Neighbourhood Parking Framework

Approach & Implementation

Addressing parking issues through demand management with a methodology for neighbourhood parking plan

The Cause

"Safe Streets Ahead: WAFOUNDATION's Parking Innovation Challenge Paves the Way for Road Safety"

In the heart of WAFOUNDATION's mission lies a deep-seated commitment to enhancing the quality of urban life, a vision that extends into the realm of road safety, a critical concern in our increasingly congested cities. The "Parking Innovation Challenge" is not merely an endeavor to address parking woes; it is a strategic initiative aimed at promoting road safety as a paramount cause. Through this challenge, WAFOUNDATION seeks to underscore the intrinsic link between well-conceived parking solutions and the broader objective of safer roads for all.

Effective parking management transcends the mere convenience of vehicle storage; it is a vital component in the ecosystem of urban mobility. Properly designed and strategically located parking facilities can significantly reduce the instances of vehicles parking haphazardly on the streets, which often leads to narrowed roadways, obstructed visibility, and increased risk of accidents. By innovating in the sphere of parking, we are indirectly crafting safer pathways for pedestrians, cyclists, and motorists alike.

Moreover, the "Parking Innovation Challenge" encourages participants to think beyond traditional parking solutions and consider aspects such as pedestrian pathways, cyclist lanes, and traffic flow. This holistic approach ensures that parking innovations contribute to a safer, more organized, and fluid urban traffic environment, thereby reducing potential conflict points and enhancing road safety.

Data-driven insights and analytics play a crucial role in this endeavor, allowing us to understand patterns, identify high-risk areas, and tailor parking solutions that not only meet the demand for parking but also mitigate traffic congestion, one of the leading causes of road accidents. By leveraging technology and data, WAFOUNDATION aims to empower participants to devise solutions that are both innovative and impactful, directly contributing to the reduction of road accidents and enhancing the safety and well-being of urban dwellers.

The "Parking Innovation Challenge" is a testament to WAFOUNDATION's belief in the power of collective intelligence and innovation to solve complex urban challenges. By placing road safety at the heart of this challenge, WAFOUNDATION is not just addressing a parking problem; it is taking a significant step towards creating safer, more livable cities for the future. This initiative serves as a call to action for innovators, urban planners, policymakers, and community members to join hands in a concerted effort to ensure that our roads are not just conduits for vehicles, but safe, inclusive spaces for everyone.

Introduction

Greetings,

I am delighted to introduce you to The Parking Innovation Challenge (PIC), a dynamic initiative under the stewardship of WAFOUNDATION, which aims to revolutionize parking solutions across India. As we embark on this journey, I want to shed light on the intricate relationship between mobility, parking, and road safety and how PIC is poised to champion this cause.

Our cities are continually evolving, and the challenges of mobility and parking have never been more pronounced. The ever-increasing number of vehicles on our roads has put immense pressure on our parking infrastructure, contributing to traffic congestion, increased pollution, and most importantly, jeopardizing road safety.

This is where the connection between mobility planning, parking management, and road safety becomes unmistakably clear. The way we design our transportation systems and manage parking spaces profoundly impacts the safety of our streets. Therefore, it is imperative that we address these aspects collectively and cohesively.

The Parking Innovation Challenge stands as a beacon in this regard. We see it not merely as a hackathon but as a movement—a collective endeavor to reimagine our urban landscapes, making them safer, more efficient, and more sustainable. PIC's overarching mission is to promote road safety as a central cause because every life lost on our roads is a tragedy that can and must be prevented.

In essence, PIC serves as a platform to foster innovation and collaboration. By encouraging municipalities and corporations to adopt forward-thinking policies, such as the Neighborhood Parking Policy, we aim to create a holistic approach to road safety. This policy optimizes parking resources, reduces congestion, and enhances safety within our neighborhoods, offering a sustainable solution for our cities.

In conclusion, road safety is not a solitary concern but a collective responsibility. It is intertwined with mobility planning and parking management. By embracing the principles of PIC and adopting innovative solutions, we can reshape our urban environments to prioritize safety, sustainability, and overall well-being. Together, let us work towards a future where every journey on our roads is a secure one, where innovation merges with compassion, and where our cities reflect the essence of a prosperous and safe India.

With Profound Optimism,

Akhilesh Srivastava
+91 949 199 3344
President,
ITS India Forum
6th Floor, Arunachal Building,
Barakhamba Road, Delhi

Preface

Welcome to the "Parking Innovation Challenge" – an initiative that is very close to my heart and emblematic of the WAFOUNDATION's commitment to driving meaningful change in urban living spaces. As the founder of WAFOUNDATION, I have witnessed firsthand the transformative power of collective innovation and the significant impact it can have on our communities. The creation of this Draft Policy Booklet for "Neighbourhood Parking Policy" marks a pivotal step in our journey towards reimagining and revitalizing the way parking is integrated into our neighbourhoods.

The essence of this challenge, and indeed this booklet, is to foster a collaborative environment where innovative minds can come together to solve one of the most pressing urban issues of our time – parking. As our cities grow and evolve, the need for efficient, sustainable, and community -friendly parking solutions becomes increasingly critical. This booklet not only serves as a testament to our commitment to this cause but also as a guide and inspiration for policy makers, urban planners, innovators, and community members to envision and implement parking solutions that align with the needs of modern urban living.

Through the "Parking Innovation Challenge," we sought to tap into the wealth of creativity and problem-solving skills that exists within our communities. The ideas and proposals that have emerged from this challenge are a reflection of what we can achieve when we come together, united by a common goal. This Draft Policy Booklet is a compilation of these insights, serving as a foundation upon which we can build smarter, more efficient, and more inclusive parking policies.

It is my hope that this booklet will not only inform but also inspire action. The policies and strategies outlined here are intended to spark a dialogue, to encourage experimentation and adaptation, and ultimately, to lead to the development of parking solutions that are tailored to the unique needs and dynamics of each neighbourhood.

I extend my heartfelt gratitude to everyone who has contributed to this initiative – from the participants of the challenge to the experts who have lent their knowledge and insights. Your collective enthusiasm and dedication are what make initiatives like this possible. Together, let us pave the way for a future where parking is not just a necessity but a catalyst for community enhancement and environmental sustainability.

Thank you for joining us on this journey.

Warmest Regards,

Mangesh Manikrao Wankhade

+91 823 711 2200

Founder & CEO
WAFOUNDATION.

Urban Planning Expert

In the dynamic landscape of India's urban expansion, our cities stand at the crossroads of growth and sustainability. The burgeoning population and the consequent vehicular boom present a dual challenge of maintaining mobility while preserving the urban environment. I, Vishal Pujar, with a background in architecture and urban planning from the University of Melbourne, present a vision for a transformative urban mobility framework. This vision is encapsulated in our strategic approach to "Neighbourhood Parking Policy" and Non-Motorized Transport Planning, designed to usher in an era of efficient and sustainable urban transit in Indian cities.
Our Neighbourhood Parking Policy is not just a set of regulations; it is a blueprint for reclaiming our streets from the clutches of unregulated parking chaos. This framework is built on the pillars of zoning, dynamic pricing, and smart technology integration, aimed at maximizing the utility of our urban spaces. The policy is crafted to deter excessive reliance on private vehicles, making way for a more balanced urban transit ecosystem. Through strategic pricing and zoning, coupled with the deployment of cutting-edge smart parking solutions, we envision a future where parking is no longer a source of congestion but a facilitator of seamless urban mobility.

Parallel to this, our Non-Motorized Transport Plan champions the cause of sustainable mobility. Recognizing the indispensable role of pedestrians and cyclists in decongesting our roads and enhancing urban air quality, this plan lays the groundwork for a robust infrastructure that supports walking and cycling. By establishing dedicated pathways, safe crossings, and traffic-calmed zones, we aim to elevate non-motorized transport from an alternative to a primary mode of urban transit.

The essence of our proposal lies in the harmonious integration of these frameworks. It is a call to action for a collaborative transformation, where efficient parking management and non-motorized transport infrastructure coalesce to form the backbone of our urban mobility strategy. This integrated approach not only mitigates traffic congestion and pollution but also fosters a healthier, more livable urban environment.

As we stand on the precipice of urban innovation through the Parking Innovation Challenge, our proposal for a Neighbourhood Parking Policy and Non-Motorized Transport Plan is more than just a policy document; it is a manifesto for change. It is an invitation to city planners, policymakers, and the community at large to join hands in crafting urban spaces that prioritize the health and well-being of their denizens over mere vehicular throughput. Together, let us steer our cities towards a future where sustainable mobility is not just a vision, but a reality.

Warm Regards,

Vishal Pujar
+91 984 503 8408,
Co-founder & CEO
Vistar AEC Consultants LLP.

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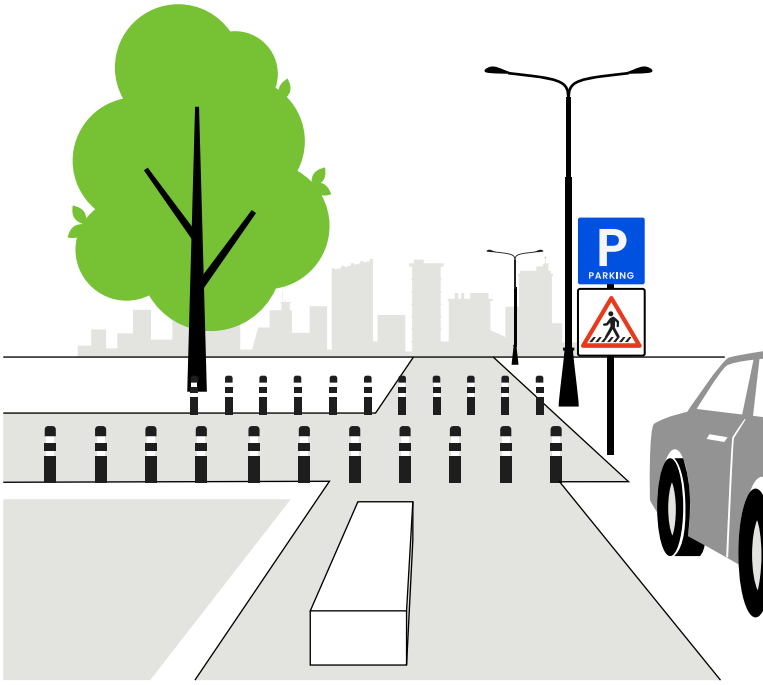
1 BACKGROUND

India's urban population is currently around 30% of its total population. Experience across the world has been that as economies grow, rapid urbanization takes this proportion to over 60% before it begins to stabilize.



Due to this rapid economic and population growth, Indian metropolises are staring at a mobility crisis. Today, urban areas face tremendous pressure on parking spaces, resulting in parking issues in India such as traffic congestion, disproportionate demand and supply, and environmental hazards, to name a few. Because of poor parking management and policy, India struggles with chaotic situations like overcrowded footpaths, illegal parking, and criminal activities due to improper surveillance. The situation is further compounded by Indian cities' sprawling geography, limited availability of land, and inadequate infrastructure.

Hence, cities must not only meet the mobility needs of the current population but also provide for the needs of those yet to join the urban population. Given the various challenges, need for a comprehensive parking strategy is more important than ever to help ensure smooth flow of traffic to alleviate the parking woes faced people across India.

Streets are the lifeline of any city- moving diverse groups of people through different modes of transport every day. In addition, they also act as critical public spaces providing various social, economic, and recreational opportunities for our people, including children, the disabled, and the elderly. Instead of looking at streets as mere thoroughfares for vehicular traffic, it is imperative to look at them as places where people walk, talk, cycle, shop, and perform a multitude of social functions critical to the collective health of the city.

PARKING PROBLEM

Mobility Issue

- Difficulty in mobility in cities due to congestion
- Reduced road speed
- Increased safety issues

Parking Issue

- Inadequate parking spaces
- Inadequate parking in buildings
- Access to parking
- Safety to park

Pedestrain Issues

- Reduced Spaces for pedestrians
- Obstruction to movement of pedestrians

Economic Issue

- Reduced accessibility to shops
- Reduced commercial frontage
- Conflict between customers & business

2 NATIONAL URBAN TRANSPORT POLICY (NUTP), 2006

Ministry of Urban Development, Government of India (MoUD) issued the National Urban Transport Policy (NUTP) in 2006, to bring about comprehensive improvements in urban transport services and infrastructure.

