पुणे सायकल प्लान
Pune Cycle Plan

December 2017

Pune Municipal Corporation

Comprehensive Bicycle Plan for Pune

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Draft Pune Cycle Plan, Appendices, Maps are available at https://punecycleplan.wordpress.com/

Acknowledgements

The project and process for preparation of the Bicycle Plan has been led by the office of Chief Engineer (Projects), PMC

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1. Introduction

Pune was once famous as a city of cyclists. Old timers recall their cycling days in the 1950s, 60s and 70s, when the cycle was the primary mode of commute for children and adults alike. Cycles were registered, and carried kerosene head lamps. Mornings and evenings were filled with the sound of cycle bells of people going to work along old Mumbai-Pune road and other areas. Safety on the roads was not such a concern since motorized vehicles were relatively lesser. However, 'transportation' is a major civic issue now. Facilities for walk, cycle, public transport have not kept pace with the growth of the city. The number of private motorized vehicles has increased very rapidly in last 10-15 years. This is leading to health impacts from polluted air, accidents, and wastage of time in congestion.

Recognizing the need to address this issue the Pune Municipal Corporation had adopted a Comprehensive Mobility Plan (CMP)in 2012. The vision for mobility in Pune articulated in the CMP is *"Moving people safely and economically by emphasizing public transport and non-motorized transport."*

As part of the efforts towards the realization of this vision, the PMC initiated the preparation of a Comprehensive Bicycle Plan for Pune through a project supported by the Ministry of Housing and Urban Affairs, Government of India.

The project and process for preparation of the Bicycle Plan has been led by the office of Chief Engineer (Projects). PMC engaged iTrans, Prasanna Desai Architects and Centre for Environment Education (CEE) as the team of consultants to prepare the draft Pune Cycle Plan. A Bicycle Advisory Committee, consisting of experienced cyclist citizens, as well as officials from the concerned line departments of PMC guided the process of plan preparation.

Work on the Pune Cycle Plan started in 2016, and extensive surveys were carried out in 2016 as part of the situation analysis. Two rounds of public consultations were done as part of the process of preparing this draft plan.

This document, the Comprehensive Bicycle Plan, 2017 (Draft).*(Hereafter referred to as 'Draft' or 'Pune Cycle Plan (Draft)'),* is meant for placement before the General Body of the Pune Municipal Corporation, for deliberation. After approval by the General Body, it is expected to be forwarded by PMC to the State Government for its approval and subsequent notification for its incorporation into the Pune Development Plan 2017.

1.1. Scope and Purposeof plan

The Pune Cycle Plan (Preliminary Draft) has proposals for

- Creation of a city-wide cycle track network and cycle-safe streets
- A city-wide Public Bicycle Scheme with a detailed project report for phase 1 area.
- Bicycle Parking Facilities
- Integration with Public Transit
- Adoption and use of Design Guidelines for planning and implementing cycle-friendly infrastructure
- Awareness and Education Campaigns, and Cycling Promotion
- Institutional Mechanisms, capacity-building and budget estimates for implementing the plan

The Pune Cycle Plan is intended to serve as the primary guidance document for the city to allocate resources, undertake projects and evaluate the outcomes towards achieving the goals set for improving cycling in Pune.

1.2. Methodology

The work for preparation of the Pune Cycle Plan was initiated in January 2016. M/s Innovative Transport (Pvt) Ltd, in consortium with Prasanna Desai Architects and Centre for Environment Education were appointed as Consultants for undertaking the situation analysis, studies and surveys, public and stakeholder consultations, and preparation of the draft proposals.

The Terms of Reference of the Consultants are available asAppendix 1.

The Pune Cycle Plan(Preliminary Draft) has been prepared based on:

- Consideration of relevant and applicable policies and plans, including the National Urban Transport Policy 2006, Pune's Development Plan 2017, the Comprehensive Mobility Plan, the parameters in the National Mission for Sustainable Habitat, relevant street design codesof the Ministry of Urban Development, the guidelines of the Indian Road Congress, and the Urban Street Design Guidelines adopted by PMC.
- Assessment of current transportation plans and projects
- Analysis of institutional structures and capacity to implement cycle inclusive plans
- Primary surveys carried out for the purpose of establishing travel patterns, modes of travel, and perceptions about cycling. These surveys included a Household Survey, Street Survey (of cyclists and non-cyclists), and an Online Survey. See Appendix 2, Appendix 3, and Appendix 4 for reports of these surveys.
- Infrastructure assessment of cycle tracks, carried out for all the existing major roads in the city, presented in Appendix 5
- Traffic counts for share of cycles, and peak times of cycle traffic, presented in Appendix 6
- Collation of cycling-related data such as cycle rentals, retail, repair shops, etc, presented as Map 4 Pune Cycle Shops Locations
- Ward-level meetings at each administrative ward, stakeholder consultations and discussions, including with cyclists, representatives of cycle shops, colleges, corporate groups, NGOs, presented as Appendix 7
- Inputs received over Facebook and the Pune Cycle Plan website, and by email and post, collated and synthesized, presented as Appendix 8
- Inputs from representatives of cycle shops, presented as Appendix 9
- Discussions with and inputs from representatives of schools Appendix 10
- Inputs received on sustainable transportation education, awareness and promotion programmes, presented as Appendix 11
- Inputs received from the public through the second round of consultations, on the Preliminary Draft of the Pune Cycle Plan, the report of which is presented as Appendix 15
- Inputs and guidance from the Bicycle Advisory Committee
- Inputs from staff of various line departments of the PMC, especially the Traffic Department and Road Department.

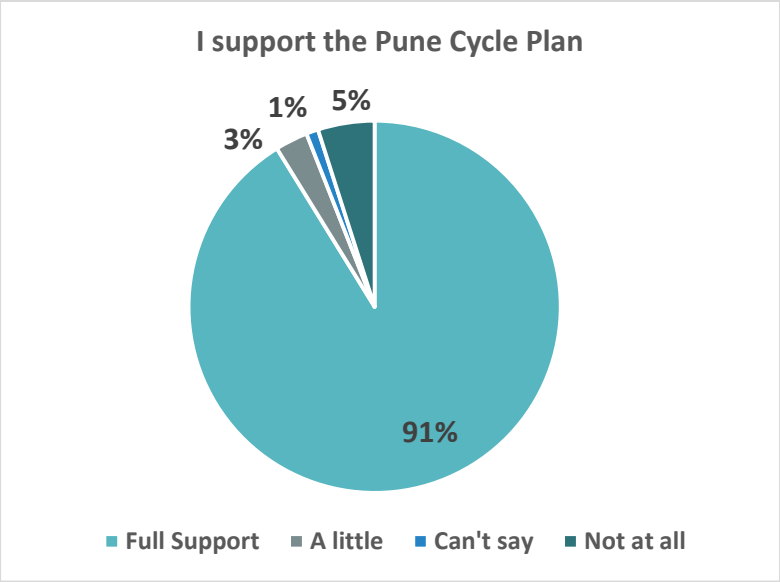
Public Consultations

As mentioned above, public consultations have been done at two stages in the preparation of this draft plan.

The first round of consultations was done in mid-2016. The intent of the PMC to prepare a cycle plan in the context of the CMP was explained. For this, meetings were arranged at each Ward Office and presentations were done to *Prabhag Samitis*(Ward Committees) and citizens groups. Meetings were

done with cyclists' groups, representatives from cycle shops, various corporate groups promoting cycling. Inputs were also sought from non-cyclists. Inputs were sought on the current experience and expectations in relation to cycling, and conditions desired for non-cyclists to shift to cycling.

The Preliminary Draft of Pune Cycle Plan was published in August 2017, providing the results of the studies and detailed provisions for cycle improvement. Public inputs were sought on this preliminary draft through the second round of consultations, meetings and surveys done in August and September 2017. This time too, meetings were organized at ward offices for Prabhag Samitis and with citizens groups. Information about the preliminary provisions was also shared through newspaper articles, website and social media. Close to 12000 individuals were directly engaged in different ways through these forums, in addition to the dissemination of information through newspapers, website and social media. The consultations reveal tremendous public interest in cycling and desire for cycling improvement in Pune.



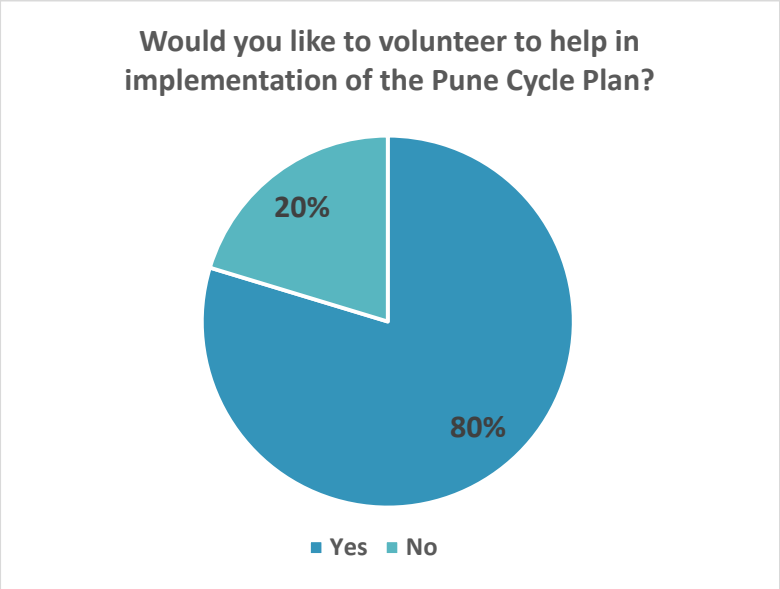


Figure 1 Responses to an online survey on all proposals in the preliminary draft of the Pune Cycle Plan (726 responses)

2. Situation Analysis

This section presents the current situation of cycling in Pune, including policy, plans, projects, institutional aspects, the physical conditions of cycling, and perceptions about cycling.

2.1. Transport policy, plans and projects

This section presents the review of the policies, plans and projects to identify the policy direction and implications for the Pune Cycle Plan. The data contained in the plan and project documents is used in the next section as part of the situation analysis vis a vis the trends of on-ground conditions for cycling, and travel patterns.

Policies and Plans

The **National Urban Transport Policy (NUTP), 2006**which provides the overall direction for transportation planning for all cities in the country including Pune, gives priority to non-motorized transport, which includes cycling. The policy states that non-motorized (NMT) modes (which include cycling) are exposed to greater risks of accidents, and their problems would have to be mitigated; NMT modes are environment friendly and have to be given their due share in the transport system of a city. As per the NUTP 2006, the safety concerns of NMT modes have to be addressed, and cities should make provision of segregated rights of way, bicycle corridors, cycle parking and cycle park and ride facilities, drinking water and resting places, development of public bicycle systems, NMT zones and area plans. Further the NUTP recommends the involvement of users in the appraisals of cycle infrastructure designs.

The NUTP is the primary overall policy guidance for the Pune Cycle Plan.

Pune's Comprehensive Mobility Plan (CMP), prepared in response to a circular issued by the Ministry of Urban Development, was approved by the PMC General Body on 12 May 2012. The vision for future transportation planning as accepted in the Comprehensive Mobility Plan of Pune (CMP) is "Moving people safely and economically by emphasizing public transport and non-motorized transport."

The CMP seeks to make public transport facilities available to all residents within a reasonable distance from their homes, work places and other destination points. It also seeks to encourage greater use of non-motorized modes by making their use safer. The CMP outlines various measures including improvement of footpaths, investment in public transport, regulation of parking, education and outreach on transportation issues, and improved enforcement of traffic regulations. Non-motorized transport includes walk and cycle.

As per studies done for the Comprehensive Mobility Plan in 2007-08, of all the trips made in Pune, about one third, that is 32%, were by walk or cycle. ***The Comprehensive Mobility Plan suggests that by 2031 at least half the trips in Pune, that is 50%, should be by walk or cycle.***

Measures suggested to discourage the use of motor vehicles and attract a large part of the growing travel demand towards public transport and non-motorized modes include:

- Identification of a number of trunk mobility corridors along which high capacity public transport systems such as BRT/Monorail/LRT/Metro, etc would be considered based on a scientific and detailed alternatives analysis.
- Enhancing the capacity and quality of the public transport so that people are willing to use it instead of moving towards personal motor vehicles
- Providing alternative routes for those having to enter the core city area even when their journey does not begin or end in this part of the city. For this purpose, ring corridors have been suggested to enable the core city area to be bypassed.

- Providing bypass routes for long distance commuter and truck traffic so that they do not have to travel through the city roads.
- Identifying feeder systems that connect different pockets and wards in the city to the most convenient point in one or more of the mobility corridors
- Providing a network of dedicated cycle tracks, footpaths and pedestrian crossings
- Pedestrianizing important portions of the core city area and linking them with strategic parking places to encourage people to walk in such areas
- Providing flyovers in a few heavily congested junctions/intersections to reduce idling traffic
- Special attention towards road safety
- Introduction of physical and fiscal measures to discourage the use of personal motor vehicles
- Reform and strengthen the institutional arrangements for managing and regulating the transport system in the city.

The Comprehensive Mobility Plan thus provides the overall transportation planning framework for the city, and prioritizes cycles, pedestrian facilities and public transport. The implications for the Pune Cycle Plan, emerging from the CMP include:

- *Need for creation of a dedicated cycle track network*
- *Possibility of using cycles as a feeder mode*
- *The proposal for decongestion of the core city and pedestrianization of selected areas, may be considered as cycle-inclusive planning, as these measures would also help to promote cycling*

Pune's Development Plan 2007-2027 published in 2013 and revised in 2017 has emphasised on the following sustainable transportation goals, objectives and performance indicators:

Table 1: Summary of Sustainable Transportation Goals, Objectives and Performance Indicators

Sustainability Goals	Objectives	Performance Indicators
Economical		
Economic productivity	Transport system efficiency. Transport system integration. Maximize accessibility. Efficient pricing and incentives.	Per capita GDP Portion of budgets devoted to transport. Per capita congestion delay. Efficient pricing (road, parking, insurance, fuel, etc). Efficient prioritization of facilities
Economic development	Economic and business development	Access to education and employment opportunities. Support for local industries.
Energy efficiency	Minimize energy costs, particularly petroleum imports.	Per capita transport energy consumption Per capita use of imported fuels.
Affordability	All residents can afford access to basic (essential) services and activities.	Availability and quality of affordable modes (walking, cycling, ridesharing and public transport). Portion of low-income households that spend more than 20% of budgets on transport
Efficient transport operations	Efficient operations and asset management maximizes cost	Performance audit results. Service delivery unit costs compared with peers. Service quality.

Social		
Equity/ fairness	Transport system accommodates all users, including those with disabilities, low incomes, and other constraints.	Transport system diversity. Portion of destinations accessible by people with disabilities and low incomes.
Safety, security and health	Minimize risk of crashes and assaults, and support physical fitness.	Per capita traffic casualty (injury and death) rates. Traveller assault (crime) rates. Human exposure to harmful
Community development	Help create inclusive and attractive communities. Support community	Land use mix. Walkability and bikability Quality of road and street environments.
Cultural heritage preservation	Respect and protect cultural heritage. Support cultural activities.	Preservation of cultural resources and traditions. Responsiveness to traditional communities.
Environmental		
Climate stability	Reduce global warming emissions Mitigate climate change impacts	Per capita emissions of global air pollutants (CO2,CFCs, CH4, etc.).
Prevent air pollution	Reduce air pollution emissions Reduce exposure to harmful pollutants.	Per capita emissions of local air pollutants (PM, VOCs, NOx, CO, etc.). Air quality standards and management plans.
Prevent noise pollution	Minimize traffic noise exposure	Traffic noise levels
Protect water quality and minimize hydrological	Minimize water pollution. Minimize impervious surface area.	Per capita fuel consumption. Management of used oil, leaks and storm water. Per capita impervious surface area.
Open space and biodiversity protection	Minimize transport facility land use. Encourage more compact development. Preserve high quality	Per capita land devoted to transport facilities. Support for smart growth development. Policies to protect high value farmlands and habitat.

In addition to the above, following urban transportation components have also been emphasised in the development plan:

- Urban roads and hierarchy
- Traffic improvements

- Non-motorised transport management
- Road safety
- Mass transport system
- Intermediate public transport
- Urban transport planning and transportation data
- Terminals

The PMC adopted the **Pune Urban Street Design Guidelines** (USDG) in 2016. These guidelines provide design recommendations appropriate for Pune, and especially focusing on facilities for pedestrians, utilities, multi utility zones including hawking and vending spaces, dedicated bus lanes and motor vehicle lanes. About 100 km of roads are being re-designed in accordance with these street design guidelines. Appropriate bicycle infrastructure is being developed as part of these street design and redevelopment projects. *A detailed review of the USDG was done as part of the Pune Cycle Plan process, especially from the point of view of cycle inclusive design. Additional guidance has been developed in the form of Cycle Design Guidelines, which should be integrated into the next edition of the USDG.*

In 2016, PMC also adopted '**Walk Smart'**, a policy on facilities for pedestrians. *This policy clarifies the type of infrastructure to be developed for pedestrian. This policy is complementary to the Cycle Plan as good footpaths are essential alongside cycle tracks, in order to provide adequate space and safety for both types of road users.*

In 2016, PMC has also published a **Public Parking Policy** (Draft). *Such a policy would also be complementary to the Cycle Plan, as road space in Pune is limited on most roads, and facilities for pedestrians and cyclists are often compromised. Controlled and restricted on-street parking for motorized vehicles, as well as adequate space for cycle parking are essential to promote non-motorized transport in Pune.*

Projects

The detailed project report for **Pune Metro**, prepared in 2012, presents two corridors i.e. PCMC to Swargate and Vanaz to Ramvadi with a combined route length of 31kms and 31 stations. This DPR recommends multi-modal traffic integration, and presents various plans to integrate metro with the city bus system, pedestrianization, dispersal facility from stations including auto rickshaw and bicycles as the major modes. *The implication is the Pune Cycle Plan must provide recommendations for integration of bicycle infrastructure with the Pune Metro corridors.*

The PMC and PCMC along with PMPML jointly launched the **Rainbow Bus Rapid Transit System** in August 2015. Rainbow BRT is operational in Pune and Pimpri Chinchwad and is managed by PMPML. The project has a planned network length of 68.80 kms. The corridors operational in Pune are Sangamwadi to Vishrantwadi of 8 km length, and Yerwada-Wagholi Corridor, which has a 7.86 km segregated section from Yerwada to Aaple Ghar on Nagar Road. The next two BRT corridors in Pune, currently under development, are on Ganeshkhind Road and old Mumbai-Pune Highway. The BRT infrastructure developed in 2005 on Satara Road and Solapur Road is currently being refurbished to match the design of the new Rainbow BRT corridors. *All the Rainbow BRT corridors are expected to have cycle tracks, though the Sangamwadi-Vishrantwadi and Yerwada-Wagholi corridors currently do not have cycle tracks.These corridors thus present a substantial opportunity for integrating cycling infrastructure with BRT and public transit. A new cycle track is already being developed along the corridor on Ganeshkhind Road, which follows the specifications proposed in the Pune Cycle Plan.*

As part of the Smart City Mission, a project has been taken up to develop a 1.5 km **Pedestrian Walkway in Aundh**. *A cycle lane is implemented as part of the project and this can be one of the early demonstration sites for design and use of a cycle lane.*

As part of the**Pune Streets Programme,** about 100 km of roads are being re-designed, including Satara Road, Solapur Road, JM Road, FC Road, core city area and Sinhagad Road**.** *The designs of some of these roads were reviewed as part of the process for preparation of the Pune Cycle Plan and suggestions were made to the Road Dept in relation to the design of cycle tracks and junctions to enableappropriate movement of cyclists*.

One of the main aims of creating the Comprehensive Mobility Plan was to prioritise and allocate the investments in the transport sector. This however lacked the operational and maintenance cost of the projects which has now been considered in the Smart city proposals. The operational and maintenance cost is a very important aspect while calculating the lifetime cost of the project as it helps in sustaining the project. Though the Comprehensive Mobility Plan aimed to focus on moving people over vehicles, the emphasis on Non-Motorized Transport was relatively low. This scenario, however, has changed with the advent of the Smart City Mission, in whichgreater emphasis has been given to Non-Motorized Transport. The proposals prepared by Pune Municipal Corporation for the Smart City Mission deal with bicycles, street design, footpaths, junctions, open space and non-motorized streets per the definition and function of a smart city and these new transit options are expected to help transform Pune to be plentiful and attractive for people of all income levels.

Some initiatives concerning bicycles were included in the Pune Smart City proposal, such as the public bicycle sharing system from 18 to 60 months, taking NMT to 8% from 1% through 27 km bicycle tracks and creating 42 km cycle track. Details are mentioned inFigure 2.

However, early in the process of preparation of the Pune Cycle Plan, the possibility of convergence of the intent of the proposed plan and the objectives of the Smart City Mission were evident. The Pune Municipal Corporation thus enhanced the mandate of the Cycle Plan process to prepare a Detailed Project Report for a Public Bicycle System for the entire city, not only for Aundh Baner Balewadi area.

		Short term <12-18 months	Medium term 18 months– 60 months	Long term >5 years
1	ICT solutions	• Public transport ITMS – GPS, real-time tracking, health monitoring in buses – Smart bus stops with PIS – Mobile apps for real time tracking • Adaptive Traffic Management System across 319 signals: – Pedestrian safety buttons – Solar Panel & UPS backup – Emergency response system • Advanced traffic management – E-challans – Mobile GPS based traffic analysis – Intelligent road asset mgmt		
2	"Less is more" solutions	• Private bus aggregator to complement public buses	• Procurement of ~2,500/ ITMS enable buses • Depot and terminal development • Public bicycle sharing system • Smart Redesign of 50 km of streets • Redesign of 75 Junctions	• Smart street redesign for entire Pune
3	High capex solutions		• ~60 km of BRT Network • ~31 km of Metro • 2 Ring Roads to be completed	• ~10-20 km BRT network • ~44 km metro network

Figure 2: Framework to solve Pune's Transport and Mobility problem

(Source: Smart City Proposalby Pune Municipal Corporation, 2015)

It may be noted that while the policy has been supportive of NMT and cycling, Pune is lagging behind in implementation of projects for cycling improvement.*There are substantial opportunities for improving cycling infrastructure in conjunction with Metro and BRT projects as well as in Smart City area which must be acted upon. It is expected that the detailed proposals for cycle improvement presented in the Pune Cycle Plan will help in creation of appropriate institutional structures and directing investment for cycling improvement over the next 5 years.*

Policies, Guidelines and Notifications

National Urban Transport Policy 2006
http://moud.gov.in/upload/uploadfiles/files/TransportPolicy(2).pdf

Guidelines for NMT Measures - policy and options
http://iutindia.org/CapacityBuilding/Toolkits.aspx
https://sti-india-uttoolkit.adb.org/mod5/index.html

Metro Rail Policy 2017
http://moud.gov.in/upload/whatsnew/59a3f7f130eecMetro_Rail_Policy_2017.pdf

IRC 11-1962 Recommended practice for the design and layout of cycle tracks
https://www.irc.nic.in/publications.aspx

Urban Road Safety Audit- NMT Infrastructure auditing
http://www.sutpindia.com/skin/pdf/Toolkits/Urban%20Road%20Safety%20Audit_200614.pdf

NMT guidance document
http://moud.gov.in/upload/uploadfiles/files/NMTGuidanceFINAL.pdf

Urban Transport Parameters proposed under National Mission on Sustainable Habitat
http://sumnet.in/images/downloadable/nmsh_parameters_v4-1.pdf

Liveability Standards in Cities - Category 11
http://moud.gov.in/pdf/59b66fb7063ecLiveabilityStandards.pdf

National Transport Development Policy Committee (NTDPC)- Urban Transport Sector
http://planningcommission.gov.in/sectors/index.php?sectors=National%20Transport%20Development%20Policy%20Committee%20(NTDPC)

Sustainable Urban Transport- Principles and Implementation Guidelines for Indian Cities
https://smartnet.niua.org/sites/default/files/resources/Draft%20Report%20on%20Sustainable%20Urban%20Transport-%20Principles%20and%20guidelines%20for%20Indian%20cities%281%29.pdf

Comprehensive Mobility Plan for Pune
https://pmc.gov.in/en/comprehensive-mobility-plan

Pune Urban Street Design Guidelines
https://pmc.gov.in/en/urban-street-design-guidelines-usdg

2.2. Travel Trends and Current Patterns

Pune has a rich history as it was once known as the cycling capital of Maharashtra. Several of the senior citizens interviewed as part of the Pune Cycle Plan recall their cycling days in the 1950s, 60s and 70s, when the cycle was the primary mode of commute for children and adults alike. Cycles were registered, and carried kerosene head lamps. Mornings and evenings were filled with the

sound of cycle bells of workers in the Ammunition Factory and others along old Mumbai-Pune road. Safety on the roads was not such a concern since motorized vehicles were relatively lesser.

