National Institute of Urban Affairs

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Ministry of Housing and Urban Affairs
Government of India

Knowledge Partner
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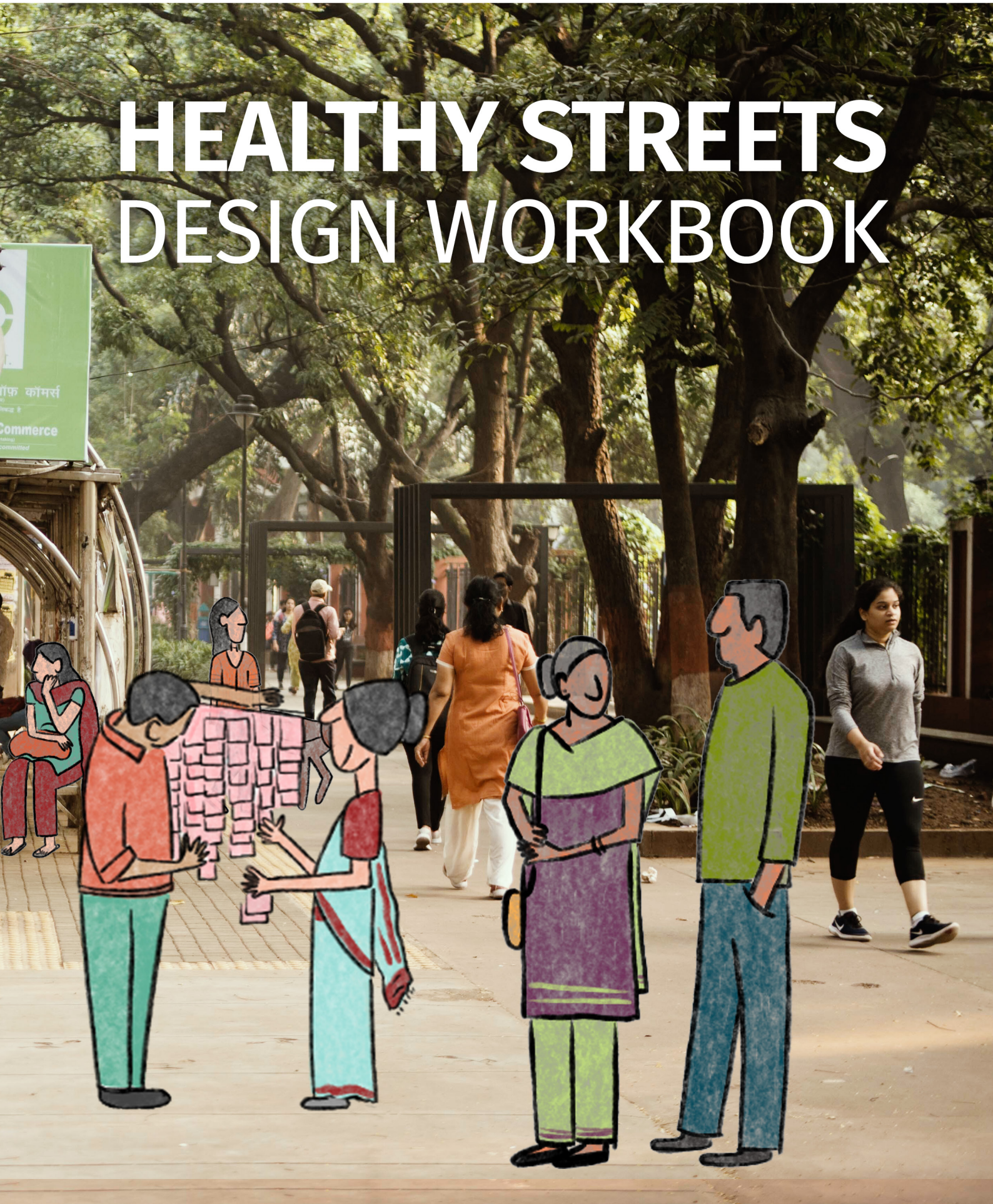
HEALTHY STREETS
DESIGN WORKBOOK



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Ministry of Housing and Urban Affairs
Government of India

The Ministry of Housing and Urban Affairs is the apex authority of Government of India to formulate policies, coordinate the activities of various Central Ministries, State Governments and other nodal authorities and monitor programmes related to issues of housing and urban affairs in the country.

Smart City
MISSION TRANSFORM NATION

The Smart Cities Mission was launched by the Ministry in 2015 to promote sustainable and inclusive cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions.

National Institute of Urban Affairs

The National Institute of Urban Affairs (NIUA) was established as an autonomous body in 1976 under the aegis of the Ministry of Housing and Urban Affairs (MoHUA). India's leading national think tank on urban planning and development seeks to provide innovative solutions to address the challenges of a fast urbanising India, and pave the way for more inclusive and sustainable cities of the future.

ITDP INDIA

The Institute for Transportation & Development Policy (ITDP) is a global non-for-profit organisation that works with cities worldwide to promote transport solutions that reduce traffic congestion, air pollution, and greenhouse emissions while improving urban liveability and economic opportunity. ITDP is represented in India by ITDP Pvt Ltd and works with governments, multilateral agencies, and civil society to make visible, on-the-ground improvements by providing technical expertise, policy solutions, research publications, and training programmes.

Message from the Minister

Hardeep Singh Puri

Minister, Ministry of Housing and Urban Affairs

Streets are crucial to the fabric of a city. They are places where the city comes alive through serendipitous interactions. They are cradles of social cohesion as people from different walks of life, hitherto unknown to each other, find a sense of community and belonging as they cross each other on a bustling morning. They are connectors where exchange of ideas happens between people, be it in the field of science, art or literature, and therefore have an undoubtedly important role in accelerating societal progress.

The ability of streets to do all of the above varies from street to street. Healthy streets, which are amenable to hassle-free access by pedestrians, provide safe environments to children, women and the elderly, provide equitable space to all modes of transport, and support vibrant community life are best suited to contribute to the city's socio-economic progress.

The Ministry of Housing and Urban Affairs is dedicated to fostering vibrant, sustainable streets that elevate the well-being of citizens. Promoting public transport, pedestrianization, cycling, and creation of vibrant public spaces is one of our topmost priorities. I welcome this handbook on design of healthy streets prepared jointly by the Smart Cities Mission and the ITDP. Thoughtful design of streets would go a long way in creating better cities which are at the forefront of contribution towards the Sustainable Development Goals. My best wishes!

Message from the Leaders

Manoj Joshi

Secretary
Ministry of Housing & Urban Affairs

Over the last eight years, the Smart Cities Mission has built the capacity of cities across the country to design and implement human-centric, vibrant streets. Cities have initiated their street transformation journeys by executing pilots & subsequently scaling up across other areas.
The Ministry of Housing and Urban Affairs, through the Smart Cities Mission, is at the forefront of this ongoing streets revolution. Transforming ideas into impactful action is important as cities champion walking, cycling, and public transport initiatives. Moreover, as cities invest in mass transit systems like metros, enhancing streets for walking and cycling becomes pivotal for efficient last-mile connectivity.

This Healthy Streets Design Workbook, jointly prepared by the Smart Cities Mission and the ITDP, offers a blueprint for thoughtful street design by compiling the finest design standards, templates for street & intersection design, material selection and more. This document will empower cities to craft safe, sustainable, and livable streets. I urge all cities to continue their efforts and serve as beacons of change for others.

Message from the Leaders

Kunal Kumar

Joint Secretary
Ministry of Housing and Urban Affairs
Mission Director, Smart Cities Mission

Good streets are the bedrock of vibrant cities, shaping how communities interact and thrive. They are more than just a bunch of pavements and crossings. They are crucial to fostering a sense of community, accessibility and aesthetics. Well-designed streets encourage active mobility, inviting pedestrians and cyclists while facilitating efficient public transport. They serve as social hubs, encouraging interactions, innovation and contribute to a city's identity.
Nurtured by the Smart Cities Mission, over 100 cities across India have been planning and implementing infrastructure to change the way in which the city moves. The right design plays a critical role in ensuring that desired impacts are achieved; such as reduced conflicts between different modes, improved road safety and increased mode share of walking, cycling and public transport, ultimately shaping a more sustainable and livable urban environment. The long-term durability of such investments on public infrastructure becomes a strong reason to get it right.

This Healthy Streets Design Workbook elaborates on key principles, the design process, guidelines, standards, street templates and other design details inspired from streets work across Indian cities. These guidelines when contextualized and used wisely by cities will assist them in accurately realizing 'Healthy Streets' on ground. Am sure, this document will play a pivotal role in supporting the scale-up of human-centric street transformation across India and other parts of the world.

Message from the Leaders

Dr. Debolina Kundu

Director (Additional Charge)
National Institute of Urban Affairs

The streets of every city are vital to urban life and foster lively interactions as well as social unity. Healthy streets, prioritizing pedestrian access, safety, equitable transport, and vibrant community life, significantly contribute to a city's socio-economic advancement. Beyond mere pathways, well-designed streets enhance community well-being and connectivity, enhances the sense of place, fostering pride and identity among residents. It serves as a canvas for cultural expression and social interaction, creating a more dynamic and cohesive community. Economically, the impact is profound. Streets designed for accessibility and aesthetics attract businesses, tourism, and investment. They become hubs of economic activity, supporting local enterprises and bolstering job opportunities. In essence, a meticulously planned street transcends its physical function, evolving into a nexus for social, cultural, and economic exchange, thereby shaping a city that is not only functional but also resilient, vibrant, and deeply connected to the needs and aspirations of its inhabitants.

To achieve this, effective street design plays a pivotal role. This Healthy Streets Design Workbook will act as a strong tool to build the capacity of all relevant stakeholders in the street development ecosystem involved in the decision-making, planning, designing and execution of sustainable, resilient, and future- ready streets. I hope that this guideline helps create a solid foundation for all those involved in scaling up sustainable transport infrastructure across Indian cities.

Message from the Leaders

Aswathy Dilip

Managing Director
ITDP India

In 2020, India kickstarted a walking and cycling revolution through the India Cycles4Change and Streets4People Challenges. Over the last two years, more than 100 cities have embarked on the journey towards creating 'Healthy Streets, Healthy Cities, Happy Lives'. Cities like Pimpri-Chinchwad, Surat, Aurangabad, Jabalpur, Kohima and more, have demonstrated impactful implementation of Healthy Streets.

Through this journey, these cities have adopted the test-learn-scale mantra and embraced a participatory approach towards implementing permanent street design projects. The cities hosted various national-level campaigns; Freedom2Walk&Cycle Challenge, Placemaking Marathons, World Bicycle Day Campaign, to catalyse behavioural change, build the capacity of city officials, raise awareness for Healthy Streets and more.

As cities are now in the process of scaling-up their efforts, learning from the extensive works of Indian cities, the Healthy Streets Design Workbook is a guiding document for city officials, practitioners, educators and other stakeholders involved in various aspects of the street design process.

Contents

List of Acronyms

Acronym	Full-form
BRT	Bus Rapid Transit
BRR	Bus Route Roads
EV	Electric Vehicle
HS	Healthy Streets
IRC	Indian Roads Congress
IPT	Informal Public Transport
MRT	Mass Rapid Transit
MUZ	Multi-Utility Zone
MoHUA	Ministry of Housing and Urban Affairs
MoRTH	Ministry of Road Transport and Highways
NIUA	National Institute of Urban Affairs
RfP	Request for Proposal
RoW	Right of Way

About the Workbook

Historically, streets served the purposes of mobility, social interaction, and commerce. However, recently, the purpose of streets has been reduced as conduits for the movement of motor vehicles, paying little or no attention to other users on our streets - pedestrians, cyclists, people doing businesses and more.

This vehicle-centred approach to planning and designing streets has multiple consequences, like traffic congestion, parking issues, increasing pollution, rising road accidents. Evidently, people also face adverse impacts on their health, well-being, and safety in our cities today.

There is an urgent need to re-look at streets that not only enable people's movement across the city but also as places where people walk, talk, cycle, shop, and perform a multitude of social functions that are critical to the health of cities and citizens. Such streets are a good indicator of a developed nation.

Over the last decade, multiple Indian cities including Chennai, Pune, Coimbatore, Delhi, and Bengaluru have started reimagining their streets as public spaces and implemented impactful pilot projects. Through the India Cycles4Change and Streets4People Challenges of the Smart Cities Mission, Ministry of Housing and Urban Affairs, in partnership with ITDP (Institute of Transport and Development Policy) India, over 100 cities have embarked on this journey to make our streets safe and enjoyable for walking and cycling.

Through their journey, cities have embraced the vision of 'Healthy Streets, Healthy Cities, Happy Lives'. These cities are now gaining momentum towards building on-ground infrastructure, expanding the existing network and making long-term commitment towards building a walking and cycling-friendly environment.

Healthy Streets are the streets where everyone - be it an eight-year old or an eighty-year old - can move safely, comfortably, and breathe clean air.

The Healthy Streets Design Workbook elaborates 5 on:

- Key principles that make a Healthy Street.
- Process of designing Healthy Streets.
- Design guidelines and standards.
- Material palette.
- Street cross-section templates.

Pashan-Sus Road, Pune

1

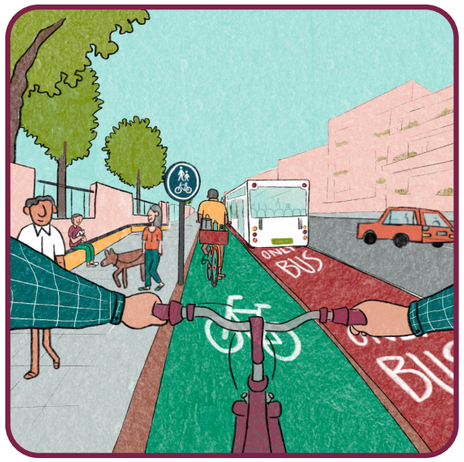
Introduction

1.1 What is a Healthy Street?

A Healthy Street prioritizes safe and comfortable mobility for all the citizens through walking, cycling, and public transport, promoting clean and healthy transportation modes.

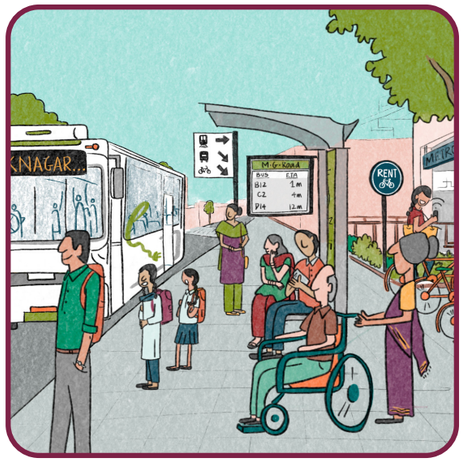
Such streets are characterized by features that encourage physical activity, social interaction and environmental sustainability. Elements like wide sidewalks, bike lanes, greenery, and public spaces contribute to a sense of community.

A healthy street should have the following -



Fair share of road space to every citizen

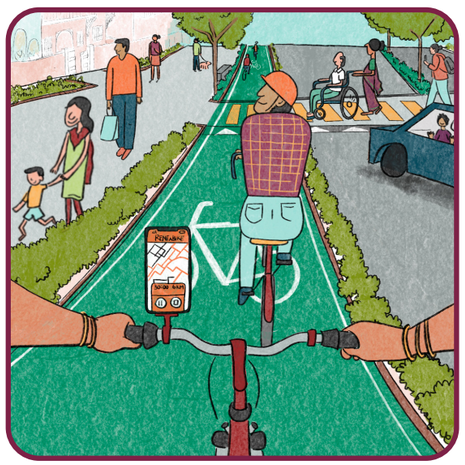
Priority to Eco-friendly transportation modes



Easy access to Public transport

Place to stop, rest and play

Safe to cross



Preference to walking and cycling

Active street edge

The design adapts to climate change

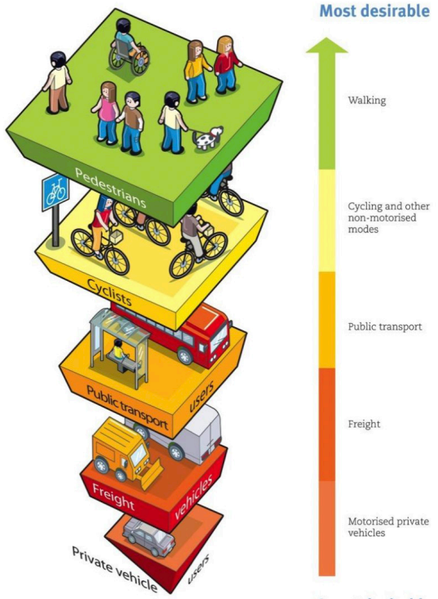
1.2 What are the Principles to design a Healthy Street?

There are 3 key design principles that must be considered when designing a healthy street cross-section.

A Healthy Street that is designed on these principles will ensure :

- Equity - To include all groups of people, especially the vulnerable and the marginalised
- Sustainability - To promote clean vehicles and reduce carbon emissions and pollution
- Quality of Life - To promote dignity and improve the quality of life for everyone

1.2.1 Prioritise space for walking, cycling and public transport



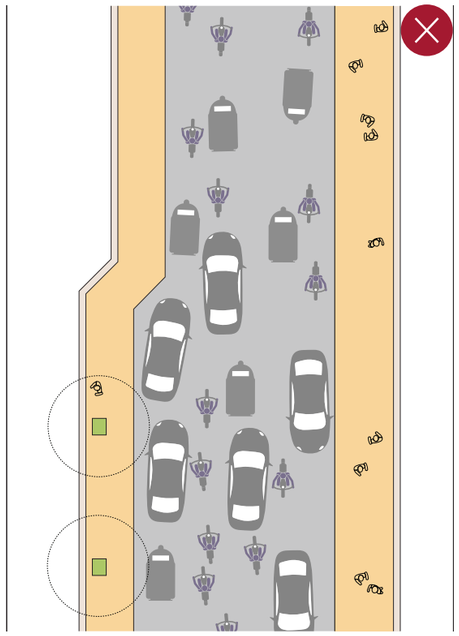
By priortizing limited street space for walking, cycling and public transport, cities can ensure that all citizens can move around their communities efficiently, affordably, and on time.

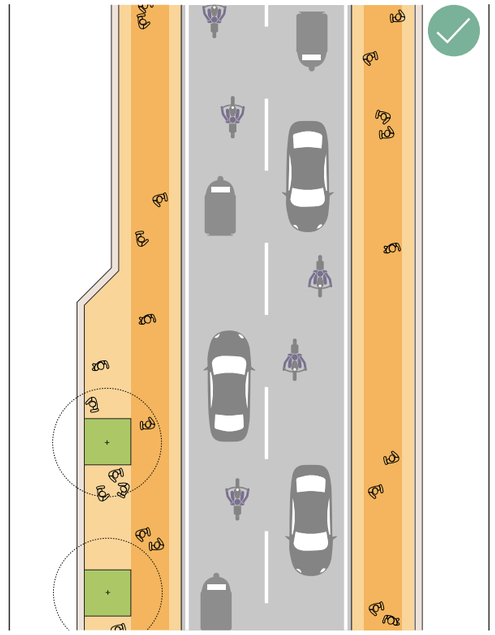
It promotes a healthier and more active lifestyle by encouraging walking and cycling. An efficient public transport system not only reduces individual transportation costs but also lowers a city's overall carbon footprint.


ITI Road, Pune

1.2.2 Maintain uniform carriageway width for one street

Varying carriageway width encourages overtaking in wider sections causing bottlenecks and congestion in narrow parts. Consistent carriageway width ensures smooth traffic flow.





1.2.3 Compact intersection design and crossings.

Implementing compact intersection design and appropriately positioned crosswalks not only enhances pedestrian safety and the smooth flow of vehicular traffic but also reduces congestion and lowers accident rates, resulting in a more efficient and secure transportation system.


D. B. Road Junction, Coimbatore

1.3 How to plan a Healthy Street Network?

A healthy streets network is a interconnected system of urban streets designed to prioritize the well-being of users, promoting walking, cycling, and other non-motorized modes of transport. This can be achieved by ensuring that people have access to all necessities at a travel time of 15 minutes or less. It requires integration of mix-use development and transport sytem.

Cities can create such networks through city-level or area-level Non-Motorized Transport (NMT) plans and Bicycle plans, which involve designing dedicated lanes, pedestrian-friendly zones, and efficient connectivity to encourage active transportation reducing reliance on motorized vehicles.

Refer IRC:SP:118 for more details on how to plan and evaluate a Street Network.

1.3.1 Understanding Street Typology

To plan greenfield development effectively, it's advisable to define a street typology network. Based on their function, carrying capacities, permissible speeds, and physical characteristics streets are classified as: .

Arterial Streets connect various parts of the city. These streets encourage movement of through traffic on a continuous route across the city. They have high traffic volume and high vehicle speeds of upto 60kmph. In a greenfield development, ROW width for an arterial street can be considered between 30 - 50m.

Collector Streets connect the arterial streets to local streets. A collector street provides connection between different neighbourhoods within a locality. In a greenfield development, ROW width for a collector street can be considered between 15 - 30m.

Local Streets provide access to buildings in a neighbourhood. They are not meant to provide through-movement for vehicles. They carry low traffic volumes and have lowest speed limits of upto 30Kmph.In a greenfield development, ROW width for a local street can be considered to be ≥15m.

Location : Silvassa

1.3.2 Planning Street Elements

Element	Arterial Street	Collector Street	Local Street	Remarks
Right of Way (For Greenfield Development)	50-30m	30-15m	≥15m	
Segregated footpath	✓	✓	+	Design speed to be 15kmph on RoW ≥9m with no footpath
Segregated cycle track	✓	✓	+	Should be on streets with RoW ≥21m
Multi-Utility Zone (MUZ)*	✓	✓	+	
On-street Parking	+	✓	+	Should be in service lane if provided on arterial streets
At-grade crossings	✓	✓	✓	
Bus Stops	✓	✓	+	
Dedicated Bus Lanes	+	+	✗	
Service Lane	+	✗	✗	
Speed Limit	Upto 60 kmph	Upto 40 kmph	Upto 30 kmph 15 kmph where no footpaths	
Carriageway	**Carriageway width should be maximum of 50% of the total Right of Way as per IRC:SP:118-2018**			
Lane width	3-3.5m	3-3.5m	3m	

Table 1: Street elements and their presence on Arterial, Collector and Local Streets

✓ Should be present + May be present ✗ Should not be present

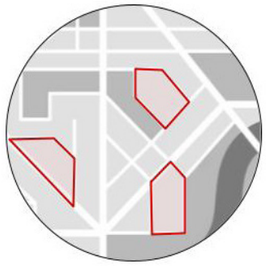
*MUZ - It serves as a flexible area designed to accommodate various functions and utilities like water supply and sewage, green spaces and amenities like street furniture and lighting.

1.3.3 Create Small Block Sizes

A block is a piece of land (a plot, or multiple plots) surrounded by publicly accessible streets on all sides. A highly dense street network will have a smaller block size which creates multiple route options to reach from point A to point B in a locality, thus making it possible to take the smallest route possible. A neighbourhood with a smaller block size is usually encourages walking and cycling owing to shorter travel distances and route options.

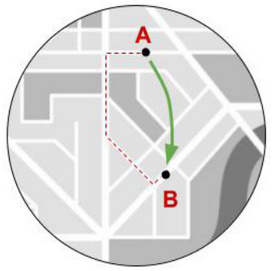
Block sizes can be analysed using following parameters:

Block Perimeter
It is the maximum distance a person has to walk to complete a round around the block. Block perimeter should be between 500-600M, with one side between 125-150M



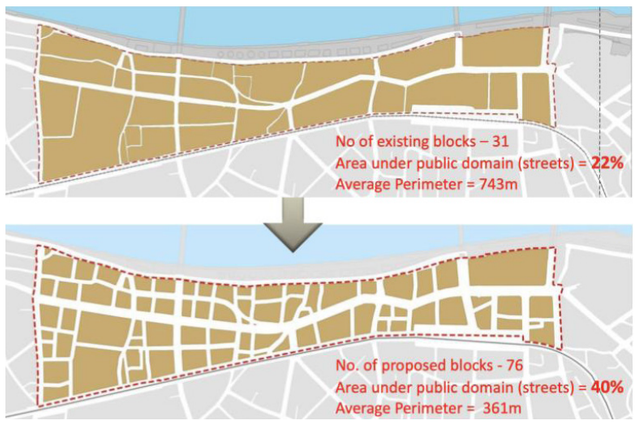
Pedestrian Route Directness
Pedestrian Route Directness (PRD), is the ratio of the actual distance required for a person to reach from point A to point B, as opposed to the direct distance between the two points.

PRD = Actual distance travelled/straight line.
PRD is recommended to be less than 1.15 for walkable neighborhoods



Creating small blocks in a Brownfield Scenario

It is possible to create compact blocks in a brownfield scenario too. In a such a case, planning of street network has to be done through a Local Area Plans. Planning exercise should consider potential redevelopment, plot ownership, street widths, and land use.



Ashram Road LAP, Ahmedabad | Image Source: HCPDPM Pvt. Ltd.

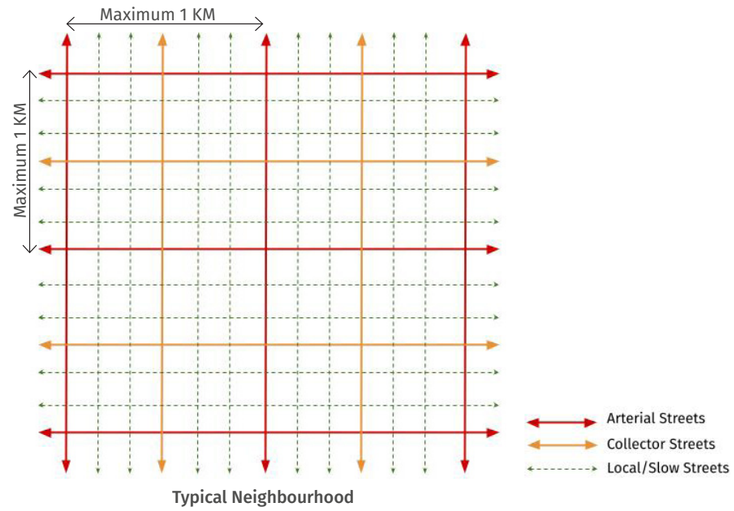
Compact street networks can be developed in a brownfield scenario by:

1. Creating linkages through large land parcels like maidans, universities etc, to facilitate walking and cycling access.

2. Carving streets through property setbacks - as and when property is redeveloped.

Creating small blocks in a Greenfield Scenario

For greenfield planning exercise, streets can follow a gridded pattern, to create an ideal network of arterial, collector and local streets to achieve a walkable and cyclable block size.



Typical Neighbourhood

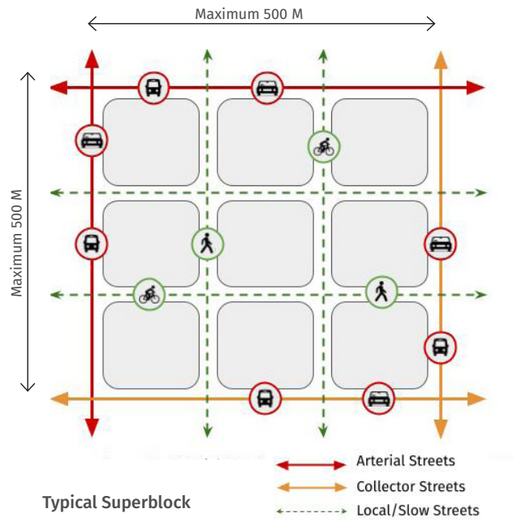
Arterial streets should not be more than 1km apart, while collector streets should not be more than 500m apart.

Local streets should not be more than 150m apart - which will help in achieving an ideal block size.
Greenfield planning can be facilitated through a two tiered planning approach - through Development/Master plans, and town planning schemes.

1.3.4 Create Traffic Circulation Plan

Low traffic neighbourhood can be created through planning Superblocks. Superblocks redirect high-speed and heavy traffic to designated roads, ensuring the safety and accessibility of local streets for pedestrians and cyclists. Low traffic neighbourhoods in London have not only promoted a healthy 'walk & cycle' lifestyle, but have also reduced the risk of accidents due to higher speeds. Such neighbourhoods exist in the busiest parts of London, where congestion and air polllution was a major issue. Today, people can breathe cleaner air and travel without the fear and stress of traffic.

By creating superblocks, Barcelona has achieved a better walking & cycling network, better access to public transport, more public green spaces and an overall economically competitive city.
Superblocks, or low traffic neighbourhoods can be created by rerouting heavy and motorised traffic on arterial and collector roads. Neighbourhood local streets are strictly the thoroughfare of active modes, while providing access to cars and other motorised vehicles to enter buildings only. This can be achieved by diverting motorised traffic by the use of bollards, while allowing movement for people and cycles.



Typical Superblock

Example of a street network of Bogota Superblocks

1.4 How to implement a Healthy Street?

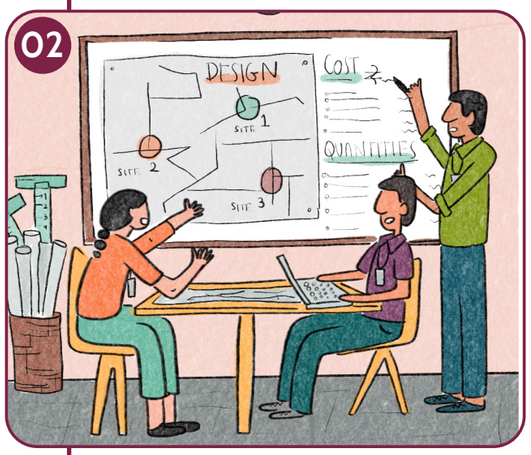
It is important to engage with citizens from all walks of life - different income groups, genders, ages, abilities - throughout the process of planning, designing, testing, and implementating a Healthy Street. Continued communication with the citizens ensures that the city is engaged, informed, and eventually persuaded to embrace Healthy Streets.

Setting up an Apex Committee - ensuring participation from government departments, utility regulators, experts and civil society, can help towards achieveing a collaborative approach amongst all stakeholders. This committee can develop the Healthy Streets Policy, Parking Policy, review designs and monitor the progress of all Healthy Streets projects in their city.

Build the foundation

Cities can initiate various capacity building initiatives for city engineers to ensure good quality street design. Contextualising the Healthy Streets Design Workbook for the city will ensure best practice standards are met.

In the initial phases where city teams require guidance, they can hire a qualified consultant (urban designer) using an RfP with stringent qualification criteria. The Urban Local Body can then help the designer identify streets to commence designing. The cities shall also proactively allocate budget towards street improvement and inform the State of such requirements annually.



Ensure a participatory design process

Designing streets should start by gathering various stakeholders to understand the changes needed for Healthy Streets in our cities. It's crucial to raise awareness about the need for street improvements and enable ownership among citizens. Urban Local Bodies should carry out the design and implementation process by regularly organizing public participatory discussions to involve the community in decision-making and ensure a site-responsive transformation.

Test the conceptual design

Conceptual designs should be tested on-ground to capture real-time impact and citizen feedback. The testing should be documented using photographs, videos, blogs, to analyse the impact of the design.

Using simple, low-cost materials like pots, planters, traffic cones, paint, chalk, tapes, traffic cones, etc that are readily available help understand the impact of the design quickly.

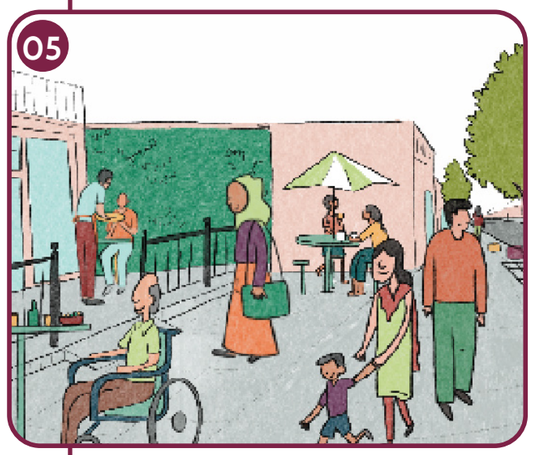
Refer the guide to capture learnings.

Implement the detailed design

Upon evaluation of the on-ground impact, improved detail drawings should be prepared, including cost estimates for the Bill of Quantities, and tender documents to hire a contractor for implementing the design on-ground.

Regular site visits should be scheduled by the city working teams to monitor construction accuracy and to address any issues that may come up during implementation.

Refer the implementation guidelines.



Prepare for scale-up

Upon permanent implementation of a Healthy Street design, it is important for the city team to assess the usability of the street before and after designing to understand the gaps and inform the upcoming projects.

More streets can then be identified to test in the coming months. This leads to long-term outcomes towards creating a walking and cycling-friendly city.

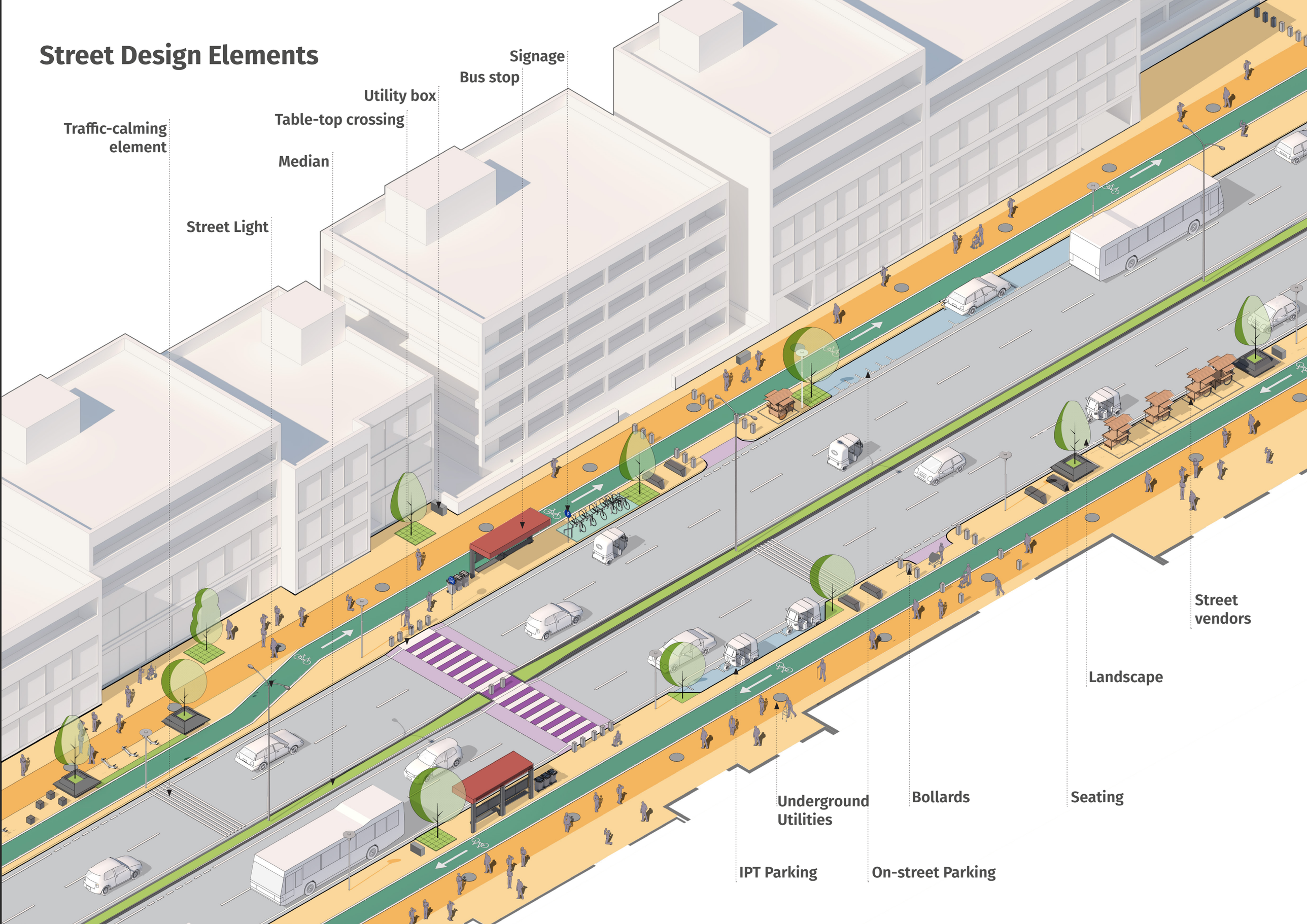
Refer the test-learn-scale guide.