The vision of this policy is to move people rather than vehicles. NUTP aims to provide safe, affordable, quick, comfortable and sustainable access to all the facilities. In line with its vision, this policy addresses congestion and pollution problems by providing more road space to public transportation, improving traffic performance through traffic management instruments, mitigating private vehicle growth, and improving vehicle and fuel technology to reduce air pollution.

The objectives of this policy would be achieved through comprehensive approach include Urban Transport Planning, Infrastructure Design, Public Transport, parking policy, Non-Motorized Transport, Traffic Management, Financing, Governance and Capacity Building.

2.1 PARKING ECONOMICS

Many researchers believe that parking has an economic value attached to it and thus shall be treated as a commodity for which the user must pay. Land in the current rush of urbanization is a limited resource for which there is unlimited demand. In such cases, the issue of whom should such a scarce commodity be allocated arises. Undoubtedly, there is need for prioritization of scarce road space.

The next issue is the availability of parking at low rates. As observed, parking is either cheap or nominally charged while it occupies a valuable asset of the city. Subsidy is for users who have the limited means and choices, and people demanding parking do not fall in this category. Social and economic motives do not justify subsidies in parking. As soon as parking becomes 'free' it loses its value. Spaces fill up rapidly and queues are formed causing spill over. People cruise for parking leading to increase in vehicle km travelled leading to congestion and pollution.

Such inequality presents a pressing need for decision makers to look at parking as a valuable economic asset rather than as a solution to infrastructure issue.

PARKING SOLUTION

Mobility Plan

- Mobility plans helps to reduce emissions marking healthier atmosphere and to tackle the climate crisis which is universally acknowledged, IN EU road transport is considered as second biggest source of CO2 emissions (European Environment Agency, 2019).
- To reduce different forms of transport on roads, which in turn helps people for faster and safer commute.
- To reduce the amount of time vehicle spent on road.

Parking Policy

- Transformation from Haphazard parking to well organized parking.
- To establish the paid parking ticket guidelines.
- To establish strong enforcements of parking regulations and active management of parking demand.
- Increase the speed of the vehicle by reducing on street parking or limiting the on street parking.

NMT Approach

- NMT approach focus on Attractive mode of transport for relatively short distances, with recreation and landscape.
- Provision of sidewalks, crosswalks, paths, pedestrian oriented land use design, encourages people to commute with their feet.
- NMT approach also increases the economic activities in the area.

2.2 PARKING STANDARDS

Cities set parking requirements, which specify minimum amount of parking that has to be provided, commonly known as parking minimums. These parking minimums are mandated under building by-laws of the urban area. The amount of parking varies in relation to the land use and activity present for a given region. Thus, by-laws specify the parking requirements for apartments, offices, theatres, schools, hospitals and so on. The requirements can be specified in terms of Equivalent Car Space (ECS) either per unit area or in ECS for number of students in a school or number of seats in an auditorium. Different cities use different measures to mandate requirements. The figure below compares the trends in ECS for commercial car parking in different Indian and foreign cities. The figures are in ECS/ 100 sq. m.

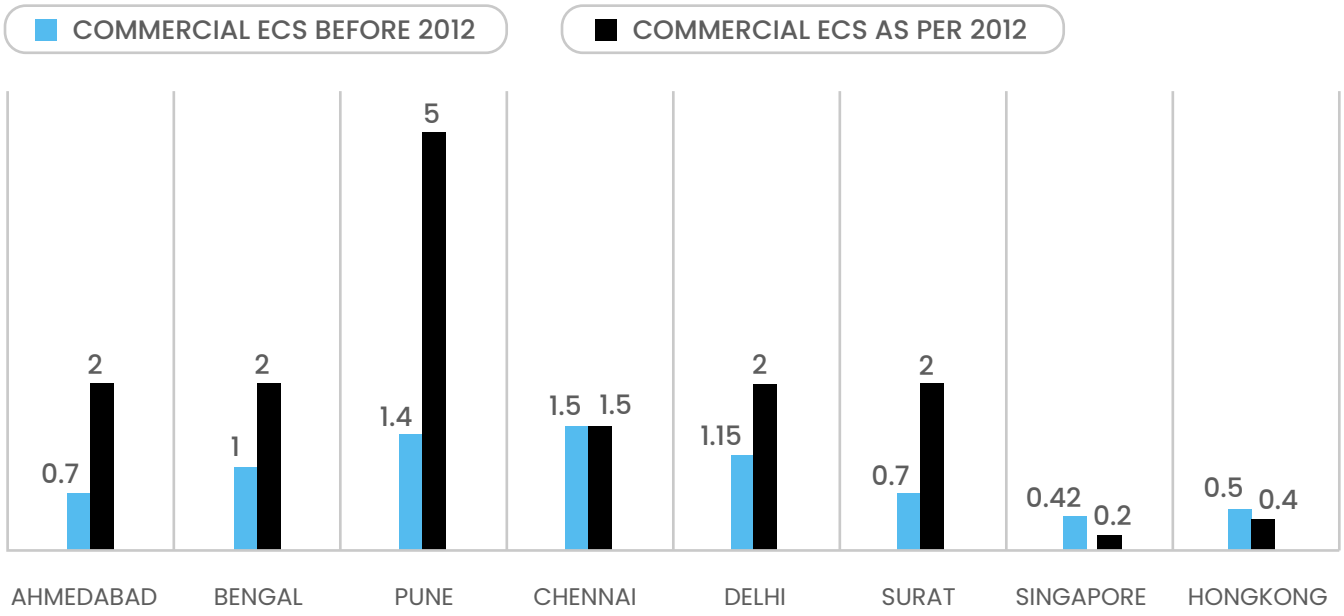


Figure 1 COMMERCIAL ECS IN INDIAN CITIES AND OTHER CITIES
Source: Parking Strategies: Evolution and Strategies for Future, Lokre, Abhijit (2013)

As the trend depicts, most Indian cities have the tendency to provide more parking than required - they have increased the parking minimums over the years. This approach is in contrast to cities around the world, which are reducing minimum parking requirement. Singapore and Hong Konghave considerably reduced the already low parking requirement to prevent congestion. Parking minimums provided in building by-laws lead to increase in parking supply. This puts developers under pressure to underutilize an economically valuable asset. **These standards are based solely on land use and do not take into account factors such as proximity to transit, cost of land or the potential for parking sharing and the role for the private sector.**

2.3 GLOBAL APPROACHES

There has been extensive research in the area of parking policy and management around the world. Within the multiple debates, Paul Barter, has identified three clear approaches to how cities have attempted to manage parking as seen in figure 6.

These approaches are:

1. The conventional approach.

The salient features are:

a. Parking policy should aim to provide supply to meet demand

b. Parking is infrastructure that needs to be provided by government - plentiful, free and conveniently located

Within this approach, some cities go for a pure demand and supply based approach, where supply must fulfil demand, while others go for a variation where demand is estimated after considering land use and activities, public transit and economic characteristics. However, both variations are demand based.

2. The management approach.

The salient features are:

a. Parking policy is considered a tool to manage larger issues of transport policy and demand management

b. Programs are created that aim to make more efficient use of available parking space There are two variations to this approach. The approach may be towards multiple objectives of increasing efficiency; urban regeneration, mobility and conflict reduction or the approach may be towards a single objective of constraining parking demand.

3. The market approach.

The salient features are:

a. Parking is considered equivalent to other market commodities

b. Spill over is not considered negative; it is an indicator of price sensitivity

c. Pricing will achieve equilibrium between demand and supply
   - Too high a price, more spaces would remain vacant
   - Too low a price, queuing and cruising would happen

Donald Shoup, a leading researcher in USA, advocates the third approach strongly.
G J Roth in England has also advocated it in the 1960s.

Figure 2 GLOBAL APPROACHES TO PARKING Source: Parking Policy in Asian Cities, Paul Barter(2011)

The conventional response to high demand for parking is to provide additional parking accommodate increasing private car use. Abundant parking supply, especially at travel destinations, promotes increasing private car use which results in the need for more parking. This is referred to as the cycle of private car dependency. Proactive use **of Travel Demand Management (TDM)** strategies can break the cycle of private car dependency and assist with establishing more sustainable travel patterns e.g. use of public transport (bus and rail services).

2.4 NEED FOR A PARADIGM SHIFT

Globally, parking stories are depicting the need of aparadigm shift in how cities should manage parking issues. The table below shows comparison between the old and new paradigms.

The new paradigm is based on the management and marked based approach. It advocates moving away from the conventional demand based approach.

Table 1 THE OLD AND NEW PARADIGM OF PARKING

Old Paradigm	New Paradigm
Parking problem means inadequate parking supply	There can be many types of parking problems, including inadequate or excessive supply, too low or high prices, user information, and inefficient management
Abundant parking supply is always desirable	Too much supply is as harmful as too little
Parking requirements should be applied rigidly, without exception or variation	Parking requirements should reflect each particular situation, and should be applied flexibly
Parking management is a last resort, to be applied only if increasing supply is infeasible	Parking management programs should be used to prevent parking problems
It is the government's responsibility to provide parking; it is a social infrastructure	The market should respond to the demand. Government should stay out of the business of providing parking
Subsidies in parking are inevitable; government should assist private operators through gap funding and tax incentives	Subsidies in parking are similar to the poor subsidizing the rich and should not be allowed
More off-street parking provision is key to solve spillover problems. Parking charges do not matter	Off-street parking without charges does not work. Multi-storied parking lots lie unused

Source: Parking Strategies: Evolution and Strategies for Future, Lokre, Abhijit (2013)

The National Urban Transport Policy (NUTP) of 2014 has taken on board the principle of demand management for parking. This entails earmarking and limiting legal parking spaces and pricing suitably to restrain dependency on cars. NUTP has recommended a graded scale of parking fees to recover the economic costs of land used for parking. An intelligent pricing policy to control the demand for parking is required. Users of personal vehicles should pay for the space they use for parking. The 'user pays' principle should govern the pricing of parking. Government should not subsidize this cost.

2.5 PARKING APPROACH AS PER NUTP

It asks cities to amend their by-laws to ensure that 'parking is available to all residents' and that 'multi-level parking complexes should be made mandatory in city centers with high rise commercial complexes'.

- Land is valuable in all urban areas. Parking places occupy large portions of such land. This fact should be recognized in determining the principles for allocation of parking space.

- Levy of a high parking fee, that truly represents the value of the land occupied, should be used as a means to make the use of PT more attractive. Simultaneously, a graded scale of parking fee, that recovers the economic cost of the land used in such parking, should be adopted. The objective would be to persuade people to use PT to reach city centers. Preference in the allocation of parking space for PT vehicles and non-motorized mode as well as easier access of work places to and from such spaces would go a long way in encouraging the use of sustainable transport modes. Park and ride facilities for bicycle users, with convenient inter-change, would be another useful measure.

- While there is a need to limit parking facilities to discourage use of personal vehicles, parking is needed to cater to the needs of the owners of personal vehicles under the principle of ''Mobility for All''. This should be done without using public spaces. Parking lots along the PT corridors (near the transit stops or stations) should be built to encourage park & ride system and also enhance the ridership of PT.

- Multi-level parking complexes should be made a mandatory requirement in city centers that have several high rise commercial complexes. Such complexes could even be constructed underground. Such complexes could come up through public-private partnerships in order to limit the impact on public budget. All such parking complexes would be encouraged to go in for electronic metering so that there is better realization of parking fees to make the investments viable and also a better recovery of the cost of using valuable urban space in the parking of personal motor vehicles. In residential areas too, appropriate change in bye-laws would be considered to free the public carriage way from parked vehicles that impede the smooth flow of traffic. Provisions would also be made in the appropriate legislation to prevent the use of the right of way on road for parking.

