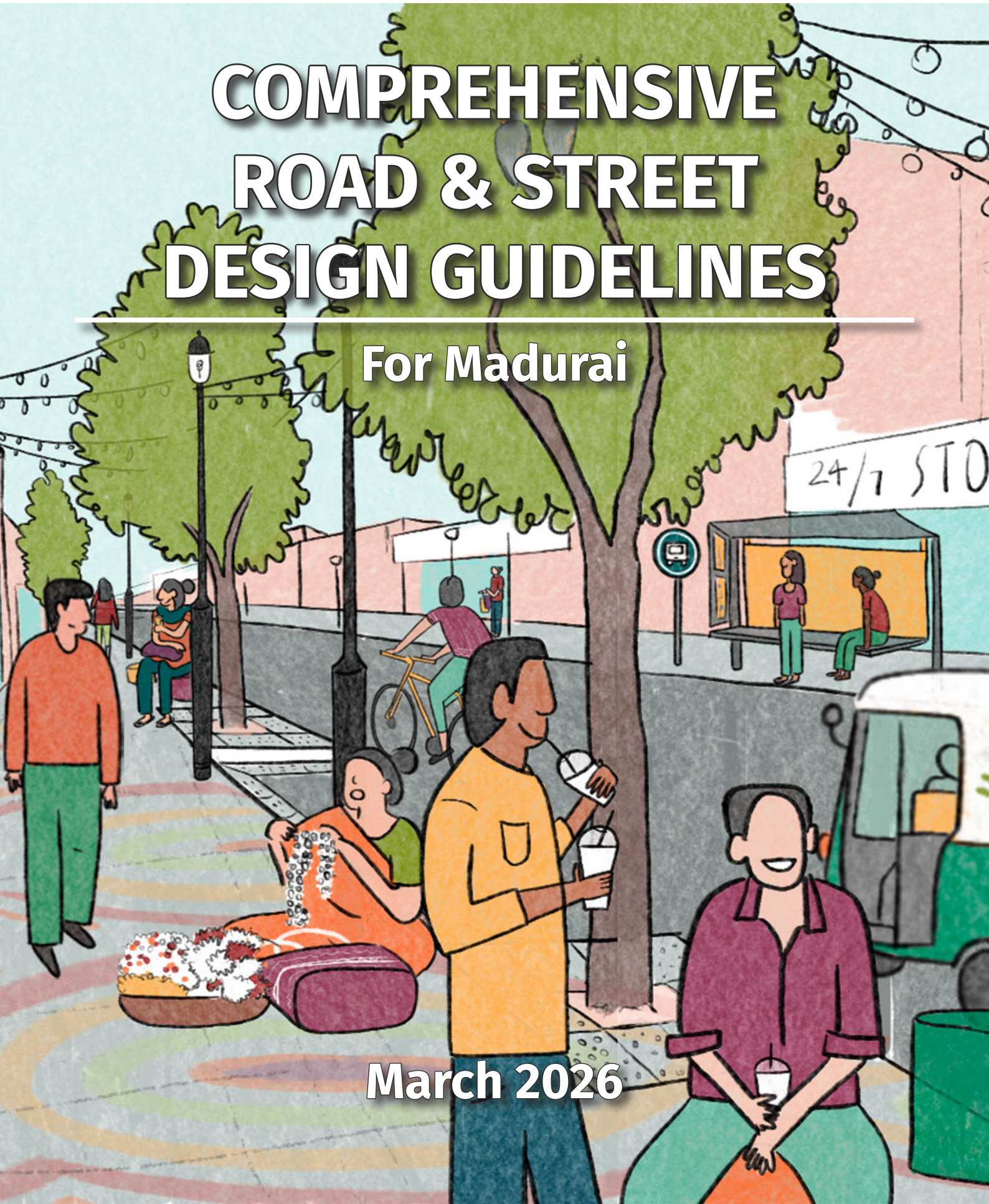
Knowledge Partner

ITDP INDIA

COMPREHENSIVE ROAD & STREET DESIGN GUIDELINES

For Madurai



March 2026

Acknowledgements

The Complete Street Policy, Comprehensive Road and Street Design Guidelines, and Parking Policy Strategy and Action Plan for Madurai were approved through Proceedings No. E1/014069/25, issued by the Madurai Municipal Commissioner on 12 March 2026. The documents were subsequently placed before the Madurai Corporation Council and approved vide Resolution No. 1403 dated 2 June 2026.

March 2026

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All photographs and graphics by ITDP, unless mentioned otherwise

This document is a city specific adaptation of the Healthy Streets Design Workbook launched in 2024 by the Ministry of Housing and Urban Affairs and Comprehensive Roads and Street Design Guidelines for Chennai Metropolitan Area.

The Municipal Administration and Water Supply (MAWS) Department, Government of Tamil Nadu is responsible for policy formulation, planning, and oversight of Urban Local Bodies, including Municipal Corporations, Municipalities, and Town Panchayats. The department guides and funds urban services such as roads and street infrastructure, water supply, sewerage, storm-water drainage, solid waste management, and street lighting, while also coordinating implementation of state and centrally sponsored urban programmes to improve service delivery and urban governance.

The Madurai Municipal Corporation (MMC) is the civic body governing the city of Madurai in Tamil Nadu, India. It was initially constituted as a municipality in 1866 and upgraded to a municipal corporation on 1 May 1971 due to rapid population growth and urban expansion. Today, it is the second-largest municipal corporation in Tamil Nadu, covering around 148 sq km and divided into 100 wards across five zones. The governance structure includes an elected Mayor, Deputy Mayor, and a Municipal Commissioner heading the administration

Knowledge Partner

The Institute for Transportation and 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.

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Pondy bazaar, Chennai

About the Guideline

Historically, Roads and Streets served the purposes of mobility, social interaction, and commerce. However, in recent times, their role has been reduced to conduits for the movement of motor vehicles, paying little or no attention to other users—pedestrians, cyclists, people doing business, and more. This vehicle-centred approach to planning and designing Roads and Streets has led to multiple consequences, such as traffic congestion, parking issues, increasing pollution, and 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-imagine Roads and Streets not only as pathways for movement across the city but also as places where people walk, cycle, shop, and engage in a multitude of social functions that are critical to the health of cities and their citizens. Such roads and streets are a strong indicator of a developed and equitable society.

Across Madurai, there is growing momentum to design roads and streets that prioritise pedestrians and public transport users. As more roads and streets are envisioned to be transformed, a common set of guidelines is imperative to inform and direct the design process.

Complete Roads and streets are where everyone—be it an eight-year-old or an eighty-year-old—can move safely, comfortably, and breathe clean air. The Comprehensive Road & Street Design Guideline elaborates on:

- Key principles that define a Complete Road and street
- The process of designing Complete Roads and streets
- Design guidelines and standards
- Road and street cross-section templates
- Material palette

Applicability of the Document

The Comprehensive Road & street Design Guideline is intended for various stakeholders such as:

- Government authorities responsible for city and municipal planning
- Road owning and implementing agencies maintaining and executing roads and street projects
- Consultants and practitioners such as urban designers, architects, planners, and engineers
- Public transport operators
- Mobility agencies
- Authorities involved in policy and development
- Researchers and students studying urban design and planning

The guidelines mentioned in this document are applicable to all urban roads, including highways and expressways within Madurai Local Planning Area (LPA). Madurai LPA includes the Madurai Corporation, two Municipalities , five Town Panchayats, and 176 Village Panchayats. The respective road owning agencies shall transfer their implementation rights to the Urban Local Bodies for better integration. Until such transfer occurs, pedestrian safety measures outlined in this document must be adhered to.

Implementing Authorities

Madurai City Corporation, Highways and Minor Ports Department, National Highways Authority of India (NHAI), Chennai Metro Rail Limited (CMRL) and Other Urban Local Bodies (ULBs).

Other Authorities to be Involved

Directorate of Town and Country Planning (DTCP), Tamil Nadu State Transport Corporation (TNSTC). Indian Railways (Southern Railways), Police Departments, Utilities Department TWAD, TNEB), Water Resource Department (WRD).

Throughout this document, the term ‘Madurai’ refers to the Madurai Corporation Area



Pondy bazaar, Chennai

List of Acronyms

Acronyms	Abbreviations
ADB	Asian Development Bank
BoQ	Bill of Quantities
BRR	Bus Route Roads
BRTS	Bus Rapid Transit System
BSCL	Bhubaneshwar Smart City Limited
BvLF	Bernard van Leer Foundation
CATV	Community Antenna Television
CSO	Civil Society Organisation
DIP	Ductile Iron Pipe
DTCP	Directorate of Town and Country Planning
ECS	Equivalent Car Space
EV	Electric Vehicle
FRP	Fibre-Reinforced Polymer
GFC	Good For Construction
GI	Galvanised iron
HCV	Heavy Commercial Vehicles
HDPE	High-Density Polyethylene
HT	High Tension
IPT	Intermediate Public Transport
IRC	Indian Road Congress
ITC	Infant, Toddler and Care-Givers
JICA	Japan International Cooperation Agency
LAP	Local Area Plan
LCV	Light Commercial Vehicle
LED	Light Emitting Diode
LMIC	Low and Middle Income Countries
LPA	Local Planning Authority
LT	Low Tension
Lvl	Level
MMC	Madurai Municipal Corporation
MOHUA	Ministry of Housing and Urban Affairs
MoRTH	Ministry of Road Transport & Highways

Acronyms	Abbreviations
MRTS	Mass Rapid Transit System
MS	Mild Steel
MUDA	Madurai Urban Development Authority
MUZ	Multi-utility Zone
NACTO	National Association of City Transportation Officials
NIUA	National Institute of Urban Affairs
NMT	Non-Motorised Transport
OFC	Optical Fibre Cable
PCC	Plain Cement Concrete
PIS	Passenger Information System
PMC	Pune Municipal Corporation
PVC	Polyvinyl Chloride
RCC	Reinforced Cement Concrete
RfP	Request for Proposal
RMU	Ring Main Unit
RoW	Right-of-Way
RWA	Residential Welfare Association
MUZ	Multi-utility Zone
SS	Stainless Steel
SUV	Sport Utility Vehicle
TOD	Transit Oriented Development
ToR	Terms of Reference
TPS	Town Planning Scheme
TU	Tactical Urbanism
ULB	Urban Local Body
UNCRPD	United Nations Convention on the Rights of Persons with Disabilities
UTTIPEC	The Unified Traffic and Transportation Infrastructure (Planning and Engineering) Centre
VRU	Vulnerable Road Users

Harrington Road, Chennai

1

Introduction

1.1. Urban Mobility Scenario of Madurai

1.2. Best Practices from Indian and International Cities

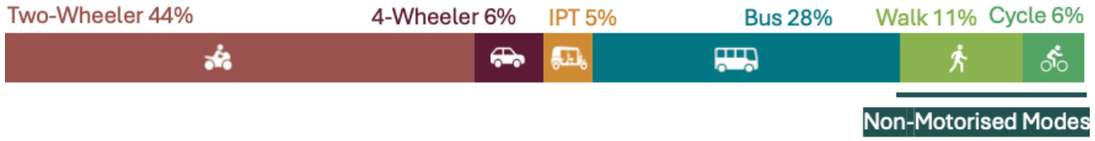
1.3. Vision and Goals

1.1 Overview of Urban Mobility Scenario in Madurai

The Madurai revised Local Planning Area (LPA) spans 1,254.93 sq. km with a population of 2.8 million, while the Madurai Municipal Corporation (MMC) covers 237.99 sq. km and houses 1.78 million people. The LPA comprises 1 Corporation, 2 Municipalities, 5 Town Panchayats, and 176 Village Panchayats, reflecting a diverse urban–rural structure. Madurai's road network is largely radial–concentric, anchored around the historic core and extending outward through key arterial and sub-arterial corridors that connect surrounding towns and villages to the city. These roads form the backbone for daily commuting, public transport operations, and regional connectivity within the Madurai urban region.

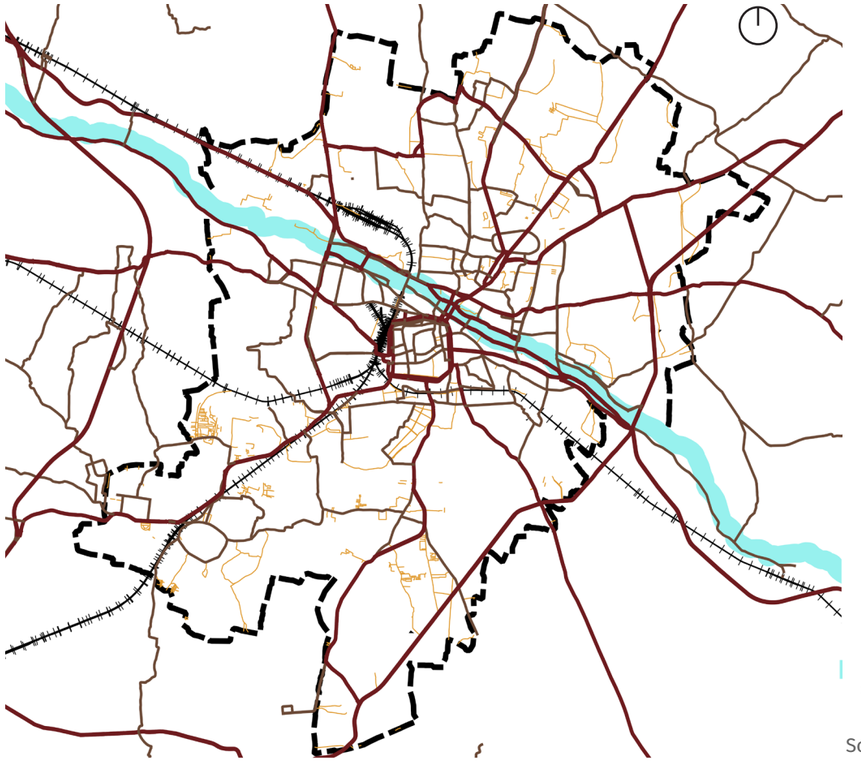
1.1.1 Modal Split in CMA (2023)

Within the Madurai Urban Development boundary, two-wheelers dominate daily trips (44%), followed by buses (28%), while walking (11%) and cycling (6%) together form a limited share. This indicates rising dependence on motorised modes despite short trip lengths. Walking continues to play a critical role as first- and last-mile access to buses, highlighting the need to prioritise safe, comfortable pedestrian and cycling infrastructure to sustain public transport use and rebalance street space.



Source : Madurai Master Plan, 2025

1.1.2Madurai's Urban Road Network



1,467.5 km

Total Road Network within MUDA

Legend

Road Network
- Arterial Roads
- Sub-Arterial Roads
- Collector Streets
- Rail Network
- Corporation
- R. Vaigai

0 5 10 km

Source : Master Plan 2025

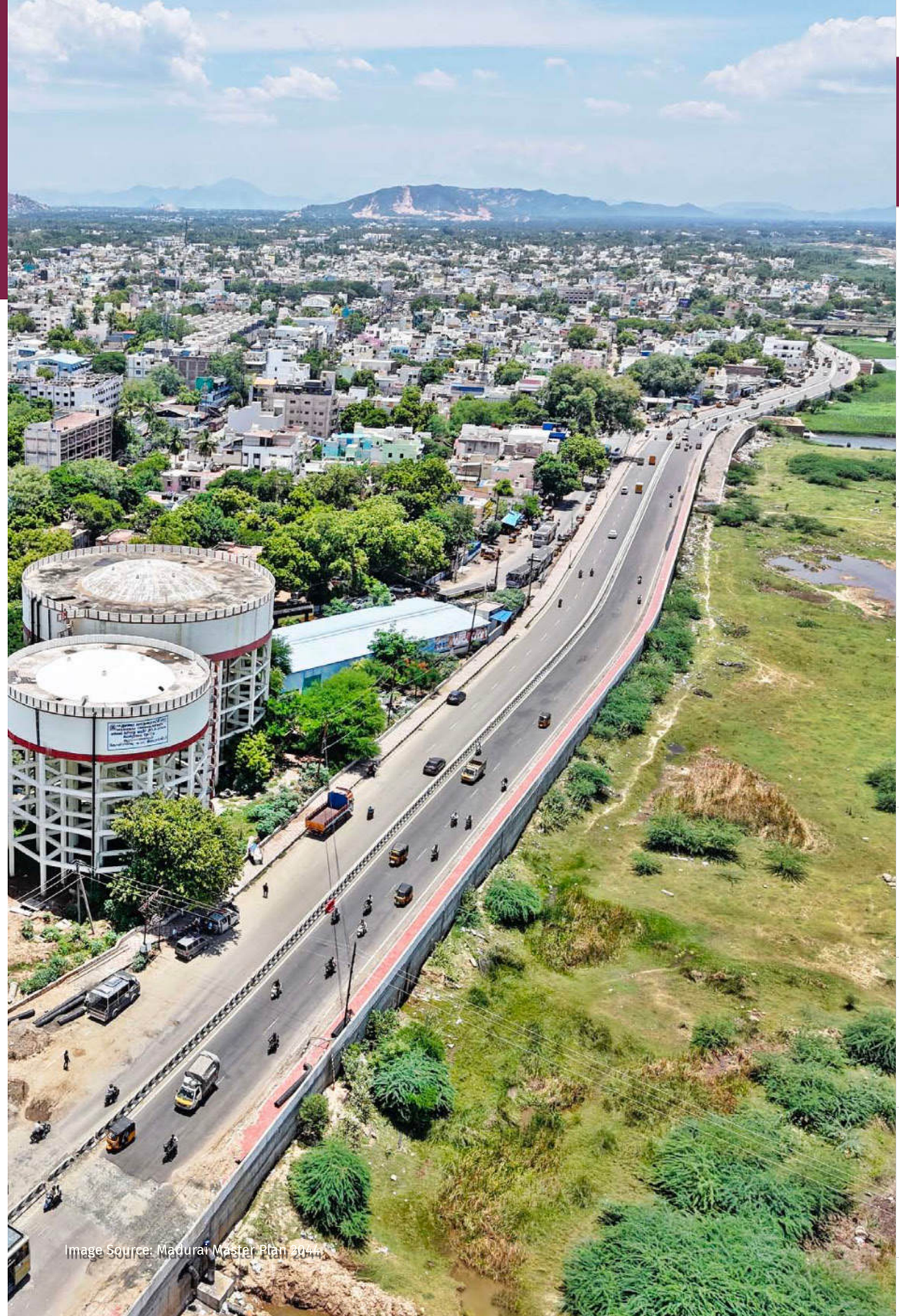
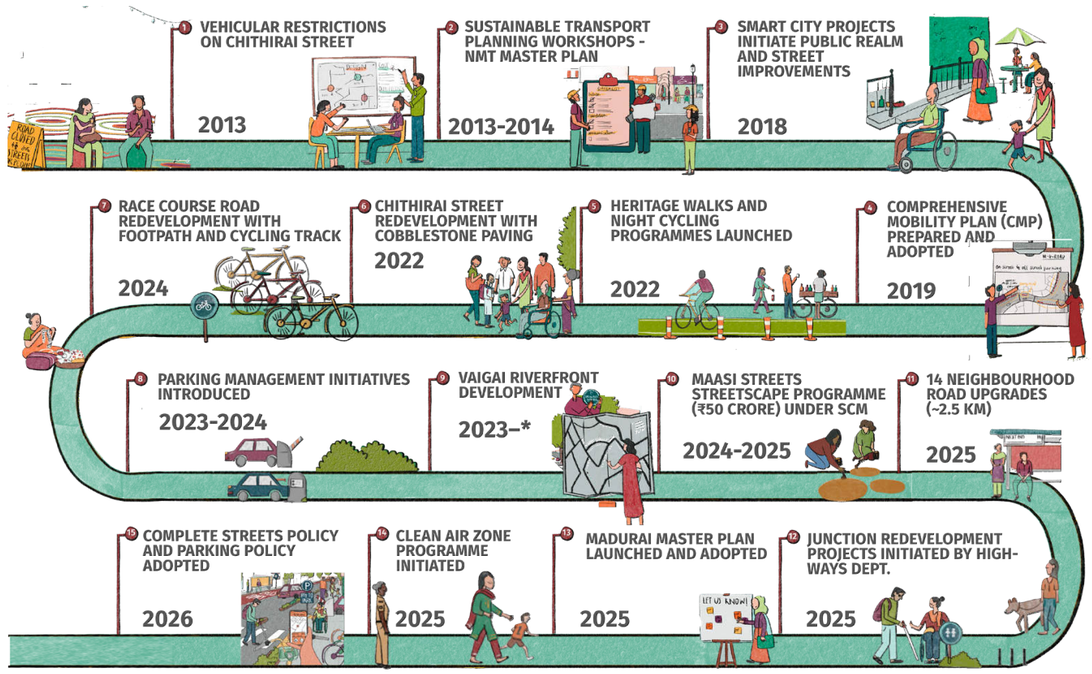


Image Source: Madurai Master Plan 2044

1.1.3 Journey towards NMT

Madurai has historically been a walk and cycle-oriented city, supported by short trip lengths, mixed land use, and high pedestrian activity, especially in the core and temple precincts. Over time, however, rising ownership of two-wheelers and private vehicles has shifted travel patterns towards vehicle-driven mobility, reducing safety and comfort for pedestrians and cyclists.

In response, Madurai has begun to re-prioritise non-motorised transport through pedestrianisation in heritage areas, selective footpath and cycling improvements, parking management, and public realm projects under the Smart Cities Mission. The Comprehensive Mobility Plan and Madurai Master Plan reinforce this shift, positioning walking and cycling as essential to urban mobility. The city is now at a critical transition, balancing growing motorisation with renewed efforts to strengthen walkability and cycling.

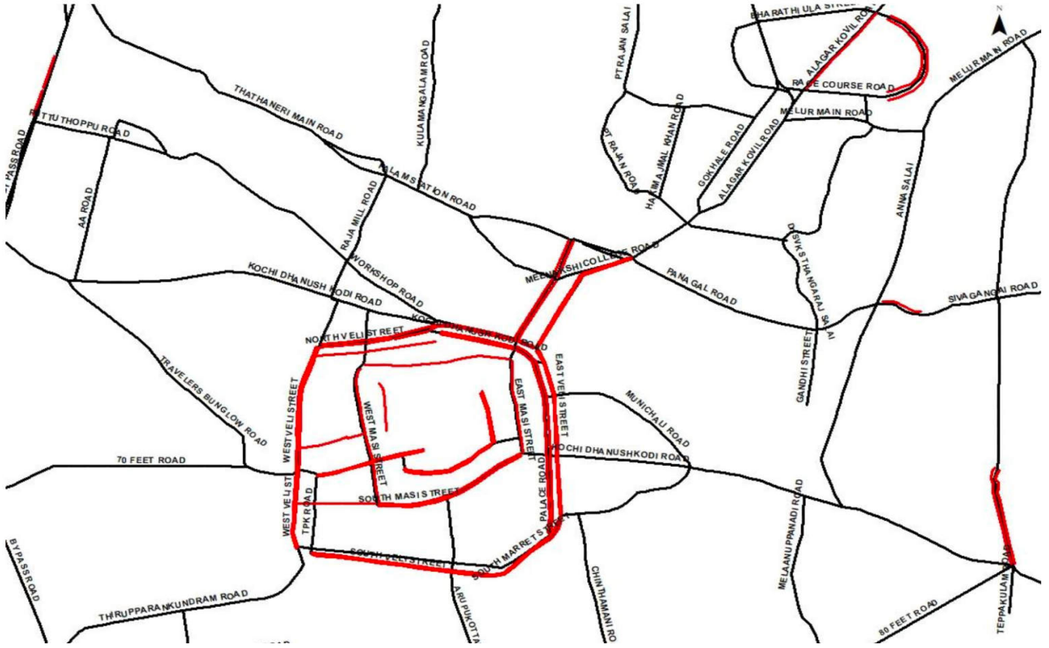


Time line highlighting milestones in Madurai's NMT journey



Arapalayam
Image Source: Madurai Master Plan 2044

1.1.4 Status Quo of NMT Projects in Madurai so far



Footpaths developed by MMC and Highways



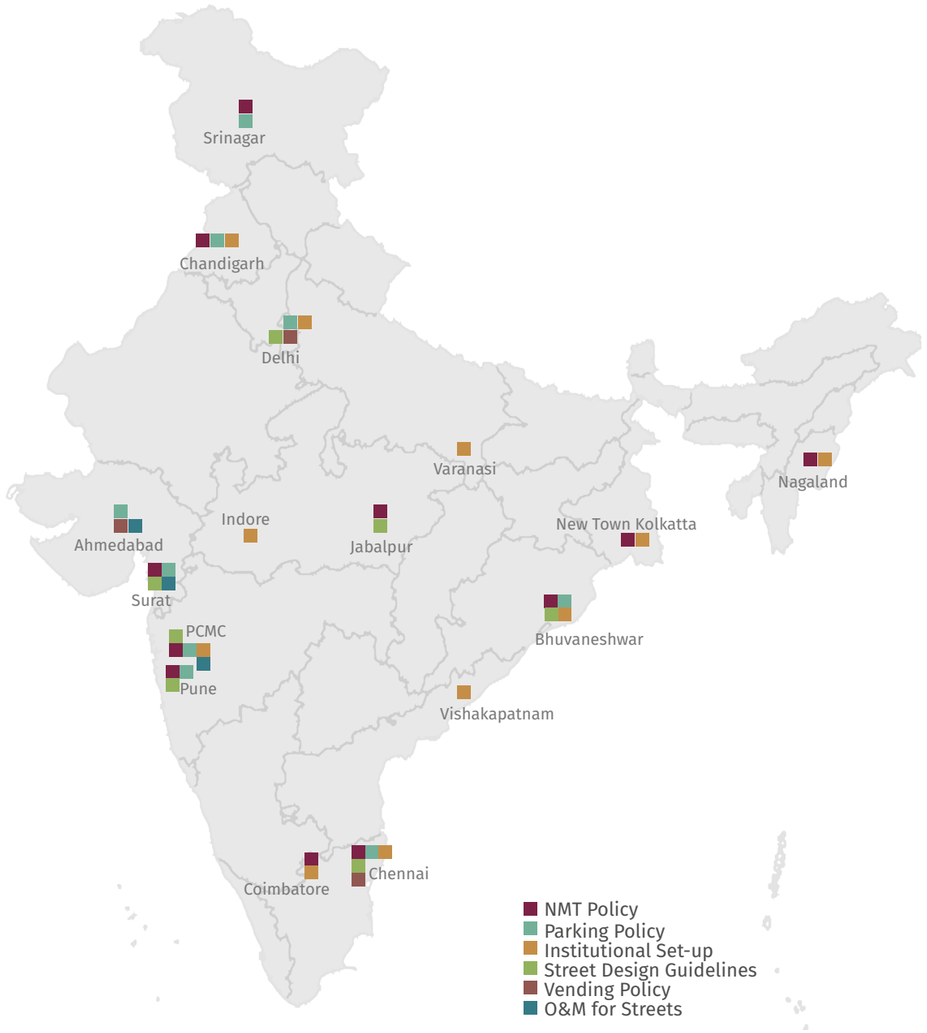
Chithirai Street
Image Source: Madurai Master Plan 2044

1.2 Best Practices from Indian and International Cities

The best practices presented in this section draw on successful policy-making, guidelines, street design, planning, and implementation approaches adopted in leading Indian and international cities. They illustrate how people-first principles, context-sensitive design, and coordinated governance can transform streets into safe, accessible, and vibrant public spaces. These practices serve as reference models to guide cities in delivering high-quality streets that prioritise walking, cycling, public transport, and inclusive urban mobility.

