COMPLETE STREETS
BEST PRACTICES

Smart City
MISSION TRANSFORM-NATION

Ministry of Housing and Urban Affairs
Government of India

ITDP

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Ministry of Housing and Urban Affairs
Government of India

The Ministry of Housing and Urban Affairs is the apex authority of Government of India to formulate policies, coordinate the activities of various Central Ministries, State Governments and other nodal authorities and monitor programmes related to issues of housing and urban affairs in the country. The Smart Cities Mission was launched by the Ministry in 2015 to promote sustainable and inclusive cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions.

ITDP

The Institute for Transportation and Development Policy works around the world to design and implement high quality transport and urban development systems and policy solutions that make cities more livable, equitable, and sustainable.

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introduction

Complete Streets (CS) are streets with safe, and continuous footpaths, segregated cycle tracks, safe pedestrian crossings with refuges, uniform carriageway and organised on-street parking. These streets prioritise safety, convenience, and comfort of all users regardless of their age, ability, or mode of transportation. By promoting walking and cycling or “non-motorised transport” (NMT), complete streets help in achieving the sustainable goals of the city. Such high-quality streets make a city truly livable and transforms public spaces into community hubs where people can meet, interact, do business, and have fun.

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.

Other volumes of this toolkit are

i. Complete Streets Policy Framework
ii. Complete Streets Policy Workbook
iii. Complete Streets Planning Workbook
iv. Complete Streets Design Workbook
v. Complete Streets Implementation Workbook and
vi. Complete Streets Evaluation Metrics
vii. Complete Streets Best Practices

creating complete streets

Complete Street A street designed to cater to the needs of all users and uses, through equitable allocation of road space is referred to as a complete street.

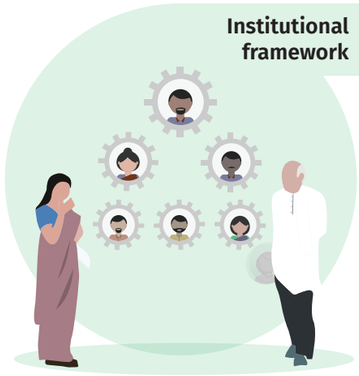
Volume 01 of the Complete Streets Toolkit - Complete Streets Policy Framework - adresses the rationale for making improvements to streets.

Transforming successful pilots into larger city-wide networks of complete streets requires cities to embrace a progressive long-term vision. This can be achieved by adopting a Complete Streets Policy.

Volume 02 of the Complete Streets Toolkit - the Complete Streets Policy Workbook - for Smart Cities across India, provides a step-by-step approach for developing and adopting a Complete Street Policy that is supported by a strong institutional set-up.

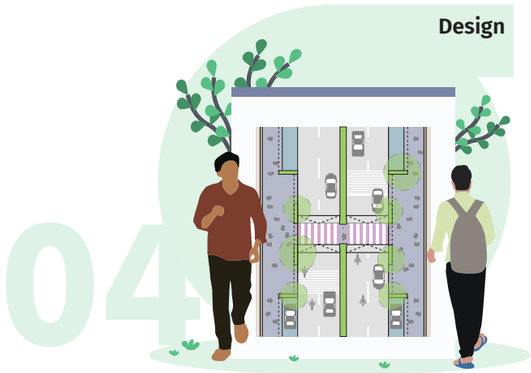
Volume 03 of the Complete Streets Toolkit - Complete Streets Planning Workbook- provides a step-by step guidance to city officials, engineers, planners and consultants on creating a city-wide walking and cycling networks.

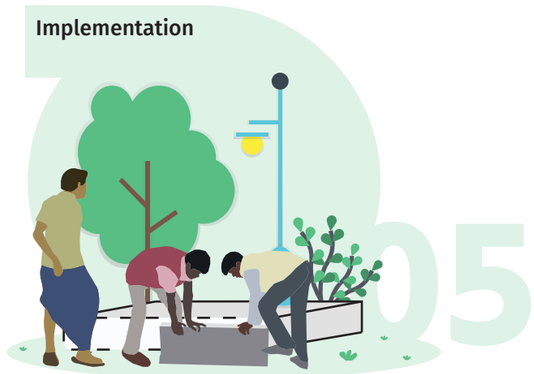
The output created through this process includes a long-term masterplan for a Complete Streets network with proposed phasing and estimated investment. These include streets with continuous footpaths, segregated cycle tracks (where possible), safe intersections, uniform carriageways and organised parking; as well as greenways, pedestrian-only streets, non-motorised vehicle and public transport priority streets, shared-streets, and junction redesign projects.



Creation of complete streets involves cooperation and collaboration between multiple stakeholders (such as urban local bodies, traffic police, planning agencies, consultants, experts, community groups and others) at different stages, at both the city and zonal level. Setting-up a dedicated committee and cell, as elaborated in volume 02, is an essential step to ensure the successful implementation of the complete streets projects.

It is important to obtain the reviews and approval from various stakeholders at each stage of the process of creation of complete streets to ensure that the end product caters to the expectation and needs of all.





More often than not, the process of creating complete streets happens in isolation without involving the end users or the other agencies pivotal to the operation of the street. This leads to a disconnect between the local context and the design, which eventually renders the redesigned street unusable.

A participatory approach to street design involves the stakeholders - government representatives, public, NGOs, etc - in the design process to ensure that the final design caters to the needs of the intended users. The result of such a process is invariably more feasible and also innovative.

Many cities have initiated work on redesigning their streets. However, owing to the lack of a single guiding document for street design, cities are currently following different methods and standards. There is thus an urgent need for a national-level document that serves as guidelines for the design of complete streets.

Volume 04 of the Complete Streets Toolkit - the Complete Streets Design Workbook - for Smart Cities across India, elaborates on the best practice standards and guidelines as well as the process designing complete streets to city officials, engineers, urban designers, and consultants.

Apart from design execution, the mismanagement of the entire construction process can cause delays and inconvenience to residents. The diversion of traffic, dug-up roads with poor attention to on-site safety, obstruction at property entrances, and water logging add to the problems of residents.