F. C. Road, Pune

2

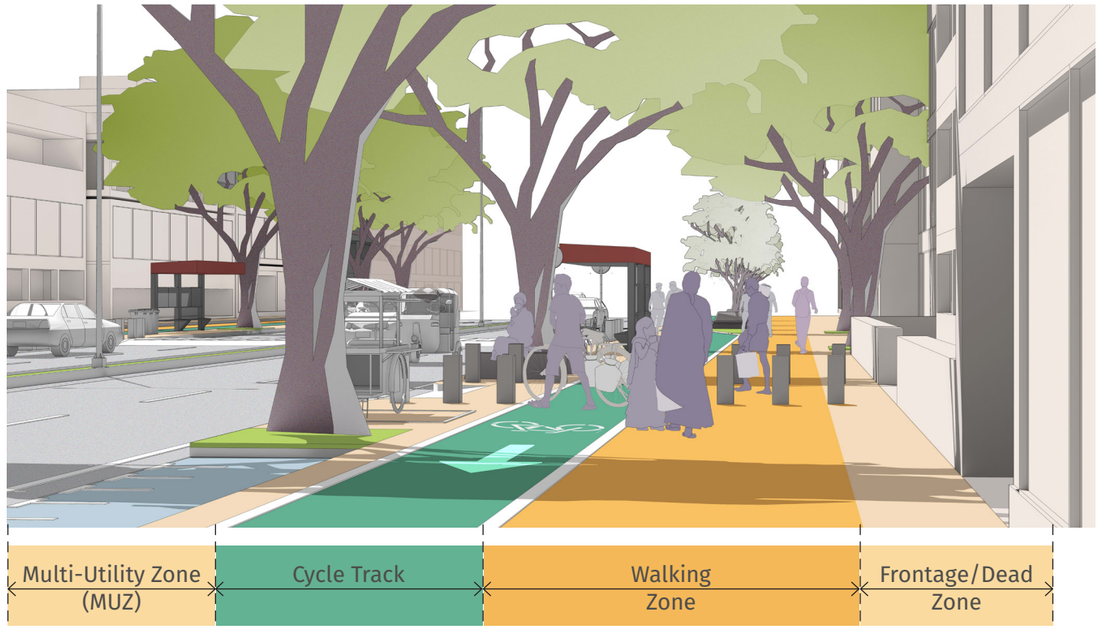
Street Design Elements

Street Design Elements



2.1 Footpaths

Footpaths are vital to ensure people can walk safely and comfortably. Segregated footpaths enhance connectivity, improve safety & comfort and ensure accessibility for all pedestrians, including all genders, ages, abilities. They activate streets and boost businesses by providing places for people to walk, stop, sit, meet, talk, shop and eat.



Footpath Zones

Frontage/dead zone

Space adjoining the property edge that acts as a buffer from the boundary wall and can contain any spill-over activities, like waiting crowd at shops. It allows for an unobstructed walking zone.

Walking zone

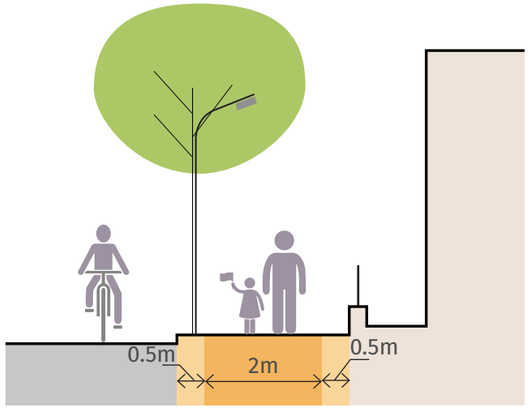
Continuous one-level walking space, free of any obstructions, and ensuring a clear height of 2.4m above the finished level of footpath throughout.

Multi-Utility Zone (MUZ)

Space to provide facilities like street furniture, bus stops, IPT (Informal Public Transport) stands, landscape, children play equipment, street signages, street lighting, telecom and electric boxes, on-street vending, on-street parking, and other public utilities.

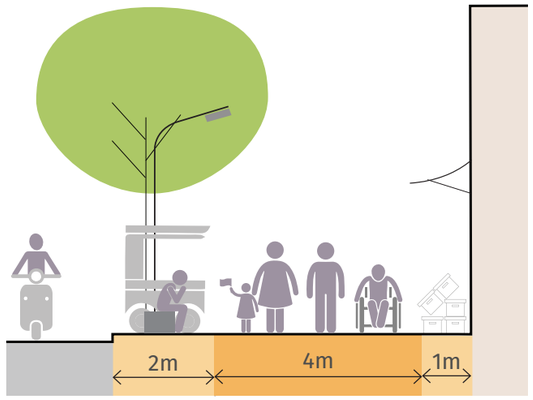
Aundh-Ravet Road, PCMC

Width



Residential Streets

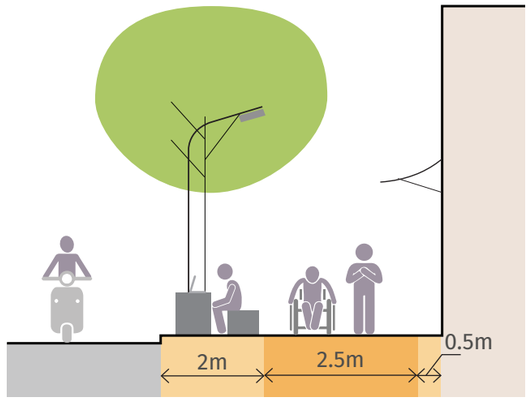
Frontage zone	minimum 0.5m
Walking zone	minimum 2m
Multi-utility zone	minimum 0.5m



High-intensity pedestrian footfall

Areas such as markets, shopping streets, transit nodes, religious nodes, railway/metro stations, bus terminals, witness a high-intensity pedestrian footfall.

Frontage zone	minimum 1m
Walking zone	minimum 4m
Multi-utility zone	minimum 2m



Commercial Streets*

Frontage zone	minimum 0.5m
Walking zone	minimum 2.5m
Multi-utility zone	minimum 2m

*Streets with shopfronts & offices.

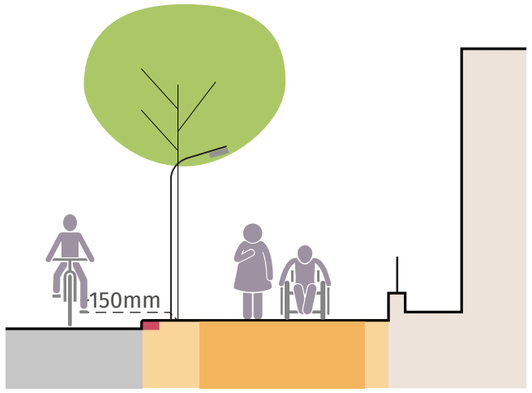
Local streets ≤10m RoW*

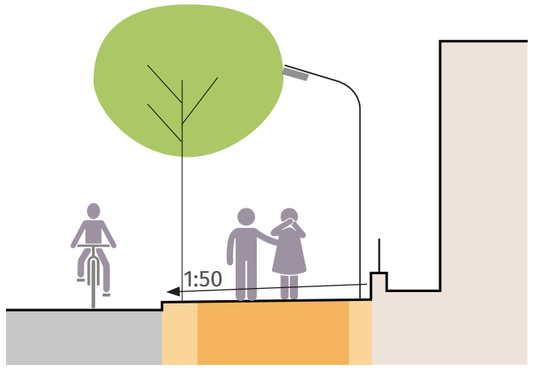
Streets with RoW ≤ 10m may be designed as shared streets. MUZ can be optional or provided as discontinuous patches.

*Refer Chapter 3 street templates for 6m & 9m.

Based on the availability of alternate routes and RoW width; streets with high-intensity pedestrian footfall can be considered as pedestrian-only streets or pedestrian mall that allows only walking, cycling and public transport.

Height & Gradient





Height

Top of the kerb should be 150mm high from the finished carriageway surface to prevent mounting of vehicles & ensure comortable walking for all.

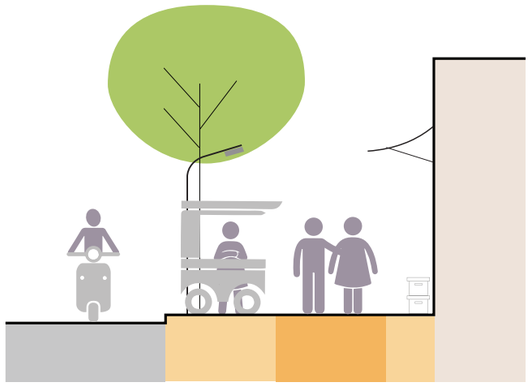
Gradient

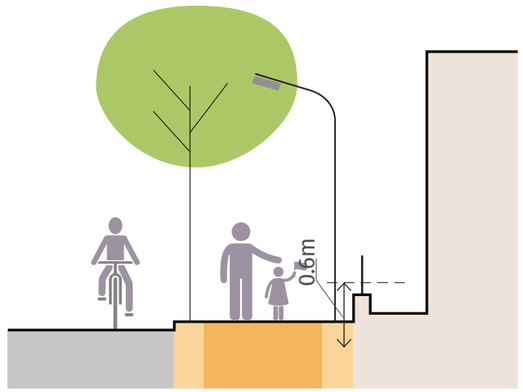
Recommended gradient of 1:50* should be maintained for surface runoff.

*Footpath height to be 150mm at kerb edge

Eyes On Street

Active street edges, featuring shop facades and vendors, or transparent boundary walls, contribute to a sense of safety. The “eyes on the street” aspect offers informal urban surveillance, as illustrated in the figure below.





Public building-use

Ensure a welcoming and open atmosphere along public building-use street edges, which can be hindered by the presence of compound walls.

Private building-use

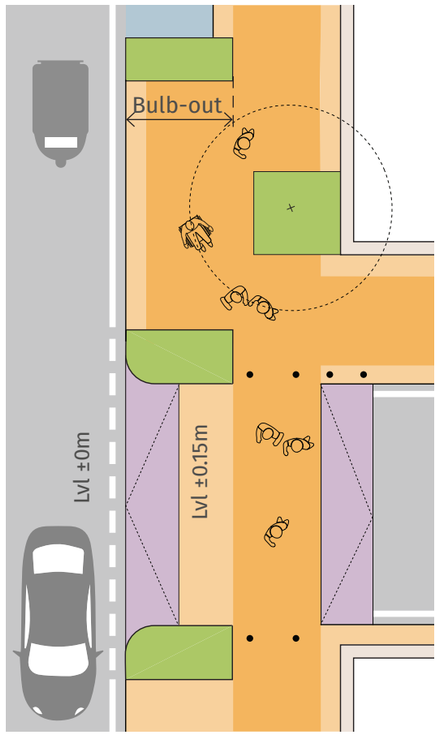
Private buildings should have boundary walls that are transparent above the height of 0.6m or brightened with graffiti if opaque.

Compound walls should be discouraged for street edges having public building-use.

Instead, consider designing seating and interactive spaces where the compound wall is present. It fosters more open and engaging environment which enhances both the aesthetics and safety of the area.

J.M. Road, Pune

Continuity Across Streets & Fixed elements

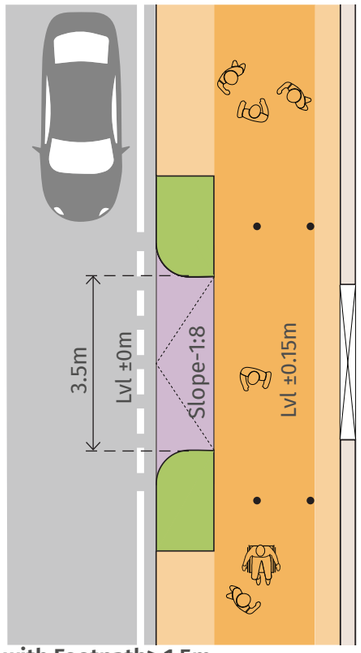


Footpaths should continue across local streets as table-tops with ramps for vehicle access.

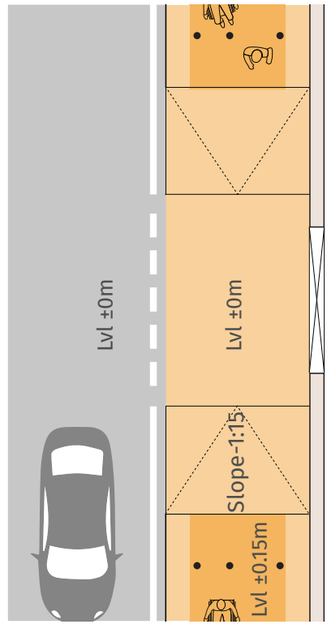
Bulb-outs in MUZ
If there are permanent obstructions, a clear 2m wide walking zone should be maintained through bulb-outs in the MUZ.

A clear wide footpath with vendors in MUZ in Smart Janpath, Bhubaneswar
Image Source - Elements Creative India

Continuity Across Property Access

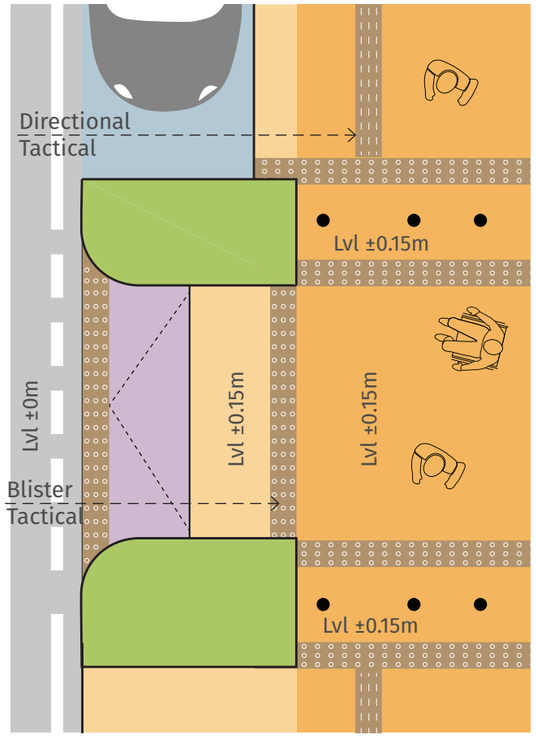


Streets with Footpath≥ 1.5m
Vehicle access ramp should have a slope of 1:8, and should not be wider than 3.5m to avoid parking encroachment.



Streets with Footpath <1.5m wide
Footpaths should slope down at 1:15 to accommodate property entrances.

Street Navigation for the Visually Impaired



Surface material should be anti-skid such that any breaks in the surface (like drainage channels, expansion joints) are not more than 10mm wide.

Visually impaired pedestrians need guidance while walking to find their way, overcome obstacles, and cross safely. Tactile pavers should be laid 600mm away from the edge of any obstacle to avoid collision as shown in the figure.*

*Detail specification of tile design can be referred in IRC:SP:117

Flared ramp

JM road, Pune. Image source - Oasis Designs Inc

J.M. Road, Pune

2.1.1 Landscape

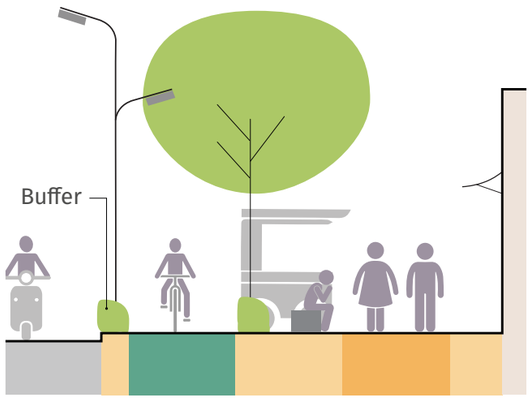
Landscape improves user comfort by providing shade while also enhancing the aesthetics of the streets. It also creates an opportunity to reduce stormwater runoff by directing it into landscaped areas and tree pits. Landscape elements such as shrubs should be only provided when there is adequate walking space.

Existing trees should be retained, new trees that suit the local climatic conditions should be planted. An integrated plan of street lights, signage and trees should be prepared to ensure tree foliage does not cause a hindrance to wayfinding and lighting.

Landscape/horticulture experts should be consulted to ensure appropriate details suitable for local context. Refer IRC:SP:119, IRC: SP 50 and IRC: SP 42 for more details.

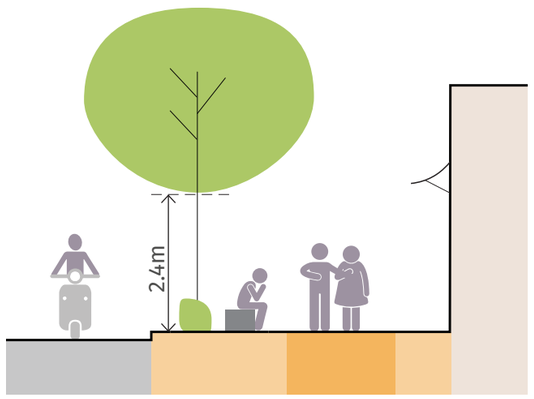
Tree pits along the road, Ring Road, Delhi. Image Source - Oasis Designs Inc

Location & Vertical Clearance



In the MUZ
Landscape elements should be placed in the MUZ to serve shade for walking, cycling, seating, vending, and other activities.

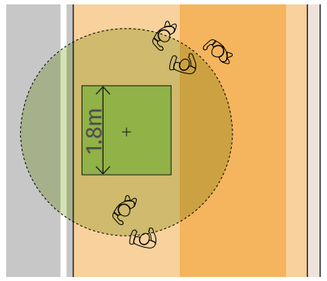
As a protective buffer
Trees and low-height shrubs can be used as a buffer between various modes of transport.

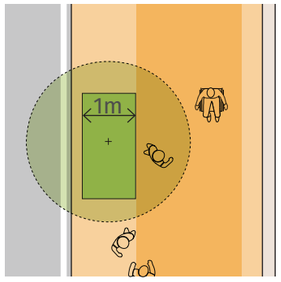


Vertical Clearance
Vertical clearance of 2.4m from the finished footpath level should be maintained by regular pruning; for safe pedestrian movement and ensure the foliage does not block street light and signage.

Tree Pits


DP Road, Pune
Image Source - Elements Creative India





As per IRC:SP:119-2018, the centre-to-centre distance between tree trunks shall be >15m for large trees, >10m for medium trees, and >6m for small trees.

However, the distance can be adjusted based on the canopy size to ensure continuous shade.

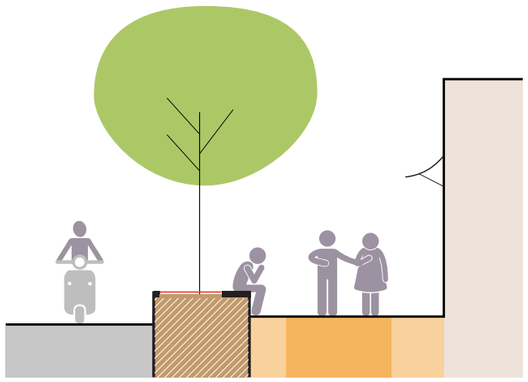
As per IRC:SP:119-2018, size of the tree pits should be at least 3.3 sq.m.to accommodate roots at full maturity.

It can be achieved keeping minimum of 1.8m as one dimension for large trees or minimum 1m internal dimension for medium height trees.

Tree grating

Surmountable tree gratings in level with the finished footpath surface should be used to ensure appropriate width of the walking zone, for narrow streets and when retaining existing trees.

The grating gaps should be perpendicular to the movement of wheelchairs, with contrasting colour bands along the edges for accessibility.[2]



Raised tree pits

Tree pits raised to the height of a standard seating may be provided around trees with exposed roots, ensuring provision for water percolation.

Tree pits should be located in the MUZ, ensuring there is no obstruction to the walking zone.

DP road, Aundh, Pune

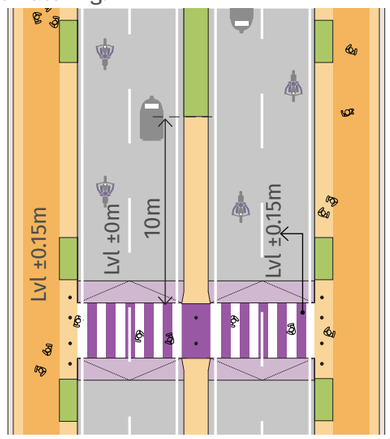
At least 100 trees shall be planted, per planting row, per side within one kilometre distance, as per IRC:SP:119

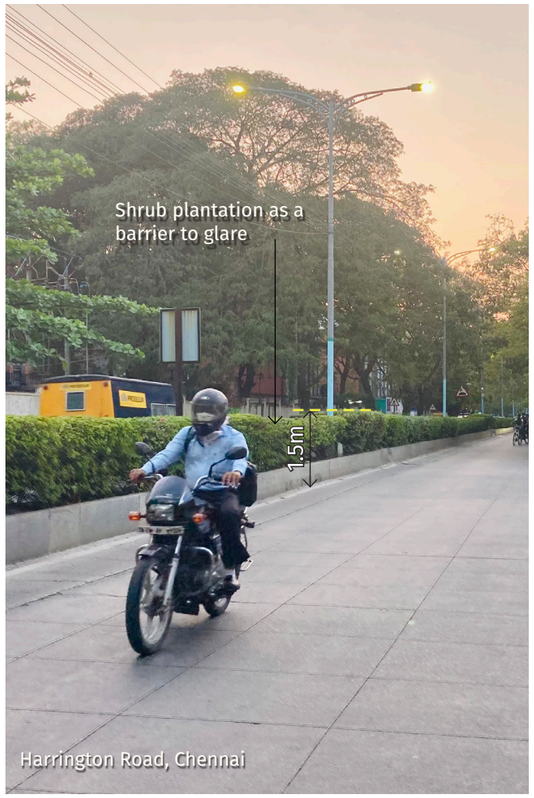
Right of Way	Minimum no. of trees/km
<35m	200
35-45m	300
46-60m	500
61-120m	700

Refer street template of 21m RoW representing two rows of tree plantation & 9m RoW representing one row.

Shrub Plantation

To sustain green spaces, methods such as drip irrigation and underground tanks can be employed for efficient watering.





At Median

At midblock crossings, shrub plantations should be discouraged within 10m from the pedestrian refuge to improve visibility for pedestrians specially children.

Shrubs up to 1.5m in height should be planted in medians to minimise headlight glare from the opposite direction. When the available clear width of landscaped area in a median is more than 1m, a row of small or medium trees can be planted.

Traffic island

Plantation in traffic island should be avoided. In areas with a low water table, roundabouts can include bio swales and detention ponds.. Dense clumps of large shrubs or low-branching trees should be avoided to maintain visibility across the carriageway.

In larger traffic islands, high-branching, well-pruned trees can be planted, ensuring a clear height of 4.5 m from the carriageway level.


Palanganatham, Madurai

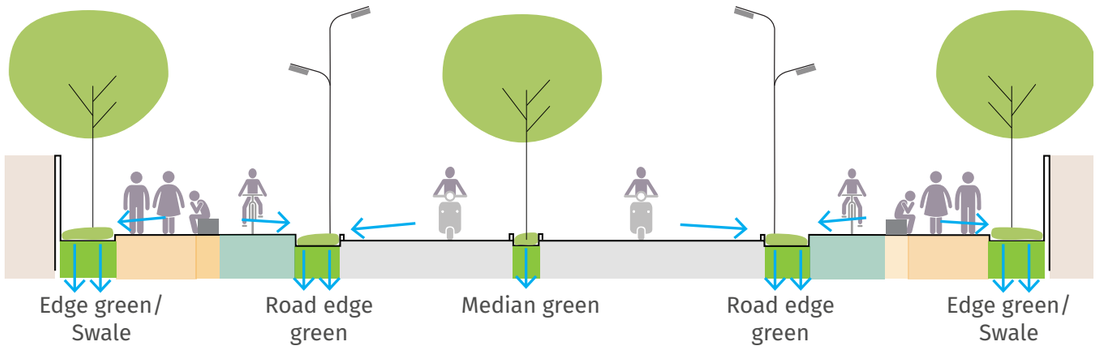

J.M. Road, Pune

Native grasses or hedges should be planted within all tree pits, unpaved areas, and medians to prevent dust resuspension. Large shrubs near signages should be avoided as a lack of short-term maintenance could interrupt wayfinding and access to information.

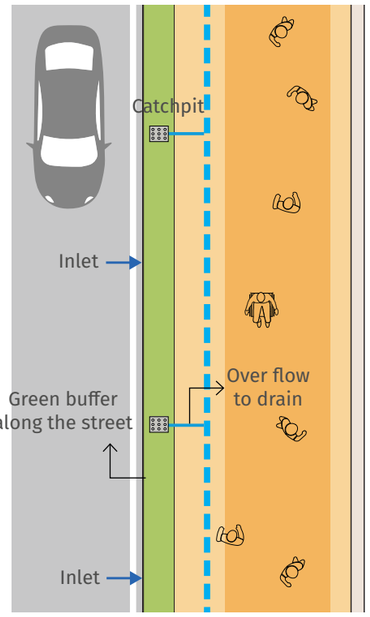
Storm Water Management

Effective stormwater management on streets is crucial to prevent flooding, safeguard water quality, and ensure the overall resilience of urban infrastructure.

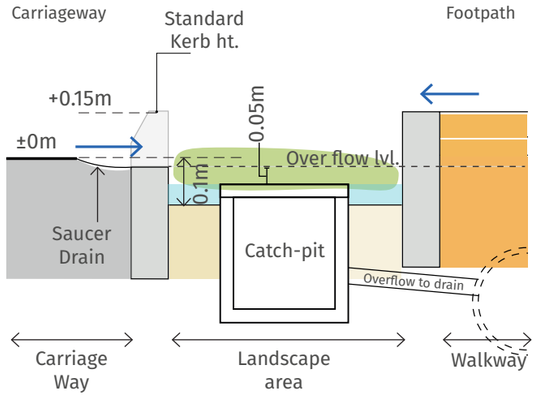
Tree pits along the road on Ring Road, Delhi. Image Source - Oasis Designs Inc


Edge green/ Swale | Road edge green | Median green | Road edge green | Edge green/ Swale

Kerb Side Detail



Refer IRC:SP:50-2013



Road edge green with catchpit

Catchpit provided in adjacent green strip allows extra water to go to near by drain through underlay pipe.

Catchpit manhole cover should be minimum 0.1m above the soil bed and 0.05m lower than the road level.

Water Filteration

It involves strategically planting vegetation alongside roads to capture and filter stormwater runoff. The green buffer serves as a natural filter, trapping pollutants and promoting infiltration, thus enhancing water quality and mitigating the adverse effects of urban runoff on local ecosystems.

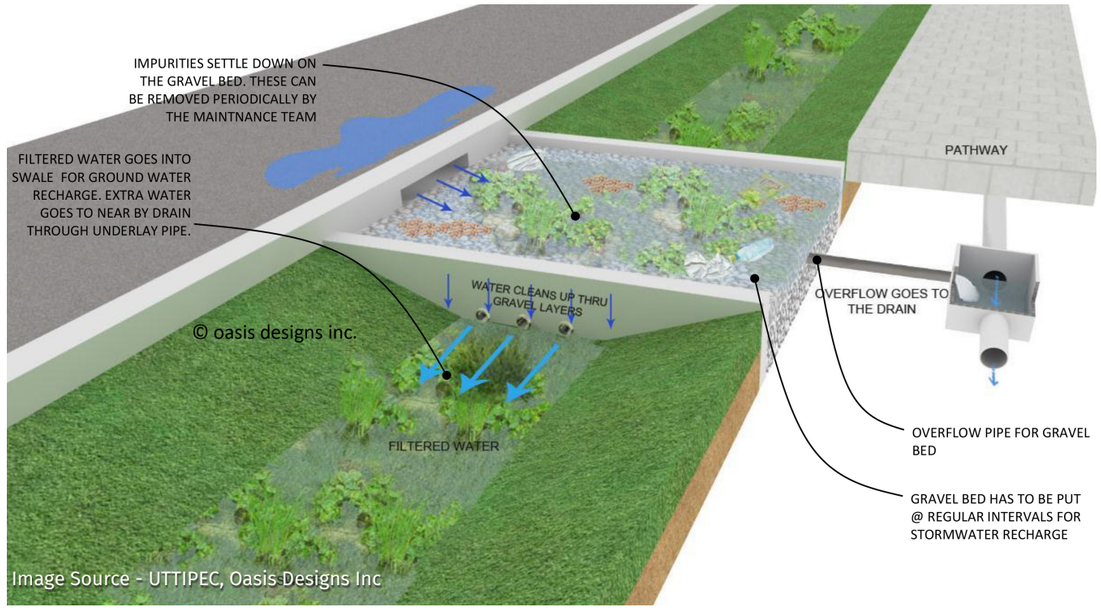
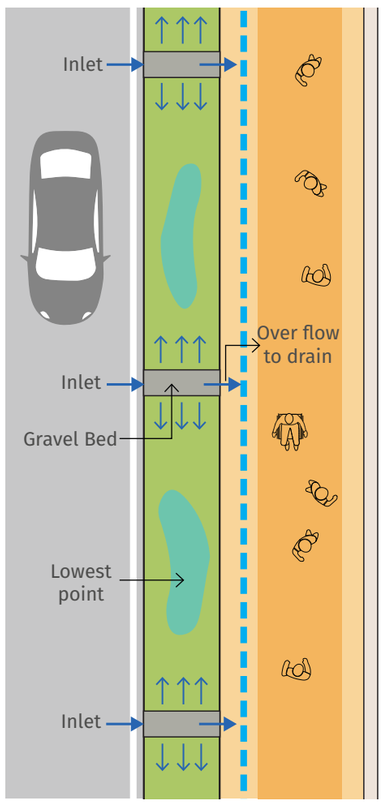


Image Source - UTTIPEC, Oasis Designs Inc



Swale

A swale is a shallow, vegetated depression to manage stormwater runoff, promoting infiltration and reducing erosion.

Rainwater flows into the gravel trench, where it gets filtered. The filtered water then goes into the swale. Any excess water from the swale flows into the drain beneath the pathway.

It can be implemented alongside streets, parking lots, landscaped buffers or wide green spaces.

Width of the swale shoud not be less than 0.9m and depth should be 0.6m with an ideal slope ratio of 2-5%.

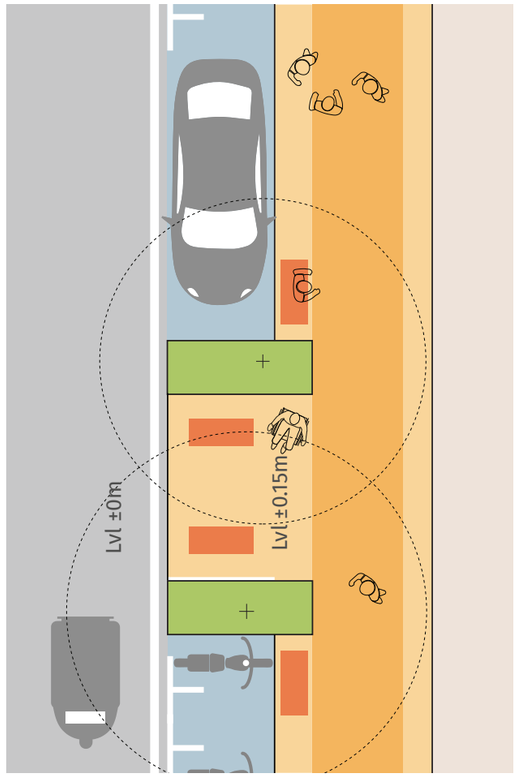
2.1.2 Street Furniture

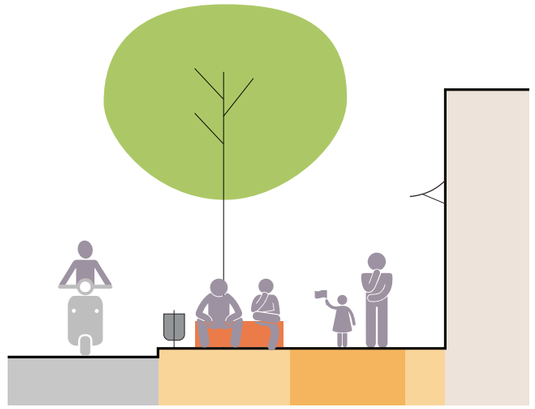
Street furniture comprises items like benches, playground equipment, bollards, railings, streetlights, and signage. These elements provide seating, recreational opportunities, and a platform for social interaction.

When selecting street furniture, it's crucial to prioritize the quality and durability of materials. Regular maintenance is essential. Street furniture design should emphasize safety, aesthetics, easy access for repairs or replacements, cost-effectiveness, and resistance to vandalism.

All street furniture should be located in the MUZ to avoid obstruction in the walking zone. The layout of furniture should be such that it is universally accessible and convenient to use and maintain.

2.1.2A Seating

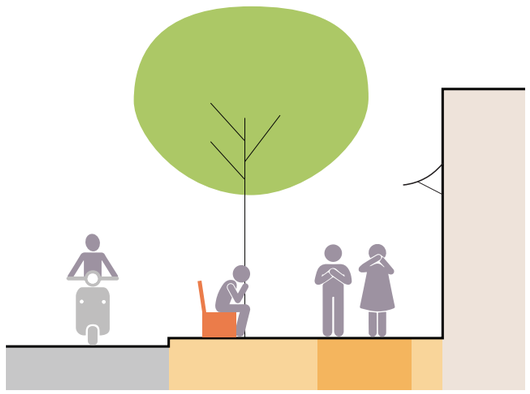




Orientation

Streets with wide MUZ (>1.5m) can have a group seating layout perpendicular to the direction of pedestrian movement.