- Parking demand is insatiable; entails enormous cost and uncontrolled parking supply encourages car dependency. Conventional policy plans only for more parking supply. Under the on-going reform process in India, cities are expected to make the transition from the conventional approach to using parking as a demand management tool. The strategy should be to minimize and avoid serving each building with its own parking. It is more judicious to build parking for the neighbourhood. If the policy can be reoriented to provide parking for each development area instead of each building then the parking requirement will also be modest. Standards can vary from zone to zone or city to sub-urban areas within the city and may be reviewed periodically and revised if necessary.

Table 2 NUTP APPROACH TO PARKING

Policies/Plan	APPROACH		
	A. Conventional	B. Management	C. Market
NUTP	▪ State governments should amend building by-laws in all million plus cities so that adequate parking space is available for users of such buildings ▪ Multi-level parking complexes should be a mandatory requirement in city centers ▪ Minimize the impact of on-street parking and encourage off-street	▪ Provide park and ride facilities for bicycle users with convenient interchange ▪ Improve safety for pedestrians by reducing illegal parking ▪ Utilize parking controls to regulate car usage ▪ Optimize existing parking capacity, before creating new parking facilities ▪ Develop public-private partnerships (PPP) for the operation of either on-street or (more often) off-street parking facilities	▪ Levy of a high parking fee that truly represents the value of the land occupied ▪ Introduce paid parking as a method to dissuade car use raise and/or revenue ▪ Utilize fees and fines from parking to invest in the building of car parks and to improve public transport

3 PARKING POLICIES IN INDIAN CITIES

3.1 NEED FOR PARKING POLICY

Private vehicles require enormous terminal capacity. They stay parked for long periods. A private vehicle, typically, stays parked for 20-22 hours in a day (80-92% of time). Other modes of transport spend more time in transit than parking. A car parked on street consumes 15 sq.m., while a car parked off street requires 23 sq.m. These figures are startling when seen in the context of minimum sizes of dwelling units specified in Development Control Regulations (DCR) of most cities - 18-25 sq.m. If we consider that each car requires three parking spaces per day, the total area required by a car each day is between 45 to 70 sq.m. Certainly, it proves that providing for more and more parking is not a sustainable solution.

3.2 PARKING POLICY

Parking policies can permit one to optimise and facilitate the management of parking by implementing several strategies and functionalities in response to solve the various issues occurring by the parking. So, parking policies help to manage the traffic inside and outside the parking areas.
The parking policies generally consist of few general elements like details and demography of the city, their urban structure, current issues and challenges of the city, availability of infrastructure and the need of city. Then the policy also consists of legal provisions, current Act and legislations, mobility plans, etc. It also talks about the aim and objectives to be achieved through various types of strategies.

3.3 COMPARATIVE ANALYSIS OF PARKING POLICIES OF DIFFERENT INDIAN CITIES

A comparative study of parking policies of cities having population greater than four million and nearest characteristics is done to understand the direction taken for implementation of the same in Indian cities.

Surat (Surat Municipal Corporation, 2018), Bengaluru (Directorate of Urban Land Transport, 2020) and Pune (Pune Municipal Corportation, 2016) parking policy objectives comparison.

City	Objectives	Category
Surat	To manage demand through pricing and other means.	Demand pricing
	To reduce private vehicle usage and dependency through "Travel Demand Management (TDM)" strategies	Reduce private vehicles usage
	To support public transport use wherever possible.	Promote public transport
Bangaluru	Move from chaotic parking to well organised parking	Organised parking
	Move from free parking to paid parking	Paid parking
	Move from Government-driven parking supply to market-driven parking supply and management	Market-driven demand and supply management for parking
	Move from passive and weak enforcement of parking regulations to active management of parking demand	Strengthen enforcement and management
Pune	Achieving 80 per cent of motorised trips by public transport by 2031 as mentioned in comprehensive mobility plan of Pune, 2008 by encouraging use of public transport using public parking policy as a travel demand management tool.	Promote public transport
	Achieving at least 50 per cent reduction in total vehicle kilometre travelled (VKT) in Pune by year 2031 by creating effective parking management system.	Reduce private vehicles usage
	Transforming at least 10 per cent on street parking spaces to public open spaces or NMT infrastructure by rationalisation of parking spaces in the initial year of policy implementation.	Recreating street parking spaces

Based on the parking objectives of a particular city, Policies for the parking approach is arrived.

Mapping of Policy Directives to Objectives for Bengaluru

Objective 1	Move from chaotic parking to well organised parking	*Policy 1* *Policy 3* *Policy 4* *Policy 7*	Preparation of Area Level Parking management Plans Streamlining and Limiting On-street Parking Regulation of Residential Parking Regulation of Transport Vehicles
Objective 2	Move from free parking to paid parking	*Policy 2*	Charging fees for Parking
Objective 3	Move from Government driven parking supply to PPP/market driven parking supply & management	*Policy 5* *Policy 6*	Provision of Off-Street Parking Parking norms for ToD/LAP influence zones
Objective 4	Move from weak enforcement of parking regulations to active management of parking demand	*Policy 8* *Policy 9* *Policy 10* *Policy 11*	Management of Public Parking Adoption of latest Technology for Parking Management Enforcement of Parking Parking Revenue Utilization

Mapping of Policy Directives to Objectives for Surat

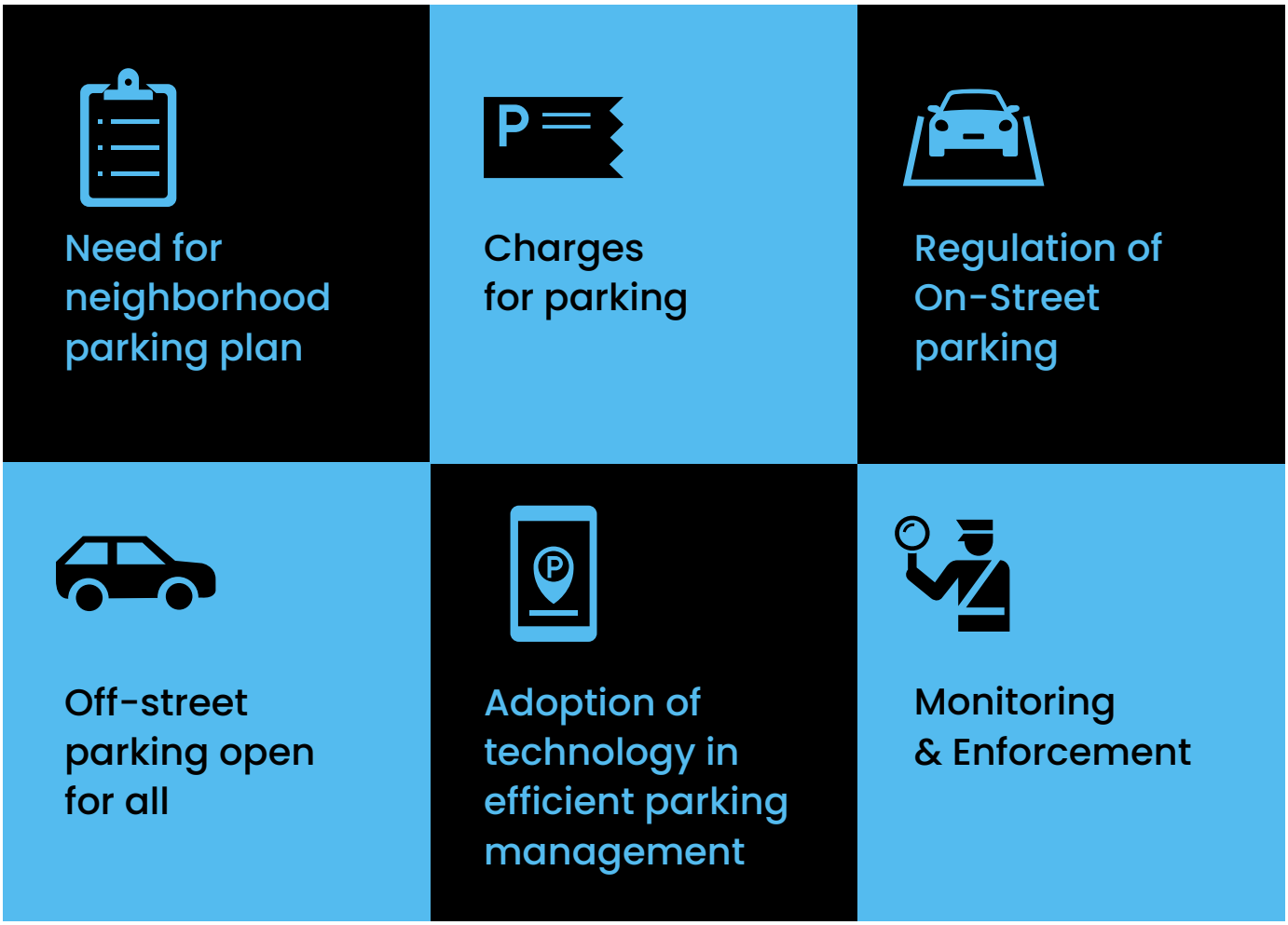
Objective 1	To manage demand through pricing and other means	*Policy 1* *Policy 2* *Policy 3* *Policy 4* *Policy 8* *Policy 10*	Charging for parking Enforcing parking Providing proof of parking Sharing parking Managing Freight Parking Technologies - Smart parking
Objective 2	To reduce private vehicle usage and dependency through strategies.	*Policy 5* *Policy 6*	Reducing parking minimums Issuing parking permits
Objective 3	To support public transport use wherever possible	*Policy 7* *Policy 9*	Regulating IPTS parking Promoting Non-Motorized transport near transit and off- street parking facilities

Mapping of Policy Directives to Objectives/Strategic Intent for Pune

Objective 1	Achieving 80 per cent of motorized trips by public transport by 2031 as mentioned in comprehensive mobility plan of Pune, 2008 by encouraging use of public transport using public parking policy as a travel demand management tool.	*Policy 6* *Policy 7* *Policy 8*	Organizational structure for the implementation of parking policy Enforcement, police involvement and supporting measures Parking revenue management
Objective 2	Achieving at least 50 per cent reduction in total vehicle kilometer travelled (VKT) in Pune by year 2031 by creating effective parking management system.	*Policy 1* *Policy 4* *Policy 5*	Parking Districts Technology for on street and off street parking Parking pricing
Objective 3	Transforming at least 10 per cent on street parking spaces to public open spaces or NMT infrastructure by rationalization of parking spaces in the initial year of policy implementation.	*Policy 2* *Policy 3* *Policy 8*	On street parking management Provision for off street parking structures Parking revenue management

3.4 CONCLUSION

From the comparative analysis of the cities, we can identify the following broad categories of policies that an Indian city needs.



Of these, the need for a neighbourhood plan becomes at most important to understand the parking demands of an area and manage them in a holistic manner.

4 NEIGHBOURHOOD PARKING PLAN

4.1 NEED FOR NEIGHBOURHOOD PARKING PLAN

As the parking demand in an area is met by the overall parking inventory available in an area, parking solutions (for planning and management) should be conceived at an area level rather than at the scale of an individual road or an individual parking lot.

Owing to the size and complexity of the cities of today, it requires a systemic approach to be adopted to determine the actual need for public parking within an area and to identify locations for provision of parking.

The neighbourhood-based approach allows the city to tailor its policies to the unique characteristics of each neighbourhood.

4.2 WHAT IS NEIGHBOURHOOD PARKING PLAN?

A Neighbourhood Parking plan is prepared by any local body, which includes the demarcation of all types of parking spaces for all mode as well as essential street amenities.

This includes on-street, off-street and multi-level parking facilities, vending zones, multi-modal integration facilities, green open spaces along with the allied traffic and pedestrian/ NMT circulation plans, signage plans and pricing strategy.

It must be prepared in consultation with local stakeholders, planning bodies/departments and with a team of transport planners and urban designers.

4.3 PREPARATION OF NEIGHBOURHOOD PARKING PLAN

4.3.1 Delineate and demarcate the area

1. Demarcate the neighbourhood boundary based on areas bounded by major roads on all sides; should preferably include a variety of land-uses.
2. Also, delineate based on natural boundaries like forest, district parks or any other major physical barriers that divide neighbourhoods.
3. Indicate the jurisdiction of the relevant urban local body or any other land owning agency.