Volume 05 of the Complete Streets Toolkit - the Complete Streets Implementation Workbook - for Smart Cities across India, aims to highlight the typical steps of project implementation that can ensure a good final product - a truly Complete Street.

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List of acronyms

BoQ	Bill of Quantities
BRR	Bus Route Roads
BRT	Bus Rapid Transit
CS	Complete Streets
CSMP	Complete Streets Master Plan
DBM	Dense Bitumen Macadam
DIP	Ductile Iron Pipes
DLC	Dry Lean Concrete
DWC	Double wall corrugated
FFL	Finished Floor Level
FRP	Fibre Reinforced Plastic
GIS	Geographic Information System
HDPE	High Density Polyethylene
HRIDAY	Heritage City Development and Augmentation Yojana
IRC	The Indian Road Congress
IPT	Informal Public Transport
MEP	Mechanical, Electrical and Plumbing
MLCP	Multi-Level Car Parking

List of acronyms

MRT	Mass Rapid Transit
MS	Mild Steel
MUZ	Multi-Utility Zone
MoRTH	The Ministry of Road Transport and Highways
NMT	Non-Motorised Transport
PCC	Plain Cement Concrete
PCU	Passenger Car Unit
PMV	Personal Motor Vehicle
PQC	Pavement Quality Concrete
PVC	Polyvinyl Chloride
RCC	Reinforced Cement Concrete
RCC NP3	Reinforced Cement Concrete - Non-Pressurised class 3
RfP	Request for Proposal
RoW	Right-of-Way
ToR	Terms of Reference
ULB	Urban Local Body
WBM	Water Based Macadam
WMM	Wet Mix Macadam

definitions

Accessibility Facilities offered to people to reach social and economic opportunities, measured in terms of the time, money, comfort, and safety that is associated with reaching such opportunities.

Average trip length The average distance covered by a transport mode for a trip. This is commonly measured in kilometres.

Bus rapid transit (BRT) High quality bus-based mass transit system that delivers fast, comfortable, reliable, and cost-effective urban mobility through the provision of segregated right-of-way infrastructure, rapid and frequent operations, and excellence in marketing and customer service.

Bulb-out Lateral extensions of the footpath into the carriageway to reduce the crossing distance for pedestrians. They reduce vehicle speeds, provide enhanced protection and visibility for pedestrians, and lower the time taken to cross the street.

Complete streets Streets that are designed to cater to the needs of all users and activities, through equitable allocation of road space. Complete streets provide safe and inclusive environments that support users of all age groups, genders, and physical dispositions. They also guarantee efficient mobility by focusing on moving people, user safety, universal accessibility, vitality and liveability, sensitivity to local context, and environmental sustainability.

Eyes on the street Informal surveillance of any street by the residents, shopkeepers, and other users of the street.

Greenway A linear, landscaped pedestrian or bicycle route based on natural passages such as canals, rivers, or other scenic courses. It is typically for recreational use, with an emphasis on conserving and preserving vegetation.

Informal Public Transport (IPT) This includes vehicles like share autos, vans, minibuses that operate on a shared or per seat basis on specific routes, in an unregulated or semi-regulated environment, and with no government support. The service may or may not have a predefined “fare structure”.

Mass rapid transit (MRT) A high quality public transport system characterized by high capacity, comfort, overall attractiveness, use of technology in passenger information system, and ensuring reliability using dedicated right of way for transit vehicles (i.e. rail tracks or bus lanes).

Mobility Conditions under which an individual is capable of traveling in the urban environment.

Mode share The share of total trips carried out by different modes of urban transport including, but not limited to walking, cycling, bus, rail, share auto-rickshaws, private auto, two wheelers, and cars.

Non-motorized transport (NMT) All forms of human powered transportation including, but not limited to, walking and cycling.

On-street parking The space occupied by parked vehicles along the edge of the street or carriageway which otherwise could have been used by motorized or non-motorized traffic.

Off–street parking The term refers to the dedicated spaces provided for parked vehicles outside the right-of-way. It includes parking lots, multi-level car parking and other off-street facilities.

Public Transport (PT) Shared passenger vehicle which is publicly available for multiple users.

Parking management A mechanism to facilitate efficient use of street space to ensure additional space dedicated for pedestrians, cyclists, public transport, and motorists. In addition, over time, collecting a fee for parking can manage its demand and ensure that personal motor vehicle users compensate the city for the use of valuable land on which they park their vehicles.

Right of Way (RoW) Measure of the width of the road taken from compound wall/edge on one side of the street to that on the other side.

Shared street A street where formal distinctions between spaces allocated for various users, is removed. The concept of shared streets is to ensure that each street user becomes progressively more aware and considerate of the others in the street. Specific design interventions can be made to force the vehicles to slow down and match the pace of those on foot.

Sustainable transport modes The following modes are categorized as “sustainable modes” of urban transport because, when compared with personal motor vehicles, they consume the least amount of road space and fuel per person-km and also cost much less to build the infrastructure: walking, cycling, and public transport (including a regular bus service as well as MRT systems).

Traffic calming Traffic calming measures ensure pedestrian and vehicle safety by reducing the speed of motor vehicles through vertical and/or horizontal displacements, real/perceived narrowing of carriageways, material/colour changes that signal conflict point, or complete closure of streets for vehicular traffic.

1

CHENNAI STREET DESIGN PROJECT

1 Chennai street design project

city area	426 sq.km.
population	7.1 million
total length of roads in city	2847 km
length of streets reconstructed	75km
implementing authority	Greater Corporation Chennai, Chennai Smart City Ltd.

background

Over two thirds of the daily trips in Chennai are made by walk, cycle or public transport. As in other cities of India, walking and cycling are an integral part of Chennai's transport landscape. Realising the need to invest efforts in improving sustainable transportation systems in the city, the Chennai Corporation has been promoting initiatives prioritising pedestrians and cyclists since 2013, through progressive policies and projects.