1.2.1 Status of Indian Cities in Foundational Measures

Fifteen Indian cities including Ajmer, Bhopal, Chandigarh, Gangtok, Indore, Jhansi, Kochi, Kohima, Nagpur, New Town Kolkata, Pimpri Chinchwad, Rourkela, Sagar, Silvassa, and Ujjain, have formally adopted Healthy Streets Policies, setting a strong precedent for people-centric street design across the country. In parallel, several cities, including Bhubaneswar, Pune, Delhi, Chennai, and Bengaluru, have developed their own Street Design Guidelines that align with the Healthy Streets framework, promoting safe, inclusive, and sustainable urban mobility.



1.2.2 Case Studies from Indian Cities

City	Key Street Design Initiatives	Lead Agencies
Delhi	• Complete Streets Under Delhi Master Plan 2041 • Redevelopment of Chandni Chowk Pedestrian Zone • Smart City Area Street Redesign (NDMC)	DDA, PWD, NDMC, Smart City SPV
Mumbai	• Mumbai Street Design Manual • Pedestrian-Friendly Kalanagar Junction Redesign • Lotus Initiative Streets • Bandra, Dadar, Andheri Road Improvements (MMRDA) • Coastal Road Pedestrian Realm Improvements	MCGM/BMC, MMRDA, Mumbai Traffic Police
Bengaluru	• Tender Sure Projects • Smart Streets Under Bengaluru Smart City • Church Street Pedestrianisation	DULT, BBMP, Bengaluru Smart City
Hyderabad	• Strategic Road Development Programme (SRDP) Streetscape • Charminar Pedestrianisation Project (CPP) • Lakefront Access Improvement (Hussain Sagar)	GHMC, HMDA, Hyderabad Smart City
Ahmedabad	• Complete Streets under Smart City Mission • Janmarg BRT Corridor Public Realm Improvements • Riverfront Road Pedestrian and Cycle Improvements • Manek Chowk Pedestrianisation	AMC, AUDA, Ahmedabad Smart City
Chennai	• Chennai Complete Streets Programme • T Nagar Pedestrian Plaza • 200km of Bus Route Roads Development • Safe Access To Schools	GCC, CUMTA, ITDP, Chennai Smart City
Coimbatore	• Model Roads By Smart City (Race Course, Db Road, NSR Road) • Lakeside Public Realm Improvements	CCMC, Coimbatore Smart City, GIZ
Mizoram (Aizawl)	• NMT and Hillside Street Redesign Pilots • Pedestrian Safety Improvements In Steep Terrains • Smart City Pedestrian Plazas	Aizawl Smart City, UD & PA
Pune	• Pune Cycle Plan (200 Km Network) and Bicycle Tracks • Complete Streets Guidelines • Jangli Maharaj and Fergusson College Road Redesign • Riverfront Street Improvements	PMC, Pune Smart City, PMPML
PCMC (Pimpri-Chinchwad)	• Nashik Phata–Wakad BRT Corridor Streetscape • Linear Garden	PCMC, Smart City SPV
Indore	• Rajwada Pedestrian Zone • NMT Streets under Smart City (AB Road Zone) • Riverfront Streetscape	IMC, Indore Smart City
Kochi	• Kochi Water Metro Access Streets • MG Road and Marine Drive Pedestrian Improvement • Fort Kochi Heritage Street Upgrades	Kochi Smart City, KMC, KMRL
Chandigarh	• Sector 17 Plaza Pedestrianisation and Public Realm Upgrades • V2/V3 Road Corridor Streetscape Enhancement under Smart City Mission • Cycle Tracks and Greenway Improvements across Sectors • Jan Marg and Capitol Complex Pedestrian Access Upgrades	Chandigarh Smart City Ltd (CSCL), CAMC Chandigarh, UT Transport Dept
New Town, Kolkata	• Complete Streets Initiative across Action Area I, II and III • 120 Km+ Dedicated Cycle Network with Bike-Sharing Integration • Public Realm Improvements around Eco Park, Mother's Wax Museum and Biswa Bangla Gate	NKDA, HIDCO, Kolkata Police, Smart City Mission

City	Key Street Design Initiatives	Lead Agencies
Kolkata	• East-West Metro Corridor Streetscape Improvements •Park Street Pedestrian-Friendly Redesign (Pilot Events and Temporary Pedestrianisation) • Kolkata Riverfront Access Improvements	KMC, NKDA, KMDA, Kolkata Police
Lucknow	• Hazratganj Pedestrian Zone and Heritage Streetscape • Gomti Riverfront Public Realm Improvements • Janeshwar Mishra Park Access Roads Redesign	LDA, LMC, Lucknow Smart City
Bhubaneswar	• Bhubaneswar Street Design Manual • Smart District Complete Streets (Janpath, Saheed Nagar) • Ekamra Kshetra Heritage Streets and Pedestrianisation	BDA, BMC, Bhubaneswar Smart City Ltd (BSCL)
Srinagar	• Dal Lakefront Promenade and Street Redesign • Polo View Market Pedestrianisation • Smart City Streetscape Projects (Lal Chowk)	SMC, Srinagar Smart City Ltd, SDA

1.3.3 Case Studies from International Cities

City	Key Street Design Initiatives	Lead Agencies
New York City, USA	• Times Square Pedestrianisation • NYC Street Design Manual • Vision Zero Complete Streets • Protected Bike Lane Network Expansion	NYC DOT, Mayor's Office
London, UK	• Healthy Streets Approach • Oxford Street Transformation • Cycle Superhighways • Low-Traffic Neighbourhoods (LTNs)	Transport for London (TfL), Borough Councils
Paris, France	• Champs-Élysées Pedestrianisation Plan • '15-Minute City' Policy • Seine Riverbank Pedestrian Zone • 1,000 Km+ Bike Lane Expansion	Paris City Council, APUR
Copenhagen, Denmark	Strøget Car-Free Streets • Green Wave Cycling Corridors • Superkilen Public Space Redesign	City of Copenhagen, Realdania
Barcelona, Spain	• Superblocks (Superilles) Model • La Rambla Redesign	Barcelona City Council, Area Metropolitana de Barcelona
Singapore	• Orchard Street • Car-Lite Districts (Marina Bay, Punggol) • Park Connector Network (PCN) • Transit-Oriented Street Design	LTA, URA
Melbourne, Australia	• Little Streets Pedestrian Priority • Urban Forest and Green Street Programme • Docklands and CBD Streetscape Renewal • Cycling Network Expansion	City of Melbourne
Tokyo, Japan	• Shared Streets In Ginza (Pedestrian-Only Weekends) • 'Green Road' Neighbourhood Paths • Station-Area Public Realm Upgrades	Tokyo Metropolitan Govt
Bogotá, Colombia	• Ciclovía (World's Largest Open Streets) • TransMilenio BRT Corridor Streetscape • Plazas and Pedestrian Improvements In CBD	City of Bogotá
Seoul, South Korea	• Cheonggyecheon Stream Restoration • Seoul Station Pedestrian Plaza • Car-Free Zones In Jongno • Superblocks around Schools	Seoul Metropolitan Govt


CSIR road, Chennai

1.3 Vision and Goals

Despite several street improvement projects, Madurai continues to face fragmented planning, inconsistent design standards, rampant footpath encroachment and inadequate pedestrian and cycling infrastructure. Without a unified framework, multiple agencies implement uncoordinated interventions that compromise safety, accessibility, and long-term maintenance. With rising congestion, air pollution, and road fatalities, a strong NMT vision is essential. Prioritising walking and cycling reduces car dependency, strengthens last-mile connectivity, improves public health and air quality, and helps build a more resilient, inclusive, and people-centric Madurai.

1.3.1 Vision Statement

> **To create people-centred, well-connected Complete Streets that make walking, cycling, and public transport seamless, while offering safe, inclusive and pleasant public spaces that nurture community life and local commerce.**

1.3.2 Goals

1. Improve NMT network around transit stations, schools, key facilties and high accident spots
2. Develop NMT network along blue green infrastructure
3. Provide safe streets and crossings
4. Ensure well-maintained and encroachment-free footpath
5. Integrate utility implementation with footpath
6. Ensure all roads/ streets have a green canopy



Harrington Road, Chennai

1.3.3 Resonance with Comprehensive Mobility Plan 2019 and Master Plan 2044

The integration of Street Design Guidelines with the Master Plan (2044) and Comprehensive Mobility Plan (CMP 2019) is essential to ensure cohesive, people-centric urban development. The CMP outlines mobility priorities, and the Street Design Guidelines translate these visions into on-ground design standards.



Proposed NMT Network and Cluster Plan

Efficient mobility

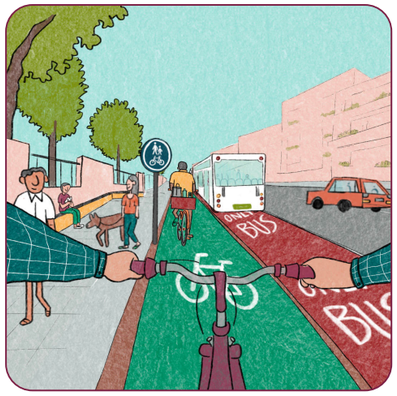
A complete road and street ensures efficient mobility by offering multiple modes of travel, especially high-quality facilities for public and non-motorised transport. With greater capacity, a complete road and street moves more people by allocating space equitably for all users, rather than prioritising only private motor vehicles.


Bus Lane
10,000 pphpd


Footpath
2,000 pph


Cycle Track
2,500 pph


Carriageway
1,500 pph






Street vending


Play elements


Active Edge

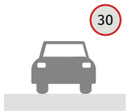

Seating and Trees

Liveability

A complete road and street is full of life, with elements that improve activity. Improved liveability improves conditions for existing users, attracts more users, increases retail activity and transforms the roads and streets into a vital public space.

Safety

A complete road and street is safe for all user groups by providing segregated spaces for each and incorporating traffic-calming measures. Complete roads and streets ensure personal safety as well, with good lighting and 'eyes on the roads and streets' through active edges and vending.



Reduced speed


Safe crossings


Sufficient lighting


Eyes on the street






Complete street with cycle track


Pedestrianised complete street

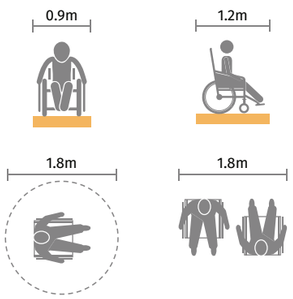

Shared complete street

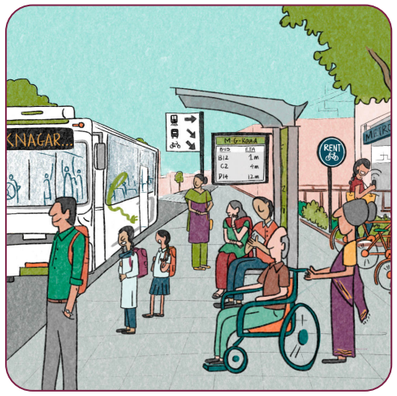
Sensitivity to local context

A complete road and street is designed to suit the local context, factoring in local street activities, pedestrian movement patterns, nearby land uses, and the needs of the people. Design interventions can range from elements added to the street to street-level interventions like shared or pedestrianised streets.

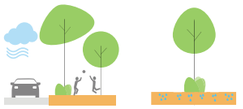
Universal accessibility

A complete road and streets should be accessible to all, including people with disabilities. Continuous, even-surfaced footpaths, table-top crossings, ramps, and tactile pavers wherever level differences occur are some measures to ensure universal accessibility.








Better microclimate and air quality

Sustainable and porous materials


Sustainable modes of transport

Environmental sustainability

A complete road and street promotes sustainable modes of transport and have the scope to improve local climatic conditions. Trees and plants on roads and streets help absorb pollutants and reduce heat. Well-designed, complete roads and streets also help properly capture and channelise rainwater.



Pondy bazaar, Chennai

2

Comprehensive Road and Street Network Planning

2.1. Complete Road and Street Approach

2.2. How to plan a Comprehensive Road and Street Network?

2.3. Elements and Principles of Complete Road and Street

2.4. Children and Streets

2.1 Complete Road and Street Approach

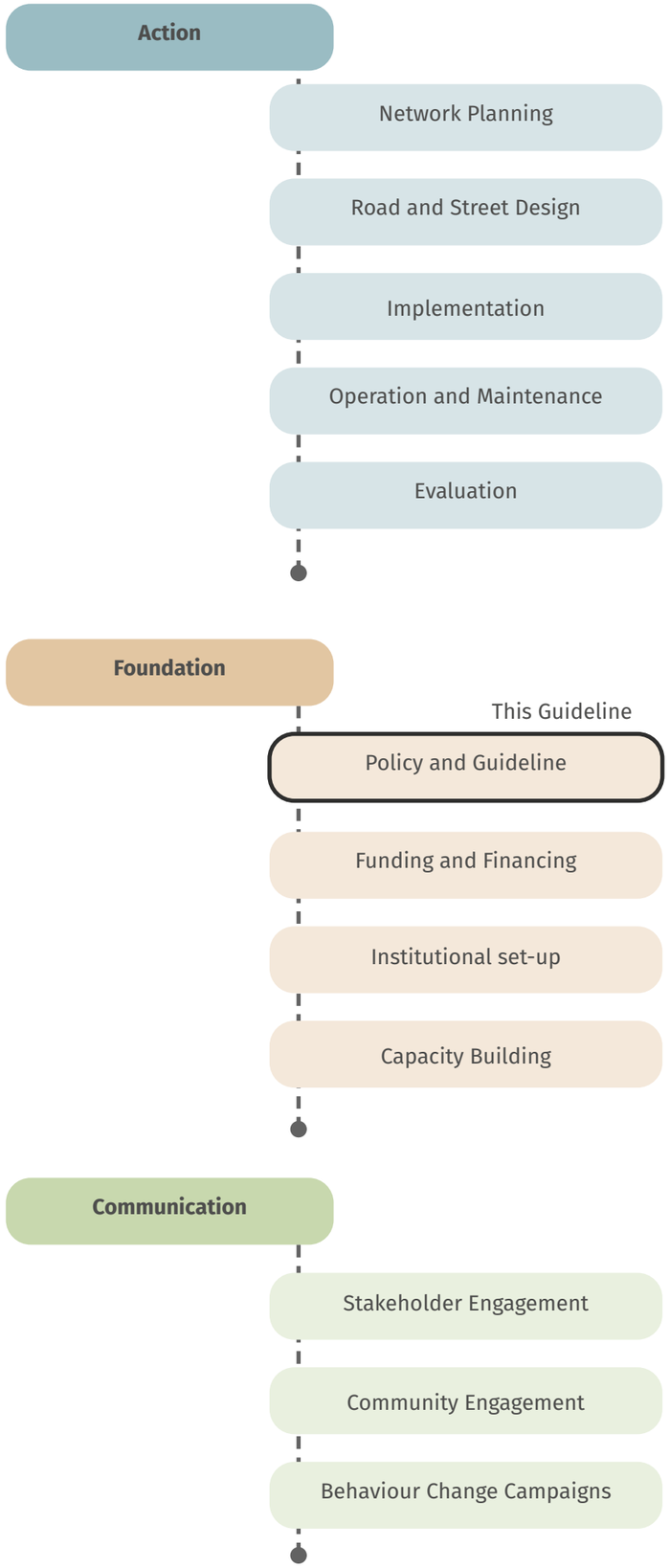
Complete roads and streets can be achieved by adopting various measures structured under a 3-Pillar Strategy—Action, Foundation, and Communication. These steps will help to make walking, cycling, and public transport attractive across the city.

2.1.1 Three-Pillar Strategy

Action	Foundation	Communication
The Action pillar focuses on all works related to roads and streets undertaken by any implementation agency in the city and will follow a standard process for planning, design, and implementation. It will help create a uniform, standardised, and high-quality road and street infrastructure across the city.	The Foundation pillar involves establishing necessary institutions and procedures, adopting policies, plans, and guidelines, and providing regular capacity development for their teams.	The Communication pillar focuses on incorporating a participatory planning approach and using various communication tools to engage citizens and raise awareness.



OMR, Chennai
Image Source: ITDP India



2.2 How to Plan a Comprehensive Road and Street Network?

A street network is an interconnected system of urban roads and streets designed to prioritise the well-being of users, promoting walking, cycling, and other non-motorised modes of transport. This can be achieved by ensuring that people have access to all necessities within a 15-minute travel time. It requires integrating the city's development with its transport systems. Cities can create such networks through city- or area-level Non-Motorised Transport (NMT) plans and bicycle plans, which involve designing dedicated lanes, pedestrian-friendly zones, and efficient connectivity to encourage active transportation and reduce reliance on motorised vehicles.

2.2.1 Integrating Complete Road and Street Network Plan with Statutory Planning Processes

The road and street network plan should be integrated into statutory frameworks such as the Master Plan, Local Area Plans, and CMP to ensure long-term sustainability. Embedding it in development regulations will mandate pedestrian-friendly infrastructure, while aligning it with parking and traffic management plans will support effective implementation.

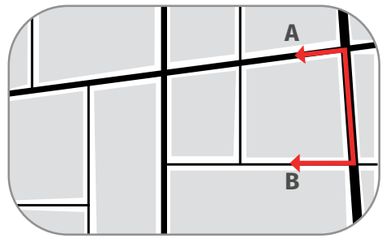
A. Standardising Right-of-Ways for Road and Street Network Development (Ref Chapter 3 for detailed templates)

Category	RoW	No of Lanes	Footpath	Cycle Track	Tree Corridor	Median	Service Lane	BPL/ BRTS	Metro	Multi-utility Zone (MUZ)	Parking
Arterial	60m	8	✓		✓	✓	✓	✓		✓	✓
Arterial	60m	6	✓	✓	✓	✓	✓		✓	✓	✓
Arterial	45m	6	✓		✓	✓	✓	✓		✓	✓
Arterial	45m	4	✓	✓	✓	✓	✓		✓	✓	✓
Sub-arterial	36m	6	✓		✓	✓		✓		✓	✓
Sub-arterial	36m	4	✓	✓	✓	✓			✓	✓	✓
Sub-arterial	30m	4	✓		✓	✓			✓	✓	✓
Sub-arterial	30m	4	✓		✓	✓				✓	✓
Sub-arterial	30m	4	✓	✓	✓	✓				✓	✓
Collector	24m	4	✓		✓	✓				✓	✓
Collector	24m	2	✓	✓	✓					✓	✓
Collector	18m	2	✓		✓					✓	✓
Local	12m	2	✓		✓						
Local	9m	2	✓							✓	

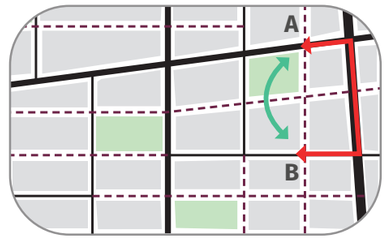
i. A Grids of Roads plan has to be developed by the development authorities as part of the statutory planning process.
ii. The plan shall cover all arterial, sub-arterial, and collector roads (up to RoW of 18m).
iii. The proposed hierachy of roads is to be developed/implemented by the development authorities through Town Planning Schemes (TPS)/ Land Pooling Schemes (LPS), Transferable Development Rights (TDR) or land acquisition, etc.
iv. Local streets (12 m and 9 m) are to be developed by development authorities/ Roads-Owning Agencies/ private developers.
v. For any roads above 12 m RoW proposed in the Grids of Roads plan that cuts across any proposed layouts, the necessary TDR compensation shall be provided as per extant TDR rules.

B. Planning for Complete Road and Street Network in Greenfield Development

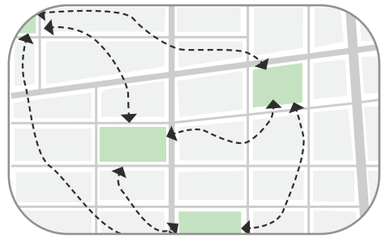
A road and street Network in greenfield developments ensures seamless connectivity, walkability, and transit integration. Town Planning (TP)/ Land Pooling Schemes are a practical example of structured network planning in greenfield developments

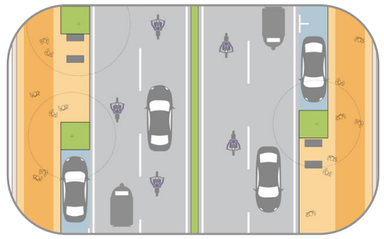


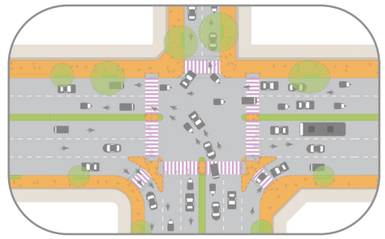
Establish Grids of Roads Network implementing standard Right-of-Ways

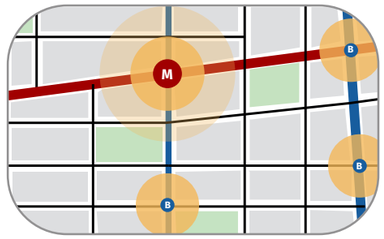


Create Smaller Block Sizes


Develop an Integrated Open Space Network


Adopt the Complete road and street Approach


Create Traffic Management Plans

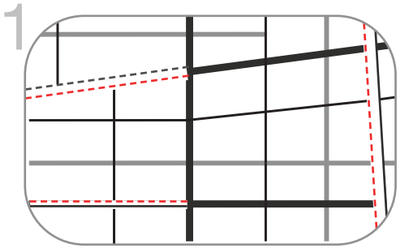


Implement Transit-Oriented Development (TOD)

C. Planning for Complete Road and Street Network in Brownfield Development

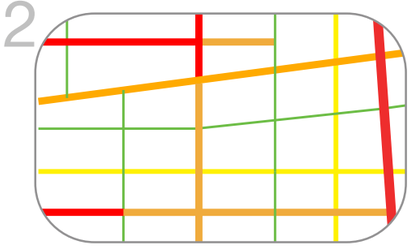
Brownfield development should prioritise a well-connected street network by implementing Local Area Plans (LAPs) to create smaller, walkable blocks. Streets must be upgraded by identifying gaps in footpaths and cycling infrastructure, ensuring necessary repairs, and enhancing pedestrian and cycling facilities. Improving connectivity through missing links, intersection upgrades, and re-purposing underutilised spaces will strengthen mobility.

1



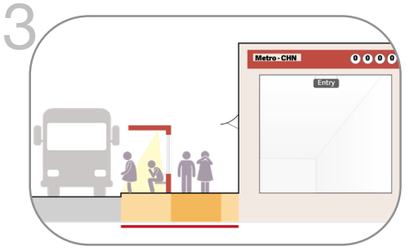
Identify the existing road hierarchy for the city and develop desired hierachy as mentioned (2.2.1 A)

2



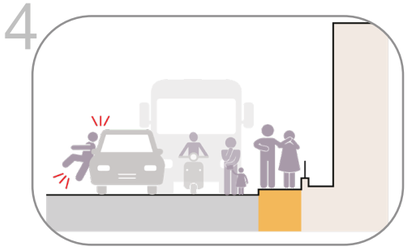
Map the desired speeds of the network based on the road hierarchy - this will help identify the level of traffic-calming interventions

3



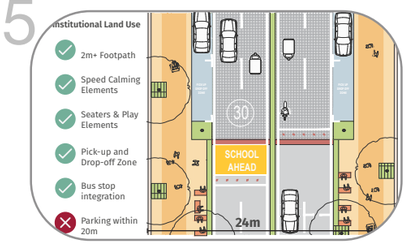
Prioritise streets that improve accessibility to transit stations, educational institutions, areas of work, commercial destinations, parks, and other open spaces.

4



Identify streets that witness high pedestrian crashes

5



Design roads and streets as per RoW and adopt the respective template

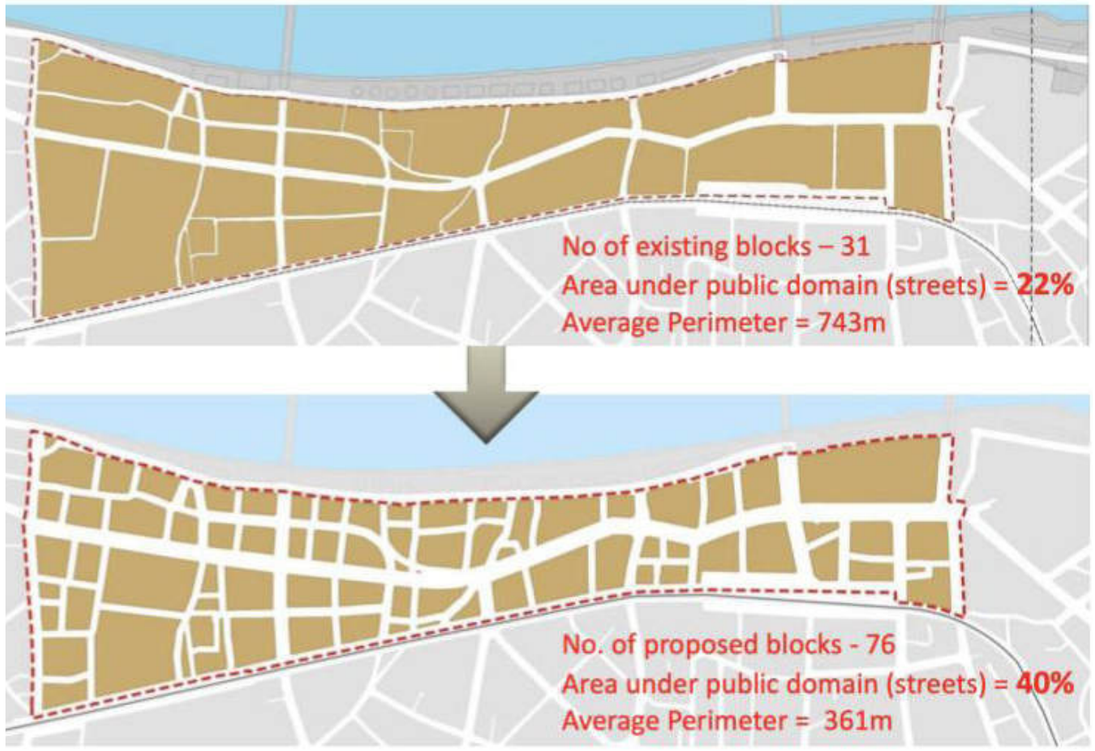
6



Refine the type of infrastructure based on the local context and implement TOD Eg: if the street has high footfall, it can be made a NMT only street.