However, as also highlighted in the Comprehensive Mobility Plan (CMP), cycling has a decreasing trend, along with increasing ownership and use of motorized two-wheelers. Surveys carried out for the Pune Cycle Plan reveal the current status of cycling in Pune. Certain trends are revealed when this data is compared with data from the earlier Development Plan (DP) and the CMP.

This section presents the conclusions from the surveys carried out for Pune Cycle Plan, and trends for selected parameters, depending on the availability of information.

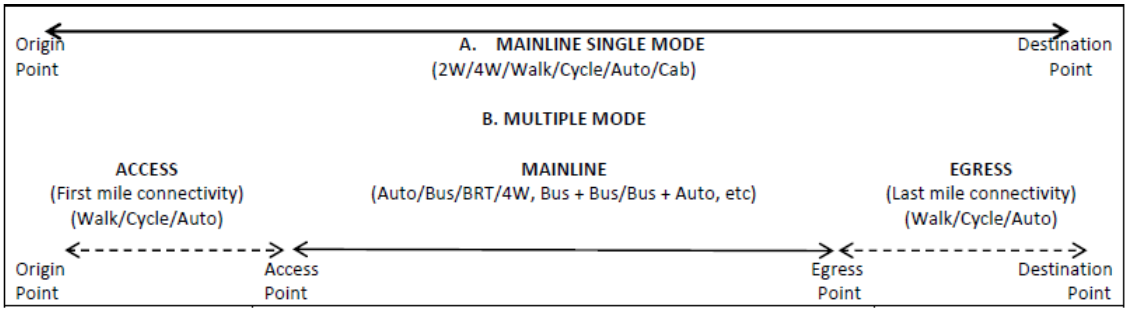


Figure 3: The Segments of a Journey

2.2.1. Travel Trends

Mode share

As per the draft DP (1981), the presence of cycles in the traffic stream was 57.5% and 53.23% respectively in and outside the congested parts and 56% in the city at that period, without much difference in the peak hour and the rest of the day, which was more than half of the mode share.

The report also presents inferences from a household survey, indicating that 44% of the inter-zonal trips and 56% of total trips were made by walk compared to 26% of inter-zonal and 21% of total trips by cycle. Excluding walk trips, 46% and 49% respectively were made by cycles. This shows why Pune was known as the cycle capital of Maharashtra.

As per the Comprehensive Mobility Plan, in the year 2008, walking and cycling constituted 33.3% of the total trips in Pune, including 11% made by cycles, down from 77% of total trips including 21% by cycles in the year 1981.

The mode share of cycles, elicited from the household survey carried out in 2016 for the Pune Cycle Plan is 3%. This is a much smaller proportion as compared to the modal share of 2012 from Pune Metro DPR study which shows 9% of cycle as a mode share.

The mode share of cycles is a declining trend, dropping from 21% in 1981 to 3% in 2016.

Trip length

Average trip length from a 5000 household-survey sample came out to be 6.14 km in 2008, increased from 4.05 km in 1981. People had to go farther for their trips in the year 2008 as compared to the year 1981. The average trip length inferred from the Household Survey carried out in 2016 for the Pune Cycle Plan is 4.3km. The survey for the cycle plan recorded all trips, including

short local trips, since the purpose is planning for the cycle mode. The calculation of average trip length includes both types, that is single mode, and multiple mode, counted as a single trip. The methods of and data from the CMP survey were not accessible, but it may be that the focus of those surveys was work trip, and short local trips are not accounted for, leading to a larger figure for average trip length.

Average trip length shows a slight upward trend.

Cycle Ownership

As per the draft Development Plan (1981), there was about one cycle per household and the number of privately owned bicycles were about 3 lakhs. The impact of available cycles for hire was almost equal to that of the private cycles. Indeed, the numbers of cycles available on hire were almost 50,000 and used almost six times as much as private cycles.

Cycle ownership in Pune city, as per 2011 census is32.8%. As per the surveys carried out for the Pune Cycle Plan in 2016, cycle ownership is 33%. The data on number of cycles for rent is not comprehensively available.

There may have been a declinein cycle ownership and availability of cycles for rent. However, the cycle ownershipfigures seem to be steady at about 33% over the last 7 years.*The next census may provide a clearer understanding of cycle ownership trends.*

Safety/ Accidents

As per the CMP, “In November 2008, fatal accidents accounted for 24% of the total accidents recorded in Pune of which 11% accidents were serious and 65% were minor ones whereas in 1981, these numbers were 5%, 4% and 91% respectively.” As per the CMP, accidents increased as most roads do not have segregation for cycle traffic from the motorized traffic causing potential unsafe conditions. Moreover, from the infrastructure assessment it was observed that about 50% of roads did not have foot paths on both the sides.

Both the CMP and the 1981 draft DP indicate that bicycle infrastructure must be provided on strategic locations to encourage and cater to dedicated cycling trips and must be continuous and form a network in the city. Keeping in mind the development pace in the recent times, the network should not be limited on strategic locations but should be created throughout the city.

There is an increasing trend of accidents over the past three and a half decades, attributed to increasing motorization and lack of safe segregation for cycle traffic.

2.2.2. Current Travel Patterns

Travel Modes

- 47% of the mainline trips in the city are walking trips, which is a substantial proportion
- Cycling constitutes 3% of the total mainlinetripsi.e. 2,03,370 cycle trips each day
- Public transport i.e. buses and BRTS constitutes of 11.5% of the total trips.
- Auto-rickshaw which is an intermediate transport mode, constitutes of 4% of total trips which is a percent more than cycle.
- The city has a large share of two-wheeler trips, 29% of the total trips.
- Four-wheelers have a share of 5.5%

For access and egress trips, almost all the trips are by walk.(From Household Survey)

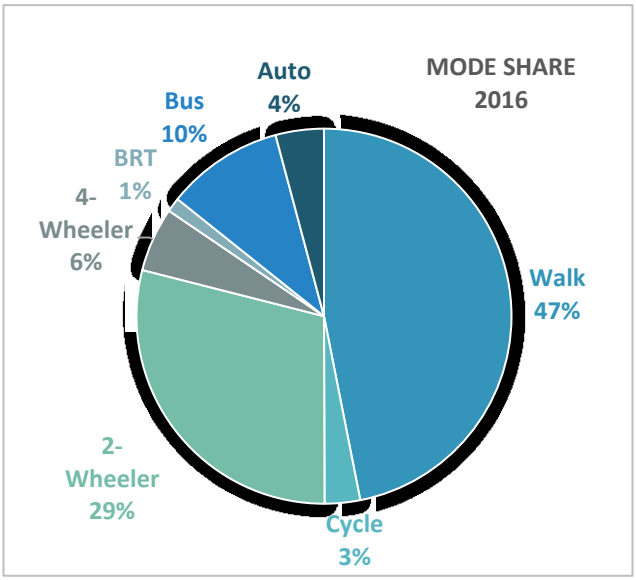


Figure 4: Share of different modes of transportation in Pune, 2016

Considering this data, the challenge is to convert a large proportion of the 29% motorized two-wheeler trips, and the 5.5%, four-wheeler trips to bicycle mode or bicycle + public transport, or intermediate transport + public transport mode. Obviously, with improved cycling infrastructure, some long walking trips will also be converted to cycling.

Cycling at 3% is close to the mode share of trips by auto, and 50% of the trips by cars.

Travel Distance

When total trip distance for all the trips are observed, 20% of the trips are up to 0.5km of length and can be comfortably walked, followed by 23% in the range of 0.51-1km which can be walked as well as cycled (if given a hassle-free choice), 12% are in the range of 1-2km and 13% are in the range of 2.1-4km. (From Household Survey)

The latter two ranges show that 25% of the total trips can be comfortably cycled as the distance of 1-4 km is a cyclable distance as per Indian conditions.

Travel Mode and Travel Distance Correlation

When a mode and travel distance are co-related, the potential for conversion of other modes into cycling trips is revealed. This includes motorized modes as well as possibly 'forced' pedestrian trips by people who may not have any option and are forced to walk long distances. (Household Survey)

- For distances of 0.51 to 1 km, 2.2% of overall trips are by motorized two-wheelers
- For distances of 1-2 kms, 3.8% trips use motorized two-wheelers and 6% walk down
- For distances of 2.1-4km, 6.2% trips use motorized two-wheelers while 1.8% trips are by walk.

Considering that a distance of up to 4 km is cyclable, there is the potential for conversion of 10% of the trips in this segment, which are currently by motorized mode, to cycle trips. Additionally, up to about 8% of pedestrian trips which are in the segment of 1 to 4 km could be converted to cycle trips.

Travel Time

The trip time for the mainline haul trip was observed.

- 35% of the total mainline trips are made in 6-10 minutes
- 33% mainline trips are made in 11-20 minutes
- 17% mainline trips are made in about 20-30 minutes.

This shows that most trips do not have long travel times.

The access trip time has also been captured for all the mainline trips (having access trips) and it shows that majority of access trips are made within 5 minutes for mainline trips of 11-20 minutes, as well as for mainline trip of 20-30 minutes. (From Household Survey)

Travel Mode and Travel Time

Mainline trip time has also been compared with the mode that the commuter uses. It shows that the trips made within 5 minutes are walk trips, followed by 6-10 minutes' trip of which again walking is a major share and two-wheeler also holds a sizable number of trips. The 11-20 minutes of trip time has two-wheeler as the major mode, followed by walk. Cycling as a mode would be best for such trips which currently are almost absent. (From Household Survey)

Travel Purpose

A substantial number of trips (40%) are work trips, followed by education (school/college/tuition centres) related trips i.e. 31%. Shopping trips are 22%. (From Household Survey)

Travel Distance by Cyclists

64% cyclists who responded to the Street Survey travel a distance of 1-4 kms, while 21% travel between 4-6kms.

This mix of local short distance trips and long-distance trips across the city is also borne out in the trip pattern reported in the Household Survey (as presented later in this section).

About 54% of the cyclists who responded to the Online Survey indicate that the average distance they cycle in a day is more than 8kms. About 31% cyclists cover around 6-8 kms.

Travel Purpose and Travel Distance

When trip purpose was compared with the overall trip distance, it gives an interesting output which is the desirable cycling distance i.e. 1-4kms have a major share of work and education trips.

Majority of such trips are also regular in nature. It would be best to provide cycle as an alternative for such commutes, as a considerable number of work and education trips are made using motorized two-wheelers.

Almost 10% of the total trips which are made using motorized two-wheelers are within 4kms. About 2% use auto rickshaws for distances up to 4 km. (From Household Survey).

A large proportion of the respondents of the Online Survey reported using the cycle for exercise, while those who responded to the Street Survey are more likely to go to school or a workplace which may be nearby and for which cycling is a practical option. This may explain the longer average daily cycling distance from the Online Survey.

Cyclists Commute Timing

The evening peak hour of cyclists is same as that of other motorized vehicles i.e. 6-8 pm, however, the morning peak hour is a bit early i.e. 7-9 am. A major observation is that between 1-4 pm, rarely cyclists are on roads.

(From Online Survey).

Inter and intra ward travel patterns of cycling commuters in Pune

A visualization of the spatial patterns of cycling trips in Pune is presented below. This is based on the origins and destinations reported in the Household Survey. The method of sub-division of the city as Electoral Wards of 2007-2012 is the basis for this visualization, as the geographic population distribution of Pune as per the 2011 Census is linked to these 144 Electoral Wards. The start points and end points of all trips were allocated the centroids of the particular ward they originated or destined in, respectively.

- The coloured circles represent intra-ward trips
- The lines represent inter-ward trips

The patterns indicate:

- Local trips are well distributed throughout the city
- Certain locations like Yerwada, Hadapsar Industrial Estate, Sinhagad Road, University/ Aundh Road show a higher number of local trips.
- There are a higher number of trips between north-west and south-east Pune, and central Pune and south-east Pune. Cycle trips also take place between central Pune and south-west Pune.

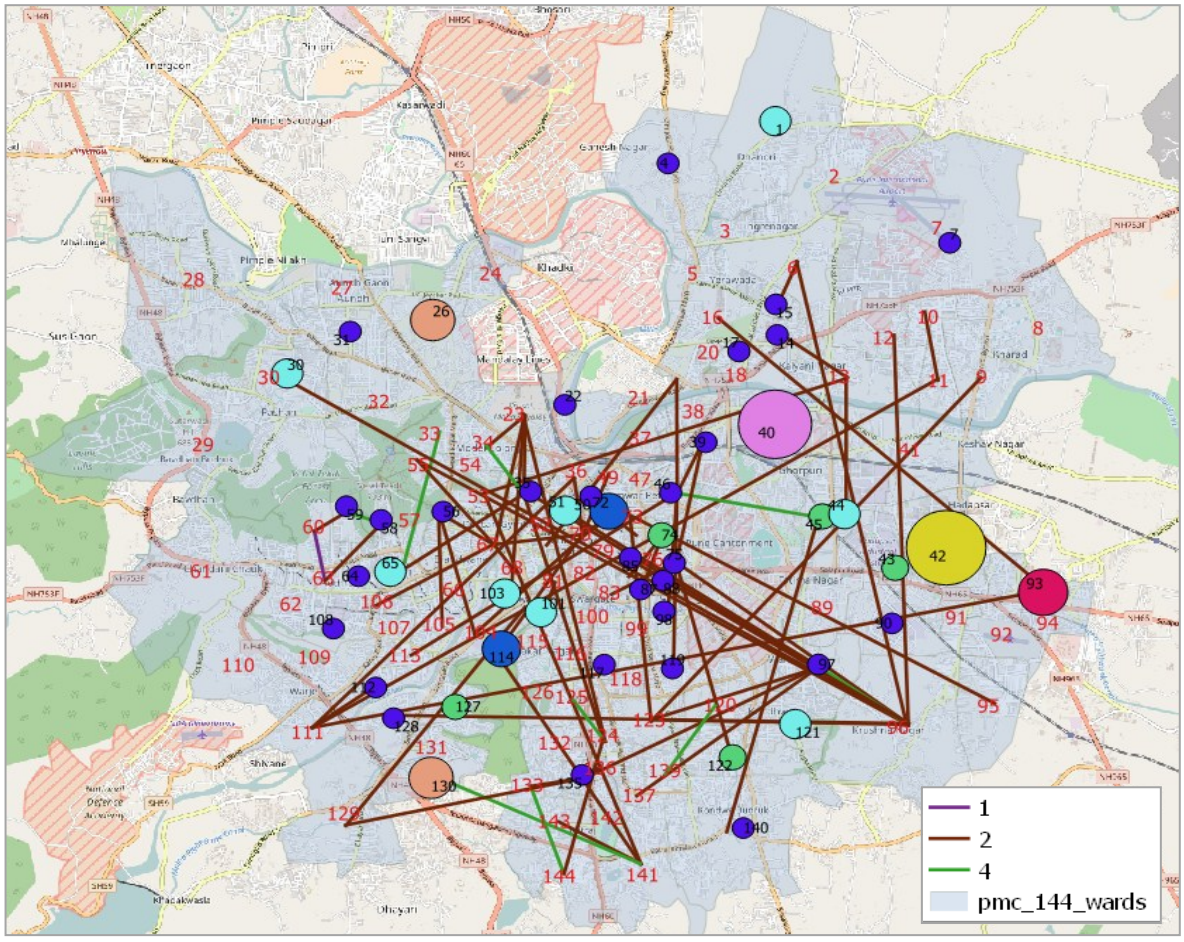


Figure 5: Inter and intra ward travel patterns of cycling commuters in Pune

Reasons for Cycling

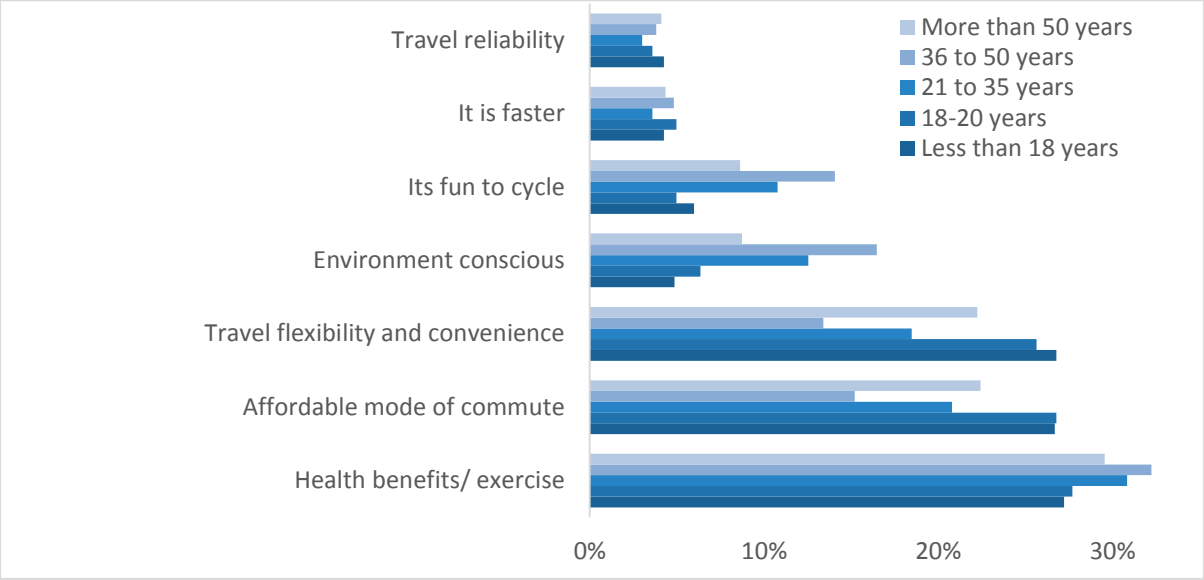


Figure 6: Reasons for Cycling (age-wise)

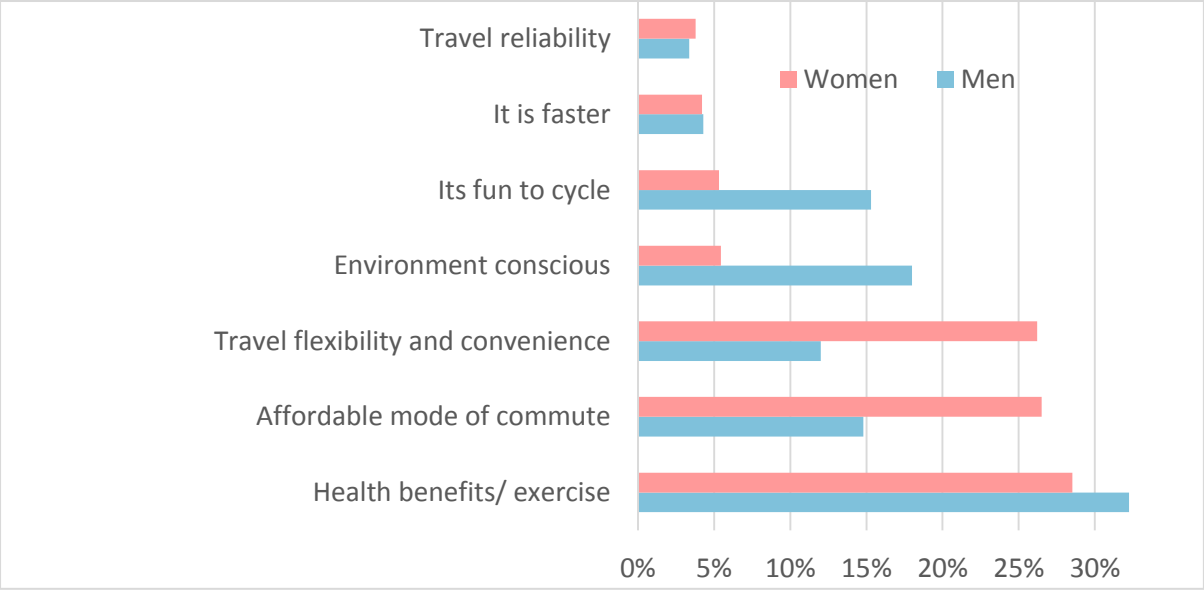


Figure 7: Reasons for Cycling (gender)

The main reasons for cycling, stated by cyclists are health benefits, affordability, and travel flexibility and convenience. This is especially so in the case of younger people, older people, and women.

However, these are not the main reasons for 36-50 year olds, especially men. Men in this age group may be using cycles primarily for exercise and so these parameters do not apply. For 36-50 year olds, the health benefits, fun, and environment consciousness are more important factors, which are consistent with usage of cycles for exercise.

The recognition of health benefits of cycling is high across age-groups and gender.

Respondents could choose more than one option. The bars represent the relative importance of the options, for that age or gender category.

2.3. Cycling Infrastructure Assessment

The status of cycle infrastructure has been captured through an observational survey and an audit of the existing infrastructure.

Cycle Tracks: The audit of the design of the current cycle tracks in Pune reveals the lack of a systematic approach of street design, leading to improper infrastructure. For example Figure 8 shows an ill-designed cycle lane having bollards in the start, Figure 12 shows an ill-designed bus stopthat hinders the continuity of the cycle lane, Figure 14 shows how street services are developed without giving any consideration to the cycle or pedestrian infrastructure and lack of dedicated space to street hawkers also leads to encroachments as shown in Figure 13.

Encroachment on Cycle Infrastructure and Enforcement: A lack of awareness among commuters and violation of cycle tracks by motorized vehicles have also been observed. Figure 9 and Figure 10 shows how motorized vehicle users either park or ride on the cycle lanes and how lack of maintenance of NMT lanes (in Figure 11) forces cyclists and pedestrians to use the main carriage way.