Chennai started its non-motorised transport journey with 26 streets redesigned to have comfortable walking infrastructure. The city's commitment to safer access for pedestrians and cyclists was further reinforced when Chennai Corporation's Council adopted a progressive NMT policy in 2014. The car-free Sundays in Besant Nagar, launched in 2015, has been a big step towards the transformation of the street into a public space in Chennai. Expanding its network gradually, Chennai now has 75km of Complete Streets. For this comprehensive approach to improving sustainable transport, the Corporation of Chennai was recognized with Sustainia Award in 2015.

goal

1. To increase share of walking and cycling trips to over 40 percent by 2018
2. By building safe and continuous footpaths on at least 80 percent of all streets
3. To reduce pedestrian and cycling deaths
4. To allocate a minimum of 60 percent of the Corporation's transport budget to construct and maintain footpaths and cycle tracks

In order to achieve this, Chennai set in motion a multi-pronged approach to revision its streets as complete streets.

Chennai's multi pronged approach to complete streets

vision and policy

In 2014, Chennai became the first Indian city to adopt a Non-Motorized Transport Policy. The document displayed the city's commitment towards providing safe infrastructure for walking and cycling.

The NMT policy states the vision of transportation in Chennai as:
'Chennai will be a city with a general sense of well-being through the development of quality and dignified environment where people are encouraged to walk and cycle; equitable allocation of public space and infrastructure; and access to opportunities and mobility for all residents.'

The NMT policy mandates that a minimum of 60 percent of the Corporation's transport budget is allocated to construct and maintain NMT infrastructure.

Fig.
Chennai recognised with the Sustainia Award in 2015

institutional framework

Chennai Unified Metropolitan Transport Authority (CUMTA) was formed as a city level transportation authority, to help in the coordination between agencies. A non-motorized transport sub committee was set up within CUMTA to review and facilitate information-sharing between all parties involved. Chennai thus leads an inclusive process with all street-related stakeholders, like the traffic police, utility service agencies and various transportation departments.

Internally, the Corporation has a dedicated department - Bus Route Roads (BRR) Department for all works related to its public transport corridors

Fig.
Weekly review meeting for Chennai Smart City projects

capacity building

workshops

To improve the capacity of the city engineers in non-motorised transport infrastructure, ITDP in collaboration with Anna University conducted a series of training programmes. The aim of the programme was to develop their technical expertise on NMT user needs, design principles, planning and implementation, and to improve management capacity and disseminate best practices. Chennai Smart City Ltd. has also established the practice of conducting an orientation workshop for capacity development as soon as a new consultant or contractor is appointed for a street design project.

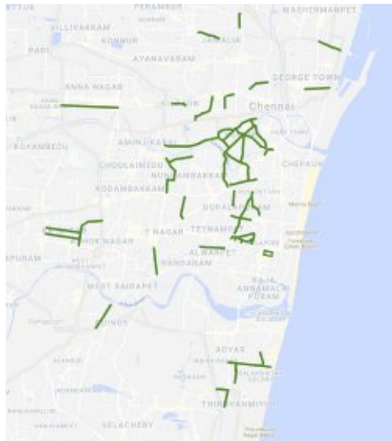
study tours

Periodic study tours to various cities - both national and international, have been organized as part of the city's capacity building program. The primary purpose of these tours has been to learn about world class streets, planning and design of non-motorized transport facilities and networks, bus rapid transit (BRT) systems, public cycle sharing systems (PCSS), intermodal integration, parking management and congestion pricing

Fig.
The team of engineers from Chennai along with the CEO of CSCL visited Pune in 2017 to learn about the city's Complete Streets

planning

Taking into account the needs of all users, the corporation started reimagining roads as Complete Streets. As a first step, 26 streets were redesigned with wide and continuous footpaths; however these were fragmented and scattered across the city. Chennai is now trying to create a larger network of streets which is well-connected and integrated, so as to facilitate comfortable walking over a considerable yet convenient distance. The maps show the different phases of street redesign work in the city.



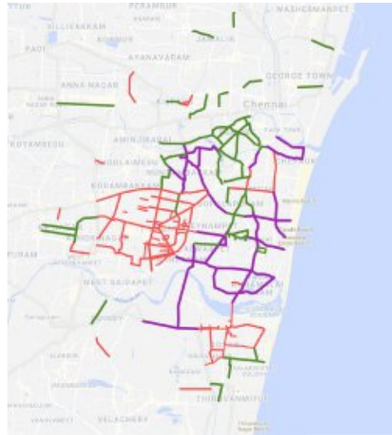


Fig.
(map on left) Phase 1 - Completed
(map on right) Phase 2,3,4 - Various stages of completion
Purple - Earmarked for the future

design

With about 75km of Complete Streets designed and implemented in the city, much can be learnt from Chennai's street design process, starting from appointing the designer. While the city tenders out the design of some street projects, it also has a set of empanelled architects to whom streets from the packages are allocated. The formalities and official paperwork required to start the project is reduced with empanelled architects.

Fig.
An architecture firm empanelled by the Greater Chennai Corporation presenting the design of an intersection in Chennai.

a Harrington road

right of way: 18-20 meters

street length: ~900 meters

context: school area

The 900 m stretch of Harrington Road hosts 9 schools, 2 large auditoria, several restaurants & other commercial activities. The school children account for a high volume of young pedestrian traffic in this area, which required interventions for wide footpaths and safe crossings. The residents' association in the area played a strong role in voicing the needs of the people and to drive the project through successfully. They also remain pivotal in the maintenance of the street. Harrington road resonates today as a good example of street transformation in Chennai.

Fig.
Before and After street design intervention in Harrington Road

b Dr. Radhakrishna Road

right of way: 8-10 meters

street length: 750 meters

context: residential area

Dr. Radhakrishna road is a narrow residential street used by vehicles to bypass traffic on the adjacent parallel main road. Without a dedicated walkway, the safety of the pedestrians using the street was compromised. Despite the street being very narrow, the city decided to redesign it with a wide footpath on one side and an unhindered carriageway of uniform width, allocating equitable space for all street users

Fig.
Footpath on one side of Dr. Radhakrishna Road; repair work being done on footpath as part of maintenance

Egmore road network c

right of way: 12-15 meters

street length: 12.8 km

context: commercial and institutional area

Egmore is a prime neighbourhood in the city attracting heavy footfall and vehicular traffic, with the railway station, several institutions and other commercial buildings in the area. Formalized and expanded sidewalks for pedestrian traffic in Egmore have made the streets much safer and more accessible. The creation of footpaths has also improved last-mile connectivity to the station. The streets in the network include Police Commissioner Office Road, Pantheon Road, and Halls Road. Apart from streets, the corporation also redesigned Pantheon Road junction, a key intersection of 5 streets in the area.

