URBAN95

Infant, Toddler and Caregiver Friendly Safety Design Guidelines for Pune City

Pune Municipal Corporation

Bernard van Leer FOUNDATION

TARU LEADING EDGE

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The report is developed with the support of Bernard van Leer Foundation through the Urban 95 Program for Pune. The report is developed through the understanding, literature review and analysis by the Pune Urban 95 technical team and inputs from the contributors as well as experts.

Pune Municipal Corporation

City Partner, Urban95, Phase II, Pune
The Pune Municipal Corporation is the civic body that governs Pune, is in charge of the civic needs and infrastructure development of the city. It formulates policies, develops plans and guidelines for holistic and sustainable urban development of the city. A MoU has been signed between Pune Municipal Corporation and Bernard Van Leer Foundation for transforming Pune City into a Child and family-friendly city in 2018 to develop neighbourhoods that promote early childhood development.
Website: *https://pmc.gov.in*

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ABBREVATIONS

AQI	Air Quality Index
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
BRTS	Bus Rapid Transit System
CCDO	Chief Child Development Officer
CCTV	Closed Circuit Television
CMP	Comprehensive Mobility Plan
CP	Community Park
CPCB	Central Pollution Control Board
CPHEEO	Central Public Health & Environmental Engineering Organization
CPTED	Crime Prevention Through Environmental Design
DCPR	Development Control and Promotion Regulations
DP	Development Plan
DP	District Park
ECBC	Energy Conservation Building Code
FOB	Foot Over Bridge
HAP	Housing Area Park
ICT	Information and Communication Technology
IEC	International Electro technical Commission
IGBC	The Indian Green Building Council
IMC	Indore Municipal Corporation
IPT	Intermediate Public Transport
IRC	Indian Road Congress
ITC	Infant Toddler Caregiver
ITCN	Infant Toddler Caregiver Friendly Neighbourhood
KMPH	Kilometers Per Hour
LED	Light Emitting Diode
MoEFCC	The Ministry of Environment, Forest and Climate Change
MUZ	Multi Utility Zones
NAAQ	National Ambient Air Quality Standards
NBC	National Building Code
NGO	Non-Governmental Organization
NIUA	National Institute of Urban Affairs
NMT	Non-Motorized Transport
NO_X	Nitrogen Oxides
NP	Neighbourhood Park
NUTP	National Urban Transport Policy
PCMC	Pimpri Chinchwad Municipal Corporation
PIS	Passenger Information System
PMC	Pune Municipal Corporation
PMR	Pune Metropolitan Region
PWD	Public Work Department
RWH	Rain Water Harvesting
SAFAR	System of Air Quality and Weather Forecasting and Research
SC	Smart City
SCP	Sub-City Park
SPTM	Save Pune Traffic Movement
SWM	Solid Waste Management
URDPFI	Urban and Regional Development Plans Formulation and Implementation

USDG	Urban Street Design Guidelines
WHO	World Health Organisation

GLOSSARY

Built environment	Any structure that is man-made and that provides a space for human activity. This includes buildings, streets, man-made parks, etc.
Caregivers	Any person/ persons responsible for the safety and well-being of a child. They could be parents, grandparents, relatives, caretakers, or even elder siblings.
Childcare Facilities/ITC destinations	A place/business offering childcare amenities such as crèche, anganwadi, pre-school, primary school, maternity home, child healthcare, etc.
Child-friendly Design	Design features that are tailored to the specific needs of young children and enhance and support their experience outdoors.
Education	It is the imparting of knowledge, skills, values, beliefs, and habits. Here it means crèche, pre-primary to primary education facilities
Exposure	Exposure is the state/ likelihood of being exposed to risk.
Healthcare	It is a formal and organized way to provide medical care and assistance to people. Here, ITC health care covers facilities like anganwadi, dispensaries, maternity homes, etc.
ITC-safe zones	Trails/ areas in the city that are highlighted to indicate high footfall of children. These zones are characterized by lower speed limits, visual cues, and playful signages.
Mobility	It is the movement of people between their homes and places where they work and play. It is also the movement of the entities that are needed to sustain all aspects of a person's life in the city like automobiles, public transport, etc.
Open Space	Open space is any space open to the sky that is an integral part of a site (land parcel with definite boundaries).
Public space	It is the entire built environment in the city that can be accessed freely by all people. It includes streets, footpaths, open plazas, parks and green open spaces, shopping areas, etc.
Risk	Risk is potential exposure to a situation involving uncertain danger, injury, loss that may involve certain factors such as perceptions, prosperity, or rewards. Here, risk encompasses risk from crime, road accidents, air pollution, noise pollution, and unclean urban environment.
Social Infrastructure	Public Amenities apart from recreational places that are a part of the daily routine of ITCs like daily shopping, cultural facilities, health centers, daycare centers, and public toilets.
Urban safety	Safety-related to the design and planning of the physical built environment.
Young Children	Children who are between the ages of 0 – 5 years.

Executive Summary

A safe urban environment for young children is crucial for their healthy early childhood development (ECD) as childhood experiences in modern environments can have a long-term impact on their holistic well-being. Growing up with a sense of security in their neighbourhoods positively impacts the mental development of young children than growing up in neighbourhoods that foster crime, illegal activities, road accidents, etc. The presence of dark alleys, isolated areas, speedy traffic, etc. can develop trepidations in both ITCs and their caregiver, restricting their quotidian liberty and choices, safe free movement and negatively impacting their perception and urban experiences. As neighbourhoods are the first urban space that a child interacts with, it is important to plan and design them with an increased perception of safety for both ITCs and their caregivers. The present neighbourhoods in our cities are not primarily designed to manifest this perception and hence, many instances of crimes, road accidents are recorded every year. Also, due to rapid urbanization, our environmental quality (air, noise pollution, etc.) degrading, therefore, impacting the health of the surroundings. Growing up in unsafe or unhealthy urban environments will negatively impact the ECD of our next generations. Hence, it is important to include this vision of providing a safe and healthy environment while designing and planning our urban spaces. Thus, as a part of Pune Municipal Corporation's Urban95 program, supported by the Bernard van Leer Foundation, Design Guidelines for Safe City for Infant, Toddlers, and Caregivers (ITC) have been developed for Pune City.
As there are no specific guidelines on safe city or safety for infants, toddlers, and their caregivers (ITC) in Pune, this document will act as a base for guiding all those involved in city planning & designing of safe urban environments. It will be a comprehensive set of urban designing, planning, and management guidelines specifically catering to the safety needs of ITCs in the context of Pune. It will address both real and perceived risks (based on baseline study) encountered by ITCs across the city, to help construct a suitable environment. This guideline will supplement other existing policy and planning documents charted for Pune city.
These guidelines are structured into 3 Chapters and supported by an Annexure.

Chapter 1: Provides a brief introduction to the theme of safety, the purpose of the document, its scope and applicability.

Chapter 2: Identifies the safety risks encountered by ITCs in the context of Pune, outlines the applicable guiding principles for achieving safer urban environments. Further, it provides detailed design strategies and guidelines for each safety components identified, supporting them with best relevant global practices and illustrations. Also, how the guidelines will supplement the existing policy and planning framework has been illustrated in each safety component section. This chapter also contains a section at the end, which describes how designing the urban built environment from the ITC lens will add resiliency to the city and help in increasing the preparedness of the city in the situation of pandemics. Thus, promoting safety from climate change and pandemic impacts/risks.

Chapter 3: Provides the operational and management mechanism for the implementation of the safety components and provides evaluation and monitoring mechanisms for future sustenance of safe ITC-friendly urban environments.

Annexure I: Provides a detailed Safety Assessment Checklist which will act as a ready reckoner for the respective Pune municipal corporation (PMC) officials, urban practitioner to assess the safety risk of an area and develop an ITC friendly design strategy to mitigate the risk encountered by selecting appropriate safety components and guidelines outlined in this document.

Urban safety for ITCs encompasses safe access to all ITC destinations like pre-primary and primary school, day-care centres, maternity homes, dispensaries, vendor kiosks, safe public transport facilities etc, fostering safe play in neighbourhoods, crime prevention, and providing a clean and healthy environment. This document encompasses all these areas and provides detailed guidelines to help make them safe for ITCs and thus, a safe urban environment for all.

The guidelines are targeted to assist a range of stakeholders with an interest in working towards creating safer environments for ITCs. These include urban practitioners, Pune Municipal Corporation officials, Relevant District and State Departments, Local communities, activist groups, NGOs, working in any field related to safety in an urban environment, and ITC well-fare.

1

INTRODUCTION

1. Introduction

1.1 Vision of the guideline

To make the urban environment in Pune safe and secure for Infant, Toddlers, and their Caregivers for living, playing, and moving, fostering a healthy and habitable city.

1.2 Purpose of the guideline

As there are no specific guidelines on safe city or safety for infants, toddlers, and their caregivers (ITC) in Pune, this document will act as a base for guiding all those involved in city planning & designing of safe urban environments. It will be a comprehensive set of urban designing, planning, and management guidelines specifically catering to the safety needs of ITCs in the context of Pune. It will address both real and perceived risks (based on baseline study) encountered by ITCs across the city, to help construct a suitable environment.

The document will provide for the following:

- Guide the urban practitioners to assess the safety risk of an area and develop an ITC friendly design strategy to mitigate the risk encountered.
- Act as a ready reckoner for the respective Pune municipal corporation (PMC) officials, ensuring that ITC safety principles have been considered while designing and planning of urban facilities in the ITC zones across the city.
- Promote the planning of safer cities for ITCs and instruct all the stakeholders to consider the safety of ITCs from the beginning while designing and planning the urban areas.

As this is the pioneer design guideline for the safety of ITCs for Pune, it is designed to be a flexible document that can be altered and improved to incorporate the lessons learned on the ground and subsume changes in design methods and technologies.

This guideline will supplement other existing policy and planning documents charted for Pune city.

1.3 Applicability of the guideline

This guideline is applicable to all the urban built environment within the jurisdiction of Pune Municipal Corporation (PMC) - city limit. These include all hierarchy of the streets, open spaces, public parks, playgrounds, plazas and other public spaces. It includes both brownfield and greenfield areas within the existing PMC limit as well as those within the extended or future boundaries of PMC.

1.4 Target Audience

The guidelines are targeted to assist a range of stakeholders with an outlook of creating safer environments for ITCs. These include:

- Urban Practitioners – Architects, Engineers, Urban Designers, Planners and Consultants
- Pune Municipal Corporation officials – all officials responsible for the designing, construction, maintenance, and approval of the various built urban environments.
- Relevant District and State Departments such as the Police Department, District Disaster Management Authority, Regional Transport Office, etc.
- Local communities, activist groups, NGO's, working in any field related to safety in a metropolitan surroundings and ITC well-fare.
- Private Sector – Contractors, urban service providers, etc.

1.5 Scope of the guideline

The scope of safety in this document is restricted to the safety from built environment risks only, such as risks from road accidents, risks from crime and violence in isolated/ unsafe public areas, risks from an unhealthy environmental quality, and other risks which are a result of inappropriate urban planning, design, and management of the built environment. Also, these risks are assessed from ITCs' safety perspectives focusing on ITC routes and destinations across the city. The guidelines do not cater to social safety risks requiring child protection services or risks from urban terrorism and climate change/disaster management risks.

1.6 Relevant policy frameworks

There are no policies or programs at the National, State, or Pune city level that address the safety provisions through built environment specifically. Although few safety provisions for safeguarding from crime, road accidents, unhealthy environments are addressed in few policies and guidelines mentioned below:

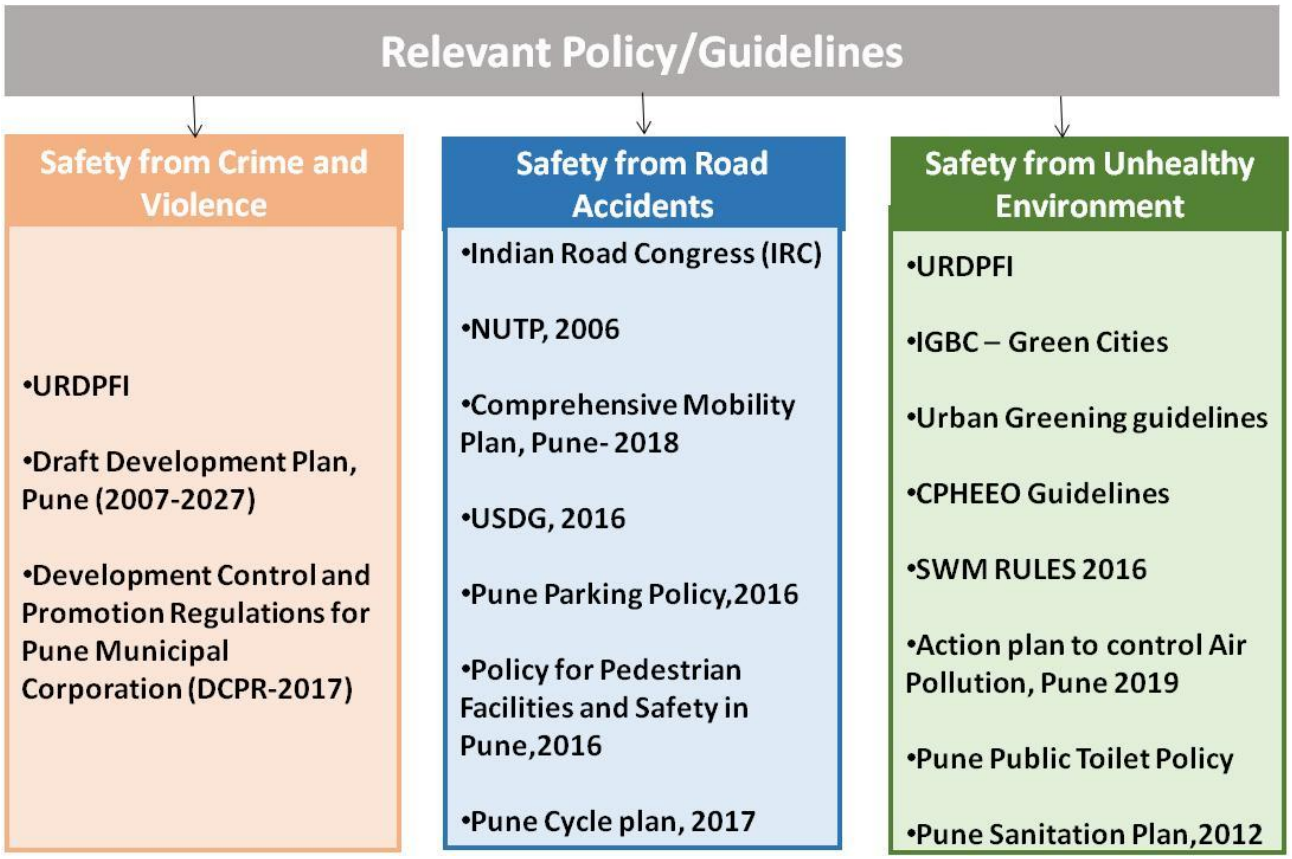


Figure 1.1: Relevant Guidelines and Policy frameworks

Source: Urban 95, Phase 1

Below are the relevant brief salient features for each of these documents:

	Policy/ Guideline	Salient Features
NATIONAL	URDPFI Guidelines 2014	• Promoting coherent and methodical regional and urban planning, and development. • Design guidelines for the provision of basic services.
	Indian Road Congress (IRC)	• IRC provides various guidelines for road safety, safe designing of non-motorized networks like footpaths, cycle tracks, intersection, signage's, lighting requirements, etc.
	National Urban Transport Policy, 2006	• Aims to provide safe and sustainable urban mobility. It provides guidelines to integrate land use and transport plans in cities, promote people-oriented equitable allocation of road space, non-motorized transport, car restraint measures, clean fuel and vehicle technologies, etc. and establish models of best practices. Pune's CMP, 2018 is based on guidelines/ directions provided by this document.
	Indian Green Building Council (IGBC) Guidelines	• The IGBC Green rating system addresses the most important national priorities which include water conservation, handling waste, energy efficiency, reduced use of fossil fuels, green cities, healthcare & well-being. It enjoins to the application of national standards and codes such as the NBC, ECBC, MoEF guidelines, CPCB guidelines, amongst several others. • It confers separate guidelines for Green Cities, Green Mass Transit system, Green Health, and Well-being rating system, Green townships, etc. with provisions for Site Selection & Planning, Sustainable Water Practices, Conserving & Harvesting Energy, Environment Quality, Health & Hygiene, Safety.
	Urban Greening Guidelines, 2014	• Provides recommendations for enhancing urban greenery along the streets, public areas, etc. • Suggests practices and methods to protect and maintain the greenery and provides key stages for planning, developing and integration of urban green spaces in the constructed environment.
	Solid Waste Rules 2016	• Developed by MoeFCC it provides detailed guidelines to manage 6 types of wastes- Municipal Solid Waste, Plastic Waste. Construction and Demolition waste, E-waste, hazardous waste, and biochemical and medical waste. These need to be adopted by the respective local bodies

			to formulate a strategic integrated master plan for solid waste management.
		Central Public Health & Environmental Engineering Organization (CPHEEO) Guidelines	• CPHEEO has developed detailed guideline manuals for Storm-water Drainage systems, municipal solid waste, rainwater harvesting, sewage management which help to plan and implement these urban utilities for hygiene and cleanliness of the built environment.
C I T Y		Draft Development Plan, 2007-2027	• It is a vision document for guiding the planned development of the city for a spectrum of 20 years (2007-2027). It is primarily a land-use plan which guides the planned development of residential and amenity spaces with provisions of infrastructures such as alignment of roads, reserved areas for garden, schools, hospitals and other facilities like fire stations, etc. It indirectly governs the perception of safety through the urban structure of the proposed built environment. • It circumscribes the potential to imbibe safety elements in overall planning and management.
		Development Control and Promotion Regulations for Pune Municipal Corporation (DCPR-2017)	• Provides the minimum regulations for planning of urban structures, allocating land and defining the technical details of the same at Pune city level. It also indirectly provides the safety concerns through regulations for built environment such as buildings' height, density in an area, F.S.I, road widths, setbacks, etc.
		Comprehensive mobility plan Pune, 2018	• Provides detailed provisions for the safety of all modes of transport. It promotes public transport facilities and safe non-motorized transport across the PMR region. • It also includes guidelines for a safe road environment to be established by junction improvements, ensuring the use of proper signages, lane markings, identifying accident-prone areas and provision of emergency services through safety audits.
		Urban Street Design Guidelines, 2016	• Provides detailed guidelines to transform the streets of Pune into safer and more habitable public spaces for all age groups. This includes- safe and accessible NMT design, safe street elements like safe crossings, traffic regulating measures, speed breakers, signals, street lighting, signage's, safe intersection designs, safe MUZ planning, and universal accessibility principles.
		Policy for Pedestrian Facilities	• This policy is developed to make Pune a pedestrian-friendly city with high-quality pedestrian infrastructure, emphasizing safety and comfort for all ages and promoting walking as a convenient mode of transport

and Safety in Pune, 2016	along with a pleasant experience for all ages. It gives a detailed guideline for designing and planning footpaths/walkways, 'At grade' pedestrian crossings, and grade-separated crossing i.e. Foot over bridge (FOB) and subways. • It recognizes children as one of the important stakeholders/user groups but does not provide children specific guidelines.
Public Parking Policy, Pune, 2016	• Provides detailed guidelines for effective parking management across the city, maintenance, availability, integration with other modes, traffic safety, and enforcement. Major provisions in the policy support in the development of safer environments for ITCs. • It promotes public transport and proposes to free –up parking land and convert these into green pockets.
Pune Cycle Plan, 2017 (Urban Cycling Design Guidelines, 2017)	• Provides guidelines to transform Pune into a city where cycling is safer, attractive, comfortable and a mode of commuting for children, women, senior, citizen, daily wage workers, etc. • The Urban Cycling design guideline which is a part of the Pune Cycle plan gives detailed insights to widths, speed limits and requirements of footpaths and bicycle tracks in correspondence to different categories of roads and mentions protocols and developments to be made at the junctions and intersections for providing safe cycling infrastructure across the city.
Public Toilet Policy, 2016	• Provides a standard framework for toilet designing and maintenance to ensure a clean and hygienic facility. The guiding principles of the design are based on universal layout. It aims at providing facilities for the differently abled and cater to the special needs of the elderly. The layout and facilities have ensured women's safety in general but facilities for pregnant women or women with infants and toddlers like diaper changing decks, ITC friendly design of toilet accessories, etc. have not been considered.
Action Plan to Control Air Pollution in Pune, 2019	• Provides the details on air pollution mitigation strategies through the transport sector (Cleaner Technology shift, promoting CNG, E-vehicles, NMT etc.), road design strategies, creation of green spaces to absorb pollutants, reducing emissions from trash burning/biomass and C&D waste, road-side dust, etc. It also provides necessary emission inventories, monitoring, implementation, and public awareness mechanisms to execute the action plan.
Pune City Sanitation Plan, 2012	• Provides the details about the present scenario of the city for sewage and sanitation system, solid waste management, water supply, and stormwater drainage system. It identifies the gaps in these service deliveries and

	provides a plan for the improvement of these services to reach their respective SLB (Service level benchmarks) along with necessary budgetary provisions. • Also provides an analysis of the present environmental status of the city, its urban green cover, water, air, and noise pollution and its impacts along with measures to mitigate them.

Table 1.1.1: Salient Features from other relevant guidelines and policy frameworks for safety

1.7 Theory of Change

Considering the above-mentioned target audience, Pune city tries to incorporate the activities that can change the existing situation for the safety of ITCs in Pune. It includes protection from crime and violence, road and traffic accidents, and unhealthy environments leading to safe neighbourhoods, streets, and healthier environments and thus achieving the goal of safeguarding ITCs in the city. It primarily refers to the following activities, outputs, and outcomes:

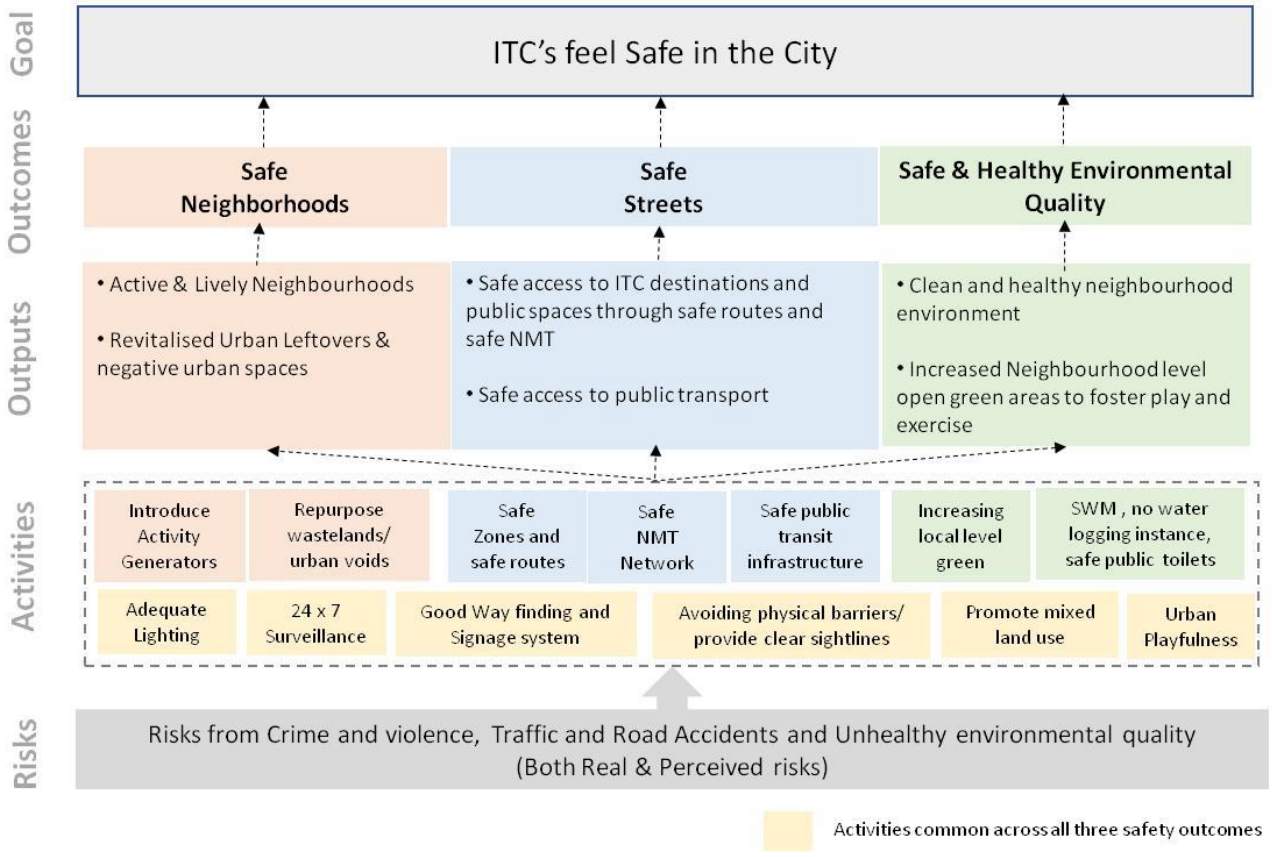


Figure 1.2: Pyramid of Activities, outputs, and outcomes contributing to the goal of Safe City for ITCs

Source: Urban 95, Phase 1

1.8 Structure of the document

These guidelines are structured into 3 Chapters.
Chapter 1: Provides a brief introduction to the theme of safety, the purpose of the document, its scope, and applications.

Chapter 2: Identifies the safety risks encountered by ITCs within Pune; outlines the applicable guiding principles for achieving safer urban environments. Further, it provides detailed designing strategies and guidelines for each safety components identified and support them with best relevant global practices and illustrations. Also, how the guidelines will supplement the existing policy and planning framework has been elaborated in each safety component section.

Chapter 3: Provides the operational and management mechanism for implementation of the safety components and provides evaluation and monitoring mechanisms for future sustenance of safe ITC-friendly urban environments.

2

TOWARDS SAFER PUNE FOR ITCs

2. Towards Safer Pune for ITCs

2.1 Defining Urban safety for Infant, Toddlers, and Caregivers

Providing a safe urban environment for children is crucial for their healthy early childhood development as childhood experiences in modern environments can have a long-term impact on their holistic well-being. Growing up with a sense of security in their neighbourhoods positively impacts the mental development of young children than growing up in neighbourhoods that foster crime, illegal activities, road accidents, etc. due to the presence of dark alleys, isolated areas, speedy traffic, etc. can develop trepidations in both ITCs and their caregivers, restricting their quotidian liberty and choices, safe free movement and negatively impacting their perception and urban experiences. As Neighbourhoods are the first urban space that a child interacts with, it is important to plan and design these with an increased perception of safety for both ITCs and their caregivers.

Urban safety for ITCs encompasses safe access to all ITCs destinations like pre-primary and primary school, daycare centers, maternity homes, dispensaries, vendor kiosks, safe public transport facilities, fostering safe play in neighbourhoods, crime prevention, and providing a clean and healthy environment. Thus, for making cities safer for ITCs, the following safety constraints should be addressed.

Figure 2.1: Constraints encountered by children in the built environment.

Source: Urban 95, Phase 1

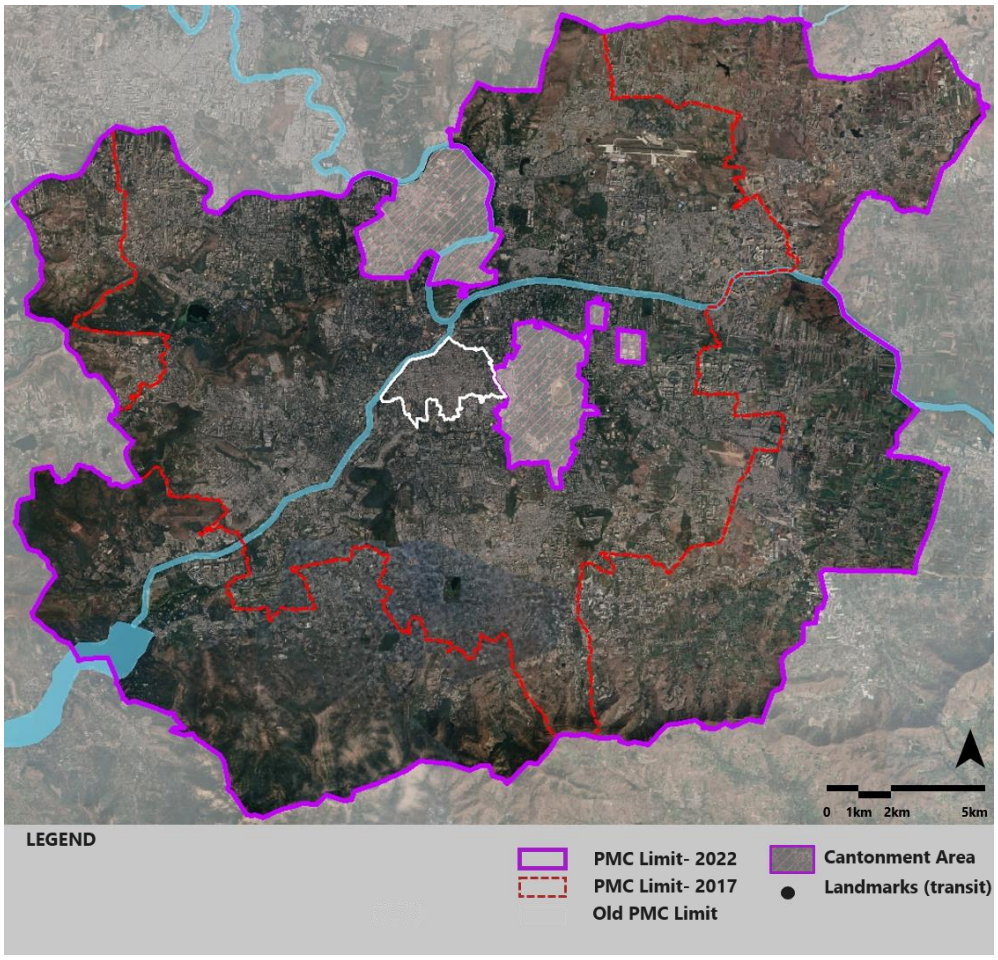
2.2 How Safe is Pune Today?

Urban crimes are often believed to exist within larger metropolitan cities. However, according to an empirical study by the UN-Habitat 2007, crimes and accidents within the city was found to be linked to poor urban planning, design and mismanagement of city policies, as opposed to the size of the urban agglomeration. Developing countries experience greater risks of urban crime. They undergo rapid population growth and urban sprawl, resulting in higher risk of urban mismanagement. Nearly 60% of people residing in cities within developing countries, have at some point experienced crime and transit-related accidents (UN Habitat report 2007). Amongst the citizens, women and children are especially more vulnerable to urban crime and to the fear of navigating urban areas. This increasing their challenges of accessing public spaces, public services and utilities. Thus, it becomes critical to recognise Urban Safety as a direct outcome of efficient urban planning and design, influencing social behaviour and surveillance systems. It is also imperative to integrate the needs of children in sustainable urban development to be able to cater to future generations.

This section examines the idea of safety in Pune city by evaluating potential risk factors leading to crime and violence, road accidents and unhealthy environments by analysing data recorded over the past five years along with caregiver's perceptions of safety derived from the Baseline Report Urban 95.

2.2.1 Pune's Urban Expansion and Child Safety

Pune city lies between latitudes 18° 25' N and 18° 37' N and longitudes between 73° 44' E and 73° 57' E. The tier 1 city is located south of Mumbai, in the state of Maharashtra, western India. It is the second largest city in the state of Maharashtra, with an area of 250.56 sq. km, after the state capital, Mumbai. The Pune Municipal Corporation limits have extended from 2017 to 2022 including the peripheral fringe areas within its development area, excluding the cantonment areas. The heritage old core (peth area), remains the dense nuclei of the city.