Figure 8: Ill designed cycle lane with bollards breaking the continuity

Figure 9: Vehicles parked over footpath and cycle lanes and forcing NMT users to use carriageways

Figure 10: Lack of awareness about the importance and rights of NMT among commuters using motorized vehicles

Figure 11: Cyclists and pedestrians being forced to use the carriage way due to lack of maintenance of cycle tracks and footpaths

Figure 12: Ill-designed Bus stops creating blockage for pedestrian and cycle movement

Figure 13: Encroachment of the NMT lane by hawkers due to absence of dedicated space for them

Figure 14: Cyclists being forced to use the carriage way because of unplanned services in the NMT lanes (like public toilets)

Cycle infrastructure audit and observational surveys were carried out in the city to know the condition of existing cycle infrastructure i.e. cycle tracks, parking facilities and repair shops information. The analysis for the same has been done from four different aspects based on cycling inclusive street design guidelines. This includes safety of cyclists, comfort of cyclists, coherence and directness for cyclists and the attractiveness of cycling tacks for cyclists. The analysis of the condition of cycle tracks and the maps representing the analysis are provided in survey report.

The assessment shows:

- A very large proportion (little over 90%) of the existing cycle tracks is encroached. Encroachment by vehicles is relatively smaller, at 33% (by vehicle + by both), while that by activity is very high at 89% (by activity + by both). However, encroachment by moving motor vehicles is dangerous, and encroachment by parked vehicles often occupies almost the entire track width.
- Existing cycle tracks score fairly well as regards width, height, attractive / active surrounding land use and slope.
- Existing cycle tracks perform very poorly as regards shade, signage, presence of barriers, continuity and traffic calming.
- Pavement quality, treatment at junctions are also very poor.

The key findings are presented in Figure 15.

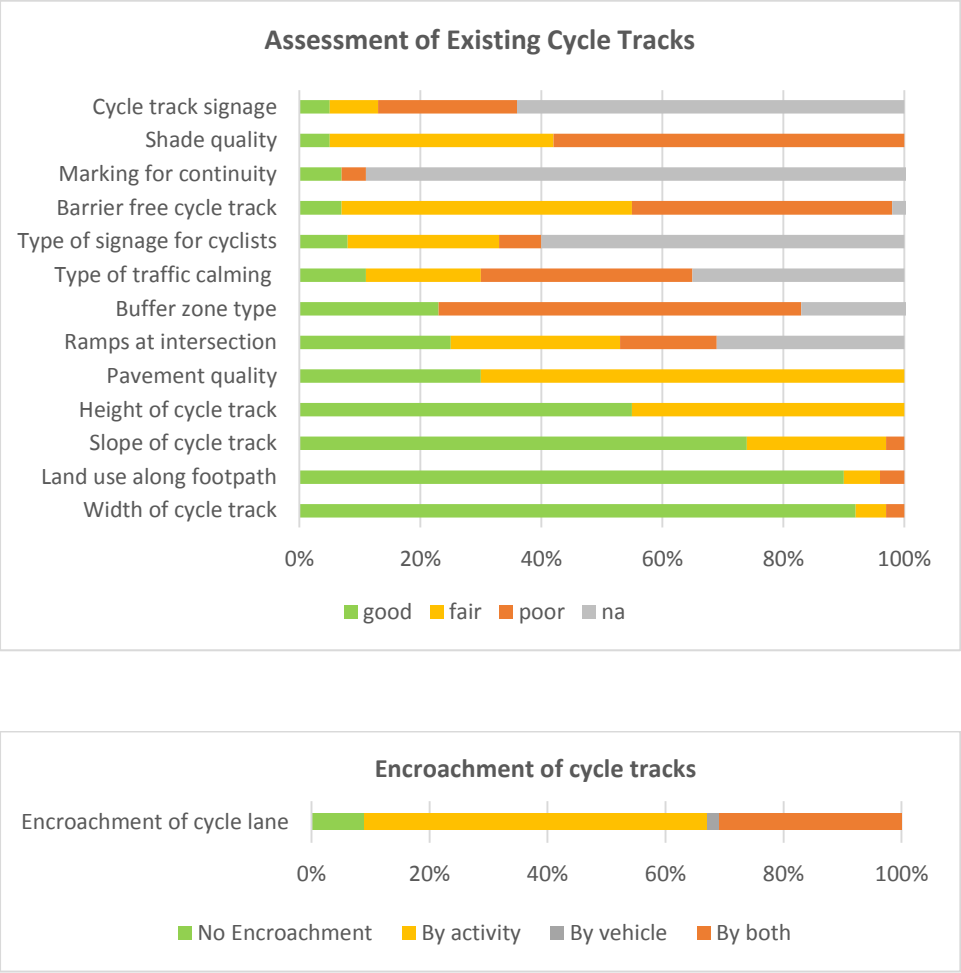


Figure 15 Assessment of Existing Cycle Tracks

Cycle Parking and other Facilities

The study conducted throughout the city included assessment of cycle parking facilities and an inventory of cycle repair and retail shops in the city (refer Figure 52Figure 18).Cycle parking at public locations was absent except for a few locations such as railway station (refer Figure 16)and institutional areas like schools and colleges (refer Figure 17).However, cycle parking is not present in all the institutes.

Figure 16: Range Hill Road

Figure 17: Garware college

Figure 18: Solapur Road

Cycling Routes

A mapping exercise for preferred routes by cyclists (referFigure 19: Preferred route by cyclistsFigure 19) and non-cyclists (referFigure 20). A mapping of perceived unsafe corridors (referFigure 21) was also conducted based on inputs by online survey respondents. The inputs were based on names of the stretches which were then marked based on its frequency of occurrence.

The most preferred routes by cyclists and non-cyclists are also perceived as the most unsafe corridors. For example, Nagar Road and Satara Road. The only corridor which is perceived to be comparatively less unsafe and is also a preferred route is Baner road.

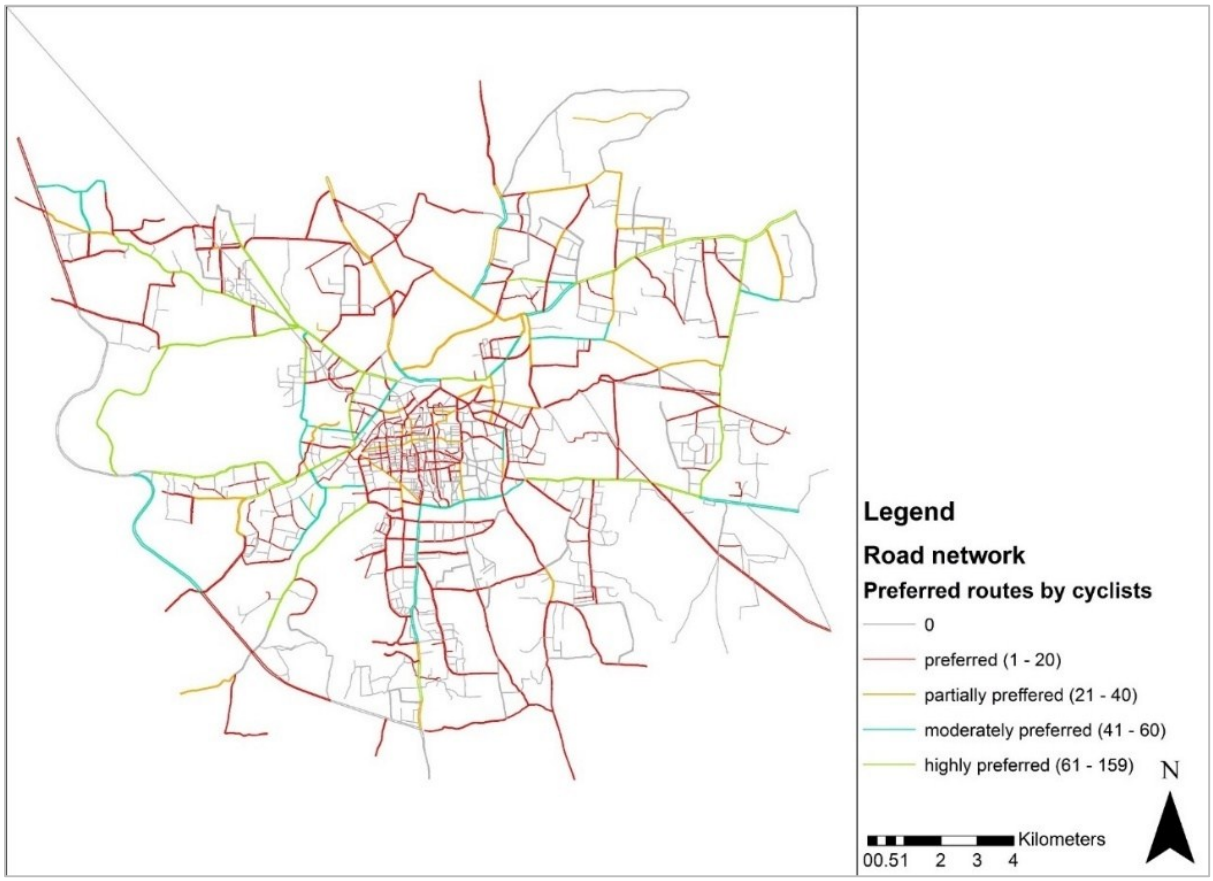


Figure 19: Preferred route by cyclists

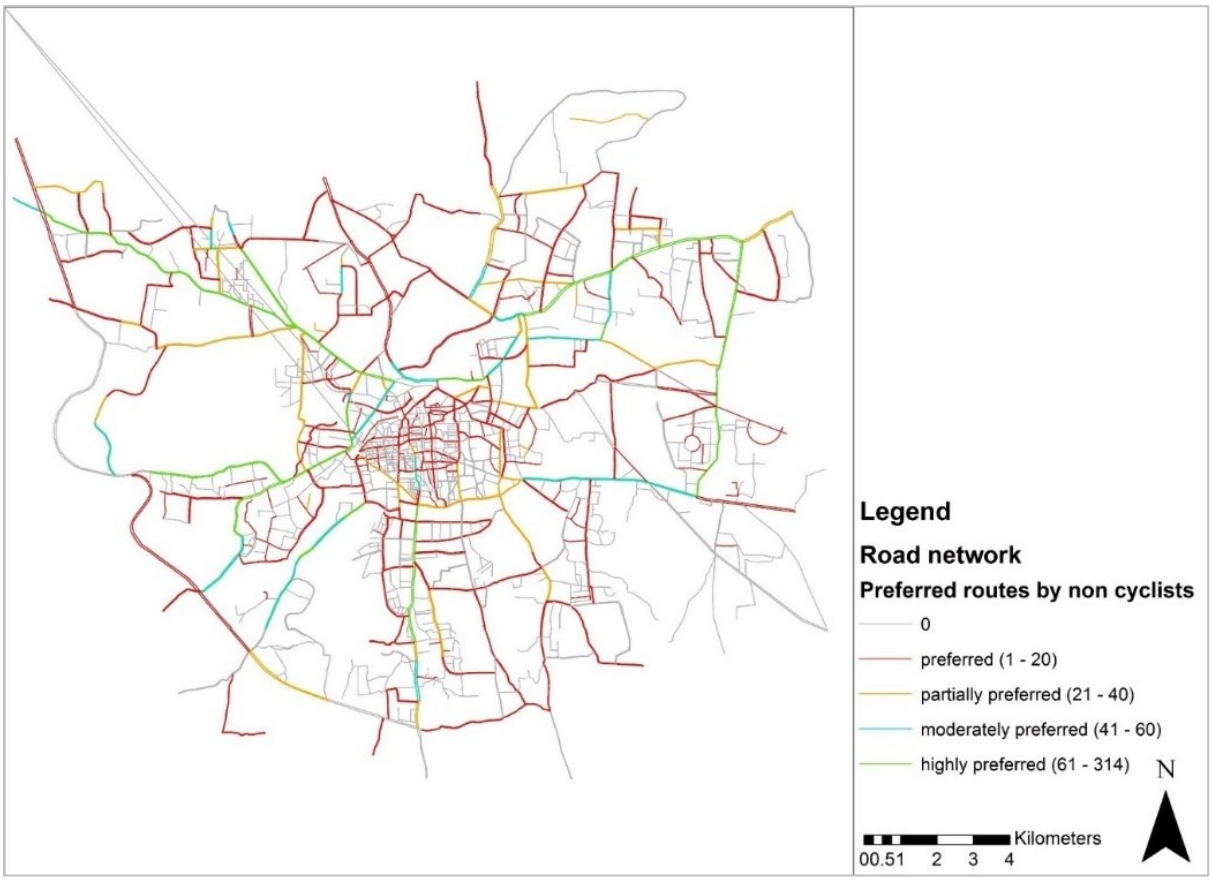


Figure 20: Preferred route by non-cyclists

Figure 21: Perceived unsafe corridors

Public Perceptions about Cycling Infrastructure

Cyclists were asked to rate their experience of cycling in the city on five different parameters.

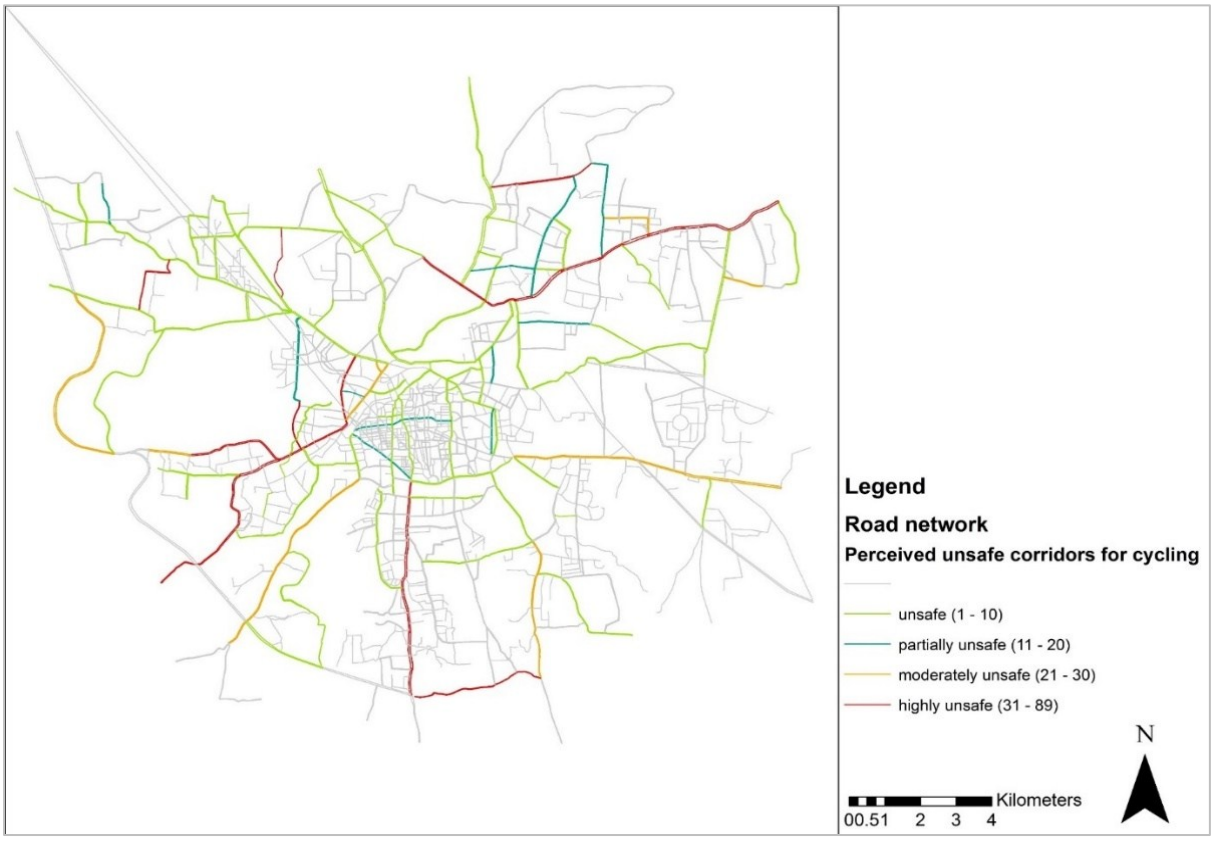
Behaviour of motorists: The majority of cyclists find behaviour of motorists towards cyclists as unacceptable and they don't feel safe on road. This may be due to the traffic regulation enforcement issues i.e. motorists using cycle lanes to drive and specially during peak hours, or the absence of cycle infrastructure itself.

Safety: While overall safety on the road is a very big concern, it comes second to the concern about behaviour of motorists.

Crossings: Cyclists find signals and crossings highly inconvenient. The general observations survey also shows that the signal cycle doesn't have a cyclists' phase.

Surface for Cycling: The surface that cyclists currently use (which is primarily roads, and not cycle tracks) is of relatively lesser importance.

Cycle Parking: A few cyclists agree that they find cycle parking easily.However, from the observational survey, it has been noted that very few locations have cycle parking.



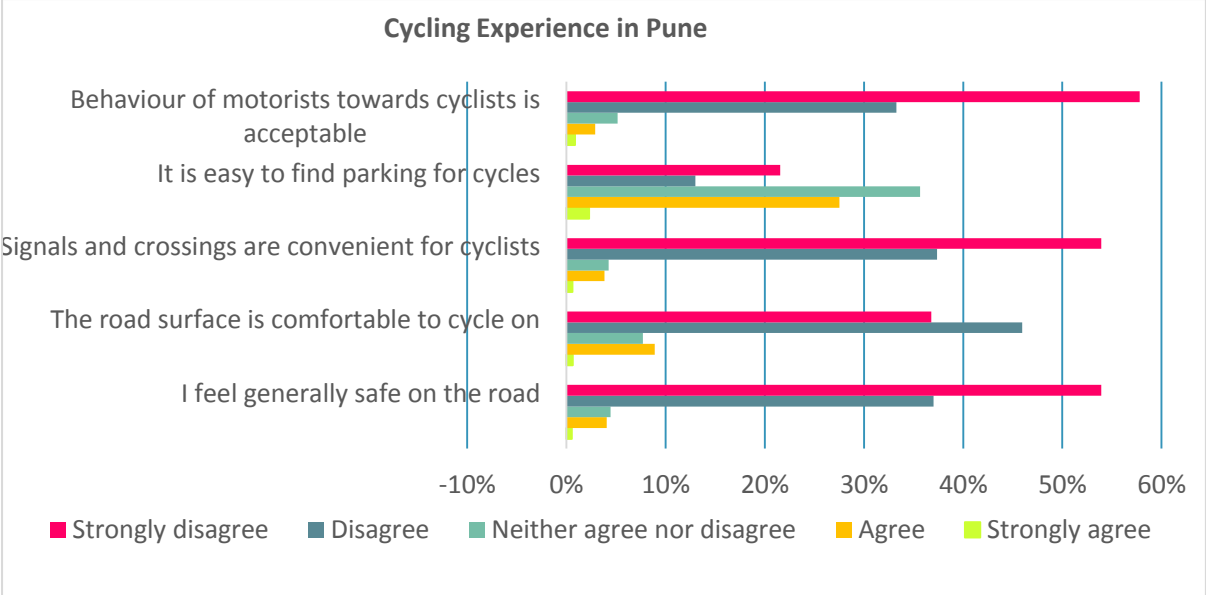


Figure 22 Perceptions about Cycling Experience in Pune

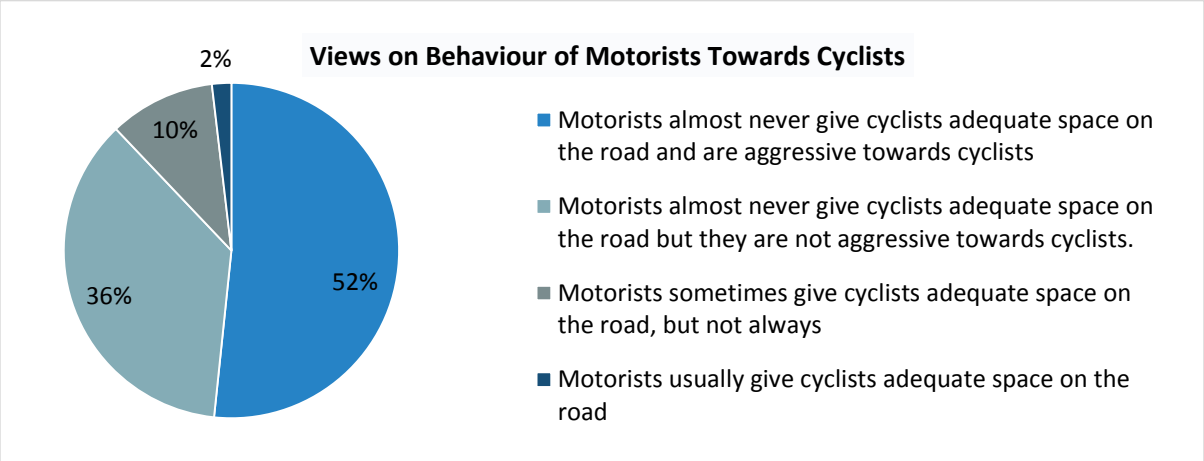


Figure 23Views on Behaviour of Motorists towards Cyclists

What are the Reasons for Not Cycling

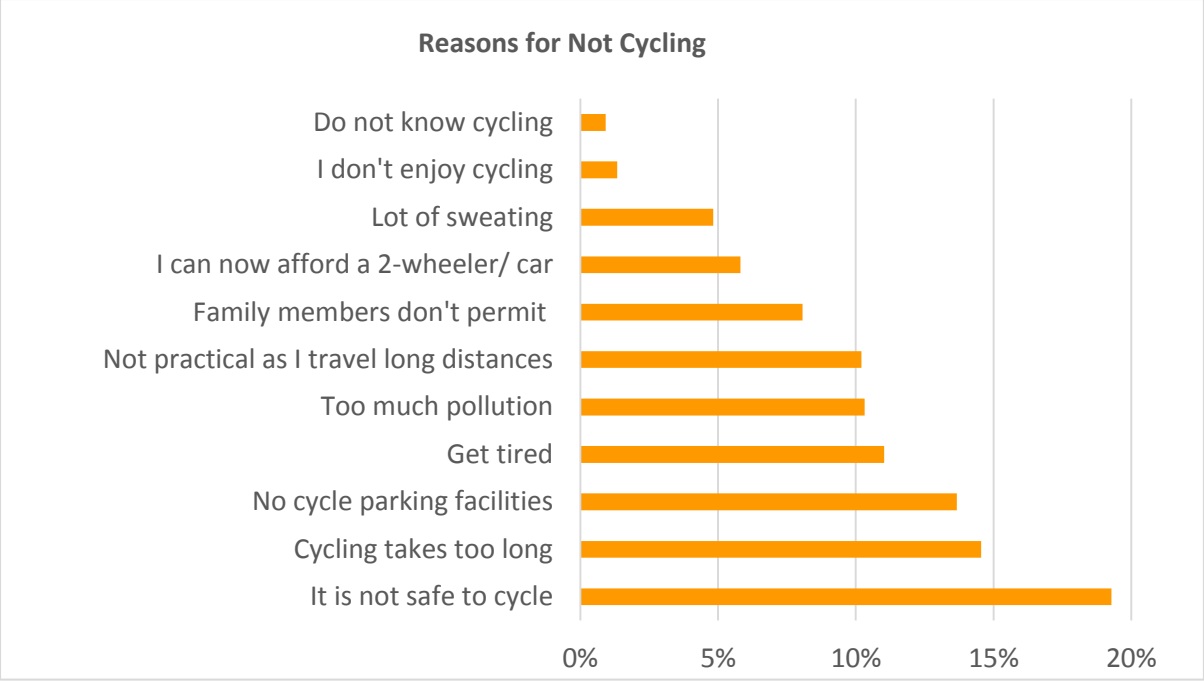


Figure 24 Reasons for not cycling

The respondents are non-cyclistsor those who used to cycle but don't do so any more. The graph presented here is based on the responses to the Online Survey.