Fig.
Before and After street design intervention in PCO Road

citizen engagement

To promote a participatory design approach, Chennai has organised many discussions and citizen engagement activities involving multiple stakeholders. Every car-free Sunday at Elliot's Beach Road witnesses pedestrians and cyclists taking centre stage on a street that is otherwise filled with parked cars and traffic. The campaign thus helps promote non-motorised transport among citizens. The flagship project of Chennai Smart City Ltd., the pedestrian plaza, was initiated through a citizen engagement activity, to understand the views of the public, followed by multiple discussions with stakeholders over the years.

Fig.
Car-free day in Chennai; Architects and the public engaging in an event 'Our Cities Ourselves' to reimagine the streets and public spaces in Chennai

challenges and takeaways

1 lack of coordination

One of the key challenges in the creation of Complete Streets in Chennai has been the lack of coordination between the different departments involved in street design. Several government agencies are responsible for individual aspects of transportation and there needs to be effective coordination between them for smooth progress. Projects often get delayed due to improper communication between agencies, for instance, delay in shifting feeder pillars, cables, etc. Also, different components of the work in a single street get done at different times, entailing a waste of resources. For example, without coordination, utilities department end up digging newly laid streets to install or repair cables.

Fig.
Even after the construction of the footpath, the utility boxes remain in the same location as before on TTK Road in Chennai, as a result of poor coordination

learnings

It is crucial to involve all street-related parties in the discussions from the time of project conception. This facilitates a platform for effective communication between the departments. Chennai Smart City Ltd. along with Greater Chennai Corporation has initiated weekly review meetings to monitor the progress of Smart City projects, inviting different departments as per the agenda. At the decision-making level, CUMTA has been notified for a coordinated effort towards
transportation in Chennai.

Another solution is to institutionalize an apex committee that could oversee the entire process of the creation of Complete Streets through the different stages, bringing together all involved agencies on a regular basis.

Lack of project monitoring 2

Lack of effective project monitoring at various stages, have led to poor design results. Often the designer's intent is not properly communicated to the contractors. The capacity development workshops help in equipping the personnel involved with the right skills to ensure good design implementation.

Fig.
Broken bollards on conron smith road

learnings

Appointing a project monitoring consultant (PMC) to periodically review the design and implementation to ensure the project deadlines are met will lead to better results.

Capacity development workshops are powerful tools to train the engineers and contractors who are directly involved with the project implementation.

3 difficulties in operation & maintenance

Frequent maintenance of footpaths has been a constant challenge for the streets that witnessed transformations in Chennai. Broken bollards, repairs, encroachment, etc.

Fig.
Poor condition of footpath after construction

learnings

Scope of work for Operations & maintenance at least for the defect liability period should be a separate clause in the RFP. The activities to be performed under this should be clearly mentioned in the clause.

4 encroachment

Streets with high commercial activities tend to attract encroachment from both vehicles and vendors. Without a parking management plan and effective enforcement of the rules, encroachments can ruin the street transformation works.

Fig.
Parked vehicles encroaching footpath and cycle track in KK Nagar, Chennai

learnings

The Traffic Police is a key stakeholder in ensuring encroachment free sidewalks. They need to be involved from the process of planning and implementation, to ensure the enforcement of the rules.

Parking and vending management plans can help regulate the type of users for different space.

Garnering support from public and other stakeholders

The city has tested out the designs of multiple intersections, through tactical urbanism approaches which are quick, temporary and on-ground interventions. Working with local officials and activists, the prototyping allows the users to see how public space can be used when the design is shaped at a human scale.

The complete streets projects and initiatives, have often faced push backs from the traffic police, a critical stakeholder in project planning and implementation. This had led to slowing down the works and highlights the need to better understand and to align interests with the traffic police. Tactical urbanism became a powerful tool to help bridge this relation and convince stakeholders to the benefits of the interventions.

Fig.
Testing out the proposed design of the Pantheon Road intersection before construction

Two trial runs were conducted as part of the pedestrian plaza project in T Nagar. It helped in understanding how the people responded to the intervention, collecting citizen feedback and in building support for the project. Visitors witnessed a new Pondy Bazaar, bustling with activity and games throughout the morning. The lack of congestion despite diverted traffic further added to the success of the experiment.

Fig.
The pedestrian plaza bustling with activity in the reclaimed space created during the first trial run

Tactical Urbanism - Adyar Junction | YouTube
https://youtu.be/X63JJ6G3_IA

2

PUNE STREET DESIGN PROJECT

2 Pune street design project

city area	331.3 sq.km.
population	6.04 million
total length of roads in city	100km under the Pune Streets Programme 27 km of street redesign under the Smart Cities Initiative 18km of street retrofitting under the Smart Cities Initiative
implementing authority	Pune Municipal Corporation (PMC) Pune Smart City Development Corporation Ltd. (PSCDCL)

background

Pune is currently a leading example in India in the field of sustainable transportation, especially the creation of streets as vibrant public spaces. From adopting the progressive policies such as the Pedestrian Policy and Parking Policy, and implementing high quality pilots - like the JM Road under **Pune Streets Program**, DP Road under **Smart City Complete Streets Project** - which prioritise walking and cycling; to creating city-wide plans for cycling, and setting up an Urban Design Cell to build the institutional capacity, Pune is transforming from a car-centric city to a people-friendly urban setup. To further ensure the sustainability of the projects, the city is focusing on community participation and public-private collaboration.

goals

The vision shown by the pedestrian policy, street design guidelines and the Pune Bicycle Plan is being realized on ground by the street design proposals.

