emergencies
- Solar panels should be used to generate electricity for street light poles
- Light poles should be placed at MFZs as per guidelines given. Light pole should not obstruct any dedicated corridors designed like cycle track, pedestrian walkway etc.



Solar light poles along the sidewalk

Light poles at central median





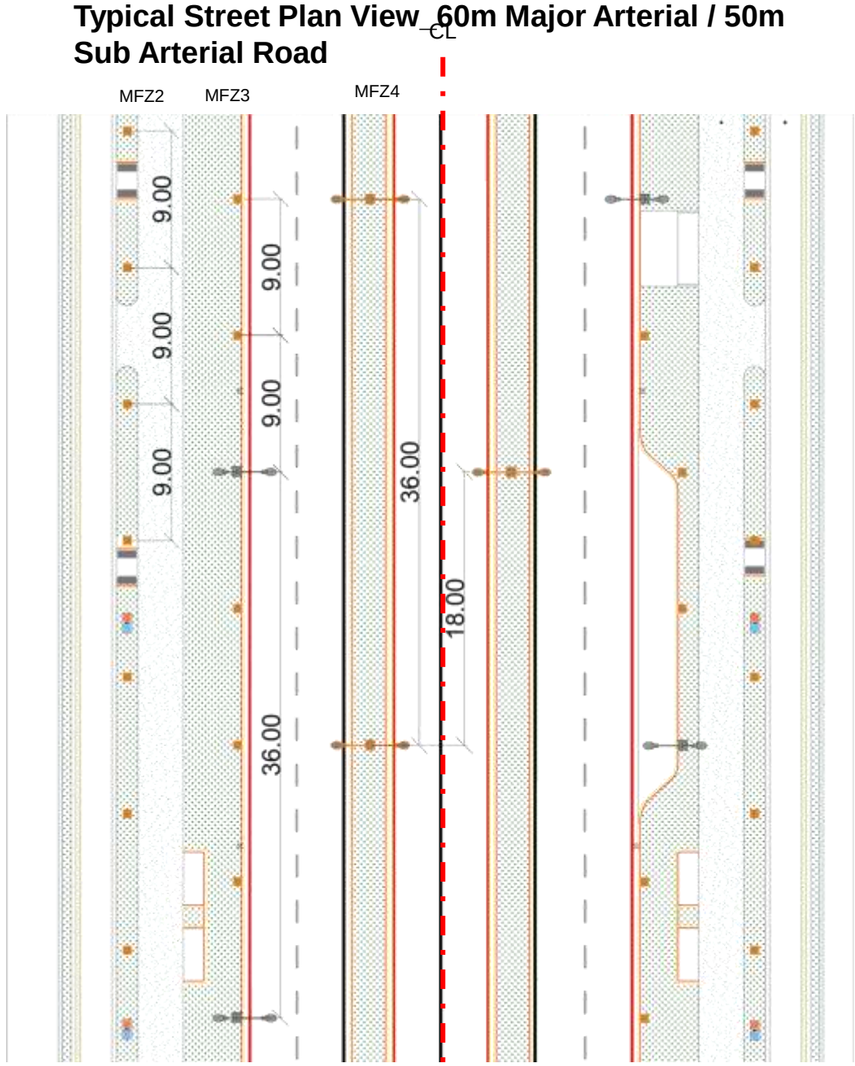
https://www.thehindu.com/news/cities/Coimbatore/street-lights-to-glow-on-detecting-vehicle-movement/article20654728.ece, https://www.pjupanelsurya.com/blog/page/5/

6.1 Streets Sections

Street Lighting

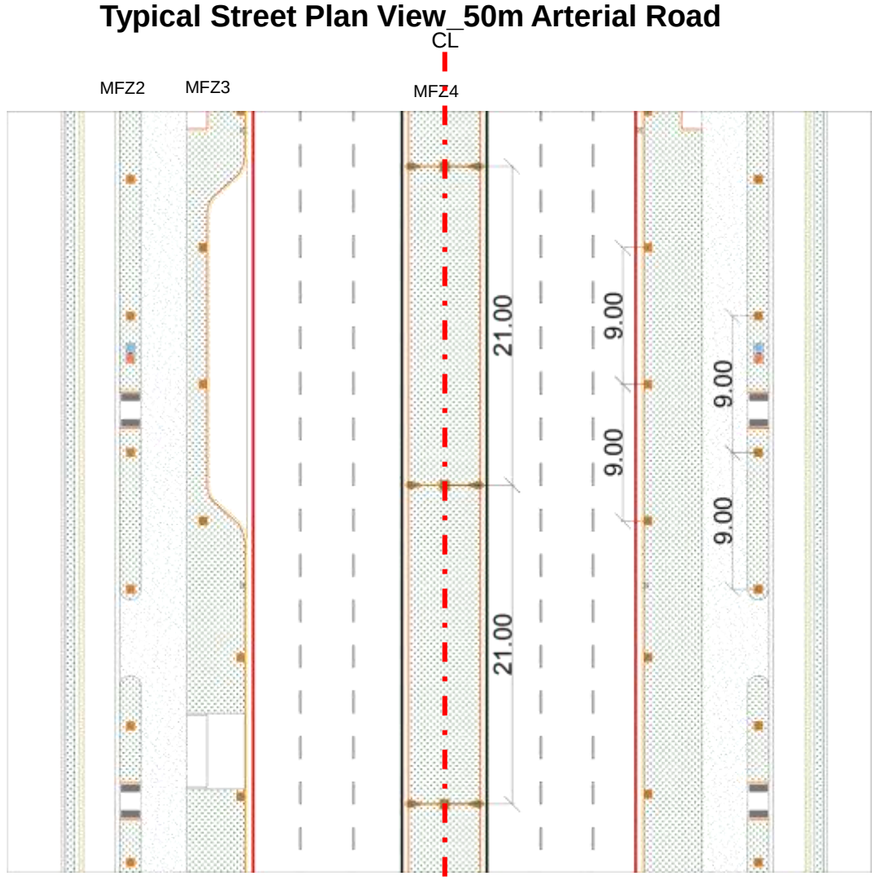
Illustrations showing light pole interval for street lighting

Typical Street Plan View_60m Major Arterial / 50m Sub Arterial Road



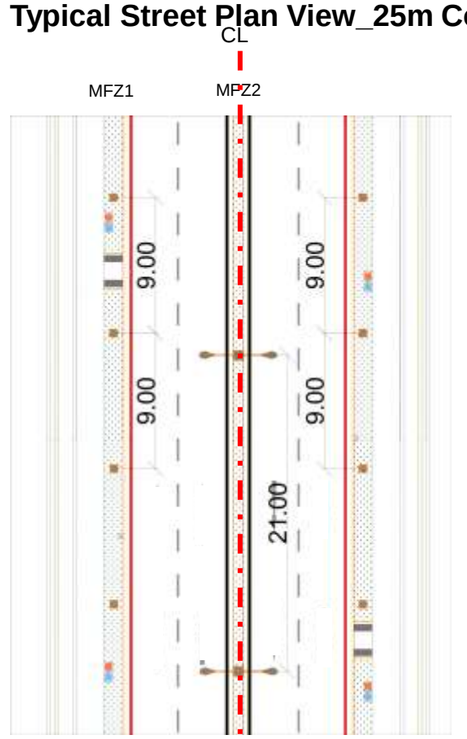
Street Plan View

Typical Street Plan View_50m Arterial Road



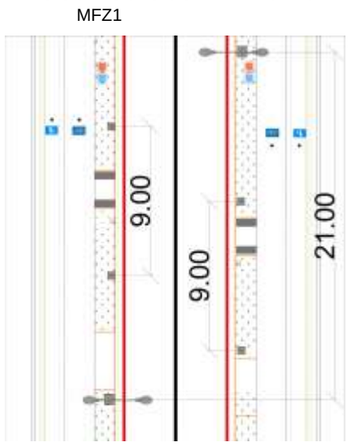
Street Plan View

Typical Street Plan View_25m Collector Road



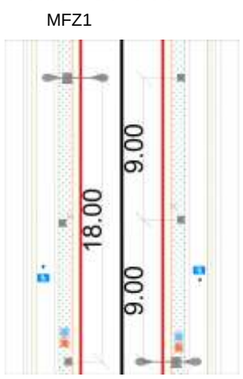
Street Plan View

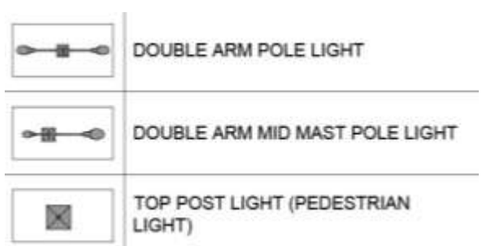
Typical Street Plan View_ Local street 17m and 15.6m



Street Plan View

Typical Street Plan View _ Local street 12 m and 9m



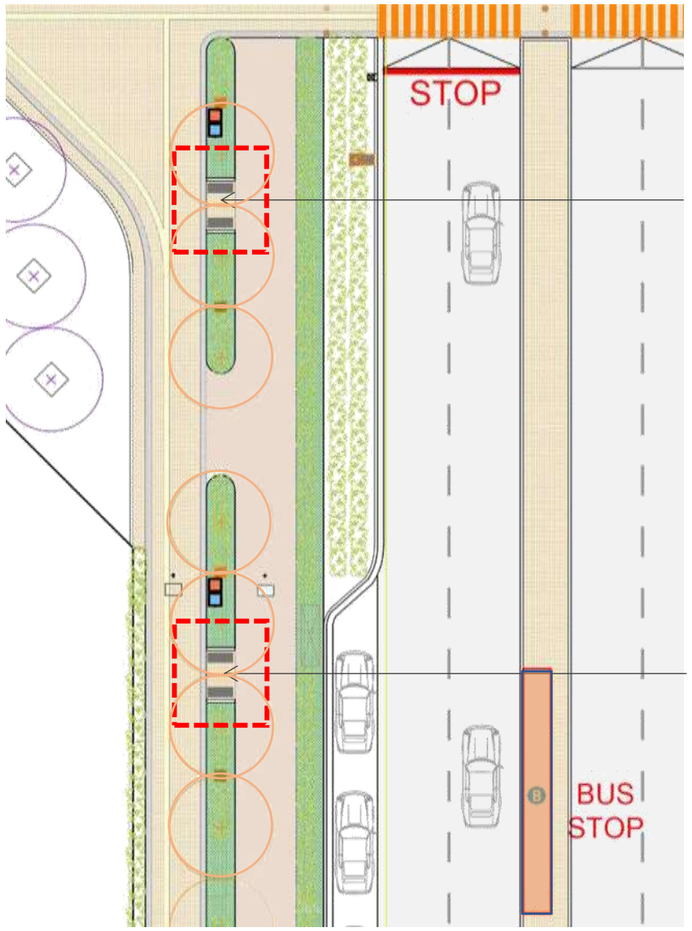


6.1 Streets Sections

Seating

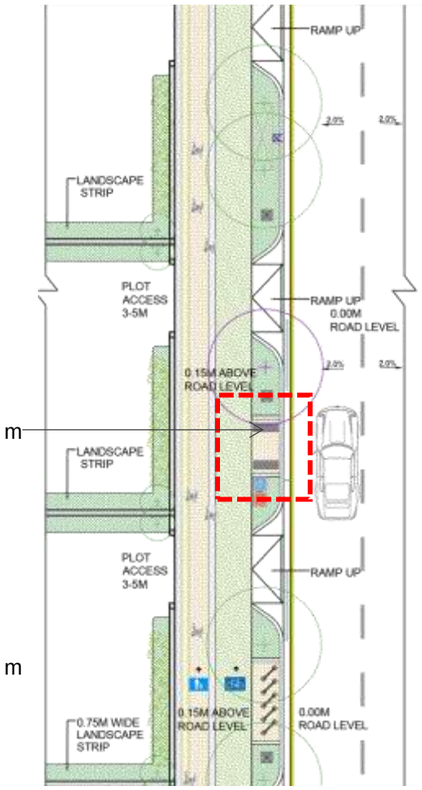
- Seating should be provided giving pedestrians a place to rest, wait, or simply to sit, relax and enjoy street life. Providing comfortable and inviting places to sit can transform a sidewalk into a gathering place and enhance its role as a public space and community amenity
- Seating should be provided on all type of ROWs except 12 m and 9m wide road
- Seating should be comfortable for lingering, as longer stay creates a more vibrant environment on the sidewalk and enhances the safety of the street with an active pedestrian flow
- The design and location of seating should respond to the surrounding space and functions. Seating should be located outside of the pedestrian walkway but with views of pedestrians at the same time
- Care should be taken to ensure that permanently installed seating should not interfere with entrances to buildings, loading zones, parked vehicles, access to fire hydrants, and other potential conflicts
- Seating should be able to accommodate a minimum of two people to encourage interaction
- Seating should be provided under tree shaded region
- Seating should be integrated into the surrounding context, such as buildings, raised tree beds, planters, street walls and outdoor cafés
- Benches adjacent to bus stops should ideally be located at the back of the sidewalk facing the street
- Materials and styles should be chosen for maximum durability, comfort, safety, security and usability
- Seating should have low heat conductivity
- Street furniture should enhance the identity and character of the corridor and surrounding district
- Seating furniture should be a maximum length of 1.2m to avoid people sleeping on it

Typical Plan View_ 50m Sub Arterial Road



Street Plan View

Typical Plan View_ 15.6m Local Street



Street Plan View

Berkley city street furniture

Amazon Headquarters and Terry Avenue Streetscape

http://www.bergerpartnership.com/work/amazon-headquarters-and-terry-avenue-streetscape/smaller-rectangle-amazon-4/, https://fourthstreetshop.com

6.1 Streets Sections

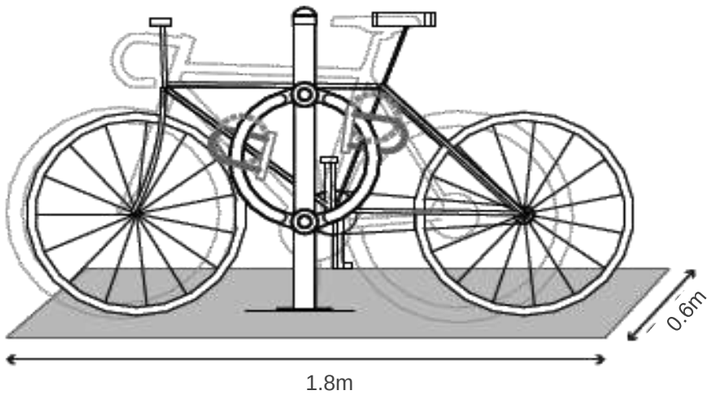
Cycle Racks

- The parking space for a bicycle should be1m X 1.8m
- Bicycle parking should be providing simple, well-designed and shaded racks to encourage bicycling as active transport
- Bicycle racks should be permanently affixed to a paved surface
- Long-term (overnight) bicycle parking for residents, employees, and students should be provided within buildings
- Short-term bicycle parking should be provided on the sidewalk or in plazas close to building entrances
- Cycle rack should be provided at intervals of 750 m to 1000m
- Min 10 cycle parking racks should be provided at each location

Bicycle rack designs should meet the following criteria:

- The frame of the bicycle should be supported at two points above the bicycle's centre of gravity
- Access for different bicycle frame sizes and styles should be provided
- Easy locking of the frame and at least one but preferably both wheels should be allowed
- Bicycle racks should be easily accessible while meeting all minimum setback requirements
- Bicycles should be parked in clusters at a 45 degree angle in the MFZ in 25m collector roads and for all local streets from 17m to 9m
- Shared e-cycle or bicycles parking should be provided near the transit stops

Portland covered bike parking



Ring bike racks have an appealing design and should be installed in series for a high-capacity bike corral

- Bike racks should be composed of standard or stainless steel industrial tubes and durable for a long service life
- Stainless steel has natural protective qualities to prevent staining and rust with regular use. A range of style and colour options should be selected to suit surrounding buildings and streetscapes

http://www.brimberrydesigns.com/covered-bike-racks-L29998/great-covered-bike-racks-p90-in-simple-home-decor-inspirations-with-covered-bike-racks/ , www.reliance-foundry.com/bike-parking/bike-racks#gref , www.reliance-foundry.com/bike-parking/bike-racks#gref , www.reliance-foundry.com/bike-parking/bike-racks#gref

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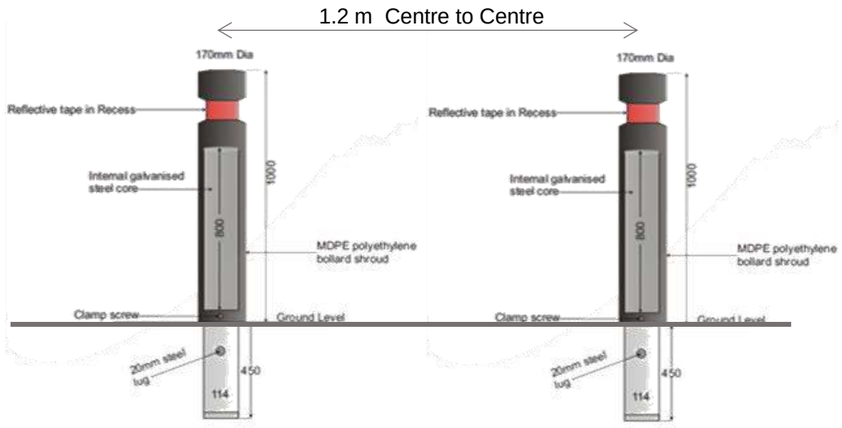
6.1 Streets Sections

Bollards

Permanent Bollards or temporary posts and objects should be used to create an unobtrusive boundary between different modes of transportation or different realms of the street.

- Bollards should protect pedestrians, bicyclists, buildings and specific areas from vehicular access and to highlight traffic calming measures
- Provide security measures for buildings and infrastructure such as government and financial institutions
- Bollards should be used to restrict vehicular access to car-free zones, trails, cycle tracks and waterfronts etc.
- Bollards should also prevent delivery trucks from using sidewalks in commercial and mixed-use areas
- Bollards should be located at the intersection pedestrian crossing and at the entry exits of plot access
- Bollards should be clearly visible in all lighting conditions for all users, particularly pedestrians and vehicles
- Bollards should be properly maintained when damaged due to accidents or deterioration from the environment
- Movable bollards should be considered if restricting access is only needed during part of the day
- Standard diameter of bollards should be 0.17m, distance spacing is 1.2m and height is 1m as per IRC 103 2012
- Reflective material, lighting, and colours that provide contrast to the surrounding environment should be used for bollards
- Bollards should be free-standing or fixed where appropriate

Bollards spacing

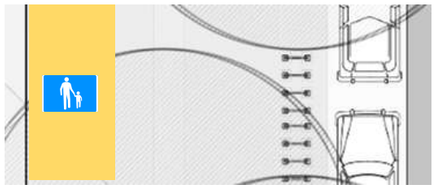


Types of bollards temporary and permanent

Sidewalk and Road Markings

- Clear marking should be provided to indicate direction and priority of traffic flow
- Marking signage should be a logo implemented with same scale and same proportion everywhere
- Road marking should be an essential element which is required for improving efficiency of the street
- Markings should strictly adhere to:
    - IRC 35 – 2015 for road markings
    - MoUD IUT Code of Practice for Road markings

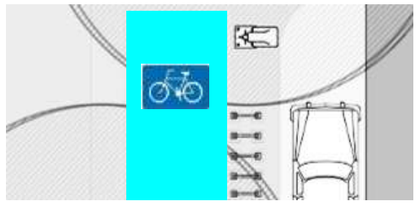
Pedestrian Zone



Pedestrian walkway

National association of city transportation officials

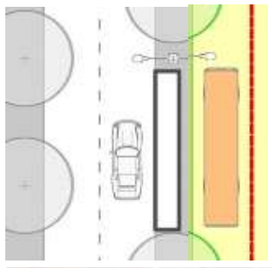
Cycle Track



Bicycle / e bikes track

Boston , Complete streets

Rapid Transit Lanes / Bus Lane



National association of city transportation officials

https://www.avon-barrier.com/bollards/

6.1 Streets Sections

Typical Streetscape view of 50m Arterial Road

Landscaped strip not only screens the pedestrians from vehicular movement but also creates a comfortable walking space for pedestrians

Seasonal flowering tree planting to establish themed pedestrian footpaths

Shrub Beds enhance the character of the streets by adding colour, texture and variation through different plant material.

Dedicated cycle track separated by landscape strips

Pedestrian footpaths with rangoli paving patterns inspired by local culture to facilitate movement

Pedestrian entry /Exit to plot

MFZ – landscape strip along boundary wall to create great walking experience and maintain privacy/ security for private plots.

6.1 Street Sections

Typical Transit Stop

Smart Technology

Transit stop should be incorporated with smart technology to perform different functions including monitoring and enhancing uses of parking, energy, signalization and wayfinding.

Bus bay should be provided with grass paver block

Smart Infrastructure

Free WiFi zones, device and e-bike changing points, ATM, as well as maps of city and neighbourhood connection

Traffic Signage

Traffic signs to regulate and control all types of traffic (pedestrian, vehicular,NMV). It should be place as instruction before action to follow.

6.1 Streets Sections

Recommended Streetscape Guidelines Matrix

Elements of Street	9 m	12 m	15.6 m	17 m	25 m	50 m (Arterial)	50 m (Sub Arterial)	60 m wide (Major Arterial and Seed Access Road)	Criteria Fpr Placement and Location / Remark
	Range	Range	Range	Range	Range	Range	Range	Range	
Sidewalk	1.75m	3m	5m	4.8m	5m	12m	12m	11m	
Pedestrian Walkways	1.00m	2.00m	2..00m	2 m	2 m	2.40 m - 4.00 m	2.40m - 4.00	2.40 - 4.00 m	
NMT Zone	N.A	N.A	2.00 m	2 m	2 m	2 m - 3.00 m	2 m- 3.00m	3.00 m	
Multi Functional Zones(MFZ- (M1 ,M2 ,M3,M4).	M1= 0.75m	M1= 1m	M1= 1 m	M1= 1 m	M1= 1 m	M1= 0.6 m	M1= 1.4m	M1 = 1m	
					M2= 1m	M2=1.4 m	M2= 4m	M2=4m	
						M3=4 m	M3=2.5m	M3= 3m	
						M4=5 m	N.A	N.A	
Bicycle Rack	NA	NA	750m -1000m	750m -1000m	750m -1000m	750m -1000m	750m -1000m	750m -1000m	Close to bus stop , accessible to public.
Trapezoidal Hump	For pedestrian crossing minimum width of 2.5 m- 4 m flush with sidewalk and curb with speed calming measures.								
Curb Ramps Width	For pedestrian and NMT track 3m - 5m of width tob provided on both sides of each pedestrian crossing at each quadrant.Never on the corner of the intersection.								
Street Lights for street and Pedestrian on Sidewalk	8-10m	8 - 10m	8 - 10m	8 - 10m	8 - 10m	8 - 10m	8 - 10m	8 - 10m	Height of these light post are about 3 m-4m
Street Lights for Vehicles at Median	N.A	N.A	N.A	N.A	21 c/c (median)	21 c/c (median)	36 c/c (median)	36 c/c (median)	Height of these light post are about 7m-9m .
Turning Radius	Turning radius at the intersections - Intersections with different ROW's with allocated chamfer will be applicable as per higher ROW turning radius, wherever chamfer is not allocated minimum turning radius as per ROW turning criteria. Turning radius for small to medium size vehicle is 5m.Entry to heavy vehicles is restricted during day time except emergency vehicles and school buses. If heavy vehicles allowed on local streets minimum 7.5 m turning radius should be adopted.								
	5m	5m	5m	5m	12m	12m	12m	12m	
Mast Lighting	High mast lighting to b eprovided at major intersections of 25m and above ROWs and height 30m (As per UTTEPEC Guidelines)								
Police Booth	Traffic control management at intersections for signalized and non-signalized junction.At all intersections Camera electronic devices should be provided for traffic monitoring and management. (Suggestive -In absence of electronic monitoring devices Traffic control kiosk and shelters for traffic police should be provided at intersection.)								
Traffic Signals	Traffic signals should be provided at all intersections								
Benches - Center to Center c/c	In combination of 2 seats without obstructing cycle and pedestrian movement - Min 0.12m (L) height 0.45mseat Locations 50 m c/c Intervals, seating near transit stops, Public plaza's, Public buildings, Commercial buildings, also at intersections.								
Bus Stops	NA	NA	NA	NA	750-1000m	750-1000m	750-1000m	750-1000m	
Litterbins	Dry and wet waste separate bins should be provided at intersections, plazas, public amenities, transit stops, parks etc. Location 30m c/c interval near transit stops, Public plazas, Public buildings, Commercial buildings, also at intersections.								
Public Art	To enhance public realm and locate near TPOD , Transit hubs, Waterfronts to create public spaces as landmarks.								
Kiosk / Public Toilets	Arrangement near Intersections, public / Commercial area /APCRDA Plots of city.(Refer urban and streetscape plugins guidelines)								
Trees (Center to Centre)	On side walk of every ROW tree interval distance = 3 m- 6m c/c								
	For centeral median tree interval distance = 5m-7m distance c/c								
Tree Grates	Tree grates wherever required for every tree. dim 1.2 x 1.2 m (Street Corners of intersections and public plaza areas)								
Tree Guard	On every road minimum guard size 1.2 x 1.2 m height of about 2 m.								
Types of Curbs	Straight Curb - Straight curbs should be provided 0.15 m above road level								
	Mountable Curb - Mountable curb should be provided at the start of every curb ramp flush with road level.								
	Curved Curb - Curved curb should be provided at every curb ramp turning 0.15m above road entry/exit point of plot and at every intersection corner for turning radius								
Tree Pit	Street Corners of intersections and public plaza areas - minimum pit size 1.2 x 1.2 m depth of about 1.2 m								
Shrubs	Depth of shrub bed is minimum 0.6m								
Bollards	Provided with maximum 1.2 m to 1.2 m c / c interval distance at Intersections, Entry /Exit of plots ,at median crossing								
Signages	Signage's should be placed as part of MFZ, integrated with transit stop, light poles, cycle racks, information kiosks								

Note: 1. All Dimensions are in metres.
2. These guidelines consider flexible range for pedestrian walkway + cycle track / shared Sidewalks*
3. Given range is in meters and those are to promote design flexibility for creativity
4. The Street Cross-sections are suggestive and to be adapted as per detailed requirements.

N.A – Not applicable.

6.2 Street Intersections

6.2 Street Intersections

Typical Street Intersections

Street intersections should be treated as nodes within capital city LPS layout plan to create identity and character to the neighbourhood clusters.

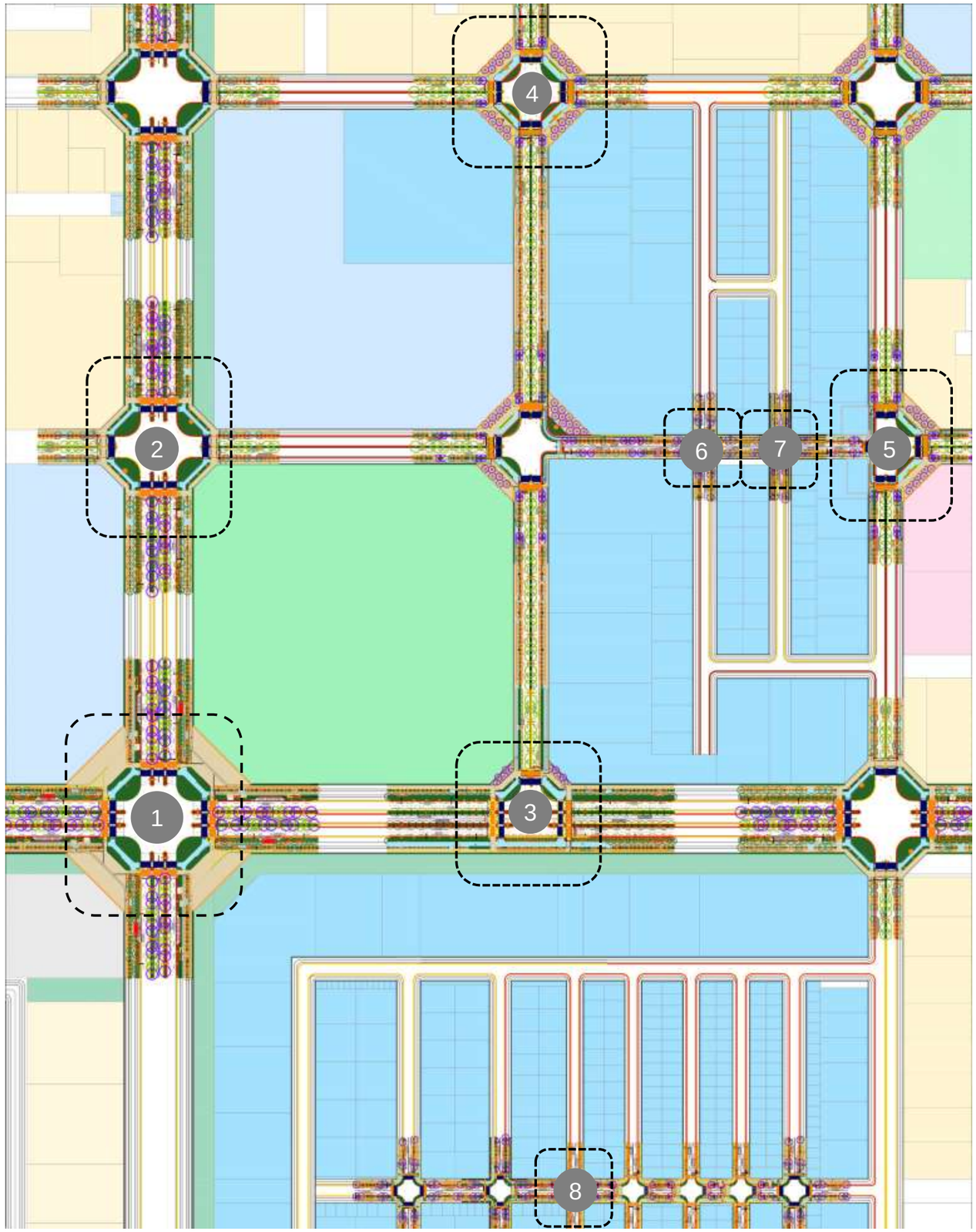
Sample Community Block

- Intersection design should ensure safety of all users while promoting smooth traffic movement as intersections have a significant impact on the mobility, accessibility and liveability
- The quality of an intersection environment will vary significantly, depending on turning radii, the presence of refuge islands, the continuity of cycle tracks, and other design features

Key Plan

1. **50 m X 50m Intersection**
2. **50 m X 25 m**
3. **50 m X 25 m T junction**
4. **25 m X 25 m**
5. **25 m X 25 T junction**
6. **17 m X 17m**
7. **17 m X 15.6m**
8. **17 m X 12 m**

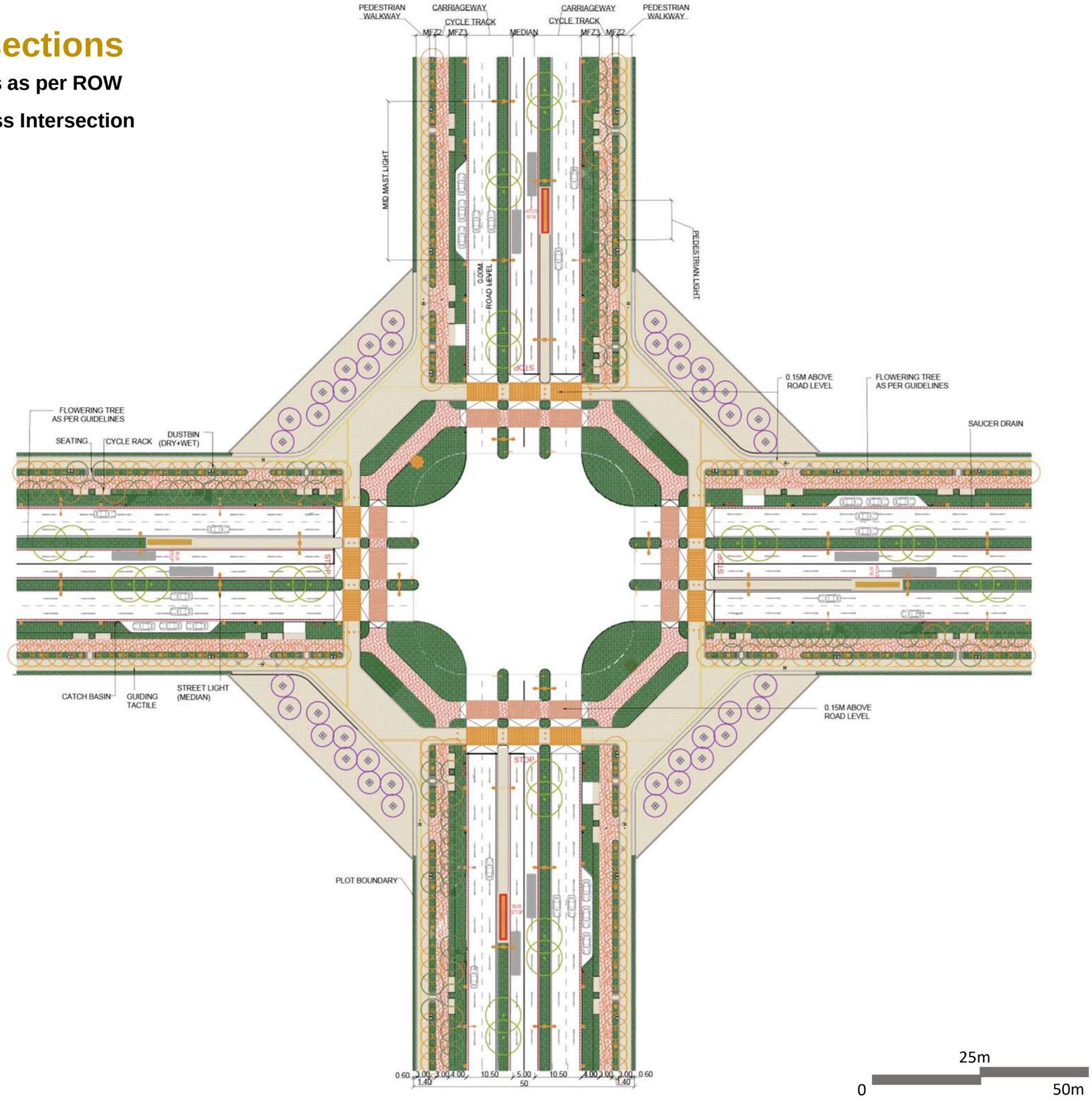
This section briefly introduces the basic elements of intersections and intersection design templates for typical ROW combinations



6.2 Street Intersections

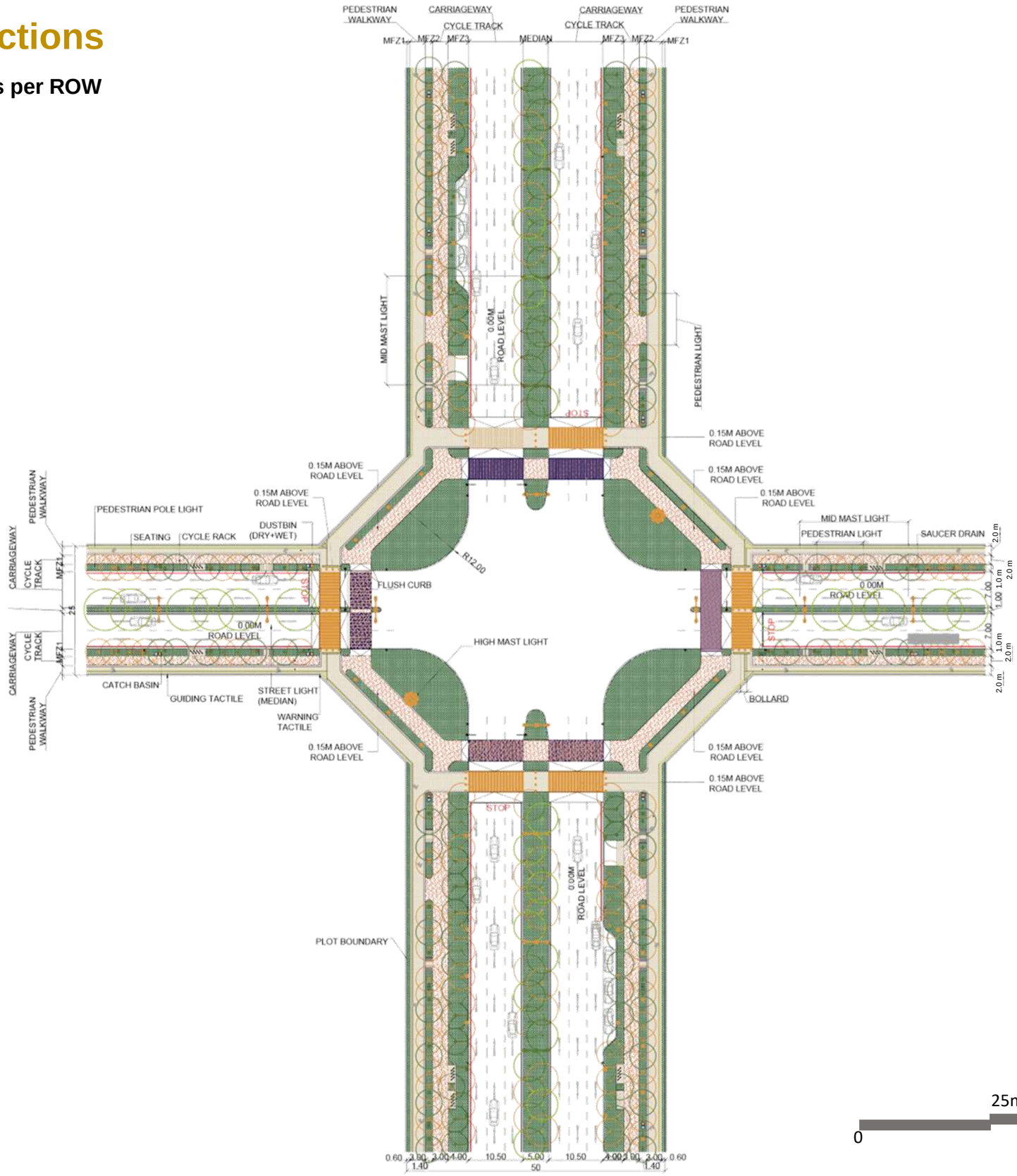
Typical Street Intersections as per ROW

50mx50m Sub Arterial Cross Intersection



6.2 Street Intersections

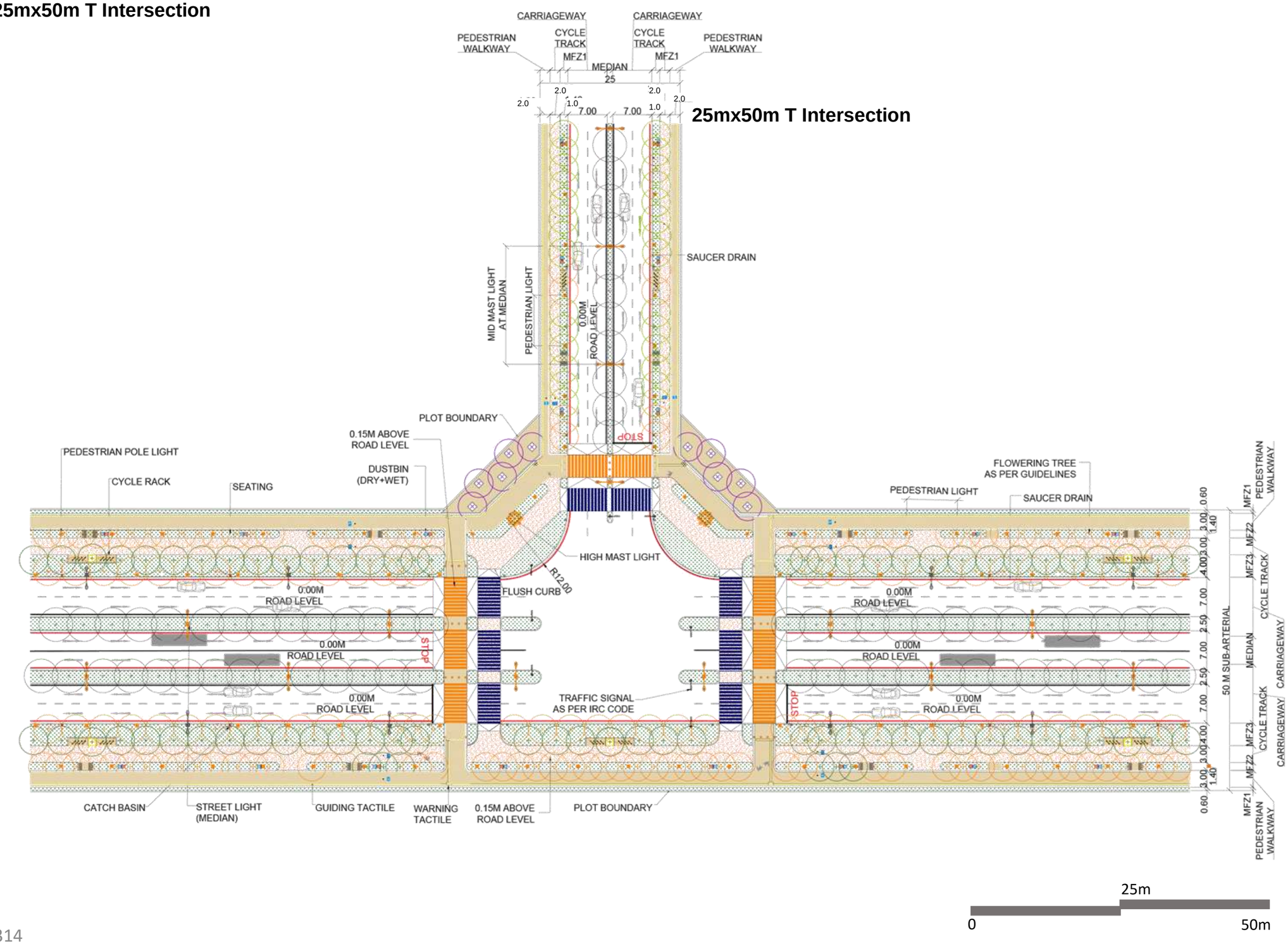
Typical Street Intersections as per ROW



6.2 Street Intersections

Typical Street Intersections as per ROW

25mx50m T Intersection

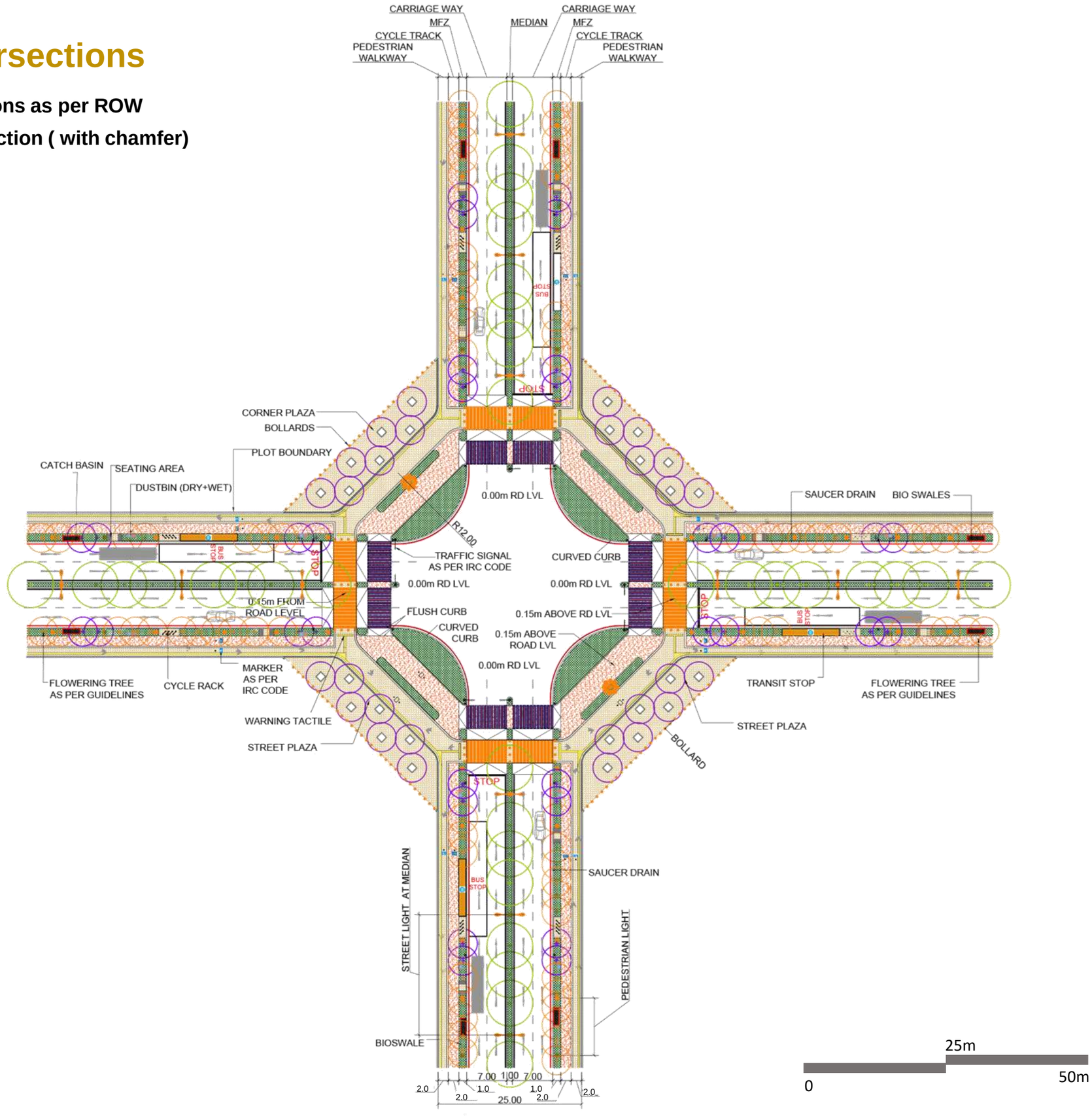


25mx50m T Intersection

6.2 Street Intersections

Typical Street Intersections as per ROW

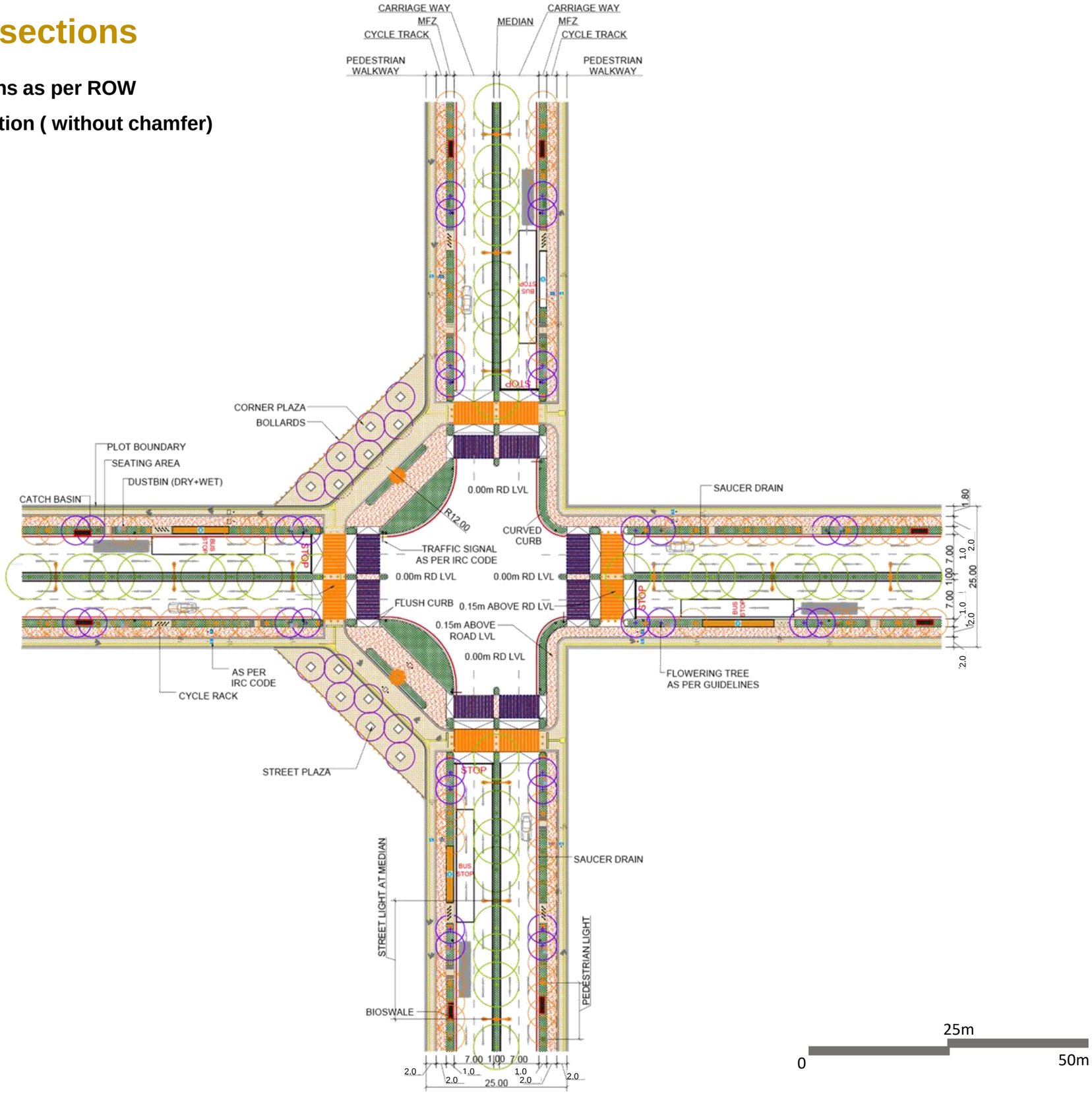
25mx25m Cross Intersection (with chamfer)



6.2 Street Intersections

Typical Street Intersections as per ROW

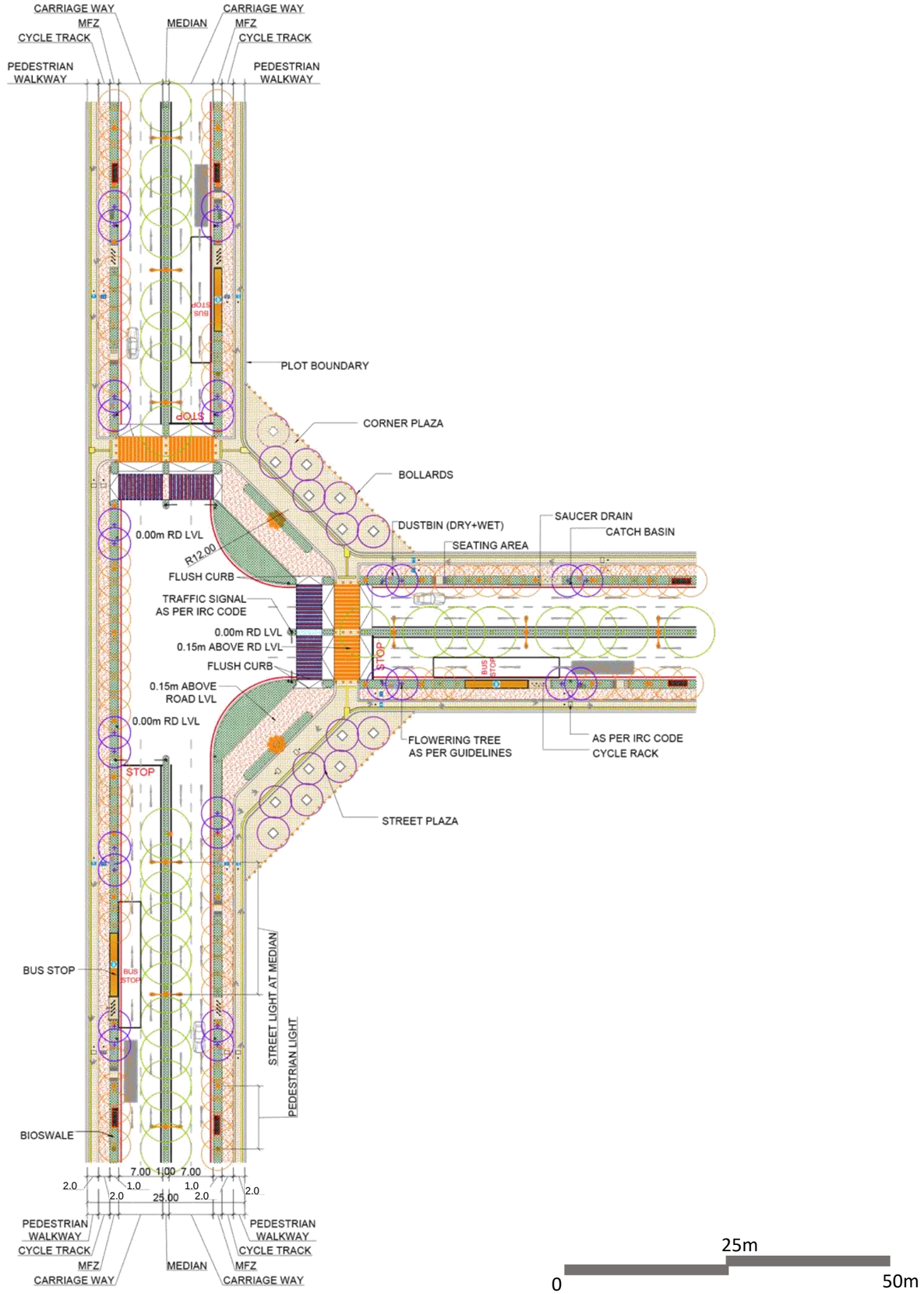
25mx25m Cross Intersection (without chamfer)



6.2 Street Intersections

Typical Street Intersections as per ROW

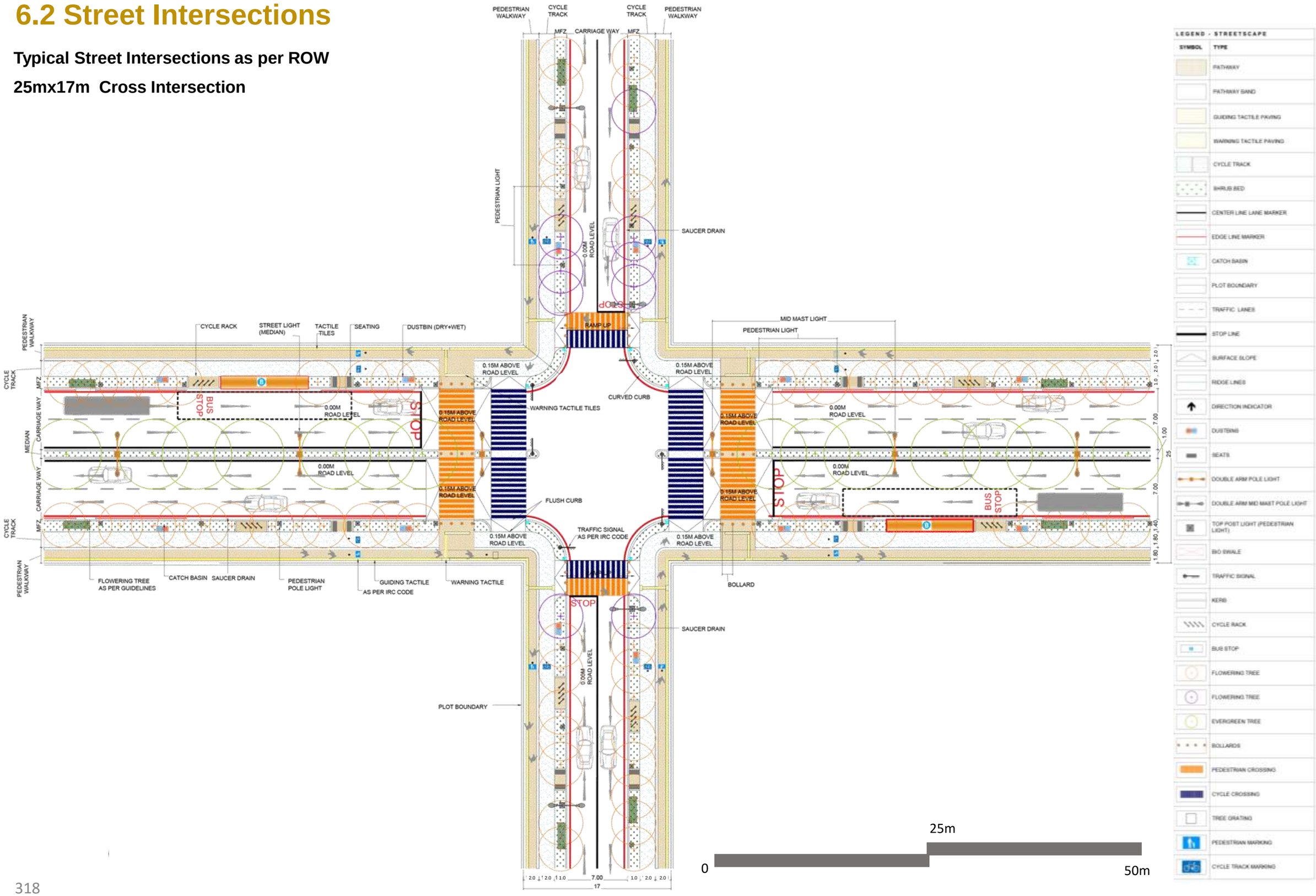
25mx25m T Intersection



6.2 Street Intersections

Typical Street Intersections as per ROW

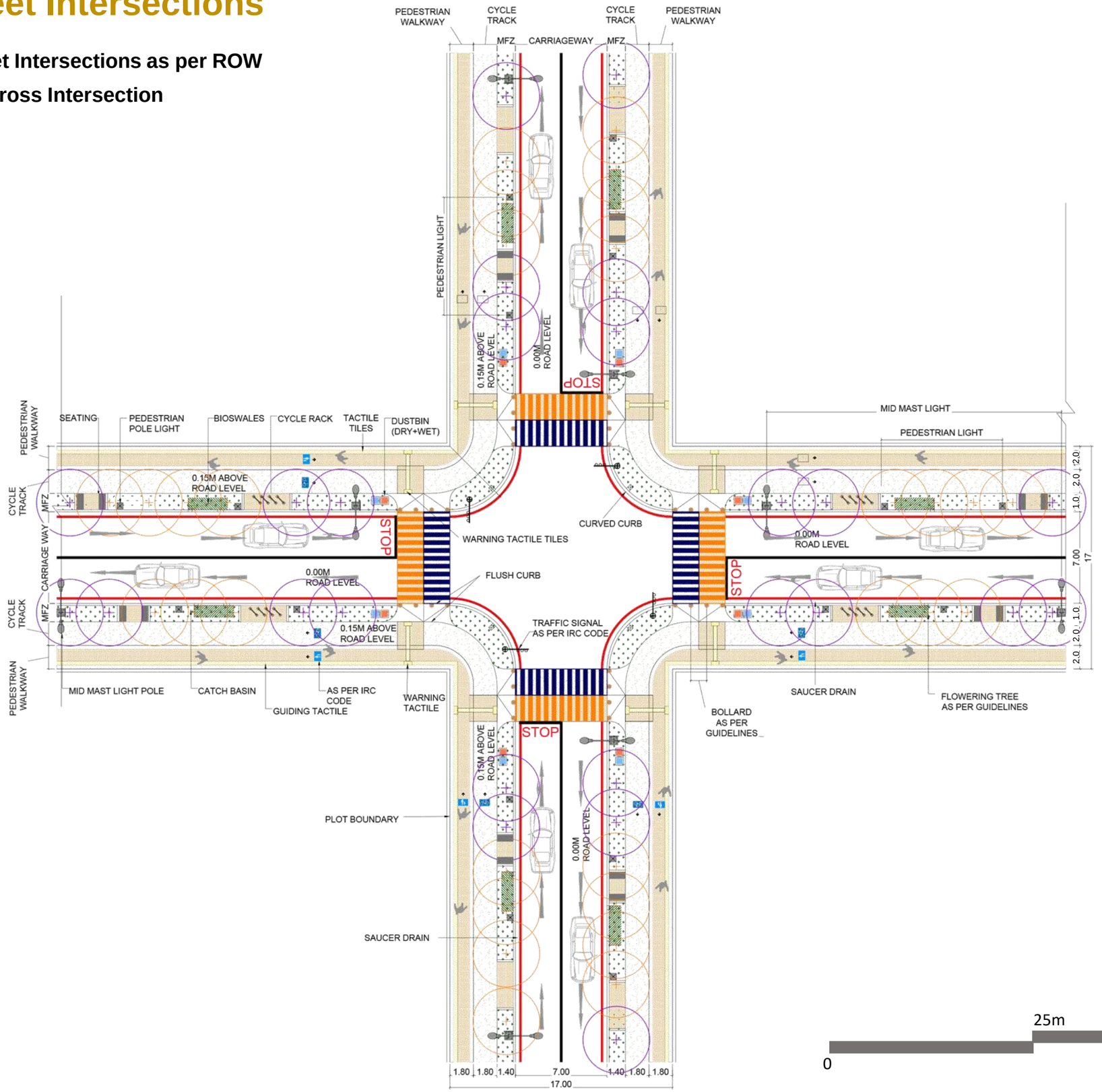
25mx17m Cross Intersection



6.2 Street Intersections

Typical Street Intersections as per ROW

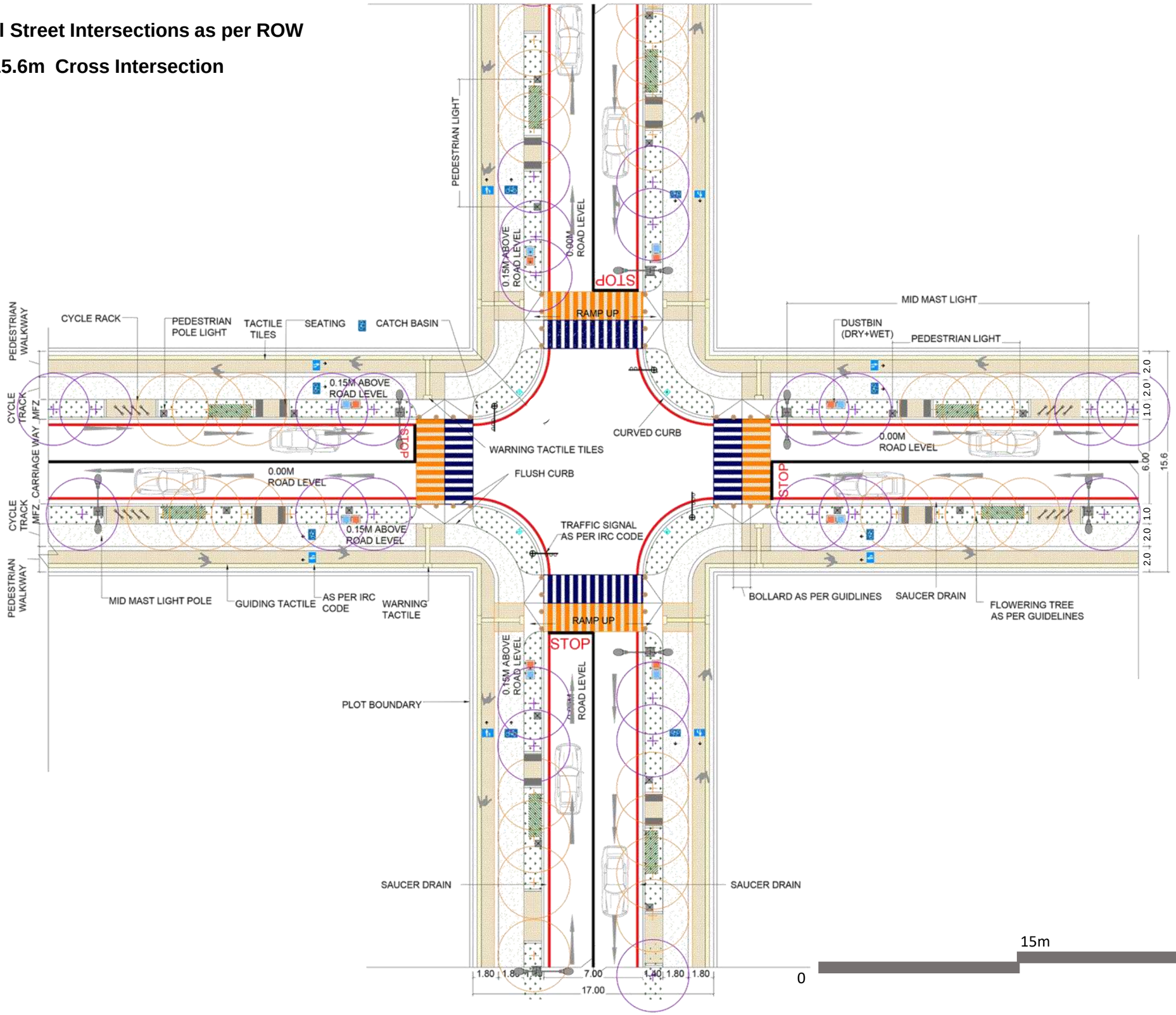
17mx17m Cross Intersection



6.2 Street Intersections

Typical Street Intersections as per ROW

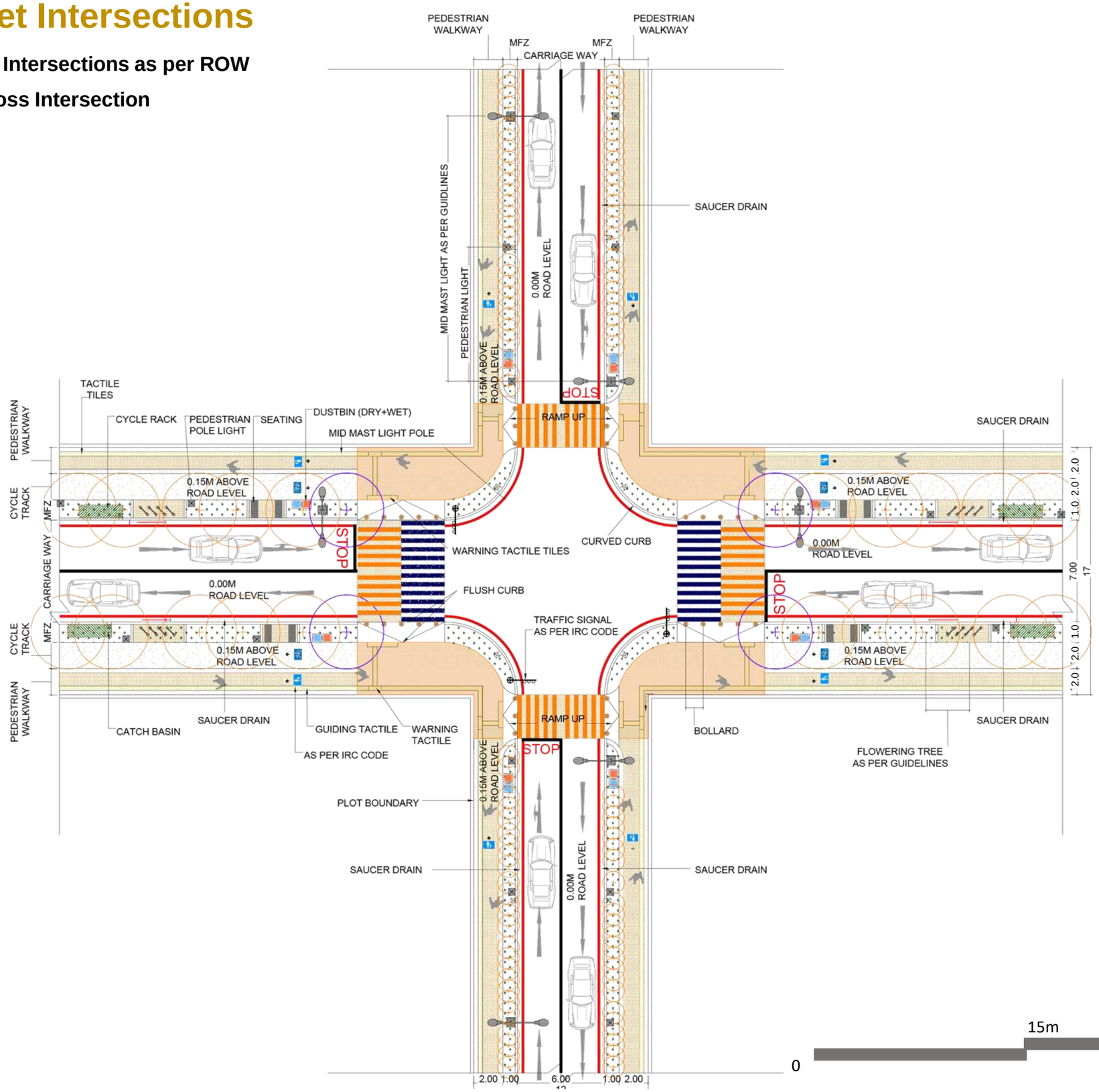
17mx15.6m Cross Intersection



6.2 Street Intersections

Typical Street Intersections as per ROW

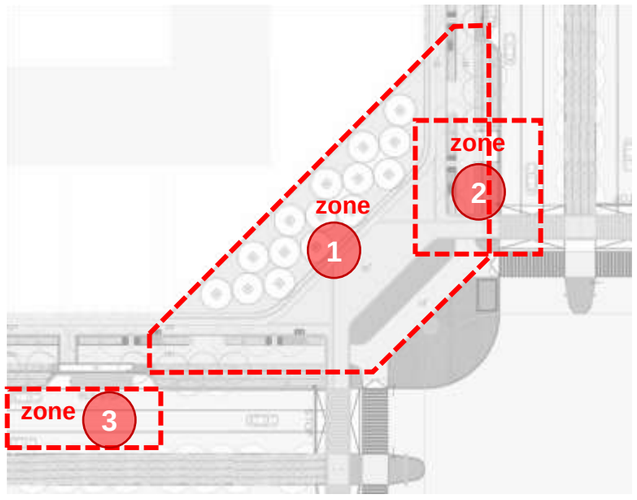
17mx12m Cross Intersection



6.2 Street Intersections

Intersection Corner

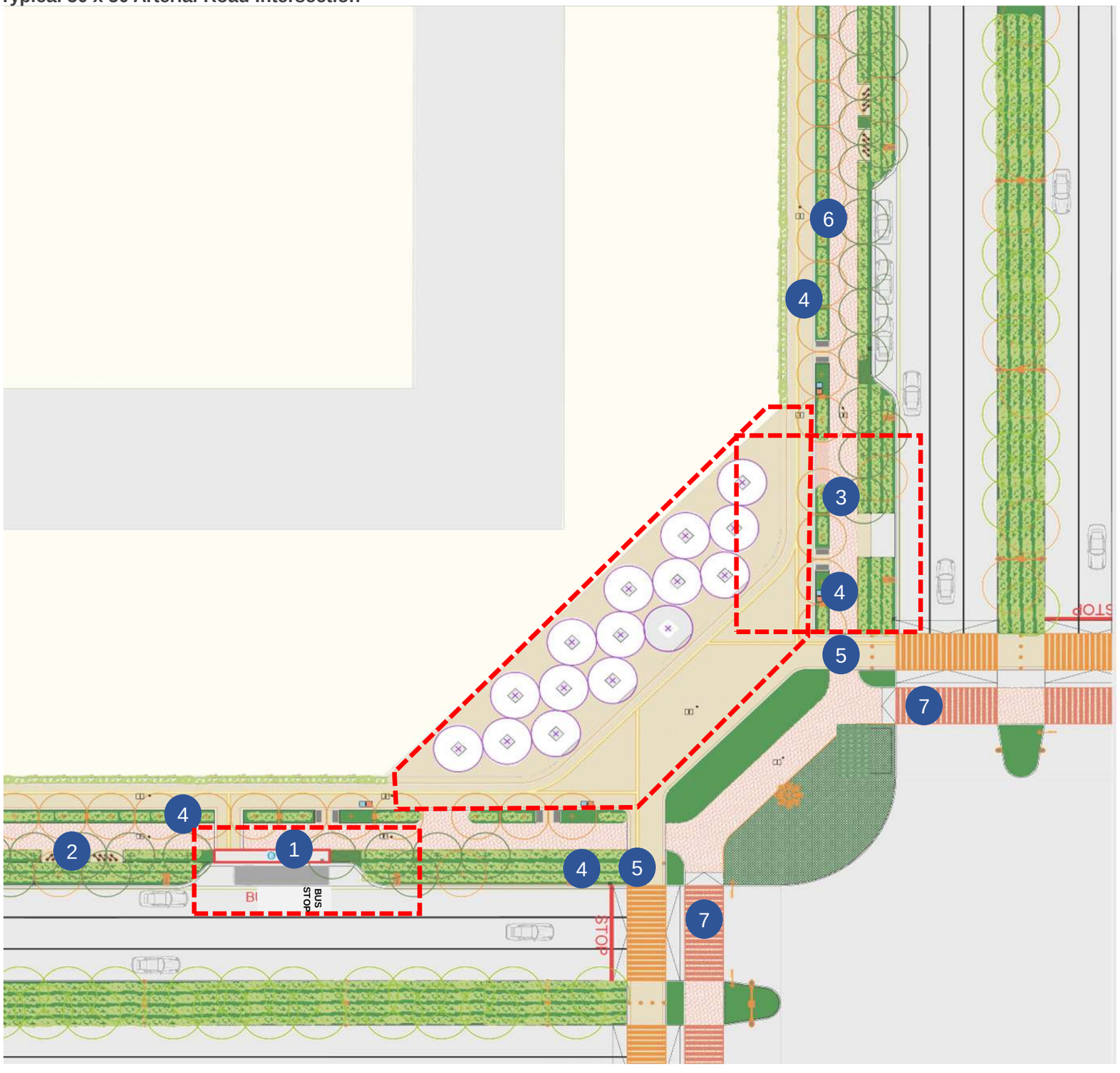
- All intersections should be signalised
- Corner space at intersections should be designed for place making bringing liveliness to public realm
- Each intersection corner should be designed with 3 zones as shown in key plan
    - Zone 1 – Corner plaza
    - Zone 2 – Public infrastructure and services
    - Zone 3 – Public transit stop



Key plan of intersection corner showing typical zones identified for design interpretation

1. Transit stop
2. Cycle Track (NMT)
3. Public infrastructure / Services
4. Dustbins / Recycle bins
5. Pedestrian crossing with bollards barrier
6. Drop off area for vehicles
7. Cycle track crossing

Typical 50 x 50 Arterial Road Intersection

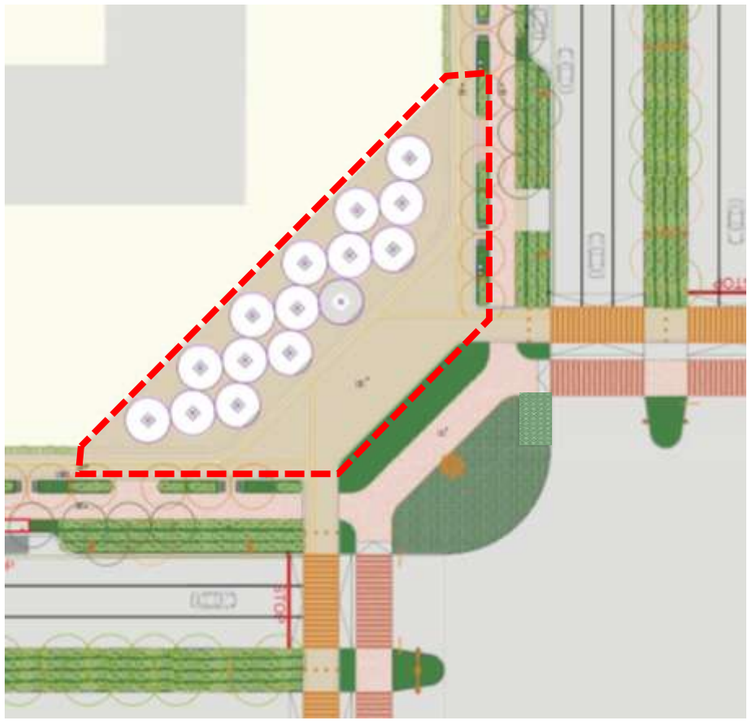


6.2 Street Intersections

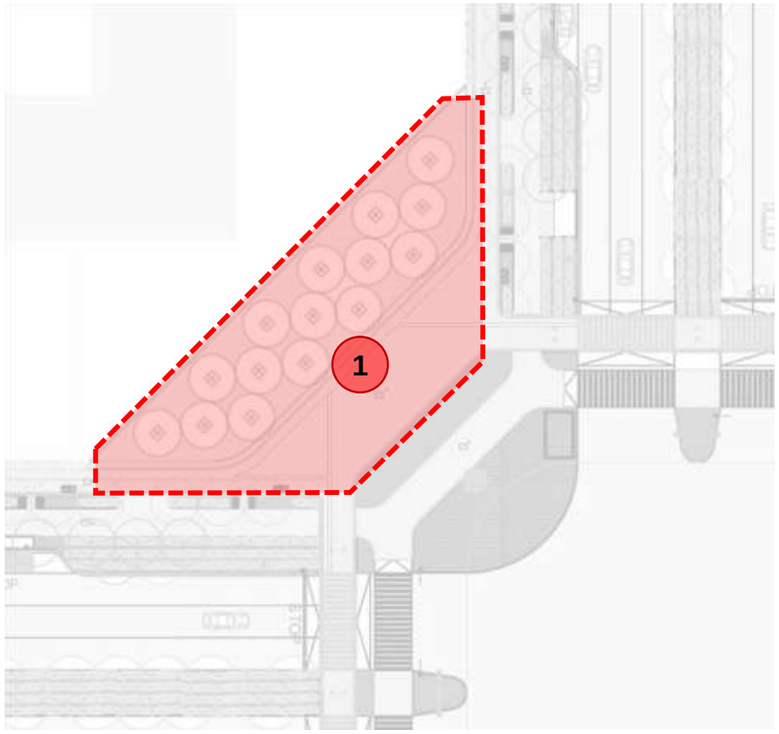
Zone1
Corner Plaza

Corner plaza should be designed as public plazas to create identity and character to intersections.

- Corner plaza at intersections should provide safer, greener space for pedestrians before crossing road
- Corner plaza should provide activities that encourage and engage people for various social and cultural events
- Land uses and private development at the corner plots should promote public uses at the intersection to boost business and invigorate street life in a neighbourhood
- Art installations, performances, vendors, and markets should be provided to improve the quality and identification of a corner public plaza, while engaging local artists, local communities and business owners
- Corner plazas should offer pause spaces for people offering leisure, amenities and safety, creating lively atmospheres at street intersections
- Parking should not be allowed or permitted within the corner public plaza
- Plaza design and landscape (refer Chapter 3 - Waterfront and Open Space Network Guidelines)



Corner plazas can offer pause spaces



Shibuya intersection, Shibuya, Tokyo, Japan

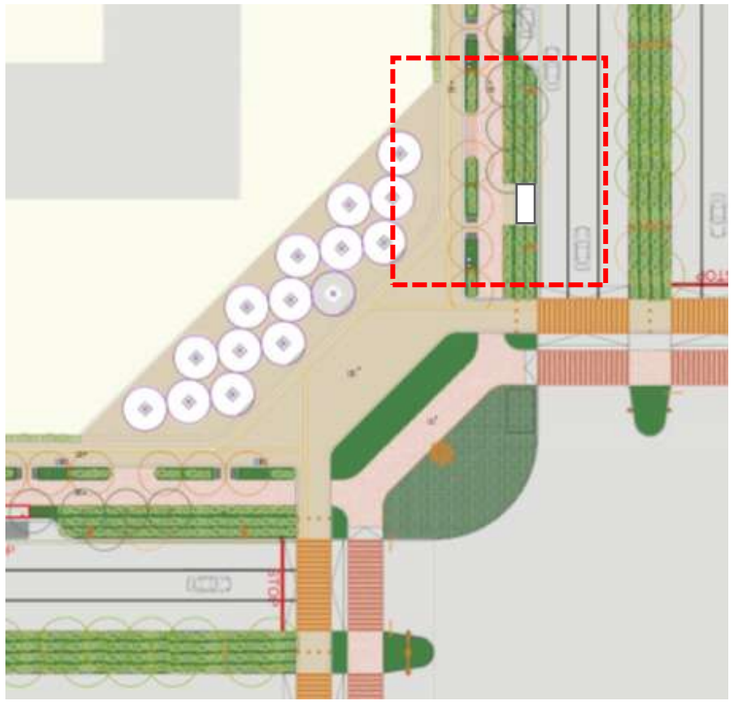
Interim public plaza at intersection

https://www.airnewzealand.com.au/destination-tokyo Source :National Association of City transportation officials

6.2 Street Intersections

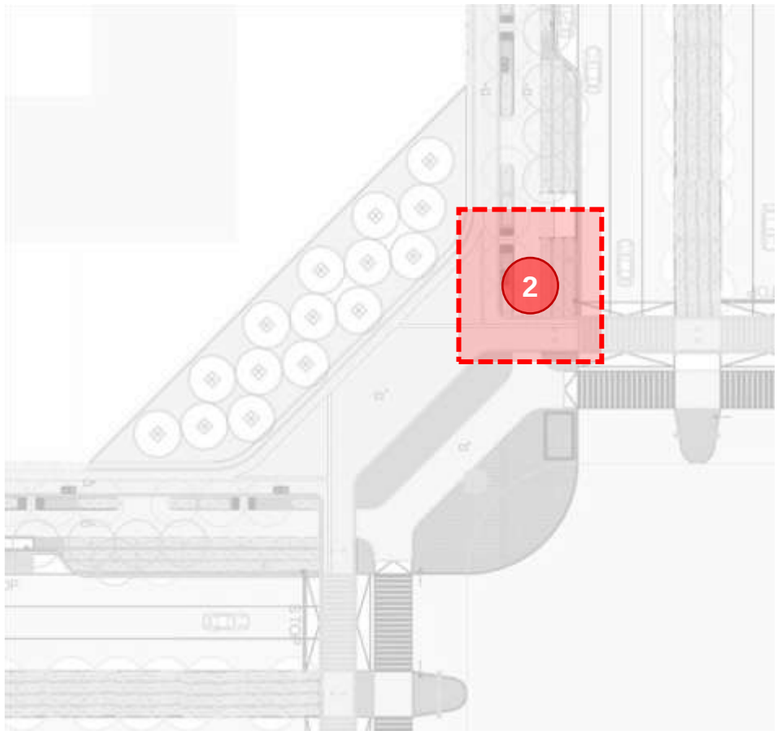
Zone 2
Public Infrastructure and Services

- Digital tags and information panels should be provided for easy navigation and offering directions to surrounding area
- Information panels and displays should be visually attractive and located strategically at each intersection
- Digital information panels and tags should be integrated into a support network that ensures web links to reflect real time information and create public awareness
- Digital panels should not obstruct the pedestrian walkway
- Digital panels should be supported by advertising revenue from local shops, restaurants, sports, and entertainment venues
- Small newspapers stalls, ATM, Smart infrastructure installations, charging stations for shared vehicles, smart phones etc. should be designed to add character to the intersection
- Utilities and services structure should be placed in MFZ landscape area screened by plantation, art work or decorative screens
- Public Infrastructure details (refer to Streetscape and Urban Plugin Guidelines in Public Infrastructure Section 6.3 in this chapter)



Street intersection plan view showing zone 2 of the street corner plaza for public infrastructure and services

Diverse range of features and uses offer amenities and add character to intersections



Digital information panels

https://www.pinterest.com/pin/335166397250501415/, https://www.pinterest.com/pin/276971445819622566/

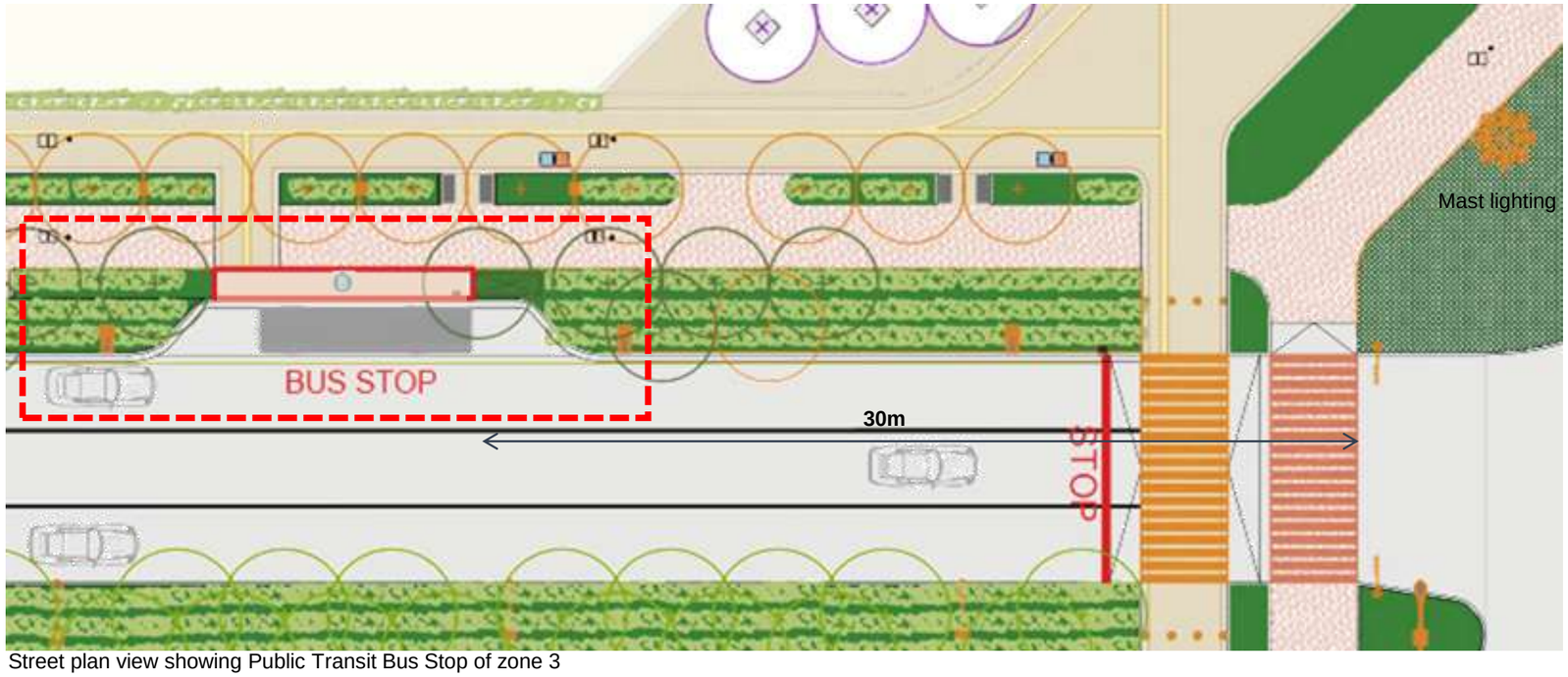
6.2 Street Intersections

Zone3

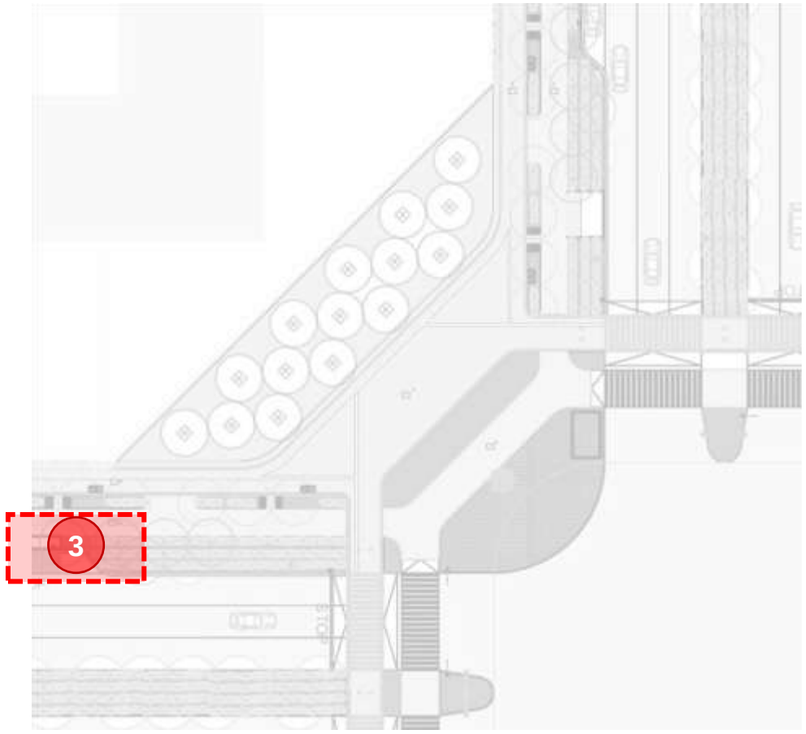
Public Transit Stop

Transit stops should be designed to attract riders, improve operational efficiency, build the brand identity of a system, and foster local economic development.