Map 2.1: Pune Municipal Corporation Limits

Source: Landsat, Google Earth 2021

Pune is the ninth most populous city in the country with a population of 3,124,458 (Census 2011). The population of children (age groups 0-6 years) is 10.79% of the city's population, of which 176,624 were boys while 160,438 were girls. Pune city, besides being situated as the cultural capital of the State, is expanding towards manufacturing industries - glass, sugar, forging and IT industries. Pune's rich history as an educational hub with many schools, colleges, and universities, has also created opportunity for population migration, as a favourable environment for better quality of life for themselves and for their family. Pune's expansion in terms of area and population, is owed largely due to the availability of economic opportunities, favourable climate, and the presence of cultural and educational institutions.

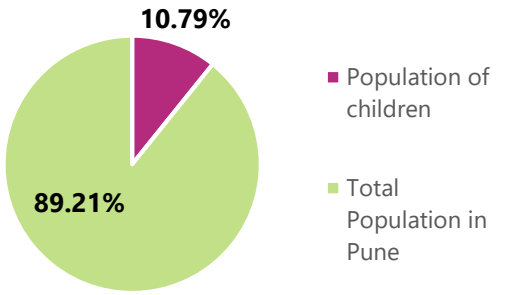


Figure 2.2: Total Child (0-6 yrs) population in Pune city as per census 2011 were 337,062

Source: *Ref:* https://www.census2011.co.in/census/city/375-pune.html

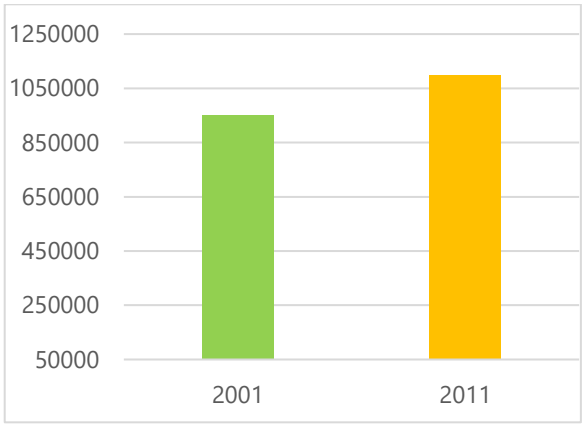


Figure 2.3: Growing trend in decadal population growth (considering State of Maharashtra)

Source: Decadal growth in population of children in Pune District

The average road width between the 1990-2014 expansion area was 7.82 meters, and Area of roads of the total built-up area is 21% (Atlas of Urban Expansion). The city's rich history and rapid development has resulted in layered neighbourhood typologies. The low-rise, dense settlements of the Peth areas have smaller block sizes and mixed-use streets. The colonial areas are characterised by larger road width and low densities, green open areas, while the industrial and fringe areas allow for high-rise, open spaces, creating variation in living conditions within the greenfield and brownfield sites.

2.3 Analysis of Potential Risks in the City

2.3.1 Pune's Liveability Index

In 2018, Pune ranked 1st amongst 111 cities across India in terms of "liveability" in the Ease of Living index released by the Ministry of Housing and Urban Affairs. Among the 15 parameters, the cities were judged upon, Pune ranked 2nd in pollution reduction, 4th in health and open public spaces, and 25th in safety and security. However, the city has seen an increased migration of more than 8.25 lacs, resulting in a growing need for housing, infrastructure and institutions. This has resulted in new phases of development, varying neighbourhood spatial typologies and social communities. According to the 'Standard of Living Index' conducted in six neighbourhoods in Pune, the socio-economic gradient indicated a spectrum of upper middle-income to low income neighbourhoods to informal (unregistered) slum settlements (source: survey Butsch/Kroll 2008/09 and 2009/10). Rapidly growing cities can add severe stress on planning infrastructure-transit, social and educational. Inadequate city planning can pose challenges on families with young children as they are vulnerable to poor living conditions, insufficient social and physical infrastructure, inadequate mobility, safety and security and adverse impact on public health.

The present situation analysis of the risks encountered in Pune city is examined. Both quantitative and qualitative analysis has been captured. Quantitative data has been captured through census, Pune's open-

source platform, and literature review while qualitative data has been captured from the Baseline Report prepared under the Urban95 initiative for developing Pune as a Child and family-friendly city. The information is visualised using city maps and statistical graphs corelating urban spatial geography and perceptions of urban safety.

2.3.2 Risk of Crime and Violence

According to the National Crime Record Bureau's report of 2018[1] , the total number of crimes recorded in Pune during 2017 decreased from 19,554 to 19,172 in 2018 and further decreased to 14,034 in 2019. The categories of crimes as per Police data of 2017 are shown in the Figure below. Chiefly the incidences of theft, burglar, and kidnapping were recorded. There is no specific data recorded or documented on kidnapping or associated risk for children.

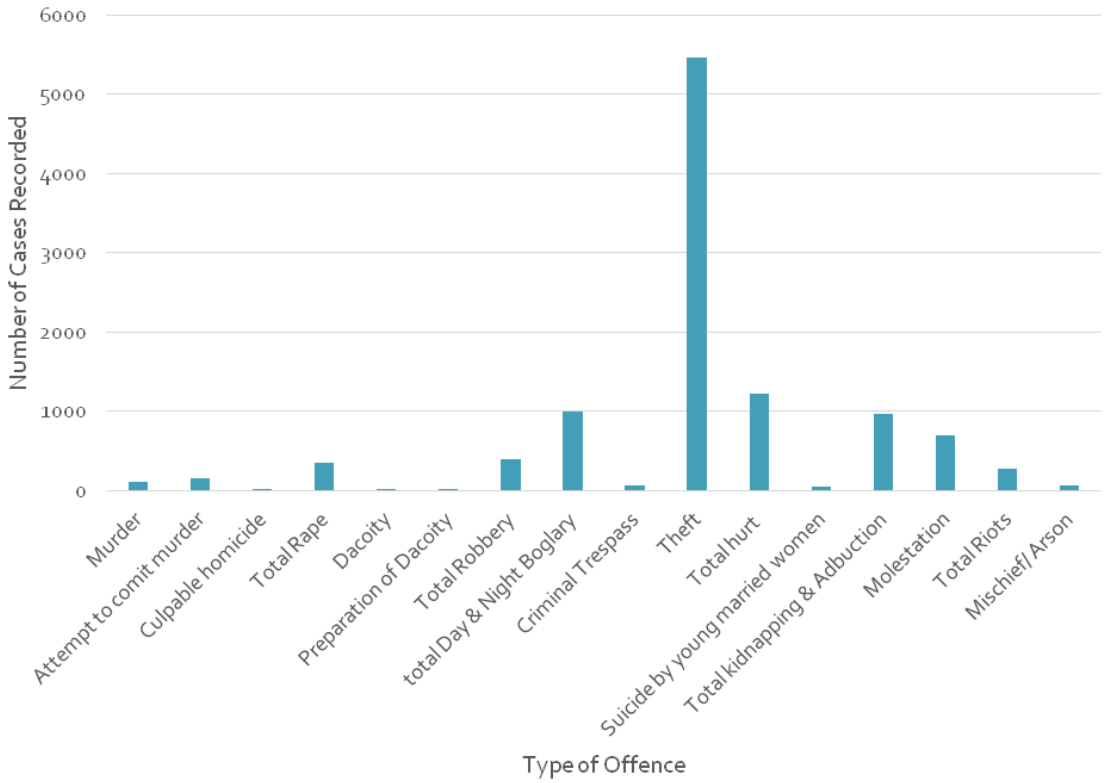


Figure 2.4: Types of Offence recorded in Pune in the year 2017

http://opendata.punecorporation.org/Citizen/CitizenDatasets/Index?categoryId=42&dsId=447&search=crime

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[1] *Pg 249,351, Crime in India, Statistics-Volume I, National Crime Record Bureau, Ministry of Home Affairs, 2018. Link:* https://ncrb.gov.in/sites/default/files/Crime%20in%20India%202018%20-%20Volume%201.pdf

The below figure shows the reduction in crime rate against women and children in Pune.

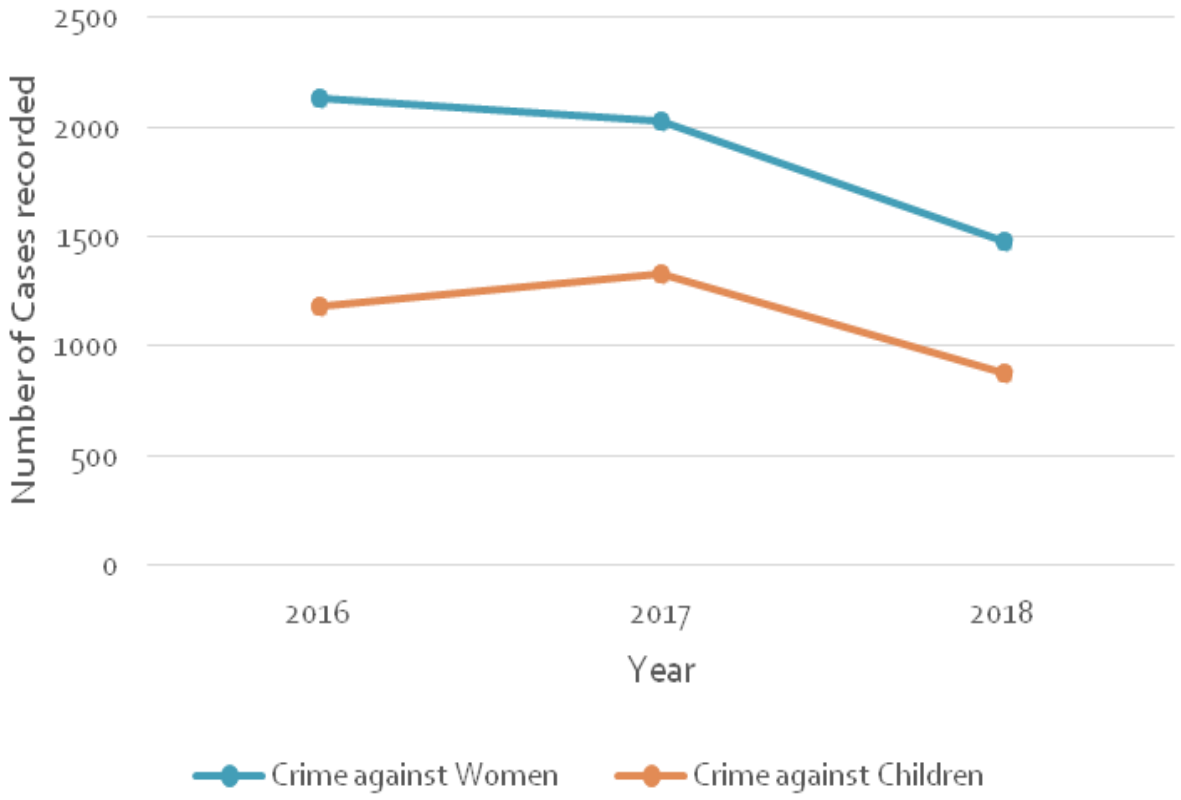


Figure 2.5: Crime rate against Women and Children in Pune from 2016-2018

Source: Crime in India (2018), Statistics Vol-I, National Crime Records Bureau, Ministry of Home Affairs

The crime rate against women also reduced from 2032 in 2017 to 1481 in 2018. Crime against women includes rape, dowry cases, acid attacks, kidnapping, abduction, etc. Also, the crime rate against children in Pune reduced from 1335 cases in 2017 to 877 cases in 2018 including murder, foeticide, kidnapping, abduction, etc.

Caregiver's perception: From the Baseline Report Urban95: Infant, Toddler, and Caregiver friendly Pune city, caregivers perceived their neighbourhoods to be safe for women and children. More than 62% of the caregivers found the Neighbourhood spaces to be clean, well-lit and safe due to familiarity with their neighbours which nurtured more social interactions and a sense of community (Refer Figure below). However, they suggested that the passive and active surveillance methods can be enhanced to ensure the future safety. Also, all the ITCs routes should be developed for safe and easy accessibility.

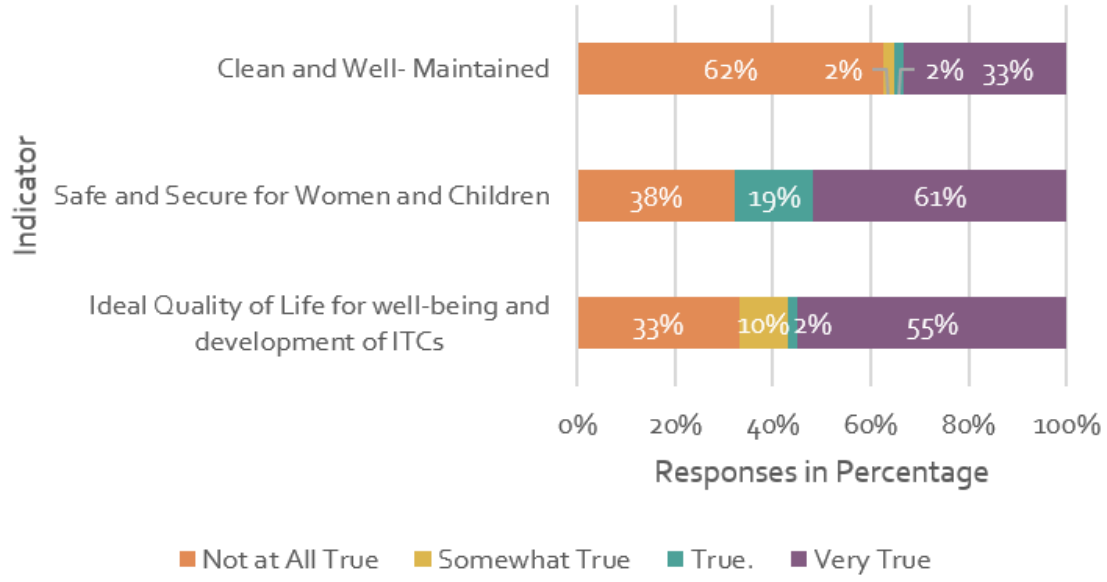


Figure 2.6: Caregivers' perception of their Neighbourhood

Source: Urban 95 Baseline Report: ITC Friendly Pune City

2.3.3 Risk of Road Accidents

In total, 891 number of road injuries and 352 number of road fatalities have been recorded for the year 2018 in Pune City. However, the year 2017 saw a higher margin of road accidents with 1151 number of road injuries and 373 number of road fatalities. According to the Pune Municipal Corporation Citizen Dataset, almost 30% of these include injuries and fatalities are of pedestrians and cyclists. The primary reason for these accidents is over-speeding, violation of traffic rules, unsafe pedestrian infrastructure and road junctions.

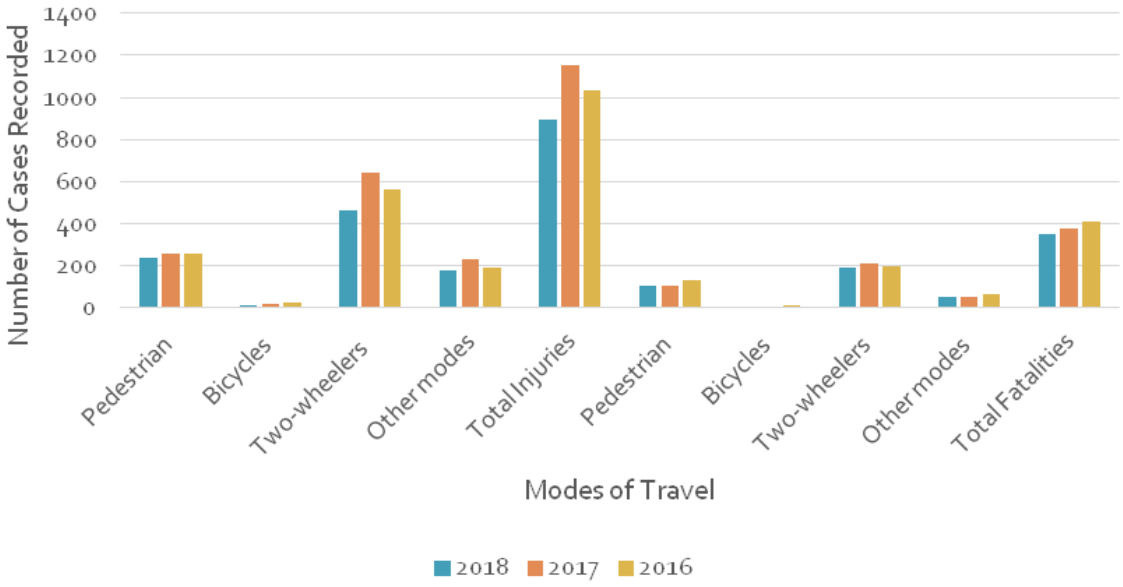
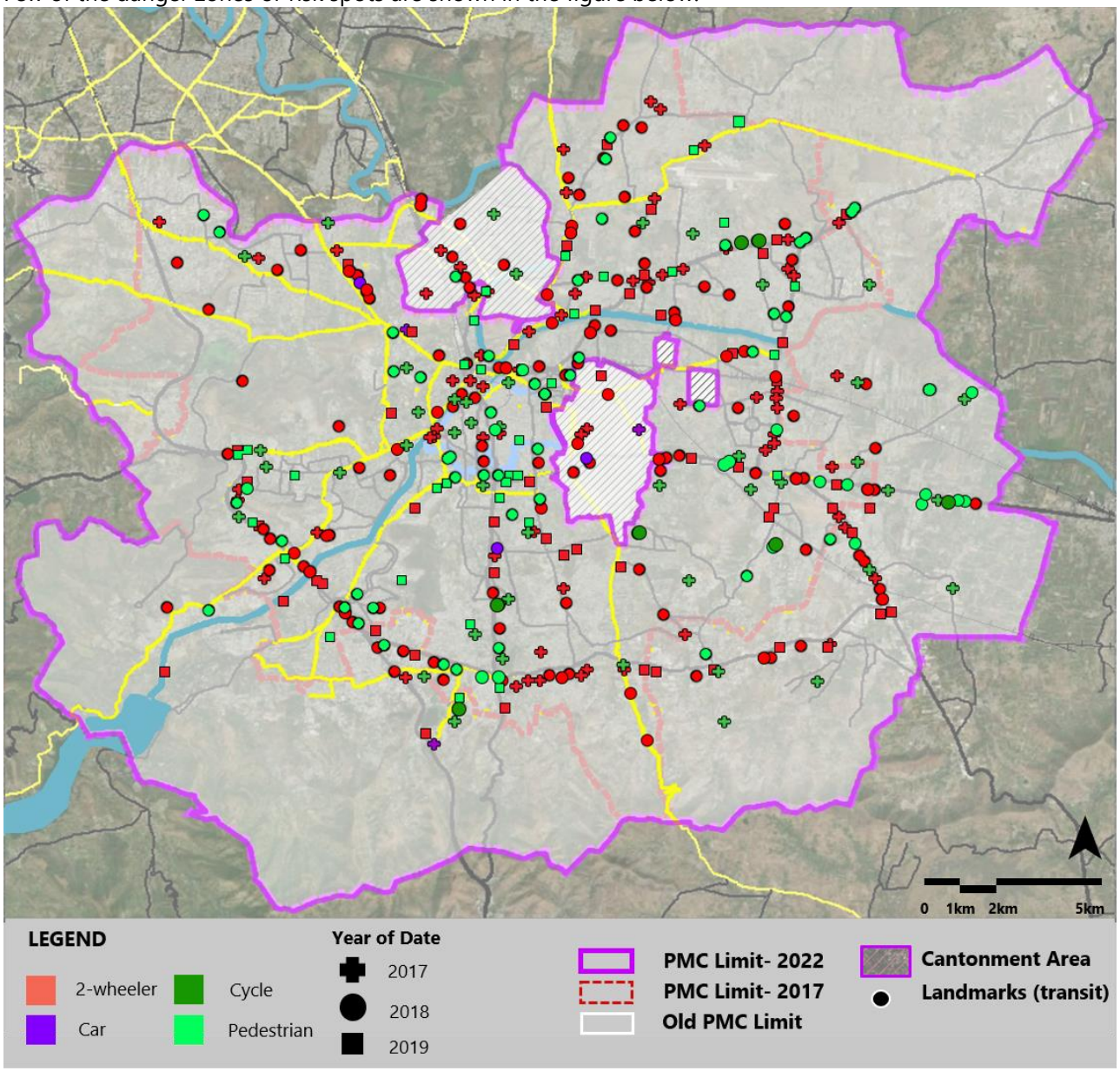


Figure 2.7: Road Injuries and Fatalities recorded for the year 2016-2018

Source: http://opendata.punecorporation.org/Citizen/CitizenDatasets/Index?categoryId=42&dsId=447&search=roadfatalities

Few of the danger zones or risk spots are shown in the figure below:



Map 2.2: Spatial distribution of Crash spots in Pune

Source: Save Pune Traffic Movement -SPTM, Pune

From the spatial distribution mapping of crash spots in Pune, majority of accidents have been observed to frequently occur along the highways – (NH 48), arterial roads and the city center area, indicating conflicts within high-speed corridors and converging street junctions.

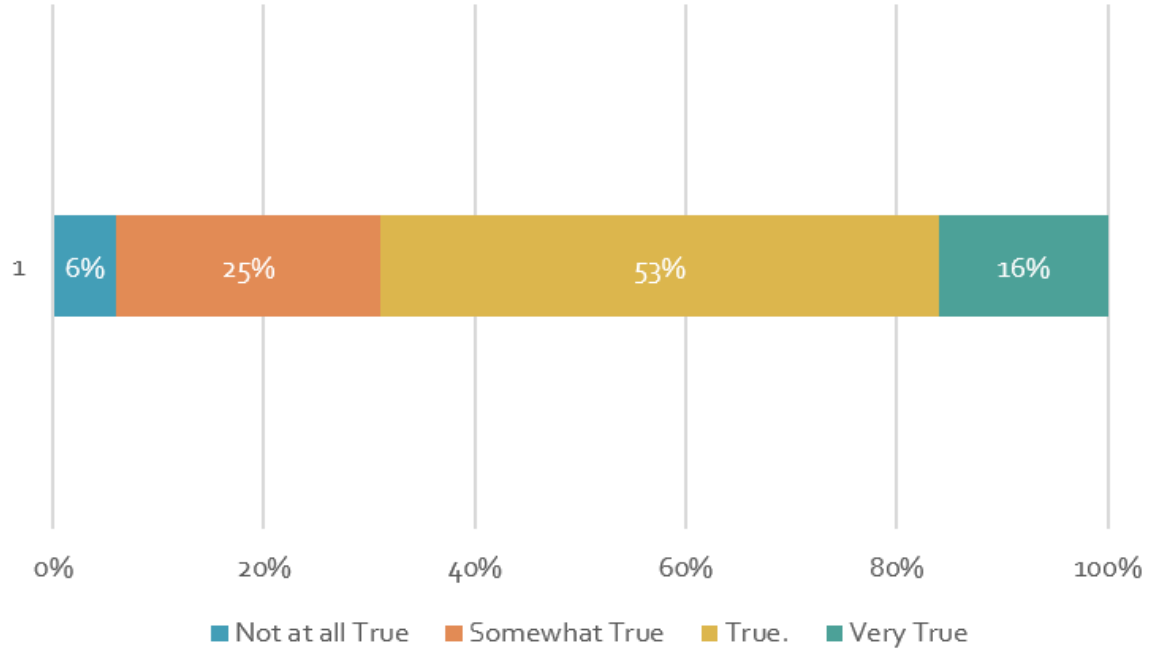


Figure 2.8: Caregivers perception on safety of Public Transport for children

Source: Urban 95 Baseline Report: ITC Friendly Pune City

Caregiver's Perception from the Baseline Report Urban95: Infant, Toddler and Caregiver friendly Pune city, caregivers perceived the existing streets in Pune to be unsafe and not properly built because of unsafe crossings, unsafe and discontinuous footpaths, encroachment on footpaths, high traffic density, high speed of traffic, over-crowded streets and bus-stops, lower green cover, limited traffic regulating measures, noise and air pollution. They avoid taking children to nearby gardens, open spaces, store clinics that are accessible by foot because of the above issues. Caregivers avoid bicycle because of the discontinuous infrastructure and poor management of existing bicycle network and services. Also, they feel that the existing streets do not encourage a friendly environment for children. They suggest that this could be improved by providing sidewalk games, interactive marking on footpaths, creative signage's, installation of artwork/sculptures, resting spaces, etc. Moreover, there is an urgent need to make public transport accessible and safe for ITCs as only 53% of caregivers feel safe while using public transport services.

A **'Pedestrian safety perception survey'** was conducted by NGO Parisar, across 41 wards/prabhags of Pune (whose findings were released in the National Pedestrian Conference on the Right to Walk on February 2020).

According to the survey, it was observed that the pedestrians feel unsafe while walking on the roads due to the following reasons:

- Lack of well-constructed footpaths
- Encroachment on footpaths due to parking, hawkers
- Overcrowding
- Incomplete and uneven footpaths
- High speed of vehicles and traffic on roads
- Disobeying traffic rules

Specifically, 50% of the respondents from Mayur Colony-Dhanukar, 43% from Janata-Vasahat-Dattawadi ward, 33% from Ambegoan-Katraj, and 25% from Bavdhan-Kothrud found the roads to be most unsafe. The pedestrians from these 4 wards were highly concerned of their safety on roads. Also, a major finding of the survey was that the citizens were unaware of a proper grievance disposal process and the authority governing

it. Hence, post the survey, Parisar launched a citizen pedestrian forum called STEP (Steps Towards Empowering Pedestrians) to bring awareness on pedestrian rights and advocate the changes[2].

2.3.4 Risk of an Unhealthy Environment

Pune's air pollution has increased by 35.7% since 2010, as per the Indian Institute for Meteorology (IITM), as shown in the figure below. Emissions from transport services (road, rail, aviation), residential activities (cooking, heating, and lighting), industrial activities, dust from road, re-suspension and construction activities, open waste burning, utilization of diesel generators, and brick kiln emissions have contributed to the total increase. [3]

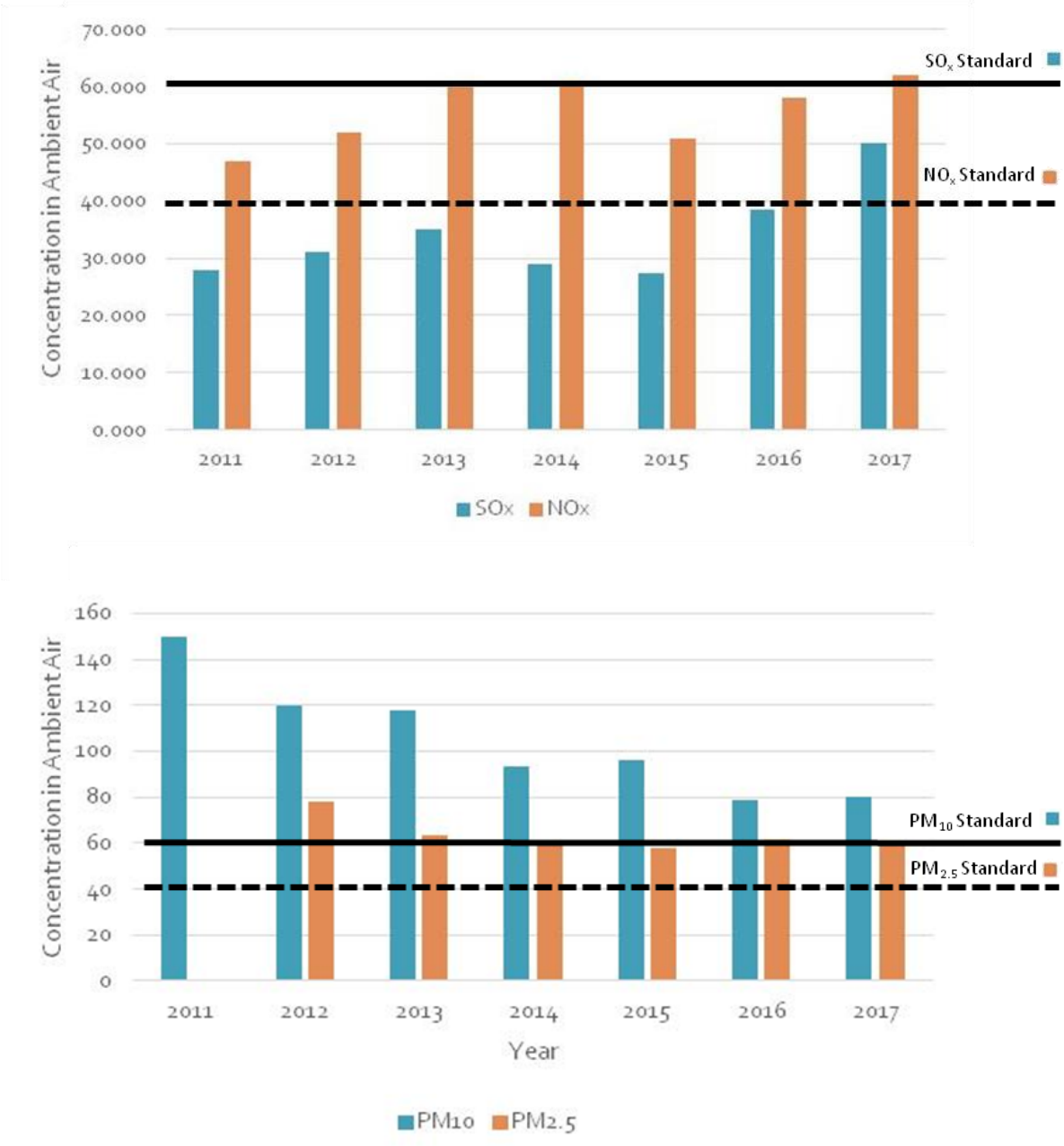


Figure 2.9: Air Pollution in Pune[3]

Source: Based on Pune Environmental Status Report 2017

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[2] *The Indian Express, Parisar Survey: Most pedestrians in Pune complain about non-availability of of footpath, March 2020 Link:* https://indianexpress.com/article/cities/pune/parisar-survey-most-pedestrians-in-pune-complain-about-non-availability-of-footpath-6294705/ *Accessed on 30th March 2020*

[3] *Pg 19, Pune Municipal Corporation, Resilient Pune strategy Report. Link :*https://www.pmc.gov.in/sites/default/files/pune-resilience-strategy.pdf

PMC, together with System of Air Quality and Weather Forecasting and Research SAFAR, have installed air quality monitoring stations at six locations across the city. The air quality is represented via a color-coded system that allows the public to easily comprehend it in the Pune Metropolitan Region and to make any adjustments to their personal outdoor plans. Below is the Air Quality Index (AQI) for the monitored locations along with the impacts of each parameter[3].

