



Ministry of Housing and Urban Affairs  
Government of India



# Non-Motorised Transport Network in the City

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TRAINING MANUAL



ClimateSmart Cities Assessment Framework  
Mobility and Air Quality





सत्यमेव जयते  
Ministry of Housing and Urban Affairs  
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ClimateSmart Cities Assessment Framework  
Mobility and Air Quality

**Percentage of Coverage of Non-motorised Transport Network in the City  
Training Manual**

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*Photo Credits: Markus Spiske on Unsplash*

# Executive Summary

On one hand, cities are a significant contributor of carbon emissions aggravating climate change and on the other, cities are considerably impacted by climate disasters. The recently released Global Climate Risk Index 2021 ranks India as the 7th most-affected country from climate-related extreme weather events (storms, floods, heat waves etc.). Further, studies indicate that poor planning and urban management are expected to cost Indian cities somewhere between \$2.6 and \$13 billion annually.<sup>1</sup> Cities are increasingly at the forefront of addressing both urbanization and climate change and to strengthen climate-sensitive urban development, a holistic understanding of the urban development from a climate lens is crucial. The ClimateSmart Cities Assessment Framework (CSCAF) launched in 2019 by the Ministry of Housing and Urban Affairs (MoHUA), Government of India aimed to address this gap. This first-of-its-kind assessment with 28 progressive indicators across 5 thematic areas helps cities to benchmark their development, understand the gaps and further prioritize climate relevant development.

With a focus on building local capacities to develop and adopt climate measures, the Climate Centre for Cities (C-Cube) at the National Institute of Urban Affairs (NIUA) initiated a series of training aligned to the thematic areas of CSCAF - Energy and Green Buildings, Urban Planning, Green Cover & Biodiversity, Mobility and Air Quality, Water Management, Waste Management. The focus of the training is to provide a step-by-step approach of conducting studies, assessments and stakeholder consultations, establishing committees, developing action plans and implementing relevant measures that not only makes the cities climate resilient but also helps them progress across the assessment of CSCAF.

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<sup>1</sup>Mani, M. et al., 2018. *South Asia's Hotspots: The Impact of Temperature and Precipitation Changes on Living Standards*, Washington D.C.: World Bank Group.



The training is on the 'Percentage of Coverage of Non-motorised Transport Network in the City' indicator under the thematic areas of Mobility and Air Quality in the CSCAF. This indicator assesses the network length for dedicated cycle lanes/ tracks and footpaths in the city. Hence, the training module is directed at the city practitioners to improve the non-motorised transport network in their respective cities. The training focuses on the fundamentals of non-motorised transport, challenges and opportunities in Indian cities as well as on the strategies to develop and implement a city-wide NMT plan. The training also provides insights on tackling key design and implementation challenges through an exercise.



*JM Road, Pune (Credits: ITDP India Programme)*





Who is the training manual designed for?



What is the focus of the training manual?



How to make use of this manual?



What are the Learning outcomes of the training?



Scope and limitations of the training



The training is targeted towards the Smart Cities, specifically the ULB officials, Engineers, Planners, Public Works Department, Central Public Works Department, Planning Agencies, Policymakers, Highway Departments, Transport Agencies and Civil Society organisations involved with work around Mobility.

The manual focuses on educating the cities with detailed information on non-motorised transport and different strategies to increase the coverage across the city.

A list of reading material has also been provided for guidance on design, planning and policy, administrative, legal, budgetary, and participatory processes for NMT planning.

The manual can be utilised as a guide while improving NMT infrastructure and services in the city. The chapters focus on different phases of planning and implementation, which can be used while carrying out the said activities in the city. The manual also equips the users with simple tools and surveys that can be used at different stages.

- I. Understanding the fundamentals of non-motorised transport.
- II. Understanding how a city-wide NMT plan is developed and implemented.
- III. Knowledge-sharing of NMT planning through case studies.
- IV. Interactive exercise on tackling key design and implementation challenges.

The scope of the training focuses largely on the 'Plan and Design' phase of an NMT network. However, reading material has been listed for the rest of the development phases.



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## Abbreviations

CDP	City Development Plan
CMP	Comprehensive Mobility Plan
CMVR	Central Motor Vehicles Rules
CSCAF	ClimateSmart Cities Assessment Framework
IRC	Indian Roads Congress
NMT	Non-motorised Transport
NUTP	National Urban Transport Policy
PBS	Public Bicycle Sharing
RfP	Request for Proposal
ULBs	Urban Local Bodies
UTTIPEC	Unified Traffic & Transportation Infrastructure (Planning & Engineering) Centre



# 1

## Introduction

### 1.1. What is non-motorised transport?

Non-Motorised Transport (NMT), also known as active transport, refers to modes of transport which are powered by human power rather than other forms of energy like fossil fuels.

### 1.2. Different modes of non-motorised transport

In India, non-motorised transport includes much more than just walking and cycling. Given the historical use of streets for social activities, street vendor carts, cycle rickshaws, handicap tricycles, and occasional festive vehicles also fall under the NMT category.

Figure 1.1. Non-motorised Transport Modes



Walking



Cycling



Rickshaws



Bullock Cart



Vendors



PwD Tricycles

*Note: Source read clockwise - ITDP, CV Subrahmanyam (The Hindu), Prasad Kulkarni (Worldstreets.wordpress.com), Shalu Sharma, Adam Cohn, CC BY-SA 3.0 (ecobusiness.com), Shutterstock (The Telegraph)*

### 1.3. Why non-motorised transport?

Non-motorised transport has numerous benefits for individual users as well as society at large. It enables improvements to physical health, air quality, the environment, climate change, personal finance, accessibility, mobility and the empowerment of vulnerable groups. NMT is a green and clean mode of transport with low carbon footprints, minimal energy consumption and zero local emissions. Due to its affordability, it is the most preferred mode of transport in low-income households in India.

#### Social Benefits

1. Equitable and improved accessibility
2. Improved physical health
3. Improved public transit access
4. Improved road safety
5. Placemaking

#### Economic Benefits

1. Affordability
2. Reduced dependency on fuel
3. Tourist economy
4. Urban regeneration

#### Environmental Benefits

1. Low carbon form of mobility
2. Reduced congestion
3. Better air quality
4. Noise reduction
5. Sustainable development

# 2

## NMT Scenario in India

In India, around 50% of the population commute by foot or by cycle/cycle rickshaw. A 2008 study of 30 Indian cities found that in cities with more than 8 million population: 22% walked all the way, 8% used cycles and 44% used public transport. This adds up to 74% of people who rely on non-motorised transport for at least part of the commute (Singh, 2018). The high modal share of NMT is attributed to the relatively compact Indian cities with high population densities and mixed land use, resulting in shorter trip lengths. But this scenario is rapidly changing as cities in India are getting increasingly motorised with limited attention to NMT facilities, extreme heat and cold conditions and poor road safety leading to a decrease in the overall NMT trip modal share. A car-driven approach to city design has led to growing issues like pollution, lack of road safety, and congestion. High road accident rates with pedestrians and cyclists suggest that they are the vulnerable users of the Indian streets.

### 2.1. Challenges

The following are some of the key challenges faced by Indian cities in the NMT sector:

**Lack of safety and space:** Despite having a high modal share, most Indian roads are unsafe for walking and cycling. NMT users have the highest share of road accidents. Data suggests that car occupants are a minority when it comes to fatalities caused due to these accidents. In 2013, 50 one million-plus cities contributed to more than half the road accidents in the country (*0.1 million*) and about 32% of urban road accident deaths. This suggests a significant spatial conflict between NMT users and vehicular traffic, highlighting the lack of safe and quality infrastructure for the former. There is an overall lack of sensitivity for vulnerable road users.