4.3.2 Study the zoning and user activities

1. Map out land use pattern in the neighbourhood area.
2. It is necessary to record the types of economic activities in the area.
3. Based on the zoning and the economic activities, the approach to the parking solution will prevail.

4.3.3 Evaluation of ground situation

1. Identify all Metro stations, bus stops, bus bays, para transit access,
   Pedestrian crossing, fire hydrants, loading zones, taxi stands, driveways, electric charging areas, public toilets, amenities, bike sharing facilities and other features that are likely to affect the use of the street for parking.

2. Document traffic management measures in force, such as prohibited turns, one way streets, exclusive bus lanes etc. Identify the gated streets, service and rear-access alleys.
3. Evaluate street networks, ROW and effective ROW of streets.
4. Most schools in the city do not have space for parking school buses and vans within the campus leading to haphazard parking of school buses and vans on roads. Large number of schools also do not have space for pick up and drop facility within their premises leading to not only parents stopping on the kerb edge and causing bottlenecks but also creating an unsafe environment for children.

4.3.4 Identify the parking spaces

1. Through parking space inventory survey approximately mark all the areas where parking (by mode) is taking place or can take place, including:
    - On-street parking: Total length of kerb and lengths governed by no waiting and limited waiting restrictions.
    - Off-street parking lots
    - MLCPs/ Stack parking
    - Parking within buildings (e.g. basement/ stilt/ etc.)
    - Under-utilized plots/ building premises/ vacant plots
2. Document and prepare a base map of the neighbourhood parking management area to mark all existing parking spaces, hawkers/vendors, amenities like parks, public toilets, public utilities like transformers, street infrastructure, street furniture, etc.
3. Document percentage of green area within the neighbourhood boundary.
4. Map out the residential, commercial and office buildings in the neighbourhood area to indicate the usage of parking spaces in the buildings. This can help to earmark parking lots that can be shared between different sharing of parking spaces.
5. Freight related movement in cities is closely linked to location of wholesale markets, type of produce/item, existing distribution system etc. An inventory of parking areas for them is also necessary in such areas.

4.3.5 Trends in the parking

1. The trends in the neighbourhood parking should be recorded based on overall parking accumulation, turnover of parking spaces, average duration of
parking in various on-street and occupancy in off-street parking lots in the neighbourhood area.
2. Off-street parking survey should include in-out flow of vehicles at different time intervals; occupancy count in the selected parking lots. Assess number of vehicles that enter the parking lot to assess turn over, duration and occupancy by modes of vehicles.
3. On-street parking should include in-out flow of vehicles at different time intervals; occupancy count in the selected parking lots. Assess number of vehicles that enter the parking lot to assess turn over, duration and occupancy by modes of vehicles. Apply license plate method of survey to assess inflow and outflow of vehicles in time intervals.
4. All these are needed to devise various strategies for reorganising parking. Parking solution largely vary upon the duration and span of the parking.

4.3.6 Identify the Blackspots

1. To identify the blackspots in the area, where there is no parking provisions
2. To communicate with the potential stakeholders of the land, and making private parking spaces open to public (with charges)

4.3.7 Study the parking demand in the area

1. The study of average parking lots required in the area based on current and projected trends in the area.
2. Parking activities largely vary from different zones in the city.

4.3.8 Layout of neighbourhood parking plan

1. Parking layout and parking accommodation plan can be arrived for the neighbourhood area and for particular streets.
2. Each stretch of a street between two intersections, called a block face, would be the smallest unit of parking management within each parking district.
3. Different block faces within a parking district may have different parking rates and rules. A block face can be designated as either paid parking, unpaid parking, or no-parking areas (which must be monitored to ensure no parking occurs).
4. The neighbourhood-parking plan can help to identify major corridors with mixed land use for redevelopment with areas for parking, green development and pedestrianisation.
5. Proposal of MLCPs based on the area requirement.
6. NMT based approach to reaching the destinations from the MLCPs.
7. Well designed safe footpaths & active fronts along footpaths.
8. Hawking & vending spaces provision along the way for mutual benefit of vendors and public.

4.3.9 Multi-Level Car Parking as an important solution part of the comprehensive neighbourhood parking plan

1. Multilevel car parking helps utilize limited space more efficiently, reduce traffic congestion, provide safety and security, and provide convenience for commuters.
2. It also reduces the risk of theft and damage.
3. The neighbourhood-parking plan needs to inventories surface and structured parking in all commercial, residential and industrial centres.
4. Development of multi-level parking facilities, if required by the neighbourhood parking plan, may be taken up in a public-private partnership framework, with private sector investments and responsibility of common area management of both multi-level and surface area parking in the designated area.

4.3.10 Non- Motorized Transport (NMT) Approach to neighbourhood parking plan

1. An NMT plan also needs to be included in the neighbourhood-parking plan for optimizing the same, encouraging off street parking by improving the pedestrian movement between the places.
2. An NMT approach focuses on attractive mode of transport for relatively short distances, with recreation and landscape.
3. Provision of sidewalks, crosswalks, paths, pedestrian oriented land use design, encourages people to commute with their feet.

4. NMT approach also increases the economic activities in the area.
5. The following design standards and guidelines are to be adopted to develop infrastructure that supports and expands the use of these modes.

4.3.10.1 Footpaths

Footpaths will meet the following standards, in compliance with IRC: 103 - 2012:

1. Footpaths shall include space for business frontage (frontage zone), space for pedestrian mobility (pedestrian zone) that is at least 1.8m wide in residential areas and 2.5m in commercial areas, and space for landscaping and street furniture (furniture zone) (Figure 5).
2. A frontage zone provides a buffer between street-side activities and the pedestrian zone. Next to a compound wall, the frontage zone can become a plantation strip.
3. A pedestrian zone provides continuous space for walking and shall be clear of any obstructions, level differences, or other obstacles to pedestrian movement.
4. A furniture zone is a space for landscaping, furniture, lights, bus stops, signs, and private property access ramps

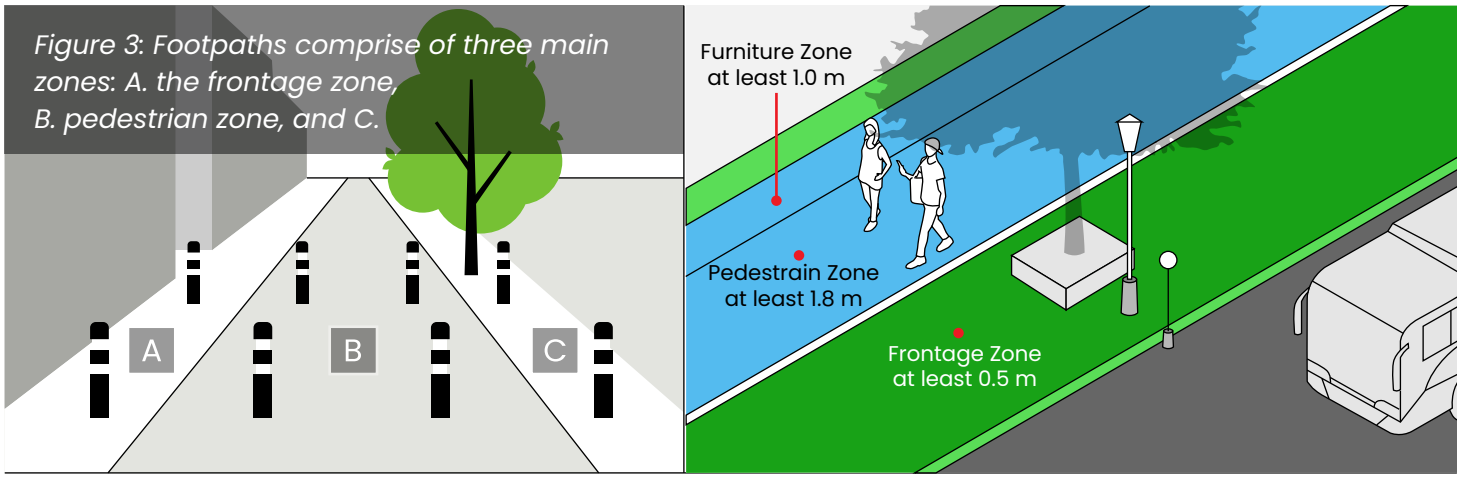


Figure 3: Footpaths comprise of three main zones: A. the frontage zone, B. pedestrian zone, and C.

5. Height of the footpath shall not exceed 150mm above the carriageway.
6. Footpath surface shall be evenly paved and smooth for all users, including those on wheelchairs.
7. Footpath shall be continuous even at property entrances for uninterrupted pedestrian movement.
8. The height of the footpath shall remain the same. To provide access to private properties, vehicle ramps shall be provided in the furniture zone with a 1:6 gradient (Figure 6).
9. Bollards shall be installed to prevent vehicles from parking on the footpaths, leaving a clear width of at least 1.2m (IRC:103 - 2012, 6.1.12) for wheelchair access.

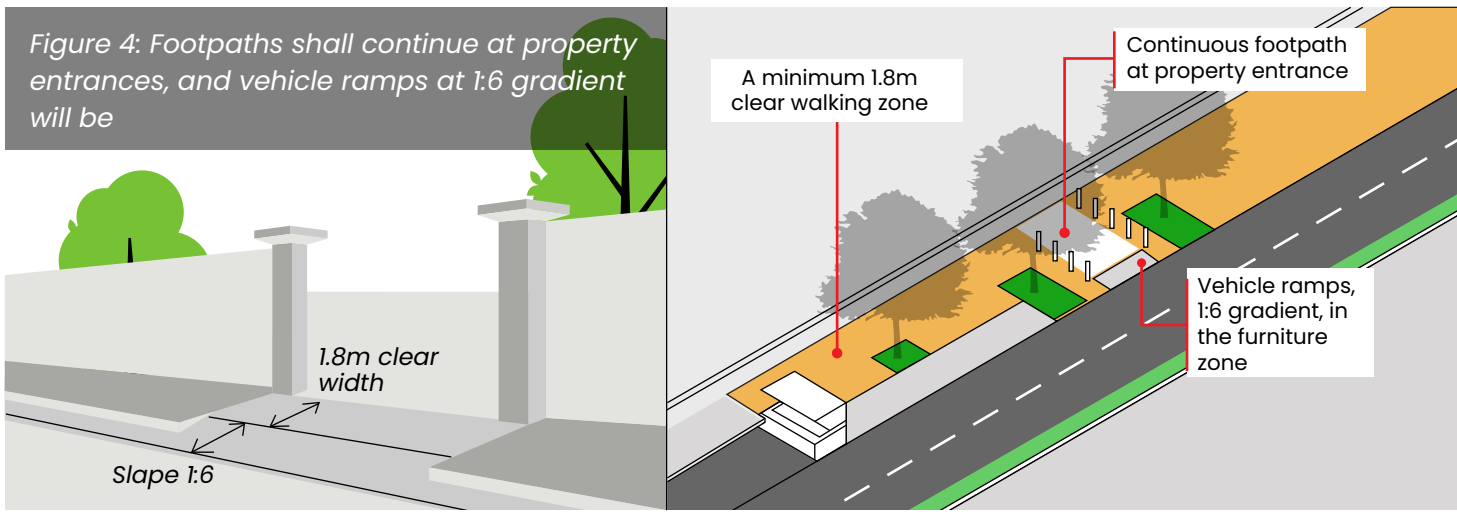
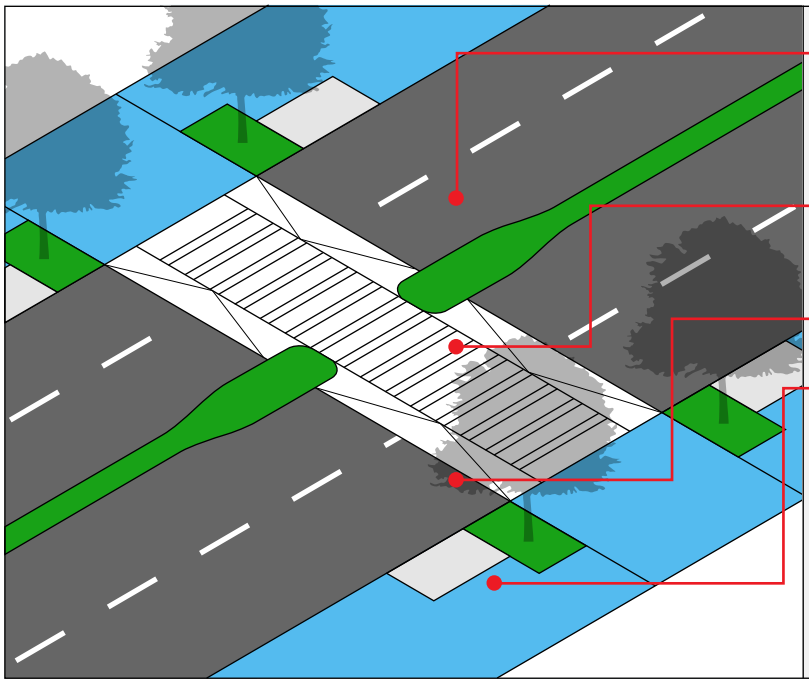