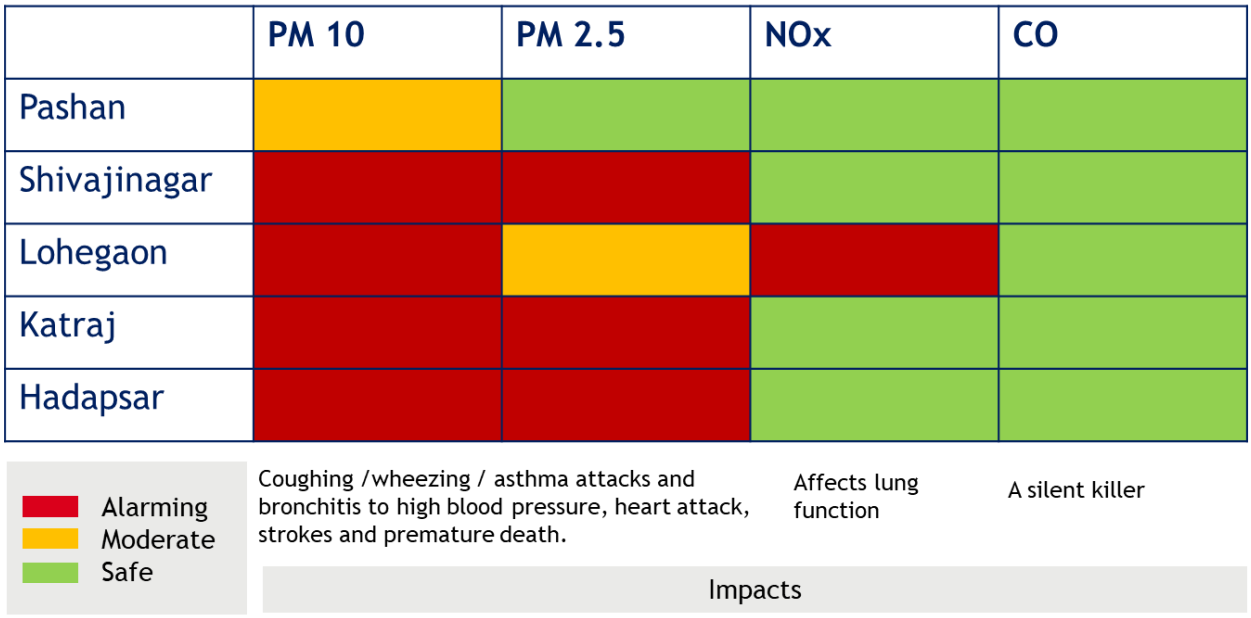

Figure 2.10: Color-coded representation of area-wise Air Quality in Pune with its impacts

Source: Pune Environmental Status Report 2018-2019

Particulate Matter 2.5 which can enter the bloodstream via the lungs is specifically harmful. In Pune, PM 2.5 is at ~56 ug/ m3, which is higher than the national average of 40 and 5 times higher than the WHO guideline of 10. PM 10 levels are higher in the fringe areas due to higher construction activities. The presence of Nitrogen Oxides (NO_X) and Carbon Monoxide in the air puts citizens under the threat of severe respiratory diseases[3]. Also, as a toddler breathes 3 times faster i.e., 40-60 breaths per minute as compared to an adult i.e., 20 breathes per minute, they are more vulnerable to the degrading state of air quality[4].

Caregiver's perception, according to the Baseline Report Urban95: Infant, Toddler, and Caregiver friendly Pune city, caregivers perceive the environment around parks as noisy and polluted (air pollution). Also, they find the present parks and open spaces unsafe for infants of 0-5 years because they provide common play age for all age groups which are mostly dominated by children and teenagers hence, they prefer dedicated play areas/zones for infants.

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[4] Pg xi, Bernard Van Leer Foundation, Infants, Toddler, Caregiver friendly Neighbourhood, Policy Framework, 2019

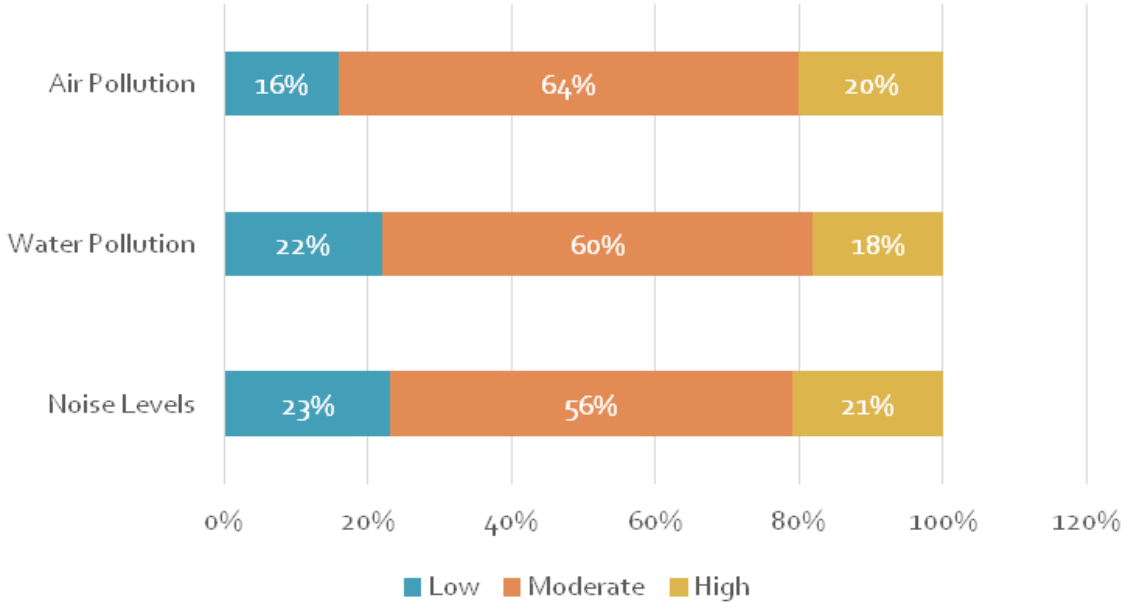


Figure 2.11: Caregivers' perception on pollution level around parks and green spaces in the neighbourhood

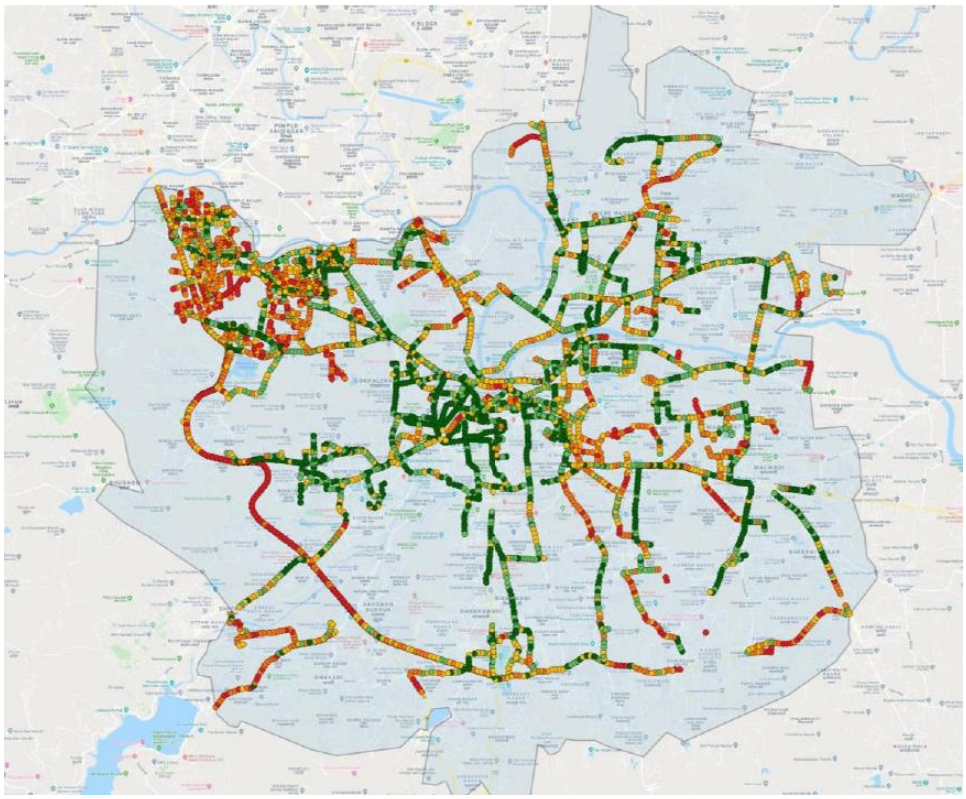
Source: Urban 95 Baseline Report: ITC Friendly Pune City

2.3.5 Ease of Walkability (Safetipin Audit)

One of the key factors of urban safety is the ability to walk freely in public space, without the fear of incoming vehicles, crime or sexual harassment. Walkability also is a result of easy access to public amenities and utilities. Pedestrian-friendly cities cater to not only the transit needs of low-income groups, but also to enable children's independent mobility, reducing reliance on private vehicles. Ease of walkability is, therefore, inevitability linked to the efficient design of the built environment.

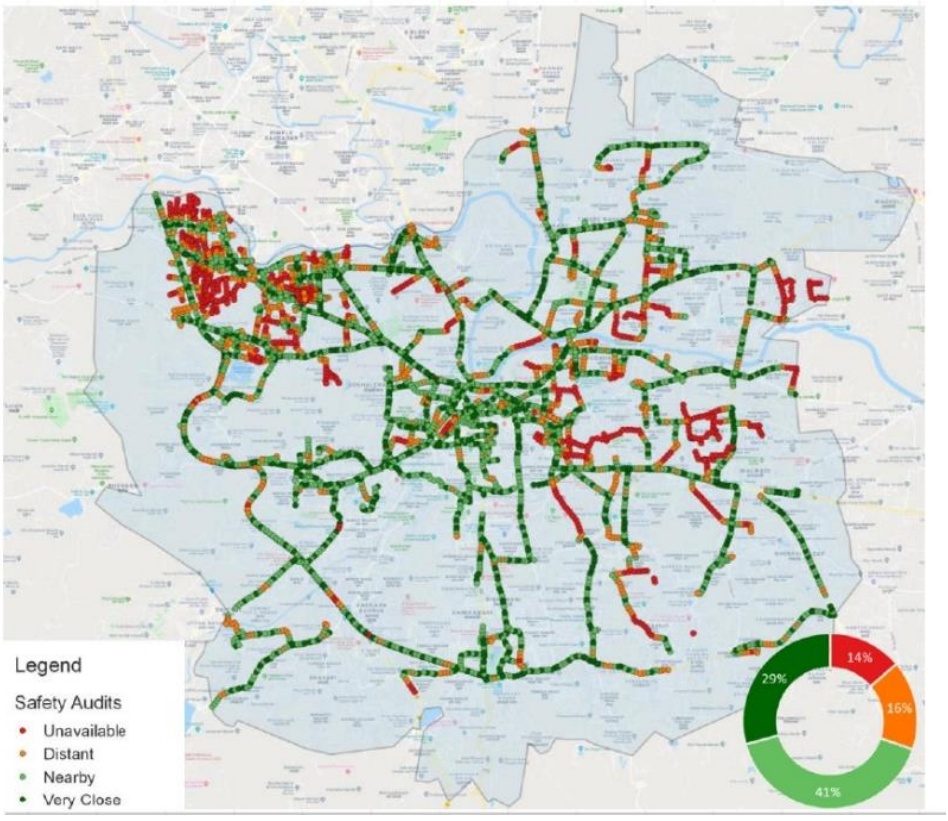
Pune's walkability was analysed by the Safetipin Audit 2019. Safetipin is a social organisation that uses app-based crowdsourced information to collect and analyse data on urban safety, specifically aimed towards women and children's safety needs. Safetipin Audit 2019 generated – 6,632 audit pins, analysed collection of 52,280 Images and covered a road Length of 650 km. Safety Audits were collected within the Pune Municipal Corporation limits. The ease of Walkability index is broadly determined by four parameters; **Lighting** levels, construction of the **Walk path**, width and continuity; **Visibility** based on the principle of 'eyes on the street', and porosity of the street edges. The parameter of access to **Public Transport,** indicates the ease of accessing any mode of public transport i.e. metro/bus/auto/taxi etc. and is measured in terms of the distance to the nearest mode.

The green pins (dark green and light green) indicate safe areas, amber pins indicate the places, and red pins the unsafe places in the city.



Map 2.3: Safety Walkability Map of Pune Municipal Limits

Source: Safetipin Audit 2019



Map 2.4: Ease of Access to Public Transport facilities

Source: Safetipin Audit 2019

The Walkability analysis Map (2.3) indicates that the new developments in the fringe areas face higher risk for pedestrian mobility. The highway and primary arterial corridors are also high-risk walkable corridors. The suburban parts of the city also indicate a lack of pedestrian-friendly infrastructure. Areas within the city center such as Shivaji Nagar, Deccan, and the older heritage core Peth areas and Swargate were rated comparatively safer by the auditors. From the Public Transport facility availability analysis map (2.4), we can infer that around

29% of audit points are at walkable distance from nearest bus stop. 14% of public transport have been identified as unavailable Tertiary and colony roads have been rated low in this parameter.

The analysis from the average score of the safety parameter audits conducted across the city indicates that on a scale of 0-3 used for scoring, four safety audit parameters that have low ratings 1. Security, gender usage; while lighting, openness and walk path are above average (Fig: 2.12).

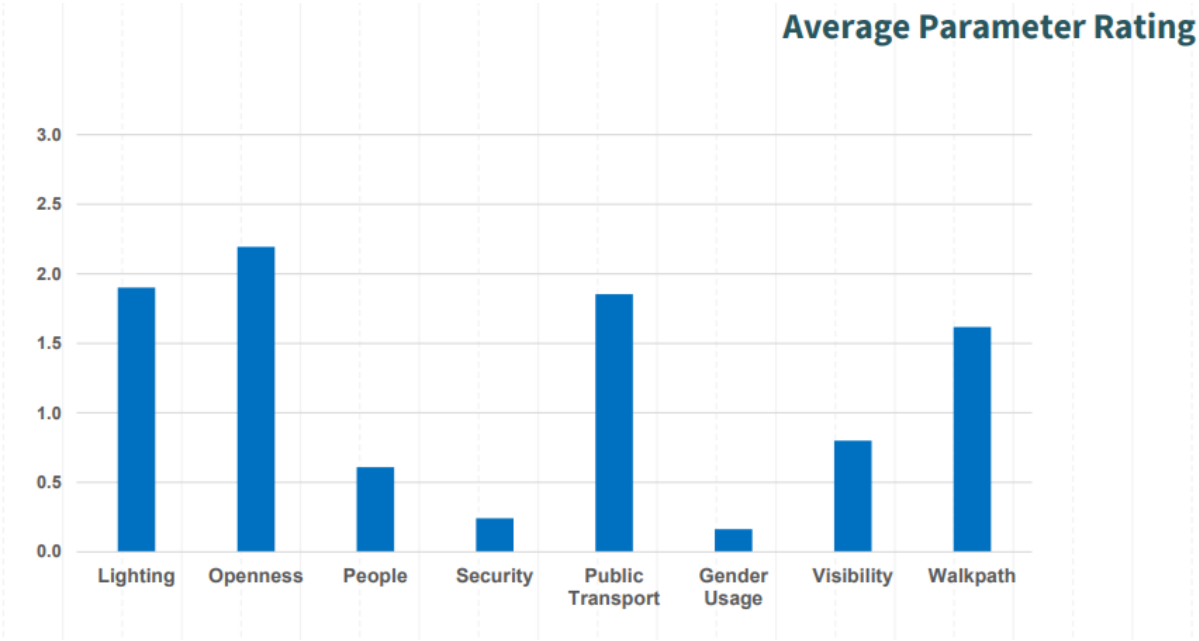


Figure 2.12: Average score of safety audit parameters

Source: Safetipin Pune Audit 2019

2.4 Inference: Urban Safety

- From the safety analysis conducted across the city, it is apparent that the spatial and physical attributes of the city and the transit corridors play an important role in urban safety. The city center and peripheral areas experience unique challenges of facing dense, traffic convergence in the core area, and isolated, fast moving traffic in the peripheries. The analysis brings to light the gaps in pedestrian infrastructure that accounts for an evident imbalance of gender participation in public areas. Urban infrastructure necessitates the inclusion of gender diverse spaces to increase safe access of women and children in public spaces.
- Unavailability of public transport after dark and low presence of pedestrian infrastructure at transit stops, highlights mobility challenges for the ITC users. The city centre's smaller urban block sizes present favourable conditions for shorter walking distances. The convergence of streets increases the rate of transit accidents. The pavements are often encroached by street vendors, parked vehicles, or even taken up by two-wheelers motorists, threatening pedestrian safety. At the city peripheries, low visibility and access to public transit points, leads to higher secluded and deserted areas, increasing the risks of crime. Efficient Street lighting supports the visible security and surveillance in the identified areas will improve people's perception of the area and increase the crowd.

Below is the present status of urban safety in Pune and the benchmarks that the city needs to achieve to make it safer for ITCs considering both real risks and perceived risks:

	Safety from Crime/Violence	Safety from Road Accidents	Safe from an unhealthy environment
Present scenario	The total crimes recorded are 19,554.	Total Injuries- 891 Total fatalities – 350	Present AQI – Trend towards moderate to risky
Targets to achieve	100% reduction in crimes	Fatality rate per lakh population <= 2 persons [5]	Air Quality Index in Green colour code for all areas monitored i.e. within the prescribed limited of National Ambient Air Quality Standards NAAQ standards for each parameter.
Caregiver Perceptions	38% finds Neighbourhood unsafe	• 53% finds public transport as safe. • Perceives roads as unsafe and avoids the use of NMT due to a lack of safe and accessible road infrastructure and traffic management.	16% of caregivers perceived air pollution near present parks and 23% find issues due to noise.

Table 2.1: Urban Safety summary of the present scenario for Pune

2.5 Guiding Principles for Safe Pune for ITCs

To help Pune achieve the benchmarks and become a safer city for ITCs, below are the guiding principles and safety components for the three risks identified i.e.

i. **Safety from Crime and Violence**
ii. **Safety from Road Accidents**
iii. **Safety from an Unhealthy Environment**

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[5] *Based on –Pg 35, Service Level Benchmarks, for Urban Transport, MoUD, Government of India. Link:* http://mohua.gov.in/upload/uploadfiles/files/Service_level.pdf

2.5.1 Safety from Crime and Violence

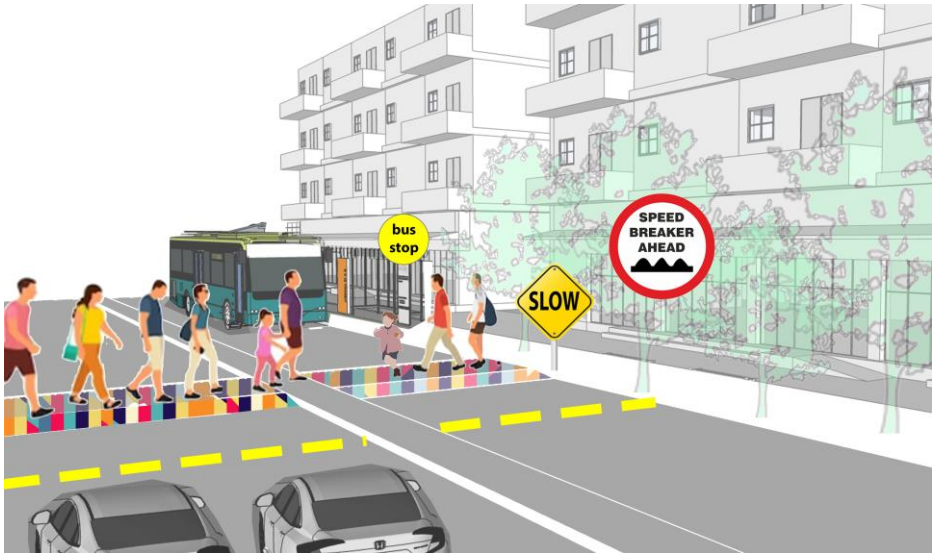
Principle 1: Active and Lively Neighbourhood Spaces

This Principle focuses on making the neighbourhoods lively and active by introducing design elements such as promoting mixed land use spaces, eliminating dark spots, activating isolated areas, increasing natural surveillance (by increasing eyes on street/space), increasing open spaces and play areas, connectivity and introducing children friendly elements on floors, street/public spaces, furniture, etc.

Principle 2: Revitalize Urban Leftovers and Negative Urban Spaces

This Principle focuses on refurbishing the urban leftover spaces/voids with meaningful functions related to ITCs to positively transform the spaces and foster safer neighbourhoods. Revitalizing these design components/elements such as natural surveillance, clear sightlines, adequate lighting, and ITCs friendly elements/materials should also be considered

2.5.2 Safety from Road Accidents

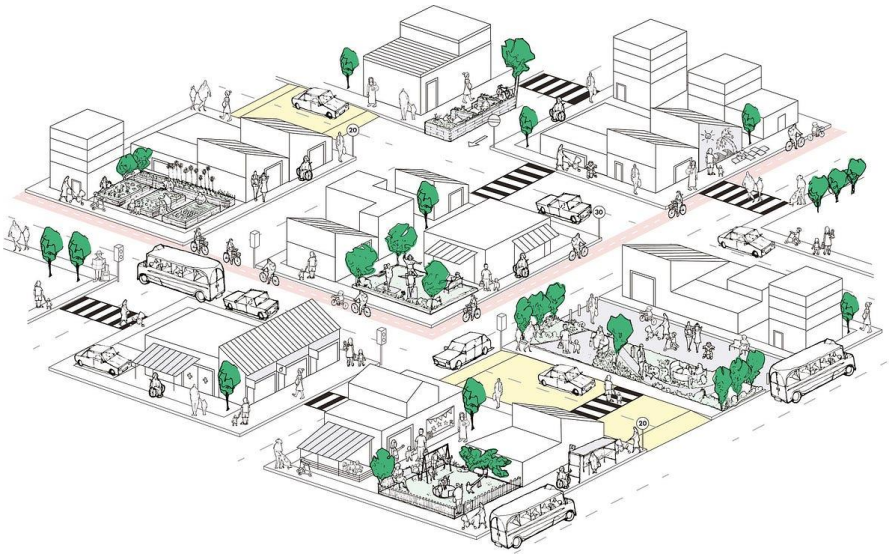


Principle 3: Traffic calming measures that reduce vehicle speeds and allow safe crossing

This Principle focuses on making routes to ITCs destinations safer by introducing traffic regulating measures such as speed bumps, chicanes, refuge islands, shared streets and other street design applications to reinforce safety. It should also include design components/ elements such as natural surveillance, adequate lighting, good signage, and navigation provision, etc.

Principle 4: Safe Access to Public Transport

This Principle focuses on ensuring ITC's accessibility to public transport system along with their safety across the city. It should include design elements/components to increase natural surveillance, provide clear sightlines, increase friendliness, provide adequate lighting, etc.



Principle 5: Safe Access to ITC destinations and public spaces through safe NMT (Non-Motorised Transport)

This Principle focuses on developing safe routes and safe zones around ITCs' destinations to ensure that safety elements are incorporated in these areas and can be safely accessed by walking and cycling. It should also include the provision of design components/elements such as mixed-used, traffic regulating measures, surveillance, good navigation system, etc.

Principle 6: Neighbourhood Planning that reduces the need for vehicle travel

This Principle focuses on placing ITCs' daily requirements within walkable limits and in proximity that encourages and promotes active transport and reduces dependency on vehicles.

2.5.3 Safety from an Unhealthy Environment

Principle 7: Clean and healthy Neighbourhood environment

This Principle focuses on reducing air, noise pollution in the entire city especially near ITCs' destinations, routes, and in residential neighbourhoods. It also focuses on providing an effective solid waste management system to keep the urban spaces/ ITCs areas clean and provisions of the good drainage system in neighbourhood for reducing instances of floods/water-logging. Thus, reducing the negative impacts of waterlogging, pollution, and unclean environment on children.

Principle 8: Increase Neighbourhood level green open areas to foster play and exercise

This Principle focuses on increasing the green open spaces in the neighbourhood to encourage outdoor activities for healthy early childhood development. It also focuses on providing safe and accessible playground facilities. These open spaces should include design components for natural surveillance, clear sightlines, adequate lighting, ITC friendly elements/features, etc.

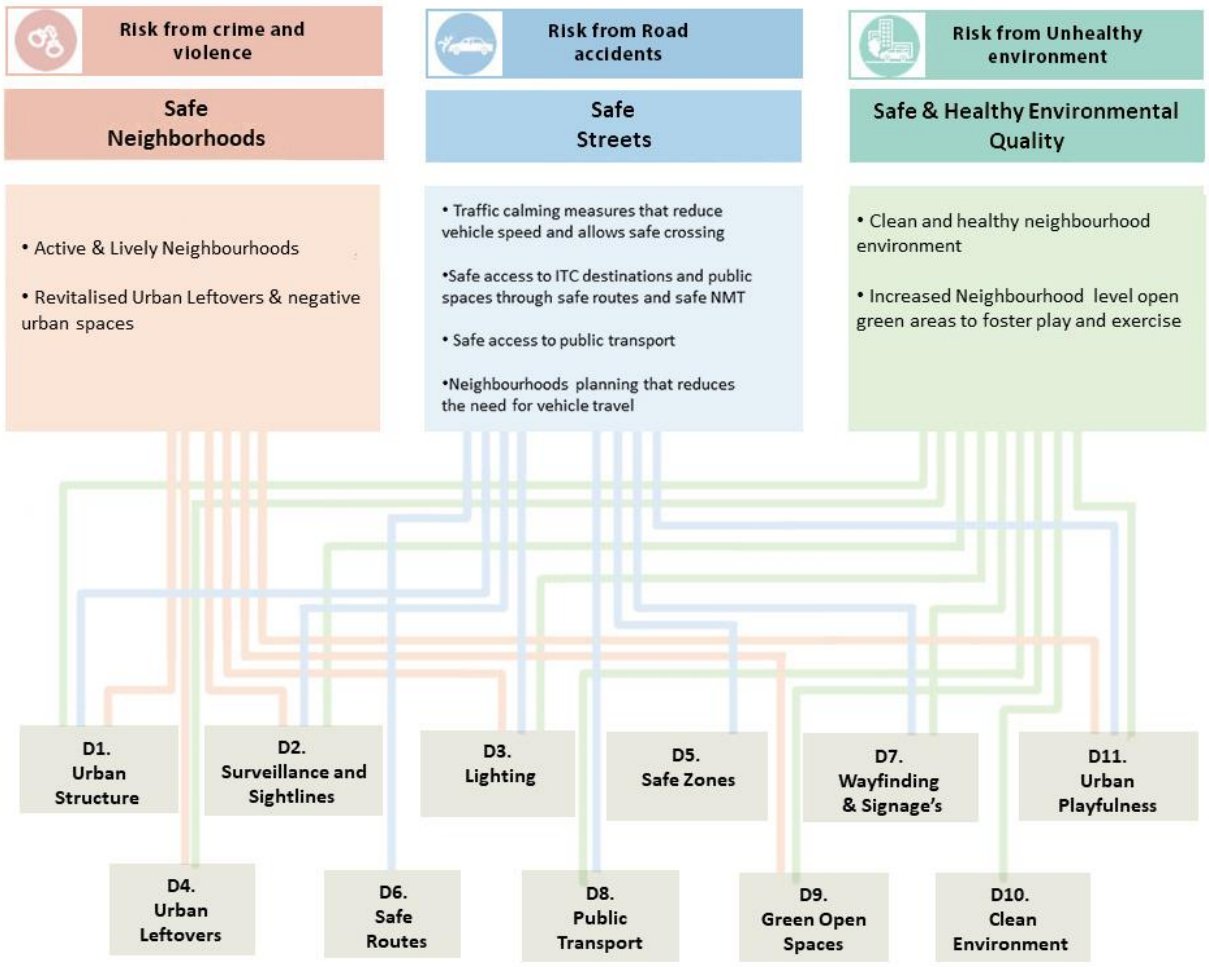


Figure 2.13: Relation between Safety Risks, guiding principles and safety components

Source: Urban 95, Phase 1

2.6 Safety Design Components/ Elements

The guideline sets out a series of key safe design elements which are elaborated in the following manner:

- **Safe Design context and objectives** –this describes how the respective component is applicable to ITCs safety and its context for Pune city;
- **Design guidelines** – These are recommended solutions to the issues described under each component. They need to be modified to suit the context of each area.
- **Best Practices/ Case Examples** – Illustrations of do's and don'ts for each principle

2.6.1 D1 Urban Structure

Figure 2.14: Typical Urban Structure of Old City, Pune

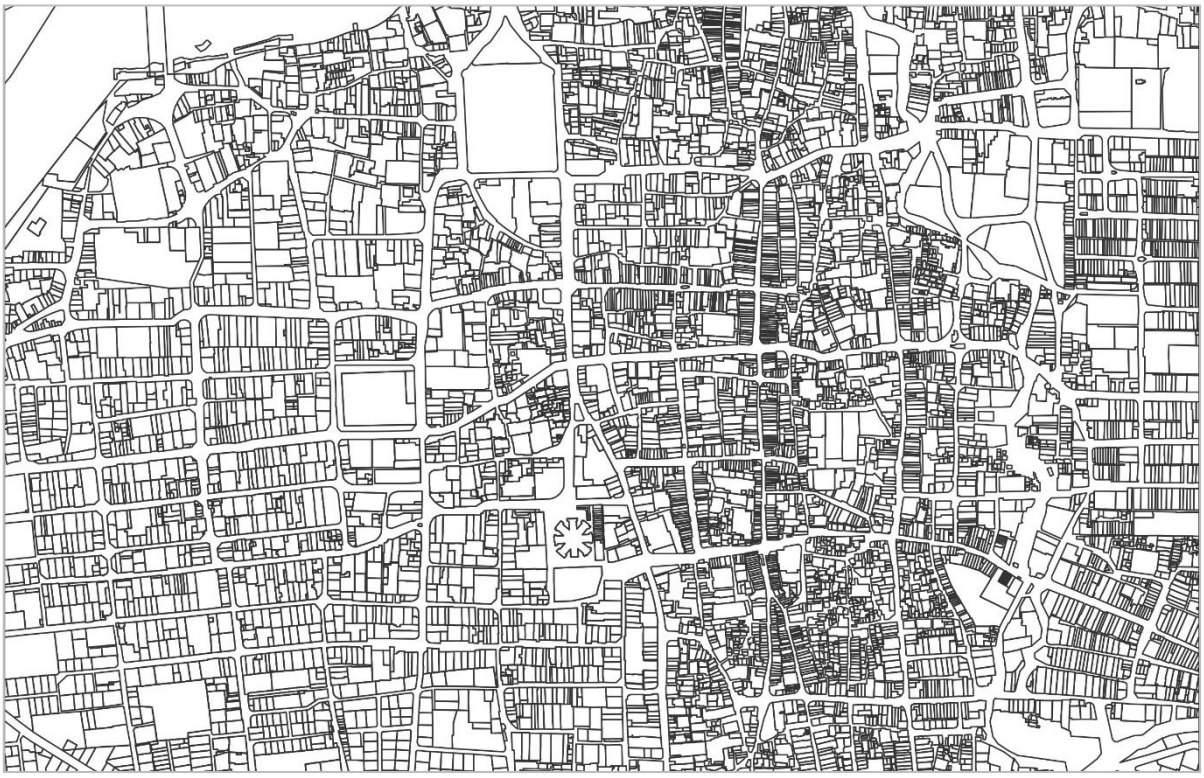
Source: Vishal Tomar

Definition

Urban structure refers to the layout of an area including where the streets are located, how street blocks are arranged, and how building lots and open spaces are set out on these blocks. It contributes to both the ambiance and the functionality of an area.

Purpose

A well configured urban structure can help define a neighbourhood and elaborate logical spacing and organization of the place. A well-designed urban structure can achieve more 'eyes on the street' and maximize activity to deliver enhanced real safety and sharper insights of the same.



Map 2.5: Urban Structure of Old City, Pune

Source: Open Source data

Existing Context

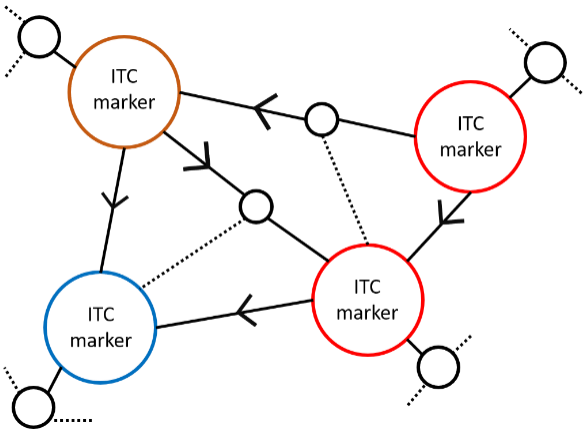
The urban structure of the core (old) city of Pune i.e. the Peth areas have a good mix of land use overviewing public spaces, has high-density development and continuous street connectivity which enhances the perception of safety amongst its residents. A similar urban structure was adopted in later urban developments in the city around the core area i.e. in Shivajinagar, Deccan area, Kothrud, etc with similar characteristics, but this was lost as the city expanded.