**Poor-quality infrastructure:** There is a lack of dedicated infrastructure (*uniform pedestrian pavements, cycling paths*) coupled with its poor maintenance and upkeep. There is an urgent need to provide infrastructure proportionate to NMT usage. The prioritisation of uninterrupted flow of motorised vehicles needs to be shifted to enabling NMT users with a conducive environment, increasing accessibility for all. Streets need to be redesigned to allocate space for pedestrian pathways and bicycle lanes which follow the basic standards outlined in the guideline documents mentioned in chapter 5.

**Gaps in data:** Data related to NMT infrastructure and usage is poorly collected, analysed and presented. The table below shows the discrepancies in data gathered for the same city, at the same time but by different agencies (*Tiwari & Jain, 2013*). City-level traffic studies often predict the increase in demand for motorised transport, missing the component of projecting travel demand for NMT. Accident data collected by the police is also misrepresented or lacks investigation. Transparent data collection on NMT usage and infrastructure needs to be carried out by cities to understand their baseline scenario and to generate better-informed strategies.

**Weak implementation of policies:** Before 2006, the transport policy was mostly focused on investments in motorised transport. The NUTP 2006 policy talks about non-motorised transport to act as an independent mode of transport for short trips and last-mile connectivity. However, the on-ground implementation of NUTP has not yielded the desired results, and the mobility challenges have increased since then (*Kumar et al., 2015*).

These challenges are amplified by the phenomenon of urban sprawl and increasingly segregated and spread-out land-use patterns.

## 2.2. Opportunities

Cities are leveraging funding from the Smart Cities Mission to introduce projects like Public Bicycle Sharing and Smart Roads, paving the way for citizens to explore alternative and inclusive forms of transportation.

The COVID-19 pandemic has given the cities an opportunity to reorient city design and planning to encourage NMT usage. Cities worldwide have taken up extensive projects to expand their NMT network to promote a modal switch to walking and cycling. Cities like Milan have seen a surge in the number of cyclists by seven times as the people travelling on public transport switched to cycling to be able to maintain physical distance. Cities in Europe are investing close to 1 billion euros on cycle-related infrastructure, and more than 2,300 km of new bicycle lanes have been rolled out since the pandemic started (Vandy, 2020).

During the pandemic, India witnessed bicycle sales multiply, with nearly five million cycles sold between May and September 2020 (India Today, 2020). A survey on travel behaviour post-lockdown conducted by ITDP India in 2020 suggests that cycling is expected to increase by 50-65%.

Recent initiatives, by the Ministry of Housing and Urban Affairs, of Cycles for Change and Streets for People challenge have brought a healthy competitive spirit and inspired cities to initiate pedestrian and cycling-friendly through a participatory approach.

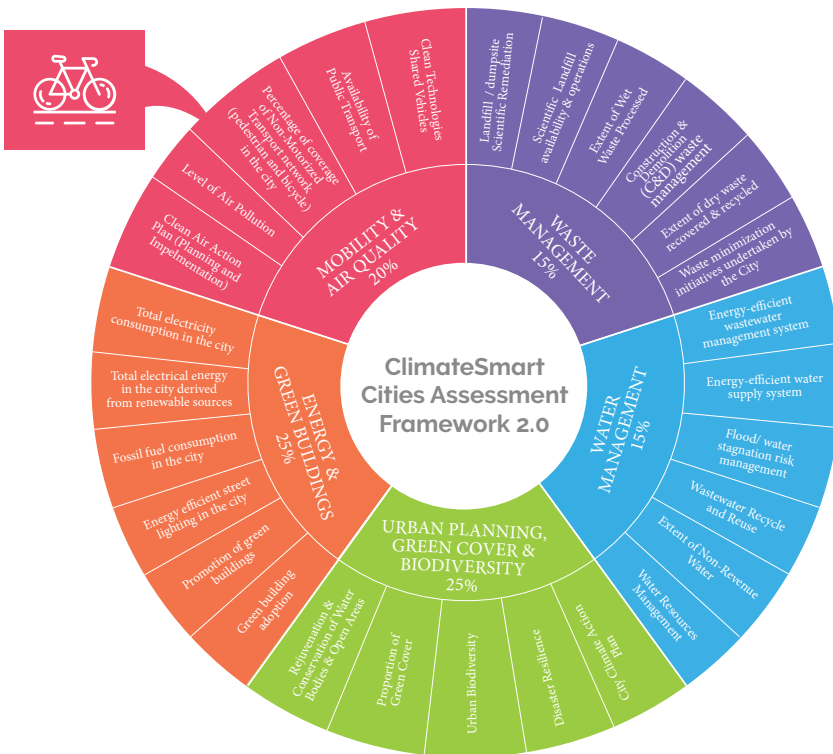


Photo Credits: Satyajeeet Mazumdar on Unsplash

# 3

## CSCAF Indicator: Percentage coverage of non-motorised transport in the city

Figure 3.1. Thematic areas and indicators of Climate Smart Cities Assessment Framework



**Rationale:** Developing the Non-Motorised Transport (NMT) network in a city addresses the problems related to the high consumption of non-renewable energies.

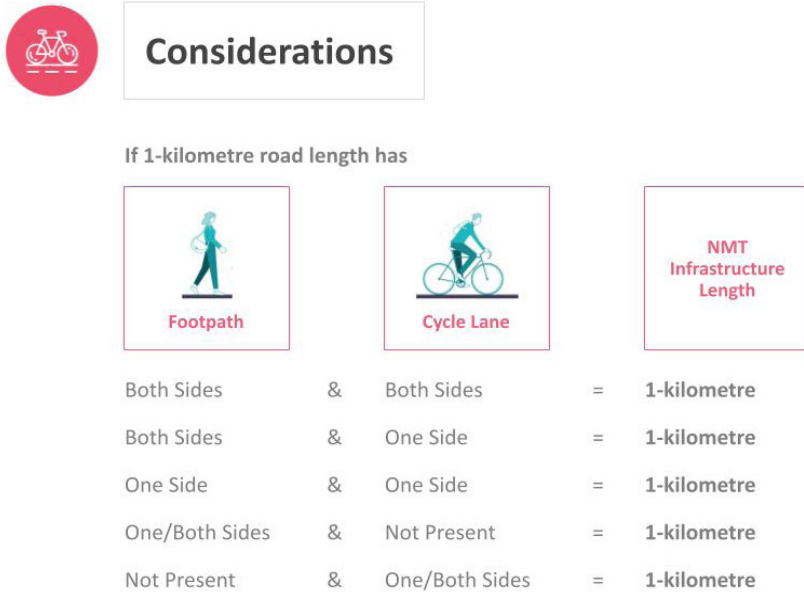
**Description:** This indicator assesses the network length for dedicated cycle lanes/ tracks and footpaths in the city on major road networks (*all arterial, sub-arterial roads and public transport corridors*).

**Methodology:** The city has to calculate the total length of footpath and cycle lanes/tracks. Footpath minimum width and cycle lane/track minimum width should be as per the street design guidelines of MoHUA.