These projects reimagine the major roads in Pune as “complete street”, taking into account the comfort, convenience, and safety of all street users. The new designs include wide-shaded continuous footpaths, cycle tracks, vibrant public spaces with seating, street vending, bus stops, uniform carriageway, and organised on-street parking.

Pune has been taking bold steps for a comprehensive result

Pune's multi pronged approach to complete streets

vision and policy

Under the Comprehensive Mobility Plan for Pune City (2008), the city officials have been inspired to create complete streets based on the Planning for People approach.

The city adopted the Pedestrian Policy (2016) which provides for consistent, high quality pedestrian infrastructure with equitable allocation of road space. While promoting walking and cycling, Pune is also taking active measures to control personal motor vehicle usage. The city aims to achieve this through travel-demand measures such as on-street parking, with changes based on parking demand as well as congestion charging. In 2018, the city approved for a progressive Parking Policy.

The city has made own Budgetary provision for good quality footpaths and cycle tracks under the Pune Streets Programme (PSP) by ensuring 50% of transport budget for sustainable transportation since last 3 years.

institutional framework

An Urban Design Cell with urban designers was created in Pune Municipal Corporation, a first in the country, to review the designs, as well as design neighbourhood streets. The Pune Municipal Corporation led an inclusive process, involving multiple stakeholders, during design and implementation of the project. This resulted in a public-private collaboration which is very unique to this project.The street design process involved the selection of experienced urban designers through a stringent process of tendering.

capacity building

The first Urban Design Cell was created in the Pune Municipal Corporation to review street designs and for the neighbourhood streets to develop the required capacity. The Urban Design Department of CEPT University, Ahmedabad is the capacity building institute for this cell.

Additionally, PMC organised study tours for senior officials to London. Capacity Development workshops and lectures were held by different NGOs and experts.

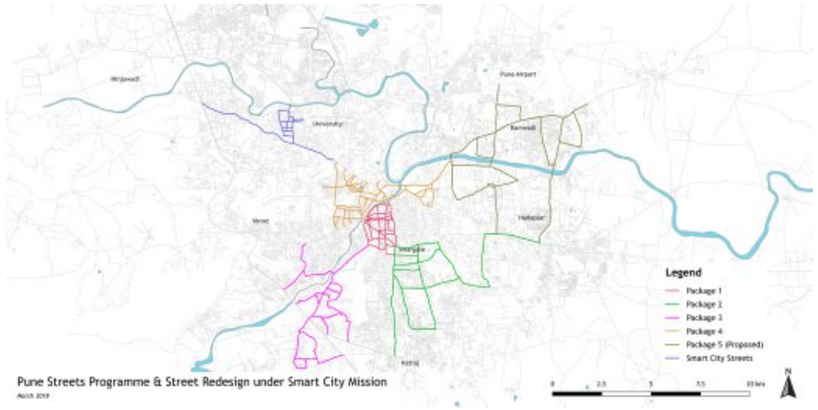
planning

Under PSP initiative, PMC has undertaken redesign of 100 km of roads in 4 packages and the detail design of each package is assigned to four different empaneled Urban Designers. The Jangali Maharaj (JM) Road Rejuvenation project was the first project under the 'Pune Streets Program' (PSP). Currently under PSP, PMC has initiated execution of stretches at other locations like Congress House road, FC road and Satara road.

Under the Smart City Mission, A network of 27 km of major roads were identified to be converted into "Complete Streets". DP road, in the ABD area was the pilot. New work initiated now at ITI road.

Under the **Pune Bicycle Plan**, the city is looking to extend its current 94km network into a 300km city wide network in the next three financial years the city is undertaking a comprehensive approach to promote bicycles and increase the modal share of cycling to 25% by 2031. To promote cycling for first- and last-mile connectivity, the city has launched a **Public Bicycle Share** with 4,000 cycles under operation in its first phase and the trip rate is estimated to be four trips per cycle per day.

Also recently, Pune demarcated a Transit-Oriented Development zone in its Development Plan. Clearly, the city is progressively working to harbour a more sustainable and ecological tomorrow.



design

In addition to the proposed 100 km under PSP, 27 kilometers of streets have been identified and already allotted for redesign as Complete Streets in the ABD area as part of the Smart City proposal, along with 18 kilometers of street retrofitting.

The **Urban Street Design Guidelines (USDG) (2016)**, provides a mandate for engineers and planners for designing and executing streets to meet all local needs, avoiding the one-size-fits-all approach.

The first phase on JM Road and DP Road has been lauded across the country, even winning the Housing and Urban Development Corporation Award and the Volvo Mobility Award 2017. These projects have been discussed below.

The following section looks at two cases of street transformation in the city of Pune. The approaches to design, implementation and accompanying challenges have also been discussed.

challenges and takeaways

a Aundh DP road

right of way: 24 meters
street length: 1.6km
project cost: 22 crore
context: residential and commercial mixed use

It has wide-shaded-continuous footpaths, cycle track and cycle stands, vibrant public spaces, designed parking bays and facilities for pedestrian comfort and convenience. Universal accessibility is an integral part of the design.The project was implemented integrating all the existing trees & involved realigning of all the underground services and installing new ones to meet the future demands. The streets are well lit with new street and pedestrian lights installed.

b Jangali Maharaj (JM) Road

right of way: 30 meters
street length: 1.87 km
project cost: 20 crore
context: commercial area

The JM Road transformation set yet another successful example for Pune street redesign. Located in a commercial area, the street was redesigned in a way that promoted safety of pedestrians and cyclists, creating quality public spaces along the edges, exhibiting high quality craftsmanship for street elements and carving out spaces for various street activities.

design development with public participation 1

While many stakeholders were excited about the proposed transformation especially after being part of the trial run, the shopkeepers were apprehensive about transforming the street into a one-way traffic street. To resolve their qualms, city officials and designers actively engaged with them, explaining the significance of a wide and continuous pedestrian plaza.