Issues

The urban sprawl/ new developments in the periphery i.e. the sub-urban area is dominated with concepts like gated communities and thus have sparse and low-density development reducing the safety perception of the area. Thus, it is important that the urban structure of Pune follows the successful principles that worked in the core city planning earlier; modify them to suit the new development requirements to ensure safety in its built environment throughout the city.

Objectives

- ITCs have a shorter range of mobility, it thus makes sense to **conglomerate** a **network of ITC destinations** and complimentary services in close proximity.
- **Mixed-use, well-connected**, urban structure with passive surveillance and a good mix of ITCs activities located at walking distances can make the neighbourhoods more safe and friendly to the ITCs.



Design Guidelines

Urban structure can be sub-divided into following mentioned urban elements to promote safety in neighbourhoods:

1| Continuity of Street Network and Urban structure

Continuity helps to prevent spatial fragmentation allowing the city to function as an integrated system. **Integrate** and **connect** with the street pattern and urban structure of the surrounding areas for uninterrupting urban flows, enhance movement, urban vitality and natural surveillance.

Walkable Block sizes	Connected Street Network	Minimising Motorised interference
In Greenfield areas, the block length should be preferably 75-150m to promote a paramount walking within the limits.[6]	Make sure that 1-2 streets in the neighbourhood are linked from 'center to edge' to allow easy access to adjoining areas. prioritizing walking, cycling and public transport within neighbourhoods. To scale.	Encourage pedestrian passage throughout or maintain activity at ground level on ITCs daily routes to promote surveillance. (refer to Pune Street Design Guidelines and D3 Safe Streets section.)

2| Locating ITC's Destinations- Layout Planning

ITCs destinations (public spaces, parks, play areas, day care/crèche, healthcare and educational institutions) should be well-connected, in agglomeration, close proximity and walkable.

Active Land Use	Near Transit Points	Close Proximity
ITCs destinations should be located in active/mixed land use areas or medium/high-density ones for natural surveillance. Consider vicinities to other community services and facilities. Urban voids and vacant irregular shape plots can be converted into tot-lots of play areas for ITCs (Refer D4. Urban Voids for more details)	Should be located near pedestrians, cycling, and transit routes to minimize dependency on vehicles. Public transport facilities should also be provided in close access to these destinations.	ITCs facilities should be in 5-10 minutes of walking distance from their residences. using numerous ITC network options for users to reach their destinations provides for safety-

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[6] *Pg 23 Cities Safer by Design. WRI. Link:* https://www.wri.org/publication/cities-safer-design

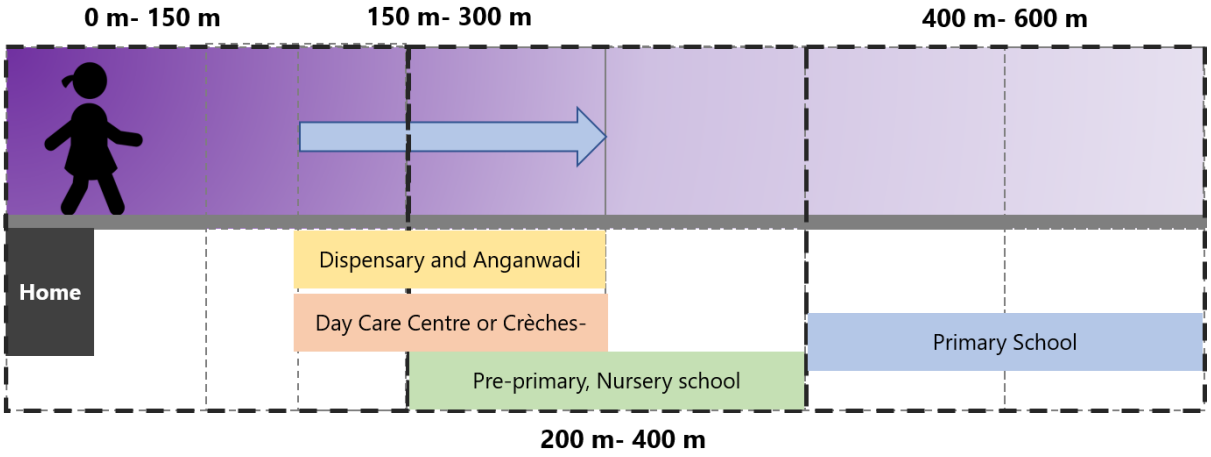
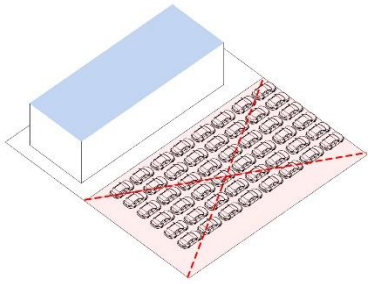
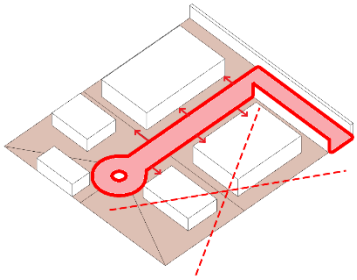
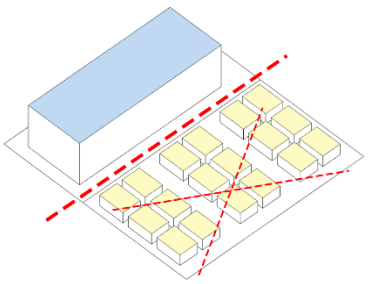


Image 2.1: advisable walking distances per child-care facility for planning a conglomeration of mix destination as per ITCN Design Guidelines:

3| Land use Mix and Social Mix

Encourage **land use mixes** that promote activity, surveillance and legitimate contact between people near ITCs destinations and on ITC routes with active facades.	Ensure **good social blending** in a neighbourhood. The residents should be of different economic backgrounds/different income groups (MIG, HIG groups, etc.) and have cultural blending as well as the presence of various cultural communities.	Promote **community interactions** by creating appropriate public social spaces for interactions, various uses of public spaces that encourage a sense of belonging, thus increasing the sense of security.

Urban Structure should be planned avoiding:

		
Large areas with single-use functions Single-function blocks, empty or out-of-scale places; (such as parking lots, large commerical complexes) with limited, or unsafe and pedestrian thoroughfares /connections should be avoided.	**Completely confined spaces** Avoid large plots with compounded/blank facades, Cul-se-sacs, and plots that have limited access to primary areas (such as landmarks, markets, open public spaces/transit stops, etc.), and low visibility from residential buildings/mixed-use areas.	**Homogeneous land-uses** Strict separation of compatible land uses may result in the isolation of buildings or spaces. Ensure the presence of inter-dependent building functions and mixed land uses are allocated within walkable distances.

Single function blocks should cover less than 10 percent of any Neighbourhood[7].	Infrastructure elements (such as transit corridors, flyovers, rail tracks, compound walls etc.) should not form physical barriers, enclaves, and wastelands, forming unsafe places, especially along pedestrian corridors.	Encourage ITC-friendly landmarks to form a walkable network, encouraging safety and natural surveillance.

References: Relevant Policy/ Guidelines

URDPFI Guidelines 2014	
National Urban Transport Policy, 2006	**Comprehensive Mobility Plan Pune, 2018**
Draft Development Plan, 2007-2027	**Development Control and Promotion Regulations for Pune Municipal Corporation (DCPR-2017)**
Urban Street Design Guidelines, 2016	**Policy for Pedestrian Facilities and Safety in Pune,2016**
Public Parking Policy, Pune, 2016	**Pune Cycle Plan, 2017 (Urban Cycling Design Guidelines, 2017)**

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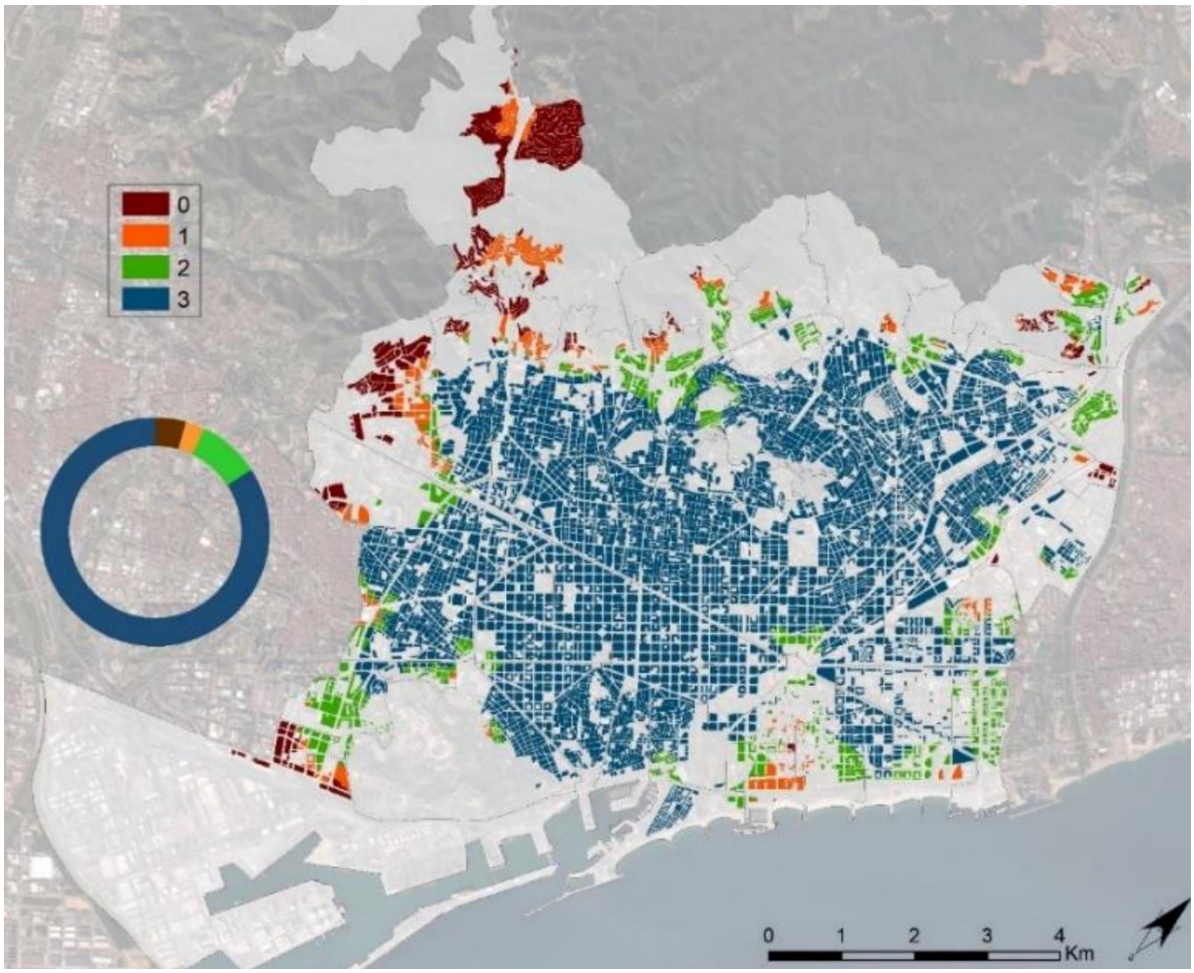
[7] *UN Habitat, A new Strategy of sustainable neighborhood planning: Five principles link* https://unhabitat.org/sites/default/files/download-manager-files/A%20New%20Strategy%20of%20Sustainable%20Neighbourhood%20Planning%20Five%20principles.pdf

Best Practices – Case Example 1 :
Walkable Neighbourhoods, Superblocks Of Barcelona



Care features (left side) and education (right side). Number of variables accessible simultaneously from each of the parcels. Source: own elaboration based on data from Open Data BCN [42] and the 1: 5000 Orthophoto from ICGC, used under a CC BY 4.0 license [41].

Source: https://www.mdpi.com/2624-6511/5/1/10

Barcelona, constructed in a relatively small area of 92 sq. km with a density of 16,000 inhabitants per sq. km–still one of the highest in Europe– represents a model of walkable neighbourhoods with a cluster mix of destinations planned close to residential areas supporting physical activity and feeling of trust in a community. The proximity of things to do and accessible green areas combined with strolling and bicycle infrastructure are particularly important for children, who are not able to travel as far and as easily as adults. Opportunities for quotidian liberty can be enhanced with such a model of the street network, block size, land use mix. Also, the new repurposed spaces within the blocks can be used for children to play and communities to interact for enhancing social interactions and harmony.

Key Takeaways:

- Restricting traffic on main roads around consolidated 400 x 400 m blocks. Thus, converting internal streets in this block as "citizen spaces" by promoting active transport (pedestrian, cycling, etc.) and thus improving safety, encouraging social gathering by the creation of walkable green open spaces. As the main road traffic does not enter inside the block, road safety is ensured.

- Streets within the block should be made pedestrian and cycle friendly. This will also give a chance to develop street open spaces and interactive spaces within the block for social interaction.
- Planning daily essentials within the walkable distance in the block.

Best Practices – Case Example 2:

Improved Perceived Safety Through Urban Infill In A Retrofit Neighbourhoods, Espoo, Finland8

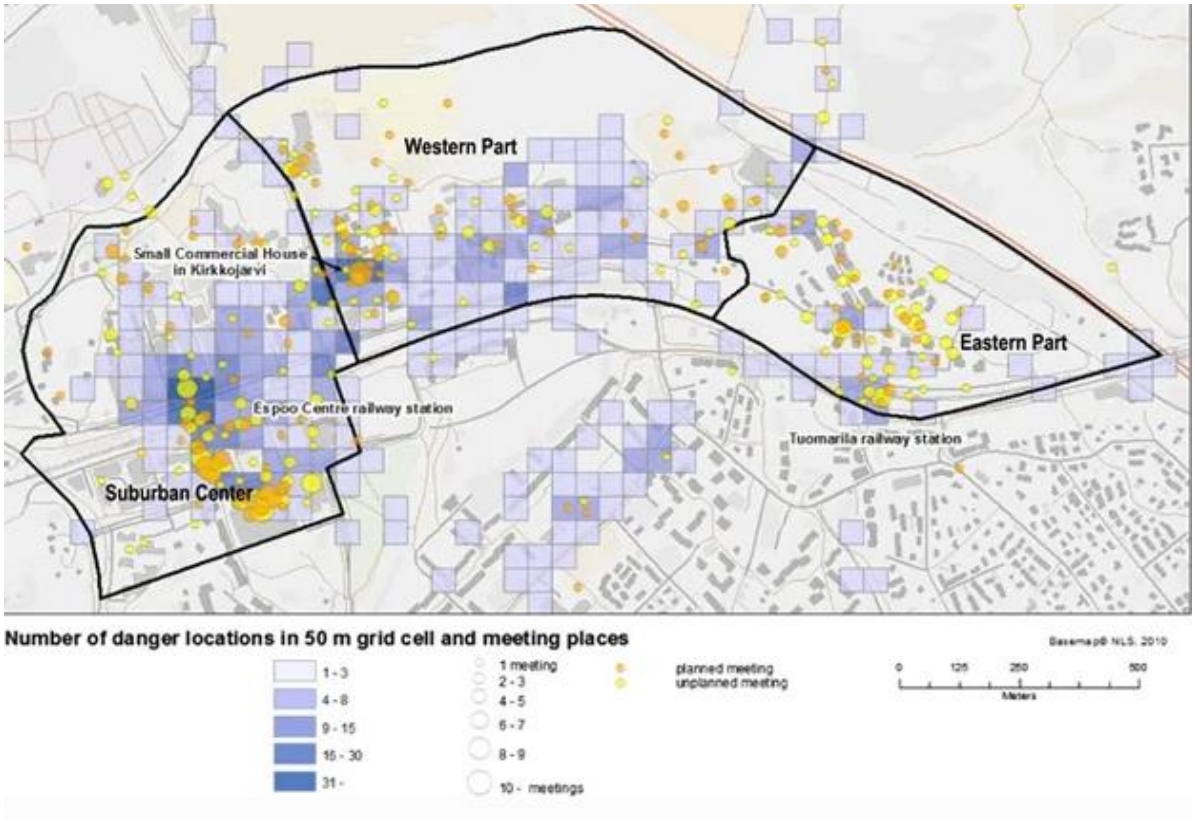


Figure 2.15: Distribution pattern of danger hotspots in the Neighbourhood and meeting areas.

Source: *https://link.springer.com/article/10.1057/udi.2013.31*

Urban infill includes the potential to change the track of the development of existing, distressed neighbourhoods. Using a location-based public participation geographic information system approach, this case study demonstrates how urban structures can be modified to reduce crimes, accidents in the Neighbourhood and increase the sense of safety of its residents.

Key Takeaways:

Using a participatory geographic information system approach to analyse and plan measures to reduce accidents and crimes in the neighbourhood thus increasing the sense of safety.

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[8] *M. Kyatta, Perceived Safety of the retrofit neighborhood: A location-based approach, Springer, 2014 Link:* https://link.springer.com/article/10.1057/udi.2013.31

1. D2 Green Open Spaces

Figure 2.16: Empress Botanical Garden, Pune

Source: Sahapedia

Definition

As per the report by UNHabitat, Module 6 on public space UN-Habitat (2018), Public Open Spaces Refer to undeveloped land or land with no buildings (or other built structures) that is accessible to the public, and that provides recreational areas for residents and helps to enhance the beauty and environmental quality of neighborhoods.

Purpose

The availability of green open spaces in the neighbourhood plays a vital role in encouraging routine physical play in its residents. With changing lifestyles, children today spend most of their time in static activities like travelling, playing video games, watching television, etc. and comparatively lesser time in active outdoor play. As play contributes to healthy childhood development, adequate play can contribute to the overall growth and health of children.

Existing Context

As per AMRUT park inventory, PMC has developed 158 gardens across the city, but lacks sufficient housing area, parks and tot-lots in the neighbourhoods. Along with availability and safe accessibility to open spaces and parks, it is also important to consider the type of play facilities designed in these play areas. Presently, open spaces/parks in Pune are designed with conventional play equipment and facilities but nature play, sensory play, imaginative play, play for universal accessibility, etc. are missing.

Issues

Also, as per AMRUT Assessment, per open space in Pune city is 5.15 sq.m which is almost 50% less than the recommended 10-12 sq.m per person as per URDPFI. Thus, more open green spaces are needed to bed provided which are distributed, easily accessible, and innovatively designed to encourage more active outdoor play for ITCs.

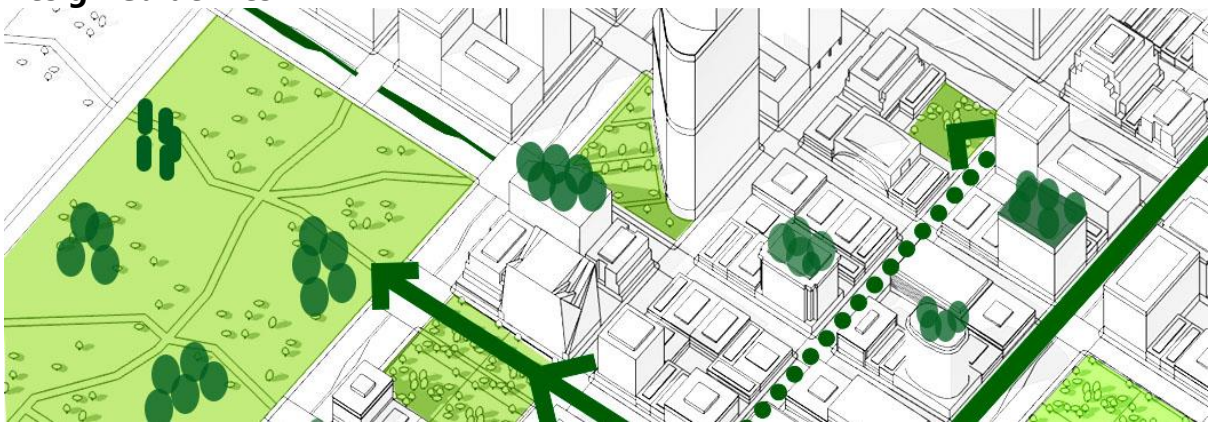
The major reason for this is lack of consideration of open spaces in the Neighbourhood planning such as tot-lots, housing area parks, etc. at a walkable distance for ITCs.

Presently as per the Baseline report Urban95: Infant, Toddler, and Caregiver friendly Pune city, the present schools in Pune has mono-functional use of space which can be enhanced for multi-use post-school hours.

Objectives

- To increase the number of open spaces at neighbourhood level.
- To encourage outdoor physical activities and play in urban areas.

Design Guidelines



Heirarchy of Green Open Spaces

1| Green Open Spaces - Heirarchy

A. Assess the open space in your neighborhood and assess its adequacy as per **URDPFI and ITCN guidelines given below:** Post the gap analysis; identify the number and define a hierarchy of parks to be added in your neighborhood/ region.

Sub-City Park (SCP) – Area: 2,50,000 sq.m & above
Population served: 1 city level park, sports complex, maidan -10 lakhs
District Park (DP) –Area : 50,000 – 2,50,000 sqm
Population served: 1 District park, sports centre, maidan – 5 lakh
Community Park (CP) – Area: 10,000 – 50,000 sqm
Population served: 2-3 Community Parks and open spaces – 1 Lakh
Neighborhood Park (NP) –Area: 5,000 -10,000 sq.m
Population served: 3-4 Local parks and playgrounds – 15,000
Housing Area Park (HAP) –Area: Less than 5,000 sq.m
Population served: 3-4 local parks and playgrounds - 5000
Tot-lot – Area: 50-125 sq.m
Population served: min 6-2,500 as per Urban greening guidelines 2014

2| Within Safe Zones and Integrated Network:

While allocating land for the new parks, try to develop an integrated open space network that is well connected and easily accessible by NMT or public transport.

B. Ensure that the open spaces should be accessible within 5-10 minutes of walking distance i.e. 200-300m for ITCs.

A. Local Area Plans can identify catchments of the ITCs parks/ open spaces and create Safe Park Zones to assure ITCs safety near park areas. (Refer D5. Safe Zone elements for more details)

For example, Safe Park Zones, .implemented in Illinois employs an integrated approach that promotes walking to parks by ensuring the safety of pedestrians through reducing speed limits and infrastructure improvement.[9]

Dedicated Zones for 0-6 years/ ITC-specific Activities

B. Ensure that the play area is reserved for the age group of 0-5 years in all the categories of parks.

C. Provision must be made to promote different kinds of play like imaginative play, sensory play, nature play, etc. for the overall development of children.

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[9] http://atpolicy.org/wp-content/uploads/2016/05/Creating-a-Safe-Park-Zone-for-Communities-in-Illinois-Active-Transportation-Alliance_BGW.pdf *Accessed on 22nd November 2019*

D. Parks/ open spaces at the neighbourhood level should allow for flexible spaces/ adaptive use based on the need of the community.

E. School playgrounds can be used in areas with insufficient open spaces. Schools offer outdoor spaces for children to engage in play and socialize. It is advisable to use the school playground for community physical activities after school hours. (ITCN Design Guidelines Pg. 89).

Surveillance

F. Ensure the formation of active parks for continuous surveillance. Active parks are those parks that have various activities planned to engage all age groups. Also, parks should have permeable fences for visual connectivity with the surrounding and security. (Refer Pg 70 of ITCN guidelines for more details)

G. Open spaces should encourage the establishment of open gyms with exercise and play equipment designed for all age groups.

H. Ensure that the open spaces/ parks are easily accessible by strollers.

I. Areas inside and around the open spaces should be well lit. (Refer D3. Lighting for further details)

J. The furniture placed in these open spaces like seating, dustbins, signages, water fountains, etc. should have ITC friendly design. The furniture installed should be vandal proof.

K. Supporting ITC amenities such as child-friendly toilets, lactation rooms, changing rooms, etc. should be provided near the parks/ open spaces.

Landscape:

L. The open spaces should have adequate landscape green space with a variety of plants that are colorful, safe, edible, playful, etc. Thorny, toxic plants, plants with milky discharge hazardous to children should be avoided. Native vegetation should be planted as it has inheritably low maintenance requirements. A few of the native species are given below;

Neem (Azadirachta indica), Mango (Mangifera indica), Shisham (Dalbergia sissoo), Imli (Tamarindus indica), Karanj (Pongamia sp.), and some flowering trees like Amaltas, Gulmohar, Kachnar, etc. should also be provided. Other trees that can be planted are Jarul (Lagerstroemia indica), Touch Me Not (Mimosa pudica)[10] , etc. which are safe for children and stimulates their senses..

Few non-poisonous plants that can be grown as physical barriers are Coleus, Dracaena, Chlorophytum comosum, etc[11] . Some common plants such as Duranta, Lantana camara, etc. are poisonous and should be avoided[12]

Also, avoid the use of chemical fertilizers and pesticides and ensure the use of locally acquired composted material for fertilization of plants.

M. Safe materials[13] should be used in play areas such as;

- EPDM flooring /rubber tiles – Provides safe surfaces so that the child does not get hurt
- Wood – natural material, low cost, and heat resistant
- Plastic – Low-cost, does not host insects and pests
- Metal/composites – Durable, vandal-proof, high level of structural integrity

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[10] https://garden.org/learn/library/foodguide/

[11] https://www.poison.org/articles/plant , *Accessed on 19th November 2019*

[12] https://www.childrens.health.qld.gov.au/chq/our-services/queensland-poisons-information-centre/plants-mushrooms/ , *Accessed on 19th November 2019*

[13] *Pg 64-65, Superpool, Playground ideas for 0-3, 2019. Link;* https://bernardvanleer.org/publications-reports/playground-ideas-for-0-3-years/`

- Impact-absorbing Sand – smooth, low-cost, etc

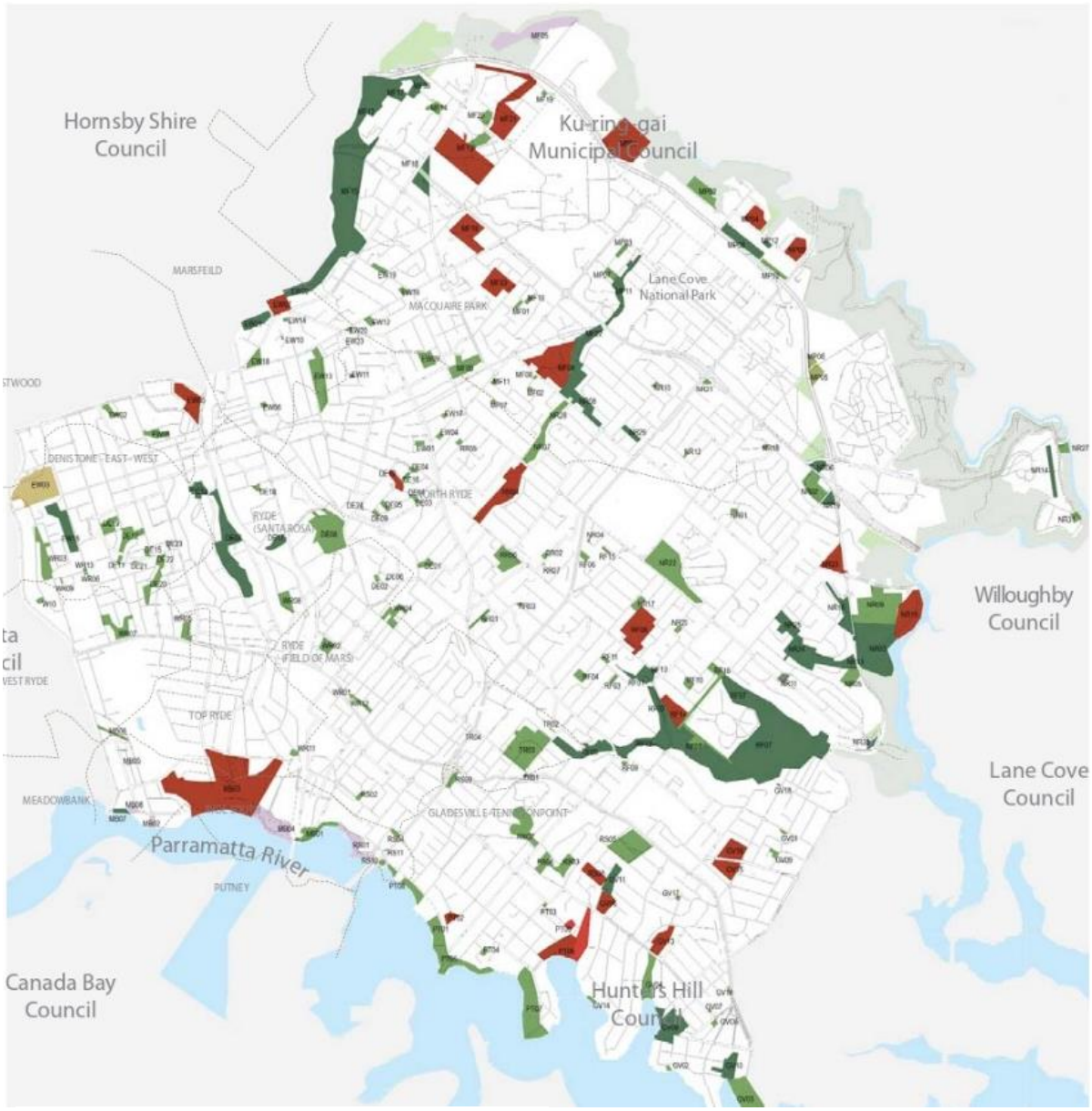
N. Also, ensure that the paint used for play equipment is non-toxic and is VOC (Volatile Organic Compounds) free.

Green Open Spaces should be planned avoiding:

Isolated areas	Completely confined spaces	Inaccessible public transport connections
Avoid the areas that are isolated and accessed by routes that are unsafe, inaccessible by ITCs, or dark.	Should have at least 3 edges with active frontages to overview activities within the park i.e. with good passive surveillance.	To be planned with public transit stops that can be easily accessible by public transport system.
It should not be in close vicinity to crime-prone areas like bars, night clubs , etc.	Active and well-lit surroundings.	

Best Practices – Case Example 1 :

Integrated Open Space Plan', By City Of Ryde, Australia[14]



In 2012, the City of Ryde developed an integrated open spaceplan with an aim to analyze the existing public open spaces – a type of open space and recommend on how the open spaces can be well distributed across the city, be conserved, enhanced, and extended meeting the community's recreational and leisure needs, both now and for the future. It also recognized the recreational, environmental, social,health relatedvalues of these open spaces and identified the future actions to ensure that the values of open space are sustainably managed.

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[14] *City of Ryde Council, Integrated Open space plan, 2012. Website:* https://www.ryde.nsw.gov.au/files/assets/public/publications/parks-open-space/integrated-open-space-plan-2012.pdf

While doing so other urban layers such as transport, social infrastructure was also analyzed to establish clear linkages and corridors between key points of interest, town centers, and transport nodes and suggest enhancements and location of green open spaces along with the preferable zones, routes to encourage their use.

Key Takeaways:

- While developing an integrated open space plan for the city, other urban layers like transport, social infrastructure, etc. should also be considered to enhance its usability.