Table 3.1. Performance evaluation of the indicator

	1	2	3	4	5
<b>Progression Levels</b>	NMT Coverage: Less than 15%	NMT Coverage: 15% to <25%	NMT Coverage: 25% to < 35%	NMT Coverage: 35% to < 50%	NMT Coverage: ≥ 50%
<b>Evidence/ Data sources</b>	<ul style="list-style-type: none"> <li>NMT Network plan of the city</li> <li>Annual completed list of NMT and Pedestrian projects of Public Works department and Municipal Corporations</li> <li>Bicycle lanes constructed in the city</li> <li>Map of NMT network in the city as a .kml file (line geometry with optional attribute: width of lanes)</li> <li>Map of bicycle lanes constructed in the city as a .kml file (line geometry with optional attribute: width of lanes)</li> </ul>				
<b>Responsible Department/ Agency</b>	State/ Municipal Corporation, SPV's – Public Transport companies, City Development Authority, Smart City SPV's, Regional Transport offices				
<b>Reference Document</b>	Promoting Non-Motorized Transport in Asian Cities: Policymakers' Toolbox (UN-Habitat and Shakti Sustainable Energy Foundation; 2013) <a href="https://tinyurl.com/wbjd5b3">https://tinyurl.com/wbjd5b3</a> Urban cycling design guidelines (UCDG) <a href="https://pmc.gov.in/sites/default/files/urban-cycling-design-guidelines.pdf">https://pmc.gov.in/sites/default/files/urban-cycling-design-guidelines.pdf</a>				
<b>Score</b>	0	25	50	75	100

Figure 3.2. Considerations for the CSCAF indicator



### Evidence required

1. An annual completed list of NMT and pedestrian projects of public works department and municipal corporation
2. NMT Network plan of the city, if present
3. Map of NMT network in the city (as a .kml/.kmz file)
4. Map of cycle track/lanes constructed by the city as a .kml/.kmz file

### Additional & optional evidence

Details of footpath or cycle track or cycle lanes

1. Road name & type
2. Right of way
3. Width of footpath & cycle track
4. Road length & length of footpath & cycle track
5. Presence of footpath on one side/both sides of the road



Photo Credits: Sushil Kumar Verma on Twitter

# 4

## Institutional Framework

### 4.1. Policy Premise

#### National Urban Transport Policy (NUTP) 2006

[Access the detailed document here.](#)

Any NMT projects proposed by cities should conform to existing policies at the national, state and city levels. The objective of the National Urban Transport Policy is to ensure safe, affordable, quick, comfortable, reliable and sustainable access for the growing number of city residents to jobs, education, recreation and other needs within our cities. The policy acknowledges the environmental and social benefits of NMT and proposes measures to give it its due share in the transport system.

This has been indicated by the following measures:

1. **Segregated lanes for bicycles and pedestrians** must be constructed to ensure the safety of cyclists and pedestrians. The segregation of traffic, as well as vehicles moving at different speeds, would improve traffic flow and reduce congestion and accidents.
2. The segregated paths must be designed along arterial roads as well as access roads to public transport nodes to encourage the usage of the public transport system. **Segregated NMT paths** are required not only along arterials but also access roads to public transport terminals. Infrastructure for parking and public sharing systems must also be designed.
3. Priority to parking spaces and convenient park and share facilities to **enable last-mile connectivity and the use of public transport** to reach city centres is recommended.
4. NMT facilities must be designed and constructed by **consulting experts and the end-users (community)**.



5. Exclusive zones for NMT or **priority to NMT** in congested urban areas will be supported by the Central Government.
6. Footpath activities like street vending must be designed or controlled to ensure **pedestrian safety**.

Post-2006, the focus of transport development shifted from heavy infrastructure to improving NMT infrastructure and public transport. JNNURM funds were linked to the NUTP vision to promote inclusive development.

#### **Central Motor Vehicles Rules (CMVR) 1989**

[Access the detailed document here.](#)

The CMVR was the first to highlight safety rules providing **passive protection for pedestrians**, stating that motorists cannot enter pedestrian ways and are liable to a penalty.

#### **Persons with Disabilities Act 1995 (Sec 44)**

[Access the detailed document here.](#)

This Act is an important consideration for the design phase as it mandates and presents guidelines to design **universally accessible infrastructure**.

## Urban Street Vendor Policy, 2007 and The National Policy on Urban Street Vendors, 2009

[Access the detailed document here.](#)

The two policies protect the livelihood and spatial rights of the street vendors. The Urban Street Vendor Policy recommends guidelines for **proper vending zones as service providers on the sidewalk**. The National Policy on Urban Street Vendors recognizes street vendors as a legitimate part of the urban retail trade giving them legal status. It aims to provide legal zones in city or town master or development plans to ensure spatial justice.

## 4.2. Guidelines and design standards

### UTTIPEC Street Design Guidelines

[Access the detailed document here.](#)

UTTIPEC was set up by the Delhi Development Authority to **enhance mobility, reduce congestion and promote traffic safety** by adopting standard transport planning practices, capacity building, enforcement measures, road safety audits, traffic engineering practices and better organizational coordination in the National Capital Territory of Delhi. The Street Design Guidelines issued by the body focuses on six key mandates:

1. Multimodal integration plan for metro stations
2. Pedestrian crossing facilities at vulnerable/accident spots
3. Standard typical crossing design
4. Synchronization of signals, signage & road markings etc.
5. Street design guidelines
6. Cycle sharing & other intermediate public transit (IPT)

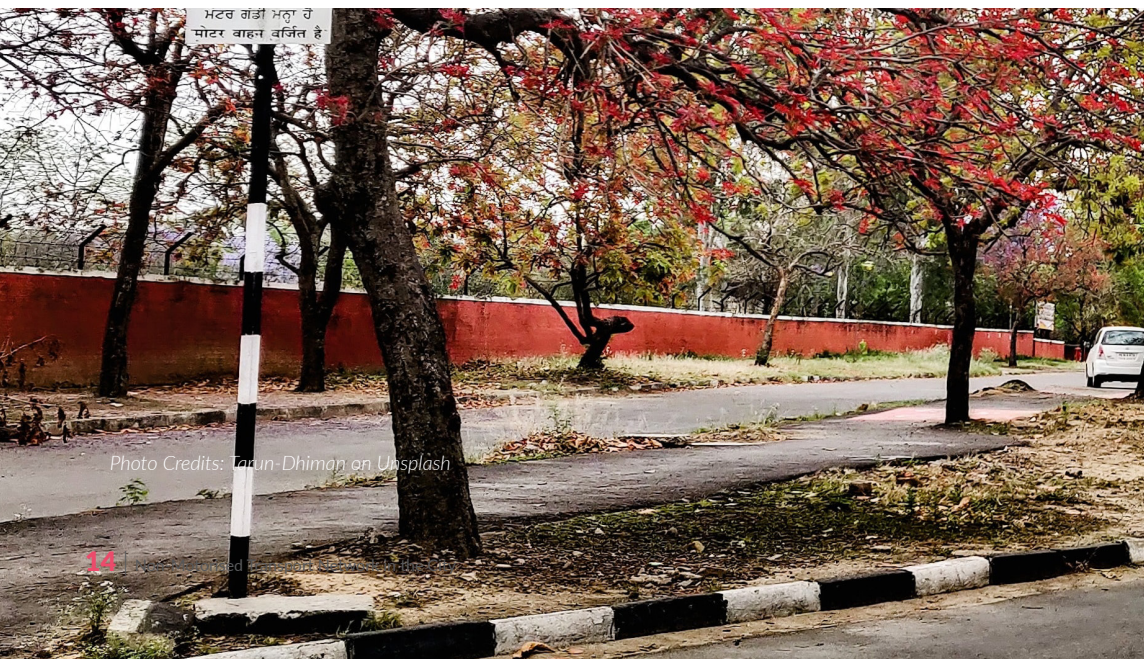


Photo Credits: Tarun Dhiman on Unsplash

## Urban Road Codes

[Access the detailed document here.](#)

The Indian Roads Congress issues Road Codes as a **guideline document for developing urban roads**. There are 15 such codes, with the latest update issued in 2003. Increasing traffic combined with a surge in the mix of modes warrants periodic revision of existing documents to suit the changing urban context. A new Code of Practice for the design of Urban Roads prepared by the Institute of Urban Transport in 2009 on behalf of the Ministry of Urban Development focuses on the changing character of the urban roads. The new code aims to serve as a bridge between the current research on **safe urban roads and safe road design** in cities today. The type and character of each urban road should respond according to the functions it performs, i.e. providing accessibility or safety or both. The codes are elaborated in 5 parts:

- Part I: Elaborates various norms and standards for urban road cross-section design.
- Part II: Elaborates various norms and standards for intersection design;
- Part III: Elaborates various norms and standards for road markings;
- Part IV: Elaborates various norms and standards for signages;
- Part V: Includes various norms and standards for traffic calming methods

## Better Streets, Better Cities - Street Design Guidelines (ITDP)

[Access the detailed document here.](#)

These guidelines were jointly published by ITDP and Environmental Planning Collaborative 2011 as a **reference for street design**. The guideline discusses the sixteen elements that make up a street, presents a set of templates for typical road widths and intersections and explains the process of designing a street to final completion through an example.