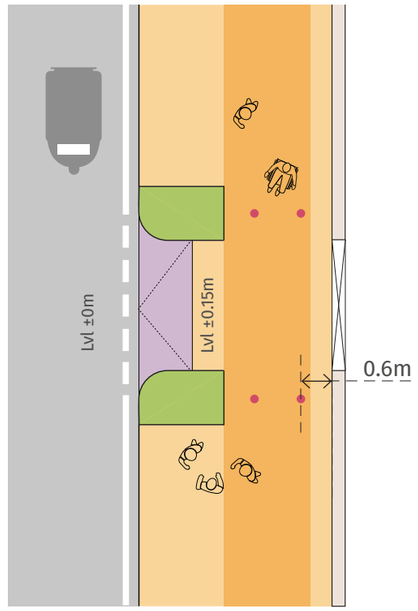
Streets with narrow MUZ (<1.5m) can have a linear seating layout along the direction of pedestrian movement.



Design

Seats may have backrest and armrest.
Height and depth of seats should be 450mm (excluding backrest). They should be well shaded either natural or built.

2.1.2B Bollards



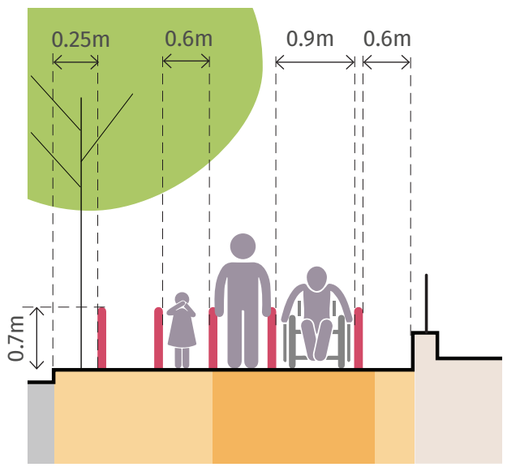
Location

Bollards should be provided at locations where vehicle encroachment is possible, such as property entrances, pedestrian median refuge, and table-top crossings.

Height
Bollard height should be minimum 0.7m for footpaths.

Spacing
Clear width for footpaths should be 0.6m; 0.9m for wheelchair access should be provided near the building edge.
Bollard outer edge should be placed 0.25m away from the footpath kerb edge and 0.6m away from the building edge/boundary to ensure proper fixing.

Reflective tapes
Bollards with minimum 1000 mm high should be identifiable by using contrasting colours with the provision of reflective tapes as per IRC:103.



Reflective tapes
Bollards with minimum 1000 mm high should be identifiable by using contrasting colours with the provision of reflective tapes as per IRC:103.


Reflective tapes on bollards at Binny road, Chennai

2.1.2C Railings

Location

Railings should be avoided on streets, as it obstructs access on and off the footpath. This obstruction can impede pedestrian movement and compromise safety by limiting the ease of entry and exit.


Encroachment along the railing in Anna Salai, Chennai

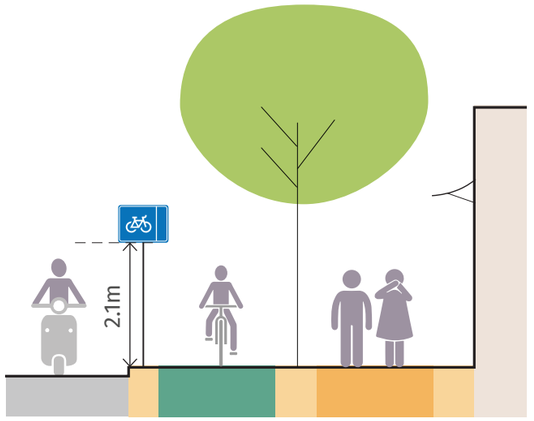
Placement

Railings may be provided near schools, it should be located 0.25m away from the footpath edge and should have a height of 0.7m. This safety measure helps protect pedestrians, especially children, by preventing accidental falls onto the road.

In the case of streets where on-street parking is provided, the parking provision will act as a barrier eliminating the need for railings.


Railing along the bus stop hinders the access to buses in P. H. Road, Chennai

2.1.2D Signage



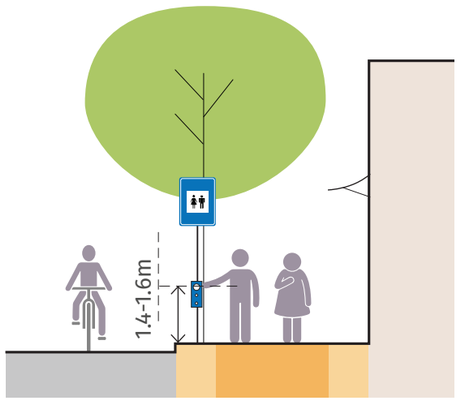
Location

Signage should be located at 0.25m from the kerb edge with minimum 2.1 m vertical clearance from the finished footpath level to the bottom of the signage board.

Multiple informatory signs can be combined on a single pole to reduce clutter.

All signages shall adhere to the specifications mentioned in IRC: 67 - 2021


J. M. Road, Pune



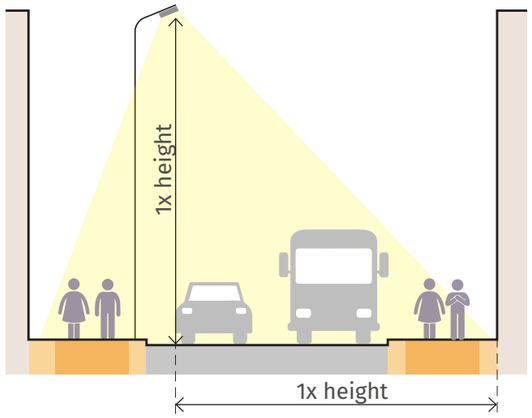
Braille Signage

Braille sign boards* should be located between 1.4-1.6m from finished footpath level.
*For signage design details, please refer to IRC:SP:117

Orientation

Signage should be placed perpendicular to the line of traffic, on the left side of the road with clear visibility.

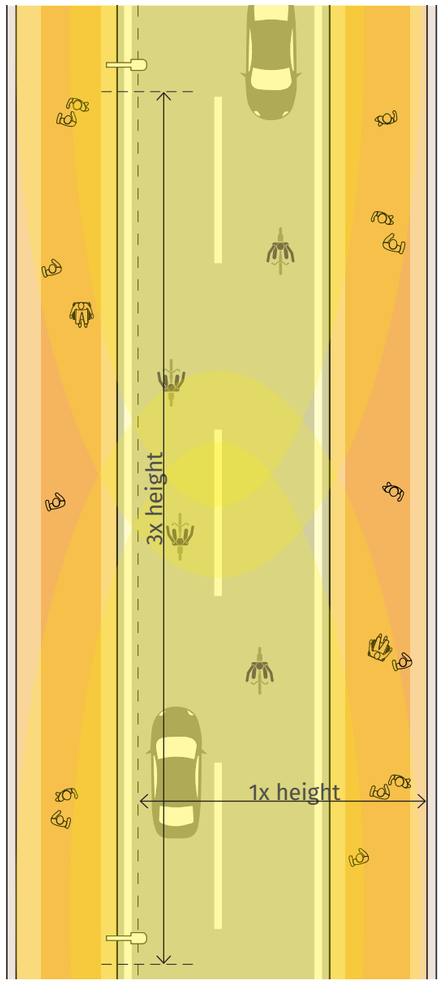
2.1.2E Street Lights*

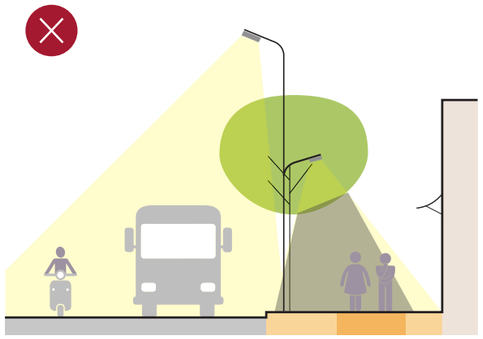


Light Fixtures

LED light fixtures are recommended for low energy consumption. Warm white LED light is preferred. 25-30 lux levels of lighting should be available on the footpath as per IRC 103.

Street lights should be placed in a way to illuminate the street surface, minimising glare and light pollution.





Landscape & Lighting

An integrated plan of street lights and trees should be prepared to avoid any obstruction to streetlight.

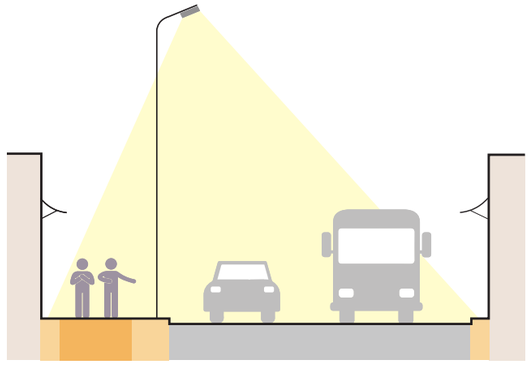
Height

Light poles should be no higher than 12m so as to avoid undesirable illumination of private properties.

Spacing

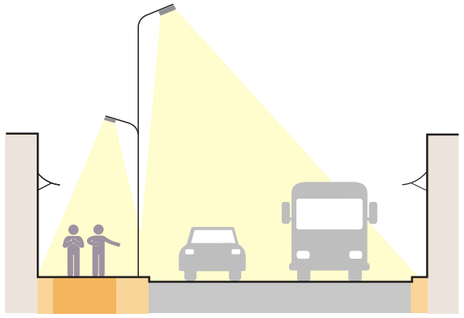
Spacing between two light poles should be about 3 times the height of the fixtures to ensure full coverage.

*These guidelines are generic recommendations. A lighting consultant may be engaged to contextualise these, determine the necessary lux levels, and develop detailed designs.



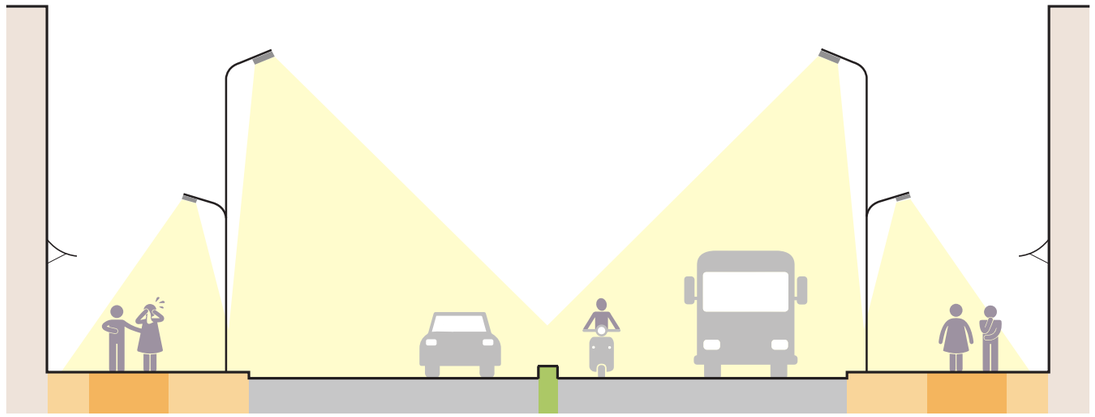
Placement on RoW ≤ 12m

A single light in the MUZ can be used if it illuminates the entire RoW.



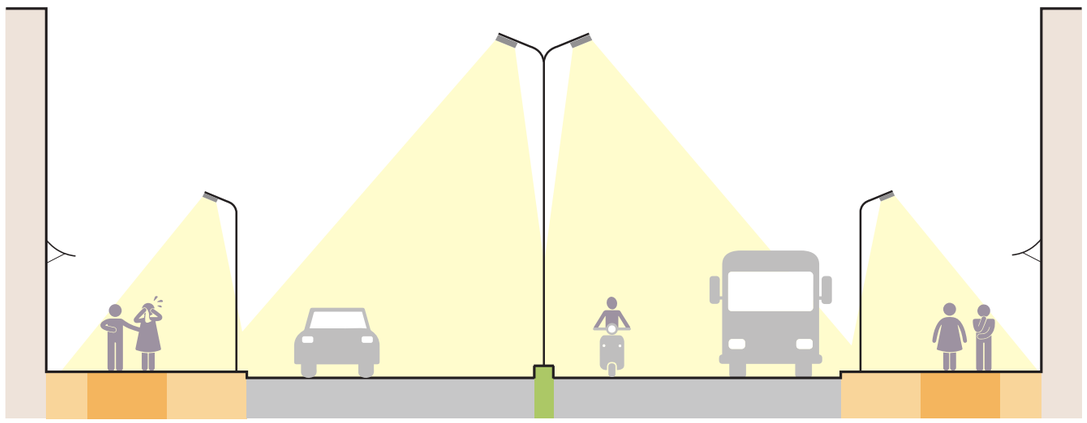
Placement on RoW ≤ 12m

Else, a pedestrian light should be fixed at a lower level to illuminate the entire edge.



Placement on wide streets

Pedestrian and street lights can be combined in a single pole in the MUZ to avoid clutter, provided there is proper illumination.



Median poles can be used for the carriageway and pedestrian lights should be provided separately.

Pondy Bazaar Pedestrian Plaza, Chennai

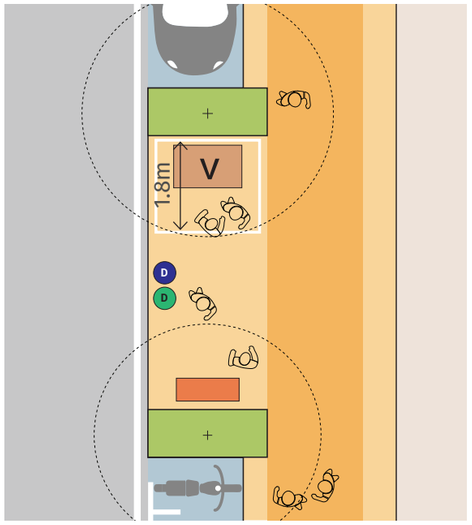
Chennai's Pedestrian Plaza has a 25 m Right of Way, out of which footpaths occupy 15m.

Being a commercial street with heavy footfall, 7.5m wide footpaths on each side provide the much needed space for people to walk, stop, rest, shop and more!

2.1.3 Street Vending

Street vending provides for an important social space and serves as a form of security for those walking on the street, especially women. The National Street Vendors Act, 2014 makes it mandatory to accommodate vending areas in street design, ensuring provisions for spillover. A spatial plan for street vending can be formulated, contributing to enhanced personal security through the presence of street vendors.[3]

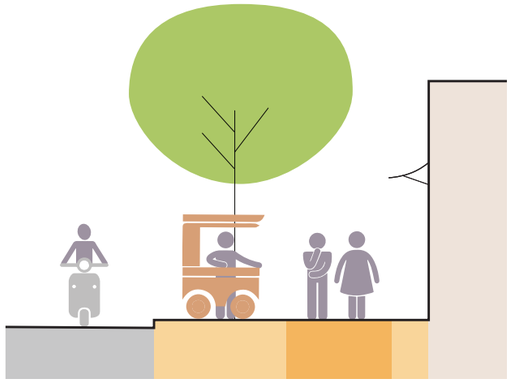
Location & Design



Design

A typical vendor space of 1.8m x 1.8m (including spillover space) should be clearly demarcated in the MUZ.

Public amenities like water taps, electricity points, and dustbins should be provided accordingly. [3]



Location

Street vending activity should be located in the MUZ to avoid any obstruction in the walking zone.

Demarcated vending spaces should be provided where there is an existing demand, especially near high footfall zones.

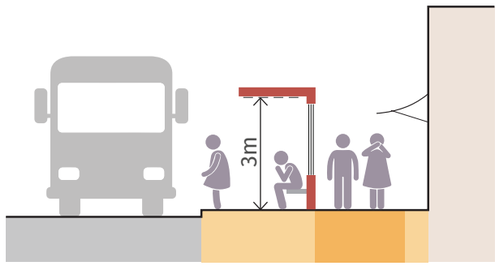
Vendor obstructs the walking zone in Pune

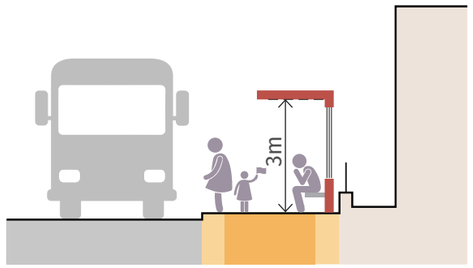
A clear wide footpath with vendors in MUZ in Smart Janpath, Bhubaneswar
Image Source - Elements Creative India

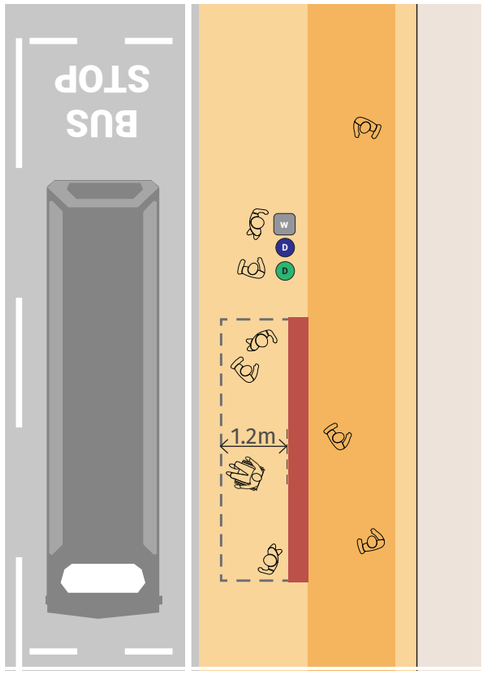
2.1.4 Bus Stops

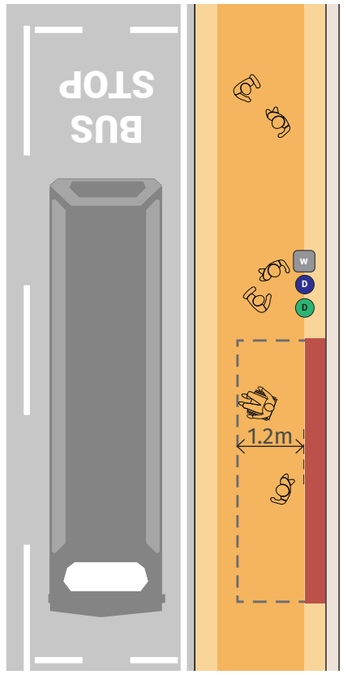
Bus stops provide safe and comfortable waiting spaces. They should be located such that they are easy to identify and do not obstruct the walking zone. Bus stops should be placed such that buses can pull-over in their original path and do not need to get into a niche (bus bay), thus ensuring smooth movement of traffic. A typical bus stop shelter should be 9mx2.5m in size. The length of the bus stop should be determined based on the number of buses and expected volume of buses using the stop. For seamless multi-modal integration, relocate the existing bus stops wherever necessary to the nearest public transport interchange options. Ensure the placement of new bus shelters in closer proximity to other modes of public transport.

Location









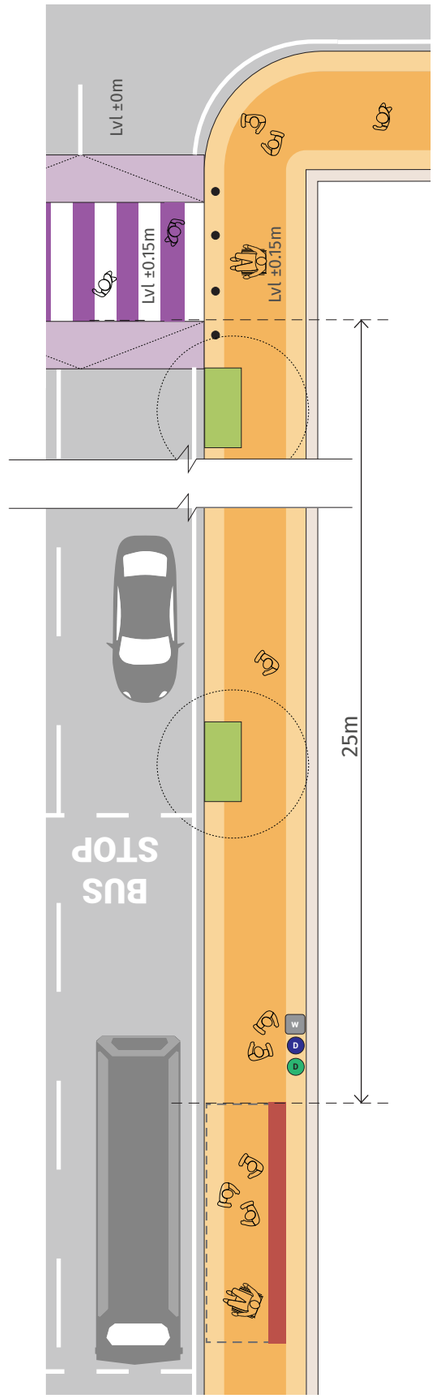
Footpaths >4.5m wide

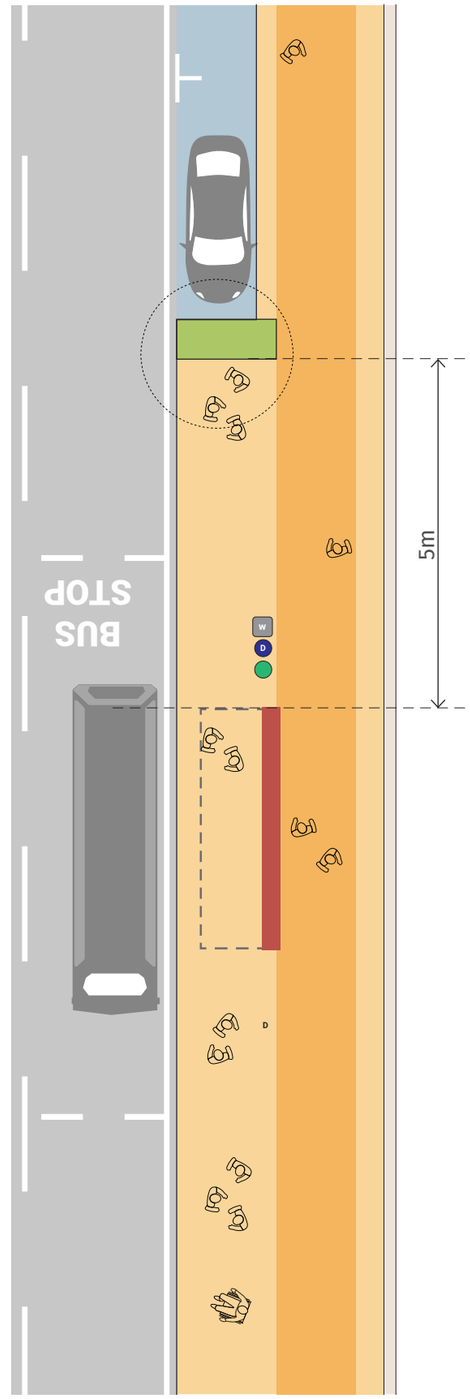
For footpaths > 4.5m wide, bus stops should be in the MUZ.

Footpaths <4.5m wide

For footpaths < 4.5m wide, bus stops should be pushed to the wall to ensure sufficient space in the front for walking zone.

Distance from Junctions and Parking





Distance from Junction

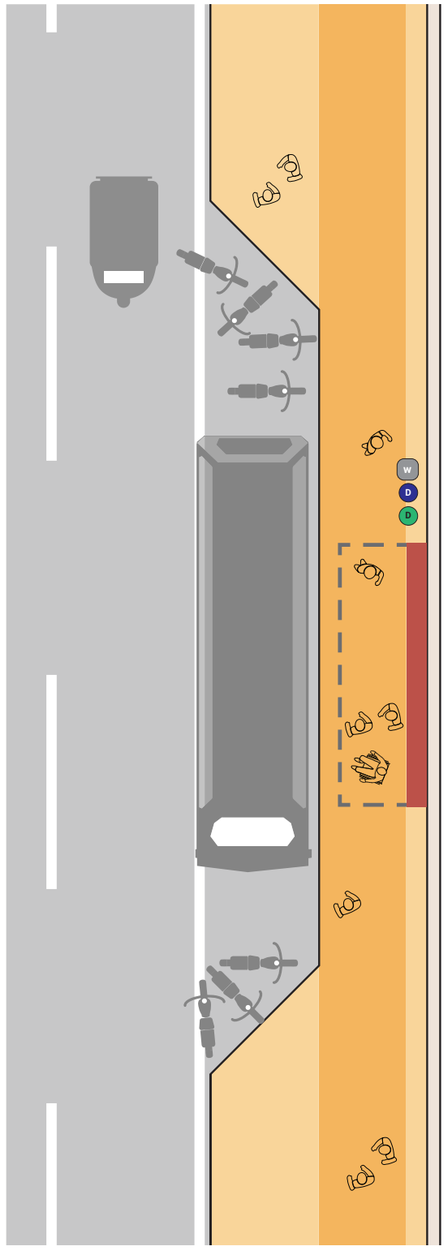
Bus stops should be located 25m from junctions with safe pedestrian crossings at the intersection.

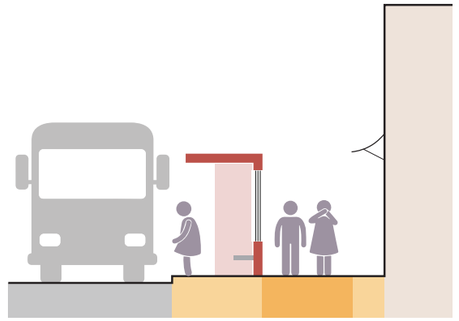
Distance from parking bay

There should be no parking 5m before and after the bus stop to allow space for vendors, signage, and other needs.

J.M. Road, Pune

Design





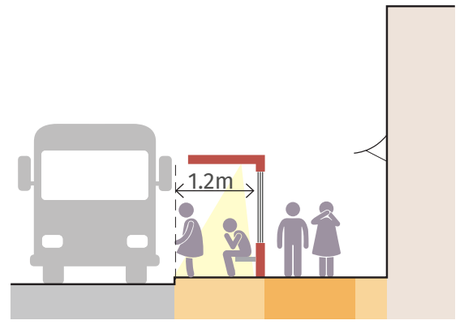
Accessibility

Bus stops should be easy to locate, and should display information maps, up-to-date route number, direction of travel, major stops and helpline perpendicular to pedestrian movement on footpaths>4.5m wide and parallel to pedestrian movement on footpaths <4.5m wide

Bus stops should be at the same level as footpaths, and railings should not be provided along the kerb edge, as it obstructs the lighting path. In cases where the bus stand's elevation is not on the same level from the walkway or pathway, it is recommended to have two separate ramps for boarding and alighting.

Bus Bay

Bus bays should be avoided on urban streets as they make it difficult for buses to enter and exit bays with high volume, low speed traffic and may be occupied by parked vehicles.
Therefore, it's advisable to provide bus bays primarily on high-speed routes such as urban expressways and highways.



Comfort & Safety

There should be sufficient shade (recommended permanent roofing) and light with a clear waiting space of 1.2m wide in front of the shelter, having a seating to ensure comfort.

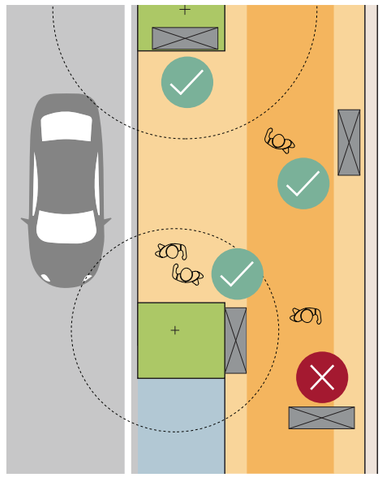
The back panel of the bus stop should be transparent to ensure safety.

2.1.5 Utilities

Designing utilities on urban roads involves strategically planning infrastructure such as water supply, sewage systems, electricity, storm water pipes, telecommunication networks, etc.

The placement of above ground and underground utilities at the appropriate locations ensures unconstrained movement of pedestrians & cyclists and provides easy access for maintenance. Utilizing common utility ducts for multiple services can be adopted due to its installation and maintenance advantages.

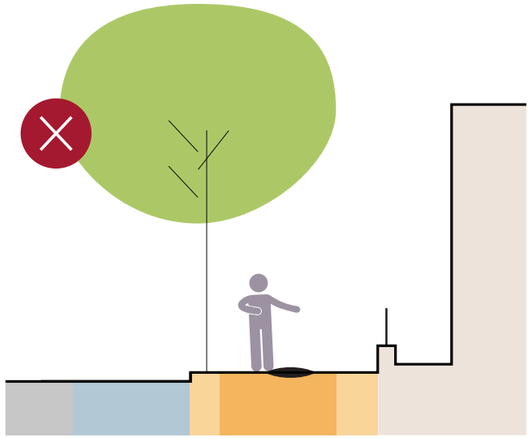
Above-ground utilities



Utility Boxes

Utility boxes should be located in the frontage or MUZ, where available. They should be placed ensuring that there is no physical and visual obstruction in the walking zone and along street edges.

Utility box with metal box enclosure, Aundh-DP Road, Pune.



Manholes

Manhole covers should preferably be located in the MUZ.

Especially in cases, where manhole covers have to be located in the walking or cycling zone, they should be at the same level as the finished surface of the footpath as shown in below figure.

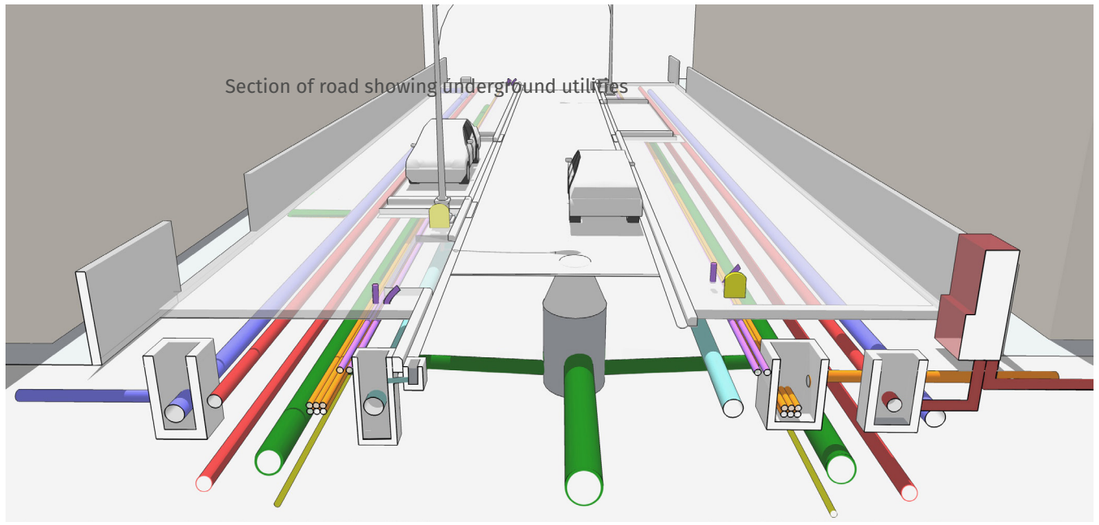
Raj Bhavan Road, Bengaluru. Image Source : Elements Creative India

Under-ground utilities

Ducts are recommended for all underground utilities, given that manholes are located at regular intervals. offer advantages such as streamlined installation, ease of maintenance, reduced visual clutter, and enhanced safety by consolidating multiple services within a shared infrastructure.

MEP experts should be consulted to ensure appropriate details suitable for local context.
Refer IRC:SP:98 for more details.

The image below depicts a road section highlighting the placement of underground utilities, accompanied by a table detailing the specifications of each utility.



Category	Water	Electricity		Street Lights & other fixtures		Stormwater
Utility Pipe	Main	Low-tension	High-tension	Side lines	At median	Main
Duct Material	MS/DIP	HDPE DWC	RCC-NP3	HDPE	HDPE	RCC-NP3
Duct size (dia)	0.15m-0.3m	0.15m-0.3m	0.3m-0.45m	0.1m-0.2m 0.3m	0.3m 0.3m	0.5m-1.2m 0.5m-1m
Service laying depth	1m-6m	0.6m-1m	1.5m-2m			

Category	Sewage		Telecommunications		Private connections	Additional ducts
Utility Pipe	Rider sewer	Trunk sewer (under median)	Copper cables	Optic fibres OFC	For each utility	Future additions
Duct Material	RCC Hume Pipe	RCC Hume Pipe	HDPE	HDPE	PVC/HDPE	HDPE
Duct size (dia)	0.3m-0.45m	0.5m-1m	0.1m-0.3m	0.1m-0.3m	0.1m	0.15m
Service laying depth		More than 1.5m	0.6m-1m if directly laid 1m-2m if laid in ducts			

Distance between electric cables & OFC
Vertical - 1m
Horizontal - 1m

Distance between electric cables & water supply lines HT/LT
Vertical - 1m
Horizontal - 1m

* MEP experts should be consulted to ensure appropriate details suitable for local context.
Refer IRC:SP:98 for more details.

Depth of laying service lines along roads

The depth of installation depends on the type of service line accommodated. The minimum depth is from considerations of providing a minimum cover to safeguard the line from any superimposed loads or impact, or from erosion & this should not be less than 0.6 m.

Aundh DP road, Pune

2.2 Cycle Tracks

Physically segregated cycle tracks ensure safety and reduce the possibility of encroachment by moving motor vehicles and parking. Cycle tracks should be continuous, with smooth turnings to allow uninterrupted movement and well-shaded & well-lit to provide comfort and safety. Cycle tracks should be planned in a network rather than in isolated parts to ensure seamless connectivity across the neighbourhoods.

Physically segregated cycle tracks

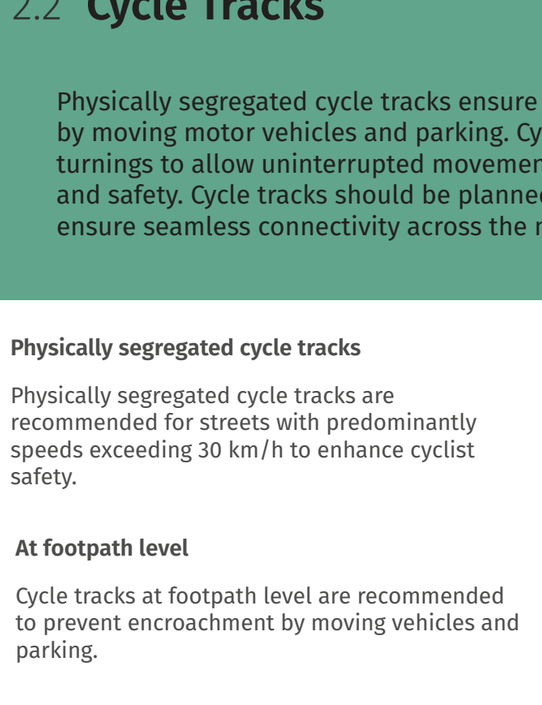
Physically segregated cycle tracks are recommended for streets with predominantly speeds exceeding 30 km/h to enhance cyclist safety.

At footpath level

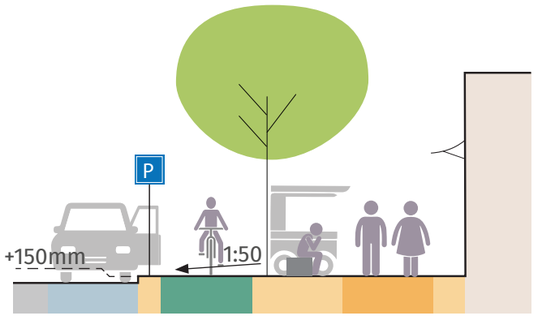
Cycle tracks at footpath level are recommended to prevent encroachment by moving vehicles and parking.