Best Practices – Case Example 2:

'Integrated Open Spaces Plan', Bhubaneshwar[15]

Figure 2.17: Parks designed for differently-abled children, BDA Park Bhubaneswar

Source: *Bhubaneswar* Smart City Limited

https://www.newindianexpress.com/states/odisha/2018/jul/13/parks-for-special-needs-1842822.html

Bhubaneswar Smart city limited is developing an Integrated open space plan for the city of Bhubaneswar. For this, it has followed a systematic approach, firstly by conducting an on-ground quick assessment of the distribution of green spaces in the neighborhoods, identifing the gaps the lands where new green pockets/ gardens can be planned, the land ownerships, and by devising an implementation mechanism to ensure equitable distribution and access to green open space for all citizens.

Apart from this, Bhubaneswar has developed a park designed especially for the differently-abled children with various types of sensory play equipments.

Key Takeaways:

- Develop a city level integrated open space plan ensuring equitable distribution and hierarchy of green spaces.

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[15] *For more details on designing open spaces/ parks for ITC refer ITCN Design Guideline Pg 63-83*

Link: https://bernardvanleer.org/app/uploads/2019/04/ITCN-Design-Guidelines_Revised.pdf

- While designing the parks/open space, participatory planning and approach should be adopted to fullfil everyone's requirements.
- Specific Design features/equipments and playful spaces should be designed for children.

D3 Wastelands/Urban Leftovers

Figure 2.18: Underutilised spaces under the Flyover at Swargate, Pune.

Source: Pune Municipal Corporation

Definition

Urban leftovers/voids are underused or unused neglected spaces in the cities.

-Urban voids are formed due to improper urban planning leading to complex junctions and plot shapes, large infrastructure projects, plots with ambigious ownership due to contested area boundaries. Such areas offer low defined functions and goverance.

Purpose

Due to less footfall and isolation from the surrounding activities, they foster illegal, anti-social activities and hence are perceived to be unsafe. Not only are these spaces avoided but also the adjacent areas get impacted due to their presence, making the neighborhood unsafe. It thus becomes vital that the formation of urban voids should specifically be avoided near ITCs routes and destinations.

Existing Context

In Pune, the most observed urban voids are of three types:

i. Planning Voids – Formed due to lack of planning/ poor land management i.e. Areas under flyovers/metro lines, irregular shaped land-locked vacant plots, frontage zone of a semi-public building, etc.

ii. Functional Voids – Defunct spaces or spaces that are not used for its designed function i.e. vacant building, inactive defunct amenity plots under public ownership, leftover space in parking lots, unused railway yards/lines, etc.

iii. Geographical Voids – Unusable/ neglected existing geographical features i.e. Areas along nallahs and canals, etc.

Objectives

To activate the urban leftover/voids with meaningful functions related to ITCs to foster safer neighborhoods.

Design Guidelines

Appropriating Urban Voids within brownfield neighborhoods

existing urban leftover areas should be identified and assessed to rejuvenate them into a useful function as per the need of the neighborhood.

While repurposing the voids following things should be considered;

The new use of the void space should be finalized after a thorough need assessment of the neighborhood. It is recommended that these areas can be converted into small yet usable spaces for children between 0-5 years.	A proper access route should be made for areas that presently lack vehicular/pedestrian access.	Safe lighting and surveillance should be provided in these areas as per its requirement. (Refer D5 of the safety components) These areas should have furniture accessible to ITCs and materials chosen to be safe for ITCs.

Within Greenfield neighborhoods/ or while formulating local area plans for new developments, care should be taken to **avoid** the formation of such leftover areas/voids by :

Minimize flyovers - Complex Junctions

Infrastructural buffer
Causing vague pedestrian movement/direction
Sense of placelessness.

Lack of pedestrian priority

Open pockets with low pedestrian access, and poor connections.

Out of scale urban elements.

Complex Plot areas
Non-constructable plots.
Areas between plots/buildings should be defined and activated.
Plots that are empty and activiated only certain times of the day.

Best Practices –

Case Example 1 :

Repurposing Urban Leftover Spaces Under Flyovers

a. 'School Under Bridge' On Yamuna Bank, Delhi, India

'School Under Bridge' On Yamuna Bank, Delhi, India

Source: https://www.mdpi.com/2624-6511/5/1/10

The neglected space under the metro flyover in the Shakarpur area on the banks of Yamuna river was converted into a school for children who were not enrolled in mainstream schools. The majority of the children attending this school belong to the farming community on the banks. As the Shakarpur area lacked a public school in its vicinity and the present schools were not in the walkable distance for these children, this initiative benefited the children.

"The free school under the Bridge" initiative was started by a shop-keeper in 2007 and today it successfully caters up to 300 students including both boys and girls. Thus, once a neglected space, it has been utilized for the welfare of society by positively converting it into education space.

Best Practices – Case Example 2:
Children Parks Under Flyover, Vijayawada[16]

Figure 2.19: Distribution pattern of danger hotspots in the Neighbourhood and meeting areas.
Source: *https://link.springer.com/article/10.1057/udi.2013.31*

The leftover space under the Kanakadurga flyover in Vijaywada was repurposed to a playful, lively open space open and free to public use. The Vijaywada Municipal Corporation has developed a large open space between pillar No.4 and 20 under the flyover and named it as F1H2O Park. The main attractions are the hanging gardens (green pillars), the paintings on the base of the flyover, open-air gym for youth, a children's park and play equipment, skating rinks, the multipurpose court for shuttlers, ball badminton, etc. and water fountains and an amphitheater. Waste materials were reused to make the statues and specific plant species that grow in semi-covered places were selected for vertical garden walls.
Post its opening, the park has got a good response from the citizens. It is observed that around 5,000-6,000 people visit the park on weekends and around 500-600 people visit the park during weekdays, few of them being regular visitors. Thus, it is a successful example of converting a dead space into a lively and playful space that can be used by citizens of all age groups.
Key Takeaways:

- Urban voids like spaces under flyovers have a huge potential to be repurposed into playful spaces for children such as parks, tot-lots, play areas, etc. and also to be used to conduct specific activities like pre-schools, children library, weekly group activities, etc. in places void of open spaces in the neighbourhood.
- These spaces should be well-lit and use materials that are safe for ITCs.

[16] https://www.deccanchronicle.com/nation/current-affairs/190219/vijayawada-park-under-flyover-is-huge-hit-with-citizens.html

Best Practices – Case Example 2:
Pocket Parks In Hongkong

Figure 2.20: Pocket Parks in Hongkong

Source: https://thinkingcity.org/2019/03/29/hong-kong-designers-reimagine-the-citys-pocket-parks/

In Mega-cities open public spaces are scarce. The Designers in Hong Kong came up with an idea to reuse leftover urban pockets and repurpose them into parks/open spaces for rest and play called "sitting-out spaces" or "rest gardens". They often selected spaces under flyovers, tucked into two-building, awkwardly shaped plots, etc. as these otherwise made the neighbourhood unhealthy and unsafe by promoting illegal activities, etc. Today there are around 169 such parks, with an average size of 1,000 sqft which are managed by the government. They serve as the much-need breathing space in the hyperdense city.

Many standardized designs are being developed which can be replicated keeping in mind the cultural and demographic context of the neighbourhood. One such prototype developed is a playground for young children in Yi Pei Square. It features a slide and a tunnel for young children that encourages sense of discovery. These small play areas are designed according to the anthropometry of young children. Also, it has a colourful graphic flooring pattern as shown in the image.
Thus, Hong Kong city designers have set an excellent example of how to reuse the unwanted, awkward, leftover plots in the city to convert them into spaces for playing and resting.

Figure 2.21: Pocket Parks, Hongkong

Source: https://thinkingcity.org/2019/03/29/hong-kong-designers-reimagine-the-citys-pocket-parks/

Key Takeaways:

- A city-level initiative can be taken up to convert all the urban voids into green open and playful spaces.
- The purpose of these spaces should be decided to suit the respective context of use required in the neighbourhood
- Young children play areas can be provided in these spaces with equipment designed at their height and being colorful and attractive.

2. D4 Safe Zones

Figure 2.22: Pilot Project, Street in Byculla, Mumbai exhibiting safe zone elements

Source: WRI

Definition

Zones around ITCs destinations such as children's playgrounds, parks, schools, maternity homes, community centers, etc. are areas that require special attention to provide safety for children. Safe Zones aims to create a safer environment for children on road by slowing down of vehicles through the introduction of traffic regulating measures and urban design features.

Purpose

Children move differently than adults in the pub realm. Their activities and movements a exploratory and more unpredictable in natu hence requiring particular design consideratio such as their lower eye levels, narrower periphe vision, lower capacity for decision-making, and t tendency for sudden action. This makes the more vulnerable to collisions with traffic th adults. So, it is critically important to redu vehicle speeds in areas having a higher number children.

Existing Context

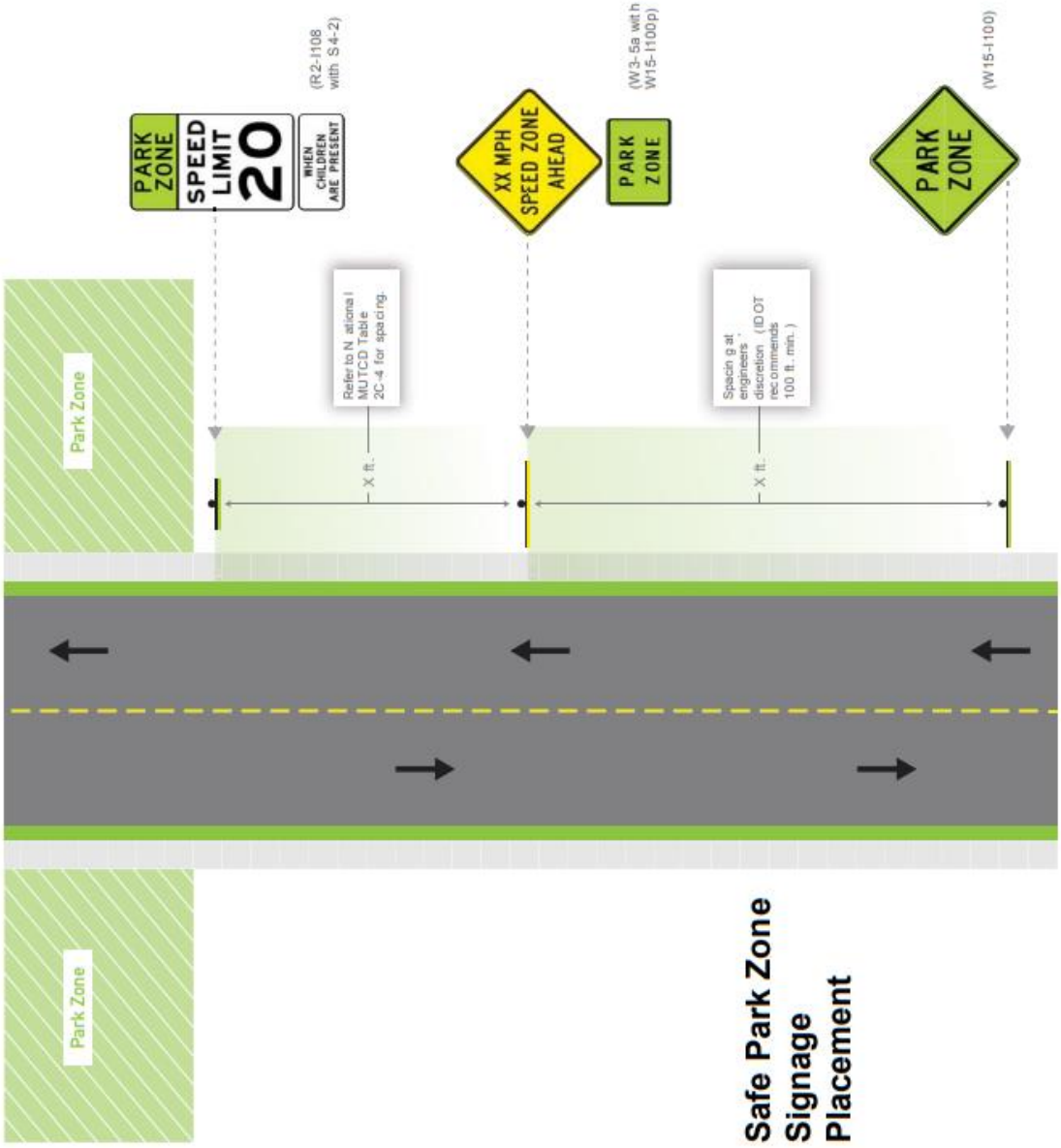
Pune presently does not have such safe demarcated zones around the ITCs destination. Safe zones can be formed near schools, parks, play areas, etc. for increasing the safety of ITCs in the city.

Objectives

- To emphasize child and student safety, special considerations are taken to enhance play and school zones.
- To improve student pedestrian safety along the school trip routes.
- To enhance walking and cycling environment; encouraging more physical activity and reducing vehicle speeds.

Design Guidelines

A. Demarcate **the 'Safe Zone'** around ITCs destinations with a walking boundary as a general rule of thumb of **800 meters around it .**



Safe Park Zone Signage Placement

Signage :

Installation of standardized traffic signs for Safe Zones near ITCs destinations as follows:

Traffic signs for protecting children :

These signs shall give notice for the protection of children within a Safe ITCs Zone.

These are installed at a point where Safe ITCs Zone starts and on both the sides of the roads in Safe Zone.

Zigzag edge lines (stopping and parking is prohibited): White and Yellow zigzag road markings should be placed to show that the area must be kept clear to allow unrestricted view for approaching drivers or ITCs wanting to cross the road.

White Zigzag lines to be placed on either side of the pedestrian crossing areas. No parking on white zigzag should be allowed.

Yellow Zigzag lines should be located outside the entrances of hospitals, schools

Traffic signs for Protecting children within the ITCs Zone: These are advanced warning signs giving warning of nearby ITCs destinations such as school kindergarten or playground and the commuting routes and/or crosswalks signs used in advance of the first crosswalk sign encountered by each direction of traffic. ***Secondary Signs*** such as 'ITCs Zone'- 'X' M Ahead, ITCs Zone speed limit '30 kmph' etc.	(pre-primary and primary), crèches, day-care centers to indicate motorists that this area must be kept clear of waiting or parking. Where the yellow zigzag line is supported by an upright sign, there is a mandatory prohibition of stopping during the times shown ***Pavement Markings*** shall be used to supplement regulations and warnings provided by traffic signs and signals. For example, Common stencils used in school zones include SCHOOL, SLOW SCHOOL X-ING, etc.	

Note: Signs should be used judiciously, as overuse may breed driver non-compliance and excessive signs may create visual clutter.

Installation of Sidewalks and other Road elements

Pedestrian-friendly elements The connecting routes shall be equipped with pedestrian facilities such as Anti-Skid Pavement on both sides of the road with street furniture, table-top crosswalks, speed bumps, bollards, etc.		

Necessary Measures in Safe ITCs Zone

Parking restrictions: Parking of vehicles obstructs the view of the motorists to see the children due to their short height. Therefore, parking restrictions are required to regulate the parking near ITCs destinations. Signs and markings that shall be used near ITC destinations are as follows:	***Temporary Parking :*** ***Parking signs*** (for example, some streets near schools have 15-minute parking limits during school zone hours).	***No stopping signs*** **Traffic Greenlight** **Greenlight** duration of pedestrian signals near ITCs destinations shall be determined based on children's average walking speed. The average walking speed of adults is between 75-85 m/ minute while that of an

		adult with a toddler is between 20-30m/ minutes.36

No parking signs	Loading zone signs (used in pick-up or drop-off areas).	

Speed limits shall be enforced in ITCs zones of not more than 30 kmph depending upon the time of functioning of the destination. For example:

In School Zones: On school days, Monday to Friday during school functioning hours: 30kmph speed limit when children are present in the safety zone. Each Child Safety Zone has the speed limit clearly displayed.	**In Park Zones:** 365 Days a Year. The enforcement hours around parks will be limited to only those hours when the parks are open (typically 6 a.m. to 11 a.m. and 3:00 p.m. to 9:00 p. m.) with a 30 kmph speed limit.	

Applicability

Zones near ITCs facilities (e.g. Safe Park Zones, Safe School Zones) should be mandatorily described in the Development plan which can be further detailed out at neighborhood level in the Local Area Plan. Comprehensive traffic control plans shall be prepared to layout the installation of signsand pavement marking measures, taking into account key streets surrounding the ITCs destinations. Plans for Safe ITCs Zones should follow a timeline strategy to mandate improvements.

Best Practices –
Case Example 1 :
School Zone Improvement, Seoul, Korea

Figure 2.23: School Improvement Zone, Seoul, Korea

Source: https://www.mdpi.com/2624-6511/5/1/10

The neglected space under the metro flyover in the Shakarpur area on the banks of Yamuna river was converted into a school for children who were not enrolled in mainstream schools. The majority of the children attending this school belong to the farming community on the banks. As the Shakarpur area lacked a public school in its vicinity and the present schools were not in the walkable distance for these children, this initiative benefited the children.
"The free school under the Bridge" initiative was started by a shop-keeper in 2007 and today it successfully caters up to 300 students including both boys and girls. Thus, once a neglected space, it has been utilized for the welfare of society by positively converting it into education space.

Best Practices –
Case Example 2:
Safe Park Zones Initiative, Illinois

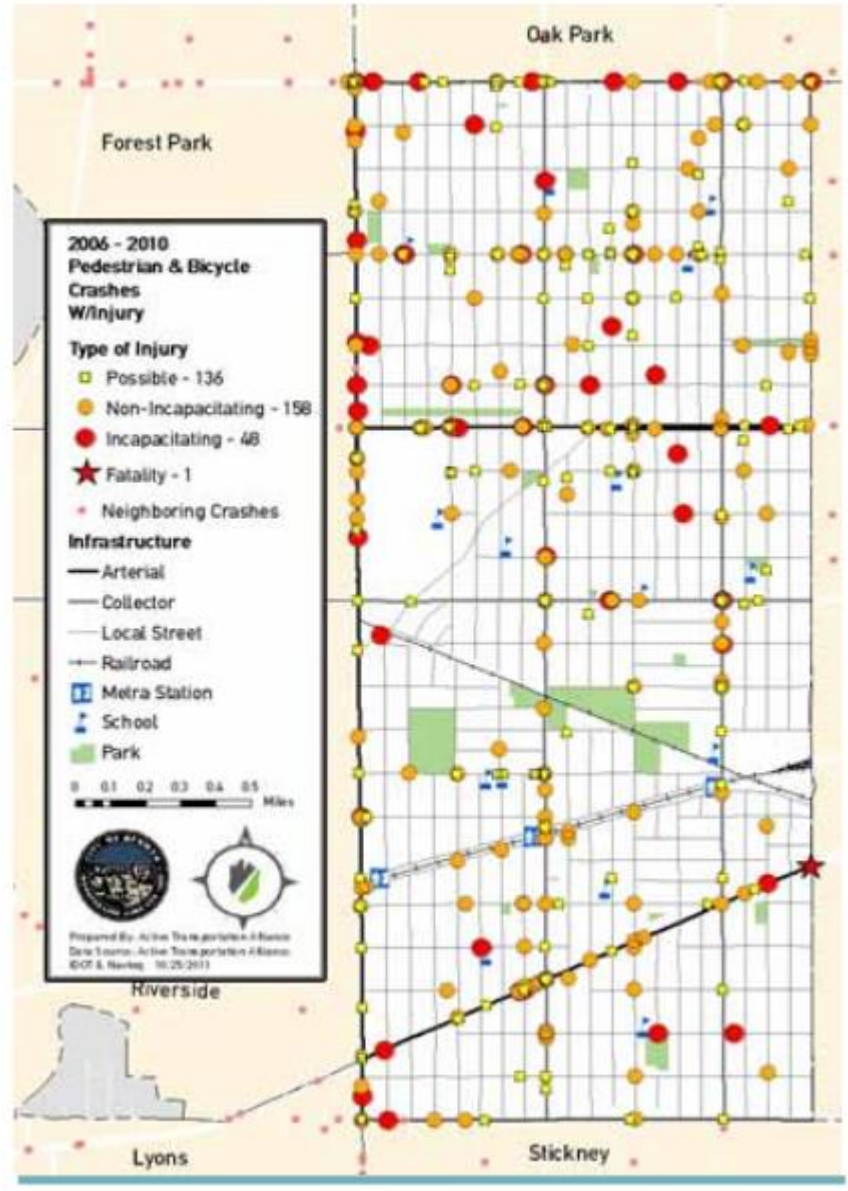


Figure 2.24: Mapping of pedestrian and cyclist crash spots

Source: Active Transportation Alliance (Illinois Safe Zone)

The initiative aimed to encourage easier access to parks by promoting a safer environment and by introducing infrastructure that emphasizes the presence of pedestrians walking to the Park. In 2006, Illinois was the first state to implement a Safe Park zone statute. By, 2012, five of Illinois' municipalities had adopted the Safe Park Zone, set the speed limit to 20mph, signage's, improved pedestrian infrastructure, heavy fines for violating rules, etc.

Key Takeaways:

- Spot fines can be enforced/ levied for violations to ensure enforcement in safe zones.

3. 5 Urban Sanitation

Figure 2.25: Public infrastructure and sanitation as an integral aspect of child safety

Source: https://www.iddri.org/en/publications-and-events/blog-post/sanitation-developing-cities-imperative-sustainable-urban

Definition

Along with good physical planning and layout of the urban areas, proper provision and management of public utilities, it is also important to provide a clean and healthy urban environment. Waste dumped on streets, over-flowing dustbins, open drains, smelly toilets, etc. can make the urban environmental quality unhealthy for the users/residents. Bad solid waste management can result in diminishing air quality and can be a source of diseases. Similarly, stagnant water in waterlogged areas, open drains act as a breeding ground for mosquito-borne diseases such as dengue, and chikungunia. Both the situations affect children more[4]

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Purpose

Neighborhoods in Pune have become much cleaner due to PMC's efforts taken under the Swatch Bharat Mission, Smart City Program, AMRUT, and other similar initiatives. These efforts need to be sustained and urban utility planning should also consider ITC friendly responsive design/ planning. Below are a few guidelines to design public utilities for ITC which needs to be followed along with all the existing provisions made in SC, AMRUT, Public Toilet policy, Pune City Sanitation Plan and other applicable city level guidelines to ensure a cleaner Pune

Objectives

- To ensure clean streets, neighborhoods, and public spaces by effective solid waste management.

- To reduce instances of waterlogging across the city.
- To provide clean and ITC-friendly public toilet facilities.

Design Guidelines

Solid Waste Management (SWM)

Establishing an effective waste management system is one of the first steps to create healthy neighbourhoods.

A. For effective management of solid waste, the waste must be segregated into organic and inorganic waste at source. The inorganic waste can further be segregated into recyclables, e-wastes, and hazardous wastes, sanitary wastes to ensure proper disposal.

B. Waste management system

For Municipal wastes,

- Ensure the presence of SWM segregation and collection facility for both household wastes and community wastes in the respective Neighbourhood to avoid littering/dumping on the roadside.
- The wastes need to be timely collected to avoid overfilled community dustbins.
- Ensure that the collected wastes is efficiently treated/ disposed off as per the composition of waste. Disposal facilities can be centralized or decentralized as suitable.
- Promote natural/sustainable technologies like leave-in-pots, tumbler composting, OWC composting, biogas plant, etc for organic/wet wastes. Encourage residents to compost kitchen wastes at the Household level itself. Also, ensure that the recyclables from inorganic/dry wastes should be sold to authorized vendors for reuse. For further details on the technologies and reuse options, kindly refer to Swatchh Bharat Mission Manual 1, 2, CPHEEO Manual [17]..
- Device a proper street cleaning mechanism to keep the streets and public spaces clean and litter-free.
- Neighbourhood/ Local level awareness campaigns can be conducted to sensitize the residents on the health impacts of waste dumping, inform them about proper ways for waste segregation, and also to encourage them to shift to a eco-friendlier choice of materials and inculcate reusing habits. This will help in minimizing the overall quantity of waste generated. Schools, parks, public plazas can be effective areas for such campaigns. Children if sensitized can contribute in bringing behavioral changes in their respective families.

C. If other types of wastes such as Bio-medical wastes, Industrial Wastes, Construction & Demolition wastes, e-wastes, etc. are also generated in the selected area, contributes a negative impact on health; it is advisable to develop waste management systems for each waste stream as per as the respective provisions given in Solid Waste Management Rules 2016.

Solid Waste Infrastructure:

D. Provide adequate garbage bins in play areas, parks, plazas besides the benches, resting points, frequently used pedestrian routes, etc.

E. Ensure that these garbage bins are accessible to children.

F. Use symbols or color-code them to educate children/ other users on what type of waste should be disposed in which bins.

G. These dustbins can have creative designs and playful placing as shown in the illustrations below to foster the habit of using dustbins in children along with making this experience fun.

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[17] *Solid waste management CPHEEO Manual. Link:* http://cpheeo.gov.in/cms/manual-on-municipal-solid-waste-management-2016.php

Safe drainage and public sanitation facilities

Open drainage systems, waterlogging, unhygienic public toilet facilities can have negative impacts on the health of residents in the areas. Below are a few guidelines to help mitigate these impacts.

Urban stormwater drainage system (for zero water logging instances)

A. Ensure that every Neighbourhood has a good drainage system including major ITC destinations and routes such as streets, parks, public plazas, etc.

B. Try to design natural drainage systems like bio-swales, percolation ponds, infiltration trenches, etc. This will act as natural sponges and add to the natural features, green pockets in the Neighbourhood. For further details on designing these structures refer SUDS- Sustainable Urban Drainage Systems.

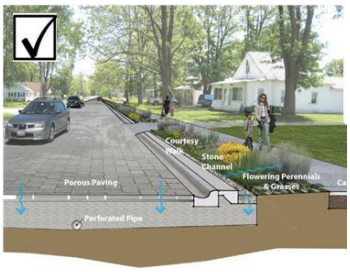
C. If a manual drainage system is present in the Neighbourhood, ensure that it remains unblocked by timely clearing of leaves or other debris accumulated.

D. Fill-up potholes as soon as they form.

E. Ensure the segregation of sewerage from stormwater runoff.

F. Encourage rainwater harvesting in all private and public buildings to reduce the amount of run-off in the open spaces. This harvested water can be treated and reused or groundwater recharge can be done. For further details for RWH methods and techniques refer Rainwater Harvesting manual, CPHEEO.

Avoid waterlogging on ITC routes such as routes to school, parks, play areas, etc.



Provide natural drain systems like bio-swales, infiltration trenches, etc along roads, near public areas.

Provide retention ponds, pe paving in public areas.

Clean and ITC friendly Public toilet Facilities

Pune Public Toilet Policy, 2016 is set out with a vision to improve public health, safety (especially for women) and provide access to sanitation for all. It provides a standard framework for toilet design and maintenance and is applicable to new toilets, refurbishment of existing ones with their maintenance and management.

Along with the design and maintenance guidelines provided in this policy, the below guidelines need to be followed to provide clean and accessible public toilet facilities for ITCs.

A. All public toilets located close at ITC destinations or where ITC footfall is high should have the provision of ITC-friendly toilet accessories to facilitate independent access by children. For example, child-friendly water closets/ separate toilet seats for children should be installed[18]; washbasin should be fixed at a reachable height for children i.e. around 550 mm[19].

B. Along with accessories, toilet furniture should also be easily accessible to children. For example, the height of the toilet doorknob/grab bars should be between 455 – 685 mm[20] , etc.

C. Ensure that space is allocated for a diaper changing deck as well as a separate dustbin for their disposal with respective signages. This space should be provided preferably in a common area (accessible to both men and women).

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[18] *Pg. 42 (Illustrations 13,14,15), Asean Public Toilet Standarad,2016. Link:* https://www.asean.org/wp-content/uploads/2012/05/ASEAN-Public-Toilet-Standard.pdf

[19] *Pg. 13,* https://www.toilet.org.sg/articles/GuideBetterPreschoolToilet.pdf

[20] *Pg. 4* https://www.babychangingstations.com/mm5/pdf/ADA_Planning_Guide.pdf

D. Access Ramp should be provided at the entrance and should be stroller friendly with minimum 1.8m width, have anti-skid material; minimum 1:12 slope[21] with the provision of handrails at two levels one at heights of between 550mm and 650mm[22] and hoists.
E. Provision to be made for urinal for children (up to 5 years) in line with their anthropometric requirement i.e. urinal to be mounted at a height of not more than 400mm[55] from the finished floor area.
F. Ensure periodic cleaning and maintenance of the toilet facilities as given in the Public Toilet Policy, 2016.
G. Ensure that both the solid and liquid waste is disposed off or scientifically treated timely to keep the surroundings of the toilets clean and odour-free.
H. Ensure good ventilation in public toilets.
I. It is advisable to have indoor plants that filter and clean indoor air quality. Also, more greenery/plants can be added outside the toilet in their surroundings to absorb the odour.
J. Provide separate Lactation rooms/nursing booths at ITCs destinations and public areas with high ITCs footfall. Ensure that these rooms are clean, well-lit, and have comfortable seating. These should ideally overview a tot-lot or play area and can be clubbed with toilet facilities. For further details refer ITCN Design Guideline Pg.82.

Unclean and unhygienic public toilet on FC Road, Pune


Provide stroller-friendly ramp access, good ventilation, and greenery around public toilets[26]


Provide toilet accessories that friendly, including diaper changin

Mitigating Air and Noise Pollution at the local level

Pune city sanitation plan, Environmental status report, Development plan of Pune and an Action plan for Pune to control Air Pollution outlines city level mitigation strategies to reduce air and noise pollution across Pune. These include various strategies across different sectors for example in the transport sector it promotes cleaner Technology shift, CNG vehicles, E-vehicles, NMT, road design strategies, etc. In the housing sector it includes the use of green-rated HVAC systems, mitigating sources of indoor air pollution, ensure proper C& D waste practices to reduce dust during construction, reducing emissions from solid waste transportation, burning, etc.

- Provide no-honking zones near schools, maternity homes, etc. and set noise limits in these areas.
- Ensure that activity/ land-use which generate noise such as malls, public grounds, train tracks, etc. are not located near schools, maternity homes, etc
- Increase the green cover for noise masking/buffing.

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[21] *Pg. 13,* https://cpwd.gov.in/Publication/aged&disabled.PDF

[22] Pg. 50, Inclusive Mobility Guidelines UK. Link: *https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/3695/inclusive-mobility.pdf*

Best Practices –
Case Example 1 :
Cleanest City Of India, Indore[23]

Indore was ranked No.1 for consecutive 3 years i.e. from 2017-2019 according to Swatch Survekshan, an initiative of the Urban Development Ministry.

In 2016, Indore Municipal Corporation (IMC) adopted the 'bin less city model', starting with two wards, then expanding to 10 wards and was slowly spread across the city. At the start, the city achieved 100% door-to-door collection, post which segregation at the source was initiated and encouraged, and proper disposal facilities for each waste stream were installed.

Along with placing a proper SWM system and providing necessary infrastructure support other measures such as user charges and incentives were also adopted. These included imposing fines if citizens werecaught littering on the roads and to those who did not accommodate organic waste composting facility in their campus. A discount of 5 – 50% was offered in property tax to those who installed bulk waste convertors in their campus. The competition was conducted among institutions, hospitals, restaurants, wards to encourage innovative ways of SWM. A monthly award with a certificate of recognition was given to the best ward and also to the SWM workers working in honor of their efforts to keep the city clean.

Key Takeaways:

- Impose fines, provide incentives/acknowledgments for positive citizen behaviour to encourage and ensure a solid waste management plan's effective implementation.
- 100% segregation, collection, and disposal for clean neighbourhoods. Encourage innovation.