- Transit stop zone should be integrated in MFZ areas keeping traffic lanes clear for movements and should be located 30m away from pedestrian crossing at intersections
- The design, prominence, and comfort of a transit stop should be considered for enhancing experience of passengers
- Transit stops should be resilient against different weather conditions by providing adequate covered areas for commuters
- Wayfinding and transit scheduling signage should be integrated at transit stop zones for commuters to plan their trips
- Multi-modal transit service with immediate transit change should be provided to improve the connections between destinations
- Public transit stop zone should provide cycle racks to promote last mile connectivity
- Public transit stop details(refer to Chapter 5 - TPOD Guidelines)



Street plan view showing Public Transit Bus Stop of zone 3



Public Transit Stop

Montgomery County Maryland US_ *Photo by Wolfram Burner on Flickr.*

6.2 Street Intersections

View of Typical Intersection

Promoting public uses through private development plots at intersection

Place Making at Intersection
Intersections should be designed for people to gather and enjoy corner plaza for social and cultural activities. Major intersections should play a role in image and identity by serving as gateways of a new district or neighbourhood

Wayfinding
Intersections should play an important role in wayfinding and urban recognition. Intersections should be made identifiable through corner building, plaza, or public art, which should help people recognize their location or remember a specific route within the city

Traffic Controls
Intersections should be provided with the most efficient and cost-effective method of control, signalized intersections

Storm Water Management
Green street elements should be incorporated to reduce storm water runoff by permeable surface at intersections and street corners. Bio swales should be incorporated not only to recharge groundwater, but to filter pollutants from surface runoff water

Access for All
Universal accessibility design principles should inform all aspects of intersection design, ranging from geometry to signal timing with a commitment to achieving the best outcome for all users

Safety and Security
Trapezoidal hump for pedestrian crossing at intersection

Dedicated Cycle Zones
Intersections should provide dedicated road crossing marking for cycle track

6.2 Street Intersections

View of Typical Street Corner Plaza at an Intersection

Screening and air purification plantation should be integrated at corner plaza

Streetscape and urban plugin should be incorporated at corner plaza

Corner plaza should provide tree coverage to reduce heat absorption

Public uses at corner plots should provide colonnade structure with shop front

Corner plaza and private development should create vibrant public space by providing Café and food court with plaza seating

Corner plaza should have lighter shade paving material to reduce heat island effect.

Groundcovers and landscape as permeable surfaces

6.3 Public Realm Infrastructure

6.3 Public Realm Infrastructure

Overview

Public infrastructure should be defined as facilities or systems that provide the necessary support in the urban environment. Public infrastructure refers to structures such as roads, bridges, water supply, sewage, substations, electrical grids and telecommunications etc. Public infrastructure should help to make a city more connected, socially inclusive, convenient, and comfortable for the lives of the citizens. A well-planned and designed public infrastructure structure should ensure an efficient use of space in the public realm and is pivotal to the growth of the city.

This section will focus on various public amenities along the ROW consisting of sidewalk and the road from smaller elements such as waste-bins, water fountains to large scale amenities like bus stops or public toilets to substation etc to guide proper development of public infrastructure.

Objectives

- The objective of public infrastructure and utility services is to accommodate all amenities and facilities needed for pedestrians, cyclists or transit users on city streets

Public Amenities and Kiosks

- Public amenities and kiosks like news paper, ATM, vending machines should be placed on MFZ near public buildings
- Multi purpose kiosks should be located near corner plaza, public buildings, and along commercial frontage
- Kiosks should be fixed on the ground with relevant public authorities monitoring its use

Traffic Signals and Police Booth

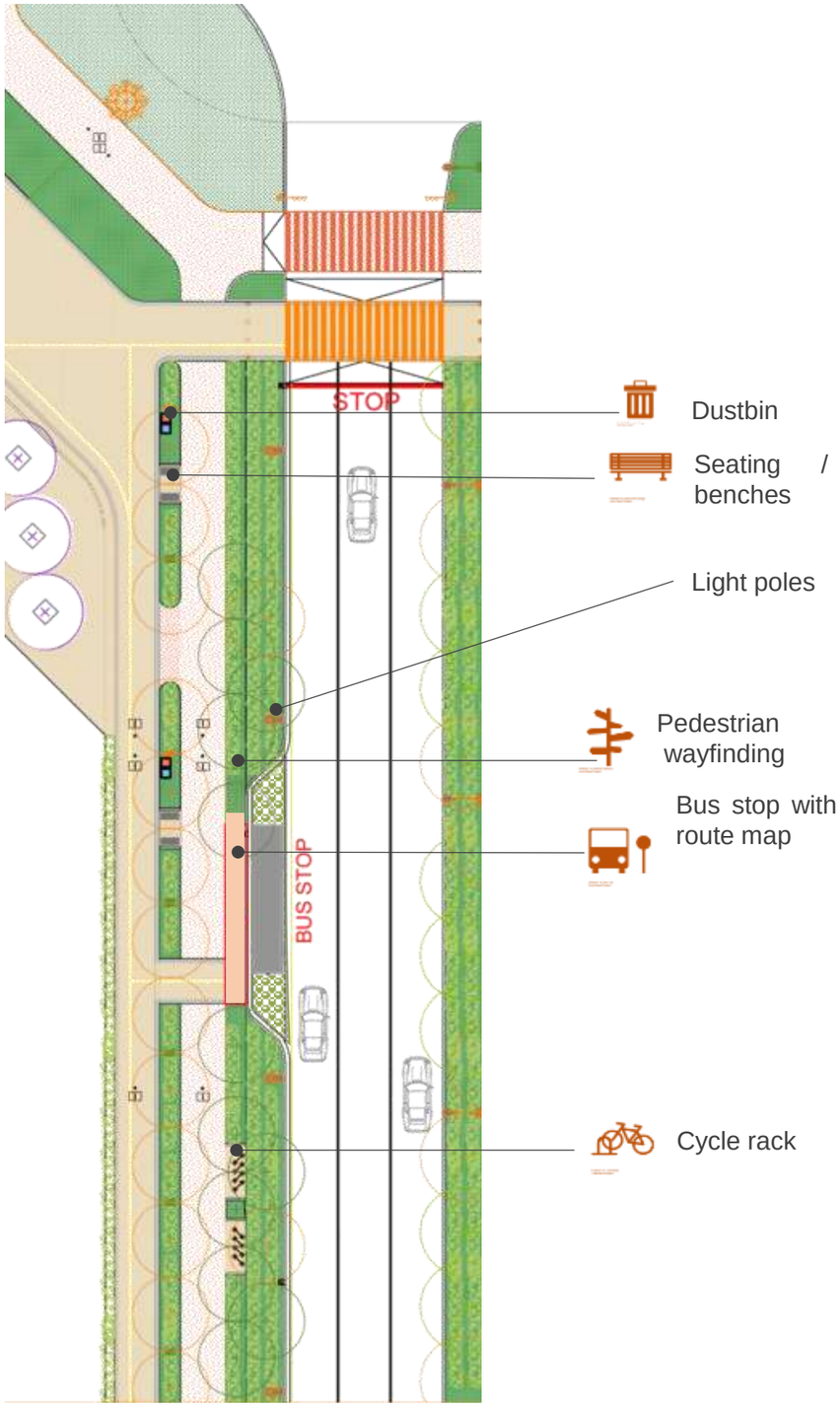
Traffic control management at intersections for signalized and non-signalized junction

- At all intersections, camera and sensors should be provided for traffic monitoring and management
- Cameras should be positioned to maximize visibility and should not block, or be blocked by signs, utility wires, or other traffic control devices
- In the absence of electronic monitoring devices, traffic control booths for traffic police should be provided at intersection (suggestive)
- Traffic control booths space should be designed for at least two traffic police officers with adequate facilities on the side, such as seating, water fountain, first aid kit, information contacts of nearby emergency services
- Traffic control booths at major intersection should be interconnected with telecommunication services for emergency contact
- Traffic control booth at intersection should not obstruct drivers' line of vision

Pedestrian Wayfinding and Route Maps

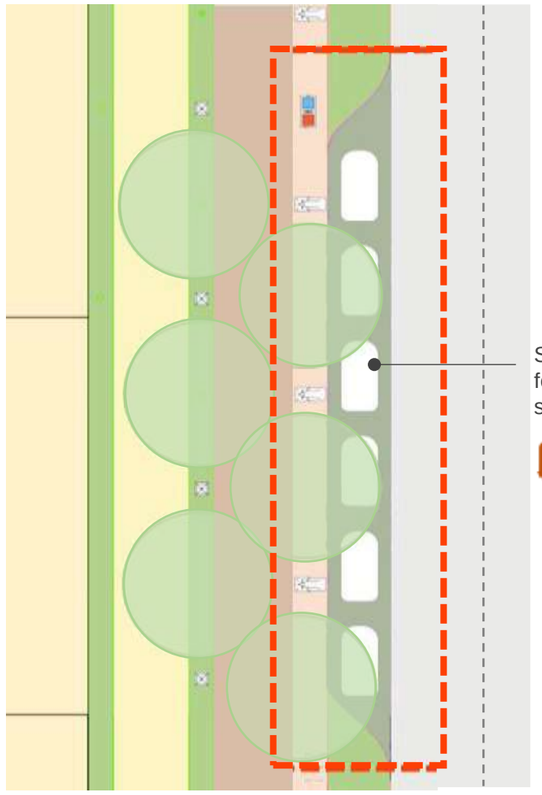
- Adequate wayfinding signage and well-designed, artistic "Local Area Maps" should be displayed at intersections and all entry/exits points of transit stations showing local roads and important civic destinations
- Transit stops and metro stations should provide an overall system route map
- Information about bus routes and timing should also be displayed in a static signage along with real-time electronic signage
- Mobile applications with satellite route map should be launched to increase accessibility to the information

50m Arterial / Sub Arterial Road



Street Plan View

25m Collector Road



Street Plan View

6.3 Public Realm Infrastructure

Branding / Advertisements

- Advertising on streets should be standardized systematically and should not affect the aesthetics of Amaravati nor compromise revenue generation for the city
- Advertisement boards should be placed such that it does not cause physical and visual obstruction to pedestrians, cyclists, vehicular traffic as well as signage
- Advertisement boards should be located in MFZ or bus shelters
- Signage should be along with light pole at median interval as mentioned in streetscape guidelines matrix (Section 6.1)
- Branding and advertisement panels should be integrated with bus stop, kiosks, utility buildings etc.
- Advertisement structures should not project on the carriageway, pedestrian walkway or cycle track
- Any structure should not be detrimental to safety of the people, vehicles and adjoining property
- Advertisement boards should not be extended out to the street and block the views of traffic
- Large advertisement should be placed strategically but should not adversely affect the character of the street, important places, landmarks, heritage sites, religious buildings and natural elements like river, hills, trees etc.
- Sky signs should not be placed near intersection i.e. they should be placed beyond 50m distance from the 'STOP' line marked at the intersections of roads

Advertisement on Street divider in Hyderabad

Advertisement on Sidewalk in New York City

Advertisement at bus stop , Orchard Street, Singapore

https://mothership.sg/2016/07/ocbc-is-giving-everybody-free-wifi-along-orchard-road-at-sports-hub-its-banks/, http://www.bluelinemedia.com/bus-advertising/new-york-city-ny, https://dir.indiamart.com/impcat/kiosk-advertising.html

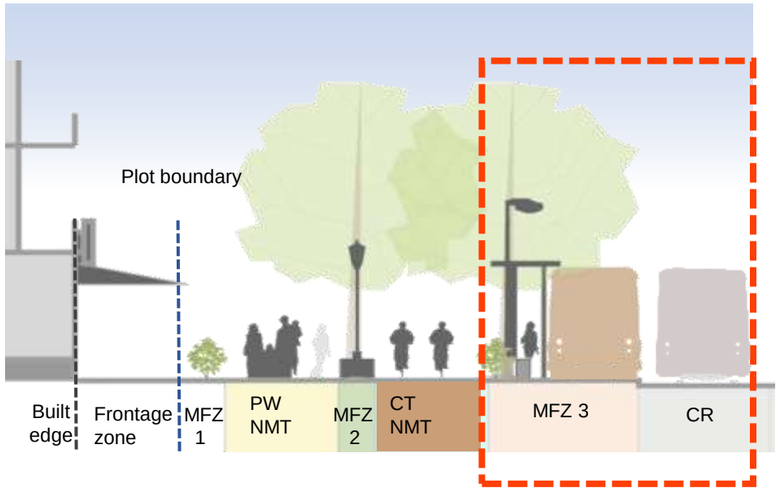
6.3 Public Realm Infrastructure

Transit Stops (BRT/LRT/Bus Stops)

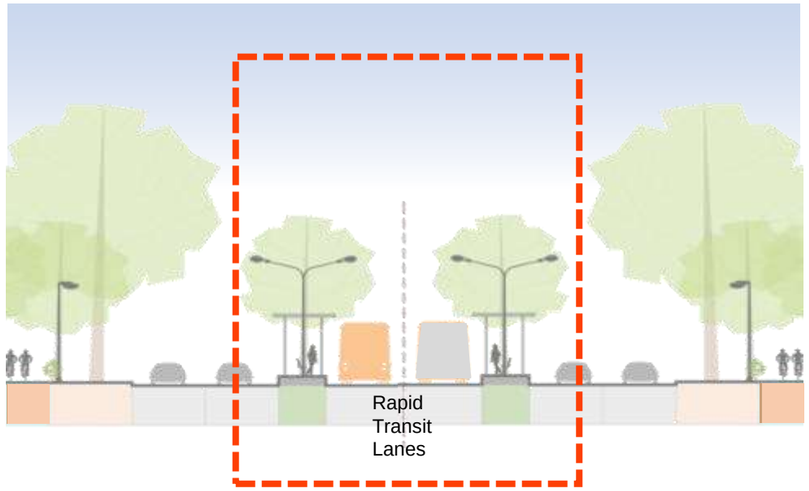
Ideal dimensions of bus stop should be 10m (L) X 1.5m (W) X 2.2m (H). If passenger demand is high, more bus shelters should be provided.

- Multiple bus shelters of recommended size should be constructed at busy location along mobility corridors
- Grass paver blocks should be provided for transit lanes for creating permeable surfaces with lawn for reducing heat absorption
- The design of the transit stop should be compact; without taking too much of pedestrian or MFZ space and should not obstruct visibility of surroundings and the flow on pedestrian walkway
- Transit stop designs should be robust; with anti-skid, leveled floor space and preferably with cantilever roof for sufficient shade and light
- Seating should be compact and minimal
- Night illumination should be provided for all transit stops linking with PV panel roof for renewable energy
- Transit stops should have emergency phone numbers/ police help line numbers/ respective authority of corporation numbers displayed
- Digital display information should include bus route, maps of transit station and corridor with bus or tram transit number and possibly with fare charges
- Transit stops should be constructed in drop off bays on bulb-outs on ground level as the adjacent pedestrian walkway or in MFZs
- Water logging at transit stops should be avoided by placing water absorbing soil pits
- Bus stops should not obstruct cycle movement, pedestrian flow or vehicular movement or create traffic nuisance
- Bus stops should be in the vicinity of the junction but at a distance of 30 m away from any intersection
- Transit stop should be at same level of pedestrian walkway for ease of assess with maintaining same level. i.e. 150mm from road level
- Conflict between vehicular movement and Rapid Transit Lanes should be avoided using railing or bollards
- Permanent lane marking should be provided to distinguish transit station waiting area near stop and ensure proper alignment of Rapid Transit Lanes
- Effective measures like lighting, day–night vision marking alignment should be provided to guide the bus/tram to align properly with the transit stop

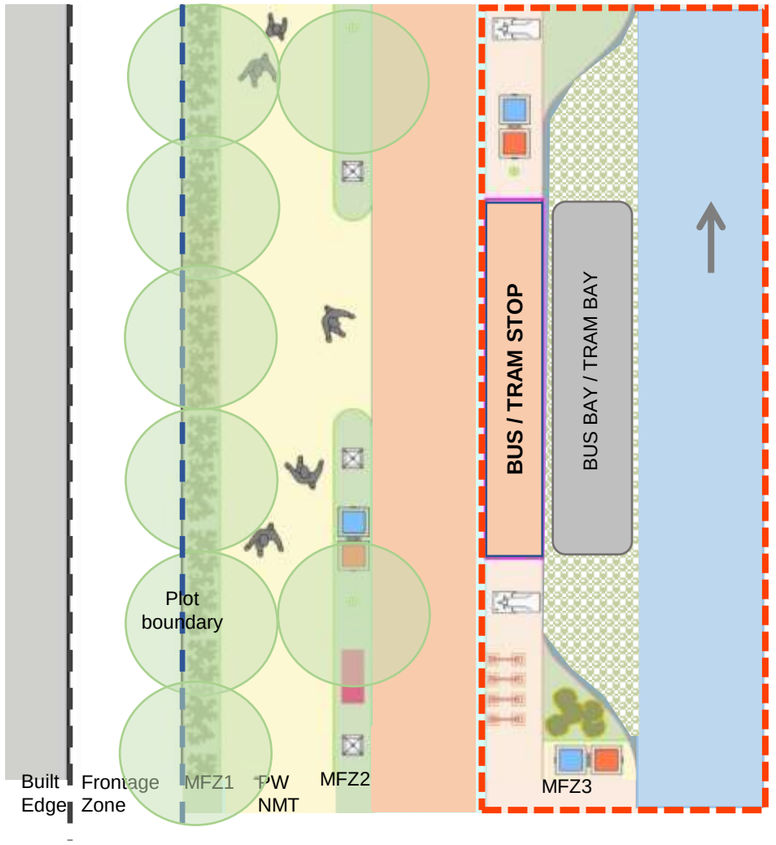
50m Arterial Road



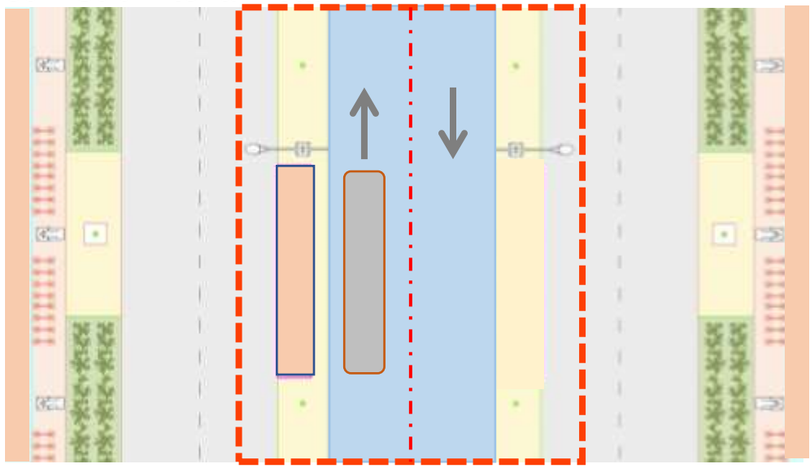
50m Sub Arterial Road



50m Arterial Road



50m Sub Arterial Road



Bogota's Bus Rapid Transit System

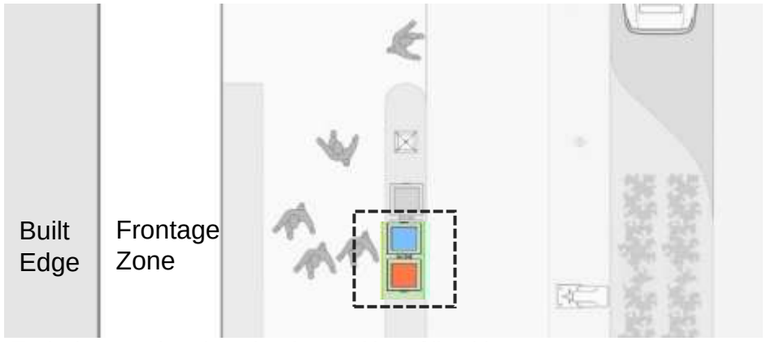
Dedicated lanes have provided for 50 m sub arterial and 60m Major arterial road from the centre lanes of the roads

Source : wikipedia.com

6.3 Public Realm Infrastructure

Litterbins/ Recycle bins

- Litterbins should be placed at public places and frequent intervals in order to keep the streets clean. Streets should be kept clean for community hygiene but also encourage people to use streets for walking and socializing
- Litterbins should be smaller in size and should be covered. These should be easy to maintain and ensure regular replacement
- Litterbins should not be placed on sidewalks or cycle tracks. They should be placed in MFZs with clear visibility and direct access from sidewalk
- Litter/Recycle Bin should be located within MFZ at 50m intervals within 200m of buildings away from important landmark buildings with separate wet and dry bins
- Litterbins/ recycle bins should have a capacity of min. 72 liter.(ref. Trash and recycling enclosure design guide-July 2016 City of Santa Barbara,U.S)
- Litterbins should be placed at public gathering places such as public buildings, government offices, parks, commercial zones, or near mid way pedestrian crossings and at intersection
- At every location litterbins should be categorized for different waste disposal i.e. recycle, dry and wet etc.
- Pets waste dustbins, medical waste, construction waste and other hazardous material waste should be properly disposed in dedicated area allocated in each township or as suggested by relevant public authority



Typical street plan view showing position of litterbins

Large garbage containers should be avoided and garbage bins should be kept clean and limited to specific locations

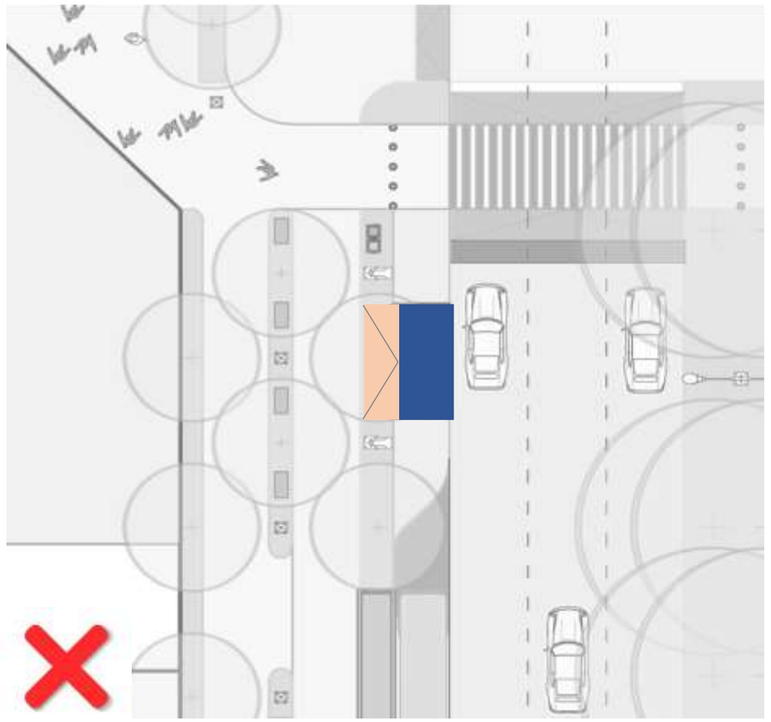
Segregation according to the type of waste

Door to door collection system is ideal method of waste collection to discontinue practice of garbage containers on streets.

Ref : Indore Sanitation Plan, SWACH and International best practices

Public Toilets

- Public Toilets should be placed with distinct signs for men and women within open spaces and near transit stations at 500-800m walking radius
- Provision of public toilets should be in public and government buildings, APCRDA vacant plots, POPS etc.
- Public Toilets should not obstruct sidewalks, cycle lanes or carriage ways
- Public toilets should be connected to sewerage lines and should be kept clean
- The design and access for public toilets should be friendly for children, elderly and disabled persons
- Public toilet locations (refer to streetscape and urban plugins guidelines in this section)


Street plan view with public toilet location at intersection which is not preferred

Avoid use of temporary public toilets for regular use and keep PT clean

Designs of public toilets

https://www.npr.org/sections/health-shots/2015/08/10/431240543/san-diego-installed-public-loos-but-now-theyre-flush-with-problems, Ref:https://www.sacurrent.com/the-daily/archives/2016/07/28/do-your-business-in-downtowns-new-100000-public-toilet

6.3 Public Realm Infrastructure

Drinking Water Fountains/Taps

- Drinking water fountains should be made available at convenient places for public use, such as near important junctions, transit stops and open spaces
- Purified water supply should be provided for drinking water fountains
- Water Discharge Control (Recycling) should be considered to reduce water waste.
- The water tap boards should be located at every 500 - 800m distance centre to centre along key roads and open spaces
- Water fountains should not be in the way of pedestrian or cycling flow but located in the MFZs
- Regular maintenance should be done by authority to maintain drinking water quality

Drinking water fountains designed for all

https://www.theguardian.com/cities/2017/dec/05/british-cities-water-fountains-investigation

- Drinking water fountains should be located in high-use pedestrian areas and rest stops
- Also it is important to ensure height is accessible to all users

Electrical and Transformer Substations

- The electrical substations should not lie on the pedestrian pathways
- There should be buffer separating these substations keeping only maintenance access path
- Transformer substation location should be placed properly in MFZ with landscape plantation, art work or decorative screens protection cover
- Substation should not be at road intersection areas. They should be located within developments with proper screening such as vertical greening or decorative screens
- Electric and transformer substations design treatment (refer Chapter 7 -Built Form Guidelines)

Installation in MFZs of streets

http://www.newindianexpress.com/states/andhra-pradesh/2017/jan/29/vizags-one-town-lives-among-hanging-live-wires-and-uncovered-transformers-1564704.html

6.3 Public Realm Infrastructure

Streetscape and Urban Plugins

- Streetscape and urban plugins should be proposed within vacant plots and MFZ to facilitate community needs at convenient locations within walkable distance
- Small APCRDA vacant plots and returnable plots reserved with purpose to avoid a T junctions should function as small scale public amenities and social spaces catering to the communities and neighbourhoods using streetscape and urban plugins
- Streetscape and urban plugins spaces should be restricted only to pedestrian movement and should not be allocated for parking areas
- Universal accessibility measures should be considered for all streetscape and urban plugin spaces
- All POPS, street corner plaza, open spaces and parks should be provided with streetscape and urban plugins to cater to community needs

List of recommended streetscape plugins –

Location	Streetscape and Urban plugins
APCRDA Plots	Public toilets, Play Area/Tot Lots, Outdoor Gym, service staff storage and changing rooms, branding and marketing, news paper stand and reading corner, flea markets, ATMs, pocket parks, service amenities, sand box, community activity display boards, dogs parks, laundry booths, recycle material collection points, farmers markets, street markets, milk booth, seating space, drinking water fountains, feeder bus stop, public art installation
Waterfront, Canals, Ponds and Parks	Public toilets, play area/tot lots, outdoor gym, emergency booths and dispensers, service staff storage and changing rooms, news paper stand and reading corner, flea markets, street markets, pocket park, sand box, community activity display boards, dogs parks, recycle material collection points, farmers market, seating space, drinking water fountains, feeder bus stop, public art installation
MFZ	Way finding signage's, emergency booths and dispensers, branding and marketing, news paper stands and reading corner, ATMs, laundry booths, recycle material collection Points, milk booth, drinking water fountains, public art installation
POPS	Public toilets, play area/tot lots, pocket parks, service amenities, recycle material collection points, seating space, drinking water fountains, public art installation
Street Corner Plaza	Recycle material collection points, seating space, news paper stand and reading corner, ATMs, community activity display boards, drinking water fountains, public art installation

*Note -All the following streetscape plugins should be provided within 500-800m walking radius intervals.

1 Cycle Stand

2 Seating

3 Market Stalls

4 Public Plazas

5 Kiosk

6 Display board

7 Dog Park

8 ATMs

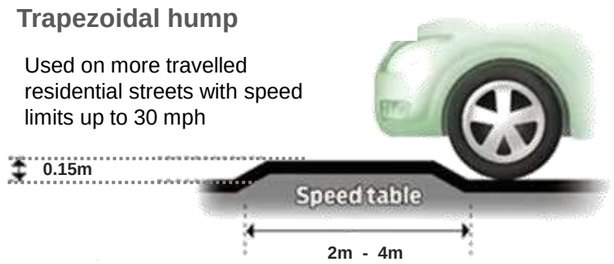
9 Public Toilets

10 Outdoor Gym

6.3 Public Realm Infrastructure

Traffic Calming Measures
Surface Treatment

- Intersection geometry and street surfaces should be maintained and in safe operating condition for all users at all times including paved surfaces in the pedestrian realm, cycle tracks, transit areas. Surface treatments should ensure an even and undisrupted horizontal surface
- Traffic calming treatment should start at least 25 m before the zebra/ table-top crossing
- Surface treatment with colour rough texture should be provided with anti slippery material to slow down the speed of the vehicles
- Traffic calming should be considered on a case-by-case basis especially at intersections and near social amenities such as schools, hospitals and community
- Signs should be located in advance so that drivers can slow down to negotiate the feature



Source: Palm beach county and local communities

Standards for trapezoidal on public and private roads

Trapezoidal Hump (IRC -11-2015)

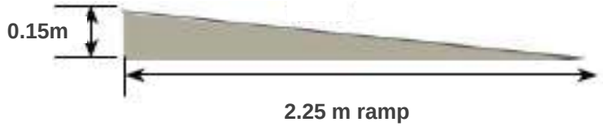
- Trapezoidal hump is also acts as a speed breaker to reduce vehicles speed at the intersections
- Trapezoidal hump should allows pedestrian crossing continuous movement at same raised level without any obstacle of ramps up and down
- Cobble stone should not be used on the top of the table top crossing but on the slopes
- Ramp slope 1:15 should be provided
- Raised crossings also increase visibility of pedestrians and physically slow down traffic allowing pedestrians to cross safely
- Tactile paving should be provided along pedestrian walk
- Speed tables should not be confused with speed bumps
- Speed bumps should be used in parking lots and not recommended for public streets

Trapezoidal hump should be located at:

- Slip Roads
- Where high-volume streets intersect with low-volume streets, such as at alley entrances, neighbourhood residential streets, and service lanes of multi-way boulevards
- Every major intersection - All intersections intersecting with above 25m ROW are included in major intersection
- Traffic calming treatment should start at least 15m before the zebra/ table-top crossing

Trapezoidal hump

Streetsblog Chicago



Coloured texture surface treatment on pedestrian crossing

https://en.wikipedia.org/wiki/Pedestrian_crossing

6.3 Public Realm Infrastructure

Universal Accessibility Design

Universal Accessibility and Barrier Free Design

(IRC 103 2012)

As per 'Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995', a barrier free built environment should be achieved to facilitate the disabled. Streets form part of the public realm, and are widely and frequently used by people of all abilities and they should be designed with the principles of barrier free environment to ensure the safety and comfort for all users while experiencing the built environment.

Therefore, Universal Accessibility Design (UAD) guidelines should through proper design of the streetscape, address the various needs of different user groups, including elderly and people with special needs whose physical, mental or environmental conditions limit their abilities and performance regarding their movements within the city.

Office of The Chief Commissioner for Persons with Disabilities, Ministry of Social Justice and Empowerment, Government of India published a report, named 'Planning a barrier free environment 2001', which describes in detail about the design requirements of people with special needs for access and movement within building and public places. The UDAG takes these recommendations as reference to formulate the UAD guidelines for any aspect related to barrier free design for streets and street elements within the city.

UAD Requirements

People using wheelchairs, crutches, walkers, and with visual or hearing impaired should be addressed with street design to cater to their needs. The design consideration for two main target groups of users, visual impairment and mobility impairment should follow instructions below:

For People with Impaired Mobility

- Any thresholds and changes in level should be avoided
- Ground and floor surface should be hard and even. Slip resistance should be for ambulant disabled people to move securely
- Obstacles, ground projections or other protrusions should be avoided in pedestrian areas such as walkways, corridors, passageways or aisles
- Handrails should be provided on stairs and ramps

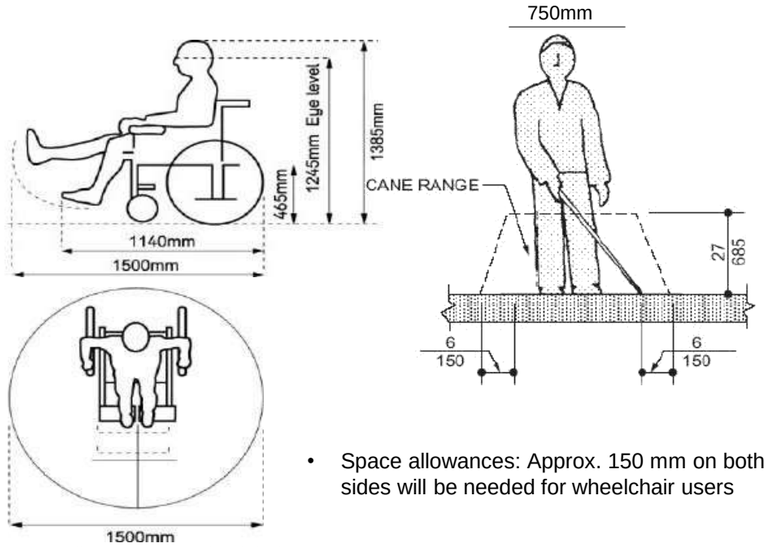
For People with Visual Impairment

- Contrasting colours and warning blocks should be used to aid the identification of doors, stairs, ramps, passageways, etc.
- Surface colour, material and texture should be varied to indicate pathway, change of directions etc. Orientation path should be specially illuminated
- Posts, single steps and projections from walls should be avoided to minimize the risk of falls and injuries

Wheelchair Space Allowance

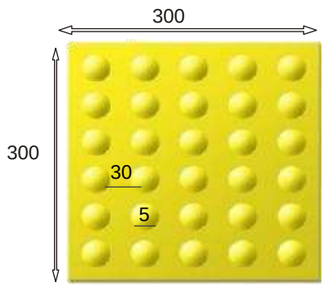
The minimum clear floor for single stationary wheel chair and occupant should be 0.9mx 1.2m as shown in the figure below

- A minimum clear floor ground area of 1.2m x 1.2m should allow access for both forward and side approach
- The minimum clear floor ground area for a wheelchair to turn should be 1.5m and preferably 1.8m



Space allowances for wheelchair

- Space allowances: Approx. 150 mm on both sides will be needed for wheelchair users



Warning tile at intersection

Entrance and pathway marked with tactile paving

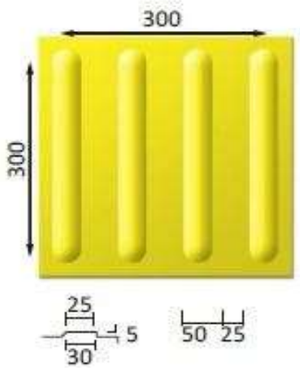
UAD Tactile Paving

Material and Texture

- Tactile paving should be used as a textured bright colored tile which should be detected by a visually impaired person and provide guidance with regard to the positioning, way finding and street crossing etc.
- Tactile paving should be provided in the line of travel avoiding obstructions of utility services such as manholes/tree guards/lamp posts etc.
- Tactile paving tile should have colors which contrast with surrounding surface

UAD Installation

- Tactile paving should be laid 0.9m wide across the entire sidewalk and pedestrian crossing
- Tactile paving should be installed in front of an entrance/exit to and from a staircase or multi-level crossing facility, at public transport terminals, station, stops or boarding areas
- A distance of 0.6m should be maintained from the edge of sidewalk or any obstruction to the warning blocks position
- Tactile tile should be installed from a public facility to the nearest public transport station
- Warning tile or concrete tactile tile with vehicular load consideration (Min 40 Tones) at parcel entry exits should be considered



Line type blocks indicate the route to follow while dotted type blocks indicate other occasions

Blind woman waking on tactile paving.
http://globalaccessibilitynews.com/photo-gallery/

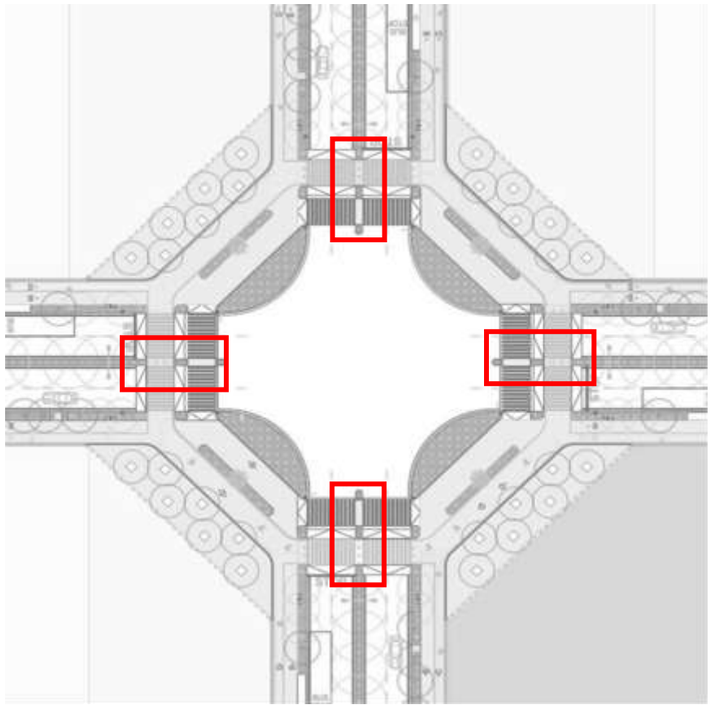
Source of images: Design for access and mobility-building and associated facilities, New Zealand Standard

6.3 Public Realm Infrastructure

Universal Accessibility Design

UAD Sidewalks

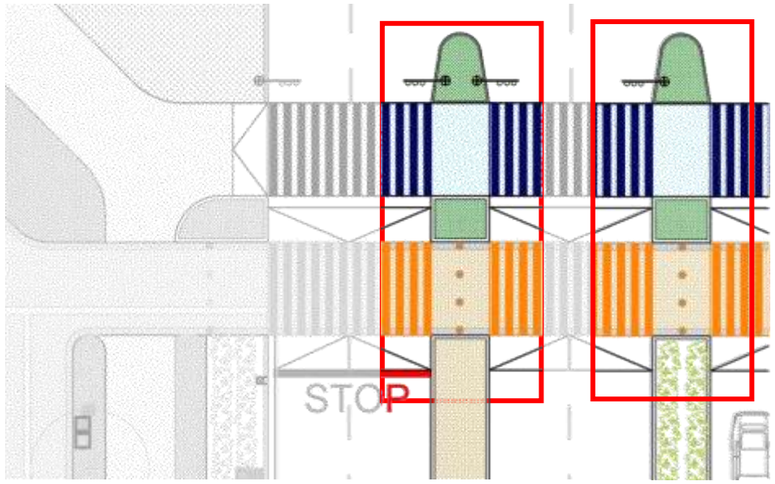
- Sidewalks should be continuous and should have stable and firm with slip-resistant surface. No projections, drops, or unexpected variation in levels
- Sidewalks should have guiding blocks for people with visual impairment; and fitted with visual signs and tactile clues (e.g. Braille blocks) as route finders
- Sidewalks should have well defined edges of paths and routes by use of different colors and textures
- Sidewalks should have curb cuts wherever a person is expected to walk into or off the pathway with warning blocks installed next to all entry and exit points of the pathway



Key map of intersection showing refuse island

UAD Intersection and Crossings

Refuge islands should be provided to reduce the length of crossing and make it more convenient and safer for use by allowing pedestrian to cross one direction of traffic at one time. The refuse areas should reduce the pedestrian exposure time to traffic and offers a protection and should be located at the midpoint of the marked crossing.



Safety for pedestrian as well as cyclist

Main Road crossing condition

Neighbourhood streets crossing island

UAD Traffic signal

- Pedestrian traffic lights should be provided with clearly audible signals for pedestrians with visual impairment
- Acoustic devices should be installed on a pole at every crossing
- The time interval allowed for crossing should be programmed according to the slowest crossing persons
- The installation of two adjacent acoustic devices such as beepers should not be recommended in order to avoid disorientation
- Acoustical signals encourage safer crossing behavior among children as well

A road safety feature on the Northern Ireland Road safety.

source : http;//www.roadsafetyni.gov.uk/

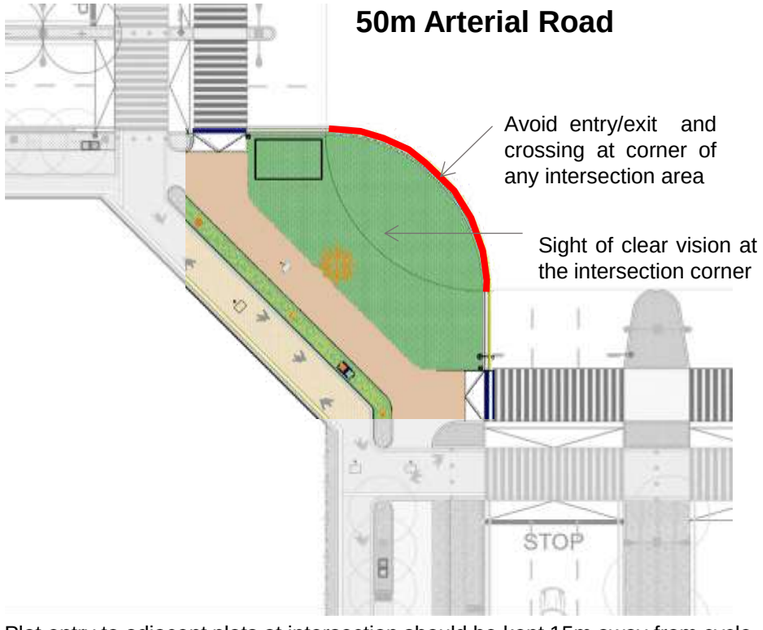
6.3 Public Realm Infrastructure

Universal Accessibility Design

UAD Turning Radius

Turning radius at the intersections - Intersections with different ROW's with allocated chamfer should be applicable as per higher ROW turning radius, wherever chamfer is not allocated min turning radius as per ROW criteria (As per Global Designing Cities Initiative and National Association of City Transportation Officials standards)

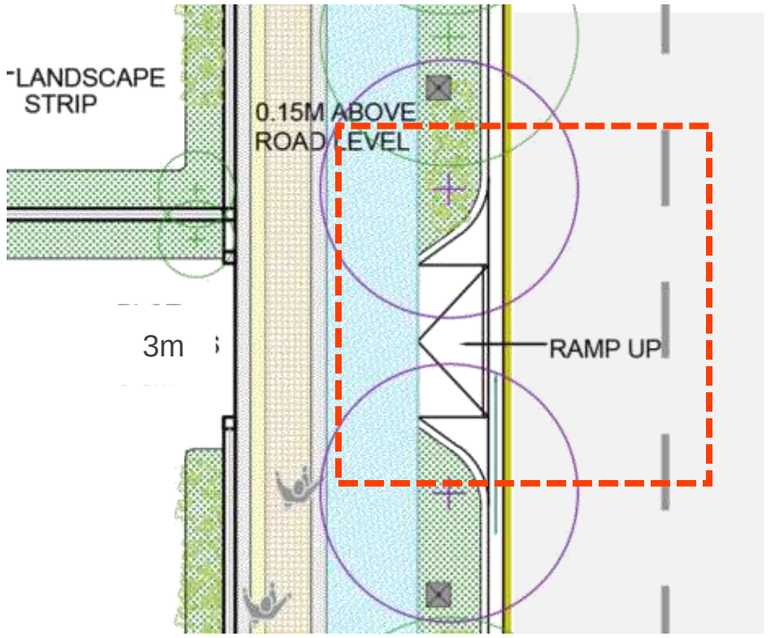
- Turning radius for different ROW and intersections (refer to streetscape guidelines matrix, section 6.1)
- Turning radius should be adjusted and subject to detail transportation study for different transportation modes at each intersection



Plot entry to adjacent plots at intersection should be kept 15m away from cycle crossing edge

UAD Curb Ramps

- Curb ramps should be provided accessibility at street intersections, and other areas where elevated walkways are edged with curbing
- Curb ramps should facilitate crossing for users with wheelchair, strollers and bicycle
- Curb ramp should locate near to pedestrian table crossing and both sides of each pedestrian crossing at each quadrant.
- Curb ramp should not be provided on the corner of the intersection
- Two curb cuts per corner should be preferred over no curb cuts by the sides
- Anti-skid surface treatment should be provided on all curb ramps
- Well functioned drainage system should be provided at junction corners to avoid standing water in the crossing area
- Longitudinal ramps should not exceed a maximum ramp grade of 1:10 Edge protection for ramps steeper than 1:20 or landings more than 1.3 m long should be provided above the adjacent grade
- Tactile warning strip should be provided on the curb side edge of the slope as a waning signal to the visual impaired persons
- Paving material should be selected with vehicular load consideration (Min 40 Tones) at parcel entry exits



Typical street plan view showing detail intersection at the curb ramp

Curb Ramp

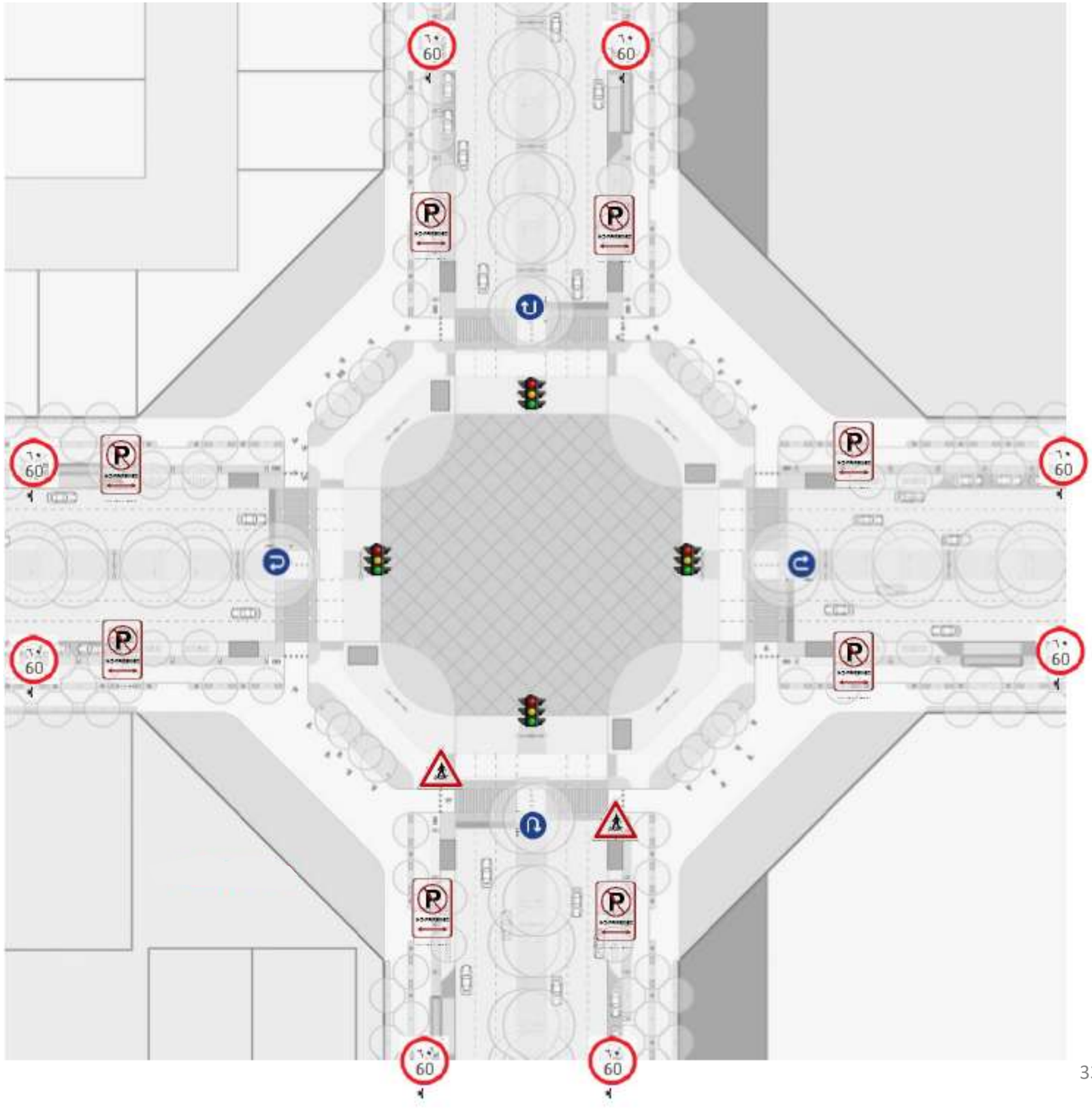
http://www.seattle.gov/sdci/codes/changes-to-code/curb-ramps

6.3 Public Realm Infrastructure

Universal Accessibility Design

UAD Regular Visual and Auditory Signals

- Signal location should be standardised at center of median at intersection.
- Advanced automatic signal poles should be used showing only two signals green and red. Signal should show time in seconds before switching to give appropriate alert for action
- Pedestrian crossings at junction should be provided with clearly audible and visible signals to facilitate safe and independent crossing
- Audible crossing signals (pelican crossings) should be provided for persons with vision impairments
- Signage should be visible from min. 100m away
- Acoustic devices should be installed on a pole at the point of origin of crossing and not at the point of destination
- Distractions to visual appearance and audible clearance of signals from other utility installations should be avoided at junction
- Traffic signs should be provided as prescribed in the *Motor Vehicles Act 1988* for following:
  - Road Safety Rules
  - Permissible Speed and Access
  - Warning about potential hazards
  - Directions and distances of destinations, landmarks and suburbs



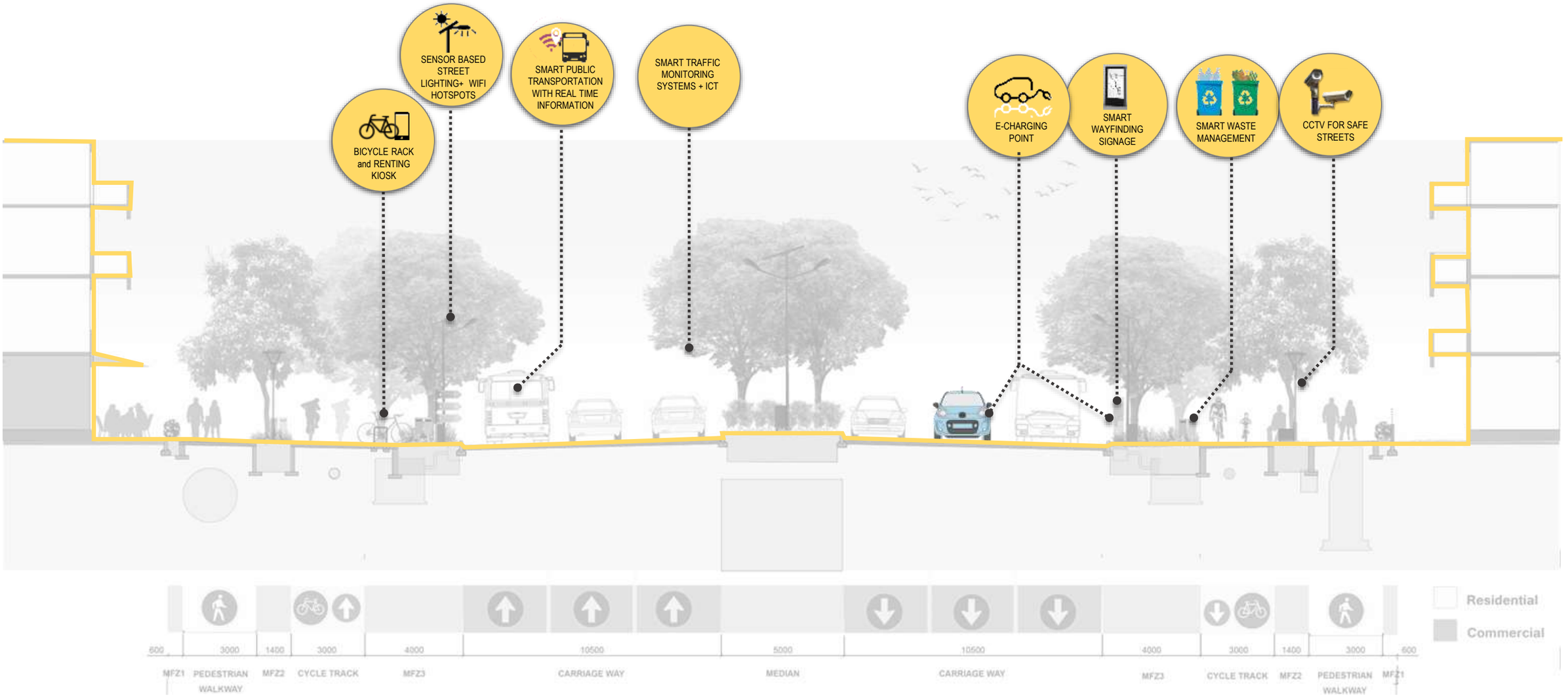
UAD Road Signs

(IRC :35-2015)

- Mandatory/Regulatory Signs: In accordance with the Motor Vehicle Act, 1988, every driver of a motor vehicle should drive the vehicle in conformity with any indication given by the mandatory signs and not obeying these signs is an offense
- Cautionary/warning Signs: Cautionary signs should be meant for cautioning the driver about the hazards lying ahead on the road
- Informatory Signs should be provided to guide the road users regarding the distance and directions roadside facilities and destinations
- Signage should be placed at the standard location for easy identification for drivers
- Signanage should be placed well before alert location to get the expected action required.

6.3 Public Realm Infrastructure

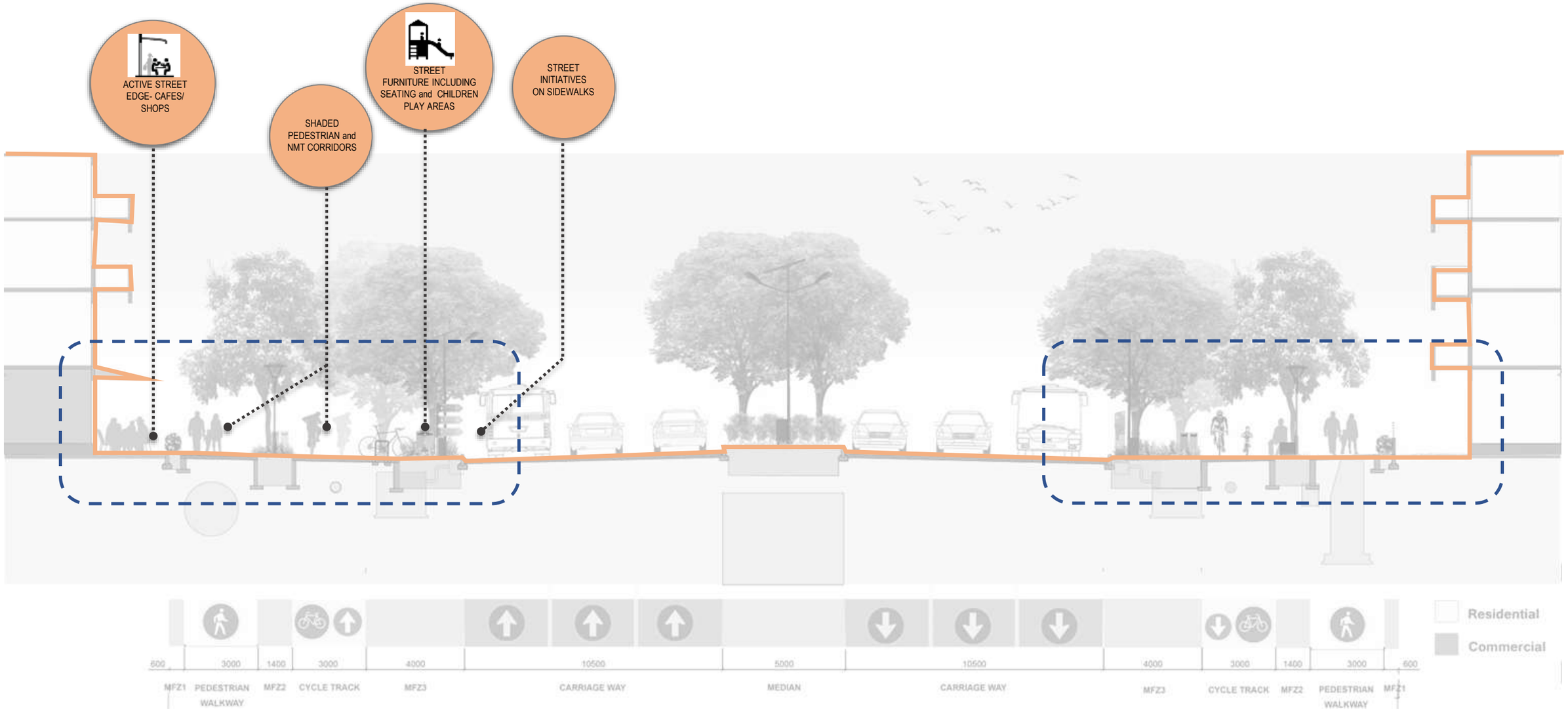
Streetscape with Smart Infrastructure



Street life enhanced with smart infrastructure should promote convenience, ease of working and safety.

6.3 Public Realm Infrastructure

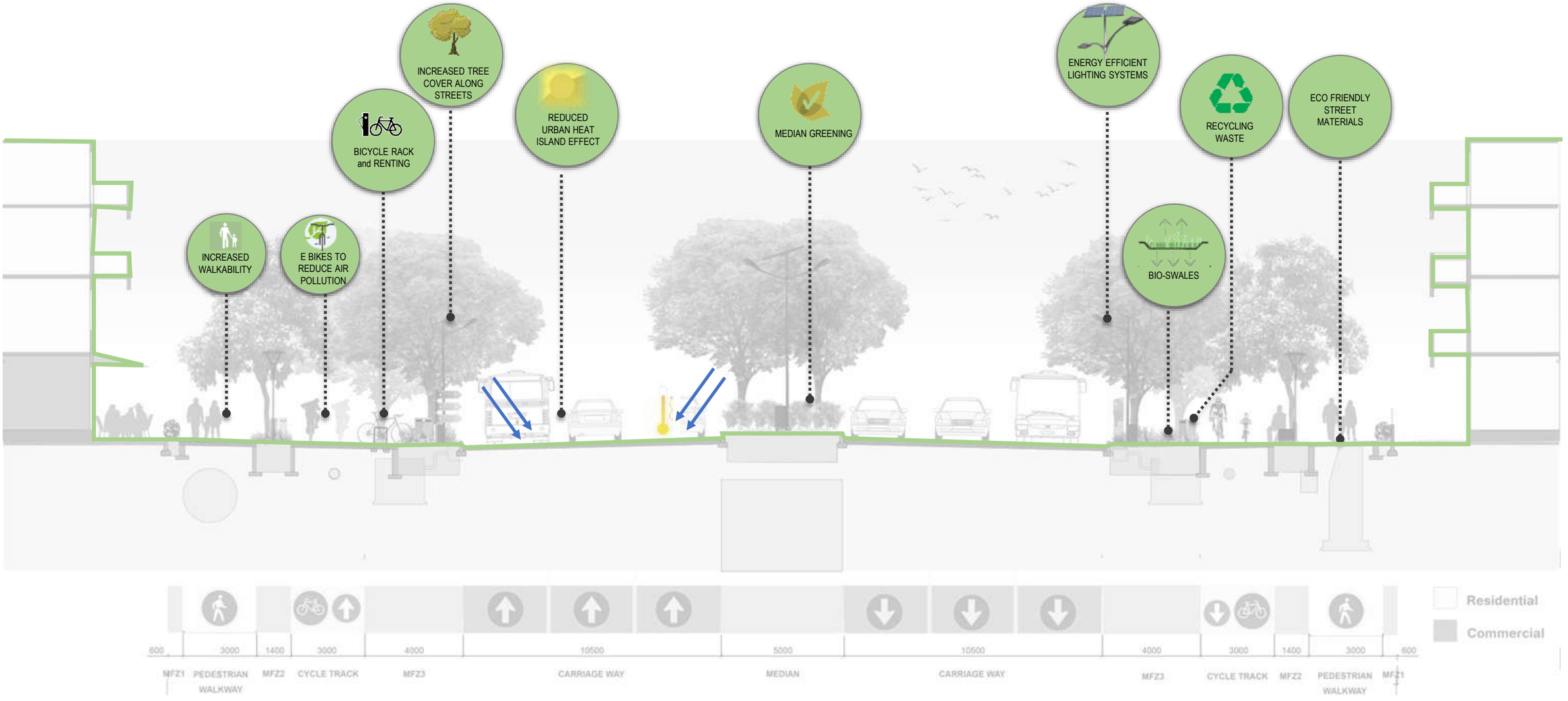
Streetscape for Pedestrians and Active Frontage



Street life enhanced social activities should safely accommodate travellers of all age groups and abilities.

6.3 Public Realm Infrastructure

Streetscape with Sustainable and Climate Adapted Features



Street life enhanced with sustainable infrastructure promotes a cleaner, greener and more pedestrian friendly environment aspiring for a better future.

6.4 Street Plantation and Materials

6.4 Street Plantation and Materials

Street Plantation

Street plantation and landscaping improve the livability and quality of green space in context of streets. It should play a functional role in providing shade to pedestrians, cyclists, vendors and public transport passengers. It should also enhances the aesthetic quality of the streets.

Benefits of Landscapes

Landscape should be pivotal in creating comfortable, clean and memorable street environment. It helps shape the character of the place, improve environment from different perspectives, such as aesthetic quality, enhance micro climate, energy saving and storm water management.

City enjoys plantation benefits in different ways and thus should be classified into following categories:

Trees benefits us in different ways as follows:

Environmental Benefits of Trees

- Reduce energy use and heat island effects
- Reduce greenhouse gases and airborne particulates
- Improve water quality and groundwater recharge
- Support of natural diversity
- Improve micro climate, air quality and reduce noise pollution

Social Benefits of Trees

- Enhance comfort, beauty, and attractiveness of streets
- High quality public spaces is key to the success of the city
- Helps to reduce stress and improves quality of life of people
- Reduces exposure to UV rays
- Symbolic connection to the natural world

Economic Benefits of Trees

- Improve comfort, image and identity of the area
- Enhance the attractiveness of the community and the city
- Perception of quality and care
- Increases real estate values of residential and commercial properties
- Through branding and marketing, draw businesses and people to the city

Landscaping buffers enhances the psychological separation between the carriageway and the cycle track or footpath

Tree cover improves the comfort for pedestrians and cyclists

This footpath is wide, continuous, and shaded, which however the continuous fencing towards the carriageway prevents free pedestrian movement

A street with adequate space for walking and other activities is safer for pedestrians and allows for smoother motor vehicle movement

Photo Sources (Better Streets, Better Cities, 2011), http://static1.squarespace.com/static/594a7ef737c5813e5d8a8f8d/5a6f451b652dea61da8901c7/5afdefb9758d462549036d86/1528494144611/Lexington_Streetscape_Main.jpg?format=1500w, https://www.researchgate.net/profile/Theodore_Eisenman/publication/314236552/figure/fig4/AS:468634637213699@1488742612754/Streetscape-in-Seattle-Washington-that-meets-the-Green-Factor-requirement-for.png

6.4 Street Plantation and Materials

Road Side Plantation
(IRC : SP 21- 2009)

One of the main objectives of roadside avenue plantation should be to provide shade.

Shade bearing trees should be selected for road side plantation with an average spacing of 3 to 6 m, which should provide ample growing space for most species.

These tree species should be of local significance and should be mostly evergreen in nature. This ensures that there is no substantial leaf-fall in winters and prevents the problem of blockage of roadside drains.

Trees with the following characteristics should be planted as shade trees:
- Trees with high crown forms secure better visibility should be adopted for plantation
- Trees that retain their foliage longest should be preferred over deciduous trees

Selection of Tree and Plant Species
Factors that determine the selection of trees and plant species are as follows:
- Road width
- Available space for planting
- Adjacent Land use and type of surrounding activity
- Ease and cost of maintenance
- Form, size, colour and texture as per the urban design goals of the street

Fully mature tree canopy cover should be considered in respect to how it will affect street and pedestrian lighting, building fronts or views of signage.

Shrub Beds in Medians
(IRC : SP 21- 2009**)**

The species planted in median should be low or medium height with ornamental value to enhance the visual experience of the road corridor and also act as a screen to prevent glare from incoming vehicles

Median width of less than 1.5m should have only small shrubs, ground covers or lawn

Median with width of 2.5m should have 2 to 4 rows in combination of shrubs, ground covers and lawn

Median with width up to 5m should have 5 to 8 rows in combination of shrubs, ground covers and lawn

Tree plants should be placed at distance 3m c/c and pit size for planting should be 60 x 60 x 60cm

No Plantation Zone
(IRC : SP 21- 2009)

No plantation Zone Within 1 .5m from the toe of the carriageway

At median cut and grade separator, at least 5m blank space should be left for clear view of the traffic.

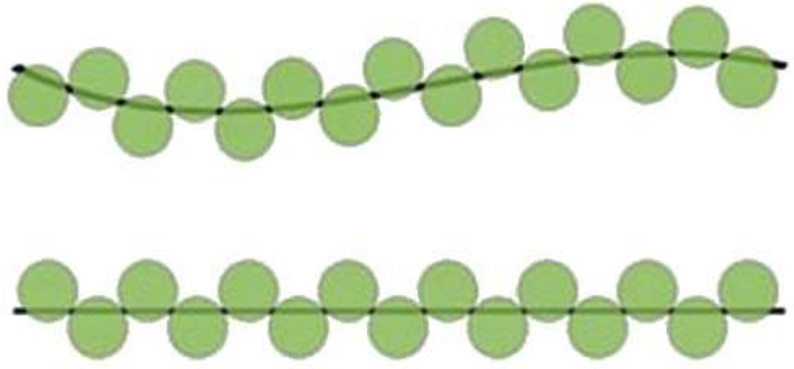
http://www.fao.org/docrep/008/a0532e/A0532e06.htm

6.4 Street Plantation and Materials

Design Criteria and Standards

Vibrancy in Street through Plant Material
A sense of place should be created and altered by the landscape design. It should be integrated to the street according to the adjacent land use and character of the area.

Tree Pits and Common Underground Utilities
Tree pits should have dimensions of at least 1.5m x1.5m to accommodate roots at full maturity. On narrow footpaths, the same surface area should be achieved with 1m by 2.25m tree pits. Hume pipes should be placed at lower level to avoid conflict with tree roots.



Continuous Staggering Tree Line
A continuous tree line compatible with underground utility lines should be planted in median and buffer zones.

C/C Distance between Trees
Appropriate distance between trees should provide continuous shading, depending on the individual trees' canopy size and shape.

Location of Tree Pits
Tree pits locations should be coordinated with the position of street lights and other utilities. Trees with high branching structures should be preferred.

Visual Clearance and Tree Canopy
Medium-height vegetation should be trimmed directly adjacent to formal crossings to improve the visibility of pedestrians and cyclists.

http://freebird-chaithra.blogspot.in/2012/03/flowering-trees-in-india.html, http://www.conteches.com/Products/StormwaterManagement/Biofiltration-Bioretention/Filterra, Wilson Bros Gardens
https://www.google.co.in/imgres?imgurl=https%3A%2F%2Fwww.wilsonbrosgardens.com%2Fassets%2Fimages%2FScreen-Planting
https://content.ces.ncsu.edu/extension-gardener-handbook/15-tree-fruit-and-nuts http://www.conteches.com/Products/StormwaterManagement/Biofiltration-Bioretention/Filterra,

6.4 Street Plantation and Materials

Planting along Sidewalks
Continuous planting zones along the residential frontage should be suitable. Character plantation should be introduced as potted plant on light poles.

Shaded walkways
Large canopy to trees should be planted to create shaded sidewalks for comfortable microclimatic conditions.

Tree Gratings
Tree gratings finished at the same level as surrounding pavement should be provided to allow people to walk while still allowing water, air and nutrients to access the roots.

Continuous Planting along Walkways
Continuous planting zones should be suitable for areas with less footfall. It should be contained within the walking zone.

Special streets such as retail (shopping streets) should have trees in tree-guards and not in continuous planting strips to allow more flexibility and space for pedestrian movement.

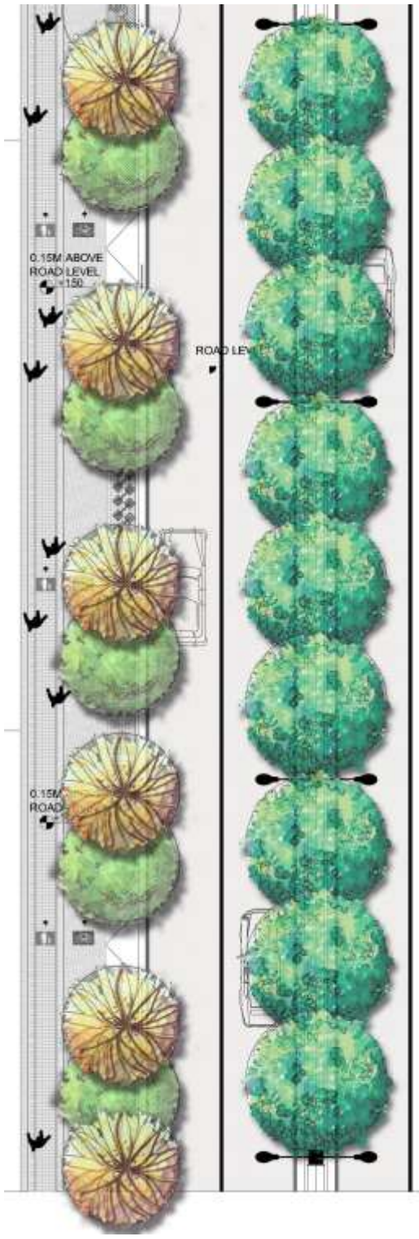
Plant Character
Only native trees should be planted on streets in order to minimise irrigation requirements and prolong tree life.

Tree Gratings and Tree Guards
Tree guards should be provided for young trees. Local materials like bamboo should be used. Tree gratings finished at the same level as surrounding pavement to allow people to walk while still allowing water, air and nutrients to access the roots.

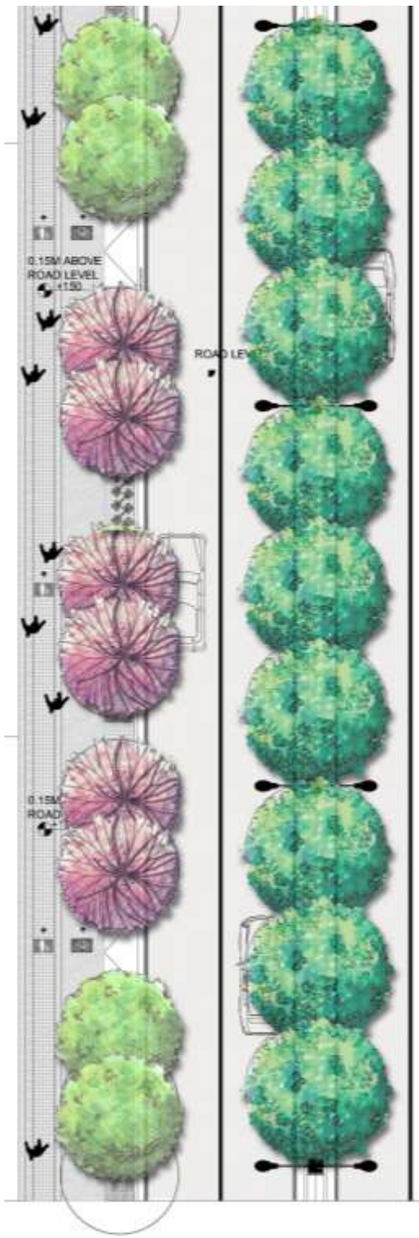
(Source: https://worldarchitecture.org/) (Source: Street Design Guidelines, UTTIPEC, DDA) Street Design Guidelines © UTTIPEC, DDA 2009 Street Design Guidelines © UTTIPEC, DDA 2009 (Source: Street Design Guidelines, UTTIPEC, DDA) Source: Pradeep Sachdeva Design Associates, Nov 2009 x

6.4 Street Plantation and Materials

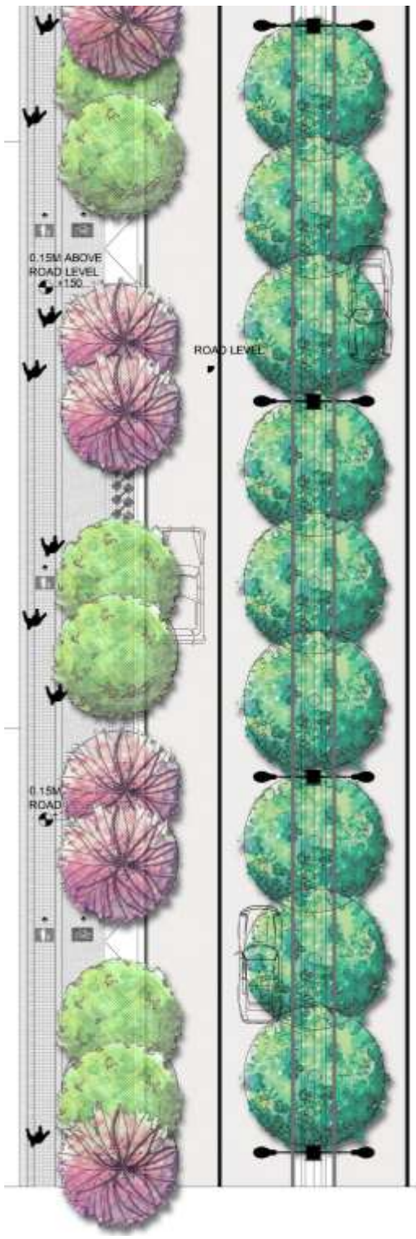
Planting Possibilities



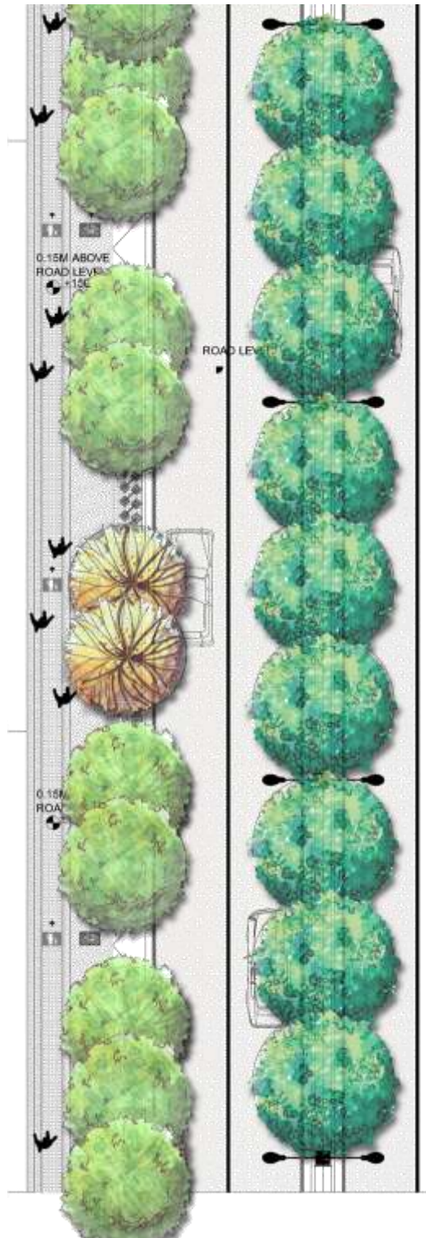
OPTION 1 – ALTERNATE COMBINATION OF MEDIUM EVERGREEN AND FLOWERING TREES



OPTION 2– AVENUE PLANTATION IN COMBINATION OF MEDIUM EVERGREEN AND FLOWERING TREES



OPTION 3– GROUP OF 2 TREES IN COMBINATION OF MEDIUM EVERGREEN AND FLOWERING TREES



OPTION 4– SINGLE OR GROUP OF 2 FLOWERING TREES IN BETWEEN EVERGREEN TREES

6.4 Street Plantation and Materials

Planting Character

Each ROW should have different colour plantations considering different seasons, according to the hierarchy of roads.
The ROW should have a combination of green trees and ornamental trees.

Following suggested planting character and experience should be created while travelling throughout the city.

- 50m should have red flowering
- 25m should have pink flowering trees
- 17m should have purple flowering trees
- 15.6m should have white flowering trees.
- 12m should have pink flowering trees
- 9m should have purple flowering trees.

All the above suggested colour schemes should be in combination with evergreen trees.

Note

- The list is reflecting suggestive plantation palette for street character using flowering trees. Additional species can be added based on availability of trees and local conditions matching design intent.
- Refer plantation combination possibilities of similar sized flowering and evergreen trees

ROW	COLOUR	NAME	FLOWERING SEASON	TREE SIZE
60 M	RED FLOWERING	DELONIX REGIA	MAY-JUL	L
		ERYTRINA INDICA	JAN-MAR	L
		CALLISTIMON CITRINUS	FEB-JUL	M
		BUTEA MONOSPERMA	JAN - MAR	M
		BOMBAX CEIBA	JAN - MAR	M
		RED ACCASIA		M
		EVERGREEN TREES (REFER PLANTING LIST)		L / M
50 M SUB ARTERIAL ROAD	ORANGE FLOWERING	SARACA INDICA	FEB-APR	M
		CORDIA SEBESTINA	SPRING,SUMMER,WINTER	M
		SPATHODEA CAMPANULATA	JAN-FEB,AUG-OCT	L
		EVERGREEN TREES (REFER PLANTING LIST)		L / M
50 M ARTERIAL ROAD	YELLOW FLOWERING	CASSIA FISTULA	MAY-JULY	M
		PELTOPHORUM PTEROCARPUM	SEP-NOV	L
		THESPESIA POPULENEA	JAN-APRIL	L
		TABUBIA ARGENTIA	JAN-APRIL	L
		TABUBIA AUREA	JAN-APRIL	L
		ACACIA FARNESIANA		
		EVERGREEN TREES (REFER PLANTING LIST)		L / M
25 M / 12 M	PINK FLOWERING	SAMANEA SAMAN	MAR-SEP	L
		PLUMERIA RUBRA	JUNE-NOV	M
		LARGESTROMIA INDICA	MAR-MAY	M
		TABUBIA ROSEA	FEB-MAR	L
		EVERGREEN TREES (REFER PLANTING LIST)		L / M
17 M / 9 M	PURPLE FLOWERING	**BAHUNIA PURPUREA**	FEB-APRIL,JUNE-OCT	M
		LARGESTROMIA SPECIOSA	FEB-MAR	M
		JACCARANDA MIMISOFOLIA	FEB-MAR	L
		EVERGREEN TREES (REFER PLANTING LIST)		L/M/S
15.6 M	WHITE FLOWERING	CHLOROXYLON SWIETENIA	MAR-APRIL	L
		TABUBIA PILLADA	JAN-APRIL	L
		PLUMERIA ALBA	JUNE-NOV	M
		PONGAMIA PINNATA	JAN-MAR	L
		NYCTANTHES ARBOR-TRISTIS	SPRING,SUMMER,WINTER	M
		PLUMERIA OBTUSA	JUNE-NOV	M
		MILINGTONIA HORTENSIS	SEP-MAY	L
		EVERGREEN TREES (REFER PLANTING LIST)		L / M

6.4 Street Plantation and Materials

Planting Palate

Use of Native Species

Evergreen species

Flowering species

L= Large tree should be min 6m in height
M= Medium tree should be 4.5m in height

All trees at the time of procurements should be min 2.4m in height.
Minimum 4” calliper size
Bag size = 30’’ X30” size
Minimum 5 to 8 branches should be required for plants while selecting plant for plantation.

