Project Urban Living Lab

IMAGINE panaji
SMART CITY DEVELOPMENT LTD.

INCLUSIVE STREETS

Implementation Strategy

July 2021

PANAJI

Green Strategic Partnership
India-Denmark

ROYAL DANISH EMBASSY
New Delhi

MINISTRY OF FOREIGN AFFAIRS
OF DENMARK

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PULL is a sandbox to test new approaches and solutions for sustainable and liveable cities in collaboration with residents, policymakers, public bodies, businesses and academia. It has been set up under a Memorandum of Understanding (MoU) between the Royal Danish Embassy in India (RDE) and Imagine Panaji Smart City Development Limited (IPSCDL), drawing on an earlier MoU on Sustainable and Smart Urban Development signed between the governments of Denmark and India in April 2018. It is being implemented by Oxford Policy Management, Transitions Research, and TERI.

Editorial and Design
Oxford Policy Management (India Office)
Transitions Research
The Energy and Resources Institute (TERI)

Authored by
Ashali Bhandari, Silky Jain, Karthikeyan Kuppu, Rishika Das Roy, Bhavya Bogra and Hema Vaishnavi Ale

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For More Information

MINISTRY OF FOREIGN AFFAIRS OF DENMARK
ROYAL DANISH EMBASSY New Delhi

Danish Ministry of Foreign Affairs,
Royal Danish Embassy, New Delhi
Plot number 33 B,
Dr. S Radhakrishna Marg,
Chanakyapuri,
New Delhi 110021, India
Tel.: +91 11 4209 0700
Fax: +91 11 2460 2019
Email: delamb@um.dk
Web: www.indien.um.dk

Oxford Policy Management

Oxford Policy Management (India office)
4/6, Sirifort Institutional Area, August Kranti Marg, New Delhi. 110049, India
Tel.: +91 (0)1148 081 111
Email: info.indiaoffice@opml.co.uk
Web: www.opml.co.uk

TRANSITIONS RESEARCH

Transitions Research,
362/B, Coma Vado
Aldona, Bardez - 403508
Goa, India.
Email: hello@transitionsresearch.org
Web: www.transitionsresearch.org

teri The Energy and Resources Institute
Creating Innovative Solutions for a Sustainable Future

The Energy and Resources Institute,
Centre for Urban Planning and Governance Sustainable Habitat Programme,
Darbari Seth Block, IHC Complex,
Lodhi Road, New Delhi 110003, India
Tel.: +91 11 2468 2100; 2468 2111
Fax: +91 11 2468 2144 or 2145
Email: pmc@teri.res.in
Web: https://www.teriin.org/cities

Executive Summary

According to the Gender Vulnerability Index[1] launched by the Ministry of Women and Child Development in 2017, Goa is one of the safest states for women in India. Women in Goa have better access to health and education services and are less likely to be in poverty or to face violence. Access to safe and gender inclusive mobility options[2] is essential to ensure girls and women can earn a living and avail basic services and opportunities.

In the capital city of Panaji, disinvestment in infrastructure for pedestrians and users of public transport disproportionately impacts women[3]. A data-driven Safety Audit conducted by the social enterprise Safetipin found that the city has an above average safety score of 3.41 out of 5, but Panaji could address existing challenges and improve walking infrastructure throughout the city to make mobility more inclusive.

Inclusive Streets is a comprehensive and gendered mobility improvement framework for the city of Panaji to address the following questions:

1. What are the challenges faced by girls and women in Panaji while walking in the city?
2. What can the city do to mitigate these problems and make the city more inclusive for women?

This Implementation Strategy localises and expands on the recommendations developed in the Inclusive Streets Preliminary Report, to improve the female pedestrian experience in the city. The recommendations listed out here have been prioritised based on feedback from the Apex Committee on Non-Motorised Transport (NMT) in June, 2021. They are targeted interventions that can be implemented to make Panaji a more inclusive city.

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Abbreviations

City Corporation of Panaji (CCP)
Imagine Panaji Smart City Development Limited (IPSCDL)
Non-Governmental Organisation (NGO)
Non-Motorised Transport (NMT)
Project Urban Living Lab (PULL)
Public Works Department (PWD)
Resident Welfare Associations (RWAs)
Royal Danish Embassy (RDE)
Urban Local Body (ULB)
Water, Sanitation and Hygiene (WASH)

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Walks with Women on 18th June Road

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Figure 2: Women Taking a Break from Work at Panjim Market (Source: Walking with Women in March, 2021)

BACKGROUND

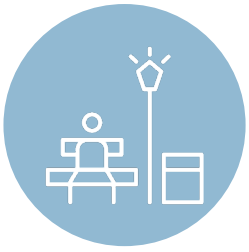
Principles of Walkable Streets

In Panaji, neighbourhoods without walk paths, parking on spaces allocated for pedestrians and the sprawling expansion of the city connected by motorways and not walkways, has created unpleasant and sometimes unsafe experiences for girls and women who walk. Women's needs are multifarious: they are more likely to be caregivers, walking with children or someone elderly; home-makers, who need to make various types of trips every day; or informal workers, working or vending on the street as opposed to with a stand or pushcart[4]. Pedestrian streets must be redesigned to be female-friendly, supporting the diverse needs of women.

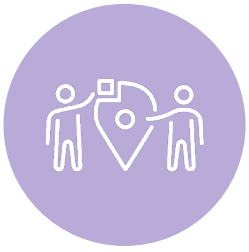
The Preliminary Report highlighted three guiding principles of walkability as goals to work towards to promote gender-equitable walkability in Panaji.

TRAVERSABLE STREETS:
that enable pedestrian movement without any major impediment. This principle focuses on the physical condition of streets and walk paths.

SAFE STREETS:
where female pedestrians can walk without fear of crime or physical harm. This principle focuses on both physical and social conditions that mitigate crime and accidents.



SOCIABLE STREETS:
which spark interaction between people. Borrowing from William Whyte's theory of triangulation[5], this principle focuses on stimuli that facilitate these interactions, ranging from people waiting together at a bus stop to stopping to have a chai or buy vegetables while walking home.



Methodology

OVERVIEW

PULL adopted a comprehensive approach to understand the challenges faced by women while walking in Panaji and develop localised interventions. The recommendations are based on the findings of a Safety Audit, conducted by PULL's data partner Safetipin, in January and February 2021. Ground truthing was conducted in March as PULL held Walks with Women to understand how women perceived walking in the city.

SAFETIPIN AUDIT PROCESS

Panaji's Safety Audit was conducted using the Safetipin Nite app. The app captured night-time photos of city streets between 7pm and 9pm on weekdays from 20 January, 2021 to 17 February, 2021. Each photo was then scored on eight parameters by analysts. For more information about the Safetipin Audit, please refer to the preliminary report (pg.12).

WALKING WITH WOMEN

Walks with Women were conducted in Panaji on March 7th and 8th, 2021. The facilitators walked alongside girls and women as they commuted or walked for leisure to understand, in real-time, which factors impacted the way in which they perceived their surroundings. For more information about these walks, please refer to the preliminary report (pg. 10).

RECOMMENDATIONS

Five of the seven recommendations utilise spatial data provided by the Safety Audit and IPSCDL to create GIS-based, localised strategies for action:

Recommendations one, two, three, four and five aggregate Safetipin parameter data at the scale of the ward to identify which wards have the lowest parameter scores and require the most urgent action. For some recommendations, PULL has identified specific streets, based on location-specific data from the Safety Audit, that require the most urgent action;

Recommendations two and three specify the quantity of new infrastructure that must be developed or installed in priority wards. GIS analysis was performed by summarising the length of the roads (based on the Roadscenterline shapefiles shared by IPSCDL) in each ward, to determine the required infrastructure for that geography. Standards from the Indian Roads Congress Guidelines for Pedestrian Infrastructure were used as the benchmarks for infrastructure provision.

Challenges in Panaji

Traversable Streets

1. POOR WALK PATH DESIGN

Discontinuous walk paths which do not allow universal accessibility make walking on designated walk paths challenging for women, especially those who are carrying heavy loads (vendors/sanitation workers) or the elderly and differently-abled.

2. OBSTRUCTIONS ON DESIGNATED WALK PATHS

Across the city, many walk paths have obstructions like construction debris, garbage and poles (street lights, electrical) that make walking easily on the walk path a challenge for pedestrians.

3. VEHICULAR ENCROACHMENT ON WALK PATHS

Vehicular encroachment is a challenge in high traffic areas in Panaji, where people often block the right of way for pedestrians by driving motorcycles on walk paths or parking vehicles on them.

85%

of Panaji's streets did not have a good walk path according to the Safety Audit

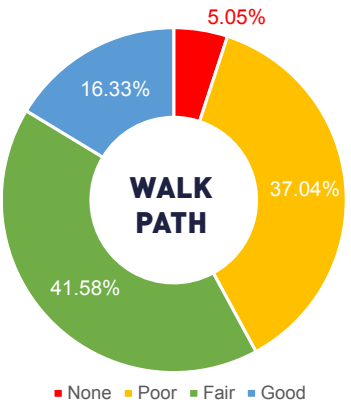


Figure 3:
Distribution of Audit scores for the parameter Walk Path

Safe Streets

4. LOW LIGHTING

While most of Panaji is well lit, there are neighbourhoods which are not, and walking in these areas at night can feel unsafe. Poor lighting also makes it difficult for people with disabilities to walk at night.

5. MALE DOMINATED SPACES

While the Safety Audit of Panaji highlighted the fact that the city's streets are not very diverse, PULL found that this is not a major deterrent for women during the day. However, some women stated that public spaces are not accessible to them for recreational purposes because they are dominated by men.

6. UNSAFE CROSSINGS

Crossing the streets in most parts of the city is dangerous, given the lack of designated crossing infrastructure in the city. Women who work on the streets, like vendors and sanitation workers, are at higher risk of an accident due to prolonged exposure.

13

Zebra Crossings
were found in the Safety Audit in all of Panaji

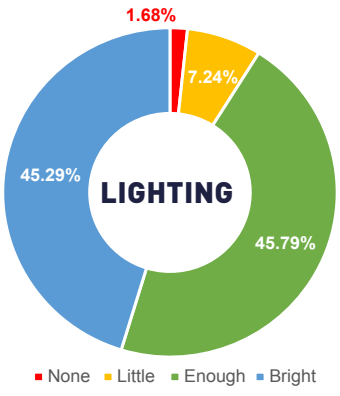


Figure 4:
Distribution of Audit scores for the parameter Lighting

Challenges in Panaji

Sociable Streets

7. SEATING INFRASTRUCTURE

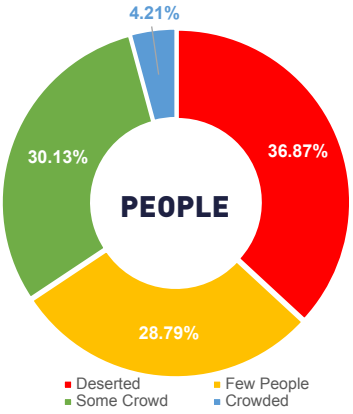
Across the city there are very few provisions for women to sit down and take a break while walking or for women who work in the informal economy to eat lunch.