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

Creating Small Blocks in a Brownfield Scenario



Source: HCPDPM, Ahmedabad - LAP 1

Compact blocks can be created in brownfield areas through Local Area Plans. Planning exercises should consider potential redevelopment, plot ownership, street widths, and land use.

Compact networks in brownfield areas can be achieved by:

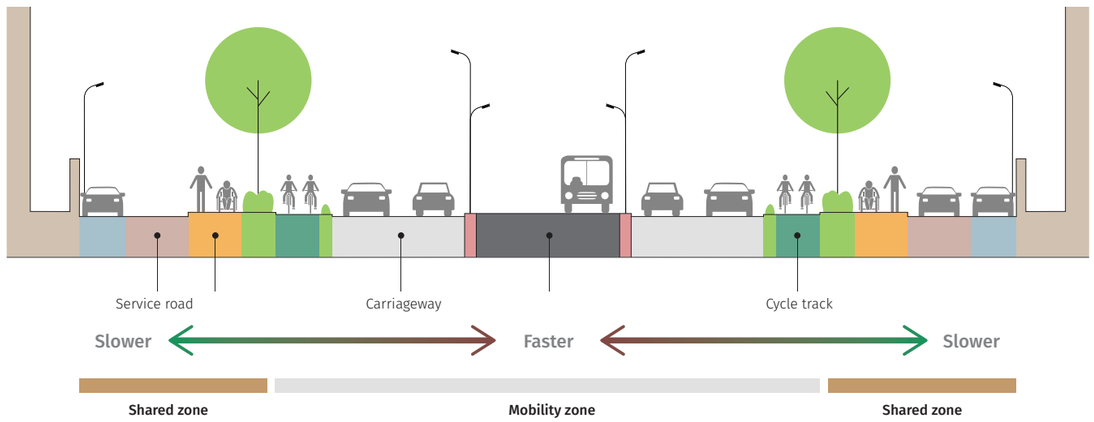
1. Introducing pedestrian and cycle links through large land parcels like playgrounds, universities, etc.
2. Carving streets through property setbacks, as and when the property is redeveloped



2.3 Elements and Principles of Complete Road and Street

A complete road and street prioritises safe and comfortable mobility for all citizens through walking, cycling, and public transport, promoting clean and sustainable transportation modes.

Such roads and streets are characterised by features that encourage physical activity, social interaction, and environmental sustainability. Elements such as wide footpaths, cycle lanes, greenery, on-street parking management, and public spaces contribute to a sense of community.



2.3.1 Street Typology

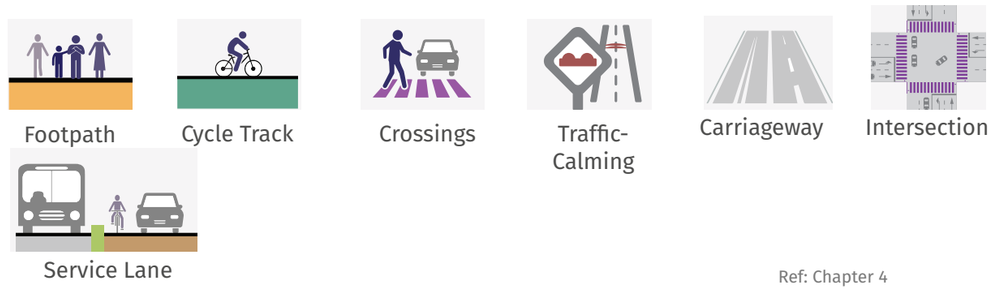
Based on their functions, carrying capacities, permissible speeds, street widths, and physical characteristics, roads and streets can be classified into 1) Arterial 2) Sub-Arterial 3)Collector and 4) Local Streets.

Type of Streets	Function	Max. no of lanes	RoW as per IRC	Recommended RoW	Design Speed
Arterial	These streets facilitates the movement of through-traffic across the city, connecting major urban areas.	6 lanes	45-60m	45m, 60m	60 km/h
Sub-Arterial	Functioning as secondary arteries, these streets distribute traffic between arterial and collector roads.	4 lanes	30-45m	30m, 36m	60 km/h
Collector	These streets link arterial roads to local streets, ensuring connectivity between neighbourhoods within a locality.	2 lanes	15-30m	18m, 24m	40km/h
Local Streets	Primarily providing direct access to buildings and residences, these streets do not facilitate through traffic.	2 lanes	<15m	9m, 12m	30km/h

*The above-mentioned categories are based on their function and may correspond to the recommended RoWs. This document and Master Plan seek to achieve standardisation of RoW and a clear functional hierarchy.

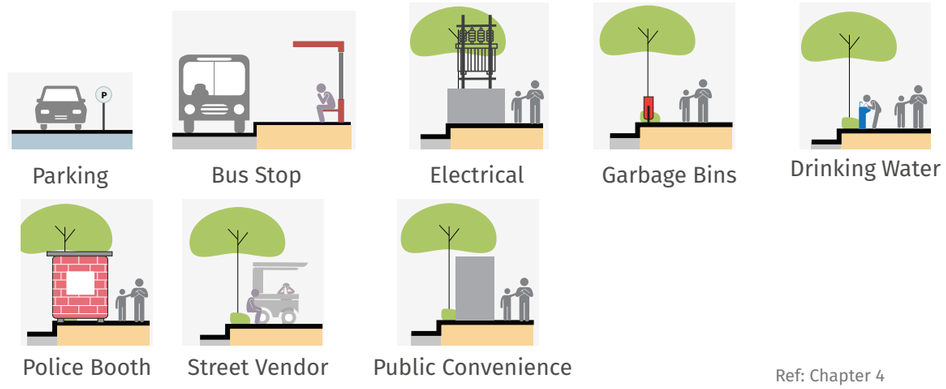
2.3.2 Elements of a Complete Road and Street

Street Space Components



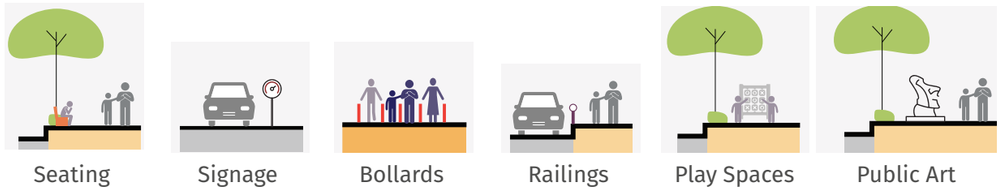
Ref: Chapter 4

Public Amenities



Ref: Chapter 4

Street Furniture



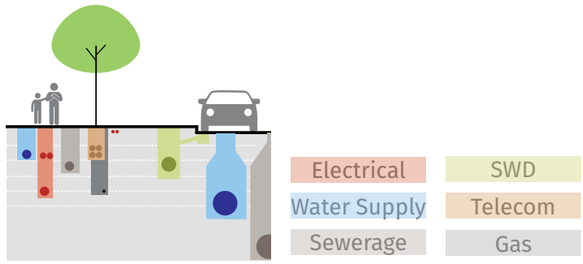
Ref: Chapter 4

Greening and Landscape



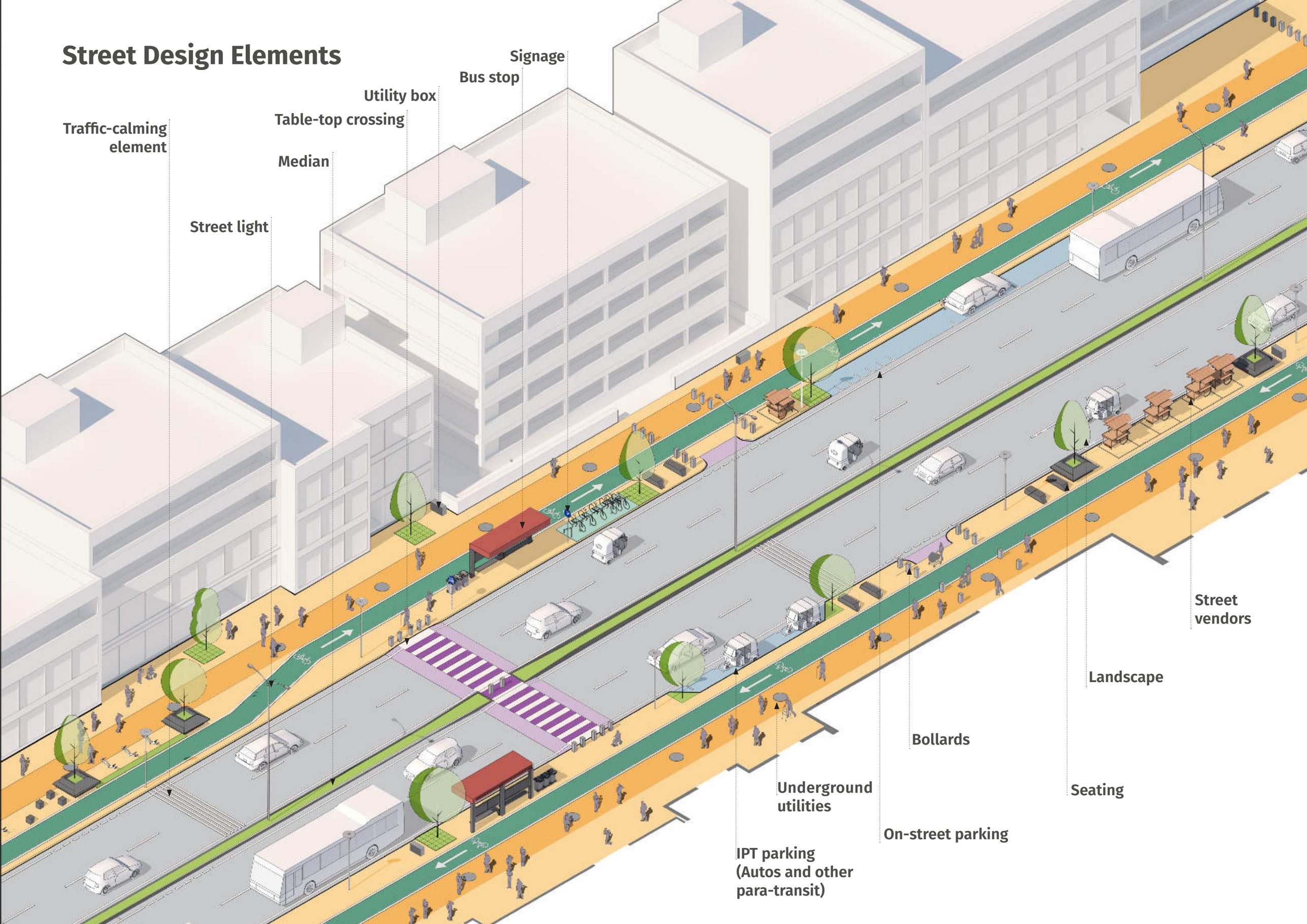
Ref: Chapter 4

Underground Utilities



Ref: Chapter 5

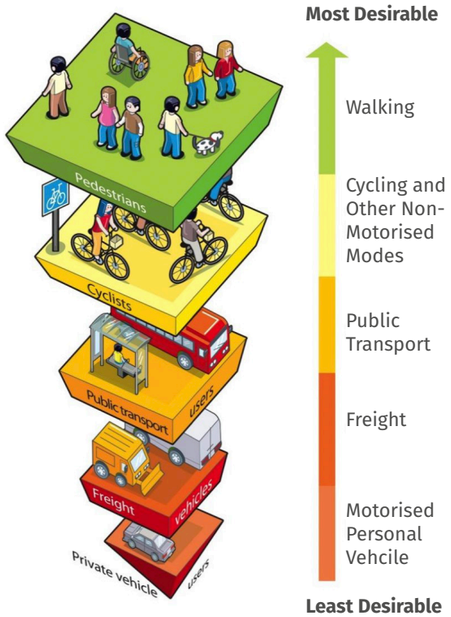
Street Design Elements



2.3.3 Principles of Designing a Complete Road and Street

Well-designed streets are crucial in shaping safe, efficient, and vibrant urban environments. The following principles provide a framework for optimising road space, enhancing mobility, and fostering inclusive, people-friendly streets. By integrating these principles into planning and design, cities can create equitable, efficient, and resilient urban spaces that support both daily movement and community interaction.

A. Prioritise space for walking, cycling and public transport



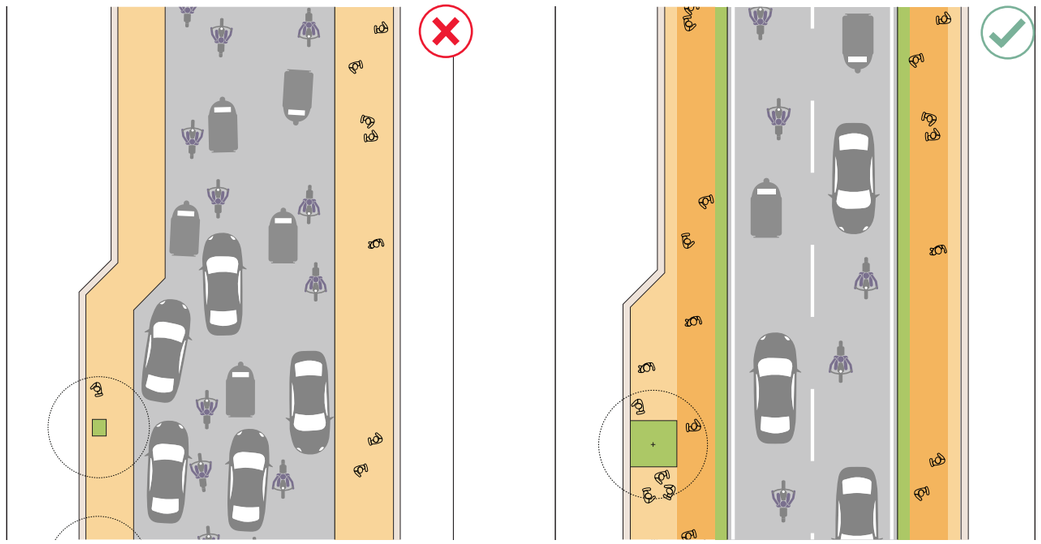
By prioritising limited street space for walking, cycling and public transport, cities can ensure that all citizens can move around their communities efficiently, affordably, and on time.

Streets should be designed to maximise efficiency by accommodating all road users, including pedestrians, cyclists, public transport, and motor vehicles. A well-balanced road space ensures smooth movement, minimises conflicts, and enhances overall mobility.



B. Maintain uniform carriageway width for one street

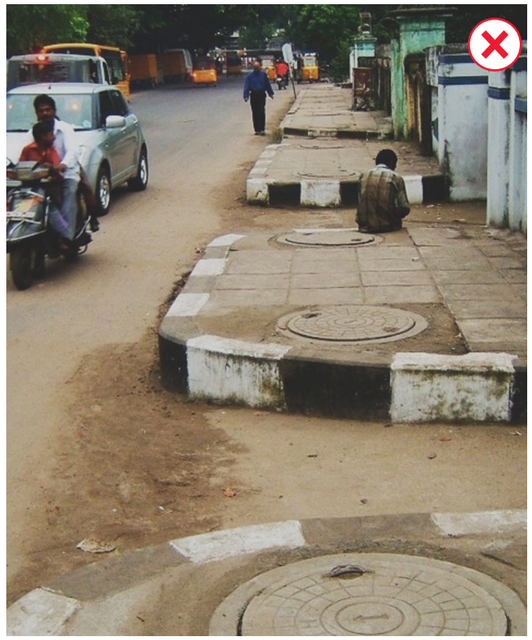
Varying carriageway width encourages overtaking in wider sections causing bottlenecks, congestion in narrow parts and a higher chance of road accidents. Consistent carriageway width ensures smooth and safe traffic flow.



Obstruction-free carriageaways
Any elevated structure that has pillars or supports (such as pillars for metrorail or flyovers) should not obstruct the carriageway. Grade seperator ramps also should be planned on additionally acquired land to maintain uniform carriageway, and not encroach on existing road space.

C. Ensure continuous, one-level footpaths

A footpath with recurrent breaks at property entrances and side streets makes walking difficult, and is inaccessible for the differently-abled. Footpaths that are over 150m high and those with frequent obstructions discourage pedestrians from walking on them, forcing them to shift to the carriageway.





D. Ensure unobstructed, clear walkways

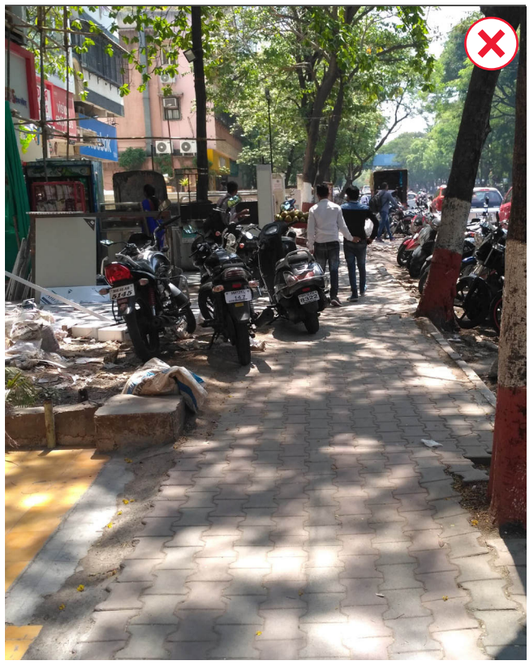
A minimum clear width of 2m must be maintained, free from encroachments, vending activities, street amenities, and utility obstructions, to enable seamless pedestrian flow and universal accessibility.





E. Encourage lively streets

The presence of street furniture invites people onto the streets and makes streets lively by providing opportunities for social interaction.





F. Design for shaded streets

Well-shaded streets are aesthetically pleasing, physically comfortable, and help in tackling urban air pollution and the heat island effect. This also improves the liveability of the streets.





G. Ensure seamless Multi-modal Integration

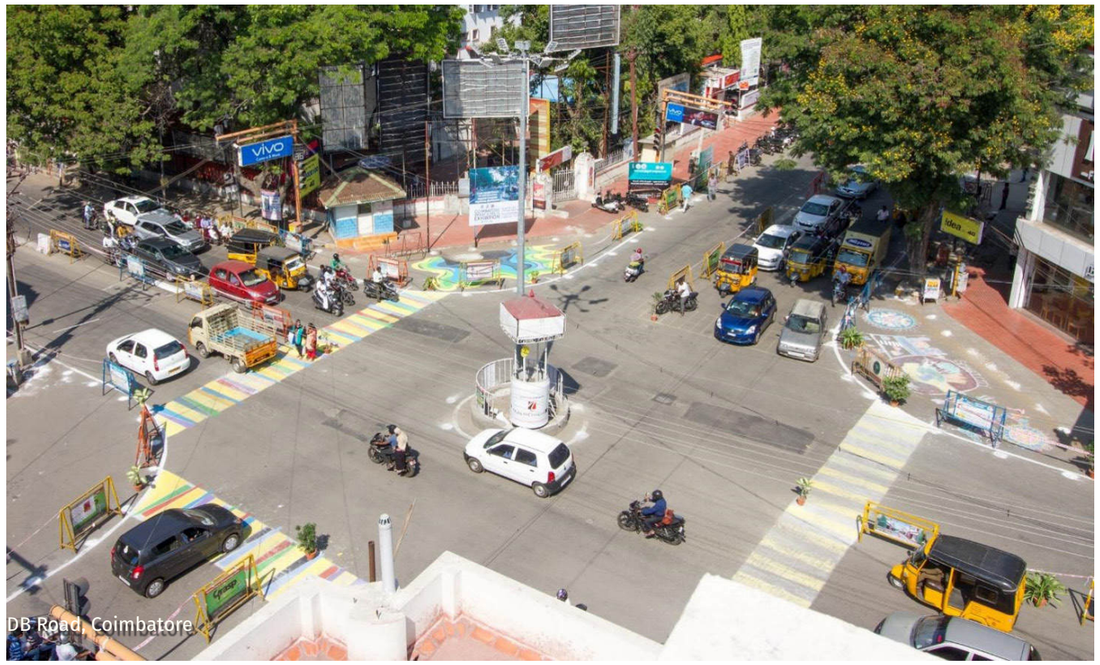
Streets should be designed to support seamless transitions between different modes of transport, including walking, cycling, buses, metro, and shared mobility. Dedicated pick-up and drop-off zones, accessible transit stops, and safe pedestrian crossings enhance connectivity between modes.



Chennai Central Area

H. Design compact intersections and crossings

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



DB Road, Coimbatore

I. Discourage long-term on-street parking

On-street parking should be designated only after prioritizing space for sustainable modes, encouraging short-term, high-turnover parking rather than long-term vehicle storage. Parking management must be planned at a network level, not in isolation, to prevent spillover effects. Implementing time restrictions, comprehensive on-street and off-street management, and dynamic demand-based pricing can further optimise kerbside space usage.



NSC Bose Road, Chennai

J. Encourage pedestrianisation of streets

Pedestrianisation of streets is ideal in areas with high footfall and intense commercial activity. Prioritising pedestrians in such zones enhances safety, supports local businesses, and creates vibrant public spaces that encourage social interaction and active street life.

Permanent pedestrianisation:
Streets with consistently high pedestrian footfall, dense commercial or recreational activity, limited need for vehicular access, and strong public transport connectivity are suitable for permanent pedestrianisation. These streets function as major public spaces and benefit from long-term infrastructure improvements that prioritise people over vehicles.

Temporary pedestrianisation:
Streets with moderate activity or mixed land use can be pedestrianised temporarily during specific times—such as weekends, festivals, or peak shopping hours. This approach helps test the feasibility of full-time pedestrianisation, supports local businesses, and balances access needs for delivery vehicles and residents.

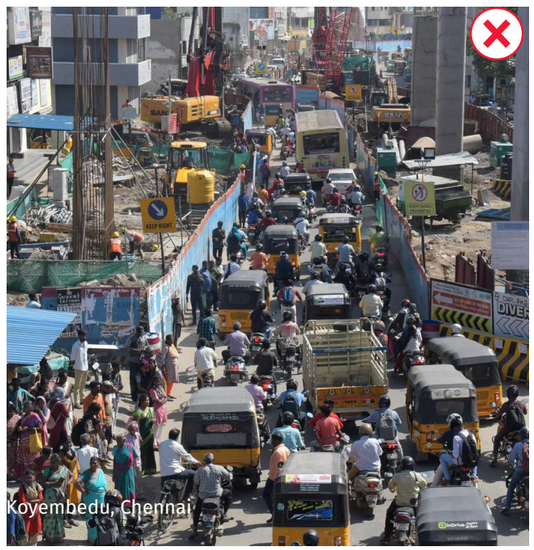

KNK Road, Chennai

K. Create work zone management and traffic management plans

Creating traffic management plans ensures safe and efficient movement for all street users during and after street improvements. These plans help manage vehicle flow, designate loading and unloading zones, regulate access for emergency and service vehicles, and minimise conflicts in pedestrian-priority areas. Proper planning also supports smooth transitions during construction and facilitates enforcement once the street design is implemented.

Work zone management includes:

- Planning safe and efficient movement of pedestrians, cyclists, and vehicles during construction.
- Providing clear signage, lighting, and barriers to guide users and prevent conflicts.
- Ensuring temporary walkways and crossings are accessible and continuous.
- Coordinating construction schedules to minimise disruption to nearby residents and businesses.
- Maintaining access for emergency, delivery, and service vehicles.
- Regularly monitoring and updating traffic diversions based on on-ground conditions.