- Existing tree should not be removed by the contractor until specifically ordered in writing by the engineer as well as received approval from relevant government authority
- Constructed planters should be in MFZs but not on the sidewalks
- The contractor should obtain the necessary planting permits from relevant government authority prior to the start of work for bio-swale plantation

Tree Plantation List

SR.NO.		TREES	SIZE
1		Ficus bengalensis	L
2		Delonix regia	L
3		Mangifera indica	L
4		Pongamia pinnata	L
5		Samanea saman	L
6		Tamarandus indica	L
7		Thespesia populenea	L
8		Albezia lebbek	L
9		Chloroxylon swetinea	L
10		Neolambrekia cadamba	L
11		Barringtonia asiatica	L
12		Tabubia argentia	L
13		Terminalia catappa	L
14		Mimusops elangi	L
15		Michelia champaca	M
16		Fillicium decepens	M
17		Messua ferrea	L
18		Erytrina indica	L
19		Gyrocarpus amiracanus	L
20		Azadirchta indica	L
21		Bahunia purpurea	M
22		Bahunia recemosa	M
23		Alstonia scholaris	L
24		Eucalyptus citriodora	L
25		Saraca indica	L
26		Syzegium cumini	L
27		Dillinia indica	L
28		Tabubia pillada	L
29		Milea azadarach	L
30		Plumeria alba	S
31		Cordia sebestina	L
32		Callistemon cirtinus	M
33		Milingtonia hortensis	L
34		Necthathus arbor tritis	M
35		Diospyros malabarica	L
36		Terminalia alata	L
37		Pterocarpus marsupium	L

SR.NO.		TREES	SIZE
38		Shorea roxburghii	L
39		Dalbergia latifolia	L
40		Terminalia arjuna	L
41		Ficus racemosa	L
42		Peltophorum pterocarpum	L
43		Tabebuia aurea	M
44		Dalbergia sissoo	L
45		Polyalthia longifolia	L
46		Plumeria obtusa	S
47		Plumeria rubra	S
48		Schefflera actinophylla	M
49		Cassia fistula	L
50		Lagerstroemia speciosa	L
51		Melaleuca bracteata	M
52		Butea monosperma	L
53		Cassia javanica	L
54		Phyllanthus emblica	M
55		Bombex ceiba	L
56		Grevillea robusta	L
57		Jacaranda mimosifolia	L
58		Polyalthia longifolia	L
59		Ficus racemosa	L
60		Cochlospermum religiosum	M
61		Ficus religiosa	L
62		Grevillea robusta	L
63		Anthocephalus cadamba	M
64		Calophyllum inophyllum	L
65		Madhuca latifolia	L
66		Melia azedarach	L
67		Spathodea campanulata	L
68		Pterospermum acerifolium	M
69		Albizia julibrissin	M
70		Acacia auriculiformi	M
71		Zizipus jujuba	L
72		Crataeva religiosa	M
73		Aegle marmelos	M
74		Muntingia calabura	M

6.4 Street Plantation and Materials

Evergreen species

Flowering species

T=Tall shrubs should be 2.8m in height
M= Medium shrub should be 1.6m in height

- Existing tree should not be removed by the contractor until specifically ordered in writing by the engineer as well as received approval from relevant government authority
- Constructed planters should be in MFZs but not on the sidewalks
- The contractor should obtain the necessary planting permits from respective government authority prior to the start of work for bio-swale plantation

Shrub Plantation List

SR.NO.		SHRUBS	SIZE
1		Bambusa multiplexa	T
2		Raphis exalsa	T
3		Bambusa ventricosa	T
4		Nerium indicum	T
5		Tabernaemontana divaricate	T
6		Hibiscus rosa sinensis	T
7		Acalypha wilkisiana tahiti	T
8		Jathropha pandureafolia	T
9		Boungainvillea spectabilis	T
10		Boungainvillea glabra	T
11		Carissa carandus	T
12		Tabernamontana dwarf	T
13		Cestrum necturnum	T
14		Jasminum multiflorum	M
15		Jasminum sambac	M
17		Jasminum grandiflorum	T
18		Hymenocallis caribaea	M
19		Lilium candidum	T
20		Adenium obesum	T
21		Euphorbia milli	T
22		Nerium olander dwarf	T
23		Pedilanthus tithymloides	T
24		Furcarea foetida	T
25		Thumbergia erecta	T
26		Sansevieria hyacinthoides	M
27		Ficus benjamina	T
28		Galphemia glouca	M
29		Ixora odorata	T
30		Tecoma stans	M
31		Mussenda clabrata	T
32		Gardenia lucida	T
33		Allamenda cathrtica	T
34		Drecena marginata	T
35		Clerodendrum inreme	T
36		Acalypha wilkisiana macafeana	T
37		Mussenda ethrophtla	M

SR.NO.		SHRUBS	SIZE
38		Rondeletia leucophylla	T
39		Cycas beddomei	T
40		Memecylon umbellatum	T
41		Nephrolepis cordifolia	M
42		Murraya koenigii	T
43		Furcraea foetida	T
44		Duranta repens	M
45		Clerodendrum indicum	T
46		Heliconia psittacorum	M
47		Tulbagia lily	M
48		Acalypha indica	T
49		Euphorbia cotnifolia	T
50		Crinum lily	T
51		Catharanthus rosea	M
52		Pennisetum rueppeli	M
53		Boungainvillea thimma	T
54		Agapanthus africans	M
55		Dracaena fragrans	T
56		Philodendron xanadu	M
57		Ficus starlight	T
58		Canna indica	M
59		Alpenia vittata	M
60		Duranta repens alba	M
61		Stachytarpheta indica	M
62		Bauhinia galpinii	T
63		Tecoma capensis	T
64		Malvaviscus arboreus mexicanus	T
65		Jatropha multifida	T
66		Exocaria-bicolor-variegata	M
67		Schefflera arboricola	M
68		Syzygium australe	T
69		Heliconia pissitocorum	M
70		Gardenia jaminoids	M
71		Murraya paniculata	T
72		Heliconia caribaea big red	T
73		Alpenia purpurata	T

6.4 Street Plantation and Materials

Evergreen species

Flowering species

L= Large tree should be min 6m in height
M= Medium tree should be 4.5m in height

T=Tall shrubs should be 2.8m in height
M= Medium shrub should be 1.6m in height

All trees at the time of procurements should be min 2.4m in height.
Minimum 4” calliper size
Bag size = 30’’ X30” size
Minimum 5 to 8 branches should be required for plants while selecting plant for plantation.

- Existing tree should not be removed by the contractor until specifically ordered in writing by the engineer as well as received approval from relevant government authority
- Constructed planters should be in MFZs but not on the sidewalks
- The contractor should obtain the necessary planting permits from respective government authority prior to the start of work for bio-swale plantation

Shrub Plantation List

73		Alpenia purpurata	T
74		Crossandra infundibuliformis	M
75		Sterelizia reginae	T
76		Plumbago capensis	M
77		Acalypha hispida	M
78		Hemelia petens	T
79		Tabernaemontana divericata	M
80		Pachystachys lutea	M
81		Cymbopogon citratus	M
82		Calliandra haematocephala	M

Wetland Species

SR.NO.			
1		Eichhornia crassipes	
2		Ipomoea aquatica	
3		Nelumbo nucifera	
4		Phyla nodiflora	
5		Alternanthera sessilis	
6		Commelina benghalensis	
7		Myriophyllum indicum	
8		Utricularia aurea	
9		Hydrilla verticillata	
10		Ceratophyllum demersum	

6.4 Street Plantation and Materials

Bio Swale

Bio-swales should be considered as landscape elements consisting of swale drainage courses with gently sloped sides filled with vegetation, compost or rip / rap. They should help to capture treat and infiltrate storm water runoff. Bio swales are natural and aesthetically pleasing alternatives to concrete gutters and storm sewers. Amaravati should provide bio-swale at specific areas as indicated at the table. Relevant international best practices are included as follows:

ROW	Location	Min Size	Bio-swale interval
60m Seed access road and Major arterial road	MRT and Seed Access Road)MFZ 1 and MFZ 3.	Minimum size of bio-swale 0.9m X 6m	Provided at c/c interval of 30m
ROW 50m Sub Arterial road	Sub Arterial MFZ 3 and MFZ 4	Minimum pit size of bio-swale 0.9m X 6m	Provided at c/c interval of 30m
ROW 50m Arterial road	Arterial MFZ2 and MFZ 3	Minimum pit size of bio-swale 0.9m X 6m	Provided at c/c interval of 30m
ROW 25m	MFZ 1	Minimum pit size of bio-swale 0.9m X 3m	Provided at c/c interval of 15m
ROW 17m	MFZ 1	Minimum pit size of bio-swale 0.9m X 3m	Provided at c/c interval of 15m
ROW 15.6m	MFZ 1	Minimum pit size of bio-swale 0.9m X 3m	Provided at c/c interval of 15m

Seepage Basin

- The overflow of storm water in bio-swale should be provided with seepage basin within bio-swale to drain out with proper channel to discharge
- No connection to sewers

(Design and guidelines for green infrastructure practices, City of New York)

Bio-Swale Soil Mix

- Filter media mixture of 50% ASM and 50% medium to coarse sand with varied particle size of 0.6m depth
- Transition layer coarse sand with 0.7–1.0 mm particle size and 0.1m depth
- Drainage layer fine gravel 1.0–5.0mm particle size and 0.2m depth
- Bio-swale grading for soil surface in pit
- Soil surface grading should be provided with low level at center from the edges of pit

Typical Planting Shrubs for Bio-Swale

Following shrubs and groundcovers should be considered as part of bio-swale

- Canna generalis
- Acalypha wilkesiana cultivar
- Bougainvillea ‘Sakura Variegata’
- Chrysopogon zizanioides
- Codiaeum variegatum
- Complaya trilobata
- Cymbopogon citratus
- Dracaenaceae reflexa
- Melastoma malabathricum
- Nerium oleander ‘Pink’
- Ophiopogon jaburan
- Pennisetum alopecuroides
- Pennisetumx advena ‘Rubrum’

(Plant Selection for Bio retention Systems and Storm water Treatment Practices, Centres for Urban Greenery and Ecology)

6.4 Street Plantation and Materials

Material and Landscape Specification

Material palette

Selection of paving materials should consider the following factors:

1. Functionality
2. Durability
3. Cost and maintenance
4. Material availability

Design Criteria

1. Shape
2. Colour
3. Pattern
4. Comfort

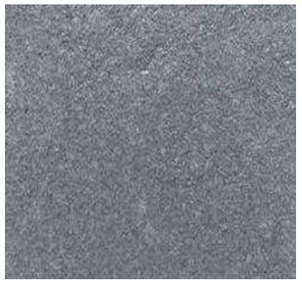
Material Palette should be suggested as shown on the right. The materials should be used at different parts of the streetscape in according to the character and function of the context.

Residential street paving

Commercial street, Australia

Stone

Narzi limestone
Kadapa, AP



Kaddapa stone
Kadapa, AP

Tandur stone
Telangana

Steel grey Granite
Chilakarupeta, AP

Black pearl Granite
Chilakarupeta, AP

Black Slate
Markapur, AP

Lime peacock slate

Indian Autumn slate

Rustic Autumn slate

Quartzite

Gravel

Feldspar white granite

Galaxy black granite

Blue granite
Adduvukonda, AP

Gneiss Stone
Eastern ghats, AP

Concrete

Concrete

Permeable Concrete

Interlocking paver blocks

Asphalt/ Bitumenous

Roller compacted concrete

Source: https://www.pinterest.co.uk/pin/261842165815793729/, http://www.apmdc.ap.gov.in/

6.4 Street Plantation and Materials

Public promenades

Earth Materials

Clay brick pavers

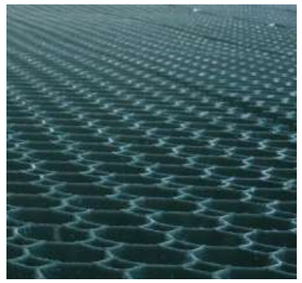
Rammed earth

Sun dried bricks

Children play area

Synthetic materials

Rubber along with asphalt

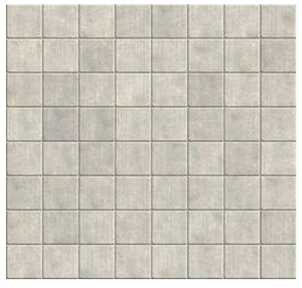


Plastic paving

Plastics paving blocks

Wood plastic composite

Turf Reinforcement Mats



Tiles

Resin/ Epoxy based

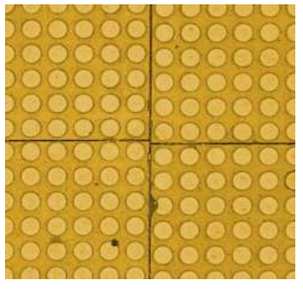
Rubberized flooring –EPDM (ethylene propylene diene terpolymer) rubber

Synthetic Grass pavers

Public plazas

Tactile Paving

Corduroy stone



Blister on Street Stone

Wooden Paving

Wooden strips pattern

Wooden planks

6.4 Street Plantation and Materials

Material Criteria and Specifications

1 Pedestrian Walkways

Paving Material

- Paved material should be sourced from locally available natural stone or paver tiles
- Paving patterns should be creatively used for directional purpose and combination of various colours in pattern should be used as per the neighbouring site context and ROW

Texture

- Surface finish for pedestrians should be non-slippery and easy to maintain
- A combination of hard and soft textures should be incorporated
- Tactile tiles should be used to guide disabled people at pedestrian crossing, transit stops and street intersections

Colour

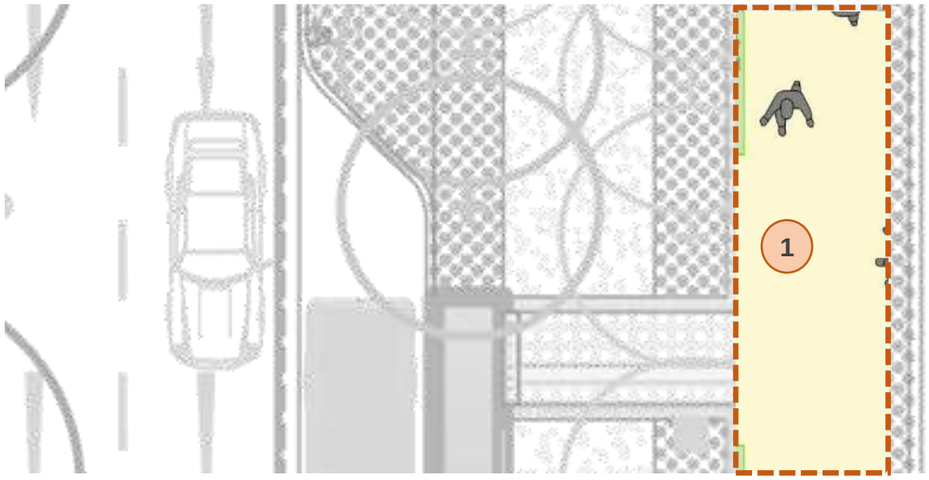
Colours use for paving should be pastel and cool colour shades to reduce heat absorption on sidewalks. Combination of cool and warm colours or locally available stone or concrete paving material should be used for highlighting design pattern element and character of the important streets, corner plaza and waterfront promenade.

There should be mix of min two different colour schemes, texture and material in the same paved area as long as the combination present a harmonious result.

Natural stone paving, concrete paver blocks, stamped concrete, colored concrete of pastel shades with rough texture as per design considerations.

2 Cycle Track

- The surface of the cycle track should be different from carriageway and walkway
- Colored concrete and colored asphalt e.g. pastel shades of bright colors (red, blue or green) to define the cycle tracks

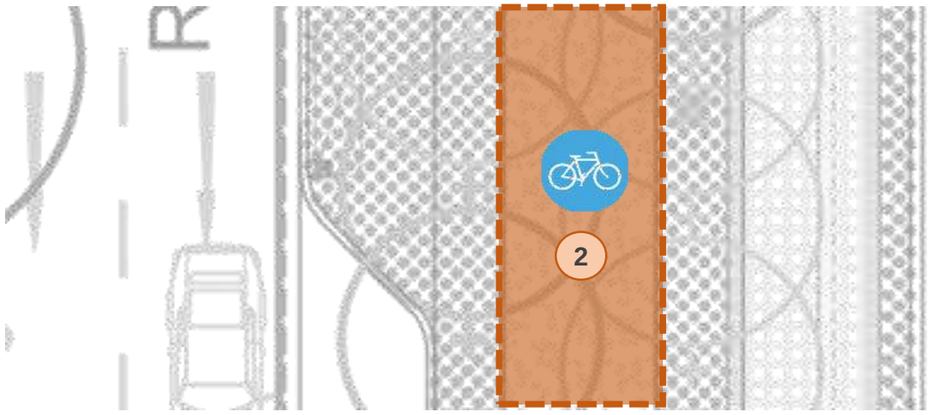


Pedestrian walkway paving material range

Concrete Tremix	Interlocking paver blocks	Kadapa stone	Dark Granite stone

Dark granite stone for paving, Singapore

Interlocking paver pattern, India



Cycle track paving material range

Asphalt/ Bitumenous Or cold pressed Asphalt	Rubber along with asphalt	Rubberized flooring –EPDM (ethylene propylene diene terpolymer) rubber	Concrete

Source: http://www.apmdc.ap.gov.in/ https://www.indiamart.com/proddetail/cycle-track-paints , https://www.indiamart.com/proddetail/cycle-track-paints

6.4 Street Plantation and Materials

Material Criteria and Specifications
Street Lighting and Seating

3 Street Lighting Fixtures

Street lighting should be based on categories linked to purposes shown below:

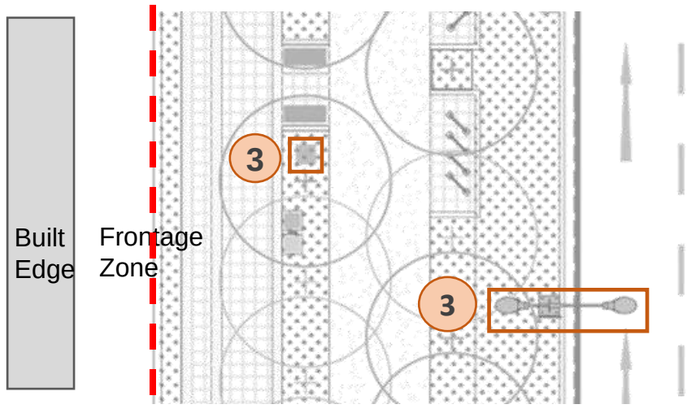
- Pedestrian lighting
- Street lighting for carriage way/ intersections.
- Bollard lighting
- Lighting fixtures for public spaces/rotaries/ monuments/ waterfronts
- Eco-friendly lighting systems
- Smart lighting systems

Colour

- White LED light should be preferred for carriage way in Amaravati city streets
- Street lighting for sidewalks based on street character

Pole specification

- Retain standard green/ brown/ black colour
- Material used for light pole should be non conductive
- Accent colour bands or patterns should be used to highlight specific corridors
- Artistic wraps for traffic control boxes should be considered, especially on wayfinding installations, in festival celebration and tourist areas



4 Seating Areas

- Seating should be long lasting, soft-edged and easy to maintain
- Seating material should be sourced from locally available natural stone
- Metallic framed benches should be avoided due to climatic context
- Use of tree pit seating and planter ledges should be considered

Style and Finish of Seating

Style of the seats should be in consideration to context of park, plaza, road side, waterfront and tourism places.

- Granite stone for benches
- Stainless steel
- Mix of two different seating styles must be avoided

Texture

- Texture of seating material should be polished surface, leather finish or easy to maintain and clean from dust and rain.

Source: furnitubes.com

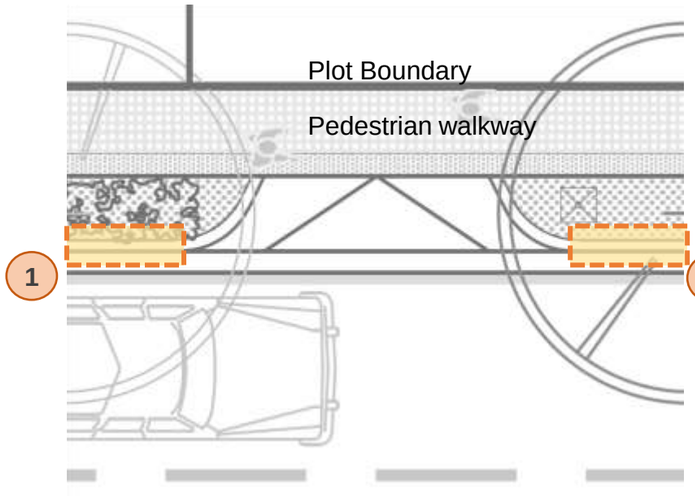
6.4 Street Plantation and Materials

Material Criteria and Specifications

Curbs

1 Straight Curb

- Straight curb should be used between the edge of the carriageway and the front edge of the green space / furnishing zone
- Straight curbs should be provided above road level

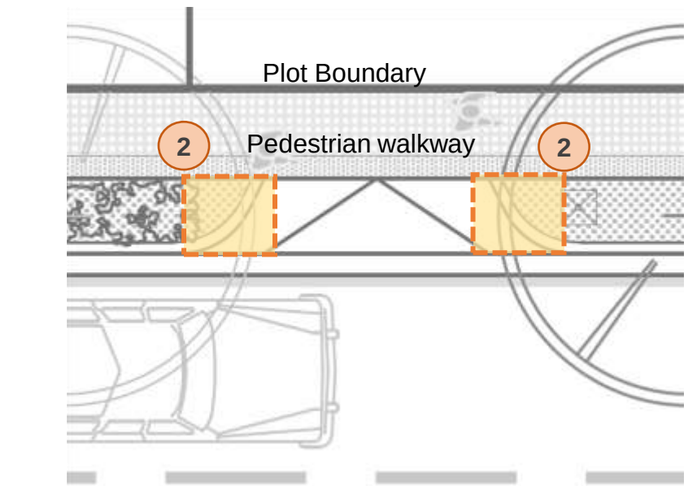


Straight curb

Straight curb material range
- Precast concrete curb
- Granite stone curb

2 Curved *Curb*

- Curved curb should be provided at every turning point of each intersection and entry/ exit point of the plot

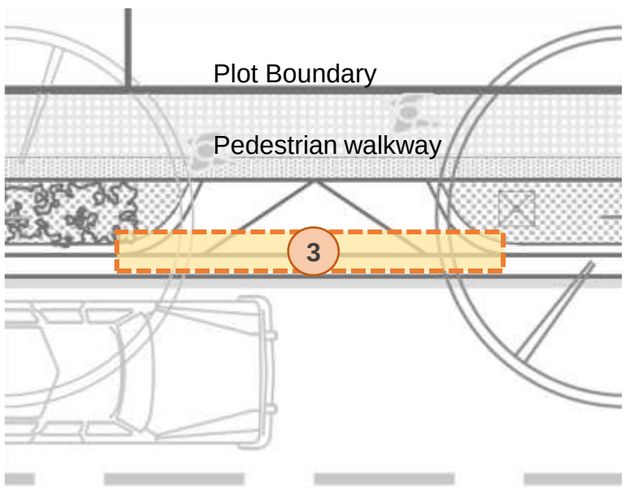


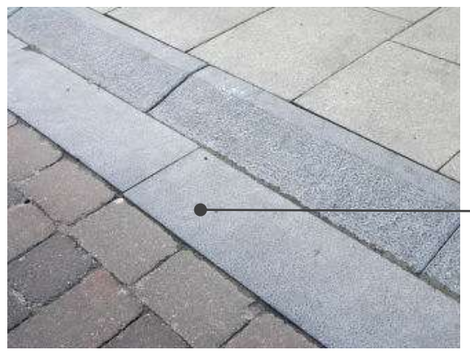
Curved curb

Curved curb material range
- Precast concrete curb
- Granite stone curb

3 Mountable Curb

- Mountable curb should be provided at the start of every curb ramp
- Pedestrian crossing with trapezoidal hump should be provided with mountable curb flushed with crossing and pedestrian walkway level





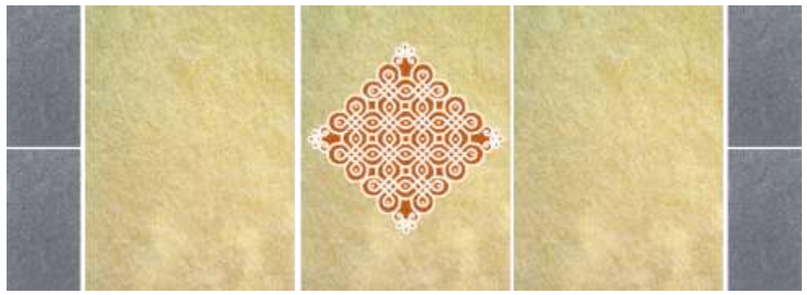
Mountable curb

Flush curb material range
- Precast concrete curb
- Granite stone curb

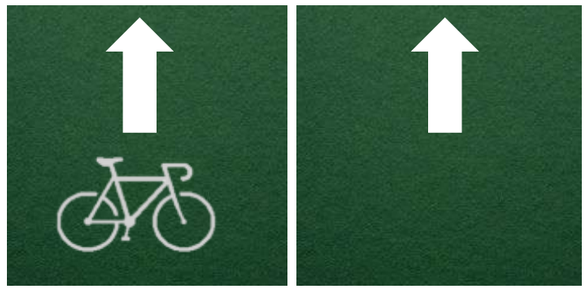
6.4 Street Plantation and Materials

Typical Sidewalk Pavement Material and Pattern (Recommended)

Option_1

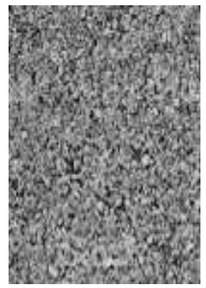


Pedestrian Walkways – along commercial and public spaces
Use of natural local stone material with traditional AP patterns for key plazas and/ or along public spaces.



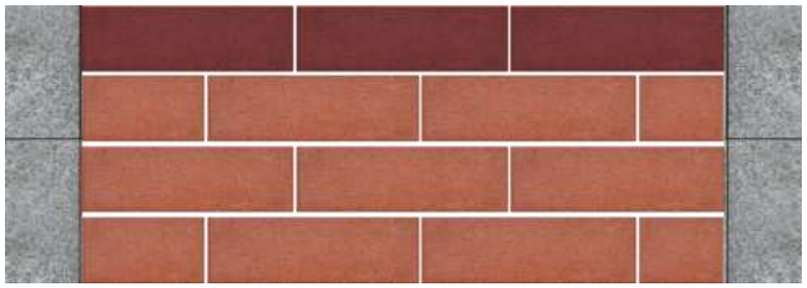
Cycle tracks– Synthetic finish

Drop-off/
Drop off lots/
Rapid Transit Lanes

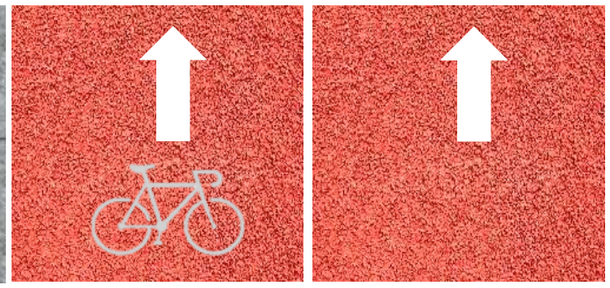


Carriageway

Option_2

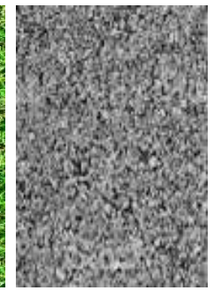


Pedestrian Walkways with Traditional patterns –
Shades of Red and beige colour pavers with grey liner paving



Cycle tracks – Synthetic finish

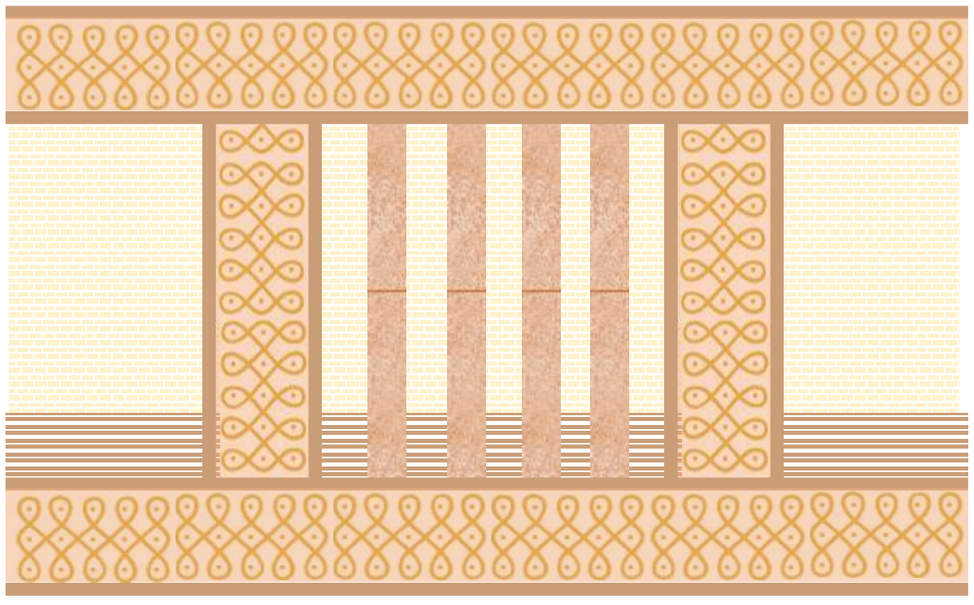
Landscape strips/
Sidewalk edge carpet grass



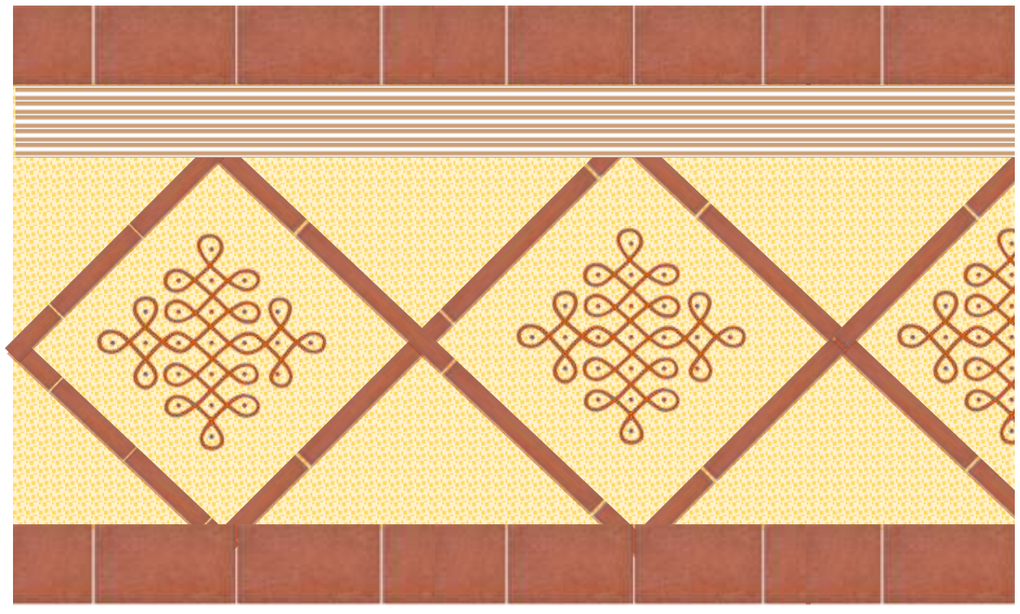
Carriageway

(Shown as indicative materials maybe based on client approval) Colored concrete, colored asphalt e.g. pastel shades of red and green to define hierarchy of roads. Colours consideration as per universal guidelines for people with colour blindness. colours should not fade due to dust and should remain indicative purpose for longer duration.)

Paving pattern design consideration based on local cultural elements



Printed concrete tiles can be manufactured to reflect local rangoli pattern giving identity to key ROW corridors.



Summary of Streetscape Guidelines

Guidelines	Public Sector	Private and other sectors	Mandatory	Suggestive	Chapter Page
Street Sections					276
Sidewalk width should be including pedestrian walkway and cycle track as part of the Non-Motorized Transit (NMT) and Multi functional zone (MFZ) as per respective ROW	√	√	√		
Number of lanes and width of all carriageway lanes should be provided as per Amaravati Masterplan	√	√	√		
Minimum pedestrian walkway should be provided on both sides of the street as per respective ROW	√	√	√		
Minimum Cycle track (NMT) should be provided on both sides of the street as per respective ROW	√	√	√		
MFZ's as planting strip should be provided on both sides of the street as per respective ROW	√	√	√		
Bus stops, drop off areas, feeder bus stops and rickshaw should be accommodated within MFZ corridors	√	√	√		
Sidewalk surface logo and road surface markings should be provided indicating directions of flow and surface markings for mode of transportation on each ROW as per IRC 35-2015	√	√	√		
Tactile paving band should be provided on all the pedestrian walkways as part of pedestrian walkway and Min 0.6m should be maintained from the ramp edge of footpath as per IRC 103-2012	√	√	√		
Shade structures - bus stops, shelter, resting areas, information kiosks should be placed and designed with respect to MFZ widths along different ROW's	√	√	√		
Benches and seats should be provided at strategic locations as part of MFZ 1 In combination of 2 seats without obstructing cycle and pedestrian movement	√	√		√	
Litter and recycling bins capacity of min 72 lit should be provided on all streets including dry and wet waste separate bins	√	√	√		
Tree grates and guards at paved areas should be provided of size 1.2 m x 1.2m of stone, concrete or FRP	√	√		√	
Cycle racks should be provided on all streets near transit stop, public building and amenities (Distance interval 750m -1000m). Min 10 cycles at each location	√	√	√		
Utility chamber tray type covers should be provided to match the adjacent paving material, color, pattern and levels	√	√	√		
Staggering of Pedestrian light pole should be provided on all pedestrian pathways with Street light poles as per guideline (Ref. streetscape guidelines matrix for respective row)	√	√	√		
Staggering of Street light pole should be provided on all streets with Pedestrian light poles as per guideline (Ref. streetscape guidelines matrix for respective row)	√	√	√		
High mast light should be provided at major intersections of 25m and above ROWs	√	√		√	
Traffic signals (IRC 1985) should be placed at all intersections	√	√		√	
Traffic signals and mandatory signs should be provided at the intersection signage's pole and should be placed as part of MFZ as per IRC 67-2012	√	√	√		
Traffic signage's along the roads should be placed as part of MFZ as per IRC 67-2012	√	√	√		
Directional and information signage should be placed as part of MFZ as per signage's IRC 67-2012	√	√	√		
Advertisement and hoardings signage's should be placed as part of MFZ, integrated with transit stop, light poles, cycle racks, information kiosks	√	√	√		

Summary of Streetscape Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Turning Radius at the intersections					310
Intersections with different ROW's with allocated chamfer should be applicable as per higher ROW turning radius, wherever chamfer is not allocated min turning radius should be followed as per ROW criteria	√	√	√		
Trapezoidal hump for pedestrian crossing as per IRC 11-2015 (Traffic calming measures 7.5) should be followed with min width of 2.5 m- 4 m flush with sidewalk and curb with speed calming measures	√	√	√		
Trapezoidal hump should be provided at 17m and above ROW intersection	√	√	√		
Trapezoidal hump pedestrian crossing should be provided at 17m and above ROW intersection	√	√	√		
Road widths with ROW of 12m and 9 m should have zebra crossing at road level with traffic calming measures	√	√	√		
Tactile tile from a public facility to the nearest public transport station should be provided	√	√	√		
Warning tile or concrete tactile tile with vehicular load consideration (min 40 tones) should be provided at parcel entry exits	√	√	√		
Bollards for pedestrian crossings at the intersections should be provided at 1.2m spacing with height of 1m as per IRC 103-2012	√	√	√		
Min width of 2 m – 4 m with speed calming measures should be provided for cycle track crossing with curb ramp	√	√	√		
At all intersections camera electronic devices should be provided for traffic monitoring and management. In absence of camera traffic control kiosk and shelters should be provided for traffic police	√	√		√	
Straight curbs should be provided 0.15m above road level	√	√	√		
Curved curb should be provided at every road turning 0.15m above road level at every intersection	√	√	√		
Curved curb should be provided at every curb ramp turning 0.15m above road level entry/exit point of plot	√	√	√		
Mountable curb should be provided at the start of every curb ramp for plot width ranging from 3.50 to 7.50 m street frontage	√	√	√		
Minimum 5 Pedestrian Crossings for 1 Km stretch of street with trapezoidal hump should be provided with mountable curb.	√	√	√		
Curb ramp should be provided on both sides of each pedestrian zebra crossing at each quadrant and never on the corner of the intersection as per IRC 103-2012.	√	√	√		
Plot access ramp width should be 3 m - 5 m as per IRC 103-2012	√	√	√		
Cycle crossing ramp width should be 3 m - 5 m as per IRC 103-2012	√	√	√		
Public Realm Infrastructure					328
Advertisement Boards should be provided on the streets as per respective ROW	√	√		√	
Bus Stop (Min dimensions:10m (L) X 1.5m (W) X 2.2m (H) with Night illumination on bus stops should be provided	√	√	√		
Bus Stops should be min 30 m away from any junction	√	√		√	
Litter/Recycle Bin should be located within MFZ at 50m intervals within 200m of buildings away from important landmark buildings with separate wet and dry bins	√	√	√		
Public Toilets should be placed with distinct signs for men and women within open spaces and near transit stations at 500-800m walking radius	√	√	√		
Drinking Water fountains/Taps should be located within MFZ, at every 500 - 800 m distance centre to centre	√	√		√	
Electric Station/Transformers Substation should be located within MFZ with plantation buffer	√	√	√		
Streetscape and urban plugins should be proposed within vacant plots and MFZ to facilitate community needs at convenient locations within walkable distance	√	√	√		
Refuge Island of ROW 25m and above should be provided	√	√	√		

Summary of Streetscape Guidelines

Guidelines	Public Sector	Private and Other Sector	Mandatory	Suggestive	Chapter Page
Street Plantation					344
Soil mix and depth- Trees Tree Pits : Min. soil depth 1.2m, Shrubs Planting Beds-Shrubs: Min. soil depth 0.6m, Groundcovers Planting Beds-Lawn and Ground Covers: Min. soil depth 0.3m should be provided	√	√	√		
Trees - All the medium and large size trees should be of min 1.8m at time of planting	√	√	√		
Tall shrubs should be of min 0.6 m, Medium shrubs should be of min 0.3 m and Groundcovers should be of min 0.15 m at time of planting	√	√	√		
All the shrub plantation should follow the layer system considering the hierarchy of heights with respect to pedestrian and vehicular movement	√	√	√		
Root barrier treatment should be provided for tree plantation to protect utilities and building structural elements	√	√	√		
Planting configuration strategies should be referred as per guidelines under streetscape chapter 6 and IRC code SP – 021 2009.	√	√	√		
Street plantation category for trees, shrubs and ground covers should be provided for different multi-functional zones of respective ROW	√	√	√		
Shade bearing trees should be selected for road side plantation with an average spacing of 3 to 6 m	√	√		√	
Median with width of 2.5m should have 2 to 4 rows in combination of shrubs, ground covers and lawn	√	√		√	
Median width of less than 1.5m should have only small shrubs, ground covers or lawn	√	√		√	
Median with width up to 5m should have 5 to 8 rows in combination of shrubs, ground covers and lawn	√	√		√	
Drip irrigation should be provided for all the green areas including all MFZ. The water used for irrigation must be recycled grey water	√	√		√	
Median screen plantation should be provided to avoid headlight glare	√	√	√		
Bio-swale should be provided at specified areas	√	√	√		
Bio-swale installation interval varies with its pit size. Larger the pit size bio-swale c/c interval distance should be less whereas increase in c/c distance interval with decrease in bio-swale pit size	√	√	√		
The overflow of storm water in bio-swale should be provided with seepage basin within bio-swale to drain out with proper channel to discharge	√	√	√		
Bio - swale soil mix should be as per plant selection for bio retention systems and storm water treatment practices	√	√	√		
Bio - swale grading for soil surface in pit should be provided with low level at center from the edges of pit	√	√	√		
Material					354
Pedestrian walkways- Natural stone paving, concrete paver blocks, stamped concrete, colored concrete of pastel shades with rough texture should be provided as as per design considerations	√	√		√	
NMT corridors- Colored concrete, colored asphalt e.g. pastel shades of red and green should be provided to define hierarchy of roads	√	√		√	
Tactile paving- Corduroy stone or concrete tactile tile with vehicular load consideration (min 40 tones) should be provided at parcel entry exits	√	√		√	
Corner plazas- Natural stone paving of lighter shades should be provided with rangoli patterns as appropriate	√	√		√	
Pedestrian crossing- Color should be to match NMT corridor with thermoplastic paint patterns markings	√	√		√	
NMT track crossing- Color should to match NMT corridor with thermoplastic paint patterns markings	√	√		√	
Seats- Natural stone cladding and coping of lighter shades should be provided with concrete or constructed fixed base for seats	√	√		√	
Curb - All types- Precast concrete curb should be provided	√	√		√	
Drop-off, transit corridor - Concrete grass paver blocks should be provided with fire tender loading (40 tone) consideration	√	√	√		
Bollard and railing- Concrete, stone and MS railing should be provided as per design consideration	√	√		√	

7 Built Form Guidelines

Built Form Guidelines

7.1
Site Development and Building Typologies

7.2
Architectural and Façade Treatment

7.3
Green Building Features

7.1 Built Form Guidelines

Overview

Amaravati planned city should ensure its built form is consistent in terms of the overall vision ensuring that its urban fabric, density, building massing, aesthetics and buildings relate to the surroundings and their functional pattern formed at the city, district and neighbourhood level. The built form guidelines together with the ZR not only define the built form, building height and massing but also the area around the buildings with proper street level interface. The built form guidelines also emphasize the importance of the buildings with its relationship to pedestrian comfort, view lines and setting of uniform standards to shape the urban form of Amaravati.

Amaravati built form guidelines will establish a sense of scale, place making and street level continuity to enhance city image. In view of the environment and microclimate of Amaravati the built form guidelines also enhances climate responsive design to improve the micro-climate and increase the comfort for all citizens. The built form guidelines are formulated on the basis of site development, built massing, open space within plots, architectural treatment including green building and large scale development requirements.Green Buildings, Low Carbon and Net Zero Buildings should be promoted and encouraged.

Scope and Limitation

This chapter provides a set of guidelines for architectural elements and characteristics in relation with built form in Amaravati. The built form within plot should not only respond to micro-climate, local architectural design but also integrate with urban design strategies. Built form guidelines area based on existing masterplan plots established under LPS layouts.

As per masterplan and zoning regulations buildings are classified into the following land-uses -

- Residential
- Commercial
- Public /Institutional
- Industrial
- Utilities

The overall Amaravati (LSP) layouts – plot sizes, road alignments and plot access roads has limitations on built form of built form of various plots.

Outline

This chapter describes different aspects within and around the buildings in the plots as follows:

7.1 - Site Development and Building Typologies
7.2 - Architectural and Façade Treatment
7.3 - Green building feature

City Skyline of Kowloon

City Skyline of Frankfurt, Germany with the riverfront and commercial district

, https://www.planning.vic.gov.au/policy-and-strategy/planning-reform/central-city-built-form-review http://pictarics.pw/Nol-Bu-Ne-is-a-favourite-amongst-Auckland-City-locals-with.html

7.1 Site Development and Building Typologies

7.1 Site Development and Building Typologies

Site Development

Buildings should be designed with a human-scale perspective. Spaces for pedestrian movement should be respected and a dead frontage that discourages people from walking around the building should be avoided. Planting should be along building periphery to maximize shaded areas resulting in a pleasant environment. Street frontage setbacks from plot edges are proposed to create spaces improving the vibrancy of the streets and especially benefitting retail and other commercials for economic opportunities. Ensuring priorities to pedestrian access for achieving connectivity and safety from street side.

Following guidelines defines the spaces between the building edge and plot boundary

Setbacks

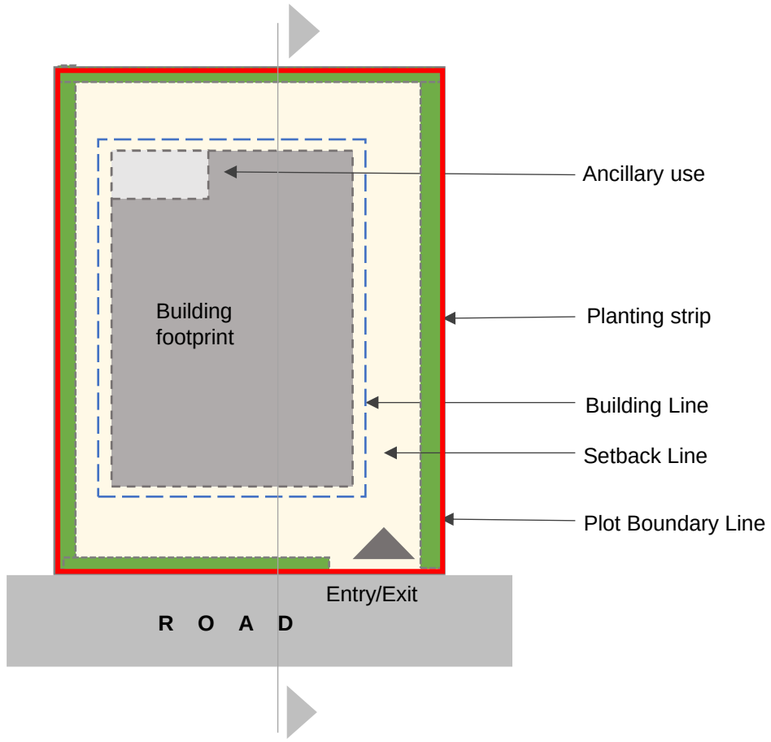
Following guidelines should be adopted for all plots sizes with land use from Amaravati Masterplan:

- Building setbacks for plots should be as per Amaravati Zoning Regulations.
- For plots within transit zone refer TPOD guidelines for specific building setback requirements.
- Planting strip along plot boundary as per plot size excluding plot access should be followed (Refer plot boundary and edge treatment for details)
- Ancillary buildings should be located within building line. (Refer Plan showing setbacks with mandatory planting area)
- Ancillary buildings for services like DG sets, electrical substation and HSD yards etc. should be places in setbacks with proper screening and access for maintenance.
- Utility and services should be screened with decorative fencing or landscaping.

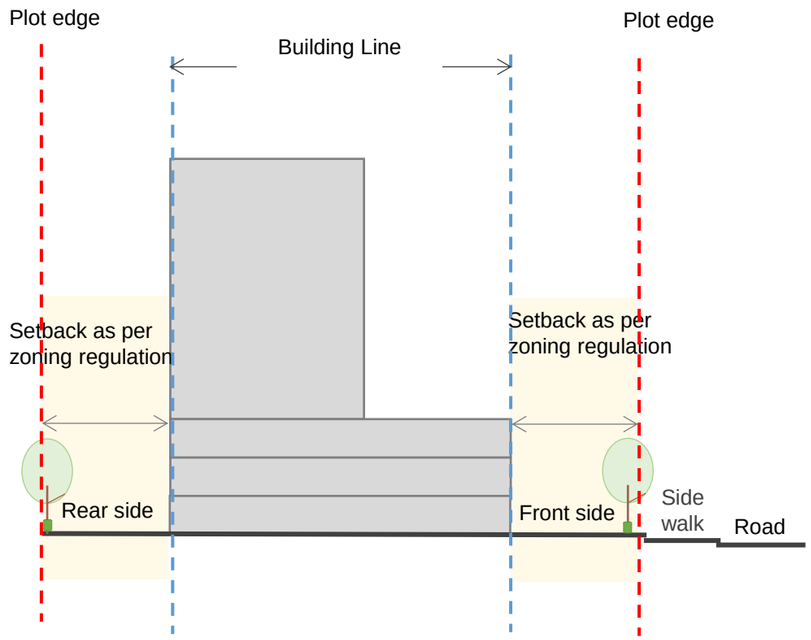
Services

Following guidelines should be adopted for all plots sizes with land use from Amaravati Masterplan:

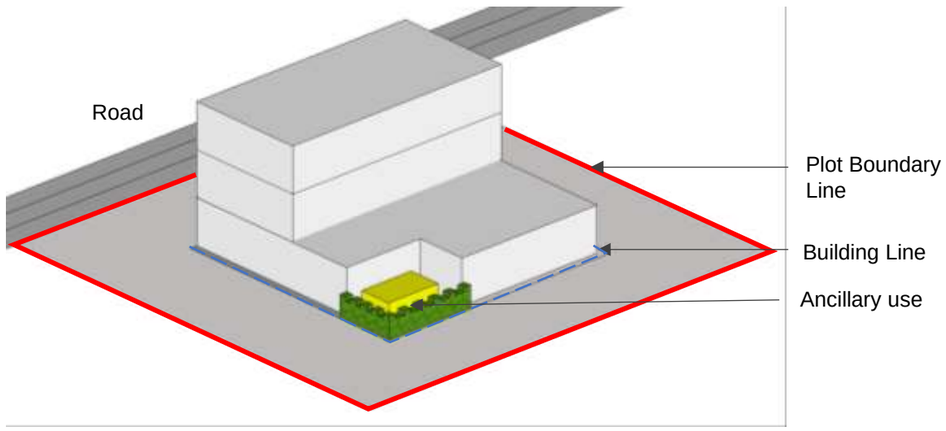
- Service infrastructure of the building should be planned on the rear side of the site
- It should be separated and screened from public access points.
- Service yards on the site should be screened with creative fencing or landscaping



Plan showing setbacks with mandatory planting area



Section showing plot edge and plantation



Service infrastructure planned on the rear side of and it should be screened with fencing or landscaping.

7.1 Site Development and Building Typologies

Plot Access

Following guidelines should be adopted for plot access of various scale development

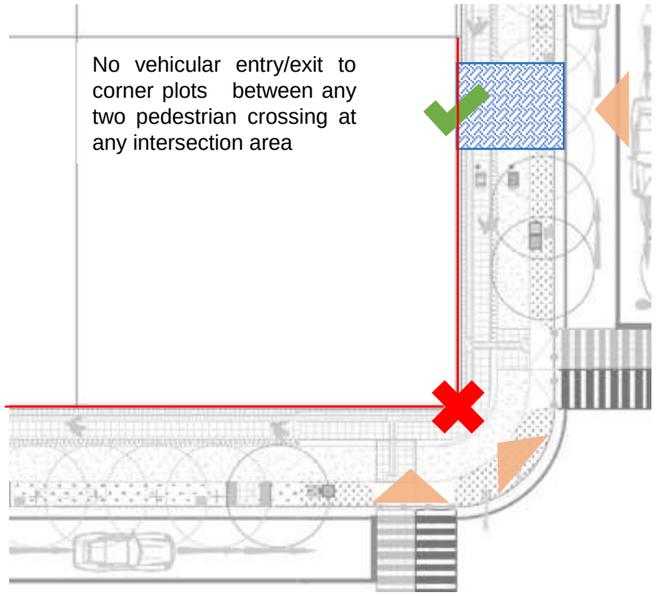
Small and Medium Plots
Plot area below 300sqm (small)
Plot area 300sqm – 500sqm (small)
Plot area 500sqm – 2000sqm (medium)
Plot area 2000sqm – 4000sqm (medium)

Small (plot area below 300 sq m) and Medium Scale Plots (plot area 300 to 4000 sq m)

- For the plots street frontage width ranging from 3.5m-7.4m entry-exit should be provided with a mountable curb
- Plots street frontage width ranging from 3.5m-7.4m entry-exit should be provided with a mountable curb
- Plots street frontage width ranging from 7.5m-49m entry-exit to should be provided with a curb ramp. (Refer to Streetscape guidelines for curb width)
- Small scale plots at street intersection cannot have vehicular access from the street corner. Vehicular access should be provided from the sides of the plot.
- For all medium scale plots entry-exit gate access width should be between 2.4m-3m.
- For medium scale plots vehicular entry–exits curb ramps provision should be located at minimum 15m distance from any pedestrian crossing at intersections.

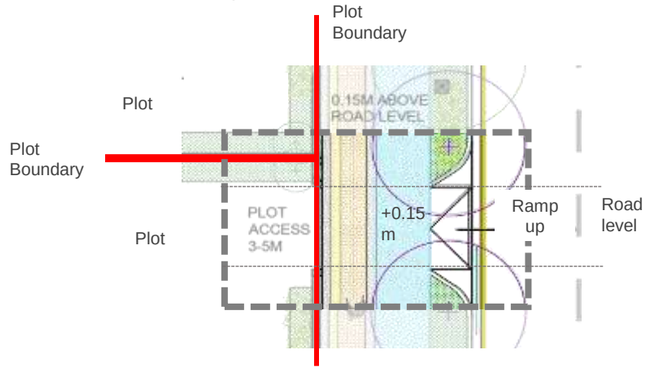
For plot area above 4000 sq.m refer to large scale plots development plots guidelines

Plot Size	Entry type with curb	Entry/exit size
Plot width facing street below 7.5m	Mountable curb	3m
Plot width facing street between 7.5m should below 50m	Curb ramp	3m to 5m



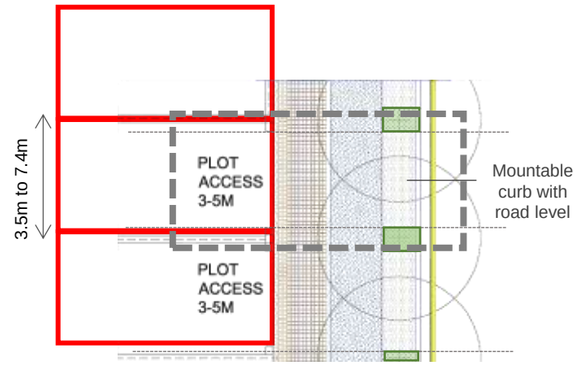
Illustrative plan showing Intersection without entries / exits

For medium scale plots



Illustrative plan showing plot access with curb ramp typical scenario for plot width 7.5m and above.

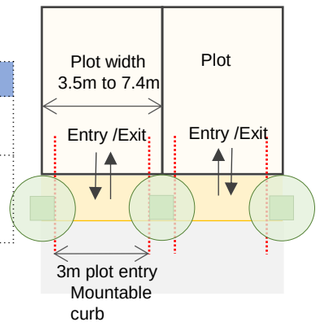
For small scale plots



Illustrative plan showing plot access with mountable curb for plot width less than 7.4m

Plot Access as per plot width consideration

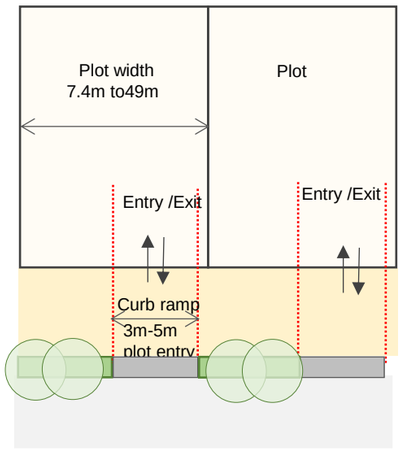
1. For plot width range 3.5m to 7.4m



For the plots of width range 3.5m-7.4m entry-exit should be provided with flush curb.

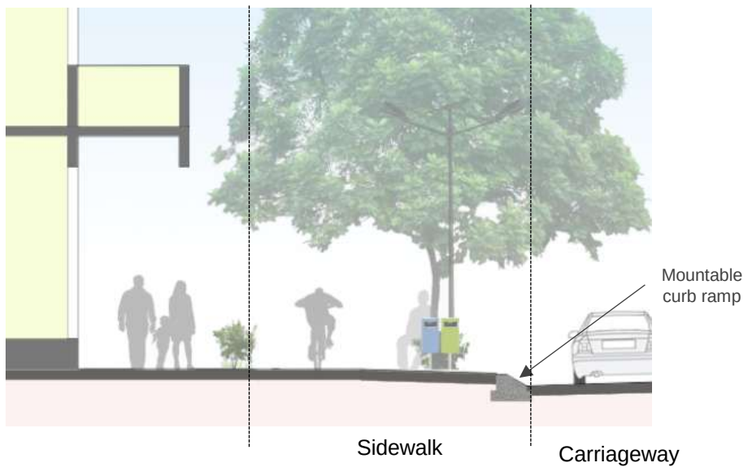
Road
Sidewalk
Curb ramp

2. For plot width range 7.5m to 49m



For the plots of width range 7.5m-49m entry-exit should be provided with curb ramp

Illustrations showing small and medium scale development



Section showing through plat edge

7.1 Site Development and Building Typologies

Plot Boundary and Edge Plantation

Following guidelines should be adopted for all plots sizes with land use from Amaravati Master plan:

- Hedges and planting should be used to replace solid walls as an alternative way to distinguish plot boundaries.Landscape screening though hedges and shrubs allows transparency to the building frontage and improves pedestrian safety as it provide better visibility of the streets from the buildings.
- The use of planting strip creates a natural transition between buildings and sidewalks compared to solid compound walls where buildings are noticeably separated from the streets.
- Planting strip along the plot boundary should be kept free from services / utilities.
- Plot boundary edge treatment with compound wall height should be maximum 1.2 m - consisting of 0.45 m solid wall and 0.75 m screening above the solid wall with min 50% visibility that should be built above the finished level of sidewalk.
- All commercial plots street frontage boundary edge should not be fenced. Bollards or low height planting strips should be used along the street edge for better accessibility to shopfront.
- Low lying solid compound wall or transparent fencing should be provided to discourage misbehaviour of people from sidewalks.
- Fencing materials should be in combination of stained wood, concrete posts, metal of white, black, grey, brown colours. Compound wall can be of brick, stone, artificial stone or structural RCC.

Following guidelines should be adopted for Plot Boundary and Edge plantation of various scale development

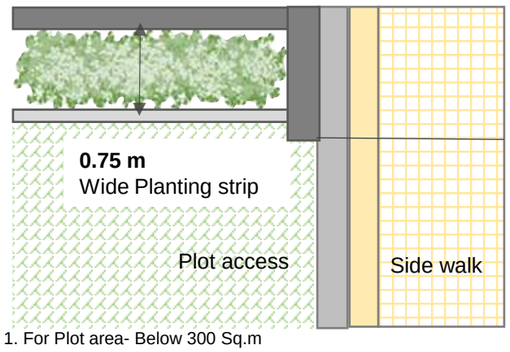
Small and Medium Scale Plots :

- For following plot sizes minimum width clear landscape strip should be provided in front, back and side edges.
- For plot area above 4000 sqm refer to large scale plots development plots guidelines
- For following plot sizes minimum clear width for landscape strip should be provided in front, back and side boundary edges as mentioned in table below

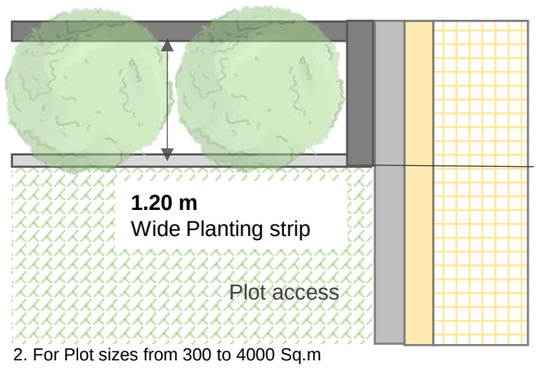
Plot Size	Front and Back	Sides
Upto 300 sqm (Small)	0.60m to 0.75 m	N/A
300 to 500 sqm(Small)	0.75m to 0.90m	0.60m to 0.75m
500 to 2000 sqm(Medium)	1.20m	1.20 m
2000 to 4000 sqm(Medium)	1.50m	1.50m

Sections showing plot edge along street edge

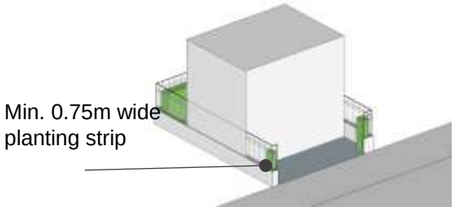
Planting strip at plot boundary edge



1. For Plot area- Below 300 Sq.m



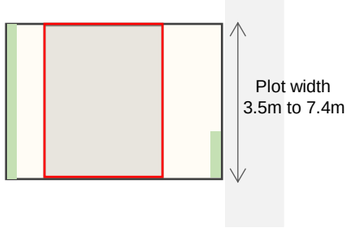
2. For Plot sizes from 300 to 4000 Sq.m



1. For Plot area- Below 300 Sq.m

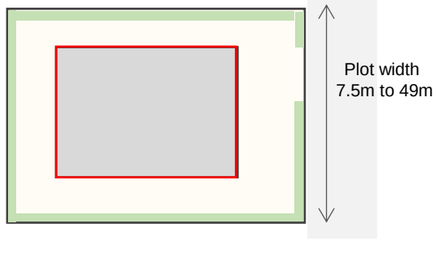
Edge plantation as per plot size and width consideration

Plot less than 300 sq.m

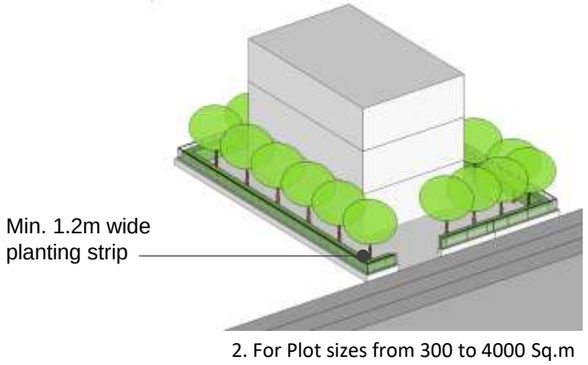


For plot sizes below 300 sq.m minimum 0.75m width

Plot area 300 sq.m to 4000 sq.m



For plot sizes 300 sq.m to 4000 sq.m provide clear landscaped strip of minimum 1.2 m width.



2. For Plot sizes from 300 to 4000 Sq.m

7.1 Site Development and Building Typologies

Built Massing

Building Height Profile

- Stepped building height profile for transit corridor should be highest at the transit node and step down further (Refer to TPOD Guidelines for details)
- Stepped building height profile should be followed to provide waterfront views to buildings directly facing public spaces such as riverfront, canals, open spaces and parks, as well as buffer zone

Following guidelines should be adopted for all plots sizes with land use from Amaravati Master plan:

- Building heights to follow Amaravati Zoning Regulations.
- Building heights should not be considered individually but part of a community as a whole maintaining floor lines, colonnades, street level continuous retail frontage.
- It should be compatible with surrounding context of parks, canals, waterfront and transit nodes. Views and shading of a building should ensure that it corresponds with adjacent streets, open spaces and buildings.
- Setting up a step down building profile and respectful spacing between buildings should be planed to create a harmonious build environment.
- Stepped building profile should be adopted for waterfront, canal front and open space facing buildings. Refer waterfront and open space guidelines.
- Buildings on corner lots should be oriented to address both streets and generally located close to the street edge.

Small and Medium Scale Plots

- Following guidelines should be adopted for building heights and profile of various scale development.
- Building heights as per Amaravati Zoning Regulations
- For plots within TPOD zone, buildings should comply with heights as per TPOD criteria for zone 1 and 2.
- Building profile should respond to the context and help in identity creation.

Building Footprints

Following guidelines should be adopted for footprints of various scale development.

Large Scale Plots

- Public and large scale building's roof and podium should provide 20-50% area of ground coverage as an intensive green (vegetated) cover

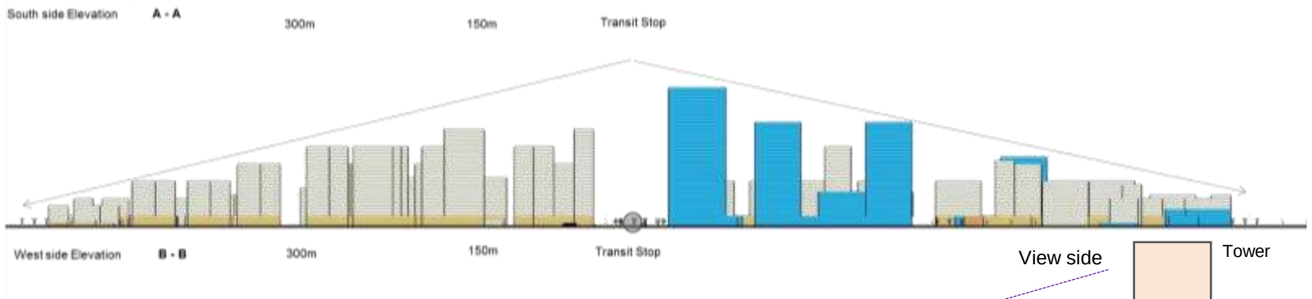
Small & Medium Scale Plots

- Minimum building ground coverage should follow as per Amaravati Zoning Regulations

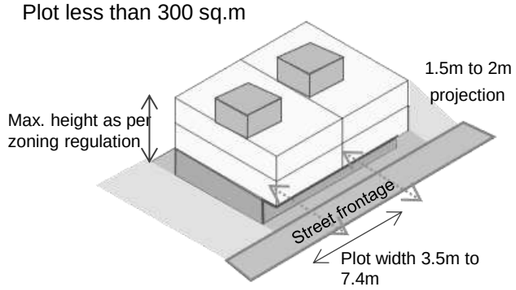
Plots with buildings facing public spaces such as waterfront, open spaces and parks, buffer zone and public transit corridors should have following considerations for building footprints and profile.

Plot Size	Building footprint along public spaces	Building Profile along public space
Upto 300 sqm (Small)	As per Amaravati Zoning Regulations	As per Amaravati Zoning Regulations
300 to 500 sqm(Small)		
500 to 2000 sqm(Medium)	Building and tower footprints along public spaces should be staggered within and adjoining plots	Development along public spaces should have stepped height profile for buildings and between towers.
2000 to 4000 sqm(Medium)		

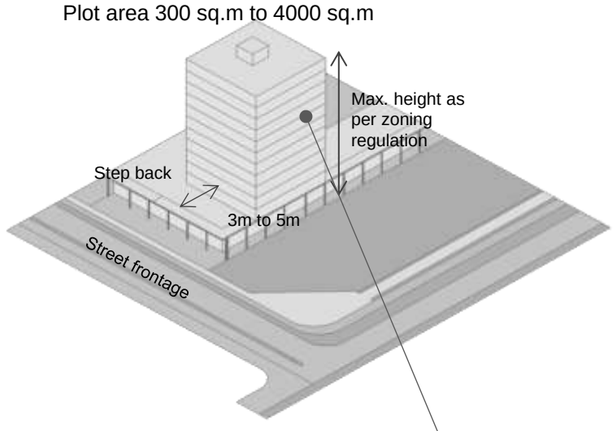
Stepped building height profile



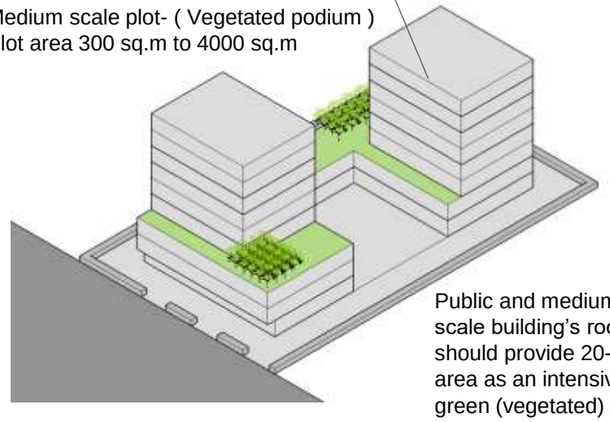
Small scale plot –
Plot less than 300 sq.m



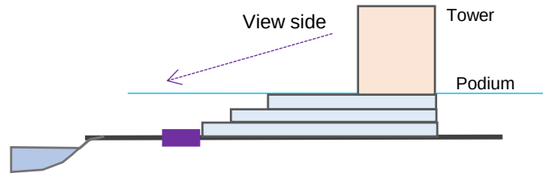
Medium scale plot-
Plot area 300 sq.m to 4000 sq.m



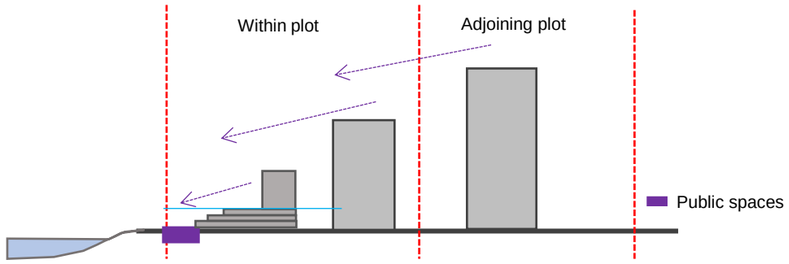
Medium scale plot- (Vegetated podium)
Plot area 300 sq.m to 4000 sq.m



Public and medium scale building's roof should provide 20-50% area as an intensive green (vegetated) roof.

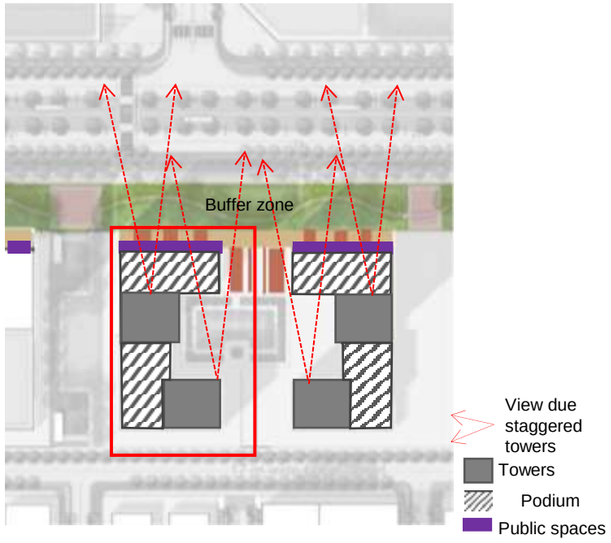


Section showing Step profile with mid level terracing to achieve maximum viewpoints



Section showing built form typology with stepped profile building along water front, open space, public transit corridor within and adjoining plots

Buffer zone



Plan showing building and tower footprints along public spaces should be staggered within plot

7.1 Site Development and Building Typologies

Plinth Level

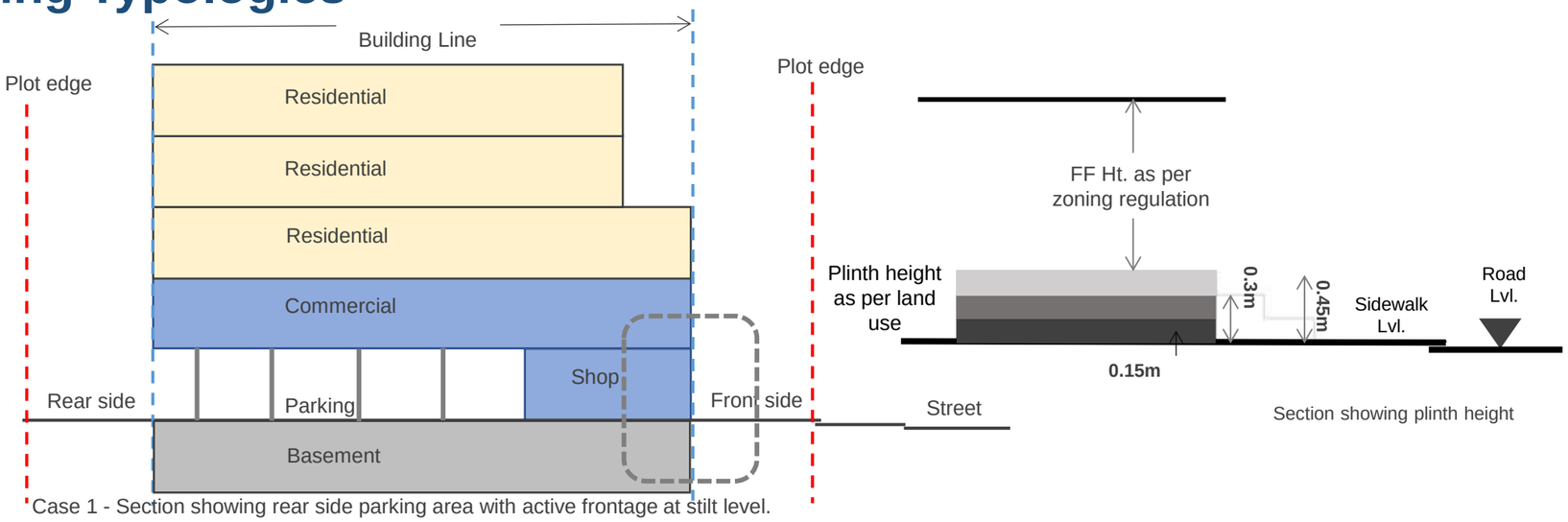
Following guidelines should be adopted for all plots sizes with land use from Amaravati Master plan:

- Minimum plinth height of the habitable spaces should be 0.45m above finished sidewalk level
- Minimum plinth height of the parking stilt structures should be 0.15m above finished sidewalk level
- Plinth height of commercial shops should be 0.15m above finished sidewalk level preferably for ease of access.
- Steps should be considered within plinth only and projected out steps from plinths for building entry access should not fall out of plot boundary into public pedestrian walkway.
- Semi sunken plinth for commercial/mixed use buildings should be considered with segregated pedestrian and vehicular access.
- For semi sunken structures 1.5m plinth level is preferable.
- If semi sunken structure is proposed with stilt or slab level at 1.5m within the flood demarcation zone, the habitable spaces should be above the flood line level

- Following table list the plinth level for various land uses.

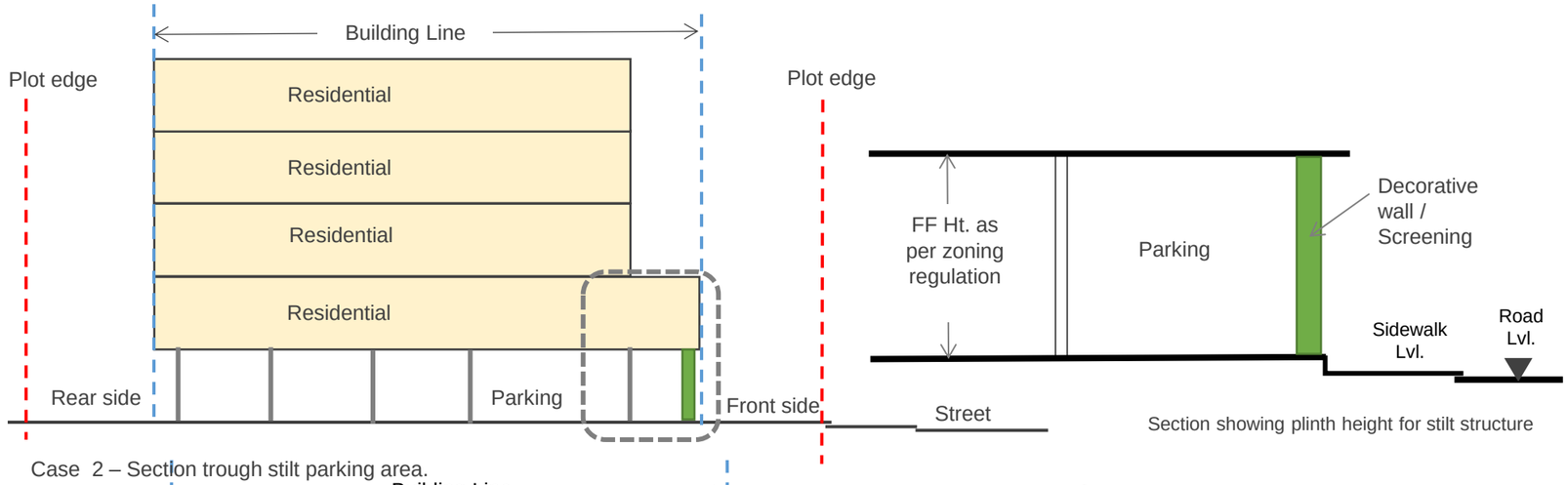
Land use	Plinth height in meter from road level
Residential	0.45m to 1.5m
Commercial	0.15m to 1.5m
Institutional	0.15m to 1.5m
Industrial	0.15m to 1.5m
Special zone	0.15m to 1.5m

Note- Building design NBC guidelines should be followed.
http://mohua.gov.in/upload/uploadfiles/files/Chap-4.pdf



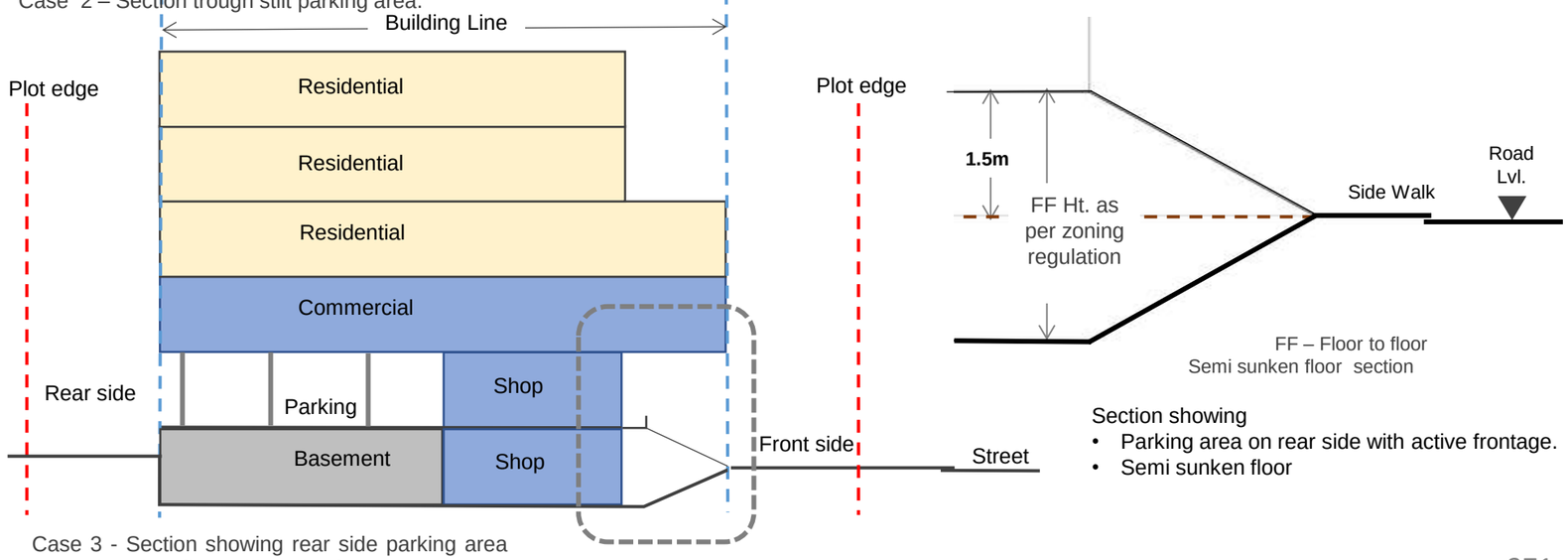
Case 1 - Section showing rear side parking area with active frontage at stilt level.

Section showing plinth height



Case 2 – Section trough stilt parking area.

Section showing plinth height for stilt structure



Case 3 - Section showing rear side parking area at semi sunken floor with active frontage

Section showing
- Parking area on rear side with active frontage.
- Semi sunken floor

7.1 Site Development and Building Typologies

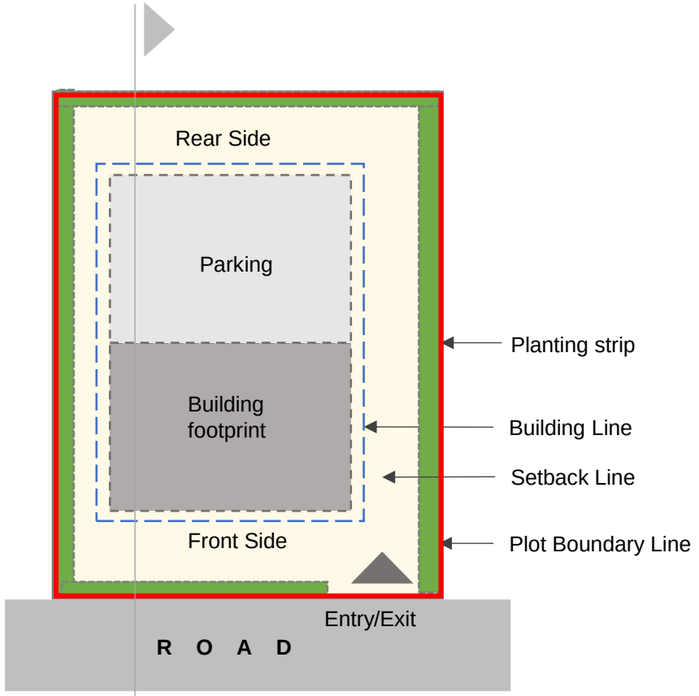
Parking

Following guidelines should be adopted for parking of various scale development

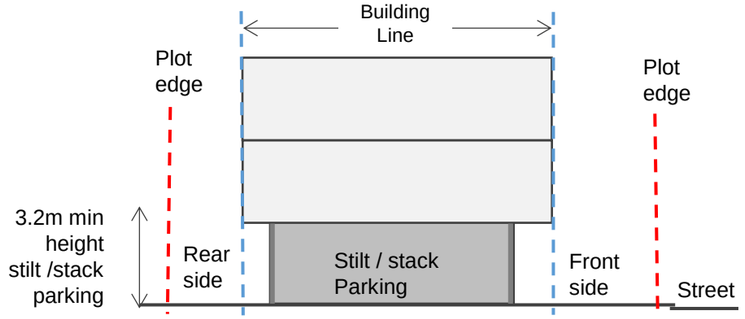
Small and Medium Scale Plots

- Following table illustrating parking space provision for various plot sizes.
- Provision of mechanical stack parking for additional or future car parking requirements should considered.
- For stilt parking floor height should be minimum 3.2m and should consider additional height for provision of stack parking.

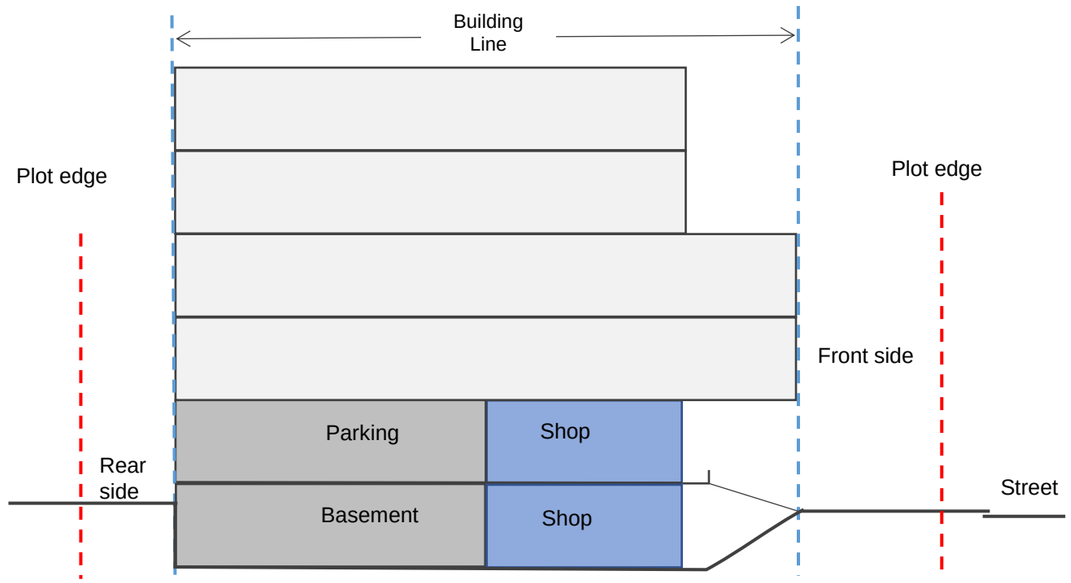
Plot Size	Parking space
Up to 300 sqm (Small)	Stilt with provision of mechanical stack parking
300 to 500 sqm (Small)	Stilt with provision of mechanical stack parking
500 to 2000 sqm (Medium)	Stilt and semi sunken basement parking provision of mechanical stack parking
2000 to 4000 sqm (Medium)	Podium and sunken basement parking provision of mechanical stack parking



Plan showing parking within the building line



Small Scale size Plot



Section showing medium size plots

- Parking area on rear side under building footprint with active frontage.
- Semi sunken floor

7.1 Site Development and Building Typologies

Open Space within Plot

Following guidelines should be adopted for all plots sizes with land use from Amaravati Master plan:

- Mandatory planting strip along plot boundary should be as per plot size excluding plot access.
- All government, semi-public and public plots should develop 30- 50% of the open space area along the street edge as privately owned publicly accessible public spaces (POPS) as square and plaza
- For POPS, squares and plazas details refer waterfront open space guidelines.