8. INEQUITABLE ACCESS TO WASH FACILITIES

Women need access to clean public and community toilets across the city. In Panaji there are very few free toilets and at paid toilets, men's urinals are cheaper than the WC facilities for women. Poor signage is also a challenge as tourists and visitors may not know where to go to access WASH facilities.

9. INACTIVATED SPACES

During weekends and at night, some streets in Panaji can feel like dead spaces, with very little activity and few eyes on the street. This creates an unwelcoming atmosphere, where pedestrians, especially women, would not choose to congregate or spend time.



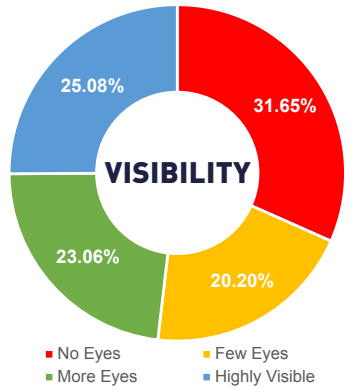


Figure 5 and 6:
Distribution of Audit scores for the parameters People and Visibility

Way Forward

OBJECTIVE

The Inclusive Streets Implementation strategy localises the pan-city recommendations presented in the Preliminary Report with area-specific and actionable interventions that improve walking conditions in Panaji, especially for women

RECOMMENDATIONS

The recommendations that were presented to the Apex Committee on Non-Motorised Transport in June 2021 from the Inclusive Streets Preliminary Report have been refined and developed into area-specific recommendations. These recommendations directly improve access for women who walk in the city, whether they are workers in informal livelihoods, commuters, passers-by or tourists.

PULL's recommendations will help Panaji achieve three principles of walkability, as they facilitate the creation of Traversable, Safe and Sociable Streets. As seen in Figure 7, they are multifaceted and holistic as they meet multiple principles of walkability. The recommendations to improve walking conditions in Panaji are:

	Traversable Streets	Safe Streets	Sociable Streets
1. Redesign Walk Paths			
2. Increase Lighting			
3. Create Safe Crossings			
4. Remove Obstructions			
5. Activate Dead Spaces			
6. Provide WASH Infrastructure			
7. Install Community Seating			

Figure 7: Summary of Recommendations

Figure 8:
Sanitation Workers Collecting Garbage from Residential Buildings (Source: Walking with Women in March, 2021)

RECOMMENDATIONS

1. REDESIGNING WALKPATHS

CONTEXT

Safe and accessible walking infrastructure is essential for creating an environment conducive to walking in Panaji. Inadequate walking infrastructure can increase the risk of pedestrian accidents and discourage people from walking[6], especially the elderly and differently-abled. Based on the Safety Audit conducted throughout the city, only 16% of the locations surveyed had a "good" walk path. This recommendation aims to help the city improve and build designated walk paths to ensure that everyone, especially senior citizens, the differently-abled and women can traverse the city on foot.

METHODOLOGY

By analysing the scores for the Walk Path parameter and the number of streets with accessibility features in the Safety Audit, PULL has prioritised wards and streets for developing new and upgrading existing walk paths.

The scores for the parameter walk path have been aggregated and averaged at the scale of the city wards. Based on these results PULL has prioritised which wards require new and/or upgraded walking infrastructure. Wards with an average score between 0 and 2 (not inclusive of the score 2) have been selected as priority wards. This is because these scores indicate that, on average, streets in this ward have no walk paths or have poor-quality walk paths.

It is important to note that the Audit found that in the entire city of Panaji, none of the locations that had been audited had either hand rails or tactile tiles, two important components in promoting traversable streets. These should be prioritised for any new walk path development.

ABOVE

Figure 9: Promenade along a canal in Copenhagen, showing a unique walk paths to ensure safe and comfortable pedestrian flow (Source: Ramboll)

CASE STUDY: PEDESTRIAN FRIENDLY STREETS IN DANISH CITIES

In Denmark, pedestrian areas in city streets are vibrant spaces that are designed to help people move safely and easily as well as spark interaction between people. To ensure pedestrian safety, pedestrian areas are designed to keep motorised vehicles away from the carriage way, using materials that are solid, even and durable in extreme weather. To ensure that pedestrian space is visually distinguishable from vehicular carriageways, the material used is tactile, to help visually-impaired persons navigate junctions, and the colour of different spaces can also be different. Pedestrian areas in Copenhagen also use art, greenery, seating and lighting to create a unique experience for pedestrians.

In Denmark, different types of streets have different types of walk paths, to best suit the needs of unique areas.

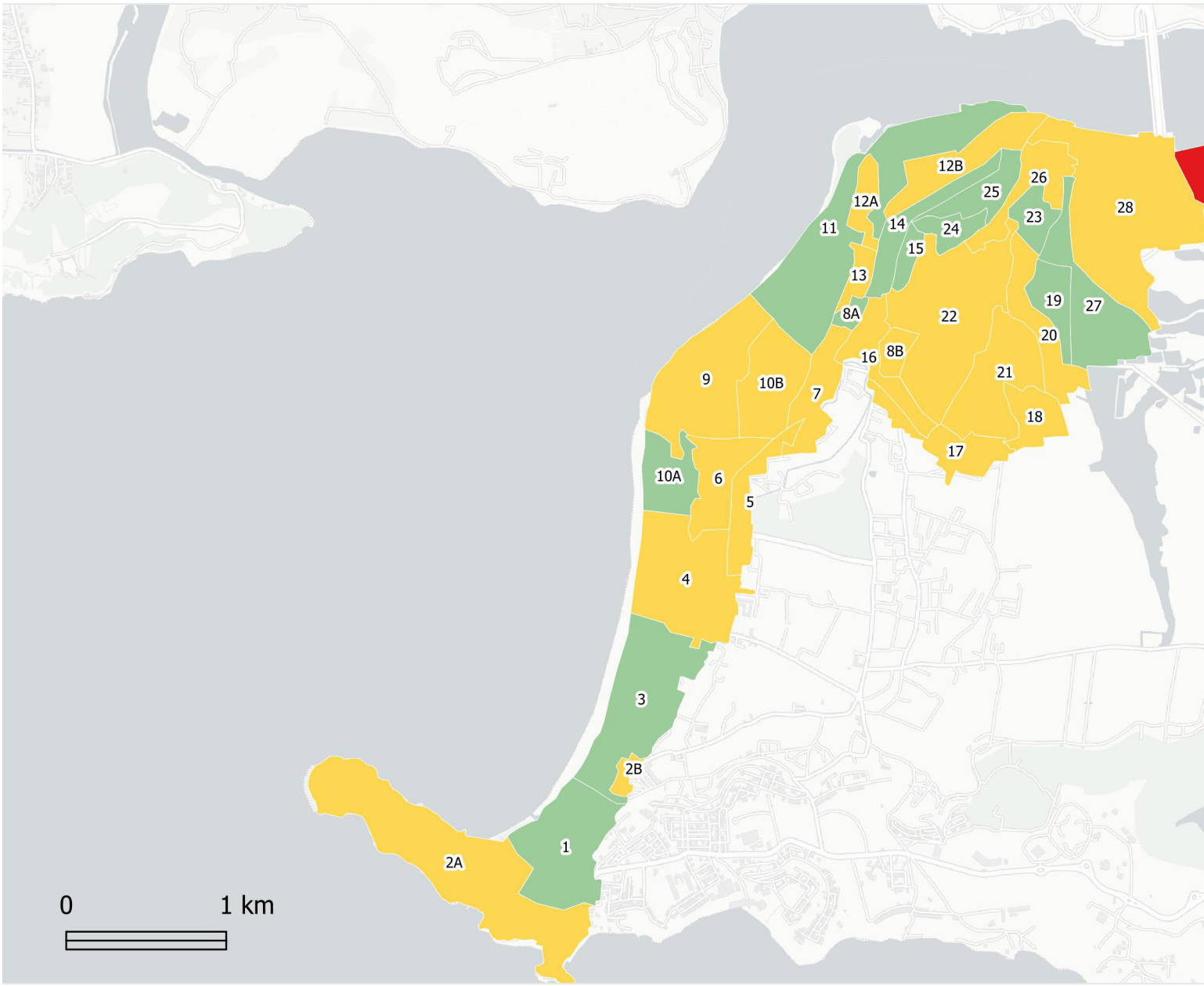
First, water promenades are a common feature in Danish cities - as they are in Panaji. Near the canals of Copenhagen, roads have been completely pedestrianised. Walk paths lined by mixed-use buildings overlooking the waterway, are used as recreational paths (see figure 9). This could serve as an inspiration for developing paths near St Inez Creek. Walk paths near waterbodies in the central city are wide and lined with trees to prevent vehicular encroachment.

Second, in areas with smaller roads, the material chosen for the roads is cobble stones, so as to limit traffic speeds. Here, walk paths are at-grade but differentiated from the carriageway by use of material, colour and bollards at cross-walks.

Third, on the main roads in Copenhagen, dedicated bike lanes are used to separate pedestrian walk paths from the carriage way. Here, pedestrian zones are raised to separate the flow of bicycles and vehicles from pedestrians, with safe crossings.