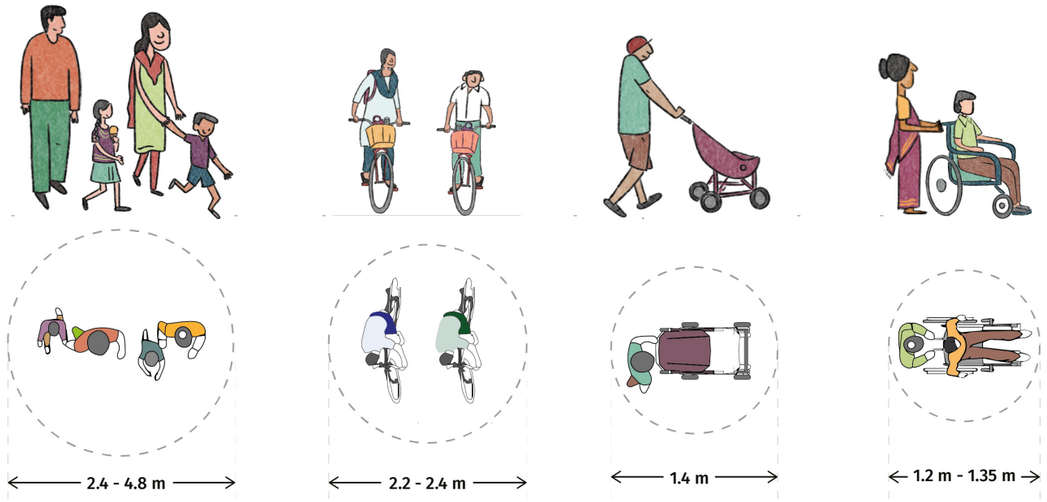

Koyembedu, Chennai

2.4 Children and Streets

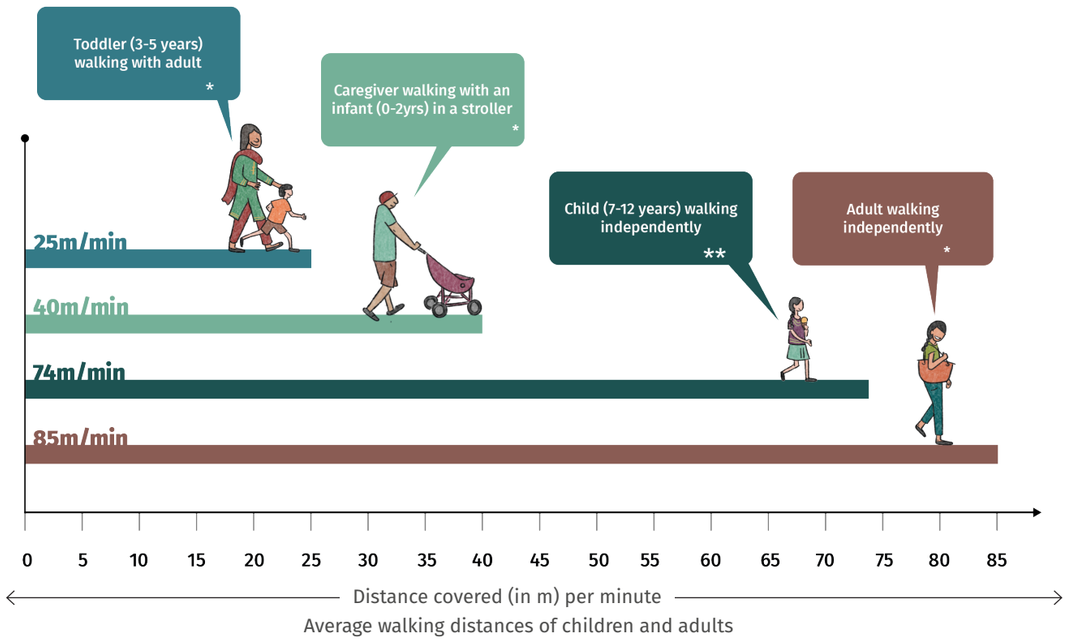
Schools are vital institutions where children spend a significant portion of their formative years, learning, socialising, and growing. School-going children, between ages 6 and 17 (1st to 12th Standard) interact differently with footpaths, cycle tracks, parking spaces, building utilities, landscaping and other street features when compared to adults. Their walking speeds, depending on age, are also slower than adults' speeds, and children are closer to the ground than adults due to their height.

2.4.1 Designing Streets around Schools

Given children's distinct needs and requirements, it is important to study their physical behaviour, developmental stages and ergonomics to help design safe streets that accommodate their physical growth, understand their limitations, and help foster healthy interactions.



Space requirements for children and caregivers
as per Designing Streets For Kids, Global Designing Streets Initiative

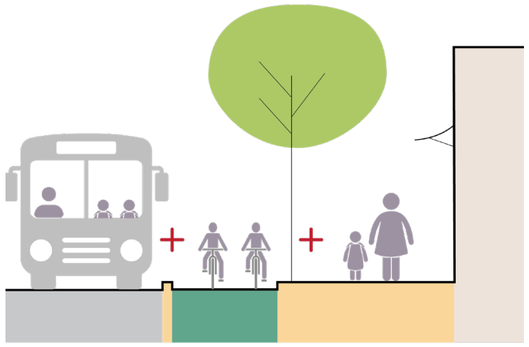


Average walking distances of children and adults

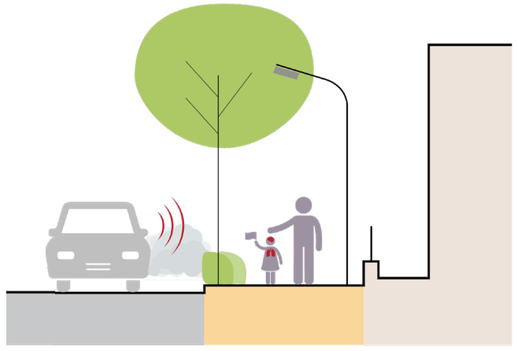
* Infant, toddler and caregiver-friendly neighborhoods Design Guidelines, 2019, Bernard van Leer Foundation
** Study on Normal Walking Speed According to Age and Gender in Preliminary Students in Surabaya, 2022

2.4.2 Principles of Streets Designed for Children*

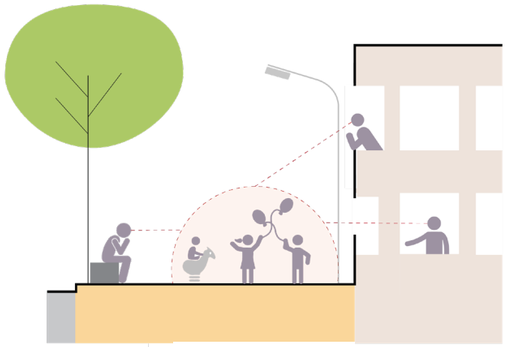
* Graphics inspired by 'Designing Streets for Kids' by Global Designing Cities Initiative



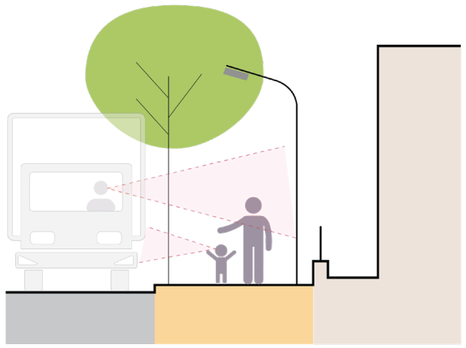
Accommodates safe mobility choices



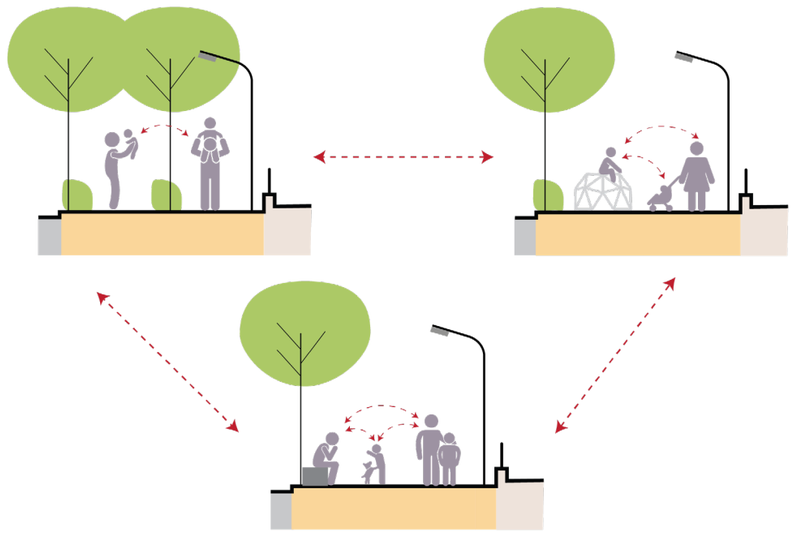
Provides a safe environment



Enables sense of security



Makes children visible users



Supports spaces for interaction, pause, play and learning

Child-Friendly Street Design

Table-top crossing

Parking / Pick-Up and drop-off zones

Traffic-calming element

Median

Street light

School

Yellow carpet zones near schools

SLOW

30

SCHOOL AHEAD

Landscape

Footpath

Cycle track

Bollards

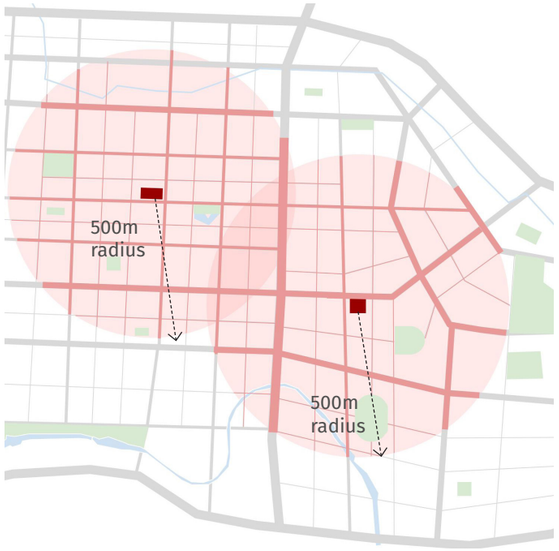
Seating

School entry/exit

Signage

Play spaces

2.4.3 Type of School Streets



All streets within the school zone (defined as a 500m radius around the school) shall be designed with safe infrastructure to facilitate the movement of school children.

However, streets adjacent to school entries and exits typically experience higher student volumes than other streets in the zone. Therefore, streets within the school zone can be categorised into two types: school streets and access streets, each requiring distinct design treatments.

School streets

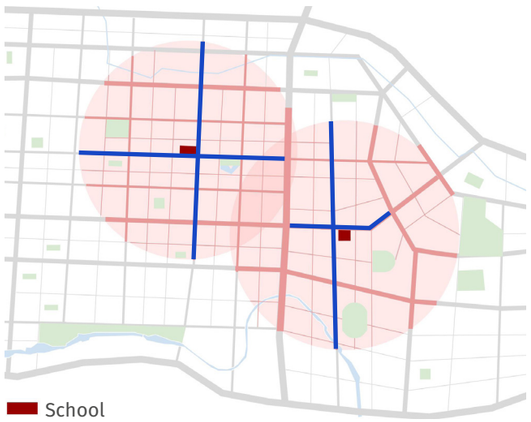
School Streets are streets that directly host the school's entry or exit points. These streets carry a higher volume of students and are the primary locations for pick-up and drop-off activities. A school street is defined as the street segment with the school entry/exit that extends up to the boundary of the school zone on either side.

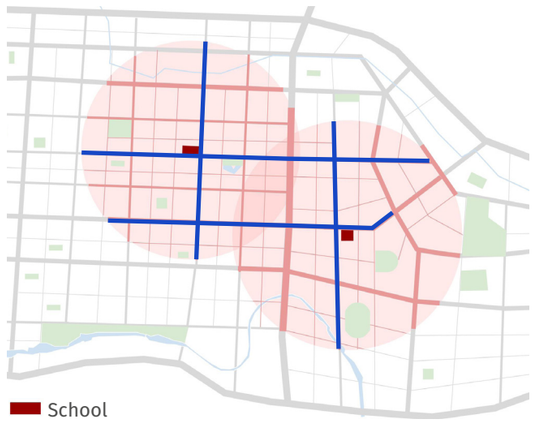
School access streets

School access streets are used by students and parents to reach the school. These typically carry fewer students than school streets.

School access streets shall follow the general design recommendations outlined in Chapter 4, with the addition of traffic-calming and way-finding elements to support safer access.

The extent of the school street can be modified based on the context and overlapping school zones as shown in the two images below.





2.4.4 Elements of School Streets and Access Streets

Element	School Street	School Access Street
Segregated footpath Refer to Chapter 4.1 for details	✓	✓
Segregated cycle track Should be on streets with RoW ≥18m	✓	✓
Traffic calming	✓	✓
Way-finding	✓	✓
School entry/exit	✓	✗
Parking Refer to Chapter 4.9.3 for details	–	✓
Pick-up and drop-off zones Refer to Chapter 4.9.3 for details	–	✓
Pedestrian and cyclist crossing	✓	✓
Play and learning spaces	✓	–
Transit stations	–	–
Tree corridor	✓	✓
Street furniture	✓	–

✓ Should be present – May be present ✗ Should not be present

The provision of the above-mentioned elements shall be determined based on the context and the children's needs, and shall also factor in the type of street to be designed.

South Avenue Road, Chennai

3

Road and Street Design Templates

3.1. Standard Road and Street Templates

3.2. Efficient and Safe Intersections/ Junctions

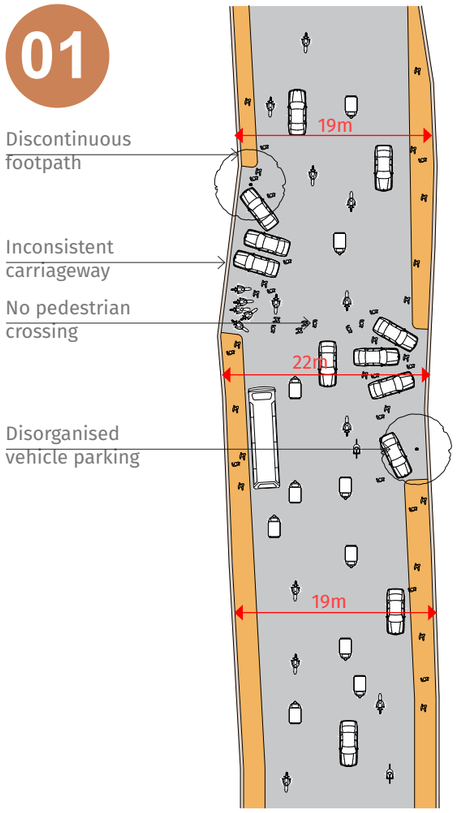
3.3. Road Marking and Signage

3.1 Standard Road and Street Templates

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

Further, based on local conditions, the appropriate street template can be adopten and contextualised

01

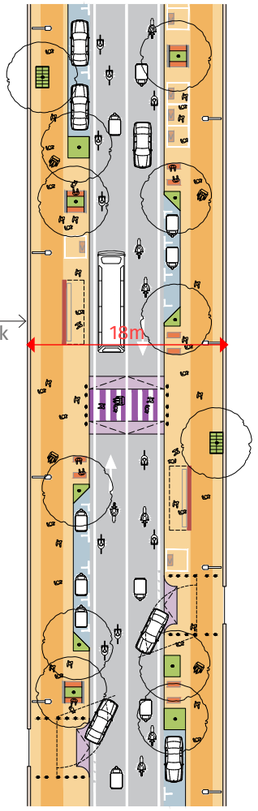


Study existing conditions

• Study the existing conditions on the street, including the available RoW, vehicle movement, adjoining land-use, buildings that attract high footfall, vending activities, pedestrians crossing facilities, existing condition of the footpath, parking counts, violations, etc.

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

02

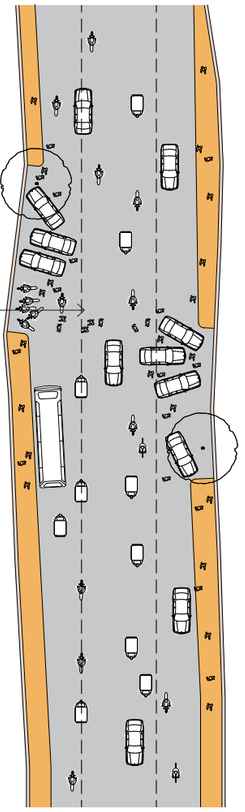


Identify street template

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

- Primary RoW of existing street.
- Adjacent land-use and street activities.
- Street typology

03

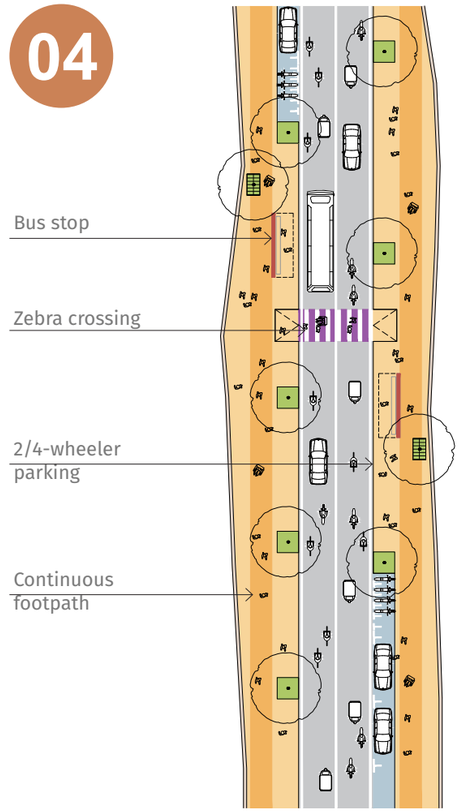


Overlay the template

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

- Align the centreline and mark new kerb-lines on the street.

04



Detail the street design

Refer to ‘Chapter 4: Above Ground Road and Street Elements’ and detail out the street edge to suit the local context.

Recommended RoW for existing and proposed roads

All road developments projects shall adhere to the standardised RoW allocations to ensure consistency, safety, and equitable use of road and street space

Typology no	Category	RoW	No of Lanes	Footpath	Cycle Track	Tree Corridor	Median	Service Lane	BPL/ BRTS	Metro/Elevated	Multi-utility Zone	Parking
1a	Arterial Road	60m	8	✓		✓	✓	✓	✓		✓	✓
1b	Arterial Road	60m	6	✓	✓	✓	✓	✓		✓	✓	✓
1c	Arterial Road	45m	6	✓		✓	✓	✓	✓		✓	✓
1d	Arterial Road	45m	4	✓	✓	✓	✓	✓		✓	✓	✓
2a	Sub-arterial Road	36m	6	✓		✓	✓		✓		✓	✓
2b	Sub-arterial Road	36m	4	✓	✓	✓	✓			✓	✓	✓
2c	Sub-arterial Road	30m	4	✓		✓	✓			✓	✓	✓
2d	Sub-arterial Road	30m	4	✓		✓	✓				✓	✓
2e	Sub-arterial Road	30m	4	✓	✓	✓	✓				✓	✓
3a	Collector Street	24m	4	✓		✓	✓				✓	✓
3b	Collector Street	24m	2	✓	✓	✓					✓	✓
3c	Collector	18m	2	✓		✓					✓	✓
4a	Local Street	12m	2	✓		✓						
4b	Local Street	9m	2	✓							✓	



4b 9 m RoW

Local Street

Two lanes with one-sided footpath

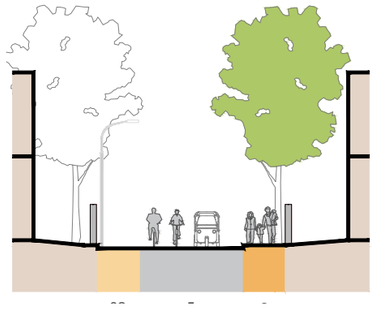
This template is suitable for narrow, local streets with mixed-use areas and moderate pedestrian activity. A footpath on one side facilitates a dedicated pedestrian path for safety and convenience of walkers alongside vehicular traffic.

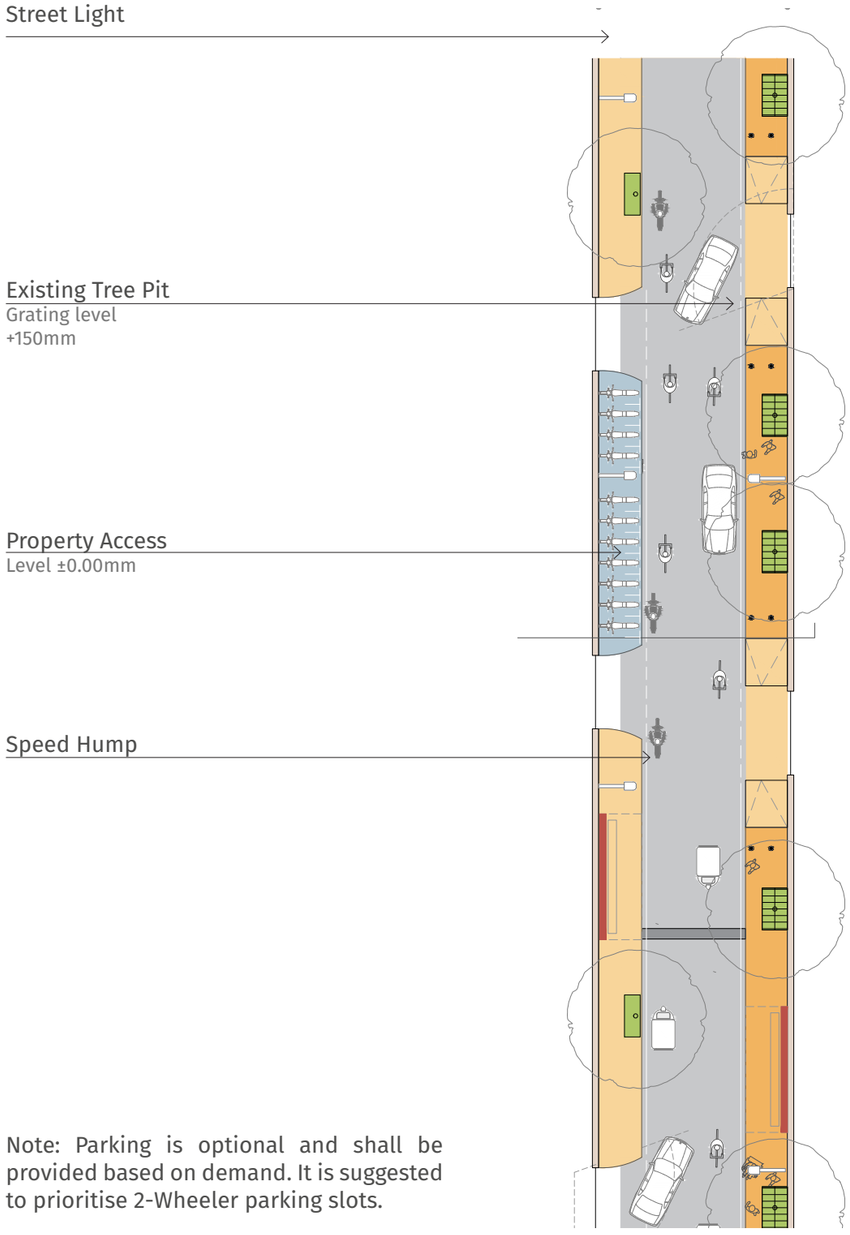
Land-use Adjoining the Street

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-utility Zone	Parking
Public Transport	Buses
Service Lane	





Note: Parking is optional and shall be provided based on demand. It is suggested to prioritise 2-Wheeler parking slots.

4a 12 m RoW

Local Street

Two lanes with symmetrical footpaths

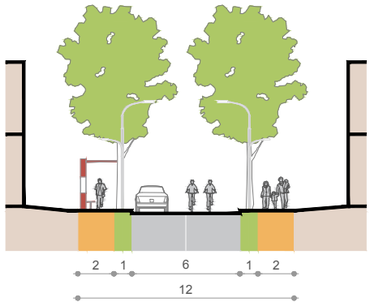
This template accommodates equal distribution of footpath space without on-street parking, enhancing safety and convenience for pedestrians. It is ideal for mixed-use areas and urban neighbourhoods.

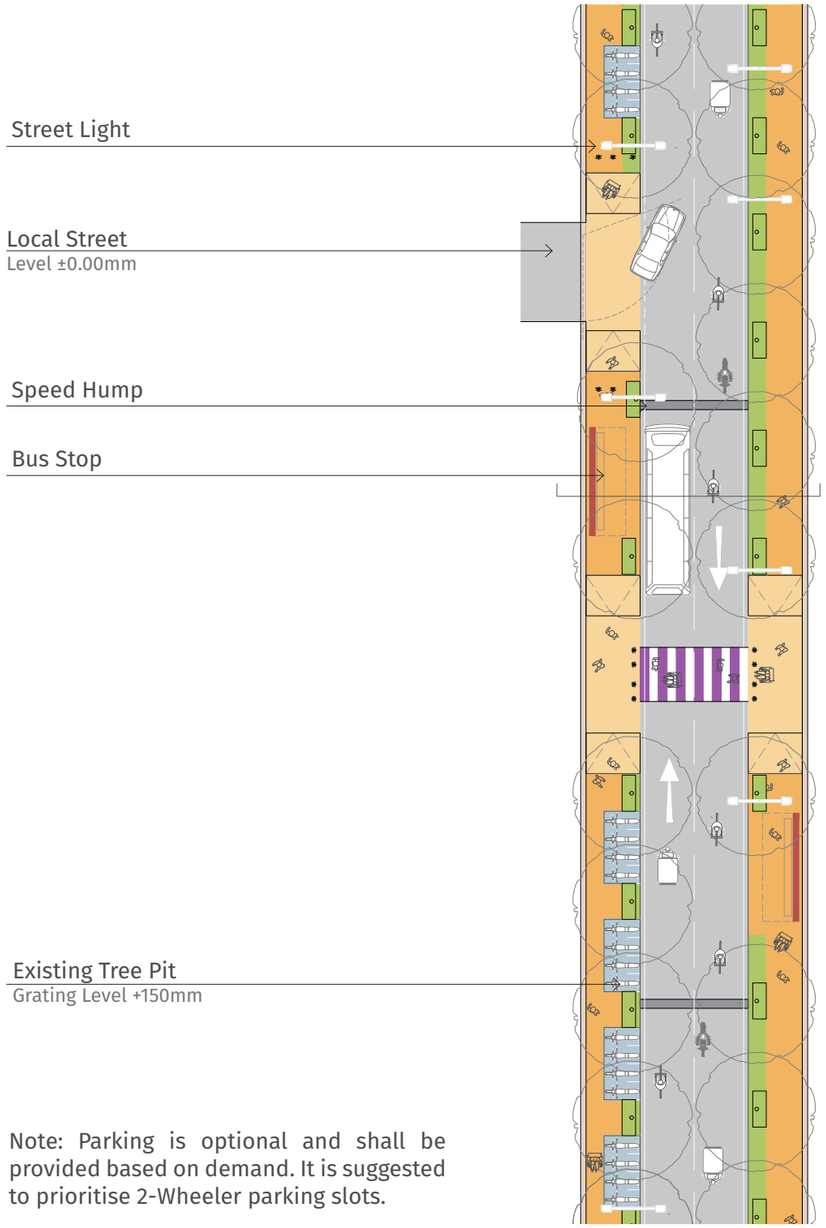
Land-use Adjoining the Street

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-utility Zone	Parking
Public Transport	Buses
Service Lane	





Note: Parking is optional and shall be provided based on demand. It is suggested to prioritise 2-Wheeler parking slots.

3c 18 m RoW

Collector Street

Two lanes with symmetrical footpaths

This template is well-suited for areas with mixed land use, retail and commercial establishments, which have high pedestrian activity but also need to maintain vehicular movement.