Figure 4: Footpaths shall continue at property entrances, and vehicle ramps at 1:6 gradient will be

4.3.10.2 Pedestrian Crossings: Midblock

1. Pedestrian crossings will be constructed as raised crosswalks, or painted zebra crossings. Zebra crossing will comply with IRC 103:2012, 6.7.3.1.
2. All pedestrian crossings will be at-grade. Authorities may create skywalks to link railway or public transport terminal pedestrian bridges with key destinations, provided that doing so does not compromise at-grade NMT infrastructure.
3. Pedestrian crossings will be located every 80- 250m in residential areas, and every 80-150m in commercial and mixed use area.
4. At unsignalised crossings, raised crosswalks shall be constructed. Raised crosswalks shall have a minimum width of 3 m, elevated to the level of the adjacent footpath, with ramps for motor vehicles with a slope of 1:8 (IRC 103:2012, 6.7.4.1) (Figure 7).



Height: Crosswalks should be elevated to the height of the adjacent footpath with 1:8 gradient ramps for vehicles (IRC 103: 2012, 6.7.4.1)

Pedestrain refuge: The regfuge should remain the same width as the crossing (IRC 103: 2012, 6.7.3.3)

Width: The width should be no narrower than 3m (IRC 103:2012, 6.7.2)

Crossing distance: Pedestrians must be given the shortest possible direct route to cross (IRC 103:2012, 6.7.4.1). Bulb-out in the parking lane reduces the crossing distance

Figure 5: Raised pedestrian crossing reduces vehicle speed, thereby increasing pedestrian safety

5. Medians shall be designed as surmountable pedestrian refuge to enhance pedestrian safety. Streets with 4 or more traffic lanes shall have medians with pedestrian refuges of minimum 2m depth, and 3m width (IRC 103: 2012, 6.7.3.3), with bollards located in the refuge space to enhance pedestrian safety.
6. Grade separated facilities such as foot overbridges and subways are often unsafe and inaccessible to many users, and inconvenient for all pedestrians. Therefore, facilities that involve a significant vertical displacement of pedestrians will not be permitted on urban streets. Such facilities will only be considered in the context of limited access expressways.

4.3.10.3 Pedestrian Crossings: Intersection

1. At unsignalised intersections, raised crossings shall be provided to ensure pedestrians can cross safely. They shall be elevated to the level of the adjacent footpath, with ramps for motor vehicles with a slope of 1:8 (Figure 8).
2. Smaller turning radii increase pedestrian safety by reducing vehicle speeds. Turning radii at intersections shall not exceed 3m on non bus-route roads, and 6m on bus route roads.
3. Pedestrian crossings will be located in alignment with pedestrian desire line -pedestrian travel path.

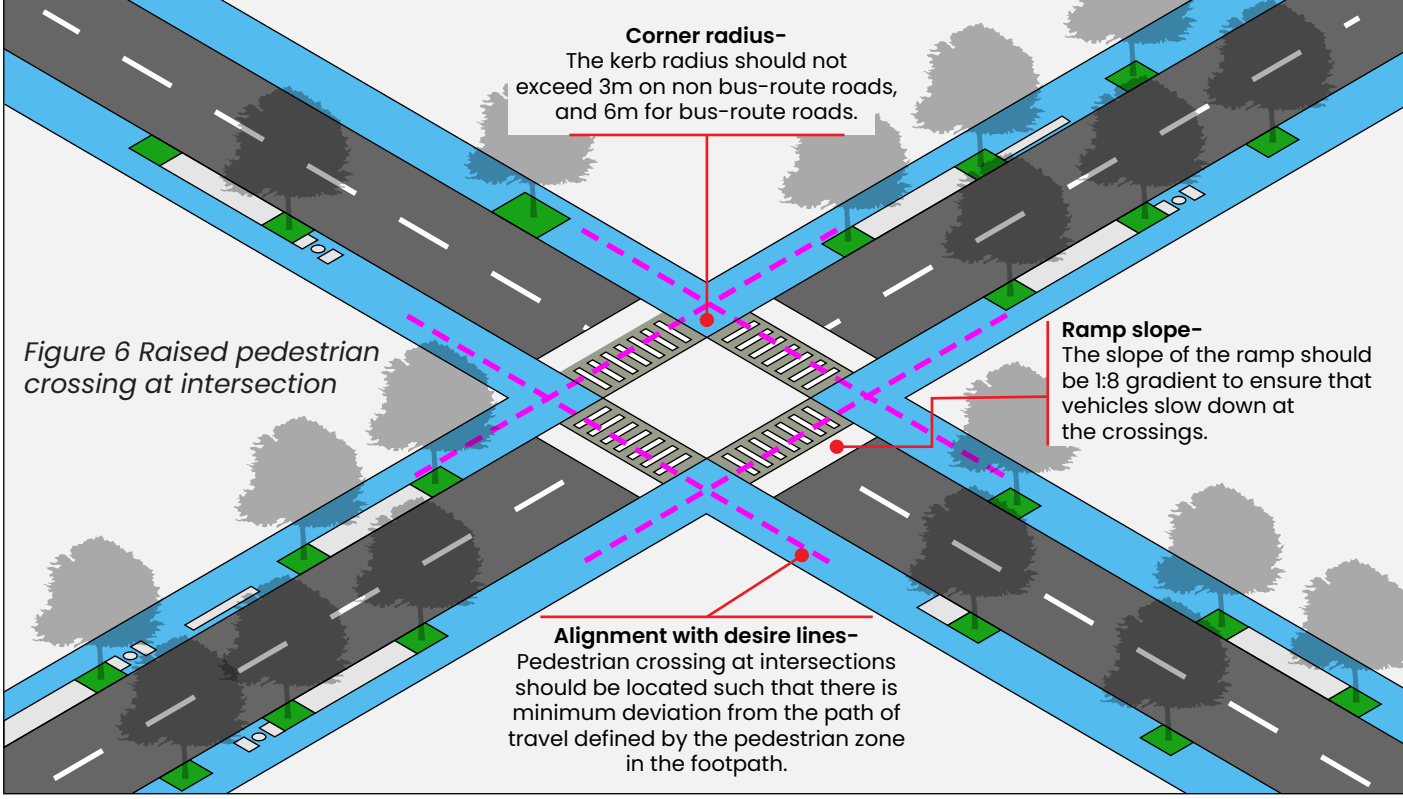


Figure 6 Raised pedestrian crossing at intersection

4.3.10.4 Landscaping

1. All footpaths shall have a continuous tree line to provide shade and improve the aesthetic of the streetscape.
2. Placement of landscaping shall be coordinated with other street amenities (especially advertising panels and utility boxes) to maintain a clear path of travel for pedestrians and cyclists so as to not obstruct their through movement.
3. Height of trees shall be maintained so that it does not hinder the visibility of all road users. Canopy of trees shall have a minimum of 3m from the surface of the footpath to ensure better visibility for pedestrians (Figure 10).
4. Native trees shall be planted to minimise irrigation and maintenance requirements, and for a prolonged tree life.
5. All trees will be protected with tree pits that allow maximum soil exposure enabling water and air to get to the roots.
6. Tree pits, with a minimum dimension of 1m x1m, shall be provided to accommodate the growth of root structures as tree matures.

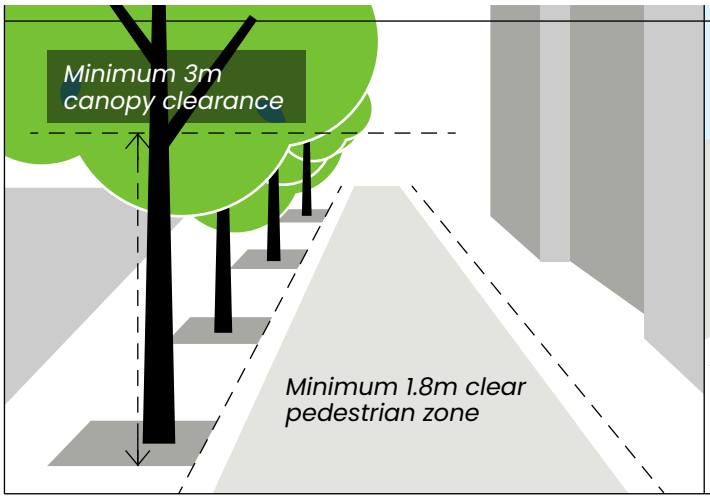


Figure 7 Placement of trees shall allow for a clear walking and cycling path. A 3m canopy height ensures better visibility for pedestrians

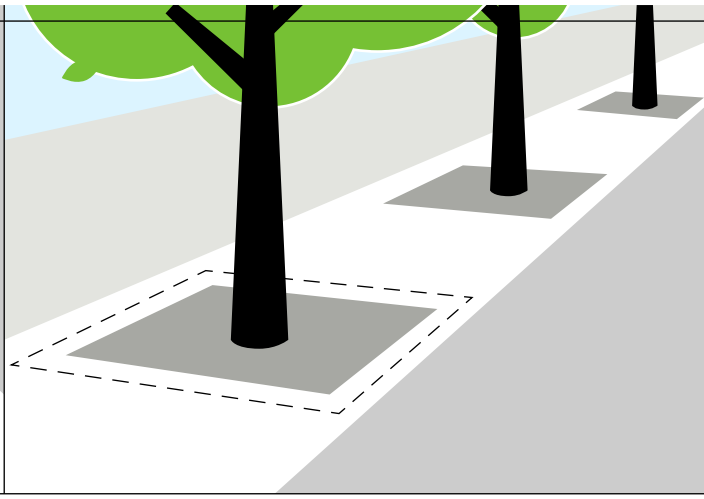


Figure 8 Tree will be protected with tree pits that allow unobstructed pedestrian movement

4.3.10.5 Bus Stops

1. Bus stops shall provide safety and comfort for passengers while waiting, and shall be conveniently placed. Placement of bus stops will allow for continuous footpaths and cycle tracks. This may imply diverting the footpath, cycle track, or service lane behind the stop (Figure 11).
2. Bus-bays shall be avoided at all times. This is because bus drivers generally stop in their linear path of travel, thus, forcing passengers to walk into the carriageway to board the bus. Also, vehicles behind the bus sometimes attempt to pass on the left, compromising passenger safety.
3. Bus stops shall be placed adjacent to the bus linear line of travel so that the bus does not need to pull over to the left (IRC: 103:2012, 6.10). If there is a parking space between the footpath and the carriageway, bus stops shall be located on the bulb-out of the parking lane.
4. Bus stops shall ideally be placed at 200-400m intervals so that passengers can easily access the stop by walk.
5. The length and width of a bus stop will vary depending upon passenger demand.
6. However, it is recommended that stations be at least 2.5m wide which is adequate for a seating arrangement.
7. Seating shall not be more than 450 mm above finish floor level. The finish floor level shall not exceed 150 mm above the carriageway.