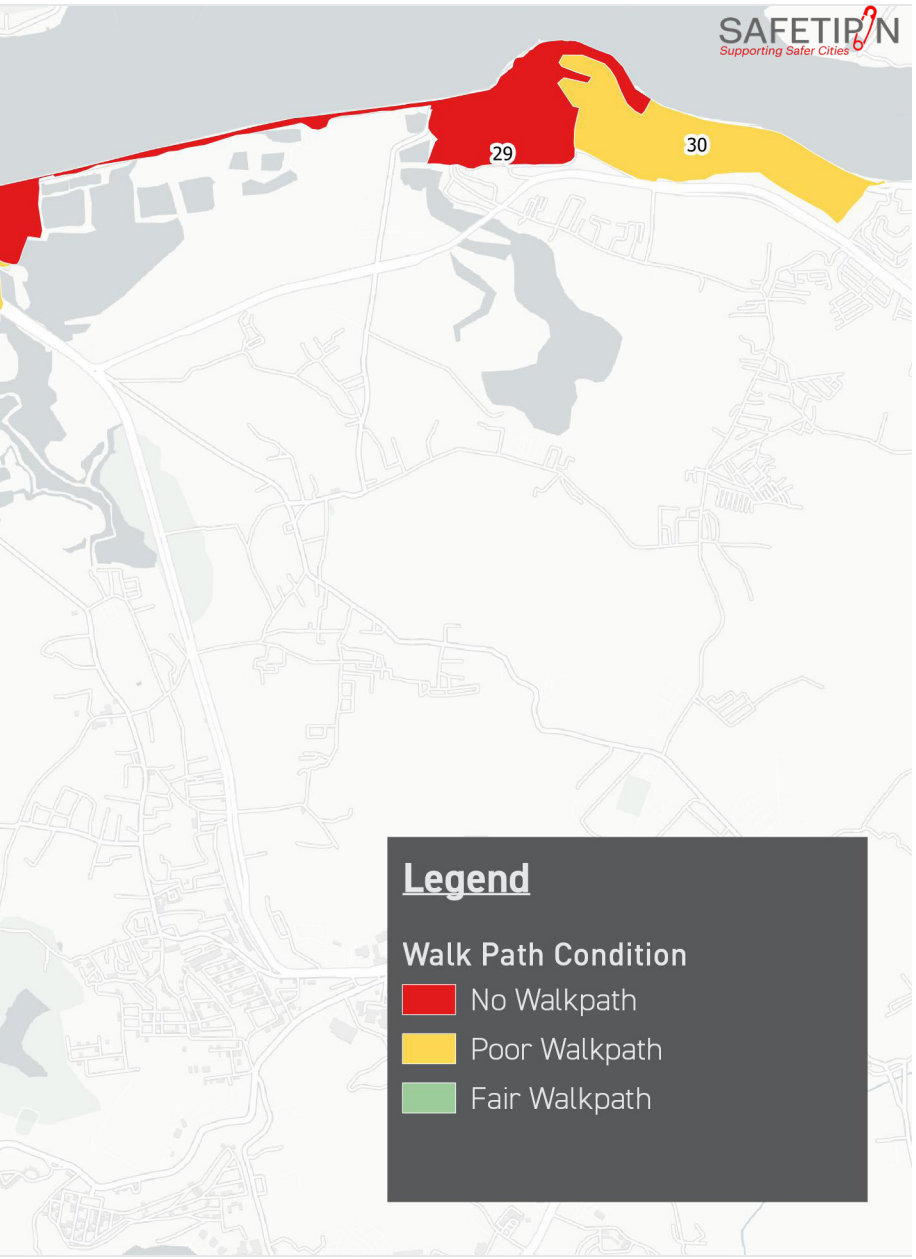
Panaji could also adopt a hierarchy of streets and redesign pedestrian walk paths as per the type of street. On smaller streets, bollards could be used to separate the road from on-grade walk paths that are distinguished by colour and the material used, while larger roads could have raised and wider walk paths and street furniture.

1. REDESIGNING WALKPATHS



ABOVE

Map 1: The Condition of Walk Paths across Wards in Panaji (based on data provided by Safetipin)



PRIORITY AREAS FOR IMPLEMENTATION

22 wards have been selected as wards of high importance and priority for developing or upgrading infrastructure. Ward 29 was the only ward with an average score of less than 1, indicating this ward has an average rating of no walk paths. In this ward, all streets require new walk paths to be built. In the other priority wards, some streets require new walk paths while others require upgradation.

Wards: 29, 2B, 8B, 16, 17, 18, 20, 22, 7, 21, 10B, 28, 6, 30, 12A, 5, 13, 2A, 9, 26, 4, 12B.

1. REDESIGNING WALKPATHS

MEDIUM-LONG TERM ACTIONS

Walk paths must be redesigned or created to be universally accessible and meet safety standards throughout Panaji. Surface material, width and continuity of walk paths must be kept in mind to ensure ease of use by women.

1. **New Walk Paths**
   In areas where there are no walk paths, new designated walk paths must be designed and built. Ideally this should occur on both sides of the streets[7] to prevent unnecessary crossings and prevent risk of colliding with vehicles. 75% of the city's streets should be covered to achieve the highest Level of Service according to the Ministry of Housing and Urban Affairs' Urban Transport Service Level Benchmarks[8]

2. **Upgrading Walk Paths**
   The following design elements are minimum standards that must be followed while redesigning or building walk paths:

Walk Path Dimensions:

Different types of streets require different walk path widths to manage the flow of pedestrians. Since residential zones have less footfall than commercial zones, these walk path widths should be different[9].

- Residential zones should have walk path widths of 1.8m + 1m for planting or furniture;
- Commercial zones should have walk path widths of 2.5m + 1.5m for planting or furniture;
- High intensity commercial zones should have walk path widths of 4m + 1.5m for planting or furniture.

Walk paths should ideally be raised and not designed to be at ground level, in order to prevent vehicular encroachment.

- The height of the foot path should not exceed 150mm[10];
- Bollards should be placed at kerb ramps and egresses to prevent vehicles from entering walk paths (more details in Recommendation 3: Create Safe Crossings);
- Railings can be installed on on-grade walk paths near junctions to prevent vehicular encroachment in high-traffic areas[11]. Railings should not be installed across the entire

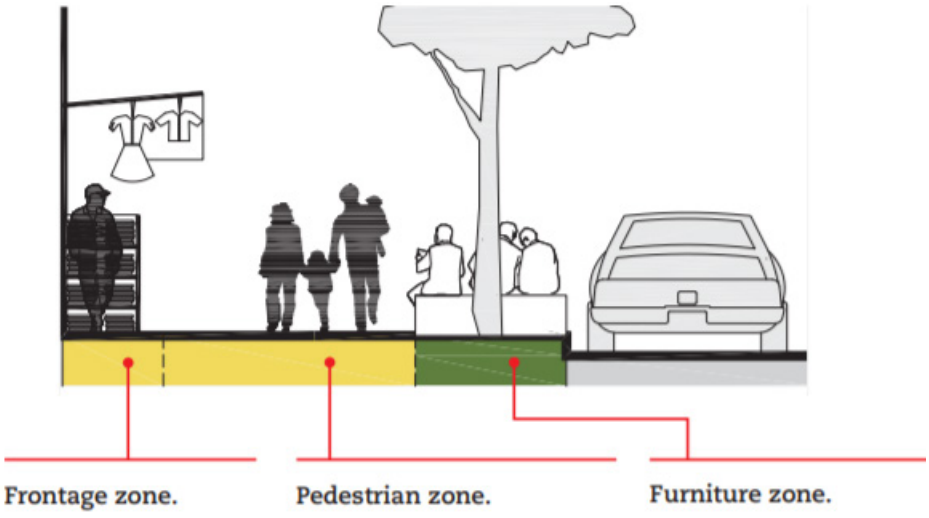
length of raised walk paths in order to avoid hindrance for pedestrians[12].

Walk Path Surface Quality:

Firm and paved surfaces are essential for creating safe walk paths. They reduce the likelihood of slipping and accidents, especially in the monsoon, and are particularly helpful for persons with disabilities[13].

- Walk paths should be non-skid, using tiles with a matte finish. Materials used could include interlocking paving tiles, sandblasted stones or unpolished stone or checkered tiles;
- Any variation in the level of the walk paths should be marked with bright contrasting colours to ensure it is clearly visible, especially for people with vision impairment. This would include, but is not limited to, marking any steps, kerbs or repair work.

GUIDE



PRINCIPLES OF WALKABILITY

STAKEHOLDERS

Public Works Department (PWD), City Corporation of Panaji (CCP), Imagine Panaji Smart City Development Limited (IPSCDL), Urban Transport Department - Govt. of Goa

REFERENCES

IRC 103: 2012
Service Level Benchmarks for Urban Transport by MoHUA
Footpath Design by Institute for Transportation and Development Policy (ITDP)
Urban Street Design Guidelines Version 1 by Pune Municipal Corporation (2016) by ITDP

LEFT:

Figure 10: A street section depicting the frontage, pedestrian and furniture and planting zones that need to be designed to accommodate pedestrian flows. (Source: ITDP)

1. REDESIGNING WALKPATHS

SYNERGY WITH ONGOING WORK

As per documents regarding the "Upgradation of Pedestrian Walkway in Panaji City", the city aims to upgrade existing pedestrian infrastructure from Old Patto Bridge to Church Square on MG Road and Rua Jose Falcao in Wards 28 and 26. Based on the data from the Safety Audit, Ward 28 is a priority ward and streets in these sections have poor to fair quality walk paths. Therefore, this pilot would help improve women's ease of walking by making streets more traversable. PULL suggests that the RCC foundation that will be built every 9m to erect street lights be placed in the furniture zone of the walk path (see figure 10). It is also advisable to follow both the recommended guidelines on the following page on walk path surface quality to reduce the risk of accidents, and walk path dimensions to ensure that they are accessible to those with disabilities and that the walk paths are protected from vehicular traffic.

Based on the presentation at the 13th Board Meeting of IPSCDL, a three-metre wide, 99 metre long bridge is being built for pedestrians to connect the Central Library and the Creek. According to the Safety Audit, the areas on both sides of the bridge already have fair and good walk paths. The proposal for the bridge is quite comprehensive but should also follow the recommendations above on walk path surface quality to ensure safe access. The recommendations for walk path dimensions should be heeded at the egress points of the bridge while connecting to other walk paths in the city. In general, tactile tiles and street lighting should also be added.

The same presentation also suggests that a promenade linking Miramar Beach with the ECG Building will be made for both pedestrians and cycling. Electric street poles here should be provided in the furniture zone and should not be blocked by trees. This project suggests that the cycle track must be visible from the pedestrian walk path, even if at a different elevation (currently it is lowered), to ensure visibility and eyes on the street, which is important for the safety of female cyclists.

Figure 11: Streets without Walk Paths (Source: Walking with Women in March, 2021)

2. INCREASE LIGHTING

CONTEXT

Adequate lighting on urban streets results in positive outcomes like road safety, a sense of security, improved economic and social activities and a better overall quality of life in general. Insufficient lighting not only exposes pedestrians (especially women) to crime and accidents, but also puts drivers at risk. The city of Panaji scored well in the lighting parameter in the Safety Audit: more than 45% of the locations surveyed have bright light. However, some areas were found to be scantly lit due to inconsistent lighting infrastructure. This recommendation aims to promote lighting in the city in order to increase people's perceptions of safety and security, thereby motivating them to walk more.