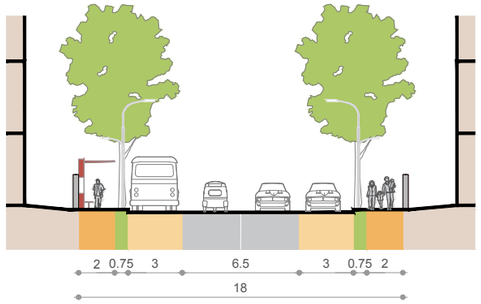
In these collector streets, cyclists are part of mixed traffic, hence traffic-calming is essential to ensure speeds are within 30 km/h.

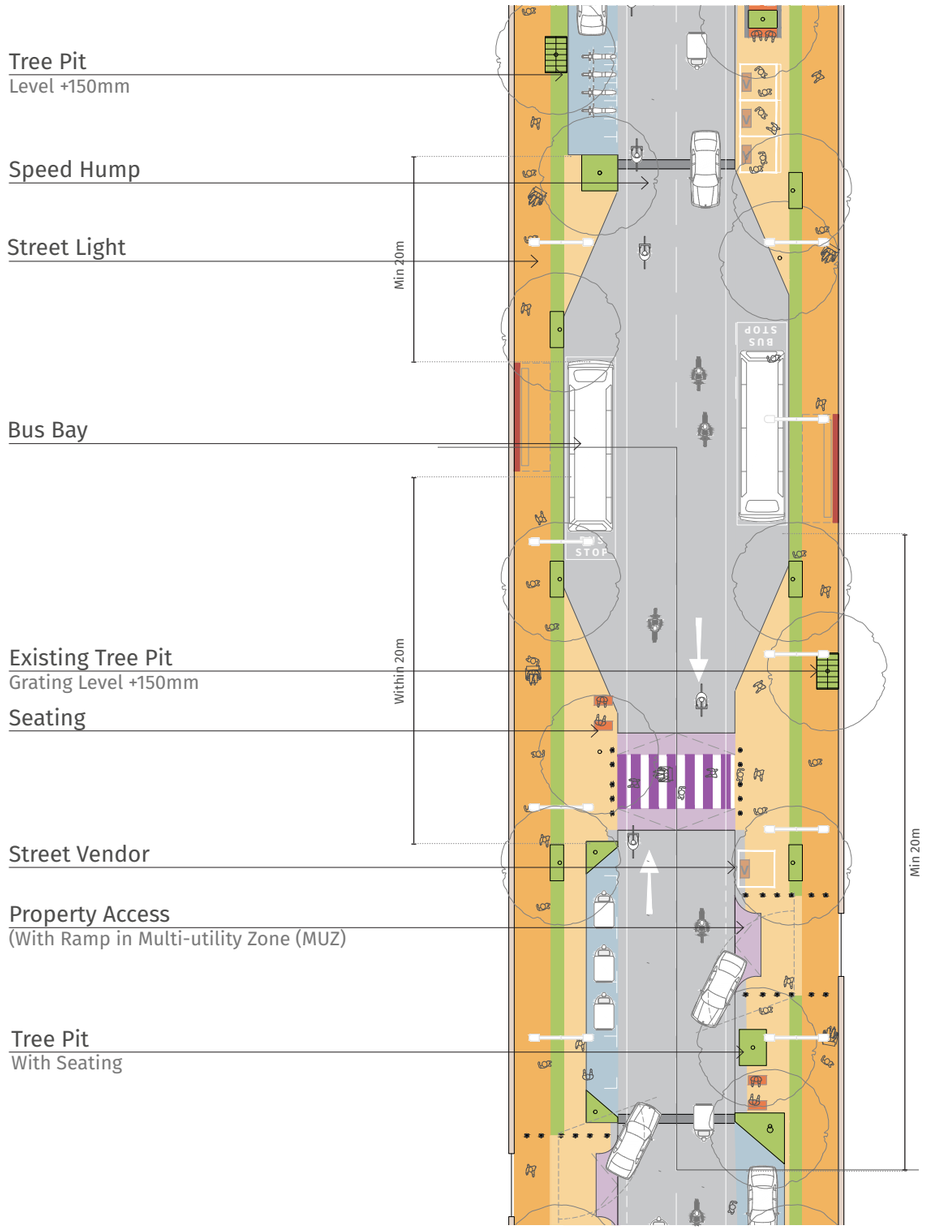
Land-use Adjoining the Street

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-utility Zone	Parking
Public Transport	Buses
Service Lane	





3b 24 m RoW

Collector Street

Two lanes with segregated cycle tracks

This street template can be used for wider collector streets where vehicle speeds are above 30 km/h.

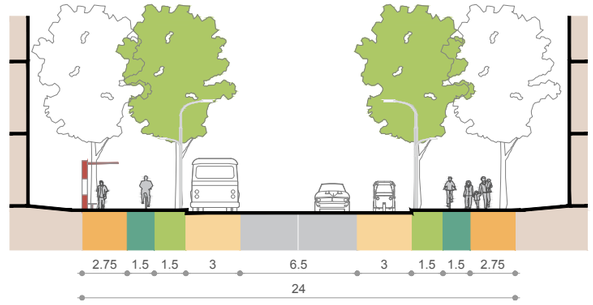
Segregated cycle tracks ensure safety of cyclists from fast moving vehicles.

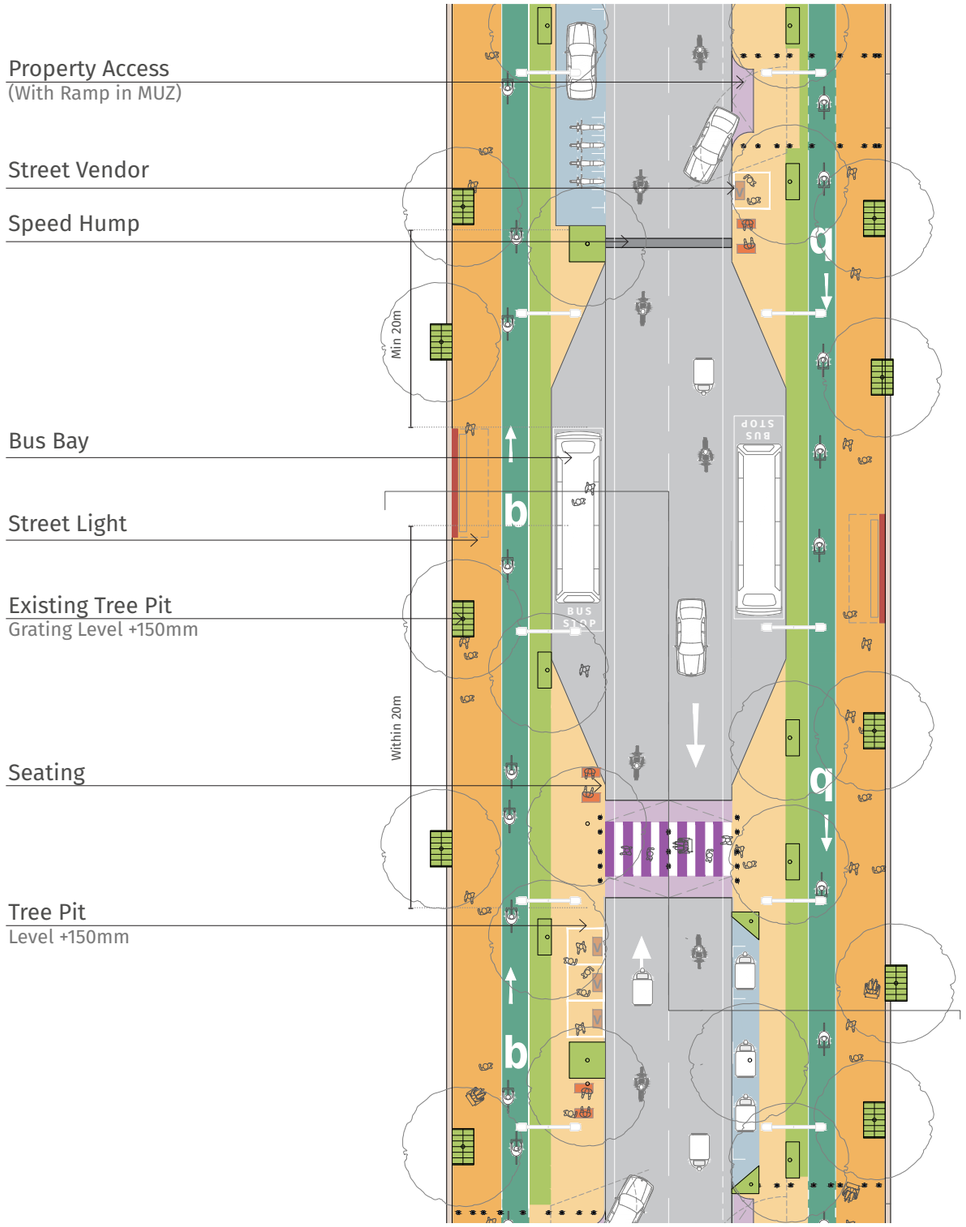
Land-use Adjoining the Street

- Residential
- Institutional
- Commercial
- Mixed-Use

Street Elements

- Footpath
- Cycle Track
- Tree Corridor
- Median
- Multi-utility Zone
- Parking
- Public Transport
- Buses
- Service Lane





3a 24 m RoW

Collector Street

Four lanes without cycle tracks

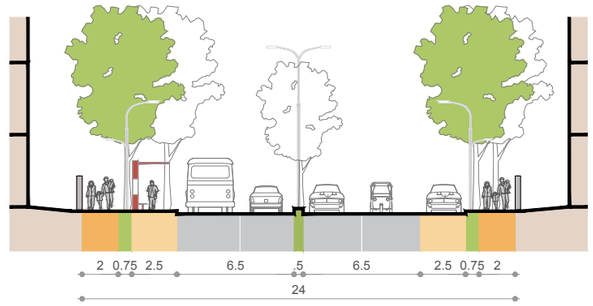
This template works effectively for collector streets in mixed and commercial land-use.

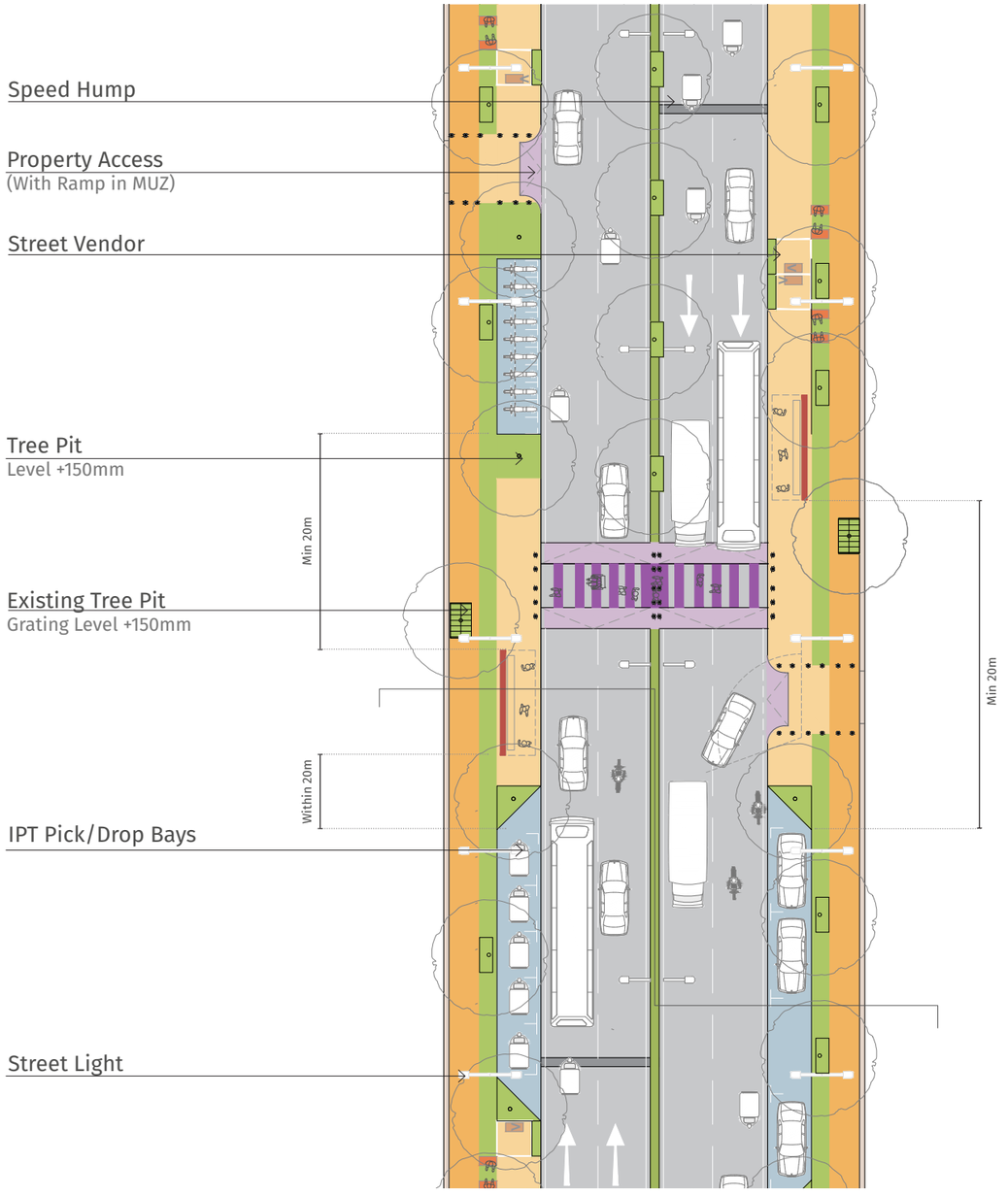
Land-use Adjoining the Street

- Residential
- Institutional
- Commercial
- Mixed-Use

Street Elements

- Footpath
- Cycle Track
- Tree Corridor
- Median
- Multi-utility Zone
- Parking
- Public Transport
- Buses
- Service Lane





2e 30 m RoW

Sub-Arterial Road

Four lanes with segregated cycle track

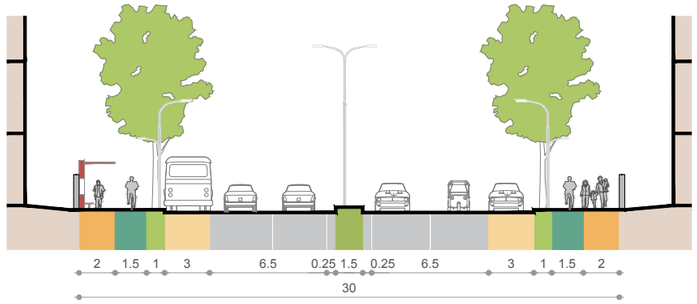
This template excels in sub-arterial roads of mixed-use areas where urban vibrancy is vital, such as city centres, commercial districts, and neighbourhoods with significant pedestrian footfall.

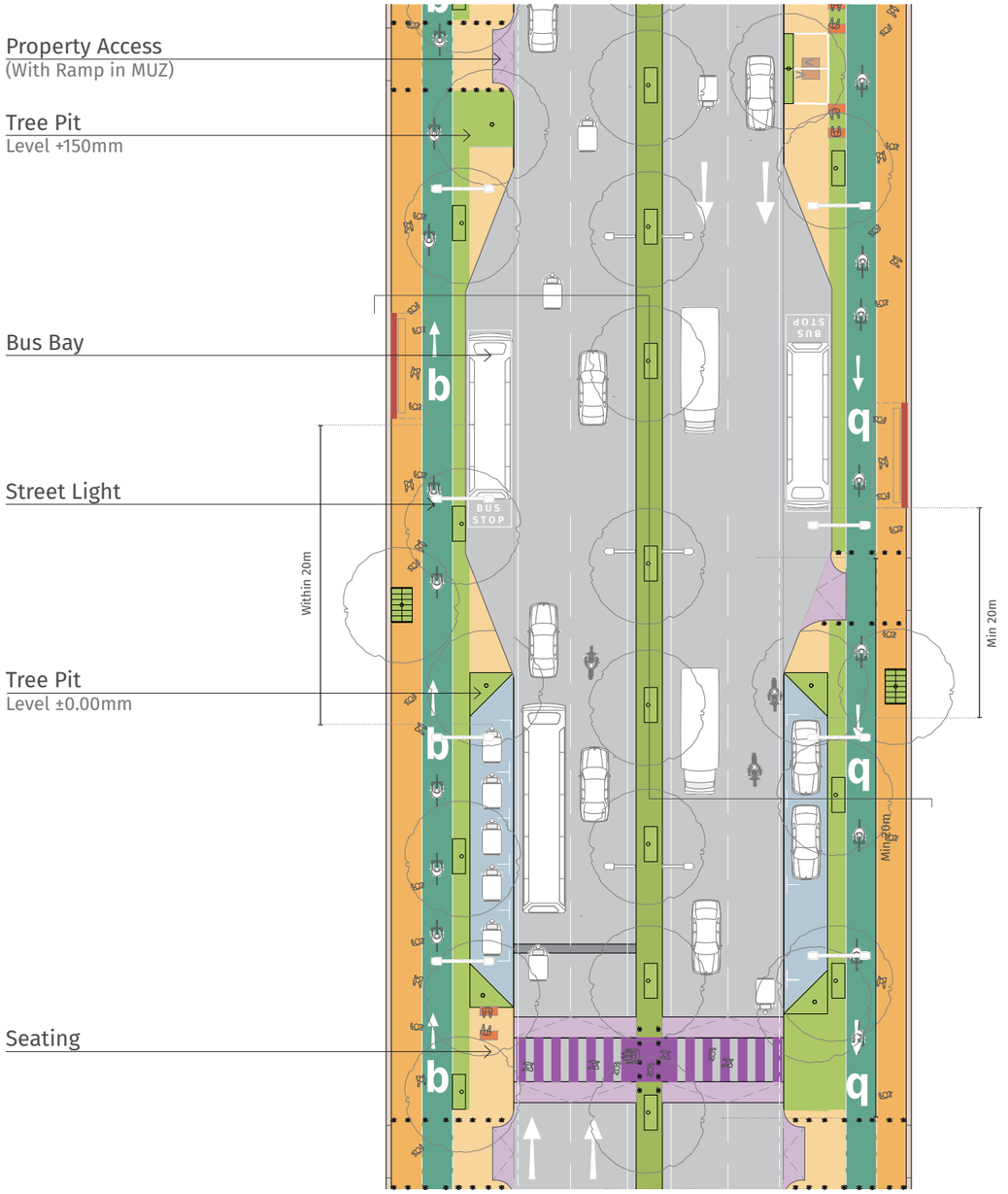
Land-use Adjoining the Street

- Residential
- Institutional
- Commercial
- Mixed-Use

Street Elements

- Footpath
- Cycle Track
- Tree Corridor
- Median
- Multi-utility Zone
- Parking
- Public Transport
- Buses
- Service Lane





2d 30 m RoW

Sub-Arterial Road

Four lanes with metro corridor

This template is ideal for four-lane corridors which align with the metro line. The high transit ridership pedestrian activity on these streets demand safe, continuous, and well-integrated streets.

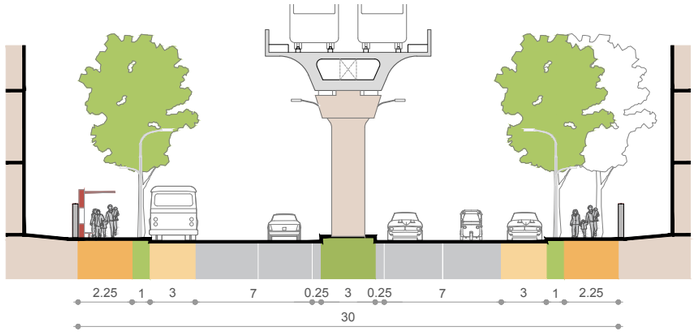
The template emphasise seamless access to metro stations, organised feeder and pick-up zones, and multimodal integration while maintaining efficient vehicle movement.

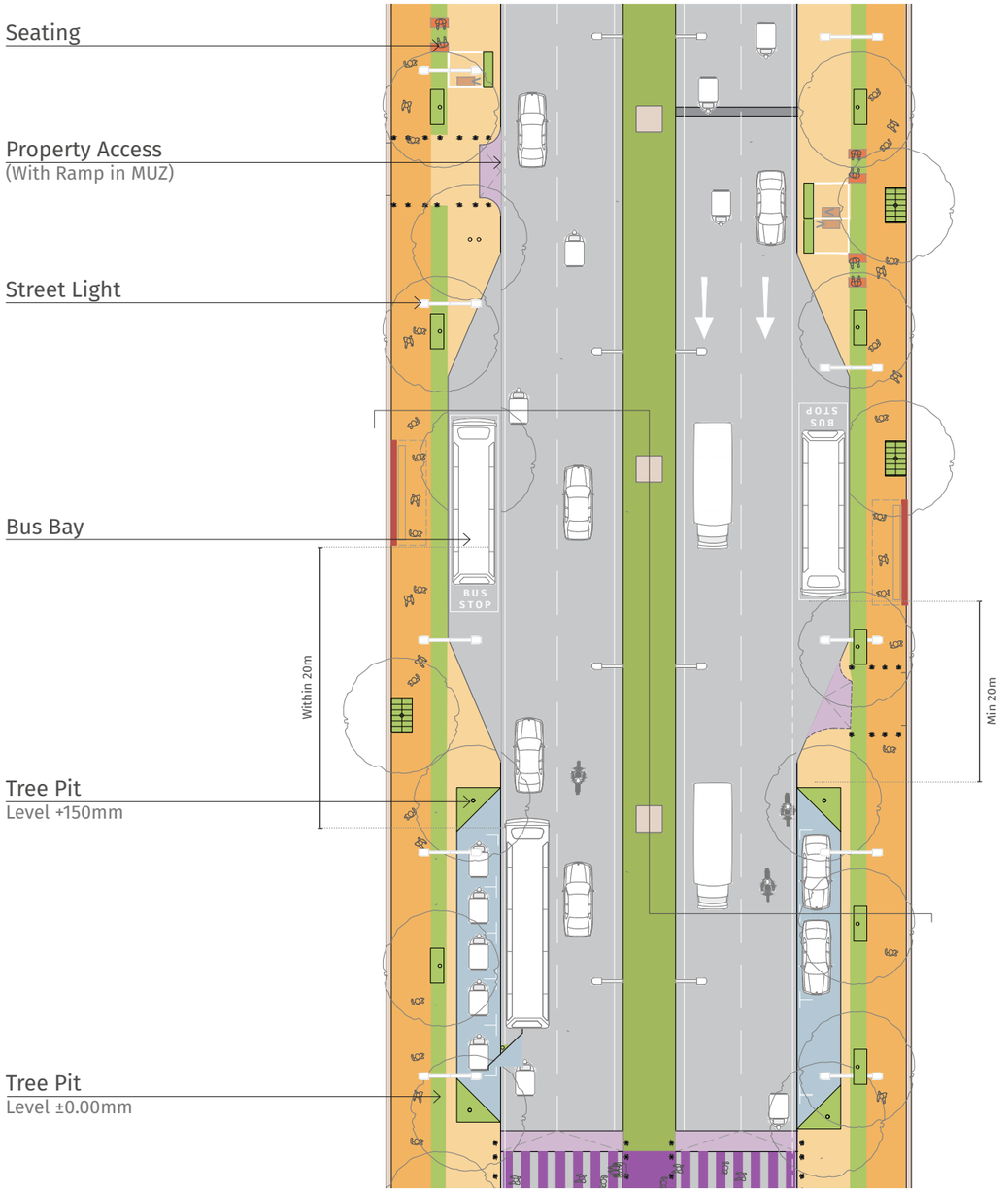
Land-use Adjoining the Street

- Residential
- Institutional
- Commercial
- Mixed-Use

Street Elements

- Footpath
- Cycle Track
- Tree Corridor
- Median
- Multi-utility Zone
- Parking
- Public Transport
- Metro Corridor
- Service Lane



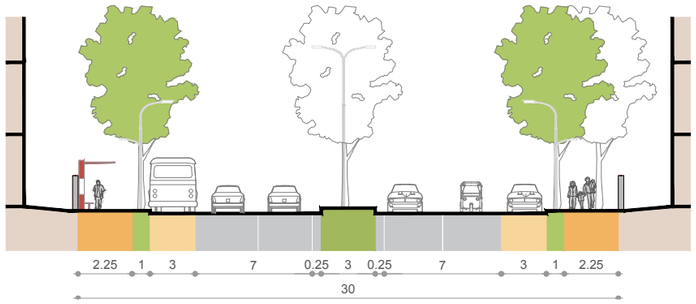


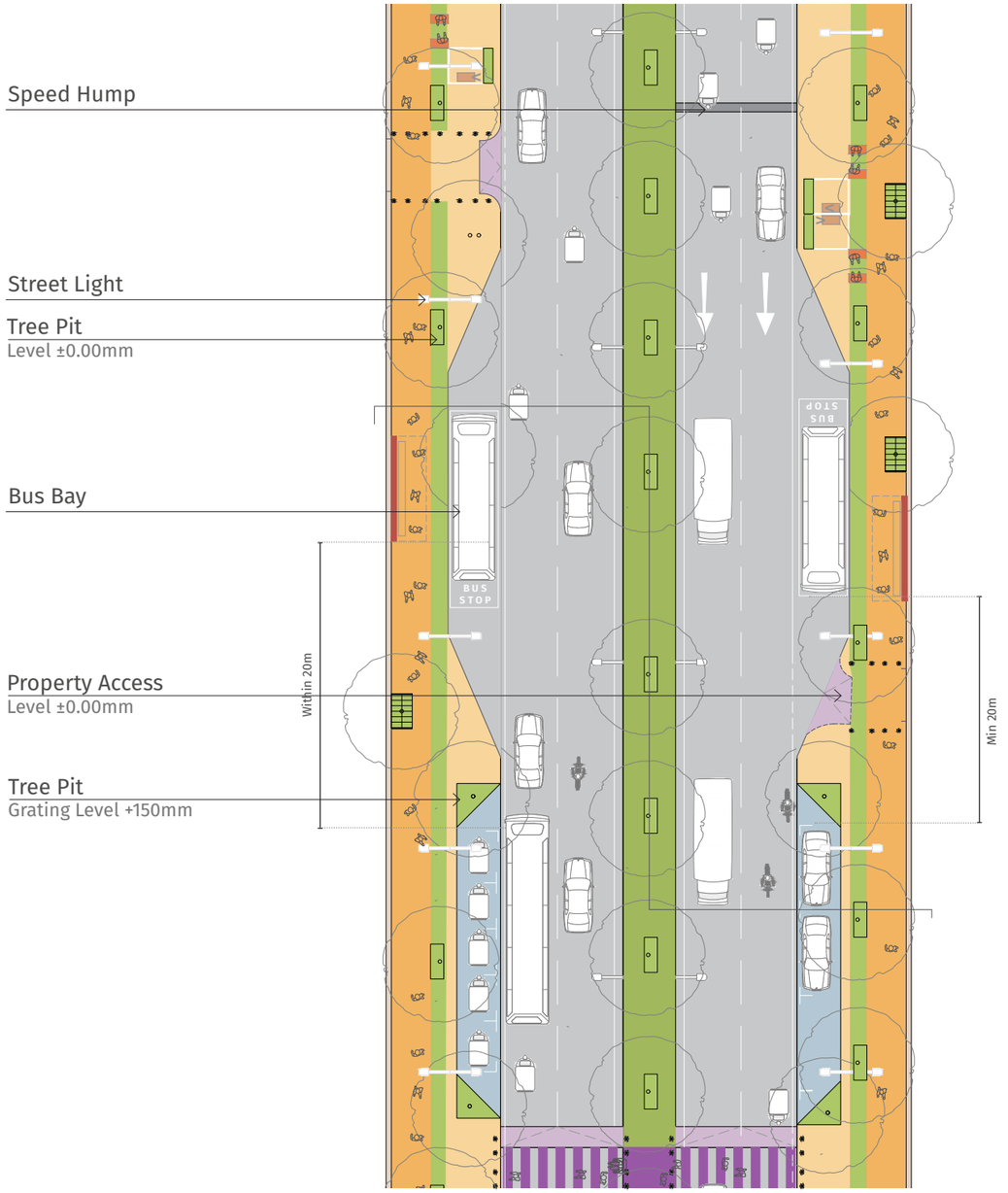
2c 30 m RoW

Sub-Arterial Road

Four lanes without segregated cycle track

This template is suited for sub-arterial roads functioning as arterial roads and have adjacent commercial and mixed land use.