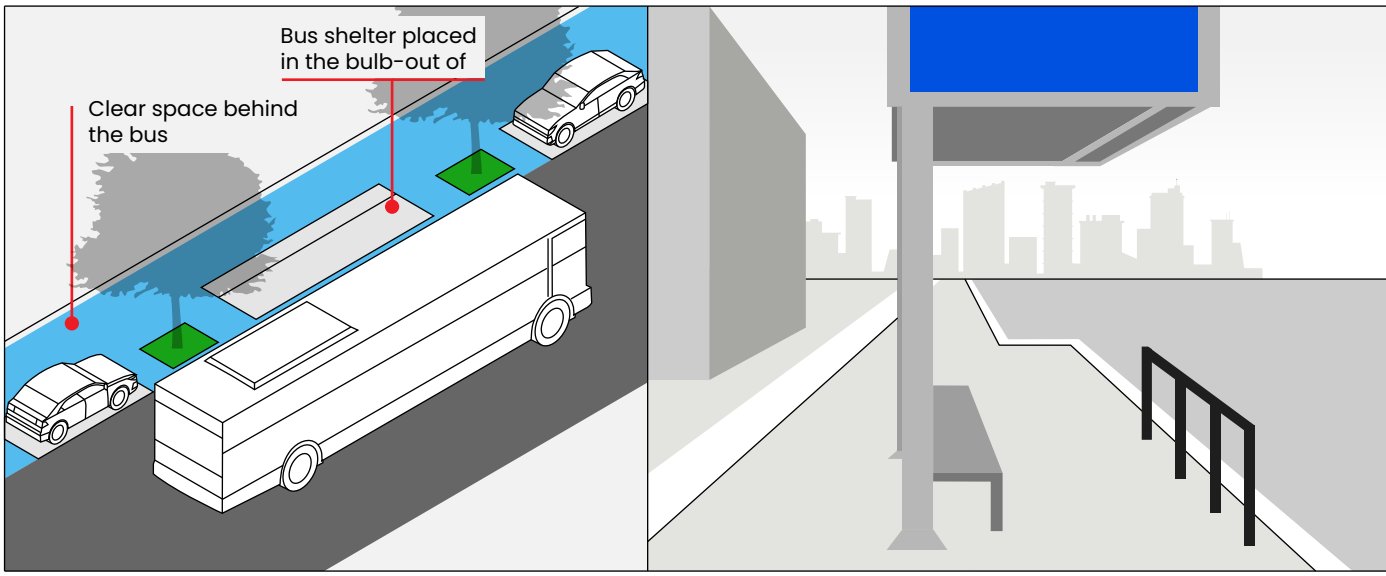


Figure 9: Bus stops shall be placed adjacent to the bus linear line of travel, and shall allow for continuous footpath and cycle tracks

4.3.10.6 Street Lighting

1. Street lighting shall be provided such that the longitudinal dimension is equivalent to three times the pole height, and horizontal dimension is slightly longer than the pole.
2. The table below indicated pole height and spacing option. The spacing between two light poles shall be approximately three times the height of the pole.
3. Poles shall be no higher than 12m to reduce undesirable illumination of private properties.
4. Additional lighting shall be provided particularly at black spots, areas of sexual harassment and/or violence, areas of personal crime, and areas of isolation.
5. The placement of street lighting shall be coordinated with other street elements so that they do not impede proper illumination.
6. A single row of light posts is generally sufficient for streets up to 12m wide.
7. On wider streets, dual lights can be mounted on a single central post.

Table 3 Pole height and spacing metrics

Street Type	Pole height (m)	Spacing (m)
Footpath or cycle track (<5m width)	4.5-6.0	12-16
Streets with ROW of 9m or less	8-10	25-27
Streets with ROW of more than 9m	10-12	30-33

4.3.10.7 Street Vending

Street vending shall be accommodated where there is demand for their goods and services. Well-planned vending zones allow formal and informal vending to coexist together without compromising pedestrians and cyclists mobility (Figure 12).

Vending areas shall be positioned in the furniture zone, to ensure the continuity of footpaths and cycle tracks.

Concerned authorities shall refer to their city-specific Street Vending Act/state level rules for permitted dimensions of street vending stalls.

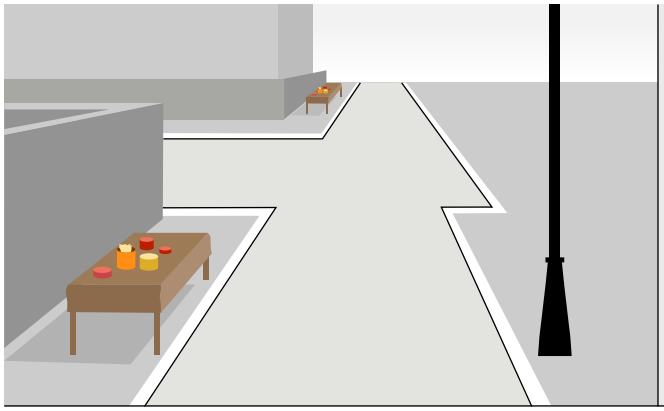


Figure 10
Street vendors shall be accommodated to enliven public spaces, without compromising the

4.3.10.8 Street Furniture and Amenities

1. Street furniture and amenities shall be located where they are likely to be used. Furniture is required in larger quantities in commercial hubs, market areas, junctions, bus stops, railway stations, and public buildings, and on streets with high pedestrian activity.
2. Most street furniture, especially benches and tables, shall be placed where it receives shade and does not obstruct pedestrian through movement (Figure 13).
3. Street furniture can be installed in bulbouts of parking lanes. Similarly, a landscaping strip can be discontinued with street furniture on hardscaped spaces.
4. In high commercial areas, trash bins shall be provided at every 20m and public toilets shall be placed at every 500-800 m.

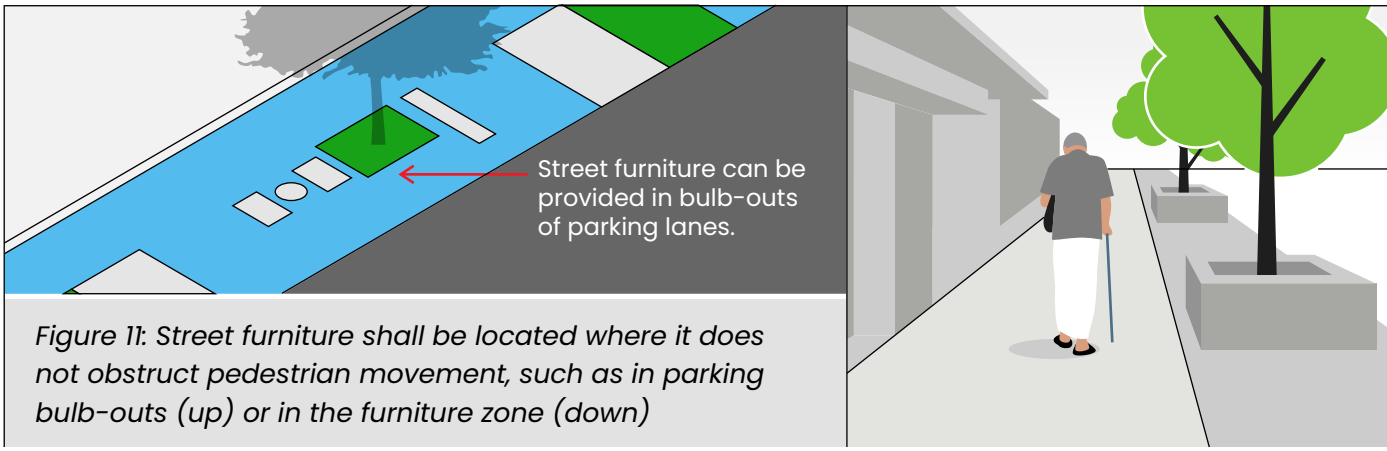


Figure 11: Street furniture shall be located where it does not obstruct pedestrian movement, such as in parking bulb-outs (up) or in the furniture zone (down)

4.3.10.9 Cycle Tracks

1. Cycle tracks will have at least 2m of clear space per direction for one-way movement and 3m for two-way movement, and have a smooth surface -- asphalt or concrete. Paver blocks will be avoided (Figure 14).
2. Painting cycle tracks, without segregation, shall be discouraged as they are likely to be encroached by parked vehicles. They shall be elevated 100-150 mm above the carriageway.
3. A buffer of 0.5m between the cycle track and parking areas or the carriageway shall be constructed.
4. In compliance with IRC 11: 1962, cycle tracks shall be provided on streets that have more than 100 motor vehicles and 400 cyclists during peak hour. On routes with more than 200 motor vehicles per hour, cycle tracks shall be provided even if the cycle traffic is less than 100 per hour.

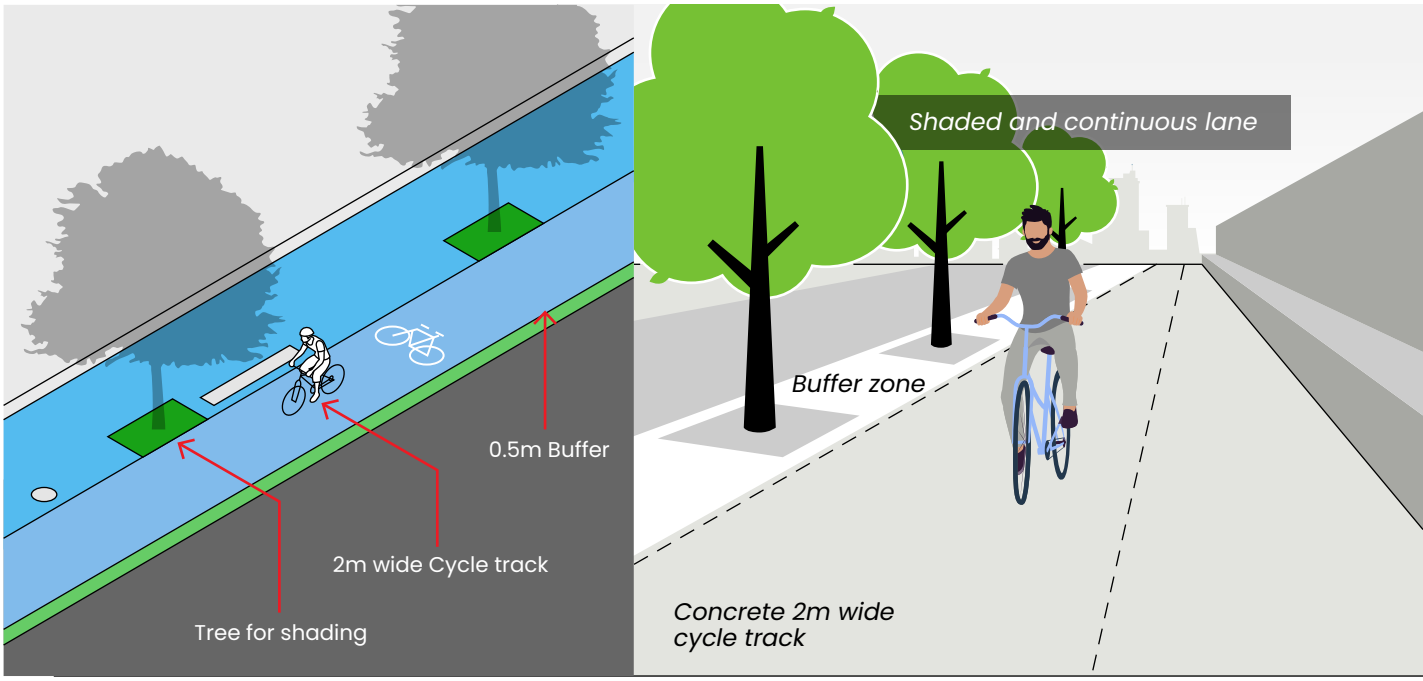


Figure 12 Cycle tracks shall have a minimum width of 2m with a buffer of 0.5m from the carriageway. Trees along the cycle track provide shade and comfort for cyclists.