METHODOLOGY

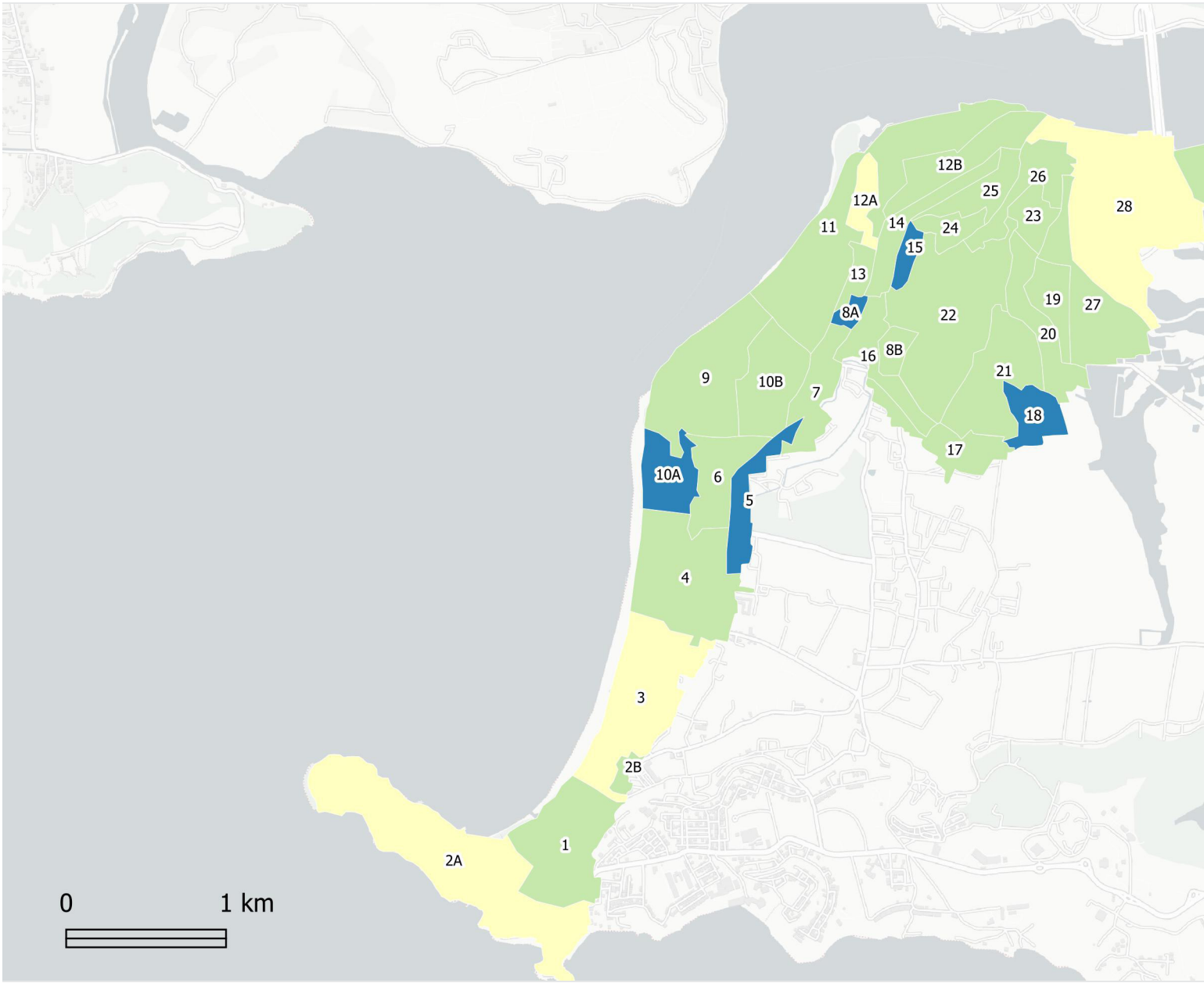
By analysing the scores for the lighting parameter and the number of streets with street lighting infrastructure in the Safety Audit, PULL has prioritised wards and streets for installing new and upgrading existing lighting infrastructure.

The scores for the parameter lighting have been aggregated and averaged at the scale of the city wards. Based on these results, PULL has prioritised which wards require new and/or upgraded lighting fixtures. Wards with an average score between 0 and 2 (not inclusive of the score 2) have been selected as priority wards, because these scores indicate that, on average, streets in this ward have no or little lighting.

Based on the road length in each of the priority wards, PULL has determined the number of lights required in each ward based on an average of placing street lights at every 25 metres in the city (as per IRC guidelines)[14].

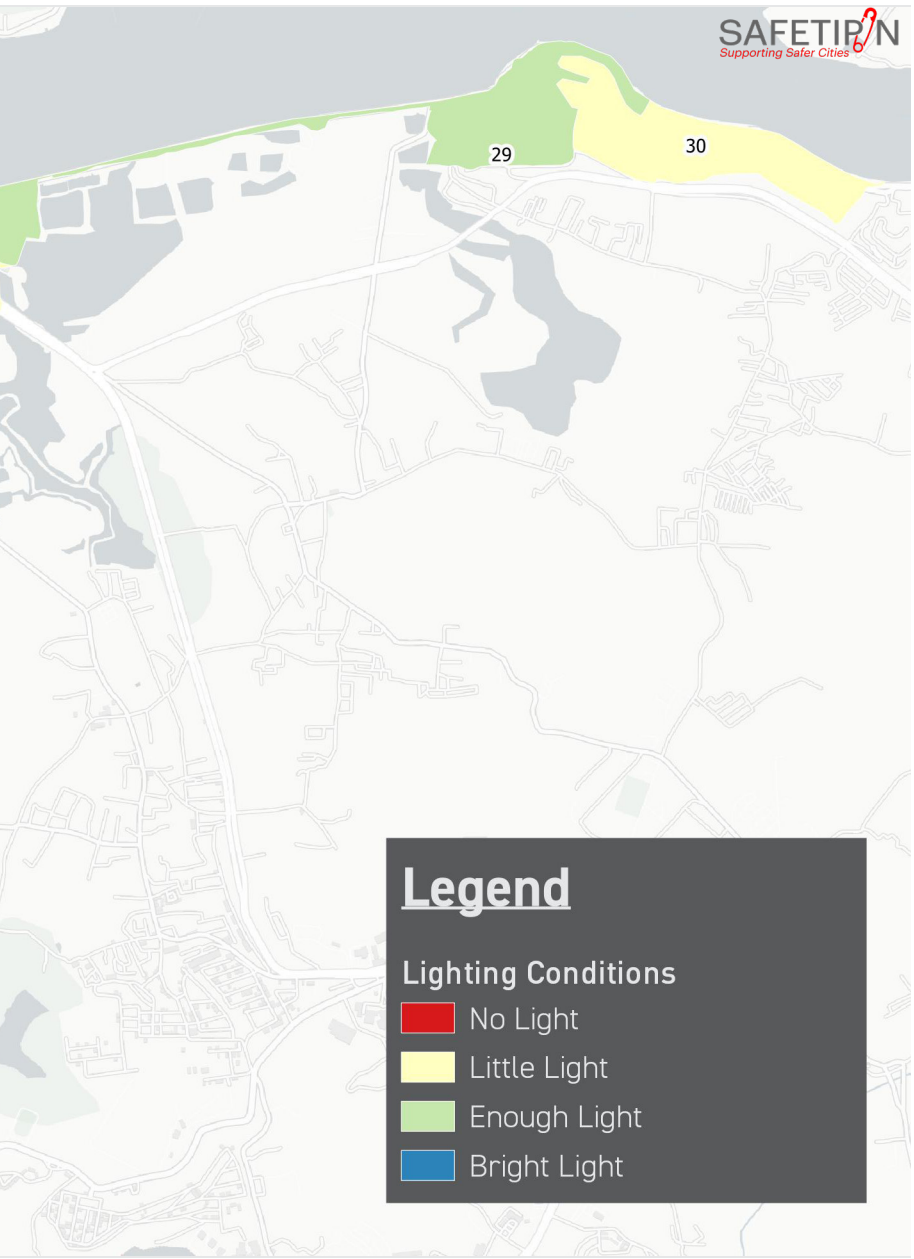
Figure 12: Wall of Dreams Lighting Installation by Ramboll in Copenhagen (Source: Ramboll)

2. INCREASE LIGHTING



ABOVE

Map 2: Lighting Conditions Across Wards in Panaji (based on data provided by Safetipin)



PRIORITY AREAS FOR IMPLEMENTATION

In general, the lighting parameter had a high average score of 2.3/3, indicating that a majority of the surveyed wards were sufficiently lit. Based on the 30 priority wards analysed, 5 wards were selected as wards of high priority for installing or upgrading lighting fixtures, with Ward 12A getting the lowest score of 1.73. Across all the priority wards, 1,474 street lights are required but this needs to be compared to the existing number of lights in the five wards to determine the lighting gap.

Wards: 12A, 2A, 3, 28, 30.

2. INCREASE LIGHTING

SHORT-MEDIUM TERM ACTIONS

Good quality lighting is a pre-requisite for designing safe streets for people, especially for the elderly, women and the differently-abled. Safe streets are achieved when streets, roads, bike paths and walk paths are illuminated. It is recommended that lighting for vehicular traffic is distinguished from pedestrian traffic and uniquely explored as cars, motorcycles, bicycles and pedestrians all move at different velocities and hence have different visual needs. This section focuses on actions for improving lighting for pedestrians.

1. **New Lighting Fixtures**

   On streets that have no lighting fixtures, new fixtures that are in accordance with the guidelines for pedestrian facilities must be installed[15]:

   - Lighting should be at the scale of pedestrians; thus, lighting fixtures should not exceed a height of 4m from ground grade level;
   - The light should face downwards to focus on pedestrian walk paths and bike lanes rather than car lanes;
   - White light sources with illuminance of 25-40 lux are recommended for walk paths to avoid shadows and get a better colour definition. In the case of pedestrian crossings, higher lighting levels of 80 lux are recommended. Additionally, colour contrast from the road and the tactile tiles should also be maintained to ensure visibility at night;
   - New lighting fixtures can be used to illuminate both the pedestrian walk paths and vehicular lanes as lights can be at different heights on different sides of the poles[16].

2. **Upgrading Lighting to Improve Brightness**

   In the priority wards (those which have "little" or "no" lighting), the city must conduct an audit to record the number and location of existing fixtures to determine the additional number of lights that are required. Existing street lights may also need to be moved in case of any possible obstruction (ie., trees or signage). The following guidelines must be heeded:

   - Lighting fixtures must consider the location of existing and proposed trees such that there is no blockage of light from their foliage. The fixtures should also be placed in a straight line ensuring a clear circulation corridor[17];

- In order to prevent any blind spots/ dark patches between two lighting poles, they must be spaced at 2.5 – 3 times the height of the pole[18] or at a distance of 25 to 30m between each pole.

3. Local Audits

In areas where streets were not audited by Safetipin, a local audit (either community-driven or city-led) should be conducted to determine the condition of the lighting infrastructure. If new fixtures are required they may be installed over a longer period of time.

4. Energy Efficient Lights

Existing conventional street lighting fixtures should also be retrofitted with solar powered or energy efficient LED lights as a means to achieving Panaji's broader goal of net carbon neutrality[19]. The city can achieve additional energy savings by using smart lighting control systems, that adjust the lighting in the public space to appropriate levels during the night.

5. Creative Lighting

Visually stimulating creative lighting installations should also be introduced in some streets with high footfall (eg., commercial and tourist areas) as a way to increase social activity and persuade more pedestrians to choose those streets as their preferred route (see Figure 13).

6. Lighting Masterplan

In the long term, the city can work towards developing a lighting masterplan, which defines general guidelines for lighting in the city. This plan should consider the specific spatial, traffic, climatic, social and economic conditions in the city.

PRINCIPLES OF WALKABILITY

Figure 13: Creative lighting installation in Sweden (Source: Ramboll)

STAKEHOLDERS

IPSCDL, CCP, PWD, Department of Energy, Energy Efficiency Services Limited.