Land-use Adjoining the Street

Residential	Institutional
Commercial	Mixed-Use

Street Elements

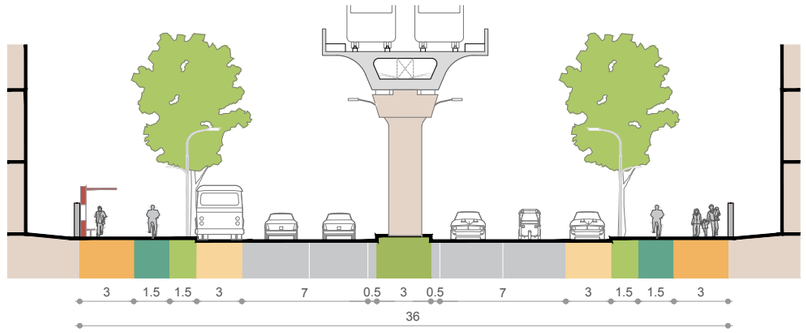
Footpath	
Cycle Track	
Tree Corridor	Median
Multi-utility Zone	Parking
Public Transport	Buses
Service Lane	

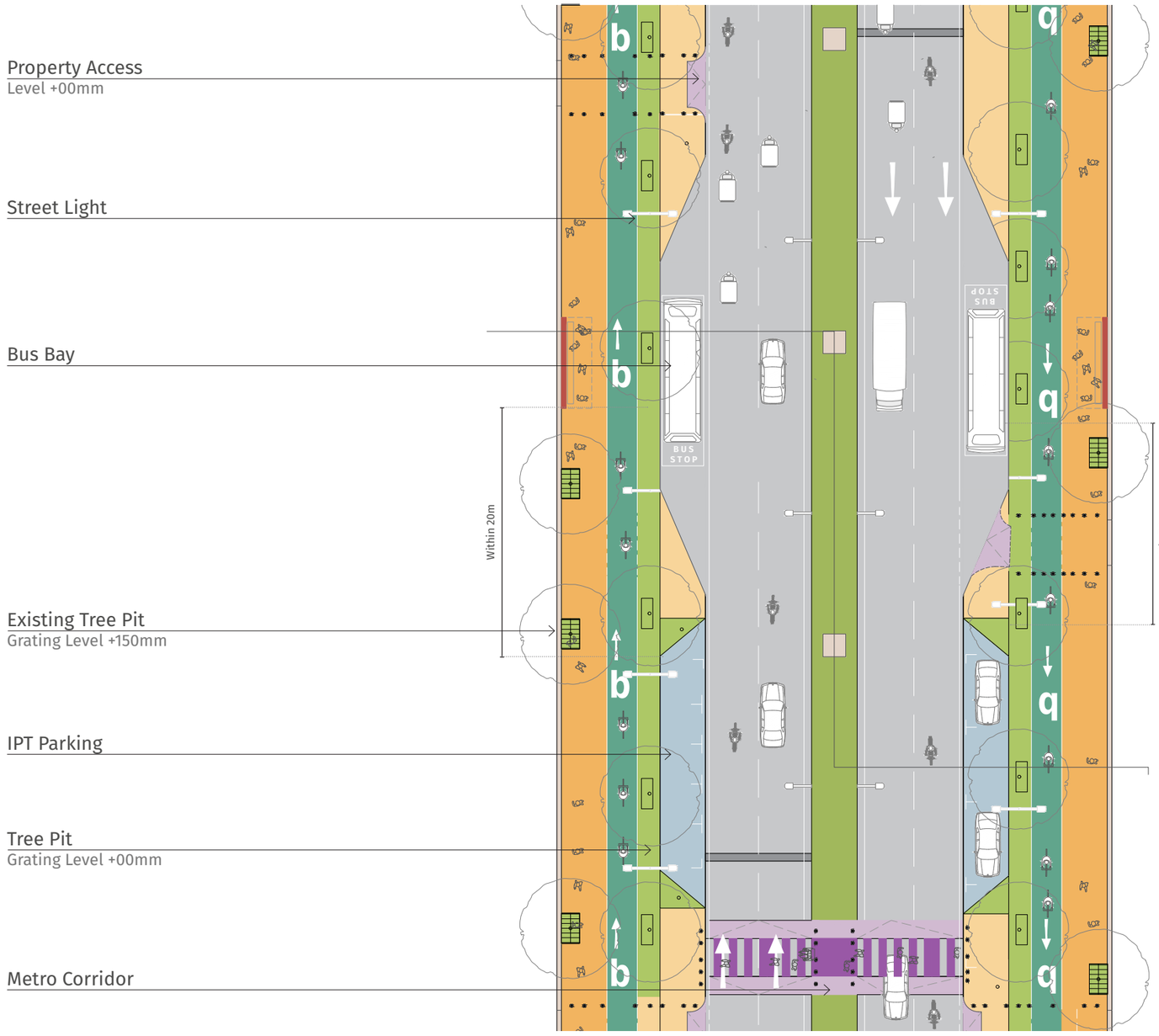
2b 36 m RoW

Sub-Arterial Road

Four lanes with metro corridor and segregated cycle track

This template is well suited for arterial roads and major urban corridors with high-intensity traffic. It prioritises efficient public transportation as well as non-motorised travel.





Land-use Adjoining the Street

Residential	Institutional
Commercial	Mixed-Use

Street Elements

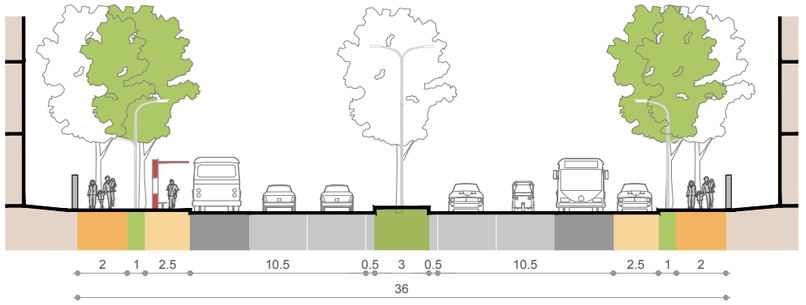
Footpath	
Cycle Track	
Tree Corridor	Median
Multi-utility Zone	Parking
Public Transport	Metro Corridor
Service Lane	

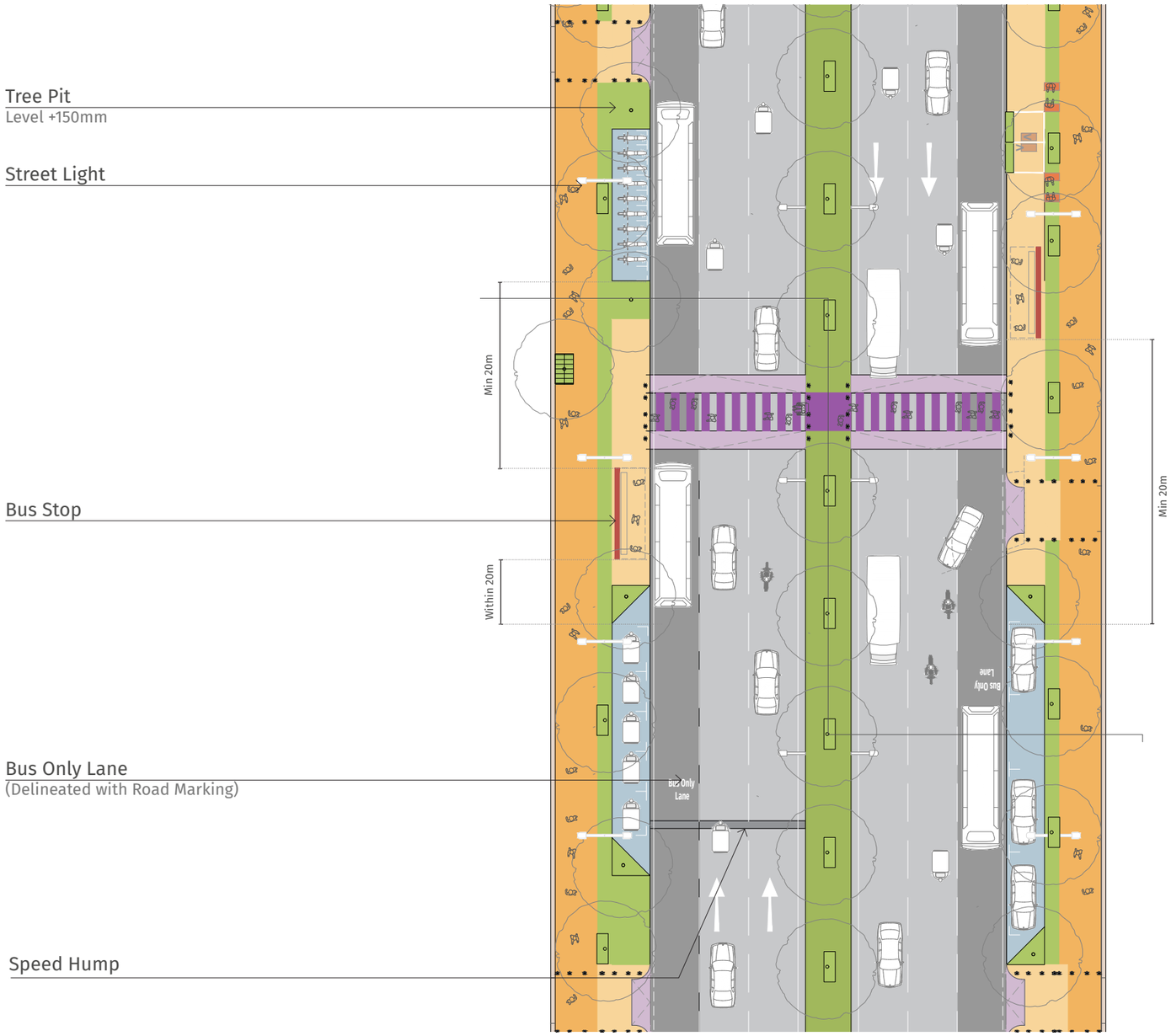
2a 36 m RoW

Sub-Arterial Road

Four lanes with dedicated bus lane

This template is well-suited for arterial roads and major urban corridors with high-intensity traffic. It prioritises efficient public transportation, pedestrian and vehicle movement





Land-use Adjoining the Street

Residential	Institutional
Commercial	Mixed-Use

Street Elements

Footpath	
Cycle Track	
Tree Corridor	Median
Multi-utility Zone	Parking
Public Transport	Dedicated Bus Lane
Service Lane	

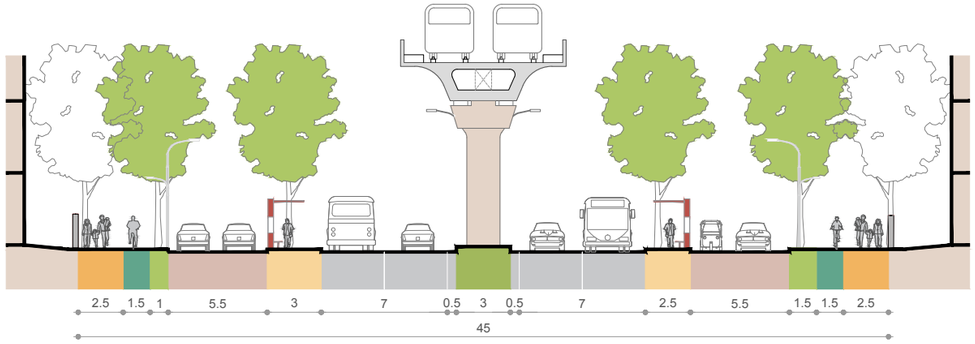
1d 45 m RoW

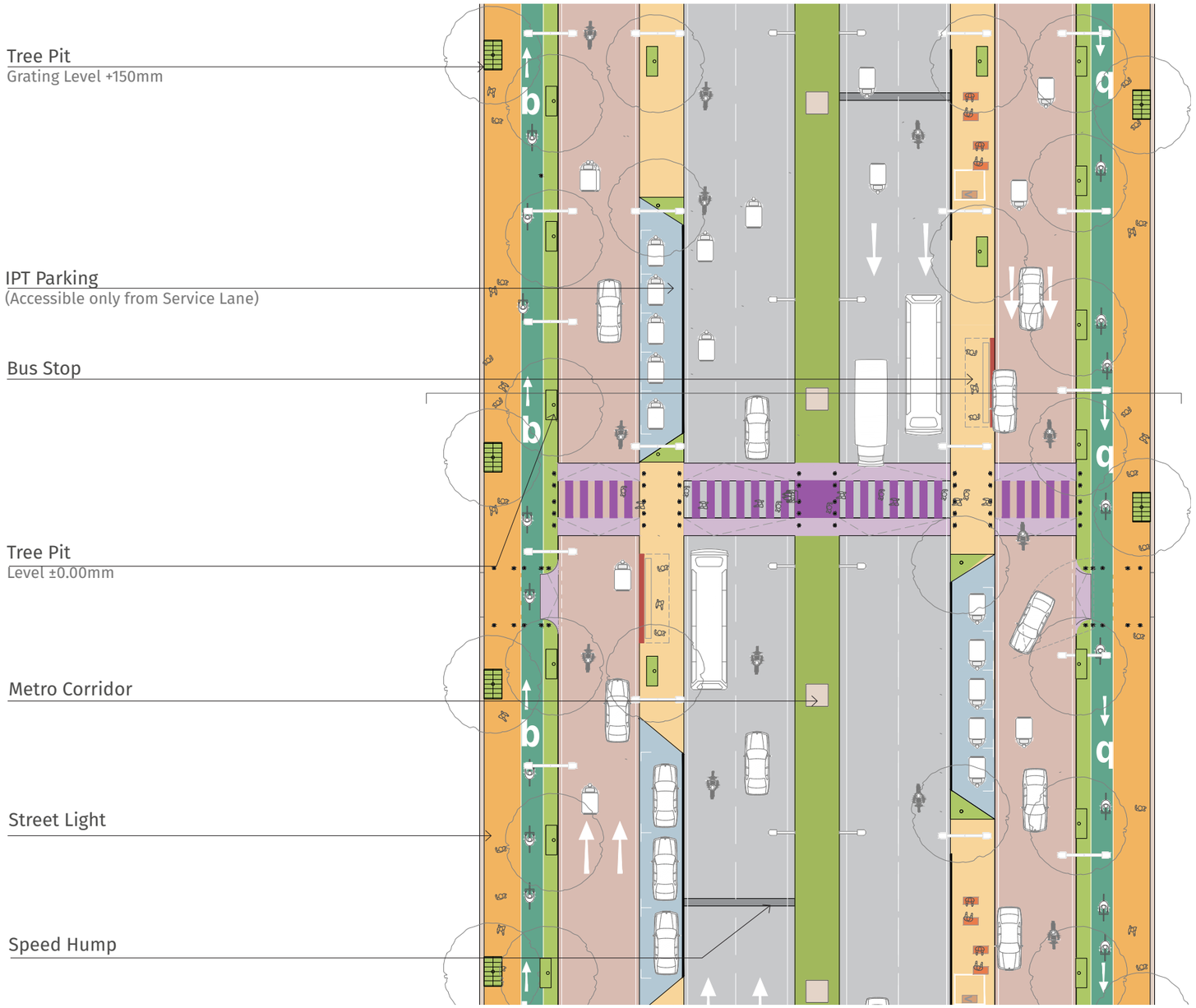
Arterial Road

Four lanes with metro corridor and segregated cycle tracks

This template is well suited for arterial roads with heavy vehicular traffic, metro stations and pedestrian movement from the transit stops.

Entrances to the metro stations should be planned ensuring unobstructed clear walking zone of minimum 2m width.





Land-use Adjoining the Street

Residential	Institutional
Commercial	Mixed-Use

Street Elements

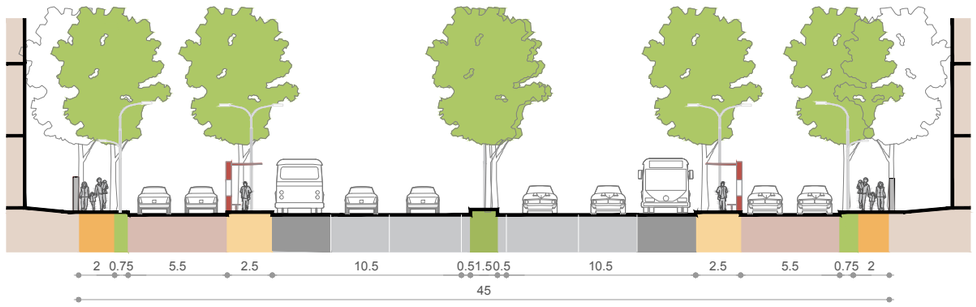
Footpath	
Cycle Track	
Tree Corridor	Median
Multi-utility Zone	Parking
Public Transport	Metro Corridor
Service Lane	

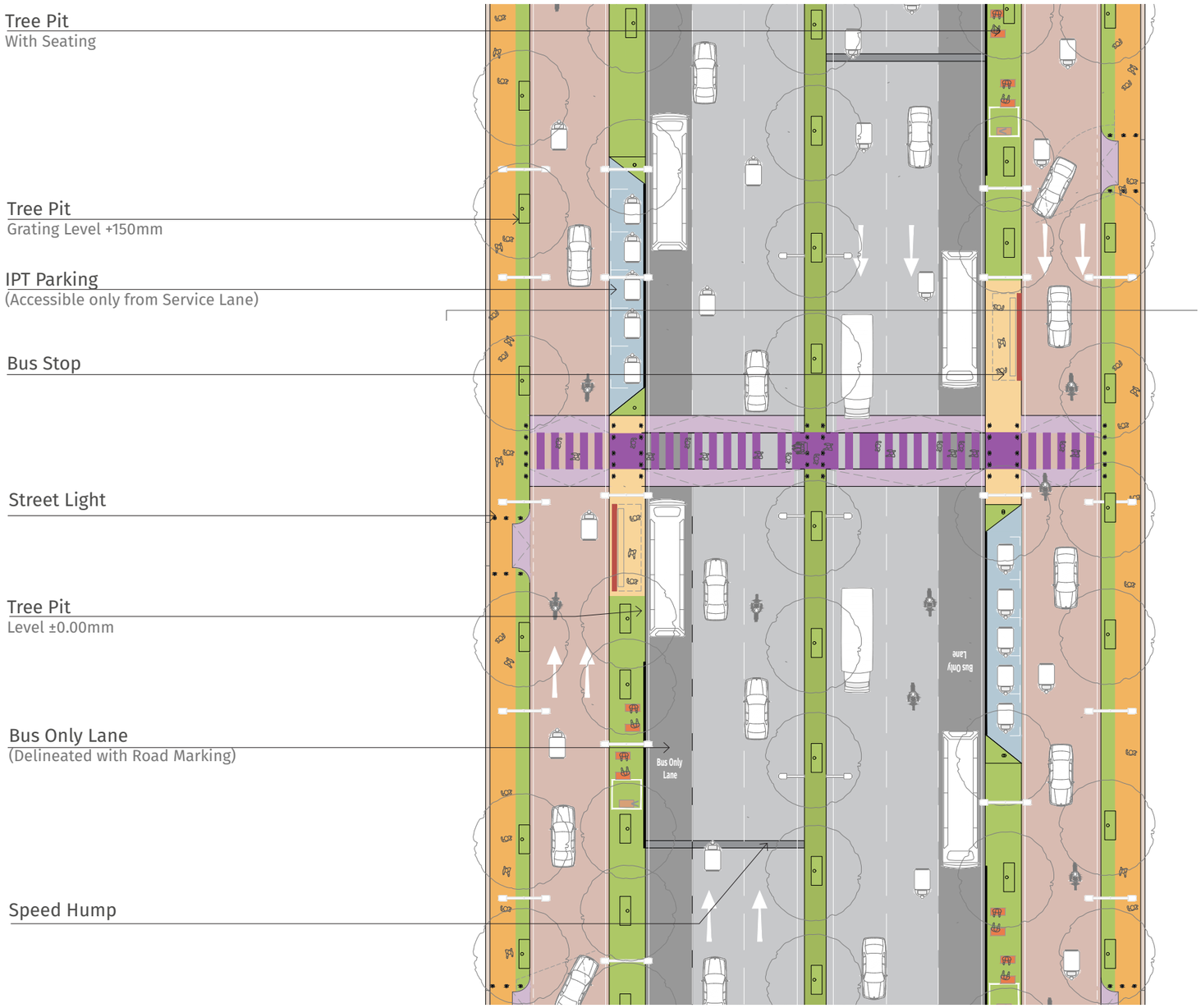
1c 45 m RoW

Arterial Road

Six lanes with dedicated bus lanes/BRTS

This template is well suited for arterial roads, with varied transit modes and a dedicated bus lane. It ensures efficient transit and a minimum 2m clear walking zone for safe pedestrian access.





Land-use Adjoining the Street

Residential	Institutional
Commercial	Mixed-Use

Street Elements

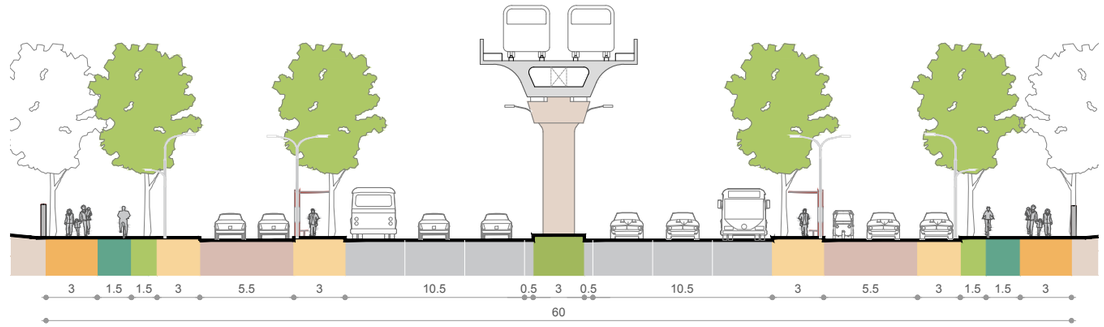
Footpath	
Cycle Track	
Tree Corridor	Median
Multi-utility Zone	Parking
Public Transport	Dedicated Bus Lane
Service Lane	

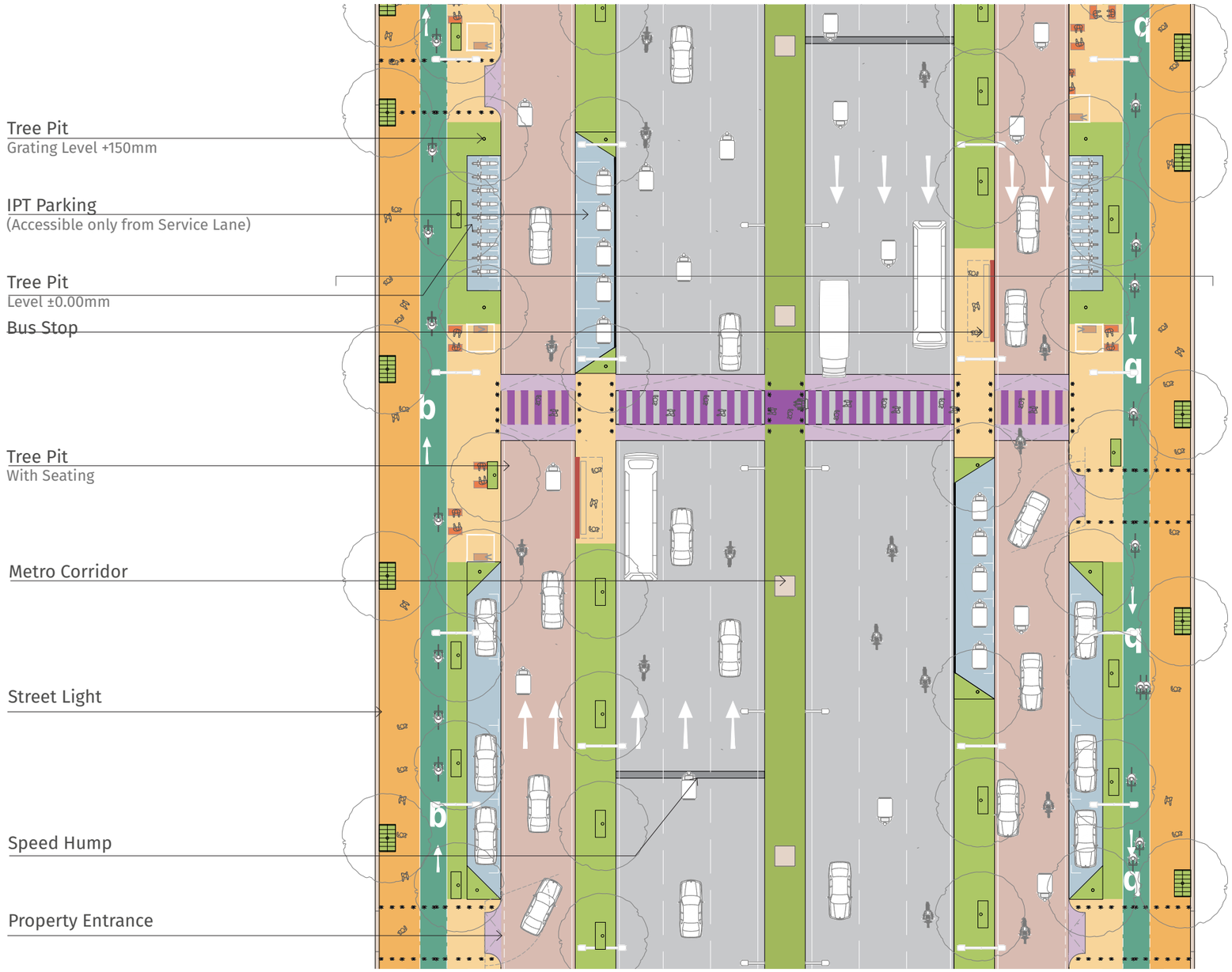
1b 60 m RoW

Arterial Road

Six lanes with metro corridor and segregated cycle track

This template is well suited for major mobility corridors with through traffic.