The major reason behind their not cycling is they don't feel safe to cycle. It is followed by the fact that cycles take too long to travel as they might have long travel distance that is more than the cyclable distance i.e. up to 4-5km and they don't find cycle parking facilities. Feeling tired and polluted outdoors are also reasons for people not opting for cycling.

Similarly, from the street survey, these three are the major reasons by non-cyclists for not opting for cycling or the reason for leaving cycling. However, feeling tired and polluted outdoors were the top reasons given by the respondents of the Street Survey.

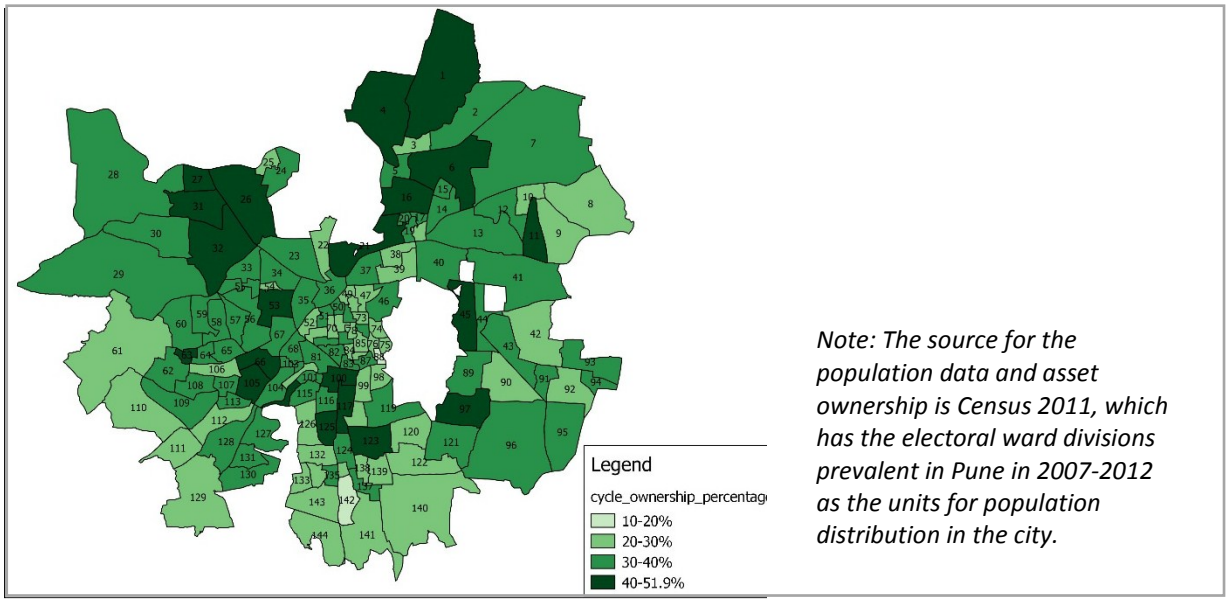
2.4. Cycles

About 18% of the cyclists conveyed that they use cycle either daily or sometimes. Majority of these commuters are young and middle-aged men employed in services provision, and with monthly household incomes up to INR 20,000. (From Street Survey).

From the vehicular ownership status, there are two interesting observations. Firstly, ownership of a single motorized vehicle is less with commuters owning a single cycle which means that cycle is the main vehicle they own and such commuters are in substantial numbers. Secondly, of the cyclists surveyed, 22% of cyclists don't own a cycle. These may include those using a cycle provided from the service delivery work place, for example milkman, gas cylinder delivery man, etc.

Vehicle Ownership: About 77% of the cyclists own 1 or more than 1 cycle whereas 57% of them don't own a 2-wheeler and 93% of them don't own a 4-wheeler. It shows the potential number of cyclists who will still use cycle as a mode. The proportion of households having cycles, is depicted for various areas in the city in

. It corresponds well with the pattern of inter- and intra-ward cycle trips, depicted in Figure 5.



Note: The source for the population data and asset ownership is Census 2011, which has the electoral ward divisions prevalent in Pune in 2007-2012 as the units for population distribution in the city.

Figure 25: Percentage of households with cycle ownership across wards in Pune

Bicycle Theft: 21% of the cyclists have lost their bicycles due to theft which is a considerable number as theft and vandalism discourages cyclists to opt for cycling as their main mode.

Bicycle Type: 77% of the cyclists are either using or are willing to use a non-geared cycle. About 80% are willing or able to spend INR 3400 to buy a new cycle or are have a cycle in that price range. However, it should be noted that 21% of them are still using geared cycles which costs more. Considering the price of geared cycles, it may be inferred that cyclists of middle and upper income categories use cycles for their regular work commute.

Existing Rental Systems: Cycles can be rented in Pune from at least 13 locations. (See Figure 52: Map showing Cycle Shops Located in Pune City). The discussion with the representatives of shops and rental services revealed two trends:

1. A declining trend of sale and rental of the older cycle models, and of renting cycles for daily work or recreational cycling
2. An increasing trend of sale and rental of newer models, and of renting cycles for weekend cycling events and recreational trips, especially among young professionals.

The key features of cycle sharing systems as per the **Government of India toolkit for Public Bicycle Systems** are:

- A dense network of stations across the coverage area, with a spacing of approximately 300 m between stations
- Cycles with specially designed parts and sizes to discourage theft
- A fully automated locking system at stations that allows users to check cycles in or out without the need for staffing at the station
- Electronic tags to track where a cycle is picked up, the identity of the user, and the station where it is returned. The identity of the user is associated with that of the cycle to ensure security
- Redistribution of cycles to ensure availability of cycles and empty docking points
- Real-time monitoring of station occupancy rates through information technology (IT) systems, used to guide the redistribution and provide user information through the web, mobile phones, on-site terminals, and other platforms

- Pricing structures that incentivise short trips, helping to maximize the number of trips per cycle per day

2.5. Current Institutional Structures

The PMC Road Department is responsible for the construction, repair and maintenance of the road within the corporation jurisdiction. The PMC Traffic Department is responsible for planning, permissions, notifying rules and coordination with the Pune Traffic Police.

A Non-Motorized Transport (NMT) Cell was set up in 2008 in PMC to look at the issues related to pedestrians and cyclists, and provision of footpath and cycle track infrastructures. The NMT Cell was responsible to conduct footpath and pedestrian related work including granting of permission for footpath digging, etc. It was responsible for cycling and walking infrastructure in the city and acting to improve it.

However, the NMT Cell has remained non-functional for a long time and presently there is no department in PMC primarily responsible for facilities for pedestrians and cyclists. The NMT Cell neither had any long-term plan or policy in place nor did it have an operational budget.

The public meetings and stakeholder discussions highlighted concerns about the municipal capacity for sound implementation of the Cycle Plan, especially considering the lack of maintenance of the cycle tracks created earlier.

The implementation of Pune Cycle Plan for improving cycling will require an appropriate institutional mechanism with adequate authority, technical capacity, and financial resources.

2.6. Traffic Management and Enforcement

Pune Traffic Police has the mandate for the enforcement of traffic rules and to take actions against the violations, as per the provisions of the Motor Vehicles Act and the Maharashtra Motor Vehicles Rules (1989). They are also responsible for the on-road management of traffic, vigilance, and to record violations and prohibition of such violations. The RTO regulates permits for the Intermediate Public Transport routes and operations apart from giving licence, and permits for commercial vehicles.

Citizens' views, including of both cyclists and non-cyclists, rank Traffic Management and Enforcement among the top most concerns, as seen in Figure 29: Summary of top public suggestions for the Pune Cycle Plan.As presented earlier, the public experience and perception about traffic management is that the behaviour of motorists towards cyclists and pedestrians is unsafe, and that they don't feel safe on road. Especially highlighted is the need to prevent encroachment by motorized two-wheelers, parked vehicles, and street vendors.

While provisions exist for preventing and penalizing encroachment on cycle tracks and footpaths by motorized vehicles, enforcement needs to be strengthened with a specific attention to prioritizing pedestrian and cyclist movement and safety.

2.7. Education/ Promotion efforts

Current Education and Cycling Promotion Efforts

Discussions with schools and colleges, RTO, Traffic Police, NGOs promoting sustainable transportation and cycling, cycle shops, corporate social responsibility staff at workplaces show that a range of awareness and cycling promotion activities are being done in Pune.

- **Indradhanushya:**PMC has public education and awareness programmes extended through

Indradhanushya Centre for Citizenship and Environment Education. The Centre has education programmes and sustainable urban transportation is one of the components.

- **Promotion and Outreach for Rainbow BRT**: PMC carried out promotion and outreach programme for the bus rapid transit system along the two corridors that had focus on sustainable urban transportation.
- **Road Safety Patrol**: The Pune Traffic Police has an education and awareness programme for the schools on road safety. The programme promotes creation of Road Safety Patrol groups at schools to improve management of traffic at the school gates and creating a safer environment for school students. Innovations in project-based learning and action projects may be useful to enhance the effectiveness of the Road Safety Patrol education aspects.
- **Traffic Park** exists in Chittaranjan Vatika for several years. Equipment, upkeep and structured learning needs improvement. Civil society groups and private enterprises have shown interest in setting up and using Traffic Parks in partnership with PMC.
- **Civil society efforts:** A few NGOs in the city carryout education and awareness projects on sustainable urban transportation and focus on walking and cycling in the city and ask for creation of a safer environment for the pedestrians and cyclists.Cyclists' groups and NGOslike Pune Cycle Pratishthan, Parisar, Save Pune Traffic Movement, CEE and ITDP advocate for sustainable transportation and carry out a few public education and advocacy activities such as through talks, discussions etc.
- **Cycling Clubs**: There is an active cycling culture, with various-area based cycling groups, Cycle for Pune, Pune Cycling Club, Pune Cycling Enthusiasts, Pune Cyclers, Pune Randonneurs, and several corporate groups such as Nvidia, TCS, Tech Mahindra, Vodafone, Zensar that have cycling clubs or groups. Cycle retail and rental stores like LifeCycle, Track and Trail, Giant Starkenn, Cymour, organize cycling events at work places, recreational rides on weekends etc.
- **Workplace incentives**: Some workplaces offer incentives and amenities to promote cycling, such as permission to cyclists to arrive a little later or leave a little earlier than other employees, cash incentives, shower rooms and space for drying cycling clothes, cycles for borrowing for short trips from office.
- **Public walk and cycle events**: Like in many other cities around the world, public walk and cycle events like Happy Streets are being organized in Pune, with part of a public road being closed to motorized traffic

Public Perceptions about Educational Efforts Needed

The analysis of street and online surveys and the public inputs received reveals that there is a strong perception that education and promotion is needed, especially in relation to

- Addressing unsafe and disrespectful behaviour of motor-vehicle drivers towards pedestrians and cyclists
- Addressing encroachment on footpaths and cycle tracks
- Cycling promotion, partnerships, incentives to re-introduce cycling and encourage people to cycle

Young People: Discussions with college students showed that the generic barriers to cycling are valid for young people, such as lack of safe infrastructure. However, they mentioned their interest in promoting cycling, campus-based improvements as action projects. They also mentioned that underage driving and the fascination for motorized two-wheelers would remain a challenge to address.

Driver Behaviour: Literature review shows that poor driver behaviour may be addressed through a 'safe systems' approach, better physical design of streets, and improved enforcement. Poor driving training may be addressed through driving schools, work place employee safety programmes, unions of auto drivers, cab companies, etc. Driving Schools are authorized by the RTO, and efforts for upgradation of their curriculum and teaching methods may be undertaken with the RTO.

Cycle Mechanics Skill Training: The discussion with representatives from shops revealed that there is a need for training of mechanics for cycle repairing, especially for the high-end bicycles repairing, as repair of these bicycles require high skills. There is a shortage of such skilled labour in the city.

Public Support for Shift to Sustainable Transport: Interactions with civic groups, residents' associations and as part of the street re-design project in Aundh reveal that transport demand management measures are difficult to undertake, especially controls on parking. Deeper and more widespread understanding about the transition in transportation systems in Pune will be needed so as to garner support for adding cycle tracks and restricting parking spaces. Participatory neighbourhood planning processes may help evolve local area systems conducive to people's needs.

Cycling does not exist on its own, but as part of a transportation system. The transition to sustainable transportation in Pune depends on partnerships and support from many actors, including educational institutes, work places, residential neighbourhood groups, commercial entities, cycle shops, and various institutional entities, including PMC, Traffic Police, PMPML, Railways etc. Efforts such as Commute Seattle, Sustrans, and the Bicycle Embassies in The Netherlands and Denmark[1] are examples of such partnerships and outreach.

2.7.1. Schools-related Consultations and Survey

School students are an important group for cycle use in the city. Going to school, meeting friends, just exploring, attending other classes or running errands – children have their own mobility needs. The studies undertaken for the Bicycle Plan also included schools as a segment, with exploration of two elements:

- Cycle as a mode of transport / mobility for school students
- Learning about sustainable transport and learning cycling, through schools

Cycle as a mode of school transport

To understand current usage and trends of cycling among school students and staff, information was gathered from two sources, facilitated by PMC's School Education Department.:

1. Discussion with representatives of schools – this discussion was arranged on 13 July 2016 and was attended by 25 representatives of schools.
2. A questionnaire was sent out to all schools, on 8 July 2016 with responses requested by 25 July 2016; 47 schools responded with filled-in questionnaires

Table 2: Highlights of the school related survey and consultations
1. A very small number of students cycle to school (about 3% in the schools that responded); though a large number walk to school (25% of the responding schools), as their school is close by. Otherwise, auto-rickshaw or vans are the most used modes (35%).

[1] https://commuteseattle.com/who-we-are/
http://www.sustrans.org.uk/
https://www.dutchcycling.nl/

2. As cycling is no longer a part of the daily routine for most children and parents have safety concerns, it may be reasonable to assume that lesser and lesser children are learning to cycle.
3. A little less than half the schools have not formed a School Transport Committee, which could potentially be the committee to enhance cycle safety and promotion with schools
4. Schools don't necessarily have covered cycle parking or basic cycle repair kits
5. Schools would like to have: • Improved cycle infrastructure • Coaching for cycle riding for children • Cycle repair kit for the school • Awareness sessions for children about the benefits of cycling • Cycle Day events; cycles available at reduced cost or access to free cycles; awards for cyclists • Counseling for parents and students to prevent underage motorized two-wheeler riding, and strict enforcement from Traffic Police on this

Learning about Sustainable Transportation

The methods used to understand the current situation of what students are being taught about traffic and transportation issues included:

- Curriculum and textbook analysis
- Meetings with Traffic Police who manage Road Safety Patrol programme in about 60 schools
- Meetings with a few NGOs in Pune who have been advocating sustainable mobility and have conducted structured programmes with schools.

The detailed reports of these analysis and meetings are presented in Appendix 10 and Appendix 11.

Table 3: Highlights of School-based Learning about Sustainable Transportation
1. Learning how to cycle is the most effective way for children to be interested in cycling; children should be provided opportunities to learn cycling, including competitive cycling.
2. It is appropriate to help children learn about sustainable transportation
3. However, it may not be appropriate to ask children to cycle in traffic till safety provisions for cyclists are improved

4.	Textbooks do have content related to road safety, transportation modes, pollution etc. However, there are gaps and taken as a whole, the content throughout school does not provide a holistic understanding of the topic of sustainable transportation.
5.	Schools do provide opportunities for co-curricular learning such as through action projects
6.	The domain of schools and mobility deserves attention to accelerate efforts for sustainable mobility. Sustainable transportation efforts in schools may focus on learners as responsible citizens as well as the school itself to be a site for demonstrating sustainable practices.
7.	A 'whole school, whole system' approach may be adopted, that includes school managements, parents' associations, transportation service providers, the PMC road department and school education department, PMPML, Traffic Police, citizens groups and NGOs, transportation planners, etc.
8.	The aim should be to support learners to understand the need for sustainable transportation and for them, and the school as a whole, to participate as active citizens in creating safe transportation in cities.

2.8. Potential for Increase in Cycling in Pune

The potential for increase in cycling in Pune can be estimated on the basis of:

- Travel patterns, especially combining parameters of cyclable trip length and age-group that is likely to be able to cycle easily, including shifts from motorized modes as well as from walk trips that are longer than average walk trips
- Stated willingness to shift to cycle + public transport / BRT, along BRT corridors
- Stated willingness to shift, if cycling infrastructure improves

A shift of about 20% has been estimated, primarily based on travel patterns, and excluding trips that would be made for recreation. The stated willingness to shift is considered as an affirmative attitude, that adds to the likelihood of such a shift taking place, once infrastructure improvements are done.

This includes an11% shift of long distance walk trips, considering that the presence of public bicycle system cycles and safe cycling infrastructure would provide a conducive environment for those who walk long distances to use a cycle instead. The most important shifts would be of 6% trips by motorized two-wheelers and 1% trips by people in cars, autos and buses, which are of distances between 0.5 to 5km, and by people in an age group that is likely to be able to cycle.

A shift of 20% combined with the existing share of 3% of cycles, gives an estimated projected mode share of 23% for cycles.

Potential Shift to Cycles Across Modes

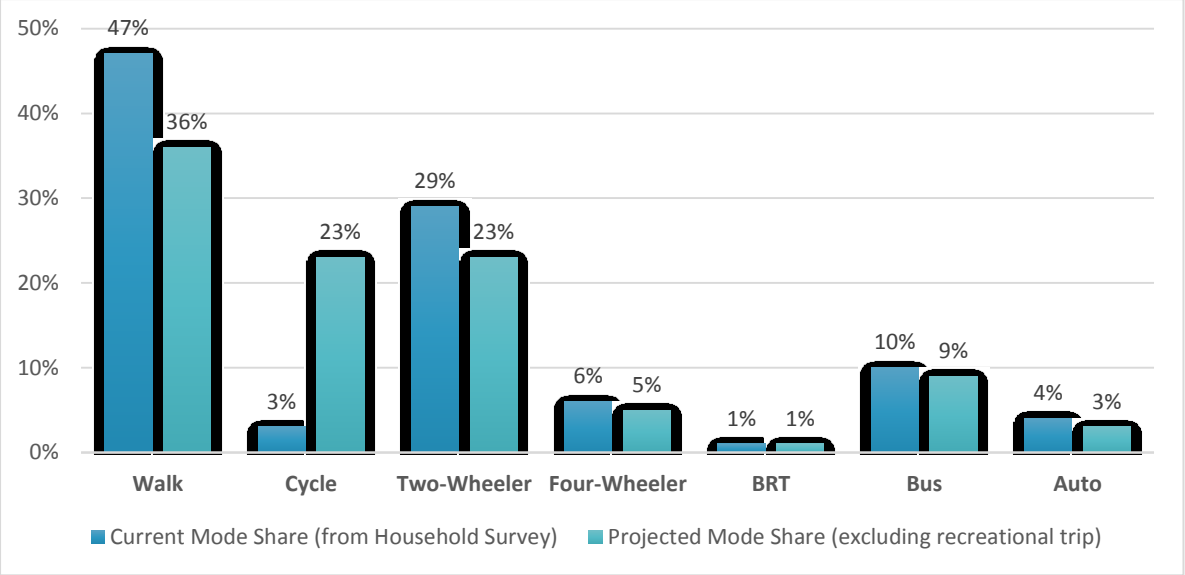


Figure 26: Potential of shift from other modes to cycling

The potential for shift is calculated based on the mode share, the per capita trip rate factor (i.e. 1.92 based on the surveys conducted for Pune Cycle Plan), to yield the total number of trips. The proportion of trips that meet three criteria, that is, trips of cyclable distance, done by an age group most likely to be able to cycle, and the purpose (all except recreational trips) was calculated. The projected total trips for each mode are calculated by subtracting the shifted trips from the total current trips. These together yield the projected mode share. The details of the extrapolation are presented in the Household Survey report.

Willingness to Cycle Among Non-Cyclists

When asked about their willingness to shift to cycling if infrastructure and safety is improved, 57% of the respondents of the Online Survey agreed to shift followed by 35% who would use cycle as a mode for few trips and would not completely opt for this mode. Very few were doubtful of shifting and only 3% disagreed of shifting to cycle as a mode.

The top purposes that current non-cyclists may use cycles for in the future are exercise and work trips. Short distance trips, trips to access public transport, and social or personal trips are also among the main reasons that current non-cyclists may use cycles for in the future. They would start to use cycles only if the present bicycle infrastructure is improved or created in the areas where it is currently absent.

Of the respondents to the Street Survey, about 79% of the present non-cyclists are willing to shift to cycling if infrastructure and safety is improved. About 86% of the current cyclists are ready to cycle for their mainline haul, if state of the art cycle infrastructure is created. However, in case of providing only bicycle sharing system in the city, only about 18% of the commuters are willing to shift to public cycle from their current mode. It is being assumed that some percent of not willing to shift to public cycles can be due to preference to their own cycles and, it cannot be used for service

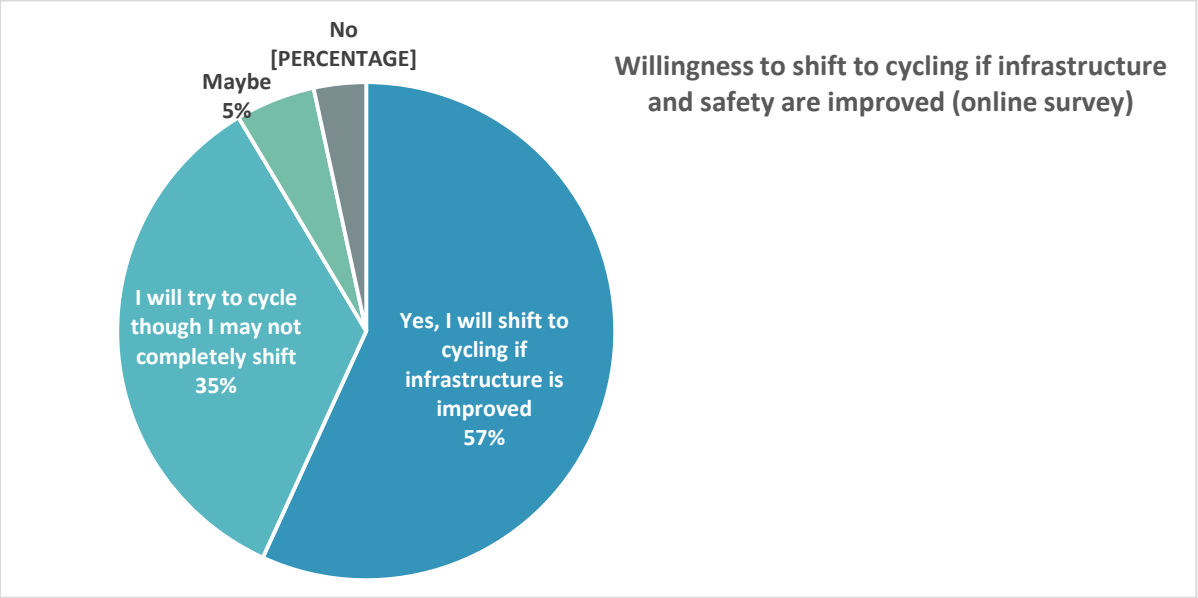


Figure 27: Willingness to shift to cycling if infrastructure improves

delivery purposes as well.