REFERENCES

IRC 103: 2012
Panaji Solar City Master Plan
Promoting Low Emission Urban Development Strategies in Emerging Economy Countries (Urban LEDS Project) by UN-Habitat
Tactical Urbanism Guidebook by MoHUA and GIZ
Street Design Guidelines by Delhi Development Authority

2. INCREASE LIGHTING

SYNERGY WITH ONGOING WORK

As per the city's "Street Lighting Upgrade Project: Urban Range-Heritage Lighting", street lights are going to be installed across the city:

First, there is a plan to install street lights on the road divider between the Ribander Causeway and DB Road. It is important to note that these lights are unlikely to cover pedestrian walk paths, given their placement. Therefore, the proposed lights on the walk path from Miramar Circle to the Ribandar Causeway should be installed as per the recommendations listed above and placed in the furniture zone of the walk path;

Second, for the lights that are likely to be installed on all small lanes in Ribandar, Panaji and Caranzalem, streets should be prioritised as per the findings of the Safety Audit;

Third, the lights that are likely to be installed in tourist locations between Port Road and MG Road will probably be placed on the road divider and walk path. Caution must be taken to avoid existing obstructions and ensure that enough priority is given to walk paths;

Finally, in the colony areas of Panaji, Miramar, Altinho and Patto, the priority wards and streets should guide decision-makers in identifying areas with the highest need: for example, Ward 28 and streets in Patto require more lighting as do streets in colonies in Panaji in Wards 3 and 12A.

Figure 14:- Walk Path with Good Lighting in Panaji (Source: Walking with Women in March, 2021)

3. CREATE SAFE CROSSINGS

CONTEXT

One of the key principles of walkable roads is creating safe crossings, making the streets 'Traversable' and 'Safe'. It is important to create walking conditions which reduce conflicts between pedestrians and vehicular traffic. Walking infrastructure needs to keep in mind the needs of persons with disabilities, people carrying heavy goods, children, women and families as this will ensure the safety of all pedestrians. Without enough traffic lights, zebra crossings and infrastructure like medians on large roads, pedestrians (especially women) scurry through traffic, risking accidents while crossing the street at many points in the city. This challenge is exacerbated by poor edge management, where edges of walk paths are lined with parked motorbikes and vehicles. This trend stretches onto designated crossing spaces, making it difficult to safely disembark from the walk paths and safely cross the street..

METHODOLOGY

By analysing features related to traversable streets in the Safety Audit, namely ramps and zebra crossings, PULL has prioritised wards for installing infrastructure to promote safe crossings and enable better edge management.

The number of both features has been aggregated at the scale of the city wards. Based on the road lengths of each ward and the average placement of zebra crossings at every 150 metres (as per IRC guidelines), PULL has prioritised wards that do not have enough zebra crossings for implementation.

Figure 15: Transformation of Big Bazaar Street that improves edge management and promotes safe crossings[20]

CASE STUDY: BIG BAZAAR STREET, COIMBATORE

A major junction on Big Bazaar Street in Coimbatore was selected to improve accessibility for pedestrians. Previously, crossing the street was a challenge as there were few signalised intersections and designated walk paths.

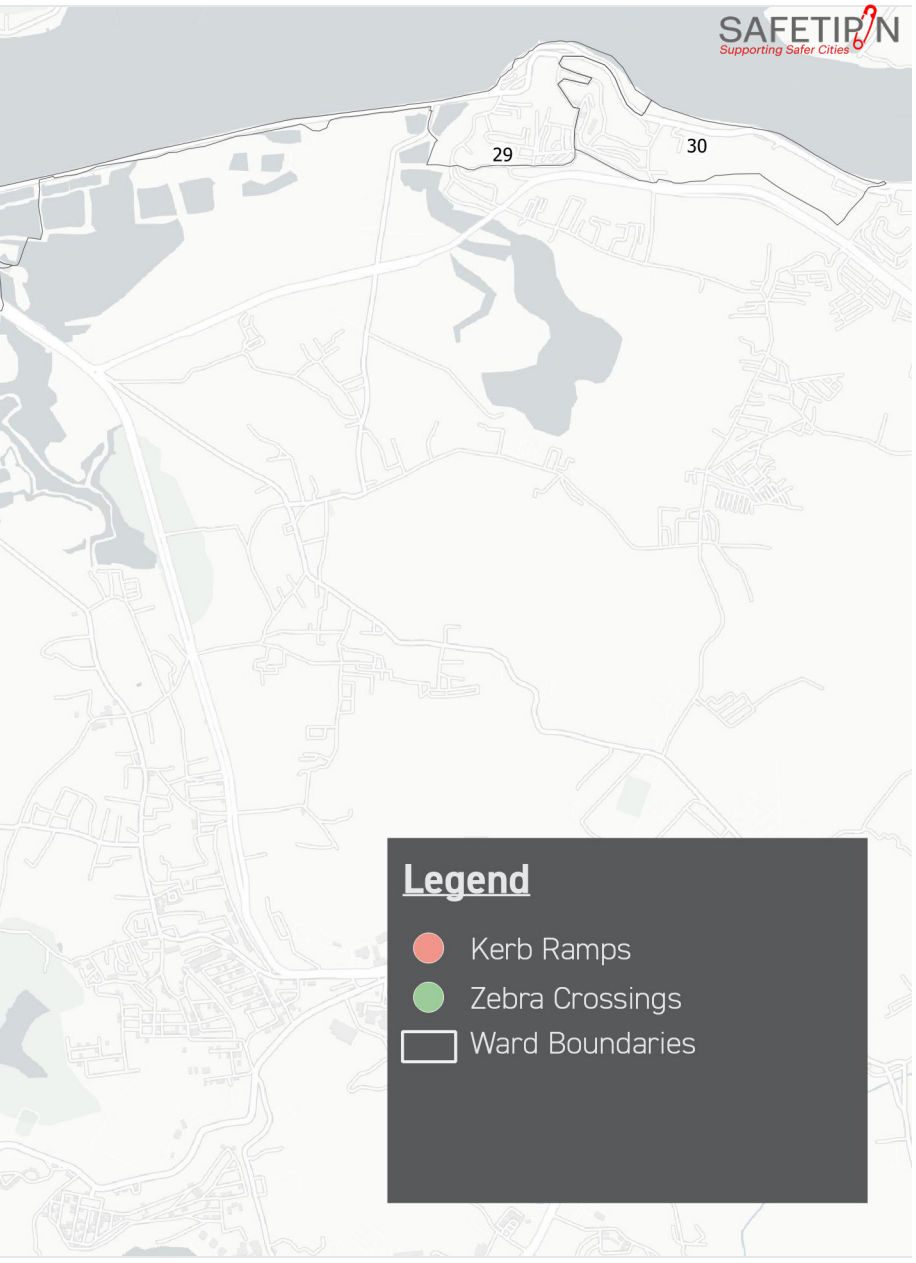
The city's municipal corporation and traffic police worked with GIZ India, GFA Consulting Group, Urban Design Collective, Eventia and a civil society organisation called the Residents Awareness Association of Coimbatore (RACC) to determine the needs of different users of the streets. One area was identified to make crossings safer.

Using paint and proper signage, the collaborative worked together to paint new and colourful zebra crossings to signal to vehicles to wait for pedestrians. They also painted the edge of the walk path to designate new space as pedestrian and vending space, improve edge management and reduce the risk of any accidents for pedestrians exiting the walk path.

3. CREATE SAFE CROSSINGS

ABOVE

Map 3: Accessibility Features in Panaji (based on data provided by Safetipin)



PRIORITY AREAS FOR IMPLEMENTATION

As none of the wards have adequate crossing infrastructure, all wards have been selected as areas of implementation. This can be further prioritised if cross-referenced with information about pedestrian foot fall and vehicular traffic, as areas with more people walking and more vehicle flow should be prioritised for implementation.

Wards: All Wards

3. CREATE SAFE CROSSINGS

SHORT-MEDIUM TERM ACTIONS

This recommendation on safe crossings is based on the features zebra crossings and ramps from the Safety Audit and uses government-approved standards for pedestrian facilities to suggest improvements that could make crossing easier for pedestrians, reduce the risk of accidents and promote safe mobility.

1. New Crossings

Panaji must install safe, designated pedestrian crossings at more frequent intervals to ensure pedestrians have the shortest possible direct route to cross the street. In the short run, clear signage and surface markings can be used to expedite the creation of crossings. However, in the long term, the city must install permanent crossings with traffic-signalised and designated walking times for pedestrians. As per the Indian Roads Congress Guidelines for Pedestrian Facilities, all road crossings and signalised intersections should have a designated pedestrian crossing, most commonly in the form of a zebra crossing, and adhere to the following guidelines[25]:

- Pedestrian crossings should be at minimum 3m wide; Public feedback suggests the installation of speed humps along with crossings to ensure pedestrian safety;
- In residential areas, crossings should be placed every 80-250 metres with attention to the entry points to buildings, transit stops and public facilities;
- In commercial areas, crossings should be placed/designated every 80-150 metres.
- All crossings should have universal accessibility features including embossed texture for easy detection or a dropped kerb;
- Mid-Block Crossings must be provided for people to cross the street safely between building entries or bus stop locations or active land uses on both sides of the street;
- Crossings must be provided at all T-junctions. At roundabouts, crossings should be provided at the perimeter of the circular roadway;
- All roads with four lanes or more should have a median/refuge island for pedestrians at signalised crossings or mid-block zebra crossings. The median should be at least 1.2m but ideally 2m wide, have tactile paving, ideally be ground level and have safety bollards to prevent vehicular encroachment;
- Bollards, when used to prevent vehicular encroachment, should still enable people with other needs to walk. They should be at a minimum of 1m height and identifiable

by contrasting colours and reflecting tapes. There should be a gap of 900m between two bollards[21];

- Where required, IRC regulations support the installation of underpasses more than foot over bridges. However given that 1) Panaji is prone to flooding and underpasses require high maintenance in the rains and 2) people who perceive risk of assault[22] (often women) avoid them, foot over bridges might be a better solution;
- Foot over bridges are lengthier walks and must therefore only be located on very high-traffic roads like highways. They must include features for persons with disabilities including ramps/lifts;
- Traffic signals should have a maximum waiting period of 45 seconds as per service level benchmarks.

2. New Ramps

Ramps are extremely important in providing smooth transitions between the walk path and the vehicular passageway. The absence of such infrastructure disproportionately impacts persons with disabilities, the elderly and people with reduced mobility when crossing the streets. As per the Safety Audit conducted by Safetipin, there were only four ramps located in the entire city, three of which were located on Raj Bhavan Road in Wards 1 and 2A. The fourth was located next to Azad Maidan in Ward 11. Panaji must install kerb ramps at all egresses from the walk path to the road based on the following standards[23]:

- Standard kerb ramps should be cut back into the walk path at a gradient not greater than 1:12;
- Flared edges at kerb ramps provide transitions in all directions and are recommended;
- The minimum width of kerb ramps is 1200mm;
- Tactile warning strips should be installed on the kerb edge so persons with low visibility do not accidentally walk onto the road;
- Ramps should ensure there are no gaps between the gutter and the street surface. This will require periodic maintenance;
- It is better to provide two kerb cuts per street corner than one ramp in the centre of the corner to support pedestrians with vision impairment;
- Ramps should be integrated at any point where there is a level change.