Best Practices –
Case Example 2:
Local Level Action Plan, Lambeth, London[24]

Lambeth is a borough in London. A local area air quality action plan was developed to improve the air quality in the area during 2017-2022. The local level action plan provides a detailed baseline assessment of the area (conducts emissions inventory for NO2, PM10, and PM2.5), identifies the sources of pollution/sectors responsible (transport, housing, industries, etc.), defines focus areas/hotspots/sensitive receptors (schools, residential/nursing homes, day nurseries, etc.) ,sets priorities and provides specific measures to combat air pollution in these areas and increase awareness. A participatory planning approach was adopted to include local communities and come-up with localized solutions. The plan also provides implementation and management mechanisms for the measures defined.

It was found that the 3 major sources of pollution within the borough are road transport, construction, and domestic, commercial gas use, while it is estimated that up to 40% of pollution in Lambeth is from sources outside the borough. Thus, the plan encourages sustainable travel, shifting to sustainable technologies (low-carbon emitting technologies) and promotes sustainable construction, and also focuses

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[23] *How Indore became the cleanest city in India, The Hindu, October 2017. Link:* https://www.thehindu.com/news/cities/chennai/how-indore-became-the-cleanest-city-in-india/article19808051.ece

[24] https://www.lambeth.gov.uk/sites/default/files/pcc-air-quality-action-plan-2017-2022.pdf

on reducing exposure to air pollution by increasing awareness and reinforcing positive behaviours amongst the citizens.
Few other localized solutions include increasing green infrastructure, building a green wall, reduce taxi idling;
conducting a feasibility study for introducing regenerative street sweepers, creating low emission zones, increasing joint works with other neighbourhood boroughs, recruiting citizens to monitor the action plan, etc.

Key Takeaways:

- Although Pune has a city-level Air Quality action plan, similar local level action plans can be developed to improve the local air quality.
- The participatory approach should be adopted to come up with specific localized solutions and the local community should be involved in monitoring the action plan for ownership.
- Detailed emission inventory and mapping should be conducted from time-to-time. Also, similar to this study, ITCs destinations like schools, crèche, parks, nursing homes, etc. should form a part of the sensitive receptors while analyzing the impact of local emissions children are the most susceptible.

Best Practices –
Case Example 2:
Noise Action Plan, Gothenburg, Sweden[25]

The city of Gothenburg develops a noise action plan every five years. Their latest noise action plan was developed for the year 2014-2018. The aim and purpose of this plan is to reduce the negative effect of ambient noise on health by giving the people of Gothenburg access to a good sound environment both indoors and outdoors. The action plan takes a holistic approach to the city's noise problems and strives to create good sound environments in the city. It also improves the awareness about noise in the city by the creation of noise maps and monitoring. It also considers the impacts of upcoming planning strategies, projects, and other programs/policies developed for the city. The action plan provides priorities and proposes specific measures to be taken during 2014–2018 with an implementation plan, stakeholder responsibilities, and cost required for each measure.
The important aspect of this plan is that it specifically focuses on creating good sound environments around homes, preschools, schools and also parks and green areas and has specific targets for these areas such as: (i) At least 90 percent of Gothenburg's population have by 2020, at the latest, an outdoor noise level (at home) lower than 60 dBA daily equivalent level at the exposed facade. (ii) At least 95 percent of the city's schools, including preschools, have by 2020 at the latest access to play-grounds with a maximum 55 dBA daily equivalent level (iii) Parks and green areas: All the city parks have by 2020 at the latest levels below 50 dBA daily equivalent level in the greater part of the park area.
The plan provides measures in 3 categories, development planning, transport planning, and green strategy.

Key Takeaways:

- The plan provides a good framework and a structured holistic approach that can guide Pune to develop its noise action plans for ITCs areas.
- Defines the use of noise monitoring and mapping in devising mitigation measures for the hotspots.

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[25] https://goteborg.se/wps/wcm/connect/329f7997-14fe-4261-a8dc-25efcbd1d2e8/Noise+Action+Plan_2014_2018+%28mindre%29.pdf?MOD=AJPERES

- As the plan focuses on pre-schools, parks, open spaces, and residential areas –similar ITCs destinations should be prioritized for Pune as well to reduce the negative impacts of the noise emissions on children.
- Does not consider all the possible sources, which should be included while creating noise mapping and an action plan for Pune city.

For more details refer to ITCN Design Guideline Pg 81, 82, 98,103.
Link: *https://bernardvanleer.org/app/uploads/2019/04/ITCN-Design-Guidelines_Revised.pdf*

4. D6 Safe Public Transport

Figure 2.26: Gender sensitive public transit

Source: https://www.itsinternational.com/its5/feature/breaking-bias-making-public-transport-safer-women

Definition

A good public transport system plays a vital role in reducing the usage of the private mode of transport and facilitates ITCs to connect with various ITC destinations across the city. Pune transport policies promote public transport facilities targeting 80% of motorized trips to be via public transport. This will provide more affordable public transport options for ITCs and will also help in improving the overall air quality of the city. Also, this will free-up the land of parking of private vehicles which can be converted into play-areas or green pockets, increasing the green of the city.

Purpose

ITC Accessibility, inclusivity, and safety are not considered while designing and providing for these public transport infrastructure facilities. Pune should consider the guidelines below to make the public transport system more accessible, safe, and friendly for ITC users.

Below are a few guidelines in addition to the guidelines given for Public transport system planning in the Comprehensive Mobility Plan (CMP) and Urban Street Design Guidelines (USDG) to make them safer and accessible to ITCs.

Objectives

- To increase the safety of ITCs using the public transport system
- To encourage stroller friendly and ITC friendly public transit system design

Design Guidelines

A. If transit stops like bus/BRT/metro stations are located more than 1.5 km away from ITC amenity, it is advisable to provide Intermediate Public Transport (IPT)/Para-transit facility to ensure last-mile connectivity to ITC destinations.

B. While locating the transit-stops, the following should be considered:

5. Transit stops should be connected by Safe routes (For safe routes refer D6 design element)
6. Sited in mixed land-use areas, near active spaces to ensure good passive surveillance and clear sightlines
7. Sited in areas that are active and well-lit at night

C. Transit stops should have ITC friendly design, which includes:

8. Ramps with a gradual slope of 1:20 (5%) to 1:15 (6.7%) to make them stroller friendly and easily accessible to ITCs
9. Transit stops should be well-shaded and have proper resting spaces accessible to children.

D. Design of buses, metros should have space allocated to accommodate a stroller for its easy navigation inside, at the entry and at the exit.

E. Introduce CCTVs in all major public transports to make the travel of ITCs more secure.

F. PMC has proposed Passenger Information System (PIS) for BRTs. It should include ITC friendly features such as real-time data to understand the arrival time and the location of the bus which can be tracked by caregivers for their convenience, estimated travel time, emergency information pop-ups, parent/caregiver seat reservations, and redressal system for ITCs. This will help caregivers to plan their travel with convenience while travelling, and also give feedback on the BRTS system/infrastructure if any difficulties are encountered.

Safe Public Transit should be planned avoiding:

Typical bus stop in Pune, inaccessible for strollers, and have a non-permeable façade.	Low kerbs along with low floor buses can facilitate caregivers using public transit. Bus stops in London[26]	Sheltered Bus Stops with low seating, clear sightlines, and service information [26]

References: Relevant Policy/ Guidelines

URDPFI Guidelines 2014	
National Urban Transport Policy, 2006	**Comprehensive Mobility Plan Pune, 2018**
Draft Development Plan, 2007-2027	**Development Control and Promotion Regulations for Pune Municipal Corporation (DCPR-2017)**
Urban Street Design Guidelines, 2016	**Policy for Pedestrian Facilities and Safety in Pune,2016**
Public Parking Policy, Pune, 2016	**Pune Cycle Plan, 2017 (Urban Cycling Design Guidelines, 2017)**

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[26] *MoHnUA;Urban 95;BvLF; BDP, 2019, Infant, Toddler, Caregiver- Friendly Neighborhood: Design Guideline*

Best Practices –

Case Example 1 :

Project Bus Stop

Project Bus Stop is a concept that brings a tech-infused library experience to the roadside by offering free Wi-Fi, phone-charging points, smart interactive boards, a green roof, bicycle parking, e-book downloads, furniture accessible to children, and even a swing. This is a testing site for Smart innovations by the government whois eager to turn Singapore into a Smart Nation.

Not only is the bus stop designed for the children's needs, but it also has a transparent glass wall surface providing clear sightlines from surrounding areas to ensure the safety of ITCs waiting at the bus stops.

Key Takeaways:

- Bus stops near ITC destination should include features such as furniture accessible to children, interactive play activities to engage them, etc.
- Also, it should have transparent glass wall surfaces to provide clear sightlines form surrounding areas to ensure the safety of ITCs waiting.

For more details refer ITCN Design Guideline Pg 99

Link: https://bernardvanleer.org/app/uploads/2019/04/ITCN-Design-Guidelines_Revised.pdf

D7 Safe Routes

Figure 2.27: Dedicated and protected pedestrian realm, Delhi, India

Source: https://www.globalgiving.org/projects/saving-children-on-indias-dangerous-roads/reports/

Objectives

- To ensure safe access to child amenities on ITCs routes/in one stretch

Design Guidelines

A. Safe routes shall be incorporated in both Greenfield and Brownfield neighborhood planning OR Local Area Plans by:

• Mark up the Safe route in a Neighborhood by

o Identifying route between existing child-focused destinations such as schools, tot-lots, parks and playgrounds, daycare centers, anganwadis, community centers;

o Using signage to indicate the presence of children, as well as signage legible to children, to allow easier navigation. Signage shall be located so that it is visible at a child's height (maximum height of 1075mm) and include colorful symbols. Information shall also be translated into the Marathi language for the ease of understanding.

• The speed limit shall be set to 30 kmph on safe routes that include child-focused destinations along their length.

• New or reconfigured streets as safe routes shall comply with Urban Street Design Guidelines and shall also include the following:

o Ensure that ITCs are a part of the user profile in the street context analysis particularly if there are schools, parks, or other child-focused destinations nearby;

o All efforts shall be made to minimize curb radii and lane widths where feasible, to reduce vehicle speed;

o Minimize the exposure risk of children to motorized vehicles by designing pedestrian-oriented intersections with landscaped curb extensions for shorter crossing distances, raised crosswalks, and other features to provide safe crossings;

o At non-signalized intersections & mid-block crosswalks in Safe Route and neighborhoods, Rectangular Rapid-Flashing Beacon (RRFB) shall be used in combination with pedestrian warning signs to provide a high-visibility strobe-like warning to drivers;

o Be physically separated from vehicle lanes with a barrier/green buffer;

o Be lined with street furniture as well as trees where possible to provide a shaded canopy;

o Footpaths shall be made playful to create experiences along the route of ITCs daily journey and around the destination of ITCs activities such as schools, parks, daycare centers, kindergartens, anganwadis, crèches, etc.

- Child attractive designs/patterns on the footpath to make it playful which can be informative too.

- If excess space exists along a particularly wide footpath, a portion of it shall be dedicated to recreational activitiessuch as painted floor games like hopscotch, connecting dots, etc. while still accommodating unobstructed pedestrian movement.

• Incorporate ramps on public stairs for stroller or bicycle wheels to improve access and connectivity on safe routes. Ramps with the incline of 1:20 (5%) to 1:15 (6.7%) are preferred for strollers.36 When cycling infrastructure is provided it shall connect to safe routes and the network of child-focused destinations and be physically separated from vehicular lanes and parking to minimize risks and provide comfort to children.

B. The child-focused destinations/ amenities shall preferably be located along the safe route in future proposals.

C. As far as possible, child-focused destinations should be conglomerated to minimize the number of intersections ITCs need to cross;

Additional points:

• Work with the residents of the neighborhood to understand what lacks and prevents them from feeling safe to access child-focused destinations.

• Conduct a Walk Audit with Caregivers (residents of the Neighborhood) and other key partners to identify routes that they take to reach to ITCs destinations, and to gather suggestions for improving walking, biking and accessibility to and from homes and other destinations.

Applicability

When working to address Safe Routes through city policies and plans, it should be given priority. Special consideration should be given in Comprehensive Mobility Planning, Cycle plan/Pedestrian Policy, Urban Street Design Guidelines, Zoning, City budget, and infrastructure prioritization – addressing Safe routes. Safe Routes thrive on interagency collaboration.

References: Relevant Policy/ Guidelines

URDPFI Guidelines 2014	
National Urban Transport Policy, 2006	**Comprehensive Mobility Plan Pune, 2018**
Draft Development Plan, 2007-2027	**Development Control and Promotion Regulations for Pune Municipal Corporation (DCPR-2017)**
Urban Street Design Guidelines, 2016	**Policy for Pedestrian Facilities and Safety in Pune,2016**
Public Parking Policy, Pune, 2016	**Pune Cycle Plan, 2017 (Urban Cycling Design Guidelines, 2017)**

Best Practices –
Case Example 1 :
Kindlint 'Child Route', Eindhoven, Netherlands

Figure 2.28:The route of the Kindlint is visible in brightly colored tiles in the sidewalk.

Source: https://www.vvs-straatmeubilair.be/maatwerk-kindlint-oranjestraat/

In 2007 the first Kindlint ('child route') in The Netherlands was implemented in Spaarndammerbuurt, Amsterdam.
A Kindlint is meant to provide a safe, walkable route for children in the neighbourhood. It connects the residential areas to playgrounds, schools, parks, and other locations for children. It is marked by signage and a distinctive colored and textured path for children to follow. Crossing points have been made safer with traffic-inhibiting measures, and other tiles have been used there, intending to keep children waiting. Along the route, there are fun 'playing moments' for children, such as a fountain, a

balance beam, or boulders to jump over. It is meant to reduce the age at which independent mobility is attained, and to increase perceived safety for parents.

Key Takeaways:

- Safe routes can incorporate features such as navigation, traffic regulating measures, play areas along the route, etc.

Best Practices –
Case Example 2:
Safe Routes In The Liveable Cities Project, India[27]

Figure 3.27: The livable Cities Project in India have created attractive and safe routes to encourage walking, cycling, and play

Source: https://healthbridge.ca/projects/livable-cities-india Arup, Cities Alive, Designing for Urban Childhood, London, 2017

The Livable Cities Project in India aimed to increase the number of children and families walking, cycling and playing in deprived urban areas by creating active and safe routes to school accessible parks, playgrounds, and beaches and healthy transportation. Programmes in Bangalore, Nagpur,

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[27] *Arup, Cities Alive, Designing for Urban Childhood, London, 2017. Link:* https://www.arup.com/perspectives/publications/research/section/cities-alive-designing-for-urban-childhoods *Accessed on 30th March 2020*

Thrissur and Malappuram reclaim, protect and maintain park space and implement community solutions to improve walking conditions. Successful implementations include the redesigning of 14 parks, giving 1,400 children access to safe parks close to home and bringing 2,000 people to the streets of Bangalore to cycle, walk and socialize through open street events.

Key Takeaways:

- Create active and safe routes to ITCs destinations like schools parks, playgrounds, etc. by improving walking/cycling infrastructure.
- Revitalize parks and create opportunities to socialize through open street events in deprived urban areas.

1. D8 Urban Surveillance

Figure 2.29: Gender and children's perspective on safety and access to urban spaces

Source: https://thewire.in/women/feminist-perspectives-on-space-safety-and-surveillance-improving-a-womans-right-to-the-city

Definition

Good natural surveillance and clear sightlines are very crucial to enhance the perception of the safety of space. Perception of safety influences the nature and the extent to which people use spaces and places. If our public spaces, walking and cycling routes, parks, playgrounds, entrances and exits to buildings, public transport facilities are designed with good natural surveillance and with clear sightlines they can encourage people to use them and feel secure while using them. People's ability to see around themselves, particularly relating to what is ahead is also important to develop a sense of security.

Purpose

Clear sightlines provide individuals with the opportunity to see the route ahead of them and identify possible risks. It also increases the probability of offenders being seen, heard, reported, and potentially apprehended, reducing the chances of crime/ accidents.

Urban planning in the old city of Pune had facilitated good natural surveillance through its planning. But this element was lost in new developments with high walls, long front set-backs, gated communities, isolated streets; location of parks, public transit in isolated areas, etc. Thus, these guidelines can be adopted to ensure surveillance and thus the sense of safety of these areas.

Objectives

- To ensure maximum visibility and natural surveillance on all ITCs daily routes and destinations across the city to enhance real and perceived safety.
- To avoid physical barrier due to landscaping and other built form elements that can potentially obscure clear sightlines.

Design Guidelines

A. To increase natural surveillance on ITCs routes and near ITCs destinations, it is advised to propose mixed land use (mix of both formal and informal activities) and active building edges and facades.

B. For increasing safety and natural surveillance in neighbourhoods, consider the following:

• Orient windows, balconies, and verandahs to get a good overview of public spaces and streets.

• Ensure that in residential areas the residential building facades that face the public realm are connected to habitable rooms.

• Ensure that in commercial areas, the ground level of commercial buildings is designed to maximize the opportunity for activate frontages and allow clear observation of ITCs public areas and easy accessibility.

• If the built edge is fenced, then replacing the fence material by visually permeable material (not solid) and having a height less than 1.2 meters high to enable surveillance of the adjoining street of public space.

• On isolated daily ITCs routes, informal activities can be introduced such as hawker's zones, resting spaces for passer-by's near building porches/edges, informal social gatherings can be organized in evenings, public art/ game activities can be designed on the routes to attract passerbys, etc.

• Ensure that building entrances are clearly visible and do not provide opportunities for concealment.

C. To increase natural surveillance in parks, public areas, etc, consider the following;

• Locate parks, play areas, public open spaces so that they are visible from adjoining buildings such as houses, streets, schools, etc.

• Parks and other public open spaces should be bound on at least three sides, and preferably four sides, by streets with active building frontages that provide good surveillance and clear and in-depth sightlines of the park.

• To increase natural surveillance in public parks, plazas, several activities to attract all age groups should be introduced.

• Locate toddlers' playing areas where they are clearly visible from the surroundings.

• Install see-through fencing/ permeable fencing to control access and prevent children from roaming while still providing visibility from the surrounding areas.

• Design park furniture, element, etc. such that it does not block the visibility of users. Consider visual connections while designing.

• Avoid landscaping that creates barriers or restricts sightlines and allows intruders to hide. Tall shrubs can provide hiding places and should not be planted close to the paths or fences.

• Ensure that the vegetation does not obscure lighting, either during its growth phase or at maturity.

• Avoid cut-off dead spaces or isolated pockets of land within a park that cannot be overviewed.

- Introduce programs in parks in the evenings- even at tot-lots to increase footfall and generate more activities during off-peak hours likelate night movie shows, community gathering/events in the evening, etc.
- Ensure that there is at least one safe through-route in all parks, play areas with frequent 'escape routes' linking the through-route to the surrounding streets.

D. To increase natural surveillance and clear sightlines for safety in public transit stops, subways, on ITCs routes, etc. consider the following:

- Entrances to parking structures, metro stations, other transit stops should be located in places well visible from the surroundings.
- Stops of public transport in each direction should be facing each other so that persons waiting on each side are visible from the other stop.
- Transit shelters should be transparent, open, and located far from entrapment spots.
- CCTVs can be installed in parking structures, at transit stations, etc. as an extra safety measure to ensure continuous active surveillance. They help potentially deter offenders from committing a crime and can be useful for repaid responses only if monitored live. Otherwise, they act mainly as tools for crime detection and investigation rather than prevention.
- SOS emergency buttons can also be provided especially in dark, isolated areas/ routes such as subways, over bridges, transit stops with low foot-fall, etc.
- Provisions should be made for hawkers inside the subway to provide for passive surveillance which will increase the sense of safety for ITCs.
- Advertisement boards (if any) to be restricted within a specific slot to ensure clear visibility from the interior of Foot-over bridge(FOB) from road level.
- Advertisement boards should not be placed on compound walls and at street corners in a way that the cross-view of traffic is blocked and a blind corner is formed.
- The landscaping on streets/ on footpath should not obstruct the view of the ITCs walking. Ensure that the shrub height used to segregate footpaths with road traffic should be of minimum 0.9m height and there should be no obstruction between 0.9 to 2.4 m to provide clear sightlines for children.
- Design site layouts so that pedestrian routes and destination points are easily identifiable and have clear sightlines.

E. To ensure good natural surveillance of all the above spaces, ITCs routes and destinations should be well lit. (Refer D3.Lighting Design Element below)

Building and Street Edges should be planned avoiding:

High walls and log set-backs in Koregaon park do not provide an opportunity to view the public realm from the building.	Windows and transparent parapets foster spontaneous surveillance of public space/street [28]	Low vegetation and High branching trees ensure clear sightlines[29]

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[28] *Pg 32-33,Action Safepolis, Handbook on Crime prevention guidelines for urban planning, design and Management, 2006-2007*

[29] *Pg 4, Department of Lands and Planning, Community Safe Design Guide, Northern Territory Government, 2010*

Best Practices –
Case Example 1 :
'Parks Without Borders, New York, USA[4]

Figure 2.30: Bryant Park, New York

Source: https://en.wikipedia.org/wiki/Bryant_Park

New York has one of the most extensive neighbor¬hood park systems in the US. With more than 5,000 individual properties comprising some 29,000 acres of land, the parks and playgrounds and community gardens add up to a significant share of the city's space. NYC Parks launched Parks Without Borders, a new program focusing on the corners, borders, and other underused spaces within (and around) New York parks. This helped increase the sense of safety in ITCs as it assured passive surveillance from the surrounding areas and clear sightlines.

Key takeaways:

ITCs destinations like parks, playgrounds should have low or permeable fences to ensure passive surveillance from the surrounding areas and clear sightlines.

Best Practices –
Case Example 2:
Natural Surveillance Around Sankey Tank, Bangalore

Figure 2.31:
Source:

Sankey Tank is a man-made lake that covers an area of around 32 acres. It was converted into a recreational space and park in 2000 by Bangalore Water Supply and Sewerage Board (BWSSB) and the Bangalore Mahanagara Palike (BMP) and has been actively used as a waterfront space by citizens residing in the surrounding areas. It provides a secure environment as it is surrounded by active edges on all the 4 sides as shown in the land use map in the figure. On one edge is the busy Sankey road, the other side has a commercial edge on the ground floor and residential areas on the floors above it that overview the park and the remaining 2 sides have parks. Also as the boundary fence of the tank has a permeable fence, it provides for clear sightlines making the citizens feel secure while using this space.

Key Takeaways:
Provide permeable fence in public areas with high ITCs footfall for clear sightlines to increase the perceived safety of the space..

D9 Street Lighting

Definition

Good lighting plays a vital role in reducing the fear of crime and community safety. Lighting is considered to be adequate if a face can be easily recognized at a distance of 15 m10. Poorly lit public spaces are unwelcoming and discourage people from using public spaces resulting in the reduction of passive surveillance of the areas. This leads to increased opportunities for criminal activities, violence, fear and anxiety.

Purpose

Sufficient lighting during the night/early morning hours is important so that ITCs are visible and have enough light to see their surroundings. It also prevents children from tripping over obstacles lying on the pavement or uneven paving. Well-lit public spaces attract more people, encourage night time/early morning hour's usage, increase the activities and passive surveillance of an area. This enhances the real and perceived safety of the environment in areas. Lighting should be designed to ensure that both carriageway and pedestrian/cycle paths are sufficiently illuminated to prevent accidents.

Objectives

- To increase the level and quality of lighting in public spaces.
- To encourage night time activity in designated areas of the public realm.
- To make pathways in public spaces clearly visible and welcoming at night.

Design Guidelines

New or reconfigured streets shall comply with Urban Street Design Guidelines, Pune and shall also include the following:

A. Pedestrian lighting should be prioritized in the following locations:

- Streets with high ITCs/pedestrian volumes
- Key civic and commercial streets
- Areas of concerns regarding pedestrian safety and security, such as at pedestrian subways.
- Small streets such as alleys and pedestrian pathways.

B. Recommended Illumination Level for different public spaces are as follows:

Table 3.2: Recommended Illumination Levels for different public spaces

Particulars	Level of Illumination in Lux	Pole Height	Source
Pedestrian crossing	50 lux	-	Code of Practice-1 (Cross Section) Cycle track Urban Street Design Guidelines Pune
20 lux			
Main roads carrying mixed traffic like city main roads/ streets, arterial roads, throughways	15 lux	9-10 meters	IS 1944-1 and 2: Code of Practice for Lighting of Public Thoroughfare. Part 1 and 2 For main and secondary roads (Group A and B)
Secondary roads with considerable traffic like local traffic routes, shopping streets	8 lux	7.5-9 meters	
Secondary roads with light traffic	4 lux	7.5-9 meters	
Pedestrian Subway	50 lux (minimum)	-	IRC 103:2012

Parking area	50 lux (minimum)	-	National Building Code of India, Volume 2, 2016
On footpath for pedestrians only	25-40 lux	-	IRC 103:2012
Parks and public plazas	15-30 lux	-	ITCN Design Guideline

C. In areas with high pedestrian activity white lighting for footpath is recommended. It is recommended to maintain the color contrast from the road and to ensure that the color contrast of tactile tiles is visible at night to persons with poor vision. White light also gives good color rendition at night by allowing the eye to register the true color of an object. Both these qualities assist people's natural ability to see at night, assess their safet, and hence act accordingly.

D. Parks and gardens close at night, therefore, lower-performing sources are suitable. Blue-white lamps should be used as they offer a good rendition of greens and browns.

E. In retail and commercial areas, lighting levels shall be higher than surrounding areas to prevent glare for pedestrians. The lighting to be installed depends on the type, strength, and colors of the shops' lighting.

F. Public transport shelters shall be well-lit as it draws attention to and encourages the use of such amenities. The lighting shall not be so bright that it reduces the ability to see into darker surrounding spaces.

G. Maps along with directional and informational signage shall be well-lit as they are essential to provide orientation and navigation at night.

H. All lighting shall be directed downwards to illuminate the immediate surrounding areas. Lights shall not be placed at eye level because they prevent pedestrians and cyclists from seeing beyond the light source.

I. High-mast spotlights shall be avoided as they cast dark shadows.

J. All recessed spaces and entrances to buildings shall be well-lit.

K. Lighting shall illuminate pathways and no dark spots/zones shoud be left.

L. Lighting fixtures shall be placed in positions that are not be blocked by mature vegetation, awnings and any other physical barriers.

M. Solar-powered lights and LED lighting should be preferred.

N. All lights shall comply with ISO IEC safety standard IEC60598, IEC 61347.

O. The lighting fixtures shall be vandal-proof, well maintained and promptly replaced if damaged or not functioning.

Best Practices –
Case Example 1 :
'Roshan Dilli' Campaign[30]

Increasing street lighting to make them safe, reduce crime and accidents, Delhi

Source: Delhi Safety Analysis report. Safety pin

NDTV in partnership with UBER launched a campaign 'Roshan Dilli' to raise the safety standard of lighting in public spaces in Delhi. Lighting is the key factor in shaping the perception of safety for women. It crowd-sourced data from the citizens to map the street or walkway which are perceived unsafe due to inadequate/poor street lighting and provided a common platform for the concerned stakeholders to raise issues to help formulate strategies to light up dark spots in the city to reduce crime, accidents and help aid navigation. Further, keen to tackle the non-functional street lights, the Public Works Department (PWD) of Delhi government came forward to repair the faulty lights, in addition to lighting up the dark spots to increase the sense of safety at night in public areas.

Key Takeaways:

- Using crowd-sourced data from citizens to map dark & unsafe spots in the city and provide a common platform to raise issues and formulate strategies for these spots.
- Lighting up these dark spots to increase the sense of safety at night/early morning hours.

For more details on refer ITCN Design Guideline Pg 48
Link: https://bernardvanleer.org/app/uploads/2019/04/ITCN-Design-Guidelines_Revised.pdf
For more details on Assessing Lighting conditions in Public areas, Parks refer City of Ryde's Lighting Assessment parameters:
Link: https://www.ryde.nsw.gov.au/files/assets/public/publications/ryde-riverwalk/ryde-river-walk-master-plan-appendix-c.pdf

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[30] *Roshan Dilli, an NDTV and UBER Campaign, 2019. Link:* https://special.ndtv.com/roshan-dilli-a-campaign-to-light-up-public-spaces-in-delhi-and-make-the-city-safer-for-women-47/

10. D10 Signages and Wayfinding

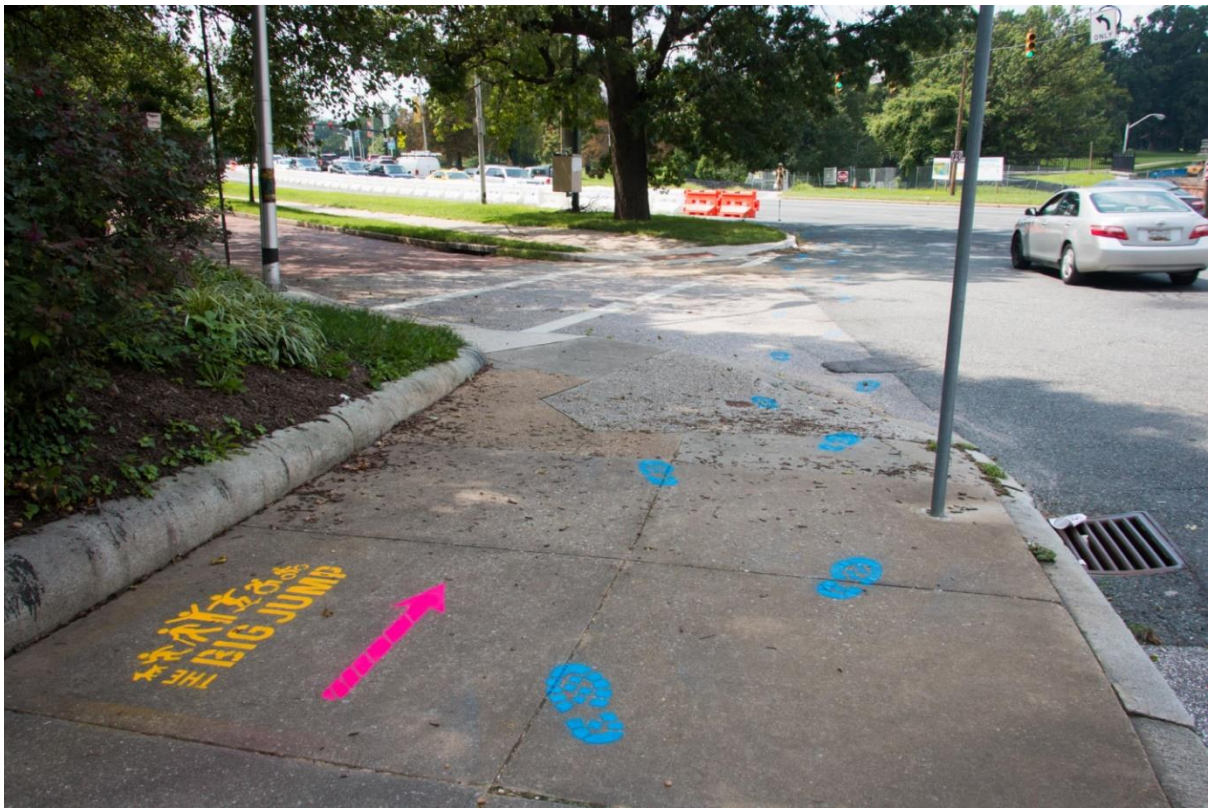

Figure 2.32: Big Jump, Graham Projects, Baltimore

Source: https://grahamprojects.com/projects/big-jump-wayfinding/

Definition

Young children do not develop the ability to navigate directions such as left and right until the age of 10 years. They cannot read street names and hence rely on other measures to show them the way. They usually recognize routes by recalling landmarks. Thus, it is difficult for them to travel and explore their surroundings independently because of which

Purpose

Caregivers fear of them getting lost or hurt. Children are very curious about the elements in their surroundings, they are playful and interactive throughout their journey. Thus, a good navigation system designed for children should not only assure safety in their daily routes but also educate them about the desired behaviors of the adult world.