# 5

## Case Study

### 5.1. Coimbatore NMT Network Plan

[Access the detailed document here.](#)

#### Introduction

Coimbatore is the second-largest city in Tamil Nadu, with a population of about 2 million in 2019 across 257 sq km. 57% of the trips in Coimbatore are made by walking and public transport. Walking and cycling are used for first-mile and last-mile connectivity for 70% of the bus trips. Cycling is also preferred by a large population of about 1 lakh people every day for their commute (GIZ, 2020). However, with the increase in the number of private vehicles and poor NMT network, the users' safety on the streets is at risk.







Coimbatore City Municipal Corporation (CCMC) has prepared a NMT Network Plan for Coimbatore with the support of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. The CCMC aims to improve the safety and convenience of NMT users and, in turn, increase the modal share of NMT in the city through the city-specific NMT plan. The plan focuses on 26 pedestrian hotspots and a 290 km network of safe and convenient roads for cycling and walking (GIZ, 2020).

The primary objective of the NMT network plan is to form a comprehensive set of measures to provide the citizens with safe and convenient walking and cycling facilities and help Coimbatore adopt a sustainable, low-carbon mobility system by the year 2035. The plan envisions to benefit around 10 lakh people directly.

## Approach

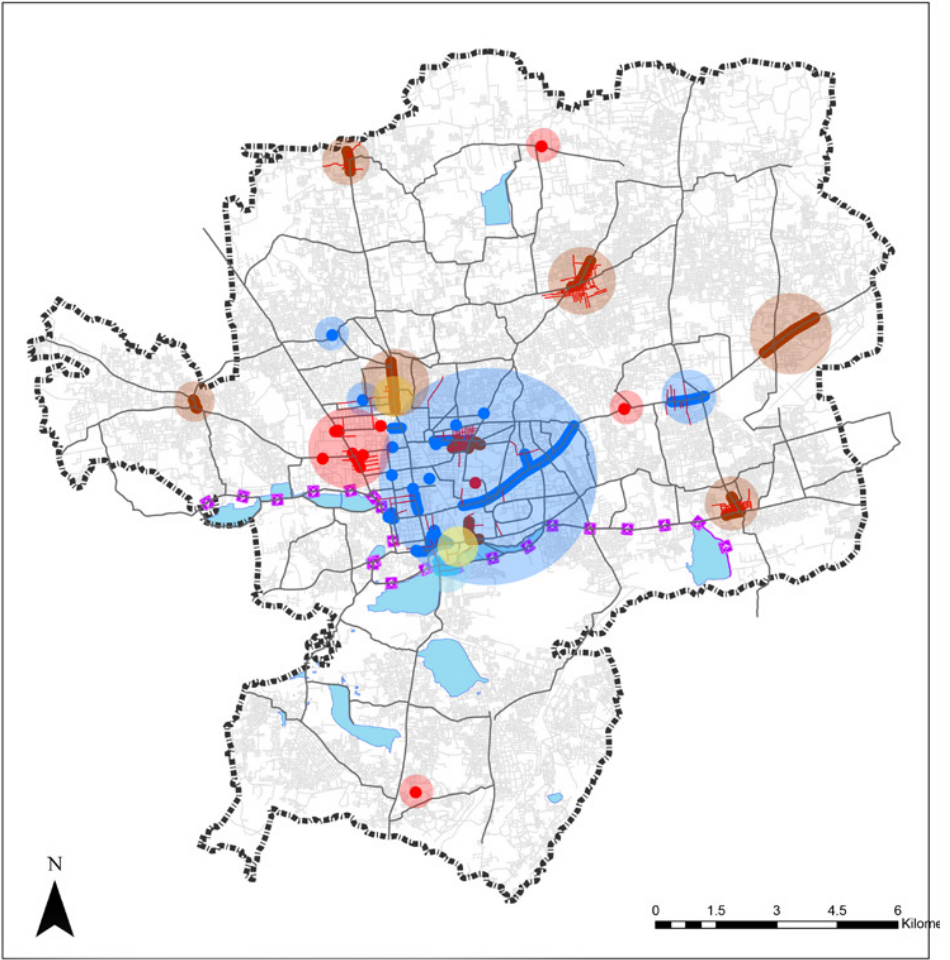
1. Assessing the existing scenario of road safety, accident hotspots, NMT nodes and public transport connectivity
2. Preparing a detailed project methodology and conducting stakeholder consultations for its approval
3. Conducting activity surveys in all pedestrian hotspots to understand the demand intensity
4. Identifying measures of different pedestrian hotspots and NMT routes based on the context

Figure 5.1. Proposed measures for the NMT Plan

Measure 0 – SIDEWALKS ON ALL THE STREETS		
Measure 1 – COMPLETE STREETS		
Measure 2– SHARED STREETS		
Measure 3– ONE-SIDED TWO-WAY CYCLE LANE		
Measure 4– PAINTED CYCLE LANES		
Measure 5– SPEED CONTROL MEASURES		
Measure 6– PROVISION OF SHADE		
Measure 7– PARKING MANAGEMENT		

Note. Source - A Non-motorised Transport Network Plan For Coimbatore, published by GIZ

Figure 5.2. Proposed NMT Network



## Proposed NMT Network

### Legend

--- Corporation Boundary

Waterbodies

Road

SCP - Eco Mobility Corridor

Proposed Bicycle Route

Pedestrian Priority Roads

Lakefront Zone

Station area zone

Retail zone

Campus Zone

Cultural Zone

Note. Source - A Non-motorised Transport Network Plan For Coimbatore, published by GIZ

## Implementation phasing

The NMT Plan proposes a network covering 294 km, comprising over 2500 road links spread across five zones in Coimbatore. It is planned to be implemented in five Phases. The project is proposed to be implemented through construction contracts and public financing. The total project cost is estimated to be approximately ₹1704 crores, with phases 1 to 5 costing 552.10, 265.63, 329.43, 337.62, and 219.65 crores, respectively (GIZ, 2020).

## Monitoring and evaluation

The existing institutional and monitoring framework of CCMC is proposed to be utilised for the execution of the citywide NMT Network Plan. An NMT Cell is also proposed to be established mid-way through the project to undertake the responsibilities of all activities associated with NMT infrastructure and services.

## 5.2. Chennai NMT Policy

[Access the detailed document here.](#)

### Introduction

Two-thirds of Chennai's population travel on foot, by bicycle or public transport. There is a lack of infrastructure for the low-income groups who are more likely to walk or cycle. There has been a steady decline in the modal share of cyclists and pedestrians from 41% in the 1970 study, 40% in the 1984 study, 46.6% in 1992-95 and 34% in 2008 to 28% in 2018. Chennai has one of the highest rates of road deaths in the country. The city encounters more than 10,000 accidents per year. This makes it pertinent for the city to create safer streets and roads in the city, especially for the most vulnerable groups – pedestrians and cyclists.

The coverage of sidewalk and cycle lanes stand at 17.03% and 0.26%, respectively. This adds to the lack of safety for the NMT users and acts as a prime reason for the reluctance of the citizens to opt for NMT as their everyday commute option.

### NMT Policy

The Municipal Corporation of Chennai, now called the Greater Chennai Corporation (GCC), adopted a Non-motorised Transport Policy in 2014, supported by the Institute for Transportation & Development Policy (ITDP) – India Programme. The policy aims to prioritise walking and cycling and increase the modal share of NMT in the city. The policy mandates a minimum of 60 per cent of the Corporation's transport budget be allocated to construct and maintain NMT infrastructure.