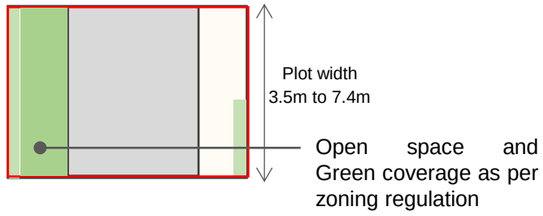
Following guidelines should be adopted for open space within plots of various scale development.

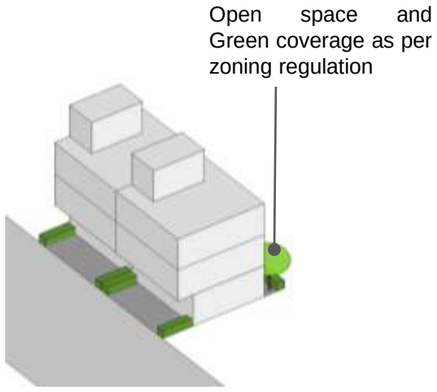
Small and Medium Scale Plots

- Minimum Reserved Green area should be provided for plot sizes more than 300 sq.m and up to 4000 sqm. Reserved Green should provide min 60% tree canopy coverage.
- Minimum Recreational open space for plot sizes more than 500 sq.m and up to 4000 sq.m consisting of landscaping, seating and play areas.
- Following table summarize the plot size and its open space guidelines

Plot Size	Reserved Green	Recreational open space
Up to 300 sqm(Small)	As per zoning regulation	N/A
300 to 500 sqm(Small)	5% Reserved Green area of plot area should be provided	N/A
500 to 2000 sqm(Medium)	10% Reserved Green area of plot area should be provided	5% Recreational open space area of plot area should be provided
2000 to 4000 sqm(Medium)	10% Reserved Green area of plot area should be provided	5% Recreational open space area of plot area should be provided

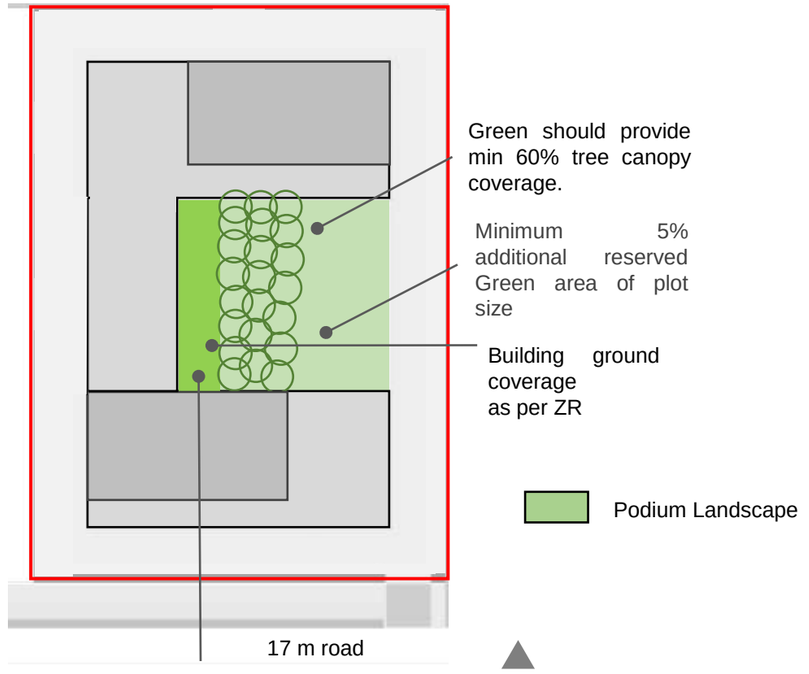
Small scale (Plot size less than 300 sq.m)

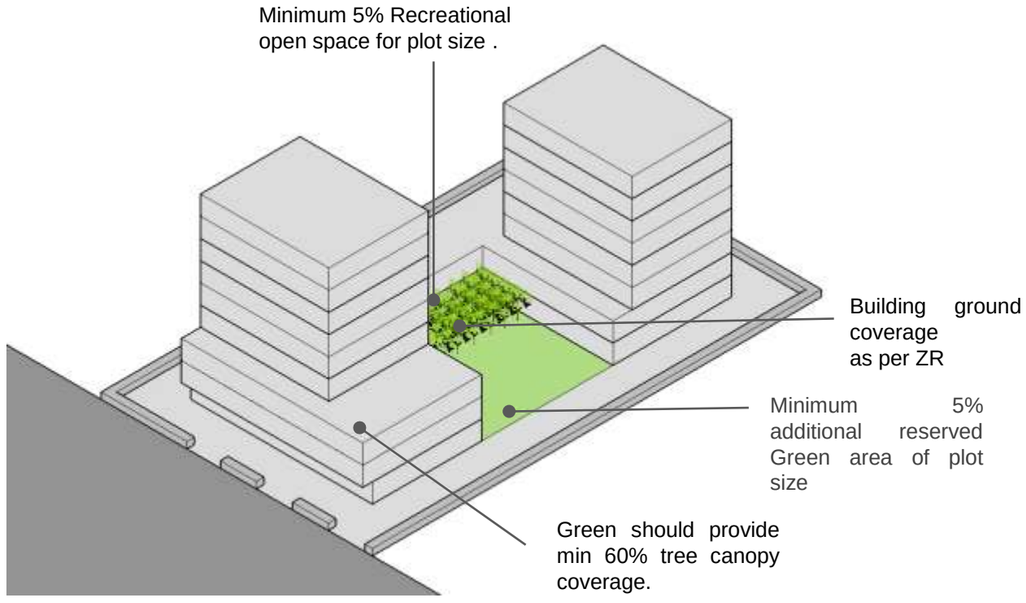




Small scale (Plot size less than 300 sq.m)

Medium scale (Plot size range 300 to 4000 sq.m)

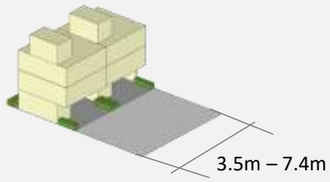
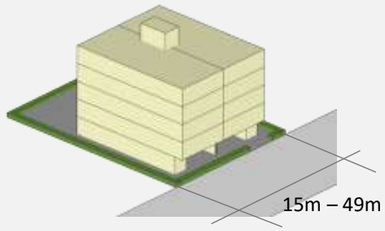
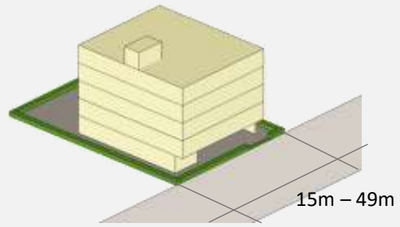
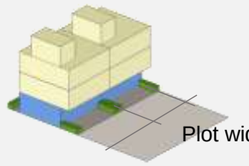
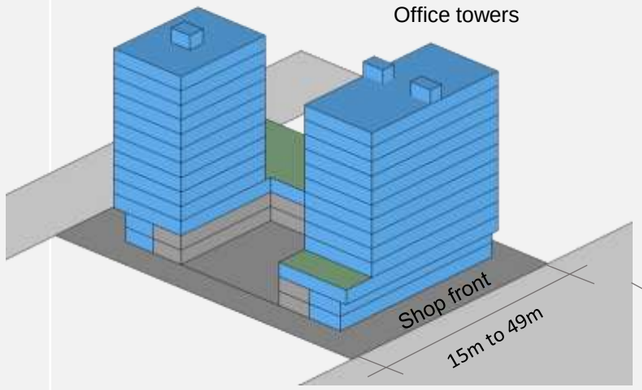
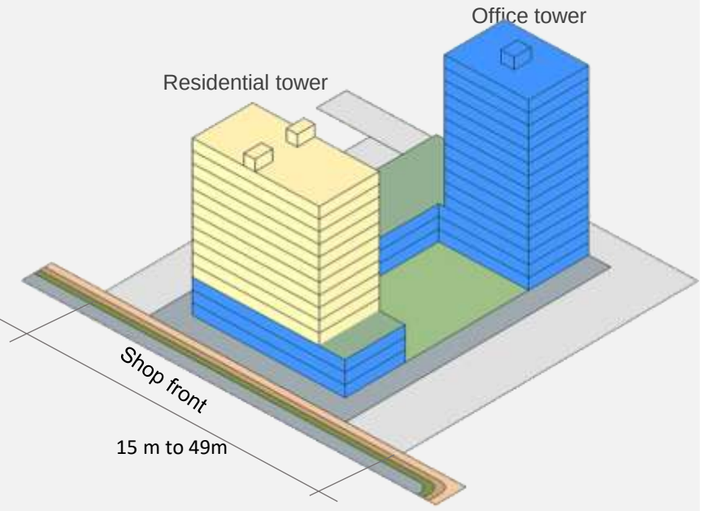




Medium scale (Plot size range 300 to 4000 sq.m)

7.1 Site Development and Building Typologies

Building typology for small and medium scale plots

Land use	Small scale Plots	Medium scale Plots
Residential	• Row house typology for plots street frontage range from 3.5m to 7.4m 	• Bungalow or apartment typology for plots street frontage range from 15 m to 49 m • Twin Bungalow/ Apartment typology for plots street frontage range from 7.5 m to 15 m  
Commercial and Mixed Use	Shop House Typology for plots street frontage range from 3.5m to 7.4m 	Retail Shops and Offices for plots street frontage range from 15 m to 49m  

*Note :All building heights as per zoning regulation
All building typology within TPOD zone should refer TPOD guidelines Chapter 5

7.1 Site Development and Building Typologies

Large Scale Development

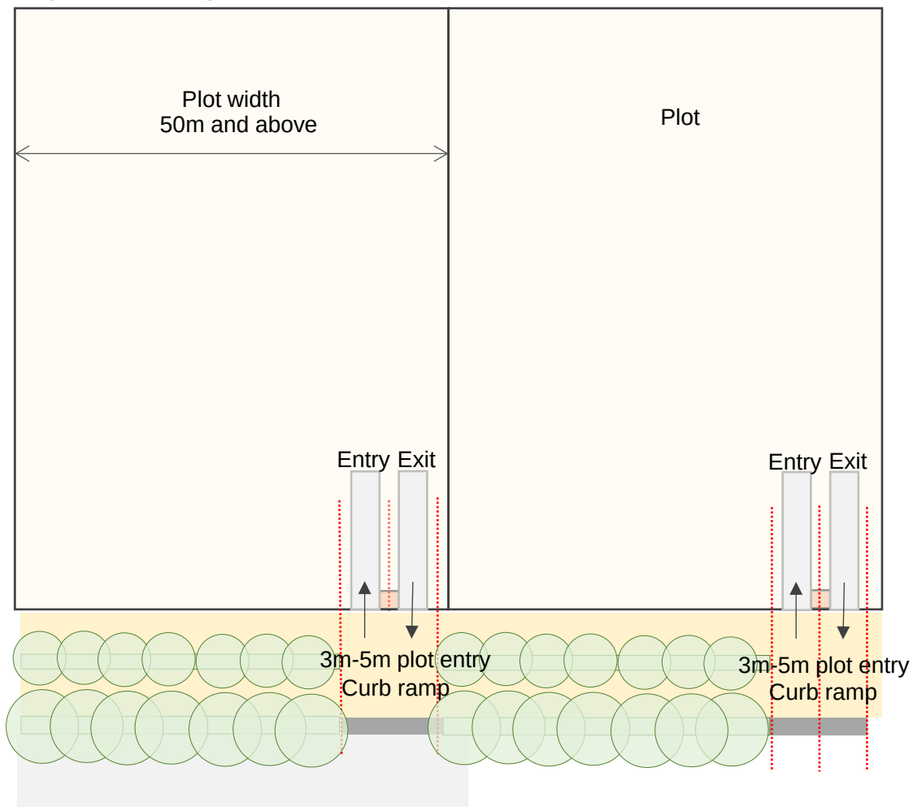
plot area above 4000 sq m

Plot Access – Large Scale Plots

Following guidelines should be adopted for plot access of large scale development.

- For all large scale plots entry-exits should have provision for curb ramps and universal accessibility design features.
- For all large scale plots entry exit gate access width should be between 3m to 5m.
- 3m to 5m curb ramp should be provided for plots with plot width 7.5m (Refer to Streetscape guidelines for curb width)
- Separate entry and exit points with curb ramp should be provided with plot width more than 50m on street frontage
- For large scale plots vehicular entry–exits curb ramps provision should be located at minimum 15m distance from any pedestrian crossing at intersections.
- Large scale plots at street intersection cannot have vehicular access from the street corner. Vehicular access should be provided from the sides of the plot.

For plot width range 50m and above

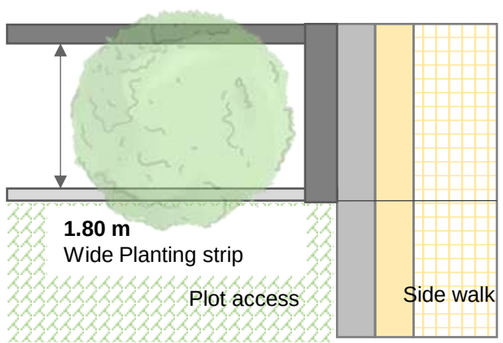


Plot Access - For the plots of width range 50m and above entry-exit should be provided with curb ramp

Edge plantation as per plot width consideration

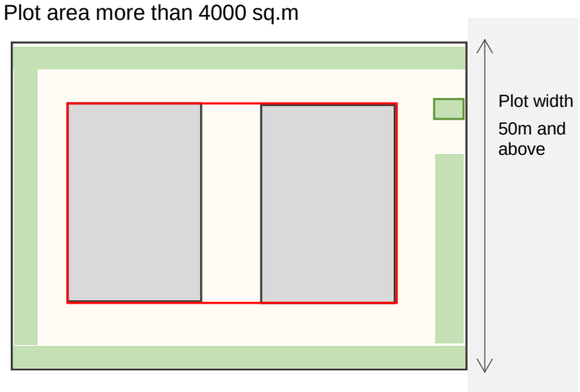
Plot Boundary and Edge Plantation - Large Scale Plots

- For plots sizes above 4000 sq. m provide clear landscaped strip of minimum 1.8 m width should be provided without any underground services.



3. For Plot sizes above 4000 Sq.m

Plot area more than 4000 sq.m



For plot sizes above 4000 sq. m minimum 1.8m width

7.1 Site Development and Building Typologies

Large Scale Development

Footprints - Large Scale Plots

Following guidelines should be adopted for footprints of large scale development.

- Minimum building ground coverage should follow as per Amaravati Zoning Regulations
- Building footprint should be kept to minimum to increase natural ground surface areas for landscape and plantation.
- Public and large scale building's roof and podium should provide 20-50% area of ground coverage as an intensive green (vegetated) cover.
- Large footprints that appear bulky and create an unwelcoming visual barrier should be avoided
- Large scale development podium should allow pedestrian movement through the building block by providing voids, openings or stepped landscaped corridor to allow access to podium top.

Building Heights and Profile - Large Scale Plots

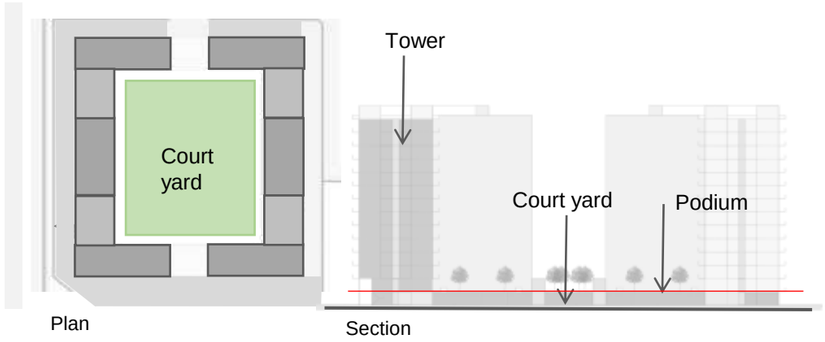
Following guidelines should be adopted for large scale plots-

- Building heights should be as per Amaravati Zoning Regulations.
- For plots within TPOD zone, buildings should comply with heights as per TPOD criteria for zone 1 and 2.
- Site development should respond to the context and help in identity creation
- Plots with more than two buildings should achieve staggered layouts with minimum distance of 15m between the towers.
- The buildings oriented or facing each other in adjacent plots should have a minimum distance of 15m between each other.
- Buildings within a plot facing each other should have minimum distance of 15m between the podium of the buildings and minimum 30m between the building towers.
- Height and orientation of the towers should allow natural air movement within the plots.

- Advantages of staggered arrangement of building layout
- Effective air movement
- Visual privacy between adjacent buildings
- Open space views between adjacent buildings
- Vistas towards open spaces from every building

Plot area more than 4000 sq.m

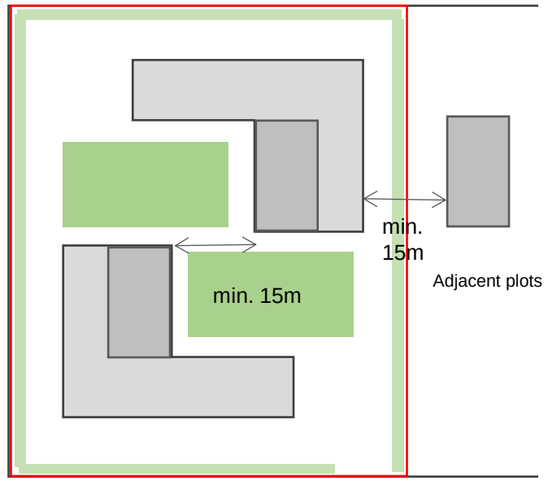
Courtyard and podium



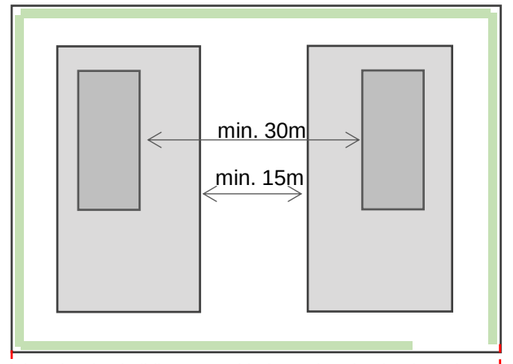
Courtyard and podium with mid- rise/High rise towers

Step profile with mid level terracing

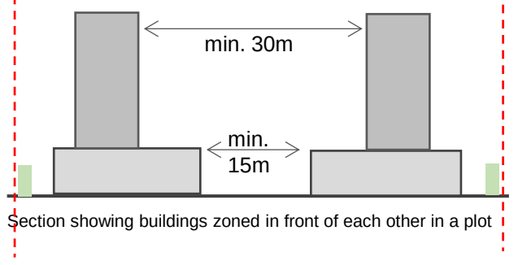
Plot area more than 4000 sq.m



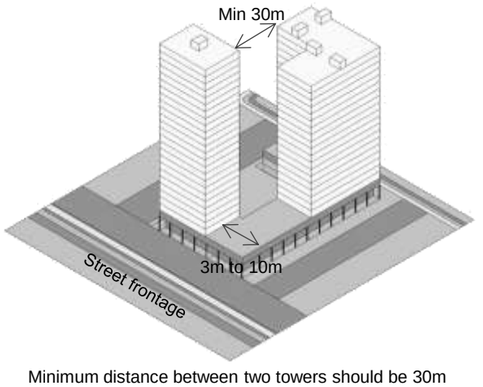
Plan showing 1) Staggered buildings in a plot
2) Buildings zoned in front of each other in adjacent plots



Plan showing buildings zoned in front of each other in a plot



Section showing buildings zoned in front of each other in a plot



Minimum distance between two towers should be 30m

*Note -Maximum buildings heights and ground coverage considered as per masterplan zoning regulation

Source-http://www.contemporist.com/this-building-is-covered-in-fully-landscaped-rooftop-terraces/ , https://mfaegypt.org/2015/12/31/egypts-foreign-policy-in-2015-taking-stock-and-moving-forward/ , http://www.landezine.com/index.php/2015/06/zorlu-center-by-ds-landscape

7.1 Site Development and Building Typologies

Large Scale Development

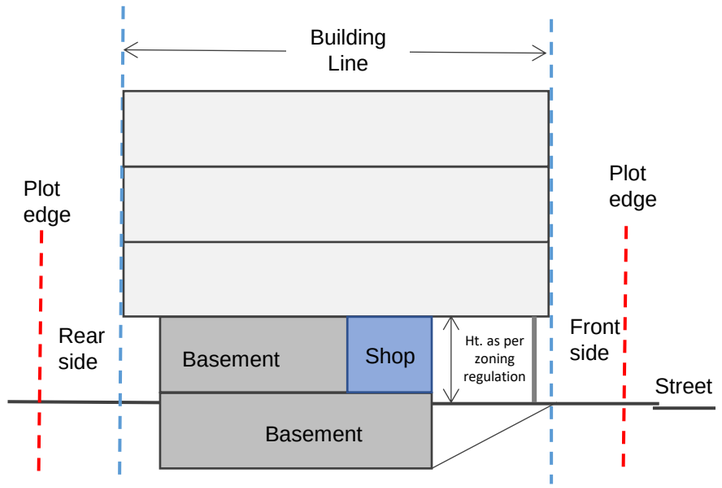
Parking - Large Scale Plots

Following guidelines should be adopted for parking of large scale development

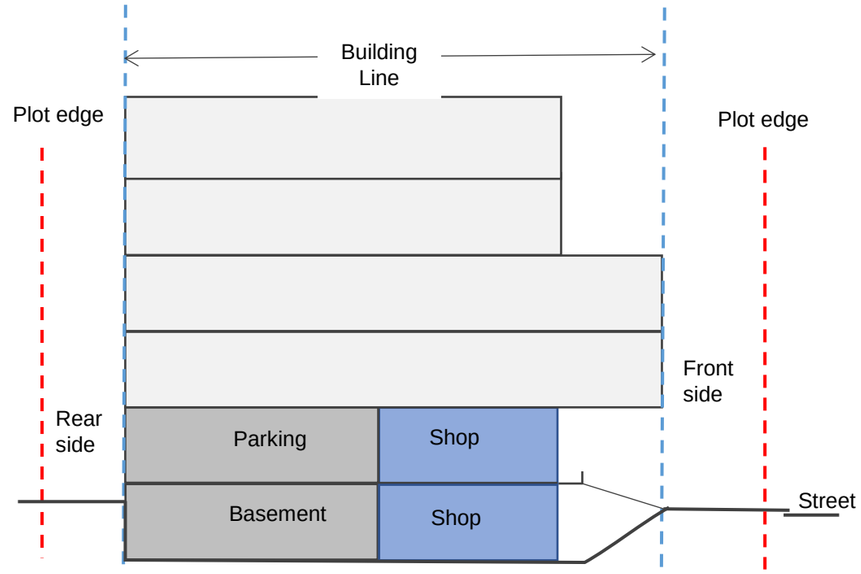
- For plot sizes above 4000 sq.m.- Parking spaces and basement ramps should be provided under the building footprint.
- Multilevel car parking should be provided as part of the podium with active frontage on road side.
- Open parking spaces should not be permitted

Large parking lots along street frontage and at corner plots should not be allowed
.

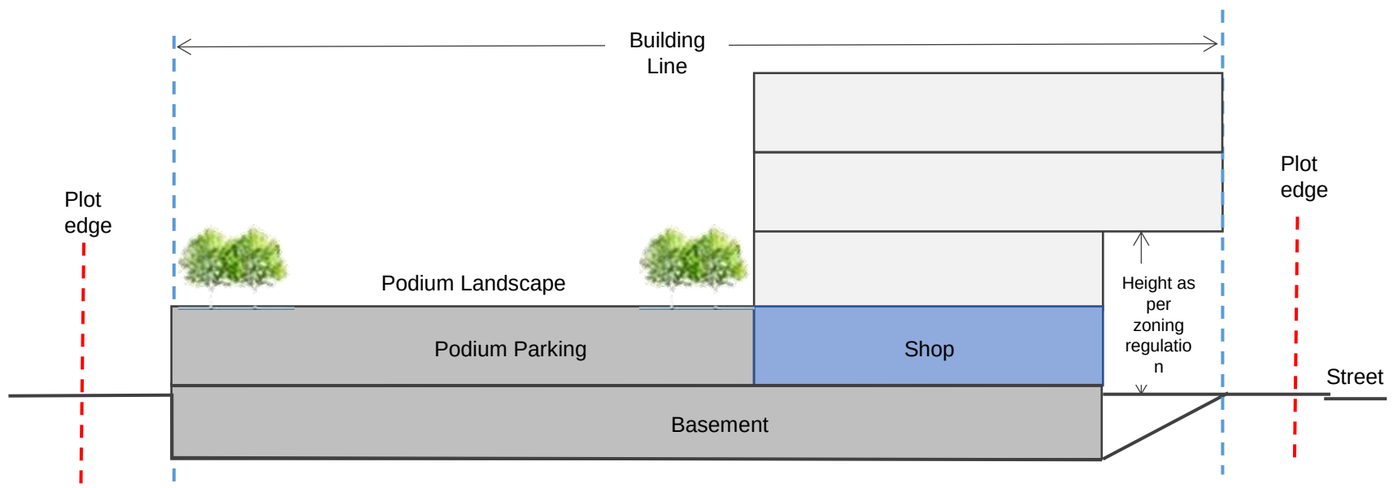
Large parking lots along street frontage and at corner plots should not be allowed



Large Scale size Plot



Section showing
- Parking area on rear side with active frontage.
- Semi sunken floor



Parking – Section showing parking for large scale size Plot

Source ;http://cdiltd-southampton.co.uk/shop-fronts/2809670 , Source: Design standards and guidelines – Detroit's traditional main street overlay areas , Source: http://www.mysheriff.co.in

7.1 Site Development and Building Typologies

Large Scale Development

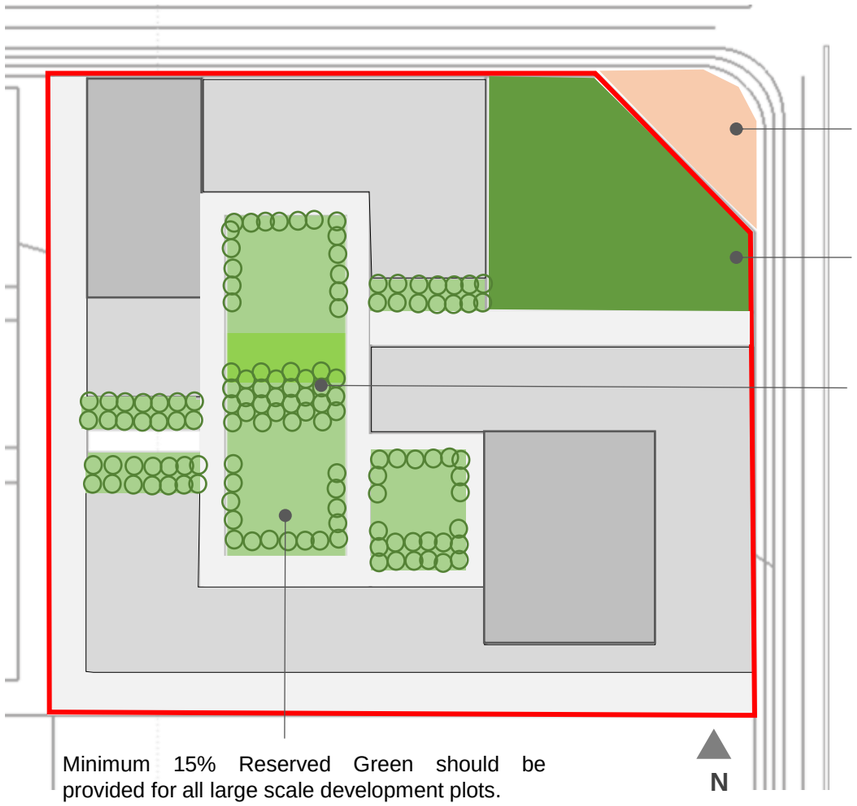
Open Space within Plot

Following guidelines should be adopted for open space within plot of large scale development

Large Scale Plots

- All large-scale development plots (Residential, Commercial, Institutional) having areas above 4000 sq. m should provide 10 - 20% of plot area as Privately Owned Publically Accessible Spaces (POPS). For POPS detail refer waterfront and open space checklist and guidelines
- Minimum 5% additional reserved green should be provided for all large scale development plots. Reserved green should provide min 60% tree canopy coverage
- Large scale development plot having internal courtyards should provide minimum 40% of courtyard should be landscaped with plantation
- Large scale public, commercial and mixed use development plots should provide pedestrian connectivity towards transit node and parks
- Plantation within large scale development plots should follow MOEF guidelines.

Large scale (Plot size range 4000 sq.m and above)



Street plaza, Union square

Publicly oriented private open spaces

http://reelsf.com/reelsf/2013/12/3/the-conversation-snooping-in-union-square ,
https://www.mas.org/initiatives/advocates-for-privately-owned-public-space

7.1 Site Development and Building Typologies

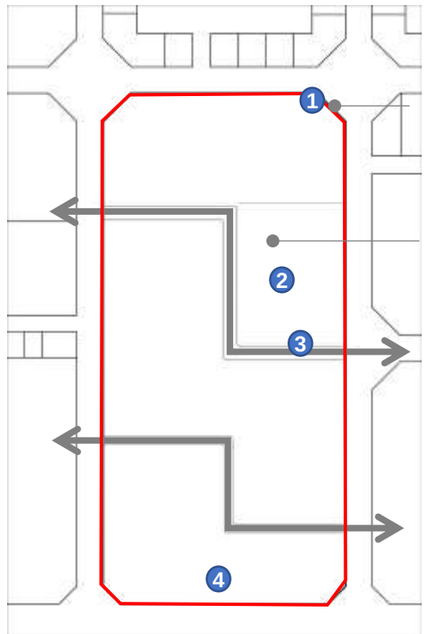
Large Scale Development

Large Scale Plots

Permeability and Connectivity

Following guidelines should be adopted for permeability and connectivity of large scale development.

1. Large blocks of masterplan layout should be subdivided for providing pedestrian and NMT connection to maintain permeability through blocks.
2. Plot subdivisions should consider adjacent plot size and road alignments to continue urban fabric.
3. Internal roads and pedestrian movement should follow structure of existing LPS layout for movement and access to transit stops.
4. Plot size of length above 250m should consider for plot subdivision.
   For plot division, plot size of length or width should be 100 to 150 m to achieve permeability and connectivity for pedestrian movement.



Plot boundary

Plot division

Plan showing large plot development integrating with existing context

Pedestrian Network

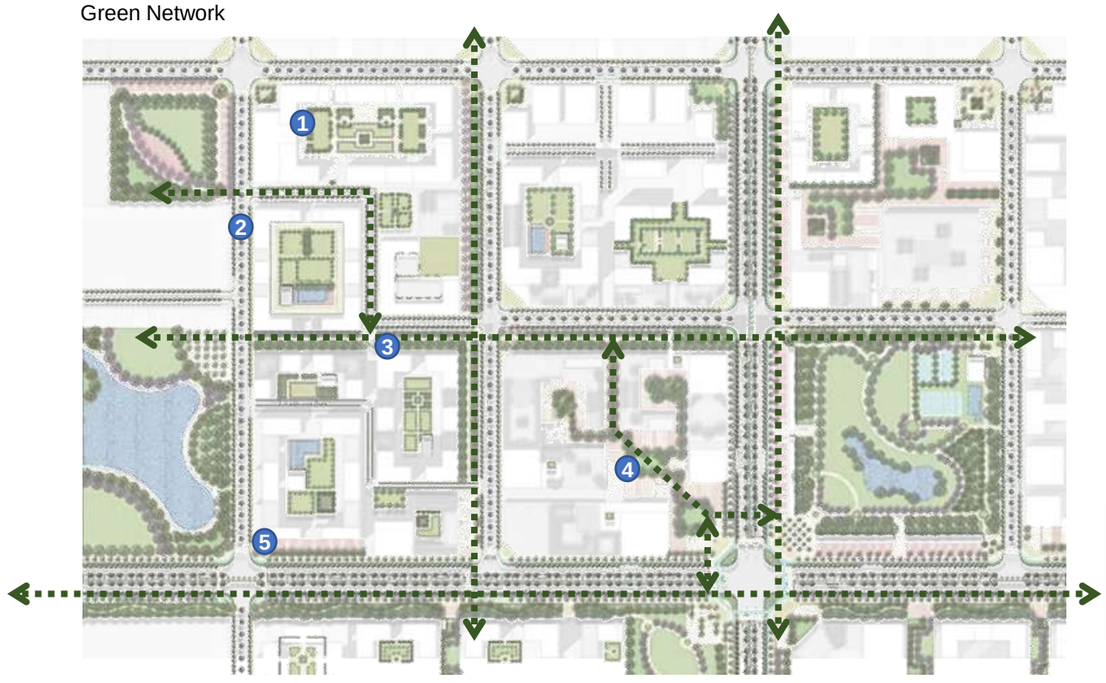
Green Network

1. Adjoining plots building layout should consider combining private open spaces as courtyard to increase functionality and sharing larger open spaces.
2. Streets should include adequate planting to form boulevards to create pedestrian-friendly environment.
3. Large scale plots should provide green corridors as POPS connecting surrounding parks or open spaces to maintain ecology and pedestrian connectivity of the area.
4. Large scale plots should provide pedestrian access through POPS to create shorter routes and reduce the walking distance. Desired line should be followed for creating pedestrian network, POP's and green space network which connects public spaces
5. Privately owned public spaces- street corner plaza (Refer open space Guideline)
6. Pedestrian network should connect open space and internal plazas to transit nodes

LEGEND

- Plot Boundary
- Vehicular circulation
- Green network with open spaces
- Pedestrian connection
- Transit stop
- Feeder bus stop

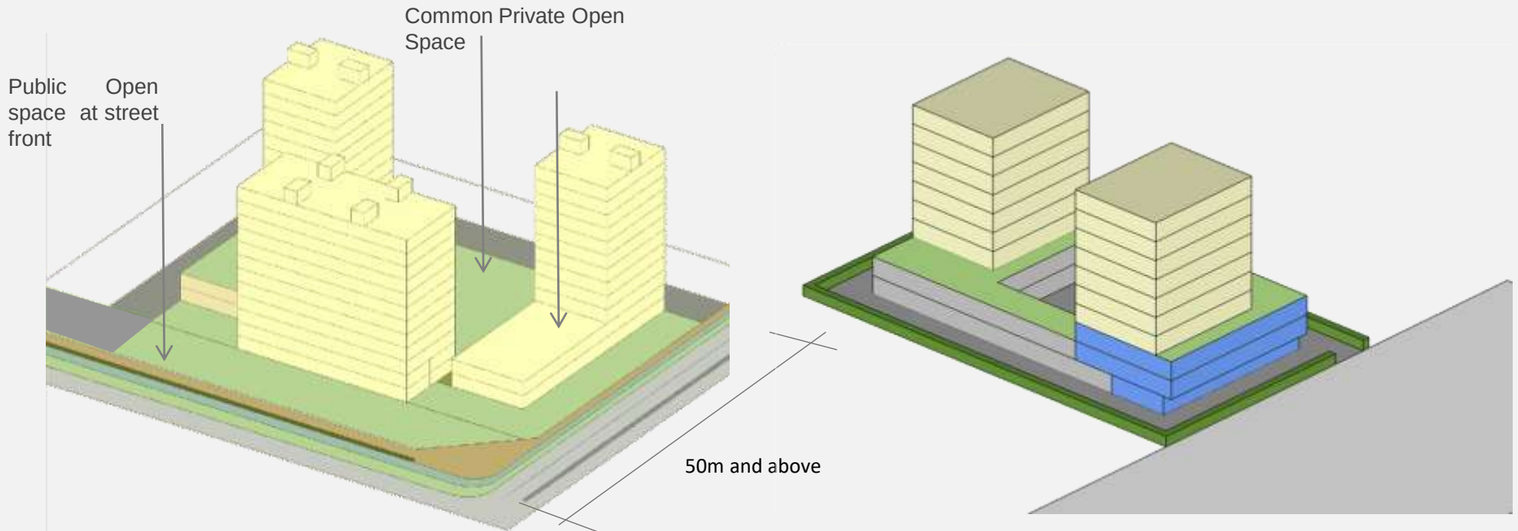
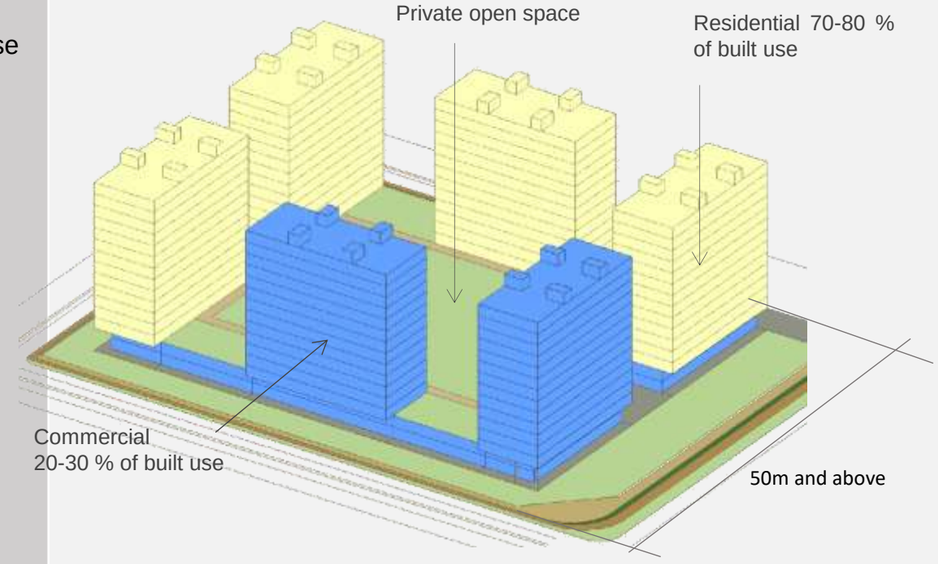
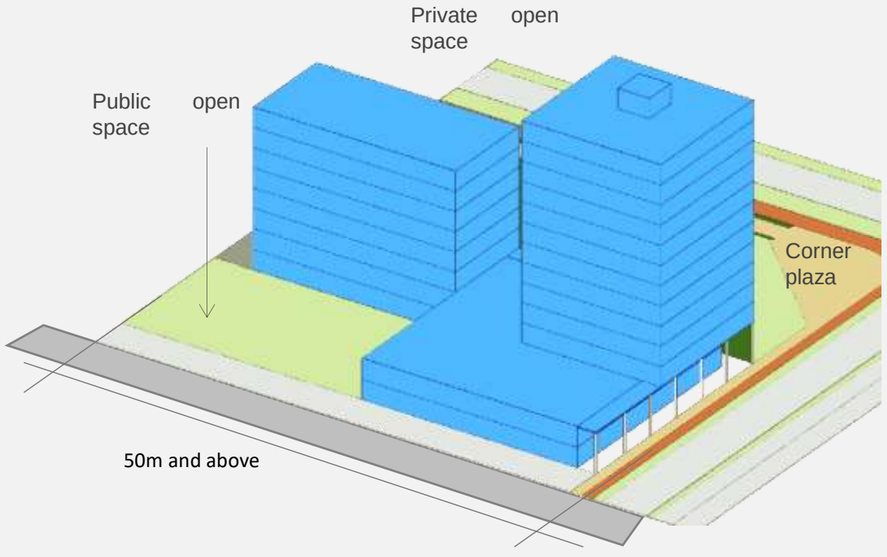
Green Network



http://www.bsnarchitects.com/old-post-office-plaza
, https://en.wikipedia.org/wiki/Tower_42, https://www.straitstimes.com/singapore/rooftop-greenery-adds-splash-of-colour-to-hdb-estates, http://www.jkrweb.com/shelf/?book=newyorkcity-bestphotos

7.1 Site Development and Building Typologies

Building typology for large scale plots

Land use	Large scale Plots
Residential	 Apartments for plots street frontage range 50m and above
Commercial and Mixed Use	SOHO(single office house office)or plots street frontage range from 50m and above  Malls and Commercial Complex or plots street frontage range more than 50m 

*Note :All building heights as per zoning regulation
All building typology within TPOD zone should refer TPOD guidelines Chapter 5

7.1 Site Development and Building Typologies

Institutional

- Criteria for assessment for education facilities of area and public amenities allocation should follow Amaravati Zoning Regulations plan for primary school, secondary school and higher education institutes colleges and universities
- Criteria's for assessment for education institutes are as per Amaravati Zoning Regulations
- Plots within TPOD zone should refer TPOD chapter for guidelines

Setbacks

- Building setback as for institutional land use plots should be as per zoning regulations

Services

- Refer services guidelines mentioned with plot area for site development under built form guidelines

Plot Boundary and Edge Plantation

- Refer plot edge condition and plantation guidelines mentioned with plot area for site development under built form guidelines

Plot Access

- The major entrances of schools and other institutional sites should face the street
- The design of institutions at corner sites should address the streetscape of both public frontages
- Maximum two entry points should be permitted
- Entry points should be welcoming and address local context creating vistas and importance
- Bus access should have ease of circulation, clear access to entry and exit and should be bifurcated from the school precinct

Building Footprint

- Ground coverage for plots should be as per zoning regulations

Building Height and Profile

- Maximum building height for plots should be as per zoning regulations
- Site development should respond to the context and help in identity creation
- Entry of building should be emphasised with grandeur and monumental scale

Plinth Level

- For plinth height refer table in built massing plinth level guidelines

Parking

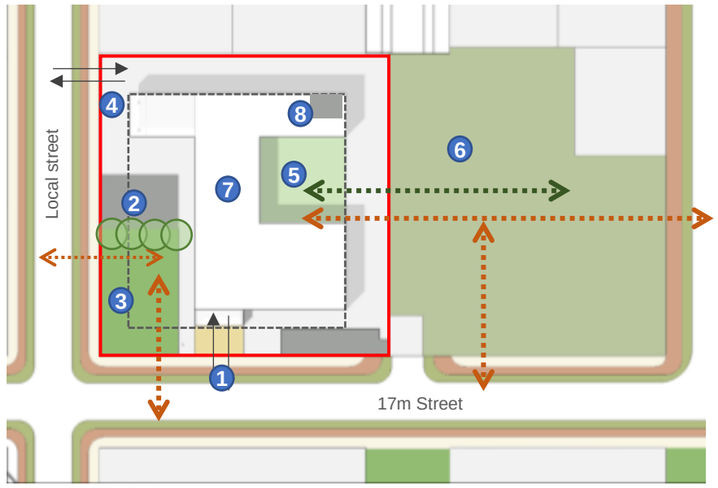
- Access points to parking areas should be minimized to reduce their impact on the surrounding context
- Bus parking should be provided within plot under tree shaded region
- Location of bus parking should be provided with ease of circulation for entry – exit without disturbing school precinct
- Parking areas should be located possibly to the rear side of plot or side margin. Parking on front side of street should be minimised and only permitted to buses

Open Space within Plot

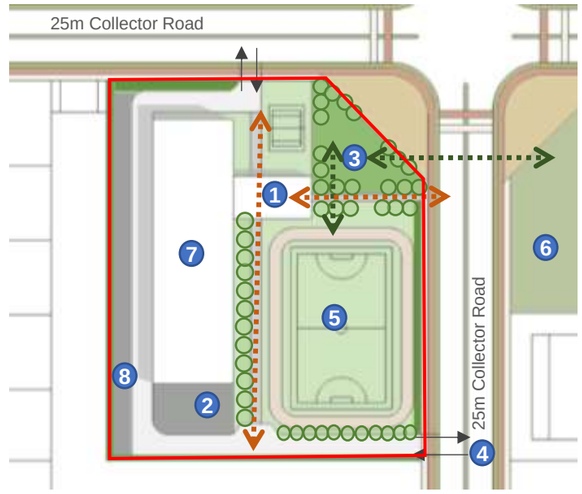
- Institutional building should be planned with semi public building activity frontage with open spaces as per POPS guidelines (refer waterfront and open space chapter. Incentives should be provided for min 10% shared open space (POP's)of institutional plot area
- Landscape should be screened parking areas from view of streets and surrounding buildings

Sustainability

- Buildings should meet green building requirements as outlined in built form guidelines sub chapter, green building features

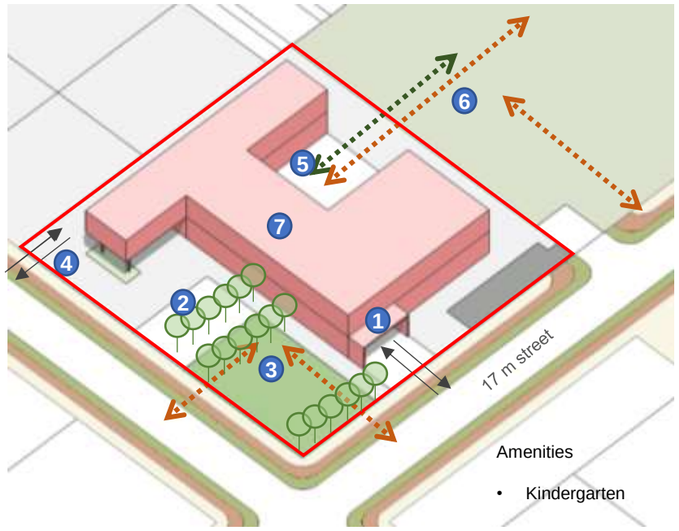


Primary School Plan



Secondary School Plan

Green network with open spaces
Pedestrian connection
Plot access
POPS
Private open space
Institutional
Tree Cover



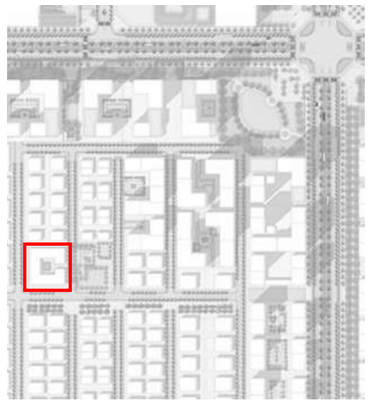
Primary School View

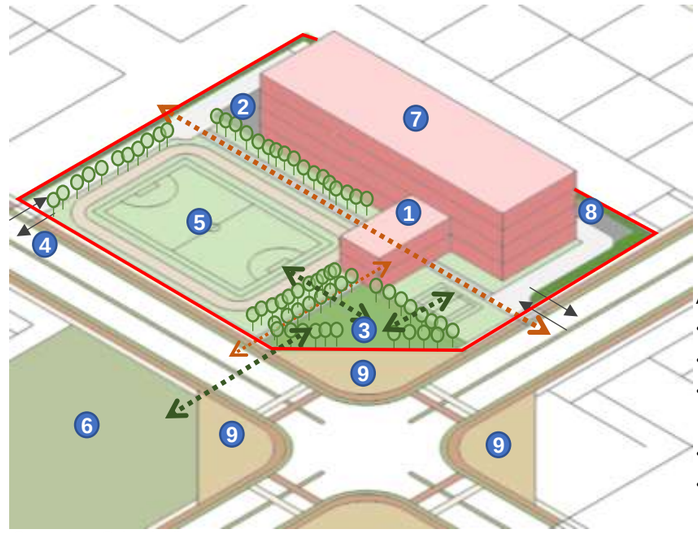
1. Main entrance with canopy addressing street front
2. Shaded bus parking
3. Minimum 10 % shared open space for public use (POPS)
4. Service entry
5. Private open space
6. Green network connection addressing adjacent community park
7. Institutional Building
8. Service Yard

Amenities

- Kindergarten

KEY PLAN



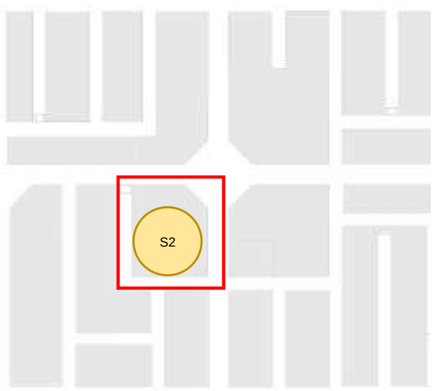


Secondary School View

1. Main entrance with canopy addressing street front
2. Shaded bus parking
3. Minimum 10 % shared open space for public use (POPS)
4. Service entry
5. Private open space
6. Green network connection addressing adjacent community park
7. Institutional Building
8. Service yard
9. Street Corner

Amenities

- Football field
- Kabbadi field
- Multipurpose court
- Jogging Track
- Cricket Pitch



Key Plan

7.1 Site Development and Building Typologies

University / Campus design

- Refer large scale development and institutional building design guidelines for built form guidelines for plot and building design

Site planning

- Site planning should promote the sense of community derived from actively shared spaces, and provide for enriching experiences
- Campus planning should aim at balancing multipurpose use of the public and private spaces
- Internal driveways, walkways, greens, courtyards, plazas, gardens, playfields and open spaces should be planned together using diverse elements of the campus and the context in a coherent way
- Public spaces should provide places for conversations, and be visible to those using buildings and passing by them
- Each cluster of buildings should have both outdoor spaces in relation with indoor spaces for gatherings and social occasions
- Individual buildings should also be designed to maximize the opportunities for social and intellectual exchange
- Building should have appropriate frontages for creating visual importance to building
- Building Designs – Multiple buildings in a single project must demonstrate a positive functional relationship with one another

Heights of Structures

- Height of structure should be directly proportional to the width of the internal driveway
- Height of structures should depend on the prominent building of the campus and should respond to the existing structures within site context

Building Footprints

- Large footprints that appear bulky and create an unwelcoming visual barrier should be avoided
- Articulation on of floor plates using indentations and creating opportunities for permeability should be encouraged

Building with the Environment

Topography –

- Building located on slopes should follow a terraced form similar to the existing topography of the site
- The orientation of the buildings should encourage vistas towards spaces of prominence within the campus as well as the surrounding sites.

Views –

Buildings should be oriented towards spectacular views of natural elements on site and surrounding context.

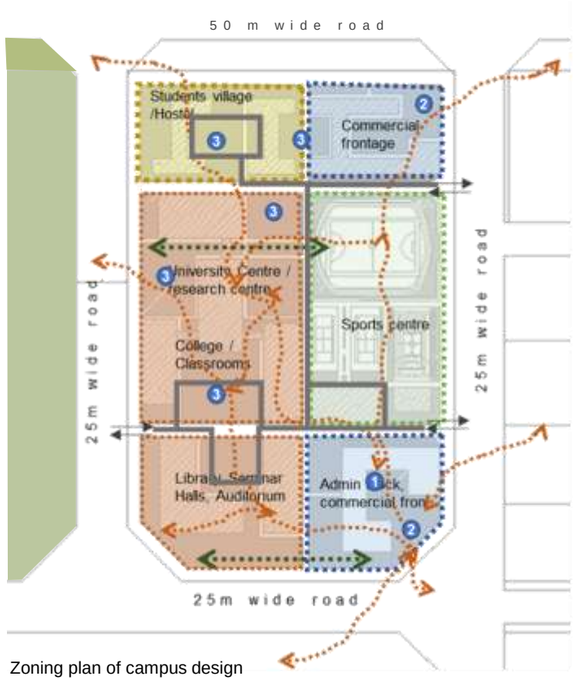
Existing views of the neighbouring buildings should be preserved through terraced building forms.

Sustainability

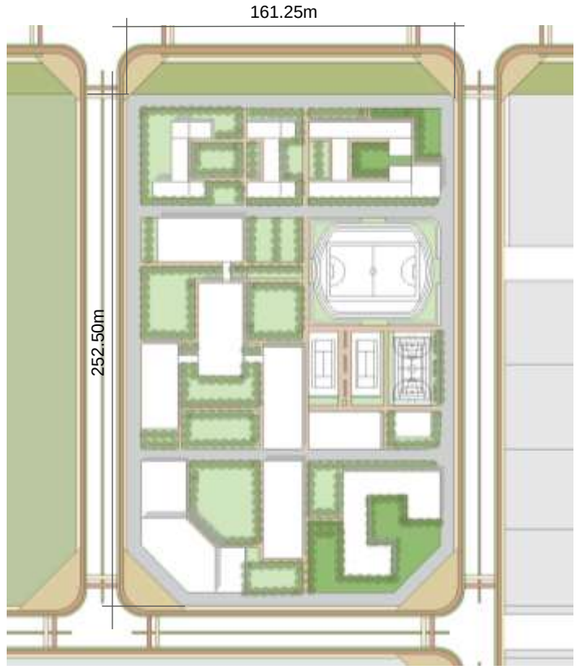
- Buildings should meet green building requirements as outlined in built form guidelines sub chapter, green building features

Landscape and Streetscape

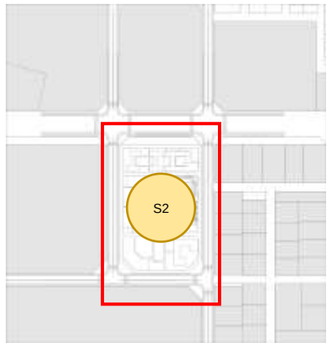
- Refer large scale development open space guidelines from Built Form Chapter
- Refer POPs , squares and plazas guidelines from open space chapter
- Structures should be sited and designed to form lively and secure public ways, that have surveillance from occupants throughout the day and night. The aim should be to provide spaces that are defensible and used for multifunction
- Sports complex should be designed with open space, which should be shared with people for public use and also easily accessible from residential areas, education zone of campus



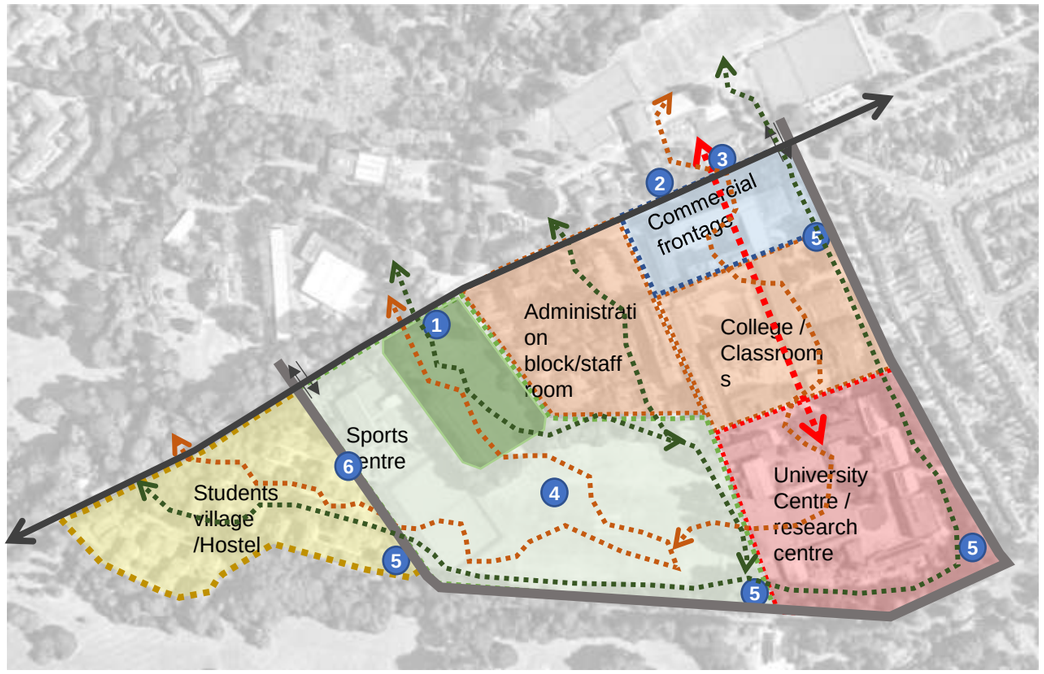
Zoning plan of campus design



Master plan showing campus design of university



Key Plan



Eg. Oxford brooks university UK

- The campus palate of landscape materials, walkways, lighting, signage and street furniture should be used and reflect context with all public spaces that are part of project to convey special identity
- Secure bicycle parking should be provided in required premises of education, residential, sport complex, open spaces of public zone

Green network with open spaces

Pedestrian connection

Plot access

POPS

Private open space

Internal driveways

1. Shared open space (POPS) and sports facilities
2. Public interface edge with commercial activities
3. Axial connection towards building to enhance main entrance
4. Centrally placed sports complex with open spaces, easily accessible from education and residential zone within campus
5. Services distributed in different zones considering service road on rear side of the plot
6. Less internal driveways
7. Public space are zoned along the street edge on the front side of the plot for ease of access and its functionality

7.1 Site Development and Building Typologies

Industrial

Industrial development should support the logical distribution of buildings, parking and loading- unloading areas in an integrated way to minimize the impact of heavy vehicles in those area

Setbacks

- Building setback should be as as per Amaravati Zoning Regulations

Services

- Refer service guidelines as per plot area, stated under the site development parameter in Built form guidelines.

Plot Boundary and Edge Plantation

- As per Industrial plot size, edge plantation guidelines should be followed for street frontage
- Service utilities should be separated and screened from public access points by decorative jali work and landscaping.

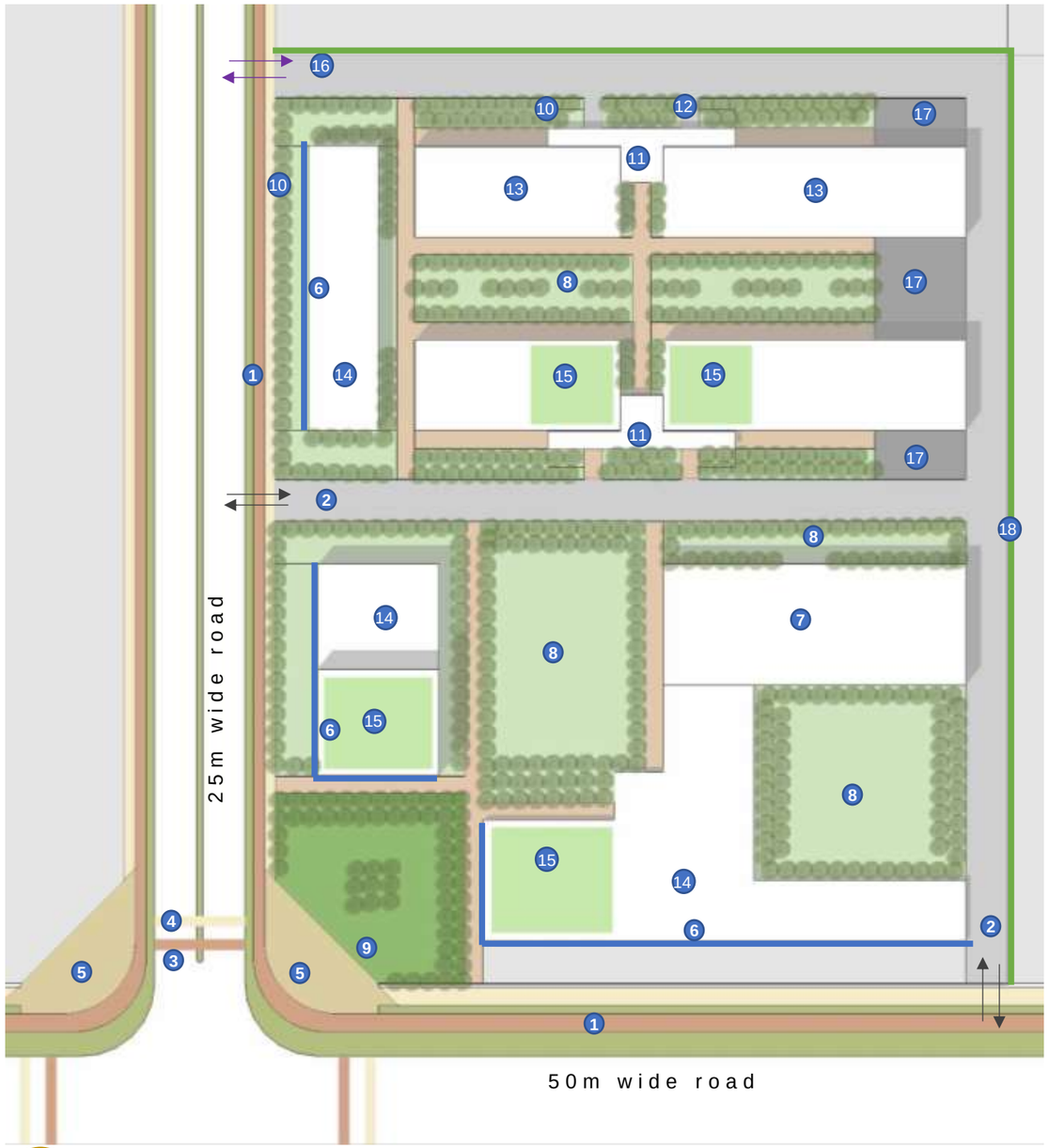
Building Footprint

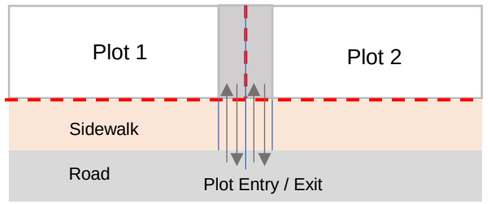
- Ground coverage should be as per Amaravati Zoning Regulations

Building Height and Profile

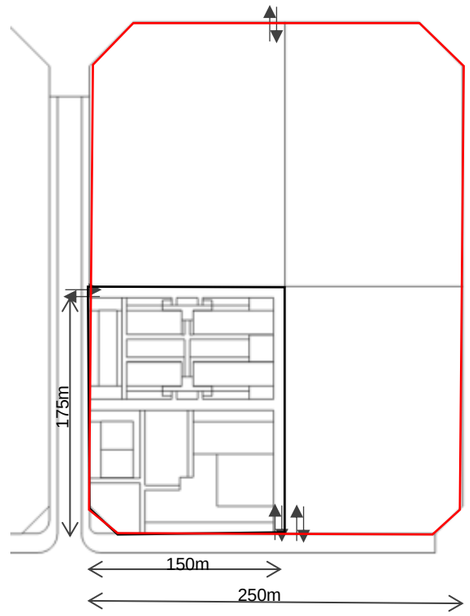
- For height and profile refer built for guidelines for large scale development plot
- Maximum building height should be as per Amaravati Zoning Regulations
- Industrial plot layout or typology should be designed with administrative offices or shops at street frontage
- Corner plots of industrial areas should be designed with product display area and access for people
- Manufacturing units and service access to plots should be placed on rear side of plot

1. Sidewalk (refer streetscape guidelines streetscape guidelines)
2. Plot Entry / Exit (Refer built form guidelines for industrial plot access)
3. Cycle crossing
4. Pedestrian crossing
5. Street Corner
6. Commercial Active Street frontage
7. Industrial building
8. Internal private courtyard of institutional building (Refer guidelines in open space within industrial plots)
9. Internal courtyard for open space and permeable to pedestrian movement
10. Buffer Plantation for screening and air purification
11. Canopies
12. Loading and Unloading areas
13. Manufacturing units/ Workshop
14. Showroom
15. Administration block
16. Service entry /exit
17. Surface Parking
18. Edge Plantation

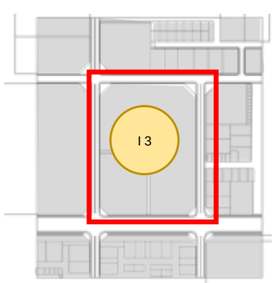




Plan showing joint access driveway to adjacent plots



Convenient access promoted through the provision of pedestrian linkages at longer and larger block lengths more than 150 m on street frontage side or higher ROW.



Key Plan

*Note :All building heights as per zoning regulation
All building typology within TPOD zone should refer TPOD guidelines Chapter 5

7.1 Site Development and Building Typologies

Industrial

Plot Access

- Separate service entry to manufacturing units should be provided for loading – unloading of goods
- Maximum 4 entry points are restricted to industrial plots
- Manufacturing units should be located at the rear side of the plot
- Joint access driveways to adjacent development lots is encouraged in order to maximize landscaped areas surrounding lots
- Convenient access to transit routes should be promoted through the provision of pedestrian linkages at longer and larger block lengths more than 150 m on street frontage side or higher ROW.

Plinth Level

- For plinth height refer table in built massing plinth level guidelines

Parking

- Access points to parking areas should be minimized to reduce their impact on the surrounding context
- Bus parking should be provided within plot under tree shaded region
- Location of bus parking should be provided with ease of circulation for entry – exit without disturbing school precinct
- Parking areas should be located possibly to the rear side of plot or side margin. Parking on front side of street should be minimised and only permitted to buses
- Visitors parking within plot should be under stilt within building line
- Surface parking should be allowed for heavy vehicles of services only within plot boundary

Green Roof Treatment

- An area equal to 5 – 10% of total ground cover area should be provided as green roof

Storage Room

- Storage room should be provided as per the raw material requirement of the industry
- The location of the storage facility should be at the rear end of the plot and easily accessible to the heavy vehicle entry and exit path

Open Space within Plot

- Landscape should screen parking areas from view of streets and surrounding buildings
- Development should be set back to create buffer areas from existing natural features and surrounding to manifesting unit buildings
- 40% of open space should be provided green with planted tree coverage to minimize pollution to areas of industrial zone and should be provided over and above the mandatory setbacks. Such green open space could be in more than one location and should be open to sky with a minimum width of 3m with a minimum area of 15 sq. at each
- 50 % of green space should be planted with air purification plants to industrial site development for health benefits

Sustainability

- Buildings should meet green building requirements as outlined in built form guidelines sub chapter green building features

*Note :All building heights as per zoning regulation
All building typology within TPOD zone should refer TPOD guidelines Chapter 5

Industrial View

1. Sidewalk (refer streetscape guidelines)
2. Plot Entry / Exit (Refer built form guidelines for industrial plot access)
3. Cycle crossing
4. Pedestrian crossing
5. Street Corner
6. Commercial Active Street frontage
7. Industrial building
8. Internal private courtyard of institutional building (Refer guidelines in open space within industrial plots)
9. Internal courtyard for open space and permeable to pedestrian movement(Refer open space guidelines)
10. Buffer Plantation for screening and air purification
11. Canopies
12. Loading and Unloading areas
13. Manufacturing units/ Workshop
14. Showroom
15. Administration block
16. Service entry /exit
17. Surface Parking
18. Edge Plantation

Plot access
POPS
Private open space
Multi-functional zone
Cycle track
Pedestrian walkway

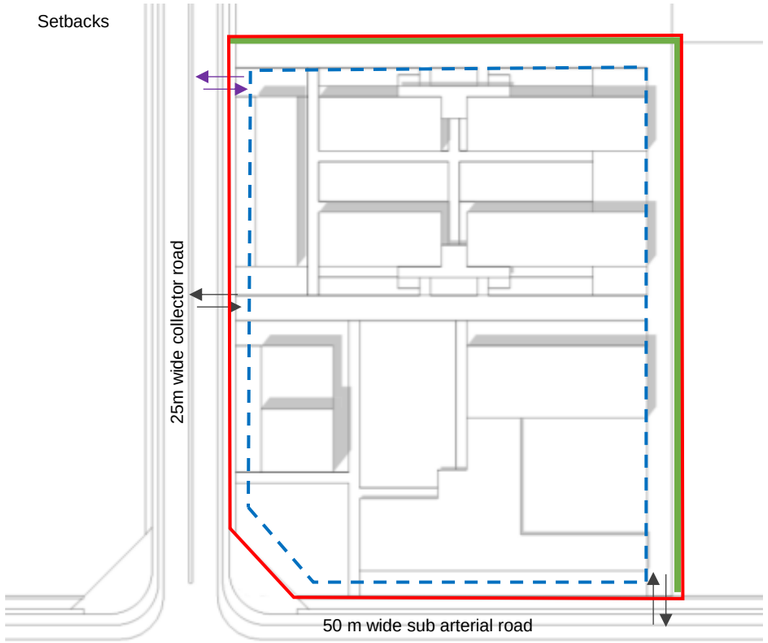
Administrative block
Showroom
Industrial Building
Manufacturing Unit
ommercial frontage

7.1 Site Development and Building Typologies

Building Typology

A. Site development

Setbacks



Road

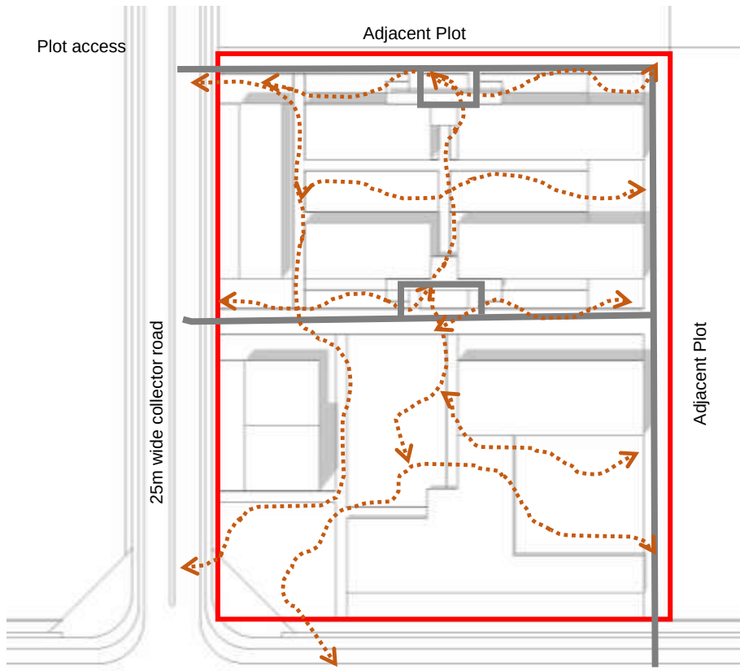
Main entry / Exit

Service Entry / exit

Plot Boundary

Set Back line

Plot access

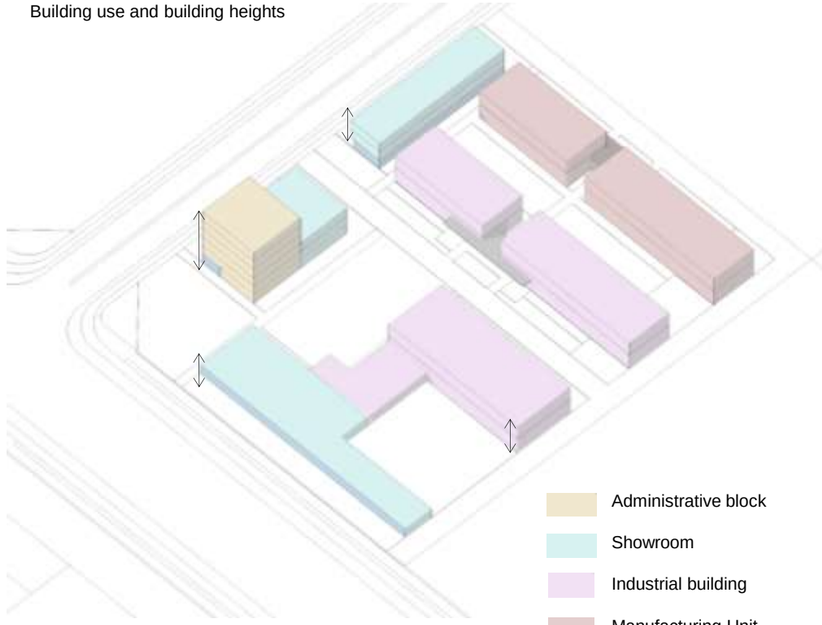


Internal vehicular movement

Pedestrian connection

B. Built massing

Building use and building heights



Building heights as per Amaravati Zoning Regulations

Administrative block

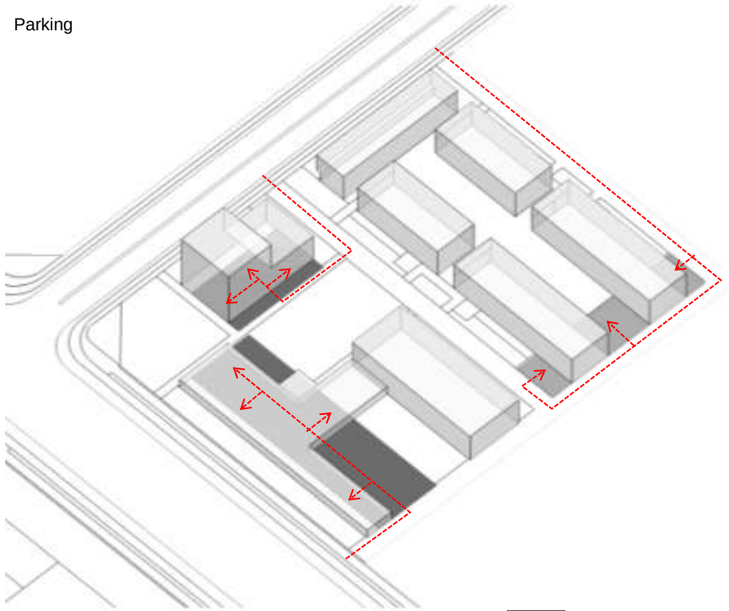
Showroom

Industrial building

Manufacturing Unit

Active commercial frontage

Parking



- Parking areas should be located possibly to the rear side of plot or side margin. Parking on front side of street should be minimised and only permitted to buses
- Visitors parking within plot should be under stilt within building line
- Surface parking is allowed for heavy vehicles of services only within plot boundary

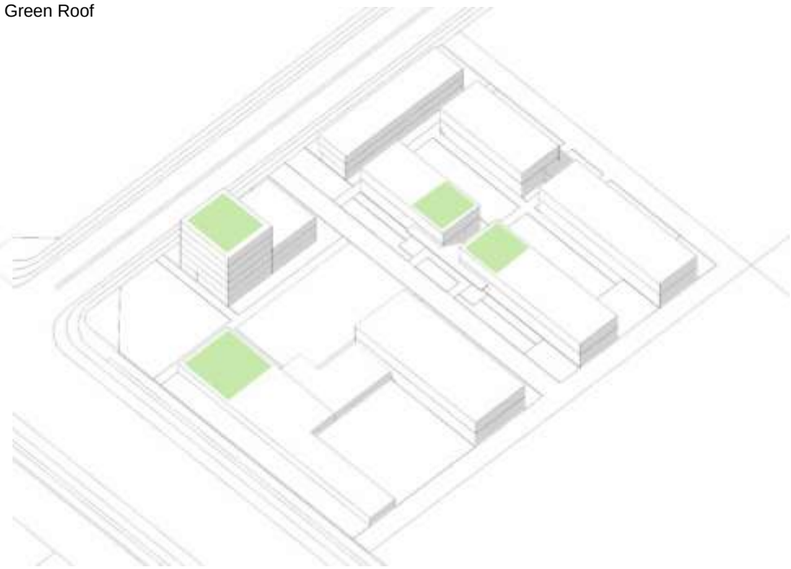
Basement Parking

Surface Parking

Vehicular circulation

C. Open space within plot

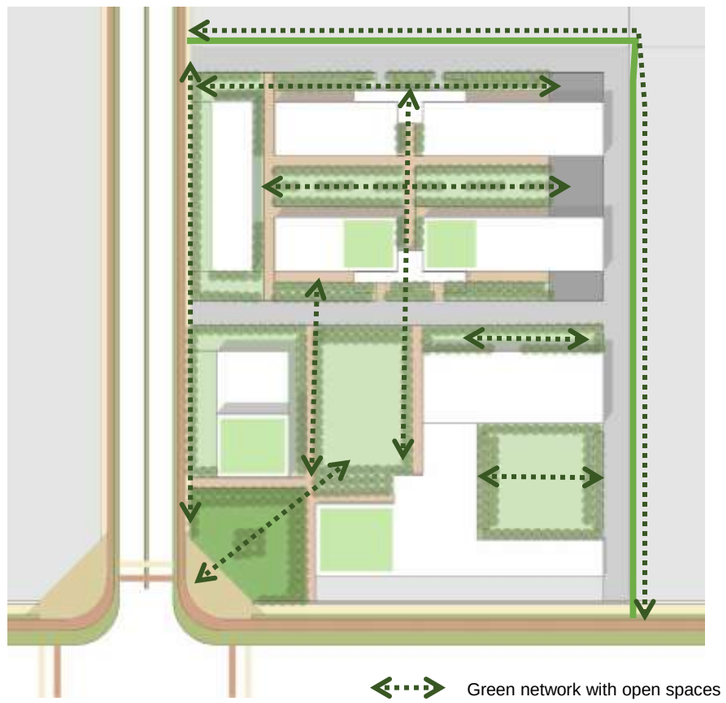
Green Roof



Terrace should provide 15-30% area of ground coverage as an intensive green (vegetated) cover and above 30% to 50 % should be suggestive for intensive green (vegetated) cover.

Building Terraces

Open space and green network



- 40% of open space should be provided green with planted tree coverage

Green network with open spaces

7.1 Site Development and Building Typologies

Utility Plot

- Utilities should be proposed within reserved areas as per Amaravati Zoning Regulations
- Safety measures necessary for each utility should be undertaken as per National Building Code 2016 clauses
- Incentives should be provided for incorporating utilities within private plots and reducing infrastructure development load on the government

Setbacks

- Building setbacks as per Amravati zoning regulations

Services

- Refer service guidelines as per plot area stated under the site development parameter in Built form guidelines.

Plot Boundary and Edge Plantation

- As per utility plot size, edge plantation guidelines should be followed for street frontage
- Service utilities should be separated and screened from public access points by decorative jali work and landscaping.
- Adequate green buffer around Integrated Solid Waste Management Facility and Common Hazardous Waste Treatment and Disposal Facility by carrying proper assessment, but not less than 100m width.