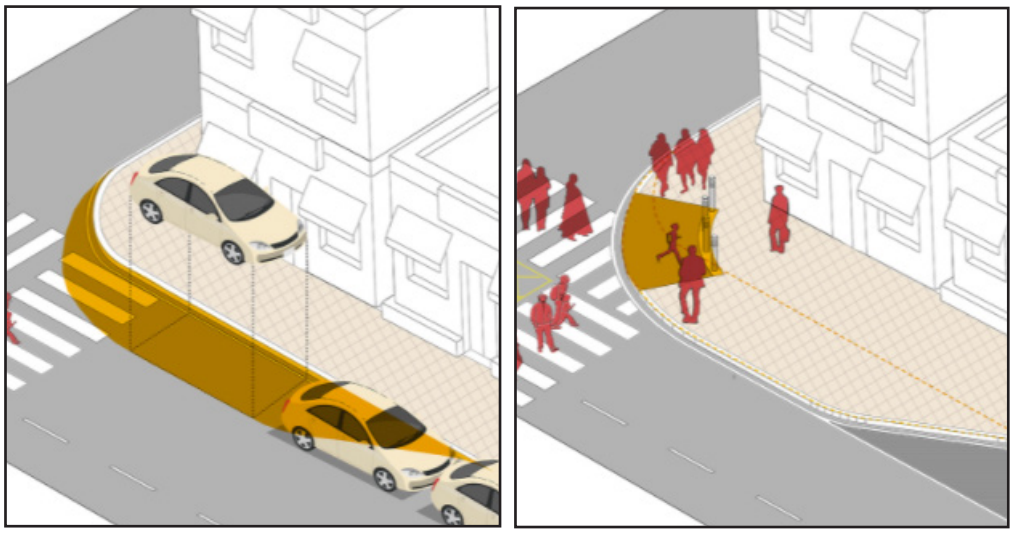
3. CREATE SAFE CROSSINGS

3. Edge Management

Given that many of Panaji's footpaths are bordered by parking spaces or drains and there are very few ramps/ kerb ramps (as per Audit), it is important that egress off the walk paths is safe. This can be done by proper kerb installation with flared edges and adhering to the following edge management standards[24]:

- Streets are designed with smaller turning radii. This increases pedestrian safety by shortening crossing distance, increasing pedestrian visibility for drivers, decreasing vehicle turning speed and making drivers look out for pedestrians while taking the turn;
- Ensuring that on-street parking is not encroaching upon crossing walk paths or the street corner edges;
- Drains along kerbs should be kept covered to prevent accidents when people are walking on or off walk paths;
- Kerb extensions should include universally acceptable bulb-outs.

Guide:



PRINCIPLES OF WALKABILITY

STAKEHOLDERS

PWD, CCP, IPSCDL Traffic Police, Urban Transportation Department - Govt. of Goa.

REFERENCES

IRC 103: 2012
Tactical Urbanism Guidebook by MoHUA and GIZ
Street Design Guidelines by ITDP
Ross Centre for Cities at the World Resources Institute

LEFT

Figure 16: Creating a bulb-out to create safer crossings by adding ramps and slowing cars. (Source: WRI[26])

Figure 17: Junction without any zebra crossings near MG Road (Source: Safetipin)

4. REMOVE OBSTRUCTIONS

CONTEXT

To create a safe and inclusive walkable environment in Panaji, it is essential to pay attention to the design of pedestrian infrastructure. Poor quality pedestrian routes may lead to a decline in pedestrian mobility[27] and obstructions like dumped construction debris, trash and repair work on walk paths are barriers to easily accessing the city by foot. This recommendation aims to ensure streets are easily traversable and facilitate better interactions by proposing design and systematic solutions to minimise the number of obstructions on Panaji's streets.

METHODOLOGY

By analysing the location, number and type of obstructions that were counted on Panaji's streets as per the Safety Audit, PULL has prioritised wards and streets for removal or redesign to accommodate permanent obstructions. Non-permanent obstructions were not included in this prioritisation method as the Audit was conducted earlier this year and these may have already been removed.

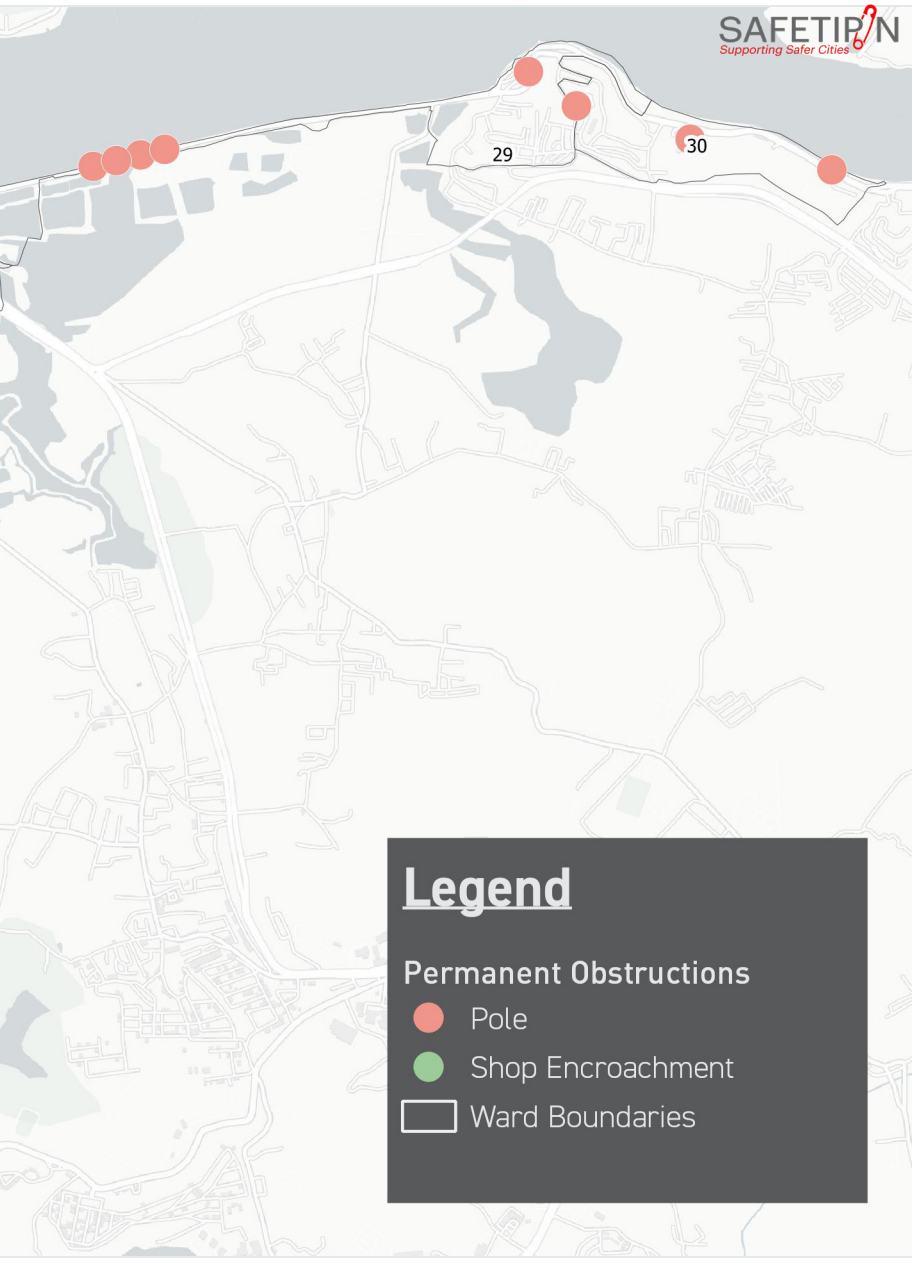
The number and type of obstructions have been aggregated at the scale of the ward and wards which have permanent obstructions have been prioritised.

Figure 18: Empty boxes obstructing the walk path near Panjim Market (Source: Safetipin)

4. REMOVE OBSTRUCTIONS

ABOVE

Map 4: Permanent Obstructions in Panaji (based on data provided by Safetipin)



PRIORITY AREAS FOR IMPLEMENTATION

As the number and type of obstructions varies per ward, the priority areas for implementation vary as per the type of obstruction. In total, 17 wards have been selected as priority wards with permanent obstructions: 16 wards have streets with poles as obstructions on pedestrian walk paths and 3 wards have streets with shop encroachments. Wards 11 and 27 are listed as the highest priority wards as they have both forms of encroachment.

6 wards were found to have non-permanent obstructions: Wards 11, 12B and 29 reported garbage as an obstruction and Wards 9, 13, 14 and 29 reported construction debris or repair work as an obstruction. It is likely that these obstructions may have already been cleared .

Wards:
11, 27, 9, 29, 10B, 25, 28, 30, 2A, 6, 2B, 3, 12A, 13, 23, 26, 27, 12B

4. REMOVE OBSTRUCTIONS

SHORT TERM ACTIONS

Many obstructions on city streets are impermanent: debris from construction or repair work or garbage accumulation that were found as part of the Safety Audit in February may have already been removed; however, while they were there, they disrupted pedestrian flow. On the other hand, permanent obstructions like electrical boxes, light poles and even shops cannot easily be moved. Therefore, urban design solutions must address these to make it easier for people to walk:

1. **Permanent Obstructions**

   Provisions must be made for walking around permanent obstructions like poles with signs, light poles and telecom/electrical boxes. In areas with fixed obstructions like poles, telecom boxes and garbage bins, the following design elements should be incorporated on walk paths[28]:

   - All obstructions should be contained within the furniture or frontage zones, though furniture zones are preferable. In order to minimise collection any obstructions attached to poles should not face the line of pedestrian flow and should be in line with the walk path edges;
   - Tactile warnings should extend over a width of at least 600m outside the obstructions;
   - Poles should have contrasting durable colour marking strips, 300m in length, placed with the centre line at a height of 1.5m to ensure visibility;
   - New pole installations should be outside the path of travel and in one continuous line with a 10mm raised platform.

   Permanent encroachments like shops and vending areas should also be moved from the pedestrian zone to the frontage zone. The eviction of shop keepers should be avoided in all circumstances. Design guidelines for the frontage zone include[29]:

   - Any overhanging signs should be mounted at a minimum of 2.2m height;
   - Where possible, on-street parking can be removed and that space be designated as a multi-use, vending zone for daily or weekly markets.

2. **Reducing Garbage and Litter (Non-Permanent)**

   For non-permanent obstructions like garbage and litter, the city should engage in frequent cleaning of streets and garbage bins should be installed throughout the city:

- Community audits with business owners and residents of neighbourhoods can help identify trash hotspots. The city should then engage in more frequent cleaning in these areas;
- Trash cans and garbage bins should be installed in the furniture zone and not in the pedestrian zone.