This dialogue resulted in a balanced design solution, where shopkeepers willingly handed over (just for redevelopment and not ownership) their storefront to be transformed into a wide pedestrian plaza. Now, a public pedestrian plaza has been created on either sides of the street in front of storefronts. The dialogue not only created a settlement, that proved advantageous for both stakeholders, but also helped create support and sense of ownership for the project.

learnings

The importance of effective stakeholder engagement from the stages of project planning and providing platforms for deliberation with stakeholders.

This dialogue and addressing of the concerns ensures greater support for the project. The residents can stake claim to a safer neighbourhood and a proportional appreciation of real estate; shop owners stand to gain revenue out of increased footfall; street users can enjoy segregated, attractive, and organised street space; and even street vendors can chance upon a livelihood opportunity.

Shoppers talk Pedestrian Plaza | YouTube
https://www.youtube.com/watch?v=fmamNi_akAM

2 preservation of existing trees

It was crucial to ensure that, during the design and implementation, none of the existing trees on streets undergoing transformations were cut down, especially when they came in the way of utility lines. Ducts of different types and materials were used instead of conventional trenches for carrying utilities. Wherever there was a tree, the utilities lines were designed with double wall corrugated flexible pipe, diverted around the tree. Additional trees were planted at later stages. The pedestrian plazas were created with ample seating provision around the trees, adding to the vibrancy of the spaces.

learnings

- Ensuring coordination between the different departments of design, shaped effective solutions

- Using ducts over trenches. Offers flexibility, occupies less space.

3 operations and maintenance

challenge

neglect for maintenance of footpath leads to their degradation. If unattended, issues like tree pruning, broken pavements and street furniture, piling of debris and water logging especially during monsoons can be hazardous for the citizens. The engineers have large area under their jurisdiction, added to that the lack of coordination lead to some spots requiring urgent attention remain unattended.

learnings

C1: Complaints redressal:

Municipal corporations should set up 24 hr helpline especially during monsoon season for attending complaints related to water logging, trees, debris and other problems. PC has setup websites for accepting complaints. The JE of the respective area is responsible for redressal of complaints with 48 hrs.

C2: Road Maintenance Van

Road department had called for tenders to appoint 4 Road Maintenance vans in the 4 zones of Pune City on trial basis.

Pune Municipal Corporation 24x7 maintenance vehicle for quick repair; the van is equipped with bollards, tiles, paver blocks, carriageway and footpath pavement material etc. Citizens can lodge complaints online/ on mobile app and the maintenance van staff fix it.

The RMV had a 24 hr standing instruction to carry out work repairs.

The RMVs are interconnected by the Road Maintenance Mobile app which is operated by all the junior engineers of the road dept.

The Citizens have been given a toll free number wherein they can register their complaints.

The back office forwards these complaints to the concerned Junior engineer who in turn carries out the repair works with the help of RMV.

Introduction of the RMV has led to speedy redressal of citizen complaints and also has brought down the complaint solving lead time.

Due to success of the 4 RMVs, 8 more RMVs are now in stage of being introduced bringing the total number of RMVs to 12.

C3: Maintenance contract:

Apart from the typical 2 yrs O&M as the defect liability period, the same contractor was also hired for additional 5 yrs period as an extended contract with additional payment accordingly. Such strategy encourages contractor to use good quality material and better workmanship during construction for improved cost optimisation in the future. The detailed scope of work for such activities is mentioned in the maintenance manual and is also part of the tender.

garnering support

A participatory approach has been followed throughout the process. Public consultations were conducted with citizens and elected representatives to get their opinions on the proposal.

One such important event in Pune was the seven-day trial run of the proposed pedestrian plaza in Aundh DP Road. Showing residents on the ground what their neighborhood could be helped convince the shopkeepers to agree to merge shop frontage with footpaths. A Mock up of about 500 m was carried out for a period of 7 days.The road was partly closed and one way traffic was made operational.The event witnessed a foot fall of nearly 3000 persons/day.The mock design trial had both takers and critics after a couple of days, but it was important to note that people who have been involved in urban improvement efforts for years had a positive view of this mock design.

A committee consisting of NGOs, traffic police etc. was later formed by PMC for reviewing designs at various important stages. The proposal has thus evolved through the process.

ANNEXURES

list of references

list of references

Following are some of the acts, laws and initiatives undertaken until now by Central, State Governments and other organizations in the road and transportation sector prominently related to vehicles, road construction, road users. The Complete Streets framework toolkit has taken into consideration the information and suggestions as mentioned in these studies.

Indian Road Congress Guidelines

The Indian Roads Congress (IRC) was set up by the Government of India in consultation with the State Governments in December, 1934 and is a registered society under the Registration of Society Act. It is the premier body of Highways Engineers in India. The Principal objectives of the India Roads Congress are to provide a national forum for regular pooling of experience and ideas on all matters concerned with the construction and maintenance of highways, to recommend standard specifications and to provide a platform for the expression of professional opinion on matters relating to roads and road transport including those of organizations and administration. It also publishes Journals, monthly magazines and research bulletins.

Few of such journals regarding design of urban roads have been considered in the study for the framework documents. The documents recommend to follow the given IRC for the technical specifications and details for construction of street elements:

1. IRC: 35-2015 Code of Practice for Road Markings
2. IRC: 36-2010 Recommended Practice for Construction of Earth Embankments and Subgrade for Road Works
3. IRC: 37-2012 Guidelines for the Design of Flexible pavements
4. IRC: 67-2012 Code of practice for Road Signs
5. IRC: 70-2017 Guidelines on Regulation and Control of Mixed Traffic in Urban Areas
6. IRC: 98-2011 Guidelines on Accommodation of Utility Services on Roads in Urban Areas
7. IRC: 99-2018 Guidelines for Traffic Calming Measures in Urban and Rural Areas
8. IRC: 103-2012 Guidelines for Pedestrian Facilities
9. IRC:SP: 50-2013 Guidelines on Urban Drainage
10. IRC:SP: 055 Guidelines on Traffic Management in Work Zones
11. IRC:SP: 057 Guidelines for Quality Systems for Road Construction
12. IRC:SP: 112-2017 Manual for Quality Control in Road and Bridge Works
13. IRC:SP: 117-2018 Manual on Universal Accessibility for Urban Roads and Streets
14. IRC:SP:119-2018 Manual of Planting and Landscaping of Urban Roads