Plot Access

- Maximum two vehicular access points should be permitted per plot

Building Footprint

- Ground coverage for utility plots should be as per zoning regulations
- Administration blocks / offices under utility plot development should be placed along street frontage

Parking

- Staff parking of administration blocks / offices should be placed within building line with stilt or basement parking arrangement
- Surface parking should be allowed only for heavy vehicles of services and utility infrastructure within plot line with buffer plantation to hide and shade such parking area /zones

Multi Level Parking building within utility plots -

- Public use multi-level parking should be provided for the plots having area of 2000 sq.m and above
- For utility plots that should be dedicated only to Multi level parking, building should be multiuse with an active commercial street frontage. Terrace level food court, cafeteria or sports facilities should also be provided.
- Utility plots within TPOD zone, major parks , waterfront canal fronts should provide multilevel parking

Green wall screening multi-level parking

Multi-level parking with retail on the ground floor

Green wall screening transformer

Jali mesh and green screening electrical substation

Arial view of utility plot designed for electrical power transformer in high voltage substation

Source: https://architizer.com/projects/the-extension-of-the-perrache-confluence-substation-in-lyon-france/, https://architizer.com/projects/multi-level-parking-voestalpine/, https://airfreshener.club/quotes/transit-ca-oakland.html, https://www.ci.azusa.ca.us/624/What-does-a-Transformer-Do
https://www.shutterstock.com/video/clip-17033515-aerial-view-voltage-power-transformer-substation-high

7.1 Site Development and Building Typologies

Town Centre

- The Town Center should be envisioned should be vibrant, strong, and connected with a great sense of place for Amaravati. Vision for town center should be achieving an integrated mixed use development with focus on well-designed public realm.
- Town Centers should be proposed within reserved areas of town center zones as per Amaravati Zoning Regulations
- For plots within TPOD zone should refer TPOD guidelines

Setbacks

- Building setbacks as per Amaravati Zoning Regulations

Services

- Refer service guidelines as per plot area, stated under the site development parameter in Built form guidelines
- Service utilities should be separated and screened from public access points by decorative jali work and landscaping

Plot Boundary and Edge Plantation

- Guidelines for large scale development plot should follow for plot boundary and edge plantations

Plot Access

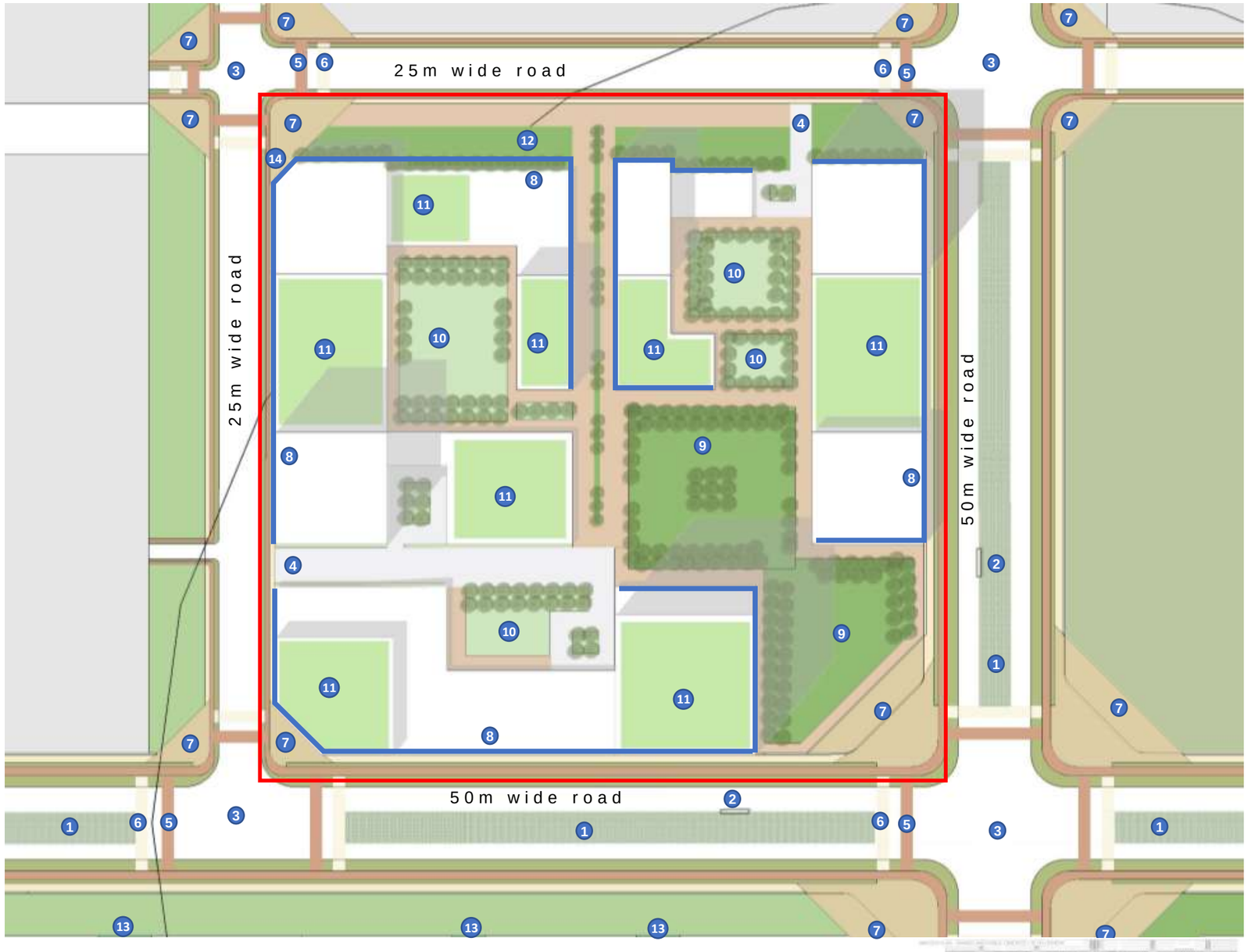
- Entry points should be welcoming and address local context creating vistas
- The design of the buildings within the town centre located at the corner sites should address the streetscape on both the public frontages
- Maximum two access points should be permitted per plot

Building Footprint

- Ground coverage for plots should be as per zoning regulations
- Town centres should have mixed use development with retail, offices, public amenities and residential typologies, with the following percentage break up -
- 50-70% residential
- 20-40% commercial
- Min 10% public amenities
- 60 % of the retail shops should have street front on the ground floor

1. Transit corridor(Refer streetscape chapter)
2. Transit bus stop ((Refer guidelines in streetscape chapter)
3. Major intersection node of neighbourhood (Refer guidelines in streetscape chapter)
4. Plot Entry / Exit (Refer built form chapter for plot access guidelines)
5. Cycle crossing(refer streetscape chapter)
6. Pedestrian crossing (Refer streetscape guidelines chapter)
7. Street Corner(Refer guidelines in open spaces chapter)
8. Active Commercial frontage(refer building frontage guidelines in built form chapter)
9. Internal courtyard for open space and permeable to pedestrian movement(Refer guidelines POPS in open space chapter)
10. Internal private courtyard of institutional building (Refer guidelines in built form chapter)
11. Private Terrace Garden (refer built massing guidelines in built form chapter)
12. Screening / Buffer planation along utility plot(Refer built for guidelines)
13. Urban and streetscape plugins (Refer streetscape chapter)
14. Feeder Bus Stop (refer town center guidelines and last mile connectivity guidelines in TPOD chapter

*Note :All building heights as per zoning regulation
All building typology and town center within TPOD zone should refer TPOD guidelines Chapter 5



C4 Town Centre Plan

Plot access
POPS
Private open space
Neighbourhood park
Multi-functional zone
Cycle track
Pedestrian walkway
Commercial street front
Plot boundary

7.1 Site Development and Building Typologies

Town Centre

Building Height and Profile

- Location and site development should encourage vistas to the building from the surrounding urban fabric to ensure signature status
- Entry of the building should be emphasised with grandeur and monumental scale
- Town centre plot development should have at least one building within the plot that creates identity for the town centre through its maximum height. This maximum height should be determined by Amaravati Zoning Regulations plan and TPOD zone

Plinth Level

- For plinth height refer table in built massing plinth level guidelines

Parking

- For parking refer large scale development plot guidelines

Open Spaces within Plot

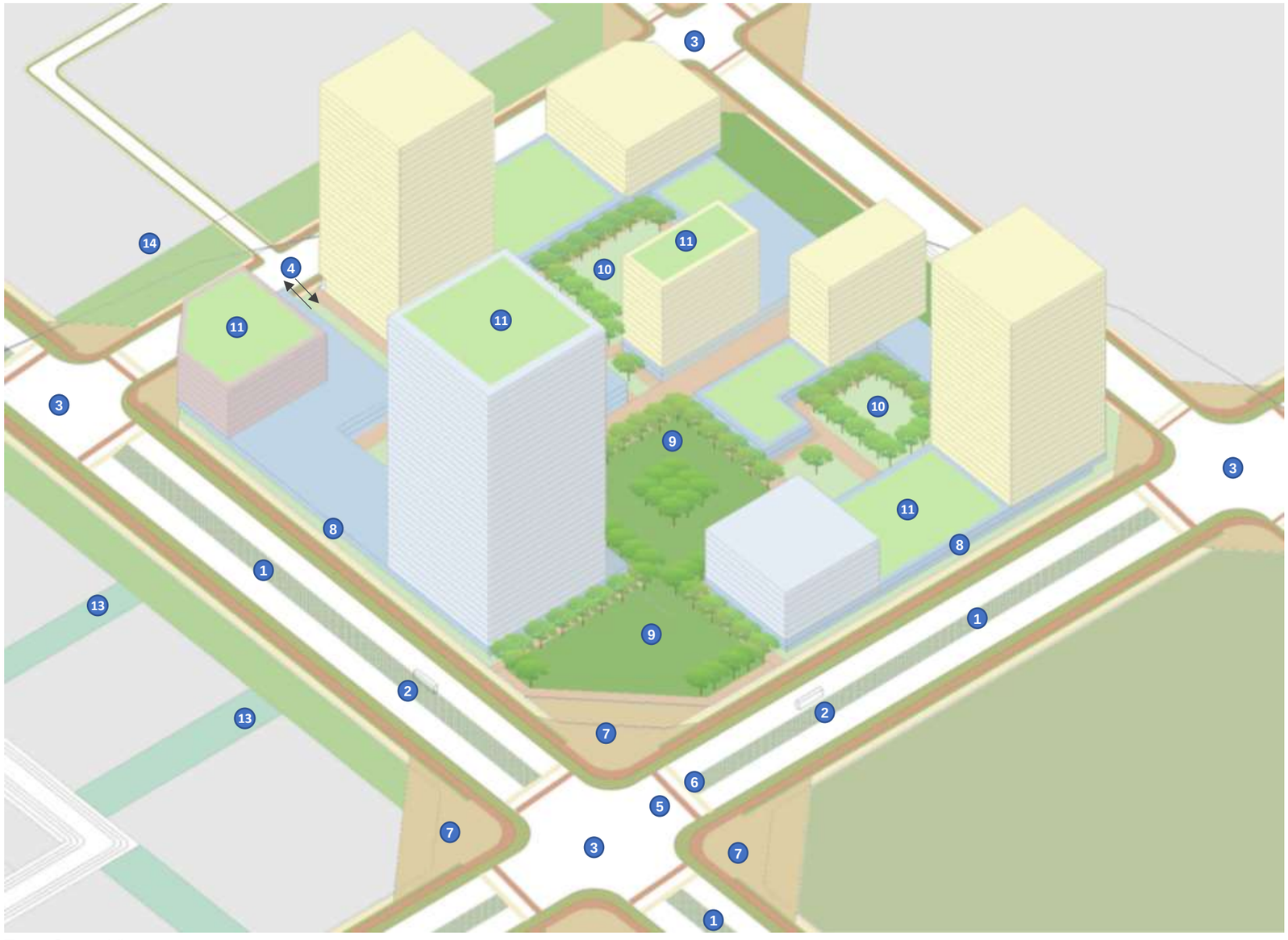
- Minimum 5% additional reserved green should be provided. Reserved green should provide min 60% tree canopy coverage
- Minimum 5% additional reserved green should be provided. Reserved green should provide min 60% tree canopy coverage
- Minimum 40% of the internal courtyards should be landscaped with plantation
- Plantation should follow MOEF guidelines.

Town Centre Feeder Bus Stop -

- The feeder bus stop should be located within the plot boundary and along the street edge. This feeder bus stop should plan to connect city transit stop and neighborhood feeder stop
- It should be zoned within 300-500m walkable distance from the transit stop and should be on the feeder bus route
- The location should be determined after due consideration of the transport routes in the neighborhood zone
- Building entrances should be oriented towards transit stops and provide direct pedestrian access

Sustainability

- Buildings should meet green building requirements as outlined in built form guidelines sub chapter green building features



Town Centre View

1 Transit corridor
2 Transit bus stop
3 Major intersection node of neighbourhood (Refer guidelines in)
4 Plot Entry / Exit
5 Cycle crossing
6 Pedestrian crossing
7 Street Corner(Refer guidelines in open spaces chapter)
8 Active Commercial frontage
9 Internal courtyard for open space and permeable to pedestrian movement(Refer guidelines in)
10 Internal private courtyard of institutional building (Refer guidelines in)
11 Private Terrace Garden
12 Screening / Buffer planation along utility plot
13 Urban and streetscape plugins
14 Feeder Bus Stop

Town Centre Plan

Plot access
POPS
Private open space
Commercial street front
Plot boundary
Public amenities
Residential
Commercial
Institutional
Utility and Service infrastructure
Town park
Multi-functional zone
Cycle track
Pedestrian walkway

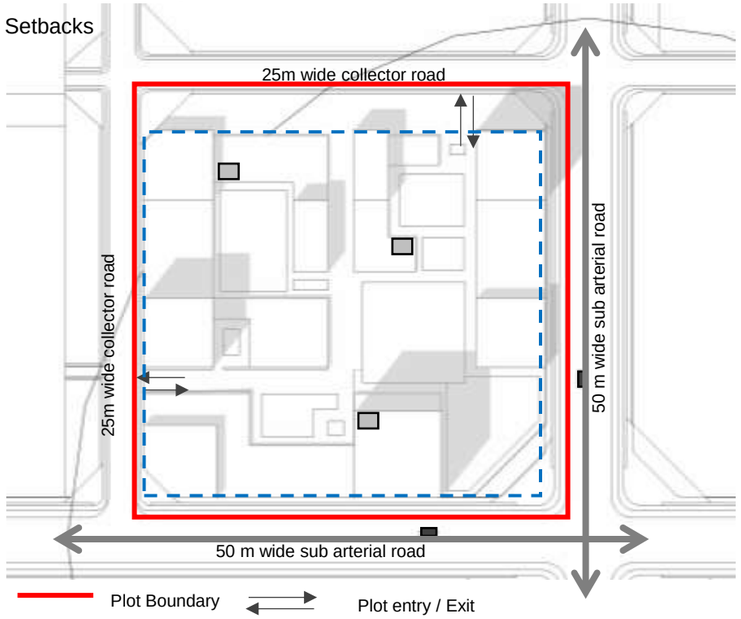
*Note :All building heights as per zoning regulation
All building typology and town center within TPOD zone should refer TPOD guidelines Chapter 5

7.1 Site Development and Building Typologies

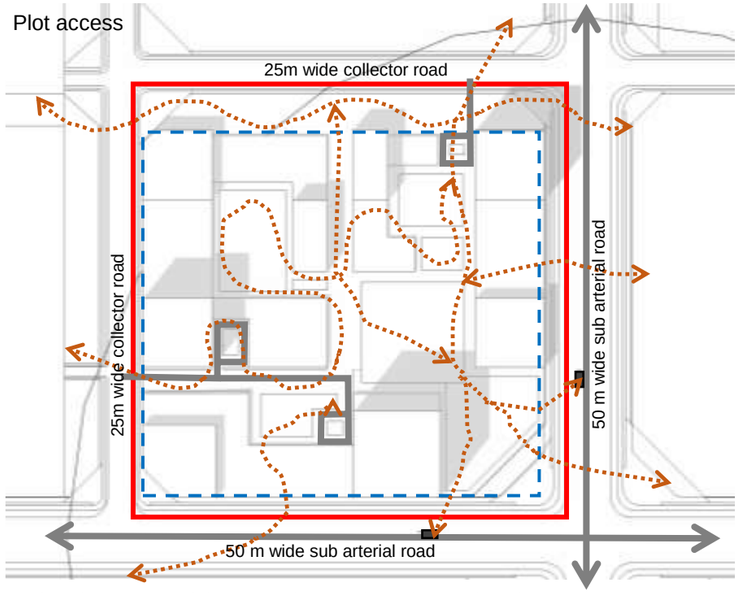
Building Typology

A. Site development

Setbacks



Plot access

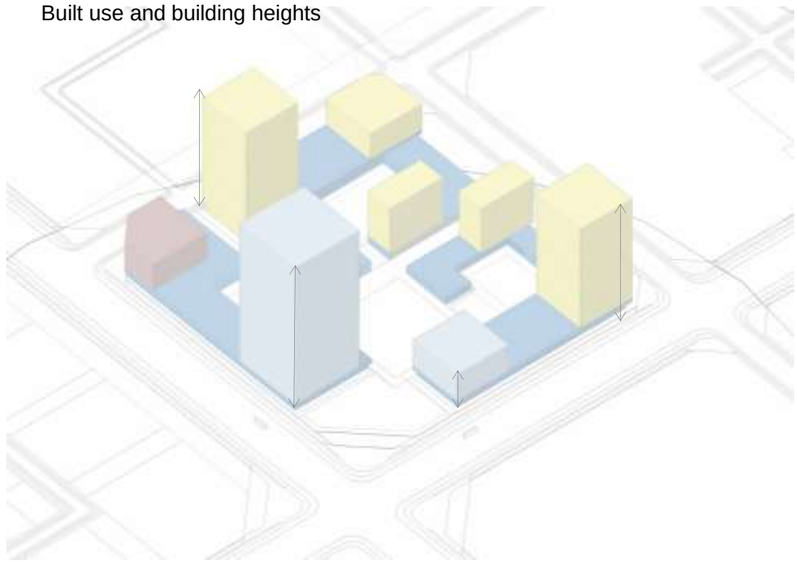


Pedestrian connectivity towards transit nodes and parks
Vehicular entry and movement is restricted inside plot

Transit Bus Stop
Internal vehicular movement
Pedestrian connection

B. Built massing

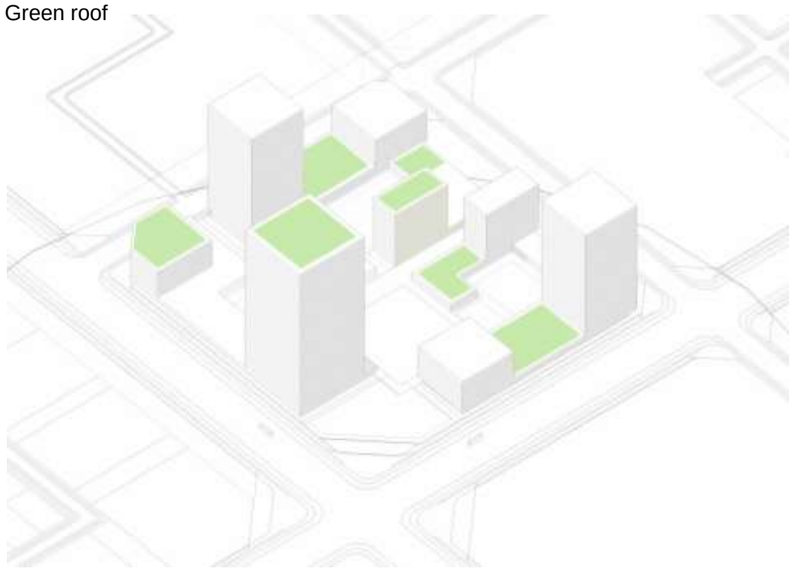
Built use and building heights



Building heights as per Amaravati Zoning Regulations and as per TPOD zone

50-70% Residential
20-40% Commercial
Retail shops
Min. 10% Public amenities

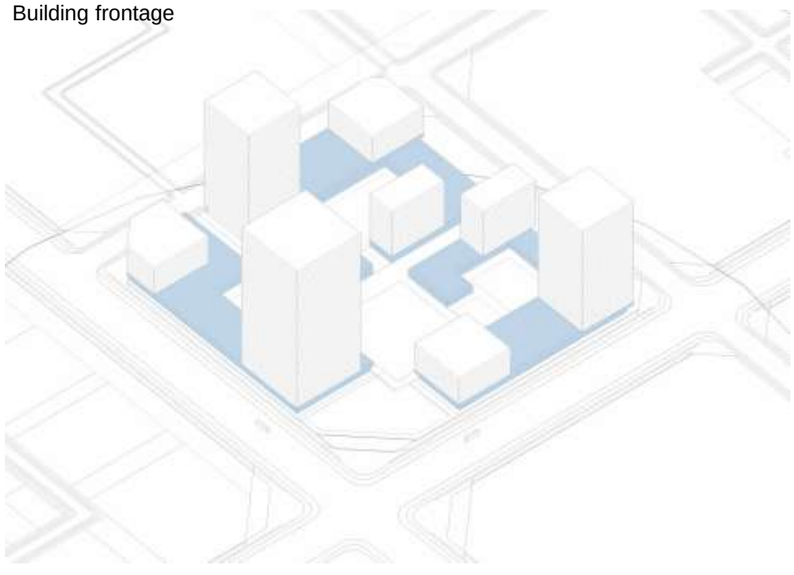
Green roof



Terrace and podium should provide 15-30% area of ground coverage as an intensive green (vegetated) cover and above 30% to 50 % should be suggestive for intensive green (vegetated) cover.

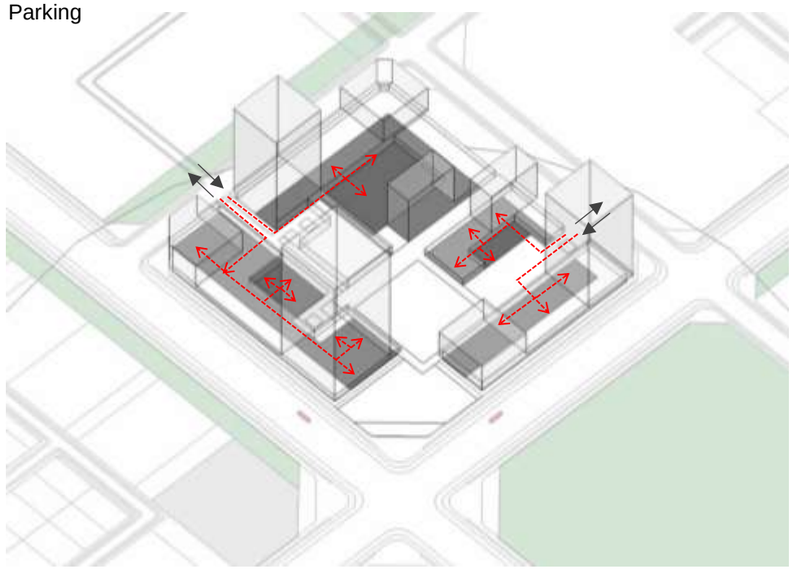
Building Terraces

Building frontage



60 % of retail shop at street front on ground floor

Parking



Parking should locate rare side of the building and to the basement

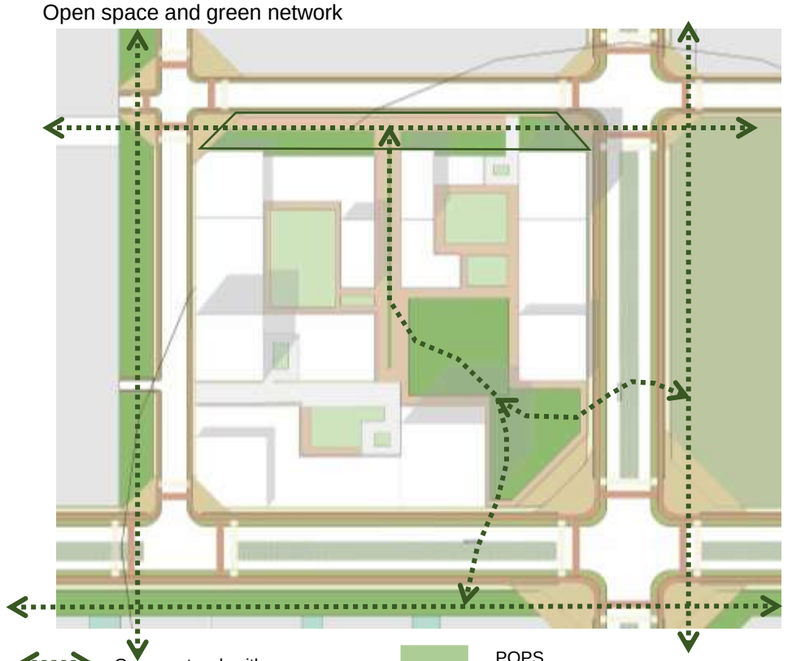
Vehicular access
Vehicular circulation

7.1 Site Development and Building Typologies

Building Typology

C. Open space within plot

Open space and green network



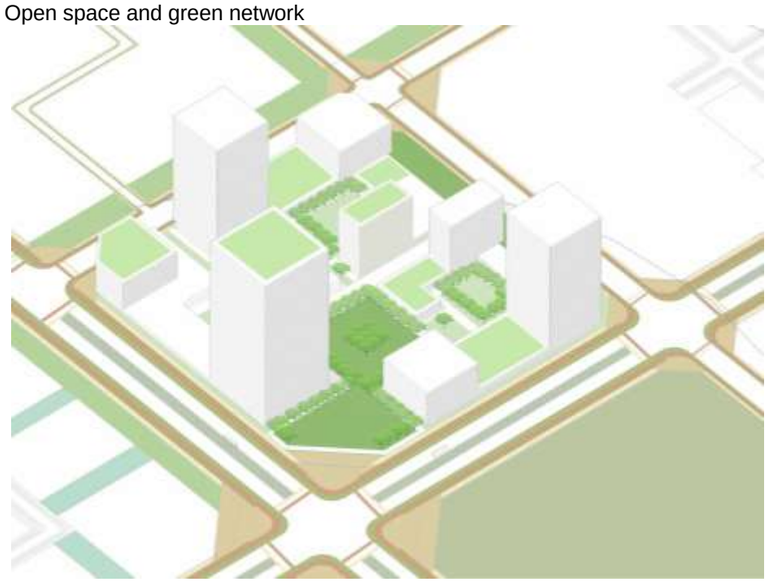
Green network with open spaces

POPS

Private open space

10 % additional open space for public use

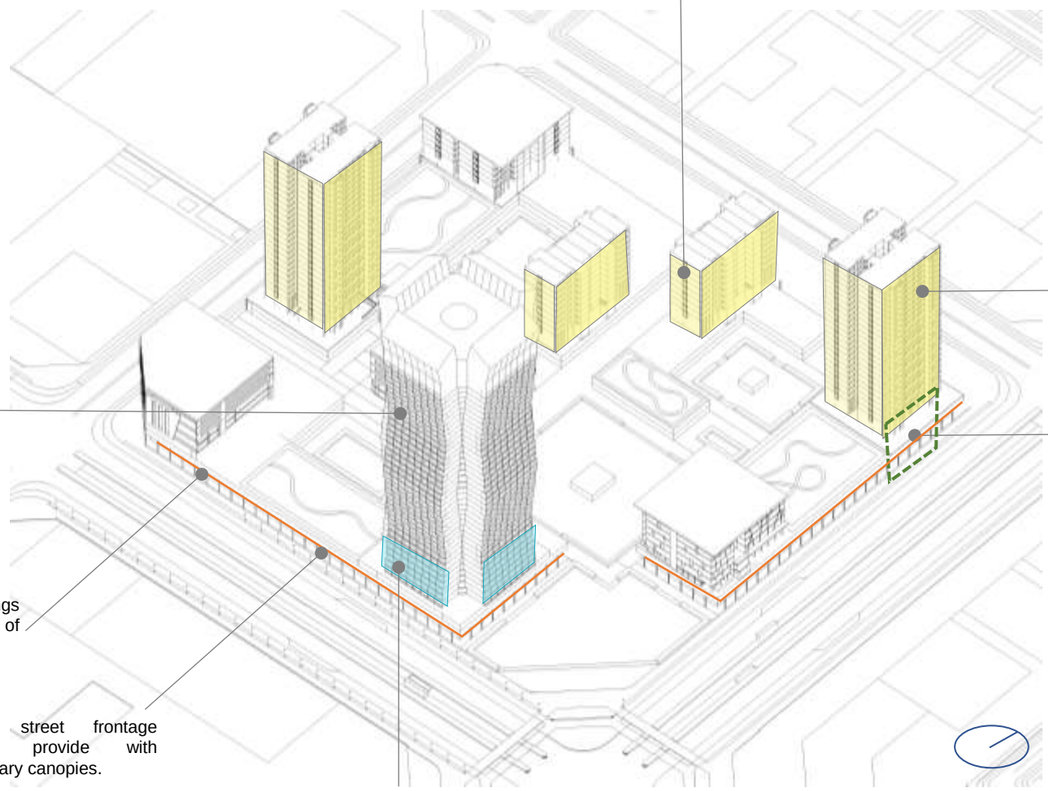
Open space and green network



Streetscape Urban Plugin

D. Architectural treatment

Architecture facade



- 10-20% of plot area as POPS
- 5% additional reserved green should be provided.
- Min. 40% of internal courtyard to landscaped with planation.
- Min. 10% reserved green area with 60% tree canopy coverage
- Terrace and podium should provide 15-30% area of ground coverage as an intensive green (vegetated) cover and above 30% to 50 % should be suggestive for intensive green (vegetated) cover.

7.1 Site Development and Building Typologies

Building Typology

Neighbourhood centre

- Neighbourhood centres should be proposed within reserved areas as per Amaravati Zoning Regulations
- For plots within TPOD zone should refer TPOD guidelines

Setbacks

- Building setbacks as per Amaravati Zoning Regulations

Services

- Refer service guidelines as per plot area, stated under the site development parameter in Built form guidelines

Plot Boundary and Edge Plantation

- Guidelines for large scale development plot should follow plot boundary and edge plantations

Plot Access

- Entry points should be welcoming and address local context creating vistas
- The design of the buildings within the neighbourhood centre located at the corner sites should address the streetscape on both the public frontages
- Maximum two access points should be permitted per plot
- Neighbourhood centre should share maximum public purpose connecting to people and community blocks to each another

Parking

- For parking refer large scale development plot guidelines

Building Footprint

- For building footprint refer larger scale development plot built form guidelines
- Centre should have mixed use development with retail, offices, public amenities and residential typologies, with the following percentage break up -
- 50-70% residential
- 20-40% commercial
- Min 10% public amenities
- 60 % of the retail shops should have street front on the ground floor
- Internal courtyard for open space and permeable to pedestrian movement connecting neighbourhood
- Commercial street frontage on ground floor to create public realm

Plinth Level

- For plinth height refer table in built massing plinth level guidelines

Building Height and Profile

- For height and profile refer built for guidelines for large scale development plot and Town centre guidelines

Neighborhood Centre Feeder Bus Stop – (refer TPOD guidelines)

- The feeder bus stop should be located within the plot boundary and along the street edge. This feeder bus stop should plan to connect city transit stop and town center feeder stop
- It should be zoned within 300-500m walkable distance from the transit stop and should be on the feeder bus route
- Building entrance should be oriented towards transit stops and provide direct pedestrian access

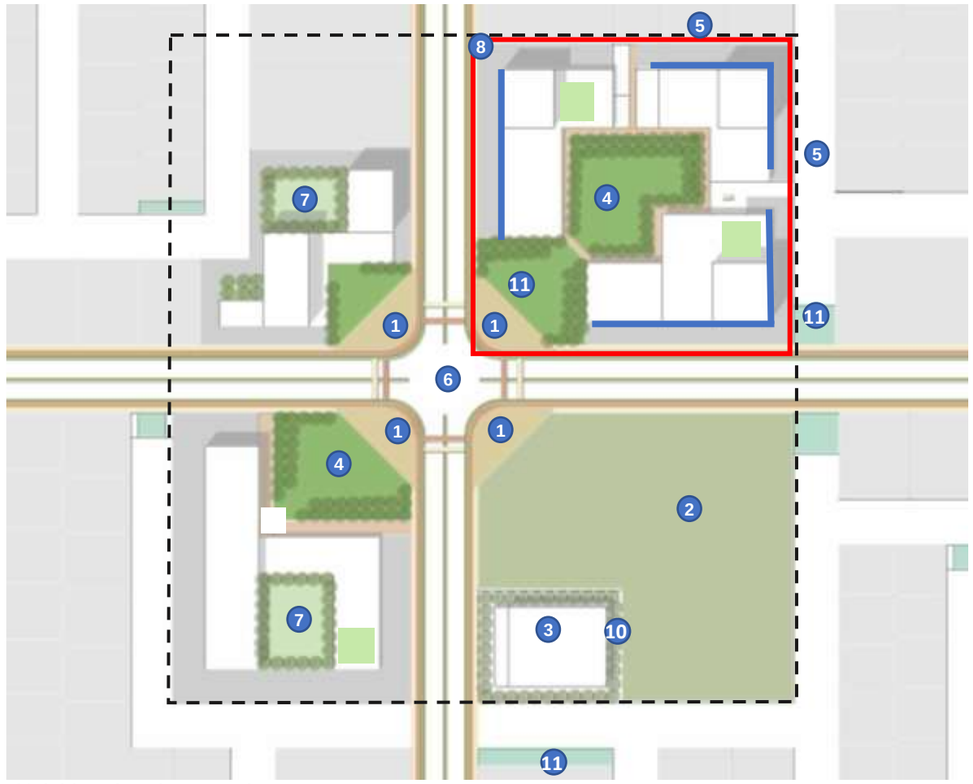
Open Spaces within Plot

- For open space within plot refer large scale plot development guidelines outlined in Built Form Guidelines

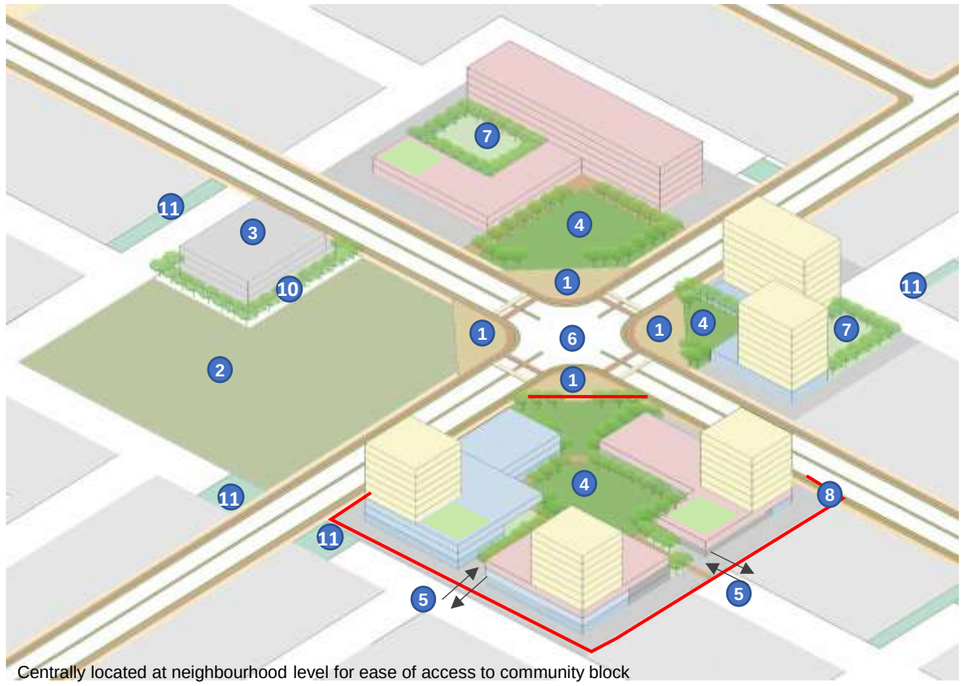
Sustainability

- Buildings should meet green building requirements as outlined in built form guidelines sub chapter green building features

*Note :All building heights as per zoning regulation
All building typology and town center within TPOD zone should refer TPOD guidelines Chapter 5



Neighbourhood centre plan

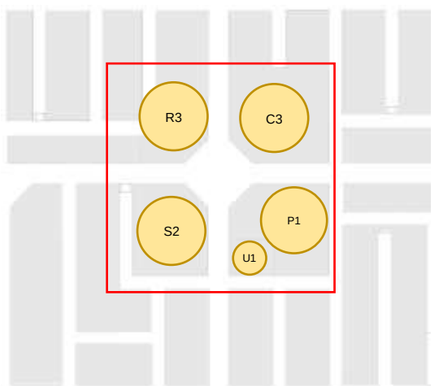


Centrally located at neighbourhood level for ease of access to community block

Neighbourhood centre view

Plot access
Commercial street front
Plot boundry
Neighbourhood canter zone
Plot boundary
Multi-functional zone
Cycle track
Pedestrian walkway
Street corner
POPS
Private open space
Neighbourhood park
Public amenities
Residential
Commercial
Amenity
Utility and Service infrastructure

1. Street corner plaza (Refer guidelines in open spaces chapter)
2. Neighbourhood park (Refer guidelines in open spaces chapter)
3. Parking and services building (Refer guidelines in)
4. Internal courtyard for open space and permeable to pedestrian movement (Refer guidelines for utility plots)
5. Access points to neighbourhood centre from community (Refer guidelines in)
6. Major intersection node of neighbourhood (Refer guidelines in)
7. Internal private courtyard of institutional building (Refer guidelines in)
8. Neighbourhood centre feeder bus stop
9. Cycle parking racks
10. Buffer planation along utility plot
11. Streetscape and urban plugins

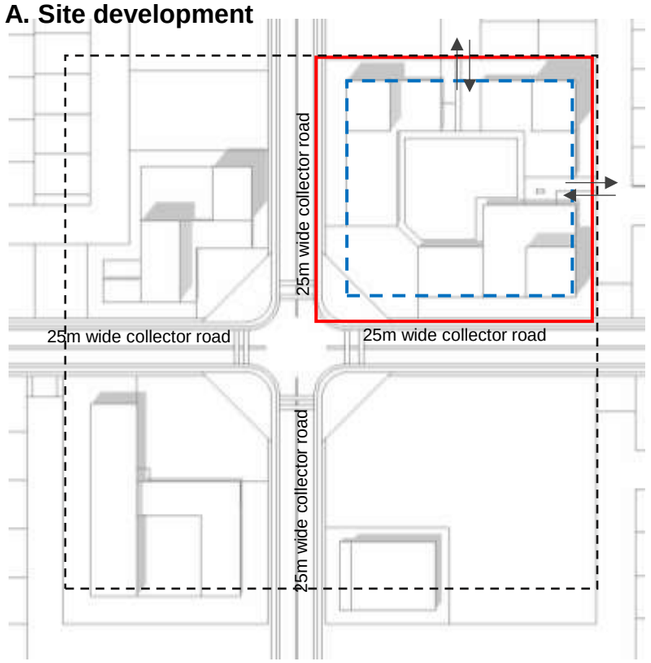


Key Plan

7.1 Site Development and Building Typologies

Building Typology

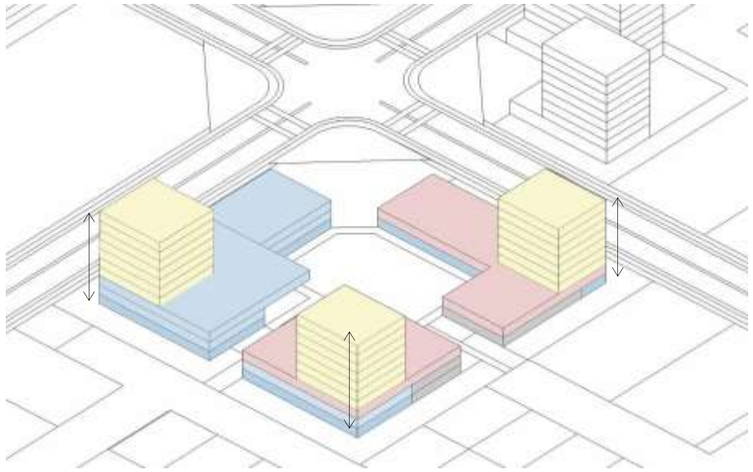
A. Site development



Pedestrian connectivity towards transit nodes and parks

B. Built massing

Built use and building heights



Residential 50-70% of built use

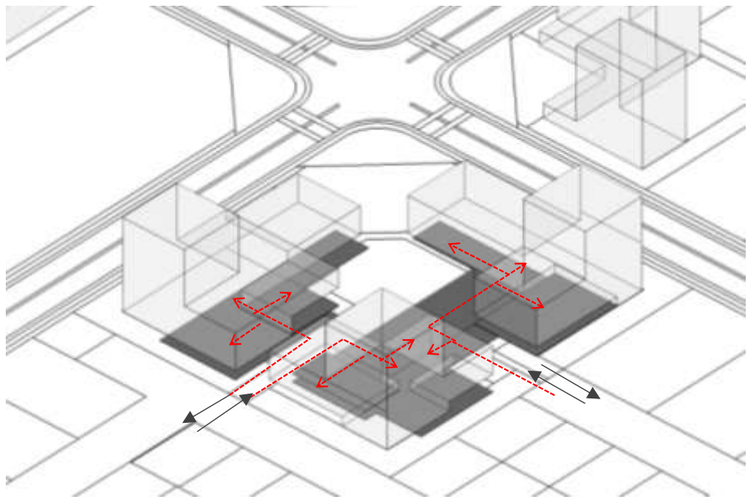
Commercial 20-40% of built use

Retail 60 % of retail shop at street front on ground floor

Amenity Min. 10% of built use

Building heights as per Amaravati Zoning Regulations and as per TPOD zone

Parking



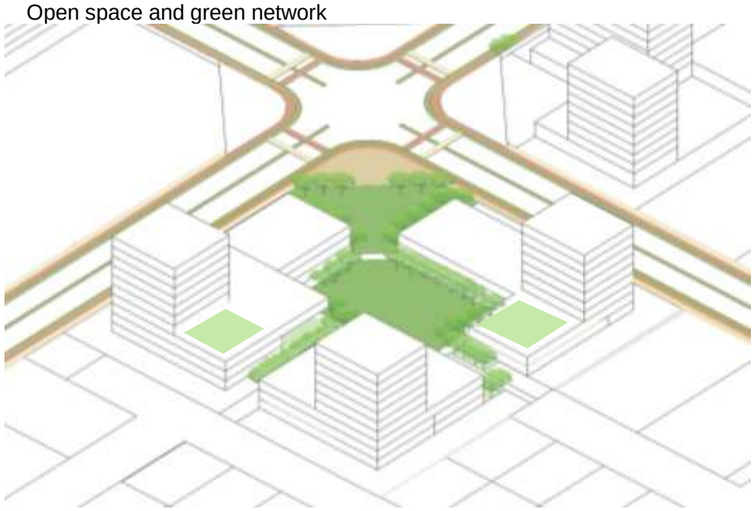
Parking should locate rare side of the building

Vehicular entry

Vehicular circulation

C. Open space within plot

Open space and green network

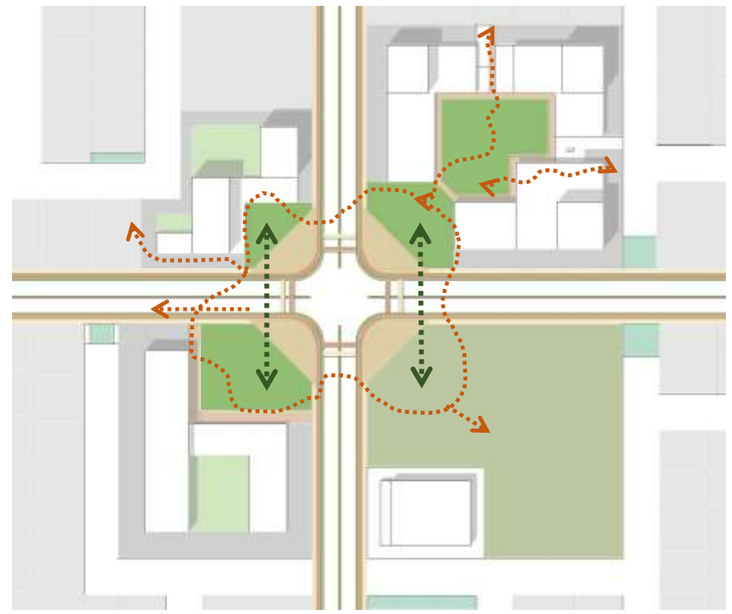


- 10-20% of plot area as POPS
- 5% additional reserved green should be provided.
- Min. 40% of internal courtyard to landscaped with planation
- Min. 10% reserved green area with 60% tree canopy coverage
- 15%-30% area of ground coverage for podium and roof greening and 30 to 50 % should be suggestive for roof greening.

Building Terraces

POPS

Green space and pedestrian network



Pedestrian connectivity towards transit nodes and parks.

Green network with open spaces

Pedestrian connection

POPS

Private open space

*Note :All building heights as per zoning regulation
All building typology and town center within TPOD zone should refer TPOD guidelines Chapter 5

7.1 Site Development and Building Typologies

Village Center

- Village centre development project will consider the following site selection criteria -
- Village center should locate possibly at the center of the village and should easily accessible to villagers
- It should integrated with LPS layout as equally as to village
- Relationship to transit corridors
- Proportional plot size should me min 2000 sq.m and above, possibly mix use arrangement of existing buildings in context with land use
- Placement of parking within walkable distance

Setbacks

Building setbacks as per Amaravati Zoning Regulations

Services

- Refer service guidelines as per plot area, stated under the site development parameter in built form guidelines

Plot Boundary and Edge Plantation

- Refer plot boundary and edge plantations guidelines as per plot size

Plot Access

- Maximum two access points should be permitted per plot
- Entry points should be welcoming and address local context creating vistas
- The design of the buildings within the village centre located at the corner sites should address the streetscape on both the public frontages

Building Footprint and Massing

- Refer building footprint guidelines as per plot size
- Roof and podium should provide 10-20% area of ground coverage as an intensive green (vegetated) cover
- Refer village integration guidelines for program formation and provision of facilities. Village centre should fulfil a basic necessity of public amenities of village

Plinth Level

- For plinth height refer table in built massing plinth level guidelines

Building Height and Profile

- Location and site development should encourage vistas to the building from the surrounding urban fabric to ensure signature status
- Village center should reflect village character in response to the context
- Structure should have sloping roof

Built Massing

- Design or restoration of building should respect integrity and intent of original design
- Existing height and width of historical village typology, style should be maintained with scale and proportions
- The proportions of original design elements such as rooflines, floor levels, storefronts, upper storey windows should be restored
- Generally flat or gable roofs with stepped or sloped parapets
- Commercial and office building frontage should be located as near as practical to the front setback line, or if a corner building, as near as practical to the setback lines of both streets
- In the case of corner buildings, this may be accomplished using angled or sculpted building corners or an open plaza at the corner.
- Coordinate Building Designs – Multiple buildings in a single project must demonstrate a positive functional relationship with one another

Village Centre Plan

1. Plot Entry / Exit
2. Parking Zone
3. Internal Driveway
4. Active Commercial frontage
5. Administrative Offices
6. Training Center
7. Community Multipurpose Hall
8. Library
9. Internal private courtyard
10. Private Terrace Garden
11. Screening / Buffer planation along utility plot
12. Outdoor Open Space
13. Shared Street
14. Cycle crossing
15. Pedestrian crossing
16. Street Corner
17. Urban and streetscape plugin
18. Shared Street

Plot access
Commercial street front
Plot boundary
Village Centre Building
Temple
Street Corner Plaza
Urban Plaza
Public Open Space
Urban and streetscape plug-in
Park
Internal Walkway
Internal Driveway
Shared Street

Rayapudi Village Centre key Plan

7.1 Site Development and Building Typologies

Village Center

Parking

- For parking refer built form guidelines
- Parking should be provided within zone walkable distance of range 300m to 500m from village centre
- Surface parking should be avoided into parking plot. Surface parking is allowed only for heavy vehicles
- Refer utility plot guidelines from multi level parking building

Open Spaces within Plot

- Outdoor open spaces should linked with relative functions and built use
- Public should use outdoor open spaces during various festivals, family events, sports activities etc.
- Provision of 10 - 20% of parcel area as Privately Owned Publically Accessible Spaces (POPS). For POPS detail refer waterfront and open space checklist and guidelines
- Minimum 5% additional reserved green should be provided. Reserved green should provide min 60% tree canopy coverage
- Minimum 40% of the internal courtyards should be landscaped with plantation
- Plantation should follow MOEF guidelines

Architectural Facade and Treatment

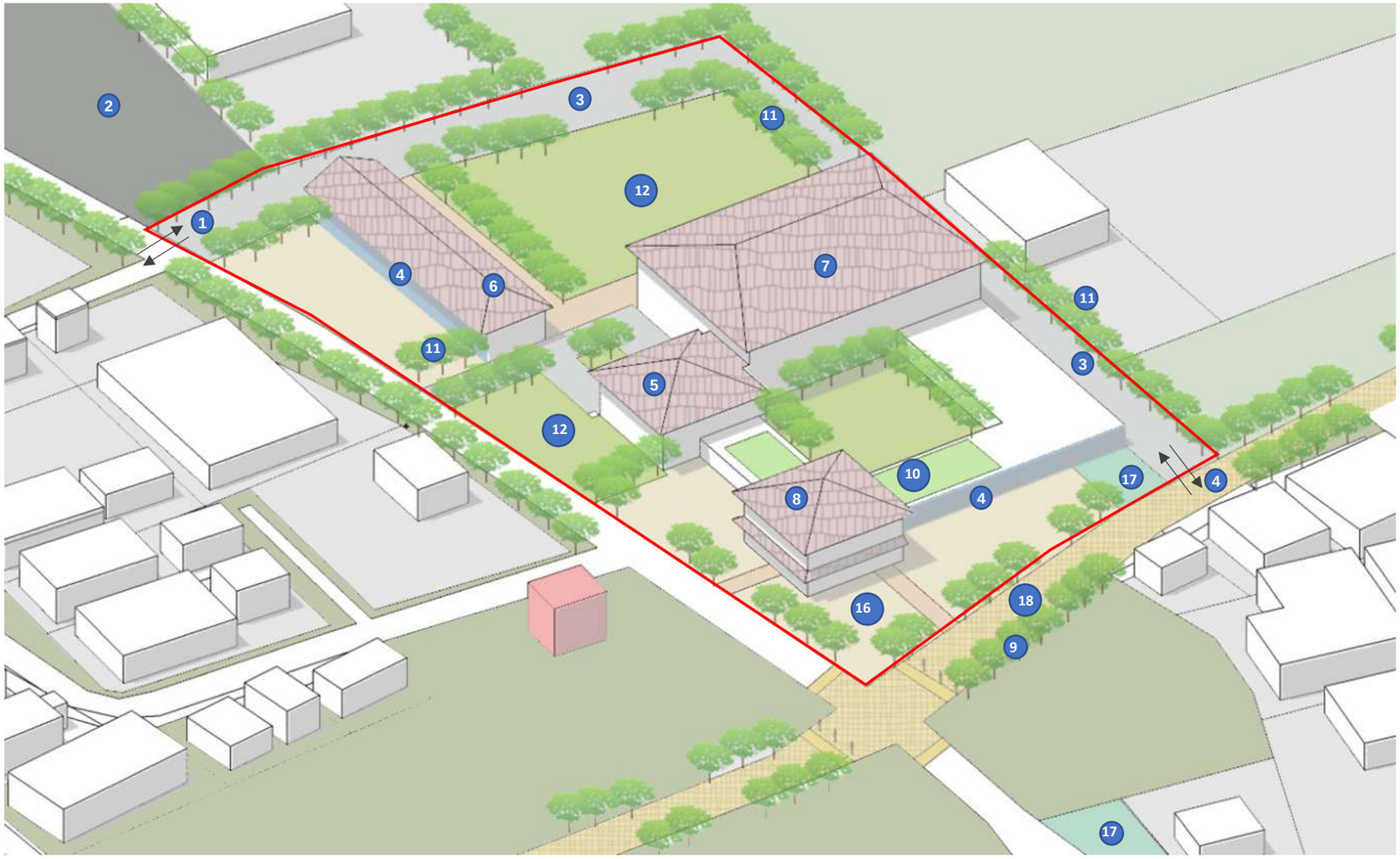
- Refer architectural façade and treatment guidelines for village center building façade treatment and additional guidelines should be followed for village center.
- Quality materials and natural and earth tone colours should be used maintaining original visual character of village if possible
- Parapet, cornice, and fascia band ornamentation should be designed as building element for village character
- Structures of historic significance or which are listed on a municipal, county, state or national historical register should comply with said municipal, county, state or national guidelines for historic structures within precinct or inside plot should be preserved
- loading and unloading areas of building services should not face public spaces along street front
- Existing or planned amenities such as parks, open space, water features or public shared streets should be architecturally articulated

Materials and Colour

- Authentic materials and quality craftsmanship should be used in restoration of heritage buildings, usually wood for structural elements, cladding, and finishes.
- New materials (or synthetic materials such as fibreglass moulds or patches) used in reconstruction should duplicate or match the original design

Sustainability

- Buildings should meet green building requirements as outlined in built form guidelines sub chapter green building features



Village Centre View

1 Plot Entry / Exit
2 Parking Zone
3 Internal Driveway
4 Active Commercial frontage
5 Administrative Offices
6 Training Center
7 Community Multipurpose Hall
8 Library
9 Internal private courtyard
10 Private Terrace Garden
11 Screening / Buffer planation along utility plot
12 Outdoor Open Space
13 Shared Street
14 Cycle crossing
15 Pedestrian crossing
16 Street Corner
17 Urban and streetscape plugin
18 Shared Street

Plot access
Commercial street front
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Temple
Street Corner Plaza
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Public Open Space
Urban and streetscape plug-in
Park
Internal Walkway
Internal Driveway
Shared Street

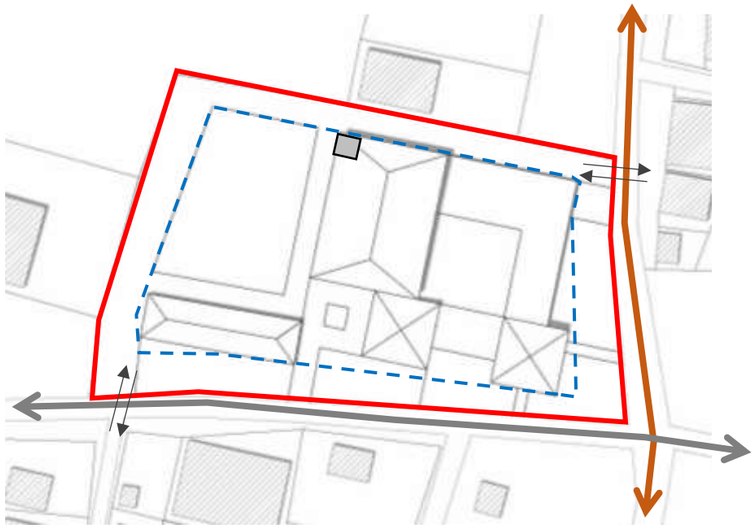
Rayapudi Village Centre key Plan

7.1 Site Development and Building Typologies

Building Typology

A. Site development

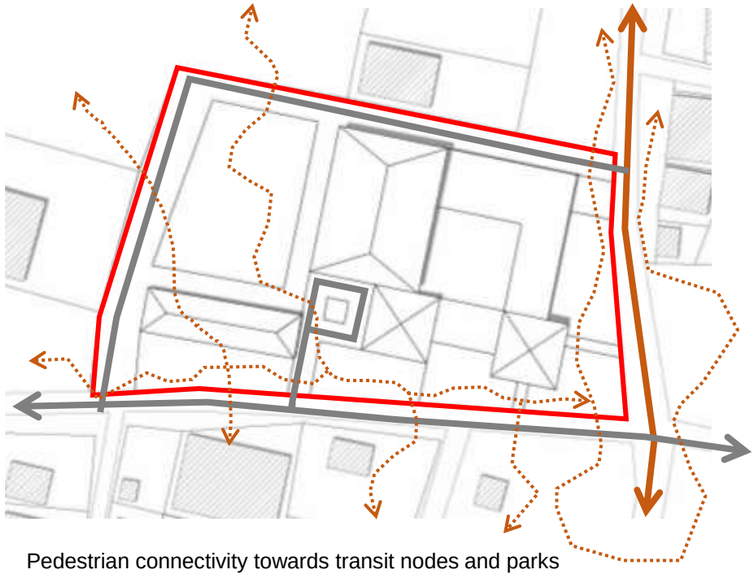
Setbacks



Plot Boundary
Set Back line
Service Yard
Plot entry / Exit
Village street
Shared Street

Plot access

25m wide collector road

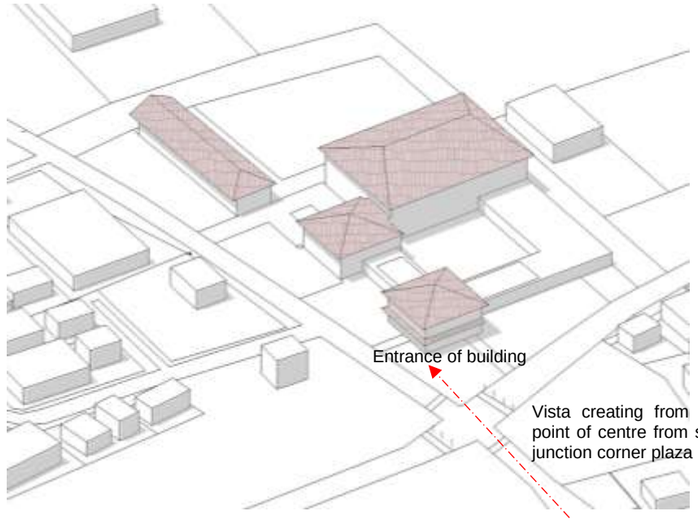


Pedestrian connectivity towards transit nodes and parks
Vehicular entry and movement is restricted inside plot

Shared Street
Internal vehicular movement
Pedestrian connection

B. Built massing

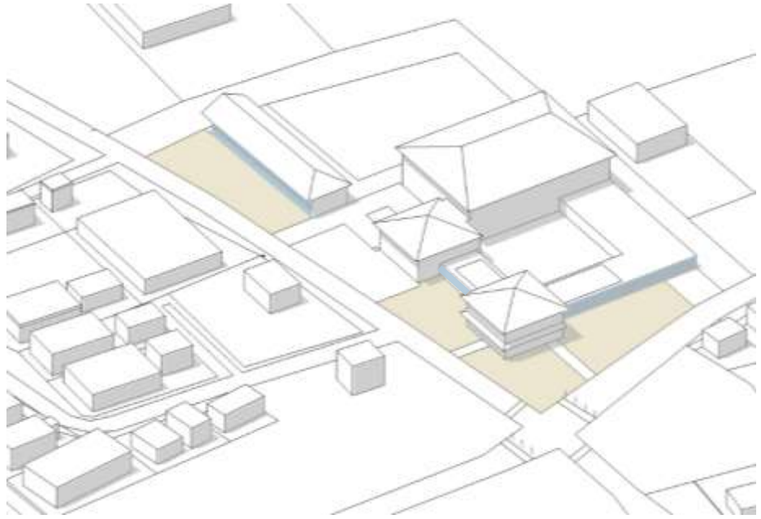
Built use and building heights



Building heights as per Amaravati Zoning Regulations and as per TPOD zone

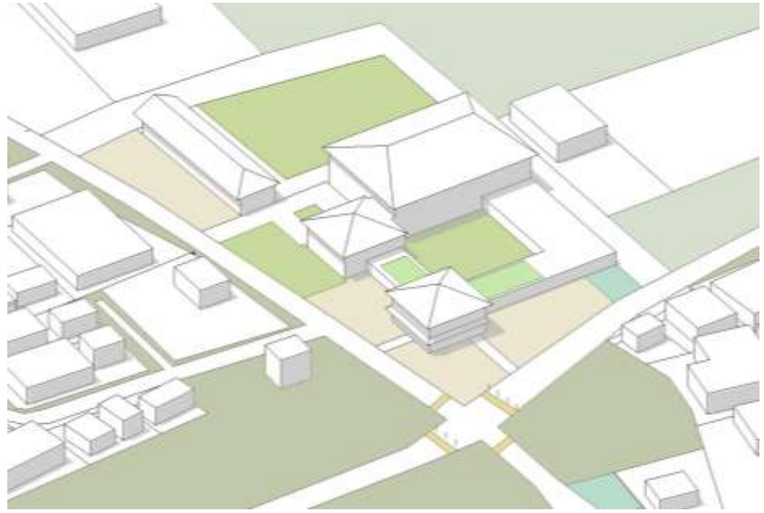
- Sloping roof
- Courtyard typology
- Welcoming entry point of building and addressing local context creating vistas

Building frontage



60 % of retail shop at street front on ground floor
Urban plaza

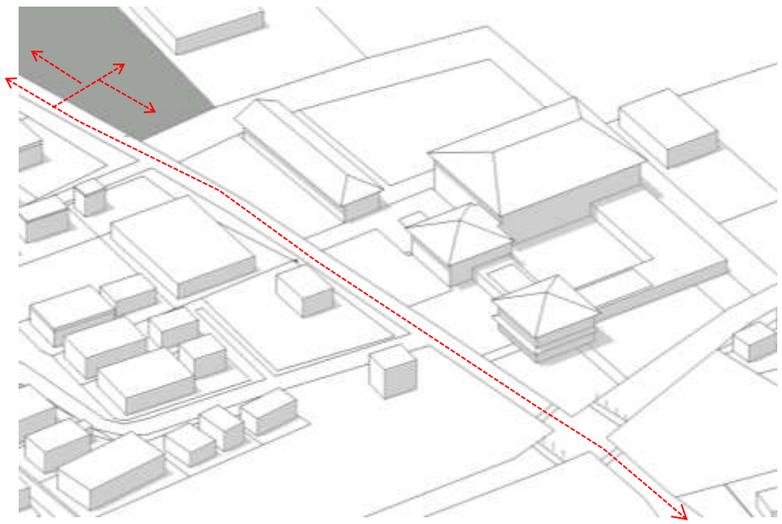
Green roof



Roof and podium should provide 10-20% area of ground coverage as an intensive green (vegetated) cover

Building Terraces
Public Open Space
Park
Urban Plaza
Urban and streetscape plug-in
Urban plaza

Parking



Parking plot should be provided within range of 300 -500 m of walkable distance

Vehicular access
Vehicular circulation

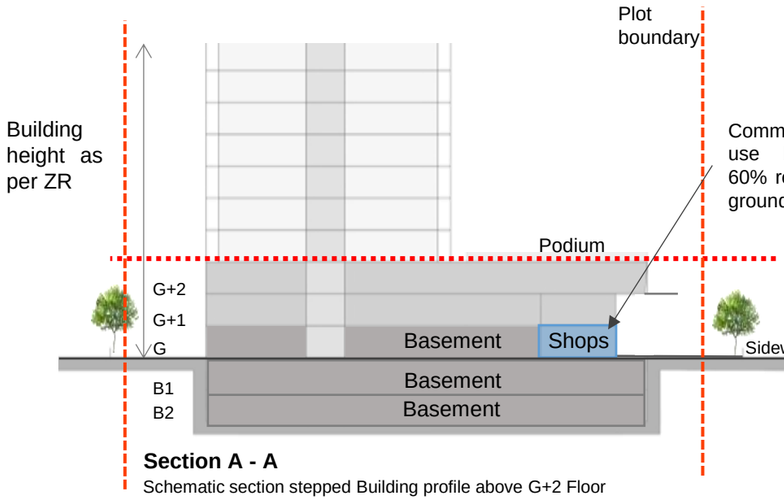
7.2 Architectural and Facade Treatment

7.2 Architectural and Facade Treatment

Building frontage and facades

The building frontage and facades should be designed with a welcoming frontier and in context of the street. It should have common heights followed for the ground and first 2 floors to enable continuity with retail and commercial uses on the ground floor.

- Commercial and mixed use buildings should provide up to 60% of total of street frontage with retail shop at ground floor. Shop street frontage should be transparent through opening and shop windows.
- 40 to 50 % of building facades at the street level should consist of vision glass or entrances.
- Podium along the street edge should be treated with public or semi-public commercial activities and parking spaces should be accommodated at rear side of active frontage.
- Podium heights more than G+2 should adopt stepped/ terraced building profile
- Residential building's entrance lobby and community recreational spaces should be planned along the street frontage and locate parking at the rear side
- All building services facing streets should be avoided and covered with screened as part of elevation treatment.
- Dead walls, window less facades should be avoided along the street edge.
- Commercial and public buildings facade treatment should reflect unique character inspired from local cultural and vernacular architectural elements to create identity
- Commercial and public buildings entrance should be grand and integrated with landscaped plazas for creating public spaces defining character.



Section A - A

Schematic section stepped Building profile above G+2 Floor

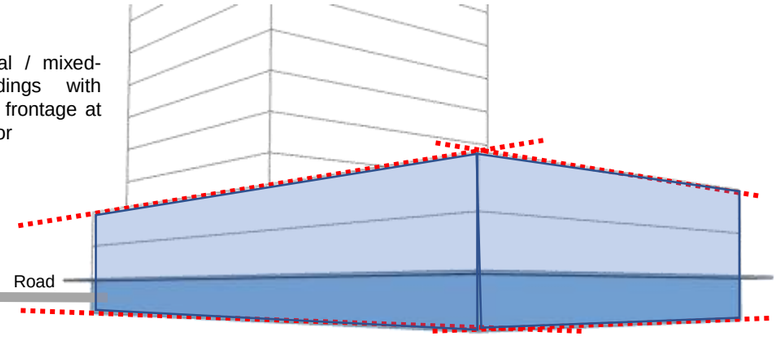
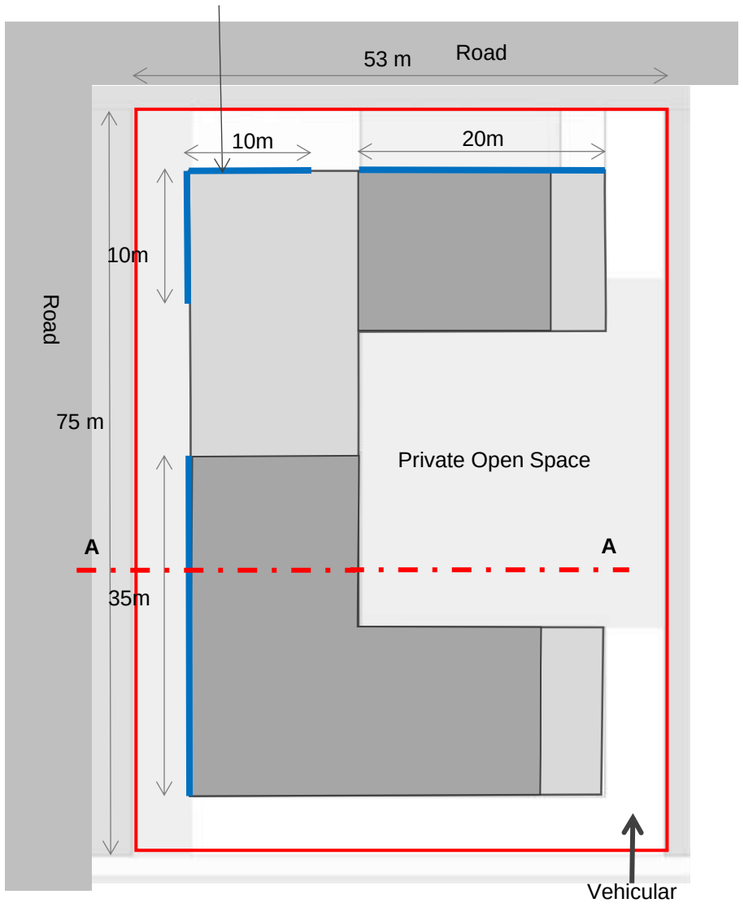


Illustration showing maintained height profile along street frontage

Commercial and mixed use buildings with shops at ground floor should provide up to 60 % retail frontage along the street edge.



Layout design with commercial active building frontage

The Avenue des Champs-Élysées

Cross Roads, Vancouver

Source: http://www.aucklanddesignmanual.co.nz/sites-and-buildings/mixed-use/case-studies/crossroad

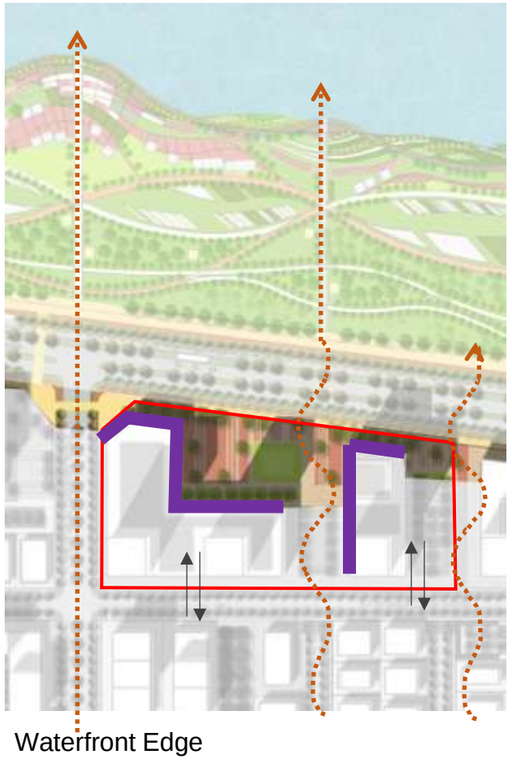
7.2 Architectural and Facade Treatment

Building Frontage

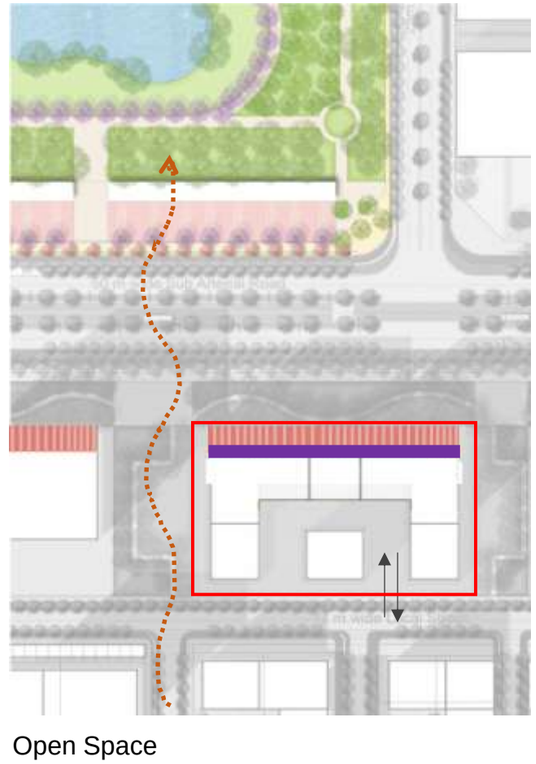
Public Spaces, Major Roads and Transit Corridors

Plots with buildings facing public spaces such as waterfront, open spaces and parks, buffer zone and public transit corridors should have following considerations for orienting buildings to ensure active urban edges.

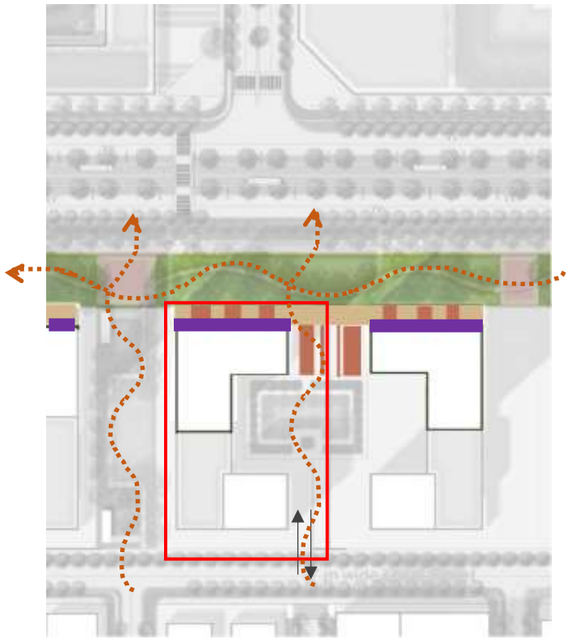
- Plots with buildings facing waterfront, open space, buffer zone, major roads and public transit corridor should be designed with active frontage of the plot as mixed use development.
- These plots with development oriented towards public spaces should have direct pedestrian access with the drop off and potentially having on street parking facilities.
- These plots should also be considered for having vehicular access from the roads adjoining the public spaces irrespective of its ROW.
- Buildings should be placed at the corners or strategic view corridors to create visual focal points along the public spaces.
- Buildings orientation and position along the public spaces should be addressing the view corridors and maximizing the views towards waterfront and parks.
- The public spaces facing buildings should have colonnade character. (refer TPOD guidelines for colonnade details.)
- Publicly accessible POPS and urban squares should include retail and public amenities along the public spaces. (refer Waterfront and Open Space Network Guidelines for further details)



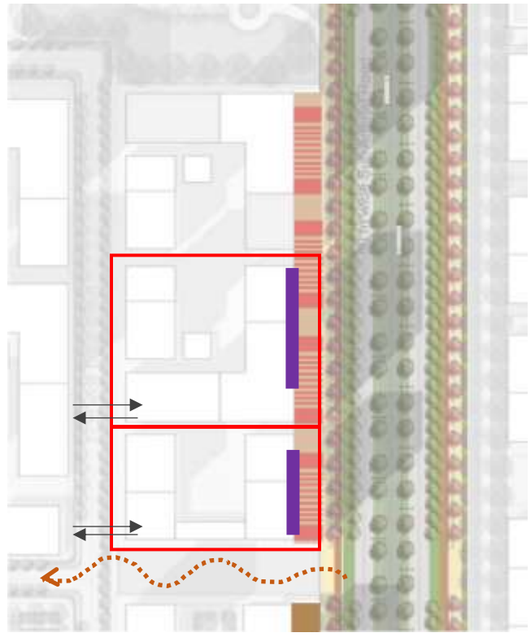
Waterfront Edge



Open Space



Buffer zone



Major roads and public transit corridor

Plot boundary

Pedestrian movement

Building frontage with active edge

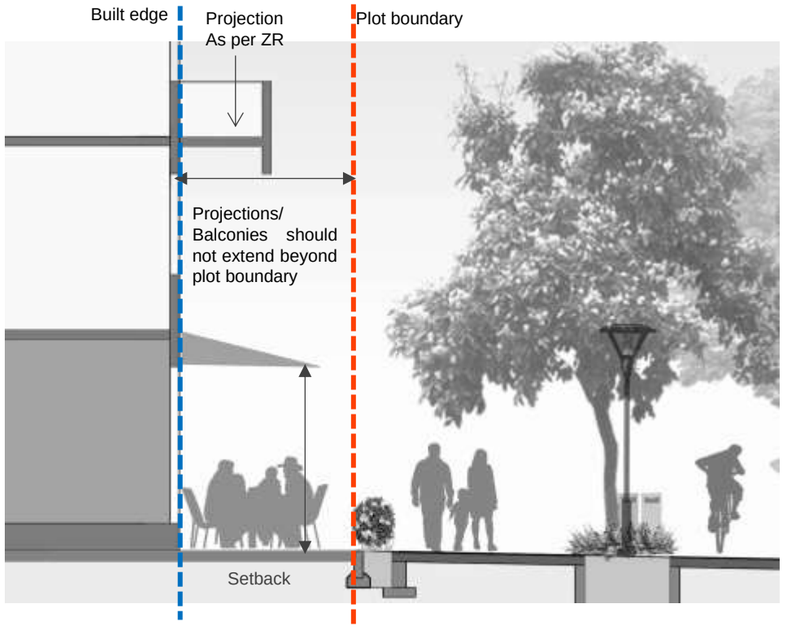
Plot access

7.2 Architectural and Facade Treatment

Balconies and Projections

Any projections such as balconies and canopies should follow certain standards and restrictions in terms of its sizes and uniformity in terms of the projection line from the setback. They should be aesthetically maintained by design and function with transparent railings and space for planters. They should not be enclosed on all sides and function as a semi-outdoor space for rooms within the buildings.

- All projection widths of balconies and canopies as per Amaravati Zoning Regulations.
- Entrance canopies with minimum vertical clearance of 4.5m from finished ground level.
- Building balconies should orient toward public spaces such as waterfront, open space and public transit corridors.
- Active street frontage should be provided with canopies or shading devices for creating comfortable microclimatic outdoor spaces as part of plazas.



Canopies along street frontage with minimum vertical clearance above finished sidewalk level

Building entrance canopy

Balconies projection

Awing along street frontage /

Awing on shop /

Entrance canopy for building /

Temporary shops along street shops

https://jenelamanuel.wordpress.com/2012/03/15/united-nations-avenue/ , https://damsinc.com/brise-soleil , https://mapescanopies.com , / https://in.pinterest.com/pin/267119821625618796 , https://www.architecturalcanopies.com ,

7.2 Architectural and Facade Treatment

Services

- Service infrastructure of the building should be planned on the rear side of the site
- It should be separated and screened from public access points
- Service yards on the site should be screened with fencing or landscaping
- Toilet vent pipes, AC comperes or box, Kitchen vent should be designed preferably to rear side of building and should not be visible front street frontage side
- All service pipes should be provided within duct should be provided with ease of access for maintenance
- All building services facing streets should be screened as part of elevation treatment
- Each tenement should have dry balcony
- The materials used for screening should act as sound barriers to reduce the noise interference due to the services

Toilet ducts/pipes

Metallic covering around the pipes with planting over it

AHU/HVAC

Metallic jali surrounding the compressor

AC ducts

Projected perforated box as treatment to hide wall mounted services and duct

Services screening

Screening through plantation to hide services

Water tank

Wooden covering around the water tank

Dry balcony

Dry balconies with horizontal louvres treatment

Dry balcony provision to each tenement

7.2 Architectural and Facade Treatment

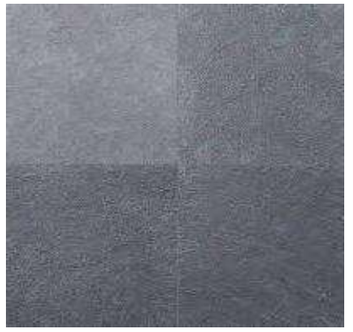
Architectural Materials

Locally available climate responsive materials and colours reflecting cultural identity should be used for all buildings. Highly reflective cladding materials should be avoided.

- Avoid excess glazing at South and West facades.
- All buildings should use materials that compliment the streetscape and responds to the human scale.
- High quality durable materials such as brick, stone, architectural concrete masonry units and glass should be used in retail and commercial office developments
- All projections such as balconies, grills, railings should be attractive well crafted and easy to maintain
- Utility and services of the building should be hidden and treated carefully with screening as to avoid visual imbalance of the aesthetic elements of the design.

Local materials

Granite,Tandur stone

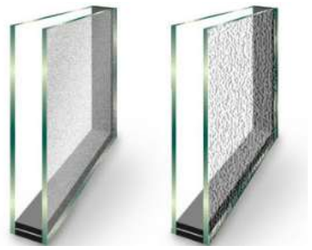


Kadapa stone

Mangalore roof tiles

Energy efficient materials

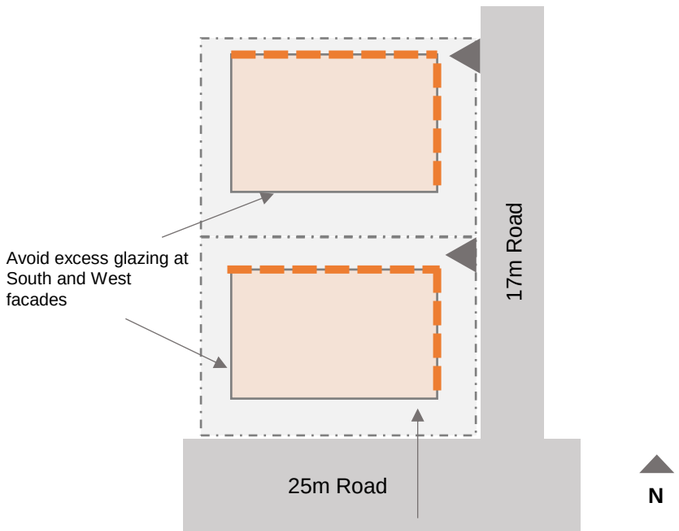
Clay Hollow Bricks



Insulated Glass

Fibre cement sheet

Green roofing trays



Local materials for cladding residential buildings

Avoid glazing at southern and western facades to reduce impact of heat.

Typical residential house using local available materials

Buildings that respond to the street and human scale

Source: https://dir.indiamart.com/kurnool/natural-ston , https://www.exportersindia.com, http://www.kalyanassociates.in/roofing-tiles.html, https://theconstructor.org , https://statewidebuildingproducts.com.au , https://www.eccoproducts.eu/en/green-roofs/benefits , http://perciacell.com/images-of-kerala-house design , https://www.straitstimes.com/singapore , https://theconstructor.org

7.2 Architectural and Facade Treatment

Colours

Colours used for buildings should be light and cool shaded so that they create a cooler environment that is soothing to the eyes. Residential buildings should avoid overly bright colours and use tones that are light shaded

Public and commercial buildings should follow:

- Colours used for buildings should be light and cool colour shades so that they create a cooler environment that is soothing to the eyes
- Combination of cool and warm colours or locally available stone or artificial cladding should be used for highlighting the design element and character of the building
- Residential buildings should avoid overly bright colours and use tones that are light shaded
- Maximum 30% use of glazed facades for energy efficient buildings
- Maximum 40% of facade area with warm colours or locally available stone cladding should be used for highlighting the design element and character of the building
- Minimum 60% of the facade area should be using cool colours or stone textured paint

Residential

Simple palette of materials for low rise buildings with less glazing and landscaping along sidewalk

Commercial

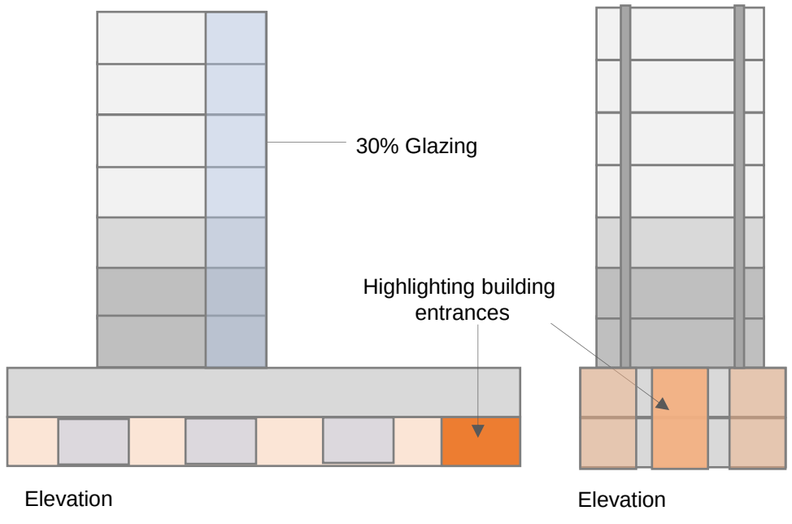
Commercial building with glazing and green facades

Industrial

Contemporary Industrial buildings with large panels for exteriors

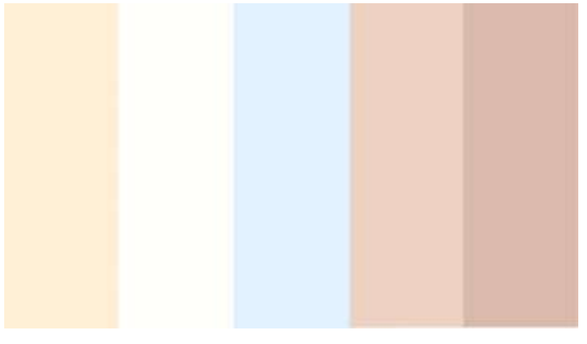
Institutional

Institutional building with material finish color palette
NIFT Campus , New Delhi



Indicative building colour combination for residential and commercial buildings

Stone textured paint for exterior building walls



Recommended Cool to warm colour palette for building walls

Maximum 30% Glazing
Glazing for energy efficient buildings

Source- https://www.greenbuildinginfo.eu/,

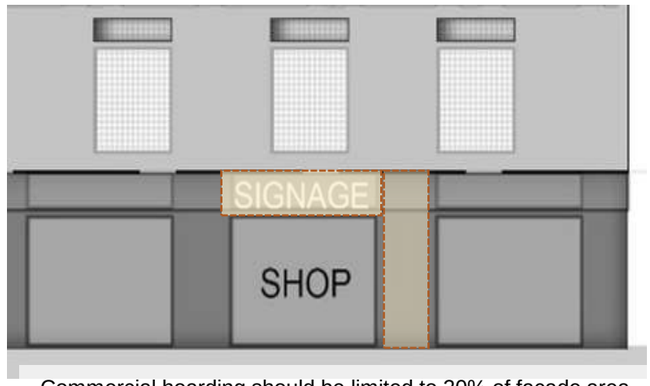
7.2 Architectural and Facade Treatment

Building Signage

Types:

a. Projecting and Wall mounted
b. Free standing
c. Address signboard
d. Awning and canopy sign

- All building signage should be clear, visible, and easy to understand
- Use different languages including local preferences for public buildings is recommended
- plot address should be displayed on plot boundary edge facing road at entry/exit points
- Commercial hoarding/signage should be limited to 20% of building facade and should be placed according to architectural façade. treatment avoiding covering of windows and doors
- Projecting signs should not exceed more than 1 meter from building face/ building line towards street frontage
- Way finding signage should be integrated in with building and landscape elements
- Avoid high glare intensity signage lighting such as neon lighting
- Awning and canopy type signage should be installed at same level of height with minimum clear height of 2.4m from finished level of side walk.



Commercial hoarding should be limited to 20% of façade area

Signage on building

Outdoor Free standing signage - Changi village, Singapore

Name plate on compound wall

Hanging signage, UK

Source: https://www.indiamart.com/proddetail/building-signage-9237939388.html , https://www.sign-maker.net/stone/marble-granite-signs.htm , http://holidayterritory.com , : https://www.pinterest.co.uk , https://my.spokanecity.org/smc/?Section=17C.123.060

7.2 Architectural and Facade Treatment

Building Signage

References for different streets / buildings.

Commercial signage and shop names should follow alignment and form placed in context of the building frontage. The overall street front when viewed with the buildings in a line should have continuity with fixed height from the sidewalk. Hoardings and large signs should not be allowed and signs can cover a minimal of the building elevation.

Neighborhood shopfront

Oxford street, UK

Chinatown, New York

Midland, Ontario

IIM Bengaluru

Ameerpet , Hyderabad

Built Form

Source: Vancouver, Google street view , https://londonist.com/2015/10/secrets-of-oxford-street , http://vedosyruzy.scificities.com/chinatown-handbag-2-26.php?i=1 , http://howardrideoutarch.com/ , http://blog.ticketgoose.com/ameerpet-the-software-trainer/ , https://www.deccanchronicle.com/nation/current-affairs/061117/iimbs-israel-centre-opened.html

7.3 Green Building Features

7.3 Green Building Features

Sustainable Development Framework

With respect to green building and environment, the following aspects are laid out for sustainable development framework.

- Passive solar design
- Building materials and construction technology
- Standardized norms
- Water management
- Rainwater harvesting
- Green roofs
- Urban agriculture
- Proposed incentives

Approach and Methodology

It comprises of review of data such as climate records, passive design strategies and vernacular architecture of the region which led to the understanding of design objectives for climate response architecture in Amaravati. The strategies were derived considering warm and humid climate zone.

Several standards like the Energy Conservation and Building Code (ECBC 2007), National Building Code (2016) and Green building rating systems such as LEED, IGBC and GRIHA were referred for sustainability standards.

The detailed analysis was carried out for a typical neighbourhood grid admeasuring 1.2 km by 1.2 km for which a shadow and wind analysis was done. Furthermore, a base case simulation was performed for wind patterns, energy analysis and urban heat island effect. The results were studied and following an issue identification, the design parameters were modified according to the region specific climate responsive strategies and sustainability standards. The design case was simulated and the results were compared to understand the change between the two cases. A detail of the simulation methods and results are provided in Annexure 1.