Existing Context

In Pune, such navigation systems are absent. Even the signage's present on the streets and in public areas like parks, playgrounds, near schools, etc. are not at the eye level of children nor are they symbolic or colorful for children to understand its meaning. There is an urgent need to design and install ITCs friendly navigation systems across the city, especially at routes and zones that have high ITCs footfall. Knowing where you are and which way to go contributes

to a sense of security and signage contributes to creating a sense of place.

Objectives

- To develop an ITCs friendly navigation system in Pune for safe navigation by young children and their caregivers in their neighborhoods.

Design Guidelines

A. Identify and demarcate the daily routes and destinations of ITCs in the city where navigation systems can be introduced. These would include the daily routes taken by ITCs, such as routes leading to schools, playgrounds, parks, crèche, everyday social amenities like local markets, vendor kiosks, and other ITCs frequented areas. While doing so, designers should also incorporate and map the informal routes taken by the children in their neighborhood.

B. Assess the existing navigation system present in the area or the route and identify if any of the existing elements can be re-designed or if there is a need to introduce new elements in the area to improve the children's perception of urban space and facilitate their easy navigation.

C. Develop and design strategic functions and communicative purposes of these new navigation elements. These could be of 2 major types:

- Basic Function of route identification and safe navigation: to inform, to orient, to reassure, realized by visual communication like signage's, symbol, cues like change in surface texture, colors, landmarks, etc.
- Experiencing function: to excite (engage the sense), to explore, to entertain, to educate (about behaviors, rules, cultures,etc.) realized through "playing"

D. Also, if possible incorporate digital navigation elements such as interactive digital touch screens- with real-time information, 'you are here' maps, etc. at the height of children for easy navigation.

E. The navigation system should be easy to maintain for long-term sustenance.

Below a few elements of the wayfinding systems have been detailed out:

Signages

Signages help to identify both the appropriate and inappropriate use of space. Below are a few ITCs friendly signages with illustrations:

SN	Type	Purpose	Location	Illustrations
1	Informative Signage's	To demarcate/reserve area and inform the navigator about the	Children play areas, stroller pathways, child-parent parking bays, school zones, or demarcating drinking water fountains, toilets	

		function/ use of that space	(inside/outside), baby care rooms, etc.	Signage Demarcating children play area  Signage Demarcating Parent & Child Parking space[31] etc.
2	Directional Signage's	To guide the navigator	On pathways, ITC routes, near activity areas, entry/exit, etc.	   Playful and creative directional signage [32]

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[31] *https://www.change.org/p/tesco-change-supermarket-family-parking-to-parent-and-young-child*

[32] https://in.pinterest.com/pin/679902874973015573/ *Accessed on 21st March,2020.*

3	Cautionary Signage's	To prevent accidents during navigation	Near play areas, construction sites, hazardous urban services (electric, drainage, etc.)	 
4	Educational Signage's	To inform/educate the navigator about the surrounding elements	Near trees, shrubs, near cultural or historic monuments/elements, etc.	 Varrobook interpretive graphic display system[33]

Table 2.2: Few illustrations of ITC-friendly creative signages

A. Signages shall be designed in such a way that they are visible at an eye-level of 95cm. Kid's specific signage's should be positioned at their eye level – the optimum viewing band for pre-fives is between 700-1075 mm[34]. Incase space demands signage for both the adult and pre-fives, separate signboards should be provided on the same pole or adjacent to each other.

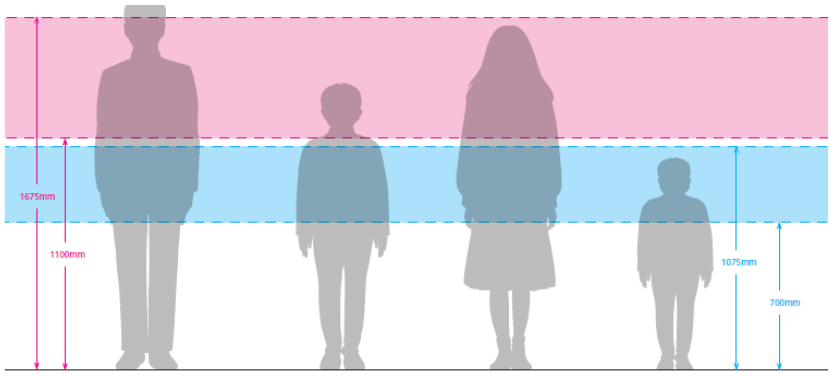

Figure 2.33: Viewing band for adults (pink) and pre-fives (blue) [34]

B. It is recommended to use pictorial, colorful, bright, and recognizable features and symbols instead of text that children can relate to easily. Signages can be designed innovatively, made attractive, and placed at a relevant location.

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[33] https://in.pinterest.com/pin/520376931915938042/ *Accessed on 22nd March 2020.*

[34] https://www.britishcouncil.in/sites/default/files/guidelines_for_museum_display.pdf *Accessed on 21st March 2020.*

C. Signage's shall be well lit and legible at any hour of the day and strategically placed in such a way that they are not obscured by vegetation or other hindrances.
D. Signages shall also provide indication recognizable for children which gives information to locate key areas that assist such as telephones, toilets, etc.
E. Signage's should be vandal proof and easy to maintain.
F. They should be readable and positive

Other Wayfinding Elements

A. Use of existing landmarks, street art, recognizable objects placed at regular intervals to indicate routes or use of paving treatments like the variation in materials and textures to indicate boundaries and directions can work well for children's wayfinding.

Few of the wayfinding elements or methods are illustrated below:

Table 2.3: Few Illustrations of different way-finding methods

SN	Type	Purpose	Location	Illustration
1	Paths – Floor paints, textures	To demarcate the navigation route and to make it easily identifiable and a playful experience for children.	Streets, ITC routes, etc.	 Floor games [35]
2	Walls	To demarcate	On ITC routes and near ITC destinations	 Wall painted on the route to a in Ludhiana

[35] https://rethinkingchildhood.com/2016/08/02/playful-child-friendly-places-urbanization/ *Accessed on 22nd March 2020.*

3	Landmarks – Landscape, sculptures, point of orientation such as a shop sign, advertising, colors, graffiti, signage, mailboxes, bus shelters, colored garbage bins.	To help the child remember routes	On ITC routes	 Painted Electric box in San Jose
4	Nodes- elements interesting for children to sign a path in the points of intersection as a pedestrian crossing, trees, streetlight, shop-sign, advertising, colors, graffiti, signage, semaphores	To highlight familiar destinations for easy wayfinding	On ITC routes	 Colorful crossing

B. Wayfinding elements should be easy to maintain
C. Wayfinding should be Colorful and attractive

Below are a few case examples of ITC friendly wayfinding design:

Best Practices –
Case Example 1 :
Adelaide City Wayfinding[36]

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[36] *Adelaide City Way finding strategy, Studio Binocular. Link:* https://www.studiobinocular.com/projects/adelaide/

Figure 2.34: Innovative and easy to understand wayfinding system installed across the Adelaide City including parks, open spaces, street, cycle tracks, etc

Source: https://www.studiobinocular.com/projects/adelai de/

As a part of the master plan for Adelaide City, it devised a city-wide comprehensive wayfinding strategy that would help unify and improve the sense of a place for its citizens. It included informative, directional easy to understand signage's, etc. connecting parks, open spaces, and public urban areas to make them easier to navigate. These signages also supported the promotion of 'active' mode of transport such as walking, cycling, and public transport to help circumvent the forecast increase in traffic and congestion in the city.

It now acts as an adaptive, flexible, and resilient information system. For this design agency – studio Binocular undertook an extensive research phase that reinforced the importance of holistic and integrated user-focused design. It included the design of a comprehensive mapping system – including precinct maps and detailed 'heads up' pedestrian maps with illustrated landmarks for orientation and accessible pedestrian routes. The signages were placed at 2 different heights as shown in the figure to make them accessible to children and on the floor as required. This helped in creating a more accessible, safe cityeasy to navigate.

Key Takeaways:

- Develop a city-wide comprehensive wayfinding strategy, especially for ITC daily routes for their easy navigation.
- Place signage's at a height easy for the young children or on the floor, it can be symbolic and colourful for easy remembrance.

Best Practices –
Case Example 2:
Wayfinding On DP Road Aundh, Pune

Figure 3.30: Road marking, proper signage's, playful elements and sculptors act as wayfinding elements on ITI DP road in Aundh, Pune

Source: https://aundhstreets.wordpress.com/aundh-streets-project/

Under the area development project of Smart city Pune, ITI Road/ DP road in Aundh was re-designed to make it a smart and pedestrian-friendly road stretch. For this, proper uneven continuous footpaths have been provided, with bollards installed at places to avoid encroachment by 2-wheelers, kids play zones have been demarcated, and resting areas are provided. Apart from these the road has a good signage system in pace and creative elements like sculptures and marking on the footpath which can help in easy navigation by ITCs.

Key Takeaways:

- Designing a well-defined signage system
- Using elements like sculptures, markings on footpaths for easy navigation for children.

11.D11 Playful Urban Spaces

Figure 2.35: JM Road, Pune Street Program

Source: Oasis Designs (http://oasisdesigns.org/pune.asp)

Definition

Playful Urban spaces is based on the 'right to the city' concept that advocates making available play elements accessible in urban public spaces. It optimises pockets of urban public spaces in order to activate transit routes.

Elements of playfulness in an urban fabric improves vibrancy, attractiveness, and safety for the citizens, especially the ITCs. Playful elements can be incorporated as interventions in streets, public parks and plazas, ITCs routes, etc.

Existing Context

Pune has been taking a few steps to introduce playfulness on its streets. For example under the Pune Smart City initiative, ITI Road in Aundh was re-sectioned to introduce a few areas dedicated for children play zones with activities such as floor games, skating tracks, ITCs-friendly skating, amphitheatre, etc. to make the 1.2 km stretch playful and safe for ITCs.[37]

Purpose

Playfulness as an element is not prioritized while planning and designing urban areas in Indian cities. Playful elements when introduced on streets/public spaces can increase the time spent by the users in the given space, thus increasing the passive surveillance and activity mix. This will help reduce instances of crime. It makes the space more attractive and colourful, adding to its vibrancy and experience. It can have positive impacts on the user's health and space.

Objectives

- To introduce playfulness in public areas and help increase the sense of security and usability of that space.

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[37] *PMC to turn section of ITI Road into Kids zone, Times of India, December 2018. Link;* https://timesofindia.indiatimes.com/city/pune/pmc-to-turn-section-of-iti-road-into-kids-zone/articleshow/67315758.cms *Accessed on 30th March 2020*

Design Guidelines

Areas to include Playful Elements along ITC routes:

A. Identify the isolated and crime-prone public areas that can be benefited by adding playful elements to increase the footfall, passive surveillance, and sense of security of that place. Case examples as below:

Underutilised and Plain footpath in front of ITC destination- Shivarkar garden, Pune

The dark isolated underpass near Dhanukar colony, Pune[38]

Long stretches of compounded walls, underutilised with playful elements, Bangalore[39]

Following are the few ways playful elements can be added across various urban infrastructures to enhance ITCs' experience and increase the sense of safety:

Playful footpaths - Perma-Playstreets, Chicago IL[40]

Colourful mural of the public washrooms in Tatura, Australia[41]

Toronto's Underpass park Utlising the underspaces of flyovers and public infrastructure with play elements.[42]

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[38] *This subway has a dark side, Pune Mirrior, February 2012. Link:* https://punemirror.indiatimes.com/pune/cover-story/this-subway-has-a-dark-side/articleshow/31906864.cms *Accessed on 30th March 2020*

[39] *https://www.thehindu.com/news/cities/bangalore/wont-adjust-give-us-our-footpaths-pedestrians/article21269569.ece*

[40] *Pop up Park at Great Suffolk Street* :https://www.designcouncil.org.uk/news-opinion/when-park-runs-itself-creating-legacy-pop-park *Perma-Playstreet, Playful footpath installations, Chicago. Link:* https://kaboom.org/play_everywhere/gallery/perma_playstreets *Accessed on 21st November, 2019.*

[41] *https://www.miragenews.com/new-mural-brightens-up-tatura-public-toilets-901729/*

[42] http://v1.archiecho.com/item/13461_underpass-art-amp-parks-15-fun-projects-reclaiming-disused-urban-space

Footpaths

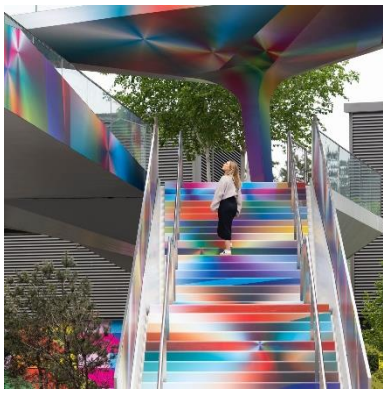
If excess space exists along a particularly wide footpath, a portion of it could be dedicated to recreational activities such as painted floor games like hopscotch, connecting dots, etc. while still accommodating unobstructed pedestrian movement.

Urban utilities adjacent to footpaths or compound walls can be made interactive and playful to enhance the ITCs' experience along the route.

Urban Voids

In excess of space/ urban void/ leftover areas along the edge of the street, playful and inclusive furniture/games can be installed. For example, play facilities at JM Road Pune, playful bench designed by Urban Conga[43] , etc.

Playful and safe pedestrian subway experiences created in an underpass at Kifissias Avenue, Greece[44] , or an underpass in Makati, Philippines[45].



Felipe Pantone's kinetic public art over the public foot-over bridge[46]

Playful streets within the buffer areas of sidewalks[47]

Subways

It has been noticed that subways are not popular amongst the pedestrians (including ITCs) as mostly they are dark and dingy, ill-maintained leading to unsafe and poor experiences. Usage of subways can be boosted by remodeling the subways using public art in form of colourful flooring patterns, walls, light as art, etc. to create pleasant and safe experiences for ITCs to use them.

Foot-over-Bridges

The steps/floor of FOB can be interactive and playful for making the climb a fun experience for the children.

Dedicated cycle tracks

These dedicated cycle tracks for ITCs should have playful markings on the surface to make cycling a fun experience for children and demarcate the space.

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[43] https://www.marvelbuilding.com/playful-bench-lets-play-music-strangers-sit-play.html *Accessed on 18th October 2019.*

[44] *A new, colorful, interactive Microcosm, Greece. Link:* https://www.ellines.com/en/good-news/45483-a-new-colourful-interactive-microcosm/ *Accessed on 23rd October,2019*

[45] *Why Makati is a walkable city you should live in,2016. Link:* https://www.philstar.com/lifestyle/arts-and-culture/2016/05/31/1572798/why-makati-walkable-city-you-should-live-in *Accessed on 23rd October, 2019.*

[46] *https://www.thisiscolossal.com/2022/05/felipe-pantone-quick-tide/*

[47] https://www.london.gov.uk/sites/default/files/ggbd_making_london_child-friendly.pdf *(page 8)*

ITCs resting areas

Illustrations from ITCN Design Guideline:

Playful benches for ITCs at Circling the avenue, Israel[48]

Sidewalk games in NBS School in Dwarka, Delhi[49]

Playful bench designed at young children height[50]

A. ITCs resting areas can be designed along the street or in public plazas as required.

B. The design of benches should also be such that a toddler can access it independently and also cater to the needs of babies and pregnant women. As per the availability of space, benches can be of extra-wide width 650mm for the babies to rest. Recommended height of the seating: 400-500mm for adults and 200mm for toddlers.[51] Provisions of the backrest for pregnant women.

C. Benches can be colourful and an interactive element/form to facilitate child interaction. These elements for small children will be exciting to climb, crawl, and have a playful experience keeping in mind the safety and anti-theft property. The material of the benches should be chosen based on the properties in terms of thermal comfort, wear-tear, etc. from the ITCs point of view. E.g., concrete and steel benches absorb heat and can be uncomfortable during summer. Wood stays cooler. In limited availability of space, flip-down benches can be a space-efficient option to provide resting spaces.

Crossings:

A. The pedestrian crossing near schools, parks, or other ITCs activity zones can be brightly colored, playful for easy identification by small children, and inform/alert the traffic of the presence of children zone. Animated colorful crosswalks and intersections can be added as it will notify the vehicle users to slow down and signal that the kids live and play along the street and can be implemented at locations close to schools, children parks, and crèches.

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[48] *https://landezine.com/circling-the-avenue-by-bo/*

[49] *https://www.landscapeindia.net/publication/blog/a-school-in-delhi*

[50] https://www.marvelbuilding.com/playful-bench-lets-play-music-strangers-sit-play.html *Accessed on 18th October 2019.*

[51] *Infants, Toddlers and Caregivers Neighbourhood- Design Guidelines, Pg. 54,55*

Also, such brightly colored zebra crossings make the itidentifiable for small children. Also, children can be involved in designing interactive/playful crossings near ITCN activities.

On transit stops

A. Custom creative designs for new and retrofit shelters at bus stops near schools, crèches, daycare centers & other ITCs daily destinations for easy identification to children.

B. Retrofitting existing transit shelters or designing new ones to accommodate play opportunities that pass the time.
For example, art and murals embedded in the walls, playful benches, and lighting, games, and art on the pavement, etc. Partnerships can be explored with agencies responsible for advertising at bus stops. Part of the space reserved for ads can be used to incorporate games and puzzles.[52]
For example, The Urban Thinkscape Project in Philadelphia USA constructed playful bus stops with puzzles and street lighting projecting animated stories on the pavements.[53]

Public Toilets

Presently playful elements in the toilets for children are missing

A. Playful and inviting design can be introduced for child-friendly toilet accessories[54] like creative washbasin taps, colorful toilet seats, etc.,
B. Paintings/visuals can be done on toilet walls, doors, etc.
C. Also, hygiene education can be introduced through signages or paintings.
D. Informational signage for diaper changing decks and child-sized toilet should be displayed figuratively and in writing.

Case Example: Geberit Bambini Child- friendly Sanitary Rooms.

Public art on-street space and public plazas

A. Public art enlivens public space and adds a sense of safety. It can includean educational character like the history and culture of Pune, numbers, distinct shapes, etc. so that children can learn by looking at it. Art can be incorporated into otherwise standard street elements such as light poles, benches, trash receptacles, and utility boxes. Art can be informative and explorative as well.[55] Bright colors to be used as they excite the children. It should be designed keeping in mind how it looks like from children's eye level.[56]

Best Practices –
Case Example 1 :
Safe Colourful Crossing Near School Zones, London[57]

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[52] https://kaboom.org/playbook/design_guides/transit *Accessed on 24th September 2019*

[53] https://kaboom.org/play_everywhere/gallery/urban_thinkscape *Accessed on 21st November 2019*

[54] https://www.international.geberit.com/products/bathroom-ceramic/geberit-bambini-series/ *Accessed on 7th October 2019*

[55] https://www.sfbetterstreets.org/find-project-types/streetscape-elements/street-furniture-overview/public-art/ *Accessed on 18th October 2019*

[56] *Infants, Toddlers and Caregivers Neighbourhood- Design Guidelines, Pg. 96*

[57] *THB, Safe steps for school and colourful crossings, London,2018. Link:* http://www.cpneighbours.org/wp-content/uploads/2018/08/Safe-Steps-Brochure-FINAL.pdf

Figure 2.36: Safe Colorful crossing in school zones, Croydon, London

Source: https://www.croydonadvertiser.co.uk/news/croydon-news/pedestrian-crossing-croydon-looks-like-1212319

Safer Steps for School program was initiated by THB post witnessing the lack of care given by parents crossing the road with their children at their Child's primary school. This resulted in around 15,000 road accidents involving pedestrians under the age of 16 in 2017. For this government campaigns to build awareness and help improve the behavior of children were done. But the government always was looking for what more can be done to raise such awareness and ensure more safety while crossing.

Thus, Safe Steps for Schools™; a visual road-safety programme which comprises road crossings and walkways to revolutionize Child Road Safety throughout the UK was introduced. School crossings were painted using environmentally friendly, skid-resistant, and cost-effective preformed markings to produce a striking, brightly coloured road crossing. This, combined with footprints guides the children to and from the school, incentivizes school children to use the appropriate road crossing in a fun and visual way. On February 1st, 2018 in partnership with Croydon Council, under this program, the first crossing was laid at Crescent Primary School in Croydon. The crossings have been extremely well received by school-children and parents alike and reduce the number of accidents, enhancing safety.

Key Takeaways:

Road crossings can be painted with bright colours to make them easy to spot by moving traffic and also help guide pedestrians to safely cross, increasing awareness and reducing accidents.

Best Practices –

Case Example 2:

Tactical Urbanism- Safe Family Friendly Crossings In Wanawadi, Pune[58]

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[58] *Child-friendly patch comes to life in Wanawadi Pune, Pune Mirror, and December 2019. Link:* https://punemirror.indiatimes.com/pune/civic/child-friendly-patch-of-road-comes-to-life-at-wanawadi/articleshow/72430351.cms *Accessed on 20th March 2020*

Figure 2.37: Safe Colorful crossing in front of Shivarkar children park in Wanawadi, Pune

Source: https://punemirror.indiatimes.com/pune/civic/child-friendly-patch-of-road-comes-to-life-at-wanawadi/articleshow/72430351.cms

Pune Municipal Corporation (PMC) under the Urban95 initiative demonstrated a safe colorful crossing in front of the Shivarkar garden in Wanawadi, Pune. The intervention's objective was to develop a safe and accessible crossing for ITCs and also make vehicle users aware of the pedestrian crossing. It is a pop-up traffic regulating measure. It helped in upgrading the present state of the table-top crosswalk, freeing up part of the right of way for pedestrians, providing a safe in-between refuge space to split the length of the crossing, zigzag lines to demarcate no-parking zones, and playful visuals to highlight the pedestrian space.

Key Takeaways:

- Colourful crossing act as a pop-up traffic regulating measure.
- It can be introduced near ITCs destinations like parks, schools, crèche, etc.
- Additional safety elements like refuge spaces, non-parking spaces before and after crossing, etc. should be included as required to make them safe for ITC.

2.7 Supporting future resiliency

Designing the urban built environment from ITCs lens and ensuring their safety and accessibility, will not only make our streets, neighbourhoods, and environment safer from crime, violence, road accidents, air, and noise pollution, etc. but will also support in increasing the future resiliency and preparedness of the city from climate change/disasters risks.

Children being the most vulnerable users have greater risk during disasters. The pandemics and disasters such as (Covid-19, Ebola, earthquake, floods, etc.) have highlighted the needs that are overlooked during normalcy i.e. the infrastructure provision for children and their caregivers. As cities come to halt during such times, the importance of access to quality healthcare, basic services/daily needs, safe open places, etc. becomes evident. ITCs-friendly urban planning and design guidelines suffice such requirements. Thus, if we design cities considering the needs of young children, it will add to the cities' resilience for the future.

Following are the few linkages demonstrating how ITCs friendly safe design/guidelines will increase future resiliency of the city:

- **Proximity to daily services and walkable neighbourhoods**

As ITCs have a shorter range of mobility, it is advisable to conglomerate a mix of ITCs daily destinations such as schools, parks, recreation facilities, clinics, vendor kiosks, convenient shopping, etc together and locate them such that one destination falls in the route of the other. These ITCs facilities should be located in 5-10 minutes (max. up to 600m) of walking distance from their residences and well connected to the whole neighbourhood. Also, public transport facilities should be provided in close access to these destinations. Make sure that 1-2 streets in the neighbourhood are linked from 'center to edge' to allow easy access to adjoining areas.

Ensuring mixed-used development and maximizing the active transportation within the neighbourhoods creates resiliency and reduces the carbon footprint of urban development. Such neighbourhoods with infrastructure for basic services as health, education, etc. acts as a complete entity and self-sustaining with its network of public transport, pedestrian connectivity, open spaces, and social infrastructure, etc. They ensure that daily essentials are easily available and accessible at walking distances during pandemics/disaster emergencies. Also, due to active transport, carbon emissions for ITCs daily trips will be reduced making air quality better. The well-connected street network from 'center to edge' will act as an emergency escape route during emergencies or for service delivery during disaster emergencies.

- **Sustainable Mobility**

Mobility is an essential part of ITC's life as they travel around the cities to meet their daily needs. Hence, it is important to ensure that street infrastructure is safe and accessible for ITCs. For this, it is advisable to design streets that have safe NMT facilities and encourage public transport for longer distances. Streets as public space also provide space to exercise or play in close proximity to the homes.

During Pandemic, travel restrictions have a major impact on the lives of ITCs. Access to urban services related to ITCs needs within a comfortable commuting distance of 500m in the neighbourhood encourages the use of active mobility such as walking and cycling. Cities must prioritize walking, cycling, and public transport to ensure resiliency in the future. This will **create opportunities for healthy outcomes and support the communities**. **Physical activity will lead to a reduction in health risks such as obesity, mental health; heart diseases, etc**. Access to quality and well-maintained sidewalks, bicycle lanes as part of the city-wide transport network, safe and reliable public transport as well as streets as playgrounds where children can play safely and freely on roads will help to shift to active mobility from car-centric transport planning. This will **reduce air pollution and CO_2 emissions promoting a healthier environment.**

- **Green Open Spaces**

As outdoor green spaces for playing are important for the healthy early childhood development of infants and toddlers, it is recommended that cities should have adequacy of green spaces as per URDPFI and ITCN guidelines and ensure its availability and accessibility. They should be located within 5-10 minutes walking distance i.e. 200-300m for ITCs.

From Pandemics, the importance of open public and green spaces as an essential civic infrastructure is underlined. Designing of public and open green spaces ensuring access by ITCs and use for play creates **healthy, vibrant, and resilient neighbourhoods** where young children can thrive. They act as green sinks and **reduce the urban heat island (UHI) effect.** They can also be designed for dual-use to act as

sponges/retention ponds during flooding instances increasing the **flood** preparedness of the area. Moreover, these public open/green spaces can help in implementing **emergency services and evacuation protocols** and can be converted for emergency infrastructure or temporary installations as required during pandemics/disasters. A few of the guidelines that promote resiliency in cities are as follows:

1- The quantity, quality, and access to open and green spaces.
2- Development of an integrated open space network that is well connected and easily accessible by NMT or public transport.

- **Clean Environment**

As a toddler breaths 3 times faster i.e. 40-60 breaths per minute as compared to an adult i.e. 20 breathes per minute, young children are more vulnerable to the degrading state of air quality. Hence, it is important to ensure good quality of air in the neighbourhood environment. For this, it is recommended to shift to sustainable transportation, technology, construction options, increase greenery, avoid burning/dumping of solid waste and conduct timely monitoring, etc.

Cleaner air and reduction in greenhouse gas emissions **directly help in climate change mitigation** i.e. it helps in maintaining the rise in temperature, risks from fluctuation in precipitation pattern and frequency of disaster events, etc. It further **reduces the negative health impacts of air pollution making cities healthier to live in.**

- Access to Urban Services and promoting sustainable practices

It is advisable that every child should have access to clean water and sanitation facility. As water is a scarce resource, it is advisable to strengthen the future water security by adopting integrated water management by the city; promotion of sustainable practices like rainwater harvesting, nature-based solutions, smart technologies to avoid leakages and ensure effective use of water resources should be installed. Also, open drainage systems, waterlogging, etc. can have negative impacts on the health of residents in areas, especially children. To avoid such risk it is important to ensure that every Neighbourhood has a good drainage system including major ITCs destinations and routes such as streets, parks, public plazas, etc. For these, natural drainage systems like bio-swales, percolation ponds, infiltration trenches, etc. can be explored. This will act as natural sponges and add to the natural features, green pockets in the Neighbourhood.

During pandemics like COVID-19, Ebola, the importance of **access to water resources** was found evident as **water is the key to pandemic suppression and prevention**. Hence, by ensuring 100% access to clean water and sanitation will ensure **increased preparedness of citizens for future such pandemics**. Also, **strengthening water security** for the future by increasing nature-based solutions, promoting water conservation techniques like rainwater harvesting, etc. **will improve the future resiliency of the city**. Also, the natural drainage system will not only help in **flood management** but also act as **green infrastructure mitigating climate change impacts**.

- **Increasing Urban Playfulness**

  Playfulness as an element is majorly ignored/not prioritized while planning and designing urban areas in Indian cities. It is important to introduce elements of playfulness in cities fabric to make the urban spaces more vibrant, attractive, and safe for the citizens especially ITCs as they are the ones who will benefit the most by the addition of playful elements on the street, parks, public plazas, ITC routes, etc.

  Making urban spaces playful will have an indirect impact on the emotional and mental health of the citizens. Such elements can be useful during pandemics such as COVID-19 where mobility of the citizens is restricted. Playful elements in street/public spaces will engage them in various activities during such times and make the spaces more colourful, attractive, and vibrant. But they should have enough space for physical distancing or similar other requirements as essential.

3

OPERATIONS AND MANAGEMENT

3. Operations and Management

3.1 Action Plan for Implementation of the safety components

Effective implementation and management is the key to ensure that the city and its neighbourhoods become progressively safer for ITCs overtime. To achieve the final goal of safer Pune for ITCs as mentioned in the Theory of change section in Chapter 1, following methodology/process should be adopted to operationalize the safety components in the larger picture of safer city goal as shown below:

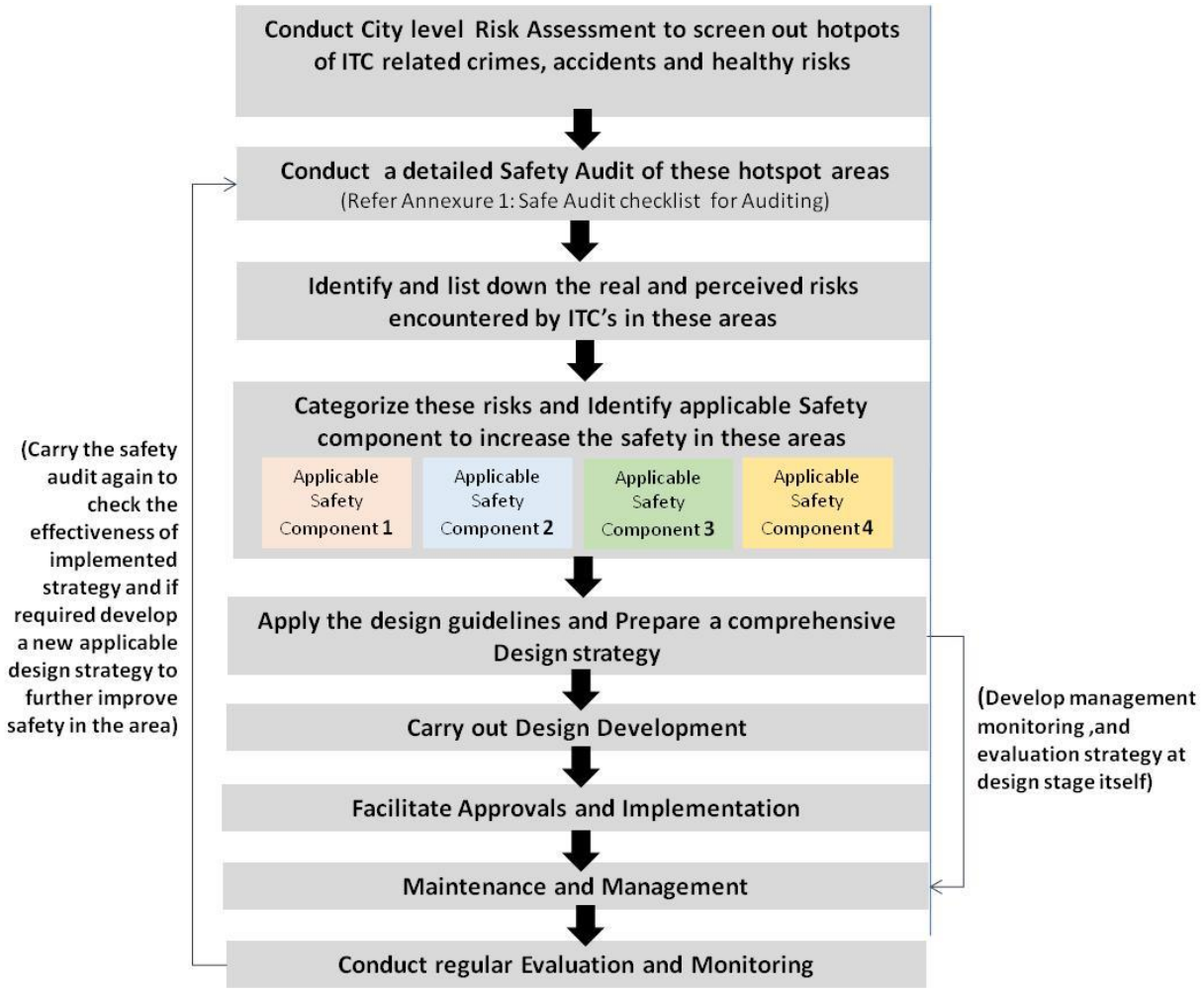

Figure 3.1: Process to implementation of guidelines to achieve the larger goal of Safe city for ITCs

To ensure successful application of the process mentioned above it is important to have a governance structure in place, a committee that is accountable for the integration and implementation of the guidelines.