The policy aims to restrict the current decline in walking and cycling in the city by creating a safe and continuous network of footpaths, cycle tracks, greenways and other NMT facilities. The policy talks about building safe and continuous footpaths on at least 80% of all streets, increasing the share of walking and cycling trips to over 40%, and, most significantly, eliminating pedestrian and cyclist deaths.

Some of the goals of the policy are to improve access and mobility for all residents, socially and economically empower people through the provision of improved low-cost mobility, enable gender equity through the provision of NMT facilities that are safe for women to use, enable social inclusion in creating NMT facilities that follow principles of universal design, and involve local residents, businesses, and other stakeholders in the preparation of designs and standards in order to foster the community's active use.

To guide street design interventions, the policy talks about the creation of street design guidelines, which will include design templates for streets of various widths, minimum standards and design guidelines for footpaths, cycle tracks, BRT, intersections, signage and road marking and other street elements.

The GCC also urges the State Highways Department, the Chennai Metropolitan Development Authority, and other concerned authorities to adopt street design standards consistent with the provisions of the NMT Policy. Chennai has designed and implemented 75km of Complete Streets in different parts of the city.

Several projects and initiatives have been kickstarted under the policy's effect. Pedestrianisation of Pondy Bazaar, a commercial market space, is one such example. The city aims to transform 110 Kms of streets under the flagship 'Mega Streets' Programme. The RFP for the project is underway and is expected to be realised over the next four years.

## Evaluation

The Corporation will measure the effectiveness of the policy, using indicators detailed below.

1. Increase in the modal share for pedestrians and cyclists
2. Decrease in the traffic crashes involving pedestrians and cyclists
3. Increase in the footpath coverage
4. Increase in the cycle track coverage
5. Increase in the public transport mode share
6. Decrease in the personal motor vehicle kilometres travelled (VKT)





Photo Credits: Andrea Leopardi on Unsplash

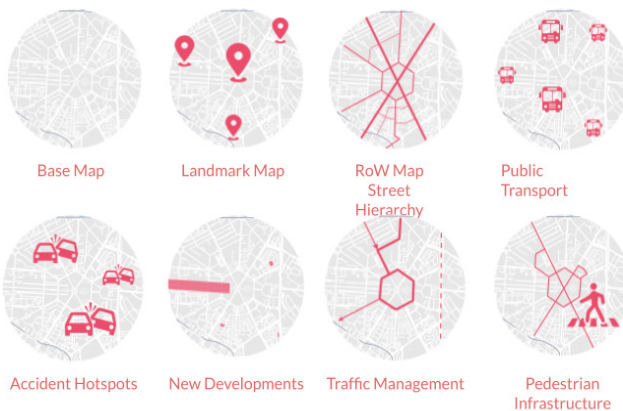
# 6

## Five-step process to develop NMT in the city

### 6.1. Step 1 - Assess

The 'Assess' section deals with the baseline scenario of NMT in the city through relevant information obtained from various sources. This includes an assessment of existing institutional structures, physical infrastructure, citizen needs and aspirations, existing initiatives and stakeholders' interests.

Figure 6.1. Data required for assessing the baseline scenario



Note. Source - Complete Streets Planning Manual, ITDP, 2020

The above-mentioned data could be sourced from Open Street Maps/Google Earth Pro, on-field surveys, state and national highways departments, traffic police, Urban Local Body, Road Owning Agencies, development authority, City Development Plans, Comprehensive Mobility Plans, detailed project reports, etc.

Read more: [Gathering baseline data \(Pages 22-33\)](#)

The document (*Complete Streets Planning Workbook*) details out the different types of datasets required to analyse the baseline scenario.

## 6.2. Step 2 - Engage

The 'Engage' section talks about involving all development actors in the process of improving NMT infrastructure and services in the city. It involves partnering with different departments, building the capacity of officials and engineers, conducting workshops with the designers, planners, and most importantly, enabling the participation of all citizens in the development process.

Read more: [Stakeholder communication & engagement](#)

The toolkit details out the different modes of engagement that can be carried out with stakeholders during the planning and implementation processes.

### 6.3. Step 3 - Plan and Design

The 'Plan and Design' section elaborates on the effective planning and design process to ensure that the NMT users have direct, accessible, coherent, safe, attractive and comfortable routes on their journeys.

Key principles of NMT design process:



**Connectivity**

A seamless, continuous, well-shaded network of pedestrian and cycle infrastructure encourages walking and cycling. Ensuring first- and last-mile connectivity with public transport systems is one of the basic objectives of an NMT plan.



**Safety and security**

Certain measures like sidewalks, raised medians, bus stop placement, traffic-calming, measures, and treatments for those with limited mobility – all improve pedestrian safety. Essential elements for ensuring safety and security include but are not limited to safe crossings, pedestrian traffic lights, street lights, bollards, clear signages, etc.



**Inclusivity and accessibility**

Design must consider and include the existing activities/usage of the space and provide universal access to people with all abilities. Some elements include well-sloped ramps, paving for the visually impaired, crossings for the visually impaired, child-friendly and elderly-friendly elements, etc.



**Wayfinding**

Wayfinding systems help create a sense of place within a community, knitting it together through consistent treatments to help residents and visitors navigate between points of interest. A comprehensive and coordinated wayfinding system can contribute to a community's distinct identity while improving mobility for many different types of street users.

## How to prepare a City-wide Plan?

1. Map existing street network and identify gaps
2. Develop NMT network plan with street hierarchy/typologies
3. Identify goals and targets for 5 to 10 year periods
4. Identify priority commuter and recreational NMT corridors
5. Establish statutory relevance

Read more: [Visakhapatnam NMT city-specific plan](#)

The document contains the city-specific NMT plan for Visakhapatnam along with its planning process and methodology.

## 6.4. Step 4 - Invest

The 'Invest' section builds a case for investing in NMT projects and identifies the possible financing options that cities could use to ensure that more funding is dedicated for NMT use. It could be initiated by incorporating specific guidelines on the allocation of transport budgets and aiming to allocate a considerable percent of total spending on transport initiatives for NMT projects.

Funding could also be sourced from parking fees, congestion pricing, convergence with national schemes, public-private partnerships and urban transport funds, if established.

Read more: [Funding commitment in the NMT Policy for Nairobi, Kenya \(Pages 16-18\)](#)

The document highlights the example of Nairobi's NMT policy where the city has recommended that a special NMT Fund be created. It also briefs upon other potential sources of funding for developing NMT infrastructure and services.

## 6.5. Step 5 - Test and Implement

The 'Test and Implement' section talks about testing a design solution on-ground through tactical urbanism techniques, reviewing the impact, making course corrections, and implementing it. This process involving the stakeholders and citizens proves to be efficient and economical.

Read more: [Mumbai's HP intersection redesign](#)

The blog talks about how one of Mumbai's most dangerous intersections was redesigned in 3 simple steps using a testing approach.

## 6.6. Key actions to improve and promote NMT

Figure 6.2. Some action points to improve and promote NMT in the city



Collect data and evidence to inform decisions



Develop a safe environment for cycle lanes and footpaths along with safe crossings - create awareness on road safety



Regulate signages and wayfinding



Integrate NMT network to public transport hubs for first and last mile connectivity



Integrate NMT network to public transport hubs for first and last mile connectivity



Allocate dedicated funds in the municipal budget for improving NMT Non-Motorised Transport Training Module



Prepare a city NMT plan



Photo Credits: Raghavendra Prasad on Unsplash

# 7

## Scenario building exercise

The interactive session is curated with an intent to gain an understanding of designing NMT-friendly spaces through a scenario building exercise.

1. A common street design challenge/scenario is presented, along with four possible options under each question.
2. The challenge/scenario is to be analysed to arrive at a ranking/priority of solutions in terms of non-motorised transport relevance, feasibility and ease of implementation.
3. The ranking/priority of solutions is to be indicated using coloured dots (*legend detailed below*).