MoRTH Specifications

The Ministry of Road Transport and Highways is a ministry of the Government of India, is the apex body for formulation and administration of the rules, regulations and laws relating to road transport, and transport research in India. Some of the MoRTH regulations and specifications referred in the Complete Streets framework documents have been listed below:

1. MoRTH Section 300: Earthwork, Erosion Control and Drainage
2. MoRTH Section 400: Sub-Base, Bases Not-Bituminous and Shoulders
3. MoRTH Section 500: Base and Surface Courses (Bituminous)
4. MoRTH Section 800: Traffic Signs, Markings and Other Road Appurtenances

Design of Urban Roads-Code of Practice, 2012[1]

The code of practice for designing of urban roads has been prepared by the Transportation Research and Injury Prevention Programme (TRIPP) for the Institute of Urban Transport (IUT), Ministry of Urban Development. The primary purpose of this document is to provide a code of practice for various Urban Road Components. It has been developed in five parts:

Part I : Urban road cross section design
Part II : Intersection design
Part III: Road markings
Part IV : Signages
Part V : Traffic Calming methods

Among other recommended codes, the document has two major variations from IRC codes in terms of road design for intended speed limit and linking of lane width with speed limit.

Motor vehicles Act[2]

The Motor Vehicles Act, 1988 is an Act of the Parliament of India which regulates all aspects of road transport vehicles. The Act came into force from 1 July 1989. It replaced Motor Vehicles Act, 1939 which earlier replaced the first such enactment Motor Vehicles Act, 1914. The Act provides in detail the legislative provisions regarding licensing of drivers/ conductors, registration of motor vehicles, control of motor vehicles through permits, special provisions relating to state transport undertakings, traffic regulation, insurance, liability, offences and penalties, etc.

Disabilities Act[3]

The Rights of Persons with Disabilities act replaces the Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995. It fulfills the obligations to the United National Convention on the Rights of Persons with Disabilities (UNCRPD), to which India is a signatory. The Act came into force during December 2016.

Accessibility is one of the rights that is given importance under this act which makes it mandatory to provide for disabled friendly design of public places including roads and streets.The Rules under this Act have specified the Standards for Accessibility through Harmonised Guidelines and Space Standards for Barrier Free Built Environment for Persons With Disabilities and Elderly Persons.[4] The guidelines prepared by Ministry of Urban Development are comprehensive guidelines inclusive of all provisions updated and harmonized to act as an easy reference Practitioner's Guide for Barrier Free Designs with universal access, responding to the varying needs of the persons with disabilities.

The Guidelines and Toolkits for Urban Transport Development

The Guidelines and Toolkits for Urban Transport Development were prepared by a Technical Assistance on Urban Transport Strategy (TA 4836-IND) funded by the Asian Development Bank for the Ministry of Urban Development (MoUD), Government of India.

[1] http://mohua.gov.in/cms/Design-of-Urban.php
[2] http://www.tn.gov.in/sta/Mvact1988.pdf
http://164.100.47.4/BillsTexts/LSBillTexts/PassedLoksabha/214C_2016_LS_Eng.pdf
[3] http://disabilityaffairs.gov.in/upload/uploadfiles/files/RPWD%20ACT%202016.pdf
[4] https://cpwd.gov.in/Publication/Harmonisedguidelinesdreleasedon23rdMarch2016.pdf

These documents are designed to help decision makers and practitioners in states and municipal governments who are concerned with urban transport development in medium-sized cities in India.

It consists of 5 modules addressing topics like -

- Comprehensive mobility plans[5]
- Bus Rapid Transit Systems (BRTS)
- Guidelines for Bus service improvement
- Guidelines for parking measure
- Guidelines for NMT measures.

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

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

Recommendations of working group on 12th FYP[7]

The Working Group on Urban Transport for the 12th Five Year Plan has made recommendations on investments and plans on 9 broad themes in urban transport which were identified in line with the National Urban Transport Policy (NUTP) developed by the Government of India.

Study on traffic and transportation policies and strategies in Urban Areas in India, MOUD, 2008[8]

The study aimed at updating the transportation information and projections made from the previous study 'Traffic and transportation policies and strategies in Urban Areas in India 1994' in order to review the National Urban Transport Policy in light of the new and comprehensive data provided within this report.

Service Level Benchmarking, 2009[9]

Since 2009, the Ministry of Housing and Urban Affairs (then titled Ministry of Urban Development) has adopted the practice of service level benchmarking. Through the SLB initiative, the Ministry hoped to create a robust set of indicators across sectors for which data would be collected at the city levels and collated and published at the National level. This would then help create a ranking for cities, aided by a positive competitive spirit. At the same time, cities were also expected to set targets for themselves and better their performances over time.

[5] https://smartnet.niua.org/sites/default/files/resources/file_1016201405372097.pdf
[6] http://www.iutindia.org/downloads/Documents.aspx
[7] http://planningcommission.gov.in/aboutus/committee/wrkgrp12/hud/wg_%20urban%20Transport.pdf
[8] http://mohua.gov.in/upload/uploadfiles/files/final_Report.pdf
[9] http://mohua.gov.in/upload/uploadfiles/files/Service_level.pdf

Within urban transport, pedestrian and non-motorized transport facilities were assigned indicators -such as the share of city roads with footpaths and the coverage and efficiency of street lighting etc.

National Mission on sustainable habitats: Report of the Sub-Committee on Urban Transport

Under the National Action Plan for Climate Change, the National Mission on Sustainable Habitat has been launched to cover various aspects which include better urban planning and modal shift to public transport. Regarding Urban Transport, the objectives of the National Mission on Sustainable Habitat (NMSH) are "To address the issue of mitigating climate change by taking appropriate action with respect to the transport sector such as evolving integrated land use and transportation plans, achieving a modal shift from private to public mode of transportation, encouraging the use of non-motorised transport, improving fuel efficiency, and encouraging use of alternative fuels etc.