Painted cycle lanes

These can be provided while testing new designs on existing streets. Painted cycle lanes, however, are prone to encroachment by moving vehicles, vending, parking. Hence it is recommended that the parking space and vending is well-defined.

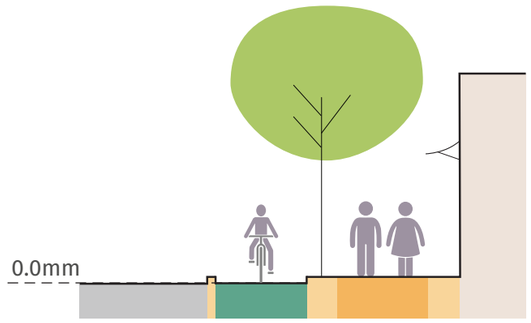


Painted Cycle Track in Chandigarh,
Image Source - Smart Commute Foundation



Buffer

In streets with parking along cycle track, a buffer of minimum 0.5m should be provided to protect the cyclists from dooring. In other cases, only a kerb (0.15m wide)may be used as a buffer to save space.



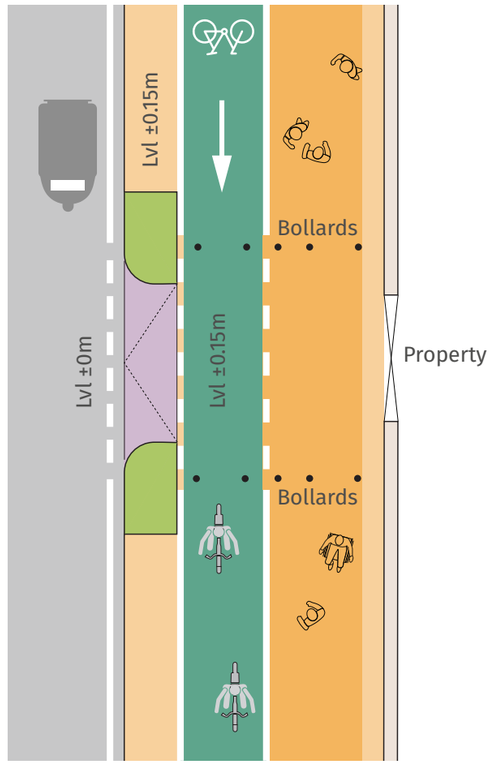
At carriageway level

Cycle tracks at road level have lower construction and maintenance costs, but they may not be universally accessible to wheelchair users when crossing from the sidewalk to the road due to the level difference.

Points to note

Cycle tracks should be clearly demarcated using paint & signage, especially at intersections and property entrances to deter motor vehicle encroachment.To prevent pedestrians from using cycle tracks, ensure there is a clear and unobstructed walking space.

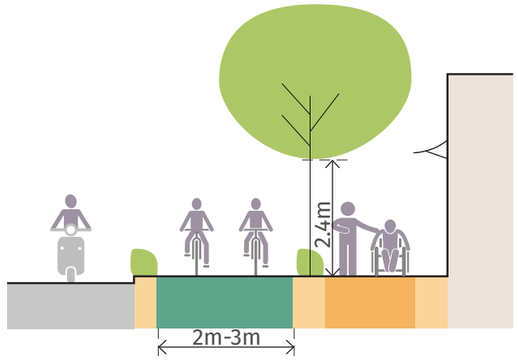
Continuity



At property entrances and intersections, the cycle track should continue at the same level and vehicle access should be provided by a ramp in the buffer, where possible.

Frequent change in the direction and location of cycle tracks should be avoided, unless absolutely necessary to accomodate public facilities, like vendors, bus stops.

Image Source - BRT_Delhi



Width

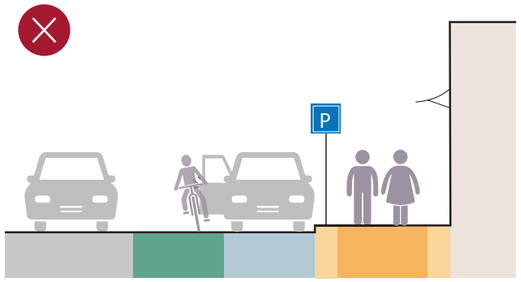
Cycle tracks should be minimum 2m wide for one-way movement and minimum 3m wide for two-way movement.

Vertical Clearance

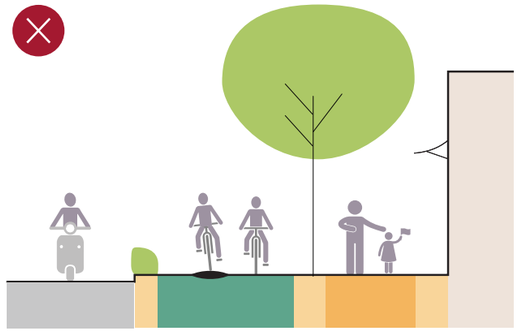
Vertical clearance of 2.4m should be maintained at all points.

Pashan Sus Road, Pune

Comfort & Safety



Cycle tracks should not be provided between parking and carriageway to ensure cyclists don't get hit by dooring.

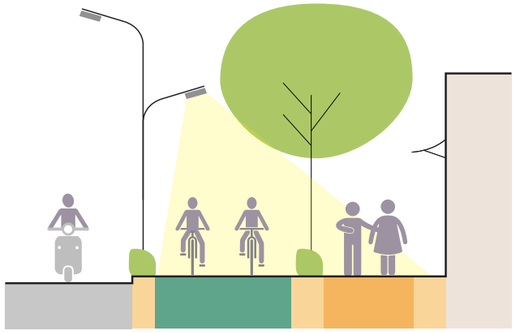


Surface

Cycle tracks should have an even surface free from undulations due to material or any level difference.

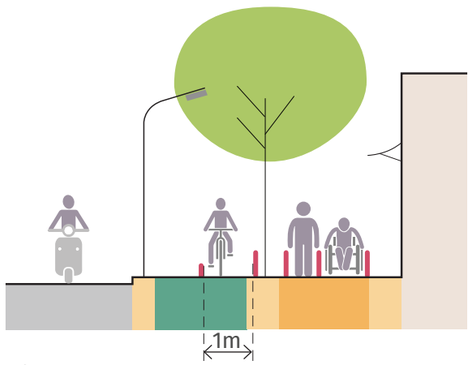
Shade

Continuous shade through tree cover should be provided to shelter cyclists from harsh weather.



Visibility

Cycle tracks should be well-lit and be clearly differentiated from footpath and carriageway. It is recommended to demarcaate the cycle track through a coloured surface and lane markings.



Bollards

Bollards of height 0.2-0.4m with a clear spacing of 1.2m clear distance along the width of the cycle track can be provided to prevent 3 and 4 wheelers encroachement. 2-wheeler encroachment shall be avoided through enforcement.

Please note that closely spaced bollards can obstruct the movement of cyclists, force them to reduce the speed, thereby discouraging cyclists to use cycle tracks.

F. C. Road, Pune

Cycle track at the Smart Janpath Road is provided behind the bus stop to avoid conflict between cyclists and waiting passengers at the bus stop.

Smart Road, Bhubaneswar, Image source : Elements Creative India

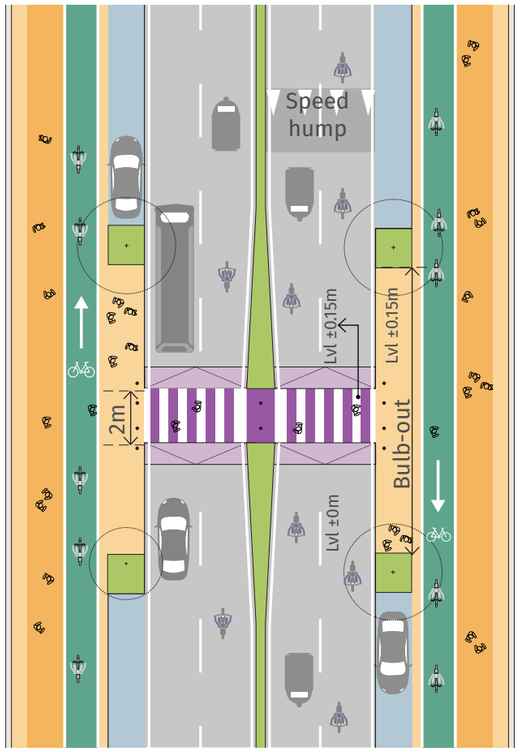
2.3 Pedestrian and Cyclist Crossings

Well-designed midblock and intesection crossings provide a safe and convenient way for pedestrians and cyclists to cross streets, discouraging them from risking their lives on urban streets.

Foot-overbridges or subways are often inconvenient and hotspots for crime and anti-social activities. Hence, pedestrian foot-overbridges should be considered only on urban expressways where vehicle speeds are above 60kmph.

DP & ITI Road, Pune
Image Source -Elements Creative India

Table-top Crossing



Location
Tabletop crossings are recommended to be provided at all unsignalised locations.They are also ideal for footpaths of narrow widths where providing ramps is not feasible.

Height
Raised to the level of the adjacent footpath (maximum of 0.15m) with the vehicular ramps of 1:8 slope provides wheelchair access too.

Intervals
Every 80-150m in urban areas

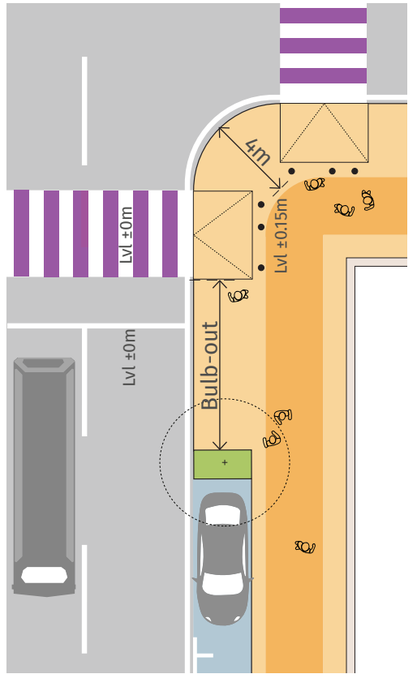
Width
Atleast 2m wide and 4m in front of schools, hospitals, markets and other high footfall areas as per IRC:103

Bulb-outs
In case of a parking lane, bulb-outs should be provided to reduce the crossing distance.

Traffic-calming
It is recommended to provide speed hump at a distance (as per IRC:99) before the table-top crossing to slow down vehicle speed before table top.

Cobble stone paving on road before table top to slow down vehicle speed

Zebra Crossing with Ramps



Location
Zebra crossings recommended at signalised crossings.

Height
Footpath should be ramped down (slope 1:15) to the level of the carriageway.

Width
Atleast 2m of width should be provided.

Turning radius
Small turning radius slows down vehicles and increases pedestrian safety while crossing.

Turning radii at intersections should be 4m on local and collector streets, and maximum 9m on arterial streets.

Across Intersections

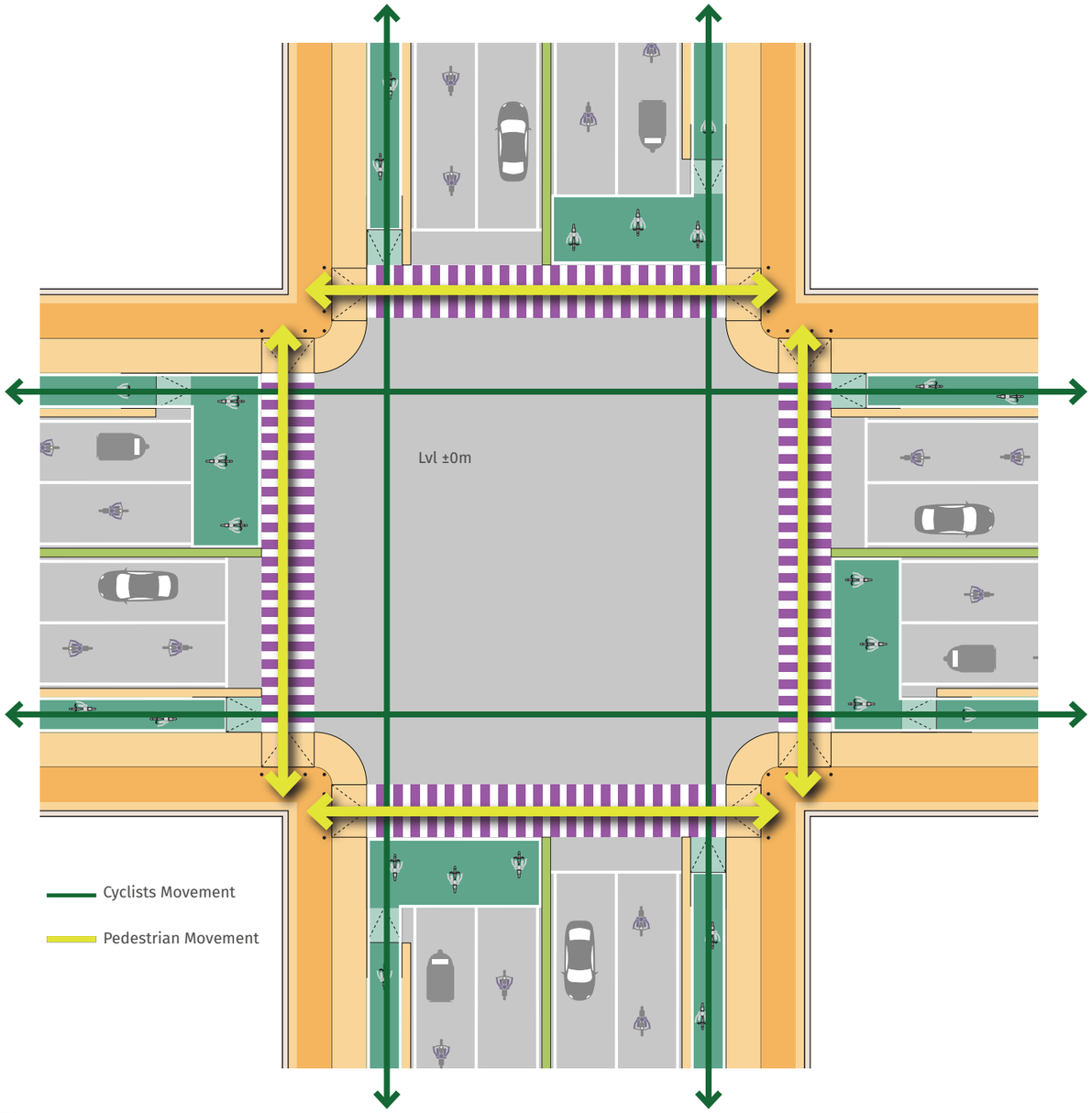
Streets with segregated cycle tracks

Continuity of cycle tracks should be maintained on intersections.
Bike box should be added to allow cyclists to wait at the signals.

Streets without segregated cycle tracks

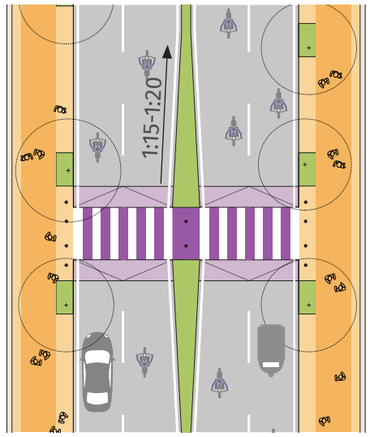
In case of narrow streets where segregated cycle tracks are not provided, the intersection can be raised to reduce the traffic speeds and enhance safety for cyclists.

Pedestrian crossings should be located at all corners of the intersection, such that there is minimum deviation from the path of the walking zone.



2.3.1 Median & Pedestrian Refuge

Medians reduce conflict between opposite directions of traffic and chanelises the traffic to high taffic volume streets. Pedestrian refuges or refuge islands provide easy crossing and safety to pedestrians at large intersections. It provides intermediate resting point for pedestrians while crossing a large intersection. It breaks the crossing length in small segments. The unused carriageway space at intersections should be converted to pedestrian refuge for safe crossing and efficient vehicle throughput. Refuge islands should be free of landscaping and fencing to ensure usability.

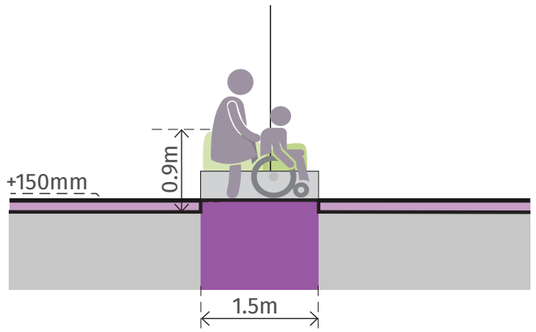


Criteria for median
Streets with more than two lanes in each direction should have a median.

Break in the median
Break in the median should be provided every 80-150m for pedestrian crossings on urban roads; frequency can be adjusted based on site conditions.

Median width
Medians should be of uniform width, 1.2m wide. Where pedestrian refuge needs to be added, a gradual variation in median width ofof 1:15-1:20 should be provided as shown in the diagram.

Landscape
Bushes should be trimmed to ensure visibility. Drought-tolerant, low maintenance native species that are capable of stormwater filtration should be planted on the medians.



Pedestrian refuge width
For a safe and inclusive pedestrian refuge, for people with strollers, wheelchair, cycles; a minimum 1.5m width of refuge should be provided. The refuge island shall be at the level of carriageway to ensure access to wheelchair and free from any landscaping.

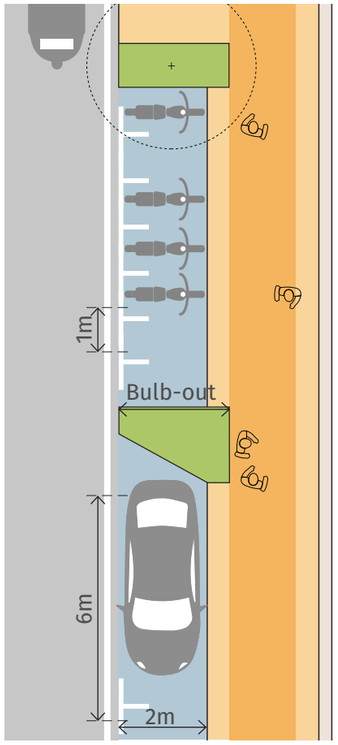
Bollards
Bollards should be placed in the refuge to prevent motor vehicles from turning.

Smart Janpath, Bhubaneswar.
Image Source - Elements Creative India

2.4 On-street Parking*

On-street parking is a sub-optimal use of limited street space. On-street parking, if provided should move to off-street locations to ensure that the limited street space is prioritised to move people efficiently and allow people to sit, play and socialise. On-street parking should be clearly designated, limited and priced. Pricing manages the parking demand and enforcement ensures discipline.

Design



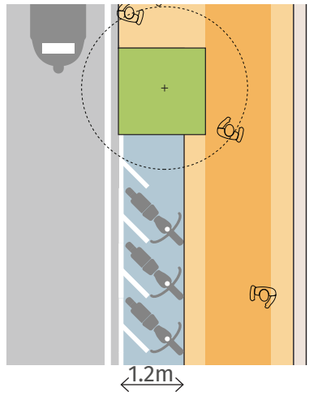
Orientation

Parallel parking is recommended for four-wheelers on streets where parking is essential. It saves the precious street space for public use and allows flexibility to accommodate perpendicular two-wheeler parking as well.

Bulb-outs in Parking bays

Integrate bulb-outs into parking bays every five car parks (approximately 30m) to accommodate pedestrian lights, utility boxes, and street furniture without interruption.

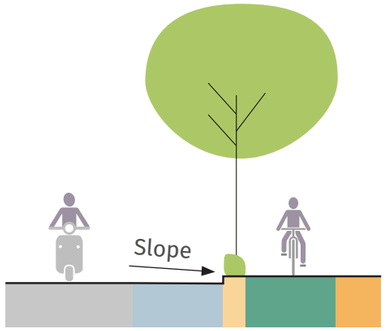
Dedicated cycle parking should be provided at public transport stops and stations and in commercial areas, to facilitate multi-modal integration.



Narrow Streets

On narrow streets with high demand for two wheeler parking, angular parking bays (1.2-1.5 m wide) are recommended.

*Refer Table 1: Street elements and their presence on Arterial, Collector and Local Streets



Parking Space Dimensions

Vehicle Type	Parking bay dimensions
4-wheeler	2m x 6m
2-wheeler & Cycle	1m x 2m*
Auto-rickshaw, e-rickshaw & Cycle-rickshaw	1.5m x 3m

* 2-wheeler zone of size 6m x 2m can be demarcated to accomodate 6-7 two-wheelers or cycles.

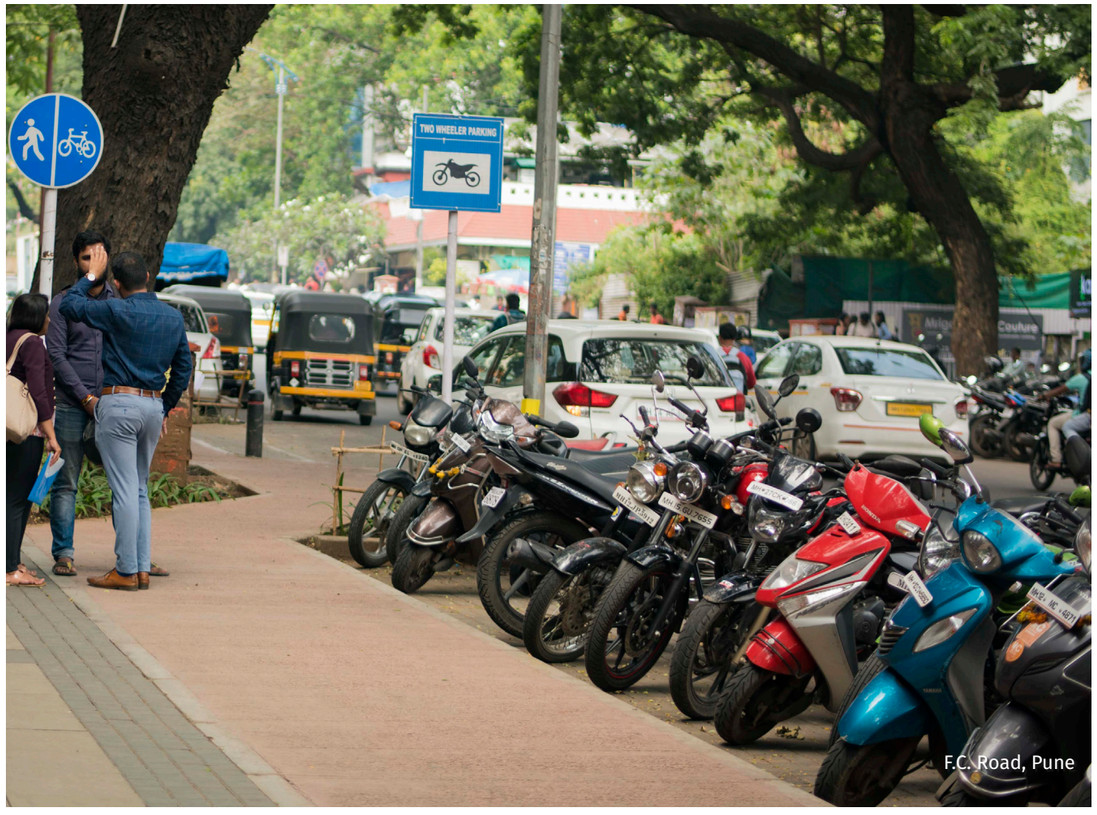
Surface

The area allotted for parking should have a clean and levelled surface, free from water logging with proper drainage facilities.

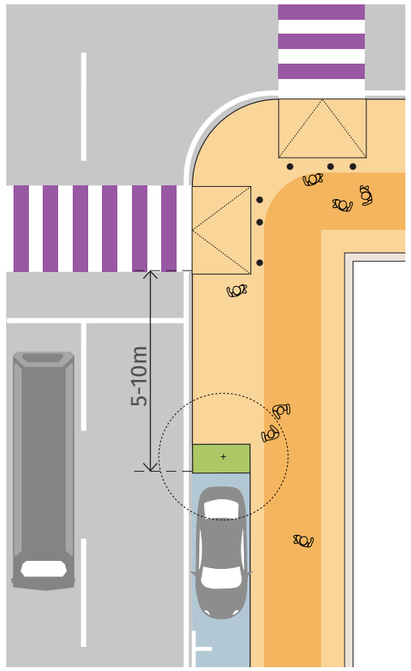
Visibility

Each parking bay should be clearly defined and marked to avoid haphazard parking. Appropriate parking signages giving information on timings, vehicle type parking and price should be provided.*

*Parking signages and markings should be provided as per IRC:67 and IRC:35 respectively.



F.C. Road, Pune

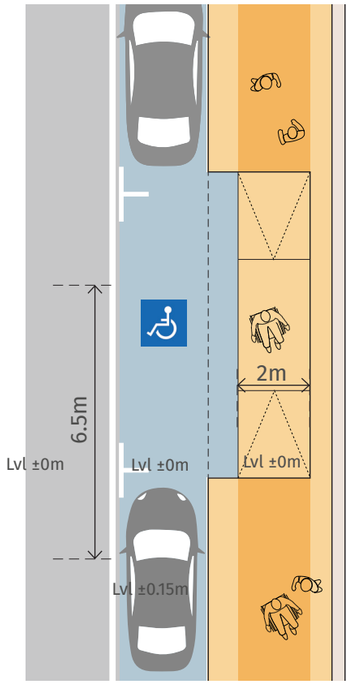


Distance from Intersection

It is recommended that parking, if required, should be located at a distance of 50m from the intersection on collector streets and 10m from the intersection on local streets, to avoid conflict in vehicle movement and provide waiting space for pedestrians before crossing.*

*Refer IRC 70 for more details.

Accessible Parking Bay



It is recommended to provide wheelchair accessible parking spaces in off-street locations. On-street accessible parking space numbers should be provided in discussion with the local stakeholders, ensuring the continuity of walking zone.*

Where provided, on-street accessible parking bays must be clearly demarcated with signage and have

*Refer IRC:SP:117 for more details.

EV Charging

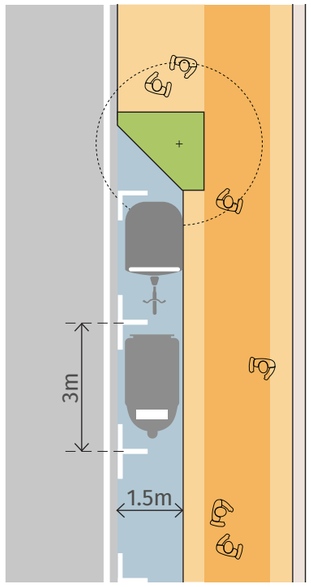
It is recommended to provide charging points in off-street locations, ensuring the street space is used for short-term parking only.

However, where necessary, 0.5m of existing buffer in the MUZ can be used to accommodate charging points at parking bays.

Iconic Road, Surat
Image Source - Streets Compendium, SCM

Intermediate Public Transport (IPT)

IPT stands should preferably be located 5m before and after bus stops and other transit stations. All recommendations for location near intersections, bus stops remain same as for other on-street parking. IPT stands should also be located at places of high footfall - especially near hospitals and commercial areas.



Orientation

IPT stands should accommodate parallely parked auto-rickshaws to ensure ease of manoeuvring and to occupy less space.

Kerb Edge

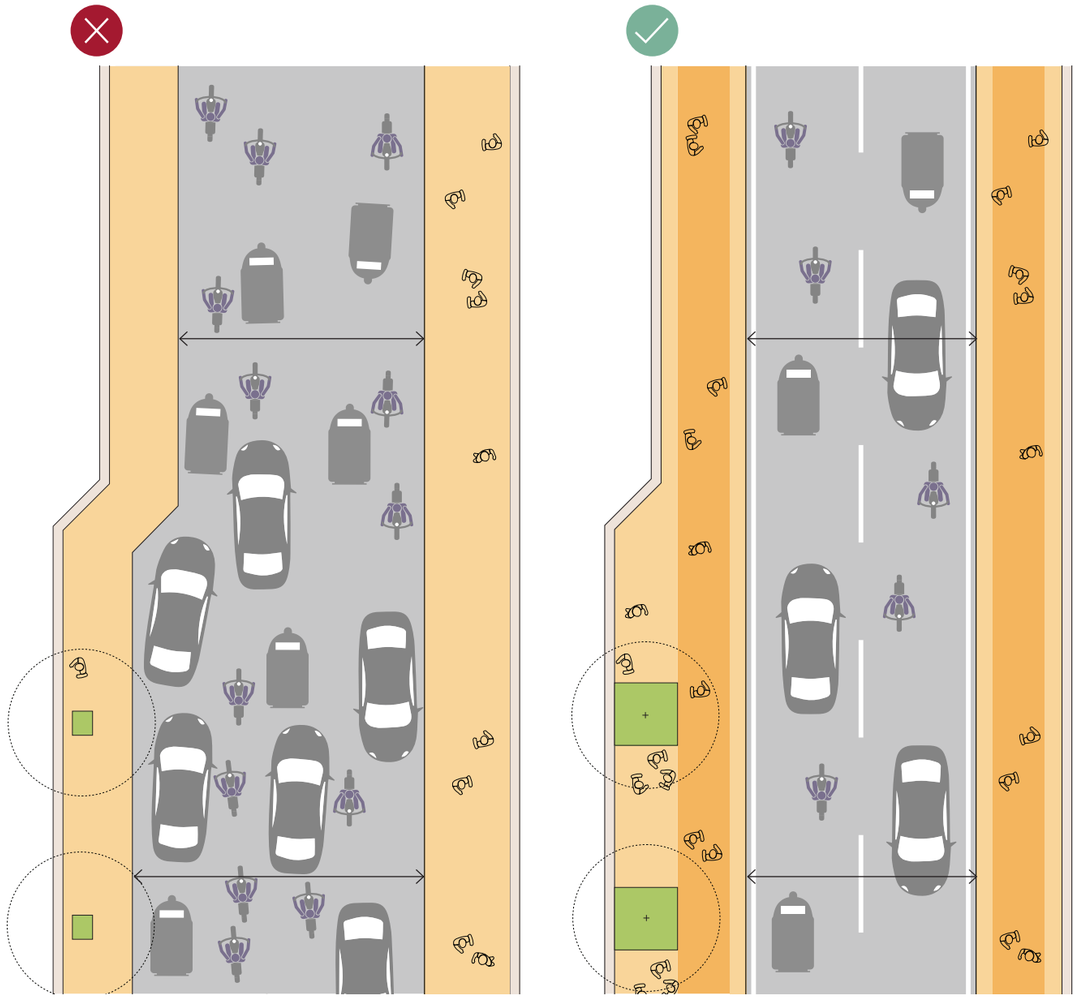
The kerb edge might be positioned at a 45-degree angle to emphasize the distinction between IPT stands and on-street parking. Clear signages for IPT markings highlighting the max capacity for autos should be provided.

On street parking in Pondy Bazaar, Chennai

2.5 **Carriageway**

The purpose of a carriageway is to enable seamless movement of vehicular traffic. A consistent width must be maintained throughout the street length to avoid bottlenecks. A carriageway can be designed for appropriate speeds based on the function of streets in the city network.*

Design



The carriageway width should not increase in portions where a wider RoW is temporarily available. Bottlenecks lead to congestion and traffic jams.

*Refer Table 1: Street elements and their presence on Arterial, Collector and Local Streets

Carriageway Width

Table shows the recommended Carriageway widths according to IRC:86-2018 -

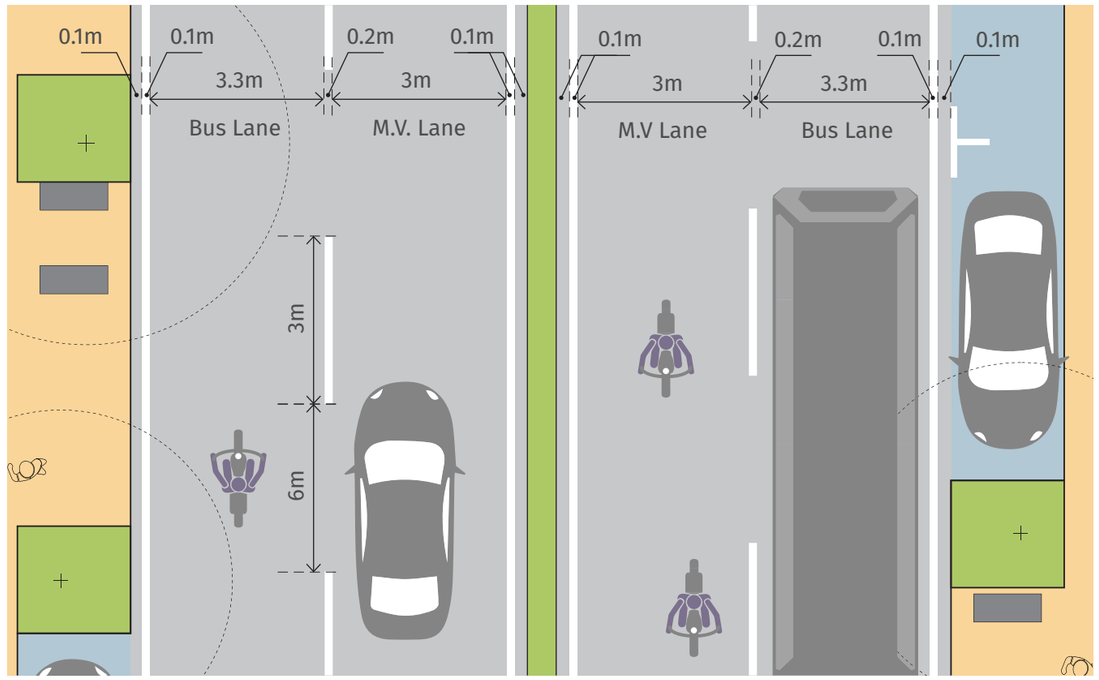
Carriageway Type	Width
Single Lane with raised kerbs	3.5m
2- lane with raised kerbs	7m
4- lane with raised kerbs	14m
6- lane with raised kerbs	21m
8- lane without kerbs	28m

For access roads to residential areas, a lower lane width of 3 m is permissible.

Minimum width of urban road without kerb shall be 5.5 m including allowances for a stalled vehicle and pedestrian movement.

Lane Width

Road lane marking on the carriageway is a crucial aspect of traffic management, enhancing safety and guiding motorists effectively. These markings, including lane dividers and symbols, play a vital role in maintaining organized and efficient traffic flow on roads.