 **Priority 1**

 **Priority 2**

 **Priority 3**


### 7.1. Warm-up quiz

01

Choose one or more options that describe the characteristics of complete walkways/footpaths. Complete walkways/footpaths:

Are easily accessible from all buildings along the walkway.

Are seamless and connected to the adjacent pedestrian network.

 Enable universal access to all users.

Have adequate and reliable lighting at night.



02

Choose one or more options that describe the characteristics of successful bicycling infrastructure.

Cohesion:  
Connecting origins and destination through cycle network.

Directness:  
Creating short and fast routes and minimising detours.

Safety:  
Providing protected lanes or avoiding differences in traffic speed.

Comfort:  
Providing a continuous network with minimal stops and no obstructions.

03

Which of these is a key challenge with regards to NMT improvement in your city?

Lack of planning and design expertise

Citizen and stakeholder consensus

Implementation

Funding and finances

## 7.2. Scenario building questions

04

Consider a street in a high volume commercial zone with issues of speeding motor vehicles and encroachment on the existing sidewalk.

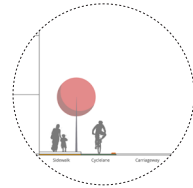
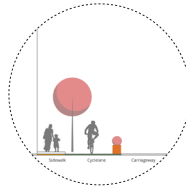
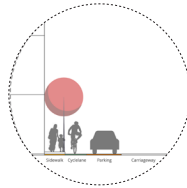
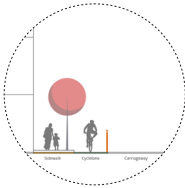
**Which of the elements would work best for better pedestrian/cyclist safety?**

Add bollard as a segregating element.

Use landscaping or greenery as segregation.

Use parking as a protective edge for NMT.

Use kerbs or delineators as segregation.



Commercial streets are usually social spaces, too, having a high volume of public and informal economic activities. Speeding vehicles and encroachment are major challenges experienced in commercial streets. There are several design solutions to tackle the issue of speeding vehicles in these commercial zones.

The motorised and non-motorised transport can be separated through elements such as bollards, kerbs and delineators. In many cases, parking and landscaping are also used as protective edges for NMT users.

05

Consider a street which faces high speeding at the mid-block level which endangers the safety of pedestrians while crossing.

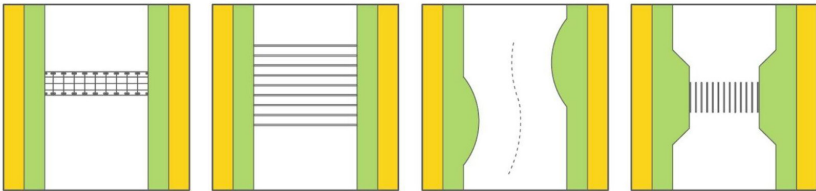
**Which of the below measures has been the most effective in your city?**

Add a speed bump or hump.

Add rumble strips at appropriate intervals.

Form a chicane.

Create a pinch point.



Traffic calming is a useful way of controlling drivers' speeds where speeds are either excessive or inappropriate for the type and use of a road. The justification for installing traffic calming is often based on improving safety by reducing accidents. Changes in speed have been shown to bring about changes in injury accidents. A rule of thumb is that a 5 per cent reduction in injury accidents can be expected to result from a one mph reduction in mean speed (Taylor *et al.*, 2000).

Speed bump/hump, rumble strips, chicane and pinch point, are some measures of traffic calming. These measures help in strategically reducing motor vehicles speed while making it safer for pedestrians or cyclists to cross. Pinch point as a traffic calming measure also helps in reducing the crossing distance for the NMT users.

Intersection crashes are one of the most common types of crash problem, particularly in urban areas.

**Which of the following is a major cause for intersection crashes in your city?**

Inadequate sight distance to on-coming vehicles.

High approach speeds.

Lack of intersection visibility.

Complex intersection layout.

Intersection crashes are one of the most common types of crash problems, particularly in urban areas. A number of different intersection crash types can occur, including Collision between oncoming vehicles, particularly when turning across traffic, right-angle collisions, where neither vehicle is turning, right-angle or side-swipe collisions where one or more vehicles are turning, and rear-end crashes.

There are a number of causes of intersection crashes, including inadequate sight distance to oncoming vehicles, high approach speeds, lack of intersection visibility, lack of gaps in traffic, complex intersection layout etc.

Understanding the cause of a road crash is crucial to making streets safe for all types of users. Systemic road accident investigations and documentation can help in obtaining useful data and gathering insights on how to tackle the challenge. The intervention of improving the safety of the intersection or street could be taken up by the concerned authorities/departments based on the evidence collected.

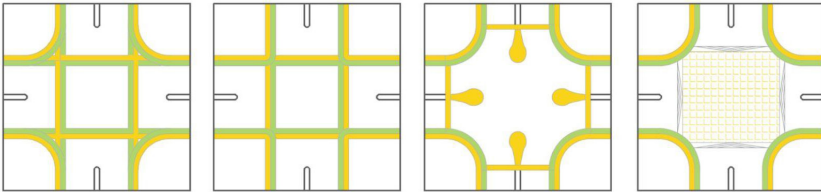
**Which of the interventions would work best for better pedestrian/cyclist safety?**

Add/highlight pedestrian and cycle crossing.

Reduce corner radii to reduce crossing distance.

Incorporate refuge islands at medians.

Create a tabletop intersection.



There are multiple ways to make an intersection safe for pedestrians and cyclists. Highlighting the pedestrian and cyclist crossing using simple materials like paints can enhance the visibility and thereby, assist in their safety. Like in the example of the pinch point, reducing the corner radii of the intersection could reduce the crossing distance of the users. The usability of this intervention can be tested in tactical ways with the help of barricades, hazard cones or similar temporary segregating elements.

In the case of vast intersections, the addition of refuge islands that act as waiting areas for people while crossing becomes important. Another way to ensure the safety of NMT users is to create a raised/tabletop intersection. Tabletop intersections reduce the speed of motorised vehicles, enhance the visibility of pedestrians and also make the crossing seamless and convenient.

In your old city commercial area (high-density), there are parking and congestion issues.

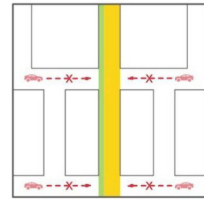
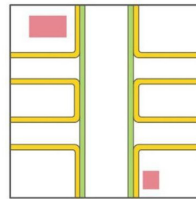
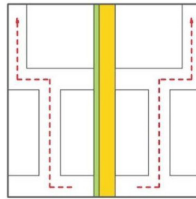
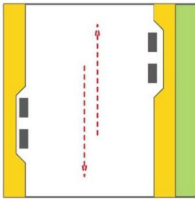
**Which of the aspects will work best for decongestion?**

Organise parking along the street.

Convert the street into a pedestrian and cycle only zone while rerouting the motorised traffic.

Convert an underutilised site into a parking zone.

Create a car-free zone in the main street.



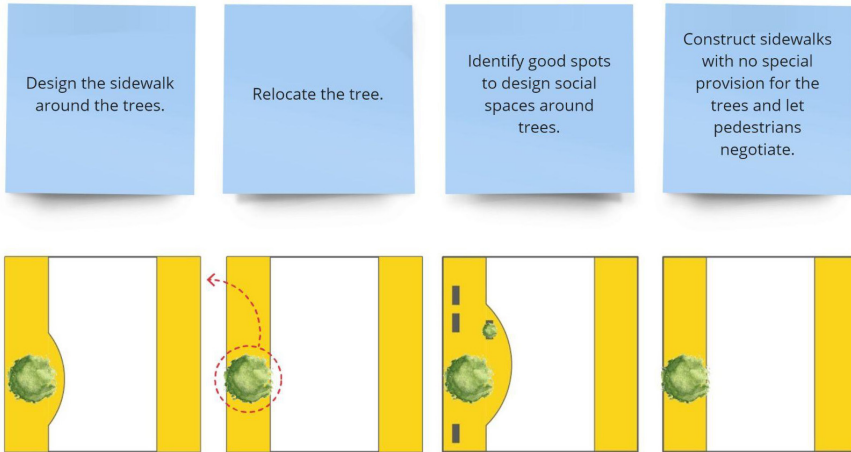
Parking challenges are faced by most bazaar streets in India. Unregulated parking results in hindered pedestrian access and low-profit margins for the traders/shop owners. Regulating the parking has proven to increase user safety and also decongest the bazaar.