Potential for integration with public transit

The survey indicates that a significant shift to BRT system (about 45%) from motorised modes may be possible if Public Bicycle Sharing system is provided. The analysis of the responses in the BRT zones shows that 65% of the present commuters are willing to use BRT, if public cycles are made available to them within 5 minutes walking distance from their origin/destination points and at the BRT stations. The mode shift would primarily cater to the access/egress trips to the public transport.

2.9. Summary of Public Inputs and Suggestions for Improvements

Desired Facilities and Improvements in Cycling Infrastructure

Figure 28 presents the views of respondents to the Online Survey.

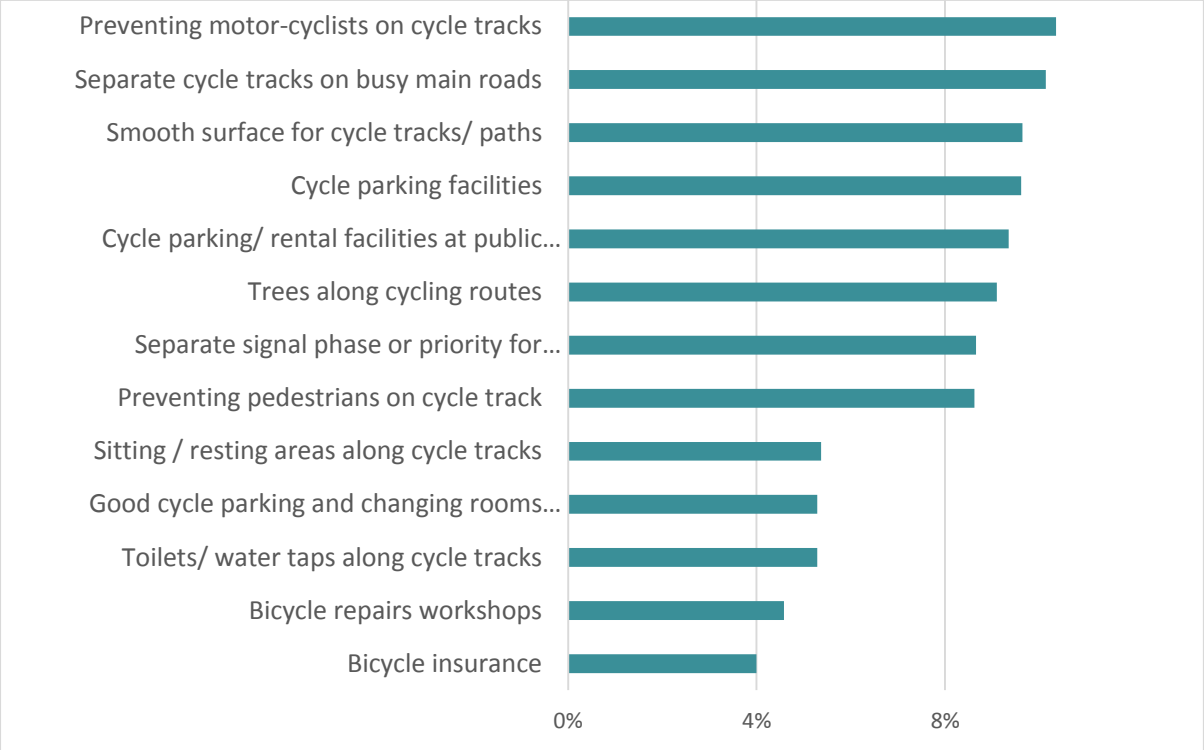
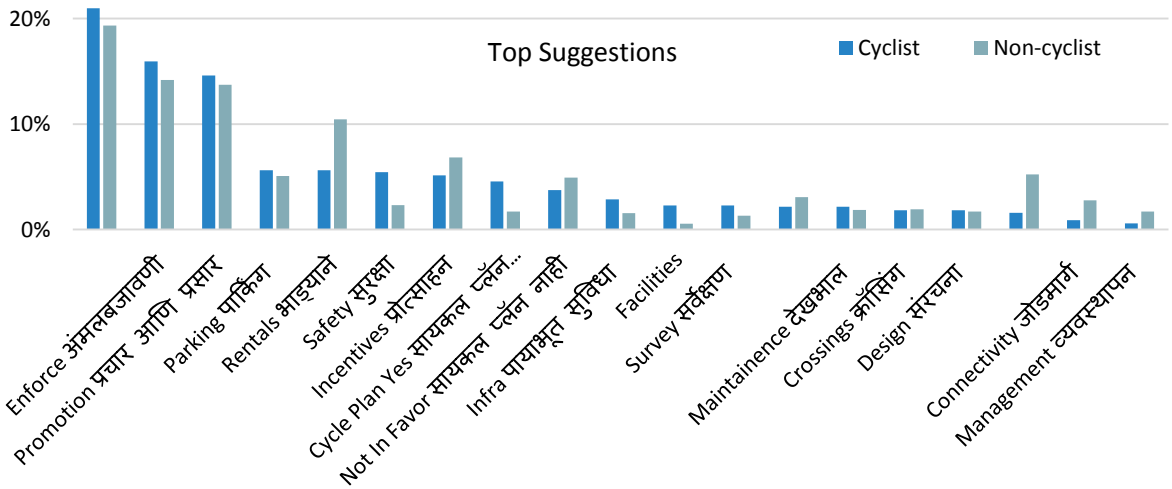


Figure 28: Desired Facilities and Improvements in Cycling Infrastructure

Figure 29 presents the summary of inputs received over email, on the website, letters, and through



the Online Survey. The detailed list of these inputs is presented in Appendix 8.

Figure 29: Summary of top public suggestions for the Pune Cycle Plan

The top most suggestions from the public for cycling improvement in Pune are:

- Creation of a city-wide cycle network, including facilities at junctions
- Strong systems for management and enforcement
- A comprehensive effort for public awareness, engagement, building a supportive attitude towards cycling and traffic discipline
- Availability of rental cycles
- Availability of cycle parking
- Trees along cycle tracks
- Strengthening facilities for pedestrians and public transport, which are complementary and synergistic modes for cycling

2.10. Implications

A range of measures will be essential to make cycling safer, and to increase cycling in Pune.

Changes in the infrastructure for cycling and its management are essential for the safety of current cyclists. The safer and more attractive the cycling infrastructure, the greater the likelihood of commuters choosing to cycle as a mode to travel for various travel needs.

It has been observed that cycling as a mode has drastically decreased since 1980s as it used to be more than 50% in the traffic flow in 1981 whereas it has decreased to mere 7% in year 2008 and may be as low as 3% in the present day.

The inadequacy of the cycle infrastructure network in the city in the recent times with increased in modal share of motor vehicles is a root cause of this decline in cycling. This has led to increase in the actual threat to cyclists as well as in the perception of Punekars.

However, the knowledge of health and other benefits of cycling among Punekars shows that if the infrastructure is in place, commuters would opt for cycling. The stated preference survey also reveals the same outcome that commuters are willing to shift to cycling if infrastructure including cycle parking is developed.

Pune is well-placed to take a comprehensive initiative for improving cycling infrastructure across the city, given the current institutional and physical situation.

The next section describes some key proposals that would help Pune enhance cycling in the coming years. Such investment in cycling improvement is expected to benefit the city and the public, by

- Improving public health
- Improving road safety
- Reduction in air pollution as more people opt for cycling
- Providing an eco-friendly, affordable transportation option

Systematic and substantial efforts to improve and support cycling are in line with the policy and directives of the Ministry of Housing and Urban Affairs, as well as PMC's own policy to support sustainable mobility in the city.

3. Vision and Goals

Vision

Make Pune a cycling-friendly city where cycling is safe, comfortable, convenient, attractive and enjoyable.

Objective
Increase the modal share of cycling from the current 3% to 25%, by the year 2031.

The goals of the Pune Cycle Plan are to:

1. Create a consensual vision and multi-stakeholder buy-in for cycling
2. Create an appropriate and robust institutional structure as part of the Pune Municipal Corporation to anchor, implement, and review the Pune Cycle Plan
3. Ensure public engagement and user participation in the development of cycle and walk friendly infrastructure and its monitoring
4. Retain the existing share of bicyclists, and encourage potential users to use bicycles
5. Make bicycle the preferred travel mode as compared to other motorized modes
6. Ensure integration between cycling and public transport, and ensure integration of cycling as a mode of transportation
7. Make travel demand management strategies sensitive to cycling and users of non-motorized vehicles
8. Ensure that the urban road infrastructure, including cycle only greenways, is designed / retrofitted to an agreed standard and is cycling friendly
9. Provide secure parking for bicycles
10. Ensure that traffic infrastructure projects, policies, plans and traffic management project efforts should prioritize and are cycling-friendly
11. Provide walk and cycle-friendly routes to all schools, adequate bicycle parking facilities within schools, and bicycle training to all school pupils
12. Promote cycling through a range of engagement and awareness activities

4. Cycling Improvement Proposals

- Bicycle Department at PMC
- City-wide Cycle Network
- Cycle Design Guidelines
- Public Bicycle System
- Cycle Parking
- Integration with Transit
- Regulation and Enforcement
- Outreach and Promotion
- Monitoring and Evaluation
- Implementation Schedule

4.1. Bicycle Department at PMC

It is proposed that the PMC will set up a Bicycle Department and the implementation of the Bicycle Plan will be done through this Bicycle Department.

Role of Bicycle Department – The role of this Department is presented in Table 4. The Bicycle Department will anchor the implementation of the Pune Cycle Plan, prepare budgets, coordinate with the other departments of PMC including the ward offices, other stakeholders and external agencies and departments for implementation, and monitor and review the implementation. Table 4 illustrates the primary roles that the Bicycle Department would have.

Table 4: Role of Bicycle Department

1. Planning
• Prepare submissions to the General Body
• Facilitate further planning with relevant PMC departments (DP Cell, Road Dept., Building Permission, Skysign, Garden Dept., Revenue Dept., etc) and external agencies (PMPML, Metro Rail, PSCDCL, PMRDA, Railways, etc)
• Prepare annual implementation plans, financial estimates/ budgets for incorporation within the PMC budget and for proposals for external funding if needed
2. Design, Project Management, Execution, and Maintenance
Ensure / facilitate the following:
• Cycle Design guidelines are integrated into Urban Street Design Guidelines, and updated over time
• Coordination with relevant department so that Public infrastructure is created as per the Bicycle Plan, with adherence to designs and timelines
• Adherence to DC Rules regarding cycle parking and infrastructure
• Maintenance of cycle infrastructure
• Complaints management
• Management and oversight of projects related to Public Bicycle Sharing scheme and any other cycle related projects
3. Capacity Building
• Facilitate orientation workshops for all entities and staff concerned with any elements of Transportation Planning and Bicycle Plan implementation
• Arrange workshops on 'cycle inclusive design' for engineers, architects, planners involved in design and implementation of transportation projects
• Periodic orientation and updating events for govt and other transportation agencies (PMPML, Railways, Metro, RTO etc)
• Ensure that relevant staff in PMC are kept abreast of cycling related developments nationally and internationally
4. Public Engagement and Promotion
• Facilitate provision of public information about the bicycle plan implementation
• Arrange annual event for citizens review and inputs for plan implementation
• Facilitate Cycle Promotion and IEC activities through a PPP model
5. Research/ Monitoring/ Evaluation and Reporting
• Commission studies to evaluate the performance of bicycle infrastructure being created, especially where assessment of particular designs is needed
• Commission studies to assess potential for further development of bicycle infrastructure
• Organize annual and five-yearly review of plan implementation
• Maintain the repository of documents and data, and update software
• Prepare Annual Report of plan implementation and review and table in PMC GB annually

Staff of Bicycle Department

1. The Bicycle Department will be headed by Superintendent Engineer rank officer, as the Nodal Officer, and supporting technical staff will be appointed as required.
2. A position for 'Customer Experience Manager' will be created and staff recruited.
3. The Nodal Officer will report to an Additional Municipal Commissioner.

Training and Orientation

The Bicycle Department will arrange to put in place the following training and orientation programmes:

1. A primer module on 'Pune Bicycle Inclusive Mobility Systems – Planning, Design and Implementation', that may be delivered online and/ or as a printed self-learning material for all staff in critical positions for implementation of the bicycle plan, including the Bicycle Dept. staff, Road Dept. and Traffic Dept.
2. An annual training workshop, including practical on field exercises and design assignments for all staff in critical positions for implementation of the bicycle plan, including the Bicycle Dept. staff, Road Dept. and Traffic Dept.
3. Module for Enforcement staff of PMC and Traffic Police
4. Module for cycle-inclusive infrastructure planning and design, for Buildings Department, Civil, Encroachment, Sky signs, Water-sanitation, etc.

Every time a staff member is appointed into these departments/ agencies with responsibilities for bicycle related infrastructure or services, they should be required to undertake the appropriate training module.

The training modules should be updated annually.

In addition, the staff of the Bicycle Department and other staff involved in transportation planning and implementation should regularly participate in national and international training and exposure events on cycle inclusive planning. The Municipal Commissioner will depute staff for such training from time to time.

4.2. Cycle-inclusive mobility planning proposals

To make cycling safer and more attractive, much more needs to be done than providing cycle tracks and cycle lanes. Currently, many aspects of road planning and design discourage cycling and make it less safe. Cycling-inclusive planning and design makes cycling more attractive and safer.

PMC will undertake the following cycling-inclusive planning measures (which PMC is empowered to take up under Section 208 of MMC Act), in coordination with Traffic Police:

1. **Sustainable Transportation Orientation**
   In compliance with the vision and principles of the NUTP and CMP, when proposing or planning any urban transportation infrastructure or management intervention / project, the PMC will ensure to:
   a. Define the traffic and transport problem in terms of Emissions, Accidents, Energy Use and Congestion for the given existing or proposed commuter population.
   b. Study and present different alternatives for the intervention and make a detailed budget estimate how each alternative will help to reduce motor vehicle use, and thereby reduce emissions, accidents, energy use and congestion, while improving access and feasible mobility options for the commuters.
   c. For each of the possible alternatives, specifically describe how the intervention leads to an improvement of the facilities for public transport, cycling and walking.

2. **Proposal for Cyclist and Pedestrian-friendliness and De-congestion of the core city**
   a. Make certain streets in the core city, car- and motorcycle-free
   b. Remove through traffic from the core city - Make it impossible to cross the core city by car or motorcycle by creating streets that are only open to non-motorized transport in such a way that cars and motorcycles cannot cross the core city, but instead go around it by using the inner ring road (refer Figure 31 as an example).
   c. Create an inner ring road around the core city.
   d. Create a parking plan and policy that requires all visitors with motor vehicles to pay for parking. Refer section 4.2.2.
   e. Introduce a local area circulator or public shuttle service that permits movement within the core city, using appropriate-sized vehicles such as CNG or electric rickshaws, CNG six seaters, mini vans or mini buses.

3. **Controlled parking for motor vehicles**
   Paid and controlled parking reduces the demand for motorized trips and makes other modes of transport, like walking, cycling and public transport, more attractive. The PMC's draft Parking Policy contains a comprehensive approach to provision and management of public parking for motorized vehicles. The policy is fully complementary with cycle-inclusive planning. It is recommended that a Parking Policy should be developed and implemented as a complementary measure of the Pune Cycle Plan.

4. **Dismantle multi-lane one-way streets with three or more traffic lanes** as these are unsafe (leading to higher speeds) or difficult to cross for pedestrians and cyclists, by making them two-way. One-way streets with two traffic lanes (6.00 – 8.00 m. wide) can either be made two-way or converted into one-way streets with one traffic lane and contraflow cycling facilities or parking bays.

5. **Avoid the construction of flyovers** and when unavoidable plan and design them in a relatively cycling-inclusive way. As part of the approach to make Pune's road infrastructure inclusive and safe for cycling, the following recommendations are made, in the context of flyovers:

- Traffic planning proposals must avoid flyovers, and if any flyover is being proposed, justification must be provided through detailed studies for how it would contribute to reduction of motorized traffic or improve the conditions for pedestrians, cyclists or public transport.
- Existing flyovers must be retro-fitted for cycles as per the guidelines provided.

6. **Pedestrian-friendly redistribution of space**
    - Ensure that when creating new cycling-infrastructure, it is not done by reducing footpaths. It may be considered only where footpaths are wider than needed for the volumes of pedestrians. In that case pedestrian counts should be provided to support this. In all other cases cycling-infrastructure should mostly be constructed from existing road space or empty space.
    - Green space (trees) should be respected as much as possible although in some cases a well-funded decision to replant trees can be justifiable to guarantee good quality cycling infrastructure.
    - Where proper footpaths are not available, the construction of a cycle track should include the construction or improvement of an adjacent, good quality, footpath.

Cycling-inclusive planning and design is essential to enable Pune to reach its ambitious targets for cycling (25% of journeys) which have indeed been met in various European cities that have implemented all the following cycling-inclusive planning and design measures.

The key measures for cycling-inclusive planning and design are explained in the following pages, together with references to the less cycling-inclusive practices today.

4.2.1. De-motorization of the core city

A challenge for Pune is high motorcycle use. It is probably neither possible nor necessary to ban these in much of the core city area. However, creating a limited number of streets where only non-motorized traffic can pass and which can also not be crossed by cars and auto-rickshaws is recommended. As proposed in the Comprehensive Mobility Plan (CMP),Lakshmi Road would be an excellent choice to start the de-motorization of the core city. Auto-rickshaws can easily be kept out of certain de-motorized areas or streets with bollards. Where to allow auto-rickshaws, should be the outcome of a detailed study since auto-rickshaws can play an important role in keeping a de-motorized core city accessible. The same is true for public transport or a local area shuttle service. Clean buses, metro, and a local circulator shuttle service should be able to cross the core city to allow for maximum accessibility without the use of private motorized vehicles.	The recommendations below are made to resolve congestion and improve livability of the core city: 1. Make certain streets in the core city, car- and motorcycle-free 2. Remove through traffic from the core city - Make it impossible to cross the core city by car or motorcycle by creating streets that are only open to non-motorized transport in such a way that cars and motorcycles cannot cross the core city, but instead go around it by using the inner ring road (refer Figure 31 as an example). 3. Create an inner ring road around the core city. 4. Create a parking plan and policy that requires all visitors with motor vehicles to pay for parking. Refer section 4.2.2. Introduce a local area circulator or public shuttle service that permits movement within the core city, using appropriate-sized vehicles such as CNG or electric rickshaws, CNG six seaters, mini vans or mini buses.

Examples: Countless cities in Europe and the United States saw the economies of their inner cities dying because of congestion and pollution and discovered that only de-motorization helped to bring back businesses, residents and clients.

Car-free city-centres One of the factors that has contributed enormously in making cycling a success in the world's most cycling-friendly cities (for instance in the Netherlands or Denmark) is the development of car-free city-centres. By closing off, or severely limiting access to these areas a situation is created where cycling (and public transport) becomes a more attractive mode of transport to reach the city-centre than the car. Experience in many European cities show that the creation of bicycle and pedestrian-friendly city-centres with limited access for motorized vehicles has many advantages: The quality of life improves and real-estate prices go up. Tourism flourishes. This leads to more spending in hotels, restaurants and shops in the city-centre. Air quality improves and accident rates drop drastically. Figure 30shows an example of Copenhagen with pre-and post-results of such measure.	 **Figure 30: De-motorization of 'Nyhavn' in Copenhagen has led to a flourishing local economy and increased spending by tourists, visitors. (Left: 1970, Right: present day**

Figure 31 below shows the de-motorization of the city-centre of the city of Groningen. Inside Groningen more than 50% of all journeys is done by bicycle

Figure 31: The yellow streets in the Dutch city of Groningen are car- (and motorcycle) free.

Decongestion Experiences in countless cities in Europe and elsewhere show that among the most successful measures to reduce congestion in a city is to make it impossible to cross the city-centre by making certain streets and areas in the city-centre car-free. Figure 32below explains this clearly:
Picture on the left: While streets in the city-centre are often narrow, they attract the greatest amount of traffic (see picture on the left) and thus are subject to serious congestion. Also in Pune, the combination of a lot of through traffic and many people that want to access the many destinations in the core city, causes congestion in the core city.

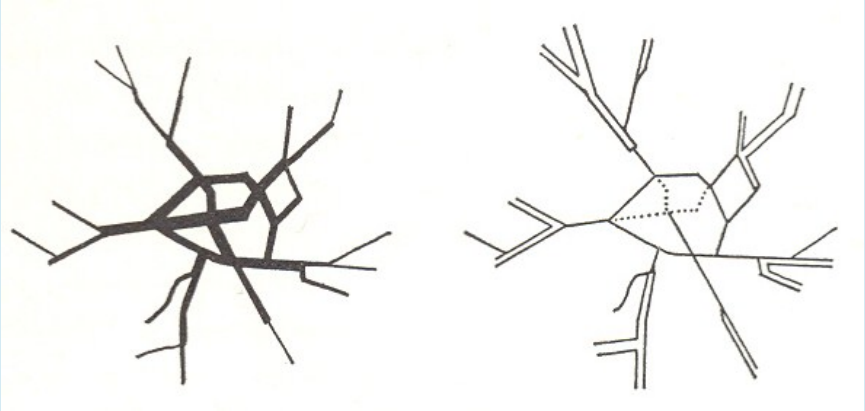


Figure 32:Congested city with city-centre open for motorized traffic (left) and decongested car-free city-centre

Picture on the right: By removing through traffic and making city-centre streets pedestrian and cycling-only streets (as has been done in cities in The Netherlands, Denmark, Germany, France and many other countries since the 1970's) traffic volumes and congestion reduce significantly

4.2.2. Controlled Parking for Motorized Vehicles

Paid and controlled parking reduces the demand for motorized trips and makes other modes of transport, like walking, cycling and public transport, more attractive. The PMC's draft Parking Policy contains a comprehensive approach to provision and management of public parking for motorized vehicles. The policy is fully complementary with cycle-inclusive planning.

It is recommended that the PMC's Parking Policy (draft) 2016 be approved and implemented as a complementary measure of the Pune Cycle Plan.

(Recommendations for public parking for cycles are presented in Section4.3.5.

Case Example

Between the years 1990 and 2010 Amsterdam saw cycle trips to the city-centre increase from 15 to 25% of all journeys, mostly at the expense of the car[2].In this period, relatively few new cycle tracks to the city-centre were constructed, instead it was particularly an increase of the price of paid parking in the city-centre, that made that more and more visitors came to the city-centre by bicycle instead of by car. Currently (2016), parking a car in the city-centre of Amsterdam costs 5 Euros (Rs. 375) per hour.

[2] Source: The Netherlands mobility survey and Periodical travel survey Amsterdam

4.2.3. Dismantling multi-lane one-way roads

Multi-lane one-way roads should be avoided in urban areas. One-way roads with more than one traffic lane per direction (multi-lane one-way roads) are negative for cycling and road safety and should therefore be avoided. Particularly in centrally located areas such as FC Road and JM Road as shown in Figure 34, a one-way traffic system is not appropriate because of the following reasons:

- **Road safety:** The (maximum) speeds of motorized traffic at one-way roads with more than one lane of traffic increase. This leads to a worsening of the road safety (one of the main problems mentioned in the CMP) particularly for pedestrians and cyclists crossing the road. This means that in highly commercial areas with many pedestrians, one-way roads should be removed.[3]
- **Road safety and directness:** Cyclists still will move (and want to move) in two directions. Even when this is provided for in the designs, cyclists moving against traffic on one-ways creates serious problems at intersections - where motorized traffic has free turns, and where traffic does not stop. This leads to problems for road safety and directness for cyclists. Therefore, multi-lane one-way roads should be avoided.
- **Road safety:** For pedestrians and cyclists crossing the road, on one-way roads, traffic does not always come from the same direction as on two ways (where you always look right first). This leads to more accidents with cyclists and pedestrians crossing the street.
- **Road safety and directness:** Right-turns on multi-lane one-way roads are almost impossible to negotiate for cyclists because they need to cross several lanes of fast moving traffic (see photo below).
- **Road safety:** On multi-lane, one-way roads, a central traffic island (to make it easier and safer for pedestrians and cyclists to cross) cannot be applied safely.
- **Directness:** One-way roads lead to detours for motorized traffic and thus more kilometers travelled on urban roads. This also leads to higher traffic volumes at intersections where vehicles would not need to come if they could reach their destination without having to make a loop.