4.3.10.10 Traffic Calming Elements

1. Traffic calming elements ensure pedestrian and vehicle safety by reducing at least speed and potentially also the volume of motor vehicles.
2. Traffic calming slows down vehicles through vertical displacements, horizontal displacement, real or perceived narrowing of carriageway, material/colour changes that signal conflict point, or complete closure of a street.
3. Raised crossing serves as a traffic calming element - they shall have a minimum width of 3m, elevated to the level of the adjacent footpath, with ramps for motor vehicles with a slope of 1:8 (IRC 103:2012, 6.7.4.1).
4. Pedestrian islands of varying shapes, sizes, and located, shall be located within the right-of-way in shared spaces. Pedestrian islands require vehicles to navigate around them, thus, reducing vehicle speeds.
5. Parallel parking lanes can alternate between the two sides of a street to prevent vehicles from speeding. The alternating obstacles are also known as chicanes.
6. Parking lanes shall have a maximum 2.5m width. Each parking slot shall be no more than 5.0m x 2.5m for a four-wheeler. The same area can be used by two-wheelers to park perpendicularly.

Table 4 Street element standards

Street element	Specifications	Minimum width (m)	Maximum width (m)
Footpath	Clear walking space	1.8	*
	Residential area, including furniture zone and frontage zone	3.3	*
	Commercial area, including furniture zone and frontage zone	5.0	*
	High-intensity commercial area, including furniture zone and frontage zone	6.5	*
Tree pit		1.0	*
Bus shelter		2.5	*
Cycle track	One-way	2.0	*
	Two-way	3.0	*
Buffer		0.5	*
Parking	Parallel parking	2.00	2.5
Carriageway	Local street	3.5	4.5
	Minor collector	4.5	6.5
	Major collector	6.5	11.0
	Arterial	12.0	18.0

* Width as per requiement

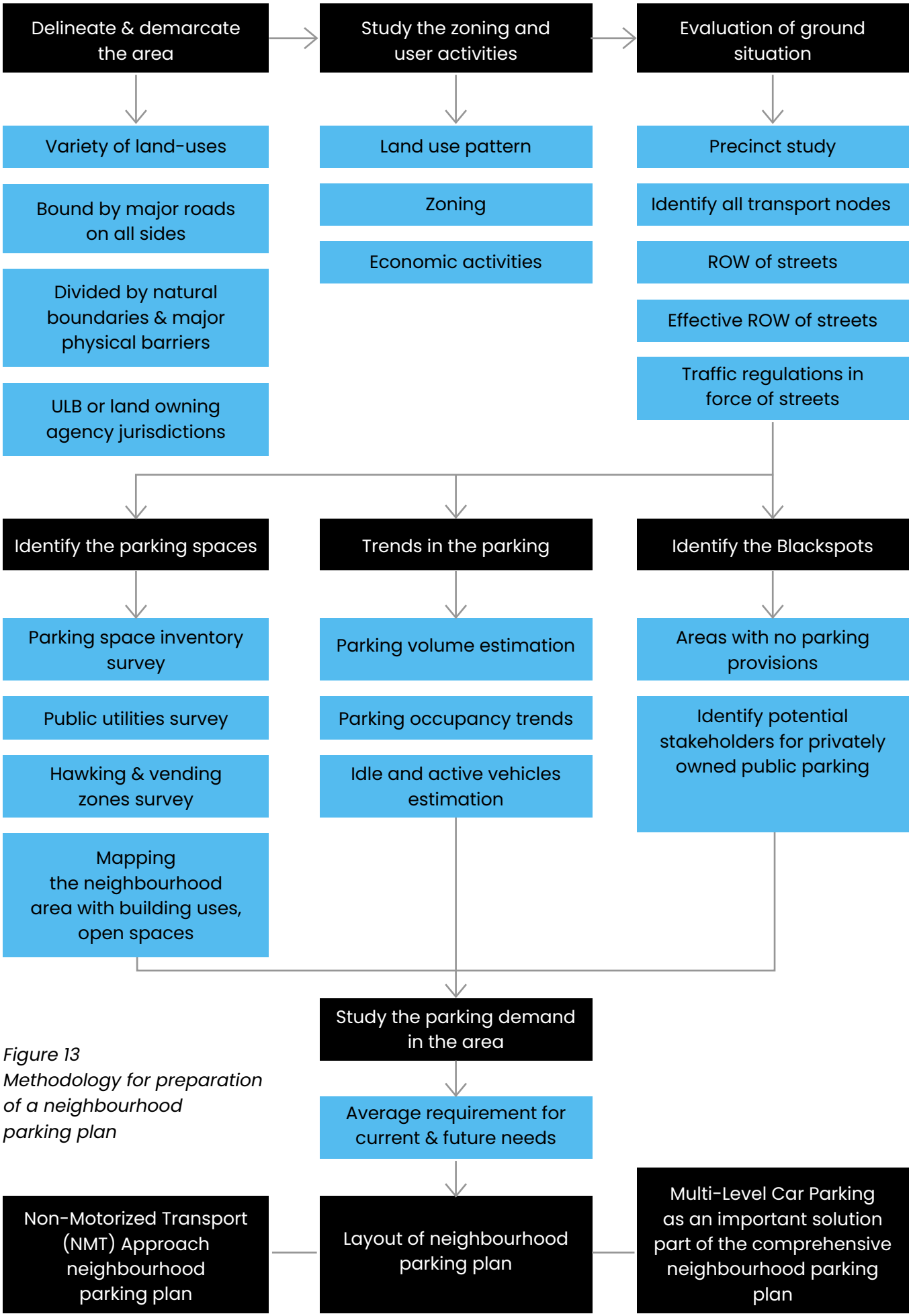


Figure 13
Methodology for preparation of a neighbourhood parking plan

5 CHARGES FOR PARKING

- Parking consumes prime and scarce urban space in thriving business and commercial areas at the expense of other uses and hence when not charged incurs an opportunity cost.
- When parking is either free or heavily subsidized or bundled with other costs, the demand for parking inflates, as users do not pay the cost of parking utility. This may either lead to congestion on roads as people cruise for free parking, since parking supply cannot catch up with ever inflating demand or the high cost of supplying parking to meet the demand will be difficult to economically justify.
- Hence, parking should not be provided free of cost and utilization of any designated public parking space shall be charged a fair part of the true cost of parking. Parking charges may ensure that commuting by private vehicle is more expensive than commuting by public transport in the city.

5.1 PARKING CHARGES FRAMEWORK

1. Pricing on-street higher than off-street parking to move demand from on-street to off-street to help eliminate congestion, bottle necks, delay and reduced mobility efficiency arising from on-street parking.
2. On-street parking price may be 1.5to 3 times higher than off-street parking.
3. Use differential pricing for various types of on-street parking to spatially distribute the demand for parking across a commercial or business district. Streets with high level of activity and congestion may be priced higher as opposed to roads with lower activity and congestion.
4. The Neighbourhood Parking Plan should identify non-residential roads that are within 250m around intense commercial areas, where the on-street parking, if provisioned in the plan, shall be priced higher than other on-street parking fee.
5. Pricing long duration on-street parking higher than short term to ensure increased turn around and discourage locking of on-street parking space for longer duration.
6. On-street parking shall as far as possible be encouraged only for short duration parking (not exceeding 1 hour).
7. In order to discourage long duration parking, parking charges be increased, when parking duration exceeds 1 hour.
8. Pricing may encourage park-and-ride (off-street) near peripheral mass transport stations by allowing subsidized long duration fee for park-and ride users.
9. Mechanisms may be developed to segregate park-and-ride users from general parking users at these locations.
10. Park-and-ride users could be charged subsidized rates for parking their vehicles at these facilities that nudge commuters to ride transit than driving their vehicles in the city.
11. Pricing to ensure there is turnaround of parked vehicles and discourage abandonment of vehicles at off-street locations.
12. Parking longer than 48 hours may be charged up to twice the normal off-street price.
13. Parking beyond 96 hours without necessary prepaid tickets may be treated as abandonment of vehicle for necessary action by traffic police.
14. Pricing Residential Parking system through a permit based system should be evolved after piloting in some areas of the city initially. Residential parking permits may be charged a fee quarterly or annually based on the permit.

5.2 METHODOLOGY TO CALCULATE NON-RESIDENTIAL PARKING FEE

1. Base parking fee would be established in each zone based on the cost of public commuting.
2. On-street and off-street parking fee, and residential permit fee for a zone may be calculated as a multiple of the base fee established for that zone as follows.
3. The minimum base parking fee shall may be set at to and fro public transport fare for an average one-way trip length to incentivize commuters to use public transport.
4. No charges shall be levied for parking of bicycles (and pedal assisted electric bicycles) at spaces designated for bicycle parking. Charges for all other vehicles may be determined as per the Passenger Car Equivalent (PCE) factor.
5. Monthly parking pass may be formulated for the benefit of regular users of off-street parking lots.
6. The monthly parking pass may be calculated as price of 10 hour parking for a given vehicle category for 25 day/month.
7. Bulk parking fee mechanism for off-street parking, may be formulated to facilitate shared mobility operators and e-commerce delivery agents. The aggregator and RTO shall validate such beneficiaries. A database of such beneficiaries should be maintained in the central parking portal.
8. Parking fee, on a prorated basis for the duration occupied shall be redeemed as and when an off-street parking facility is utilized.
9. Redemption of bulk parking fee shall be valid only at off-street parking lots and shall not be valid at any on-street parking lot.

5.3 PERIODICAL REVISION PARKING FEE STRUCTURE

1. The base parking fee may be considered for revision by the civic agency once in two and a half (2.5) years by following the same methodology as described above.
2. If the average parking occupancy data over a year shows that more than 95% of parking space in a Zone is occupied for more than 5 hours in a day, then one the following may be followed to ensure there is some availability of parking within a zone.
3. Parking fee may be considered for increase to regulate the parking demand or increase turnover of parking.
4. Civic agency shall strive to create additional off-street parking as envisaged in the Neighbourhood Parking Plan.
5. Explore possibility of increasing parking capacity by adoption of multi-level parking and automated parking systems.

6 ON-STREET PARKING

6.1 REGULATION OF ON-STREET PARKING

1. On-street parking shall be clearly designated, managed, charged and restricted in volume.
2. Regulating parking on congested streets and streets with high activity: On-street public parking shall NOT be provided on roads and areas like around multi-level parking lots, transit stations etc identified by Traffic Policies and marked with No Parking signs.
3. Defining parking spaces through physical means: A key initial step for effective regulation of on-street parking is to establish "parking" and "no-parking" zones
4. Prioritizing pick-up/drop-off, loading/un-loading over parking along street edge: Road space should be prioritised for improving access for people to safely reach their places of activity by carving space for drop-off/ pick-up by private or shared mobility, bus bays etc.
5. Prevent long term on-street parking: On-street parking, when needs to be provided, may only be used for short duration parking.
6. Parking areas shall be allocated after providing adequate space for pedestrians, cyclists, trees and landscaping, and street vending.
7. Parallel parking is the preferred parking layout in terms of the area occupied per car.
8. The same parking layout can be used as perpendicular parking for two-wheelers.
9. Parking bays shall have a maximum width of 2.5m (Figure 4).
10. Each parking slot shall be no more than 5.0m x 2.5m for a four-wheeler. The same area can be used to park five two-wheelers. Additional buffer may have to be provided at either ends of the parking bay for safe entry and exit of vehicles from these parking bays.
11. Unlike footpaths and cycle tracks, parking lanes need not be continuous.
12. On-street parking may be provided where space is available in the public right-of-way, after providing necessary NMT infrastructure.
13. Parking signages shall be erected that clearly communicate parking rules to the public, and shall be in compliance with IRC: 67. All signages will be located so as to not hinder pedestrian and cyclist movement, preferably in the furniture zone of the street.
14. Designated parking is often laid with similar material used on the adjacent carriageway - asphalt or concrete. Differentiated surface material such as paver blocks may also be used to distinguish space allocated for parking.
15. Bicycle parking spaces will be equipped with supporting infrastructure (Sheffield Stands, guard rails, cycle lockers) to lock the cycles.