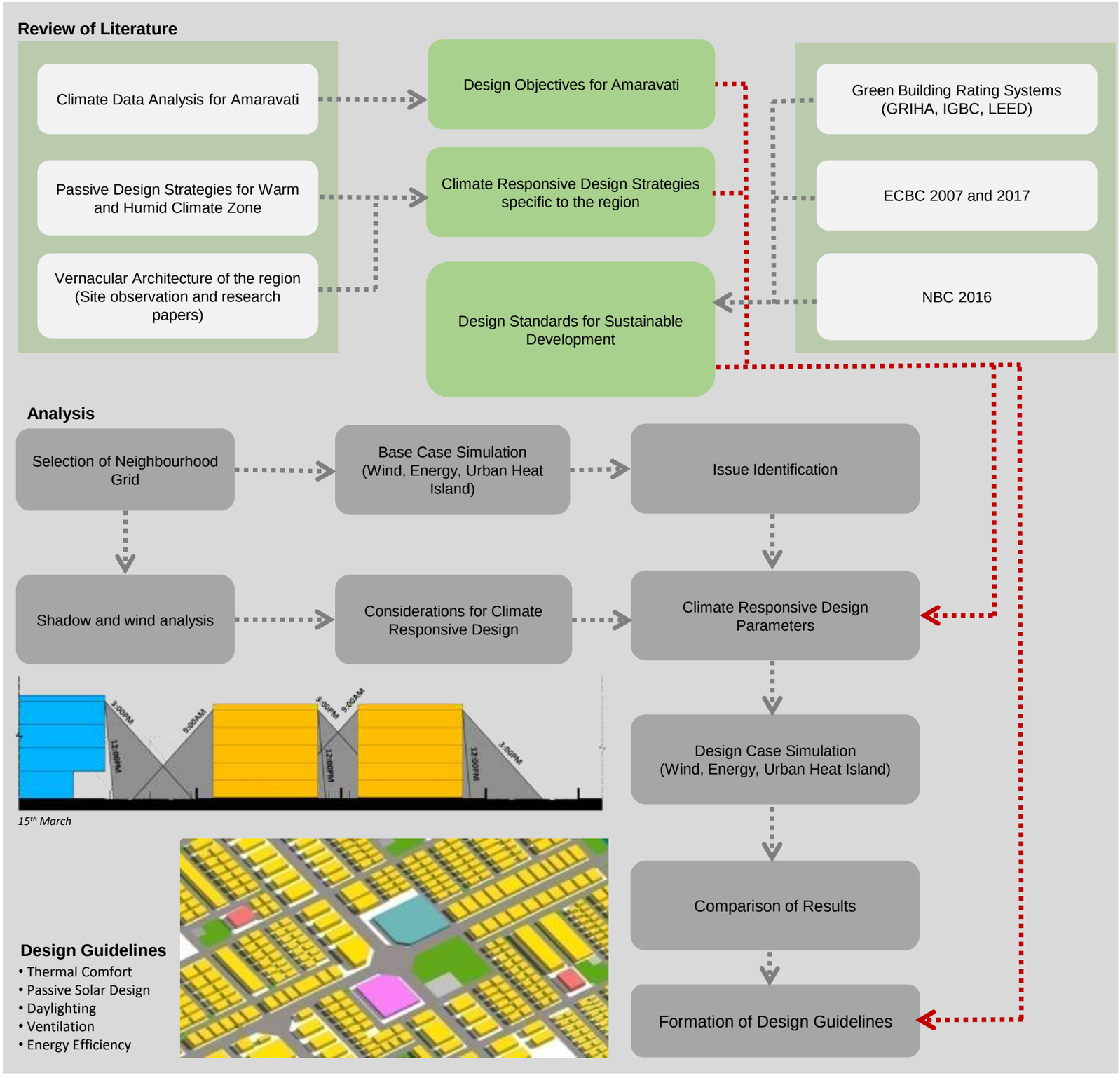
The design guidelines for Amaravati have been formulated in conjunction to the climate responsive design strategies and the sustainability standards referred to for study.

Design Objectives

The design objectives for climate responsive architecture for Amaravati Capital City are as follows:

- Minimize heat gain
- Maximize heat loss
- Induce natural ventilation
- Protection from rain

They are related to orientation, building form, building envelope design, materials, construction techniques etc.



Flowchart showing methodology for green building guidelines

7.3 Green Building Features

Passive Solar Design

Passive solar design relies on the use of natural energy to create a thermally comfortable indoor environment for the user. Through design considerations of orientation, building form, building envelope design, materials, construction techniques etc to meet the climatic design objectives of the site.

Building Orientation:

- As per sun path diagram study, the ideal building orientation is North-South with the longer faces of the building facing north and south directions.
- As there is high amount and duration of solar radiation from the south and south west direction, adequate shading provisions must be made on those facades.
- High temperatures occur in the months of April to June and intense solar radiation is experienced between 2:00 to 5:00 PM when the sun's position is towards the west (WNW). Hence, suitable horizontal projections and shading features must be taken into account in this direction.
- If plot orientation favours an east-west, the solar heat gain can be controlled by keeping building faces at an appropriate angle to the road.
- When the abutting road does not allow desirable orientation, insistence by bye-laws or otherwise, for facing the building on that road should be relaxed.

Building form:

- Due to high solar radiation, it is recommended that the building form should be compact to minimize surface area exposed for heat gain. However, in case of a high surface area to volume ratio used in building, adequate shading can ensure less heat gain

Building Envelope

Walls:

- External walls should be constructed of bricks or other similar locally available material as per Bureau of Indian Standards (BIS) with thickness determined by maximum U value or climate performance.

For Warm and Humid climate	Opaque Wall Assembly Maximum U-factor (W/m2K)
All building types, except below	0.40
No Star Hotel <10,000 m2 AGA	0.63
Business <10,000 m2 AGA	0.63
School <10,000 m2 AGA	0.85

- In the case where cavities are created in the wall section, filling the empty air space with loose insulating materials will improve the overall thermal performance.

Fenestration and Shading Devices:

- Window to wall ratio (WWR) should be 30% of the total wall area
- Shading depth should be determined based on window size and in combination of solar heat gain coefficient (SHGC).

Vertical Fenestration Assembly SHGC Requirements	
Maximum SHGC Non-North	0.27
Maximum SHGC North for latitude ≥15 degree N	0.50
Maximum SHGC North for latitude <15 degree N	0.27

Roofs:

- Roofs should comply with the maximum assembly U-factor as prescribed by ECBC 2017.

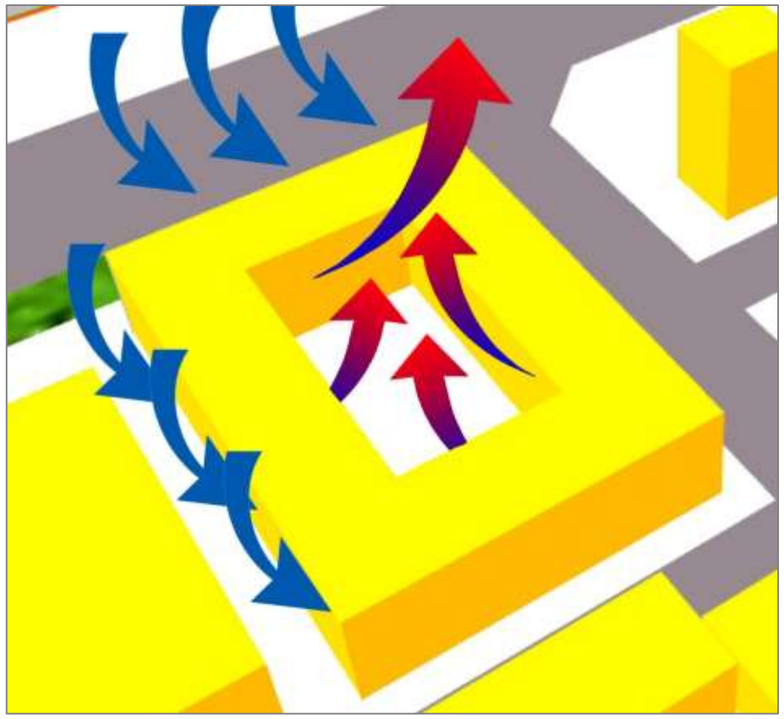
For Warm and Humid climate	Roof Assembly Maximum U-factor (W/m2K)
All building types, except below	0.33
School <10,000 m2 AGA	0.47
Hospitality <10,000 m2 AGA	0.20

- Building roofs should have solar reflectance index of 0.75 or higher.
- The use of 'cool roofs' reduces the heat gain by the building
- In case 100% of the roof is shaded by solar PV panels, high solar reflective index finish is not required.
- Green roofs reduce heat gain in buildings by providing a layer of insulation.
- In buildings on plots over 4000 sq. m. area, minimum 20% of building roof area should be an intensive green (vegetated) roof

Courtyards and Verandahs:

- Courtyards are a source of natural light and ventilation and verandahs act as buffer spaces between the indoor and outdoor environment, preventing direct heat and glare from entering inside.
- Integrating these passive design features would have a positive effect on indoor thermal environment.

Use of Jali walls in CII Sohrabji Godrej Green Business Center, Hyderabad



Integration of courtyard in building design

Solar panels at North Caroline Museum of Natural Sciences, Raleigh

Courtyard at British School, New Delhi

Image Source: http://ijetst.in/index.php/current-issue/1105-analyzing-sun-angles-of-solar-time-dial-for-design-of-building-envelope-components-for-the-region-of-andhra-pradesh-india; http://photoelectric.in/

7.3 Green Building Features

Daylighting

Daylighting is a key consideration in climate responsive architectural design as it affects energy use, visual and thermal comfort of the indoor environment.

Layout:

- In group and cluster developments, alternating building blocks perpendicular to each other rather than in parallel orientation would improve daylighting in the buildings.
- For buildings on back to back plots or those in close proximity to each other, provide a minimum percentage of WWR for the affected building face/s.

Daylight Factor: The daylight factors for interiors as per Bureau of Indian Standards (BIS):

Location		Daylight Factor (%)
Dwellings	Kitchen	2.5
	Living Room	0.625
	Study Room	1.9
	Circulation	0.313
Schools	Class room	1.9 – 3.8
	Laboratory	2.5 – 3.8
Offices	General	1.9
	Drawing, typing	3.75
	Enquiry	0.625 – 1.9
Hospitals	General wards	1.25
	Pathological Lab	2.5 – 3.75
Libraries	Stack room	0.9 – 1.9
	Reading room	1.9 – 3.75
	Counter area	2.5 -3.75
	Catalogue room	1.9 – 2.5

Room Design:

- The depth of the room should be 1.5 to 2 times the height of the window for good natural light penetration. The higher the window height, the better the penetration of light.
- Internal and external finishes of the building must be light in colour to reflect more light.

Fenestration:

- Window areas as one-sixth of the total carpet area of a room as per NBC.
- Vertical window configurations (strip window) provide better penetration, uniform dispersion of daylight.
- For large room depths, provide vertical windows with increase in window head height and smaller rooms can be equipped with horizontal windows where the work plane is nearer to the window.
- Windows are should be provided with suitable external shading features, either fixed/ movable louvers or overhangs so as to integrate diffused sunlight and reduce heat gain and glare.

Glazing Characteristics:

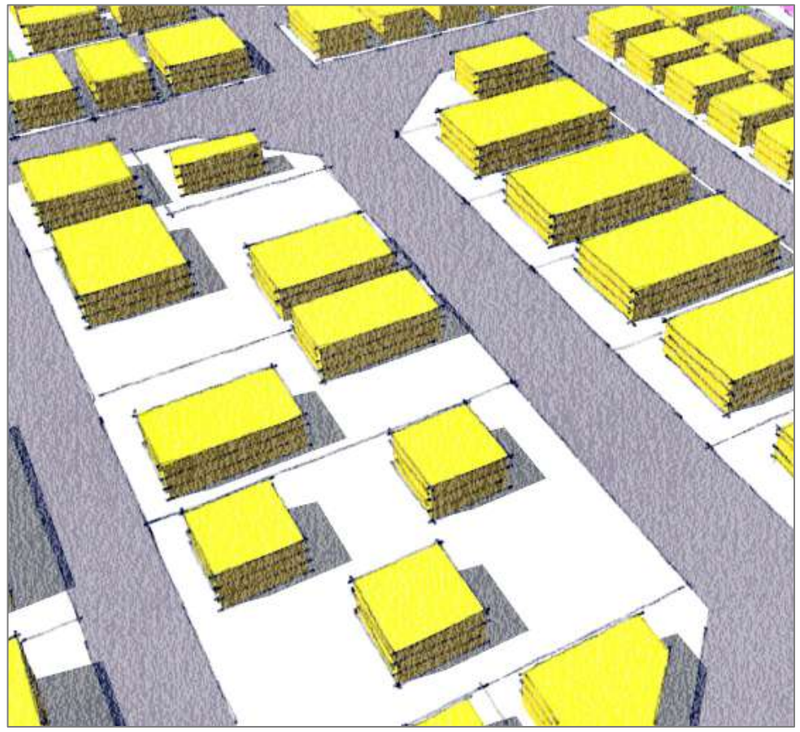
- Daylighting through windows depends on the visual light transmittance (VLT) and size of the opening.
- High transmittance glass in neutral or soft colour is ideal for good daylighting.
- The minimum VLT as per ECBC is shown in the table beside:

Window to Wall ratio (WWR)	Minimum VLT
0.00 – 0.3	0.27
0.31 – 0.4	0.20
0.41 – 0.5	0.16
0.51 – 0.6	0.13
0.61 – 0.7	0.11

VLT requirements for different WWR

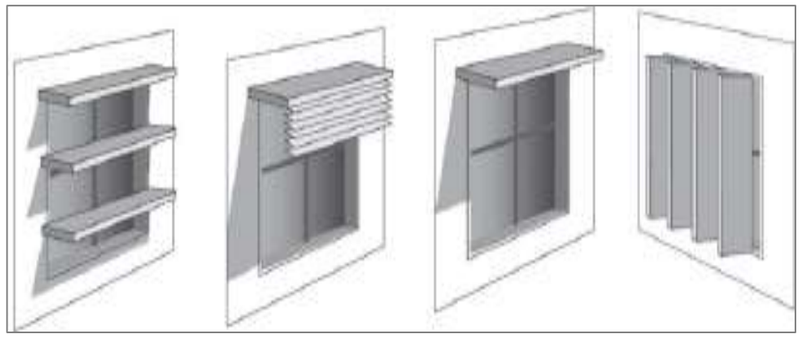
Passive Daylighting Strategies:

- Light shelves are suitable for providing diffused natural light inside the building and contribute to better penetration of daylight into deeper floor plates.
- Light pipes can be used to transport daylight through thick roof structures and without transmitting excessive heat.
- The maximum U-factor should be 4.25 and maximum SHGC for skylights should be 0.35 as per ECBC 2017. The area of skylight should not exceed 5% of roof area.



Building disposition and alternating building blocks perpendicular to each other improves daylighting

Light shelves and light pipes for daylighting



Types of horizontal shading devices and exterior sun shelves to direct sunlight towards the ceiling inside

Image Source: https://www.powersystemsdesign.com/articles/migrating-from-power-centric-to-space-sensing-daylighting-systems/36/5528, https://www.designingbuildings.co.uk/wiki/Light_shelf; http://www.orionlighting.com/product/apollo/apollo-solar-light-pipe-lp/, https://www.hmda.gov.in/EBGH/the%20guidelines/pdfs/Com%20Bg%202.pdf, http://www.gordon-inc.com/interiors/specialties/lightshelf.aspx

7.3 Green Building Features

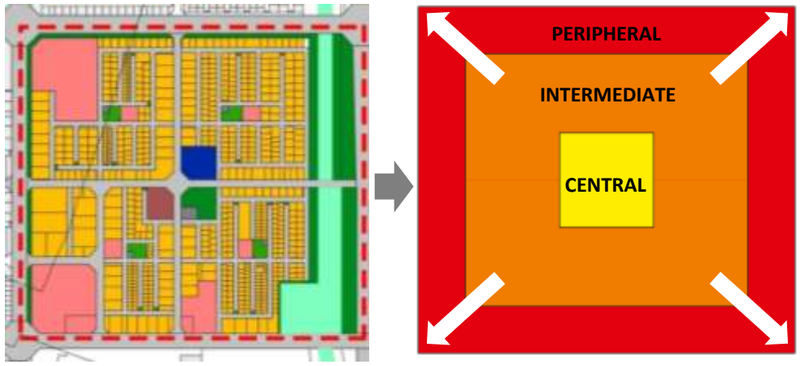
Passive Ventilation

For the warm and humid climate of Amaravati Capital City, the use of passive ventilation is an effective strategy to lose heat gained in naturally ventilated buildings. The considerations for proposing passive ventilation guidelines are:

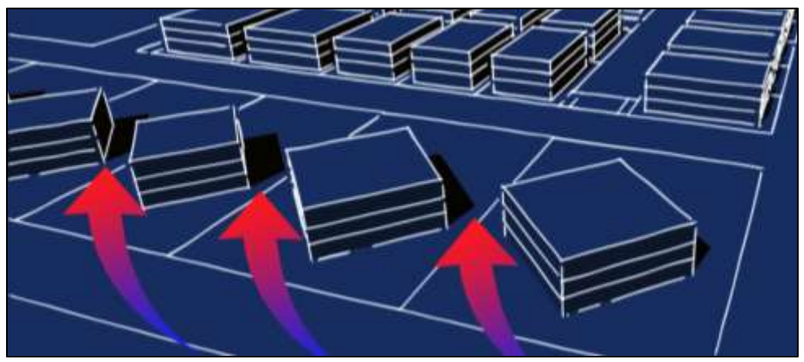
- The annual predominant wind direction South east to North west (Source: Autodesk and ISHRAE)
- The direction of wind flow in summers (critical period) is south and south west direction. (Source: Figure 5.3 - Wind rose diagram, EIA and EMP of Amaravati Capital City - Sep 2015)
- The neighborhood unit (1.2 x 1.2 km) grid used for assessment and simulation have been categorized into three hierarchies of plots as per their location: peripheral, intermediate and central
- The orientation of buildings on the larger peripheral plots would affect the wind flow for intermediate and central plots and hence guidelines have been proposed to ensure continuity and no breaks in wind flow and air movement.

Neighbourhood Level:

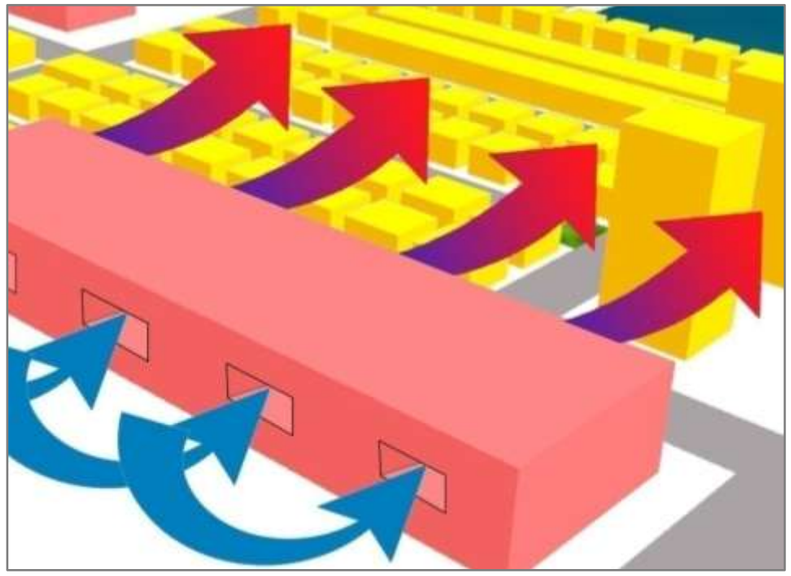
- As the predominant annual wind direction is South east to North west buildings on the larger peripheral plots at the neighborhood level must be oriented such that they do not obstruct the wind flow heading for intermediate and more central plots.
- To ensure unobstructed breezeways, buildings on the peripheral plots may be oriented as much as 45 degrees to the incident wind.
- Provision of voids (positioned perpendicularly to the direction of incident wind) in the facades of buildings on plots of areas more than 4000 sq. m. is ideal to allow unobstructed breezeways and air paths.



Selected neighbourhood grid and categories of plots as per location



Orientation of peripheral buildings at neighbourhood level for unobstructed wind flow



Voids in buildings on large peripheral plots for unobstructed wind flow

Plot Level:

Orientation and Planning:

- The ideal building orientation for maximizing wind flow is perpendicular to the prevalent wind direction or ranging from 0 to 30 degrees from the perpendicular.
- The provision of open sided verandahs facilitates an increment in room air motion.
- An efficient distribution of inlet openings ideally positioned to a lower level on the windward direction and outlets on the leeward façade (of which a part must remain openable) must be ensured to better facilitate ventilation.
- Reduction of ground cover area at grade level of podium structures is essential to ensure that wind flow and direction remain unimpeded.

Fenestration:

- For passive ventilation in restrictive sites, provide courtyards, *chowks*, atriums or ducts.
- Louvre, sash and other suitable provisions for windows must be considered depending on the face of the building, such as to not impede the flow of incoming wind whilst blocking harsh sunlight and glare.
- In industrial buildings, the window height should be around 1.6 meters and width approximately two-thirds of the wall width with a sill height of 1.1 meters above floor level. Additionally, openings of 0.9 meters height must be provided over two-thirds the length of glazing in roof lights.

Use of mechanical means:

- Air movement is essential in warm and humid climates for body cooling, hence a certain minimum desirable wind speed is required for achieving thermal comfort. For obtaining values of indoor wind speed above 2 m/s mechanical means of ventilation must be adopted.
- Recommended values for air changes and wind speeds must comply with the NBC 2016, IS: 3362 – 1977 and the following: ASHRAE, ECBC, Green rating systems such as GRIHA, LEED and IGBC.
- All structures having multi-level basement provisions must have natural ventilation features in addition to mechanical ventilation systems as part of the architectural design, through provision of light-wells / cutouts / ducts

Use of passive ventilation features in TCS building at Hyderabad, India

Provision for breezeway in Marque Mosman project, Sydney

Image Source: https://worldarchitecture.org/architecture-news/cvgpn/mario_bottadesigned_tcs_buildings_are_modern_icons_of_contextual_architecture_in_india.html, https://www.nettletontribe.com.au/projects/marque-mosman/

7.3 Green Building Features

Energy Efficiency

The general energy efficiency guidelines should be considered are:

Energy Efficiency in Electrical and Artificial Lighting Systems

- **Electrical Systems:** For all buildings connected with loads more than 100kW, the power factor of the building should be maintained above 0.95. The transformer losses at 50% load and 100% load should be in compliance with the standards set forth by the ECBC 2007 (Chapter 8, Section 8.2.1.). All motors installed should be as per ECBC 2007 (Chapter 8, Section 8.2.2.).

- **Service Hot Water and Pumping**: The service water heating requirements and systems installed should comply with ECBC 2007 requirements (Chapter 6, Section 6.2.). Minimum 3 star rated BEE appliances should be utilized wherever applicable, with lighting and plug loads segregated in the wiring to the extent possible.

- **Interior Lighting:** All lamps used as point light source or in linear light source configuration should be LED and should be T-5 or at least 4 star BEE rated TLF's or equivalent. Installed interior lighting power should not exceed the lighting power density (LPD) value as recommended by the ECBC 2007 Chapter 7, Section 7.3 shown below. All lighting controls should be installed as recommended by the ECBC 2007, Chapter 7, Section 7.2.1. for all buildings connected with load of 100kW or more.

Building Area Type	LPD (W/m2)	Building Area Type	LPD (W/m2)
Automotive Facility	9.7	Multifamily Residential	7.5
Convention Center	12.9	Museum	11.8
Dining: Bar Lounge/ Leisure	14.0	Office	10.8
Dining: Cafeteria/ Fast Food	15.1	Parking Garage	3.2
Dining Family	17.2	Performing Arts Theatre	17.2
Dormitory/ Hostel	10.8	Police/Fire Station	10.8
Gymnasium	11.8	Post office/Town Hall	11.8
Healthcare clinic	10.8	Religious Building	14.0
Hospital/ Health care	12.9	Retail/Mall	16.1
Hotel	10.8	School/University	12.9
Library	14.0	Sports Arena	11.8
Manufacturing Facility	14.0	Transportation	10.8
Motel	10.8	Warehouse	8.6
Motion Picture Theatre	12.9	Workshop	15.1

Interior Lighting Power – Building Area Method

- **Exterior Lighting:** For commercial, multi-storey residential complexes, housing societies, apartment complexes, all lighting sources should have minimum luminous efficacies standards and the LPD for respective applications should be in accordance with ECBC 2007, Chapter 7 Section 7.4. All lighting controls installed are as per recommendations given by the ECBC 2007, Chapter 7, Section 7.2.1.4.

Exterior Lighting Applications	Power Limits
Building entrance (with canopy)	13 W/m2 of canopied area
Building entrance (without canopy)	90 W/ linear m of door width
Building exit	60 W/linear m of door width
Building facades	2 W/m2 of vertical façade area

Energy Efficiency through the Utilization of Renewable Energy

- **For lighting**: Multi-storey residential, housing societies and apartment complexes should comply with 15% of the total external lighting load be met through renewable energy sources. In non-residential buildings, 5% of the total lighting load should be met through renewable energy sources.

- **For water heating**: Residential, commercial and institutional buildings should meet a minimum of 20% of water heating needs on a per year basis through renewable energy. Insulation of pipelines should be provided as per norms set and to reduce water wastage, water re-circulating pumps should be provided in high rise buildings.

Energy Efficiency in HVAC/Mechanical Ventilation Systems

- **HVAC:** The internal and external design conditions of a conditioned space should comply with the National Building Code 2016 (the minimum fresh air required in a mechanically ventilated or air-conditioned spaces).
- Efficiency of all equipment so installed must comply with the ECBC 2007 (Chapter 5, Section 5.2.2). To ensure increased efficiency level, use high efficiency refrigerant cooling, chillers, pumps, and fans, multiplexed chillers, low friction duct layout and sizing, low pressure drops in air handling and piping components.
- Distribution cooling systems (unitary air conditioners/ split air conditioners) must be at least BEE 3 star rated products.
- In order to prevent conductive heat losses through piping and duct works, insulation must be provided as per ECBC 2007 (Section 5.2.4)
- Use of air-side economizers/water-side economizers for improving indoor air quality and providing energy savings.

- **Mechanical Ventilation**: All kitchen and bathroom spaces in a residential building must confirm to requirements of air flow as set forth in the ECBC 2007

Indira Paryavaran Bhavan is Net Zero Energy Building at New Delhi, India

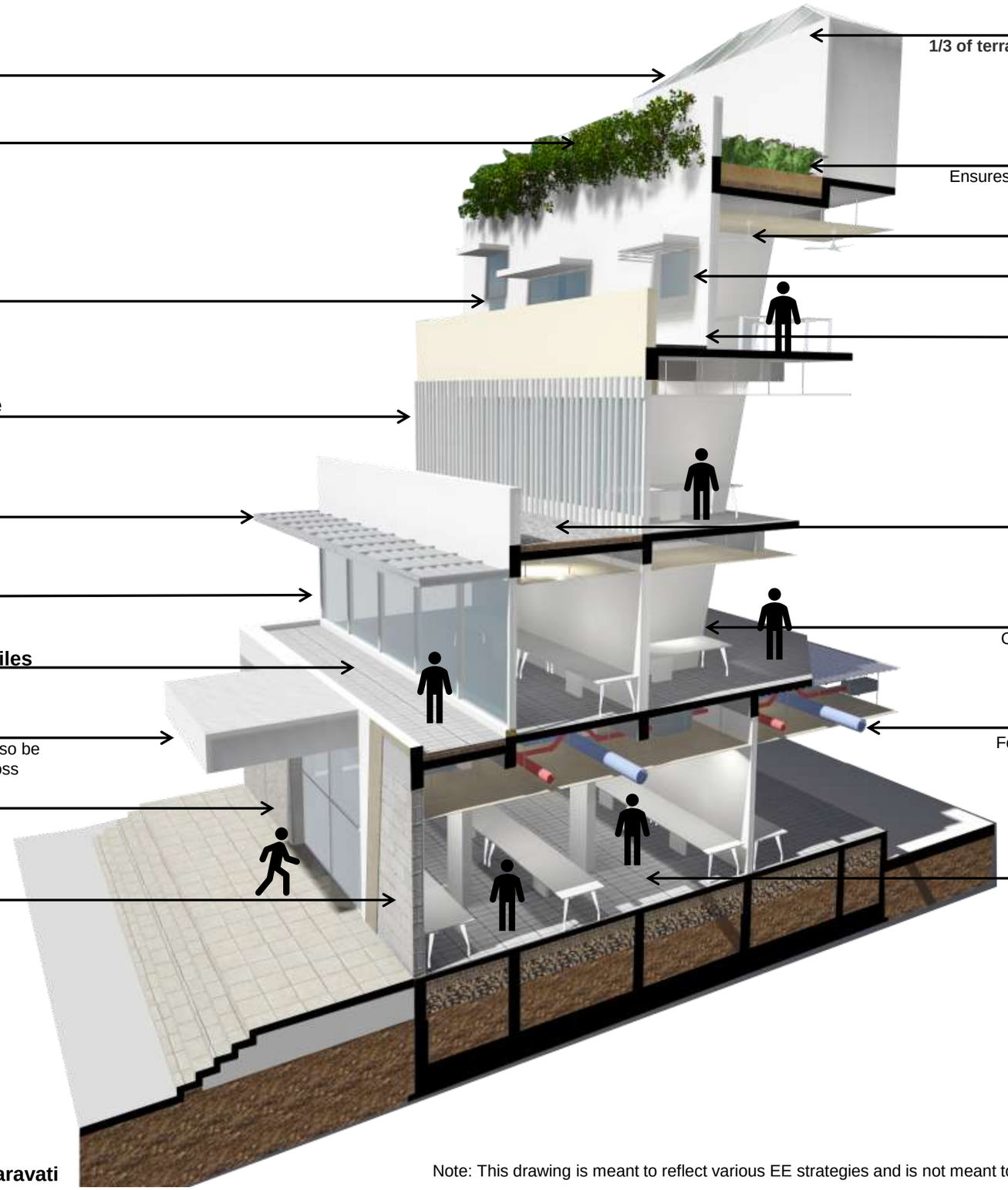
NREL's Research and Support Facility Building in Golden, Colorado is example of Net Zero site energy project (2220,000 sq. ft.). The following energy efficiency features are used in this building:

1. Building is organized in long 60 ft wide wings for optimal solar orientation
2. 1.6 MW of photovoltaics on site, 450kW on rooftop
3. Louvered sunshade protects glazing at the entrance lobby
4. Window to wall ratio for north and south walls is 25% and windows are organized into daylight and view sections
5. Radiant slabs provide heating and cooling from the exposed structure above
6. Manually operable windows allow for natural ventilation and automated operable windows can open during summer nights to night purge the spaces with cool air
7. Electrochromic west glazing and thermochromic east glazing, shaded with recessed balconies
8. Transpired solar collectors on south façade of building
9. An open office plan with low profile workstations allow proper daylighting and natural ventilation
10. 12'' high raised floor provides ventilation air, power and data
11. Thermal labyrinth stores passively cooled and heated air for future use.

Building and Energy Diagram

Image sources: ECBC 2017, https://www.wbdg.org/resources/net-zero-energy-buildings, https://www.nrel.gov/docs/fy12osti/51387.pdf, https://www.nbmcw.com/tech-articles/case-studies/38475-indira-paryavaran-bhawan-first-on-site-zero-net-energy-building-of-india.html, http://www.moef.nic.in/ipb/home1.htm

7.3 Green Building Features



1. Skylight

19. Roof : PV Panels & Solar Roof
1/3 of terrace top should be covered with PV panels along with Solar Heaters

3. Vertical Greening
Not >9m wall height from plinth level / Potential for Cooling Compound Walls

2. Roofing Option: Intensive Green Roof
Ensures Roof Insulation and Enhanced Micro-climate Conditions

4. Ceiling Fans
Air changes and Distancing as per ECBC

5. Ideal Sill Height
As per Daylighting Criteria of the ECBC / SP41

6. Vertical Strip Windows
Focused Daylighting as per requirement

7. Roofing Option: Foam Sprayed Roof
As an insulation alternative to traditional BBC fill roofs

8. Solar Oriented Louvers / Fins on Façade
Glare Reduction / Diffused Sunlight Percolation

10. Sun Cutters
Do not obstruct wind flow

9. Roofing Option: Terrazzo Roof
Cast In-situ Mosaic chips as high SR Material

11. Glazing Members
Suitable SHGC and VLT values/ With Openable Area Provision for Passive Ventilation

12. Interior Wall Assembly
Of Suitable Material to Prevent Internal Moisture Build-Up

13. Roofing Option: Thermal / Cool Roof Tiles

15. Deep Entrance Canopy Profiles
For ensuring Outdoor Thermal Comfort Arcades may also be considered on non-setback edges / Facilitating Heat Loss

14. Suitable HVAC Systems
For Cooling Floor Plates with Minimal Energy Consumption

16. Opaque Wall Assembly
Surface Treatment for minimizing Thermal Mass

17. IAQ and Artificial Lighting
User Access Control as part of Intelligent Buildings For Lighting as well as HVAC can Minimize Energy Consumption

18. Opaque Wall Assembly
Suitable Material to prevent Heat Gain and Transmittance

Conceptual Section for Energy Efficiency Strategies in Commercial Buildings of Amaravati

Note: This drawing is meant to reflect various EE strategies and is not meant to be considered as a reference or for scale or construction

7.3 Green Building Features

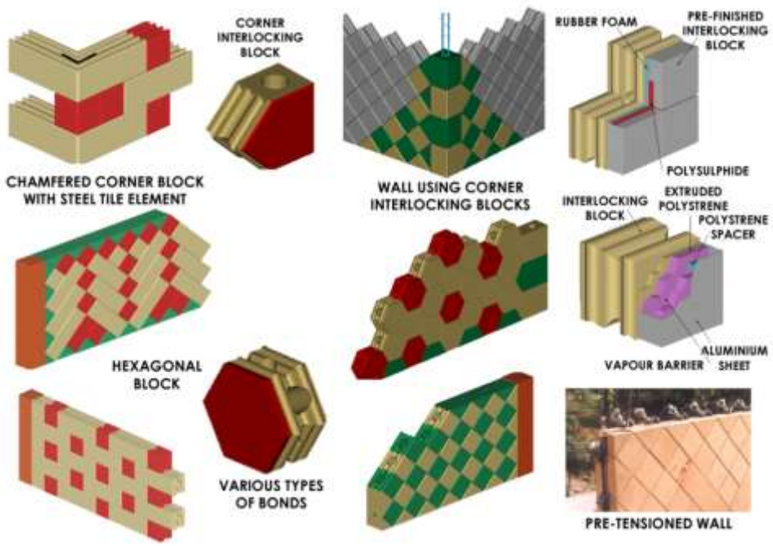
Building Materials Specifications

Considerable amounts of energy are utilized as part of the manufacturing and transportation of building materials and therefore energy conservation becomes an important aspect with respect to the focus of minimizing greenhouse gas emissions and reducing the overall cost rate of suitable building materials in the context of Amaravati. The following are the recommended building materials:

- **Cement alternatives in concrete and other cement matrix products**:
  The manufacture of cement is a high energy intensive process with high transportation costs due to centralized production. The following substitutes are accordingly recommended:
  - Pozzolonas and other mineral ad-mixtures: fly-ash and ground slag in cement concrete and other lime-pozzolona mixtures may be used to replace particular percentages of OPC (ordinary portland cement) in cement concrete in accordance with good practice.
  - Rice husk ash (RHA): Rice husk ash, a waste from the rice industry may be used for part replacement of cement.
  - Ready-Mix Concrete (RMC): Ready-mix Concrete use as per manufacturing plants if present in or should be set-up in close proximity to Amaravati, ensuring quality control and reduction in dust and noise pollution as created by in-situ conventional concrete.
  - Recycled Aggregate: Crushed concrete aggregate is the most common form of recycled aggregate which should be considered for use in concrete, Up to 30% of natural crushed coarse aggregates can be replaced by the coarse recycled concrete aggregate in fresh concrete. Recycled aggregate can be considered for use in sites where existing building are present.
  - Other artificial aggregates such as lime, broken burnt clay bricks as coarse and fine aggregates, light weight aggregates reference may be made to the accepted standards.
  - Light Weight Concrete: Performed foam concrete for levelling of floors, sprayed onto horizontal surfaces or in hollow cavities as light weight fillers. Ferrocement also uses minimal material, particularly steel which is reduced when compared to conventional RCC.

- **Commonly Used Masonry Blocks:**
  - Hollow Concrete blocks: They use lesser concrete when compared to solid concrete blocks and provide better thermal insulation due to cavity. Filling of the cores with concrete or concrete with steel reinforcement offers much greater tensile and lateral strength to structures wherever required.
  - Autoclaved aerated concrete (AAC) blocks: Made by mixing fly-ash, lime, cement and gypsum with foaming agent like aluminum powder which gives them the lightweight and good insulation property.
  - Lightweight Concrete blocks: Manufactured from light weight aggregates.
  - Preformed foam cellular concrete blocks: Considerably better thermal insulation properties than normal bricks or concrete.
  - The design mix of concrete blocks can have fly ash as a percentage substitute of cement by volume.

- **Alternatives to Burnt clay bricks and tiles:**
  Ideally, preference should be given to locally manufactured bricks and tiles to reduce transportation energy. As sustainable alternatives, the following other types may be used:
  - Hollow/Perforated bricks: There is better performance thermal insulation due to air cavities. These bricks when provided with reinforcements can be used for structural applications and as filler blocks to replace concrete in the tensile zone.
  - Low and medium-fired bricks: Low-fired bricks are absorbent in nature, acting as moisture regulators, hence recommended for use in internal walls or inner layer of internal cavity walls. Medium fired bricks although comparatively durable have similar applications.
  - Burnt clay fly ash bricks: These are fly ash based and use bricks lime as a binder, along with accelerator in required proportion, bearing good thermal properties. Mostly used as masonry units and as fillers in prefabricated floor slabs.
  - Hollow core interlocking blocks are a sustainable alternative which utilizes recycled materials, is light weight and cost effective.



Hollow core interlocking blocks

Hollow Concrete blocks

Autoclaved Aerated Concrete (ACC) blocks

Hollow Bricks

Foamed Concrete Panels

Rat trap bond

Grove interlocking blocks

Hollow interlocking blocks

Coloured Fly ash brick

Material	Weight	Climatic Performance	Recycled Content	Embodied Energy (MJ/ sq. m.)
Hollow concrete blocks	Light, reduces reinforcement quantity	Hollow part provides insulation, U value of 1.89 W/m2 K	Recycled aggregates can comprise the total material composition	420.7
AAC blocks	Light, reduces reinforcement quantity	High thermal resistance, U value of 0.70 W/m2 K	Up to 70 % of the fly ash can be recycled composition	531.1
Fly ash Lime – Gypsum (FaL-G) blocks	Light	U value of 1.20 W/m2 K	33% Pre-consumed fly ash composition	628.8
Brick masonry with air cavity provision	Light, reduces reinforcement quantity	U value of 1.79 W/m2 K	Nil	561.5
Burnt clay fly ash bricks	Heavy	U value of 1.73 W/m2 K	As per fly-ash recycled content	736.0

Source: http://architecturelive.in/prof-anil-laul-a-pioneer-of-indigenous-architecture-in-india-pappal-suneja/, https://www.indiamart.com/proddetail/concrete-hollow-block-15486690562.html, https://homebuildershq.weebly.com/blog/what-is-the-difference-between-autoclaved-aerated-concrete-and-non-autoclaved-aerated-concrete, http://gosmartbricks.com/hollow-bricks/, https://www.eabassoc.co.uk/foamed-concrete-clc-hollow-panels.php, http://civilengineerramarajan.blogspot.com/2017/08/rat-trap-bond-its-advantages.html, https://www.indiamart.com/cubic-construction-solutions/interlocking-clc-blocks-compound-wall.html, http://www.earth-auroville.com/hollow_interlocking_blocks_en.php, http://www.civilprojectsonline.com/building-construction/fly-ash-bricks-building-materials-and-construction/, Report on Strategies for Cleaner Walling Material in India, 2011

7.3 Green Building Features

Building and Construction Technology Specifications

- Precast/Prefabricated Concrete Elements: Where feasible as per appropriate scale meriting requirement of typical structural elements, prefabricated and precast technology could be used. Apart from economical benefits better quality control and lesser construction time, in particular L-panel roofing systems may have less embodied energy when compared to conventional RCC roofs.
- Aluminium formwork technology or Mivan: In large plots with multiple buildings and repetitive units, aluminium formwork technology can be used which results in faster and economical construction.
- Steel and composite structures are suitable for high rise commercial buildings

Mivan formwork

Mivan construction in India

Zoning District	Building Typology (as per Zoning Regulations)	Maximum Building Height (as per Zoning Regulations)	Construction Technology	Roof Construction (Refer to Passive Solar Design)			
				RCC with cement alternatives	Filler slab technology	Thermal tiles/ High SRI coating (Cool Roof)	Green Roof (Minimum 20% of roof area)
R1 (Village Planning Zone)	Attached/ Detached/ Semi detached	13 m	RCC construction				
	Apartment (AP1, AP2, AP3)	16 m	RCC construction/ Precast technology				AP3
	Group Development	16 m	RCC construction/ Precast technology				
R2 (Low Density Zone)	Attached/ Detached/ Semi detached	11 m	RCC construction				
	Apartment	16 m	RCC construction				
R3 (Medium to High Density Zone)	Attached/ Detached/ Semi detached	13 m	RCC construction				
	Apartment (AP1, AP2, AP3)	18 m	RCC construction				AP3
	Apartment High Rise	37 m	RCC construction/ Mivan, Precast technology				
	Group Development	37 m	RCC construction/ Mivan, Precast technology				
R4 (High Density Zone)	Any	Subject to approvals	RCC construction/ Mivan, Precast technology				
C1, C2, C3, C4, C5, C6	Any	Varies	RCC/ Steel/ Composite/ Precast technology				Plots with area over 2000 sq. m.
C1, C2, C3, C4, C5, C6	High Rise	30m or Subject to Approvals	Steel/ Composite/ Precast technology				

Recommendations for building construction technologies for Amaravati Capital City

Precast construction in Bengaluru

Image source: www.homemantra.co; http://www.epcworld.in/p/post/precast-technology-improves-quality-helps-developers-build-homes-faster, http://www.mivanindia.com/one-page.html

7.3 Green Building Features

Water Management

Rainwater Harvesting

The intent is to reduce demand for fresh water and reduce the storm water runoff quantity at plot level.

- Rainwater harvesting is mandatory in all buildings on plots of size 300 sq. m. or more (as per Government of Andhra Pradesh G.O. Ms. No. 350A dated 9th June 2000). As most parts of Amaravati Capital City have a high ground water table, storage method is should be adopted for harvesting rain water. Rain water collected from roof and non-roof areas should be stored in tanks for direct use.
- The rainwater harvesting system should be designed for capacity as per norms specified in 'IGBC Green New Buildings Rating System Reference Guide' by Indian Green Building Council.
- Strict enforcement of rainwater harvesting policies and monitoring mechanism by authorities to review functioning of rain water harvesting system

Water Conservation in Buildings

The intent is to minimize the water consumption in buildings in order to reduce the overall water demand by:

- The use of water efficient plumbing fixtures:
  - Dual water closet flush tanks (6 LPF and 3 LPF for full flush and half flush)
  - Waterless urinals or urinals with 4 LPF
  - Faucets and health faucets with flow of 6 LPF
  - Shower head and handheld spray of flow 10 LPF
  - Faucets with sensors in public buildings
- The use of water efficient landscape design:
  - Planting of native species and limited use of turf (not more than 30% of green area) for landscape of plots in which a minimum of 15% of green coverage is mandatory as per Zoning Regulations (September 2016)
  - The use of treated water for landscape irrigation
  - The use of water efficient landscape irritation system including drip irrigation and pressure regulating devices.

Green Roofs

The intent is to reduce storm water runoff volume generated at plot level by the use of green roofs which have the following benefits:

- Reduce runoff by delaying the initial time of runoff due to absorption of water in the green roof
- Reduce the total runoff by retaining part of the rainfall
- Spread the residual runoff over a long time period through a relatively slow release of the excess water that is stored in the substrate layer.
- Vegetated intensive green roofs to cover a minimum 20% of total roof area in plots over 2000 sq. m. area
- Use of treated grey water for irrigation of green roof
- Timely monitoring should be done by authorities to ensure the proper functioning and maintenance of the green roof
- An area equal to 15 – 30 % of total ground cover area should be provided as green roof.
- 30% to 50% total ground cover area should be provided as green roof should be suggested.

Rainwater harvesting tank at plot level

Green roof in CII Sohrabji Godrej Green Business Centre, Hyderabad

Water efficient plumbing fixtures

Vegetative green roof

Image Source: https://www.architectureanddesign.com.au/suppliers/kingspan-environmental/slimline-water-tanks; www.watersaving.in; http://www.greenroofs.com/projects/pview.php?id=1076, https://igbc.in/igbc/html_pdfs/abridged/IGBC%20Green%20New%20Buildings%20Rating%20System%20(Version%203.0).pdf, https://www.roofingcontractor.com/articles/90285-product-focus-vegetative-roof-systems

7.3 Green Building Features

Proposed Incentives for Green Buildings

Green buildings

- Proposed property tax rebate in the range of 5% to15% offered for building projects rated by an accredited green building rating system
- Proposed fast track approval or sanction on priority basis for projects registered for green certification.
- Ministry of Environment, Forest and Climate Change (MoEFandCC) gives priority to projects for environmental clearance that have obtained pre-certification under a green building rating system like LEED, IGBC, GRIHA etc
- The Industries and Commerce Department of the Government of Andhra Pradesh offers 25% subsidy on total fixed capital investment of the project (excluding cost of land, land development, preliminary and preoperative expenses and consultancy fees) for buildings which obtain green rating from IGBC/LEED/GRIHA. This incentive is applicable for MSME and large industries.
- Municipal Administration and Urban Development Department of Andhra Pradesh offers the following incentives to projects obtaining the rating from IGBC/LEED/GRIHA:
  - 20% reduction on permit fees
  - If the property is sold within three years, one-time reduction of 20% on duty on transfer of property (surcharge on stamp Duty) on the submission of Occupancy Certificate issued by the Local Authority.

Green roofs

- Provision of financial incentives or tax rebates to building owners for the installation of green roofs. As in the case of Singapore, Japan and Hamburg, the authorities can give financial incentive of up to 50-60% for the capital cost of a green roof.

Rainwater harvesting

- Rainwater harvesting is mandatory in all buildings on plots of size 300 sq. m. or more (as per Government of Andhra Pradesh G.O. Ms. No. 350A dated 9th June 2000)
- Existing state government's incentive of 10% rebate in property tax for owners who undertake waste water and rain water harvesting structures on their plots (as per Government of Andhra Pradesh G.O.Ms.No.168 dated 7th April 2012).
- However, in the case of Amaravati Capital City, as decentralized wastewater management is planned at city level, the 10% rebate in property tax should be applicable for plot owners who undertake rainwater harvesting structures on their plots.

Water efficient plumbing fixtures

- As the use of water efficient plumbing fixtures can significantly reduce the indoor water consumption, financial incentives on water efficient products and water bills could be provided to purchasers based on the efficient WEP-I (Water Efficient Products- India) rating of the product

Solar photovoltaic (PV) systems

- Promotion of rooftop PV system at building level through development of 'rent a roof' policy at city level
- Central financial assistance up to 30 to 70% of benchmark cost in residential, institutional and social sector buildings under 'Grid connected Rooftop and Small Power Plants Programme' of MNRE. The benchmark cost of a PV system includes the hardware cost up to the site including PV modules, inverters, minimum storage battery, cost of meters, local connectivity cost, cost of civil works, foundations, installation, operation and maintenance for a period of five years, comprehensive maintenance for a period of 5 years and warranty for the complete systems
- Existing national scheme by IREDA (Indian Renewable Energy Development Agency Ltd.) through NABARD (National Bank for Agriculture and Rural Development) for provision of 40% subsidy on capital costs of solar PV Systems for units. The manufacturer/supplier and the PV model must be approved by the MNRE (Ministry of New and Renewable Energy).

Energy efficient lamps

- LED (light emitting diode) lights should be made mandatory in all buildings
- Distribution 20W LED tube lights and BEE 5-star rated energy efficient fans to consumers under the UJALA (Unnat Jyoti by Affordable LEDs for All) scheme.
- UJALA scheme promotes energy efficiency at the residential level by changing light bulbs to LED, saving 28,57,545 MWh energy per year in Andhra Pradesh.
- Every grid-connected consumer having a metered connection from their respective Electricity Distribution Company can get the LED bulbs at about 40% of the market price under the scheme.

Suzlon One Earth green building in Pune

The Madison Square Garden Company (MSG) has added a dynamic exterior LED lighting system.

The Green Roof Strategy and financial benefits have transformed roofscape in Hamburg

Image Source: http://lokaa.in/blog/top-10-green-buildings-india/; http://www.ujala.gov.in/state-dashboard/andhra-pradesh, http://www.urbanstrong.com/green-roof-habitat-for-the-birds/

7.3 Green Building Features

Matrix for Green Buildings as per Land Use

Building Type	Recommended green building minimum rating to be followed	
Residential	GRIHA	Star Rating : 25 - 40 points, 1 star (minimum range)
	IGBC	Certification Level : Certified (minimum)
Commercial	GRIHA	Star Rating : 41 - 55 points, 2 star (minimum range)
	IGBC	Certification Level : Silver (minimum)
Industrial	GRIHA	N.A
	IGBC	Certification Level : Certified (minimum)
Public / Semi-public Buildings	GRIHA	Star Rating : 56 -70 points, 3 star (minimum range)
	IGBC	Certification Level : Gold (minimum)
Institutional Building	GRIHA	Star Rating : 56 -70 points, 3 star (minimum range)
	IGBC	Certification Level : Gold (minimum)

Note : Any other equivalent national and international rating system with similar weightage may be followed such as

- LEED
- BREEAM
- Any other national and international rating system

References of National Standards and other Green Building Rating Systems for Guidelines

Passive Solar Design and Ventilation

- IS7762-1:1974 Recommendations for orientation of Buildings Part 1 Non-Industrial Buildings.
- General regulations and criteria as per the National Building Code 2016.
- SP41 (1987): Handbook on Functional Requirements of Buildings (Other than Industrial Buildings) [CED 12: Functional Requirements in Buildings].
- IGBC Green New Building Rating System under the category of Sustainable Building Design, SA credit 3 considers the provision of passive design features, eligible for owner occupied/tenant occupied buildings.
- Reference to Daylighting contextual standards and rating systems listing.
- As per the ECBC 2007, natural ventilation of buildings should comply with the design guidelines provided in the NBC 2005, *Part 8, 5.4.3 and 5.7.1.*
- The IGBC Green New Buildings rating system, considers '*Minimum Fresh Air Ventilation*' under the section of *Indoor Environment Quality Mandatory Requirement 1*. For non-airconditioned carpet areas less than 100 square meters, 8% should be dedicated as openable area and similarly for carpets greater than 100 square meters, 12% should be dedicated as openable area. All ventilation rates should comply with ASHRAE Standard 62.1 – 2010..
- The IGBC Green Homes rating system, considers Indoor Environment Quality Mandatory Requirement 3.
- GRIHA V – 2015, Criteria 12: '*Maintaining Good IAQ',* addresses the need to *'ensure design and monitoring of ventilation systems such that indoor air quality meets the minimum requirements*'
- LEED standard.
- Guidelines for wind and ventilation as proposed by the Hong Kong Institute of Urban Design have been referenced.

Daylighting

- The National Building Code 2016 Volume II Part 8 Section 1: Lighting and Ventilation of Buildings, Sub-section 4.2. Daylighting.
- SP41 1987, Handbook on the Functional Requirements of Buildings, Part 4 – Lighting, Section 3 'Daylighting' highlights requirements / criteria pertaining to daylighting.
- IS Code 2440:1975 Guide for Daylighting of Buildings (second revision)
- IGBC Green Homes Rating System, Indoor Environmental Quality IEQ Mandatory Guideline 2, *Minimum Daylighting.*
- IGBC New Buildings Rating System, Indoor Environment Quality IEQ Credit 2: Daylighting.
- IGBC Green Factories Rating System, Indoor Environment Quality and Occupational Health.
- GRIHA 2015, Criterion 11: Achieving indoor comfort
- LEED v4, Indoor Environment Quality, EQ Credit: Daylight
- ECBC 2007, Section 4.3.3. Vertical Fenestration, Sub-section 4.3.3.1 Minimum Visible Transmission of Glazing for Vertical Fenestration.
- Model Energy Efficiency Guidelines for Integrating into Building by-laws, 'Report of the sub-committee for development of National Sustainable habitat parameters for energy efficiency in Residential and Commercial Buildings, May 2011'

Energy Efficiency

- The Energy Conservation Building Code 2007.
- The National Building Code 2016, Volume II, Part 11 Sustainability, Section 8.2. Envelope Optimization Methods for Energy Efficiency.
- Model Energy Efficiency Guidelines for Integration into Building Bye-laws, Report of the sub-committee for development of National Sustainable Habitat parameters for energy efficiency in Residential and Commercial Buildings, May 2011.
- 'An abridged manual on Environmental Building Guidelines for Hyderabad Metropolitan Development Authority', TERI, 2009.
- IGBC Green Homes Rating Systems, IGBC Green New Buildings, IGBC Green Factories, IGBC Green Residential Societies Rating Systems, IGBC Green Interiors Rating System, IGBC Green Affordable Housing, IGBC Green Campus Rating System.
- GRIHA 2015 considers, 13 points maximum under criterion 8: Energy Efficiency
- LEED v4 rating considers for the following building typologies: NC, CS, Schools, Retail, Data Centers, Warehouses and Distribution Centers, Hospitality, and Healthcare, under the heading of 'Energy and Atmosphere', considers 11 criteria should be fulfilled.

Building Materials

- The National Building Code 2016, Vol. II, Part 11, Section 9 Materials, Sub-section 9.2. 'Building Materials and Recommended Suitable Alternatives'

Source: http://www.grihaindia.org/, https://igbc.in/igbc/, https://www.breeam.com/, https://new.usgbc.org/leed

Summary of Built Form Guidelines

Guidelines		Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Site Development and Building Typologies						
Setbacks						367
Adopted for plots size with land use from Amaravati Master plan	Building setbacks for plots should be provided as per Amaravati Zoning Regulations	√	√		√	
	For plots within transit zone refer TPOD guidelines for specific building setback requirements.	√	√		√	
	Planting strips along plot boundary as per plot size excluding plot access should be followed for the street edge up to the width of ROW (Refer plot boundary and edge treatment for details)	√	√	√		
	Planting strips along plot boundary for the sides beyond the street edge and rear edge of the site should be provided	√	√		√	
	Ancillary buildings should be located within building line.	√		√		
	Ancillary buildings for services like DG sets, electrical substation and HSD yards etc. should be places in setbacks with proper screening and access for maintenance.	√	√		√	
	Utility and services should be screened with decorative fencing, art work or landscaping.	√	√	√		
Services						367
Adopted for plots size with land use from Amaravati Master plan	Service infrastructure of the building should be planned on the rear side of the site and should be separated and screened from public access points	√	√	√		
	Service yards on the site should be screened with creative fencing or landscaping	√	√	√		
Plot Access						368
Small and Medium Scale Plots	Street frontage of plots with width ranging from 3.5m-7.4m entry-exit should be provided with a mountable curb	√	√		√	
	Street frontage of plots with width ranging from 7.5m-49m entry-exit to should be provided with a curb ramp. (Refer to Streetscape guidelines for curb width)	√	√	√		
	Small scale plots at street intersection should not have vehicular access from the street corner. Vehicular access should be provided from the sides of the plot.	√	√	√		
	For all medium scale plots entry-exit gate access width should be between 2.4m-3m	√	√	√		
	Medium scale plots entry-exit gate access width should be between 2.4m-3m and curb ramp should be located at min 15m distance from any pedestrian crossing at intersections	√	√	√		
Plot Boundary and Edge Plantation						369
Adopted for plots size with land use from Amaravati Master plan	Hedges and planting should be used to replace solid walls as an alternative way to distinguish plot boundaries	√	√		√	
	Planting strip along the plot boundary should be kept free from services / utilities.	√	√	√		
	Plot boundary edge treatment with compound wall height should be maximum 1.2 m - consisting of 0.45 m solid wall and 0.75 m screening above the solid wall with min 50% visibility that should be built above the finished level of sidewalk.	√	√		√	
	All commercial plots street frontage boundary edge should not be fenced. Bollards or low height planting strips should be used along the street edge for better accessibility to shopfront.	√	√		√	
	Low lying solid compound wall or transparent fencing should be provided to discourage misbehaviour of people from sidewalks	√	√	√		
	Fencing materials should be in combination of stained wood, concrete posts, metal of white, black, grey, brown colours. Compound wall can be of brick, stone, artificial stone or structural RCC.	√	√		√	

*Note : Plots within TPOD zone should refer TPOD chapter for guidelines

Summary of Built Form Guidelines

Guidelines		Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Small and Medium Scale Plots	For plot sizes below 300 sq. m 0.60m - 0.75m for front and back setback width clear landscape strip should be provided.		√	√		
	For plot sizes from 300 sq.m up to 500 sq.m –front and back setback as 0.75 to 1.20m and sides with 0.60m to 0.75m setback should be provided as clear landscape strip.		√	√		
	For plot sizes above 500 sq.m up to 2000 sq.m –front and back setback as 0.90 to 1.20m and sides with 0.75m to 0.90m setback should be provided as clear landscape strip.	√	√	√		
	For plot sizes above 2000 sq.m up to 4000 sq.m –front and back setback as 1.50 m and sides with 1.50 m setback should be provided as clear landscape strip.	√	√	√		
Built Massing						
Building footprint						370
Small and Medium Scale Plots	Building ground coverage should be provided as per Amaravati Zoning Regulations.	√	√	√		
	Buildings on corner lots should be oriented to address both streets and generally located close to the street edge.	√	√		√	
	Public and large scale building's roof and podium should provide 20-50% area of ground coverage as an intensive green (vegetated) cover	√	√		√	
Building Heights						370
Small and Medium Scale Plots	Building heights should be provided as per Amaravati Zoning Regulations.	√	√	√		
	Stepped building profile should be adopted for waterfront, canal front and open space facing buildings. Refer waterfront and open space guidelines.				√	
	For plots within TPOD zone, buildings should comply with heights as per TPOD criteria for zone 1 and 2	√	√		√	
	Site development should respond to the context and help in identity creation	√	√		√	
Plinth level						371
Adopted for plots size with land use from Amaravati Master plan	Minimum plinth height of the habitable spaces should be 0.45m above finished sidewalk level.		√	√		
	Minimum plinth height of the parking stilt structures should be 0.15m above finished sidewalk level.		√	√		
	Plinth height of commercial shops should be 0.15m above finished sidewalk level preferably for ease of access.		√	√		
	Semi sunken plinth for commercial/mixed use buildings should be considered with segregated pedestrian and vehicular access.		√	√		
	Semi sunken structure requiring drop off or other activities, plinth level max 1.5m is preferable		√	√		
	Semi sunken slab is proposed with stilt or 1.5 m slab level from road level in flood demarcation zone. Habitable space should be avoided below the flood line level.		√	√		
Parking						372
Small and Medium Scale Plots	Plot sizes upto 500 sq.m. - Parking spaces should be in stilts with provision of mechanical stack parking		√	√		
	Plot sizes above 500 sq.m. up to 2000 sq.m - parking spaces should be in stilts and semi sunken basement parking provision of mechanical stack parking	√	√	√		
	Plot sizes below 2000 up to 4000 sq.m- Parking spaces should be provided at podium and sunken basement parking with provision of mechanical stack parking	√	√	√		

*Note : Plots within TPOD zone should refer TPOD chapter for guidelines

Summary of Built Form Guidelines

Guidelines		Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Open Space Within Plots						373
Adopted for plots size with land use from Amaravati Master plan	Mandatory planting strip along plot boundary should be as per plot size excluding plot access	√	√	√		
	All government, semi-public and public plots should develop 30- 50% of the open space area along the street edge as public accessible POPS	√	√		√	
Small and Medium Scale Plots	For plot size above 300 upto 500 sqm – 5% Reserved Green area of plot area should be provided. Plot size above 500 upto 4000sqm - 10% Reserved Green area of plot area should be provided. This reserved Green should have min 60% tree canopy coverage	√	√	√		
	Plot size above 500 upto 4000sqm - 5% Recreational Green area of plot area should be provided	√	√	√		
Large Scale Development (plot area above 4000 sqm)						
Plot Access						375
Large scale plots entry-exits should have provision for curb ramps and universal accessibility design features		√	√	√		
Large scale plots entry exit gate access width should be between 3m to 5m		√	√	√		
3m to 5m curb ramp should be provided for plots with plot width 7.5m (Refer to Streetscape guidelines for curb width)		√	√	√		
Separate entry and exit points with curb ramp should be provided with plot width more than 50m on street frontage		√	√		√	
Large scale plots vehicular entry–exits curb ramps provision should be located at minimum 15m distance from any pedestrian crossing at intersections		√	√	√		
Large scale plots at street intersection should not have vehicular access from the street corner. Vehicular access should be provided from the sides of the plot		√	√	√		
Plot Boundary and Edge plantation						375
Plots sizes above 4000 sq. m should provide clear landscaped strip of minimum 1.8 m width should be provided without any underground services		√	√	√		
Adequet green buffer around Integrated Solid Waste Managment Facility and Common Hazardous Waste Treatment and Disposal Facility by carring proper assesment, but not less than 100m width.						
Footprints						376
Building footprint should be kept to minimum to increase natural ground surface areas for landscape and plantation		√	√		√	
Public and large scale building's roof and podium should provide 20-50% area of ground coverage as an intensive green (vegetated) cover		√	√		√	
Large footprints that appear bulky and create an unwelcoming visual barrier should be avoided		√	√		√	
Building Heights and Profile						376
For plots within TPOD zone, buildings should comply with heights as per TPOD criteria for zone 1 and 2.		√	√		√	
Site development should respond to the context and help in identity creation		√	√		√	
Plots with more than two buildings should achieve staggered layouts with minimum distance of 15m between the towers		√	√	√		
The buildings oriented or facing each other in adjacent plots should have a minimum distance of 15m between each other		√	√	√		
Plots with buildings facing each other should have minimum distance of 15m between the podium of the buildings and minimum 30m between the building towers		√	√	√		
Towers height and orientation should allow natural air movement within and between plots, taking advantage of staggered arrangement of building layout		√	√		√	

*Note : Plots within TPOD zone should refer TPOD chapter for guidelines

Summary of Built Form Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Parking					377
Plot sizes above 4000 sq.m.- Parking spaces and basement ramps should be provided under the building footprint	√	√	√		
Multilevel car parking should be provided as part of podium with active frontage on road side		√	√		
Open parking spaces should not be permitted	√	√	√		
Open space within plot					378
Provide 10 - 20% of plot area should be provided as publicly accessible Privately Owned Public Spaces (POPS)	√	√	√		
Minimum 5% additional reserved green should be provided for all large scale development plots. Reserved green should provide min 60% tree canopy coverage	√	√	√		
Large scale development plot having internal courtyards should provide minimum 40% of courtyard should be landscaped with plantation	√	√	√		
Large scale public, commercial and mixed use development plots should provide pedestrian connectivity towards transit node and parks	√	√	√		
Plantation within large scale development plots should follow MOEF guidelines	√	√		√	
Permeability and connectivity					379
Large blocks of master plan layout should be subdivided for providing pedestrian and NMT connection to maintain permeability through blocks	√	√		√	
Plot subdivisions should consider adjacent plot size and road alignments to continue urban fabric	√	√		√	
Internal roads and pedestrian movement should follow structure of existing LPS layout for movement and access to transit stops	√	√		√	
Plot size of length above 250m should consider for plot subdivision	√	√		√	
For plot division, plot size of length or width should be 100 to 150 m to achieve permeability and connectivity for pedestrian movement	√	√		√	
Adjoining plots building layout should consider combining private open spaces as courtyard to increase functionality and sharing larger open spaces	√	√		√	
Streets should include adequate planting to form boulevards to create pedestrian-friendly environment	√	√		√	
Plots should provide green corridors as POPS connecting surrounding parks or open spaces to maintain ecology and pedestrian connectivity of the area	√	√		√	
Large scale plots should provide pedestrian access through POPS to create shorter routes and reduce the walking distance. Desired line should be followed for creating pedestrian network, POPS and green space network which connects public spaces	√	√		√	
Pedestrian network should connect open space and internal plazas to transit nodes	√	√		√	
Green Network					379
For adjoining plots, the building layouts should consider combining private open spaces, to increase functionality and sharing of larger open spaces	√	√		√	
Streets should include adequate planting to form boulevards which create pedestrian-friendly environment	√	√		√	
Large scale plots should provide green corridors as POPS (Refer open space guidelines) connecting surrounding parks or open spaces to maintain ecology and pedestrian connectivity of the area	√	√		√	
Large scale plots should provide pedestrian access through POPS to create shorter routes and reduce the walking distance. Desired line should be followed for creating pedestrian network, POP's and green space network which connects public spaces	√	√		√	

*Note : Plots within TPOD zone should refer TPOD chapter for guidelines

Summary of Built Form Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Institutional					381
Criteria for assessment for education facilities of area and public amenities allocation should follow Amaravati Zoning Regulations plan for primary school, secondary school and higher education institutes colleges and universities	√	√	√		
Criteria's for assessment for education institutes are as per Amaravati Zoning Regulations	√	√	√		
For setbacks, services, plot boundary, edge plantation, plinth level and building footprint as per guidelines in built form chapter and Amaravati Zoning Regulations	√	√	√		
Plot Access					
The major entrances of schools and other institutional sites should face the street	√	√	√		
The design of institutions at corner sites should address the streetscape of both public frontages	√	√		√	
Maximum two access points should be permitted per plot	√	√		√	
Entry points should be welcoming and address local context creating vistas and focal point	√	√		√	
Building height and profile					
Maximum building height should be provided as per zoning regulations	√	√	√		
Site development should respond to the context and help in identity creation	√	√		√	
Entry of building should be emphasised with grandeur and monumental scale	√	√	√		
Parking					
Access points to parking areas should be minimized to reduce their impact on the surrounding context	√	√	√		
Bus parking should be provided within plot under tree shaded region	√	√	√		
Location of bus parking should be provided with ease of circulation for entry – exit without disturbing school precinct	√	√	√		
Parking areas should be located possibly to the rear side of plot or side margin.	√	√	√		
Plinth Level					
For plinth height refer table in built massing plinth level guidelines	√	√	√		
Open Space within the plot					
Institutional building should be planned with semi-public building activity frontage and open spaces as per POPS guidelines (refer Waterfront and Open Space Network Guidelines)	√	√		√	
Landscape should screen parking areas from view of streets and surrounding buildings	√	√		√	
University / Campus design					382
Refer large scale development and institutional building design guidelines for built form guidelines for plot and building design	√	√	√		
Site planning				√	
Internal driveways, walkways, greens, courtyards, plazas, gardens, playfields and open spaces should be planned together using diverse elements of the campus and the context in a coherent way	√	√		√	
Heights of Structures					
Height of structure should be directly proportional to width of internal driveway	√	√	√		
Height of structures should depend on the prominent building of the campus and should respond to the existing structures within site context	√	√	√		

*Note : Plots within TPOD zone should refer TPOD chapter for guidelines

Summary of Built Form Guidelines

Guidelines		Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Building Footprint						
Large footprints should be avoided		√	√		√	
Articulation of floor plates using indentations and creating opportunities for permeability is encouraged.		√	√		√	
Building with the environment						
Topography	Building located on slopes should follow a terraced form similar to the existing topography of the site	√	√	√		
	The orientation of the buildings should encourage vistas towards spaces of prominence within the campus as well as the surrounding sites.	√	√		√	
Views	Buildings should be oriented towards spectacular views of natural elements on site and surrounding context.	√	√		√	
	Existing views of the neighbouring buildings should be preserved through terraced building forms.	√	√		√	
Landscape and Streetscape	Structures should be sited and designed to form lively and secure public pathways that have surveillance from occupants throughout the day and night. The aim is to provide spaces that are defensible and used for multifunction	√	√	√		
	Sports complex should be designed with open space which should be shared with people for public use and also easily accessible from residential areas, education zone of the campus	√	√	√		
Industrial						**383**
Industrial development should support the logical distribution of buildings, parking and loading-unloading areas in an integrated way to minimize the impact of heavy vehicles in those areas.			√	√		
For setbacks, services, plot boundary, edge plantation, plinth level and building heights as per guidelines in built form chapter and Amaravati Zoning Regulations			√	√		
Plot access						
Separate service entry to manufacturing units should be provided for loading –unloading of goods			√	√		
Maximum 4 entry points should be provided to industrial plots			√	√		
Joint access driveways to adjacent development lots should be encouraged in order to maximize landscaped areas			√	√		
Convenient access to transit routes should be promoted through the provision of pedestrian linkages at longer and larger block lengths more than 150 m on street frontage side or higher ROW			√	√		
Building Footprint						
Corner plots of industrial areas should be designed with product display area and access for people			√		√	
Industrial plot layout or typology should be designed with administrative offices or shops at street frontage			√		√	
Manufacturing units and service access to plots should be placed on rear side of plot			√		√	
Building height and profile						
For height and profile refer built for guidelines for large scale development plot				√		
Maximum building height should be as per Amaravati zoning regulations				√		

*Note : Plots within TPOD zone should refer TPOD chapter for guidelines

Summary of Built Form Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Parking					
Access points to parking areas should be minimized to reduce their impact on the surrounding context	√	√	√		
Location of heavy vehicles parking should be provided with ease of circulation for entry – exit without disturbing school precinct	√	√	√		
Parking areas should be located to the rear side of plot or side margin	√	√		√	
Staff and visitors parking within plot should be under stilt within building line	√	√	√		
Surface parking is allowed only for heavy vehicles within plot boundary	√	√	√		
Green Roof Treatment					
An area equal to 15 – 30 % of total ground cover area should be provided as green roof	√	√	√		
An area above 30%- 50% of total ground cover area should be provided as green roof	√	√		√	
Warehouse and Storage facilities					
The location of the warehouse and storage facilities should be at the rear end of the plot and easily accessible to the heavy vehicle entry and exit path	√	√	√		
Open space within plot					
Plantation and landscape hedges should screen heavy vehicles parking areas from view of streets and surrounding buildings	√	√		√	
Development should be set back to create buffer areas from existing natural features and surrounding to manifesting unit buildings	√	√	√		
More than 50% of open space should be provided with tree canopy coverage to minimize air and noise pollution to areas of industrial zone and should be provided over and above the mandatory setbacks	√	√	√		
50 % of green space should be planted with air purification plants to industrial site development for health benefits	√	√	√		

*Note : Plots within TPOD zone should refer TPOD chapter for guidelines

Summary of Built Form Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Utility Plot					386
Utilities should be proposed within reserved areas as per Amaravati Zoning Regulations	√		√		
Safety measures necessary for each utility should be undertaken as per National Building Code 2016 clauses	√		√		
Incentives should be provided for incorporating utilities within private plots and reducing infrastructure development load on the government	√			√	
For setbacks, services, plot boundary, edge plantation, plinth level and building heights refer guidelines in built form chapter and Amaravati Zoning Regulations	√		√		
Plot Access					
Vehicular access points should be permitted as per Amaravati Zoning Regulations	√		√		
Building footprint					
Ground coverage for utility plots should be as per zoning regulations	√		√		
Administration blocks / offices under utility plot development should be placed along street frontage	√			√	
Parking					
Staff parking of administration blocks / offices should be placed within building line with stilt or basement parking arrangement	√		√		
Surface parking is allowed only for heavy vehicles of services and utility infrastructure within plot line with buffer plantation to hide and shade such parking areas /zones	√			√	
Multi-Level Parking building within utility plots -					
Public use multi-level parking should be provided for the plots having area of 2000 sq.m and above	√			√	
Utility plots with multi level parking facility should provide an active commercial street frontage and terrace level food court, cafeteria or sports facilities to achieve balanced revenue generating multi functional spaces	√			√	
Utility plots within TPOD zone, major parks , waterfront canal fronts should provide multilevel parking	√		√		

Summary of Built Form Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Town Centre					388
Town Centers should be proposed within reserved areas of town center zones as per Amaravati Zoning Regulations	√	√		√	
For setbacks, Services, Plot boundary edge and plantation, Building footprint, Building height and profile, Plinth Level and Parking guidelines refer respective large scale development plot guidelines	√	√		√	
Plot Access					
Entry points should be welcoming and address local context creating vistas	√	√		√	
Maximum number of through pedestrian connections should be provided connecting surrounding development blocks	√	√		√	
Building footprint					
Town centres should have mixed use development with retail, offices, public amenities and residential typologies, with the following percentage break up - 50-70% residential , 20-40% commercial, Min 10% public amenities , 60 % of the retail shops should have street front on the ground floor	√	√		√	
Building height and profile					
Location and site development should encourage vistas to the building from the surrounding urban fabric to ensure signature status	√	√		√	
Entry of the building should be emphasised with grandeur and monumental scale	√	√		√	
Town centre plot development should have at least one building within the plot that creates identity for the town centre through its maximum height	√	√		√	
Green Roof Treatment					
An area equal to 15 – 30 % of total ground cover area should be provided as green roof	√	√	√		
An area above 30%- 50% of total ground cover area should be provided as green roof	√	√		√	
Plinth Level					
For plinth height refer table in built massing plinth level guidelines	√	√		√	
Open spaces within plot					
10 - 20% of plot area should be provided as publicly accessible POPS	√	√		√	
Minimum 5% additional reserved green should be provided. Reserved green should provide min 60% tree canopy coverage	√	√		√	
Minimum 40% of the internal courtyards should be landscaped with plantation	√	√		√	
Town center feeder bus stop					
The feeder bus stop should be located within the plot boundary and along the street edge. This feeder bus stop should plan to connect city transit stop and neighborhood feeder stop	√			√	
It should be located within 300-500m walkable distance from the transit stop and should be on the feeder bus route	√			√	
The location should be determined after due consideration of the transport routes in the neighborhood zone	√			√	
Building entrances should be oriented towards transit stops and provide direct pedestrian access	√			√	

Summary of Built Form Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Neighbourhood Centre					391
Neighborhood Centers should be proposed within reserved areas of town center zones as per Amaravati Zoning Regulations	√	√		√	
For setbacks, Services, Plot boundary edge and plantation, Building footprint, Building height and profile, Plinth Level, Parking, Open spaces within plots and sustainability guidelines refer respective large scale development plot guidelines and town center guidelines	√	√		√	
Plot Access					
Maximum two access points should be permitted per plot and should be welcoming and address local context creating vistas	√	√		√	
The design of the buildings within the town centre located at the corner sites should address the streetscape on both the public frontages	√	√		√	
Neighbourhood centre should be for public purpose connecting people and community together	√	√		√	
Building Footprint					
Centre should have mixed use development with retail, offices, public amenities and residential typologies, with the following percentage break up - 50-70% residential , 20-40% commercial, Min 10% public amenities, 60 % of the retail shops should have street front on the ground floor	√	√		√	
Internal courtyard should be provided for open space and permeable to pedestrian movement connecting neighbourhood	√	√		√	
Neighborhood center feeder Bus stop					
The feeder bus stop should be located within the plot boundary and along the street edge and should be connected to city transit stop and town center feeder stop	√			√	
It should be located within 300-500m walkable distance from the transit stop and should be on the feeder bus route. Building entrance should be oriented towards transit stops and should provide direct pedestrian access	√			√	
Village Centre					393
Location					
Village centre development should consider the following site selection criteria-					
Village centre should be located possibly at the center of the village and should be easily accessible to villagers	√			√	
Village centre should integrated with LPS layout as equally as to village	√			√	
Relationship to transit corridors should be considered	√			√	
Proportional plot size should be min 2000 sq.m and above, possibly mix use arrangement of existing buildings in context with land use	√			√	
Placement of parking within walkable distance should be considered	√			√	
For setbacks, Services, Plot boundary edge and plantation, Plot access, Building footprint, Building height and profile, Plinth Level, Parking, Open spaces within plots and sustainability guidelines refer respective large scale development plot guidelines and Town center guidelines	√	√		√	
Building Footprint and Massing					
Roof and podium should provide 10-20% area of ground coverage as an intensive green (vegetated) cover	√			√	
Refer village integration guidelines for program formation and provision of facilities. Village centre should fulfil a basic necessity of public amenities of village	√			√	

Summary of Built Form Guidelines

Guidelines	Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Building height and profile					
Location and site development should encourage vistas to the building from the surrounding urban fabric	√			√	
Village center should reflect village character in response to the context	√			√	
Village center building's should have sloping roof or local area architectural character. (Refer village integration guidelines)	√			√	
Built massing					
Existing height and width of historical village typology, style should be maintained with scale and proportions	√			√	
Generally flat or gable roofs with stepped or sloped parapets	√			√	
Commercial and office building frontage should be located near to the front setback line of the plot	√			√	
In the case of corner buildings, this may be accomplished using angled or sculpted building corners or an open plaza at the corner	√			√	
Coordinate Building Designs – Multiple buildings in a single development must demonstrate a positive functional relationship with one another	√			√	
Parking					
Parking should be provided within zone walkable distance of range 300m to 500m from village centre	√			√	
Surface parking should be avoided into parking plot. Surface parking is allowed only for heavy vehicles	√			√	
Open Spaces within plot					
Provision of 10 - 20% of parcel area as publicly accessible POPS	√			√	
Minimum 5% additional reserved green should be provided. Reserved green should provide min 60% tree canopy coverage	√			√	
Minimum 40% of the internal courtyards should be landscaped with plantation	√			√	
Architectural facade and treatment					
Quality materials and natural and earth tone colours should be used maintaining original visual character of village as far as possible	√			√	
Parapet, cornice, and fascia band ornamentation should be designed as building element for village character	√			√	
Structures of historic significance or which are listed on a municipal, county, state or national historical register should comply with said municipal, county, state or national guidelines for historic structures within precinct or inside plot should be preserved	√			√	
loading and unloading areas of building services should not face public spaces along street front	√			√	
Existing or planned amenities such as parks, open space, water features or public shared streets should be architecturally articulated	√			√	

Summary of Built Form Guidelines

Guidelines		Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Architectural facade and Treatment						396
Building frontage and facades	Commercial and mixed use buildings should provide upto 60% of total of street frontage with retail shop at ground floor. Shop street frontage should be transparent through opening and shop windows	√	√	√	√	
	40 to 50 % of building facades at the street level should consist of vision glass or entrances.		√	√	√	
	Podium along the street edge should be treated with public or semi-public commercial activities and parking spaces should be accommodated at rear side of active frontage		√	√	√	
	Podium heights more than G+2 should adopt stepped/ terraced building profile		√	√	√	
	Entrance lobby, amenities and community recreational spaces should be planned along the street frontage for residential buildings and should locate parking at the rear side		√	√		
	Building services facing streets should be screened as part of elevation treatment including but not limited to pipes, outdoor AC units, hanging cloths, exhaust pipes etc.	√	√	√		
	Dead walls, window less facades should be avoided along the street edge	√	√	√	√	
	Commercial and public buildings facade treatment should reflect unique character inspired from local cultural and architectural elements to create identity	√	√	√	√	
	Commercial and public buildings entrance should be grand and integrated with landscaped plazas for creating public spaces defining character	√	√	√	√	
Building frontage along public spaces	Plots with buildings facing waterfront, open space, buffer zone, major roads and public transit corridor should be designed with active frontage of the plot as mixed use development.	√	√	√		
	These plots with development oriented towards public spaces should have direct pedestrian access with the drop off and potentially having on street parking facilities	√	√		√	
	These plots should also be considered for having vehicular access from the roads adjoining the public spaces irrespective of its ROW	√	√		√	
	Buildings should be placed at the corners or strategic view corridors to create visual focal points along the public spaces		√	√		
	Buildings orientation and position along the public spaces should be addressing the view corridors and maximizing the views towards waterfront and parks		√	√		
	The public spaces facing buildings should have colonnade character (refer TPOD guidelines for colonnade details.)	√	√	√		
	Publicly accessible POPS and urban squares should be placed with retail and public amenities along the public spaces. (refer Waterfront and Open Space Network guidelines for details.)		√		√	
Balconies and Projections	All projection widths as per Amaravati Zoning Regulations	√	√		√	
	Entrance canopies with minimum vertical clearance of 4.5m from finished ground level	√	√		√	
	Building balconies should orient toward public spaces such as waterfront, open space and public transit corridors	√	√		√	
	Active street frontage should be provided with temporary canopies or shading devices for creating comfortable microclimatic outdoor spaces as part of plazas	√	√		√	
Services	Service infrastructure of the building should be planned on the rear side of the site		√		√	
	It should be separated and screened from public access points		√		√	
	Service yards on the site should be screened with fencing or landscaping		√	√		
	Toilet vent pipes, AC units, kitchen vent should be designed preferably to rear side of building and should not be visible directly. These services should be recessed or covered with using decorative screens or vertical green elements.	√	√	√		
	All service pipes should be provided within duct with ease of access for maintenance	√	√	√		
	All building services facing streets should be screened as part of elevation treatment	√	√	√		

Summary of Built Form Guidelines

Guidelines		Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Services	The materials used for screening should act as sound barriers to reduce the noise interference due to the services	√	√	√		
	Each tenement should have dry balcony with place for drying cloths	√	√		√	
Building Signage	Plot address should be displayed on plot boundary edge facing road at entry/exit points.	√	√	√		
	Commercial hoarding/signage should be limited to 20% of building facade and should be placed according to architectural façade treatment avoiding covering of windows and doors.	√	√	√		
	Projecting signs should not exceed more than 1 meter from building face/ building line towards street frontage.	√	√	√		
	Way finding signage should be integrated in with building	√	√	√		
	Avoid high glare intensity signage lighting such as neon lighting	√	√	√		
	Awning and canopy type signage should be installed at same level of height with minimum clear height of 2.4m from finished level of side walk.	√	√	√		
Architectural Materials and Colors	Locally available climate responsive materials and colors reflecting cultural identity should be used for all buildings	√	√	√		
	Public and commercial buildings should follow maximum 30% use of glazed facades for energy efficient buildings	√	√	√		
	Public and commercial buildings should follow maximum 40% of facade area with warm colors or locally available stone cladding should be used for highlighting the design element and character of the building	√	√	√		
	Public and commercial buildings should follow minimum 60% of the facade area should be using cool colors or stone textured paint	√	√	√		
	Awning and canopy type signage should be installed at same level of height with minimum clear height of 2.4m from finished level of side walk	√	√	√		

Summary of Built Form Guidelines

Guidelines			Public Sector	Private and Other Sectors	Mandatory	Suggestive	Chapter Page
Green building Guidelines							405
General guidelines	All buildings should be planned in consideration of the geographic, topographic and climatic aspects of Amaravati region which is a hot and humid climate		√	√	√	√	
	The guidelines encourage the usage of locally available resources and materials		√	√	√	√	
	Buildings should plan for rainwater harvesting, reusing waste water and use energy efficient lighting systems		√	√	√	√	
	An area equal to 15 – 30 % of total ground cover area should be provided as green roof		√	√	√		
	An area above 30-50 % of total ground cover area should be provided as green roof		√	√		√	
	1/3 of terrace top should be covered with PV panels along with Solar Heaters		√	√	√	√	
Guidelines as per building type that may follow either of the national green building norms. *							
Building Type	**Recommended green building minimum rating to be followed**		√				
Residential	GRIHA	Star Rating : 25 - 40 points, 1 star (minimum range)	√	√	√	√	
	IGBC	Certification Level : Certified (minimum)	√	√	√	√	
Commercial	GRIHA	Star Rating : 41 - 55 points, 2 star (minimum range)	√	√	√	√	
	IGBC	Certification Level : Silver (minimum)	√	√	√	√	
Industrial	GRIHA	N.A	√	√	√	√	
	IGBC	Certification Level : Certified (minimum)	√	√	√	√	
Public / Semi-public Buildings	GRIHA	Star Rating : 56 -70 points, 3 star (minimum range)	√	√	√	√	
	IGBC	Certification Level : Gold (minimum)	√	√	√	√	
Institutional Building	GRIHA	Star Rating : 56 -70 points, 3 star (minimum range)	√	√	√	√	
	IGBC	Certification Level : Gold (minimum)	√	√	√	√	
***Any other equivalent national and international rating system with similar weightage may be followed such as** BREEAM, LEED			√				

8 Implementation

Implementation

Overview

Regulatory framework and implementation mechanisms should be in place to use the UDAG to guide future development of the People's Capital of Amaravati as envisioned. APCRDA should adopt and implement the UDAG by working together with the public sector, private sector, community, academia, non-profit organisations and other relevant stakeholders to shape Amaravati as a smart and sustainable city that is liveable and walkable.

The UDAG is effective only if it is used properly to guide the development of Amaravati as the masterplan is being implemented. An Urban Design Committee (UDC) should be formed to facilitate the UDAG's implementation, which should consist of representatives from APCRDA, ADCL, professional experts, village representatives, academia and other relevant stakeholders. UDC tasked to evaluate and permit key designated and large projects among other things. UDC's role will be further elaborated in the chapter.