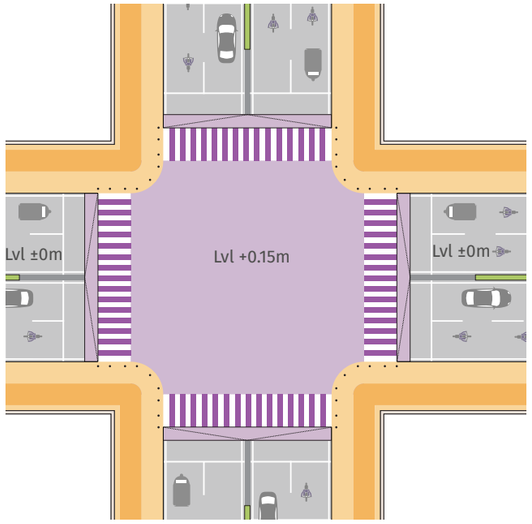


2.6 Traffic-calming measures

Traffic-calming features decrease vehicle speeds, reducing the likelihood of fatalities and severe injuries from accidents. They also create safer conditions for pedestrians and cyclists sharing the road with motor vehicles, especially when separate footpaths and cycle tracks are unavailable.

Vertical Displacement

Vertical Displacement includes Raised junctions, Speed humps, Speed bumps, Speed tables,

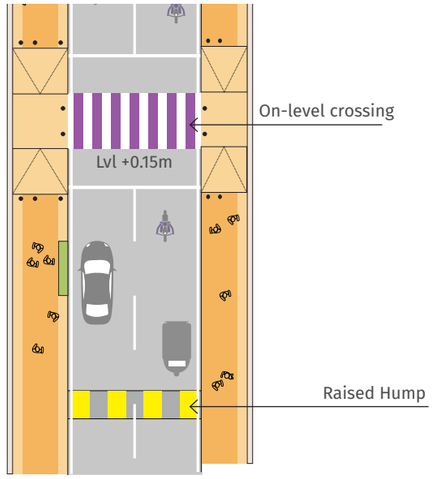


Raised Junctions
Elevated platform encourages motorists to slow down, promoting safer road interactions and minimizing the risk of accidents.

The raised nature of these junctions provides a visual cue to drivers, reinforcing the need for caution in specific areas.

Material difference on the carriageway (like cobble-stone paving) can be provided upto a distance of 10-20 m from the speed tables to slow down traffic and ensure pedestrian safety.

Aundh D. P. Road, Pune

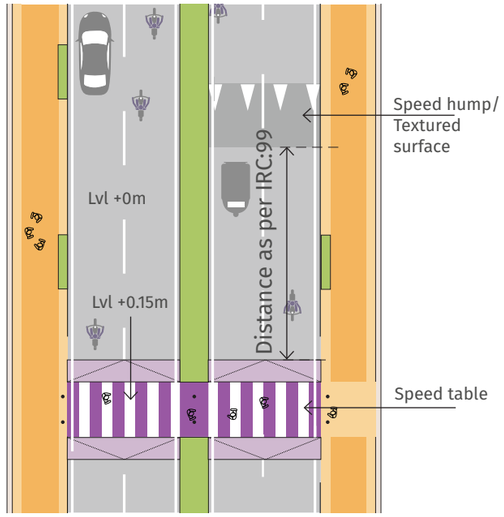


Speed Humps
Speed humps are cast-n-situ in the carriageway and provide a smooth reduction in motor vehicle speeds.

Location criteria
Speed humps can be provided on local and collector streets. Steep speed humps may lead to discomfort for drivers.

These should be located at a distance (as per IRC:99) from pedestrian crossing.

*Refer IRC:99 for design standards of speed table on bus routes.



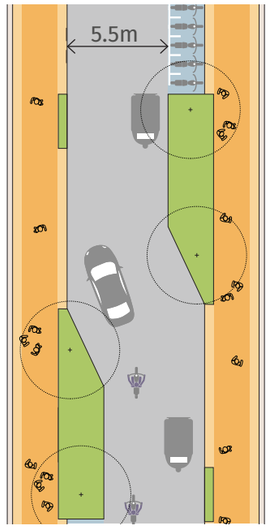
Speed Tables
Speed table (also known as table-top crossing) is a crossing raised at the level of footpath, that extends to the full width of the carriageway.

Speed hump should be provided at a distance from speed table (as per IRC:99) for smooth reduction in motor vehicle speeds.

Location criteria
Speed table should be provided on arterial and collector streets at:
- Unsignalised junctions
- Mid-block crossings with frequent pedestrian movement

Speed tables are not recommended on bus route roads (BRR), unless absolutely necessary.*

Horizontal Displacement



Chicane

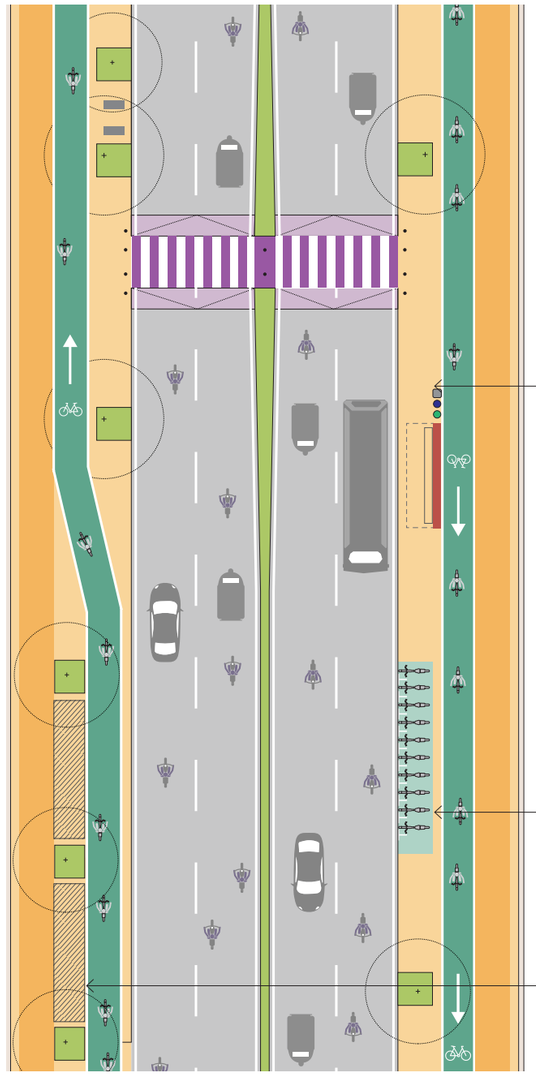
Chicanes combined with temporary/permanent barriers in the carriageway may be provided on local streets to slow down the vehicles. It should be combined with retro-reflective hazard markers.

2.7 Public Amenities

Integrating public amenities, like bicycle parking, dustbins, drinking water facilities, toilets and garbage containers enhances the attractiveness of the street, making it more comfortable for the users.

Location

Public amenities should be located based on on-site context. It is recommended that, it is provided in high footfall areas such as transit stations, commercial shop fronts and vending areas.

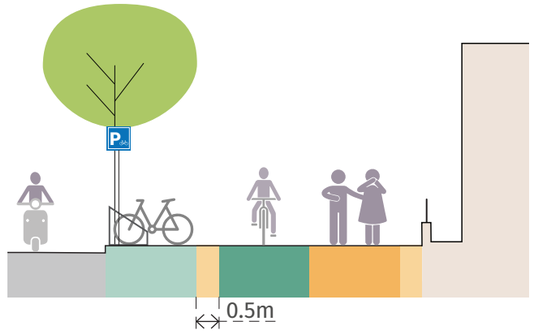


Dustbins
Separate wet and dry waste dustbins should be provided in the MUZ within a maximum surface area of 1.5 sq.m. at a preferable frequency of 50-75m.

Public Bicycle Sharing Station
Public bicycle sharing stations should be located at a preferable frequency of 300m, close to the cycle tracks in the MUZ.

Play & Gym Equipment
Play & Gym equipment can be located in the MUZ based on the demand and adjacent building-uses.

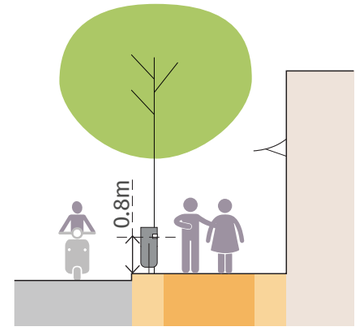
Design



Public Bicycle Sharing Stations

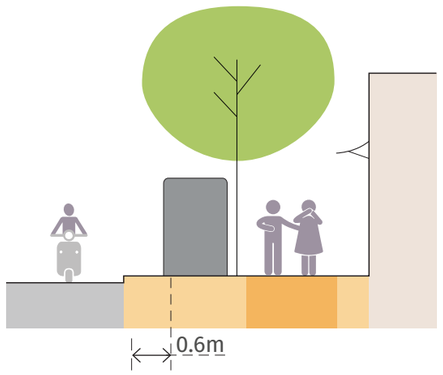
For streets with MUZ >2m
Public Bicycle Sharing Stations should be located within the MUZ, ensuring a 0.5m buffer from the cycle track and adequate walking zone.

For streets with MUZ<2m
Public Bicycle Sharing Stations should be located in parking bays.



Trash bins

Opening of the bins should preferably be at a height of 0.8m from the finished floor level.



Public Toilets

it is recommended that public toilets should be provided in off-street locations, ensuring accessibility and safety for all users.

However, if it is provided as on-street, it should be placed at a minimum of 0.6m clear distance from the kerb edge with a minimum of 2m clear walking zone in front of it.Regular maintenance should be done to ensure clean environment.

*Refer IRC:SP:117 for detail design.

Play & Gym Equipment

Play & gym equipment should be located within the MUZ, with a minimum 0.5m buffer along the edge to ensure safety.

Seating arrangement should be integrated with the equipment, preferably every 50-100 m, to ensure comfort for caregivers.

Play & gym equipment can be provided on local streets, commercial streets, and school zones.

Major Arterial Road(East-West), Action Area I, New Town Kolkata

J. M. Road, Pune

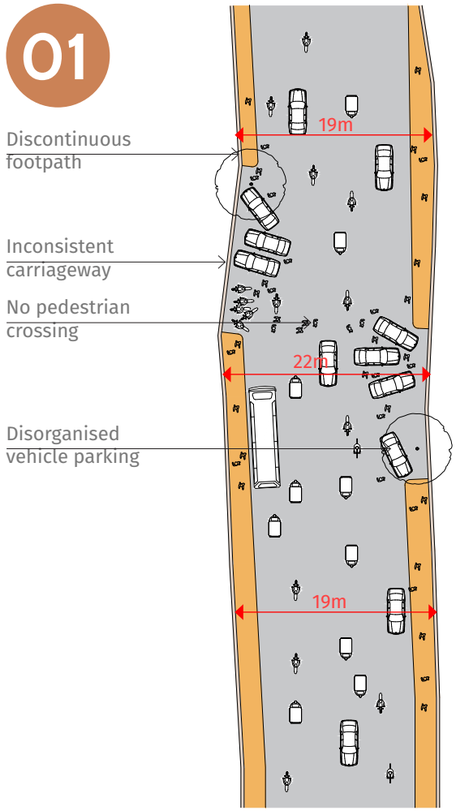
3

Street Design Templates

Street design begins with a comprehensive site analysis to understand context, including street width, land use, the current state of footpaths, crossings, and other elements, traffic volume, and the behavior of various road users, such as pedestrians, cyclists, etc.

Further, based on the city's vision of creating a Healthy Street, an appropriate street template can be contextualised.

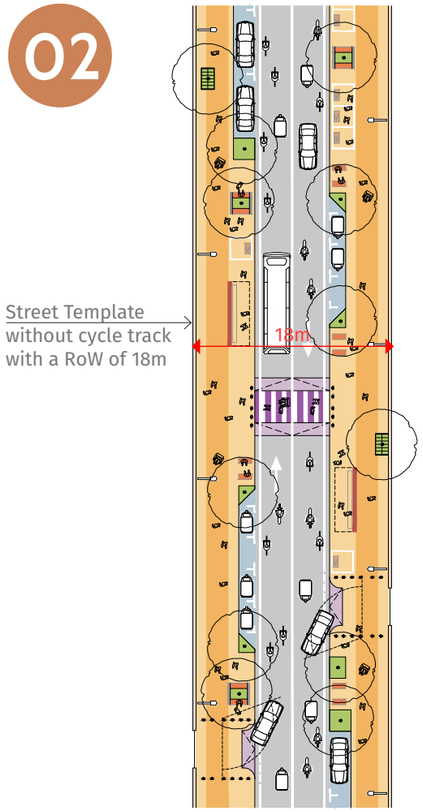
Contextualising a Street Template



Study existing conditions

Study the existing conditions on the street, including, the available Right-of-Way (RoW), vehicle movement, adjoining landuse, buildings that attract high footfall, vending activities, pedestrians crossing facilities, existing condition of footpaths, parking counts, violations etc.

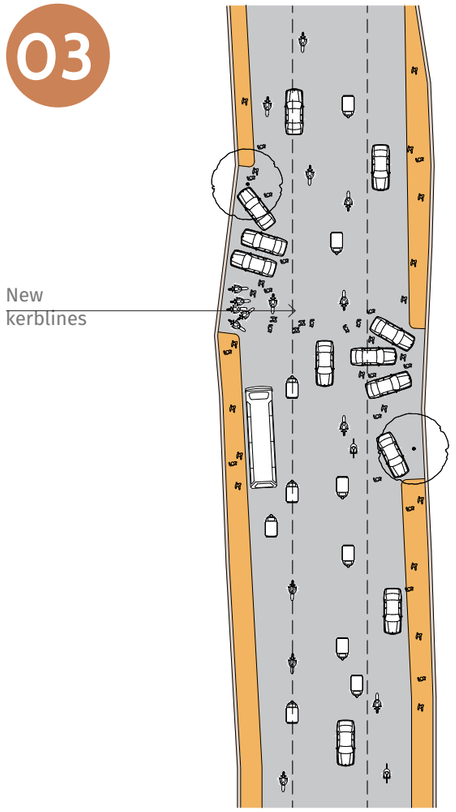
Identify and demarcate all the different RoWs on the street between two consecutive intersections.



Identify street template

Based on the following key points, select a relevant street template:

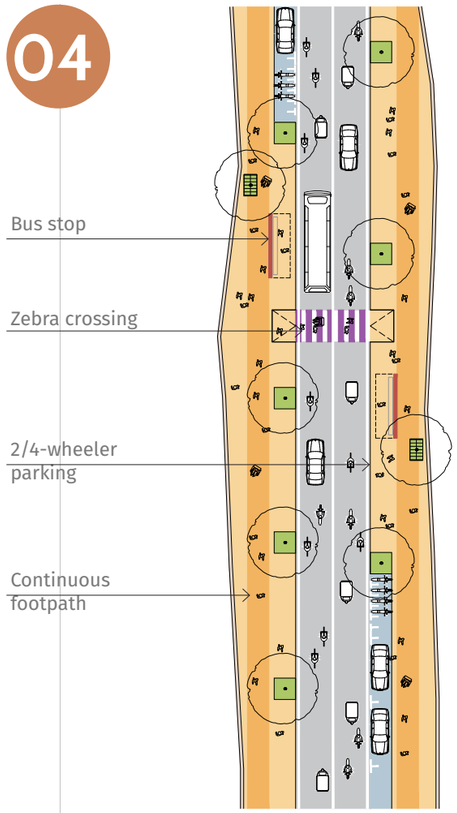
- Primary right-of-way (RoW) of the existing street.
- Adjacent landuse and street activities.
- Street typology



Overlay the template

Overlay the selected template on the drawing of the existing street.

Align the centreline and mark new kerblines on the street.



Detail the street design

Refer to 'Chapter 2: Street design elements' and detail out the street edge to suit the local context.

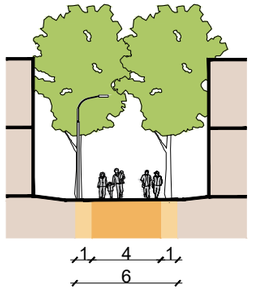
6M

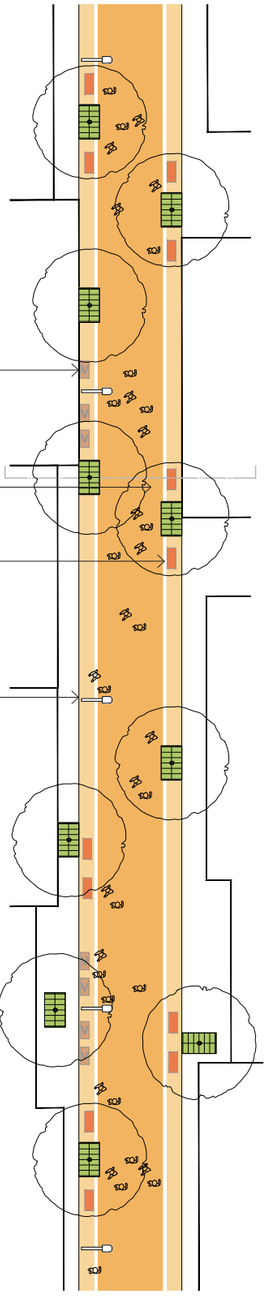
6m wide Pedestrian-only streets

They suitable for areas with high pedestrian traffic, such as markets and transit station surroundings.

Prohibiting vehicles on these bustling streets helps reduce noise, conflicts, and enhances the pedestrian experience. Adequate alternate routes for motor vehicles should be planned.

Pedestrianization of streets can be implemented during specific hours of the day, taking into consideration the street's current usage.





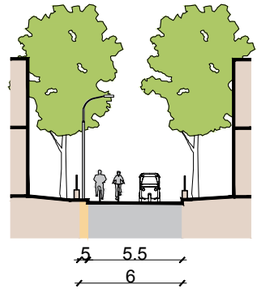
Street Vendors

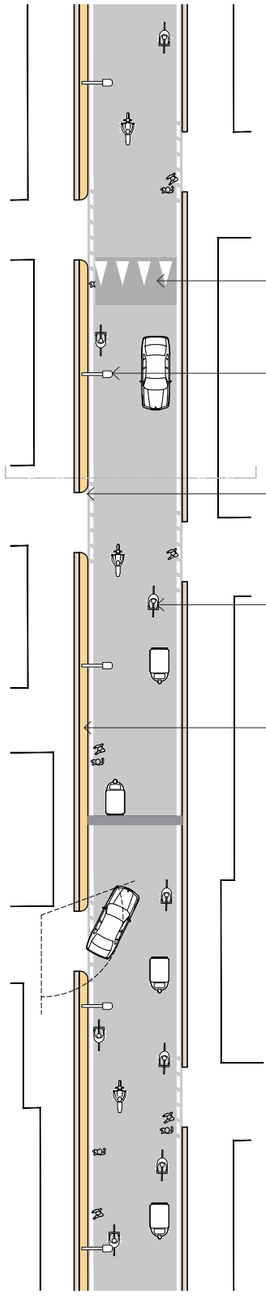
Existing tree pit
grating level +150mm

Seating

Street Light

two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS





6M

6m wide shared streets

Shared streets without segregated footpaths are ideal for local streets generally in residential/neighbourhood areas with lower traffic volumes, allowing pedestrians and cyclists to safely coexist with vehicles.

Segregated footpaths are not required when street is traffic calmed to 15km/hr.

Textured Surface for speed calming

Street Light

Property acess
level ±0.00mm

Cyclist

Footpath

Speed hump

two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS

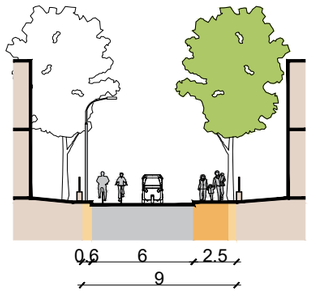
9M

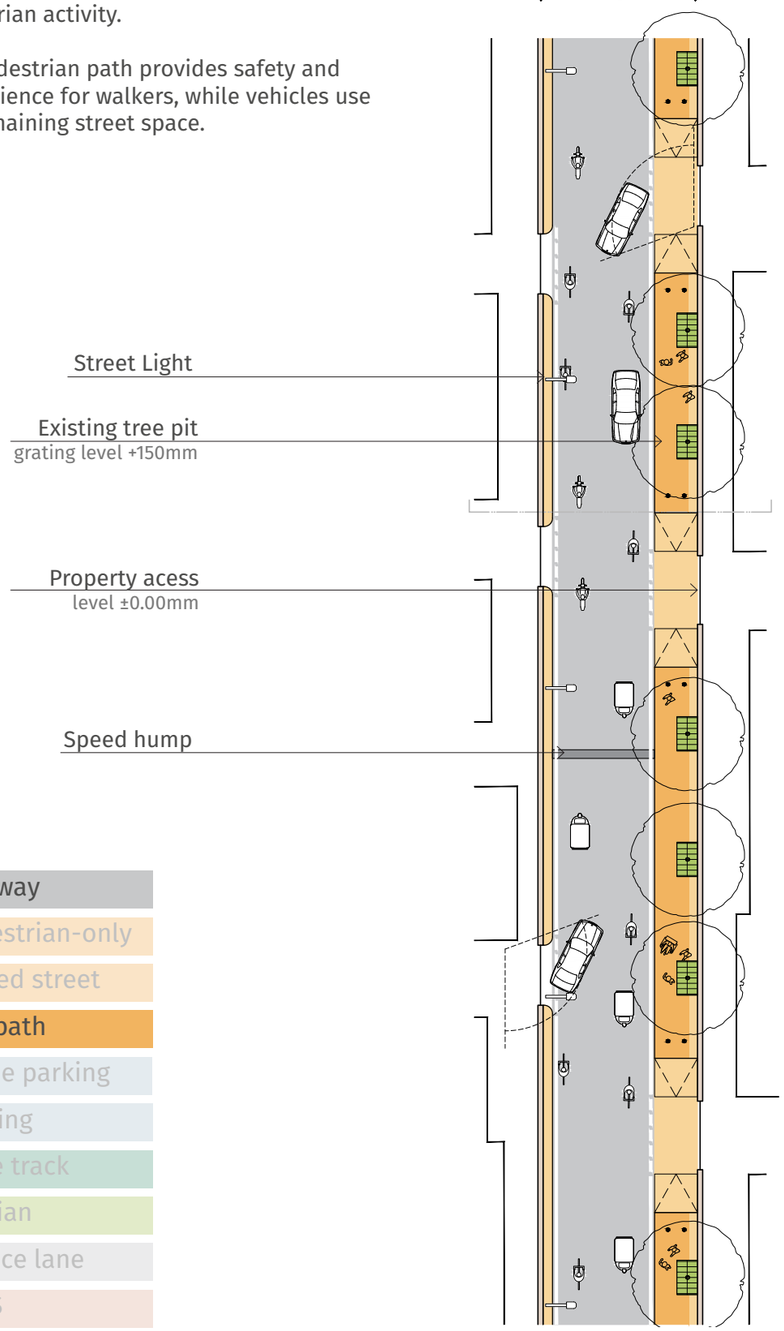
9m wide street with one side footpath

It can facilitate a dedicated pedestrian path alongside vehicular traffic.

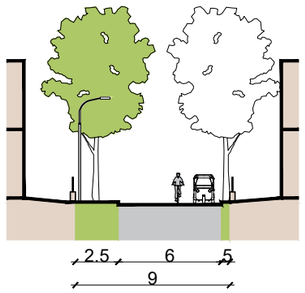
This configuration is suitable for local street with mixed-use areas with moderate pedestrian activity.

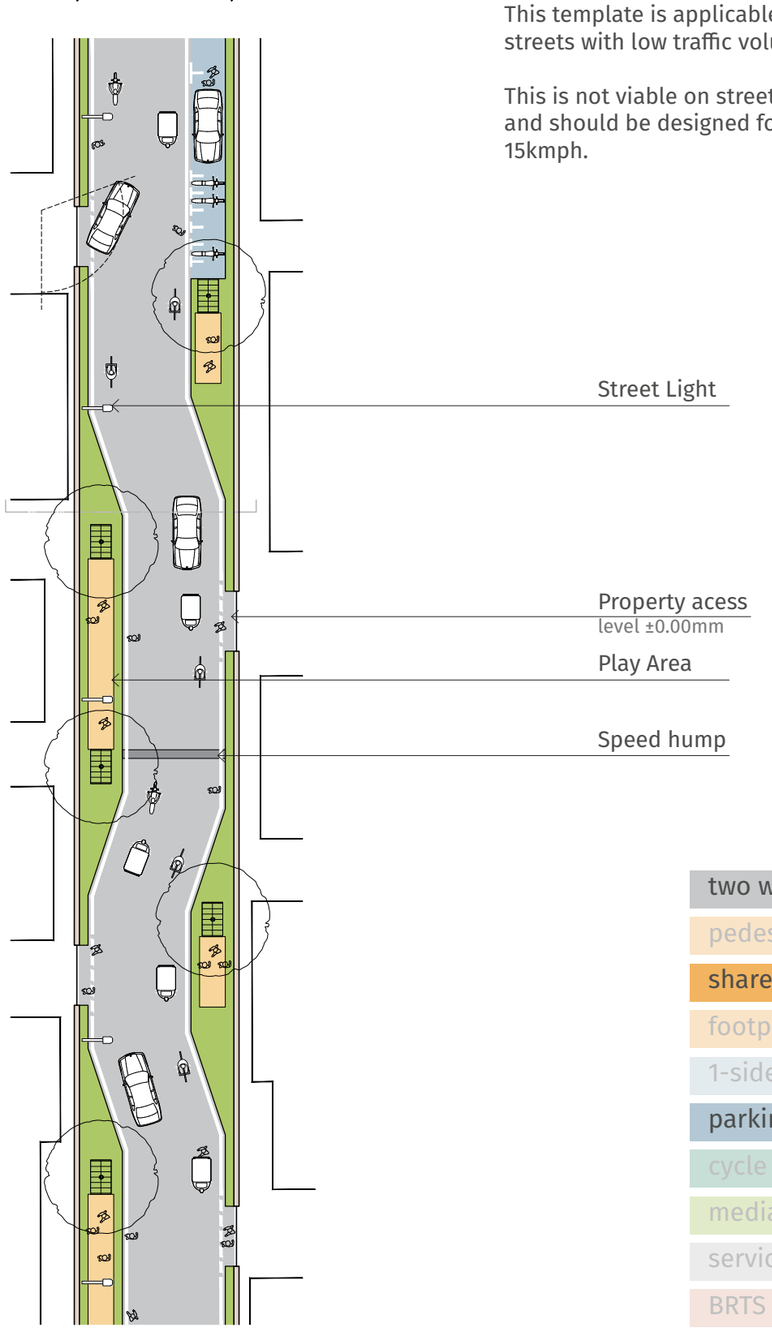
The pedestrian path provides safety and convenience for walkers, while vehicles use the remaining street space.





two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS





9M

9m wide street with Chicane

Chicanes serves as an effective traffic calming measure. The serpentine design slows down vehicle speeds, enhancing safety.

This template is applicable primarily to local streets with low traffic volumes

This is not viable on street with bus routes and should be designed for speeds below 15kmph.

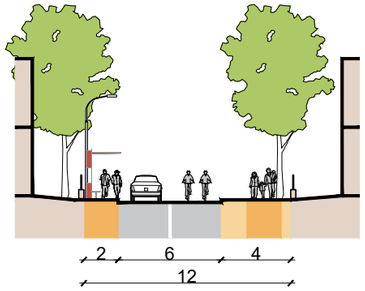
two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS

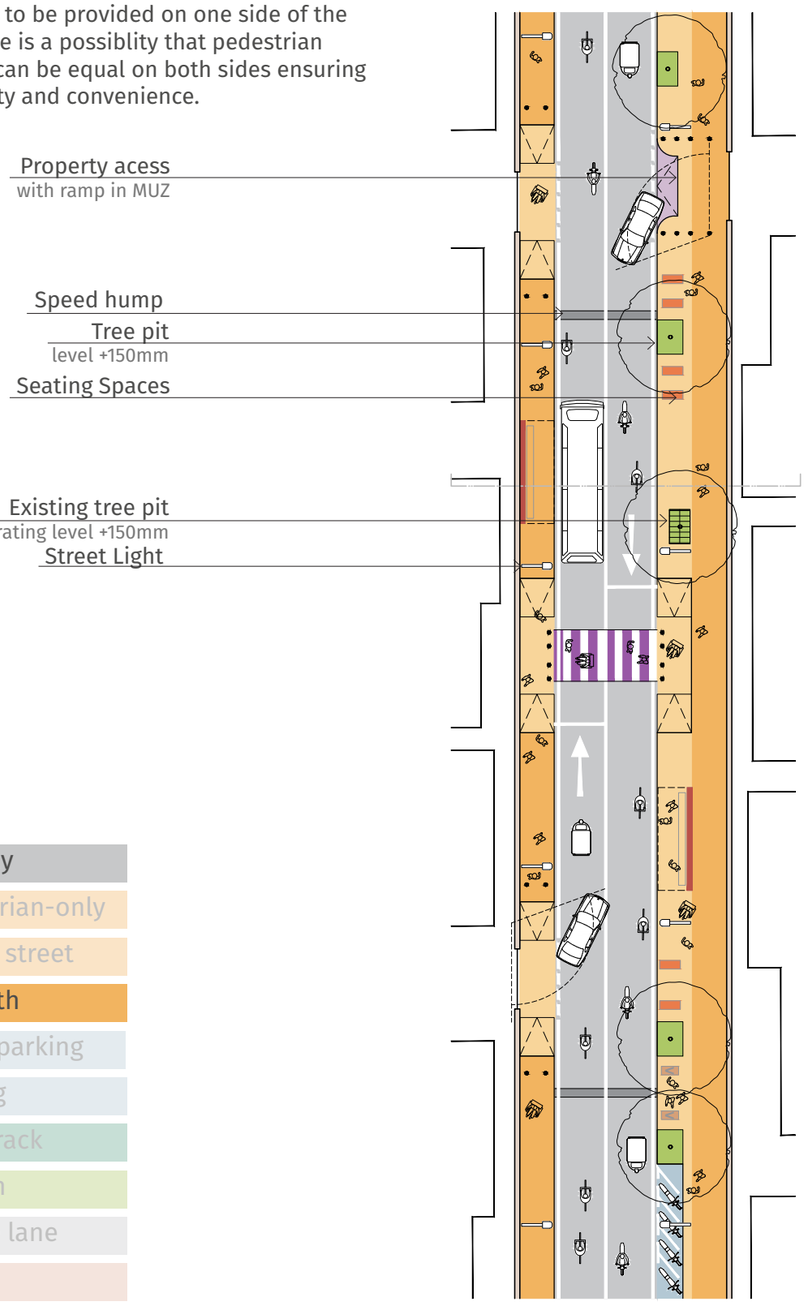
12M

12m wide with Asymmetrical Footpaths

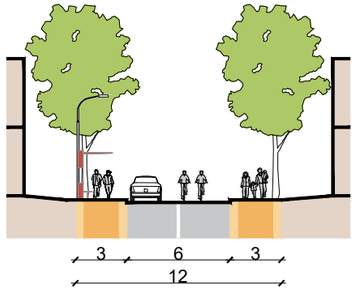
In this configuration, a 2m wide footpath on one side and a more generous 4m wide footpath on the other side are provided.

This template is particularly beneficial for mixed-use streets, commercial districts. When parking is to be provided on one side of the road. there is a possiblity that pedestrian intensity can be equal on both sides ensuring their safety and convenience.





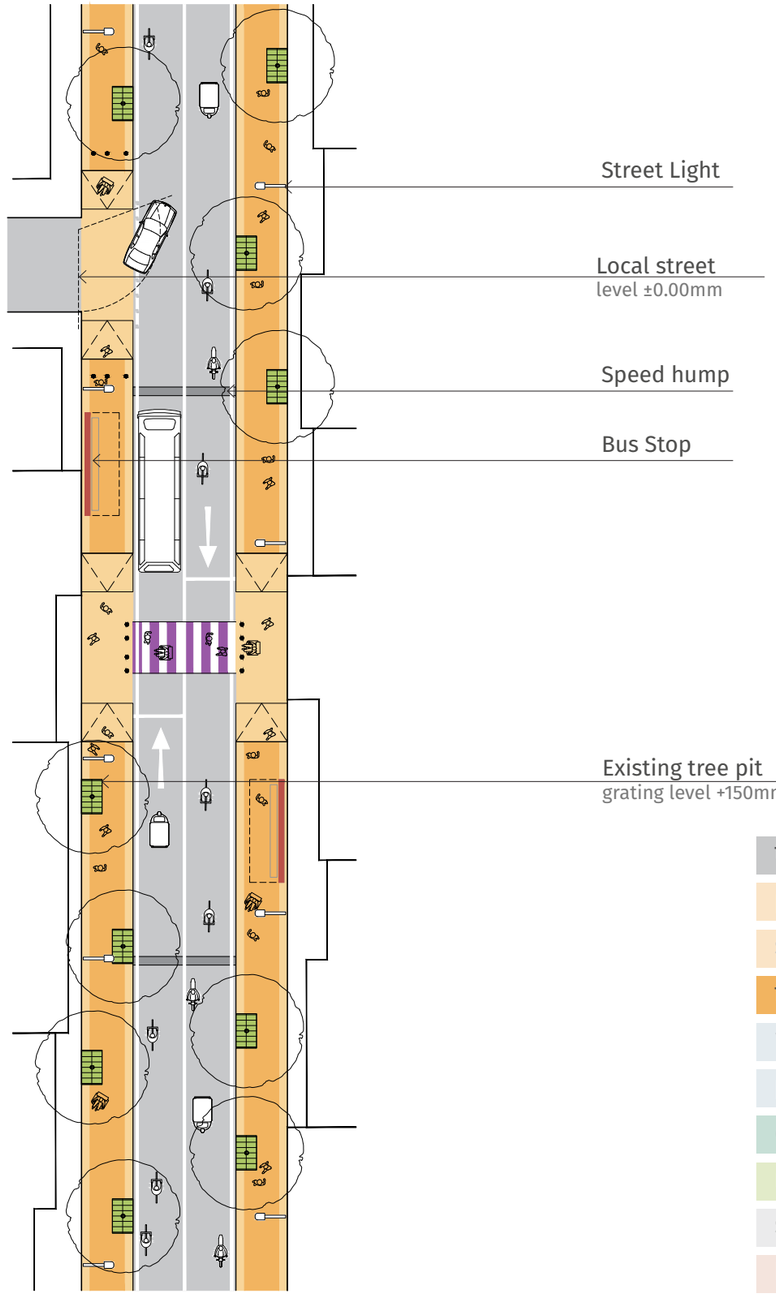
two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS



12M

12m wide with Symmetrical Footpaths

This equal distribution of footpath space without on-street parking enhances safety and convenience for pedestrians, making it ideal for mixed-use areas, commercial districts, and urban neighborhoods.