Figure 33: One-way, one lane road with two-way cycle track (this road used to have two traffic lanes)

Figure 34: On JM Road, cyclists turning right have to weave across 4 lanes of traffic

[3] Note that because of road safety problems with cyclists and pedestrian's multi-lane one-way roads have been removed everywhere in cities in The Netherlands in the 1970s.

One-way roads are an American invention that was meant to 'improve the flow of motorized traffic'. In car-country, the US, with very few pedestrians and cyclists, this seemed to work relatively well. However, since the 2000's, because of the negative effects for cycling, walking and road safety, many cities in the US are also changing their one-way streets back to two-way streets.[4]

Re-design of existing one-way roads in Pune is recommended with the following guidelines, to make them safer for cycles:			
1. At one-way roads with more than 2 traffic lanes, such as in Figure 34, it is recommended to convert the road into a two-way road with - depending on connectivity needs for cyclists - in most cases one-way cycle tracks (or in some cases lanes) on either side of the carriageway.	2. On one-way roads with two traffic lanes (5.00-8.00 m. carriageway width), there are two options: a. Remove one lane and provide cycling infrastructure using the available extra space b. Keep both lanes and make the road two-way. This allows for shared use of the road in two directions. Of course, in some cases, enough space is available to still provide cycle tracks or cycle lanes at either side of the carriageway.	3. For multi-lane one-way roads - In this case, one-way cycle tracks on either side, or a one-way cycle track on one side of the road is possible. However, such a solution creates serious road safety and traffic flow problems at intersections and should therefore be avoided at all costs. The construction of cycle tracks is a great opportunity to replace an outdated one-way traffic system with a cycling- and pedestrian-inclusive two-way alternative.	New roads should not be designed as one-way roads. With one exception: In those cases where the one-way road only has one traffic lane as shown inFigure 33, there is no problem to make the road one-way. On the contrary, this can be a great way to provide space for cycling infrastructure, where otherwise no space would be available.

[4]See the article ***One Way? Wrong Way?*** here: http://articles.courant.com/2009-12-27/news/hc-plc-condon-one-way-streets.artdec27_1_two-way-streets-downtown-traffic. Quote: *"Will it be time to remove some or all of the one-ways? That seems to be the trend across the country."*

4.2.4. Planning and Design of Flyovers

Why not to apply flyovers

When promoting cycling, flyovers should not be implemented for the following reasons:

- Flyovers are a short-term measure that in the long-term leads to more traffic and more serious congestion at locations where flyovers are not constructed.
- Flyovers typically start in the centre of the road and thus lead to dangerous weaving manoeuvres for cyclists at busy times when trying to access the flyover. This is because cyclists need to cross lanes of fast moving traffic where traffic lights cannot be placed.
- Cyclists using the flyover would need to ascend which means significant additional effort.
- Speeds on flyovers can be high, therefore flyovers should have cycle tracks. This significantly increases the costs of the flyover and in practice is often not done creating an environment hostile to cycling.
- Cyclists that avoid the climb
- Flyovers take a lot of space. This leads to situations where it becomes difficult or impossible to create cycle tracks. Figure 36 (with BRT) shows this. On the left side of the road 12.75 m. is available for motorized traffic. This is more than sufficient for three traffic lanes + a cycle track. However, with a lane needed to access the intersecting road, on the left side, there is no space left to create a cycle track here.

Figure 35: A cyclist is accessing a flyover in Pune (Karve Road) when traffic is relatively light.

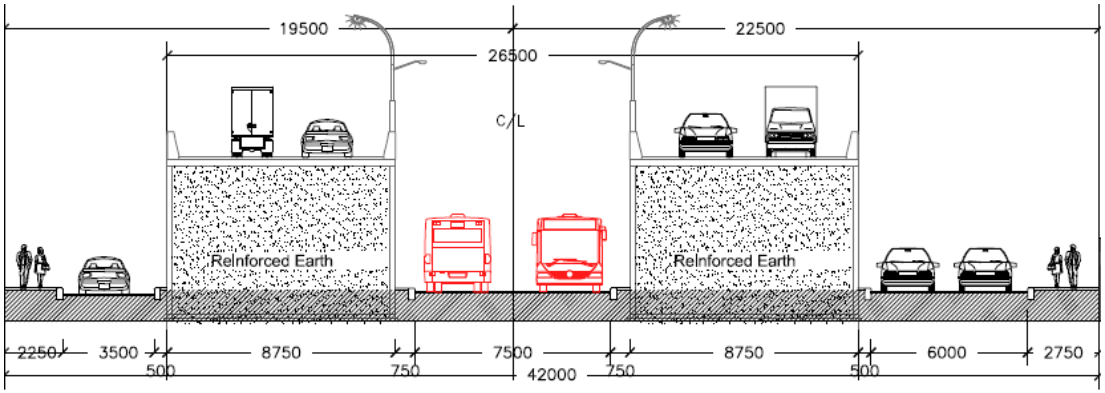


Figure 36: Space taken by flyovers limits the possibilities to provide cycling infrastructure

The approach to make Pune's road infrastructure inclusive and safe for cycling, the following recommendations are made, in the context of flyovers:

1. Traffic planning proposals must avoid flyovers, and if any flyover is being proposed, justification must be provided through detailed studies for how it would contribute to reduction of motorized traffic or improve the conditions for pedestrians, cyclists or public transport.
2. Existing flyovers must be retro-fitted for cycles as per the following guidelines.

a. Approach at existing flyovers	*b. Approach at new flyovers*	*c. On the flyover*
In the case of existing flyovers, something needs to be done to provide at least some cycling infrastructure. Taking Figure 36 as an example the following could be done: – **On the flyover.** Here about 8.00 m. road space is available in each direction. While many cyclists prefer to stay at road level, some cyclists might want to mount the flyover to avoid having to wait for traffic on the cross-road below. Possible design: A 2.00 m. raised adjacent cycle track **(section 4.2.2 of Appendix 2 of cycle master plan)** at the left side of the road and two traffic lanes of 3.00 m. each. If available space is less, a 1.75 m. cycle lane (red asphalt with continuous white line) could be applied. – **Left side.** Here only 5.75 m. in total is available for all modes. This is a pinch point where providing proper cycling infrastructure is not possible. If additional space cannot be created there are a few options: 1. With few pedestrians: 1.50 m. footpath, 1.50 m. cycle lane (red asphalt), 2.75 m. traffic lane. This entails a widening of the carriageway width to 4.25 m. 2. With few pedestrians: Widen the footpath to	As mentioned above, the construction of new flyovers should be avoided. However, if projects are underway or cannot be stopped anymore, it is important to include proper cycling infrastructure as described below. Traffic lanes entering and leaving the main road – Typically: One lane oMV traffic only (since most traffic will go over the flyover) – Apply segregated cycle track with verge between cycle track and MV lane as per **section 4.2. of Appendix 2 of cycle master plan.** – When there is only 1 traffic lane adjacent to the cycle track, it is acceptable, even on an arterial road, to apply a 2.00 m. width for a one-way cycle track with a verge of 1.00 m. Crossing the road under the flyover A question here is how easy it is to cross the cross-road under the flyover. In many cases, because motorized traffic is generally not crossing here (they'll use the flyover), crossing the road for cyclists is very difficult. It is therefore recommended to provide a traffic island in the crossroad to provide a safe refuge for cyclists. In case there are traffic	It depends how easy it is to cross the crossroad and how steep and how high the climb over the flyover is, whether cyclists will prefer to cycle over the flyover. However, on flyovers at 1 level height (up to 5 or 6 metres) it is recommended to apply a footpath and at least some cycling infrastructure. Because low volumes of cyclists and pedestrians can be expected a 1.50 m. footpath and a 2.00 - 2.20 m. wide one-way cycle track on each side with a verge of 0.50 m. is sufficient. If needed the verge can be narrowed further because no pedestrians will cross here and no vehicles will stop. But the cycle tracks should not be narrowed further. This is because of the speed differences uphill that should allow for overtaking - slow and faster cyclists - and the high speeds downhill that also require sufficient width. Note that accessing a flyover by bicycle, see Figure 35, can be difficult because a continuous flow of traffic needs to be negotiated. However, if only one lane is passing the flyover on the left, it is much easier to access the flyover.

2.75 m. and convert this into a shared cycle track / pedestrian footpath. 3. With many pedestrians: Leave road as is and lead cyclists onto the carriageway, sharing with motorized traffic. **Right side.** Here 6.00 m. of carriageway is available. Because this is only used by vehicles accessing the main road from the crossroad, the carriageway can be reduced to one traffic lane only - like at the left side of the flyovers. The design could then look as follows: 3.25 m. carriageway, 0.75 m. dividing verge **(see table 4.2, option 5, section 4.2.5 of Appendix 2 of cycle master plan)**, 2.00 m. one-way cycle track. This, unlike the proposed designs above, is appropriate cycling infrastructure.	lights, adapting them in such a way that cyclists can use them to safely cross the road is also recommended.	

4.3. Cycle Infrastructure

4.3.1. Cycle Infrastructure Design Principles and Guidelines

The Pune Urban Street Design Guidelines (2016) (USDG) was reviewed. Cycle-related infrastructure is already included in some measure in the USDG. However, more detailed guidance is provided as part of the Pune Cycle Plan. See Appendix 12.

It is recommended that:

1. The Cycle Design Principles and Guidelines presented in the Pune Cycle Plan should be integrated into the Pune Urban Street Design Guidelines by the PMC and the associated committee.

2. The USDG should be updated from time to time, based on the implications for infrastructure design that emerge from the annual reviews, surveys, audits and monitoring reports of the cycle plan

Cycle-friendly Design

Cyclists, like other road users, have certain requirements. These requirements should be met as well as possible and can be used to:

- Properly design cycling infrastructure.
- Evaluate cycling infrastructure designs before implementation.
- Evaluate cycling infrastructure after implementation.

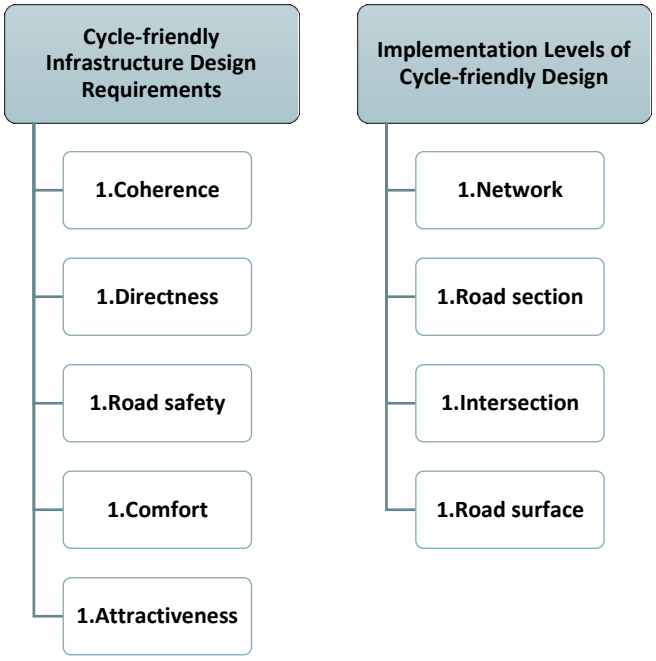
Five main requirements can be distinguished to guarantee cycle-friendly infrastructure:

1. Coherence
2. Directness
3. Road safety
4. Comfort
5. Attractiveness

Each of the five requirements need to be met at the following levels:

1. Network
2. Road section
3. Intersection
4. Road surface

These five requirements and the desired street designs are presented in the following pages.



1. Coherence

Coherence: Cycling infrastructure forms a coherent and recognizable whole.
Criteria: Ease of finding; freedom of route choice; continuity of routes; consistency of quality; completeness of the network.

i. Coherence at network level	ii. Coherence at road section level	iii. Coherence at intersection level
Coherence is important at network level. A coherent network allows cyclists to make their whole journey on cycle-friendly infrastructure. Missing links - locations where cycling infrastructure does not connect or is not provided - lead to a less complete and coherent network.	Coherent cycling infrastructure provides continuity along the whole road section without disturbance by trees, lamp posts, bus stops or other obstacles.	Consistency of quality: Cycle tracks should be clearly marked across intersections. At side roads along main roads this can be emphasized with a different color road surface as shown below.

Figure 37: No continuity of cycle track at bus stop (Ganeshkhind Road)

Figure 38: Coherence at intersection level: cycle track is clearly marked across the intersection

2. Directness

Directness: Cycling infrastructure offers direct routes with minimal delays and detours.

Criteria: Detour distance; cycling speed; delay (time).

Because cycling is a relatively slow mode of transport and cycling takes significant effort, cyclists - more even than motor cyclists - want to stop as little as possible and try to avoid any possible detours or delays.

The following measures may be taken to improve the directness for cycling:

- Provide a smooth **road surface** on cycle tracks (preferably asphalt) rather than interlocking pavement blocks (cycling speed) and ensure proper maintenance of cycle tracks.
- Avoid or dismantle multilane **one-way streets**. These streets force cyclists to make detours. Even if contraflow cycle tracks are provided one-way systems make it difficult for cyclists to cross (continuous flow of traffic) and lead to longer waiting times.

Other measures to improve directness:

- Make **intersections** as compact as possible and reduce signal cycle times (preferably not more than 90 seconds)
- Make cycle tracks **wide enough** and without obstacles that affect the continuity and flow of cycle traffic.

3. Road Safety

Road safety: Cycling infrastructure guarantees the safety of cyclists and other road users.

Criteria: Chance of encounter with motorized traffic; complexity of riding; subjective road safety.

Road safety is one of the most important and complex requirements for cycling. Therefore, we pay extra attention to this requirement. Good road safety should be created at network level, road section level, intersection level and road surface level as explained below.

i. Road safety at network level:

Chance of encounter with motorized traffic

The number of conflict points with motorized traffic should be as small as possible.

- Avoid encounters with heavy flows of fast moving traffic. This can be done for instance by leading motorized through-traffic around city-centres and residential areas, rather than through these areas.
- Limit the number of side roads and crossings with motorized traffic.

Figure 39illustrates one way how the number of encounters with motorized traffic can be minimised. Left side of Figure 39shows the current situation in Pune with through-traffic going through the heart of the core city, thus leading to the necessity for cyclists (and other road users) to cross busy roads in the central area of the city.

This leads to higher rates of traffic accidents. Right side of Figure 39is the solution at network level to lead traffic around the city-centre and thus significantly improve road-safety inside of the city-centre.

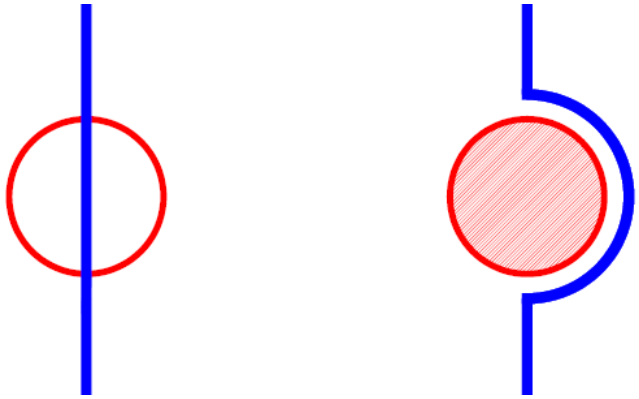


Figure 39: Road safety problems resulting from traffic going through the city centre (left) are resolved by leading all through-traffic around the city-centre (right).

ii. Road safety at road section level

At road section level, the following criteria are important:

a. Time and length of encounter with motorized traffic

- Limit the part of the trip where conflicts with motorized traffic are possible. This can be done, for instance, by applying segregated cycle tracks.

b. Visibility for cyclists

- The road surface, kerbs, road markings, etc. should be well visible and well lit.

c. Visibility by other traffic

- Where conflicts between cyclists and other traffic are possible, the cyclists should be well visible and eye-contact should be possible.

d. **Complexity of riding** - Potential problems on encounters between cyclists and other traffic should be minimized.

- The higher the flows and volumes of motorized traffic, the more segregation is needed.
- Facilities should be wide enough to enable safe encounters, overtaking and evasive movements.
- Cycle lanes and raised adjacent cycle tracks should never be two-way to avoid that cyclists will end up on the carriageway in the case of conflicts between approaching cyclists.

Figure 40shows an example of a very narrow cycle track. The limited width here has a negative impact on the requirements road safety and comfort. On top of this, raised adjacent cycle tracks should never be two-way to avoid conflicts and the risk that cyclists end up on the carriageway.

Figure 40: Lack of road safety at road section level. This cycle track is too narrow.

iii. Road safety at intersections level

Many accidents happen at intersections. Hence this is a location where much can be done to improve road safety for cyclists. In many cases changing the geometry of the intersection is necessary after which cycle facilities can be added to allow for safe crossing.

Complexity of riding- The chance of conflicts and (severe) accidents with cyclists is minimized by:

- Reducing the crossing distance (keep intersection compact).
- Enabling eye-contact between road users.
- Reducing waiting times (to discourage cyclists to jump the red light).
- Reducing speed differences between motorized modes and cyclists by slowing down motorized traffic at the intersection.
- Providing space for overtaking and deviating maneuvers.
- Changing one-way roads for general traffic into two-way roads to avoid confusion from which direction vehicles are coming, to reduce the need for cyclists to weave between cars and to avoid that cyclists will use the road in contra-flow direction.
- Removing slip roads (free left-turn at intersections).

Chance of blinding - Cyclists should not be blinded by motorized vehicles' headlights.

Figure 41Figure 41shows an example of a right-turn slip road (left-turning in the Indian situation). For cyclists (and other vehicles) going straight and passing the slip road, there is a potential conflict with vehicles leaving the slip road with relatively high speeds. These designs are made with the speed and flow of motor vehicles in mind, but this has a very negative effect on the road safety for cyclists. In cycle-friendly countries like the Netherlands slip roads are no longer applied in urban areas. Closing the free slip and leading vehicles via the heart of the junction is the solution here.

Figure 41: Lack of Road safety. Left-turn slip roads allow vehicles to keep their speed when turning left.

iv. Road safety at road surface level

Chance of encounter with motorized traffic

The state of the road surface does not induce cyclists to abstain from using provided cycle facilities.

- The road surface of a cycle lane or cycle track should be at least as smooth as that of the carriageway.

Complexity of riding

The road surface makes it easy to cycle and keep course.

- The state of the road surface does not distract the cyclist from traffic or force the cyclist into dangerous maneuvers.
- The road surface is rough enough (also when wet) to enable safe cycling.

Figure 42: Use of interlocking paver blocks for cycle track surface may be appropriate provided these are affixed at level

4. Comfort

Comfort: Cycling infrastructure enables quick and comfortable cycling.

Criteria: Hindrance from traffic; smoothness of road surface; chance of stopping; hindrance from weather.

Most important to ensure comfortable cycling are:

- A smooth road surface (see Figure 43).
- Limited hindrance from traffic by creating a wide enough verge (separation) between cycle track and carriageway.
- Limited hindrance from the weather (sun, heat, rain) by providing trees along the cycle track.
- No hindrance from obstacles on the cycle tracks.

In Pune, many cycle tracks are not comfortable because of a bad uneven road surface (block pavement), obstacles such as trees, lamp posts and bollards.

Figure 43: A smooth road surface, also at intersections, leads to better comfort.

5. Attractiveness

Attractiveness: Cycling infrastructure provides an attractive cycling experience for cyclists.

Criteria: Experience of surroundings; sense of social safety; chance of blinding.

Attractiveness is probably the most subjective of the five requirements with everyone having their own opinion on what is attractive. In general, attractive cycling conditions should at least provide 'social safety' and an attractive environment. Social insecurity can be minimised by leading cycle routes through areas with people and by providing sufficient lighting. Attractiveness relates to the aesthetics of the built environment and a pleasant natural environment.

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i. Attractiveness at network level

Environmental quality
Select a routing that is attractive for cyclists.

- Routes lead through green areas.
- Routes lead through lively urban areas
- The routes are quiet and with clean air.

Social safety- Select a routing that doesn't lead through deserted areas and which avoids areas known for delinquency.

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ii. Attractiveness at road surface level

Aesthetic quality

- The appearance of the road surface fits with the character of the surroundings.
- Note that the requirement attractiveness does not apply at intersection level.

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iii. Attractiveness at road section level

Environmental quality - The direct surroundings of the cycle facility are (made) attractive for cyclists.

- Well-designed and lively
- Provide trees and attractive street furniture.

Social safety

- Cycle facilities are visible for other road users and well lit.
- No walls or bushes that could provide a shelter for potential offenders.

Figure 44: Attractive cycle route along a park in Antalya, Turkey shows an example of attractive routing. At road section level, this cycle track could have been made even more attractive by providing a greater separation with the carriageway.

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Figure 44: Attractive cycle route along a park in Antalya, Turkey

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6. Cycle Ways

Three types of cycle ways are proposed:

- Segregated Cycle Track - A Raised Segregated Cycle Track is proposed on major Arterial Roads of the city. A segregated cycle track is required on roads with heavy traffic movement. Ideally the Segregated Cycle track should be separated by a buffer of 1m width.
- Marked Cycle Lane - Cycle Lanes are provided, where Cycle Tracks cannot be provided, generally due to narrow RoW. The Cycle Lane is marked on the M.V. Lane by painting the Surface itself or by cats eye. Cycle Lanes are not recommended as they are not as safe as Segregated Cycle Track, and only a compromise due to lack of space.
- Independent Cycleways, or Greenways along canals, streams, rivers, hill sides, through gardens, campuses etc.

Most inner neighbourhood streets which generally have narrow rights of way, and light traffic, can be proposed as streets with Shared Use. Such streets can be made safer by applying traffic calming measures such as, speed bumps or paved streets, thus forcing the vehicles to move at the speed of Cyclists and avoiding major clashes. Below, the different types of cycling infrastructure are shown inFigure 45.

Figure 45: Three types of cycling infrastructure

Segregated Cycle Track	Painted Cycle Lane	Shared Use Street
		
Physical segregation	Visual segregation	No Segregation

Criteria for deciding the treatment of the road include:

●Speed of motorized traffic ●Volume of motorized traffic ●Nature of traffic

7. Vegetation Guidelines

The creation of cycling infrastructure should include conservation and addition of vegetation along the cycle tracks and over outdoor cycle parking lots. Vegetation as part of cycle infrastructure is highly desirable as:

- Plants provide shade from sun and rain to pedestrians, cyclists, motorcyclists, vendors
- People in vehicles also benefit from shaded streets as direct sun heats up cars and vans
- More comfortable ambient temperature
- Vegetation helps subdue or screen the headlights of oncoming vehicles, making it easier to drive at night
- Air pollution, dust and noise is reduced
- The bright reflection of sunlight off roads, especially from concrete is subdued
- Research shows that when vegetation is present, people tend to drive slower, reducing the possibility or severity of mishaps
- Streets that have vegetation are more pleasant, for people to meet, talk to each other, and this indirectly also helps make streets safer

The criteria for and selection of various species of trees and shrubs for planting on street sides and in medians is detailed out in the vegetation guidelines, 'Cycle Smart Green City', presented in the Appendix.