Based on the availability of space, parking could be organised along a street. There are also successful examples of market spaces that have been pedestrianised. Chandni Chowk in New Delhi is a recent example of how it has been managed through redevelopment.

In certain instances, an underutilised site within the vicinity of the market has been converted into a parking zone. Interventions like these, if taken up by the city administration, can generate revenue which can then be utilised to further improve the streets.

In an institutional zone, a few trees along the stretch are posing a challenge to the design of footpaths.

**Which of the approaches would you take to design the footpaths?**



Trees are one of the most important components of street design as they improve the air quality and enhance the street experience of a lot of users. However, sometimes due to inconsistent design and planning, trees can limit the pedestrian experience. Many times, trees are viewed as obstructions on sidewalks. If their placement is designed strategically, trees can benefit all the users on the street by regulating vehicle movements and also improving the microclimate.

Transplanting a tree is not a good alternative since the survival rate is only about 50%. The process is also cost-intensive.

Read more: [Footpath Fix by ITDP \(Pages 17, 38\)](#)

The document is a guide to implementing footpaths in Indian cities. It provides guidance on construction detailing, especially that of different utilities (*Trees included*).

Consider a street with a huge number of vendors. This attracts high footfall but also adds to the congestion.

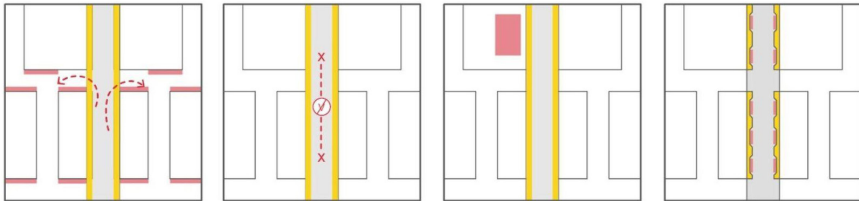
**Which of the approaches would you take to redesign the street?**

Relocate the vendors to the feeder streets.

Convert street into a no-vending zone to reduce congestion.

Organise them within an empty plot adjacent to the street.

Strategically organise and allocate spaces for the vendors along the street.



Street vendors are an integral part of Indian street culture and contribute to the informal economy. Usually, they set up their small stalls or businesses on encroached space meant for transportation. Regulating the vendor spaces as per their business requirements and also in the interest of road movement should be the way towards decongestion. Engagement of all stakeholders, including vendors, in this case, is crucial to the creation of livable streets. Participatory design is a proven method of tackling challenges and designing streets for all.

Saiyadpura and Bhatar markets in Surat are examples of organising vendor spaces. The Surat Municipal Corporation has allocated spaces for street vendors and improved the markets' infrastructure.

The Sunday Market in Bhopal operates only on Sundays when the roads are pedestrianised. Paid parking is provided nearby to support market activities.

There are also instances where the vendors are provided vending space through off-street provisions, like in the case of Laxminagar Hawkers' Zone in Rajkot.



Consider a mixed-use street having multiple schools. Speeding vehicles make it unsafe for school children to access the street.

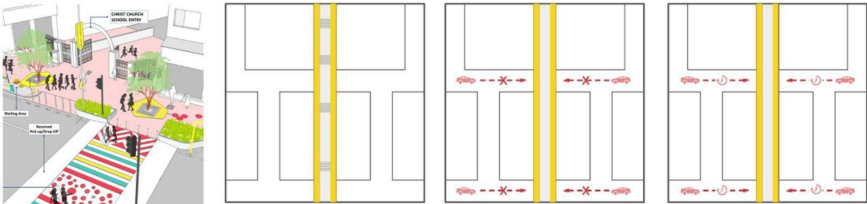
**Which of the approaches would you take to ensure children's safety?**

Create vibrant and child-friendly NMT infrastructure.

Transform the route into a low-speed zone.

Convert the route into a car-free street.

Make temporary closures to motor vehicles during peak school movement hours.



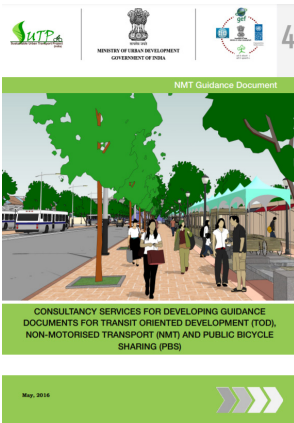
A 2017 report prepared by the Ministry of Road Transport & Highways estimates 25 children die on Indian roads every day. Around 60,000 children are killed from road accidents in India every year, many of them as pedestrians. Children are one of the most vulnerable users on roads (Luke et al., 2020).

Ensuring the safety of children on streets, especially near schools, parks, and community centres, is vital. Implementing traffic calming measures in and around school zones can help in maintaining low vehicle speeds. Other elements like safe crossings and clear signages enhance the safety of children. In addition, designing and creating vibrant, child-friendly NMT infrastructure ease children's access to schools and also encourage independent, active travel.

## List of Reference Materials

Reference materials that can aid in planning and developing NMT infrastructure and services – planning & policy guidance, templates & toolkits for surveys and documentation, guidelines and tools for street design, parking and public bicycle sharing guidance, templates for RfP, and guidance for implementation and evaluation of projects – are listed below. Click on the underlined text to access the documents and web links.

### 8.1. NMT Planning and Policy Guidance



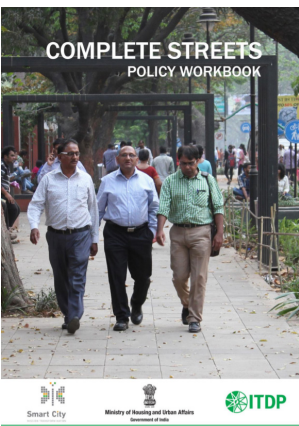
#### *NMT Guidance Document, 2016* by MoHUA

This NMT Guidance Document presents a compendium of strategies and recommendations for integrating accessibility with land use and infrastructure investment decisions in shaping NMT-friendly street designs. It also identifies a five-step planning process for local authorities, central government agencies and development professionals to follow.



### *Complete Street Policy Framework* by ITDP India

This book provides a basic understanding for the need for complete streets in our cities. It introduces the principles of complete street design and looks at the benefits of this approach, through various cases at the national and international level.

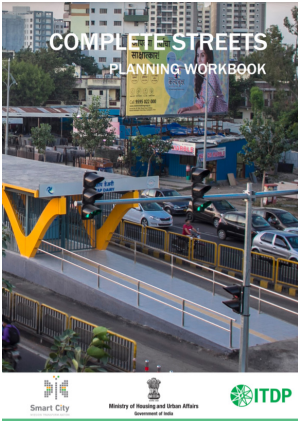


### *Complete Streets Policy Workbook* by ITDP India

This book helps understand the need for cities to adopt a complete streets policy. The various stages of policy framing, from envisioning and goal setting to stakeholder engagement are discussed in detail, stressing the need for a robust institutional framework that facilitates collaboration.

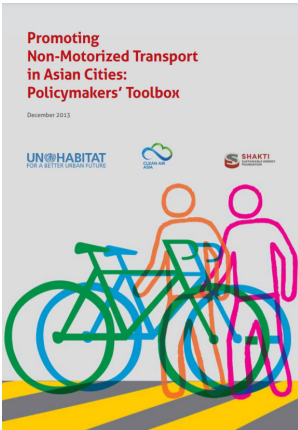
**Policy Template** by ITDP India

This is a Complete Street Policy Template, developed by ITDP India.