Land-use Adjoining the Street

Residential	Institutional
Commercial	Mixed-Use

Street Elements

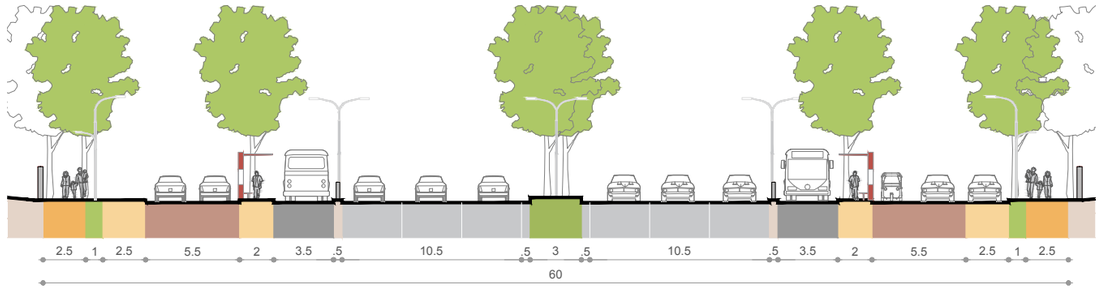
Footpath	
Cycle Track	
Tree Corridor	Median
Multi-utility Zone	Parking
Public Transport	Metro Corridor
Service Lane	

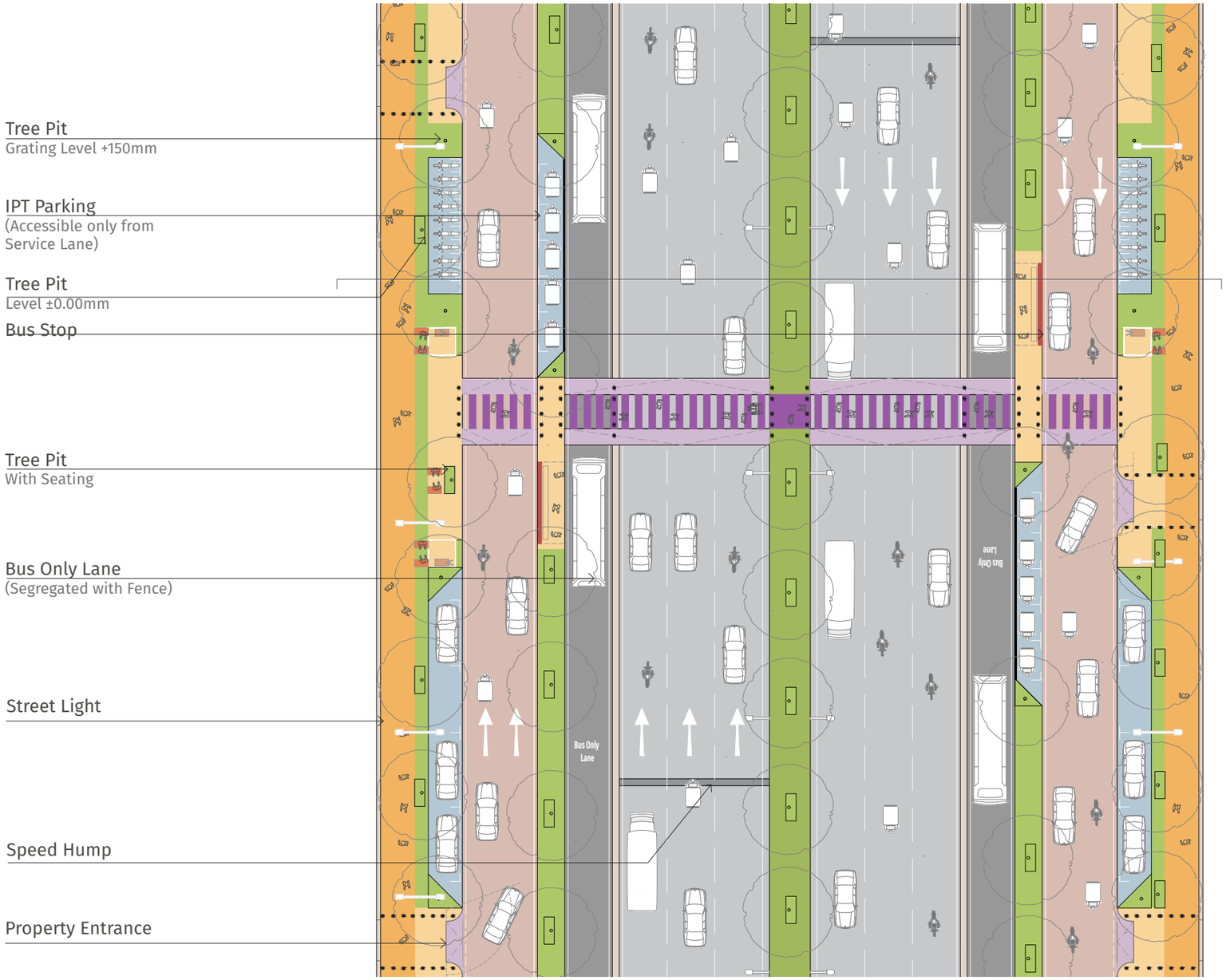
1a 60 m RoW

Arterial Road

Eight lanes with dedicated bus lane/BRTS

This template is well suited for wide arterial roads with mulitple transport modes. It balances efficient transit and provides a minimum 2m clear walking zone for safe pedestrian access





Land-use Adjoining the Street

Residential	Institutional
Commercial	Mixed-Use

Street Elements

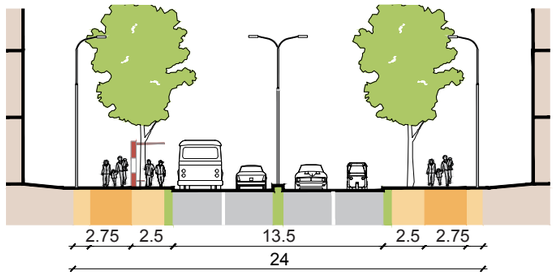
Footpath	
Cycle Track	
Tree Corridor	Median
Multi-utility Zone	Parking
Public Transport	Dedicated Bus Lane
Service Lane	

Child Friendly Street Design

Child-friendly street guidelines act as an added layer to the standard RoW templates, applied only in school influence zones. While the base templates ensure uniform street standards citywide, the child-friendly overlay adds targeted safety features—like traffic-calming, safer crossings, and wider footpaths—specifically where children walk, ensuring enhanced protection without altering RoW standards elsewhere.

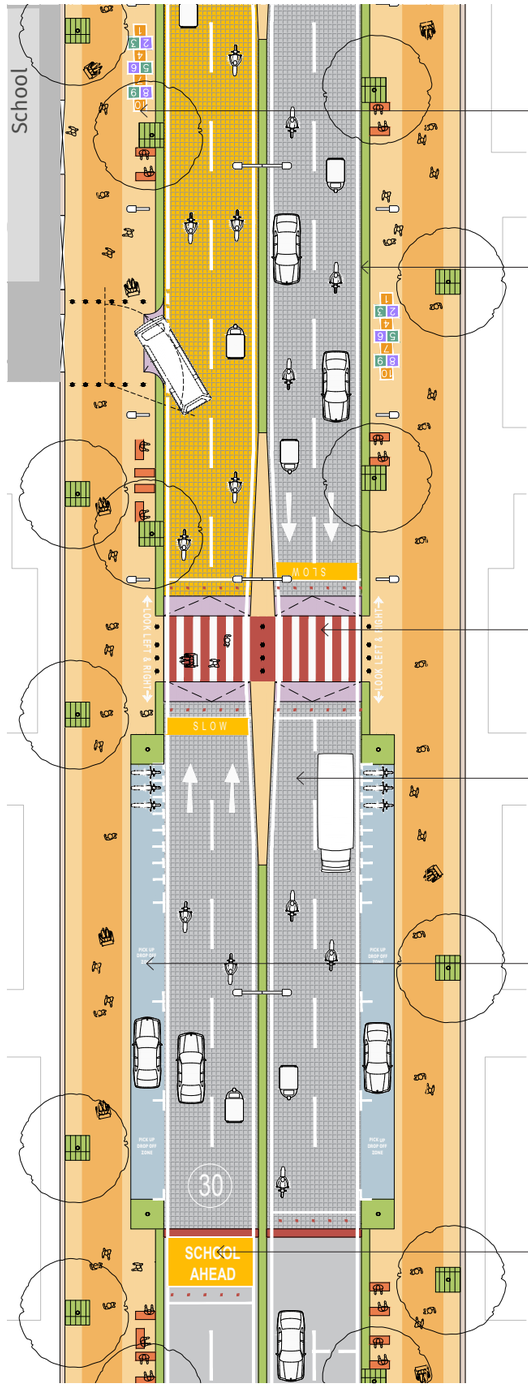


Avvai Shanmugam Street, Chennai (Pilot Safe Route to School Project)



Sample RoW 24m

The sample RoW focuses on providing wider footpath, introducing play areas, pick-up and drop-off zones, visual cues for drivers, integration with public transport stops, Traffic-calming elements and parking



Play Spaces

Delineating the School
as a yellow carpet zone

Tabletop Crossing
with refuge island

Cobblestone Paving
for traffic-calming the street

On-street Parking
serving as pick-up / drop-off zones during school hours

Speed Hump
with road markings

- one way
- two way
- footpath
- 1-side parking
- parking
- cycle track
- median
- service lane
- BRTS

3.2 Efficient and Safe Intersections/ Junctions

Intersections or junctions are the focal points of our streets and its activity. Intersection design involves weighing the potentially conflicting goals of safety and vehicle throughput—they are spaces where through movement of vehicles, pedestrians cyclists and public transport, all share the same space. Hence, it is important to design intersections for safety and accessibility of all road users, while giving priority to the movement of public transport, cycles, and pedestrians.

3.2.1 Key Principles of Intersection/ Junction Design

Similar to the principles of complete streets, intersections shall prioritise safety, mobility and livability.

Safety

- Provide universal accessibility
- Optimise turning radius for reduced vehicular speed
- Introduce refuge islands/channelisers
- Provide street lines and markings

Mobility

- Segregate movement as per desired directions of travel
- Align travel lanes,
- Enhance throughput
- Segregate and prioritising NMT

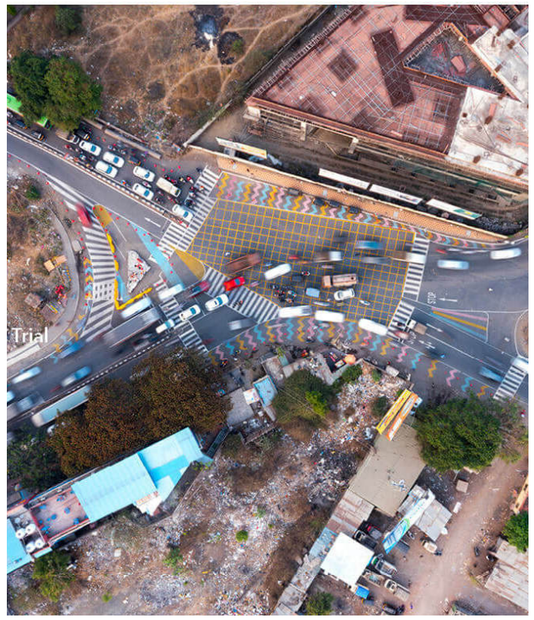
Livability

- Provide green spaces
- Introduce elements for comfort (street furniture)
- Define activity spaces in reclaimed areas

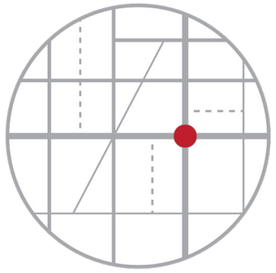
Developed in collaboration with IBI Groups



Khadi Machine Chowk, Pune; Source : Studio PoD



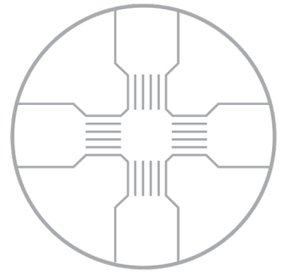
3.2.2. Intersection/ Junction Design Priorities And Design Factors



Analyse intersections as part of network



Prioritize safety of vulnerable pedestrians and cyclists



Make intersections compact



Simplify and align the geometry



Integrate public spaces



Integrate signal timings with design

Adopted from the NACTO Urban Street Design Guide

Design of intersection/ junctions depends on following factors:

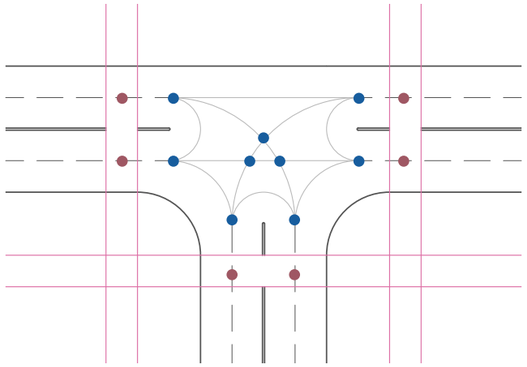
Geometric Alignment
The angle and number of intersecting streets determine an Intersection/ Junction's geometry, which directly impacts turning movements and pedestrian crossings. In Madurai, many intersections form acute or skewed angles due to the city's organic street patterns. Improving the geometry of such intersections should be prioritised to enhance traffic flow and safety.

Right of Way
The available right of way is a critical factor in intersection design, influencing space allocation for vehicles, pedestrians, and cyclists. Wider roads approaching an intersection often dictate traffic flow, affecting movement from narrower roads. To ensure balanced and efficient mobility, intersections should be designed for optimal right-of-way distribution. Where necessary, widening or reconfiguring intersections should be considered.

Land Use
The presence of high-activity zones such as schools, temples, hospitals, offices, and markets near major intersections impacts their performance. Multiple access points to adjoining properties can lead to congestion and conflicts. To improve junction efficiency, property access should be strategically planned or diverted where needed.

Traffic Count
The volume of vehicular and pedestrian traffic relative to the street's capacity determines intersection management strategies. The choice between signalised, non-signalised, or roundabout designs depends largely on traffic flow patterns. Intersection planning should incorporate traffic and pedestrian counts, along with network-wide analysis, to minimise pedestrian-vehicle conflicts and enhance safety.

3.2.3 At-grade Intersection/ Junction Typologies

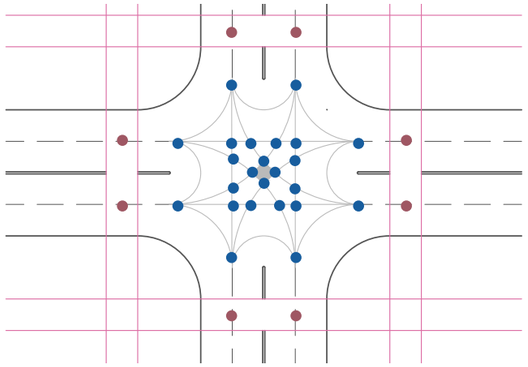


Three-leg intersection (T-junction)
Connects a minor road to a major road; simple layout with controlled turning movements.

V-V conflict: 9 P-V conflict: 6 Total: 15



Bhakthi Circle, Ahmedabad; Source : The Urban Lab

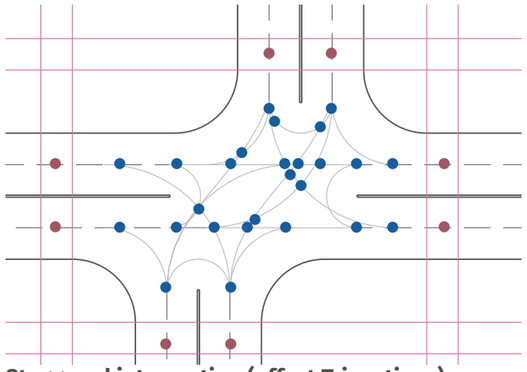


Four-leg intersection (crossroad)
Two roads intersect at or near right angles; requires signal control and pedestrian crossings.

V-V conflict:24 P-V conflict: 8 Total: 32



Karnavati Junction, Ahmedabad; Source : The Urban Lab



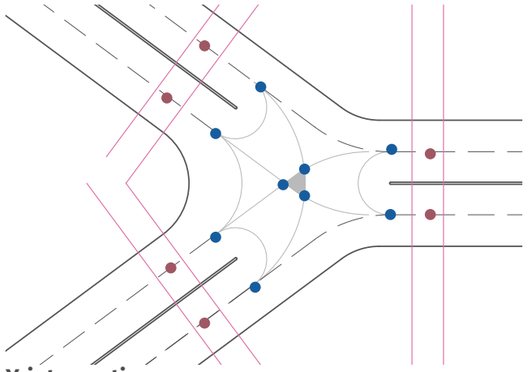
Staggered intersection (offset T-junctions)

Two closely spaced T-junctions offset to reduce direct conflict between opposing traffic.

V-V conflict: 26 P-V conflict: 8 Total:34



Karla Phata, NH 48, Maharashtra



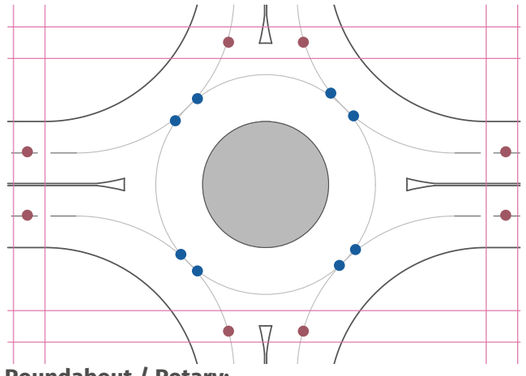
Y-intersection

Formed by roads meeting at an acute angle; needs careful geometry and visibility management.

V-V conflict: 9 P-V conflict: 6 Total: 15



Kankaria Junction, Ahmedabad; Source : The Urban Lab



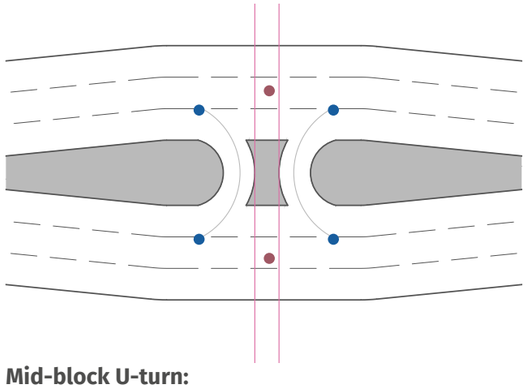
Roundabout / Rotary:

Vehicles circulate around a central island, reducing speeds and conflict points.

V-V conflict: 8 P-V conflict: 8 Total:16



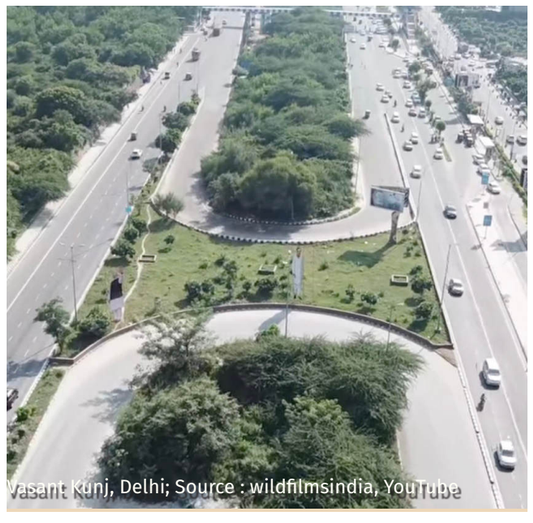
Madhavaram, Chennai ; Source : MapCarta



Mid-block U-turn:

Median opening allowing safe vehicle turnaround between intersections, easing junction conflicts.

V-V conflict: 4 P-V conflict: 2 Total: 6



Vasant Kunj, Delhi; Source : wildfilmsindia, YouTube

Intersection/ Junction Templates

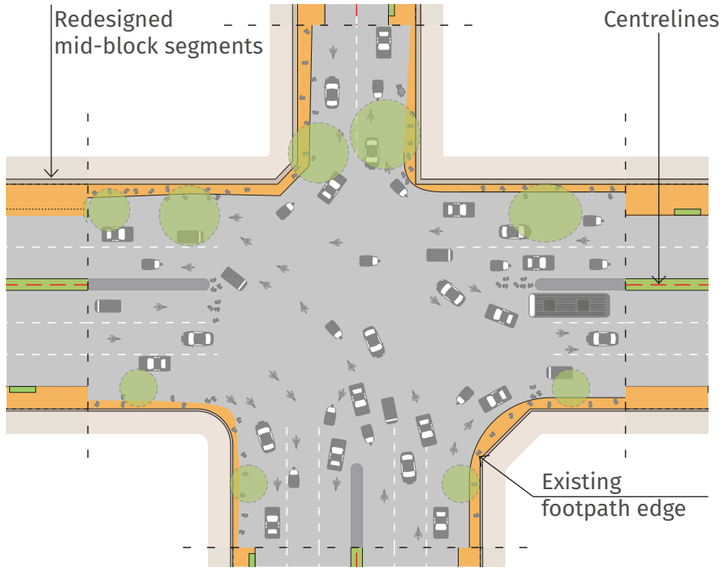
Intersection design aims to minimise conflicts between road users, enhance vehicle flow, and ensure safety. They should be designed in compact layouts that require pedestrians to cross in smaller sections. This design also effectively guides traffic and enhances vehicle throughput. The intersection design template may vary based on number of lanes, traffic intensity at junction.

For further details, refer to IRC 65 and 92

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 the current site situation.

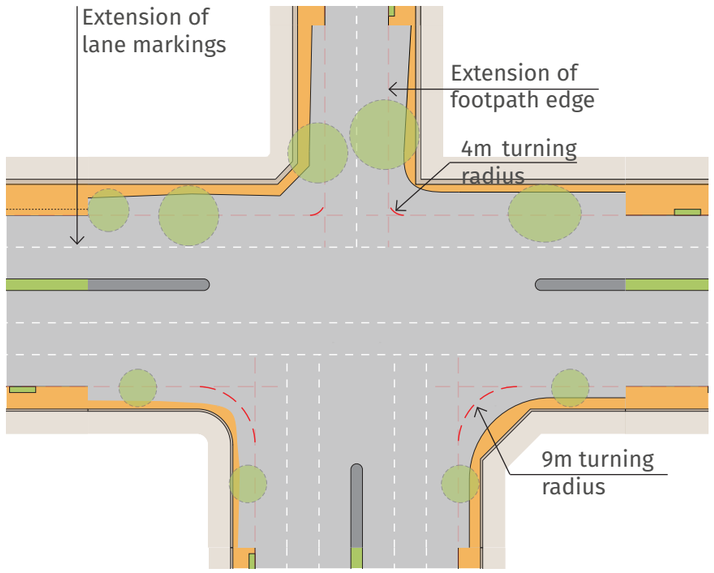
Overlay the redesigned mid-block segments of all the arms of the intersection on the existing intersection drawing such that the centrelines align.

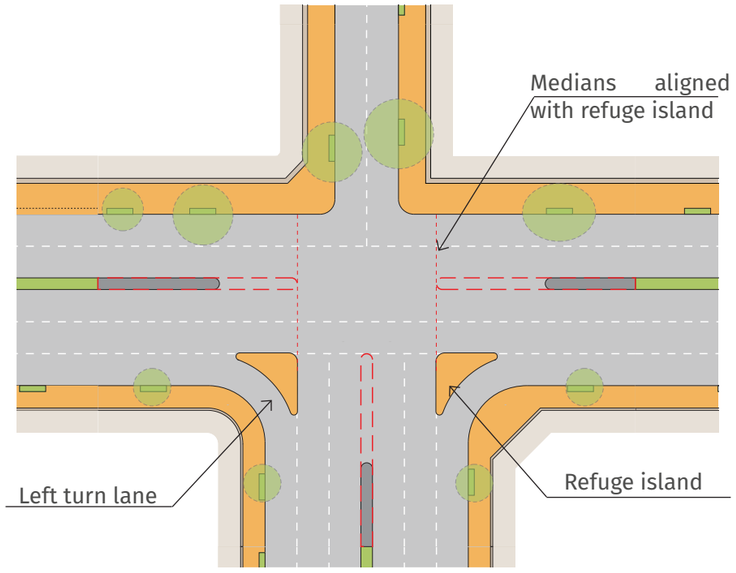


Step 2

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 9m for Bus Route Roads (BRR) and 4m for non-Bus Route Roads.