These are recommended for adoption by the Garden Dept. and Road Dept.

4.3.2. Cycle Network applying above principles to Pune's road network

The Cycle Network Plan (Figure 46) for Pune city has been proposed, based on the Guidelines and Principles suggested in the Urban Cycling Design Guidelines (UCDG).

The Proposed Cycle Network Plan) consists of approximately

- 531 km segregated cycle track
- 154 km marked or painted cycle lanes
- 75 km independent cycle ways/ greenways
- 54 km or currently existing cycle tracks that are to be retrofitted

This network considers the connectivity with proposed metro corridors and stations.

Type	**LHS (Km)**	**RHS (Km)**	**Total (Km)**
Retrofit	26	27	**54**
Cycle Track	255	276	**531**
Cycle Lane	70	84	**154**
Merged (footpath + cycle track)	5	6	**11**
Greenway			**75**
Total	431	393	**824**

Some views showing the scenario after implementation of Guidelines and Design Principles in the design are presented in the next pages.

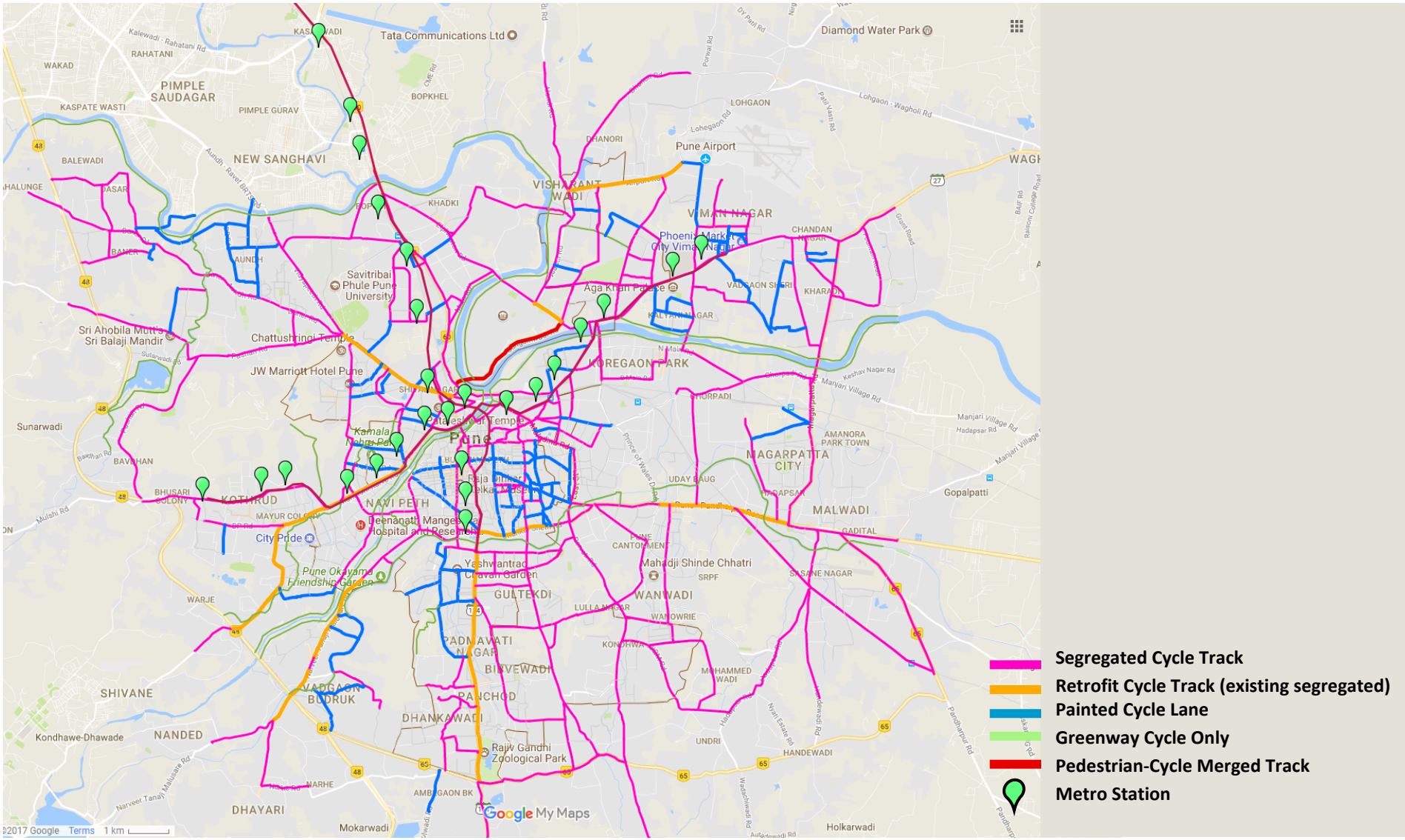

Figure 46: Proposed cycle network plan

Segregated Cycle Track

A Raised Segregated Cycle Track is proposed on major Arterial Roads of the city. A segregated cycle track is required on roads with heavy traffic movement. Ideally the Segregated Cycle track should be separated by a buffer of 1m width.

Figure 47:Treatment of arterial and sub-arterial roads

Current situation at Sinhagad Road

Current situation S.B. Road (Sub-arterial)

Concept visualization at(Arterial) Sinhagad Road

Concept visualization at(Sub-arterial) – S.B. Road

Painted Cycle Lane

Painted Cycle Lanes are provided, where Segregated Cycle Track cannot be provided, generally due to narrow RoW. The Cycle Lane is marked on the M.V. Lane by painting the Surface itself. Cycle Lanes are not recommended as they are not as safe as Segregated Cycle Track, and only a compromise due to lack of space.

Figure 48 presents a visualization of the treatment for a collector road with a painted cycle lane.

Figure 48:Treatment of Collector Roads

Existing situation at Mahadji Shinde Rd., Aundh

Visualization of 'painted cycle lane' design concept at Mahadji Shinde Rd., Aundh

Shared Use

Neighbourhood streets which generally have narrow rights of way, and light traffic, can be proposed as streets with Shared Use. Such streets can be made safer by applying traffic calming measures such as, speed bumps or paved streets, thus forcing the vehicles to move at the speed of Cyclists and avoiding major clashes.

Figure 49 presents an example of a Neighbourhood Street, with before and after scenarios.

Figure 49:Treatment of Access Roads

Existing situation at Patwardhan Baug Rd.

Visualization of 'shared use' design concept at Patwardhan Baug Road

Greenways and facilities

The Greenways could be classified into two groups, with one group being Cycle Priority routes enabling cyclists to cut through the city, while the other being Recreational Routes.

Around 75 Kms of Greenways have been proposed along Canals, Rivers and Hills throughout the city, the network of which can be seen in the Map (46) above, marked in Green colour. Currently, Old Canal Road is the only closest example of a Greenway, which in some stretches, transitions into a Park with Jogging Track and Cycle Track (from Bhandarkar Road to BMCC Road).

Cycle Priority Routes

The cycle priority routes could be called as Cycle Highways. Such routes, which cut through the city, could facilitate cyclists to reach their destinations quickly and safely. This can be achieved by prioritizing Cycles Over Motorized vehicles, by providing wider Cycle Tracks, or in some cases, the stretch can be completely closed for Motorized Traffic, depending upon the land use and access to properties. Also, such routes will have adequate shade for Cyclists, hence providing a comfortable environment for cyclists.

Recreational Routes

Recreational routes along the rivers and canals, and through parks can also be shortcuts through the city saving valuable time for the cyclists.

Figure 50: Greenway concept visualization on Old Canal Road (Warje)

Figure 51: Greenway concept visualization on Old Canal Road (near Law Collage. Rd.)

4.3.3. Public Bicycle Sharing system

Public Bicycle System (PBS) is a term for a service that provides cycles to commuters without them having to own and maintain. It has been observed across the world that the cycle sharing service increases the mode share of cycles. Cycle sharing can help reduce pollution, reduce traffic noise, improve safety on the roads. For users, it is a healthy mode of transport, often quicker than other modes for short distances, without the need to maintain the cycle or worrying about where to park.

To encourage cycling, it is recommended that a Public Bicycle System be introduced in the entire city.

PBS systems may be

- Fully supported and run by the city
- Run privately without any financial support of the city
- Run privately with some aid (financial or otherwise) by the city

The aim is to ensure that a PBS system serves the entire city, with a good quality of service at affordable rates and which is accessible to all segments of society.

It is recommended that the following level of service of bicycle share systems should be achieved over the next 3 years.

- No. of PBS cycles - 3 cycles for every 100 residents or about 1 lakh cycles in the city in aggregate
- No. of PBS cycle trips - 4 or more trips per cycle per day or about 4 lakh PBS cycle trips per day

These targets shall be revised from time to time.

A detailed project report for Phase 1 of a docking system based PBS system has been prepared and is placed in the Appendix. A policy document for encouraging dockless systems may be prepared and revised by PMC from time to time, to take advantage of technological advancements in PBS systems.

A detailed project report for Phase 1 of a docking system based PBS system has been prepared and is placed in the Appendix. A policy document for encouraging dockless systems may be prepared and revised by PMC from time to time, to take advantage of technological advancements in PBS systems.

Recommendations for Pune Public Bicycle System (docking system based)

1. **Cycles and Stations -** The number of cycles and stations recommended is:

	Phase 1	Phase 2	Total
Stations	388	410	798
Cycles	4700	8400	13100

2. **Automation**- A fully automatic system is recommended

3. **Station Locations** – Station locations were identified through an extensive ground truthing exercise carried out with the PMC Road Dept. The criteria followed for selection of locations are
   a. Proximity to destinations, BRT or other bus stops, train stations, etc
   b. Adequate space availability
   c. Location does not block any other use

4. **Registration –** Registered users may be provided with a MI Card, which will be valid for use on PMPML buses as well

Public Bicycle System

Users can check out a cycle from any cycle station at any time of the day, use it to go anywhere they want to, and then return it to any cycle station located nearby their destination.

Cycle sharing provides an ideal transport solution for short trips and a feeder to other public transport options. It is recommended that the bicycle design should be easy to ride for both women and men of different heights, sturdy, with mechanisms to prevent theft and vandalism, and with space for branding for easy identification.

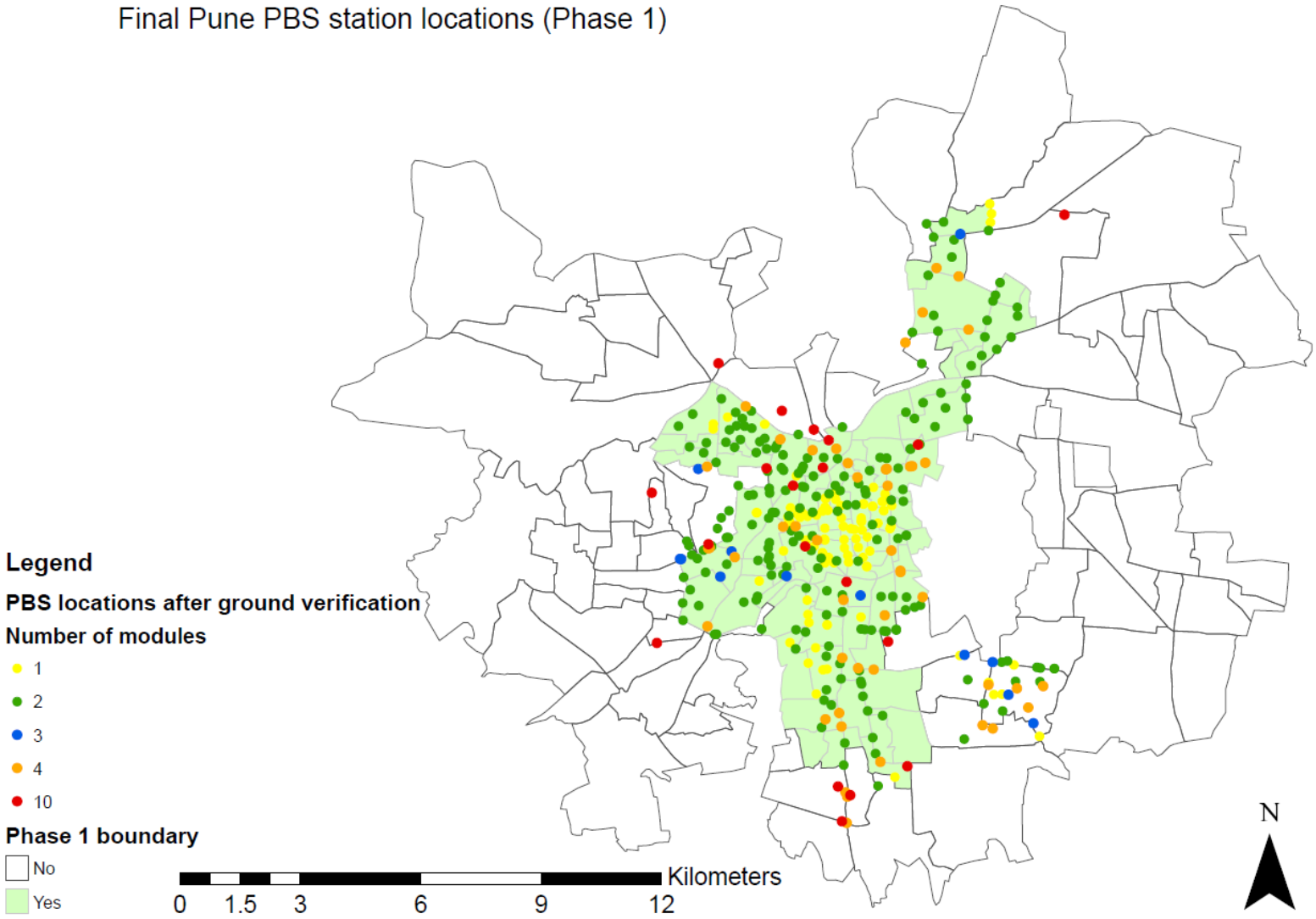

Figure 50: Proposed locations and sizes of stations for Public Bicycle System, Phase I

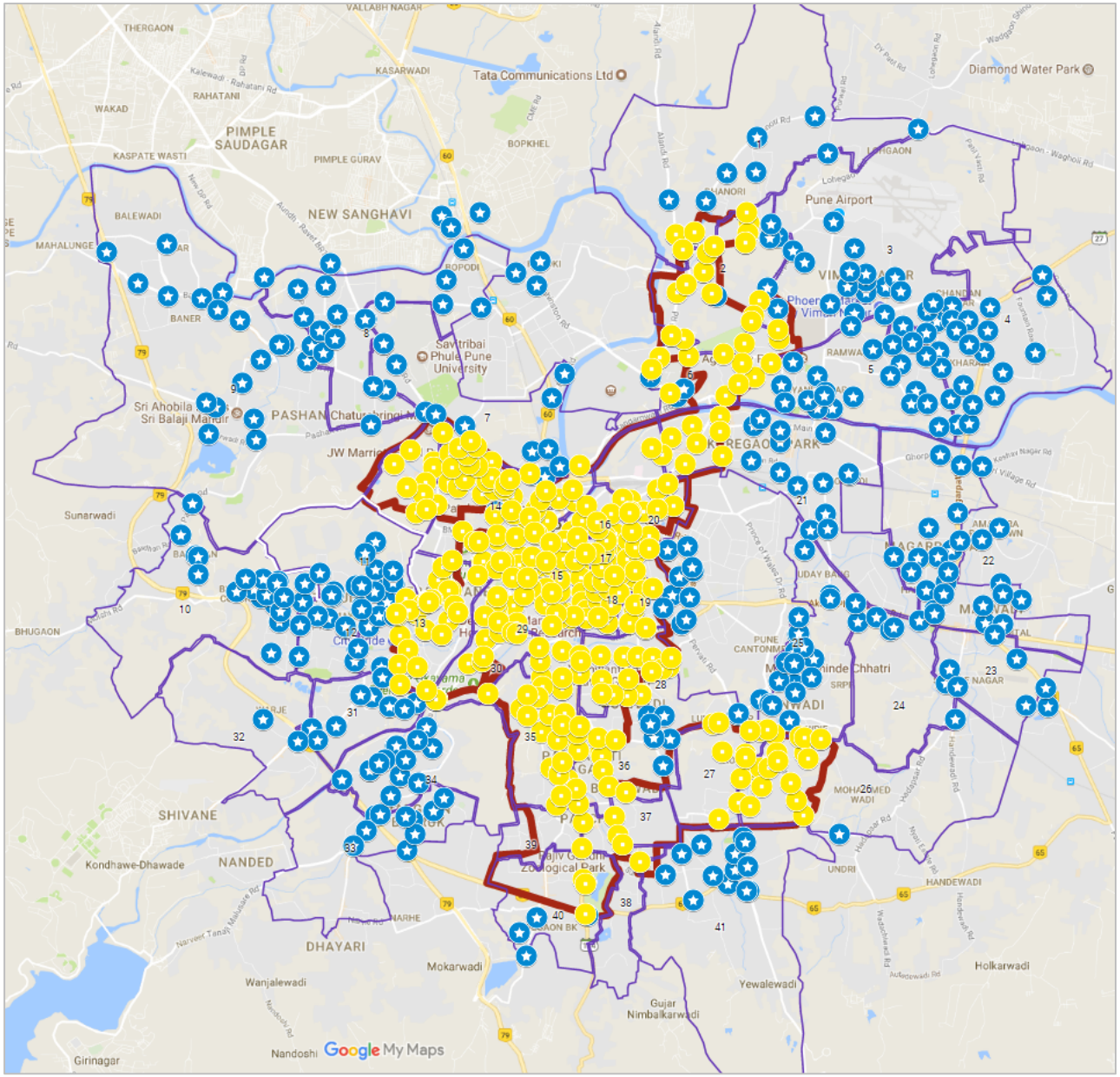

Figure 51: Proposed tentative locations of Public Bicycle System stations, Phase I and Phase II of docking type system

Legend

Proposed Station Locations Phase I

Proposed Station Locations Phase II

4.3.4. Integration with Public Transit

The integration of cycling with intra and inter-city bus systems, rail and metro can help convert journeys made by private motorized modes to cycle and public transport. The advantages include:

- City level - Lesser number of motorized vehicles on roads, meaning lesser accidents and pollution and more effective use of the road network
- Personal level - Active transportation component in the journey, providing health benefits

For integration of the cycle infrastructure with public transit, the following measures are recommended:

1. **Physical integration**: PMC should coordinate with PMPML, Maha Metro, MSRTC, Indian Railways to provide space for bicycle parking and PBS stations inside or very close to transit stops. Cycle parking spaces at depots and termini should include long-term cycle parking enclosures.

2. **Connectivity**: Safe cycling infrastructure or safe shared roads should be provided to connect to the bicycle parking and PBS stations at the Public transit stations in such a way that conflicts with motorised traffic and particularly busses are minimized, particularly close to the station.

3. **Public interface**: PMC should coordinate with PMPML, Maha Metro, MSRTC, Indian Railways to ensure that information about the cycle network and PBS is prominently displayed for the use of passengers, at the transit stops/ stations

4. **Fare integration**: PMC should coordinate with PMPML and Maha Metro to ensure the usage of the common mobility card MI Card for the public bicycle share, BRT and other bus services, metro

5. **Coordinated planning and information sharing**: PMC should coordinate with PMPML, Maha Metro, MSRTC and Indian Railways to undertake a joint annual review of the transportation systems and facilities provided to the public, share information on commute patterns, customer care, etc with a view to improving the public services.

4.3.5. Cycle Parking

Cycle Parking is an essential element for successful implementation of the Cycle Plan. Bicycle Parking must not only be provided in every building in the city, but also given priority over Motorized vehicles.

Providing bicycle parking encourages people to use their bicycles as transportation. People are more likely to use a bicycle if they are confident that they will find convenient and secure parking at their destination.

The following measures are recommended in order to provide adequate, comfortable parking spaces for cycles in private properties, and public on-street and off-street cycle parking.

1. **Cycle Parking Space in buildings and private properties**

   In the Development Plan 2017, under Section 20.1.1 General space requirements. The provision:

   'c) Marking of parking spaces: Parking spaces shall be paved and clearly marked for different types of vehicles'

   Will be changed to:

   c) Placement and Marking of cycle parking spaces: Parking spaces shall be paved and clearly marked for different types of vehicles, including bicycles. The placement of cycle parking shall be such as to provide easy and convenient access close to the building entrance. Where multi-level parking is provided, the cycle parking should be provided at the ground level location.

2. **On-street Cycle Parking Spaces**
   - The minimum amount of Cycle Parking space should be equivalent to 10% of the total area provided for Vehicular Parking, or two Car Parking bays, whichever is more. If cycle parking gets full, more cycle parking must be created, even if it has to be created by removing vehicular parking that might also be full.
   - Cycle parking facilities will be created as Bicycle Zones, that are clearly indicated, with signage and road markings, with appropriate cycle stands where required, suitable for various types of cycles, that keep cycles upright.
   - Such Bicycle Zones shall be designated as being part of the "cycle track", so that no motorized vehicle shall be legally allowed to occupy this space and in such case, shall attract penal provisions and actions under both the Maharashtra Municipal Corporations Act and Motor Vehicles Act by the PMC or Traffic Police or RTO as appropriate
   - The Cycle Parking map depicts the number of cycle stands to be provided on-street. These may be provided alongside the proposed PBS Stations or as Bicycles Zones including the PBS stations, as per available area.

3. **Off-street Cycle Parking Spaces**
   - Existing off-street and multi-storied public parking lots will provide Cycle Parking space equivalent to 10% of the total area provided for Vehicular Parking, or two Car Parking bays, whichever is more. If a cycle parking gets full, more cycle parking must be created, even if it has to be created by removing vehicular parking that might also be full.
   - PMC will coordinate with public transit agencies, including PMPML, Maha Metro, Indian Railways, MSRTC, Airport Authority of India etc, to provide long-term cycle parking facilities available.
   - Enclosures with locking facilities for cycles allocated for long-term parking may also be provided in off-street parking locations managed by PMC.

4. **Design Standards** for Cycle Parking - The PMC shall prepare design standards and schedule of rates for cycle stands and Bicycle Zones to meet the various types of needs for public and semi-public parking, including on-street and off-street situations, short duration and long duration cycle parking, and for parking of owned or rental cycles. The design standard for cycle parking stands and bicycle zones shall be used in design of public roads as a standard item of street furniture and transport facilities.