**Complete Streets Planning Workbook** by ITDP India

This book aims at assisting cities in the setting of a progressive long-term vision, providing a step-by-step guidance to city officials, engineers, planners and consultants on creating a city-wide network. It aims at creating a masterplan for a Complete Streets network with proposed phasing and investment.



**Promoting Non-Motorized Transport in Asian Cities: Policymakers' Toolbox** by UN-Habitat

The toolkit elaborates on how to improve NMT in Asian cities and gives an overview into the assessment, planning and implementation aspects.

**NMT Strategy Template** by ITDP

This is an NMT Strategy Template, developed by ITDP and UNEP.

## 8.2. Survey Templates and Toolkits

### *NMT facility audit form (JSON format) by ITDP*

This survey covers footpath presence and quality; presence of crossing facilities and traffic calming; parking, vending; universal access elements; and cycle facilities. The survey form is filled out once per block.

### *NMT count survey form by ITDP*

This is a survey form for NMT cordon counts with disaggregation by gender, disability, and age.

### *On-street parking occupancy survey form by ITDP*

This survey records the number of vehicles parked on each block, classified by type. The data can be used to calculate the parking occupancy rates.

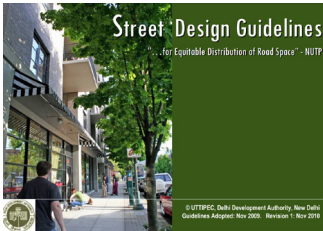
### *NMT perception survey form by ITDP*

This survey seeks to gather input on perceptions about the walking and cycling environment and views on priority improvements.

### *iRAP Road Safety Toolkit*

The toolkit provides Information on the causes and prevention of road crashes that cause death and injury.

## 8.3. Street Design



### *Street Design Guidelines by UTPIPEC*

This document outlines a set of 10 non-negotiable Street Design Components as well as additional guidelines to design equitable streets.



### *Better Streets, Better Cities by ITDP India*

The manual identifies the different functions of streets and emphasizes the need to design complete streets that provide space for all users. Through the street and intersection templates one can get a sense of how the different elements come together for different types and sizes of streets.



### *Urban Street Design Guidelines, Pune 2016*

The Urban Street Design Guidelines give an overview of various elements that go into designing streets making them universally accessible, and also provide standard templates for different sizes and uses of streets.



### *Complete Streets Design Workbook by ITDP India*

This book aims at setting guidelines for the design of complete streets. The document elaborates on the best practice standards and guidelines as well as the process of designing complete streets to city officials, engineers, urban designers and consultants.



### *Coimbatore Street Design & Management Policy, 2017*

This is the Street Design and Management Policy adopted by Coimbatore City Municipal Corporation in 2017.



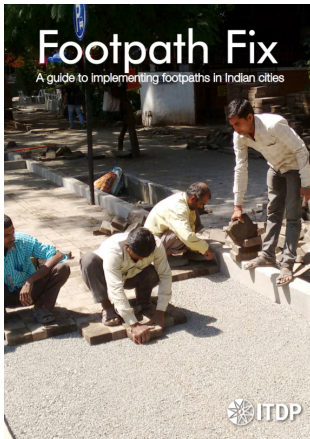
## Footpath design

A guide to creating footpaths that are safe, comfortable, and easy to use

November 2013

### *Footpath Design: A guide to creating footpaths* by ITDP India

This is a quick reference guide that highlights key concepts from the IRC Guidelines, including footpath design standards that have been updated in the present Revision. The guide also draws from local and international best practice for some themes not covered in the IRC publication.



## Footpath Fix

A guide to implementing footpaths in Indian cities



### *Footpath Fix: A guide to implementing footpaths in Indian cities* by ITDP India

The document is a guide to implementing footpaths in Indian cities. It provides guidance on construction detailing, especially that of different utilities. It highlights the typical steps of project implementation in chronological order that can ensure a good product and the precautions that must be taken at each stage of the construction process.

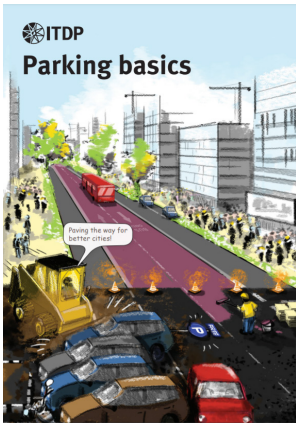
### *Pedestrian Safety: A Road Safety Manual for Decision-Makers and Practitioners* by WHO

This document describes: the magnitude of pedestrian deaths and injuries; key risk factors; ways of assessing the pedestrian safety situation in a given setting and preparing an action plan; and how to select, design, implement and evaluate effective interventions. The manual stresses the importance of a comprehensive, holistic approach that includes engineering, legislation and enforcement as well as behavioural measures.

### *Streetmix*

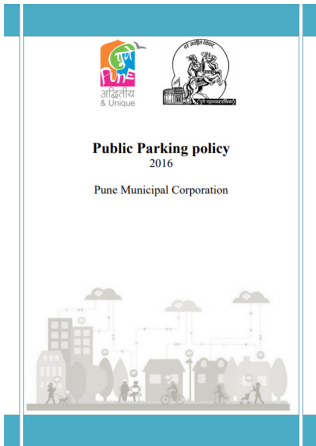
An online tool to design, remix, and share your street. The tool has provisions to add bike paths, widen sidewalks or traffic lanes.

## 8.4. Parking and PBS



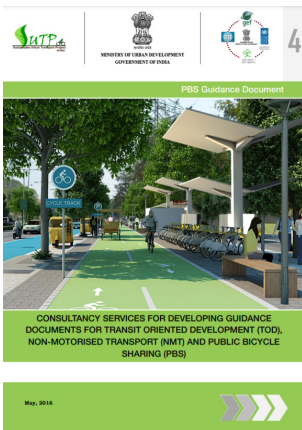
### *Parking Basics* by IT DP India

This book provides a basic understanding of on-street parking and off-street parking along with ways to manage them effectively.



### *Public Parking Policy, Pune 2016*

This is the Public Parking policy adopted by Pune Municipal Corporation in 2016.



### *Public Bicycle Sharing Guidance Document*

This PBS Guidance Document presents a compendium of strategies and recommendations for integrating bicycle sharing in transportation planning initiatives in India.



## 8.5. RfP Templates

[Template RfP for hiring design consultant](#) by ITDP India

[Template RfP for hiring implementation agency](#) by ITDP India

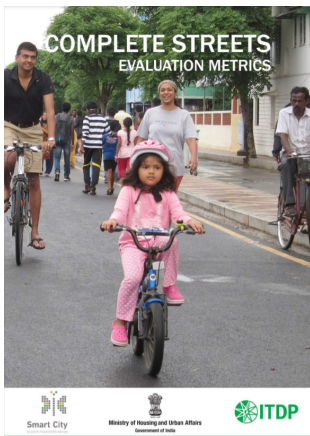
[Template RfP for hiring O&M agency](#) by ITDP India

## 8.6. Implementation, Evaluation and Best Practices



### [Complete Street Implementation Workbook](#) by ITDP India

This document provides guidance for urban designers, municipal engineers and contractors on construction detailing and management of complete streets. The document aims to function as a checklist for project implementation, providing guidelines based on best practices in the field.



### [Complete Streets Evaluation Metrics](#) by ITDP India

This book describes key outcomes, outputs and performance indicators for monitoring a city's progress towards transforming its streets to Complete Streets.



### *Complete Streets Best Practices* by ITDP India

This document covers the challenges and learnings from complete streets case studies in multiple cities across India. The best practices involved in the various stages of making complete streets a reality, from policy to implementation are covered in this book.

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Government of India**