Given that Amaravati has relied substantially on land pooling, the construction of the road network needs to be completed over the next couple years to provide access to the LPS plots. While some areas like the AGC is currently under construction and Seed Capital which is likely to be implemented soon, but other areas may take some time to be developed depending on market and investment interest. Therefore, implementation of the entire city of Amaravati could still take some time and will need a phased development strategy over the next 10 years. Strong leadership, political will with a common vision, community support and investment interest are needed for the successful development of Amaravati as planned. With the proper implementation of UDAG, Amaravati has the potential to become a vibrant, walkable and happy city that is well-designed creating a sense of place and community ownership, to become a model for other cities in India and beyond.

The UDAG should be monitored, reviewed, and refined regularly for the effectiveness of the implementation of the guidelines. Following the completion of the UDAG, it is necessary to update the ZR and also have more detailed urban design masterplans for the waterfront, open space, village integration, TPOD and streetscape mock up designs done. These detailed urban design plans should be undertaken following UDAG to iron out any issues that may surface during design, planning, and implementation to ensure that Amaravati is developed as envisioned. An extensive community engagement and public outreach program with stakeholders should be initiated to share UDAG to create an awareness with the stakeholders on the importance of the guidelines and their role in shaping the future development of the Amaravati. The purpose, use and role of UDAG should be well understood among various stakeholders including the public sector, private sector, NGOs, community, academia, professional institutions etc. It is important that APCRDA, the various Government departments, organisations and other key stakeholders including the community are on the same page, and that proper channel of communication are open to have effective two-way communication. This is critical in making sure that the community is engaged and they can actively participate and be true partners in the development of Amaravati, the people's new capital city.

Pedestrian friendly and active neighbourhood in Berlin

Source: https://www.flickr.com/photos/la-citta-vita/5853024104

Implementation

8.1
Regulatory Framework

8.2
Implementation Mechanism

8.3
Use of UDAG

8.4
Next Steps

8.1 Regulatory Framework

8.1 Regulatory Framework

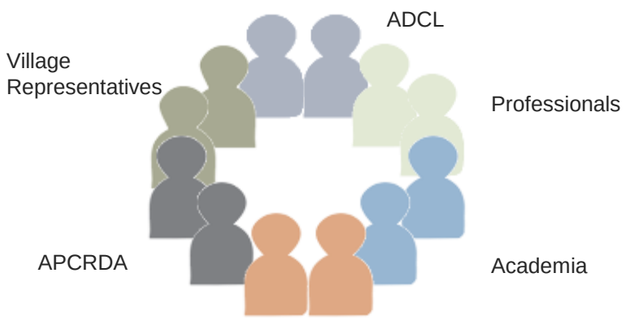
Regulatory Framework

The APCRDA oversees the development of Amaravati, the People's Capital, to create a liveable and walkable city with a blue and green network connected with sustainable transit including walking and biking. It is important to integrate existing urban villages with the surrounding LPS development providing good access to transit, services, amenities, and other infrastructure and facilities in the city. The Amaravati Masterplan was developed to provide land use, street network, zoning regulations, building guidelines, etc. to assist with development of the city. These plans and regulations will need to be reviewed and revised according to the UDAG to guide the future development of Amaravati. Proactive steps should be taken by APCRDA as suggested to by the UDAG, for public outreach and create awareness among key stakeholders such as public and private sector, the local community, or forming a possible public private community partnerships to work on specific projects.

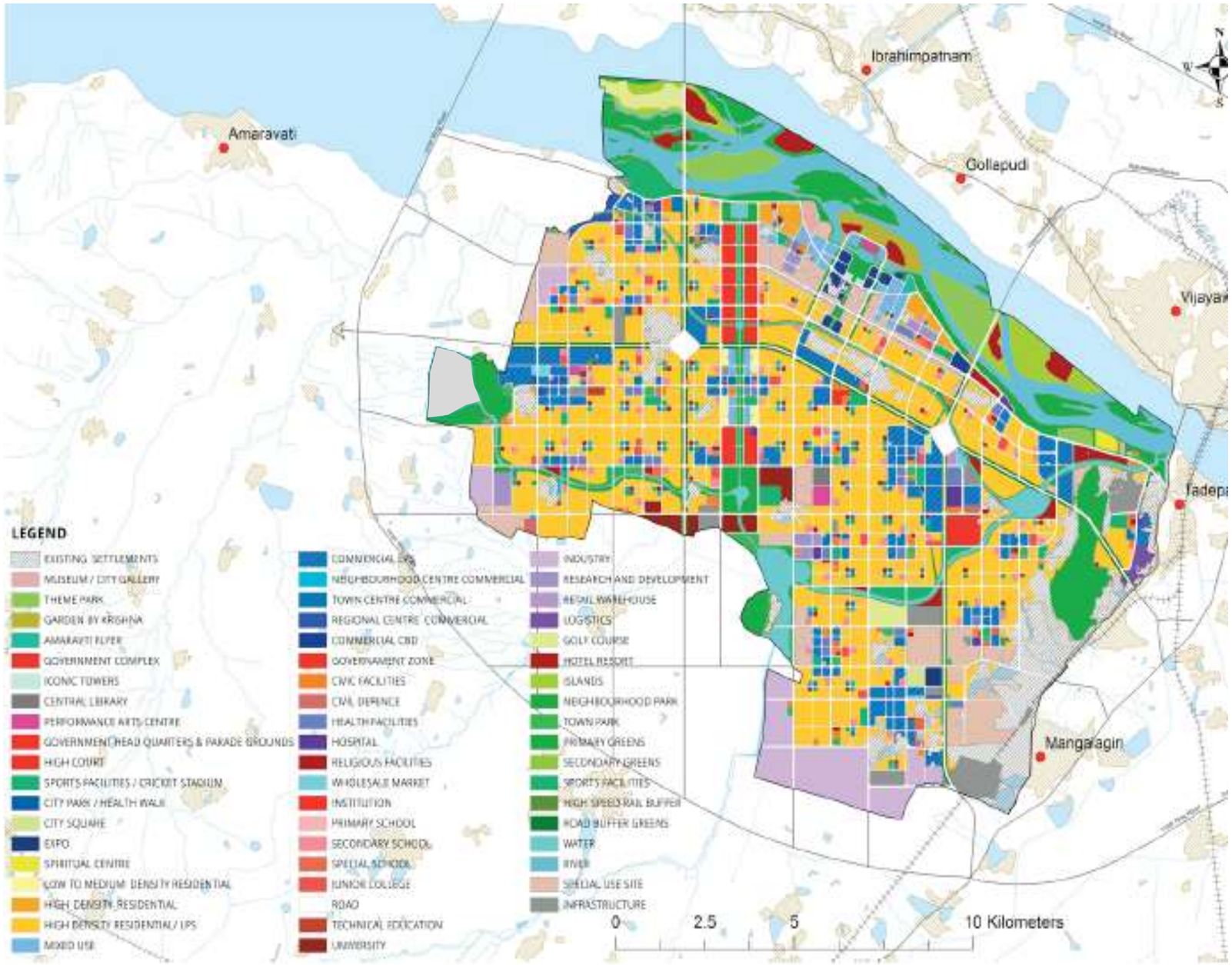
Urban Design Committee

To ensure the concept of people focused and sustainable development is achieved throughout Amaravati, UDAG should be used during implementation of the future development of the city. To facilitate this, the formation of an Urban Design Committee (UDC) is recommended. The UDC should have a minimum of 12 to 20 members maximum consisting of experts from urban design and related fields including urbanists, urban designers, planners, architects, landscape architects, conservationists, engineers etc. The UDC should also consist of other representatives from APCRDA, ADCL, village representatives, academia and other relevant stakeholders. The UDC should include a Chairman from the government and a Vice-Chairman not from public sector but from the community, each serving 2-3 years.

The UDC should meet often, every month or at least once in 2 months to not only evaluate ongoing projects but also assess important and large scale projects as well as major developments such as Seed Capital, and projects along waterfront, transit corridors, along key roads and within special areas or districts. These projects should be assessed to make sure they follow the UDAG and offer value to the city. This will determine if the project is approved to become a part of Amaravati, this process will be further elaborated in the Implementation Mechanism section.



Urban Design Committee



Amaravati Masterplan

8.2 Implementation Mechanism

8.2 Implementation Mechanism

Implementation Mechanism

To demonstrate how APCRDA and the UDC can work together and follow UDAG to guide the future development of the city, case studies from Delhi and Vancouver are included as references. These two cases studies are chosen as they are set up to ensure future developments help create a better city for all.

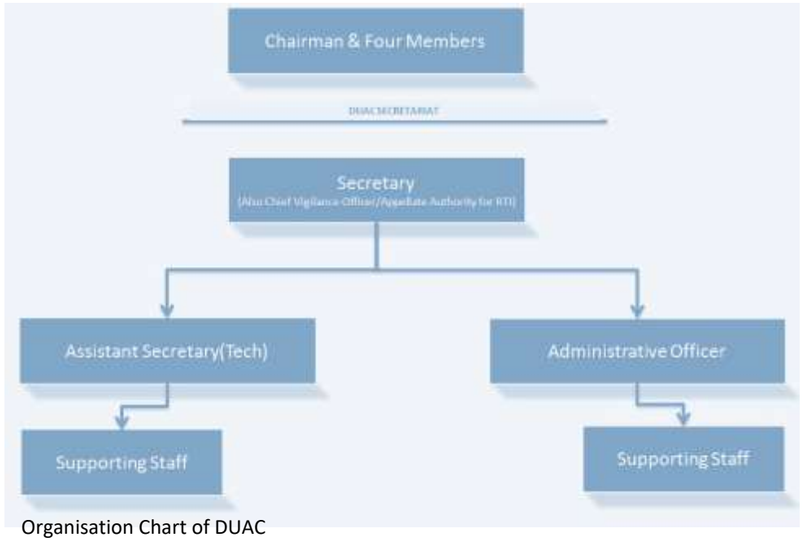
Case Studies

Delhi Urban Art Commission

The Delhi Urban Art Commission (DUAC) was set up by an Act of Parliament in 1973. It aims to advise the Government of India in preserving, developing and maintaining the aesthetic quality of urban and environmental design within Delhi. The mission is to provide advice and guidance to local bodies with respect to any project of building or engineering operations or any development proposal which affects or is likely to affect the skyline or the aesthetic quality of the surroundings or any public amenity provided therein.

The duty of the Commission is to scrutinize, approve, reject or modify proposals in respect of the following aspects:

- Development of district centres, sub district civic centres, community centres, areas earmarked for Government, administrative buildings and for residential complexes, public building/complex
- Re-development of the area within the jurisdiction of New Delhi Municipal Committee
- Architectural expressions and visual appearance of new building
- Re-development of areas in the places of historical importance
- Conservation, preservation and beautification of monumental and heritage buildings, public parks and public garden
- Street furniture and hoardings
- Location and plans of infrastructural proposal
- Transport corridors
- Any other project or lay-out to beautify Delhi or to add to its cultural vitality or to enhance the quality of the surroundings



Organisation Chart of DUAC

When a project is received by the DUAC for approval, the preliminary scrutiny is done by the technical staff of the Commission as per existing practice and put up to the Commission. Subsequently, the Chairman/ Members/ Advisors of the Commission will meet to consider approval of the projects to examine the following parameters:

Urban Form / Context

- The overall layout of the area/building, space planning, distance between buildings, massing, heights, etc.
- The effect of the building on the skyline as urban form of buildings shape the skyline of the city
- Buildings are part of the street's overall image. Buildings need to be harmoniously juxtaposed into the street context as presented to the eye of the beholder
- Buildings need to be oriented in a manner so that they make use of the surrounding good views.

Environmental considerations

- The orientation, sizes of courts, ventilation, etc. should ensure maximum use of natural light and ventilation
- The treatment of the exterior hard and soft open spaces, levels, plant materials (ground cover, shrubs, trees), rain water, etc.
- Water harvesting, reuse, solar lighting, nature of materials used and various other 'green building' features

Building Aesthetics

- The type of building exterior finish including colour, wall mounted equipment, boundary wall and signage provision as they have major bearing on city aesthetics
- Provisions for integration of public art into the building / layout

Accessibility and Vehicular Parking

- The entry / exit to the site becomes very important in terms of location since ease of access, merging with traffic, etc. are affected
- Pedestrian access into the site / building as well as within the site / between various buildings
- Proper vehicular parking is necessary including number, location, positioning and workability
- The entrance to the site / layout / building is very important from both the functional as well as the aesthetic point of view

Through this system, all projects referred to the DUAC for approval are considered based on specific preset parameters, which ensures greater transparency, rationality, objectivity and accountability in the process.

Vancouver Urban Design Panel

Vancouver Urban Design Panel

The Vancouver Urban Design Panel consists of at least 13 members from different groups including architects, engineers, landscape architects, public representatives and the planning commission. The panel advises the City Council on development proposals and policies including major development applications, rezoning proposals and other projects of public interest. Projects are usually reviewed in their early conceptual stages or when it is being brought to the Department of Planning and Civic Development. All civic development projects including bridges, roads, open space and transit system are reviewed by the panel. Moreover, the panel helps the planning department and City Council to create urban design policy including the design and interrelationship of all physical components of the city. However, the Panel does not approve or refuse projects or make policy decisions but votes for either "support the project", "support the project with recommendations" or "recommend resubmission" of projects.

Panel meetings are held every two weeks throughout the year, special meetings can be held when necessary. The panel meetings are transparent as they are open to public attendance. However the public comments are not taken during the meetings.

The composition of the Vancouver Urban Design Panel includes a multidisciplinary team which allows the Panel to comment from a diverse perspective. However, the inability to approve or refuse projects or policy decisions does not guarantee the vision and intention of Vancouver's urban design guidelines are realized.

Sources: http://www.happycitiessummit.org/event.html , https://www.pinterest.pt/abdullahsacak/art/, https://www.hyderabadtourism.travel/shilparamam-hyderabad#galleryfd345448cc-4, https://cityhallwatch.wordpress.com/2014/01/26/udp-jan-29/

8.2 Implementation Mechanism

Planning and Development Application

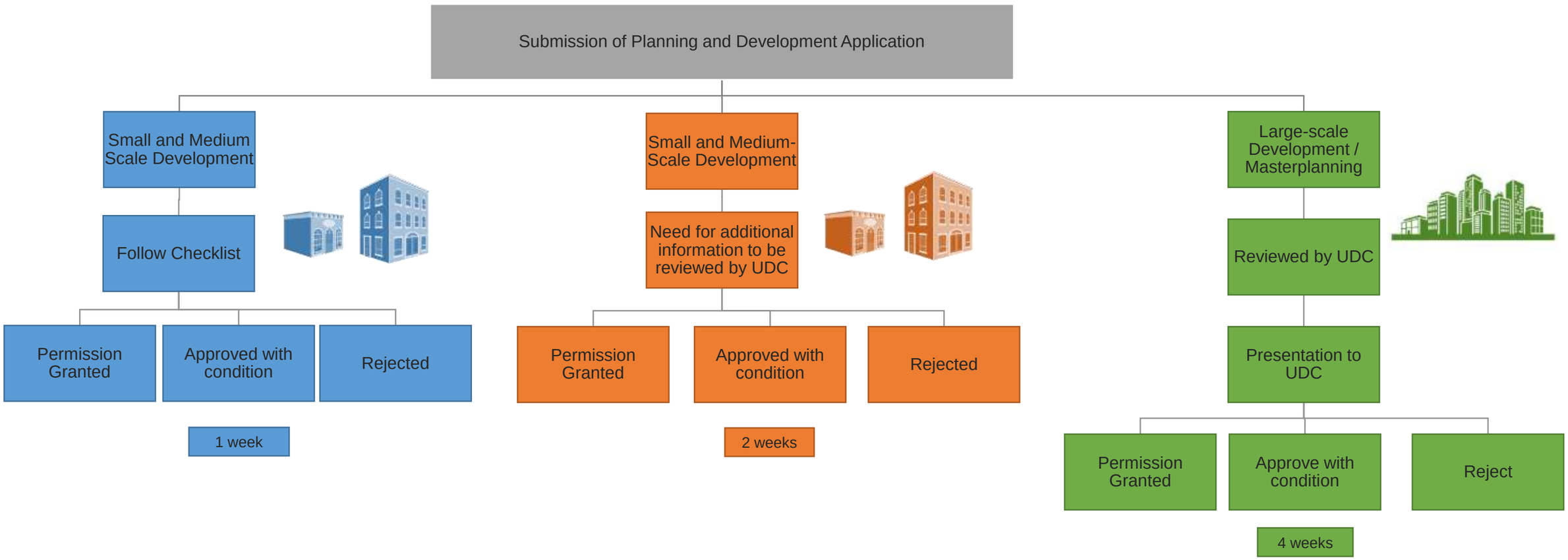
All project proponents should submit a planning and development application to APCRDA to seek approval before the commencement of project construction. Similar to the DUAC, there should be specific parameters which are used to examine if projects are following the UDAG. A UDAG checklist should be prepared to evaluate if the project are complying with the relevant guidelines.

The planning team within APCRDA should review the application in accordance with the UDAG checklists and prepare technical assessment for the UDC to review. The planning and development application evaluation process should be divided into 3 categories. The first category refers to small or medium scale projects, which should take about 1 week to evaluate, whether the development meets the relevant UDAG checklists. The second category deals with applications that need more information and a review by UDC which would take around 2 weeks to complete. The third category applies to important and relevant large scale projects, which require the submission of a masterplan and impact assessments and should normally take 4 weeks. For large scale projects, a presentation is needed in addition to the submission of the application to explain the development and its merits and the value it offers to the city.

The decision made by the UDC can be grouped into three scenarios as advice which should be taken seriously by APCRDA. The first one is approved so can be granted permission, which means the project can commence as it is planned. The second scenario is that the approval is subject to conditions. Possible conditions include specific aspects of the development such as the colour or the material, or restrict the use of the site such as limiting the operating hour or the provision of additional public space or amenities. It can be used as a tool to finance public infrastructure projects and streetscape amenities through a combination of public and private partnerships to fund projects and contribute positively to the city. For example, through the entitlement process for new construction, a developer may be required to provide public space, plant street trees or dedicate a right-of-way as necessary for the widening of the sidewalk. In some instances, private developers could propose funding identified improvements because these improvements would add substantial appeal to their projects. Such improvements could include special pedestrian scale streetlights, sidewalk furniture, corner curb bulb-outs, enhanced landscaping, public art, etc. Streetscape enhancements could also include green infrastructure, to incorporate storm water management techniques for the built environment through enhanced landscaping and pervious surfaces rather than channelling water directly to the storm water drainage system. As long as the owner/developer is willing to satisfy these conditions, the project can be approved and proceed for construction. The final case is the application is rejected as it does not follow the UDAG and/or ZR so the applicant can resubmit the application with the required revisions.

The UDC should meet every month or at least once in two months or commence special meeting to discuss and evaluate any ongoing projects or submitted applications and review the effectiveness of the UDAG regularly. The masterplan and the UDAG should be monitored and reviewed every two years, and refined if necessary after evaluation of the outcomes.

Apart from the UDC, it is also essential to set up District Level and Village Representative offices across the city to engage with the community and the public at large. These offices should provide an opportunity for the community and general public to convey their views and opinions on ongoing projects and critical urban issues. The UDC should take the public comments into their consideration to ensure projects and policies consider the impact on the communities.



UDAG Planning and Development Application Process

8.3 Use of UDAG

8.3 Use of UDAG

UDAG aims to guide future development of Amaravati to become a world-class people's capital of Andhra Pradesh. UDAG also helps the public sector, private sector, NGOs, community and the people in understanding the role of UDAG and the importance of urban design in creating a smart and sustainable city. UDAG encourages community involvement and to help increase awareness and education while emphasising the role the various stakeholders should play in shaping the city. City Level Strategies suggested in UDAG should be applied at city, township, neighbourhood level or village level as appropriate. UDAG can be used as a guide for urban design and architecture elements of a site related to public, private and institutional developments to ensure high quality development. UDAG has guidelines related to the Waterfront, Open Space Network, Village Integration, TPOD, Streetscape and Built Form.

UDAG should be implemented by APCRDA and used in conjunction with relevant checklists / summary guidelines to achieve intended design outcomes. APCRDA should establish decision making processes and organise people and resources to form the UDC. UDAG should be implemented through administrative or statutory means depending on whether they are strategies or guidelines. UDAG are mandatory or suggestive and relate to either the public or private sector or both as indicated in the summary guidelines. UDAG should be used as strategies and approaches for writing of policy framework, legislations and bylaws. With the UDAG in place, the ZR will need to updated and the current Amaravati Masterplan should be integrated into existing and future land use legislations and bylaws. This should ensure that all regulations are in-line with each other, for example UDAG and ZR with a common vision to realise Amaravati as envisioned.

UDAG can help guide all parties involved to work together effectively and efficiently, as the design and development of a city is a complex multi-disciplinary process. UDAG provides a common ground to guide everyone involved in the development of Amaravati including city officials, administrators, planners, urban designers, architects, landscape architects, transport planners and infrastructure engineers and professionals from relevant industries and sectors as well.

Public Sector

Public sector should make sure it adheres with the suggested guidelines, as well as the relevant legislations and bylaws are in place. APCRDA should regularly organise different activities for public engagement such as forums, workshops and exhibitions to share UDAG so people are better informed and give feedback as well. Active participation and involvement and use of UDAG by the various stakeholders including the public sector, private sector, community and other stakeholders is critical in shaping the future development of Amaravati.

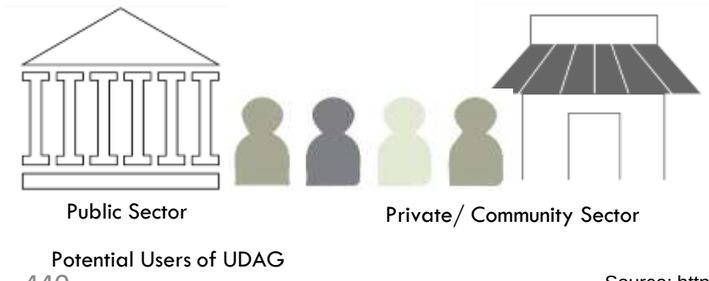
Private Sector

UDAG will guide private developers to create sensitive developments with public space offering pedestrian priority. Designers and developers are encouraged to follow and incorporate the UDAG in their planning and design work. To pursue a smoother approval process, developers should ensure their designs and plans adheres to municipal bylaws and legislations, as well as the UDAG strategies and principles. With the current masterplan in place, the purpose of UDAG is a reference for developers to follow and help create a people's city with more innovative designs and inspirations, which will lead Amaravati to a world-class city. UDAG also highlights the development opportunities within Amaravati, it showcases the importance of waterfront developments, open space, village integration, informal sectors and TPOD, etc. A well established UDAG also gives private developers and other potential investors the confidence to invest in the city.

The Community

UDAG creates a better understanding between the government and the community regarding the future development of the city as it lists out the long term goals for Amaravati. Also, it helps the community to identify potential commercial opportunities, which promotes investment and economic enhancement includes. Potential community benefits include designing and building commercial space that is specifically for small businesses; leasing commercial space at an affordable rate to small businesses; providing the space for community facilities, amenities and infrastructure for a farmer's market; or providing a space specifically for food trucks, exhibitions and fairs.

Since the UDAG will have the most direct impact on the local communities, their comments on the developments must be prioritised through the formation of district and Village councils. Active involvement from the community and stakeholders can ensure the smart and sustainable future development of Amaravati.



Amaravati stakeholder workshop

Community engagement for land-pooling scheme in Amaravati

Source: https://www.clc.gov.sg/docs/default-source/urban-solutions/urb-sol-iss-13-pdfs/10_case_study-amaravati-land-pooling-scheme.pdf

8.4 Next Steps

8.4 Next Steps

Way Forward

Urban Design Strategies and Masterplans

As a follow up of UDAG, city level strategies need to be further detailed. Also, it is important to undertake more detailed urban design plans for specific areas and city level strategies to ensure that Amaravati is developed as envisioned. These detailed urban design plans should be undertaken following UDAG to iron out any issues that may surface during design, planning, and implementation. The following detailed urban design plans should be developed:

Waterfront Masterplan

As demonstrated in the Waterfront and Open Space Network Guidelines the overall waterfront masterplan should be developed following UDAG. It is important to establish continuous accessibility, build active and passive nodes along the waterfront, and provide linkages from the hinterland to the waterfront. The proposed waterfront framework with the nine precincts along River Krishna should be further developed to ensure that each precinct is distinct and relates well to the hinterland to form attractive nodes along the riverfront. Detailed design should include a pedestrian, bike, transit and vehicular circulation along the proposed waterfront boulevard, as well as design of the key nodes including waterfront market places, parks, play area and ecological corridors. Detailed landscape design strategies for plantation and shrubs for waterfront edge treatment should also be developed.

For the mode of public transport along waterfront corridors, environmentally friendly transport system (EFTS) should be further explored, such as electric bus, tram or other sustainable options. Potential development parcels along the waterfront should be identified with stepped building profile with context sensitive design to create an interesting urban form and a publicly accessible waterfront. Also the open space network including the buffer zones along the canals and other water bodies within the city should be further developed.

Waterfront framework

Village integration plan

Village Integration Plans

As demonstrated in the Village Integration Guidelines, village integration plans should be further developed for integrating with the public space and surrounding LPS layout and street network. The village integration plans for the selected three villages of Rayapudi, Malkapuram and Nelapadu should be further developed as pilots in the initial stage to guide all other existing villages. The pedestrian, bike, transit and vehicular connectivity should be further elaborated and provided with designs to allow seamless integration between the existing villages and the LPS layout. The urban form transition for the existing villages with the surrounding residential and commercial developments should include the design of the public realm and open spaces to ensure a pleasant environment at a human scale. Other village improvement projects should also be identified and prioritized working with village representatives and the community.

Streetscape Design and Built Form

Streets are an important aspect of the image and identity of Amaravati. Following the Streetscape Guidelines, a more detailed design and mock ups of the different streets and intersections should be undertaken to ensure that the streets of Amaravati will be developed as a pleasant and walkable environment as envisioned in the guidelines. The design of street furniture, signage and way finding, landscaping, lighting, as well as paving and materials should be established to create a pleasant street environment as envisioned in the guidelines. Built form along the key streets should also be explored in more detail to ensure better correlation between built form and streetscape.

TPOD Design

To establish TPOD in Amaravati, a transit study should be undertaken to assess the feasibility of the EFTS (Tram/Bus) along the waterfront and possibly along the Central axis of AGC as well. The transit network hierarchy should also be established based on the transit modes and routes. In the initial phase, three transit nodes should be selected to create a detailed design for station related developments, including potential locations of pedestrian linkages and exits. Open spaces should be connected with the transit nodes by establishing pedestrian linkages as suggested in the TPOD Guidelines. The development parameters for parcels within the TPOD influence zone should also follow the TPOD Guidelines in order to create the urban form of high density mixed use development as envisioned. Public private partnerships are key for TPOD, hence APCRDA should proactively seek potential partners to role out the transit system for Amaravati.

Streetscape design and built form

TPOD design

8.4 Next Steps

Way Forward

Interim Development Strategy

As the development of any new city is usually a long process, Amaravati will take time to develop over the next decade or so, therefore an interim development strategy with temporary use of the land within the city will become necessary.

Mobility and Road Network

The road network is expected to be completed within the next two years, but it will take much longer for the development to be in place. Temporary interim uses, for example, part of the right-of-way of the road network including the cloverleaf area can be developed as open space to begin with and reinstated when there is need for road capacity. The smaller local streets should be developed more like shared streets with temporary street markets etc. In addition the vacant land can be used for temporary uses such as events and exhibitions, fairs, markets, urban agriculture, solar panels, parking and other amenities till there is market demand for development.

Urban Agriculture and Community Farms

Given Amaravati's agricultural heritage, urban agriculture and community farms should become a natural interim use if not permanent use in some places. Urban agriculture provides a number of key benefits such as environmental enhancement and economic resilience. For example, the open spaces should include patches for urban agriculture at the waterfront and community farming near existing villages for providing integrity to the original context and heritage of the site. During the interim period several vacant plots should be utilized for urban agriculture and community farming as appropriate.

Public Outreach and Community Engagement

Public outreach and community engagement is very important to create a smart and sustainable city. People centric development should be key to ensure that Amaravati achieves its vision. Using technology and communication effectively, public outreach should be further enhanced to ensure citizen participation to bring people closer to decision makers, thereby improving, transparency and inclusiveness. This will also enhance social cohesiveness and ensure social equity to make Amaravati a happy city.

Community and Place Making

Community and place making will play a critical role in ensuring high quality public realm to promote social interactions in Amaravati. The key spaces for community and place making include the green networks, riverfront promenade and canal buffer areas at city level, plazas, civic buildings, gathering spaces, and school yards at district and neighbourhood level, and religious places at village level. At street level and public spaces, community and place-making is essential for vibrancy and enhancing streets as the visual corridors.

Public Art Program

The integration of art and culture within the city is a place making strategy as public art plays a key role in reinforcing the visual identity of the city and adds significant value to both public realm infrastructure and private development. Local heritage, art and culture should be promoted within the public spaces and streets of Amaravati and well integrated within existing villages. The City public art program should allocate 1% to 2% percent of all eligible capital project costs towards the design, fabrication and installation of public artwork to enhance the design and add to the character of the community. Public art funds within the city should be managed by the Arts commission, a regulatory body formed by the authority and specific projects should be implemented in collaboration with stakeholders and capital project managers. Public art projects that are developed by outside agencies should also contribute to place making, but will need to be negotiated on a case-by case basis.

La Ramblas in Barcelona

Urban farming at vacant lots

Potential waterfront area using as a religious and social-cultural place in Rayapudi to be transformed into a community place programming as in Tauranga Harbourfront

Source: https://www.flickr.com/photos/la-citta-vita/5853024104 https://cityfarmer.info/urban-farmers-in-india-growing-fruit-vegetables-at-home-to-cut-dependence-on-market/

8.4 Next Steps

Way Forward

Public Engagement

Public Engagement is an interactive two-way process that encourages public participation, exchange of ideas and flow of information. It reflects the government's willingness to share information and treat citizens as partners in decision-making process and the development of the city. It also enhances citizen's recognition of their responsibility, sense of ownership of development processes and the implementation of development programs.

Ideally, governments should require public participation to be taken place and ensure that the policies and project proposals formulated from the public engagement are taken into account when making the final decision. Public engagement should be undertaken at all stages of the policy or project development process. This will ensure the needs and interests of the citizens are considered in the decision-making processes. Furthermore, public engagement improves the political position of marginalized or vulnerable groups, such as women, youth, children and minorities whose inputs are often not taken into consideration.

Methods of Public Engagement

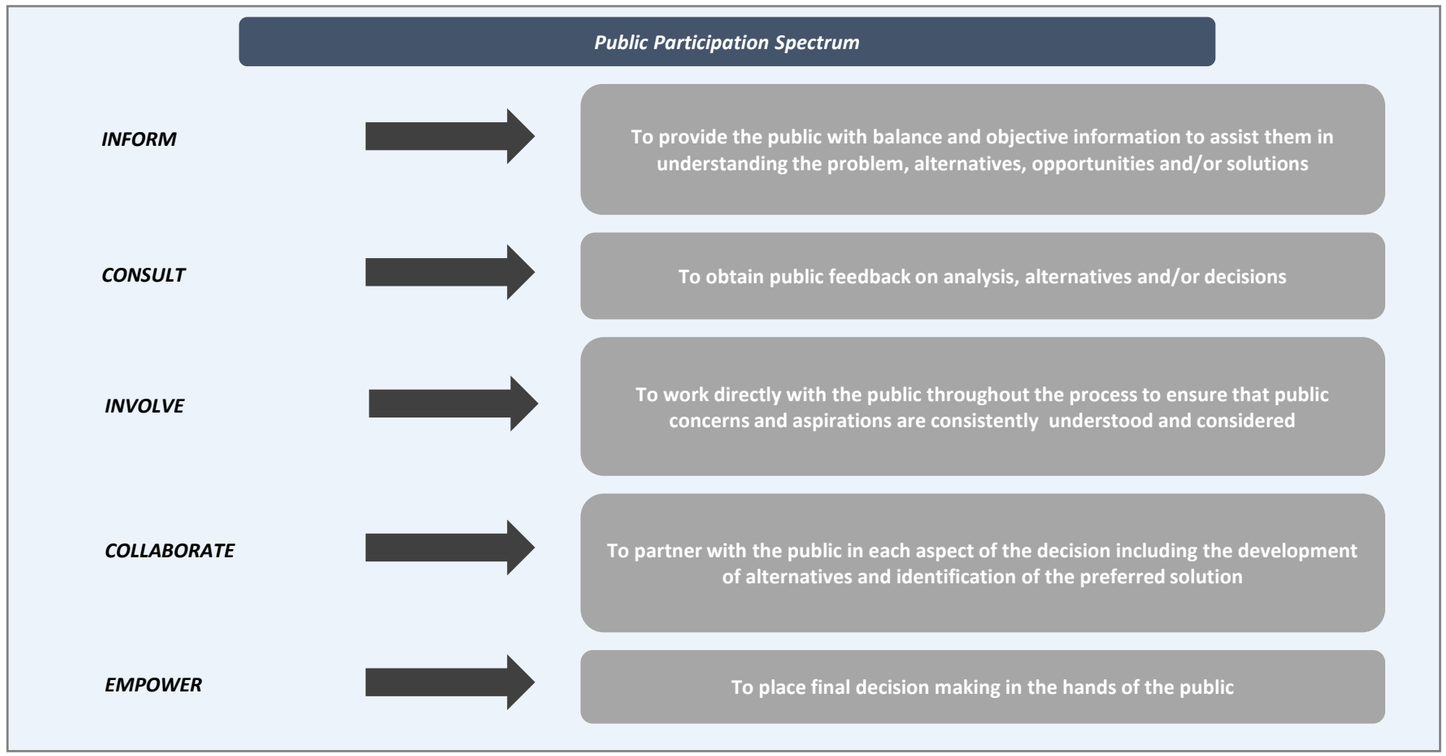
a) **Information sharing**: Information can be shared through different means including local T.V. channels, national / local newspapers, mobile based voice or text messages, posters, radio stations and social-media platforms.

b) **Consultation:** Consultative meetings with the stakeholders should be undertaken at different stages of the project regularly. Consultation methods include direct interaction through electronic media, workshops, multi-media video presentations, exhibitions and citizen outreach centers to provide information on current and proposed developments.

c) **Joint assessment:** Participatory assessment and monitoring with the stakeholders are used as tools for enhancing public engagement. These include joint citizen monitoring by youth clubs, self-help groups, guilds and professional associations.

d) **Participatory planning:** Comprehensive planning as well as and local plans such as village layout plans should use participatory planning to gage the needs and aspirations of the citizens for shared decision making.

e) **Real time engagement and monitoring:** A platform could be created for public participation and community engagement to allow public opinions to be collected, addressed and monitored effectively (for example, the Real Time Governance).



Public Participation Spectrum

Real Time Governance in Amaravati

Examples of community engagement in Amaravati

Sources: https://twitter.com/andhrapradeshcm/status/940259269982666753, https://pre-empt.bcchr.ca/clip-india-site-visit-august-23-28-2014

8.4 Next Steps

Case Studies

Other effective public engagement methods are also studied from various cities.

Citizen Outreach Center

Citizen Cells or Nagrik Sahyog Kendra, Gujarat

An Owner Driven Housing Process was conceptualized in 2006 post earthquake in Gujarat as part of the Reconstruction Programme in Bhachau town, Kutch. It was intended to help the beneficiaries and stakeholders to make informed choices regarding their habitat by providing knowledge on seismic technology, building materials and construction practices.

Nagrik Sahyog Kendra became an effective interface between the Government and citizens to facilitate rehabilitation process in Bhachau. It was entrusted with the responsibility for :

- Educating citizens about all associated processes, guidelines, progress through newsletter 'Nagarvani' and community meetings.
- Holding Public consultations for selection of beneficiaries for each participating NGO
- Revising beneficiary list on the basis of on site physical verification by different NGOs and their feedback
- Facilitating periodic coordination meetings along with Bhuj Area Development Authority (BHADA)
- Appraising BHADA on operational issues
- Facilitating process of land regularization for all the houses constructed/ retrofitted and preparing case files
- Following up and ensuring provision of legal documents for land to each beneficiary

Community interaction by Nagrik Sahyog Kendra in Bhachau town. Kutch

Web Based Citizen Charter

Madurai Municipal Corporation, Tamil Nadu

Citizens' Charter by the City Municipal Corporation of Madurai is committed to achieve a STAR system i.e. **S**imple, **T**ransparent, **A**ccountable and **R**esponsive.

It provides all-important information to the citizens about the services being delivered by the Municipal Corporation. The system will receive public grievances and redress the same qualitatively and time bound. The Service / Grievance redress time schedule is provided for following services:

- Infrastructure works
- Approval of Building Plan and Issue of Building License
- Septic Tank cleaning
- Waste Management
- Birth and Death Registration
- Prevention of food adulteration
- Other Trades Licensing
- Immunisation
- Dispensaries and Maternity Homes
- Revenue Resources

By introducing e-governance and automated access to all our functions and services, citizen charter helps to ensure accountability and transparency.

Ontario, Canada

Ontario province public engagement strategy is intended to expand the use of electronic channels, mainly the Internet, to help bring citizens closer to their government. The goal is to ensure citizens have access to a wide range of tools and information that will enable them to participate more fully in the democratic process. Electronic citizen engagement may include but are not limited to:

- Internet consultations on proposed law and/or policy
- "Town Hall" meetings via the Web
- open on-going dialogues on specific issues
- online remote voting for elected officials
- digital voting

For example, all significant environmental policy and program changes are posted on the Environmental Bill of Rights Registry, which is available through public libraries and on the Internet.

Citizen Report Card

Bangalore

It was a civil society initiative undertaken in 1993 to monitor government services in terms of efficiency and accountability. The exercise gathered citizen feedback on performance of public agencies and disseminated the findings to the citizenry, thus exerting public pressure on the agencies to initiate reforms. A seven-point rating scale facilitated quantification of citizen satisfaction levels with regard to service delivery, dimensions of corruption, staff behaviour etc. Workshops and meetings organized specifically with local civic groups and NGOs created a common platform for these bodies to discuss and raise priority issues for reform. Service Satisfaction survey of 1036 households in 1994 through Bangalore Citizen Report Card is illustrated below:

Agency	No. of Users	% Satisfied	% Dissatisfied	Rank
Power Company	1027	47	14	2
Water Board	871	42	18	3
Telephone Company	424	67	07	1
Driving License	174	32	27	5
Urban Development Authority	92	16	38	6
Police	65	34	26	4

Philippines

The Filipino Report Card on Pro-Poor Services assesses the performance of selected government services based on public experience and the responsiveness of government officials. Assessed services include basic health, elementary education, housing, potable water and food distribution. They provide valuable insights on the priorities and problems faced by the public in accessing public services and how the various services may be better tailored to their needs. It is necessary to implement the Report Card surveys periodically (at 12 to 18-month intervals) in order to assess the improvements in service delivery from a bottom-up perspective.

Sources: http://indiagovernance.gov.in/files/citizen_engagement_in_egovernance.pdf, http://siteresources.worldbank.org/INTPCENG/1143333-1116505690049/20509283/Filipino+Report+Card+on+Pro-chapter7-report-cards.pdf, http://www.unnati.org/pdfs/books/OwnerDrivenHousingProcess.pdf, http://www.mgs.gov.on.ca/en/IAndIT/STEL02_046927.html, http://www.maduraicorporation.co.in/citizencharter.html

8.4 Next Steps

Way Forward

Community Engagement

An extensive community engagement and public outreach program should be included to not only raise awareness among the local community, but more importantly to emphasise their roles in the use of UDAG for the implementation of the new capital city, so that the vision of Amaravati as the people's capital is realised soon. It is important that the government and the various stakeholders interact with the provision of proper and effective channels for communication.

For village integration, opportunities should be created for the local communities to take initiative to improve their own village. Inter-village competitions should be launched by selecting few villages as pilots to take the lead to initiate innovative approaches and solutions to different urban issues and winning projects can be showcased as reference examples. Other community engagement events such as street markets, arts and crafts fairs, movie nights, magic carpet interim parks and riverfront, exhibitions should be held on a temporary or regular basis.

The popular Happy Sunday Program, and the successful Happy Cities Summit should be organised regularly. The Happy Cities Summit can be shorter with one day for the main conference, one day for interactive workshops and another day for local tours. Additionally, the celebration of popular festivals such as Ugadi, Dassera, Deepavali and other religious festivals should be organised to attract locals and visitors into the city.

The private sector and universities should also be encouraged to be more involved by sponsoring events, organising training programs or providing temporary facilities for fairs and exhibitions as part of an interim strategy. By exploring different types of temporary uses throughout the city can result in community and place-making that creates vibrancy and sets the stage for Amaravati development to take place.

The formulation of Amaravati Foundation will also attract more funding and investment from Andhra people and other interested parties from India and abroad for the organisation of these events, activities and other initiatives.

Public Engagement Fund

- Creation of Public Engagement Fund is important not only for developing methodologies for public engagement but also for funding the actual citizen engagement pilots which will demonstrate the utility of the concept. This could come from the Amaravati Foundation as well
- APCRDA should work with Department of Information Technology (DIT) and take the initiative in launching the public engagement program
- This Fund will enable various state Ministries/Departments to undertake the process of public engagement for current e-Governance projects
- For all new projects, appropriate funding arrangement will have to be made from within the project budget

Citizen Report Card (CRC)

- Citizen Report Card is a simple yet powerful tool to provide systematic feedback to public agencies from users of public services, which should be explored
- CRC helps to monitor government services in terms of efficiency and accountability
- Feedback received from CRC helps to exert public pressure on the agencies to initiate reforms

Happy Cities Summit: Amaravati 2018

Happy Cities Hackathon 2018

Shilparamam in Hyderabad

Sources: http://www.happycitiessummit.org/event.html , https://www.pinterest.pt/abdullahsacak/art/, https://www.hyderabadtourism.travel/shilparamam-hyderabad#galleryfd345448cc-4, https://cityhallwatch.wordpress.com/2014/01/26/udp-jan-29/

Appendix

Appendix

A.1
Glossary of Terms

A.2
UDAG Checklists

A.1 Glossary of Terms

A.1 Glossary of Terms

Active Recreational Zone (P2) refers to zones established to provide parks offering active recreational and sports activities. While structures within the parks are allowed, the general character of the Active Recreational Zone should remain as green and recreational.

Architectural Styles are features creating images for buildings that will be notable and historically identifiable. These include elements such as built form, method of construction, building materials, and regional character.

Bio Swale is a type of bio filter designed to remove silt and pollution from surface runoff, consisting of a swaled drainage course with gently sloped sides and filled with vegetation, compost and/or riprap.

Blue and Green Network is a network of waterfront and open space creating an environmentally sustainable urban environment that provides flood resilience and mitigates the impacts of climate change**.** It recreates a naturally oriented water cycle while contributing to the amenity of the city by bringing water management and green infrastructure together.

Bollard is short post used to prevent vehicular traffic from entering an area meant for pedestrian movement and cycle track.

Buffer Zone aims to preserve the natural landscape along the water's edge from any development/construction, and contribute to protecting biodiversity along the riverfront.

Building Design refers to the architectural, engineering and technical applications to the design of the buildings, which includes various architectural components like entrance/exits, facades fenestrations, balconies, construction materials, building services and fire safety.

Building Performance is the ability of a building to fulfil required functions under intended use conditions or behaviour when in use.

Built Form is the physical form of buildings and how it harmonises with the surrounding area as well. It describes the building's appearance, height, bulk, setbacks and architectural style.

Bureau of Indian Standards (BIS) is the national standards body of India. It enables the government to bring under the mandatory certification regime for such articles, processes or services which is necessary from the point of view of health, safety, environment, prevention of deceptive practices, consumer security etc.

Bus Rapid Transit (BRT) improves the capacity and reliability of the traditional bus system through increased rapidness of transit. By rerouting the busses and assigning dedicated bus lanes, it minimises obstructive traffic and enhances the efficiency level of transit. BRT aims to combine the capacity and speed of a metro, while incorporating the flexibility, low cost and simplicity of a bus system.

Carriageway (CR) is the part of a road intended for vehicles rather than pedestrians.

Central Business District (CBD) is the main business and commercial area of a town or city.

Cluster is a group of independent structures that come together to form a community. These clusters stimulate urban economic growth benefited from their collaborative locations.

Construction Technology refers to the methods, materials and equipment used to build a structure.

Curb-cuts are designed to prioritize active pedestrian usage. Ramps are graded down from the top surface of a sidewalk to the surface of the adjoining road.

Daylight Factor (DF) refers to the ratio of outside illuminance over inside illuminance.

Density is the amount of people within a certain area.

Development Frontage refers to the frontier boundaries set by the developers to manage each independent buildouts with the use of frontage roads or local roads in parallel to the highways/ main roads. More often than not, developers minimise density along the boundary corridors to shift away from the heavy traffic on the frontage roads.

Embodied Energy is the sum total of energy that is used to extract, process, package, transport and install the material in the building.

Energy Efficiency in Buildings refers to buildings that have significant energy reduction in heating and cooling, independently of the energy and of the equipment that will be chosen to heat or cool the building.

Entrance Gateway refers to a landmark or an actual gateway for the existing villages with distinct character.

Environmental Friendly Transit System (EFTS) such as tram/bus to be provided along the waterfront.

Equitable City is a city where all people are treated equally, both physically and socially. Their rights and safety are prioritized in urban design and developments.

Façade is the principal front of a building that faces on to a street or open space.

Flexible Zoning allows various uses within a zone and taking into account the overall density of development.

Flood Management refers to measures that minimise the impact of flooding or high water levels. Amaravati is being developed on the flood plains of river Krishna, Blue and green network plays an critical role in flood resilience by combining flood management functions into urban open spaces.

Footfalls are similar to the concept of foot traffic. It is a unit of measure to define the number of people engaging with the space, such as walking or living.

Sidewalk Cafes are cafes or restaurants with seating on the sidewalks and footpaths. This will dramatically increase the vibrancy of the surrounding area.

Green Building refers to structures that are environmentally sensitive and resource-efficient throughout the building-cycle: from planning to design, construction, operation, maintenance, renovation, and demolition. Green building incorporates green construction, sustainable building, and renewable energy sources.

Green Cover refers to any green and permeable surface in cities and towns.

Green Coverage refers to the percentage of plot area covered by permeable surfaces and meant for landscaping.

Green to Open Ratio (GOR) refers to the ratio of green coverage area to the allocated open space area within plot.

Green Roof System refers to an assembly that supports an area of planting /landscaping, built up on a waterproofed substrate at any level that is separated from the natural ground by a human made structure.

Heat Island Effect is a phenomenon in which air and surface temperature of an area are higher than nearby areas due to the replacement of natural land cover with pavement, building and other infrastructure.

Indian Roads Congress (IRC) is the Apex Body of Highway Engineers in India. The IRC Standards are used for various road infrastructure.

Indoor Air Quality (IAQ) refers to the nature of indoor air that affects the health and well-being of building occupants.

Influence Zone is an area influenced by a centre function, such as TPOD zone developments.

Informal Sector refers to the diversified set of economic activities and enterprises that are not regulated or protected by the state. Street vendors constitute an important segment in informal economy and take into account the natural markets where sellers and buyers naturally congregate for the sale and purchase of products and services, e.g.: Sarojini Nagar in Delhi.

Intermodal Transit Network consists of railway transit and bus rapid transit routes with feeder routes connecting neighbourhoods to transfer stations, ensures efficient transit within the city.

Large Scale Development refers to plot area over 4000 sqm.

Land Pooling Scheme (LPS) is a mechanism to make land available which is adopted by Andhra Pradesh for the development of the Capital City, Amaravati. Land parcels owned privately are legally consolidated by transferring ownership rights to the authority, in exchange of the partial ownership of the developed land.

Lighting Power Density (LPD) represents the load of any lighting equipment in any defined area, or the watts per square foot of the lighting equipment.

Light Shelf is an architectural element that allows daylight penetration in a building. It is usually a horizontal light-reflecting overhang on a window or opening and is placed above eye-level and has high reflectance upper surface. This surface reflects daylight onto the ceiling and deeper into a space.

A.1 Glossary of Terms

Limited Development Zone refers to the area between the waterfront boulevard and the public zone along the riverfront; there should be limited development (5%), restriction on building heights (8m) and context sensitive.

Mass Railway Transit (MRT) is a high-capacity railway based public transport system powered by electricity. It can function underground or above ground with exclusive right of way where traffic congestions cannot obstruct its travel time. It significantly contributes to the mobility of a city.

Mass Transit Corridor is a linear axis where there is more than one form of public transportation.

Massing refers to the perception of the general shape and form as well as size of a building. It affects the visual impact a building makes, massing is one of the most important architectural design considerations.

Medium Scale Development refers to plot area between 500 to 4000 sqm.

Microclimate is the atmospheric condition in a relatively small area, often with differences in temperature, humidity and ventilation. An example of microclimate will be an area that is near a water body where it is relatively cooler than surrounding. It helps in reducing the urban heat island effect.

Mixed-income Development is a community integrated with different types of housing units, such as apartments, town houses, single-detached dwellings, for people with various income levels.

Mixed-use Development is a development with different land uses catered to the local context.

Mixed-use Zoning refers to a zoning district parcel that horizontally and vertically blends residential, commercial, cultural, institutional, or entertainment uses in single detached buildings, where these functions are physically and functionally linked by transit and pedestrian oriented connections.

Multi-Functional Space acts as a buffer space between villages and LPS layouts; it should allow various socio-cultural events to create vibrancy and enhance the village character

Non-motorized Transit (NMT) is often known as active human powered transportation, which includes walking, cycling, or other small-wheeled transport like skates, skateboards, etc.

Passive Recreational Zone (P1) refers to districts established to provide recreational and leisure facilities and activities in selected areas that have unique features (including visual corridors, buffer areas, or along significant routes).

Passive Solar Design refers to the use of the sun's energy for heating and cooling of living spaces by exposure to the sun.

Pedestrian Catchment refers to an area that people are willing to walk to the transit station.

Pedestrian Connectivity is the ability for pedestrians to get from one place to another, the directness of links and the density of connections. A highly connected pedestrian network provides short travel routes with different route allowing direct travel between destinations. This is achieved by implementing many short links, intersections, and minimising the number of dead-ends.

People First Planning is an urban planning approach that prioritizes people's relationship with the surrounding, and not the technical specifications of different transport systems, to create a more sustainable city.

Peri-urban Areas refer to lands that are experiencing dispersive urban growth which creates hybrid landscapes of urban and rural characteristics.

Phased/Interim zoning refers to a temporary zoning use when the local government amends its zoning plan. It ensures that the development in the specific zone will be consistent while the municipality finalizes the plan.

Place Making is an approach to the planning, design and management of public spaces. With community based participation at its centre, an effective place-making process focuses on local community's assets, inspiration and potential by creating high quality public spaces that promote people's health, happiness, and well-being.

Place Making Network is a collaborative method of reimagining the heart of the city in the form a comprehensive connected network. It is used to increase and maximise shared value of the space through the design of new parks, plazas and shared infrastructure.

Planned Unit Development (PUD) is residential or commercial development guided by a total design plan in which one or more of the zoning or subdivision regulations, other than use regulations, shall be permitted to be waived or varied to allow flexibility and creativity in site and building design and location, in accordance with general guidelines.

Plinth is a base or structure that raises a structure above ground.

Privately Owned Public Spaces (POPS) are outdoor spaces that can be used by the public but remain privately owned and maintained. As such, the location and design of POPS are planned to enhance the development and complement the larger public realm network.

Protected Zone (P3) is established to conserve and protect the environmentally sensitive areas such as steep slopes and rivers which are rich in nature and biodiversity. These areas are non-developable for other strategic purposes.

Public Amenities are facilities offered to the general public for their use and/or leisure at all times, which should be clean and easily accessible.

Public Frontage refers to the smaller roads that lead from the development frontage. It is often regarded as the curb or sidewalk that connects all the independent developments together and mainly caters to the circulation of people around the community or town.

Public Permeability refers to the connectivity of pedestrians or vehicles that the urban form permits.

Public Realm enhances public life and interactions. It is a publicly accessible space that can be around, between or within buildings including public squares, parks and open spaces. It adds to the image and character, creating a sense of place for the neighbourhoods and the city.

Public Zone is the area behind buffer zone where no development is permitted to offers leisure and relaxation space for gathering and social interaction. The public zone is minimum of 60m.

Riparian Buffer is a vegetated and forested buffer strip that runs along water bodies or canals. It brings environmental benefits and enhances the water quality of the adjacent waterbody.

Riparian Corridor helps to reduce the concentrated flows to the water body and provide continuous habitat for birds and other wildlife species that require undisturbed access to food, shelter and water.

Roof Forms differ from place to place, depending on the local context and climate.

Root Barrier is typically used to direct roots away from utilities and infrastructure and into intended rooting zones.

Scale refers to the sense of height, bulk, and architectural articulation of a place or individual building in relation to the size of a human body.

Shared Streets are streets where pedestrian right-of-way is prioritized. Formal barriers such as lanes, curbs, and sidewalks to separate pedestrians, cyclists, and motorized vehicles are removed. These streets are shared by everyone, with each user increasingly aware and respectful of each other.

Site Amalgamation is the act of combining one or more parcels of land that are adjacent to each other to be recognized under the same land title.

Skyline is the city's image observed from far formed by the cohesion of skyscrapers and high-rise buildings.

Small Scale Development refers to plot area under 500sqm.

Smart City refers to a framework that focuses on "People, Place, and Planet" as core values to create smart thinking, planning and design. It uses innovative technology initiatives as a connector to achieve smart mobility, smart living, smart infrastructure, smart environment, smart governance, and smart economy. Smart City aims to uplift the liveability and well-being of the residents by improving the infrastructure, climate, health and inclusiveness of the city.

Smart Economy encourages entrepreneurship and innovation; local and global interconnectedness; as well as flexible labour market to increase the overall productivity and enhance the economy of the city.

Smart Environment refers to green building and environmental strategies; environmental protection schemes; pollution control and management; and sustainable resource management. The overall aim of smart environment is to lower carbon footprints while increasing resource efficiency of Amaravati.

Smart Governance is the collaborative decision and policy making with transparent public participation. It concerns the public and social services that directly affect the community's tenants. It thus encourages public-private participation and cooperation under the implementation of smart technologies in the governance of the city.

Smart Infrastructure looks into technology to develop and integrate into its city's infrastructure through the implementation of projects such as smart grids and mobile utility monitoring. It also engages with situational management such as disaster and resilience management to protect itself from potential cyber-attacks.

Smart Living aims to enhance the happiness and liveability of Amaravati. By providing quality educational facilities, public spaces and affordable housing, it ensures a safe and secure Amaravati that is culturally vibrant, socially cohesive and inclusive.

Smart Mobility combines the ease of travel both locally and internationally. It embraces and prioritizes non-motorized transit options with integrated real time traffic technology, and introduces multi modal transit systems to further enhance accessibility.

A.1 Glossary of Terms

Socially Inclusive Society is a community where residents have opportunities to participate fully in the social, economic and cultural life of their community.

Solar Heat Gain Coefficient (SHGC) is the fraction of incident solar radiation admitted through a fenestration, both directly transmitted, absorbed and subsequently released inward through conduction, convention and radiation.

Solar Reflectance Index (SRI) is a measure of material's ability to reject solar radiation, as shown by a small temperature rise.

Storefront Glazing refers to the glass storefront in front of retail and commercial establishments. One of the main purposes of storefront glazing is to enhance the appearance of a store and promote the use of natural lighting which decreases energy consumption.

Sustainability refers to the state in which components of ecosystem and their functions are maintained for the present and future generations.

Sustainable Building refers to a building that meets the specified building performance requirements while minimizing disturbance to and improving the functioning of local, regional and global ecosystem both during and after its construction and specified service life.

Sustainable Development refers to the development that meets the need of present without comprising the ability of future generations to meet their own.

Sustainable Streetscape is the natural and built elements of the street, defined by the design quality and visual effect. It includes buildings, the street surface as well as the fixtures and fittings that facilitate a variety of uses in the area. It is significant to the visual image of sustainable cities, as it enhances the city's image and attracts tourist.

Sustainable Urban Mobility is the ability of people choosing sustainable modes of transit to their destinations within or between urban areas, using various public transit services, as well as walkability within the urban areas, rather than dependency private vehicles.

Thermal Comfort is the comfort that relates indoor design temperatures or acceptable temperature ranges to outdoor meteorological and climatological parameters.

Thermal Transmittance (U Value) refers to thermal transmission through unit area of the given building unit divided by the temperature difference between the air and other fluid on either side of the building unit in steady state conditions. Its unit is W/m^2K.

Transit and Pedestrian Oriented Development (TPOD) is a development and design approach that focuses on transit efficiently and prioritises pedestrians to create vibrant, liveable, sustainable communities. It explores the opportunities of dense development surrounding the transit node with a mixture of retail, housing and other commercial activities such as offices. Surrounding the developments around high-quality transit systems, it creates a compact, walkable, transit and pedestrian-oriented, mixed-use development at transit nodes.

Transit Corridor is a linear area that supports various modes of transportations, such as pedestrian, trams and bus rapid transit (BRT).

Urban Agriculture is the practice of growth, cultivation, processing and distribution of food products in and around urban areas. It is integrated into the urban economic and ecological system by linkages that include use of urban residents as labourers, use of typical urban resources (like organic waste as compost and urban wastewater for irrigation), direct links with urban consumers and direct impacts on urban ecology.

Urban Design and Architecture Guideline (UDAG) is to guide the future development of Amaravati to become a walkable, liveable and happy city with a unique image and identity, which covers the riverfront, the canals and open space network, villages and surrounding LPS areas, the streetscape, built form along the streets, TPOD, commercial, mixed use and large scale developments.

Urban Design Committee (UDC) is a panel of experts, public sector, private sector, community representatives and academia facilitating the implementation of UDAG through review and assessment of planning and development applications with respect to the UDAG.

Urban Form is the physical characteristics of the built-up areas, including the shape, size, density and configuration of settlements.

Urban Structure is the structure of the city including land use, development, roads and open space.

Urban Tree Canopy is a measurement which encompasses the layer of leaves, branches and stems of trees sheltering the ground when viewed from above. This measurement is expressed as a percentage of ground area that is covered by tree crowns and is related to the branching spread of the trees in an urban forest. Some urban tree canopies cover natural areas or gardens and lawns, while other canopies spread across impervious surfaces such as roads, buildings and parking lots. A densely forested area with trees that have interlacing branches and no space between them may have a tree canopy percentage of nearly 100%. On the other hand, a prairie area with mostly grasses and very few trees may have an urban tree canopy of less than 5%.

Vaastu Principles is a traditional Hindu system of architecture governing building orientation, design and site layout and development. It integrates nature, the relative functions of various parts of the structure, and ancient beliefs utilising geometric patterns (yantra), symmetry and directional alignments.

Vertical Zoning is a system that regulates land use and creates a mix of community vertically. For example, the building will provide retail and commercial uses on the lower floors, meanwhile providing residential or office spaces on the upper floors.

View Management Framework refers to the preservation framework for important views across the city, from parks and other public spaces that take in important buildings, to urban landscapes that help define the city. A view management framework should provide the basis for more detailed guidance on each view.

Viewpoints/Vantage Points are places that offer a view of the city.

Viewshed is a geographical location that is visible from a fixed vantage point. For example, viewsheds are often areas with scenic or historic value that need to be preserved against developments. Preservation of viewsheds should be an objective in the creation of public open spaces, green belts, parks, etc.

Village Integration refers to seamless integration of existing villages into the new development for effective functioning of the overall city. It focuses on development of infrastructure, improvement in quality of life and well-being of the people.

Vista is a distant view through or along an avenue or opening.

Visual Light Transmittance (VLT) refers to the ratio of total transmitted light to total incident light.

Walkability is the overall experience of walking from one place to another, which includes the connectivity, efficiency, comfort and enjoyment.

Wall to Window Ratio (WWR) is the measure of the percentage area determined by dividing the building's total glazed area by its exterior envelope wall area.

Waterfront Boulevard refers to transforming the existing bund road into a vibrant, pedestrian and bike transit friendly street to bring people to the riverfront, while providing accessible access.

Zoning Regulations (ZR) is the Amaravati Zoning Regulations formulated by APCRDA.

A.2 UDAG Checklists

Waterfront and Open Space Network Guidelines Checklist

UDAG Checklist: Waterfront and Open Space Network

WATEFRONT AND OPENSPACE NETWORK GUIDELINES CHECKLIST					
Urban Design and Architectural Guidelines (UDAG), Amaravati Waterfront and Open Space Network Guidelines following the Principles and Strategies included in Chapter 3 of UDAG	**Mandatory**	**Suggestive**	**Comply**	**Do not comply**	**Comments/ Remarks**
Nodes					
There should be a maximum of 1 km distance between nodes to create a variety of destinations along the riverfront	√				
Riverfront signage should provide a map showing all nodes and the distance to other nodes and key areas along the riverfront, such as landmarks, recreational space, etc.	√				
Clear wayfinding should be provided, including directions to other key nodes, landmarks, pedestrian crossings on waterfront boulevards, public transport and more	√				
Nodes should be connected by the promenade linking other nodes with walking trails and open spaces in between	√				
Local artwork should be integrated into the key nodes to create distinct character for the nodes		√			
Promenade					
Riverfront promenade should be 5m to 20m wide and connect the nodes along the riverfront	√				
Distinct pavement should be provided for the promenade	√				
Clear signage and way finding should be provided to key nodes, to the hinterland	√				
Seating should be provided and oriented towards the riverfront	√				
Flexible Open Space					
Open space should be located along the riverfront, accessible and linked by pedestrian paths and view corridors from the hinterland	√				
Open spaces along the riverfront should be linked with walking trails and clear wayfinding	√				
Planting should not block visual access to the riverfront, of open space, entrance/exit from the street	√				
Seating should be provided and oriented towards the riverfront where appropriate		√			
Walking Trails					
Walking trails should be minimum 6 m wide	√				
Clear signage and wayfinding should be provided at 50 m interval	√				
Pedestrian scale lighting should be provided at 9 m interval	√				
Permeable surface should be provided for walking trails	√				
Seating should be provided at 500 m interval	√				
View Corridors and Pedestrian Linkages					
Multiple pedestrian connections should continue through public spaces and plazas	√				

WATEFRONT AND OPENSPACE NETWORK GUIDELINES CHECKLIST					
Urban Design and Architectural Guidelines (UDAG), Amaravati Waterfront and Open Space Network Guidelines following the Principles and Strategies included in Chapter 3 of UDAG	**Mandatory**	**Suggestive**	**Comply**	**Do not comply**	**Comments/ Remarks**
Minimum 4m setback should be provided as an easemen for plots facing the riverfront	√				
Minimum 3m setback should be provided for all structures from these connecting roads	√				
Built form at the riverfront should enable maximum view of River Krishna	√				
Building lines should be maintained along major streets that form view corridors to the riverfront	√				
Curb-cuts should be provided at crossings to accommodate people of all levels of mobility, and removable bollards should be installed to restrict vehicular access for safety (refer to Streetscape Guidelines)	√				
Service entrances should not be permitted along major streets that disrupt pedestrian linkages and view corridors to the riverfront	√				
Visibility of public space should be maintained with storefront glazing on ground level floors of developments facing public space. Building corners should use storefront glazing to provide visual connections to the publicly oriented uses from all approaches	√				
Building and shop entrances should face the view corridors and pedestrian linkages to the riverfront to encourage pedestrian movement	√				
Outdoor dining with café seating and arcaded ground floors should be encouraged for retail and restaurants along the view corridor	√				
Wide pedestrian crossings of 10 m should be provided at intersections to provide safe pedestrian access to the riverfront from the hinterland	√				
Private developments should be designed with POPS and public pathways providing linkages to the riverfront	√				
Connecting Open Space to the Riverfront					
Changes in elevation should be provided for with steps, landscape, screening and enclosures as appropriate (refer to Plantation and Materials section)	√				
A finished edge should be provided along the connection	√				
Pedestrian crosswalks should be provided at 100m interval	√				
Public amenities, such as seating, toilets and signage, etc. should be located at the ends of the connection to encourage movement along the streets connecting to the hinterland and the waterfront	√				
Street furniture such as seats, benches, wayfinding and signage should be provided at the pedestrian crossings along waterfront boulevard	√				
Adequate lighting should be provided at a human scale at 15m intervals to ensure visibility and safety	√				
Spatial pattern of street lights and trees along the waterfront boulevard should be designed such that it creates a character of the pedestrian linkage to ensure the visibility of the road and the views of the riverfront remains uninterrupted		√			

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Stepped Building Height Profile					
Stepped building height profile should be followed to provide river views to buildings directly facing River Krishna	√				
Landmarks with viewpoints to the river should be ensured to provide key images of the city and reinforce the city's image and identity	√				

WATEFRONT AND OPENSPACE NETWORK GUIDELINES CHECKLIST					
Urban Design and Architectural Guidelines (UDAG), Amaravati Waterfront and Open Space Network Guidelines following the Principles and Strategies included in Chapter 3 of UDAG	**Mandatory**	**Suggestive**	**Comply**	**Do not comply**	**Comments/ Remarks**
Waterfront Boulevard					
Pedestrian walkways should be 10m wide on the riverfront side to encourage a pedestrian-friendly environment	√				
EFTS such as Tram/bus lanes should be provided on riverside of the street to encourage use of public transport and direct pedestrian access to the riverfront	√				
Ample street tree plantation should be provided along the waterfront boulevard to offer shading (refer to Streetscape Guidelines)	√				
Developments on the hinterland along the street edge should be mixed-use with retail on lower floors with active shop fronts		√			
The waterfront boulevard alignment should be sensitive to existing buildings and villages adjacent and near the waterfront	√				
Canal Network					
No developments along water edge should be permitted	√				
A continuous green buffer 30 m should be provided on either side of the canal	√				
Restricted developments on the water edge and stepped building height profile for 100m on either sideto maximise canal front views					
Mixed-use development is encouraged for developments up to 100 m on either side, facing the canals with pedestrian paths along the waterfront so they do not become private areas	√				
Buffer zone should include trails, promenades and bike paths for walking and cycling	√				
Seating at 300m interval should be provided facing the waterfront where appropriate	√				
Higher quality public realm should be provided along the promenades	√				
Soft tree lined and landscaped edge should be provided along the canal	√				
Consistent landscaped entry features for the canal front should be identified	√				

UDAG Checklist: Waterfront and Open Space Network

WATEFRONT AND OPENSPACE NETWORK GUIDELINES CHECKLIST					
Urban Design and Architectural Guidelines (UDAG), Amaravati Waterfront and Open Space Network Guidelines following the Principles and Strategies included in Chapter 3 of UDAG	**Mandatory**	**Suggestive**	**Comply**	**Do not comply**	**Comments/ Remarks**
Appropriate lighting features that balance safety and natural environment should be selected	√				
Safe and clearly marked access points to the canal need to be identified at 500 m regular intervals	√				
Promenade should provide a distinct sense of place alon the canal	√				
Canal Buffer Zone					
Pedestrian path of minimum 3m to 6m wide should be provided	√				
Bike paths of minimum 2m to 3m wide should be provided	√				
Landscaping should be provided where appropriate	√				
Pedestrian scale lighting should be provided at a 9m interval for safety and visibility	√				
Seating areas should be provided at a 20m interval along pedestrian paths and facing the canal	√				
Developments within buffer zone are not permitted	√				
Clear access points to the canal shoreline should be provided	√				
Plantation					
Plantation-70-90% of the waterfront areas	√				
Tree coverage - Minimum 70% should be covered	√				
Shrubs and ground covers - Minimum 70% of area should be covered	√				
Permeable surface area - Minimum 75% of road buffer zones area	√				
Irrigation for softscape area should be provided	√				
Types of plantation mix - • Air purification-30-40% • Habitat creation-50-60% • Omamental and fragrance-10-20% • Screening-10-20%	√				
Types of shrubs mix- • Air purification - 20-30% • Habitat creation - 40-50% • Ornamental and fragrance-20-30% • Screening-20-30%	√				
Water Transit and Pedestrian Oriented Development (W-TPOD)					
Water transit network connection to BRT/MRT should be developed with commercial development along the canals	√				
Waterway transit stops with pedestrian linkage to other public transport should be provided	√				
Landscaping along the waterfront should be provided	√				

WATEFRONT AND OPENSPACE NETWORK GUIDELINES CHECKLIST					
Urban Design and Architectural Guidelines (UDAG), Amaravati Waterfront and Open Space Network Guidelines following the Principles and Strategies included in Chapter 3 of UDAG	**Mandatory**	**Suggestive**	**Comply**	**Do not comply**	**Comments/ Remarks**
Stepped development profile should be followed with no buildings permitted at water edge along canals to maximise waterfront views	√				
Low building heights for developments close to the canals with maximum building height restriction of 8 m	√				
Private residential developments should not be permitted along canals	√				
Mixed use development with green roofs and terraces towards the canal edge should be provided to achieve maximum frontage of towards waterfront	√				
Building should be a maximum of 20m with min 6m no building zones with active building frontage with balconies and semi or fully covered space	√				
Clear pedestrian signage and wayfinding should be provided to connect water transit to BRT/MRT at waterway stops and pedestrian path intersections	√				
Lakes and Ponds					
Building should be a max of 20m with min 6m no building zones with active building frontage with balconies and semi or fully covered space	√				
Lakes/ponds should not be filled or reclaimed and any development that divides the water bodies should not be allowed	√				
Multiple accessibility points should be ensured from all sides and the water body and should not surrounded by private developments	√				
Appropriate lighting features that balance safety and natural environment should be provided and selected	√				
Buildings should be beyond the buffer zone and limited to a building height restriction of up to a maximum of 8 m closer to the waterbody		√			
Benches and seating areas at points of interest facing the lakes/ponds for relaxation should be provided		√			
Appropriate shrubs and grass species should be planted near the water edge as a riparian		√			
A stepped development profile with 100 m mixed use development zone beyond the buffer zone should be provided to maximize views with no development on the waters edge	√				
Prevention of any kind of water related pollution from point sources by diverting and treating the pollution loads before entering the lakes/ponds	√				
In situ measures of lake cleaning should be undertaken, such as de-silting, de-weeding, bioremediation, aeration, bio-manipulation, or any other successfully tested eco-technologies where appropriate	√				
Lake Buffer Zone					
Pedestrian path of min 3-6 m wide should be provided	√				
Landscaping where appropriate (refer to Plantation and Materials section)	√				
Pedestrian scale lighting should be provided at a 9 m interval for safety and visibility	√				

UDAG Checklist: Waterfront and Open Space Network

WATEFRONT AND OPENSPACE NETWORK GUIDELINES CHECKLIST					
Urban Design and Architectural Guidelines (UDAG), Amaravati Waterfront and Open Space Network Guidelines following the Principles and Strategies included in Chapter 3 of UDAG	**Mandatory**	**Suggestive**	**Comply**	**Do not comply**	**Comments/ Remarks**
Seating areas should be provided at a max of 100 m interval along pedestrian paths facing the waterfront where appropriate	√				
Pedestrian paths should ensure multiple entrances and exits (min of 4) to the lake for accessibility and safety	√				
Buildings should be beyond the buffer zone and limited with a building height restriction of a up to max of 12m	√				
Cycle tracks of min 2-3 m wide should be provided		√			
Signage and wayfinding should be at entrances, exits, and by the lake as well as intersections of pedestrian paths		√			
Lakes and ponds should consist of a min 30m buffer zone that has green coverage, trees and ecological landscape	√				
Buffer zone should consist of walking trails and pedestrian paths	√				

WATEFRONT AND OPENSPACE NETWORK GUIDELINES CHECKLIST					
Urban Design and Architectural Guidelines (UDAG), Amaravati Waterfront and Open Space Network Guidelines following the Principles and Strategies included in Chapter 3 of UDAG	**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Hills					
60-80% of the hill areas as protected areas for plantation, habitat creation and rejuvenation with restricted access and control point should be provided	√				
Watershed areas of the hills should be conserved, retained and connected to canal network.	√				
Forest trails and steps should be provided with use of local natural material and without mortar for pedestrian pathways. Use of any man made materials that damages environment should be avoided	√				
Existing topographical conditions and contours should be retained and maintained by using plantation techniques.	√				
Preventive plantation techniques should be provided to reduce and restrict soil erosion.	√				
Featured structures should be provided to represent local identity at strategic locations considering visual corridors from the city areas.	√				
All development built up including religious, tourism, iconic structures should be limited to max 1% of the development site area.	√				
Temporary structures should be provided to min of 5 % in areas excluding the areas of plantation.	√				
Sound produced from loud speakers, sound emitting construction equipment and fire crackers should be restricted to Day time – 50 db. Night time – 40 db *(As per noise and pollution's norms – Ministry of environment and forest India)*	√				
The private vehicular movement should be restricted with providing only non-polluting vehicular access.		√			
Lights only in active areas for safety and security concerns should be provided	√				
Screen and buffer plantation should be provided at the edge of the hills.	√				
Proper storm water management systems should be provided to avoid water clogging and stagnation.	√				
Plantation					
Existing flora fauna should be conserved / retained.	√				
Native and local species should be planted.	√				
Minimum 75 % of tree cover should be provided	√				
Minimum 90% of permeable spaces should be provided	√				

UDAG Checklist: Waterfront and Open Space Network

WATEFRONT AND OPENSPACE NETWORK GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Waterfront and Open Space Network Guidelines following the Principles and Strategies included in Chapter 3 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not comply**	**Comments/ Remarks**
Open spaces						
Green buffers along the road						
Facilities should be provided within Road buffer zones	Cycle racks	√				
	Sculptures and art works should be provided		√			
Plantation	70-90% of area should be achieved through tree plantation.	√				
	Minimum 70 % of Total Area should be provided with Plantation of shrubs and Groundcovers	√				
	Permeable surface area - Minimum 75% of road buffer zones area should be provided	√				
	Irrigation for softscape area should be provided.	√				
Types of Tree plantation mix	Air purification – 30-40%	√				
	Habitat creation – 40-50%	√				
	Ornamental and fragrance – 20-30%	√				
	Screening -10-20%	√				
Types of Shrub plantation mix	Air purification – 20-30%	√				
	Habitat creation – 30-40%	√				
	Ornamental and fragrance – 20-30%	√				
	Screening -30-40%	√				
City level parks (50 acres and above considered as large-scale open spaces)						
Elements and Amenities should be provided within City level park	• Jogging tracks • Leisure lawn areas • Gathering spaces • Public plazas • Play area and Recreational activities for all age groups • All Landscape Elements should be safe and designed should be universally accessible. Tourism destinations	√				
	• Botanical garden • Conservatories • Theme parks • Water bodies – lakes, ponds, with nonpolluting recreational activities • Exhibitions spaces		√			

WATEFRONT AND OPENSPACE NETWORK GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Waterfront and Open Space Network Guidelines following the Principles and Strategies included in Chapter 3 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not comply**	**Comments/ Remarks**
	• Theme parks • Water bodies – lakes, ponds, with nonpolluting recreational activities • Exhibitions spaces		√			
Elements and Amenities should be provided within city level park	Tourism destinations, botanical gardens, conservatories, theme parks and water bodies should be designed with exhibition spaces		√			
Facilities should be provided within city level park	Toilets- Separate toilets for ladies and gents should be at walking distances from the active areas.	√				
	Parking under the Hardscape and sports courts park amenity buildings should be provided to avoid use of landscaped park area should be used for surface parking.	√				
	Drinking water facilities should be provided within 300 m walking radius	√				
	Information/ food kiosk should be located at entrance and resting areas.	√				
Plantation	50-70% of should be achieved through tree plantation	√				
	Shrubs and ground covers – Minimum 50% of area should be covered & Permeable surface area Minimum 60% of Park Area	√				
Types of Tree plantation mix	Air purification – 30-40%	√				
	Habitat creation – 40-50%	√				
	Ornamental and fragrance – 20-30%	√				
	Screening -10-20%	√				
Types of Shrub plantation mix	Air purification – 20-30%	√				
	Habitat creation – 30-40%	√				
	Ornamental and fragrance – 20-30%	√				
	Screening -10-20%	√				

UDAG Checklist: Waterfront and Open Space Network

WATEFRONT AND OPENSPACE NETWORK GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Waterfront and Open Space Network Guidelines following the Principles and Strategies included in Chapter 3 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not comply**	**Comments/ Remarks**
Town park (up to 15 acres)						
Elements and Amenities should be provided within Town park	• Sport's courts & open fitness area • Play area for kids and Recreational areas for all age groups • Jogging tracks • Cycle track • All Landscape Elements should be safe and designed should be universally accessible. • Resting Areas for Senior Citizen	√				
	• Sports Club and Entrance plaza	√				
Elements and Amenities should be provided within Town park	• Pets Park		√			
Facilities should be provided within Town park	Parking should be provided near the entry exit points accessible directly from the access road.	√				
	Parking under the hardscape and sports courts park amenity buildings to avoid use of landscaped park area should be used for surface parking.	√				
	Drinking water facilities should be provided should be provided at walking distance from active areas.	√				
	Information/ food kiosk should be located at entrance and resting areas	√				
Plantation	Minimum 50%of park area should be provided with tree Cover	√				
	Minimum 50%of park area should be provided with shrubs and groundcovers	√				
	Minimum 75 %of park area should be permeable surface.	√				
Types of Tree plantation mix	Air purification – 30-40%	√				
	Habitat creation – 40-50 %	√				
	Ornamental and fragrance – 20-30 %	√				
	Screening -10-20%	√				
Types of Shrub plantation mix	Air purification – 20-30%	√				
	Habitat creation – 30-40%	√				
	Ornamental and fragrance – 20-30%	√				

WATEFRONT AND OPENSPACE NETWORK GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Waterfront and Open Space Network Guidelines following the Principles and Strategies included in Chapter 3 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not comply**	**Comments/ Remarks**
Neighborhood park (1 acre to 5 acres)						
Elements and Amenities should be provided within Neighborhood park:	• Play area and Recreational activities for all age groups • Informal flexible lawn space. • Comfortable Seating Area • Bicycle Parking at Park Entrances & Cycle Tracks • Pockets of Rain Gardens with full infiltration with reservoirs showcasing native plants. • Permanent, flexible use of park shelter to provide shade and accommodate group uses	√				
	• Multipurpose Sport's courts • Skate zones • Open Fitness Area with Fitness Equipment's. • Community Farming.		√			
Facilities should be provided within Neighborhood park	Toilets- separate toilets for ladies and gents should be provided at walking distances from the active areas.		√			
	Parking should be provided for non-motorized vehicles.		√			
	Drinking water facilities should be provided at walking distance from active areas.		√			
Plantation	Plantation-30-50% of should be provided through tree plantation.		√			
	Shrubs and ground covers - 60% of area should be covered		√			
	Minimum 70% of park area should be permeable surface area.		√			
	Irrigation for softscape area should be provided.		√			
Types of Tree plantation mix :	Air purification – 20-30%		√			
	Habitat creation – 40-50 %		√			
	Ornamental and fragrance – 30-40 %		√			
	Screening -10-20%		√			
Types of Shrub plantation mix :	Air purification – 20-30%		√			
	Habitat creation – 30-40%		√			
	Ornamental and fragrance – 30-40%		√			
	Screening -20-30%	√				

UDAG Checklist: Waterfront and Open Space Network

WATEFRONT AND OPENSPACE NETWORK GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Waterfront and Open Space Network Guidelines following the Principles and Strategies included in Chapter 3 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not comply**	**Comments/ Remarks**
Community Park (Upto 1 Acre)						
Elements and Amenities t should be provided within Community park	• Walkways and pathways (minimum 1.8 m width) • Shades spaces for seating • Play areas for kids with 90% visibility to allow passive surveillance. • Play equipment's with comfortable spacing considering the safety area demarcations. • Play area and Recreational activities for all age groups should be provided • All Landscape Elements should be safe and designed should be universally accessible. • Featured Entry Gateways • Areas with 30 % passive and 70% active activity considerations Lawn areas for leisure and recreation	√				
Facilities should be provided within Community park	Toilets- separate toilets for ladies and gents should be provided at walking distances from the active areas.	√				
	Drinking water facilities should be provided at walking distance from active areas.	√				
	Parking should be provided for non-motorized vehicles only.	√				
Plantation	30-50% of area should be achieved through tree plantation.	√				
	Shrubs and ground covers - Minimum 50% of area should covered	√				
	Permeable surface area -Minimum 60 % of community park area	√				
	Irrigation for softscape area should be provided.	√				
Types of Tree plantation mix	Air purification – 20-30%	√				
	Habitat creation – 40-50%	√				
	Ornamental and fragrance – 20-30%	√				
	Screening -10-20%	√				
Types of Shrub plantation mix :	Air purification – 10-20%	√				
	Habitat creation – 30-40%	√				
	Ornamental and fragrance – 20-30%	√				
	Screening -30-40%	√				

WATEFRONT AND OPENSPACE NETWORK GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Waterfront and Open Space Network Guidelines following the Principles and Strategies included in Chapter 3 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not comply**	**Comments/ Remarks**
Privately owned Publicly Accessible Open Spaces						
Elements and Amenities should be provided within Private Owned Publicly Accessible Open Spaces	• Water features/ Fountains to create ambient noise and a tranquil environment • Shaded seating areas • Interactive spaces • Public Art & Signages • Pedestrian Scale lighting and Trees for shade. • Creative changes of elevation as a source of play or seating • Play area and Recreational activities for all age groups should be provided • All Landscape Elements should be safe and designed should be universally accessible.	√ √				
Plantation	Minimum 30 % of Tree covers should be provided.	√				
	Permeable surface area 50% of Squares & plazas	√				
Types of Tree plantation mix :	Air purification – 20-30%	√				
	Habitat creation – 10-20 %	√				
	Ornamental and fragrance – 50-60%	√				
	Screening -20-30%	√				
Types of Shrub plantation mix :	Air purification – 10-20%	√				
	Habitat creation – 10-20%	√				
	Ornamental and fragrance – 30-40%	√				
	Screening- 20-30%	√				

UDAG Checklist: Waterfront and Open Space Network

WATEFRONT AND OPENSPACE NETWORK GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Waterfront and Open Space Network Guidelines following the Principles and Strategies included in Chapter 3 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not comply**	**Comments/ Remarks**
Edge Treatment , Park Furniture ,Signage , Lighting						
Accessibility	All Landscape Elements should be safe and designed should be universally accessible	√				
Edge treatments for all above open spaces	Achieve minimum 60% plantation edge of the total perimeter	√				
	Maximum 20 % of the edge as entry exit points should be equally divided on street frontage	√				
	5% of the street frontage should be allocated for active commercial street edge.		√			
	Maximum 5%of the edge should be treated with advertisement banners and hoardings.	√				
	Maximum 10% edge should be vehicular access entry exit points.(excluding Community& neighbourhood parks)	√				
	Minimum 50% visibility should be achieved along the park edge through plantation.	√				
Park furniture for all above open spaces	Dustbin should be provided at intervals of 30 m	√				
	Bollards should be provided to restrict vehicular access	√				
	Each open space should have minimum 1 art and sculptural element to promote local culture and identity.	√				
Signage should be provided at for all above open spaces	Way finding signage's at strategic locations like • Entry /exits • Pathways • Plazas • Public facilities	√				
Lighting should be provided at for all above open spaces	Pole lights of height 3m should be placed along the pathway at 9m c/c	√				
	Bollards, pathfinders should be provided to illuminate pedestrian pathways	√				
	Uplighters at trees and shrub plantation areas.	√				
	Flood lights –Sports courts and plays capes	√				
	Led strips – Seats and steps	√				
Materials For All Open Spaces						
Pathway and walkways should be provided with natural stone paving, concrete paver blocks, stamped concrete, colored concrete of pastel shades with rough texture as per design considerations		√				
Cycle tracks should be provided colored concrete, colored asphalt e.g. pastel shades of red, blue & green to define hierarchy of roads		√				