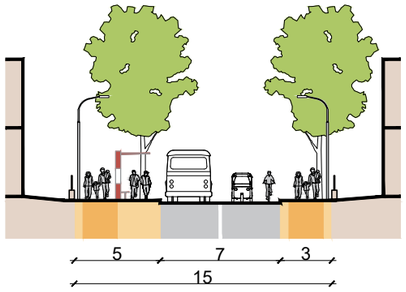


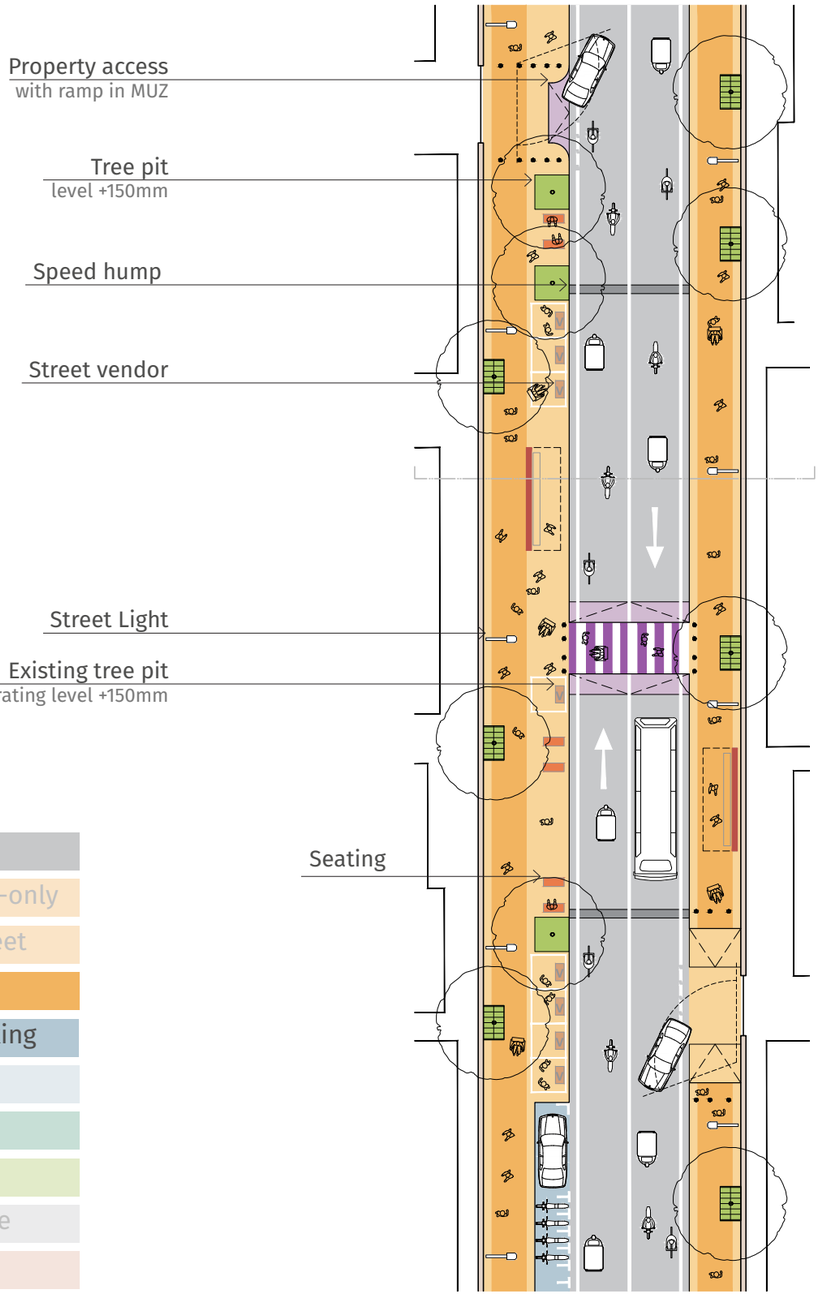
two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS

15M

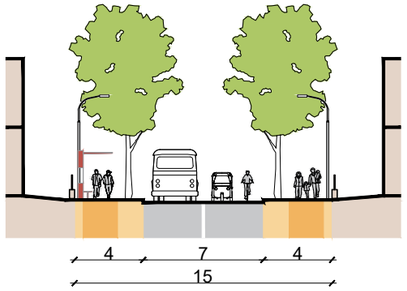
15m wide with wide footpath on one side

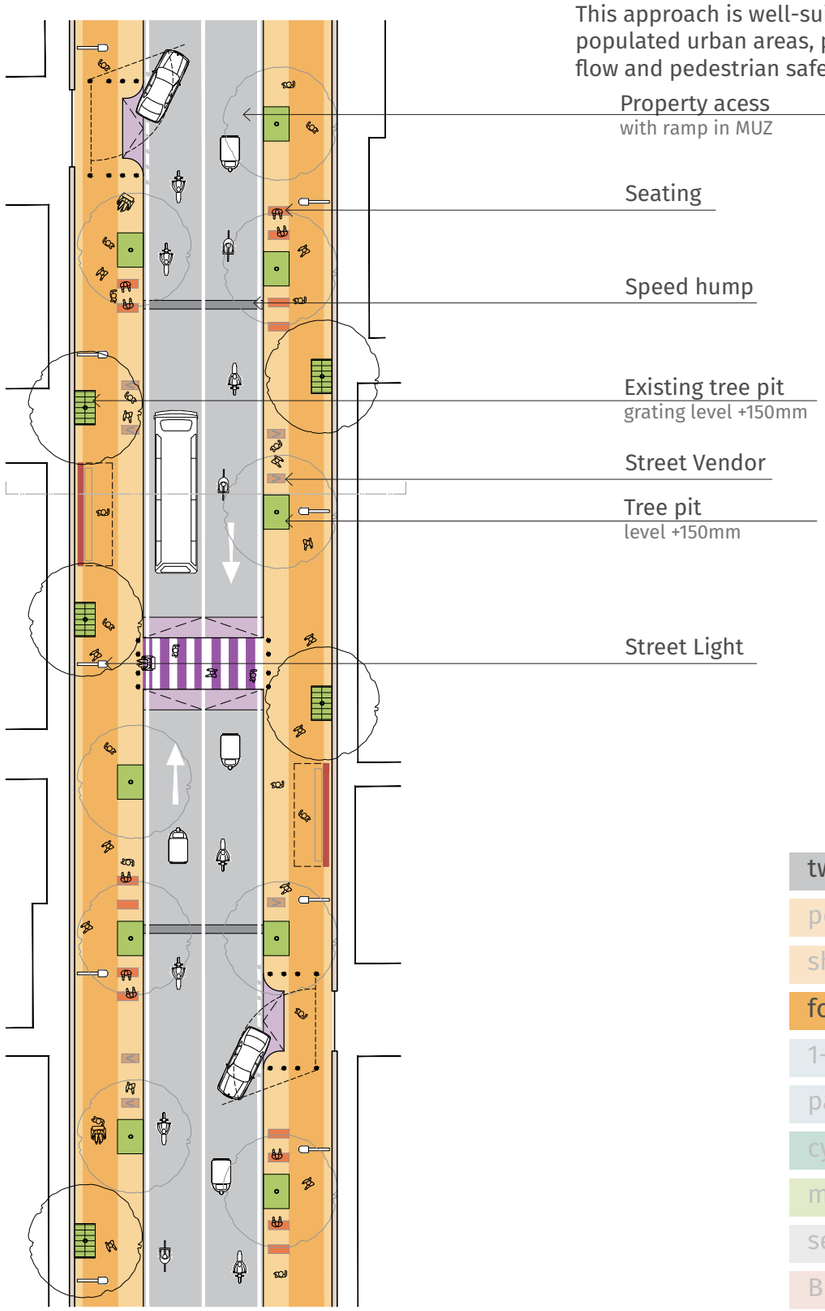
This option is particularly recommended when there are retail edges. Allowing parking on one side not only accommodates the parking needs of patrons but also contributes to the vibrancy of retail districts.





two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS





15M

15m wide with Symmetrical Footpaths

In this scenerio, parking is relocated to off-street facilities, including multi-level structures. It promotes a clutter-free, pedestrian-friendly environment while meeting the parking demands of residents and visitors.

This approach is well-suited for densely populated urban areas, prioritizing traffic flow and pedestrian safety.

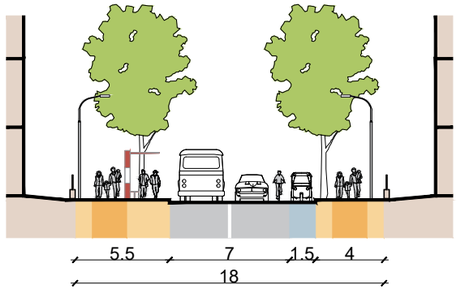
two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS

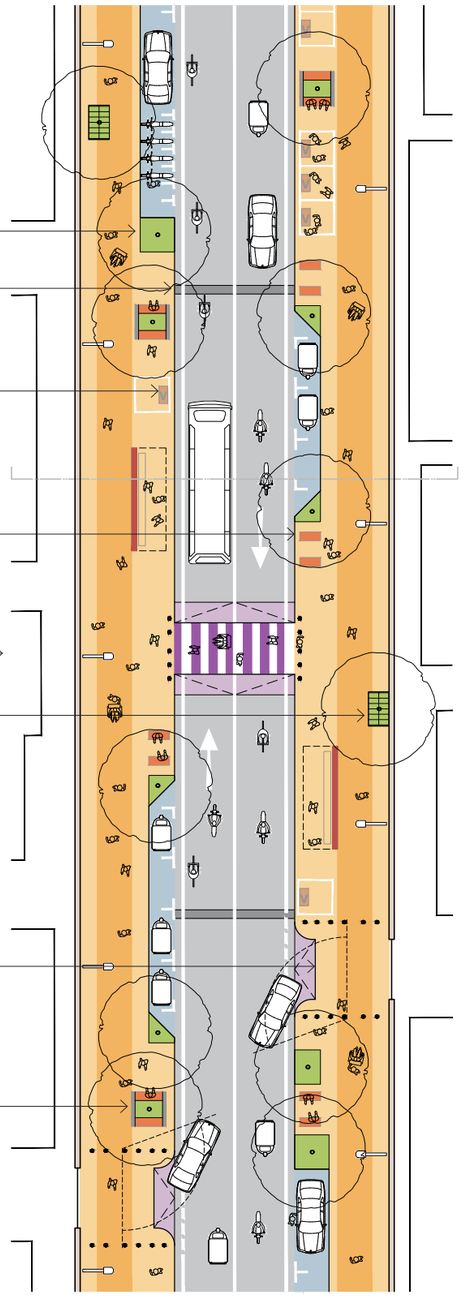
18M

18m wide with Symmetrical Footpaths

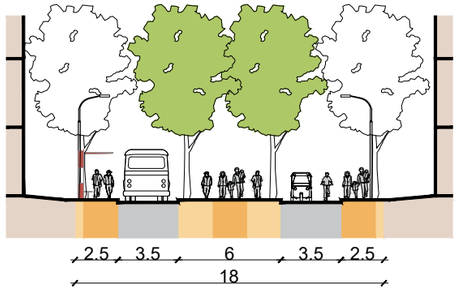
It is well-suited for areas with mixed land use, high pedestrian activity, and retail or commercial establishments while maintaining vehicular accessibility.

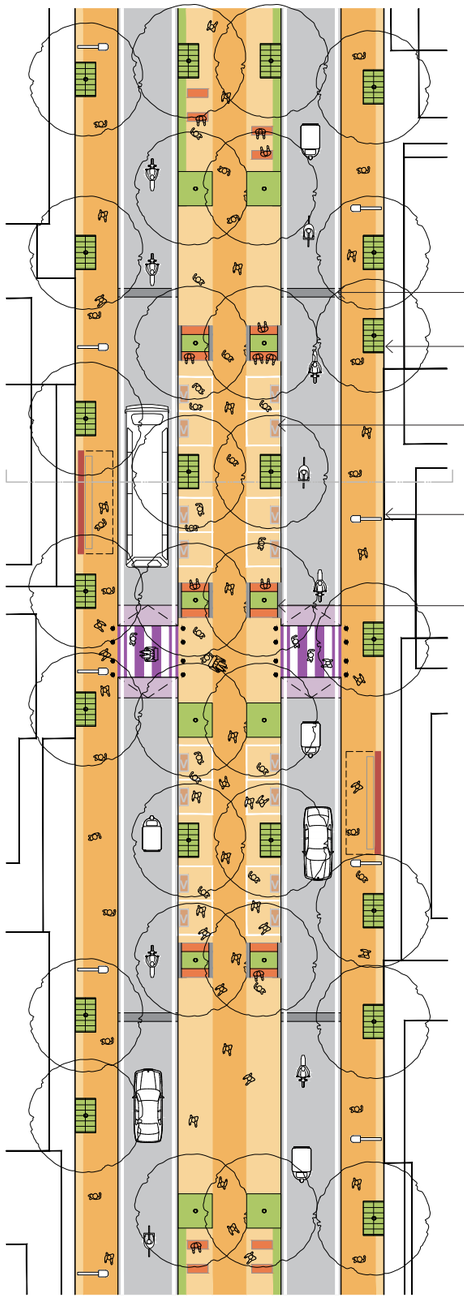
Cyclists will be in mixed traffic, hence streets should be traffic calmed to ensure speeds are within 30km/h, suitable for collector streets.





two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS





18M

18m wide with Pedestrian malls

Pedestrian malls, that prioritise walking, cycling and public transport, can be designed in locations with heavy pedestrian footfall and vending locations.

Parking spaces for freight should be accomodated within limited off-peak hours.

Such streets can be considered for commercial markets and transit station areas.

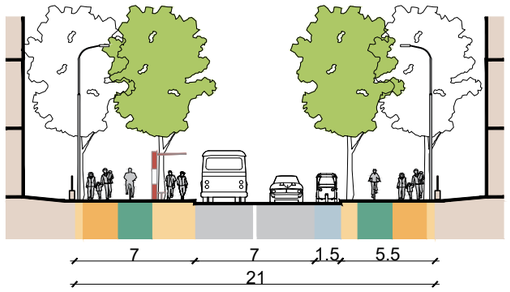
two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS

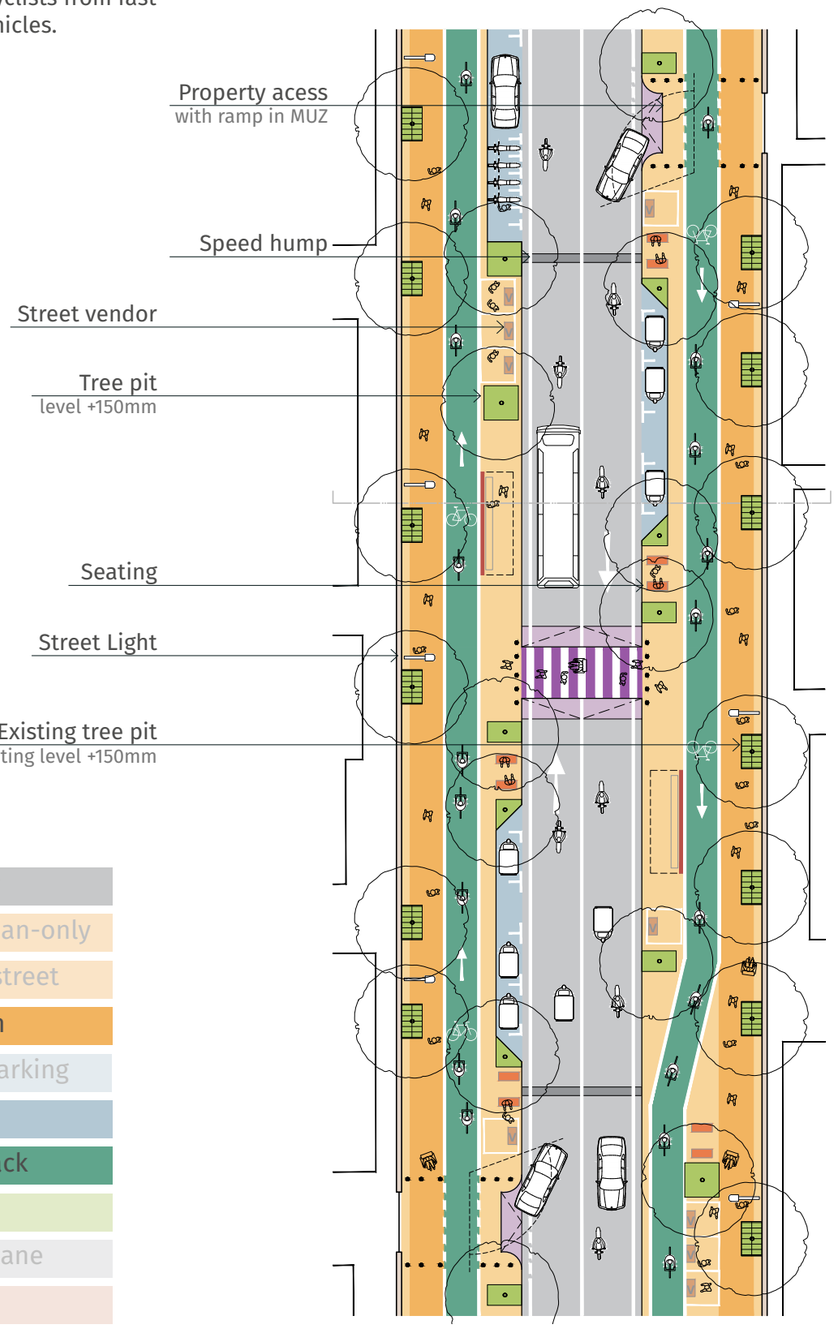
21M

21m wide street with Cycle tracks

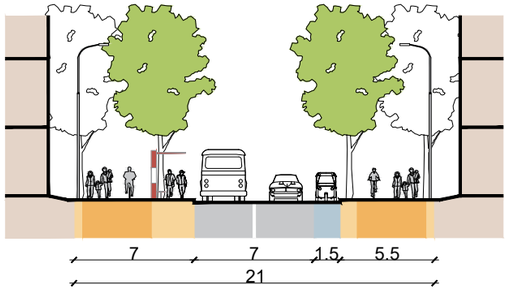
This template shall be considered for collector streets were vehicle speeds are above 30kmph.

A segrated cycle track ensures safety of cyclists from fast moving vehicles.





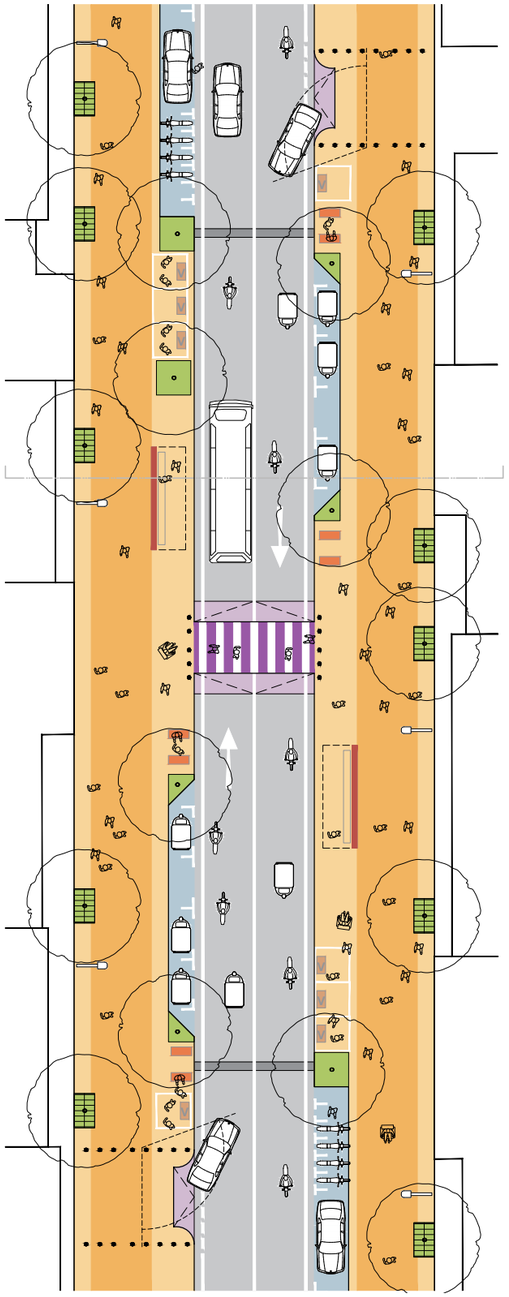
two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS



21M

21m wide street with wide pedestrian plaza

This template is more suitable for high-street retail and commercial areas where there is high pedestrian footfall.



Property access
with ramp in MUZ

Street Vendor

Speed hump

Tree pit
level +150mm

Seating

Existing tree pit
grating level +150mm

Street Light

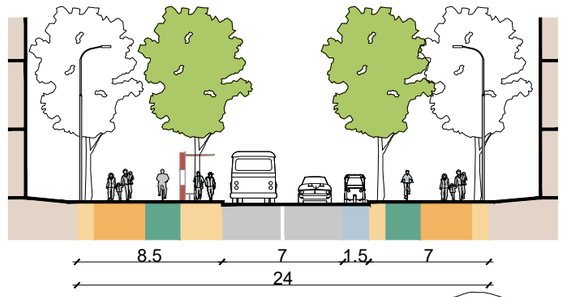
two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS

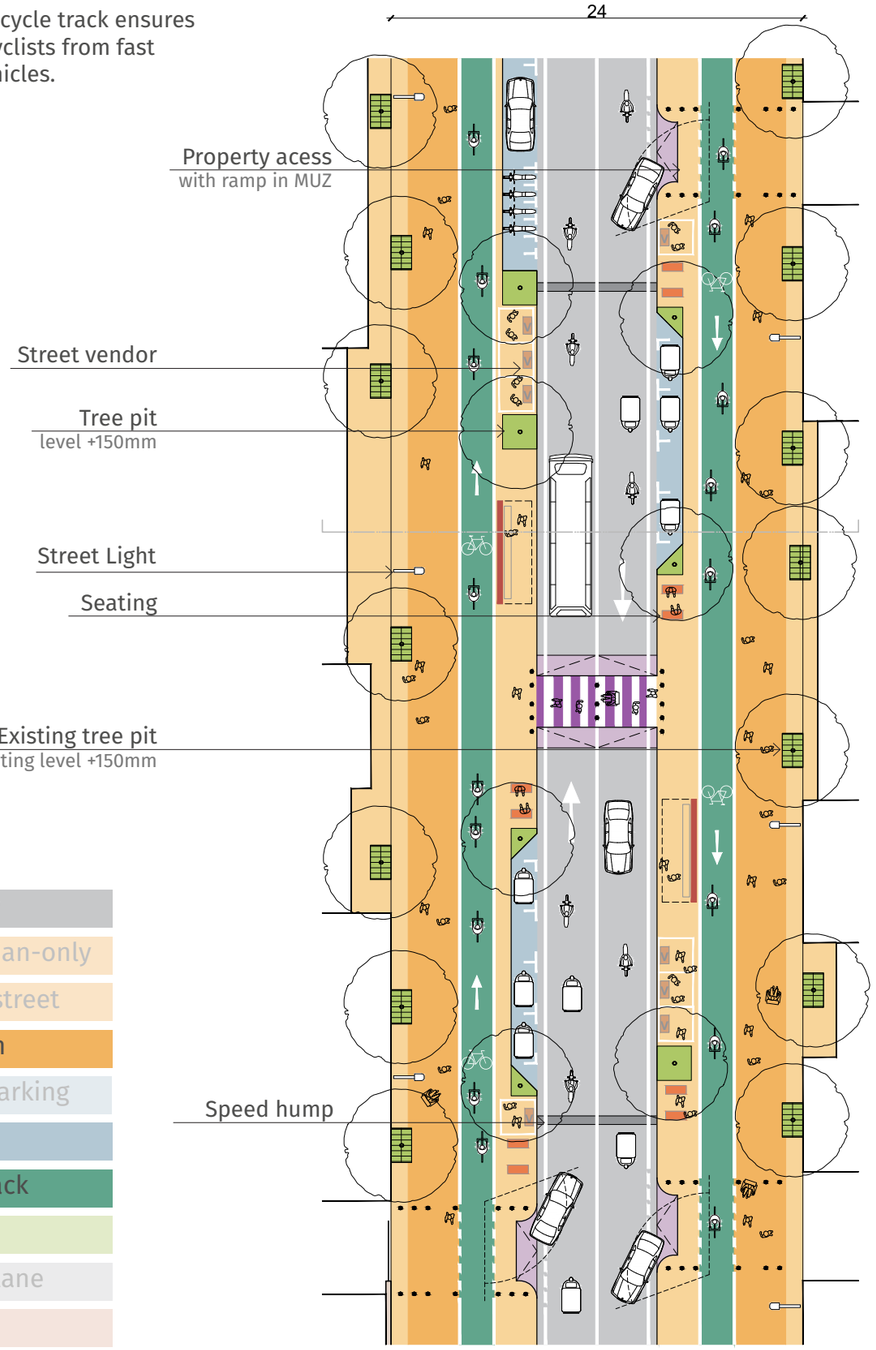
24M

24m wide street with Cycle tracks

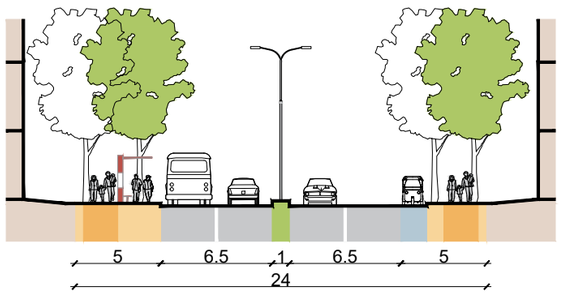
This template shall be considered for collector streets were vehicle speeds are above 30kmph.

A segrated cycle track ensures safety of cyclists from fast moving vehicles.





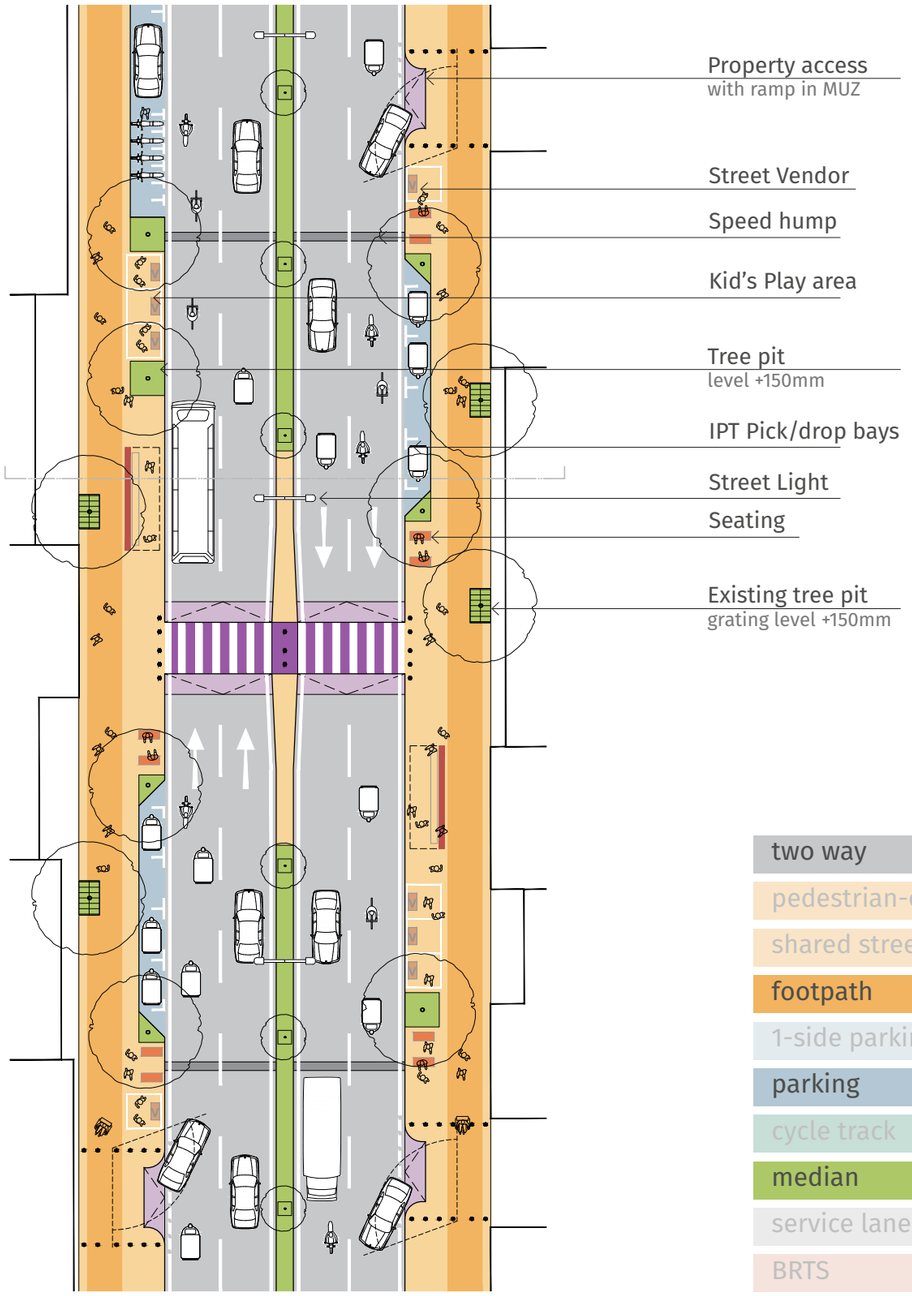
two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS



24M

24m wide street without Cycle tracks

This template works effectively for collector streets in mixed and commercial land-use.



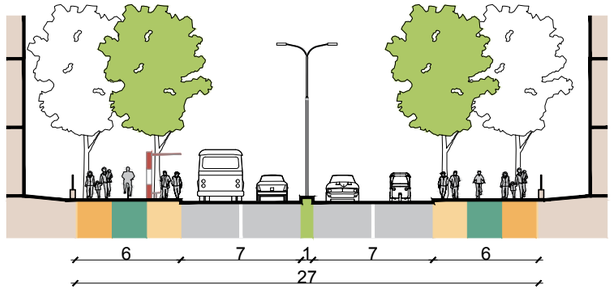
two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS

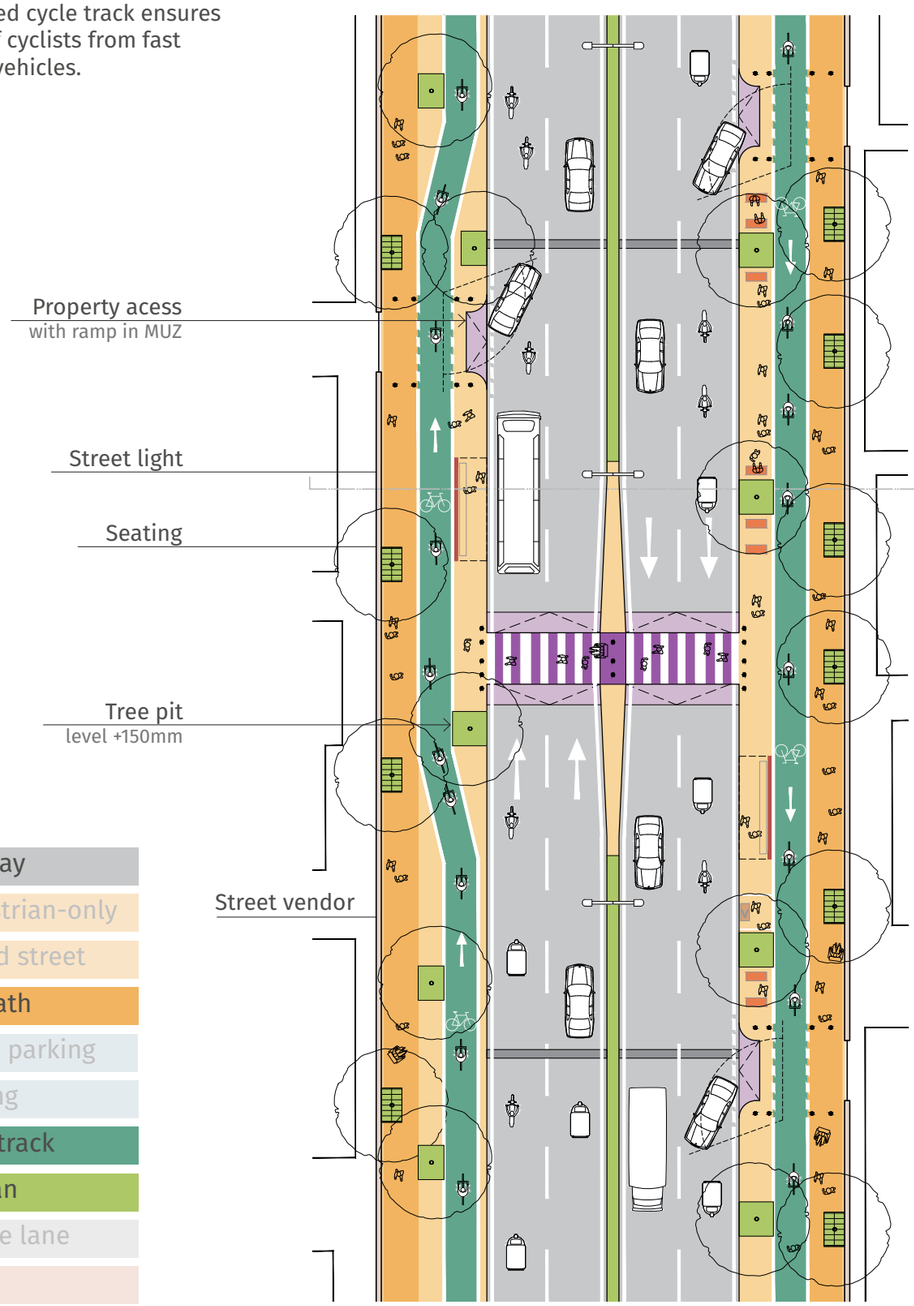
27M

24m wide street with segregated Cycle tracks

This template shall be considered to be suitable for arterial streets were vehicle speeds are above 30kmph.

A segrated cycle track ensures safety of cyclists from fast moving vehicles.