3. Managing Construction Debris and Repair Work (Non-Permanent)

To address obstructions due to construction and repair work, the following measures should be undertaken[30]:

- Any form of service cover (eg., manhole) should not be located on walk paths. They should be non-slip and the opening should not be more than 10mm wide. Drainage should be sited away from pedestrian flow and perpendicular to pedestrian flow so as to not trap any wheels (luggage, wheelchair);
- All areas with road work should be clearly marked using bright contrasting colours, signage and tactile pavement;
- If repair work or construction debris blocks the pedestrian zone, an alternative walk path should be provided. Temporary walk paths and crossing points should be created, potentially on the road, to prioritise pedestrian safety[31]. These temporary walk paths must be marked with barricades (preferable water filled), have warning lights placed at the ends of barriers to inform vehicles and pedestrians, and have handrails fixed at a height of 1 to 1.2 metres;
- Any scaffolding should be marked with white bands at eye level with 2.1 metre head room.

PRINCIPLES OF WALKABILITY

STAKEHOLDERS

IPSCDL, CCP, PWD, Urban Transport Department - Govt. of Goa

REFERENCES

IRC 103: 2012
IRC SP: 55 - 2014

5. ACTIVATE DEAD SPACES

CONTEXT

Urban spaces can feel deserted during low traffic times, when commercial establishments are closed or when nobody else is around. Areas with predominantly commercial or predominantly residential buildings, have fewer 'eyes' on the street at certain hours of the day, resulting in spaces that make women walking on the streets feel isolated. Furthermore, factors in the built environment, like high boundary walls, make walk paths feel deserted and discourage pedestrian activity. To activate these 'dead' spaces in the city, this recommendation suggests different ways the city can encourage and boost activity during quieter hours (like nights and weekends).

METHODOLOGY

Based on the Safety Audit, PULL analysed the parameters people and visibility as well as the locations of boundary walls in the city. The buildings land use layer that was provided by IPSCDL was also used and these were all combined to determine which areas the city should prioritise for implementation.

First, people was selected as one parameter as it showcases the number of people at a given location, which is important in creating active spaces. Second, visibility was selected to show the number of 'eyes' on the street which contributes towards a sense of safety and security and reduces the perception of isolation. These parameters were aggregated and averaged at the ward and based on these results, priority wards with both low people and visibility scores were selected. Safetipin also shared the location of boundary walls in the city, which are blank walls that further contribute to a sense of isolation.

Then, the number of mixed-use and single-use buildings were added in as a factor to determine which areas would be more active during the day and night time, as mixed-use buildings have more activity at varied hours of the day and on weekends. Ward 25 had the highest percentage of mixed-use buildings in the ward at 23%, while Wards 9 and 10A had zero buildings that were mixed-use. The wards that had low visibility and low people scores, with few mixed-use buildings and high numbers of boundary walls have been selected as priority wards for implementation. All interventions should be implemented in consultation with local residents and stakeholders. If, for example, one ward has low scores in all factors, but is predominantly residential, they may prefer art and lighting installations to a night market.

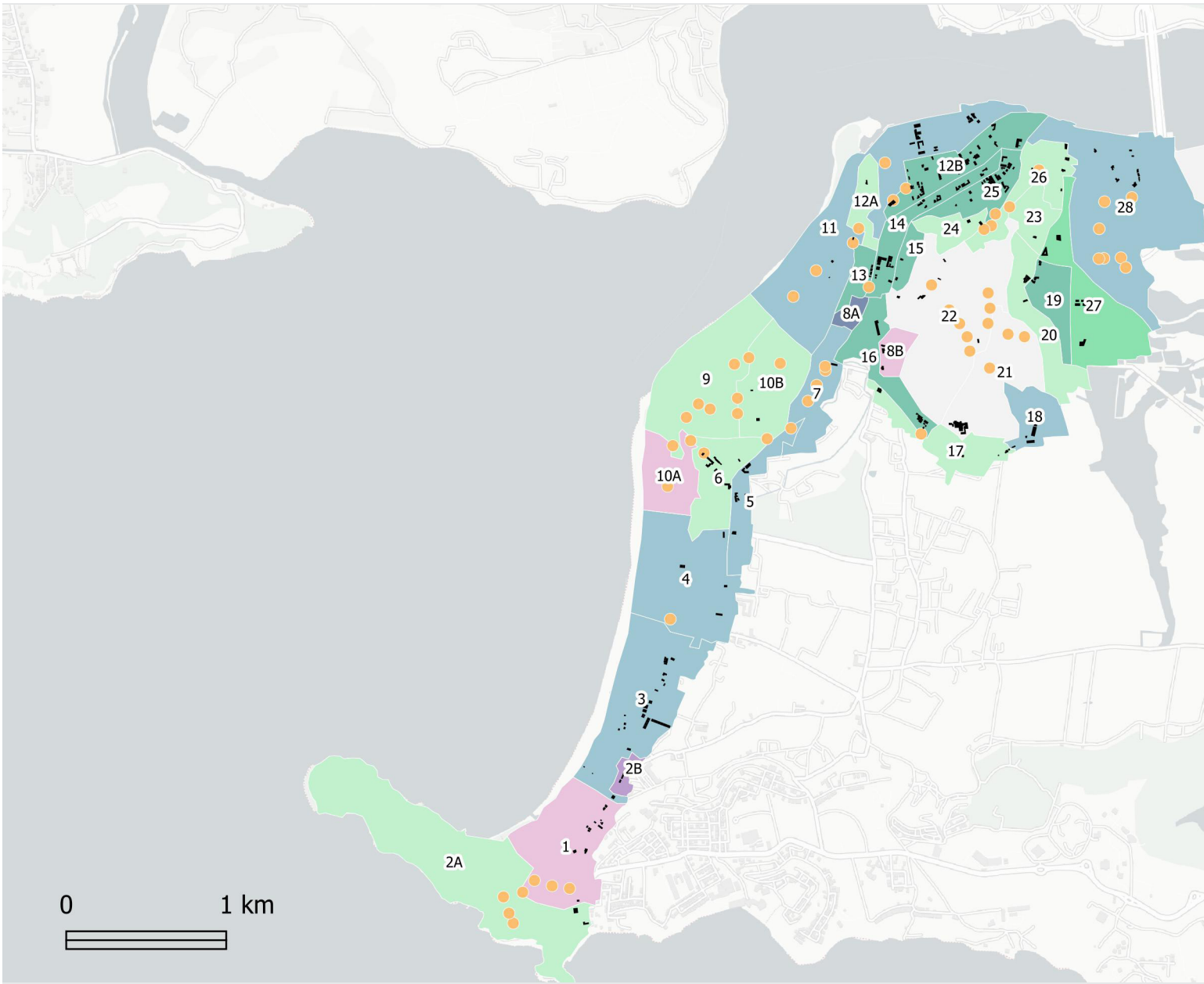
Figure 19: Malon Urbano is a community-led movement to reclaim streets and engage with friends[32]

CASE STUDY: MALO URBANO, CHILE

The Malon Urbano movement connects communities on local streets in cities in Chile. The concept entails closing off a local street from vehicular traffic and organising a community potluck to engage with friends and neighbours through informal conversations and playing games.

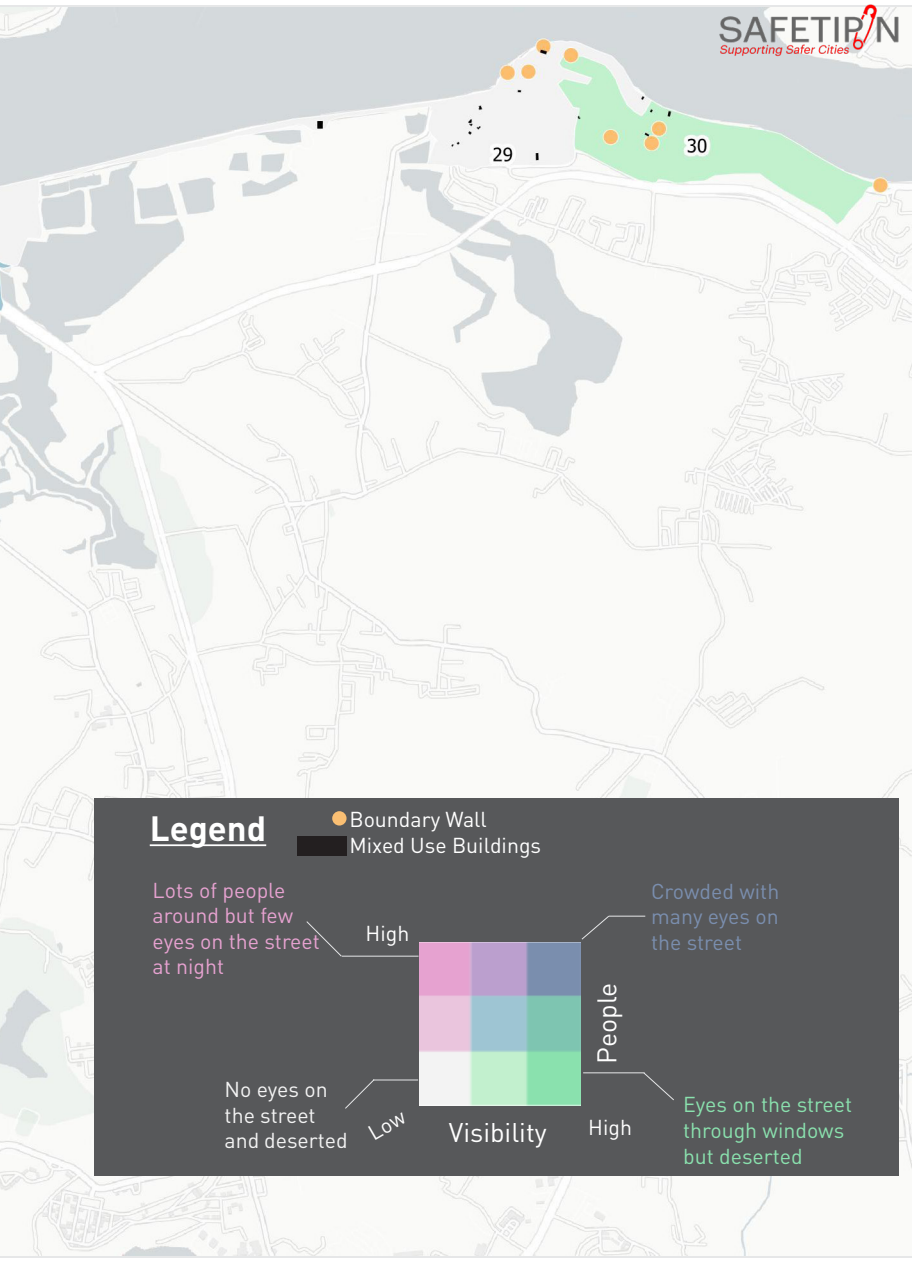
Working with local officials, community members need to get permission to close a street to protect people from vehicles. They then reach out to neighbours and friends to spread the word and get a group of volunteers together to decorate the street with paint, games, music, tables and chairs. Volunteers allocate tasks to members of the community and request potential attendees to bring food as the event is centred around a potluck. On the day of the event, city streets are transformed into vibrant, active, public spaces.
This serves as a low-cost way for the city to activate spaces during low-traffic times, enable community connections and create sociable streets. As opposed to creating pop-up markets and using community art, these types of events can be employed on local streets and not only in high-footfall areas.