3.1.1 Proposed Institutional Arrangement -Who will be responsible for overseeing implementation?

For each of the safety component described in Chapter 2, various stakeholders will be responsible for different stages of design until implementation and a **cross-collaboration** between them comes into effect. For this, a **safety team consisting of the Chief Child Development Officer (CCDO) and ITCs Committee needs to be formulated**. ITCs Committee will include both government and citizen representatives i.e. it will include one representative PMC Officer from each of the relevant PMC Departments such as the Social Development Department (SDD), Health Department, Education Department, Road Department, Environment Department, Garden Department, and also include citizen representatives from relevant community organizations and NGOs, citizen safety champions.

This Safety Committee will be responsible to ensure proper and holistic implementation of the safety guidelines across the selected project/ area of intervention throughout the project cycle. The safety committee will be

assisted by the ITCs Technical experts to keep them updated on the market technologies and designing methods and also undergo timed capacity development programs in ITCs safety aspects.

Post-implementation, they will also be responsible to evaluate the intervention and suggest the contextual issues/challenges faced to modify the guideline to make it more effective.

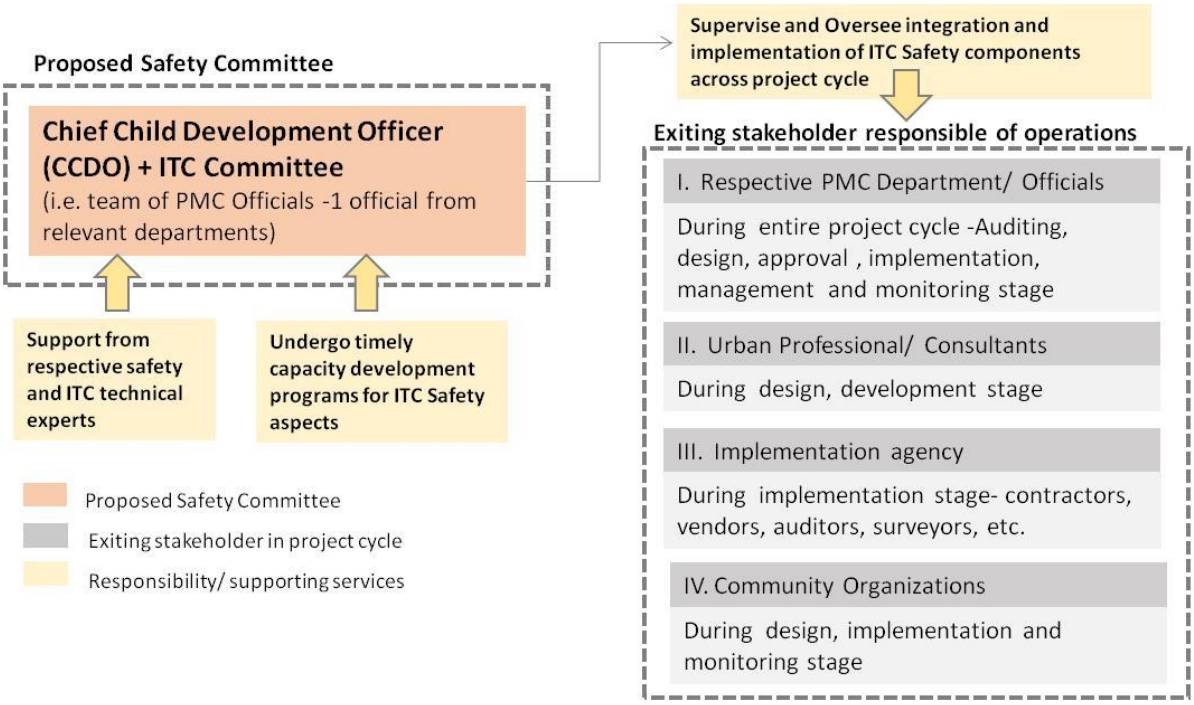

Figure 3.2: Proposed institutional arrangement for the operationalizing safety component

Approval from the safety committee should mandatorily be taken to ensure proper implementation of guidelines**.**

3.1.2 Integration & Operationalization of Safety Components

Below are a few strategies that will support operationalizing the safety guidelines via various channels.

I. Application through on-going projects, plans, and programs and in combination with existing city-level policy framework

These safety guidelines should be made mandatory in all the on-going urban built-environment projects in areas that have high ITCs footfall for rapid and wider implementation of the guidelines across the city. While doing so, the existing safety provisions made in other applicable city policies should also be adhered to as described below.

Pune doesn't have any specific plan, policy, or program on safer cities, but the safety aspect is addressed in various existing policies/ programs/initiatives in their respective sections. Following is the list of applicable built-environment policies:

i. Draft Development plan, 2007-2027
ii. Comprehensive Mobility plan, 2018
iii. Development Control and Promotion Regulations for Pune Municipal Corporation (DCPR -2017)
iv. Policy for pedestrian facilities and safety in Pune,2016
v. Pune cycle plan, 2017
vi. Urban Street Design Guidelines, 2016
vii. Smart city initiative, AMRUT,100 Resilient City and other applicable on-going programs
viii. Neighbourhood level Local area plans to be developed in the future
ix. And other relevant existing and future policy documents as applicable

Although these policies outline provision for safety, ITCs perspective/ focus is absent in them, and also the specific design guidelines are lacking, which can be supplemented by to referring this guideline.

This safety guideline is an addition to the provisions already outlined in these policies/ plans and should be read and implemented in a combination of these.

II. Prioritization of intervention areas

Although the goal is to make the entire city "Safer for Pune", following areas with ITCs facilities and high ITCs footfall should be prioritized at the start:

- All School zones (pre-primary schools, anganwadis, day-care centers, etc.)

- All young children's park and playground zones (tot-lots, housing area parks, Neighbourhood area parks, playgrounds, other recreational areas like lakefronts, river banks, etc.)
- Medical facilities (Dispensary, Maternity homes, etc.)
- Public plazas, public spaces, market areas, vendor kiosks, etc. that have high ITCs footfall
- Public transit stops like bus stops, metro stops, etc. that have high ITCs footfall
- Street infrastructures like pedestrian pathways, foot over bridges, underground subways, etc. where ITCs footfall is high should be made safe.
- All urban leftovers, isolated spots on ITCs routes, or near ITCs destinations.

Eventually, the implementation zones/areas can be expanded to cover the entire city (present and future jurisdiction limit)

III. Arranging for support Funding

Budget provisions should be made for safety auditing, risk assessment, designing development, integrating safety components in on-going and future urban built environment work in the city, and for monitoring as a part of the PMC Annual Budget similar to the PMC budget provision made for Road Safety initiatives proposed by NMT Committee[59]. Also, funds/ budgets are required for initiatives such as awareness programs, safety campaigns, appointing Neighbourhood watch committees (if required), capacity building programs, etc.

Apart from the PMC budget allocations, funding can be secured from local businesses, CSR activities (corporate social investment programs), community initiatives, etc.

IV. Developing local community models for active policing and participation

For the sustenance of the perception of safety apart from the physical design interventions in the built environment, it is also important to engage local communities at three levels:

- **For Data collection**: As there is a lack of data collected on risks encountered by ITCs and their safety perception, geo-tagged crowd-sourcing data can be collected from local communities to develop a database on safety risks for ITCs in Pune. This function can be integrated into already existing online platforms like PMC Care, Pune trafwatch for road accidents, SAFAR for air quality, CDSA's QCM-DRR platform, STEP (Steps Towards Empowering Pedestrians) or a new platform can be specifically developed.
- **Design Development stage**: As locals are the best stakeholders to describe their risks encountered and are also the ones who will be impacted by the intervention, it is recommended to involve them while developing the comprehensive safety design strategy for the selected areas.
- **Active Patrolling and community monitoring**: Additional patrolling/supervising can be provided in the areas with a high level of crime/accidents by encouraging the establishment of Neighbourhood-level watch teams, post-implementation.

V. Outreach and capacity building

Along with physical/spatial interventions and community participation to improve safety of the ITCs in the selected hotspot it is also important to advocate for citizens' behavioural changes to reduce the risks. For this, it is recommended to undertake awareness drives and safety campaigns to educate communities/ citizens about model civic behaviour to reduce instances of crime/violence/ unclean environments. These drives can also build capacities of ITCs to tackle risk situations and increase their preparedness when they encounter a risk (crime, violence, accident, etc.). Below are a few on-going initiatives in Pune:

- Recently, the Mayor of Pune has launched a "Pune Road Safety Campaign" in February 2019 with a target to reduce the traffic crash fatalities by 50 % in the next 5 years[59]. The campaign will be a joint effort between the government organizations and the NGO's, media, citizens, etc.
- Save Pune Traffic Movement (SPTM), a local NGO conducted multiple road safety sessions[59] and a model making competition named Parivartan across various schools, colleges in Pune and open platforms to spread awareness on road safety behaviors and also get citizen's innovative suggestions to improve road safety in their areas[60].

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[59] *Save Pune Traffic Movement website. Link:* http://www.savepunetraffic.org/ *Accessed on 30th March,2020*

[60] *Parivartan, A model making competition by SPTM, 2018. Link:* http://www.savepunetraffic.org/content/parivartan-2018 *Accessed on 30th March,2020*

- Recently PMC completed Pune Traffic Park[61] in the Aundh area to help educate children and citizens about road safety behaviors and traffic rules with a demonstration by real-time scenarios[62].

Similar initiatives should be undertaken for spreading awareness to the reduce risks from crime, violence in the neighbourhoods and targeting behavioral changes in citizens' habits/choices., encouraging cleaner and healthier environments.

3.2 Monitoring Mechanism and Performance Evaluation

A monitoring and evaluation system allows the implementers to assess the effectiveness of their design interventions, get a contextual understanding of their successes and loopholes. It thus helps them provide an evidence-based feedback/input which can be helpful to develop or modify guidelines that did not work and sustain the ones that did.

The proposed Safety committee will appoint a third-party consultant to conduct post-intervention monitoring. For this, it is recommended to use the Safety Audit Assessment checklist developed per safety design component as provided in Annexure I of this document.

Each assessment/ safety audit will help achieve the following benchmarks for each risk identified to reach the final goal of ITCs feel safe in Pune.

Table 3.1: Indicative Indicators for each risk and Service Level Benchmarks for Evaluation and Monitoring

S.N	Data Indicator title	Benchmark Value		
		Thriving	Striving	Surviving
1	Perception of safety for ITCs of key public amenities - streets, parks, play spaces, school, health services, etc.	More than 80% of residents feel safe outside environment around public amenities (streets, parks, play spaces, school, health services, etc.)	80 - 50% of residents feel safe in the outside environment around public amenities (streets, parks, play spaces, school, health services, etc.)	Less than 50% of residents feel safe in the outside environment around public amenities (streets, parks, play spaces, school, health services, etc.)
2	Crime rate against children (incidence of crimes committed against children per one lakh population of children up to 6 years of age)	0%	1-2%	More than 2%
3	% of children dying in road crash accidents in the % of total road crash fatalities	0%	1-2%	More than 2%
4	Level of air pollution against the maximum permissible norms[63] (NO_2, SO_2, RSPM/ PM $_{2.5}$, PM $_{10}$, etc.) (National average and WHO guideline)	RSPM/ PM $_{2.5}$< 10 ug/ m3 PM $_{10}$ <20 ug/ m3 NO_2 < 40 ug/ m3 SO_2 < 50 ug/ m3	RSPM/ PM $_{2.5}$: 10-40 ug/ PM $_{10}$ 20-60 ug/ m3 NO_2 40-80 ug/ m3 NO_2 50-80 ug/ m3	RSPM/ PM $_{2.5}$>40 ug/ m3 PM $_{10}$ >60 ug/ m3 NO_2 > 80 ug/ m3 NO_2 > 80 ug/ m3

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[61] *Traffic Park in Aundh, Maharashtra Times, Pune, February 2020. Link:* https://maharashtratimes.com/maharashtra/pune-news/traffic-park-in-aundh/articleshow/73943166.cms *Accessed on 30th March 2020*

[62] *PMC to build Traffic Park for Kids in Aundh, Sakaal Times, March 2019. Link:* https://www.sakaltimes.com/pune/pmc-build-traffic-park-kids-aundh-36784 *Accessed on 30th March,2020*

[63] http://www.indiaenvironmentportal.org.in/files/file/Permissible%20Level%20for%20Pollutants.pdf

Annexure I: Safety Assessment Checklist

Below is the safe city checklist for quick assessment of the specific area identified, categorized into each of the safety components described in the document. The following checklist is provided only as a guide for the users to be able to identify which issues/ risks need to be addressed in order to improve ITCs safety in their selected areas. This will help them identify which principles and guidelines outlined in the document will be potent in minimizing the risks/issues encountered. This checklist has been developed as a ready reckoner for the safety assessments and will act as an improvement tool for the city officials across various spaces in the city.
Hence, the checklist has included the areas in which the listed criteria will be applicable. Following are the areas:

1- Neighbourhood
2- Streets
3- Open Green Spaces- Parks, Gardens, Public spaces/Plazas, Waterfronts, etc.
4- Health- Dispensary, Anganwadi, Nursing Home, Child Welfare and Maternity Centre
5- Education- Pre-primary, Nursery schools, Kindergartens, Primary school, Day Care Centres, Crèches

It is recommended that an assessment should be carried out at the initial stage of the design process and also post-implementation for monitoring the effectiveness of the interventions. The findings of the audit/ assessment should be documented both the times.

SN	Criteria	Applicable Areas	Response		Remark
			Yes	No	
D1	Urban Structure				
1	Does the land use in the immediate area generate activity at different times of the day and night?	Neighbourhood			
2	Is there any separation of compatible land uses that may result in isolation of buildings or spaces?	Neighbourhood			
3	Does the street network continue with the street pattern of surrounding areas to ensure natural surveillance?	Neighbourhood			
4	Is the network of streets and pedestrian routes clear and legible?	Neighbourhood			
5	Are there isolated routes in the neighbourhood which people avoid or alternatively can't avoid?	Neighbourhood			
6	Is there a good social blend(religious/ economic) in the given area?	Neighbourhood			
7	Are ITCs destinations located in the areas with active/mixed land use with medium and high density to ensure natural surveillance?	Neighbourhood, Open Greenspace, Street, Health, Education			
8	Is any ITCs destination or route located in an isolated/ secluded corner or area?	Neighbourhood, Open Greenspace,			

		Street, Health, Education			
9	Are all the daily ITCs destinations such as schools, crèches, daycare centers, etc. located within 5-10 minutes i.e. 300m max walking distances in the neighbourhood?	Neighbourhood			
10	Is it clear which areas are publicly accessible and which areas should not be publicly accessible?	Neighbourhood			
11	Does the area and its surroundings appear owned and cared for to ensure a defined territory?	Neighbourhood			
12	Is there a sense of Neighbourhood in the area to ensure community patrolling?	Neighbourhood			
13	Is there a perception of fear by ITCs in neighbourhood? List the reasons and the areas.	Neighbourhood			
D2	Surveillance and Sightlines				
1	Can people on the street/ public areas be seen by the people from the adjoining areas? Or are the active frontages present on the ITCs route or public space that can overlview the activities on street/ park/open spaces, etc.?	Neighbourhood, Street, Open Green Space			
2	Does the immediate area have activity and footfall at different times of day and night near the ITCs destination or transit stop, etc for natural surveillance?	Neighbourhood, Street, Open Green Space, Health and Education			
3	Do boundary walls or fences allow for people using streets and open spaces to be seen from inside buildings?	Neighbourhood, Open Green Spaces			
4	Are building entrances clearly visible from the street, well lit, articulated and secure?	Neighbourhood, Street			
5	Do the ITC destinations such as parks, public areas, etc have permeable /see-through fencing for clear sightlines from the surrounding areas?	Open Green Spaces, Education			
6	Does the vegetation obscure views onto open spaces/ public areas?	Neighbourhood, Open Green Spaces, Street			

7	Are there corners or recessed areas that enable people to hide?	Neighbourhood, Open Green Spaces, Street			
8	Are there sharp corners, grades, fences, or objects that reduce the ability to see what is coming/ obscure the sightlines from the surrounding areas?	Neighbourhood, Open Green Spaces, Street			
9	Are the safety as well as emergency features like CCTV, SOS, 24*7 active surveillance present in and around at ITCs facilities such as parks, transit stops, subways, etc.?	Neighbourhood, Open Green Spaces, Street			
D3	Lighting				
1	Does the space have sufficient lighting during the night/ early morning hours? Pedestrian crossing- 50 lux Cycle track - 20 lux Main roads carrying mixed traffic like city main roads/ streets, arterial roads, throughways- 15 lux Secondary roads with considerable traffic like local traffic routes, shopping streets- 8 lux Secondary roads with light traffic- 4 lux Pedestrian Subway- 50 lux Parking area- 50 lux On footpath for pedestrians only- 25- 40 lux Parks and public plazas- 15-30 lux	Neighbourhood, Open Green Spaces, Street			
2	Are there any dark spots in the areas?	Neighbourhood, Open Green Spaces, Street			
3	Is there persistentlighting with limited contrasts and no dark spots?	Neighbourhood, Open Green Spaces, Street			
4	Is there adequate lighting available in areas such as recesses and entrances, pathways and potential entrapment locations, etc., and along routes which are meant to be accessed after dark?	Neighbourhood, Open Green Spaces, Street			
5	Are the lighting fittings vandal resistant?	Neighbourhood, Open Green Spaces, Street,			

6	Are the lightings from fixtures been blocked by mature vegetation, awning, or physical barriers?	Neighbourhood, Open Green Spaces, Street			
7	Are the lights LED and solar-powered?	Neighbourhood, Open Green Spaces, Street			
D4	Urban Leftovers				
1	Are there any isolated, under-used or unused spaces in the area? E.g.: Areas under flyovers/metro lines, irregular shaped land-locked vacant plots, frontage zone, etc.	Neighbourhood, Open Green Spaces, Street			
2	Do these spaces attract illegal activities or as dump areas?	Neighbourhood, Open Green Spaces, Street			
3	Are these spaces accessible by pedestrians or vehicular routes?	Neighbourhood, Open Green Spaces, Street			
4	Are these spaces well-lit at night hours?	Neighbourhood, Open Green Spaces, Street			
5	Do the surrounding areas have mixed use of activities which can help passive surveillance of these spaces?	Neighbourhood, Open Green Spaces, Street			
D5-6	Safe Zones & Safe Routes				
1	Are there any safe zones demarcated in the area? For ex.-Safe School Zone, Safe Park Zone, and around other destinations such as crèches, kindergartens, health care centers, etc.	Neighbourhood			
2	Are there any existing safe routes demarcated which connect all the ITCs destinations like parks, crèches, daycare centre, schools, etc. in a Neighbourhood?	Neighbourhood, Streets			
3	Is there any speed limit set in the area (to 30km/hour) depending on the time of functioning of the destination such as school, park, etc.?	Neighbourhood, Streets			
4	Does the area have a proper standard traffic signage system in place?	Neighbourhood, Streets			
5	Does the traffic signal near ITCs destinations consider the walking speed of children?	Streets			

6	Are there any proper traffic regulating measures in the area such as speed bumps, speed table/crossings, etc. ?	Streets			
7	Do the intersections around ITCs destinations have pedestrian countdown signal programmed for the slow walking speed of ITCs?	Streets			
8	Are there any parking restrictions to regulate the parking near ITCs destinations such as schools, parks, etc.?				
9	Are the junctions/intersections near ITCs destination signalized?	Streets			
10	Are the intersections designed compact with other pedestrian safety elements such as curb extension, small turning radius, refuge islands, channelizers, etc.?	Streets			
11	Are the footpaths or sidewalks designed with adequate widths, good condition, and uniformity?	Streets			
12	Are the sidewalks free of construction and impassable barriers (e.g. trash cans, electric boxes, etc.) /	Streets			
13	Are the footpaths or sidewalks separated from the street by a landscaped area with trees, where appropriate?	Streets			
14	Whether the use of anti-skid material along with different types of patterns or colors of paving for indications zones such as a safe walking zone, playing zone, or events such as crossings, bus stops, etc. been made?	Streets			
15	Are the bollards present with adequate spacing restricting entry of vehicles on pedestrian space and also facilitating Caregivers carrying strollers as well as wheelchair users?	Streets			
16	Are the crossings identified anddeveloped at a safe, convenient location and preferably along with the shortest walking ,crossing distance?	Streets			
17	Are the provisions made for the adequate size of	Streets			

	refuges/medians for road crossing?				
18	Are the safety provisions at un-signalized intersections & mid-block crosswalks in neighbourhoods present?	Streets			
19	Are the utilities placed underground or in MUZ to prevent obstruction in the pedestrian pathway?	Streets			
20	Are the crossing obstructed by parking/vegetation?	Streets			
21	Are the inclination ramps with lower handrails provided where level differences exist such as subways, foot overbridges, etc.?	Streets			
22	Are the ITCs related cycling infrastructure such as cycle loops, cycle parking, etc. present in the Neighbourhood?	Streets			
23	Are there Pavement Markings to supplement regulations and warnings provided by traffic signs and signals?	Streets			
24	Are White and Yellow zigzag road markings placed to show that the area must be kept clear of parking?	Streets			
25	Does the ITCs user encounter any issues due to lack or unsafe pedestrian infrastructure such as uneven surfaces, discontinuous footpaths, illegal encroachment, poor lighting, inaccessible by strollers, etc?	Streets			
26	Are there clear signage's present to make the navigation through an area easy on safe routes?	Streets			
27	Are there differentiated floor materials or sensorial elements present to indicate danger/events such as sidewalk edge, bus stops, etc.?	Streets			
D7	Way Finding and Signage's				
	Signage's				
1	Are the signages present at necessary locations in the area? These include cautionary signage's, informative signage's, directional signage's, educational signage's, etc.	Neighbourhood,			

2	Are the kids specific signage's placed at their eye level i.e. between 700- 1075mm?	Neighbourhood, Street, Open Green Space, Health and Education			
3	Are these signages designed creatively, with the use of symbols for easy understanding by young children?	Neighbourhood, Street, Open Green Space, Health and Education			
4	Are they readable and positive?	Neighbourhood, Street, Open Green Space, Health and Education			
5	Are the maps along with directional and informational signage well-lit at night?	Neighbourhood, Street, Open Green Space, Health			
6	Are they vandal-proof?	Neighbourhood, Street, Open Green Space, Health and Education			
7	Are they easy to maintain?	Neighbourhood, Street, Open Green Space, Health and Education			
	Way Finding				
1	Apart from Signage's does the area have any other navigation system present?	Neighbourhood			
2	Are there any landmarks on the route identified that can act as a navigation element for ITCs?	Neighbourhood, Streets			
D8	Public Transport- Transit stop				
1	Are transit stops located within 0.5km of the areas?	Neighbourhood, Streets			
2	Are IPT stands planned if the main bus stop/metro stations/BRTS is more than 1.5kms away from the Neighbourhood?	Neighbourhood, Streets			
3	Are there provisions made for safe, convenient pedestrian & bicycling network connections to transit stops for improving ITC last-mile connectivity?	Neighbourhood, Streets			
4	Are these transit stops located in mixed-use areas or surroundings that generate activities during the day and night time to ensure natural surveillance?	Neighbourhood, Streets			

5	Do these bus stops have transparent facades to ensure clear-sightlines from surrounding areas?	Streets			
6	Are the surrounding areas of the transit stops well-lit?	Streets			
7	Is there sufficient lighting inside the transit stop?	Streets			
8	Is there a ramp with a gradual slope of 1:12 present at the entrance/exit of the transit stop to provide stroller-friendly access to space?	Streets			
9	Are the transit stops well-shaded and have proper resting spaces at the height of children?	Streets			
10	Is there a proper Passenger Information System (PIS) in place to provide real-time information to the Caregivers travelling with young children as well as other users?	Streets			
D9	Green Open Spaces				
1	Is the hierarchy of parks considered while designing neighbourhood? Recommended hierarchy of parks as per URDPFI Guidelines 2015 is: Neighbourhood Park (NP) - 5,000 - 10,0000 sq.m Housing Area Park (HAP) - Less than 5,000 sq.m As per BvLF guideline, 2019: Tot-lot - 50-125 sqm.	Neighbourhood, Open Green Space			
2	Are the green open spaces sufficient as per the population density of the Neighbourhood (as per URDPFI norms)? Category vs population served per unit as per URDPFI Guideline 2015: NP - 3-4 local parks and playgrounds - 15000 HAP - 3-4 local parks and playgrounds -5000 Tot-lot min 6 -2,500 as per Urban greening guidelines 2014	Neighbourhood, Open Green Space			
3	Are the green open spaces located in areas that are isolated or accessed by routes that are unsafe, inaccessible for the ITCs, or dark?	Neighbourhood, Open Green Space			

4	Are there any illegal, crime attracting activities near the open spaces?	Neighbourhood, Open Green Space			
5	Does the park have atleast 3 edges surrounded by active frontages which can overview activities inside the park?	Neighbourhood, Open Green Space			
6	Is there a public transit system within 10-15 minutes walking distance from the park/ open space?	Neighbourhood, Streets, Open Green Space			
7	Is there a dedicated play area for children up to 5 years?	Open Green Space			
8	Are the spaces such as pathways, play areas, entrances, and exits etc.in the park well-lit?	Open Green Space			
9	Is there any area in the open space that ITCs feel unsafe about?	Open Green Space			
10	Are there any dark spots or isolated corners in the park/ open space?	Open Green Space			
11	Does the open space/ park have activities that cater to all age groups?	Open Green Space			
12	Does the open space/ park have activities at all hours of the day?	Open Green Space			
13	Is the furniture placed in these open spaces like seating, dustbins, signage's, water fountains, etc. should have ITCs friendly design?	Open Green Space			
14	Are there ITCs amenities, like child-friendly toilets, lactation room, drinking water fountains, etc. provided in the open space?	Open Green Space			
15	Is the landscape provided in the open space safe for children i.e. is it in non-thorny, edible, playful and non-toxic, etc.?	Open Green Space			
16	Are the school playgrounds used for play after school hours by the community?	Neighbourhood, Education			
17	Have the natural materials/ soft surfaces been provided under all play equipment area?	Open Green Space, Education, Health			
18	Are the provided play equipment safe, well-kept, and appropriate for children's age and developmentally-appropriate play equipment for large motor and sensorial play?	Open Green Space, Education, Health			
19	Is the furniture provided vandal-proof?	Open Green Space,			

		Education, Health			
D10	Clean Environment				
	Solid Waste Management				
1	Are streets and open spaces clean and well maintained?	Neighbourhood, Streets, Open Space, Education, Health			
2	Is there any litter or open dumpsite in the area?	Neighbourhood, Streets, Open Space, Education, Health			
3	Is there a proper solid waste management system present in the area?	Neighbourhood, Streets, Open Space, Education, Health			
4	Is there segregation of waste at the source present?	Neighbourhood, Streets, Open Space, Education, Health			
5	Is there a proper coverage of solid waste through the door-to-door collection and in the Neighbourhood?	Neighbourhood, Streets, Open Space, Education, Health			
6	Are there educative signs to teach young children about the segregation of waste while dumping it in the dustbin?	Neighbourhood, Streets, Open Space, Education, Health			
7	Are the designs of the dustbins creative to encourage the children to use them?	Neighbourhood, Streets, Open Space, Education, Health			
	Urban Drainage system				
1	Are there any instances of waterlogging in the area?	Neighbourhood, Open Green Space, Street			
2	Are there any open drains in the area?	Neighbourhood, Open Green Space, Street			
3	Are there natural systems integrated into the design to conserve the quality of water?	Neighbourhood, Streets, Open Space, Education, Health			

4	Are the rainwater harvesting systems (RWH) mandatory in households, parks, schools, and other public plots within the Neighbourhood?	Neighbourhood, Streets, Open Space, Education, Health			
	Public Toilet facility				
1	Is there any public toilet facility present in the area?	Public Toilet			
2	Are the public toilets clean?	Public Toilet			
3	Are the public toilets periodically maintained?	Public Toilet			
4	Are the toilets well-lit?	Public Toilet			
5	Is there a proper cross-ventilation system present in the toilet facility?	Public Toilet			
6	Are there any complaints registered regarding the unhygienic condition or poor maintenance of the toilet facility by ITCs?	Public Toilet			
7	Do the toilets have stroller-friendly ramp access?	Public Toilet			
8	Are there ITCs friendly facilities inside the toilet such as diaper changing deck, dustbins for a diaper, etc.?	Public Toilet			
9	Are the accessories inside the toilet accessible by young children?	Public Toilet			
10	Are proper signages installed within the toilets as required?	Public Toilet			
11	Are there any existing lactation booths present in the area?	Public Toilet			
12	Is there a provision for Lady Caretaker in female toilets for help?	Public Toilet			
13	Are there provisions for periodic maintenance and cleaning of the toilets? And is its status evaluated timely?	Public Toilet			
	Air/Noise pollution				
1	Is there any complaint regarding the air quality in the area? Is there any instance of health/ respiratory disease recorded in the vicinity?	Neighbourhood, Streets, Open Space, Education, Health			
2	Are the noise levels above permissible limits in the given areas?	Neighbourhood, Streets, Open Space, Education, Health			

3	Are there provisions of negotiated sound factors to reduce noise from traffic such as trees and enclosed spaces while highlighting natural sounds?	Neighbourhood, Streets, Open Space, Education, Health			
D11	Urban Playfulness				
1	Are playful elements present in the given area?	Neighbourhood, Streets, Open Space, Education, Health			
2	Do the footpaths have color flooring patterns and sidewalk games?	Neighbourhood, Streets			
3	Do the ITCs resting areas have colorful benches and have other playful elements around it?	Neighbourhood, Streets, Open Space, Education, Health			
4	Are there colored zebra crossing markings made which are easily identifiable by vehicle users?	Streets			
5	Are there any playful elements in transit stops located near ITC destinations such as arts, murals embedded in walls, playful benches, lighting games, etc.?	Streets			
6	Is there any public art present on ITCs routes, public spaces which are interactive or attractive for children such as wall art, paintings, sculptures of animals, etc.?	Neighbourhood, Streets, Open Space,			
	Other				
1	Does PMC monitor and maintain the quality and safety of ITCs facilities such as Parks, Streets, Crèches, Schools, Anganwadis, etc.?	Neighbourhood, Streets, Open Space, Education, Health			
2	Is the consultation with the community, caregiver groups/networks, RWAs, etc. carried out to account for local safety needs and issues?	Neighbourhood, Streets, Open Space, Education, Health			
3	Is the information such as crime data or social and demographic information pertaining to an area collected and used to identify areas of greater vulnerability to crime?	Neighbourhood, Streets, Open Space, Education, Health			