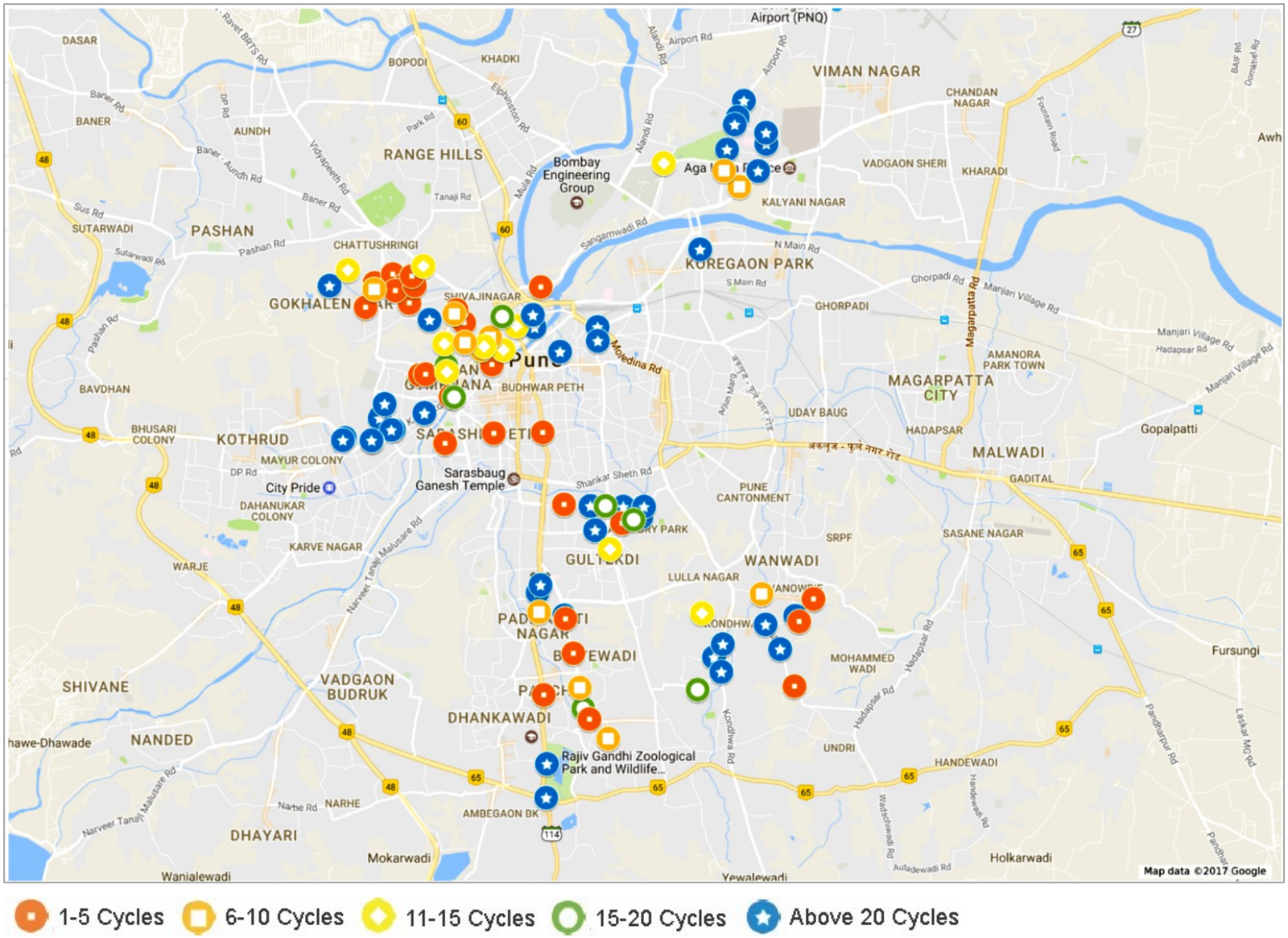

Figure 54: Map showing potential locations of Cycle Parking Phase-I

4.3.6. Repair Shops, Resting Places and other Facilities

Repair Shops

A database has been created of shops offering sale, repair and rentals of cycles, as part of the surveys done for the Pune Cycle Plan. The map in Figure 52 shows the location of shops around the city, based on the surveys done from September to December 2016.

One of the oldest cycle shop at Nagar Road is being run by the third generation in the family. Till around 15-20 years before, there were about 100 cycles, being rented daily, most customers being workers. But the numbers have been dwindling since then, and now the shop has around only 10-15 cycles left for rentals. As such, the owner relies on other sources of income to meet his needs.

About 168 cycle shops were surveyed and interviewed around the city, of which, 2 are only retail shops, and 79 shops are only repair shops. About 31 shops provide repair & retail services, and 6 shops provide repair & rental services. The remaining shops provide all the three services, Repair, Rental and Retail.

Although the survey was conducted recently, the data needs to be updated frequently as new shops keep opening up in the city, while some shops shut down.

Resting Places/ Cycle Zones/ Spots

It is recommended that all along the cycle network, small and large resting places/ zones should be created for cyclists. These may range from one bench and a rain shade to more elaborate stands and rain shelters with drinking water dispensers/ ATMs and air pumps.

Such spots could also help encourage non-cyclists to take a recreational ride, and help generate interest in cycling and understanding the benefits to individuals and to the city.

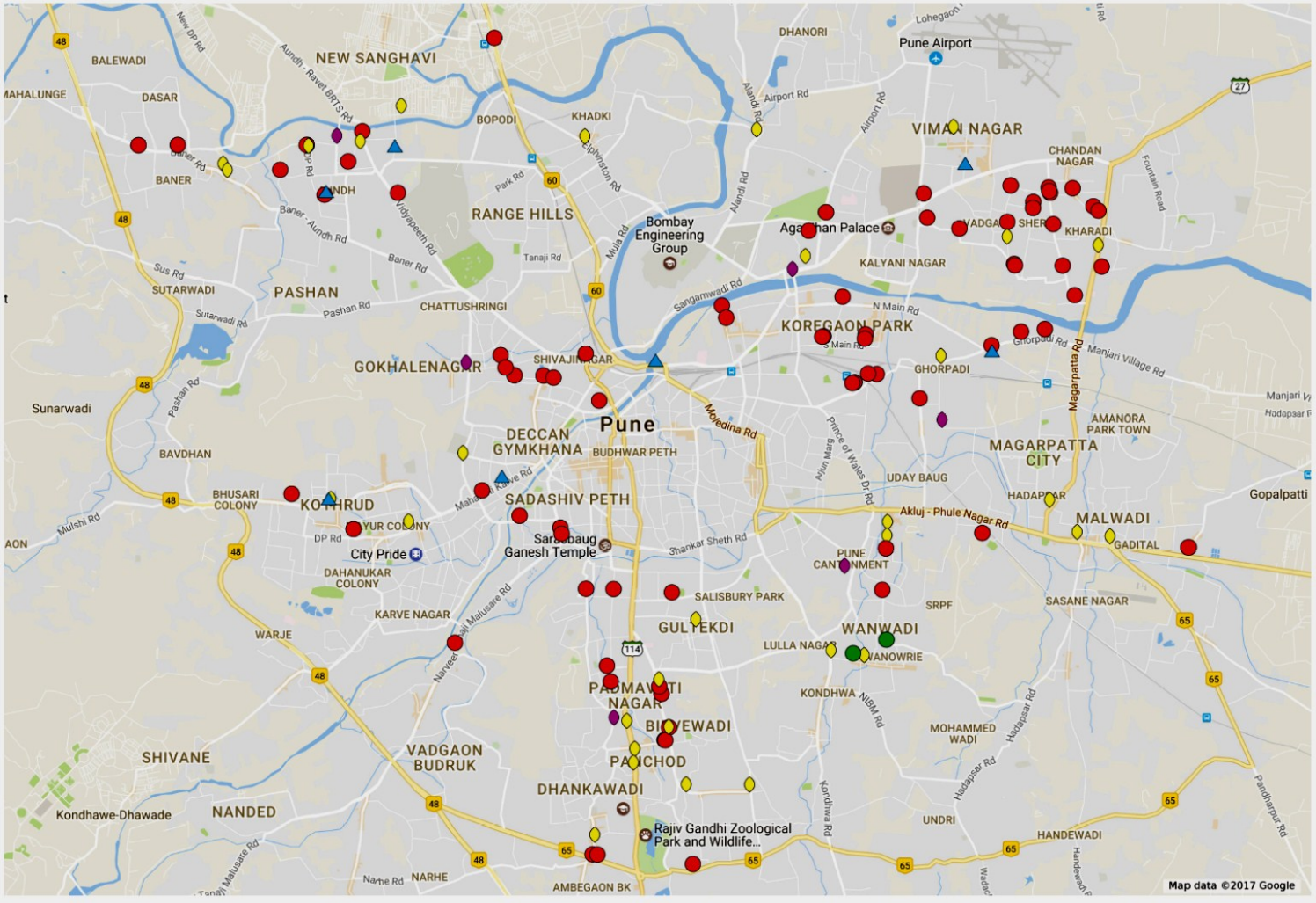

Figure 52: Map showing Cycle Shops Located in Pune City

Figure 53: Cycle Stands in a Cafe in Germany

Figure 54: Ciclo Café in Chennai, India

Figure 54 shows Ciclo Café, which is one of the first Café in India, and is also a full-fledged Cycle shop and provides service for maintenance of Cycles.

4.4. Traffic Management, Regulation and Enforcement

The management of traffic to ensure safety for all road users is of critical importance. The Motor Vehicles Act, the Central Motor Vehicles Rules, and the Maharashtra Motor Vehicles Rules have provisions related to regulation and penalties for driving or parking motorized vehicles on cycle tracks.

Extract from Motor Vehicles Act:

"138. Power of State Government to make rules. –

(1) The State Government may make rules for carrying into effect the provisions of this Chapter other than the matters specified in section 137.

(2) Without prejudice to the generality of the foregoing power, such rules may provide for –

(h) prohibiting the use of foot-paths or pavements by motor vehicles;"

Extract from Central Motor Vehicle Rules:

8 Caution at road junction.—The driver of a motor vehicle shall slow down when approaching at a road intersection, a road junction, pedestrian crossing or a road corner, and shall not enter any such intersection, junction or crossing until he has become aware that he may do so without endangering the safety of persons thereon.

11 Right of way.—The pedestrians have the right of way at uncontrolled pedestrian crossings. When any road is provided with footpath or cycle track specially for other traffic, except with permission of a police officer in uniform, a driver shall not drive on such footpath or track.

15 Parking of the vehicle.—(1) Every driver of a motor vehicle parking on any road shall park in such a way that it does not cause or is not likely to cause danger, obstruction or undue inconvenience to other road users and the manner of parking is indicated by any sign board or markings on the road side, he shall park his vehicle in such manner. (2) A driver of a motor vehicle shall not park his vehicle:— (ii) on a foot-path;

Extract from Maharashtra Motor Vehicle Rules:

"228. Footpaths, cycle tracks and traffic segregation — Where any road or street is provided with footpaths, or tracks, no person shall, save with the sanction of a police officer in uniform, drive any motor vehicle or cause or allow any motor vehicle to be driven on any such footpath or track."

Extract from Gazette of India, New Delhi, 23rd June 2017 (for Motor Vehicle Act, 1988):

39. Pedestrian crossings, footpaths and cycle tracks.-
(1) While approaching an uncontrolled pedestrian crossing, the driver shall slowdown, stop and give way to pedestrians, users of invalid carriages and wheelchairs.
(2) If traffic has come to a standstill, the driver shall not drive the vehicle on the pedestrian crossing if he is unlikely to be able to move further and thereby block the pedestrian crossing. (3) When any road is provided with a footpath or cycle track, no vehicle shall drive on such footpath or track, except on the directions of a police officer in uniform or where traffic signs permitting such movement have been displayed.

Additional Supportive Mechanisms

The following additional mechanisms are proposed to enhance the effectiveness of traffic management and regulation for safety of all road users:

1. An annual ‘Road and Cycle Safety Plan’ process will be undertaken by the Bicycle Department in conjunction with the PMC Traffic Dept, PMC Road Dept, PMC Encroachment Dept and Traffic Police. The purpose is to provide a platform for coordination of traffic management measures and coordination between these agencies. The process will include
    a. review of data and information on accidents, traffic violations, infrastructure audits, complaints etc
    b. root cause analysis including invited road safety experts if needed
    c. preparation of the traffic management, regulation and enforcement plans, including identification of personnel and equipment needs, the plans for enforcement drives and potential media and awareness campaigns in conjunction with enforcement drives.
2. PMC would constitute a Cycle Wardens Patrol to monitor the cycle tracks (on cycle), and record usage and violations using cameras, which may be hand held/ helmet / body mounted.
3. CCTV shall be installed in locations identified as especially vulnerable, where motorized two-wheelers are likely to, or are known to, encroach upon cycle tracks, at junctions and any such locations that require monitoring
4. Recordings from the Cycle Wardens and CCTVs may be used for issuing e-challans and penalties.

4.5. Public Awareness and Outreach

PMC will undertake a substantial structured effort to rejuvenate and promote cycling to attain the desired mode share of 25% trips by cycle over the coming few years. Towards this,

a. PMC will Facilitate the creation of a 'Pune Cycle Partnership' as a public private partnership entity with the PMC as a stakeholder, for anchoring and supporting cycle promotion activities and inviting CSR and other partnerships

b. The Bicycle Advisory Committee will oversee the Cycle Promotion activities

c. The Nodal Officer, Bicycle Department with Indradhanushya will provide the required administrative support

d. In addition to Cycle Promotion, PMC will ensure that the PMC Helpline and Complaints Management System will enhance its capabilities to include response to cycle-related complaints

e. The Public Awareness and Outreach effort should include:

- Preparation of an overall brand strategy for the Pune Cycle Plan implementation phase
- Preparation of detailed plans for engagement with each of the segments and proposals indicated in the table below, in discussion with the concerned stakeholders as appropriate.

Table 5 shows the details of public awareness and outreach.

Figure 55: Cycle Training Facility (RAPA), Glasgow

Table 5: Activities for public awareness and outreach

Segment	Purpose	Proposals	Institutional Partners
All	• Easy access to all information about cycling in Pune, events, efforts to improve cycling, partnerships and volunteering	1. Develop and maintain a website / portal and social media about the Pune Cycle network, cycling maps, information about cycling facilities, events, apps, plan implementation, partnership programmes, schemes, guidance documents for citizens groups, institutions, work places, volunteering opportunities, cycling tips, how to get cycle training etc	Bicycle Dept, PMC IT Dept
Children or school students	• Encourage positive attitude towards cycling and enhance understanding of sustainable transportation • Enable gathering of feedback from children as users of transportation services • Enable data collection on school transportation • Provide systematic cycling training	2. Introduce new content and innovative teaching methods and materials in the Road Safety Patrol programme 3. Set up mechanisms for feedback/ data collection: a. Gather feedback from students on their travel experience, such as through a participatory survey as part of the Road Safety Patrol programme and use this feedback for bringing about improvements as needed in traffic management, road infrastructure etc b. Add a data set in the annual school report form, on how students and staff travel to school and submit to School Education Dept and Bicycle Dept 4. Introduce systematic training for cycling in all interested schools, through trained instructors 5. Provide cycle kits and training on bicycle maintenance 6. Through School Transport Committees and School Management Committees, actively discourage underage driving, and promote safe road behaviour and use of protective gear by parents/ guardians and all school staff	Traffic Police and RTO Road Safety Patrol program PMC School Education Dept. Indradhanushya
Youth	• Encourage cycling • Take up cycling projects at college or workplace • Contribute to cycle promotion	7. Develop institutional partnerships with colleges and youth groups for: a. cycle-friendly campuses b. student projects such as surveys and studie c. cycling promotion events	Bicycle Dept / Indradhanushya

Informal sector workers and home-based workers	• Promote cycling and access to cycles	8. Develop a scheme for gifting cycles, especially to young girls and women from economically disadvantaged groups 9. Improve access to public bicycle system for economically disadvantaged individuals such as through reimbursement/ voucher method 10. Especially encourage women to learn cycling and use cycles through events and other techniques	PMC Urban Community Development Dept
Young and mid-level professionals	• Promote commute cycling or cycle to work • Promote recreational cycling • Promote safe driving ethics through workplace-based orientation	11. Encourage young women to take up cycling 12. Develop a programme of partnerships with workplaces / employers to promote cycling 13. Develop guidance on cycle-friendly workplaces, including induction orientation on cycling, providing or subsidizing cycles and cycling gear, changing rooms/ showers, safe cycle parking slots, incentives to cyclists, cycle clubs and events, adopting a code of practice of safe and respectful driving	Bicycle Dept/ Indradhanushya
Motorists	• Practice safe driving	14. Prepare joint plans with Traffic Police and media to combine enforcement drives with outreach campaigns	Bicycle Dept, Traffic Police, Media, RTO/ Road Safety Committee
RTO and Driving schools	• Promote safe driving	15. Develop a 'Safe Roads' or 'Drive Safe' partnership programme for driving schools, with awards and guidance for promoting good driving practice respectful of pedestrians and cyclists 16. Ensure inclusion of cycle related signs in driving school training module and RTO's driving test	RTO
Existing Cyclists	• Retain and promote cycling	17. Develop partnerships for recognition and awards for different types of cycling activities 18. Develop a mechanism for volunteering in cycle promotion efforts, cycle training, organization of events	Bicycle Dept/ Indradhanushya
Cycle shops	• Promote cycling directly and through other actors	19. Facilitate formation of an Association of cycle shops 20. Facilitate the organization of an Annual Cycle Expo 21. Capacity building of shop marketing staff and technicians 22. Training cycle mechanics for maintenance of high-end cycles 23. Loans/ gifts of cycle maintenance kits to entrepreneurs	Bicycle Dept Encroachment Dept. and Lighthouse

		24. Branding support to small shops and getting them to be on the Cycle Shops Map	
Residents' Associations/ civic groups and community engagement	• Help make neighborhoods walk and cycle friendly	25. Develop comprehensive guidance and facilitate neighborhood action projects to improve sustainable mobility at area level 26. Provide professional and sustained support to residents' groups / volunteer teams in local area planning for walk-cycle-PT improvement, parking control, identify spots for better enforcement and community / volunteer based support for enforcement (of prevention of cycle infra violation) 27. Create networking mechanism for neighbourhood groups to stay connected with and informed about city level efforts and improvements 28. Prevent encroachment of cycle tracks	Indradhanushya
Elected representatives	• Supportive policies and projects, allocation of funds, facilitate local projects and cycle promotion	29. Guidance note and presentations at Prabhag Samitis on how to a. Facilitate neighborhoods to be walk and cycle friendly, including monitoring of cycle infrastructure projects b. Organize promotional events, awards for cyclists, cycling training, prevent encroachment of cycle tracks c. Make allocations for cycling infrastructure in ward budgets	Indradhanushya
Commercial Enterprises, Malls, Restaurants, Movie theatres	• Promote cycling by customers/ visitors and staff	30. Develop a partnership programme for cycle-friendly commercial enterprises to promote and incentivize cycling by staff and customers 31. Encourage adherence to the DC Rules for cycle parking	PMC Bicycle Dept/ Indradhanushya
'Cycle Mitra' Volunteer Base		32. Help create a large volunteer base for cycle promotion, cycle training, cycle events, and participation in ensuring implementation of the Pune Cycle Plan	Bicycle Dept/ Indradhanushya
Cycle Training		33. Provide on demand, structured training for cycling, at frequent and regular intervals, at different parts of the city and school 34. Develop/ adopt cycling instructors' manual 35. Accredit cycling instructors 36. Rejuvenate Chittaranjan Vatika Traffic Park and develop new Traffic/ Cycle Parks to enable children to learn to ride safely	Bicycle Dept/ Indradhanushya

4.6. Monitoring and Evaluation

Mechanisms for annual review of cycle plan implementation

1. An Annual Report will be prepared by the Nodal Officer on each element of the Pune Cycle Plan and progress of implementation
2. The Bicycle Department would take up the task of commissioning studies and surveys and compiling and analysing data from various sources, for different indicators that would help evaluate the progress towards the overall goal for cycling improvement and the effectiveness of different measures. The indicators include Number of people shifting to cycling/ mode share of cycling, Safety of cyclists and others, Number of violations of cycle infrastructure, Physical condition of cycle infrastructure, Cyclists' satisfaction, Road users' satisfaction, Complaints redress, etc
3. The Annual Report will be tabled at PMC General Body on a fixed schedule every year, with a view to ensuring that the decisions and recommendations from the General Body with regard to implementation and future actions may be incorporated into the plan and budget for the next financial year.
4. An annual Participatory Audit of Cycle Infrastructure will be conducted by the Bicycle Department with interested citizens/ volunteer groups / the Bicycle Advisory Committee.
5. An Annual Discussion Forum for cyclists will be arranged by the Bicycle Department for a citizens' review of the progress of plan implementation and suggestions for improvement.
6. Suggestions from the General Body, the results of the audit and citizens discussion will be integrated by the Bicycle Department into the next annual plan.

Table 6: List of indicators for compilation and analysis of existing data

Indicators	Arrangements for studies/ surveys and compilation and analysis of existing data	Department / organization providing data
1. Number of people shifting to cycling/ mode share of cycling	Annual/ once in two year's sample survey to establish mode share	Bicycle Department
2. Safety of cyclists and others	Accidents data from Police and Traffic Police	Police and Traffic Police
3. Number of violations of cycle infrastructure	Traffic violations data from Traffic Police	Traffic Police
4. Physical condition of cycle infrastructure	Annual audit of cycle infrastructure	Bicycle Department
5. Cyclists' satisfaction	Cyclists satisfaction survey	Bicycle Department
6. Road users' satisfaction	Special studies on ease of use of various cycle infrastructure, including intersection and cross section design, traffic management measures etc.	Bicycle Department
7. Complaints redress	Analysis of the nature of complaints and performance as regards their resolution	IT Department

4.7. Implementation Schedule

2017-18

It is recommended that there be immediate implementation of measures for enhancing institutional capacity of PMC, and selected projects as confidence building measures towards full implementation of the cycle plan. These may include:

1. Set up PMC 's Bicycle Department
2. Prepare enforcement plan
3. Set up the Pune Cycle Partnership
4. Commission retrofitting / re-construction of selected existing cycle track.
5. Initiate Public Bicycle Share System
6. Commission preparation of a Detailed Project Report for designation of inner city ring road, restriction of through traffic, and inner-city parking management plan, including the public engagement plan
7. Traffic/ Road/ Bicycle Dept to develop a mechanism for 'time-based' segregation of cycle lanes to serve school timings (e.g. ITI Road, Aundh), in discussion with Traffic Police
8. Traffic/ Road/ Bicycle Dept to develop an area-level enforcement mechanism linked to parking management system and appropriate IEC, with a view to freeing up and protecting road space for cycle ways (e.g. in Aundh)
9. Traffic/ Road/ Bicycle Dept to provide cycle stands at BRT stations on Nagar Road, Alandi Road, and various PMPML bus stops and depots
10. Garden Dept / Traffic Dept to commission a competent agency to rejuvenate the Traffic Park at Chittaranjan Vatika or set up new facilities at other appropriate locations
11. Traffic/ Road/ Bicycle Dept to develop a pilot project for school-cycling and students to learn and practice cycling to be taken up (potential sites are at Sahyadri Hospital to Moze School and PMC Krida Sankool in Shastri Nagar area)
12. Through Lighthouse, commission the development of a training facility for cycle mechanics training and ecosystem for placement and customer engagement
13. IT Dept to facilitate development of one or more apps for cyclists for information on cycle facilities and events, infrastructure audit and reporting
14. IT Dept / Bicycle Dept/ Indradhanushya / Pune Cycle Partnership to facilitate development of Pune Cycle Portal website
15. Facilitate the organization of a Pune Cycle Week and Expo in January or February 2018, including exhibitions of cycles and cycling equipment, cycling events, discussions and orientation programmes for different audiences to engage in cycling promotion, if possible launch of various products and services by PMC for cycle promotion (model tracks, enforcement systems, apps, website, Pune Cycle Partnership etc)

5. Appendix