5. ACTIVATE DEAD SPACES



ABOVE

Map 5: Inactive Spaces by Ward in Panaji (based on data provided by Safetipin and IPSCDL)



PRIORITY AREAS FOR IMPLEMENTATION

17 wards have low scores for both the people and visibility parameters, of which 12 have boundary walls within their limits and 14 have less than 5% of mixed-use buildings. The wards in which these are common have been selected as priority areas for implementation. Wards with no boundary walls but less than 1% of mixed-use buildings have also been selected. In total there are 12 priority wards.

Wards:
22, 29, 21, 2A, 10A, 9, 6, 26, 10B, 30, 12A, 23

5. ACTIVATE DEAD SPACES

SHORT- MEDIUM TERM ACTIONS

The city of Panaji can take actions to make quiet or inactivated spaces livelier and make streets along these corridors more welcoming for women. Building on the state's legacy of night markets for the tourism economy, Panaji can use markets and pop-ups as a tool to activate spaces. These can be set up at nights or on weekends and encourage small and women-owned businesses. The city can also use aesthetic interventions like public art, murals and creative lighting to make streets more welcoming and facilitate community development.

1. **Markets**

   Developing markets that can activate public spaces are a community effort[33]. Local ward councillors, civil society organisations, local residents, businesses and vendors must come together to form a committee to ensure markets are well run-in and in accordance with local rules. During the COVID pandemic, where outdoor spaces are considered safer, this could be an important economic development tool.

   • First, the committee needs to determine a location and frequency for the markets. This will depend on vendors, location availability, and any funds that are required to run the market. Visibility and accessibility are important for market success and markets that sell food or local products are unlikely to attract customers who have to travel for more than 15 minutes to the location. Commercial areas that can be pedestrianised at low traffic times (weekends or nights) could serve as good locations, as could areas that already have public spaces like parks or plazas that are underutilised;

   • Markets should be designed as a public space. While funding may be a constraint, markets with activities (maybe music or performances) and seating attract more people and have more success. Locations near transit stops are also accessible and attract more people;

   • Markets should be promoted through social media, active programming and good signage;

   • Markets should be inclusive spaces that cater to varied socio-economic demographics, including women. This means ensuring that vendors represent diverse groups and programming and activities are safe and friendly for people of all ages. Markets can also be utilised to showcase local organisations and facilitate a sense of community by building partnerships;

- While some areas are better suited for markets, smaller, residential streets that are quieter and may not attract enough people to set up a market can be activated through programming like individual vending spaces.

2. Street Art

Residential streets and areas with many boundary walls can be activated through the use of creative public art and lighting. Street art can be used to make streets more vibrant, representing histories and showcasing local stories. Organisations like St+art have already worked in the city of Panaji to create art to showcase local culture. Creative lighting can be used to create unique visual environments and encourage people to spend time in areas.

PRINCIPLES OF WALKABILITY

STAKEHOLDERS

IPSCDL, CCP, Goa Tourism Department

REFERENCES

Project For Public Spaces
St+art Foundation

LEFT

Figure 20: Mural in Panaji (Source: St+art Foundation)

6. PROVIDE EQUITABLE WASH INFRASTRUCTURE

CONTEXT

The provision of public toilets is a vital aspect of urban development. Lack of clean and accessible public toilets poses significant challenges to health and hygiene, tourism, economic development inclusivity and mobility[34]. Women, in particular, face greater consequences as they have different sanitation needs and fewer as well as more expensive toilet facilities to use. This recommendation aims to guide the city of Panaji towards improving access to public toilets so as to make streets more welcoming and inclusive.

METHODOLOGY

As the Safety Audit did not include any parameters or features for public toilets, this recommendation aims to support the city in conducting the required assessments to improve public toilet service provision. This policy recommendation is based on a literature review of standard guidelines for public toilets in India.

Figure 21: Pink Ladies Toilet Inaugurated in Delhi with gender specific provisions like breastfeeding rooms and sanitary napkin vending machines[35]

6. PROVIDE EQUITABLE WASH INFRASTRUCTURE

SHORT- MEDIUM TERM ACTIONS

The city of Panaji must ensure adequate public and community toilets which adhere to the ideal standards[36] for toilet provision and are accessible to different groups of people. In areas where there are insufficient or inadequate public toilets, new/upgraded toilet facilities must be installed. Comprehensive planning should be carried out in order to prevent risk of failures and mismanagement.

1. **Demand and Supply Side Assessment**
   An integrated assessment that includes data from both demand side and supply side is crucial to deduce the extent of toilet service provision, and must be conducted. A demand side assessment involves a spatial analysis of areas to determine new locations based on factors like footfall, gender-based differentiation, and willingness to pay for toilet usage. On the other hand, a supply side assessment identifies gaps in existing infrastructure and requirements for new infrastructure like the location of existing toilets, measurements and drawings of these toilets, the technical and administrative capacity of ULB, and facilities provided.

2. **Toilet Design**
   Key design considerations such as accessibility, infrastructure, internal design, etc. which consider diverse sanitation needs, should be kept in mind while installing toilets
   - Toilets should be prioritised within reasonable walking distance of high footfall generating areas and avoided at areas perceived as less safe (liquor shops, areas with no street lighting etc.);
   - Accessibility concerns should be addressed with design elements such as ramps, low plinth height etc.;
   - The toilet facility must have demarcated entrances for men and women to assure safety and privacy. Mandatory stand-alone facilities should also be provided for transgender people, especially in high footfall locations (bus stands, markets);
   - All toilets must have basic infrastructure like electricity, sufficient water supply, plumbing, drainage etc. Gender-specific infrastructure such as sanitary bins, child

care provisions etc., should also be included in the toilet design;

- The number of WC/ urinal units is dependent on the location of the public toilet. For instance, if the location of the toilet is at a terminal railway station or bus stand, the requirement for WC units for women would be ‘5 for first 1000 persons and 1 for every subsequent 2000 persons of part thereof;
- The general norm for toilet seats in community toilets is one seat for 35 men and one seat for 25 women as per the Swachh Bharat Mission-Urban guidelines by GoI.

3. Operations and Maintenance

Efficient operation and maintenance activities must be put in place to ensure cleanliness and safety. These include regular cleaning schedules, appropriate staffing, monitoring and complaint redressal mechanisms etc.

4. Signage

Signage for toilets should be clear, standard and unobstructed. These signs should be displayed in busy areas or junctions. Moreover, display boards must be placed within the toilet facility indicating the phone numbers of maintenance agencies, helpline numbers, operation timings and user charges.

5. Cost

Ideally, access to the toilet facilities should be free of cost. In case there are user charges, they should be standard for men and women.

PRINCIPLES OF WALKABILITY

STAKEHOLDERS

IPSCDL, CCP, PWD, Department of Water Resources

REFERENCES

Advisory on Public and Community Toilets by CPHEEO

7. INSTALL COMMUNITY SEATING

CONTEXT

It is important to create people-friendly urban streets through street planning and design, which includes adding street furniture like community seating. This recommendation addresses the concerns of elderly women and workers who stated that they need places to rest while walking, and also aims to promote sociable streets that help build a sense of community and place.

METHODOLOGY

As the Safety Audit did not include any parameters or features for street furniture or infrastructure similar to community seating, this recommendation aims to support the city in scoping for areas to install community seating. This policy recommendation is based on a literature review of guidelines for pedestrian facilities.

SHORT TERM ACTIONS

The provision of street furniture varies, depending on the volume of pedestrian traffic. The city of Panaji must ensure elderly people, especially women, street vendors and workers have necessary infrastructure to walk comfortably and safely. While street furniture would benefit all residents, the city can prioritise installing seating on streets with high commercial activity and footfall.

1. **Site Selection**
   Pedestrian surveys need to be conducted to identify areas with high pedestrian footfall. These surveys should include both footfall counts and discussions with people, especially women, working and walking on the street to understand their needs in terms of types of seating. Potentially, these would include tourist attractions and large employment hubs (eg., Tonca STP, Patto Centre, Panjim Market). These areas should be prioritised while determining where to install street furniture.

2. **Seating Design**
   The following guidelines should be adhered to while installing seating infrastructure[37]:
   - Seating should not obstruct the walk path for pedestrians. Therefore, furniture

should be placed in the frontage or furniture zone of the walk path, preferably under the shade;

- Seating should be parallel to the kerb and face towards the buildings if placed in the furniture zone or face towards the street if placed in the frontage zone;
- On streets with heavy pedestrian flow, seating should be provided every 50 metres;
- Seats should be painted in contrasting colours to ensure they are visible to people with poor vision;
- The base of a seat should be 450mm tall and the total height of the entire seat, including the height of the backrest, should be 700mm. Seating should also be designed to ensure there is space for wheelchair users to rest;
- Tables can also be considered and added where space allows for them. The tables should have knee clearance of 700mm and be 600mm deep.

PRINCIPLES OF WALKABILITY

STAKEHOLDERS

IPSCDL, CCP, PWD, Urban Transport Department - Govt. of Goa

REFERENCES

IRC 103: 2012
Footpath Design by Institute for Transportation and Development Policy (ITDP)

LEFT

Figure 22: Seating option in Hørsholm, Denmark
(Source: Ramboll)

Figure 23: A residential street in Fountainhaas


GOVERNMENT APPROVED
GOLD WIN
DREAMLAND ONLINE
GOLD WIN
DREAMLAND ONLINE
TIMOTEO MANSION
GA07 L 3887

CONCLUSION

Figure 24: Women in Joggers Park

Concluding Remarks

Panaji's streets are have challenges that disproportionately impact female pedestrians, given that women are more likely to walk and use public transportation and that they are more likely to be care givers and informal workers. To ensure that Panaji's development caters to the needs of all genders, the city must be reimagined into a more inclusive place.

The seven recommendations presented in this Implementation Strategy would directly improve access for women who walk in the city. These recommendations will help transform the city by creating traversable, safe and sociable streets. By implementing these interventions, Panaji would be localising international goals like Sustainable Development Goals 5 (Gender Equality) and 11 (Sustainable Cities and Communities). The city will also be contributing to national directives, like the National Mission for Sustainable Habitat, by promoting non-motorised transportation.

Overall, this Strategy presents a compelling vision for an inclusive future for the city of Panaji.

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*All maps in the Implementation Strategy have been produced using Carto Lite basemaps

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