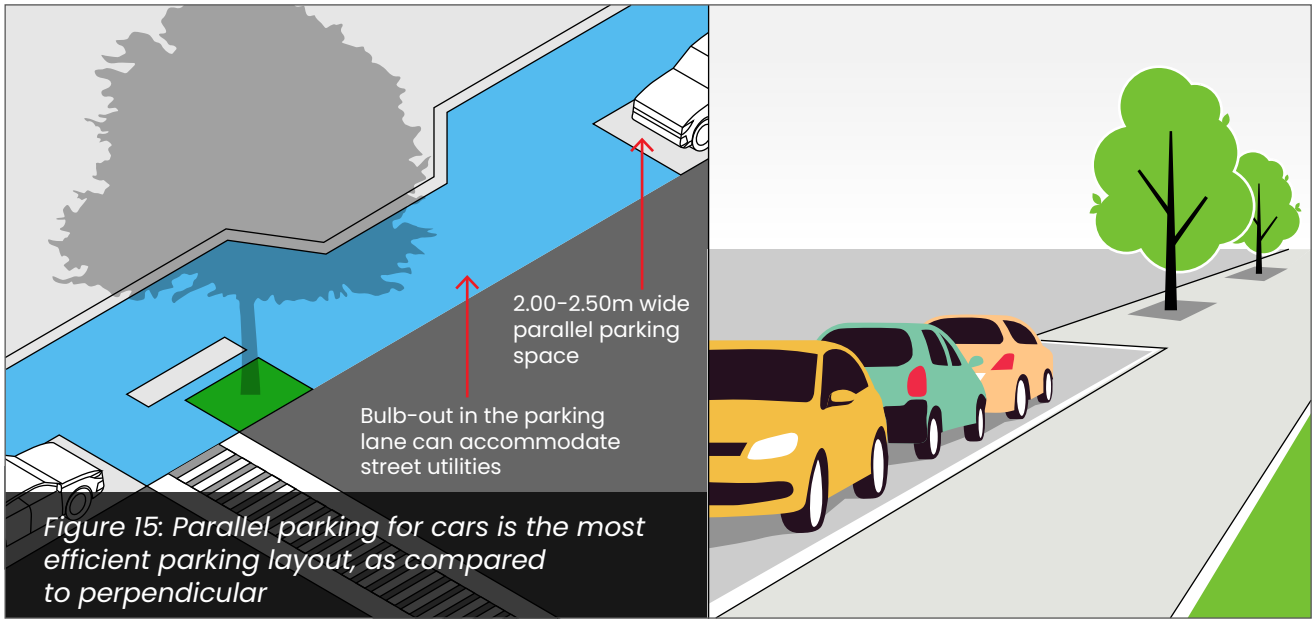


Figure 15: Parallel parking for cars is the most efficient parking layout, as compared to perpendicular

6.2 RESTRICTION ON RESIDENTIAL ON-STREET PARKING

1. Today most residential neighbourhood streets are overtaken by on-street parking rendering these streets not only unsafe but also at times inaccessible to ambulances and fire tender vans during an emergency.
2. In the long term, cities must regulate all on-street parking in residential areas and reclaim much of this space for common public good. The burden of providing parking space for personal vehicles should be on the vehicle owner and not the civic agency.
3. The following measures are recommended to manage on-street residential parking in the short term on a pilot basis.:
4. Permit system to manage on-street parking in the short term on a pilot basis in some selected areas.
5. Available road width may be considered while provisioning on-street parking to ensure that parked vehicles do not obstruct circulation of emergency vehicle circulation.
6. Such reclaimed residential street space will in turn be safer for walking and cycling and will lead to more people choosing to walk, cycle or use public transport.
7. A steady shift towards sustainable mobility especially for last mile commute at the residential level will also ensure a lower private vehicle ownership.
8. However, a phased approach is necessary to reduce inconvenience to the public and hence ensuring adoption.
9. The civic agency may engage with elected representatives and citizens at the ward level for creating awareness, building consensus and a slow yet steady movement towards reclaiming residential street space from parking.

7 OFF -STREET PARKING OPEN FOR ALL

The need for off-street parking is expected to be met by better utilization of existing inventory and augmentation with new inventory in the following ways:

Utilisation of Existing Off-street Inventory.

- Higher pricing of on-street parking will serve as an impetus for properties to restore parking space appropriated for other use to its original intended use.
- Pricing of on-street parking will encourage existing underutilised parking spaces within buildings to be made available for public use using technology.
- Establishments whose existing parking is not being fully utilised may rent the same to the civic agency who in turn will use it as public parking.
- Establishments may also share their parking lot and allow other customers to park for a fee. In such cases, the establishments shall provide the parking information on the parking portal maintained by the civic agency.

Introduction of New Off-street Inventory

1. In commercial areas with high parking demand within each zone, the civic agency may notify these areas as no-tolerance enforcement zones to provide sufficient safeguards for private sector to invest in off-street parking lot development.
2. Owners of vacant plots maybe encouraged to utilize their land for off-street parking. The civic agency should facilitate development and operations of off-street parking facility by entering into an agreement with owners of vacant plots and Professional Parking Space Management Agency, where the owner may lack the wherewithal to operate such facilities on their own. The agreement can be for a short duration initially and may be extended with mutual consent of all parties.
3. The terms of the agreement, including revenue sharing, may be stipulated by the civic agency.

4. The civic agency would have options in the agreement regarding construction of MLCP/ mechanised parking, or surfacing of plot for at-grade parking, so that the owner of the plot may indicate his choice while entering into
the agreement.

8 ADOPTION OF TECHNOLOGY IN EFFICIENT PARKING MANAGEMENT

- For efficient management and enforcement of parking it is crucial to adopt technology.
- The civic agency should endeavour to utilize latest technology for setting up parking spaces such as RFID tag, on-street meters, automated boom barriers, CCTVs, and computerized parking slips with timers, VMS parking boards, mobile applications, and so on.
- This will be implemented to assess parking demand; reduce monetary pilferage; reduce parking violation with parking meters; allow mobile payment; manage differential rates; inform users about parking availability.
- The technologies may be so designed to be user friendly, provide direct usage and revenue reports to concerned government agencies to enable them to conduct audits.
- All public parking related information could be integrated in Central Parking Portal hosted by the civic agency.
- The portal could display real time information on parking status of all parking lots in the city. The portal would also be used to gather parking related information from all businesses that provide for parking (even if it is not a public parking).
- The parking portal may be built on an open interoperable digital infrastructure in the form of Open APIs/ Protocols.
- In addition to the portal, the civic agency may use the data to disseminate information on availability of parking, pricing and parking restrictions, if any to users through various means like VMS boards, mobile app, etc. to enable users to make informed decisions on parking choices.
- Private players/operators/start-ups may be encouraged to offer competitive and creative technology solutions that would help the civic agency to optimise the use of and augment parking spaces.

9 MONITORING & ENFORCEMENT

- Monitoring and enforcement should go hand in hand. Monitoring and enforcement must be easy to adopt, to the extent possible, must be less dependent on manpower and hassle free for the public through technology driven solutions.
- Monitoring and enforcement would be the responsibility of the Zonal Task Force, who may perform their duties through parking space management agencies.
- Monitoring and enforcement (M&E) has to be dealt with for residential and non-residential areas. Multiple methods can be utilized for M&E using fool-proof technology driven methods, engaging with associations like resident welfare associations, business associations and enabling citizens to monitor and report violations.
- Owners of illegally or wrongly parked vehicles may be fined and clamped, if necessary.
- When vehicles that are repeatedly found violating parking norms (with violations 5 times or more), vehicle registration of such vehicles may be recommended to be suspended by the transport department and vehicles may be clamped by the traffic police until the time suspension is revoked.
- In case a violating vehicle is removed by a towing service or impounded, as the case may be, the towing charges including the cost of manpower and the parking/ custody charges for the impounded vehicles should be levied.
- The broader objective of utilization of the parking revenue should be to reduce the demand for parking by improving other sustainable mobility options like footpath and public realm for improved conditions for walking, safe cycling infrastructure, integrated public transport network, etc.
- Thereby, over time need to commute by private vehicles would reduce and land allocated for parking can be reclaimed and put for more productive use.
- Part of the revenue generated from parking fee (or annuity obtained from Parking Space Management Agency) and parking fines may be deposited in a dedicated Parking Fund Account created by the civic agency.
- The parking funds shall be ring-fenced and should be utilised by the civic agency only for developmental works related to safety of pedestrians, road safety, development of infrastructure for non-motorised transport (NMT), footpath improvement, improving public realm for pedestrian on streets (planting of avenue trees), improving transit infrastructure (like bus stops, bus bays, IMTH, etc.), subsidizing public transport, and carrying out awareness activities to citizens on parking and sustainable transport uses.

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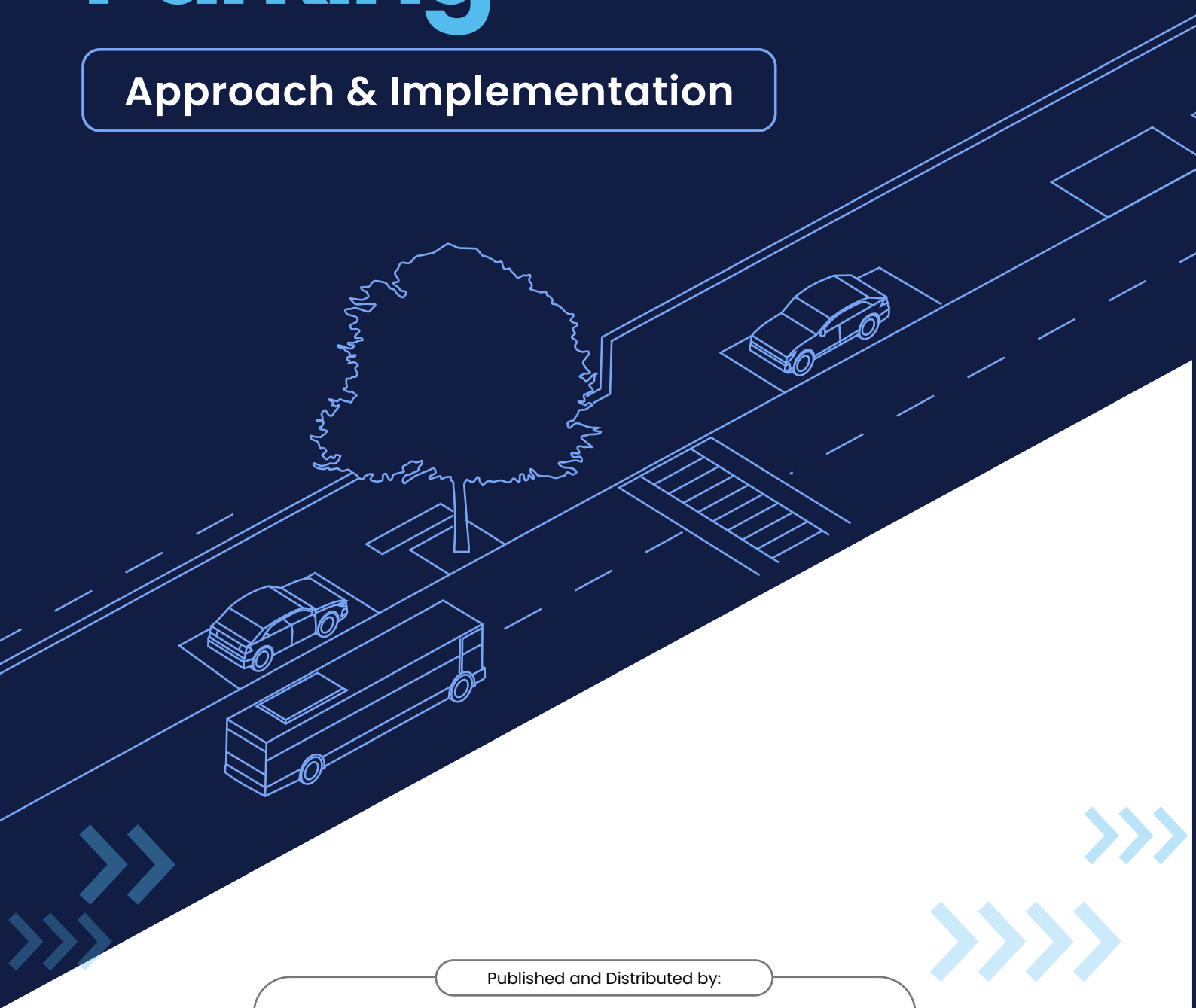

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