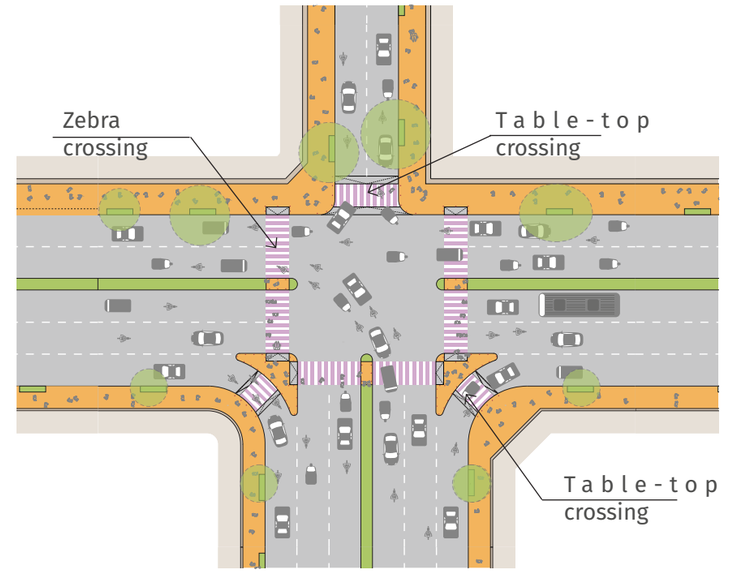




Step 3

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.

Roundabouts

Roundabouts serve to minimise 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.

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

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

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.

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

Focus on intersection

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

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.

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

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

Complex Intersection/ Junction

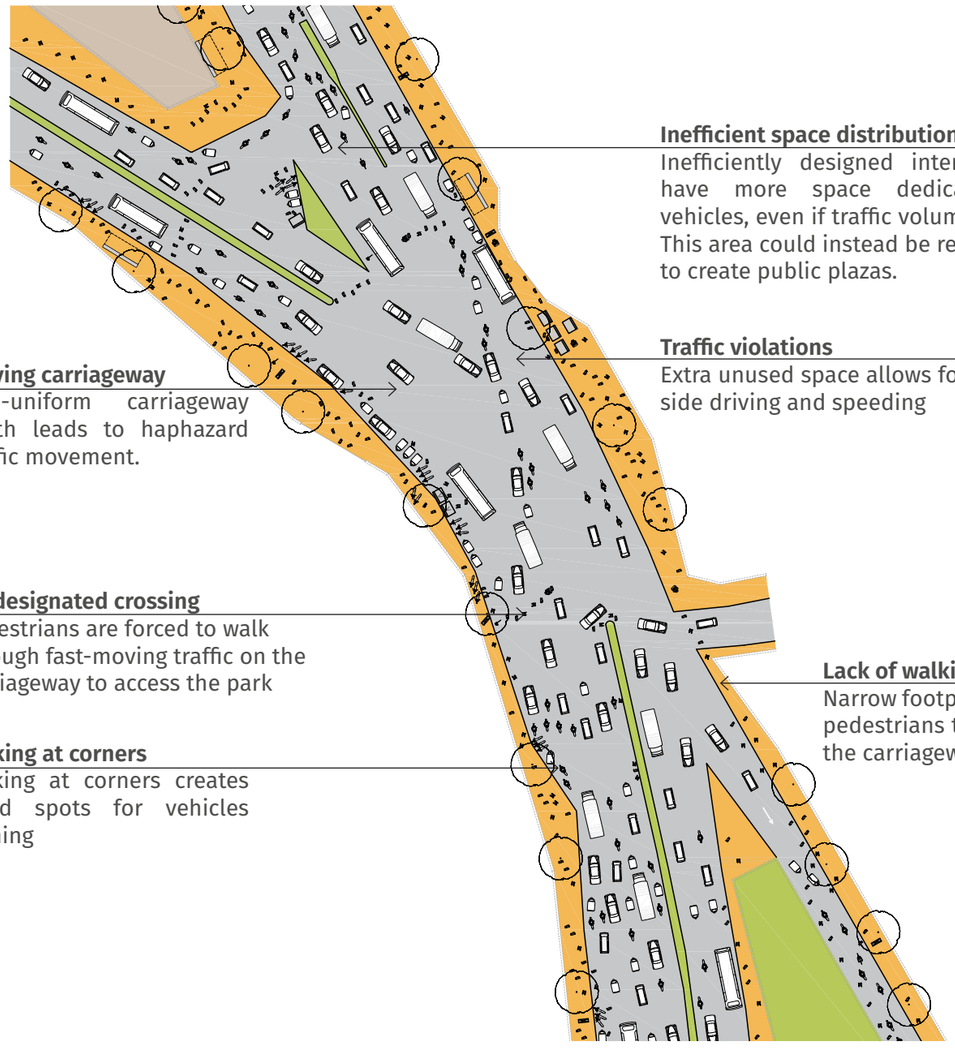
This example represents a busy arterial highway branching off into an arterial road and a local one-way street while also meeting a four-lane street and another local street at angles, forming a complex X-intersection.

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 liveability of the intersection.



Buenos Aires, Argentina

Before



Inefficient 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

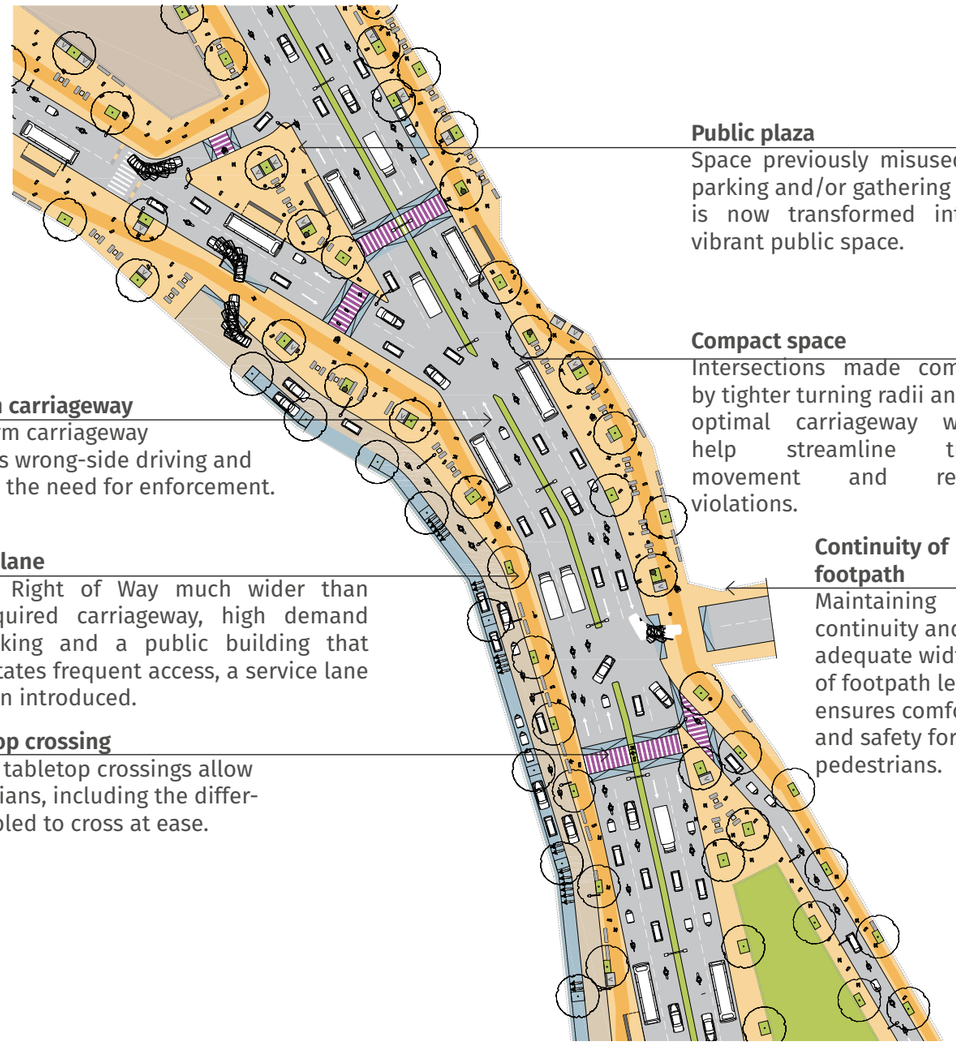
Varying carriageway
Non-uniform carriageway width leads to haphazard traffic movement.

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 differently-abled to cross at ease.

3.3 Road Marking and Signage

Road markings and signage are critical to any street design. They translate the design into a format that guides real-world user behaviour, reinforces right-of-way, minimises conflict, and ensures that street elements function safely and intuitively. Without them, even well-designed streets become confusing, unsafe and difficult to navigate (IRC 35).

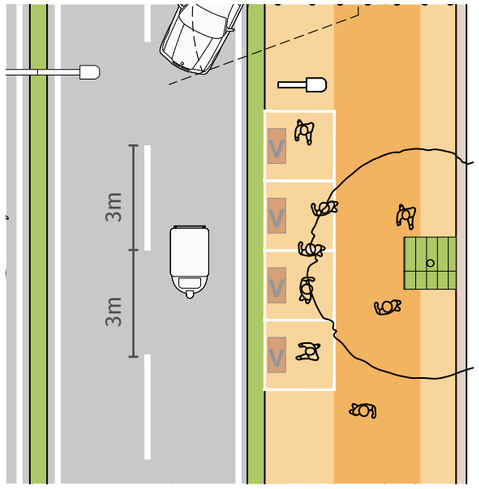
3.3.1 Road Markings

1. Longitudinal Marking

The longitudinal marking is generally provided along the traffic movement. It is used to guide movement and regulate overtaking.

Continuous (solid) line	No overtaking allowed
Broken line	Overtaking permitted when safe
Double solid line	Strictly no crossing
Solid + broken line	Traffic on the broken side can cross; solid side cannot

Width of Marking	150 mm in urban areas
Gap:	Line ratio: 2:1 6m gap : 3m mark In warning areas 1:1 3m gap : 3m mark (Prefered in Core areas)



Usage of 1:1 Longitudinal Marking

2. Transverse Markings

The Transverse markings are provided across the carriageway for traffic control with single/ double continuous lines such as 'stop marking' and 'give way' marking.

Stop Line:

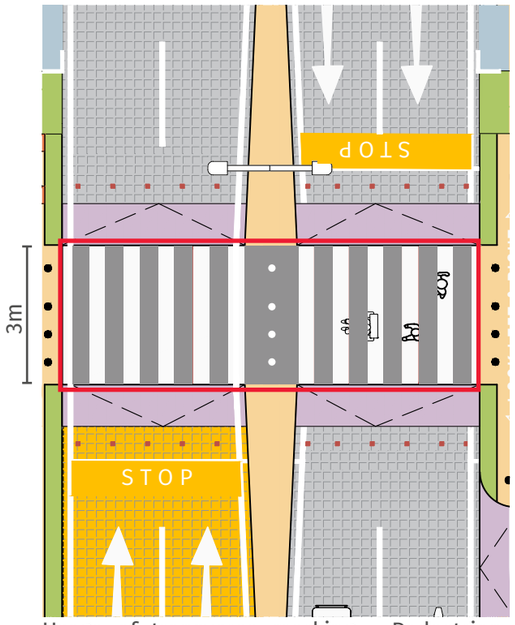
Width of Marking	200–500 mm
Placement	1–3 m before pedestrian crossing

Give Way Line (Yield):
Two broken lines laid side by side and supplemented by the hollow triangular Give Way approach marking.

Width of Marking	200mm
Gap	600 mm line segments; 300 mm gaps.

Pedestrian Crossing (Zebra)

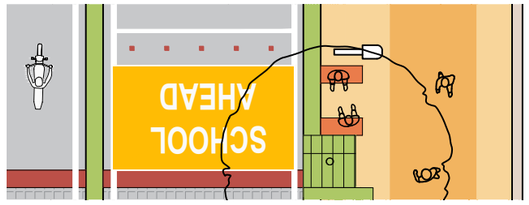
Stripe width	500 mm
Gap	500 mm
Crossing width	minimum 2.5 m (urban), recommended 3–4 m near metro/bus hubs/schools



Usage of transverse marking - Pedestrian Crossing

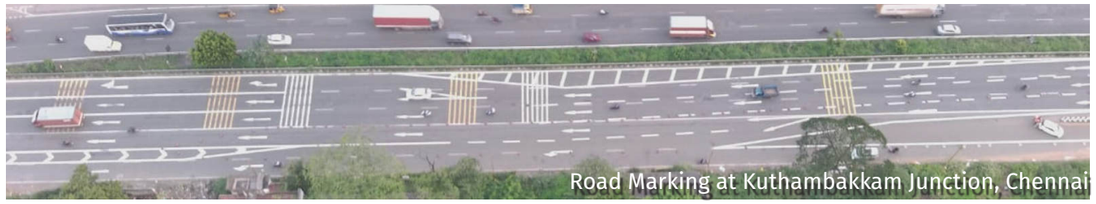
3. Word Messages and Symbols

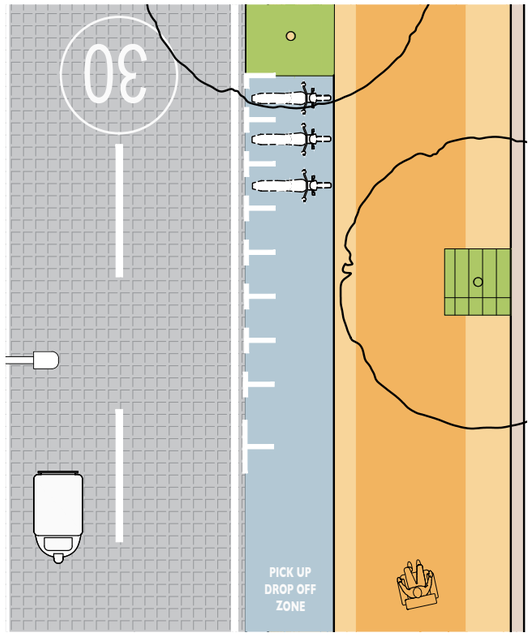
Examples	'School Zone', 'Slow', 'Stop', 'Restricted Parking', 'No Parking' etc
Letter height	2–3 m on urban streets for legibility



4. Hazard Markings

Placement	Obstructions (islands, medians, gore areas), Merging/diverging sections
Marking	Diagonal stripes sloping downwards towards the direction of travel.


Road Marking at Kuthambakkam Junction, Chennai



5. Parking and Bus Stop Markings

Marking	Rectangular parking bays and bus stop with text
Width of bay	2.5 m for cars; 3m for bus
Length of bay	5 m for cars; 12 m for bus
Accessible parking:	Special symbol as per IRC:35 and MoRTH norms

6. Speed Reduction Markings

Marking	Transverse bars; Optical speed bars
Placement	Near schools, sharp curves, bus bays.

7. Border / Edge lines

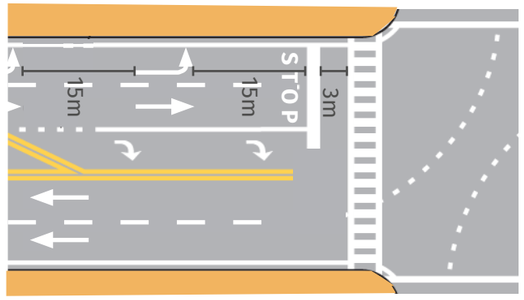
Used to indicate end of carriageway

Marking	Single continuous white line
Placement	150mm – 200mm from edge

Continuity line shall be used across the mouths of side roads

For details on arrow marking, bus stop marking, block marking and directional marking, refer IRC 35: 2015

8. Intersections/ Junctions



Mandatory markings:

- Marking for traffic control
- Lane demarcating markings
- Diagonal and chevron markings
- Directional arrow markings and word messages
- Hatch markings/ghost island
- Prohibitory markings
- Pedestrian crossings

Material for Road Marking Thermoplastic (recommended) |
Glass beads 250–400 g/m²
Cold paint is allowed for low-volume streets, but to be avoided on major arterials

Color
White regulatory/centerline
Yellow separation of opposing flows, no-parking zones
Black & white for kerb markings

3.3.2 Signage

A. Types of Signs

As per IRC:67–2022, road signage shall follow standard specifications for design, colour, size, and placement. The code classifies signs into three main categories: Mandatory/Regulatory, Cautionary/Warning, and Informatory Signs.

1. Mandatory / Regulatory Signs

Speed limit | No parking | One-way | No entry

Shape Circular
Color Red border + White background
Dimension 600 mm diameter


Priority for One Direction Traffic


No Entry


No Parking


Speed Limit


No Right Turn


No Halting or Stopping


Height Limit


No U-Turn


All Motorised Vehicle Prohibited


Compulsory Left Turn

2. Cautionary / Warning Signs

Pedestrian crossing | School zone | Curve | Narrow road

Shape Equilateral triangle
Color Red border + White background
Dimension 600mm (Length of each side of triangle)


Right Hand Curve


Pedestrian Crossing


Cross Road


Gap in Median


School Ahead


Traffic Signal

3. Informatory Signs

Parking | Bus stop | Metro station | Hospital | Wayfinding signs

Shape Rectangle / Square
Color White border + Blue background
Dimension Typically 600 mm x 450 mm or 800 mm x 600 mm depending on ` speed environment


Bus stop



Parking on both sides

B. Placement Guidelines

1. Height (Bottom of signboard)

Urban: 2.1 m (minimum)
Pedestrian-heavy zones: 2.1–2.5 m
On medians: 1.5 m
Carriage way: 4.5m

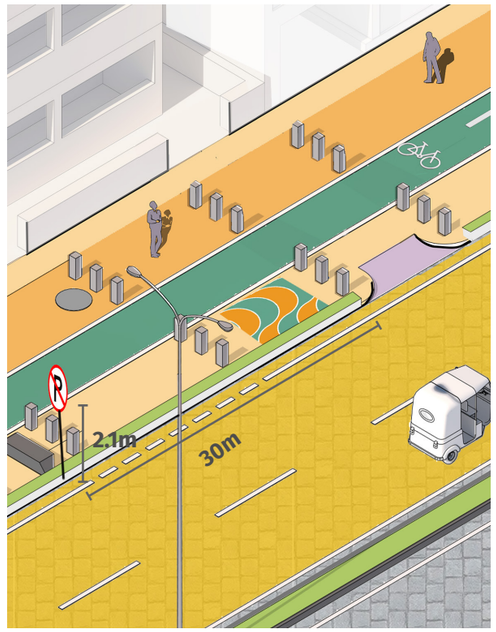
2. Lateral Clearance

Distance from kerb 0.6–1.0 m
(Sign should not block pedestrian clear width)

3. Advance Placement Distance

For <50 km/h urban speeds,

Placement 30–50 m before conflict point
School zone 100 m in advance



C. Material for Signboard

- Retro-reflective sheeting (as per type IV/V/X)
- Aluminum sheets with anti-rust treatment
- Night visibility requirements as per IRC:67 Table 6



3.3.3 Way finding around School Zones

Road Markings

Road markings such as ‘SCHOOL AHEAD’ and ‘SLOW’ remind motorists to yield to pedestrians.

The road marking ‘SCHOOL ZONE’ shall be demarcated on streets where the boundary of the School Zone starts—500m radius around the school.

‘PICK-UP / DROP-OFF’ zones shall be clearly defined by the appropriate road markings.

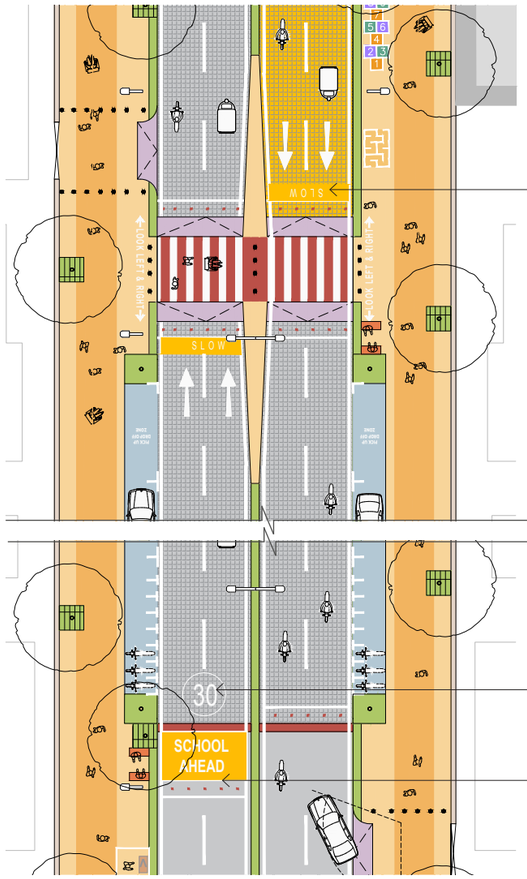
Additionally, the desired speed limit shall be demarcated on the carriageway.

Spacing of road markings shall adhere to standards as per IRC:35 and IRC:32.



Demarcation of School Zone, Byculla, Mumbai
Image Source: WRI India


‘Slow-Down’ road marking around schools, Surat
Image Source: The Urban Lab Foundation



‘SLOW’ Road Marking

‘SLOW’ is to be marked before the table top and other traffic-calming elements, closer to the school entry/exit gate.

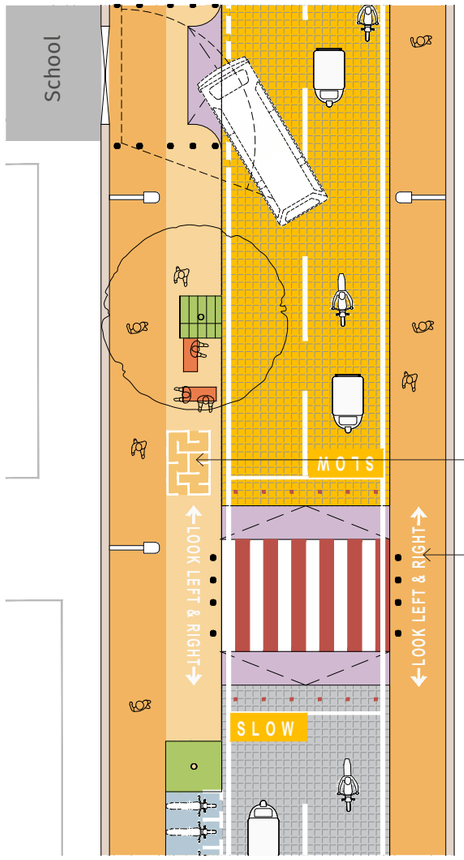
Street Speed Limit

These shall be demarcated after the ‘SCHOOL AHEAD’ marking and at intersections.

‘SCHOOL AHEAD’ Road Marking

These shall be demarcated at least at a distance of 100 m on either side of the school gate

Footpath Markings



Consistent way-finding, using arrow markings, shall be provided around transit stations, mid-block crossings, intersections, pick-up and drop-off locations, and play areas to help children, especially those with disabilities, understand information.

Signage shall be stamped on the footpath, in addition to the signboards, to guide children.

Markings such as ‘LOOK LEFT/LOOK RIGHT’ shall also be stamped on the Footpath at pedestrian crossings.

Play Spaces Painted

‘LOOK LEFT/LOOK RIGHT’ Marking



Guide strips and painted signage on Footpath around schools, Byculla, Mumbai
Image Source: WRI India

Signage

Signage shall be installed within the school zone to identify speed limits, parking and no-parking zones, pick-up and drop-off zones, pedestrian crossings, etc.

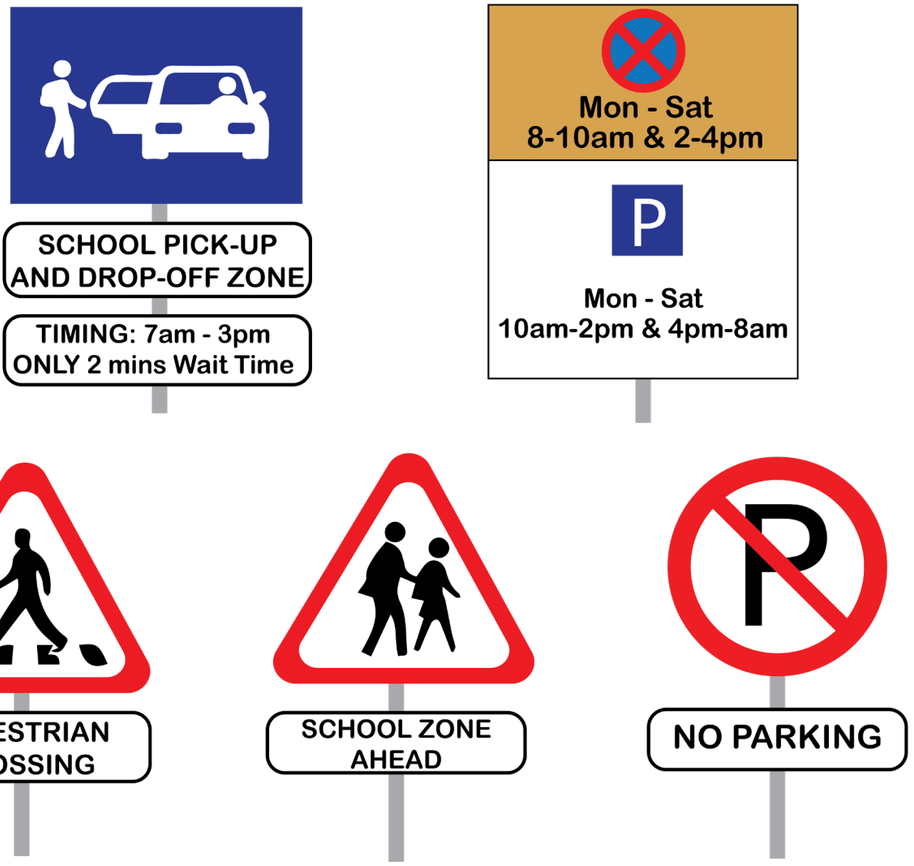
Signage for pedestrians and motor vehicle drivers must be prioritised equally and designed with their speeds and heights in mind.

All signage must be written in the local language to ensure easy understanding by all citizens.

Spacing of signage shall adhere to the standards per IRC SP:32 and IRC:67.



Vittal Malya Road, Bengaluru



Sample set of signage that is recommended to be provided around schools

Pick-up and drop-off zones

Appropriate kerb striping and signage must be provided to delineate the pick-up and drop-off zones.

Signage must also specify the permissible timings for pick-up and drop-off activities, in line with the school start and end times.

The signage and markings shall also indicate the waiting time for pick-up and drop-off and shall not exceed two minutes.



Time-based signage for vehicle entry in school streets, Avvai Shanmugam Salai, Chennai



Pretend pupils in West Midlands, England, use innovative signage to demarcate no parking and pick-up / drop-off zones around the school.

Image Source: Neighborhood News Online