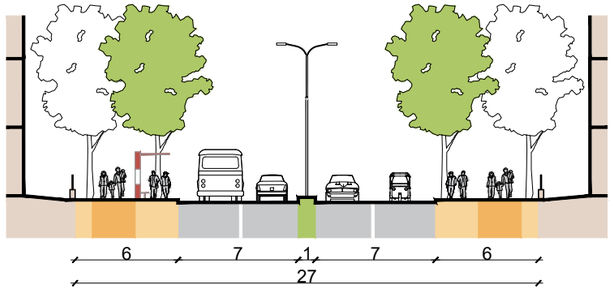


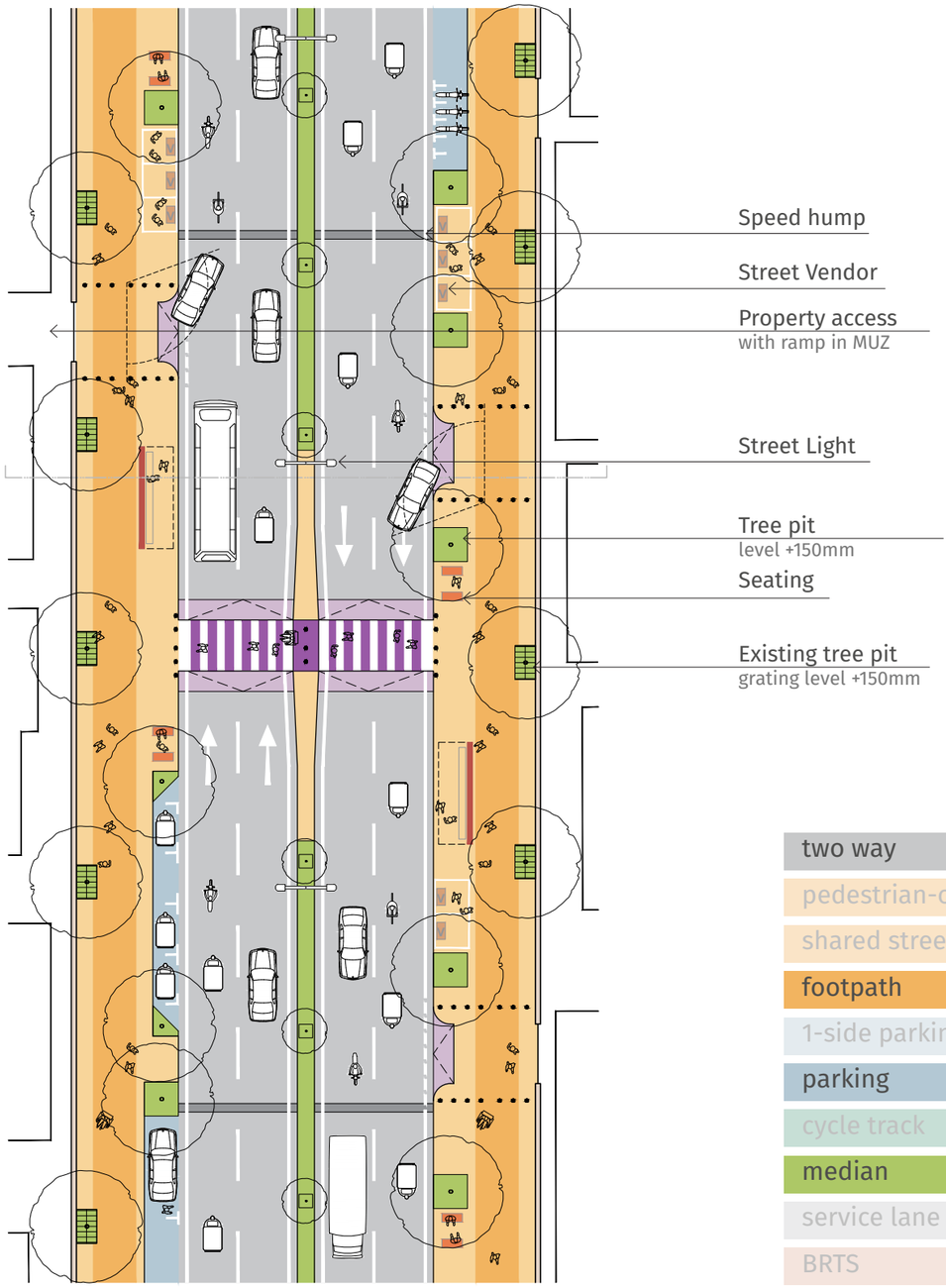
two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS

27M

27m wide street with both side wide pedestrian plaza

This template works effectively for arterial streets in mixed and commercial land-use with high pedestrian footfall.



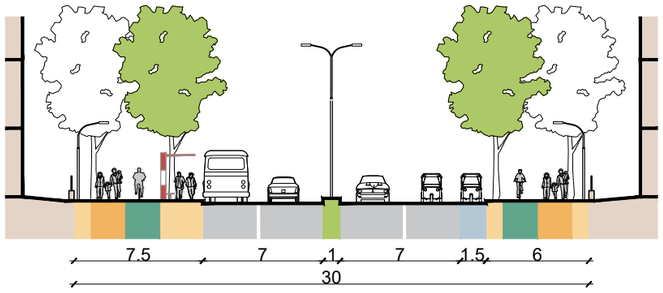


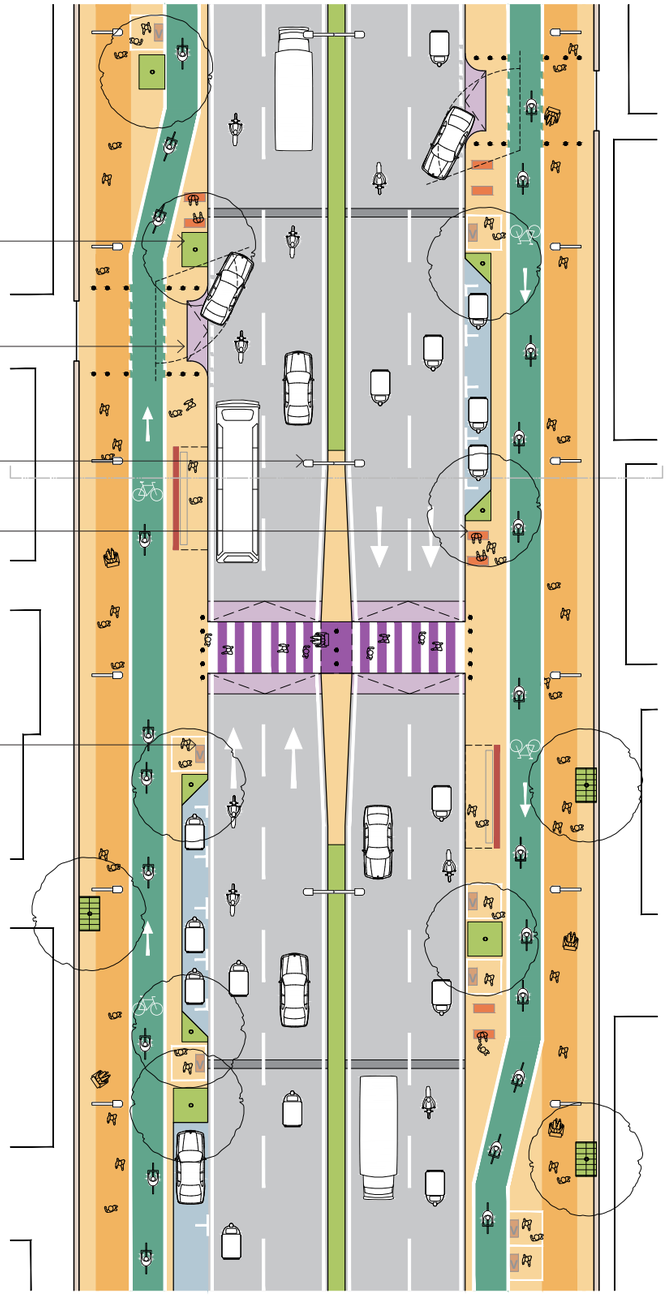
two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS

30M

30m wide street with segregated Cycle tracks

The template excels in arterial streets of mixed-use areas where urban vibrancy is vital, such as city centers, commercial districts, and neighborhoods with significant pedestrian footfall.



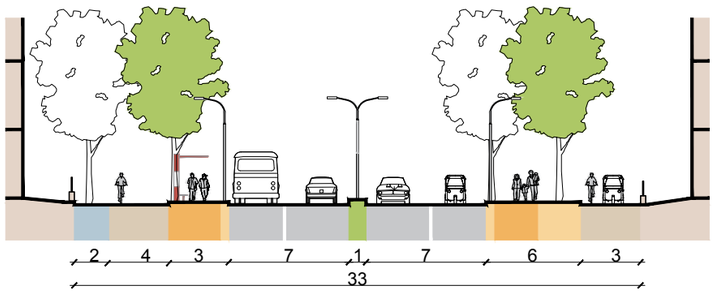


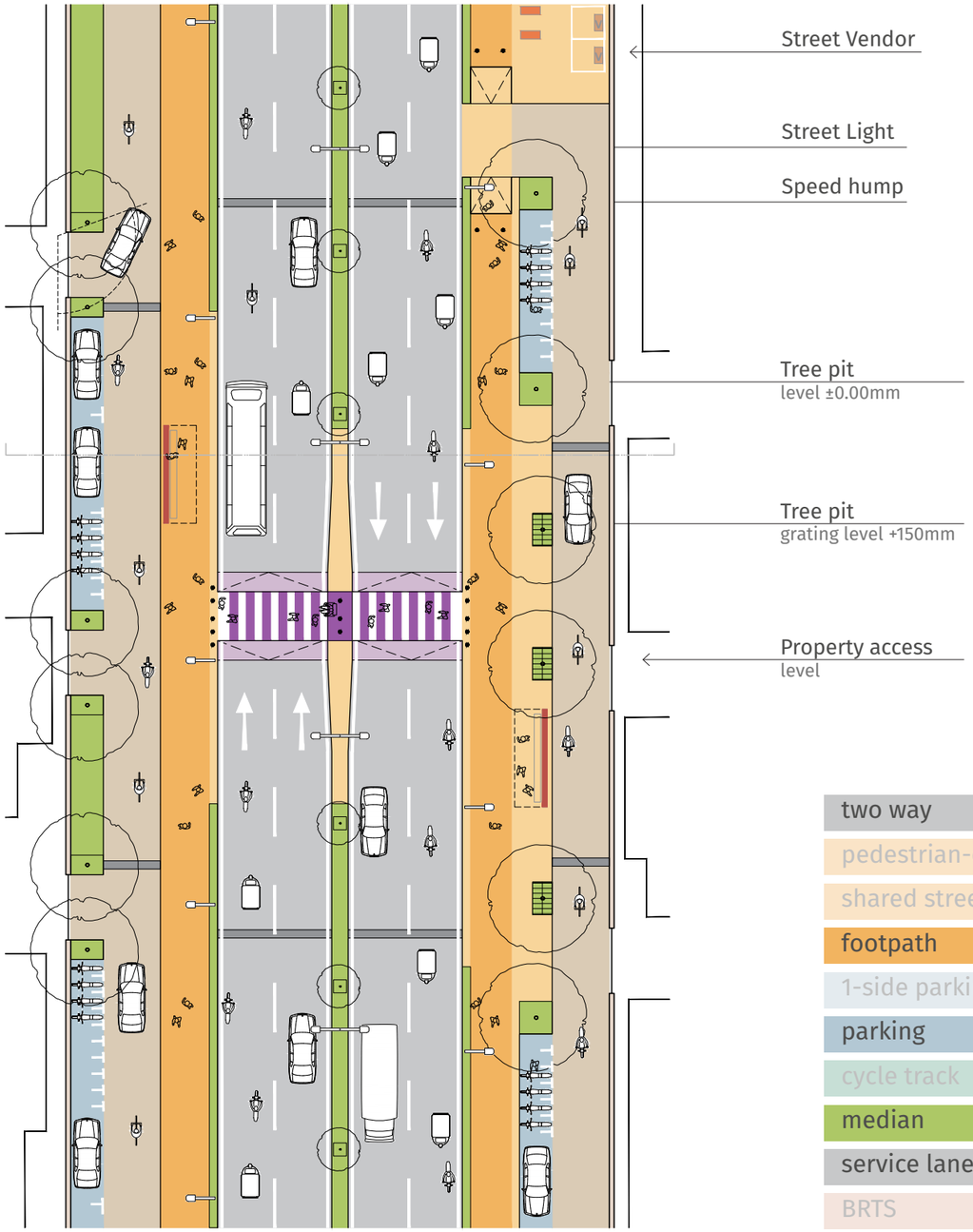
two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS

33M

33m wide street with service lanes

Service lane should be designed as a discontinuous lane with entry and exit, to avoid its usage as another carriageway.



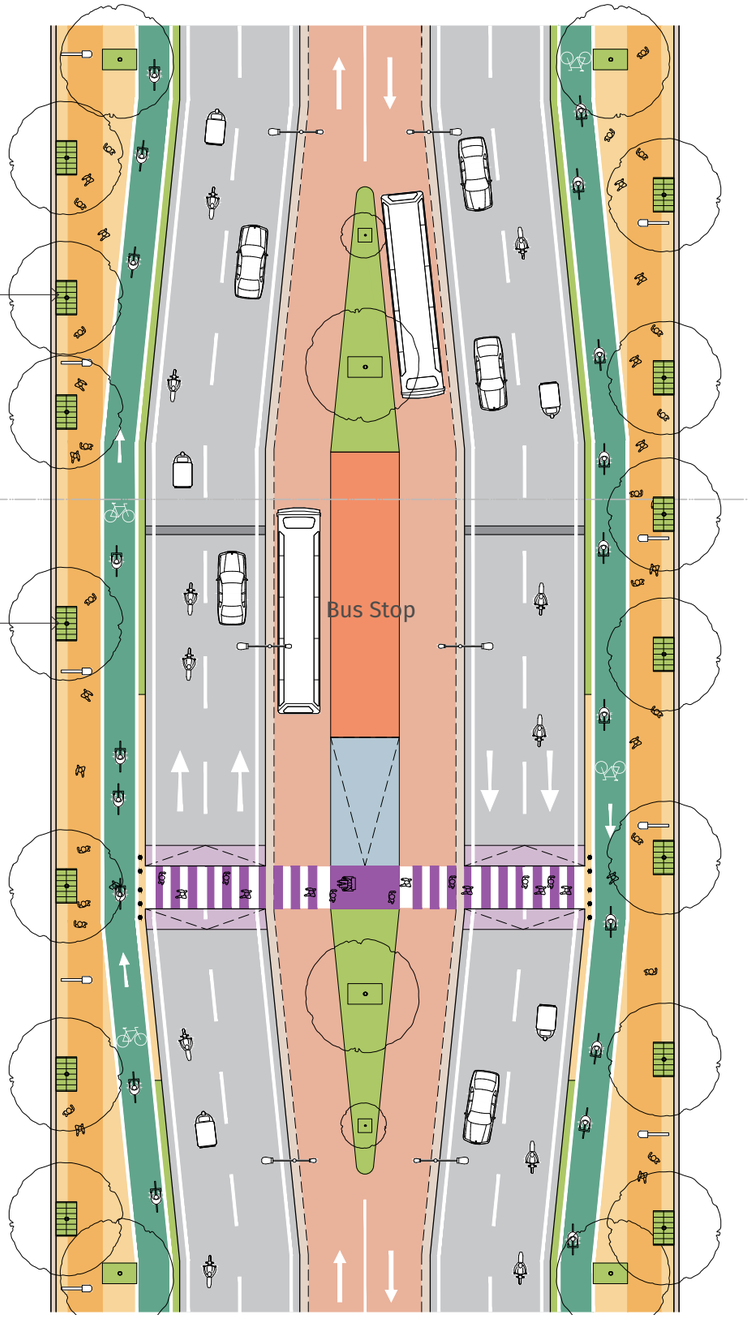


two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS

36M

36m wide street with BRT corridor

It is well-suited for arterial streets, major urban corridors with high-intensity traffic. It prioritizes efficient public transportation and non-motorized travel

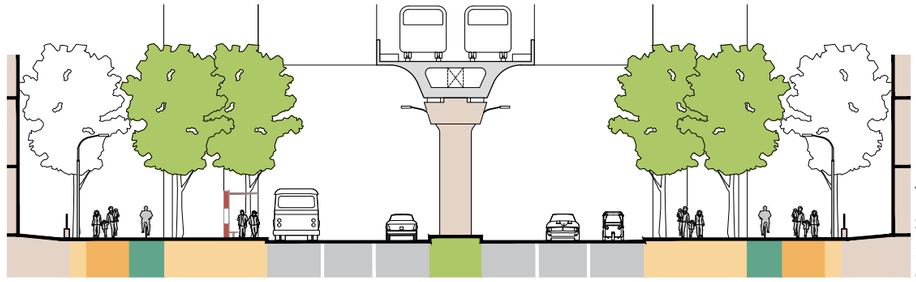


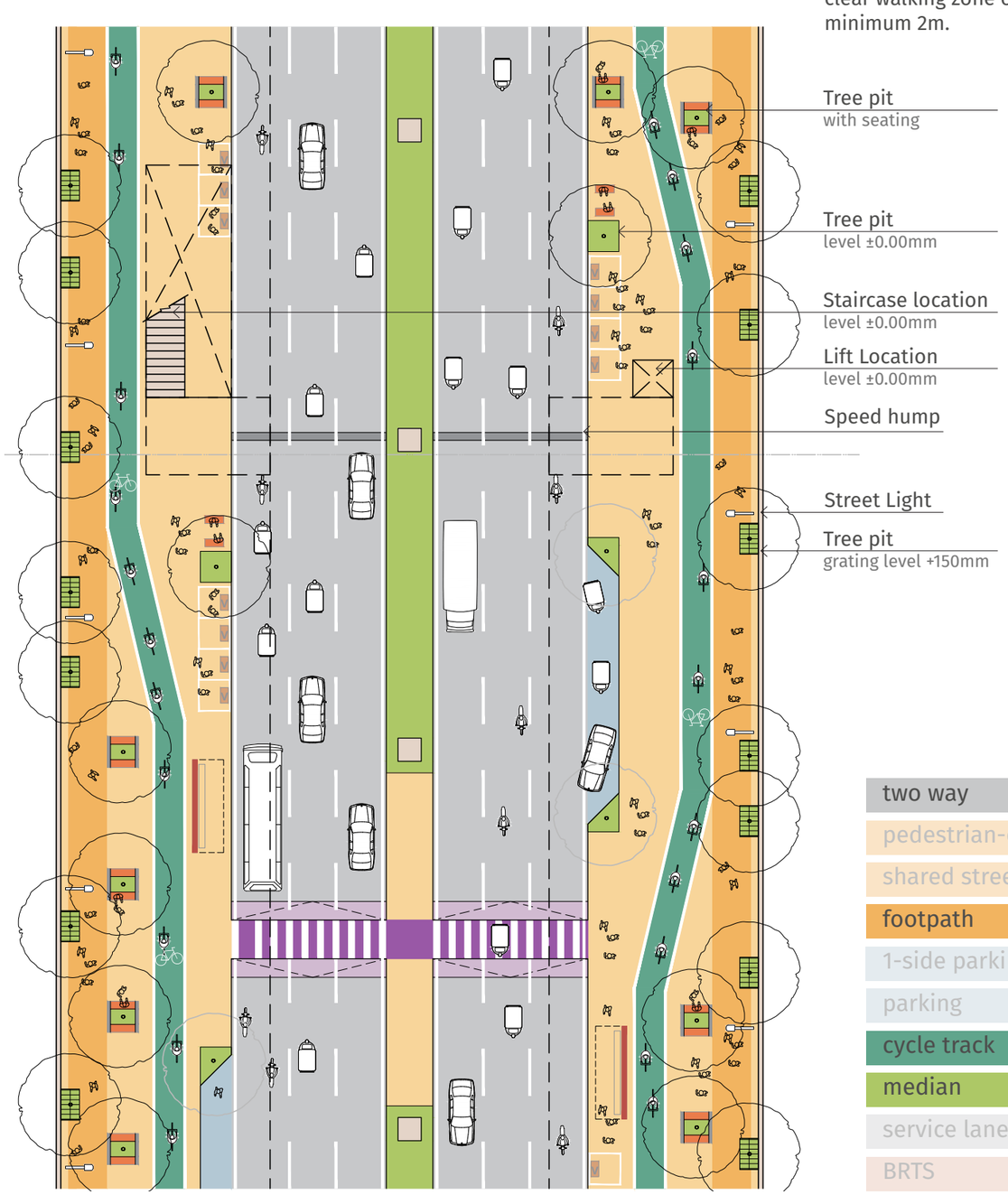
two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS

45M

45m wide street with segregated cycle tracks

This template is well suited for arterial streets. Metro station entrances should be planned ensuring unobstructed clear walking zone of minimum 2m.





two way
pedestrian-only
shared street
footpath
1-side parking
parking
cycle track
median
service lane
BRTS

D. B. Road Junction, Coimbatore

4

Intersection Design

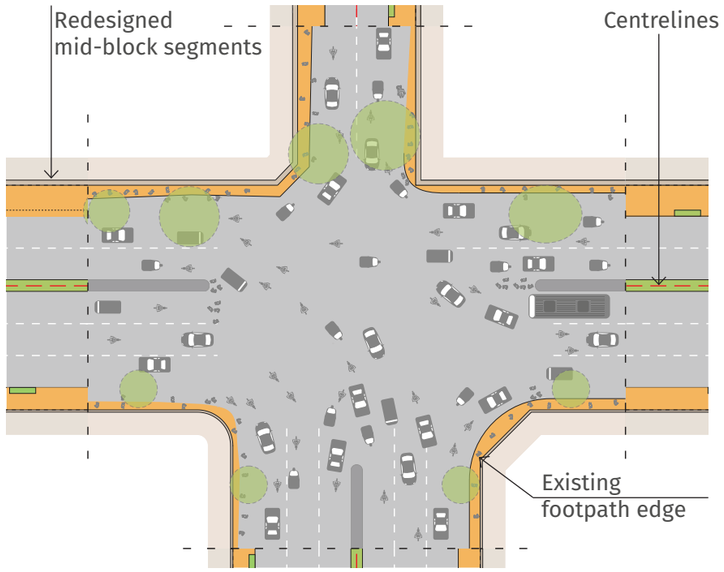
4.1 Design Process

Intersection design aims to minimize conflicts between road users, enhance vehicle flow, and ensure safety. They should be designed in compact layouts that require pedestrians to cross in smaller sections. This design also effectively guides traffic and enhances vehicle throughput.

Step 1

Prepare a drawing of the intersection to be redesigned, highlighting the conflict points. Ensure that the footpaths and medians have been demarcated as per current site situation.

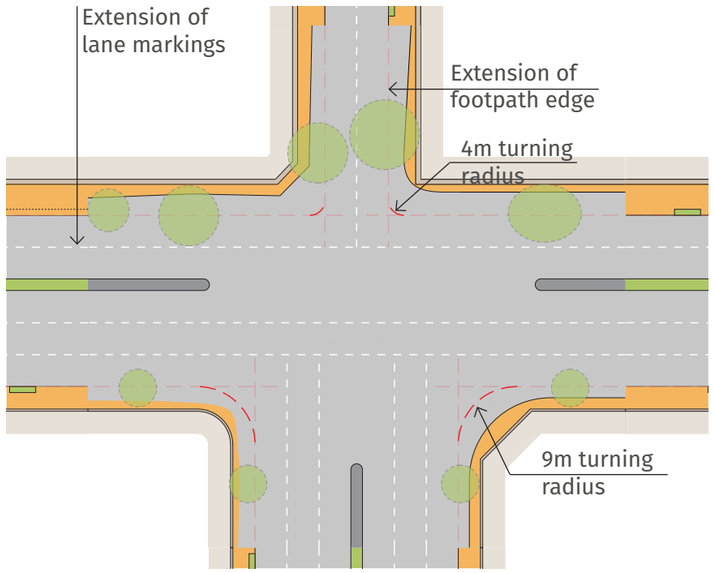
Overlay the redesigned mid-block segments of all the arms of the intersection on the existing intersection drawing such that the centrelines align.

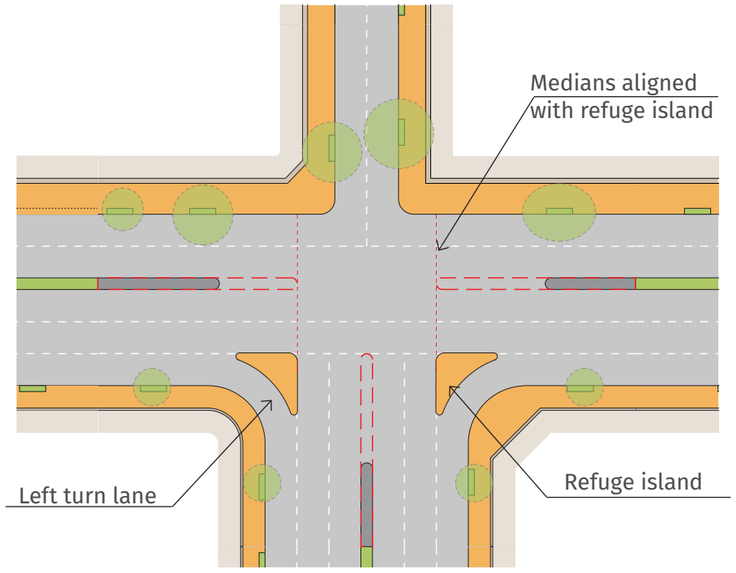


Step 2

Extend the footpaths and the lane markings from the mid-block segments into the intersections to retain a uniform carriageway width.

Provide sufficient turning radii. The turning radius should preferably be a maximum of 9 m for Bus Route Roads (BRR) and 4m for non-Bus Route Roads.

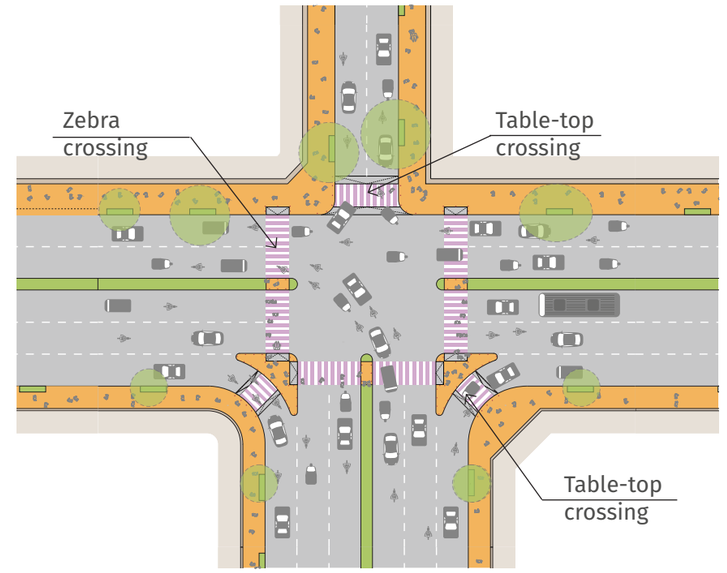




Step 3

Where continuous flow of traffic has been observed, provide a left turning lane. Introduce a triangular refuge island to ensure pedestrian safety.

Extend the medians into the intersection, up to the traffic islands. This would prevent wrong side driving and ensure safety of pedestrian crossings.



Step 4

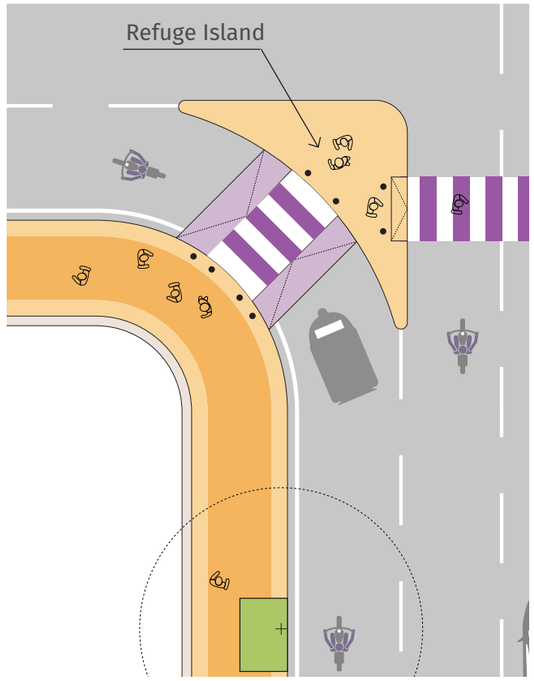
Provide at-grade zebra crossings with pedestrian access ramps across all signalised arms of the intersection.

Unsignalised street junctions should have tabletop crossings.

Provide bollards to prevent vehicular entry into footpaths and provide unhindered pedestrian refuges in the medians and islands.

Refuge Islands

Refuge islands provide intermediate spaces where pedestrians and cyclists can wait safely before crossing successive streams of traffic.



Location

Refuge islands should be provided at intersections where pedestrians have to cross more than two lanes of traffic in succession. These islands can also act as channelisers of traffic.

Height

Refuge islands should be at the same level as the footpath.

Tabletop crossings must be provided between the footpath and the refuge islands for safer crossing.

Refuge islands should be highlighted by reflective bollards. Light poles and signages, if any, should not obstruct pedestrians' movement and vision.

Chandigarh


Testing the design at Jupiter Hospital Junction, Pune


Implementation at Jupiter Hospital Junction, Pune

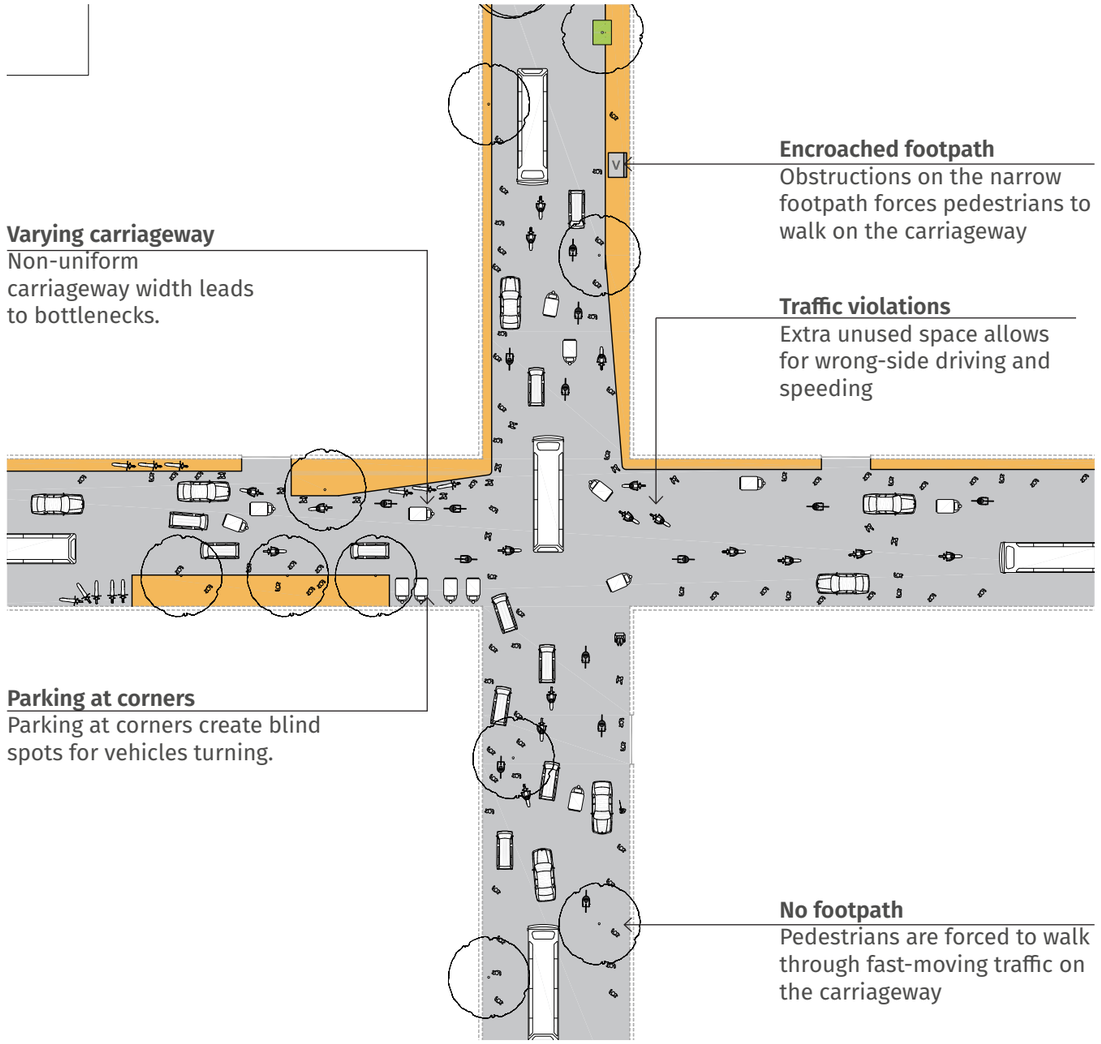
4.2 Example - Roundabout

Roundabouts serve to minimize conflicts among road users. Their design encourages a continuous, circular flow of vehicles, reducing the need for stops and sharp turns.

In unsignalised intersections, a roundabout can improve safety and reduce speed at an unsignalised intersection.


Pantheon Road Junction, Chennai

Before



Varying carriageway
Non-uniform carriageway width leads to bottlenecks.

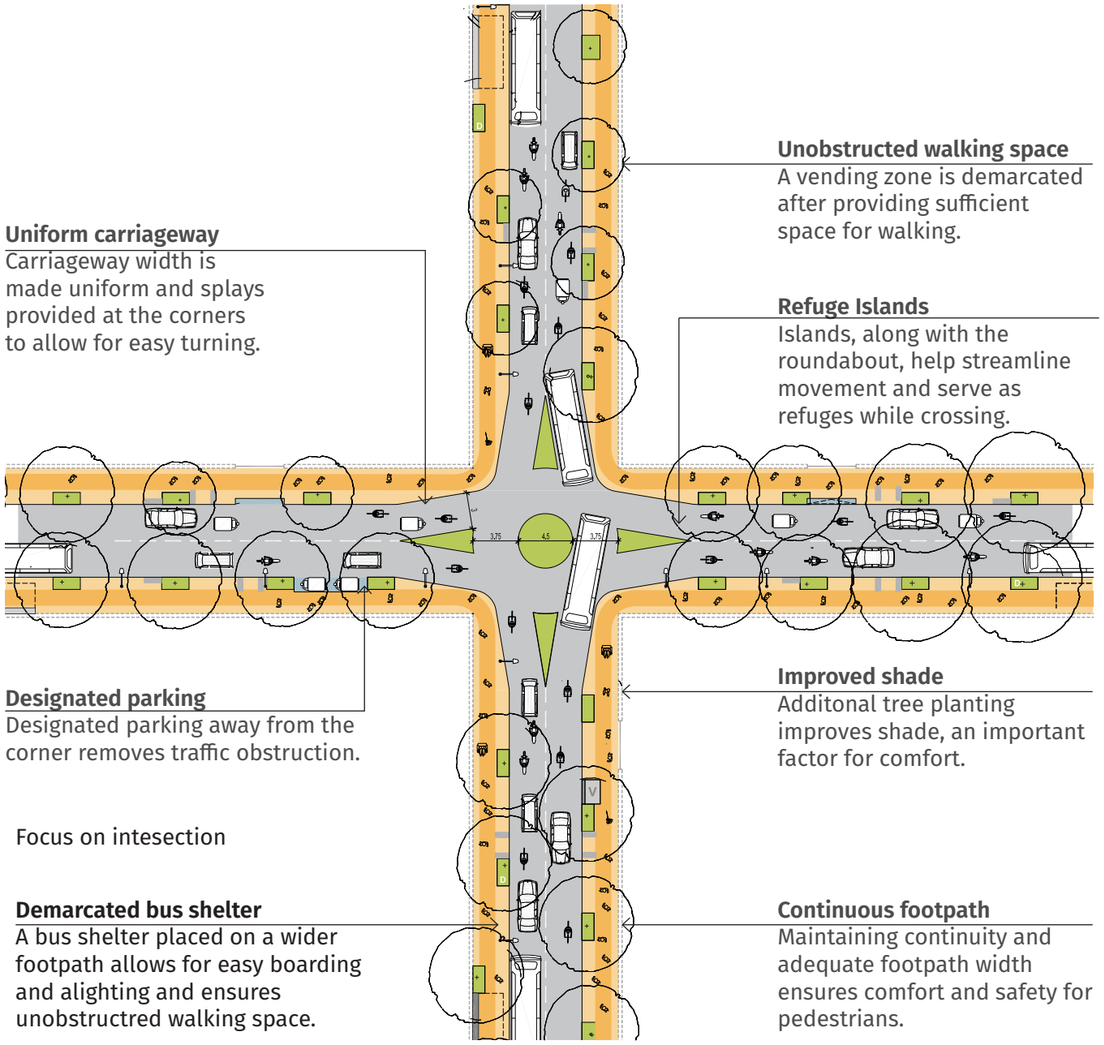
Encroached footpath
Obstructions on the narrow footpath forces pedestrians to walk on the carriageway

Traffic violations
Extra unused space allows for wrong-side driving and speeding

Parking at corners
Parking at corners create blind spots for vehicles turning.