UTTIPEC Guidelines for street design[10]

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

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

The Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014[11]

Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014 is an Act of the Parliament of India. This Act was drafted with the legislative intent of protecting the livelihood rights of street vendors as well as regulating street vending through demarcation of vending zones, conditions for and restrictions on street vending. The Act now governs over all matters in regards to the rights and duties of the street vendors in India.

Chennai Non-Motorised Transport Policy, 2014[12]

The Chennai Municipal Corporation adopted a progressive non-motorised policy in October 2014 to make walking and cycling its priority. The policy aims to arrest the current decline in walking and cycling in the city by creating safe and pleasant network of footpaths, cycle tracks, greenways and other NMT facilities.

[10] http://smartcities.gov.in/upload/uploadfiles/files/StreetGuidelines_DDA.pdf
[11] http://legislative.gov.in/sites/default/files/A2014-7.pdf
[12] https://www.itdp.in/wp-content/uploads/2014/10/NMT-Policy.pdf

Urban Street Design Guidelines, Pune 2016[13]

In accordance with the key principles of moving people before vehicles in National urban Transport Policy, the Municipal Corporation of Pune adopted the 'Urban Street Design Guidelines' as a new policy document aimed at 'equitable allocation of street space'. The 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.

Policy for Pedestrian Facilities and Safety, Pune 2016[14]

The Municipal Corporation of Pune, in 2016 adopted a Pedestrian Facilities and Safety Policy, keeping in view the focus set in NUTP and CMP for Pune. The Policy establishes good quality public transport system as well as safe, adequate and usable facilities for pedestrians and cyclists as the solutions to city's traffic problems and aims at providing consistent, high quality pedestrian infrastructure with equitable allocation of road space.

Public Parking Policy, Pune 2016[15]

The policy on Public Parking adopted by Pune Municipal Corporation in 2016, is expected to help the city in becoming more 'people friendly' than 'vehicle friendly'. The Policy aspries to discourages usage of private modes, encourages efficient use of available parking spaces, aids in evolving a better transportation system, builds a strategy to reduce congestion, pollution, and also helps the public transport system to grow.

NMT Guidance document, 2016[16]

The Guidance Documents for preparing Non-Motorised Transport (NMT) plans has been undertaken by the Sustainable Urban Transport Project, Ministry of Urban Development (MoUD), Government of India (GOI) with support from Global Environment Facility (GEF), UNDP and World Bank. The focus of the Guidance Document is to establish a systematic process for plan preparation, serving more as an implementation manual with checklists of potential alternatives, rather than providing technical standards for development of detailed specifications.

Coimbatore Street Design & Management Policy, 2017[17]

Keeping with the approach set-out in NUTP-2006, the Coimbatore City Municipal Corporation (CCMC) adopted a Street Design & Management Policy to ensure the implementation of high-quality transport systems. The Policy seeks to achieve an environment that supports more equitable allocation of road space by incorporating a focus on non-motorised transport (NMT) and public transport (PT) in the planning, design, managing, and budgeting stages.

[13] https://pmc.gov.in/sites/default/files/road_img/USDG_Final_July2016.pdf
[14] http://smartcities.gov.in/upload/development/5a9009c9843cdPolicy%20for%20Pedestrian%20Facilities%20and%20Safety%20in%20Pune%20City.pdf
[15] https://pmc.gov.in/sites/default/files/project-glimpses/PMC-public-parking-policy-English-revised-March2016-Final.pdf
[16] https://smartnet.niua.org/sites/default/files/resources/nmtguidancefinal.pdf
[17] https://www.itdp.in/wp-content/uploads/2018/01/CoimbatoreStreetDesignandManagementPolicy_ITDP_170218.pdf

Ease of Living Index, 2018[18]

The SLB initiative has been reimagined and expanded into the Ease of Living Index, covering more sectors and aspects of citizen lives. Within transport however, the larger set of indicators remain largely similar to the earlier SLBs.

Specifications for Urban Road Execution, Tender SURE

Bangalore City Connect Foundation (BCCF) in conjunction with Indian Urban Space Foundation (IUSF) approached the state government of Karnataka to build an Urban road and tender manual in 2010. The publication contains guidelines on designs, specification and procurement of contract for urban roads execution with the priority on the comfort and safety of pedestrians and cyclists, as well as recognizing the needs of street vendors and hawkers.

Urban Street Design Guide, NACTO

NACTO's (a non-profit organization) 'Urban Street Design Guide' gives guidance through toolbox and tactics that cities can use to make streets safer, more liveable, and more economically vibrant. The Guide outlines both a clear vision for complete streets and a basic road map for how to bring them to fruition.

Better Streets, Better Cities, ITDP[19]

A street design manual for Indian cities prepared by ITDP, (a not for profit organization) that discusses design details of various street elements and street sections on 'complete streets' principle.

Parking Basics, ITDP[20]

Parking Basics a guiding document by ITDP, outlines the key principles and steps involved in managing on-street parking and regulating off-street parking.

Footpath Design: A guide to creating footpaths, ITDP[21]

The footpath design guide prepared by ITDP is a quick reference guide which highlights key concepts from the IRC Guidelines, including footpath design standards. The guide also draws from local and international best practice for some themes not covered in the IRC publication.

[18] https://easeofliving.niua.org/assets/upload/pdfs/ease-of-living-national-report.pdf
[19] https://www.itdp.org/wp-content/uploads/2011/12/Better-Streets-Better-Cities-ITDP-2011.pdf
[20] https://www.itdp.org/wp-content/uploads/2015/10/Parking-Basics.pdf
[21] https://www.itdp.in/wp-content/uploads/2014/04/05.-Footpath-Design_Handout.pdf

Footpath Fix, ITDP[22]

Footpath Fix the second volume after Footpath Design is a step-by-step guide on footpath construction detailing for urban designers, municipal engineers, and contractors.The guide aims to highlight the steps of footpath construction in a chronological order, from pre-excavation to above-ground construction. It also features necessary precautions, drawing from experience on-ground, that must be taken into consideration at each stage of construction.

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All photographs and graphics by ITDP, unless otherwise mentioned.

[22] https://www.itdp.in/wp-content/uploads/2018/07/Footpath-Fix.pdf


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