WATEFRONT AND OPENSPACE NETWORK GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Waterfront and Open Space Network Guidelines following the Principles and Strategies included in Chapter 3 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not comply**	**Comments/ Remarks**
Soil Mix Should Be Provided For All Open Spaces						
Tree Pits	• Min. soil depth 1200 mm • 1/10 composted sewage sludge. • 1/10 bark fines. • 1/5 coarse sand. • 3/5 topsoil. Providing and treating all planting beds with ant termite powder 4 to 5 grams per plant or as directed by planting contractor.		√			
Shrubs	• Min. soil depth 600 mm • 1/3 topsoil. • 1/3 excavated soil. • 1/6 compost. • 1/6 coarse sand. Amendments required in soil analysis report. Providing and treating all planting beds with ant termite powder 4 to 5 grams per plant or as directed by planting contractor.		√			
Lawn and Ground Covers	• Min. soil depth 300 mm • 1/3 topsoil. • 1/3 excavated soil. • 1/6 compost. • 1/6 coarse sand. Amendments required in soil analysis report. Providing and treating all planting beds with ant termite powder 4 to 5 grams per plant or as directed by planting contractor.		√			
• Root barrier treatment should be provided for tree plantation to protect utilities building structural elements.			√			

UDAG Checklist: Waterfront and Open Space Network

Planting	Tree & Shrub list					
SR.NO.	TREES	SHADE	HABITAT	SCREENING	AIR PURIFYING	FRAGRANT
1	Ficus bengalensis					
2	Delonix regia					
3	Mangifera indica					
4	Pongamia pinnata					
5	Samanea saman					
6	Tamarandus indica					
7	Thespesia populenea					
8	Albezia lebbek					
9	Chloroxylon swetinea					
10	Neolambrekia cadamba					
11	Barringtonia asiatica					
12	Tabubia argentia					
13	Terminalia catappa					
14	Mimusops elangi					
15	Michelia champaca					
16	Fillicium decepens					
17	Messua ferrea					
18	Erytrina indica					
19	Gyrocarpus amiracanus					
20	Azadirchta indica					
21	Bahunia purpurea					
22	Bahunia recemosa					
23	Alstonia scholaris					
24	Eucalyptus citriodora					
25	Saraca indica					
26	Syzegium cumini					
27	Dillinia indica					
28	Tabubia pillada					
29	Milea azadarach					
30	Plumeria alba					
31	cordia sebestina					
32	callistemon cirtinus					
33	Milingtonia hortensis					
34	Necthathus arbor tritis					

UDAG Checklist: Waterfront and Open Space Network

SR.NO.	SHRUBS	SHADE	HABITAT	SCREENING	AIR PURIFY	FRAGRANT
1	Bambusa multiplexa					
2	Raphis exalsa					
3	Bambusa ventricosa					
4	Nerium indicum					
5	Tabernaemontana divaricate					
6	Hibiscus rosa sinensis					
7	Acalypha wilkisiana tahiti					
8	Jathropha pandureafolia					
9	Boungainvillea spectabilis					
10	Boungainvillea glabra					
11	Carissa carandus					
12	Tabernamontana dwarf					
13	Cestrum necturnum					
14	Jasminum multiflorum					
15	Jasminum sambac					
16	Tabernamontana divaricazta					
17	Jasminum grandiflorum					
18	Hymenocallis caribaea					
19	Lilium candidum					
20	Adenium obesum					
21	Euphorbia milli					
22	Nerium olander dwarf					
23	Pedilanthus tithymloides					
24	Furcarea foetida					
25	Thumbergia erecta					
26	Sansevieria hyacinthoides					
27	Ficus benjamina					
28	Galphemia glouca					
29	Ixora odorata					
30	Tecoma stans					
31	Mussenda clabrata					
32	Gardenia lucida					
33	Allamenda cathrtica					
34	Drecena marginata					
35	Clerodendrum inreme					
36	Acalypha wilkisiana macafeana					
37	Mussenda ethrophtlla					
38	Rondeletia leucophylla					

Village Integration Guidelines Checklist

UDAG Checklist: Village Integration

VILLAGE INTEGRATION CHECKLIST					
Urban Design and Architectural Guidelines (UDAG), Amaravati Village Integration Guidelines following the Principles and Strategies included in Chapter 4 of UDAG	**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Connectivity to LPS and Surrounding Areas					
Existing village access roads should connect with the proposed road network	√				
Vehicular and pedestrian crossings should be provided at junctions where village is connected to proposed road network for free movement	√				
Villages should be planned with traffic prone areas with a low speed zone for pedestrian safety	√				
Villages should connect near transit points and major activity areas	√				
Junctions where proposed road network connects the village should act as major nodes and entry points of the village		√			
Infrastructure Development					
Existing and new road network should be enhanced and developed	√				
Existing sewage system should be upgraded for future needs	√				
Utility (water supply, electricity, sewage) connections for households should be provided underground to free up space on the street	√				
Storm water drainage in the villages with bio swale and permeable surface on ground level should be provided	√				
Decentralized waste water treatment facility should be included in villages		√			
Rain water harvesting should be provided for plots more than 200 sq. m.		√			
Treated water should be used for irrigation in landscaped areas		√			
Enhancing Village Character					
Fragmented villages should be connected by pedestrian priority zone to retain the village character (e.g. In Ainavolu village, the proposed arterial roads (50m wide) fragments the village into 4 parts)	√				
A maximum vehicular speed of 30km/h should be followed in pedestrian priority zones	√				
Vacant plots between the village and new development should be used as multi-functional spaces for activities	√				
Village edges should be redefined ensure no marginal lands are created	√				
A minimum 6m wide road at the periphery of the multi-functional space should be provided for emergency vehicle access	√				
Minimum 60% of the multi-functional space should be permeable / softscape surface with greening	√				

VILLAGE INTEGRATION CHECKLIST					
Urban Design and Architectural Guidelines (UDAG), Amaravati Village Integration Guidelines following the Principles and Strategies included in Chapter 4 of UDAG	**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
New developments / redevelopments of existing buildings should be sensitive to the existing village character including height, building materials and colours	√				
Socio-cultural events, festivals, weekly markets, fairs, exhibitions, recreation etc. in the multi-functional space should be organised to bring vibrancy to the village and provide a platform for villagers to sell their products and thereby generating economic opportunities for the villagers		√			
Pedestrians should have right of way to the streets within villages to promote pedestrian-friendly environment and retain distinct character of the village	√				
Parking					
Vehicular access points to a site should be limited to a maximum of 2 spaces	√				
Parking basements should not be permitted in the village core area due to narrow streets but should allow parking at the periphery of the villages	√				
Parking spaces should be avoided on building fronts and main streets; instead they should provide surface parking on the side or rear end instead	√				
Street parking should be provided in the interim as appropriate and screened with landscape/wall or screening compatible with the building design	√				
Parking should be accessed from secondary streets, where possible, in order to decongest main roads	√				
Visitor parking should be provided on vacant plots adjacent to the villages depending on the activity	√				
Access for Emergency Vehicles (for new development /redevelopment of existing buildings)					
For access of emergency vehicles like ambulance, fire engine and hearse, road width should be 9m; minimum road width for fire tender movement is 6m	√				
As per IS code 13039 - External Hydrant Systems Provision and Maintenance: In towns /cities, fire hydrants either stand post type or underground type should be provided at intervals of 100m connected to sufficient capacity water reservoir. It should be located at a distance of not less than 2m from face of the buildings	√				

UDAG Checklist: Village Integration

VILLAGE INTEGRATION CHECKLIST					
Urban Design and Architectural Guidelines (UDAG), Amaravati Village Integration Guidelines following the Principles and Strategies included in Chapter 4 of UDAG	**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
As per NBC 2016-Fire and Life Safety (Part 4), the above provisions are applicable to the following buildings: a. Hotel, educational, institutional, business, mercantile, industrial, storage, hazardous and mixed occupancies, where any of these buildings have floor area more than 500 sq. m. on any one or more floors b. Educational buildings having height 9 m and above c. Institutional buildings having height 9 m and above d. All assembly buildings e Buildings having area more than 300 sq. m. of incidental assembly occupancy on any floor f. Buildings with two basements or more, or with one basement of area more than 500 sq. m.					
For buildings along a pedestrianized street, emergency vehicle access should be provided towards rear side of the plot	√				
Integration of Smaller Plots Affected by Road Widening					
Amalgamation should be considered for small village plots becoming unviable for developments due to road widening		√			
Village and Activity Center					
There should be at least one Village Centre in a multi-functional space with provision of skill development training programs (like trade, construction business, surveying etc.) and public amenities in each village	√				
Village Centres should have a min area of 150 sq.m. and vernacular design elements should be included as part of its built form	√				
Village Centres should also consist of outdoor spill-out spaces for gatherings, cultural events and community discussions		√			
Community and Public Spaces					
Traditional gathering spaces in the villages should be identified, preserved and enhanced by creating activity areas/plazas. The spaces should be re-activated with events and programs such as light and sound shows etc.	√				
Cultural events intrinsic to the identity of the village should be organised		√			
Traditional arts, crafts, textiles and articles should be promoted through exhibitions, fairs, weekly markets etc.		√			
Tourist precincts should be developed with public art installations within villages with religious, heritage and eco-tourism potential	√				

VILLAGE INTEGRATION CHECKLIST					
Urban Design and Architectural Guidelines (UDAG), Amaravati Village Integration Guidelines following the Principles and Strategies included in Chapter 4 of UDAG	**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Entrance Gateways					
Entrance points of existing villages have gateways, which helps to create image and identity of the village and should be retained	√				
Landmarks should be created near the entrance or alternatively the entrance gateway should be designed as a landmark for the village		√			
Clear signage should be available next to entrance gateway for visitors	√				
Public plazas should be at entrance gateway to further highlight and define the entrance of the village	√				
Multi-Functional Space					
Vacant plots at the village edge and open space within the villages should be identified as buffer areas for multi-functional space	√				
A 6m wide road should be provided at the periphery of the multifunctional space for fire tender movement	√				
Socio-cultural events, festivals, weekly markets, fairs, exhibitions, recreation etc. which are temporary structures, should be permitted		√			
Development should be limited to only 10% of the plot area with uses such as public amenities, kiosks, small cafes etc.	√				
Minimum 60% of the multi-functional space should be open space with permeable / soft-scape surface	√				
Heritage					
Heritage sites should be enhanced with open space and landscaping	√				
Any development encroaching heritage sites should be relocated and re-provisioned in the periphery of the heritage site or village.	√				
No new development should be permitted within 300m radius from the heritage sites	√				
Heritage sites should have clear signage to improve legibility of the area	√				
An information board or plate should be available to introduce the history and significance of the heritage	√				
Wayfinding tools should be clear to bring people to the heritage sites with ease, from public transport, village gateway to main streets within the village	√				
Mixed-Use Development					
Active retail frontage with spill-out should be provided to create interactive spaces along water bodies, open spaces, multi-functional activity areas and main pedestrian routes	√				

UDAG Checklist: Village Integration

VILLAGE INTEGRATION CHECKLIST					
Urban Design and Architectural Guidelines (UDAG), Amaravati Village Integration Guidelines following the Principles and Strategies included in Chapter 4 of UDAG	**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Rental accommodation should be permitted on upper floors for working population and home stays for tourists	√				
Areas for informal sector and vending activity or daily/weekly market should be identified	√				
Retail frontage along arterial roads should set up for commercial and service-oriented establishments.	√				
Small-scale food processing unit and milk marketing with support of a functional dairy cooperative should be available		√			
Improved Social Amenities					
Education and healthcare facilities should be provided	√				
Healthcare facilities for livestock should be provided	√				
Water fountains and public toilets should be provided in villages	√				
Adequate shading, lighting and seating should be provided in villages	√				
Landscaped streets and paved pedestrian paths should be provided	√				
Medium to large plots (over 500m^2) in LPS should be identified to be used for education and health facilities	√				
Public amenity should be available within 500m radius of village	√				
Open space and Waterfront Connectivity					
A network of recreational spaces should be created providing connectivity between different types of open spaces	√				
A network of pocket parks should be provided with pedestrian connections	√				
Buffer zone along water bodies should be provided with bio-swales		√			
High quality pedestrian linkage and network should be formed between the waterfront and internal nodes with high footfall	√				
Pedestrian linkages such as bridges should be provided across water bodies to not only connect villages, but also offer a pleasant pedestrian experience	√				
Open space should be high quality and easily accessible	√				
Existing water features such as rivers, lakes and ponds should be transformed into attractive places through restoration and water management	√				

VILLAGE INTEGRATION CHECKLIST					
Urban Design and Architectural Guidelines (UDAG), Amaravati Village Integration Guidelines following the Principles and Strategies included in Chapter 4 of UDAG	**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Ecology and Biodiversity Action Plan (BAP)					
Mitigation measures and proposals for biodiversity restoration/ conservation/ enhancement should be provided to address the threatened species and habitats in the area	√				
Slope Protection					
Vegetation on slopes should be provided to reduce soil erosion	√				
Appropriate design of drainage system, which includes surface channel, stepped or trapezoidal channel, catch pit and/or sand trap, should be provided to control the storm water discharge	√				
Subsoil drainage system should lay beneath the surface for ground water discharge		√			
The water pressure in subsoil drain system should be maintained by the following methods: ○ Introducing a filter layer behind the slope leading water to outlets ○ Provision of weep holes, cut-off drain and subsoil drain pipe		√			
Monitoring and Surveillance					
Monitoring and surveillance mechanism should be provided to maintain natural assets	√				
The protection and management of the water bodies should be undertaken by the Advanced Locality Management (ALM) committee of the area	√				
Community Integration					
Village Improvement Group (VIG) should be set up with inclusion of village representatives with equal percentage/ratio of male-female/minority from the village population. VIGs will work together with the government to ensure that the Local Area Plans would result in the smart and sustainable development of the villages	√				
Village Centre should be provided for community interaction, for meetings and events such as sports and other socio-cultural activities	√				
Community centre should be provided within the village centre for community engagement, education and awareness including grievance redressal mechanism; it should have a minimum area of 50 sq. m.	√				
Village representatives should organise and document consultative meetings with stakeholders at monthly intervals		√			
Citizen outreach should share information through different channels, such as TV, news media, social media and more	√				

UDAG Checklist: Village Integration

VILLAGE INTEGRATION CHECKLIST					
Urban Design and Architectural Guidelines (UDAG), Amaravati Village Integration Guidelines following the Principles and Strategies included in Chapter 4 of UDAG	**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Projects related to villages should go through public consultation. Consultation should include direct interaction with the community through meetings with elected representatives, opinion surveys, open house events etc. (Refer to Implementation Chapter)	√				
Community members should be engaged in collecting data and mapping data to inform stakeholders of facts and trends	√				
Administrative Integration					
Village panchayat areas should be included in Amaravati Capital City's administrative boundary as part of the administrative setup	√				
To ensure the voices and needs of the villages are heard and addressed, there should be at least 2 representatives from the village population in the administrative	√				
R1-village planning zone should be designated as 'urban villages'	√				
Local development authority should have a separate team responsible for urban villages	√				
Local Area Plans should be developed in detail for different urban villages by the local development authority to help in better understanding the infrastructure/developmental/socio-cultural/economic needs of the villages Grievance redressal mechanism should be setup for resolving any disputes on land pooling, acquisition and any other issues raised by the people	√				
Grievance redressal mechanism should be setup for resolving any disputes on land pooling, acquisition and any other issues raised by the people		√			

TPOD Guidelines Checklist

UDAG Checklist: Transit and Pedestrian Oriented Development

TRANSIT AND PEDESTRIAN ORIENTED DEVELOPMENT GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Transit and Pedestrian Oriented Development Guidelines following the Principles and Strategies included in Chapter 5 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
TPOD Nodes Network Plan						
Criteria for Transit Nodes						
Primary TPOD Nodes	Primary TPOD Nodes are interchange nodes of two transit lines, BRT and MRT lines, or intersection of two MRT lines connecting different places or zones of the city. They are major potential zones with respect to land use and source of large pedestrian generators. Primary TPOD nodes should have public transit Interchange (PTI) with other public modes to achieve last mile connectivity in city transit network	√				
Secondary TPOD Nodes	Secondary TPOD Nodes are usually near commercial zones and important locations, such as city gateway, riverfront or city parks. They are potential business centres for the area. Secondary TPOD Nodes should be connecting to other transport modes	√				
Tertiary TPOD Nodes	Tertiary TPOD Nodes are transit stations near residential developments. The neighbourhood is complemented by a small mix of retail and commercial for small businesses. An abundance of open spaces should be in close proximity for the local residents. Tertiary TPOD Nodes should be within walking distance to nearby residential areas and/or have cycle tracks and other transport modes.	√				
Phased Development						
TPOD should be implemented in phases as per transport infrastructure starting initially with BRT corridors to form TPOD nodes within large commercial areas and integrated with MRT at a later stage when appropriate			√			

TRANSIT AND PEDESTRIAN ORIENTED DEVELOPMENT GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Transit and Pedestrian Oriented Development Guidelines following the Principles and Strategies included in Chapter 5 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
TPOD Nodes Network Plan						
Criteria for Transit Nodes						
In view of targeted transportation strategy for 2050 as per APCRDA. Phasing of different modes based on priorities is recommended below: Bus Lines-Initial Phase- (1-2 yrs) BRT-Intermediate Phase-(3-5 yra) MRT-Final Phase-16-12 yrs)			√			
Built Form, Density and Mixed Use						
Additional FSI and building heights for parcels within TPOD node should be incentive based and given based on the parameters provided in the TPOD quidelines		√				
All incentive-based policies for TPOD should be governed within the regulations of respective authorities.		√				
Zone 1- Up to 150 metres (From BRT Transit stop)	High density development should be allowed within 150 m from the transit station. Additional FSI up to 1.5 should be permitted Building Height of 100 m to 120 m should be permitted	√				
Zone 2-150 to 300 metres (From BRT Transit stop)	High density development should be allowed between 150m to 300 m from the transit station 1. Additional FSI up to 0.5 should be permitted II. Building Height of 40 m to 60 m should be permitted	√				
Zone 3-300 to 500 metres (From Transit stop)	Medium density development should be allowed between 300m to 500m from the transit station 1. Additional FSI up to 0.5 should be permitted il. Building Height of 40 m to 60 m should be permitted	√				
Mixed-use Development within TPOD Zones	Parcels within TPOD zone should be mixed Juse development and consist of the following vertical distribution: 1. 50% to 70% residential 1. 20% to 40% commercial iii. 10% public amenities					

UDAG Checklist: Transit and Pedestrian Oriented Development

TRANSIT AND PEDESTRIAN ORIENTED DEVELOPMENT GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Transit and Pedestrian Oriented Development Guidelines following the Principles and Strategies included in Chapter 5 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Commercial and retail activities should be located on the ground and lower floors of the building		√				
Min 40% land reserve should be for public open space and additional 10% publicly accessible privately owned public space (POPS)			√			
Transition in scale between higher density development around the transit station and adjacent lower density development should be created by descending building heights and densities from the transit station to achieve a stepped building height profile, with the highest building at the transit node.		√				
Multi-modal Transit and Last Mile Connectivity						
The shortest direct route for pedestrians and non-motorized modes of transport should be provided to access transit stops within TPOD zone 1 and 2 through buildings or complexes using POPS or open spaces, plazas and squares		√				
Narrow roads of 9m to 12m within TPOD zone 1 and 2 should consider pedestrianisation/shared streets and proposed as public spaces, depending on the pedestrian movement and activity time slots			√			
A well connected pedestrian network should be provided to create a walkable and environment friendly space for citizens to promote healthy lifestyle and encourage last mile connectivity to transit stops		√				
In order to extend the range of mobility and improve accessibility, a safe and well-designed cycling environment should be provided and designed within the TPOD network		√				
Street Level Interface and Multi-Level Linkage						
Open Space at Street Level	Different levels of open spaces should be provided in different TPOD influential zones to ensure people can access and enjoy the open space within a walkable distance in their neighbourhoods and within the city as well	√				
	A well-connected park network should be established through a well-connected street network to allow for easy access to all amenities.	√				
	Min 30% land should be reserved for public open space and additional 10% publicly accessible POPS	√				

TRANSIT AND PEDESTRIAN ORIENTED DEVELOPMENT GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Transit and Pedestrian Oriented Development Guidelines following the Principles and Strategies included in Chapter 5 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Open Space at Street Level	Design of street and open space should create an interactive and lively space that is socially inclusive for all, facilitating an experiental based pedestrian movement to the TPOD center	√				
Street Environment at TPOD Nodes	Large scale public, commercial and mixed use development plots should provide multi-level pedestrian connectivity towards transit node		√			
	Building pedestrian entrances should be oriented towards transit stops and provide direct pedestrian access	√				
	Ground floor should be designed with active uses such as shops, retail, restaurants, outdoor cafes along the street to provide street level interface within TPOD zone 1 and 2	√				
	Street planting should form boulevards to create pedestrian-friendly environment	√				
	Public art should be used at transit nodes to create landmarks that help establish a character for each transit stop		√			
	All parking requirement should be located under the built structure or at the rear side (Area-Stilt and basement)	√				
	Basement and podium parking should be provided as per zoning requirement. No surface parking is permitted	√				
	Public parking should be provided under public parks or town centres	√				
	A minimum 10 cycle parking racks should be provided within walking distance from the transit stop in TPOD zone 1 within MFZ area	√				
	On-street surface parking is discouraged in Amaravati; instead mixed use developments near transit stations should provide underground parking that links to public transport and driveways to adjacent plots	√				

UDAG Checklist: Transit and Pedestrian Oriented Development

TRANSIT AND PEDESTRIAN ORIENTED DEVELOPMENT GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Transit and Pedestrian Oriented Development Guidelines following the Principles and Strategies included in Chapter 5 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Colonnade	Colonnades should act as a semi-public interface/spill-out area between the street and building to act as an essential protection against harsh sun and rain and also improve the micro climate of the area; local architectural elements should be introduced as appropriate	√				
	Buildings within TPOD zone 1 and 2 (within 300m radius) should provide colonnades at the street frontage with active street edge.	√				
	These buildings should ideally be placed with zero setback or 2m setback to be considered from the front property line to maintain same built edge line with colonnades within 300m TPOD zone		√			
	Height of colonnade should be maintained a clear min 4.5 m to 6 m as per shops heights and width minimum 3m. This is to ensure that visibility to active uses is not hindered, and that it provides a sufficient amount of space for movement and permeability.	√				
	Maximum level difference of 0.15m should be permitted between shop and internal colonnade facade and it shall not project beyond the building line	√				
	Commercial and mixed use development within TPOD zone of 300m radius should provide colonnades along the street frontage or POPS	√				
Multi-Level Linkage						
Concourse platform should connect different modes of transit at the street level and along development parcels.			√			
Provision of concourse platforms should be at MFZ and not blocking pedestrian walkways or cycling tracks		√				
Pedestrians should be given direct access to bus stops with crossings linking from sidewalks (refer to Streetscape Guidelines)		√				
Clear concourse platforms way finding signage should be available for better connectivity and accessibility		√				
Street planting should form boulevards to create pedestrian-friendly environment. (refer to Street Guidelines)		√				
Alternatively, upper level footbridge linkages can be provided to connect large scale developments with the BRT comidors at primary nodes of intersection			√			

TRANSIT AND PEDESTRIAN ORIENTED DEVELOPMENT GUIDELINES CHECKLIST					
Urban Design and Architectural Guidelines (UDAG), Transit and Pedestrian Oriented Development Guidelines following the Principles and Strategies included in Chapter 5 of UDAG	**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Concourse platforms should be clearly visible for pedestrians; clear concourse platforms way finding signage should be available for better connectivity and accessibility	√				
Multiple pedestrian connectivity options should be available within TPOD Influence Zone 1 and 2 to ensure accessibility to transit stops.	√				
Pedestrian network should connect open spaces and intermal plazas to transit nodes.		√			

Streetscape Guidelines Checklist

UDAG Checklist: Streetscape Guidelines

STREETSCAPE GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Streetscape Guidelines following the Principles and Strategies included in Chapter 6 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Sidewalk width (Including Pedestrian walkway, NMT and MFZ)	ROW 60m (Major Arterial Road)-11m	√				
	ROW 60m (Seed Access Road)- 11m	√				
	ROW 50 m Sub Arterial - 12 m	√				
	ROW 50 m Arterial - 12 m	√				
	ROW 25 m-5m	√				
All carriageway lanes	Number of lanes and width as per Amravati master plan		√			
Minimum pedestrian walkway should be provided on both sides of the street	ROW 60m (Major Arterial Road) - 3 m	√				
	ROW 60 m (Seed Access Road) - 3 m	√				
	ROW 50 m Sub Arterial - 3 m	√				
	ROW 50 m Arterial - 3 m	√				
	ROW 25 m-2 m	√				
	ROW 17 m- 2 m	√				
	ROW 15.6 m-2 m	√				
	ROW 12 m-2m	√				
	ROW 9m-1 m	√				
Minimum Non-Motorized Transit (Cycle Track) Zone should be provided on both sides of the street	ROW 60m (Major Arterial Road) - 3 m	√				
	ROW 60 m- (Major Arterial Road) - 3 m	√				
	ROW 60 m (Seed Access Road) - 3 m	√				
	ROW 50 m Sub Arterial - 3 m	√				
	ROW 50 m Arterial - 3 m	√				
	ROW 25 m-2 m	√				
	ROW 17 m- 2 m	√				
	ROW 15.6 m-2 m	√				
	ROW 12 m- part of carriageway	√				
	ROW 9m - part of carriageway	√				

STREETSCAPE GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Streetscape Guidelines following the Principles and Strategies included in Chapter 6 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Multi-Functional Zone (MFZ) as planting strip should be provided on both sides of the street	ROW 60 m: M1-1m M2-3 m M3(Median)-3m	√				
	ROW 50 m Arterial: M1-0.6 m M2-1.4 m M3-4 m M4(Median)-2.5 m	√				
	ROW 25 m: M1- 1 m M2 (Median)-1 m	√				
	ROW 17 m: M1-1 m	√				
	ROW 15.6 m M1- 1 m.	√				
	ROW 12 m: M 1-1 m	√				
Bus stops, drop off areas, feeder bus stops & rickshaw	Should be accommodated within MFZ corridors	√				
Sidewalk surface logo and road surface markings should be provided on each ROW as per IRC 35-2015	Indicating directions of flow and surface markings for mode of transportation	√				
Tactile paving band should be provided on all the pedestrian walkways as part of pedestrian walkway as per IRC 103-2012	Min 0.6m needs should be maintained from the ramp edge of footpath	√				
Shade structures-bus stops, shelter, resting areas, information kiosks	Should be placed and designed with respect to MFZ widths along different ROW's(Ref. streetscape and urban plugin guideline)	√				
Benches & seats should be provided at strategic locations as part of MFZ 1 eg. plaza, bus stops, commercial and public amenities, parks, vacant plots, information kiosks etc..	In combination of 2 seats without obstructing cycle and pedestrian movement - Min 1.2m (L) height 0.45m seat. Locations 300-500 m c/c Intervals, seating near transit stops, Public plaza's, Public buildings, Commercial buildings, also at intersections.	√				

UDAG Checklist: Streetscape Guidelines

STREETSCAPE GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Streetscape Guidelines following the Principles and Strategies included in Chapter 6 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Litter & recycling bins capacity min 72 lit should be provided on all streets	Dry and wet waste separate bins should be provided at intersections, plazas, public amenities, transit stops, parks etc. Location 30m c/c interval near transit stops, Public plazas, Public buildings, Commercial buildings, also at intersections and 100m c/c along sidewalks should be placed in MFZ.	√				
Tree grates & guards at paved areas such as parcel entry exit area, cycle stands, near intersections, information kiosks, seats, etc.	1.2m x 1.2m stone, concrete or FRP	√				
Cycle racks should be provided on all streets	Near transit stop, public building and amenities (Distance interval 750m -1000m). Min 10 cycles at each location (Refer TPOD guidelines for details)	√				
Utility chamber covers	Tray type covers to match the adjacent paving material, color, pattern and levels	√				
Pedestrian light poles should be provided on all pedestrian pathways	Staggering of Pedestrian light pole with Street light poles as per guideline (Ref, streetscape guideline matrix for respective row)	√				
Street light poles should be provided on all streets	Staggering of Street light pole with Pedestrian light poles as per guideline (Ref. streetscape guideline matrix for respective row)	√				
High mast light should be provided at intersections	At major intersections of 25m and above ROWs	√				
Traffic signals (IRC 1985)	At all intersections should be provided	√				
Traffic signals & mandatory signs should be provided at the intersection as per IRC 67-2012	Signage's pole should be placed as part of MFZ	√				
Traffic signage's along the roads as per IRC 67-2012	Signage's pole should be placed as part of MFZ	√				
Directional and information signage's IRC 67-2012	Signage's should be placed as part of MFZ	√				

STREETSCAPE GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Streetscape Guidelines following the Principles and Strategies included in Chapter 6 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Advertisement and hoardings	Signage's should be placed as part of MFZ, integrated with transit stop, light poles, cycle racks, information kiosks		√			
Street Intersections						
Tuming radius as per ROW turning criteria. Turning radius for small to medium size vehicle is 5m. Entry to heavy vehicles is restricted during day time except emergency vehicles and school buses. If heavy vehicles allowed on local streets minimum 7.5 m turning radius should adopted. be	ROW 60 m (Major Arterial Road and Seed Access Road)- 12 m	√				
	ROW 50 m Sub Arterial - 12 m	√				
	ROW 50 m Arterial - 12 m	√				
	ROW 25 m -12 m	√				
	ROW 17 m-5m	√				
	ROW 15.6 m-5m	√				
	ROW 12 m -5m	√				
	ROW 9 m -5m	√				
Trapezoidal hump for pedestrian crossing as per IRC 11-2015 (Traffic calming measures)	Min width of 2.5 m-4 m flush with sidewalk and curb with speed calming measures.	√				
	Trapezoidal hump shall be provided at 17m and above ROW intersection having commercial, mixed use, public amenities, and parks, transit stops etc.	√				
	Trapezoidal hump pedestrian crossing shall be provided at 17m and below intersection having commercial, mixed use, public amenities, parks, transit stops etc.		√			
	Road widths with ROW of 12m and 9 m could have zebra crossing at road level with traffic calming measures.	√				
	Tactile tile from a public facility to the nearest public transport station	√				
	Should be placed 0.3m before the beginning and end of the ramps, stairs and entrances	√				
	Warming tile or concrete tactile tile with vehicular load consideration (Min 40 Tones) at parcel entry exits	√				
Bollards should be provided for pedestrian crossings at the intersections as per IRC 103-2012	1.2m spacing with height of 1m	√				

UDAG Checklist: Streetscape Guidelines

STREETSCAPE GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Streetscape Guidelines following the Principles and Strategies included in Chapter 6 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Cycle track crossing with curb ramp	Min width of 2 m-4m with speed calming measures	√				
Straight curbs should be provided above road level	0.15m above road level	√				
Curved curb should be provided at every road tuming above road at every intersection	0.15m above road level	√				
Curved curb should be provided at every curb ramp turning above road entry/exit point of plot.	0.15m above road level	√				
Mountable curb should be provided at the start of every curb ramp for plot width ranging from 3.50 to 7.50 street frontages.	Flush with road level	√				
Pedestrian crossing with trapezoidal hump should be provided with mountable curb	Flush with crossing and pedestrian walkway level	√				
Curb ramp for following locations should be provided as per IRC 103-2012	Both sides of each pedestrian zebra crossing at each quadrant. Never on the comer of the intersection.	√				
Plot access ramp width (As per IRC 103-2012)	3m - 5m	√				
Cycle crossing ramp width (As per IRC 103-2012)	3m - 5m	√				
Public Realm Infrastructure						
Public amenities and kiosks like newspaper, ATM, vending machines	Should be placed and fixed on MFZ near public buildings	√				
Pedestrian Wayfinding and Route Maps	Should be displayed at intersections and all entry/exits points of transit stations showing local roads and important civic destinations	√				

STREETSCAPE GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Streetscape Guidelines following the Principles and Strategies included in Chapter 6 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Traffic control management at intersections for signalized and non-signalized junction.	At all intersections Camera electronic devices should be provided for traffic monitoring and management. (Suggestive -In absence of electronic monitoring devices Traffic control kiosk and shelters for traffic police should be provided at intersection)	√				
Branding/ Advertisements	ROW < 9m-prohibited	√				
	For all streets with central median 25 and above. Central Median: Intervals of 50m		√			
Transit Stop	Bus stop min dimensions : 10m(L) X 1.5m(W) X 2.2m(H)	√				
	Night illumination on bus stops	√				
	Min 30 m away from any junction	√				
	Drop-offs zone: Min 50m before bus stop and 20m after bus stop	√				
Litter/Recycle Bin	Located within MFZ	√				
	Away from hospitals, heritage monuments and important landmark buildings 50m intervals between litter/recycle bins within 200m of buildings with separate wet and dry bins	√				
Public Toilets should be placed in MFZ	Distinct signs for men and women	√				
	Within open spaces and near transit stations	√				
	500-800m walking radius (Refer streetscape and urban plugin guideline)	√				
Drinking Water Fountains/Taps	Located within MFZ	√				
	Water tap boards should be located at every 500-800 m distance centre to centre		√			
Electric Station/Transformers Substation	Located within MFZ	√				
	Plantation buffer to avoid people's reach	√				
	Jali protection on substations		√			

UDAG Checklist: Streetscape Guidelines

STREETSCAPE GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Streetscape Guidelines following the Principles and Strategies included in Chapter 6 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Refuge island	ROW 25m and above provided	√				
Streetscape and urban plugins within walkable distance	Should be proposed within vacant plots and MFZ to facilitate community needs at convenient locations	√				
Universal accessibility and barrier free design (IRC 103 2012)	Should be considered to Sidewalks, at intersections, crossings, to traffic signal location	√				
Regular visual and auditory design	Pedestrian crossings(with pelican crossings) at junction should be provided with clearly audible and visible signals to facilitate safe and independent crossing		√			
Road signs (IRC 35-2015)	Informatory Signs should be provided to guide the road users regarding the distance and directions roadside facilities & destinations	√				
	Signage should be placed well before alert location to get the expected action required.	√				
Street Plantation						
Shade bearing trees should be selected for road side plantation with an average spacing of 3 to 6 m		√				
Median with width of 2.5m should have 2 to 4 rows in combination of shrubs, ground covers and lawn		√				
Median with width up to 5m should have 5 to 8 rows in combination of shrubs, ground covers and lawn		√				
Soil mix & depth-Trees	Tree Pits: Min. soil depth 1.2m a. 1/10 composted sewage sludge. b. 1/10 bark fines. c. 1/5 coarse sand. d. 3/5 topsoil. Providing and treating all planting beds with ant termite powder 4 to 5 grams per plant or as directed by planting contractor.	√				
Soil mix & depth-Shrubs	Planting Beds-Shrubs: Min. soil depth 0.6m. a. 1/3 top soil. b. 1/3 excavated soil. c. 1/6 compost. d. 1/6 coarse sand. e. Based on soil analysis report above proportion may be adjusted to local needs. Providing and treating all planting beds with ant termite powder 4 to 5 grams per plant or as directed by planting contractor.	√				

STREETSCAPE GUIDELINES CHECKLIST								
Urban Design and Architectural Guidelines (UDAG), Amaravati Streetscape Guidelines following the Principles and Strategies included in Chapter 6 of UDAG			**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Planting Beds-Lawn & Ground Covers:	Min, soil depth 300 mm a. 1/3 topsoil b. 1/3 excavated soil. c. 1/6 compost. d. 1/6 coarse sand. Soil mix & depth-Groundcovers e. Based on soil analysis report above proportion may be adjusted to local needs (Amendments required in soil analysis report) Providing and treating all planting beds with ant termite powder 4 to 5 grams per plant or as directed by planting contractor.		√				
Street plantation - General	Plantation should be planted in staggered form for more than one row		√				
	Trees - All the medium and large size trees must be of min 1.8m at time of planting.		√				
	Tall Shrubs must be of min 0.6 m at time of planting.		√				
Street plantation- General	Medium Shrubs - must be of min 0.3 mat time of planting.		√				
	Groundcovers-must be of min 0.15 m at time of planting.		√				
	All the shrub plantation to follow the layer system considering the hierarchy of heights with respect to pedestrian and vehicular movement.			√			
	Follow the IRC code SP-021 2009 & Amravati Urban Design Guidelines		√				
	Root barrier treatment should be provided for tree plantation to protect utilities and building structural elements.		√				
	Planting configuration strategies should be referred as per guidelines under streetscape chapter 6 and IRC code SP-021 2009.		√				
Street plantation- Height limit	ROW 60 m	MFZ1	Trees • Medium size (2.4 m -min 4 m) flowering @ max 3 m C/C • 1 row of trees	√				
			Shrubs Medium shrub (0.45 (m - 0.6m)@ 0.3 m C/C & groundcover(0.15 m-0.3 m)@0.15 m C/C	√				

UDAG Checklist: Streetscape Guidelines

STREETSCAPE GUIDELINES CHECKLIST								
Urban Design and Architectural Guidelines (UDAG), Amaravati Streetscape Guidelines following the Principles and Strategies included in Chapter 6 of UDAG				**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Street plantation- Height limit	ROW 60 m	MFZ2	Trees • Combination of medium size (2.4 m- min 4 m) flowering & evergreen. 50% of each type @ max 3 m c/c • 2 row of trees	√				
			Shrubs • Medium shrub (0.45 m-0.6 m) @ 0.3 m CIC & groundcover (0.15m - 0.3m)@ 0.15m C/C	√				
Soil mix & depth- Groundcovers		MFZ3	Trees • Large evergreen/flowering size (4.5 m-min 6 m) 40-60% of each type respectively @ max 5m C/C • 2 rows of trees	√				
			Shrubs • Medium shrub (0.45m-0.6 m) @ 0.3 m C/C & groundcover (0.15m - 0.3m) @ 0.15m C/C					
Street plantation - Height limit	ROW 50m Sub Arterial	MFZ1	Shrubs • Tall shrubs (up to 1.2 m) @ 0.6 m C/C • 2 rows of shrubs	√				
		MFZ2	Trees • Medium size (2.4m min 4 m) flowering @max 3 m C/C • 1 row of trees	√				
			Medium shrub (0.45 m-0.6m) @ 0.3 m C/C & groundcover (0.15m - 0.3m)@ 0.15m C/C	√				
		MFZ3	Trees • Combination of medium size (2.4m -min 4m) flowering & evergreen. 50% of each type @ max 3 m c/c • 1 row of trees	√				
			Shrubs -Medium shrub (0.45 m - 0.6m) @0.3 m C/C groundcover (0.15m -0.3m) @ 0.15 m C/C	√				
		MFZ4	Trees • Large evergreen/flowering size (4.5m-min 6m) 40-60% of each type respectively @ max 5 mC/C • 2 rows of trees	√				
			Shrubs -Medium shrub (0.45 m-0.6 m) @ 0.3 m C/C & groundcover (0.15m-0.3 m) @ 0.15 m C/C	√				
			Shrubs -Medium shrub (0.45 m-0.6 m) @ 0.3 m C/C & groundcover (0.15m-0.3 m) @ 0.15 m C/C	√				
Street plantation - Height limit	ROW 50m Arterial	MFZ1	Shrubs • Tall shrubs (up to 1.2 m) @ 0.6 m C/C • 1 row of shrubs	√				
		MFZ2	Trees • Medium size (2.4m min 4 m) flowering @max 3 m C/C • 1 row of trees	√				
			Medium shrub (0.45 m-0.6m) @ 0.3 m C/C & groundcover (0.15m - 0.3m)@ 0.15m C/C	√				
		MFZ3	Trees • Combination of medium size (2.4m -min 4m) flowering & evergreen. 50% of each type @ max 3 m c/c • 1 row of trees	√				
			Shrubs -Medium shrub (0.45 m - 0.6m) @0.3 m C/C groundcover (0.15m -0.3m) @ 0.15 m C/C	√				
		MFZ4	Trees • Large evergreen/flowering size (4.5m-min 6m) 40-60% of each type respectively @ max 5 mC/C • 2 rows of trees	√				
			Shrubs -Medium shrub (0.45 m-0.6 m) @ 0.3 m C/C & groundcover (0.15m-0.3 m) @ 0.15 m C/C	√				
Street plantation - Height limit	ROW 25 m	MFZ1	Trees • Medium size (2.4 m -min 4 m) flowering @ max 3 m C/C • 1 row of trees	√				
			Shrubs Medium shrub (0.45 (m - 0.6m)@ 0.3 m C/C & groundcover(0.15 m-0.3 m)@0.15 m C/C	√				

UDAG Checklist: Streetscape Guidelines

STREETSCAPE GUIDELINES CHECKLIST								
Urban Design and Architectural Guidelines (UDAG), Amaravati Streetscape Guidelines following the Principles and Strategies included in Chapter 6 of UDAG				**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Street plantation - Height limit	ROW 25 m	MFZ2	Trees • Large evergreen/flowering size (4.5m-min 6m) 40-60% of each type respectively @ max 5 mC/C • 2 rows of trees	√				
			Shrubs -Medium shrub (0.45 m-0.6 m) @ 0.3 m C/C & groundcover (0.15m-0.3 m) @ 0.15 m C/C	√				
Street plantation - Height limit	ROW 17 m	MFZ1	Trees • Combination of medium size (2.4m -min 4m) flowering & evergreen. 50% of each type @ max 3 m c/c • 1 row of trees	√				
			Shrubs -Medium shrub (0.45 m - 0.6m) @0.3 m C/C groundcover (0.15m -0.3m) @ 0.15 m C/C	√				
Street plantation - Height limit	ROW 15.6 m	MFZ1	Trees • Combination of medium size (2.4m -min 4m) flowering & evergreen. 50% of each type @ max 3 m c/c • 1 row of trees	√				
			Shrubs -Medium shrub (0.45 m - 0.6m) @0.3 m C/C groundcover (0.15m -0.3m) @ 0.15 m C/C	√				
Street plantation - Height limit	ROW 12 m	MFZ1	Trees Combination of Small size and medium shrubs with ground cover (2.4 m- min 4m) flowering & evergreen. 50% of each type @ max 1.5 mc/c -1 row of trees	√				
Street plantation - Height limit	ROW 9 m	MFZ1	Trees Combination of Small size and medium shrubs with ground cover (2.4 m- min 4m) flowering & evergreen. 50% of each type @ max 1.5 mc/c -1 row of trees	√				

STREETSCAPE GUIDELINES CHECKLIST							
Urban Design and Architectural Guidelines (UDAG), Amaravati Streetscape Guidelines following the Principles and Strategies included in Chapter 6 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Drip irrigation must be provided for all the green areas including all MFZ. The water used for irrigation must be recycled grey water.			√			
Median screen plantation should be provided to avoid headlight glare. As stated in IRC Code SP-21 2009.		√				
Bio-swale must be provided at specified areas (As per standard design and guidelines for green infrastructure practices City of New York) (Bio-swale installation interval varies with varying with it pit size. Larger the pit size bio-swale c/c interval distance will be less whereas increase in c/c distance interval with decrease in bio-swale pit size)	ROW 60 m- • Location -(MRT and Seed Access Road) MFZ 1 and MFZ 3. • Minimum size of bio-swale 0.9m x 6m provided at c/c m interval of 30 m	√				
	ROW 50 m – • Location - Sub Arterial MFZ 3 and MFZ 4 • Minimum pit size of bio-swale 0.9m X 6m provided at c/c interval of 30 m	√				
	ROW 50 m – • Location - Arterial MFZ2 and MFZ 3 • Minimum pit size of bio-swale 0.9m X6m provided at c/c interval of 30m	√				
	ROW 25 m – • Location - MFZ 1 • Minimum pit size of bio-swale 0.9m X3m provided at c/c interval of 15 m	√				
	ROW 17 m – • Location - MFZ 1 • Minimum pit size of bio-swale 0.9m X3m provided at c/c interval of 15m	√				
	ROW 15.6 m – • Location - MFZ 1 • Minimum pit size of bio-swale 0.9m X3m provided at c/c interval of 15m	√				
Seepage Basin (As per standard design and guidelines for green infrastructure practices _ City of New York)	The overflow of storm water in bio-swale is should be provided with seepage basin within bio-swale to drain out with proper channel to discharge.					
	No connection to sewers.					

UDAG Checklist: Streetscape Guidelines

STREETSCAPE GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Streetscape Guidelines following the Principles and Strategies included in Chapter 6 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Bio – swale soil mix (As per Plant Selection for Bio Retention Systems and Storm Water Treatment Practices_ Centre for Urban Greenery and Ecology.)	• Filter media mixture of 50 % ASM and 50 % medium to coarse sand with varied particle size & 0.6m depth • Transition layer Coarse -sand with 0.7–1.0 mm particle size & 0.1m depth • Drainage layer fine gravel 1.0–5.0mm particle size & 0.2m depth	□ √ □ □ □ √ □ □ √	□	□	□	
Bio - swale Grading for soil surface in pit. (As per standard design and guidelines for green infrastructure practices _ City of New York)	Soil surface grading should be provided with low level at center from the edges of pit.	√	□	□	□	
Typical planting shrubs for Bio-swale (As per Plant Selection for Bio Retention Systems and Storm Water Treatment Practices_ Centres for Urban Greenery and Ecology)	Shrubs & Groundcover - • Canna generalis • Acalypha wilkesiana cultivar • Bougainvillea ‘Sakura Variegata’ • Chrysopogon zizanioides • Codiaeum variegatum • Complaya trilobata • Cymbopogon citratus • Dracaenaceae reflexa • Melastoma malabathricum • Nerium oleander ‘Pink’ • Ophiopogon jaburan • Pennisetum alopecuroides • Pennisetumx advena ‘Rubrum’	□	√	□	□	
Materials and colours						
Colours	Colours use for paving should be pastel and cool colour shades		√			
	Combination of cool and warm colours or locally available stone or concrete paving material should be used.		√			
Pedestrian walkways	Natural stone paving, concrete paver blocks, stamped concrete, colored concrete of pastel shades with rough texture as per design considerations.		√			

STREETSCAPE GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Streetscape Guidelines following the Principles and Strategies included in Chapter 6 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
NMT corridors	Colored concrete, colored asphalt e.g. pastel shades of red, blue & green to define hierarchy of roads		√			
Tactile paving	Coloured stone or concrete tactile tile with vehicular load consideration (Min 40 Tones) at parcel entry exits.		√			
Corner plazas	Natural stone paving of lighter shades should be provided with rangoli patterns as appropriate		√			
Pedestrian crossing	Color to match NMT corridor with thermoplastic paint patterns markings.		√			
NMT track crossing	Color to match NMT corridor with thermoplastic paint patterns markings.		√			
Seats	Natural stone cladding & coping of lighter shades with concrete or constructed fixed base for seats.		√			
Curb - All types	Precast concrete curb.		√			
Drop-off, transit corridor	Concrete grass paver blocks with fire tender loading (40 tone) consideration	√				
Bollard and railing	Concrete, stone and MS railing as per design consideration		√			

UDAG Checklist: Streetscape Guidelines

Annexure – Plantation list for trees

SR.NO.		TREES	SIZE
1		Ficus bengalensis	L
2		Delonix regia	L
3		Mangifera indica	L
4		Pongamia pinnata	L
5		Samanea saman	L
6		Tamarandus indica	L
7		Thespesia populenea	L
8		Albezia lebbek	L
9		Chloroxylon swetinea	L
10		Neolambrekia cadamba	L
11		Barringtonia asiatica	L
12		Tabubia argentia	L
13		Terminalia catappa	L
14		Mimusops elangi	L
15		Michelia champaca	M
16		Fillicium decepens	M
17		Messua ferrea	L
18		Erytrina indica	L
19		Gyrocarpus amiracanus	L
20		Azadirchta indica	L
21		Bahunia purpurea	M
22		Bahunia recemosa	M
23		Alstonia scholaris	L
24		Eucalyptus citriodora	L
25		Saraca indica	L
26		Syzegium cumini	L
27		Dillinia indica	L
28		Tabubia pillada	L
29		Milea azadarach	L
30		Plumeria alba	S
31		Cordia sebestina	L
32		Callistemon citrinus	M
33		Millingtonia hortensis	L
34		Necthathus arbor tritis	M
35		Diospyros malebarica	L
36		Terminalia alata	L
37		Pterocarpus marsupium	L

SR.NO.		TREES	SIZE
38		Shorea roxburghii	L
39		Dalbergia latifolia	L
40		Terminalia arjuna	L
41		Ficus racemosa	L
42		Peltophorum pterocarpum	L
43		Tabebuia aurea	M
44		Dalbergia sissoo	L
45		Polyalthia longifolia	L
46		Plumeria obtusa	S
47		Plumeria rubra	S
48		Schefflera actinophylla	M
49		Cassia fistula	L
50		Lagerstroemia speciosa	L
51		Melaleuca bracteata	M
52		Butea monosperma	L
53		Cassia javanica	L
54		Phyllanthus emblica	M
55		Bombax ceiba	L
56		Grevillea robusta	L
57		Jacaranda mimosifolia	L
58		Polyalthia longifolia	L
59		Ficus racemosa	L
60		Cochlospermum religiosum	M
61		Ficus religiosa	L
62		Grevillea robusta	L
63		Anthocephalus cadamba	M
64		Calophyllum inophyllum	L
65		Madhuca latifolia	L
66		Melia azedarach	L
67		Spathodea campanulata	L
68		Pterospermum acerifolium	M
69		Albizia julibrissin	M
70		Acacia auriculiformi	M
71		Zizipus jujuba	L
72		Crataeva religiosa	M
73		Aegle marmelos	M
74		Muntingia calabura	M

Evergreen species Flowering species

- **SIZE OF TREES**

L- Large Trees (4.5 – 6m) M- Medium Trees (2.4 – 4m)
All trees at the time of procurements should be min 2.4m in height.
Minimum 4" calliper size
Bag size = 30" X30" size
Minimum 5 to 8 branches should be required for plant while selecting plant for plantation

Annexure – Plantation list for Shrubs

SR.NO.		SHRUBS	SIZE
1		Bambusa multiplexa	T
2		Raphs exalsa	T
3		Bambusa ventricosa	T
4		Nerium indicum	T
5		Tabernaemontana divaricate	T
6		Hibiscus rosa sinensis	T
7		Acalypha wilkisiana tahiti	T
8		Jathropha pandureefolia	T
9		Bougainvillea spectabilis	T
10		Bougainvillea glabra	T
11		Carissa carandus	T
12		Tabernamontana dwarf	T
13		Cestrum nectunum	T
14		Jasminum multiflorum	M
15		Jasminum sambac	M
17		Jasminum grandiflorum	T
18		Hymenocallis caribeea	M
19		Lilium candidum	T
20		Adenium obesum	T
21		Euphorbia milli	T
22		Nerium olander dwarf	T
23		Pedilanthus tithymloides	T
24		Furcarea foetida	T
25		Thumbergia erecta	T
26		Sansevieria hyacinthoides	M
27		Ficus benjamina	T
28		Galphemia glauca	M
29		Ixora odorata	T
30		Tecoma stans	M
31		Mussenda clabrata	T
32		Gardenia lucida	T
33		Allamenda cathrtica	T
34		Drecena marginata	T
35		Clerodendrum inreme	T
36		Acalypha wilkisiana macafeana	T
37		Mussenda ethrophila	M

SR.NO.		SHRUBS	SIZE
38		Rondeletia leucophylla	T
39		Cycas baddomei	T
40		Memecylon umbellatum	T
41		Nephrolepis cordifolia	M
42		Murraya koenigii	T
43		Furcraea foetida	T
44		Duranta repens	M
45		Clerodendrum indicum	T
46		Heliconia psittacorum	M
47		Tulbagia lily	M
48		Acalypha indica	T
49		Euphorbia cotnifolia	T
50		Crinum lily	T
51		Catharanthus rosea	M
52		Pennisetum rueppeii	M
53		Bougainvillea thimma	T
54		Agapanthus africans	M
55		Dracaena fragrans	T
56		Philodendron xanadu	M
57		Ficus starlight	T
58		Canna indica	M
59		Alpenia vittata	M
60		Duranta repens alba	M
61		Stachytarpheta indica	M
62		Bauhinia galpinii	T
63		Tecoma capensis	T
64		Malvaviscus arboreus mexicanus	T
65		Jatropha multifida	T
66		Exocaria-bicolor-variegata	M
67		Schefflera arboricola	M
68		Syzygium australe	T
69		Heliconia pissitocorum	M
70		Gardenia jaminoids	M
71		Murraya paniculata	T
72		Heliconia caribaea big red	T
73		Alpenia purpurata	T

Evergreen species Flowering species

- SIZE OF SHRUBS

T – Tall Shrubs (Upto 1.2m) M- Medium Shrubs (0.45

- Existing tree should not be removed by the contractor until specifically ordered in writing by the engineer as well as received approval from relevant government authority
- Constructed planters should be in MFZs but not on the sidewalks
- The contractor should obtain the necessary planting permits from respective government authority prior to the start of work for bio-swale plantation

Built Form Guidelines Checklist

UDAG Checklist: Built Form Guidelines

BUILT FORM GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Site development and building typologies						
Setbacks						
Adopted for plots size with land use from Amaravati Masterplan	Building setbacks for plots should be provided as per Amaravati Zoning Regulations	✓	□	□	□	
	For plots within transit zone refer TPOD guidelines for specific building setback requirements.		✓			
	Planting strips along plot boundary as per plot size excluding plot access should be followed for the street edge up to the width of ROW (Refer plot boundary and edge treatment for details)	✓				
	Planting strips along plot boundary for the sides beyond the street edge and rear edge of the site should be provided		✓			
	Ancillary buildings should be located within building line.	✓				
	Ancillary buildings for services like DG sets, electrical substation and HSD yards etc. should be places in setbacks with proper screening and access for maintenance.		✓			
	Utility and services should be screened with decorative fencing, art work or landscaping.	✓				
Services						
Adopted for plots size with land use from Amaravati Masterplan	Service infrastructure of the building should be planned on the rear side of the site.	✓				
	It should be separated and screened from public access points.	✓				
	Service yards on the site should be screened with creative fencing or landscaping	✓				
Plot Access						
Small & Medium Scale Plots (plot area below 300 sq m to plot size 300 to 4000 sq m)	For the plots with street frontage width ranging from 3.5m-7.4m, the entry and the exit should be provided with a mountable curb		✓			
	For the plots with street frontage width ranging from 7.5m-49m, the entry and the exit should be provided with a curb ramp.	✓				
	Small scale plots at street intersection cannot have vehicular access from the street corner.	✓				

BUILT FORM GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
	Vehicular access should be provided from the sides of the plot.	✓				
	For all medium scale plots entry-exit gate access width should be between 2.4m-3m.	✓				
	For medium scale plots vehicular entry-exits curb ramps provision should be located at minimum 15m distance from any pedestrian crossing at intersections.	✓				
Plot Boundary and Edge Plantation						
Adopted for plots size with land use from Amaravati Masterplan	Hedges and planting should be used to replace solid walls as an alternative way to distinguish plot boundaries					
	Planting strip along the plot boundary should be kept free from services / utilities.	✓				
	Plot boundary edge treatment height should be maximum 1.2 m - consisting of 0.45 m solid wall and 0.75 m screening with min 50% visibility that should be built above the finished level of sidewalk.					
	For all commercial plots street frontage boundary edge should not be fenced. Bollards or planting strips should be used along the street edge for better accessibility					
	Low lying solid compound wall or transparent fencing should be provided to discourage misbehaviour of people from sidewalks					
	Fencing materials should be in combination of stained wood, concrete posts, metal of white, black, grey, brown colours. Compound wall can be of brick, stone, artificial stone or structural RCC.					
	Adequate green buffer around integrated Solid Waste Management Facility and Common Hazardous Waste Treatment and Disposal Facility by carrying proper assessment, but rjot less than 100m width					
Small & Medium Scale Plots (plot area below 300 sq m to plot size 300 to 4000 sq m)	For plot sizes from 300 sq.m up to 4000 sq.m, provide clear Landscape strip of minimum 1.2 m width should be provided.	✓				
	For plot sizes from 300 sq.m up to 500 sq.m -front and back setback as 0.75 to 1.20m and sides with 0.60m to 0.75m setback should be provided as clear landscape strip.	✓				
	For plot sizes above 500 sq.m up to 2000 sq.m – front and back setback as 1.20m and sides with 0.75m to 0.90m setback should be provided as clear landscape strip.	✓				
	For plot sizes above 2000 sq.m up to 4000 sq.m – front and back setback as 1.50 m and sides with 1.50 m setback should be provided as clear landscape strip.	✓				

UDAG Checklist: Built Form Guidelines

BUILT FORM GUIDELINES CHECKLIST							
Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Built Massing						
Building footprint						
Small & Medium Scale Plots (plot area below 300 sq m to plot area 300 to 4000 sq m)	Minimum building ground coverage as per Amaravati Zoning Regulations.	✓				
	Public and medium scale building's roof should provide 30-50% area as an intensive green (vegetated) roof.		✓			
	Buildings on corner lots should be oriented to address both streets and generally located close to the street edge.		✓			
Building Heights						
Small & Medium Scale Plots (plot area below 300 sq m to plot area 300 to 4000 sq m)	Building heights should be as per Amaravati Zoning Regulations.	✓				
	Stepped building profile should be adopted for waterfront, canal front and open space facing buildings. Refer waterfront and open space guidelines.					
	For plots within TPOD zone, buildings should comply with heights as per TPOD criteria for zone 1 & 2					
	Site development should respond to the context and help in identity creation		✓			
Plinth Levels						
Adopted for plots size with land use from Amaravati Masterplan	Minimum plinth height of the habitable spaces should be 0.45m above finished sidewalk level.	✓				
	Minimum plinth height of the parking still structures should be 0.15m above finished sidewalk level.	✓				
	Plinth height of commercial shops should be 0.15m above finished sidewalk level preferably for ease of access.					
	Semi sunken plinth for commercial/Mixed use buildings should be considered with segregated pedestrian and vehicular access.					
	For semi sunken structures 1.5m plinth level is preferable.	✓				
	If semi sunken structure is proposed with stilt or slab level at 1.5m within the flood demarcation zone, the habitable spaces should be above the flood line level	✓				

BUILT FORM GUIDELINES CHECKLIST							
Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Parking						
Small & Medium Scale Plots (plot area below 300 sq m to plot area 300 to 4000 sq m)	Plot sizes up to 500 sq.m. - Parking spaces should be in stilts with provision of mechanical stack parking	✓				
	Plot sizes above 500 sq.m. up to 2000 sq.m - parking spaces should be in stilts and semi sunken basement parking provision of mechanical stack parking	✓				
	Plot sizes below 2000 up to 4000 sq.m- Parking spaces should be provided at podium and sunken basement parking with provision of mechanical stack parking	✓				
Open Space Within Plots						
Adopted for plots size with land use from Amaravati Masterplan	Mandatory planting strip along plot boundary should be as per plot size excluding plot access.	✓				
	All government, semi-public & public plots should develop 30-50% of the open space area along the street edge as publicly accessible privately owned public spaces (POPS) as square and plaza. For POPS, squares and plazas details as per Waterfront and Open Space Network Guidelines					
Small & Medium Scale Plots (plot area below 300 sq m to plot area 300 to 4000 sq m)	For plot size above 300 up to 500 sqm - 5% Reserved Green area of plot area should be provided. Plot size above 500 up to 4000sqm - 10% Reserved Green area of plot area should be provided. This reserved Green should have min 60% tree canopy coverage	✓				
	Plot size above 500 up to 4000sqm - 5% recreational green area of plot area should be provided	✓				
Large Scale Development (plot area above 4000 sq m)						
Plot Access	For all large scale plots entry-exits should have provision for curb ramps and universal accessibility design features	✓				
	For all large scale plots entry-exit gate access width should be between 3m to 5m	✓				
	3m to 5m curb ramp should be provided for plots with plot width 7.5m (Refer to Streetscape guidelines for curb width)	✓				
	Separate entry and exit points with curb ramp should be provided with plot width more than 50m on street frontage		✓			
	For large scale plots vehicular entry-exits curb ramps provision should be located at minimum 15m distance from any pedestrian crossing at intersections.	✓				

UDAG Checklist: Built Form Guidelines

BUILT FORM GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
	Large scale plots at street intersection cannot have vehicular access from the street corner. Vehicular access should be provided from the sides of the plot.	✓				
Plot Boundary & Edge Plantation	For plots sizes above 4000 sq. m provide clear landscaped strip of minimum 1.8 m width should be provided without any underground services.	✓				
Footprints	Building footprint should be kept to minimum to increase natural ground surface areas for landscape and plantation.		✓			
	Public and large scale building's roof and podium should provide 20-50% area of ground coverage as an intensive green (vegetated) cover.		✓			
	Large footprints that appear bulky and create an unwelcoming visual barrier should be avoided		✓			
Building Heights and Profile	For plots within TPOD zone, buildings should comply with heights as per TPOD criteria for zone 1 & 2.		✓			
	Site development should respond to the context and help in identity creation		✓			
	Plots with more than two buildings should achieve staggered layouts with minimum distance of 15m between the towers.					
	The buildings oriented or facing each other in adjacent plots should have a minimum distance of 15m between each other.					
	Buildings within a plot facing each other should have minimum distance of 15m between the podium of the buildings and minimum 30m between the building towers.	✓				
	Height and orientation of the towers should allow natural air movement within the plots		✓			
Parking	For plot sizes above 4000 sq.m.- Parking spaces and basement ramps should be provided under the building footprint.	✓				
	Multilevel car parking should be provided as part of podium with active frontage on road side.	✓				
	Open parking spaces should not be permitted	✓				

BUILT FORM GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Open Space Within Plot	Provide 10 - 20% of plot area should be publicly accessible POPS. For POPS, squares and plazas details as per Waterfront and Open Space Network Guidelines	✓				
	Large scale development plot having internal courtyards should provide minimum 40% of courtyard should be landscaped with plantation	✓				
	Large scale public, commercial and mixed use development plots should provide pedestrian connectivity towards transit node and parks	✓				
	Plantation within large scale development plots should follow MOEF guidelines.		✓			
Permeability and Connectivity	Large blocks of master plan layout should be subdivided for providing pedestrian and NMT connection to maintain permeability through blocks		✓			
	Plot subdivisions should consider adjacent plot size and road alignments to continue the urban fabric.		✓			
	Internal roads and pedestrian movement should follow structure of existing LPS layout for movement and access to transit stops		✓			
	Plot size of length above 250m should be considered for plot subdivision.		✓			
	For plot division, plot size should be 100 to 150 m in length or width to achieve permeability and connectivity for pedestrian movement.		✓			
Green Network	For adjoining plots, the building layouts should consider combining private open spaces, to increase functionality and sharing of larger open spaces		✓			
	Streets should include adequate planting to form boulevards which create pedestrian-friendly environment		✓			
	Large scale plots should provide green corridors as POPS (Refer open space guidelines) connecting surrounding parks or open spaces to maintain ecology and pedestrian connectivity of the area		✓			
	Large scale plots should provide pedestrian access through publicly accessible POPS to create shorter routes and reduce the walking distance. Desired line should be followed for creating pedestrian network, POPS and green space network which connects public spaces	✓				

UDAG Checklist: Built Form Guidelines

BUILT FORM GUIDELINES CHECKLIST							
Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG			**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Institutional							
Criteria for assessment for education facilities of area and public amenities allocation should follow Amaravati Zoning Regulations plan for primary school, secondary school and higher education institutes colleges and universities							
Setback	Building setback for institutional land use plots should be as per zoning regulations		✓				
Services	Refer services guidelines mentioned with plot area for site development under built form guidelines		✓				
Plot Boundary and Edge Plantation	Refer plot edge condition and plantation guidelines mentioned with plot area for site development under built form guidelines		✓				
Plot Access	The major entrances of schools and other institutional sites should face the street		✓				
	The design of institutions at corner sites should address the streetscape of both public frontages		✓				
	Maximum two entry points should be permitted						
	Entry points should be welcoming and address local context creating vistas and importance						
	Bus access guidelines - • Ease of circulation • Clear access to entry and exit • Bifurcation from the school precinct						
Building Footprint	Building footprint for ground coverage for plots should be provided as per zoning regulations		✓				
Building Height And	Maximum building height should be as per zoning regulations		✓				
Profile	Site development should respond to the context and help in identity creation			✓			
	Entry of building should be emphasised with grandeur and monumental scale		✓				
Plinth Level	For plinth height should refer table in built massing plinth level guidelines		✓				

BUILT FORM GUIDELINES CHECKLIST							
Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG			**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Parking	Access points to parking areas should be minimized to reduce their impact on the surrounding context		✓				
	Bus parking should be provided within the plot under tree shaded region		✓				
	Location of bus parking should be provided with ease of circulation for entry – exit without disturbing school precinct			✓			
	Parking areas should be located possibly to the rear side of plot or side margin.		✓				
	Parking on front side of street should be minimised and only permitted to buses		✓				
Open Space Within Plot	Institutional building should be planned with semi-public building activity frontage and open spaces as per POPS guidelines (refer Waterfront and Open Space Network Guidelines. Incentives should be provided for min 10% shared open space (POPS) of institutional plot area		✓				
	Landscape should screen parking areas from view of streets and surrounding buildings		✓				
University / Campus design							
Site Planning	Refer large scale development and institutional building design guidelines for built form guidelines for plot and building design		✓				
	Site planning should promote the sense of community derived from actively shared spaces, and provide for the enriching experiences			✓			
	Internal driveways, walkways, greens, courtyards, plazas, gardens, playfields and open spaces should be planned together using diverse elements of the campus and the context in a coherent way			✓			
	Each cluster of buildings should have both outdoor spaces in relation with indoor spaces for gatherings and social occasions		✓				
	Services should be placed on one side of plot or conveniently distributed with zones as per guidelines for large scale development plots		✓				
Heights of Structures	Height of structure should be directly proportional to width of the internal driveway			✓			
	Height of structures should depend on the prominent building of the campus and should respond to the existing structures within site context		✓				

UDAG Checklist: Built Form Guidelines

BUILT FORM GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Building Footprints	Large footprints should be avoided					
	Articulation of floor plates using indentations and creating opportunities for permeability should be encouraged.		✓			
Building with the environment						
Topography	Building located on slopes should follow a terraced form similar to the existing topography of the site	✓				
	The orientation of the buildings should encourage vistas towards spaces of prominence within the campus as well as the surrounding sites.		✓			
Views	Buildings should be oriented towards spectacular views of natural elements on site and surrounding context.		✓			
	Existing views of the neighbouring buildings should be preserved through terraced building forms.		✓			
Landscape and Streetscape	Structures should be sited and designed to form lively and secure public pathways that have surveillance from occupants throughout the day and night. The aim is to provide spaces that are defensible and used for multifunction		✓			
	Sports complex should be designed with open space which should be shared with people for public use and also easily accessible from residential areas, education zone of the campus		✓			
	The campus palate of landscape materials, walkways, lighting, signage and street furniture should be used and should reflect context with all public spaces that are part of project to convey special identity		✓			
	Secure bicycle parking should be provided in required premises of education, residential, sport complex, open spaces of public zone		✓			
Industrial						
Industrial development should support the logical distribution of buildings, parking and loading- unloading areas in an integrated way to minimize the impact of heavy vehicles in those area			✓			
Setbacks	Building setbacks should be as per Amaravati Zoning Regulations		✓			

BUILT FORM GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Services	Refer service guidelines as per plot area, stated under the site development parameter in Built form guidelines.	✓				
Plot Boundary and Edge Plantation	As per Industrial plot size, edge plantation guidelines should be followed for street frontage	✓				
	Service utilities should be separated and screened from public access points by decorative jali work and landscaping.	✓				
Building Footprint	Building footprint for ground coverage for plots as per zoning regulations	✓				
	Industrial plot layout or typology should be designed with administrative offices or shops at street frontage	✓				
	Corner plots of industrial areas should be designed with product display area and access for people	✓				
	Manufacturing units and service access to plots should be placed on rear side of plot.	✓				
Building Height and Profile	For height and profile refer built for guidelines for large scale development plot	✓				
	Maximum building height should be as per Amaravati Zoning Regulations	✓				
Plot Access	Separate service entry to manufacturing units should be provided for loading -unloading of goods	✓				
	Maximum 4 entry points are restricted to industrial plots		✓			
	Manufacturing units should be located at the rear side of the plot		✓			
	Joint access driveways to adjacent development lots is encouraged in order to maximize landscaped areas surrounding lots		✓			
	Convenient access to transit routes should be promoted through the provision of pedestrian linkages at longer and larger block lengths more than 150 m on street frontage side or higher ROW.	✓				
Plinth Level	For plinth height refer table in built massing plinth level guidelines	✓				
	Access points to parking areas should be minimized to reduce their impact on the surrounding context	✓				

UDAG Checklist: Built Form Guidelines

BUILT FORM GUIDELINES CHECKLIST						
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Parking	Location of bus parking should be provided with ease of circulation for entry - exit without disturbing school precinct	✓				
	Parking areas should be located possibly to the rear side of plot or side margin. Parking on front side of street should be minimised and only permitted to buses		✓			
	Visitors parking within plot should be under stilt within building line	✓				
	Surface parking should be allowed for heavy vehicles of services only within plot boundary	✓				
Green Roof Treatment	An area equal to 15 - 30 % of total ground cover area should be provided as green roof	✓				
	An area above to 30% - 50 % of total ground cover area should be provided as green roof		✓			
Storage Room	Storage room should be provided as per the raw material requirement of the industry		✓			
	The location of the storage facility should be at the rear end of the plot and easily accessible to the heavy vehicle entry and exit path		✓			
Open Space Within Plot	Landscape should screen parking areas from view of streets and surrounding buildings	✓				
	Buffer areas should be proposed between the industrial and residential zone in order to preserve the existing natural features within the plot as well as the surrounding areas		✓			
	40% of the open space should have tree cover. The total plantation area within the open space can be divided into smaller parts. Each part should have minimum width of 3m and cover at least 15 sq. m area.	✓				
	50 % of the green space within the industrial plot should be planted with air purifying plants for health benefits		✓			
	Buildings should meet green building requirements as outlined in built form guidelines sub chapter green building features.					
Utility Plot						
Utilities should be proposed within reserved areas as per Amaravati Zoning Regulations		✓				
Safety measures necessary for each utility should be undertaken as per National Building Code 2016 clauses		✓				

BUILT FORM GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Incentives should be provided for incorporating utilities within private plots and reducing infrastructure development load on the government			✓			
Setbacks	Building setbacks as per Amravati zoning regulations	✓				
Services	Refer service guidelines as per plot area stated under the site development parameter in Built form guidelines.	✓				
Plot Boundary and Edge Plantation	As per utility plot size, edge plantation guidelines should be followed for street frontage	✓				
	Service utilities should be separated and screened from public access points by decorative jali work and landscaping.	✓				
Plot Access	Maximum two vehicular access points should be permitted per plot	✓				
	Ground coverage for utility plots should be as per zoning regulations	✓				
	Administration blocks / offices under utility plot development should be placed along street frontage	✓				
Parking	Staff parking of administration blocks / offices should be placed within building line with stilt or basement parking arrangement	✓				
	Surface parking should be allowed only for heavy vehicles of services and utility infrastructure within plot line with buffer plantation to hide and shade such parking area /zones		✓			
Multi-Level Parking Building Within Utility Plots	Public use multi-level parking should be provided for the plots having area of 2000 sq.m and above		✓			
	For utility plots that should be dedicated only to Multi level parking, building should be multiuse with an active commercial street frontage. Terrace level food court, cafeteria or sports facilities should also be provided.		✓			
	Utility plots within TPOD zone, major parks, and waterfront canal fronts should provide multilevel parking.	✓				
Town Centre						
Town Centers should be proposed within reserved areas of town center zones as per Amaravati Zoning Regulations		✓				
For plots within TPOD zone should be refer TPOD guidelines		✓				
Setbacks	Building setbacks as per Amravati zoning regulations	✓				

UDAG Checklist: Built Form Guidelines

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Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Services	Refer service guidelines as per plot area stated under the site development parameter in Built form guidelines.	✓				
	Service utilities should be separated and screened from public access points by decorative jali work and landscaping.	✓				
Plot Boundary and Edge Plantation	Guidelines for large scale development plot should followed for plot boundary and edge plantations	✓				
Plot Access	Entry points should be welcoming and address local context creating vistas		✓			
	The design of the buildings within the town centre located at the corner sites should address the streetscape on both the public frontages		✓			
	Maximum two access points should be permitted per plot	✓				
Building Footprint	Ground coverage for plots should be as per zoning regulations					
	Town centres should have mixed use development with retail, offices, public amenities and residential typologies, with the following percentage break up – 50-70% residential 30-40% commercial Min 10% public amenities 60 % of the retail shops should have street front on the ground floor					
Building Height and Profile	Location and site development should encourage vistas to the building from the surrounding urban fabric to ensure signature status		✓			
	Entry of the building should be emphasised with grandeur and monumental scale		✓			
	Town centre plot development should have at least one building within the plot that creates identity for the town centre through its maximum height. This maximum height should be determined by Amaravati zoning regulation plan and TPOD zone		✓			
Plinth Level	For plinth height refer table in built massing plinth level guidelines		✓			
Parking	For parking refer large scale development plot guidelines	✓				
Open Spaces	Provision of 10 - 20% of plot area should be as Privately Owned Publically Accessible Spaces (POPS).	✓				

BUILT FORM GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Within Plot	For POPS detail refer waterfront and open space guidelines					
	Minimum 5% additional reserved green should be provided. Reserved green should provide min 60% tree canopy coverage		✓			
	Minimum 40% of the internal courtyards should be landscaped with plantation		✓			
	Plantation should follow MOEF guidelines.		✓			
Town Center Feeder Bus Stop	The feeder bus stop should be located within the plot boundary and along the street edge. This feeder bus stop should plan to connect city transit stop and neighborhood feeder stop		✓			
	It should be zoned within 300-500m walkable distance from the transit stop and should be on the feeder bus route		✓			
	The location should be determined after due consideration of the transport routes in the neighborhood zone		✓			
	Building entrances should be oriented towards transit stops and provide direct pedestrian access		✓			
Neighbourhood Centre						
Neighbourhood Centers should be proposed within reserved as per Amaravati Zoning Regulations			✓			
For plots within TPOD zone should be refer TPOD guidelines			✓			
Setbacks	Building setbacks as per Amravati zoning regulations	✓				
Services	Refer service guidelines as per plot area stated under the site development parameter in Built form guidelines.	✓				
Plot Boundary and Edge Plantation	Guidelines for large scale development plot should followed for plot boundary and edge plantations	✓				
Plot Access	Entry points should be welcoming and address local context creating vistas		✓			
	The design of the buildings within the town centre located at the corner sites should address the streetscape on both the public frontages		✓			
	Maximum two access points should be permitted per plot		✓			

UDAG Checklist: Built Form Guidelines

BUILT FORM GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
	Neighbourhood centre should share maximum public purpose connecting to people and community blocks to each another		✓			
Parking	For parking refer large scale development plot guidelines		✓			
Building Footprint	For building footprint refer larger scale development plot built form guidelines		✓			
	Centre should have mixed use development with retail, offices, public amenities and residential typologies, with the following percentage break up - 50-70% residential 20-40% commercial Min 10% public amenities 60 % of the retail shops should have street front on the ground floor		✓			
	Internal courtyard for open space and permeable to pedestrian movement connecting neighbourhood		✓			
	Commercial street frontage on ground floor to create public realm		✓			
PlinthLevel	For plinth height refer table in built massing plinth level guidelines		✓			
Building Height and Profile	For height and profile refer built for guidelines for large scale development plot and Town centre guidelines		✓			
Village Centre						
Location	Village center should be located possibly at the center of the village and should be easily accessible to villagers		✓			
	It should integrated with LPS layout as equally as to village		✓			
	Relationship to transit corridors should be considered		✓			
	Proportional plot size should me min 2000 sq.m and above, possibly mix use arrangement of existing buildings in context with land use		✓			
	Placement of parking within walkable distance		✓			
Setbacks	Building setbacks as per Amravati zoning regulations		✓			
Services	Refer service guidelines as per plot area stated under the site development parameter in Built form guidelines.		✓			

BUILT FORM GUIDELINES CHECKLIST						
Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Plot Access	Entry points should be welcoming and address local context creating vistas		✓			
	The design of the buildings within the town centre located at the corner sites should address the streetscape on both the public frontages		✓			
	Maximum two access points should be permitted per plot		✓			
Building footprint and massing	Refer building footprint guidelines as per plot size		✓			
	Roof and podium should provide 10-20% area of ground coverage as an intensive green (vegetated) cover		✓			
	Refer village integration guidelines for program formation and provision of facilities. Village centre should fulfil a basic necessity of public amenities of village		✓			
Plinth Level	For plinth height refer table in built massing plinth level guidelines		✓			
Building height and profile	Location and site development should encourage vistas to the building from the surrounding urban fabric to ensure signature status		✓			
	Village center should reflect village character in response to the context		✓			
	Structure should have sloping roof		✓			
Built massing	Existing height and width of historical village typology, style should be maintained with scale and proportions		✓			
	The proportions of original design elements such as rooflines, floor levels, storefronts, upper storey windows should be restored		✓			
	Generally flat or gable roofs with stepped or sloped parapets		✓			
	Commercial and office building frontage should be located as near as practical to the front setback line.		✓			
	In the case of corner buildings, this may be accomplished using angled or sculpted building corners or an open plaza at the corner.		✓			
	Coordinate Building Designs - Multiple buildings in a single project must demonstrate a positive functional relationship with one another		✓			
Parking	For parking refer built form guidelines		✓			

UDAG Checklist: Built Form Guidelines

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Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG		**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
	Parking should be provided within zone walkable distance of range 300m to 500m from village centre		✓			
	Surface parking should be avoided into parking plot. Surface parking is allowed only for heavy vehicles		✓			
	Refer utility plot guidelines from multi-level parking building		✓			
Open Spaces within plot	Provision of 10 - 20% of parcel area should be as Privately Owned Publically Accessible Spaces (POPS). For POPS detail refer waterfront and open space checklist and guidelines		✓			
	Minimum 5% additional reserved green should be provided. Reserved green should provide min 60% tree canopy coverage		✓			
	Minimum 40% of the internal courtyards should be landscaped with plantation		✓			
	Plantation should follow MOEF guidelines		✓			
Architectural facade and treatment	Quality materials and natural and earth tone colours should be used maintaining original visual character of village if possible					
	Parapet, cornice, and fascia band ornamentation should be designed as building element for village character		✓			
	Structures of historic significance or which are listed on a municipal, county, state or national historical register should comply with said municipal, county, state or national guidelines for historic structures within precinct or inside plot should be preserved		✓			
	loading and unloading areas of building services should not face public spaces along street front		✓			
	Existing or planned amenities such as parks, open space, water features or public shared streets should be architecturally articulated					
Materials and Colour	Authentic materials and quality craftsmanship should be used in restoration of heritage buildings, usually wood for structural elements, cladding, and finishes.	✓				
	New materials (or synthetic materials such as fibreglass moulds or patches) used in reconstruction should duplicate or match the original design	✓				

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Architectural and Treatment						
Building frontage and facades	Commercial and mixed-use buildings with shops at ground floor should provide up to 60 % retail frontage along the street edge.	✓	✓			
	Podium along the street edge should be treated with public or semi-public commercial activities and parking spaces should be accommodated at rear side of active frontage.	✓	✓			
	Podium heights more than G+2 should adopt stepped/terraced building profile.	✓	✓			
	In residential buildings, entrance lobby and community recreational spaces should be planned along the street frontage and locate parking at the rear side.	✓				
	All building services facing streets should be screened as part of elevation treatment	✓				
	Dead walls, window less facades should be avoided along the street edge.	✓				
	Commercial and public buildings facade treatment should reflect unique character inspired from local cultural and vernacular architectural elements to create identity	✓				
	Commercial and public buildings entrance should be grand and integrated with landscaped plazas for creating public spaces defining character.	✓				
Building frontage along public spaces	Plots with buildings facing waterfront, open space, buffer zone, major roads and public transit corridor should be designed with active frontage of the plot as mixed use development.	✓				
	These plots with development oriented towards public spaces should have direct pedestrian access with the drop off and potentially having on street parking facilities.		✓			
	These plots should also be considered for having vehicular access from the roads adjoining the public spaces irrespective of its ROW.		✓			
	Buildings should be placed at the corners or strategic view corridors to create visual focal points along the public spaces.	✓				
	Buildings orientation and position along the public spaces should be addressing the view corridors and maximizing the views towards waterfront and parks.	✓				

UDAG Checklist: Built Form Guidelines

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	The public spaces facing buildings should have colonnade character (refer TPOD guidelines for colonnade details.)	✓				
	POPS and urban squares should be placed with retail and public amenities along the public spaces. (refer Waterfront and open space guidelines for details.)		✓			
Balconies & Projections	All projection widths as per Amaravati Zoning Regulations.		✓			
	Entrance canopies with minimum vertical clearance of 4.5m from finished ground level.		✓			
	Active street frontage should be provided with temporary canopies or shading devices for creating comfortable microclimatic outdoor spaces as part of plazas.		✓			
	Building balconies should orient toward public spaces such as waterfront, open space and public transit corridors.		✓			
Services	Service infrastructure of the building should be planned on the rear side of the site					
	It should be separated and screened from public access points		✓			
	Service yards on the site should be screened with fencing or landscaping					
	Toilet vent pipes, AC comperes or box, Kitchen vent should be design preferably to rear side of building and should not be visible front street frontage side	✓				
	All service pipes should be provided within duct and with ease of access for maintenance	✓				
	All building services facing streets should be screened as part of elevation treatment	✓				
	Each tenement should have dry balcony with place for drying cloths		✓			
	The materials used for screening should act as sound barriers to reduce the noise interference due to the services and landscape elements.	✓				
Architectural Materials and Colours	Public and commercial buildings should follow: • Maximum 30% use of glazed facades for energy efficient buildings. • Maximum 40% of facade area with warm colours or locally available stone cladding should be used for highlighting the design element and character of the building.	✓ ✓				

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	• Minimum 60% of the facade area should be using cool colours or stone textured paint. • Avoid high glare intensity signage lighting such as neon lighting	✓ ✓				
Building Signage	Plot address should be displayed on plot boundary edge facing road at entry/exit points.	✓				
	Commercial hoarding/signage should be limited to 20% of building facade and should be placed according to architectural façade treatment avoiding covering of windows and doors.	✓				
	Projecting signs should not exceed more than 1 meter from building face/ building line towards street frontage.	✓				
	Way finding signage should be integrated in with building	✓				
	Avoid high glare intensity signage lighting such as neon lighting.	✓				
	Awning and canopy type signage should be installed at same level of height with minimum clear height of 2.4m from finished level of side walk.	✓				
Green building Guidelines						
General Guidelines:	All buildings should be planned in consideration of the geographic, topographic and climatic aspects of Amaravati region which is a hot and humid climate.	✓				
	The guidelines encourage the usage of locally available resources and materials.	✓				
	Buildings should plan for rainwater harvesting, reusing waste water and use energy efficient lighting systems.	✓				
	1/3rd of terrace top should be covered with PV Panels along with solar heaters	✓				
	An area equal to 15 - 30 % of total ground cover area should be provided as green roof	✓				
	An area above to 30% - 50 % of total ground cover area should be provided as green roof		✓			

UDAG Checklist: Built Form Guidelines

BUILT FORM GUIDELINES CHECKLIST							
Urban Design and Architectural Guidelines (UDAG), Amaravati Built Form Guidelines following the Principles and Strategies included in Chapter 7 of UDAG			**Mandatory**	**Suggestive**	**Comply**	**Do not Comply**	**Comments/ Remarks**
Guidelines as per building type that may follow either of the national green building norms.							
Building Type	Recommended green building minimum rating to be followed						
Residential	GRIHA	Star Rating-25-40 points, 1star (minimum range)	✓				Residential
	IGBC	IGBC: Certification Level-Certified (minimum)					
Commercial	GRIHA	Star Rating-41-55 points, 2star (minimum range)		✓			
	IGBC	Certification Level-Certified (minimum)					
Industrial	GRIHA	N.A		✓			
	IGBC	Certification Level-Certified (minimum)					
Public / Semi-public Buildings	GRIHA	Star Rating-56-70 points, 3star (minimum range)		✓			
	IGBC	Certification Level-Gold (minimum)					
Institutional Building	GRIHA	Star Rating-56-70 points, 3star (minimum range)		✓			
	IGBC	Certification Level-Gold (minimum)					

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"Any other equivalent national and international rating system with similar weightage may be followed such as • BREEAM • LEED • Any other national and international rating system.					
References for Green Building Ratings	• http://www.grihaindia.org/ • https://igbc.in/igbc/ • https://www.breeam.com/ • https://new.usgbc.org/leed				

A Collaborative “People Place and Planet” Approach

Amaravati The New People’s ‘Capital City’