No footpath
Pedestrians are forced to walk through fast-moving traffic on the carriageway

After



Uniform carriageway
Carriageway width is made uniform and splays provided at the corners to allow for easy turning.

Unobstructed walking space
A vending zone is demarcated after providing sufficient space for walking.

Refuge Islands
Islands, along with the roundabout, help streamline movement and serve as refuges while crossing.

Designated parking
Designated parking away from the corner removes traffic obstruction.

Improved shade
Additonal tree planting improves shade, an important factor for comfort.

Focus on intesection

Demarcated bus shelter
A bus shelter placed on a wider footpath allows for easy boarding and alighting and ensures unobstructred walking space.

Continuous footpath
Maintaining continuity and adequate footpath width ensures comfort and safety for pedestrians.

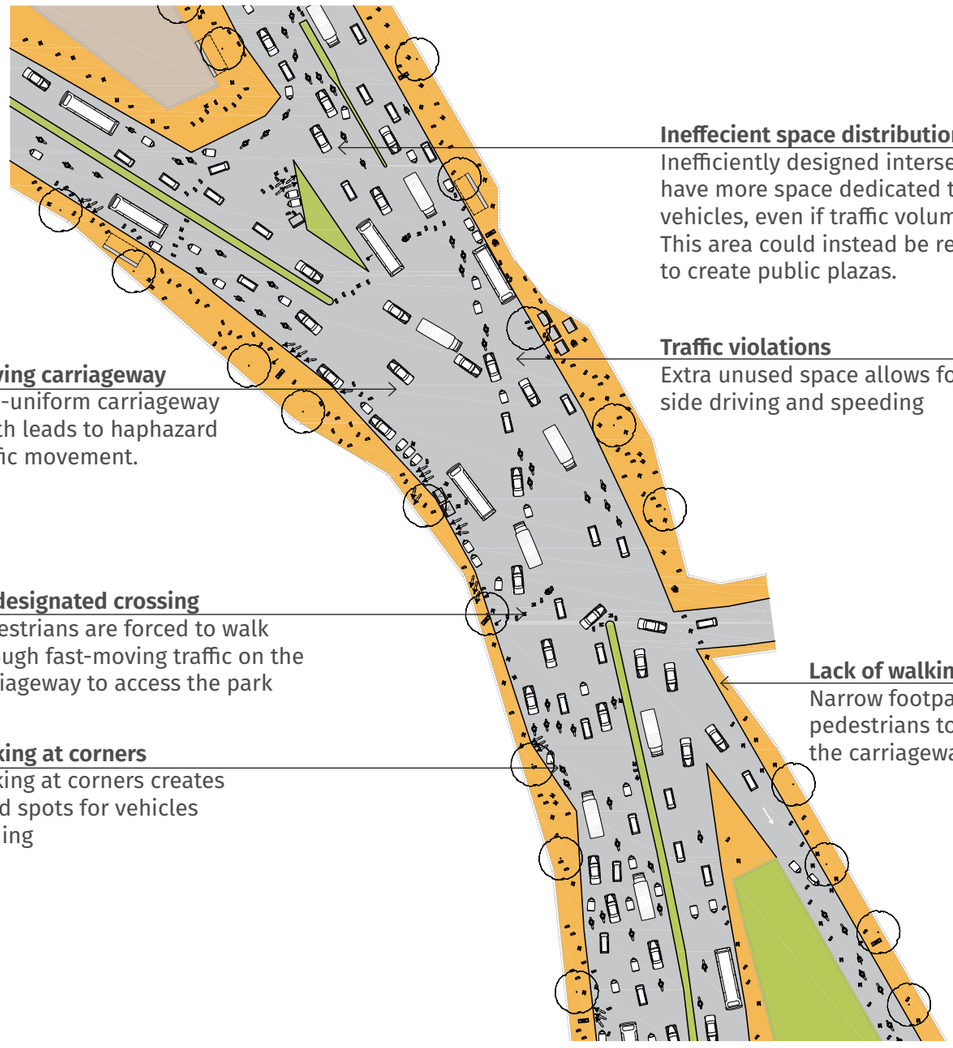
4.3 Example - Complex Intersection

This example represents a busy arterial highway branching off into an arterial road and a local one-way street while also meeting a four-lane street and another local street at angles, forming a complex X-intersection.

Often, streets in an organically formed urban setup meet at angles, forming non-orthogonal intersections. Creating perpendicular angles where possible and making the space compact by public plazas, significantly enhances the safety and livability of the intersection.


Buenos Aires, Argentina

Before



Ineffecient space distribution
Inefficiently designed intersections have more space dedicated to vehicles, even if traffic volume is low. This area could instead be reclaimed to create public plazas.

Traffic violations
Extra unused space allows for wrong-side driving and speeding

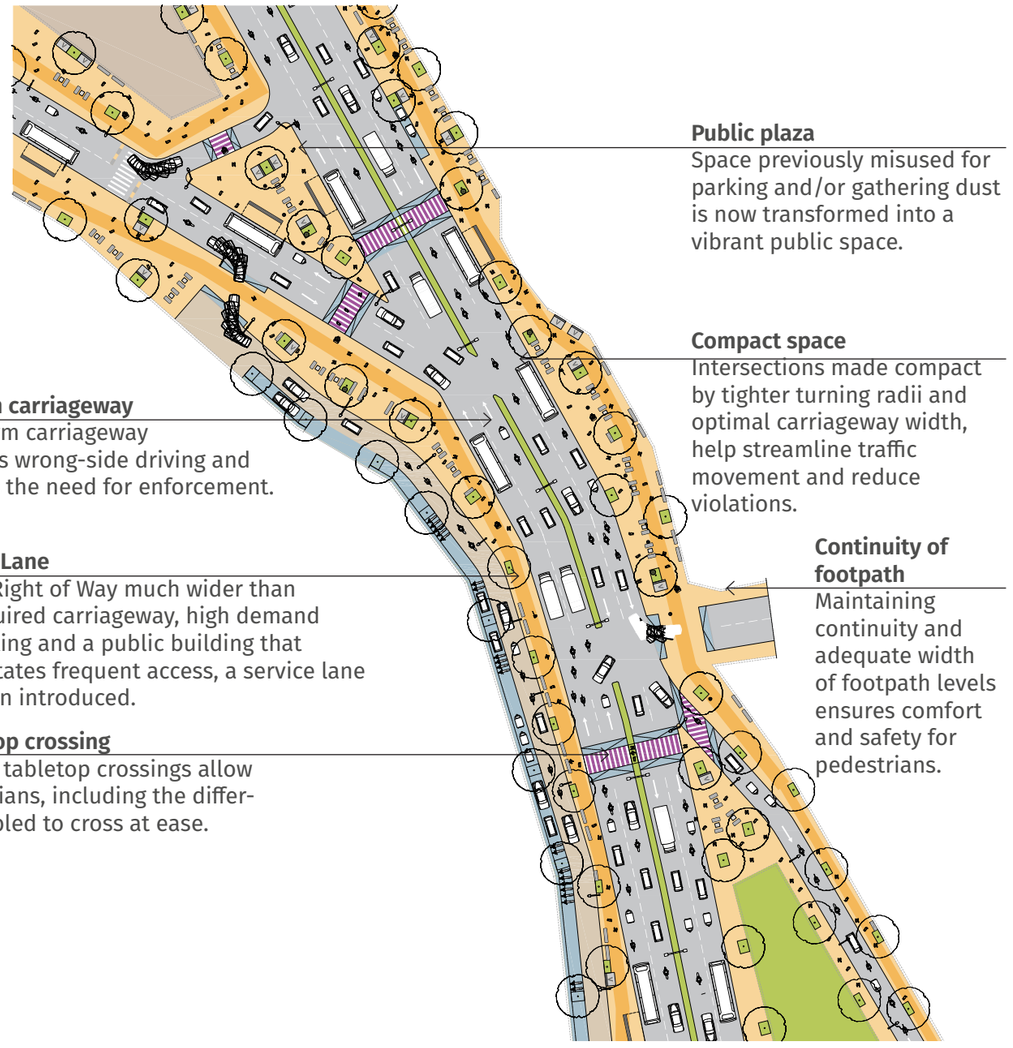
Varying carriageway
Non-uniform carriageway width leads to haphazard traffic movement.

No designated crossing
Pedestrians are forced to walk through fast-moving traffic on the carriageway to access the park

Lack of walking space
Narrow footpath forces pedestrians to walk on the carriageway

Parking at corners
Parking at corners creates blind spots for vehicles turning

After



Public plaza
Space previously misused for parking and/or gathering dust is now transformed into a vibrant public space.

Compact space
Intersections made compact by tighter turning radii and optimal carriageway width, help streamline traffic movement and reduce violations.

Uniform carriageway
A uniform carriageway prevents wrong-side driving and reduces the need for enforcement.

Continuity of footpath
Maintaining continuity and adequate width of footpath levels ensures comfort and safety for pedestrians.

Service Lane
With a Right of Way much wider than the required carriageway, high demand for parking and a public building that necessitates frequent access, a service lane has been introduced.

Table-top crossing
Regular tabletop crossings allow pedestrians, including the differ-ently-abled to cross at ease.

J. M. Road, Pune

5

Street Materials

5.1 Criteria for material selection

Materials play an important role in deciding the usability of design. Good materials go hand-in-hand with the design and help achieve the intended purpose of various street elements. Material selection should be an on-going process through the different stages of design. To ensure appropriate budget allocation and longevity of street elements, it is important to select materials that are durable and easy to maintain.

Aundh D. P. Road, Pune

Materials used in the streets should be:

- Easy to install
- Easy to procure
- Durable
- Cost-effective in maintainence
- Easy to clean
- Easy to dismantle and repair
- Highly resistant to vandalism
- Slip resistant


Pashan Sus Road, Pune

5.2 Flooring Finish

There are three types of flooring finish:
- Unit paving - natural stone
- Unit paving - manufactured
- Cast-in-situ

Flooring finish should be selected such that it is adaptable to different weather conditions and suitable as per universal accessibility requirements.

Aundh D. P. Road, Pune

5.2.1 Unit paving - natural stone


S. M. Street, Kozhikode

Stone Blocks

Pros
- Highly durable, less prone to weathering; 80mm thick stone blocks can be used for bearing vehicular load as well
- Can be laid in variety of design patterns
- Easy to dismantle for future repairs

Cons
- Expensive; heavy to transport
- Results in uneven surface and sinking if sub-base is not prepared with care
- Prone to dismantling if kerbs are not installed properly

Application
On carriageways for slowing traffic, landscaped zones, shared streets, at entries for gates and ramps; avoided on footpath due to its highly undulated surface

Harrington Road, Chennai

Stone Slabs/Tiles

Pros
- Thicker slabs are durable; less prone to weathering
- Can also be used as cladding or seating to compliment the pavement finish

Cons
- Expensive and heavy
- Thinner slabs prone to breakage if mishandled or dropped
- Labour-intensive to install
- Slippery during rains if polished
- Results in uneven surface and sinking if sub-base is not prepared with care

Application
Sandblasted/leather finished stone on footpath - generally in select projects; not recommended on cycle tracks and load-bearing areas

5.2.2 Unit paving - manufactured

Concrete blocks

Pros
- Variety of sizes, colours, and patterns available
- Cost-effective
- Easier to install than stone slabs
- Anti-skid due to rough surface

Cons
- Results in uneven surface and sinking if the base is not prepared with care
- Un-chamfered edges may lead to chipping of blocks
- May become pigmented and slippery due to growth of moss on constant exposure to water

Application
On footpaths, parking bays, and carriageways to control speed; not recommended on cycle tracks


J.M Road, Pune

Cement Tiles

Pros
- Cost-effective
- Lighter than stone tiles, stone/concrete pavers
- Available in different textures, colours, designs, patterns, and shapes

Cons
- Prone to breakage if mishandled or dropped
- More labour-intensive to install than PCC finish
- Slippery during rains if without anti-skid studs
- Results in uneven surface and sinking if the base is not prepared with care
- Prone to dismantling if moisture retains in the surface

Application
On footpaths, especially tactile flooring; not recommended on parking bays and cycle tracks


Raman Street, Chennai


J. M. Road, Pune

Permeable concrete blocks

Pros
- Offers a porous surface that enables water percolation
- Variety of sizes, colours, and patterns available
- Cost-effective
- Easier to install
- Anti-skid due to rough surface

Cons
- Improper composition of the material can result in loss of durability
- Requires regular cleaning to avoid blockage due to oil and dust
- Results in uneven surface and sinking if the base is not strong and stable

Application
On footpaths, parking spots, plazas.

Interlocking tiles

Pros
- Variety of sizes, colours, and patterns available
- Cost-effective
- Easier to install than stone slabs
- Anti-skid due to rough surface
- Easy to replace few tiles without removing all

Cons
- Results in uneven surface and sinking if the base is not prepared with care
- More labour-intensive to install than PCC finish
- Prone to dismantling if moisture retains in the surface
- May become pigmented and slippery due to growth of moss on constant exposure to water

Application
On footpaths and parking bays; not recommended on cycle tracks


Pinjala Subramaniam Street, Chennai

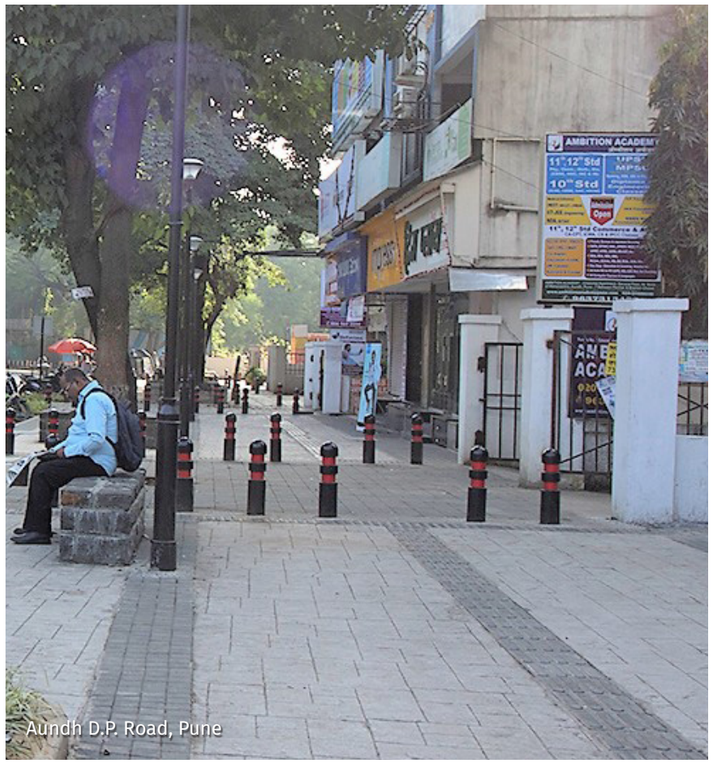
5.2.3 Cast-in-situ

PCC Stamped Concrete

Pros
- Variety of stencils available
- Monolithic surface; does not start dismantling like pavers
- Uniform finish
- Easy to clean and maintain

Cons
- Stamping too deep may disrupt wheelchair movement
- Expansion joints should be provided to prevent cracking
- Has to be demolished in case of future repairs of underground utilities
- Need additional care during curing to avoid paw-prints

Application
On footpaths, landscaping, plazas; intricate stencils not recommended for cycle track



Aundh D.P. Road, Pune

PCC broom finish

Pros
- Relatively quick to install
- Grooves provide sufficient grip
- Cheaper than other PCC finishes
- Monolithic surface; does not start dismantling like pavers
- Uniform finish

Cons
- Finish has to be even to avoid poor cycling experience
- Looks fairly plain
- Expansion joints should be provided to prevent cracking
- Has to be demolished in case of future repairs of underground utilities
- Need additional care during curing to avoid paw-prints

Application
On footpaths, cycle tracks, parking bays, and carriageways


F. C. Road, Pune


F. C. Road, Pune

PCC Pigmented Concrete

Pros
- Adds colour to the street
- Can be combined with other finishes for variations in design
- Relatively quick to install
- Monolithic surface; does not start dismantling like pavers
- Uniform finish
- Easy to clean and maintain

Cons
- Colour wears off with time resulting in a dull look
- Expansion joints should be provided to prevent cracking
- Has to be demolished in case of future repairs of underground utilities
- Need additional care during curing to avoid paw-prints

Application
Generally used to differentiate between functions for instance pigmented concrete on cycle track


J. M. Road, Pune

Rubberised floor finish

Pros
- EPDM rubber surface helps in impact absorption
- Reduces the risk of permanent injury by cushioning the fall
- Highly durable, less prone to weathering
- Offers permeability
- Available as tiles, easy to install

Cons
- Comparatively expensive
- Seams are prone to vandalism and staining

Application
In play areas for children, on the footpaths

5.3 **Bollards**

There are four preferred types of materials used for bollards:
- Pigmented RCC
- Stone
- Galvanised iron
- Stainless steel

Bollard material should be robust for easy maintenance especially owing to high numbers.

Reflective tapes on bollards at Binny road, Chennai

S. M. Street, Kozhikode

Pigmented RCC

Pros
- Pigment added to concrete mixture results in homogenity, as opposed to painted bollard
- Cost-effective
- Lighter than stone bollards, making it easier to handle
- Can be cast in different shapes as per design

Cons
- Tends to chip off with time
- Lighter colours fade off with time leading to dull look


Harrington Road, Chennai

Stone

Pros
- Durable

Cons
- Tends to break at the grooves
- Expensive

Galvanised iron

Pros
- Cost-effective compared to stone bollards
- Lighter than stone bollards, making it easier to handle
- Can be fabricated in different shapes as per design

Cons
- Paint tends to chip off
- More expensive than RCC bollards

Church Street, Bengaluru

Stainless steel

Pros
- Cost-effective compared to stone bollards
- Lighter than stone bollards, making it easier to handle
- Easy to clean and maintain due to smooth surface

Cons
- Limited in shape - generally available only as pipes
- Less aesthetical as compared to other types of bollards

Source: Wikimedia Commons

West Avenue Bus Stop, Chennai

5.4 Seating

There are four preferred types of seating materials:
- Stone
- Precase concrete
- Metal
- Fibre reinforced polymers
-

Seating material should be selected such that it provides comfort in all weather conditions.

J. M. Road, Pune

F. C. Road, Pune

Stone

Pros
- Highly durable, less prone to weathering
- Does not chip away easily

Cons
- Expensive
- Labour-intensive to install

J. M. Road, Pune

Precast concrete

Pros
- Cost-effective
- Can be cast in different shapes as per design
- Pigmented concrete mixture results in homogenity, as opposed to painted seats

Cons
- Tends to chip off with time
- If painted, colour chips off with time

Metal

Pros
- Can be fabricated with varying degrees of ornamentation - highly suited for traditional design themes
- Durable
- Less prone to weathering

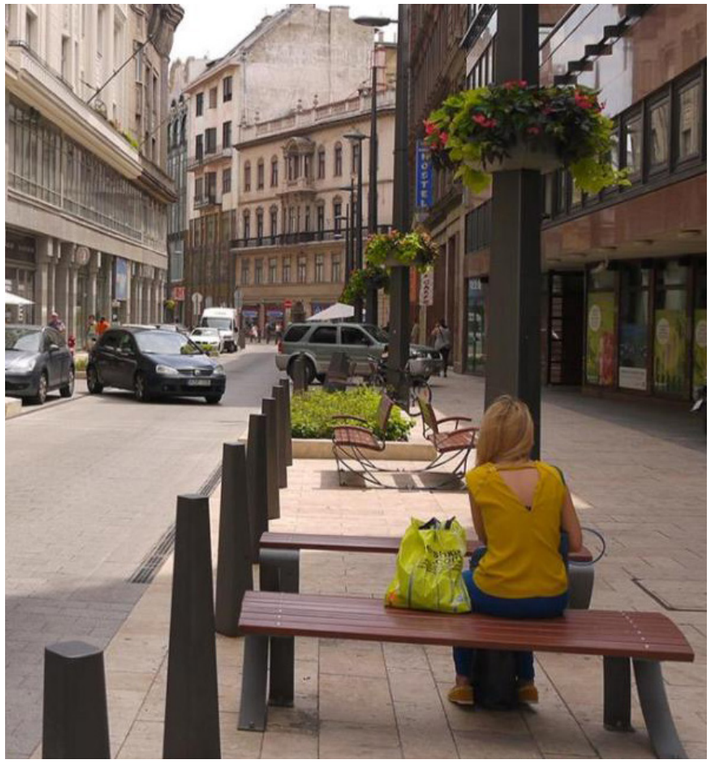
Cons
- Becomes easily hot or cold depending on outside temperature, making it uncomfortable to use
- Hard and not comfortable to use for long - preferred to avoid squatters
- Paint tends to chip off
- Rusts with time
- Tends to be easy to steal

Source: Wikimedia Commons

Fibre reinforced polymers (FRP)

Pros
- Can be cast in different shapes as per design
- Pigment added to FRP mixture results in homogenity, as opposed to painted seats
- Can be made translucent, providing for embedded lighting options
- Durable, being plastic in nature

Cons
- Expensive
- Relatively difficult to source, owing to fewer FRP vendors dealing with seating



Pondy Bazaar Pedestrian Plaza, Chennai

Pashan Sus Road, Pune

6

Resources

6.1 Insitutionalising Healthy Streets Approach

Institutionalising the Healthy Streets Approach refers to putting in place a system that will support the scale-up of Healthy Streets across the city.

It involves setting up a committee to oversee the work, organising monthly targets, adopting policies to support the approach, preparing action plan to set clear goals and more.

6.1.1 Institutional Setup Guide

An important step in the scale-up strategy for Healthy Streets is an Institutional Setup, including a Healthy Streets Apex Committee and a Healthy Streets Department / Cell.

This guide and concept note template is to help you form the Apex Committee and consequently, the Department / Cell. These institutional bodies will build resilience as you scale up Healthy Streets initiatives across your city.

6.1.2 Monthly Content Calendar Guide

Monthly Content Calendar is a simple project management tool to help cities curate the workplan for the coming months, to work towards achieving the milestone goals as set by the city.

This calendar is just like a regular planner/calendar. The only difference is that this calendar is curated to ensure that a city achieves the Action, Foundation and Communication goals as set by the National Challenges.

6.1.3 Adopting the Healthy Streets Policy

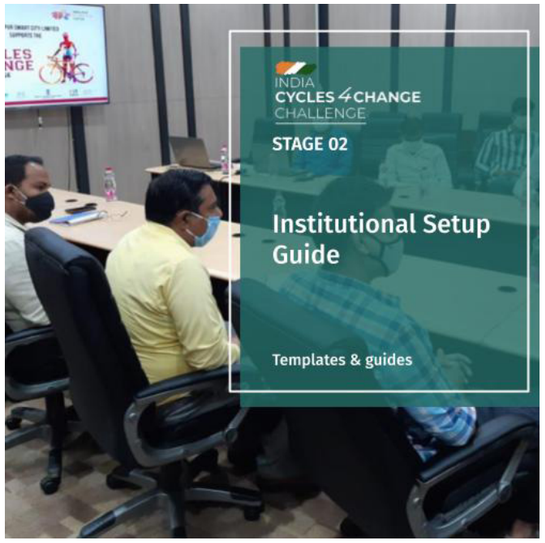
Healthy Streets Policy sets out the vision, goals, and actions required to transform your city's streets into safe, attractive, and comfortable spaces. The Healthy Streets Policy Template is a simple guide to help through the process.

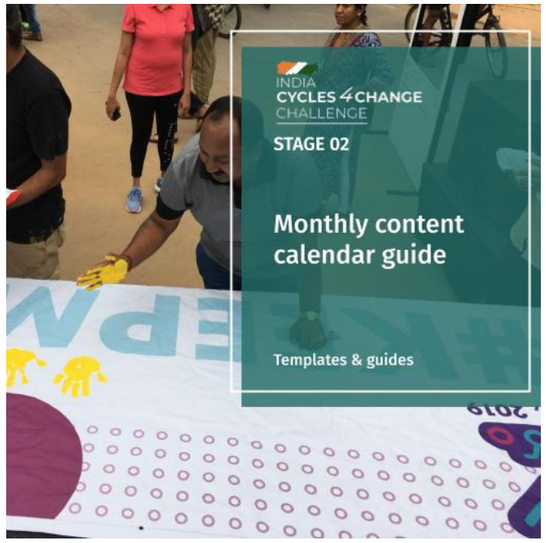
The template can be edited and then the draft policy can be rolled out to incorporate comments from government departments and citizens. Upon consultation, the policy can be adopted.

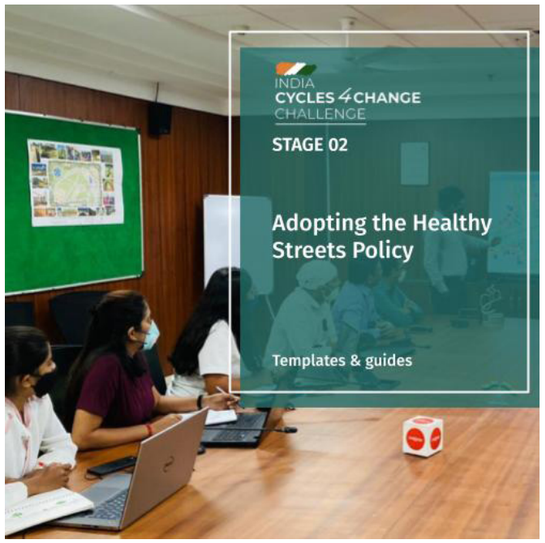
6.1.4 Three-year Healthy Streets Action Plan Guide

Action Planning is an approach to set goals and lay out a mid-term road map. Through the Healthy Streets Action Plan, cities will set goals & lay out a 3-year roadmap to become walking- & cycling-friendly.

This guide outlines the steps required to prepare a 3-Year Healthy Streets Action Plan and also provides the template for the same. This action plan will enable cities to identify and develop Healthy Streets proposals for the next 3-years.







Access the other resources here

6.2 Capacity Development Tools

City teams are required to develop and strengthen their skills to support scaling-up of Healthy Streets across their city.

It involves skills to conduct site analysis, awareness campaigns, methods for stakeholder engagement, hiring process for consultants and more.

6.2.1 Handlebar Survey Guide

Handlebar Survey helps in understanding the pain points for cycling, from a cyclist's perspective. As cities identify cycle track networks, conducting handlebar surveys is a key step to address the on-ground issues for cycling.

This is a step-by-step guide and a template that outlines the three stages of a handlebar survey - preparation before the survey, the ride and analysis of the data collated during the survey to make an informed decision.

6.2.2 Walking Audit Guide

In a walking audit, the city officials, designers, and other stakeholders are expected to walk together in their selected pilot sites, to understand what makes their streets walkable and liveable, and what is missing.

This is a step-by-step guide that outlines the 3 stages involved in the process of conducting the walking audit - planning & communication, conducting survey on-ground and collating & sharing the findings.

6.2.3 Open Streets Campaign Guide

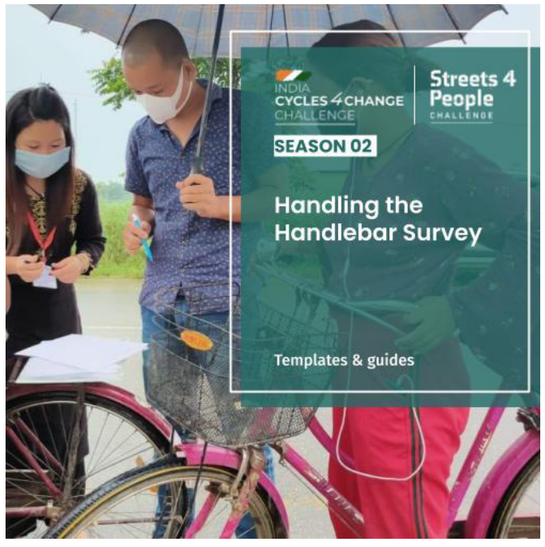
Open Streets Campaign is a recurring event which aims to reimagine streets as safe, happy, and healthy public spaces for all by opening them up for the exclusive use of pedestrians, cyclists, and other non-motorized transport users!

The guide outlines the method involved to put in place a system that will support cities for scaling-up the Open Streets events as a recurring campaign for the coming years, thereby embedding mobility-related behaviour change.

6.2.4 Design Competition Template

City-led Design Competitions aim to crowdsource innovative ideas for designing and testing the pilot interventions through quick, low-cost, and innovative solutions. Each city can launch their own design competition with specific details.

This is a step-by-step guide to update the design competition brief template. It also contains social and print media templates for the cities to spread the word and maximize participation in the competition.



Access the other resources here

Ghole Road, Pune

7

References

References

Indian Roads Congress Guidelines [1]

The Indian Roads Congress (IRC) was set up by the Government of India in consultation with the State Governments in December, 1934 and is a registered society under the Registration of Society Act.

Following are the documents referred for this publication:

1. IRC:35-2015 Code of Practice for Road Markings
2. IRC:70-2017 Guidelines on Regulation and Control of Mixed Traffic in Urban Areas (First Revision)
3. IRC:86-2018 Geometric Design Standards for Urban Roads and Streets (First Revision)
4. IRC:92-2017 Guidelines for the Design of Interchanges in Urban Areas (First Revision)
5. IRC:98-2011 Guidelines on Accommodation of Utility Services on Roads in Urban Areas (Second Revision)
6. IRC:99-2018 Guidelines for Traffic Calming Measures in Urban and Rural Areas (First Revision)
7. IRC:SP:12-2015 Guidelines for Parking Facilities in Urban Roads" (First Revision)
8. IRC:SP:50-2013 Guidelines on Urban Drainage (First Revision)
9. IRC:67-2022 Code of Practice for Road Signs (Fourth Revision)
10. IRC:SP-110-2017 Application of Intelligent Transport System for Urban Roads
11. IRC:SP:111-2017 Capacity Building of Road Agencies In Charge of Implementation of Road Projects in Urban Areas
12. IRC:SP:117-2018 Manual on Universal Accessibility for Urban Roads and Streets
13. IRC:SP:118-2018 Manual for Planning and Development of Urban Roads and Streets
14. IRC:SP:119-2018 Manual of Planting and Landscaping of Urban Roads
15. IRC:SP:128-2020 Guidelines for Green Urban Road Manual
16. IRC:124-2017 Bus Rapid Transit (BRT) Design Guidelines for Indian Cities
17. IRC:103-2022 Guidelines for Pedestrian Facilities (Second Revision)
18. IRC:11-2015 Recommended Practice for the Design and Layout of Cycle Tracks (First Revision)
19. IRC:SP-88- 2019 Manual on Road Safety Audit (First Revision)

Harmonised Guidelines & Standards for Universal Accessibility in India 2021 [2]

The Harmonised Guidelines 2021 intend to be used as a reference for various stakeholders of built environment including the State Governments, the Development Authorities, the Planning Organisations, and Private Sector. The Harmonised Guidelines for Universal Accessibility shares a vision for a universally accessible and inclusive India.

The Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014 [3]

Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014 is an Act of the Parliament of India. This Act was drafted with the legislative intent of protecting the livelihood rights of street vendors as well as regulating street vending through demarcation of vending zones and laying out conditions/ restrictions for street vending.

Motor Vehicles Act [4]

The Motor Vehicles Act, 1988 is an Act of the Parliament of India, which regulates all aspects of road transport vehicles. The Act came into force from 1 July 1989.

The Act provides in detail, the legislative provisions regarding licensing of drivers/ conductors, registration of motor vehicles, control of motor vehicles through permits, special provisions relating to State Transport Undertakings, traffic regulation, insurance, liability, offences, and penalties, etc.

Disabilities Act [5]

The Rights of Persons with Disabilities Act fulfills the obligations to the United National Convention on the Rights of Persons with Disabilities (UNCRPD), to which India is a signatory.

The guidelines, prepared by the Ministry of Urban Development are comprehensive guidelines, inclusive of all provisions updated and harmonised to act as an easy reference to Practitioner's Guide for Barrier Free Designs.

The National Urban Transport Policy (April 2006) [6]

It was approved by the Government of India to tackle urban mobility issues. It provides for integrated land use and transport plans in cities, coordinated planning for urban transport, people oriented equitable allocation of road space, capital support in the form of equity participation and/or viability gap funding, innovative financing, dedicated urban transport funds, non-motorised transport, car restraint measures, clean fuel and vehicle technology, private sector participation, and pilot projects in cities to establish models of best practices.

UTTIPEC Guidelines for Street Design [7]

As per the recommendations of National Urban Transport Policy, DDA, Delhi has notified Unified Traffic and Transportation Infrastructure (Plg. & Engg.) Centre (UTTIPEC) to enhance mobility, reduce congestion, and to promote traffic safety by adopting standard transport planning practices.

Recently UTTIPEC has published street design guidelines to promote sustainable transportation system in the city of Delhi.

Global Street Design Guide, NACTO [8]

Originally a program of NACTO, the Global Designing Cities Initiative (GDCI) was founded in 2014 by Janette Sadik-Khan, operating under the guidance of Director Skye Duncan.
The Global Street Design Guide is supporting practitioners to redefine the role of streets in cities around the world. Created with the input of experts from 72 cities in 42 countries, the Guide offers technical details to inform street design that prioritizes pedestrians, cyclists, and transit riders.

The Sponge Handbook: Chennai [9]

The Sponge Handbook: Chennai is designed to be a guiding document to align regional planning priorities and neighbourhood planning processes with the hydrological cycle of Chennai's basins.
The handbook uses the Buckingham Canal area to demonstrate how the Sponge Basin framework can lead to the re-imagination of urban neighbourhoods, transit stations, open spaces, streets, and the rejuvenation ofmulti-functional infrastructures like the canal itself.

Streets for Pandemic Response & Recpvery NACTO [10]

This resource aggregates and synthesizes emerging practices in transportation and street design in response to the COVID-19 pandemic. It highlights cities' current efforts to re-organize streets to best manage this crisis and support economic recovery. This evolving resource is not a comprehensive list of options, nor is it calibrated for the needs of a specific community; every city should assess local context and need, as well as the trajectory of the pandemic in the community, to inform a response and implementation strategy.

Urban Street Design Guidelines [11]

Pune has developed 'Urban Street Design Guidelines' to ensure that appropriate street types and design elements are implemented to create better streets for people. The Urban Street Design Guidelines give an overview of various elements that go into designing streets making them universally accessible, and also provide standard templates for different sizes and uses of streets. It provides a mandate for PMC engineers and planners for designing and executing streets to meet local needs, avoiding a one-size-fits-all approach.

Street Design Guidelines for Bhubaneswar, 2021 [12]

The Street Design Guidelines for Bhubaneswar intend to provide a step-by-step approach to formulating a Complete Street. Designing for Complete Streets is an exercise that acknowledges the needs and limitations of each user group and their interaction with the others. This manual gives guidelines regarding the designing of street for appropriate allocation of spaces and general specifications for various elements of the street. It is recommended to refer to IRC guidelines for technical engineering aspects regarding technology and construction procedure.